BID DOCUMENTS COVER SHEET

CONTRACT DOCUMENTS

FOR

L-636 Physical Education & Student Union Complex

AT

LOS MEDANOS COLLEGE

2700 East Leland Road,
Pittsburg, California 94565

CONTRA COSTA COMMUNITY COLLEGE DISTRICT

Consist of the following:

DSA File #7-C1
DSA Application # 01-115488

Volume 01 - Divisions 02-14

Architect: LPA
60 South Market Street,
Suite 150 San Jose, CA 95113

May 8, 2017
VOLUME 00 – DIVISIONS 00-01

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**DRAWINGS PREPARED BY LPA INC.**

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- SECTION 024113 -

SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Removing above- and below-grade site improvements.
   2. Clearing and grubbing.

B. Selective Demolition Schedule:
   1. Demolition and removal of existing site elements from Project site as indicated on Contract Drawings. Include, in general, the following:
      a. Concrete and asphaltic paving, curbs and gutters, parking lots, and driveway approaches indicated on the Contract Drawings.
      b. Utilities, retaining walls, concrete and asphaltic paving, curbs, trash area, fencing, signs, parking stall bumpers, benches, and trees designated for removal.
      c. Turf and plants.
      d. Utility structures including, but not limited to, pull boxes, irrigation piping, and storm drain piping.
      e. Pole light foundations.
      f. Electrical conduits, wiring, and light poles not shown to be reused or protected in place.
      g. Selected trees as indicated on the Contract Drawings.
   2. Remove and Reinstall:
      a. Concrete pavers and benches. Store for installation in new location as directed by Owner.
      b. Selected chain link fencing and gates. Relocate as indicated on the Contract Drawings.
   3. Remove and Salvage: Salvage existing items as indicated on the Contract Drawings. Remove from Project site and store as directed by Owner.
   4. Remove Swimming Pool, Pool Accessories, and Pit Structures: Demolish entirely, including related utilities.
      a. When entire pool walls and bottom are removed, backfill material shall be placed in individual one-foot lifts and compacted to an 85 percent relative compaction in accordance with Division 31.
      b. Surface grades shall be sloped away from property line directly to right-of-way or through an approved facility to comply with City Grading Code.
   5. Remove and Relocate: Transformer, pole lights, fire hydrants, portable buildings and related items.
   6. Protect items indicated to remain in place during construction, including those items which must remain in use until completion of the...
main buildings. Coordinate these items in accordance with Paragraph 1.04-F.1.b.

C. Referenced Sections:
1. Section 013113 - Project Coordination.
2. Section 013300 - Submittal Procedures.
3. Section 015639 - Temporary Tree and Plant Protection.
4. Section 015719 - Temporary Environmental Control.
5. Section 015723 - Temporary Storm Water Pollution Control.
7. Section 017839 - Project Record Documents.
8. Section 018113 - Sustainable Design Requirements.
9. Section 024116 - Structure Demolition.
10. Section 310000 - Site Clearing.

1.02 REFERENCED STANDARDS
A. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 33 - Safeguards During Construction.
         1) Section 3302 - Construction Safeguards.
         2) Section 3303 - Demolition.

B. California Code of Regulations (CCR):
      a. Chapter 14 - Fire Safety During Construction and Demolition.

C. California Code of Regulations (CCR):

D. Geotechnical Investigation Report, as described in Division 31.

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS
A. Clean: To remove dirt clods, rocks, tree branches, and other items which may fall from hauling equipment or which may be “tracked” from the site.

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

C. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the Owner’s property.

D. Remove and Reinstall or Relocate: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in the same locations or in locations indicated.

E. Remove and Salvage: Items indicated to be removed and salvaged remain the Owner’s property. Remove, clean, and pack or crate items to protect
against damage. Identify contents of containers with weather-resistant labels and deliver to Owner's designated secure onsite storage area.

F. **Plant-Protection Zone**: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

G. **Subsoil**: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

H. **Surface Soil**: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

I. **Topsoil**: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

J. **Tree-Protection Zone**: Area surrounding individual trees or groups of trees to be protected during construction, and as follows:

1. As indicated on Drawings.

K. **Vegetation**: Trees, shrubs, groundcovers, grass, and other plants.

### 1.04 Administrative Requirements

A. Coordination: Refer to Section 015639 for protection of trees and landscaping to remain.

B. Coordination: Refer to Section 015723 for erosion control and compliance with the **Storm Water Pollution Prevention Plan**.

C. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

D. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

E. Coordination: Refer to Section 024116 for demolition of buildings.

F. Predemolition Conference: Prior to the work of this Section, visit the site in company with the Owner and Architect and verify the extent and location of demolition required.

1. Identify limits of site demolition.
   a. Mark items and interface surfaces, as required, to identify items to be removed and items to be left in place intact.
   b. **Closely coordinate with the District, the College, and the Architect regarding existing items (including transformers and portable buildings) that will be relocated, removed, or demolished after the two main buildings have been completed.**

2. Identify salvage items and agree upon disposition.
3. Inspect and discuss condition of construction to be selectively demolished.
4. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
5. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.05 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections, for information only, unless otherwise indicated.
   1. Proposed dust-control measures.
   2. Proposed noise-control measures.
B. Schedule of selective demolition activities indicating the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity.
   2. Interruption of utility services.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Detailed sequence of selective demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
C. Inventory of items to be removed by Owner.
D. Inventory of items to be removed and salvaged by Contractor.
E. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by selective demolition operations.
F. Record Drawings: Provide at Project closeout according to Section 017839.
   1. Identify and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2.1 and Credit 2.2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.

1.07 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed selective demolition Work similar to that indicated for this Project.
1.08 FIELD CONDITIONS

A. Existing Conditions: Conditions existing at time of inspection for bidding purpose will be maintained by Owner as much as practical.
   1. Utility Services:
      a. Issue written notices of planned demolition operations to utility companies and pay associated fees.
      b. Conduct demolition work without interrupting utilities to existing on-site facilities. Power interruption is not acceptable.
      c. Maintain existing power poles and lines serving existing occupied buildings.
      d. Cooperate with District for use of existing generator.
      e. Maintain heated water to existing Science Building and Gymnasium.

B. Ambient Conditions:
   1. Dust Control:
      a. Comply with dust regulations imposed by local air pollution agencies having jurisdiction. Prevent dust from becoming a nuisance to the public and to the surrounding area.
      b. Use of water shall not result in hazardous or objectionable conditions, such as flooding or contaminated runoff.
   2. Erosion Control:
      a. Comply with erosion and sediment regulations imposed by local agencies having jurisdiction.

C. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Prohibited Practices Within Protection Zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Storage or sale of removed items or materials on-site.
   3. Parking vehicles or equipment.
   4. Foot traffic.
   5. Erection of sheds or structures.
   6. Impoundment of water.
   7. Excavation or other digging unless otherwise indicated.
   8. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
   9. Do not direct vehicle or equipment exhaust towards protection zones.
   10. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

F. Other Conditions:
   1. Do not commence site clearing operations until temporary erosion- and sedimentation-control measures are in place.
2. Do not commence site clearing operations until plant-protection measures are in place.
3. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.
4. Coordinate timing of new work during off hours with District.

1.09 WARRANTY

A. Existing Special Warranty: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Comply with the requirements of CBC Chapter 33, as applicable.
B. Comply with governing EPA notification regulations before starting selective site demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
C. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
   2. Reuse and recycle 100 percent of trees, stumps, rocks, and associated vegetation and soils resulting primarily from land clearing in accordance with CALGreen 5.408.3.
   3. Submit documentation to enforcing agency which demonstrates compliance with CALGreen 5.408.1.4. Sample compliance forms are available in the CALGreen Guide.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For information on LEED goal requirements, refer to Section 017419. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 2 Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris in accordance with City and County requirements.
   2. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.

2.03 REPAIR MATERIALS

A. Use repair materials identical to existing materials.
   1. Where identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   2. Use materials whose installed performance equals or surpasses that of existing materials.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped.
B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
D. When unanticipated mechanical, electrical, or structural elements that conflict with the intended function or design are encountered, investigate and measure the nature and extent of the conflict. Promptly submit a written report to the Architect.
E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 PREPARATION

A. Traffic:
   1. Provide and maintain adequate warning signs, lanterns, and lighting for vehicular and personnel protection during the period of work as required by applicable safety ordinances.
   2. During site clearing operations, ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
   3. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from the Owner and applicable municipal authorities for areas outside the Owner’s property line.
   4. Provide traffic control devices, flagmen and other controls to ensure safe passage of traffic and pedestrians.
   5. Provide required barriers and devices for SWPP.
      a. Confirm Owner NOI has been submitted prior to starting work.

B. Protection:
   1. Erect barriers, fences, guard rails, enclosures, and shoring to protect personnel, structures, the public, and site improvements and utilities to be maintained intact.
   2. Use appropriate means necessary to prevent dust from becoming a nuisance to the public and to the surrounding area. Use water in a manner which will not result in hazardous or objectionable conditions, such as flooding or contaminated runoff.
      a. Comply with governing storm water runoff protection regulations.
   3. Comply with regulations of the air quality management district in force at the time of the performance of this work.
   4. Protect from damage trees and plants designated on Contract Drawings to remain.
   5. Protect and maintain benchmarks and survey control points from disturbance during construction.
6. Protect existing site improvements to remain from damage during construction.
   a. Restore damaged improvements to their original condition, as acceptable to Owner.

7. Locate and clearly identify trees, shrubs, and other vegetation to remain.
   a. Wrap a 1-inch blue vinyl tie tape flag around each tree trunk at 54 inches above the ground.

C. Tree Protection: Prior to site clearing work meet with Architect on site to stake out and properly mark trees designated for preservation, as required. Refer to Section 015639.

D. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Do not interrupt existing utilities serving occupied or operating facilities, except when authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.
   a. Provide not less than 72 hours’ notice to Owner if shutdown of service is required during changeover.
2. Arrange to shut off indicated utilities with utility companies.
3. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the site before proceeding with selective demolition.

E. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

F. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

G. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around selective demolition area.
1. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

3.03 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Refer to Section 015719.
3.04 TREE AND PLANT PROTECTION

A. Tree Protection: Protect trees and plants remaining on-site according to requirements in Section 015639 - Temporary Tree and Plant Protection.

3.05 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
   1. Arrange with utility companies and authorities having jurisdiction to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Architect and Owner not less than fourteen days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's written permission.

C. Excavate for and remove underground utilities indicated to be removed.

3.06 SITE DEMOLITION METHODS

A. Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete Work within limitations of governing regulations and as follows:
   1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. To minimize disturbance of adjacent surfaces, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
   2. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
   3. Maintain adequate ventilation when using cutting torches.
   4. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   5. Dispose of demolished items and materials promptly. On-site storage or sale of removed items is prohibited.
   6. Return elements of construction and surfaces to remain to condition existing before start of selective demolition operations.

B. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain, using power-driven masonry saw or hand tools; do not use power-driven impact tools.

C. Break up and remove concrete slabs on grade, unless otherwise shown to remain.

D. Manholes to be abandoned shall have the bottom slab broken up and the filled with sand.
E. Abandoned sewers shall be filled with sand, slurry, or grout, and capped at both ends.

F. Salvageable Improvements: Carefully remove items indicated to be salvaged, and store on Owner's premises, unless otherwise indicated.

G. Trees: Protect trees and landscaping to remain in accordance with Section 015639.

3.07 CLEARING AND GRUBBING

A. Remove debris, foreign objects, concrete slabs and foundations, asphalt paving, portland concrete paving and curbs, site lighting and bases, site walls, area drains and catch basins, unwanted existing underground utilities and drain lines, conduits, trees, and other site construction as indicated and as required to provide a site suitable for constructing the proposed Project.

B. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain.
   2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade, unless otherwise indicated.
   3. Use only hand methods for grubbing within protection zones.
   4. Chip removed tree branches and dispose of off-site.

C. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.08 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil in a manner to prevent intermingling with underlying subsoil or other waste materials. Strip topsoil to depth indicated below:
   1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water and other erosion control measures.
   1. Limit height of topsoil stockpiles to 72 inches.
   2. Do not stockpile topsoil within plant protection zones.
   3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
3.09 POLLUTION CONTROLS

A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
   1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as flooding, and pollution.

B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.

C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before start of selective demolition.

3.10 ADJUSTING

A. Promptly patch and repair holes and damaged surfaces caused to adjacent construction by selective demolition operations.

3.11 CLEANING

A. Hose down and clean adjacent buildings and site on completion of selective demolition operation.

B. Debris and Rubbish: Haul debris and materials promptly from site as they accumulate. Maintain site and adjacent public construction free of debris and sweep clean daily. Exercise all reasonable means to abate noise.
   1. Transport debris and materials to a legal off site disposal area in a manner that will prevent spillage on streets or adjacent areas. Clean up spillage from streets and adjacent areas.
   2. Do not store or burn refuse on site.

C. Off-Site Work: Clean haul roads on and off site to a distance of 3 miles from the site, and as required by governing agencies having jurisdiction.

D. Waste Management: Recycle or salvage waste materials in accordance with Section 017419.

E. Change filters on air-handling equipment on Owner's adjacent buildings at completion of selective demolition operations.

3.12 MATERIALS OWNERSHIP

A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

B. Historical items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner, which may be encountered during selective demolition, remain the Owner's property. Notify Owner immediately upon discovery. Do not disturb until direction is
given. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.
1. Cooperate with Owner’s archaeologist or historical adviser.

3.13 WASTE MANAGEMENT

A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
B. Burning: Do not burn demolished materials.
C. Disposal: Transport demolished materials off Owner’s property and legally dispose of them.
D. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner’s property.
E. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Demolition of existing structures, related utilities, underground tanks and piping, related paving, appurtenances as indicated on Contract Drawings, and removal from site. Include:

1. Removal of entire buildings and portions of existing structures incidental to the alteration of such structures.
2. Protection of existing construction indicated to remain.
3. Legal off-site disposal of the products of demolition and associated debris.
4. Identification and disposition of salvage.
5. Extermination of vermin and rodents encountered during demolition operations.

B. Refer to Contract Drawings for specific items to removed, such as:

1. Existing masonry structures.
2. Foundations, slabs, and concrete block walls.
3. Underground plumbing and gas lines to shut-off valves.
4. Electrical services to service poles.
5. Underground tanks.
6. Specific portions of existing buildings, such as:
   a. Slabs, walls, windows, roof overhangs, roof screens, stairs, handrails, landings, sprinklers, and abandoned utility lines.
   b. Veneer, piers, storefront framing, plumbing fixtures, HVAC equipment, and light fixtures.
   c. Concealed plumbing and gas lines to shut-off valves.
   d. Concealed electrical and telephone systems to be abandoned.
   e. HVAC equipment and ductwork.
7. Asphalt paving, concrete paving, curbs, gutters, and sidewalks.

C. Refer to Section 024113 for site demolition operations.

D. Refer to Section 310000 for site clearing operations, including:

1. Asphalt paving, concrete paving, curbs, gutters, and sidewalks.

E. Work Excluded:

1. Materials and finishes containing asbestos have been identified by the Owner. Removal of asbestos-containing materials shall be performed by a licensed asbestos abatement/removal contractor retained by the Owner.
2. Notify the Owner prior to initiating demolition operations. Demolition shall not commence until asbestos-containing material has been removed.

F. Related Sections:
   1. Section 013300 - Submittal Procedures.
   2. Section 013523 - Owner Safety Requirements.
   3. Section 015639 - Temporary Tree and Plant Protection.
   4. Section 024113 - Selective Site Demolition.
   5. Section 017419 - Construction Waste Management and Disposal.
   6. Section 024113 - Selective Site Demolition.
   7. Section 310000 - Site Clearing.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 33 - Safeguards During Construction.
         1) Section 3302 - Construction Safeguards.
         2) Section 3303 - Demolition.

B. California Code of Regulations (CCR):
      a. Chapter 14 - Fire Safety During Construction and Demolition.
         1) Section 2703 - General Requirements.
            a) 2703.8 - Construction Requirements.
            (1) 2703.8.7 - Hazardous Materials Storage Cabinets.
         c. Chapter 34A - Existing Structures.
            1) Section 3403A - Additions, Alterations or Repairs.
            2) § 3417 - 3423.

C. California Code of Regulations (CCR):

D. National Fire Protection Association (NFPA):
   1. 241 - Safeguarding Building Construction and Demolition Operations.

E. National Institute of Building Standards (NIIBS):

F. Occupational Safety and Health Standards for the Construction Industry (29 CFR Part 1926) as promulgated by OSHA (Subpart 7 - Demolition).

G. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Coordinate with site clearing work of Section 311000.
C. Predemolition Conference: Prior to the work of this Section, visit the site in company with the Owner and Architect and verify the extent and location of demolition required.
1. Verify that structures where demolition work is located are unoccupied and discontinued in use.
2. Identify limits of demolition.
   a. Mark items and interface surfaces, as required, to identify items to be removed and items to be left in place intact.
3. Identify salvage items and agree upon disposition.
4. Inspect and discuss condition of construction to be selectively demolished.
5. Review structural load limitations of existing structure.
6. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
7. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.04 SUBMITTALS

A. Procedures: In accordance with the provisions of Section 013300, submit proposed salvage, demolition, and removal procedures to the Architect for review before work is started. Procedures shall include:
1. List of items to be removed.
   a. In consultation with the Owner, identify items to be removed to salvage, and receive Owner's directions relative to the disposition of such salvage.
2. Plan of coordination with other work in progress.
3. Disconnection schedule of utility services.
4. Detailed description of methods and equipment to be used for each operation.
5. Sequence of operations.
6. Safety procedures regarding demolition work in general, and demolition work adjacent to occupied facilities and public ways in particular. Conform to the requirements of Section 013523.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
1. Letter Template for MR Credit 2.1 and Credit 2.2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.
1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Personnel Qualifications: Regularly engaged and specializing, for the preceding 5 years, in the demolition of structures.
      a. Adequately equipped to provide expeditious removal from the site refuse resulting from demolition operations.

1.07 FIELD CONDITIONS

A. Existing Conditions existing at time of inspection for bidding purpose will be maintained by Owner as much as practical.

B. Ambient Conditions:
   1. Dust Control:
      a. Comply with dust regulations imposed by local air pollution agencies having jurisdiction. Prevent dust from becoming a nuisance to the public and to the surrounding area.
      b. Use of water shall not result in hazardous or objectionable conditions, such as flooding or contaminated runoff.

C. Asbestos: It is not expected that asbestos will be encountered in the Work. If any materials suspected of containing asbestos are encountered, do not disturb the materials. Immediately notify the Architect and the Owner.
   1. Asbestos will be removed by Owner before start of Work.

D. Storage or sale of removed items or materials on-site will not be permitted.

1.08 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.
   1. If possible, retain original installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage original Installer or fabricator, engage another recognized experienced and specialized firm.
      a. Processed concrete finishes.
      b. Ornamental metal.
      c. Roofing.
      d. Firestopping.
      e. Window wall system.
      f. Fluid-applied flooring.
      g. HVAC enclosures, cabinets, or covers.
PART 2 - PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations of governmental agencies having jurisdiction.
   1. Obtain and pay for permits required in connection with the work of this Section. Pay fees made necessary by the removal and dumping of debris.
   2. Conform to the requirements of NFPA 241 with regard to early planning, scheduling, and implementation of fire prevention measures, fire protection systems, rapid communications, and on-site security.
   3. Comply with State of California regulations governing removal of underground tanks and abandoning existing wells.
   4. Removal of storage tanks or related piping shall be in accordance with removal procedures of local fire department.

B. Waste Management: Comply with CA LGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.
   2. Submit documentation to enforcing agency which demonstrates compliance with CALGreen 5.408.1.4. Sample compliance forms are available in the CALGreen Guide.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2.1 and MR Credit 2.2 Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
      a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.

2.03 MATERIALS

A. Materials required for temporary building enclosures shall comply with the specifications of the applicable sections of this Project Manual.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Prior to the work of this Section, visit the site in company with the Owner and Architect and verify the extent and location of demolition required.
   1. Verify that structures to be demolished are unoccupied and discontinued in use.
   2. Identify limits of demolition.
      a. Mark items and interface surfaces as required to identify items to be removed and items to be left in place intact.
   3. Identify salvage and agree upon disposition.

3.02 PREPARATION

A. Protection:
   1. Erect barriers, fences, guard rails, enclosures, chutes, and shoring to protect personnel, structures, and utilities remaining intact.
      a. Install temporary chain link construction fence immediately upon removal of perimeter walls or fences to prevent public access to area of demolition activities.
   2. Protect existing buildings and other existing work that is to remain in place, that is to be reused, or that is to remain the property of the Owner, by temporary covers, shoring, bracing, or supports.
   3. Protect designated trees and plants from damage.
   4. Warning Signs: Provide warning signs, lanterns, and lighting for vehicular and personnel protection. Maintain warning signs during the period of work as required by applicable safety ordinances.
   5. Prevent dust from becoming a nuisance to occupants, neighbors, the public, and to other work being performed on or near the site.
   6. Where required, shut off, cap, and otherwise protect existing utility lines in accordance with the requirements of the public agencies or utilities having jurisdiction.
   7. Install erosion control measures, as required and as indicated on the Contract Drawings.

B. Traffic Access:
   1. Ensure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities.
   2. Do not close or obstruct streets, sidewalks, alleys, or passageways without permission from authorities having jurisdiction.
   3. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways.
   4. Maintain access to adjacent existing buildings to ensure uninterrupted operations during demolition work.

C. Exterminate vermin and rodents in structures to be demolished.
3.03 DEMOLITION METHODS

A. General:
1. Use only methods and equipment approved by governmental agencies having jurisdiction. Demolish and completely remove from job site the existing construction designated to be removed.
2. Demolish concrete or masonry walls in small sections. Continuously wet down debris to prevent creation of dust or fire hazard. Haul debris or materials promptly from site as they accumulate. Keep site reasonably free of debris and sweep clean daily. Exercise reasonable means to abate undue noise.
3. The use of explosives is prohibited.

B. Structures:
1. Begin demolition at top of structure and proceed to lowest level.
   a. Demolish structure above each floor level before damaging supporting members on lower levels.
2. Lower structural framing members to ground by hoist or crane.
3. Completely remove footings, foundations, and other underground construction.

C. Utilities and Related Equipment: Remove existing utilities as indicated and as uncovered by work, and terminate in a manner conforming to Code. Salvage meters and related equipment without additional cost to the Owner. Dispose of abandoned utility lines encountered that are not shown on the Contract Drawings.
1. Metal Pipe: Remove from site.
2. Vitrified Clay Pipe: Break in place.

3.04 FILLING AND GRADING

A. General: During demolition of paved areas, asphalt and concrete fragments exceeding 6 inches in maximum dimension shall be removed from the site. Upon approval by the Geotechnical Engineer referenced in Section 312220, smaller fragments may be deposited throughout deep fill areas in a manner that avoids nesting or interference with future subsurface utilities.

B. Fill voids with soil. Place fill in lifts not exceeding 12 inches thick and compact to a density not less than adjacent soil in accordance with Section 312220.
1. After demolition, if earthwork operations will not be proceeding immediately, grade surface to adjacent contours and slope to drain.

3.05 SALVAGE

A. Demolition: Materials or equipment to be demolished shall become the property of the Contractor except for items specified to remain the property of the Owner. Such items, if any, shall be carefully removed to avoid damage and be delivered by the Contractor to location stipulated.
1. Materials and equipment shall not be placed on view to prospective purchasers or sold on site.
B. Replacement: In the event of destruction of items to be reused or not scheduled to be demolished, promptly replace such items to original condition at no additional cost to the Owner.

3.06 CLEANING

A. Debris and Rubbish: Remove and transport debris and rubbish to an off-site disposal area via a haul route approved by the governing agency in a manner that will prevent spillage on streets or adjacent areas. Clean up spillage from streets and adjacent areas.

B. Do not store or burn materials on site.

C. Remove all tools, equipment, and appliances used for demolition from the site upon completion of the work.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Formwork for cast-in-place concrete.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 017123 - Field Engineering.
   5. Section 018113 - Sustainable Design Requirements.
   6. Section 032000 - Concrete Reinforcing.
   7. Section 033100 - Structural Concrete: Underslab vapor barrier.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 19A - Concrete.
   2. Title 24, Part 11 - California Green Building Standards Code

B. American Concrete Institute (ACI):
   1. ACI Manual of Concrete Practice, latest edition:
      a. 117 - Standard Tolerances for Concrete Construction and Materials.
      b. 301 - Specifications for Structural Concrete for Buildings.
      c. 303R - Guide to Cast-in-Place Architectural Concrete Practice.
      d. 318 - Building Code Requirements for Reinforced Concrete.
      e. 347 - Recommended Practice for Concrete Formwork.
         1) SP-4 - Formwork for Concrete (Synopsis only).

C. U.S. Department of Commerce Product Standard (PS):
   1. PS 1-95 - Softwood Plywood.

D. West Coast Lumber Inspection Bureau (WCLIB):
   1. Grading and Dressing Rules No. 17.

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):
1.03 ADMINISTRATIVE REQUIREMENTS
A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.
B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
C. Coordination: Prior to erecting formwork, coordinate locations of plumbing, mechanical, and electrical blockouts in concrete.

1.04 SUBMITTALS
A. Product Data: In accordance with provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications on proprietary products.
B. Shop Drawings: In accordance with the provisions of Section 013300, submit Shop Drawings indicating the proposed location of construction joints, and the locations and configurations of wall openings, penetrations, and other features that will affect the appearance of exposed concrete. Include design data where applicable.
1. Indicate location of form ties on exposed concrete walls. Include:
   a. Openings, offsets, reveals, and depressions.
   b. Locations and placement of steel embeds.
2. Submit large scale plans and wall elevations.
3. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.

1.05 SUSTAINABLE DESIGN SUBMITTALS
A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Management Plan for Credit MR Prerequisite 1: Identify area dedicated to the collection and storage of materials for recycling.
   2. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.

1.06 QUALITY ASSURANCE
A. Form Designer's Qualifications: When required by the governing authorities having jurisdiction, employ a civil or structural engineer currently licensed to practice in the State of California to design formwork. Neither the Architect nor the Architect's consultants have been retained to design the required formwork, nor to determine the means and methods by which such operations are accomplished.
2.01 MANUFACTURERS

A. Acceptable Manufacturers of Accessory Products:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with the applicable recommended practice contained in ACI 301, ACI 318, ACI 347, and the formwork design data contained in ACI SP-4.
   1. Comply with applicable recommendations of ACI 303R for exterior exposed concrete.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.

2.04 DESIGN CRITERIA

A. Design Requirements: Design formwork in accordance with calculations based on recommendations of ACI 347 and ACI SP-4.
   1. Limit deflections to 1/8-inch between supports after placement of concrete.
2. Erect formwork in a manner that will ensure the safety of construction personnel and the public, and that will protect private and public property from damage.

### 2.05 MATERIALS

A. Form Materials: Conform to the following, as applicable:
   1. Lumber: Douglas Fir species; structural grade; with grade stamp clearly visible.
      a. Studs and Walers: Construction or Standard Grade Douglas fir lumber conforming to WCLIB No. 17, and not less than 2 x 4 nominal size.
      a. Species: Douglas Fir species; solid one side grade; sound, undamaged sheets with straight edges.
   3. Metal: Minimum 16 gage steel sheet, well matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
      a. Pan Type: Steel, Glass fiber type; removable of size and profile required.
   4. Void Forms:
      a. Foam Form Filler: DOW Styrofoam high density extruded poly-styrene in bulk sizes having a compressive strength load rating of 40 psi minimum.

B. Form Coatings: Provide form-release coating material which conforms to the regulations of the local air quality management district in force at the time of application. When recommended by the manufacturer of forming materials, use a chemically active release coating.
   1. Normal Use: Design is based on the use of one of the following products:
      a. Crete-Lease 880-VOC, manufactured by Cresset Chemical Company.
      b. Debond Form Coating with emulsifier, manufactured by L&M Construction Chemicals.
      c. Nox-Crete Form Coating (chemically active), manufactured by Nox-Crete, Inc.

### 2.06 COMPONENTS

A. Forms:
   1. At Exterior Exposed Concrete: Exterior grade, high density overlay (HDO) or medium density (MDO) B-B plywood.
      a. Design is based on the use of Multipour manufactured by Simpson Timber Co.
      b. When forming below-grade surfaces indicated to receive waterproofing materials, use forming materials specified for exposed concrete.
2. At Interior Exposed Concrete: Exterior Grade, concrete form B-B plywood, mill-oiled and edge-sealed.
   a. Conform to appearance requirements of exterior exposed concrete formwork.
3. At Unexposed Concrete:
   a. Form concrete surfaces that will be unexposed in the finished structure with materials recommended in ACI 347.
   b. When forms are constructed from lumber, provide lumber that is dressed on at least two edges and one side for tight fit.
      1) Grade and Species: Construction Grade or Standard Grade Douglas fir lumber conforming to WCLIB No. 17.
4. Metal Deck Forms At Supported Floors and Mechanical Equipment Pad: Design is based on the use of standard corrugated steel deck units, or as specified by proprietary designation on the Contract Structural Drawings.
   a. Provide steel decking with section properties, negative and positive, proportioned in conformance with the applicable requirements of the AISI Specifications referenced.
   b. For support of subsequently installed ceiling construction, provide deck units with integrally formed slots capable of receiving hanger wire, and supporting a load per slot of not less than 100 pounds.
   c. Composite type deck shall be provided with integral embossments capable of developing mechanical shear bond between decking and concrete.
5. At Supported Floors and Mechanical Equipment Pad: Metal deck as specified in Section 053100.
6. At Slab Joints: As indicated on the Contract Drawings.
7. Studs and Walers: Construction or Standard Grade Douglas fir lumber conforming to WCLIB No. 17, and not less than 2 x 4 nominal size.

2.07 FORMWORK ACCESSORIES

A. Accessory Materials:
   1. Joint Filler:
      b. Backer Rod: Closed cell polyethylene.
   2. Slip Dowel Sleeves: Speed Dowel 1/2-inch diameter by 12-inch long two-piece polypropylene sleeve to allow movement of reinforcing dowels at expansion joints, manufactured by Greenstreak, Inc., or equal.
   3. Form Ties, General: Factory-fabricated, removable, or snap-off galvanized metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
      a. Furnish ties that will leave no corrodi...
c. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

4. Form Ties at Exposed Surfaces: Factory-fabricated, stainless steel or fiberglass color keyed to wall color snap ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   a. Furnish ties with tapered plastic tie cone spreaders that, when removed, will leave holes 3/4 inch in diameter on concrete surface.
   b. Furnish internally disconnecting ties that will leave no metal closer than 1-1/2 inches after exposing aggregate, from the architectural concrete retaining wall surface.
   c. Furnish glass-fiber-reinforced plastic ties, not less than 1/2-inch in diameter, of color selected by Architect from manufacturer's full range.
   d. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

5. Fillets for Chamfered Corners: Wood or rigid plastic strips; maximum possible lengths.

6. Dovetail Anchor Slots: Minimum 14 gage thick galvanized steel; foam non-filled; release tape sealed slots; bent tab anchors; to concrete formwork; manufactured by Burke.

7. Flashing Reglets: 16 gage thick galvanized steel; Rigid PVC; longest possible lengths; release tape sealed slits; with alignment splines for joints; to concrete formwork.

8. Nails, Spikes, Lag Bolts, Through Bolts, and Anchorage: Sized as required; of strength and character to maintain formwork in place while placing concrete.

B. Waterstops: Provide materials and types suitable to specific purpose, as indicated on the Contract Drawings:

1. Bentonite type equal to Mameco International SuperStop, Miradri Miraclay, Cetco Waterstop-RX, or equal.
   a. Provide factory fabricated bentonite waterstop corners, transitions, and intersections leaving only straight butt joint splices for the field.

2. Rubber: Minimum 1750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, maximum possible lengths, ribbed profile, preformed corner sections, heat welded jointing.

3. PVC type, Style No. 747 as manufactured by Greenstreak Plastic Products Company, Inc., or equal.
   a. Provide factory fabricated PVC waterstop corners, transitions, and intersections leaving only straight butt joint splices for the field.
   b. Splice with Teflon covered thermostatically controlled waterstop splicing iron as recommended by manufacturer. Align ribs and bulb ends, as applicable. Welds shall exhibit continuous bead of excess melted material free of pinholes and charred or burnt material.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Verify elevations and provide final excavation adjustments required for footings prior to placing concrete.
   2. Comply with the administrative requirements of Section 017123.

3.02 PREPARATION

A. Safety Precautions: Plan formwork construction procedures in advance to ensure the unqualified safety of personnel engaged in formwork construction and concrete placement.

3.03 FORM CONSTRUCTION

A. General: Construct forms to the sizes, shapes, lines, and dimensions indicated on Contract Drawings, and as required to obtain accurate alignment in finished structure. Provide for openings, offsets, depressions, keyways, recesses, chamfers, formed reveals, blocking, screeds, bulkheads, anchorages, inserts, and other features required. Use forming materials appropriate for the required finishes. Erect formwork in a manner that will ensure the safety of construction personnel and the public, and that will protect private and public property from damage.
   1. Design of formwork for structural stability and sufficiency is the Contractor's responsibility.
   2. Coordinate size and location of openings, depressions, recesses, and chases required for subsequent work.
   3. Avoid the use of stakes within the footing section of slabs on grade.
   4. Except as otherwise indicated on the Contract Drawings, provide 3/4-inch chamfers at exposed external corners.
   5. Construct formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials.
   6. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.
   7. Do not use patched forms for exposed concrete surfaces.
      a. Plywood containing patches, flitches, wafers, cracks, or other imperfections shall not be used.
   8. Reveals shall have sharp, crisp edges.
   9. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.
  10. Align form ties in accordance with accepted Shop Drawings.
   11. Where possible, support forms for low site walls with bracing to avoid the use of form ties and to minimize patching.
   12. Do not mark on concrete side of forms with layout or other marks with materials that will transfer to concrete surface.
B. Construction Joints: Set top of stakes 3/8-inch below slab surface elevation, spaced 12 inches on centers. Finish concrete to the top of the joint and burn in with hand trowel. Reinforcing shall be continuous through joints unless detailed otherwise.

C. Waterstops and Groutable Hose Waterstop System Components: Install in accordance with manufacturer’s recommendations and Contract Drawings.
   1. Bentonite Waterstops:
      a. Place at cold joints and penetrations where indicated on Contract Drawings.
      b. Preparation:
         1) Brush off all dust and debris and apply a coat of primer or spray adhesive to the area where the waterstop is to be placed on the standing structural member.
         2) Using moderate hand pressure press a continuous bead of waterstop firmly into position on the standing structure. Check to be certain that the waterstop has bonded to the primed area.
         3) For proper joining, cut ends with sharp tool at 45-degree angle, and then place ends over one another.
         4) Peel the protective backing from the exposed side of the waterstop. Knead the overlapped ends together to form continuous, uninterrupted gasket.
      c. Bentonite waterstops must not be installed more than 2 days prior to concrete placement. After installation of waterstops, cover the waterstop with a plastic sheet to protect from weather damage.
      d. Bentonite waterstops shall be dry and not activated when concrete is placed. If the waterstops have been water damaged they shall be replaced before the concrete is placed.

D. Earth Forms: If natural soil or compacted fill can be accurately cut and maintained, foundations may be poured against earth without forming when requested by Contractor and accepted by the Geotechnical Engineer.
   1. Concrete coverage shall be as indicated in Section 032000.
   2. Foundation concrete may be placed directly into neat excavations, provided the foundation trench walls are stable as determined by the Geotechnical Engineer. In such cases, the minimum formwork indicated on the Contract Drawings is mandatory to ensure clean excavations immediately prior to and during the placing of concrete.
   3. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

E. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is to be placed.
   1. Fill joints in forms to produce smooth surfaces, intersections, and arrises.
   2. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.
F. Form Coatings:
   1. Coat contact surfaces of wood forms with form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come in contact with reinforcement or surfaces which will be bonded to fresh concrete.
   2. Coat steel forms with a non-staining rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork will not be acceptable.
   3. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

G. Wetting: Dampen bottom of footing excavations immediately prior to pouring. Remove saturated soil or mud from excavation. Dampen subgrade at slabs placed directly on earth 24 hours in advance of placing. Reroll as required. Wet wood forms sufficiently to tighten cracks, reduce suction, and maintain workability of concrete mix.

H. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Structural Engineer before proceeding.

3.04 TOLERANCES

A. Tolerances: Conform to tolerance requirements of ACI 117 for general building cast-in-place concrete construction. On exposed edges and faces, construction tolerances shall be one-half of those in ACI 117.

B. Finish Lines: Formwork shall be positioned to maintain hardened concrete finish lines within the following tolerances:
   1. Variation from plumb:
      a. In 10 feet: 1/4-inch.
      b. In any story or 20 feet: 3/8-inch.
      c. In 40 feet or more: 3/4-inch.
   2. Variation from level or from grades indicated:
      a. In 10 feet: 1/8-inch.
      b. In any bay or 20 feet maximum: 1/2-inch.
      c. In 40 feet or more: 3/4-inch.
   3. Cross-Sectional Dimensions:
      a. Minus: 1/4-inch.
      b. Plus: 1/2-inch.

C. Variation of the linear building lines from established position in plan and related position of columns, walls and partitions.
   1. In any bay or 20 feet maximum: 1/2-inch.
   2. In 40 feet or more: 3/4-inch.

D. Slabs: Variation from level including bottoms, unless specified otherwise. Refer to Section 033100.
   1. In 10 feet: 1/4-inch.
E. Openings:
1. Variations in the sizes of sleeves, slab openings and wall openings shall not exceed 1/4-inch.
2. Variations in the locations of sleeves, slab openings and wall openings shall not exceed 1/2-inch.

3.05 EQUIPMENT PADS, PITS, TRENCHES, AND CURBS

A. Provide forming for concrete light pole bases, catch basins, and pads for mechanical and electrical equipment in accordance with Shop Drawings furnished for the equipment.
1. Coordinate size and location of equipment with mechanical, plumbing, and electrical requirements.
2. Provide coved base and bullnosed corners for equipment bases poured on concrete slabs.
3. Form blockouts required by other trades for passage of piping and conduit. Blockout for floor drains to permit installation in proper alignment.
4. Tool edges.

3.06 INSTALLATION OF EMBEDDED ITEMS

A. General:
1. Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions submitted by suppliers of the items to be attached.
2. Secure conduit, outlet boxes, sleeves, bolts, and other items in place before inspection and commencement of concrete placement.
   a. Do not place conduit or piping in concrete slabs on grade or on metal deck.
   b. Place conduit and piping below concrete slabs on grade.
      1) Thicken slab 3 inches around conduit placed under slabs on grade.
3. Piping: Do not embed piping in structural concrete unless acceptable to Structural Engineer.
4. Install accessories in accordance with manufacturer’s instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.
5. Coordinate setting of items related to plumbing, mechanical, and electrical systems embedded in concrete.
6. Coordinate location of openings for pipes and inserts required for mechanical and electrical systems. Reinforce required openings as indicated in Structural Contract Drawings.

B. Sleeves: Standard or heavier weight galvanized steel pipe sleeves may pass through footings when specifically indicated in the Structural Contract Drawings. Refer to Contract Structural Drawings for special reinforcing around sleeves and for method of locating sleeves. Size sleeves to pass largest coupling on pipe.

C. Rough Hardware and Miscellaneous Metal: Set inserts, sleeves, bolts, anchors, angles, and other items to be embedded in concrete. Set embedded bolts and sleeves for fans, meters, pumps, and other equip-
3.07 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Division 01.

B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

3.08 REMOVAL OF FORMS

A. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after curving at not less than 50 degrees F for 72 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements may not be removed until concrete has attained 28-day minimum design compressive strength, but in no case less than 21 days for standard reinforced concrete and 7 days for post-tensioned concrete. Determine potential compressive strength of inplace concrete by testing representative field-cured concrete specimens of concrete in question.

C. Form facing material may be removed 7 days after placement only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

D. Exercise particular care in removing forms from exposed concrete surfaces so that surfaces are not marred or gouged, and that corners are true, sharp, and unbroken.

E. In the event that accelerated form removal is desired, submit methods to Architect for review and acceptance.

F. Reshore members as required in Article 3.10 - Reshoring.

3.09 REUSE OF FORMS

A. Do not reuse wood formwork without Architect's approval.
B. If formwork is permitted for reuse, clean and repair surfaces of forms to be reused in the work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable.
   1. Reused formwork shall comply with appearance requirements of new formwork materials.
   2. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

C. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets.

3.10 RESHORING

A. Conform to the recommendations of ACI 347 regarding shoring and reshoring of multi-story buildings.

B. Plan reshoring operations in advance in consultation with the Architect’s structural engineering consultant. While reshoring operations are under way, no construction loads shall be permitted on the new construction.
   1. Fifty percent of shoring shall be left in place for at least 28 days after pour, or until concrete design strength has been attained.
   2. All shores shall be left in place until uppermost slab is 28 days old.
   3. Fifty percent of shoring may be stripped at 21 days after pour if the following conditions are met:
      a. No concrete slab above the slab being stripped is less than 7 days old.
      b. Stripping is done one-half bay at a time.
      c. Reshoring is done within 3 hours after shore removal. After reshoring is completed, the second one-half of the bay can be stripped and reshored.
   4. Reshoring can be done using 50 percent of the original shores placed in checkerboard fashion.
   5. Reshore at 8 feet on centers each way.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.11 CLEANING

A. Waste Management:
   1. Recycle or salvage waste plywood and metal materials in accordance with CALGreen Section 5.408.1.
   2. Recycle or salvage waste plywood and metal materials in accordance with Section 017419.

END OF SECTION
- SECTION 032000 -

CONCRETE REINFORCING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Reinforcing steel for concrete and masonry work.

B. Referenced Sections:
   1. Section 012100 - Allowances.
   2. Section 013300 - Submittal Procedures.
   3. Section 014100 - Quality Requirements: Special inspections.
   5. Section 018113 - Sustainable Design Requirements.
   6. Section 031000 - Concrete Forming and Accessories.
   7. Section 033100 - Structural Concrete.
   8. Section 042200 - Concrete Unit Masonry.

C. Allowances: This Section may be affected by allowances described in Section 012100.

1.02 PRICE AND PAYMENT PROCEDURES

A. Extra Stock Material Allowance: Provide coordination, details, and installation of an additional 2 tons of the total reinforcing quantity for the project in addition to the quantities shown on drawings. This additional steel shall be installed during construction, in sizes and locations as directed.

1. Provide unit price for purpose of adjusting contract price to reflect quantity of extra material actually used.

1.03 REFERENCES

A. ASTM International (ASTM):
   2. A 615-15a - Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
B. California Code of Regulations (CCR):  
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:  
      a. Chapter 17A - Structural Tests and Inspections.  
      b. Chapter 19A - Concrete.  
C. American Concrete Institute (ACI), latest adopted edition:  
   1. 117 - Standard Tolerances for Concrete Construction and Materials.  
   2. 315 - Details and Detailing of Concrete Reinforcement.  
   3. 318 - Building Code Requirements for Reinforced Concrete.  
D. American Welding Society (AWS), latest adopted edition:  
   1. A2.4 - Symbols for Welding and Nondestructive Testing, Including Brazing.  
   3. A5.5 - Specification for Low-alloy Steel Covered Arc-welding Electrodes.  
   5. D1.4 - Structural Welding Code - Reinforcing Steel.  
E. Concrete Reinforcing Steel Institute (CRSI):  
F. United States Green Building Council (USGBC):  
   1. Leadership in Energy and Environmental Design (LEED):  

1.04 ADMINISTRATIVE REQUIREMENTS  
A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.  
B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.  
C. Coordination: Coordinate Work specified in this Section with other Sections which require placement of embedded products and provision of openings and recesses. If formwork is placed after reinforcing, resulting in insufficient concrete cover over reinforcing, request instructions from Architect (Structural Engineer) before proceeding.  

1.05 SUBMITTALS  
A. Product Data: In accordance with the provisions of Section 013300, submit manufacturer's descriptive literature and specifications for proprietary materials.  
B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings, including bending diagrams for reinforcing steel.  
   1. Prepare Shop Drawings in accordance with the applicable requirements of ACI 315 Part B and the CRSI Manual referenced.  
      a. Include reinforcing plans for horizontal work and large scale elevations of vertical walls.  
   2. Indicate welds in accordance with AWS A2.4.
3. Indicate type of corrosion resistant reinforcing proposed and locations, if applicable.

C. Quality Control Submittals:
1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
   a. Where reinforcing is subject to welding, submit carbon equivalent determination reports in accordance with requirements of Article 2.06 - Source Quality Control.
   b. Test data is required when material tracking is not available or where unidentified steel is used.
2. Certificates: Submit copies of steel producer's certificates of mill analysis, tensile, and bend tests for reinforcing steel. Transmit copy to installer for welded splices.

1.06 SUSTAINABLE DESIGN SUBMITTALS
A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 QUALITY ASSURANCE
A. Qualifications:
1. Fabricator's Qualifications: When required, show evidence of approval by governmental agencies having jurisdiction.
2. Welder's Qualifications: Employ welders currently qualified in accordance with AWS D1.4.
B. Qualification of Welds, Welding Operators, and Welders: Comply with applicable Building Code standard. Perform welding procedure qualification, except for prequalified procedures, as required by AWS D1.4, prior to executing any welding of reinforcing steel.
1. Only AWS Certified Welding Inspectors shall be used for tests and qualifications associated with welding of reinforcing steel.
2. Only AWS qualified welders or welding operators shall perform welding of reinforcing steel.
C. Welding of reinforcing shall be in conformance with AWS and CBC. Do not weld reinforcing without approval of the structural engineer.

D. Install reinforcing in accordance with ACI 318, CRSI, and CBC.

### 1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver reinforcing materials bundled, and with identifying labels or tags affixed and legible. The Architect reserves the right to observe deliveries, to review bills of lading, and to reject the following:
   1. Reinforcing not accompanied by required mill certificates.
   2. Reinforcing exhibiting rusting or other contamination which might prohibit or inhibit bonding of concrete.

B. Grade 60 reinforcing steel shall be clearly marked to differentiate from Grade 40, if concurrently occurring on site.

C. Storage: Store materials off ground and under cover.
   1. Store welding electrodes in accordance with AWS standards.

D. Marking and Shipping: Bundle reinforcing, tag with identification, and transport and store so as not to damage any material. Use metal tags indicating size, length and other marking shown on placement drawings. Maintain tags after bundles are broken.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Covert Operations, Long Beach, CA (562)986-4212.
   2. Greenstreak, Inc., St. Louis, MO (800)225-9400, [www.greenstreak.com](http://www.greenstreak.com)
   3. Hilti Inc., Tulsa, OK (918)252-6000, (800)879-8000.
   4. Sika Chemical Corporation, Lyndhurst, NJ (201)933-8800.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

#### 2.02 REGULATORY REQUIREMENTS

A. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

#### 2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 MATERIALS

A. Reinforcing: Except as otherwise specified, provide deformed-type reinforcing conforming to ASTM A 615, Grade 60.
   1. When welding is required, provide reinforcing conforming to the requirements of ASTM A 706, Grade 60.
      a. Conform to the additional requirements of AWS D1.4.

   1. Furnish in flat sheets.
   2. Provide mesh in sizes indicated on the Structural Contract Drawings.

C. Welding Rods: Refer to Structural Contract Drawings.

D. Accessory Materials:
      a. Supports at Slab on Grade: Provide devices with load-bearing pads or horizontal runners where base material will not support chair legs, to prevent puncture of vapor retarder.
         1) If wire-bar type devices are not feasible, provide precast concrete cube reinforcing supports of equal or greater strength to specified concrete.
      b. Corrosion Resistance:
         1) Provide plastic coated, plastic-tipped (CRSI Class 1) or stainless steel types at exposed-to-view concrete surfaces.
         2) Provide only stainless steel (CRSI Class 2) at exterior exposed surfaces to be painted.
   2. Tie Wires: Annealed copper-bearing steel, 16 gage minimum, conforming to ASTM A 1064, Grade 60.
   5. Deformed Wire Stirrups: Refer to Structural Contract Drawings.

E. Fasteners: As indicated on the Structural Contract Drawings.
2.05 FABRICATION

A. General: Fabricate reinforcing in accordance with required shapes and dimensions. In case of fabricating errors, do not rebend or straighten reinforcing in a manner that will injure or weaken the material.
1. Do not rebend reinforcing.
2. Do not heat reinforcing to facilitate bending.
3. Do not fabricate reinforcing until Shop Drawings have been reviewed by Structural Engineer.
4. Do not tack weld any reinforcing.
5. Do not weld any reinforcing unless specifically indicated on the Structural Contract Drawings.

B. Do not fabricate reinforcing until reinforcing Shop Drawings have been reviewed for general conformance by the Structural Engineer.
   b. Bending and Forming: Fabricate reinforcing of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcing for bending. Bend reinforcing No. 6 size and larger in the shop only. Reinforcing with unscheduled kinks or bends are subject to rejection. Use only tested and approved reinforcing materials.
   c. Welding: Use only ASTM 706 steel where welding is proposed. Perform welding, only where indicated on Structural Contract Drawings, in accordance with AWS D1.4 using specified low-hydrogen electrodes. Preheat 6" each side of joint. Protect joints from drafts during the cooling process; accelerated cooling is prohibited. Do not tack weld reinforcing. Clean metal surfaces to be welded of all loose scale and foreign material. Clean welds each time electrode is changed and chip burned edges before placing welds. When wire brushed, the completed welds must exhibit uniform section, smooth welded metal, feather edges without undercuts or overlays, freedom from porosity and clinkers, and good fusion and penetration into the base metal. Cut out welds or parts of welds found defective with chisel and replace with proper welding. Prequalification of welds shall be in accordance with Code. No welds shall be made at bends in reinforcing.
   d. Fusion welding is not permitted unless approved by Engineer of Record and DSA.

C. Unacceptable Materials: Reinforcing with any of the following defects will not be permitted in the work:
1. Reinforcing lengths, depths, and bends not conforming to specified fabrication tolerances.
2. Bends or kinks not indicated on the Structural Contract Drawings.
3. Reinforcing with reduced cross-section due to excessive rusting or other causes.

D. Tolerances: Comply with CRSI Manual and ACI 117.
2.06 SOURCE QUALITY CONTROL

A. Tests: Materials for which physical characteristics have been stipulated shall have had such characteristics independently confirmed by laboratory tests employing industry-recognized procedures.

B. Do not weld reinforcing unless a chemical analysis sufficient to determine the carbon equivalent (CE) has been performed. Calculate the carbon equivalent of reinforcing steel on the basis of the chemical composition shown in the mill test report.
   1. Submit a copy of the mill test report to the Structural Engineer prior to placement of reinforcing steel in concrete members.
   2. If mill test reports are not available, perform a chemical analysis of reinforcing representative of the reinforcing to be welded. The carbon equivalent (CE) shall not exceed 0.55.
   3. Special inspection, as outlined in Section 014500, is required for welding of steel reinforcing.

C. Source Quality Control: Testing Laboratory shall perform the following conformance testing, select test samples of reinforcing, ties, and stirrups from the material at the site or from place of distribution, each sampling including at least two 18-inch long pieces, and perform the following tests according to ASTM A615.
   1. Identified Reinforcing: If samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with Identification Certificate so as to be readily identified, perform one tensile and one bend test for each 10 tons or fraction thereof of each size of reinforcing. Submit mill reports when samples are selected.
   2. Refer to Section 014500 for general requirements and to Article 1.07 - Quality Assurance for specific procedures.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Preparation: Clean reinforcing to remove loose rust and mill scale, earth, and other materials which might reduce or destroy bond with concrete.

3.02 INSTALLATION

A. General: Comply with the CRSI Manual for details and methods of placing reinforcing and supports.
   1. Do not displace or damage vapor barrier, if any, while placing concrete reinforcing. If damage occurs, repair vapor barrier before placing concrete.
      a. Provide for movement which equals joint width plus 1/2-inch.
   2. Expansion Joints: Interrupt reinforcing at expansion joints. Provide No. 5 by 24-inch long dowelled joints at 18 inches on centers with one end of dowel set in capped dowel sleeve.
   3. Construction Joints: Allow reinforcing to run through without interruption, unless otherwise noted on Contract Structural Drawings.
B. Support: Position, support, and secure reinforcing against displacement by formwork, construction or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as required and as indicated on Contract Drawings.
   1. Provide sufficient numbers and sizes of supports to carry reinforcing.
      a. Do not place reinforcing more than 2 inches beyond the last leg of any continuous reinforcing support.
      b. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
      c. Provide additional reinforcing for support where required to support reinforcing shown on Contract Drawings.
   2. Repair and resupport reinforcing which may have moved during concrete placement operations.

C. Securing in Place:
   1. Accurately place reinforcing and wire tie in precise position where reinforcing cross. Bend ends of wire ties away from the forms. Wire tie reinforcing to corners of ties and stirrups.
   2. Support reinforcing according to the current edition of CSRI Recommended Practice for Placing Reinforcing Supports using approved accessories and chairs.
   3. Where precast concrete cubes are used, embed wire ties to support reinforcing steel in concrete placed on grade and in footings.
   4. Use care not to damage vapor barriers where they occur.

D. Coverage: Place reinforcing to obtain minimum coverages for concrete protection in accordance with CBC 1907A.7, and as indicated on Contract Structural Drawings. Securely tie reinforcing and related supports together with tie wire to hold reinforcing accurately in position during concrete placement operations. Place wire ties so that twisted ends are directly away from exposed concrete surfaces.
   1. For concrete footings cast directly against earth, provide a clear distance of not less than 3 inches between earth and reinforcing.
   2. For formed concrete in contact with earth or exposed to the weather, provide a clear distance between concrete surface and reinforcing of not less than 1-1/2 inches at No. 5 or smaller, and 2 inches at No. 6 reinforcing and larger.

E. Clearance Between Reinforcing: Provide clearance between parallel reinforcing and between reinforcing and vertical surface of forms of not less than 1-1/2 times the nominal diameter for round reinforcing, but in no case less than 1-1/2 inches or less than 4/3rds the maximum size aggregate.

F. Splicing:
   1. Provide standard reinforcing splices by lapping ends and tying securely with tie wire. Comply with details indicated on Contract Structural Drawings.
      a. Unless noted otherwise on Structural Contract Drawings, comply with requirements of ACI 318 for minimum lap of Class B spliced reinforcing, including ACI 318 references in CBC 1901A.2.
2. Provide 1-1/2-inch minimum clearance between sets of splices. Stagger horizontal reinforcing so that adjacent splices are greater than 4 feet apart, unless indicated otherwise on Structural Contract Drawings.

3. Field Welding: Comply with the requirements of AWS D1.4 where field welding is required. Prior to field welding, determine the weldability of reinforcing in accordance with Article 2.06 - Source Quality Control. Only steel conforming to the chemical requirements of AWS D1.4 may be welded.

4. Splices: Do not splice reinforcing at the points of maximum stress except where indicated. Lap splices as shown or required to develop the full strength of reinforcing. Stagger splices in horizontal wall reinforcing at least 24" longitudinally in alternate reinforce and opposite faces.

G. Wire Fabric: Install welded wire fabric in longest lengths practicable. Lap adjoining pieces at least 12 inches minimum, and lace splices with tie wire. Offset end laps in adjacent widths to prevent continuous laps.

1. Extend fabric to within 1 inch of edge at slabs.

H. Slab on Grade Reinforcing: Do not displace or damage vapor retarder at slab on grade.

I. Dowels: Secure tie dowels in place before depositing concrete. Provide No. 3 reinforcing for securing dowels where no other reinforcing is provided.

J. Maintaining Reinforcing In Position: Take adequate precautions to ensure that reinforcing position and spacing is maintained during placement of concrete.

K. Adjustment and Inspection: Do not bend or straighten reinforcing in a manner injurious to material. Do not use reinforcing with kinks or bends not shown on Structural Contract Drawings and reviewed shop drawings, or reinforcing with reduced cross-section due to corrosion or other cause.

L. Tolerances: Placement tolerances shall conform to CRSI Manual and ACI 117.

3.03 Masonry Reinforcing

A. Refer to Section 042200 for installation of masonry reinforcing.

B. Splice reinforcing in masonry with laps as indicated on Structural Contract Drawings.

C. Position vertical reinforcing in masonry walls at the center of the wall and tie in position top and bottom, and at intervals not exceeding 192 bar diameters, unless otherwise noted on the Structural Contract Drawings.

D. Provide dowels between footings and walls of the same grade, size, and spacing as vertical wall reinforcing, unless otherwise noted on the Structural Contract Drawings.
3.04 FIELD QUALITY CONTROL

A. Inspection and Tests of Welds: Provide special inspection of shop and field welding in accordance with CBC Section 1704A and Structural Contract Drawings.
   1. Tests will be made by testing laboratory for reinforcing welds, as follows:
      a. Qualification of welders engaged in electric-arc welding of reinforcing.
      b. Verification of location of reinforcing for accuracy.
      c. Inspection of reinforcing welds by certified welding inspectors.
      d. X-ray test of one of the first three arc-welds made by each welder.
      e. Tensile tests of sample welds of the largest size reinforcing for each type of welding.
   2. When welds are judged to be deficient, provide and pay for such additional X-rays and tests as directed by the Structural Engineer. Defective welds shall be repaired, replaced, and retested.

B. Placing: Provide special inspection as required by CBC 1704A.4.
   1. Schedule inspecting of reinforcing steel for conduit, sleeves, and embedded items to allow for correction, if necessary, before placement of overlying grids on reinforcing steel.

3.05 ADJUSTING

A. Defective Reinforcing Work: The following shall be considered defective and may be ordered removed and reconstructed at no change in Contract Time or Contract Sum:
   1. Reinforcing with kinks or bends not shown on Structural Contract Drawings.
   2. Reinforcing injured due to bending or straightening.
   3. Reinforcing heated or bent.
   4. Reinforcing not placed in accordance with Contract Documents.
   5. Reinforcing that is rusty or oily.
   6. Reinforcing exposed in surface of concrete.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Cast-in-place concrete, including reinforcement, concrete materials, mix design, placement procedures, and finishes.
   1. Include concrete retaining walls.
   2. Include special proportioning procedures and admixtures to reduce moisture vapor emissions through interior concrete slabs on grade.
   3. Include responsibility for providing floor slabs that meet manufacturers’ moisture and alkalinity limitations for finish floor coverings.
   4. Include special materials and procedures for concrete exposed to weather.
   5. Include integral hydrophobic and anti-corrosive concrete admixture system in concrete locations described in Part 2.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 012613 - Requests for Interpretation.
   3. Section 013300 - Submittal Procedures.
   4. Section 014500 - Quality Control: General requirements for testing and special inspection.
   5. Section 017123 - Field Engineering.
   7. Section 018113 - Sustainable Design Requirements.
   8. Section 031000 - Concrete Forming and Accessories: Preparation for placement.
   9. Section 032000 - Concrete Reinforcing.
   10. Section 033536 - Polished Concrete Surface Finishing.
   11. Section 033542 - Concrete Sealing.
   12. Section 079200 - Joint Sealants.
   13. Section 096466 - Wood Athletic Flooring.
   14. Section 096513 - Resilient Base and Accessories.
   15. Section 099100 - Painting.
   16. Section 312323 - Fill.

C. Refer to Section 031000 for waterstops and related joint requirements.

1.02 REFERENCED STANDARDS

A. ASTM International (ASTM):
2. C 31-12 - Practice for Making and Curing Concrete Test Specimens in the Field.
5. C 42-13 - Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
6. C 78-10 - Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
7. C 88-13 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
17. C 173-12 - Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
18. C 192-12a - Method of Making and Curing Concrete Test Specimens in the Laboratory.
19. C 231-10 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
27. C 617-11 - Practice of Capping Cylindrical Specimens.
30. C 979-10 - Specification for Pigments for Integrally Colored Concrete.
34. D 638-10 - Test Method for Tensile Properties of Plastics.
38. D 2047-11 - Test Method Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
42. E 154-08a(2013) - Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover in Crawl Spaces.
43. E 514-11 - Test Method for Water Penetration and Leakage Through Masonry.
44. F 710- - Practice for Preparing Concrete Floors to Receive Resilient Flooring.
46. E 1643-11 - Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
47. E 1745-11 - Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

B. California Code of Regulations (CCR):
1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
   a. Chapter 11b - accessibility to public buildings, public Accommodations, Commercial Buildings, and Public Housing:
      1) Division 3 - Building Blocks.
         a) Section 11B-302 - Floor or Ground Surfaces.
         2) Division 4 - Accessible Routes.
            a) Section 11B-403 - Walking Surfaces.
   b. Chapter 17A - Structural Tests and Inspections.
   c. Chapter 19A - Concrete.
      1) Section 1905A - Modifications to ACI 318.
C. American Concrete Institute (ACI):
      a. 117 - Standard Tolerances for Concrete Construction and Materials.
      b. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
      c. 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
      d. 223 - Standard Practice for the Use of Shrinkage-Compensating Concrete.
      e. 301-10 - Specifications for Structural Concrete for Buildings.
         1) Section 6: Architectural Concrete.
            a) 6.3.9: Repair of Tie Holes and Surface Defects.
            b) 6.3.10: Finishing.
      f. 302.1R - Guide for Concrete Floor and Slab Construction:
         1) Addendum: Vapor Retarder Location.
      g. 303R - Guide to Cast-in-Place Architectural Concrete Practice.
      h. 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
      i. 305R - Hot Weather Concreting.
      j. 306R - Cold Weather Concreting.
      l. 308 - Standard Practice for Curing Concrete.
      m. 315 - Details and Detailing of Concrete Reinforcement.
      n. 318 - Building Code Requirements for Reinforced Concrete.
      o. 318R - Commentary on Building Code Requirements for Reinforced Concrete (ACI 318).
      p. 360R - Slab-on-grade.
      q. 503.4 - Specification for Repairing Concrete with Epoxy Mortars.

D. American Society of Concrete Contractors (ASCC):
   1. Position Statement № 24 - Tolerances for Suspended Concrete Slabs.

E. IAPMO Evaluation Service (IAPMO ES), a division of International Association of Plumbing and Mechanical Officials:
   1. IAPMO Uniform Evaluation Reports, (UER-), designated by applicable report number.

F. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction (ESR-), designated by applicable report number.

G. Public Works Standards, Inc. (PWS):

H. British Standards Institution (BS):
I. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Water Vapor Transmission: In accordance with ASTM C 168, the steady water vapor flow in unit time through a unit area (of the actual membrane thickness).
   1. Note: Water vapor transmission is a property of the material.

B. Water Vapor Permeance: In accordance with ASTM C 168, the time rate of water vapor transmission through unit area (of the actual membrane thickness) induced by unit vapor pressure difference.
   1. Note: Permeance is a performance evaluation and not a property of a material.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Refer to Section 012613 for RFI drawing requirements.
   2. Refer to Section 017419 regarding procedures for implementing construction waste management requirements.
   3. Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
   4. Refer to Section 033536 for special polished concrete requirements.
   5. Identify finish flooring manufacturers’ concrete slab vapor emission and alkalinity requirements, and coordinate concrete slab mixing and installation procedures to achieve desired results. Concrete slab requirements for finish flooring may be more restrictive than general requirements of the Contract Documents, and may require additional materials, means, or methods. Such additional materials, means, or methods shall be included as part of the work.
   6. Coordinate method of securing reinforcing and other embedded items in concrete slabs on grade without penetrating vapor barriers.
   7. Verify depth of slab depressions for waterproofing and toppings at walking decks.
   8. Verify depth of slab depressions for wood athletic floors and finish materials installed over mortar beds.

B. Preinstallation Conference: Review hydrophobic waterproofing procedures for conducting work of this Section, including:
   1. Review of mix design and mix test results.
   2. Mixing procedure.
   3. Conditions for acceptance of concrete at project site.
   4. Placement procedures.
   5. Finishing options and procedures.
   6. Curing and crack control procedures.
   7. Testing for acceptable moisture emissions, alkalinity pH levels, and relative humidity of concrete slab prior to installation of finish flooring.
   8. Effect of the above on the project schedule.
1.05 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: For proprietary products, submit complete manufacturer’s descriptive literature and specifications.

C. Shop Drawings: Submit layout drawings showing location of slab-on-grade joints.
   1. Submit large scale dimensioned plans for horizontal work having slab openings, penetrations, depressions, and steps.

D. Samples: Submit the following:
   1. Aggregate proposed for exposed finish, indicating color, texture, and size, for acceptance-review. Submit not less than 5 pounds of aggregate.

E. Quality Control Submittals: Submit the following items to Architect and Structural Engineer for information only:
   1. Design Data: Submit design mix data for each type of concrete and each compressive strength required on the Structural Contract Drawings. Submittal of mix designs shall not relieve Contractor of its responsibility to furnish concrete of proper consistency and specified strengths. Where used for concrete subject to special inspections, submit mix designs to testing laboratory for review and written acceptance.
      a. Design mix submittal shall be wet stamped and signed by a professional engineer licensed in the State of California.
      b. For each material, including admixtures and water, state water-cement ratio and maximum allowable water content.
      c. For each material, state manufacturer’s name, designation, and source.
      d. Submit shrinkage and creep factors for each type of aggregate, and each source proposed for use, for acceptance-review.
      e. For each mix design:
         1) Pay costs associated with mix design preparation.
         2) Consider concrete cover and clear distances between reinforcing bars as indicated on the Structural Contract Drawings in determining the aggregate size for mix designs. This may result in an aggregate size smaller than specified elsewhere in this Specification.
         3) Submit a schedule which identifies the locations within the structure where each mix design is proposed for use.
         4) Submit project specific 28-day shrinkage test results in accordance with Paragraph 2.14-C.
   2. Test Reports: Submit certified laboratory test reports to Structural Engineer and Building Department confirming physical characteristics of materials used in the performance of the work of this Section.
      a. Include shrinkage tests and petrographic tests on concrete with aggregate proposed for use.
   3. Placement Schedule: Prepare a placement schedule and submit to Architect and Structural Engineer for review and acceptance prior to start of concrete placement operations.
4. Field Reports: Maintain an accurate record of the items listed below. Keep records available for review at the site. Upon completion of work of this Section, deliver two copies of each record to Structural Engineer in form acceptable to Architect and Structural Engineer.
   a. Concrete Placement: Date and time of placement in each portion of schedule. Include starting and ending temperatures, humidities, and wind velocities.

5. Certificates: Provide certificate of composition of blended hydraulic cements in accordance with ASTM C 595.


7. Refer to Section 012613 for RFI drawing requirements.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.07 CLOSEOUT SUBMITTALS

A. Warranty Documentation:
   1. Submit required warranties, including waterproof floor sealer warranty.
   2. Submit manufacturer’s standard hydrophobic concrete admixture warranty document executed by an authorized company official. Manufacturer’s warranty is in addition to, and not a limitation of, other rights owner may have under the contract documents.
1.08 QUALITY ASSURANCE

A. Qualifications:
   1. Testing Laboratory Qualifications for Mix Designs: Regularly engaged and specializing, for the preceding 10 years, in the preparation of mix formulae for structural concrete.
      a. Testing laboratory shall be acceptable to the enforcement agency and the Owner.
   2. Concrete Supplier: Provide ready-mixed concrete from a concrete supplier approved by the hydrophobic concrete admixture manufacturer having a minimum of 5 years' experience providing hydrophobic and anti-corrosive concrete admixtures on projects of similar scope and authorized to dispense the hydrophobic concrete admixture manufacturer's waterproofing materials.

B. Field Samples: Prepare a sample of exposed concrete finish in a semi-concealed location for Architect's acceptance-review.
   1. Vertical Concrete Sealer and Water Repellent: Test a minimum 4 foot by 4 foot area on concrete wall to be sealed. Use the manufacturer's application instructions. Let test area protective treatment cure before inspection. Keep test panels available for comparison throughout the cleaning project.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Comply with the requirements of ASTM C 595 regarding packaging and package marking for cement delivered in package or bulk.

1.10 FIELD CONDITIONS

A. Environmental Requirements:
   1. Fly ash shall meet the recycled content requirements specified in Section 018113.
   2. Product substitutions shall be approved in writing, prior to use, by the Owner or Architect and Structural Engineer as specified in Section 017419.
   3. The actual dollar cost of the amount of this product used on the project must be tracked. The actual dollar cost shall be separated into the amount that meets the requirements of Section 017419 and amount that does not meet the requirements (for the amount of product allowed for use as a substitution as described above and in Section 017419).

1.11 WARRANTY

A. Warrant concrete floor sealer to be free from manufacturing defects for a period of 15 years. Applications completed by an approved installer in accordance with published technical data will be warranted for the suppression and control of water vapor emission, alkalinity, and relative humidity from concrete during the warranty period.

B. Provide manufacturer's standard 10-year hydrophobic and anti-corrosive concrete admixture warranty executed by an authorized company official
covering cost of repair of any leak in protected areas through industry-accepted and approved means.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Floor Leveling Compounds:
1. Ardex, Inc., Coraopolis, PA (412)264-4240.
2. Mapei Corporation, Garland, TX (972)271-9500, with offices in Fredericksburg, VA (540)310-0111, with offices in Anaheim, CA (714)385-0155.

B. Acceptable Manufacturers of Floor Sealer Products:
2. Euclid Chemical Company, Cleveland, OH (800)321-7628.
5. Sonneborn Building Products, Hayward, CA (415)889-9899.

C. Acceptable Manufacturers of Vapor Retarder Products:
1. Fortifiber Corporation, Fernley, NV (800)773-4777, with offices in Los Angeles, CA (213)268-6783, (800)443-4079.
3. Reef Industries, Inc., Houston, TX (713)943-0070, (800)231-6074.

D. Acceptable Manufacturers of Accessory and Admixture Products:
1. BASF Admixture Systems (formerly Master Builders Technologies), Cleveland, OH with regional resource center at (800)627-2929, (800)233-1232.
3. Custom Building Products, Bell, CA (213)582-0846.
4. Euclid Chemical Company, Cleveland, OH (800)321-7628.
9. Larsen Products Corporation, Rockville, MD (800)633-6668, represented by Frontier Building Supply, Los Angeles, CA (818)765-3865.
18. Sonneborn Building Products, Minneapolis, MN (612)835-3434 and Hayward, CA (415)889-9899.

E. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Refer to Section 014500 with regard to compliance with applicable codes and regulations.

1. Comply with ACI 301, ACI 318 and ACI 318R for interpreting design requirements of reinforced concrete.
   a. Section 1.6.1 of ACI 301 requires that Contractor keep a copy of ACI SP-15 in the field office of any project where ACI 301 requirements are referenced.

2. Concrete floor surfaces shall have a minimum slip resistance coefficient of friction of 0.6 as tested in accordance with ASTM C 1028 or ASTM D 2047.
   a. Comply with Section 11B-403 requirements for slip resistance.
B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

C. Comply with CALGreen 5.504.4.3 Paints and Coatings:
   1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
   2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED requirements, refer to Section 018113.
   1. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      a. Concrete Sealers: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

2.04 CEMENT MATERIALS

A. Refer to Structural Contract Drawings.

2.05 AGGREGATE MATERIALS

A. Normal Weight Aggregate: Conform to ASTM C 33 and CBC 1903A with proven concrete shrinkage characteristics of less than 0.04 percent when tested in accordance with ASTM C 157, and proven, by past service records, not to cause alkali-aggregate reactivity (AAR). Do not change source of aggregate during course of work without prior written acceptance of the Architect and Structural Engineer.
   1. Fine Aggregate: Washed natural sand consisting of hard, particles, containing not more than the maximum limits of deleterious material allowed by Table 1 of ASTM C 33.
      a. Fineness modulus shall be in the range of 2.90 to 3.10.
2. Coarse Aggregate, Structural Concrete:
   a. Clean washed gravel or sound crushed rock, containing not more than 5 percent flat, thin, elongated, or laminated material, and containing not more than the maximum limits of deleterious material allowed by Table 3 of ASTM C 33 for moderate weathering regions.
      1) Grade 1-inch aggregate from No. 100 sieve to 1 inch.
      2) Grade 1-1/2-inch aggregate from No. 100 sieve to 1-1/2 inches.
   b. Maximum Size: No larger than three-fourths of the clear space between reinforcing bars or between reinforcing bars and forms, nor larger than one-fifth of the narrowest dimension between sides of forms, nor larger than one-third of the depth of slab.
      1) 1-Inch Maximum Aggregate: Use in other than mass concrete.
      2) 1-1/2-Inch Maximum Aggregate: Use in mass concrete where reinforcement clearance will permit.

3. Coarse Aggregate, Site Work: Include site walls and flat work.
   a. Conform to general requirements for normal weight aggregate specified above, except that maximum size of coarse aggregate shall be 3/8-inch.

B. Lightweight Aggregate: Coated, calcined expanded clay or shale produced by rotary kiln process, and complying with ASTM C 330.
   1. Provide aggregates having a loss of not more than 8 percent if tested by sodium sulfate solution and 10 percent if tested by magnesium sulfate solution, all in accordance with ASTM C 88.
   2. Maximum Size: No larger than 3/4th of the clear space between reinforcing bars or between reinforcing bars and forms, 1/5th of the narrowest dimension between sides of forms, 1/3rd of the depth of slab, with a maximum size of 3/4-inch.
   3. Acceptable types include Hydralite, Ridgeline, Rocklite, or equal.

2.06 OTHER CONCRETE MATERIALS

A. Steel Reinforcement: Refer to Section 032000.

B. Water: Clean and free from deleterious amount of acids, alkalis, salts, or organic materials.

2.07 ADMIXTURES AND ADDITIVES

A. General: Provide admixtures and additives produced by established manufacturers.
   1. Do not use admixtures and additives which have not been incorporated and tested in accepted combinations and mixes.
   2. Do not use admixtures without written acceptance of the Architect and Structural Engineer.
   3. Admixtures containing chlorides will not be permitted.

B. The following admixtures may be used only with the written acceptance of the Architect and Structural Engineer.
2. Water Reducing: Design is based on the use of Kel-Crete Admixture, manufactured by Kel-Crete Industries, or equal. Conform to ASTM C 494, Type A. Provide a polymer-based admixture which enhances the characteristics of concrete to extent no less beneficial than the following:
   a. Water Reduction: Not less than 5 percent.
   b. Increase in Compressive Strength: Not less than 10 percent at age 28 days.
   c. Dry Shrinkage: At age 21 days, less than concrete without admixture.

3. High-Range Water Reducing Type: Design is based on the use of MasterRheobuild 1000 (formerly Rheobuild 1000), manufactured by Master Builders Solutions (BASF), or equal. Conform to ASTM C 494 Type F.

4. Air Entraining: Conform to ASTM C 260. Design is based on one of the following:
   a. Kel-Crete Admixture, manufactured by Kel-Crete Industries.
   b. Nox-Aire, manufactured by Nox-Crete.

5. Water Repelling: Design is based on the use of Sika Corporation Sikamix W-10 Water Repelling and Efflorescence Controlling Admixture, or equal conforming to ASTM E 514.

6. Plasticizer: Conform to ASTM C 494, Type F. Design is based on the use of Kel-Crete Admixture, manufactured by Kel-Crete Industries.

C. Superplasticizers:
   1. Dynatron, as manufactured by Chem-Masters Corporation.
   2. Sikament 10 ESL, manufactured by Sika Corporation.
   3. Plastiflow N, manufactured by Nox-Crete.

D. Integral Crystalline Waterproofing Admixtures: ASTM C 494, Type S; complex catalyzed hydrosilicate, water and vapor proofing liquid admixture.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Moxie International, Moxie Shield 1800 Admixture, or comparable product by one of the following:
      a. System W1000, manufactured by Hycrete, Inc.
      b. MasterPel, manufactured by BASF Admixture Systems.
      c. Xypex Admix C-500, manufactured by Xypex Chemical Corporation.
   2. Properties:
      a. Water/Cement Ratio: Maximum 0.52.
      b. Water Vapor Transmission: Less than 0.1 perms.
      c. Water Seepage or Permeability: Not to exceed 7.00 x 10^-9 cm/s at 50 psi.

2.08 VAPOR RETARDERS

A. Vapor Retarder, **Class A**: Conform to ASTM C 755.
   1. Reinforced high density polyethylene or mylar geomembrane, minimum 15 mils thickness, having the following properties:
      a. Water Vapor Permeance: 0.02 Perms maximum, in accordance with ASTM E 154 Section 7.
b. Underslab Vapor Retarder Classification: Class A, in accordance with ASTM E 1745.
c. Puncture Resistance: 2200 grams minimum, in accordance with ASTM D 1709 Method B.
d. Tensile Strength: 45 lbf/in minimum, in accordance with ASTM E 154 Section 9, Method ASTM D 882.
2. Products: One of the following, in accordance with ASTM E 1745:
b. Viper VaporCheck II 15-mil Class A, manufactured by Insulation Solutions.
c. Vapor Block 15, manufactured by Raven Industries.
d. Griffolyn Type 105, manufactured by Reef Industries.
e. Stego Wrap 15-mil Class A Vapor Barrier manufactured by Stego Industries.
g. Florprufe 120, manufactured by Grace Construction Products.
h. Blackline 400, manufactured by Carlisle coatings & Waterproofing.

B. Subslab Waterproofing (At Floor Slabs Subject to Minor Hydraulic Moisture Pressures Including All Gymnasium Floors): Vapor barrier under slab on grade with low hydraulic moisture pressures or wet soils. Conform to ASTM C 755.
1. Reinforced high density polyethylene (HDPE), mylar geomembrane, or 1/8-inch thick pre-molded membrane having the following minimum properties:
a. Water Vapor Permeance: 0.005 Perms maximum, in accordance with ASTM E 96.
b. Water Vapor Barrier Classification: Class A, in accordance with ASTM E 1745.
c. Puncture Resistance: 2400 grams minimum, in accordance with ASTM D 1709 Method B.
d. Tensile Strength: 70 lbf/in minimum, in accordance with ASTM E 154 Section 9, Method ASTM D 882.
2. Products: One of the following, or equal:
a. Alumiseal Zero Perm Vapor Barrier manufactured by Alumiseal Corporation.
b. Griffolyn VAPORguard manufactured by Reef Industries.
c. Stego Wrap 15-Mil Class A Vapor Barrier manufactured by Stego Industries.
d. Pre-Molded Membrane vapor seal with plasmatic core manufactured by W.R. Meadows. Refer to special installation requirements in Part 3.
3. Accessory Products: Provide vapor proofing mastic, pipe boots, and related accessory products recommended by manufacturer of vapor retarder.
C. Subslab Waterproofing (At Floor Slabs Subject to Ground Water Intrusion Identified in the Geotechnical Report): Refer to horizontal blind-side waterproofing specified in Section 071353.

D. Seam Tape:
   1. High density reinforced polyethylene vapor retarding seam tape with pressure sensitive adhesive as recommended by manufacturer of vapor/radon barrier for product accepted for use. Minimum 4 inches in width and of a contrasting color.

2.09 LIQUID CURE/SEAL SYSTEMS

A. Floor Liquid Curing Compound **Type FCC**: For use on concrete slabs that will be exposed with separately applied floor sealer finish, or on slabs that will be covered by breathable floor coverings or mortar beds.
      a. Compound shall be a water-based non-staining dissipating, translucent resin, conforming to ASTM C 309, Type 1, Class B.
         1) Sodium silicate compounds will not be permitted.
      b. Product shall be compatible with subsequently applied toppings (sealers, hardeners, finishes, or coverings).

B. Floor Remedial Vapor Emission and Alkalinity Control Sealer **Type FCS**:
   For remedial use on concrete slabs on grade that do not meet manufacturer's specific moisture emission and alkalinity limits for non-breathable floor finishes, refer to Section 033542.

C. Evaporation Retardant: Use in conjunction with hot weather concreting:
   1. E-Con, manufactured by L&M Construction Chemicals.
   2. ConFilm, manufactured by BASF Admixture Systems.
   3. Sika Film, manufactured by Sika Corporation.

2.10 GROUT MATERIALS

A. Patching Mortar:
   1. Horizontal: Polymer modified portland cement mortar for horizontal patching, equal to:
      a. Durapatch Industrial, manufactured by L&M Construction Chemicals.
      b. Embeco R310, manufactured by BASF Admixture Systems.
      c. ProSpec Vinyl Concrete Patch, as manufactured by Bonsal American.
   2. Vertical: Polymer modified portland cement mortar for vertical and overhead patching, equal to:
      a. Durapatch VOH, manufactured by L&M Construction Chemicals.
      c. ProSpec Vertical Leveling Mortar, as manufactured by Bonsal American.

B. Non-Shrink Cementitious Grout: Special purpose precision mineral aggregate grouts, selected and utilized for each special application as
recommended by manufacturer. Grout shall be prepackaged, non-metallic, non-gaseous. It shall be non-shrink when tested in accordance with ASTM C 1107 at a fluid (flow cone) consistency of 20-30 seconds. Grout shall attain 8000 psi compressive strength in 28 days at above flow and shall not bleed. Provide one of the following products:
1. Duragrun, manufactured by L&M Construction Chemicals.
2. Five Star Grout, manufactured by Five Star Products.
4. Masterflow 928 (with extended working time), manufactured by BASF Admixture Systems.
5. ProSpec High Strength Precision Grout, or ProSpec C-1107 Construction Grout, as applicable, manufactured by Bonsal American.

C. Non-Shrink Epoxy Grout: One of the following, or equal:
1. Five Star Epoxy Grout, manufactured by Five Star Products.
2. Epogrun, manufactured by L&M Construction Chemicals.

2.11 ACCESSORY MATERIALS

A. Granular Fill: For use under concrete slabs on grade, refer to Geotechnical Investigation and Section 312323.

B. Curing Barriers:

C. Chemical Bonding Agent: Film-forming, freeze-thaw resistant, acrylic latex emulsion compound suitable for brush or spray application, complying with ASTM C 1059, Type II. Provide one of the following products:
1. Weldcrete, manufactured by Larsen Products Corporation.
3. Everbond, manufactured by L&M Construction Chemicals.
4. ProSpec Acrylic Additive, manufactured by Bonsal American.

D. Floor Leveling Compound: Two-part acrylic polymer latex concrete equal to one of the following:
2. Levelex, manufactured by L&M Construction Chemicals.
3. Level-Right Plus, manufactured by Maxxon Corporation.
4. ProSpec, Level Set 300 Series, type appropriate to specific application, manufactured by Bonsal American.

E. Floor Patching Materials:
1. Interstate Epoxy Patching Compound.
2. Sakrete Fast Setting Cement Patcher.
3. ProSpec Floor Patch Pro, manufactured by Bonsal American.

F. Skim Coat: Blended compound of portland cement, graded silica aggregates, and special chemical additives formulated for bonding, smoothing, rubbing, and thin coating concrete surfaces, equal to Pavcrete manufactured by Lyons Manufacturing or Rapid Set WunderFixx manufactured by CTC Cement.
1. Bonding Agent: Manufacturer’s Type II acrylic bonding agent, when applicable. Do not use PVA Type I bonding agents.
2. Integral Color: Color shall be selected by Architect.
   a. Pigment: SGS ColorFlo Liquid iron oxide color pigments, as manufactured by Solomon Colors, or equal, in accordance with ASTM C 979.
   b. Admixture: Chromix-L manufactured by L.M. Scofield Products, or equal product manufactured by Davis Colors.

G. Aggregate for Non-Slip Finish (at Steps): Aluminum oxide grits or crushed emery, factory-graded, packaged, rust-proof and non-glazing:
1. Grip It, manufactured by L&M Construction Chemicals.
2. Fric tex, manufactured by Sonneborn Building Products.

H. Geotextile Fabric: Mirafi 500X, or equal.

I. Fasteners: Sizes, types, and embedment as indicated on Contract Drawings. Post-installed fasteners as manufactured by Hilti Inc., Sika Chemical, or equal.
1. Anchors: Equal to Hilti HIT-RE 500-SD conforming to ICC ESR 2322.
3. Shot Pins: Shot pins shall be low velocity with minimum 3/4-inch embedment.
4. Through Dowels: Equal to Sika Sikadur 35 High Mode LV.

J. Isolation Joint Sealant: In accordance with Section 079200. Provide polyurethane type compatible with fiber joint filler.

K. Metal Dividers: Standard white metal (zinc) dividers with integral anchors, 1/8-inch by 1-1/4-inches minimum depth, one piece at each opening, unless otherwise indicated on Structural Contract Drawings.

2.12 PROPORTIONING

A. Mix Designs:
1. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
2. Proportioning Structural Lightweight Concrete: Comply with ACI 211.2 recommendations.
3. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
   a. For trial mixtures method, employ independent testing agency acceptable to Architect and Structural Engineer for preparing and reporting proposed mix designs.
4. Accurately control the proportions, water content, and air content. Use weighing equipment accurate to within 1 percent for cement and 2 percent for aggregates, and adjustable for varying aggregate moisture content. A beam auxiliary shall register any part of the last 100 pounds of each aggregate. The aggregate hopper shall have a volume adjustment.
   a. Proportion concrete by weight of loose, dry material.
b. Fine aggregate volume shall be at least 35 percent of the sum of the separate fine and coarse aggregate volumes.

5. Design mix to produce shrinkage test results in accordance with 2.14-C.

B. Vapor Emission and Alkalinity Control Procedures: At interior slabs, implement the following provisions to reduce vapor emissions to levels recommended by manufacturers of floor finish materials used on this Project:

1. Comply with requirements of this Section for installation, curing, sealing, and protection of subslab moisture barrier.

2. Do not cover subslab vapor retarder with sand cushion. Concrete slabs-on-grade must come in contact with vapor retarder.

3. Concrete Mix:
   a. Concrete compressive strength shall be as indicated on the Structural Contract Drawings.
   b. Slabs-on-Grade: Water to cement content shall not exceed a ratio of 0.42 upon delivery at site, nor 0.45 when placed.
   c. Other Concrete Not in Contact with Soils: Water to cement content shall not exceed a ratio of 0.45 upon delivery to site, or 0.48 when placed.
   d. Additional admixtures may be used in the same concrete batch, provided such admixtures are added separately and the combination has been determined by independent laboratory testing to have no deleterious effect on the concrete. Do not use calcium chloride admixtures.

4. Provide "continuous moisture" curing for slabs-on-grade as specified in Article 3.07-A - Curing Slab Areas.

C. Admixture: If admixture is proposed for use by concrete supplier, conform to types accepted by Architect and Structural Engineer in writing. Quantity per sack of cement and method of using admixture shall be in accordance with recommendations of manufacturer and laboratory furnishing mix design.

1. Integral Waterproofing Admixture: Refer to manufacturer's recommendations for dosage.

D. Patching Mortar: Combine dry mix with liquid and add water in proportions recommended by patching mortar manufacturer.

2.13 MIXING CONCRETE

A. General: The minimum ultimate 28-day compressive strength of concrete shall be controlled in accordance with requirements on Contract Structural Drawings. Mixes may be established by a qualified person based upon previously proven mixes and material tests made by a recognized testing agency.

1. Slump: As indicated on the Structural Contract Drawings, and determined in accordance with ASTM C 143 and ACI 301.

2. Integral Waterproofing Admixture: Refer to manufacturer's recommendations for dosage.

B. Weather Requirements:

1. Hot Weather Usage: Adjust mix as required to counteract effects of anticipated or probable hot weather on strength of concrete. Con-
form to recommendations of ACI 305R regarding admixtures, temperature of mixing water, and delivery times.

a. During hot weather, proper attention shall be given to ingredients, production methods, handling, placing, protection and curing to prevent excessive concrete temperatures or water evaporation that may impair required strength or serviceability of the member or structure.

b. When air temperature is between 85 degrees F. and 90 degrees F, limit mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 degrees F, limit mixing and delivery time to 60 minutes.

C. Transit-mixed Concrete: Mix in accordance with provisions of ASTM C 94.

1. With each load, provide ticket certifying the materials and quantities as well as compliance with the accepted mix design.
2. On the transit mix ticket, state the time water was first added to the mix.
3. At the batch plant, withhold 2-1/2 gallons of water per cubic yard of concrete.
4. Upon arrival at the job site, as directed by the Testing Laboratory Inspector, add all or part of the withheld water before the concrete is discharged from the mixer.
5. Mix concrete for not less than 5 minutes after the withheld water has been added, and not less than 1 minute of that time immediately prior to discharge of the batch.
   a. Drum shall rotate approximately 70 to 100 revolutions at a mixing speed of approximately 6 to 18 rpm.
   b. After mixing, drum shall rotate at an agitating speed of approximately 2 to 6 rpm.
   c. Unless otherwise directed, provide 15 minutes total mixing per batch after first addition of water.
6. Discharge of the concrete shall be completed within 90 minutes after water is introduced into the mix, or before the drum has completed 300 revolutions.

2.14 SOURCE QUALITY CONTROL

A. Tests for Concrete Materials at Batch Plant: Utilizing batch plant test records, perform the following tests in accordance with provisions of the building code:

1. Cement: Sample and test cement, or provide mill test reports, as accepted, certifying that the cement conforms to the requirements of this Specification.
2. Aggregate:
   a. Sample and test concrete aggregate for grading and soundness before concrete mix designs are established.
   b. Test aggregate for shrinkage characteristics in accordance with ASTM C 157.
   c. Conduct petrographic examinations of aggregate proposed for use in accordance with ASTM C 295.
3. Air Content: ASTM C 173, volumetric method or ASTM C 231, pressure method. One test for each set of compressive strength test specimens.

4. Refer to Article 3.14 - Field Quality Control for testing of actual concrete mix and placement.

B. Inspection: Accompany each load of materials or concrete with a signed copy of batch plant's certificate stating quantity of each material, design strength, amount of water added at plant, admixtures, departure time and date, and maximum amount of water allowed to be added at site.

C. Shrinkage Test:
   1. Before placing any concrete, prepare a trial batch of the mix design, using the same aggregates, cement, and admixtures (if any) proposed for use on the project. Prepare at least three specimens for determining the drying shrinkage of the mix design.
   2. The drying shrinkage specimens shall be 4" x 4" x 11" prisms, made, cured, dried, and measured as specified in ASTM C 157. Measure and report separately for 7, 14, 21, and 28 days of drying. After 7 days of moist curing, the effective gauge length of the specimens shall be 10 inches.
   3. The average drying shrinkage of the test specimens after 28 days of drying shall not exceed 0.045 percent for footing and grade beams, and 0.035 percent for all other locations. Use adequate amount of shrinkage reducing admixture as required.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Verify elevations and depressions of floor finishes, and be responsible for final excavation required for foundations and footings prior to placing concrete.
      a. Conform to the administrative requirements of Section 017123.
   2. Notify Architect and Structural Engineer 48 hours before scheduled start of placing concrete to permit Architect's and Structural Engineer's observation of excavations, forms, reinforcement, and embedded items before concrete is placed.
   3. Verify locations of proposed and future breathable and non-breathable floor finishes in advance of placing concrete to determine type of floor sealers to be applied in finishing operations.
   4. Verify that formwork is properly located such that the unshored concrete will maintain specified tolerances after forms are removed.

B. Verification for Commissioning:
   1. CxA will perform site observation of the initial under slab vapor retarder as part of BECx.
3.02 PREPARATION

A. Forms: Immediately before start of pour, remove foreign matter accumulated in forms. Close ports and openings left in formwork.
   1. Clean rough surfaces to be bonded in accordance with CBC 1905A.7, and as follows:
      a. The surface of horizontal construction joints shall be cleaned and roughened by removing the entire surface and exposing clean aggregate solidly embedded in mortar matrix.
      b. In the event that the contact surface becomes coated with earth, sawdust, or other contaminants after being cleaned, the entire surface so coated shall be re-cleaned.

B. Vapor Retarder: Install vapor retarder over subbase in accordance with ASTM E 1643 and ACI 302.1R Addendum as required by slab floor finish requirements.
   1. Roll subgrade smooth before placing vapor retarder.
   2. Lap joints minimum 6 inches. Tape and seal all penetrations and laps with high density polyethylene pressure sensitive tape and mastic. Turn up edges of vapor retarder 2 inches at vertical surfaces. Attach pipe boots accordance with manufacturer's recommendations.
   3. Do not cover with additional subbase material. Place concrete directly on vapor retarder.
   4. Avoid grade staking through vapor retarder.
   5. Repair damaged areas of vapor barrier with overlapping patches of vapor barrier secured with pressure sensitive tape.

C. Subslab Waterproofing: Install premolded waterproof membrane directly over tamped grade under areas to receive wood flooring. The polyfilm (logo) side of the board is placed down to the grade with the felt side up to the concrete.
   1. Material is placed in position in either the "Dutch lap" method with laps sealed with manufacturer's catalytic bonding asphalt, or by the "butt-joint" method with joints sealed with manufacturer's detail strips.
   2. Extend waterproofing to down face of adjacent footings 12 inches, or horizontally 5 feet from edge of wood flooring above.
   3. Use under all moisture-sensitive floor finishes and floors in rooms adjacent to below grade walls.

D. Equipment: Thoroughly clean tools and equipment used in transporting, placing, and consolidating concrete immediately before and after each pour.

3.03 PLACING AND COMPACTING

A. Pouring Schedule: Pour concrete in accordance with accepted pouring schedule and construction joint layout.

B. Conveying: Acceptable methods include bucket, cart, wheelbarrow, and buggies. Pumps or belts shall be used only for mixes specifically designed for conveying by such methods.

C. Placing: Place concrete continuously between predetermined construction and control joints. Keep surface of concrete level throughout, with-
out flow from one position to another. Deposit at such a rate that mix is plastic and flows readily into space between bars.

1. Sloped slabs shall be placed uniformly from established points and lines.

2. Comply with the requirements of CBC 1905A.10.

D. Compacting:

1. General: Spade, rod, vibrate, and consolidate concrete in forms. Vibrators shall not be left in any one spot longer than 30 seconds and shall be kept constantly in motion. One vibrator shall be assigned to each location where concrete is being placed and a standby vibrator shall be kept ready at all times. Avoid creating rock pockets, air bubbles, honeycomb, or separation of ingredients.

2. Work concrete thoroughly around reinforcement and embedded items and into corners and angles of forms by spading, rodding, and tamping.

3. Consolidation: Vibrate to consolidate each layer with previously placed layers, completely embedding reinforcing and fixtures, and bringing fine material to surface of slab to produce proper finish.

E. Compression Test Specimens: Prepare in accordance with Article 3.14 - Field Quality Control.

F. Slab-on-Grade: Install control joints and construction joints in accordance with Article 3.10 - Control Joints. Set screeds. Rod, tamp, and float to indicated levels and slopes. Maintain reinforcing at proper levels. Slabs depressed to receive finishes specified in other Sections shall be screeded and tamped.

1. Over vapor retarder use screed pads to hold screed posts.

2. Comply with recommendations of ACI 302.1R at concrete slabs to reduce plastic and drying shrinkage cracks.

G. Reinforcement: Clean bars extending through construction joints while concrete encrustation is soft.

H. Hot Weather Placing: Comply with recommendations of ACI 305R regarding placing of concrete during hot weather.

1. Take accepted measures to reduce evaporation and temperature of concrete during hot, dry weather.

2. Be prepared to use fog spray when required by the Architect and Structural Engineer, or when rate of evaporation exceeds 0.2 pounds per square foot per hour.

3.04 TOLERANCES

A. Tolerances for Concrete Construction and Materials shall conform to all requirements of ACI 117, Standard Specifications for Tolerances for Concrete Construction and Materials, published by the American Concrete Institute, except as modified by the requirements of these Specifications.

1. Formed Surfaces: Maintain bowing, warping, and dimensional tolerances within the maximum tolerances stated in ACI 117 for Class A surfaces.
2. Concrete Slabs: Floor finish tolerances shall be measured in accordance with ASTM E 1155 Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System (Inch-Pound Units) for the following conditions:
   a. Typical Slabs-on-Grade:
      1) Floor profile quality classification of Flat with a minimum FF30 and FL20.
   b. Typical Supported Slabs:
      1) Flatness shall not vary more than 5/16-inch in any direction along a freestanding 10-foot unleveled straightedge.
      2) Levelness: Floors must be level, and the elevation of the top surface shall fall within a 3/4-inch envelope in accordance with ASCC Tolerances for Suspended Concrete Slabs, unless part of a sloping floor or as otherwise noted.
   c. Fitness, Training, and Similar Rooms:
      1) Depressed floors shall be level to a tolerance of 1/8-inch in 10 feet.
      2) Verify that Fitness Room floors are recessed as specified in Section 096466 and as indicated on Contract Drawings.
   d. Exposed Floors in Utility Areas:
      1) Floor profile quality classification of Flat with a minimum FF15 and FL13.

3. Concrete Door Sills:
   a. Slabs Under Operable Partitions or Sound-Rated Accordion Doors: 1/8-inch from level along line under partition or door.

B. Levelness tolerances shall be measured within 72 hours after slab concrete placement.

C. Owner reserves the right to test floors and concrete members for conformance to ACI 117 - Tolerance Specifications by Use of the Dipstick Floor Profiler. Should tolerances not be within the limits specified, the Contractor shall be required to pay the cost of the tests, as well as the repairs required to bring work into compliance.

D. Correction Procedures:
   1. High spots on slabs which receive floor covering shall be ground down to meet specified tolerances.
   2. Low spots on slabs which are to receive floor covering shall be filled to meet specified tolerances.

3.05 FINISHING FLATWORK

A. Screeding: Work out irregularities and bring surfaces to true finish grade or elevation. Remove excess water and debris worked to the surface during compaction and screeding.

B. Initial Troweling:
   1. Do not commence troweling until surface water sheen has disappeared.
   2. Use wood bullfloats to open top of slab to allow bleed water out.
      a. Do not use metal floats.
   3. Do not apply dry cement, sand, or water to surface.
4. Slabs to Receive Mortar-bed with Topping or Bonded Finish: Upon completion of pour, and before concrete has hardened, texture surface of slab with stiff broom, or roughen surface.

5. Slabs to Receive Crack Isolation Membrane or Mortar-bed with Cleavage Membrane: Finish slabs with typical smooth troweled surface.

C. Final Troweling:
1. Interior Slabs: Steel trowel and burnish.
   a. Do not finish slab until bleed water has evaporated.
   b. Do not apply water to the concrete during finishing.
   c. Do not allow rain water to stand on slab.
3. Liquid Curing Compound: Where specified, apply in accordance with the requirements of this Section.
4. Sealer: Where specified, apply in accordance with the requirements of this Section.

D. Finish for Interior Stairs and Ramps:
1. Sprinkle abrasive aggregate uniformly on unhardened surface immediately prior to finishing, at the rate of 2 pounds per square yard. Work into surface during finishing. Rub lightly to expose abrasive aggregate while concrete is green.
2. Concrete walking surfaces shall have a minimum slip resistance coefficient of friction of 0.6 as tested in accordance with ASTM D 2047.
3. Stairs: Apply grooves and tooled edges to tread nosings in accordance with the Contract Drawings.
4. Warning Stripes: Apply 2-inch wide warning stripe of 70 percent contrasting color at top and bottom nosings of each run at interior stairs, 1 inch maximum from edge of nosing.
   a. Refer to Section 321313 and Section 321316 for exterior stairs.
5. Ramps, General:
   a. Provide medium broom finish.

E. Scratch Finish:
1. Consolidate, strike off, and level concrete, eliminating high spots and low spots.
2. Finish to 1/2-inch tolerance.
3. Roughen surface with stiff coarse broom before final set.
4. Locations:
   a. Surfaces scheduled to receive thick-set mortar beds or similar cementitious materials, except for thick-set mortar beds on cleavage membranes or on waterproofing membranes.

F. Float Finish:
1. After screeding, consolidating and straightening concrete slabs, do not work surface until ready for floating.
2. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats. The application of portland cement to slab during floating or troweling is prohibited.
3. Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and frill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

4. Finish to straightedge tolerance.

5. Cut down high areas and fill in low areas.

6. After restraightening, Refloat surface to uniform, smooth, granular texture.

7. Locations:
   a. Surfaces scheduled for trowel and broom finishes.
   b. Surfaces scheduled to receive adhered roofing or waterproofing membrane.
   c. Surfaces scheduled to receive thick-set mortar beds on cleavage membrane.

G. Trowel Finish:
1. After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

2. Finish to straightedged tolerance.

3. Locations:
   a. Surfaces scheduled to receive thin-set mortar beds, resilient flooring, carpet, and wood flooring.
   b. Exposed surfaces.
   c. Surfaces scheduled to receive paint or other thin film finish coating.

H. Medium Broom Finish:
1. Provide float finish and let set.

2. While surface is still plastic draw medium stiff fiber bristle broom uniformly over surface to provide texture perpendicular to main traffic direction.

3. Locations:
   a. Stair treads.

I. Heavy Broom Finish:
1. Provide float finish and let set.

2. While surface is still plastic draw stiff fiber bristle broom uniformly over surface to provide texture perpendicular to main traffic direction.

3. Locations:
   a. Ramps, loading yards, and trash pickup areas.

3.06 FINISHING FORMED CONCRETE

A. Surface Repairs: Repair surface defects, including defective areas and tie holes as recommended in ACI 301 Chapter 9.

B. Rough-Formed Finish: Cast concrete texture imparted by form-facing material, not arranged in any specific visual manner. Repair and patch tie holes and defective areas. Rub down or chip off fins and other projections exceeding 1/4-inch in height.

1. Apply to concrete surfaces not exposed to public view.
C. Smooth-Formed Finish: Cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Completely remove fins and other projections.
   1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
   2. Apply the following rubbed finish, defined in ACI 301 Chapter 10 Section 10.3, to smooth-formed finished concrete.
      a. Grout-cleaned finish.

D. Painted Finish: Entire surface area exposed to view shall be free of voids, cracks, spalls, protrusions, or non-uniform textures.
   1. Prior to sacking, prepare surfaces in accordance with Section 099100.
   2. Entire surface area of concrete exposed to view shall be repaired, resurfaced, and made ready to receive paint finish specified under Section 099100.
      a. Resurfacing of concrete panel surfaces shall be accomplished with specified resurfacing materials in accordance with manufacturer's instructions and the preparation and application procedures of ACI 503.4.
   3. Interior surfaces at window openings shall be ground smooth, resurfaced, and prepared to receive sealants.
      a. Resurface concrete sills, jambs, and heads with specified resurfacing, patching, and finishing materials in accordance with manufacturer's instructions.
         1) Interior surfaces at openings shall be ground smooth, resurfaced, and prepared to receive sealants.
   4. Finish repaired surfaces with primer and two coats of paint finish as specified under Section 099100.

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

F. Patching and Skim Coating: Refer to Article 3.16-B.

G. Sealing: Where indicated on Contract Drawings, treat vertical surfaces of exterior exposed formed concrete with sealer specified in this Section.
   1. Refer to Division 32 for sealing of concrete paving.

### 3.07 CURING FLATWORK

A. Slab Areas, General: Commence curing operations as soon as practicable after finishing operations without marring surfaces, and in any case, within 2 hours. Keep forms containing concrete in a wet condition until removed. Freestanding water is not acceptable before concrete set has occurred. Curing method shall be consistent with recommendations of ACI 308 at concrete slabs. Cure concrete with one of the following methods:
   1. Curing Compound, Slabs Over Metal Deck: Cure by completely and uniformly applying liquid curing compound in accordance with manu-
facturer's printed instructions. Apply at least two coats at right angles to each other.

a. Reapply curing membrane at saw cut joints and at exposed edges of slab after removal of forms.
b. Omit curing compound and use moisture curing where required to provide floor sealer.
c. Omit curing compound where curing/sealing compound specified provides a concurrent curing function and is applied at the time of concrete placement appropriate to such function.

2. Continuous Moisture: Cure by keeping concrete continuously wet for a period of at least 7 days after pouring in accordance with established ACI Guidelines for curing interior slabs to receive flooring finishes. During periods of high temperature, low humidity, or wind, wet concrete as often as required to keep concrete continuously moist for a period of at least 10 days. Cover with waterproof curing paper or reinforced vapor retarder, maintaining a film of water.

B. Ambient Conditions:
1. Hot Weather Curing:
   a. Conform to recommendations of ACI 305R regarding curing of concrete flatwork in hot weather.

3.08 SEALING FLATWORK

A. Sealed Concrete: Grind and clean floors prior to sealing.

B. Sealer/Dustproofer:
   1. Prepare substrates and spray apply curing sealer in accordance with manufacturer's directions.
   2. Locations:
      a. Mechanical rooms, main trash room, electrical rooms, and telephone rooms.
      b. Other locations where indicated or scheduled on Contract Drawings.

C. Sealing Concrete Paving: Refer to Division 32.

3.09 SEALING FORMED SURFACES

A. Formed Surfaces: Where indicated on Contract Drawings, treat vertical surfaces of exterior exposed formed concrete with sealer in accordance with specified sealer finish Type FSF.

3.10 CONTROL JOINTS

A. General: Locate form joints true to line and profile.

B. General: Locate form joints true to line and profile. Coordinate with location of slip dowel sleeves installed in Section 032000. Comply with the requirements of CBC 1906A.4.
   1. Tool edges with 1/4-inch radius tool to minimize possibility of spalling at exposed concrete.

C. Location: As indicated on the Structural Contract Drawings, but not more than 20 feet on centers in both directions at exterior slabs. Limit interior
slabs on grade to 400 square foot bays with length to width ratios of 1 to 1.5 maximum.
1. Locate on column center lines and at re-entry corners wherever practical.
   a. Avoid areas receiving tile or paver floor finish.
2. Coordinate locations with proposed floor finish joint layout.
3. Limit length to width ratios to 1 to 1.25.

D. Saw Cutting: Saw cut 1/8-inch wide by one-quarter depth of slab immediately after slab has attained its initial set.
1. Avoid saw cuts occurring in aisle ways where possible.

3.11 GROUTING

A. Grout: Provide required grouting with cement grout. Thoroughly puddle and rod to provide bond.
   1. Compressive strength of grout shall be tested in accordance with ASTM C 109.

B. Non-Shrink Grout: Install non-shrink grout properly beneath bearings of plates, columns, and other structural members using product recommended by manufacturer for specific application and in accordance with printed instructions.

3.12 FLOOR LEVELING

A. Apply floor leveling compound where required by work of other Sections.

B. At floor mat recesses, secure frame, and apply floor leveling compound to maintain proper depth for installation of walk-off mats.

C. Comply with manufacturer's installation recommendations.

3.13 EQUIPMENT BASES, PADS, CURBS, PITS, AND TRENCHES

A. Pour pits for valves and trenches. Pour bases, pads, and curbs for miscellaneous concrete items. Steel trowel surfaces hard, dense, and smooth with corners, intersections, and terminations rounded. Where structural details for minor structures listed above do not specify otherwise, walls, floors, and covers shall be 5 inches thick, reinforced with No. 3 bars at 12 inches on centers both ways at center of members.

3.14 FIELD QUALITY CONTROL

A. Tests: In accordance with Section 014500, perform tests and submit test reports. Sample fresh concrete in accordance with ASTM C 172, except modified for slump to comply with ASTM C 94.
   1. Slump: Test will be performed in accordance with ASTM C 143. One test will be made for each concrete load at point of discharge and one test for each set of compressive strength test specimens.
   2. Concrete Temperature: Test will be taken hourly when air temperature is 40 degrees F or below, and when 80 degrees F or above, and each time a set of compression test specimens is made.
   3. Curing: Cure specimens in accordance with ASTM C 31.
4. Frequency of Compressive Strength Testing: Test will be made in accordance with ASTM C 39, ACI 318, and CBC 1913A.10 and Table 1704A.4.

B. Special Inspection: Where slab concrete is based on a compressive design strength in excess of 2500 psi (CBC Section 1704A), provide the services of a Special Inspector in accordance with Section 014500 to observe the taking of test specimens and the placing of concrete. A complete and accurate record of these tests shall be kept by the Inspector.
   1. Require that each load of concrete or materials be accompanied by a signed copy of batch plant’s certificate stating the quantity of each material, amount of water, admixtures, departure time and date.

C. Moisture Vapor Emission Testing: After concrete slabs have cured and prior to installation of finish flooring materials, verify that moisture content and alkali content of concrete slabs do not exceed limits acceptable to manufacturer of flooring materials.
   1. Refer to Section 033542 for testing requirements.

D. Vapor Emission and Alkalinity Testing:
   1. Perform vapor emission and alkalinity testing and take appropriate action based on results in relation to finish floor manufacturer's moisture and alkalinity requirements.
      a. Refer to Section 033542 for remedial procedures.

3.15 DEFECTIVE CONCRETE

A. Mix Proportions: If ultimate compressive strength of test cylinders fall below minimum assumed in design, evaluate current operations and adjust proportions of concrete mixes for remaining portion of structure to produce concrete of desired design strength.

B. Test Cores: Should required test cylinders fail to show minimum design compressive strength, take test cores at locations designated by Structural Engineer.
   1. If results show compressive strength to be less than design stress, concrete shall be deemed defective and shall be replaced in a manner acceptable to the Structural Engineer and the Building Department. Contractor shall pay costs of patching.
   2. If results show compressive strength to conform to design stress, drypack coring holes and finish to match adjacent surface.

C. Concrete work not formed as indicated, not true to intended alignment, not plumb, level, or true to intended grades, cracked, with embedded sawdust or debris, and not fully conforming to the provisions of these Specifications, shall be deemed defective. Remove defective concrete from the job site and replace with concrete complying with specified requirements.

D. Concrete substrates for non-breathable floor finishes that indicate by testing excess quantities of moisture and alkalinity shall require remedial measures, as specified in this Section.
3.16 PATCHING FORMED CONCRETE

A. Patching Exposed Concrete: After flushing with water, pack tie wire, nail, bolt, and core sample holes which will be exposed as soon as possible after form removal. Grout and repair rough pockets, cracks, or honeycomb. If patches are required, chip defective areas to a uniform depth of at least 1 inch with sides at right angles to surface. Match surrounding concrete surfaces in color and texture. Make trial patch to determine color match. Before applying, moisten surrounding concrete and apply specified bonding compound.

1. Smooth Formed Concrete: Grind off ridges, offsets, and other prominent marks of smooth formed concrete while concrete is green, and grind smooth. Sack exposed concrete surfaces.
   a. Painted concrete shall be considered as being exposed.

2. Patch defects deeper than 1/2-inch in panels with specified patching material and methods deemed by the Architect as the appropriate method to correct such defects.

B. Skim Coating: Apply to architectural formed cast-in-place concrete walls in accordance with manufacturer's instructions.

1. New concrete must be cured 28 days.
2. pH must be verified prior to skim coating application to determine if primer needs to be applied, as required by manufacturer.
3. Clean concrete in accordance with ASTM D 4258.
4. Mixing Skim Coat:
   a. Add to water, adding only enough to make a stiff trowelable consistency like soft putty.
   b. Add color additive.
   c. Working Time: Approximately 15 minutes.
5. Apply to walls with trowel in smooth uniform coat in continuous operations to maintain a uniform shade.
6. Patching: Broad deep areas in concrete surface shall be filled with skim coat material in accordance with manufacturer's directions prior to application of skim coat. Where surfaces are shiny smooth, apply manufacturer's Type II bonding agent.

C. Patching Unexposed Concrete: Ridges, offsets, and other prominent marks need not be ground off, cleaned, or sacked. This requirement applies to concrete areas that will be concealed by other construction.

1. Finish below-grade concrete indicated to receive waterproofing in the same manner as exposed, smooth-formed concrete, except that surfaces need not be sacked.
2. Patch and repair concrete slabs ready to receive future finish materials installed by Owner.

D. Patching Formed Concrete Used in Landscape Work: Site concrete with imperfections shall be removed and replaced with acceptable concrete. Patching is not acceptable.
3.17 CLEANING

A. Wash and clean flatwork surfaces. Leave free from oil, paint, plaster, form coating, and other foreign substances, ready to receive scheduled finishes.

END OF SECTION
POLISHED CONCRETE SURFACE FINISHING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Applying hardener/sealer/color/dye protection and polishing concrete to specified gloss level.

B. Related Work:
   1. Section 012500 - Substitution Procedures.
   2. Section 013113 - Project Coordination.
   3. Section 013300 - Submittal Procedures.
   4. Section 014339 - Mockups.
   5. Section 014500 - Quality Control.
   7. Section 033100 - Structural Concrete.

C. Mockups: The work of this Section may be affected by mock-up requirements described in Section 014339.

1.02 REFERENCE STANDARDS

A. ASTM International (ASTM):
   1. C 779-12 - Test Method for Abrasion Resistance of Horizontal Concrete Surfaces
   2. C 805-13 - Test Method for Rebound Number of Hardened Concrete.
   7. F 1869-16a - Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
B. California Code of Regulations (CCR):
      a. Chapter 11b - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-302 - Floor or Ground Surfaces.
         2) Division 4 - Accessible Routes.
            a) Section 11B-403 - Walking Surfaces.

C. California Code of Regulations (CCR):

D. American Concrete Institute (ACI):
      a. 117 - Specification for Tolerances for Concrete Construction, Section 4.5.6.
      b. 302.1R - Guide for Concrete Floor and Slab Construction, Chapters 8-11.
      c. 310R - Guide to Decorative Concrete, Section 7.2.

E. American National Standards Institute (ANSI):
   1. A137.1-2012 - Ceramic Tile.

F. American Society of Concrete Contractors (ASCC).
   1. D100 - Series Definitions.

G. Concrete Sawing and Drilling Association (CSDA):
   1. BP-015 - Green Polishing and Grinding Practices.
   2. ST-115 - Measuring Concrete Micro Surface Texture.

H. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. ASCC Finished Gloss Levels:
   1. Level Three: Medium to high gloss, semi-polished with objects being reflected not quite sharp and crisp, but can be easily identified.

B. ASCC Aggregate Exposure:
   1. Class B: Fine aggregate (salt and pepper), with an approximate surface cut depth of 1/16-inch, providing an exposure with little or no medium aggregate exposure at random locations.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
B. Preinstallation Conference:
   1. Conduct conference at project site to comply with requirements in Section 013113, and as follows:
      a. Required attendees include the Owner, Architect, General Contractor, polished concrete system Installer, and polished concrete system manufacturer's representative.
      b. Review slab finish requirements, F-numbers and finishing practices.
      c. Review of System requirements, including drawings, specifications and other contract documents.
      d. Review of mock-up location, size and equipment. See mockup requirements in this Section.
      e. Review and finalization of installation schedule, and verification of availability of required materials, trained Installer personnel, equipment and facilities to execute specification and avoid delays.
      f. Limit access to work area by other trades to reduce possible damage to the floor before, during and after completion. To include no pipe cutting on floor.
      g. All lifts must be diapered to prevent drips or staining.
      h. Review of required inspection, testing, certification and material usage accounting procedures.
      i. Review of power requirements and responsibility.
      j. Review of temporary protection requirements during and after installation.
      k. Review of manufacturer's written recommendations for cleaning procedures during and after installation.

1.05 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data:
   1. Submit special concrete finish manufacturer's specifications and test data.
   2. Submit special concrete finish describing product to be provided, giving manufacturer's name and product name for the specified material proposed to be provided under this section.
   3. Submit special concrete finish manufacturer's recommended installation procedures, which when approved by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the work.
   4. Submit special concrete finish technical data sheet giving descriptive data, curing time, and application requirements.
   5. Submit special concrete finish manufacturer's Material Safety Data Sheet (MSDS) and other safety requirements.

C. Samples:
   1. Each floor has its own unique appearance when completed. Manufacturer's lab samples are supplied only to show a smooth shiny surface. The final appearance of the finished floor cannot be guaranteed to match a sample due to the natural variations in concrete.
D. Qualification Data:
   1. Provide letter of certification from concrete finish manufacturer stating that installer is a certified applicator of special concrete finishes, is familiar with proper procedures and installation requirements required by the manufacturer, meets the qualifications as specified, and is eligible for manufacturer’s warranty.

E. Test Reports:
   1. Provide certified test reports, prepared by an independent testing laboratory, confirming compliance with specified performance criteria.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.07 CLOSEOUT SUBMITTALS

A. Maintenance Data: Provide manufacturer’s instructions for maintenance of installed work, including methods and frequency recommended for maintaining optimum condition under intended use. These instructions shall contain precautions against cleaning products and methods that may be detrimental to finishes and performance.

1.08 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. Qualified in accordance with Section 014500 for system specified.

B. Installer Qualifications:
   1. Use a certified installer and adequate number of skilled workmen who are thoroughly trained and experienced in the necessary craft.
   2. A factory-trained, competent supervisor must be maintained on site during all times during which specified work is performed.
   3. The special concrete finish manufacturer shall certify applicator.
   4. Applicator shall be familiar with the specified requirements and the methods needed for proper performance of work of this Section. Applicator must have availability of proper equipment to perform work within scope of this project on a timely basis.
   5. Applicator shall have successfully performed a minimum of five projects of at least 5000 square feet each.

C. Manufacturer’s Certification:
   1. Provide letter of certification from concrete finish manufacturer stating that installer is a certified applicator of special concrete finishes, and is familiar with proper procedures and installation requirements required by the manufacturer.
D. Mockups: Provide mockups in accordance with the quality requirements of Section 014339.

1. Before performing the work in this Section, an on-site mockup representative of specified process, surface, finish, color and joint design/treatments must be installed for review and approval. These mockups shall be installed using the same installer personnel who will perform work. Approved mockups may become part of completed work, if undisturbed at time of substantial completion.

2. For each type finish, demonstrate typical joints, surface finish, color variation (if any), and standard of workmanship.
   a. Construct mockups approximately 5 feet x 5 feet in a location directed by the Architect.
   b. Refer to Section 014339 for mockup requirements.

E. Source Control: Provide primary products produced by a single manufacturer. Provide secondary products acceptable to manufacturer of primary products.

1.09 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand name and directions for storage.

B. Dispense special concrete finish material from factory numbered and sealed containers. Maintain record of container numbers.

C. Handle products in accordance with manufacturer’s printed recommendations.

1.10 FIELD CONDITIONS

A. Ambient Conditions:
   1. Comply with manufacturer’s written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting topping performance.
      a. Concrete shall have a Floor Flatness rating of at least 40.
      b. Concrete shall have a Floor Levelness rating of at least 40.
      c. Concrete shall be cured a minimum of 28 days or as directed by the manufacturer before application of polishing concrete slabs can begin.
      d. Polishing operations shall take place 10 days prior to installation of equipment and Substantial Completion, thus providing a complete, uninhibited concrete slab for application.

B. Close areas to traffic during floor application and after application, for time period recommended in writing by manufacturer.

C. Dispose of slurry and finish by products in compliance with applicable codes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design-Basis Manufacturer of Polishing System:
B. Acceptable Manufacturers of Accessory Products:
      a. Contact: Jason Bye (888)736-7550, jbye@rochester.rr.com.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with applicable codes and regulations of governmental agencies having jurisdiction, including applicable requirements for accessible access contained in local governing agency security ordinances, and applicable federal access laws.
   2. Slip Resistance Comply with CBC Section 11B-302 and CBC Section 11B-403 for slip resistance.
      a. Polished concrete floors shall be tested in accordance with ANSI B101.3 and achieve a Slip Resistance Potential rating of not less than 0.60 for level surfaces or inclined surfaces.
         1) Refer to Article 3.05 for testing method.

B. Comply with recommendations of the Concrete Polishing Association of America.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Indoor Environmental Quality: For additional information on LEED requirements, refer to Section 018113.
   1. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      a. Concrete Sealers: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

B. Sustainability Characteristics: Concrete curing compounds, sealers, and hardeners shall comply with low VOC requirements of the BAAQMD.

2.04 PERFORMANCE CRITERIA

A. Performance Criteria:
   1. Abrasion Resistance: ASTM C 779; up to 400% increase in abrasion resistance.
   2. Impact Strength: ASTM C 805; up to 21% increase impact strength.
   3. Ultra Violet Light and Water Spray: ASTM G 153; no adverse effect to ultra violet and water spray.
   4. Reflectivity: Up to 30% increase in reflectivity.
2.05 SYSTEM DESCRIPTION

A. Concrete Finish: Proprietary stain-resistant, UV-resistant, water-based, odorless, VOC-compliant, and environmentally safe chemical hardener, penetrating sealer, and densifier equal to ULTRAFLOR Polished Concrete System, or equal.
   1. Appearance: Class B aggregate exposure with Level 3 finished gloss as defined in Article 1.03.

2.06 MATERIALS

A. Concrete Mix: Refer to Section 033100 for concrete mix.
   1. Natural cement without color pigments.

B. Hardening/Sealing Agent: Water-based proprietary stain-resistant, UV-resistant, water-based, odorless, VOC-compliant, and environmentally safe lithium-silicate chemical hardener, penetrating sealer, lithium densifier, and color dye solution for polishing concrete floors. Use products that do not require maintenance reapplication of silicate or of a sacrificial coating.
   1. Design-Basis Product: Diamatic Flor-Sil Lithium Hardener Densifier for Standard Concrete.

C. Hardening/Sealing/Stain-Resisting Agent: Water-based potassium silicate hardener and stain-resistant hardener. One of the following:

D. Joint Sealants: As recommended by manufacturer.
   1. Design-Basis Products:
      a. Versaflex 100% solids polyurea joint fillers.
         1) SL/75, SL/85, SL/90.
      b. Metzger McGuire 100% solids polyurea joint filler
         1) Spal-Pro RS 88 Rapid Set Polyurea Joint Filler
      c. Hi Tech Systems Polyurea elastomeric Joint Filler
         1) HT-PE85 MI Flexible Joint Filler.

E. Sealer: As recommended by polished concrete system manufacturer.

F. Floor Repair Material: Liquid silicate material to fill and repair concrete surface imperfections, applied at appropriate time during the polishing process. One of the following, or equal:
   1. CP Concrete Patch manufactured by Ardex Engineered Cements.

G. Unreacted Silicate Rinse: Liquid rinse solution.

2.07 RELATED MATERIALS

A. Water: Potable.

B. Neutralizing Agent: Tri-sodium phosphate or baking soda.

C. Compatible curing agent recommended by polished concrete system manufacturer.
PART 3 - EXECUTION

3.01 EQUIPMENT

A. Scrubber Machines: Equal to the following:
   1. Concrete Polish Equipment and Tooling Diamatic BMG 780 Grinder.

B. Polishing Pads:
   1. Polisher/Burnisher: Equal to Diamatic Micro Polisher.
   2. Stripper Pad: Equal to 3M 7300 Black Stripper Pad, 3M 6800 Red Cleaner Pad, or 3M 5300 Blue Cleaner Pad.

3.02 EXAMINATION

A. Examine concrete substrate, with installer present, for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Do not proceed until unsatisfactory conditions are corrected.

B. Verify that base slab meet finish and surface profile requirements in Section 033100.

C. Prior to application, verify that floor surfaces are free of construction laitance.

D. Verify that the floor has not been exposed to the elements. If weather damage has occurred, additional grinding will be required.

E. Verify that existing concrete has cured a minimum of 28 days before and meets the requirement of 3000 psi and 100 pcf before commencing polishing methods.

F. Conduct preinstallation conference, in accordance with Article 1.04.

3.03 PREPARATION

A. Protect adjacent surfaces from damage, on the immediate floor area, or the floor levels below. Tape and protect areas adjacent to work areas.

B. Remove contamination of the slab by soil, foot prints, drag marks, welding marks, hydraulic fluids, or any other outside contaminant will required additional treatment or grinding.
   1. Refer to Article 3.07 for protection requirements.
      a. Petroleum stained concrete must be removed and replaced.
   2. Crack repair shall be completed after the first metal bond diamond grind and floor cleaning.
      a. Cracks shall be repaired in the concrete surface shall be a minimum depth of 3/8" and made to eliminate any feathered edges.
      b. Fill the crack chased areas with polishable repair mortar.
         1) Design-Basis Product: Diamatic Ultraflor PRM-16.
         2) Cracks shall be overfilled and broadcast to refusal with play sand or concrete shavings, and shall be subsequently ground down to the level of the concrete surface.
         3) Crack filling material shall installed and allowed to cure in strict accordance with the manufacturer’s recommendations before proceeding with the next step in the Ultraflor process.
C. Joint Fill (Indoor):
   1. All joint fill materials shall be installed in accordance with the written instructions provided in the approved manufacturer's technical data.
   2. For the best results all joints should be filled before or after the first pass of metal bonded diamonds, but before any further grinding continues.
   3. If the joint filling will occur after the polishing process, apply soap or another product as instructed by the manufacturer to the edge of the concrete to prevent staining the concrete surface.

3.04 APPLICATION

A. Floor shall be prepared for polishing application with specified diamond grinding steps, followed by the application of hardener/sealer agent and final polishing steps. Note that the exact number of grinding and polishing steps required will be determined by the flatness achieved by the concrete finisher, along with the desired look that is specified by the Architect and Owner.
   1. Gloss readings shall not be obtained through the use of microfilming products, sealers, coatings, enhancers, or as the result of resin transfer from resin bond abrasives.
      a. Readings shall be taken not less than 10 feet on centers in field areas and within 1 foot of floor area perimeters. In no case shall a reading be below 2% of specified minimum sheen:
   2. Class B Aggregate Exposure, Level Three Gloss (high gloss) 400-grit finish shall be produced as follows:
      a. 150 grit metal bonded diamonds, 50 grit resin diamonds, 120 grit resin diamonds, 220 grit resin diamonds, hardener/sealer, 400 grit resin diamonds.
      b. Exposed aggregate with Level Three Gloss Finish requires the addition of 40 grit metal bonded diamonds and 60 grit metal bonded diamonds as the beginning steps.
   3. Commence floor finish applications in presence of manufacturer's technical representative.
   4. Follow special concrete finish published manufacturer's installation instructions.
   5. Match workmanship of field sample approved by Architect.

B. Edges Polish edge work areas with a 5" or 7" Diamatic Hand Held or Walk Behind polishing tool. Employ the same edge polishing process and corresponding steps specified for the desired gloss level. Each edge polishing step shall be done immediately after the same main polishing step at the adjacent area.
   1. Complete grinding and polishing with grinder/polisher equipment connected to a dust collector.

C. Joints Filled After Polishing: Fill joints with joint sealant as recommended by manufacturer. Match color of adjacent polished concrete.

D. Sealing, Hardening, and Polishing of Concrete Surface:
   1. Concrete must be in place a minimum of 28 days or as directed by the manufacturer before application can begin.
2. Application is to take place at least 10 days prior to racking and other in-store accessory installation, thus providing a complete, uninhibited concrete slab for application.

3. Only a certified applicator shall apply hardener/sealer. Applicable procedures must be followed as recommended by the product manufacturer and as required to match approved mockup.

4. Achieve waterproofing, hardening, dust-proofing, and abrasion resistance of the surface without changing the natural appearance of the concrete, except for the sheen.

5. Tolerance: Finish to within 1/2" of vertical surfaces where practical.
   a. Polish to pre-determined level based on mockup.

E. Color and Stain-Resistance: Install concrete color dye to integrally color the concrete during the polishing process.
   1. Apply and tape non-absorbent paper at adjacent areas to protect from overspray.
   2. Spray-apply polished concrete with color dye in three uniform coats at end of the polishing process in accordance with manufacturer's directions. Let each coat dry between coats. Do not broom color dye.
      a. Polish between coats where recommended by concrete polishing applicator.
   3. Spray-apply sealer in two light coats in accordance with manufacturer's directions.
      a. Burnish between coats as recommended by concrete polishing applicator.

3.05 FIELD QUALITY CONTROL


B. Bonded abrasive polished concrete floors shall be tested for slip resistance by measuring the wet dynamic coefficient of friction using an approved tribometer according to ANSI B101.3 Test Method for Measuring Wet DCOF of Common Hard Surface Floor Materials and shall achieve a Slip Resistance Potential rating of Acceptable (not less than 0.30 for level surfaces or inclined surfaces), as recommended by the Concrete Polishing Association of America (CPAA).

C. Test Reports: Provide field quality control sheen gloss reading and static coefficient of friction test results conducted as specified and recorded on floor plan diagram confirming compliance with specified performance criteria.

3.06 CLEANING

A. The premises shall be kept clean and free of debris at all times.

B. Remove spatter from adjoining surfaces, as necessary.

C. Repair damages to surface caused by cleaning operations.

D. Remove debris from jobsite
   1. Dispose of materials in separate, closed containers in accordance with local regulations.
3.07 PROTECTION

A. Protect finished work until fully cured in accordance with manufacturer’s recommendations.
   1. Take precautions to prevent petroleum stains from the concrete surfaces to be exposed. Since no known satisfactory chemical or cleaning procedure is available to remove petroleum stains from concrete, stained concrete shall be removed and replaced.
      a. Hydraulic powered equipment must be diapered to avoid staining of the concrete.
      b. No trade shall park vehicles on the interior floor slabs. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
      c. No pipe cutting machine shall be used on the interior floor slabs.
      d. Steel shall not be placed on interior floor slabs to avoid rust staining.
      e. Equipment must be equipped with non-marking tires.
   2. Avoid moisture and standing water for 72 hours after installation. Don’t place protective plastic sheeting, rubber matting, or rugs that prevent proper drying.
   3. If finished at 120 grit level, Contractor shall protect finished areas from excessive or standing water for a period of 30 days.

B. Protect the finish with substantial covering recommended by Applicator. If construction equipment must be used on these substrates, diaper all components that may drip fluids.

C. Allow light pedestrian use only until 24 hours after installation. Normal traffic may resume 7 days after completion of concrete topping system.

3.08 MAINTENANCE

A. Initial Maintenance:
   1. Restrict using water on the surface for 72 hours after initial installation. The surface should not be cleaned using a string mop for 60 days to avoid streaking of the Flor-Finish. Avoid using mats or treated coverings for a minimum of 14 days to allow the finish to fully cure.
      a. Once the system is fully cured out (minimum 72 hours), routinely sweep, dry mop, use of a high quality micro-fiber dust mop is the best method. Flor-Clean Neutral pH Daily Cleaner may be used when soils or stains must be removed. Any standing water should be removed immediately after cleaning.
      b. An auto-scrubber may be used if equipped with a vacuum system to remove any standing water. The equipment tank should use Flor-Clean diluted in clean water. The scrubber should be equipped with a soft pad only, do not use a brush attachment.

END OF SECTION
- SECTION 033542 -

CONCRETE SEALING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Sealing of interior cast-in-place concrete slabs, where scheduled.
   1. Include vapor emission and alkalinity testing procedures and control systems for concrete slabs covered with non-breathable floor coverings (such as thinset ceramic tile, resilient flooring, sheet vinyl, carpet, and resinous coatings) applied directly to concrete slabs on grade.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 033100 - Structural Concrete: Coordination with requirements for surface preparation, finishing, and curing of concrete slabs.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. F 710-11 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   3. F 1869-11 - Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

B. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Vapor Emission and Alkalinity Criteria and Control: Determination of water vapor emission and alkalinity levels in concrete slabs with non-breathable floor finish materials, and prescribed treatment systems to provide permanent control where maximum levels allowable by manufacturers of floor are exceeded.
   1. Where non-breathable floor finish products are specified, provide specified treatment to reduce vapor emission levels to maximums required by the manufacturer of the proposed products.
1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with applicable procedural requirements of Section 018113.

B. Refer to Section 033100 for vapor retarders applied under concrete slabs.

1.05 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Warranty Documentation: Submit copy of actual warranty for review by Architect.

C. Sustainable Design Submittals:
   1. Product Data for EQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.06 QUALITY ASSURANCE

A. Qualifications: Specifically trained, and licensed, certified, or otherwise approved in writing by the sealer manufacturer.

1.07 FIELD CONDITIONS

A. Environmental Requirements: Apply materials under environmental conditions no less stringent than those stipulated by the manufacturer.
   1. Do not apply concrete sealing materials when the surface or ambient temperature is below 40 degrees F.

1.08 WARRANTY

A. Vapor Emission Sealer: Warrant concrete sealer to be free from manufacturing defects for a period of 15 years. Applications completed by an approved installer in accordance with published technical data will be warranted for the suppression and control of water vapor emission, alkalinity, and relative humidity from concrete during the warranty period.

B. Sealer Finish: Upon completion of the work of this Section, and as a condition of its acceptance, furnish Owner with manufacturer's standard written warranty signed by an officer of the manufacturer's firm and co-signed by an officer of the applicator's firm, under which:
   1. Surfaces to which the product was applied under this Section are warranted to remain waterproof; and...
   2. The manufacturer agrees to provide materials required to maintain such surfaces in the warranted condition for a period of 5 years commencing on the date on which the product was applied; and...
   3. The applicator agrees to provide labor and equipment required to maintain such surfaces in the warranted condition for a period of 5 years commencing on the date on which the material was applied; and...
   4. The warranted materials, labor, and equipment shall be provided at no additional cost to the Owner.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   2. Euclid Chemical Company, Cleveland, OH (800)321-7628.
   5. Sonneborn Building Products, Hayward, CA (415)889-9899.

B. Materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or the products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with rules of the governing air quality management district covering architectural coatings. Product shall meet volatile organic compounds (VOC) requirements applicable at time of application.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. EQ Credit 4.1 Low-Emitting Materials, Adhesives an Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
   2. Concrete curing compounds, sealers, and hardeners shall comply with low VOC requirements applicable at time of application.
      a. Concrete sealers applied within the building interior shall have no more than 100g/L VOC content.

2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Provide a product that enhances the physical characteristics of concrete to not less than the degree noted:
   1. Weatherometer Test Exposure: 500 hours with no visible film failure.
   2. Wet/Dry Cycle: 200 hours with less than 1 percent absorption factor.
   3. Hydrostatic Pressure: Less than 1 percent gain in 8 hours under 20 psi pressure.
2.05 MATERIALS

A. Corrective measures and sealers shall be compatible with all types of floor covering products and systems specified for the Project.
   1. Note: In locations where concrete slabs meet manufacturer requirements for vapor emissions and alkalinity at time of installation, corrective measures will not be required.

B. Vapor Emission Sealer: For use on concrete slabs on grade that do not meet manufacturer's specific moisture emission and alkalinity limits for non-breathable floor finishes:
   2. Diamond VRS, manufactured by Diamond Stone Products.
   3. VC5, manufactured by Sinak Corporation.

C. Sealer Finish Type SC: For general use at exposed concrete slab areas for appearance where indicated on drawings.
   1. Design is based on the use of high solids, minimum 25% non-yellowing water-based acrylic cure/sealer conforming to ASTM C 309, Type 1, Class B and ASTM C 1315 Type 1, Grade B, low VOC compliant meeting all local air quality regulations, equal to one of the following products:
      a. Euclid Aqua Cure VOX Super, manufactured by Euclid Chemical Co.
      b. Dress & Seal WB30, manufactured by L&M Construction Chemicals.
      c. Kure-N-Seal W30, manufactured by Sonneborn Building Products.
      d. VOComp 25, manufactured by W.R. Meadows.
      e. HLQ-125, as manufactured by Sinak Corporation.
   2. Product shall be in compliance with volatile organic compounds (VOC) content limits required by air quality management district at the time of performance of the work.

PART 3 - EXECUTION

3.01 MOISTURE TESTING EQUIPMENT

A. Acceptable Manufacturers:
   1. American Moisture Test, Inc.

3.02 EXAMINATION

A. Preapplication Testing: Owner's independent testing laboratory shall conduct vapor emissions testing using anhydrous calcium chloride test kits in accordance with ASTM E 710 and ASTM F 1869. Test methods based on ASTM F 2170 using RH meters may be used at testing laboratory's option.
   1. Test interior slab areas to be covered with non-breathable floor covering (such as thinset ceramic tile, resilient tile, sheet vinyl, linoleum, carpet, and resinous coatings).
2. Vapor Emissions Pre-Testing: Test interior slab-on-grade surfaces scheduled to receive non-breathable floor covering to establish vapor emission and alkalinity levels.
   a. Test interior slabs-on-grade prior to finish flooring installation and after the building is enclosed, the HVAC system has begun operation, and the spaces to receive finish flooring are brought to an environmental condition matching the designed conditions of use.
   b. Conduct tests according to procedures described in Article 3.05-Field Quality Requirements.

3.03 PREPARATION

A. Protection:
   1. Mask finished surfaces adjacent to application area.
   2. When applying near glazing, mask glass.
   3. Avoid contact with plant life, glass, aluminum, and other finished surfaces. Where contact occurs, immediately wipe with a damp cloth or flush with water.
   4. Mask materials adjacent to floor area to be shot blasted.

B. Surface Preparation:
   1. New concrete shall be cured for at least 28 days in warm weather prior to application.
   2. Sweep areas to be treated, using a fine bristle broom, or hose off with water and let dry to remove all surface dust and dirt.
   3. Free the surface from oil, grease, dirt, or other contaminants which would inhibit penetration of the product into the pores of the concrete.
   4. Confirm by instrument measurements that interior moisture content of concrete slab does not exceed 15 percent.
   5. Shot blast areas to be treated with sealer with № 420 shot to form an ICRI № 4 profile for optimum product penetration.

C. Final surface shall be compatible with flooring adhesives proposed for use, and smooth without transitions. Use specified primers and a minimum of 1/8-inch thick tapered cement fill as required to repair non-compatible conditions.

3.04 APPLICATION

A. Apply sealer in accordance with the manufacturer's recommendations.

B. After pre-testing, where vapor emissions and alkalinity tests do not meet floor finish manufacturer requirements for non-breathable floor finishes, apply specified penetrant in strict compliance with the manufacturer’s written instructions, allowing for the proper drying time.
   1. At areas to receive non-breathable floor finish materials, extend curing time of concrete slabs, provide multiple coats of penetrant, or both, as required to reduce water vapor emissions and alkalinity to levels acceptable to floor finish material manufacturers.

C. Application: On cured concrete surfaces, saturate the surface with sealer at the rate recommended by manufacturer.
   1. If dry spots appear, broom excess material onto the dry spots or respray them immediately.
2. Keep the entire surface wet with the sealer for 30 minutes. Broom or squeegee the excess material from low spots to the high areas and puddle so it will be absorbed into the surface.

3. If, after 30 to 40 minutes, the majority of the material has not been absorbed into the surface, remove excess material from the surface.

3.05 Field Quality Requirements

A. Validation Testing:
   1. Vapor Emissions Validation Testing: After application of the vapor emissions and alkalinity control system, test all interior slab-on-grade surfaces which received the system to establish system performance.
      a. The Owner’s independent testing will conduct vapor emissions testing using anhydrous calcium chloride test kits in accordance with ASTM E 710 and ASTM F 1869, or using relative humidity meters in accordance with ASTM F 2170.
      b. At a minimum, test interior slabs-on-grade prior to finish flooring installation and after the spaces to receive finish flooring are brought to an environmental condition matching the designed conditions of use.
      c. Provide test kits at the rate of three kits per 1000 square feet and one additional test kit for each additional 1000 square feet or portion thereof. For validation, provide one test kit placed beside every sixth test kit. Optionally, conduct relative humidity tests in accordance with RH meter manufacturer’s recommendations.
   2. Alkalinity (pH): Conduct pH tests at each calcium chloride test using a pH pencil. For greater accuracy, conduct pH tests with ExStik pH Meter manufactured by Extech Instruments Corporation, or equal.

B. Vapor emission test readings shall not exceed those required by the published standards of the finish flooring manufacturers. In general, acceptable criteria requires that vapor emissions not exceed levels from 3 to 8 pounds, although actual requirements for various manufacturers may vary.

C. If the validation test vapor emission and pH readings exceed the requirements of the finish flooring manufacturer, the Contractor shall provide remedial materials and labor, at no additional cost to the Owner, to bring vapor emissions and pH within acceptable limits.

3.06 Adjusting

A. After a period of 24 to 48 hours, spray sealed surface with water to determine water repellency. To accommodate variations in porosity of the surface, apply a second coat in the affected locations.

END OF SECTION
1.01 SUMMARY

A. Section Includes: Precast concrete specialties including treads.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 033100 - Structural Concrete: General requirements for concrete materials.
   6. Section 042200 - Concrete Unit Masonry: Mortar for setting concrete splashblocks.
   7. Section 051200 - Structural Steel Framing.
   8. Section 055100 - Metal Stairs.
   9. Section 079200 - Joint Sealants.

1.02 REFERENCE STANDARDS

A. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 5 - General Site and Building Elements.
            a) Section 11B-504 - Stairways.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with construction waste management requirements specified in Section 017419.

B. Comply with applicable procedural requirements of Section 018113.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of precast concrete.
D. Samples: In accordance with the provisions of Section 013300, submit the manufacturer's standard palettes for selection of color and texture.
   1. When selection has been made, submit samples of precast concrete tread finish not less than 12 inches by 12 inches in size for review and acceptance.

E. Quality Control Submittals: Submit the following:
   1. Design Data: Submit structural calculations for precast concrete specialties confirming the ability of such assemblies to safely support code required loads. Calculations shall be prepared and stamped by a State of California licensed professional engineer.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Sustainable Design Submittals:
   1. Product Data and Certification Letter for Credit MR 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for Credit MR 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

A. Field Samples: Prior to other work of this Section, prepare samples at a location on the building where indicated by the Architect.
   1. Provide one field sample for each type of precast unit used in the work.
   2. Show method of bedding, grouting, cleaning, and other aspects of the work of this Section to the quality specified.
   3. Make necessary adjustment in the field samples as required by the Architect.
   4. Field samples, when accepted by the Architect, shall be used as a basis for comparison with the remainder of the installation of the work of this Section.
   5. Upon acceptance by the Architect, the field samples may be actual portions of the finished work of this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design is based on the use of products manufactured by the following:
   2. JCF and Associates, Orange, CA (714)541-8888.
   4. Dura Art Stone, Fontana, CA (909)350-9000.
   5. Quick Crete Products, Norco, CA (909)737-6240.
B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of another manufacturer accepted in advance in accordance with Section 012500.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 4: Use materials with recycled content that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
      a. Provide primary materials containing at least 10 percent by weight of post-consumer and pre-consumer recycled content.
   2. MR Credit 5: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for 10 percent of the total materials value.
      a. Give preference to products manufactured and of primary raw materials extracted/recovered within 500 mile radius of Project site.

2.03 DESIGN CRITERIA

A. Design Requirements: Units shall be designed as required to support loads imposed by building elements bearing upon the precast elements, as well as consideration of transportation and installation loads.

2.04 MATERIALS

A. Materials for precast concrete units shall comply with the general requirements of Section 033100, cast from 5000psi hard rock concrete Type III cement.

B. Setting Bed Materials: In accordance with Section 042200.

C. Anchors: As required by Contract Structural Drawings for each size and shape.

D. Sealer: Stand-Off series of protective treatment products, as applicable, as manufactured by ProSoCo, Inc.

E. Sealant: As specified in Section 079200.

2.05 TREADS

A. Precast Concrete Treads and Risers: Equal to Steptread system for steel frame construction as manufactured by Stepstone, Inc.

B. Fabrication:
   1. Treads and Risers: Precast concrete with tooled edge nosing as indicated on Contract Drawings. System shall include hot-dipped galvanized concealed and recessed angle support connection and fasteners. Reinforce with zinc plated welded rebar reinforcing cages.
      a. Provide closed risers with beveled toe space in accordance with CBC 11B-504 accessibility regulations.
2. Risers: Provide 16 gage galvanized sheet steel risers with toe space as required by regulations for disabled persons, and secured with non-ferrous fasteners.
3. Risers: Refer to Section 055100 for sheet metal risers.

C. Finish: Top, and front & rear nosings shall be. Exposed ends and bottoms shall be steel form finish with voids filled and sacked smooth.
D. Finish: Top, and front & rear nosings shall be acid etched finish. Exposed ends and bottoms shall be steel form finish with voids filled and sacked smooth.
   2. Provide contrasting color stripe at each nosing.

2.06 FABRICATION

A. Shape precast concrete units to size and configuration as indicated on Contract Drawings.
   1. The pertinent design as indicated on the Contract Drawings is considered satisfactory for cast-in-place concrete, but does not provide for stresses incurred in factory precasting, transporting, and erecting.

B. Reinforce precast concrete units to resist forces of transportation and installation.

C. Tool edges as detailed. Include concealed galvanized angle support and threaded sleeves for connections. Reinforce with zinc coated reinforcing mesh.

D. Surface shall be treated with acid etched finish.

E. Surface Sealing: Apply specified surface sealer in accordance with the manufacturer's recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install work in accordance with the manufacturer's submittals, as accepted.

B. Install precast units secured to steel stair framing as indicated on Contract Drawings.

C. Install precast units with full bed joints.
   1. Provide 3/8-inch concave tooled joints.
   2. Solidly fill cavity with grout, taking care to fully embed reinforcement.
   3. Spot bed with mortar around anchors in cavity areas, as the work progresses, completely covered in and around all ties.
   4. Do not exceed a thickness of 10 inches between the surface of the backing area and the outside face of the veneer.

D. Anchor Systems: Install with anchor systems as indicated on Contract Drawings.
E. Grouting:
1. After precast units have been placed and secured, grout open spaces at connections and joints, as indicated on Contract Drawings.
2. Use only the grout system or systems recommended by the manufacturer of the precast units and accepted by the Architect.
3. Provide forms or other acceptable method to retain the grout in place until it is sufficiently hard to support itself.
4. Pack spaces with stiff grout material, tamping voids completely full. Place the grout in a manner to finish smooth, plumb, and level with adjacent concrete surfaces.
5. Keep grouted surfaces damp for not less than 24 hours after grout has taken its initial set. Promptly remove grout material from exposed surfaces before it hardens.

F. Joint Sealing: Where joints align with non-cementitious materials, install sealants in joints in accordance with the provisions of Section 079200.

G. Precast Treads: Install in proper alignment and sloped slightly to drain in accordance with Contract Drawings.

3.02 CLEANING

A. Upon completion of this portion of the work, thoroughly hose down and clean all finished surfaces, removing mortar, dirt, and other foreign matter from surfaces upon which they were not scheduled to be applied.

END OF SECTION
1.01 SUMMARY

A. Section Includes: Concrete unit masonry work and accessories.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 014500 - Quality Control.
   5. Section 018113 - Sustainable Design Requirements.
   6. Section 032000 - Concrete Reinforcing.
   7. Section 033100 - Structural Concrete.
   8. Section 076200 - Sheet Metal Flashing and Trim.
   9. Section 079200 - Joint Sealants.
  10. Section 099623 - Graffiti-Resistant Coatings.
  11. Section 312323 - Fill.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. A 615-12 - Specification for Deformed and Plain-Steel Bars for Concrete Reinforcement.
   6. C 90-14 - Specification for Loadbearing Concrete Masonry Units.
   9. C 140-13a - Sampling and Testing Concrete Masonry Units.
  15. C 331-11 - Specification for Lightweight Aggregates for Concrete Masonry Units.
17. C 426-10 - Test Method for Linear Drying Shrinkage of Concrete Masonry Units.
20. C 744-11 - Specification for Prefaced Concrete and Calcium Silicate Masonry Units.

B. California Code of Regulations (CCR):
1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
   a. Chapter 17A - Structural Tests and Special Inspections.
   b. Chapter 21A - Masonry.
      1) Section 2104A - Construction.
         a) 2104A.3A - Cold Weather Construction.
         b) 2104A.4A - Hot Weather Construction.
         c) 2104A.5A - Grouted Masonry.
      2) Section 2105A - Quality Assurance.
         a) Table 2105A.2.2.1.2 - Compressive Strength of Concrete Masonry.
3. Division of the State Architect (DSA):
   a. Interpretations of Regulations (IR):
      1) 21-2.13 - Filled Cell Concrete Masonry High Lift Grouting Method.
      2) 21-4 - Concrete Masonry Unit Standards.

C. American Concrete Institute (ACI):
1. 216.1-14 - Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies.

D. IAPMO Evaluation Service (IAPMO ES), a division of International Association of Plumbing and Mechanical Officials:
1. IAPMO Uniform Evaluation Reports, (UER-), designated by applicable report number.

E. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction (ESR-), designated by applicable report number.

F. The Masonry Society/American Concrete Institute/Structural Engineering Institute of the American Society of Civil Engineers (TMS)/(ACI)/(SEI/ASCE):
G. National Concrete Masonry Association (NCMA):
   1. TEK 7-1A - Fire Resistance Rating of Concrete Masonry Assemblies.
   2. TEK 8-2 - Removal of Stains from Concrete Masonry Walls.

H. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Fluid Consistency: As fluid as possible for pouring coarse grout intimately in place without segregation of constituents and producing a non-shrink yield.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate sizes and locations of openings in masonry with work specified in other Sections.

B. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

C. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.05 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer’s descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit Shop Drawings prepared according to ACI 530 and 530.1.
   1. Submit 1/8-inch scale wall elevations with wall penetrations, control joints, and reinforcing layout.

C. Samples: In accordance with the provisions of Section 013300, submit samples of unit masonry proposed for use, showing texture and range of color. Size shall be full size of face, up to 2 inches thick for each unit type and finish.

D. Quality Control Submittals:
   1.Certificates:
      a. Certify source and type of aggregates proposed to be incorporated into the work.
      b. Submit certification from block manufacturer confirming compliance with criteria established by reference standard and this Section.
   2. Design Data: Submit design mix data for each type of concrete and each compressive strength required on the Contract Drawings. Submittal of mix designs shall not relieve Contractor of its responsibility to furnish concrete of proper consistency and specified strengths.
      a. Design mix submittal shall be wet stamped and signed by a professional engineer licensed in the State of California.
      b. For each material, including admixtures and water, state water-cement ratio and maximum allowable water content.
c. For each material, state manufacturer's name, designation, and source.
d. Submit shrinkage and creep factors for each type of aggregate, and each source proposed for use, for acceptance-review.
e. For each mix design:
   1) Pay costs associated with mix design preparation.
   2) Submit a schedule which identifies the locations within the structure where each mix design is proposed for use.
f. Mix design shall be stamped and signed by a California licensed Civil Engineer.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 QUALITY ASSURANCE

A. Mockups: Comply with the requirements of Section 014500. Provide sample masonry panel as follows:
   1. Make sample panel approximately 4 feet high by 8 feet long.
   2. Provide one sample panel for each combination of face units, face pattern, and mortar color used in the work. Include expansion joint in sample panel, if applicable. Upon approval of finish, test area will serve as standard of quality for exposed work.
      a. Mockups do not become a part of the finished work.
   3. If sample panel is not accepted, completely demolish and replace it as required by the Architect.

1.08 FIELD CONDITIONS

A. Ambient Conditions:
   1. Hot and Cold Weather Construction: Comply with CBC 2104A.4 and recommendations of ACI 531R Commentary Part 3 Chapter 5 regarding hot and cold weather requirements for mortar and grout.
      a. Hot Weather Conditions: Protect unit masonry construction from direct exposure to wind and sun when erected in an ambient air temperature of 90 degrees F in the shade, with relative humidity less than 50 percent, and with a wind velocity greater than 8 mph.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design Basis Manufacturer:
   1. Basalite Corporation, Sacramento, CA (800)350-5866.

B. Acceptable Manufacturers of Accessory Products:
   5. Grace Construction Products, Cambridge, MA (617)876-1400, (800)558-7066.
   7. Master Builders Technologies, division of Degussa, Cleveland, OH (216)831-5500, (800)228-3318, (714)476-0500 [Admixtures], (800)824-8441 [Construction Products].

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS
A. Regulations:
   1. Materials, construction, and workmanship shall be in accordance with CBC Sections 2105A and 2114A.
      a. Comply with requirements of DSA IR 21-4.
   2. Comply with requirements of ACI 216, including NCMA TEK 7-1A regarding the calculation of fire resistance ratings for concrete masonry assemblies.
   3. Comply with ASTM C 1314, if accepted by the building official.
B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS
A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE CRITERIA
A. Performance Requirements: Minimum specified average net area compressive strength \( f'_{m} \) of masonry assembly shall be in accordance with Structural Contract Drawings.

2.05 BLOCK MATERIALS
A. Hollow and Solid Load Bearing Units:
   1. Class: Medium weight, tested in accordance with ASTM C 140.
   2. Aggregate:
      b. Special Aggregate: Provide units made with aggregate matching aggregate in Architect’s sample.
   3. Average oven-dry density of solid grouted medium weight CMU block shall not exceed 125 pounds per cubic foot.
   4. Admixture: Add water repellent admixture to block mix in accordance with recommendations of manufacturer.
B. Physical Requirements for Block Units:

1. Dimensions:
   a. Standard Block: Nominal 4 inches high by 16 inches long by thickness of wall. Cap units shall be 2 inches high by 16 inches long by thickness of wall.
   b. Interior and Exterior Exposed Block: 4 inches high by 16 inches long by thickness of wall.

2. Shape:
   a. Shear Walls: Provide open end units at shear walls.
      1) All walls are shear walls.
   b. Bond Beam Block: Deep cut type.
   c. Provide lintel units over wall openings.
   d. Special Units: Provide cap, end, corner, pilaster, and other special units as required.

3. Surface Texture:
   a. Precision: Provide precision block surface only at concealed surfaces, and where indicated on Contract Drawings.
   b. Ground-Face (Burnished) Units: Equal to Trenwyth Trendstone Ground Face Units integrally colored, and containing an efflorescent preventative admixture.
      1) Provide ground face on one, both, and end faces, where exposed to view at interior and exterior of building.
      2) Conform to ASTM C 744 with respect to adhesion, abrasion, color change, and resistance to crazing.

4. Block Color:
   a. Precision: Integral color as selected by Architect.
   b. Ground Face (Burnished) Block: Integral color Basalite 375, as approved by Architect from full size face samples.


2.06 OTHER MASONRY MATERIALS

A. Mortar and Grout Materials: Conform to ASTM C 270.
   1. Portland Cement: Comply with ASTM C 150 for Type II (Low Alkali).
      a. “Masonry” cement is not acceptable.
   2. Aggregate: Provide clean, sharp, well graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, organic matter, and complying with the following:
      a. Sand for Mortar: Comply with ASTM C 144.
         1) For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
         2) For burnished units, provide special aggregate.
      b. Aggregate for Grout: Refer to Structural Contract Drawings.
      b. Hydrated Lime: ASTM C 207, Type S.
      c. Lime Substitute: When accepted in advance by the Architect, Kel-Crete Admixture may be used in place of lime.
         1) Comply with ICC ES ER-5005.
4. Admixtures: Comply with ASTM C 494 and ASTM C 260. Use only admixtures specifically accepted in advance by the Architect and by DSA. The following list of admixtures must be submitted to DSA for approval with the mix design prior to construction:
   a. Grout Aid: SikaGrout Aid, an expanding, retarding, and water-reducing high lift grouting aid for portland cement grouts to provide a slow, controlled expansion prior to the grout hardening, as manufactured by Sika.
   b. Water Repellent Concrete Block Admixture:
      1) Block Used in Exterior Walls: One of the following:
         a) Dry-Block, as manufactured by Grace Construction Products.
         b) MasterPel 235 polymeric integral water repellent admixture system, manufactured by Master Builders Solutions (BASF).
   c. Water Repellent Mortar Admixture: One of the following:
      1) Mortar: Dry-Block II, as manufactured by Grace Construction Products, or equal.
      2) MasterPel 240A (formerly Rheopel Plus Mortar), manufactured by Master Builders Solutions (BASF).

5. Coloring Pigment: When required, provide pure mineral oxides conforming to ASTM C 979, non-fading and alkali proof, furnished in pre-measured packages, equal to SGS Concentrated Mortar/Concrete Colors, as manufactured by Solomon Colors, or equal.


B. Reinforcing Steel:
   1. Reinforcing: Refer to Section 032000 and Structural Contract Drawings.
      a. Reinforcing bars shall be deformed type.
   2. Tie Wires: Black annealed, ASTM A 82, minimum 16 gage.
      a. Provide vertical bar positioners.

C. Joint Reinforcement: Standard weight, hot-dipped galvanized.

D. Flashing Materials:
   1. Sheet Metal Flashing: Refer to Section 076200 for galvanized sheet metal.
   2. Through-Wall Flashing: Fabricate continuous flashings under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch high end dams where flashing is discontinuous.
E. Accessory Materials:
1. Cleaner:
   a. Job-Mixed Detergent Solution: Solution of tri-sodium phosphate (1/2-cup dry measure) and laundry detergent.
   b. Masonry Cleaner: Stand-Off series of interior cleaners, as applicable, as manufactured by ProSoCo, Inc.
2. Typical Sealer: As specified in Section 033100.
   a. Comply with VOC requirements.
3. Control Joint Inserts: Full width, keyed PVC masonry control joint as manufactured by Hohmann & Barnard or National Wire Products Industries.
5. Smooth Dowels: No. 6 x 18 inches end wrapped with tape and coated with heavy duty grease.
6. Stabilizing Partition Top Anchors:
   a. Equal to Hohmann & Barnard PTA-420 with 1-1/2 x 3 x 1/8 thick top plate at 32 inches on centers.
   b. Provide fire rated joint filler at fire-rated walls.
7. Water Repellent Treatment: Refer to Section 099623.
8. Water Repellent Coating: Refer to Section 076200 for treating exposed tops and back of parapets with elastomeric coating.

2.07 MIXES

A. Mortar:
1. Type: Conform to ASTM C 270 for Type M below grade and Type S above grade, as indicated on Contract Drawings, or as otherwise directed by Structural Engineer.
   a. Minimum compressive strength of the mortar shall be as required to achieve the compressive strength ($f'_m$) of masonry type specified when combined with masonry units used in the structure.
      1) Type M: Refer to Structural Contract Drawings for below grade walls.
      2) Type S: Refer to Structural Contract Drawings for above grade bearing and exterior walls.
   a. For Type M Mortar: Provide 1-part portland cement to 1/4-part hydrated lime and not less than 2-1/4 parts sand by volume nor more than 3 times the sum of the volumes of the sand and lime used.
   b. Minimum compressive strength of the mortar shall be as required to achieve the compressive strength ($f'_m$) of masonry type specified when combined with masonry units used in the structure.
3. Lime Substitute: Where Kel-Crete Admixture is used in place of lime, add 2 to 3 ounces per 100 pounds portland cement to water before cement and sand.
4. Mechanically mix mortar in a batch mixer for not less than 3 minutes, using only sufficient water to produce a mortar which is spreadable and of a workable consistency.
5. Water Repellent Admixture: Add water repellent admixture to mortar mix in accordance with recommendations of manufacturer for use in exterior walls.

B. Grout:
1. General: Provide fine grout or coarse grout as designated on the Contract Drawings, or as otherwise directed by the Architect and Engineer of Record, and in accordance with ASTM C 476.
   a. Grout shall have a compressive strength and slump as indicated on the Structural Contract Drawings.
2. Proportions (By Volume): In accordance with ASTM C 376, Table SC-7.
   a. Coarse Grout: Provide 1 part portland cement to 1/10-part lime to 2-1/4 to 3 times the sum of the volume of the cementitious materials for pea gravel, with sufficient water to achieve "fluid consistency."
3. Lime Substitute: Instead of lime, add 1 to 2 ounces of lime substitute per 100 pounds portland cement, or as recommended by manufacturer.
4. Water Repellent Admixture: At exterior locations add water repellent admixture to grout mix in accordance with recommendations of manufacturer.

C. Accurately measure the ingredients and thoroughly mix materials in a mechanically operated mortar mixer. Add pigment as required to match Architect's color selection.

D. Retemper mortar with water as required to maintain high plasticity.
   1. On mortar boards, retemper only by adding water within a basin formed with mortar, and by working the mortar into the water.
   2. Discard mortar which is unused after 1-1/2 hours following initial mixing.

PART 3 - EXECUTION

3.01 PREPARATION

A. Do not commence installation until foundations are clean, rough, and level, or until floor slabs are structurally sound. Clean projecting dowels free from loose scale, dirt, concrete, and other material that will inhibit bond.

B. Verify that dowels are properly located.

C. At block surfaces receiving below grade waterproofing systems, provide smooth mortar parge coat free of ridges, gaps, holes, or other surface imperfections.

D. Flashing: Install cavity flashing in accordance with manufacturer's recommendations and appropriate SMACNA details. Form corners and bond laps. Provide end dams at interruptions.
   1. Install embedded thru-wall flashing and weep vents in masonry at shelf angles, lintels, ledges, and other obstructions to downward
flow of water in wall and where indicated. Run flashing to outside face of masonry.

E. Weather Requirements: Refer to Paragraph 1.08-A for hot and cold weather construction requirements.

### 3.02 INSTALLATION

A. Vertical Reinforcement:
   1. Install reinforcement in accordance with Section 032000.
      a. Provide dowels between footings and walls of the same grade, size, and spacing as vertical wall reinforcing, unless otherwise noted on the Structural Contract Drawings.
      b. Position vertical bars in masonry walls at the center of the wall with vertical bar positioners, and tie in position at top, bottom, and at intervals not exceeding 192 bar diameters, unless otherwise noted on the Structural Contract Drawings.
      c. Splice reinforcing bars in masonry with laps as indicated on Structural Contract Drawings.
      d. Grout in accordance with Paragraph: Grouting, below.

B. Horizontal Reinforcement:
   1. Install horizontal reinforcement in accordance with Structural Contract Drawings.
   2. Provide dovetail anchors at every other course where masonry abuts concrete columns.

C. Hollow Masonry Units:
   1. Lay only dry masonry units.
   2. Use masonry saws to cut and fit masonry units.
   3. Provide full mortar coverage on horizontal and vertical face shells and webs in courses of the following:
      a. Piers, columns, and pilasters.
      b. Starting course on footings and solid foundation walls. Provide full bedding under both the face shell and web.
      c. Where adjacent to cells or cavities to be filled with grout.
   4. Adjust masonry units to final position while mortar is soft and plastic. If units are displaced after mortar has stiffened, remove, clean joints of mortar, and re-lay with fresh mortar.
   5. When joining fresh masonry to set or partially set masonry construction, clean exposed surface of set masonry and remove loose mortar prior to laying fresh masonry.
   6. If necessary to stop a horizontal run of masonry, rack back one-half block length in each course. Do not use toothing to join new masonry to set or partially set masonry when continuing a horizontal run.
   7. Protect sills, ledges, and off-sets from mortar drippings or other damage during construction. Remove misplaced mortar or grout immediately.
   8. Fire Rated Block:
      a. Two-Hour Rating: Solid grout all vertical cores.
b. Four-Hour Rating: Fill cells with loose lightweight aggregate in accordance with ACI 216 and fire resistance rating analysis to achieve required fire ratings.

9. Cover top of walls with non-staining waterproof coverings when work is not in progress.

10. Remove excess mortar and clean residue using procedures recommended in TEK 8-2.

11. Fill voids between top of masonry wall and solid structure above with fire safing and fill with firestopping sealant at rated partitions.

12. Slope top surface of cap units two percent to drain.

D. Bond:
   1. Typical Walls/Retaining Walls/Trash Enclosure: Install in running bond with vertical joints located at center of masonry units in alternate courses. Align vertical cells.
      a. Center Scored Block: Align score with vertical joint below in running bond.

E. Horizontal and Vertical Face Joints:
   1. Thickness: 3/8-inch nominal, and uniform in appearance.
   2. When thumb-print hard, tool joints in exposed surfaces with round jointer for raked joint. Mortar joints shall be tooled at all ground-face (burnished) face block.
      a. Compress and strike off for flush joints when serving as a base for DIFS, cement plaster, textured coatings, masonry veneer, or membrane waterproofing or dampproofing.
   3. Remove mortar protruding into cells of cavities to be reinforced or filled.

F. Built-in Work: Avoid cutting and patching. Install bolts, anchors, nailing blocks, inserts, frames, vents flashings, conduit, and other built-in items as masonry work progresses.
   1. Solidly grout spaces around built-in items, including hollow metal door frames.

G. Joints:
   1. Control Joints: Provide at 20 feet on centers maximum, and as indicated on Contract Drawings.
   2. Expansion Joints: 50 feet on centers maximum, and as indicated on Contract Drawings.

H. Flashing: Install through-wall flashing as recommended by manufacturer.
   1. Provide plastic weep inserts in vertical joints where required to drain air cavities.

I. Waterproofing:
   1. Treat exposed tops and backs of parapets with water repellant coating specified in Section 099623, and with elastomeric cap specified in Section 076200.
3.03 GROUTING

A. Grouting: Grout specified in Paragraph 2.07-A.2 shall be used in cavities below flashing, bond beams, and other areas requiring casting of anchor bolts. Pour all cells full of grout.
   1. Do not slush with mortar.
   2. Puddle grout to flow into voids between blocks and to surround the reinforcing steel.
      a. Consolidate by rodding for lifts less than 12 inches high.
      b. Consolidate by vibrating for lifts 12 inches high and greater.
   3. Lay up walls not more than 4 feet before grouting. Do not pour grout over 4 feet high.

3.04 FIELD QUALITY CONTROL

A. Tests: When laboratory tests of masonry materials are required by Contract Documents or by building code, they shall be performed by the independent testing laboratory in accordance with the provisions of Section 014500.

B. Sampling of the materials shall conform to standard ASTM and ACI procedures, as follows:
   1. Test portland cement for percentage of water soluble alkali and for physical factors necessary to determine suitability for masonry mortar, in accordance with ASTM C 114.
   2. Test lime to determine suitability in masonry mortar, in accordance with ASTM C 110.
   3. Test sand for grading and other factors affecting its use in masonry mortar, in accordance with ASTM C 144.
   4. Field test mortar for compression in accordance with ASTM C 476 as indicated in Contract Documents.
   5. Sample and test grout in accordance with ASTM C 1019.
   6. Test masonry units in accordance with ASTM C 140 and ASTM C 426.
   7. Test masonry assembly with prisms in accordance with CBC 2105A.2.2. Report results in accordance with CBC Chapter 17A.

C. Inspection: Furnish continuous special inspection in accordance with the provisions of Section 014500.
   1. Provide special inspection for concrete masonry units in accordance with CBC 1701A.5 during preparation and taking of any required prisms or test specimens, placing of all masonry units, placement of reinforcement, inspection of grout space, immediately prior to closing of cleanouts, and during all grouting operations.

D. Tolerances:
   1. Maximum Variation From Unit to Adjacent Unit: 1/16-inch.
   2. Maximum Variation From Plane of Wall: 1/4-inch in 10 feet, and 1/2-inch in 20 feet or more.
   3. Maximum Variation From Plumb: 1/4-inch per story non-cumulative.
   4. Maximum Variation From Level Coursing: 1/8-inch in 3 feet, 1/4-inch in 10 feet, and 1/2-inch in 30 feet.
   5. Maximum Variation of Joint Thickness: 1/8-inch in 3 feet.

3.05 CLEANING

A. Upon completion of the work of this Section, fill holes and tooled joints at final completion of masonry work.
   1. Cut out and repoint defective joints.
   2. Dry brush masonry surface after mortar has set at end of each day's work and after final pointing.

B. Clean exposed surfaces with masonry cleaner using fiber bristle brooms or brushes followed by a thorough rinsing with clear water.
   1. In the event ordinary cleaning is not adequate, use other means as directed by the Architect, at no additional cost to Owner.

C. Sealing: Apply one coat of water repellent sealer as specified in Section 099623 to ground-face/burnished block after clean down and when walls are dry.

D. Where indicated on Contract Drawings, apply graffiti-resistant coating in accordance with Section 099623.

E. Leave work and surrounding surfaces clean and free of mortar spots, dust, and droppings, and ready for specified finish.

3.06 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
   1. Crush masonry waste to less than 4 inches in each dimension.
   2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312323.
   3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

3.07 PROTECTION

A. Protect exposed masonry surfaces for duration of construction.

END OF SECTION
SHOP-APPLIED COATINGS FOR METALS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Protective organic coating systems factory-applied to aluminum products.
   1. Refer to Section 099600 when high performance coatings are required.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 084000 - Entrances, Storefronts, and Curtain Walls.
   5. Section 089100 - Louvers.
   6. Section 099600 - High Performance Coatings:

1.02 REFERENCES

A. ASTM International (ASTM):
   2. D 2244-11 - Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.

B. California Code of Regulations (CCR):

C. American Architectural Manufacturers Association (AAMA):
   2. 621-02 - Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordination: If more than one product is required to be coated under this Section, all such products shall be coated with the same production lot of material at the same time by a single source coating applicator to ensure that the quality of the coating, color, and gloss is uniform.

C. Coordination: For coiled stock used in other Sections, comply with AAMA 621.

1.04 ACTION SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Samples: In accordance with the provisions of Section 013300, submit three samples of each specific finish for color only, on minimum 3-inch by 5-inch metal sheet, matched to Architect's color selection.
   1. Production Samples for Metallic Colors: After approval of metallic color samples, submit three production line samples of each specific finish on each specific substrate from production line proposed for this Project, on minimum 8-inch by 10-inch metal sheet, for acceptance by Architect to serve as a standard of workmanship for Project.

1.05 INFORMATIONAL SUBMITTALS

A. Quality Control Submittals:
   1. Applicator's Qualifications: Submit name of proposed applicator of organic coating specified, including documentation confirming that proposed applicator is a certified applicator for the organic coating systems specified.
   2. Test Reports: Submit test reports indicating compliance with performance requirements specified.
   3. Certificates: Submit certificates from applicator stating that finishes conform to requirements of this Section. Include certification that all products coated under the requirements of this Section have been coated with the same production lot of material at the same time by the same applicator.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).
1.07 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
   1. Maintenance: Submit manufacturer's cleaning and maintenance recommendations.

B. Warranty Documentation:
   1. Warranty: Submit copies of written warranty, as supplied by the applicator, agreeing to repair or replace defective coating work during the warranty period.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Provide one quart of field-applied air-dry touch-up material, manufactured at same time as production coating materials, for each type and color coating used on Project.

1.09 QUALITY ASSURANCE

A. Qualifications:
   1. Metal Finisher's Qualifications: Regularly engaged and specializing, for the preceding 10 years, in the factory application of protective organic coating systems on metals, including:
      a. Authorization by manufacturer of coating material to apply product and provide warranty.
      b. Having a demonstrated capability to apply coatings in accordance with the requirements of the referenced standard, and in a production volume required within the constraints of the accepted construction schedule.
      c. Multi-stage aluminum cleaning and chemical pretreatment system conforming to AAMA 2603 and AAMA 2605, as applicable.
      d. Oven capability to fully cure the coatings for optimum hardness, mar resistance, and weather resistance.
      e. On site quality testing equipment to ensure specified results.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Protect extrusions and other metal by interleaving effective packaging materials and covering exposed areas of coated metal.

B. Painted items shall be protected during transit, storage, fabrication, and installation to minimize coating damage.

1.11 WARRANTY

A. Minimum Warranty Periods:
   1. Products complying with AAMA 2603:
      a. On Aluminum: 2 years.
   2. Products complying with AAMA 2605:
      a. On Aluminum Extrusion Only: 20 years.
      b. On Aluminum Brake Metal Only: 5 years.
      c. On Perforated Aluminum Panel: 5 years.
B. Defective work shall be defined as coatings that exhibit any of the following defects:
   1. Peel (loose adhesion), check, chip, crack, blister, or any other form of loss of adhesion.
   2. Change color more than 5 NBS units as determined by spectrophotometer or colorimeter capable of color measurements by reflectance readings in accordance with procedures set forth in ASTM D 2244 after removal of external deposits.
   3. Chalking in excess of 5 Delta E (Hunter) units and #8 chalk rating when measured in accordance with ASTM D 659.
   4. Loss of film thickness in excess of 10 percent of original values.
   5. Loss of gloss in excess of 70 percent of original value.

C. The following clauses shall be included in the coating warranty by the manufacturer or applicator:
   1. If the finish exhibits a failure of any of the types indicated above, the Contractor’s liability under the warranty shall include refinishing the portion of the item or panel having a defective finish to the same quality as the original shop-applied finish.
   2. Refinishing, if permitted, shall be performed by use of field finishing practices and materials compatible with, and providing similar results to, that of the original paint.
   3. Refinishing after start of the warranty period shall carry the same warranty period as the original work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Resin Manufacturers for AAMA 2605: One of the following:
   1. Arkema Group (Kynar 500 PVDF), Philadelphia, PA, (215)587-7520, with branch offices in Los Angeles, CA (213)296-8224.
   2. Ausimont USA, Inc. (Hylar 5000), Morristown, NJ (201)292-6250, (800)221-0553, with representation in Sacramento, CA (916)722-0145.

B. Acceptable Coating Formulators: One of the following:
   1. Akzo Nobel International Paint, Inc. (formerly Courtaulds Coatings), Columbus, OH (800)294-3361.
   4. The Valspar Corporation, Garland, TX (800)777-0476, (214)276-5181.

C. Acceptable Coating Formulators for AAMA 2603: One of the following:
   1. Tiger Drylac USA, Inc., Ontario, CA (909)930-9100.
   2. Chemical Technology Laboratories (CTL), Lynwood, CA (213)532-6756.

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal.

B. Comply with CALGreen 5.504.4.3 Paints and Coatings:
   1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
   2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      b. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GC-11.

2.04 PERFORMANCE CRITERIA

A. Performance Requirements for Interior Use per AAMA 2603: Meet or exceed the criteria specified in AAMA 2603 for color uniformity, specular gloss, dry film thickness, film adhesion, impact resistance, abrasion resistance, chemical resistance, corrosion resistance, and the following conditions of weather exposure:
   1. Salt Spray: 1000 continuous hours exposure per ASTM B 117.
   2. Humidity: 1000 continuous hours per ASTM D 2247.
   3. Outdoor Exposure: No checking, cracking, or loss of adhesion, only slight chalking and fading within one year.

B. Performance Requirements for Exterior Use per AAMA 2605: Meet or exceed the criteria specified in AAMA 2605 for color uniformity, specular gloss, dry film thickness, film adhesion, impact resistance, abrasion resistance, chemical resistance, corrosion resistance, and the following conditions of weather exposure:
   1. Salt Spray: 4000 continuous hours exposure per ASTM B 117.
   2. Humidity: 4000 continuous hours per ASTM D 2247.
   3. Outdoor Exposure: Comply with AAMA 2605 requirements for 5-year South Florida Exposure Test.

2.05 AAMA 2603 MATERIALS

A. Finish: Coating: Conform to the requirements of AAMA 2603 for silicone polyester.

B. Silicone Polyester Coating: Thermosetting multi-coat with minimum 50 percent pure silicone polyester resins complying with AAMA 2603. Acceptable formulations include:
   1. Duracron, manufactured by PPG Industries.
   2. Valex, manufactured by The Valspar Corporation.
3. Dynapon, manufactured by The Valspar Corporation.
4. System 68, manufactured by Chemical Technology Laboratories (CTL).

2.06 AAMA 2605 MATERIALS

A. Design is based on colors provided by PPG Industries.
B. Primer: PPG UC51742 for specified Duranar series, or equal product for system proposed for use.
C. Barrier Coat: Barrier coat for light colors and 4-coat systems, as recommended by manufacturer of finish coating.
D. Color Coat: Minimum 70 percent polyvinylidene fluoride (PVDF) resin by weight, complying with AAMA 2605, as recommended by manufacturer of finish coating. Acceptable formulations include:
   1. Design is based on the use of Duranar Series, or equal, as manufactured by PPG Industries.
      a. Duranar XL: Three-coat metallic flake system with clear top coat. Provide barrier coat at colors where recommended by manufacturer.
      b. Fluropon Classic: Three-coat aluminum flake system with clear top coat. Provide barrier coat where recommended by manufacturer at light colors.
      c. Fluropon Premiere: Bright-colored, three-coat system.
   2. Fluoroceram Series, as manufactured by Morton International.
E. Clear Top Coat: Manufacturer's standard, as follows:
   1. PPG Industries: Clear Duranar XL Top Coat.
   2. The Valspar Corporation: Super Fluroclear for Fluropon Series.
   3. Other Manufacturers: As recommended by manufacturer of finish coating.
F. Color:
G. Opacifier Coating for Glass Spandrel Panels: Duranar DTG, or equal.

2.07 TOUCH UP MATERIALS

A. Primer: KLC7840 Vinyl-Butyral Wash Primer, as manufactured by PPG Industries.
B. Finish: Megaflon MS, 100 percent fluoropolymer air-dry, field-applied, spray-coating conforming to AAMA 2605, as manufactured by PPG Industries.

PART 3 - EXECUTION

3.01 APPLICATORS

A. Acceptable Applicators: One of the following:
   1. Arcadia Architectural Coatings, Vernon, CA (323)269-7300.
   3. Certified Enameling, Inc., Los Angeles, CA (213)264-4403.
   4. Frontier Aluminum Corporation, Corona, CA (909)735-1770.
5. Process by Martin, Lynwood, CA (310)637-1855.
6. Top Gun Industrial Finishing, Inc., Sana Clara, CA (408)988-8443.

B. Coordination: Refer to Article 1.03 Administrative Requirements for single source applicator requirements.

3.02 EXAMINATION
A. Verification of Conditions: If finish is damaged by applicator or fabricator, refinish in factory before shipment of members to Project. Inspection shall be performed by the installation contractor prior to installation.

3.03 PREPARATION
A. Cleaning:
   1. Remove surface soil and contaminants such as carbon, grease, oil, welding flux, and other oxides using power wash or cleaner designed to deoxidize the metal surface.
   2. Rinse with clear water.
B. Preparation:
   1. Aluminum: Chemical film conversion process utilizing alodine type pretreatment. Rinse with clear water.
      a. Primer Coat: Spray apply epoxy primer with red oxide to a minimum dry film thickness of 3.0 mils.
         1) Bake at 400 degrees F minimum.
         2) Cure in accordance with manufacturer's standards.
         3) Use metal temperature recording devices on production parts to ensure the metal is attaining minimum required metal temperature for prescribed amount of time to cure primer.
         4) Test for proper cure using prescribed solvent rub and pencil hardness test as required by coating supplier.

3.04 AAMA 2603 APPLICATION
A. Silicone Polyester Finishing System: Application shall be performed by conventional air or electrostatic spray.
   1. Aluminum: System shall consist of the following:
      a. Primer Coat Over Aluminum: Spray apply a thin film of epoxy primer at a dry film thickness of 0.3 mil, plus-or-minus 0.1 mil.
         1) Bake at 400 degrees F minimum.
         2) Cure in accordance with manufacturer's standards.
         3) Use metal temperature recording devices on production parts to ensure the metal is attaining minimum required metal temperature for prescribed amount of time to cure primer.
         4) Test for proper cure using prescribed solvent rub and pencil hardness test as required by coating supplier.
      b. Color Coat:
         1) Aluminum: Spray apply color coat to obtain a total (primer and color coat) dry film thickness of between 1.2 and 1.5 mils on exposed surface
         2) Cure approximately 30 minutes at 400 degrees.
3.05 AAMA 2605 APPLICATION

A. Primer: Dry film thickness of 0.3-mil plus-or-minus 0.1-mil (flash coating not acceptable).
   1. Electrostatically spray applied evenly on all exposed surfaces of metal and bake at a temperature of 450 degrees F minimum.
   2. Employ metal temperature recording devices on production parts to ensure metal attains minimum required temperature for prescribed amount of time to cure primer.

B. Barrier Coat, If Required: Barrier coat, applied at a thickness of 1.0 mil minimum.

C. Color Coat: 1.0 to 1.3 mils dry film thickness.
   1. Spray apply over primer by conventional air or electrostatic method.
   2. Cure approximately 30 minutes at 400 degrees.

D. Clear Coat: 0.6-mil dry film thickness.
   1. Spray apply over color coat.
   2. Cure approximately 30 minutes at 400 degrees.

3.06 FIELD APPLIED FINISH

A. Primer: Apply at a rate of 0.3-mil to 0.5-mil DFT. Cure a minimum of 2 hours.

B. Touch-up Coating, All Substrates:
   1. Apply one coat specified finish topcoat in accordance with manufacturer's instructions and technical date bulletins. Allow topcoat to dry 4 hours minimum at 77 degrees F and to achieve full cure in 3 to 5 days.

C. Apply clear coat to protect Megaflon MS metallic coatings and coatings in seacoast regions.

3.07 FIELD QUALITY REQUIREMENTS

A. Inspection: In accordance with AAMA 2603 and AAMA 2605, as applicable.

B. When viewed at right angles at 5 feet from exposed surface, work shall be free of finger marks, runs, sags, orange peel, holidays, stains, scratches, gripper marks, or other undesirable flaws.

C. Finishes shall be uniform on all exposed surfaces, including edges and radii of bends on metal. Architect shall be sole judge of uniformity of color, gloss, direction of grain, and other appearance requirements.

D. Coatings that do not comply with specified coating requirements, or do not match accepted samples, shall be recoated at Contractor's expense.

E. Damaged areas of coatings shall be touched-up where damaged in the field. If field damage is extensive due to handling by building trades, request factory applicator to evaluate and determine proper field process to be applied by applicator.
3.08 ADJUSTING

A. Fluoropolymer On-Site Repair: The Architect reserves the right to review field touch-up of damaged or defective units, to disapprove any attempts not considered repair-worthy, and to have them replaced with finished units conforming to the requirements of this Section.
   1. Repair or replace damaged or defective work to specified condition.
   2. Repaired work shall be subject to a second review by the Architect for satisfactory appearance.

B. Silicone Polyester On-Site Repair: Repair silicone polyester finish as follows:
   1. Clean work with iron phosphate.
   2. Apply clear sealer.
   3. Apply epoxy primer.
   4. Apply color coat.

3.09 CLEANING

A. Comply with AAMA 609 and AAMA 610 methods, equipment, and materials applicable for cleaning architecturally finished aluminum after construction and for subsequent periodic maintenance.

B. Remove protective coverings and clean surfaces of materials with a non-abrasive, non-acid, non-caustic, and very mild liquid. Rinse and dry thoroughly.

3.10 PROTECTION

A. Provide suitable means to prevent damage to installed material by covering window wall framing and similar fabrications with protective materials or other devices. Retain these coverings until just prior to Architect's review for substantial completion.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Structural steel, related anchors, bolts, fastenings, and erection.

B. Referenced Sections:
   1. Section 012100 - Allowances.
   2. Section 012500 - Substitution Procedures.
   3. Section 013300 - Submittal Procedures.
   4. Section 014500 - Quality Control.
   5. Section 017419 - Construction Waste Management and Disposal.
   7. Section 031000 - Concrete Forming and Accessories.
   8. Section 033100 - Structural Concrete.
  10. Section 050595 - Welded Stud Connectors.
  11. Section 051213 - Architecturally-Exposed Structural Steel: Requirements for welding and finishing where AESS is indicated.
  12. Section 053100 - Steel Decking.
  13. Section 099100 - Painting.

1.02 PRICE AND PAYMENT PROCEDURES

A. Extra Stock Material Allowance: Provide and install an additional 2 tons of structural steel for the project in addition to the quantities shown on drawings. This additional steel shall be installed during construction, in sizes and locations as directed by Structural Engineer.
   1. The allowed steel may be of any shape or size, and the number of pieces and locations of application may vary.
   2. Provide unit price for purpose of adjusting contract price to reflect quantity of extra material actually used.
   3. Refer to Section 012100 for allowance procedures.

1.03 REFERENCES

A. ASTM International (ASTM):
   1. A 6-14 - Specification for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.
3. A 53-12 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
10. A 490-14a - Specification for Heat-Treated, Steel Structural Bolts, 150 ksi (1035 MPa) Tensile Strength.
17. F 3125-15 - Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 17A - Structural Tests and Special Inspections.
      b. Chapter 22A - Steel.

C. IAPMO Evaluation Service (IAPMO ES), a division of International Association of Plumbing and Mechanical Officials:
   1. IAPMO Uniform Evaluation Reports, (UER-), designated by applicable report number.

D. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction (ESR-), designated by applicable report number.

E. American Galvanizers Association (AGA):
   1. Inspection of Products Hot-Galvanzing After Fabrication.
F. American Institute of Steel Construction (AISC):
   1. 325-11 - ASD Steel Construction Manual, including:
   2. 341-10 - Seismic Provisions for Structural Steel Buildings
   3. 360-10 - Specification for Structural Steel Buildings.

G. American Institute of Steel Construction (AISC):

H. American Iron and Steel Institute (AISI):
   1. 9 002 - Welding of Stainless Steels and Other Joining Methods.

I. American Welding Society (AWS):
   1. A2.4 - Symbols for Welding and Nondestructive Testing, Including Brazing.

J. The Society for Protective Coatings (SSPC):
      b. Volume 2 - Systems and Specifications, 7th Edition, including Specifications, Guides, Procedures, and Supplements:
         1) SP-3 - Power Tool Cleaning.
         2) SP-6 - Commercial Blast Cleaning (NACE 3).

K. Federal Specifications (FS):
   1. FF-S-325 - Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring Masonry).

L. Military Specifications (MIL):
   1. MIL-P-21035 - Paint, High Zinc Dust Content Galvanizing Repair.

M. Research Council on Structural Connections:

N. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.04 ADMINISTRATIVE REQUIREMENTS

A. Allowances: This Section may be affected by allowances described in Section 012100.

B. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

C. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

D. Coordination: Comply with AESS requirements of Section 051213.
E. Preinstallation Meeting: Conduct a preinstallation meeting with the engineer of record, fabricator, erector, Contractor, and inspectors to discuss the Welding Procedure Specifications as indicated on Structural Contract Drawings.

F. Scheduling: Deliver anchor bolts, base plates, and other anchorage devices that are embedded in cast-in-place concrete or masonry construction to the Project site in time to be installed before the start of cast-in-place concrete operations or masonry work.

1.05 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of structural steel. Shop Drawings shall include not less than the following:
   1. Dimensioned profiles of structural members cross-referenced to plans for purposes of location.
      a. Individual items of structural steel shall be cross-referenced by grid location.
   2. Fabrication and installation details, including details of anchorage to supporting structure.
   3. Designated shop and field welds in accordance with AWS A2.4.
   4. Indicate type of primer and finish, if applicable, to be applied to each member.
   5. Project welding requirements as indicated on Structural Contract Drawings.
   6. Identify members which will receive sprayed fireproofing specified in Section 078100.

D. Quality Control Submittals: Submit the following to Architect and Engineer of Record:
   1. Design Data: Submit structural calculations signed and sealed by a qualified structural engineer licensed in the State of California confirming design of connections not specifically detailed on the Contract Drawings.
   2. Test Reports:
      a. Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
      b. Submit Charpy-V-Notch (CVN) Impact Test by results the manufacturer for applicable steel members and components.
   3. Certificates:
      a. Furnish mill test reports of identified stock.
      b. Submit manufacturer’s certificates certifying welders employed on Project.
      c. Certificate of Compliance for Offsite Fabrication: Submit in accordance with CBC 1704A.2 for structural steel. Furnish copies to Owner, Testing Laboratory, and Structural Engineer.
4. Welding Procedures:
   a. Submit welding procedures, indicating joint details and tolerances, preheat and interpass temperature, postheat treatment, single or multiple pass, electrode type and size, welding current, polarity, and amperes and roof treatment.
   b. Welding procedures shall comply with the requirements of AWS D1.1 and D1.8. Include welding parameters recommended by the welding electrode manufacturer.
   c. Refer to Structural Contract Drawings for weld testing and inspection.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 CLOSEOUT SUBMITTALS

A. Warranty: Submit copies of written warranty, as supplied by the applicator, agreeing to repair or replace defective coating work during the warranty period.

1.08 QUALITY ASSURANCE

A. Qualifications:
   1. Fabricator's Qualifications: Regularly engaged and specializing, for the preceding 5 years, in the fabrication of structural steel for building construction.
      a. When required, licensed, bonded, or otherwise approved by governmental agencies having jurisdiction.
   2. Erector's Qualifications: Regularly engaged and specializing, for the preceding 5 years, in the erection of structural steel for building construction.
      a. Licensed or certified.
   3. Welder's Qualifications: Currently certified in accordance with AWS D1.1.
B. Reference Modifications: Comply with Code of Standard Practice for Steel Buildings and Bridges, except as follows:

1. Modify Paragraph 4.2.1 by deletion of the following sentence: "This approval constitutes the Owner's acceptance of all responsibility for the design adequacy of any connections designed by the fabricator as part of his preparation of these shop drawings."

2. Delete Paragraph 4.2.2 in its entirety.

3. Modify paragraph 7.9.3 by deletion of the following sentence: "The contract documents specify the sequence and schedule of placement of such elements."

4. Provide special inspection for expansion anchors.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Storage: Protect steel members that will be stored on site for a prolonged period to protect from adverse effects of exposure to weather.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. American Solder and Flux.
2. Bethlehem Steel Corporation.
4. Euclid Chemical Company, Cleveland, OH (800)321-7628.
5. Hilti, Inc., Tulsa, OK (918)627-9711, (800)979-8000.
7. Master Builders Inc., Cleveland, OH (216)831-5500, (800)228-3318, (714)476-0500 [Admixtures], (800)824-8441 [Construction Products].
8. Metalloy Products
10. Rust-Oleum Corporation, Vernon Hills, IL (312)367-7700, (800)323-0851, and represented by Vista Paint, Fullerton, CA (714)380-6800.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:

1. Where required by the building code of jurisdiction, and as specified in Section 014500, provide inspections by a special inspector.
2. Comply with air quality management regulations in force at the time of the performance of the work of this Section with regard to low VOC primers.
3. Welding for buildings shall conform to City of Los Angeles Interdepartmental Correspondence dated August 11, 1997 titled Repair of...
Cracked Moment Framed Connections in Welded Steel Frame from Structures of SMRF-Welded Connections in New Buildings (Ref. A).

4. Comply with FEMA 353 for quality control and assurance for moment frames.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 DESIGN CRITERIA

A. Design Requirements: Where designated as AESS on Contract Drawings, comply with requirements of Section 051213 for Architecturally Exposed Structural Steel (AESS).
1. Galvanized steel members shall comply with the requirements of Section 051213 Architecturally Exposed Structural Steel (AESS) where steel is designated as AESS in the Contract Drawings.

2.05 MATERIALS, FERROUS STEEL

A. General: Tensile requirements for steel members shall conform to applicable ASTM standards referenced.

B. Wide Flange Shapes: Refer to Structural Contract Drawings.

C. Channels, Angles, Tees, Bars, and Plates: Refer to Structural Contract Drawings.

D. Structural Steel Tubing and Pipe: Refer to Structural Contract Drawings.

2.06 CONNECTIONS

A. Anchor Bolts: Conform to ASTM F 1554 Grade 55, weldable, hot-dipped galvanized, and Supplement S1. Provide headed type, with ASTM A 563 Grade A hexagonal nuts, unless otherwise indicated on Contract Drawings.
B. Threaded Anchor Rods: As indicated on Structural Contract Drawings.
C. Standard Threaded Fasteners: Refer to Structural Contract Drawings.
D. High-Strength Threaded Fasteners: Refer to Structural Contract Drawings.

2.07 OTHER MATERIALS

A. Filler Metals for Welding: Weld material shall comply with AISC Section J2.6, AWS A5.18, or AAWS A5.20, E70 series, and AISC 341.
   1. Shielded Metal Arc Welding: AWS D1.1 and D.8, with specified electrodes:
      a. Steel Member Connections: AWS A5.1 or A5.5, E80XX low hydrogen with a minimum toughness of 20 foot-pounds at 20°F.
      b. Steel Reinforcing Bar Connections: E90XX low hydrogen.
   2. Charpy V-Notch Toughness: Electrodes for welding moment frames, braced frames, and drag members (designated CVN) shall have a minimum CVN toughness of 20 foot-pounds at minus 20 degrees F.
      a. When they are used as members in the seismic Force Resisting System, ASTM A 6 Group 3 shapes with flanges 1-1/2 inches thick and thicker, ASTM A 6 Groups 4 and 5 shapes, and plates that are 1-1/2 inches thick or thicker in built-up cross-sections shall have a minimum V-Notch toughness of 20 foot-pounds at 0 degrees F.

B. Shop Paint Primer: Apply one of the following, or equal:
   1. Exterior Use: Prime galvanized steel and finish in accordance with Section 099600.
      a. Refer to Section 099600 for epoxy primers required with urethane finish coatings.
      b. Refer to Section 051213 for steel designated as AESS.
   2. Interior Use:
      b. Tnemec Series 115 Uni-Bond DF Primer, manufactured by Tnemec Company.
      c. Refer to Section 051213 for steel designated as AESS.

C. Field Repair Galvanize Coating: Dry-Galv manufactured by American Solder and Flux, or Galvalloy manufactured by Metalloy Products.

D. Non-Shrink Grout: Refer to Section 033100.

E. Headed Welded Studs: Granular flux-filled shear connector or anchor studs, equal to Nelson Stud Welding Division of TRW ICC ER 2614, or equal, manufactured of Grade C-1015, cold-rolled steel conforming to ASTM A 108.

F. Adhesive Anchoring System: As indicated on Structural Contract Drawings.

G. Expansion Bolts: As indicated on the Structural Contract Drawings.
2.08 WELDING

A. Welded Construction: Strictly comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work. Assemble and weld built-up sections by methods which will produce true alignment of axes without warp.
   1. Welding shall comply with AWS D1.1.

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

C. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members as indicated on Structural Contract Drawings. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning.

D. Anchor Bolts: Furnish anchor bolts and other connectors required for securing structural steel to foundations and other in-place work. Furnish templates and other devices as necessary for presetting bolts and other anchors to accurate locations.

2.09 FABRICATION

A. Shop Fabrication and Assembly: Fabricate structural steel in accordance with the AISC Specification and CBC Chapter 22A. Do not start fabrication until mill test reports have been accepted by Structural Engineer.
   1. Fabricate and assemble structural assemblies in the shop to greatest extent possible. Provide camber in structural members where indicated, or required.
   2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
   3. Furnish column bases shop-attached to columns.
   4. Shop connections shall be welded, except where bolted connections are indicated.
   5. Field connections shall be bolted, except where welded connections are indicated on the Contract Drawings.
   6. Holes shall be standard hole diameter, except holes for anchor bolts, which may be oversize holes as indicated on Structural Contract Drawings.
   7. Cleaning: Clean contact surfaces immediately prior to assembly and leave unpainted.
   8. Special Requirements For Members Belonging To Lateral Force Resisting Frames:
      a. Thermal cutting of members shall comply with AISC Section M2.2.
      b. Splices in heavy sections shall comply with AISC Section J1.7.
      c. Beam holes and weld access holes shall comply with AISC Section J1.8.

B. AESS: Where applicable, comply with requirements of Section 051213 for architecturally-exposed structural steel (AESS).
C. Welded Connections: Refer to Structural Contract Drawings for welding requirements.
   1. General: Make welded connections by shielded-arc method in accordance with AWS D1.1 and City of Los Angeles Interdepartmental Correspondence.
      a. Welding shall be done in the shop unless otherwise shown or specified.
      b. Prior to welding, preheat members in accordance with AWS D1.1 and Structural Contract Drawings.
      c. Welds not otherwise identified shall be continuous fillet welds, with size based on AISC standards for thicker part being joined.
      d. Welds exposed in the finished work shall be ground and dressed smooth to preserve the shape and profile of the welded item.
   2. Inspection: Welding shall be continuously inspected under supervision of a Special Inspector in accordance with Section 014500.
   3. Headed Welded Studs: Prepare steel surfaces as recommended by the manufacturer of shear connectors. Shop- or field-weld headed welded studs, spaced as indicated, to beams and columns. Use automatic end welding of headed stud shear connectors in accordance with the manufacturer's printed instructions. Provide complete fusion between end of the stud and the members without porosity or evidence of lack of fusion.

D. Galvanizing: Hot dip galvanize all ferrous metal in accordance with ASTM A 123. Hot dip galvanize all exterior and interior ferrous steel. Perform galvanizing after fabrication (shearing, punching, bending, forming, assembling, and welding) in the largest units practicable. Remove projections, barbs, and icicles after galvanizing.
   1. Comply with requirements of Section 051213 for AESS with special attention to surface blemishes. Grind all pits, runs, and rough spots to provide a smooth, clean surface for paint finish.

E. Shop Painting:
   1. Preparation:
      a. General: Clean surfaces of mill scale, grease, dirt, and foreign matter in accordance with SSPC SP-3.
         1) Where members will be exposed to long term exterior exposure, comply with SSPC SP-6.
      b. Architecturally-Exposed Structural Steel (AESS): Refer to Section 051213 where exposed to view or indicated as AESS.
   2. Regular Primers: Shop paint surfaces of structural steel members (including galvanized members) with specified primer, except as follows:
      a. Structural steel members, or portions of members, to be welded or embedded in concrete specified in Section 033100.
      b. Surfaces in contact with high strength bolts, bearing surfaces, and surfaces supporting concrete-filled metal deck specified in Section 053100.
      c. Members to be galvanized or to receive other coatings as indicated on Contract Drawings and Specifications.
      d. Members that will be concealed by interior finishes.
3. Epoxy Primers: Surfaces to receive urethane coating systems shall be primed with epoxy primer specified in Section 099600.
   a. Architecturally-exposed Structural Steel (AESS): Refer to Section 051213 where exposed to view or indicated as AESS.

4. Inaccessible Surfaces: Shop paint exterior and interior steel surfaces not in contact, but inaccessible for painting after erection, with two coats of specified primer. Thoroughly work primer into joints and angles.

F. Finish:
   1. Exterior: Structural steel exposed to view shall be finish painted in accordance with Section 099600.
   2. Interior: Structural steel exposed to view in public places shall be finish painted in accordance with Section 099600.
   3. Architecturally-exposed Structural Steel (AESS): Refer to Section 051213 where exposed to view or indicated as AESS.

2.10 SOURCE QUALITY CONTROL

A. No structural steel materials may be used, fabricated, or furnished until written acceptance of quality control submittals is issued by the code enforcement agency.
   1. Conduct a thorough material ID and mill certification review for steel products.

B. Conform to the inspection requirements of CBC Chapter 17A and the testing requirements of CBC 2212A as specified in Section 014500:
   1. Inspection of Structural Welding: CBC 1704A.3.1.4.
      a. Inspection of all shop and field welding operations shall be made by a qualified welding inspector approved by the enforcement agency. The minimum requirements for a qualified welding inspector shall be as those for an AWS certified welding inspector (CWI), as defined in the provisions of the AWS QC1. All welding inspectors shall be as approved by the enforcement agency.
      a. Review manufacturer's Material Test Report (MTR). Verify that material properties are as specified by DSA-approved documents, and that materials are readily identifiable and traceable to a MTR.
      b. Sample unidentifiable material for testing. Testing of materials must be performed by a laboratory accepted in the DSA Laboratory Evaluation and Acceptance Program (LEA).
      c. Conduct a thorough visual examination of the seam weld area in hollow structural sections (HSS) for visible discontinuities. Visual examination shall include as a minimum the exterior of the seam weld and the interior at each end.
      d. Conduct a thorough visual examination of surfaces of structural plate for visible lamination discontinuities.
C. Determine mechanical properties in conformance with ASTM A 370 of the following materials:
   1. Structural steel shapes and tubing.
   2. Anchor bolts.
   3. Filler metals for welding.
   4. High-strength threaded fasteners.
   5. Headed stud type shear connectors.

D. Inspect shop-assembled high-strength bolted connections and shop welds as described in Article 3.02 - Field Quality Control.

E. Refer to Section 014500 for responsibility and cost of testing services.

F. Charpy-V-Notch tests shall be performed by the manufacturer employing Test Frequency (P) in accordance with latest edition of AISC seismic provisions, utilizing standard specimen sizes indicated in Figure 6 of ASTM E 23. The absorbed energy in a CVN impact test shall not be less than that indicated by the following formula where CVN minimum average value shall be 20 ft. lb.:
   1. \[ CVN = \frac{F_y \left( t + 0.25 \right)}{5.45} \text{ ft. lb.} \]
   
   Where:  
   \[ F_y = \text{Specified Yield Stress (ksi)} \]
   \[ t = \text{Material Thickness (in.)} \]
   \[ CVN = \text{ft. lb. of absorbed energy when tested at a temperature of 70 degrees F.} \]
   2. Components requiring mandatory toughness requirements shall be designated on the steel shop drawings.
   3. Refer to Structural Contract Drawings for additional Charpy-V-Notch test requirements.

G. Prior to welding, base metal thicker than 1-1/2 inches when subjected to through thickness weld shrinkage strains shall be ultrasonically inspected for discontinuities.

**PART 3 - EXECUTION**

**3.01 ERECTION**

A. General: Erect structural steel in accordance with the AISC Specification referenced.
   1. Accurately assemble structural steel components to the lines and elevations indicated, within the specified erection tolerances.
   2. Accurately align and adjust the various members forming parts of a frame or structure after being assembled and before being fastened.
   3. Fasten splices of compression members after the abutting surfaces have been brought completely into contact.
   4. Clean bearing surfaces and surfaces that will be in permanent contact before the members are assembled.
   5. Coordinate setting of anchor bolts and anchors using templates with work of Section 031000.
   6. Make splices and field connections with bolts except where welding is indicated on Contract Drawings.
   7. Cranes will not be allowed on building slab areas.
B. Temporary Supports: Provide temporary bracing and supports for all dead loads of structure and the imposed loads of erecting and construction activities. Maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing. Provide erection bracing plans designed and stamped by State of California licensed Civil or Structural Engineer.
   1. Do not tighten building framing connections for temporary bracing purposes.

C. Connections:
   1. Field connections shall be bolted, except where welded connections are indicated on the Contract Drawings.
   3. Simple Shear Connections: High strength bolts, or as indicated on the Structural Contract Drawings.
      a. Simple shear connections shall be removable by handwrench without power tool and not fully tightened.

D. High-Strength Steel Bolting: Perform in accordance with the AISC Code of Standard Practice referenced, and in accordance with the CBC Chapter 22A.

E. Cutting of Holes: Field cutting of holes shall be made by drilling only. Burning of holes will not be permitted.

F. Field Assembly: Set structural frames accurately to lines and elevations. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure within specified AISC tolerances.
   2. Splice members only where indicated and accepted on final shop drawings.
   3. Do not enlarge holes in members by burning or by use of drift pins except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
   4. Back-up bars, dams, and runoff tabs shall be removed: the weld, base metal shall be ground flush and smooth per AWS.

G. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in structural framing. Cutting will be permitted only on secondary members which are not under stress. Finish gas-cuts sections equal to a sheared appearance when permitted.

H. Follow applicable fabrication sections.

I. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
J. Tolerances: Individual pieces shall be erected in conformance with the AISC Specification referenced. Deviation from plumb, level, and alignment shall not exceed 1 to 500.

3.02 FIELD QUALITY CONTROL

A. Inspection of Erection: Special Inspector will inspect erection, field welding, and high-strength bolting.

B. Certification: Special Inspector will:
   1. Certify in writing, after completion of the work, that structure has been erected in accordance with the Contract Documents and the building code.
   2. Certify in writing, after completion of the work, that welding has been performed in accordance with the Contract Documents and the building code.
   3. Certify in writing, after completion of the work, that high-strength bolting has been performed in accordance with the Contract Documents and the building code.

C. Inspection of Welding:
   1. Inspection of structural welding shall conform to the requirements of AWS D1.1.
   2. Special Inspector will visually inspect welds and be present to inspect and accept groove, single-pass, multi-pass, and penetration welding.
   3. Non-Destructive Testing: Comply with CBC Chapter 17A.
   4. Complete penetration groove welds contained in the beam to column joints of the moment frames shall be tested 100 percent either by ultrasonic testing or by radiography.
      a. At other than moment frame beam to column connections, base metal thicker than 1-1/2-inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities directly behind such welds. Test shall be performed not less than 24 hours after joint completion.

D. Inspection of High-Strength Bolts, Nuts, and Washers:
   1. Testing Laboratory will inspect high-strength bolting performed in fabricator's shop or at the site.
      a. Bolt tightness shall be checked on a minimum 10 percent of bolts, selected at random, for each high-strength bolted joint.

E. Inspection and Testing of Headed Welded Studs:
   1. Special Inspector shall continuously inspect field welding of headed studs.
      a. Inspection of all shop and field welding operations, including the installation of automatic end-welded stud shear connectors, shall be made in accordance with CBC 2213A.2 by a qualified welding inspector approved by the enforcement agency.
2. At the beginning of work each day make minimum of two test welds with same equipment and materials as actual work piece. Test studs shall be subjected to 90 degree bend test by striking them with a heavy hammer. After test, weld section shall not exhibit any tearing out or cracking.

3.03 ADJUSTING AND CLEANING

A. Field Touch-up Painting: After the erection of structural steel, touch-up field connections, exposed bolts, and abrasions in the prime coat with the same paint used for the shop painting.
1. Rusting: Structural members showing evidence of rusting over 25 percent of any surface after erection shall be removed and replaced.
2. Mark Numbers: Remove or apply prime coat over mark numbers as part of work of this Section.

B. After erection and field welding, wire brush scarred galvanized surfaces and apply field repair galvanize coating according to manufacturer's specifications.
1. Surfaces covered with structural concrete or lightweight insulating concrete fill need not be touched-up.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Surface preparation and finishing of members noted on Contract Drawings as AESS and in the areas defined as AESS in the Specifications.
   1. Include exposed steel shapes, plates, and bars used in structural steel fascias, canopies, trellises, stairs, and other exposed fabrications generally specified in Division 05 Sections.
   2. Refer to Division 05 Sections for other requirements regarding steel work not included in this section.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013113 - Project Coordination: Project meetings.
   3. Section 013300 - Submittal Procedures.
   4. Section 014339 - Mockups.
   5. Section 014500 - Quality Control.
   7. Section 018113 - Sustainable Design Requirements.
   8. Section 051200 - Structural Steel Framing.
   9. Section 053100 - Steel Decking.
   10. Section 055000 - Metal Fabrications.
   11. Section 099100 - Painting.
   12. Section 099600 - High Performance Coatings.

C. Mockups: The work of this Section may be affected by mock-up requirements described in Section 014339.

1.02 REFERENCES

A. ASTM International (ASTM):
B. American Galvanizers Association (AGA):
   1. *Inspection of Products Hot-Galvanizing After Fabrication.*

C. American Institute of Steel Construction (AISC):
      a. Chapter 10.

D. American Iron and Steel Institute (AISI):
   1. 9002 - Welding of Stainless Steels and Other Joining Methods.

E. American National Standards Institute (ANSI):

F. National Association of Architectural Metal Manufactured (NAAMM):

G. The Society for Protective Coatings (SSPC):
   1. Steel Structures *Painting Manual PA*.
      b. Volume 2 - Systems and Specifications, 7th Edition, including Specifications, Guides, Procedures, and Supplements:
         1) SP-1 - Solvent Cleaning.
         2) SP-2 - Hand Tool Cleaning.
         3) SP-3 - Power Tool Cleaning.
         4) SP-6 - Commercial Blast Cleaning (NACE 3).
         5) SP-7 - Brush-off Blast Cleaning. (NACE 5).
         6) SP-12 - Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultra High-Pressure Water Jetting Prior to Recoating.

H. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

### 1.03 DEFINITIONS

A. **AESS:** Architecturally Exposed Structural Steel.
   1. Where exposed to view in finish construction, steel members shall be considered architecturally exposed structural steel and conform to the requirements for AESS.
      a. Refer to Architectural Contract Drawings for hatched region identifying areas to comply with the requirements of these Specifications.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Preinstallation Conference: Schedule and conduct conference at the Project site to comply with requirements of Section 013113. As a minimum, the meeting shall include the Contractor, fabricator, erector, the finish-painting/coating subcontractor, Owner, and Architect. Coordinate requirements for shipping, special handling, attachment of safety cables,
temporary erection bracing, touch up painting, and other requirements for AESS.

1.05 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit product data for paint products.
   1. Compatibility: Submit components/procedures of the paint system for AESS as a single coordinated submittal. As a minimum, identify required surface preparation, primer, intermediate coat if applicable, and finish coat. Items shall be coordinated with the finish coat specified in Division 09.

C. Shop Drawings: Furnish in accordance with the provisions of Section 051200 and Section 055000.
   1. Provide erection drawings clearly indicating which members are considered as AESS members.
   2. Include details that clearly identify all of the requirements listed in Article 2.05 - Fabrication and Article 3.03 - Erection of this Section. Provide connections for exposed AESS consistent with concepts indicated on the architectural and Structural Contract Drawings.
   3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined herein.
   4. Indicate welds by standard AWS symbols, distinguishing between shop and field welds. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections. Indicate to which direction bolt heads should be oriented.
   5. Clearly indicate which surfaces or edges are exposed and what class of surface preparation is being used.
   6. Indicate special tolerances and erection requirements as noted on the drawings or defined herein.

D. Samples: Submit samples for verification of typical types of members and connections required.
   1. Prepare components indicated below of same thickness and metal listed for final unit of work.
      a. Twelve-inch long reduced size sections of each distinctly different linear shape.
      b. Welded connections.
      c. Samples for verification of each type and size of exposed fastener exhibiting metal type and finish.
   2. Where finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   3. Assembled sample of each system made from full-size partial length components. Show method of finishing members at intersections.

E. Qualification Data: Submit data to demonstrate the capabilities and experience of fabricators and erectors. Include lists and photographs of completed projects with names and addresses of projects, architects, owners, and other relevant information specified.
1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:

1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.07 QUALITY ASSURANCE

A. Fabricator Qualifications: In addition to those qualifications listed in Division 05 Sections, engage a firm experienced in fabricating AESS similar to that indicated for this Project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.

B. Erector Qualifications: In addition to those qualifications listed in Division 05 Sections, engage an experienced firm that has completed AESS work similar in material, design, and extent to that indicted for this Project, and with a record of successful in-service performance.

C. Mockups: Refer to Section 014339 for mockup requirements. Prior to installation, construct mockups for each system and finish required to verify selections made under sample submittals and to demonstrate appearance as well as execution. Mockups shall comply with the following requirements, using materials indicated for final units of work.

1. Place mockups on site in the location directed by Architect. Where possible, provide mockup components in full height section that can be incorporated into the final work.

1.08 FIELD CONDITIONS

A. Field Measurements: Check actual dimensions of other construction by accurate field measurements before fabrication. Show recorded meas-
urements on final Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

PART 2 - PRODUCTS

2.01 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
   a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.

2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   a. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GC-11.

2.02 DESIGN CRITERIA

A. Design Requirements: Where structural steel or metal fabrications are exposed to view, or designated as AESS on Contract Drawings, or referenced in the Specifications, comply with fabrication requirements, including tolerance limits of Section 10 of AISC Code of Standard Practice for structural steel identified as architecturally exposed structural steel (AESS) regarding:

1. Delivery of material.
2. Surface appearance and weld show-through.
3. Welding and joint uniformity.
4. Material and erection tolerances.
5. Deflection limitations.

B. Where exposed to view in finish construction, structural steel members shall be considered architecturally exposed structural steel and conform to the requirements for AESS.
C. Comply with requirements of other Division 05 sections, including Sections 051200 and 055000 in conjunction with work of this Section.
2. Finish: AESS steel shall be finished in accordance with Section 099600.
   a. Comply with additional cleaning, preparation, and primer requirements.

2.03 MATERIALS

A. Metals: Provide materials specified in product section for each item of steel fabrication requiring AESS preparation and finish.
1. General: Provide metal free from surface blemishes where exposed to view in the finished unit. Select rolled shapes that have true and even radii matching the profiles shown in the AISC Steel Manual. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, rolled trade names, roughness, stains, discolorations, or other imperfections on finished units are not acceptable.
2. Stainless Steel: Grade and type designated below for each form required:
   a. Tubing: ASTM A 554, Grade MT 304.
   b. Plates and Bars: ASTM A 240.

B. Fasteners:
1. Select fasteners of the type, grade, and class as shown on Contract Drawings required to produce connections in sizes that are capable of withstanding design loadings.
2. Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
   a. Stainless Steel Fasteners: Provide fasteners fabricated from Type 316 stainless steel.
3. High-Strength Bolts, Nuts, and Washers: In accordance with Section 051200 for heavy hex heads and nuts.
   a. Provide rounded bolt heads with twist-off bolts where indicated.
   b. Provide standard carbon steel at interior locations.
   c. Provide mechanically galvanized finish at exterior locations.

2.04 PRIMERS

A. Primers: Refer to respective Division 05 Sections.
1. Ferrous Metal: Comply with applicable requirements of Section 099600.
2. Galvanized Steel: Comply with applicable finish requirements of Section 099600.
2.05 FABRICATION

A. General: Fabricate architecturally exposed structural steel (AESS) to comply with requirements indicated for design, dimensions, details, finish, and member sizes, but not less than that required to support structural loads.

1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes, including pits, rust, scale, seam marks, roller marks, rolled trade names, and surface roughness.

2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

3. Locate field joints in AESS assemblies at concealed locations or as approved by the Architect.

4. Detail AESS assemblies to minimize field handling and expedite erection.

B. In addition to special care used to handle and fabricate AESS, employ the following fabrication techniques:

1. Fabrication Tolerance: Fabricate steel to one half the normal tolerance as specified in the Code of Standard Practice Section 10.

2. Welds Ground Smooth: Fabricator shall grind welds of AESS smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within +1/16"-0" of plate thickness.

3. Contouring and Blending of Welds: Where fillet welds are indicated to be ground-contoured, or blended, oversize welds as required and grind to provide a smooth transition and to match profile on approved mock-up.

4. Continuous Welds: Where welding is noted on the drawings, provide continuous welds of a uniform size and profile.

5. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

6. Coping and Blocking Tolerance: Maintain a uniform gap of 1/8"±1/32" at all copes and blocks.

7. Joint Gap Tolerance: Maintain a uniform gap of 1/8"±1/32".

8. Piece Marks Hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.

9. Mill Mark Removal: Deliver steel with no mill marks (including stenciled, stamped, or raised) in exposed locations. Mill marks shall be omitted by cutting of mill material to appropriate lengths where possible. Where not possible, the fabricator can fill and/or grind to a surface finish consistent with the approved mockups.

10. Grinding of Sheared Edges: Fabricator shall grind edges of sheared, punched or flame-cut steel to match approved mockups.

11. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 20 feet under any lighting condition determined by the Architect. Tolerances for the vertical and hori-
horizontal walls of rectangular HSS members after rolling shall be the specified dimension ±1/2".

12. Seal weld open ends of round and rectangular hollow structural section with 3/8" closure plates. Provide continuous sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.

C. Cutting:
1. Straight cut-off of roll formed shapes shall be straight and true. Curved, beveled, filleted and shaped parts that are repeated shall be preformed on computer controlled equipment to ensure repetition between identical parts.
2. Cut lines true and straight. Form radii true and concentric. Make transitions between straight and radius smooth and tangential to curve.
3. Identical parts shall not exceed 1/16-inch distance, 1/16-inch radial variation, or 1-degree angular variation.
   a. Finished cuts shall have a smooth even surface comparable or better than surface quality with as-milled surfaces.
4. Ease exposed edges to a radius of approximately 1/16-inch, unless otherwise indicated.

D. Assemble steel systems in shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

E. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
1. Form changes in direction of members by radius bends of radius indicated.

2.06 SHOP CONNECTIONS

A. General: Provide brackets, flanges, miscellaneous fittings, and anchors to connect members to other construction.
1. Provide inserts and other anchorage devices to connect systems to concrete or masonry work. Fabricate anchorage devices capable of withstanding imposed loads. Coordinate anchorage devices with supporting structure.

B. Connections: Shop fabricate systems for connecting members by welding. For connections made during fabrication, weld corners and seams continuously to comply with the following:
1. Non-welded Connections: Fabricate systems by connecting members as indicated on Structural Contract Drawings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
   a. Bolted Connections: Make in accordance with Division 05 Sections. Provide bolt type and finish as noted herein and align bolt heads as indicated on the approved shop erection drawings.
2. Welded Connections: Comply with AWS D1.1 and Section 051200. Appearance and quality of welds shall be consistent with the mockups. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding the tolerance of this Section.
   a. Use only metal inert gas welding. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   b. Obtain fusion without undercut or overlap.
   c. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

C. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

D. Fabricate joints that will be exposed to weather in a watertight manner.
   1. Provide means to drain entrapped water in hollow sections of members that are exposed to the weather, to moisture from condensation, or to other sources or humidity.
   2. Exposed ends of members shall be welded closed with prefabricated end fittings.

2.07 SHOP FINISHES

A. Surface Preparation: Clean surfaces to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Prepare surfaces according to SSPC Specifications as follows:
   1. Interior Applications, Generally: SSPC-SP 3 Power Tool Cleaning.
   2. Exterior Applications, Generally: SSPC-SP 6 Commercial Blast Cleaning.
   4. Miscellaneous Shapes, Bars, and Plates: Clean in accordance with SSPC SP-7.
   5. Coordinate the required blast profile with the approved paint submittal prior to beginning surface preparation.

B. Steel:
   1. Galvanizing: Hot-dip galvanize items indicated to be galvanized after fabrication to comply with applicable standard listed below:
      a. ASTM A 123 for galvanizing iron and steel products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips.
      b. ASTM A 153 for galvanizing iron and steel hardware.
   2. Fill vent and drain holes that will be exposed in the finished work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
   3. Preparation for Shop Priming: After galvanizing, thoroughly clean steel items of grease, dirt, oil, flux, and other foreign matter, and treat with etching solution as specified in Section 099600.
      a. Exteriors (SSPC Zone 1B): SSPC SP-6 Commercial Blast Cleaning.
C. Shop-prime steel surfaces, except the following:
   1. Surfaces embedded in concrete or mortar.
      a. Extend priming of partially embedded members to a depth of 2".
   2. Surfaces to be field welded.
   3. Surfaces to be high-strength bolted with slip-critical connections, if primer does not meet the specified AISC slip coefficient.

D. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
   1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
   2. Apply two coats of shop primer to surfaces that are inaccessible after assembly or erection.
   3. Spray apply shop primer specified in Section 099600 to prepared surfaces of components, unless otherwise indicated. Comply with requirements of SSPC PA-1 Paint Application Specification No. 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
   4. Final finish coats shall be spray applied to primed surfaces in accordance with manufacturer's written instructions and Section 099600.

E. Stainless Steel:
   1. Remove or blend tool and die marks and stretch lines into finish.
      a. Grind and polish surfaces to produce uniform directional, textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece. Metal shall be free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
      b. Bright, Directional Polish: Match AISI No. 4 finish.
      c. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

F. Cleaning:
   1. Clean in accordance with SP-3 and SP-6.
   2. Hot dip galvanize steel components.
   3. Spray apply primer coatings as specified in Section 099600.
   4. Comply with NAAMM Metal Finishes Manual for recommendations relative to applying and designating finishes.
   5. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples and one-half of the amount permitted for structural steel. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.
   6. Protect finishes from damage by applying a strippable, temporary protective covering prior to shipment.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Erector shall check AESS members upon delivery for twist, kinks, gouges, or other imperfections that do not conform to the quality provided in the approved mockup which might result in rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

B. Special care shall be taken with steel scheduled to receive paint or high performance coating over hot dip galvanized steel. Remove tool marks and surface imperfections by grinding, filling, and sanding as necessary so that no imperfections are noticeable after final paint.

3.02 PREPARATION

A. Provide connections for temporary shoring, bracing, and supports only where noted on the approved Shop Drawings. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift, and align pieces using padded slings and/or other protection required to maintain the appearance of the AESS through the process of erection.

B. Coordinate setting drawings, diagrams, templates, instruction, and directions for installing sleeves, concrete inserts, anchor bolts, and items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.03 ERECTION

A. Fit exposed connections accurately together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installation. Set accurately in location, alignment, and elevation, as measured from established lines and levels.

1. Do not weld, cut, or abrade surfaces of components that have been coated or finished after fabrication and are intended for field connection by mechanical or other means without further cutting or fitting.

C. Erect prepainted finish pieces using padded slings or other similar methods to avoid damage to finish. Provide padding as required to protect finish while rigging and aligning member’s frames. Weld tabs for temporary bracing and safety cabling only at points concealed from view in the completed structure or where approved by the Architect during the pre-installation meeting. Methods of removing temporary erection devices and finishing the AESS members shall be approved by the Architect prior to erection.

D. Set AESS accurately in locations and to elevations indicated, and according to AISC specifications referenced in this Section.

E. In addition to the special care used to handle and erect AESS, comply the following erection tolerances and techniques:

1. AESS Erection Tolerances:

   a. Erection tolerances for AESS fabrications within close visibility (up to 15 feet from any occupied or travel position) shall meet
the requirements of the more strict tolerances for structural steel per Chapter 7 of the AISC Code of Standard Practice. This requirement is one-half of Standard Tolerance of Chapter 10.

b. Erection tolerances for AESS fabrications with more distant visibility (beyond 15 feet from any occupied or travel position) shall meet the requirements of Chapter 10 of the AISC Code of Standard Practice.

2 Welds Ground Smooth: Erector shall grind welds smooth in the connections of AESS members. For groove welds, the weld shall be made flush to the surfaces of each side and be within +1/16"-0" of plate thickness.

3 Contouring and Blending of Welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required; grind to provide a smooth transition and to match profile on approved mock-up.

4 Continuous Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.

5 Minimize Weld Show-Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

6 Bolt Head Orientation: Bolt heads shall be oriented uniformly or as indicated on the Contract Documents. Where bolt-head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.

7 Removal of Field Connection Aids: Run-out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up, and welding in the field shall be removed from the structure. Field groove welds shall be selected to eliminate the need for backing bars or to permit their removal after welding. Welds at run-out tabs shall be removed to match adjacent surfaces and ground smooth. Holes for erection bolts shall be plug welded and ground smooth.

8 Filling of Weld Access Holes: Where holes must be cut in the web at the intersection with flanges on W shapes and structural tees to permit field welding of the flanges, they shall be filled. Filling shall be executed with proper procedures to minimize restraint and address thermal stresses in Group 4 and 5 shapes.

F. Field Welding: Weld profile, quality, and finish shall be consistent with mockups approved prior to fabrication.

G. Splice members only where indicated or approved by the Architect and Structural Engineer.

H. Obtain permission for any torch cutting or field fabrication from the Architect. Finish sections thermally cut during erection to a surface appearance consistent with the mock up.

I. Do not enlarge unfair holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection
plates that are misaligned where holes cannot be aligned with acceptable final appearance.

### 3.04 FIELD CONNECTIONS

A. Bolted Connections: Install bolts of the specified type and finish in accordance with Division 05 Sections.

B. Welded Connections: Comply with AWS D1.1 for procedures, and appearance. Refer to Division 05 Sections for other requirements.
   1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.
   2. Obtain Architect’s approval for appearance of welds in repaired or field modified work.

### 3.05 FIELD QUALITY CONTROL

A. Structural Requirements: Owner will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports. Refer to Division 05 Sections for detailed bolt and weld testing requirements.

B. AESS Acceptance: Architect shall observe the AESS steel in place and determine acceptability. The testing agency shall have no responsibility for enforcing the requirements of this Section.

### 3.06 ADJUSTING AND CLEANING

A. Clean all metals by washing thoroughly with water and soap, followed by rinsing with clean water.

B. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint shall be completed to blend with the adjacent surfaces of AESS. Such touch up work shall be done in accordance with manufacturer’s instructions as specified in referenced Division 09, painting and coating sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

D. After installation of metal deck to steel beams, paint all projecting portions of mechanical fasteners, screw points, and burn-throughs of plug welds where occurs as specified for final coats. Prepare surface in accordance with SSPC SP-3 for plug welds.

### 3.07 PROTECTION

A. Protect finishes from damage during construction period with temporary protective coverings approved by manufacturer. Remove protective coverings at the time of Substantial Completion.
B. Restore finishes damaged during installation and construction period so that no evidence remains of correction work. Return items that cannot be refinished in the field to the shop. Make required alterations and refinish entire unit, or provide new units.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Steel floor and roof decks, as applicable.
   1. Roof deck.
   2. Composite floor deck.
   3. Supplementary framing for openings up to and including 18 inches.
   4. Bearing plates and angles.
   5. Stud shear connectors.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 016600 - Product Storage and Handling Requirements.
   5. Section 018113 - Sustainable Design Requirements.
   6. Section 051200 - Structural Steel Framing: Support for steel deck.

C. Related Sections:
   1. Section 033100 - Structural Concrete: Concrete fill.
   2. Section 095300 - Acoustical Ceiling Suspension Assemblies: Installation of hanger wires prior to pouring concrete fill.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. A 36-12 - Specification for Structural Steel.
   2. A 653-13 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. California Code of Regulations (CCR):

C. American Iron and Steel Institute (AISI):
   1. Specifications for the Design of Cold-Formed Steel Structural Members (2007).
D. American Welding Society (AWS):
   1. A2.4 - Symbols for Welding and Nondestructive Testing, Including Brazing.
   2. D1.3 - Structural Welding Code—Sheet Steel.

E. IAPMO Evaluation Service (IAPMO ES), a division of International Association of Plumbing and Mechanical Officials:
   1. IAPMO Uniform Evaluation Reports, (UER-), designated by applicable report number.

F. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction (ESR-), designated by applicable report number:
      a. UER No. 217

G. Steel Deck Institute (SDI):
   1. No. 26 - Design Manual for Composite Decks, Form Decks and Roof Decks.

H. FM Global (FM):
   1. Approval Guide.

I. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings comprehensively describing fabrication and installation of steel deck. Shop Drawings shall include not less than the following:
   1. Dimensioned plans, location of deck panels, supplementary framing, openings, number and spacing of headed stud anchors, and accessory fabrications in relation to one another and in relation to contiguous building construction.
   2. Typical and special fabrication and installation details, including details of anchorage to supporting structure.
   3. Indicate welds in accordance with the requirements of AWS D1.3 and AWS A2.4.
   4. Closures and edge details.
   5. Composite stud layout and details.
C. Quality Control Submittals: In accordance with the provisions of Section 013300, submit the following:
   1. Certificates: Furnish manufacturer’s certification that steel decking materials conform to the requirements of the Structural Contract Drawings.
      a. Accompany steel deck deliveries with certified mill reports.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 CLOSEOUT SUBMITTALS

A. Warranty Documentation: Submit copies of written warranty, as supplied by the applicator, agreeing to repair or replace defective coating work during the warranty period.

1.07 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer's Qualifications: Currently a member in good standing of the Steel Deck Institute (SDI) or having a demonstrated capability of manufacturing steel structural decking in accordance with SDI standards.
   2. Installer's Qualifications: Regularly engaged and specializing, for the preceding 5 years, in the installation of steel structural decking systems.
      a. Specifically trained, licensed, certified, or otherwise approved in writing by the deck unit manufacturer.
   3. Welders' Qualifications: Currently certified in accordance with the requirements of AWS D1.3.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 016600 regarding storage of materials. Do not overload structure with material stored in concentrated areas.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   2. Vulcraft, a Division of Nucor Corporation, Brigham City, UT (801)734-9433, Florence, SC (843)662-0381.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.

2.03 REGULATORY REQUIREMENTS

A. Regulations:
   1. Where required by the building code of jurisdiction, provide inspections by a Special Inspector.
   2. Comply with ICC ES Evaluation Report, or IAPMO Uniform Evaluation Reports, as applicable to steel deck product proposed for use.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
   2. Submit documentation to enforcing agency which demonstrates compliance with CALGreen 5.408.1.4. Sample compliance forms are available in the CALGreen Guide.
2.04 DESIGN CRITERIA

A. Design Requirements: Design is based on deck type indicated on Contract Structural Drawings with vertical and lateral loads indicated in the current ICC ES Evaluation Report for product proposed for use.

2.05 MATERIALS

A. Provided materials shall comply with the recommendations of SDI Design Manual.

B. Steel for Galvanized Metal Deck Units: Steel sheet of structural (physical) quality, chemically-treated, not oiled, minimized spangle, ASTM A 653 grades and types as required by Structural Contract Drawings, and zinc coated (galvanized) in accordance with ASTM A 924.
   1. Use Class G60 coating designation for deck not exposed to view.
   2. Use Class G90 at composite type deck and where exposed to exterior.

2.06 MANUFACTURED UNITS

A. General: Design is based on the use of steel deck units specified by proprietary designation on the Contract Structural Drawings.
   1. Provide steel decking with section properties, negative and positive, proportioned in conformance with the applicable requirements of the AISI Specifications referenced.
   2. For support of subsequently installed ceiling construction, provide deck units with integrally formed slots capable of receiving hanger wire, and supporting a load per slot of not less than 100 pounds.
   3. Composite type deck shall be provided with integral embossments capable of developing mechanical shear bond between decking and concrete.
   4. Vented Decks: Deck units with concrete fill at areas to receive waterproofing membranes, roofing, elastomeric coatings, and other impermeable membranes shall be vented type.
      a. Vent tabs shall be protruding and staggered in the low flutes, 12 inches maximum on centers, or other joint deformation, to provide a minimum 1.5 percent openings uniformly distributed over the total deck area for relief of vapor pressure.
      b. Do not use vent tabs openings to support mechanical equipment.
   5. Provide prepunched holes in edges for welded studs attached at overlapped units.

B. Form Deck Units:
   1. At Supported Floors and Mechanical Equipment Pad: Design is based on the use of steel deck units as specified by proprietary designation on the Contract Structural Drawings.

C. Unperforated Deck: Refer to Structural Contract Drawings.

D. Accessory Materials:
   1. Structural Steel Shapes: Comply with ASTM A 36.
   2. Welding Electrodes: Comply with AWS D1.3, E70 rods.
   3. Fastening Accessories: No. 14 gage steel weld washers with bent-up ears.
4. Include edge form, bent plates, and all closures.
5. Acoustical Insulation: Glass fiber type, minimum 1.1 lb/cu ft density; profiled to suit deck.

E. Galvanizing Repair Paint: In accordance with the requirements of MIL-P-21035. Galv-Alloy, Dry-Galv, or equal.

F. Shear Connectors: Refer to Section 051200 for welded headed studs.

2.07 FABRICATION

A. Deck Units: Form deck units in lengths to span two or more support spacings, with ends and side laps as indicated on Structural Contract Drawings. End laps shall be 2 inches minimum at roof deck not receiving concrete fill.
   1. Provide deck configurations complying with SDI Design Manual, of the gage, depth, and width as indicated.
   2. Where supporting structural concrete fill, provide composite type deck, deformed to provide mechanical bond between steel deck and concrete fill.

B. Accessory Components:
   1. Use standard sheet metal cell closures for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units.
   2. Fabricate metal closure strips, for openings between decking and other construction, of not less than 12 gage sheet steel, unless otherwise indicated on Structural Contract Drawings. Form to provide tight fitting closures at open ends of cells or flutes and sides of decking.

C. Factory Cleaning:
   1. Prior to delivery of deck units, solvent-clean surfaces of rolling oils and other unwanted matter that might prevent or inhibit bonding of coatings or cementitious fireproofing.
   2. Metal Deck Exposed to View: In addition to solvent cleaning, wash with soap and water followed by rinsing with clean water.
      a. Provide special protective covering for shipment and erection where exposed to view.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install work in accordance with SDI Design Manual and the manufacturer's recommendations.
   1. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
      a. Maintain two-span condition minimum, and three-span condition where possible. Shore at non-continuous support conditions.
      b. Provide 2-inch bearing minimum at supports.
   2. Place deck units in straight alignment for entire length of run of cells and with close alignment between cells at ends of abutting units.
3. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.
4. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
5. Do not use deck units for storage or working platforms until permanently secured. Do not exceed the capacity of the deck to support loads.
6. Cut and neatly fit deck unit and accessories around other work projecting through, or adjacent to, the decking.
7. Shore deck during concrete placement as required by manufacturer or Contract Drawings.
8. After concrete is placed on deck, do not load until concrete is 28 days old. Do not exceed design live load as indicated in Contract Documents.

B. Fastening Deck Units:
1. Fasten metal deck units to steel supporting members by not less than 1/2-inch effective diameter plug welds or elongated welds of equal strength, spaced as indicated on Structural Contract Drawings, and at closer spacing where required for lateral force resistance.
   a. Attach deck units to supporting steel members and at side laps as indicated on Structural Contract Drawings.
   b. Where exposed to view from below, conceal any evidence of attachment.
2. Comply with AWS requirements and procedures for manual shielded arc welding, appearance, and quality of welds, and methods used in correcting welding work.
3. Mechanically fasten side laps of adjacent deck units with welds, mechanical fasteners, or button punch seams as indicated on Structural Contract Drawings.
4. Welded stud connectors may be used to replace required deck fastening welds on a one-for-one basis.

C. Reinforcement at Openings: Provide metal closure pieces and additional reinforcement as required for strength, continuity of decking, and support of adjacent work.

D. Closure Strips: Provide metal closure strips at open uncovered ends and edges of metal decking, and in voids between decking and other construction. Weld into position to provide a complete decking installation.

E. Acoustical Deck:
1. Cut acoustical deck in a clean and neat manner. Openings not indicated on Contract Drawings shall be approved by Architect’s structural consultant.
2. Fasten acoustical deck to supports with three 3/4-inch diameter puddle welds across width as indicated on the Contract Drawings or on accepted manufacturer’s submittals.
3. Fasten sidelaps together with 1-1/2-inch long fillet welds or No. 12 screws as indicated on Contract Drawings or manufacturer’s submittals.
3.02 FIELD QUALITY CONTROL

A. Provide continuous inspection of metal deck welds and mechanical fasteners.

3.03 ADJUSTING AND CLEANING

A. After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members, except where decking is covered by concrete.
   1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with requirements of Section 051200 and manufacturer's recommendations.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Structural metal stud wall framing, including exterior studs subject to wind forces.

B. Referenced Sections:
1. Section 012500 - Substitution Procedures.
2. Section 013300 - Submittal Procedures.
4. Section 018113 - Sustainable Design Requirements.
5. Section 074273 - Fibre Cement Wall Panels.
7. Section 092216 - Non-Structural Metal Framing: Interior non-bearing applications.

C. Related Sections:
1. Section 051200 - Structural Steel Framing.

1.02 REFERENCE STANDARDS

A. ASTM International (ASTM):
1. A 653-11 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5. C 955-11c - Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases.

B. California Code of Regulations (CCR):
1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
   a. Chapter 22A - Steel.

C. IAPMO Evaluation Service (IAPMO ES), a division of International Association of Plumbing and Mechanical Officials:
1. IAPMO Uniform Evaluation Reports, (UER-), designated by applicable report number.

D. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction (ESR-), designated by applicable report number:
   a. ESR-1166P.
   b. ESR-1663.
   c. ESR-2457.
   d. ESR-4943P.

E. American Iron and Steel Institute (AISI):
1. Code of Standard Practice for Cold-Formed Steel Structural Members, latest edition.
2. Cold-Formed Steel Framing Design Manual, latest edition.

F. American Welding Society (AWS):
1. D1.1 - Structural Welding Code - Steel.
2. D1.3 - Structural Welding Code - Light Gauge.
3. E1.3 - Specifications for Welding Sheet Steel.

G. Federal Specifications (FS):
1. FF-S-325 - Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring Masonry).
2. FF-P-395 - Pin, Drive, Guided and Pin Drive, Power Actuated (Fasteners for Power Actuated and Hand Actuated Fastening Tools).

H. Gypsum Association (GA):
1. 216 - Specifications for the Application and Finishing of Gypsum Board.
2. 302 - Installation of Screw-type Steel Framing Members to Receive Gypsum Board.

I. Metal Lath/Steel Framing Association (ML/SFA):
1. Specifications for Metal Lathing and Furring.

J. Military Specifications (MIL):
1. MIL-P-21035 - Paint, High Zinc Dust Content Galvanizing Repair.

K. Steel Stud Manufacturers Association (SSMA):
1. Industrial Technical Note Series.
L. Underwriters Laboratories (UL):

M. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Refer to Section 092216 for non-structural metal framing.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer’s descriptive literature and specifications.
   1. Submit framing system manufacturer’s standard published load/span charts for members proposed for use indicating compliance with design requirements.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings showing all wall framing elevations, wall sections, kicker locations, ceiling framing and bracing, and all connections to structure.

C. Quality Control Submittals: In accordance with the provisions of Section 013300, submit the following:
   1. Certificates: Furnish certification of test results that material was manufactured, sampled, tested, and inspected in accordance with ASTM A 924.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include
statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Welder's Qualifications: Currently certified in accordance with AWS D1.1 and D1.3, as applicable for light gage steel.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design of steel studs and accessories is based on products of the following manufacturer:
   2. Equal products manufactured by a member of Steel Stud Manufacturers Association (SSMA), Chicago, IL (312)456-5590.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with the applicable requirements of ASTM C 955 and the ML/SFA Specifications referenced.
   3. Comply with one of the following:
      a. Comply with the ICC ES Active Evaluation Report 2457 or ES ESR-1166P for ClarkDietrich Building Systems Cold-Formed C-studs Structural Framing.
      b. Comply with ICC ES Active Evaluation Report, as applicable, for the proposed manufacturer of the steel stud system.
   4. Comply with UL 2079 for deflection track in fire rated walls, as applicable.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half
of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 DESIGN CRITERIA

A. Design Requirements: Design of gage, spacing, and connections is indicated on the Structural Contract Drawings.

B. Provide properties in accordance with Steel Stud Manufacturers Association (SSMA) recommendations.
   1. Deflection properties shall be in accordance with Structural Contract Drawings.

2.05 MATERIALS

A. Forming Steel for Galvanized Finish: Use at all locations on Project applicable to this section.
   1. Studs and Joists:
      a. 16 Gage and Heavier: ASTM A 653 Grade D hot-dipped galvanized sheet, structural (physical quality), minimum yield point of 50,000 pounds per square inch, coating designation G60 in accordance with ASTM A 924, chemically treated, oiled. Other equivalent coatings are not acceptable.
      b. 18 Gage and Lighter: ASTM A 653 Grade A hot-dipped galvanized sheet, structural (physical quality), minimum yield point of 33,000 pounds per square inch, coating designation G60 in accordance with ASTM A 924. Other equivalent coatings are not acceptable.
   2. Runners (Track) and Accessories:
      a. All Gages: ASTM A 653 Grade A hot-dipped galvanized sheet, structural (physical quality, coating designation G60 in accordance with ASTM A 924, chemically treated, oiled. Other equivalent coatings are not acceptable.
         1) 16 Gage and Heavier: Minimum yield point of 50,000 pounds per square inch.
         2) 18 Gage and Lighter: Minimum yield point of 33,000 pounds per square inch.

2.06 DESIGN CRITERIA, SECONDARY FRAMING AT WALL PANELS

A. Structural Requirements: The following criteria applies to structural steel studs supporting insulated wall and soffit panels specified in Section 074273.
   1. Provide wall panel secondary framing assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, in accordance with ASTM E 72.
2. Secondary supports for the panel system shall be designed in accordance with AISC design procedures. Through-tube support systems shall be designed and installed only by the manufacturer and certified wall systems contractor.
   a. Secondary supports shall not vary from the theoretical plane by more than the specified tolerances. *(Note: These are more stringent than AISC or ACI tolerances to ensure optimal appearance and performance of the wall system.)*
      1) 1/4-inch in any 20-foot length vertically or horizontally.
      2) ±1/2-inch maximum in any building elevation.
      3) ±1/8 inch within 5 feet of any change in plane such as corners and soffits.
   b. Cold-formed steel girts, subgirts, or studs to which insulated metal panels are attached shall be a minimum of 16 gage. Cold formed steel 18 gage shall not be used as structural supports. All cold-formed framing shall be designed in accordance with the latest edition of AISI. Double studs or minimum 3-inch wide bearing surface shall be provided at vertical joints of horizontal panel systems and at all horizontal stack joints of vertical panel systems to insure the integrity of liner side seals.

3. The panel system and secondary supports shall be designed to allow differential movement of the buildings roof and floor structures.
   a. Movement of roof and floor systems exceeding 1/4-inch shall require the use of through tube supports with sliding connections.

4. Performance of the wall panel system shall be verifiable with tests witnessed or conducted by independent agencies.
   a. Structural performance of the wall panels shall be derived from ASTM E 72 Chamber Method with a deflection limit of L/180 applied to positive load. Ultimate structural values shall be achieved without the use of backside mechanical attachments to the structure.

5. Secondary Metal Framing: Design secondary metal framing according to AISI Standard for Cold-Formed Steel Framing - General Provisions. Provide minimum 3-inch wide bearing surface for wall panels at the following locations:
   b. Vertical Panel System: At horizontal stack joints.

2.07 COMPONENTS

A. Steel Studs: Provide standard shape studs and tracks with stiffened flanges.
   1. Comply with the provisions of ASTM C 955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
   2. Provide type, size, and gage, indicated on Structural Contract Drawings.
   3. Physical properties shall be computed in accordance with AISI Specification and Design Manual.
B. Deflection and Slip Clips: Provide yield stress and gage required to provide strength to resist tension caused by negative wind loads. Provide end restraint to prevent rotation. Allow for 1/2-inch deflection in both vertical and horizontal directions. One of the following:
   1. Slotted Track: Equal to SLP-TRK, web-slotted vertical slip track, manufactured by SlipTrack Systems and complying with ICC ER 5344.

C. Flat Straps, Utility Angles, Web Stiffeners, and Bridging Channels: Manufacturer's standard cold-formed metal framing. Provide galvanized or painted type to match type to which attached.

D. Accessory Materials: Metal used in accessory items shall be manufactured from galvanized metal.
   2. Welding Electrodes: As recommended by manufacturer of steel studs.
   3. Primer: FS TT-P-664, Composition G, and FS TT-P-636C.
   4. Galvanize Repair Field Coating: Dry-Galv manufactured by American Solder and Flux, or Galvalloy manufactured by Metalloy Products.
   5. Expansion Anchors: Fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing in accordance with ASTM E 488 conducted by a qualified independent testing agency.
   6. Power-Actuated Anchors: Complying with ANSI 1061, ANSI 1062, or ANSI 1065 austempered to a Rockwell C hardness of 50 to 58, as manufactured by Hilti, or equal. Fastener system shall be type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

2.08 FABRICATION

A. Shop Finishing: When painted components are provided, provide manufacturer's standard factory applied primer.

PART 3 - EXECUTION

3.01 ERECTION

A. General: Partition Construction:
   1. Refer to Contract Drawings for interior partition construction. Each partition shall be constructed as indicated, except that necessary offsets in framing may not be indicated. It is the intent that finished wall surfaces be continuous planes for their entire extent, even though stud sizes and finish thicknesses may vary. Adjust locations of studs as necessary to accomplish this, except do not use less than sizes of studs or thickness of finish as indicated. Where partition type is shown at a given area, but not indicated at an adjoining area or an area of similar use or type, the partition type that is indicated shall be provided.
   2. Do not use gas cutting for field correction of fabrication without concurrence of Structural Engineer.
B. Stud Framing: Install in accordance with ASTM C 1007 and Contract Structural Drawings.
   1. Abutting pieces of track shall be anchored to a common structural element, spliced, or butt welded together.
      a. Set tracks in two continuous beads of sealants as specified in Section 079200.
   2. Seat studs squarely in track with stud web and flange abutting track web.
      a. Provide continuous bridging within 12 inches of deflection track.
      b. Allow a minimum of 1/2-inch vertical deflection of the primary framing on non-bearing studs.
      c. Allow for a minimum of 1/4-inch per story drift.
   3. Cut right angle connections of framing components to fit squarely against abutting members.
   4. Do not splice studs.
   5. Hold members firmly in position until permanently fastened.
   6. Provide four studs minimum at corners of stud walls. Locate to provide surfaces for attachment of interior and exterior finishes.
   7. Double vertical studs shall be stitch welded together on both flanges with 1/16-inch groove welds by 1 inch long at 12 inches on centers.
   8. Tracks: Top and bottom tracks for interior and exterior partitions shall be in accordance with Structural Contract Drawings.
   9. Provide galvanized components at all locations.

C. Connections:
   1. Connect members together with fusion arc welding.
   2. Perform welding in accordance with AWS D1.1 and D1.3 as applicable.
   3. Tighten erection bolts and screws used in welded construction.
   4. Refer to Contract Structural Drawings for design intent of special connector details.
   5. Deflection Clips: Provide deflection and slip clips as indicated on Structural Contract Drawings.

D. Interface with Other Products:
   1. Install backing support for all wall mounted brackets and equipment, including steel ladders.

E. Tolerances: Position members plumb, square, and true to line, with a tolerance of 1/8-inch in 10 feet.

3.02 FIELD QUALITY REQUIREMENTS

A. Inspections:
   1. Perform inspections at all phases of steel stud construction.
   2. Check steel stud members for bearing, reinforcing, and completeness of attachments.
   3. Complete general inspection of steel stud system prior to applying loads.
3.03 ADJUSTING

A. Galvanized Surfaces: Clean field welds and abraded areas, and apply two coats of galvanizing repair paint.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Custom fabricated items from steel, aluminum, and ornamental shapes, plates, bars, strips, tubes, pipes, and castings that are not a part of structural steel or other metal framing systems, including, but not necessarily limited to, the following:

1. Bollards (guard posts).
2. Canopies.
4. Ladders, elevator pit and roof access with safety posts.
5. Perforated metal panels.
6. Pit covers and frames.
7. Roof mechanical enclosure screens.
8. Sign posts.
9. Stairs.
10. Other miscellaneous fabrications detailed, specified, required, or including:
   a. Backing plates for wall hung fixtures and casework (where applicable).
   b. Corner and edge guards.
   c. Inserts and anchoring devices set in concrete or built into framing for installation of miscellaneous metal and other required work.
   d. Internal supports for glazed aluminum framing.
   e. Lintels, clip angles, and continuous angles.
   f. Sheet metal thicker than No. 11 U.S. Standard gage (approximately 0.11-inch thick), unless otherwise specified.
   g. Sill support angles, elevator.
   h. Sleeves that are not provided under other Divisions.
   i. Stanchions at low walls.
   j. Custom supports for mechanical equipment.
   k. Support brackets at counters.
   l. Supports for sectional doors.
   m. Supports for operable partitions.

11. Refer to Section 051200 for additional custom connections to building structural members.

B. Referenced Sections:
   1. Section 012300 - Alternatives.
   2. Section 012500 - Substitution Procedures.
3. Section 013300 - Submittal Procedures.
5. Section 018113 - Sustainable Design Requirements.
6. Section 054100 - Structural Metal Stud Framing.
7. Section 033100 - Structural Concrete.
8. Section 050513 - Shop-Applied Coatings for Metals.
10. Section 054100 - Structural Metal Stud Framing.
11. Section 099100 - Painting: Coordination of finish paint coats with shop-applied primer.
12. Section 099600 - High Performance Coatings.
13. Section 101403 - Exterior Signage: Coordination with requirements for sign posts.
14. Section 101404 - Interior Signage: Coordination with requirements for sign posts.

C. Related Sections:
1. Section 032000 - Concrete Reinforcing.
2. Section 051200 - Structural Steel: Coordination with elevator support rails and sill support angles.
3. Section 053100 - Steel Deck.
4. Section 055100 - Metal Stairs.
5. Section 076200 - Sheet Metal Flashing and Trim: Sheet metal 10 gage and thinner.
6. Section 087100 - Door Hardware.
7. Section 323119 - Tube Steel Fences and Gates.

1.02 REFERENCES

A. ASTM International (ASTM):
4. A 53-12 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
7. A 307-14 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
8. A 500-13 - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
10. A 924-14 - Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.


17. F 844-07a(2013) - Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

18. F 3125-15 - Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

B. California Code of Regulations (CCR):
   1. Title 8, California Elevator Safety Construction Code (CESCC).
      a. Division 1. Department of Industrial Relations.
         1) Chapter 4. Division of Industrial Safety.
            a) Subchapter 6 - Elevator Safety Orders.
            b) Subchapter 7 - General Industry Safety Orders.
               (1) Group 1 - General Physical Conditions and Structures.
                  (a) Article 4 - Access, Work Space, and Work Areas.
                     i) § 3277 - Fixed Ladders.

C. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      b. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-309 - Operable Parts.
         2) Division 4 - Accessible Routes.
            a) Section 11B-404 - Doors, Doorways, and Gates.
               (1) 11B-404.1 - General.
                  (a) 11B-404.2.4 - Maneuvering Clearances.
                  (b) 11B-404.2.9 - Door and Gate Opening Force.
            b) Section 11B-405 - Ramps.
         3) Division 5 - General Site and Building Elements.
            a) Section 11B-504 - Stairways.
            b) Section 11B-505 - Handrails.
c. Chapter 16 - Structural Design.
   1) Section 1607 - General Design Requirements.
      a) 1607.8 - Loads on Handrails, Guards, Grab Bars, Seats and Vehicle Barriers.
      (1) 1607.8.1 - Handrails and Guards.
      (a) 1607.8.1.1 - Concentrated Load.
      (b) 1607.8.1.2 - Intermediate Rails.

D. California Code of Regulations (CCR):
      a. Chapter 35 - Welding and Other Hot Work.
      1) Section 3504 - Fire Safety Requirements.
         a) 3504.1 - Protection of Combustibles.
         b) 3504.2 - Fire Watch.
         c) 3504.3 - Area Reviews.

E. California Code of Regulations (CCR):

F. American Institute of Steel Construction (AISC):
      a. Section 10 - Architectural Exposed Structural Steel (AESS).

G. American Iron and Steel Institute (AISI):
   1. 9 002 - Welding of Stainless Steels and Other Joining Methods.

H. American National Standards Institute (ANSI):
   1. A14.3 - Type I Industrial Ladders.

I. American Welding Society (AWS):
   1. D1.1 - Structural Welding Code - Steel.
   2. D1.2 - Structural Welding Code - Aluminum.
   3. D1.3 - Structural Welding Code--Sheet Steel.
   4. D1.4 - Structural Welding Code--Reinforcing Steel.
   5. D1.6 - "Structural Welding Code--Stainless Steel.

J. American Architectural Manufacturers Association (AAMA):

K. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ESR-).

L. National Association of Architectural Metal Manufactured (NAAMM):
   1. AMP 500-06 - Metal Finishes Manual.
M. The Society for Protective Coatings (SSPC):
   1. Steel Structures Painting *Manual*:
      b. Volume 2 - Systems and Specifications, 7th Edition, including
         Specifications, Guides, Procedures, and Supplements:
         1) SP-1 - Solvent Cleaning.
         2) SP-2 - Hand Tool Cleaning.
         3) SP-6 - Commercial Blast Cleaning (NACE 3).
         4) SP-7 - Brush-Off Blast Cleaning (NACE 5).

N. Specialty Steel Industry of North America (SSINA):
   1. Finishes for Stainless Steel.

O. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for imple-
   menting construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for imple-
   menting sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300,
   submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300,
   submit complete Shop Drawings comprehensively describing fabrication
   and installation of metal fabrications, including:
   1. Plans, elevations, and sections drawn to a scale of 1 inch equals 1 foot.
   2. Details drawn to a scale of 3 inches equals 1 foot.
   3. Setting drawings, templates, and instructions for installation of
      anchorage devices as required.

C. Samples: In accordance with the provisions of Section 013300, submit
   samples as follows:
   1. Manufacturer's standard palettes for the selection of colors and fin-
      ishes for proprietary items.
   2. Custom coating colors stipulated by the Architect, for review and
      acceptance.
   3. Items noted in material articles in Part 2.

D. Quality Control Submittals: In accordance with the provisions of Section
   013300, submit the following:
   1. Design Data: Submit structural calculations for steel stairs, guard-
      rails, handrails, and confirming the ability of such assemblies to safe-
      ly support code required loads, including seismic loadings.
      Calculations shall be prepared and stamped by a licensed profes-
      sional engineer in the State of California.
2. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.06 QUALITY ASSURANCE

A. Welder's Qualifications: Currently certified in accordance with AWS D1.1.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: When required for the protection of finish, deliver metal materials, components, and assemblies wrapped with identifying labels affixed and legible. The Architect reserves the right to observe deliveries, review bills of lading, and to reject the following:
   1. In the case of items accepted under proprietary designation, items not identifiable as specified products of the accepted manufacturer.
   2. Items not properly shop primed as required.
   3. Factory prefinished items exhibiting damage to such finish not repairable by conventional and minor field touch-up procedures.

1.08 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Fasteners:
   1. ITW Ramset/Red Head, Wood Dale (800)354-7432.

B. Grouts:
   1. Five Star Products Inc., Fairfield, CT (800)243-2206.
   2. Master Builders, Los Angeles, CA (213)868-4726.

C. Handrail Brackets:
   2. Lavi Industries, Valencia, CA (800)624-6225.

D. Primers:
   2. Rust-Oleum Corporation, Vernon Hills, IL (312)367-7700, (800)323-0851, and represented by Vista Paint, Fullerton, CA (714)380-6800.

E. Slotted-Channel Supports:

F. Steel Gates:

G. Vehicle Traffic Barriers:

H. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Use materials conforming to the regulations of the local air quality management district in force at the time of application.
   1. Handrails for stairs and ramps shall comply with grip and mounting requirements of CBC 11B-504.6.
2. Comply with welding and other hot work preparation in accordance with provisions of CFC 3504.1 to 3504.3.1.
3. Concrete walking surfaces shall have a minimum slip resistance coefficient of friction of 0.6 as tested in accordance with ASTM C 1028.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

C. Comply with CALGreen 5.504.4.3 Paints and Coatings:
1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. EQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   b. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GC-11.

2.04 PERFORMANCE/DESIGN CRITERIA

A. Performance Requirements, Stairs:
1. Steel stairs shall withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Each load shall be applied to produce the maximum stress in each component of steel stairs.
   a. Framing: Capable of supporting a uniform live load of 100 pounds per square foot and a 300-pound concentrated load at any point.
b. Treads: Capable of withstanding a uniform load of 100 pounds per square foot or a concentrated load of 300 pounds per square foot on an area of 4 square inches located in the center of the tread, whichever produces the greater stress.

c. Platforms: Capable of withstanding a uniform load of 100 pounds per square foot.

B. Performance Requirements, Railings: Comply with requirements of ASTM E 985 for structural performance based on the following:

1. Handrail Assemblies and Guardrails: Capable of withstanding a 200-pound single concentrated load applied in any direction in accordance with CBC 1607A.7.1.1.

2. Intermediate Rails, Panel Fillers, and Connections: Capable of withstanding a load of 50 pounds per square foot applied horizontally at right angles over the entire tributary area, including openings and spaces between rails, in accordance with CBC 1607.8.1.2.

3. Handrails and Guardrails: Capable of withstanding a 20-pound per lineal foot lateral load on top rail, and a 50-pound per lineal foot at exit facilities serving an occupant load greater than 50, in accordance with CBC 1607A.7.1.

C. Comply with deformation compatibility requirements of CBC Chapter 16 in accordance with inelastic interstory displacements equal to 0.02 times the story height.

D. Design Requirements: Where designated as AESS on Contract Drawings, comply with requirements of Section 051213 for Architecturally-Exposed Structural Steel.

2.05 MATERIALS

A. General: Miscellaneous metal work that will be exposed to view shall be fabricated of materials that are smooth and free of pitting, seam marks, roller marks, rolled trade names, roughness, and other surface blemishes.

1. Provide miscellaneous steel, framing, supports, and other items required to complete work, whether or not indicated on Contract Drawings.

2. Provide, as part of this Section, miscellaneous small parts of material No. 10 gage and thinner, or items specifically called out in this Section, when those items are incorporated into the assembly or its installation, and is a normal and accepted part of the work.

B. Steel:

1. Components of exterior steel fabrications shall be hot dipped galvanized in accordance with ASTM A 53, ASTM A 123, ASTM A 153, or ASTM A 653, as applicable.

   a. Galvanizing shall be Class G60 unless specified otherwise.

       1) Exterior metal fabrications within 5 miles of ocean shores or salt water bodies shall be Class G90.
b. Refer to Article 2.16-H for galvanizing of metal fabrications after fabrication.


3. Structural Sheet: ASTM A 1011 hot-rolled, or ASTM A 1008 cold-rolled, Class 1, grades as required for design loading.

4. Pipe: Provide standard weight (Schedule 40), unless otherwise indicated or specified.
   a. Handrails: ASTM A 53, Type S, Grade A, black finish, unless galvanizing is required.
   b. Columns: ASTM A 53, Type S, Grade B structural, black finish, unless galvanizing is required.

5. Tubing: ASTM A 500, Grade B, cold-formed.

6. Brackets, Flanges, and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

7. Refer to Section 051200 for additional steel sections as necessary.

C. Stainless Steel:
1. Interior: AISI Type 304 stainless steel with No. 4 satin polished finish, conforming with ASTM A 167 and ASTM A 480.

2. Exterior: AISI Type 316, stainless steel with No. 4 satin polished finish, complying with ASTM A 554 and ASTM A 666.

2.06 COMPONENTS

A. Concrete Fill: In accordance with Section 033100.

B. Non-Shrink Grouts: In accordance with Section 033100.

C. Filler Metals for Shielded Metal Arc Welding: E70XX low hydrogen electrodes complying with AWS D1.1.

D. Concrete Inserts: Threaded or wedge type, galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims manufactured from ASTM A 153 hot-dipped galvanized steel.
   1. Pipe Sleeves: Standard weight wrought iron, with an inside diameter 1/2-inch greater than outside diameter of penetrating pipe.

E. Channel Supports: Unistrut P1000 Seismic Channel, size and gage as required by loading.
   1. Provide connectors as required.

F. Fasteners: Provide zinc-coated fasteners where used in exterior or other wet areas, or where built into exterior walls. Select fasteners for the type, grade, and class required.
   1. Bolts and Nuts: Regular hexagon head type, ASTM A 307 and ASTM F 3125, as required by Contract Structural Drawings.
      a. Nuts of the self-locking type may be used instead of upsetting the bolt threads where specified.
      b. Lag Bolts: Square head type.
c. Bolts used in conjunction with stainless steel fabrications shall be manufactured of stainless steel.

2. Screws:
   b. Wood Screws: Flat head carbon steel.

3. Washers:
   b. Lock Washers: Helical spring type carbon steel.
   c. Bevel Washers: Square shape with hole 1/16-inch greater than bolt size up to 1-inch bolts, and 1/8-inch greater than bolt size where bolt is larger than 1 inch diameter.
   d. Power-Driven Fasteners: Low velocity powder-activated fasteners, as manufactured by Hilti (ICC ES ESR-2184 or ER-1663), ITW Ramset (ICC ES ESR-1955), or equivalent, and provided with steel washers.


5. Toggle Bolts: Tumble-wing type, FS FF-B-588, type and style as required.

G. Shop Primer:
   1. Weather-Protected Steel: Conform to the regulations of the air quality management district in force at the time of application. Select primer that is compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Section 099100.
      a. Tnemec Series 10-99 Modified Alkyd Rust-Inhibitive Primer, red, green, or gray color, manufactured by Tnemec Company, Inc.
      b. Rust-Oleum 6100 System low VOC modified alkyd Shop Coat Primer, manufactured by Rust-Oleum Corporation.
      c. Where a high performance finish coating will be required on interior surfaces, provide primer as specified for weather-exposed steel.
   2. Weather-Exposed Steel: Conform to the regulations of the air quality management district in force at the time of application. Select primer that is compatible with finish coats of paint. Coordinate selection of metal primer with coating system requirements specified in Section 099100 or Section 099600, as applicable.

H. Field Repair Galvanize Coating: Galvax Cold Galvanizing Paint 95% Zinc, manufactured by Fastenal Company, or ZRC Galvilite Galvanizing Repair Compound, manufactured by ZRC Worldwide, or equal.

2.07 BOLLARDS

A. Galvanized extra heavy weight (Schedule 80) steel pipe set in a concrete foundation and filled solid with 3000 psi concrete as specified in Section 033100.
   1. Provide concrete dome top.
2.08 CANOPIES

A. Material: 22 gage corrugated Galvalume preformed metal deck panels, manufactured by ASC Pacific, Inc., or equal.
   1. Profile: Mini-V-Beam.

B. Components:
   3. Deck: A siliconized gypsum, fire-tested hardboard with glass-mat facers, equal to Dens-Deck provided in thicknesses of 1/2-inch or 5/8-inch as indicated in Contract Documents.
      a. Provide Dens-Deck Prime where a pre-primed surface on one side is required.

C. Fabrication: Fabricate and, to the greatest degree practicable, assemble in the shop.
   1. Weld joints and grind smooth.
      a. Comply with the AISC requirements for architectural-exposed structural steel (AESS).
   2. When the use of mechanical fasteners is necessitated by fabrication requirements, provide concealed, stainless steel fasteners.

D. Finish: Match finish specified in Section 050513 for AAMA 621 in color selected by Architect.

2.09 GATES - STEEL, SWINGING, TRASH ENCLOSURE

A. Components:
   1. Covering: Design is based on the use of 3-inch deep 16 gage hot-dipped galvanized corrugated sheet steel 12 inches wide with folded edges as indicated in Contract Drawings.
   2. Frames: Fabricate gate frames from galvanized steel shapes as indicated on the Contract Drawings.
      a. Drill drainage holes in bottom frame at 6 inches on centers maximum.
   3. Jambs: Galvanized bent steel shapes with welded bolts for embedment into masonry wall at mortar joints at 16 inches on centers.
   4. Hardware: Manufactured from steel galvanized after fabrication.
      a. Hinges: Custom fabricated heavy duty 180 degree swing type, as indicated on Contract Drawings. Provide number of hinges required to support weight of gate under heavy use.
      b. Provide cane bolt at each leaf and slidebolt latch, as indicated on the Contract Drawings.
      c. Provide one set of ground sleeves for closed position and one set for fixing in open position.

B. Fabrication:
   1. Miter or cope frame corners, treat with body filler, and grind smooth.
   2. Welding shall comply with AESS requirements of Section 051213.
   3. Weld hardware to frame assembly.
4. Secure covering to gate frames with manufacturer's standard, corrosion-resistant fasteners.

C. Finish: At components required to be field painted, touch-up weld areas, and other areas of damage to zinc coating, with cold-galvanizing compound.
   1. Prime in accordance with Paragraph 2.16-H.
   2. Finish in accordance with Article 2.17.

D. Installation: Secure gates to bent steel jambs aligned with uniform clearances.

2.10 LADDERS - STEEL, FIXED

A. Regulations: Fixed ladders shall conform to the requirements of CCR Title 8.

B. Materials: Fabricate of steel stock.

C. Fabrication: Unless otherwise indicated on Contract Drawings, ladder shall be 24 inches wide, and centerline of rung shall be 7 inches from face of wall or obstruction.
   1. Rungs: 7/8-inch diameter rods at 12 inches on centers.
   2. Stringers: Flat bar, 2 inches by 1/2-inch thick.
   3. Where terminating at roof hatch, extend stringers within 2 inches of roof hatch cover.
      a. Align top rung with surface of upper level.
   4. At elevator, extend stringers to 42 inches above floor line in conformance with State elevator regulations.
      a. Align top rung with surface of upper level.

D. Installation: Support ladder on wall and floor with 2-inch wide by 3/8-inch thick steel clip angles secured to structural substrate with 3/4-inch bolts at 3 feet 6 inches on centers maximum.

E. Finish in accordance with requirements of Article 2.17.
   1. Coat rungs with resin and silica sand.

F. Safety Post System:
   1. Design is based on LadderUp LU-1 manufactured by Bilco, or equal.
   2. System includes steel rail, splice plates, rung clamps, extension support, climbing sleeve, safety belt, lifeline, and other fittings required for a complete system. Items exposed to the exterior shall be galvanized.
   3. Installation to roof hatch latter shall be performed by a manufacturer authorized installer.

2.11 LADDERS - ALUMINUM, PREFABRICATED

A. Regulations: Fixed ladders shall conform to the requirements of:
   1. CCR Title 8.
   2. OSHA/ANSI A14.3 for Type I industrial metal ladders.

B. Manufacturers:
   1. Alaco Ladder Company, Chino, CA (714)591-7561.
3. Precision Stair Corporation, Morristown, TN (615)586-2265, (800)225-7814.

C. Design is based on prefabricated heavy duty aluminum ladder equal to Model 563-PR with No. 560 brackets as manufactured by Alaco Ladder Company.

D. Materials:
   1. Aluminum: Alloy 6061-T6 or 6063-T5, mill finish.
   2. Rungs: Manufacturer's standard serrated, channel, square, or round tube.
   3. Stringers: Manufacturer's standard channel or tube shape.

E. Fabrication: Ladder shall be at least 1 foot 6 inches wide. Centerline of rung shall be 7 inches from face of wall or obstruction.
   1. Top rung shall be aligned with upper level.

F. Installation: Support ladder on wall and floor with brackets secured to structural substrate with 1/2-inch lag bolts at 6 feet on centers maximum.

2.12 PERFORATED PANELS

   1. Design Basis Manufacturer: Morin/Kingspan Group Company, or equal.
   4. Panel Depth: 1-1/2".
   5. Cover Width: 12".
   7. Hole pattern shall be round, staggered, in sizes, center dimensions, and openness factors as indicated on the Contract Drawings.
   8. Provide smooth edges, blank margins, and finished end pattern.
   9. Finish shall be shop finished with polyvinylidene fluoride powder coating meeting requirements of Section 050513.

2.13 PIT COVERS AND FRAMES

A. Galvanized 1/4-inch checkerplate covers with fingerhole pulls and galvanized angle frame anchored to concrete as detailed. Grind edges smooth before galvanizing.

2.14 ROOF SCREENS

A. Metal Decking: Corrugated galvanized preformed metal siding panels, manufacturer by Atas International, Morin Corporation, or equal.
   1. Material: Galvanized sheet steel, conforming to 18 gage ASTM A 653, and zinc coated (galvanized) with Class G60G90 coating designation in accordance with ASTM A 924.
   2. Profile: Atas Rib Panel BWR360, Morin Y-36 Roof Panel, or, equal, 36 inches wide by 1-1/2 inches deep.
B. Supports: Structural steel shapes specified in Article 2.05.
   1. Subgirts: As specified in Section 054100.
   2. Provide panel clip for applications that require higher wind load resistance.

C. Fabrication:
   1. Utilize maximum continuous lengths possible, lapping at supports in accordance with manufacturer's recommendations.
   2. Provide factory prefabricated mitered corners fabricated from 0.050-inch aluminum. Match adjacent panels to maintain continuity.
   3. Closure Strips and Trim: Fabricated from same metal, gage, and finish.

D. Installation: Install panels plumb and true with reveals aligning as indicated on the Contract Drawings.
   1. Attach to galvanized stiffeners and steel supports with concealed non-corrosive, plated, hardened, self-drilling steel fasteners as recommended by manufacturer, or as indicated on Contract Drawings.
   2. Coat contact surfaces with bituminous paint to separate dissimilar metals.

2.15 SIGN POSTS

A. Steel Posts: Type as indicated in Section 101403. Fabricate from 0.120-inch-thick, square steel tubing. Include post caps, fillers, spacers, junction boxes, base plates, access panels, and related accessories required for complete installation. Hot-dip galvanize post assemblies after fabrication to comply with ASTM A 123.
   1. Finish: Paint specified in Section 099600.

2.16 FABRICATION, GENERAL

A. Specified Items: Refer to Articles in Part 2 for fabrication of specific items.

B. General: Use materials of size and thickness shown or, if not shown, of size and thickness required to produce strength and durability in finished product. Fabricate to field dimensions using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
   1. Use hot-rolled bars for work fabricated from bar stock, unless shown or specified to be fabricated from cold-finished or cold-rolled stock.
   2. Fabricate units with continuously welded joints and smooth exposed edges.

C. Miscellaneous Steel Trim: Provide shapes and sizes as required for profiles shown. Except as otherwise noted, fabricate units from structural steel shapes, plates, and bars with continuously welded joints and smooth exposed edges. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation of other work.

D. Welding: Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32-inch unless otherwise indicated on Contract Draw-
ings. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

1. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush, to match and blend with adjoining surfaces.
   a. Weld 1/8-inch continuous fillet all around, ground smooth with cold galvanize at all field welds.

2. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head countersunk screws or bolts.

3. Wherever AESS is indicated on Contract Drawings or in the Specifications, conform to the requirements for welding as indicated in Section 051213.
   a. Fabricate with exposed surfaces smooth, square, and free of surface blemishes, including pits, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
   b. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.

E. Provide type of anchorage compatible with supporting structure. Fabricate and space anchoring devices as indicated on the Contract Drawings, in accordance with applicable codes, and as required by accepted engineering practice to provide support for intended use.

F. Cut, reinforce, drill, punch, and tap metal work as required to receive finish hardware and similar items. Remove burrs and ease edges to a radius of approximately 1/32-inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

G. Shop Assembly: Preassemble items in shop to greatest extent to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

H. Hot Dip Galvanizing: Provide materials with a zinc coating for those items indicated or specified to be galvanized, as follows:
   1. Comply with ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8-inch thick and heavier, and assembled steel products.
      a. Coating shall be continuous, and as reasonably smooth and uniform in thickness as the weight, size, shape of the item, and necessary handling of the item during the dipping and draining operations at the galvanizing kettle will permit.
         1) Galvanized finish shall comply with AESS requirements of Section 051213.
      b. Galvanized Finish: Provide galvanized finish within the range of color and surface textures presented in the mockups.
   2. Comply with ASTM A 153 for galvanizing iron and steel hardware to be centrifuged or otherwise handled to remove excess zinc.
   3. Hot dip galvanize exterior ferrous metal work after fabrication.
4. Assemble work in sections as large as can be handled by galvanizing equipment.
5. Remove projections, barbs, and icicles after galvanizing.
6. Provide galvanizing for items permanently exposed to the exterior and other interior wet areas, or where built into exterior walls. Items located at other areas shall be shop primed and field finished in accordance with Section 099100, except where finish is omitted due to sprayed fireproofing.
   a. Exterior members specified to be galvanized shall receive urethane coating system specified in Section 099600.
      1) Galvanized items specified to receive urethane coatings must be shop primed with epoxy primer in accordance with Section 099600.

I. Shop Priming:
   1. Weather-Exposed Steel: Shop prime miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.
      a. Remove scale, rust, and other deleterious materials before applying shop coat.
         1) Clean oil, grease, and similar contaminants in accordance with SSPC SP-1.
         2) Clean off heavy rust and loose mill scale in accordance with SSPC SP-2.
      b. Immediately after surface preparation, brush or spray-on primer in accordance with manufacturer's instructions, and at a rate providing a minimum dry film thickness of 2 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.
      c. Apply one shop coat to fabricated metal items, except apply two coats of paint to surfaces inaccessible after assembly or erection. Tint color of second coat to distinguish it from first.
   2. Weather-Protected Steel: Shop prime galvanized members as specified for weather-exposed steel.

2.17 FINISHES

A. Steel to Receive Acrylic or Urethane Coatings:
   1. Interior Ferrous Steel: Items not otherwise coated but exposed to view shall be prepared and painted in accordance with Section 099100.
   2. Exterior Steel and All Galvanized Steel: Apply urethane coating system in accordance with Section 099600.
   3. Color: Provide color selected by Architect from manufacturer's standard color palette.
B. Stainless steel components shall be finished to the relatively equal appearance for each type in accordance with *Finishes for Stainless Steel* as published by the Specialty Steel Industry of North America:

C. Steel to Receive Field-Applied Fluoropolymer Coatings:
   1. Field finish with the following touch up materials:
      a. Primer: KLC7840 Vinyl-Butyral Wash Primer, as manufactured by PPG Industries.
      b. Finish: Megaflon MS, 100 percent fluoropolymer air-dry, field-applied, spray-coating conforming to AAMA 2605, as manufactured by PPG Industries.
      c. Refer to Section 050513 for preparation and application requirements.
   2. Match color of aluminum glazing frames specified in Section 084113.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Handrails: Verify that surfaces adjacent to wall mounted handrails are smooth.

3.02 INSTALLATION, GENERAL

A. General: Provide anchoring devices and fasteners to secure miscellaneous metal items to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, and other connectors as required.
   1. Provide galvanized or stainless steel fasteners at exterior locations.

B. Cutting and Fitting: Perform cutting, drilling, and fitting required for installation of miscellaneous metal items. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind joints smooth and touch-up with shop paint coat. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.

C. Placement: Set work accurately in location, alignment, and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
   1. Where free standing, set posts in core drilled holes with quickset grout in color to match adjacent paving.

D. Field Welding: Comply with AWS D1.1 for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work.

E. Dissimilar Metals: Provide a separator at contact surfaces of dissimilar materials wherever there is a possibility of corrosive or electrolytic action.
   1. Use polystyrene to separate aluminum from galvanized steel, and zinc.
2. Use zinc chromate primer or bituminous paint to separate aluminum from cured concrete, mortar, or plaster.

### 3.03 INSTALLATION, SPECIFIED ITEMS

A. Refer to Articles in Part 2 for installation of specific items.

### 3.04 ADJUSTING

A. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2 mils.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and apply two coats of field repair galvanize coating.

C. Items not requiring refinishing shall be cleaned free of foreign matter.

D. Lubricate and adjust swinging gates for smooth operation.

### 3.05 CLEANING

A. Waste Management: Recycle or salvage waste steel materials in accordance with Section 017419.

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END OF SECTION
**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Section Includes: Interior and exterior steel stairs.

B. Referenced and Related Sections:
1. Section 012500 - Substitution Procedures.
2. Section 013300 - Submittal Procedures.
4. Section 018113 - Sustainable Design Requirements.
5. Section 034800 - Precast Concrete Specialties: Exterior stair treads.
6. Section 051200 - Structural Steel Framing: Galvanizing of exterior stairs.
7. Section 051213 - Architecturally-Exposed Structural Steel.
8. Section 055000 - Metal Fabrications.

**1.02 REFERENCES**

A. ASTM International (ASTM):
1. A 36-12 - Specifications for Structural Steel.
2. A 53-12 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
3. A 82-07 - Specification for Steel Wire, Plain, for Concrete Reinforcement.
5. A 307-14 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
6. A 500-13 - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
7. A 1008 12a - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
10. D 2047-11 - Test Method Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
14. F 844-07a - Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
15. F 3125-15 - Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      b. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 4 - Accessible Routes.
            a) Section 11B-404 - Doors, Doorways, and Gates.
         2) Division 5 - General Site and Building Elements.
            a) Section 11B-504 - Stairways.
               (1) 11B-504.6 - Handrails.
            b) Section 11B-505 - Handrails.
               (1) 11B-505.5 - Clearance.
               (2) 11B-505.6 - Gripping Surface.
      c. Chapter 16 - Structural Design.
         1) Section 1604 - General Design Requirements.
         2) Section 1607 - General Design Requirements:
            a) 1607.8 - Loads on Handrails, Guards, Grab Bars, Seats and Vehicle Barriers.
               (1) 1607.8.1 - Handrails and Guards.
      d. Chapter 35 - Welding and Other Hot Work.
      1) Section 3504 - Fire Safety Requirements.
         a) 3504.1 - Protection of Combustibles.
         b) 3504.2 - Fire Watch.
         c) 3504.3 - Area Reviews.

C. American Institute of Steel Construction (AISC):
      a. Section 10.

D. American Society of Civil Engineers (ASCE):

E. American Welding Society (AWS):
   1. A2.4-12 - Symbols for Welding and Non-destructive Testing.
   2. D1.1-10 - Structural Welding Code - Steel.

F. National Association of Architectural Metal Manufacturers (NAAMM):
G. The Society for Protective Coatings (SSPC):
      b. Volume 2 - Systems and Specifications, 7th Edition, including Specifications, Guides, Procedures, and Supplements:
         1) SP-2 - Hand Tool Cleaning.
         2) SP-7 - Brush-Off Blast Cleaning (NACE 5).

H. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Deferred Approval Procedures: Work of this Section may be affected by the deferred approval procedures described in Section 013315.

B. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

C. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

D. Coordination: Coordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Quality Control Submittals: In accordance with the provisions of Section 013300, submit the following:
   1. Design Data: Submit structural calculations for Steel Stairs No. 1, No. 2, and Access Stair to Room 102, guardrails, handrails, confirming the ability of such assemblies to safely support code required loads and displacements, including seismic loadings and displacements. Calculations shall be prepared and stamped by a State of California licensed structural engineer.
      a. Design data for steel stairs and railings shall be subject to deferred design approval procedures specified in Section 013300.

C. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings comprehensively describing fabrication and installation of metal stairs and railings. Shop Drawings submitted shall include not less than the following:
   1. Submit Shop Drawings signed and sealed by a qualified structural engineer licensed in the State of California confirming design of connections and members not specifically detailed on the Contract Drawings.
   2. Dimensioned plans, elevations, and details locating assembly components in relationship to each other and in relationship to contiguous building structure.
   3. Typical and special fabrication and installation details, including details of anchorage to supporting structure.
   4. Materials and finishes.
5. Welded connections including net weld lengths. Conform to standard AWS 2.4 welding symbols.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer:
      a. AISC-certified firm having 10 years experience manufacturing components similar to or exceeding requirements specified in scope of project.
      b. Having sufficient capacity to produce and deliver required materials without causing delay in work.
   2. Installer: Acceptable and approved by stair manufacturer.
   3. Welder: Currently qualified for the welding of structural steel, in the shop and field, in accordance with the requirements of AWS D1.1.

1.07 DELIVERY, STORAGE & HANDLING

A. Delivery and Acceptance Requirements:
   1. Deliver material in accordance with project schedule and with manufacturer's instructions.
   2. Deliver materials in manufacturers prebundled and banded lots with identification labels intact and in sizes to suite project.
B. Storage and Handling Requirements:
   1. Store materials on skids or appropriate planks so material is not in
direct contact with the ground and at least 4 inches above grade. 
   Ensure rain or snow runoff freely flows under material making no
contact with product.

C. Packaging Waste Management:
   1. Separate waste materials for refuse and recycling.
   2. Remove packaging materials from site and dispose of at appropriate
facilities.
   3. Collect and separate for disposal paper, plastic, polystyrene, card-
board packing material in appropriate onsite bins for recycling.
   4. Fold metal and plastic banding; flatten and place in designated area
for recycling.

1.08 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field
measurements taken specifically for the work of this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Stair Manufacturers:
   1. American Stair Corporation, Romeoville, IL (815)886-9600, 
      (800)872-7824, www.americanstair.com, with local representation
      by Hastco, Huntington Beach, CA (800)592-7382 (Hal Stein).
   2. Pacific Stair Company, Salem, OR, www.pacificstair.com, represent-
      ed by The Donovan Company, Anaheim, CA (714)630-5505,
      www.thedonovanaco.com

B. Like materials shall be the products of one manufacturer and shall be ei-
ther the ones upon which the design is based or equal products of a
manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Use coating materials conforming to the regulations of the
local air quality management district in force at the time of application.
   1. Handrails for stairs and ramps shall comply with grip and mounting
requirements of CBC 11B-504.6.
   2. Comply with welding and other hot work preparation in accordance
with provisions of CFC 3504.1 to 3504.3.
   3. Concrete walking surfaces shall have a minimum slip resistance coef-
ficient of friction of 0.6 as tested in accordance with ASTM D 2047.

B. Waste Management: Comply with CALGreen Section 5.408 Construction
Waste Reduction, Disposal and Recycling. Establish a construction waste
management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-
hazardous construction and demolition waste in accordance with
CALGreen 5.408.1.3.
C. Comply with CALGreen 5.504.4.3 Paints and Coatings:
   1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
   2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. EQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      b. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GC-11.

2.04 PERFORMANCE/DESIGN CRITERIA

A. Design Requirements:
   1. Comply with the applicable design requirements of CBC Chapter 16, ASCE 7, ASTM E 894 and ASTM E 935.
      a. Design stairs to withstand stresses resulting from loads specified above as well as stresses resulting from railing system loads.
   2. Comply with deformation compatibility requirements of CBC Chapter 16 in accordance with inelastic interstory displacements equal to 0.025 times the story height.
   3. Refer to General Structural Notes on Structural Contract Drawings for additional stair design requirements.

B. Where designated as AESS on Contract Drawings, comply with requirements of Section 051213.

C. Performance Requirements, Stairs:
   1. Steel stairs shall withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections.
      a. Limit deflection of treads, platforms, and framing members: to L/240.
b. Treads: Capable of withstanding a uniform load of 100 pounds per square foot and a concentrated load of 300 pounds per square foot on an area of 4 square inches and located in the center of the tread.

c. Platforms: Capable of withstanding a uniform load of 100 pounds per square foot.

d. Framing: Capable of supporting a uniform live load of 100 pounds per square foot and a 300-pound concentrated load at any point.

D. Performance Requirements, Railings: Handrails shall withstand allowable structural loads without exceeding the allowable design working stress of materials, including handrails, railings, anchors, and connections. Comply with requirements of ASTM E 985 for structural performance based on the following:

1. Handrails and Railings: Capable of withstanding a 200-pound load applied in any direction in accordance with CBC 1607.8.

2. Intermediate Rails, Panel Fillers, and Connections: Capable of withstanding a load of 25 pounds per square foot applied horizontally at right angles over the entire tributary area, including openings and spaces between rails, in accordance with CBC 1607.8.

3. Balcony Railings and Guardrails: Capable of withstanding a 50-pound per lineal foot lateral load on top rail, and a 50-pound per lineal foot at exit facilities serving an occupant load greater than 50, in accordance with CBC 1607.8.

2.05 MATERIALS

A. General: For fabrication of miscellaneous metal work that will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness.

B. Steel for Custom Fabricated Stairs:

1. Structural Sheet: ASTM A 1011 hot-rolled, or ASTM A 1008 cold-rolled, Class 1, grades as required for design loading.
   a. Provide, as part of this Section, miscellaneous small parts of material thinner than No. 10 gage, or items specifically called out in this Section, when those items are incorporated into the assembly or its installation, and is a normal and accepted part of the work.


3. Pipe: ASTM A 53, Type S, Grade B, black finish, unless galvanizing is required. Provide standard weight (Schedule 40), unless otherwise indicated or specified.

4. Tubing: ASTM A 500, Grade B, cold-formed.

5. Brackets, Flanges, and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

C. Perforated Aluminum Panels: Refer to Section 055000.
D. Galvanizing: Hot dip galvanize exterior non-passivated ferrous steel stairs in accordance with ASTM A 123. Perform galvanizing after fabrication (shearing, punching, bending, forming, assembling, and welding) in the largest units practicable. Remove projections, barbs, and icicles after galvanizing.
1. Galvanizing may not be omitted where selected to receive high performance urethane coating systems.
2. Galvanize exterior steel components not exposed to view at the mechanical yard may be left unfinished. Unless otherwise noted, steel in other exterior locations shall be finished.

2.06 EXTERIOR STAIRS

A. Components:
2. Risers: Perforated aluminum plate 1/8-inch thick manufactured by the McNichols Company, or equal. Provide 1/4-inch holes at 3/8-inch on centers, straight pattern, 35 percent openness, 60 inches wide.
3. Treads: Precast concrete treads as specified in Section 034800.
4. Handrails: In accordance with Article 2.11: Fabrication, Railings.

B. Fabrication:
1. Weld all connections in accordance with AWS D1.1. Provide welds, ground smooth where exposed.
2. Shop prime exposed steel surfaces of stairs.

C. Connections: Connections to structure shall be delivered to members concentrically and without inducing torsion to the members.

D. Concrete Fill: For otherwise unfinished landings and treads:
1. Treads: Light broom to a slip-resistant finish. With troweling, broadcast and incorporate slip-resistant aggregate equivalent to Frictex H manufactured by Sonneborn Building Products.

E. Finish in accordance with requirements of Article 2.10 Fabrication, Stairs.

2.07 INTERIOR STAIRS

A. Concrete-Filled Pan Stairs:
1. Supports:
   a. Form stringers of rolled steel channels.
   b. Provide closures for exposed ends.
2. Treads, Risers, and Landings:
   a. Treads: Form from not lighter than 14 gage sheet steel pans filled with concrete and reinforced with welded wire mesh.
   b. Risers: Provide perforated sheet steel with perforations sized and spaced as indicated on Contract Drawings.
   c. Form landings from minimum 12 gage sheet steel pans. Reinforce underside with steel angles.
   d. Fabricate with steel angle supports attached to pans and to stringers with welds.
e. Space risers and treads equally.
3. Welding: Weld all connections in accordance with AWS D1.1. Provide continuous welds, ground smooth where exposed.

B. Concrete Finish: For otherwise unfinished landings and treads:
1. Finishes: For otherwise unfinished landings and treads, light broom finish to a slip-resistant finish.

2.08 COMPONENTS

A. Concrete Fill: Portland cement concrete with lightweight aggregate.

B. Welded Wire Mesh: Plain steel wire conforming to ASTM A 82 with minimum yield strength of 65 ksi. Fabrication of mesh shall conform to ASTM A 1064.

C. Miscellaneous Framing and Supports: Provide miscellaneous steel items, framing, and supports, as required to complete work, whether or not indicated on Contract Drawings.

2.09 ACCESSORIES

A. Non-Shrink Grouts: In accordance with Section 033100.


C. Fasteners: Provide zinc-coated fasteners where used in exterior or other wet areas, or where built into exterior walls. Select fasteners for the type, grade, and class required.

D. Shop Priming: Use materials conforming to the regulations of the air quality management district in force at the time of application.
   1. Select primer which is compatible with finish coats of paint. Coordinate selection of metal primer with finish paint.

E. Handrails: Provide handrail cap profile as indicated on the Contract Drawings.

F. Handrail Brackets: Custom fabricated with galvanized steel bar stock as indicated in Contract Documents. Locate 6 feet on centers maximum. Provide backing plate spacer appropriate to substrate and secure to structural substrate with 3/8-inch diameter concealed bolt as recommended by manufacturer.
2.10 FABRICATION, STAIRS

A. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32-inch unless otherwise shown.
   1. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush, to match and blend with adjoining surfaces.
   2. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head countersunk screws or bolts.
   3. Fabricate and locate anchoring devices as indicated on Contract Drawings and in accordance with sound engineering practice to provide support for intended use.
   4. Where indicated on Contract Drawings, fabricate to comply with requirements of Architecturally-Exposed steel systems (AESS), as described in Section 051213.

B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
   1. Provide items required to be embedded in concrete with setting templates.

C. Shop Coating:
   1. Shop Priming: Shop prime miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.
      a. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with applicable SSPC Specifications.
      b. Remove oil, grease, and similar contaminants in accordance with SSPC SP-2.
      c. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide a minimum dry film thickness of 2 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.
      d. Apply one shop coat to fabricated metal items, except apply two coats of paint to surfaces inaccessible after assembly or erection. Tint color of second coat to distinguish it from the first.

2.11 FABRICATION, RAILINGS

A. Fabricate of steel pipe in accordance with dimensions and details shown on Contract Drawings. Railing components shall be mitered and welded. Where detailed, fabricate bends in suitable jigs without crushing pipe.
   1. Handrails: 1-1/4-inches to 1-1/2 inches in nominal diameter.
   2. Infill: Perforated aluminum panels as specified in Section 055000.
B. Join posts, rails, and corners by fitting posts to top rails, fitting intermediate rails to posts, mitering corners, grooving welding joints, and grinding smooth without sharp or abrasive corners, edges, or services. Connections shall be welded.

C. Railing splices shall be butted and reinforced by a tight interior sleeve not less than 6 inches long. Adjust railings prior to anchoring to ensure matching alignment at butting joints. Plumb posts in each direction. Secure posts and rail ends to building construction as required.

### 2.12 FINISHES

A. Interior and Exterior:
   1. Steel: Apply urethane coating in accordance with Section 099600.
   2. Aluminum: Refer to perforated aluminum panels specified in Section 055000.
   3. Color: Provide color selected by Architect from manufacturer's standard color palette.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

A. Verification of Conditions: Verify that walls adjacent to handrails are smooth with rounded edges, and free of sharp or abrasive elements in accordance with CBC 11B-505.6.

#### 3.02 PREPARATION

A. Remove construction debris from work area and properly barricade the stair shafts from general construction traffic while the stair system is being installed. Do not allow general construction traffic to use the stairs until flight and landing frames are securely connected, and permanent raling is installed or temporary railing is in place in accordance with OSHA guidelines.

#### 3.03 INSTALLATION

A. Stairs:
   1. Install stairs and landings, and handrails plumb, straight, and true to line and level, with neatly fitted joints and intersections.
   2. Do not field cut or alter stair system assemblies or structural components without written authorization.
   3. Field welding and joining shall conform to AWS D1.1 and AWS D1.3.
   4. Perform field welding in accordance with AWS D1.1. Field weld to match standard of shop welding.
   5. Make exposed joints butted tight, flush, and hairline.
   6. Grind and remove weld splatter, prep welds same as manufacturer for item being fitted, except that continuous rail wraps shall be ground smooth.
   7. Anchor items securely to adjacent construction with sufficient anchorage devices to provide adequate support of stairs and railings.
      a. Secure railings to walls with wall brackets.
8. After installation, touch-up field welds, scratched or damaged surfaces with primer. Touch-up shop-primed areas with same primer as used by stair system manufacturer.

B. Railings: Locate supports 48 inches on centers maximum. Provide backing plate spacer appropriate to substrate and secure to structural substrate with 3/8-inch diameter bolt as recommended by manufacturer.
   1. Mount handrails 1-1/2 inches clear from side walls in accordance with CBC 11B-505.5.1.

C. Minimum Tolerances:
   1. Maximum variation of vertical alignment shall be 0.25-inch per floor, non-accumulative.
   2. Maximum differential of true elevation benchmark shall be 0.50-inch per floor, non-accumulative.

D. Finish for Concrete-Filled Pan Treads and Landings:
   1. Provide medium broom finish.
      a. Concrete walking surfaces shall have a minimum slip resistance coefficient of friction of 0.6 as tested in accordance with ASTM D 2047.
   2. Stairs: Apply grooves and tooled edges to tread nosings in accordance with the Contract Drawings.

E. Warning Stripes: Unless otherwise noted on the Contract Drawings, block out a 2-inch wide stripe 1 inch from edge of nosing and fill with black epoxy of 70 percent contrasting color in accordance with CBC 11B-505.6 and ICC/ANSI A117.1 requirements, and which is at least as slip resistant as other areas of the tread.
   1. Interior: Apply warning insert stripes of contrasting color at top and bottom nosings of each run.
   2. Exterior: Apply warning insert stripes of contrasting color at every nosing.

3.04 ADJUSTING

A. Adjust components and systems for correct function and operation in accordance with manufacturers published installation instructions.

3.05 CLEANING

A. Upon completion of stair installation remove tools, debris, and surplus materials from the stair shafts.

B. Remove debris from stair assemblies that was acquired during transit and storage, leave ready for final finish coat preparation by the painting contractor.

C. Waste Management:
   1. Coordinate recycling of waste materials.
   2. Collect recyclable waste and dispose of or recycle field generated construction waste created during demolition, construction or final cleaning.
   3. Place waste in approved and appropriate jobsite recycling containers.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Wood construction required for moisture-sensitive locations and fire-resistive construction, including the following:
   3. Roof-related rough carpentry.
   4. Telephone backboards and miscellaneous plywood backing.
   5. Wood, fasteners, framing anchors, and other standard (catalog) hardware for installation in building structure.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 076200 - Sheet Metal Flashing and Trim.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. A 653-15 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 7 - Fire and Smoke Protection Features.
      b. Chapter 23 - Wood.

C. American Wood-Preservers Association (AWPA):
   1. U1 - Use Category System (UCS).
D. APA-The Engineered Wood Association (APA):

E. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ER-).

F. U.S. Department of Commerce Product Standards (PS):
   1. 1-83 - Softwood Plywood/Construction and Industrial.

G. West Coast Lumber Inspection Bureau (WCLIB):
   1. Grading and Dressing Rules No. 17.

H. Western Wood Products Association (WWPA):

I. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications for fasteners and accessories.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   4. MR Credit 6 and MR Credit 7: Use a minimum of 50 percent of wood-based materials and products made from rapidly renewal certified
wood complying with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials rigged for lifting. The Architect reserves the right to observe delivered materials, to review the accompanying bills of lading, and to reject lumber products not exhibiting appropriate grade and quality marks.
   1. Protect sheet materials from breaking corners and damaging surfaces while unloading.

B. Storage: Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
   1. Do not store seasoned materials in wet or damp portions of the site or building.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Pressure Treatment Product Manufacturers:

B. Acceptable Pressure Treatment Facilities:
   3. Other treatment facilities acceptable to Architect.

C. Acceptable Fastener Manufacturers:
   2. Hilti Corporation, Tulsa, OK (918)627-9711, (800)979-8000.

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or products of another manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Grading: Provide products graded in accordance with the following:
      a. Lumber: Grading rules of WCLIB No. 17 and WWPA Grading Rules.

2. Marking: Each piece of lumber shall be factory-marked with grade mark of inspection agency evidencing compliance with grading rule requirements.
   a. Lumber: WCLIB No. 17.
      1) Grade stamp shall contain legible symbol of grading agency.
      2) Mill number or name.
      3) Grade of lumber.
      4) Designation of species or species grouping or combination.
      5) Condition of seasoning at time of manufacture.
         a) S-GRN: Unseasoned.
         b) S-DRY: Maximum moisture content 19%.
         c) MC-15 or KD: Maximum moisture content 15%.
   c. Preservative Treated Lumber and Plywood: Third-party quality control Check-Mark.

B. Waste Management: Comply with CALGreen Section 5.408.1 Construction Waste Diversion:
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.
   4. Certificates for MR Credit 6: Certify that products specified are made from rapidly renewable sources.
   5. MR Credit 7 Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria for wood building components.

2.04 LUMBER MATERIALS

A. Lumber: Conform to WWPA Grading Rules and WCLIB No. 17, and PS 20.
   1. Species:
      a. Non-Structural Roof-Related Lumber Nailers: Douglas fir or No. 2 western hemlock.
2. Dimensions: Drawings indicate nominal sizes. Provide actual dimensions conforming to PS 20 for moisture content specified for each use.
3. Surfacing: Surface four sides (S4S), unless specified otherwise.
4. Seasoning: S-Dry with 19 percent maximum moisture content for sizes 2 inches or less in nominal width.
5. Wane: Limited to a maximum of 5 percent of members in accordance with grading rules of Southern Pine Inspection Bureau.

B. Plywood: Conform to APA PRP-108 and PS 1. Where grade is not otherwise shown on the Contract Structural Drawings, comply with the following:
   a. Seasoning: Moisture content at the time roofing is installed shall be less than 19 percent.
   b. Provide Exterior Exposure type where any edge or surface is permanently exposed to the weather.
3. Countertop Substrate: Exterior Exposure Classification APA C/C plugged, preservative treated in accordance with AWPA Use Category UC1.

C. Fasteners: Fasteners and accessories shall be hot dip galvanized in accordance with ASTM A 153.
1. Fastening Lumber to Lumber: Cement coated or annular threaded nails of sufficient length to penetrate 1-1/4 inches into adjoining members, except as otherwise indicated.
   a. Fasteners used with lumber in exterior locations shall be corrosion resistant type.
2. Fastening Lumber or Sheathing Panels to Steel: Minimum No. 8 sheet metal screws through 5/8-inch diameter steel washers.
3. Fastening Lumber or Sheathing Panels to Concrete:
   a. Specially threaded anchors of sufficient length to penetrate concrete a minimum of 1-1/2 inches, equal to Tapcon Concrete Anchors, manufactured by Illinois Tool Works, Buildex Division.
   b. Drilled type expansion anchors shall be equal to Molly Fasteners. Products manufactured by ITW Ramset/Red Head or Hilti may be used if equivalent in pull-out strength.
   c. Shot pins shall be powder-driven steel studs equal to Hilti, or ITW Ramset/Red Head (ICC ES ER-1955).

D. Rough Hardware:
1. Materials: Where in contact with copper-bearing wood preservative (such as CBA, CA, and ACQ), provide G185 galvanizing in accordance with ASTM A 653 or ASTM A 153 galvanizing to avoid a corrosive reaction with zinc.

2.05 WOOD TREATMENT MATERIALS

A. Preservative Treated Wood Products:
1. Treat lumber using vacuum pressure process complying with CBC requirements.
2. Lumber and plywood designated to be preservative treated shall be pressure treated in compliance with recommended practices of AWPA Use Category System (UCS):
3. Lumber shall be kiln dried to maximum moisture content of 19 percent after treatment and plywood shall be re-dried to maximum moisture content of 15 percent after treatment.
4. Lumber and plywood shall be treated with Type A copper boron azole (CBA-A), Type B copper azole (CA-B), or Type C ammoniacal copper quat (ACQ-C) to a net retention in pounds cubic foot as follows:
   a. AWPA Use Category UC1: 0.25 ACQ-C / 0.20 CBA-A / 0.10 CA-B.
   b. AWPA Use Category UC2: 0.25 ACQ-C / 0.20 CBA-A / 0.10 CA-B.
5. Provide materials complying with requirements of AWPA Standards, and complying with requirements of CBC Chapter 23.
   a. Acceptable products include ACQ Preserve, Nature Wood, Wolmanized Natural Select, or equal.
      1) Lumber treated with creosote, pentachlorophenol, copper naphthenate, or copper 8-quinolinolate, and chromated copper arsenate (CCA) are unacceptable.
6. Wood nailers for use with roofing work shall be classified as UC2.

B. Fire Retardant Treatment: Treat lumber using vacuum pressure process complying with CBC requirements.
1. Lumber and plywood designated to be fire-retardant-treated shall be pressure treated in compliance with recommended practices of AWPA Use Category System (UCS):
   a. Interior, Dry, Above Ground: AWPA Use Category UCFA.
   b. Exterior, Above Ground, Exposed to Weather: AWPA Use Category UCFB.
2. Lumber shall be kiln dried to maximum moisture content of 19 percent after treatment and plywood shall be re-dried to maximum moisture content of 15 percent after treatment.
3. Provide materials complying with the latest requirements of AWPA Standards, and complying with administrative requirements of CBC Chapter 23.
   a. Acceptable fire retardant treatment products include Chemical Specialties D-Blaze, Arch Wood Protection Dricon, Hoover Pyro-Guard, S-T-N FirePro, or equal.
      1) Exterior Locations: Arch Wood Protection FRX, or equal.
   b. Treatment shall be classified for use as Interior Type A, Low Hygroscopic, in compliance with ASTM D 3201.
   c. Fire retardant chemical shall be free of halogens, sulfates, chlorides, ammonium phosphate, and formaldehyde and shall be registered for use as a wood preservative by U.S. Environmental Protection Agency.
5. Flame spread rating shall be not more than 25 when tested in compliance with ASTM E 84, NFPA 255, or UL 723, with no increase in
flame spread and significant progressive combustion upon continuation of test for an additional 20 minutes.

PART 3 - EXECUTION

3.01 PRESSURE TREATMENT

A. Pressure-Treated Wood Products:
   1. Provide pressure-treated wood used in following areas:
      a. Framing, blocking, furring, and nailing strips built into exterior concrete or masonry construction.
      b. Wood in contact with earth, concrete, plaster, masonry, or steel.
      c. Wood used for sills, screeds, cant strips, plates, blocking, gravel stops, nailers, and bucks.
      d. Rough carpentry work for roofing applications.
    2. Apply two brush coats of same preservative used in original treatment to sawed or cut surfaces of treated lumber.
       a. Field apply preservative to cut faces.

B. Fire Retardant-Treated Wood Products:
   1. Fire retardant treated wood shall be provided where wood blocking or nailers are used as part of fire rated assemblies, and where required to comply with building codes.
   2. Do not rip or mill fire retardant treated lumber unless specifically allowed by manufacturer. Only end cuts, drilling holes, and joining cuts shall be permitted.

3.02 ROOF BLOCKING

A. Roofing-Related Rough Carpentry:
   1. Weather Protection: Rough carpentry installed in conjunction with roofing work shall be protected from exposure to the weather by roofing or flashing materials specified under Section 076200 on same day work is installed.
   2. Fastening Lumber or Sheathing Panels to Lumber:
      a. Nails shall be spaced 12 inches on centers maximum and staggered across face of wood member. Fasteners also shall be located within 3 inches of each end of wood member.
         1) Provide a maximum spacing of 6 inches on centers, 8 feet each way from outside corners for roof edge blocking.
      b. Nail heads shall be flush with wood surface and nails shall penetrate adjoining piece 1-1/4-inches minimum.
      c. Withdrawal resistance of nails shall be a minimum of 100 pounds per nail.
      d. Bolt heads and nuts that bear against face of wood shall be provided with metal washers.
      e. All 5/8-inch diameter and larger anchor bolts shall have malleable iron washers.
      f. Machine nailing is not acceptable on 5/16-inch sheathing panels if penetration of top surface is more than manual nailing, or if minimum edge distances are not maintained.
3. Fastening Lumber or Sheathing Panels to Steel:
   a. Anchors shall be spaced 2 feet on centers maximum and staggered if lumber is greater than 5 inches wide.
   b. Head of anchor shall be flat or countersunk flush with surface.
   c. Withdrawal resistance of anchors shall be a minimum of 400 pounds per anchor or numbers of fasteners increased accordingly from that specified. Provide minimum penetration of 1/4-inch through steel.

4. Fastening Lumber or Sheathing Panels to Concrete or Masonry:
   a. Anchors shall be spaced 3 feet on centers maximum and staggered if lumber is greater than 5 inches wide.
   b. Head of anchor shall be flat or countersunk flush with surface.
   c. Withdrawal resistance of anchors shall be a minimum of 400 pounds per anchor or number of fasteners increased accordingly from that specified. Provide minimum penetration of 1-1/2 inches into concrete.

3.03 TELEPHONE BACKBOARD

A. Telephone Backboard:
   1. Fire-retardant treated as required by building code requirements for location of use.
   2. Attach with screws at 24 inches on centers at edges.
   3. Refer to Division 26 for application of backboards in electrical work.

3.04 FIELD QUALITY CONTROL

A. Inspection:
   1. Roofing system manufacturer's local authorized field representative or Owner's full time Inspector will perform moisture content testing of roof-related lumber materials.

3.05 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

3.06 CLEANING

A. During execution of this portion of the work, keep the premises in a neat, safe, and orderly condition, free from accumulations of sawdust, cut pieces, and debris.
   1. At the end of each working day, thoroughly sweep surfaces where refuse from this portion of work has settled.
   2. Remove the refuse to the area on the jobsite designated for refuse storage and in a container provided under this Section.
   3. Upon completion of this portion of the work, thoroughly broom clean surfaces in area of construction activities.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Custom wood, laminate-clad, and simulated wood fabrications, including:
   1. Custom wall paneling.
   2. Custom wood fabrications.
   3. Custom solid surface fabrications.
   4. Custom standing and running trim, including hardwood base.
   5. Custom display cases.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 014500 - Quality Control.
   5. Section 018113 - Sustainable Design Requirements.
   6. Section 099100 - Painting.
   7. Section 123661 - Simulated Stone Countertops.

C. Related Sections:
   1. Section 064116 - Plastic Laminate-Clad Architectural Cabinets.
   2. Section 081416 - Flush Wood Doors.

D. Related Work in Other Sections:
   1. Installation of building specialties.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. D 6007-14 - Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber.
B. California Code of Regulations (CCR):
   1. Title 17 - Public Health, April 2008:
      a. Division 3. Air Resources
         1) Chapter 1. Air Resources Board
            a) Subchapter 7.5. Airborne Toxic Control Measures
               (1) §93120. Airborne Toxic Control Measure to Reduce
                   Formaldehyde Emissions from Composite Wood
                   Products, (ATCM).
      b. Sections 93120.1-93120.12

C. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 7 - Fire and Smoke Protection Features
   2. Title 24, Part 11 - California Green Building Standards Code

D. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the
   International Code Council:
   1. Evaluation Reports, Materials, Products, Methods and Types of Con-
      struction (ER-).

E. Americans with Disabilities Act of 2010 (ADA):
   1. Title III - Access to Public Accommodations and Commercial Facili-
      ties, Subpart D - New Construction and Alterations, Appendix A -
      Americans with Disabilities Act Accessibility Guidelines.

F. American National Standards Institute (ANSI):
      Fiberboard.

G. American Society of Civil Engineers (ASCE):

H. APA-The Engineered Wood Association (APA):
   1. APA Design/Construction Guide.

I. Woodwork Institute (WI):
   1. Architectural Woodwork Standards (AWS), 2nd edition (2014) and
      subsequent errata, published jointly by AWI, AWMAC, and WI, includ-
      ing Appendices, Guide Specifications, and WI Certified Compliance.
      a. Section 1 - Submittals:
      b. Section 2 - Care and Storage.
      c. Section 3 - Lumber.
      d. Section 4 - Sheet Products.
      e. Section 5 - Finishing.
      f. Section 6 - Interior & Exterior Millwork.
      g. Section 8 - Wall Surfacing.
      h. Appendix:
         1) Adhesive Guidelines.
         2) Joinery Details.
         3) Casework Integrity.
   1. A135.4 - Basic Hardboard Product Standard.

K. Hardwood Plywood and Veneer Association /American National Standards Institute (HVPA/ANSI):

L. National Electrical Manufacturers Association (NEMA):

M. National Fire Protection Association (NFPA):

N. U.S. Department of Commerce (DOC):
   1. Product Standards (PS):

O. West Coast Lumber Inspection Bureau (WCLIB):

P. Western Wood Products Association (WWPA):
   1. Grading Rules for Western Lumber.

Q. Window and Door Manufacturers Association (WDMA):
   1. IS 4 - Industry Standard for Water-Repellent Preservative Non-Pressure Treatment for Millwork.

R. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination with Other Sections: Wood stock incorporated into the work of this Section shall be coordinated with requirements for hardwood veneer and solid stock specified in other related Sections of this Specification.
   1. To ensure match in quality, color, and appearance, all veneer hardwood shall be obtained from a single source in accordance with this Section.

B. Coordinate installation of work with other trades. Obtain templates or full size sample of built-in devices to ensure proper fit.

C. Coordination: Coordinate with construction waste management requirements specified in Section 017419.

D. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.
1.04 SUBMITTALS

A. General: Make submittals in accordance with the provisions of Section 013300.

B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.
   1. Include bamboo plywood product data.

C. Shop Drawings: Prepare Shop Drawings in accordance with Section 1 of AWS and the provisions of Section 013300.
   1. Provide WI Certified Compliance label on first sheet of each set of Shop Drawings.
   2. Coordination: Coordinate rough-in for items installed through, or in, millwork and trim. Indicate rough-ins for proper alignment with edges, faces, and reveals.
   3. Submit wood grille layout indicating location of all cutouts.

D. Samples:
   1. Submit three 12-inch by 24-inch wood veneer panels and 12-inch long hardwood boards for color, grain selection, finish, and matching.
   2. Include joinery, showing typical conditions, including reveals and corners.
   3. Hardwood base.

E. Submit the following:
   1. A WI Certified Compliance Certificate issued by cabinet supplier prior to delivery of products to jobsite, certifying that the items of work meet the requirements of the AWS grade specified.
   2. A WI Certified Compliance Certificate issued by the cabinet installer at completion of the installation certifying that the installation meets the requirements of AWS.
   3. Design Data: Submit calculations prepared by State of California licensed engineer confirming compliance with ASCE 7 Table № 13.5-1.
   4. Certification Requirements: Submit third party certification that composite wood products comply with CCR Title 17 ATCM formaldehyde emission standards, unless otherwise exempted.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of
extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

4. MR Credit 6 and MR Credit 7: Product data and chain-of-custody certificates certifying that products specified shall be made from rapidly renewal certified wood complying with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.

B. Indoor Environmental Quality Submittals:

1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

2. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

3. Product Data for IEQ Credit 4.4: For composite wood products and adhesives used in composite wood assemblies on and off-site, documentation indicating that they contain no added urea formaldehyde.

1.06 QUALITY ASSURANCE

A. Quality Standard Requirements: comply with Architectural Woodwork Standard, latest edition, for grades of interior architectural woodwork, construction, finishes, and other requirements, including related applicable requirements of Appendix A.

1. Comply with AWS Appendix B Part 12 - Installation for installation requirements.

B. Qualifications:

1. Fabricator shall be a current member in good standing of WI and meeting experience qualifications specified in Section 014500.
   a. Work shall be performed by a firm certified by WI compliance programs.

C. WI Certification: Comply with the WI Certified Monitored Compliance program qualification requirements of AWS Appendix B - Quality Control Enforcement Options - Woodwork Institute.

1. Quality Standards: Comply with AWS for grades of interior architectural woodwork construction, finishes, and other related requirements.
   a. Contractor, upon award of work, shall contact WI at (916)372-9943 and request the Certified Monitored Compliance Program for this Project.
   b. Furnish evidence of Certification Monitored Compliance by submittal of Certified Monitored Compliance Certificate issued by WI listing items certified, the application Grade, and whether installation is included.

2. Furnish WI Certified Monitored Compliance Program labels and certificates indicating that woodwork and installation complies with requirements of grades specified.
3. Affix WI individually serial-numbered Certified Compliance Label to Shop Drawings and each elevation of casework and countertop, displaying grade specified.

D. Inspection: WI certification and grade stamps will be required.
1. Arrange an inspection by a representative of WI to determine that the work of this Section has been performed in accordance with the specified standards.
2. In the event such inspection determines that the work of this Section does not comply with the specified requirements, immediately remove the non-complying items and replace them with items complying with the specified requirements.
   a. On-site repair of non-complying items will not be allowed.
3. Certifications: Affix compliance labels to each unit or product, displaying grade specified.

E. Field Samples: Install field samples of designated finishes indicating attachment, jointing, and overall workmanship for review and acceptance.
1. Field samples shall be approximately 8 feet by 8 feet, and include perimeter conditions, joints, and reveals, as applicable.
2. Provide field samples identical in every respect to completed work.
3. Work will be reviewed for quality and conformity to specification requirements.
4. When accepted by the Architect, field samples may be deemed as incorporated into the work and will become the standards by which subsequent work of this Section will be evaluated for acceptance.

### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Conform to AWS Appendix B Part 2 - Care and Storage. Deliver manufactured units with identifying labels affixed and legible. The Architect reserves the right to observe delivered materials, to review the accompanying bills of lading, and to reject the following:
1. Units not accompanied by required certificates.
2. Units exhibiting damage to finish.

B. Labeling: On each item fabricated of composite wood, apply label as a stamp, tag, sticker, or bar code, indicating fabricator’s name, production date, and CCR Title 17 ATCM compliance standard of the product.

### 1.08 FIELD CONDITIONS

A. Field Measurements: Field measure in-place construction and existing casework to ensure accurate fit of fabricated and manufactured units.

B. Provide assembly instructions for units that will be delivered in two or more pieces.

C. Ambient Conditions: Store and install woodwork under the conditions of temperature and humidity established for the operating facility.
1. Allow woodwork to acclimate to such conditions for not less than 7 days prior to installation.
   a. Optimum conditions for storage of wood paneling are approximately 75 degrees F and 40% to 65% relative humidity.
   b. Allow circulation of air around components.
c. Humidity control for wood veneer laminate is critical to avoid stress-cracking or bubbling.

2. Do not store woodwork until permanent heating and ventilation systems are properly functioning.

1.09 WARRANTY

A. Bamboo Products: Manufacturer's standard 5-year warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Acceptable Supplier of Hardwood and Veneers:

C. Acceptable Manufacturers of Medium Density Fiberboard Panels:
   2. Willamette Industries, Inc., Duraflake Division.

D. Acceptable Manufacturers of Plastic Laminate Products:
   1. Formica Corporation, Cincinnati, OH (513)786-3400, (800)367-6422.
   2. Nevamar Corporation, Odenton, MD (301)569-5001, (800)638-4380.
2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with the certification requirements of CCR Title 17 ATCM for formaldehyde emissions of composite wood products, unless otherwise exempted, using ASTM E 1333 primary or ASTM D 6007 secondary compliance testing.

2.03 PERFORMANCE CRITERIA

A. Surface Burning Characteristics: Comply with fire performance characteristics indicated below for wall paneling. Products shall be Class A fire rated.
1. Confirm by testing in accordance ASTM E 84, NFPA 255, NFPA 286, and ASTM E 162 for flammability, combustibility, and smoke developed. Fire Performance Characteristics:
   a. Fuel Contribution: ASTM E 84 Class C.

2.04 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.
4. Certificates for MR Credit 6: Chain-of-custody certificates certifying that products specified shall be made from rapidly renewable sources.
5. MR Credit 7 Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria for wood building components.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. IEQ Credit 4.1 - Low-Emitting Materials—Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
2. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   b. Clear Wood Finishes: not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

3. IEQ Credit 4.4 - Low-Emitting Materials--Composite Wood and Agrifiber Products: Composite wood and agrifiber products used on the interior shall contain no urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
   a. Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

2.05 MATERIALS

A. General: Materials shall comply with the Premium Grade requirements of AWS, unless otherwise modified or indicated.

B. Wood:
   1. Conform to the applicable requirements of the AWS.
      a. Section 3 - Lumber.
      b. Section 4 - Sheet Products.
      c. Section 5 - Finishing.
      d. Section 6 - Interior & Exterior Millwork.
      e. Section 7 - Stairwork & Rails.
   2. Softwood For Opaque (Paint) Finish: In accordance with AWS for Premium Grade.
      a. Species and Cut: Straight grain Douglas fir, hemlock, or Ponderosa pine.
   3. Hardwood For Opaque (Paint) Finish: Premium Grade.
      a. Species: Natural maple, birch, poplar, or ash.
   4. Hardwood For Transparent (Stain) Finish: In accordance with AWS for Premium Grade.
      a. Species and Grain: American beech *(Fagus grandifolia)*, vertical grain.
      c. Species and Grain: Plain sliced select white birch.

C. Hardwood Veneer:
   1. Grade: HPVA Grade AA.
   2. Species and Cut: Match solid hardwood.
   3. Thickness: 1/40-inch at time of cutting.
   4. Veneer and Assembly Matching:
      b. Matching Within Panel Face: Center balance match.
      c. End Matching of Adjacent Leaves: Vertical butt slip end match and horizontal slip side.
match (first end-to-end, then side-to-side).

d. End Matching of Adjacent Leaves: Horizontal slip side match and slip vertical butt (first side-to-side, then reverse end-to-end).

e. Panel Matching Within Room: Sequence matched panels, pre-manufactured sets, selectively reduced in width.

5. Construction:
   a. Panel Back: Sound veneer of same species.
   b. Panel Edges: Veneer all edges with same species and cut.
   c. Panel Core: Medium density fiberboard (MDF).

6. Obtain veneer in sufficient quantities to allow for waste and veneer matching.

D. Panel Core, Plywood Materials:
   1. Softwood Plywood: PS 1, Standard Sheathing Grade, Group 1, Appearance Quality, Douglas fir, with face veneer rotary cut, minimum 3/4-inch thick, intermediate glue, formaldehyde-free, and complying with referenced AWS.
      a. Provide sustainable Forestry Initiative-certified lumber with no added urea-formaldehydes equal to EurolyPlus, produced by Columbia Forest Products, or equal.

E. Panel Core Composite Wood Materials, General Requirements: MDF panels with a formaldehyde-free adhesive system. Provide the following common physical properties applicable to specific use panel core MDF materials manufactured by SierraPine:
   1. Material: Medium density fiberboard (MDF).
      a. Wood Fiber: 100 percent post-industrial recycled wood residuals.
      b. Binder: Formaldehyde-free adhesive system, per LEED EQ 4.4.
   2. Conformance: ANSI A208.2, industrial-grade MDF.
   3. Certifications:
      a. SCS Certified: Post-industrial recycled wood fiber. No added formaldehyde.
      b. CPA Certified: Environmentally Preferable Product.
      c. FSC Certified.
   4. Panel Thickness: 3/4 inch, or as indicated on the Contract Drawings.
   5. Physical Properties, based on 3/4-Inch thickness, ASTM D 1037, Part A:
      a. Density: 48 pounds per cubic foot.
      b. Linear Expansion: 0.30 percent, dimensional change in length and width due to humidity change.
      c. Formaldehyde Emissions: As low as 0.01 ppm.
      d. Comply with applicable formaldehyde emission requirements of CCR Title 17 Sections 93120-93120.12 (ATCM).
a. Backer Sheet: NEMA Type BKM (0.039-inch nominal thickness) with no decorative face, for use as a balancing sheet at concealed surfaces only. Refer to 2.05-G.5.
   1) Cabinet Liner: Low-pressure decorative laminate cabinet liner material intended for use in cabinet interiors. Equal to Kortron brand, melamine, or polyester overlay.
      a) Provide white color, unless otherwise directed by Architect.
   2) Semi-exposed Areas: Low pressure decorative polyester overlay.

F. Panel Core Materials, High Performance and Moisture Resistant: MDF panels with a formaldehyde-free adhesive system. In addition to the general requirements specified above, provide the following physical properties:
   1. Material: Medex medium density fiberboard (MDF), as manufactured by SierraPine, or equal.
   3. Physical Properties, Base on 3/4-Inch Thickness, ASTM D 1037, Part A:
      a. Internal Bond: 200 psi.
      b. Modulus of Rupture: 6,000 psi.
      c. Modulus of Elasticity: 600,000 psi.
      d. Modulus of Hardness, Janka Ball: 1,200 pounds.
      e. Screw Holding: Required to pull 1-inch #10 sheet metal screw.
         1) Face: 350 pounds.
         2) Edge: 275 pounds.
      f. Water Absorption: 5 percent average, 24-hour soak.
      g. Thickness Swell: 3 percent average, 24-hour soak.
      h. Flame Spread Rating, ASTM E 84: Class C.
      i. Moisture Content: 4 to 6 percent average, oven-dry basis.

G. Plastic Laminates **Type PL-3**: Equal to high-pressure type, conforming to requirements of NEMA LD-3, as manufactured by Pionite Decorative Surfaces.
   1. External Vertical Surfaces: 0.028-inch thick, general purpose type.
   2. Edge Banding: Through color, 0.060-inch thick, in type to match adjacent surfaces.
   3. Colors and Patterns: As selected by Architect from manufacturer's standard products.
   4. Adhesive: Formaldehyde-free, rigid urea resorcinol adhesive, complying with requirements for WI Type II water-resistive adhesive, conforming to FS MMM-A-188.
      a. Permanent type adhesive equal to white glue or uncolored contact adhesive to prevent glue lines from showing at through color or plastic laminates.
   5. Backing Sheets: For concealed areas only.
      a. Backer Sheet: NEMA Type BKM (0.039-inch nominal thickness) with no decorative face, for use as a balancing sheet at concealed surfaces only.
1) Cabinet Liner: Low-pressure decorative laminate cabinet liner material intended for use in cabinet interiors. equal to Kortron brand, melamine, or polyester overlay.
   a) Provide white color, unless otherwise directed by Architect.
2) Semi-exposed Areas: Low pressure decorative polyester overlay.

H. Fiberboard For Fabric Covered Tackboard Finish: Medium density fiberboard (MDF), 1/2-inch thick or as indicated in Contract Documents, equal to USG Micore 300.

I. Engineered Quartz Surfacing: Refer to Section 123661.

2.06 PANELING

A. Wall Paneling: Hardwood veneer as specified above.
   1. Core:
      a. Up to 1/4-inch Thick: Plywood core.
      b. Panels Thicker Than 1/4-inch: Provide MDF panel manufactured from formaldehyde-free 100 percent recycled wood waste, as manufactured by SierraPine, or equal. Provide balancer sheet adhered to the D face of the core.
         1) Provide Class B core where required by code.
   2. Glue: Interior Type II glue, Class C flame spread per ASTM E 84.
   3. Provide solid stock edge banding and reveals to match veneer.
   4. Fireblocking: Conform to CBC 717.2.
   5. Cleats: Wood, 1/2-inch wood strips at 24 inches on centers.

B. Wood Paneling: Architectural panels composed of sustainable Forestry Initiative-certified lumber with no added urea-formaldehydes equal to EurolyPlus, produced by Columbia Forest Products, or equal.

C. Finish: Transparent with medium stain, and as specified in Section 099100 for factory finish.

2.07 STANDING AND RUNNING TRIM

A. Wood Base (Opaque Finish):
   1. Material: MDF panel, as specified.
   2. Type: 2-1/2-inch high with reveal, flush with finished wall surface, or as indicated on Contract Drawings.
   3. Opaque Finish: Paint in accordance with Section 099100 to match adjacent wall surface.

B. Wood Base (Transparent Finish):
   2. Type: 2-1/2-inch high with reveal, flush with finished wall surface, or as indicated on Contract Drawings.

2.08 CUSTOM FABRICATIONS

A. Display Cases:
   1. Components: Wood veneer and solid stock in accordance with Contract Drawings.
2. Bottom: Solid surfacing in accordance with Section 064150.
4. Track: Concealed.
5. Glass Shelves and Doors: Hanging, sliding glass doors, 1/4-inch thick clear tempered with polished edges and steel rods.
   a. Provide bronze adjustable collars with set screws at rod shelf supports.
   b. Provide adjustable notches for alignment.
   c. Provide 3/8-inch diameter bronze pipe sleeves for rods.
   d. Provide decorative bronze lock shield.

B. Ballet Bar: Fabricate of specified hardwood stock in accordance with Contract Documents.

2.09 FABRICATION

A. Workmanship shall conform to the Premium Grade standards of AWS for construction details.
   1. Standard wood moldings shall conform with WWPA WP Series where applicable.

B. Woodwork shall be made to dimensions, profiles, and details indicated on Contract Drawings.
   1. Trim that is 2 inches wide and larger shall be backed out.
   2. Exposed edges and corners shall be eased.
   3. Exposed surfaces of architectural woodwork shall be free from tool marks, torn grain, cross sanding, and workmanship defects that cannot be concealed by specified finish.
   4. Select veneer flitches of specified species that comply with Premium Grade quality, free of knots and other significant defects that will detract from a uniform and consistent appearance.
      a. Architect will be present during flitch selection.
   5. Visible woodwork surfaces shall be finished wood veneer or solid stock hardwood. No exposed substrate surfaces will be permitted.

C. Paneling:
   1. Glue face veneers to MDF core utilizing hot-plate method only. Glue surfaces in close contact throughout. Glue stains are not acceptable.
      a. Panels shall have a balancer sheet adhered to the concealed face of the MDF core.
   2. Provide solid stock hardwood routed into panel at reveal locations and at panel bases and corners as indicated on Contract Drawings. Face veneer shall provide continuous overlap of solid stock at exposed edges.
      a. Provide lock miter detail at all corner joints.
      b. Inside corners of cutout openings shall be radiusied as large as possible (0.1875-inch) minimum to avoid stress cracking. The edges and corners shall be filed smooth be filed smooth and free of chips or nicks.
3. Preassemble panels in shop to verify fit and consistency of veneer matching.
   a. Architect’s representative will be present to preview veneer matching.

2.10 FINISH

A. Wood panel finish shall be factory applied in a clean and dustproof environment.
   1. Exposed edges shall be finished to prevent moisture absorption.

B. Factory Finishing: Finish architectural woodwork according to AWS, Section 5, for Premium Grade, using AWS Finishing System as follows:
   1. System 10 - UV Curable, Water-Based.
      a. UV curable, water-based factory finishes shall be UV-cured to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations.
      b. VOC content of adhesives and sealants used shall be less than the current VOC limits of the local air quality management district.
      c. Sealants used as fillers shall meet or exceed the requirements of the local air quality management district.

C. Opaque Field Finish: In accordance with requirements of Section 099100.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Preparation:
   1. Condition woodwork to average prevailing humidity conditions in installation areas prior to work. Install woodwork after wet operations are completed and woodwork has been primed and sealed. Reseal cut surfaces, edges, and ends as specified.
   2. Field verify existing substrates, adjoining construction, and other physical conditions under which the work shall be installed. Commence work only after unsatisfactory conditions have been eliminated.
   3. Prior to installation of work, examine shop fabricated work for completion, and complete work as required, including back priming and removal of packing.
   4. Backprime surfaces to be installed in contact with concrete, masonry, or plaster in accordance with the requirements of Section 099100.

3.02 INSTALLATION

A. Architectural woodwork shall be installed in accordance with the applicable recommendations of the AWS Installation Requirements. Workmanship shall conform with Premium Grade requirements, and as modified in this Section.
B. Work shall be installed plumb, level, true, and straight without distortion. Reveals and exposed panel terminating edges shall be in constant alignment both vertically and horizontally. Adjust as required using concealed shims. Install work to a tolerance of 1/8-inch in 8 feet for plumb and level, with a maximum offset of 1/16-inch in flush adjoining surfaces, and a maximum offsets of 1/8-inch on revealed adjoining surfaces.
   1. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

C. Anchor woodwork to nailers, built-in blocking, or directly to substrate, as indicated on Contract Drawings. Secure to grounds, stripping, and blocking with countersunk concealed fasteners and blind nailing for a complete installation.
   1. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailings, countersunk and filled flush with woodwork, and matching finish where transparent finish is indicated.
   2. Units fastened with screws shall be plugged with matched dowel material and sanded smooth.

D. Standing and Running Trim:
   1. Install with a minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Scarf in-line joints where full length pieces are not possible. Stagger joints in adjacent and related members. Cope at returns and miter at corners.
      a. Align joints with joints in adjacent materials.
   2. Apply wood finish material straight, plumb, level, in true alignment, and closely fitted. Apply moldings and trim with mitered corners and mitered or coped angles. Securely attach architectural woodwork items to prepared wood grounds or blocking, or other suitable prepared solid surfaces. Form joints to minimize shrinkage effects and dressed to hairline tolerance.

E. Paneling:
   1. Paneling shall be installed as defined in AWS Part 8.
   2. Install with uniform, tight joints between panels.
   3. Attach panels to backing material with concealed continuous 1/2-inch wood cleat at 16 inches on centers vertically or concealed extruded aluminum cleat attachment system that permits easy removal of panels. No exposed fasteners will be permitted.
   4. Attach panels to backing material with concealed continuous 1/2-inch wood cleat at 16 inches on centers vertically or concealed attachment system that permits easy removal of panels. No exposed fasteners will be permitted.
   5. Fasteners shall be concealed from view.
   6. Accurately align joints and score lines with architectural features.
   7. Horizontal joints are not permitted in plywood panels unless otherwise indicated on Contract Drawings.

F. Telephone Backboard: Attach with screws at 24 inches on centers at edges.
G. Install solid surface fabrications in accordance with the general requirements of WI Manual, as applicable, and manufacturer’s recommendations.

H. Building Specialties: Install specialty items specified under other sections which are not specified to be installed by specialty product manufacturer or supplier.

3.03 CLEANING

A. Do not use abrasive cleaners, acid, or alkaline-based compounds. Protect surfaces of the wood veneer laminate from coming in contact with the solvents.

END OF SECTION
1.01 SUMMARY

A. Section Includes: Plastic laminate casework.
   1. Include tall storage cabinets.
   2. Include reception and related desks at Bookstore.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 014500 - Quality Requirements.
   5. Section 018113 - Sustainable Design Requirements.
   6. Section 064150 - Casework Countertops.
   7. Section 123661 - Solid Surfacing Countertops.

C. Related Sections:
   1. Section 099100 - Painting: Coordination with requirements for back-priming.

1.02 REFERENCES

A. ASTM International (ASTM):


B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks:
            a) Section 11B-309 - Operable Parts.
C. California Code of Regulations (CCR):
   1. Title 17 - Public Health, April 2008:
      a. Division 3. Air Resources
         1) Chapter 1. Air Resources Board:
            a) Subchapter 7.5. Airborne Toxic Control Measures:
               (1) §93120. Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products, (ATCM).
               (a) Sections 93120.1-93120.12.

D. California Code of Regulations (CCR):

E. American Society of Civil Engineers (ASCE):
      a. Table 13.5-1 - Coefficients for Architectural Components.

F. Woodwork Institute (WI):
   1. Architectural Woodwork Standards (AWS), 1st edition (2009) and subsequent errata, published jointly by AWI, AWMAC, and WI, including Appendices, Guide Specifications, and WI Certified Compliance.
      a. Section 1 - Submittals:
      b. Section 2 - Care and Storage.
      c. Section 3 - Lumber.
      d. Section 4 - Sheet Products.
      e. Section 6 - Millwork.
      f. Section 10 - Casework: Decorative plastic type.
      g. Appendix:
         1) Adhesive Guidelines.
         2) Joinery Details.
         3) Casework Integrity.

G. American National Standards Institute (ANSI):

H. Builders Hardware Manufacturers Association/American National Standards Institute (BHMA/ANSI):
   1. A156.9-2003 - Cabinet Hardware.

I. Composite Panel Association/American National Standards Institute (CPA/ANSI):
   1. A135.4 - Basic Hardboard Product Standard.

J. Hardwood Plywood and Veneer Association /American National Standards Institute (HVPA/ANSI):

K. National Electrical Manufacturers Association (NEMA):
L. U.S. Department of Commerce (DOC):
   1. Product Standards (PS):

M. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 FLAMMABILITY REFERENCES

A. Business and Institutional Furniture Manufacturer’s Association (BIFMA):
   1. FF1-78.

B. National Fire Protection Association (NFPA):

C. Upholstered Furniture Action Council (UFAC):
   1. Fabric Classification Test Method, Class 1.

   1. Commercial Standard (CS):
      a. 191-52, Class 1 - Flammability of Clothing Textiles.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordination: Coordinate rough-in for items installed through or in millwork and trim. Locate rough-ins for proper alignment with edges, faces and reveals. Coordinate backing and framing provisions in wall to ensure adequate support of casework.

1.05 SUBMITTALS

A. Product Data: Submit complete manufacturer’s descriptive literature and specifications in accordance with the provisions of Section 013300.

B. Shop Drawings: Prepare Shop Drawings in accordance with Section 1 of AWS and the provisions of Section 013300.
   1. Provide WI Certified Compliance Label affixed to first sheet of each set of Shop Drawings.

C. Samples: In accordance with Section 1 of the AWS and the provisions of Section 013300, submit the following:
   1. Laminated plastic.
   2. Sample door and drawer elements.
   3. Hardware.
D. In accordance with the provisions of Section 013300, submit the following:

1. A WI Certified Compliance Certificate issued by cabinet supplier prior to delivery of products to jobsite, certifying that the items of work meet the requirements of the AWS grade specified.

2. A WI Certified Compliance Certificate issued by the cabinet installer at completion of the installation certifying that the installation meets the requirements of AWS.

3. Design Data: Submit calculations prepared by State of California licensed engineer confirming compliance with ASCE 7 Table No. 13.5-1.

4. Certification Requirements: Submit third party certification that composite wood products comply with CCR Title 17 ATCM formaldehyde emission standards, unless otherwise exempted.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

4. MR Credit 6 and MR Credit 7: Product data and chain-of-custody certificates certifying that products specified shall be made from rapidly renewable certified wood complying with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.

B. Indoor Environmental Quality Submittals:

1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

2. Product Data for IEQ Credit 4.4: For composite wood products and adhesives used in composite wood assemblies on and off-site, documentation indicating that they contain no added urea formaldehyde.

1.07 QUALITY ASSURANCE

A. Quality Standard Requirements:

1. Comply with Architectural Woodwork Standards (AWS) Section 10 - Casework, including related requirements of Appendix A, as applicable.
2. Comply with AWS Section 10 and Appendix B Part 12 - Installation for installation requirements.

B. Qualifications:
   1. Fabricator shall be a current member in good standing of WI and meeting experience qualifications specified in Section 014500.

C. WI Certification: WI Certified Program certification and grade stamps will be required.
   1. Arrange an inspection by a representative of the WI to determine that the work of this Section has been performed in accordance with the specified standards.
   2. In the event such inspection determines that the work of this Section does not comply with the specified requirements, immediately remove the non-complying items and replace them with items complying with the specified requirements.
      a. On-site repair of non-complying items will not be allowed.
   3. Certifications: Affix the WI Certified Compliance labels to each unit or product, displaying grade specified.

D. Mockups: Provide full size sample of base cabinet approximately 4 feet in length in location designated by Architect. Provide materials and colors specified.
   1. Provide mockups identical in every respect to completed work.
      a. Provide hardware in color and finish specified.
   2. Units will be reviewed for quality and conformity to specification requirements.
   3. When accepted by the Architect, mockups may be deemed as incorporated into the work and will become the standards by which subsequent work of this Section will be evaluated.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Conform to AWS Appendix B Part 2 - Care and Storage. Deliver manufactured units with identifying labels affixed and legible. The Architect reserves the right to observe delivered materials, to review the accompanying bills of lading, and to reject the following:
   1. Units not accompanied by required certificates.
   2. Units exhibiting damage to finish.

B. Labeling: On each item fabricated of composite wood, apply label as a stamp, tag, sticker, or bar code, indicating fabricator's name, production date, and compliance standard of the product.

1.09 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.
B. Provide assembly instructions for units that will be delivered in two or more pieces.

C. Ambient Conditions: Install casework under conditions for temperature and humidity established for the operating facility. Acclimate casework to such conditions not less than 7 days prior to installation.
   1. Maintain temperature and humidity at completed Work in accordance with requirements for storage.
   2. Do not install cabinetwork until wet operations are completed and cabinetwork has been primed or sealed.
   3. Condition woodwork to average prevailing humidity under air conditioned conditions in installation areas prior to work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Medium Density Fiberboard Panels:
   2. Willamette Industries, Inc., Duraflake Division.

B. Acceptable Manufacturers of Plastic Laminate Products:
   1. Formica Corporation, Cincinnati, OH (513)786-3400, (800)367-6422.
   2. Nevamar Corporation, Odenton, MD (301)569-5001, (800)563-4380.

C. Acceptable Manufacturers of Accessory Products:
   2. Builders Brass Works Corporation, Los Angeles, CA (213)269-8111.
   5. Epco USA, City of Industry, CA (626)961 6827, epco@epcocorp.com.
17. US Tek, (626)859-9225.

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Comply with the certification requirements of CCR Title 17 ATCM for formaldehyde emissions of composite wood products, unless otherwise exempted, using ASTM E 1333 primary or ASTM D 6007 secondary compliance testing.

B. Regulations: Operable parts of accessible cabinets shall comply with CBC Section 11B-309.

C. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

D. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

E. Comply with CALGreen 5.504.4.3 Paints and Coatings:
   1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
   2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

F. Comply with CALGreen 5.504.4.5 Composite Wood Products: Hardwood plywood, particleboard, and medium density fiberboard composite wood products shall meet the requirements for formaldehyde as specified in CCR Title 17 Sections 93120-93120.12 - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products (ATCM).
   1. Comply with CALGreen Table 5.504.4.5 for formaldehyde limits.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.
   4. Certificates for MR Credit 6: Certify that products specified are made from rapidly renewable sources.
   5. MR Credit 7 Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria for wood building components.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
   2. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      b. Clear Wood Finishes: not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.
   3. IEQ Credit 4.4 - Low-Emitting Materials--Composite Wood and Agrifiber Products: Composite wood and agrifiber products used on the interior shall contain no urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
      a. Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
2.04 MATERIALS

A. General: Materials shall comply with the Premium Grade requirements of *AWS*, unless otherwise modified or indicated.

B. Lumber:
   1. Softwood Lumber: Graded in accordance with *AWS* maximum moisture content of 6 percent, any species and grade as allowed for grade specified for woodwork product.
   2. Hardwood Lumber: Species as indicated on the Contract Drawings, complying with requirements of specified grade for casework fabrication.
   3. Furring, Blocking, Shims, and Cleats: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

C. Plywood Panels:
   1. Softwood Plywood: PS 1, Standard Sheathing Grade, Group 1, Appearance Quality, Douglas fir, with face veneer rotary cut, minimum 3/4-inch thick, Intermediate Exposure glue.
      a. At concealed conditions, provide Douglas fir plywood, thickness as indicated for casework construction, Intermediate Exposure glue at casework panels.
      b. At exposed conditions, provide Douglas fir face veneers, rotary cut, APA A-B Grade at transparent finish and APA B-B (Plugged) Grade at opaque finish, unless otherwise indicated.
   2. Hardwood Plywood, Exposed: Northern Grown Red Oak, complying with HVPA HP-1 standard, 9-ply plywood veneer core, grade as specified for casework construction, with "A" face of panel of specified species and veneer assembly.
   3. Hardwood Plywood, Semi-Exposed: Close-grained hardwood plywood, CPA/ANSI 135.4, plywood core, minimum 5 plies, formaldehyde-free, and complying with requirements of *AWS*.
      a. Provide minimum thickness according to referenced standards, as detailed on Contract Drawings, and as specified herein.
   4. Hardwood Plywood, Concealed: Close-grained hardwood plywood, CPA/ANSI 135.4, plywood core, minimum 5 plies, formaldehyde-free, containing minor defects such as pin knots, sapwood, or mineral streaks as long as strength is not affected, and complying with requirements of *AWS*.
      a. Acceptable species are maple, yellow birch, oak, ash, and hackberry. Not acceptable species are softer hardwood such as basswood, poplar, or aspen.

D. General Requirements, Panel Core Composite Wood Materials: MDF panels with a formaldehyde-free adhesive system. Provide the following common physical properties applicable to specific use panel core MDF materials manufactured by SierraPine:
   1. Material: Medium density fiberboard (MDF).
      a. Wood Fiber: 100 percent post-industrial recycled wood residuals.
      b. Binder: Formaldehyde-free adhesive system, per LEED EQ 4.4.
   2. Conformance: ANSI A208.2, industrial-grade MDF.
3. Certifications:
   a. SCS Certified: Post-industrial recycled wood fiber. No added formaldehyde.
   b. CPA Certified: Environmentally Preferable Product.
   c. FSC Certified.
4. Panel Thickness: 3/4 inch, or as indicated on the Contract Drawings.
5. Physical Properties, based on 3/4-Inch thickness, ASTM D 1037, Part A:
   a. Density: 48 pounds per cubic foot.
   b. Linear Expansion: 0.30 percent, dimensional change in length and width due to humidity change.
   c. Formaldehyde Emissions: As low as 0.01 ppm.
   d. Comply with applicable formaldehyde emission requirements of CCR Title 17 Sections 93120-93120.12 (ATCM).

E. High Performance and Moisture Resistant Panel Core Materials: MDF panels with a formaldehyde-free adhesive system. In addition to the general requirements above, provide the following physical properties.
   1. Material: Medex medium density fiberboard (MDF), as manufactured by SierraPine, or equal.
   3. Physical Properties, Base on 3/4-Inch Thickness, ASTM D 1037, Part A:
      a. Internal Bond: 200 psi.
      b. Modulus of Rupture: 6,000 psi.
      c. Modulus of Elasticity: 600,000 psi.
      d. Modulus of Hardness, Janka Ball: 1,200 pounds.
      e. Screw Holding: Required to pull 1-inch #10 sheet metal screw.
         1) Face: 350 pounds.
         2) Edge: 275 pounds.
      f. Water Absorption: 5 percent average, 24-hour soak.
      g. Thickness Swell: 3 percent average, 24-hour soak.
      h. Flame Spread Rating, ASTM E 84: Class C/3.
      i. Moisture Content: 4 to 6 percent average, oven-dry basis.

F. Hardboard: CPA/ANSI 135.4, interfelted lignocellulosic fibers consolidated under heat and pressure, tempered treated, smooth one side. Provide 1/4-inch thick minimum when used as dust panel.

G. Surface Laminates: Refer to Article 2.08 for location of use.
   1. Plastic Laminates: High-pressure type, conforming to requirements of NEMA LD 3.
   2. Countertops: Refer to Section 123661 for countertop material.
   3. Horizontal Surfaces, Other Than Countertops:
      a. General Purpose: NEMA Type HGS (0.039-inch nominal thickness).
      b. Post-Formed: NEMA Type HGP (0.039-inch nominal thickness) horizontal post-forming type.
   4. Vertical Surfaces:
      a. General Purpose: NEMA Type VGS (0.028-inch nominal thickness) vertical general purpose type.
b. Post-Formed: NEMA Type VGP (0.028-inch nominal thickness) vertical post-forming type.

5. Backing Sheets: For concealed areas only.
   a. Backer Sheet: NEMA Type BK M (0.039-inch nominal thickness) with no decorative face, for use as a balancing sheet at concealed surfaces only.
      1) Cabinet Liner: Low-pressure decorative laminate cabinet liner material intended for use in cabinet interiors. Equal to Kortron brand, melamine, or polyester overlay.
         a) Provide white color, unless otherwise directed by Architect.
      2) Semi-exposed Areas: Low pressure decorative polyester overlay.

6. Edge Banding:
   b. Other Visible Edges: Match type used for adjacent surfaces.

7. Colors and Patterns: Provide types, colors, patterns, and surface textures to match types indicated on Contract Drawings, or equal.
   a. Type PL-2 Vertical Surfaces (General Use): Design is based on products manufactured by Formica Corporation.
   b. Type PL-4 Vertical Surfaces (at Bookstore): Design is based on products manufactured by Nevamar Corporation.

8. Texture: NEMA LD 3 Type B Matte Surface Satin Finish (15-34 gloss level range).

H Fasteners:
1. Provide fasteners of type, grade and class required for intended use and sized and spaced as required for loads and substrate.
   a. Refer to special seismic anchoring requirements of AWS Appendix A Seismic Fabrication & Installation Requirements, and as indicated on Contract Drawings.
2. Select material, type, size, and finish required by each substrate for secure anchorage. Provide non-ferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
   a. Screws: For use at wood or metal stud walls, minimum No. 14 x 3 inches, Phillips truss head, Type 17 hard, zinc-plated, self-tapping, full head screws. Provide material, type, size, and finish suitable for each use. Comply with applicable requirements of FS FF-S-111.
   b. Anchors: For use at masonry walls, minimum 1/4-inch diameter by 3 inches, Hilti, Kwik-Con II (ICC ER-5239) screws, or equal.
3. Exposed Anchors and Fasteners: Same material, color and finish as metal to which applied, except use only stainless steel at aluminum materials, and use cadmium plated at interior pre-painted steel products.
I. Adhesive: Permanent type white glue or uncolored contact adhesive to prevent glue lines from showing at through color plastic laminates. Comply with ASTM D 905.
   1. Contact Adhesives: PS 51, Type II water-resistant, water base type, formaldehyde free.
   2. Rigid: Urea or resorcinol adhesives.
   3. Semi Rigid: PVA.
   4. Wall Adhesive: Solvent release, cartridge type, compatible with wall substrate, capable of achieving durable bond.
   5. Fire-Resistive Adhesives:
      a. For Use at Lumber and Wood Veneers: Penacolite G-1124, manufactured by Koppers, or equal.

J. Accessories:
1. Sealants: Refer to Section 079200.

2.05 CASEWORK HARDWARE

A. Cabinet Hardware: As listed below or where indicated otherwise on Contract Drawings. Provide ANSI/BHMA A156.9 Grade 1 minimum.

1. Hinges: Heavy duty overlay hinges with extended side panel leaf and 175-degree or greater opening angle. Grade 2 series for full overlay.
   a. Rockford Process Control (RPC) Part № 851, or equal.

2. Pulls: Chicago Series 4.2 inches wide x 0.40-inch diameter, U-shaped wire rod style pulls meeting the requirements for accessible pull hardware, manufactured by Siro Designs, or equal.
   a. Finish: Bright chrome.
   b. Finish: Matte nickel finish.

3. Catches:
   a. Magnetic type, where required.

4. Locks: K&V 986 Series pin tumbler dead lock type, or equal. Provide 2 keys for each lock, keyed alike as directed by Architect.
   a. Provide locks on 100 percent of the drawers.
   b. Provide locks on 100 percent of the cabinet doors.

5. Drawer Slides: Accuride, or equal.
   a. Heavy Capacity Drawers: Full extension, heavy duty, 150 pounds at 18 inches.
   b. File Drawers: Full extension, heavy duty, 100 pounds at 18 inches.
   c. General Purpose Drawers: Full extension, heavy duty, 75-pound capacity at 18 inches.
   d. Pencil Drawers: Full extension, 50 pounds at 18 inches.

6. Adjustable Shelf Supports: Recessed heavy duty type.
   a. Clips, pins, and brackets shall be in accordance with AWS Appendix B Part 12 - Installation requirements for casework.

7. Wall Mounted Shelving:
   a. K&V 87 heavy duty single-slotted standards.
      1) Provide sizes to accommodate shelves indicated on Contract Drawings.
b. K&V 186/187 12 gage steel heavy duty brackets with injection-molded thermoplastic polyamide resin lock lever.
c. Provide end rests, bracket locks for extra stability where required, and bookends at open ended shelving.
d. Color: As selected by Architect.

8. Pencil Drawers: Häfele Model 955A textured plastic pencil drawer with ball-bearing slides, black or grey color as selected by Architect.

9. Other miscellaneous hardware as required to complete work of this Section.

B. Casework Hardware Finish: BHMA/ANSI A156.18. Where not otherwise indicated on Contract Drawings, provide satin polished stainless steel.

1. Stainless Steel:
   a. Satin: No. 4 satin polished, BHMA 630.

2. Concealed Hardware: Polished or satin chrome or brushed stainless steel.

### 2.06 COUNTERTOPS

A. Laminate Clad Countertops: Refer to Section 064150.

B. Solid Surfacing Countertops: Refer to Section 123661.

### 2.07 CASEWORK CONSTRUCTION

A. Plastic Laminate Casework:

1. Grade: Premium, in accordance with AWS Section 10.
   a. Composite panel cores in grades specified may be used.

2. Construction Type - Door and Applied Drawer Front Profiles:
   a. Type A - Frameless: Front edge of cabinet body components are edge banded.

3. Style Type - Cabinet and Door Interface Style:
   a. Style 1 - Overlay:
      1) Type A - Frameless:
         a) Flush Overlay.

### 2.08 FABRICATION

A. Plastic laminate casework and cabinets shall be fabricated in accordance with Premium Grade standards of AWS Chapter 10 for construction details. Fasten together with multiple units or single section, at Contractor’s option.

1. Drawers: Dovetail all joints.
2. Fillers shall be flush with face of doors.
3. Joints between cabinet units shall be concealed joint, tight type.
4. Underside of cabinets shall be flush, laminated in individual units.
5. Face frame members in modular casework are not permitted.
6. Interior color of all cabinets shall be white, unless otherwise indicated on Contract Drawings.
7. Exposed edges of glass shall be polished with eased corners.
8. Recess back of fully enclosed casework 2 inches, or as required to accommodate electrical plugs when inserted in flush wall outlets.

B. Plastic Laminate-Faced Casework Fabrication:

1. Casework Fabrication, General: Shop fabricate casework in compliance with AWS for grade specified.
2. Construction Details: Comply with referenced standards, with details and notes indicated on the Drawings, and the following:
   a. Cabinet Cases: 3/4-inch thick specified casework panel core, with plastic laminate at exposed and semi-exposed faces and cabinet liner at concealed faces. Where casework is located in room or space subject to high humidity, use 3/4-inch exterior grade plywood.
   b. Doors: 3/4-inch thick panel core, with high-pressure plastic laminate at exposed and concealed faces.
   c. Drawer Fronts: 3/4-inch thick panel core.
   d. Drawer Sides, Backs and Sub-Fronts: 9/16-inch thick 7-ply maple hardwood plywood in accordance with AWS.
   e. Drawer Bottoms: 1/4-inch thick plywood, faced with high-pressure cabinet liner material on upper face, except provide 3/8-inch thick bottoms at drawers 30 inches and wider. Provide species to compliment grain and hue of balance of cabinet. Rain Forest species shall not be used.
   f. Shelves: Support with specified shelf pins.
   g. Dust Panels: 1/4-inch thick hardboard, above compartments and drawers except where located directly under tops, to vertically secure spaces at locked cabinets.
   h. Base and Sleepers: Unfaced composite panels 3/4-inch by net 4 inches.
   i. Lumber Components:
      1) Backing Cleats: 3/4-inch by nominal 4 inches.
      2) Web Rails: 3/4-inch by nominal 4 inches.
      3) Supports for TV Swivel Pullout Shelf: Size to support maximum load capacity of shelf.
   j. Closures: Minimum 1-inch and maximum 3 inches wide, scribed to wall. Close all gaps at face, bottom and top of cabinets. Provide closure at all cabinet sides abutting walls, to ensure clearance for door to swing open fully.

3. Plastic Laminate Surfacing: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make hairline corners and joints. Refer to AWS 1.2.10 to 1.2.12 for definitions of exposures. Refer to Paragraph 2.04-G for material specifications.
   a. Exposed Surfaces, Exterior and Interior: High pressure plastic laminate.
   b. Semi-Exposed Locations: Cabinet liner.
   c. Concealed Surfaces: Backing sheet.
   d. Panel Edges: Refer to 2.04-G-6 for location of edge banding materials.
      1) Plastic laminate banding shall be of same finish and pattern as exposed face of panel.

4. Field Cutting and Fitting Provisions: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
5. Base or Full-Height Cabinets Fabrication:
   a. Mounting Strips: Minimum 1/2-inch by 2-1/2 inch, at top and bottom of case. Provide intermediate mounting strip at middle of casework 60 inches and taller, including book cases.
   b. Back: 1/4-inch thick composite panel, dadoed into top rail, sides and bottom of cabinet.
   c. Toe Kicks: Separate from or integral with base unit casework, 4 inches high by 2 inches deep at front and 4 inches high by 3/4-inch deep at exposed ends.
   d. Shelves:
      1) Shelves, Base Cabinets: One adjustable shelf, or as indicated on the Contract Drawings.
      2) Shelves, Full-Height Cabinets: One shelf for each 12 inches of clear open height in cabinet, or as indicated on the Contract Drawings.
   e. Drawer Construction: Lock dadoed or doweled, glued at all joints, except drawer bottom. Drawer bottoms shall be ploughed into drawer sides, backs and sub-fronts. Provide 3/8-inch thick bottoms at drawers 30 inches and wider. Provide steel rails to receive standard, letter-size Pendalflex hanging file folders.
   f. Door Catches at Doors Without Locks: Install typically on all doors except as specified below for double doors with locks. Install spring-loaded latch body to inside face of door, with the catch installed on the bottom face of cabinet top panel. Center catches 1-1/2 inches from strike edge of door.
   g. Door Catches at Double Doors with Locks: Installed on door leaf without lock. Install spring-loaded latch body to inside face of door, with the catch installed on the bottom face of cabinet top panel. Center catches 1-1/2 inches from strike edge of door.
   h. Door and Drawer Pulls:
      1) Install door pulls horizontally, with top mounting hole centered 1-1/2 inches from top edge of door and 1-1/2 inches from strike edge of door.
      2) Install drawer pulls horizontally, centered horizontally on drawer faces and 1-1/2 inches down from top edge of drawer front, unless otherwise indicated on the Drawings. Do not install pulls on false drawer fronts or sink base panels. Do not install pulls on drawers located directly above knee spaces, such as pencil drawers, or on keyboard trays.
   i. Doors: Conceal apron at sink base cabinet by extending cabinet doors to underside of counter.
6. Wall Cabinets:
   a. Mounting Strips: Minimum 1/2-inch by 2-1/2 inch, at top and bottom of case. Provide intermediate mounting strip at middle of casework 60 inches and taller.
   b. Back: 1/4-inch thick composite panel, dadoed into top rail, sides and bottom of cabinet.
   c. Shelves: Wall cabinets shall have two adjustable shelves, or as indicated on the Contract Drawings.
d. Door Catches at Doors without Locks: Install typically on all doors, except as specified below for double doors with locks. Install spring-loaded latch body to inside face of door, with the catch installed on the bottom face of cabinet bottom panel. Center catches 1-1/2 inches from strike edge of door.

e. Door Catches at Double Doors with Locks: Installed on door leaf without lock. Install spring-loaded latch body to inside face of door, with the catch installed on the top face of cabinet bottom panel. Center catches 1-1/2 inches from strike edge of door.

f. Door Pulls: Install door pulls horizontally, with mounting holes centered 1-1/2 inches from bottom edge of door and 1-1/2 inches from strike edge.

7. Movable Cabinets:
   a. Provide glides or heavy duty casters, as indicated in the Contract Drawings.

8. Closet and Utility Shelving:
   a. Shelf Material: 3/4-inch composite panels as specified for cabinet cases.
   b. Shelf Cleats: 3/4-inch solid lumber.

9. Mail Room Shelving:
   a. Shelf Material: 3/4-inch composite panels as specified for cabinet cases. Comply with AWS Section 6 - Interior & Exterior Millwork. Provide Kortron finish on top surfaces

C. Coordinate work with built-in items supplied in other Sections. Obtain templates using actual devices to ensure proper fit.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that surfaces permanently concealed and in contact with contiguous construction, have been backprimed.

B. Substrate Verification: Verify adequacy of backing and support framing. Inspect subsurfaces to ensure that backing is suitable for plumb, true and level installation.

C. Casework Inspection: Inspect casework before installation for damage. Verify that casework will fit in intended locations.

3.02 INSTALLATION

A. General: Install casework in accordance with AWS Chapter 10 and Appendix B Part 12 - Installation requirements. Attach fasteners at top and bottom of cabinets in accordance with maximum horizontal spacing.
   1. Install after partition work is complete and painted.
   2. Set plumb, level, and straight. Fit tight and scribe to walls, ceilings, and other surfaces, so no open joints occur.
   3. Furnish fillers, closures, and trim for a complete installation.
   4. Fasten wall cabinets to wood blocking or special sheet metal reinforcing plates at maximum spacing of 32 inches on centers.
   5. Reseal cut surfaces, edges, and ends as specified.
B. Casework and Cabinets:
1. Secure toe kick bases and casework to floor using appropriate angles and anchors.
2. Set and secure casework in place, straight, rigid, plumb, and level.
3. Attachment to Walls:
   a. Fasten to wood blocking or special sheet metal reinforcing plates at top and bottom of cabinets with specified fasteners at maximum spacing of 32 inches on center, or as indicated in AWS.
   b. Fasten to masonry at top and bottom of cabinets in accordance with maximum horizontal spacing indicated in AWS.
4. Secure casework at top and bottom to each wall stud or to backing in wall with 3-inch hex head, No. 14 self-drilling sheet metal screws, spacing fasteners at 16 inches on center maximum.
5. Conceal anchorage devices where possible.
6. Countersink exposed fasteners.

C. Joining Casework Components: Attach products with fasteners and fastening methods to result in concealed attachments.

D. Fitting Casework: Carefully scribe casework which is against other building materials, leaving gaps of 1/16-inch maximum. Do not use additional overlay trim for finishing joints and edges.

E. Cabinet Hardware: Install cabinet hardware in accordance with manufacturer's instructions, properly fit, securely applied, and carefully adjusted. Use care not to injure work or finish when applying.
1. Properly index and file keys as directed by Owner.
2. Install drawer and other pull out slides with fasteners adequate to support maximum load capacity of indented storage.
3. Mount wall shelving standards directly in alignment with wall studs.

F. Shelving and Clothes Rod Installation:
1. Cut shelf cleats at ends of shelves about 1/2-inch less than width of shelves and sand exposed ends smooth.
2. Install shelf cleats by fastening to framing or backing with trim screws set below face and filled. Space fasteners not more than 16 inches on centers. Use two fasteners at each framing member or fastener location.
3. Install shelf brackets according to manufacturer's recommendations, spaced not more than 36 inches on centers, fastened to framing members, blocking, or metal backing.
4. Install shelves, fully seated on cleats, brackets, and supports. Fasten shelves to cleats with trim screws, set flush.
5. Secure rods to bracket rod flanges.

3.03 ADJUSTING AND CLEANING

A. Adjusting: Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly, without binding or squeaking.
B. Touch up stained, scratched, or otherwise discolored surfaces to match original shop finish or samples. Replace portions of work cut or otherwise damaged too badly to repair by minor touch up.

C. Cleaning: Clean casework, counters, shelves, hardware, fittings, and fixtures.
   1. Remove all marks, glue residue and soiling from all exterior and interior surfaces for dust-free condition.

3.04 PROTECTION

A. After installation, protect casework from damage for duration of construction until substantial completion.

END OF SECTION
1.01 SUMMARY

A. Section Includes: Countertops integral with architectural cabinets and counters.
   1. Include cover panels for locker seating.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 079200 - Joint Sealants.
   5. Section 099100 - Painting: Coordination with requirements for back-priming.
   6. Section 123616 - Metal Countertops: Stainless steel countertops.
   7. Section 123661 - Simulated Stone Countertops: Engineered quartz countertops.
   8. Division 22 Plumbing Sections: Coordination with installation of sinks and trim.
   9. Division 26 Electrical Sections: Coordination with installation of electrical outlets and trim.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. D 6007-14 - Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber.

B. California Code of Regulations (CCR):

C. Woodwork Institute (WI):
      a. Section 1 - Submittals:
      b. Section 2 - Care and Storage.
      c. Section 3 - Lumber.
      d. Section 11 - Countertops.
e. Appendix:
   1) Preservative & Water Repellent Treatments.
   2) ADA Requirements.
   3) Seismic Fabrication & Installation Requirements.
   4) Adhesive Guidelines.
   5) Joinery Details.

D. National Electrical Manufacturers Association (NEMA):
   1. LD 3-2005 - High-Pressure Decorative Laminates.
      a. Annex A - Application, Fabrication, and Installation

E. U.S. Department of Commerce (DOC):
   1. Product Standards (PS):
      a. I-95 - Construction and Industrial Plywood.

F. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: Submit complete manufacturer’s descriptive literature and specifications in accordance with the provisions of Section 013300.

B. Shop Drawings: Prepare Shop Drawings in accordance with Section 1 of the AWS referenced and the provisions of Section 013300.
   1. Provide WI Certified Compliance Label affixed to first sheet of each set of Shop Drawings.
   2. Coordinate with other trades and show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in countertops. Indicate rough-ins for proper alignment with edges, faces, and reveals.

C. Samples: In accordance with Section 1 of the AWS and the provisions of Section 013300, submit the manufacturer’s standard color and finishes palette, for selection.
   1. Solid surface, for color selection.

D. Certificates: Submit the following:
   1. Grade: A WI Certified Compliance Certificate issued by cabinet supplier prior to delivery of products to jobsite, certifying that the items of work meet the specified grade requirements of AWS.
   2. Installation: A WI Certified Compliance Certificate issued by the cabinet installer at completion of the installation certifying that the installation meets the installation requirements of AWS.
   3. Grade Stamps: Each unit of casework shall bear the applicable Institute grade stamp for the grade specified.
4. Design Data: Submit calculations prepared by State of California licensed engineer confirming compliance with ASCE 7 Table № 13.5-1.

E. Qualification Statements:
   1. Submit, with bid, information regarding previous work including list of projects with similar size and quality, contact persons, addresses, and telephone numbers.
      a. Qualifications will be reviewed prior to award of contract.
      b. Previous projects and fabrication shop will be visited prior to award.
   2. Fabricator shall submit an AWI Prequalification Form.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   4. MR Credit 6 and MR Credit 7: Product data and chain-of-custody certificates certifying that products specified shall be made from rapidly renewal certified wood complying with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.
   2. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).
   3. Product Data for IEQ Credit 4.4: For composite wood products and adhesives used in composite wood assemblies on and off-site, documentation indicating that they contain no added urea formaldehyde.
1.06 QUALITY ASSURANCE

A. Quality Standard Requirements:
   1. Comply with Architectural Woodwork Standards (AWS) Section 10 - Casework, including related requirements of Appendix A, as applicable.
   2. Work shall be performed by a firm certified by AWI Quality Certification Program (QCP).

B. Qualifications:
   1. Fabricator shall be a current member in good standing of WI and meeting experience qualifications specified in Section 014500.
      a. Work shall be performed by a firm certified by WI compliance programs.

C. WI Certification: WI Monitored Compliance Program certification and grade stamps will be required.
   1. Project shall be registered with WI by Contractor and assigned a project number for use in reporting compliance.
   2. Arrange an inspection by a representative of the WI to determine that the work of this Section has been performed in accordance with the specified standards.
   3. In the event such inspection determines that the work of this Section does not comply with the specified requirements, immediately remove the non-complying items and replace them with items complying with the specified requirements.
      a. On-site repair of non-complying items will not be allowed.
   4. Certifications: Affix the WI Certified Compliance labels to each unit or product, displaying grade specified.

D. Field Samples: Provide full size sample of each type of countertop approximately 4 feet in length in location designated by Architect. Provide materials and colors specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver manufactured units with identifying labels affixed and legible. The Architect reserves the right to observe delivered materials, to review the accompanying bills of lading, and to reject the following:
   1. Units not accompanied by required certificates.
   2. Units exhibiting damage to finish.

B. Labeling: On each item fabricated of composite wood, apply label as a stamp, tag, sticker, or bar code, indicating fabricator's name, production date, and compliance standard of the product.

1.08 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

B. Environmental Conditions: Install countertops under conditions for temperature and humidity established for the operating facility.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design is Wilsonart International, Inc., Temple, TX (817)778-2711, (800)433-3222, with offices in Santa Fe Springs, CA (562)423-1200. Acceptable Manufacturers of Plastic Laminate Products Include:
   1. Formica Corporation, Cincinnati, OH (513)786-3400, (800)367-6422.
   2. Nevamar Corporation, Odenton, MD (301)569-5001, (800)638-4380.

B. Acceptable Manufacturers of Solid Surface Countertop Products:
   3. Formica Corporation, Cincinnati, OH (513)786-3400, (800)367-6422 (Surell).
   4. Nevamar Corporation, Odenton, MD (301)569-5001, (800)638-4380 (Fountainhead).

C. Acceptable Manufacturers of Medium Density Fiberboard Panels:
   2. Medite Corporation, Medford, OR (800)676-3339.

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Tables 5.504.4.1 and 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

B. Comply with CALGreen 5.504.4.3 Paints and Coatings: Architectural paints and coatings shall comply with VOC limits in Table 5.504.3.
   1. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Prerequisite 1 - Storage and Collection of Recyclables: Provide an easily accessible area that serves the entire building and is dedicated
2. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.

3. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

4. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

5. Certificates for MR Credit 6: Certify that products specified are made from rapidly renewable sources.

6. MR Credit 7 Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria for wood building components.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   b. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GC-11.
   c. Clear Wood Finishes: not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.
   d. Concrete Sealers: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

3. IEQ Credit 4.4 - Low-Emitting Materials--Composite Wood and Agrifiber Products: Composite wood and agrifiber products used on the interior shall contain no urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
   a. Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
2.04 PERFORMANCE CRITERIA

A. Performance Characteristics: Comply with fire performance characteristics of CBC 803.1 as follows:
   1. Flame Spread: Class A 0-25.
   2. Smoke Developed: 0-450.

2.05 MATERIALS

A. General: Materials shall comply with the Custom Grade requirements of A I S, unless otherwise modified or indicated.

B. Lumber:
   1. Softwood Lumber: Graded in accordance with A I S maximum moisture content of 6 percent, any species and grade as allowed for grade specified for woodwork product.

C. Plywood Panels:
   1. Softwood Plywood: PS 1, Standard Sheathing Grade, Group 1, Appearance Quality, Douglas fir, with face veneer rotary cut, minimum 3/4-inch thick, intermediate glue.
      a. At countertop locations with plumbing fixtures, provide panels with exterior glue.

D. Composite Panels:
   1. Non-Fire Retardant Type: Moisture-resistant particle board, ANSI 208.1, Grade M-3 (exterior glue), MR-10, composed of wood chips matrix bound with high-moisture resistant urea-free resin binders per LEED EQ 4.4, and passing requirements of ASTM D 1037.
      a. Comply with applicable formaldehyde emission requirements of CCR Title 17 Sections 93120-93120.12 (ATCM).

E. Plastic Laminates: High-pressure decorative laminate type, conforming to requirements of NEMA LD 3. Provide types listed below as recommended by manufacturer for each type of use:
   1. **Type PL-1** Countertop Surfaces:
      a. General Purpose: NEMA Type HGS (0.048-inch nominal thickness).
      b. Post-Formed: NEMA Type HGP (0.039-inch nominal thickness) horizontal post-forming type.
      c. Abrasion-Resistant: NEMA Type HDM (0.059-inch nominal thickness) high wear type with abrasion-resistant characteristics.
   2. Backer Sheet:
      a. NEMA LD 3 Type BLM (0.039-inch nominal thickness) with no decorative face, for use as a balancing sheet.
   3. Edge Banding:
      a. Match type used for countertop surface.
   4. Colors and Patterns: Provide types, colors, patterns, and surface textures to match types indicated on Contract Drawings or selected by Architect.
      a. Texture: Type A Gloss surface complying with NEMA LD 3 High Gloss Finish (60-100 gloss level range).
      b. Texture: Type B Matte surface complying with NEMA LD 3 Satin Finish (15-34 gloss level range).
F. Accessories:

2.06 FABRICATION

A. Countertops shall be manufactured in accordance with the standards established in the latest edition of the AWS in the grade or grades hereinafter specified or as shown on the Contract Drawings.
   1. Joints between countertop units shall be tight, using ZDB zinc countertop joint fastener.
   2. Built-up member at front edge of countertop shall be solid surface.
   3. Face frame members in casework are not permitted.
   4. Provide square, eased, edges.

B. Plastic Laminate Countertops and Splashes:
   1. Grade: Premium, in accordance with AWS Section 11, and as modified in this Section.
   2. Edge Covering: Self-edged with top laminate extending over vertical edge laminate.
      a. Provide no drip waterfall (bullnose) edge at countertops with sinks or lavatories and attached to adjacent countertops.
      b. Provide continuous laminate waterfall edge laminate at countertops with sinks or lavatories.
      a. Type: Cove splash.
         1) Provide cove splash at countertops with sinks.
      b. Top: Radiused top.
      c. Height: Four inches above deck unless indicated otherwise on Contract Drawings, or where job conditions do not permit.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that cabinets have been properly installed.

3.02 INSTALLATION

A. General: Install casework countertops in accordance with AWS installation requirements.
   1. Secure countertops to cabinet units by screwing through corner blocks of base cabinets or other supports into underside of countertop. Scribe to adjacent surfaces.
   2. Space seams not less than 12 feet on centers in long runs, and aligned with cabinet divisions where possible.
   3. Attach wood substrate countertops with screws or other mechanical fasteners. Do not glue. Finish edges at sink cut-outs with one coat of oil-based wood primer.
   4. Attach solid surface with threaded steel concealed joint fasteners to align and secure adjoining countertops.
   5. Secure backsplashes to tops with concealed metal brackets at 16 inches on centers and to walls with adhesive.
6. Caulk space between backsplash and wall with sealant specified in Section 079200.

3.03 ADJUSTING AND CLEANING

A. Touch up stained, scratched, or otherwise discolored surfaces to match original shop finish or samples. Replace portions of work cut or otherwise damaged too badly to repair by touch up.

B. Cleaning: Clean casework, counters, shelves, hardware, fittings and fixtures.
   1. Remove all marks, glue residue and soiling from all exterior and interior surfaces for dust-free condition.
   2. Sanitary cleaning, if necessary, will be performed by Owner.

C. Upon successful completion, issue WI Certificate specified under Article 1.04 Submittals.

3.04 PROTECTION

A. After installation, protect countertops from damage.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Prefinished fiberglass reinforced plastic (FRP) sanitary wall paneling at janitor areas.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 092900 - Gypsum Board: Requirements for moisture-resistant backing.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications describing prefabricated panels and method of installation.
B. Samples: In accordance with the provisions of Section 013300, submit the manufacturer's standard color and finishes palette, for selection of colors.
   1. When selection has been made, submit three samples of the following for acceptance-review:
      a. Paneling, samples not less than 12 inches by 12 inches in size.
      b. Molding, samples not less than 12 inches in length.
      c. Sealants, samples not less than 12 inches in length.
   2. Samples shall be mounted to substrates specified with specified adhesive and sealed molding

C. Quality Control Submittals: In accordance with the provisions of Section 013300, submit the following:

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Two full size sheets and 1 quart adhesive.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. A member in good standing of AWCI (Association of The Wall and Ceiling Industry).
   2. A provider of advanced installer training.

B. Installer Qualifications:
   1. At least five years experience in the installation of fiberglass reinforced plastic panels.
   2. Experience on at least five projects of similar size, type and complexity as this Project.
   3. An employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Storage:
   1. Store panels flat and fully supported.

1.09 FIELD CONDITIONS

A. Environmental Requirements: Maintain an ambient temperature, in installation areas, of not less than 60 degrees F, for 24 hours before, during, and following the use of adhesives.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design is based on the use of products manufactured by one of the following:
   3. Marlite Organization, Dover, OH (216)343-6621, with operations center in La Mirada, CA (714)523-2500, (213)944-0157.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations, including health department and flammability requirements related to the intended use of materials provided under this Section.
   1. Provide FRP panels with a Class A rating in accordance with CBC Table 803.9 and having a Flame Spread Index of 0-25 and a Smoke Developed Index of 0-450, as determined by ASTM E 84.
   2. Surface Burning Characteristics: Class I, in accordance with ASTM E 84.

B. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
2.04 MATERIALS

A. Paneling: Glasbord Fire-X Factory Mutual Smooth Wall Glass Fiber Reinforced Plastic Paneling with Surfaseal, as manufactured by Crane Composites.
   1. Provide homogeneous, fiberglass reinforced, polyester panels, nominally 0.075-inch in thickness conforming to ASTM D 5319.
      a. Color: White No. 85, or as selected by Architect.
      b. Finish: Smooth.
   2. Moldings: Manufacturer’s standard extruded aluminum moldings, including panel division, edge, and inside and outside corner configurations.
      a. Provide moldings in colors matching those of panels, as selected by Architect.

B. Panel Installation Adhesive: Crane Composites No. 101 water borne, water-resistant, non-flammable, all-purpose construction adhesive as recommended by FRP panel manufacturer for required substrates.
   1. Provide an adhesive conforming to ASTM C 557.

C. Panel Seam Sealant: Two-part urethane sealant as recommended by manufacturer. Color shall match panels.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that moisture-resistant substrate is installed in accordance with Section 092900, and that surfaces are smooth, sound and uniform, that nails or screw fasteners are countersunk, and that joints and cracks are filled flush and smooth with adjoining surfaces. Treat cut edges of substrate with sealant.

3.02 PREPARATION

A. Clean substrates to remove substances that could impair bond of adhesive, including oil, grease, dirt, dust, or other contamination.

B. Condition panels by unpacking and placing in installation space no less than 24 hours before installation.

C. Lay out panels before beginning installation. Locate panel joints to provide equal panel widths at ends of walls and so that trimmed panels at corners are not less than 12 inches wide.

3.03 INSTALLATION

A. General: Install prefinished paneling in accordance with the manufacturer's current published recommendations.
   1. Cut panels with carbide tipped saw blades or with snips.

B. Panel Installation Adhesive:
   1. Install panels with manufacturer’s recommended expansion gaps for floor, inside and outside corner joints, and adjacent panel edges.
   2. Install panels using a full spread of adhesive. Follow adhesive manufacturer’s recommendations for trowel type and application of adhesive.
3. Roll entire panel surface or apply uniform pressure with a soft block of wood. Press firmly over entire surface, working from center to outer edges.

C. Panel Seam Sealant:
   1. Mask panel edges in compliance with panel manufacturer’s recommendations.
   2. Fill grooves in panel joints with specified seam sealant at a rate such that seam is completely filled with sealant, but completed within recommended open time for sealant.
   3. Smooth seam sealant beads flat with panel edges within recommended open time for sealant.
   4. Apply sealant to exposed edges of electrical and other cover plates. Allow sealant to set for 24 hours.
   5. After smoothing joint sealant, remove masking and any excess sealant.

3.04 PROTECTION

A. After installation, protect countertops from damage for duration of construction until substantial completion.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Complete elastomeric sheet membrane waterproofing system for below grade horizontal and vertical surfaces, and landscape site walls.
   1. Blind-side waterproofing applied to formwork where sufficient excavation space is not available to install waterproofing or where waterproofing extends under slabs.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 334600 - Subdrainage: Coordination with drainage composite and perforated drain piping at footings.

C. Related Sections:
   1. Section 042200 - Concrete Unit Masonry: Coordination with requirements for surface condition and preparation.
   2. Section 033100 - Structural Concrete: Coordination with requirements for surface condition and preparation.
   3. Section 323310 - Architectural Site Concrete.

1.02 REFERENCES

A. ASTM International (ASTM):
B. California Code of Regulations (CCR):
   1. Title 24, Part 11 - California Green Building Standards Code

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Structural waterproofing refers to waterproofing applied directly to surfaces being waterproofed.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with construction waste management requirements specified in Section 017419.

B. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

C. Preinstallation Meetings: A preinstallation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

1.05 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's technical product data and specifications

C. Shop Drawings: Submit Shop Drawings indicating relationship of all elements of waterproofing system detailed specifically for this project.

D. Quality Control Submittals:
   1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
      a. Submit product test reports from a qualified independent testing agency indicating and interpreting test results of waterproofing for compliance with requirements, based on comprehensive testing of current waterproofing formulations.
   2. Certificates: Submit certificate from manufacturer stating that product is suitable for the intended use.
      a. Submit manufacturer's certification stating materials ordered and supplied are compatible with each other, suited for locale and purpose intended, and shipped in sufficient quantity to ensure proper, timely installation.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means
by which it is diverted, and statement that requirements for the credit have been met.

a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

4. MR Credit 7 MR Credit 6 Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council’s (FSC) Principles and Criteria for wood building components.

1.07 CLOSEOUT SUBMITTALS

A. Warranty Documentation: Submit copies of written warranty, as supplied by the applicator, agreeing to repair or replace defective coating work during the warranty period.

1.08 QUALITY ASSURANCE

A. Qualifications: Licensed, certified, or otherwise approved in writing by the membrane manufacturer.

B. Material Compatibility: Provide waterproofing materials that are compatible with one another under conditions of service and application required, as demonstrated by waterproofing manufacturer based on testing and field experience.

C. Sole Source: For each type of material required for the work of this section, provide primary materials that are the products of one manufacturer.

1.09 FIELD CONDITIONS

A. Apply membrane waterproofing system only when existing and forecasted conditions are within the time limits established by the manufacturer of the materials and products used.

1.10 WARRANTY

A. Sheet Membrane Waterproofing: Provide written 10-year material warranty issued by the membrane manufacturer upon completion of the work.

B. Contractor's Bonded Warranty: Warranty the installation of the waterproofing system and flashing to be watertight for a period of 2 years from the date of Substantial Completion. Make repairs during this warranty period to maintain the waterproofing watertight. Owner has the right, in the case of emergency, at any time during the warranty period and without invalidating the warranty, to make temporary repairs required to protect the building and the contents of the building from damage due to leakage through the installed waterproofing system.
C. Bonds required for this project shall be as set forth in the General Conditions.

D. Final Inspection will be conducted by the Quality Control Observer and the membrane manufacturer's technical department representative. Deficiencies found shall be corrected by applicator prior to issuance of warranty. If corrections are required for reinspection by the Quality Control Observer, cost of the Quality Control Observer's services and expenses shall be paid by Contractor.

E. Disclaimers and Limitations: Manufacturer disclaimers and limitations on product warranties do not relieve the Contractor from furnishing a warranty on work that incorporates the products. Manufacturer disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers for Waterproofing Membrane Products:
   6. Polyguard Products, Inc., Ennis, TX (214)875-8421, represented by The Ward Company, Laguna Beach, CA (714)497-1550.

B. Acceptable Manufacturers for Accessory Products:
C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Components of the waterproofing system shall comply with air quality management district regulations in force at the time of application.

B. Comply with CALGreen Section 5.407 Water Resistance and Moisture Management: Provide a weather-resistant exterior wall and foundation envelope as required by CBC 1403.2 (Weather Protection) and CEC Section 150 (Mandatory Features and Devices).

C. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

D. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.
   4. Certificates for MR Credit 6: Chain-of-custody certificates certifying that products specified shall be made from rapidly renewable sources.
   5. Certificates for MR Credit 6: Certify that products specified are made from rapidly renewable sources.
   6. MR Credit 7 Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council’s (FSC) Principles and Criteria for wood building components.
2.04 PERFORMANCE CRITERIA

A. Performance Requirements for Structural Waterproofing: The membrane shall exhibit physical characteristics no less beneficial than the following:

1. Thickness: When tested in accordance with ASTM D 3767 Method A, an effective total minimum thickness of 60 mils.
2. Tensile Strength (Film): When tested in accordance with ASTM D 882 Modified, 5000 pounds per square inch, minimum.
3. Tensile Strength (Membrane): When tested in accordance with ASTM D 412 Modified, 325 pounds per square inch, minimum.
4. Crack Cycling: When tested in accordance with ASTM C 836 Modified, over 1/4-inch crack at 100 cycles, no effect at a minimum temperature of minus 10° F (minus 25° C).
5. Hydrostatic Head Resistance: When tested in accordance with ASTM D 5385, capable of resisting a hydrostatic head of 231 feet, minimum.
6. Permeance: When tested in accordance with ASTM E 96 Method B, 0.05 Perms [grains per square foot per hour per inch mercury gage] maximum.
7. Water Absorption: When tested in accordance with ASTM D 570 for a period of 72 hours, not more than 0.10 percent absorption, by weight.

B. Performance Requirements for Blind-Side Waterproofing: The membrane shall exhibit physical characteristics no less beneficial than the following:

1. Thickness:
   a. Horizontal: When tested in accordance with ASTM D 3767 Method A, an effective total minimum thickness of 56 mils.
   b. Vertical: When tested in accordance with ASTM D 3767 Method A, an effective total minimum thickness of 42 mils.
2. Crack Cycling: When tested in accordance with ASTM C 836 Modified, over 1/4-inch crack at 100 cycles, no effect at a minimum temperature of minus 10 degrees F (minus 25 degrees C).
3. Hydrostatic Head Resistance: When tested in accordance with ASTM D 5385 Modified, capable of resisting a hydrostatic head of 231 feet, minimum.
4. Permeance: When tested in accordance with ASTM E 96 Method B, 0.01 Perms [grains per square foot per hour per inch mercury gage] maximum.
5. Water Absorption: When tested in accordance with ASTM D 570 for a period of 72 hours, not more than 0.50 percent absorption, by weight.

2.05 MATERIALS

A. Membrane for Structural Waterproofing:

1. Provide a self-adhering elastomeric sheet membrane, in sheet form, consisting of a layer of rubberized asphalt furnished, on one face, with a cross-laminated polyethylene film and, on the second face, with a disposable release sheet. Provide one of the following, or equal:
   a. CCW Miradri 860/861 Sheet Membrane Waterproofing, manufactured by Carlisle Coatings and Waterproofing.
   b. Bituthene System 4000, manufactured by Grace Construction Products.

B. Membrane for Blind-Side Waterproofing: Provide a sheet form waterproofing membrane, consisting of a layer of high density polyethylene film disposable release sheet, specially formulated synthetic adhesive, and protective coating. Provide additional surface treatment on the horizontal membrane
3. Tape: Bituthane Preprufe Tape, or equal.

C. Vertical Protection Board: Manufacturer's standard vertical protection board, equal to one of the following:
1. CCW Protection Board-V, manufactured by Carlisle Coatings and Waterproofing.
2. Styrofoam Brand Protection Board, manufactured by Dow Chemical.
3. APOC 5620 Protection Panel, manufactured by Gardener.
4. AMOCOR-PB4 Protection Board, manufactured by Tenneco Building Products.
5. W.R. Meadows Protection Board.

D. Horizontal Protection Board: Manufacturer's recommended asphaltic core protection board, approximately 1/8-inch thick, sandwiched between two inert non-woven glass reinforcing mat cap sheets, equal to one of the following:
1. CCW Protection Board-H, manufactured by Carlisle Coatings and Waterproofing.
2. 990-31 Protection Board, manufactured by Henry Roofing Systems.

E. Accessory Materials: Provide, primers, liquid membrane, elastomeric mastic, and adhesives specifically formulated by the manufacturer for use with the waterproofing membrane system proposed for use.
1. Surface Conditioner (as required): Grace Bituthene System 4000 Surface Conditioner, or equal.
2. Primer: Carlisle CCW-714 or AWP Water Based Primer, Grace Bituthene Water-Based Primer, Henry Roofing Systems Acquaprime Emulsion Primer, or equal.
5. Elastomeric Mastic: Carlisle CCW-704, Henry Roofing Systems Polybutene Polymer Modified Sealing Compound, or equal.
8. Sealant: CCW-703 Vertical Grade Liquiseal Membrane or CCW-201 Polyurethane Sealant.

9. Termination Bar: Type 304 stainless steel or prefinished aluminum, approximately 1/8-inch thick by 1 inch wide predrilled at 9 inches on centers.


F. Drainage Composite: In accordance with Section 334600.

G. Waterstop: Swellable, conformable, expandable, synthetic waterstop strip, equal to CETCO RX-101, Adcore ES by W.R. Grace, or equal.

H. Pourable Grade Asphalt Modified Urethane: Two-component, self-leveling, pourable grade asphalt modified urethane membrane to be applied onto structural concrete deck prior to application of Bituthene 4000, Bituthene Deck Prep Surface Treatment by W.R. Grace.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Curing: Confirm that concrete and masonry have cured for a period of not less than 7 days for structural concrete.
   a. Lightweight concrete shall be cured for not less than 14 days.

2. Concrete: Verify that concrete has been repaired in the following manner:
   a. Bugholes over 1/2-inch in length and 1/4-inch deep shall be plugged with concrete and finished flush with surrounding surfaces.
   b. Form tie rod holes shall be filled flush with surrounding surfaces.
   c. Fins shall be ground smooth. Outside corners shall be free of sharp edges.
   d. Scaling shall be removed to sound, unaffected concrete and the exposed area repaired.
   e. Materials and methods used for repair work shall be compatible with the membrane material.

3. Masonry: Verify that mortar joints in smooth texture masonry surfaces have been flush cut, and rough texture masonry surfaces have been parged.

4. Moisture: Using an electronic moisture meter of industry-recognized design, verify that the moisture content of substrate is within the range stipulated by the manufacturer for waterproofing.

B. Verify that penetrations through the waterproofing are rigidly installed and ready to receive waterproofing installation.

C. Acceptance of Conditions: By commencing operations, Contractor acknowledges existing surface conditions as satisfactory, and accepts full responsibility for performance of work installed under this Section.
3.02 PREPARATION

A. Surface Preparation for Structural Waterproofing:
   1. Prior to application of the waterproofing system, repair concrete and masonry substrata as required to provide sound surfaces to receive waterproofing. Provide surfaces free of voids, spalled areas, loose aggregate, and sharp protrusions, with no coarse aggregate visible. Remove contaminants from the exposed concrete surface, including dust, dirt, loose stones, and debris.
   2. Cracks in concrete 1/16-inch to 1/4-inch shall be pretreated with a 60-mil coating of liquid membrane 2 inches wide centered on the crack. Alternately, apply a 6-inch wide strip of elastomeric membrane centered over crack. Provide 3-inch end laps.
   3. Pretreat horizontal to vertical inside corners with a 3/4-inch fillet of liquid membrane and a 12-inch strip of waterproofing membrane centered in each direction from corner.
   4. Pre-treat outside corners with a minimum 12-inch strip of waterproofing membrane centered in each direction from corner.
   5. At horizontal to vertical intersections, extend liquid membrane each direction from corner and then install 12-inch wide membrane strip centered over corner.

B. Surface Preparation for Blind-Side Waterproofing:
   1. Horizontal: Earth and stone substrates shall be compacted to produce an even, solid substrate. Remove loose aggregate and sharp protrusions. Concrete substrates shall be smooth and monolithic. Fill gaps or voids greater than 1/2-inch. Remove standing water prior to membrane installation.
   2. Vertical: Substrates shall be smooth and sound. Suitable substrates include drainage composite or plywood formwork.

C. Waterstop Installation:
   1. Install waterstops as indicated in Contract Drawings and at cold joints in the concrete.
   2. Fix waterstops along concrete joints using mechanical fixings or adhesives as determined by the site conditions and in accordance with manufacturer’s written recommendations.
   3. Waterstop joints shall be overlapped 4 inches to ensure full contact between jointed pieces.

D. Surface Conditioning: Spray diluted surface conditioner with fine mist nozzle at the rate recommended by the manufacturer. Allow surface conditioner to thoroughly dry before installing waterproofing membrane.

E. Primer: Spray or roll on, as recommended by manufacturer, diluted primer at the rate recommended by the manufacturer. Allow surface conditioner to thoroughly dry before installing waterproofing membrane.

3.03 INSTALLATION

A. Membrane for Horizontal Waterproofing: Apply fluid deck prep surface treatment onto the prepared concrete at a minimum thickness of 2.0 mm.
   1. Allow fluid deck prep surface treatment to cure a minimum of 24 hours.

3. Seal daily terminations with trowelled bead of Liquid Membrane.

4. Apply protection course and related materials in accordance with manufacturer’s recommendations.

B. Membrane for Structural Waterproofing: Apply waterproofing membrane vertically in sections of 8 feet in length, or less. Press membrane securely in place with heavy hand pressure and with manufacturer-approved rollers, during application. At vertical surfaces, apply waterproofing membrane beginning at the low point of the surface and working to the high point in shingle fashion.

1. Seams: Edges and end seams shall be overlapped at least 6 inches. Apply succeeding sheets with a 6-inch minimum overlap and stagger end laps. Roll the entire membrane firmly and completely as soon as possible. Patch misaligned or inadequately lapped seams with membrane material. Slit any fishmouths, overlap the flaps, and repair with a 6-inch patch of membrane and roll in place. The edges of the patch shall be sealed with a troweling of liquid membrane.

2. Edges and T-Joints: Terminate the membrane directly on vertical surfaces by pressing firmly to the wall surface. Press edges with a metal or hardwood tool.
   a. Apply a troweled bead of liquid membrane to edges of vertical and horizontal terminations.

3. Corners: Install a 12-inch minimum flashing strip of membrane centered on outside and inside corners. The edges of laps within 12 inches of corners shall be sealed with a 1-inch wide x 1/4-inch thick troweling of liquid membrane.

4. Projections: Apply a double layer of membrane around posts or projections extending at least 6 inches in all directions and seal terminations with elastomeric mastic.

5. Treat membrane seams, laps, and edges with 1/4-inch thick x 1-inch wide troweling of liquid membrane.


C. Horizontal Membrane Installation for Blind-Side Waterproofing:

1. Apply vertical membrane with the polyethylene film facing the prepared substrate. Remove the release liner and press membrane to subslab surface.

2. Apply succeeding sheets by overlapping the previous sheet 3 inches along the uncoated edge of the membrane. Roll firmly to ensure a tight seal.

3. Overlap ends of the membrane 3 inches. Apply tape centered over the end lap and roll firmly.
D. Vertical Membrane Installation for Blind-Side Waterproofing:
   1. Apply membrane with the polyethylene film facing the prepared soil retention system or formwork. Remove the release liner and fasten membrane to backing with large head nails or staples.
   2. Apply succeeding sheets by overlapping the previous sheet 3 inches along the uncoated edge of the membrane. Roll firmly to ensure a tight seal.
   3. Overlap ends of the membrane 3 inches. Apply tape centered over the end lap and roll firmly.

E. Protection Board: Protect vertical and horizontal waterproofing membranes with protection board at below grade vertical surfaces top receive backfill.
   1. Attach with protection board adhesive or two-sided adhesive tape, as applicable.
   2. Install protection system the same day the membrane is applied to minimize exposure of membrane to sunlight, and before starting subsequent construction operations.

F. Drainage Composite: Install as indicated in Section 334600.

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Representative: Make arrangements necessary to have a trained employee of the manufacturer on site periodically during membrane waterproofing work to review installation procedures.

B. Independent Third Party Inspection: Provide minimum 48-hour notification to Owner's waterproofing inspection service prior to the start of work.
   1. Waterproofing inspection service shall provide periodic and final inspections prior to application of protection board. Protection board and backfill shall not be installed until required repairs are completed and work is accepted in writing.
   2. Submit summary of project site observations, instructions, and report of waterproofing installation sequence.
PART 1 - GENERAL

1.01 SUMMARY

A. Section includes: fluid applied waterproofing system between slab membrane at deck locations indicated on Contract Drawings:
   1. Epoxy primer.
   2. Reinforced polyurethane waterproofing system.
   3. Protection board.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 033000 - Cast-in-Place Concrete.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):

C. California Code of Regulations (CCR):

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. WQC Consultant: Waterproofing Quality Control Consultant.
1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with construction waste management requirements specified in Section 017419.

B. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

C. Cooperate and coordinate with the owner's inspection and testing agency. Do not cover any installed waterproofing membrane unless it has been inspected, tested and approved.

D. Preinstallation Conference: Convene one week prior to commencing work of this section, in accordance with Section 013119.
   1. A preinstallation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.
   2. Custom details and Shop Drawings shall be approved in writing by the primary material manufacturer, Architect, and WQC Consultant.

E. Pre Bid Job Walk: 10 working days prior to bid opening there is to be a mandatory pre bid job walk. Anyone not attending the pre bid job walk will not be allowed to bid the project. All products considered an equal to the specified product or any changes in the scope of work of installation or specifications must be presented at the pre bid job walk. If a change in the specification is accepted, it will be considered as an alternate and will be presented as a bid amendment issued 5 working days prior to the bid opening. No other changes to the specification or bid documents will be accepted.

1.05 SUBMITTALS

A. Product Data: Submit manufacturer's standard submittal package including specification, installation instructions, and general information for each waterproofing material.

B. Applicator Qualifications: Submit a current qualified applicator certificate from the specified waterproofing manufacturer.

C. Manufacturer's warranty.

D. Manufacturer's approval of substrate.

E. Manufacturer's field inspection reports. Minimum one per week, punch list and final inspection.

F. Quality Control Submittals: In accordance with the provisions of Section 013300, submit the following:
   1. Certificates:
      a. Certificate, signed by the manufacturer, confirming that work has been installed in accordance with Specifications and manufacturer's current printed instructions and recommendations, as accepted.
      b. Certificate, signed by the manufacturer, confirming that the fluid applied waterproofing proposed for use conforms to the air qual-
ity management district regulations in force at the time of application.

1.06 CLOSEOUT SUBMITTALS

A. Warranty Documentation: Submit copies of written warranty, as signed by the applicator, agreeing to repair or replace defective waterproofing work during the warranty period.

1.07 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.08 QUALITY ASSURANCE

A. Primary waterproofing materials shall be products from a single manufacturer. The primary manufacturer shall recommend any secondary materials. Manufacturer shall have a minimum of 10 years' experience in the manufacture of materials of this type.

B. Applicators shall have a minimum of 5 years' experience in the application of waterproofing materials of the type specified. Applicator shall an authorized applicator from the specified waterproofing manufacturer.

C. Inspection:
1. A Waterproofing Quality Control Consultant (WQC) will be retained by the Owner to furnish full-time quality control. Duties and functions of the quality controller will include monitoring of the waterproofing system installation.
2. Contractor shall secure the services of a representative of the manufacturer for initial instructions in application of materials. The manufacturer shall supply such service as required at no additional cost to the Owner. Manufacturer's representative shall conduct, at a minimum, one visit at commencement of installation and two site visits per week thereafter, and issue a letter of findings regarding installation procedures and overall acceptance of area visited.

3. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover installed waterproofing membrane unless it has been inspected, tested, and approved.

D. Mockups: Prior to installation of waterproofing membrane, apply waterproofing membrane to 50 ft² of deck to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, and to demonstrate tie-ins with adjoining construction, and other termination conditions, as well as qualities of materials and execution.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Store all coating materials in the original unopened containers between 50° - 80°F (10°-26°C) until ready for use.

B. Follow the special handling or storage requirements of the manufacturer for cold weather, hot weather, etc.

C. Safety: Refer to all applicable data, including, but not limited to MSDS sheets, PDS sheets, Product labels, and specific instructions for specific personal protection requirements.

D. When working with Part B, avoid contact with skin and eyes. If contact occurs, wash skin with water or alcohol; flush eyes immediately with large quantities of water and get medical attention. Do not smoke during mixing, application, or in the immediate area if thinners are used until all vapors have disappeared.

E. Ventilation: Provide adequate ventilation to prevent the accumulation of hazardous fumes during application.

F. Environmental requirements: Proceed with work of this section only when existing and forecasted weather conditions will permit the application to be performed in accordance with the manufacturer's recommendations.

1.10 WARRANTY

A. The contractor shall guarantee that all work performed will be free from defects in materials and workmanship. Upon notice of defect in writing to the contractor within one year after completion of work, the contractor shall, at his own expense, make necessary repairs or replacements of the defective work in question.

B. Manufacturer Guaranty: Furnish a 20-year Garland Warranty. Assembly Warranty covering repairs required to keep waterproofing field and flashings watertight for work included in this Section.

1. Include removal and reconstruction of overburden and planting to complete repairs.
C. Contractor Bonded Warranty: Warranty the installation of the waterproofing system and flashing to be watertight for a period of 2 years from the date of Substantial Completion. Contractor shall make repairs during this warranty period to maintain the waterproofing watertight and in conformance with these Specifications without additional cost to the Owner. Without invalidating or voiding any portion of the warranty, the Owner has the right, in the case of emergency at any time during the warranty period and without invalidating this warranty, to make temporary repairs required in order to protect the building and the contents of the building from damage due to leakage through the installed waterproofing system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design Basis: The design is based upon roofing systems engineered and manufactured by:

B. Acceptable Manufacturers of reinforced systems if approved according to Section 012500:
   1. American Hydrotech, Inc.
   2. Henry Company.
   3. Laurenco, Inc.

C. Like materials shall be products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

B. Waste Management: Comply with CALGreen 5.408.1 - Construction Waste Management. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3 - Waste Stream Reduction Alternative.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.
   2. Reuse and recycle 100 percent of trees, stumps, rocks, and associated vegetation and soils resulting primarily from land clearing in accordance with CALGreen 5.408.3 - Excavated Soil and Land Clearing Debris.
   3. Submit documentation to enforcing agency which demonstrates compliance with CALGreen 5.408.1.4 - Documentation. Sample compliance forms are available in the CALGreen Guide.
C. Comply with CALGreen 5.504.4.1 - Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 - Adhesive VOC Limit and Table 5.504.4.2 - Sealant VOC Limit.
1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
   a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. IEQ Credit 4.2 - Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   a. Concrete Sealers: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

2.04 SYSTEM DESCRIPTION

A. Waterproofing system shall consist of drainage composite protection board installed over a 3 layer polyester reinforced fluid applied waterproofing system. Protection/separator layer shall be loose laid over waterproofing membrane. The 64 mils of polyurethane waterproofing membrane shall be installed over the cleaned and primed concrete deck.

B. Waterproofing system installation shall include the installation of the specified flashings to be covered by the waterproofing system. Uncured neoprene flashing materials are specified in this specification and on the detail drawings.

2.05 MATERIALS

A. Urethane Coatings: Dura-Walk WC. Liquid urethane rubber membrane materials shall meet the published properties of these products and also
must meet applicable Air Pollution Control regulations. Dura-Walk WC is solvent free.

1. System consists of a primer (8 mils wet), base coat (16 mils wet), a wear coat (16 mils wet), and a top coat (16 mils wet).
   a. Dura-Walk WC has the following physical properties:
   b. Tensile Strength: 900 psi (ASTM D412)
   c. Elongation: 500% (ASTM D412)
   d. Tear Resistance: 150 pli (ASTM D1004)
   e. Hardness: 65 Shore A min @70°F(21°C) (ASTM D2240)
   f. Water Vapor Permeability: 0.02 Perm Inches (ASTM E96)
   g. Solids by Volume: 100%

B. Primer: Dura-Walk FC two-component epoxy concrete primer.


D. Flashing and Joint reinforcing fabric: Dura-Walk Polyester Tape, Dura-Walk Neoprene are sheet flashing and related materials required for flashing drains, base angles, etc. Consult your local representative for specific recommendations.

E. Sealant and backer rod:
   1. Tuff Stuff sealant.
   2. Round foam backer rod.

F. Protection board:

G. Topping Material: Concrete topping as specified in Section 033000.
   1. Concrete materials shall be approved in writing by the membrane manufacturer for use with their system

H. Fasteners:
   1. Termination Bar: Pre-punched, 6 inches on center, flat, 0.1” aluminum termination bar, pre-engineered by the primary manufacturer.

I. Misc. Accessories: All items incorporated into this system shall be compatible with and approved by coating manufacturer.

**PART 3 — EXECUTION**

**3.01 EXAMINATION**

A. Verify that substrate is ready to receive work, surface is clean, dry and free from projections, and depressions loose scale, sand, curing compounds, grease, oil, asphalt, and other foreign deposits.

B. Do not begin work until concrete substrate has cured 28 days, minimum.

C. The work shall not be started when temperature is under 40°F (4°C) or when precipitation is imminent.
D. Verify that all other work involved with this area, done under other sections, has been completed and accepted by the architect and general contractor prior to starting the waterproofing application.

3.02 PREPARATION

A. Clean substrate to remove any and all surface contaminants. Surfaces to be coated must be cleaned to a sound surface.
   1. Profile surface with a shot blaster.

B. Mask off all adjoining areas that are not to receive the fluid applied waterproofing.

C. Provide a suitable workstation to mix the coating materials.

D. Concrete: Special attention should be given to smoothness of surface and freedom from contaminants including paint or previous coatings. Consult your Garland representative for alternate procedures for coating over existing paint. Such procedures are highly dependent on specific job conditions. Curing compounds if used shall be removed by sandblasting or etching. In the event specifications are not met, the following corrective procedures are recommended.
   1. Surface Contaminants: Wipe up grease or oil with a solvent and absorbent sweeping material. Disposal of this material should be in accordance with local laws and codes. Wash with solvent-alkaline cleaners diluted one part cleaner and five parts water. Rinse thoroughly with clean water. If evidence of oil film remains as indicated by water "beading," etch surface with 10% solution muriatic acid. Agitate etch with stiff bristle broom; then rinse with clean water.
      a. Remove curing compounds by etching with 10% muriatic acid and sweeping, followed by clean water rinse. Allow to thoroughly dry before applying coating. Grinding or sandblasting can remove heavy deposits of contaminants.
      b. Any residual traces of asphalt stains must be sealed with Dura-Walk Primer to avoid staining of light colored top coats. Apply primer in two coats and allow a minimum of 48 hours cure time.
   2. Fins and Projections: Grind smooth.
   3. Rock Pockets and Depressions: Commercially available concrete patching compounds can be used provided they contain no bitumen based binders. Only those patching compounds utilizing a binder are recommended for patching. Neat cement sacking is NOT an acceptable surface preparation for coatings.
   4. Leveling Grout, Epoxy Sand:
      a. Leveling Grout: Use 100% solids low viscosity epoxy mix with three to four volumes of fine, dry sand (70 mesh (.21) or finer). This epoxy is usually available from masonry supply firms as a patching compound. Three volumes sand provides a semi-fluid mix, and four volumes sand is a stiffer mix. Calculate volume of fill needed on the basis of sand only.
3.03 INSTALLATION

A. Technical Advice: The installation of this waterproofing membrane shall be accomplished in the presence of, or with the advice of the manufacturer's technical representative.

B. Concrete Primer: apply one coat of Dura-Walk FC Primer by roller at a rate of 1/2 gallon per 100 square feet. Allow to dry a minimum of 3 hours. Drying times vary depending on weather conditions such as temperature, humidity and air movement.

C. Detail Work: Apply primer, expansion joint covers (where called for), seal cracks, and joints, install flashing and apply liquid urethane membrane.

D. Reinforcement installation:
   1. Fill the crack first with a bead of Tuff-Stuff polyurethane caulking and strike flush.
   2. Apply base coat at a rate of 16 wet mils of Durawalk Base Coat and embed reinforcement. Backroll reinforcement into coating.

E. Flashing at Deck and Wall Junctures:
   1. If the joint at the wall and deck juncture is non-moving, apply Dura-Walk Wear Coat at a rate of 4 gallons per 100 square feet (60 mils, wet), in a cove prior to application of the main deck. Apply an additional 60 mils at the juncture when applying the overall membrane for a total thickness of 120 mils.
      a. Apply Dura-Walk Wear Coat detail coating at plan changes, joints at walls, transitions from horizontal to vertical, at drains, at pipes and other penetrations, expansion joints, flashings, cracks, and joints, etc. Embed in Dura-Walk Wear Coat detail coat Dura-Walk Polyester Tape, brush in, and top coat with Dura-Walk Wear Coat. See Garland Standard Details for application instructions. Install any Dura-Walk Neoprene flashing detailed, and apply liquid Dura-Walk Wear Coat urethane membrane as directed
   2. If the joint at the wall and deck juncture is moving, flashing is accomplished by using the Dura-Walk Neoprene sheet. This is placed prior to application of the overall membrane.
      a. Choose a width of the Dura-Walk Neoprene sheet sufficient to extend 4" onto the deck and 6" up the vertical wall. Roll out the sheet close to application area. Use length as long as possible to reduce the number of lap joints, but only as long as convenient to handle.
      b. Place masking tape on the wall and a chalk line on the deck as a guide for adhesive application.
      c. Mix adhesive to obtain a uniform mixture. Apply by brush or roller to the deck ½" beyond the chalk line and to the wall onto the masking tape. Remove masking tape while adhesive is wet.
      d. When the first coat of adhesive is dry, apply a second coat of adhesive to the deck, wall, and to the neoprene sheet on the side not covered by polyethylene liner.
      e. Place a 1" expanded plastic backer rod into the wet adhesive at the juncture of the deck and wall.
f. When the Dura-Walk is dry, fold the Dura-Walk Neoprene sheet in half lengthwise so that the polyethylene surface is together. Carefully lift the neoprene sheet without stretching it and place the edge (adhesive surfaces together) along the chalk line on the deck. Stitch the edge to assure positive contact and continue with roller and stitcher toward the wall. On the wall, work from the bottom to the top, in the same manner. Remove the polyethylene liner. End laps must be joined prior to placement of flashing since a waterproof lap cannot be formed over a backer rod.

g. Apply a bead of Tuff-Stuff polyurethane caulking along edges and lap seams of the sheet.

h. After all flashing is installed wait 24 hours then solvent wipe the horizontal surfaces of the Dura-Walk Neoprene sheet or wherever the Dura-Walk Wear Coat will be applied. Apply Dura-Walk Wear Coat the same day.

F. Polyurethane Membrane: Apply Dura-Walk to secure a total minimum coverage of 4 gallons per 100 square feet (Total wet film thickness 64 mils: 8mil primer, 16 mil base, 16 mil wear, 16 mil top coat).

1. With a trowel (5/16" x 5/16" V notched trowel is effective in controlling thickness) or squeegee, spread the material over the deck at an average thickness of 1/16". 4 gallons per 100 square feet will yield this thickness. Where Dura-Walk meets Dura-Walk Neoprene sheet, the Dura-Walk must overlap a minimum of 3".

G. Water test: Allow a minimum of 48 hours before running a water test. Plug drains, flood area waterproofed and leave flooded for 48 hours.

H. Protection Board: Dura-Walk membranes must be covered to protect against physical damage. When placing protection board care should be taken to avoid physically damaging the installed membrane.

I. Protection of Membrane: Dura-Walk must be covered to protect against physical damage. When placing protection board, pedestals, pavers, etc., personnel shall be informed and care shall be taken to avoid physically damaging the installed membrane. An overall course of protection board shall be used when pedestals are to be employed as a protection against damage.

3.04 FIELD QUALITY CONTROL

A. The contractor for work under this section shall maintain a quality control program specifically to verify compliance with this specification. A daily log shall be kept to record actions in the field.

B. Inspections: A minimum of three (Substrate, Application and Final) inspections, by an approved manufacturer's representative, will be required on all projects requiring a warranty.

3.05 CLEANING

A. Clean adjacent surfaces of oversprayed, splashed, or spilled material. Remove containers, excess material, trash, and equipment from the site.
Remove masking materials after installation. Clean any stains on materials which would be exposed in the completed work.

### 3.06 PROTECTION

A. Protect finished surface against damage until backfill is placed.

B. Maintain pumping apparatus day and night, if necessary, to prevent water contact with walls until waterproofing is fully dry and accepted as finished work, and before additional construction or protection is started.

**END OF SECTION**
- SECTION 072100 -

THERMAL INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Building thermal, fire, and sound transmission insulation.
   1. Refer to Section 098100 for acoustic insulation.
   2. Refer to Section 078400 for fire safing at edge of slab and above fire-rated partitions at steel decking.
   3. Refer to Section 078400 for firestopping of duct, cable, conduit, and piping penetrations through floor slabs and time-rated construction.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 014500 - Quality Control.
   5. Section 018113 - Sustainable Design Requirements.
   6. Section 078400 - Firestopping.
   7. Section 079200 - Joint Sealants: Requirements for acoustical sealants.

C. Related Sections:
   1. Section 072216 - Roof Board Insulation: Requirements for rigid board roof insulation
   2. Section 098100 - Acoustic Insulation: Requirements for airtightness and reduction of sound transmission.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. C 423-09a - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
11. E 136-12 - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

B. California Code of Regulations (CCR):
1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
   a. Chapter 7 - Fire and Smoke Protection Features.
      1) Section 719 - Thermal- and Sound-Insulating Materials.
2. Title 24, Part 6, California Energy Code, 2013 edition:
   a. Subchapter 2 - All Occupancies--Mandatory Requirements for the Manufacture, Construction and Installation of Systems, Equipment and Building Components.

C. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ESR-).

D. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. R-value: The thermal resistance of insulation only, and not taking into account alleged air spaces or other factors assumed to result in higher values.
B. Concealed: Installed in substantial contact with an approved interior panel material to cover and protect it from any open flame or heat source.
C. Exposed: Not covered by an approved panel material.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.
B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
C. Coordination: Coordinate with plumbing, mechanical, and electrical work of Divisions 22, 23, and 26 with regard to continuity of sound insulation.
D. Sequencing: Do not install insulation until construction has progressed to the point that inclement weather will not damage or displace the insulation material.
   1. Install insulation after electric wiring, plumbing, and other concealed work is in place.
   2. Do not cover insulation with construction or finish materials until such insulation has been observed and accepted.

E. Environmental Requirements:
   1. Fiberglass and cellulose insulation shall meet the recycled content requirements specified in Section 018113.
   2. Insulation shall be formaldehyde-free.
   3. Product substitutions shall be approved in writing, prior to use, by the Owner or Architect as specified in Section 018113.
   4. The actual dollar cost of the amount of this product used on the project must be tracked. The actual dollar cost shall be separated into the amount that meets the requirements of Section 018113 and amount that does not meet the requirements (for the amount of product allowed for use as a substitution as described above and in Section 018113).

1.05 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and specifications.

C. Shop Drawings: Submit Shop Drawings indicating location and installation methods of insulation.

D. Samples: Submit 6-inch square samples of each insulation material clearly identified with manufacturer's name, brand name, R-value, fire-resistive classification, composition, and area of intended use on Project.

E. Quality Control Submittals: Submit the following:
   1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
   2. Certificates: Upon completion of installation of building envelope insulation, certify compliance with requirements of governing agency for installation of insulation and deliver to local building officials.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.

THERMAL INSULATION

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2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.
   2. Product Data for IEQ Credit 4.4: For composite wood products and adhesives used in composite wood assemblies on and off-site, documentation indicating that they contain no added urea formaldehyde.

1.07 QUALITY ASSURANCE

A. Installer's Qualifications: In accordance with the requirements of Section014000.

B. Certifications:
   1. Insulation material shall be certified by manufacturer to comply with California Quality Standards for Insulating Material, listed in the California Department of Consumer Affairs Consumer Guide and Directory of Certified Insulating Materials.

C. Certifications:
   1. Provide batt insulation certified by Greenguard Environmental Institute (GEI) to be low-emitting and have minimal impact on indoor air quality.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Fibrous Insulation Products, subject to compliance with UL Listings for proposed fire rated assemblies:
   2. CertainTeed Corporation, Valley Forge, PA (215)341-7000.
   3. Johns Manville (JM), Building Insulation Division, Denver, CO (800)654-3103, with sales offices in Santa Ana, CA (714)668-9181.

B. Acceptable Manufacturers of Spray-Applied Foam Products:
2. International Cellulose Corporation, Houston, TX (713)433-6701, (800)444-1252.

C. Acceptable Manufacturers of Accessory Products:
1. Eckel Industries of Canada Limited, Morrisburg, ON [Canada] (613)543-2967.
2. Franklin International, Columbus, OH (216-255-8900).

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
1. Comply with the requirements of CBC Section 720 regarding insulation materials.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

C. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufac-
tured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
   2. IEQ Credit 4.4 - Low-Emitting Materials--Composite Wood and Agrifiber Products: Composite wood and agrifiber products used on the interior shall contain no urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
      a. Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Performance characteristics of building insulation proposed for use shall be in accordance with the following:
   1. Thermal Resistivity (R-Value): Confirmed by testing in accordance with ASTM C 518, in conjunction with the testing of standard specimens in accordance with ASTM C 177.
   2. Permeability of Insulation Facing: Confirmed by testing in accordance with ASTM E 96.
   3. Sound Transmission Loss: When incorporated into building construction of specified sound transmission class (STC), confirmed by testing in accordance with ASTM E 90.
   4. Surface Burning Characteristics: Flame spread and smoke developed characteristics confirmed by testing in accordance with ASTM E 84.
   5. Fire-resistive Construction: When incorporated into building construction of specified fire-resistivity construction, confirmed by testing in accordance with ASTM E 119 in assemblies equivalent to those required.
   6. Combustibility: Confirmed by testing in accordance with ASTM E 136.
   7. Formaldehyde Content: Free of formaldehyde.

2.05 PRODUCT USAGE

A. General Location of Insulation Materials:
   1. Walls:
      a. Between Studs and Furring in Concealed Locations Adjacent to Non-Conditioned Spaces:
         1) At Non-Combustible Construction: Type D, as applicable.
      b. Between Studs in Exposed Locations Adjacent to Non-Conditioned Spaces:
         1) At Non-Combustible Construction: Type D, or as indicated on Contract Drawings.
c. On Surface of Solid Walls in Exterior Surfaces and Concealed Locations: **Type H1**.
d. Behind Window Wall (Non-Rated): **Type K1** or **Type K2**, as required by Code.
e. Behind Window Wall (Fire Rated): **Type L1** or **Type L2**, as required by Code.
f. Behind Transparent Glass or Translucent Spandrel Panels: **Type L3**.
g. Sound or Other Walls: Refer to Section 098100.
h. Within Multiple Exterior Studs Inaccessible to Batt Insulation:
   1) Spray-Applied Foam Filler: Type **Q3** for filling voids between multiple studs that are inaccessible to batt insulation.

2. Roofs:
a. Over Roof Deck at Roofing: Refer to Section 072216.

3. Shaftwall: **Type N**.
   a. Mechanical shafts and stairwells shall conform to appropriate wall construction.

4. Fire Safing Insulation: Refer to Section 078400.

### 2.06 PRODUCT TYPES

A. General: Products proposed for use shall be subject to compliance with UL Listings for proposed fire rated assemblies:
1. Provide batt insulation certified by Greenguard Environmental Institute (GEI) to be low-emitting and have minimal impact on indoor air quality.

B. Thickness: Generally, full depth of stud cavity at walls, unless otherwise indicated on Contract Drawings.
1. Typical R-Values:
   a. 4-Inch Studs: Minimum R-13:

C. Batt Insulation:
1. **Type D**, FSK-Faced (Suitable for Exposed and Concealed Installations between Studs): Conform to the requirements of ASTM C 665, Type III, Class A, and ASTM E 136.
   a. Combustibility: Non-combustible.
   b. Surface Burning Characteristics: Tested with ASTM E 84.
      1) Flame Spread: 25.
      2) Smoke Developed: 50.
   c. Facing Permeability: 0.10 perms, maximum.
      1) Provide type with extended flanges where cavity depth is less than the nominal thickness of the insulation.
   e. Thickness: R-13 minimum at walls with 4-inch studs and R-19 minimum at walls with greater than 4-inch studs.

D. Board Insulation:
1. **Type H1**, Rigid, Unfaced: Conform to the requirements of ASTM C 612, Class 1 and Class 2.
   a. Combustibility: Non-combustible.
b. Surface Burning Characteristics: Tested with ASTM E 84.
   1) Flame Spread: 25.
   2) Smoke Developed: 50.
   c. Density: 6.0 pounds per cubic foot.
   d. Design Basis: Type 705, manufactured by OC, or equal.

E. Curtain Wall Insulation:

1. **Type K1**, Unfaced: Fiberglass, conforming to the requirements of ASTM C 612, Class 1 and Class 2.
   a. Combustibility: Non-combustible.
   b. Surface Burning Characteristics: Tested with ASTM E 84.
      1) Flame Spread: 25.
      2) Smoke Developed: 50.
   c. Density: 2.25 pounds per cubic foot.
   d. Design Basis: Curtainwall Insulation/CW225 manufactured by OC, or equal.

2. **Type K2**, FRK-Faced: Fiberglass, conforming to the requirements of ASTM C 612, Class 1 and Class 2.
   a. Combustibility: Non-combustible.
   b. Surface Burning Characteristics: Tested with ASTM E 84.
      1) Flame Spread: 25.
      2) Smoke Developed: 50.
   c. Facing Permeability: 0.10 perms, maximum.
   d. Density: 2.25 pounds per cubic foot.
   e. Design Basis: Curtainwall Insulation/CW225 with FSK vapor retarder, manufactured by OC, or equal.

3. **Type L1**, Unfaced: Mineral wool, conforming to the requirements of ASTM C 612, Class 1 and Class 2.
   a. Combustibility: Non-combustible.
   b. Surface Burning Characteristics: Tested with ASTM E 84.
      1) Flame Spread: 25.
      2) Smoke Developed: 50.
   c. Density: 2.25 pounds per cubic foot.
   d. Design Basis: Curtainwall Insulation/MW manufactured by OC, Regular Curtain Wall or FireSpan Insulation manufactured by USG, or equal.

4. **Type L2**, FRK-Faced: Mineral wool, conforming to the requirements of ASTM C 612, Class 1 and Class 2.
   a. Combustibility: Non-combustible.
   b. Surface Burning Characteristics: Tested with ASTM E 84.
      1) Flame Spread: 25.
      2) Smoke Developed: 50.
   c. Facing Permeability: 0.10 perms, maximum.
   d. Density: 2.25 pounds per cubic foot.
   e. Design Basis: Curtain Wall Insulation/MW with FSK vapor retarder, manufactured by OC, Regular Curtain Wall or FireSpan Insulation manufactured by USG, or equal.

5. **Type L3**, Unfaced: Mineral wool, conforming to the requirements of ASTM C 612, Class 1 and Class 2.
   a. Combustibility: Non-combustible.
b. Surface Burning Characteristics: Tested with ASTM E 84.
   1) Flame Spread: 25.
   2) Smoke Developed: 50.

c. Facing Permeability: 0.10 perms, maximum.

d. Density: 2.25 pounds per cubic foot.

d. Design Basis: Dark Curtain Wall or FireSpan Insulation manufactured by USG, or equal.

F. Shaftwall Insulation:
   1. Type N, Semi-Rigid, Unfaced: Conform to the requirements of ASTM C 665, Type I, and ASTM E 136.
      a. Combustibility: Non-combustible.
      b. Surface Burning Characteristics: Tested with ASTM E 84.
         1) Flame Spread: 25.
         2) Smoke Developed: 50.
      c. Design Basis: Shaftwall Insulation, manufactured by OC, or equal.

G. Spray-Applied Insulation:
   1. Type Q3: BioBased 501w Insulation two-part, open cell, spray-applied, polyurethane foam having a nominal density of 0.5 pcf.
      a. Comply with ICC ESR-1383.
      b. Surface Burning Characteristics: In accordance with ASTM E 84:
         1) Flame Spread: Less than or equal to 25.
         2) Smoke Developed: Less than or equal to 450.

H. Accessory Materials: Subject to compliance with UL Listings for proposed fire rated assemblies, provide the following as required:
   1. Anchor Pins, Caps, and Insulation Clips: Manufacturer's recommended impaling pins and locking washers where required, equal to Stic-Klip, as manufactured by Insta-Foam Products.
      a. Adhesive for Stic-Klips: Type S Stic-Klip adhesive manufactured by Eckel Industries of Canada.
   2. Compound: Firecode Mortar Compound or Smoke Seal Caulk Compound, as applicable, manufactured by USG.
   3. Sound Board: As specified in Section 092900.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install insulation to attain minimum U-value indicated on the Contract Drawings required for finished assembly.
   1. Maintain integrity of insulation over entire area to be insulated for full height of wall and span of members. Install insulation behind outlet boxes and other devices.
   2. Insulate small areas between closely spaced framing members.
   3. Carefully cut and fit insulation around pipes, conduits, and other obstructions.
   4. Where pipes or conduit are located in stud spaces, place insulation between exterior wall and pipe, compressing insulation where necessary.
   5. Seal joints in facing material at concealed areas.
B. Batt Insulation:
   1. General:
      a. Fit batt insulation firmly between framing, or furring members, over ceiling, under roof deck, or against solid walls and spandrels, as required.
      b. Do not install batt insulation in cavities requiring compression in excess of 10 percent.
   2. Unfaced Batts: Where insulation is cut to fit small or irregular spaces, cut pieces slightly larger than the space to ensure a tight friction fit. Insert batts between studs and recessed slightly from face of the studs. Where batts are not adequately supported by friction, attach with insulation clips or tie wires spaced not more than 36 inches on centers at walls and at 12 inches on centers at ceilings.
   3. Faced Batts: Where insulation is cut to fit irregular spaces, form flanges for attachment to framing members.
      a. Insert flanged batts between framing members with membrane facing toward the building interior or conditioned space.
      b. Maintain facings intact. Patch tears or holes using non-combustible tape or by other accepted means.
      c. Where walls terminate above ceiling in plenum areas, joints, ends, and edges shall be taped and sealed with fire retardant materials.

C. Sound Transmission Insulation:
   1. Refer to Section 098100 for products and installation of sound insulation.
   2. Refer to Section 079200 for technical provisions of acoustical sealants to be used in conjunction with sound insulation.

D. Curtain Wall Insulation: Mechanically attach foil-faced curtain wall insulation to mullions and transoms at spandrel panels with impaling pins in a secure manner as indicated on Contract Drawings. Hold insulation away from spandrel panel with 1-inch air space.
   1. Exposed aluminum mullions shall be protected with securely fastened foil-faced curtain wall insulation.
   2. Tape insulation joints with pressure sensitive scrim tape. Butt ends and edges closely together, filling voids and sealing around perimeter and penetrations, to provide a complete vapor barrier.

E. Spray-Applied Foam Insulation: Apply spray-on insulation by certified applicators with pneumatic spray equipment, filling voids, cracks, and holes.
   1. Fill spaces between multiple studs inaccessible to batt insulation.
   2. Use in locations concealed by gypsum board only. Do not use in exposed locations.
   3. Apply to thickness as indicated in Contract Documents.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Rigid board roof insulation, flat and tapered types, installed with roofing membrane as an integrated system.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 072221 - Roof Board Underlayment: Cover board.
   6. Section 075423 - Thermoplastic Polyolefin Roofing.

C. Related Sections:
   1. Section 072100 - Thermal Insulation.
   2. Section 092900 - Gypsum Board.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. C 1289-14a - Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
         1) Section 1508 - Roof Insulation.
C. FM Global (FM):
      a. 4450 - Class 1 Insulated Steel Roof Decks.
      b. 4470 - Class 1 Roof Covering.
   2. Loss Prevention Data Sheets:
      a. 1-28 - Design Wind Loads.

D. National Roofing Contractors Association (NRCA):

E. Polyisocyanurate Insulation Manufacturers Association (PIMA):

F. Roof Insulation Contractors/Thermal Insulation Manufacturers Association (RIC/TIMA):

G. Underwriters Laboratories (UL):
   1. 1256 - Fire Test of Roof Deck Constructions.

H. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

   A. R-Value is the thermal resistance of insulation only, and does not take into account alleged air spaces or other factors assumed to result in higher values.


      2. *Design Stabilized R-Value*: Thermal resistance of polyisocyanurate foam insulation based on 5-year stabilization period after manufacture.

1.04 ADMINISTRATIVE REQUIREMENTS

   A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

   B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

   C. Coordination: Conform to requirements for roofing system guaranty and coordinate work with Section 075423.

1.05 SUBMITTALS

   A. General: Make submittals in accordance with provisions of Section 013300.

   B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.

   C. Shop Drawings: Submit shop drawings indicating fastener patterns for FMRC wind uplift resistance specified.

      1. Coordinate with shop drawing submittals for Section 075423.
D. Samples: Submit 6-inch square by 1.5-inch thick samples of each insulation material clearly identified with manufacturer’s name, brand name, R-value, fire-resistive classification, and composition.

E. Quality Control Submittals: Submit the following:
1. Test Reports: Certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
2. Certificates:
   a. Certificates confirming that roofing membranes proposed for use are mutually acceptable for application to both the manufacturer of the roofing membrane and the manufacturer of the insulation system, and that no warranty, guaranty or bond issued by either party is modified or rendered void by virtue of such application.
   b. Upon completion of installation of building envelope insulation, and in conjunction with roofing system work, one card certifying compliance with requirements of Title 24 for installation of insulation shall be completed, executed, and delivered to local building officials, and one card shall be conspicuously posted at a location on site acceptable to the building official.
3. Manufacturer’s Instructions: The manufacturer’s current recommended methods of installation, including relevant limitations, safety and environmental cautions, and application rates.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 QUALITY ASSURANCE

A. Manufacturer’s Qualifications:
1. Obtain primary sheet roofing material from a single manufacturer.
2. Manufacturer shall have directly produced the specified roof insulation components for a period equal to or greater than that of the specified warranty term prior to beginning the work of this Section.
3. Provide secondary materials as recommended by manufacturer of primary materials, unless written approval from primary manufacturer is provided, listing recommendations on secondary materials.

4. Manufacturer’s qualified technical representative will be required to visit project site to advise Installer of procedures and precautions for installation of roofing materials and to verify warranty requirements.

B. Applicator Qualifications: Five years successful documented experience in installation of roof insulation similar to those required for this project and approved by membrane manufacturer.

1. Owner’s Representative reserves the right to request a list of completed jobs and references to verify work and performance.

C. Certifications:

1. Provide insulation manufacturer’s certification that proposed system meets minimum requirements for warranties. Details and specifications that do not comply with manufacturer’s standards shall be revised to comply with warranty requirements at no additional cost.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Storage: Store insulation indoors, dry, off-floor, and under cover.

1.09 FIELD CONDITIONS

A. Ambient Conditions:

1. Proceed with roofing work when existing and forecasted weather and wind conditions permit performance in accordance with manufacturer’s recommendations and warranty requirements.

2. Do not apply adhesive when ambient temperature is below 40 degrees F.

B. Protection:

1. Protect building contents and grounds during the process of the work.

2. Remove debris daily from the roof.


C. Cleaning During Construction:

1. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.

2. New roof insulation waste material, including scrap roof insulation and empty cans of adhesive, shall be immediately removed from the site by the applicator and properly transported to a legal dumping area authorized to receive such material.

3. Arrange work sequence to avoid use of newly installed roof insulation as a walking surface or for equipment movement and storage. Where such access is absolutely required, provide necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over NWP felt or plywood over insulation board shall be pro-
vided for new and existing roof areas that receive rooftop traffic during construction.

1.10 WARRANTY

A. Guaranty: The work of this Section, including warranty, is related to roofing system specified in Section 075423.
   1. Roof insulation shall be a component of the PVC roofing system and will be included in the 20-year warranty.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

C. Provide single source, single responsibility guaranty which covers insulation, membrane, insulation, bituminous flashing, walkways, roofing manufacturer-supplied roof drains, expansion joint covers, copings systems and fascia systems.

D. Provide manufacturer's Guaranty equal to Johns Manville's Fifteen-Year Gold Shield No Dollar Limit (NDL) Roofing System Guaranty, running from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS


B. Acceptable Manufacturers, listed alphabetically:
   1. Carlisle SynTec, Carlisle, PA (800) 434-2279.

C. Acceptable Manufacturers of Insulation Products: Materials shall be products of, or specifically recommended by, one manufacturer and shall be provided by, or acceptable to, roofing membrane manufacturer issuing roofing system guaranties.

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulations:
1. Provide insulation and insulation fasteners listed in the FM Guide referenced that are tested and approved by Factory Mutual in accordance with their Standard 4470.
2. Provide Class I Wind Rating, IA-90 Approval, as determined in accordance with FMRC Standard 4470.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
   a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE CRITERIA

A. Performance Characteristics: Performance characteristics of roof insulation board proposed for use shall have been confirmed by tests in accordance with the following:
1. Thermal Resistivity (R-Value): ASTM C 518 and, in the case of foamed-plastic insulations, comply with the conditioning requirements of RIC/TIMA 281-1 and PIMA 101.
2. Permeability of Insulation Facing: ASTM E 96, less than 1 perm.
6. Dimensional Stability: ASTM D 2126 or ASTM D 696, less than 2 percent linear change.

B. Design Requirements: Provide product compatible with warranty related requirements of specified roofing system.
2.05 MATERIALS

A. Rigid insulation shall be of type and manufacture acceptable to roofing system manufacturer for inclusion in roofing system warranty.
   1. Thickness of insulation is indicated on Contract Drawings.
   2. Insulation board shall be installed in two layers where recommended by manufacturer.

B. Core: HCFC-free, closed cell faced rigid cellular polyisocyanurate core thermal roof insulation board bonded in the foaming process to universal non-asphaltic fiberglass reinforced faced roof insulation board and tapered panels.
   1. FS HH-I-1972/Gen, or HH-I-1972/2, Class I, as applicable.
   2. Comply with ASTM C 1289, Type II, Class 1, Grade 2.
   3. UL listed for Class A rated assemblies.
   4. FM rated as Class 1A-60 and 1A-90 for fire and wind resistant systems for built-up roofing.
   6. Design-stabilized value of R-5.56 per inch thickness of foam board shall be maintained over expected life of roof system.
      a. Provide a minimum value of R-30 over entire roof surface of each building as indicated on Contract Drawings.
   7. Tapered Insulation: Provide tapered shapes with pre-cut miters and pre-cut crickets of same insulation material proposed for use. Provide slope as indicated in Part 3 of this Section.

C. Roof Board Underlayment: Refer to Section 072221.

D. Accessories:
   1. Mechanical Fasteners for Insulation: Manufacturers standard, FM listed, corrosion resistant, Drill-Tec Insulation Fastener and Plates threaded roofing fasteners and pressure plates of appropriate width as approved for guarantied systems.
   2. Low Rise Foam Adhesive: Manufacturer's standard FM-approved low rise foam adhesive for two-layer installation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Refer to roofing system specifications for examination and verification procedures.
   1. Verify that roof openings, curbs, pipes, sleeves, ducts, vents, or other penetrations through the roof are solidly set, and that flashings, tapered edges, and reglets are secure and tight to the building.

B. Metal Roof Deck:
   1. Verify that metal deck is securely fastened with no projecting fasteners or severe weld “burn-throughs.”
   2. Verify that roof openings, curbs, pipes, sleeves, ducts, vents, or other penetrations through the roof are solidly set, and that flashings, tapered edges, and reglets are secure and tight to the building.
3. Verify that flatness and fastening of roof deck to structure complies with the following:
   a. Top Flanges: No concavity or convexity in excess of 1/16-inch across any three adjacent flanges.
   b. Side Laps: Properly nested and mechanically fastened at maximum 36 inches on centers.
   c. End Laps: Minimum 2-inch laps located over fastened supports.

C Verify that roof is sloped as indicated on the Contract Drawings.
   1. Tapered insulation shall be used in areas where adequate slope does not exist to build proper slope.

D. Vapor Retarder: When required by manufacturer for proper installation or for warranty requirements, install vapor retarder prior to installation of rigid insulation in accordance with insulation manufacturer's recommendations.

3.02 INSTALLATION

A. Install insulation in accordance with the manufacturer's instructions, and in accordance with the requirements of FM 1-28 for an 1-90 installation.
   1. For single-layer construction, apply insulation board with, and fasten with specified fasteners in accordance with manufacturer's recommendations.
      a. Install rigid roof insulation board with specified attachments in accordance with FM Property Loss Prevention Data Sheet 1-28.
   2. For bottom layer of two-layer construction, fasten rigid insulation board with specified fasteners in accordance with manufacturer's recommendations.
      a. Stagger end and side joints of insulation in successive rows.
   3. For top layer of two-layer construction, embed insulation board with low-rise foam adhesive in accordance with manufacturer's requirements and recommendations.
   4. Other requirements for roof insulation:
      a. Do not leave insulation exposed to the weather. Apply no more in one day than can be covered with roofing membrane on the same day.
      b. Insulation shall not bridge expansion joints where they occur.
      c. Insulation shall be laid in 24-inch widths wherever possible.

B. Tapered Insulation: Install over non-drainable deck areas in the form of crickets to direct the flow of water around objects to roof drains.
   1. Lay insulation with edges parallel to perimeter of roof. Lay in ashlar pattern with joints between the long dimension of the board parallel.
   2. Arrange tapered sections to maintain a minimum 1/4-inch per foot slope over entire roof area. Horizontal fill areas shall be same material as tapered insulation.
   3. Keep roof insulation 1/4-inch from vertical flashing.
   4. Secure to deck with low rise foam adhesive or mechanical fasteners, as applicable.
   5. Stagger end joints of insulation in successive rows.
C. Cover Board: Refer to Section 072221.

3.03 CLEANING

A. Promptly remove trash and clean areas of debris caused by work of this Section.

END OF SECTION
- SECTION 072221 -

ROOF BOARD UNDERLAYMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Underlayment board for protection of roof insulation.
      a. Include underlayment on uninsulated parapets.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 072216 - Roof Board Insulation.
   6. Section 075423 - Thermoplastic Polyolefin Roofing.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
   2. Title 24, Part 11 - California Green Building Standards Code

B. ASTM International (ASTM):
   1. C 1177-13 - Specification for Glass Mat Gypsum Substrate for Use as
      Sheathing.
   2. D 3273-12 - Test Method for Resistance to Growth of Mold on the
      Surface of Interior Coatings in an Environmental Chamber.
   3. E 84-15b - Test Method for Surface Burning Characteristics of Build-
      ing Materials.
   4. E 119-12a - Method for Fire Tests of Building Construction and Mate-
      rials.
   5. E 136-12 - Test Method for Behavior of Materials in a Vertical Tube
      Furnace at 750° C.

C. FM Global, Factory Mutual Research (FM):
   2. Property Loss Prevention Data Sheets:
      b. 4450 - Approval Standard for Class 1 Insulated Steel Deck Roofs
         (with supplements).
         1) Report J.I. IN2A6.AM.
D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with construction waste management requirements specified in Section 017419.

B. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications indicating material composition, thickness, sizes, and fire resistance.

B. Shop Drawings: Submit Shop Drawings indicating fastener and adhesive patterns for FMRC wind uplift resistance specified.

C. Quality Control Submittals:
   1. Certification: Submit manufacturer's written certification that product meets specified fire resistance requirements.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to the job site in manufacturer's original packaging, containers and bundles with manufacturer's brand name and identification intact and legible.

B. Storage and Handling: Roof board shall be kept dry before, during and after application. Outside storage shall be off ground and protected by a breathable waterproof covering. Dry wet roof board before installation. Install no more roof board than can be roofed the same day.
1.07 FIELD CONDITIONS

A. Environmental Requirements:
   1. Avoid accumulation of water due to leaks or condensation in or on roof boards during and after construction.
   2. Avoid application of roof board during rain, heavy fogs, and other weather conditions that may deposit moisture on the surface.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Acceptable Manufacturers of Accessory Products: Provide a system by a manufacturer that complies with the specified requirements.
   1. CertainTeed Corporation, Valley Forge, PA (215)341-7000.
   2. Dow Chemical Company, Construction Materials Group, Midland, MI (800)232-2436.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Refer to Article 2.04 for thickness of underlayment products applicable to this Project.
   1. Comply with UL 790 Class A listing when minimum 1/4-inch thick roof board is used as a barrier overlayment.
   2. Comply with UL 1256 when minimum 1/4-inch thick roof board is used as a thermal barrier underlayment over steel decks.
   3. Comply with Underwriters Laboratories classification when minimum 5/8-inch thick roof board is used in UL P assemblies.
   5. Comply with Factory Mutual 4450 criteria for Class 1 insulated steel roof decks.
      a. Capable of adhering a minimum 1/2-inch thick roof board to steel deck to withstand a wind uplift resistance in excess of 90 psf according to FMRC Standard 4450, report J.I. IN2A6.AM.
   6. Test installation for uplift in accordance with FMRC for 60 psf and 90 psf.
   7. Comply with FMRC for mechanical attachment to metal decks for wind uplift. For additional FMRC 1-60 and 1-90 windstorm resistance compliance, refer to membrane manufacturer's FMRC listing:
      a. 1/4-inch Thickness: Install in accordance with J.I. OY8A9.AM and J.I. 3003782.
b. 1/2-Inch and 5/8-Inch Thicknesses: Install in accordance with J.I. 1N2A6.AM of FMRC Standard 4450.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

C. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 MATERIALS

A. Exterior Gypsum Roof Deck (Glass Mat-Faced) Roof Underlayment Board: Design is based on the use DensDeck nonstructural, glass mat-embedded, water-resistant gypsum core panel, manufactured by G-P Gypsum Corporation, or equal.
   1. Composition: ASTM C 1177 and ASTM D 3273, maximum permissible lengths, ends square cut, water resistant, silicone-treated core penetrated by fiberglass mats front and back.
      a. Type: DensDeck Prime Roof Board, as manufactured by Georgia-Pacific Gypsum, or equal. Provide thickness, as indicated in the Contract Drawings.
         1) Location: Use as exterior gypsum glass mat underlayment roof board over metal roof deck or rigid insulation fully-adhered single ply roofing membranes applied with adhesives.
   2. Edge Profile: Square.
   3. Size: Nominal 4 feet by 8 feet.
B. Fire Resistance:
   1. All Thicknesses: Flame spread 0, smoke developed 0, when tested in accordance with ASTM E 84; noncombustible when tested in accordance with ASTM E 136.
   2. 5/8-inch Thick Type X Roof Board: UL-classified Type DGG when tested in accordance with ASTM E 119.

C. Mechanical Fasteners: Manufacturers No. 15 steel screws or equivalent, with 3-inch square No. 26 formed galvanized steel plates, FMRC-listed as approved for use in the wind uplift mode specified.

D. Adhered Systems: Insta-Foam Products Insta-Stik Adhesive used with specified roof insulation board shall achieve a FMRC Class-180 according to test report 1Y7A5.AM in selected Class 1 insulated steel and concrete deck roof construction.

2.05 TAPERED FILLER STRIPS

A. Physical Characteristics: Provide tapered filler strips having physical characteristics no less beneficial than the following:
   1. Surface-burning Characteristics:
      b. Smoke Developed: 5.
   2. Compression Resistance: At 5 percent consolidation, 35 psi.
   3. Water Absorption: 1.20 percent by volume.
   4. Weight: For a 1-inch thickness, 0.90-pound per square foot.
   5. Tensile Strength: 4 psi, laminar.
   6. Thickness: Not less than that specified by the manufacturer for the flute span of the metal decking provided.

B. Acceptable Products:
   1. Fesco Board, as manufactured by Johns Manville Roofing Systems Division.
   2. Celotex Board, as manufactured by Celotex Corporation.
   3. Permalite, Sealskin, as manufactured by International Permalite.
   4. Gaftemp, as manufactured by GAF Building Materials Corporation.
   6. DensDeck, as manufactured by G-P Gypsum Corporation.

C. Mechanical Fasteners: Manufacturers standard, FMRC-listed as approved for use in the wind uplift mode specified.

D. Cants: Pre-formed or pre-cut insulation material cut to configuration shown on the Contract Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that maximum flute span of metal deck complies with manufacturer's recommendations.
B. Verify the need for a separator sheet or sheet between the roof board and the roofing membrane with the roof membrane manufacturer or roofing systems designer.

3.02 INSTALLATION

A. Use maximum lengths possible to minimize number of joints. Locate edge joints parallel to and on deck ribs. Stagger end joints of adjacent lengths of roof board. Butt ends and edges.

B. Fasten roof board directly over metal deck where indicated on drawings using specified fasteners system in accordance with requirements of Article 2.02.
   1. Maximum Flute Spans:
      a. 2-5/8 inches for 1/4-inch thick roof panels.
      b. 5 inches for 1/2-inch thick roof panels.
      c. 8 inches for 5/8-inch thick roof panels.
   2. Install roof boards lengths perpendicular to direction of flutes.

C. Adhere roof board directly over rigid insulation where indicated on Contract Drawings using specified adhesives.

D. When applying solvent-based adhesives or primers, allow sufficient time for the solvent to flash off to avoid damage to roofing components.

E. Parapets: Do not use 1/4-inch thick roof boards for vertical parapet applications.
   1. Spacing: Maximum framing space shall be as follows:
      a. 16 inches on centers for 1/2-inch thick roof boards.
      b. 24 inches on centers for 5/8-inch thick roof boards.
   2. Metal Framing: Fasten a maximum 8 inches on centers around the perimeter and 8 inches on centers in the field.

END OF SECTION
- SECTION 072710 -

AIR AND VAPOR BARRIERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Air barrier and permeable vapor barrier membranes at exterior enclosure.
   1. Include transition materials at flashing conditions.

B. Related Sections.
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 014500 - Quality Control.
   4. Section 018113 - Sustainable Design Requirements.

C. Mockups: The work of this Section may be affected by mock-up requirements described in Section 014339.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. D 882-12 - Test Methods for Tensile Properties of Thin Plastic Sheeting.

B. California Code of Regulations (CCR):

C. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction (ESR-).

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
B. Preinstallation Meeting: Convene a preinstallation meeting a minimum of one week prior to commencing work of this section. Attendees shall include representatives of air and vapor barrier manufacturer, exterior wall installers and project superintendent. Agenda shall include the following:
1. Review of approved submittals.
2. Coordination with sequence of installation with adjacent materials.
3. Schedule for subsequent work covering air and vapor barrier.
5. Review of manufacturer’s cautions and warnings with regard to use of system components that may be toxic and flammable. Take proper precautions when completed membrane is slippery when wet or covered with frost.

C. Scheduling: Schedule installation of cladding panels immediately after completion of air and vapor barrier membrane installation to avoid possible damage to membrane when exposed during construction.

1.04 SUBMITTALS

A. General: Refer to Section 013300 for general submittal procedures.

B. Product Data: Submit manufacturer’s product data for each material. Include standard details, certified test results, installation instructions, and recommendations for sealing penetrations and perimeter.

C. Shop Drawings: Submit shop drawings indicating details of construction for continuous air and vapor barrier for each type of exterior wall and soffit assembly required for the project. Include relationship with adjacent materials, indication of sequence of installation, and materials and methods for sealing connections and penetrations. At a minimum, Shop Drawings shall include details of the connections indicated at subparagraph 2.04-A.5, as applicable to the Project:

D. Samples: Submit three labeled samples of each proposed product, not less than 6 inches by 12 inches in size.

E. Design Data: Prior to purchase of building materials for exterior wall and roof assemblies, submit dew point analysis for each exterior wall assembly required for the Project, including materials and interior and exterior air films. If analysis does not indicate zero ounces of accumulation at conditions specified below, include list of recommendations and materials which will produce zero ounces of accumulation. At a minimum, Dew Point Analysis shall include the following:
1. R-values of materials actually proposed for use, specific to manufacturer selected.
2. Graph of temperature versus distance from interior.
3. Temperature conditions of 72 degrees F interior and 30 degrees F exterior.
4. Humidity conditions of 35 percent interior and 60 percent exterior
5. Potential accumulation of water in ounces per day per square foot.
F. Source Quality Control Submittals:
   1. Certificates: Submit certificate from manufacturer stating that product 
      is suitable for the intended use.
      a. Submit manufacturer's certification stating materials ordered and 
         supplied, including transition materials, are compatible with each 
         other, suited for locale and purpose intended, and shipped in suffi-
         cient quantity to ensure proper, timely installation.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percent-
      ages by weight of post-consumer and pre-consumer recycled content 
      for products having recycled content. Include statement indicating 
      costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location 
      and distance from Project of material manufacturer and point of extrac-
      tion, harvest, or recovery for each raw material. Include statement in-
      dicating cost for each regional material and the fraction by weight that 
      is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for addi-
   tional information on LEED submittals.
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the 
      inside of the weatherproofing system, documentation including printed 
      statement of VOC content.

1.06 QUALITY ASSURANCE

A. Qualifications of Installer: Submit qualifications of firm installing air and 
   vapor barrier membrane materials, including name and qualifications of 
   supervisor for this project, and including name and location of three pro-
   jects where similar work was performed by both firm and supervisor.
B. Qualifications of Testing Laboratory: Testing shall be performed by an 
   acceptable independent testing laboratory acceptable to code authorities.
C. Mockups: Build mockups to verify selections made under sample submittals 
   and to demonstrate aesthetic effects and set quality standards for materials 
   and execution.
   1. Construct mockups of window opening flashing including head and sill 
      overlaps to coordinate proper fit of windows and doors.
      a. Size: 60 inches high by 48 inches wide.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Carlisle Coatings and Waterproofing Incorporated, Wylie, TX (800)527-
      7092.
   2. Henry Company, Huntington Park, CA (323)583-5000, with local repre-


B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations of governmental agencies having jurisdiction over airborne emissions and industrial waste disposal.

1. Products shall comply with State and local regulations concerning AIM (Architectural, Industrial and Maintenance) coatings regarding Volatile Organic Content (VOC).

B. Comply with CALGreen Section 5.407 Water Resistance and Moisture Management: Provide a weather-resistant exterior wall and foundation envelope as required by CBC 1403.2 (Weather Protection) and CEC Section 150 (Mandatory Features and Devices).

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes 10 percent of the total value of the materials in the project.

2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2.04 PERFORMANCE CRITERIA

A. Performance Requirements: The building envelope shall be designed and constructed with a continuous air and vapor barrier to control air leakage into, or out of the conditioned space. The air and vapor barrier shall have the following characteristics:

1. Continuous, with air-tight joints.
2. Air permeability not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3-inch water.
   a. Water permeability shall be at least 10 times that of the vapor barrier.
3. Capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
4. Durable and maintainable.
5. Joined in an air-tight and flexible manner to the air and vapor barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
   a. Foundation and walls.
   b. Walls and windows or doors.
   c. Different wall systems.
   d. Wall and roof.
   e. Wall and roof over unconditioned space.
   f. Walls, floor, and roof across construction, control and expansion joints.
   g. Walls, floors, and roof to utility, pipe and duct penetrations.
6. Capable of maintaining performance characteristics while withstanding potential high temperatures behind exterior siding materials.
7. Capable of permanently resisting UV exposure.

B. Air and Vapor Barrier Penetrations: Penetrations of the air and vapor barrier and paths of air infiltration/exfiltration shall be made air-tight.

C. Fire Performance Characteristics: Provide water-resistant barrier with the following fire-test characteristics.
   a. Flame spread index: 25 or less.
   b. Smoke developed index: 450 or less.

2.05 DESIGN CRITERIA

A. Design Requirements: Air and vapor barrier membrane shall be located, constructed, and flashed to discharge to the outside any incidental condensation or water penetration. Air and vapor barrier membrane shall accommodate movements of building materials by providing expansion and control joints as required, with appropriate air seal materials at such locations, changes in substrate, and perimeter conditions.

2.06 FLUID APPLIED SYSTEMS

A. Fluid-Applied Vapor Permeable Air Barriers at Sidings: Spray applied membrane applied at 1/8-inch (90 wet mils) minimum thickness. At joints, provide manufacturer's recommended joint tape and termination bar recommended by manufacturer. Provide one of the following which meet or exceed specified requirements:
1. Grace Construction Products:
2. Henry Company:
   a. Air-Block 31MR: Low VOC type.
   b. Air-Block 33MR: UV-, fire-resistant-resistant type.
2.07 SELF-ADHERING SYSTEMS

A. Self-Adhering Vapor Permeable Air Barriers at Sidings, Cladding, Panels, or Roofing: Self-adhering, self-sealing and self-healing rubberized asphalt integrally bonded to polyethylene film, 40 dry mils minimum thickness overall. Provide compatible membrane joint tape recommended by manufacturer. Provide manufacturer's recommended primer and one of the following which meet or exceed specified requirements.

2.08 TRANSITION MATERIALS

A. Self-Adhering Transition Materials: To provide an air and vapor barrier between the membrane and adjacent materials, provide transition materials consisting of extruded low-modulus silicone sheet and silicone sealant designed to adhere to polyethylene side of membrane and adjacent material. Provide the following materials as acceptable to the manufacturer of the air and vapor barrier membrane:
   1. Adhesive-Coated Transition Strip: Henry Building Envelope Systems Blueskin Breather, or equal product by Carlisle.
   3. Silicone Sealant: Dow 790 Silicone Sealant or Tremco Spectrum 3 Sealant.

B. Provide fluid applied air barrier membrane with self-adhering flexible sheet flashing from the same manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, adjoining construction, and conditions under which work will be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

B. Surfaces to receive air and vapor barriers shall be thoroughly dry and free of moisture. Fasteners shall be countersunk.

C. Surfaces shall not contain any grease, oil, or any other contaminants which could affect the complete bonding of waterproofing membrane to concrete surface.

3.02 PREPARATION

A. Proceed with air and vapor barrier membrane installation only after substrate preparation is complete. Obtain approval from the membrane manufacturer's representative of gypsum sheathing surface preparation before proceeding with membrane installation.
   1. Exterior Sheathing: Tape joints 1/8-inch and wider with minimum 2-inch exterior wallboard mesh tape recommended by manufacturer of air and vapor barrier.
2. Protrusions: Apply minimum 6-inch wide strips of self-adhering air and vapor barrier where joints between dissimilar building materials occur, such as protrusions around doors and windows.

B. Clean the existing surface prior to installing air and vapor barrier membrane components to remove dirt and debris. Do not install air and vapor barrier system components over wet substrates.

C. Protection:
1. Equipment used on the Project shall comply with applicable municipal and safety regulations including OSHA guidelines.
2. Protect finished work from damage during subsequent work, such as impact, marring of the surfaces, and other damage. Replace or repair damaged work or materials at no additional cost to the Owner.

D. Coordinate flashing and sealant work to ensure a concurrent and continuous membrane and flashing installation.

3.03 INSTALLATION, FLUID-APPLIED
A. Air and Vapor Barrier Membrane: Comply with air and vapor barrier membrane manufacturer's printed instructions, approved submittals, and the following:
1. Apply materials within manufacturer's requirements for temperature and weather conditions.
2. Do not allow contamination with dust or dirt.
3. Seal completely at edges, perimeter and penetrations.

3.04 INSTALLATION, SELF-ADHERED
A. Perimeters and Penetrations:
1. Pipes and Conduit: Install manufactured penetration sleeves sized for the penetration of pipes and conduit as recommended by manufacturer.
2. Windows and Doors:
   a. Secure prefabricated flashing corners at window sill ends.
   b. Lay strip of membrane across sill and secure with tape or mechanical fasteners so that the membrane used for the wall can be slipped underneath the corners and sill, allowing for a minimum lap of 6 inches.
   c. Wrap a strip of membrane around jambs extending horizontally along walls a minimum of 9 inches.
   d. Secure flashing corners at ends of window head.
   e. Lay strip of membrane across the opening, extending horizontally beyond the corners a minimum of 6 inches.
      1) Cut membrane along the leading edge of the header an inch or two beyond each jamb, so that the nailing flange of the window may side up behind the membrane.
3. Membrane Application:
   a. Install membrane in accordance with manufacturer’s instructions over exterior sheathing. Secure membrane so that the subsurface is protected from weather until cladding can be installed.
      1) Wrap penetrations as specified and detailed.
      2) Starting from the bottom, unroll the membrane, black side out, mechanically fastening top and bottom, 2 feet on centers.
3) Seal against jambs of openings with double-sided tape.
4) Vertical laps shall be a minimum of 6 inches with taped joints, or 12 inches without tape. Horizontal laps shall be a minimum of 6 inches.

b. Complete installation of flashing penetrations and water-resistive barriers in accordance with manufacturer’s instructions.
   1) Apply sealing mastic to seal voids caused by fitting air barrier around projects.
   2) Do not install more air barrier than can be covered by siding or roofing the same week.
   3) Protect air barrier from damage during exposure period.

4. Provide elastomeric membrane strip behind each line of fasteners to seal nail penetrations.
   a. Locate at uniform spacings at required centers and fasten as indicated in the Contract Drawings.

3.05 FLASHINGS

A. Flashings: Install concurrently with the waterproofing membrane as the job progresses. No temporary flashing shall be allowed without the prior written approval of the project manager and membrane manufacturer. Approval shall be for specific locations on specific dates. Flashings shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces.

3.06 FIELD QUALITY CONTROL

A. Owner will engage an independent inspector to observe substrate and installation. Inspector shall provide a written, sign-off log, on penetrations before the membrane is placed. Form of log shall be approved by Architect before contract with inspection service is approved.

3.07 ADJUSTING

A. Damage to finished portions or the air and vapor barrier membrane shall be either repaired or replaced in a manner acceptable to the Owner.
   B. Repair damage as follows:
      1. Insert a full height piece of membrane extending 12 inches horizontally beyond the damage and extend up and under membrane above. Mechanically attach membrane to substrate top and bottom.

3.08 CLEANING

A. Upon completion of the system remove masking, protections, equipment, material, and debris from the work and storage area. Leave those areas in an undamaged and acceptable condition.

3.09 PROTECTION

A. Protect installed membrane from damage due to extended ultraviolet light, harmful weather exposures, physical abuse, and other possible causes.
B. Provide temporary protection over air and vapor barrier membrane if materials covering air and vapor barrier membrane will not be installed within manufacturer's recommended time limit for exposure.

END OF SECTION
- SECTION 074243 -

COMPOSITE WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Aluminum-faced, composite core, building panel rain-screen system, including perimeter extrusions and stiffeners, gaskets, sealants, fasteners, and related flashings and accessories.
   1. Include provision of exterior ceiling panels for Building B.

B. Related Sections:
   1. Section 011100 - Summary of Work.
   2. Section 012500 - Substitution Procedures.
   3. Section 013300 - Submittal Procedures.
   4. Section 014339 - Mockups.
   5. Section 017419 - Construction Waste Management and Disposal.
   7. Section 072710 - Air and Vapor Barriers.
   8. Section 079200 - Joint Sealants: General requirements for installation of joint sealants.
   9. Section 092216 - Non-Structural Metal Framing.

1.02 REFERENCES

A. ASTM International (ASTM):


B. American Architectural Manufacturers Association (AAMA):

C. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ESR-).

D. National Fire Protection Association (NFPA):
   1. 285 - Intermediate Scale, Multi-Story Fire Test Apparatus.

E. Society for Protective Coatings (SSPC):
   1. SSPC Paint 32-2006 - Coal Tar Emulsion.

F. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: The work of this Section is affected by mock-up requirements described in Section 014339.

B. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

C. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

D. Coordinate with the suspension system work of Section 095300 for installation of exterior ceiling panels.

E. Preinstallation Meetings: Conduct preinstallation meetings to verify project requirements, substrate condition, installation instructions and warranty requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings comprehensively describing fabrication and installation of metal panels.
   1. Indicate thickness and dimension of parts, fastening and anchoring methods, detail and location of joints, including joints necessary to accommodate thermal movement.
C. Samples: In accordance with the provisions of Section 013300, submit two 12-inch by 12-inch samples of specified finish complete with factory-applied edge treatment for acceptance-review.
   1. Upon acceptance of samples by Architect, proceed with fabrication of full size mock-up.

D. Test Reports: Furnish independent laboratory test data of composite aluminum panel system indicating that products meet or exceed performance requirements.

E. Quality Control Submittals:
   1. Design Data: In accordance with the provisions of Section 013300, submit deferred approval data for work of this Section.

F. Substrate Condition Field Report: Furnish report from installer confirming that surfaces, alignments, and tolerances to which materials of this Section will be applied are in a suitable and acceptable condition to receive finish materials specified in this Section.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Provide five additional face panels, and one of each type of corner, sill or soffit panel for Owner’s stock. Include sufficient stiffeners, edge trim, and gaskets to mount spare panels. Panels shall be manufactured and finished identical to installed panels.

1.07 QUALITY ASSURANCE

A. Qualifications: Manufacturer, fabricator, and installer shall have demonstrated no less than 10 years successful experience of metal panel work similar in scope and size to this project.

B. Field Samples: When and as directed by the Architect, install a formed glazing panel in aluminum framing on a portion of the project. Field
sample installations shall be representative of the work proposed in every respect. When accepted by Architect, the field sample will become the standard by which the work of this Section will be judged.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver fabricated panels and component parts identified in accordance with accepted Shop Drawings.

B. Protect panel finishes and edges from damage during shipping and erection. Inspect work for damage upon delivery.

C. Storage: Stack materials on platforms or pallets, covered with suitable ventilated covering. Do not store panels to accumulate water or be in contact with other materials that might cause staining, denting or other surface damage.

1.09 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

1.10 WARRANTY

A. Panels: Provide manufacturer's standard 5-year panel lamination warranty.

B. Installation shall be free of water leakage in accordance with performance requirements.

C. Finish: Provide manufacturer's standard 20-year finish warranty, to run concurrently with the framing system specified in Section 084313.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design Basis Manufacturer:
   1. 3A Composites USA, Inc. (Alucobond), Benton, KY (270)527-4200, (800)626-3365, www.alucobondusa.com, with representation in Northern California (916)427-8811 (Jim Vann).

B. Acceptable Manufacturers:
   2. 3A Composites USA, Inc. (Alucobond), Benton, KY (270)527-4200, (800)626-3365, www.alucobondusa.com, with representation in Northern California (916)427-8811 (Jim Vann).
   3. Mitsubishi Chemical America, Inc. (Alpolic), Composite Materials Division, Chesapeake, VA (800)422-7270, with representation in California (949)586-9418.

C. Acceptable Fabricators:
D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with ICC ES Evaluation Reports applicable to product proposed for use:
      a. ICC ES Report 3435, issued to Alcoa Architectural Products.
   2. Comply with code regulations relating to fire resistance of core materials.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE/DESIGN CRITERIA

A. Design Requirements:
   1. Thermal Movement: Allow free and noiseless vertical and horizontal movement for an ambient temperature range from 20 degrees F to 180 degrees F.
   2. Wind Loads: Based on wind design criteria indicated on the Structural Contract Drawings applied to panels and corners in positive and negative modes.
   3. Seismic Forces: Design to accommodate floor structure displacement of 0.006-inch per foot of floor height.
   4. Deflection:
      a. Panel: With load applied normal to plane of panel, deflection of horizontal perimeter framing shall not exceed 1/175 of span length, or 3/4-inch, whichever is less.
      b. Anchor: Maximum anchor deflection shall not exceed 1/16-inch in any direction.
      c. Permanent deflection of framing members shall not exceed 1/1000 of span length, and components shall not experience failure or gross permanent distortion.
B. Performance Requirements:
1. Air Infiltration: Air leakage of not more than 0.160 cfm/ft² (complete chamber) when tested according to ASTM E 283 at the following test pressure difference.
   a. Test Pressure Difference: 1.57 psf positive air pressure difference.
2. Water Infiltration:
   a. Water Penetration under Static Pressure: No water penetration under static pressure at 15.0 psf when tested according to ASTM E 331 at a test pressure difference 6.24 lb/sq ft.
   b. Water Pressure under Dynamic Pressure: Less than 5% water on surface of chambers water moisture barrier when tested no less than 12.0 psf in accordance to AAMA 501.1.
3. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 330.
   a. Wind Loads: As indicated on drawings.
   b. Other design loads: As indicated on drawings.
   c. Deflection limits: For wind loads no greater than l/175 for frame elements and L/60 for panel materials.
4. Fire-Resistance Ratings: Comply with ASTM E84 if a rated wall is required; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   a. Indicate design designations from UL's Fire Resistance Directory or from the listings of another qualified testing agency.
5. Fire Propagation Characteristics: Where required by code, metal composite material wall panel systems with 4mm FR Alucobond shall pass NFPA 285 testing. 4mm PE is certified to Class A usage under ASTM-E-84.

2.05 SYSTEM DESCRIPTION

A. Rain Screen System:
1. Barrier system in which panels are fabricated and formed into pans and hung on substrate using aluminum extrusions with concealed fasteners. Panel joints are finished using elastomeric strips that float at the extrusions and sealant between panels.
   a. System may allow incidental water to enter the cladding cavity, as long as it can be drained through the system via weep holes.

2.06 COMPONENTS

A. Metal Composite Panel System Type MP-2: Design is based on Alucobond PE Rear Ventilated Rainscreen II dry seal panel system, manufactured by 3A Composites, or equal, and fabricated by Elward Systems Corporation, or equal.

B. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.
C. Aluminum-Faced Composite Wall Panels Formed with 0.020-inch thick, coil coated aluminum sheet facings.
   1. Panel Thickness: 4mm (0.157 inch).
   2. Core: Thermoplastic Core Material PE.

D. Attachment Assembly Components: Formed from extruded aluminum.

2.07 OTHER COMPONENTS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet ASTM A 653, G90 (2275 hot-dip galvanized) coating designation or ASTM A 792, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system.

B. Panel Accessories: Provide components required for a complete “rain screen” panel system including trim, copings, sills, flashings, sealants and similar items. Match material and finish of metal composite material panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed to match finish of metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, end walls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels.

E. Panel Sealants: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.

2.08 FABRICATION

A. General: Fabricate and finish metal composite material panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal composite material panel joints with factory-installed captive or separator splines that provide a water controlled seal and prevent metal-to-metal contact, and that minimize noise from movements.
C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's Architectural Sheet Metal Manual that apply to design, dimensions, metal, and other characteristics of item indicated.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   2. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
   3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are to be finished to match panels when exposed to view.
   4. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
      a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

D. Finish:
   1. Panels: Manufacturer's Alucobond PE Anodized Clear finish AAMA 611, AA-M12C22A41, Class I, 0.018 mm, or thicker.
   2. Apply a removable plastic film to the finish side of panels prior to fabrication that shall remain on the panel during fabrication, shipping, and erection to protect the surface from damage.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine supporting structure and conditions under which the work is to be erected. Notify Contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.
   1. Surfaces to receive panels shall be even, smooth, sound, clean, and free from defects detrimental to panel installation.

3.02 PREPARATION

A. Align structural support system to receive panels. Support system shall be installed to the same tolerances as required for the panel system.
   1. Maximum deviation from vertical and horizontal alignment of substrate shall be no more than 1/4-inch in 20'-0".

B. Install elastomeric membrane over exterior sheathing as specified in Section 072710.

C. Install furring channels in accordance with requirements of Section 092216.

3.03 INSTALLATION

A. General: Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other compo-
ponents of the work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal composite material panels.

2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal composite material panels are installed.

3. Install screw fasteners in predrilled holes unless self-drilling fasteners are used.

4. Locate and space fastenings in uniform vertical and horizontal alignment.

5. Install flashing and trim as metal composite material panel work proceeds.

6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.

8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use approved drill flex coated or stainless-steel fasteners for surfaces exposed to the exterior and for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete rain screen wall system, including subgirts, perimeter extrusions, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

E. Installation: Attach metal composite material wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.

1. Alucobond PE Series Rainscreen System: Install using systems standard assembly with vertical and horizontal continuous channels and flashings that provides support and secondary drainage at each panel and the base of the wall. Install all starter tracks and flashings prior to installing panels. Install panels plumb and level in accordance with approved panel system shop drawings. Do not apply sealants to joints unless otherwise indicated.
F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal composite material panel assembly including trim, coping, flashings, sealants and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated.
   1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.04  ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.05  FIELD QUALITY CONTROL

A. Testing Agency: a qualified independent testing agency to perform field tests and inspections.

B. Water-Spray Test: After installation, test area of assembly [shown on Drawings] [as directed by Architect] for water penetration according to AAMA 501.2.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.06  CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.
B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

D. Verify weep holes and drainage channels are unobstructed and free of dirt and sealants.

E. Clean all portions of the work, including surfaces of adjacent work soiled as a consequence of the work of this Section.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Through-color ultra-high performance mesh reinforced concrete panels (UHPC) wall for exterior cladding and soffits.

1.02 REFERENCES

A. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 054100 - Structural Metal Stud Framing.
   4. Section 072100 - Thermal Insulation.
   5. Section 072710 - Air and Vapor Barriers.

B. Refer to Section 072100 for thermal insulation.

C. Refer to Section 072710 for air and vapor barriers for rainscreen applications.

1.03 REFERENCED STANDARDS

A. ASTM International (ASTM):
   4. E 136-12 - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750° C.

B. European Committee For Standardization (CEN):

C. Coding Center Heidelberg (CCHD):

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including, but not limited to:
   1. Preparation instructions and recommendations for fibre cement panels.
2. Storage and handling requirements and recommendations.

3. Installation methods for the supporting framework and fibre cement wall panels.

C. Selection Samples: For each finish product specified, two complete sets of 5-1/4" x 2-1/2" color chips representing manufacturer's full range of colors and patterns available in the United States.

D. Verification Samples: For each finish product specified, two samples, minimum size 12 inches square, representing actual product, color, and patterns.

E. Shop Drawings: Provide detailed drawings of non-standard applications of panel materials which are outside the scope of the standard details and specifications provided by the manufacturer.

F. Code Compliance: Prior to the bid, submit documents showing product compliance with local building code. Include appropriate Evaluation Reports and/or test reports supporting the use of the product.

G. Engineering Calculations: Submit engineering calculations as required by the local building code, showing that the installed panels and attachment system meets the wind load requirements for the project.

H. Operation and Maintenance Data: Submit operation, maintenance, and cleaning information for products covered under this section.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Credit MR 4: Manufacturer’s Product Data indicating the following:
   a. Percentages by weight of post-consumer and pre-consumer recycled content.
   b. Indicate total weight of products provided.
   c. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Furnish not less than 10 square feet for every 500 square feet or fraction thereof, for each color, pattern, and type and color provided.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: All products listed in this Section shall be installed by a single installer trained and approved by the manufacture or representative.

B. Mockups: Provide a full size mock-up for evaluation of surface preparation techniques and application workmanship. Mock-up shall include a corner, window sill, jamb and head condition, wall base, and wall-roof intersection.
1. Finish areas as designated by Architect.
2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Ship, unload, store, protect, uncrate, and handle panels in accordance with manufacturer's instructions. Crates shall be returned to manufacturer after use.

B. Ship panels in crates labeled with installation sequence.

C. Storage and Handling Requirements:
1. Store crated panel materials in dry conditions, protected from weather and other trades.

D. Moving panels that are stacked in crates should be done with a forklift or a crane. Ensure the panels are secured to the pallet in a way that will not cause damage. Stacks should be transported under a waterproof cover.

E. Always lift panels off of each other; never slide them over one another to avoid scratching finished surfaces.

1.09 FIELD CONDITIONS

A. Ambient Conditions: Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits or which could involve life safety situations.

B. Field Measurements Verify actual measurements/openings by field measurements performed by the installer prior to release for fabrication. The General Contractor or Installer shall be responsible for existing site dimensions. Recorded measurements shall be indicated on shop drawings based on field measurements provided by the installer. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
1.10 WARRANTY

A. Special Warranty: At project closeout, provide manufacturer's limited 10-year warranty covering defects in materials. Warranty is only available when material is installed by an installation contractor trained and approved by the manufacturer's representative.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Concrete Panels: Design is based on products manufactured by TAKTL, LLC, Glenshaw, PA (412)486-1600, www.taktl-llc.com.


C. Like components shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of another manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.

1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
   a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
   a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.

2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.

3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.
2.04 PERFORMANCE CRITERIA

A. Color Evaluation: No change, 2000 hours of accelerated weathering with color evaluation, in accordance with CCHD Performance Test Report.

2.05 SYSTEM DESCRIPTION

A. Summary: Ultra-high performance concrete solid exterior wall panels and pre-engineered support system.

B. Basis of Design Product/Manufacturer: TAKTL Standard + Exterior Patterned Wall and Façade Panels.
   1. Fasten to substrate with base bid exposed fasterers unless Alternative 15 specified in Section 012300 for concealed fasteners has been accepted and included in Contract.

2.06 WALL PANELS

A. Panels: Factory-formulated with ultra-high performance concrete and reinforced with alkali-resistant glass mesh, factory-mixed and manufactured. Comply with ASTM C 1186. Type A, Grade IV.
   2. Panel Thickness: 5/8-inch nominally, thickness variation +/-1/16.
   3. Panel Edges: Mitered and fully adhered at all outside panel corners, mitered (open joint) at all inside corners.
   5. Color and Texture: As selected by Architect.

B. Support Structure:
   1. Support Structure: Eco cladding VCI 40 vertical and HCl horizontal girts over continuous insulation.
      a. Complete sub-frame assembly to support and anchor solid exterior solid UHPC wall panels, consisting of cold-formed steel with zinc-aluminum-magnesium ZM40 coating. Extruded aluminum support structure shall be anchored to building structure. Attachment system shall consist of the following components:
         1) 18 gage structural steel studs.
         2) DensGlass sheathing.
         3) HCl horizontal girts spaced at 39 inches on centers at exposed fasteners.
         4) CI vertical girts spaced at 32 inches on centers at concealed fasteners.
         5) PanelRails in opposite direction supporting concrete panels.
         6) Ultra-high performance concrete panels.
      b. Fasteners: Corrosion-resistant stainless steel concealed fasteners and undercut anchors of type, size, and spacing required for type of substrate and project conditions.
   2. Components for Exposed Fasteners (Base Bid):
      a. Horizontal HCl girr hat channel support bracket anchored directly to building structure.
b. Vertical hat channel PanelRail that fastens into horizontal support brackets to support UHPC wall concrete panels. Include vertical RevealRail where required.

3. Components for Concealed Fasteners (Alternative Bid):
   a. Vertical CI Girt channels anchored directly to building structure.
   b. Horizontal PanelRail hat channel support rails attached to girt profile which provides means to suspend UHPC wall panels.

PART 3 - EXECUTION

3.01 EXAMINATION
   A. Do not begin installation until substrates have been properly prepared.
   B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION
   A. Clean panel surfaces thoroughly prior to installation. Remove cutting or drilling dust from the surface of the panel using a microfiber soft cloth.
   B. Prepare surfaces using the methods recommended by manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION
   A. Install in accordance with manufacturer's instructions and approved submittals.
   B. For exterior applications, comply with local codes and structural engineer's fastening calculations along with manufacturer's recommendations for fastener spacing.

3.04 RAISSCREEN REQUIREMENTS
   A. Detailing Requirements:
      1. Air space inlets and outlets are required at top and bottom of building or wall termination, equivalent to a continuous 1/2-inch to 3/4-inch space to facilitate airflow behind the panels. Do not block vertical airflow at windows, doors, eaves, or at the base of the building. Airflow shall be continuous from bottom to top so there is air movement behind each panel. Air flow behind the panels is critical to the performance of the rain screen constructions.
      2. Fasteners in profile shall accommodate thermal expansion/contraction of metal and not interfere with panel application.
   B. Rainscreen Installation: Comply with manufacturer's installation requirements.
3.05 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Fully-adhered feltback TPO thermoplastic polyolefin single-ply roofing, flashing, stripping, and integrally related roofing accessories.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 033100 - Structural Concrete.
   6. Section 072216 - Roof Board Insulation.
   7. Section 072221 - Roof Board Underlayment.
   8. Section 076200 - Sheet Metal Flashing and Trim.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. D 4434-12 - Specification for Poly(Vinyl Chloride) Sheet Roofing.

B. FM Global (FM):
      a. 4450 - Class 1 Insulated Steel Roof Decks.
      b. 4470 - Class 1 Roof Covering.
   2. Loss Prevention Data Sheets:
      b. 1-28R - Roofing Systems.
      c. 1-29 - Above-Deck Roof Components.
      d. 1-49 - Perimeter Flashing.

C. National Roofing Contractors Association (NRCA):

D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):

E. Underwriters Laboratories, Inc. (UL):

F. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):
1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with construction waste management requirements specified in Section 017419.

B. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

C. Coordination: Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, provide necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over NWP felt or plywood over insulation board shall be provided for new and existing roof areas that receive rooftop traffic during construction.

D. Preinstallation Meeting:
   1. At least one week prior to start of roofing installation, convene pre-roofing conference at Project site.
   2. Attendance is required by installer, manufacturer's technical representative, Architect and Contractor, including mechanical and sheet metal trades.
   3. Review requirements for work and conditions which could possibly interfere with successful performance of work.
   4. Minimum Agenda:
      a. Review project specifications and Drawings, including details.
      b. Establish installation schedules and sequence.
      c. Coordinate work with in-place and subsequent construction.
      d. Review weather and working conditions.
      e. Review installation procedures, including:
         f. Substrate requirements.
         g. Insulation installation.
         h. Membrane installation.
         i. Roof terminations, flashings, and roof drain requirements.
         j. Review inspection, testing, and quality control procedures.
         k. Review protection requirements for construction period beyond roofing installation.
         l. Procedures for making roof penetrations after membrane installation.
   5. Conduct tour of roof deck and report discrepancies and problem areas to Architect.

1.04 SUBMITTALS

A. General: Comply with the submittal provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and specifications.
   1. Submit manufacturer's printed specifications and instructions for installation of membrane.
   2. Include procedures and materials for terminations, flashing, splicing, and bonding.
C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of roofing system showing the roof plan and indicating every roof detail.
   1. Indicate layout of sheets, location of field splices, type of splices, layout of tapered insulation sections, mechanical equipment flashing, termination details, and penetration details.

D. Samples: Submit samples of finish for final review and acceptance.
   1. Membrane Material: 8.5 inches x 11 inches, including sample lap.
   2. Insulation: 6 inches x 6 inches by 2 inches thick.
   3. Coated metal flashing.
   4. Fasteners: One each type.

E. Quality Control Submittals:
   1. Test Reports: Submit test reports confirming that the roofing system proposed for use has been tested for conformance with the UL roofing system classification specified.
   2. Certificates:
      a. Submit manufacturer's certification stating materials ordered and supplied are compatible with each other, suited for locale and purpose intended, and shipped in sufficient quantity to ensure proper, timely installation.
      b. Submit manufacturer's approval of installer.
      c. Submit installer's experience record.
      d. Certify materials shipped to Project site meet membrane manufacturer's published performance requirements.
      e. System: Acknowledgement of Acceptance, signed by the roofing system manufacturer, of the roofing system and installation methods proposed to qualify for the specified warranty.
      f. Applicator: Evidence of approval, signed by the roofing system manufacturer, of the roofing applicator proposed to perform the work of this Section.
      g. Quality Building Services Technical Representative (Quality Control Observer): Evidence of approval, signed by the roofing system manufacturer, of the Quality Control Observer proposed by District for monitoring of the work of this Section.
   3. Manufacturer's Instructions: The manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, and application rates.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Sustainable Sites Submittals:
   1. Product Data for SS Credit 7.2: Highlight compliance with Solar Reflectance Index (SRI) requirements.

B. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 CLOSEOUT SUBMITTALS

A. Warranty Documentation:
   1. Submit sample forms of warranty and guaranty forms identical to those proposed to be issued at completion of roofing work.
   2. Provide a Project Closeout Report upon delivery of the project warranty. This report to include:
      a. Progress reports as a result of roof inspections.
      b. Job-site progress photos.
      d. Roof access/rooftop signage indicating care, safety, and contact instructions

1.07 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Obtain primary sheet roofing material from a single manufacturer.
      a. Manufacturer shall have directly produced the specified TPO membrane and flashing components for a period equal to or greater than that of the specified warranty term prior to beginning the work of this Section. The TPO membrane and flashing components shall have also maintained a consistent product formulation for a minimum of 20 years.
   2. Provide secondary materials as recommended by manufacturer of primary materials, unless written approval from primary manufacturer is provided, listing recommendations on secondary materials.
   3. Manufacturer's qualified technical representative will be required to visit project site to advise Installer of procedures and precautions for installation of roofing materials and to verify warranty requirements.

B. Applicator Qualifications: Five years successful documented experience in installation of roofing systems similar to those required for this project and approved by membrane manufacturer.
   1. Owner’s Representative reserves the right to request a list of completed jobs and references to verify work and performance

C. Certifications:
   1. Provide roofing manufacturer's certification that proposed system meets minimum requirements for warranties. Details and specifications that do not comply with manufacturer's standards shall be revised to comply with warranty requirements at no additional cost.
2. Membrane manufacturer shall certify that the polymer thickness is the thickness specified. Certification shall be signed by an officer of the membrane manufacturer.
   a. ASTM plus-or-minus tolerance for membrane thickness is not acceptable.
3. Pullout Testing: Confirm manufacturer's required pullout resistance of fasteners and adhesive by on-site pullout tests conducted by an independent testing laboratory. Verify location of prestressed cables to avoid damage to structure.
4. Moisture Testing: Conduct moisture testing of concrete decks to determine moisture content

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver roof system materials in original manufacturer's labeled packages.
B. Store materials on site in enclosures or under breathable protective coverings off ground.
   1. Follow instructions contained on adhesive canister for specific storage instructions. As a general rule, adhesives shall be stored at temperatures between 40ºF and 80ºF.
   2. Flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
C. Do not store material in or on building in such concentrations as to impose excessive strain on deck or structural membranes.
D. Damaged materials or materials not conforming to the specified requirements will be rejected by the Architect and Quality Control Observer. Rejected materials shall be immediately removed from the job site and be replaced with specified materials.

1.09 FIELD CONDITIONS

A. Ambient Conditions:
   1. Proceed with roofing work when existing and forecasted weather and wind conditions permit performance in accordance with manufacturer's recommendations and warranty requirements.
   2. Do not apply adhesive when ambient temperature is below 40 degrees F.
B. Protection:
   1. Protect building contents and grounds during the process of the work.
   2. Remove debris daily from the roof.
C. Temporary Cut-Offs: Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. All temporary waterstops shall be constructed to provide a 100% watertight seal.
   1. Flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses
   2. The stagger of the insulation joints shall be made even by installing partial panels of insulation.
3. The new membrane shall be carried into the waterstop. The edge of the membrane shall be sealed in a continuous heavy application of sealant.

4. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and properly disposed of off site. None of these materials shall be used in the new work.

5. If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

D. Cleaning During Construction:

1. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.

2. New roofing waste material, including scrap roof membrane and empty cans of adhesive, shall be immediately removed from the site by the applicator and properly transported to a legal dumping area authorized to receive such material.
   a. For scrap membrane trimmings and waste, contact the Roofing Manufacturer regarding recycling program instructions on collection and transport procedures.

3. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, provide necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over NWP felt or plywood over insulation board shall be provided for new and existing roof areas that receive rooftop traffic during construction.
   a. Single-source, responsible party to resolve trade damage issues before proceeding with roof system installation.

E. Environmental Conditions:

1. Roofing materials shall meet the environmental requirements specified in Section 018113.

2. Product substitutions shall be approved in writing, prior to use, by the Owner or Architect as specified in Section 018113.

3. Comply with manufacturer’s requirements and recommendations for ambient and surface temperatures and humidity for application and curing.

1.10 WARRANTY

A. Manufacturer Warranty: Provide a 20-year full-system labor and material warranty to cover the replacement of damaged roofing and insulation materials and repair leaks due to defective materials or workmanship for the term of the warranty.

1. Warranty shall not have restrictions to void the warranty such as “damage resulting from foot traffic” or “defects resulting in leaks due to installation”.

2. Prior to award of contract, provide sample of actual manufacturer’s warranty for the District’s review and acceptance.
3. Warranty shall cover from base flashing termination at parapet wall to same at opposite end and/or side of roof, or from outside edge to outside edge if applicable. All details for penetrations, seismic joints, roof hatches, sheet metal, mechanical pads and mechanical/plumbing/electrical penetrations are covered under the warranty. All flashing materials integrally related to the termination of the roofing system, whether manufactured by the roofing manufacturer or not, shall be covered under the warranty.

4. Warranty shall not include provision for decreasing the value over the 20-year term of the warranty

5. Warranty shall state that roof system is warranted for Exposure C winds up to maximum expected mph.

6. Warranty shall be issued upon completion of installation of the roof system to the manufacturer’s satisfaction, and receipt by manufacturer of final payment from the applicator.
   a. Applicator shall submit executed manufacturer’s warranty to receive final retention funds held.
   b. District will enter into separate maintenance agreement with roofing system manufacturer to keep system warranty in good standing.

B. Contractory Warranty:
   1. Provide a 5-year workmanship warranty to repair defects in the event work related to installation of roofing, flashing, or metal found to be within the labor and materials warranty period is defective or otherwise not in accordance with the Contract Documents. The warranty shall be issued directly to the District.
   2. Provide a 5-year Workmanship Warranty to repair defects in the event work related to installation of roofing, flashing, or metal found to be within the Contractor warranty term, defective or otherwise not in accordance with the Contract Documents.
   3. Upon completion of installation of the roof system, submit executed contractor’s Warranty to receive final retention funds held.
   4. Within 60 days prior to expiration of the Contractor warranty, the Contractor shall be required to schedule an inspection of the entire project, repair any deficiencies and provide a letter to the District detailing the results/observations of the inspection and any resultant repairs.

C. Final Inspection shall be made by the District’s Quality Control Observer and a representative of the membrane Manufacturer’s technical department. Deficiencies found shall be corrected by applicator at no cost to the District prior to issuance of Warranty. If the District determines that reinspection is required of the roof consultant by the District, cost of the Quality Control Observer’s services and expenses shall be paid by Contractor.

D. Bonds required for this project shall be set forth in the District’s General Conditions.

E. Disclaimers and Limitations:
   1. Manufacturer’s disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturer’s disclaimers and limitations on product
warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

F. Warranty Requirements:
1. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.
2. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.
3. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the District has benefited from use of the Work through a portion of its anticipated useful service life.
4. District's Recourse: Expressed warranties made to the District are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the District can enforce such other duties, obligations, rights, or remedies.

PART 2 - PRODUCTS

2.01 MANUFACTURERS


B. Acceptable Manufacturers, listed alphabetically:
1. Carlisle SynTec, Carlisle, PA (800) 434-2279.

C. Acceptable Manufacturers of Accessory Products: Provide accessory products by the manufacturer of the roofing system proposed for use. Where a product is not available from the roofing system manufacturer, provide product acceptable to the roofing system manufacturer.

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
1. Product substitutions shall be approved in writing, prior to use, by the Architect as specified in Section 018113.
2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Underwriters Laboratories, Inc. (UL) - Class A Fire Hazard Classification and Class 90 Wind Uplift Resistance Classification.
   2. Factory Mutual (FM):
      a. Class 1-90 Wind Uplift Resistance Classification.
      b. FM Approvals 4450 and 4470 Class 1 ratings.
   3. Conform to regulations of public agencies including any specific requirements of the city and state of jurisdiction.
   4. Roofs shall be Energy Star listed without need to apply field coatings.
   5. Comply with Cool Roof Rating Council (CRRC) requirements without need to apply field coatings.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Sustainable Sites: For additional information on LEED goal requirements, refer to Section 018113.
   1. SS Credit 7.2 - Heat Island Effect--Roof:
      a. Option 1 Roof (Solar Reflectance Index): Roof materials contributing to 75 percent of the total available roof area shall have a factory-coated cap sheet with a minimum SRI of 78 for low-sloped (</=2:12) roofs and a minimum SRI of 29 for steep-sloped roofs.

B. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 SYSTEM DESCRIPTION

A. Mechanically-Fastened System: Thermoplastic Polyolefin (TPO) sheet roofing membrane installed over roof underlayment board and roof insulation board, and mechanically-fastened to metal deck.
   1. Design of system is based on GAF Evergard Membrane TPO, or equal.
   2. System is composed of the following components:
      a. EverGuard TPO.
      b. Drill-Tec Fastener and Membrane Plates.
      c. Drill-Tec Insulation Fastener and Plates.
      d. EnergyGuard Polyiso Insulation.
B. Fully-Adhered System: Thermoplastic Polyolefin (TPO) sheet roofing membrane installed over roof underlayment board, and fully adhered to parapets.

1. Design of system is based on GAF Evergard Fleece-Back TPO Membrane, or equal.
2. System is composed of the following components:
   a. EverGuard Fleece-Back TPO Membrane.
   b. EverGuard Low VOC TPO Bonding Adhesive.
   c. Drill-Tec Insulation Fastener and Plates.
   d. EnergyGuard Polyiso Insulation.

2.05 ROOFING MEMBRANE

A. Membrane Material:
   1. Roof Areas: sheet membrane with internal mat reinforcement.
      a. Integral 9-ounce polyester fleece backing (feltback).
   2. Polymer Thickness: 60 mils.
      a. Certification of the polymer and total thicknesses shall be signed by the membrane manufacturer's quality control manager. ASTM plus-or-minus tolerance for membrane thickness is not acceptable.
   3. Sheet Size: Provide 10-foot wide sheets or as required to minimize membrane laps.
   4. Color: Energy Gray 322, initial reflectivity of 0.83, initial emissivity 0.92, and solar reflective index (SRI) of >78 100.
   5. Membrane shall meet the following additional conditions:
      a. Manufacturer shall produce its own material. Third-party or private labeled membranes are not acceptable.
      b. Manufacturer shall not list any exclusion of warranty coverage for ponding/standing water conditions.
      c. Mil thickness shall have a tolerance of ±2 mils. Membrane will be checked during installation for mil thickness compliance. If deviation from mil thickness tolerance is found, entire order or shipment shall be returned to the manufacturer for replacement with specified material.
      d. Membrane must include a minimum of 22 mils of polymer thickness above the scrim.

B. Physical Properties: In accordance with ASTM D 4434, Type II, Grade 1 properties table for polyester mat reinforcement.

2.06 INSULATION

A. Refer to Section 072216 for roof board insulation and tapered insulation strips.

2.07 UNDERLAYMENT

A. Refer to Section 072221 for roof board underlayment and tapered filler strips.
   1. Provide manufacturer recommended underlayment board.

B. Mechanical Fasteners: Manufacturer's standard, FMRC-listed as approved for use in the wind uplift mode specified.
2.08 FLASHING

A. Flashing, General: In accordance with roofing system manufacturer’s recommendations.

B. Wall/Curb Flashing:
   1. Type A Flashing Membrane: 60 mil minimum polyester reinforced membrane adhered to approved substrate using re-activating type vertical bonding adhesive.
   2. Type B Flashing Membrane: 60 mil minimum polyester reinforced membrane used for mechanically-attached flashings to approved substrate using manufacturer-approved plates and/or attachment bar.
   3. TPO-Clad Base Flashing Membrane: TPO-coated, heat-weldable 25 gage G90 galvanized metal sheet with a 20 mil unsupported TPO membrane laminated on one side. Sheet size shall be 4 feet x 10 feet.

C. Miscellaneous Flashing:
   1. Expansion Joint Flashing: A prefabricated expansion joint cover made from TPO membrane, and designed for securement to wall or horizontal surfaces to span and accommodate the movement of new and existing expansion gaps from 1-inch to 4-1/2 inches across. Material shall be available in 40 foot rolls.
   2. Termination Reglet: A heavy-duty, extruded aluminum flashing termination reglet used at walls and large curbs. Termination reglet is produced from 6063-T5, 0.10-inch to 0.12-inch thick extruded aluminum, has a 2-1/2-inch deep profile, and is provided in 10 foot lengths. Use prefabricated mitered inside and outside corners where walls intersect.
   a. Flash roof safety anchors in a similar manner.
   4. T-Patch Membrane: Circular 0.048-inch thick TPO membrane patch welded over T-joints formed by overlapping thick membranes.
   5. Corner Membrane: Prefabricated outside and inside flashing corners made of 0.060-inch thick membrane that are heat-welded to membrane or TPO-clad base flashings.
   6. Multi-Purpose Sealant: Manufacturer’s recommended sealant used at flashing terminations.
   7. Vertical Flashing Adhesive: VOC compliant, reactivating type adhesive used to attach membrane to flashing substrate.
   8. Felt Flashing: A non-woven polyester or polypropylene mat cushion layer that is necessary behind TPO flashing membrane when flashing substrates are rough-surfaced or incompatible with the flashing membrane. Consult Product Data Sheets for additional information.
   9. TPO Coverstrip: 8-inch wide precut flashing made from polyester reinforced TPO membrane. Use to coverstrip plates and attachment bars at various locations.

2.09 CANT STRIPS

A. Cants: Preformed or precut material in configurations indicated on the Contract Drawings.
B. Physical Characteristics: Provide material having physical characteristics no less beneficial than the following:

1. Surface-burning Characteristics:
   b. Smoke Developed: 5.

2. Compression Resistance: At 5 percent consolidation, 35 psi.

3. Water Absorption: 1.20 percent by volume.

4. Weight: For a 1-inch thickness, 0.90-pound per square foot.

5. Tensile Strength: 4 psi, laminar.

6. Thickness: Not less than that specified by the manufacturer for the flute span of the metal decking provided.

### 2.10 ATTACHMENT COMPONENTS

A. Membrane Adhesive:

1. Membrane Adhesive at Roof Underlayment Substrates: Manufacturer’s recommended contact adhesive for bonding roof membranes and flashings to substrate.

2. Feltback Membrane Adhesive at Concrete Substrates: Water-based, VOC compliant, single component urethane adhesive used to attach the feltback membrane to the horizontal or near-horizontal concrete substrate.
   a. Consult Product Data Sheets for application rate additional information.

3. Vertical Flashing Membrane Adhesive: Water-based, contact-type adhesive used to attach the membrane to the flashing substrate.
   a. Consult Product Data Sheets for application rate and additional information.

4. Application Rate: Consult with membrane manufacturer for application rates over various substrates.

B. Membrane Termination Bar: Low profile flat, extruded aluminum, bar, 1 inch wide by 1/8-inch thick that has predrilled holes at 6 inches on centers, and used with required fasteners to attach to roof deck or to walls/curbs at terminations, penetrations, as well as at incline changes of the substrate.

### 2.11 WALKWAY PROTECTION

A. Walk Treads Units (Traffic Padding): Polyester reinforced, 0.096-inch, weldable membrane with surface embossment, used as a protection layer from rooftop traffic.

1. Color shall be light gray.

### 2.12 ACCESSORY MATERIALS

A. Accessories: Provide GAF EverGuare TPO Prefabricated Accessories including primers, batten strips, adhesives, sealants, mastics, prefabricated pipe flashing, liquid sealers, and appropriate cleaning agents and solvents as recommended by membrane manufacturer for conditions encountered.

B. Sealants: Urethane-based one-part multi-purpose sealant.
C. Sealing Tape Strip: Compressible foam with pressure-sensitive adhesive on one side. Used with metal flashings as a preventive measure against air and wind blown moisture entry.

D. Aluminum Tape: 2-inch wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at TPO-clad metal joints.

E. Multi-Purpose Tape: High performance sealant tape used with metal flashings as a preventive measure against air and wind blown moisture entry.

F. Membrane Cleaner: High quality solvent cleaner used for the general cleaning of residual asphalt and scuff marks from membrane surface. Membrane cleaner is also used daily to clean seam areas prior to hot-air welding in tear off or dirty conditions or if the membrane is not welded the same day it is unrolled.

G. Portable Pipe Hangers: Manufacturer's standard.

H. Pipe and Equipment Supports: Strut-based support supported on an engineered thermoplastic base with UV stabilizer, ‘Caddy Pyramid ST’ Series with fixed struts for equipment support and ‘Caddy Pyramid 50’ with polyethylene closed-cell foam base with 16 gage galvanized steel for light pipe support. The roof and equipment support system shall be as manufactured by ERICO International Corporation, Solon, Ohio, or approved equal.

I. Flashing System at Vertical Surfaces: Flashing at walls and parapets shall comprise a surface-mounted reglet and a snap-in counter flashing in minimum 24 gage galvanized steel standard zinc finish. Reglet shall be surface-mounted, installed on wall with drive pins that are sealed with special washers. Counter flashing shall snap-in under the reglet and designed to withstand wind velocities up to 110 mph up to 2 hours. ‘SM’ reglet and ‘Springlok’ counter flashing shall be as manufactured by Fry Reglet Corporation or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces scheduled to receive roofing to ensure that they are smooth, dry, and free from oils, grease, and conditions that will adversely affect execution, permanence, or quality of work.

1. Verify that roof surfaces slope at least 1/4-inch per foot. Tapered insulation or lightweight insulating concrete shall to be used to build proper slope where required.
   a. Ponding of water areas shall not be greater than 18 inches in any direction.

2. The surface of the insulation or substrate shall be inspected prior to installation of the TPO feltback roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination.

B. Verification for Commissioning:

1. Define water testing requirements as part of BECx.
3.02 PREPARATION

A. Construction Indoor Air Quality Management: If building is enclosed at time of application, temporarily seal penetrations and cover roof openings to the building interior to protect indoor air quality by blocking entry of VOC pollutants in accordance with Section 018119.

3.03 INSTALLATION, GENERAL

A. General:
1. Manufacturer's technical representative shall be required to be present as necessary to ensure proper installation.
2. Install materials in accordance with manufacturer's printed instructions.
3. Roofing membrane shall encapsulate all equipment pads and parapet walls where indicated on Contract Drawings, in accordance with manufacturer's details.
   a. Where applicable, edge metal shall be TPO-coated galvanized steel where the membrane terminates directly to the metal.
4. Provide inspection of the roofing system as specified in Article 3.10.

B. Flashing:
1. Apply the TPO membrane flashing sheet in accordance with manufacturer's specifications. Flashing sheet shall be of sufficient width to extend from the top edge of the flashing a minimum of 6-inches past the base angle (toe) onto the roof.
2. For adherence methods and procedures, conform to manufacturer's published instructions.
3. Fasten membrane edges with membrane termination bar.
4. Completely bond flashing to the underlying surface. Remove and replace any loose flashings. Slit overlap and press down fishmouths or other deficiencies and patch with a piece of the membrane. The patch must extend the full width of the flashing (from top to bottom termination points) and extend a minimum of 6 inches in the other directions from the deficiency. Treat the exposed edges of the patches as vertical flashing laps.
5. Fasten top of flashing under metal counterflashing at manufacturer's recommended spacing using manufacturer's provided membrane termination bar and appropriate fasteners.
6. Flash penetrations passing through membrane.
7. Use factory prefabricated pipe flashings where installation is possible.
8. When prefabricated pipe flashings cannot be used, field fabricate pipe seals.
9. Terminations:
   a. Provide water cutoffs at end of each day's work.
   b. Pull membrane loose from water cutoff and remove contaminated material before resuming work.

C. Roof Drain Flashings:
1. Install tapered insulation to drain elevation.
2. Trim field sheet where tapered insulation starts. Install plates and fasteners at insulation transition.
3. Cut membrane flashing allowing for a minimum 4 inch overlap onto the field sheet. Leave a minimum 1 inch of membrane extending into the drain bowl.
4. Adhere membrane to roof underlayment board.
5. Install sealant under flashing membrane at clamping ring and drain flange.
6. Install clamping ring and tighten fasteners.

D. Insulation Installation: Refer to Section 072216.

E. Roof Underlayment Installation: Refer to Section 072221.

F. Equipment Pads:
1. Adhere membrane over equipment supports or pads prior to reinstallation of mechanical equipment.
2. Install secondary protection membrane under each equipment isolator pad prior to attachment into curb/platform.
3. Use approved grommet fasteners at all exposed attachment locations.

3.04 INSTALLATION, MEMBRANE

A. General:
1. Cut sheets to maximum size possible in order to minimize seams.
2. Adhered System:
   a. Unroll membrane over prepared substrate.
   b. Allow membrane to relax for 1/2 hour before beginning installation.
   c. Lap adjoining sheets a minimum of 6 inches.
   d. Clean lap areas in accordance with manufacturer's written instructions.
   e. Install attachment devices and plates at spacings recommended by manufacturer of the roofing system.
   f. Perform molecular hot-air weld (seal) seams using hot air devices and tools recommended by manufacturer of roofing system.

B. Membrane Installation: Comply with manufacturer's printed instructions.
1. TPO membrane shall be adhered according to roofing manufacturer's and Factory Mutual's requirements.
2. Membrane overlaps shall be shingled with the flow of water where possible.
3. Tack welding membrane for purposes of temporary restraint during installation is not permitted.

C. Perimeter and Corner Areas: Over the properly installed and prepared absorbent substrate, membrane bonding adhesive shall be poured out of the pail and spread using notched squeegees. The adhesive shall be applied at a rate according to roofing manufacturer's requirements (no adhesive is placed on back of the membrane). The formation of a film on the surface of the adhesive shall not be allowed to occur. The membrane shall be carefully unrolled into the wet adhesive while the edges are overlapped 3 inches. The membrane shall be pressed firmly into the adhesive layer with a water-filled, foam-covered lawn roller by frequent rolling in two directions.
1. Membrane bonding adhesive shall not be used if temperatures below 40° F are expected during application or subsequent drying time.
2. No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.
3. Hot-air weld overlaps according to manufacturer's recommendations.
4. Seam test cuts shall be taken at least 3 times per day.
5. Parapets: Up to 36 Inches High: Comply with manufacturers recommendations for mechanical and adhesive application. Provide mechanical fastening up to 54 Inches high maximum. Secure with termination bar as recommended by manufacturer.

D Securement Around Rooftop Penetrations:
1. Around perimeters, at the base of walls, drains, curbs, vent pipes, or any other roof penetrations, membrane attachment bars shall be installed as required by roofing manufacturer. Fasteners shall be installed in accordance with the manufacturer's instructions using the fastener manufacturer's recommended torque-sensitive fastening tools with depth locators. Fasteners shall clamp the membrane tightly to the substrate.

3.05 HOT-AIR WELDING
A. General:
1. Seams shall be hot-air welded. Seam overlaps shall be 3 inches wide when automatic machine-welded, and 4 inches wide when hand welded, except for certain details.
2. Membrane to be welded shall be clean and dry.
B. Welding: Hand- or machine-welded in accordance with manufacturer's instructions.

3.06 MEMBRANE FLASHINGS
A. Vertical Flashing Adhesive:
1. Over the properly installed and prepared flashing substrate, adhesive shall be applied according to instructions found on the manufacturer's product data sheet. Adhesive shall be applied in smooth, even coats with no gaps, globs, or similar inconsistencies. Only an area that can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.
2. No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.
B. Install membrane discs according to the Contract Drawings with approved attachments into the structural deck at the base of parapets, walls, and curbs. Membrane discs may be required by roofing manufacturer at the base of all tapered edge strips and at transitions, peaks, and valleys according to manufacturers approved details.
C. Follow manufacturer's requirements and recommendations and comply with the specifications.
D. Flashings shall extend a minimum of 8 inches above finished roofing level unless otherwise accepted in writing by the Architect and the roofing manufacturer's technical department.
E. Flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the TPO membrane.

F. Flashing membranes shall be mechanically fastened along the counter-flashed top edge with attachment disc or attachment bar at 6 to 8 inches on centers.

G. TPO membrane flashings shall be terminated according to roofing manufacturer's recommended details.

H. Adhered flashings that exceed 18 inches in height shall receive additional securement. Consult roofing manufacturer's technical department for securement methods.

3.07 METAL FLASHINGS

A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of FM and SMACNA.

B. Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.

C. Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.

D. Metal joints shall be watertight.

E. Metal flashings shall be securely fastened into layers of roof board underlayment blocking. Fasteners shall penetrate nailers a minimum of 1 inch.

F. Counter flashings shall overlap base flashings a minimum of 4 inches.

G. Airtight and continuous metal hook strips are required behind metal fascias. Hook strips shall be fastened 12 inches on centers into nailers.

H. Hook strips shall extend past nailers over wall surfaces by 1-1/2-inch minimum and shall be securely sealed from air entry.

3.08 METAL BASE FLASHINGS

A. TPO-clad metal flashings shall be formed and installed in accordance with the Contract Drawings.

1. Metal flashings shall be fastened into layers of board underlayment blocking with two rows of post galvanized flat head annular ring nails, 4 inches on centers, staggered. Fasteners shall penetrate the nailer a minimum of 1 inch.

2. Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

3. Set outside edge of the TPO clad metal flashing into 2-sided butyl tape.

B. Adjacent sheets of Sarnaclad shall be spaced 1/4-inch apart. The joint shall be covered with 2-inch wide aluminum tape. A 4-inch minimum wide strip of TPO flashing membrane shall be hot-air welded over the joint.

3.09 WALKWAY INSTALLATION

A. Walkway Treads: Roofing membrane to receive walkway surfacing shall be clean and dry. Apply a continuous coat of bonding adhesive to the deck
sheet and the back of treads in accordance with roofing manufacturer's technical requirements and press treads into place with a water-filled, foam-covered lawn roller. Hot-air weld the entire perimeter of the Walkway to the TPO deck sheet.

3.10 FIELD QUALITY REQUIREMENTS

A. Pay for full time technical inspector to monitor the installation of all roofing products.

B. One inch wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the applicator at no extra cost to the District.

C. Test cuts, when so required, shall be approximately four inches wide by 42 inches long, cut at right angles to the direction of the length of the plies and, when possible, shall be made prior to the application of the surfacing.

D. Tolerances: Areas of ponding water shall be limited to maximum 18-inch dimension in any direction.

E. Coordinate with Commissioning:
   1. Verify roof flood testing per ASTM D 5957 as part of BECx.
   2. Verify roof sealant pull testing per ASTM C 1193 as part of BECx.

3.11 ADJUSTING AND CLEANING

A. Keep the roof and premises clean and free of accumulations of waste materials and rubbish at all times. Remove all debris, scrap and rubbish from the work area daily. Do not throw or drop material from the roof.

B. Promptly remove surplus materials and all equipment from the site upon completion of the work. In case of undue delay or dispute, District may remove rubbish, materials and equipment and charge cost to Contractor, with such action permissible by District 48 hours after a written notice has been transmitted to Contractor.

C. Prior to final acceptance, restore all areas affected by this work to their original state of cleanliness and repair all damage done to the premises, including the grounds, by workmen and equipment.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Sheet metal flashing and roof-related metal components.
   1. Include related non-metal flexible waterproof membranes used as flashing underlayments and as indicated on the Contract Drawings.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 014500 - Quality Control.
   5. Section 018113 - Sustainable Design Requirements.
   6. Section 014339 - Mockups.
   7. Section 050513 - Shop-Applied Coatings for Metals.
   8. Section 075423 - Thermoplastic Polyolefin Roofing: Related membrane flashing work.
   9. Section 078400 - Firestopping.
   10. Section 079200 - Joint Sealants.
   11. Section 099100 - Painting.
   12. Section 099600 - High Performance Coatings.

C. Related Sections:
   1. Section 055000 - Metal Fabrications: Steel pipe downspout.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. A 653-15 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   3. A 666-15 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Strip, Plate, and Flat Bar.

B. California Code of Regulations (CCR):
1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      1) Section 1504 - Performance Requirements.
      2) Section 1507 - Clay and Concrete Tile.

C. American Architectural Manufacturers Association (AAMA):

D. American Welding Society (AWS):
1. D1.3 - Structural Welding Code - Sheet Steel.

E. FM Global (FM):
   a. 1-49 - Perimeter Flashing.

F. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):

G. Single Ply Roofing Institute (ANSI/SPRI/FM4435):

H. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Gage Equivalents: The following common gage equivalences for decimal thicknesses at galvanized sheet metal are for reference only:
1. 0.064-inch - 16 gage.
2. 0.052-inch - 18 gage.
3. 0.040-inch - 20 gage.
4. 0.034-inch - 22 gage.
5. 0.028-inch - 24 gage.
6. 0.022-inch - 26 gage.

B. Stainless steel thicknesses are given in decimal inch measurements only.
1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.05 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer’s descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings describing the fabrication and installation of sheet metal work.

C. Samples: In accordance with the provisions of Section 013300, submit samples of manufactured items.

D. Inspection Report for Information: Copy of elastomeric flashing manufacturer’s inspection report of completed elastomeric flashing systems.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 QUALITY ASSURANCE

A. Fabricator Qualifications: Fabricators of copings, fascias, and gravel stops shall be certified by NRCA’s ANSI/SPRI ES-1 ITS Certifications for Shop-fabricated Edge Metal Flashings.

B. Level of Care: The Contract Drawings indicate a level of care regarding the flashing and sheet metal work. Contractor shall provide flashings with the same level of care at conditions not specifically detailed on the documents. Contractor shall provide a watertight building envelope.
C. Mockups: Prepare mockup in accordance with requirements specified in Section 014339.

1.08 WARRANTY

A. Manufacturer’s Guaranty:
1. Pre-finished metal material shall require a written 20-year non-prorated warranty covering fading, chalking, and film integrity. The material shall not show a color change greater than 5 NBS color units per ASTM D 2244 or chalking excess of 8 units per ASTM D 4214. If either occurs material shall be replaced at no cost to the Owner.

B. Contractor Bonded Warranty:
1. Provide a notarized written warranty assuring that all sheet metal work including caulking and fasteners will be water-tight and secure for a period of 2 years from the date of final acceptance of the project. Warranty shall include all materials and workmanship required to repair all leaks that develop, and make good any damage to other work or equipment caused by such leaks or repairs.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Referenced Manufacturers:
1. Buildex, a division of Illinois Tool Works, Elk Grove Village, IL.
3. Fry Reglet Corporation, Alhambra, CA (213)289-4744.
6. Polyken Technologies, Tulsa, OK (918)627-3635, division of Kendall International, Inc.
7. Rainguard Products Co., Inglewood, CA (213)670-2953.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of another manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: If not otherwise detailed, comply with applicable recommendations of the SMACNA Manual.
1. Copings, fascias, and gravel stops, as applicable, shall be designed, fabricated, and installed for wind loads required by code, and tested for resistance in accordance with ANSI/SPRI ES-1, as required by CBC 1504.5.
B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE CRITERIA

A. Thermal Movement:
   1. Completed system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.
   2. Interface between fascia, cant dam and flashing, and coping and anchor plate shall provide for unrestrained thermal movement in direction along the longitudinal direction with no penetration of cant, roofing membrane, or anchor plate by mechanical fastening devices.

2.05 MATERIALS

A. Sheet Metal Flashing: Where indicated as "sheet metal" in Contract Drawings and Specifications, design of flashing and accessory applications is based on the use of galvanized steel unless stainless steel or other type of non-ferrous metal is indicated on Contract Drawings. Where thicknesses are indicated for galvanized metal, use equivalent thicknesses for other metals as indicated in SMACNA Manual.
   1. Steel: Galvanized sheet, lock-forming quality, coating designation G60 in accordance with ASTM A 653, not chemically treated, not oiled.
      a. Finish: Refer to Article 2.12.
   2. Aluminum: Conform to the requirements of ASTM B 209, or as required by forming operations.
      a. Finish: Refer to Article 2.12.
   3. Stainless Steel: Type 316 conforming to ASTM A 240.
      a. Finish: No. 4 satin polished finish
4. PVC-Clad:
   a. Where installed in conjunction with roofing system specified in Section Error! Reference source not found., provide galvanized, factory-coated sheet metal equal to cladded metal provided by single ply roofing manufacturer.
      1) Finish: Coordinate with metal flashing finish specified in Section Error! Reference source not found. Refer to Article 2.12.

B. Membrane Flashing:

C. Accessory Materials:
   1. Solder: Lead free type, conforming to ASTM B 32.
      a. Flux: Conform to FS O-F-506C, Type I, Form A or B.
   4. Slip Sheet: Building paper, FS UU-B-790, Type I (No. 15), Grade A (high water-vapor resistance), Style 1b (uncreped, not reinforced, red rosin sized).
   5. Sealants: Refer to Section 079200.

D. Fasteners: Where possible, use same materials as metal flashings being fastened. Exposed fasteners shall have 5/8-inch steel/EPDM washers under the head. Fasteners shall be selected for resistance to rust and corrosion.
   1. Sheet Metal to Wood Nailers:
      a. Exposed Application: No. 10 screws minimum. Penetrate wood blocking 1-1/2 inches minimum. Installed withdrawal resistance shall be a minimum of 150 pounds per screw.
   2. Sheet Metal to Sheet Metal: Self-tapping sheet metal screws of 1/2-inch length and a No. 8 minimum diameter. HWH screw with bonded washer equal to ITW Buildex ICH Traxx self-drilling fastener with bonded washer.
   3. Concrete and Masonry Anchors: Specially threaded anchors, equal to Tapcon, 3/16-inch minimum diameter, length to penetrate minimum 1-1/2 inches through concrete or masonry, as manufactured by Buildex. Installed withdrawal resistance shall be a minimum of 150 pounds force per anchor.
2.06 MANUFACTURED COMPONENTS

A. Standard Products: Counterflashing, through flashings, reglets, gravel stops, copings, and edgings in stock patterns, conforming to details on Contract Drawings, and as required to provide watertightness.
   1. Counterflashing Systems: Fry Reglet Springlok, or equal, of type appropriate to mounting surface, or as indicated on Contract Drawings.
      a. Refer to Article 2.07 for custom flashings.

B. Vent Pipe Penetrations: Refer to single ply membrane as part of roofing system, as specified in Section 075423.

2.07 FABRICATION, GENERAL

A. General: Conform to the recommendations of SMACNA Manual for fabricating items not specifically detailed or indicated in Contract Drawings.
   1. Hem all exposed edges.
   2. Angle bottom edges of exposed vertical surfaces to form drips.
   3. Shop weld in accordance with AWS D9.1 or D1.3, as applicable.
   5. Form corner, transition, and termination pieces as a single unit. Do not extend less than 4 inches nor more than 12 inches in any direction.
   6. Material thicknesses are minimum, but greater thicknesses shall be provided where recommended by SMACNA.
   7. Provide end dams at sill and head flashings.
   8. Stainless Steel Work: Fabricate of shapes and sizes detailed, with sharp clean profiles, precision formed, straight, and free from defects.
      a. Use fusion welding techniques, specifically intended for stainless steel.
      b. Grind and polish welds on exposed finished surfaces with No. 320 grit to blend with texture of adjacent surfaces.
      c. Provide No. 4 satin polished finish.

B. Seams:
   1. Seams: Fabricate non-moving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

C. Cleats and Straps:
   1. Material: Same as metal being secured.
   2. Fabricate cleats and attachment devices of sizes recommended by SMACNA Manual for application, but not less than one gage thicker than metal being secured.

D. Reglets:
   1. Masonry or Concrete: Fasten with drive pin with neoprene and stainless washer through expansion shields.
   2. Wood or Steel: Fasten with non ferrous screws appropriate to reglet material and backing.
2.08 FABRICATION, FLASHING

A. Counterflashing: Sheet metal, typically 0.028-inch, unless otherwise indicated on Contract Drawings.
   1. Provide compressible elastomeric tape to span irregularities.
B. Base Flashing: Refer to single ply membrane as part of roofing system, as specified in Section 075423.
C. Penetration Flashing at Roof Openings: Refer to single ply membrane as part of roofing system, as specified in Section 075423.
D. Drainage Pans: Refer to single ply membrane as part of roofing system, as specified in Section 075423.
E. Equipment Support Flashing: Refer to single ply membrane as part of roofing system, as specified in Section 075423.
F. Through-Wall Flashing:
   1. Material: Sheet metal, 0.040-inch.
   2. Provide welded end dams.
   3. Refer to Section 042200 for flexible flashings.

2.09 FABRICATION, CAPS

A. Copings, Parapet Caps:
   1. Material: Sheet metal, 0.034-inch, or as indicated on the Contract Drawings.
   2. Design: Conform to SMACNA Manual Figure 3-1, modified in accordance with Contract Drawings.
   3. Comply with SPRI/ANSI/FM4435 ES-1 and FM Class I-90 certifications for Zone 1 and Zone 2 windstorm resistance areas as tested by FM Global.
B. Gravel Stop at Fascia/Trim and Edge of Slabs:
   1. Material: Sheet metal, 0.034-inch.
   2. Design: Conform to details on Contract Drawings.
C. Fascia at Canopy:
   1. Material: Sheet metal, 0.064-inch.
   2. Design: SMACNA Manual Figure 2-9B, modified in accordance with details indicated on Contract Drawings.
      a. Drip: Provide fascia to soffit drip in accordance with Figure C-3, modified in accordance with details indicated on Contract Drawings.
      b. Butt Joint: Provide butt joint back up plate in accordance with Table 2-1, Figure J2, modified in accordance with details indicated on Contract Drawings.

2.10 FABRICATION, DRAINAGE

A. Overflows: Refer to Section 055000.
   1. Design: SMACNA Manual Figure 1-26, modified in accordance with details indicated on Contract Drawings.
B. Gutters: Refer to Section 055000.

C. Downspouts: Refer to Section 055000.

D. Splash Pans:
   1. Material: Sheet metal, 0.028-inch. Coat both sides with bituminous paint.
   2. Design: SMACNA Manual Figure 1-36, or as indicated on Contract Drawings.

2.11 FABRICATION, OTHER

A. Vent Pipe Penetrations:
   1. Stainless steel hose clamp with watertight sealant as indicated on the Contract Drawings.

2.12 FINISHES

A. Finish:
   1. Aluminum: Where not exposed to public view, furnish aluminum flashing with clear anodized finish.
   2. Aluminum: Where exposed to public view, furnish aluminum flashing with fluoropolymer conforming to the requirements of AAMA 2605, as specified in Section 050513.
      a. Color: Custom color as selected by Architect.
   3. Galvanized Steel: Finish galvanized metal with urethane coatings in accordance with Section 099600.
   4. PVC-clad Galvanized Steel: Roof locations exposed to view.
   5. Stainless Steel: No. 4 satin polished finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify the following:
   1. Substrates are smooth and clean to extent needed for sheet metal work.
   2. Reglets, cants, and blocking to receive sheet metal are installed and free of foreign matter.
   3. Shapes and dimensions of surfaces to be covered are in accordance with Contract Drawings.

3.02 PREPARATION

A. Surface Preparation: Back prime sheet metal when applying directly over wood or cementitious substrate.

3.03 INSTALLATION, GENERAL

A. General:
   1. Install work watertight, without waves, warps, buckles, fastening stresses, or distortion.
      a. Seal joints by continuous soldering, except at working joints.
      b. Employ concealed clips, cleats, and fastenings.
c. Make provisions for expansion and contraction in accordance with industry recognized standards.

d. Provide hemmed edges where applicable.

e. Locate seams and joints in alignment with joints in architectural features such as window mullions and plaster control joints.

2. Soldering:
   a. Pre-trim edges of sheet metal materials before soldering.
   b. Apply flux and begin soldering immediately.
   c. Soldering shall be performed slowly with well-heated soldering irons until the seams are thoroughly heated and the solder has been completely sweated through the full width of the seams.
   d. As work progresses, neutralize excess flux with 5 to 10 percent washing soda solution, and thoroughly rinse.

3. Welding: When required, perform welding in accordance with AWS D1.3 and D9.1, as applicable.


5. Dissimilar Metals: Apply asphalt coating compound 7-1/2 mils dry film thickness to each contacting face of dissimilar metals.

6. Self-Adhering Membrane:
   a. Apply over top of horizontal construction covered with other non-waterproofing type finish materials.

7. Sealant Tapes: Refer to Section 079200.

B. Seams:
   1. Flat Lock Seams: Exposed metal edges shall be turned back into hemmed edge. Refer to SMACNA Manual Figure 3-2.
      a. Finished width 3/4-inch.
      b. Four-ply flat lock, malleted tight.
      c. Sweat full with solder.
   2. Drive Lock Seams: Exposed metal edges shall be turned back and secured with double hook driven into place. Refer to SMACNA Manual Figure 3-2.
      a. Finished width 1-1/2 inches.
      b. Four-ply flat lock, malleted tight.
      c. Sweat full with solder.
   3. Soldered Lap Seams: Provide joggle lap joints between adjacent pieces overlapping 4 inches and set in sealant. Apply two beads of sealant as recommended by SMACNA Manual Figure 3-2.
      a. Use for heavy gage metal that inhibits bending.
      b. Lap Seams less than 4 inches shall be formed for strength and full-soldered.

C. Cleats and Straps:
   1. Spaced Cleats (concealed from view):
      a. Spacing: Two feet on centers.
      b. Secure to substrate with fasteners and cover heads with cleat tabs.
      c. Provide continuous cleats where indicated on Contract Drawings.
D. Reglets: Install straight, in-line, properly lapped and sealed with leakproof joints. Secure to substrate at 16 inches on centers using specified fasteners with stainless steel washers and neoprene pads.
   1. Install reglets with slip joints at expansion and seismic joints to allow for movement. Do not secure same section of reglet over wall panel joint.

3.04 INSTALLATION, FLASHING

A. Base and Counterflashing:
   1. Overlap base flashing 4 inches minimum.
   2. Install bottom edge tight against base flashing.
   3. Lap seam vertical joints 3 inches minimum, and apply urethane sealant.
   4. Miter, lap seam, and close corner joints with solder or urethane sealant.
   5. Counterflashing shall have interlocking endlaps, wind clips, and prefabricated corner pieces.

B. Penetration Flashing at Roof Openings:
   1. Base Flashing:
      a. Extend flange onto roof 6 inches minimum away from penetration.
      b. Extend flange upward around penetration to at least 8 inches above roofing.
      c. Fold back upper and side roof flange edges 1/2-inch minimum.
      d. Solder-lap joints.
   2. Counterflashing:
      a. Overlap base flashing 1 inch minimum with storm collar sloped away from penetration.
      b. Secure to penetration with draw band and sealant.

C. Drainage Pans:
   1. Drain rings shall be removed prior to application of roofing.
   2. Install drainage pans in accordance with Section 075423.
   3. Embed a 4-pound lead sheet flashing into asphaltic roof cement, set over the roofing, and extend under the clamping ring. Install two flashing/stripping plies in hot asphalt extending 3 inches and 6 inches respectively, followed by the surfacing sheet. Lead sheet shall terminate in sump and not extend onto roof surfaces.
      1) In the event that the drain sumps exceed 4 inches in depth, substitute a layer of SBS modified flashing sheet for the surfacing sheet.
   4. Set drain ring into asphaltic plastic roof cement and tighten.
   5. Re-install guard screen over drain.

D. Equipment Support Flashing:
   1. Fully cap support.
   2. Overlap base flashing 4 inches.
   4. Provide sealant around penetration through flashing.

E. Through-wall Flashing:
   1. Start flashing 1/2-inch behind exposed face of wall and extend through wall.
2. Lap-seam joints and seal with sealant.
3. Provide sealant around penetrations through flashing.

3.05 INSTALLATION, CAPS

A. Copings, Parapet Caps:
   1. Install over self-adhering flexible flashing membrane where PVC roofing does not occur.
   3. Install anchor plates with concealed fasteners at 6 feet on centers maximum. Install concealed splice plates set in mastic at coping intersections. Do not lap coping sections.
   4. Snap copings into place over anchor plates and splice plates, with minimum 1/4-inch wide joints over splice plate intersections. Set copings over splice plates in with extruded butyl tape, 1/2-inch from intersection edges.
   5. Make weathertight fit, allowing for expansion and contraction.

B. Gravel Stop at Fascia/Trim:
   1. Set in adhesive.

C. Fascia at Canopy:
   1. Install with minimum number of butt joints, spaced 1/8-inch at average expected temperature range to allow for expansion and contraction. Seal with elastomeric sealant specified in Section 079200.
   2. Secure with concealed clips and fasteners.

3.06 INSTALLATION, DRAINAGE

A. Gutters: Refer to Section 055000.
   1. Provide expansion joints centered between downspout connections, or at 10 feet maximum. Lap 1-inch, rivet on 2-inch centers and solder in accordance with recommendations of SMACNA Manual.
   2. Hangers: In accordance with recommendations of SMACNA.

B. Downspouts: Refer to Section 055000.

C. Splash Pans: Secure to roof surface with compatible adhesive or sealant.

3.07 INSTALLATION, OTHER

A. Vent Pipe Penetrations: In accordance with manufacturer’s recommendations for type of roof surface.

3.08 FIELD QUALITY REQUIREMENTS

A. Inspection: Arrange for elastomeric flashing manufacturer’s technical personnel to inspect installation of elastomeric flashing on completion of flashing installation.
   1. Notify Owner 48 hours in advance of date and time of inspection.

END OF SECTION
- SECTION 077233 -
ROOF HATCHES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Roof hatches.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 055000 - Metal Fabrications.
   5. Section 075423 - Thermoplastic-Polyolefin Roofing.
   6. Section 099100 - Painting.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 8 - Industrial Relations:
      a. Division 1 - Department of Industrial Relations.
      1) Chapter 4 - Division of Industrial Safety.
         a) Subchapter 7, General Industry Safety Orders.
         (1) Group I - General Physical Conditions and Structures.
            (a) Article 4 - Access, Work Space, and Work Areas.

B. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications describing fabrication and installation of roof hatches.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled
content for products having recycled content. Include statement indicating costs for each product having recycled content.

2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

**2.02 REGULATORY REQUIREMENTS**

A. Regulations: Where used in conjunction with fixed ladders, comply with requirements of CCR Title 8, § 3277 - Fixed Ladders.
   1. Comply with provisions of the local municipal security ordinance.

**2.03 SUSTAINABILITY REQUIREMENTS**

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

**2.04 PERFORMANCE CRITERIA**

A. Performance Requirements: Design roof hatches to withstand uplift due to expected wind loads indicated on Structural Contract Drawings.

**2.05 MANUFACTURED UNITS**

A. Ladder Access: Provide high security, self-flashing, integral curb roof hatch, 4 feet by 4 feet in size, equal to one of the following:
   2. Nystrom RHPB48x48S2T.

**2.06 FABRICATION**

A. Cover: 1/4-inch mill finish sheet aluminum with 18 gage aluminum liner and 3-inch beaded flange, neatly welded, brake-formed, hollow metal design with double-wall concealed polyisocyanurate R-18 insulation,
beaded, overlapping flange, fully welded at corners, and internally reinforced for 40 psf live load.
1. Provide extruded EPDM rubber gasket permanently adhered to cover.

B. Frame, Deck-Mounted Curb: 3/16" gray powder coated galvanized sheet steel, height 12 inches above top of roofing surface, provided with a 3-1/2-inch flange and holes for securing to the roof structure. Equip with integral metal cap flashing of the same material as the curb, fully welded at corners.
1. Provide 1-inch rigid insulation curb and 1-inch thick exterior grade fiberboard nailer secured to exterior face of curb.
2. Configure sloped curb to match roof slope to maintain level cover.

C. Hardware:
1. Provide heavy pintle hinges having non-removable pins. Provide frame mounted telescopic tube-enclosed torsion spring or pneumatic operators.
2. Provide positive 3-point snap latch with turn handles and padlocked slide bar or slide bolt hasps on the interior.
   a. Cover shall be equipped with automatic hold-open arm and vinyl covered grip handle to allow one-hand release. Hardware shall be zinc or cadmium plated.
   b. Provide smoke actuated devices where required by code.
3. Provide neoprene weathertight seal.

D. Finish: Factory prime, field reprime, and finish paint interior and exterior exposed metal components in accordance with Section 099600.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install work in accordance with the manufacturer's submittals, as accepted by Architect.

B. Secure roof hatches through deck to roof structure by fastening to steel deck, or as indicated on Contract Drawings.
1. Spacing of fasteners shall be 12 inches on centers, staggered on adjacent wood framing members, and at 8 inches on centers at high wind locations.
2. Seal curb flange to roof deck to prevent roofing adhesive from running into roof opening.

C. Install a 24 gage galvanized steel counterflashing insert underneath the integral cap flashing to overlap the top edge of the base flashing. Secure with 3/8-inch diameter head screws through 5/8-inch steel/neoprene washers, three per side, or at 12 inches on centers.

3.02 ADJUSTING

A. Adjust roof hatches for proper operation and ease of opening.

END OF SECTION
- SECTION 078400 -

FIRESTOPPING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Firestopping at openings through fire-rated construction.
   1. Firestopping shall be used generally in the following locations:
      a. Duct, cable, conduit, and piping penetrations through fire-rated roofs and floors, and through fire-rated partitions or fire walls.
      b. Penetrations of vertical service shafts.
      c. Penetrations in fire-rated partitions or openings in fire walls.
      d. Fire safing at top of partition conditions.
      e. Fire safing at fire-rated construction joints.
      f. Fire safing at edge of slab conditions.
   2. Include protection of plastic piping and cables in return air plenums.

B. Related Work: Provide firestopping in conjunction with work specified in the following Divisions:
   1. Division 21 and 22: Holes or voids created to extended fire suppression and supervisory systems through fire-rated roofs, floors, and walls.
   2. Divisions 23: Holes or voids created to extended mechanical systems through fire-rated roofs, supported floors, and walls.
   3. Division 25 to 28: Holes or voids created to extended electrical systems through fire-rated roofs, supported floors, and walls.

C. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

D. Related Sections:
   1. Section 092900 - Gypsum Board.

E. Apply firestopping solutions using industry standards, codes, performance requirements, and design criteria indicated.

1.02 REFERENCES

A. ASTM International (ASTM):
   3. E 2174-10a - Standard Practice for On-Site Inspection of Installed Fire Stops.
B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 7 - Fire and Smoke Protection Features.
         1) Section 703 - Fire-Resistance Rating and Fire Tests.
            a) 703.7 - Marking and Identification.
         2) Section 714 - Penetrations.
   2. Title 24, Part 11 - California Green Building Standards Code

C. Factory Mutual Global (FM):
   1. 4991 - Approval of Firestop Contractors.

D. National Fire Protection Association (NFPA):
   1. 13 - Installation of Sprinkler Systems, 2013 edition with California
      amendments.
   3. 72 - National Fire Alarm and Signaling Code, 2016 edition
      with California amendments.

E. Underwriters Laboratories (UL):
   1. 1479 - Fire Tests of Through-Penetration Fire Stops.
   2. Building Materials Directory:
      a. Through-Penetration Firestops Systems (XHEZ), and Fill, Void or
         Cavity Materials (XHHW).

F. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. AHJ: Authorities Having Jurisdiction or Governmental Agencies.

B. Firestopping: An intumescent and endothermic material, or combination
   (assembly) of materials, to retain the integrity of fire-rated construction
   by maintaining an effective barrier against the spread of flame, smoke,
   and gases.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implement-
   ing sustainable design requirements.

B. Coordinate the work of this Section with work performed under the
   Mechanical and Electrical Divisions of these Specifications.

C. System Details: Refer to manufacturer's guide for typical system and
   application details for conditions not otherwise detailed or specified.
   1. Review field conditions and provide all components necessary to
      achieve required fire ratings complying with UL listing requirements.
1.05 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for materials and prefabricated devices, providing descriptions sufficient for identification at the Project site.
   1. UL Listing Data: Submit actual UL Listing product data for assemblies that will be used on Project, including assemblies not specifically indicated on the Contract Drawings.

B. Shop Drawings: Submit in accordance with Section 013300 showing proposed material, reinforcement, anchorage, fastenings, and method of installation. Construction details shall reflect actual job conditions.

C. Quality Control Submittals:
   1. Certificates: Submit manufacturer’s letter of certification or certified laboratory test report that the material or combination of materials to be provided meet the requirements specified in ASTM E 814 and are classified in the UL Building Materials Directory.
   2. Manufacturer’s Instructions: Include manufacturer’s instructions for installation.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.07 QUALITY ASSURANCE

A. Qualifications: Firestopping shall be performed by a firestop contractor who is:
   1. Licensed by state or local authority, where applicable.
   2. Approved in accordance with FM Standard 4991.
   3. Shown to have successfully completed not less than five comparable scale projects.
   4. Trained by, and acceptable to, firestop material manufacturer.
   5. A member certificated and in good standing in the Firestop Contractors International Association (FCIA), or equivalent firestopping organization.

B. Inspection Agency: Independent inspection agency employed and paid by Owner to examine penetration firestopping in accordance with ASTM E 2174.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. 3M Fire Protection Products, St. Paul, MN, (800)328-1687, with branch offices in Los Angeles, CA (213)726-6300, and represented by Kerwin Company in Anaheim, CA (714)939-6887.
   5. Hevi-Duty/Nelson, a unit of General Signal, Tulsa, OK (918)627-5530, (800)331-7325, with representation in Huntington Beach, CA (714)898-3510.
   6. Hilti, Tulsa, OK (800)879-8000, with sales offices in Bell, CA (800)879-6000, ext 7521.

B. Acceptable Manufacturers of Firewall Signage:

C. Like materials shall be the products of one manufacturer and shall be either those upon which the design is based or equal products accepted in advance in accordance with Section 012500.
   1. Manufacturers must be able to match manufacturers listed in various UL Listings indicated in the Contract Drawings.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
2. **MR Credit 5 - Regional Materials:** Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. **LEED Goals for Indoor Environmental Quality:** For additional information on LEED goal requirements, refer to Section 018113.

1. **IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants:** Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

### 2.03 REGULATORY REQUIREMENTS

A. **Regulations:**
   1. Materials shall meet the requirements of CBC 703.7, CBC Section 714, and NFPA 70.
   2. Apply firestopping solutions using industry standards, codes, performance requirements, and design criteria indicated.

B. **Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks:** Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.

   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

### 2.04 MATERIALS

A. **Firestopping:** Asbestos-free and capable of maintaining an effective barrier against flame, smoke, and gases in compliance with the requirements of ASTM E 814 and ANSI/UL 1479.

   1. Materials shall be suitable for the firestopping of penetrations made by steel, glass, plastic, and insulated pipe.
   2. On insulated pipe, the fire-rating classification shall not require removal of the insulation.
   3. The rating of the firestops shall in no case be less than the rating of the fire-rated floor or wall assembly.

B. **Firestopping material:** shall constitute one or more of the following products, or equal, selected as most appropriate for the intended application, and based on the Contract Drawings and the manufacturer’s recommendations. Like materials shall be products of the same manufacturer.

   1. Hilti FS 601 Fire Caulk or FS One Sealant FS 601.
   4. Hilti CP 606 Firestop Sealant.
   5. Hilti CP 645 Wrap Strip.
   6. Hilti CP 767 Speed Strips.
8. Hilti CP 777 Speed Plugs.

C. Firestopping material to encase electrical outlet boxes in fire-rated walls:
   1. Equal to 3M Brand Fire Barrier Moldable Putty+ Pads (MPP+).

D. Curtainwall Insulation: Fibrous insulation for curtainwall backup and exterior panel enclosure shall be in accordance with Section 072100.

E. Safing Insulation:
   1. **Type O1**, Semi-Rigid, Unfaced: Insulation formed from fire-resistant mineral wool fibers and manufactured specifically as a barrier to the passage of fire and smoke.
      a. For packing and filling openings above fire-rated partitions at steel decking.
      b. Combustibility: Non-combustible.
      c. Surface Burning Characteristics: Tested with ASTM E 84.
         1) Flame Spread: 25.
         2) Smoke Developed: 50.
      d. Melting Point: In excess of 2000 degrees F.
      e. Fire Resistance: 1-hour.
      f. Design Basis: Safing Insulation/MW manufactured by OC Thermafiber, Safing Insulation manufactured by OC Thermafiber, or FBX Safing Insulation products manufactured by Fibrex Insulations, Inc.
   2. **Type O2**, Semi-Rigid, FSK-Faced: Insulation formed from fire-resistant mineral wool fibers and manufactured specifically as a barrier to the passage of fire and smoke.
      a. For packing and filling edge of slab openings at exterior walls and glazed framing.
      b. Combustibility: Non-combustible.
      c. Surface Burning Characteristics: Tested with ASTM E 84.
         1) Flame Spread: 25.
         2) Smoke Developed: 50.
      d. Melting Point: In excess of 2000 degrees F.
      e. Fire Resistance: 2-hour.
      f. Design Basis: Safing Insulation/MW with FSK vapor barrier manufactured by OC Thermafiber, Safing Insulation manufactured by OC Thermafiber, or safing products manufactured by Fibrex Insulations, Inc.
   3. **Type O3**, High-Density Ceramic or Mineral Fiber Safing:
      a. For packing and filling large and/or critical openings, usually behind a sealant or putty.
      b. Acceptable Products:
         Fibrex FBX Safing Insulation.
         1) Roxul Safe.
         2) OC Thermafiber.
      c. Comply with the requirements of Section 098100.
4. **Type O4**, Fire-Barrier (Acoustical) Putties:
   a. For closing large openings and joints typically over 1-inch wide, applied full depth or backed with a dense safing, as indicated in the Contract Drawings.
   b. Acceptable Products:
      1) Specified Technologies Inc. SSP Series Firestop Putty Pads.
      2) Chargar Nelson FSP Firestop Intumescent Putty.
      3) Unifrax Fiberfrax Fyre Putty.
   c. Comply with the requirements of Section 098100,

5. **Type O5**, Foamed-in-Place Silicone Sealant:
   a. For closing electrical ducts and cable trays where they penetrate construction, expanding and filling around and between separated cables, usually applied full depth of construction between permanent and temporary dams.
   b. Acceptable Products:
      1) 3M Brand Fire Barrier 2001 Silicone RTV Foam.
   c. Comply with the requirements of Section 098100,

**PART 3 - EXECUTION**

3.01 PREPARATION

A. Surface Preparation: Clean surfaces to receive firestopping materials. Remove dirt, grease, oil, loose materials, rust, or other substances that may affect installation or the fire resistance.

3.02 INSTALLATION

A. Install firestopping materials at locations required by building code in accordance with manufacturer's recommendations.
   1. Provide in thicknesses indicated on Contract Drawings.
   B. Seal voids made by penetrations to ensure an effective fire barrier.
   C. At holes or void openings 4 inches or larger install firestopping materials to support the required floor load, unless the opening is protected from possible loading or traffic.
   D. Wrap cables and PVC piping with plenum wrap in accordance with manufacturer's instructions. Secure with tie wire or banding and seal edges with foil tape.
   E. Safing Insulation: Insert at locations indicated on Contract Drawings or as required by Code, and secure in place with standard impaling Z-clips as required by code.
      1. Attach a light gage steel angle to vertical mullions horizontally at the edge of slab safing line to provide resistance to the compression fit of the safing.
      2. Provide 4-inch thick safing at perimeter of slab with slightly compressed fit and topped with 1-inch mortar compound flush with top of floor slab.
         a. Where mortar compound is not used on top of safing, use foil-faced safing and perimeter caulk with smoke seal caulk.
3.03 IDENTIFICATION

A. In accordance with CBC 703.7 and local codes, fire walls, fire barriers, fire partitions, smoke barriers, smoke partitions, or other walls required to have protected openings or penetrations, shall be effectively and permanently identified with signs or stenciling. Such identification shall:
   1. Be located in accessible concealed floor-ceiling or attic spaces;
   2. Be located within 15 feet of the end of each wall and be repeated at intervals not exceeding 30 feet measured horizontally along the wall or partition;
   3. Include lettering not less than 3-inch in height with a minimum 3/8-inch stroke in a contrasting color, and incorporating the suggested wording: **FIRE AND/OR SMOKE BARRIER – PROTECT ALL OPENINGS**, or other approved wording.
      a. AHJ-approved signage types such as placards, stencils, or pre-printed decals are acceptable.

3.04 FIELD QUALITY CONTROL

A. Areas of work shall remain accessible until inspection and approval by the firestopping inspector applicable code authorities.
   1. Examine firestopped areas to ensure proper installation prior to concealing or enclosing firestopped areas.

B. Independent inspection agency shall verify installation process and determine, in general, that firestopping has been installed in compliance with requirements of tested and listed firestop system.
   1. The inspector shall advise Contractor of any deficiencies noted within one working day.
   2. Where deficiencies are found, repair or replace the firestopping so that it complies with requirements of tested and listed system design.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Fire-resistive joint systems for the following:
1. Ceiling-to-wall joints.
2. Floor-to-wall joints.
3. Head-of-wall joints.
4. Wall-to-wall joints.
5. Perimeter fire-resistive joint systems consisting of floor-to-wall joints between perimeter edge of fire-resistance-rated floor assemblies and exterior curtain walls.
6. Perimeter fire-resistive joint systems consisting of wall-to-wall joints between perimeter edge of fire-resistance-rated wall assemblies and exterior curtain walls.

B. Referenced Sections:
1. Section 012500 - Substitution Procedures.
2. Section 013300 - Submittal Procedures.
3. Section 018113 - Sustainable Design Requirements.
4. Section 072100 - Thermal Insulation: For floor-to-wall joints indicated as perimeter fire-containment systems between perimeter edge of fire-resistance-rated floor assemblies and back of non-fire-resistance-rated exterior curtain walls.
5. Section 078400 - Firestopping: For systems installed in openings in walls and floors with and without penetrating items.

1.02 REFERENCES

A. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
1. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
2. Coordinate sizing of joints to accommodate fire-resistive joint systems.
3. Comply with applicable procedural requirements of Section 018113.
B. Scheduling: Notify Owner’s testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit for each type of product indicated.

C. Shop Drawings: Submit for each fire-resistive joint system; show each kind of construction condition in which joints are installed; show relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.
   1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.

D. Samples: Submit for each type.

E. Certificates: Submit for each type of fire-resistive joint system, signed by product manufacturer.

F. Qualification Data: Submit for Manufacturer and Installer.

G. Test Data: Submit field quality-control test reports.

H. Evaluation Reports:
   1. Research Reports: For each type of fire-resistive joint system.
   1. Submit evidence of fire-resistive joint systems’ compliance with ICBO ES AC30, from the ICBO Evaluation Service.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4.1 and MR Credit 4.2: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5.1 and MR Credit 5.2: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, Approval of Firestop Contractors.

B. Installation Responsibility: Assign installation of fire-resistive joint systems in Project to a single qualified Installer.
C. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Article 2.04:
   1. Fire-resistance tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
   2. Fire-resistant joint systems shall be identical to those tested in accordance with testing standard referenced in Article 2.06. Provide rated systems complying with the following:
      a. Fire-resistive joint system products shall bear classification marking of qualified testing agency.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.08 FIELD CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistant joint system manufacturer, or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure fire-resistive joint systems in accordance with manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   2. Grace Construction Products.
   3. Hilti, Inc.
   5. Specified Technologies Inc.
   6. 3M Fire Protection Products.

B. Like materials shall be products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. VOC Content: Provide fire-resistive joint systems that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Architectural Sealants: 250 g/L.
   2. Sealant Primers for Nonporous Substrates: 250 g/L.
   3. Sealant Primers for Porous Substrates: 775 g/L.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4.1 and MR Credit 4.2 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.
   2. MR Credit 5.1 and MR Credit 5.2 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.

2.04 PERFORMANCE REQUIREMENTS

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.

B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities and L-ratings indicated as determined by UL 2079.
   1. Load-bearing capabilities as determined by evaluation during the time of test.

C. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated in the Fire-Resistive Joint System Schedule in Part 3, as determined by NFPA 285 and UL 2079.
   1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.

D. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

2.05 MATERIALS

A. Products: Subject to compliance with requirements, provide fire-resistive joint systems specified in Section 072100, Section 078400, and Section 079200.

FIRE-RESISTIVE JOINT SEALANTS

078443 - 4
B. Safing Insulation:
   1. Semi-Rigid, FSK-Faced: Insulation formed from fire-resistant mineral wool fibers and manufactured specifically as a barrier to the passage of fire and smoke.
      a. Combustibility: Non-combustible.
      b. Surface Burning Characteristics:
         1) Flame Spread: 25.
         2) Smoke Developed: 0.
      c. Melting Point: In excess of 2000 degrees, F.
      d. Fire Resistance: 2-hour.
      e. Design Basis: Safing Insulation/MW with FSK vapor barrier manufactured by OC, Thermafiber Safing Insulation manufactured by Thermafiber, or safing products manufactured by Fibrex Insulations, Inc.

2.06 FIRE-RESISTIVE JOINT SYSTEMS

A. Compatibility: Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating assemblies in and between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or Between Fire-Resistance Rated Construction: Provide fire-resistive joint systems with ratings determined in accordance with ASTM E 1966 or UL 2079.

C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide fire-resistive joint systems with ratings determined by ASTM E 119 based on testing at a positive pressure differential of 0.01-inch w.g. or ASTM E 2307.
   1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
   2. Provide products for a complete assembly in accordance with testing per UL System No. CW-D-2042, or approved equal products in another tested assembly approved by Architect:
      a. Safing System: Max separation between edge of floor assembly and face of framing members (at time of installation) is 8 inches. The safing system is designed to accommodate vertical shear movement up to a max of 5 percent of its installed width. The safing system shall incorporate the following construction features:
         1) Forming Material: Nominal 4 pcf density mineral wool batt insulation. Batt sections cut to a min 4-inch width and stacked to a thickness which is min 25 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor slab. The stacked forming material is compressed 20 percent in the thickness direction and inserted cut-edge-first into the linear gap such that its top surface is flush with the top surface of the floor assembly. A maximum of one tightly-butted seam is permitted between Mullions. Additional pieces of forming material to be
friction-fit into spaces between mullion mounting clips at each mullion location.
   a) Product: Thermafiber SAF.

2) Fill, Void or Cavity Material: Minimum 1/8-inch wet thickness (minimum 1/16-inch dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2-inch onto the top surface of the floor and onto the curtain wall insulation and framing covers. When SpecSeal Fast Tack Spray is used, wet and dry thickness of spray is minimum 5/64-inch.
   a) Specified Technologies: SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray.

D. Products: Subject to compliance with requirements, provide one of the fire-resistive joint systems indicated for each application in the Fire-Resistive Joint System Schedule in Part 3.

E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Article 2.04. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of work.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
   1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
   2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Protection: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon
as possible without disturbing fire-resistant joint system's seal with substrates or damaging adjoining surfaces.

### 3.03 INSTALLATION

A. General: Install fire-resistant joint systems to comply with Article 2.04 and fire-resistant joint system manufacturer's written installation instructions for products and applications indicated.

B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for fire-resistant joint systems by proven techniques to produce the following results:
   1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
   2. Apply fill materials so they contact and adhere to substrates formed by joints.
   3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

D. Safing Insulation: Insert at locations indicated on Contract Drawings or as required by Code, and secure in place with standard impaling Z-clips as required by code.
   1. Provide 4-inch thick foil faced safing at perimeter of slab slightly compression fit, and topped with 1-inch mortar compound flush with top of floor slab.
      a. Where mortar compound is not used on top of safing, use foil-faced safing and perimeter caulk with smoke seal caulk.
   2. Refer to Section 078400 for firestopping of duct, cable, conduit, and piping penetrations through floor slabs and time-rated construction.

### 3.04 FIELD QUALITY CONTROL

A. Testing Services: Inspecting of completed installations of fire-resistant joint systems shall take place in successive stages as installation of fire-resistant joint systems proceeds. Do not proceed with installation of joint systems for the next area until testing agency determines completed work shows compliance with requirements.

B. Remove and replace fire-resistant joint systems where testing indicate that they do not comply with specified requirements.

C. Additional inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Do not enclose fire-resistant joint systems with other construction until testing reports are issued and fire-resistant joint systems are determined to comply with requirements.
3.05 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Interior and exterior joint sealing and caulking.
   1. Include sealants between glazing frames and adjacent building materials.
   2. Include acoustical gasketing.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 078400 - Firestopping: Sealants required for openings in fire-rated construction.
   5. Section 098100 - Acoustic Insulation: Sealants required for airtightness and reduction of sound transmission.

C. Related Sections:
   1. Section 033100 - Structural Concrete.
   2. Section 054100 - Structural Metal Stud Framing.
   3. Section 072100 - Thermal Insulation.
   4. Section 076200 - Sheet Metal Flashing and Trim.
   5. Section 084000 - Entrances, Storefronts, and Curtain Walls
   6. Section 087105 - Door and Hardware Installation.
   7. Section 088100 - Glass Glazing: Glazing compounds.
   8. Section 089100 - Louvers.
   9. Section 092216 - Non-Structural Metal Framing.
  10. Section 092900 - Gypsum Board.
  11. Section 093000 - Tiling.
  12. Section 098100 - Acoustic Insulation: Requirements for airtightness and reduction of sound transmission.
  13. Section 099100 - Painting.
  14. Section 321313 - Concrete Paving.

1.02 REFERENCES

A. ASTM International (ASTM):
   4. D 2000-12 - Classification System for Rubber Products in Automotive Applications.

B. California Code of Regulations (CCR):
1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
   a. Chapter 7 - Fire and Smoke Protection Features.
      1) 714 - Fire-Resistant Joint Systems.

C. American Architectural Manufacturers Association (AAMA):

D. American Concrete Institute (ACI):
1. 504-R - Guide to Sealing Joints in Concrete Structures.

E. Glass Association of North America [consisting of Flat Glass Marketing Association, Glass Tempering Association, and Laminators Safety Glass Association] (GANA), www.glasswebsite.com:

F. Underwriters Laboratories, Inc. (UL):

G. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. The terms sealant and caulking shall be considered interchangeable.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.05 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with Section 013300, submit Shop Drawings locating all sealants by product name.

C. Samples: In accordance with the provisions of Section 013300, submit the manufacturer's standard palette of colors for Architect's selection.
   1. When custom color selections have been made, submit samples of cured sealants, in colors selected, approximately 4 inches in length.
   2. Submit samples of materials in contact with sealants for adhesion and compatibility testing by the sealant manufacturer. Provide
results of testing along with manufacturer’s acceptance and recommendations of their use.
a. Include testing for staining of stone by absorption of silicone sealants.
3. Coordinate with work of other Sections relating to testing for compatibility, or in preparing mockups and field samples in advance of actual construction.

D. Quality Control Submittals:
1. Test Reports: Submit manufacturer’s certified laboratory test reports for adhesion to project substrates confirming physical characteristics of materials used in the performance of the work of this Section, and in the compatibility of the materials in contact with sealants used.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.07 CLOSEOUT SUBMITTALS

A. Warranty Documentation: Submit copies of written warranty, signed by the manufacturer and the applicator, agreeing to repair or replace defective products and work during the warranty period.

1.08 QUALITY ASSURANCE

A. Qualifications: Installers/Applicators shall be qualified, thoroughly trained, experienced, possessing the necessary skills, and are completely familiar with the specific requirements and techniques needed to perform the work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials in original unopened containers or bundles with labels showing manufacturer, product name of designation, color, shelf life and installation instructions.
B. Storage and Handling Requirements: Store materials in accordance with manufacturer’s instructions.
1.10 FIELD CONDITIONS

A. Environmental Requirements: Apply sealant materials under environmental conditions no less stringent than those stipulated by the manufacturer.

1.11 WARRANTY

A. Warranty materials and workmanship against loss of adhesion or cohesion, discoloration, or other degradation for a period of not less than 5 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of General Sealant Products:
   7. PRC (Product Research & Chemical Corporation), Commercial Products, Gloucester City, NJ (609)456-5700, (800)257-8454, with offices in Glendale, CA (213)666-7512.
   8. Rhône-Poulenc Inc. (Rhodorsil), Monmouth, NJ (201)297-0100.
  10. Sika, Lyndhurst, NJ (201)933-8800, with offices in Santa Fe Springs, CA (562)941-02313.

B. Design of accessory items is based on the use of products manufactured by the following:
   3. Illbruk, (Will-Seal), Minneapolis, MI (612)521-3555.

C. Acceptable Manufacturers of Foam Sealant Tapes:

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. VOC Content of Interior Sealants: Provide sealants and sealant primers that comply with the following limits for low VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Nonmembrane Roof Sealants: 300 g/L.
3. Single-Ply Roof Membrane Sealants: 450 g/L.
4. Sealant Primers for Architectural, Nonporous Substrates: 250 g/L.
5. Sealant Primers for Architectural, Porous Substrates: 775 g/L.
6. Modified Bituminous Sealant Primers: 500 g/L.
7. Other Sealant Primers: 750 g/L.

B. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.

1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half
of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2.04 SYSTEM DESCRIPTION

A. General: Provide joint sealants in not less than the following circumstances:
1. Where expansion and contraction occurs.
2. Between materials and products where infiltration of moisture, water, light, or air blown particles may occur.
3. Between materials and products in, or penetrating, sound-insulated walls, partitions, and related construction.
4. Between dissimilar materials where they join on a surface or corner.
5. Between materials and products in, or penetrating, fire-resistive construction.

2.05 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: Custom colors as selected by Architect to match adjacent surfaces.
   1. Window Frame Perimeter (Exterior): Provide custom colors as selected by Architect.
   2. Other: Provide custom colors as selected by Architect.

C. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

D. Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

E. Stain-Test-Response Characteristics: Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing accord-
ing to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

### 2.06 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
   1. Type C: Closed-cell material with a surface skin.
   2. Type O: Open-cell material.
   3. Type B: Bicellular material with a surface skin.
   4. Type: Any material indicated above.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

E. Backer Rod Material: Provide flexible and compressible non-gassing polyethylene foam, rounded at contact surfaces, compatible with sealant, and as recommended by sealant manufacturer.
   1. Backer rods shall be sized and shaped to control depth of sealant. Provide compression upon insertion of 25 percent to 33 percent for closed-cell rods and 40% to 50% for open-cell rods.
   2. Provide open cell type at interior perimeter weather seals adjacent to weather resistant barriers.
   3. Provide closed cell type at exterior perimeter weather seals adjacent to exterior wall finish.
   4. Provide closed cell type adjacent to construction materials at other sealant locations.

### 2.07 GASKETING

A. Partition Closure Gaskets at Abutting Interior Partitions:
   1. Filler Gasket (at Window Mullions): Closed cell expanded neoprene, black premolded joint filler, equal to Everlastic Type NN1, 1040 Series, manufactured by Williams Products.
   2. Gasketing Tape: Norex BCF butyl-coated foam extrusions with compressible PVC foam core, as manufactured by The Specialty Elastomers sector of Saint-Gobain Performance Plastics.
3. Filler Gasket: Closed cell expanded neoprene, black premolded joint filler, equal to Everlastic Type NN1, 1040 Series, manufactured by Williams Products.

4. Compressible Joint Filler: Manufacturer's standard open-cell, flexible foam strip of polyurethane or other weather-resistant foam, saturated with butylene or other non-drying liquid sealant/adhesive to a formulation that will form a paintable watertight joint at 50 percent compression, without staining, migrating, hardening, or other performance failure.
   a. Polytite, manufactured by Polytite Manufacturing Corporation.
   b. Will-Seal 150G, manufactured by Illbruk.

B. Acoustical Gaskets:
   1. Self-Adhesive Sponge Neoprene Pads: **Type K1**, for providing a compressible filler and acoustical seal in the gaps of slip joints. Set in place with 10 to 15% compression. Airtight splices work in lengthwise direction.
   2. Self Adhesive Bubble Gaskets: **Type K2**, for providing an acoustical seal around the edge of an operating access panels (typically set on jamb or head frame or stop to act as a compression seal).

### 2.08 ACCESSORIES

A. Primer: Non-staining type recommended by joint sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Joint Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

D. Fire-Rated Insulation: Ceramic fiber insulation blanket, 4 pounds per cubic foot density, equal to Johns Manville Cerablanket, Standard Oil Engineered Materials’ Fiberfax, and Williams Products’ Everlastic Dynashield.

### 2.09 PRODUCT USAGE

A. Exterior: Provide joint sealants at the following exterior locations, or as indicated on Contract Drawings:
   1. Traffic Bearing Joints in Paved Areas:
      a. Level Areas up to 1 Percent Slope: **Type A1** and **Type A2**.
      b. Horizontal Joints Exceeding 1 Percent Slope, and on Vertical Risers: **Type A2**.
      c. Concrete Slab Joint Filler: **Type G1**.
      d. Detector Loop Sealant: **Type G2**.
   2. Dynamic Joints with Movement up to 50 Percent of Joint Width: **Type B1a** or **Type C1** or **Type D1a**, as appropriate, or as indicated on Contract Drawings.
3. Non-Staining Joints: **Type D1c.**
4. Non-Dynamic Joints:
   a. General Use: **Type B2** or **Type C1.**
   b. Wall Penetrations: **Type E1** or **Type C1.**

**B. Interior:** Provide joint sealants at the following interior locations:
1. Traffic Bearing Joints:
   a. Concrete Slab Joint Filler: **Type G1.**
2. Non Fire-resistive Rated Construction, Paintable:
   a. Interior Dynamic Joints at Concrete Joints: **Type E1.**
   b. Interior Static Joints: **Type E1 or Type E2** or **Type F1.**
   c. Ceramic Tile and Plumbing Fixture Conditions: **Type D2.**
   d. Wall Penetrations: **Type E1.**
   e. Interior Door and Window Perimeters: **Type E2** or **Type F1.**
   f. General Purpose Acoustical Applications: **Type F2.**
      1) For all interior walls, ceilings, window/door perimeters, and related penetrations.
   g. Concrete Slab Joint Filler: **Type G1.**
   h. Joint Filler Pads: **Type K1.**
   i. Joint Filler Gaskets: **Type K2.**
3. Fire-Resistive Rated Construction: Refer to Section 078400.

**C. Glazing Systems:** Provide types of sealants at the following locations:
1. Aluminum Frames:
   a. Exterior Perimeter Weather Seals (adjacent to exterior wall finish): **Type D1a** or **D1e.**
   b. Interior Perimeter Weather Seals (adjacent to weather resistant barrier): **Type D1d.**
   c. Interior Construction Sealants (adjacent to interior wall finish): **Type D1a.**
   d. Structural Glazing Sealants: **Type D1b.**

**D. Use only materials recommended by manufacturer for each specific application.**

### 2.10 MATERIAL TYPES

**A. Sealants:** Provide the following types in colors to match adjacent materials, and as approved by Architect.

1. **Type A1** - Polyurethane Traffic Grade Sealant: Two-part, self-leveling; ASTM C 920, Type M, Grade P, Class 25, Use T; Shore hardness 30-40. Acceptable products:
   a. Pecora NR-200 Urexpan.
   b. PRC Permapol RC-2SL.
   c. Sikaflex 2c SL.
   d. BASF Sonolastic SL 2
   e. Tremco Vulkem 245 SL (255 at wide joints).

2. **Type A2** - Polyurethane Traffic Grade Sealant: Two-part, non-sag, cold-applied, chemically cured, traffic grade, Shore A of 40+; ASTM C 920, Type M, Grade NS, Class 25, Use T, M, A, and O. Acceptable products:
   a. Pecora Dynatred.
   b. Sikaflex 2c NS.
c. Tremco Vulkem 227.

3. **Type B1a** - Polyurethane High Performance Sealant: Two-part, non-sag, highly adhesive and elastic, general purpose; ASTM C 920, Type M, Grade NS, Class 25, Use NT, M, A, G, and O; UL classified; Shore hardness 15-30. Acceptable products:
   a. Pecora Dynatrol II.
   b. PRC Permapol RC-2.
   c. Sikaflex 2c NS.
   d. BASF Sonolastic NP 2.
   e. Tremco Vulkem 922 or Dymeric Plus.

4. **Type B2** - Polyurethane General Purpose Sealant: One-part, non-sag, low-modulus moisture cured; ASTM C 920, Type S, Grade NS, Class 25, Use NT, M, A, and O. Acceptable products:
   a. Pecora Dynatrol I.
   b. PRC Permapol RC-1.
   c. Sika Sikaflex 15 LM.
   d. BASF Sonolastic NP 1.
   e. Tremco Vulkem 116, 230, 921, or Dymonic.

5. **Type C1** - Modified Silicone (Silyl-terminated Polyether) Sealant: One-part, non-sag, low-modulus, high-elongation and compression recovery, highly adhesive, zero VOC, odorless, and non-staining. Acceptable product:
   a. BASF Sonolastic 150, Sonolastic 150 Tint Base, or equal.

6. **Type D1a** - Silicone High Performance Sealant: One-part, non-sag, medium-modulus, medium-elongation and compression recovery, highly adhesive, ASTM C 920, Type S, Grade NS, Class 50, Use NT G, M, and O; UL classified. Acceptable products:
   a. Dow Corning 795.
   c. Pecora 864.
   d. Rhône-Poulenc Rhodorsil 3B and 5C.
   e. BASF Sonolastic Omniseal.
   f. Tremco Spectrem II.

7. **Type D1b** - Silicone Structural Glazing Sealant: One-part, non-sag, high-modulus, high-elongation and compression recovery, highly adhesive, ASTM C 920, Type S, Grade NS, Class 25, Use NT G, M, and O; UL classified; design strength of 20 psi; City of Los Angeles RR24637. Acceptable products, subject to meeting performance requirements:
   a. Dow Corning 983 (two-part).
   b. GE 4000, produced by Momentive Performance Materials.
   c. Rhône-Poulenc Rhodorsil 90.

8. **Type D1c** - Non-Staining General Purpose Silicone Sealant (General Purpose for Stone and Stainless Steel Panels): One-part, non-sag, medium-modulus, high-elongation and compression recovery, ASTM C 920, Type S, Grade NS, Class 50, Use NT G, M, and O. Acceptable products:
   a. Dow Corning 786 SMS.
9. **Type D1d** - Silicone Weather Barrier Sealant: One-part RTV, non-sag, medium-modulus, 25% movement, ASTM C 920, Type S, Grade NS, Class 25, for use at polymeric surfaces such as peel and stick weather resistant barriers, including polyolefin and fibrous, woven, or liquid-applied elastomeric weather and air barriers; also surfaces such as vinyl, PVC, anodized aluminum, paint, powder coat, and fluoropolymer coatings; not paintable. Acceptable products
   a. Dow Corning 758 (NO KNOWN EQUAL).

10. **Type D1e** - Silicone Building Sealant: One-part, non-sag, ultra-low-modulus, high-elongation and compression recovery, highly adhesive, ASTM C 920, Type S, Grade NS, Class 100/50, Use T, NT G, M, A, and O; UL 263 classified (ASTM E 119) Fire Tests of Building Construction and Materials. Acceptable products:
    a. Dow Corning 790.
    b. Momentive Performance Materials Weatherseal SCS2700 Silpruf LM.

11. **Type D2** - Silicone General Purpose and Sanitary Sealant: One-part, non-sag, primerless, sanitary, and highly flexible, ASTM C 920, Class 25; USDA approved. Acceptable products:
    a. Dow Corning 786.
    c. Pecora 898 or 863.
    d. Rhône-Poulenc Rhodorsil 6B.
    e. BASF Sonolastic OmniPlus.

12. **Type E1** - Acrylic Terpolymer Sealant: One-part, non-sag, highly adhesive and elastic; FS TT-S-00230. Acceptable product:
    a. Tremco Mono 555.

13. **Type E2** - Acrylic Latex SEALANT: One-part non-sag; ASTM C 834. Acceptable products:
    c. BASF Sonolac.
    d. Tremco Acrylic Latex 824.

14. **Type F1** - Butyl General Purpose Sealant: One-part, non-sag; FS TT-S-1657, Type 1, gun grade. Acceptable products:
    a. Pecora BC-158.
    b. Tremco Butyl.

15. **Type F2** - Highly resilient, permanently flexible, shrink and stain resistant. Acceptable products:
    a. Hilti CP672.
    c. Ohio Sealants’ OSI Pro-Series SC-175 Sound Sealant, VOC-compliant, white waterbase sealant for concealed locations.
    d. STI SpecSeal Smoke 'N' Sound Acoustical Spray.
    e. Tremco Acoustical Sealant, black synthetic rubber material for concealed locations only.
    f. U.S. Gypsum Acoustical Sealant, white waterbase material suitable of exposed or concealed locations, but not waterproof.
    g. Comply with the requirements of Section 098100.
16. **Type G1** - Epoxy Concrete Joint Filler: Two-part epoxy. Acceptable products:
   a. BASF Epolith G (non-sag).
   b. BASF Epolith P (self-leveling).
   c. Tremco Vulkem 275.

17. **Type G2** - Epoxy Detector Loop Sealant: Two-part epoxy. Acceptable product:

18. **Type K1** - Self-Adhesive Sponge Neoprene Pads: Compressible closed cell Polyvinyl Chloride foam or neoprene sponge, 8 pcf to 12 pcf density, self-adhering, for use as filler and acoustical seal in gaps of slip joints, set in place with 10% to 15% compression. Acceptable products:
   a. Norseal Type V760 Foam Sealants with firm, high-density foam for vibration damping with adhesive on one side, manufactured by Saint-Gobain Performance Plastics, or equal by D.S. Brown Company.
   b. Norseal Type V980/V990 closed cell PVC Foam Sealants with pressure-sensitive adhesive on both sides, manufactured by Saint-Gobain Performance Plastics, or equal by D.S. Brown Company.
   c. Norprene Profile custom-designed thermoplastic elastomer foam Extrusions compressible foam tapes adhesive-coated on one side, manufactured by Saint-Gobain Performance Plastics, or equal by D.S. Brown Company.
   d. Comply with the requirements of Section 098100.

19. **Type K2** - Self Adhesive Bubble Gaskets: Nominal 1/4-inch x 1/2-inch compressible bulb of silicone rubber or polyprene with self-adhesive on one side. Provide color selected by Architect. Acceptable Products:
   d. Comply with the requirements of Section 098100.

### 2.11 SOURCE QUALITY CONTROL

A. Perform preconstruction tests of sealants for adhesion and compatibility with all adjacent substrates and accessory components. Submit results of tests with a certification letter from the sealant manufacturer listing the successful results with any recommendations.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

A. Verification of Conditions:
   1. Examine joints to be sealed for construction defects which would adversely affect execution of work.
   2. Ensure that concrete has cured a minimum of 28 days in warm weather and 40 days in cold weather.
   3. Do not start work until ambient conditions are satisfactory.
   4. Perform sealing before final coats of paint are applied.
B. Commencement of installation shall be considered as acceptance of the substrate and environmental conditions as being suitable for installation of products.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
   a. Concrete.
   b. Masonry.
   c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
   a. Metal.
   b. Glass.
   c. Porcelain enamel.
   d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of sealant backings.
   2. Do not stretch, twist, puncture, or tear sealant backings.
   3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

F. Install sealants by proven techniques to comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses provided for each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
   1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
   2. Apply a bead of silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's printed schedule and covering a bonded area of not less than a 3/8 inch. Hold edge of sealant bead inside of masking tape by 1/4 inch.
   3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
   4. Complete installation of horizontal joints before installing vertical joints. Lap vertical joints over horizontal joints. At end of joints, cut silicone extrusion with a razor knife.

H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, to produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant to comply with sealant manufacturer's written instructions.
3.04 APPLICATION

A. General: Comply with sealant manufacturer's printed instructions regarding joint size limitation and geometry, mixing, priming, and application.

B. Install backing in continuous lengths without interruption. Do not turn backing around corners. Butt lengths together tightly with crowd-in at all corners or changes in plane.
   1. Install backing so that joint depth is 50 percent of joint width, but no less than 1/4-inch deep. Install backer in full sections from corner to corner with crowd-in.

C. Apply sealant in joints using pressure gun with nozzle cut to fit joint width. Make sure sealant is deposited in uniform, continuous beads without gaps or air pockets.
   1. Within 10 minutes of sealant application, tool joints to required configuration as a separate operation to fill joints and provide a smooth surface. If masking materials are used, remove immediately after tooling.

D. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint.
   1. Remove excess sealant from surfaces adjacent to joint.
   2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   3. Concave Joints at Locations Indicated on Contract Drawings: Provide concave joint configuration in accordance with ASTM C 1193 Figure 5A.

E. Apply acoustical sealant on, around, and between building construction members such as framing, panel boxes, cutouts for penetrations of other materials or equipment, and where walls and floors are designated to be sound-attenuating or acoustically treated.

F. Install joint gasket material of the proper thickness and width to fill space completely and neatly.
   1. Do not allow spillage or migration of primer onto adjoining exposed surfaces.
   2. Install joint sealer/expansion Joint material in accordance with the manufacturer's instructions.

G. Install compressible gasketing tape material of the proper thickness and width to fill space completely and neatly with an in-place compression of 10% to 15%.

H. Paving: Provide light dusting of № 60 silica sand at expansion/control joints in paving.
3.05 FIELD QUALITY REQUIREMENTS

A. Perform periodic field testing as recommended by sealant manufacturer. Submit results stating location and date performed to the Architect for review.

B. Verification of Commissioning:
   1. Use AAMA 501.2 in addition to E 1105 for testing intersections of dissimilar building systems as part of BECx.

3.06 CLEANING

A. Remove excess materials adjacent to joints by mechanical means or with xylol (xylene) or mineral spirits as work progresses to eliminate evidence of spillage or damage to adjacent surfaces.
   1. Leave finished work in neat, clean condition with no evidence of spillovers onto adjacent surfaces.

END OF SECTION
EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Aluminum expansion and seismic joint covers.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCE

A. ASTM International (ASTM):
   1. A 666-15 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
   4. D 2000-12 - Classification System for Rubber Products in Automotive Applications.

B. American Architectural Manufacturers Association (AAMA):

C. Warnock Hersey (WHI):
   1. Certification applicable to product proposed for use.

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):
1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Provide all templates as required to related trade for location of support and anchorage items.

1.04 SUBMITTALS

A. General: Furnish submittals in accordance with the provisions of Section 013300.

B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.
   1. Include data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seal for UV exposure.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing the fabrication and installation of expansion joint assemblies.
   1. Show full extent of expansion joint cover assemblies. Include large-scale details indicating profiles of each type of expansion joint cover assembly, splice joints between sections, joinery with other types, special end conditions, anchorages, fasteners, and relationship to adjoining work and finishes. Include description of materials, finishes, and installation instructions.

D. Samples: Submit representative sections of assemblies 12 inches in length.
   1. Include samples for each type of alloy to be used in work and metal finish. Where normal color and texture variations are to be expected, include two or more units in each set of samples showing limits of such variations.
   2. Include samples of each type and color of flexible seal used.

E. Quality Control Submittals:
   1. Certificates: Furnish copies of UL classifications or WHI listings.
   2. Certificates: Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4.1 and MR Credit 4.2: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5.1 and MR Credit 5.2: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
1.06 QUALITY ASSURANCE

A. Single-Source Responsibility:
   1. Obtain expansion joint cover assemblies from one source from a single manufacturer.

1.07 DELIVERY, STORAGE AND HANDLING

A. Exercise proper care in the handling of all work so as not to damage the finished surface, and take proper precautions to protect the work from damage after it is in place.

B. Deliver materials to the job site ready for use, and fabricated in as large sections and assemblies as practical. Assemblies shall be identical to submitted and reviewed shop drawings, samples, and certificates.

C. Store materials under cover in a dry and clean location off the ground. Remove materials that are damaged or otherwise not suitable for installation from the job site and replace with acceptable materials at no additional cost.

1.08 FIELD CONDITIONS

A. Prior to fabrication field measure actual locations of walls and other construction where work is to be installed. Show recorded measurements on final Shop Drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

   B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based, or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Loading Characteristics:
   1. Standard Floor Covers: Design to withstand a minimum point load of 500 lbs. without damage or permanent deformation.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.
2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.

2.04 SYSTEM DESCRIPTION

A. Design is based on the use of products manufactured by The C/S Group, division of Construction Specialties International, Inc.
   1. Use only component types required for project.

2.05 MATERIALS

A. Aluminum:
   1. Extrusions: Conform to ASTM B 221 for Alloy 6063 Temper T5.
   2. Plate: Conform to ASTM B 209 for Alloy 6061 Temper 651.

B. Seals: Flexible extrusions non-hydroscopic, thermoplastic rubber with longitudinal, internal baffles retained in compatible metal frames. Types include:
   1. Vinyl: Extruded PVC.
   2. Rubber: Extruded Santoprene 8000 series Grade 121-73 (black); Grade 221-73 (colorable).
   3. Color: Where visible, as selected by Architect from manufacturer's standard color palette.

C. Water Barrier: Flexible PVC, 30 mils thick; EPDM 45 mils thick.

D. Centering Bars: Type 304 stainless steel conforming to the general requirements of ASTM A 666 with protective coating.

E. Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible vapor seals, filler materials, drain tubes, adhesives, and other accessories compatible with material in contact, as indicated on the Contract Drawings or as required for complete installations.

2.06 COMPONENTS

A. Corner to Seismic Wall Covers: Model AFWC Series mill finish aluminum covers, as manufactured by C/S Group, or equal.
   1. Provide profiles and sizes indicated on Contract Drawings.

B. Specialty Seismic Exterior Seals: VSS-400 Series, as manufactured by C/S Group, or equal.
   1. Provide profiles indicated on Contract Drawings.

C. Other Joint Cover Types: Types and profiles as indicated on the Contract Drawings, manufactured by C/S Group, or equal.
2.07 FABRICATION

A. General: Provide expansion joint cover assemblies of design, basic profile, materials, and operation indicated on Contract Drawings.
1. Select units comparable to those indicated or required to accommodate joint size, variations in adjacent surfaces, and structural movement.
2. Furnish units in longest practicable lengths to minimize number of end joints.
3. Provide hairline-mitered corners where joint changes directions or abuts other materials.
4. Include closure materials and transition pieces, tee-joints, corner, curbs, cross-connections, and other accessories as required to provide continuous joint cover assemblies.
5. Provide compatible designs at intersecting floor, wall, and ceiling conditions as indicated on Contract Drawings.
6. Provide continuous vinyl gutter and tempered steel centering bar with nylon spheres at each end.

B. Exterior Joint Covers: Vertical Exterior Seals:
1. Thermoplastic rubber primary seals extruded in Santoprene retained in extruded aluminum side frames complete with independent continuous PVC back seal. Side frames mounted on butyl caulk tape with appropriate anchor 18 inches on centers. Installation shall include factory, heat welded transitions to ensure a watertight system. System to include material for field-formed flexible base closures at base of vertical joints. Color of primary seal to be one of four standard colors or custom color selected by Architect.

C. Supply flush mounted seal with dual movement grooves designed to remain in place throughout movement of the joint to 50% of the joint width.

D. Finishes: Comply with NAAMM Metal Finishes Manual for finish designations and application recommendations, except as otherwise indicated. Apply finishes in factory after products are fabricated.
1. Aluminum: Factory painted in accordance with AAMA 2605 as specified in Section 050513.
   a. Color: As selected by Architect to match adjacent materials.
2. Exposed Seals: Provide color as selected by Architect from manufacturer's standard color palette.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Make a thorough examination of all surfaces receiving the work of this section and before starting the installation, notify the architect, in writing, of any defect which would affect the satisfactory completion of the work of this section.
3.02 PREPARATION

A. Protect aluminum surfaces in contact with cementitious materials with heavy metal free high solids primer or chromate conversion coating with a minimum dry film thickness of 2.0 mils.

3.03 INSTALLATION

A. Install work in accordance with manufacturer's submittals as accepted by the Architect.
   1. Securely anchor units to structure in alignment with surfacing.
   2. Install complete with required accessories and factory fabricated miters. Runs shall be in continuous lengths without butt joints.

B. Provide anchorage devices and fasteners for securing expansion joint cover assemblies to in-place construction, including threaded fasteners with drilled-in anchors for masonry and concrete where anchoring members are not embedded in concrete. Provide countersunk stainless steel fasteners of type and size to suit type of construction indicated, and provide for secure attachment of expansion joint cover assemblies.

C. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels.

D. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling.

E. Set floor covers at elevations to be flush with adjacent floor materials. If necessary, shim to level, but ensure base frames have continual support to prevent rocking and vertical deflection.

F. Locate covers in continuous contact with adjacent surfaces. Securely attach in place with all required accessories.

G. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches on centers.

H. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames.

I. Adhere flexible filler materials (if any) to frames with adhesive of pressure-sensitive tape as recommended by manufacturer.
   1. Installation of extruded preformed seals: install seals to comply with manufacturer's instructions and with minimum number of end joints.
   2. For straight sections provide preformed seals in continuous lengths.
   3. Vulcanize or heat-seal all field splice joints in preformed seal material to provide watertight joints using manufacturer's recommended procedure.
   4. Apply manufacturer's approved adhesive, epoxy or lubricant-adhesive to both frame interfaces prior to installing preformed seal.
   5. Seal transitions in accordance with manufacturer's instruction.
J. Installation of Exterior Seal Joint Assemblies:
   1. Seal all end joints within continuous runs and joints at transitions in
      accordance with manufacturer's directions to provide a watertight
      installation.
   2. Seal transitions and butt joints in accordance with manufacturer's
      instruction
   3. Install secondary seals in continuous lengths; vulcanize all field splice
      joints in secondary seal material to provide watertight joints using
      manufacturer's recommended procedures.

3.04 CLEANING

   A. Do not remove strippable protective material until finish work is adjacent
      areas is complete. When protective material is removed, clean exposed
      metal surfaces to comply with manufacturer's instructions.

3.05 PROTECTION

   A. Protect elastomeric seals from damage during the construction period.

3.06 ADJUSTING

   A. Adjust joint cover to freely accommodate joint movement.

END OF SECTION
PART 1 - 1.01 SUMMARY

A. Section Includes:
1. Standard and custom hollow metal doors.
2. Standard and custom hollow metal frames and sidelights.

B. Referenced Sections:
1. Section 012500 - Substitution Procedures.
2. Section 013300 - Submittal Procedures.
3. Section 018113 - Sustainable Design Requirements.
4. Section 042200 - Concrete Unit Masonry: Requirements for grout.
5. Section 081416 - Flush Wood Doors.
6. Section 087100 - Door Hardware.
7. Section 087105 - Door and Hardware Installation.
8. Section 088100 - Glass Glazing.
9. Section 099100 - Painting.
10. Section 281300 - Access Control.

1.02 REFERENCES

A. ASTM International (ASTM):
1. A 568-15 - Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy and Hot-Rolled, Cold-Rolled, General Requirements for,
4. A 1008 12a - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.


12. E 413-10 - Classification for Determination of Sound Transmission Class.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 7 - Fire and Smoke Protection Features.
         1) Section 710 - Smoke Partitions.
            a) 710.5 - Openings.
               (1) 710.5.2 - Doors.
                  (a) 710.5.2.2 - Smoke and Draft Control Doors.

C. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE):
   1. 90P - Energy Conservation in New Building Design.

D. American National Standards Institute (ANSI):
   1. A250.4 and A250.5 - Test Procedure and Acceptance Criteria for Physical Endurance, Steel Doors and Frames.
   3. A250.10 - Test Procedure and Acceptance Criteria for Painted Steel Surfaces for Steel Doors and Frames.
   4. A250.11 - Recommended Erection Instructions for Steel Frames.

E. Hollow Metal Manufacturers Association (HMMA), a division of the National Association of Architectural Metal Manufacturers (NAAMM):
   1. 840-07 - Installation and Storage of Hollow Metal Doors and Frames.
   2. 850-00 - Fire-Rated Hollow Metal Doors and Frames.

F. National Fire Protection Association (NFPA):
   1. 80 - Fire Doors and Other Opening Protective, 2016 edition.
   2. 105 - Installation of Smoke Door Assemblies and Other Opening Protective, 2016 edition.

G. Steel Door Institute (ANSI/SDI):
   1. 100 - Recommended Specifications for Standard Steel Doors and Frames.

H. Underwriters Laboratories (UL):
   1. 10B - Fire Test of Door Assemblies, 1997 edition.
3. 63 - Fire Door Frames.
4. 105 - Installation of Smoke Door Assemblies and Other Opening Protective.
5. 1784 - Air Leakage Tests of Door Assemblies.

I. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Gage Equivalents: The following common gage equivalences for decimal thicknesses at galvanized sheet metal are for reference only:
   1. 0.108-inch - 12 gage.
   2. 0.079-inch - 14 gage.
   3. 0.064-inch - 16 gage.
   4. 0.052-inch - 18 gage.
   5. 0.040-inch - 20 gage.
   6. 0.028-inch - 24 gage.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordination: Coordinate work of this Section with access control-security system specified in Section 281300.

1.05 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit Shop Drawings comprehensively describing the fabrication and installation of frames and indicating not less than the following:
   1. Schedule of frames referencing the same opening designations and dimensional conventions indicated on the Contract Drawings.
   2. Elevations, plans, and sections as required.
   3. Typical and special details for fabrication and installation.
   4. Provisions for finish hardware specified in Section 087100.

C. Samples: Approximately 12- by 12-inch corner, representing the required construction of doors and frames for Project.
   1. Frames: Show profile, welded corner joint, welded hinge reinforcement, dust-cover boxes, floor and wall anchors, stops, and silencers. Include panel and louver sections and glazing stops if applicable.
   2. Samples of coatings, in colors indicated on Contract Drawings.

D. Quality Control Submittals:
   1. Certificates: Submit certificates executed by the manufacturer confirming that the doors proposed for use conform to the recommendations of HMMA 867 or ANSI/SDI 100, as specified or referenced in this Section, and NFPA 80 when applicable, including the applicable requirements of other standards referenced in NFPA 252 or UL 10B, as
applicable. Accompany certificates with substantiating test reports and calculations. In addition, submit certificates evidencing the following:

a. Thermal resistivity (R-value) of exterior doors, as required.
b. Sound transmission class (STC) of doors in accordance with ASTM E 90 and ASTM E 413.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).
   2. Product Data for IEQ Credit 5: For door closures and seals, documentation including printed statement indicating product complies with requirements for a permanent installation to capture dirt and particulates from entering building.

1.07 QUALITY ASSURANCE

A. Qualifications: Manufacturer shall have demonstrated the ability to produce standard hollow metal door assemblies in accordance with the recommendations of the Steel Door Institute (SDI), as well as custom hollow metal door assemblies produced in accordance with the recommendations of the Hollow Metal Manufacturers Association (HMMA), as applicable.
   1. Hollow metal doors and frames shall be the products of one manufacturer.
   2. Certification of Label Construction: For components exceeding UL physical limitations, furnish inspection certificate stating that component construction conforms to UL rating requirements.
   3. Certification that the frames proposed for use have been investigated by UL and certified for UL 10C.
   4. Hollow metal manufacture shall be a HMMA member to provide custom doors and frames, and a SDI member to provide standard doors and frames.
   5. The hollow metal manufacturer shall supply doors and frames through a national distribution system. Marketing material through a factory direct method will not be acceptable.
      a. Hollow metal supplier shall be a qualified local direct distributor of products to be furnished. The distributor shall have in their regular
employment an AHC and/or CDC with a local business address, telephone and fax line, who will be available at reasonable times throughout the project regarding matters affecting the door openings.

b. Proposed distributor shall be located within the Northern California market.

6. Installer Qualifications: Installer shall have a minimum of 5 years experience in the installation of metal frames similar in the type required for this Project.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver assemblies in manufacturer's protective wrapping with identifying labels affixed and legible.
1. Ship doors and frames with temporary spread bars securely fastened to the frame bottoms.

1.09 FIELD CONDITIONS

A. Field Measurements: Prepare Shop Drawings for existing openings in accordance with field measurements taken specifically for the work of this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Acceptable Manufacturers of Louver Products:

C. Acceptable Manufacturers of Sound Sealant Products:

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations of governmental agencies having jurisdiction, including the following:

1. Air Infiltration: When tested in accordance with the requirements of ASTM E 283, doors shall have exhibited air leakage no greater than 0.50 cubic feet per minute per square foot of fixed area for single doors and 1.00 pounds per square foot of fixed area for double doors.
   a. Doors shall not exceed 1.0 cubic feet per minute per linear foot of perimeter crack.
   b. Fire endurance test shall establish neutral pressure level at 40 inches above finished floor after 5 minutes and maintain that condition during remainder of entire test period.

2. Provide doors complying with positive pressure requirements of CBC Chapter 7 Section 714 and UL 10C. Refer to Paragraph 2.06-C.1.a.
   a. Fire endurance test shall establish neutral pressure level at 40 inches above finished floor after 5 minutes and maintain that condition during remainder of entire test period.

3. Comply with provisions of local municipal security code.

B. Comply with CALGreen 5.504.4.3 Paints and Coatings:
   1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
   2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 4: Use materials with recycled content that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
2. MR Credit 5: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   b. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GC-11.
2. IEQ Credit 5 Indoor Chemical and Pollutant Source Control: Permanent entryway mats complying with requirements for a permanent installation to minimize and control pollutant entry into building complying with criteria laid out in the LEED Reference Guide.

2.04 SYSTEM DESCRIPTION

A. Exterior Hollow Metal Doors and Frames Including Interior Custom Frames (Special Shapes, Glazed Transoms, and Sidelites): Comply with the re-
requirements of Laminated Core Hollow Metal Doors as described in this Section or referenced to HMMA 867 Guide Specifications.

B. Interior Hollow Metal Doors and Standard Frames: Comply with the requirements of ANSI/SDI 100.

2.05 MATERIALS

A. Sheet Steel: Doors and frames at all locations:
   1. Provide frames fabricated from hot-rolled sheet, commercial quality sheet steel, pickled and oiled, cut edge, conforming to ASTM A 1011 and ASTM A 568, and hot-dipped galvanized alloyed type in accordance with ASTM A 924 and ASTM A 653 for an A60 coating designation.

B. Stiffeners: SDI-compliant:
   1. Continuous vertical formed steel sections, 0.028-inch minimum thickness, spaced with interior webs not more than 6 inches apart, which upon assembly, span the full thickness of the interior of the door. Voids between stiffeners shall be filled with insulation material.

C. Core:
   1. Doors: One of the following:
      a. Polystyrene: Rigid, extruded, closed cell board, 1 pound per cubic foot (16 kilograms per cubic meter) density minimum, conforming to ASTM C 578, Type 1.
      b. Polyurethane: Rigid, cellular type, board conforming to ASTM D 1622, or foamed-in-place, 1.8 pound per cubic density minimum, containing no urea formaldehyde resins.
      c. Polyisocyanurate: Rigid, pre-formed, closed cell board, conforming to ASTM C 591 (unfaced) or ASTM C 1289 (faced).

D. Insulation:
   1. Interior Doors: Three-pound density mineral wool.
   2. Temperature Rise Rated (TRR) Fire Doors: Internal construction shall be in accordance with the individual manufacturer’s listings.

E. Sound Seals: Provide sound seal products from the following, or equal:
   1. SoundSeal, as manufactured by IAC Acoustics.
   2. Quiet Series Products, manufactured by Noise Barriers.

F. Primer Material: Door manufacturer’s standard rust-inhibitive primer coating, compatible with field-applied interior and exterior paint finishes specified in Section 099100.

G. Grout: Portland cement grout, with conventional aggregate, in accordance with Section 033100. Lightweight aggregate is not acceptable.

H. Glass: Refer to Section 088100 for glass materials.
2.06 MANUFACTURED UNITS

A. Doors:
   1. Construction:
      a. Exterior Locations: Provide 0.079-inch (14 gage) exterior metal
doors conforming to the Hardware Reinforcements and Prepara-
tions recommendations of HMMA 867 Guide Specifications for
Grade III (extra heavy-duty), Model 1 (full flush, hollow steel con-
struction).
         1) Provide the tops and bottoms of exterior doors with welded
            sheet steel flush closures.
         2) Provide exterior doors with apparent U-values of 0.12, as
determined in accordance with ASHRAE 90P.
      b. Interior Locations: Provide 0.053-inch (16 gage) interior metal
doors conforming to the requirements of ANSI/SDI 100 for Grade
II (heavy-duty), Model 1 (full flush, hollow steel construction).
         1) Steel Stiffened: Continuous vertical formed steel sections, 0.026"
minimum thickness, spaced with interior webs not more than
6 inches apart, which upon assembly, span the full thickness of
the interior of the door. Voids between stiffeners shall be filled
with fiberglass or mineral rock-wool batt-type material.
      c. Stile and Rail: 0.053-inch (16 gage) galvanized tubular steel door.
         Provide heavy duty corner reinforcement and fittings for top and
bottom pivots. Miter corners, weld continuously, and grind smooth.
   2. Hardware Reinforcements: Steel plate in conformance with recommen-
dations of HMMA 867 Guide Specifications for Door Hardware
Reinforcements and Preparations, and ANSI/SDI 100, as applicable.
   3. Finish Hardware: Prepare frames for hardware in conjunction with the
work described in Section 087100 and Section 281000.
      a. Refer to Section 087105 for locations of hardware.
   4. Removable Glazing: Provide square (unmolded) glazing stops in
accordance with recommendations of HMMA, 867 Guide Specifications
for Removable Glazing Stops, and ANSI/SDI 100, as applicable, and
Technical Document HMMA 820-TN03.
      a. Provide removable glazing stops formed from sheet steel not less
than 0.032-inch (20 gage) in thickness. Stops shall have mitered
corner joints.
      b. Secure stops with No. 8 oval-head zinc-coated steel screws at
12 inches on centers, maximum.
      c. Provide stops for glazed openings in fire-resistive rated openings in
accordance with the requirements of NFPA 80.
   5. Louvers: Provide factory installed frame louvers of the inverted, all-
welded type. Conform to the requirements of HMMA 867, or ANSI/SDI
100, as applicable, except that louver blades shall be fabricated from
not less than 20 gage steel and set in 18 gage frames.
      a. For exterior frames, provide Y or Z blade type louvers with 18 by
14 bronze or stainless steel insect screen.
      b. Design of louvers in fire-resistive rated frames is based on the use
of a model similar to FLDL-UL manufactured by Anemostat Prod-
ucts, or equal. Provide louvers having the following characteristics and features:
1) Provide Underwriters Laboratories (UL) label.
2) Provide automatic closing mechanism activated by a fusible link device rated at 135 degrees F.
c. Factory finish to match finish of associated frames.

B. Frames: Welded units with double-rabbet integral trim, of sizes and shapes indicated and Contract Drawings.
1. Fabricate interior frames from sheet steel not less than 0.053-inch (16 gage).
   a. Exterior frames, and frames for openings over 4 feet wide, shall be not less than 0.067-inch (14 gage). Reinforce frame head sections 4 feet or greater in length with angle or channel stiffeners formed from sheet steel not less than 0.093-inch (12 gage).
   b. Field assembly or the use of knockdown frames will not be permitted.
2. Anchors: Provide floor and jamb anchors and diagonal bracing in accordance with recommendations of HMMA 840, 867 Guide Specifications for Floor Anchors and for Jamb Anchors, or ANSI/SDI 100, as applicable.
   a. Provide anchors formed from not less than 0.042-inch (18 gage) steel.
3. Hardware Reinforcements: Steel plate in conformance with recommendations of HMMA , 867 Guide Specifications for Frame Hardware Reinforcements and Preparations, and ANSI/SDI 100, as applicable.
4. Finish Hardware Stops: Prepare frames for hardware in conjunction with the work described in Section 087100 and Section 281300.
   a. Refer to Section 087105 for locations of hardware.
   a. Provide removable glazing stops formed from sheet steel not less than 0.032-inch (20 gage) in thickness. Stops shall have mitered corner joints.
   b. Secure stops with No. 8 oval-head zinc-coated steel screws at 12 inches on centers, maximum.
   c. Provide stops for glazed openings in fire-resistive rated openings in accordance with the requirements of NFPA 80.
   d. Stops in door frames shall be continuous to the bottom of frames.

C. Fire-resistive Rated Assemblies:
1. Where opening assemblies are scheduled on the Contract Drawings to be fire-resistive rated, provide such assemblies successfully tested in accordance with NFPA 252 or UL 10B, as applicable, and installed in accordance with NFPA 80.
   a. Shop- or field-apply labeled gasketing of type required to prevent passing of smoke or other products of combustion through or around the assembly. Comply with requirements of CBC 715.4.3.1 for smoke and draft control.
2. Provide Underwriters Laboratories (UL) label, or Factory Mutual Engineering and Research Corporation (FM) symbol of approval.
D. Electric Through-Wire (HMF):
   1. Provide hollow metal frames receiving electrified hardware with wiring harness and concealed plug connectors on one end to accommodate up to twelve wires.
   2. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the electric hinge.

E. Insulated Doors: Provide at all exterior doors.
   1. Thermal: Provide doors that, when tested in accordance with ASTM E 90, exhibit a U-value equal to 0.067, and an R-value equal to 2.2 or greater.
   2. Sound: Provide doors that, when tested in accordance with ASTM E 90, exhibit a Sound Transmission Class (STC) of not less than 43 for a door thickness of 1-3/4-inch.

F. Sound-Rated Doors:
   1. Acoustical gaskets shall be an integral part of the door frame and comprised of single magnetic seals. At fire-rated conditions, dual seals are required, one magnetic and one neoprene bulb. Single compression seals and/or seal-stops applied to flush frames are not acceptable.
   2. Door frame shall be a split frame, 16 gage minimum.
   3. Hinges shall be cam-lift type.
   4. Door is to have no exposed fasteners.
   5. Door shall be pre-hung at the factory.

2.07 FABRICATION

A. Provide frames units fabricated, prepared for hardware, and ready for assembly and installation.
   1. Flush Doors: Provide continuous 0.053-inch (16 gage) channel frame welded into door body over specified core. Welds shall be ground smooth and blended such that they are indistinguishable from adjacent surfaces. Reinforce for hardware as required.

B. Finish:
   1. Remove tool marks and surface imperfections by grinding, filling, and sanding. Special care shall be taken with doors scheduled to receive high gloss finish that no imperfections are noticeable after finishing. Exposed surfaces shall be seamless.
   2. Chemically treat and phosphate coat surfaces to inhibit corrosion and promote paint adhesion.
   3. Shop-apply rust-inhibitive primer with spray equipment to galvanized and ungalvanized material in accordance with requirements of Section 099100.
   4. Field finish in accordance with requirements of Section 099100.
      a. In addition to factory prime coat, field apply a second prime coat.
      b. Painting subcontractor shall field apply two coats of finish coats in accordance with specification requirements.
      c. Initial field finish coat shall be applied after doors are installed. Final coat shall be applied after finish hardware templating and pilot holes have been made.
      d. Prior to the application of the final field applied finish coat, surface installed hardware shall be removed, and then carefully reinstalled after the final coat has been applied and dried.
      e. Color: As indicated in Contract Documents.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that minor dents or scratches caused by shipping, handling, or installation are properly cleaned, repaired, and touched up with a rust inhibiting primer.

3.02 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.
   1. Remove corrosion in accordance with SSPC-SP 3.
   2. Fill pitted and damaged surfaces with steel patching compound. Follow manufacturers written instructions for application of patching material.
   4. Galvanized Surfaces: Repair with galvanizing repair paint according to manufacturer's written instructions.

3.03 INSTALLATION

A. 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 plus or minus 1/16-inch.
      b. Between Edges of Pairs of Doors: 1/8-inch plus or minus 1/16-inch.
      c. Between Bottom of Door and Top of Threshold: Maximum 3/8-inch.
      d. Between Bottom of Door and Top of Finish Floor (No Threshold):
         Maximum 3/4-inch.
   2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80 requirements, with manufacturer's recommendations, and with Section 087105 for door hardware installation.

B. Install frames in accordance with the requirements of Section 087105 and in conjunction with Section 087100.
   1. Fully grout frames that are installed in exterior walls or located adjacent to interior wet areas.
   2. Provide not less than a 1/4-inch wide sealant rebate at the head and jambs of exterior door frames.

C. Glazing: Comply with installation requirements in Section 088100 and with hollow metal manufacturer's recommendations.
   1. Secure stops as indicated in Article 2.06.

D. Sound-Rated Doors:
   1. Coordinate all gaskets with other hardware to provide a continuous perimeter seal. Provide shim or offset bracket to mount automatic closers as required to clear gaskets.
   2. Apply and adjust all gaskets to form an airtight seal with latching and closure forces in compliance with code requirements and the American Disabilities Act, as applicable.
3. Install the threshold's horizontal surface 1/4-inch above the finish surface on the swing-side of the doors.
4. Install in conformance with manufacturer's directions.

**3.04 FIELD QUALITY CONTROL**

A. Doors may be selected for in situ verification testing of the acoustical performance per ASTM E-336. Provide adjustments as required to achieve a minimum Noise Isolation Class (NIC) rating five points less than the specified STC rating. Contractor shall remedy all defects without additional expense to the Owner.

**3.05 ADJUSTING**

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.
   1. Remove grout and other bonding material from hollow metal work immediately after installation.
   2. Remove corrosion in accordance with SSPC-SP 3.

B. Primed Surfaces: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
   1. Fill pitted and damaged surfaces with steel patching compound. Follow manufacturers written instructions for application of patching material.

C. Galvanized Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

D. Scratches and marks shall be repaired to the satisfaction of the Architect.

**3.06 PROTECTION**

A. Protect frame surfaces from construction damage by means of non-abrasive and cushioning material until job completion and final acceptance by Architect.

**END OF SECTION**
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Flush wood doors with stained and painted finishes.
   1. Include sound rated doors at mechanical rooms and electrical rooms, where occurs.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   5. Section 081113 - Hollow Metal Doors and Frames.
   6. Section 087105 - Door and Hardware Installation.
   7. Section 088100 - Glass Glazing.
   8. Section 099100 - Painting.

C. Related Sections:
   1. Section 087100 - Door Hardware.

1.02 REFERENCED STANDARDS

A. ASTM International (ASTM):
   1. C 303-10 - Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
   2. D 6007-14 - Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber.

   1. A135.4 - Basic Hardboard Product Standard.
   2. A208.1 - Wood Products.
C. California Code of Regulations (CCR):
   1. Title 17 - Public Health, April 2008:
      a. Division 3. Air Resources:
         1) Chapter 1. Air Resources Board:
            a) Subchapter 7.5. Airborne Toxic Control Measures:
               (1) §93120. Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products, (ATCM).

D. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 7 - Fire and Smoke Protection Features.
         1) Section 715 - Opening Protectives.

E. National Fire Protection Association (NFPA):
   2. 252-2012 - Standard Methods of Fire Tests of Door Assemblies.

F. Underwriters Laboratories (UL):
   1. 10B - Fire Test of Door Assemblies.
   2. 10C - Positive Pressure Fire Tests of Door Assemblies.

G. U.S. Department of Commerce Product Standards (PS):
   1. PS 1-95 - Softwood Plywood/Construction and Industrial.

H. Window and Door Manufacturers Association (WDMA):
   1. IS 1A-13 (series) - Industry Standard for Wood Flush Doors.

I. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordination with Other Sections: Wood stock incorporated into the work of this Section shall conform to requirements for hardwood specified in other related sections.
   1. Obtain hardwood material from a single source to ensure match in quality, color, and appearance.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and specifications.
C. Shop Drawings: In conjunction with the submittal requirements of Section 081113 and Section 081416, submit complete Shop Drawings comprehensively describing fabrication and installation of wood doors. Indicate not less than the following information:
1. Cross references, by identical numerical designation, to the door schedule on the Contract Drawings for each door provided.
2. Elevations of each door type and size with dimensionally indicated provisions for hardware, louvers, and glazed openings.
3. Door fabrication details, including edge details indicating materials types and species.
4. Face panel materials and thicknesses.
   a. In the case of hardwood face veneers scheduled to receive transparent finish, indicate species, cut, and assembly of face veneers.

D. Samples: Submit the following:
1. One 8-inch by 10-inch corner section of each type of door.
2. Samples of the door face veneers specified.
   a. Hardwood veneers scheduled to receive transparent finish in sizes and in sufficient numbers (three minimum) to demonstrate the inherent variations in color and grain of the product and to confirm compliance with the requirements of this Section.
   1) Factory Stained: Where samples will be factory finished, submit up to four sets of four 8-inch by 10-inch by 1/4-inch thick samples of each veneer demonstrating range of each finish. a) Include on back of each sample a complete description of the finish and each coat applied.
   2) Factory Painted: Where samples will be factory finished, submit up to four sets of four 8-inch by 10-inch by 1/4-inch thick samples of face panel to demonstrate finish. a) Include on back of each sample a complete description of the finish and each coat applied.
   3) Furnish three 8-inch by 10-inch by 1/4-inch thick samples to subtrade providing work of Section 099100 for preparation of natural and stained finish samples.
3. Samples of coatings, in colors stipulated by the Architect, applied to representative vision frame or louver blade sections.

E. Quality Control Submittals:
1. Certificates: Submit certificates issued by a qualified testing and inspection agency confirming the following:
   a. Standards by which doors proposed for use have been manufactured.
   b. Identification of the testing and inspection agency.
   c. Identification of the plant to which certificates have been issued.
   d. A declaration of the compliance of the plant and the product to the requirements of the governing standards.
F. Qualification Statements:
   1. Submit, with bid, information regarding previous work including list of projects with similar size and quality, contact persons, addresses, and telephone numbers.
      a. Qualifications will be reviewed prior to award of contract.
      b. Previous projects and fabrication shop will be visited prior to award.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
   3. MR Credit 6 and MR Credit 7: Use a minimum of 50 percent of wood-based materials and products made from rapidly renewal certified wood complying with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
   2. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      b. Clear Wood Finishes: not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.
3. IEQ Credit 4.4 - Low-Emitting Materials--Composite Wood and Agrifiber Products: Composite wood and agrifiber products used on the interior shall contain no urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
   a. Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Regularly engaged and specializing, for the preceding 10 years, in the design, manufacture, and fabrication of flush wood doors.
   2. Have demonstrated the ability to manufacture products in conformance with the quality assurance requirements of WDMA IS 1-A.

B. Certifications: Doors shall bear a label affixed to top of door rail indicating manufacturer's name with full description of face veneer assembly, species, cut, match, door type, size, and hardware matching information.
   1. Provide labels for fire-rated doors indicating hourly fire rating, temperature rise, smoke resistance, and listing agency information.
   2. Labeling Requirements: Affix temporary label to each door certifying that solid blocking has been provided for attachment of door hardware in accordance with specifications, and that any door with hardware installed using visible through bolts will be rejected and replaced by Contractor with doors having properly installed hardware.
   3. Certification: Submit third party certification that composite wood products comply with CCR Title 17 §93120 ATCM formaldehyde emission standards, unless otherwise exempted.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver doors to job site only after project is ready for installation, and after building finishes are dry and building has reached average prevailing relative humidity of the locality.
   1. Factory finished doors shall be individually wrapped in corrugated cartons or polybags to protect finish from damage.

B. Storage:
   2. Store doors indoors in enclosed spaces, flat, off-floor, under cover until interior finishing work has been completed, and in accordance with the requirements of the governing quality assurance standards referenced.
   3. Maintain relative humidity conditions within limits required by terms of manufacturer's warranty.
   4. Prior to installation, acclimate doors to final building environmental conditions.
C. Labeling: On each item fabricated of composite wood, apply label as a stamp, tag, sticker, or bar code, indicating fabricator's name, production date, and compliance standard of the product.

1.08 WARRANTY

A. Warranty interior doors for life of installation in accordance with the design-basis manufacturer's standard published limitations.
   1. Include the costs of rehanging and refinishing wood doors exhibiting defects in materials or workmanship including warp and delamination. Warp in excess of tolerances stipulated in WDMA IS 1-A will constitute a defective door installation.
   2. Manufacturer shall inspect installation of doors before issuance of the warranty and note on the warranty that the doors have been hung in accordance with the manufacturer's recommendations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Manufactured units shall be equal to products of one of the following, or a manufacturer accepted in advance in accordance with Section 012500.

B. Acceptable Manufacturers of Accessory Products:
   2. The Airolite Company, Marietta, OH (614)373-7676.
   4. Anemostat Door Products, division Dynamics Corporation of America, Carson, CA (310)835-7500.
   5. NGP (National Guard Products, Inc.), Memphis, TN (800)647-7874, with representation in Germantown, MD (301)353-1400, www.ngpinfo@nginc.com.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with the certification requirements of CCR Title 17 §93120 ATCM for formaldehyde emissions of composite wood products, unless otherwise exempted, using ASTM E 1333 primary or ASTM D 6007 secondary compliance testing.

B. Comply with pertinent recommendations contained in referenced standards required by this Section.
   1. Fire-rated Doors: Provide doors successfully tested in accordance with NFPA 252, or equivalent UL 10B test procedures.
      a. Provide doors tested with frames as an assembly.
   2. Comply with positive pressure testing requirements of CBC 0715.4.1 and UL 10C.
      a. Fire endurance test shall establish neutral pressure level at 40 inches above finished floor after 5 minutes and maintain that condition during remainder of entire test period.
         1) Refer to 2.05-C.4.d.2) for type and location of seals.
   3. Comply with CBC 11B-404 regarding minimum door opening widths.

C. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with §94507 of CCR Title 17 - Public Health.

D. Comply with CALGreen 5.504.4.3 Paints and Coatings:
   1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
   2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

E. Comply with CALGreen 5.504.4.5 Composite Wood Products: Hardwood plywood, particleboard, and medium density fiberboard composite wood products shall meet the requirements for formaldehyde as specified in CCR Title 17 §93120 - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products (ATCM).
   1. Comply with CALGreen Table 5.504.4.5 for formaldehyde limits.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.
   3. Certificates for MR Credit 6: Certify that products specified are made from rapidly renewable sources.
4. MR Credit 7 - Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council’s (FSC) Principles and Criteria for wood building components.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   b. Clear Wood Finishes: not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

3. IEQ Credit 4.4 - Low-Emitting Materials--Composite Wood and Agrifiber Products: Composite wood and agrifiber products used on the interior shall contain no urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
   a. Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

2.04 MATERIALS

A. Solid Core Materials:
   1. Particleboard: Type I density (32 to 33 pounds per cubic foot), Class 1, Commercial Standard CS 236, and conforming to ANSI A208.1, Grade 1-LD-2. Particleboard shall be urea formaldehyde free.
      a. Comply with applicable formaldehyde emission requirements of CCR Title 17 §93120 (ATCM).
   2. Mineral: Asbestos-free, non-combustible mineral composite with a minimum 28 pounds per cubic foot density when tested in accordance with ASTM C 303.
   3. Structural Composite Lumber (SCL): Combination of blocks or strips, maximum 2-1/2-inch wide, of a single species of structural composite lumber complying with the requirements of WDMA IS 1-AAWS.
B. Composite Wood Materials, Provide the following physical properties applicable to core MDF materials manufactured by SierraPine:
   1. Material: Medium density fiberboard (MDF) equal to Medex medium density fiberboard (MDF) as manufactured by SierraPine
      a. Wood Fiber: 100 percent post-industrial recycled wood residuals.
      b. Binder: Formaldehyde-free adhesive system, per LEED EQ 4.4.
   2. Conformance: ANSI A208.2, industrial-grade MDF.
   3. Certifications:
      a. SCS Certified: Post-industrial recycled wood fiber. No added formaldehyde.
      b. CHPS Compliant: Section 01350 approved.
      c. CPA Certified: Environmentally Preferable Product.
      d. FSC Certified.
   4. Panel Thickness: 3/4 inch, or as indicated on the Contract Drawings.
   5. Moisture Resistant: ASTM D 1037, 6-cycle accelerated aging test.
   6. Physical Properties, based on 3/4-Inch thickness, ASTM D 1037, Part A:
      a. Density: 48 pounds per cubic foot.
      b. Linear Expansion: 0.30 percent, dimensional change in length and width due to humidity change.
      c. Formaldehyde Emissions: As low as 0.01 ppm.
      d. Internal Bond: 200 psi.
      e. Modulus of Rupture: 6,000 psi.
      f. Modulus of Elasticity: 600,000 psi.
      g. Modulus of Hardness, Janka Ball: 1,200 pounds.
      h. Screw Holding: Required to pull 1-inch #10 sheet metal screw.
         1) Face: 350 pounds.
         2) Edge: 275 pounds.
      i. Water Absorption: 5 percent average, 24-hour soak.
      j. Thickness Swell: 3 percent average, 24-hour soak.
      k. Flame Spread Rating, ASTM E 84: Class C.

C. Face Panels:
   1. Hardwood Veneer for Transparent Finish: Conform to the requirements of WDMA IS 1-A Premium grade. Veneer shall be FSC certified.
   2. MDO Plywood for Opaque Finish: Comply with PS 1. Surface shall be weatherproof and carry a Class B fire rating.
      a. Comply with applicable formaldehyde emission requirements of CCR Title 17 §93120 (ATCM).

D. Blocking: One of the following, as required:
   1. Flame-resistant treated solid hardwood stock.
   2. Structural composite lumber complying with WDMA I.S.10 with a screw withdrawal of 400 lbf/700 lbf.
      a. Composite lumber shall be urea-formaldehyde-free.

E. Adhesives:
   1. Interior Premium Grade Doors: Type II rigid set, conforming to WDMA TM-6.
      a. Adhesives shall be urea-formaldehyde-free.
2. Exterior Use, Premium Grade, and Fire Rated Doors: Type I rigid set, conforming to WDMA TM-6.
   a. Adhesives shall be urea-formaldehyde-free.

F. Accessory Components:
1. Vision Frames: Provide vision frames manufactured by Anemostat or equal, and having the following characteristics and features:
   a. For Installation in Non-Rated Doors: Design is based on the use of Anemostat Model FGS-75 LoPro Series low profile metal vision frames.
      1) At Premium grade non-rated transparent finished hardwood veneer faced doors, use solid stock wood species matching face veneer. Form frames with square profile, installed flush with door.
   b. For Installation in Fire-Resistive Rated Doors: Design is based on the use of Anemostat Model FGS-75LoPro Series low profile metal vision frames manufactured in accordance with the requirements of NFPA 80, and bearing a UL or Warnock Hersey International listing.
      1) At premium grade transparent finished hardwood veneer faced doors, provide Anemostat fire-rated metal frames veneered to match door face and manufactured in accordance with the requirements of NFPA 80, and bearing a UL or Warnock Hersey International listing for rating required.
   c. Factory finish to match color selected by Architect.

2. Door Louvers: Provide louvers manufactured by Anemostat and having the following characteristics and features:
   a. For Installation in Non-Fire-Resistive Rated Doors: Model CHDL-2F (non-vision, inverted V).
   b. For Installation in Fire-Resistive Rated Doors: Model FLDL-UL.
      1) When required to be installed in fire-resistive rated doors, bear the listing mark of the UL or Warnock Hersey International listing for rating required, and provided with an automatic closing mechanism activated by a fusible link device rated at 135 degrees F.
   c. Factory finished to match color selected by Architect.
   d. Fasteners: Exposed fasteners shall be security type.

3. Glass: Provide safety glass in accordance with Section 088100.
   a. Provide fire-rated glass in accordance with Section 088813 where installed in fire-rated doors.

4. Astragals: Provide metal astragals manufactured by Anemostat and having the following characteristics and features
   a. For Installation in Fire-resistive Rated Door Pairs: Anemostat Model FMEA manufactured in accordance with the requirements of NFPA 80, and bearing a UL or Warnock Hersey International listing.
      1) At premium grade transparent finished hardwood veneer faced doors, provide Anemostat Model WV-FMEA wood veneered edges and astragals to match door face and manufactured in accordance with the requirements of NFPA 80, and bearing a Warnock Hersey International listing for rating required.
2.05 MANUFACTURED UNITS

A. Type:

B. Typical Doors: Premium grade, conforming to the applicable requirements of WDMA IS 1-A (series).
   1. Face Panels: Comply with LEED Credit IEQ 4.4.
      a. Transparent Finish:
         1) Species and Cut: Select white maple, plain-sliced.
         2) Adjacent Veneer Matching: Book match/Slip leaf match.
         3) Transoms: Continuous match.
      b. For Opaque Finish: Provide MDO plywood door face panels.
   2. Core:
      a. Solid:
         1) Non-Fire-Rated: Particleboard.
         2) Fire-Rated: Mineral.
   3. Edge Banding:
      a. Vertical Edges:
         1) Particleboard: 1-3/8-inch wide double laminated hardwood stiles without finger joints in outer band, or edged veneer banded to match face veneer.
            Species of outer stiles shall be same as face veneer except hardboard and birch veneer faced doors which shall have hard maple stiles.
         2) Structural Composite Lumber: 1-1/2-inch wide double banded laminated hardwood stiles without finger joints in outer band.
            a) Provide outer stiles of fire-retardant treated hard maple stiles at fire-rated doors.
         3) Mineral: Manufacturer's standard for receiving full mortise hinge.
            a) Species of outer stiles shall have fire-retardant treated hard maple stiles.
      b. Horizontal Edges:
         1) Particleboard: Minimum 1-1/8-inch wide mill option hardwood rail, or LSL aspen hardwood rail.
         2) Mineral: Manufacturer's standard for required label.
   4. Blocking: Provide specified blocking located for door hardware to be surface mounted. No through bolting will be allowed.
      a. Top and Bottom Rail: 6 inches wide.
      b. Intermediate Rail: 5 inches wide for impact resistance.
      c. Vertical Sides: 5 inches wide by 18 inches long solid blocking at lock locations.
      d. Other: Provide additional blocking, 2 inches wide minimum, at openings and hardware.
   5. Core Interface: Type A, bonded.
   6. Cross Banding: Treated low density hardwood flitches, 1/16-inch thick, or manufacturer's tested engineered fiber, extending full width and height of door with grain running at right angles to face and back veneers.

C. Fire-rated Doors: Provide doors successfully tested in accordance with ASTM E 152.
   1. Provide doors bearing the label of the Underwriters Laboratories, or of Warnock Hersey International (WHI), for the fire-resistive rating required. Manufacturer's self-certification labels are not permitted.
      a. Labels shall be permanently attached to hinge stile or top rail of door.
   2. Blocking: Provide flame-resistant blocking sized and located as specified for typical doors. No through bolting will be allowed.
   3. 20-Minute Fire Rating: Particleboard core, having vertical edges at meeting stiles veneered to match face over fire-rated components.
      a. Astragals are not required.
   4. 45-, 60-, 90-, and 180-Minute Fire Ratings: Mineral core, 5-ply minimum, bonded with Type I adhesive.
      a. Inner Stiles: Structural composite lumber (SCL) for 45-minute rating; noncombustible material for 60- and 90-minute rating.
      b. Comply with WDMA requirements for Premium Grade.
      c. Provide fire-rated doors to withstand 250-degree F temperature rise.
      d. Stiles: UL or Warnock Hersey approved.
         1) Stiles shall be veneered to match door face veneer at transparent finish doors.
         2) Edge Construction: At hinge stiles, provide edge construction with intumescent seals concealed by outer stile matching face veneer, and laminated backing at hinge stiles for improved screw-holding capability and split resistance.
         3) Pairs: Furnish formed-steel edges and astragals with intumescent seals for pairs of fire-rated doors, unless otherwise indicated.
            a) Finish steel edges and astragals to match door hardware (locksets or exit devices).
         4) Direct Screw Withdrawal: Pilot holes for 0.134-inch and 0.180-inch diameter templated hinge screws and pivots, if applicable, shall be prepared by the manufacturer.
   e. Manufacture labeled doors to the required size providing proper clearances without field trimming.

D. Sound Insulating Doors: Provide doors which, when tested in accordance with ASTM E 90, exhibit a Sound Transmission Class (STC) of not less than 43 for a door thickness of 1-3/4 inches.
   1. Doors may be selected for in situ verification testing of acoustical performance in accordance with ASTM E-336. Provide adjustments as required to achieve a minimum Noise Isolation Class (NIC) rating in accordance with ASTM E-413 five points less than the specified STC rating. Contractor shall remedy defects without additional expense to the Owner.
2.06 FABRICATION

A. Doors: Machine doors for cutouts, hinges, locks, and other hardware requiring routing and mortising. Perform rabbeting as required to properly hang doors.
   1. Vertical and horizontal edges of solid and mineral core doors shall be bonded to core and abrasively planed before applying veneer to ensure minimal telegraphing of core.
   2. Hot press entire door construction under a pressure of 85 psi to 125 psi at not less than 240 degrees F to ensure even glue bond at door edges and across face.
   3. Furnish doors prepared for hardware and ready for installation.
      a. Door clearances shall be as specified in Section 087105.
      b. Locations of finish door hardware shall be as specified in Section 087105.
      c. Drill 5/32-inch diameter size pilot holes for full mortise hinges.
   4. Bevel strike edge of single acting doors at a slope of 1/8-inch in 2 inches.
   5. Openings in doors shall be made in the factory.
      a. Non-Rated Doors: Provide hardwood stops finished to match solid color or wood grain face panels.
      b. Fire-Rated Doors: Provide steel stops for fire-resistant rated doors in accordance with NFPA 80.
   6. Seal edges of doors in the factory, if required by manufacturer to meet warranty requirements.

B. Dutch Door: Fabricate door for hinged operation in Dutch door configuration with shelf.

C. Accessory Components: Provide vision frame and louver assemblies complete, prefinished, and factory installed.

2.07 FINISHES

A. General: Match sample finishes on file in Architect’s office.
   1. Furnish wood doors with shop-applied finishes.
   2. Exposed surfaces, including top and bottom rails, shall be sealed, if required by manufacturer to meet warranty requirements.
   3. Completed finishes applied to exposed surfaces shall show no noticeable finish sanding scratches, runs, sags, blistering, blushing, checking or crazing, cracking, glue spots, or other similar conditions.
   4. Orange peel, field repairs, and touch-ups shall not be noticeable beyond 3 feet in completed finishes applied to exposed surfaces.

B. Factory Finish: Finish flush wood doors according to AWS Section 5, for Premium Grade, using AWS Finish System as follows:
   1. AWS System 10 - UV Curable, Water-Based:
      a. UV curable, water-based factory finishes shall be UV-cured to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations.
      b. VOC content of adhesives and sealants used shall be less than the current VOC limits of the local air quality management district.
c. Sealants used as fillers shall meet or exceed the requirements of the local air quality management district.

C. Field Finishes:
1. Transparent finished hardwood faced doors touched up or repaired on site shall comply with requirements of Section 099100.
2. Opaque field finished doors shall be primed in factory in accordance with requirements of Section 099100 for on site finishing.

PART 3 - EXECUTION

3.01 EXAMINATION
A. Verification of Conditions: Do not install wood doors until the required temperature and relative humidity have been stabilized in installation areas.

3.02 INSTALLATION
A. Conform to applicable sections of WDMA IS 1-A, "How to Store, Handle, Finish, Install, and Maintain Wood Doors."
   1. Installation tolerances shall be in accordance with WDMA IS 1-A.
B. Fit flush wood doors accurately in frames, within clearances specified below. Shim as necessary.
   1. Non-Fire-Rated Doors:
      a. Jambs and Head: 1/8-inch plus or minus 1/16-inch.
      b. Between Edges of Pairs of Doors: 1/8-inch plus or minus 1/16-inch.
      c. Between Bottom of Door and Top of Threshold: Maximum 3/8-inch.
      d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4-inch.
C. Sound Rated Doors:
   1. Install doors, frames, and gasket assemblies plumb and square to provide a continuous seal.
   2. Provide shim to mount automatic closers as required to clear gaskets.
   3. Install the threshold’s horizontal surface 1/4-inch above the finish surface on the swing-side of the doors.
   4. Apply and adjust gaskets to form an airtight seal with latching and closure forces in compliance with CBC Chapter 11B.
D. Tops and Bottoms: Coat with wood sealer after matching and fitting. Tops of doors visible from an upper floor or elevated level shall be finished to match face panel.
E. Refer to Section 087105 for installation of door hardware.

3.03 ADJUSTING
A. Field Finishing: Where necessary to repair opaque finish in field, sand entire surface of door with a 5/0 180-grit sandpaper while door is in a horizontal position.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Metal panels for access to junction boxes, valves, telephone and data equipment, fire alarm, and other concealed devices in walls, ceilings, and spaces where access may be required. Include laundry access door at athletic laundry facility.

1. Refer to Division 21 through Division 28 Sections and Contract Drawings for location requirements. However, required access doors may not be specifically indicated on the Contract Drawings, or they may be specified in other Divisions.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Division 22 - Plumbing.
   6. Division 26 - Electrical.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. A 653-13 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. Underwriters Laboratories (UL):

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors and panels.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
C. Scheduling: Coordinate delivery schedules with other work to avoid delays to progress of Project.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with Section 013300, submit Shop Drawings showing installation details and locations of all panels.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: For access doors and panels installed in walls and partitions of fire-resistive construction, provide assemblies listed in the UL Directory referenced, for the rating or ratings indicated.

B. Provide access to junction boxes, valves, telephone and data equipment, fire alarm, and other devices behind non-accessible walls and ceilings.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

### 2.04 MATERIALS

A. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924.

B. Stainless Steel:
   1. Non-Magnetic Type: Type 301/302/304 stainless steel conforming to ASTM A 176.
   2. Fasteners and Anchors: Type 304 stainless steel.

### 2.05 MANUFACTURED TYPES

A. General: In order to establish a basis for design, model number designations are based on the use of access doors manufactured by Karp Associates, except as noted. Equal products of other listed manufacturers are acceptable.

1. Locks:
   a. Unless otherwise specified, provide ceiling- and wall-mounted access doors and panels with manufacturer’s key-operated cylinder locks having automatic dust shutters. Provide stainless steel cams and studs.
2. Finish Types: Provide finishes as follows:
   a. **PC**: Sheet steel with factory applied, baked-on, rust inhibitive primer. Provide for general use.
   b. **SS**: Stainless steel with No. 4 satin polished finish. Provide at toilet room walls and at areas where higher than normal moisture conditions exist.

B. Product Application Legend: Provide type suitable for surface material and fire rating. Finish and color shall match adjacent surface, except stainless steel finishes shall be No. 4 satin polished finish.

1. Non-Fire-Resistive Rated Construction:
   a. Ceramic Tile and Masonry Walls: **Type A**.
   b. Utility Areas: **Type A**.
   c. Gypsum Board Walls Not Exposed to Public View: **Type C**.
   d. Gypsum Board Walls Exposed to Public View: **Type D1**.
   e. Plaster Surfaces: **Type F**.
   f. Gypsum Board Ceiling: **Type H1**.
   g. Laundry Intake Door: **Type I**.

2. Fire-resistive Construction:
   a. Walls and Ceilings: **Type K3**.
C. Non-rated Wall Access Doors:

1. **Type A** - Flush-mounted Metal Door, with Exposed Flange, for General Use.
   b. Frame: Sheet steel, minimum 16 gage, with 3/4-inch wide, one-piece trim flange.
   c. Door: Sheet steel, minimum 14 gage.
   d. Hinge: Concealed continuous piano hinge.
   e. Finish: PC or SS, as required.

2. **Type C** - Flush-mounted Metal Door, Concealed Flange, with Gypsum Board Flanges:
   a. Design-basis: Model KDW, as manufactured by Karp Associates, or equal.
   b. Frame: Sheet steel, minimum 16 gage, with galvanized steel gypsum board corner bead flanges.
   c. Door: Sheet steel, minimum 14 gage.
   d. Hinge: Concealed continuous piano hinge.
   e. Finish: PC, only.

3. **Type D1** - Flush-mounted in Wall, Concealed Flange, with Recessed Door to Receive Gypsum Board:
   a. Design-basis: Model RDW, as manufactured by Karp Associates, or equal.
   b. Frame: Sheet steel, minimum 14 gage, with galvanized steel gypsum board corner bead flanges.
   c. Door: Sheet steel, minimum 16 gage with 1-inch deep recess.
   d. Hinge: Concealed pivoting rod assembly.
   e. Finish: PC, only.

4. **Type F** - Flush-mounted, Concealed Flange, with Recessed Door to Receive Plaster:
   a. Design-basis: Model DSC-210 PL, as manufactured by Karp Associates, or equal.
   b. Frame: Sheet steel, minimum 16 gage, surrounded by a 22 gage galvanized steel expansion casing bead with metal lath flanges.
   c. Door: Sheet steel, minimum 16 gage, recessed 1/2-inch and lined with self-furring galvanized expanded metal lath.
   d. Hinge: Concealed pivoting rod assembly.
   e. Finish: PC, only, with exposed edges finished in white enamel.

D. Non-rated Ceiling Access Doors:

1. **Type H1** - Flush-mounted in Ceiling, Concealed Flange, with Recessed Door to Receive Gypsum Board:
   a. Design-basis: Model KATR, as manufactured by Karp Associates, or equal.
   b. Frame: Sheet steel, minimum 16 gage.
   c. Door: Sheet steel, minimum 18 gage with 1-1/2-inch deep recess.
   d. Hinge: Continuous piano hinge.
   e. Finish: PC, only, with exposed edges finished in white enamel.
E. Fire-Rated Access Doors: Provide doors UL listed and labeled for fire-rating required. Shop- or field-apply labeled gasketing of type required to prevent passing of smoke or other products of combustion through or around the assembly. Comply with requirements of CBC 715.4.3.1 for smoke and draft control.

1. **Type I** - Laundry Intake Door in Wall at Athletic Laundry Facility:
   a. Design Basis: Model BH bottom hinged hand operated, automatic closing, self-latching access panel with cylinder lock, as manufactured by Action Chutes, or equal. Provide stainless wall sleeve. Chute is not included.
   b. Frame: Stainless steel angle.
   c. Rating: 1.5-hour fire-rated UL Class B label 250 F maximum temperature rise.
   d. Size: 14" x 17".
   e. Door: 0.038-inch (20 gage) SS stainless steel.
   f. Finish: No. 4 satin finished.
   g. Coordinate lock with building keying system.

2. **Type K3** - Flush-mounted with Exposed Flange, Insulated, for Rated Construction Up to 1-1/2-Hour UL rating in Walls and for Rated Construction Up to 3-Hour Warnock Hersey rating in Ceilings:
   a. Design-basis: Model KRP-150FR with exposed flange, as manufactured by Karp Associates, or equal.
   b. Frame: Sheet steel, minimum 16 gage, with 1-inch wide, one piece trim flange.
   c. Doors: Sheet steel, minimum 20 gage, pan type with 2-inch thick insulation and sheet steel liner.
      1) Provide self-closing doors.
   d. Hinge: Continuous piano hinge
   e. Lock: Flush key-operated
   f. Finish: PC or SS, as specified.

### 2.06 FABRICATION

A. Fabricate each access door assembly as a complete unit ready for installation.
   1. Reinforce flush doors with 14 gage galvanized steel channels as required.
   2. Fasteners: Type 304 stainless steel.

B. Fabricate units of continuous welded steel construction, welds ground smooth and flush with adjacent surfaces.
   1. Polish seams of stainless steel units to satin finish.

### PART 3 - EXECUTION

#### 3.01 EXAMINATION

A. During utility rough in and prior to framing openings for review panels, review with Architect and Owner locations of access panels that are exposed to view.
   1. Contractor shall determine type and location of access panels and submit to Architect for review types of access panels for each location.
3.02 INSTALLATION

A. Install access panels as appropriate to function, location, and surface conditions in accordance with the manufacturer's submittals.
1. Provide proper backing or support as required. Secure with recommended inserts, anchors, and other fasteners as required.
2. Complete installation without damage to the surrounding surfaces.
3. Locate panels uniformly within tile module at walls to receive tile finish.

3.03 ADJUSTING

A. After completion of installation, test operation of covers and adjust door as required to prevent binding. Adjust latching and locking mechanisms to operate smoothly.

END OF SECTION
- SECTION 083313 -

COILING COUNTER DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Overhead coiling counter doors and frames at Physical
   Education Equipment Storage.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 087100 - Door Hardware: Padlocks.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. A 240-16 - Specification for Chromium and Chromium-Nickel
      Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for
      General Applications.
   2. B 221-12a - Specification for Aluminum-Alloy Extruded Bars, Rods,
      Wire, Shapes, and Tubes.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 7 - Fire and Smoke Protection Features.

C. National Fire Protection Association (NFPA):
   1. 80 - Fire Doors and Other Opening Protectives, latest edition.
   2. 105 - Allowable Air Leakage.

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for
   implementing sustainable design requirements.

B. Coordination: Coordinate electric locks and interlocks with work of
   Division 26 - Electrical.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.
B. Product Data: Submit complete manufacturer's descriptive literature and specifications.

C. Shop Drawings: Submit complete Shop Drawings describing fabrication and installation of coiling doors.

D. Quality Control Submittals:
   1. Provide manufacturer's installation instructions.

E. Closeout Submittals:
   1. Operation and maintenance manuals.
   2. Certificates: Furnish certification of approval that doors meet material, regulatory, and operational requirements.

### 1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

### 1.06 QUALITY ASSURANCE

A. Qualifications: Installer shall be an authorized distributor or representative of the manufacturer.

### 1.07 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

### 1.08 WARRANTY

A. Standard Warranty: Two years from date of shipment against defects in material and workmanship.

B. Maintenance: Submit for Owner's consideration and acceptance a maintenance service agreement for installed products.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Ceco/Windsor Door, a Robertson Ceco Company, Marysville, CA (916)743-1851, with distribution center in Orange County, CA (714)278-3232.
   2. The Cookson Company, San Francisco, CA (415)826-4422, with sales offices in Los Angeles, CA (213)531-2576.
4. Overhead Door Corporation, Dallas, TX, with manufacturing facilities in Sacramento, CA (916)387-0171.

B. Units shall be the products of one manufacturer and shall be either the products upon which the design is based or equal products manufacturers accepted in advance in accordance with Section 012500.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.

2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.

2.03 MATERIALS

A. Aluminum: Provide members fabricated from extrusions conforming to the applicable requirements of ASTM B 221 for Alloy 6063, Temper T5 or T6.

2.04 MANUFACTURED UNITS

A. Non-Rated Openings: Provide counter door assemblies equal to Cornell Rolling Counter series in sizes and arrangements indicated on the Contract Drawings, and with the following attributes:

1. Type:

2. Curtain: No. 1F interlocked flat-faced slat, 1-1/2 inches wide by 1/2-inch deep. Fit alternate slats with high strength molded nylon endlocks riveted at each end.
   a. 0.040-inch thick aluminum slat.

2.05 OPERATION

A. Crank: Provide manufacturer's standard fixed crank box with awning type handle.

2.06 FABRICATION

A. General Requirements:

1. Guides: Manufacturer's standard box section fabricated from same material and finish as curtain.

2. Barrel: Manufacturer's standard steel tubing with oil-tempered torsion spring counterbalance.

3. Hood and Fascia: Provide minimum 1/4-inch steel intermediate support brackets as required to prevent excessive sag.
   a. Material: 0.040-inch thick aluminum with reinforced top and bottom edges.
4. Brackets: Fabricate from reinforced steel plate with bearings at rotating support points to support counterbalance shaft assembly and form end closures.
   a. Finish: Phosphate treatment followed by a light gray baked-on polyester powder coat, minimum 2.5 mils cured film thickness.
5. Bottom Bar: Tubular section equal to curtain material. Provide fiber strip to seal contact with counter.
6. Locking Device: Padlockable slide bolt on coil side of bottom bar at each jamb extending into slots in guides. Provide cylinders keyed to building system.
7. Locking Device: Concealed sliding bolts on each end of bottom bar with deadlock operated by thumb knob from coil side. Provide cylinders keyed to building system.

B. Shop Finish:
   1. Aluminum Curtain and Hood: Clear anodized finish.
   2. Other Components: Rust inhibitive primer compatible with specified finish.

PART 3 - EXECUTION

3.01 EXAMINATION
   A. Examine substrates upon which work will be installed and verify conditions are in accordance with reviewed Shop Drawings.

3.02 INSTALLATION
   A. Coordinate the work of related trades to ensure the proper and adequate interface with the work of this Section.

   B. Install the work of this Section in accordance with the approved Shop Drawings and the manufacturer’s recommended installation procedures as accepted by the Architect. Comply with NFPA 80 and applicable requirements of governmental agencies having jurisdiction,
      1. Anchor all components firmly into position.
      2. Finish in accordance with Section 099100.

3.03 ADJUSTING
   A. Upon completion of installation, put coiling counter doors through at least ten operating cycles. Make required adjustments and ensure that components are in optimum operating condition.

3.04 CLEANING
   A. Immediately prior to completion of Project, remove protective wrapping and clean exposed surfaces.

3.05 CLOSEOUT ACTIVITIES
   A. Demonstration: Put all items through at least ten operating cycles. Make required adjustments and ensure that components are in optimum operating condition.
      1. Verify performance compliance of perimeter and joint seals.
B. Training: Instruct Owner's Representative in maintenance procedures.

END OF SECTION
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Overhead coiling roll-up slat doors, including:
   1. Interior steel fire rated doors.
   2. Exterior steel insulated doors.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

C. Related Sections:
   1. Section 055000 - Metal Fabrications: Jambs and guides for overhead coiling doors.
   2. Section 087100 - Door Hardware: Locking device cylinders.
   3. Section 099100 - Painting.
   4. Division 26 Sections: Coordination of electrical requirements for motor-operated doors.

D. ASTM International (ASTM):
   1. A 653-15 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

E. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:

F. National Fire Protection Association (NFPA):
   1. 80 - Fire Doors and Other Opening Protective, 2016 edition.

G. Underwriters Laboratories, Inc. (UL):

H. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
B. Coordination: Coordinate electric locks and interlocks with work of Division 26 - Electrical.

C. Scheduling: Furnish inserts and anchoring devices which must be set in concrete for the installation of the units. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

1.03 SUBMITTAL

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings describing fabrication and installation of coiling doors.

C. Quality Control Submittals:
   1. Certificates: Furnish certification of approval that doors meet material, regulatory, and operational requirements.

1.04 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.05 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

1.06 WARRANTY

A. Rolling Service Doors shall be warranted for a period of 2 years from the time of shipment against defects in workmanship and materials.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer:

B. Acceptable Manufacturers:
   1. Ceco/Windsor Door, a Robertson Ceco Company, Marysville, CA (916)743-1851.
5. Pacific Rolling Door Company, San Lorenzo, CA (510)278-3211.

C. Like materials shall be products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
1. Where doors are scheduled to be fire-resistive rated, comply with the applicable requirements of CBC and NFPA 80.
2. Design exterior doors for maximum possible wind loads in the area of the site.
3. Withstand wind load in exterior locations as referenced on Structural Contract Drawings.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 SYSTEM DESCRIPTION

A. Door Types:
1. Exterior Standard Service, Manually Operated: Cornell Thermiser Max Insulated ESD30 Rolling Door, hand-crank operated, Series 610 with flat profile Insulated Slat, or equal.
   a. Performance: ASHRAE 90.1 and tested air infiltration requirements of less than 0.3 CFM/FT².
   b. Provide seal package with lintel brush contacting door curtain.
2. Interior Standard Service, Motor Operated: Cornell ESD10, Overhead Door Series 610, motor-operated, with F-265 flat profile slat, or equal.
2.05 COMPONENTS

A. Door Curtain, Steel: Fabricate rolling door curtain of interlocking slats designed to withstand the anticipated loading, of continuous length for the width of the door, and without splices.

1. Standard Steel Slats:
   b. Standard Slats: Manufacturer's standard No. 5F slat, approximately 2-5/8 inches by 3/4-inch, 22 gage, or larger as required by door size.
      1) Use 20 gage slats on doors 14-foot wide or wider.

B. Door Construction:

1. End Locks: Heavy malleable iron castings, secured to curtain slats with two galvanized rivets. Provide locks on alternate slats for curtain alignment and resistance against lateral movement.

2. Curtain Jamb Guides: Fabricate curtain jamb guides of steel shapes with sufficient depth and strength to retain the curtain against specified wind loading. Slot bolt holes for track adjustment.

3. Bottom Bar: Manufacturer's standard steel angle assembly incorporating a continuous resilient weather seal at exterior doors.

4. Windlocks: Provide windlocks riveted to alternate slats where anticipated wind loads may be in excess of code minimums.
   a. Use on every slat on door widths 14 feet wide or wider.

5. Weather Seals: Provide manufacturer's standard continuous weather seals at exterior doors.
   a. Replaceable vinyl weatherstripping at jamb guides.
   b. Compressible vinyl astragal at bottom bar.

C. Counterbalancing Mechanism: Counterbalance doors by means of an adjustable steel helical torsion spring, mounted around a steel shaft in a spring barrel, and connected to the door curtain with barrel rings. Use grease-sealed ball bearings or self-lubricating graphite bearings for rotating members.

1. Counterbalance Barrel: Fabricate spring barrel of hot-formed structural quality carbon steel, welded or seamless pipe, of sufficient diameter and wall thickness to support the roll-up of curtain without distortion of slats and limit barrel deflection to not more than 0.03-inch per foot of span under full load.
   a. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance the weight of the curtain, with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to the barrel and the shaft.
   b. Torsion rod for counterbalance shaft of case-hardened steel, of required size to hold the fixed spring ends and carry the torsional load.
2. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate with bell-mouth guide groove for curtain.

3. Hood: Form to entirely enclose coiled curtain and operating mechanism at opening head. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.
   b. Weather Seal: Incorporate manufacturer's standard flexible neoprene-rayon weather seal baffle at exterior and insulated doors.

   a. Electric Motor: Refer to requirements of Article 2.06 - Electric Door Operator.
   b. Hand-Crank: Provide manufacturer's standard fixed crank box.

2.06 ELECTRIC DOOR OPERATOR

A. General: Design is based on the use of electric door operator assembly of the size and capacity recommended by the door manufacturer. Provide complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid operated brake, clutch, remote control stations, and control devices.
   1. Provide a hand-operated disconnect or a mechanism for automatically engaging a chain operator and releasing brake for emergency manual operation. Disconnect and operator shall be accessible from floor level. Include a motor operated interlock device to automatically prevent the motor from operating when emergency operator is engaged.
   2. Design operator so that motor may be removed without disturbing the limit-switch adjustment and without affecting the emergency auxiliary operator.
   3. Install operator using standard mounting where possible.

B. Electric Motors: Provide high-starting torque, reversible, constant duty, UL listed, Class A insulated electric motors with overload protection, sized to move door in either direction, from any position, at not less than 0.67 foot per second.
   1. Provide motor recommended by manufacturer. Provide size and rating as required for reliable operation and low maintenance.
   2. Coordinate wiring requirements and current characteristics of motors with Division 26.

C. Remote Control Station: Provide momentary-contact, 3-button control station with push button controls labeled OPEN, CLOSE, and STOP. Locate on interior surface of wall adjacent to door jamb.
D. Safety Edge Device: Provide each door with an electric safety switch, extending full width of door bottom, and located within a U-shaped neoprene or rubber astragal mounted to the bottom door rail. Contact with switch before fully closing shall immediately stop the downward travel and reverse direction to the fully opened position. Connect to the control circuit through a retracting safety cord.
   1. Provide automatic shut-off when door encounters a 50-pound resistance.

2.07 FABRICATION
   A. General: Provide doors prefabricated, prefinished, and to the greatest degree practicable, assembled in the factory and ready for installation.
   B. Locking: Provide cylinder locks on bottom bars master-keyed to building system.
   C. Finish: Shop clean ferrous metal and galvanized surfaces, exposed and unexposed, except seals, gaskets, or lubricated surfaces.
      1. Steel: Manufacturer’s bonderized treatment with a baked-on thermosetting polyester primer, and factory finish under work of Section 099100.
      2. Color:
         a. Exterior: Provide custom color selected by Architect to match exterior wall panels specified in Section 074273.
         b. Interior: Provide custom color selected by Architect.

PART 3 - EXECUTION

3.01 INSTALLATION
   A. Install doors in accordance with the Contract Drawings and the manufacturer’s submittals, as accepted by the Architect.
      1. Install motor, track, and rails on Mason BR captive neoprene mounts to reduce noise and vibration to the adjacent spaces.

3.02 FIELD QUALITY CONTROL
   A. Fire doors shall be tested and certified for use.

3.03 ADJUSTING
   A. Lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.04 CLEANING
   A. Thoroughly clean surfaces of rust. Touch-up abraded areas of zinc coating with cold-galvanizing compound.
   B. Touch-up abraded areas of finish with finish coating equivalent to that applied in the shop.
3.05 DEMONSTRATION

A. Put all items successfully through at least ten successive operating cycles. Make required adjustments and ensure that components are in optimum operating condition.

1. Verify performance compliance of perimeter and joint seals.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Manual vertical lift glazed aluminum sectional overhead doors.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 017836 - Warranties.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 055000 - Metal Fabrications: Steel channel framed opening.
   6. Section 087100 - Finish Hardware: Locking device cylinders.
   7. Section 088100 - Glass Glazing.
   8. Division 26 Electrical Sections: Coordination with electrical connections.

1.02 REFERENCES

A. ASTM International (ASTM):
   3. A 653-13 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   8. C 1048-12 - Specification for Heat Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.

B. American Architectural Manufacturers Association (AAMA):

C. National Fenestration Rating Council (NFRC):
   1. 100-2010 - Procedure for Determining Fenestration Product U-factors.
   3. 400-2010 - Procedure for Determining Fenestration Product Air Leakage.

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Scheduling: Furnish inserts and anchoring devices which must be set in concrete for the installation of the units. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.
   1. Refer to other Sections for installation of inserts and anchorage devices.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.
   1. Show component construction, anchorage method, and hardware.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of sectional overhead doors.
   1. Show profiles and locations of glazed panels.
   2. Indicate accessories, opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
D. Samples:
   1. Submit sample portion of panel 12 inches by 12 inches showing hinge, track roller, joint gasketing, and jamb seal.
   2. Submit two finish samples of panels, 12 x 12 inches in size, illustrating color and finish.

E. Quality Control Submittals:
   1. Design Data: Submit calculations demonstrating that door sizes specified will withstand specified wind loads.
   2. Test Reports: Submit certified laboratory test reports confirming physical characteristics of insulation used in the performance of the work of this Section.
   3. Manufacturer Instructions: Include any special procedures required by project conditions.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
   1. Operation and Maintenance Data: Submit operating and maintenance data.
      a. Include normal operation, troubleshooting, and adjusting procedures.
      b. Include data for motor and transmission, shaft and gearing, lubrication frequency, and spare part sources.
   2. Warranty: Submit copies of written warranty, as signed by the applicator, agreeing to repair or replace defective work during the warranty period.
   3. Warranty Documentation: Submit manufacturer warranty.
      a. Ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three years of documented experience.

B. Installer: Company specializing in performing the work of this section with minimum three years of experience.
C. Installer Qualifications: Authorized distributor specifically trained and licensed, certified, or otherwise approved in writing by the manufacturer, and specializing in performing the work of this Section with minimum three years of experience.

D. Conform to applicable code for motor and motor control requirements.

E. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling: Store materials in clean, dry, interior area in accordance with manufacturer’s instructions. Protect materials from damage during handling and installation.

1.09 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

1.10 WARRANTY

A. Refer to Section 017836 for general warranty requirements.

B. Manufacturer Warranty: Warranty the door sections against defects in material and workmanship for five years from date of delivery to the original purchaser. Window components are warranted against defects in material and workmanship for three years from date of delivery to the original purchaser. Manufacturer warrants all hardware and spring components against defects in material and workmanship for one year (or cycle life of the springs) from date of delivery to the original purchaser.

C. Warranty: In addition to standard manufacturer’s warranty, provide the following:
   1. Five years against delamination of skins.
   2. Lifetime warranty on track and hardware including; heavy-duty stainless steel hinges, stainless steel sealed roller, high cycle galvanized springs, track, and aluminum alloy rails.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

A. Materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or the following products of another manufacturer accepted in advance in accordance with Section 01630.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.03 PERFORMANCE/DESIGN REQUIREMENTS

A. Performance Requirements:
   1. Fenestration U-Factors: NFRC 100.
   3. Water Leakage: None, when measured in accordance with ASTM E 331 and ASTM E 547.
   4. Air Infiltration: Limit air infiltration through assembly of wall area, measured at a specified differential pressure across assembly in accordance with NFRC 400, ASTM E 283, and ANSI/DASMA 105.
      a. Air Infiltration Test Pressure Differential: 6.24 pounds per square inch.
      b. Air Leakage: 0.06 cfm.
   5. Thermal Transmittance, Including Glazing: U-value = 0.080 maximum in accordance with ANSI/DASMA 105.
      a. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E 330, using 10 second duration of maximum load.

2.04 SYSTEM DESCRIPTION

A. Design is based on the use of Arm-R-Lite Titan Model aluminum doors with glazed panels manufactured by Arm-R-Lite Door Manufacturing Company.
   1. Operation: Provide doors designed for electric motor operation.
   2. Jamb Construction: Masonry jambs with anchor bolt fasteners.

2.05 MATERIALS

A. Aluminum Sheet: ASTM B 209, 5005 alloy, H14 temper, plain surface.
B. Aluminum Extrusions: At least 38 ksi tensile strength; ASTM B 221 and Aluminum Association (AA) standards.
C. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A 653 with G40 coating.

D. Torsion Springs: Galvanized steel; ASTM A 227, Class II zinc coating in accordance with Section 9.2 of ASTM A 641.

2.06 MANUFACTURED UNITS

A. Sectional Overhead Glazed Doors:
   1. Equal to Arm-R-Lite Titan Model, or BP Model 450 HD:
      a. Size: As indicated on the Contract Drawings.
         1) Maximum Height: 14 feet.
         2) Width Range: 12 to 18 feet.
      b. Weight Capacity: 700 pounds maximum.
      c. Wall Thickness: 0.105-inch.

B. Stiles and Rails:
   1. Top and Bottom Rails: 5-3/8-inch wide.
   2. End Stiles: 3-1/4 inches wide minimum.
   5. Fasteners: Zinc-plated 5/16-inch thru-bolts, nuts, and washers to secure stiles and rails.

C. Door Thickness: 1-3/4-inch, nominal.

D. Insulated Glazing Panels: Laminated glass; CBA Certified Products through IGCC, tested in accordance with ASTM E 2190.
   1. Thickness: 1-inch insulated glass units, dual sealed with polyisobutylene as primary sealant and silicone as secondary sealant.
   2. Low-E coating on № 2 surface.
   3. Air Space: Argon filled.
   4. Type: Transparent.
   5. U-Factor: As indicated.
   7. Visible Light Transmittance: As indicated.

E. Insulated Aluminum Panels: 1/2-inch thick insulated panel sandwiched between 0.065 inch thick aluminum sheets.
   1. Finish: AAMA 2605 organic coating system as specified in Section 050513.

F. Counterbalance: Galvanized torsion springs, head plates, and center spring supports mounted on continuous torsion bar and adjusted to counter weight and travel of door.
   1. Cable Drums: Die cast aluminum, paired for track type indicated.
   2. Lift Cables: High tension aircraft cable type, 3/16-inch diameter.
   3. Springs: Stainless steel and related hardware as necessary for system indicated.

G. Track: As required for track system indicated with continuous steel support angles and slight taper to ensure weather-tight fit in closed position.
   1. Track System: Full vertical lift typically, except standard overhead door where mezzanine above.
2. Track Size: 2-inch.
   a. Material: 12 gage, galvanized steel on continuous support angle, track set, and brackets.


4. Track Radius: 20 inches at standard overhead lift.

H. Hinges: 12 gage stainless steel, offset type, graduated to ensure weather tight fit.

I. Rollers: 2-inch stainless steel, polymer coated roller, sealed, 700 lbs capacity each, with precision bearing.

J. Operators: 1/2 hp, single phase, commercial jackshaft without chain hoist.
   1. Control: Keyed Open/Close/Stop, wall mounted.

K. Sill Weatherstripping: Factory applied EPDM gasket full length of bottom section and at each end of top rail making contact with bumper spring.

L. Jamb and Head Weatherstripping: Three part extruded aluminum and EPDM system with fasteners concealed with snap-on cover.

M. Lock: Interior side mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle. (For use when Electric Operator is not present; cannot be combined)
   1. Lock Cylinders: See Section 087100.

2.07 FABRICATION

A. Join styles and rails with 1/4-inch screws or by welding.

B. Factory seal glass with snap-in extruded PVC retainer channels.

C. Joints: Smooth and tight fitting mitered joints.

2.08 FINISH

A. Organic Coating: Conform to the requirements of AAMA 2605 for multiple coat thermally cured, polyvinylidene fluoride (PVDF) fluoropolymer coating, medium gloss, as specified in Section 050513.

B. Clear Anodized Aluminum: Clear anodic coating; AA-M12C22A21 at most 4 mils thick; ASTM B 244.

C. Color: As selected by Architect from manufacturer's standard range.

D. Field Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that:
   1. Wall openings are ready to receive work, and that opening dimensions and tolerances are within specified limits.
   2. Electric power is available and of the correct characteristics.
   3. Field conditions and structural blocking are acceptable and are ready to receive work of this Section.
4. Related items provided under other Sections are properly sized and located.
5. Built-in items are in proper location, and ready for installation of this work.

3.02 PREPARATION
   A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.03 INSTALLATION
   A. Install the work of this Section in accordance with the Contract Documents and manufacturer’s recommended installation procedures.
   B. Anchor assembly to wall construction and building framing without distortion or stress.
   C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
   D. Fit and align door assembly including hardware.
   E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.
   F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 079200.
   G. Tolerances:
      1. Maximum Variation from Plumb: 1/16 inch.
      2. Maximum Variation from Level: 1/16 inch.
      3. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
      4. Maintain dimensional tolerances and alignment with adjacent work.

3.04 ADJUSTING
   A. Put all items through at least ten operating cycles. Have manufacturer’s field representative present to make required adjustments and ensure that components are in optimum operating condition.
      1. Adjust door assembly for smooth operation and full contact with weather stripping.
      1. Verify performance compliance of perimeter and joint seals.

3.05 CLEANING
   A. Touch-up abraded areas of finish with finish coating equivalent to that applied in the shop.
   B. Clean doors, frames and glazing.
   C. Remove temporary labels and visible markings.

3.06 PROTECTION
   A. Protect installed products from damage during subsequent construction.
B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION
- SECTION 084000 -

ENTRANCES, STOREFRONTS, AND CURTAIN WALLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Curtain wall and storefront, entrance doors, mullion extenders, filler panels, accent trim, sunshades, and metal closures as applicable.

B. Referenced Sections:
   1. Section 011100 - Summary of Work.
   2. Section 012500 - Substitution Procedures.
   3. Section 013300 - Submittal Procedures.
   4. Section 013315 - Deferred Submittal Procedures.
   5. Section 016600 - Product Storage and Handling Requirements.
   7. Section 018113 - Sustainable Design Requirements.
   9. Section 055000 - Metal Fabrications: Internal reinforcing, support brackets.
   10. Section 072100 - Thermal Insulation: Fire safing.
   11. Section 079200 - Joint Sealants: General requirements for joint sealers.
   12. Section 087100 - Door Hardware: General requirements for door hardware and lock cylinders.
   13. Section 087105 - Door and Hardware Installation.
   14. Section 088100 - Glass Glazing: Requirements for glass materials and installation.

C. Deferred Submittal Procedures: The work of this Section may be affected by the deferred submittal procedures specified in Section 013315.

1.02 REFERENCES

A. ASTM International (ASTM):
   3. A 307-14 - Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.
   4. A 490-12 - Specification for Heat-Treated, Steel Structural Bolts, 150 ksi (1035 MPa) Tensile Strength.
   5. A 500-13 - Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
6. A 653-13 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
13. C 1048-12 - Specification for Heat Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.
15. C 1172-14 - Specifications for Laminated Architectural Flat Glass.
16. D 2000-12 - Classification System for Rubber Products in Automotive Applications.
18. D 2287-12 - Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.

B. California Code of Regulations (CCR):
1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
   a. Chapter 7 - Fire and Smoke Protection Features.
   b. Chapter 11B - Accessibility to Public Buildings, Public
      1) Division 4 - Accessible Routes.
         a) Section 11B-404 - Doors, Doorways, and Gates.
   c. Chapter 16 - Structural Design:
      1) Section 1604 - General Design Requirements:
      2) Section 1609 - Wind Loads.
         a) Figure 1609.3.1 - Equivalent Basic Wind Speeds.
      3) Section 1613 - Earthquake Loads.
   d. Chapter 24 - Glass and Glazing.
C. American Architectural Manufacturers Association (AAMA):
   1. TIR A9-91 - Metal Curtain Wall Fasteners, including Addendum (2000).
   4. 501-05 - Methods of Test for Exterior Walls.
   5. 501.2-09 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
   6. 501.4-09 & 501.6-09 (Combined Document) - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts (501.4) and Recommended Dynamic Test Method For Determining the Seismic Drift Causing Glass Fallout from a Wall System (501.6).
   7. 502-12 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
   8. 503-08 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
   9. 611-12 - Voluntary Specification for Anodized Architectural Aluminum.

D. American National Standards Institute (ANSI):

E. American Society of Civil Engineers (ASCE):
      a. Chapter 13 - Seismic Design Requirements for Nonstructural Components.
         1) Part 13.5.9 - Glass in Glazed Curtain Walls, Glazed Storefronts, and Glazed Partitions.

F. Glass Association of North America - consisting of Flat Glass Marketing Association, Glass Tempering Association, and Laminators Safety Glass Association (GANA):

G. National Fenestration Rating Council (NFRC):
   1. 100 - Procedure for Determining Fenestration Product Thermal Materials.

I. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Water Penetration: The appearance of uncontrolled water (other than condensation) on the room side face of any part of the system. Water may only be present inside any guttering system which contains a weep system to drain water to the exterior.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordination:
   1. Coordination with other trades providing adjacent work is required to make proper allowances for tolerances in construction, fabrication, and installation of the work of these various trades.
   2. Coordinate and verify accuracy of opening dimensions with related trades whose work adjoins the work of this Section, and be responsible for working out of all details and measurements.
   3. Sizes, locations, and alignments of openings shall take such tolerances into account in the design and installation so as not to adversely affect the allowable width constraints of the perimeter sealant joints.
   4. Coordinate bench marks for elevations and building line offset marks for alignment.
   5. Provide structural steel integral to curtain wall as part of the work associated with this Section. Note that more restrictive dimensional tolerances are required for steel framing integral to curtain wall.

D. Scheduling: Schedule deferred submittals for review by DSA on a timely basis so as not to delay the project.
   1. Submit to design team within 60 days of Notice to Proceed.

E. Deferred Submittal Responsibility: Refer to Section 013315.
   1. This is a performance specification. Performance criteria for solution of airtight, watertight, and structurally sound curtain wall system is for sole purpose of establishing design intent.
   2. Drawings indicate external profiles and configurations required, relationships of building structure, and other exterior and interior building elements with which work of this Section will interface. Details shown are intended to emphasize acceptable profiles.
   3. Adequately prove acceptability of solutions to Architect. Be totally responsible for curtain wall and other work of this Section. Total
responsibility does not preclude the Architect's approvals at each step of the procedures.

1.05 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications including certified copies of prior testing.
   1. In the event that prior project valid test reports are not available, mockups shall be constructed and tested at Contractor's expense.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings comprehensively describing fabrication and installation of curtain wall and doors. Shop Drawings and calculations shall be signed and sealed by a structural engineer, registered and licensed in the State of California. Shop Drawings submitted shall include not less than the following:
   1. Plans, elevations, and sections dimensionally locating system components in relation to each other and in relationship to contiguous building structure.
      a. Clearly and fully illustrate all work and its relationship to adjacent and back-up construction, arrangement and interrelationship of component parts, sequence of assembly and erection.
      b. Show the layout in large size plans, elevations and sections. Shop drawings shall include dimensions, sizes, spacings, gauges, welds, details, materials and finishes of all individual and aggregate components of the Work of this Section.
      c. Refer to Paragraph 1.11-B for verifying field conditions prior to preparing Shop Drawings.
   2. Full-size typical and special fabrication details, and details relative to anchorage to supporting structure, provisions for and control of thermal movement, and allowance for building movements. Include the following:
      a. Clearances and provisions for thermal movement.
      b. Provisions for additional bracing of adjacent components required to support loads of openings products.
      c. Joinery techniques, provision for horizontal and vertical expansion, glass and metal thicknesses, framing and anchor member profiles.
      d. Location of joint splices for expansion.
      e. Relative layout of adjacent building elements to each other and to grid lines.
      f. Dimensional position of glass edge relative to metal daylight.
      g. Glass bite.
      h. Glass face clearances.
   3. Dimensioned profiles of framing members, special fabrications, and accessories.
   4. Provisions for glazing, including sealants, gasketing, and setting accessories. Identify all materials by type and manufacturer. Show locations where each component is used, method of application, and any other special instructions.
5. Provision for construction and installation of end dams.
6. Details shall clearly and completely describe the application of sealants as to the type, configuration, and manufacturer used to make the construction and installation water tight.
   a. Include full size details, isometric drawing of connections, joinery, flashing and sealant continuity, extrusion die drawings prepared by extrusion manufacturer, and complete schedule of and location drawing for all imbeds, anchors, and other components installed in or attached to adjacent construction.
7. Provisions for doors and door hardware.

C. Samples:
   1. In accordance with the provisions of Section 013300, submit samples of:
      a. Fabricated parts that show fabrication techniques, joinery, fasteners, and accessories.
      b. Finish, in color stipulated, factory applied to representative extrusion.
   2. Submit Sample of IGCC/IGMA Certification Label with required 12"x12" glass samples.
   3. Coordinate samples with the submittals requirements of Sections 050513, 079200, 087100, and 088100.
   4. Submit samples of all materials and finishes, representative in every respect of materials to be supplied.

D. Deferred Submittals: Refer to Section 013315 for submittal procedures.
   1. Submit engineering calculations for wind loads and seismic movement comprehensively confirming the design and anchorage of the system proposed for compliance with Article 2.04 - Performance/Design Criteria.
      a. Calculations shall include, but not necessarily be limited to, the engineering analysis of all individual and aggregate components, fastening devices, connections, and imbeds of Work of this Section.
      b. Submit calculations prepared, stamped, and signed by a structural engineer currently licensed to practice in the State of California.
      c. Submit calculations in a form acceptable to the governing authorities having jurisdiction.
      d. Calculations shall include anchorage to structure.
      e. Calculations shall be coordinated with, referenced to, and submitted concurrently with, Shop Drawings.

E. Test and Evaluation Reports:
   1. Submit test reports from the sealant manufacturer for adhesion of all specified sealant compounds and structural glazing sealants to the glazing system components and materials. Include recommendations for surface preparation, and primers, if required.
   2. Provide test information on compatibility of sealants with accessory materials such as gaskets, spacers, and setting blocks.
   3. Provide certified test reports for all performance characteristics of the curtain wall system described in Article 2.04.
F. Qualification Statements: Submit list of successfully completed projects including project name and location, name of architect, and type and quantity of doors manufactured.

1. Provide evidence that manufacturer can label energy performance in accordance with California Title 24 and the individual project requirements listed on the ENV-1 form.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. The following criteria are required for products included in this Section:

1. The post-industrial and/or post-consumer recycled content (by weight) of the Glass and Glazing and frames shall be documented in accordance with the LEED Submittal Requirements.

2. Materials that are both manufactured and harvested or extracted within 500 miles (by air) of the project site shall be documented in accordance with the LEED Submittal Requirements.

3. Field applied adhesives, sealants and architectural coatings used for work in this section shall meet the requirements of Section 018113 VOC Limits for adhesives, sealants and paints. Only those products used on the interior of the building (inside of the weatherproofing system) are required to comply with these requirements. Certification of these products shall be in accordance with LEED submittal requirements.

B. LEED Submittal Requirements:

1. A completed "Green Materials Certification Form" (GMF). Information to be supplied on this form shall include:

   a. Cost breakdowns for the materials included in the Contractor or sub-contractor’s work. Cost breakdowns shall include total cost plus itemized material costs.

   b. Identification (Yes/No) of materials manufactured within 500 miles of the project site.

   c. Identification (Yes/No) of materials extracted/harvested within 500 miles of the project site.

   d. The percentages (by weight) of post-consumer and/or post-industrial recycled content.

   e. The VOC content of all field-applied adhesives, sealants, paints and coatings as required by 1.06.A.3.

2. Supplementary Information: In addition to the GMF, the following submittal information shall be provided:

   a. GMF Back-Up Documentation.

   b. Product Cut Sheets.

3. The LEED submittal information shall be assembled into one package per Section or per sub-contractor. Incomplete or inaccurate LEED submittals may be used as the basis for rejecting the submitted products.

C. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 CLOSEOUT SUBMITTALS

A. Closeout Submittals:

1. Operation and Maintenance Data: Prepare and submit for review and use by Owner a maintenance manual that includes the following:
   a. Detailed instructions for cleaning the various materials, including methods and acceptable cleaning products, as well as those that should not be used.
   b. Instructions for the removal and replacement of glazing materials.
   c. Seismic performance at 200 percent design displacement at 2 times Δm.
   d. Reproducible set of Shop Drawings.

2. Warranty: Furnish required written warranties effective from the date of Substantial Completion.

3. Asbestos and PCB Certification: After completion of installation but prior to Substantial Completion, Contractor shall certify in writing that products and materials installed, and processes used, do not contain asbestos or polychlorinated biphenyls (PCB), using format in Article 3 of General Conditions.

4. Hazardous Materials Notification: In the event no product or material is available that does not contain asbestos, PCB, or other hazardous materials as determined by the Owner, a Material Safety Data Sheet (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.

1.08 QUALITY ASSURANCE

A. Qualifications:

1. Fabricator: Fabricator shall have been in the curtain wall fabrication business for the past 10 years and shall provide proof of having successfully completed at least five projects similar in scope, type, and quality of the work specified herein within the last 2 years.

2. Installer: In case the erection of the work is performed by a company other than the manufacturer adhere to the following:
   a. Installer shall have at least 5 years of experience in the installation of curtain wall work of similar scope, type, and quality of the work specified herein, and shall provide proof thereof.
   b. Installer shall be acceptable to the manufacturer and the Owner.
B. Certifications:
   1. Certify that the following materials conform to the requirements of this Section:
      a. Alloys and finishes.
      b. Fasteners.
      c. Entrance doors.
   2. Provide NFRC (National Fenestration Rating Council) label where applicable. Obtain certifications from the National Fenestration Rating Council (NFRC) for product lines associated with the project in accordance with Title 24 Part 6 of the California Code of Regulations. Review Project curtain wall assemblies with the NFRC to determine the number of product lines. Prepare and submit applications, product and technical data, and physical mockups required by NFRC to complete the certification process. Use the following performance data as a base line performance minimum that the certified assembly must meet:
      a. Energy Performance Ratings:
         1) U-Value (Winter): 0.28 Btu/(hr x sq ft x °F)
         2) Solar Heat Gain Coefficient Clear IG Units: 0.27
         3) Shading Coefficient: 0.32
      b. Additional Performance Ratings:
         1) Visual Transmittance: 64%
         2) Solar Heat Gain Coefficient Tinted IG Units: 0.27
   3. The performance data to be used as a baseline performance minimum that the certified assembly must meet, including U-Factor, SHGC Clear IG Units, and SHGC Tinted IG Units, is indicated in the Contract Drawings.
   4. Manufacturer shall certify air infiltration rates in accordance with Section 116 of Title 24, Part 6, Chapter 1 of Non-Residential Energy Standards.
   5. Fees associated with the NFRC's uniform rating and labeling system shall be paid by the Contractor.

1.09 PRECONSTRUCTION TESTING

A. Mockup: Erect a portion of the system proposed for use, for review and acceptance.
   1. Provide glazed mockup representative, in every respect, of the completed work.
      a. Include corner condition showing application of sealants.
   2. When accepted, the mockup will become the standard by which subsequent work of this Section will be evaluated for acceptance.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Refer to Section 016600 for general delivery, storage, and handling requirements.

B. Material shall be stored in a dry, well-ventilated location. Handling of materials shall be kept to a minimum, and all materials shall be carefully protected from soiling, and from harmful moisture.

C. Glass: Provide cushions at glass edges to prevent damage at all times during transport, storage, and handling of glass. Protect glass faces from
scratches and abrasion. Protect glass edges from chipping or other damage. Deliver each piece of glass with factory labels (indicating glass type, quality and thickness). Do not remove labels until installation has been accepted.

D. Glazing Materials: Deliver glazing materials in manufacturer's unopened containers, fully identified with trade name, color, size, hardness, type, class and grade. Store glazing materials where they will be free from damage and in accordance with manufacturer's recommendations.

E. Finished Metals: Protect finished against soiling, staining or damage from scratches and abrasion. Maintain protection during construction until project completion.
   1. Provide wrappings, strippable coatings or other means of protection which will result in finish work approved by the Owner.
   2. During construction, remove protection for visual observation of finish as directed by the Owner and replace to maintain protection.

1.11 FIELD CONDITIONS

A. Review Contract Drawings in order to become familiar with structural framing and other elements to which curtain wall and aluminum shades can be attached. If additional elements are required for attachment of the work included herein, provide at no additional cost to the Owner.

B. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

1.12 WARRANTY

A. Warranty curtain wall to be free of defects in construction, materials, and workmanship, and to remain in a weathertight condition for a period of 5 years after date of acceptance of project, and that any and all defects will be promptly corrected without additional cost to Owner.

B. Warranty:
   1. Curtain Wall System: Entire curtain wall installation for 5 years to remain water-tight, air-tight, and weather-tight. Warranty shall include:
      a. Glass, glazing, and sealant materials.
      b. Abnormal deterioration, aging, or weathering.
      c. Water leakage under conditions equivalent to those specified.
      d. Air leakage exceeding specified criteria.
      e. Adhesive failure, cohesive failure, cracking, or discoloration of sealants.
   2. Entrance Doors: Two-year manufacturer's warranty.
   3. Shop-Applied PVDF Coating: Refer to Section 050513.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design is based on products manufactured by Kawneer North America, an Alcoa Company, Norcross, GA, (770)449-5555, www.kawneer.com, with manufacturing facilities in Visalia, CA (559)651-4000. The following
acceptable manufacturers may be used if they can provide NFRC certified products and will be the responsible party or specifying authority as defined by NFRC.


B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Doors in curtain wall shall comply with CBC Chapter 7, CBC 11B-206.5, and CBC Section 11B-404.1.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE/DESIGN CRITERIA

A. Design Requirements:
1. Wind Pressures: Refer to Structural Contract Drawings.
   a. For the exposure and wind speed indicated on the Structural Contract Drawings, design wind pressures shall be as required by code, except that design pressure shall not be less than 20 psf.
   b. Design system for flexural, shear, and torsional stresses resulting from positive and negative wind pressures acting normal to plane of system.
   c. Wind loading need not be considered additive to seismic loading.
2. Configuration: The design intent is based on the use of principal framing members, profiles, approximate sizes, and glazing modes indicated on the Contract Drawings.
   a. Dimensions and profile adjustments may be proposed, provided that the visual design concept, as determined by the Architect, is maintained.
   b. Compliance of the structural design to the requirements will be the sole responsibility of the curtain wall system manufacturer.

3. Impact loads shall comply with CBC 2406.1.

B. Performance Requirements: Curtain walls and storefronts identical to those furnished under this section shall have been independently tested by the manufacturer. If such tests are not available, mockups shall be constructed and tests performed. In either case, tests shall be conducted by an Independent Laboratory accepted by the Owner. Test results shall meet or exceed the following:

1. Structural Performance: Refer to AAMA TIR A11.
   a. Allowable Deflections: At a maximum fiber stress of 16 ksi and a safety factor of 165 percent:
      1) Framing Members: When subjected to a uniform load deflection test in accordance with the requirements of ASTM E 330, deflections shall not exceed the following:
         a) Perpendicular to the Plane of the Wall: Up to 13"-6" span, 1/175 of the span, and from 13″-6″, restrict to 1/240 of the span+ 1/4-inch.
         b) Parallel to the Plane of the Wall: Reduction of the glass or panel bite in excess of 25 percent of the design dimension, or 1/8-inch, whichever is greater.
   b. Maximum Allowable Deformation Under Uniform Structural Load Test: When tested in accordance with the requirements of ASTM E 330, and at inward and outward test pressures of 150 percent of the design wind pressures, the system proposed for use shall exhibit the following:
      1) No glass breakage or gross permanent distortion.
      2) No failure, in structure or function, of fasteners or anchors. Anchor deflection shall not exceed 1/8-inch and permanent set shall not exceed 1/16-inch.
      3) No permanent deformation of system framing members in excess of 1/1000 of clear span.
   c. Structural Movement:
      1) Interstory Drift: One percent of story height.
      2) Column Shortening: Story Height inches/2000 inches to be accommodated by curtain wall system.
      3) Vertical Beam Deflection:
         a) Prewall installation: Span/360, not to exceed 0.75-inch.
         b) Postwall installation: 0.50-inch.

2. Provisions for Thermal Movement: The system proposed for use shall provide for free and noiseless vertical and horizontal thermal movement of component parts when subjected to expansion and contraction relative to plus 70°F resulting from an exterior surface range of
plus 10°F to plus 150°F and a building interior temperature range of plus 50°F to plus 100°F.

3. Provisions for Movement of Building Structure: Design curtain wall system to:
   a. Comply with CBC 1613 requirements for seismic displacements and the design parameters stated on the Structural Contract Drawings.
   b. Provide for the in-place tolerances of construction that interfaces with the curtainwall.
   c. Design curtain wall system to accommodate vertical deflection of the supporting structure due to dead load and live load.
   d. Accommodate a displacement of not less than the maximum allowable story drift when subjected to anticipated deflections of the structure at design floor drift for both elastic story drift limit Δs and inelastic story drift limit Δm.
      1) Such displacement shall be assumed to be simultaneously parallel and perpendicular to the plane of the wall.
      2) At design Δs no failure or permanent displacement of any kind may occur.
      3) At twice the above displacement, wedge gaskets may disengage and perimeter weatherseals may not experience cohesive failure, but no other failure or deterioration of any kind may occur.
      4) At Δm repairable damage, structural and non-structural may occur. Components may not disengage and fall from the building.
   e. Prevent glass contact with the system framing members during wind or seismic displacement.

4. Air Infiltration: The system proposed for use shall have exhibited air leakage no greater than 0.06 cubic feet per minute per square foot of fixed area at 6.24 pounds per square foot when tested in accordance with the requirements of ASTM E 283.
   a. Doors installation shall not exceed 1.0 cubic feet per minute per linear foot of perimeter crack.

5. Air Infiltration: The system proposed for use shall have exhibited air leakage no greater than 0.06 cubic feet per minute per square foot of fixed area at 6.24 pounds per square foot when tested in accordance with the requirements of ASTM E 283.
   a. Doors installation shall not exceed 1.0 cubic feet per minute per linear foot of perimeter crack.

6. Water Penetration Resistance:
   a. Under Static Pressure Differential: The system proposed for use shall have exhibited no water infiltration when tested in accordance with the requirements of ASTM E 331 for a static pressure differential of 8.0 pounds per square foot for a period of 15 minutes.
   b. Under Dynamic Pressure Differential: The system proposed for use shall have exhibited no uncontrolled water penetration other than condensation on indoor face of any component when tested in accordance with the requirements of AAMA 501.4 or ASTM
E 331 for a dynamic pressure differential of 8.0 pounds per square foot. Water test shall be performed immediately after static pressure test for a period of 15 minutes.

C. Design Responsibility:
   1. The design, fabrication, and installation of the curtain wall system and its connections to the primary building framing is described herein as a performance type specification. The Contractor is responsible for engineering design and testing of all components and materials as well as the fabrication, installation, and performance of the curtain wall system.
      a. Design Caution: Curtain wall shall be designed to bypass intermediate floor decks without transferring loads. Curtain wall loads shall be transferred to the ground floor. Clips provided at intermediate floors shall be for planar resistance only.
   2. The details indicated on the Contract Drawings are intended as a guide for aesthetic and interfacing requirements with other work. The requirements establish basic dimensions, sight lines and profiles of components.
   3. Responsibility for the design of curtain wall and its connections to the primary building framing in conformance with the requirements of the Contract Documents rests with the Contractor.
   4. Design shall be performed under the supervision of a registered engineer licensed in the State of California.
   5. Modifications to the materials and systems within curtain wall will be considered by the Architect when they conform to all of the following:
      b. Paragraph 2.04-B Performance Requirements.
      c. Visual intent described in the Contract Drawings.
      d. They are submitted prior to the bid.
   6. Engineering calculations shall be provided to verify the design conforms to the requirements of the Contract Documents except test data shall be submitted where specifically required.

2.05 MATERIALS

A. Extruded Aluminum:
   1. Exposed Extrusions: Conform to the requirements of ASTM B 221 Alloy 6063 Temper T5 or T6.
      a. Covers, Trim, and Special Shaped Mullions: Where matching covers and trim are indicated, provide extruded shapes with sharp, uninterrupted exterior profiles of same material and finish.
   2. Concealed Extrusions: AA6061-T6, 6063-T6, ASTM B 221.

B. Formed Aluminum:
   1. Sheet Aluminum: Conform to the requirements of ASTM B 209, or as required by forming operations.
   2. Formed Components: Brake shape formed aluminum sheet matching finish of curtain wall system. Conform to the requirements of ASTM B 211.
ENTRANCES, STOREFRONTS, AND CURTAIN WALLS

3. Sills and Jambs: Where required, provide heavy gage sill flashing as part of the work of this Section.


C. Steel Stiffeners: Provide materials conforming to requirements of Section 055000.

D. Framing Anchors: Aluminum or steel, providing steel is properly isolated from aluminum.
1. Framing anchors shall provide for three-way adjustment to accommodate fabrication and construction tolerances, be structurally adequate to carry weight of curtain wall units, and allow for thermal building movement.
2. Anchorage at curtain wall head members shall be designed to accommodate expected building and thermal movements.

E. Fasteners: Comply with design criteria and recommendations of AAMA TIR A9. Use self-locking devices for fasteners that are subject to loosening or turning out, whether due to vibration, thermal, or structural movements.
1. Materials:
   b. For High Strength Steel: ASTM A 325.
   c. For Stainless Steel: Non-magnetic, AISI Type 300 series, ASTM A 176.
   d. For Aluminum: Stainless steel Type 304.
   e. Aluminum Studs: AA6063.
2. Wet Locations: Series 300 non-magnetic stainless steel self-drilling screws.

F. Glass: Refer to Section 088100.

G. Glazing Components:
1. Framing Perimeter Sealants: Refer to Section 088100.
2. Glazing Sealants: Refer to Section 079200.
3. Glazing Gaskets: Refer to Section 088100.
4. Glazing Accessories: Refer to Section 088100.

H. Accessories:
1. Weep Hole Baffles: 45-pore per inch open cell plastic-coated urethane foam, compressed 30 to 50 percent.
2. Protective Paint: Zinc chromate primer conforming to FS TT-P-645, or bituminous paint, as recommended by manufacturer.
3. Sealants: Custom color, as specified in Section 079200.
4. Bituminous Paint: Cold-applied asphalt emulsion paint formulated for 30-mil thickness per coat, complying with requirements of SSPC-Paint 32 and ASTM D 1187, except containing no asbestos.
2.06 CURTAIN WALL

A. System Types: Design is based on the following curtain wall glazing system for vertical and horizontal mullions, outside glazed for 1” insulated glazing, thermally broken, and structural silicone glazed, as indicated on the Contract Drawings:
   1. Arcadia T470-OPG 2900T Series 2-1/4-inch by 4-1/2-inch deep minimum.
   2. Arcadia T500-OPG 2900T Series 2-1/2” sightline x 7” deep minimum.
   3. Arcadia T500-OPG 23011T Series 2-1/2” sightline x 10” deep minimum.

B. Where sunshade fins or extensions are indicated on Contract Drawings, framing system shall be reinforced with nested steel channels or steel tubes to withstand the forces at connections as applicable.

C. Dissimilar Materials: Provide separation as specified in Part 3 of this Section.

2.07 STOREFRONT

A. System Type: Design is based on the following storefront glazing systems:
   1. Arcadia AFG451T Interior/Exterior Storefront Series with a 2-inch sightline x 4-1/2-inch deep minimum profile, center glazed for 1” insulated glazing, thermally broken, as indicated on the Contract Drawings at interior and extension.
      a. Refer to window opening types in Contract Drawings for locations of interior type.
   2. Arcadia AFG451 Interior Storefront Series with a 2-inch sightline x 4-1/2-inch deep minimum profile, center glazed for 1” insulated glazing, as indicated on the Contract Drawings for interior partitions.
      a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

B. Where sunshades, shading devices, or extensions are indicated on Contract Drawings, framing system shall be reinforced with nested steel channels or steel tubes to withstand the forces at connections as applicable.
   1. Non-Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, non-ferrous shims for aligning system components.
   2. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
   3. Perimeter Anchors: Provide insulation between steel material and aluminum material to prevent galvanic action when steel anchors are used.

2.08 ENTRANCES

A. Entrance Doors, General:
   1. Provide aluminum-framed doors with square-edged, flush glazing stops for 9/16” laminated glass,
2. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.
3. Provide CBC Chapter 11B compliant non-recessed threshold.

B. Exterior Swinging Entrance Door Type: Arcadia WS512T Thermal Entrance with wide vertical stiles, wide top rail, and 10-inch bottom rail, thermal aluminum framed glazed doors.

C. Interior Swinging Entrance Door Type: Arcadia WS512 Entrances with wide vertical stiles, wide top rail, and 10-inch bottom rail, non-thermal aluminum framed glazed doors.

D. Weatherstripping: Provide manufacturer’s standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.

E. Hardware: Provide hardware in accordance with Section 087100.

2.09 SUNSHADES

A. Custom exterior sunshade fins, installed vertically and horizontally.

B. Aluminum Panels: Refer to drawings for sizes and locations.
      a. Perforations: As indicated on Contract Drawings.
   2. Horizontal Sunshades: Aluminum panels attached with aluminum brackets to vertical mullions equal to Arcadia BSD003 Brise Soleil Airfoil Sunshades with outrigger supports and closed bullnose outer edge.

C. Finish: Fluoropolymer coating finished to match curtainwall/storefront framing and applied in accordance with Section 050513.

D. Fabrication:
   2. Inboard edge captured sunshade system with structural metal framing. Maintain dimensional profiles as indicated in Contract Documents.
   3. Exposed welding or exposed fasteners of perforated sheet to tubes is not permitted.
   4. Projecting mounting brackets shall be engineered and provided by the curtainwall manufacturer.

E. Finishes: Match finish and color of curtainwall framing.

2.10 FABRICATION

A. General: Shop fabricate frames into complete units in accordance with the manufacturer's published recommendations, verifying measurements at the job site prior to fabrication.
   1. Provide integral aluminum flashings.

B. Framing Members:
   1. Vertical and Horizontal Framing Members: Manufacturer’s standard sections of sufficient strength to meet project requirements.
2. Provide horizontal mullion configurations which allow for pockets at glazing faces to receive fixed resilient elastomeric glazing gaskets.
3. Make provisions at horizontal members to lead moisture accumulation to exterior.
4. Internally reinforce framing members with concealed structural steel members as required to limit deflection based on structural calculations and design analysis for imposed deadloads and windloads.
   a. Reinforcement shall be accomplished without increasing size of framing members.
5. Resistance to Forcible Entry: Provide jambs adjacent to door locks to withstand a force of 700 pounds.
   a. Provide reinforcement 3 inches above and 3 inches below and 1 inch on each side of frame.
6. Provide mullions and horizontals with flexible thermal break materials.
7. Connections to building frame shall be designed as pinned connection transferring no moment or torsion stresses to supporting members.

C. Closures and Edge Trim: Fabricate from 0.060-inch-inch thick brake metal sheet aluminum. Finish to match curtainwall framing.
1. Filler Gasket (at Abutting Interior Partitions): Refer to Section 079200.

D. Fitting: Insofar as practicable, perform fitting of the work in the factory.
1. Exposed work shall be carefully matched to produce continuity of line and design. Joints in exposed metal work, unless otherwise shown or specified, shall be accurately fitted and rigidly secured with hairline contacts.
   a. Splice joints for expansion shall be located on centerline of intersecting mullion or on centerline of architectural design features.
2. Except where otherwise shown, specified, or directed, the method of assembly and jointing will be at the Contractor's option, provided the results meet the intent of the Contract Drawings. The manufacturer's proven methods that will produce the required standards of workmanship shall be used subject to the Architect's acceptance. Fabricate and fasten metal work so that work will not be distorted nor fasteners overstressed from the expansion and contraction of the metal.
   a. Provide concealed fasteners and anchorage devices. Exposed fasteners are not permitted.

E. Welding: Welding shall be in accordance with the AWS recommendations, with electrodes, or by methods recommended by manufacturer of alloys being welded.
1. Distortion or discoloration of exposed metal surfaces caused by welding will not be acceptable.
2. Weld spatter and welding oxides on finished surfaces shall be removed by descaling or grinding.
3. Weld or mechanically fasten along entire line of contact on the unexposed side. Weld beads on exposed surfaces shall be ground and finished to match and blend with finish on adjacent parent metal. Grinding and polishing of nonferrous metal shall be done only
with clean wheels and compounds free from iron compounds. No soldering or brazing shall be allowed.

F. Priming:
1. Prime steel and unpainted aluminum in contact with steel, masonry, or concrete.
2. Prime steel parts of anchors, reinforcement, and supports.
3. Provide minimum dry film thickness of 1 mil for zinc chromate and 30 mils for bituminous paint.

G. Protective Treatments for Metals.
1. Galvanizing Carbon Steel: Hot-dipped for shapes, plates, bars, and strip in accordance with ASTM A 123; electrogalvanizing for fasteners and hardware in accordance with ASTM B 633; galvanizing for sheet in accordance with ASTM A 653.

2.11 FINISHES

A. Finish: Factory finish exposed surfaces of aluminum components in accordance with the following:
1. Fluoropolymer Finish: Conform to the requirements of AAMA 2605 for polyvinylidene fluoride (PVDF) coating, medium gloss, as described in Section 050513.
   a. Color: PPG Duranar color indicated in Section 050513.

2.12 SOURCE QUALITY REQUIREMENTS

A. Tests and Inspections:
1. Testing Sequence: Design approval tests shall have been performed in the following sequence:
   a. Air infiltration.
   b. Static water resistance.
   c. Dynamic water resistance.
   d. Structural performance at design pressure.
   e. Static air infiltration (repeat test).
   f. Static water resistance (repeat test).
   g. Structural performance at 150 percent design pressure.
   h. Seismic performance at design displacement $\Delta s$.
   i. Seismic performance at 150 percent design displacement at $\Delta s$.
   j. Seismic performance at $\Delta m$.
   k. Static air infiltration (repeat test).
   l. Static water structural performance at 150 percent.
2. Certified test reports signed by the testing authority shall be submitted for review and acceptance prior to bid proposal.

B. Coordination of Other Tests and Inspections:
1. Owner retains the right to inspect every aspect of curtain wall at every facility providing curtain wall requirements.
2. The Owner will retain an independent inspection service to inspect the work for conformance with the approved submittals.
3. Work shall be performed in compliance with Owner’s insurance underwriter’s requirements.
4. Provide services of a qualified curtain wall inspector acceptable to Owner and selected and paid by Contractor.

PART 3 - EXECUTION

3.01 PREPARATION

A. Galvanic Protection: Wherever aluminum will be in contact with steel, concrete, or other material with potential electrolytic reaction, provide permanent isolation of the aluminum as accepted in advance by the Architect.

B. Verification: Verify that wall openings are of correct size to fit the glazing system components. Notify Contractor of all deviations in size or defects in the opening substrates that preclude a proper weather tight or structurally sound installation.

C. Protect finished surfaces as necessary to prevent damage during progress of the work.

D. Mount magnetic contacts in factory drilled holes.

3.02 INSTALLATION

A. General: Install members in accordance with manufacturer's recommendations with adequate provision for settling, expanding, and contracting to occur without breaking glass, or any loss of weatherability.

1. Set plumb, square, and level.
2. Fasten securely in correct vertical and horizontal alignment.
3. Firmly anchor members using anchoring devices required for positive attachment of the members. Install internal steel reinforcing where required by structural design.
4. Exercise care in the drilling of anchorage holes to obtain full rated strength from attachment devices.
5. Take precautions during erection to provide for thermal movement without creating undue stresses in the fasteners, sealants, or glazing materials.
6. Sealing compounds shall be tooled in a secondary operation to fill joint and provide a smooth surface.
7. Provide horizontal mullion extensions at the perimeter of all CMU openings.
8. Route magnetic contact leads to ceiling plenum areas at points connection to HVAC controls.

B. Anchoring: Firmly anchor members, using epoxy set anchoring devices required to ensure positive attachment of the members to structure or adjacent wall components.

1. Install slip pads between moving parts.
2. Provide a separator at contact surfaces of dissimilar materials wherever there is a possibility of corrosive or electrolytic action.
   a. Use polystyrene to separate aluminum from galvanized steel, zinc, or relatively small areas of stainless steel or white bronze.
   b. Use zinc chromate primer or bituminous paint to separate aluminum from cured concrete, mortar, or plaster.
3. Anchorage assemblies to the building shall be inspected by a qualified independent curtain wall inspector selected and paid by the Contractor.
   a. Inspector shall file written reports regarding observations for each anchorage condition.

C. Tolerances:
   1. After installation, curtain wall shall be plumb, square, level, and correctly aligned within the following limitations:
      a. Maximum deviation from true vertical or horizontal 1/8-inch in 24 feet or 1/4-inch in the total run in a wall plane.
      b. Maximum offset from true alignment between consecutive members in line, end-to-end, shall be 1/32-inch.
   2. Elements shall be plumb, level, and true within the following:
      a. Offset from true horizontal and vertical design location shall not exceed 0.01-inch per foot for any component, not to exceed 0.125-inch, nor shall any joints between or among preassembled units vary from design location in excess of 0.01-inch per foot, not to exceed 0.125-inch.

D. Glazing: Install glass and glazing components in accordance with GANA Glazing Manual as specified in Section 088100.
   1. Incorporate fully resilient dry settings of glass units using the manufacturer’s recommended or approved gasketing system compatible with silicone sealants to be incorporated into structural glazed components of the system.
      a. Size and place setting blocks as recommended by GANA Glazing Manual, not less than 4 inches long placed at quarter-points in sill sections, and placed not less than 6 inches from the vertical glass edges in horizontal intermediate mullions.
   2. Extruded Glazing Gaskets:
      a. Install gaskets to maintain airtight compression of the glass against the interior spacer/gaskets.
      b. Install wedge glazing wedge gaskets and back spacer gaskets inside and outside of proper size for specified glass. Provide crowd-in length as recommended by the manufacturer to avoid pull back at the corners. All back spacer gasket corners shall be bed sealed for an air tight installation. Back spacer gaskets shall be cut into section in the vertical frame members with splice joints at each horizontal mullion location.
         1) Allow zone dam or water deflector installations to be sealed water tight without being interrupted by the gasket passing through.
         2) Seal vertical gasket grooves watertight at the zone dam or deflector location.
      c. Provide gaskets in manufacturer’s standard color selected by the Architect.
E. Sealants: Refer to Section 079200.
   1. Shop and Field Sealant: Select an appropriate sealant for joint size, probable movement and type of substrates for sealing between framing system and adjacent work.

F. Doors: Install doors in accordance with the requirements of Section 087105.

### FIELD QUALITY CONTROL

A. Water Tests: Upon completion of installation of work of this Section prior to acceptance by Owner, perform field tests in accordance with ASTM E 1105 on selected completed portions of the wall from floor to floor and one structural bay wide at Architect’s direction.
   1. Perform field testing in accordance with ASTM E 1105 at 8.0 psf at 10 percent, at 50 percent, and at 75 percent completion of the work of this Section for each building.
   2. If test fails, repair leaks and re-test. Continue with tests and repairs or replacements on the overall installation until such time as tests reasonably and certifiably exhibit no water intrusion, thereby instituting specified guaranty.

B. Manufacturer’s Field Service:
   1. Field representative for manufacturer of components and products used shall provide initial start-up assistance during erections, as required by the manufacturer.
   2. The local authorized field representative of the manufacturer shall make periodic job site inspections, adhesion tests, and observe and report on quality of job progress, work in progress, and work completed to date.
   3. The representative shall submit written reports, based upon his inspection to the Contractor and Owner, and shall provide a copy of these reports to the applicator.

C. Final Inspection and Approval: Formal final inspection of completed work shall be made jointly by the manufacturer’s field representative and the Contractor.

D. Periodically test sealants in place for adhesion using methods recommended by sealant manufacturer. Promptly replace sealant which does not adhere, or fails to cure. A minimum of one test will be made at each floor on each elevation.

### CLEANING

A. General: Immediately prior to acceptance of the work, remove protective materials from the curtain wall system and clean exposed members.

B. After field welding, remove weld slag and touch up primed surface.

C. Touch up minor abrasions to match adjacent surfaces.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Automatic (low-energy) power-assisted aluminum-framed swing door operators and controls.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 084313 - Aluminum-Framed Storefronts.
   5. Section 087100 - Door Hardware.
   6. Division 26 Electrical Sections: General requirements for electrical work.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 24, Part 1 - California Administration Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 4 - Accessible Routes:
            a) Section 11B-404 - Doors, Doorways, and Gates:
               (1) 11B-404.3 - Automatic and Power-Assisted Doors and Gates.

B. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
   1. A156.10 - Power Operated Pedestrian Doors.
   2. A156.18 - Materials and Finishes.

C. National Fire Protection Association (NFPA):
   1. 70 - National Electrical Code, latest edition, with state recommendations.

D. Underwriters Laboratories (UL):
   1. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
1.03 SUBMITTALS

A. Product Data: Submit in accordance with the provisions of Section 013300.
   1. Materials List: Submit complete lists of all materials, parts, and equipment proposed to be furnished and installed under this portion of the work, giving the manufacturer's name, catalog number, and catalog cut for each item where applicable.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings comprehensively describing fabrication and installation of automatic swing door operators.
   1. Templates and Diagrams: Furnish templates, roughing-in and wiring diagrams, and other data to fabricator for coordination with work of electrical, doors, frames, and finish hardware.

C. Samples: In accordance with Section 013300, submit samples of metal finishes specified, for review and acceptance.

D. Quality Control Submittals:
   1. Certificates: Furnish manufacturer's certification that swing door operators and controls comply with requirements for doors and emergency exits as required by code.
   2. Manufacturer's Instructions: Submit the manufacturer's current recommended method of installation.

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

1.05 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit manufacturer's standard operating and maintenance data, including instructions for adjustment, periodic oiling and spare parts information.
   1. Manual: Submit two copies of a manual describing maintenance requirements, service, and parts.
   2. Placard: Manufacturer shall have a trained and authorized service representative within a reasonable distance of the installation. A placard with the telephone number and address of the nearest service representatives shall be posted on the case of the door operating mechanism as well as within the manual.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Furnish spare parts to Owner.
1.07 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4.1 and MR Credit 4.2: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5.1 and MR Credit 5.2: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.08 QUALITY ASSURANCE

A. Installer Qualification: Factory-trained, licensed, certified, or otherwise approved in writing by the door manufacturer.
B. Electrical work shall be in accordance with the National Electrical Code.
C. Coordination: Coordinate door hardware types and finish with Section 087100.

1.09 FIELD CONDITIONS

A. Field Measurements: Prepare Shop Drawings based on field measurements taken at site specifically for work of this Section.

1.10 WARRANTY

A. Guaranty closer to be free from defects in materials and workmanship for 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   3. Horton Automatics, Corpus Christi, TX (512)888-5591, represented by Don La Force Associates, Inc., Harbor City, CA (213)326-0701.
   4. LCN Closers, Division of Ingersol-Rand, Princeton, IL (800)248-1460.
   5. Stanley Magic-Door, Inc., Los Angeles, CA (818) 575-3690.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulatory Requirements: Where these requirements conflict with this Specification, the more stringent provisions shall govern
   1. In addition to complying with pertinent codes and regulations, comply with all pertinent recommendations contained in ANSI A156.10 and NFPA 101.
   2. Automatic entrance doors shall comply with the door protective and reopening requirements of CBC 1133B.2.3.2.

B. Emergency Exit Opening: Provide automatic door operators which comply with requirements for doors and emergency exits, as certified by the manufacturer for the application shown.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4.1 and MR Credit 4.2 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 1020 percent of the total value of the materials in the project.
   2. MR Credit 5.1 and MR Credit 5.2 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 1020 percent of the total materials value.

2.04 DESIGN CRITERIA

A. Design Requirements: Low energy door sensing system for disabled access.
   1. Design shall consider wind loads in its construction.
   2. Incorporate applicable recommendations into door assembly.

B. Electrical Requirements: 115 VAC, single-phase, 15 amp fused circuit to door headers, two 24 VAC Class II wires between door headers and remote activation devices, 1/2 inch conduit and electrical boxes at actuators.

2.05 DOOR AND FRAME

A. Door and Frame: Provided under work of Section 084313.

2.06 EQUIPMENT

A. Operator: Design shall be equal to, Senior Swing Electro Mechanical low-energy powered door operator with reduced force spring, as manufactured by LCN Closers.

B. Operator: Design is based on HD-SWING Series 4000LE Low-Energy. Heavy-Duty powered overhead concealed door operator for extra large and high traffic barrier-free swing doors with reduced force spring, as manufactured by Horton Automatics, or equal.
   1. Push button, push plate, switch-activated, manual, or manual/electric power assisted "Push-N-Go" opening with power boost closing and holding; comply with ANSI A156.19 and UL 325.
6. Fail Safe: In event of power failure, make door operate manually with controlled spring close as though equipped with a manual door closer, without damage to operator components.
7. Provide adjustment by microprocessor control for:
   a. Opening speed.
   b. Back check.
   c. Hold open, from 5 to 30 seconds.
   d. Closing speed.
   e. Opening force (torque limiting).
   f. Acceleration during opening and recycling, for soft start.
8. Furnish with dual valves to control independent adjustable sweep and latch speeds, with maximum 105-degree cushion backstop.

C. Equipment: Completely electro-mechanical; comply with ANSI A156.19 and UL 325.
1. Control Box and Motor/Gear Box: Contained in aluminum housing; precision-machined gears and bearing seats and all-weather lubricant, mounted on vibration isolators.
   a. Design for concealed overhead application.
   b. Design for parallel arm "pull" operation.
   c. Design for center hung operator used with offset hung doors
2. Gears: Manufactured by operator manufacturer specifically for operators.
3. Motor: DC permanent magnet motor with shielded ball bearings. Stop motor when door stops or is fully open and when break-away is operated.
4. Door Operating Arm: Design-basis manufacturer’s Connecting Arm Type 1 Independent Pivot: Operator output shaft shall connect to an arm that transmits power to the door via a slide block connected to the arm. Arm works in a track that is mounted in the top web of the door. Door pivot is independent of the operator to allow for removal of operator without removing the door panel.
   a. Exposed Arms: Factory polished and finished to match operator enclosure.
5. Switch: Automatic Door Key Switch equal to Camden Door Controls CM-25 narrow stainless steel faceplate, 4 inches x 4-1/2 inches for mounting in aluminum jamb. Switch positions shall be OFF, AUTO, HOLD OPEN, EXIT MAINTAINED.
6. Control Circuits for Actuators and Safeties: Low voltage, NEC Class II.
8. Finish: Exposed surfaces shall be finished aluminum with color to match adjacent surfaces.
D. Enclosure: Overhead header concealing all operating parts except arms and manual control switches.
   1. Concealed Overhead Mounting: In ceiling or frame header, accessed through cutout; conceal door arm when door is closed.
   2. Provide access door on bottom of enclosure for access to controls and removable components without removal of door or operator.
   3. No exposed fasteners.

E. Activators:
   1. Touch Activation Column: Equal to Wikk Part № BPS_SM-ING48 DB with 136-3 Clear (628) anodized aluminum finish square bollard post, in-ground mount, 48 inches high by 6 inches wide by 6 inches deep, operated by wheelchair footrest or touch. Provide one activator column per opening group of doors, located on the exterior side as indicated on the Contract Drawings.
      a. Cap: Removable black RF transparent flat bollard cap.
      b. Column Finish: Clear anodized
         1) Marking: International access symbol and PUSH TO OPEN text, filled with Federal blue.
      d. Card Reader: Coordinate with Section 087100 and prep column for card reader.
   2. Decals: Visible from either side, instructing the user as to the operation and function of the door.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Coordination: Verity that the following work has been completed under other Sections:
   1. Conduit and three-conductor wire for 24 face control switches where required.
   2. Preparation of header area, frame, and door to accept operator.
   3. Preparation of doors and sills for operator arms and pivots.
   4. Installation of 4-inch x 4-inch x 1-1/2-inch square J-box and 1/2-inch conduit to header with 120 vac 15 amp service and separate ground wire.
   5. Verify that door openings and doors are properly installed and ready for installation of door operators.
   6. Verify that electrical service is available, properly located, and of proper type.
   7. Verify that electrical connections are made correctly.

3.02 INSTALLATION

A. General: Install work in accordance with the manufacturer's recommendations as accepted by the Architect.
   1. Install power-assisted doors in accordance with manufacturer's instructions and with ANSI A156.19.
   2. Install guide rails adjacent to door swings.
B. Mount operator to a continuous one-piece extruded aluminum chassis and install concealed in transom for custom center drive, offset pivot applications.

C. Provide electrical work required to connect door operators, controls and actuators and to provide connection to the power source at the point of application indicated.

3.03 FIELD QUALITY CONTROL

A. Tests: Upon completion of this portion of the work, and prior to its acceptance by the Owner, make all required tests and secure all required approvals from agencies having jurisdiction.

3.04 ADJUSTING

A. Operate the doors through not less than 100 to 300 complete movement cycles (equivalent to 3 days use by normal traffic). Confirm that all functions, devices and features are performing as required. Readjust door operators and controls for optimum operating condition and safety. Lubricate operating equipment and clean exposed surfaces.

B. Adjust swing to deliver no more than 1.25 foot-pounds of kinetic energy measured 1 inch from lock edge.

C. Adjust door operators for proper operation, without binding or scraping and without excessive noise.

3.05 CLEANING

A. Clean all exposed surfaces. Adjust all mechanisms for optimum performance.

END OF SECTION
- SECTION 084334 -

ALUMINUM FOLDING PANEL STOREFRONTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Glazed aluminum sliding/folding walls.
   1. Folding panel storefront does not include swing panels used as doors.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 016600 - Product, Storage, and Handling Requirements.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 084000 - Entrances, Storefronts, and Curtain Walls.
   6. Section 088100 - Glass Glazing: General requirements for glazing systems.

1.02 REFERENCES

A. ASTM International (ASTM):

B. American Architectural Manufacturers Association (AAMA):
   1. 611-12 - Voluntary Specification for Anodized Architectural Aluminum (Revised).
   2. 1303.5-76 - Voluntary Specifications for Forced-Entry Resistant Aluminum Sliding Glass Doors.
C. California Code of Regulations (CCR):
1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:

D. Fenestration Systems Inc. [formerly The Association] (CAWM):
1. 300 - Revisions to CMBSO 1-79 - Forced entry Resistance Tests For Windows.

E. National Fenestration Rating Council (NFRC):
1. 100 - Procedure for Determining Fenestration Product Thermal Materials.
3. 400 - Procedure for Determining Fenestration Product Air Leakage.

F. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in accordance with the provisions of Section 013300.
1. Include Owner's manual and test data listing compliance to performance criteria.

B. Shop Drawings: In accordance with Section 013300, submit Shop Drawings comprehensively describing the fabrication and installation of sliding entrances.
1. Indicate dimensioning, direction of swing, configuration, swing panels, typical head jamb, side jambs and sill details, type of glazing material and handle height.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 CLOSEOUT SUBMITTALS

A. Submit Owner's Manual from manufacturer. Identify with project name, location and completion date, type and size of unit installed.
1.07 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer: A single source manufacturer with at least 15 years experience in providing folding/sliding glazed door systems for large openings.
2. Installer: Installer experienced in the installation of manufacturer's products or other similar products for large openings. Installer shall provide reference list of at least three projects of similar scale and complexity successfully completed in the last 3 years.

1.08 DELIVERY, STORAGE, AND HANDLING

A. In addition to general delivery, storage, and handling requirements specified in Section 016600, comply with the following:
1. Deliver materials to job site in sealed, unopened cartons or crates. Protect units from damage. Store material under cover, protected from weather and construction activities.

1.09 FIELD CONDITIONS

A. Existing Conditions: Verify dimensions with actual field conditions. Inspect related work and adjacent surfaces. Report all conditions which prevent proper execution of this work to the Architect.

1.10 WARRANTY

A. Special Warranty: Provide warranty against defects in materials and workmanship.
1. Warranty Period: Two years for units (installation by manufacturer's certified trained installer required), five years for seal failure of insulated glass, and ten years for rollers, all from date of Substantial Completion of Project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
2. Other manufacturers that comply with all specified requirements of this Section.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Conform to applicable provisions of California Building Code.
B. Comply with CALGreen 5.504.4.4 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Tables 5.504.4.1 and 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

C. Comply with safety glazing requirements of ANSI Z97.1 and CPSC 16CFR 1201.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of percent of the total materials value.

2.04 PERFORMANCE/DESIGN CRITERIA

A. Design Requirements: Design header such that the deflection with the live load is limited to the lesser of L/720 of the span and 1/4-inch.
   1. Adjustment: Provide system capable of specified amount of adjustments without removing panels from tracks.

B. Performance Requirements: System shall comply with applicable manufacturer’s independently certified minimum testing results.
   1. Air Infiltration: When tested according to ASTM E 283 and NFRC 400, provide system with maximum air leakage of 0.04 cfm/ft at a static air pressure difference of 1.57 psf (25 mph) and with maximum air leakage of 0.17 cfm/ft at a static air pressure difference of 6.24 psf (50 mph).
   2. Structural Test Performance: When tested according to ASTM E 330 at 150% of positive and negative design pressures with panel sizes of 3 feet wide and 8 feet high, provide inswing system with raised sill and reinforced posts that achieves a positive design pressure rating of +55 psf (146 mph) and a negative design pressure rating of 90 psf (187 mph).
   3. Thermal Performance U-Value: Unit shall be rated, certified, and labeled in accordance with NFRC 100, as indicated in manufacturer’s latest published data for the glazing specified.
   4. Forced Entry Resistance: Provide system that, when tested according to ASTM F 842 and AAMA 1304, there was no entry.

2.05 MATERIALS

A. Aluminum: ASTM B 221 Alloy 6063 Temper T5 for extrusions with nominal thickness of 0.078-inch.
**2.06 COMPONENTS**

**A.** Design is based on the use of NanaWall SL60, Monumental Thermally-Broken, Aluminum-Framed, Folding Panel System as manufactured by Nana Wall Systems.

1. Thermally-Broken: 3/4-inch to 15/16-inch polyamide plastic reinforced with glass fibers. Pour and de-bridge thermal break will not be accepted.

**B.** Stacking Bays and Folding Panels: Provide head jamb, side jambs, sliding panels, swing panels, and stacking bays with dimensions as indicated on Contract Drawings.

1. Provide number and size of panels and location of tracks and stacking bays as indicated on Contract Drawings.
2. Provide panels with standard one lite.

**C.** Folding/Sliding Hardware:

1. Provide manufacturer's standard combination folding and sliding hardware with top, bottom tracks and threshold. Running carriages shall be provided with sealed, self-lubrication, ball bearing multi-rollers.
   a. Surface mounted hinges and running carriages will not be allowed.
   b. Weight of panels to be borne by the bottom of the guide channel in the sill will not be allowed.
2. Hinges: Stainless steel with finish closest match to finish of frame and panels. Provide stainless steel security hinge pins with set screws.
3. Provide upper guide carriage and lower running carriage with four vertical stainless steel wheels and two horizontal polyamide wheels. The vertical wheels to ride on top of stainless steel guide track covers over the full length of the sill track and lie above the water run-off level. Carrying capacity of lower running carriage to be 220 lbs. Wheels riding below the water run-off level and/or wheels riding on aluminum surfaces will not be allowed.
4. Adjustment: Provide folding/sliding hardware capable of specified amount of compensation and adjustments without needing to remove panels from tracks, in width, 1/16-inch per hinge and in height, 1/16-inch up and down.

**D.** Operating Hardware:

1. Main Entry Panel: On main entry pair of panels on models without a swing panel, provide manufacturer's standard L shaped lever handle on inside only with concealed two point locking hardware operated by 180-degree turn of handle.
2. On pairs of folding panels, provide concealed two-point locking hardware operated by 180-degree turn of handle between each pair. Standard handle finish shall be stainless steel in a brushed satin finish. Face applied flush bolt locking will not be allowed.
3. Provide handle height centered at 41-3/8-inches from bottom of panel.

**B.** Glass: Refer to Section 088100 for glass and glazing requirements.
4. Aluminum or steel locking rods, as required to meet higher structural loads, capped by polyamide at top and bottom tracks. Rods shall have a stroke of 15\(\frac{1}{16}\)-inch.
   a. Provide cylinder lock keyed to building system.

E. Glass: 3/4-inch clear insulating low-E tempered, in accordance with requirements of Section 088100.
1. Provide continuous EPDM gaskets and extruded aluminum snap-in glazing bead for dry glazing.
2. Swing Panels: None.

F. Other Components:
1. Weatherstripping: Provide manufacturer's standard double layer EPDM, Q-lon gasket, or brush seals with a two layer fiber glass reinforced polyamide fin at both the inner and outer edge of door panels or on frame for sealing between panels and between panel and frame. Single layer weather stripping will not be allowed.
2. Threshold: Provide thermally broken with polyamide raised sill in same finish as panel finish. A cover plate over the sill will not be allowed.
3. Fasteners:
   a. Aluminum or other non-corrosive materials compatible with aluminum.
   b. Provide tapered pins or machine screws for connecting frame components.

2.07 FABRICATION

A. General: Shop fabricate into complete unit, verifying measurements at the job site prior to fabrication.
1. Provide system capable of specified amount of adjustments without removing panels.

B. Workmanship: Fabricate in accordance with the manufacturer's published recommendations.
1. Accurately miter and fit all members to hairline joints.
2. Weld or mechanically fasten along entire line of contact on the unexposed side.

C. Use extruded aluminum frame and panel profiles, corner connectors and hinges, folding/sliding hardware, locking hardware and handles, glass and glazing, and weather stripping as specified herein to make a folding/sliding glass wall. Factory preassemble as is standard for manufacturer and ship with components and installation instructions.

D. Sizes and Configurations: See drawings for selected custom dimensions within maximum frame sizes possible as indicated in manufacturer's literature. Refer to Contract Drawings for selected number of panels and configuration (inward opening unit).

2.08 FINISH

A. Finish: Coating: Conform to the requirements of AAMA 2603 for silicone polyester specified in Section 050513.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify structural integrity of support beams.
   1. Examine surface of openings and verify dimensions.
   2. Verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.

B. Verify the structural integrity of the header such that the deflection with live and dead loads complies with the requirements of Paragraph 2.04-A.

C. Verify structural support for lateral loads in both wind load and eccentric load when the panels are stacked open.

D. Apply building dead loads to the header prior to installing the panels. If a reasonable amount of time has been allowed for the effect of this dead load on the header, then only the building live load can be used to meet the requirements of Paragraph 2.04-A.

E. Examine surfaces of openings and verify dimensions. Verify rough openings are level, plumb, and square with no unevenness, bowing, or unevenness on the floor over which the panels travel.

3.02 INSTALLATION

A. General: Install frame members in accordance manufacturer's recommendations and installation instructions with adequate provision for settling, expanding, and contracting to occur without damage to glass. Properly flash and waterproof around the perimeter of the opening.

B. Anchoring: Anchor securely and rigidly fit frame in place, absolutely level, straight, plumb, and square in elevation, plane, location, and in proper alignment with other work.

C. Install panels, handles, and lockset in accordance with manufacturer's recommendations.

D. If necessary, provide drain connections from lower track.

3.03 ADJUSTING

A. Adjust hardware for proper operation. Operate the doors through not less than 10 complete movement cycles. Confirm that all functions, devices and features are performing as required. Readjust door for optimum operating condition. Lubricate operating equipment as required.

3.04 CLEANING

A. General: Immediately prior to acceptance of the work, remove protective materials from the storefront system and clean exposed members.

END OF SECTION
FI BERGLASS-SANDWICH PANEL SKYLIGHTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Insulating, metal-framed translucent sandwich skylight panels at Building A Corridor Entrance and Building B Lobby and Shared Social Space.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainability Design Requirements.
   5. Section 050513 - Shop-Applied Coatings for Metals.
   7. Section 084000 - Entrances, Storefronts, and Curtain Walls: Coordination of requirements for color-coating of metals.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. A 193-12b - Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
15. D 2244-14 - Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 26 - Plastic.
         1) Article 2610 - Light-Transmitting Plastic Skylight Glazing.

C. American Architectural Manufacturers Association (AAMA):

D. American Institute of Steel Construction (AISC):

E. American Welding Society (AWS):
F. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ER-).

G. National Fenestration Rating Council (NFRC):
   1. 100 - Procedure for Determining Fenestration Product Thermal Properties.

H. Society of the Plastics Industry, Inc. (SPI):
   1. Free Falling Ball Method for Impact Strength.

I. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with construction waste management requirements specified in Section 017419.

B. Comply with applicable procedural requirements of Section 018113.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and specifications.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of skylights. Shop Drawings submitted shall include not less than the following:
   1. Dimensioned plans, elevations, and sections locating skylight components in relationship to each other and in relationship to contiguous building structure.
   2. Typical and special fabrication and installation details, including details of anchorage to supporting structure.

D. Samples: Submit the following:
   1. Samples of coatings, in colors stipulated, applied to representative components 12 inches in length for review and acceptance. The Architect will stipulate the color of coatings to be factory-applied to exposed metals.
   2. Samples of fabricated panels, not less than 24 inches by 24 inches in size, equivalent in every respect to panel specified and proposed for use.

E. Quality Control Submittals:
   1. Design Data: Calculations shall be prepared and signed by a structural engineer currently licensed to practice in the State of California.
      a. Submit structural engineering calculations confirming the proposed design in each relevant aspect and in a form acceptable to the Building Department having jurisdiction.
         1) Include calculations of both the static and dynamic loads imposed on the structural members supporting the skylight.
2. Test Reports: When and as directed by the Architect, submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.

3. Certificates: When and as directed by the Architect, submit certificates attesting to conformance of insulating panels and metal coatings, as proposed for use, to the requirements of this Section. Accompany certificates with laboratory test reports confirming the following:
   a. Panels:
      1) Weatherability and resistance to color change.
      2) Visible light transmittance.
      3) Insulating value (U-factor).
      4) Bond integrity of sandwich panels over 20-year period.
   b. Factory-applied Coatings:
      1) Salt-spray resistance
      2) Resistance to humidity.
      3) Resistance to ultra-violet ray exposure.

F. Sustainable Design Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.05 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Regularly engaged and specializing, for the preceding 10 years, in the design and manufacture of sandwich panel assemblies, and of skylight framing systems, of equivalent type, size, complexity and physical characteristics to those required.

B. Installer's Qualifications:
   1. Regularly engaged and specializing, for the preceding 5 years, in the installation of sandwich panel assemblies, and of skylight framing systems, of equivalent type, size, complexity and physical characteristics to those required.
   2. Specifically trained, and licensed, certified or otherwise approved in writing by the manufacturer.
   3. Capable of furnishing a verifiable list of not less than five projects of equivalent type successfully completed within the preceding 2 years.
C. Welder’s Qualifications: Currently qualified for the welding of structural steel, in the shop and field, in accordance with the requirements of AWS D1.1.C

D. Regulatory Requirements: Comply with requirements of ICC ES PFC-1705.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage: Store materials off-ground and under cover. Protect materials from damage, soiling and moisture collection. Retain protective wrappings in place until the commencement of erection.
   1. Store translucent sandwich panels supported on long edges.

1.07 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

1.08 WARRANTY

A. Furnish a written warranty, signed by the skylight manufacturer and the skylight installer, that:
   1. The skylight installation shall experience no water leakage and be free from defects in materials and workmanship for a period of 5 years from the date of acceptance of the building by the Owner.
   2. Light transmission loss shall be not more than 6 percent over 10 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   3. CPI International, Lake Forest, IL (847)816-1060, (800)759-6985.

B. Materials shall be the products of one manufacturer and shall be either the ones upon which the design is based, or the products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations, including flammability requirements related to the intended use of materials provided under this Section.
B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

2.03 SUSTAINABILITY REQUIREMENTS

   2. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
      a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.

   3. MR Credit 4 Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

   4. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE CRITERIA

   A. Design Requirements:
      1. Design skylight superstructure assemblies to support dead loads plus a live load of 20 pounds per square foot and a deflection in such members not more than L/240.
         a. When tested in accordance with ASTM E 72, for a 12-foot clear span in the flat position, the skylight panel shall exhibit a deflection of not more than 3-1/2 inches at 35 pounds per square foot loading nor a deflection set of more than 0.10-inch within 5 minutes of load release.

      2. Design assemblies and anchorages to resist a wind loading on any projected horizontal surface of 20 pounds per square foot without loss of structure or permanent deformation in superstructure members.
      3. Design assemblies and anchorages to resist required seismic loadings without structural failure.
      4. Design assemblies and anchorages so that neither distortion nor excessive stress are induced in members, fasteners, or joinery due to expansion or contraction resulting from a 100 degree F temperature change.
      5. Select structural fasteners to provide a 4 to 1 safety factor when fully loaded.
B. Performance Requirements:
1. Light Transmission Design Requirements: Establish light transmission value in accordance with ASTM D 1494.
2. Fire Resistance Design Requirements: When tested in accordance with ASTM E 108, the system proposed for use shall conform to requirements for a Class A roof covering.

C. Performance Requirements:
1. Weather Resistance:
   a. Light transmission shall not decrease more than 6 percent when tested in accordance with D 1003.
   b. Color stability of exterior panel due to weathering shall change no more than 3 units Delta E in accordance with ASTM D 2244 calculated by minimum 2 samples after 60 months of exposure in Arizona.
   c. After exposure to temperature of 300 degrees F for 25 minutes, the interior and exterior faces shall not darken more than 7 units Delta E in accordance with ASTM D 2244, 0 percent light transmission in accordance with ASTM D 1003, and not show any yellowing.
2. Fire Resistance:
   a. Panel shall be an Approved Light Transmitting Plastic with a CC1 Classification in accordance with ASTM D 635, showing a burn rate of 1 inch or less.
   b. Panel shall meet ICC testing requirements for Acceptance Criteria for Sandwich Panel Adhesives.
   c. Panel shall have a self-ignition temperature of 1058 degrees F or greater, in accordance with ASTM D 1929.
   d. Panel shall have a smoke density rating of 54 or less, in accordance with ASTM D 2843.
3. Impact Resistance:
   a. Panel shall be capable of repelling the impact of up to 200-foot-pounds in accordance with SPI Shatter Resistance Test.
   b. The panels shall repel hailstones of up to 1-3/16 inch diameter at velocities up to 82 feet per second with no penetration, in accordance with ASTM E 822.
4. Air Infiltration: 0.042 cfm/foot for dry-glaze joint at test pressure of 15 psf in accordance with ASTM E 283.
5. Water Penetration: Zero water penetration for dry-glaze joint at test pressure of 15 psf in accordance with ASTM E 331.
6. Delamination: Faces shall not become readily detached when exposed to 300 degrees F with 10-pound load for 25 minutes.

2.05 MATERIALS

A. Aluminum Components:
1. Battens and Perimeter Closure Members:
   a. Fabricate members from tubular shapes extruded from aluminum conforming to ASTM B 221 for Alloy 6061, Temper T6.
   b. Provide matching bar-caps with integral seals and fasteners to secure panels.
c. Provide members with integral condensate gutters.

2. Panel-Grid Members:
   a. Fabricate panel-grid from I-beam sections extruded from aluminum conforming to ASTM B 221 for Alloy 6063, Temper T6, or Alloy 6065, Temper T5.
   b. For flat panel construction, provide a grid machined to tolerances no greater than plus-or-minus 0.022-inch.

3. Flashing and Accessories: Provide items required to be formed from sheet materials formed from aluminum sheet conforming to the requirements of ASTM B 209 for Alloy 303, Temper H14.

B. Translucent Panel Facing: Provide facings produced by the panel manufacturer specifically for use in skylights, walls, and other architectural applications. Face sheets shall be uniform in color and free of ridges, wrinkles, clusters of bubbles, or pinholes which might collect moisture and dirt. Standard commercial grade thermoplastic sheets, such as acrylic, polycarbonate, gel, or film-faced sheets will not be acceptable. Provide facings with characteristics no less beneficial than the following:

1. Exterior Face Sheets:
   a. Weathering Characteristics:
      1) When tested in accordance with ASTM D 3841 for Method B, exterior face sheets shall exhibit an overall degradation factor no greater than 10.
      2) Fading: When tested in accordance with ASTM D 2244, exterior face sheet shall exhibit a color change no greater than 3.0 (7.0 for Class A FRRA Unit) Adams Units (Delta E) after 5 years outdoor exposure in South Florida weathering at 5 degrees facing south, as determined by the average no fewer than three samples.
      3) Provide exterior face sheets with an integral glass-like erosion barrier and finish with a thermoset acrylic weather-protective surface, factory-applied to a thickness of not less than 1.2 mils. Protective surfacing shall be certified by the manufacturer as fully field-restorable.
   b. Impact Strength (Exterior Face Sheets): When tested in accordance with SPI Free Falling Ball Method, exterior face sheets shall repel an impact equivalent to 60 foot-pounds without fracture or tear and be resistant to penetration by pencil point or other small sharp objects. Tests relating to failure only at complete penetration will not be adequate.
   c. Thickness: 0.070-inch, plus-or-minus 0.005-inch.

2. Interior Face Sheets:
   a. Surface-Burning Characteristics:
      1) When tested in accordance with ASTM E 84:
         a) Flame Spread Index: 185.
         b) Smoke Density Developed: 310.
      2) When tested in accordance with ASTM D 635, extent of burn shall be classified as CC-2 plastic.
b. Surface-Burning Characteristics: Provide UL listed Class A No. 723, as applicable.
   1) When tested in accordance with ASTM E 84:
      a) Flame Spread Index: 50.
      b) Smoke Density Developed: 250.
   2) When tested in accordance with ASTM D 635:
      a) Extent of burn shall be no greater than 1 inch;
      b) Faces shall not deform, deflect, or drip when subjected to fire or flame;
      c) Faces shall not delaminate when exposed to 300 degrees F for 25 minutes.
   c. Thickness: 0.045-inch, plus-or-minus 0.005-inch.
   d. Color: Crystal.

C. Panel Adhesive: Manufacturer's standard adhesive conforming to the requirements of the ICC ES Acceptance Criteria referenced, and having the following characteristics:
   1. Tensile Strength: When tested in accordance with ASTM C 297, 750 psi under the following conditions:
      a. Two exposures to 6 cycles each of the aging conditions specified in ASTM D 1037.
   2. Shear Strength: When tested in accordance with ASTM D 1002 after exposure to five separate aging conditions, minimum shear strength shall be as follows:
      a. 540 psi at relative humidity of 50 percent at 73 degrees F.
      b. 100 psi at ambient temperature of 182 degrees F.
      c. 1400 psi at 500-hour oxygen bomb test in accordance with ASTM D 572.
      d. 250 psi at accelerated aging test in accordance with ASTM D 1037, at 182 degrees F.
      e. 800 psi at accelerated aging test in accordance with ASTM D 1037 at room temperature.

D. Fasteners:
   2. Framework Connections: The following, as required by the structural characteristics of the connections:
      a. Rivets formed from aluminum conforming to the requirements of ASTM B 316.
      b. Screws or bolts formed from aluminum conforming to the requirements of ASTM B 211 for Alloy 2024 Tempar T4.
      c. Series 300 stainless steel screws conforming to ASTM A 193 for Composition B8.

E. Filler: Fiberglass batts.

F. Sealants: Conform to the requirements of Section 079200.
2.06 FABRICATION

A. General:
1. Provide assemblies fabricated for delivery in the largest sections practicable within the following constraints:
   a. Legal transport.
   b. Expansion and seismic jointing.
2. Design: Provide type as indicated on Contract Drawings.

B. Battens and Perimeter Closures:
1. Mechanically join aluminum components into assemblies in the factory by heliarc welding or by bolting.
   a. Except as specifically indicated on the accepted submittals, field fabrication and assembly will not be permitted.
   b. Exposed portions of bolts shall be factory color-coated to match adjacent surfaces of glazed assembly members, or shall be finished with color-coated caps.

C. Translucent Panels:
1. Panels:
   a. Thickness: 2-3/4 inches (70mm).
   b. U-Value: 0.20.
   c. Light Transmission: Approximately 20 percent.
   d. Shading Coefficient: Approximately 0.35.
2. Assembly:
   a. Adhesively bond under heat and pressure to grid cores of mechanically interlocking aluminum I beams.
   b. Except as otherwise indicated, grid pattern shall be manufacturer's standard Shoji, nominally 8 inches by 20 inches. Align pattern on centerlines of panel and space uniformly.
   c. The adhesive bonding line shall be black in color, straight, cover the entire width of the I-beam and have a neat, sharp edge. In order to ensure bonding strength, white spots at intersections of muntins and mullions shall not exceed four for each 40 square feet of panel, nor shall they be more than 3/64-inch in width.

D. Finishing:
1. Provide exposed aluminum surfaces of metal framing, flashing, closures, and similar components with a silicone polyester organic coating conforming to AAMA 2603 as specified in Section 050513.
2. Provide exposed aluminum surfaces of metal framing, flashing, closures, and similar components with a fluoropolymer organic coating conforming to AAMA 2605 as specified in Section 050513.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify field dimensions and adjust construction and glazing panel size to accommodate field conditions.
3.02 PREPARATION

A. Galvanic Protection: Aluminum surfaces in contact with dissimilar metals, if not organically coated, shall be given a heavy coating of zinc chromate or bituminous paint.

3.03 INSTALLATION

A. Install panels in accordance with the Shop Drawings and the manufacturer's instructions, as accepted.
   1. Install units plumb, true, without warping or racking of panels, and without waves or buckling.
   2. Exercise care in the drilling of anchorage holes to obtain full rated strength from attachment devices.

B. Allow space between components for thermal movement due to a minimum ambient air temperature shift of 100 degrees F without creating undue stresses in the fasteners, sealants or glazing materials.

C. Apply sealants where indicated on the Shop Drawings.

D. Apply sealants where indicated on Shop Drawings in accordance with the general requirements of Section 079200.
   1. Waterproofing shall be done by means of continuous exterior silicone sealant beads. Horizontal flush joints require only a continuous silicone sealant bead.

3.04 FIELD QUALITY CONTROL

A. Water Flood Testing: Skylight manufacturer shall water flood test the completed skylights in accordance with AAMA 501.2.

3.05 CLEANING

A. After installation, clean framing members and accessories. Leave glazing panels in a clear, scratch-free condition, inside and out, with labels removed. Do not use abrasive materials of any kind in cleaning surfaces.

END OF SECTION
**PART 1 - GENERAL**

**1.01 SUMMARY**

A. Section Includes: Aluminum framed, acrylic domed/polycarbonate unit skylights.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

C. Related Sections:
   1. Section 084523 - Fiberglass-Sandwich-Panel Skylights.

**1.02 REFERENCES**

A. ASTM International (ASTM):

B. American Architectural Manufacturers Association (AAMA):
   1. 501.4-00 & 501.6-01 (Combined Document) - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts (501.4) and Recommended Dynamic Test Method For Determining the Seismic Drift Causing Glass Fallout from a Wall System (501.6).

C. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ESR-).

D. Underwriters Laboratories (UL):
E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings comprehensively describing the fabrication and installation of skylights.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.

   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 WARRANTY

A. Furnish a written guaranty that the skylight installation is guaranteed by the installer to be watertight and free from defects in materials and workmanship for a period of 10 years.

   1. Aluminum framed skylights shall have a 5-year manufacturer's guaranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

   1. American Skylites, an American Group Company, Fort Worth TX (817)589-7811, (800)772-7401.


B. Components shall be the products of one manufacturer and shall be either the ones upon which the design is based on an equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with ICC ES Evaluation Report ER-2469, as applicable.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE/DESIGN CRITERIA

A. Performance Requirements:
   1. Structural Members shall be of sufficient size to support design loads.
   2. Deflection of skylight framing members shall not exceed L/175 when subject to a uniform load deflection test in accordance with ASTM E 330, and per the above specified loads.
   3. Water Penetration: No water penetration shall occur when system is tested in accordance with ASTM E 331. Water penetration is defined as the appearance of uncontrolled water other than condensation on the interior surface of any part of the skylight.
      a. Drain to the exterior all water entering at joints or glazing reveals as well as all condensation occurring within unit construction.
   4. Air Infiltration: Air infiltration through the skylight assembly when tested in accordance with ASTM E 283 shall not exceed 0.06 cubic feet per minute per square foot of fixed area.
   5. Thermal Movement: Skylight assembly shall be so designed and anchored that there will be no objectionable distortion or stresses in fastening and joinery due to expansion and contraction when subjected to temperature variance.

B. Design Requirements:
   1. Provide units designed to support dead loads plus required live loads.
   2. Design skylights to resist wind loads referenced in Section 011100.

2.05 MATERIALS

A. Aluminum: Provide aluminum components of skylight assemblies extruded in accordance with the requirements of ASTM B 221, Alloy 6063, Temper T5.
2.06 COMPONENTS

A. Dome:
   1. Acrylic: Standard profile double-dome 1/4-inch thick high impact polyester skin laminated to acrylic modified polyester resin with UV light stabilizers and silane glass fibers at outer dome fused to a polycarbonate inner sheet, conforming to the requirements of UL 972 for burglar-resistant glazing.
      a. Outer Dome: Clear (CPC).
      b. Inner Dome: Medium White (WPC).
      c. Light Transmission: Approximately 45 percent.

B. Frame: Integral with outer dome shape.
C. Curb: Wall framing above roof line.
D. Fasteners: Corrosion-resistant lag screws.

2.07 MANUFACTURED UNITS

A. Circular Dome Skylights: Design is based on the use of Energy Star Model ALT-SF-2-CPC-WPC-ES, manufactured by Kingspan Light+Air (formerly Bristolite), or equal, and provided in sizes indicated on the Contract Drawings.
   1. Provide top-of-wall-mounted, double-dome with polycarbonate facing, thermally broken type with attachment to top of framed wall.

2.08 FABRICATION

A. Provide units fabricated and assembled in the factory and delivered ready for installation.
B. Frame: Manufacturer-furnished extruded aluminum curved sheet metal, engaging dome, sealed with perimeter gaskets and incorporating an integral water barrier, wind deflector, and 10 degrees sloping weepage gutter for condensation drainage.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Skylights shall be installed by the manufacturer or an authorized installer.
   1. Install units plumb, true, without warping or racking of panels and without waves or buckling.
   2. High Wind Attachment: Secure units to roof deck using galvanized nails at 8 inches on centers into wood framing.

3.02 FIELD QUALITY REQUIREMENTS

A. Site Tests:
   1. Water Penetration: Field test in accordance with AAMA 501.4/501.6, at an air pressure difference equal to 20 percent of the positive design wind pressure with a minimum of 6.24 psf and a maximum of 12 psf.
      a. There shall be no uncontrolled water penetration as defined in AAMA 501.4/501.6 at this pressure difference.
3.03 CLEANING

A. After installation, leave domes in a clean, scratch-free condition, inside and out, with labels removed.
   1. Do not use abrasive materials in cleaning dome surfaces.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Tubular daylighting devices, consisting of roof dome, reflective tube, and diffuser assembly.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. A 653-13 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   3. D 635 10 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.
   5. D 2843-10 - Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
   9. E 308-12 - Practice for Computing the Colors of Objects by Using the CIE System

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 16 - Structural Design.
      b. Chapter 24 - Glass and Glazing.
         1) Section 2405 - Sloped Glazing and Skylights.
            a) 2405.5 - Unit Skylights.
c. Chapter 26 - Plastic.
   1) Section 2610 - Light-Transmitting Plastic Skylight Glazing.

C. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ESR-).

D. Underwriters Laboratories (UL):
   1. 181 - Factory Made Air Ducts and Air Connectors; 1998.

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with applicable for more specific procedural requirements of Section 018113.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings describing fabrication and installation of roof skylights.
   1. Show layout, profiles and product components, including anchorage, flashings and accessories.

C. Test Reports: Submit AAMA/WDMA/CSA 101/I.S./A440 certified independent laboratory test reports or evaluation service reports verifying compliance with specified performance requirements and physical characteristics of materials used in the performance of the work of this Section.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Energy & Atmosphere Submittals: Provide documentation of how the requirements of Credit will be met:
   1. EA Credit 1: Data on Energy Optimization Performance Credits for the products specified.

B. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled
content for products having recycled content. Include statement indicating costs for each product having recycled content.

2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

C. Indoor Environmental Quality Submittals: Provide documentation of how the requirements of Credit will be met:
   1. IEQ Credit 6.1: Data on Perimeter and Non-Perimeter Controllability of Systems for use of Daylight Dimmer option with the products specified.
   2. IEQ Credit 8.1: List of Daylight Credits available for the products specified.

D. Regional Priority Submittals: Provide documentation of how the requirements of Credit will be met:
   1. RP Credit 1.1 - IEQ Credit 8.1 - Daylight & Views, 75% of spaces.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 10 years.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

A. Tubular Daylighting System: Manufacturer's standard warranty for 10 years.

B. Electrical Parts: Manufacturer's standard warranty for 5 years, unless otherwise indicated.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Comply with current ICC Evaluation Report acceptance criteria for plastic skylights proposed for use.

B. Comply with applicable structural requirements of CBC Chapter 16.

C. Comply with CBC 2405.5 requirements for unit skylight plastic glazing.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Energy & Atmosphere: For additional information on LEED goal requirements, refer to Section 018113.
   1. EA Credit 1 - Optimize Energy Performance:

B. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

C. LEED Goals for Indoor Environmental Quality:
   1. IEQ Credit 6.1 - Controllability of Systems--Lighting: Use of Perimeter and Non-Perimeter Controllability of Systems for use of Daylight Dimmer option with the products specified.
   2. IEQ Credit 8.1 - Daylight and Views--Daylight: Use of Daylight Credits available for the products specified.

D. Innovation & Design Process Submittals:
   1. ID Credit 1: Use of daylighting through tubular skylights.

E. Regional Bonus Submittals: RP Credit 1.1 Daylight.
   1. IEQ Credit 8.1 - Daylight & Views, 75% of spaces.
2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Completed tubular daylighting system assemblies shall be capable of meeting the following performance requirements:

1. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.

2. Water Resistance Test: No uncontrolled water leakage at 16.5 psf pressure differential with water rate of 5 gallons/hours/sf when tested in accordance with ASTM E 331.

3. Uniform Load Test:
   a. No breakage, permanent damage to fasteners, hardware parts, or damage to make system inoperable or cause permanent deflection of any section in excess of 1 percent of its span at a positive load of 110 psf or negative load of 60 psf.
   b. All units shall be tested with a safety factor of 3 for positive pressure and 2 for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.

4. Fire Testing:
   a. Class B Burning Brand: Burning brand shall self-extinguish without transferring the fire to the dome. Refer to ASTM E 108 and UL 790.
   b. Self-Ignition Temperature, Greater than 650 degrees F: Refer to ASTM D 1929.
   c. Smoke Density: Rating no greater than 75 in accordance with ASTM D 2843, or no greater than 450 in accordance with ASTM E 84 in the way intended for use.
      1) Classification: Class C.
   d. Rate of Burn, Minimum Burning Rate: 2.5 inches minimum Classification CC-2 in accordance with ASTM D 635.
   e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch Classification CC-1 per ASTM D 635.

2.05 TUBULAR DAYLIGHTING SYSTEM

A. General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC ESR-3681, or equivalent for product proposed for use.

B. Design is based on Solatube 21-inch diameter Daylighting System, or equal product manufactured by Tubular Skylights. Provide Model 750 DS-O at Open Ceiling and Model 750 DS-C at Suspended Acoustical Ceiling.

   a. Outer Dome Glazing: Type DA, 0.125 inch minimum thickness injection molded acrylic classified as CC2 material; UV inhibited, impact modified acrylic blend.
   b. Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
   c. Inner Dome Glazing: Type DAI, 0.115 inch minimum thickness acrylic classified as CC2 material.
2. Roof Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
   a. Base Material: Sheet steel, corrosion resistant conforming to ASTM A 653 or ASTM A 463, 0.028 inch thick.
   b. Base Style: Self mounted, 8 inches high.
3. Flashing Insulator: Type FI, Thermal isolation material for use under flashing.
4. PVC Boot: Type P, White PVC for flashing to flat PVC roof surfaces.
5. Dome Edge Protection Band: Type PB, For fire-rated roofs. Galvanized steel. Nominal thickness of 0.039 inches.
6. Dome Ring: Attached to top of base section; 0.090 inch nominal thickness injection molded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
7. Tube Ring Seal: Attached to the base of the dome ring; butyl glazing rope 0.24 inch diameter; to minimize air infiltration.
8. Dome Seal: Adhesive backed weatherstrip 0.63 inch tall by 0.28 inch
9. Reflective Tube: Aluminum sheet, thickness 0.018 inch.
   a. General:
      1) Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Specular reflectance for visible spectrum greater than 99 percent. Total solar spectrum less than 93 percent.
      2) Color: \( \text{L}^a\text{a}^b \) (defined by CIE \( \text{L}^a\text{a}^b\text{b}^\text{a} \) color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
   b. Reflective 90 degree Adjustable tube:
      1) Extension Tube Angle Adapter: Provide manufacturer's standard adapters for applications requiring:
   a. Lens: Curved prismatic lens of molded acrylic plastic classified as CC2, 0.100 inch minimum thickness, minimum light transmission of 90 percent at thickness of 0.100 inch.
   b. Seal: Closed cell polyethylene foam, 3 pounds per cubic foot, and white polyvinyl chloride seal butt joint welded, EPDM rubber, or silicone foam.
   c. Diffuser Seal: Open cell foam, acrylic adhesive backed, 0.75 in wide by 0.125 in thick to minimize condensation and bug, dirt and air infiltration per ASTM E 283.
   d. Diffuser Trim Ring: Injection molded acrylic. Nominal wall thickness 0.172 inches.
12. Dimmer Control:
   a. Daylight Dimmer: Type DV provided with 0-10v Daylight Dimmer with programmable scene-based control to first dimmer, then daisy chained with 10v to other units for a maximum distance of 50 feet. Uses universal input voltages ranging between 90 and
277 V AC at 50 or 60 Hz; maximum current draw of 50 ma per unit.

b. Provide one individual wall switch per room. Coordinate with Lighting Equipment and Control System specified in Division 26.

c. Controller: Requires solid state, low voltage controller capable of 0V to 10 V DC modulating input control of up to 40 daisy-chained 0 to 10 V dimmer units. Controller provided as specified in Division 26.

d. Control Wiring: Requires two conductor, low voltage, 22 gage cable from lighting controller to 0-10 V dimmer and connecting 0V - 10 V dimmers. Up to 10 units can be connected to a single lighting controller. Lighting controller should have a minimum capacity of 100 ma.

2.06 ACCESSORIES

A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

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

B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

3.04 PROTECTION

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
1.01 SUMMARY

A. Section Includes: Door hardware trim, and related accessories for exterior and interior openings.
   1. Refer to Section 087105 for installation of door hardware.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 017823 - Operation and Maintenance Data.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 079200 - Joint Sealants.
   7. Section 081416 - Flush Wood Doors.
   8. Section 087105 - Door and Hardware Installation.
   9. Division 26 Sections: Electrical requirements.

C. Hardware Specified Elsewhere: Hardware for the following is specified or indicated in other Sections.
   2. Cabinets of all kinds, including open wall shelving and locks.
   3. Access doors and panels, except cylinders where locks are specified.
   4. Overhead rollup doors and grilles.
   5. Glazed entry doors.
   6. Toilet compartments and accessories.
   7. Fire extinguisher cabinets.

D. Related Work Specified Elsewhere:
   1. Angle sill threshold.
   2. Weatherstripping for aluminum/all-glass entry doors.
   3. Door hardware installation.
   4. Lock boxes.
   5. Signs, including code required signage.
   6. Toilet accessories.
   7. Wall and corner guards.
   8. Card readers, motion detectors, and power supplies.
   9. Conduit, junction boxes & wiring.
1.02 REFERENCED STANDARDS

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, rt 1- California Administration Code (CBC), 2013 edition:
         1) Section 1008 - Doors, Gates and Turnstiles.
            a) 1008.1.9 - Door Operations.
            b) 1008.1.10 - Panic and Fire Exit Hardware.
      b. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-309 - Operable Parts.
         2) Division 4 - Accessible Routes.
            a) Section 11B-404 - Doors, Doorways, and Gates.

C. American National Standards Institute (ANSI):
   1. 115 - Specifications for Steel Door and Frame Preparation of Hardware.
   2. 115W - Wood Door Hardware Standards; Hardware Preparation.

D. Builders Hardware Manufacturers Association/American National Standards Institute (BHMA/ANSI):
   3. A156.3-2001 - Exit Devices.
   4. A156.4-2000 - Door Controls--Closers.
   5. A156.5-2001 - Auxiliary Locks.
   6. A156.6-2001 - Architectural Door Trim.
   7. A156.8-2000 - Overhead Stops.
   9. A156.16-2002 - Auxiliary Hardware.
  10. A156.18-2000 - Materials and Finishes.

E. Door Hardware Institute (DHI):
   1. Abbreviations and Symbols.
   2. Sequence and Format for the Hardware Schedule.
   3. For Processing Hardware Schedules and Templates.

F. National Fire Protection Association (NFPA):
   1. 80-13 - Fire Doors and Other Opening Protectives.
   2. 105-13 - Standard for the Installation of Smoke and Door Assemblies.
   3. 252-03 - Standard Methods of Fire Tests of Door Assemblies.

G. Underwriters Laboratories (UL):
   1. 10B-97 - Fire Tests of Door Assemblies.
2. 10C-98 - Positive Pressure Fire Tests of Door - Panic Hardware.

H. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Exit Doors: Doors that are openable at all times from the inside without the use of a key or any special knowledge or effort.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordination: Coordinate door hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
   1. Furnish related trades with the following information:
      a. Location of embedded and attached items to concrete.
      b. Location of wall-mounted hardware, including wall stops.
      c. Location of finish floor materials and floor-mounted hardware.
      d. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
      e. Manufacturer templates to door and frame fabricators.
   2. To greatest extent possible, obtain each type of hardware (i.e. latchsets, locksets, hinges, closers, etc.) from a single manufacturer.
   3. Provide secondary materials that are produced or are specifically recommended by manufacturer to ensure compatibility.
   4. Electrified Security Hardware: Coordinate installation of the electrified security hardware with the contract hardware supplier and provide installation diagrams and technical data. Coordinate voltages of electrically operated hardware with electrical contractor.

C. Preinstallation Meetings:
   1. Initiate and conduct preinstallation meetings with hardware suppliers, including electronic hardware suppliers, hardware installers, and related trades. Coordinate materials, techniques, and installation sequence of complex hardware items. Include manufacturers' representatives of locks, panic hardware, and door closers in the meetings. Convene prior to commencement of related work.
   2. Conference attendees shall include Contractor, Owner, Architect, door hardware installers, and representatives of hardware supplier and/or manufacturers.
   3. Topics to be discussed at meeting shall include:
      a. A review of Contract Documents and accepted hardware schedule shall be made and deviations or differences shall be resolved.
b. Building code, National Fire Protection Association (NFPA), and Underwriters' Laboratories (UL) requirements shall be reviewed and conflicts in building code, NFPA, or UL requirements and Project conditions shall be resolved.

c. Review items such as proper installation sequence, adjustments, attachment, and location of door hardware. If a conflict exists between what is considered proper hardware application and Contract Documents, these differences shall be defined.

4. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

5. Pre-installation conference shall serve to clarify Contract Documents, application requirements and what work should be completed before hardware installation can begin.

6. Prepare and submit, to parties in attendance, a written report of pre-installation conference. Report shall be submitted within 3 days following conference.

D. Scheduling: Submit templates to door and frame manufacturers sufficiently in advance to avoid delay in work.

1.05 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit manufacturer's product data containing drawings or cuts of all hardware items at same time hardware schedule is submitted. Make submittal in a neat brochure form and include an index list of all items, with manufacturer's names and catalog numbers. When proposing substitutions, conform to the requirements of Section 012500.

1. Name, part number and manufacturer of each item.

2. Use BHMA Finish codes per ANSI A156.18.

3. Fastenings and other pertinent information.

4. Catalog cuts.

5. Include a list of each manufacturer's nearest representative with address and phone number.

6. Manufacturer's product data sheets for hand-operated hardware.

B. Samples: Submit sample of each hardware item for review and acceptance.

1. When proposing substitutions, submit full size samples of both the specified hardware and the proposed hardware for comparison by Architect. Samples will be returned to Contractor after selection.

C. Shop Drawings: In accordance with the provisions of Section 013300, submit six copies of detailed hardware schedule.

1. Organize schedule into Hardware Sets in vertical style as illustrated by the Sequence of Format for Hardware Schedule as published by the Door and Hardware Institute, indicating complete designations of every item required for each door or opening. Include the following information:

a. For doors of different sizes or where hinges, closers, or locks are different, a separate heading shall be used.

b. Labeled openings shall not be combined with non-labeled openings.
2. Include the following:
   a. Type, style, function, size, quantity and finish of hardware items.
   b. Use BHMA Finish codes per ANSI A156.18.
   c. Name, part number and manufacturer of each item.
   d. Fastenings and other pertinent information.
   e. Location of hardware set coordinated with floor plans and door schedule and cross-referenced to door designations on drawings both on floor plans and in door schedule.
   f. Explanation of abbreviations, symbols, and codes contained in schedule.
   g. Mounting locations for hardware.
   h. Door and frame sizes, materials and degrees of swing.
   i. List of manufacturers used and their nearest representative with address and phone number.
   j. Catalog cuts.
   k. Wiring Diagrams.
   l. Manufacturer's technical data and installation instructions for electronic hardware.

3. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.

4. Deviations: Highlight, encircle or otherwise identify deviations from Schedule of Finish Hardware on submittal with notations clearly designating those portions as deviating from this section.

5. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.

6. Substitutions: In accordance with Division 01. Include product data and indicate benefit to the Project. Furnish operating samples on request.

D. Quality Control Submittals:

1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.

2. Certificates: Furnish certificate executed by a representative of the manufacturer of the door closers and floor hinges that closers have been inspected and adjusted, are operating as designed, and have been installed in accordance with the manufacturer's instructions.

3. Manufacturer's Instructions:
   a. Templates: Where required, furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware.
      1) Follow procedures established by DHI Publication For Processing Hardware Schedules and Templates.
   b. Keying Schedule: Submit three copies of a separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
      1) Use format described in DHI Manual of Keying Systems and Nomenclature
      2) Provide copies of manufacturers wiring diagrams for installation of electrified hardware.
1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 CLOSEOUT SUBMITTALS

A. Closeout Submittals:
   1. Operation and Maintenance Data: Submit operating and maintenance data specified in Section 017823.
      a. Include a copy of wiring diagrams and elevation drawings for electronic hardware in Operation and Maintenance Data Manual.
      b. Provide complete operational descriptions of electronic components listed by opening in hardware submittals.
      c. Operational descriptions to detail how each electro-mechanical component functions within opening incorporating conditions of ingress and egress.
      d. Include a copy of operational descriptions in Operation and Maintenance Data Manual.
   2. Warranty: Submit copies of written warranty, as signed by the applicator, agreeing to repair or replace defective work during the warranty period.
   3. Key Transcript: Supply to Owner upon completion.
   4. Follow Up Inspection: Submit letter of agreement described in Article 3.03 - Field Quality Requirements.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
   1. Furnish 50 extra key blanks upon completion of project.
   2. Furnish six each of typical fasteners used to install hardware.
   3. Return new hardware not installed to the Owner.

B. Tools: Furnish the following and deliver directly to Owner's representative.
   1. One set of adjusting tools.
   2. One set of maintenance manuals for locksets, door closers, floor hinges, and exit devices.

1.09 QUALITY ASSURANCE

A. Qualifications:
   1. Obtain each kind of hardware (such as latch and lock sets, hinges, closers) from only one manufacturer, although several may be indicated as offering products complying with requirements.
      a. Comply with CBC 1008.1.9.
2. Hardware Supplier: Direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect, and Contractor.
   a. Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.

3. Hardware supplier shall have a maintenance and service facility located within 100 miles of the project site. This facility shall stock parts for products supplied and be capable of repairing and replacing any hardware item found defective within the warranty period specified in Article 1.11 - Warranty.

B. Hardware Schedule Designations: The use of one manufacturer's numeric designation system in schedules does not imply that another manufacturer's products will not be acceptable, unless they are not equal in design, size, weight, finish, function, or other significant quality. However, product items with acceptable substitutes that are noted as NONE, OWNER STANDARD, NO KNOWN EQUAL, or substitutions made after the Architect's acceptance of hardware supplier's completed hardware schedule, will not be permitted.

C. Hardware shall be free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.

D. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

E. Fire-Rated Openings: NFPA 80 compliant. Hardware UL 10C (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.

F. Note that scheduled resilient seals may exceed selected door manufacturer's requirements.

G. Refer to Paragraph 2.12-C.1 for resilient seals.

H. Refer to Paragraph 2.12-C.2 for intumescent seals.

I. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers’ instructions.

### 1.10 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Coordinate delivery to appropriate locations (shop or field).
   1. Permanent keys and cores: Secured delivery direct to Owner's representative.
B. Packing, Shipping, Handling, and Unloading:
   1. Individually package each unit of door hardware complete with proper fastening and appurtenances, clearly marked on the outside to indicate contents and specific locations in the work. Pack each item complete with necessary parts and fasteners.
   2. Properly wrap and cushion each item to prevent scratches and dents during delivery and storage.

C. Acceptance at Site:
   1. Deliver packaged hardware items to the jobsite in a timely manner for installation.
   2. Deliver materials in manufacturer’s original unopened packaging with labels intact, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
   3. Deliver construction keys to Contractor at job site. Deliver change keys and master keys only to Owner’s representative. Change out of construction keys to permanent keys shall be performed by Contractor Owner’s representative upon acceptance of project.

D. Storage and Protection:
   1. Provide securely locked storage area for hardware, protected from moisture, sunlight, paint, chemicals, dust, and excessive heat and cold.
   2. Store hardware delivered to Project, but not yet installed, in a secure locked area.
   3. Control handling and installation of hardware items that are not immediately replaceable so that Work will not be delayed by hardware losses both before and after installation.

1.11 WARRANTY

A. Provide guaranty from hardware supplier as follows:
   1. Locksets: Three years.
   2. Extra Heavy Duty Cylindrical Lock: Seven years.
   3. Extra Heavy Duty Mortise Lock: Three years.
   4. Exit Devices:
      a. Mechanical: Three years.
      b. Electrical: One year.
   5. Closers:
      a. Mechanical: Ten years.
      b. Electrified: Two years.
   6. Hinges: One year.
   7. Continuous Hinges: Ten years.
   8. Other Hardware: Two years.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design is based on the use of products of the following manufacturers for the items noted:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESIGN-BASIS MANUFACTURER</th>
<th>ACCEPTABLE SUBSTITUTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astragals</td>
<td>Zero, National Guard</td>
<td>Pemko</td>
</tr>
<tr>
<td>Closers</td>
<td>LCN</td>
<td>District Standard</td>
</tr>
<tr>
<td>Coordinators</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>Cylinders, Key System</td>
<td>Corbin-Russwin</td>
<td>District Standard</td>
</tr>
<tr>
<td>Dust Proof Strike</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>Exit Devices</td>
<td>Von Duprin</td>
<td>District Standard</td>
</tr>
<tr>
<td>Automatic Flush Bolts,</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>Hinges</td>
<td>Ives</td>
<td>Hager, Stanley, McKinney</td>
</tr>
<tr>
<td>Kick Plates</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
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<tr>
<td>Locksets</td>
<td>Corbin-Russwin</td>
<td>District Standard</td>
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<tr>
<td>Pulls</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>Push Plates</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>Seals &amp; Bottoms</td>
<td>Zero, National Guard</td>
<td>Pemko, Zero</td>
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<tr>
<td>Stops &amp; Holders</td>
<td>Ives</td>
<td>Trimco, BBW, DCI</td>
</tr>
<tr>
<td>Thresholds</td>
<td>Zero, National Guard</td>
<td>Pemko, Zero</td>
</tr>
</tbody>
</table>

1. Manufacturer contact data is available at the web site of Door Hardware Institute (DHI):

B. Except as otherwise accepted, like items shall be the products of one manufacturer and shall be either the ones upon which the design is based, the products of a manufacturer listed as an acceptable substitute, or a manufacturer accepted in advance in accordance with Section 012500.
   1. Items listed with no acceptable substitute either have no equivalent known to the Architect.
   2. Where exact types of hardware specified are not adaptable to the finished shape or size of the members requiring hardware, furnish suitable types having as nearly as practicable the same operation and quality as the type specified, subject to the acceptance of the Architect.

C. Coordinate door hardware with existing system in use on other buildings on site for extension of keying and maintenance issues.
2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Conform to federal, state, and local codes affecting this Section, including CBC and local governing agency security ordinances.
      a. Door locks and latches required to be accessible shall comply the requirements of CBC 1008.1.9 (Door Operations), CBC 11B-404 (Doors, Doorways, and Gates).
      b. Operable parts of hand-activated door opening hardware on accessible doors shall comply with CBC 11B-309.4 (Operation).
      c. Door hardware mounting height shall comply the requirements of CBC 1008.1.9.2 (Hardware Height) and CBC 11B-404.2.7 (Door and Gate Hardware).
      d. Door operating force shall comply with the requirements of CBC 11B-404.2.9 (Door and Gate Operating Force).
         1) Interior hinged doors and gates shall have a maximum opening force of 5 pounds maximum in accordance with CBC 11B-404.2.9.1.
         2) Required fire doors shall have a maximum opening force not to exceed 15 pounds in accordance with CBC 11B-404.2.9.3.
         3) Exterior hinged doors shall have a maximum opening force of 5 pounds maximum in accordance with CBC 11B-404.2.9.4.
      e. Door closer sweep period shall comply with CBC 11B-404.2.8.
      f. Threshold height shall comply with CBC 1008.1.7 and CBC 11B-404.2.5.
      g. Floor stops shall not be located in the path of travel, and not protrude more than 4 inches maximum from walls.
   2. Fire endurance test shall establish neutral pressure level at 40 inches above finished floor after 5 minutes and maintain that condition during remainder of entire test period.
   3. Provide door hardware complying with positive pressure requirements of UL 10C.
   4. Refer to Paragraph 2.06-A.8 for maximum pressure to operate doors.
   5. Refer to Section 087105 for code-required mounting heights.

B. Night Latch hardware shall not be used for accessible doors or gates unless the following conditions are met:
   1. Such hardware has a dogging feature.
   2. It is dogged during the time the facility is open.
   3. Such dogging operation is performed only by employees as their job function (non-public use).
C. Fire-Rated Openings: Provide all necessary hardware for fire-rated openings in compliance with NFPA 80 whether indicated in Schedule of Door Hardware or not. This requirement takes precedence over other requirements for such hardware, even if not indicated on Contract Drawings. Provide hardware which has been tested and listed by Underwriters Laboratories (UL) for the type and size of each door required, and which complies with the requirements of the door and frame labels.

1. Door closers, ball bearing hinges, and seals are required at fire-rated openings, whether listed in the Schedule of Door Hardware or not.
2. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating FIRE DOOR TO BE EQUIPPED WITH FIRE EXIT HARDWARE, and provide UL label on exit device indicating FIRE EXIT HARDWARE.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Product Data for IEQ Credit 5: For entryway mats, documentation including printed statement indicating product complies with requirements for a permanent installation to capture dirt and particulates from entering building.

2.04 HARDWARE COMPONENTS

A. General: Furnish all items of door hardware necessary to satisfy the requirements of code and function. Required door hardware shall be furnished even if inadvertently omitted from this Section. Such items shall be of equal quality and type.

1. Manufacturers part numbers indicated are intended to be a guide as to design, quality, function, and service. Proposed substitutions shall be in accordance with Section 012500, accompanied by substantiating data to support equivalency of design, quality, function, and service of requested substitute items.
2. Hand of lock shall be as indicated on Contract Drawings. If door hand is changed during construction, Contractor shall make necessary changes in hardware at no additional expense to Owner.
3. Hinging: Although drawings typically depict doors at 90 degrees, doors shall actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width...
to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

2.05 HINGES

A. Hinges: Exterior doors and doors subject to corrosive atmospheric conditions shall have hinges manufactured from stainless steel. Interior and fire labeled doors shall be steel. Exterior hinges with prime finish shall have ZN base. Conform to the requirements of ANSI A156.1.
1. Although Contract Drawings typically depict doors at 90 degrees, doors shall swing to maximum allowable.
   a. Provide wide-throw conventional or continuous hinges as required, up to 8 inches in width, to allow door to swing parallel to adjacent wall for true 180-degree opening.
      1) Advise Architect if 8-inch width is insufficient.
2. Conform to manufacturer’s published hinge standard for door dimensions, weight, and frequency of intended use for specified hinge. Where manufacturer’s standard exceeds the specified product, furnish the heavier hinge.
   a. Notify Architect of deviations from scheduled hardware.
3. Hinges shall have stainless steel pins and concealed bearings.
   a. Furnish extra heavy weight 4-ball bearing hinges on doors over 3 feet 5 inches wide.
   b. Provide thrust pivots at doors with panic devices.
4. Outswinging exterior doors shall have non-removable (NRP) pin with security studs.
5. Size: Hinge open widths shall be minimum, but of sufficient size to permit door to swing 180 degrees.
   a. Provide 4-1/2 x 4-1/2 on doors up to 36 inches wide.
   b. Provide 5 x 4-1/2 on doors over 36 inches wide.
6. Furnish three hinges per leaf for doors up to 7-foot 5-inch height. Add one hinge per leaf for each additional 2-foot 6-inch height above 7-feet 5-inch height.
   a. Doors less than 5 feet high shall have 2 hinges.
7. Provide metal shims and shimming instructions for proper door adjustment.
8. Finish: Match other hardware on door.

B. Continuous Hinges:
1. Geared-Type:
   a. Use wide-throw aluminum units where needed for maximum degree of swing.
      1) Advise Architect if commonly available hinges are insufficient.
2. Pinned Type: Continuous stainless steel, 0.25-inch diameter stainless-steel hinge pin.
   a. Provide engineered application-specific wide-throw units as required to provide maximum swing degree of swing.
      1) Advise Architect if 8-inch width exceeds 8 inches.
   b. Provide continuous hinge cut to net size for specific door height.
2.06 CLOSERS

A. Surface Closers:
   1. Features:
         1) Place closers inside building, stairs, and rooms. Conform to the requirements of ANSI A156.4.
      b. ISO 2000 certified. Units stamped with date-of-manufacture code.
         b. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
         c. Adjustable in accordance with CBC 11B-404.2.9.
      d. Provide separate adjusting valves for closing speed, latching speed, and backcheck. Provide fourth valve for delayed action where scheduled.
      e. Extra-Duty Arms (EDA): Rigid main and forearm with reinforced elbow.
         1) Provide at exterior doors scheduled with parallel arm units.
      f. Exterior Door Closers: Tested to 100 hours in accordance with ASTM B 117 salt spray test.
         1) Furnish data on request.
      g. Fluid: Non-flaming, will not fuel door or floor covering fires.
      h. Pressure Relief Valves (PRV): Not permitted.
   2. Independent lab-tested 10,000,000 cycles.
   3. Exterior Doors: Seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F.
      a. Furnish checking fluid data on request.
   4. Provide size 2 through 6, unless otherwise specified, at exterior and interior fire-rated doors. Installer shall individually set spring tension at each door.
      a. Provide size 1 through 4 at interior non-rated doors for barrier-free access.
   5. Flush transom offset brackets shall be used where parallel arm closers are indicated for doors with fixed transom panels.
   6. Provide drop brackets, mortise shoes, and long arms as required for narrow head rails.
   7. Provide separate valves and adjust for spring setting, closing speed, latch speed, and back check.
   8. In compliance with CBC 11B-404.2.9 accessibility regulations, provide the following maximum opening resistances:
      a. Exterior Doors: 5 pounds.
      b. Interior Doors: 5 pounds.
      c. Fire-Rated Doors: 5 pounds. (Note: The maximum effort to operate the door may be increased to the maximum allowable by the appropriate administrative authority, not to exceed 15 pounds).
9. Provide delayed closing action as required for accessibility in accordance with CBC 11B-404.2.8.
   a. Sweep of door with closer shall be adjusted to move from 90 degrees open position to a point 12 inches from latch in 5 seconds, measured at the leading edge.

10. Door closers in exterior locations shall be tested to 100 hours of ASTM B 117 salt spray test.

11. Refer to Section 081416 for blocking requirements and Section 087105 for mounting surface attached door hardware to wood doors. 

No through bolting will be allowed where visible in public areas.

2.07 LOCKSETS

A. Locks, General:
   1. Provide heavy duty mortise type with lever handles conforming to requirements for required fire rating, security, and handicapped access, as required by code.
      a. Comply with requirements of local security ordinances.
      b. Mounting: Latching hardware shall be located between 36 inches and 44 inches above finished floor surface in accordance with CBC 11B-404.2.7.
      c. Refer to Section 087105 for complete list of mounting heights.
   2. Backset: 2-3/4 inches typically, more or less as needed to accommodate frame, door or other hardware.
      a. Deadbolts shall have 1-inch minimum throw with 3/4-inch minimum embedment in accordance with security ordinance of local governing agency.
   4. Strikes: 16 gage curved steel lip, bronze or brass, with 1-inch deep box wrought construction, and have lips of sufficient length to clear trim and protect clothing.
   6. Levers for labeled doors shall have specified fusible links.
   7. Locks shall have interchangeable cores.
   8. Provide visual key control on face of cylinder and keys.

B. Mortise Locksets and Latchsets: As scheduled.
   1. Design: Equal to Schlage L-9000 Series, 06L style.
   2. Chassis: Cold-rolled steel, handing field-changeable without disassembly.
   3. Lever Trim: Through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
      a. Spindles: Security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
   4. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
   5. Electric Operation: Manufacturer-installed continuous duty solenoid.
   6. Strikes: 16 gage curved steel, bronze or brass with 1-inch deep box construction, lips of sufficient length to clear trim and protect clothing.
7. Certifications: Conform to the requirements of:
   a. ANSI A156.13, Grade 1 Operational, Grade 1 Security.

2.08 EXIT DEVICES

A. Exit Devices, General:
   1. End Caps: Impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
   2. No exposed screws to show through glass doors.
   3. Non-handed basic device design with center case interchangeable with all functions. No extra parts required to effect change of function.
   4. Where devices span over door lite frame and the face of the selected lite manufacturer’s frame is raised from the face of the door, provide panic hardware manufacturer’s fitted shims or glass-bead kits.

B. Exit Devices, Performance Requirements:
   1. At fire-label doors, provide exit devices with UL and fire marshal approvals.
   2. Panic hardware operation shall comply with CBC 11B-309.4.
   3. Device push bar release mechanism shall be operable with a force of 5 pounds in accordance with CBC 11B-404.2.9.3.
      a. Maximum effort to open required fire doors may be increased to the minimum allowable by the appropriate administrative authority, not to exceed 15 pounds in accordance with and CBC 11B-404.2.9.3, Item 4.
   4. Maximum unlatching force applied to panic hardware at required fire doors shall not exceed 5 pounds in the direction of travel, in accordance with CBC 11B-309.4.
   5. Panic hardware shall be located between 34 inches and 44 inches above finished floor surface in accordance with CBC 1008.1.9.2.
   6. Panic hardware shall comply with CBC 1008.1.10.
   8. Independent lab-tested to 1,000,000 cycles.

C. Exit Devices, Design Requirements:
   1. Provide rim device at single doors. Provide removable mullion with rim devices at double doors. Conform to the requirements of ANSI A156.3, Grade 1.
      a. At glazed aluminum doors, provide appropriate product series as required for width of stile.
   3. Construct of brass, bronze, or stainless steel base metal.
   4. Lever handle trim shall match locksets.
   5. Touch bar type devices shall have quiet return, deadlocking latchbolt, and non-handed stainless steel touchpads.

D. Exit Devices, Functional Requirements:
   1. Non-Fire Rated Devices: Cylinder dogging.
2. **Lever Trim**: Breakaway type, forged brass or bronze escutcheon min 0.130-inch thickness, compression spring drive, match lockset lever design.

3. **Fire-Labeled Devices**: UL label indicating Fire Exit Hardware. Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.

4. **Electrically Operated Devices**: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.

### 2.09 DOOR BOLTS

A. **Automatic Flush Bolts**: Provide low operating force automatic flush bolts at emergency exits in path of travel.

1. Embed 5/8-inch into head and threshold at inactive leaf of double doors in accordance with security ordinance of local governing agency. Conform to the requirements of ANSI A156.5.

### 2.10 PUSH/PULLS

A. **Push/Pulls**: Conform to the requirements of ANSI A156.6.

1. Push: 4 inches x 16 inches x 0.050-inch thick plate, beveled four sides. Attach with oval head screws, back-to-back installation with pull plates.

2. Pulls: 4 inches x 16 inches x 0.050-inch thick plate, beveled four sides with 8-inch pull. Attach with oval head screws, back-to-back installation with push plates.

### 2.11 PLATES

A. **Protective Plates**: Provide with all four exposed edges beveled. Conform to the requirements of ANSI A156.6.

1. Sizes: Thickness shall be 0.050-inch thick.
   a. **Kick Plates**: 10 inches high by width of door less 2 inches for single doors, and 10 inches x door width less 1 inch for pair of doors.
   b. **Mop Plates**: 6 inches x door width less 2 inches for single doors, and 6 inches x door width less 1 inch for pair of doors.

2. Furnish with machine or wood oval head screws of bronze or stainless steel to match predominate finish of other adjacent hardware.
   a. Countersink screw holes.

### 2.12 DOOR GASKETING

A. **Seals**: Conform to the requirements of ANSI A156.22.

1. **Materials**: Door sweeps and seals shall be Santoprene, solid high-grade neoprene, silicone rubber, polyurethane, polypropylene, or nylon brush, as scheduled. Vinyl seal material is not acceptable.
   a. **Solid neoprene**: shall conform to MIL R6855-CL III, Grade 40.
   b. **Sponge neoprene**: shall conform to MIL R6130, Type II, Group C.

2. Match adjacent frame color as closely as possible.

3. UL label shall be applied to seals at all rated doors. Provide at 20-minute openings at head and jambs.

4. Non-corroding fasteners at in-swinging exterior doors.

5. Refer to Schedule of Finish Hardware for smoke seals.
B. Seals at Sound Control Openings:
   1. Use components tested as a system using nationally accepted standards by independent laboratories. Ensure that the door leafs have the necessary sealed-in-place STC ratings. Fasten applied seals over bead of sealant.
   2. Refer to door sections for additional sound seal requirements.

C. Seals at Fire-rated Doors:
   1. Resilient Seals: UL10C compliant. Coordinate with selected door manufacturers and selected frame manufacturer's requirements.
      a. Where rigid housed resilient seals are scheduled and the door manufacturer only requires an adhesive-mounted resilient seal, furnish rigid housed seal at minimum, or both the rigid housed seal plus the adhesive applied seal. Adhesive applied seals alone are deemed insufficient for this Project where rigid housed seals are scheduled.
   2. Intumescent Seals: Fire-labeled opening assembly complete and in full compliance with UL10C. Where required, Provide factory-installed intumescent seals meeting the requirements for door type and door manufacturer.

D. Automatic Door Bottoms: low operating force units. Doors with automatic door bottoms plus head and jamb seals cannot require more than two pounds operating force to open when closer is disconnected.

2.13 STOPS AND HOLDERS

A. Stops: Conform to the requirements of ANSI A156.16.
   1. Provide stops to protect walls, casework, or other hardware.
      a. Wall Stops: Unless otherwise indicated in Schedule of Door Hardware, furnish wall type with appropriate fasteners. Where wall type cannot be used, furnish floor type. If neither can be used, furnish overhead type.
      b. Floor Stops: Unless otherwise noted in Schedule of Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.
         1) Floor stops shall not be located in the path of travel. Distance from walls shall be 4 inches maximum.

B. Overhead Stops: Conform to the requirements of ANSI A156.8.
   1. Furnish units with non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
   2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations.
      a. Minimum: 90-degree stop/95 degree deadstop.
      b. Note degree of opening in submittal.
2.14 SILENCERS

A. Silencers: Furnish silencers for interior hollow metal frames, three for single doors, and four for pairs of doors. Omit where sound or light seals occur, and at fire-resistive-rated door assemblies.
   1. Leave no unfilled/uncovered pre-punched silencer holes.

2.15 THRESHOLDS

A. Thresholds: Comply with CBC 11B-404.2.5 regarding threshold requirements. Maximum height shall be 1/2-inch and maximum slopes shall be 1:2 vertical to horizontal.
   1. Provide stainless steel thresholds at main entries and aluminum thresholds at other locations, unless otherwise specified.
   2. Fire-Rated Openings, 90 Minutes or Less Duration: Use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, request direction from Architect.
   3. Sound Control Openings: Set units in full bed of acoustical sealant specified in Section 079200. Leave no air space between threshold and substrate.
   4. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
      a. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

2.16 MISCELLANEOUS DOOR HARDWARE

A. Silencers: Furnish silencers for interior hollow metal frames, three for single doors, and four for pairs of doors. Omit where sound or light seals occur, and at fire-resistive-rated door assemblies.

B. Padlocks: Provide one each at roof hatches, trash gates, roll-up doors, chain link gates, and other similar items where hasps are provided.

C. Overhead Door Hardware: Garage doors shall be secured with a cylinder lock, padlock with hardened steel shackle, metal slide bolt, or equivalent when not otherwise locked by electric power operation. Springs shall conform to applicable ordinance requirements regarding quality, certification, containment devices, identification and installation.

2.17 ELECTRO-MECHANICAL HARDWARE

A. General Requirements:
   1. Comply with CBC Section 1008.1.3.4 with regard to access-controlled egress doors.
   2. Coordinate installation of electro-mechanical hardware to ensure proper size wire is used to power loads.
      a. Voltage drop shall not exceed 5% of load's stated voltage.
      b. Voltage drop shall be calculated by first determining resistance of load (R=E/I voltage divided by AMP draw). Next, determine...
resistance of wire (per below chart). Divide this number by resistance of load. If result exceeds 5 percent, wire thickness shall be increased.

c. Wire length shall equal distance to load and back to supply (Lock 50 feet from power supply; wire length = 100 feet). Two loads powered by one pair of wires draw double current and have half (50 percent) of resistance.

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<thead>
<tr>
<th>Wire Size</th>
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</thead>
<tbody>
<tr>
<td>12 Gage</td>
<td>1.6 OHM</td>
</tr>
<tr>
<td>14 Gage</td>
<td>2.5 OHM</td>
</tr>
<tr>
<td>16 Gage</td>
<td>4.1 OHM</td>
</tr>
<tr>
<td>18 Gage</td>
<td>6.4 OHM</td>
</tr>
<tr>
<td>20 Gage</td>
<td>10.1 OHM</td>
</tr>
<tr>
<td>22 Gage</td>
<td>16.0 OHM</td>
</tr>
</tbody>
</table>

3. Furnish electro-mechanical hardware with power supply units, junction boxes, and other accessories needed for a complete, efficient installation.

a. Connector plugs shall be furnished on electrified hardware and power transfers. Power wires shall be equipped with male connectors on the solenoid (electric lock / electric panic) side. Signal conductors shall have female connectors on the solenoid (lock / panic) side.

4. Power Supply Units:

a. Power supply units shall be designed for use with electro-mechanical locksets.

b. Output power shall be field selectable for either 24 volts DC at 1 ampere or 12 volts DC at 2 amperes. Input power shall be 120 volts AC at 0.6 ampere, unless otherwise indicated.

c. Units shall have a terminal block that shall accept 14 gage stranded wire.

d. Enclosure shall be not less than 10 inches x 10 inches x 4 inches deep, constructed of 19 gage steel with a hinged cover. Provide not less than six, 1/2-inch knock out holes for conduit connection.

5. Power Transfer Devices:

a. Provide a means to transfer power from frame to door stile. Devices shall be reversible and allow a full 180-degree door swing with 4 1/2 inches x 4 1/2 inches butt hinges or 3/4 inches offset pivots. When door is in closed position, transfer unit shall be concealed.

b. Transfer units shall contain ten AWG UL approved conductors.

c. Rating: 10 Amps at 24 VDC (Class 1 low voltage)

B. Electro-Mechanical Locksets:

1. Electro-mechanical locks shall comply with requirements for size, quantity, type, etc., as set forth for non-electric locks and shall conform to ANSI A156.23. Locks shall be UL listed for labeled doors.
2. Solenoids used in electro-mechanical locks shall meet UL requirements for cycle life, low operating temperature and shock and fire hazard qualifications; and be designed for intermittent and continuous duty.
   a. Power Requirements: 1.0 amps; 24 VAC/DC.
3. Products: Schlage Electrified L Series

2.18 KEYING

A. Key System: Key system shall be Schlage 6-pin, Primus existing keyway, GMKD, interchangeable-core, as directed by Owner.
1. Cylinders and key system shall be of the same manufacturer as lockset manufacturer, unless otherwise scheduled.
2. Initiate and conduct meetings with Owner and door hardware consultants to determine system keyways, keybow styles, structure, and degree of geographic exclusivity.
   a. Meet with Owner and hardware supplier to develop Keying Schedule for great grand master keying, master keying, pass key, and change key groups.
   b. For bidding use great grand master keying charge.
   c. Owner will order and supply permanent cylinders/cores. Owner/Contractor will install permanent cylinders/cores.
3. Keying system will be approved by Owner in writing.
   a. For protection of the Owner, locks and cylinders shall be keyed at the factory of the lock manufacturer where permanent records are maintained. Written approval by Owner of keying diagram shall be furnished to lock manufacturer at time of order for locks and cylinders.
4. Key system shall be coordinated with existing campus key system.
5. Furnish keys of nickel silver only.
   a. Key blanks shall be available only from factory-direct sources, not available from after-market key blank manufacturers.
   b. Extend utility patent protection until 2014.
6. Permanent Keys: Deliver only to Owner’s representative.
7. New factory registered master key system.
8. Key Cylinders: Furnish utility patented, 6-pin solid brass construction.
9. Permanent Keys: Use secured shipment direct from point of origin to Owner.
10. For Estimate: Three keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
    a. Bitting List: Use secured shipment direct from point of origin to Owner upon completion.

B. Construction Keying: Furnish construction key system with temporary keys that can be rendered inoperative by removing the temporary core.
1. Permanent cylinders shall be assembled and shipped with separate exterior door locksets, including locksets for glazed entry doors.
   a. Where interchangeable core systems are specified, use temporary cores for construction keying.
2. Change keys shall be packed in separately identified envelopes and shipped to the Owner by certified mail.
3. Construction keys shall be shipped with the door locks.
4. Construction insert extractor keys shall be shipped to the Owner by certified mail.
5. Furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cylinders/cores in Owner’s presence.
6. At completion of Project, Contractor shall install permanent cores in the presence of the Owner, remove the construction cores from the lock cylinders and turn over construction cores to the Supplier.
   a. Demonstrate that construction key no longer operates.

C. Key Identification: Master keys and grand master keys shall be identified with a registry number, and not stamped with MASTER or the letter M. Individual room keys shall not be stamped with a key cut, but with a plain identification number using standard DHI nomenclature.
   1. For the IC cores the keyway will be N23.
   2. Stamp with DO NOT DUPLICATE.

D. Key Quantities:
   1. Change Keys: Furnish three keys for each core with a maximum of 10 keys per keyed alike group. Furnish balance due as blanks.
   5. Grand Master Keys: Furnish 6 keys per set.

E. Key Cabinet: Provide wall mounted key cabinet with 150 percent capacity.
   1. Cabinet: 18 gage steel enclosure, piano hinged door with lock.
   2. Accessories: Manufacturer's standard two-tag system, including cross-reference binder, envelopes, labels, tags with self-locking key clips, receipt forms, and temporary and permanent markers. Label hooks from 1 to 100.

F. Key Control Software: Same manufacturer as key cylinders. Supply to Owner.

2.19 FABRICATION

A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

2.20 FINISHES

A. Typical Finish: Except as otherwise specified in Schedule of Door Hardware, furnish hardware finished in accordance with ANSI/BHMA A156.18 for BHMA 630 (Satin Stainless Steel) unless scheduled otherwise in Door Hardware Schedule.

B. Door Closers: Surface mounted door closers shall be factory powder coated to match other dominant hardware finish on natural finish doors, or match color of door finish if painted.

C. Hinges: Except as otherwise scheduled, hinges used on painted doors shall be BHMA 600 (Prime Coat finish).
D. Finish natural aluminum items in BHMA 689 to match predominant adjacent material.
   1. Provide satin-chrome plated arms, tracks and covers where scheduled bright metallic powder coat (MTLPC) not available.

E. Seals: Coordinate to match frame color.
   1. Finish of metal parts shall be furnished in BHMA 600 match finish, but field painted to match color of door frame.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions:
   1. Examine doors, frame, and related items for conditions that would prevent proper application of hardware.
   2. Correct conditions detrimental to timely and proper execution of work.
   3. Do not proceed until unsatisfactory conditions have been corrected.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

3.02 INSTALLATION

A. Hardware Locations and Installation Procedures:
   1. Refer to Section 087105.

3.03 FIELD QUALITY REQUIREMENTS

A. Inspection: Hardware supplier shall inspect all installed hardware within 10 days of Contractor's request, and certify in writing that the hardware is complete, correctly installed, and properly adjusted. Further corrections of defective material shall be the responsibility of hardware installer.

B. Follow Up Inspection: Installer shall provide a letter of agreement to the Owner that approximately 6 months after substantial completion, installer shall visit the jobsite with the representatives of the manufacturers of the locking devices and door closers and accomplish the following:
   1. Re-adjust all hardware.
   2. Evaluate maintenance procedures and recommend changes or additions, and instruct Owner's personnel.
   3. Identify items that have deteriorated or failed.
   4. Submit a written report identifying current problems and likely future problems.

C. Certify in writing that the supplier has made an inspection of the finished installation, including the electrified and pneumatic hardware, and has verified that the hardware is functioning properly.
3.04 SYSTEMS STARTUP

A. Commissioning: Conduct these tests prior to request for certificate of substantial completion:
   1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
   2. With installer, access control contractor, and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.
   3. With installer and electrical contractor present, test hardware inter-faced with fire/life-safety system for proper operation and release.

3.05 LEGENDS

A. Legend of listed manufacturers:

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<tr>
<th>ABBREVIATION</th>
<th>MANUFACTURER</th>
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<tr>
<td>C-R</td>
<td>Corbin-Russwin</td>
</tr>
<tr>
<td>GLY</td>
<td>Glynn-Johnson</td>
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B. Legend of material finishes:

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3.06 SCHEDULES

A. Door Schedule on the Drawings indicates which Hardware Set is used with each door.

B. Hardware Sets listed in the Schedule of Door Hardware shall conform throughout to the requirements of the foregoing specification.
   1. The last column in the Hardware Schedule refers to the manufacturer abbreviations listed above.
   2. Hinge size listed in Schedule of Door Hardware indicates width by height in open position.

### LEGEND OF MATERIAL FINISHES

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## SCHEDULE OF DOOR HARDWARE

### HARDWARE GROUP NO. 01

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WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY

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WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY

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BALANCE OF HARDWARE BY DOOR MANUFACTURER

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WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY
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WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY

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DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

WEATHER-STRIPPING FURNISHED WITH DOOR & FRAME ASSEMBLY

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DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

GASKETING FURNISHED WITH ALUMINUM FRAME ASSEMBLY
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Door contacts & wiring furnished by access control supplier.
Gasketing furnished with aluminum frame assembly.

# Hardware Group No. 10

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Card reader, door contact & wiring furnished by access control supplier.
Gasketing furnished with aluminum frame assembly.

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Card reader, door contact & wiring furnished by access control supplier.
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CARD READER, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER
GASKETING FURNISHED WITH ALUMINUM FRAME ASSEMBLY

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CARD READER, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER
GASKETING FURNISHED WITH ALUMINUM FRAME ASSEMBLY

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CARD READER, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

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CARD READER, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

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CARD READER, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

### HARDWARE GROUP NO. 21

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CARD READER, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER
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CARD READER, DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

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CARD READER, DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER
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**HARDWARE GROUP NO. 26 (NOT USED)**

**HARDWARE GROUP NO. 27 (NOT USED)**

**HARDWARE GROUP NO. 28 (NOT USED)**

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**HARDWARE GROUP NO. 29**

**CARD READER, DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER**

**HARDWARE GROUP NO. 30**

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Card reader, door contacts & wiring furnished by access control supplier.

### Hardware Group No. 35

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Card reader, door contact & wiring furnished by access control supplier.
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CARD READER, DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

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GASKETING FURNISHED WITH ALUMINUM FRAME ASSEMBLY
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CARD READER, DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

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CARD READER, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

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CARD READER, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER
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GASKETING FURNISHED WITH ALUMINUM FRAME ASSEMBLY

## HARDWARE GROUP 48 (NOT USED)

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CARD READER, DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER
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CARD READER, LOCAL ALARM, DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

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CARD READER DOOR CONTACT & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER

HARDWARE GROUP NO. 53

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CARD READERS, KEYPADS, DOOR CONTACTS & WIRING FURNISHED BY ACCESS CONTROL SUPPLIER
KNOX BOX TO BE LOCATED AT THIS OPENING

END OF SECTION
DOOR AND HARDWARE INSTALLATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Installation of doors, frames, and finish hardware.

B. Related Sections:
   1. Section 079200 - Joint Sealants.
   2. Section 081113 - Hollow Metal Doors and Frames
   3. Section 087100 - Door Hardware: Finish hardware products.

C. Refer to Section 087100 for door hardware product requirements.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
         1) Section 1008 - Doors, Gates and Turnstiles.*
      b. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-309 - Operable Parts.
         2) Division 4 - Accessible Routes.
            a) Section 11B-404 - Doors, Doorways, and Gates.
               (1) 11B-404.2 - Manual Doors, Doorways, and Manual
                   a) 11B-404.2.8 - Closing Speed.
                      i) 11B-404.2.8.1 - Door Closers and Gate Closers.

B. Door and Hardware Institute (DHI):
   1. Installation Guide for Doors and Hardware. (ANSI A115.1G)
   2. Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
   4. Publication WDHS-2 - Recommended Fasteners for Wood Doors.
   5. Publication WDHS-3 - Recommended Locations for Architectural Hardware.

C. National Fire Protection Association (NFPA), latest edition:
1.03  ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 087100 for coordination of door hardware with other work.

B. Preinstallation Meetings:
   1. Prior to installation of hardware, arrange conference between hardware supplier, hardware installers, and related trades to review materials, procedures and coordinating related work.
   2. Conference attendees shall include Contractor, Owner, Architect, door hardware installers, and representatives of hardware supplier and/or manufacturers.
   3. Topics to be discussed at meeting shall include:
      a. A review of Contract Documents and accepted hardware schedule shall be made and deviations or differences shall be resolved.
      b. Building code, National Fire Protection Association (NFPA), and Underwriters' Laboratories (UL) requirements shall be reviewed and conflicts in building code, NFPA, or UL requirements and Project conditions shall be resolved.
      c. Review items such as proper installation sequence, adjustments, attachment, and location of door hardware. If a conflict exists between what is considered proper hardware application and Contract Documents, these differences shall be defined.
   4. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
   5. Preinstallation conference shall serve to clarify Contract Documents, application requirements and what work should be completed before hardware installation can begin.
   6. Prepare and submit, to parties in attendance, a written report of preinstallation conference. Report shall be submitted within 3 days following conference.

PART 2 - PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Regulations:
   1. Conform to applicable requirements for accessibility contained in CBC Chapter 11B, local governing agency security ordinances, and applicable federal access laws.
      a. Door hardware mounting height shall comply the requirements of CBC 1008.1.9.2 (Hardware Height) and CBC 11B-404.2.7 (Door and Gate Hardware).
      b. Door operating force shall comply with the requirements of CBC 11B-404.2.9 (Door and Gate Operating Force).
         1) Required fire doors shall have a minimum opening force not to exceed 15 pounds in accordance with CBC 11B-404.2.9.3.
         2) Other interior doors shall have a maximum opening force of 5 pounds maximum in accordance with CBC 11B-404.2.9.1.
         3) Other exterior doors shall have a maximum opening force of 5 pounds maximum in accordance with CBC 11B-404.2.9.4.
c. Door closer sweep period shall comply with CBC 11B-404.2.8.
d. Threshold height shall comply with CBC 1008.1.7 and CBC 11B-404.2.5.
e. Floor stops shall not be located in the path of travel, and not protrude more than 4 inches maximum from walls.

2.02 FASTENERS

A. Fasteners: Manufacture door hardware to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware.

1. Types:
   a. Exposed screws shall be Phillips head.
   b. Flat head sleeve anchors (FHSCL) may be slotted drive.
   c. Wood Screws: Provide threaded-to-the head wood screws on all wood doors, both rated and non-rated.
   d. Metal Screws: Flat head sleeve anchors (FHSCL) may be slotted drive. Sleeve nuts shall be full length to prevent door compression.

2. Concealed Fasteners: Provide concealed fasteners for door hardware that are exposed when door is closed. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware.

3. Fire-Rated Applications:
   a. Steel Machine or Wood Screws: For the following fire-rated applications:
      1) Mortise hinges to doors.
      2) Strike plates to frames.
      3) Closers to doors and frames.
   b. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:
      1) Surface hinges to doors.
      2) Closers to doors and frames.
      3) Surface-mounted exit devices.

4. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

5. Fasteners for Wood Doors: Comply with requirements in DHI Publication WDHS-2.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Ensure that frames are plumb, square, firmly secured, and properly handed.

B. Verify that prefinished doors have been properly sized and coordinated with prefabricated frames.

C. Verify that jambs are solid blocked for a distance of three stud spaces at 6 inches above, and 6 inches below, strike.
D. Upon completion of electrified security hardware installation verify that all components are working properly, and state in the required guaranty that this inspection has been performed.

3.02 DOOR AND FRAME INSTALLATION

A. Fit doors accurately in frames, and provide clearances, including paint finish. Provide maximum clearances at edge of doors as follows:

1. Between Door and Frame at Head and Jambs: 1/8 inch, plus 1/32-inch minus 0.
2. At Meeting Edges Pairs of Doors and at Mullions: 1/8 inch, plus 1/32-inch minus 0.
3. At Transom Panels Without Transom Bars: 1/8 inch.
4. At Sills Without Thresholds: 1/2 inch max above finish floor, plus 1/32-inch minus 0. Verify, and make allowance for, adjacent floor finish material.
5. At Sills With Thresholds: 1/8 inch above threshold, plus 1/32-inch minus 0.

B. Where fitting of field finished wood doors is necessary, trim both sides and both ends equally. Bevel lock edges of single doors and both edges at meeting stile of double doors. Do not cut doors to openings smaller than those for which they are fabricated. Ease cut edges to 1/16-inch radius.

1. Install fire-rated doors with clearances as specified in NFPA 80.

C. Adjusting: Upon completion check each door to ensure that hardware functions properly and that doors, when open in any position, remain fixed without influence from gravity. After fitting and hanging, remove from frame so cut edges and ends may be refinished. Reinstall doors when finish is dry.

D. Install fire rated doors and frames in accordance with their listing, NFPA 80, and manufacturer's recommendations.

3.03 FINISH HARDWARE INSTALLATION

A. General:

1. Install each item of finish hardware in accordance with manufacturer's instructions.
2. Postpone installation of surface mounted items until finishes have been completed on the substrate.
3. Set units level, plumb, and true to line and location.
4. Prior to finishing, remove finish hardware items (except butts) which are not otherwise protected. Reinstall hardware items after finish is completed.

B. Hardware Locations: Comply with recommendations of DHI WDHS-3 and CBC 11B-404.2.9.1 for location of door hardware. Base dimensions from finish floor, which is defined as the top of the concrete slab or other solid floor finish, unless floor finish material has a compressed thickness of greater than 1/2-inch.

1. Hinges:
   a. Top Hinge: Located 5 inches from head of frame to top of hinge.
b. Bottom Hinge: Located 10 inches from finish floor to bottom of hinge.

c. Intermediate Hinge:
   1) Single: Centered between top and bottom hinges.
   2) Multiple: Equally spaced with other intermediate hinge between top and bottom hinges.

2. Locks: Located 38 inches from finish floor to center of lever.

3. Deadlock Strike: Located 40 inches from floor, centered.

4. Push Bar: Located 40 inches from finish floor to center of bar.

5. Panic Bar: Located 39-13/16 inches from finish floor to center of bar.

6. Push Plate: Located 44 inches from finish floor to center of plate.

7. Pull: Located 42 inches from finish floor to center of grip.

C. Surface Mounted Hardware:

1. Drill pilot holes for all screws. Accurately and neatly make holes using templates of the finish hardware furnished by hardware supplier.

2. Surface Mounted Door Hardware at Wood Doors: Secure with specified wood screws into solid blocking core. Refer to Section 081416 for wood door blocking requirements. Do not use through-bolts or other exposed fasteners where visible in public area.

3. Locks: Attach lock with cylinder guard to inside of door with 1/4-inch diameter screws.

4. Strikes: Attach strike plate to solid blocking with two screws 2 inches long.

5. Astragal: Fasten astragal to outside face of active leaf of exterior double doors by welding or with non-removable head security fasteners at 10 inches on centers maximum on exterior side, and extend lip 1 inch over inactive leaf.

D. Thresholds: Set thresholds at exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Section 079200, and fasten with 1/4-20 stainless steel machine screws and lead expansion shield anchors, or Red Head SFS-1420 (equivalent), flat head sleeve (SS/FHSL). Close ends.

E. Floor Stops: Where floor stops are required, locate away from path of travel and within 4 inches maximum of wall surface in accordance with DSA Policy 99-08.

F. Door Closers:

1. Provide delayed closing action as required for disabled access in accordance with CBC 11B-404.2.8.1:
   a. Door closers and gate closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to a position of 12 inches from the latch is 5 seconds minimum.

3.04 ADJUSTING

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly.
B. Re-adjust hardware for proper function as required after doors and frames are finished. Check for free operation and proper clearances. Refit and refinish as required.

C. Sound Seals: Sound-gasketed and sound-rated doors shall be adjusted to provide a continuous seal at the entire perimeter of the door.

D. Follow-Up Inspection: Installer shall provide a letter of agreement to the Owner agreeing to visit the jobsite approximately 6 months after Substantial Completion with the representatives of the manufacturers of the locking devices and door closers, and accomplish the following:
   1. Readjust all door hardware.
   2. Evaluate maintenance procedures and recommend changes or additions, and provide further instruction to Owner's personnel.
   3. Identify items that have deteriorated or failed.
   4. Submit a written report identifying problems and likely future problems.

3.05 CLEANING

A. Clean adjacent wall, frame and door surfaces soiled from installation/reinstallation process.

3.06 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.07 PROTECTION

A. Cover installed hardware, protect from paint, cleaning agents, weathering, and moving equipment. Remove covering materials and clean hardware just prior to substantial completion.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Requirements for exterior and interior glass and glazing systems referenced by other Sections for products and installation.
   1. Refer to Section 079200 for sealants around glazed frames.

B. Referenced Sections:
   1. Section 012300 - Alternatives.
   2. Section 012500 - Substitution Procedures.
   3. Section 013300 - Submittal Procedures.
   4. Section 016600 - Product Storage and Handling Requirements.
   5. Section 017419 - Construction Waste Management and Disposal.
   7. Section 079200 - Joint Sealants.
   8. Section 083615 - Sectional Glazed Aluminum Doors.
   10. Section 084334 - Aluminum Folding Panel Storefronts.

C. Related Sections:
   1. Section 081113 - Hollow Metal Doors and Frames: Glazed interior windows.
   2. - Gypsum Board: Glazing adapters.

D. Work Included in Other Sections:
   1. Mirrors for toilet accessories.
   2. Full height full width mirrored walls.

E. Alternatives: This Section may be affected by alternatives described in Section 012300.

1.02 REFERENCES

A. ASTM International (ASTM):
   5. C 1048-12 - Specification for Heat Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.
7. C 1172-14 - Specifications for Laminated Architectural Flat Glass.

B. California Code of Regulations (CCR):
1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
   a. Chapter 24 - Glass and Glazing.
      1) Section 2406 - Safety Glazing.

C. American National Standards Institute (ANSI):

D. American Architectural Manufacturers Association (AAMA):

E. Glass Association of North America [consisting of Flat Glass Marketing Association, Glass Tempering Association, and Laminators Safety Glass Association] (GANA), www.glasswebsite.com:

F. National Fenestration Rating Council (NFRC):


H. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by designations in inches, but acceptable with equivalent metric thicknesses according to ASTM C 1036.
C. **Insulating (Dual-Glazed):** Hermetically sealed units consisting of two panes of glass separated by a 1/2-inch wide vacuum or inert gas-filled interspace (also identified as *air space*).
   1. **Interspace:** Space between lites of an insulating-glass unit.

D. **Laminated Glass:** Two layers of annealed glass bonded as a single unit by a PVB interlayer. Refer to glass types below for specific descriptions.

### 1.04 ADMINISTRATIVE REQUIREMENTS

A. **Coordination:** Coordinate work of this Section with glazing frames and door lites provided in other Sections.

B. **Coordination:** Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

C. **Coordination:** Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

D. **Preinstallation Conference:** Conduct conference at Project site.
   1. Review and finalize construction schedule and verify availability of materials, Installer’s personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review temporary protection requirements for glazing during and after installation.

### 1.05 SUBMITTALS

A. **General:** Make submittals in accordance with provisions of Section 013300.

B. **Product Data:** Submit complete manufacturer’s descriptive literature and specifications.
   1. **Glass:** Provide structural, physical, and environmental characteristics, size limitations, and special handling requirements.
   2. **Glazing:** Provide chemical, functional, and environmental characteristics. Provide limitations, special application requirements, and available colors.
      a. Locate and identify sealants by product name on Shop Drawings provided by manufacturer of window systems.

C. **Shop Drawings:** Submit Shop Drawings showing details of glass installation.
   1. Provisions for glazing, including sealants, gasketing, and setting accessories. Identify materials by type and manufacturer. Show locations where each component is used, method of application, and other special instructions.
      a. Submit Shop Drawing indicating IGU spacer bar splice locations for each glass lite size & type.
      b. Submit Shop Drawing indicating location and color of IGCC/IGMA Certification Label, whether located on interior side glass surface or spacer bar, for each glass lite size and type.

D. **Samples:** Submit the following:
   1. One 12-inch by 12-inch sample of each kind of glass proposed to be incorporated into the work. Provide samples bearing manufacturer’s identifying labels.
2. Six-inch long sample of each type of sealant and tape proposed for use.
3. Manufacturer’s standard palette for the selection of glazing sealant colors.

E. Quality Control Submittals: Provide certificates for the following:
1. Design Data: Submit design data showing that, when exposed to the design wind load, the stress on the structural sealant proposed for use does not exceed 20 pounds per square inch, or a 6 to 1 safety factor, for the sealant dimensions indicated in the design details.
2. Test Data: Provide test data of adhesion of structural sealants to production samples of metal panel and glass, tested in accordance with ASTM C 794.
   a. Provide glass materials as required for testing work of Section 083615, Section 084000, and Section 084334.
3. Certificates: Certify compatibility of glass with glazing materials proposed for use:
   a. Provide certification that materials in contact with sealant such as gaskets, spacers, or setting blocks, are compatible with silicone sealant after 21 days exposure to UV (2000-4000 micro-watt radiation).
   b. Furnish a report of the flatness tolerances for each lite, indicating compliance with the specified flatness tolerances.
   c. Certify that sealed glass units meet or exceed specified requirements.
   d. Furnish report certifying that chemically strengthened glass proposed for use be not less than an average of 30,000 to 33,000 Modulus of Rupture (MOR) for glass 0.156-inch to 0.200-inch in thickness based on a minimum of ten pieces of glass tested.
   e. Submit California Energy Commission Certificate of Compliance Field Inspection Energy Checklist ENC-1C.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association’s Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass:
   1. Obtain glass from single source from single manufacturer for each glass type.
   2. Where solar control reflective glass or Low E coated glass of a primary glass manufacturer that has established a certified fabricator program is specified, obtain glass in fabricated units from a manufacturer that is certified by the coated glass manufacturer.
   3. Obtain glazing accessories from single source from single manufacturer for each product and installation method.

F. Certifications: Review and certify that products proposed for use will perform in accordance with this specification relative to the specific applications indicated on the Contract Drawings.

G. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer’s name, type of glass, thickness, and safety glazing standard with which glass complies.

H. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
   2. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   3. Test no fewer than four samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

I. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Install glazing in mockups specified in Section 084000 to match glazing systems required for Project, including glazing methods.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Ship, transport, and deliver glass in accordance with the manufacturer's recommendations. The Architect reserves the right to reject the following:
1. Glass not bearing required labels.
2. Glass units with chipped or irregular edges, visually discernible pinholes, inclusions, surface waviness, scratches, or damage to coatings.
3. Sealant materials exhibiting shelf lives in excess of those recommended by the manufacturer.

B. Labeling: Each piece of glass furnished shall bear the manufacturer's removable label identifying the following, except that each light of tempered glass shall bear manufacturer's identification showing glass type and thickness by etching or other permanent means in accordance with CBC 2406.3, and need not contain a removable label.
1. Name of manufacturer.
2. Proprietary brand name and product number.
3. Quality, grade, and thickness.

1.09 FIELD CONDITIONS

A. Field Measurements: Manufacture tempered glass in sizes determined by measurements taken at the site specifically for work of this Section.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated Glass Products: Manufacturer's standard form in which coated glass manufacturer agrees to replace coated glass that deteriorates within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating glass manufacturer agrees to replace insulating glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instruc-
Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated glass manufacturer agrees to replace laminated glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Glass Manufacturers:
2. PPG Industries, Inc., Glass Group, Pittsburgh, PA (412)434-3035, with offices in Irvine, CA (714)955-0722.
4. Other glass manufacturers meeting qualification requirements of Section 016600.

B. Acceptable Glass Fabricators:
3. Other fabricators meeting qualification requirements of Section 012500 and this Section.

C. Acceptable Sealant Manufacturers:
1. Dow Corning Corporation, Midland, MI (517)496-4586, (800)662-0661, with sales offices in Irvine, CA (714)757-5000.

D. Acceptable Manufacturers of Accessory Items:
1. 3M, Specified Construction Products Department, St. Paul, MN (800)480-1704, with local Fasara dealers listed at: http://solutions.3m.com/wps/portal/3M/en_US/Window_Film/Solutions/Support/Find_a_Dealer/.
2. CPFilms (Courtaulds Performance Film), a division of Solutia, St. Louis, MO (314)674-1000, (800)255-8627, www.llumar.com.
E. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based, or equal products of another manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with safety glazing requirements of CBC 2406.
   2. Comply with ANSI Z97.1 for 400-foot-pound impact and CPSC Document 16 CFR 1201 for Category II regarding the manufacture and use of safety glazing materials.

B. Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

C. Comply with California Energy Commission Certificate of Compliance Field Inspection Energy Checklist ENC-1C indicating compliance with the fenestration performance requirements.

D. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

E. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Energy & Atmosphere: For additional information on LEED goal requirements, refer to Section 018113.
   1. EA Credit 1 - Optimize Energy Performance:
      b. Provide appliances that are ENERGY STAR rated.
B. LEED Goals for Materials & Resources:
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the preconsumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

C. LEED Goals for Indoor Environmental Quality:
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
   2. IEQ Credit 8.1 - Daylight and Views--Daylight: Provide daylight and views into the regularly occupied areas of the building in at least 75 percent of the spaces.

2.04 PERFORMANCE CRITERIA

A. Performance Requirements:
   1. Provide glass material thicknesses complying with the height and exposure factors required by the governing building code.
   2. Provide glazing materials that have been manufactured to withstand a uniform design load for a duration of 60 seconds with a maximum statistical probability of breakage not exceeding 8 out of 1000 lites.
   3. Provide glass material of thickness resulting in deflection of L/240 or 1 inch maximum. Include cost for increased thickness, if required, in base bid.
   4. Provide watertight and airtight installation of each piece of glass. Each installation shall withstand normal temperature changes, wind loading, and impact loading without failure.
      a. Failure includes loss or breakage of glass, failure of sealants or gaskets to remain watertight and air-tight, deterioration of glazing materials, rattles, and other defects in materials or performance.

B. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   1. For monolithic glass lites, properties are based on units with lites of thickness indicated.
   2. For laminated glass lites, properties are based on products of construction indicated.
   3. For insulating glass units, properties are based on units of thickness indicated for overall unit and for each lite.
4. U-Factors: Center of glazing values, according to NFRC 100 and based on LBL's WINDOW 6.3 computer program, expressed as Btu/sq. ft. x h x deg F.

5. Solar Heat Gain Coefficient and Visible Transmittance: Center of glazing values, according to NFRC 200 and based on LBL's WINDOW 6.3 computer program.

6. Visible Reflectance: Center of glazing values, according to NFRC 300.

7. Fenestration: Indicate fenestration performance on California Energy Commission Certificate of Compliance Field Inspection Energy Checklist ENC-1C indicating compliance with the following requirements:
   b. Maximum allowable Solar Heat Gain Coefficient: 0.27.

C. Flatness Tolerances:
   1. Glass heat-treated by the horizontal roller hearth process with inherent roller-wave distortion parallel to the bottom edge of the glass shall conform to the following:
      a. Roller-Wave or Ripple: The deviation from flatness at any peak shall not exceed 0.003-inch as measured per peak to valley for 1/4-inch thick glass. An electronic read out of the flatness values for each lite shall be submitted as an informational submittal.
      b. Bow and Warp: The bow and warp tolerances shall not exceed 1/32-inch per linear foot.

2.05 GLASS MATERIALS

A. Materials:
   1. Flat Glass: Conform to the requirements of ASTM C 1036 for Type I (transparent glass, flat), Class 1 (clear), q3 (glazing select), float glass.
   2. Interlayer: PolyVinyl Butyral (PVB) film, equal to Saflex manufactured by Montsanto Chemical Company.
      a. Provide 0.030-inch thick clear interlayer where glass has a nominal combined thickness of less than 5/16-inch thick.
      b. Provide 0.060-inch thick clear PVB interlayer where glass has a nominal combined thickness of 5/16-inch thick or more.
   3. Translucent Film: Fasara window film manufactured by 3M, or equal.
      a. Provide Fasara Luce SH2FGLU, solid pattern, with the following attributes:
         1) Shading Coefficient: 0.59.
         2) Visible Light Reflectance: 31%.
         3) Visible Light Transmittance: 34%.
   4. Opaque Coating: Opaci-coat-300 one-component water-based silicone coating curing as an opaque colorfast elastomeric film, as manufactured by ICD High Performance Coatings, or equal.
      a. Minimum 6.50 mils dry opacifying coating (4) with full range of colors provided by the manufacturer.
      b. Apply to glass with roll coated method.
      c. Mask edges on glass where in contact with structural glazing or install with weather-seal method.
B. Strength:
   1. **Annealed Glass**: Flat glass, as described above.
   2. **Heat-Strengthened Glass**: Flat glass, conforming to ASTM C 1048 for Kind HS, and further processed to increase strength to approximately 6000 psi.
      a. *Heat-strengthened glass may be used to increase the strength of heat-absorbing glass types, but may not be used as safety glass.*
   3. **Tempered Glass**: Flat glass, conforming to ASTM C 1048 for Kind FT, and further processed to increase strength to approximately 5 times annealed glass.
      a. Cut to shape and size before tempering.
      b. Fabricate without tong marks, or be capable of concealing tong marks when glass is installed.
      c. Edges exposed in the finished work shall be ground smooth, polished, and eased. Other edges shall be seamed.
   4. **Laminated Glass**: Two layers of annealed glass bonded as a single unit by a PVB interlayer complying with ASTM C 1172, Kind LA, with polished ground edges. Refer to glass types below for specific descriptions.
      b. Laminated Glass products shall be fabricated in autoclave with heat plus pressure, free of foreign substances and air or glass pockets.

C. Insulating Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with requirements of ASTM E 2188, ASTM E 2189.
   1. Sealing System: Dual seal, with polyisobutylene primary and manufacturer's standard secondary.
   2. Spacer: Aluminum spacer with clear anodic finish and thermally-broken construction.
   3. Desiccant: Molecular sieve or silica gel, or blend of both.

D. Thickness: Glass thicknesses are indicated as minimums. Provide glass lites in thicknesses as required to comply with requirements indicated.
   1. Minimum Glass Thickness for Exterior Lites: Not less than 1/4-inch (6 mm).

# 2.06 GLASS COMPONENTS

A. Vision (Clear) Glass:
   1. **Clear**:
      a. Strength: Annealed or tempered, as required by code.
      b. Thickness: 1/4-inch, as indicated on Contract Drawings.
      c. Locations: Provide at single glazed interior openings, part of exterior laminated units, and as scheduled.
         1) Provide at interior vision glass assemblies, and as scheduled.
      d. Performance Values for 1/4-inch Thickness:
         1) Visible Light Transmittance: 89 percent.
         2) Solar Heat Gain Coefficient: 0.81.
         3) Shading Coefficient: 0.94.
4) Winter U-Value: 1.09 Btu/(hr x sqft x °F).

2. Ultra Clear: Clear water white glass equal to PPG Starphire low iron soda lime float glass with visible light transmission of 91 percent for 1/4-inch thickness.
   a. Strength: Annealed, heat-strengthened, or tempered as required by code.
   b. Performance Values (1/4-inch):
      1) Visible Light Transmittance: 89 percent.
      2) Solar Heat Gain Coefficient: 0.81.
      3) Shading Coefficient: 0.94.
      4) Winter U-Value: 1.09 Btu/(hr x sqft x °F).

3. Low-E Ultra Clear:
   a. Type: PPG Solarban 70XL (2) provided as part of insulated glass in accordance with dual-glazed assembly type with low emissivity (Low-E) pyrolytic coating conforming to ASTM C 1376 on ultra clear glass, tempered or heat strengthened where required by Code. Locate coating on surface designated by number in parentheses starting from exterior surface.
   b. Performance Values (for insulating units in combination with 1/4-inch thick clear):
      1) Visible Light Transmittance: 73 percent.
      2) Solar Heat Gain Coefficient: 0.41.
      3) Shading Coefficient: 0.47.
      4) Winter U-Value: 0.29 Btu/(hr x sqft x °F).

2.07 GLASS TYPES

A. General: Refer to Article 2.06 for specific requirements of glass material components included in Glass Types.

B. Type GL-1:
   1. Insulating Glass: Low-E Ultra Clear: PPG Solarban 70XL (2) provided as part of insulated glass in accordance with dual-glazed assembly type with low emissivity (Low-E) pyrolytic coating conforming to ASTM C 1376 on ultra clear glass, tempered or heat strengthened where required by Code. Locate coating on surface designated by number in parentheses starting from the exterior surface.
      a. Type: 1/4-inch thick ultra clear Low-E (2) glass, 1/2-inch wide air gap, 1/4 inch thick clear glass tempered or heat strengthened where required by code.
      b. Thickness: 1-inch thickness.
      c. Locations: Provide at exterior vision glass assemblies as scheduled.
      d. Performance Values:
         1) Visible Light Transmittance: 64 percent.
         2) Solar Heat Gain Coefficient: 0.27.
         3) Shading Coefficient: 0.32.
         4) Winter U-Value: 0.28 Btu/(hr x sqft x °F).
C. **Type GL-2:**
   1. Laminated Glass: Clear:
      a. Type: 1/4-inch thick clear outboard lite, a 0.060-inch thick patterned translucent PVB interlayer, and a 1/4-inch thick clear inboard lite.
      b. Thickness: 9/16-inch thickness.
      c. Pattern: From full range of patterns, frosts, and solids provided by the manufacturer.
      d. Locations: Provide at interior glazing at offices, conference rooms, shops.

D. **Type GL-3:**
   1. Substitutive Laminated Insulating Glass: Clear, with Continuously Variable Self-Tinting Interlayer:
      a. Type: Glass lights shall be double-glazed and separated by a nominal 3/8-inch wide air space with 90% argon/10% air.
         1) Exterior pane shall be nominal 9/16-inch thick laminated glass consisting of an outboard layer of 1/4-inch thick heat-strengthened clear glass, a 0.060-inch Pleotint Sunsuitive self-tinting PVB interlayer, and an inboard layer of 1/4-inch thick heat-strengthened clear glass.
         2) Interior pane shall consist of a 1/4-inch thick exterior pane of clear tempered Pleotint SN68 Low-E (3) with low emissivity (low-E) pyrolytic coating on surface designated by number starting from exterior surface.
      b. Thickness: 1-inch thickness nominal.
      c. Locations: Provide at skylight glass assemblies.
      d. Thickness: 9/16-inch thickness.
      e. Pattern: From full range of patterns, frosts, and solids provided by the manufacturer.
      f. Locations: Provide at interior glazing at offices, conference rooms, shops.
      g. Performance Values Clear State (Laminate 10°C):
         1) Visible Light Transmittance: 55 percent.
         2) Solar Heat Gain Coefficient: 0.37.
         3) Shading Coefficient: 0.42.
         4) U-Value: 0.26 Btu/(hr x sqft x °F).
      h. Performance Values Tinted State (Laminate 65°C):
         1) Visible Light Transmittance: 8 percent.
         2) Solar Heat Gain Coefficient: 0.16.
         3) Shading Coefficient: 0.18.
         4) U-Value: 0.26 Btu/(hr x sqft x °F).

E. **Type GL-4: Spandrel Glass Film/Coating: (Alternate No. 7)**
   1. Insulating Glass, Clear + Opaci-Coat-300:
      a. Type: 1/4-inch thick clear tempered or heat strengthened Low-E (2) glass, 1/2-inch wide air gap, and 1/4-inch thick clear tempered or heat strengthened glass with film/coating applied to No. 4 surface.
2.08 GLAZING MATERIALS

A. Glazing Compounds: Refer to Section 079200.
   1. Refer to Section 079200 for sealants around glazed frames.
   2. Color shall be as selected by Architect from manufacturer's standard color palette.

B. Glazing Gaskets: Refer to product Sections where glass is used.

C. Closures and Edge Trim (Glazing Adapters): Fabricate from 0.040-inch thick brake metal sheet aluminum. Finish to match framing.
   1. Filler Gasket (at Abutting Interior Partitions): Refer to Section 079200.

D. Mirror Setting Materials: Design is based on the use of the following products manufactured by Palmer Products Corporation:
   1. Protective Coating: Mirro-Bac Paint.
   3. Adhesive: Mirro-Mastic.

2.09 FABRICATION

A. Insulating Glazing Units:
   1. Glazing channels for all insulating glass shall be blackclear anodized color.

B. Privacy Film: Provide 18 inches wide, 30 percent white color Fascara non-reflective translucent window film at standing height as indicated on the Contract Drawings.

C. Film Graphics: Provide nonreflective frosted translucent vinyl film graphics in design and pattern as indicated on the Contract Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Examine framing and substrate work to receive glass and glazing materials, and conditions under which glass will be installed.
   2. Inspect each piece of glass immediately before installation, and eliminate those which have observable edge damage or face imperfections.

3.02 PREPARATION

A. Surface Preparation:
   1. Clean glazing channels to receive glass immediately before glazing. Remove coatings which are not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used.
   2. Apply primer or sealer to joint surfaces where recommended by sealant manufacturer.
3.03 INSTALLATION

A. General:
   1. Install glass in accordance with the GANA Glazing Manual referenced and with CBC Chapter 24.
   2. Provide safety glass for glazed panels within 48 inches of a door, where glazed panels are less than 18 inches above a floor or adjacent to a walking surface, and at other locations required by law or code.
   3. Provide safety glass for glazed panels as indicated in the Contract Drawings and as required by law or code.
   4. Cut and install heat absorbing glass as recommended in Technical Services Report No. 130 by PPG Industries, or similar reports by proposed manufacturers.
      a. Where glass bite will be reduced by thermal movements of the frame, increase nominal glass bite to provide 3/8-inch bite when splice joints are fully open.
   6. Do not attempt to cut, seam, nip, or abrade glass that is tempered, heat strengthened, or coated.
   7. Both panes of dual-glazed units shall be tempered where tempered glazing is required.

B. Glazing: Refer to respective window and door Sections for glazing requirements of glass installations.

C. Tape Glazing:
   1. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sight-line of stops.
   2. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
   3. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
   4. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
   5. Do not remove release paper from tape until just before each glazing unit is installed.
   6. Apply heel bead of elastomeric sealant.
   7. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
   8. Apply cap bead of elastomeric sealant over exposed edge of tape.
3.04 FIELD QUALITY CONTROL

A. Provide independent laboratory inspection of fenestration in accordance with requirements of California Energy Commission Certificate of Compliance Field Inspection Energy Checklist ENC-1C.

3.05 ADJUSTING

A. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during the construction period, including natural causes, accidents, and vandalism.

3.06 CLEANING

A. Maintain glass in a reasonably clean condition during construction to avoid damage by alkaline materials.
B. Remove labels and adhesive residue as soon as possible after completion of glass and glazing work.
C. Conform to glass manufacturer’s requirements and recommendations regarding cleaning of coated glass.

3.07 PROTECTION

A. Protect glass from breakage immediately upon installation. Attach crossed streamers to framing held away from glass. Do not apply markers of any type to surfaces of exterior glass. Remove nonpermanent labels and clean surfaces.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Wall mounted mirrors not part of toilet room accessories.

B. Referenced Sections:
1. Section 012500 - Substitution Procedures.
2. Section 013300 - Submittal Procedures.
3. Section 018113 - Sustainable Design Requirements.

C. Related Sections:
1. Section 088100 - Glass Glazing: General requirements for glass.
2. Section 092900 - Gypsum Board.

1.02 REFERENCES

A. ASTM International (ASTM):
2. C 1048-12 - Specification for Heat Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.

B. American National Standards Institute (ANSI):

C. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Samples: In accordance with the provisions of Section 013300, submit representative samples of mirrors proposed for use, for review and acceptance.
1. Provide samples bearing manufacturer's identifying label.
1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

1.06 QUALITY ASSURANCE

A. Labels: Furnish each mirror bearing the manufacturer's removable label identifying the following:
   1. Name of manufacturer.
   2. Proprietary brand name and product number, if applicable.
   3. Quality, grade, and thickness.

1.07 PROJECT CONDITIONS

A. Field Measurements: Base fabrication of mirrors on field measurements taken specifically for the work of this Section.

1.08 WARRANTY

A. Submit written warranty for a period of 5 years, agreeing to repair or replace mirror materials which fail to perform as specified.

B. Provide 5-year guaranty against silver spoilage, discoloration or manufacturing defects.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Mirror Accessory Products:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Safety Glass: Comply with ANSI Z97.1 for 400-foot-pound impact and CPSC Document 16 CFR 1201 for Category II regarding the manufacture and use of safety glazing materials.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2.04 MATERIALS

A. Mirrors:
1. Material: Annealed glass conforming to the requirements of ASTM C 1036 for Type I, Class 1, Quality q1 (Mirror Select) float glass with Safety Backing Film applied to back of mirror in compliance with safety glass requirements.
   a. Provide mirrors conforming to the requirements CS 27, with silver coating and electro-deposited copper backing.
   b. Insulate back of mirror with two coats of Mirro-Bak Paint manufactured by Palmer Products, or equal.
B. Setting Materials: Design is based on the use of the following products manufactured by Palmer Products Corporation, or equal:
   1. Protective Coating: Mirro-Bac Paint.

C. Mirror Support Hardware: Design is based on products supplied by Glass Distributors, or equal.
   1. Top Edge: D514BA Brite Anodized Finish, Deep Nose 1/4-inch aluminum J-Channel.
   2. Bottom Edge: D645BA Brite Anodized Finish, Low Profile 1/4-inch aluminum J-Channel.

2.06 FABRICATION

A. Fabricate mirrors in the factory with polished flat, eased edges, as indicated on Drawings.

B. Prior to delivery, apply two coats of specified protective coating to back of mirrors.

C. Provide cut outs for ballet bar supports.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Preparation: Seal wall surfaces behind mirrors with specified substrate primer/sealer.

3.02 INSTALLATION

A. Install mirrors plumb, level, and in true alignment.

B. Install mirrors with top and bottom edge supports in accordance with the stipulations of, and using equipment specifically recommended by, the edge support manufacturer.
   1. Seal wall surfaces behind mirrors with specified substrate primer/sealer.
   2. Install mirrors to walls in accordance with manufacturer’s recommendations, leaving uniform open ventilating space between back of mirror and surface of substrate.
   3. Verify with straightedge that mirrors are installed distortion-free with a corner-to-corner flatness tolerance of 1/16-inch in 10 feet.

3.03 ADJUSTING AND CLEANING

A. Clean exposed surfaces of mirror units in accordance with manufacturer’s instructions.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Combination louver/damper installed in exterior walls, directly connected to mechanical equipment.
   1. Include elevator penthouse vent.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   5. Section 079200 - Joint Sealants.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. A 653-13 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. Air Movement and Control Association (AMCA):
   1. 500 - Test Method for Louvers, Dampers, and Shutters.
   2. 511 - Certified Ratings Program.

C. American Architectural Manufacturers Association (AAMA):

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordination: Where required, coordinate connections to louvers with Division 23.
1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer’s description literature and specifications.

C. Samples: Submit samples of louvers showing selected color and finish.

D. Shop Drawings: Submit Shop Drawings comprehensively describing the fabrication and installation of wall louvers. Drawings submitted shall indicate not less than the following:
   1. Details of fabrication and erection of louvers.
   2. Anchorage, accessories, and finishes.
   3. Rough opening sizes.
   4. Louver free area.

E. Quality Control Submittals:
   1. Design Data: Submit design data for specified louver.
   2. Test Reports: Submit certified laboratory test reports confirming air flow performance and noise reduction characteristics.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 CLOSEOUT SUBMITTALS

A. Warranty Documentation: Submit copies of written warranty, as signed by the applicator, agreeing to repair or replace defective work during the warranty period.

1.07 QUALITY ASSURANCE

A. Certifications: Certify compliance with AMCA Certified Ratings Program in accordance with AMCA Publication 511.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Energy & Atmosphere: For additional information on LEED goal requirements, refer to Section 018113.
   1. EA Credit 1 Optimize Energy Performance:
      b. Provide appliances that are ENERGY STAR rated.

B. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.03 PERFORMANCE CRITERIA

A. Performance Requirements: Provide structurally sound, impact resistant louvers conforming to applicable testing and performance requirements described herein.
   1. Air Performance, Water Penetration, and Air Leakage Ratings:
      Provide louvers complying with performance requirements of Air Movement and Control Association (AMCA) Standard 500.
      a. Louver free area is shown as a percentage of a 4 feet by 4 feet louver.

2.04 SYSTEM DESCRIPTION

A. Louvers: Wind-driven rain louvers with horizontal blades which incorporates a drainable head member and horizontal rain-resistant blades designed to protect air intake and exhaust openings and to provide maximum resistance to wind driven rain in building exterior walls that are sensitive to water penetrations.

2.05 MATERIALS

A. Aluminum: Extruded aluminum, complying with the requirements of ASTM B 221 for Alloy 6063, Temper T6.
2.06 FIXED LOUVERS

A. Aluminum Louvers and Frames: Design is based on products manufactured by Construction Specialties, or equal:
   2. Frame: Heads, sills, jambs, and mullions shall be 0.115" extruded aluminum.
   3. Blades: Fixed Blades shall be 0.125" extruded aluminum.
   4. Sill Pan: Manufacturer's standard formed sill flashing of same material and finish as louvers.

2.07 ACCESSORIES

A. Fasteners:
   1. Provide stainless steel machine screws and fasteners for aluminum louvers.

B. Bird Screen for Aluminum Louver: Heavy duty 1/4-inch square woven flattened expanded aluminum wire mesh, 0.063 diameter wire, secured in 12 gage extruded aluminum frame.
   1. Finish: Screen frames shall be standard mill finish.

2.08 ELEVATOR VENTS

A. Type: Ruskin Drainable Adjustable Model No. ELC 6375DX.
   1. Six inch frame with box channel frame and non-visible mullions.
   2. Low leakage 0.081-inch blade with flexible, compressible jamb seals
   3. Drain gutter in each fixed blade
   4. Withstand 20 psf wind load (equivalent 90 mph).

2.09 ACCESSORIES

A. Fasteners:
   1. Provide stainless steel machine screws and fasteners for aluminum louvers.

B. Screen for Aluminum Louver: Heavy duty 1/4-inch square woven aluminum wire mesh, 0.063 diameter wire, secured in 12 gage aluminum frame.

2.10 FABRICATION

A. Fabricate, assemble, and finish louvers in the factory.
   1. Frames:
      a. Blades shall be attached by means of all-welded construction.
      b. Blades shall be secured and hinged in conformance with recommendations of Woven Wire Products Association.
      c. Spacing: Maintain equal blade spacing to produce uniform appearance.
      d. Provide sealant rebate at front edge perimeter in contact with supporting element.
      e. When required, provide concealed type vertical mullions for continuous louver appearance.
      f. Provide sill flashing of same material and finish as louvers.
2. Protect galvanized and nonferrous-metal surfaces from corrosion and galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

B. Screen: Construction: Conform to recommendations of Woven Wire Products Association.
1. Screen shall be easily removed for maintenance.

C. Aluminum Finish:
1. Type: Factory-applied two-coat 70% Kynar or 70% Hylar fluoropolymer based resin Polyvinylidene Fluoride (PVF2) coating system, applied in accordance with AAMA 2605 specifications.
2. Colors: Refer to Section 050513 for color.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Check openings to ensure that dimensions conform to Contract Drawings.

B. Verify that openings are free of irregularities that would interfere with installation.

3.02 INSTALLATION

A. Install louvers in accordance with manufacturer's recommended installation instructions.
1. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
2. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
3. Form closely fitted joints with exposed connections accurately located and secured.
4. Flash and caulk in accordance with Section 079200.
   a. Install concealed gaskets, flashings, joint fillers, and insulation, as louver installation progresses, where weathertight louver joints are required.
5. Louvers in hollow metal frames shall be factory installed.
6. Install screens on inside face of louvers.

3.03 ADJUSTING, CLEANING, AND PROTECTING

A. Adjusting: Test operation of adjustable louvers and adjust as needed to produce fully functioning units that comply with requirements.

B. Cleaning: Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
1. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
2. Clean and touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

C. Protecting: Protect louvers and vents from damage during construction. Use temporary protective coverings where needed and approved by louver manufacturer. Remove protective covering at the time of Substantial Completion.

END OF SECTION
- SECTION 092216 -

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Light gage metal wall and ceiling framing systems.
   1. Refer to Section 054100 where heavier gage or structural studs are required at interior locations.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 053100 - Steel Decking: Coordination of hanger placement prior to pouring floor or roof fill.
   6. Section 054100 - Structural Metal Stud Framing: Load resisting metal studs.
   7. Section 078400 - Firestopping: Fire safing.
   8. Section 079200 - Joint Sealants.
   10. Section 098100 - Acoustic Insulation: Requirements for airtightness and reduction of sound transmission.

1.02 REFERENCES

A. ASTM International (ASTM):
   4. C 645-14 - Specification for Non-Structural Steel Framing Members.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 22 - Steel.
   a. Chapter 35 - Welding and Other Hot Work.
      1) Section 3504 - Fire Safety Requirements.
         a) 3504.1 - Protection of Combustibles.
         b) 3504.2 - Fire Watch.
         c) 3504.3 - Area Reviews.
   3. Title 24, Part 11 - California Green Building Standards Code

C. American Iron and Steel Institute (AISI):
   1. Code of Standard Practice for Cold-Formed Steel Structural Mem-
      bers, latest edition.
   2. Cold-Formed Steel Framing Design Manual, latest edition.

D. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the
   International Code Council
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types
      of Construction (ESR-).

E. Steel Stud Manufacturers Association (SSMA):
   1. Industrial Technical Note Series.

F. Underwriters Laboratories, Inc. (UL):

G. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for imple-
   menting construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for imple-
   menting sustainable design requirements.

C. RFI Requirements: Generate quality engineering drawings for RFIs,
   issued by a qualified detailer. Accompany RFIs with structural foundation
   or framing plans. Copy partial plans and relevant details from Contract
   Drawings and indicate grid line locations and floor levels. Furnish proper-
   ly drawn engineering drawings illustrating as-built conditions, issues in
   question, and Contractor's proposed solutions. Photographs are not
   acceptable substitutions to engineering drawings.
   1. Incomplete RFIs will be returned without response. Contractor will
      be responsible for delay due to incomplete RFIs.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300,
   submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300,
   submit complete Shop Drawings comprehensively describing fabrication
   and installation of non-load bearing wall framing.
C. Design Data: Submit design calculations, large scale elevation of every wall, large scale wall sections, enlarged connection details showing reactions to support structure, and schedule showing member sizes

D. Test Data and Evaluation Reports: Submit independent laboratory sound test results demonstrating compliance with acoustical requirements for 20 gage EQ studs used in sound-rated partitions.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Welder’s Qualifications: Currently certified in accordance with AWS D1.1 and D1.3, as applicable for light gage steel.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Members of Steel Stud Manufacturers Association (SSMA), Chicago, IL (312)456-5590, including the following:


4. Design Shapes in Steel, South El Monte, CA (626)579-2032.


7. United Metal Producers, Inc., Corona, CA (951)739-9535.

B. Acceptable Manufacturers of Drywall Accessories:

C. Acceptable Manufacturers of Foam Sealant Tapes:

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with the applicable requirements of ASTM C 754 and the ML/SFA Specifications referenced.
   2. Comply with one of the following:
      b. ICC ES Active Evaluation Report ER-4943P for members of the Steel Stud Manufacturers Association, as applicable, for the proposed manufacturer of the steel stud system.
   3. Comply with UL 2079 for deflection track in fire rated walls, as applicable.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufac-
2.04 DESIGN CRITERIA

A. Design Requirements: Design of gage, spacing, and connections is indicated on the Contract Drawings.
   1. Deflection properties shall be in accordance with Structural Contract Drawings.
   2. Design is based on the use of ClarkDietrich's ProSTUD Drywall Framing System manufactured by ClarkDietrich Building Systems, or equal.

B. Framing Members, General: Cold-rolled hot-dip galvanized steel track conforming to ASTM C 645 (Note: ClarkDietrich ProSTUD EQ Drywall Framing products are not required to meet the 0.0312-inch minimum thickness requirement for 20 gage studs in accordance with ASTM C 645).
   1. Design Responsibility: Drawings and calculations shall be stamped by a Professional Engineer (PE).
   2. Coordination Effort: Design engineer shall submit a signed letter stating that they have reviewed the construction documents as related to the boundary conditions to which the light gage framing is attached to and other elements supported by the metal studs.
   3. Wind Load and Seismic Load: In accordance with Structural Contract Drawings.
   4. Accommodate interstory horizontal drift in accordance with Structural Contract Drawings.
   5. Accommodate vertical building structure deflection of 3/4-inch.
   6. Design to accommodate attachment of adjacent elements, such as windows, doors, and other architectural elements. Coordinate with other trades to accommodate welded, bolted and/or screws attachment. Design for additional loads from these elements, including weight, wind load and seismic load.
   7. Supporting elements shall be designed to avoid torsion.
   8. Ceiling and soffit framing shall be designed to deflect less than L/240. Design shall accommodate 10 psf of live load in additional to all dead load.
   9. Use of shot pins/pneumatic fasteners in direct tension is not acceptable.
  10. Expansion anchors and epoxy anchors shall have a minimum embedment of eight times bolt diameter. Such anchors shall have a current ICC report.

C. Provide properties in accordance with Steel Stud Manufacturers Association (SSMA) recommendations.
   1. In accordance with GA-216 update, where studs complying with ASTM C 645 are used to received abuse-resistant and impact-resistant gypsum panels, they shall be not less than true 20 gage 0.312-inch design thickness studs in accordance with with Sections 4.3 and Section 8.1 of ASTM C 645.
2. High performance gypsum board panels that provide wet code compliance, such as moisture-resistant and tile backer boards, shall be not less than true 20 gage 0.312-inch design thickness studs.

3. Refer to 1.04-D for testing sound-rated wall assemblies with 20-gage EQ studs.

D. Structural Design:
1. Structural design of overhead non-structural light gage metal framing systems is indicated on the Structural Contract Drawings.
2. Provide framing systems, gages, supports, bracing, and connections as necessary to meet the structural requirements specified.
3. Partition framing shall conform to the widths indicated. Provide thicker gages and decreased stud spacing as necessary to meet the design requirements.
4. Select framing members based on the manufacturer's published span tables.

E. Design Loads: If not otherwise indicated in Structural Contract Drawings, design loads shall be as follows:
1. Interior Ceiling Assemblies: 5 pounds per square foot uniform live load, plus dead loads.
   a. Live load not applicable where light fixtures, ductwork, and other items are independently supported.
2. Exterior Soffit Assemblies: 30 psf positive and negative uniform live load, plus dead loads.
3. Interior Partitions without Wall Mounted Casework: 10 pounds per square foot uniform lateral load.
4. Interior Partitions with Wall Mounted Casework: 5 pounds per square foot uniform lateral load, casework dead load, and casework live load of 25 psf of shelf area.
5. Interior Partitions at Elevator Shaftwalls: 10 pounds per square foot uniform lateral load.
6. Seismic Loads: Conform to the requirements required by Code.

F. Deflection Requirements: If not otherwise indicated in Structural Contract Drawings, design loads shall be as follows:
1. Maximum deflection of L/240 for flexible finish materials such as gypsum board and veneer plaster.
2. Maximum deflection of L/360 for rigid finish materials including gypsum plaster, cement plaster, ceramic tile, maximum 3/8-inch thick stone tile, or mirrors.
3. Stud out-of-plane deflection properties shall be in accordance with the following:
   b. Stucco/Plaster Finishes: L/360.
   c. Tiles: L/360.
4. Deflection properties shall be in accordance with Structural Contract Drawings.
2.05 COMPONENTS

A. Framing Members: Cold-rolled hot-dip galvanized steel track conforming to ASTM C 645. Other equivalent coatings are not acceptable.

1. Floor and Ceiling Tracks: Type DHT Drywall Track, hemmed, 1-1/2-inch flange, minimum 20 gage.
   a. Provide width to accommodate stud size.

2. Wall Studs: Roll-formed C channel with knurled edges and keyhole shaped punched openings along web.
   a. Drywall Studs: Type DWS Drywall Studs, 20 gage minimum, or equivalent, standard widths as required for height and purpose, or as indicated on Contract Drawings.
   b. Shaftwall Studs: C-H/CT type studs, minimum 20 gage, or equivalent, size as required or as indicated on the Contract Drawings.
      1) J-Runner: Type J-Runner track, minimum 20 gage, 2-1/2-inch main flange by width to accommodate stud size.
   c. Where supporting impact-resistant gypsum board panels, provide minimum 20 gage studs.

3. Furring Channels: Hot dip galvanized steel conforming to requirements of ASTM C 645:
   a. Hat Shaped: Type FC Furring Channel, 7/8-inch deep with 1-1/4-inch screwable surface and 1/2-inch wing flanges, minimum 20 gage.
   b. Z-Shaped: Type ZF Furring Channel, 7/8-inch attachment flange and 1-1/4-inch face flange by depth indicated on Contract Drawings, minimum 20 gage.
   c. Resilient Channels: Type RC-1 Resilient Channel, 1/2-inch deep, minimum 25 gage.

4. Stiffeners and Main Runner Channels: Type CR cold-rolled or hot-rolled steel channels, minimum 16 gage, size as required, coated with rust-inhibitive paint.
   a. Use Bridge Clip manufactured by The Steel Network, or equal, when locking down cold rolled channels.

5. Ceiling Deflection Track:
   b. Fire-Rated Walls: Deflection track in fire rated walls shall conform to applicable ICC ES Report for product proposed for use.


7. Acoustic Isolators: RSIC-1 Resilient Sound Isolation Clip for use with drywall furring channels and in other configurations as required, as manufactured by Pac International. The acoustic isolator shall have the following characteristics:
   a. Natural organic rubber compound, blended with fire-inhibiting compounds.
   b. Molded to isolate ferrule from clip.
c. Minimum of 12 micro-vibration controlling pedestals at point of contact with framing member.
d. Manufactured to ASTM D 2000, M2 AA 510 A13, which includes:
   1) Hardness, ASTM D 2240, Shore A: 47.
   2) Modulus 300 Percent, ASTM D 412, Die C: 5.3 MPa.
   3) Tensile Strength, ASTM D 412, Die C: 11.2 MPa.
   4) Elongation at Break, ASTM D 573: 454 percent.
e. Clip: Galvanized or aluminum-zinc coated steel, 16 gauge.
g. Projection: 1-5/8 inches from supporting structure, when 7/8-inch drywall furring channels are used.

B. Accessory Materials:
1. Tie Wire: Conforming to the requirements of ASTM A 641.
2. Fasteners: Steel screws conforming to ASTM C 1002 or steel sheet metal screws, as recommended by the framing member manufacturer.
3. Access Panels: Refer to Section 083100.
4. Fire Safing: Refer to Section 072100.
5. Acoustical Sealants: Refer to Section 079200 and Section 098100.
6. Self-Adhesive Foam Sealants and Sponge Neoprene Pads: Refer to Section 079200 and Section 098100.
7. Hanger Wires: 12 gage galvanized steel wire, but not less than size and spacing recommended by manufacturer. Comply with requirements of ASTM A 641.
8. Anchors: Shotpins in accordance with ICC ES 2388.

2.06 DRYWALL SUSPENSION SYSTEM

A. Provide a proprietary suspension system equivalent to Flat Drywall Ceilings by USG Interiors, 630 Drywall System manufactured by Chicago Metallic Corporation, or Drywall Furring Systems manufactured by Armstrong World Industries.
   1. Provide a system conforming to ASTM C 635 for Heavy Duty classification.
   2. Provide drywall attachment clips at main runners for additional surface for screw attachment of gypsum board.
   3. Cross tees shall have 1-1/2-inch wide face.
   4. Hat furring tees shall have 1-3/8-inch wide face.
   5. Provide channel molding at wall.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Wire-Tying:
      a. Use single-strand 16 gage or double-strand 18 gage tie wire.
      b. Splicing: Double wrap tie.
      c. Framing members perpendicular to each other: Saddle-tie.
   2. Deflection Relief at Non-load Bearing Walls and Partitions:
      a. Cut studs short where abutting underside of steel, concrete or other rigid construction, and attach to ceiling deflection track or clips.
      1) Allow 3/4-inch vertical deflection at primary structure.
2) At metal deck, install filler plates across open flutes for attachment of top track.
3) Fill space above top track or filler plate with fire safing and cover with gypsum board at rated partitions.
b. Secure ends of horizontal stiffeners to abutting steel, concrete, or masonry walls and columns.
   1) Do not abut end studs to steel, concrete, or masonry walls and columns.

3. Partition Construction:
a. Each partition shall be constructed as indicated on Contract Drawings, except that necessary offsets in framing may not be specifically indicated. Finished surfaces of walls shall be continuous planes for entire extent, even though stud sizes and finish panel thicknesses may vary. Adjust face of studs as necessary to accomplish this, except do not use less than sizes of studs or thickness of finish indicated.
b. Where a partition type is shown at a given area, but not indicated at an adjoining area, or an area of similar use or type, the partition type that is indicated shall be provided.

B. Erection of Non-load Bearing Walls:

1. General:
a. Form corners and intersections of partitions with three studs.
b. Place studs no more than 2 inches from internal corners.
c. Provide headers above and below framed wall openings having area of 2 square feet or more.
d. Brace entire wall assembly to supporting structure as required.
e. Stud configurations transmitting noises will not be accepted.
f. Install sheet metal reinforcing straps where required to support items including, but not limited to, wall mounted equipment, furniture, cabinets, display rails, and handrail supports. Secure to structural members with flat head screws.
g. Provide 14 gage track as backing for supporting wall cabinets. Secure backing with three No. 10-18 self-tapping screws at each vertical stud. Provide flags to indicate position of backing.
h. Provide metal closures at top of stud wall cavities where exposed to plenum.

2. Floor and Ceiling Tracks:
a. Align floor and ceiling tracks.
b. Attach tracks to structure with specified anchors at maximum of 24 inches on centers.
c. Tack weld to steel framing.

3. Studs:
a. Plumb and align studs. Level ceiling supports.
b. Space studs at 16 inches on centers, unless otherwise indicated.
c. Extend studs from floor to roof structure continuously without splices.
d. Attach studs to floor and ceiling track by methods recommended by metal stud manufacturer.
e. Place studs with flanges pointing in the same direction on a surface.
f. Provide double 20 gage studs at door jambs.
g. Metal stud walls supporting single-sided shelving shall have double studs placed back-to-back and screwed together with No. 8 SMS at 12 inches on centers along the height of the stud.

4. Horizontal Stiffeners:
   a. Brace studs where recommended or detailed with steel channel stiffeners placed horizontally inside partition.
   b. Spacing: Maximum 5 feet on centers vertically.
   c. Wire-tie horizontal stiffeners to each stud with single strand 16 gage or double strand 18 gage tie wire.

5. Vertical Stiffeners: At wall hung equipment, add 16 gage load bearing metal studs as specified in Section 054100, or double 20 gage studs.

C. Installation of Vertical Furring:
   1. Erect free-standing vertical furring of screw studs and accessories as required for stud partitions.
      a. Stiffen and brace to structure at 48 inches on centers.

D. Installation of Suspended Ceiling Framing:
   1. Hangers:
      a. Attach hanger to steel member by use of beam clips or by wrapping around or through steel member and bolting, tying, or tack welding hanger to itself.
      b. Space hangers in accordance with SSMA recommendations.
      c. Locate hanger within 6 inches of ends of main runner channels.
      d. Attach lower end of hanger to main runner channel by wire-tying.
         1) Prevent twisting and turning of main runner channel.
         2) Develop full strength of hanger.
   2. Main Runner Channels: Cold-rolled channels.
      a. Spacing: As determined by manufacturer or applicable standards for required load.
      b. Locate main runner channel within 6 inches of parallel walls.
      c. Stop framing 1/2-inch short of any rigid vertical surface or control joint.
      d. Splicing:
         1) Overlap ends a minimum of 12 inches.
         2) Interlock flanges.
         3) Secure splice near end of each channel with tie wire.
   3. Cross Furring: Screw studs or furring channels.
      a. Spacing: As recommended by manufacturer of screw channel.
      b. Wire-tie cross-furring to main runners.
      c. Splicing:
         1) Overlap ends of cross furring minimum 8 inches.
         2) Interlock channel flanges.
         3) Wire-tie near each end of splice.
      d. Suspension grillage shall not come in contact with abutting partitions or load-bearing walls.
   4. Isolation Hangers: Install in accordance with manufacturer's instructions.
3.02 INSTALLATION OF ACOUSTIC ISOLATORS

A. Install resilient sound isolation clips and drywall furring channels in accordance with manufacturer's instructions.

B. Mechanically fasten resilient sound isolation clips to structure with screws, bolts, or expansion anchors, dependent upon structure.

C. Space resilient sound isolation clips at maximum of 24 inches by 48 inches on center for walls and ceilings.

D. Do not exceed design load (pull and shear) of 36 pounds per isolation clip.

E. Stagger isolation clip installation, so dead load is supported by all support members.

F. Splicing Drywall Furring Channels:
   1. Splice drywall furring channels with minimum of 6-inch laps.
   2. Secure laps with 2 framing screws or 18 gauge tie wire double wrapped.
   3. Locate splices between resilient sound isolation clips.
   4. Do not locate splices on resilient sound isolation clips.

G. Install resilient sound isolation clips on 1 side of wall assembly, unless otherwise indicated on the drawings.

H. Flanking Noise:
   1. Review installation details to prevent structure-borne flanking noise.
   2. Do not allow drywall furring channels or gypsum board to contact foreign materials, including floors, ceilings, or wall framing members.

I. Ensure metal ferrule of resilient sound isolation clips is in firm contact with structural member.

J. Gypsum Board:
   1. Install gypsum board in vertical or horizontal position with 1/8-inch to 1/4-inch gap around perimeter for acoustical sealant application.
   2. Install gypsum board in accordance with ASTM C 840 as specified in Section 092900.

K. Acoustical Sealant:
   1. Seal potential air leaks with acoustical sealant to achieve best Field Sound Transmission Class (FSTC).
   2. Seal electrical outlets and penetrations with acoustical sealant.
   3. Apply fire-rated acoustical sealant at locations where fire-rated assembly is required.

L. Putty Pad Sealant: Acoustically seal with putty pads, electrical boxes in walls and ceilings in which resilient sound isolation clips are used.

M. Walls: Install drywall furring channels perpendicular to framing members.
   1. Space drywall furring channels maximum of 24 inches on center.
   2. Locate first drywall furring channel parallel to floor and maximum of 3 inches above floor and one drywall furring channel maximum of 6 inches from ceiling.
3.03 DRYWALL SUSPENSION SYSTEM

A. Install drywall suspension system in accordance with ASTM C 636.
   1. Install cross furring tees at 24 inches on centers for 5/8-inch thick gypsum board.
   2. Install hat furring tees at 16 inches on centers for 1/2-inch thick gypsum board.
   3. Install additional suspension wires when required to limit deflection to L/360 maximum.
   4. Provide drywall channel molding at vertical terminations.
   5. Provide drywall transition clips to allow the use of the grid as trim between gypsum board and acoustical panels.
   6. Attach gypsum board at 24 inches on centers minimum.

3.04 CLEANING

A. Waste Management: Recycle or salvage waste steel framing materials in accordance with Section 017419.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Gypsum board (drywall), including partitions, shaft walls, soffits, exterior sheathing, and accessories, as applicable.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 072221 - Roof Board Underlayment: Roof underlayment board at roofing.
   6. Section 079200 - Joint Sealants: General requirements for caulking and sealing, and for acoustical sealants.
   7. Section 083100 - Access Doors and Panels.
   8. Section 099100 - Painting.

C. Related Sections:
   1. Section 078400 - Firestopping: Fire and smoke assembly signage.
   2. Section 092216 - Non-Structural Metal Framing.

1.02 REFERENCES

A. ASTM International (ASTM):
   3. C 919-12 - Practice for Use of Sealants in Acoustical Applications.
14. E 136-12 - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

B. California Code of Regulations (CCR):
1. Title 17 - Public Health, April 2008:
   a. Division 3. Air Resources:
      1) Chapter 1. Air Resources Board:
         a) Subchapter 8.5. Consumer Products:
            (1) Article 2. Consumer Products.

C. California Code of Regulations (CCR):
1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
   a. Chapter 7 - Fire and Smoke Protection Features.
   b. Chapter 25 - Gypsum Board and Plaster.

D. Association of the Wall and Ceiling Industries International (AWCI):
1. Recommendations for Gypsum Board Finish Levels.

E. Gypsum Association (GA), latest editions:
1. 201 - Using Gypsum Board for Walls and Ceilings.
2. 214 - Recommended Levels of Gypsum Board Finish.
3. 216 - Specifications for the Application and Finishing of Gypsum Board.

F. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordinate the option, if selected, of a Level 4 finish with a primer-surfacer as specified in Section 099100 to qualify for a Level 5 finish.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: Submit diagram of control joint locations prior to installation.

C. Substrate Condition Field Report: Furnish report from installer confirming that surfaces, alignments, and tolerances to which materials of this Section will be applied are in a suitable and acceptable condition to receive finish materials specified in this Section.
1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Product Data for IEQ Credit 4.1: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.07 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

B. Do not install interior products until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, those that are moisture damaged, or those that are mold damaged.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. Georgia-Pacific Gypsum Corporation, a subsidiary of the Georgia-Pacific Gypsum Corporation, a subsidiary of the Georgia-Pacific Corporation, Atlanta, GA (800)824-7503 (Sales West), (800)225-6119 (Technical), www.gp.com/gypsum.


B. Acceptable manufacturers of accessory products are as follows, or equal:
   1. Fry Reglet Corporation, Alhambra, CA (818)289-4744.
   2. Larsen Products Corporation, Rockville, MD (800)633-6668.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

### 2.02 REGULATORY REQUIREMENTS

A. Regulations: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Fire-Resistance-Rated Assemblies: Indicate by design designations from GA 600.
   2. Fire resistive walls, partitions and ceilings shall conform to CBC Chapter 7.
   3. Gypsum board construction shall conform to CBC Chapter 25.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

C. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

### 2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufac-
tured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives an Sealants: Adhesives used to laminate gypsum board panels to substrates shall comply with the requirements of SCAQMD Rule 1168.

2.04 MATERIALS

A. Design is based on gypsum board products manufactured by Georgia-Pacific Gypsum Corporation for the purpose of establishing required characteristics and quality.

1. Exterior Sheathing Board (Glass Mat-Faced) Panels: ASTM C 1177 and ASTM D 3273, maximum permissible lengths, ends square cut, water resistant, silicone-treated core penetrated by fiberglass mats front and back, and identified by gold color face.
   a. Regular and Fire-Rated Type: 5/8-inch thick, UL classified Type X, DensGlass Fireguard manufactured by Georgia-Pacific Gypsum, or equal.
      1) Location: Use as glass mat exterior gypsum sheathing over exterior metal studs.

2. Exterior Gypsum Roof Deck (Glass Mat-Faced) Panels: Refer to Section 072221.

3. Interior Gypsum Board (Glass Mat-Faced) Panels: ASTM C 1658 with applicable portions of ASTM C 1177, ASTM C 1396, and ASTM D 3273, maximum permissible lengths, ends square cut, tapered edges, paperless, mold resistant, silicone-treated core penetrated by fiberglass mats front and back gypsum board interior panels.
   a. Regular and Fire-Rated Type (Mold Resistant): 5/8-inch thick Type X DensArmor Plus Fireguard High-Performance Interior Panel, as manufactured by Georgia-Pacific Gypsum, or equal.
      1) Location: Use at interior surfaces of exterior walls except where indicated otherwise.
   b. Regular or Fire-Rated Type (Mold Resistant) Impact Resistant Type: 5/8-inch thick DensArmor Plus Fireguard Impact-Resistant Interior Panel manufactured by Georgia-Pacific Gypsum, or equal. Comply with ASTM C 1629 Test Standard.
      1) Location: Use where indicated on Contract Drawings as impact resistant or abuse-resistant gypsum board, or where subject to high or continual impact or abuse.

   a. Regular and Fire-Rated Type: 5/8-inch thick ToughRock Fireguard Gypsum Wallboard, as manufactured by Georgia-Pacific Gypsum, or equal.
      1) Location: Use at surfaces of interior walls and ceilings in office area of Building 2 only.
   1) Location: Use at surfaces of interior walls at heavy traffic areas where indicated on Contract Drawings to resist abuse, except where normal moisture conditions exist.

   a. Regular and Fire-Rated Type: 5/8-inch thick ToughRock MoldGuard Gypsum Board interior panels with treated paper and UL Classified Type X fire-resistant core, as manufactured by Georgia-Pacific Gypsum, or equal.
      1) Location: Use at interior walls and ceilings in Building 1 typical except shower rooms, and Building 2 Warehouse, including warehouse office areas, entres, and corridors (replaces “greenboard”).

6. Tile Backer Board: ASTM C 1178, tapered edges, silicone treated gypsum core, with integral fiberglass mat faces.
   a. Regular and Fire Rated Type: 5/8-inch thick, UL Classified Type X fire-resistant core, DensShield Fireguard Tile Backer, as manufactured by Georgia-Pacific Gypsum, or equal.
      1) Location: Use as a substrate for tile at shower rooms and waterproof membrane a minimum 6" above finish floor.

7. Shaftwall Gypsum Board Liner (Glass Mat-Faced): ASTM C 1658 with applicable portions of ASTM C 1396, ASTM D 3273, and FS SS-L-30D Type IV, ends square cut, beveled edges, paperless, moisture and mold resistant glass mat-faced, with UL Classified Type X fire-resistant core.
   a. Fire Rated Type: 1-inch thick, DensGlass Shaftliner Panels, as manufactured by Georgia-Pacific Gypsum, or equal.
      1) Location: Use with shaft wall studs. Coordinate with C-H metal studs provided under Section 092216.
   b. Refer to Contract Drawings for assembly fire ratings.

B. Fasteners:
   1. Light Gage Metal Framing: USG Type II for attachment of gypsum board to light gage steel framing (24 to 26 gage). Provide extra length fasteners when applied through additional material thicknesses to metal furring channels. Conform to ASTM C 1002.
      a. Optionally, provide Type S fine thread, rust-resistant, sharp point drywall screws for attachment of gypsum board to light gage steel framing (24 to 26 gage).

2. Heavy Gage Metal Framing: Type S-12 fine-thread, rust resistant, drill point drywall screws for attachment of gypsum board to heavy gage steel framing (12 to 22 gage). Conform to ASTM C 1002.

3. USG Acorn slotted fastener with HW Tapcon anchor for attaching metal furring to concrete or masonry surfaces.
C. Trim: Provide sizes appropriate for thickness of gypsum board. Use at all corners.
   1. Paper-Faced Metal Trim: Use with abuse-resistant and impact-resistant panels.
      a. Corner Beads: Equal to USG Sheetrock Brand Paper Faced Metal Corner Tape On Bead and Trim in full range of types and sizes.
         1) Provide L-Shaped Tape On Trim where gypsum board abuts suspended ceilings, beams; plaster, masonry, and concrete walls; and untrimmed door and window jambs.
         2) Provide J-Shaped Tape On Trim at exposed gypsum board edges, and as indicated on the Contract Drawings.
   2. Metal Trim: Use at other than abuse-resistant and impact-resistant panel types.
      b. Edge Trim: Equal to USG No. 200 Series galvanized metal trim.
      c. Control Joint: Equal to USG No. 093 zinc control joint. Provide removable tape strip to protect opening during installation operations.
      d. Furring Channels: Refer to Section 092216.

D. Closures, Adapters, and Edge Trim: Fabricate from 0.040-inch thick brake metal sheet aluminum. Finish to match framing.
   1. Filler Gasket (at Abutting Interior Partitions): Refer to Section 079200.

E. Accessories: In general, provide gypsum board accessories in accordance with GA 216.
   1. Reinforcing Tape, Joint Compound, Adhesive, and Water: Conform to GA 216 and ASTM C 475 for applicable requirements. Provide product with no more than 50 g/L VOC content.
      a. Exterior Use with Glass Mat Sheathing: Gyproc 90 setting-type joint compound, as recommended by Georgia-Pacific Gypsum.
      b. Interior Use: USG Sheetrock Brand Setting Type Joint Compound (Durabond), or equal.
   2. Sealant: Provide products with no more than 50 g/L VOC content.
      a. Exterior Sheathing Sealant: Dow Corning 795, or equal, as specified in Section 079200.
      b. Acoustical Sealant (Mastic): USG Sheetrock Acoustical Sealant, or equal, as specified in Section 079200. Comply with requirements of ASTM C 919.
   3. Adhesive: Equal to USG Durabond 500 Laminating Adhesive, trowel grade with no more than 50 g/L VOC content.
   4. Primer-Surfacer Spray-On Pretreatment: Refer to Section 099100 for use of primer-surfacer. Provide product with no more than 50 g/L VOC content.
   5. Access Doors: Refer to Section 083100.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Verify that supports for exterior ceiling board are located at 16 inches on centers minimum and leveled to the required tolerances.
   2. Verify that backing has been installed for wall mounted items.
   3. Verify that elevator guide rails will not compromise the fire rating of the shaft wall system.

3.02 PREPARATION

A. Locate double studs for control joints at locations complying with GA-216.

3.03 INSTALLATION

A. Gypsum Board:
   1. General: Install gypsum board in accordance with the requirements of GA 216 and ASTM C 840, including recommendations of the manufacturer for the systems required. Use specified fastener types, lengths, and spacings when fastening gypsum board to supports. Install ceiling panels before applying gypsum board to walls.
      a. Single-Layer Application:
         1) Apply gypsum board with long dimension parallel to framing or furring members.
         2) Stagger ends and edges over firm bearing, with joints staggered on opposite sides of partition.
         3) Fasten in accordance with code requirements and manufacturer recommendations.
      b. Double-Layer Application:
         1) Apply base layer with long dimension parallel to framing or furring members. Stagger joints on opposite sides of partition.
         2) Apply face layer with long dimension parallel to framing or furring members. Stagger joints from those on the base layer and on opposite sides of partition.
         3) Do not adhesively laminate panels.
      c. Multiple-Layer Application:
         1) Apply base layers with long dimension parallel to framing or furring members. Stagger joints on opposite sides of partition.
         2) Apply face layer with long dimension parallel or perpendicular to framing or furring members. Stagger joints from those on the adjacent layers and on opposite sides of partition.
         3) Do not adhesively laminate panels in multiple layers.
      d. Ceiling Application:
         1) Apply ceiling panels with long dimension parallel or perpendicular to framing or furring members.
         2) Comply with manufacturer recommendations with regard to support spacing, fastener type and spacing, and weight of unsupported overlaid insulation.
   2. At steel studs, attach leading edge of gypsum board panel to the open, or unsupported edge, of the steel stud flange to hold the flange in a rigid position for attachment of the adjacent panel.
3. Place edge trim at edges and where gypsum board abuts dissimilar materials, unless concealed. Place corner beads at all external corners.

4. Where used as a substrate for tile, treat cut edges and holes in exterior sheathing board, moisture resistant gypsum board, and tile backer board with a coat of thinned down ceramic tile mastic or flexible sealant.

5. Seal penetrations of partitions by conduit, pipe, ductwork, and rough-in boxes with sound insulation. Provide acoustical sealant at perimeter edges at sound-insulated walls.

6. Control Joints: Comply with the requirements of GA-216, Section 4, Article 4.7.
   a. Partitions: Provide expansion joints at 30 feet on centers maximum, or as indicated on Contract Drawings.
   b. Ceilings: Provide expansion joints at 50 feet on centers maximum where perimeter relief is installed, and 30 feet on centers maximum where perimeter relief is not installed, or as indicated on Contract Drawings.

7. Install fire-resistive gypsum board continuously behind recessed items (such as fire extinguisher cabinets) to preserve integrity of sound or fire ratings.

8. Coordinate installation of access panels specified in Section 083100.

B. Exterior Gypsum Sheathing Board:
   1. Fasten to metal studs with 1-1/2-inch long No. 6 Type S or Type S-12 bugle head self-tapping corrosion-resistant screws at a maximum spacing of 8 inches on centers around perimeter and in field.
      a. Bear screw heads tightly against face of sheathing, but do not cut into the face paper. Locate fasteners not more than 1-inch from edges, and not less than 3/8-inch from the edges and ends of the panel.
      b. Install composite gypsum board as indicated in the Contract Drawings.
   2. Joint Treatment Without Tape: Insert backer rod into all joints wider than 1/8-inch.
      a. Sealing: Apply enough sealant to cover fasteners when troweled flat. Approximate rate of usage is 3/8-inch bead, or 58 square feet per 10.5-ounce tube of sealant.

C. Abuse-Resistant and Impact-Resistant Gypsum Fiber Panels:
   1. Install with paper-faced metal beads and trim in accordance with manufacturer's instructions.
   2. Position all ends and edges over framing members or solid blocking.
   3. Apply gypsum board with long dimension parallel to framing or furring members. Stagger ends and edges over firm bearing.
   4. Tape joints with manufacturer-recommended non-fiberglass type tape.
   5. Finish with spray-on primer-surfacer.

D. Shaftwall:
   1. Provide a partition assembly system specifically designed to enclose vertical shafts and to permit installation, including gypsum board fi-
ish, from outside the shaft. Design is based on USG Cavity Shaftwall Systems, manufactured by US Gypsum, for the purpose of establishing type, kind and quality.

2. Required Characteristics:
   a. Allowable Deflection: 1/240 of the horizontally unsupported partition height when subjected to intermittent positive or negative air pressure loadings of 5 pounds per square foot.
   b. Fire Resistive Rating: 2-hour when tested in accordance with ASTM E 119.
   c. Sound Transmission Class (STC): Not less than 39.
   d. Thickness (Finish-to-Finish): 4-5/8 inches.
   e. Flatness Tolerances: 1/4-inch in any 4-foot radius.

E. Sound Wall Penetrations: Cut-outs shall be regular without fracturing the core or tearing the surface of gypsum board. Meet the following requirements.
   1. Minimize penetrations of insulated wall and ceiling constructions. Penetrate only where necessary and fully seal airtight at the perimeter using acoustical sealant.
   2. Where ducts and piping greater than 3 inches diameter penetrate insulated wall or ceiling construction, provide a clearance of 1-inch + 1/4-inch at the perimeter of the penetration.
   3. Where conduit piping 3 inches diameter and less (including mechanical, hydraulic, and plumbing) pass through insulated wall or ceiling construction, provide a clearance of 1/4-inch + 1/8-inch between the conduit or piping and the structure, unless otherwise shown.
   4. After the ductwork, conduit or piping has been installed, repair the gypsum board perimeter clearance to the specified tolerance as required. Where the clearance exceeds 3/4-inch, provide a sheet metal sleeve within the partition packed with safing insulation batts and caulk both sides airtight with an acoustical sealant. Where the perimeter clearance exceeds 3/8-inch, use a flexible backing rod to caulk against.
   5. Where penetration clearances are 3/8-inch or less, caulk airtight with acoustical sealant at gypsum board.
   6. Gypsum board penetrations (including those resulting from wiring, cables, and electrical junction boxes) shall be sealed airtight with acoustical sealant.
   7. The back and sides of junction boxes in sound-rated construction must be sealed airtight with sheet caulking. Caulk perimeter face at gypsum board with acoustical sealant.
   8. Recessed panel boards, equipment, and boxes with penetration area greater than 25 sq. in. at sound-rated partitions shall be fully enclosed and sealed with 5/8-inch thick gypsum board.
   9. Seal multiple conduit penetrations airtight with expanding fire foam sealant.

3.04 FINISHING

A. General: Tape, fill, and sand exposed joints, edges, corners, and openings, to produce surface ready to receive surface finishes. Comply with
applicable recommendations of ASTM C 840, GA-214, GA-216, and AWCI Recommendations, and as modified below.

1. Gypsum Board Pretreatment: Apply prior to application of finish coatings, including primer paints, in accordance with Section 099100.
2. Finish levels described in this Article have been adapted from the referenced standards GA-214 and GA-216. Although all types of surfaces are described, not all may be present on the Project.

B. Location of Use:
   1. **Level 1:**
      a. Not permitted.
   2. **Level 2:**
      a. Use at concealed areas and construction not indicated to be Levels 3, 4, or 5.
   3. **Level 3:**
      a. Use at locations such as repair shops, warehouse storage, service rooms, riser closets, electrical rooms, and equipment rooms.
   4. **Level 4:**
      a. Use at locations such as shop offices, training rooms, and corridors to Building 1.
   5. **Level 5:**
      a. Use at locations such as lobbies, restrooms, conference rooms, private offices, open office areas, workrooms, and kitchens in Building 2.
      b. Use typically at ceilings.

C. Finish Descriptions:
   1. **Level 1:**
      a. Not permitted.
   2. **Level 2:**
      a. Joints and Interior Angles: Embed tape in joint compound. Apply one separate coat of joint compound over joints, angles, fastener heads, and accessories.
      b. Surface Appearance: Surface shall be free of excess joint compound. Tool marks and ridges will be acceptable.
   3. **Level 3:**
      b. Surface Appearance: Joints compound shall be smooth and free of tool marks and ridges.
      c. Pretreatment: Apply prior to application of finish coatings, in accordance with Section 099100.
   4. **Level 4:**
      a. Joints and Interior Angles: Embed tape in joint compound. Apply three separate coats of joint compound over all joints, angles, fastener heads, and accessories.
      b. Surface Appearance: Smooth and free of tool marks and ridges.
5. **Level 5:**
   1) A *Level 4 finish with primer-surfacer will qualify as a Level 5 finish if a primer-surfacer spray-on pretreatment, as specified in the work of Section 099100, is used.*
   b. Surface Appearance: Smooth and free of tool marks and ridges.

3.05 **CLEANING**

A. Waste Management: Recycle or salvage waste unpainted gypsum board materials in accordance with Section 017419.

3.06 **PROTECTION**

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other detrimental causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

**END OF SECTION**
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Floor tile and wall tile installed with thin-set methods over prepared surfaces (mortar bed, backer board, and concrete slabs). Tile materials include:
   1. Porcelain tile.
   2. Quarry tile.
   3. Thresholds.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 014500 - Quality Control.
   5. Section 016600 - Product Storage and Handling Requirements.
   7. Section 018113 - Sustainable Design Requirements.
   8. Section 033100 - Structural Concrete.
   9. Section 092900 - Gypsum Board.
  10. Section 092216 - Non-Structural Metal Framing
  11. Section 096513 - Resilient Base and Accessories
  12. Section 102116 - Plastic Shower and Dressing Compartments.

1.02 DEFINITIONS

A. Large Format Tile (LFT): Having a dimension of 15" or greater in any dimension, based on requirements of the TCNA Handbook, latest edition.

1.03 REFERENCES

A. ASTM International (ASTM):
   2. D 2047-11 - Test Method Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 2 - Scoping Requirements.
            a) Section 11B-247 - Detectable Warnings and Detectable Directional Texture.
               (1) 11B-247.1 - Detectable Warnings.
                  (a) 11B-247.1.2 - Where Required.
                     i) 11B-247.1.2.2 - Curb Ramps.
               (2) 11B-247.2 - Detectable Directional Texture.
      2) Division 3 - Building Blocks.
         b) Section 11B-302 - Ground and Floor Surfaces.

C. American National Standards Institute (ANSI):
   1. A108.1B-2010 - Installation of Ceramic Tile in the Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.
   2. A108.4-2009 - Installation of Ceramic Tile with Organic Adhesives or Water-Cleanable Tile Setting Epoxy Adhesive.
   3. A108.5-2010 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
   4. A108.6-2010 - Installation of Ceramic Tile with Chemical-Resistant, Water-Cleanable, Tile-Setting and -Grouting Epoxy.
   5. A108.8-2010 - Installation of Ceramic Tile with Chemical-Resistant Furan Resin Mortar and Grout.
   6. A108.9-2010 - Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout.
   8. A108.11-2010 - Interior Installation of Cementitious Backer Units.
  15. A118.3-2013 - Specifications for Chemical-Resistant, Water-Cleanable Tile-Setting and -Grouting Epoxy and Water-Cleanable Tile-Setting Epoxy Adhesive.
  16. A118.4-2012 - Specifications for Modified Dry-Set Cement Mortar.
  17. A118.6-2010 - Specifications for Standard Cement Grouts for Tile Installation.
  18. A118.7-2010 - Specifications for High Performance Cement Grouts for Tile Installation.
19. A118.8-2010 - Specifications for Modified Epoxy Emulsion Mortar/Grout.
20. A118.9-2010 - Specifications for Test Methods and Specifications for Cementitious Backer Units.
22. A118.15-2013 - Specifications for Improved Modified Dry-Set Cement Mortar.

D. Tile Council of North America (TCNA):

E. National Tile Contractors Association (NTCA):

F. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.04 DEFINITIONS

A. Thin-Set: As used in this Section, the term thin-set refers to a product or material rather than to a method. Dry-set and latex portland cement mortars are thin-set bonding materials used to secure tile materials to any substrate, including cured mortar setting beds and concrete slabs.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.
B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
C. Coordination: Coordinate location of expansion and contraction joints in concrete slabs with spacing requirements of tilework joint spacing where tile finishes occur.

1.06 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Samples:
   1. Tile: Submit full-size samples of each type and color of tile indicated in the Contract Drawings.
   2. Grout: Submit samples of grout from manufacturer's standard and customer palettes.

C. Certificates:
   1. Furnish manufacturer's Master Grade Certificates for tile proposed for use. Certificates shall be on standard forms of the Tile Council of North America certifying type, grade, and quality of tile.
   2. Furnish manufacturer's certificate that coefficient of friction of floor products provided meet the requirements of this Section.
D. Substrate Condition Field Report: Furnish report from installer confirming that surfaces, alignments, and tolerances to which materials of this Section will be applied are in a suitable and acceptable condition to receive finish materials specified in this Section.

1.07 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Materials: At time of completing the installation, deliver stock of maintenance material to the Owner.
   1. Furnish an amount equal to 2 percent of each type, size, and color of tile installed, minimum one full carton.
   2. Furnish full size units matching the units installed, packaged with protective covering for storage, and identified with appropriate labels.

1.09 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer's Qualifications: Licensed by the Tile Council of North America to produce mortar and grout.
   2. Tile Installer's Qualifications: In accordance with Section 014100.

B. Mockups: Prior to commencing work, provide a 48-inch by 48-inch section of tile grouted and finished with required trim for each color, texture, shape, size, and type of tile selected.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Comply to the general delivery, storage, and handling requirements of Section 016600.
1.11 FIELD CONDITIONS

A. Ambient Conditions: Set and grout tile when the temperature is at least 50 degrees F and rising.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Tile Manufacturers:
   1. American-Olean Tile Company, a Division of Daltile, Dallas, TX (214)398-1411, with offices in Anaheim, CA (714)634-4300.

B. Acceptable Accessory Products Manufacturers:

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Slip Resistance: Comply with ADA Guidelines, CBC Section 11B-302, and CBC Section 403.
      a. Floor tile products shall comply with a DCOF (dynamic coefficient of friction) value of 0.42 minimum for level interior floors when wet, as specified in ANSI A137.1, Section 9.6 - DCOF AcuTest.
   2. Comply with health department requirements regarding floor sealers.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
C. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.

1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.

2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:


2.04 PERFORMANCE CRITERIA

A. VOC Content of Interior Sealants: Provide sealants and sealant primers that comply with the following limits for low VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.

2.05 TILE MATERIALS

A. General: Refer to Contract Drawings for specific manufacturers, material group codes, product descriptions, colors, and locations of use.

B. Porcelain Tile: Conform to requirements of ANSI A137.1. Refer to Finish Schedule on Contract Drawings for location of use and colors.

1. Floor Tile **Type T-1**: Porcelain.

   a. Manufacturer: SpecCeramics

   b. Size: 12" x 12".

   c. Style: Newstone.

   d. Finish: Bush hammered.
2. Wall Tile **Type T-2**: Porcelain.
   a. Manufacturer: SpecCeramics
   b. Size: 12" x 24".
   c. Style: Newstone.
   d. Finish: Polished.

3. Provide required matching standard coved base, trim shapes, and patterns as selected by Architect.

4. Provide both field and accent color patterns as indicated on the Contract Drawings.

5. Slip Resistance Comply with CBC Section 11B-302 and ANSI A137.1, Section 9.6 - DCOF AcuTest, for slip resistance.

C. Engineered Stone: Conform to requirements of ANSI A137.1. Refer to Finish Schedule on Contract Drawings for location of use and colors.

1. Stair Tread Tile **Type T-3**: Engineered Stone.
   a. Manufacturer: HG Stones.
   b. Size: Provide as indicated on Contract Drawings.
   c. Style: Neolith Iron Collection.
   d. Finish: Satin.

2. Provide required matching standard coved base, trim shapes, and patterns as selected by Architect.

3. Provide both field and accent color patterns as indicated on the Contract Drawings.

4. Slip Resistance Comply with CBC Section 11B-302 and ANSI A137.1, Section 9.6 - DCOF AcuTest, for slip resistance.

D. Quarry Tile: Standard Grade units conforming to the requirements of ANSI 137.1, 6 inches by 6 inches by 1/2-inch thick, with non-slip aggregate finish.

1. Floor Tile **Type QT-1**: Quarry tile.
   b. Size: 8" x 8".
   c. Style: Quarry Naturals.
   d. Finish: Slip resistant.

2. Wall Base **Type B-3**: Match QT-1. Grout joints shall align with floor tile grout joints.
   b. Size: 5" x 8".
   c. Style: Quarry Naturals.
   d. Finish: Smooth.

3. Provide cove base and other trim shapes, as required.

4. Provide non-slip aggregate finish for increased slip resistance at kitchen and other wet areas.

5. Slip Resistance Comply with CBC Section 11B-302 and ANSI A137.1, Section 9.6 - DCOF AcuTest, for slip resistance.

E. Trimmers: Provide necessary matching standard coved base, caps, stops, returns, trimmers, and other shapes to complete installation.

F. Thresholds: Daltile Natural Stone Threshold, matte finish.

1. Size: Length shall be full width of door opening. Width shall be as indicated on Contract Drawings.
2. Profile: As indicated or as required to provide transition between finished surface of tile and that of adjacent finished flooring. Taper and bevel in accordance with accessibility regulations to align with adjacent floor finish materials.

3. Provide color selected by Architect.

2.06 MORTAR SETTING MATERIALS

A. Bonding Mortars: Commercially prepared, factory-packaged mixtures conforming to the referenced standards. Provide products licensed by the Tile Council of North America and formulated specifically for the setting of tile and stone.

1. Walls:
   a. Large Format Porcelain Tile: Prolite Tile Large Format Tile & Stone Mortar, a flexible, polymer-modified mortar system conforming to ANSI A118.4 and A118.11, manufactured by Custom Building Products, or equal.
      1) Comply with A118.15 - Improved Modified Dry-Set Cement Mortar to meet 28-day shear bond of at least 400 psi.

2. Floors:
   a. Large Format Porcelain Tile: Prolite Tile Large Format Tile & Stone Mortar, a flexible, polymer-modified mortar system conforming to ANSI A118.4 and A118.11, manufactured by Custom Building Products, or equal.
      1) Comply with A118.15 - Improved Modified Dry-Set Cement Mortar to meet 28-day shear bond of at least 400 psi.

3. Stair Treads and Countertops:
   a. Natural Stone: ProLite Tile & Stone Mortar, a flexible, polymer-modified, mortar system, conforming to ANSI A118.11, manufactured by Custom Building Products, or equal.

4. Thresholds:
   a. 100% Solids Epoxy Mortar three-component mortar system with mold and mildew protection, conforming to ANSI A118.8, manufactured by Custom Building Products, or equal.

2.07 GROUT MATERIALS

A. Grouts: Commercially prepared, factory-packaged mixtures. Provide products licensed by the Tile Council of North America and specifically formulated for grouting tile. Colors shall be as selected by Architect.

1. Walls:
   a. Prism SureColor Grout: Sanded, polymer-modified cementitious grout system, conforming to ANSI A118.6, manufactured by Custom Building Products, or equal, for joint widths over 1/8-inch.

2. Floors:
   a. At Restrooms, Kitchens, Showers, and Thresholds: 100% Solids Epoxy Grout, two-component 100 percent solids epoxy grout, conforming to ANSI A118.3, manufactured by Custom Building Products.
   b. At Other Locations: Prism SureColor Grout: Sanded, polymer-modified cementitious grout system, conforming to ANSI A118.6,
manufactured by Custom Building Products, or equal, for joint widths over 1/8-inch.

3. Countertops: 100% Solids Epoxy Grout, two-component 100 percent solids epoxy grout, conforming to ANSI A118.3, manufactured by Custom Building Products.

2.08 ACCESSORY MATERIALS

A. Floor Preparation Accessories:
   1. Concrete Crack Filler: Mapei solvent-free epoxy Planicrete EP, or equal.
   2. Spot Patching Compound: Mapei Plani/Patch fast-setting cement-based polymer-modified patching compound, or equal.
   3. Self-Leveling Underlayment:
   4. Latex Patching and Leveling Compound: Henry's 335 or 336, Dura-bond Webpatch 90, or Durabond 60L.
   5. Floor Primer: As recommended by manufacturer.
   6. Wax Remover: As recommended by manufacturer.

B. Waterproofing/Crack Isolation Control Membrane: Use between tile and setting surface. Comply with ANSI A118.10 for waterproofing membranes and ANSI A118.12 for crack isolation membranes. Provide one of the following:
   1. Custom Building Products RedGard Waterproofing and Crack Prevention Membrane meeting ANSI A118.10 and IAPM R&T File No. 4244.
   2. Mapelastic two-component flexible fiber-reinforced mortar meeting ANSI A118.10 for waterproofing and having a nominal thickness of 1/16-inch minimum, as manufactured by Mapei Corporation, or equal.
   3. NobleSeal TS, chlorinated polyethylene sheeting with fiberglass scrim on both sides, and having a nominal thickness of 30 mils, manufactured by The Noble Company, or equal. Comply with ANSI A108.17.

C. Sheet-Form Sound Isolation Control Membrane: Use between tile and setting surface where acoustical control is indicated, including at second floor rest rooms in Building B.
   1. NobleSeal SIS, chlorinated polyethylene sheeting with fiberglass scrim on both sides, and having a nominal thickness of 30 mils, manufactured by The Noble Company, or equal. Comply with ANSI A108.17.

D. Tile Backer Board: Refer to Section 092900.

E. Cleaner: Provide specific products recommended for type of material and degree of staining to be cleaned.
   1. Aqua Mix Series of stone and tile cleaners.
2. Bostik Findley CeramaSeal Tile and Stone Cleaner.

F. Grout Sealer: Acrylic emulsion, 18 percent solids, clear, non-yellowing, slip resistant, equal to one of the following:
1. Aqua Mix Grout Sealer.
2. Custom Building Products Grout and Tile Sealer.
3. Impregnator 511 Grout Sealer.

G. Finishing Sealers: Clear, self-polishing, non-yellowing, slip resistant, suitable for interior unglazed, sealed floors, equal to one of the following:
1. Aqua-Mix Floor Shine and Hardener.
2. Custom Building Products Aqua Mix Sealer's Choice Gold.

H. Sealants: Design is based on the use of Hydroment High-Performance Urethane Sealants manufactured by Bostick Findley.
1. Provide sealants color-matched to the design-basis grout manufacturer's standard colors.
2. Refer to Section 079200 for sealant requirements.

I. Metal Dividers: Stainless steel dividers with horizontal leg, 1/8-inch wide depth of adjacent surfaces, one continuous piece at each opening.

J. Metal Transition Strips: Refer to Section 096513.

2.09 MIXES

A. Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar: Provide mixes in accordance with the requirements of ANSI A108.5.


C. Epoxy Mortar and Grout: Provide mixes in accordance with the requirements of ANSI A108.6.

D. Proprietary Materials: When required to be field-mixed, mix in accordance with manufacturer's instructions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
1. Where tile is designated to be adhered directly to a prepared surface, do not commence installation until substrate is found to be within the following tolerances:
   a. Horizontal Surfaces: Flat within 1/8-inch in 10 feet in all directions.
   b. Vertical Surfaces: Plumb within 1/8-inch in 8 feet in all directions.
      1) Prior to commencing work at tile walls illuminated from light coves above, take measurements to confirm flatness in presence of Architect.
      2) Surfaces exceeding flatness tolerances shall be repaired in accordance with corrections procedures specified in Section 092216 and Section 092900 prior to commencing tile work.
c. Sloped Surfaces: Where required for drainage, verify substrate is uniformly sloped to drain, as indicated on Contract Drawings.

2. Verify that surfaces to receive tile are firm, dry, clean, and free from oily or waxy films and curing compounds.

3. Verify that grounds, anchors, plugs, plumbing and mechanical work, electrical work, and similar items in or behind the finish have been installed before proceeding with the installation.

4. Verify that access panels, floor drains, and other devices will occur within tile module.

### 3.02 PREPARATION

A. Install crack isolation control membrane between prepared surface and tile in accordance with TCNA Method F125-Full and manufacturer's recommendations. Run membrane 6 inches high at vertical interruptions. Comply with ANSI A118.12.

B. Comply with manufacturer's surface preparation requirements for specified mortar.

C. Where concrete slab substrates are not fully cured (green concrete), provide uncoupling membrane over slab. Where slab is required to be waterproofed, tape edges.

D. Apply grout release to tile prior to grouting when specified to receive epoxy grout.

### 3.03 SYSTEM TYPES

A. System Applications:

1. Floors:
   
   a. Interior Slabs-on-Grade:
      
      1) Toilet Rooms on Slab with Crack Isolation Membrane: **System D4**.
      
      2) Kitchen Areas: **System G1**
      
      3) Shower Receptors: **System H3**.

   b. Interior Supported Floors:
      
      1) Toilet Rooms on Slab with Crack or Sound Isolation Membrane: **System D4**.

   c. Thresholds: **System Q2**.

2. Walls:

   a. Interior Walls:
      
      1) Toilet Rooms on Interior Tile Backer Board: **System K3**.
      
      2) Shower Walls on Interior Tile Backer Board Over Ceramic Tile Floor or Receptor: **System N3**.

3. Countertops: **System Q3**.

### 3.04 SYSTEM DESCRIPTIONS

A. Floor Systems:


   a. Method: Adhered to crack isolation membrane adhered directly to interior supported concrete slab.
b. Materials:
   1) Porcelain Tile: In accordance with Article 2.05.
   2) Membrane: Sheet-form crack isolation control membrane conforming to ANSI A118.12.
   3) Cementitious Bond Coat: In accordance with ANSI A118.4.
   4) Cementitious Grout: In accordance with ANSI A118.6.

c. Installation:
   1) Porcelain Tile: In accordance with ANSI A108.5.
   2) Membrane: In accordance with ANSI A108.17.
   3) Cementitious Bond Coat: In accordance with ANSI A118.5.
   4) Cementitious Grout: In accordance with ANSI A108.10.

d. Requirements:
   1) Concrete surface shall have steel trowel finish, with maximum allowable variation of 1/8-inch in 10 feet from required plane, and no more than 1/16-inch in 24 inches when measured from the high points in the surface.
   3) Integrate membrane into drain assembly and up base flashing to 4 inches above finished floor.
   4) Comply with manufacturer's mixing, application, and curing requirements for specified mortar.

2. **Floor System G1:** TCNA Handbook for Method F131 - Concrete Subfloor, Epoxy Mortar and Grout.
   a. Method: Adhered directly to interior slab-on-grade floors.
   b. Materials:
      1) Mortar Bond Coat: Epoxy in accordance with ANSI A118.3.
         a) Use flexible bonding mortar at all areas where porcelain tile is required.
      2) Grout: Epoxy, in accordance with ANSI A118.8.
   c. Installation:
      1) Tile: In accordance with ANSI A108.6.
      2) Grout: In accordance with ANSI A108.10.
   d. Requirements:
      1) Slab shall be well cured, clean, and free of cracks.
      2) Provide expansion joints in accordance with recommendations of TCNA Handbook for Method TCNA.

3. **Shower Receptor System H3:** TCNA Handbook for Method B420 - Shower Receptors, Mortar Bed Floor, Ceramic Tile.
   a. Method: Thin-set to shower pan membrane at floors in individual shower stalls.
   b. Materials:
      1) Porcelain Tile: In accordance with ANSI A137.1.
      2) Membrane: Sheet-Form Shower Pan Membrane conforming to ANSI A118.10.
      3) Mortar Bed: In accordance with ANSI A118.02
      4) Cementitious Bond Coat: In accordance with ANSI A118.4.
         a) Use polymer-modified flexible bonding mortar at areas where porcelain tile is required.
      5) Epoxy Grout: In accordance with ANSI A118.3.
c. Installation:
   1) Porcelain Tile: In accordance with ANSI A108.5.
   2) Reinforced Mortar Bed: In accordance with ANSI A108.1C.
   3) Shower Pan Membrane: In accordance with ANSI A108.13.
   4) Cementitious Bond Coat: In accordance with ANSI A118.5.
   5) Epoxy Grout: In accordance with ANSI A108.6.

d. Requirements:
   1) Use in conjunction with Plastic Shower Compartments specified in Section 102116.
   2) Surround shower drain with crushed stone to prevent mortar from blocking weep holes.
   3) Cover joints and corners with 2-inch wide alkali-resistant glass fiber mesh tape. Apply skim coat cementitious bonding material over tape, and over fastener heads.
   4) Seal penetrations, corners, and abutments to dissimilar materials with flexible sealant.
   5) Turn shower pan waterproofing up wall to 6 inches above level of shower floor at base.

B. Wall Systems:
1. **Wall System K3**: TCNA Handbook for Method W245 - Interior Walls over Wood or Metal Studs, Coated Glass Mat Water-Resistant Gypsum Backer Board.
   a. Method: Thin-set to interior tile backer board at walls in wet areas.
   b. Materials:
      1) Porcelain Tile: In accordance with ANSI A137.1.
      2) Cementitious Bond Coat:
         a) Porcelain Tile: Polymer-modified flexible bonding mortar in accordance with ANSI A118.4 at areas where porcelain tile is required.
      3) Cementitious Grout: In accordance with ANSI A118.6.
   c. Installation:
      1) Porcelain Tile: In accordance with ANSI A108.5.
      2) Cementitious Bond Coat: In accordance with ANSI A118.5.
      3) Cementitious Grout: In accordance with ANSI A108.10.
   d. Requirements:
      1) Verify substrate is interior coated glass mat, water-resistant, tile backer board in accordance with Section 092900, attached to 0.033” thick (20 gage) galvanized metal studs with non-corrosive and non-oxidizing fasteners.
      2) Cover joints and corners with 2-inch wide alkali-resistant glass fiber mesh tape. Apply skim coat cementitious bonding material over tape, and over fastener heads.
      3) Seal penetrations, corners, and abutments to dissimilar materials with flexible sealant.
      4) Install expansion joints in accordance with TCNA Handbook for Method EJ 171.

2. **Shower Wall System N3**: TCNA Handbook for Method B420 - Shower Receptors, Wood or Metal Studs, Coated Glass Mat Water-
Resistant Gypsum Backer Board Walls, Ceramic Tile (Over Ceramic Tile Receptor).

a. Method: Thin-set to interior glass mat tile backer board at walls of individual shower stalls.
   1) Porcelain: In accordance with ANSI A137.1.
   2) Membrane: Sheet-form crack isolation control membrane conforming to ANSI A118.12.
   3) Cementitious Bond Coat: In accordance with ANSI A118.4.
      a) Use polymer-modified flexible bonding mortar at areas where porcelain tile is required.
   4) Cementitious Grout: In accordance with ANSI A118.6.

b. Installation:
   1) Porcelain Tile: In accordance with ANSI A108.5.
   2) Membrane: In accordance with ANSI A108.13.
   3) Cementitious Bond Coat: In accordance with ANSI A118.5.
   4) Cementitious Grout: In accordance with ANSI A108.10.

c. Requirements:
   1) Use in conjunction with Floor Method B420 Shower Receptor floors.
   2) Verify substrate is interior coated glass mat, water-resistant tile backer board in accordance with Section 092900, attached to 0.033" thick (20 gage) galvanized metal studs with non-corrosive and non-oxidizing fasteners.
   3) Cover joints and corners with 2-inch wide alkali-resistant glass fiber mesh tape. Apply skim coat cementitious bonding material over tape, and over fastener heads.
   4) Seal penetrations, corners, and abutments to dissimilar materials with flexible sealant.
   5) Install expansion joints in accordance with TCNA Handbook for Method EJ171.

C. Special Systems:
   2. Countertops Q3:

3.05 INSTALLATION

A. Layout:
   1. Layout work according to patterns detailed or accepted. For heights shown, maintain full courses to produce nearest attainable height without cutting tile.
      a. Refer to Contract Drawings for installation layout pattern and orientation.
   2. Layout tile to center fields and patterns exactly on the areas and on architectural features. Whenever possible no tile that is less than half size shall occur. Locate cut tiles as indicated on Contract Drawings. Align joints vertically and horizontally from floors to walls. No stag-
gered joints will be permitted, unless specific pattern is indicated on Contract Drawings.

a. Where running bond/brick joint patterns are indicated using tiles where the side being offset is greater than 18 inches nominal dimension, the running bond offset shall be a maximum of 33%, as defined in ANSI A108.2, Paragraph 4.3.8.1.

3. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, except as otherwise shown. Terminate work neatly at obstructions, edges, and at corners without disrupting pattern or joint alignments.

4. Confirm layout with Architect prior to installation of tile work.

B. Cutting and Fitting: Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, and covers overlap tile.

C. Setting Tile: Comply with applicable recommendation of the TCNA Handbook.

1. Interior: Apply bond coat to substrate and to back of each piece.
   a. Large format tiles require backbuttering. If tiles have a mesh backing which is resinous or epoxy coated, use one of the following options:
      1) Use epoxy mortar in accordance with ANSI 118.3.
      2) Use Complete Contact Mortar as manufactured by Custom Building Products, or equal.

2. Firmly embed and beat tile into mortar with finished surfaces brought to true and level planes.
   a. Restore workability if skinning has occurred.
   b. Space tiles a minimum of 1/8-inch. Do not allow tiles to touch each other or any other rigid material.
   c. Install control joints where tile abuts restraining surfaces, around the perimeter of the tile work and where two substrate materials of different composition meet in the same plane. Interior installations shall have expansion joints spaced a maximum of 24 feet by 24 feet.
   d. Backfill all molding pieces, making sure there are no gaps.


1. Grout tile approximately 24 hours after setting. Thoroughly brush out floor tile joints before grouting. Apply grout release to tile prior to grouting when specified to receive epoxy grout.

2. Grout shall be mixed and applied in accordance with manufacturer’s instructions. Force a maximum of grout into joints. Before grout sets, strike or tool the joints of cushion-edge tile to depth of cushion, filling gaps. Fill joints of square-edged tile flush with surface. Surplus grout shall be cleaned from face of the tiles immediately.
E. Thresholds: Install with full bed of epoxy mortar in accordance with ANSI A108.9 at doorway transition between porcelain floor tile and other flooring materials.

F. Metal Dividers: Provide at transition to other floorings.

G. Transition Strips: Provide Reno-U at thin-set tile to concrete, and Reno-V at tile to resilient.

3.06 EXPANSION JOINTS

A. Expansion Joints: Comply with the recommendations of TCNA Handbook, except where more restrictive requirements are specified. Requirements for stone are the same as for tile.

1. Joint Spacing:
   a. Interior:
      1) Slabs on Grade: Space a maximum of 20' to 25' in each direction.
         a) Tilework Exposed to Direct Sunlight or Moisture: Space a maximum of 8' to 12" in each direction.
      2) Above Grade Slabs: Space a maximum of 8' to 12" in each direction.
   b. Expansion, construction, isolation, control, contraction, seismic, cold, and sawcut joints in the structure shall continue through the mortar bed, membrane, tile, and stone work, including such joints at vertical surfaces.
      1) Do not install crack isolation membrane as a slip plane over sawcut joints to relocate a movement joint.

2. Joint Width:
   a. Interior:
      1) Floor Tile and Wall Tile: Same as grout joint width, but not less than 1/4-inch.
      2) Quarry and Paver Tile: Preferred not less than 1/4-inch, but never less than 1/8-inch.
   b. General Recommendations:
      1) Joints in tile and setting bed materials shall never be less than the width of the sawcut control joint width.
      2) Joints through tilework directly over structural concrete joints must never be narrower than the structural joint.

3. Perimeter: Provide movement joints where tilework abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in substrate materials, but not at drain strainers.

4. Materials:
   a. Backer Rod Material: Refer to Section 079200 for closed cell type.
   b. Sealant: Refer to Paragraph 2.08-H.
      a) Color: Custom color as selected by Architect.

3.07 SEALANTS

A. Seal plumbing and electrical penetrations through tile with specified sealant.
B. Fill expansion joints with elastomeric sealant as recommended by the Tile Council of North America using back-up rods to prevent sealant from bonding to substrate.

3.08 ADJUSTING

A. Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.

B. Tile having stains or discolorations from any cause that are not remov-able with soap and clean water shall be replaced.

3.09 CLEANING

A. Apply a protective coat of specified cleaner, or a neutral solution of one part cleaner to one part water, to clean completed tile work.

1. Clean excess grout with specified cleaner using burlap bag, cloths, or non-staining soft wood excelsior. Sponge and wash tiles thoroughly and then polish with clean, dry cloths. Use no acids or abrasive soaps on tile, except as approved by the tile manufacturer.

B. Seal non-epoxy tile grout joints and floor tile with specified tile and grout sealers in accordance with manufacturer's instructions.

C. Waste Management: Recycle or salvage waste tile and packaging materials in accordance with Section 017419.

3.10 PROTECTION

A. Apply non-staining laminated and reinforced Kraft paper having a bitu-minous or latex binder over floor tile as soon as pointing and grouting and cleaning are completed. Lap the sheets at least 4 inches and seal the laps against escape of moisture. Leave curing paper in place until job is ready for final cleaning, at least 7 full days. Keep traffic off floors during the curing period of 3 days.

B. Immediately prior to final acceptance of tile work, rinse protective coat of neutral cleaner from all tile surfaces.

1. Apply one coat of specified tile sealer.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Acoustical panels for installation in ceiling suspension systems.

B. Referenced Sections:
   1. Section 012100 - Allowances.
   2. Section 012500 - Substitution Procedures.
   3. Section 013300 - Submittal Procedures.
   5. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. C 423-09a - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   4. E 413-10 - Classification for Determination of Sound Transmission Class.
   5. E 1264-14 - Classification of Acoustical Ceiling Products.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
         1) Section 803 - Wall and Ceiling Finishes:
            a) 803.1 - General.
               (1) 803.1.2 - Room Corner Test for Interior Wall or Ceiling Finish Materials.
                  (a) 803.1.1 - Acceptance Criteria for NFPA 286.

C. California Code of Regulations (CCR):
D. Acoustical Manufacturer's Association (AMA):
   1. 1-II - Ceiling Sound Transmission Test by Two-room Method.

E. Ceilings and Interior Systems Contractors Association (CISCA):
   2. Guidelines for Seismic Restraint Direct Hung Suspended Ceiling Assemblies.

F. National Fire Protection Association:

G. Underwriters Laboratories (UL):

H. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Noise Reduction Coefficient (NRC): Rating of an acoustical material's ability to absorb sound, measured at four frequencies in accordance with ASTM C 423, averaged, and expressed in accordance with ASTM E 1264.

B. Ceiling Attenuation Class (CAC): Rating of a ceiling's efficiency as a barrier between adjacent closed offices, confirmed by testing in accordance with ASTM E 413/AMA 1-II and defined in ASTM E 1414.

C. Articulation Class (AC): Rating of a listener's ability to understand the spoken word within a space.

1.04 ADMINISTRATION REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordination: Provide acoustical panel products of the same manufacturer furnishing suspension products in Section 095300.

1.05 SUBMITTALS

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in accordance with the provisions of Section 013300.

B. Shop Drawings: In accordance with the provisions of Section 013300 and in conjunction with the submittal requirements of Section 095300.
   1. Indicate grid layout and related dimensioning, junctions with other work or ceiling finishes, and interrelation of mechanical and electrical items related to system. Indicate method of suspension where interferences exists.
   2. Indicate installation details required for seismic design loads.

C. Samples: In accordance with the provisions of Section 013300, submit 6-inch square samples of acoustical lay-in panels for acceptance-review.
D. Quality Control Submittals:
   2. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.07 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit maintenance data.

B. Warranty Documentation: Submit copies of written warranty, as signed by the applicator, agreeing to repair or replace defective acoustical ceiling work during the warranty period.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Provide two boxes of each type of ceiling panel. Provide full-size panels only, in original, appropriately labeled cartons.

1.09 WARRANTY

A. Special Warranty: Where humidity resistance is specified, provide 10-year warranty against visible sag of ceiling panels.
   1. When used in conjunction with manufacturer's suspended grid system, increase warranty of ceiling panels to 15 years or lifetime, as applicable.

PART 2 -PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

3. USG Interiors, Inc. (Donn), Chicago, IL (800)950-3839, with offices in Orange, CA (714)978-0901, www.usg.com.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations, including NFPA 286 flammability requirements related to the intended use of materials provided under this Section.

1. Comply with CBC 803.1.2.1 Acceptance Criteria for NFPA 286: During the 40 kW exposure, the interior finish shall comply with Item 1. During the 160 kW exposure, the interior finish shall comply with Item 2. During the entire test, the interior finish shall comply with Items 3 and 4.

2. Surface Burning Characteristics:
   a. Flame Spread: Class A, confirmed by testing in accordance with ASTM E 84 and ASTM E 119 for a range of 0 to 25.
   b. Smoke Developed Index shall not exceed 50, confirmed by testing in accordance with NFPA 286.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.

1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.

2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.
2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Performance characteristics of acoustical materials proposed for use shall have been confirmed by tests in accordance with the following:

   a. Flame Spread: Class A, confirmed by testing in accordance with ASTM E 84 and ASTM E 119 for a range of 0 to 25.
   b. Smoke Developed: Total smoke released shall not exceed 1,000 m², confirmed by testing in accordance with NFPA 286.

2. Light Reflectance: Confirmed by testing in accordance with ASTM E 1264, Type III, Form 1 for the following:
   a. LR-1: 75 percent or greater.

B. Design Criteria:

2. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/360 of span.

2.05 ACOUSTICAL PANELS

A. Provide acoustical lay-in panels conforming to ASTM E 1264 and having the following characteristics:

1. Flame Spread and Smoke Developed: Refer to Paragraph 2.04-A.1.a.
2. Humidity Resistance: When available as a product option, provide manufacturer's humidity-resistant and anti-microbial performance, equal to Armstrong HumiGuard Plus, or USG ClimaPlus.
   a. Product shall exhibit no visible sag under conditions not to exceed 90 percent relative humidity and 104 degrees F.
   b. Provide warranty against sagging.
3. VOC: No added formaldehyde (NF).

B. Design based on the use of a 24-inch by 48-inch grid:

1. Thinline Grid:  
   a. Rabbeted Edge:
      1) Non-Fire Rated:
         a) Type ACT-1: Equal to Armstrong No. 2722 Dune Second Look II with HumiGuard Plus and BioBlock+, 24 inches by 48 inches by 3/4-inch thick, beveled rabbeted edge for 9/16-inch wide grid, with center score to provide appearance of two 24-inch squares with No. 7877 shadow wall molding.
            (1) NRC: 0.50.
            (2) CAC: 35.
            (3) Recycled Content: High.
      2) Non-Fire Rated:
         a) Type ACT 2: Equal to Armstrong No. 511 Cirrus Second Look III with BioBlock+, 24 inches by 48 inches by 3/4-inch thick with center score to provide appearance of 12" x
48" planks, beveled rabbeted edge for 9/16-inch wide grid with No. 7877 shadow wall molding.

1) NRC: 0.50.
2) CAC: 35.
3) Recycled Content: 71 percent.

2. Standard Grid:
   a. Regular Edge:
      1) Non-Fire Rated:
         a) Type ACT 4: Equal to Armstrong No. 871 Clean Room VL Perforated Class 5 with washable plastic coating and HumiGuard Plus and BioBlock+, 24 inches by 48 inches by 5/8-inch thick, square lay-in edge for 15/16-inch wide grid with No. 7878 shadow wall molding.
            (1) NRC Range: 0.55.
            (2) CAC Range: 35.
            (3) Recycled Content: 38 percent.
            (4) LR: 0.78.

C. Ceiling: Design based on the use of a 48-inch by 48-inch grid:
   1. Thinline Grid:
      a. Rabbeted Edge:
         1) Non-Fire Rated:
            a) Type ACT 3: Equal to Armstrong No. 3255PB Optima with HumiGuard Plus, fiberglass composition with plant-based binder, 48 inches by 48 inches by 1-inch thick, rabbeted square edge for 9/16-inch wide Silhouette XL grid with 1/8-inch reveal slot and No. 7878 shadow wall molding.
               (1) NRC Range: 0.95.
               (2) AC Range: 190.
               (3) Recycled Content: 33 percent.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install work in accordance with the manufacturer's submittals and recommendations, as accepted by Architect.
   1. Install work in conjunction with the work of Section 095300.

3.02 CLEANING

A. Clean exposed surfaces of acoustical ceilings. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

B. Waste Management: Recycle or salvage waste materials in accordance with Section 017419.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Grid suspension systems for lay-in acoustical panels.
   1. Include suspension system for drywall suspension systems.
   2. Include suspension system for composite wall panels at exterior soffit of Building B.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 079200 - Joint Sealants.
   6. Section 092216 - Non-Structural Metal Framing.
   7. Section 095100 - Acoustical Ceilings: Lay-in ceiling panels.
   8. Section 095424 - Modular Metal Ceilings.

C. Related Sections:
   1. Section 031000 - Concrete Formwork: Installation of connectors for suspension wires.
   2. Section 053100 - Steel Decking: Coordination of hanger placement prior to pouring floor or roof fill.
   3. Section 074243 - Composite Wall Panels.

1.02 REFERENCES

A. ASTM International (ASTM):
   3. A 653-13 - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   4. A 1008 12a - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
10. E 580-14 - Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

B. California Code of Regulations (CCR):
1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
   a. Chapter 8 - Interior Finishes.
      1) Section 803 - Wall and Ceiling Finishes:
         a) Table 803.9 - Interior Wall and Ceiling Finish Requirements by Occupancy.
   b. Chapter 25 - Gypsum Board and Plaster.
      1) Section 2504 - Vertical and Horizontal Assemblies.
3. Division of the State Architect, Interpretation of Regulations (DSA), Revised 4-18-12:

C. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ESR-).

D. Ceilings and Interior Systems Contractors Association (CISCA):

E. Underwriters Laboratories (UL):

F. United States Green Building Council (USGBC):
1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.
B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
C. Coordination: Provide suspension products of the same manufacturer furnishing acoustical panel products in Section 095100 and Section 074243.
**1.04 SUBMITTALS**

A. Product Data: In conjunction with the submittals requirements of Section 095100, submit complete manufacturer’s descriptive literature and specifications.
   1. Submit load and deflection curves of all acoustical hangers.
      a. Submit certification that the neoprene compound and dynamic frequency complies with AASHTO specifications.

B. Shop Drawings: In conjunction with the submittals requirements of Section 095100 and Division 26, submit Shop Drawings which comprehensively describe the installation of ceiling suspension systems. Drawings submitted shall include:
   1. Reflected ceiling plans locating each suspension member and each ceiling panel.
   2. Hanger wire locations.
   3. Typical and special installation details.
   4. Point of origin of ceiling grid.
   5. Submit full scale drawing of acoustical hangers showing the minimum 30-degree contact arc in all planes. Include compressed spring height and spring rates.

C. Samples: Submit samples of each type of suspension system member, molding, and hanger.

D. Quality Control Submittals:
   1. Design Data: Submit calculations confirming vertical and horizontal support of suspension systems proposed for use. Provide calculations prepared and signed by a structural engineer currently licensed to practice in the State of California.

**1.05 SUSTAINABLE DESIGN SUBMITTALS**

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
1.06 QUALITY ASSURANCE

A. Installer Qualifications: Installer must have a minimum of two years of successful experience in installation of suspended ceilings of similar requirements to this project. The installer must be acceptable to the architect, manufacturer, and owner’s representative.

B. Fire Performance Characteristics: When specified as fire resistant, ceiling boards shall conform to Class A flame spread rating when tested according to ASTM E84 and CBC 303.1.1.

1.07 WARRANTY

A. Provide manufacturer’s standard written guaranty against material failure for 10 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   2. Chicago Metallic Corporation, Chicago IL (800)323-7164, with offices in Vernon, CA (213)582-1100.
   3. USG Interiors, Inc. (Donn), Chicago, IL (312)606-5859, with area sales office in Orange, CA (714)978-0901, www.usgcorp.com.

B. Design of vibration isolators is based on the use of products manufactured

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with requirements of ICC ES Active Evaluation Report as applicable for product proposed for use.
      a. ESR-2282 for Chicago Metallic Corporation (includes BPB Celotex Corporation).
      b. ESR-1222 for USG Interiors (Donn).
      c. ESR-1308 for Worthington Armstrong Venture (Armstrong World Industries).
      d. Comply with ICC ESR-1308, or equal, when using Armstrong BERC2 Suspension System as a code-compliant alternative to CBC requirements.
   2. Conform to approved UL Exposed Ceiling Design for required fire rating, where applicable.
4. Comply with the requirements of CBC 803.9, NFPA 286, ASTM E 84, and UL 723.
5. Comply with the recommendations of DSA IR 25-2.13 regarding metal suspension systems for lay-in panel ceilings.
6. Comply with the recommendations of DSA IR 25-3.13 regarding vertical support of gypsum board ceilings.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE CRITERIA

A. Suspension System: Suspension system shall be Heavy Duty in accordance with ASTM C 635 and Section 5 of ASTM E 580, which defines the structural classification of main runners that support ordinary ceiling loads such as light fixtures and air diffusers by the capacity of main runners to support a uniformly distributed load.
1. Limitations: Notwithstanding ASTM C 635, ceilings shall not support material or other building components, except for batt insulation. Ductwork, grilles, light fixtures, plumbing, and similar work shall have individual support systems and shall not use the ceiling system or suspension wires for support.
2. Comply with ICC ESR-1308 when using Armstrong BERC2 Suspension System as a code-compliant alternative to CBC requirements.

2.05 MATERIALS

A. Grid: Runners and other grid components shall be fabricated from materials conforming to ASTM A 653 and ASTM E 580 commercial quality cold-rolled steel hot dipped galvanized in accordance with ASTM C 645 for G60 designation, and having an aluminum cap prefinished with baked polyester paint.
2. Strength: Heavy Duty ASTM classification, as approved by DSA.

B. Hanger Wires: 12 gage galvanized steel wire, but not less than size and spacing recommended by manufacturer.
   1. Comply with requirements of ASTM A 641.

C. Compression Strut: Steel stud conforming to ASTM A 1008, Grade C, painted, gage as indicated on Contract Drawings.

D. Fasteners: Size anchors and attachment devices for 5 times design load indicated in ASTM C 635, Table 1, and tested in accordance with ASTM E 488.

2.06 COMPONENTS

A. Exposed T-bar System (Standard, Non-Rated): Conform to ASTM C 635 for strength, fabrication tolerances, and finish.
   1. Design is based on Armstrong Prelude XL 15/16-inch wide exposed T-bar system with BERC2, or equal.
   2. Non-fire rated double web direct hung exposed.
   3. Armstrong 7897 Shadow Mold with 1/2-inch reveal, or equal.
      a. Comply with ICC ESR-1308 using BERC2 clips and Armstrong Seismic Rx Suspension System.

B. Exposed T-bar System (Thinline, Non-Rated): Conform to ASTM C 635-07 for strength, fabrication tolerances, and finish.
   1. Design is based on Armstrong Suprafine XL 9/16-inch wide exposed tee system with Seismic Rx, or equal.
   2. Non-fire rated double web direct hung exposed.
   3. Armstrong 7878 Shadow Mold with 3/8-inch reveal, or equal.
      a. Comply with ICC ESR-1308 using BERC2 clips and Armstrong Seismic Rx Suspension System.

C. Exposed T-bar System (Thinline, Dimensional, Non-Rated): Conform to ASTM C 635 for strength, fabrication tolerances, and finish.
   1. Armstrong Interlude XL 9/16-inch Dimensional Tee with aluminum cap at center of tee to create a reveal effect and BERC2, or equal.
   2. Non-fire rated double web direct hung exposed.
   3. Armstrong 7897 Shadow Mold with 1/2-inch reveal, or equal.
      a. Comply with ICC ESR-1308 using BERC2 clips and Armstrong Seismic Rx Suspension System.

D. Accessories:
   1. Beam End Retaining Clip: Armstrong BERC2/USG Chicago Metallic SJCG 2 inches by 0.034-inch thick, hot-dipped galvanized cold-rolled steel per ASTM A 568 - used to join main beam or cross tee to wall molding.
   2. Seismic Joint Clip: Armstrong BERC2/USG Chicago Metallic SJCG 5 inches by 1-1/2-inch hot-dipped galvanized cold-rolled steel per ASTM A 568. The two piece unit is designed to accommodate a seismic separation joint. The clip is compatible with 9/16-inch grid systems.
   3. Wall Molding: Angle shape prefinished to match suspension system.
      a. Provide shadow mold at ceiling panels with regular edge.
4. Trapeze Supports: Unistrut channel framing systems manufactured by Unistrut Corporation, or equal, including associated fittings, fasteners, and accessories required.

2.07 CUSTOM PERIMETER TRIM

A. Knife-Edge Components:
   1. Axiom Knife-Edge Custom Perimeter Trim manufactured by Armstrong World Industries, or equal. Edge trim system with 4-inch6-inch wide horizontal face for suspended ceiling system, extruded aluminum Alloy 6063 trim channel, extruded aluminum, factory-finished in custom color polyester paint; 10-foot straight sections; plus factory-welded and finished seamless corners with 12-inch legs. Attachment to grid system is provided by specially designed tee-bar connection clips or hanging clips, which lock into the knife-edge trim channel and are screw-attached to the web of the intersecting suspension system members. Sections of trim are joined at the vertical face using the splice plate.
   2. Knife-Edge Trim Channel: 6" with special bosses formed for attachment to the Axiom tee-bar connection clip or hanging clip; commercial quality.
   3. Splice Plate: Galvanized steel finish; formed to fit into special bosses and locked in place with four factory-installed screws.
   4. Knife-Edge Alignment Clip: Commercial quality aluminum alignment plate that snaps into plenum side of horizontal detail for alignment of adjoining sections; blocks light leaks from above.
   5. Tee-Bar Connection Clip: Galvanized steel finish to match trim channel, formed to fit into special bosses and locked in place by factory-installed screws and attached to suspension system members.
   6. Tee-Bar Connection Clip: Commercial quality aluminum finished to match trim channel, formed to fit into special bosses and locked in place by factory-installed screws and attached to suspension system members.
   7. Hanging Clip: Commercial quality galvanized steel finished to match trim channel, formed to lock into special bosses and attach to suspension system members.
   8. Drywall Trim: Commercial quality extruded aluminum straight sections finished with chemical conversion coating to provide integrated taping flange for integrated 5/8-inch drywall finish.

2.08 ACOUSTICAL ISOLATORS

A. Products: Model SRH-BBT Spring and Neoprene Wire-Tie Ceiling Hangers as manufactured by Kinetics Noise Control, Type W30N Neoprene Element and Spring Hangers, as manufactured by Mason Industries, Inc., or equal.
   1. Spring hangers shall consist of a steel frame containing a neoprene or elastomer-in-shear isolation element at the top and a coil steel spring seated in a neoprene cup on the bottom. Both the element and the cup shall be molded with a neoprene bushing that passes through the hanger frame.
      a. Hangers shall be selected from a 0.4-inch static deflection series with a minimum additional travel to solid of 1/2-inch.
b. Hangers shall be selected for minimum 3/4-inch spring deflection and factory precompressed 70 percent of the total deflection determined by the assigned load per hanger.

c. Spring diameters and hanger box lower hole size shall be large enough to permit the hanger rod to swing through a 30-degree arc without metal-to-metal contact or short circuiting the spring.

d. Hangers shall be designed to carry a 500 percent overload without failure.

e. Hangers shall be manufactured with the provision for bolting or attaching to the ceiling flat iron straps, wires, rods, or steel runners.

2.09 DRYWALL SUSPENSION SYSTEM

A. Provide a proprietary suspension system equivalent to Flat Drywall Ceilings by USG Interiors, 630 Drywall System manufactured by Chicago Metallic Corporation, or Drywall Furring Systems manufactured by Armstrong World Industries.

1. Provide a system conforming to ASTM C 635 for Heavy Duty classification.

2. Provide drywall attachment clips at main runners for additional surface for screw attachment of gypsum board.

3. Cross tees shall have 1-1/2-inch wide face.

4. Hat furring tees shall have 1-3/8-inch wide face.

5. Provide painted reveal molding at wall.

PART 3 - EXECUTION

3.01 INSTALLATION


B. Center layout along centerline of room, maintaining uniform panel widths at opposite sides of space. Do not allow less than one-half unit at perimeter, unless required for proper location of lighting fixtures. Align grid with adjacent surfaces and walls.

1. Hang suspension system in flat plane, level to within 1/8-inch in 10 feet, accommodating light fixtures and air diffusers without noticeable deflection or distortion.

2. Provide moldings continuously around openings, columns, and abutments.

3. Construct tight fitting hairline joints in exposed framing members.

4. Ceiling grid shall not provide lateral support for partitions.
C. Vertical Support System: Suspension wires shall be a minimum of 12 gage galvanized wire attached to the main runner at 4 feet maximum spacing in both directions. Each vertical wire shall be attached to the suspension member and to the support above with a minimum of three turns. Any connection device at the supporting construction shall be capable of supporting a minimum of 100 pounds.
1. Suspension wires shall not hang more than 1 in 6 out of plumb unless counter sloping wires are provided.
   a. Attach wires to 3/4-inch by 3/4-inch by 10 gage steel angle secured to metal deck prior to spray-applied fireproofing, if any, with 1/4-inch diameter low velocity Hilti fasteners embedded 1-1/4-inches in accordance with ICC 2388.
2. Wires shall not attach to or bend around interfering material such as ductwork. Trapeze or equivalent devices shall be used where obstructions interfere with direct suspension.
   a. Trapeze suspension shall be constructed of back-to-back 1-1/4-inch cold formed channels for spans up to 6 feet.
3. The terminal ends of cross runners and main runners shall be supported independently with suspension wires a distance of 8 inches maximum from each wall or ceiling discontinuity.

D. Vibration Isolation:
1. Vibration isolators shall be installed in accordance with the manufacturers written instructions and all certified submittal data.
2. Coordinate work with other trades to avoid rigid contact with other equipment mounted in the ceiling.

E. Horizontal Support System: Provide lateral support of suspended ceilings in excess of 144 square feet area in accordance with ASTM E 580. The adequacy of the system, including the main runner splices and cross runner intersection connections, shall be as indicated on Contract Drawings. Provisions shall be made for possible differential movement between ceilings and side walls.
1. Provide four-way diagonal bracing with 12 gage wires starting a maximum of 6 feet from each wall and occurring on 12 feet centers in each direction.
2. A compression strut fastened to the main runner shall be extended and fastened to the structural members supporting the roof or floor above. The strut shall resist the vertical component induced by the bracing wires, as indicated on Contract Drawings.
3. Secure main runners and cross runners to wall angles at adjacent walls in a concealed manner. On opposite walls place horizontal spacer bars within 8 inches of wall and lock to grid.
   a. Spacer bars may be angles or channels with diamond point or slotted openings to prevent movement.

F. Lighting Fixtures: Provide four taut 12 gage wires, each attached to the fixture and to the structure above, capable of supporting 4 times the weight of the unit.
3.02 DRYWALL SUSPENSION SYSTEM

A. Install drywall suspension system in accordance with ASTM C 636 and DSA IR 25-3.
1. Install cross furring tees at 24 inches on centers for 5/8-inch thick gypsum board.
2. Install hat furring tees at 16 inches on centers for 1/2-inch thick gypsum board.
3. Install additional suspension wires when required to limit deflection to L/360 maximum.
4. Provide drywall channel molding at vertical terminations.
5. Provide drywall transition clips to allow the use of the grid as trim between gypsum board and acoustical panels.
6. Attach gypsum board at 24 inches on centers minimum.

3.03 FIELD QUALITY CONTROL

A. When shot-in or driven-in anchors are used in concrete for hanger wires, one in ten shall be field tested for 200 pounds tension.
B. When drilled-in anchors are used in concrete for bracing wires, one in two shall be field tested for 440 pounds tension.

3.04 CLEANING

A. Clean exposed surfaces of trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch-up of scratches and minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
B. Waste Management: Recycle or salvage waste metal materials in accordance with Section 017419.

END OF SECTION
- SECTION 095424C -

MODULAR METAL CEILINGS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Suspended interior metal ceiling systems, including:
   1. Modular perforated metal ceiling and soffit panels.
   2. Sound absorbing materials and accessories.
   3. Modular suspension assemblies.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 095300 - Acoustical Ceiling Suspension Assemblies.

C. Related Sections:
   1. Section 098433 - Sound Absorbing Wall Panels.
   2. Division 23 Sections - Heating, Ventilating and Air Conditioning.
   3. Division 26 Sections - Electrical.

1.02 REFERENCED STANDARDS

A. ASTM International (ASTM):
   3. E 580-14 - Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.
   4. E 1264-14 - Classification of Acoustical Ceiling Products.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
      1) Section 803 - Wall and Ceiling Finishes:
         a) Table 803.9 - Interior Wall and Ceiling Finish Requirements by Occupancy.
2. Division of the State Architect, Interpretation of Regulations (DSA), Revised 4-18-12:

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordinate layout and installation of metal ceilings with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, paging system, and partition assemblies.

C. Preinstallation Conference: Conduct conference at Project site as directed by project engineer and architect.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications for metal ceiling system.

B. Shop Drawings: In accordance with the provisions of Section 013300, provide dimensioned Shop Drawings showing ceiling layout, joint pattern, locations, markings, quantities, materials, sizes, shapes, initial direct-access openings, and ceiling-mounted items. Indicate methods of connecting, anchoring, fastening, bracing, and attaching to work of other trades.

C. Samples In accordance with the provisions of Section 013300, 12-inch square ceiling panel unit(s), including 12-inch long suspension components and perimeter trim member in the specified finish.

D. Test Reports: Indicate compliance of acoustical metal panel ceilings, including components with requirements based on comprehensive testing of current products.

E. Research/Evaluation Reports: Evidence of acoustical metal panel ceiling and wall component complying with DSA requirements.

F. Copy of manufacturer's warranty for this Section, showing compliance with specified requirements.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.

   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 CLOSEOUT SUBMITTALS

A. Operations and Maintenance Data: Maintenance instructions, prepared by the manufacturer, shall be delivered to the Owner.

B. Closeout Submittals: Maintenance data, prepared by the manufacturer, shall be delivered to the Owner.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Metal Panels: Furnish not less than 1 percent of total panels used on Project, in full cartons, for each color, pattern, and type installed. Provide in typical sized installed on Project.
   2. Ceiling Suspension Components: Quantity of each grid and exposed component equal to 1 percent of amount installed.

1.08 QUALITY ASSURANCE

A. General:
   1. All metal panel wall, ceiling, and soffit products installed on Project shall be from the same manufacturer.
   2. All suspended ceiling assembly products installed on Project shall be from the same manufacturer.

B. Qualifications:
   1. Manufacturer: Materials for this section shall be from a single source ceiling manufacturer with minimum 5 years experience with products of the nature specified.
   2. Installer: The contractor responsible for the work of this section shall be qualified and experienced in the performance of this work for no less than a period of 5 years.

C. Mock-Ups: Before releasing metal ceilings, if requested, construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up to comply with the following minimum requirements, using materials indicated for completed work:
   1. Locate mock-ups in the location and of the size indicated or, if not indicated, as directed by the Architect. Minimum mock-up size to be 8' x 8' unless otherwise specified.
1.09 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver metal ceiling components to job site in unopened containers identified with product manufacturer’s name, trade name and other applicable identification.

B. Acceptance at Site: Remove protective film material from panels only when space is completely clean and dust free of airborne particles.

C. Storage and Protection: Store all ceiling materials in dry and protected locations until installation.

1.10 FIELD CONDITIONS

A. Ambient Conditions: Do not install metal ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, and work above ceilings is complete.

1.11 WARRANTY

A. Provide manufacturer’s warranty against defects in workmanship, discoloration, delamination, or other defects considered undesirable by Architect or Owner for a minimum period of 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer:

B. Acceptable Manufacturers:

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
      a. The actual dollar cost of the amount of this product used on the project must be tracked. The actual dollar cost shall be separated into the amount that meets the requirements of Section 017419 and amount that does not meet the requirements (for the amount of product allowed for use as a substitution as described above and in Section 017419).
   2. MR Credit 4 - Recycled Content: Use materials with recycled content that the sum of post-consumer recycled content plus one-half of the...
pre-consumer content constitutes 10 percent of the total value of the materials in the project.

3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for 10 percent of the total materials value.  
   a. Identify each regionally manufactured material, including its source and cost.  
   b. Give preference to products manufactured and of primary raw materials extracted/recovered within 500 mile radius of Project site.

**2.03 PERFORMANCE CRITERIA**

A. Suspension System: Suspension system shall be *Heavy Duty* in accordance with ASTM C 635 which defines the structural classification of main runners that support ordinary ceiling loads such as light fixtures and air diffusers by the capacity of main runners to support a uniformly distributed load.  
1. Limitations: Notwithstanding ASTM C 635, ceilings shall not support material or other building components, except for batt insulation. Ductwork, grilles, light fixtures, plumbing, and similar work shall have individual support systems and shall not use the ceiling system or suspension wires for support.  
2. Comply with ICC ESR-1308, or equal, when using Armstrong BERC2 Suspension System as a code-compliant alternative to CBC requirements.

B. Design Requirements: Provide manufacturer's standard metal panels for ceilings of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance.  
1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400; plenum mounting in which face of test specimen is (15-3/4 inches) away from test surface per ASTM E 795.

C. Fire-Test-Response Characteristics: Provide acoustical metal panel ceilings that comply with the following requirements:  
1. Fire-response tests performed by UL, ITS/Warnock Hersey, or another independent testing and inspecting agency that is acceptable to authorities having jurisdiction, and that performs testing and follow-up services.  
2. Surface-burning characteristics of acoustical metal pan ceilings comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.

**2.04 MATERIALS**

A. Sheet Metal Characteristics: Form metal panels from sheet metals selected for their surface flatness, smoothness, and freedom from surface blemishes where exposed to view in finished unit. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, variations in flatness exceeding those permitted by referenced standards.
for stretcher-leveled metal sheet, stains, discolorations, or other imperfections.

2. Steel Sheets, where specified. Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled; with protective coating complying with ASTM C 635. For painted finishes, provide electrolytic zinc-coated steel complying with ASTM A 591/A 591M, Class B coating, chemically treated in mill with phosphate solution and light chromate rinse.

2.05 CEILING PANELS

A. Metal Ceiling Type MCT-1: Illusions, manufactured by Ceilings Plus, or equal.

1. Ceiling panels shall be die formed from a single sheet with a minimum 1-1/4-inch integral return edge on panel sides. No deflection, indentations, marks, or defacing of the exposed surface of the metal ceiling panel will be allowed.
2. Size: 24 inches by 24 inches.
3. Perforations: Type LT-22 0.394-inch square at 0.700-inch straight centers, 34 percent open. Panels shall have a non-perforated, solid margin on all sides.
5. No fasteners of any kind shall be visible on exposed surfaces of ceiling panels or support members. Light and sprinkler openings shall be factory precision cut as required.
6. The plenum shall be 100% accessible. Every panel shall be removable. Progressive panel access is not acceptable. Heavy duty torsion springs and clip assemblies shall be mounted to every panel for downward access without potential for damage to panel face or hinge assembly. Hinge assembly shall be attached to panel with minimum of 2 flush fasteners. Attaching torsion spring directly to panel with fastener will not be accepted.
7. Sound Absorbing Material: Equal to Soundtex black non-woven acoustical fleece with Class A fire rating, achieving an NRC of 0.70 minimum.
8. Match light fixture trim surrounding opening where lay-in units are used.

2.06 SUPPORTING GRID

A. Grid system shall comply with the applicable requirements of Section 095300. Provide complete suspensions systems with main runners, cross runners, hangers, trim molding, seismic retention clips, load resisting struts, and other suspension components required to support ceiling and other ceiling supported construction.

1. Supporting grid system shall consist of straight, factory formed tee complying with structural requirements of ASTM 635 and ASTM 636, heavy duty direct hung ceilings, equal to Armstrong Prelude XL Series 7300 for Exterior Applications.
   a. Provide factory slot tee to accept torsion spring attachment.
b. Where exposed tees shall be finished to match modular ceiling panels.

2. Hangers: 12 gage pre-straightened steel wires, rods, or other approved hanging device that will support required loads.

3. Tolerances: Maximum deviation of ceiling panels from edge to edge in width shall not exceed 1/8-inch in 10 feet when measured with a straightedge placed at any directional location on the finished surfaces. Maximum deviation shall not exceed 1/4-inch from level in any area or room.

4. Provide suspension system made from steel sheet with an average recycled content such that post consumer recycled content plus one half or pre consumer content is not less than 25 percent
   b. Postinstalled: Chemical anchors.

5. Face of main runners shall be factory slotted to receive torsion springs

6. Face of main and cross runners to be factory finished matte black.

2.07 ATTACHMENT DEVICES

A. Size for 5 times design load indicated in ASTM C 635, Table 1, Direct-Hung.
   1. Provide anchors as required and as approved by the Structural Engineer of record.
   2. Structural substrate indicated to support attachment device shall be approved by the Structural Engineer of record.
   3. Anchors specified shall provide corrosion resistance in accordance with metal type and application.
      a. Anchor into concrete with or without steel deck with preinstalled cast-in-place anchors.

2.08 FABRICATION

A. Fabrication: Die-form metal panels, from metal indicated, into units of size indicated and configuration standard with specified manufacturer, with torsion spring clips on flanges for engagement with concealed suspension system. Roll forming will not be accepted. Cupping at edges or corners will not be accepted. Objectionable deflection or oil canning as determined by the Architect will not be accepted.

B. Surface Preparation: Clean surfaces in accordance with the requirements of Section 050513.
   1. Polyester Finish, Interior: Baked polyester coating complying with manufacturer's instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and structural framing to which metal panels attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect installation and anchorage, and other conditions affecting performance of metal pan ceilings.
B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.

B. Measure each ceiling area and establish layout of metal pan units to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width units at borders, and comply with layout shown on reflected ceiling plans. Provide and install matching trims where necessary to finish edge of cut ceilings.

C. Survey substrate for wall attachments to ensure squareness and proper elevation for wall panel installation.

3.03 INSTALLATION

A. General Requirements: Install metal panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA Ceiling Systems Handbook.

1. Cotton white gloves shall be used for installation.

2. Install supporting channels and suspended grid in accordance with the general requirements specified in Section 095300.

3. Materials shall be installed in accordance with procedures recommended by manufacturer and requirements of agencies having jurisdiction.

4. Install ceiling suspension system to comply with performance requirements of ASTM E 580 and Article 2.03.

3.04 ADJUSTING AND CLEANING

A. Touch up minor finish damage.

B. Remove and replace units that have been damaged or cannot be satisfactorily cleaned to the Architect's acceptance, at no additional cost to the Owner.

C. Clean exposed material surfaces following manufacturer's written cleaning procedures.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Linear wood veneer metal ceiling panels and suspension systems.
   1. Include both bar and plank systems.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 095300 - Acoustical Ceiling Suspension Assemblies.

1.02 REFERENCE STANDARDS

A. International (ASTM):
   5. E 580-14 - Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:

C. ICC Evaluation Service, Inc. (ICC ES), a subsidiary corporation of the International Code Council:
   1. ICC ES Evaluation Reports, Materials, Products, Methods and Types of Construction published after February 1, 2003 (ESR-).

D. Ceilings and Interior Systems Contractors Association (CISCA):

E. Underwriters Laboratories (UL):
F. Woodwork Institute (WI):
   1. Architectural Woodwork Standards (AWS), 2nd edition (2014) and subsequent errata, published jointly by AWI, AWMAC, and WI, including Appendices, Guide Specifications, and WI Certified Compliance.

G. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordination: Provide suspension products of the same manufacturer furnishing acoustical panel products in Section 095100.

D. Coordinate layout and installation of linear wood ceiling and its suspension system with other work penetrating through the ceiling, including light fixtures, air conditioning grilles, and fire suppression system components.

E. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.

F. Preinstallation Conference: Conduct conference at Project site as directed by the project Architect.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Provide complete manufacturer's descriptive literature, product specifications, and installation instructions for supplied ceiling materials.

C. Shop Drawings: Furnish Shop Drawings indicating placement of hangers, locations of clip rails, and other details pertinent to proper installation. Drawings submitted shall include:
   1. Reflected ceiling plans locating each suspension member and each ceiling strip.
   2. Hanger wire locations.
   3. Typical and special installation details. Include dimensions to high and low points of levels or sloped ceilings.
   4. Point of origin of ceiling grid.
   5. Locations of ceiling diffusers and fire protection sprinklers.

D. Samples for Verification: Submit full-size units of each type of ceiling assembly indicated; in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics. Submit samples for each type specified.
   1. 12-inch square, (acoustical) metal/wood units.
   2. 12-inch long samples of each exposed molding or trim.
3. 12-inch long samples of each suspension component.

E. Quality Control Submittals:
1. Design Data: Submit calculations confirming vertical and horizontal support of suspension systems proposed for use. Provide calculations prepared and signed by a structural engineer currently licensed to practice in the State of California.

F. Qualification Data: Provide documents to demonstrate capabilities and experience. Include list of at least 5 completed projects with contact data for manufacturers, installers, architects, and owners.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
4. Certificates for MR Credit 7: Chain-of-custody certificates certifying that products specified shall be made from certified wood complying with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body. Include statement indicating costs for each certified wood product.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Materials: Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents. Only typical system components are included with attic stock.
1. Acoustical Wood Veneer Ceiling Grille Units: Full-size units equal to 1 percent (1%) of amount installed.
2. Ceiling Suspension System Components: Quantity of each grid and exposed component equal to 1 percent (1%) of amount installed.

**1.07 QUALITY ASSURANCE**

A. Manufacturer
   1. To certify a minimum of 5 years' experience as a manufacturing enterprise engaged in sales and production of similar products to those specified.
   2. Provide support documentation including name and date of similar projects completed. Include names and contact numbers of Architect and employers for reference.
   3. Manufacturer shall be single source, original equipment, engineering and design, and shall be the fabricator and supplier of appropriate major components. Broker / Package of components will not be acceptable.

B. Installer: Installation shall be performed by trained crews under the direction of a trained foreman.
   1. To certify a minimum 5 years' experience installing similar systems and scope to those specified or approved in written form by "Basis of Design" manufacturer.
   2. Provide list of at least 5 successful installations with similar products and scope. Include names and contact numbers of Architect and employer for reference.

C. Fire Performance Characteristics: When specified as fire resistant, wood ceiling boards shall conform to Class A flame spread rating when tested according to ASTM E 84.

D. Mock-Ups: Before releasing linear metal/wood ceilings, if requested, construct mock-ups for each form of construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mock-up to comply with the following minimum requirements, using materials indicated for completed work:
   1. Locate mock-ups in the location and of the size indicated or, if not indicated, as directed by the Architect. Minimum mock-up size to be 6' x 8' unless otherwise specified.
   2. Notify Architect seven days in advance of the dates and times when mock-ups will be constructed.
   3. Demonstrate the proposed range of aesthetic effects and workmanship.

E. Environmental Standards: When required the wood ceiling shall originate from well managed forests as certified by accredited and recognized industry certifying organizations.

**1.08 FIELD CONDITIONS**

A. Installation shall be done only when the temperature and humidity closely approximate the interior conditions that will exist when the building is occupied. The heating and cooling systems shall be operating before, during,
and after installation, with the humidity of the interior spaces maintained between 25% and 55%.

B. Environmental Limitations
1. Do not install acoustical metal / wood pan ceilings until after spaces are enclosed and weather tight and after wet work and work above ceilings is complete and accepted by project Architect.
2. Maintain environmental conditions within limits recommended by manufacturer for optimum results.
   a. Maintain within a temperature range of 50-100 degrees.
   b. Maintain within a 20%-60% relative humidity.

C. Do not install products in exterior space unless the system has been specifically designed and approved for exterior application.

D. Ensure that plenums have proper ventilation, especially in high moisture areas. There shall be no excessive buildup of heat in the ceiling areas.

E. Prior to the start of installation, exterior windows and doors shall be in place, glazed, and weather-stripped. The roof is to be watertight, and wet trades' work is to be completed, and thoroughly dry.

F. Mechanical, electrical, and other utility service installations above the ceiling plane shall have been completed. No materials should rest against, or wrap around, the ceiling suspension components or connecting hangers.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the project site in the original, labeled, unopened packages.

B. Store materials flat and level in a fully enclosed space. For a minimum of 72 hours immediately prior to ceiling installation, the linear wood strips shall be stored in the room in which they will be installed. Temperature and humidity of the room shall closely approximate those conditions that will exist when the building is occupied. Store linear wood strips off the floor.

C. Exercise care in handling to avoid damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer:

B. Acceptable Manufacturers:

C. Like components shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of another manufacturer accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulatory Requirements:
   1. Conform to approved UL Exposed Ceiling Design for required fire rating, where applicable.

B. Fire-Test-Response Characteristics: Provide suspended ceiling panels made from a non-combustible aluminum core and tested in accordance with ASTM E 84 for Class A (0-25 flame spread) surface-burning characteristics and CBC Chapter 8 Section 803.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.
   4. MR Credit 7 - Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria for wood building components.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.2 - Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      a. Clear Wood Finishes: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

2.04 PERFORMANCE CRITERIA

A. Suspension System: Refer to Section 095300.

2.05 CEILING SYSTEMS

A. Ceiling Type MCT-2: Equal to Ceilings Plus Barz Sarante with species and finish to match Architect's sample.
   1. Panels frames shall be manufactured from single sheets of aluminum selected for surface flatness, smoothness, and freedom from surface blemishes where exposed to view in a finished unit. Do not use
material where the exposed surface exhibit pitting, seam marks, roller marks, stains, discolorations, or variations in flatness exceeding those permitted by referenced standards for stretcher-leveled aluminum alloy sheets.

2. Individual linear members shall be die formed from a single sheet of aluminum, to dimensions as noted on drawings, with integral top return and end flanges. Each individual linear aluminum member shall be straight and square within 1/32" over 10 feet. Twisting, bowing, deflection, indentations, marks, or defacing of the exposed surface of the wood veneer will be allowed. Roll forming is not acceptable.

3. Metal surface shapes material shall be primed aluminum sheet type 3105 series alloy that has up to 90% recycled content. It shall be machine stretcher-leveled and a minimum of 0.040" thickness, or greater if required, so that deflection does not exceed L/360.

4. Individual linear members shall be factory attached to torsion spring backer supports (cassette assemblies). Each cassette assembly shall have minimum two backer supports up to lengths of 60", and three backer supports for lengths greater than 60", creating a modular panel assembly with minimum 1/4" reveals between panel ends.

5. No fasteners shall be visible on exposed face surfaces of ceilings members or support tees. Down-light openings, sprinkler holes and miscellaneous penetrations shall be carefully field cut as required.

6. Wood Veneer: Manufacturer's Sarante real wood veneer permanently bonded edge to edge of the aluminum sheet with no added urea formaldehyde, with an average peel strength of 18.2 psi @ 25 degrees C that complies with ASTM D 1876. Edge banding returns will not be acceptable.

7. Linear member size and spacing shall be in accordance with Contract Drawings.

8. Linear member size shall be 2" x 4", spaced at 6" oc.
   a. Panel Unit Sizes: 24" x 96", or as recommended by manufacturer.

9. End Profile: Linear Barz end joints are reveal condition unless specified otherwise integral enclosures. Linear members shall have integral ends in single piece.

10. Veneer units with visual exposure where rows terminates shall have integral end returns.

11. Provide and install matching finish trim on each side of each suspended area.

B. Ceiling Type MCT-3: Equal to Ceilings Plus Planx Sarante with finish to match Architect's sample.

1. Panels shall be manufactured from single sheets of aluminum selected for surface flatness, smoothness and freedom from surface blemishes where exposed to view in a finished unit. Do not use material where exposed surface exhibit pitting, seam marks, roller marks, stains, discolorations, or variations in flatness exceeding those permitted by referenced standards for stretcher-leveled aluminum alloy sheets.
2. Panels **shall** be die formed with a ±1" x 0.3" minimum integral returns on panel sides. No fasteners of any kind shall be visible on exposed face surfaces of ceiling panels or support tees. Down light openings and other ceiling penetrations shall be factory precision cut whenever viable.

3. Panel material shall be primed aluminum sheet type 3105 (painted) / 5005 (anodized) series alloy that has a minimum 70% (50% @ 5005) recycled content. It shall be machine stretcher-leveled and a minimum of 0.032" thickness, or greater if required, so that the panel deflection does not exceed L/360.

4. Finish: PVC free Sarante faux wood veneer permanently bonded to the aluminum sheet with urea formaldehyde free, water based adhesive of minimum bond strength of 8 psi @ 25 degrees C.

5. Size:
   a. Linear Member Size: Refer to Finish Schedule on Contract Drawings.
   b. Linear Panel Size: Sized in accordance with Contract Drawings.

6. End Profile: Panel end joints are butt condition with a splice plate (black), unless specified otherwise.

7. Perforation: SD4, as selected by the Architect from Ceilings Plus standard patterns. Panels to have solid non-perforated borders along each side.

8. Sound-Absorptive Fabric Layer: Provide manufacturer's acoustic pads sized to fit concealed surface of panel. Material shall be both non-flammable and sound-absorptive.
   a. Fire Class shall be Class A, with surface-burning characteristics for flame-spread rating of 25 or less and smoke developed rating of 50 or less. Provide independent accredited lab test results showing compliance with Class A rating as per ASTM E 84.
   b. Achieve absorption value of not less than 0.70-0.80 NRC. Provide independent accredited laboratory test results illustrating compliance with acoustical requirements as per ASTM C 423.
   c. Acoustical metal panel ceilings to provide recycled cotton, Ultrasorb in sufficient thickness to adhesive NRC rating specified.
   d. Acoustical metal panel ceilings to provide recycled Soundtex fiber fleece.
   e. Permanently laminate fleece (Install acoustical pads) to the backside of the perforated panels, unless otherwise directed by the Architect.

9. The plenum shall be 100% accessible.

10. Fire Tests: Complete system test including suspension, primed aluminum and finish shall meet ASTM E 84 Class A.

11. Provide and install matching finish trim on each side of each suspended area (or as specified).

### 2.06 SUSPENSION SYSTEMS

A. Materials: The suspension system shall be as manufactured by same manufacturer as proposed in Section 095300.
B. Main runners and cross runners shall conform to the heavy duty classification of ASTM C 635.

C. Main runners shall be installed 48” on centers. and be directly suspended by not less than 12 gage galvanized steel wire wrapped tightly at least three full turns. Suspension wires shall be straight and vertically installed not more than 48” on centers.

D. Main runners shall be interconnected by cross tees to form a 2’ x 4’ module.

2.07 FINISHES

A. Linear wood veneer strips shall be factory-finished with custom wood stain and sealer coats as selected by Architect.
   1. Spray-apply to a smooth-sanded surface.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and structural framing to which acoustical metal panels attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect installation and anchorage, and other conditions affecting performance of metal panel ceilings.

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

C. Prior to the installation of the interior finish materials, installing subcontractor shall completely read and comply with manufacturer's instructions for storage, job conditions, and the installation recommendations.

3.02 PREPARATION

A. Prior to the installation of the interior finish materials, installer shall completely read and comply with manufacturer's instructions for storage, job conditions, and the installation recommendations.
   1. Remove panels from protective packaging only when space is completely clean and free of airborne particles. Use white cotton gloves for final installation of panels into grid system.

3.03 INSTALLATION, SUSPENSION SYSTEM

A. General: Install wood veneer metal ceiling units in accordance with manufacturer's Shop Drawings and written instructions.

   1. Horizontal Support System: Refer to Section 095300.

C. Suspend ceiling hangers from building structure:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter-splay, or other equally effective means.

3. Where width of ducts and other construction within ceiling plenum produce hanger spacings that interfere with location of hangers at spacing required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

4. Where used secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

5. Space hangers not more than 48 inches on center, along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches from ends of each member. Supply supporting calculations from licensed Structural Engineer verifying hanger spacing meets all requirements, when spacing exceed those recommended.

6. Fine level grid to 1/8-inch in 10 feet to required elevations, square and true.

D. Secure bracing wires to ceiling suspension members and to supports in accordance with Code requirements. Suspend bracing from building's structural members or structural deck as required for hangers, without attaching to permanent metal forms, steel deck.

E. Scribe and cut wood veneer metal units for accurate fit at penetrations for other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

### 3.04 INSTALLATION

A. General: Install materials in accordance with manufacturer's printed instructions. Comply with applicable regulations and industry standards.

1. No fasteners of any kind shall be visible on exposed face surfaces of ceiling panels or support tees. Down light openings and sprinkler holes shall be neatly cut and finished as required.

B. Install linear metal units in coordination with suspension system.

1. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions, unless otherwise indicated. Install directionally patterned or textured panels in directions indicated on approved shop drawings. Panel-joints shall flow smoothly and in a straight line within 1/8" in 10'. Intersections shall be continuous.

2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.
3. Use manufacturer-provided clamping tool to snap wood strips onto clip rails. Installation shall proceed, in sequence, from one wall to opposite wall.

3.05 FIELD QUALITY CONTROL

A. Field Tests and Inspections: Correct deficiencies in the installed ceiling at no additional cost to the Owner.

3.06 ADJUSTING AND CLEANING

A. Upon completion of ceiling installation, linear wood strips shall be cleaned free of dirt, dust, grease, oils, and fingerprints.

1. Clean exposed surfaces of acoustical metal panel ceilings and walls. Comply with manufacturer’s written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

C. Adjust ceiling components to provide a consistent finish and appearance in conformity with established tolerances and requirements.

D. Make final adjustments to levels or contours. Work that cannot be successfully cleaned or repaired, shall be removed and replaced.

E. Waste Management: Recycle or salvage waste metal materials in accordance with Section 017419.

1.10 MAINTENANCE

A. Maintenance Instructions: Provide manufacturers standard maintenance and cleaning instructions for finishes provided.

END OF SECTION
WOOD ATHLETIC FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Resiliently-supported athletic wood flooring systems, including, as required, vapor barrier, subflooring, and accessories.
   1. Resilient underlayment-supported flooring.
   2. Resilient pad-supported flooring.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 033100 - Structural Concrete: Floor slab placement, tolerancing and finishing.
   6. Section 033542 - Concrete Sealing.
   7. Section 099100 - Painting.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. E 1333-10 - Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-302 - Floor or Ground Surfaces.
            b) Section 11B-303 - Changes in Level.
         2) Division 4 - Accessible Routes.
            a) Section 11B-403 - Walking Surfaces.
C. American National Standards Institute (ANSI):
   1. A137.1-2008 - Ceramic Tile.

D. Maple Flooring Manufacturers Association (MFMA):

1.03 Administrative Requirements

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 Submittals

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit Shop Drawings comprehensively describing the installation of the flooring system.

C. Samples: In accordance with the provisions of Section 013300, submit samples of the following:
   1. Prefinished flooring.
   2. Vented base.
   3. Threshold.
   4. Floor system assembly.

D. Quality Control Submittals:
   1. Submit certificates attesting the materials furnished will meet specification for grade, quality, dryness and treatment, if required.
   2. Certificates: Provide each bundle of flooring identified with the grade mark of the Maple Flooring Manufacturer's Association (MFMA).
      a. Optionally, accompany delivered flooring with certificates attesting that such materials meet the grade required.
   3. Submit certification from Otto-Graf-Institut, Stuttgart, West Germany, or an agency certified to do DIN testing by the Otto-Graf-Institut, that the floor system to be provided has been successfully tested in accordance with DIN 18032, Part II, for area-elastic gymnasium floor. Testing and certification by any other testing institution does not constitute DIN Certification.

E. Closeout Submittals:
   1. Operation and Maintenance Data: Submit three copies of "WSFI Care and Preservation of Your Wood Floors".

1.05 Sustainable Design Submittals

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2:
      a. Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
b. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
4. MR Credit 6 and MR Credit 7: Use a minimum of 50 percent of wood-based materials and products made from rapidly renewal certified wood complying with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Management Plan for IEQ Credit 3.2: Develop and implement an IAQ Management Plan for the pre-occupancy phase by recommended flush-out or air testing procedures.
   2. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).
   3. Product Data for IEQ Credit 4.3: For flooring, documentation indicating compliance with at least one of the following requirements:
      a. Option 1 (Hard Surface Flooring): Manufacturer's certification as compliant with FloorScore standard by an independent third party.
      b. Option 2 (All Flooring): Documentation that flooring systems meets testing and product requirements of California Department of Health Services' Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.
   4. Product Data for IEQ Credit 4.4: For composite wood products and adhesives used in composite wood assemblies on and off-site, documentation indicating that they contain no added urea formaldehyde.

C. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.
   2. Submit documentation to enforcing agency which demonstrates compliance with CALGreen 5.408.1.4. Sample compliance forms are available in the CALGreen Guide.
1.06 QUALITY ASSURANCE

A. Manufacturer's Qualifications:
   1. Manufacturer shall be a member in good standing of the Maple Flooring Manufacturers Association.
   2. Manufacturer shall be a firm established in the field and have been in business for a minimum of 10 years.
   3. Sports floors must be FIBA approved.

B. Installer's Qualifications:
   1. Flooring contractor shall be approved or otherwise authorized by the manufacturer of the flooring materials.
   2. Flooring contractor shall demonstrate relevant past experience in installing similar floor systems by submitting data on successful installations within the past 5 years.

C. Floor System Standard:
   1. Floor system shall have been tested and passed the minimum requirements of DIN 18032, Part II. Testing shall have been performed by the Otto-Graf-Institut, Stuttgart, West Germany, or an agency certified by the Otto-Graf-Institut. Test results from any other agency or testing institution does not constitute DIN certification.
   2. Floor system shall meet the following requirements:
      a. Shock absorption shall be 65% minimum.
      b. Ball return shall be at least 90% when tested against concrete.
      c. Deflection:
         1) Point of Impact: 2.3 mm minimum.
         2) 20" from Point of Impact: 15% of point of impact maximum.
      d. Friction: Range 0.5 - 0.7 per DIN Test Method.
      e. Rolling Load: 337.6 lbs. weight capacity without damage.
   3. Comply with the internationally accepted DIN Standards (DIN 18032, Part II). The Owner may, at its discretion and expense, have the finished flooring tested by an independent, certified DIN testing agency (Otto Graf Institute, Stuttgart, Germany). Should the finished flooring fail to pass these standards, the Owner may require the flooring to be removed and replaced with a floor which will pass these standards. In the event of failure, the cost of testing, removal, and replacement shall be at the expense of the Contractor.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Place wood flooring materials in the rooms or spaces to be floored 7 days in advance of the start of installation. Open packages of wood flooring that are sealed to permit natural adjustment of moisture content.

1.08 FIELD CONDITIONS

A. Existing Conditions: Do not deliver the flooring system, nor commence installation until after:
   1. The completion of the work of the wet trades.
   2. The building is fully enclosed and weathertight.
   3. Permanent heating, ventilating, and lighting systems are operable.
B. Environmental Requirements: During installation, maintain a temperature range of between 55 to 78 degrees F, and a relative humidity range of between 35 to 50 percent.

C. Field Measurements: Prepare Shop Drawings based on field measurements taken at site specifically for work of this Section.

1.09 WARRANTY

A. Furnish a 5-year guaranty for the finished wood flooring and associated work, agreeing to repair or replace flooring which shrinks, warps, cracks, or otherwise deteriorates excessively, or which buckles, delaminates or fails otherwise to perform as required or as represented by the manufacturer, due to failures of materials and workmanship.

1. Guarantee shall not cover damage caused in whole or in part by casualty, ordinary wear and tear, abuse, use for which material is not designed, faulty construction of the building, settlement of the building walls, failure of other contractors to adhere to specifications, separation of the concrete slab and excessive dryness or excessive moisture from humidity, spillage, migration through the slab or wall, or any other source.

2. This warranty is in place of all other warranties, expressed or implied, including but not limited to any warranty of merchantability or fitness for a particular purpose, and of any other obligation on the part of Manufacturer. In the event of breach of any warranty, the liability of manufacturer shall be limited to repairing or replacing Bio-Cushion III material and system components supplied by Manufacturer and proven to be defective in manufacture, and shall not include any other damages, either direct or consequential.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Resilient Wood Flooring Systems:


3. Horner Flooring Company, Dollar Bay, MI (906)482-1180.

B. Acceptable Manufacturers of Accessory Materials:


2. Huntington Laboratories, Inc.

C. Substitution Limitations: Materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulatory Requirements:
   1. Slip Resistance: Comply with ADA Guidelines, CBC Section 11B-302, and CBC Section 403.
   2. Floor products shall comply with a DCOF (dynamic coefficient of friction) value of 0.42 minimum for level interior floors, as specified in ANSI A137.1, Section 9.6 - DCOF AcuTest.

B. Comply with the certification requirements of CCR Title 17 ATCM for formaldehyde emissions of composite wood products, unless otherwise exempted, using ASTM E1333 primary or ASTM D6007 secondary compliance testing.

C. Comply with CALGreen Section 5.408.1 Construction Waste Diversion: Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

D. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Tables 5.504.4.1 and 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

E. Comply with CALGreen 5.504.4.3 Paints and Coatings: Architectural paints and coatings shall comply with VOC limits in Table 5.504.3.
   1. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

F. Comply with CALGreen 5.504.4.5 Composite Wood Products: Hardwood plywood, particleboard, and medium density fiberboard composite wood products shall meet the requirements for formaldehyde as specified in CCR Title 17 Sections 93120-93120.12 - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products (ATCM).

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
      a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of percent of the total materials value.

4. Certificates for MR Credit 6: Certify that products specified are made from rapidly renewable sources.

5. MR Credit 7 Certified Wood: Use a minimum of 50 percent of wood-based materials and products which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria for wood building components.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 3.2 Construction IAQ Management Plan--Before Occupancy: Develop and implement an IAQ Management Plan for the pre-occupancy phase by recommended flush-out procedures.

2. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   b. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GS-11.
   c. Clear Wood Finishes: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.
   d. Concrete Sealers: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

3. IEQ Credit 4.3- Low-Emitting Materials--Flooring Systems: Flooring systems shall comply with at least one of the following requirements.
   a. Option 1 (Hard Surface Flooring): Provide hard surface flooring certified as compliant with FloorScore standard by an independent third party.
   b. Option 2 (All Flooring): All flooring systems must meet testing and product requirements of California Department of Health Services' Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

4. IEQ Credit 4.4 - Low-Emitting Materials--Composite Wood and Agrifiber Products: Composite wood and agrifiber products used on the interior shall contain no urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
   a. Composite wood and agrifiber products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
2.04 RESILIENT WOOD FLOORING SYSTEM

A. Sprung Wood Floor System **Type WD-1:** Design is based on New and Improved Bio-Channel Star floor system, manufactured by Robbins Sports Surfaces:

B. Resilient Pads:
   1. Pad shall be 9/16" profiled Zero/G Shock Pad.
      a. Ground rubber or neoprene pads will not be accepted.

C. Subfloor: Bio-Channel Star Subfloor panels that have been factory prepared to accept anchor channel.
   1. Nominal 3/4" x 24" x 96", Exposure 1, structural rated sheathing with factory prepared anchor slots.
   2. Metal Anchor Channels: Anchor Spike and 16 gage steel anchor channel.

D. Flooring: Northern Hard Maple Flooring, kiln dried, second and better, graded in accordance with MFMAFJ rules.
   1. 25/32" thick x 1-1/2" width, reverse profiled, T & G and EM, KD Continuous Strip XL450
      a. Standard random length maple is not acceptable.
   2. Matching: Tongue and groove on side-match and end-match.
   3. Type: Finger-jointed (FJ).
   4. Pattern: Straight-lay (One directional)
   5. Thickness: 25/32".
   6. Width: 2-1/4".
   7. Expansion Option: Standard:
   8. Factory Finish: Unfinished:
   9. Treatment: Un-Treated:
   10. Certified Wood: FSC:

E. Vapor Barrier: Polyethylene film, black, 6-mil thickness.

F. Fasteners:
   1. Flooring: 1 3/4” barbed cleats or staples.
   2. Channel Anchors: 2” Powers Spike anchors.

G. Accessory Materials:
   1. Perimeter base - Robbins 3-inch x 4-inch Black ventilating type.
   2. Floor Finish: Design is based on Robbins Miracle or Hillyard Contender Seal 4-coat System consisting of two MFMA approved sealer coats and two MFMA approved finish coats meeting all EPA requirements.
   3. Striping Paint: Gameline paint shall be as recommended by the finishing materials manufacturer for long life, color retention, and compatible with the finish.
      a. Conform to the general requirements of Section 087100.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Inspect concrete slab for proper tolerance and dryness, and report any discrepancies to Contractor and Architect in writing.
      a. Slab will be level to within 1/8” in a 10’.
      b. Moisture content of the concrete slab shall not exceed 85% using ASTM F 2170 In-Slab Relative Humidity test, as specified in Section 033542.

3.02 PREPARATION

A. Surface Preparation: Thoroughly clean surfaces to receive wood flooring.

3.03 INSTALLATION

A. Vapor Barrier:
   1. Install polyethylene film with joints lapped a minimum of 6 inches and turned up 4 inches at the walls.

B. Subflooring:
   1. Install shock absorbing pad per manufacturer’s recommendations over vapor barrier.
   2. Following manufacturer’s guidelines, place subfloor assembly in end-to-end manner, staggering end joints in adjacent rows. Allow for a 1/4” gap between panels. Panels shall be placed on a 45 degree angle to the direction of the finish flooring. Provide 1-1/2” to 2” expansion void at the perimeter and at vertical obstructions.
   3. Install solid blocking at doorways and below any supported equipment, such as bleachers in the stacked position and portable goals.
      a. Install blocking per manufacturer’s recommendations.
   4. Place metal anchor channel in each factory-prepared location in the panel.
   5. Anchor each anchor channel in the center prerouted hole only, unless trimming at wall or vertical obstruction requires relocation in adjacent location to anchor.

C. Wood Flooring:
   1. Machine nail maple finish flooring 10” to 12” oc with end joints properly driven up and proper spacing provided for humidity conditions at Project location, as recommended by manufacturer's local certified installed.
      a. Provide 2” expansion voids at the perimeter and at all vertical obstructions.
      b. Option: Expansion rows may be evenly distributed with each row of flooring, with each space not exceeding 1/64”.

D. Sanding:
   1. Sand in accordance with manufacturer’s recommendations.
   2. After sanding, buff entire floor using 100 grit screen or equal grit sandpaper, with a heavy-duty buffing machine.
3. Inspect entire area of floor to ensure the floor presents a smooth surface without drum stop marks, gouges, streaks or shiners.
4. Floor shall be vacuumed and/or tacked clean and completely free of dirt and sanding dust before first coat of seal.

E. Finishing:
1. Apply two coat of specified sealer and three coats of specified finish.
2. Buff and vacuum and/or tack between each coat after it dries.
3. Perimeter Molding:
   a. Install vent cove base anchored to walls and vertical interruptions with base cement. Use premolded outside corners and neatly mitered inside corners.
4. Threshold Plates: Secure to concrete floor side of wood floor perimeter at openings.

3.04 PROTECTION

A. Immediately after flooring work is completed, cover flooring with a protective paper.

B. Immediately prior to final inspection, remove protective covering, repair any damage to the flooring, clean, and machine buff the entire floor area.

END OF SECTION
- SECTION 096513 -

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Resilient base, edge trim, and accessories.
   1. Include metal transition strips.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 096519 - Resilient Tile Flooring: Coordination with resilient flooring installation.
   6. Section 096813 - Tile Carpeting: Coordination with flooring installation.

1.02 REFERENCES

A. ASTM International (ASTM)

B. California Code of Regulations (CCR):
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-302 - Ground and Floor Surfaces.
            b) Section 11B-303 - Changes in Level.
         2) Division 4 - Accessible Routes.
            a) Section 11B-403 - Walking Surfaces.
               (1) 11B-403.3 - Slope.
            3) Division 5 - General Site and Building Elements.
               b) Section 11B.504 - Stairways.

C. California Code of Regulations (CCR):

D. Americans with Disabilities Act of 2010 (ADA):
E. American National Standards Institute (ANSI):
   1. A137.1-2012 - Ceramic Tile.

F. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordination: Coordinate with Section 096519 for installation of resilient base and transition strips with resilient flooring.

D. Coordination: Coordinate with Section 096813 for installation of resilient base and transition strips with carpet and rubber flooring.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.

C. Samples: Submit the manufacturer’s standard finishes palette, for selection of color.
   1. When selection has been made, submit samples of finish not less than 6 inches long for final review and acceptance.

D. Quality Control Submittals:
   1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section and certifying that adhesives used in work of this Project do not contain chemicals with extended curing times that will be irritating to occupants after completion of Project.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2.1 and Credit 2.2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4.1 and MR Credit 4.2: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5.1 and MR Credit 5.2: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.
   2. Product Data for IEQ Credit 4.3: For flooring, documentation indicating compliance with at least one of the following requirements:
      a. Option 1 (Hard Surface Flooring): Manufacturer's certification as compliant with FloorScore standard by an independent third party.
      b. Option 2 (All Flooring): Documentation that flooring systems meets testing and product requirements of California Department of Health Services' Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit list of products, methods, and procedures recommended by manufacturer to maintain products installed under this Section.

B. Warranty Documentation: Submit copies of written warranty, as signed by the installer, agreeing to repair or replace defective resilient base and accessories during the warranty period.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: After completion of the work of this Section, furnish 2 percent of each type and color of wall base and edge trim.

1.08 FIELD CONDITIONS

A. Ambient Conditions: During and after installation of flooring, take measures to ensure thorough ventilation of finished areas to prevent irritation to occupants after completion of Project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   3. Roppe Corporation, Fostoria, OH (419)435-8546, (800)537-9527.
B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   a. Floor tile products shall comply with a DCOF (dynamic coefficient of friction) value of 0.42 minimum for level interior floors when wet, as specified in ANSI A137.1, Section 9.6 - DCOF AcuTest.
2. Comply with CBC Section 11B-303 for edge treatment of finish floor materials at change of levels.
3. Adhesive VOC emissions shall not exceed maximum 50 g/L when calculated in accordance with 40 CFR 59, Subpart D (EPA Method 24).

B. Comply with CALGreen 5.504.4.6 - Resilient Flooring Systems:
1. A minimum of 80 percent of the resilient flooring installed in the Project shall be one of the following:
   a. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.
   b. Compliant with VOC emission limits and testing requirements specified in the California Department of Public Health's 1010 Standard Method for the Testing and Evaluation Chambers.
   c. Compliant with the California Collaborative for High Performance Schools (CA-CHPS) Criteria Interpretation for EQ 2.2.
   d. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.
2. Provide documentation that verifies compliance with pollutant emission limits.

C. Waste Management: Comply with CALGreen 5.408.1 - Construction Waste Management. Establish a construction waste management plan for the diverted material.
1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3 - Waste Stream Reduction Alternative.
   a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

D. Comply with CALGreen 5.504.4.1 - Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 - Adhesive VOC Limit and Table 5.504.4.2 - Sealant VOC Limit.
1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2.1 and MR Credit 2.2 Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4.1 and MR Credit 4.2 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.
3. MR Credit 5.1 and MR Credit 5.2 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
2. IEQ Credit 4.3- Low-Emitting Materials--Flooring Systems: Flooring systems shall comply with at least one of the following requirements.
   a. Option 1 (Hard Surface Flooring): Provide hard surface flooring certified as compliant with FloorScore standard by an independent third party.
   b. Option 2 (All Flooring): All flooring systems must meet testing and product requirements of California Department of Health Services’ Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

2.04 MATERIALS

A. Resilient Base: Provide material manufactured in roll stock, not in pieces.
   1. General: Conform to the applicable requirements of ASTM F 1861 for Type TS Thermoset Vulcanized Rubber, Group 1 (solid).
   2. Size:
      a. Thickness: 1/8-inch in thickness.
      b. Height: 4 inches high, or heights indicated on Contract Drawings.
      c. Length: 120 feet continuous coil.
   4. Type B-1 Configurations:
      a. Style A: Provide topset cove type when used in conjunction with resilient tile flooring or other hard surface flooring.
      b. Style B: Provide straight toeless type when used in conjunction with glue down carpet or carpet and pad.
c. Provide ribbed back for positive adhesion.
d. Provide manufacturer's standard preformed inside corners, outside corners, and end stops.

B. Resilient Transition Strips: Design is based on the use of accessory products manufactured by BurkeMercer Flooring Company, or equal, and having the following characteristics:
   1. Carpet Tile to Resilient Flooring Reducer: BurkeMercer № 710 Carpet to Resilient Transition, or equal, bevel edge carpet transition strip, standard color to match base, for use at VCT and LVT.
   2. Carpet Tile to Concrete Reducer: BurkeMercer № 700 Imperial Reducer, or equal, bevel edge carpet termination strip, standard color to match base, for use bare concrete floor.
   3. Resilient Flooring to Concrete Reducer: BurkeMercer № 633, or equal, transition strip, standard colors to match base, for use at VCT and LVT.
   4. Carpet Tile to Solid Surface Threshold: BurkeMercer № 450, or equal.

C. Metal Transition Strips: Locate where required or indicated on Contract Drawings. As manufactured by Schlüter Systems, or equal.

D. Metal Accessories:
   1. Resilient Flooring/Polished Concrete Reducer: 7/16-inch thick at center sloping 1:2 maximum aluminum threshold. Match width of door jamb.
   2. Polished Concrete: 1/4-inch thick zinc divider strips, as indicated in the Contract Drawings.

E. Adhesive: Low VOC product recommended by the resilient base manufacturer.
   1. Typical: W.F. Taylor Envirotec Series low VOC adhesive, or equal, as recommended by manufacturer.
   2. Adhesive VOC emissions shall not exceed maximum 0.60 mg/square meter/hour after 24 hours per EPA DEC Testing method. Confirm adhesive compatibility with resilient flooring manufacturer prior to installation.

F. Colors: Provide resilient base in patterns, styles, and colors indicated on the Contract Drawings, or as selected by Architect.

PART 3 - EXECUTION

3.01 PREPARATION

A. Surface Preparation: Fill minor voids with floor patch compound recommended by manufacturer to level of wall surface.

3.02 INSTALLATION

A. Adhesives: Apply adhesives using resilient base manufacturer's recommended tools and in quantity specified. Ensure ventilation of spaces during installation procedures.
B. Base: Apply resilient base to walls, columns, pilasters, casework, and other vertical surfaces at termination of flooring materials, and as indicated on Contract Drawings.
   1. Install in longest lengths practical, with preformed corners.
   2. On irregular surfaces, fill voids behind base and along top edge with manufacturer’s recommended adhesive filler.
   3. Joints shall be tightly butted with top edge in a straight line.
   4. Maintain top of base at datum elevations as indicated on Contract Drawings.
   5. Align resilient base with adjacent base at transitions to other materials.

C. Trim and Reducer Strips:
   1. Provide at all terminations of resilient flooring not adjacent to vertical surface.
   2. Install tightly to subfloor and at unprotected edges of vinyl flooring with recommended fasteners or adhesives.

D. Metal Transition Strips: Install in accordance with manufacturer’s printed installation instructions and recommendations.

3.03 CLEANING

A. Remove excess adhesive, dirt, and other marks with neutral type cleansers as recommended by resilient base manufacturer.

B. Waste Management: Recycle or salvage waste flooring and packaging materials in accordance with Section 017419.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Vinyl resilient sheet flooring, integral base, edge trim, and accessories.
   1. Refer to Section 096536 for static control vinyl tile.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 033100 - Structural Concrete.
   6. Section 096536 - Static Control Resilient Flooring.

C. Related Sections:
   1. Section 033542 - Concrete Sealing.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. D 2047-11 - Test Method Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
   6. F 710-11 - Practice for Preparing Concrete Floors to Receive Resilient Flooring.
   7. F 1869-16 - Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
B. California Code of Regulations (CCR):
   1. Title 24, Part 1 - California Administrative Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-302 - Floor or Ground Surfaces.
               (1) 11B-302.1 - General.

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Samples: In accordance with the provisions of Section 013300, submit the manufacturer's standard color and finishes palette, for selection.
   1. When selection has been made, submit samples of finish not less than 12 inches by 12 inches in size for final review and acceptance.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2.1 and Credit 2.2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.
2. Product Data for IEQ Credit 4.3: For flooring, documentation indicating compliance with at least one of the following requirements:
   a. Option 1 (Hard Surface Flooring): Manufacturer's certification as compliant with FloorScore standard by an independent third party.
   b. Option 2 (All Flooring): Documentation that flooring systems meets testing and product requirements of California Department of Health Services' *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers*, including 2004 Addenda.

1.06 QUALITY ASSURANCE

A. Certifications: Certify that adhesives used in work of this Project do not contain chemicals with extended curing times that will be irritating to occupants after completion of Project.

1.07 WARRANTY

A. Warranty: Five years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with CBC Section 11B-302 for edge treatment of finish floor materials at change of levels.
   2. Comply with CBC Section 11B-403 requirements for slip resistance.
      a. Resilient floor products shall have a minimum slip resistance of 0.6 coefficient of friction tested in accordance with ASTM C 1028 or ASTM D 2047.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2.1 and MR Credit 2.2 Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
   2. IEQ Credit 4.3 - Low-Emitting Materials--Flooring Systems: Flooring systems shall comply with at least one of the following requirements.
      a. Option 1: Provide hard surface flooring certified as compliant with FloorScore standard by an independent third party.
      b. Option 2 (All Flooring): Flooring systems must meet testing and product requirements of California Department of Health Services' Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

C. Comply with CALGreen 5.404.4.6 Resilient Flooring Systems:
   1. A minimum of 80 percent of the resilient flooring installed in the Project shall comply with one of the following:
      a. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.
      b. Compliant with VOC emission limits and testing requirements specified in the California Department of Public Health's 1010 Standard Method for the Testing and Evaluation Chambers.
      c. Compliant with the California Collaborative for High Performance Schools (CA-CHPS) Criteria Interpretation for EQ 2.2.
      d. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.
   2. Provide documentation that verifies compliance with pollutant emission limits.

D. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.
E. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.

1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Performance characteristics of resilient sheet flooring proposed for use shall have been confirmed by tests in accordance with the following:

1. Surface Burning Characteristics:
   a. Flame Spread: Class A confirmed by testing in accordance with ASTM E 84, expressed in terms of an index number, maximum.
   b. Critical Radiant Flux: Confirmed by testing in accordance with ASTM E 648, in terms of maximum watts per square centimeter.
   c. Smoke Density: Less than 450, confirmed by testing in accordance with ASTM E 662, and expressed in terms of NBS smoke number, maximum.

2.05 SHEET FLOORING

A. Vinyl Sheet Flooring **Type V-1:** Design is based on the use of iQ Optima Solid, homogeneous sheet vinyl and sheet adhesive, manufactured by Johnsonite, Inc., or equal, and having the following characteristics:

1. Thickness: 80 mils.
2. Roll Size: 6-foot wide roll.
3. Recycled Content: 20 percent.
4. Color: As selected by Architect from manufacturer's standard color palette.

2.06 ACCESSORIES

A. Accessory Materials:

1. Adhesive: Low VOC adhesive as recommended by manufacturer. Adhesive VOC emissions shall not exceed maximum 0.60 mg/square meter/hour after 24 hours per EPA DEC Testing method. Confirm adhesive compatibility with resilient flooring manufacturer prior to installation.
2. Seam Sealer: Manufacturer-approved seam sealing adhesive.
5. Reducer Strips: 1/8-inch gage, 1 inch wide, tapered bullnose edge, standard color to match base. No. 92, as manufactured by Flexco.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that slabs on grade to receive floor covering material have been installed over specified moisture barrier, and have been treated with specified concrete sealer.
B. Prior to installation of flooring, verify that moisture content and alkali content of concrete slabs do not exceed limits acceptable to manufacturer of flooring materials.
   1. Refer to Article 3.04 for vapor emission and alkalinity testing.
   2. Do not start installation of finish flooring materials in areas with vapor emission and alkalinity values in excess of manufacturer's requirements until mitigation measures and retesting has resulted in values satisfying manufacturer's requirements.

C. Verify that floors are level to acceptable tolerances. Provision of floor tolerances are specified under Section 033100. If required, postpone installation of resilient floor materials until floors are leveled with floor leveling compound specified in Section 033100.
   1. Minor patching and cleaning of floor substrata shall be performed under this Section.

3.02 PREPARATION

A. Surface Preparation:
   1. At existing buildings, remove existing flooring finishes and residual adhesives from concrete substrate as recommended by resilient sheet flooring manufacturer. Remove paint, varnish, oils, release agents, sealers, and waxes, as recommended by flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.
   2. Where necessary, scour, and sweep floor to remove loose dirt, adhered building materials, and residual curing compounds. Fill minor voids with floor patch compound to level of adjacent areas.
   3. Refer to ASTM F 710, including appendix, for guidelines and remedial measure recommendations in the preparation of concrete floors to receive new flooring.

B. Where excess moisture or alkali is present in concrete, take appropriate action based on results in relation to finish floor manufacturer's moisture and alkalinity requirements before commencing installation.

C. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.03 INSTALLATION

A. Adhesives: Apply with floor covering manufacturer's recommended tools and in quantity as specified for the floor covering.

B. Floor Covering: Prepare and install according to the manufacturer's recommendations, as accepted.
   1. Install rolls in sequential order following roll numbers on the labels.
   2. Run sheets in same direction, in accordance with direction indicators.
      Stagger end seams.
      a. Reverse sheets unless instructed otherwise in manufacturer's installation instructions.
   3. Roll flooring in both directions using a 100 pound three-section roller.
4. Seal with heat welded seams with matching color heat welding threads. Match patterns at seams, if applicable.

C. Integral Base: Install sheet vinyl integral flash coved base at toilet rooms, janitor, and other areas indicated on the Contract Drawings.
   1. Provide cove strip to support vinyl sheet material at cove.
   2. Fit flooring material into aluminum cap molding at top of base.

D. Allow adhesives to set one day according to manufacturer’s recommendations before traffic is allowed on floor.

3.04 FIELD QUALITY CONTROL

A. Vapor Emission and Alkalinity Testing: Prior to installation of flooring, verify that moisture content and alkali content of concrete slabs do not exceed limits acceptable to manufacturer of flooring materials. Provide calcium chloride and pH testing kits as follows:
   1. Moisture Vapor Emission: Prepackaged test kit of commercial consistency, equipped with a sealed dish of anhydrous calcium chloride, a metering dome with butyl rubber gasket and instructions for implementation. Weigh dishes on site prior to installation. Conform with requirements of ASTM F 1869.
      a. Test methods based on ASTM F 2170 using RH meters equal to AMT Moisture/Relative Humidity Meter manufactured by American Moisture Test may be used at testing agency's option except at concrete floors with exposed or polished finish.
   2. Alkalinity: Concrete pH test using calibrated digital 1-14 wide range pH meter equal to ExStik PH100 pH Meter manufactured by Extech Instruments Corporation to determine alkalinity level in accordance with ASTM F 710. Paper and pencil type tests are not acceptable.
   3. Provide testing kits equal to one of the following:
      a. American Moisture Test, Inc.

3.05 CLEANING

A. Remove excess adhesive, dirt, or other marks with neutral type cleaners as recommended by flooring manufacturer.
   1. After completion of Project, thoroughly clean floors.

B. Waste Management: Recycle or salvage waste flooring and packaging materials in accordance with Section 017419.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Conductive resilient vinyl tile flooring.
   1. Refer to Section 096524 for standard vinyl flooring.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 033100 - Structural Concrete.
   6. Section 096524 - Vinyl Flooring.

C. Coordinate with construction waste management requirements specified in Section 017419.

D. Comply with applicable procedural requirements of Section 018113.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. D 2047-11 - Test Method Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
   8. F 710-11 - Practice for Preparing Concrete Floors to Receive Resilient Flooring.

B. Federal Specifications (FS):
   1. FS SS-T-312B and Interim Amendment - 1 (YD).
C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Samples: In accordance with the provisions of Section 013300, submit the manufacturer's standard color and finishes palette, for selection.
   1. When selection has been made, submit samples of finish not less than 12 inches by 12 inches in size for final review and acceptance.

C. Quality Control Submittals:
   1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.

1.04 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: Submit list of products, methods, and procedures recommended by manufacturer to maintain products installed under this Section.

B. Warranty: Submit copies of written warranty, as signed by the installer, agreeing to repair or replace defective resilient tile work during the warranty period.
1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: After completion of the work of this Section, furnish one unopened carton for each type and color of flooring.

1.07 QUALITY ASSURANCE

A. Certifications: Certify that adhesives used in work of this Project do not contain chemicals with extended curing times that will be irritating to occupants after completion of Project.

1.08 FIELD CONDITIONS

A. Ambient Conditions: Maintain temperature and humidity conditions as recommended by manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Conform to applicable code requirements for flame and smoke ratings applicable to the work.
   2. Comply with ADA Guidelines for slip resistance.
      a. Resilient floor products shall have a minimum slip resistance of 0.6 coefficient of friction tested in accordance with ASTM C 1028 and ASTM D 2047.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 2.1 and MR Credit 2.2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
   2. MR Credit 4: Use materials with recycled content that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
      a. Provide primary materials containing at least 10 percent by weight of post-consumer and pre-consumer recycled content.
3. MR Credit 5: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. EQ Credit 3.1 and EQ Credit 3.2: During and after installation of flooring, take measures to ensure thorough ventilation of finished areas to prevent irritation to occupants after completion of Project.
2. EQ Credit 4.1: All interior adhesives and sealants shall comply with the requirements of the following reference standards:

2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Performance characteristics of resilient flooring proposed for use shall have been confirmed by tests in accordance with the following:
1. Surface Burning Characteristics:
   a. Flame Spread: Confirmed by testing in accordance with ASTM E 84, expressed in terms of an Flame Spread Index (FSI) number, maximum.
   b. Smoke Density: Confirmed by testing in accordance with ASTM E 662, and expressed in terms of NBS Smoke number, maximum.
   c. Critical Radiant Flux: Confirmed by testing in accordance with ASTM E 648, in terms of maximum watts per square centimeter.

B. Electrical Properties of Static Dissipative Tile:
1. Installed as a system using the required adhesive, grounding strips, and polish, SDT tile shall yield the following electrical properties:
   a. Electrical Resistance: ESD-S7.1 and ASTM F 150. Average point to ground electrical resistance between 1.0 x 10^6 to 1.0 x 10^8 ohms.
   b. Point to point and point to ground: 106 to 109 ohms.
   c. Static Generation: ESD STM 97.2 (flooring in combination with footwear and a person) at 40% R.H. with ESD shoes: <10 volts at 12% R.H. with ESD shoes: <100 volts.
   d. Static Decay: Flooring in combination with footwear (ESD shoes) and a person (5000 volts to zero) shall be 0.5 seconds average.
   e. Federal Test 101C, Method 4046 (5000 volts to zero): <0.5 seconds.

2.05 MATERIALS

A. Vinyl Sheet Flooring Type V-2: Design is based on the use of IQ Granit Static Dissipative Sheet Vinyl, homogeneous and sheet adhesive, manufactured by Johnsonite, Inc., or equal, and having the following characteristics:
1. Description: Comply with the following standards:
   a. ASTM D 2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring of 0.6 or greater.
b. ASTM E 648 - Standard Test method for Critical Radiant Flux of 0.45 watts/cm² or greater, Class I.

c. ASTM F 970 - Standard Test Method for Static Load Limit - 250 PSI.


2. Roll Sheet Width: 6'-6".

3. Gage: 0.080-inch wear layer and overall thickness.


B. Static Dissipative Tile: Design is based on SDT having the following characteristics:

1. Provide tile conforming to the applicable requirements of UL 779, NFPA 99, ESD S7.1, and ASTM F 150, and ASTM F 1700.

2. Electrical Resistance: Average point to ground electrical resistance between 1.0 x 10⁶ to 1.0 x 10⁸ ohms.


4. Sealer: Tile polish for static dissipative tile shall be as recommended by manufacturer.

5. Edge Treatment: Where edges are heat welded, pre-groove edges of tile for unitized installation.

6. Heat Weld Rods: As recommended by manufacturer in color to match tile color.

C. Colors: Provide flooring in patterns, styles, and colors indicated on the Contract Drawings, or as selected by the Architect.

D. Floor Preparation Accessories:

1. Concrete Crack Filler: Mapei solvent-free epoxy Planicrete EP, or equal.

2. Spot Patching Compound: Mapei Plani/Patch fast-setting cement-based polymer-modified patching compound, or equal.

3. Self-Leveling Underlayment:


E. Adhesive:

1. Static Dissipative Tile Adhesive: Low VOC epoxy adhesive as recommended by manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that slabs on grade to receive floor covering material have been installed over specified moisture barrier, and have been treated with specified concrete sealer.
B. Verify that floors are level to acceptable tolerances. Provision of floor tolerances are specified under Section 033100. If required, postpone installation of resilient floor materials until floors are leveled with floor leveling compound specified in Section 033100.
   1. Minor patching and cleaning of floor substrata shall be performed under this Section.

C. Prior to installation of flooring, verify that moisture content and alkalinity of concrete slabs do not exceed limits acceptable to manufacturer of flooring materials.
   1. Refer to Article 3.05 for vapor emission and alkalinity testing.
   2. Do not start installation of finish flooring materials in areas with vapor emission and alkalinity values in excess of manufacturer's requirements until mitigation measures and retesting has resulted in values satisfying manufacturer's requirements.

3.02 PREPARATION

A. Surface Preparation:
   1. Where necessary, scour, and sweep floor to remove loose dirt, adhered building materials, and residual curing compounds. Fill minor voids with floor patch compound to level of adjacent areas.
   2. Refer to ASTM F 710, including appendix, for guidelines and remedial measure recommendations in the preparation of concrete floors to receive new flooring.

B. Where excess moisture or alkali is present in concrete, take appropriate action based on results in relation to finish floor manufacturer's moisture and alkalinity requirements before commencing installation.

C. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.03 GROUNDING

A. Lay copper grounding strips in adhesive before installing static dissipative tile.

B. Connect copper grounding strip provided by manufacturer to one of the following:
   1. A stranded ground wire. Cut off excess and recess into the wall.
   2. A column or beam by drilling and taping the column and affixing the grounding strip to the column in accordance with manufacturer's instructions.

C. Lay the balance of the grounding strip into the adhesive covering it with additional adhesive. Install the flooring over the grounding strip.

3.04 INSTALLATION OF RESILIENT TILE

A. Adhesives:
   1. Apply adhesives using resilient covering manufacturer's recommended tools and in quantity specified.
   2. Allow to set one day, or according to manufacturer's recommendations, before traffic is allowed on floor.
B. Floor Covering: Install in accordance with the manufacturer’s recommendations.
   1. Lay tile flooring from center marks established with principal walls. Adjust as required to avoid use of cut units less than one-half tile at perimeters. Match tiles for color and pattern by using tile in same sequence as manufactured and packaged unless otherwise noted on Contract Drawings.
   2. Lay tile with joints aligned and with grain of all tiles in the same direction within space.
   3. Roll installed tiles with 100-pound three-section roller at time intervals recommended by manufacturer based on adhesive used.
   4. Allow installed tiles to set one day, or according to manufacturer’s recommendations, before traffic is allowed on floor.

3.05 FIELD QUALITY CONTROL

A. Vapor Emission and Alkalinity Testing: Prior to installation of flooring, verify that moisture content and alkali content of concrete slabs do not exceed limits acceptable to manufacturer of flooring materials. Provide calcium chloride and pH testing kits as follows:
   1. Moisture Vapor Emission: Prepackaged test kit of commercial consistency, equipped with a sealed dish of anhydrous calcium chloride, a metering dome with butyl rubber gasket and instructions for implementation. Weigh dishes on site prior to installation. Conform with requirements of ASTM F 1869.
      a. Test methods based on ASTM F 2170 using RH meters equal to AMT Moisture/Relative Humidity Meter manufactured by American Moisture Test may be used at testing agency's option except at concrete floors with exposed or polished finish.
   2. Alkalinity: Concrete pH test using calibrated digital 1-14 wide range pH meter equal to ExStik PH100 pH Meter manufactured by Extech Instruments Corporation to determine alkalinity level in accordance with ASTM F 710. Paper and pencil type tests are not acceptable.
   3. Provide testing kits equal to one of the following:
      a. American Moisture Test, Inc.

3.06 CLEANING

A. Prevent heavy traffic for at least 48 hours after installation.
B. Begin initial cleaning only after adhesive has been allowed to dry fully.
   1. Remove excess adhesive, dirt, and other marks with neutral type cleaners as recommended by flooring manufacturer.
   2. Apply three to four coats of slip-resistant wax sealer. After 24 hours, mop floor and buff to a sheen using a soft round pad on a high speed floor machine to burnish floor surface as recommended by the manufacturer. Damp mop to a dust free finish.
C. Protect resilient tile flooring from soil and damage resulting from construction operations. Remove protection prior to occupancy.

D. Waste Management: Recycle or salvage waste flooring and packaging materials in accordance with Section 017419.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Prefabricated rubber athletic flooring system.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 033100 - Structural Concrete: Coordination for application of sealer.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. D 2047-04 - Test Method Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-302 - Floor or Ground Surfaces.
            b) Section 11B-303 - Changes in Level.
         2) Division 4 - Accessible Routes.
            a) Section 11B-403 - Walking Surfaces.
C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive technical literature and specifications.

B. Samples: In accordance with the provisions of Section 013300, submit the manufacturer's standard palette for the selection of colors.
   1. Submit 12-inch square sample of sheet goods.

C. Quality Control Submittals:
   1. Test Reports: Submit results of moisture tests on concrete slabs and comparison with manufacturer's criteria.
   2. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety, and environmental cautions, and application rates.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.
2. Product Data for IEQ Credit 4.3: For flooring, documentation indicating compliance with at least one of the following requirements:
   a. Option 1 (Hard Surface Flooring): Manufacturer's certification as compliant with FloorScore standard by an independent third party.
   b. Option 2 (All Flooring): Documentation that flooring systems meets testing and product requirements of California Department of Health Services' Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.06 QUALITY ASSURANCE

   A. Installer Qualifications: Installer shall have not less than 3 years of experience successfully completing similar scale projects, and be recognized and approved by the manufacturer of the products specified.

1.07 DELIVERY, STORAGE, AND HANDLING

   A. Recommended environmental conditions for storage is a minimum of 55 degrees F.

1.08 PROJECT CONDITIONS

   A. Environmental Requirements:
      1. Sealer: Verify that temperature of concrete slab surface is above 55 degrees F and rising, and that relative humidity is under 50 percent.
      2. Flooring: Maintain a temperature of at least 65 degrees F in the surrounding area and on the surface receiving the floor covering for 48 hours prior to beginning work, during installation and for 48 hours after installation is complete.

   B. Do not install flooring until concrete substrate has cured for a minimum of 30 days.

1.09 SEQUENCING AND SCHEDULING

   A. Schedule work at a time when other trades have completed work in the area, including ceiling, electrical and finishing work.

1.10 WARRANTY

   A. Special Warranty: Provide manufacturer's standard 3-year guaranty.

1.11 MAINTENANCE

   A. Extra Materials:
      1. Provide material from same dye lot equal to 2 percent of installed area from each color lot for Owner's maintenance stock. Deliver to Owner upon completion of work.
      2. Provide sufficient quantity of floor cleaner and floor finish to Owner with one additional cleaning and polishing operation.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Materials shall be the product of one manufacturer and shall be either the ones upon which the design is based or the products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Comply with ADA Guidelines for slip resistance.
      a. Resilient floor products shall have a minimum slip resistance of 0.6 coefficient of friction tested in accordance with ASTM C 1028 or ASTM D 2047.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
   2. IEQ Credit 4.3- Low-Emitting Materials--Flooring Systems: Flooring systems shall comply with at least one of the following requirements.
      a. Option 1 (Hard Surface Flooring): Provide hard surface flooring certified as compliant with FloorScore standard by an independent third party.
b. Option 2 (All Flooring): All flooring systems must meet testing and product requirements of California Department of Health Services' Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Performance characteristics of resilient sheet flooring proposed for use shall have been confirmed by tests in accordance with the following:
   1. Surface Burning Characteristics:
      a. Flame Spread: Confirmed by testing in accordance with ASTM E 84, expressed in terms of an index number, maximum.
      b. Critical Radiant Flux: Confirmed by testing in accordance with ASTM E 648, in terms of maximum watts per square centimeter.
      c. Smoke Density: Confirmed by testing in accordance with ASTM E 662, and expressed in terms of NBS smoke number, maximum.

2.05 SHEET MATERIALS

A. Rubber Sports Floor **Type SP-1** and **SP-2:** Mondo Sport Impact prefabricated two-layer athletic rubber flooring, calendered and vulcanized with a base of natural and synthetic rubber, stabilizing agents and pigmentations, manufactured by Mondo America, or equal.

B. Sheet Materials:
   1. Manufactured in two layers, vulcanised together. The shore hardness of the top layer will be greater than that of the bottom layer.
   2. Thickness: 10mm (3/8-inch).
   4. Hardness: Shore A hardness 80/77 in accordance with ASTM D 2240.
   6. Coefficient of Friction: Greater than 0.6, as required by Code.
   7. Pattern/Finish: Sealskin texture with random colored flecks dispersed throughout material.

2.06 ACCESSORIES

A. Patching Compound: As recommended by manufacturer of flooring.

B. Sealer: Sealflex Primer, or equal.

C. Adhesive: Manufacturer’s recommended two-part polyurethane adhesive for sports surfaces to applicable surfaces.

D. Line Marking Paint: As supplied by athletic flooring system manufacturer.

E. Reducer Strip: As recommended by manufacturer.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that slabs on grade to receive floor covering material have been installed over specified moisture barrier, and have been treated with specified concrete sealer.

B. Verify that floors are level to acceptable tolerances. Provision of floor tolerances are specified under Section 033100. If required, postpone installation of resilient floor materials until floors are leveled with floor leveling compound specified in Section 033100.
   1. Minor patching and cleaning of floor substrata shall be performed under this Section.

C. Prior to installation of flooring, verify that moisture content and alkali content of concrete slabs do not exceed limits acceptable to manufacturer of flooring materials.
   1. Refer to Article 3.04 for vapor emission and alkalinity testing.
   2. Do not start installation of finish flooring materials in areas with vapor emission and alkalinity values in excess of manufacturer's requirements until mitigation measures and retesting has resulted in values satisfying manufacturer's requirements.
   3. Refer to Section 033542 for remedial procedures if necessary.

D. Unroll and examine sheets for defects.

3.02 PREPARATION

A. Surface Preparation:
   1. At existing buildings, remove existing flooring finishes and residual adhesives from concrete substrate as recommended by resilient sheet flooring manufacturer. Remove paint, varnish, oils, release agents, sealers, and waxes, as recommended by flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer's recommendations for flooring. Avoid organic solvents.
   2. Where necessary, scour, and sweep floor to remove loose dirt, adhered building materials, and residual curing compounds. Fill minor voids with floor patch compound to level of adjacent areas.
   3. Refer to ASTM F 710, including appendix, for guidelines and vapor emission and alkalinity remedial measure recommendations in the preparation of concrete floors to receive new flooring.

B. Where excess moisture or alkali is present in concrete, take appropriate action based on results in relation to finish floor manufacturer's moisture and alkalinity requirements before commencing installation.

C. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

D. Install divider strips as indicated in Contract Documents.
3.03 INSTALLATION

A. Layout: Lay out resilient athletic flooring from center marks established with principal walls. Align seams with court layout, adjusting as required to avoid use of cut units less than one-half width at perimeter. If indicated, comply with layout and patterns indicated on Contract Drawings.

B. Adhesive:
1. Mix adhesive in accordance with manufacturer’s instructions.
2. Apply adhesive with a notched trowel in amounts recommended by manufacturer.

C. Flooring: Install work in accordance with the manufacturer’s printed instructions as accepted by the Architect.
1. Cut and adjust flooring sheets prior to adhesion.
2. Lay flooring with tight joints. Stagger end seams approximately 6 feet.
3. Scribe edges to form neat joint at vertical surfaces.
4. Immediately roll with 75-pound sectional roller.
5. Hold all seams in place with suitable weights for a minimum of 12 hours.
6. Clean excessive adhesive from tile while still wet with cloth dampened with denatured alcohol.
7. Apply lines as recommended by manufacturer.

D. Edge Strips: Apply reducer strips at exposed edges where abutting other flooring thicknesses.

3.04 FIELD QUALITY CONTROL

A. Vapor Emission and Alkalinity Testing: Prior to installation of flooring, verify that moisture content and alkali content of concrete slabs do not exceed limits acceptable to manufacturer of flooring materials. Provide calcium chloride and pH testing kits as follows:
1. Moisture Vapor Emission: Prepackaged test kit of commercial consistency, equipped with a sealed dish of anhydrous calcium chloride, a metering dome with butyl rubber gasket and instructions for implementation. Weigh dishes on site prior to installation. Conform with requirements of ASTM F 1869.
   a. Test methods based on ASTM F 2170 using RH meters equal to AMT Moisture/Relative Humidity Meter manufactured by American Moisture Test may be used at testing agency’s option except at concrete floors with exposed or polished finish.
2. Alkalinity: Concrete pH test using calibrated digital 1-14 wide range pH meter equal to ExStik PH100 pH Meter manufactured by Extech Instruments Corporation to determine alkalinity level in accordance with ASTM F 710. Paper and pencil type tests are not acceptable.
3. Provide testing kits equal to one of the following:
   a. American Moisture Test, Inc.
3.05 PROTECTION

A. Traffic shall be prohibited for a period of 12 hours after installation, then limited traffic for an additional 12 hours.

B. Prior to acceptance of Project by Owner, clean floor with recommended cleaner.

END OF SECTION
- SECTION 096723 -

RESINOUS FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Resinous flooring system as shown on the Contract Drawings and in schedules.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 033100 - Structural Concrete.

1.02 REFERENCES

A. ASTM International (ASTM):
   4. D 635-10 - Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.
   11. F 1869-16 - Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
B. California Code of Regulations (CCR):
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-302 - Floor or Ground Surfaces.
               (1) 11B-302.1 - General.
            b) Section 11B-303 - Changes in Level.
         2) Division 4 - Accessible Routes.
            a) Section 11B-403 - Walking Surfaces.

C. California Code of Regulations (CCR):

D. American National Standards Institute (ANSI):
   1. A137.1-2012 - Ceramic Tile.

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordination: Coordinate the installation of the work of this Section after installation of adjacent epoxy wall coatings specified in Section 099656.

D. Preinstallation Conference:
   1. General contractor shall arrange a meeting not less than 30 days prior to starting work.
   2. Attendance: Contractor, Architect, Owner, and representatives of the manufacturer and installer.
   3. Review and clarify this specification, application procedure, quality control, inspection, and acceptance criteria and production schedule.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit manufacturer's technical data, installation instructions, and general recommendations for resinous flooring material.
   1. Include certification indicating compliance of materials with requirements, descriptive literature, and specifications.

C. Samples: Submit for verification purposes, 6-inch square samples of resinous flooring, applied to a rigid backing, in color and finish coating selected by Architect.
   1. For initial selection of colors and finishes, submit manufacturer's color charts showing full range of colors and finishes available.
D. Substrate Condition Field Report: Furnish report from installer confirming that surfaces, alignments, and tolerances to which materials of this Section will be applied are in a suitable and acceptable condition to receive finish materials specified in this Section.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.
2. Product Data for IEQ Credit 4.3: For flooring, documentation indicating compliance with at least one of the following requirements:
   a. Option 1 (Hard Surface Flooring): Manufacturer’s certification as compliant with FloorScore standard by an independent third party.
   b. Option 2 (All Flooring): Documentation that flooring systems meets testing and product requirements of California Department of Health Services’ Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

1.06 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer: Obtain primary resinous flooring materials including primers, resins, hardening agents, finish or sealing coats from a single manufacturer with not less than 10 years of successful experience in manufacturing and installing principal materials described in this section.
2. Applicator shall have been approved by the flooring system manufacturer in preparation and application, and shall have completed at least five projects of similar size and complexity. Provide secondary
materials only of type and from source recommended by manufacturer of primary materials.

B. Manufacturer of approved system shall be single source and made in the USA.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Packing: Materials shall be factory pre-weighed and pre-packaged in single batch containers to eliminate on site mixing errors. No on site weighing or volumetric measurements will be allowed.

B. Shipping: Material shall be delivered to job site clearly identified with the product type and batch number, and checked by flooring contractor for completeness and shipping damage prior to job start.

C. Storage: Material shall be stored in a dry, enclosed area protected from exposure to moisture. Temperature of storage area shall be maintained between 60°F and 85°F.

D. Waste Disposal:
   1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.08 FIELD CONDITIONS

A. Ambient Conditions:
   1. Air, material, and substrate temperatures shall be between 55°F and 85°F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
   2. Relative humidity in the specific location of the application shall be less than 85% and the surface temperature shall be at least 5°F above the dew point.
   3. Applicator shall ensure that adequate ventilation is available for the work area. This shall include the use of manufacturer’s approved fans, smooth bore tubing and closure of the work area.
   4. Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system. Provide adequate ventilation in work area.

B. Avoid moisture of any kind in floor area during installation and curing.

C. Job area shall be free of other trades during and, for a period of 24 hours, after floor installation.

D. Exercise caution with caustic materials.

E. Conditions of new concrete to be coated with cementitious urethane material.
   1. Concrete shall be moisture cured for a minimum of 3 days and have fully cured a minimum of 5 days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
   2. Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
   3. Sealers and curing agents shall not to be used.
4. Concrete shall have minimum design strength of 3,500 psi and a maximum water/cement ratio of 0.45.
5. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

F. Safety Requirements:
1. Open flames and spark-producing equipment shall be removed from the work area prior to commencement of application.
2. NO SMOKING signs shall be posted at the entrances to the work area.
3. Contractor shall be responsible for the removal of foodstuffs from the work area.
4. Non-related personnel in the work area shall be kept to a minimum.

1.09 WARRANTY
A. Manufacturer warrants that material shipped to buyers at the time of shipment is substantially free from material defects and will perform substantially to Dur-A-Flex, Inc. published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.

B. Comply with the warranty provisions of the General Conditions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
A. Acceptable Manufacturers:

B. Acceptable Manufacturers of Accessory Products:

C. Like materials shall be products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS
A. Regulations:
   1. Slip Resistance: Comply with CBC Section 11B-302 and CBC Section 403 ADA Guidelines.
      a. Floor tile products shall comply with a DCOF (dynamic coefficient of friction) value of 0.42 minimum for level interior floors when wet, as specified in ANSI A137.1, Section 9.6 - DCOF AcuTest.

B. Comply with requirements of United States Department of Agriculture (USDA), Food, Drug Administration (FDA), and local Health Department.
   1. Comply with local health department requirements regarding sanitary surfaces under food service equipment.
C. Comply with CALGreen 5.504.4.3 - Paints and Coatings:
   1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3 - VOC Content for Architectural Coatings.
   2. Aerosol paints and coatings shall comply with CALGreen 5.504.4.3.1 - Aerosol Paints and Coatings.

D. Comply with CALGreen 5.504.4.6 - Resilient Flooring Systems:
   1. A minimum of 80 percent of the resilient flooring installed in the Project shall at least one of the following:
      a. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.
      b. Compliant with VOC emission limits and testing requirements specified in the California Department of Public Health's 1010 Standard Method for the Testing and Evaluation Chambers.
   2. Provide documentation that verifies compliance with pollutant emission limits.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 5075 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 1020 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 1020 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
   2. IEQ Credit 4.3 - Low-Emitting Materials--Flooring Systems: Flooring systems shall comply with at least one of the following requirements.
      a. Option 1 (Hard Surface Flooring): Provide hard surface flooring certified as compliant with FloorScore standard by an independent third party.
      b. Option 2 (All Flooring): All flooring systems must meet testing and product requirements of California Department of Health Services’ Standard Practice for the Testing of Volatile Organic
2.04 PERFORMANCE REQUIREMENTS

A. Topping: Poly-Crete SL:
   1. Percent Reactive: 100 %
   2. VOC: 0 g/L
   3. Bond Strength to Concrete, ASTM D 4541: 400 psi, substrates fails
   4. Compressive Strength, ASTM C 579: 9,000 psi
   5. Tensile Strength, ASTM D 638: 2,175 psi
   6. Flexural Strength, ASTM D 790: 5,076 psi
   7. Impact Resistance @ 125 mils, MIL D-3134: 160-inch lbs
      No visible damage or deterioration

B. Broadcast Coat: Dur-A-Glaze #4 Resin:
   1. Percent Reactive: 100 %
   2. VOC: <4 g/L
   3. Water Absorption, ASTM D 570: 0.04%
   4. Tensile Strength, ASTM D 638: 4000 psi
   5. Coefficient of thermal expansion, ASTM D 696: 2x10-5 in/in/F
   6. Flammability, ASTM D 635: Self-Extinguishing
   7. Flame Spread/NFPA 101, ASTM E 84: Class A

C. Topcoat: Armor Top:
   1. VOC: 0 g/L
   2. 60 Degree Gloss, ASTM D-523: 75+/-5
   3. Mixed Viscosity, (Brookfield 25oC): 500 cps
   4. Tensile strength, ASTM D 638: 7,000 psi
   5. Abrasion Resistance, ASTM D 4060: Gloss Satin
      CS 17 wheel (1,000 g load) 1,000 cycles
      4 to 8 mg loss
      with grit
      10 to 12 mg loss
      without grit
   6. Pot life @ 70o F 50% RH: 2 hours
   7. Full Chemical resistance: 7 days

2.05 SYSTEM DESCRIPTION

A. Work shall consist of preparation of the substrate, furnishing and applying cementitious urethane based self-leveling seamless flooring system with decorative quartz aggregate broadcast, epoxy broadcast, and topcoats.

B. The system shall have the color and texture as selected by the Architect with a nominal thickness of 1/4-inch. It shall be applied to the prepared areas as indicated on Contract Drawings and in accordance with the manufacturer's recommendations.

C. Cove base shall be applied where indicated on Contract Drawings and in accordance with manufacturers standard details.
2.06 FLOORING

A. Dur-A-Flex, Inc, Hybri-Flex EQ self-leveling, broadcast quartz, epoxy/aliphatic urethane topcoat seamless flooring system.
   1. System Materials:
      b. Broadcast aggregate shall be Dur-A-Flex Q28 or Q11 quartz aggregate.
   2. Patch Materials
      b. Deep Fill and Sloping Material (over 1/4-inch): Use Dur-A-Flex Poly-Crete WR.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.
   1. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.02 PREPARATION

A. General:
   1. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
   2. Moisture Testing: Perform tests recommended by manufacturer and as follows.
      a. Perform anhydrous calcium chloride test ASTM F 1869. Application will proceed only when the vapor/moisture emission rates from the slab is less than and not higher than 20 lbs/1,000 sf/24 hrs.
      b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 99% relative humidity level measurement.
      c. If the vapor drive exceeds 99% relative humidity or 20 lbs/1,000 sf/24 hrs then the Owner and/or Engineer shall be notified and advised of additional cost for the possible installation of a vapor mitigation system that has been approved by the manufacturer or other means to lower the value to the acceptable limit.
3. Mechanical surface preparation
   a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 4-5 as described by the International Concrete Repair Institute.
   b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
   c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4-inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
   d. Cracks and non-moving joints greater than 1/8-inch wide shall be chiseled or chipped-out and repaired per manufacturer's recommendations.

4. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.

3.03 APPLICATION

A. General
   1. The system shall be applied in five distinct steps as listed below:
      a. Substrate preparation
      b. Topping/overlay application with quartz aggregate broadcast.
      c. Resin application with quartz aggregate broadcast.
      d. Topcoat application
      e. Second topcoat application.
   2. Immediately prior to the application of components, surface shall be dry and remaining dust or loose particles removed using a vacuum or clean, dry, oil-free compressed air.
   3. Handling, mixing, and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the manufacturer's recommendations.
   4. System shall follow the contour of the substrate unless leveling work has been specified by the Architect.
   5. Provide neat finish with well-defined boundaries and straight edges.

B. Topping
   1. Apply topping as a self-leveling system in one lift with a nominal thickness of 1/8-inch as specified by the Architect.
   2. Topping shall be comprised of three components, a resin, hardener, and filler as supplied by the manufacturer.
3. Add hardener to resin and thoroughly disperse by suitably approved mechanical means. Add SL aggregate to catalyzed mixture and mixed in a manner to achieve a homogenous blend.

4. Apply topping over horizontal surfaces using 1/2-inch V-notched squeegee, trowels or other system approved by the manufacturer.

5. Immediately upon placing, degas topping with a loop roller.

6. Broadcast quartz aggregate to excess into the wet material at the rate of 0.8 lbs/sf.

7. Allow material to fully cure. Vacuum, sweep, and/or blow to remove loose aggregate.

C. Broadcast:
   1. Broadcast coat resin at the rate of 90 sf/gal (Q28), or 50 sf/gal (Q11).
   2. Broadcast coat shall be comprised of liquid components, combined at a ratio of 2 parts resin to 1 part hardener by volume, and shall be thoroughly blended by mechanical means such as a high-speed paddle mixer.
   3. Broadcast quartz aggregate into wet resin at the rate of 0.5 lbs/sf.
   4. Allow material to fully cure. Vacuum, sweep and/or blow to remove loose aggregate.

D. Grout Coat:
   1. Apply grout coat with a coverage at rate of 90 sf/gal (Q28) or 50 sf/gal (Q11).
   2. Grout coat shall be comprised of liquid components, combined at a ratio of 2 parts resin to 1 part hardener by volume, and shall be thoroughly blended by mechanical means such as a high-speed paddle mixer.
   3. Backroll grout coat and crossrolled to provide a uniform texture and finish.

E. Topcoat
   1. Topcoat shall be roller applied with a coverage rate of 500 sf/gal.
   2. Finished floor shall have a nominal thickness of 1/4-inch.

### 3.04 FIELD QUALITY CONTROL

A. Tests, Inspection:
   1. The following tests shall be conducted by the Applicator:
      a. Temperature.
   2. Air, substrate temperatures, and dew point.
      a. Coverage Rates.
   3. Rates for all layers shall be monitored by checking quantity of material used against the area covered.

### 3.05 CLEANING

A. Cure flooring material in compliance with manufacturer’s directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.
B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other Sections.

END OF SECTION
- SECTION 096813 -

TI LE CARPETING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Modular carpet tiles and accessories.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 017823 - Operation and Maintenance Data.
   5. Section 017836 - Warranties.
   7. Section 033100 - Structural Concrete.
   8. Section 096513 - Resilient Base and Accessories: Wall base contiguous to floor finish.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
         1) Section 804 - Interior Floor Finish:
            a) 804.2 - Classification.
            b) 804.3 - Testing and Identification.
            c) 804.4 - Interior Floor Finish Requirements.
               (1) 804.4.2 - Minimum Critical Radiant Flux.
      b. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-302 - Floor or Ground Surfaces:
               (1) 11B-302.2 - Carpet
            b) Section 11B-303 - Changes in Level:
               (1) 11B-303.2 - Vertical
               (2) 11B-303.3 - Beveled

C. The Carpet and Rug Institute (CRI):
D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Scheduling: Order carpeting materials sufficiently in advance of scheduled installation so as not to delay progress of the work.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.
   1. Submit data related to environmental protection.

C. Shop Drawings: Submit layout drawings showing starting points for module, edging strips where applicable, and direction of pattern.

D. Samples: Submit full size samples of each type and color indicated on Contract Drawings.

E. Quality Control Submittals:
   1. Certificates: Submit certificate stating that the register numbers identify goods manufactured in accordance with this Section.
   2. Maintenance Data: Provide manufacturer’s maintenance instructions in accordance with Section 017823.
   3. Warranty: Provide standard product warranty in accordance with Section 017836.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Adhesives used to install carpet to substrates shall comply with the requirements of SCAQMD Rule 1168.
   2. IEQ Credit 4.3- Low-Emitting Materials--Flooring Systems: Flooring systems shall comply with at least one of the following requirements.
      a. Option 1 (Carpet): Carpet and pad used on the interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program.
      b. Option 2 (All Flooring): All flooring systems must meet testing and product requirements of California Department of Health Services' *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers*, including 2004 Addenda.

C. Environmental Protection: Provide products that minimize adverse affects to the environment as follows:
   1. No detectable levels of formaldehyde.
   2. No detectable levels of 4-PC (4-phenylcyclohexene).
   3. Products shall be decreasing emitters of volatile organic chemicals (VOC's).
   4. Products shall pass the University of Pittsburgh protocol for toxicity being "no more toxic than wood" when burned under the same conditions.
   5. Particle emissions shall be below 0.05 mg/m³ (based on State of Washington testing) at time of installation.
   6. Products shall be barriers to radon flow.

1.06 CLOSEOUT SUBMITTALS

A. Certificates: Submit certificate stating that the register numbers identify goods manufactured in accordance with this Section.

B. Maintenance Data: Provide manufacturer's maintenance instructions in accordance with Section 017823.

C. Warranty: Provide standard product warranty in accordance with Section 017836.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Provide additional tiles equal to 5 percent of quantity of each type and color installed.

1.08 QUALITY ASSURANCE

A. Certifications: Certify that adhesives used in work of this Project do not contain chemicals with extended curing times that will be irritating to occupants after completion of Project.

B. Sustainability Standards Certifications: Certify that carpet meets testing and product requirements of Carpet and Rug Institute Green Label program.
C. Mockups: Install typical pattern at location determined by Architect to establish quality of installation. If acceptable to Architect, mockup may be left in place as part of the work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver carpet tiles and accessories to the job site in the manufacturer's original wrapping. Register number tags or stencils shall be intact on each container.

1.10 FIELD CONDITIONS

A. Environmental Requirements: Floors shall have cured not less than 60 days, and shall be clean and dry. Floor temperature shall be maintained above 50 degrees F for 24 hours before, and 24 hours after, installation.

1.11 WARRANTY

A. Provide manufacturer's defective materials warranty, agreeing to repair or replace defective materials for a period of 15 years due to any of the following conditions:
   1. Texture retention.
   2. Excessive surface wear (more than 15 percent loss of pile fiber weight).
   3. Excessive static (more than 3.0 kilovolts at a relatively humidity of 20 percent and a room temperature of 70 degrees F).
   4. Edge ravel.
   5. Run resistance (zippering) strength.
   7. Loss of resiliency (more than 10 percent of backing resiliency).
   8. Watermarking (apparent color difference between areas due to pile reversal).
   9. Conformance to characteristics specified.

B. Provide standard product warranty covering static discharge, wear, lightfastness, and any other product attributes not necessarily covered under defective materials warranty

C. Installer shall guaranty workmanship for a period of 2 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   2. Milliken Carpet, Santa Monica, CA (760)420-6919.
   4. Shaw Contract Group, Dalton, GA (706)278-3812, (800)441-7429, with representation in Santa Fe Springs, CA (310)802-1509.
   5. Tandus C&A, Floorcoverings Division, Dalton, GA (404)259-9711, (800)248-2878, with design center in Newport Beach, CA (714)863-9666, and representation in La Mesa, CA (619)230-0080.
B. Acceptable Manufacturers of Accessory Products:
   1. Ardex, Inc., Coraopolis, PA (412)264-4240.
   2. Maipei Corporation, Elk Grove Village, IL (708)364-4470, with offices in Tempe, AZ (602)968-7722, (800)992-6273.
   3. The W.W. Henry Company, Huntington Park, CA (213)583-4961, with offices in Orange, CA (714)282-1240.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Carpet shall be securely attached to floor, have a level loop or cut pile finish, and have a maximum height of 1/2-inch in accordance with CBC 11B-302.2.
   2. Exposed carpet tile edges shall be fastened to floor with continuous trim in accordance with CBC 11B-302.2.
   3. Changes in level greater in height than 1/4-inch shall be ramped in compliance with CBC 11B-303.3.
   4. Carpet floor finish critical radiant flux shall comply with CBC 804.2 through CBC 804.4.2.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.
   2. Reuse and recycle 100 percent of trees, stumps, rocks, and associated vegetation and soils resulting primarily from land clearing in accordance with CALGreen 5.408.3.
   3. Submit documentation to enforcing agency which demonstrates compliance with CALGreen 5.408.1.4. Sample compliance forms are available in the CALGreen Guide.

C. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

D. Comply with CALGreen 5.504.4.4 Carpet Systems: All carpet installed in the building interior shall meet one of the testing and product requirements listed in 5.504.4.4 subparagraphs 1 to 5.
   1. Installed carpet cushion shall meet the requirements of the Carpet and Rug Institute Green Label Program.
   2. All carpet adhesive shall meet the requirements of CALGreen Table 5.504.4.1 Adhesive VOC Limit.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.

2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.

3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Adhesives used to install carpet to substrates shall comply with the requirements of SCAQMD Rule 1168.

2. IEQ Credit 4.3 - Low-Emitting Materials--Flooring Systems: Flooring systems shall comply with at least one of the following requirements.
   a. Option 1 (Carpet): Carpet and pad used on the interior shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program.
   b. Option 2 (All Flooring): All flooring systems must meet testing and product requirements of California Department of Health Services' Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda.

C. Environmental Requirements: Provide products that minimize adverse affects to the environment as follows:

1. No detectable levels of formaldehyde.
2. No detectable levels of 4-PC (4-phenylcyclohexene).
3. Products shall be decreasing emitters of volatile organic chemicals (VOC's).
4. Products shall pass the University of Pittsburgh protocol for toxicity being "no more toxic than wood" when burned under the same conditions.
5. Particle emissions shall be below 0.05 mg/m3 (based on State of Washington testing) at time of installation.
6. Products applied to slabs on grade shall be barriers to radon flow.
7. Product shall be delivered with a recyclable bag for use with plastic film used to protect microencapsulated tackifier.
8. Adhesive:
   a. Comply with VOC content of 50 g/L when calculated in accordance with 40 CFR 59, Subpart D (EPA Method 24).
   b. Greenguard Indoor Air Quality Certified.
c. Meets South Coast Air Quality Management District 1168 Rule 51.

2.04 PERFORMANCE CRITERIA

A. Performance, Carpet Tiles: Provide carpet tiles having characteristics confirmed by the methods specified:
   1. Characteristics:
      a. Critical Radiant Flux: ASTM E 648 Class 1 - (Floor Radiant Panel Test).
      d. Static Propensity: <3.0 kilovolts, permanent conductive fiber Tested in accordance with standards of the American Association of Textile Chemists and Colorists (AATCC).

2.05 MATERIALS

A. General: Refer to Interior Contract Drawings for code, description, manufacturer, pattern/color, and location of use.
   1. Yarn used for carpet tile shall be heat-set yarns, sheared after manufacture (if cut pile) to produce an even and consistent surface and uniform pile height.
   2. Carpet tiles shall be interchangeable throughout facility (by color) with no visible signs of variation in texture or uniformity.
   3. Provide color as selected by Architect.
   4. Tiles cut from finished broadloom stock are not acceptable.

B. Carpet Tile Types C-1 and C-2: Design is based on the use of Street Smart Collection, Modular Planks Style #SS217 carpet tile, manufactured by Interface Flooring System, or equal, as indicated in Contract Documents.
   1. Color/Pattern: Colors and pattern as selected by Architect.

2.06 ACCESSORIES

A. Floor Preparation Accessories:
   1. Concrete Crack Filler: Mapei solvent-free epoxy Planicrete EP, or equal.
   2. Spot Patching Compound: Mapei Plani/Patch fast-setting cement-based polymer-modified patching compound, or equal.
   3. Self-Leveling Underlayment:
   4. Latex Patching and Leveling Compound: Henry's 335 or 336, Durabond Webpatch 90, or Durabond 60L.
   5. Floor Primer: As recommended by manufacturer.
   6. Wax Remover: As recommended by manufacturer.
B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile, and that is recommended by carpet tile manufacturer.
   1. Releasable Adhesive: Full spread Surfaset N5000 releasable adhesive Ecoworx ES environmental self-adhesive system, or equal, as recommended by carpet manufacturer.

C. Edge and Transition Guards: Refer to Section 096513.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

A. Verification of Conditions: Verify that slabs on grade to receive floor covering material have been installed over specified moisture barrier, and have been treated with specified concrete sealer.

B. Verify that floors are level to acceptable tolerances. Provision of floor tolerances are specified under Section 033100. If required, postpone installation of carpet tile materials until floors are leveled with floor leveling compound specified in Section 033100.
   1. Minor patching and cleaning of floor substrata shall be performed under this Section.

C. Vapor Emission and Alkalinity Testing: Prior to installation of flooring, verify that moisture content and alkali content of concrete slabs do not exceed limits acceptable to manufacturer of flooring materials, confirmed by testing in accordance with ASTM F 710 ASTM F 2170.
   1. Refer to Article 3.04 for vapor emission and alkalinity testing.
   2. Do not start installation of finish flooring materials in areas with vapor emission and alkalinity values in excess of manufacturer’s requirements until mitigation measures and retesting has resulted in values satisfying manufacturer’s requirements.

**3.02 PREPARATION**

A. Surface Preparation:
   1. Remove paint, varnish, oils, release agents, sealers, and waxes, as recommended by flooring manufacturer. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer’s recommendations for flooring. Avoid organic solvents.
   2. Where necessary, scour, and sweep floor to remove loose dirt, adhered building materials, and residual curing compounds. Fill minor voids with floor patch compound to level of adjacent areas.
   3. Refer to ASTM F 710, including appendix, for guidelines and remedial measure recommendations in the preparation of concrete floors to receive new flooring.

B. Where excess moisture or alkali is present in concrete, take appropriate action based on results in relation to finish floor manufacturer’s moisture and alkalinity requirements before commencing installation.
C. Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.
   1. Prime porous floor surfaces with primer.

D. Install divider strips as indicated in Contract Documents.

3.03 INSTALLATION

A. Comply with the installation recommendations of CRI Installation Standard.

B. Layout: Areas shall be installed with the use of chalklines that subdivide the installation area into quadrants. Locate chalklines to produce maximum size perimeter modules.
   1. Intersecting chalklines shall be at right angles.
   2. Periodically, check the ongoing installation for squareness and growth by using the right angle hypotenuse rule.
   3. Maintain a square and tight installation.

C. Adhesive Grids and Application Areas:
   1. Carpet shall be securely attached to floor in accordance with CBC 11B-302.2.
   2. Apply 9-inch minimum strip of releasable adhesive along each side of the chalklines to start the installation and provide anchor points for the grid module to be created.
   3. In open areas create additional anchor lines (adhesive stripes) parallel to the chalkline every 12 to 15 feet.
   4. Perimeter tiles and cut tiles shall be adhered with a full spread of releasable adhesive. Dry fit perimeter tiles and apply adhesive after perimeter tiles have been cut.
   5. In corridor areas the grids of adhesive should be tightened up to 6 to 10 feet intervals. Certain areas may require a full spread of adhesive depending on underfloor access requirements.

D. Run carpet tiles under open bottom items and cabinets and install tight to walls.

E. Run direction of texture or grain parallel to ashlar pattern rows.

F. Bind exposed edge adjacent to hard flooring with resilient edge guard as specified in Section 096513.

3.04 FIELD QUALITY CONTROL

A. Provide calcium chloride and pH testing kits as follows:
   1. Moisture Vapor Emission: Prepackaged test kit of commercial consistency, equipped with a sealed dish of anhydrous calcium chloride, a metering dome with butyl rubber gasket and instructions for implementation. Weigh dishes on site prior to installation. Conform with requirements of ASTM F 1869.
      a. Test methods based on ASTM F 2170 using RH meters equal to AMT Moisture/Relative Humidity Meter manufactured by American Moisture Test may be used at testing agency's option except at concrete floors with exposed or polished finish.
2. Alkalinity: Concrete pH test using calibrated digital 1-14 wide range pH meter equal to ExStik PH100 pH Meter manufactured by Extech Instruments Corporation to determine alkalinity level in accordance with ASTM F 710. Paper and pencil type tests are not acceptable.

3. Provide testing kits equal to one of the following:
   a. American Moisture Test, Inc.

3.05 CLEANING

   A. Waste Management: Recycle or salvage waste materials in accordance with Section 017419.

   B. Remove material, tools and equipment. Vacuum and remove stains to satisfaction of Architect.

3.06 PROTECTION

   A. Cover carpet tiles in traffic areas during construction period with 6-mil polyethylene or other equivalent protective barrier for the remainder of the construction period.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Vinyl-coated tackable and dry-erase marker/projection screen/wall covering.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

C. This Section may be affected by allowances specified in Section 012010.

1.02 REFERENCES

A. ASTM International (ASTM):
   4. F 793-13a - Classification of Wallcovering by Durability Characteristics.

B. California Code of Regulations (CCR):

C. Chemical Fabrics & Film Association, Inc. (CFFA):

D. Federal Specifications (FS):
   1. CCC-C-521E.
   2. CCC-T-191-B.
   3. CCC-W-408A.

E. National Fire Protection Association (NFPA):

F. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Samples: In accordance with the provisions of Section 013300, submit full-width samples of wall coverings proposed for use.
   1. Samples: 12-inch by 12-inch samples of each type of tackable wall-covering material required.

C. Substrate Condition Field Report: Furnish report from installer confirming that surfaces, alignments, and tolerances to which materials of this Section will be applied are in a suitable and acceptable condition to receive finish materials specified in this Section.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Materials: Furnish extra materials matching installed products, packaged with protective covering for storage, and identified with labels clearly describing contents.
   1. Quantity: 24 square feet.
   2. Deliver extra materials to Owner.

B. Maintenance Instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.
1.07 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain tackable wallcovering system components from a single source.

B. Installers Qualifications: Must be installed by qualified installer acceptable to the wall covering manufacturer, and having 2 years' experience of wall covering installations.

C. Field Samples: Install a portion of each wall covering required.
   1. Install field samples which are representative, in every respect, of the completed work.
   2. When accepted, field samples may be deemed incorporated into the work, and will become the standards by which subsequent work of this Section will be evaluated for acceptance.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original factory wrappings and containers, clearly labeled with manufacturer, brand name, and fire hazard classification.

B. Store materials in original, undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity. Maintain room temperature within the storage area at not less than 70°F during the period materials are stored.

1.09 FIELD CONDITIONS

A. Existing Conditions:
   1. Do not install tackable wallcovering until the space is enclosed and weatherproof.
   2. Do not install tackable wallcovering until temperature is stabilized and permanent lighting is in place.

B. Environmental Requirements: Maintain ambient temperature within the building at not less than 70°F for a minimum of 72 hours prior to beginning of installation.

1.10 WARRANTY

A. Special Warranty: Submit manufacturer's limited five-year written warranty against manufacturing defects.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Provide wall coverings conforming to CFFA-W-101-A for Type II using test methods given in FS CCC-W-408A.
   2. Patterns shall be produced with cadmium-free, chromium-free, lead-free, and mercury-free water-based inks certified by the Greenguard Environmental Institute (www.greenguard.org) for low emissions of formaldehyde, VOC's, respirable particles, ozone, and other pollutants.

B. Comply with CALGreen 5.504.4.1 - Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 - Adhesive VOC Limit and Table 5.504.4.2 - Sealant VOC Limit.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Performance characteristics of wall coverings proposed for use shall have been confirmed by tests in accordance with the following:
   1. Physical Characteristics: Confirmed by testing in accordance with CFFA-W-101-A and FS CCC-W-408A through D for Type II using test methods given in FS CCC-T-191-B.
      a. Comply with Paragraph 3.6 Mildew Resistance of CCC-W-408B.
      b. Comply with provisions of ASTM F 793 regarding mildew resistance.
      c. Comply with NFPA 286 Corner Burn Test.
2. Surface Burning Characteristics: Identify components with markings from testing and inspection organization. Products shall be Class A fire rated confirmed by testing in accordance ASTM E 84, NFPA 255, NFPA 286, and ASTM E 162 for flame spread, fuel contribution, and smoke density, and NFPA 701 for large and small scale requirements. Fire Performance Characteristics:
   a. Flame Spread: 25 or less.
   b. Fuel contribution: ASTM E-84 Class B.
   c. Smoke Developed: Not to exceed 450.

2.05 PROJECTION SCREEN WALLCOVERINGS

A. Projection Screen Wall Covering: Provide low gloss marker/projection screen wall covering equal to nu•vu•rite™, as manufactured by WallTalkers, Inc.
   1. Provide wall covering having physical and performance characteristics specified for regular wall covering.
   2. Backing: Provide non-woven polyester cellulose backing, pigmented vinyl capped with Teflon® dry erase non-glare film, and heat embossed with a bi-directional lenticular pattern.
   3. Material width shall be 50 or 60 inches wide, as best suited for project conditions.
   4. Surface shall have a bi-directional lenticular pattern with approximately 40,000 reflective surfaces per square inch.
   5. Include one Walltalkers starter kit RVSK for each wall covered.
   6. Color shall be as selected by Architect.

B. Primer: Clear, adhesion-promoting primer, as recommended by manufacturer.

C. Adhesive: Solvent-free, SBR type linoleum adhesive as recommended by manufacturer.

2.06 TACKABLE WALLCOVERINGS

A. Tackable Wall Covering: Provide unicolor, resilient, tackable, homogeneous tackable linoleum wall covering equal to tac•wall®, as manufactured by WallTalkers, Inc., and consisting of linseed oil, granulated cork, rosin binders and dry pigments calendared onto natural burlap backing.
   1. Surface shall consist of linseed oil, granulated cork, rosin binders, and dry pigments calendared onto backing.
   2. Backing: Natural burlap.
   3. Material Width: 48 or 72 inches wide, as best suited for project conditions.
      1) Color shall extend through thickness of material.

B. Trim: Aluminum 1/4-inch J-Trim molding equal to JT12-00, clear satin finish..
C. Primer: Clear, adhesion-promoting primer, as recommended by manufacturer.

D. Adhesive: Solvent-free, SBR type linoleum adhesive as recommended by manufacturer.

E. Sealant: Acrylic caulk color matched to wall covering.

2.07 ACCESSORIES

A. Primer: Permeable wallcovering primer recommended by manufacturer.

B. Adhesive: Solvent-free, premixed, mildew and vermin resistant paste, as recommended by manufacturer, prepared specifically for each type of wallcovering.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Prior to commencing work verify the following:
   1. Walls are not more than 1/8-inch in 10 feet out-of-plane.
      a. Dry-Erase Marker/Projection Screen/Tackable Wall Covering: Wall surface for marker/projection screen shall be virtually flawless. Imperfections shall be corrected under Section 092900 until acceptable to Architect.
   2. Joints in gypsum board are taped, treated with joint compound, and sanded in accordance with levels specified in Section 092900.
   3. Painted surfaces shall be in sound condition and shall not contain water sensitive materials or pigments which bleed in water or oils. Dull enamel or glossy paints by sanding or rubbing with steel wool.
   4. Verify that moisture content is within limits required by wall covering manufacturer.

3.02 PREPARATION

A. Surface Preparation:
   1. Gypsum Wallboard: Dust the surface thoroughly and remove loose material.
   2. Dry-Erase Wall Covering: Apply a uniform coat of primer/sealer over gypsum board substrate.
   3. Do not commence installation until contiguous work has been completed. Where applicable, install wall covering before installation of cabinets, base, moldings or other permanent items. Remove hardware, plates, and accessories, and replace such items after wallcovering has been applied.

3.03 INSTALLATION, TACKABLE WALL COVERINGS

A. Mix adhesive in accordance with manufacturer's instructions.
   1. Apply paste to wall (not to fabric) as recommended by the manufacturer, and hang smooth and clean without excess paste.
   2. Use stiff bristled brush or flexible broad knife to eliminate air pockets and to secure fabric to substrate surfaces.
   3. Butt seams shall be tight without gaps or overlaps.
4. Using a damp sponge, remove excess adhesive from each seam as it is made, wiping clean and dry with a cloth towel.
5. Stop and inspect work after each three rolls are installed. Do not continue unless work appears satisfactory.

3.04 INSTALLATION, DRY-ERASE WALL COVERINGS

A. Dry-Erase Marker/Projection Screen/Tackable/Magnetic Wall Covering:
   1. Apply roll material horizontally, as recommended by manufacturer.
   2. Apply adhesive with 1/16-inch thick trowel.
   3. Install dry erase wallcovering sheets in exact order as they are cut from bolt. Reverse hang alternate strips (except lined products). Do not crease or bend the wallcovering when handling.
   4. Work from top to bottom, then side to side. Roll sheet firmly into adhesive for positive contact and to remove air bubbles.
   5. Remove visible adhesive residue immediately.
   6. Scribe, cut, and fit material to butt tightly to adjacent surfaces, built-in casework, and permanent fixtures and pipes.
   7. Lap and double cut and reverse roll direction to ensure virtually invisible butt seams.

3.05 ADJUSTING

A. Visually inspect to verify that installed wall covering is secure, smooth, clean, without wrinkles, and with no gaps or overlaps.
   1. Correct mismatch of color and pattern as necessary to secure Architect's acceptance.

3.06 CLEANING

A. As the work progresses, clean the surplus adhesive from wall covering and adjacent surfaces using methods and materials recommended by manufacturer.

B. Clean wallcovering using a sponge with a neutral pH cleaning solution. Do not use abrasive cleaners. Rinse thoroughly with water and let dry before using.

END OF SECTION
- SECTION 098100 -

ACOUSTIC INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Air tightness requirements to reduce sound transmission through gaps in construction around sound-sensitive or noise producing spaces.

B. Referenced Sections:
1. Section 012500 - Substitution Procedures.
2. Section 013300 - Submittal Procedures.
4. Section 018113 - Sustainable Design Requirements.
5. Section 072100 - Thermal Insulation.
6. Section 078400 - Firestopping.
7. Section 079200 - Joint Sealants: Requirements for acoustical sealants.
8. Section 092216 - Non-Structural Metal Framing.

C. Related Sections:
1. Section 072216 - Roof Board Insulation: Requirements for roof board thermal insulation.
2. Division 21 - Fire Suppression.
3. Division 22 - Plumbing.
5. Division 26 - Electrical.
6. Division 27 - Communications.

1.02 REFERENCES

A. ASTM International (ASTM):
3. E 136-12b - Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C.

B. California Code of Regulations (CCR):
1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      1) Section 720 - Thermal- and Sound-Insulating Materials.
C. United States Green Building Council (USGBC):
  1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordination: Coordinate with plumbing, mechanical, and electrical work of Divisions 22, 23, and 26 with regard to continuity of sound insulation.

D. Preinstallation Meetings: Prior to the start of installation of the work of this Section, convene a preinstallation conference under provisions specified in Division 01. Contractor, subcontractors, and trades responsible for work in this Section shall be present to review areas of potential interference and conflict, and to review the requirements for airtight construction so that airtightness is achieved where required.

E. Environmental Requirements:
   1. Fiberglass and cellulose insulation shall meet the recycled content requirements specified in Section 018113.
   2. Insulation shall be formaldehyde-free.
   3. Product substitutions shall be approved in writing, prior to use, by the Owner or Architect as specified in Section 018113.
   4. The actual dollar cost of the amount of this product used on the project must be tracked. The actual dollar cost shall be separated into the amount that meets the requirements of Section 018113 and amount that does not meet the requirements (for the amount of product allowed for use as a substitution as described above and in Section 018113.

1.04 SUBMITTALS

A. Procedure: Comply with the submittal requirements of the referenced Sections.

B. Manufacturer’s Instructions: Submit manufacturer’s data sheets, published instructions and other relevant data at least two weeks prior to use.

C. Furnish certification that batt insulation proposed for use is free of added formaldehyde.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for
products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.

1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.06 QUALITY ASSURANCE

A. Certifications:

1. Provide batt insulation certified by Greenguard Environmental Institute (GEI) to be low-emitting and have minimal impact on indoor air quality.

1.07 WARRANTY

A. Warrant acoustical sealants, packing, and caulking against faulty workmanship and defective materials for a period of five years after date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Fibrous Insulation Products:

1. Johns Manville (JM), Building Insulation Division, Denver, CO (800)654-3103, with sales offices in Santa Ana, CA (714)668-9181.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based, or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:

1. Comply with the requirements of CBC Section 720 regarding insulation materials.
B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

C. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

D. Comply with CALGreen 5.507.4 Acoustical Control: Employ building assemblies and components with STC values determined in accordance with ASTM E 90 and ASTM E 413 or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.
   1. In accordance with CALGreen 5.507.4.3, provide an STC at least 40 for wall and floor-ceiling assemblies separating tenant spaces, and for tenant spaces from public spaces.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
      a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:
2.04 PERFORMANCE CRITERIA

A. Performance Requirements: Performance characteristics of building insulation proposed for use shall be in accordance with the following:

1. Sound Transmission Loss: When incorporated into building construction of specified sound transmission class (STC), confirmed by testing in accordance with ASTM E 90.

2.05 SYSTEM DESCRIPTION

A. Contract Drawings show typical details and Specifications designate specific materials and components to achieve airtightness. Contractor shall be alert for conditions that may require special details or materials in order to achieve airtightness and shall bring these to the attention of the Architect.

B. Rooms and constructions designated airtight include offices, server rooms, meeting/conference rooms, toilet rooms, elevator walls, mechanical and electrical rooms, and equipment rooms.

C. Where a room or construction is designated airtight, typical details for airtightness that are appropriate to the room or construction shall be employed, as well as special details required. Contractor, subcontractors, and trades are jointly responsible to coordinate construction work, observe field conditions, and see that airtightness is achieved as specified.

D. Maintain construction completely airtight around rooms or in walls, floors, and other construction designated airtight. Construction joints, structural penetrations, mechanical and electrical duct penetrations, pipe and conduit penetrations, electrical boxes and fixtures, cabinets, doors, access panels, windows, frames, and supports shall be fabricated and installed in such manner as to prevent sound transmission. Provide lintels, extra frames, blocking, escutcheons, grouting, gaskets, packing, caulking, dense putties, taping, and filling as required to stop sound transmission.

2.06 PRODUCT USAGE

A. General Location of Sound Insulation Materials:

1. Sound Reduction at Walls **Type 1:**
   a. Between Studs at Interior Walls.
   b. Between Studs at Multiple Layer Gypsum Board Interior Walls.
   c. Between Studs at Double Stud Walls.
   d. Between Studs at Plumbing Walls.

2. Sound Reduction at Walls at **Type 2:**
   a. Between Studs at Fire Rated Walls.
   b. Between Studs at Shaft Walls.

3. Sound Reduction at Ceilings **Type 3:**
   a. On Surfaces of Ceilings.

b. Aerosol Adhesives: Green Seal Standard for Commercial Adhesives
   GS-36 requirements in effect on October 19, 2000.
2.07 SOUND INSULATION TYPES

A. Sound Insulation:
   1. **Type 1**, Flexible, Unfaced: Conform to the requirements of ASTM C 665, Type I, and ASTM E 136.
      a. Surface Burning Characteristics:
         1) Flame Spread: 10.
         2) Smoke Developed: 10.
      b. Thickness: Full depth of cavity.
      c. Design Basis: Sound Attenuation Batts manufactured by Owens Corning, or Sound Control Batts manufactured by Johns Manville, or equal.
   2. **Type 2**, Flexible, Unfaced: Conform to the requirements of FS HH-1-521F, and ASTM E 136.
      a. Combustibility: Non-combustible, in accordance with NFPA 220.
      c. Density: 2.5 pcf density
      d. Surface Burning Characteristics: Tested with ASTM E 84.
         1) Flame Spread: 0.
         2) Smoke Developed: 0.
      e. Design Basis: Thermafiber Sound Attenuation Fire Blankets (SAFB) manufactured by Thermafiber, sound attenuation fire batt (SAFB) insulation products manufactured by Fibrex Insulations, Inc., or equal.
      f. Thickness: 2-inch and 3-inch, at locations indicated on the Contract Drawings.
         1) Provide sound coefficients tested in accordance with ASTM E 423, and published by design basis manufacturer.
   3. **Type 3**, Flexible, Unfaced: Conform to the requirements of ASTM E 136, unfaced.
      a. Surface Burning Characteristics:
         1) Flame Spread: 10.
         2) Smoke Developed: 10.
      b. Thickness: Full depth of cavity.
      c. Design Basis: Sonobatts Insulation manufactured by Owens Corning, or Johns Manville Sound-Shield fiberglass insulation, or equal.

2.08 JOINT FILLER PRODUCTS

A. Low-Density Glass Fiber Insulation:
   1. Refer to Section 072100, Insulation Type M6 for packing and filling small joints and openings behind sealants.

B. High-Density Ceramic or Mineral Fiber Safing:
   1. Refer to Section 078400, Safing Insulation Type O3.

C. Fire-Barrier (Acoustical) Putties:
   1. Refer to Section 078400, Safing Insulation Type O4.

D. Foamed-in-Place Silicone Sealant:
   1. Refer to Section 078400, Safing Insulation Type O5.

E. General Purpose Acoustical Sealants:
   1. Refer to Section 079200, Sealant Type F2.
F. Self-Adhesive Sponge Neoprene Pads:
   1. Refer to below, Sealant Type K1.

G. Self-Adhesive Bubble Gaskets:
   1. Refer to below, Sealant Type K2.

H. Felt Lined Metal Sleeves:
   1. Refer to Section Divisions 21, 22, 23, and 25.

I. Sheet Caulking (Electrical Box Pads):
   1. Refer to Divisions 26 and 27.

2.09 GASKETING

A. Gasketing Types:

   1. **Type K1** - Self-Adhesive Sponge Neoprene Pads: Compressible closed cell Polyvinyl Chloride foam or neoprene sponge, 8 pcf to 12 pcf density, self-adhering, for use as filler and acoustical seal in gaps of slip joints, set in place with 10% to 15% compression. Acceptable products:
      a. Norseal Type V760 Foam Sealants with firm, high-density foam for vibration damping with adhesive on one side, manufactured by Saint-Gobain Performance Plastics, or equal by D.S. Brown Company.
      b. Norseal Type V980/V990 closed cell PVC Foam Sealants with pressure-sensitive adhesive on both sides, manufactured by Saint-Gobain Performance Plastics, or equal by D.S. Brown Company.
      c. Norprene Profile custom-designed thermoplastic elastomer foam Extrusions compressible foam tapes adhesive-coated on one side, manufactured by Saint-Gobain Performance Plastics, or equal by D.S. Brown Company.

   2. **Type K2** - Self Adhesive Bubble Gaskets: Nominal 1/4-inch x 1/2-inch compressible bulb of silicone rubber or polyprene with self-adhesive on one side. Provide color selected by Architect. Acceptable Products:
      c. 797 Polyprene by Reese Enterprises, Huntington Beach, CA, [www.reeseusa.com](http://www.reeseusa.com).

B. Partition Closure Gaskets at Abutting Interior Partitions:

   1. Filler Gasket (at Window Mullions): Closed cell expanded neoprene, black premolded joint filler, equal to Everlastic Type NN1, 1040 Series, manufactured by Williams Products.


   3. Gasketing Tape: Norex BCF butyl-coated foam extrusions with compressible PVC foam core, as manufactured by The Specialty Elastomers sector of Saint-Gobain Performance Plastics.
4. Compressible Joint Filler: Manufacturer's standard closed-cell, flexible neoprene expanded rubber, equal to Balco/Mercedes Expansion Control Type FS-250 Flex Seal System.
   a. Adhesive: Structural epoxy with a tensile strength of 4000 psi.
   b. Sealant: Type C1.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Partitions, walls, floors, and other constructions indicated to be acoustically insulated with construction designated airtight shall conform to the following:
   1. Cut openings in construction accurately for electrical boxes, piping, ductwork and other penetrating elements. Leave enough space around such elements so they remain free of rigid connection with the surrounding construction.
   2. Extend construction to a minimum of 1/8-inch and a maximum of 1/2-inch from adjacent construction to provide a suitable space for packing and caulking.
   3. Prior to packing and caulking penetrations as indicated on the Contract Drawings, verify that all penetrating elements such as piping and ductwork are free and clear of the opening to be packed and caulked.
   4. Where multiple layers of gypsum board are used, stagger joints in adjacent layers a minimum of 24 inches.
   5. Apply acoustical sealants and caulks in accordance with the manufacturer's instructions.

B. Acoustical Gaskets:
   1. Use Self-Adhesive Sponge Neoprene Pads Type K1 to provide a compressible filler and acoustical seal in the gaps of slip joints. Set in place with 10 to 15% compression. Airtight splices work in length-wise direction.
   2. Use Self Adhesive Bubble Gaskets Type K2 to provide an acoustical seal around the edge of an operating access panels (typically set on jamb or head frame or stop to act as a compression seal).

END OF SECTION
- SECTION 098433 -

SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Perforated flexible co-polymer wrapped absorptive sound panels (Type AC-1).
   2. Formed metal wall panel system with absorptive backing (Type MP-1).

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 092216 - Non-Structural Metal Framing.
   5. Section 092900 - Gypsum Board.
   6. Section 099100 - Painting.

C. Comply with applicable procedural requirements of Section 018113.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. C 423-09a - Sound Absorption and Sound Absorption Coefficients by
      the Reverberation Room Method.
   2. E 84-15b - Standard Specification for Surface Burning Characteristics
      of Building Materials.
   3. E 795-16 - Practices for Mounting Test Specimen During Sound
      Absorption Tests.
   4. E 1264-14 - Classification of Acoustical Ceiling Products.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
         1) Table 803.9 - Interior Wall and Ceiling Finish Requirements
            by Occupancy.

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for imple-
   menting construction waste management requirements.
B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordinate layout and installation of items penetrating or being installed into wall systems with responsible trades.

D. Preinstallation Conference: Conduct conference at Project site as directed by the project Architect.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and specifications.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing installation of sound panels. Shop Drawings shall include elevations showing locations of all joints.

D. Samples for Verification: Submit full-thickness units of each type of metal wall assembly indicated, in sets for each color, texture, and pattern specified, showing the full range of variations expected.
   1. 12-inch x 24 inch acoustical metal pan units.
   2. 12-inch long samples of each exposed molding or trim.
   3. Submit material sample and fabric palette, for selection of color.

E. Sustainable Design Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.05 CLOSEOUT SUBMITTALS

A. Maintenance Data: Provide manufacturers standard maintenance and cleaning instructions for finishes provided.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Materials: Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents. Only typical system components are included with attic stock.
   1. Acoustical Metal Wall Pan Units: Full-size units equal to 1-1/2 percent of amount installed.
   2. Suspension System Components: Quantity of each grid and exposed component equal to 1-1/2 percent of amount installed.
1.07 QUALITY ASSURANCE

A. General:
1. All metal panel wall, ceiling, and soffit products installed on Project shall be from the same manufacturer.

B. Qualifications:
1. Manufacturer: Firm having adequate capacity and successfully manufactured the specified product and completed similar projects for a period of not less than 5 years.
   a. Manufacturer shall be single source and shall be the fabricator and supplier of appropriate major components.
2. Installer: Approved and authorized by the manufacturer as qualified to perform the work required.
   a. Provide list of at least five successful installations with similar products and scope. Include names and contact numbers of Architect and employer for reference.

C. Mockups: Before installing acoustical metal walls, construct mockups to verify and to demonstrate aesthetic effects and qualities of materials and execution. Build mockup to comply with the following minimum requirements, using materials indicated for completed work:
1. Locate mock-ups in the location and of the size indicated or, if not indicated, as directed by the Architect. Minimum mockup size shall be 8’x 8’ unless otherwise specified.
2. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Site Coordination Mockup:
   a. For approval of assembly, sequence of installation, and coordination of trades involved.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
   a. When directed, demolish and remove mockup from project site

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical metal wall units and suspension system components in original, unopened packages clearly labeled with the following information: name of manufacturing source and location; product type, description and quantity; clients name and shipping address.

B. Store components in a fully enclosed space where they will be protected against physical damage from direct moisture, significant change in humidity, direct sunlight, significant change in temperature, surface contamination, and any other preventable cause.

C. Exercise care in handling components to prevent damage to the surfaces and edges and prevent distortion or other physical damage. Comply with prescribed stacking instructions to prevent damage to these components.
D. Mark panels with project identification number, panel number, location code, and quantity of units per size corresponding to the accepted Shop Drawings.

1.09 PROJECT CONDITIONS

A. Ambient Conditions:
   1. Do not install acoustical metal panel walls until after work spaces are weathertight and after wet work, and work around walls, is complete and accepted by Architect.
   2. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer’s recommended limits. Allow materials to reach ambient temperature and humidity for a minimum of 24 hours, prior to starting installation.
   3. Coordinate with other work supported by, adjacent to or penetrating through the wall system.

B. Do not install products in exterior space unless the system has been specifically designed and approved for exterior application.

1.10 WARRANTY

A. Provide specified manufacturers warranty against defects in workmanship, discoloration, or other defect considered undesirable by the Architect or Employer.

B. Warranty shall remain in effect for a minimum period of 5 years from date of initial acceptance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.
   1. Fire: Comply with CBC Table 803.11 requirements for applications indicated on Contract Drawings. Comply with ASTM E 84 for Class 1/A flame spread and smoke developed.
B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
  1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
  1. MR Credit 4: Use materials with recycled content that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
    a. Fiberglass core shall bear the Green Cross label for recycled content, and certified to have at least 35 percent recycled glass with 9 percent post-consumer and 26 percent pre-consumer content.
  2. MR Credit 5: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for 10 percent of the total materials value.

2.04 PERFORMANCE CRITERIA

A. Performance Requirements:
  1. Fire: Comply with CBC Table 803.9 requirements for applications indicated on Contract Drawings.
  2. Surface-burning characteristics of acoustical metal pans shall comply with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84.
  3. Acoustical: Determine acoustical absorptions characteristics by testing fully assembled production material in accordance with ASTM C 423 using Type A mounting as defined by ASTM E 795.

2.05 ACOUSTICAL WALL PANELS, CO-POLYMER WRAPPED

A. Acoustical Wall Panels Type AC-1: Design is based on Metro Rebound Acoustical Wall Panels as manufactured by Conweb|Wall Technology, or equal.
  1. Thickness: 1 inch.

B. Materials:
  1. Core: Composite core construction of dimensionally stable rigid fiberglass of medium density (6-7 PCF) laminated with a 1/16-inch thick perforated resilient damage resistant component.
    a. Edging: Heat-formed single piece construction. No joints will be allowed where the face meets the edge.
    b. Edge profile and corner detail shall be square.
    c. Edge treatment shall be resin hardened.
3. Finish: Metro Rebound flexible co-polymer, 60 mil thick perforated to a minimum of 25% open area.

4. Color: Refer to Finish Schedule on Contract Drawings. Pigment shall be solid throughout the depth of the face sheet.

C. Fire Rating: panel components shall have a Class "A" flame spread rating of 25 or less in accordance with ASTM E 84. The co-polymer sheet has a flame spread rating of 15 and a smoke development rating of 200, Class 1 per Underwriter's Laboratories.

D. Sound Absorption: In accordance with ASTM C 423 (Type A mounting):
   1. Noise Reduction Coefficient (NRC): NRC 0.95 for specified thickness.

E. Panel Sizes: As indicated on the Contract Drawings.

F. Tolerances:
   1. Panel core dimensions shall have a maximum tolerance of plus-or-minus 1/16-inch in width and length.
   2. Edging shall be in alignment with the panel face and concealed from view.
      a. Edging shall be fixed to the core with no visible deviations when panels are butted side by side.
   3. Panel deflection after installation shall not exceed 0.27 percent of the span.

G. Fasteners: Mounting shall be as follows:
   1. 20-gage coated steel panel clips or continuous aluminum Z-track, as recommended by manufacturer.
   2. Adhesive: As recommended by manufacturer.

H. Fabrication:
   1. Edge Detail: Bevel.
   2. Bond finish to panel face and return edges a minimum of 1-1/2 inches on back of panel, wrinkle free and fully tailored at corners with no exposed darting.

2.06 ACOUSTICAL WALL PANELS, METAL

A. Metal Wall Panel Type MP-1: Equal to Ceilings Plus WallForms, perforated and finished to match Architect's samples.
   1. Panels shall be manufactured from single sheets of aluminum selected for surface flatness, smoothness, and freedom from surface blemishes where exposed to view in a finished unit. Do not use material where the exposed surface exhibit pitting, seam marks, roller marks, stains, discolorations, or variations in flatness exceeding those permitted by referenced standards for stretcher-leveled aluminum alloy sheets.
   2. Aluminum sheet Type 5005 (anodized) series alloy shall have a minimum recycled content of 50%. Panels shall be machine stretcher-leveled and a minimum of 0.063" thickness so that the panel deflection does not exceed L/360.
      a. Finish: The metal panel finish shall be Sateen.
   3. Panels shall be die formed with a minimum 1-1/4" integral return reveal edge on each of the four panel sides. Hooks to engage the
Sound-Absorbing Wall Units

1. Panels into a factory engineered hat channel shall be an integral part of the panel flange. No fasteners of any kind shall be visible on exposed face surfaces of panels or support tees. Wall penetrations shall be factory precision cut whenever viable.

4. Panel sizes as indicated on the Contract Drawings. Provide field cut panels at non-modular perimeter conditions only if unavoidable.

5. Edge Profile: Panel joints are 1/4-inch reveal both directions. Wrap trim at wall.

6. Sound-Absorptive Fabric Layer: Provide manufacturer's acoustic pads sized to fit concealed surface of perforated panels. Material shall be both sound-absorptive and non-flammable. Provide independent accredited lab test results showing compliance with Class A rating in accordance with ASTM E 84.
   a. Complete system test including suspension, primed aluminum and finish shall meet ASTM E 84 Class A.
   b. Exposed material shall have surface-burning characteristics for flame-spread rating of 25 or less and smoke developed rating of 50 or less.
   c. Achieve sound absorption value of not less than 0.80 NRC. Provide independent accredited laboratory test results illustrating compliance with acoustical requirements as per ASTM C 423.
   d. Adhere Ultrasorb acoustical pads to the backside of the perforated panels, unless otherwise directed by the Architect.

7. Plenum shall be 100% accessible. Every panel must be removable. Progressive panel access is not acceptable.

8. Provide matching finish trim at perimeter as indicated on the Contract Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that metal stud supports are properly located and structurally adequate to support acoustical panels without deflection.

3.02 PREPARATION

A. Coordination: Furnish layouts for anchors, clips, and other attachments whose installation is specified in other Sections.

B. Measure each wall area and establish layout of acoustical metal panel units to balance border widths at opposite edges of each wall. Avoid using less-than-half-width units at borders, and comply with layout shown on elevation plan layouts.

C. Survey substrate for wall attachment to ensure squareness and proper elevation for wall panel installation.

3.03 INSTALLATION, CO-POLYMER WRAPPED PANELS

A. General: Install work in accordance with the manufacturer's recommendations.
3.04 INSTALLATION, METAL PANELS

A. General: Install acoustical metal pan walls, per manufacturers Shop Drawings provided, per manufacturer's written instructions.

B. Install edge moldings and trim of type indicated at perimeter of acoustical wall areas and where necessary to conceal edges of acoustical metal pan. Method of edge trim attachment and design of edge trims shall be as indicated on the Contract Drawings.
   1. Screw attach moldings to substrate at intervals not more than 18" o.c. and not more than 6" from ends, leveling with wall suspension system to a tolerance of 1/8" in 10'. Miter corners accurately and connect securely.
   2. Do not use exposed fasteners or pop rivets on moldings and trim without prior written approval.

C. Scribe and cut acoustical metal panel units for accurate fit at penetrations by, other work through walls. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

D. Install acoustical metal panel units in coordination with ceiling pattern.
   1. Align wall joints with directionally pattern of ceiling panel grid or as indicated on accepted Shop Drawings. Panel-joints shall flow smoothly and in a straight line within 1/8" in 10'. Intersections shall be continuous.
   2. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating wall.
   3. Remove protective film from panels only when space is completely clean and free of airborne particles. Use white cotton gloves for final installation of panels into grid system.

3.05 ADJUSTING

A. Adjust wall components to provide a consistent finish and appearance in conformity with established tolerances and requirements.

B. Panel's protective layer to be removed only after installation is complete to help prevent panel surface damage.

3.06 CLEANING

A. Clean exposed surfaces of acoustical metal panel walls. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
B. Remove and replace work that cannot be successfully cleaned and
damaged to permanently eliminate evidence of damage, including dented
and bent units.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Field preparation, priming, and finishing of all exposed surfaces within scope of work, interior and exterior, except as otherwise indicated on the Contract Drawings, whether or not colors are designated. Include the following:

1. Exposed exterior and interior plumbing, mechanical, and electrical work, except where indicated to be excluded.
2. Materials factory primed as incidental to the work of other Sections shall be reprimed in accordance with the requirements of this Section. Include unfinished and factory primed metal surfaces of exterior roof construction and roof accessories.

B. Related Requirements:

1. Refer to Section 050513 for areas to be coated with fluoropolymer, polyester, and powder coatings.
2. Refer to Section 099600 for areas to be coated with high performance urethane coatings.
3. Factory finishing of products is generally specified under the work of the Sections where the products are specified.

C. Work Excluded:

1. Prefinished Items:
   a. Finish hardware.
   b. Prefinished window wall framing.
   c. Prefinished copings.
   d. Floor toppings and waterproofed flooring systems.
2. Natural Finished Materials:
   a. Factory finished metals; stainless steel, chromium plating.
   b. Glass, carpet, plastic laminate, resilient flooring, and base.
   c. Acoustical materials and exposed insulation.
3. Cementitious Materials:
   a. Integral color masonry; burnished face masonry; stucco plaster finish systems.
   b. Concrete floors, pavements, or slabs; tile.
   c. Concrete surfaces scheduled to be sealed, exposed aggregate, sandblasted, integral color, or specified to be finished with elastomeric coatings.
4. Mechanical and Electrical:
   a. Electrical fixtures, receptacles, and controls.
b. Surfaces of concealed areas, including piping and equipment.
c. Operating units or equipment identification, performance rating, name or nomenclature plates, and code-required labels.
d. Exposed mechanical and electrical equipment (including duct-work and conduit) on the roof.

5. Concealed Areas:
   a. Areas to be concealed, except by furnishings.

D. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 050513 - Shop-Applied Coatings for Metals.
   6. Section 051200 - Structural Steel Framing.
   7. Section 051213 - Architecturally-Exposed Structural Steel.
   8. Section 055000 - Metal Fabrications.
   9. Section 092900 - Gypsum Board.
  10. Section 099600 - High Performance Coatings.
  11. Sections of Divisions 21-24 and 26-28: Refer to Mechanical and Electrical drawings and product sections with respect to painting and finishing requirements, color coding, identification banding of equipment, ducting, piping, and conduit.

1.02 RELATED STANDARDS

A. California Code of Regulations (CCR):

B. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. All Surfaces: Tops, bottoms, backs, insides, and outsides of all items or area described.

B. Coatings: Fluids applied to a surface that form a continuous solid film or barrier by physical or chemical means, and are principally designed to protect the surface.

C. Concealed: Hidden from observation; covered by other construction; not visible from any portion of the finished space or area described.

D. Exposed: Visible from any position in any portion of the finished space or area described.

E. Gloss Levels:
   1. When tested in accordance with industry recognized methods and employing a 60-degree meter equivalent to Gloss Guard II manufactured by Pacific Scientific Instrument Division, gloss levels are defined in terms of light reflectance as follows:
      a. Flat: Less than 9 percent.
b. **Low Sheen**: In the range of 10 to 25 percent.
c. **Eggshell**: In the range of 26 to 40 percent.
d. **Semi-Gloss**: In the range of 41 to 69 percent.
e. **Gloss**: Greater than 70 percent.

2. Test specimen shall have aged not less than 14 days.

**F. Paint**: Coatings used primarily for decoration.

**G. Throughout**: Wherever the material or surface occurs on the Project, irrespective of the location of use.

### 1.04 ADMINISTRATIVE REQUIREMENTS

**A. Coordination**: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

**B. Coordination**: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

**C. Scheduling**:
1. Coordinate, schedule, and perform backpriming of finished wood items in contact with concrete, masonry, or plaster in advance to avoid delays in installation.
2. Ensure that concrete surfaces to be painted have been cured at least 30 days prior to applying paint.

**D. Sequencing**: Priming of walls scheduled to receive wallcovering shall be scheduled and performed to facilitate sufficient drying time prior to wallcovering installation.

### 1.05 SUBMITTALS

**A. Product Data**: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.
1. Indicate specific products to be used to comply with types listed in Paint Schedule at end of this Section.
2. Submit manufacturer's gloss data and samples for acceptance-review.

**B. Samples**: In accordance with provisions of Section 013300, submit, on 8-inch by 10-inch hardboard, samples of each color, gloss, texture, and material selected by the Architect for the coatings required.
1. For transparent and transparent stained finishes, provide sample on each type and quality of wood used on the Project.
2. Indicate area of use for each sample.

**C. Quality Control Submittals**:
1. **Certificates**:
   a. Submit certificates confirming that materials proposed for use conform to applicable air quality regulations in force at the time of application.
   b. Submit certificate from manufacturer confirming that proposed painting subcontractor is acceptable to perform work and to provide warranty.
   c. Provide certificates confirming how exterior concrete panels have been prepped for painting.
2. Manufacturer’s Instructions: Submit the manufacturer’s current recommended methods of installation, including relevant limitations, safety and environmental cautions, and application rates.

D. Substrate Condition Field Report: Furnish report from installer confirming that surfaces, alignments, and tolerances to which materials of this Section will be applied are in a suitable and acceptable condition to receive finish materials specified in this Section.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.07 CLOSEOUT SUBMITTALS

A. Warranty Documentation: Submit copies of written warranty, as signed by the applicator, agreeing to repair or replace defective painting work during the warranty period.

B. Submit, on 8-inch by 10-inch hardboard, two sets of samples of each exterior color, gloss, texture, and product installed/applied to the completed project.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Furnish in unopened clearly labeled containers, not less than 2 gallons of each painting material, in each color and gloss level incorporated into the work.
1.09 QUALITY ASSURANCE

A. Mockups: When and as directed by the Architect, apply one complete coating system for each color, gloss, and texture required. When accepted, the mockup areas may be deemed incorporated into the work and will serve as the standards by which the subsequent work of this Section will be evaluated for acceptance.

1.10 FIELD CONDITIONS

A. Environmental Requirements: Apply coating and paint materials under environmental conditions no less stringent than those stipulated by the manufacturer. Measure moisture content of surfaces using an electronic moisture meter.
   1. Do not apply materials during fog, rain, mist, or when inclement weather is expected within the dry time specified by the manufacturer.
   2. Do not commence exterior or interior painting until the surfaces are thoroughly dry and cured.
   3. Do not apply materials unless moisture contents are below the following maximums:
      a. Gypsum Board: 12 percent.
      b. Concrete: 12 percent.
      c. Wood: 15 percent.
      d. Plaster: 8 percent.
   4. Ensure surface temperatures fall within recommendations of the coating and paint materials manufacturers.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers of Painting Products:
   2. Dunn-Edwards Paints, Los Angeles, CA (213)771-3330.

B. Manufacturers of Specialty Painting Products:
   4. United States Gypsum Company (USG), a subsidiary of USG Corporation, Chicago, IL, with sales offices in Glendale, CA (818)956-1882.
C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations of governmental agencies having jurisdiction over airborne emissions and industrial waste disposal.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
      a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

C. Comply with CALGreen 5.504.4.3 Paints and Coatings:
   1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
   2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      b. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GC-11.
      c. Clear Wood Finishes: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.
C. Sustainability Characteristics: Refer to Section 018113 for a complete list of paints and coatings.

1. Products shall contain no hazardous components listed by Green Seal Standards GS-11 (third or later edition) and SCAQMD Rule 1113 for interior paints and coatings, and comply with the following maximum VOC content in g/L for field-applied paints and coatings, or as required by the latest edition:
   a. Flat topcoat paint: 50
   b. Non-flat topcoat paint: 100
   c. Primer or undercoat: 100
   d. Pre-treatment wash primers: 420
   e. Anti-corrosive paints: 250
   f. Clear wood finishes, varnish, and sanding sealer: 275
   g. Clear wood finishes, lacquer: 275
   h. Floor coatings: 50
   i. Shellacs, clear: 730
   j. Shellacs, pigmented: 550
   k. Specialty primers: 100
   l. Stains: 100
   m. Limits for other types of paints and coatings required for use on Project as defined by specified standards.

D. Environmental Requirements:

1. Architectural coating materials shall meet the environmental requirements specified in Section 018113.
2. Product substitutions must be approved in writing, prior to use, by the Owner or Architect as specified in Section 018113.

2.04 MATERIALS

A. The Exterior Paint Systems Schedule and the Interior Paint Systems Schedule at the end of this Section are intended for field painting and are based on generic descriptions of paint products normally found in manufacturer's catalogs.

1. The Contractor may propose specific products for evaluation by Architect in accordance with Section 013300.
2. Products proposed by the Contractor shall be cross-referenced to the products of equal quality of two other listed manufacturers. If, in the Architect's judgment, all three products are equal to the generic product specified, then the proposed product will be accepted.
3. Paint products shall be low or zero VOC, and low odor type, where available for the type of paint required.
   a. Basis of Design: Interior paints shall be low-odor/zero VOC, as manufactured by Dunn-Edwards, or equal. Give preference to products with zero VOC content.

B. Paint Types P-1 to P-8: Ready-mixed materials, except field catalyzed coatings.

1. Pigments shall be fully ground maintaining soft paste consistency, capable of being readily and uniformly dispersed to complete homogeneous mixture.
2. Paints shall have flowing and brushing properties capable of drying or curing free of streaks and sags.

C. Primers: Primers and other undercoat paint coatings produced by the same manufacturer as finish coats.

D. Primer-Surfacer Spray-On Pretreatment: Vinyl-acrylic-latex-based coating for use at Level 5 finishes instead of skim coat and primer, equal to Sheetrock Brand Primer-Surfacer manufactured by USG, ProForm Surfacer/Primer manufactured by National Gypsum, or equal.

2.05 COLORS

A. Colors will be selected by Architect from color chip samples provided by manufacturer of paint system accepted for use, or, at Architect's option, custom colors will be provided to manufacturer for matching. Match accepted samples for color, texture, gloss, and coverage.

B. Where colors are specified in the Contract Documents based on a manufacturer other than the paint manufacturer accepted for use, provide proposed colors blended to match the specified color for review and acceptance by the Architect.


2.06 MIXES

A. Mix and prepare painting and finishing materials in accordance with manufacturer's directions.

1. Use only thinners and quantities recommended by paint manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification: Verify that cast-in-place concrete surfaces have been sacked and patched to an acceptable appearance prior to starting the work of this Section.

1. Moisture: Test moisture levels of wall surface areas to be painted for each 1000 square feet.

2. Alkalinity (pH): Conduct pH tests at each area tested for moisture using a pH pencil.

B. If the validation test for vapor emission and pH readings exceed the requirements of the paint manufacturer, the Contractor shall provide remedial measures, at no additional cost to the Owner, to bring moisture levels and pH to within acceptable limits.

3.02 PREPARATION

A. Protection: Protect previously installed work and materials of other trades that may be affected by work of this Section.

1. Protect prefinished and adjacent surfaces against paint and damage.

2. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or splatter from fouling surfaces not being painted.
3. Protect surfaces, equipment, and fixtures from damage resulting from use of fixed, movable and hanging scaffolding, planking, and staging.
4. Mask surfaces adjacent to penetrations and other openings where sealant materials will be applied.

B. Surface Preparation:
1. General: Prepare and clean each substrate condition in accordance with coating manufacturer's instructions.
   a. Preparation of surfaces shall be performed following specific recommendations of the coatings manufacturer.
   b. Testing: Test cleaned surfaces for the presence of dust, oil, acid, and moisture as recommended by paint manufacturer. If contaminants remain, prepare surface using high pressure water blasting as required.
   c. Degreasing: Remove mildew from affected surfaces with a solution of tri-sodium phosphate (TSP) and bleach, or other proprietary cleaner.
      1) Apply with vigorous scrubbing or pressure washing.
      2) Flush cleaned surfaces with potable water until all traces of cleaner have been removed and allow to dry completely.
      3) Do not use solvents, since solvents dissolve the contaminant and spread it over a larger area.
2. Concrete and Masonry:
   a. Concrete and masonry surfaces shall be dry, clean, and free of dirt, efflorescence, encrustations, and other foreign matter. Glazed surfaces on concrete shall be roughened or etched to uniform texture.
   b. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
   c. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's recommendations.
   d. Wash concrete surfaces to be painted with a muriatic acid solution to remove salts.
   e. Take additional pH readings to confirm pH level prior to painting.
3. Metals:
   a. Shop primed metal shall be sanded and scraped to remove loose primer and rust. Touch up bare, abraded, and damaged areas with compatible primer. Feather edges to make touch up edges inconspicuous.
      1) Architecturally-Exposed Structural Steel (AESS) shall be cleaned in accordance with provisions of Section 051200, Section 051213, Section 055000, and Section 099600.
   b. Ferrous metals not provided with a shop finish shall be cleaned of oil, grease, and foreign matter with solvent.
Scratched and abraded areas shall be touched up with red oxide primer. Prime within 3 hours after preparation.

c. Galvanized metals shall be solvent cleaned with mineral spirits and then pretreated with etching-type solution as recommended by the paint finish manufacturer. Cleaned and pretreated galvanized metal shall be primed the same day that cleaning has been performed.

d. Bare and covered pipes, ducts, hangers, exposed steel, and primed metal surfaces of equipment installed under mechanical and electrical work shall be cleaned prior to priming.

4. Gypsum Board:
   a. Gypsum board shall be dusted clean and free from encrustations and other foreign matter.

5. Wood and Hardboard:
   a. Remove dust, grit, and foreign matter from wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks, and sappy section with pigmented stain sealer when surfaces are to be painted. Fill nail holes, cracks, and other defects after priming, and spot prime repairs when fully cured.
   b. Seal wood required to be job painted. Prime edges, ends, face, undersides, and backsides of counters, cases, and cabinets. Use spar varnish for backpriming at items with transparent finish.

6. Doors:
   a. Remove hardware and accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted, or provide surface-applied protection. Reinstall removed items upon completion of work in each area. Mask all fire rating labels on doors before painting and remove when finished.

3.03 APPLICATION

A. General: Apply painting and finishing materials in accordance with Exterior and Interior Paint System Schedules at end of this Section. Use applicators and techniques best suited for the material and surfaces to which applied.

1. Minimum Number of Coats: The number of coats indicated is the minimum that shall be applied. Additional coats may be required when undercoats, or other conditions, show through final paint coat. When additional coats are required, repeat paint type indicated by symbol in Paint Systems Schedules.
   a. Apply additional coats until paint film is of uniform finish and color, and appearance is acceptable to the Architect.
   b. Additional coats shall be the same as last coat indicated.
   c. When three-coat systems are specified, the second coat shall be a split-color coat of a different shade from the first and third coats.
   d. Transparent wood finishes shall comply with AWI 1500-T-1 Visual Test for Premium category.

2. Apply each material at not less than the manufacturer’s recommended application rate.
   a. Back roll all coats at all locations.
3. **Do not omit primer coat on metal surfaces that have been shop-primed.** Apply prime coat to material that is required to be painted or finished, even though it has been factory prime coated prior to delivery to site.

4. Paint surfaces behind movable equipment same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment with prime coat only, wherever practicable.

5. Finish exterior doors on tops, bottoms, and edges same as exterior faces.

6. Sand lightly and dust clean between succeeding coat.

7. Surfaces designated to receive wall coverings shall be finished with first coat (primer/sealer) only.

8. Metal surfaces shall be painted using spray techniques.

9. Refer to Section 092900 for locations of Level 5 finish. Gypsum board may be finished as Level 4 under the work of Section 092900, and prepared with primer-surfacer under the work of this Section to qualify as Level 5 finish.

**B. Gloss Levels:** Unless otherwise indicated on Contract Drawings, typical gloss levels shall be as follows:

1. **Walls:** Eggshell, as directed by Architect.
   a. Walls at Wet Areas: Eggshell or semi-gloss, as directed by Architect.

2. **Ceilings:** Low sheen to match walls.
   a. Ceilings at Wet Areas: Semi-gloss, as directed by Architect.

3. **Metals:** Semi-gloss, as directed by Architect.

4. **Other Areas:** As indicated on Contract Drawings, or as directed by Architect.

**C. Machine Room Finishes:** Paint machine room floor and walls as follows:

1. **Floor:** Gray.

2. **Walls:** Off-white.

**D. Mechanical and Electrical Equipment:**

1. Remove grilles, covers, and access panels for mechanical and electrical systems from location and paint separately to match color of wall or ceiling.

2. Prime and paint insulated and bare pipes, conduits, boxes, insulated and bare ducts, hangers, brackets, collars, and supports, except where items are plated or covered with a pre-finished coating, or are not exposed to view.

3. Paint interiors of ducts flat black to limit of sightline through grilles.

4. Paint exposed ducts, including foil-faced insulation, and pipes with one coat of Benjamin Moore Super Spec HP Universal Alkyd Metal Primer P07, or equal, where exposed or visible through openings in ceilings.

5. Replace identification markings on mechanical and electrical equipment when painted over or spattered.

**E. Roof Structure:** Paint all exposed surfaces at ceilings including roof structural members, mechanical and electrical equipment, conduit, and piping.

1. Do not paint light fixtures and ballasts, sprinkler heads, or prefinished insulation.
3.04 ADJUSTING
   A. Remove, finish, or repaint work not in compliance with specified requirements.

3.05 CLEANING
   A. Waste Management: Recycle or salvage waste paint and packaging materials in accordance with CALGreen 5.408.3.

3.06 PROTECTION
   A. Provide WET PAINT signs, barricades, and other devices required to protect newly finished surfaces. Remove temporary protective wrappings provided for protection of other work after completion of painting operations.

3.07 PAINT SYSTEMS
   A. *Exterior Paint Systems and Interior Paint Systems* **Types P-# Series** for field painted items are described in outline form in the following Schedule.
      1. *Factory Finish Systems* refers to transparent and opaque finish systems described by national woodworking institutes in order to establish standards of quality. These finish systems do not include factory finishes specified for other materials.

**SCHEDULES**

**EXTERIOR PAINT SYSTEMS** Refer to Subparagraph 3.03-A-1 for Minimum Number of Coats symbol (✓).

A. Concrete:
   1st coat: 100% Acrylic-Epoxy Modified Concrete & Masonry Sealer
   ✓2nd coat (flat): 100% Acrylic Emulsion (Southwest Formula)

B. Precision Concrete Block (smooth, natural color):
   Filler coat: 100% Acrylic Block Filler
   ✓1st coat (flat): 100% Acrylic Emulsion (Southwest Formula)

C. Integral Color Concrete Block: Natural finish (do not paint)

D. Cement Plaster (Stucco):
   1st coat: 100% Acrylic Concrete Primer
   ✓2nd coat (flat): 100% Acrylic Emulsion

E. Site Handrails and Guardrails: Refer to Section 099600.
   1st coat: 100% Acrylic Primer (equal to PPG Pitt-Tech 90-712)
   2nd coat (semi-gloss): Epoxy Two-part Finish Coat (equal to PPG Pitt-Glaze Water Based Acrylic Epoxy 16-901/16-902)
F. Metal (where not specified to be field finished under Section 099600):
   Pretreatment (Galvanized): Pretreatment
   1st coat (Galvanized): Rust-Inhibitive Metal Primer
   1st coat (Aluminum): Rust-Inhibitive Metal Primer
   1st coat (Ferrous): Red Oxide Metal Primer
   2nd coat: Alkyd Metal Primer
   ➤ 3rd coat: (semi-gloss) 100% Acrylic Semi-Gloss Enamel

G. Steel:
   1st coat: Red Oxide Metal Primer
   2nd coat: Alkyd Metal Primer
   ➤ 3rd coat: (semi-gloss) 100% Acrylic Semi-Gloss Enamel

INTERIOR PAINT SYSTEMS

Refer to Subparagraph 3.03-A-1 for Minimum Number of Coats symbol (➤):

A. Precision Concrete Block (smooth, natural color):
   Filler coat: Acrylic Block Filler
   1st coat: Acrylic Primer
   ➤ 2nd coat (flat): Acrylic Flat Emulsion

B. Integral Color Concrete Block: Natural finish (do not paint)

C. Concrete Floors (including Elevator Machine Room):
   Pretreatment: Pretreatment as recommended by manufacturer suitable for exposure and service.
   ➤ 1st coat (semi-gloss): Tnemec Tnem Series 280 Epoxy (6-8 mils dry), or equal

D. Gypsum Board (Low Odor Zero VOC):
   Pretreatment: Surface Equalizer (Westpac Prep Coat)
   1st coat: (primer) Acrylic Low Odor Zero VOC Primer
   ➤ 2nd coat (eggshell): Acrylic Low Odor Zero VOC Eggshell Enamel

E. Gypsum Board (for general use at all finish levels):
   Pretreatment: Surface Equalizer (Westpac Prep Coat)
   1st coat: PVA Sealer
   ➤ 2nd coat (eggshell): Acrylic Eggshell Enamel

F. Gypsum Board (with primer-surfacer coat at Level 5 finish):
   Primer-Surfacer coat: Primer-Surfacer as specified in this Section
   1st coat: Acrylic Flat Emulsion
   ➤ 2nd coat (eggshell): Acrylic Eggshell Enamel

G. Gypsum Board (without skim coat, for use at moisture sensitive areas):
   Pretreatment: PVA Sealer
   1st coat: Acrylic Flat Emulsion
   2nd coat (semi-gloss): Acrylic Semi-Gloss Enamel
   ➤ 3rd coat (semi-gloss): Acrylic Semi-Gloss Enamel

H. Metal - Ferrous/Galvanized (Except AESS metals finished under Section 099600):
   1st coat: Rust Inhibitive Metal Primer
   ➤ 2nd coat (semi-gloss): Acrylic Semi-gloss Enamel
I. Wood, Opaque (Field Applied):
   1st coat: Acrylic Enamel Undercoater
   ➤ 2nd coat (low sheen): Acrylic Low Sheen Enamel
   ➤ 2nd coat (eggshell): Acrylic Eggshell Enamel
   ➤ 2nd coat (semi-gloss): Acrylic Semi-Gloss Enamel

J. Wood, Transparent Finish (Field Applied):
   1st coat (stain): Waterborne or Lacquer Stain
   2nd coat (filler): Sanding Sealer (with paste wood filler at open grained woods)
   3rd coat: Semi-Gloss Catalyzed Lacquer
   ➤ 4th coat: Semi-Gloss Catalyzed Lacquer
gloss (Pittsburgh Aquapon WB 98-57 Series)

FACTORY FINISH SYSTEMS  Refer to Fabrication Article in Sections where product finishes are specified.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: High performance modified urethane coatings for metals exposed to the environment, including interior AESS metal fabrications exposed to public view. Items generally include:
1. Exterior exposed structural steel.
2. Interior exposed structural steel viewed from public spaces.
3. Steel handrails and guardrails.
4. Steel gates and fences.
5. Exterior signage supports.
7. Stairs exposed to public spaces.
8. Exposed galvanized sheet metal work not otherwise prefinished.

B. Referenced Sections:
1. Section 012500 - Substitution Procedures.
2. Section 013300 - Submittal Procedures.
4. Section 018113 - Sustainable Design Requirements.
5. Section 050513 - Shop-Applied Coatings for Metals.
6. Section 051200 - Structural Steel Framing.
7. Section 051213 - Architecturally-Exposed Structural Steel.
8. Section 055000 - Metal Fabrications.

1.02 REFERENCES

A. ASTM International (ASTM):
1. D 6386-10 - Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

B. California Code of Regulations (CCR):

C. The Society for Protective Coatings (SSPC):
   b. Volume 2 - Systems and Specifications, 7th Edition, including Specifications, Guides, Procedures, and Supplements:
      1) SP-2 - Hand Tool Cleaning.
      2) SP-3 - Power Tool Cleaning.
      3) SP-6 - Commercial Blast Cleaning (NACE 3).
4) SP-11 - Power Tool Cleaning to Bare Metal.

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Passivation is the process of making a material "passive" in relation to another material prior to using the materials together. In the context of corrosion, passivation is the spontaneous formation of a hard non-reactive surface film that inhibits further corrosion. This layer is usually an oxide that is a few atoms thick.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

C. Coordination: Refer to Section 055000, and Section 323363 to coordinate furnishing of primers to be shop applied with the systems proposed for use in this Section.

1.05 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and Specifications.

C. Samples: Submit samples of color-matched coatings, for review and acceptance.
   1. Coatings shall be custom-tinted to match the colors and sheens selected by the Architect.
   2. Provide samples of each color on 8-1/2-inch by 11-inch hardboard.

D. Quality Control Submittals:
   1. Tests Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
   2. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of application, including relevant limitations, safety and environmental cautions, and application rates.

E. Substrate Condition Field Report: Furnish report from installer confirming that surfaces, alignments, and tolerances to which materials of this Section will be applied are in a suitable and acceptable condition to receive finish materials specified in this Section.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and
means by which it is diverted, and statement that requirements for the credit have been met.
a. Comply with Section 017419 Construction Waste Management and Disposal.
2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.07 CLOSEOUT SUBMITTALS:
A. Warranty Documentation: Submit copies of written warranty, as signed by the applicator, agreeing to repair or replace defective coating work during the warranty period.

1.08 MAINTENANCE MATERIAL SUBMITTALS
A. Extra Stock Materials: Furnish in unopened clearly labeled containers, not less than 1 gallon of each coating material, in each color and gloss level incorporated into the work.

1.09 QUALITY ASSURANCE
A. Qualifications:
1. Applicator's Qualifications: Regularly engaged and specializing, for the preceding 5 years, in the application of high-performance coatings.
2. Licensed, certified or otherwise approved in writing by the coating manufacturer.

B. Certifications: Provide services of manufacturer's representative to certify that surface preparation and primer have been applied in accordance with the requirements of this Section.
1. Certify dry-film thicknesses of applied coatings.

C. Mockups: Prior to installation work, prepare sample panel as required to secure the Architect's acceptance prior to ordering materials.

1.10 DELIVERY, STORAGE, AND HANDLING
A. Handling: Comply with manufacturer's Material Safety Data Sheets to prevent hazardous or unsafe conditions.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers: Design is based on the use of products manufactured by the following manufacturers, and designated by manufacturer number, as follows:

1. **Manufacturer 1:** Tnemec Company, Inc., Kansas City, MO (816)483-3400, represented by TPC Consultants, Inc., Compton, CA (310)637-2363.
2. **Manufacturer 2:** Pittsburgh Paints, PPG Industries, Inc., Pittsburgh, PA (800)441-9695.
3. **Manufacturer 3:** The Sherwin-Williams Company, Cleveland, OH [www.sherwin-williams.com](http://www.sherwin-williams.com) or [www.sw.com](http://www.sw.com), with representation in Southern California at (858)496-8925.

B. Legend: Example - **System A-1a**:

1. The **upper case letter** code in each System reference indicates the type of **substrate** material. Primers and finish coats shall be the products of a single manufacturer.
2. The **number** code in each System reference indicates the **manufacturer** of the products specified, as listed in Paragraph 2.01-A.
3. The **lower case letter** code is used in some System references to indicate the **option** of alternative products by the same manufacturer.
4. Use the products of a single coating manufacturer for all work of this Section.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with relevant codes and regulations of cognizant governmental agencies having jurisdiction over airborne emissions and industrial waste disposal.

B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.

1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
   a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

C. Comply with CALGreen 5.504.4.3 Paints and Coatings:

1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
2. Aerosol paints and coatings shall comply with CALGreen 5.504.3.1
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
      a. Anti-corrosive Paints: Do not exceed VOC content limits established in Green Seal Standard GC-11.

2.04 MATERIALS

A. Previously Coated Ferrous Metals with Shop Primer (Type A) Substrates: This system is only required when regular shop primer is applied in error instead of specified primer required for bare steel.
   1. System A-1 Applied over Shop Primer:
      a. Field Primer: Tnemec Series 135 Chembuild two-part catalyzed epoxy coating.
   2. System A-2 Applied over Shop Primer:
      a. Field Primer: PPG Pitt-Tech Plus DTM 100% Acrylic Formula 90-912 Series Industrial Primer.
   3. System A-3 Applied over Shop Primer:

B. Ferrous Metals (Type B) Substrates:
   1. System B-1 Applied over Ferrous Metals:

d. Finish: Tnemec Series 1E85 Low VOC acrylic polyurethane semi-gloss enamel.

2. **System B-2** Applied over Ferrous Metals:
   c. Finish: PPG Pitthane High Build Semi-Gloss Urethane Enamel

3. **System B-3** Applied over Ferrous Metals:
   c. Finish: Sherwin-Williams Acrolon 100 Water Based Urethane, B65W Series Semi-Gloss:
   d. Clear Coat: TBD

3. **Galvanized Steel or Aluminum (Type C) Substrates (Over Non-Passivated Galvanized Steel or Over Aluminum Materials):**
   1. **System C-1a** (Option) Applied over Non-Passivated Galvanized Steel or Over Aluminum:
      a. Primer: Tnemec Hi-Build Epoxoline II Series L69 (field-applied) two-part catalyzed epoxy coating.
   
   2. **System C-1b** (Option) Applied over Non-Passivated Galvanized Steel or Over Aluminum:

   3. **System C-2a** (Option) Applied over Non-Passivated Galvanized Steel or Over Aluminum:

   4. **System C-2b** (Option) Applied over Non-Passivated Galvanized Steel or Over Aluminum:

   5. **System C-3** Applied over Non-Passivated Galvanized Steel or Over Aluminum:
PART 3 - EXECUTION

3.01 PREPARATION

A. Protection: Protect previously installed work, materials, and vehicles which may be affected by work of this Section.
   1. Take specific precautions to avoid the effect of wind drift in the application of liquid materials.

B. Construction Indoor Air Quality Management: If building is enclosed at time of application, temporarily seal penetrations and cover roof openings to the building interior to protect indoor air quality by blocking entry of externally-applied coatings with VOC pollutants in accordance with Section 018113.

C. Shop Preparation: The following surfaces are intended to be prepared at the shop prior to shipping materials to the project site:
   1. System A - Previously Coated Ferrous Metals with Standard Shop Primer: Remove insoluble contaminants by SSPC SP-2 (Hand Tool Cleaning) or SP-3 (Power Tool Cleaning). Check adhesion and compatibility of the shop primer and the Field primer prior to application.
   2. System B1 - Ferrous Metals, Shop: Minimum preparation shall be in accordance with SP-6 (Commercial Blast Cleaning) to achieve a uniform anchor profile of 1-2 mils.
   3. System B2 - Ferrous Metals, Field: Shop prepare in accordance with SSPC SP-11 (Hand and Power Tool Cleaning to Bare Metal).
   4. System C - Non-Passivated Galvanized and Aluminum Materials: Remove dirt, grease, oil, salt, and other contaminants with manufacturer's recommended etching solution. Rinse thoroughly with fresh water and remove soluble and insoluble contaminants and corrosion. Chemically Treat in accordance with ASTM D 6386 Sweep abrasive blast to achieve a uniform anchor profile of 1-2 mils.

D. Field Preparation: Spot clean to base metal all welds and damaged shop prime coat in accordance with SP-11 - Power Tool Cleaning to Bare Metal.

3.02 APPLICATION

A. Finish work in accordance with the manufacturer's recommendations as accepted by the Architect. Use system appropriate for substrate material and location of application. Coordinate system with preparation and primer requirements of Section 055000, and Section 323363. Refer to Part 2 - Products for primer and finish materials.

B. Shop Primer Type A Substrates:
   1. System A-1 over Shop Primer on Ferrous Metals:
      a. Field Primer: Apply primer coating material to a dry-film thickness of 3 to 5 mils.
      b. Finish: Apply finish coating material to a dry-film thickness of 2 to 3 mils.

2. **System A-2** over Shop Primer:
   a. Field Primer: Apply primer coating material to a dry-film thickness of 5 to 7 mils.
   b. Finish: Apply finish coating material to a dry-film thickness of 2 to 5 mils.

3. **System A-3** over Shop Primer:
   a. Field Primer: Apply primer coating material to a dry-film thickness of 3 to 6 mils.
   b. Finish: Apply finish coating material to a dry-film thickness of 2 to 4 mils

C. **Ferrous Metals Type B** Substrates:
1. **System B-1** over Ferrous Metals:
   a. Shop-Applied Primer: Apply shop-applied primer coating material to a dry-film thickness of 2.5 to 3.5 mils.
   b. Field-Applied Spot Primer: Apply field-applied spot primer to a dry film thickness of 2.5 to 3.5 mils.
   c. Intermediate Coat: Apply intermediate coating material to a dry film thickness of 4 to 6 mils.
   d. Finish Coat: Apply finish coating material to a dry-film thickness of 2 to 3 mils.
   e. Clear Coat: Not Required.

2. **System B-2** over Ferrous Metals:
   a. Shop-Applied Primer: Apply primer coating material to a dry-film thickness of 3 to 4 mils.
   b. Intermediate Coat: Apply intermediate coating to a dry film thickness of 3 to 5 mils.
   c. Finish: Apply finish coating material to a dry-film thickness of 2 to 5 mils.

3. **System B-3** over Ferrous Metals:
   a. Shop-Applied Primer: Apply primer coating material to a dry-film thickness of
   b. Intermediate Coat: Apply intermediate coating material to a dry film thickness of 3 to 6 mils.
   c. Finish: Apply finish coating material to a dry-film thickness of 2 to 4 mils.

D. **Galvanized Steel** or **Aluminum Type C** Substrates:
1. **System C-1a** over Non-Passivated Galvanized Steel or Over Aluminum:
   a. Shop-Applied Primer: Apply primer coating material to a dry-film thickness of 2 to 3 mils.
   b. Finish: Apply finish coating material to a dry-film thickness of 2.5 mils to 4 mils.

2. **System C-1b** over Non-Passivated Galvanized Steel or Over Aluminum:
   a. Shop-Applied Primer: Apply primer coating material to a dry-film thickness of 2 to 3 mils.
   b. Finish: Apply finish coating material to a dry-film thickness of 2-3 mils.
3. **System C-2a** over Non-Passivated Galvanized Steel or Over Aluminum:
   a. Shop-Applied Primer: Apply primer coating material to a dry-film thickness of 4 to 6 mils.
   b. Finish: Apply finish coating material to a dry-film thickness of 2 to 5 mils.

4. **System C-2b** over Non-Passivated Galvanized Steel or Over Aluminum:
   a. Spot Primer: Apply spot primer coating material to a dry-film thickness of 4 to 6 mils.
   b. Full Coat Primer: Apply full coat primer material to a dry-film thickness of 2 to 4 mils.
   c. Finish: Apply finish coating material to a dry-film thickness of 2 to 4 mils.

5. **System C-3** over Non-Passivated Galvanized Steel or Over Aluminum:
   a. Shop-Applied Primer: Apply primer coating material to a dry-film thickness of 0.7 to 1.3 mils.
   b. Finish: Apply finish coating material to a dry-film thickness of 2 to 4 mils.

E. Apply with air atomized spray equipment in accordance with manufacturer's instructions.

### 3.03 ADJUSTING

A. Areas defaced or scratched during construction operations shall be touched up with same material and color in a manner recommended by manufacturer of coating systems to look like new.

**END OF SECTION**
Graffiti-Resistant Coatings

Part 1 - General

1.01 Summary

A. Section Includes: Non-sacrificial anti-graffiti clear protective coating.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.

1.02 Related Standards

A. California Code of Regulations (CCR):

B. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 Administrative Requirements

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 Submittals

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Samples: In accordance with the provisions of Section 013300, submit 12-inch by 12-inch sample of coating applied to each color of each substrate material for Architect's acceptance.
   1. Apply coating to one-half of each material to be coated.
   2. Upon preliminary acceptance of material by Architect, provide sample of remover for demonstration of product use for Owner.

1.05 Sustainable Design Submittals

A. Material & Resources Submittals:
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means...
by which it is diverted, and statement that requirements for the credit have been met.

a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:

1. Product Data for IEQ Credit 4.2: For paints and coatings used inside the weatherproofing system, documentation indicating chemical composition and highlighting VOC content of each product used. Indicate VOC content in grams per liter (g/L) calculated according to CFR59, Subpart D (EPA Method 24).

1.06 CLOSEOUT SUBMITTALS

A. Certificates: Submit to Architect certified copies of invoices from the coating manufacturer showing the quantity of the approved coating delivered to the job site, together with an affidavit showing the square footage of surfaces to which the coating was applied and the manufacturer's written recommendations for coverage.

B. Submit certificate of inspection and compliance signed by the applicator.

1.07 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Provide one full unopened case of graffiti remover for each 1000 square feet of protected surface for Owner's maintenance personnel to use immediately after defacements.

1.08 QUALITY ASSURANCE

A. Qualifications:

1. Installer's Qualifications: Trained and licensed, certified, or otherwise approved in writing by the system manufacturer. Provide list of five similar projects, locations, and contact information to demonstrate satisfactory experience over a period of at least 5 years.

B. Certifications: Upon completion, issue to the Architect a certificate of inspection and compliance indicating that the completed work meets all the requirements of this Section.

C. Mockups: Apply anti-graffiti coating in semi-concealed area or separate test wall for review by Architect to establish standard of quality acceptable for use on Project.

1. Test: Deface area with Krylon spray paint. Allow paint to cure for 2 weeks. Remove graffiti in accordance with manufacturer's instructions.
2. Results: Observe effectiveness of graffiti resistant coating and cleaning system.
3. Approval: Proceed with graffiti resistant treatment work only after completion of field test application, testing, and approval of mockup by Owner’s representative and Architect.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at Site: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.
B. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.10 FIELD CONDITIONS

A. Ambient Conditions: Apply material only when surface and ambient temperatures are above 40 degrees F, and ambient conditions, including relative humidity, are such that condensation does not form on surfaces during application.
B. Precautions: Comply with manufacturer safety data sheets regarding wind drift, breathing fumes, open flame, and prolonged skin contact.

1.11 WARRANTY

A. Warranty materials and workmanship for a period of 10 years from date of application.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Comply with applicable air quality management agency VOC regulations.
B. Waste Management: Comply with CALGreen Section 5.408 Construction Waste Reduction, Disposal and Recycling. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3.
a. Include carpet, wood, aggregate, paint, shingles, wallboard, and other materials that have recyclable value.

2. Submit documentation to enforcing agency which demonstrates compliance with CALGreen 5.408.1.4. Sample compliance forms are available in the CALGreen Guide.

C. Comply with CALGreen 5.504.4.3 Paints and Coatings:
1. Architectural paints and coatings shall comply with VOC limits in Table 5.504.4.3.
2. Aerosol paints and coatings shall comply with CALGreen 5.504.4.3.1.

D. Environmental Protection: Materials proposed for use shall be completely non-toxic and environmentally safe.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
1. MR Credit 2 - Construction Waste Management: Recycle and/or salvage at least 75 percent of non-hazardous construction and demolition debris.
2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
3. MR Credit 52 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
1. IEQ Credit 4.2 Low-Emitting Materials, Paints and Coatings: Paints and coatings used on the interior of the building shall comply with the following requirements.
   b. Concrete Sealers: Do not exceed VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule No. 1113 Architectural Coatings.

C. Environmental Protection: Materials proposed for use shall be completely non-toxic and environmentally safe.

2.04 MATERIALS

A. Sealer: Equal to Evonik Protectosil Aqua-trete SG ready-to-use non-solvent waterborne, surface-applied, silane product with a VOC content of 25g/L.

B. Anti-Graffiti Coating: Equal to Protectosil Antigraffiti non-sacrificial zero VOC coating, manufactured by Evonik Industries.

C. Graffiti Removal: Citrus-based paint removers, non-hazardous proprietary cleaners, steam cleaning, and low-pressure water blasting.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification: Before applying coating:
   1. Test surfaces for alkalinity. Comply with manufacturer's requirements to neutralize surface.
   2. Allow new concrete, masonry, and cement plaster substrates to age 4 weeks or longer.
   3. Moisture content should be no higher than 15 percent as registered on an electronic moisture meter. Do not apply to surfaces below 45 degrees F or above 90 degrees F. Do not apply in the direct sun.

3.02 PREPARATION

A. Surface Preparation:
   1. Substrates to receive anti-graffiti coatings shall be thoroughly cleaned of dirt, laitance, encrustations and other foreign materials which would adversely affect bonding of the anti-graffiti coating or the required appearance of the structure.
   2. Preparation of Substrates: Concrete, concrete block or brick masonry, cement plaster, acrylic plaster, and metal shall be cleaned either by water blasting at 3000 pounds per square inch, or by other acceptable methods in accordance with coating manufacturer's recommendations.
   3. Repair loose, broken, or defective mortar joints where applicable.
   4. Allow surfaces to dry thoroughly prior to application.
   5. Mask adjacent surfaces not to be coated.
   6. Remove plates, machined surfaces, and similar items already in place that are not to be coated.

B. Pretreatment: Prior to application of anti-graffiti coatings, apply one coat of manufacturer's water repellent sealer in accordance with manufacturer's printed instructions.

3.03 APPLICATION

A. General: Apply coatings in accordance with the manufacturer's recommendations as accepted by the Architect. Use applicators and techniques best suited for the material being applied. Coverage rates for sealing and coating shall comply with manufacturer's recommendation for type of surface coated.

B. Apply on all exterior wall surfaces where exposed masonry/concrete is present.

3.04 FIELD QUALITY REQUIREMENTS

A. Manufacturer's Field Services: Arrange for manufacturer's representative to perform field inspection to certify that surfaces to receive coatings are in proper condition for the application, that applicators are properly trained in manufacturer's recommended application procedures, that materials delivered to project site are those approved for work of this Section, and that the weather is suitable.
3.05 CLEANING

A. Remove temporary coverings and protection of adjacent work areas. Completely remove overspray and spoils as soon as possible before curing. Clean installed products in accordance with manufacturer’s instructions prior to acceptance by Architect. Remove construction debris from Project site and legally dispose of debris.

B. Waste Management: Recycle or salvage waste materials in accordance with Section 017419.

3.06 PROTECTION

A. Protect adjacent finished work during progress of coating application and make good damage done to such work in manner satisfactory of Architect. Properly cover and protect finished work of other trades.

3.07 DEMONSTRATION

A. After coating has cured more than 36 hours, demonstrate to Owner’s personnel recommended techniques for removing graffiti in a semi-concealed location.

1. Apply and remove various coatings using specified graffiti removal methods recommended by manufacturer onto surface, and the use of low pressure water spray to rinse remover from surfaces.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Dry markerboards, tackboards, bulletin boards, and related trim and accessories.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 101123 - Tackable Wall Panels.

C. Refer to Section 101123 for tackboards.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
         1) Table No. 803.9 - Interior Wall and Ceiling Finish Requirements by Occupancy.

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: Submit complete manufacturer’s descriptive literature and specifications in accordance with the provisions of Section 013300.
B. Shop Drawings: In accordance with the provisions of Section 013300, submit Shop Drawings comprehensively describing the fabrication and installation of visual display boards and tackboards. Drawings submitted shall indicate not less than the following:
1. Dimensioned room elevations showing installed locations of units in relation to other architectural elements.
2. Anchorage details.
3. Materials and finishes.

C. Samples: In accordance with provisions of Section 013300, submit:
1. One sample 8 inches by 10 inches of each writing surface showing color, texture, and thickness of porcelain coatings, gage of metal, thickness and type of core material, and thickness of backing sheets.
2. One sample 8 inches by 10 inches of each tackboard showing surface, core, and backing sheet.
3. One of each type of wall clip or anchoring device.
4. One of each type of accessory, each 12 inches long, of trim, trough, joint splice, tackstrip, and map rail with hook.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-built units completely assembled in one piece without joints, whenever possible. Where dimensions exceed panel size, provide two or more pieces of equal length, as acceptable to the Architect. When overall dimensions require delivery in separate units, prefait at the factory, disassemble for delivery, and make final joint at a site.

1.07 FIELD CONDITIONS

A. Environmental Requirements: Maintain minimum ambient temperatures of 55 degrees F continuously from 24 hours before installation to 24 hours after installation.

B. Ensure adequate ventilation when using adhesives.

C. Field Measurements: Prepare required Shop Drawings based on field measurements.

1.08 WARRANTY

A. Provide manufacturer’s standard written guaranty against material failure for 50 years.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design is based on the use of products manufactured by one of the following:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulatory Requirements: Comply with flame spread requirements of CBC Table 803.9.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 DRY MARKERBOARDS

A. Ceramic-On-Metal: Equal to Edge as manufactured by Polyvision Corporation. Balanced, high-pressure laminated, 3-ply construction, with facing sheet, core, and backing. Surfaces shall support magnets.
   1. Facing Sheet: Polyvision 24 gage e3 environmental ceramic enamel steel fused to cold-rolled enameling grade steel, or equal.
   2. Core: 3/8-inch thick particleboard made from 100% recycled post-consumer and post-industrial waste.
   3. Backing Sheet: 0.015-inch thick 65 percent post-consumer and post-industrial, 99 percent recyclable aluminum sheet.
   4. Laminating Adhesive: Manufacturer’s standard low-VOC moisture and fungus-resistant adhesive.
   5. Markerboards shall be GreenGuard indoor air quality certified.
2.05 TACKBOARDS

A. Natural Cork: Seamless sheet, 1/4-inch thick with self-healing, burlapped-backed ground natural cork compressed with resinous binder and integral color throughout entire thickness.
   1. Unless otherwise indicated, make rigid panels by factory-laminating under pressure to 1/4-inch thick plywood or hardboard backing.

2.06 TRIM AND ACCESSORIES

A. Aluminum: Fabricate frames and trim of solid clear anodized extruded aluminum complying with ASTM B 221, alloy 6063-T5. Exposed trim, accessories, and fasteners in size and shape to suit type of installation, and as indicated on accepted Shop Drawings.
   1. General: Provide straight, single-length units wherever possible, keeping joints to a minimum. Miter corners to a neat, hairline closure.
   2. Frames: Manufacturer's standard trim units, approximately 1-1/2 inches wide, not less than 0.062-inch thick. Provide screw-on trim, with theft-proof Phillips flat-head screws, 2 inches long, with matching finish.
   3. Troughs: Continuous ribbed aluminum extrusions for each unit. Troughs shall be manufacturer's standard screw-on channel section, with 4-inch maximum projection and closed ends angled 33 degrees to wall and smoothly curved.
   4. Finish shall be Aluminum Association AA M32C22A31 Class II satin anodized architectural anodic coating.

B. Map Rail: Aluminum-framed map rail with tackstrip at top of each unit, with the following accessories:
   1. Display Rail: Continuous cork insert approximately 2 inches wide, integral with map rail.
   2. End Stops: One at each end of map rails.
   3. Map Hooks: Four for each map rail unit, furnished with flexible metal clips.

2.07 BULLETIN BOARDS

A. Bulletin Boards: 2100 Series aluminum framed, glass enclosed bulletin boards as manufactured by Claridge Products and Equipment, or equal.
   1. Tack Surface: 1/4-inch thick natural cork laminated to 1/4-inch thick tempered hardboard.
   2. Frame: Three-inch deep aluminum with mitered corners. Doors shall have self-closing piano hinges. Provide clear anodized finish.
   3. Glass: 1/8-inch thick tempered clear safety glass with flat key tumbler lock.

2.08 FABRICATION

A. Markerboard Units: Fabricate factory-built markerboard and tackboard units completely assembled in one piece without joints, whenever possible. Where dimensions exceed panel size, provide two or more pieces of equal length, as acceptable to the Architect. When overall dimensions require delivery in separate units, prefabricated at the factory using
concealed metal splines, disassemble for delivery, and make final joint at site.
1. Applied enamel coating to butt joints and exposed edges of facing sheets.
2. Provide mullion trim at joints between markerboards and tackboards.
3. Provide matched butt joints between abutting sections of markerboard. Color match and properly trim edges.
4. Horizontal joints in markerboards or tackboards are not acceptable.

B. Make joints in trim only where total length exceeds maximum manufactured length. Fabricate with minimum number of vertical joints, balanced around center of board, as acceptable to the Architect.

C. Trim and grind frame sections and assemblies free of burrs and sharp edges.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units in locations and mounting heights as indicated on the Contract Drawings and in accordance with the manufacturer's instructions.

B. Provide clips, backing materials, brackets and anchors, trim, and accessories for a complete installation.
1. Fasten anchors and brackets at 16 inches on centers.

C. Install units with concealed hangers plumb and level, in accordance with the manufacturer's printed instructions.

D. Coordinate job-assembled units with grounds, trim, and accessories. Join all parts with neat, precise hairline joints and no rough edges.

3.02 ADJUSTING

A. Adjust units for alignment and fit. Ensure smooth operation of movable units.

3.03 CLEANING

A. Thoroughly clean surfaces of units using materials recommended by the manufacturer.

END OF SECTION
- SECTION 101123 -

TACKABLE WALL PANELS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Vinyl-fabric wrapped fiberboard tackable wall panels, including trim and accessories.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. C 423-09a - Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   5. F 793-10a - Standard Classification of Wallcovering by Durability Characteristics.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
         1) 803.1 - General.
         2) Table 803.5 - Interior Wall and Ceiling Finish Requirements By Occupancy.

C. Chemical Fabrics & Film Association, Inc. (CFFA):

D. Federal Specifications (FS):
   1. CCC-W-408A.

E. National Fire Protection Association (NFPA):
F. United States Green Building Council (USGBC):
    1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Comply with applicable procedural requirements of Section 018113.

B. Comply with indoor air quality management requirements specified in Section 018119.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013330, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: Submit installation layout, indicating location of joints. Minimize horizontal joints. Use widest panels possible. When partial panels are required, locate equal partial panels on both ends of a run.

C. Samples: In accordance with the provisions of Section 013300, submit two 12-inch by 12-inch samples of the specified fabrics applied to the specified tackable board showing corner and joint conditions.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.06 QUALITY ASSURANCE

A. Field Samples: Install a portion of each wall covering required.
   1. Install field samples which are representative, in every respect, of the completed work.
   2. When accepted, field samples may be deemed incorporated into the work, and will become the standards by which subsequent work of this Section will be evaluated for acceptance.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Mark panels with project identification number, panel number, location code, and quantity of units per size corresponding to the accepted Shop Drawings.
1.08 WARRANTY

A. Provide manufacturer's standard written guaranty against material failure for 50 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Panels:

B. Acceptable Manufacturers of Fabric:
   1. Genon Contract Wallcovering, Gencorp Polymer Products, Hackensack, NY (201)489-0100.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or the products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 SUSTAINABILITY REQUIREMENTS

A. Sustainability Submittals:
   1. MR Credit 4: Use materials with recycled content that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 Regional Materials: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for 10 percent of the total materials value.
      a. Identify each regionally manufactured material, including its source and cost.
      b. Give preference to products manufactured and of primary raw materials extracted/recovered within 500 mile radius of Project site.
B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. EQ Credit 4.1: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2.03 PERFORMANCE CRITERIA

A. Performance Requirements:
   1. Physical Characteristics, Vinyl: Confirmed by testing in accordance with CFFA W-101-A and FS CCC-W-408A.
   2. Surface Burning Characteristics: Confirmed by testing in accordance with ASTM E 84 or NFPA 255 requirements for flame spread, fuel contribution, and smoke density, and CBC Table 803.5 for Class A Flame Spread Index of 0-25.
   3. Acoustical: Determine acoustical absorptions characteristics by testing fully assembled production material in accordance with ASTM C 423 using Type A mounting as defined by ASTM E 795.

2.04 TACKBOARDS

A. Panels: Soft-Tone Acoustical/Tackable sound barrier panels as manufactured by Lamvin, Inc., or equal.
   1. Thickness: Soft-Tone 50 Series, NRC 50.
B. Vinyl-Fabric Facing, General:
   1. Wallcoverings: Type II 18% or microperforated vinyl fabric equal to Koroseal Koroseal M621-14 Neutral, microperforated vinyl. Do not use cork core.
C. Fiberboard: Non-perforated mineral fiber insulation board, manufactured specifically for use as substrate for vinyl-covered tackboard panels, asphalt-free, with ironed-on coating.
   1. Thickness: 1/2-inch.
   2. Density: 16 pcf.
   4. Panel Height: As indicated on Contract Drawings.
   6. Fire Resistance: ASTM E 84, Class B; NFPA 253, Class II.
D. Tackable Core: Non-perforated mineral fiberboard.
E. Trim: For ends and corners of panels, provide fabric wrapped plastic moldings produced by panel manufacturer. Conform to profiles and dimensions indicated on the Drawings.
   1. Provide aluminum top and bottom strips.
F. Adhesive: Heavy-duty, premixed, oil-based, VOC-compliant, non-flammable, mold, mildew, and vermin resistant, equal to Pro-Series SW-325 manufactured by OSI, prepared specifically for each type of wall-covering.
G. Sound Absorption: In accordance with ASTM C 423 (Type A mounting):

H. Panel Sizes: As indicated on the Contract Drawings.

I. Tolerances:
   1. Panel core dimensions shall have a maximum tolerance of 0.020-inch.
   2. Edging shall be in alignment with the panel face and concealed from view.
      a. Edging shall be fixed to the core with no visible deviations when panels are butted side by side.

J. Mounting:
   1. Continuous aluminum Z-track, as recommended by manufacturer.

K. Fabrication:
   1. Edge Detail: Pencil radius.
   2. Bond fabric finish to panel face and return edges a minimum of 1-1/2 inches on back of panel, wrinkle free and fully tailored at corners with no exposed darting.

2.05 FABRICATION

A. Tackable Panels: Factory laminated vinyl fabric to wood fiberboard backing with adhesive. Wrap vinyl 1-1/2 inches around vertical edges and adhere to back of panel.

B. Provide all panels in the same areas with fabric from the same production lot so that color matches between panels.

C. Fabricate panels so that vinyl fabric texture shall have same orientation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Prior to commencing work verify the following:
   1. Walls are not more than 1/8-inch in 10 feet out-of-plane.
   2. Joints in gypsum board are taped, treated with joint compound, and sanded in accordance with levels specified in Section 092900.

3.02 PREPARATION

A. Surface Preparation:
   1. Gypsum Wallboard:
      a. Dust the surface thoroughly and remove loose material.
      b. Apply a uniform release coat of material recommended by the manufacturer of the accepted adhesive.
   2. Coordinate depth of wall outlet boxes to align with surface of tackable panels.
   3. Size porous surfaces with two coats of thinned adhesive or primed with two coats of acrylic latex paint.
   4. Do not commence installation until contiguous work has been completed. Remove hardware, plates, and accessories, and replace such items after tackable panels have been applied.
3.03 INSTALLATION

A. Install work in accordance with the manufacturer's submittals and recommendations, as accepted by Architect.
   1. Match pattern at seams between adjacent panels.

B. Tackable Wall Covering: Apply material as recommended by manufacturer.
   1. Apply adhesive with trowel as recommended by manufacturer.
   2. Scribe, cut, and fit material to butt tightly to adjacent surfaces, built-in casework, and permanent fixtures and pipes.
   3. Install molding as indicated in Contract Documents.

3.04 ADJUSTING

A. Visually inspect to verify that installed wall panels are secure, smooth, and aligned at joints.
   1. Correct mismatch of color and pattern as necessary to secure Architect's acceptance.

3.05 CLEANING

A. Clean tackable wall covering using a sponge with a neutral pH cleaning solution. Do not use abrasive cleaners. Rinse thoroughly with water and let dry before using.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Exterior code-required, building, and site signage. Include:
   1. Fire lane signage.
   2. Accessible parking signage.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 033100 - Structural Concrete: General concrete requirements for sign footings.
   5. Section 055000 - Metal Fabrications: General requirements for sign-post materials.
   7. Section 321723 - Pavement Markings.

C. Related Sections:
   1. Section 101404 - Interior Signage.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
         1) Section 1011 - Exit Signs:
            a) 1011 - Means of Egress Identification.
b. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
   1) Division 7 - Communications Elements and Features.
      b) Section 11B-703 - Signs.
         (1) 11B-703.7 - Symbols of Accessibility:
             (a) 11B-703.7.2 - Symbols.
                i) 11B-703.7.2.1 - International Symbol of Accessibility.

C. California Code of Regulations (CCR):
      a. Chapter 5 - Fire Service Features.
         1) Section 503 - Fire Apparatus Access Roads.
            a) 503.3 - Marking.
         2) Section 505 - Premises Identification.
            a) 505.1 - Address Identification.

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordination: Refer to Section 321723 for coordination with code required signage painted on paving.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and specifications.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of site signage. Shop Drawings submitted shall include not less than the following:
   1. Site plans dimensionally indicating locations of signs provided.
   2. Elevations of sign assemblies indicating assembly heights, post embedments, footing dimensions, and relationships to vertical control.
   3. Materials and finishes.

D. Samples: Submit full size samples of each type and color indicated in Contract Drawings. Installed work shall match approved samples exactly, or work will not be accepted.
   1. Typical individual letter and numeral in specified material and finish, as required.
   2. Two sets of material samples indicating each designated color and surface finish.
      a. Metal: Submit color shade range on actual production sections.
      b. Plastics: Samples of plastic materials for the various applications in their finished state, and data describing the materials and finishes.
3. Additional samples of typestyles, materials and finishes, as specified.
   a. Submit for approval complete alphabets, numbers, and punctuation. If more than one foundry’s cut is to be used, each cut shall be submitted.
   b. Submit for approval templates or samples showing letter and word spacing for each letter size, in each letterform specified.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

A. Qualifications: Provide supervision by a person qualified and experienced in handling the work covered in this Section. This individual and his qualifications shall be satisfactory to and approved by the Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   5. Lettering Concepts, Inc., Huntington Beach, CA (714)848-5596.
   6. Metal Arts Division of L&H Manufacturing Company, represented by Art Clark (213)460-9820.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Regulatory Requirements: Comply with applicable requirements for disability access contained in CBC Section 11B-703, CBC Section 11B-502, and applicable federal disability access laws.

B. Building address signage shall be 6 inches high minimum, but plainly visible from roadway, as determined by local governing agency in accordance with CBC 11B-501.2 and California Fire Code 505.1.
   1. Traffic signs shall comply with local governing agency standards.

C. Comply with the provisions of CFC 503.3 for fire access markings.
   1. Comply with California Vehicle Code Section 22500.1 for No Parking - Fire Lane custom signage.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 MATERIALS

A. Aluminum:
   1. Extrusions: Aluminum shapes in accordance with ASTM B 221 and ASTM B 429 for Alloy 6063-T5.
   2. Sheet and Plate: Aluminum sheet and plate in accordance with ASTM B 209 for Alloy 5005-H32.
   3. Castings: ASTM B 26, of alloy and temper recommended by sign manufacturer for casting process required.

B. Sign Materials:
   1. Metal: Reflectorized 0.125-inch thick sheet steel or 0.1875-inch thick aluminum with baked enamel finish.
   2. Acrylic Sheet: Cast methyl methacrylate monomer (acrylic) sheet conforming to ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing), of thickness indicated, with Finish 1 (smooth or polished finish), equal to Plexiglas as manufactured by Rohm and Haas Company.
      a. Transparent Sheet (Clear): Colorless sheet in non-glare matte finish, with light transmittance of 92 percent when tested in accordance with ASTM D 1003.
      b. Translucent Sheet (White): White sheet of density required to produce uniform brightness and minimum halation effects.
      c. Opaque Sheet: Opaque sheet in colors and finishes indicated on Contract Drawings, or selected by Architect from manufacturer's standard colors.
d. Coating: As recommended by acrylic sheet manufacturer for optimum adherence to acrylic surface. Include inks and paints for copy and background colors that are non-fading for intended application.

3. Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels in sizes and thicknesses indicated, with a minimum tensile strength of 15,000 psi when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi when tested according to ASTM D 790.

C. Graphic Films: As manufactured by 3M, or equal.
      a. 3M Scotchlite Reflective Series 8300 glass bead material.
      b. 3M Scotchlite Reflective Series 6200 microprismatic material.

D. Vinyl:
   1. Die cut vinyl graphics are shall be cut from premium film reflective sheet equal to 3M Scotchlite Series 280/280i.
   2. Photoreadies or patterns for die-cut letters and graphics shall be approved by the Architect.

E. Fasteners: For securing signs to posts, provide color coordinated vandal-proof cadmium plated or stainless steel bolts with nuts and washers finished to match.
   1. Screws: Where possible, provide flat head countersunk screws with finish to match adjacent surfaces.
   2. Carriage Bolts: Provide 5/16-inch diameter carriage bolts with finish to match adjacent surfaces.
   3. Provide peened threads for vandalproof attachment.

F. Concrete: In accordance with the requirements of Section 033100, provide concrete for sign post footings with a 28-day compressive strength of not less than 3000 pounds per square inch.

G. Protective Paint: Zinc chromate primer or bituminous paint, as recommended by manufacturer for isolation between dissimilar materials.

2.05 MANUFACTURED UNITS

A. Sign Posts, Steel: In accordance with the requirements of Section 055000, provide posts for signs fabricated from galvanized steel tube with end closures welded and ground smooth.
   1. Finish posts in accordance with the requirements of Section 099600.

B. Accessibility Compliance Signs: The following are minimum code requirements:
   1. Accessibility Parking Stall Sign: Porcelain enameled 16 gage heavy duty aluminum sign with white reflectorized symbols on blue background. Sign shall have a minimum sign area of 70 square inches.
      a. Sign shall display the International Symbol of Accessibility at accessible spaces, and shall include either additional language or an additional sign stating **MINIMUM FINE $250** below the International Symbol Of Accessibility, in compliance with CBC 11B-502.6.
b. At van spaces display the additional message **VAN ACCESSIBLE** with the symbol.

c. Attach signs to post with specified fasteners

2. **Accessibility Entry Sign**: Provide 17-inch by 22-inch tow-away traffic warning sign at each entrance to off-street parking facilities or immediately adjacent to and visible from each stall or space.

   a. Sign shall have the same material and finish as the accessibility parking stall sign.
   
   b. Lettering shall be 1 inch in height.
   
   c. Provide necessary information to the signage company for sign text prior to fabrication.

      1) Lettering shall be fabricated as a permanent part of the sign.
   
   d. Text shall notify public of legal consequences of illegally parking in a space for individuals with disabilities, as follows:

   ![Unauthorized Vehicles Parked in Designated Accessible Spaces Not Displaying Distinctive Placards or License Plates Issued for Persons with Disabilities May Be Towed Away at Owner's Expense. Towed Vehicles May Be Reclaimed At [_____________________] or By Telephoning [____________________]"

3. **Accessibility Parking Stall Sign Inside Parking Structure**: Refer to Section 101404.

4. **Accessibility Route/Directional Sign**: Provide 5-inch by 7-inch sign as indicated on the Contract Drawings.

   a. Sign shall have the same material and finish as the accessibility parking stall sign.
   
   b. Directional arrows shall indicate direction of accessible path.

5. **Accessibility Entry Sign on Building**:

   a. Square sign constructed of Scotchlite Brand reflective sheeting laminated on 18 gage steel, silkscreened with symbol, color, and design as specified in Paragraph 2.06-B.

      1) Fasteners: Tamper proof screws.
      2) Mounting location and heights at building entrances that are accessible CBC 11B-502.6
   
   b. Refer to Section 101404, Paragraph 2.06-B for accessible entry signs mounted on glass.

6. **Fire Lane**: In accordance with Contract Drawings.

C. **Character (Letter and Number) Style**: Assume Helvetica Medium font for bidding, unless otherwise indicated on the Contract Drawings.
D. Signage at the Student Union Building: Design is based on the use of freestanding steel channel characters as indicated on Contract Drawings.
   1. Size: 18 inches tall by 2-inch stroke.
   2. Fabricate letters with 18 gage front face and 24 gage at side faces.
   4. Mounting: Pin mount standing off the building façade by 2 inches. Mount through exterior cladding that is standing off the soffit framing by 3-1/2 inches.
   5. Installation: Mount through exterior cladding with 3/16" aluminum studs. Length of studs shall be 8" with washer and nuts attached to metal stud framing. Provide mounting template, identifying stud locations and letters or rail attachments. Provide six to eight points of attachment per letter or C-channel rail top and bottom in custom color. Provide a minimum of five attachments at each rail or word.
   6. Lighting: Back lit with LED lamps. Coordinate with the work of Division 26 to provide electrical power and controls.
   7. Electrical Requirements: Provide a 60w power supply for each word, and a 12v low voltage with a minimum 20 LED lamps for each letter. Lead power supply line shall be 36-inches long, verified in field. Run cables in conduit with two power lines for each letter.

2.06 FABRICATION

A. Provide components fabricated and finished in the factory and ready for installation.
   1. Design of sign and posts shall be as indicated on the Contract Drawings.
   2. Die cut letters and silk-screened graphics shall be as indicated on the Contract Drawings.

B. International Symbol of Accessibility: Building accessibility signs shall comply with Section 11B-703.7. Refer to Contract Drawings for sign type, size, and design of signage.
   1. Symbol shall consist of a white figure with a blue background color in accordance with CBC 11B-703.7.2.1.
      a. Color of accessibility symbol shall match color No. 15090 as published in Federal Standard 595B.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Signs: Install work in accordance with the Contract Documents and the manufacturer's submittals, as accepted.
   1. Locate signs at parking stalls for individuals with disabilities and at building entrance approaches as indicated on the Contract Drawings, and as required by regulatory agencies.
   2. Mount signs a minimum of 80 inches from bottom of sign to finished grade if free-standing in path of travel, and a minimum height of 36 inches above finished grade if wall mounted.
   3. Pour concrete footings minimum 8 inches diameter by 20 inches deep for parking stall signs, unless detailed otherwise on the Contract Drawings.
4. Cast sleeves in concrete footing to receive open-ended bottom of sign post unless indicated otherwise. Fasten securely with specified screws.
5. Install level, plumb, and at the indicated heights.
6. Apply films using materials, methods, and tools described in manufacturer’s appropriate instruction bulletins.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Interior code required signage:
   1. Informational signs.
   2. Room identification and directional signage.
   3. Custom graphics.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, Part 1- California Administration Code (CBC), 2013 edition:
         1) Section 1011 - Exit Signs.
            a) 1011.1 - Where Required.
            b) 1011.3 - Illumination.
            c) 1011.4 - Raised Character and Braille Exit Signs.
            d) 1011.7 - Floor-Level Exit Signs.
b. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
1) Division 2 - Scoping Requirements.
   a) Section 216 - Signs.
      (1) 11B-216.6 - Entrances.
   2) Division 5 - General Site and Building Elements.
      a) Section 11B-502 - Parking Spaces.
         (1) 11B-502.2 - Vehicle Spaces.
         (2) 11B-502.3 - Access Aisle.
         (3) 11B-502.6 - Identification.
   3) Division 7 - Communications Elements and Features.
      a) Section 11B-703 - Signs:
         (1) 11B-703.1 - General:
            i) 11B-703.1.1 - Plan Review and Inspection.
         (11B-703.1.1.2 - Inspection.
      b) Section 11B-703 - Signs.
         (1) 11B-703.2 - Raised Characters.
            a) 11B-703.2.4 - Character Proportions.
            b) 11B-703.2.5 - Character Height.
         (2) 11B-703.3 - Braille.
            a) 11B-703.3.2 - Position.
         (3) 11B-703.4 - Installation Height and Location.
            a) 11B-703.4.1 - Height above finish Floor or Ground.
            b) 11B-703.4.2 - Location.
         (4) 11B-703.6 - Pictogram.
            a) 11B-703.6.1 - Pictogram Field
            b) 11B-703.6. - Finish and Contrast.
         (5) 11B-703.7 - Symbols of Accessibility:
            a) 11B-703.7.2 - Symbols.
               i) 11B-703.7.2.6 - Toilet and Bathing Facilities Geometric Symbols.

C. California Code of Regulations (CCR):
   1. Title 19 - Public Safety:
      a. Division 1 - State Fire Marshal:
         1) Chapter 3 - Fire Extinguishers.
            a) Article 4 - Classifications and Ratings of Portable Fire Extinguishers.
               (1) Section 563(b).

D. California Code of Regulations (CCR):

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
B. Coordinate the work of this Section with separately issued signage and graphics documents.

C. Refer to separately issued signage schedule for types, quantities, and text of room identification and directional signage.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature, materials list, and specifications.

C. Shop Drawings:
   1. Establish the actual detail of all manufactured or fabricated items, indicating mounting details proper relation to existing work.
   2. Sign contractor shall submit two full-size letter and word spacing patterns for each sign type specified.
   3. Submit signage schedule for review and approval by Owner.

D. Samples: Submit full size samples of each type and color indicates in Contract Drawings.
   1. Sheet materials used for custom signage in 8-inch by 10-inch sizes.
   2. Extruded materials in 10-inch lengths.
   3. Submit full size sample of dimensional letters.
   4. Typical vinyl letter.
   5. Typical individual letter and numeral in specified material and finish, as required.
   6. Two sets of material samples indicating each designated color and surface finish.
      a. Metal: Submit color shade range on actual production sections.
      b. Plastics: Samples of plastic materials for the various applications in their finished state, and data describing the materials and finishes.
   7. Sample of tactile sign with Braille.
   8. Additional samples of typestyles, materials and finishes, as specified.
      a. Submit for approval complete alphabets, numbers, and punctuation. If more than one foundry's cut is to be used, each cut shall be submitted.
      b. Submit for approval templates or samples showing letter and word spacing for each letter size, in each letterform specified.

E. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include
statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.06 QUALITY ASSURANCE

A. Manufacturer: Qualifications: Work required under this section from manufacturer regularly engaged in work of this type and scope for a minimum of 5 years.

B. Single Source Responsibility: For each separate type of sign required, obtain materials and systems from one source and from a single manufacturer.

1.07 DELIVERY, STORAGE, & HANDLING

A. Package signs to prevent damage during shipment, handling, storage and installation. Products are to remain in their original packaging until removal is necessary for installation.

B. If installation site is not ready for signage upon delivery, store signs in a dry, air-conditioned environment.

C. Handle signage in accordance with manufacturer’s instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. 3M Building & Commercial Services Division, St. Paul, MN (651)737-1053, www.3m.com/us/graphicarts/.
   3. ASI Sign Systems, Dallas, TX (214)352-9140, (800)274-7732, with offices in Culver City, CA (310)645-1400.

B. Acceptable Manufacturers of Film for Graphics:
   1. 3M, Specified Construction Products Department, St. Paul, MN (800)480-1704, with local Fascara dealers listed at: http://solutions.3m.com/wps/portal/3M/en_US/Window_Film/Solutions/Support/Find_a_Dealer/.
   2. CPFilms (Courtaulds Performance Film), a division of Solutia, St. Louis, MO (314)674-1000, (800)255-8627, www.llumar.com.
C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Accessibility signage shall comply with the requirements of CBC Chapter 11B:
   1. Tactile exit signage shall comply with CBC 1011.4.
   2. Identification symbols shall conform to CBC Sections 11B-502.6.
   3. Signage shall conform to CBC Section CBC 11B-703.
   4. Toilet room pictograms shall conform to CBC 11B-703.6. Provide the following geometric symbols on doors to toilet rooms:
      a. Men: Equilateral triangle with 12-inch sides and international symbol for man.
      b. Women: 12-inch diameter circle with international symbol for woman.
   5. Tactile signs shall comply with CBC 11B-703.3.
   6. Refer to Article 3.04 for inspection of code required signage.

B. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Table 5.504.4.1 and Table 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2.04 MATERIALS

A. Acrylic Sheet: Acrylic Sheet: Cast methyl methacrylate monomer (acrylic) sheet conforming to ASTM D 4802, Category A-1 (cell-cast sheet),
Type UVA (UV absorbing), of thickness indicated, with Finish 1 (smooth or polished finish), equal to Plexiglas as manufactured by Rohm and Haas Company.

B. Plastic Laminate: High-pressure plastic laminate engraving stock with contrasting face and core plies, in finishes and color combinations indicated on Contract Drawings.
   1. Laminating adhesive and backing materials shall be urea formaldehyde-free.

C. Aluminum:
   1. Sheet: Alloy and temper conforming to ASTM B 209 for Alloy 5005 Temper H15, with finishes indicated on Contract Drawings, or as selected by Architect from manufacturer's standard sheet finishes.
   2. Extrusions: Alloy and temper conforming to ASTM B 221 for Alloy 6063 Temper T5, with finishes indicated on Contract Drawings, or as selected by Architect from manufacturer's standard extruded finishes.
   3. Castings: Alloy and temper conforming to ASTM B 108 or as recommended by manufacturer, with finishes indicated on Contract Drawings, or as selected by Architect from manufacturer's standard finishes.

D. Vinyl Graphics Film Material: 3M Fascara Interior Decorative Film material, or equal, consisting of a durable polyester with a decorative matte surface with a silicone liner to protect clear pressure-sensitive adhesive, as manufactured by 3M Building & Commercial Services Division.
   1. Provide non-reflective frosted type in 30 percent white color as selected by Architect.
   2. Film Thickness: 3.0 mils and 3.5 mils nominal thickness.
   3. Provide uniform film without noticeable pin holes, streaks, thin spots, scratches, banding, or other optical defects. Variation in total transmission across width, at any portion along length, shall not exceed 2 percent over average. Provide film with no evidence of coating voids.

E. Reflective Symbols: 3M Scotchlite Reflective Series 6200 microprismatic material, as manufactured by 3M Commercial Graphics Division, or equal.

2.05 ACCESSORIES

A. Mounting Methods:
   1. Use concealed fasteners or other products for attachment indicated fabricated from materials that are not corrosive to sign material and mounting surface.
   2. Fasteners: Use concealed fasteners fabricated from materials that are not corrosive to sign material and mounting surface.

B. Adhesive: Permanent type with no more than 50g/L VOC content, as recommended by manufacturer.

C. Anchors and Inserts:
   1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for
drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.06 SIGNAGE SYSTEMS

A. Plastic Plaque Signage:
1. Equal to APCO IM System modular updatable plaque signage system consisting of holder unit mounted to substrate and insert panels secured to holder providing graphic and visual information.
2. Director Interchangeable Message Panels - SignTrack:
   a. Combination of Radius header and base holder units, with vertical aluminum tracks to accept PresLock fastener, single or multiple centers, and base insert units to form modulating wall mounted directory.
   b. Combination of two-header and two-base holder modules back to back with similar header and base insert units to form ceiling suspended module providing graphic and visual information.
   c. Combination of components including six aluminum extruded profiles as scheduled or selected by Architect (Square, Bevel, Large Radius, Large Bevel, EdgeOut, ThinLine) sized to molded IM inserts or custom inserts. Corner key assembly for Square and Radius Corner formats. PresLock attachment devices for retaining insert material.
3. Informer: Combination of holder unit mounted to substrate and insert panel allowing use of panel as magnetic bulletin board or poster holder, directory, emergency plan or LetterGrip holder secured to holder.
4. Materials:
   a. Holder:
      1) Material: Integranally colored injection molded high impact UV resistant, colorfast, plastic alloy complete with mounting system; ready for insert installation.
      2) Corners: Radius or Square corners; indicated in Paragraph 2.06-A.6 - Schedule.
      3) Edge Detail: Bevel edge.
   b. Mounting:
      1) Surface: Wall or vertical surface, Ceiling, Desk, as indicated on the Contract Drawings
      2) Fastening: MFH, VTM, PIN, WM, CM, as scheduled or required.
      3) Ceiling grid: Furnish manufacturer's CM track and clip system for installation direct to ceiling grid.
      4) Panel clip: Furnish manufacturer's extruded panel clip for mounting sign holder over top portion of manufactured landscape office divider partitions.
   c. Sizes: Indicated in Paragraph 2.06-A.6 - Schedule from manufacturer's standard sizes.
   d. Color: Selected by Architect from manufacturer's standard seven colors.
e. Furnish the following accessories where indicated in Paragraph 2.06-A.6 - Schedule.
   1) Message strip storage compartment.
   2) Gapped holder for window inserts specified in Schedule with mounting type VTM or PL.

f. Finishes: Color match to holder, powder coated, natural satin anodized, as scheduled or selected by Architect.

5. Insert:
   a. Non-Tactile Signs: Integrally colored injection molded high impact plastic with computer generated photographic silkscreen process surface printing chemically bonded to self-aligning reveal insert material; insert corner same type as holder.
   b. ADA Tactile Signs: 1/32" thickness computer generated photo-etched rubberized surface material chemically bonded to self-aligning reveal insert material; insert corner same type as holder; silkscreen colors surface applied.
   c. ClearLens inserts are special configured molded inserts provided with same corner configuration as the molded holder. This insert allows graphic to be seen beneath surface.

6. Schedule:
   a. Unoccupied Rooms And Toilet Rooms: Provide 2-1/2-inch x 6-inch graphic panel with raised room number and Braille dots for each door. Include international symbols for Men and Women as appropriate.
   b. Offices and Work Areas: Provide 2-1/2-inch x 6-inch graphic panel with raised room number and Braille dots for each door, with 3-1/2-inch x 6-inch in-house updateable module for each door.
   c. Conference Rooms and Classrooms: Provide 2-1/2-inch x 6-inch graphic panel with raised room number and Braille dots with ad 6-inch x 6-inch in-house updateable module for each door.
   d. Elevator Lobbies: Provide 2-1/2-inch graphic panel with emergency egress plan and text for elevator use.
   e. Stairs: 2-1/2-inch x 6-inch graphic panel with raised text and Braille dots with a 6-inch x 6-inch graphic panel with stair egress symbol image.
   f. Fire Exits: Provide exit signs in accordance with CBC Section 1011.
   g. Other Areas: As indicated on Contract Drawings.

7. Attachment Materials: As recommended by manufacturer to suit installation conditions, with consideration for potential of high abuse and for concealing fastenings.

8. Finishes: Custom colors and finishes as selected by Architect.

9. Character (Letter and Number) Style: Characters as indicated on the Contract Drawings or, if not indicated, as selected by Architect. If not indicated, assume Helvetica Medium font for bidding. Lettering shall be raised minimum 1/32-inch above sign surface.

10. Braille: Refer to Paragraph 2.07-G.
B. Accessible Building Entrance Sign on Glass:
   1. Double-sided square sign constructed of pressure-sensitive white vinyl with clear pictogram of international accessibility symbol, equal to No. 150, as manufactured by SBH, or equal.
   2. Provide at all building entrances that are accessible in accordance with CBC 11B-216.6 - Entrances.
   3. Apply to interior side of glass at entry.
   4. Refer to Section 101403, Paragraph 2.05-B.5 for accessible entry signs mounted on building.

C. Building Address Numerals on Glass:
   1. 8-inch high building address numerals formed of pressure-sensitive white vinyl.
   2. Conform to size, style, and orientation required by governing authorities, and as indicated on Contract Drawings.
   3. Apply to interior side of glass at entry.

2.07 FABRICATION

A. General: Prepare the required letters, numbers and figures with uniform margins, in the letter style, size, and color as indicated on Contract Drawings.
   1. Provide eased edges.

B. Room Identification Signs: Doors shall have room name/number signs. Use Door Schedule as a guide. Actual room name/number will be verified by Owner after construction begins.
   1. Door Numbers: Room doors accessed from corridors and required access areas shall have number signs. Use the same number on all doors from one space into a corridor. Actual room numbers will be furnished to the Contractor by the Owner after construction begins. Assume an average of 8 characters or 3 numerals per door.

C. Fire Extinguisher Identification: Red, with 1-3/4-inch high, white letters. Height of sign shall be 4 inches by required length.
   1. Signs shall read FIRE EXTINGUISHER.
   2. Provide sign on outside of door stating: FIRE EXTINGUISHER INSIDE for fire extinguishers place inside a room in accordance with Title 19, Section 563(b).

D. Miscellaneous Signs and Symbols: As required by 2013 CBC.
   1. Non-illuminated exit signs as required.
      a. 1-inch high contrasting letters on durable adhesive strip at exterior exits with text: THIS DOOR TO REMAIN UNLOCKED DURING BUSINESS HOURS.
   2. Stair level signs as indicated on Contract Drawings.

E. International Symbol of Accessibility: Building accessibility signs shall comply with CBC 11B-703.7.2. Refer to Contract Drawings for sign type, size, and design of signage.
   1. Symbol shall consist of a white figure on a blue background in accordance with CBC Section 11B-703.6.
2. Color of accessibility symbol shall match color No. 15090 as published in Federal Standard 595B.

F. Pictorial Symbols and Raised Characters: Where pictorial symbols and raised characters are required, comply with CBC Section 11B-703.6.
1. Pictogram field shall be 6 inches minimum field height.
2. Characters:
   a. Type: Raised 1/32-inch (0.794 mm) minimum sans serif uppercase characters accompanied by Contracted Grade 2 Braille described below.
   b. Size: 5/8-inch (15.9 mm) minimum to 2 inches (50.8 mm) maximum in height in accordance with CBC 11B-703.2.5.
3. Finish and Contrast: In accordance with CBC Section 11B-703.6.2, characters, symbols shall have a non-glare finish, and a 70% contrast with a non-glare background.
4. Proportions: In accordance with CBC Section 11B-703.2.4, characters on signs shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I".

G. Braille: Provide on surface of all signs where Braille symbols are specifically required, complying with CBC Section 11B-703.3.
1. Embossed Braille: California Contracted Grade 2 Braille meeting code requirements and guidelines for size, style, spacing, content, and position.
   a. Color shall be same as plaque background color.
2. Translation of text into Braille symbols shall be responsibility of manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install signs and components at the locations shown or scheduled. Cooperate with other trades for attachment of signs to finish surfaces.
1. Layout: Conform to layout information indicated on Contract Drawings, and as indicated on reviewed Shop Drawings.
2. Alignment: Install signage level, plumb, and at the height indicated with sign surfaces free from distortion or other defects in appearance.
3. Comply with CBC Section 11B-703.4 for mounting location and height requirements of tactile signs.
4. Flush: Mount letters with backs in contact with the wall surface, unless otherwise directed by Architect.

B. Fastening: Secure signage to substrate with specified fasteners and as recommended by manufacturer. Attach signage to substrate using the following methods, as suitable:
1. Securely mount signs to substrates with permanent adhesive mounting system in accordance with manufacturer's instructions.
2. Vinyl-Tape: Double-sided foam tape of thickness recommended by manufacturer, to smooth non-porous surfaces.
3. Silicone Adhesive: Liquid silicone adhesive recommended by sign manufacturer to attach sign units to irregular, porous, or vinyl-covered or rough surfaces.

4. Shim-Plate: Concealed aluminum shim plates 1.8-inch thick, with pre-drilled and countersunk holes, at locations indicated and where other mounted methods are not practicable.

C. Traffic Regulatory Signs: Materials, colors, letterforms, construction, location, spacing, placement and installation of standard traffic regulatory signs shall be according to Caltrans standards and specifications as prescribed in the current State of California Business and Transportation Agency, Department of Transportation Traffic Manual, and California State Standard Special Provision 56.50, January 4, 1988 (Roadside Signs), and also in accordance with standard plans dated January 1988, S41-3, S42-14 through 16, and Section 56.60, and any subsequent updated plans and provisions.

3.02 FIELD QUALITY CONTROL

A. Field Tests and Inspections:
   1. Code required signage shall be field inspected in accordance with CBC 11B-703.1.1.2

3.03 CLEANING

A. Clean sign surfaces upon completion of installation and again prior to Substantial Completion review.

B. Repair or remove and replace with new materials, all damaged units and units not complying with Contract Documents as approved by Architect, at no additional cost to the Owner.

C. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer’s instructions. Protect from damage until acceptance by the Architect. Remove all debris resulting from signage installation and leave site in a clean and orderly condition.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Wall mounted metal urinal screens and floor-supported/overhead-braced stainless steel toilet partitions.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 092216 - Non-Load Bearing Metal Framing.
   5. Section 102813 - Toilet Accessories.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. A 666-15 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Strip, Plate, and Flat Bar.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-309 - Operable Parts.
               (1) 11B-309.4 - Operation.
         2) Division 6 - Plumbing Elements and Facilities.
            a) Section 11B-604 - Water Closets and Toilet Compartments.
               (1) 11B-604.2 - Location.
               (2) 11B-604.3 - Clearance.
               (3) 11B-604.8 - Toilet Compartments.
                  i) 11B-604.8.1 - Wheelchair Accessible Compartments.
                    (a) 11B-604.8.1.2 - Doors.
C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and specifications.

C. Product Data: Submit complete manufacturer's descriptive literature and specifications.

D. Shop Drawings: Submit Shop Drawings comprehensively describing the fabrication and installation of urinal screens and toilet partitions.
   1. Indicate field measurements on Shop Drawings.

E. Samples:
   1. Submit manufacturer's standard color palette for selection of colors.
   2. Samples: Submit corner section of typical panel in specified finish.

F. Quality Control Submittals:
   1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
   2. Certificates: Submit certification of Installer's Qualifications as specified in Article 1.06.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

A. Installer's Qualifications: Regularly engaged and specializing, for the preceding 5 years, in the installation of the product specified, equivalent in type, size, complexity, and physical characteristics to those required.
   1. Specifically trained and licensed, certified, or otherwise approved, in writing, by the manufacturer.
   2. Capable of furnishing a verifiable list of not less than five projects of equivalent type successfully completed within the preceding 2 years.
B. Field Samples: Erect one compartment at location directed Architect for review of workmanship. Make adjustments, or replace compartment as required to comply with specifications, if required by Architect. When installation is approved by Architect, it shall serve as a standard of workmanship for the balance of the work.

1.07 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   5. The Sanymetal Products Company, Los Angeles, CA (818)969-3373.

B. Fabricators of Embossed Stainless Steel: Subject to compliance with requirements, provide products manufactured by:

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable requirements for accessibility contained in CBC Section 11B-604 and the following:
   1. Comply with CBC 11B-604.2 for wheelchair clearance.
   2. Comply with CBC 11B-604.3 for clear space at fixtures.
   3. Comply with CBC 11B-604.8.1 for accessible water closet compartments.
   4. Comply with CBC 11B-604.8.1.2 for compartment doors.

B. Provide NFPA Class A, CBC Class I fire rating. Comply with ASTM E 84 for a flame spread rating of 69 maximum, and a smoke density of 93 maximum.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for 10 percent of the total materials value.
      a. Identify each regionally manufactured material, including its source and cost.
      b. Give preference to products manufactured and of primary raw materials extracted/recovered within 500 mile radius of Project site.

2.04 COMPONENTS

A. Toilet Partitions Type SS-1: Floor-supported/overhead-braced, stainless steel finish, equal to Embassy as manufactured by Global Steel Products Series 400 Sentinel as manufactured by Bradley Corporation, or equal.
   1. Doors and Partitions: 1-inch thick, flush panels fabricated with 20 gage Type 304 18-8 stainless steel bonded to a sound deadening core.
      a. Weld formed edges every 18 inches and seal with a surrounding oval-crown steel locking strip that is mitered, welded, and finished at the corners.
      b. Comply with CBC 11B-604.8.1.2 for accessible compartment doors.
   2. Pilasters: 1-1/4 inches thick, 4 inches wide minimum, flush panels fabricated with 20 gage Type 304 18-8 stainless steel in same manner as doors and partitions. Conceal pilaster mounting assembly with one-piece stainless steel plinth.
   3. Headrail: ASTM B 221 6463-T5 alloy heavy duty aluminum extrusion with mill finish in anti-grip profile.
      a. Headrail brackets shall be 18 gage stainless steel.

B. Urinal Screens:
   1. Wall Supported: 1-inch thick, fabricated with 20 gage Type 304 18-8 stainless steel bonded to a sound deadening core.
      a. Size: 18 inches wide by 48 inches high, unless otherwise indicated on Contract Drawings.

C. Hardware: Comply with ADA requirements and CBC 11B-604.8.1 requirements and CBC 11B-309.4 for water closet compartment doors. Refer to Paragraph 3.02-C for mounting heights.
   1. Material and Finish: Manufacturer’s standard 18-8 Type 304 satin finish stainless steel complying with ASTM A 240.
   2. Hinges: Provide adjustable automatic self-closing gravity type hinges to allow door to return to its predetermined position.
      a. Hardware shall permit emergency access by lifting bottom edge of door to clear keeper.
b. Doors shall swing 90 degrees minimum.
   1) 32-inch clear unobstructed opening at front entry stalls.
   2) 34-inch clear unobstructed opening at side entry stalls.
3. Pulls and Latches at Swinging Doors: Provide CBC 11B-604.8.1.2
   conforming latch with slide, loop, or U-shaped handle immediately
   below the latch on inside of inswinging doors. The latch shall be flip-
   over style, sliding, or otherwise not requiring the user to grasp or
   twist.
4. Pulls and Latches at Doors to Accessible Compartments: Provide ADA-
   conforming U-shaped handle on outside and on the inside of inswing-
   ing doors, and ADA-conforming latch with slide or loop on inside of
   compartment doors. Latch shall be flip-over style, sliding, or otherwise
   not requiring the user to grasp or twist. Locate pull immediately below
   latch.
   a. Door hardware shall be mounted between 30 inches and 44
      inches above finished floor.
5. Accessories: Provide door stop and slide type latch keeper, coat
   hook, fittings, and brackets at each compartment.
   a. No door hardware or mounting brackets shall be exposed on the
      exterior surfaces of inswinging doors.
   b. Mount door bumpers at heights that allow intersection with
      adjacent surfaces without damage.
   c. Coat hooks shall be 48 inches above finished floor at accessible
      stalls and 6 inches from top of panel at all other doors.

D. Anchorages and Fasteners: Manufacturer's stainless steel continuous wall
   brackets and exposed fasteners of stainless steel in satin finish to match
   hardware. Use one-way type theft-resistant heads and nuts for exposed
   anchorages.
   1. For concealed anchors use hot-dip galvanized cadmium-plated, or
      other rust-resistant protective-coated steel.

2.05 FABRICATION

A. Provide components fabricated, finished, and prepared to receive acces-
   sories and hardware in the factory. Deliver components ready for
   assembly and installation.
   1. Field fabrication, including preparation for accessories, will not be
      permitted.
   2. Comply with CBC 11B-604.8 for water closet compartments.
      a. Front entry compartments shall have a clear unobstructed open-
         ing width of 32 inches when the door is positioned at an angle of
         90 degrees from its closed position.
      b. Side entry compartments shall have a clear unobstructed open-
         ing width of 34 inches when the door is positioned at an angle of
         90 degrees from its closed position.
   3. Protect finish with self-adhered strippable polyethylene-based sur-
      face protective film during shipping and installation.
B. Finish: Rigidized No. 5WL textured pattern stainless steel with No. 4 sat-
   in polish finish, or equal by Rimex.
PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect the areas and conditions under which toilet partitions are to be installed. Verify correct spacing between plumbing fixtures. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Verify that solid blocking or metal backing plates have been furnished and installed under other Sections for anchorage of toilet compartments to walls.

3.02 INSTALLATION

A. Toilet Compartments:

1. Erect compartments rigid, straight, plumb and level, and in accordance with manufacturer's printed instructions.
2. Anchor through walls to solid blocking or metal backing plates furnished and installed under Section 092216.
3. Conceal evidence of drilling, cutting, and fitting of wall and floor finish. Maintain uniform clearance not exceeding 1/4-inch at vertical edge of doors from top to bottom.
4. Secure divider panels to built-in anchorage devices using concealed fasteners.
5. Level, plumb, and tighten the installation.

B. Wall-Mounted Screens:

1. Attach with heavy duty stainless steel fasteners and concealed anchoring devices, as recommended by the manufacturer to suit the supporting wall construction and to resist lateral impact.
2. Attach to floor construction with specified anchors.

C. Mounting Heights:

1. Install door latch 34 inches minimum to 44 inches maximum above finished floor in accordance with CBC 11B-404.2.7.
2. Install coat hooks 48 inches maximum above finished floor at accessible stalls and 6 inches from top of panel at all other doors.
3. Mount door bumpers at heights that allow intersection with adjacent surfaces without damage.
4. Accessible stalls shall have inswinging doors with pulls at the interior surface mounted below latch.
5. No door hardware or mounting brackets shall be exposed on the exterior surfaces of inswinging doors.

D. Erection Tolerances:

1. Maximum variation from true position shall be 1/4-inch.
2. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 1/4-inch.
3. Maximum variation from plumb shall be 1/8-inch.
4. Flatness: Sheet metal surfaces and brackets shall not show wavy reflections.
3.03 ADJUSTING

A. Perform final adjustments to pilaster leveling devices, door hardware, and other operating parts of the partition assembly just prior to final inspection.
   1. Adjust hinges to close doors when unlatched.

3.04 CLEANING

A. Clean exposed surfaces of partitions, hardware, fittings and accessories, and touch up minor scratches and other finish imperfections using materials and methods recommended by the partition manufacturer.
   1. Replace damaged units which cannot be satisfactorily field repaired.
   2. Remove strippable protective covering, visible identification, assembly stickers, and residue left by gummed labels.

3.05 PROTECTION

A. Protect units from evidence of use or damage at the time of acceptance.

END OF SECTION
- SECTION 102116 -

PLASTIC SHOWER COMPARTMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Floor-mounted, overhead-braced solid plastic shower partitions with stainless steel doors.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 102113 - Toilet Compartments.
   5. Section 108100 - Toilet Accessories.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. A 666-15 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Strip, Plate, and Flat Bar.
   4. D 635-10 - Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-309 - Operable Parts.
               (1) 11B-309.4 - Operation.
         2) Division 6 - Plumbing Elements and Facilities.
            a) Section 11B-608 - Shower Compartments.
C. International Code Council (ICC):

D. National Fire Protection Association (NFPA):

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in accordance with the provisions of Section 013300.
   1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item where applicable.

B. Shop Drawings: In accordance with Section 013300, submit Shop Drawings for the fabrication and erection of toilet partition assemblies which are not fully described in manufacturer's data. Show all anchorage and accessory items.
   1. Submit setting drawings, templates, and instructions for the installation of anchorage devices built into other work.
   2. Indicate field measurements on Shop Drawings.

C. Samples: In accordance with Section 013300, submit manufacturer's standard palette(s) for selection of colors.

D. Quality Control Submittals:
   1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
   2. Certification: Submit certification showing independent test calculations that compartments comply with NFPA 286 Class B requirements.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include
statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Storage and Protection: Use all means necessary to protect the materials of this Section before, during, and after installation.

1.07 FIELD CONDITIONS
A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

1.08 WARRANTY
A. Provide manufacturer's standard 10-year warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
A. Acceptable Manufacturers:

B. Acceptable Fabricators of Embossed Stainless Steel:

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS
A. Regulations: Comply with applicable codes and regulations of governmental agencies having jurisdiction.
1. Comply with CBC Section 803.1 for flame spread and smoke developed classifications based on location and group classification when tested in accordance with ASTM E 84, ASTM D 635, and ASTM D 1929.
2. Comply with required fire codes for this Project when tested in accordance with NFPA 286, ASTM D 635, and ASTM D 1929.
3. Comply with accessibility requirements of CBC Section 11B-608 for shower compartments.
4. Comply with CBC 11B-604.8.1.2 for compartment doors.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE REQUIREMENTS

A. Performance Characteristics: Provide HDPE panels meeting material fire rating in accordance with NFPA 285 for Class B:
   1. Surface Burning Characteristics:
      a. Flame spread index: 25 or less.
      b. Smoke developed index: 450 or less.

2.05 MATERIALS

A. Solid Plastic Material: High density polyethylene (HDPE), manufactured under high pressure forming a single component section that is waterproof, impact resistant, non-absorbent, and having a self-lubricating surface that resists marking with writing utensils.

2.06 COMPONENTS

A. Type: Design is based on the use of Poly-Mar HD Solid Plastic floor-mounted, overhead-braced, shower partitions, manufactured by Scranton Products Company, Global Steel Products, or equal.
   1. Partitions shall be fabricated from high density polyethylene (HDPE) containing a minimum of 10 percent recycled resin, manufactured under high pressure forming a single component section that is waterproof, impact resistant, non-absorbent, and having a self-lubricating surface that resists marking with writing utensils.
   2. Comply with required fire codes for this Project when tested in accordance with NFPA 286.
   3. Color and pattern shall be as selected by Architect.

B. Partitions, Pilasters, and Seat: Solid plastic 1-inch thick, flush panels fabricated with smooth edges.

C. Brackets:
   1. Pilaster Ceiling Trim: 3 inches high, aluminum/stainless steel.
   2. Pilaster Brackets: 3 inches high, aluminum/stainless steel.
   3. Wall Brackets: 54-inch continuous aluminum/stainless steel channel.

D. Headrail: ASTM B 221 6463-T5 alloy heavy duty aluminum extrusion with mill finish in anti-grip profile.
   1. Headrail brackets shall be 18 gage stainless steel.
   2. Shower curtain hooks shall be stainless steel with self-lubricating nylon 6/6 slides.
E. Shower Doors: Equal to Imperial toilet compartment doors as manufactured by Global Steel Products.
   1. Doors: 1-inch thick, flush panels fabricated with 20 gage Type 304 18-8 stainless steel bonded to a sound deadening core and sealed from moisture.
      a. Weld formed edges every 18 inches and seal with a surrounding oval-crown steel locking strip that is mitered, welded, and finished at the corners.
      b. Comply with CBC 11B-604.8.1.2 for accessible compartment doors.

F. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, satin finish to match hardware. Use one way type theft-resistant heads and nuts for exposed anchorages.
   1. For concealed anchors use hot-dip galvanized cadmium-plated, or other rust-resistant protective-coated steel.

2.07 FABRICATION

A. Provide components fabricated, finished, and prepared to receive accessories and hardware in the factory. Deliver components ready for assembly and installation.
   1. Field fabrication, including preparation for accessories, will not be permitted.

B. General: Finish exposed surfaces free of saw marks with edges machined to 0.24-inch radius.
   1. Bevel corners and edges of cutouts.
   2. Fasten aluminum edging strips to bottom edge of doors and panels using anti-theft fasteners.

C. Finish: Rigidized No. 5WL textured pattern stainless steel with No. 4 satin polish finish, or equal by Rimex.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Inspect the areas and conditions under which toilet partitions are to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.
   1. Verify that solid blocking or metal backing plates have been furnished and installed under other Sections for anchorage of shower compartments to walls.

3.02 INSTALLATION

A. Shower Compartments:
   1. Erect compartments rigid, straight, plumb and level, and in accordance with manufacturer's printed instructions.
      a. Comply with threshold slope requirements of CBC 11B-404.2.5.
   2. Anchor 3-inch high pilaster trim to ceiling with No. 5 plastic anchors and No. 12 Phillips head screws. Fasten pilasters to trim with stainless steel, tamper resistant, torx head sex bolts.
3. Adjust leveling device on bottom of pilaster and secure with two through bolts to stainless steel shoe.

B. Provide full length heavy duty continuous stainless steel wall brackets at all panels to pilaster, pilaster to wall, and panel to wall connections.
1. Wall brackets shall be predrilled at 6 inches on centers along full length of brackets.
2. Wall brackets shall be through-bolted to panels and pilasters with one-way sex bolts.
3. Fasten wall brackets to walls at 12 inches on centers along full length of center of bracket with mushroom head anchors and with No. 14 stainless steel Phillips head screws and No. 5 plastic anchors at 12 inches on centers along the outside flanges staggered between mushroom head anchors.
4. Anchor through walls to solid blocking or metal backing plates furnished and installed under other Sections.

C. Fasten headrail to tops of pilasters and to headrail wall brackets with one-way sex bolts.

D. Conceal all evidence of drilling, cutting and fitting of wall, floor and ceiling finish. Maintain uniform clearance at vertical edge of doors from top to bottom, not exceeding 1/4-inch.

E. Erection Tolerances:
1. Maximum variation from true position shall be 1/4-inch.
2. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 1/4-inch.
3. Maximum variation from plumb shall be 1/8-inch.

3.03 ADJUSTING

A. Perform final adjustments to pilaster leveling devices, door hardware, and other operating parts of the partition assembly just prior to final inspection.
1. Adjust hinges to close doors when unlatched.
2. Excessive movement or vibration of panels or doors will not be acceptable.

3.04 CLEANING

A. Clean exposed surfaces of partitions, hardware, fittings, and accessories. Touch up minor scratches and other finish imperfections using materials and methods recommended by the partition manufacturer.
1. Replace damaged units which cannot be satisfactorily field repaired, as directed by the Architect.
2. Remove strippable protective covering on doors, visible identification and assembly stickers, and remove residue left by gummed labels.

3.05 PROTECTION

A. Protect units so that there will be no indication of use or damage at the time of acceptance.
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Flat panel, acoustically-rated, motorized operable panel partitions.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 092900 - Gypsum Board.

C. Refer to other Sections and Contract Drawings for structural supports and sound barriers above partitions.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. A 1008-12a - Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
   3. C 423-09a - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
   8. E 413-10 - Classification for Determination of Sound Transmission Class.
  10. E 1264-14 - Classification of Acoustical Ceiling Products.
B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
         1) Table No. 803.5 - Interior Wall and Ceiling Finish Requirements by Occupancy.
   
C. National Voluntary Laboratory Accreditation Program (NVLAP).

1.03 ADMINISTRATIVE REQUIREMENTS
A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS
A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit manufacturer's descriptive literature and complete specifications on material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable panel partition, component, and accessory specified. Included data on acoustical performance, surface-burning characteristics, and durability.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of operable walls. Shop Drawings submitted shall include not less than the following:
   1. Dimensioned plans, elevations, and sections locating assembly components in relationship to each other and in relationship to attachments and contiguous building structure.
   2. Typical and special fabrication, setting, weights, openings, storage, hardware, track, direction of travel, and installation details, including details of anchorage to supporting structure.
   3. Show blocking to be provided by other sections.
   4. Setting Drawings: For embedded items and cutouts required in other work, including support beam-punching template.
   5. Materials and finishes.

D. Samples: Submit the manufacturer's standard palettes for the selection of facing material and trim color. When selections have been made, submit samples of facings as follows for acceptance-review:
   1. If finish has pattern repeat then provide sample in size required to show the pattern repeat.
   2. Finish Sample: If not required by Item 1, submit sample not less than 12 inches by 12 inches in size.
   3. Panel Trim: Not less than 3 inches long

E. Quality Control Submittals:
   1. Test Reports: When and as directed by the Architect, submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
      a. Field Testing: Relative to acoustical field testing of partitions, submit the following:
         1) Field testing procedure
2) Field testing report.
3) Proof load testing of track/trolley/bracket/hanger rod assembly.

2. Product Certificates: Submit letter signed by manufacturer certifying that operable walls to be furnished on this project comply with the requirements of the specification.

3. Manufacturer’s Instructions: Submit the manufacturer’s current recommended methods of installation, including relevant limitations.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.06 CLOSEOUT SUBMITTALS

A. Closeout Submittals:
1. Operation and Maintenance Data: Submit operating and maintenance data for operating components of operable panel partitions.
   a. Panel finishes and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
   b. Seals, hardware, track, carriers, and other operating components.
2. Warranty: Submit copies of written warranty, as supplied by the applicator, agreeing to repair or replace defective work during the warranty period.

1.07 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer’s Qualifications: Demonstrated experience for a minimum of 5 years in the production of operable partitions specified.
2. Installer Qualifications: Specifically trained and licensed, certified, or otherwise approved, in writing, by the manufacturer.
3. Testing Agency Qualifications: An independent NVLAP-accredited testing laboratory with experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a Certificate of Accreditation and a Scope of Accreditation listing the test methods specified.
B. Laboratory acoustical performance of the operable wall shall have been tested in an independent acoustical laboratory.

1.08 FIELD CONDITIONS

A. Environmental Requirements: Do not install operable walls until wet work in the space has been completed, and until ambient conditions of temperature and humidity are near those values indicated for final occupancy.

B. Field Measurements: Verify operable panel partition openings and storage arrangements by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.09 WARRANTY

A. Special Warranties:
   1. Panels: Two-year warranty covering steel panel frame, faces, internal reinforcing, and trolley attachment plates.
   2. Track: Ten-year warranty.
   3. Trolley: Two-year warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Advanced Equipment Corporation, Fullerton, CA (714)635-5350.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.
B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.

1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2.03 PERFORMANCE CRITERIA

A. Performance Requirements: Performance characteristics of operable panel partitions shall have been confirmed by independent testing laboratory in accordance with the following standards:

1. Sound Transmission Class (STC): Provide STC 48, confirmed by laboratory testing in accordance with ASTM E 90.

2. Noise Isolation Class (NIC): NIC 42, confirmed by field testing in accordance with ASTM E 336. Base sound transmission loss calculations on ASTM E 413, normalized to a reference reverberation time of 0.5-second in full octave frequency.

3. Noise Reduction Coefficient (NRC): Rating of an acoustical material's ability to absorb sound, measured at four frequencies in accordance with ASTM C 423, averaged, and expressed in accordance with ASTM E 1264.

4. Fire-Test-Response Characteristics: Provide operable wall partitions with the following fire-test-response characteristics, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   a. Surface-Burning Characteristics: Class A, confirmed by laboratory testing in accordance with ASTM E-84, as follows:
      1) Flame Spread: 25 or less.
      2) Smoke Developed: 450 or less.
   b. Fire Growth Contribution: Textile wall coverings comply with the acceptance criteria of CBC Table No. 803.5.

2.04 SYSTEM DESCRIPTION

A. Operable Panel Partition: Design is based on Hufcor Series 642, a series of top supported, manually operated, paired flat panels, remotely stackable operable wall partitions.

1. Panels shall be center -stacked in relation to center line of track, with no floor track required.

B. Operation: A series of top supported, electrically operated, continuously hinged remotely stackable operable wall partitions.

1. Panels shall be stacked perpendicular to center line of track with no floor track required.
2.05 MATERIALS

A. Aluminum: ASTM B 221 Alloy 6063, Temper T5 or T6.
B. Tackable Substrate: Manufacturer's standard cork or fiberboard material.
C. Fabric Finish: Refer to Paragraph 2.10-C.

2.06 COMPONENTS

A. Track: Manufacturer's standard 11 gage No. 17 roll-formed steel channel track with right angle turn,, supported by adjustable steel hanger brackets connected to structural support by pairs of 1/2-inch diameter threaded rods.
   1. Track and brackets shall be designed for maximum point loading at mid-span.
   2. Track brackets shall interlock with top flange of the track. Space brackets 60 inches on centers maximum in field and 24 inches on centers maximum at stacking area.
   3. Track soffit shall be prefinished and integral with track.
   4. Color of track soffit trim shall match adjacent ceiling material.
B. Trolleys: Panels shall be supported by trolley carrier assemblies, each consisting of four independently replaceable all-steel trolleys with steel-tired ball bearing wheels. Trolleys shall be attached to panels with minimum 3/4" diameter adjustable pendant bolts.
   1. Provide one trolley assembly per panel on paired panels.
   2. Trolley capacity shall be 700 pounds.
C. Panels: Nominal 3-inch thick formed steel non-combustible panel, 48 inches width by required height; horizontal and vertical framing elements fabricated from 18 gage formed steel with overlapped and welded corners; reinforced top channel to support suspension system components; frame with concealed formed steel at vertical edges. Weight shall be 6.0 to 11.0 pounds per square foot.
   1. Panel Skins: Roll-formed steel wrapping around panel edge, with panel skins lock-formed and welded directly to the frame for unitized construction with minimum STC as prescribed in Article 2.03.
      a. Panels shall have one face perforated for sound absorption.
      Maximum hole diameter of perforations shall be 1/8-inch and maximum open area shall be 36 percent.
   2. Core: Fibrous glass sound attenuating material, set back 1/8-inch from face of perforated panel to avoid paint.
   3. Perimeter: Tongue and groove shape, nominal 1/8-inch thick extruded aluminum with no visible fasteners, not overlapping face material 5/16-inch and serving as a protective edge feature.
   4. Panel joints shall not require trim or panel edges.
   5. Hinges: Full leaf butt hinges attached directly to reinforcing plates welded to frame.
D. Seals: Seal system shall be completely self contained within each panel and have no visible fasteners on panel face.
   1. Vertical Interlocking Sound Seals Between Panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each
panel edge for universal panel operation. Rigid plastic or aluminum astragals or astragals in only one panel edge are not acceptable.

2. Horizontal Top Seals: Continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion without the need for mechanically operated parts.

3. Horizontal Bottom Floor Seals: Modernfold IA2 Bottom Seal. Automatic operable seals providing nominal 2-inch operating clearance with an operating range of plus 1/2-inch to minus 1-1/2 inches which automatically drop as panels are positioned without the need for tools or cranks.
   a. Bottom seal shall be spring loaded and internally guided. Bottom seal assembly shall be a cartridge, removable without cutting panel face.
   b. Final Partition Closure: Activated by lever closure panel with expanding jamb exerting force against fixed wall.

E. Accessories:
   1. Flush Pulls: Injection molded black ABS with powder coated steel cover plate to match adjacent trim.
   2. Provide safety edge at leading edge.
   3. Electrical interlocks at intersecting walls.

2.07 STACKING

A. Trolleys: Preprogram direction of trolleys and selection of appropriate stacking track automatically without the use of switches, cam-trip assemblies, or other devices.

B. Final Partition Closure: Lever closure panel with expanding jamb that compensates for minor wall irregularities and provides a minimum of 250 pounds seal force against the adjacent wall for optimum sound control. Jamb activator shall be located approximately 45 inches from the floor in the panel face and be accessed from either side of the panel. The jamb is equipped with a mechanical rack and pinion gear drive mechanism and shall extend 4 to 6 inches by turning the removable operating handle.

2.08 OPERATION

A. Electrical Operation: Provide motor operator of sufficient capacity to move partition at the rate of approximately 24 feet per minute. Include oil bath gear box, steel roller chain, torque limit clutch, auto-reset overload relays, limit switches, two-key actuated switch, and 24-volt control circuit with transformer. Provide motor mounted electric brake to prevent coasting and ensure repeatable and accurate travel limits.

2.09 FABRICATION

A. General: Factory prefabricate and prefinish operable wall system ready for installation.
   1. Fabricate panels so finished in-place partition is rigid; level plumb aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
B. Factory apply fabric finish with contact adhesive, in continuous strips without horizontal butt joints.

2.10 FINISHES

A. Track Soffit:
   1. Polyester powder coating to match ceiling surface.

B. Panel Edge Trim:
   1. Medium bronze anodized.

C. Panel Face: Facing materials shipped to factory for fabrication.
   1. Fabric Type WC-2: Hufcor Revelations reinforced vinyl fabric with woven backing weighing 21 ounces per lineal yard, conforming to FS CC-W-408 Type I, 55 inches wide, acrylic backing, flame spread 15 or less, selected from manufacturer's standard colors by Architect.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Verify floor is level and flat to within 1/8-inch maximum in 10 feet.
   2. Verify supports for track and sound baffle is properly installed vertically above track to floor or roof deck construction above.
   3. Verify fabric finish is acceptable to manufacturer prior to purchase and delivery.

3.02 INSTALLATION

A. Installation shall be performed under the supervision of a factory-trained mechanic in accordance with the manufacturer's printed installation manual to ensure satisfactory operation and performance.
   1. Comply with applicable recommendations of ASTM E 557.
   2. Track shall be connected to structural support by pairs of minimum 3/8-inch diameter threaded steel hanger rods.

B. Workmanship: Track and panels shall be installed plumb, level, and true to building lines within 1/4-inch plus or minus from design elevation.

C. Operation: Adjust panels to move smooth and easily without warp or bind. Ensure that panels will stay firmly in storage location when in full open position.

3.03 FIELD QUALITY CONTROL

A. Tests: Obtain the services of an independent acoustical consultant accepted in writing by Owner to perform field tests within 60 days after completion of installation, in accordance with the following:
   1. Judge final performance by comparing measured Noise Isolation Class (NIC) to that specified with operable wall in normally closed, sealed, and standard operating condition in final place between rooms.
   2. Cost of field sound testing shall be borne by operable wall manufacturer.
   3. Submittal of field tests of results for similar installations instead of actual on-site field testing will not meet this requirement.
B. Corrections: Prior to field testing, the acoustical consultant will examine flanking paths through the surrounding building construction for conditions that would negatively affect the acoustical performance of the operable walls. The manufacturer shall be present to observe field testing and make corrective adjustments.
   1. Nonconforming walls that have been corrected shall be retested until specified NIC is achieved.

C. Manufacturer's Field Service: Provide the services of a qualified manufacturer's representative who shall advise and inspect, at the job site, the work of this Section.

3.04 ADJUSTING

A. Corrections:
   1. Determine and correct causes of any nonconforming wall within 60 days of substantial project completion without change in contract price.
   2. Nonconforming walls that have been corrected shall be retested until specified NIC is achieved.
   3. Replace panels that cannot be cleaned and/or repaired, in a manner approved by Architect, before time of Substantial Completion.

3.05 CLEANING

A. Clean soiled surfaces of operable panel partitions on completion of installation to remove dust, adhesives, and other foreign materials in accordance with manufacturer's written instructions and repair any damage to panels during construction.

3.06 CLOSEOUT ACTIVITIES

A. Demonstration and Training: Engage a factory-authorized service representative to train owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.
   1. Test and adjust seals, hardware, carriers, tracks, pass doors, pocket doors, controls, safety devices and other operable wall components.
      Replace damaged or malfunctioning operable components.
   2. Train owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
   3. Review data in maintenance manuals.

3.07 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure operable panel partitions are without damage or deterioration at time of Substantial Completion.

END OF SECTION
- SECTION 102241 -

FOLDING GLASS PARTITIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Folding sliding glass wall systems for interior locations.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 017423 - Final Cleaning.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 088100 - Glass Glazing.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. C 1048-12 - Specification for Heat Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass.

B. American National Standards Institute (ANSI):


D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications. Include complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item where applicable.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings comprehensively describing fabrication and in-
stallation of structural glass walls. Shop Drawings submitted shall include not less than the following:

1. Dimensioned plans, elevations, and sections locating assembly components in relationship to each other and in relationship to contiguous building structure.
2. Typical and special fabrication and installation details, including details of anchorage to supporting structure.
3. Materials and finishes.

C. Samples: Submit 6-inch long samples of framing components and images of graphic designs.

D. Labeling: Each light of tempered glass shall be labeled by impermanent means. Etching or other permanent labeling will not be accepted. Include the following information:
   1. Name of manufacturer.
   2. Proprietary brand name and product number.
   3. Quality, grade, and thickness.

E. Quality Control Submittals:
   1. Test Reports: When and as directed by the Architect, submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
   2. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, and application rates.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Regularly engaged and specializing, for the preceding 5 years, in the design and manufacture of structural glass building products, equivalent in type, size, complexity, and physical characteristics to the specified product.
      a. Equipped and staffed, and having a demonstrated ability to produce components required within the constraints of the accepted construction schedule.
2. Installer: Regularly engaged and specializing, for the preceding 5 years,
in the installation of glass wall racquetball courts, equivalent in type,
size, complexity and physical characteristics to those required.
   a. Specifically trained, and licensed, certified, or otherwise approved
      in writing by the manufacturer.
   b. Capable of furnishing a verifiable list of not less than five projects
      of equivalent type successfully completed within the preceding two
      years.

1.07 FIELD CONDITIONS

   A. Field Measurements: Prepare required Shop Drawings based on field
      measurements taken specifically for the work of this Section.

   B. Ambient Conditions:
      1. Glass wall system shall not be installed until all drywall work is com-
         plete, and overhead mechanical trades and painters have finished in
         the area. Building must be reasonably dry, openings closed in, and
         permanent heating and air conditioning installed and working before,
         during, and after installation.
      2. Moderate room temperature of 65°F or more shall be maintained a
         week preceding and throughout the duration of the work.

1.08 WARRANTY

   A. Manufacturer Warranty:
      1. Manufacturer warrants glass walls to be free of defects in material and
         workmanship, and from delamination for a period of 2 years.
      2. Installer warrants materials and installation to be free of defects in
         material and workmanship for a period of one year. The exclusive rem-
         edy under this warranty shall be replacement of defective materials
         supplied by manufacturer or installer, or correction of defective installa-
         tion. Implied warranties of merchantability or fitness for intended use
         are limited to the period of this warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

   A. Acceptable Manufacturers:
      1. Modernfold Inc., an American Standard Company, Greenfield, IN
         (317)468-6700, (800)869-9685, with offices in Laguna Beach, CA
         (949)497-4140, www.modernfold.com. NO KNOWN EQUAL

   B. Like components shall be the products of one manufacturer and shall be either
      the ones upon which the design is based or equal products of another manu-
      facturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

   A. Regulations: Comply with the applicable codes and regulations of govern-
      mental agencies having jurisdiction.
      1. Safety Glass: Comply with ANSI Z97.1 for 400-foot-pound impact and
         CPSC Document 16 CFR 1201 for Category II regarding the manufac-
         ture and use of safety glazing materials.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 PERFORMANCE CRITERIA

A. Performance Requirements:
   1. Glass Criteria: Refer to Performance Criteria specified in Section 088100.

2.05 SYSTEM DESCRIPTION

A. Glass Wall System: Design is based on the use of FSW-C Continuously Hinged Manual Center Stack Folding Sliding Walls, manufactured by Modernfold, or equal.
   1. Glass wall shall be captured in full width aluminum stiles at top and bottom of each panel.
   2. Panel Size: 3'-3" maximum. Provide height as indicated on the Contract Drawings.

2.06 MATERIALS

A. Aluminum Extrusions: Conform to the requirements of ASTM B 221 Alloy 6063 Temper T5 or T6.
   1. Component parts shall be supplied in modular sizes to coordinate with standard glass sizes.
   2. Finish: Clear anodized.

B. Glass: 1/2-inch thick clear tempered glass conforming to ASTM C 1048 for Kind FT, and further processed to increase strength to approximately 5 times annealed glass.
   1. Glass shall conform to the requirements of Section 088100.

C. Decoration: Where required by Code, provide etched designs on interior surface of glass in accordance with graphic pattern provided by Architect.
   1. Sealer: Seal sandblasted portions of glass with Skyline Sealer.

2.07 COMPONENTS

A. Track: Manufacturer's standard G150 track.

B. Fitting Configuration:
   1. Manual-swinging, all-glass, continuous rail fitting at top and bottom, with trolley at center of each panel
   2. Provide continuous brush sweep at top fitting.

C. Anchors and Fastenings: Concealed. No floor track shall be required.
2.08 FABRICATION
A. Fabricate and finish system components in the factory and deliver ready for installation.
   1. Perform preparation for hardware, if required, in the factory.
   2. Edges shall be ground and polished where exposed or butted together.
   3. Provide continuous piece of glass from base to top of glass wall.
   4. End Panel: Provide free-standing 100R-G double action access panel.
B. Glass Markings: Provide etched designs on interior surface of glass in accordance with pattern provided by Architect.

PART 3 - EXECUTION

3.01 EXAMINATION
A. Verification of Conditions: Prior to work of this Section, examine previously installed work and verify that such work is complete, and as required, to the point where this installation may properly commence.
   1. Verify that a level, steel troweled slab and plumb perimeter wall framing or substrate has been provided to a tolerance of plus-or-minus 1/8" in 10' of level and plumb and subject to the approval of the glass wall subcontractor. Reporting any discrepancies in writing to Contractor

3.02 PREPARATION
A. Protection: Protect previously installed work and materials that may be affected by work of this Section.

3.03 INSTALLATION
A. General: Install work in accordance with the manufacturer's recommendations.
   B. Set walls plumb, level, square, true, and aligned in the same plane.

3.04 FIELD QUALITY CONTROL
A. Tests: Upon completion of this portion of the work, and prior to its acceptance by the Owner, make all required tests and secure all required approvals from agencies having jurisdiction.

3.05 ADJUSTING
A. Upon completion of installation, adjust doors and hardware as required for smooth operation.

3.06 CLEANING
A. Clean glass and fittings prior to the date of substantial completion in accordance with the applicable requirements of Section 017423.
   B. Clean up unused material and debris and remove from premises. Wipe down walls and ceilings as required.

3.07 PROTECTION
A. Protect glass and metal surfaces from damage and from exposure to construction materials immediately upon installation. Attach crossed streamers
to framing held away from glass. Do not apply markers or tape of any type to surfaces of glass.

B. Training: Upon completion of panel installation, the Owner, attendants, or individuals in charge and responsible for upkeep of the building shall review the care and maintenance instructions of installer and see that they are followed.

END OF SECTION
- SECTION 102602 -

WALL AND CORNER PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: End wall and corner guards.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. A 480-12 - Specification for General Requirements for Flat-Rolled Stainless and Heat Resisting Steel Plate, Sheet, and Strip.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
         1) 803.1 - General.
         2) Table 803.5 - Interior Wall and Ceiling Finish Requirements By Occupancy.

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Samples: In accordance with the provisions of Section 013300, submit manufacturer's standard color and finishes palettes for selection.
   1. When selections have been made, submit samples 12 inches in length for review and acceptance.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 4.1: For adhesives and sealants used on the inside of the weatherproofing system, documentation including printed statement of VOC content.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Submit maintenance data.

B. Warranty Documentation: Submit copies of written warranty, as signed by the applicator, agreeing to repair or replace defective work during the warranty period.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Construction Specialties, Inc. (The C/S Group), Muncy, PA (717)546-5941, (888)834-4455, with offices in San Marcos, CA (619)744-0300.
   3. Pawling Corporation, Pawling, NY (914)855-1005, represented by Hanson Associates, Orange, CA (714)542-5617.
   4. Rite-Hite Corporation, Milwaukee, WI (800)456-0600, represented by Arbon Equipment Corporation, Orange, CA (714)921-1500, (213)725-0550.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Comply with applicable requirements of CBC Chapter 8.
   1. Covers shall be fire rated where required.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 4.1 - Low-Emitting Materials--Adhesives and Sealants: Interior adhesives and sealants used on the interior of the building shall comply with the requirements of the following reference standards:

2.04 CORNER GUARDS AND END WALL PROTECTORS

A. Design is based on protective coverings manufactured InPro Corporation.

B. Material: 16 gage Type 430 formed stainless steel, conforming to the general requirements of ASTM A 176 and ASTM A 480.

C. Types:
   1. InPro Surface Mount Stainless Steel Corner Guards with 3-inch wings by width of wall by height indicated on Contract Drawings, or equal.
   2. InPro Flush Mount End Wall Protector with 3-inch wings by width of wall by height indicated on Contract Drawings, or equal.

D. Fabrication:
   1. Edges shall be deburred.
   2. Corner radii shall be 1/8-inch.
   3. Finish shall be No. 4 satin polished.
   5. If height of corner guard is not indicated on Contract Drawings, run to underside of ceiling soffit or ceiling grid.

E. Cement: As recommended by manufacturer.
PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install in accordance with the manufacturer's recommendations as accepted by the Architect.
1. Position corner guards at top of base material.
2. If height of corner guard is not indicated on Contract Drawings, run to underside of ceiling soffit or ceiling grid.

B. Stainless Steel Surface Mounted Corner Guards: Install with brush-on adhesive in accordance with the manufacturer's recommendations as accepted by the Architect.

3.02 CLEANING

A. General: Immediately upon completion of installation, remove protective film covering from the exposed surface and clean corner guards end wall protectors in accordance with manufacturer's recommended cleaning method.

B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.03 PROTECTION

A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION
1.01 SUMMARY

A. Section includes: Toilet and shower room custodial accessories.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 088300 - Mirrors.

C. Related Sections:
   1. Section 102113 - Toilet Compartments.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
         a) Section 11B-309 - Operable Parts.
            (1) 11B-309.4 - Operation.
         2) Division 6 - Plumbing Elements and Facilities.
            a) Section 11B-603 - Toilet and Bathing Rooms.
               (1) 11B-603.3 - Mirrors.
               (2) 11B-603.4 - Coat Hooks, Shelves and Medicine Cabinets.
               (3) 11B-603.5 - Accessories.

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):
1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordinate with other trades to provide blocking in wall at proper mounting heights for accessibility requirements.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications.

B. Shop Drawings: In accordance with Section 013300, provide Shop Drawings, templates, instructions, and directions for installation of anchorage devices in other work.
   1. Indicate mounting details.
   2. Indicate exact location of backing supports as determined during field measurements.

C. Samples: When proposing items manufactured other than those specified or indicated on Contract Drawings, submit full size samples in accordance with the provisions of Section 013300.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.
   1. Locate backing for support of toilet accessories prior to installation of wall finishes for inclusion on Shop Drawings.

1.07 WARRANTY

A. Warranty: Provide 15-year silver spoilage warranty on mirrors.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Design is based on toilet accessory products manufactured by Bobrick Washroom Equipment, Inc.
B. Acceptable Manufacturers:

C. Acceptable Manufacturers of Sink Trap Protection Products:

D. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable mounting height requirements for accessibility contained in 11B-603.3, CBC 11B-603.4, and CBC 11B-603.5.
   1. Moving parts shall operate with no more than 5 pounds force.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 MATERIALS

A. Design is based on toilet accessory products manufactured by Bobrick Washroom Equipment, Inc.

B. Provide accessories fabricated from 18-8 Type 304 stainless steel in accordance with ASTM A 176, satin finish unless otherwise noted. Gages shall be as indicated on design-basis manufacturer’s technical data sheets.

2.05 ACCESSORIES

A. Toilet and shower accessories and equipment to be provided for this Project are indicated on the Contract Drawings. Model numbers scheduled are based on products manufactured by Bobrick Washroom Equipment.
   1. Refer to Contract Drawings for length and diameter of grab bars.
   2. Toilet tissue dispensers shall be continuous flow type.
3. Mirrors: Type 430 stainless steel channel frame with lock tab hanger.
   a. Bobrick B-165-2436 Mirror with channel frame at all sinks.

B. Continuous Mirrors: Refer to Section 088300.

C. Hair Dryers:
   1. Recessed, vandal resistant nozzle, 2300 watt rating, 80 second energy efficient cycle.
   2. Color as selected by Architect.
   3. Mounting height shall be in accordance with disabled access requirements.
   4. Provide manufacturer's standard 10-year warranty.

D. Sink Trap Protection: No. 3013 light grey, manufactured by Plumerex Specialty Products, Trubro Lav Guard, or equal.
   1. Provide molded vinyl wrap at exposed undersink piping with concealed molded fasteners that are virtually seamless.
   2. Hand Dryers: Xlerator Model XL, manufactured by Excel Dryer, or equal, with Xlerator Recess Kit № 40502.
      a. Surface-mounted within recess kit to limit ADA protrusion to 4 inches or less, with vandal resistant fixed nozzle, 970 watt rating, automatic sensor to activate and deactivate with a 90 second maximum cycle, UL listed.
      b. Provide die-cast zinc cover with brushed stainless steel finish.
      c. Mounting height shall be as indicated on Contract Drawings.
      d. Provide manufacturer's standard 5-year warranty.

2.06 FABRICATION

A. Fabrication:
   1. Keyed (tumbler lock) accessories shall be keyed alike with the exception of coin receiving boxes on vending equipment.
   2. Embossed, stamped nomenclature or labels on exposed faces of units will not be permitted, unless discretely hidden.
   3. Return edges to wall surface.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that backing for shower seat and other toilet and shower accessories are installed and are acceptable for the loads to be attached.

3.02 INSTALLATION

A. General: Install toilet room and shower room accessories in accordance with manufacturer's recommendations and submittals, as accepted, for each item and for each type of substrate construction.
   1. Mounting heights of toilet accessories shall be in accordance with Figure 11B-1A and requirements of CBC 11B-603.3, CBC 11B-603.4, CBC 11B-603.5, and CBC 11B-604.7 for the type of use required.
   2. The accessory shall not be located closer than 1-1/2 inches to the tangent point of the grab bar.
      a. Accessories shall maintain a minimum of 12 inches when above grab bar.
3. Toilet paper dispensers and feminine napkin dispensers located on the grab bar side at accessible stalls shall not project more than the grab bar.

B. Fastening: Provide anchors, bolts, and other necessary anchorages, and attach accessories securely to walls and partitions in locations as indicated on Contract Drawings.
   1. Install concealed mounting devices and fasteners fabricated of the same material as the accessories, or of galvanized steel, as recommended by manufacturer.
   2. Except as otherwise indicated on the accepted submittals, use concealed fasteners finished to match the accessories.
   3. Install grab bars in a manner that will withstand a force of 250 pounds per foot in bending, shear, and tension.

END OF SECTION
EMERGENCY AID SPECIALTIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Defibrillator cabinets and AED units.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Submittals.
   4. Section 092900 - Gypsum Board.
   5. Section 099100 - Painting.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks:
            a) Section 11B-307 - Protruding Objects.
            b) Section 11B-308 - Reach Ranges.
            c) Section 11B-309 - Operable Parts.
               1) 309.4 - Operation.
         2) Division 4 - Accessible Routes:
            a) Section 11B-403 - Walking Surfaces.
            b) Section 11B-404 - Doors, Doorways, and Gates.
                  a) 11B-404.2.9 - Door and Gate Opening Force.

B. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. General: Make submittals In accordance with the provisions of Section 013300.
B. Product Data: Submit complete manufacturer's descriptive literature and specifications.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of emergency aid specialties.

D. Samples: Submit the manufacturer's standard colors and finishes palette, for selection.

**1.05 SUSTAINABLE DESIGN SUBMITTALS**

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

**2.02 REGULATORY REQUIREMENTS**

A. Regulations
   1. Comply with CBC Section 11B-307 protruding object requirements for accessibility.
   2. AED cabinet U-pull shall comply with CBC Section 11B-309 requirements. Pulls must not require grasping.
      a. Pulls shall be placed within reach range required by CBC Section 11B-308.
      b. Latch force of extinguisher cabinets shall be less than 5 pounds force in accordance with CBC 11B-404.2.9.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 DEFIBRILLATOR CABINETS

A. AED Cabinets: Model 145R1ADA compliant, AED Cabinet, as supplied by CPR Saver & First Aid Supply, or equal.
   1. Mounting: Cabinet shall be fully-recessed type.
      a. Size: 11" H x 11.5" W x 5.25" D.
      b. Provide recessed mounting kit, as required.
      c. Pull Handle: Brushed stainless steel.
      d. Strobe and Alarm: None.
      e. Signage: Refer to Signage Contract Drawings.
      f. Keys: Provide two keys for each cabinet, all keyed alike.
   2. Finish:
      a. Pretreatment: Zinc phosphate in accordance with FS TTC-490, Type II.
      b. Finish Coat: Polyester powder coating, exterior and interior.
         1) Color: As selected by Architect.

B. AED: Provide each cabinet with compatible defibrillator, model as recommended by manufacturer.
   1. Location: Install at locations indicated on Contract Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install work in accordance with the manufacturer's recommendations as accepted by the Architect.
   1. Verify location indicated on Contract Documents prior to installation.
   2. Mount at a height of 28 inches above finished floor to bottom of AED cabinet. Handles shall not exceed a height of 48 inches above finished floor.
   3. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
   4. Provide AED units in fully charged condition.
5. Coordinate recessed locations with work of Section 092900 where required to provide fire-resistance rating.

B. Recessed Cabinets: Recess mount using cabinet mounting hardware provided by manufacturer. Secure with through bolts and conceal bolt heads and washers from public view.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Fire extinguishers, cabinets, brackets, and related accessories, as required.

B. Referenced Sections:
1. Section 012500 - Substitution Procedures.
2. Section 013300 - Submittal Procedures.
3. Section 018113 - Sustainable Design Requirements.
4. Section 092900 - Gypsum Board.
5. Section 099100 - Painting.

1.02 REFERENCES

A. California Code of Regulations (CCR):
1. Title 19, Public Safety, 2013 edition:
a. Division 1 - State Fire Marshal:
   1) Chapter 3 - Fire Extinguishers.
      a) Article 3 - General Provisions.
         (1) Section 563 - Operating Instructions.
      b) Article 4 - Classifications and Ratings of Portable Fire Extinguishers.
         (1) Section 563 - Operating Instructions.
      c) Article 9 - Tagging, Marking, Labeling and Seal of Registration.
         (1) Section 596.1 - Required Information.
         (2) Section 596.3 - Attaching Tag.
         (3) Section 596.4 - Format.

B. California Code of Regulations (CCR):
1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
   1) Division 3 - Building Blocks:
      a) Section 11B-307 - Protruding Objects.
      b) Section 11B-308 - Reach Ranges.
      c) Section 11B-309 - Operable Parts.
         (1) 309.4 - Operation.
   2) Division 4 - Accessible Routes:
      a) Section 11B-403 - Walking Surfaces.
b) Section 11B-404 - Doors, Doorways, and Gates.
       (a) 11B-404.2.9 - Door and Gate Opening Force.

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.
B. Coordination: Coordinate location of interior mounted fire extinguishers with interior signage specified in Section 101404 as required by Title 19, Section 563(b).
C. Preinstallation Conference:
   1. Meet with local Fire Marshal on site to verify location of fire protection systems.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.
B. Product Data: Submit complete manufacturer’s descriptive literature and specifications.
C. Shop Drawings: Submit Shop Drawings comprehensively describing the fabrication, location, and installation of fire extinguisher cabinets.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 CLOSEOUT SUBMITTALS

A. Closeout Submittals:
   1. Operation and Maintenance Data: Submit operating and maintenance data for fire extinguisher equipment.
   2. Cabinet Keys: Deliver cabinet keys to Owner at completion of project.
   3. Warranty: Submit copies of written warranty, as signed by the manufacturer, agreeing to repair or replace defective equipment during the warranty period.
PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations
   1. Comply with the requirements of Title 19 Article Division 1, Chapter 3 for types, sizes, and locations of fire extinguishers and cabinets.
   2. Comply with CBC Section 11B-307 protruding object requirements for accessibility.
   3. Extinguisher cabinet U-pull shall comply with CBC Section 11B-309.4 requirements. Pulls must not require grasping.
      a. Pulls shall be placed within reach range required by CBC Section 11B-308.
      b. Latch force of extinguisher cabinets shall be less than 5 pounds force in accordance with CBC 11B-404.2.9.
   4. Accessible route to fire extinguishers shall comply with requirements of CBC Section 11B-403.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 SYSTEM DESCRIPTION

A. Fire Extinguisher: Provide units conforming to the requirements of CCR Title 19 Chapter 3 and NFPA 10, as manufactured by J.L. Industries, or equal, for UL Class fires indicated. Provide the ratings, capacities, and in locations indicated or as required by local fire department representative:
B. General Areas: Provide dry-chemical fire extinguisher units for Underwriters Laboratories (UL) Class B and C fires, equal to DC Galaxy Series as manufactured by J.L. Industries. Provide the following rating and capacity, unless otherwise required by code or local fire department representative:

- UL Rating: 10B:C
- Capacity: 5 pounds
- Finish: Red enamel

C. Electrical Equipment Areas: Provide carbon dioxide fire extinguisher units for Underwriters Laboratories (UL) Class B and C fires, equal to CO2 Sentinel Series as manufactured by J.L. Industries. Provide the following rating and capacity, unless otherwise required by code or local fire department representative:

1. UL Rating: 10-B:C.
2. Capacity: 10 pounds.

### 2.05 Fire Extinguishers

A. Regular Dry Chemical Type: Extinguisher unit containing a siliconized dry sodium bicarbonate base; nontoxic.

1. Construction: Heavy duty steel cylinder with metal valve and siphon tube, O-ring seal, replaceable valve stem seal, visual pressure gage, pull pin, and upright squeeze grip.
2. Effectiveness (Rating): Class B and C fires.
3. Model Identification and UL Rating: Galaxy 5; 10BC.
4. Finish: Factory powder-coated; Red.

B. Carbon Dioxide Type: Extinguisher unit containing liquid carbon dioxide under pressure; nonconductive.

1. Construction: Lightweight, high pressure, aluminum cylinder with O-ring seal, metal valve, replaceable molded valve stem seal, and pull pin.
2. Effectiveness (Rating): Class B and C fires.
3. Model Identification and UL Rating: Sentinel 10; 10BC.
4. Finish: Factory powder-coated; Red.

### 2.06 Cabinets

A. General Requirements:

1. Door: Powder coated steel door glazed with clear tempered glass vertical strip view window, continuous hinge, safety cam latch, and code-compliant safety-lock lever pull handle. Refer to Paragraph 2.02-A.3.b regarding pull handle and latch force requirements.
   a. Decal: Clear vinyl with white lettering mounted vertically on door.
      1) Text: FIRE EXTINGUISHER.
   2. Tub: 18 gage cold rolled steel with white powder-coat interior finish.

B. Fire Extinguisher Cabinets: 18 gage steel with baked white enamel interior finish.

1. Model:
   a. Type B1 Semi-Recessed: Equal to J.L. Industries 1816W10 Ambassador Series, ADA-compliant, accessible, semi-recessed with 1-1/2-inch flat trim projection.
b. **Type B2** Fully-Recessed: Equal to J.L. Industries 1817W10 Ambassador Series, ADA-compliant, accessible, *fully-recessed* with 3-inch rolled trim projection.

c. Provide Fire-FX option where installed in fire rated walls.

2. Door: DSA clear glass vertical strip with 1-1/2-inch face trim, safety-lock cylinder lock with flexible cam code-compliant pull handle, and continuous hinge. Refer to Paragraph 2.02-A.3.b regarding pull handle and latch force.
   a. Paint door to match adjacent wall.

3. Decal: Clear vinyl with red lettering mounted vertically on glazing.
   a. Text: **FIRE EXTINGUISHER.**

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### 2.07 ACCESSORIES

A. **Fire Extinguisher Brackets:** Provide suitable wall bracket at all locations where fire extinguishers are mounted without cabinets.

### 2.08 FABRICATION

A. Provide units factory-fabricated, finished, assembled and ready for installation.
   1. Except as otherwise accepted by the Architect, field modification of manufactured units will not be permitted.
   2. Paint exposed fasteners to match brackets or cabinet shell.

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### PART 3 - EXECUTION

#### 3.01 INSTALLATION

A. Install one fire extinguisher for each cabinet or bracket in locations required by applicable regulations.
   1. Mount at a height of 28 inches above finished floor to bottom of extinguisher cabinet. Handle on fire extinguisher cabinet shall not exceed a height of 48 inches above finished floor.
   2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
   3. Secure to concrete and masonry substrates with plastic shields.
   4. Provide extinguishers in fully charged and fresh condition. Attach Annual Maintenance Tag, Verification of Service collar, and Hydrostatic Text label to each extinguisher with future recharging date in accordance with Title 19, Section 596.1 and Section 596.3.
   5. Service Tag: Maintenance service tag shall indicate that new fire extinguisher is "new", with punch out, in accordance with Title 19, Section 596.4.
   6. Coordinate recessed locations with work of Section 092900 where required to provide fire-resistance rating.

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**END OF SECTION**
- SECTION 105113 -

METAL LOCKERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Metal lockers and accessories in Locker Rooms in Building A.
   1. Include locker benches.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 2 - Scoping Requirements.
            a) Section 11B-225 - Storage.
               (1) 11B-225.2 - Storage.
                  (a) 11B-225.2.1 - Lockers.
            2) Division 3 - Building Blocks.
               a) Section 11B-309 - Operable Parts.
                  (1) 11B-309.4 - Operation.
            3) Division 8 - Special Rooms, Spaces and Elements:
               a) Section 11B-811 - Storage:
                  (1) 11B-811.2 - Clear Floor or Ground Space.
                  (2) 11B-811.3 - Height.
                  (3) 11B-811.4 - Operable Parts.

C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):
1.03  ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04  SUBMITTALS

A. Product Data: Submit complete manufacturer’s descriptive literature, materials list, and specifications in accordance with the provisions of Section 013300.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit Shop Drawings comprehensively describing the fabrication and installation of lockers.

C. Samples: In accordance with the provisions of Section 013300, submit the manufacturer’s standard palettes, for the selection of metal finish and color.

1.05  SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:

1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
   a. Comply with Section 017419 Construction Waste Management and Disposal.

2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06  CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Submit operating and maintenance data.
   a. Keys: Upon completion of the installation, deliver locker keys and lock combinations to the Owner’s representative.

B. Warranty Documentation: Submit copies of written warranty, as signed by the installer, agreeing to repair or replace defective work during the warranty period.

1.07  DELIVERY, STORAGE, AND HANDLING

A. Do not schedule delivery of metal lockers to Project until building is fully enclosed.
1.08 FIELD CONDITIONS

A. Field Dimensions: Verify relevant dimensions in field prior to preparation of Shop Drawings.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   3. Lyons Workspace Products, Inc., Aurora, IL (630)892-8941, (800)323-0082.

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with CBC Section 11B-811 relating to location, height, operating parts, and quantity of lockers for persons with disabilities.
   1. A minimum of five percent of total lockers shall be accessible lockers.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
      a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 MATERIALS

A. Sheet Steel: Cold-rolled and leveled sheet steel for doors and door frames. Mild rolled steel for other parts. Steel shall be free from buckle,
scale, and surface imperfections, and capable of receiving a high grade enamel finish.

2.05 LOCKER COMPONENTS

A. Lockers: Design is based on Marquis Champion All-Welded Fully-Framed Athletic Lockers, manufactured by List Industries, or equal. Provide free-standing single-tier and double-tier type standard metal lockers in sizes indicated on the Contract Drawings. Total height shall be as indicated on the Contract Drawings and mounted on concrete base.

1. Types:
   a. Accessible General Lockers: Double tier 15 inches wide by 15 inches deep by 60 inches high mounted on concrete curb.

2. Body Construction: Design-basis manufacturer's fully-framed all-welded Hollow-T construction, 13 gage 1/2" fully-framed flattened expanded metal sides, 16 gage continuous top, 18 gage solid back, and 16 gage galvannealed bottom.

3. Tops, Bottoms, and Shelves: Minimum 16 gage steel, flanged edges. Provide two shelves with rolled front approximately 9 inches on centers below locker top.


5. Closed Base: Where supported on metal legs, provide matching sheet metal continuous recessed closed base anchored to floor and secured to locker.


B. Doors: One-piece, minimum 14 gage diamond perforated sheet steel, flanged at edges with a full height 3-inch wide 18 gage door stiffener. Construct doors to prevent springing when opening or closing.

1. Provide design-basis manufacturer's Security-Plus side-hinged door styles as indicated on the Contract Drawings.

2. Provide stamped louvered vents in door faces, as follows:
   a. Double-tier Lockers: Not less than two louver openings top and bottom.

3. Hinges: Heavy-duty, not less than 13 gage thick, 7-knuckle 3-1/2-inch tight pin steel hinges. Weld hinges to inside of frame and secure to door with not less than two factory-installed fasteners, completely concealed and tamperproof when locker door is closed. Provide at least three hinges for each door 42 inches high and over.

4. Latching: Provide latch and locking hardware that does not require twisting, pinching, or grasping to operate, in accordance with CBC 11B-309.4 - Operable Parts.
   a. Provide single-point, maintenance-free quiet latching with 11 gage MIG welded latch with pry-resistant lug.
   b. Positive, automatic, pre-locking, pry-resistant, quiet-type latch and pull with rubber silencers.
5. Handle: Deep-drawn heavy-duty, vandalproof and kick-proof single-point seamless stainless steel recessed handle containing strike and hole for padlock.
   a. Provide three-point latching for single-tier lockers.

C. Trim: 16 gage baked enamel finish. Provide necessary closures, fillers, and other trim members as required for a complete installation.

D. Fasteners: Cadmium, zinc, or nickel plated steel. Exposed bolt heads, slotless type. Provide self-locking nuts or lock washers for nuts on moving parts, or otherwise prevent loosening of nuts. Do not expose bolts or rivet heads on fronts of lockers or frames.

E. Equipment: Furnish hooks and hang rods of cadmium-plated steel or cast aluminum.

2.06 LOCKER ACCESSORIES

A. Handles: Manufacturer's standard chrome plated handle.
   1. At lockers designated as accessible provide stainless steel ADA compliant latching hardware that does not require twisting, pinching, or grasping to operate, in accordance with CBC 11B-309.4 - Operable Parts.

2. Locker doors shall have a seamless drawn, ANSI Type 304 stainless steel recessed handle, shaped to receive a padlock. Recess pan shall be deep enough for the lock to be completely flush with the outer door face. Pull handle shall be drawn into the left side of the handle for easy opening of the locker door.
   a. No lock shall be located more than 67 inches above the finished floor.
   b. The lock at accessible lockers shall be located at 48 inches above the finished floor.

B. Equipment: Furnish each locker with the following accessories, unless otherwise shown.
   1. Number Plates: Manufacturer's standard etched, embossed, or stamped, non-ferrous 1-inch high metal number plates with numerals not less than 3/8-inch high. Number the lockers in sequence as directed by the Architect.
      a. Attach plates to each locker door above handle, with at least two fasteners of the same finish as number plate.

2. Hooks: Steel with ball points attach with two bolts. Provide the following:
   a. Full height lockers 12 inches wide and wider: One double-prong ceiling hook and three single-prong wall hooks.

   a. Provide ADA compliant shelf and pole at 48 inches maximum above finish floor, and lower shelf at 15 inches minimum above finish floor.
C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of ASTM A 176 AISI Type 304 stainless steel, satin finish to match hardware.
   1. Use one-way type theft-resistant heads and nuts for exposed anchorages.
   2. For concealed anchors use hot-dip galvanized cadmium-plated, or other rust-resistant protective-coated steel.

D. Benches: 9-1/2 inches wide by 1-1/4 inches thick clear lacquered natural finished hardwood.
   1. Lengths shall be as indicated on Contract Drawings. Provide single pieces up to 12-foot long and equal length pieces over 12 feet.
   2. Provide rounded corners, eased edges, and sand all surfaces smooth.
   3. Mount on manufacturer's heavy duty steel pedestals finished to match lockers. Space pedestals 6 feet on centers maximum.

2.07 FABRICATION

A. Construction: Fabricate lockers square, rigid, and without warp, with metal faced flat and free of dents or distortion. Grind all exposed metal edges safe to the touch. Weld frames together. Weld or bolt other joints and connections as standard with manufacturer. Grind exposed welds flush.
   1. Lockers shall be factory-assembled of MIG welded construction, in multiple column units to meet project conditions. Assembly of locker bodies by means of bolts, screws, or rivets will not be permitted. Welding of knockdown locker construction is not acceptable.
   2. Frame and Vertical Side Panels: 13 gage 1/2-inch flattened expanded metal framed by 16 gage Hollow T tubular sections and channel frame members designed to enclose all four edges of the side panel with the entire assembly, MIG welded to form a rigid frame for each locker. The channel frame members shall be welded to the front and rear vertical frame members to create an anchor bearing surface of 1-1/4 inches wide by the depth of the locker at each side panel.
   3. Integral Frame Locker Base: 14 gage formed structural channels shall be MIG welded to the front and rear vertical side panel frame members to allow placement of locker bottom a minimum 2-3/4 inches above floor level. Locker bottom shelf located less than 2 inches above floor level will not be acceptable.
   4. Doors: Outer door shall be fabricated from single sheet prime 14 gage with single bends at top and bottom and double bends at the sides with a 3-inch wide 18 gage full height channel door stiffener MIG welded to the hinge side of the door as well as to the top and bottom door return bends, and spot welded to the inside of door face to form a rigid torque-free box reinforcement for the door. Doors shall be right hand side-hinged. Wardrobe doors 20 inches high and over shall be perforated with 5/8-inch x 1-1/2-inch diamonds. Gym doors 18 inches high and under shall be perforated with 7/16-inch x 15/16-inch diamonds. Fabricate doors shall swing 180 degrees.
   5. Hinges: Hinges shall not be less than 3-1/2 inches long 13 gage seven knuckle pin type, securely riveted to frame and welded to the
door. Secured doors to frame with a minimum of two tamper resistant rivets per hinge. Provide three hinges for doors 48" and higher and two hinges for doors shorter than 48 inches.

6. Latch Assembly: Single-point rigid non-moving positive latch by means of a heavy gage 11 gage minimum latch securely welded to the framed vertical divider. Latch assembly must be made of a single piece of steel and have a padlock loop that inserts through the recess pan. Latch must be able to accept either a padlock or built-in combination lock. Rubber bumpers shall be securely riveted to the door strike.

B. Finishing: Chemically pretreat metal with degreasing and phosphatizing process. Apply baked-on enamel finish to all surfaces, exposed and concealed, except plates and non-ferrous metal.

1. Flat Tops: Formed of one-piece 16 gage cold rolled sheet steel, be an integral part MIG welded to each vertical side panel frame member, and be continuous to cover the full width of a multiple framed locker unit.

2. Hat Shelves, Intermediate Shelves, and Bottoms: 16 gage galvannealed sheet steel, have double bends at front and shall engage slots in the Hollow T vertical frame members at all four corners and be securely welded to the frame and side.

3. Backs: 18 gage cold rolled sheet steel, be continuous to cover a multiple framed unit and be welded to each vertical side panel frame member.

4. Locker parts shall be cleaned and coated after fabrication with a seven-stage zinc/iron phosphate solution to inhibit corrosion, followed by a coat of high grade custom blended powder electrostatically sprayed and baked at 350 degrees Fahrenheit for a minimum of 20 minutes to provide a tough durable finish.

C. Color: Provide locker units in colors as selected by Architect from manufacturer's standard color palette.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that bases are level with sufficient backing to fasten lockers at bottom.

3.02 INSTALLATION

A. Install metal lockers at the locations shown in accordance with the manufacturer's instructions for a plumb, level, rigid, and flush installation.

B. Space fastenings approximately 12 inches on centers, or at each tier minimum, and apply through back-up reinforcing plates where necessary to prevent metal distortion. Conceal fasteners wherever possible. Install fasteners in pre-drilled holes and confirm that all are pulled up tight.

C. Install trim, sloping tops, fillers, and cover panels where required. Provide flush hairline joint against adjacent surfaces.

D. Fasten pedestals securely to floor with lead expansion shields and non-ferrous bolts finished to match pedestal.
E. Provide ADA compliant lockers where indicated on Contract Drawings.
   1. Equip with ADA compliant lever handles.
   2. A decal with the international symbol of accessibility shall be applied to the face of the accessible locker doors.

3.03 ADJUSTING

A. Adjust doors and latches to operate easily without binding. Verify satisfactory operation of integral locking devices.

B. Touch-up marred finishes, or replace if not acceptable to the Architect. Use only materials and finishes as recommended or furnished by the locker manufacturer.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Solid plastic lockers at Break Room in Building B.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. ASTM International (ASTM):
   3. D 635-10 - Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 2 - Scoping Requirements.
            a) Section 11B-225 - Storage.
               (1) 11B-225.2 - Storage.
                  (a) 11B-225.2.1 - Lockers.
         2) Division 3 - Building Blocks.
            a) Section 11B-309 - Operable Parts.
               (1) 11B-309.4 - Operation.
         3) Division 8 - Special Rooms, Spaces and Elements:
            a) Section 11B-811 - Storage:
               (1) 11B-811.2 - Clear Floor or Ground Space.
               (2) 11B-811.3 - Height.
               (3) 11B-811.4 - Operable Parts.
C. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in accordance with the provisions of Section 013300.
   1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item where applicable.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit Shop Drawings comprehensively describing the individual locker construction, overall dimensions, and installation of lockers. Show anchorage and accessory items.
   1. Submit setting drawings, templates, and instructions for the installation of anchorage devices built into other work.
   2. Indicate field measurements on Shop Drawings.

C. Samples: In accordance with Section 013300, submit sample of partition material, hardware, and manufacturer's standard color palette for selection of colors.

D. Quality Control Submittals:
   1. Test Reports: Submit certified laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
   2. Certification: Submit certification showing independent test calculations that compartments comply with ASTM E 84 to Class B requirements.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
1.06 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data:
      1. Submit operating and maintenance data.
         a. Keys: Upon completion of the installation, deliver locker keys and lock combinations to the Owner's representative.
   B. Warranty Documentation:
      1. Submit copies of written warranty, as signed by the installer, agreeing to repair or replace defective work during the warranty period.

1.07 DELIVERY, STORAGE, AND HANDLING
   A. Delivery: Do not schedule delivery of metal lockers to Project until building is fully enclosed.
   B. Storage and Protection: Use all means necessary to protect the materials of this Section before, during, and after installation. Locker components shall be stored flat until assembly. Finishes shall be protected from soiling and damage during handling.

1.08 FIELD CONDITIONS
   A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

1.09 WARRANTY
   A. Provide manufacturer's standard 20-year warranty for HDPE plastic panels, doors, dividers, and shelves against rust and other types of corrosion, delamination, or breakage under normal use.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
   A. Acceptable Manufacturers:
   B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS
   A. Regulatory Requirements:
      1. Comply with applicable codes and regulations of governmental agencies having jurisdiction.
         a. Comply with CBC Section 803.1 for flame spread and smoke developed classifications based on building based on location and group classification.
2. Comply with CBC Section 11B-811 relating to quantity and locations, height, operating parts, and quantity of lockers for persons with disabilities.
   a. Five percent of total lockers shall be accessible lockers.

B. Solid Plastic Material: High density polyethylene (HDPE) containing a minimum of 10 percent recycled resin, manufactured under high pressure forming a single component section that is waterproof, impact resistant, non-absorbent, and having with homogeneous color throughout.
   1. Comply with required fire codes for this Project when tested in accordance with ASTM E 84, ASTM D 635 and ASTM D 1929.
   2. HDPE components shall have a smooth orange peel finish. Locker doors and door frames shall be of the same color and selected by Architect from manufacturer’s full color palette.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 COMPONENTS

A. Locker Types: Design is based on the use of free-standing five-tier and type standard HDPE plastic lockers; equal to Model Lenoxcubby manufactured by Bradley Corporation, or equal.
   1. Size: As indicated on Contract Drawings.
   2. Total locker height shall be 72 inches, mounted on closed base 4 inches high.
   3. Provide sloping top.
   4. Color and pattern as selected by Architect.

B. Doors and Frames: 1/2-inch thick HDPE.

C. Sides, Tops, Bottoms, Backs, Base, and Shelves: 3/8-inch thick with homogenous natural color throughout. Components shall have machined edges to accept assembly brackets. Outside, insides, tops, bottoms, backs, dividers, and shelves shall be natural in color.

D. Hinges: Extruded aluminum with powder coating to match the locker door and frame. Door hinge shall be full length assembled onto the door and front.
E. Door Hardware:
   1. Latch: HDPE plastic capable of accepting various locking mechanisms. Latch shall be securely fastened to the entire length of the door, providing a continuous latch.
      a. Positive, automatic, pre-locking, pry-resistant, quiet-type latch and pull with rubber silencers.
      b. Provide two-point latching for double-tier lockers.
   2. Handles: Manufacturer's standard chrome plated handle.
      a. Provide hole in handle for user's padlock.
      b. At lockers designated as accessible, provide ADA compliant latching hardware that does not require twisting, pinching, or grasping to operate, in accordance with CBC 11B-309.4 - Operable Parts.

   1. Keypad operated electronic locks shall have the following operating functionality:
      a. The lockset shall be operable by a user selected four-digit user code, an electronic ADA-compliant User Key or an electronic Manager Bypass Key. Entry of a valid user code or user key shall lock the lockset by throwing its' deadbolt. Entry of the same user code/user key that it was locked with shall unlock the lockset by retracting its deadbolt allowing the opening of the door by pulling the lockset's optional pull handle or other handles provided by the locker vendor. The lockset shall remain unlocked until another user code/user key is entered to lock the lockset. In case the user code is forgotten, entry of the electronic bypass key or programming key shall unlock the lockset. In case of battery failure, entry of the electronic bypass key or programming key shall provide external power to the lock to unlock the lockset. The lockset shall automatically lockout for one minute after three consecutive entries of invalid operating codes/keys. The lockset shall contain an LED for visual feedback as well as a buzzer for audio feedback. When locked, the LED shall emit a flashing red light to indicate use. The buzzer shall emit an audio feedback in the case of each keypad stroke, entry of valid/invalid code, low battery and binding. Upon locking the lockset shall contain a programmable feature to automatically unlock after a pre-selected number of hours up to an 8-hour maximum. The electronic Manager Bypass Keys shall be registered to the lock with an electronic Programming Key that is unique to the lock/system. The lockset shall not require the user to insert cards or other peripherals to operate.
      b. The lockset shall be battery operated. The batteries shall be included with the lockset. The lockset shall work stand-alone with no wiring required from a lockset to another or to a central processor. The batteries shall last a minimum of 3 years based on 10 operations per day.
      c. Housing and dead bolt shall be made of metal and contain a keypad with the buttons. Lockset shall consist of two modules
with the front module containing the keypad and the rear module containing the dead bolt.

d. Front and rear modules shall contain a built-in connector capable of mating when the modules are installed on the door.

e. The locksets front module containing the keypad shall not be larger than 2.14 inches wide x 3.85 inches high with a receptacle for the management bypass key.


2. Handles: ADA compliant latching hardware that does not require twisting, pinching, or grasping to operate, in accordance with CBC 11B-309.4 - Operable Parts.

a. Door pull handle shall not be a separate component from the lockset's front module. The pull handle shall be a permanently affixed handle built as part of the lockset's front module.

3. Electronic Keys:

a. Furnish ADA User Keys equal to 150 percent of number of lockers installed.

b. Furnish ten Manager Bypass Keys.

c. Furnish two Programming Keys.

4. Software: Provide hardware and software management system required by Owner's personnel to operate and maintain system.

G. Accessories: Furnish each locker with the following field mounting accessories, unless otherwise indicated on Contract Drawings.

1. Number Plates: Manufacturer's standard etched, embossed, or stamped, non-ferrous 1-inch high metal number plates with numerals not less than 3/8-inch high. Number the lockers in sequence as directed by the Architect.

a. Attach plates to each locker door above handle, with at least two fasteners of the same finish as number plate.

H. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of ASTM A 240 AISI Type 304 stainless steel, satin finish to match hardware.

1. Use one way type theft-resistant heads and nuts for exposed anchorages.

2. For concealed anchors use hot-dip galvanized cadmium-plated, or other rust-resistant protective-coated steel.

2.05 FABRICATION

A. Provide components fabricated, finished, and prepared to receive accessories and hardware in the factory. Deliver components ready for assembly and installation.

1. Field fabrication, including preparation for accessories, will not be permitted.

2. Locker components shall snap together in a group of no more than five adjacent lockers. Adjacent lockers shall share a common side panel.

3. Finish exposed surfaces free of saw marks with edges machined to 1/4-inch radius.

4. Bevel corners and edges of cutouts.
B. Trim: HDPE plastic material to match lockers. Provide necessary closures, fillers, and other trim members as required for a complete installation. Provide one piece filler units, free of overlapped joints.

C. Heat Sink: Fasten a continuous 1-inch aluminum strip to bottom of doors and panels.

D. Color: As selected by Architect.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

A. Inspect the areas and conditions under which lockers are to be installed. Verify correct spacing between fixed walls. Do not proceed with the work until unsatisfactory conditions have been corrected.

1. Verify that solid blocking or metal backing plates have been furnished and installed under other Sections for anchorage of lockers to walls.

**3.02 INSTALLATION**

A. Lockers:

1. Erect compartments rigid, straight, plumb and level, and in accordance with manufacturer’s printed instructions.
2. No mounting brackets shall be exposed on the exterior surfaces of doors.
3. Anchor locker units to wall studs through the locker back and to the floor using 1-1/2-inch pan head screws. Furring shall be installed between lockers and wall of installation.
4. Install trim, sloping tops, fillers, and cover panels where required. Provide flush hairline joint against adjacent surfaces, using concealed bolts. Align trim with flush with face of locker.

B. Provide ADA compliant lockers in lower tiers of two-tier installations and where indicated on Contract Drawings. Affix the international accessibility symbol to face of locker.

1. Equip with ADA compliant lever handles.

C. Erection Tolerances:

1. Maximum variation from true position shall be 1/4-inch.
2. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 1/8-inch.
3. Maximum variation from plumb shall be 1/8-inch.

**3.03 ADJUSTING**

A. Perform final adjustments to door hardware, and other operating parts of the locker assembly just prior to final inspection.

**3.04 CLEANING**

A. Clean exposed surfaces of lockers, hardware, fittings, and accessories.
B. Clean exposed surfaces of panels, hardware, fittings, and accessories. Touch up minor scratches and other finish imperfections using materials and methods recommended by the partition manufacturer.
1. Replace units that have been scratched or damaged. Field touch-up will not be permitted.
2. Remove identification and assembly stickers and remove residue left by gummed labels.

3.05 CLOSEOUT ACTIVITIES

A. Demonstration and Training: Engage a factory-authorized service representative to train owner's maintenance personnel to program, operate, and maintain digital locksets for lockers.

3.06 PROTECTION

A. Protect units so that there will be no indication of use or damage at the time of acceptance.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Metal wire mesh athletic team lockers.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's descriptive literature and specifications, including:
   1. Preparation instructions and recommendations.
   2. Rated capacities, construction details, material descriptions, dimensions of individual components, profiles, and finishes.
   3. Delivery, storage, handling, and installation instructions and recommendations.
   4. Maintenance instructions and recommendations.

B. Shop Drawings: Submit Shop Drawings illustrating layout and installation.
   1. Show fabrication and installation details. Distinguish between factory and field work.
   2. Include plans, elevations, sections, details, attachments and work by others.
   3. Show system layouts, room locations, clearances, spacing, and relationship to adjacent construction.
   4. Show trim and accessories.
   5. Indicate seismic bracing and fastening requirements.
C. Samples: Submit samples of a single full-size locker for review and acceptance.
   1. Exposed Finishes: Not less than 8 by 10 inches (200 by 250 mm), for each type, color, pattern, surface, and material selected.
   2. Exposed Hardware and Accessories: One full-size unit for each type and finish.

D. Closeout Submittals:
   1. Operation and Maintenance Data: For adjusting, repairing, and replacing components and accessories.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 MAINTENANCE MATERIALS SUBMITTALS

A. Extra Stock Materials: Provide box of 50 key blanks and five extra locks.

PART 2 - PRODUCTS

2.01 MANUFACTURERS


B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with CBC Section 11B-811 relating to location, height, operating parts, and quantity of lockers for persons with disabilities.
   1. A minimum of five percent of total lockers shall be accessible lockers.
   2. At least one compartment shall be positioned less than 48 inches from the finished floor.
   3. No lock shall be located more than 67 inches above the finished floor.
      a. The lock at accessible lockers shall be located no higher than 48 inches above the finished floor.
   4. No compartment (interior bottom shelf) shall be positioned less than 28 inches from the finished floor.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10% percent of the total materials value.

2.04 WIRE MESH LOCKERS

A. Design is based on GearBoss AirPro Metal Grid Athletic Lockers, Product #241B031 wall-mounted locker with lockable foot locker and apparel hooks, as manufactured by Wenger Corporation, or equal.
   1. Seismic Performance: Comply with ASCE 7 Section 9, Earthquake Loads based upon seismic design criteria indicated on the Structural Documents.
   2. Configuration: Includes 5- to 7-inch clearance above floor for cleaning and metal legs at manufacturer's recommended intervals for support at wall and island locations.
   4. Steel Grid Infill: 2 inch square pattern, welded to steel tube frame.
   5. Steel Grid Infill: 0.25-inch diameter welded steel wire grid, welded to steel tube frame.
   6. Integral Seat and Foot Locker: Laminate-clad composite wood panel seat and foot locker lid, 3/4-inch thick, with lockable seat security compartment, replaceable split pin hinge, and locking hasp for padlock by Owner.
   7. Door: Steel grid infill, 1-inch square pattern 0.16-inch diameter wire in 1-1/4-inch outside diameter,16-gauge tube steel frame, with replaceable split pin hinge and locking hasp for padlock by Owner.
   8. Door: Laminate wood panel infill, in welded steel tube frame with replaceable split pin hinge and locking hasp for padlock by Owner.
   9. Door: Door Ready, open body can accept door after initial install.
   10. Shelf and Seat: 3/4 inch thick, formaldehyde free industrial grade composite wood with polyester, antimicrobial laminate finish.
   11. Apparel Hooks: One double and two single hooks, bolted to locker shelf and sides.
   12. Locker Size: As indicated on Contract Drawings.

B. Metal Locker Accessories:
   1. Garment Hooks:
      a. One 10-gage center hook.
      b. Two 12-gage side single hooks.
   2. Identification Plates: 20-gage steel, powder-coated paint. 12 inches wide by 2.125 inches high.


C. Metal Locker Finishes: Colors selected by Architect from manufacturer's standard range of colors and patterns.

2.05 MATERIALS

A. Steel Tube: ASTM A501, hot-formed steel tubing.

B. Steel Wire: ASTM C510, cold drawn steel wire.

C. Particleboard: To ANSI A208.1, minimum 43 lb/cu. ft. density.
   1. Provide fire retardant treated type.

D. Plywood: Exterior grade.
   1. Provide fire retardant treated type.

E. Laminate Finish: Composite, of thickness indicated, finished with thermally-fused anti-microbial polyester surfacing on both sides, meeting performance properties of NEMA LD3 for VGS grade, with heat bonded, radiused, 3 mm thick extruded PVC edge banding.
   1. Surface Abrasion Resistance: Taber Wheel, 400 cycles, for solid colors.

F. PVC Edge Banding: LMA EDG-1, radiused PVC extrusions, 3 mm thick, heat-bonded.

G. Anchors and Fasteners:
   1. Factory Provided: Material, type, and size recommended by manufacturer for secure anchorage to substrate.
   2. Field Installed: Manufacturer-recommended fasteners furnished by Contractor as required for locker substrate and project requirements.

2.06 FABRICATION

A. Fabricate components square, and rigid. Make exposed metal safe to touch and free of sharp ends or burrs.

B. Form frames, panels, doors, and accessories from one-piece, or one rigid assembly, unless specifically shown on Shop Drawings.

C. Factory preassemble metal components by welding all joints, and connections; with no bolts, nuts, screws, or rivets used in assembly, except as required for knock down shipping and attachment to mounting surfaces.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Examine installation areas and mounting surfaces with Installer present, for compliance with manufacturer's installation tolerances including required clearances, floor level, location of blocking and anchoring
reinforcements, and other existing conditions that may affect installation or performance.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

D. Proceed with installation only after correction of unsatisfactory conditions.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Condition lockers to average prevailing humidity conditions in installation areas before installation.

3.03 INSTALLATION

A. Install work of this Section in accordance with manufacturer's recommendations and pertinent requirements of postal authorities having jurisdiction.

1. Anchor components firmly into position, level, and plumb.

B. Install components plumb, level, and true; using integral levelers and anchors in accordance with manufacturer's recommendations, shop drawings and other approved submittals.

C. Install seismic fastening in accordance with approved Shop Drawings.

D. Fasten components to adjacent construction through back, near top and bottom. Fasten at indicated height using fasteners recommended by manufacturer. Comply with mounting height requirements for accessible components.

E. Through-bolt adjacent units using connector bolts provided by manufacturer.

F. Install hardware uniformly and precisely without binding.

1. Adjust and align hardware so moving parts operate freely and contact points meet accurately.

2. Allow for final adjustment after installation to ensure hardware operates smoothly without warping or binding and closes with uniform reveals.

3.04 ADJUSTING

A. Touch up abrasions and scratches to be invisible to the unaided eye from a distance of 5 feet.

B. Repair or replace defective work as directed by Architect upon inspection.

3.05 CLEANING AND PROTECTION

A. Clean surfaces. Touch up marred finishes, or replace damaged components that cannot be restored to factory-finished appearance. Use
only materials and procedures recommended or furnished by manufacturer.

B. Turn over operation and maintenance instructions to Owner. Instruct the Owner’s personnel upon request.

C. Protect installed products from damage, abuse, dust, dirt, stain, or paint until completion of project. Do not permit use during construction.

END OF SECTION
- SECTION 105613 -

METAL STORAGE SHELVING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Prefabricated storage and retail steel shelving.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 123616 - Metal Countertops.

1.02 REFERENCES

A. ASTM International (ASTM):
   2. A 653-16a - Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   3. A 1008 16 - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

B. California Code of Regulations (CCR):
      a. Chapter 16A - General Design Requirements:
         1) Table 1607A.1 - Minimum Uniformly Distributed Live Loads and Minimum Concentrated Live Loads.

C. California Code of Regulations (CCR):
         1) Section 2703 - General Requirements.
            a) 2703.8 - Construction Requirements.
D. American Society of Civil Engineers (ASCE):

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications covering storage units, components, and accessories.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings describing fabrication, layout, and installation of metal storage shelving.

C. Samples: Submit manufacturer's standard color palette for selection by Architect.

D. Quality Control Submittals:
   1. Manufacturer's Instructions: Provide manufacturer's recommendations regarding anchorage to walls.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4.1 and MR Credit 4.2: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.

   2. Product Data for MR Credit 5.1 and MR Credit 5.2: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Firm specializing in metal storage shelving installation with not less than 5 years of experience in installation of metal storage shelving similar to that required for this project.

B. Provide metal storage shelving capable of withstanding the loads required when tested according to MH 28l.2 Specification for the Design and Testing of Metal-Wood Shelving.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials only after exterior openings have been enclosed, wet work is completed and facilities are available for proper handling, storage and protection of materials, in compliance with manu-
factory's instructions and recommendations. Deliver products with factory wrappings intact and labeled to identify contents.

B. Storage: Store materials on clean concrete surface or raised platforms, in dry area, fully-protected from weather and suitable for field assembly of components.

1.08 FIELD CONDITIONS

A. Field Measurements: Prepare Shop Drawings based on field measurements taken specifically for the work of this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Provide shelving systems, including all related components and anchorages, capable of withstanding seismic forces in compliance with applicable requirements of CBC Chapter 16A. Details of construction and installation shall be approved by the Division of the State Architect (DSA).

1. Comply with CFC Section 2703.8.7 for hazardous materials and CFC 3403.2 for flammable/combustible materials.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.

1. MR Credit 4.1 and MR Credit 4.2 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.

2. MR Credit 5.1 and MR Credit 5.2 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.
2.04 PERFORMANCE CRITERIA

A. Structural Performance: Attachment of double-faced shelving to the supporting floor structure, and of single-faced shelving to wall construction shall be designed in accordance with structural criteria requirements of CBC Table 1607A and ASCE Table 13.5-1.

2.05 MATERIALS

A. Steel Sheet: Commercial steel (CS), Type B, free of scale, pitting, or other surface defects, pickled and oiled.
   1. Cold-rolled steel sheet complying with ASTM A 1008 Commercial steel (CS), Type B.
   2. Non-ferrous Coating: ASTM A 653 Commercial steel (CS), Type B, with G60 zinc (galvanized) or A60 zinc-iron alloy (galvannealed) coating.

B. Steel Tubing: ASTM A 513, Type 2.

C. Expansion Anchors: Power-actuated fasteners fabricated from corrosion-resistant material, with clips or other accessory devices for attaching foot plates at supports, and with capability to sustain without failure a load equal to 10 times that imposed by shelving systems, tested in accordance with ASTM E 1190, conducted by a qualified independent testing agency.
   1. Corrosion Protection: Zinc plated to comply with ASTM B 633, Class Fe/Zn 5 for Class SC 1 service conditions (mild).

2.06 COMPONENTS

A. General: Refer to Contract Drawings for descriptions and locations of display and storage shelving.
   1. Provide steel sheet construction consisting of upright pilasters slotted to be snapped together without any nuts, bolts, or clips.
   2. System shall be designed to support load capacity independently without bracing for accessibility on all sides.
      a. Sizes: As indicated on Contract Drawings.
      b. Shelves shall be adjustable 1-1/2 inches on centers.
   3. Assembly: Provide first unit of each bank with four uprights; shelves and top to stand independently. Provide each succeeding unit with two uprights and four shelves to allow attachment to preceding unit.

B. Post and Case Type Metal Display Shelving: As indicated on the Contract Drawings.
   1. Metal Shelving in the PE Building: Shelving in open configuration, as manufactured by Spacesaver Corporation, or equal,
      a. Type 10.11: 4-Post and Case Type Wide Span Metal Shelving, 36"W X 24"D X 84"H, floor anchored.
      b. Type 10.12: 4-Post and Case Type Wide Span Metal Shelving, floor anchored with lockable doors, 36"W X 24"D X 40"H.
      c. Type 10.16: 4-Post and Case Type Metal Shelving, 36"W x 24"D x 84"H, counter height with hanging rods and lockable doors.
   a. **Type 05.27**: Fixed, Single-Sided Metal Text Book Shelving, 72"H, slotwall back with aluminum inserts and HL shelf 16" deep.
      1) Color: Silver SIL LX6 MB5.
   b. **Type 05.42**: Fixed, Double-Sided Island Stationary Metal Text Books Shelving, 72"H with HL shelves.
   c. **Type 05.43**: Mobile, Double-Sided Island Slotwall for retail shelving.
   d. **Type 05.44**: Mobile, Double-Sided Island Metal Shelving with metal cladded sides.
   e. **Type 05.51**: Fixed, Double-Sided Island Stationary Metal Retail Shelving, 48"H, with DL shelves
3. Bookstore Shelving: Marlite Displaywall, grooved for heavy duty inserts, as distributed by Pacific Store Planning, or equal.
   a. **Type 06.19**: 1/2" thick Wall Hung Slatwall Panel with aluminum inserts.
      1) For wall backing refer to Contract Drawings.
      2) Finish: PL-4 Applied to MDF, wall hung with Z-Clips.
4. Bookstore Shipping and Receiving Shelving: Spider Boltless metal shelving, as manufactured by Rousseau Metal, or equal.
   a. **Type 12.05**: Spider Boltless Metal Shelving with wood deck, 24"D x 82"H.
      1) Refer to Contract Drawings for anchorage detail.
   b. **Type 12.09**: Spider Boltless Metal Shelving, 49"W x 24"D x 32"H with stainless steel countertop.
      1) Refer to Contract Drawings for anchorage detail.
      2) Refer to Section 123616 for stainless steel countertops.
   c. Include metal standoffs.
   a. **Type 10.14**: Heavy duty K&V 85 double slotted wall standards.
C. Accessories: Provide bracing, dividers, closed backs and sides, base, bins, shelf boxes, and label holders as required for a complete system, and as indicated on Contract Drawings.

2.07 FABRICATION

A. Shop Finishing: Finish all components except prefinished with manufacturer's baked polyester enamel.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install work in accordance with the manufacturer's recommendations as accepted by the Architect.
   1. Install and brace units plumb and level.
B. Secure shelving to floor and walls as required to resist overturning.
   1. Secure shelving units to floor with expansion anchors with capability to sustain, without failure, a load equal to 4 times the load imposed, tested in accordance with ASTM E 488, conducted by a qualified independent testing agency.

C. Metal Storage Shelving Installation: Install shelving system and accessories after finishing operations, including painting have been completed. Install system to comply with final layout drawings, in compliance with manufacturers printed instructions. Position units level, plumb; at proper location relative to adjoining units and related work. Adjust accessories to provide visually acceptable installation.

3.02 FIELD QUALITY CONTROL

A. Inspection: Inspect installed shelving and remove and replace shelving components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Provide new matching units, installed as specified and in manner to eliminate evidence of replacement.

3.03 ADJUSTING

A. Adjustment: Adjust components and accessories to provide visually acceptable installation.

3.04 CLEANING

A. Cleaning and Touch-Up: Clean storage shelving to dust-free condition for Substantial Completion review.
   1. Remove all labels and protective coverings from completed Work and thoroughly clean interior and exterior surfaces.
   2. Touch-up marred finishes or replace component parts as necessary to eliminate evidence of damage or deterioration. Use only materials and finishes as recommended or furnished by the shelving manufacturer.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Vinyl-coated ventilated shelving.
   2. Adjustable shelf systems.
   3. Storage accessories.

1.02 SUBMITTALS

A. Submit under provisions of Section 013300.
B. Product Data: Manufacturer's catalog data, detail sheets, and specifications.
C. Shop Drawings: Prepared specifically for this project; show dimensions of shelving and interface with other products.
D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square representing actual product, color, and patterns.

1.03 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.
1.04 DELIVERY, STORAGE, AND HANDLING
   A. Store products in manufacturer's unopened packaging until ready for installation.

1.05 PROJECT CONDITIONS
   A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.06 WARRANTY
   A. At project closeout, provide to Owner or Owner's Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
   A. Design is based on products manufactured by ClosetMaid Corp., Ocala, FL 800-221-0641 Tel: (352)401-6338, -www.closetmaid.com.
   B. Like materials shall be products of one manufacturer and shall be either the ones upon which the design is based or equal products of a manufacturer accepted in advance in accordance with Section 012500.

2.02 MATERIALS
   A. Steel Wire: Basic cold drawn, Grade C-1006; average tensile strength over 100,000 psi; coated.
   B. Wire Coating: Proprietary heavy-duty polyvinyl chloride (PVC) formula resin, plasticizers, stabilizers, pigments, and other additives.
      1. Thickness: 7 to 17 mil.

2.03 MANUFACTURED UNITS
   A. Coated Wire Shelving:
      1. SuperSlide: 1 inch spacing.
         b. 3/4 inch Closet Rod: Part # 2012.
         c. Internal Closet Rod Cap: Part # 2081.
         d. Pre-Loaded Side Wall Bracket: Part # 979.
         e. Corner Closet Rod: Part # 5649/5748.
      3. TotalSlide: 1 inch spacing.
      4. Shelf & Rod: 1 inch spacing.
      5. Colors: As selected by Architect.
B. Laminated Systems: Thermal-fused melamine laminated particle board system:
   1. Product: MasterSuite as manufactured by ClosetMaid Corp.
      a. Storage Shelf Thickness: 3/4 inch.
      b. Edge Banding: 0.039 inch PVC.
      c. Hang Rod: 1 inch diameter by 20 gauge tubular steel.
      d. Color: As selected by Architect.
   2. Product: ExecutiveSuite as manufactured by ClosetMaid Corp.
      a. Storage Shelf Thickness: 3/4 inch.
      b. Countertop Thickness: 1 inch.
      c. Edge Banding Exposed Surfaces: 0.02 inch PVC.
      d. Countertop Edge Banding: 0.10 inch PVC rounded.
      e. Color: As selected by Architect.
   3. Product: MultiSuite as manufactured by ClosetMaid Corp.
      a. Storage Shelf Thickness: 3/4 inch.
      b. Countertop Thickness: 1 inch.
      c. Edge Banding: 0.039 inch PVC.
      d. Color: As selected by Architect.

C. Accessories: As required and as manufactured by ClosetMaid Corp.
   1. Wall Clips.
   2. End Brackets.
   4. Poles.
   5. Standards.
   7. Pole Clips.
   8. Hang Track.

**PART 3 - EXECUTION**

3.01 EXAMINATION

A. Verification of Conditions:
   1. Prepared spaces are sized and located in accordance with shop drawings.
   2. Framing, reinforcement, and anchoring devices are correct type and are located in accordance with shop drawings.

B. Installer's Examination:
   1. Examine conditions under which installation is to be performed; submit written notification if such conditions are unacceptable.
   2. Installation activities started before unacceptable conditions have been corrected is prohibited.
   3. Installation indicates installer's acceptance of conditions.

3.02 INSTALLATION

A. General: Assemble shelving and install in accordance with manufacturer's directions.

3.03 CLEANING

A. As work proceeds, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials, and debris related to this work.
B. Upon completion of installation, clean all surfaces that have become soiled during installation.

END OF SECTION
- SECTION 112300 -

COMMERCIAL LAUNDRY EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Washer-extractors.
   2. Dryer tumblers.
   3. Laundry/utility tubs.

B. Refer to Section 064116 for wall cabinets.

C. Refer to Section 064150 for counters.

1.02 REFERENCES

A. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   4. Section 018113 - Sustainable Design Requirements.
   5. Section 064116 - Plastic Laminate-Clad Architectural Cabinets.
   6. Section 064150 - Casework Countertops.

B. Related Sections:
   1. Section 033100 - Structural Concrete: Foundation bases for equipment.
   2. Section 055000 - Metal Fabrications: Steel equipment supports.
   3. Division 22 Sections: Supply and exhaust fans; exhaust ductwork; service roughing-ins; drain traps; valves, pipes, and fittings; and other materials required to complete commercial laundry equipment installation.
   4. Division 26 Sections: Wiring disconnect switches, and other electrical materials required to complete commercial laundry equipment installation.

1.03 REFERENCED STANDARDS

A. ASTM International (ASTM):
   1. A 6-14 - Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
   2. A 653-15 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   3. A 666-15 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel, Strip, Plate, and Flat Bar.
1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 017419 regarding procedures for implementing construction waste management requirements.

B. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.05 SUBMITTALS

A. General: Make submittals in accordance with the provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.

C. Shop Drawings: Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.

D. Coordination Drawings: Indicate locations of laundry equipment and connections to utilities, and clearance requirements for equipment access and maintenance.

E. Operation and Maintenance Data: For laundry equipment to include in emergency, operation, and maintenance manuals. Include a schedule with the following:
   1. Designation indicated on Contract Drawings.
   2. Manufacturer's name and model number.
   3. List of factory-authorized service agencies including their addresses and telephone numbers.

1.06 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
1.07 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data:
   1. Furnish maintenance manuals for each type of commercial laundry equipment.
   2. Warranty documentation.

1.08 DELIVERY, STORAGE, AND HANDLING
A. Store equipment on site protected from weather, direct sunlight, and temperature extremes. Do not remove packaging prior to storage.
B. Consult manufacturer if machines are to be stored for an extended period of time.

1.09 FIELD CONDITIONS
A. Ambient Conditions: Maintain environmental conditions within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY
A. Washer Extractor, Parts Only: Manufacturer's standard form in which manufacturer agrees to repair or replace any part of the equipment assembly that fails within specified warranty period.
   1. Warranty Period: Three years from date of Substantial Completion.
B. Washer Extractor, Mainframe, Cylinder Shaft Assembly, and Bearings Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace main frame, bearing, cylinder or cylinder shaft assembly that fails within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
C. Dryer Tumbler, Parts Only: Manufacturer's standard form in which manufacturer agrees to repair or replace any part of the equipment assembly that fails within specified warranty period.
   1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
A. Acceptable Manufacturer:
B. Like components shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of another manufacturer accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. UL Certification: Provide electric equipment and components that are evaluated by UL for fire, and electric shock according to applicable safety standards and that are UL certified for compliance and labeled for intended use.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
      a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 MATERIALS

A. Washer Extractors:
   1. Stainless Steel: ASTM A 666, Type 304 with No. 4 satin finish on exposed surfaces.

B. Dryer Tumblers: Galvanized Steel: ASTM A 653 G90 coating designation; commercial-quality, cold-rolled steel that is zinc coated by the hot-dip process and chemically treated.

C. Laundry/Utility Tubs: Manufacturer’s Co-Polypure resin.

2.05 DRYER TUMBLERS

A. Design is based on UniMac/Alliance Laundry Systems Model UT075NQT Dryer Tumbler with 75lb capacity, hybrid timer, gas heat, 120/60/1ph, or equal.

B. General Characteristics:
   1. Construction: Heavy duty embossed steel with electrostatically applied baked enamel finish.
   2. Size: 38-5/8" wide x 53"deep x 76-5/8"high.
   3. Control System: Programmable microprocessor with multiple auto drying cycles, ability to time dry, and selectable moisture percentage setting, including variable temperature settings and wrinkle free at end of cycle until door opens.
4. Lint Filter: Self cleaning, depositing lint to large storage area at bottom of tumbler.

2.06 WASHER EXTRACTORS

A. Design is based on UniMac/Alliance Laundry Systems Model UWN045K2MX, 45lb capacity high 200 G-force extraction 30 Cycle programmable control 200-208/220-240/60/1-3ph, no spray rinse & no soap box, or equal.

B. General Characteristics:
   1. Programmable controller.
   2. Fresh water flushing chemical manifold.
   3. Auto tension V-belt drive.
   4. Six liquid chemical injection ports.
   5. Extraction optimizer.

2.07 LAUNDRY/UTILITY TUBS


B. General Characteristics:
   1. Construct of two Model 14 tubs joined by molded divider strip.
   2. Capacity: 20 gallons.
   3. Fixtures: Swing spout with aerator and hose, supply lines, PVC P-trap, drain stoppers, waste connector, and HandiFlo fitting.
   4. Steel legs.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:
   1. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.04 SYSTEMS STARTUP

A. System Startup and Commissioning: Arrange for a local manufacturer's representative to inspect machines prior to startup and operation.
3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Residential type appliances and installation, including:
   1. Refrigerator.
   2. Ice machine.
   3. Microwave.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Division 22 Plumbing Sections: Connections of supply and waste lines.
   5. Division 26 Electrical Sections: Installation and connection of electric power.

1.02 REFERENCES

A. California Building Standards Code (CBSC):
   1. California Building Code \[CCR Title 24, Part 2 (CBC)\], 2013 edition:
         1) Division I - New Buildings.
            a) Section 1117B - Other Building Components.

B. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

1.04 SUBMITTALS

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in accordance with the provisions of Section 013300.
   1. Provide catalog data on residential appliances demonstrating accessible controls for submission to DSA.
   2. All products shall be based on white color.
B. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, and application rates.

1.05 SUSTAINABLE DESIGN SUBMITTALS
A. Energy & Atmosphere Submittals:
   1. Product Data for EA Credit 1: For appliances, documentation indicating that products are ENERGY STAR rated.

1.06 CLOSEOUT SUBMITTALS
A. Closeout Submittals:
   1. Operational and Maintenance Data: Provide maintenance and operational manuals, warranty cards, and information on local service representation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
A. Acceptable Manufacturers:
   1. Amana Appliances, Amana, IA (800)843-0304.
   2. Cervitor Kitchens Inc., El Monte, CA (818)443-0184.
   5. Marvel Industries, division Northland Corporation, Richmond, IN (765)962-2521, (800)428)6644.

B. Like products shall be produced by one manufacturer and shall be those of the design basis manufacturer or of one accepted in advance by the Architect in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS
A. Regulations: Provide equipment conforming to CBC Chapter 11B requirements for accessibility.

2.03 SUSTAINABILITY REQUIREMENTS
A. LEED Goals for Energy & Atmosphere: For additional information on LEED goal requirements, refer to Section 018113.
   1. EA Credit 1 - Optimize Energy Performance:
      b. Provide appliances that are ENERGY STAR rated.
   2. EA Credit 1: Provide appliances that are ENERGY STAR rated.
2.04 APPLIANCES

A. Refrigerator: Equal to General Electric Model GIE18ISHSS.
   1. Top mount 13.1-cubic foot capacity refrigerator, 5.1 cubic foot capacity freezer with ice maker.
   2. Unit shall comply with ADA requirements for accessibility.
   3. Door panel shall be stainless steel.
   4. Provide ice maker with water filtration system.
   5. Reversible hinges.

B. Microwave: Equal to General Electric Profile Series Model PEB7226SFSS countertop microwave oven with 2.2 cubic feet.
   1. Unit shall comply with ADA requirements for accessibility.
   2. Door panel shall be stainless steel.

C. Ice Maker: Equal to Marvel Industries Model 30IM Clear Ice Maker.
   1. Provide 35-pound per day capacity, with replaceable front panel and reversible door swing.
   2. Unit shall be UL listed.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Coordinate as required with other trades to ensure proper and adequate provision in the work of those trades for interface with the work of this Section.

B. Install work in accordance with the original design, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures. Anchor all components firmly into position.

3.02 FIELD QUALITY CONTROL

A. Upon completion of installation and hookup to utilities, adjust each appliance as needed to secure optimum operation level.

3.03 CLEANING

A. Touch up scratches and abrasions to be completely invisible to the unaided eye from a distance of five feet.

B. Promptly remove from the job site all cartons and packing material associated with the work of this Section.

3.04 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain systems.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. The work referred to in this section consists of furnishing all labor and material required to provide and deliver all food service equipment hereinafter specified into the building, uncrate, assemble, hang, set in place, level, and completely install, exclusive of final utility connections. Final utility connections to all equipment, shall be part of the work under additional appropriate sections of the work and not part of the food service work.

1. The equipment and its component parts shall be new and unused. All items of standard manufactured equipment shall be current models at the time of delivery. Parts subject to wear, breakage, or distortion shall be accessible for adjustment, replacement and repair.

2. Each refrigeration items specification is written to provide minimum specifications and scope of work. Refrigeration equipment shall be designed and installed to maintain the following general temperature unless otherwise specified.
   a. Walk-In Refrigerators 1.7°C / 35°F
   b. Walk-In Freezers -23.2°C / -10°F
   c. Reach-In Refrigerators 1.7°C / 35°F
   d. Reach-In Freezers -23.2°C / -10°F
   e. Undercounter Refrigerators 1.7°C / 35°F
   f. Undercounter Freezers -23.2°C / -10°F
   g. Cold Pan 5°C / 41°F

3. The materials or products specified herein by trade names, manufacturer’s name or catalog number shall be provided as specified. Substitutions will not be permitted unless approved by owner’s representative in writing no later than 10 days prior to bidding. This stipulation applies to all equipment and materials. All substitutions or alternates will be expected to perform in all respects as well as the original specification. Should no request for substitution be received and approved as listed above, the project is to be provided as specified.

4. The food service equipment contractor shall be responsible for all costs associated with the acceptable alternate or approved alternate items, if the item requires additional space or specific
utilities that differ from specifications or drawings. The FSEC is responsible for all coordination, documentation and costs associated with any alternate item that was not submitted for approval and accepted by the consultant prior to bid. The FSEC shall be responsible for any costs associated with building changes, utility changes and drawings changes.

B. Coordinate Owner and Vendor-supplied equipment noted on the drawings or in the specifications as NIFSEC, "not in food service equipment contract". Show on roughing in Plans and sizes, utilities, and other requirements as furnished in the specifications, by owner or appropriate supplier in submittals as if the equipment is contractor furnished.

C. Bidders shall carefully examine the specifications and the project site including location and condition of existing equipment to determine cost for each "Existing-Reset" and "Existing-Modify" item to cover removal, modification (including materials), cleaning, inspection for damage, repair and resetting.

D. Field measurements shall be made prior to fabrication or installation of any equipment item.

E. The cutting of holes in equipment for pipe, drains, electrical outlets, etc., required for this installation, shall be part of this work. Work shall conform to the highest standards of workmanship and shall include welded sleeves, collars, ferrules and escutcheons.

F. Repair of all damage to the premises as a result of the equipment installation as well as the removal of all debris left by the work of this section.

G. Food service equipment and fixtures shall be cleaned and ready for operation at the time the facility is turned over to the Owner for final inspection by the Owner's Representative.

H. Food Service Equipment Contractor shall be responsible for coordinating with the Architect and Contractor in submitting all applicable documents.

I. All bidders shall submit with their costing a list of the subcontractors that are included in their bids and a complete "schedule of values" for all equipment and labor.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
B. Related Work In Other Sections by appropriate trades include the following:
   1. Division 5 Section "Metal Fabrications" for equipment supports.
   2. Division 6 Section “Interior Architectural Woodwork” for wood casework and plastic laminate substrates.
   3. Refer to Division 23 Sections for supply and exhaust fans; exhaust ductwork; service roughing-ins; drain traps; atmospheric vents; valves, pipes, and fittings; fire extinguishing systems; and other materials required to complete food service equipment installation.
   4. Refer to Division 26 & 28 Sections for connections to fire alarm systems, wiring, disconnects, and other electrical materials required to complete food service equipment installation.

C. All electric services including wiring to, and final connections to, the fixtures except, as specified differently in the specifications, drawings, or herein.

D. All water, waste and gas services to the fixtures including shut-off valves, trim, traps, etc., and final connections to the fixtures, except as specified differently in the specifications, drawings, or herein.

E. All hood or ventilator duct work above the connection position on such exhaust hoods or exhaust ventilators, except as specified differently in the specifications, drawings, or herein. Final welded connections at the junction point of exhaust hoods or exhaust ventilators, shall be part of the food service work.

F. Floors, quarry tile, concrete bases, walls, ceilings, finishes and related building work, except as specified differently in the specifications, drawings or herein.

1.3 DEFINITIONS

A. Terminology Standard: Refer to NSF 2, "Food Equipment", NSF 4, Heated Cabinets, NSF 7, Refrigerated Equipment, or other applicable NSF standards for definitions of food service equipment and installation terms not otherwise defined in this Section or in other referenced standards.

B. FSEC: Food Service Equipment Contractor

C. Owner-Furnished Equipment: Where indicated, Owner will furnish equipment items.

D. Vendor-Furnished Equipment: Where indicated the Owner's or operator's vendor will furnish equipment items.

E. NIFSEC: Not Included in Food Service Equipment Contract.

1.4 SUBMITTALS

A. Regardless of drawing formats provided it will remain the responsibility of equipment supplier to develop submittals in
accordance with the Specific Conditions and assume all required responsibilities there to. The consultant is not to be liable for errors or omissions by the FSEC’s use of electronic data provided by the Consultant or the development of date used in the submittal approval process. Checking product data, rough-in drawings, wall backing drawings, shop drawings, and refrigeration drawings by Designer is for design concept only, and does not relieve the Food Service Equipment Contractor of responsibility for compliance with Contract Documents, verification of utilities with equipment requirements for conformity and location, verification of all dimensions of equipment and building conditions or reasonable adjustments due to deviations.

B. The Food Service Equipment Contractor shall review and provide an affidavit with each submittal that such review has been completed by an authorized agent of the contractor.

C. Product Data: For each type of food service equipment indicated. Include manufacturer's model number and accessories and requirements for access and maintenance clearances, water and drainage, power or fuel, and service-connections including roughing-in dimensions.

D. Shop Drawings: For food service equipment not manufactured as standard production and catalog items by manufacturers. Include plans, elevations, sections, material schedule, roughing-in dimensions, fabrication details, service requirements, and attachments to other work.
   1. Wiring Diagrams: Details of wiring for power, signal, and control systems and differentiating between manufacturer-installed and field-installed wiring.
   2. Piping Diagrams: Details of piping systems and differentiating between manufacturer-installed and field-installed piping.

E. Coordination Drawings: For locations of food service equipment and service utilities. Key equipment with item numbers and descriptions indicated in Contract Documents. Include plans and elevations of equipment, access- and maintenance-clearance requirements, details of concrete, masonry or metal bases and floor depressions, and service-utility characteristics. Ventilation requirements for refrigerated equipment shall be identified in these drawings.

F. Contract Document Drawings:
   1. Drawings furnished, constitute a part of these specifications and show locations of equipment and general arrangement of mechanical and electrical services. Necessary deviation from the illustrated arrangements to meet structural conditions, shall be considered a part of the work of this section. Such deviations shall be made without expense to the owner. Equipment
drawings are definitive only and should not be used as construction documents or shop details.

2. The drawings are for the assistance and guidance of the Food Service Equipment Contractor. Exact locations shall be governed by the building configuration. The Food Service Equipment Contractor shall accept his contract with this understanding.

3. Should there be a conflict between the drawings and the specifications, the specifications shall govern.

G. Utility Roughing-in Drawings:
1. The Food Service Equipment Contractor shall prepare and submit one electronic file or two bond or a valid prints, of all roughing-in drawings, showing information necessary for the roughing-in of refrigerant lines, syrup/beer lines, plumbing, steam, mechanical and electrical utility requirements. Drawings shall also include construction requirements necessary for all equipment including floor depressions, raised bases, wall blocking, wall recesses and any critical dimensions for specific equipment requirements. Acceptance will be made upon the electronic file or one print which will be returned to the Food Service Equipment Contractor for reproduction purposes. Drawings not properly submitted in this format, will not be reviewed. Drawings without an “Accepted” or an “Accepted as Noted” stamp, will not be reviewed. Drawings without an “Accepted as noted” stamp, will not be considered an authorized shop drawing and will not be allowed on the job site.
   a. Furnish four (4) sets “Accepted” and/or “Accepted as Noted” shop drawings, for distribution to the field, as directed.

H. Shop Fabrication Drawings: The fabricator of the equipment shall prepare and submit through the Food Service Equipment Contractor one electronic file or two bond or original prints, of all shop drawings, showing all information necessary for fabrication and installation of the work of this section. Acceptance will be made upon the electronic file or one print which will be returned to the Food Service Equipment Contractor for reproduction purposes. Drawings not properly submitted in this format, will not be reviewed. Drawings without an “Accepted” or an “Accepted as Noted” stamp, will not be considered an authorized shop drawing and will not be allowed on the job site.

I. Samples for Initial Selection: Manufacturer’s color charts showing the full range of colors available for exposed products with color finishes.

J. Samples for Verification: Of each type of exposed finish required, minimum 4-inch- (100-mm-) square or 6-inch- (150-mm-) long sections of linear shapes and of same thickness and material indicated for work. Where finishes involve normal color and texture
K. Product Certificates: Signed by manufacturers of refrigeration systems, refrigerated equipment or their authorized agents certifying that systems furnished comply with NSF 7 requirements and will maintain operating temperatures indicated in the areas or equipment that they will serve.

L. Maintenance Data: Operation, maintenance, and parts data for food service equipment to include in the maintenance manuals specified in Division 1. Include a product schedule as follows:

1. Product Schedule: For each food service equipment item, include item number and description indicated in Contract Documents, manufacturer's name and model number, and authorized service agencies' addresses and telephone numbers.

1.5 QUALITY ASSURANCE AND LAWS AND ORDINANCES

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing food service equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in service performance.

B. Manufacturer Qualifications: Engage a firm experienced in manufacturing food service equipment similar to that indicated for this Project and with a record of successful in-service performance.

C. Source Limitations: Obtain each type of food service equipment through one source from a single manufacturer.

D. Product Options: Drawings indicate food service equipment based on the specific products indicated. Other manufacturers' equipment with equal size and performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

E. Regulatory Requirements: Comply with the following National Fire Protection Association (NFPA) codes:

1. NFPA 17, "Dry Chemical Extinguishing Systems."
2. NFPA 17A, "Wet Chemical Extinguishing Systems."
4. NFPA 70, "National Electrical Code."
6. The FSEC shall certify that all work and materials comply with Federal, State and Local laws, ordinances, and regulations and is confirmed by the local inspector having jurisdiction.
   a. US PUBLIC HEALTH SERVICE
   b. LOCAL HEALTH DEPARTMENT
   c. NATIONAL BOARD OF FIRE UNDERWRITERS
   d. OSHA
F. Listing and Labeling: Provide electrically operated equipment or components specified in this Section that are listed and labeled.
   1. The Terms “Listed” and “Labeled”: As defined in the National Electrical Code, Article 100.
   2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

G. AGA Certification: Provide gas-burning appliances certified by the American Gas Association (AGA).

H. ASME Compliance: Fabricate and label steam-generating and closed steam-heating equipment to comply with ASME Boiler and Pressure Vessel Code.


J. Food Service Equipment: Where provided, check-out aisles, sales counters, service counters, food service lines, queues, and waiting lines shall comply with CBC Sections 11B-227 and 11B-904. The top of tray slides shall be 28” minimum and 34” maximum above finish floor. Space and elements within food service employee work areas shall meet the requirements of CBC Section 11B-203.9. Food service equipment required to be accessible shall conform to all reach requirements in CBC Figures 2013, 11B-403.5.1, 11B-227.4, 11B-904.5, 11B-904.5.1, and 11B-904.5.2.

K. NSF Standards: Comply with applicable NSF International (NSF) standards and criteria and provide NSF Certification Mark on each equipment item, unless otherwise indicated.

L. ANSI Standards: Comply with applicable ANSI standards for electric-powered and gas-burning appliances; for piping to compressed-gas cylinders; and for plumbing fittings, including vacuum breakers and air gaps, to prevent siphonage in water piping.

M. SMACNA Standard: Where applicable, fabricate food service equipment to comply with the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) "Food Service Equipment Fabrication Guidelines," unless otherwise indicated.
N. Seismic Restraints: Provide seismic restraints for food service equipment according to the Sheet Metal and Air Conditioning Contractors National Association’s (SMACNA) "Food Service Equipment Fabrication Guidelines," appendix 1, "Guidelines for Seismic Restraints of Kitchen Equipment," unless otherwise indicated.

O. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

P. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."

Review methods and procedures related to food service equipment including, but not limited to, the following:
1. Review access requirements for equipment delivery.
2. Review equipment storage and security requirements.
3. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
4. Review structural loading limitations.
5. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

Q. Walk-in cooler and/or freezer shall comply with CBC Figures 2013, 11B-404.2.4, 11B-404.2.4.4. 11B-404.2.7 and 11B-309.4.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver food service equipment as factory-assembled units with protective crating and covering.

B. Store food service equipment in original protective crating and covering and in a dry location.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions of food service equipment installation areas by field measurements before equipment fabrication and indicate measurements on Shop Drawings and Coordination Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish required dimensions and proceed with fabricating equipment without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.
2. Food service aisles shall be a minimum 36” wide and tray slides shall be mounted at 34" maximum above the floor. CBC Section 1104B.5, item 5.
3. Pass-thru windows for food service shall conform to the reach and access requirements of CBC sections 1118B: 1122B.5;
1104B.3.12 and 1104B.4.2 for accessible transaction areas. Accessible pass-thru shelves shall not exceed 34-inch height above interior finished floor surface or exterior pavement.

1.8 COORDINATION

A. Coordinate equipment layout and installation with other work, including light fixtures, HVAC equipment, and fire-suppression system components.

B. Coordinate location and requirements of service-utility connections.

C. Coordinate size, location, and requirements of concrete bases, positive slopes to drains, floor depressions, and insulated floors. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

D. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

1.9 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents. Warranty period: 1 year from date of completion.

B. Refrigeration Compressor Warranty: 5 years from date of completion. Submit a written warranty signed by manufacturer agreeing to repair or replace compressors that fail in materials or workmanship within the specified warranty period.

PART 2 - PRODUCTS

2.1 MATERIALS - METAL

A. Submit a certified copy of the mill analysis of materials if requested by the Architect.

B. Finish for exposed surfaces to be #4 polished, unless otherwise specified.

C. Protective covering shall be provided on all polished surfaces of stainless steel sheet work, and retained and maintained until time of final testing, cleaning, start-up and substantial completion.

D. Stainless-Steel Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304, stretcher leveled, and in finish specified in "Stainless-Steel Finishes" Article.
E. Stainless-Steel Tube: ASTM A 554, Grade MT-304, and in finish specified in “Stainless-Steel Finishes” Article.

F. Zinc-Coated Steel Sheet: ASTM A 653, G115 (ASTM A 653M, Z350) coating designation; commercial quality; cold rolled; stretcher leveled; and chemically treated.

G. Zinc-Coated Steel Shapes: ASTM A 36 (ASTM A 36M), zinc-coated according to ASTM A 123 requirements.

H. Sealant: ASTM C 920; Type S, Grade NS, Class 25, Use NT. Provide elastomeric sealant NSF certified for end-use application indicated. Provide sealant that, when cured and washed, meets requirements of Food and Drug Administration's 21 CFR, Section 177.2600 for use in areas that come in contact with food.

I. Color: As selected by Architect from manufacturer's full range of colors.
   a. Backer Rod: Closed-cell polyethylene, in diameter larger than joint width.

J. Sound Dampening: NSF-certified, nonabsorbent, hard-drying, sound-deadening coating. Provide coating compounded for permanent adhesion to metal in 1/8-inch (3-mm) thickness that does not chip, flake, or blister.

K. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent, and unaffected by exposure to foods and cleaning compounds.

L. Casters: NSF-certified, heavy duty, stainless-steel, swivel stem casters with 5-inch- (125-mm-) diameter wheels, polyurethane tires with 1-inch (25-mm) tread width, and 200-lb (90-kg) load capacity per caster. Provide brakes on 2 casters per unit.

2.2 MATERIALS - CASEWORK/ MILLWORK

A. Cabinet Hardware: Provide NSF-certified, stainless-steel hardware for equipment items as indicated. Pulls, Handles and Catches to be included.

B. All wood to be thoroughly seasoned and kiln dried prior to being used for fabrication of custom casework. All wood to be free from knots, pitchy seams, or other imperfections. All exposed wood to be grade A pine.

C. All plywood to be thoroughly seasoned and kiln dried prior to being used. All plywood to be free from knots, pitchy seams, and other imperfections. All plywood to be glued with water resistant resin. Particle board may not be substituted for plywood panels. "W.I. - Custom Grade" marine grade plywood is required on all fixtures to be installed in high humidity environments.
D. All wood to have less than 12% moisture content and be a species listed by the national hardwood association.

E. Plastic laminates shall be 1/16th thick, general purpose grade GP-50 as manufactured by Wilson Art or equal. Patterns, textures, and colors as specified under individual items. Semi exposed and cabinet liners shall be CL-20. Countertops, backsplashes and edges shall be grade GP-50 on exposed and grade BK-20 on underside of tops. Exposed vertical surfaces and cabinet liners shall be grade CL-20. Sides and edges of shelving shall be grade 50. Adhesive shall be waterproof and low VOC.

F. Hardware that is furnished and installed shall be of solid material unless specified otherwise. The hardware shall be provided with the necessary mechanisms for locking. All locks shall be furnished with two (2) keys.

G. Solid Surface Material (SSM) shall be Caesarstone, Silestone or approved equal and installed over 3/4" plywood per manufacturer's instructions. Provide air space, trim and/or insulation around any heat or cold producing equipment to guard against discoloration and cracking.

2.3 FABRICATION, GENERAL, METAL

A. Fabricate food service equipment according to NSF (standards 2, 4 & 7) requirements. Factory assemble equipment to the greatest extent possible.

B. Stainless-Steel Equipment: for all parts of custom tables, tops, benches, sinks, cabinets, etc., as drawn or as specified, shall be AISI type 304 (18-8 Austenitic). All gauges called for shall be U.S. Standard Gauges, “S/S” or “S.S.” as shown in the drawings or specifications, shall indicate stainless steel.

2. Edges and Backsplashes: Provide equipment edges and backsplashes indicated complying with referenced SMACNA standard, unless otherwise indicated.

3. Apply sound dampening to underside of metal work surfaces, including sinks and similar units. Provide coating with smooth surface and hold coating 1 inch (25 mm) back from open edges for cleaning.

4. Tables: Fabricate with reinforced tops, legs, and reinforced undershelves or cross bracing to comply with referenced SMACNA standard, unless otherwise indicated, and as follows:
   a. Tops: Minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.
   b. Legs: 1-5/8 inch (41.3 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel with stainless-steel gusset and adjustable insert bullet-type feet.
with minimum adjustment of 1 inch (25 mm) up or down without exposing threads, unless otherwise indicated.

c. Undershelves: Minimum #16 gauge / 0.625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

d. Top and Undershelf Reinforcement: Provide minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick, stainless-steel reinforcing, unless otherwise indicated.

e. Cross Bracing: 1-1/4 inch (31.75 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

5. Sinks: Fabricate of minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel with fully welded, 1-piece construction. Construct 2 sides and bottom of sink compartment from 1 stainless-steel sheet with ends welded integral and without overlapping joints or open spaces between compartments. Provide double-wall partitions between compartments with 1/2-inch- (13-mm-) radius rounded tops that are welded integral with sink body. Cove horizontal, vertical, and interior corners with 3/4-inch (19-mm) radius. Pitch and crease sinks to waste for drainage without pooling. Seat wastes in die-stamped depressions without solder, rivets, or welding.

a. Wastes: 2-inch (50-mm), stainless steel ball valve, rotary-handle waste assembly with stainless-steel strainer plate, nickel-plated brass body and connected overflow.

b. Drainboards: Minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, pitched to sink at 1/8 inch/12 inches (3 mm/300 mm) of length. Reinforce drainboards with minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.

c. Legs: 1-5/8 inch (41.3 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel with stainless-steel gusset welded to #12 gauge / 0.1094-inch- (2.779-mm-) thick, stainless-steel support plate. Provide adjustable insert bullet-type feet with minimum adjustment of 1 inch (25 mm) up or down without exposing threads, unless otherwise indicated.

d. Drainboard Braces: 1 inch (25 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

e. Cross Bracing: 1-1/4 inch (31.75 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.

6. Wall Shelves and Overshelves: Fabricate to comply with referenced SMACNA standard, unless otherwise indicated, and with minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick, stainless-steel shelf tops.
7. Drawers: Provide lift-out type, 1-piece, die-stamped drawer pan fabricated from #18 gauge / 0.050-inch- (1.27-mm-) thick stainless steel with inside corners radiused. Support drawer pan with #16 gauge / 0.0625-inch- (1.588-mm-) thick, stainless-steel channel frame welded to drawer front. Provide 1-inch- (25-mm) thick, double-wall front fabricated from #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel and with integral recessed pull. Fill void in drawer front with semi rigid fiberglass sound dampening. Mount drawers on NSF-certified, full-extension, stainless-steel drawer slides that have minimum 100-lb (45-kg) load capacity per pair, ball-bearing rollers, and positive stop. Mount drawer slides for self-closing on drawer housing as indicated.

8. Refrigerated Bases: Unit to be all welded construction and fabricated in accordance with NSF Standard 7.
   a. Top: 18 gauge galvanized sub-top or 14 gauge stainless steel top.
   b. Exterior: Front and Sides to be 18 gauge number 4 finish type 304 stainless steel; bottom and back to be 18 gauge galvanized (unless otherwise noted).
   c. Interior liner: 20 gauge number 4 finish type 304 stainless steel with 3/8" radius corners.
   d. Insulation: Minimum 2" thick polyurethane foam in place insulation (CFC free).
   e. Doors: 18 gauge front and 20 gauge door pan number 4 finish type 304 stainless steel with 2" polyurethane foam in place insulation, long-life press in place gasket.
   f. Drawers: 300 lb. capacity with 14 gauge stainless steel track system, tandem 2” all stainless steel skate wheels, each drawer accommodates two 6” deep, 12” x 20” pans side by side.
   g. Shelving: Each door section shall have stainless steel wire racks.

9. Refrigerated Pan Rails: Unit to be all welded construction and fabricated in accordance with NSF Standard 7.
   a. Top: 16 gauge number 4 finish type 304 stainless steel top and inner liner.
   b. Outer liner: To be 18 gauge type 304 stainless steel; bottom and back to be 18 gauge galvanized (unless otherwise noted).
   c. Insulation: Minimum 2” thick polyurethane foam in place insulation (CFC free).
   d. Drain: Provide with 1” stainless steel drain
   e. Control: Provide with on/off control to be filed installed.
C. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Provide ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.
   1. Welded Butt Joints: Provide full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.
   2. Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.
   3. Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and underpressed.
   4. Coat unexposed stainless-steel welded joints with suitable metallic-based paint to prevent corrosion.
   5. After zinc-coated steel is welded, clean welds and abraded areas and apply SSPCPaint 20, high-zinc-dust-content, galvanizing repair paint to comply with ASTM A 780.

D. Fabricate field-assembled equipment prepared for field-joining methods indicated. For metal butt joints, comply with referenced SMACNA standard, unless otherwise indicated.

E. Where stainless steel is joined to a dissimilar metal, use stainless-steel welding material or fastening devices.

F. Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.

G. Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.

H. Provide surfaces in food zone, as defined in NSF 2, free from exposed fasteners.

I. Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.

J. Provide pipe slots on equipment with turned-up edges and sized to accommodate service and utility lines and mechanical connections.

K. Provide enclosures, including panels, housings, and skirts, to conceal service lines, operating components, and mechanical and electrical devices including those inside cabinets, unless otherwise indicated.

L. Seismic Restraints:
   1. Fabricate to comply with referenced “SMACNA Guidelines for Seismic Restraint of Kitchen Equipment” in any State, province, or jurisdiction that has legislated this requirement as necessary for acceptance. This shall include:
      a. Identifying these items on his submittal drawings, Plans, Elevations, and Sections.
b. Showing required SMACNA methods of restraint on his submittal drawings.
c. Referencing the appropriate detail(s).
d. Obtain regulatory approval for all seismic engineering details

2.4 FABRICATION, MILLWORK/ CASEWORK

A. Fabricate food service equipment according to the "Manual of Millwork, current edition" of the Woodwork Institute, including all amended printed revisions, and NSF Standards. All composite wood products shall meet the latest California Air Resources Board (CARB) Composite Wood Products Regulations. Factory assemble equipment to greatest extent possible. All specially fabricated equipment must be by one manufacturer/fabricator per specialty acceptable to Consultant and the Owner.

B. Solid Surface Material (SSM) shall be Caesarstone, Silestone or approved equal and installed over 3/4” plywood per manufacturer's instructions. Provide air space, trim and/or insulation around any heat or cold producing equipment to guard against discoloration and cracking.

2.5 EXHAUST HOOD FABRICATION

A. Definitions:
1. Listed Hood: A hood, factory fabricated and tested for compliance with UL-710 by a testing agency acceptable to authorities having jurisdiction.
2. Type I Hood: A hood designated for grease exhaust applications.
3. Type II Hood: A hood designed for heat and steam removal and for other non-grease applications.
4. Non-listed Hoods are not acceptable for this project.

B. General: Provide listed hoods with dual wall construction and manufactured from minimum #18 gauge / 0.050-inch- (1.27-mm-) thick type 304 stainless steel, unless otherwise indicated. FSEC shall verify size and location of all connections required before fabrication.
1. Exhaust hood performance tests shall be in accordance with ASTM F1704-05. Manufacturer, upon request, shall be required to submit validation that full capture and containment of appliance thermal plume and smoke can be accomplished at specified/design air volumes without modifications to duct size, filter velocity or hood/system static pressure.
2. Hoods shall comply with current NFPA 96, NSF, ASHRAE 90.1, ASHRAE 154, CA-Title 24 (CA Based Projects Only), Local Applicable Codes and Manufacturers Recommendations.
3. Product/system must meet the design, construction, performance and operational intent of the project. It is the responsibility of the FSEC to verify interface of the system with...
all associated trades including, but not limited to; electrical, mechanical, sheet metal, plumbing and controls per Division 23.

5. Design exhaust volume shall be based on hood manufacturers heat load based design calculations and not estimated CFM/linear foot or minimum UL-710 listed volume.

C. Grease Removal: Provide removable, stainless-steel, baffle-type grease. Provide minimum #18 gauge / 0.0781-inch- (1.984-mm-) thick, stainless steel filter frame and removable collection basins or troughs. Filters/baffles shall be UL 1046 Classified and tested according to ASTM Standard F 2519-05 “Standard Test Method for Grease Particle Capture Efficiency of Commercial Kitchen Filters and Extractors” by a nationally recognized testing laboratory acceptable to authorities having jurisdiction. The filters/baffles must be single stage and have a minimum extraction rate of 93% at 5 microns and 98% at 15 microns.

D. Sound Level Criteria: Isolated grease filter sound levels shall not exceed an NC rating of 55 at full design exhaust volume.

E. Light Fixtures: Provide NSF, UL, CSA AND CE-certified LED fixtures, vapor-tight sealed lenses, to provide 3500K with 50 foot candles at the cooking surface. Any exposed wiring shall be concealed in stainless-steel.

F. Appliance Interlock: Hoods to be provided with Appliance Interlock Temperature Sensor to comply with IMC 2006 requirement, section 507.2.1.1.

G. Exhaust-Duct Collars: Minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, FSEC shall provide all stainless steel duct collars and make final connections to hood, welded 100% grooved smooth and painted.

H. Fires suppression system: Hoods to be provided with wet chemical fire suppression system, model R102 as manufactured by “Ansol” or equal in compliance with UL300 standards. System shall include factory pre-piping, all permits and test as required by the authority having jurisdiction.
   1. Automatic actuation shall be by means of fusible link with no visible conduit.
   2. System shall be furnished and installed by an Ansul certified distributor in accordance with manufacturer's instructions and the authority having jurisdiction.
   3. Micro-switches shall be furnished as part of the fire protection system for “tie in” of building alarm and for the make-up air/fire/fuel shut down. Gas valve(s) shall be electric solenoid type and support simultaneous activation.
   4. Surface drop exposed piping shall be stainless steel.
2.6 STAINLESS-STEEL FINISHES

A. General: Comply with NAAMM’s "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
1. Remove or blend tool and die marks and stretch lines into finish.
2. Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Concealed Surfaces: No. 2B finish (bright, cold-rolled, unpolished finish).

C. Exposed Surfaces: No. 4 finish (bright, directional polish).

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

E. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

2.7 WALK-IN COOLERS/ FREEZERS

A. Panel Construction:
1. Panels shall be pre-fabricated, sectional construction (minimum 4-inches thick for Coolers and Freezers), of tongue and groove design with foamed-in-place gaskets (not glued, stapled, or nailed) on the male side of all interior and exterior panels and rigid urethane frame. Every panel shall be NSF and UL factory approved and bear the certifying labels. Walk-in box height to be 108”; Interior Height, unless otherwise specified.
2. Gaskets shall be impervious to stains, greases, oils, and mildew and be resistant to chemical corrosion and ultraviolet radiation. Gasket operating temperature shall be -30 degrees F to 160 degrees F (-34 degrees C to +71 degrees C).
3. Corner panels shall be 90-degree angles with coved corners; interior partition walls shall utilize ‘T’ panels with coved corners. All panels shall be manufactured in accordance NSF approved standards.
4. Panels shall be completely filled with rigid 100% foamed-in-place non-CFC urethane between interior and exterior metal ‘skins’ which have been die-formed and gauged for uniformity in size. Rigid polyurethane blowing agents shall comply with current US EPA SNAP program listings. Slab urethane or polystyrene are not acceptable. In addition, wood shall not be acceptable in any panel including doors, walls, floor, and ceiling.
5. Insulation shall have a 95% closed cell structure with an average in-place density of 2.2 lbs. per cubic foot, and compression strength at yield point of 19 lbs. per square inch. The R-Values
of the floor, ceiling and wall panels meet the requirements under the Energy Independence and Security Act of 2009 (EISA).

6. Floor panels: Floor panels shall be die stamped with 3/8-inch radius NSF coved corners. All plane intersections shall be drawn, not cut and welded. Panels shall be fabricated similar to other panels and designed to readily withstand uniformly distributed loads, point loads for stationary shelving, rolling loads from hand truck and mobile food racks. Where noted, pre-fabricated floors shall withstand rolling loads from either manual pallet jacks or electric pallet jacks.

B. Door Construction: Walk-in coolers and freezers shall have entry and exit door hardware that complies with all of the requirements of CBC Section 11B-404.2.8.1 and maneuvering clearances at the exterior side per CBC Section 11B-404.2.7 & 11B-309.4. Doors shall be flush (in-fitting) type, self-closing, 36-inches by minimum 80-inches high, 20-guage stainless steel interior and exterior.

1. Doors shall be mounted with three adjustable cam-lift hinges (Kason 1346) and hydraulic adjustable automatic hold-open (rack and pinion) door closers. Door hardware shall be chrome plated Kason model 27C. Mounting height of latching hardware shall be 34 to 48 inches above finish floor. All hardware shall meet the requirements of CBC 11B-404.2.7 & 11B-309.4.

2. Door latches shall lock and have a safety release to prevent entrapment (one quarter turn of the release handle unlocks the door from the inside).

3. All freezer door will be provided with a Department of Energy approved heater strip, heated sweep gaskets, and a heated pressure relief port.

4. Provide a solid-state electronic thermometer, pre-wired light fixtures switch and pilot lights switch on each door section. Thermometer shall have data connection capability. All door sections to have raised casings. All lights are to be vapor proof LED.

5. The doorjambs, frames, and thresholds shall be made of durable Fiberglass Reinforced Plastic (FRP).

C. Assembly: Panels shall be assembled by Posi-Locs or equal which shall be foamed-in-place and activated by a hex wrench. Floor panels shall utilize post tension construction within the floor panels. Access ports to locking devices shall be covered by snap caps and shall be located in interior of walk-in.

D. Finishes: Refer to the finishes shown and the Foodservice Equipment Schedule paragraph 3.5.

1. Surfaces (walls, ceiling and closure panels):
   a. Exposed exterior 20-gauge Type 304 stainless steel, #4 finish, Rimex Windsor pattern.
b. Unexposed exterior surfaces to be 20 gauge smooth embossed galvanized steel.
c. Interior finishes: minimum 26 gauge Antimicrobial finish steel.
d. Interior floor: verify on finish schedule and item specification, paragraph 3.5.

E. Accessories:
1. Provide and install 12 gauge (stainless steel) kickplates to 36-inches high on interior and exterior doors.
2. Provide (s/s) closure panels to interior ceiling and all adjacent walls, finished with 90-degree angles at the box and the ceiling/wall; no raw edges will be accepted.
3. Provide vinyl strip curtains.
4. Refrigerated compartments fabricated and standard, shall be fitted with flush mounted digital thermometers. Thermometers shall be adjustable and calibrated after installation. All thermometers shall have an accuracy of + 2 degrees and shall have the capability to be connected to a remote monitoring system, i.e. Modularm 75LC
5. Per document drawings, provide 14-inches by 24-inches view port - unheated for cooler door, heated for freezer door.
6. Freezer Door Fan Switches (at ambient facing freezer door only)
7. When Anthony doors are specified: include Optimax Pro LED Lighting.

F. Insulated Floor Depressions: The FSEC shall provide styrofoam insulation for cooler and freezer floors. Insulation shall be 60 high load extruded polystyrene, 2-inch thick, with R-value, 75°F mean temperature, min 5.0/inch°F ft. square h/ BTU; Compressive Strength: vertical, 60.0 lbs./inch square; Water Absorption maximum 0.1% by volume.

G. Approvals: Fire hazard classification according to ASTME-84 (UL723) shall be a flame spread rating of 25 or less with a certifying UL label attached to every panel showing the meeting of the fire code. Smoke development rating to be 450 or less; Factory Mutual approved; NSF-listed with an approved toxicity rating.

H. Walk-in coolers and freezers shall have level maneuvering clearances at the exterior side (CBC 11B-404.2.4.1) and accessible entry and exit door hardware (CBC 11B-404.2.7, 11B-309.4 & 11B-404.2.8.1).

2.8 REMOTE REFRIGERATION SYSTEMS

A. Furnish and install mechanical refrigeration work as indicated and specified, complete and ready for use. Principal items of work include:
1. Mechanical refrigeration systems, including compressor units, condensers, refrigerant piping, evaporator coils, control valves,
compressor racks, weather covers and required miscellaneous items. Refrigeration equipment shall consist of two major assemblies. One is the condensing unit assembly with all necessary components, factory installed and wired including single point electrical control panel, circuit breakers and contactors, OSHA approved fan guards, aluminum flexible conduit for internal wiring, suction filter, sight glass, drier, adjustable dual pressure control, flexible pressure hoses, Rotolock compressor adaptors and necessary tubing. The other is the refrigeration coil assembly/heat exchanger with electronic defrost time clock and on/off power switch, completely factory mounted and factory pressure tested with dry nitrogen.

a. Utilize refrigerant with an ozone depleting potential of 0
b. R-407A Low to Medium Temperatures
c. Other refrigerant approved by the Department of Energy for use in remote systems after December 31, 2017.
d. Glycol - Food Grade

1. Furnishing of motor starters and walk-in refrigerator/freezer thermostats for installation under Electrical Section.
2. Sleeves, inserts, hangers, supports and other incidental items necessary to complete the work.
3. Cutting and patching of non-structural and other incidental items necessary to complete the work on this section.
4. Testing, charging, adjusting, operational testing and cleaning of equipment. Conduct all tests as required by local inspecting agencies concerned with this project.

B. Compressors and Condensing Unit: Factory assembled, scroll compressors with air cooled condensers operating at such speed within recommended range of section and discharge pressures for economical operation and with required BTU rating per hour, sizes and capacities in accordance with specifications. Provide units of same manufacturer and type throughout, new standard cataloged, to operate with refrigerant R-407A. 100 degrees ambient air, capacities selected on 16 hour running time basis for medium temperature fixtures and 18 hour running time basis for low temperature fixtures. For locations where the ambient exceeds 100 degrees Fahrenheit, the system is to be engineered for the maximum recorded ambient temperature. Additionally, all parallel systems shall include a minimum of one digital scroll compressor and be designed with 75% redundancy minimum.

C. Condensing units shall be scroll air cooled condensing unit with rigid structural bases, 20 gauge weather covers, OSHA-approved fan guards and shrouds and waterproof electrical systems. Include internal inherent motor protection, suction line, shut off valves, liquid line shut off valves, oil pressure safety switches when required,
adjustable dual pressure control, crank case heaters and oil separators on systems with longer than 100 lin. ft. run from condensing unit to the evaporator coil. Any outdoor installation within 20 miles of the salt air environment shall be provided with coated condenser coils.

D. Medium temperature evaporators shall be equipped with Electronically Commutated Motors (ECM). Coils shall be low profile UL/NSF approved units with inline fans and cross fins staggered. Provide copper tubing, aluminum cased, permanently lubricated motors with thermal overload protection. Unit shall be provided with evaporator controller system capable of providing evaporator fan control, remote monitoring and diagnostics. Control system shall be interconnected to the local area network and be capable of sending alarm alerts via mobile telephone or e-mail. Water proof electrical system pre-wired to a single connection. Coils are designed to operate above 34 degrees Fahrenheit.

E. Low Temperature evaporators shall be equipped with Electronically Commutated Motors (ECM). Coils shall be low profile UL/NSF approved units with inline fans and cross fins staggered. Provide cooper tubing, aluminum cased, permanently lubricated motors with thermal overload protection. Unit shall be equipped with electric demand defrost controller system. Controller system shall provide on-demand defrost, remote monitoring and diagnostics and be interconnected to the local area network with the capability of sending alarm alerts via mobile telephone or e-mail. Water proof electrical system pre-wired to a single connection. Coils are designed to operate above in a range from 30 degrees above Fahrenheit to -20 degrees Fahrenheit.

F. Refrigerant lines shall be type “L” ACR copper tubing with wrought copper fittings assembled by silver soldering joints.

G. Coil drains shall be 1” IPS copper. Route and pitch ½ ” per foot to drain. Provide electrical heaters on freezer drains.

H. Refrigeration lines insulation shall have a minimum ½ “ Armstrong Armaflex AP Pipe insulation sealed with adhesive foam insulation. For glycol systems the minimum insulation shall be ¾”. Tape fittings to be sufficient thickness to prevent condensation. Lines ran externally shall include a hard white PVC cover.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Unless expressly stipulated, and in a timely manner, no additional allowances will be made for Contractors or Manufacturers for errors, omissions or ambiguities not reported at time of bidding. Carefully review and compare the Contract Documents and at once report to
Owner and/or Designer any errors, ambiguities, inconsistencies or omissions. Unless expressly stipulated, and in a timely manner, Kitchen Equipment Contractor shall be liable to Owner or Designer for any damage resulting from such errors, inconsistencies or omissions in the Contract Documents. Work shall not be done without approved Drawings, Specifications and/or Modifications and without receiving prior written receiving authorizations from Owner or Designer. Drawings and equipment specifications are intended to complement each other. Therefore, neither should be considered complete without the others.

B. Examine areas and conditions, with Installer present, for compliance with requirements or installation tolerances, service-utility connections, and other conditions affecting installation and performance of food service equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.

C. Examine roughing-in for piping, mechanical, and electrical systems to verify actual locations of connections before installation.

D. Verify all conditions at the building, particularly door openings and passageways for large equipment. Coordinate with General Contractor access to insure delivery of equipment to the required areas. Coordination shall include, but not be limited to, early delivery, hoisting, window removal and/or delay of wall construction. All special equipment, handling charges, window removal, etc. shall be paid for by the Food Service Equipment Contractor.

E. Any and all food service equipment and equipment systems noted as “by owner/operator”, “by purveyor”, or “existing” in the food service construction documents are presented for reference only. These representations must be verified in writing by the food service equipment contractor, owner, operator, and/or general contractor prior to the release of “for construction” documentation. It will be the general contractor’s responsibility to further verify and coordinate all necessary information pertaining to this equipment or systems making up, or relating to, this equipment including, but not limited to, local health department regulations, local sanitation code requirements, mechanical, structural, plumbing and electrical requirements prior to commencement of construction. Consultant or Architect take no responsibility for design, intent, function, performance, utility requirements, or code compliance of non-specified equipment.

3.2 INSTALLATION, GENERAL

A. Install food service equipment level and plumb, according to manufacturer's written instructions, original design, and referenced standards.
B. Complete equipment field assembly, where required, using methods indicated.
   1. Provide closed butt and contact joints that do not require a filler.
   2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in "Fabrication, General" Article.

C. Install equipment with access and maintenance clearances according to manufacturer’s written instructions and requirements of authorities having jurisdiction.

D. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections. Cut holes and provide sleeves for pipes on equipment, for drains, electrical, plumbing, etc., as required for proper installation. Verify sizes with Owner on the following items before ordering or fabrication: steam pans, sheet pans, trays, glass and cup racks.

E. Except for mobile and adjustable-leg equipment, securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners, unless otherwise indicated.

F. Install cabinets and similar equipment on concrete or masonry bases in a bed of sealant.

G. Install hoods to comply with NFPA 96 requirements and to remain free from vibration when operating.

H. Install seismic restraints according to referenced SMACNA standard.

I. Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at 48 inches (1200 mm) o.c. maximum.

J. Install sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.

K. Prohibit cold storage rooms from being used by any other trade for storage or work areas. Repair or cause replacement to any damaged areas on the interior of the cold storage rooms, if the damage was caused due to the cold storage rooms being used for storage or work areas.

3.3 PROTECTING

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure food service equipment is without damage or deterioration at the time of Substantial Completion.
3.4 COMMISSIONING

A. Startup Services: Engage factory-authorized service representatives to perform startup services for all equipment. Factory trained representative shall demonstrate and train Owner's maintenance and operations personnel as specified below.

1. Coordinate food service equipment startup with service-utility testing, balancing, and adjustments. Do not operate steam lines before they have been cleaned and sanitized. Provide demonstrations for both operations and maintenance personnel.

2. Remove protective coverings and clean and sanitize equipment, both inside and out, and re-lamp equipment with integral lighting. Where applicable, comply with manufacturer's written cleaning instructions.

3. Test each equipment item for proper operation. Repair or replace equipment that is defective in operation, including units that operate below required capacity or that operate with excessive noise or vibration.

4. Provide maintenance and proper operations training to both the client maintenance and operations staff.

5. Provide service parts manuals as well as maintenance manuals.

6. Provide a list of service agencies authorized by the manufacturer to service its equipment. The list must include the name and telephone number of the person to contact.

3.5 FOOD SERVICE EQUIPMENT SCHEDULE

ITEM # 1-01  AIR CURTAIN
Quantity: One (1)
Manufacturer: Mars Air Systems
Model: NH236-1UA-TS
SIS No.: W010

1. One (1) Model NH236-1UA-TS High Velocity Series 2 Air Curtain, for NSF Certified 36" wide door, Unheated, Titanium Silver powder coated cabinet (Standard Production Color) cETLus, CE, NSF, Dimensions 14.00(h) x 36.00(w) x 15.62(d)

2. One (1) 5 year warranty, standard

3. One (1) options WITHOUT control panel

4. One (1) Options WITHOUT time delay

5. One (1) 99-014 Steel Mechanical Universal Surface-mounted Plunger/Roller Switch

ITEM # 1-02  MOP SINK
Quantity: One (1)
Manufacturer: Advance Tabco
Model: 9-OP-44
SIS No.: W010

1. One (1) Model 9-OP-44 Mop Sink, floor mounted, 29"W x 29"D x 16"H (overall), 24"W x 24" front-to-back x 12" deep (bowl size), free flow drain with 2" IPS outlet, stainless steel construction
ITEM # 1-03  SERVICE FAUCET
Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0655-01
SIS No.: W010
1. One (1) Model B-0655-01 Service Sink Faucet, vacuum breaker nozzle with 3/4" garden hose thread, 1/2" NPT female flanged adjustable inlet with screwdriver stops, 6" wrist action handles, pail hook, bottom support, wall brace
2. One (1) 6" wrist action handle, standard, nc

ITEM # 1-04  MOP HOLDER
Quantity: One (1)
Manufacturer: Advance Tabco
Model: K-242
SIS No.: W010
1. One (1) Model K-242 Mop Hanger, 23", accommodates (3)

ITEM # 1-05  CHEMICAL WALL SHELF
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL Approximately 2'-6" l x 1"-0" w. Provide stainless steel chemical wall shelf with knife brackets. Wall shelf shall be: 18 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-06  ICE CUBER
Quantity: One (1)
Manufacturer: Scotsman
Model: C1030SR-32
SIS No.: W010
1. One (1) Model C1030SR-32 Prodigy Plus® Ice Maker, cube style, air-cooled, no condenser (remote), up to 996 lb production/24 hours, stainless steel finish, small cube size, ENERGY STAR®
2. One (1) 3 year parts & labor warranties
3. One (1) 5 year parts & labor warranties on Evaporator
4. One (1) 5 year parts on compressor & condenser
5. One (1) Model KVS Prodigy™ Vari-Smart™ Ice Level Control, program ice bin levels to match ice needs

ITEM # 1-07  ICE BIN FOR ICE MACHINES
Quantity: One (1)
Manufacturer: Scotsman
Model: B948S
SIS No.: W010
1. One (1) Model B948S Ice Bin, top-hinged front-opening door, up to 893 lb ice storage capacity, for top-mounted ice maker, polyethylene liner, metallic finish exterior, includes 6" legs
2. One (1) 3 year parts & labor warranties
ITEM # 1-08  CORNER GUARDS
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL (LOT) Provide 14 ga. stainless steel corner guards at 6'-6" in height. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-09  BUMPER RAILS
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL (LOT) Approximately 30'-0" l. Provide 14 ga. stainless steel bumper rails guards mounted at 34" above the finished floor. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-10  SPARE NO.

ITEM # 1-11  WATER FILTER ASSEMBLY
Quantity: One (1)
Manufacturer: Scotsman
Model: SSM2-P
SIS No.: W010
1. One (1) Model SSM2-P Water Filter Assembly, twin system, designed for ice makers & beverage equipment, cubers over 650 lb, & up to 1200 lb, flakers & nuggets over 1200 lb, includes AquaArmor by AgION for antimicrobial protection

ITEM # 1-12  FLOOR TROUGH
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
1. Model STAINLESS STEEL Approximately 4'-9" l x 1'-0" d. Provide stainless steel floor trough, and stainless steel trough box with #4 finish. Provide IMC Teddy ASTF-ADA stainless steel accessible grating. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-13  REMOTE CONDENSER UNIT
Quantity: One (1)
Manufacturer: Scotsman
Model: ERC311-32
SIS No.: W010
1. One (1) Model ERC311-32 Condenser Unit, Remote Refrigeration, designed for outdoor installation, temperature range -20°F to 120°F, galvanized finish, use with C0630xR, C0830xR, C1030xR, & C1448xR
2. One (1) 3 year parts & labor warranties
3. One (1) 5 year parts on condenser
4. One (1) Model KERCF Air Filter kit for ERC111 & ERC 311
ITEM # 1-14  WALK-IN REFRIGERATOR
Quantity:  One (1)
Manufacturer:  Thermalrite
Model:  CUSTOM
SIS No.:  W010

1. One (1) Model CUSTOM Box description: Cooler/Freezer Combo
   Items 1-14 & 1-17 - w/ 4" Floor Insulation w/Visqueen and ASTM
   15 Felt Paper and Asphalt Emulsion - Freezer Section Only - in 8"
   Depression - w/ Finished Floor and Coved Base By Others

Dimensions:
External (O.D.): 15' 11 1/2" x 7' 8" x 10' 0" - w x d x h
Internal (I.D.): 15' 3 1/2" x 7' 0" x 9' 8" - w x d x h
Volume: 1035 ft³

Finishes
Walls: Sanisteel White - 26 ga. Anti-Microbial (5mm) - interior
       Galvanized/Smooth - 20 Ga. & St. Stl. Type 304 #4 finish - 20 Ga. - exterior
Ceilings: Sanisteel White - 26 ga. Anti-Microbial (5mm) - interior
          Galvanized/Smooth - 20 Ga. - exterior

Panel Thickness
Walls: 4" UL Listed Class 1 Foam
Ceilings: 4" UL Listed Class 1 Foam

Doors
D01:
  1 Finished opening 36" x 80" hinged flush cooler door
  1 Interior finish - St. Stl. Type 304 #4 finish - 20 Ga.
  1 Exterior finish - St. Stl. Type 304 #4 finish - 20 Ga.
  1 Exterior jamb finish - St. Stl. Type 304 #4 finish - 20 Ga.
  1 Viewport- Unheated 14"x24"
  1 Kick plate: 36" 16GA Stainless steel - interior and exterior
  3 Hinge- Kason 1245 Reversible Cam-Rise
  1 Light- 1806LED000 (120v) Fixture(Mtd to Jamb) and Optic Globe
           (Ship Loose)
  1 Door- Flush Mount
  1 Temp Alarm- Modularm 75LC (120v) Multi-Monitor, Temperature
               Alarm, Door Ajar Alarm, Automatic Light Control, AC Failure
               Alarm, Panic Alarm (Low voltage 1P-1,120v F°/C°
  1 Gasket- Magnetic
D02:
  1 Finished opening 36" x 80" hinged flush freezer door
  1 Interior finish - St. Stl. Type 304 #4 finish - 20 Ga.
  1 Exterior finish - St. Stl. Type 304 #4 finish - 20 Ga.
  1 Exterior jamb finish - Sanisteel White - 26 ga. Anti-Microbial (5mm)
  1 Viewport- 120v Heated 14"x24"
  1 Kick plate: 36" 16GA Stainless steel - interior and exterior
  3 Hinge- Kason 1245 Reversible Cam-Rise
  1 Light- 1806LED000 (120v) Fixture(Mtd to Jamb) and Optic Globe
           (Ship Loose)
  1 Door- Flush Mount
LPA NO. 14034.40
L636 LOS MEDANOS COLLEGE PE AND STUDENT UNION COMPLEX
DSA BACKCHECK - APRIL 13, 2017
PITTSBURG, CA

1 Heated Jamb (4 Sided) W/ Threshold
1 Temp Alarm- Modularm 75LC (120v) Multi-Monitor, Temperature Alarm, Door Ajar Alarm, Automatic Light Control, AC Failure Alarm, Panic Alarm (Low voltage 1P-1,120v F°/C°
1 Gasket- Magnetic

ITEM # 1-15 EVAPORATOR COIL <Included>
Quantity: One (1)
Manufacturer: RDT Refrigeration
Model: ADT-070
SIS No.: W010
1. One (1) Model ADT-070 Evaporator coil provided as an integral part of the remote refrigeration system. Evaporator coils shall be a direct expansion type. Evaporators used will be all "Underwriters Laboratory Listed" supplied from factory with an expansion valve, solenoid valve and Eco-Smart demand defrost controller, pre-wired and pre-piped under nitrogen pressure and designed for use with the refrigerant specified.

ITEM # 1-16 REFRIGERATOR SHELVING UNITS
Quantity: One (1)
Manufacturer: Cambro
Model: CAMSHELVING
SIS No.: W010
1. One (1) Model CAMSHELVING (LOT) 4 tier, 21” deep shelving units, posts to be 72” high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4” increments. Provide dunnage stands for all traverses 54” or longer and at corners where corner connectors are used. Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.

ITEM # 1-17 WALK-IN FREEZER <Included>
Quantity: One (1)
Manufacturer: Thermalrite
Model: CUSTOM
SIS No.: W010
1. One (1) Model CUSTOM See item #1-14 for full specification

ITEM # 1-18 SPARE NO.

ITEM # 1-19 SPARE NO.

ITEM # 1-20 CO2 AND SODA SYSTEM
Quantity: One (1)
Manufacturer: NIFSEC
Model: BY VENDOR
SIS No.: W010

1. One (1) Model BY VENDOR Co2 and Soda Bag and Box System - NIFSEC, Provided by Vendor. Vendor to supply suitable water filtration system, as approved by Owner.

ITEM # 1-21 EVAPORATOR COIL <Included>
Quantity: One (1)
Manufacturer: RDT Refrigeration
Model: LET-065
SIS No.: W010

1. One (1) Model LET-065 Evaporator coil provided as an integral part of the remote refrigeration system. Evaporator coils shall be a direct expansion type. Evaporators used will be all "Underwriters Laboratory Listed" supplied from factory with an expansion valve, solenoid valve and Eco-Smart demand defrost controller, pre-wired and pre-piped under nitrogen pressure and designed for use with the refrigerant specified.

ITEM # 1-22 FREEZER SHELVING UNITS
Quantity: One (1)
Manufacturer: Cambro
Model: CAMSHELVING
SIS No.: W010

1. One (1) Model CAMSHELVING (LOT) 4 tier, 21” deep shelving units, posts to be 72” high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4” increments. Provide dunnage stands for all traverses 54” or longer and at corners where corner connectors are used. Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.
ITEM # 1-23  DRY SHELVING UNITS  
Quantity: One (1)  
Manufacturer: Cambro  
Model: CAMSHELVING  
SIS No.: W010

1. One (1) Model CAMSHELVING (LOT) 4 tier, 18” deep shelving units, posts to be 72” high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4” increments. Provide dunnage stands for all traverses 54” or longer and at corners where corner connectors are used. Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.

ITEM # 1-24  CONVECTION OVEN  
Quantity: One (1)  
Manufacturer: Doyon Baking Equipment  
Model: JA14  
SIS No.: W010

1. One (1) Model JA14 Jet-Air Convection Oven, Electric, dual oven, capacity (14) 18”x26” pans, integrated steam injection (shot and pulse) system, reversing 2-speed fan system, delay timer, programmable controls, timer, full view glass doors, interior light, stainless steel interior & exterior, casters. (2) 3/4 hp  
2. One (1) INTERNATIONAL ORDERS: Any orders outside the United States or Canada will be subject to a 5% International Warranty Fee added to the invoice  
3. One (1) Two year parts and one year labor warranty, standard  
4. One (1) 120/4 wire  
5. One (1) Model PLF240 Water Filter System (head & cartridge) (WF001)

ITEM # 1-25  CONDENSATE HOOD (TYPE II)  
Quantity: One (1)  
Manufacturer: Halton  
Model: CH  
SIS No.: W010

1. One (1) Model CH Condensate hood to be U.L. approved for intended use, and NSF approved. Double wall construction, 18ga. type 304 stainless steel. Provide 3” air space on back, top, and ends, as required. Ship all duct collars loose. Provide stainless steel closure strips as needed for a complete installation.
<table>
<thead>
<tr>
<th>ITEM #</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
<th>MANUFACTURER</th>
<th>MODEL</th>
<th>SIS NO.</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-26</td>
<td>EXHAUST HOOD TRIM AND CLOSURE PANEL</td>
<td>One (1)</td>
<td>Custom</td>
<td>STAINLESS STEEL</td>
<td>W010</td>
<td>Provided 14 ga stainless steel exhaust hood trim and closure panels with #4 finish. Provide all necessary closure, louvers, and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.</td>
</tr>
<tr>
<td>1-27</td>
<td>ROLL-IN PROOFER RETARDER</td>
<td>One (1)</td>
<td>Doyon Baking Equipment</td>
<td>ER136</td>
<td>W010</td>
<td>One (1) Model ER136 Proofer/Retarder, Roll-in, one-section, capacity one single rack, heat and humidity controls, self-contained refrigeration 7 day timer, automatic refrigeration. Full view glass door, stainless steel interior and exterior.</td>
</tr>
<tr>
<td>1-28</td>
<td>WALL FLASHING</td>
<td>One (1)</td>
<td>Custom</td>
<td>STAINLESS STEEL</td>
<td>W010</td>
<td>Model STAINLESS STEEL (LOT) Approximately 6'-0&quot; l. Provide 20 ga stainless steel wall flashing from floor to exhaust hood with #4 finish. Provide all necessary closure and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.</td>
</tr>
<tr>
<td>1-29</td>
<td>SPARE NO.</td>
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<tr>
<td>1-30</td>
<td>SPARE NO.</td>
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<tr>
<td>1-31</td>
<td>BAKER'S TABLE W/FLOUR EDGE</td>
<td>One (1)</td>
<td>Custom</td>
<td>STAINLESS STEEL/WOOD</td>
<td>W010</td>
<td>One (1) Model STAINLESS STEEL/WOOD Approximately 7'-3&quot; l x 3'-0&quot; w. Provide stainless steel bakers table with 1-5/8&quot; legs with adjustable bullet feet, lower and/or mid shelves, 6&quot; high back and</td>
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</table>
end splash. Top shall be NSF approved solid maple, and legs shall be 16 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-32 WALL SHELF (KNIFE BRACKETS)
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL Approximately 7'-3" l x 1"-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 18 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-33 INGREDIENT BIN
Quantity: Three (3)
Manufacturer: Cambro
Model: IBS27148
SIS No.: W010
1. Three (3) Model IBS27148 Ingredient Bin, mobile, 27 gallon capacity, 1-pc seamless polyethylene bin, 2-pc sliding polycarbonate lid, S-hook on front (scoop NOT included), (4) 3" heavy duty casters (2 front swivel, 2 fixed), white with clear cover, NSF

ITEM # 1-34 REFRIGERATOR RACK, ROLL-IN
Quantity: Two (2)
Manufacturer: Metro
Model: RF13N
SIS No.: W010
1. Two (2) Model RF13N Roll-In Refrigerator Rack, pass-thru, 21-1/4"W x 64"H, 26"D, open frame design, slides on 1-1/2" centers, holds (36) 18"x26" pans, sized to fit refrigerator, riveted extruded aluminum frame construction, natural finish, 5" swivel casters (2) with brakes, NSF
2. Two (2) Model A37 Mobile Tray Rack Corner Bumper Set, gray, adds 1/2" to overall width & 1" to overall depth of rack

ITEM # 1-35 COMPACT PREP TABLE REFRIGERATOR
Quantity: One (1)
Manufacturer: Traulsen
Model: UST4818-LR
SIS No.: W010
1. One (1) Model UST4818-LR Dealer's Choice Compact Prep Table Refrigerator with low-profile flat cover, Reach-in, two-section, 48" wide, holds (18) 1/6 pans 4" deep (included), can accommodate up to 6" deep pans, stainless steel exterior top, sides & door with Santoprene® EZ-Clean Gasket, hinged left/right, anodized aluminum interior, galvanized exterior back and bottom, rear-mounted self-contained refrigeration, (4) 4" casters, 1/4 HP, cULus, NSF
2. One (1) 3 year service/labor & 5 year compressor warranty, standard
3. One (1) 8' cord
4. One (1) Model CASTER 5SET4 Casters, 6", set of 4, for 27", 32" & 48" models

ITEM #1-36  HAND SINK
Quantity: One (1)
Manufacturer: IMC/Teddy
Model: ADA-WSX

1. Model ADA-WSX ADA-WS Handicap Hand Sink, wall mounted, 19-1/4"W, 20-1/2" front-to-back, 16/304 stainless steel, integrated backsplash, non-drip marine edges, 14 gauge. stainless steel front apron w/rear flange & "Z" strip. ADA, NSF
2. Model ITD Integrated Towel Dispenser (built in to apron)
3. Model SD Soap Dispenser, stainless steel construction, 1 pint capacity
4. Model SS Side Splashes for hand sink (pair)

ITEM # 1-37  PANTRY FAUCET
Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0325-CR
SIS No.: W010
1. One (1) Model B-0325-CR Pantry Faucet, double, 4" c/c, swivel gooseneck, lever handles, 00AA inlets & Ceramas
2. One (1) Model B-0199-01F-15 Aerator, non-splash, flow control, 1.40 gpm, 55/64"-27 UNS female threads

ITEM # 1-38  SPARE NO.

ITEM # 1-39  SPARE NO.

ITEM # 1-40  SPARE NO.

ITEM # 1-41  WORK TABLE
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL Approximately 14'-3" l x 2'-6" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) CSS Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
3. One (1) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish
4. One (1) CSS Model DRAWER Provide 16 ga stainless steel utensil drawer with metal roller track hardware, and lock measuring approximately 20" l x 20" w x 5" d
ITEM # 1-42  WALL / SPLASH MOUNT FAUCET
Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0231-CR
SIS No.: W010
1. One (1) Model B-0231-CR Faucet, 12" swing nozzle, 8" wall mount base, 1/2" NPT female Inlets, Ceramas cartridges

ITEM # 1-43  TRASH RECEPTACLE W/DOLLY
Quantity: Two (2)
Manufacturer: Rubbermaid
Model: FG262000GRAY
SIS No.: W010
1. Two (2) Model FG262000GRAY ProSave® BRUTE® Container, without lid, 20 gallon, 19-1/2"D x 22-7/8"H, round, reinforced rims, built in handles, double rimmed base, high-impact plastic construction, gray, NSF
2. Two (2) All-plastic, professional-grade construction will not rust, chip or peel; resists dents.
3. Two (2) Reinforced rims add strength and durability
4. Two (2) Built-in handles allow easy, non-slip lifting and anti-jam nesting
5. Two (2) Double-ribbed base increases stability and dragging capacity
6. Two (2) USDA Meat & Poultry Equipment Group listed and assist in complying with HACCP guidelines.
7. Two (2) Certified to NSF Standard #2 and Standard #21
8. Two (2) Model FG264043BLA BRUTE® Quiet Dolly, 18-1/4"D x 6-5/8"H, non-marking blue casters, black

ITEM # 1-44  FOOD SLICER
Quantity: One (1)
Manufacturer: Bizerba
Model: GSP-HDAUTOW/LIFT
SIS No.: W010
1. One (1) Model GSP-HDAUTOW/LIFT (355706) PRO Safety Slicer with seamless aluminum rear wall, with Lift Device, automatic or manual, gravity feed, 13" (330mm) dia. hard chromium-plated blade, anodized aluminum carriage and gauge plate, slice thickness 0" - 0.94" (0-24mm), proximity switch 15 to 45 seconds time delay power, blade shut-off switch in thickness knob, aluminum housing, with servo assist (replacement for SE12D PRO with LIFT)
2. One (1) (913004009) 90mm rear wall

ITEM # 1-45  DROP-IN HOT WELL
Quantity: Two (2)
Manufacturer: Wells
Model: HW-106D
SIS No.: W010
1. Two (2) Model HW-106D Cook 'N Hold Warmer, built-in, electric, for 11-quart round inserts, wet operation with drain, stainless steel construction, with Wellslok, UL
2. Two (2) Limited 2 year parts & 1 year labor warranty, standard
3. Two (2) Model 20623 direct
4. Two (2) Model 20908 Round Inset, 11 quart, with handles & slotted lid, fits 10-1/2" opening

ITEM #1-46  WALL SHELF (KNIFE BRACKETS)
Quantity: Two (2)
Manufacturer: Custom
Model: STAINLESS STEEL
1. Model STAINLESS STEEL Approximately 7'-6" l x 1"-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 18 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details

ITEM #1-47  POT SHELVING UNITS
Quantity: One (1)
Manufacturer: Cambro
Model: CAMSHELVING
SIS No.: W010
1. One (1) Model CAMSHELVING (LOT) 4 tier, 24" deep shelving units, posts to be 72" high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4” increments. Provide with CSRDB donut bumper and CSCTL casters with brake.

ITEM #1-48  SPARE NO.
ITEM #1-49  SPARE NO.
ITEM #1-50  SPARE NO.
ITEM #1-51  HAND SINK
Quantity: One (1)
Manufacturer: IMC/Teddy
Model: ADA-WSX
1. Model ADA-WSX ADA-WS Handicap Hand Sink, wall mounted, 19-1/4"W, 20-1/2" front-to-back, 16/304 stainless steel, integrated backsplash, non-drip marine edges, 14 gauge. stainless steel front apron w/rear flange & "Z" strip, ADA, NSF
2. Model ITD Integrated Towel Dispenser (built in to apron)
3. Model SD Soap Dispenser, stainless steel construction, 1 pint capacity
4. Model SS Side Splashes for hand sink (pair)

ITEM #1-52  PANTRY FAUCET
Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0325-CR
SIS No.: W010
1. One (1) Model B-0325-CR Pantry Faucet, double, 4" c/c, swivel goose neck, lever handles, 00AA inlets & Ceramas
2. One (1) Model B-0199-01F-15 Aerator, non-splash, flow control, 1.40 gpm, 55/64"-27 UNS female threads

ITEM # 1-53  3 COMPARTMENT POT SINK
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL Approximately 9'-0" l x 2'-6" w. Provide stainless steel pot sink assembly with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 8" high back and end splash. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. Three (3) CSS Model SINKS Provide 16 ga stainless steel sink tub measuring approximately 18" w x 26" d x 14" h. Welded in place with polished seams.
3. Three (3) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 1-54  WALL / SPLASH MOUNT FAUCET
Quantity: Two (2)
Manufacturer: T&S Brass
Model: B-0291
SIS No.: W010
1. Two (2) Model B-0291 Kettle & Pot Sink Faucet, Big-Flo, wall mounted 8" centers, 3/4" IPS model LL street EL inlets with locknuts, 18" swing nozzle, 175°F four arm handles, 1-1/4" diameter holes required in backsplash

ITEM # 1-55  UTENSIL RACK
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL Approximately 7'-0" l x 1/4" w x 2" d. Provide stainless steel flatbar utensil rack with sliding hooks 8" on center. Stainless steel shall be 16 ga with #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-56  WORK TABLE
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL Approximately 13'-6" l x 2'-6" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) CSS Model DRAWER Provide 16 ga stainless steel utensil drawer with metal roller track hardware, and lock measuring approximately 20" l x 20" w x 5" d.

ITEM # 1-57 WALL SHELF (KNIFE BRACKETS)
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010

1. One (1) Model STAINLESS STEEL Approximately 6'-6" l x 1"-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 18 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-58 SPARE NO.

ITEM # 1-59 SPARE NO.

ITEM # 1-60 SPARE NO.

ITEM # 1-61 COFFEE GRINDER <NIC>
Quantity: One (1)
Manufacturer: NIFSEC
SIS No.: W010

1. One (1) Coffee Grinder - NIFSEC

ITEM # 1-62 COFFEE BREWER <NIC>
Quantity: Two (2)
Manufacturer: NIFSEC
SIS No.: W010

1. Two (2) Coffee Brewer - NIFSEC

ITEM # 1-63 TEA BREWER <NIC>
Quantity: One (1)
Manufacturer: NIFSEC
SIS No.: W010

1. One (1) Tea Brewer - NIFSEC

ITEM # 1-64 REMOTE REFRIGERATION RACK AND SYSTEM
Quantity: One (1)
Manufacturer: RDT Refrigeration
Model: CUSTOM
SIS No.: W010

1. Model No. ZS1-3 Eco-Cool as manufacturer by Refrigeration Design Technologies (RDT)
Quantity: 1
Electrical: 208-230v/3ph
The RDT UL-Listed horizontal discharge, air-cooled rack system designed for outdoor installation. The unit shall be pre-wired for a single point electrical connection with a main fused disconnect. The refrigeration unit shall be housed in a weather-protected compact structural galvanized steel frame. The unit shall include individual dedicated
air-cooled condensers. Condensers shall be aluminum fin/copper tube designed to operate at 15 degrees TD. The exterior housing shall feature stainless steel with one piece stainless steel louvers. Entire galvanized metal frame shall be pre-assembled, welded and cleaned. Lifting points shall be integrated in the feet at each corner to facilitate installation. Condenser fan motors shall be mounted within the enclosure.

All compressor units shall be scroll type and factory assembled to operate with R-407a refrigerant.
- 5.0 HP (primary) medium temperature digital scroll compressor.
- 5.0 HP (back-up) medium temperature scroll compressor with manual change over for 100% redundancy.
- 2.5 HP low temperature scroll compressor for walk-in freezer.

Compressors and refrigeration piping will be installed in such a manner as to eliminate noise with vibration eliminators in refrigeration lines, as needed.

Each system shall be equipped with a ball-bearing fan motor, an XC645CX Dixell controller (digital compressors only), oil separator, fixed head pressure control, suction filter, liquid line sight glass, liquid line drier, crankcase heaters, headmaster controls or fan cycling, liquid line inlet and outlet valves, defrost cycle and armored super hose connections (in lieu of capillary tubes).

All refrigerant lines shall be extended to one side of the package in a neat and orderly manner. All tubing shall be securely supported and anchored with non-corrosive coated clamps. All joints must be brazed, not soldered. All piping and controls shall be factory pressure-tested with nitrogen at 175 PSI.

All field piping installed as per factory standards and the sizing of the piping shall meet proper velocities as per factory standards. Insulation will be foam type 25/50 smoke and fire type. Medium temperature will use 3/4” thick wall, low temperature will use 1” thick wall and sub-cooled liquid lines will use 1/2” thick wall insulation. All insulation shall be jacketed with Aluminum (complying with division 15000,) 1-1/2” overlap and secured with wire “zip” ties. All jacket elbows to be roll formed. All field piping installed with plastic bushing wherever steel to copper tubing comes together. Include all labor, material, equipment, tools, refrigerant, oil, and other required accessories for the complete installation of the systems as shown and specified. Interconnection of all accessories accomplished for ease of servicing.

After installation and before charging, evacuate all piping systems to a 500 micron evacuation. After evacuation, charge system with nitrogen and maintain pressure of 150% working pressure for 6 hours. Cap off, install pressure gauge and hold for 24 hours.
minimum. Re-evacuate, hold for 6 hours, charge and make electronic detector test all joints.

Final wiring of connections, conduit and/or pull boxes, provided under applicable electrical and plumbing contracts. See R-1 drawing for wiring schematic for field wiring.

WARRANTY AND SERVICE:

Included shall be a full one (1) year warranty for all parts by factory and 90 day warranty on labor on the entire refrigeration package, from the day of final acceptance of the installation as previously specified.

ITEM #2-01 WORK COUNTER

Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL

1. Model STAINLESS STEEL Approximately 6'-6" l x 3'-0" w. Provide stainless steel work counter with undershelf and/or mid shelf, galvanized metal base, and 6" high back and end splash. Top shall be 14 ga stainless steel, body to be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

2. Custom Stainless Steel Model HAND SINK Provide 16 ga stainless steel sink tub measuring approximately 10" w x 14" d x 7" h. Welded in place with polished seams. Provide with T&S basket strainer.

ITEM # 2-02 PANTRY FAUCET

Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0325-CR
SIS No.: W010

1. One (1) Model B-0325-CR Pantry Faucet, double, 4" c/c, swivel gooseneck, lever handles, 00AA inlets & Ceramas

2. One (1) Model B-0199-01F-15 Aerator, non-splash, flow control, 1.40 gpm, 55/64"-27 UNS female threads

ITEM # 2-03 MICROWAVE CONVECTION OVEN

Quantity: One (1)
Manufacturer: Turbochef
Model: I3
SIS No.: W010

1. One (1) Model I3 I3™ Convection/Microwave Oven, Rapid Cook, electric, 23" wide, ventless, countertop, fully insulated cook chamber, stores up to 200 recipes, internal catalytic converter, smart voltage sensor technology (US only), digital display, removable rack and grease collection pan, top and bottom jet plates, pull down door with ergonomic handle, multi-speed convection blower, (2) solid PTFE baskets, (1) oven cleaner, (1) oven guard, (1) aluminum paddle, (2) trigger sprayers, (1) standard rack, side hand grips, stainless steel front, top & sides, cULus, CE, ANSI, TUV

2. One (1) All items FOB: Carrollton, Texas: Consumable/accessory orders less than $5,000 will incur a handling fee. Orders shipping standard ground will incur a $15.00 handling fee. Orders shipping other than standard ground will incur $25.00 handling fee

3. One (1) One year parts and labor warranty

4. One (1) 6 foot cord (nominal), , standard
ITEM # 2-04 TRASH RECEPTACLES (COUNTER)
Quantity: Two (2)
Manufacturer: Rubbermaid
Model: FG295700BLA
SIS No.: W010
1. Two (2) Model FG295700BLA Waste Basket, 41-1/4 qt., 15-1/4"W x 11"D x 19-7/8"H, medium, soft, rolled rims, all plastic, won't chip, rust or dent, black

ITEM # 2-05 PAPER TOWEL DISPENSER
Quantity: One (1)
Manufacturer: Bobrick Washroom
Model: B-359
SIS No.: W010
1. One (1) Model B-359 Recessed paper towel dispenser shall be constructed entirely of type-304 stainless steel with satin finish. Flange shall be drawn, one-piece, seamless beveled construction. Paper towel dispenser shall have full-length stainless steel piano hinge and be equipped with a tumbler lock. Rounded towel tray shall have a hemmed opening to dispense paper towels without tearing. Capacity: 350 C-fold or 475 multifold paper towels.

ITEM # 2-06 2 OPEN BURNER RANGE
Quantity: One (1)
Manufacturer: Montague Company
Model: PART OF ITEM #2-07
1. Model PART OF ITEM #2-07 2 Open Burner Range - Part Of Item #2-07

ITEM #2-07 HD RANGE, 48" MANUAL GRIDDLE
Quantity: One (1)
Manufacturer: Montague Company
Model: 2/C24-8+C12-5
1. Model 2/C24-8+C12-5 Legend Heavy Duty Range, gas, 48", fry top, 3/4" thick, manual control, countertop, stainless steel front & 4" flue riser, black sides, 4" high adjustable legs, 90,000 BTU
2. Standard warranty: one year parts and labor warranty
3. Unitized construction including: guard rail, front panels & capping strips, per seam
4. Natural gas
5. 1" Left rear manifold with pressure regulator (up to 400,000 BTU/hr)
6. Cap & stainless steel manifold cover, left
7. 1" plate with Standard 36" depth range
8. Left Side, stainless steel for range
9. Thermostats for fry top, add Suffix "T" to model number, 48" wide (three thermostats)
10. Legend Heavy Duty Range, gas, 12", Add-A-Unit, (2) 30,000 BTU open burners, countertop, stainless steel front & 4" flue riser, black sides, 4" high adjustable legs, 60,000 BTU, CE, NSF, cETLus
11. Standard warranty: one year parts and labor warranty
12. Natural gas
13. 1-1/4" Front manifold without pressure regulator, standard
14. Cap & stainless steel manifold cover, right
15. Right Side, stainless steel for range
16. Guard rail finished end

ITEM #2-08 CHARBROILER, GAS, COUNTERTOP
Quantity: One (1)
Manufacturer: Montague Company
Model: UFLC-24R
1. Model UFLC-24R Legend Char-Broiler, 24" heavy-duty range match countertop, self-cleaning stainless steel radiants, 2-position cast iron Ultra-Flow reversible top grate, stainless steel front & top trim, black sides, 4" adjustable nickel legs, 76,000 BTU
2. Standard warranty: one year parts and labor warranty
3. Extended one year warranty, per section
4. Natural gas
5. 1-1/4" front manifold standard
6. 36-5/8" Depth std.

ITEM #2-09 HD RANGE, 12", ADD-A-UNIT, WORK TOP
Quantity: One (1)
Manufacturer: Montague Company
Model: 12-S
1. Model 12-S Legend Heavy Duty Range, 12", Add-A-Unit, (1) work top, open cabinet base with stainless steel front & 4" flue riser, black sides, black intermediate & bottom shelves, 6" high adjustable stainless steel legs, cETLus, NSF, CE
2. Standard warranty: one year parts and labor warranty
3. Extended one year warranty, per section
4. Unitized construction including: guard rail, front panels & capping strips, per seam
5. 1-1/4" Front manifold without pressure regulator, standard

ITEM #2-10 REFRIGERATED EQUIPMENT BASE
Quantity: One (1)
Manufacturer: Montague Company
Model: RB-84-SC
1. Model RB-84-SC Legend Heavy Duty Extreme Cuisine Refrigerated Equipment Base/Stand, 84" self-contained, two sections of drawers on 14 gauge stainless steel track system, (4) 27-1/4" wide drawers, (8) pan capacity (pans NOT included), welded stainless steel body, frame, front, sides & top, 6" adjustable stainless steel legs, cord & plug
2. Standard warranty: one year parts and labor warranty
3. Extended one year warranty, per section
4. 4 year (parts only) compressor warranty, Self-contained units only.
5. 6” adjustable stainless steel legs, standard

ITEM #2-11 WORK COUNTER
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL

1. Model STAINLESS STEEL Approximately 7'-6" l x 3'-0" w. Provide stainless steel work counter with undershelf and/or mid shelf, galvanized metal base, and 6" high back and end splash. Top shall be 14 ga stainless steel, body to be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. Custom Stainless Steel Model PREP SINK Provide 16 ga stainless steel sink tub measuring approximately 18" w x 24" d x 12" h. Welded in place with polished seams.
3. Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 2-12 WALL / SPLASH MOUNT FAUCET
Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0231-CR
SIS No.: W010

1. One (1) Model B-0231-CR Faucet, 12" swing nozzle, 8" wall mount base, 1/2" NPT female Inlets, Ceramas cartridges

ITEM # 2-13 SHAVER/BLENDER MACHINE
Quantity: One (1)
Manufacturer: Island Oasis
Model: SB3X
SIS No.: W010

1. One (1) Model SB3X Designed to allow operators to serve Island Oasis frozen beverages faster, the company’s signature SB3X machine combines the functions of an ice shaver and a blender. It generates up to three of the same frozen beverage at a time with the push of a button. The unique portion control feature insures the same drink every time with no waste.

Key Features:

Speed: Just 9 seconds for a 12 oz. drink
Consistency: Shaves the exact amount of ice for each drink
Portion Control: No product waste, saves money
Versatile: Ideal for all of your frozen beverage recipes, including: Smoothies, Margaritas, Daiquiris, Lattes

ITEM # 2-14 INSULATED ICE BIN STORAGE BIN
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL Provide 14 ga. stainless steel ice storage bin with #4 finish. Provide all necessary closure, louvers and trim strips for a complete installation. Insulation shall be polyurethane. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-15 WALL SHELF (CONCEALED BRACKETS)
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
SIS No.: W010
1. One (1) Model STAINLESS STEEL Approximately 5'-6" l x 1"-0" w. Provide stainless steel wall shelf with concealed brackets. Wall shelf shall be: 18 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-16 REACH-IN REFRIGERATOR
Quantity: One (1)
Manufacturer: Victory Refrigeration
Model: RS-1D-S1
SIS No.: W010
1. One (1) Model RS-1D-S1 UltraSpec Series Refrigerator Featuring Secure-Temp 1.0™ Technology, Reach-in, one-section, self-contained refrigeration, 21.5 cu. ft. capacity, (1) hinged door, (3) shelves, stainless steel exterior & interior, standard depth cabinet, full height 20 gauge stainless steel door, V-TEMP electronic temperature control/indicator, LED lighting, expansion valve technology, Santoprene door gaskets with 2 year warranty, stainless steel breakers, 1/3 HP, UL, cUL, NSF, MADE IN USA
2. One (1) 3 years parts & labor warranty (excludes maintenance items)
3. One (1) Remote refrigeration (1/3 hp medium temp. compressor by others)
4. One (1) (for cabinet only)
5. One (1) (for cabinet only)
6. One (1) Door hinging: standard on right
7. One (1) Legs, set of 4, 6" high adjustable stainless steel, standard

ITEM # 2-17 DIPPER WELL
Quantity: One (1)
Manufacturer: T&S Brass
Model: B-2282-01-F05
SIS No.: W010
1. One (1) Model B-2282-01-F05 Dipperwell Faucet, with drain, stainless steel bowl, removable inner overflow cup, 0.5 gpm flow control, brass knob, polish chrome plated

ITEM #2-18 FILLER PANELS AND TRIM
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
1. Model STAINLESS STEEL Provide 14 ga. stainless steel filler panel with #4 finish. Provide all necessary closure, louvers and trim strips
for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM #2-19  FIRE PULL BOX  
Quantity:  One (1)  
Manufacturer:  Custom  
Model:  PART OF ITEM #2-30  
1. Model PART OF ITEM #2-30 Fire Pull Box - Box by electrician, Mechanism part of item #2-30 Fire Protection System.

ITEM #2-20  VERTICAL SNEEZEGUARD  
Quantity:  One (1)  
Manufacturer:  BSI  
Model:  DECO-WEBB-401  
1. Model DECO-WEBB-401 Approximately 6'-9" l. Provide glass and stainless steel sneezeguard per current NSF requirements. Provide with 3/8" clear tempered glass with stainless steel brushed tubing with polished and beveled edges, #4 finish, weld, ground, and polished. Glass shall be fastened in place with machined round stainless steel disks. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-21  ESPRESSO MACHINE  
Quantity:  One (1)  
Manufacturer:  NIFSEC  
SIS No.:  W010  
1. One (1) Espresso Machine - NIFSEC

ITEM # 2-22  SERVICE COUNTER  
Quantity:  One (1)  
Manufacturer:  Custom  
Model:  STAINLESS STEEL / MILLWORK  
SIS No.:  W010  
1. One (1) Model STAINLESS STEEL / MILLWORK Approximately 16'-9" l x 3'-6" w. Provide stainless steel undercounter with stone top, stainless steel intermediate and/or lower shelves, galvanized metal base, millwork die front with hardwood veneer or high pressure laminate finish. See finish schedule for specific finish requirements. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-23  COMPACT PREP TABLE REFRIGERATOR  
Quantity:  One (1)  
Manufacturer:  Traulsen  
Model:  UST7230-LR  
SIS No.:  W010  
1. One (1) Model UST7230-LR Dealer's Choice Compact Prep Table Refrigerator with low profile flat cover, Reach-in, two-section, 72" wide, holds (30) 1/6 pans 4" deep (included) can accommodate up to 6" deep pans, stainless steel exterior top, sides & doors with Santoprene® EZ-Clean Gasket, hinged left/right, anodized aluminum interior, galvanized exterior back & bottom, rear mounted, self-contained refrigeration, (6) 4" casters, 1/4 HP, cULus, NSF
2. One (1) 3 year service/labor & 5 year compressor warranty, standard
3. One (1) 8’ cord
4. One (1) Model CASTER SET4 Casters, 3-1/2”, set of 6, for 60” & 72” models

ITEM # 2-24 SERVICE/SELF-SERVICE COMBO MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: HOU4852R
SIS No.: W010

1. One (1) Model HOU4852R Encore® Service/Self-Service Combo Merchandiser, 50”W, upper: curved lift-up front glass, clear glass rear sliding doors without lock, lighted glass shelf in upper display with center glass divider, convertible refrigeration, lower: open self-service refrigerated, top light, sheet metal deck, black interior, black trim, (2) cutaway end panels with mirror, Breeze™ with EnergyWise self-contained refrigeration system, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) NOTE: 43” minimum entry door clearance required (with out shipping skid)
4. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
5. One (1) Extended second year parts & labor warranty (excluding compressor) at time of order
6. One (1) Slide out self-contained refrigeration system, standard
7. One (1) cord with
8. One (1) NOTE: Compressor air intake from rear & out front panel, front panel cannot be blocked (Not applicable with remote refrigeration option)
9. One (1) Base Support: Units are supplied with levelers extended 1-1/4” & MUST be adjusted during installation to ensure unit is level for operation
10. One (1) LED 3500K lights (MUST BE CHOSEN WHEN CASE IS ORDERED)
11. One (1) Interior: Stainless steel in lieu of standard black
12. One (1) Exterior: Stainless steel (includes rear of case)
13. One (1) Rear Exterior: White, standard
14. One (1) Trim: Silver
15. One (1) Upper Rear: Clear glass rear sliding doors, standard
16. One (1) Night curtain, retractable, non-locking

ITEM # 2-25 SELF-SERVICE REFRIGERATED MERCHANDISER

Quantity: One (1)
Manufacturer: Structural Concepts
Model: B5932
SIS No.: W010

1. One (1) Model B5932 Oasis® Self-Service Refrigerated Merchandiser, 59-5/8”W, high profile, open front, (4) non-lighted shelves, top light, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, one piece formed ABS
plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. One (1) Extended second year parts & labor warranty (excluding compressor) at time of order
5. One (1) Remote refrigeration with expansion valve, solenoid valve & thermostat (does not include condensing unit), requires floor drain
6. One (1) Base Support: Levelers, standard
7. One (1) Interior: Stainless steel, in lieu of standard black
8. One (1) Exterior: Stainless steel
9. One (1) Lower front panel: Stainless steel (with stainless steel exterior only)
10. One (1) Left end panel: Full with mirrored interior, metal edging, standard
11. One (1) Right end panel: Full with mirrored interior, metal edging, standard
12. One (1) Roll-down security cover, locking (requires two end panels (full or cutaway) per case) but CANNOT be used with Case to Case acrylic end panel)(must be chosen when case is ordered)
13. One (1) 6 ft cord, exit at base, standard

ITEM # 2-26  SELF-SERVICE HEATED MERCHANDISER
Quantity: One (1)
Manufacturer: Structural Concepts
Model: B3632H
SIS No.: W010
1. One (1) Model B3632H Oasis® Self-Service Heated Merchandiser, 36-1/2"W, high profile, open front, (3) lighted metal shelves, top light, stainless steel mirror interior, full end panels with mirror, casters, 6 ft cord, cETLus, ETL-Sanitation
2. One (1) NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. One (1) One year parts & labor warranty, standard
4. One (1) Extended second year parts & labor warranty at time of order
5. One (1) Exterior: Stainless steel
6. One (1) Lower front panel: Stainless steel (with stainless steel exterior only)
7. One (1) Left end panel: Full with mirrored interior, metal edging, standard
8. One (1) Right end panel: Full with mirrored interior, metal edging, standard
9. One (1) Exterior back panel: Solid back panel - black, standard

ITEM # 2-27  BEVERAGE COUNTER
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL / MILLWORK
SIS No.: W010
1. One (1) Model STAINLESS STEEL / MILLWORK Approximately 11'-0" L x 3'-0" w. Provide stainless steel undercounter with stone top with
side and back splash, stainless steel intermediate and/or lower shelves, galvanized metal base, millwork die front with hardwood veneer or high pressure laminate finish. See finish schedule for specific finish requirements. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-28  EXHAUST HOOD
Quantity: One (1)
Manufacturer: Halton
Model: KVE
1. Model KVE Approximately 9'-0" l x 4'-6" w x 2'-0" h. Provide 18 ga type 304 stainless steel Type I exhaust hood consisting of the following: outer casing/ main body, inner liner, exhaust duct, pressure measurement T.A.B. ports, Outer casing panels shall be constructed of stainless steel with a brushed satin finish. Each joint shall be welded and liquid tight, avoiding harmful dripping of condensation. All exposed welds shall be ground and polished to the original finish of metal. Canopy ends and front shall be double sided wall construction. Provide 3 inch air space on back, top, and ends, as required. The hood shall be provided with Capture Jet® with Side-Jet technology. The Capture Jet® air shall be introduced through a special discharge panel and shall not exceed 10% of the calculated exhaust airflow. The Capture Jet® discharge velocity shall be a minimum of 1500 feet per minute. Slot or grille type discharge shall not be used. The Capture Jet® shall be internally mounted with a speed control and will not require a fire damper or electronic shut down in fire mode. The hood shall be equipped with KSA multi-cyclone stainless steel grease extractors. The KSA filters shall be NSF and UL classified with 93-98% efficiency on particulate in the 5-10 micron range based on ASTM-F2519-05. Exhaust volume shall be based on ASTM-F1704-05 and F2474-05. Baffle or slot type extractors shall not be used. Hood lights shall be U.L. Listed LED fixtures, suitable for grease hoods. per fixture, 50 foot candles at cooking surface. The lighting shall be suitable for single phase power supply. The master electrical panel consisting of one starter per motor with overload protection shall be supplied. Control panel to hood or remote mounted. Hood shall be protected by an Ansul Fire Protection System. Hood to include a built in fire protection system cabinet to match exhaust hood finish. Provide in accordance with complete drawings, details, and specifications.

ITEM #2-29  EXHAUST HOOD TRIM AND CLOSURE PANEL
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL
1. Model STAINLESS STEEL Approximately 9'-0" l x 4'-6" w. Provide 14 ga stainless steel exhaust hood trim and closure panels with #4 finish. Provide all necessary closure, louvers and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.
ITEM #2-30  FIRE PROTECTION SYSTEM
Quantity: One (1)
Manufacturer: Ansul Fire Protection
Model: R102
1. Model R102 Provide One (1) each Fire Protection System complete with nozzles, fusible links, piping, pull box, and actuators, utilizing a wet chemical extinguishing agent fabricated and installed by an approved Ansul system installer. Provide in accordance with complete drawings, details, and specifications section 114000. System to be an R-102 automatic type and be manufactured and installed per the current NFPA guidelines and be U.L. approved. Cylinders shall be mounted on wall in a stainless steel enclosure, or mounted in a stainless steel cabinet attached to the exhaust hood. All piping to be concealed with the exception of drops which shall be chrome sleeved and of as minimal exposure as possible. Size, number, and location of nozzles or fusible links to be in accordance with U.L. limits for this particular system. Fire system contractor shall provide engineered drawings, acquire permit, coordinate start-up and testing with the appropriate Fire Officials, and obtain final certification. Provide as-built drawings at completion of install. Fire System installer to provide adequate job site visits to coordinate installation of un-exposed pipe and installation of system. Include the appropriately sized and approved electronic gas shut-off valve(s).

ITEM # 2-31  ICE & SODA DISPENSER <NIC>
Quantity: One (1)
Manufacturer: NIFSEC
SIS No.: W010
1. One (1) Beverage Dispenser - NIFSEC

ITEM # 2-32  TEA DISPENSER <NIC>
Quantity: One (1)
Manufacturer: NIFSEC
SIS No.: W010
1. One (1) Tea Dispenser - NIFSEC

ITEM # 2-33  JUICE DISPENSER <NIC>
Quantity: One (1)
Manufacturer: NIFSEC
SIS No.: W010
1. One (1) Juice Dispenser - NIFSEC

ITEM # 2-34  COFFEE SHUTTLE <NIC>
Quantity: Three (3)
Manufacturer: NIFSEC
SIS No.: W010
1. Three (3) Coffee Shuttle - NIFSEC

ITEM # 2-35  CONDIMENT DISPENSER <NIC>
Quantity: One (1)
Manufacturer: NIFSEC
SIS No.: W010
1. One (1) Condiment Dispenser - NIFSEC, By Owner
ITEM # 2-36  TRASH RECEIPTACLES (COUNTER)
Quantity:  One (1)
Manufacturer:  Rubbermaid
Model:  FG295700BLA
SIS No.:  W010
1. One (1) Model FG295700BLA Waste Basket, 41-1/4 qt., 15-1/4"W x 11"D x 19-7/8"H, medium, soft, rolled rims, all plastic, won't chip, rust or dent, black

ITEM # 2-37  SOUP BAR COUNTER
Quantity:  One (1)
Manufacturer:  Custom
Model:  STAINLESS STEEL / MILLWORK
SIS No.:  W010
1. One (1) Model STAINLESS STEEL / MILLWORK Approximately 12'-0" l x 3'-6" w. Provide stainless steel undercounter with stone top, stainless steel intermediate and/or lower shelves, galvanized metal base, millwork die front with hardwood veneer or high pressure laminate finish. See finish schedule for specific finish requirements. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 2-38  SPARE NO.

ITEM # 2-39  SPARE NO.

ITEM # 2-40  SPARE NO.

ITEM #2-41  COLD FOOD WELL UNIT, DROP-IN, REFRIGERATED
Quantity:  Two (2)
Manufacturer:  Vollrath
Model:  36430
1. Model 36430 NSF7 Refrigerated Cold Pan, drop-In, 3-pan, 6-5/8" deep well, accommodates standard 12" x 20" pans with adaptor bars, drip-free flange, polyurethane foam insulated, 18/8 stainless steel, 18 gauge galvanized exterior housing, self contained refrigeration, 1/4 HP, cord with , cULus, NSF, Made in USA (allow 3-6 business days lead time)

ITEM #2-42  DROP-IN HOT WELL
Quantity:  Two (2)
Manufacturer:  Vollrath
Model:  3646410
1. Model 3646410 Soup Well, drop-in, thermostatic control mounted in stainless steel cored control panel, accommodates (1) 11 quart inset, over flange 12-13/16" dia., cutout 12-1/4" dia, outside 12-13/16" dia, well outer 12" dia., 3/4" drain, 6 ft. cord with , cULus, NSF, Made in USA
ITEM #2-43 DOUBLE SIDED SNEEZEGUARD WITH PASS SHELF
Quantity: One (1)
Manufacturer: BSI
Model: DECO-WEBB-403
1. Model DECO-WEBB-403 Approximately 8'-9" l. Provide glass and stainless steel sneezeguard per current NSF requirements. Provide with 3/8" clear tempered glass with brushed stainless steel tubing with polished and beveled edges, #4 finish, weld, ground, and polished. Glass shall be fastened in place with machined round stainless steel disks. Incorporate 12 volt LED lights at approximately 4" on center mounted in a 16 ga stainless steel brushed finish three-sided channel with internal wiring. Sneezeguard may incorporate a food warming unit mounted in a stainless steel three-sided shroud as noted on the plans. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM #2-44 MERCHANDISE DISPLAY SHELVING W/ SLATWALL
Quantity: Two (2)
Manufacturer: Custom
Model: MILLWORK
SIS No.: W010
1. Two (2) Model MILLWORK Fabricate and install per complete drawings, schedules, elevations, and details. See FS Drawings.

ITEM #2-45 CASHIER STAND (MOBILE)
Quantity: Two (2)
Manufacturer: Custom
Model: MILLWORK
SIS No.: W010
1. Two (2) Model MILLWORK Approximately 2'-6" l x 3'-0" w. Provide millwork cashier stand with hardwood veneer or high pressure laminate finish, stone top, and 5" dia. heavy-duty, non-marking casters, all with brakes. See finish schedule for specific finish requirements. Stand to include locking cash drawer and cash register. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM #2-46 CASH REGISTER <NIC>
Quantity: Two (2)
Manufacturer: NIFSEC
SIS No.: W010
1. Two (2) Cash Register - NIFSEC

ITEM #2-47 SNEEZEGUARD WITH PASS SHELF
Quantity: One (1)
Manufacturer: Custom
Model: STAINLESS STEEL/ GLASS
1. Model STAINLESS STEEL/ GLASS Approximately 4'-0" l. Provide glass and stainless steel sneezeguard per current NSF requirements. Provide with 3/8" clear tempered glass with brushed stainless steel tubing with polished and beveled edges, #4 finish, weld, ground, and polished. Glass shall be fastened in place with machined round
stainless steel disks. Incorporate 12 volt LED lights at approximately 4" on center mounted in a 16 ga stainless steel brushed finish three-sided channel with internal wiring. Sneezeguard may incorporate a food warming unit mounted in a stainless steel three-sided shroud as noted on the plans. Fabricate and install per complete drawings, schedules, elevations, and details.

<table>
<thead>
<tr>
<th>ITEM # 3-01</th>
<th>WALK-IN REFRIGERATOR</th>
</tr>
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<tbody>
<tr>
<td>Quantity:</td>
<td>One (1)</td>
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<tr>
<td>Manufacturer:</td>
<td>Thermalrite</td>
</tr>
<tr>
<td>Model:</td>
<td>CUSTOM</td>
</tr>
<tr>
<td>SIS No.:</td>
<td>W010</td>
</tr>
</tbody>
</table>

1. Dimensions:
   - External (O.D.): 13' 2 1/2" x 14' 0" x 9' 4" - w x d x h
   - Internal (I.D.): 12' 6 1/2" x 13' 4" x 9' 0" - w x d x h
   - Volume: 1505 ft³

Finishes:
- Walls: Sanisteel White - 26 ga. Anti-Microbial (5mm) - interior
- Galvanized/Smooth - 20 Ga. & St. Stl. Type 304 #4 finish - 20 Ga. - exterior
- Ceilings: Sanisteel White - 26 ga. Anti-Microbial (5mm) - interior
- Galvanized/Smooth - 20 Ga. - exterior

Panel Thickness:
- Walls: 4" UL Listed Class 1 Foam
- Ceilings: 4" UL Listed Class 1 Foam

Doors:
- D01:
  - 1 Finished opening 36" x 80" hinged flush cooler door
  - 1 Interior finish - St. Stl. Type 304 #4 finish - 20 Ga.
  - 1 Exterior finish - St. Stl. Type 304 #4 finish - 20 Ga.
  - 1 Exterior jamb finish - St. Stl. Type 304 #4 finish - 20 Ga.
  - 1 Viewport- Unheated 14"x24"
  - 1 Kick plate: 36" 16GA Stainless steel - interior and exterior
  - 2 Hinge- Kason 1245 Reversible Cam-Rise
  - 1 Light- 1806LED000 (120v) Fixture(Mtd to Jamb) and Optic Globe (Ship Loose)
  - 1 Door Closer - Calibre (hold open feature) 16503-AL
  - 1 Door- Flush Mount
  - 1 Hinge ( Additional)
  - 1 Temp Alarm- Modularm 75LC (120v) Multi-Monitor, Temperature Alarm, Door Ajar Alarm, Automatic Light Control, AC Failure Alarm, Panic Alarm (Low voltage 1P-1,120v F°/C°)
  - 1 Gasket- Magnetic

Openings:
- 1 D03: Anthony 401 glass door, NCPO 120 3/8"W x 75 1/2"H (5 x 23"Wx75"H), 8" sill
- 1 D02: Anthony 401 glass door, NCPO 96 5/8"W x 75 1/2"H (4 x 23"Wx75"H), 7" sill
Accessories

6. Trim Metal - Wall Closure/Vertical - (Standard 1" x 6" x Height) (match panel finish)
1. Single 90° Notch
1. Header Brace Bracket - Standard 2 Trim Metal - Wall Closure/Vertical - (Standard 1" x 6" x Height) (match panel finish)
2. Light- (120v) LED 30 watt Vapor-Proof Fixture (4') - (bulbs included in price)
28. Lock Wall Panels to Ceiling Panels (Factory Ceiling Caps - Standard)
27. Trim Metal - Removable Ceiling Closure Kit - Stainless Steel (Field Verified) See Plan/LF
3. Caulk - Silicone White (Tubes)
1. Ceiling Hanger Bracket (no rods) - Foam Rail 1 Frame with 5 x 401 right hinged normal temp cooler glass doors 23"w x 75"h, with Energy Controller, Cylinder Locks, Optimax Pro LED Lights, and 24" deep Gravity Feed shelving - (5) shelves per door - Freight allowed
1. Frame with 4 x 401 right hinged normal temp cooler glass doors 23"w x 75"h, with Energy Controller, Cylinder Locks, Optimax Pro LED Lights, and 24" deep Gravity Feed shelving - (5) shelves per door - Freight allowed
1. Frame with 4 x 401 left hinged normal temp cooler glass doors 23"w x 75"h, with Energy Controller, Cylinder Locks, Optimax Pro LED Lights, and 24" deep Gravity Feed shelving - (5) shelves per door - Freight allowed

Miscellaneous
1. Kason Vinyl Strip Curtains 7 Pieces of Galvanized Steel Floor Track - 8' Lengths
28. Lin.Ft. Stainless Steel Coved Base (6" High) @ Exp. Ext. 49 Lin.Ft. Matching Coved Base (6" High) @ Int.

ITEM # 3-02 EVAPORATOR COIL <Included>
Quantity: One (1)
Manufacturer: RDT Refrigeration
SIS No.: W010
1. One (1) Evaporator coil provided as an integral part of the remote refrigeration system. Evaporator coils shall be a direct expansion type. evaporators used will be all "underwriters laboratory listed" supplied from factory with an expansion valve, solenoid valve and eco-smart demand defrost controller, pre-wired and pre-piped under nitrogen pressure and designed for use with the refrigerant specified.

ITEM # 3-03 REFRIGERATOR SHELVING UNITS
Quantity: One (1)
Manufacturer: Cambro
Model: CAMSHELVING
SIS No.: W010
1. One (1) Model CAMSHELVING (LOT) 4 tier, 21" deep shelving units, posts to be 72" high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall
have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4” increments. Provide dunnage stands for all traverses 54” or longer and at corners where corner connectors are used. Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.

**ITEM #3-04** GRAVITY FLOW SHELVES  <Included>
Quantity: One (1)
Manufacturer: Thermalrite
Model: PART OF ITEM #3-01
SIS No.: W010
1. One (1) Model PART OF ITEM #3-01 Gravity Flow Shelves - part of walk-in item #3-01

**ITEM #3-05** FREEZER MERCHANDISER
Quantity: One (1)
Manufacturer: Beverage Air
Model: MMF27-1-B-LED
SIS No.: W010
1. One (1) Model MMF27-1-B-LED MarketMax™ Freezer Merchandiser, reach-in, one-section, (1) triple pane glass door, 27 cu. ft. capacity, electronic control, digital display, (5) epoxy coated steel shelves, LED interior lighting, self-closing door with automatic hold-open feature, anti-microbial door handles, bottom-mounted refrigeration, black exterior, 3/4 hp, UL, cUL, UL EPH, MADE IN USA
2. One (1) 3 years parts & labor warranty (excludes maintenance items)
3. One (1) Additional 2 yr compressor warranty, standard
4. One (1) 8’ cord, , standard
5. One (1) Self-contained refrigeration standard
6. One (1) Stainless steel exterior
7. One (1) Model 61C31-193A-01 Gravity shelf organizer (one kit per door), for LV27/MM27

**ITEM #3-06** SELF-SERVICE REFRIGERATED MERCHANDISER
Quantity: One (1)
Manufacturer: Structural Concepts
Model: B3632
SIS No.: W010
1. Model B3632 Oasis® Self-Service Refrigerated Merchandiser, 36-5/8”W, high profile, open front, (4) non-lighted metal shelves, top light, Breeze-E (Type II) with EnergyWise self-contained refrigeration system, Blue Fin coated coil, one piece formed ABS plastic tub, black interior, full end panels with mirror, cETLus, ETL-Sanitation
2. NOTE: If GFCI is required, a GFCI breaker MUST be used in lieu of a GFCI receptacle
3. 1 yr. parts & labor warranty, 5 yr. compressor warranty, standard
4. Extended second year parts & labor warranty (excluding compressor) at time of order
5. Breeze-E (Type II) with EnergyWise self-contained refrigeration, lower front air intake/upper front air discharge, standard
6. 110-120v/60/1ph, 16.0 amps, cord with NEMA 5-20P
7. NOTE: Compressor air intake through lower front & channeled up rear & out upper front, front panel cannot be blocked
8. Base Support: Casters, with levelers, standard
9. Interior: Stainless steel, in lieu of standard black
10. Exterior: Wilsonart or Formica NON-PREMIUM laminate (Color chart available from factory rep or access color selections via www.wilsonart.com or www.formica.com)
11. NOTE: SCC will not be responsible for additional charges incurred for Premium or other Manufacturer’s laminate selections not originally quoted
12. Lower front panel: Black, standard
13. Left end panel: Cutaway with insulated glass, metal edging
14. Right end panel: Full with mirrored interior, metal edging, standard
15. Roll-down security cover, locking (requires two end panels (full or cutaway) per case) but CANNOT be used with Case to Case acrylic end panel)(must be chosen when case is ordered)
16. 6 ft cord, exit at base, standard

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Motor-operated ceiling-recessed projection screens and controls.
   1. Include projector ceiling supports.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 055000 - Metal Fabrications: Projector supports.
   5. Section 095100 - Acoustical Ceilings.
   6. Division 26 Electrical Sections: General requirements for electrical work.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 16 - Structural Design:
         1) Section 1607 - Live Loads:
             a) Table No. 1607.1 - Minimum Uniformly Distributed Live Loads and Minimum Concentrated Live Loads.

B. American Society of Civil Engineers (ASCE):
      a. Table 13.6-1 - Coefficients for Architectural Component.

C. Society of Motion Picture and Television Engineers (SMPTE):

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 DEFINITIONS

A. Gain: Indication of screen’s luminance or brightness measured perpendicular of screen center and relative to a block of magnesium carbonate which serves as the standard for 1.0 gain. Higher numbers indicate greater brightness.
   1. Gain shall be determined in accordance with SMPTE RP 94-2000.
B. **Viewing Angle**: Angle from perpendicular center of screen at which the gain or brightness is decreased by 50 percent.

C. **Keystone**: Distortion of projected image when screen is not perpendicular with center line of projected image.

### 1.04 Administrative Requirements

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordination: Coordinate electrical and video control requirements with Division 26 Electrical.

### 1.05 Submittals

A. **Product Data**: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications for proprietary products.

B. **Shop Drawings**: Submit complete Shop Drawings, descriptive literature, and catalog cuts in accordance with the provisions of Section 013300.
   1. Include detailed electrical wiring diagrams and schematics.
   2. Indicate location of special supports required.

C. **Samples**: In accordance with the provisions of Section 013300, submit samples of screen material and finishes palette for exposed surfaces, for selection.

D. **Quality Control Submittals**:
   1. **Manufacturer's Instructions**: Submit the manufacturer's current recommended method of installation.
   2. **Design Data**: Submit seismic calculations stamped by a structural engineer licensed in the State of California.

### 1.06 Sustainable Design Submittals

A. **Material & Resources Submittals**:
   1. **Product Data and Certification Letter for MR Credit 4**: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. **Product Data for MR Credit 5**: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

### 1.07 Closeout Submittals

A. **Operation and Maintenance Data**: Submit operating and maintenance data.

B. **Warranty Documentation**: Submit copies of written warranty, as signed by the manufacturer, agreeing to repair or replace defective work during the warranty period.
1.08 **QUALITY ASSURANCE**

A. Certification: Provide screen units listed by Underwriters Laboratories (UL), and bearing UL labels.
   1. Screens recessed installed in return air ceiling plenums shall be certified by Underwriters Laboratory (UL) and shall bear UL label.

1.09 **WARRANTY**

A. Furnish manufacturer's projector warranty for two years with a 90-day lamp warranty.

**PART 2 - PRODUCTS**

2.01 **MANUFACTURER**

A. Acceptable Manufacturers of Projector Screens:
   3. Stewart Filmscreen Corporation, Torrance, CA (213)326-1422.

B. Acceptable Manufacturers of Accessory Products:
   1. Epson Authorized Resellers: (800)463-7766.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 **REGULATORY REQUIREMENTS**

A. Regulations: Comply with pertinent codes and regulations of governmental agencies having jurisdiction.

2.03 **SUSTAINABILITY REQUIREMENTS**

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

2.04 **PERFORMANCE CRITERIA**

A. Structural Performance: Attachment of projection screen and projector shelf to wall and ceiling construction shall be designed in accordance with structural criteria requirements of CBC Table No. 1607A.1 and ASCE Table 13.6-1.
2.05 MATERIALS

A. Rollers: Provide rigid metal rollers for operation of electric screens and case closure doors. Fabricate from either steel or aluminum. Material and roller diameter determined by manufacturer as required by type and size of each screen.

B. Viewing Surface: High Contrast Matte White flame retardant, mildew resistant, white vinyl-coated fiberglass screen that can be rolled and cleaned with mild soap and water solution.
   1. Gain: 1.0.
   2. Viewing angle: 60 degrees minimum.

2.06 PROJECTION SCREENS, MOTOR OPERATED

A. Design is based on Tensioned Advantage Electrol Screen as manufactured by Da-Lite Screen Company, or equal.
   1. Type: Recessed, plenum rated, electrically operated, retractable projection screen with rigid metal roller housing screen motor and screen tensioning system,
   2. Case: Extruded aluminum with steel end brackets designed to receive mounting hardware.
      a. Ceiling flange: Fabricate case with bottom flange to accommodate adjacent ceiling finish.
      b. Access Door: Aluminum door at bottom of case manually opens to access rollers.
      c. Finish: White, powder coating.
   3. Screen: Flame-retardant, mildew-resistant, seamless, non-supported vinyl screen with black masking borders.
      a. No horizontal seams will be permitted.
      b. Viewing Surface: Matte white non-supported vinyl screen.
         1) Gain: 1.0.
         2) Viewing angle: 50 degrees.
      d. Provide extra drop above image area to bring bottom of screen to within 30 inches of floor.
   5. Tensioning System: Tab guide cable system to maintain even lateral tension and to hold viewing surface flat.
      a. Provide locking switch cover plate.
   7. Control: Single station, low-voltage 3-button (UP-DOWN-STOP) with one switch.
   8. Integral Junction Box: Box in housing shall contain 4-prong connector for easy plug-in to motorized roller assembly with viewing surface. Housing can be installed and wired to electrical supply during construction. Motorized roller assembly shall be installed later after construction is substantially complete.
   9. Mounting: Design-basis manufacturer's Type 1 and 2 offset.
2.07 PROJECTOR EQUIPMENT SUPPORTS, FIXED

A. Provide Model CMJ500-EXT Lightweight Adjustable Suspended Ceiling Plate as manufactured by Peerless Industries, or equal.
   1. Ceiling plate consists of an adjustable collar mount plate with a 1.5” NPS center threaded fitting with holes for outlet boxes and antenna leads.
   2. Provide fixed length aluminum extension pipe columns and fasteners for attachment to slotted channel supports manufactured by Unistrut, or equal.
   3. Product shall be UL listed.

B. Location: Provide at all rooms with projection screens. Locate in alignment with projectors screens as indicated on Contract Drawings.

C. Brace projector shelf so there will be no observable movement in the image induced by motor or other mechanical vibration.

2.08 PROJECTOR EQUIPMENT SUPPORT, SCISSORS LIFT

A. Design is based on Model SL4 Motorized Scissor Lift as manufactured by Draper, or equal. Provide at Student Union Conference Room. Locate in alignment with projector screen as indicated on Contract Drawings.
   1. Type: Electrically operated, tight stacking scissor type, projector lift for lowering and retracting projector from ceiling storage location to position for show or service.
   2. Performance Requirements: Comply with Seismic Zone requirements where installed.
   3. Maximum Lift Capacity: 100 pounds.
   4. Approximate Travel Speed: 90 inches per minute.
   5. Show Position: Approximately 4 feet.
   6. Product shall be UL 2442 listed.

B. Motorized Lift:
   1. Operating Mechanism: Three sets of steel stabilizing scissors, positioned on sides and rear of operating pan, and two 1/8-inch diameter cables with 2000 foot/pounds tensile strength per cable to raise and lower operating pan, instantly reversible, thermally protected, lifetime lubricated, 3-wire motor with electric brake.
      a. Safety Belt: Provide fail-safe inertial safety belt system.
      b. Voltage: 110-120v.
   2. Operating Pan: 2-3/4" x 20" x 20" steel pan with white powder coat paint finish.
      a. Secure projector to pan with universal projector mount providing tilt, yaw, and pan adjustments using spring-loaded bolts.
   3. Ceiling Closure Panel: Steel closure panel with ceiling tile lip to allow attachment of acoustical ceiling panel flush with adjacent ceiling surface. Finish with white powder coat paint.
   4. Brace projector shelf so there will be no observable movement in the image induced by motor or other mechanical vibration.
C. Controls: Provide one 3-button wall switch station to lower, raise, and stop projector lift.
   1. Key Operated Power Supply Switch: Provide key operated switch to control low voltage power to mount operating switch. Provide two keys.

PART 3 - EXECUTION

3.01 EXAMINATION
   A. Verification of Conditions: Verify that structural supports are designed to support anticipated loads.

3.02 PREPARATION
   A. Protection: Protect adjacent surfaces from damage during installation operations.
   B. Provide fire-rated gypsum board enclosure if projection screen case is wood.

3.03 INSTALLATION
   A. General: Install work in accordance with the manufacturer’s recommendations and structural attachment details indicated on Contract Drawings.
   B. Set in continuous neoprene gasketed seal with removable trim.
   C. Mounting: Manufacturer shall provide a suspension mounting bracket for attachment of screen to overhead steel structure or adjacent wall framing.
      1. Screen shall be mounted in a cavity to avoid interference with stage curtain.
   D. Install suspended ceiling plate in accordance with manufacturer’s instructions. Attach ceiling panel as specified in Section 095100.

3.04 FIELD QUALITY CONTROL
   A. Tests: Upon completion of this portion of the Work, and prior to its acceptance by the Owner, make required tests and obtain required approvals from agencies having jurisdiction.

3.05 ADJUSTING
   A. Operate each screen through not less than three complete movement cycles. Ensure screens properly extend and retract, and that screen is level with viewing surface plumb when extended. Verify controls, limit switches, automatic doors, and other operating components are functional. Confirm that optimum performance is achieved through each function. Adjust to correct deficiencies.

3.06 CLOSEOUT ACTIVITIES
   A. Demonstration: Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain systems.

END OF SECTION
SECTION 117900 -

THERAPY EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Hydrotherapy tubs.
   1. Refer to Section 113100 for ice machine.

B. Referenced Sections:
   1. Section 013300 - Submittal Procedures.
   2. Section 113100 - Residential Appliances

C. Related Sections:
   1. Section 221005 - Plumbing Piping: Plumbing connections.

1.02 REFERENCES

A. NSF International (NSF):

B. U.S. Environmental Protection Agency (EPA):

C. Scientific Equipment and Furniture Association (SEFA):
   2. 7-1996 - Fixtures.

1.03 SUBMITTALS

A. Submit in accordance with Section 013300 - Submittal Procedures.

B. Manufacturer's Literature and Data: Include the following:
   1. Illustrations and descriptions of hydrotherapy equipment.
   2. Optional auxiliary equipment and controls that will be included for project.
C. Shop Drawings: Show details of fabrication, installation, adjoining construction, coordination with plumbing and electrical work, anchorage, and other work required for complete installation.
   1. Include electrical ratings, equipment and device arrangement, branch-circuit overcurrent protection, wiring diagrams, and connection diagrams.
   2. Include dimensions and weights of units.

D. Certificates: Submit manufacturer's test data and certifications, including NSF Certification, UL Certification, and Energy Star Qualified data prior to the commencement of installation work.

E. Field Test Reports: Indicate dates and times of tests and certify test results.

F. Manufacturer's Instructions:
   1. Manufacturer's Instructions for shipping, handling, storage, installation, and start-up.

1.04 QUALITY CONTROL

A. Manufacturer Qualifications: Manufacturer regularly and presently manufactures hydrotherapy equipment.

B. Coordination: Coordinate installation of District supplied ice machine equipment with water filter system as specified in Division 22 - Plumbing.

C. Electrical Components and Devices: UL listed and labeled for intended use.

1.05 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials: Include one month supply of cleaning and sanitizing fluid plus initial start-up and testing supply.

1.06 WARRANTY

A. Warrant hydrotherapy equipment to be free from defects in materials and workmanship for three years.

PART 2 - PRODUCTS

2.01 TANKS AND ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Tanks:
   1. Manufactured of stainless steel, not less than 0.08-inch thick, seamlessly welded.

C. Motor:
   1. 1/3-hp high-speed motor; 3450-rpm, 110-V ac, 60-Hz, electric turbine ejector-aerator with adjustment and locking device and built-in timer.
D. Accessories:
   1. Thermostatic Mixing Valve: 25 gal/min.
   2. Digital temperature display.
   3. Over the rim water inlet.
   4. Ultraviolet automatic disinfecting system.
   5. Drain and overflow outlets.
   6. Washout hose.
   7. Equip with fixtures that comply with relevant requirements in SEFA 7.

2.02 FABRICATION

A. For electrically controlled components, wire and make connections within unit at factory.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install units according to manufacturer’s written instructions and relevant requirements.

3.02 TESTING

A. Field test installed units after water systems are pressurized for proper operation.
   1. Operate hydrotherapy tubs for not less than one hour. Operate hoists through repeated full cycles for not less than one hour. During and after testing, there shall be no evidence of leaks, overheating, electrical malfunction, or other symptom of failure.
   2. For units that fail testing, make adjustments and corrections to installation, or replace units, and repeat tests until units operate properly.

3.03 CLEANING

A. At the completion of work, clean equipment as required to produce ready-for-use condition.

3.04 DEMONSTRATION AND TRAINING

A. Instruct personnel and transmit operating instructions in accordance with requirements in.

3.05 PROTECTION

A. Protect equipment from dirt, water, and chemical or mechanical injury during the remainder of the construction period.

END OF SECTION
- SECTION 121113 -

PHOTO MURALS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Custom graphics photo murals.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.

C. Related Sections:
   1. Section 092900 - Gypsum Board, for Level 5 finish information.
   2. Section 097200 - Wall Covering.
   3. Section 099100 - Painting, for priming wall surfaces.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 8 - Interior Finishes.
         1) Table 803.5 - Interior Wall and Ceiling Finish Requirements by Occupancy.

C. National Fire Protection Association (NFPA):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Schedule installation of photo murals as late as possible in sequence of construction schedule to minimize risk of damage.
   1. Do not install photo murals until space is enclosed, weather tight and conditioned.
   2. Under no circumstances shall installation begin prior to completion of abutting grid ceiling installation.
3. No wet work shall remain with exception of touchup.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit complete Shop Drawings comprehensively describing installation of photo murals. Shop Drawings shall include elevations showing locations of all joints if any, and edge conditions.

C. Verification Samples: Two samples 36 inches long representing actual product, colors, design, and treatments.

D. Proofs: Submit color proofs of graphics for coordination and approval.

E. Quality Control Submittals:
   1. Manufacturer's Instructions:
      a. Submit manufacturer's installation procedures which shall be basis for accepting or rejecting actual installation procedures.
   2. Certificates:
      a. Provide certification from manufacturer of photo mural system attesting to their product's compliance with specified requirements including fire performance characteristics.
      b. Provide certification that specialized equipment as may be required by manufacturer for proper installation of system shall be utilized.
      c. Provide certification that technicians utilized for installation have been trained or qualified by manufacturer.

F. Substrate Condition Field Report: Furnish report from installer confirming that surfaces, alignments, and tolerances to which materials of this Section will be applied are in a suitable and acceptable condition to receive finish materials specified in this Section.

1.05 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Photo Mural Materials: For each type, full-size units equal to 5 percent of amount installed.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years' experience providing successful projects of the specified materials and systems.
   1. Installer shall be trained, or qualified by manufacturer in installation techniques and procedures of photo mural system and shall demon-
strate a minimum of 5 years successful experience in such installation. Installer shall employ, on Project, mechanics with a minimum of 2 years documented experience.

2. Single Source Responsibility:
   a. To greatest extent possible, materials shall be products of a single manufacturer or items standard with manufacturer of photo murals.
   b. Provide secondary materials which are produced, or are specifically recommended by photo mural manufacturer to ensure compatibility.

B. Field Sample:
   1. At a location designated by Architect, construct a full installation of one of the murals.
   2. Request a review of the field sample before proceeding with the remaining work.
   3. Revise as necessary to secure Architect’s acceptance. Accepted field samples shall be used as datum for comparison with remainder of work of this Section for purposes of acceptance or rejection.
   4. Accepted field samples may be included in finished Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Packing, Shipping, Handling, and Unloading:
   1. Deliver materials in manufacturer's original unopened packaging and store unopened until ready for installation.

B. Storage and Protection:
   1. Store materials in a clean area, free from dust and damage from construction activities.
   2. Do not store rolled material in an upright position, or beneath other materials.
   3. Remove damaged, defective, or rejected materials from Site.

1.08 FIELD CONDITIONS

A. Environmental Requirements:
   1. Maintain ambient temperature and humidity within spaces to receive photo murals at levels indicated for final acceptance. Levels shall be maintained continuously from at least 48 hours prior installation until space is turned over to Owner.
   2. Provide an illumination level of not less than 80 foot-candles measured at mid-height of substrate surface.
   3. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

B. Field Measurements:
   1. Verify field dimensions prior to fabrication. Manufacturer shall be responsible for details and dimensions not controlled by job conditions and shall indicate, on shop drawings, field measurements beyond his control. Contractor and manufacturer shall cooperate to establish and maintain these field dimensions.
2. Measure each wall area and establish layout of panels to balance panels at opposite edges of each wall.
3. Locate electrical receptacles, switch-boxes, elevator call buttons, and other similar devices which will be exposed in finished work.

1.09 WARRANTY

A. Special Warranty: Photo mural system shall be warranted for a period of 5 years from Date of Substantial Completion. Upon notification of defects, replace, repair, re-stretch, or re-install film facing at no additional cost to Owner. Warranty shall include, but not be limited to conditions as follow:
   1. Photo mural system shall remain dimensionally stable and shall not sag or distort due to normal variances of temperature or humidity.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable manufacturers of photo murals:
   1. DesignTex, Chicago, IL (800)221-1540, designtex.com.

B. Like materials shall be the products of one manufacturer and shall be either those upon which the design is based or those accepted in advance by the Architect in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations:
   1. Provide wall coverings conforming to CFFA-W-101-A for Type II using test methods given in FS CCC-W-408A.
   2. Patterns shall be produced with cadmium-free, chromium-free, lead-free, and mercury-free water-based inks certified by the Greenguard Environmental Institute (www.greenguard.org) for low emissions of formaldehyde, VOC’s, respirable particles, ozone, and other pollutants.

B. Comply with CALGreen 5.504.4.1 Adhesives, Sealants, and Caulks: Adhesives, sealants, primers, and caulks in amounts greater than 16 ounces shall comply with SCAQMD Rule 1168 VOC limits, as indicated in Tables 5.504.4.1 and 5.504.4.2.
   1. Aerosol adhesives and smaller sizes of adhesives and sealant or caulking shall comply with CCR Title 17, commencing with Section 94507.
2.03 PERFORMANCE/DESIGN CRITERIA

A. Performance Requirements:

1. Surface Burning Characteristics: Provide wall materials with a Class A rating in accordance with NFPA 701, confirmed by testing in accordance with ASTM E 84 (NFPA 255), including requirements for flame spread, fuel contribution, and smoke density.
   a. Flame Spread: 25 or less.
   b. Smoke Developed: Not to exceed 450.

2. Surface Burning Characteristics: Identify components with markings from testing and inspection organization. Products shall be Class A fire rated confirmed by testing in accordance ASTM E 84, NFPA 255, NFPA 286, and ASTM E 162 for flame spread, fuel contribution, and smoke density, and NFPA 701 for large and small scale requirements. Fire Performance Characteristics:
   a. Flame Spread: 25 or less.
   b. Fuel contribution: ASTM E-84 Class B.
   c. Smoke Developed: Not to exceed 450.

2.04 PHOTO MURALS

A. Custom Graphics Type WC-1: Provide Custom Digital Wall Film as manufactured by MDC Wallcovering, a vinyl surface material. The digital wall film shall be printed on 53/54" vinyl wall film substrate using plezo drop-on-demand technology incorporating 8 colors, CYMK and half density CYMK. Printed image shall be dried from both front and back using combinations of IR and platen heaters to prevent media distortion. The vinyl wall film substrate shall consist of a vinyl supported material, a through-pigmented, mildew-inhibitorized polyvinyl chloride, adhered to cotton backing. Including any and all graphics required and detailed on drawings or film as selected by Architect wall film shall meet or exceed the following requirements:

2. Washable surface.
3. Total Weight: minimum 13 ounces per square yard, 19.5 ounces per linear yard.
4. Backing Weight: minimum 2 ounces per square yard.
5. Film backing and content: cotton, cotton/blend film, or a cellulose polyester non-woven.
6. Adhesion of coating to film: 3 pounds per 1 inch strip (ASTM D751)
7. Tensile strength: 97 X 92 (W x F).
8. Tear strength: 55 X 40 (W x F).
9. Mildew resistance: Zone inhibition rating of “0” on face, “1” on backing (ASTM G 21).
10. Staphylococcus resistance: 100 percent reduction within 24 hours. 1006 NYS Quantitative Bacteria Resistance.
11. Meet the EPA Headquarters Procurement specification for Product Emission (Total Aldehydes) within 7 days.
14. Contains bactericides and mildew inhibitors to protect the product from microbiological and mildew growth.

15. Ultraviolet Transmittance: 0 percent, when measured according to ASTM E 903.

16. Adhesive: Heavy Duty Clay, or Heavy Duty Clear, or brands approved as equals by the manufacturer (Wheat paste shall not be used).

2.05 ACCESSORIES

A. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer.
   1. Adhesive shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Primer/Sealer: Mildew resistant, complying with requirements in Section 099100 - Painting and recommended in writing by wall-covering manufacturer for intended substrate.

C. Seam Tape: As recommended in writing by wall-covering manufacturer.

2.06 FABRICATION

A. Film Treatment:
   1. Provide film with single pass backing when required for proper installation. Other backings shall not be used without written approval from photo mural system manufacturer.
   2. Provide liner when required to ensure uniform appearance of face film.
   3. Shop apply film treatments without affecting flame retardancy requirements, appearance, color, or hand of film.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions:
   1. Examine substrate and spaces in which work is to be performed.
   2. Do not begin installation until:
      a. Space has been enclosed and is weather-tight.
      b. Wet work has been completed and is dry.
      c. Painting is completed and wall base and floor covering is installed.
      d. Adjacent work of other trades such as woodwork, ceilings, wall coverings, etc. have been completed.
      e. Walls are more than 1/8-inch in 10 feet out-of-plane.
   3. Drywall surfaces shall be taped, bedded, sanded, and primed. Penetrations shall be sealed against air and moisture leakage through wall.
   4. Do not proceed with installation until unsatisfactory conditions have been corrected. Beginning of installation indicates acceptance of existing substrate conditions.
3.02 INSTALLATION

A. General: Comply with installation recommendations of graphic film manufacturer.
1. Panel edges shall abut adjacent finishes or surfaces or to conform to adjacent joint conditions without reveals or gaps unless required by design.
2. Visible surfaces shall be fully covered and free from wrinkles, sags, blisters, and foreign matter.
3. Panel joints shall be tight, straight, true, plumb, and in proper relation to building lines without ripples, waviness, and "hourglass" effects.
4. Seaming of film by sewing shall not be allowed.
5. Maintaining sequence of drops and matching direction/orientation of weave for sequential and uniform installation.
6. Install film with warp and weft threads plumb, level, and true. Patterns, textures, and grain of film shall be aligned and matched at seams. Throughout entire seam, join wall panels without distortion to geometry of film or pattern.
7. Film shall be applied securely to grounds using a hand tool appropriate for joint condition and nature of film. No nailing, tacking, stapling, adhesive taping, or gluing of film shall be permitted. Ensure that film surface is free of wrinkles and that weave is plumb and straight and properly aligned horizontally and vertically.
8. Film shall be installed as monolithic photo mural in continuous runs without reveals.

B. Site Tolerances:
1. Maximum variation of panels from true location shall be 1/8".
2. Maximum variation of surfaces intended to be flush shall be 1/32".

3.03 CLEANING

A. Clean exposed surfaces of wall film. Clean excess adhesive. Trim and remove loose material.
B. Use cleaning methods recommended in writing by wall-covering manufacturer.
C. Replace soiled photo murals that cannot be cleaned.
D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
E. Remove surplus materials, rubbish and debris, leaving area in a neat and clean condition.

3.04 PROTECTION

A. Cover wall film installation with new, clean vinyl sheeting.

END OF SECTION
- SECTION 122413 -

ROLLER WINDOW SHADES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Translucent roller shades systems for solar control at west and south glazing of Building B. Refer to Section 012300, Alternatives for use in Building A.
   1. Manual and electric motorized control type operators.
   2. Local group and master control system for shade operation.

B. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 084000 - Entrances, Storefronts, and Curtain Walls.
   5. Section 092216 - Non-Structural Metal Framing: Backing for support of roller shade brackets, and roller shade pockets.
   6. Section 092900 - Gypsum Board: Coordination with gypsum board assemblies for installation of shade pockets, closures, and related accessories.
   7. Section 095300 - Acoustical Ceiling Suspension Assemblies: Coordination with acoustical ceiling systems for installation of closures and related accessories.
   8. Division 26 Electrical Sections: Electric service for motor controls.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):
   1. Title 19 - Public Safety:
      a. Division 1 - State Fire Marshal:
         1) Chapter 1 - General Fire and Panic Safety Standards:
            a) Subchapter 1 - Administration:
               (1) Article 3 - General Provisions:
                  (a) Section 3-08 - Decorative Materials.
C. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommo-
         dations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-308 - Reach Ranges.
            b) Section 11B-309 - Operable Parts.
               (1) 11B-309.4 - Operation.

D. National Fire Protection Association (NFPA):
   1. 286 - Standard Methods of Fire Tests for Evaluating Contribution of
      Wall and Ceiling Interior Finish to Room Fire Growth.
   2. 701 - Standard Methods of Fire Tests for Flame-Resistant Textiles and
      Films.

E. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implement-
   ing sustainable design requirements.

B. Coordination: Coordinate penetrations and ceiling-mounted items.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and
   specifications. Include:
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, pro-
      files, features, finishes and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.
   5. Typical wiring diagrams including integration of motor controllers with
      building management system.

C. Shop Drawings: Submit plans, elevations, sections, details of installation,
   operational clearances, and relationship to adjoining work, indicating:
   1. Shade schedule coordinating room number, window type, opening siz-
      es, quantities, and key to details. Use same room designations indicat-
      ed on Drawings.
   2. Shade layout, seam, and batten locations.
   3. Overall arrangement of shades and control locations.
   4. Detailed wiring diagrams and schematics for electrically operated units,
      including connection details for all components supplied under this Sec-
      tion for installation and connection under Division 26.

D. Samples: Submit the following for each color and texture required.
   2. Aluminum finish color samples.
3. Verification Samples: One fully operational window shade sample of each type required complete with selected sample colors including sample of seam and batten when applicable.

E. Quality Control Submittals:
1. Test Reports: Submit certified independent laboratory test reports confirming physical characteristics of materials used in the performance of the work of this Section.
2. Certification: Submit certification showing independent test calculations that comply with NFPA 701 requirements.

F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
1. Product Data and Certification Letter for Credit MR 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content. Include statement indicating costs for each product having recycled content.
2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

B. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified below. Initial submittals, which do not include the Environmental Certification, below will be rejected. Materials that are simply ‘PVC free’ without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.

C. Recycling Characteristics: Provide documentation that the shade cloth can and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.

1.06 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Materials:
1. Furnish the following additional spare materials as Owner’s maintenance stock:
   a. Additional 5 percent of the total length of qualified stainless steel chain required on the project, not to exceed 100 feet.
   b. Additional 5 percent of each type of shade mounting hardware or brackets, but not less than one pair of each type.
c. A quantity of replacement shade bands completely fabricated and ready to attach to roller tubes equal to 5 percent of the total number of shade bands of each fabric and each color in the largest size required for each of those fabrics.

d. Additional 5 percent of each motor type used on project.

e. Additional 5 percent of each motor control component used on project.

2. Clearly label spare components and supply to Owner upon completion in original packaging for storage on site by Owner.

1.07 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: A minimum of 20 years' experience manufacturing products comparable to those specified in this Section.
   2. Installer: Trained and certified by the manufacturer with a minimum of 10 years' experience in installing products comparable to those specified in this Section.

B. Mockups:
   1. Provide mockup of one typical manual roller shade assembly for evaluation of mounting, appearance (color, weave, and density), accessories, and quality of workmanship.
   2. Locate mockup at window designated by Architect.
   3. Do not proceed with remaining work until mockup is accepted by Architect.
   4. Accepted mockups may become part of the completed work to serve as a standard of workmanship.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades to project in labeled protective packaging. Uniquely labeled to identify each shade for each opening. Schedule delivery to prevent delays to completion of work but to minimize on site storage time.

1.09 FIELD CONDITIONS

A. Ambient Conditions: Install roller shades after finish work including painting is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Dimensions: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate construction of surrounding conditions to allow for timely field dimension verification.

1.10 WARRANTY

A. Special Warranty:
   1. EcoVeil Shadecloth: Manufacturer's standard non-depreciating 10-year warranty.
   2. Hardware and Chain Warranty: Manufacturer's standard non-depreciating 25-year limited warranty.
4. Installation: One year from date of Substantial Completion, not including scaffolding, lifts, or other means to reach inaccessible areas.

PART 2 - PRODUCTS

2.01 MANUFACTURERS


*B. Acceptable Manufacturers of Control Systems:
   1. Leviton.
   2. Lutron.
   3. WhisperShade IQ System.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

A. Regulations: Comply with applicable codes and regulations of governmental agencies having jurisdiction.
   1. Materials used in this Section shall be tested, listed, and labeled for flammability, combustibility, and smoke developed by a testing agency acceptable by the to the authority having jurisdiction.
      a. Conform to NFPA 296, ASTM E 84, ASTM E 162, and NFPA 701 for large and small scale requirements.
   2. Manual shades shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist. The force required to activate controls shall be no greater than 5 pounds of force in accordance with CBC11B-309.4.
      a. Allowable reach ranges shall be in accordance with CBC Section 11B-308 - Reach Ranges.
   3. Comply with Decorative Materials requirements of CCR Title 19 Division 1, Chapter 1, Subchapter 1, Article 3, Section 3-08.
   4. Comply with CBC Section 803.1 for flame spread and smoke developed classifications based on building location and group classification when tested in accordance with ASTM E 84, ASTM D 635, and ASTM D 1929.
   5. Electrical: Control systems and components shall be approved as a system by either Underwriter Laboratories (UL) or Electronic Testing Laboratories (ETL).

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 4: Use materials with recycled content that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 500 miles of the project site for 10 percent of the total materials value.
2.04 PERFORMANCE CRITERIA

A. Performance Requirements, Fabric:
1. Fire Retardancy: Shade fabrics shall be tested in accordance with NFPA 701 large or small scale vertical burn test shall be rated Pass.
2. Toxicity: Shade fabrics shall be successfully tested in accordance with University of Pittsburgh Toxicity Protocol, including LC50 analysis and toxicity characteristics.
3. Anti-microbial:
   a. Results for ATCC6538 (Staphylococcus aureus) and ATCC13388 (Pseudomonas aeruginosa) indicating minimum 0.197 inches (5mm) No Growth Contact Area.
   b. Results for ATCC9642, ATCC9644, ATCC9348 and ATCC9645 indicating No Growth in accordance with ASTM G 21.

2.05 SYSTEM DESCRIPTION

A. Design is based on Mechoshade/5 manual shade system manufactured by MechoShade Systems, Inc., or equal.
B. Shade Cloth: Environmentally certified PVC-free thermoplastic polyolefin (TPO) shadecloth manufactured by open-end process that assures material can be repolymerized and rewoven into new shadecloth.
   1. Fabric shall be tensioned in the finishing stage prior to heat setting to keep the warp ends straight and minimize or eliminate weave distortion to keep fabric flat. Finish with heat and pressure.

2.06 ROLLER SHADE TYPES

A. Window Solar Shades Type RS-1:
   1. Shade Cloth: EcoVeil 0950 Series Dense Basket Weave, fabricated from TPO for both core yarn and jacket, single thickness, 0.018 opaque coated reinforced yarn, non-raveling 0.030-inch thick fabric.
      a. Weave: 1% open basket weave.
      b. Color: As indicated on Contract Drawings.
   2. Mounting:
      a. Surface: Bottom of window frame in roller shade assembly.
      b. Recessed: Wall mounted above ceiling with removable closure plate level with ceiling in color to match ceiling.
         1) Refer to electrical drawings for electrical connections.

B. Window Solar Shades Type RS-2:
   1. Shade Cloth: EcoVeil 1550 Series Dense Basket Weave, fabricated from TPO for both core yarn and jacket, single thickness, 0.018 opaque coated reinforced yarn, non-raveling 0.030-inch thick fabric.
      a. Weave: 3% open basket weave.
      b. Color: As indicated on Contract Drawings.
   2. Mounting:
      a. Surface: Bottom of window frame in roller shade assembly.
      b. Recessed: Wall mounted above ceiling with removable closure plate level with ceiling in color to match ceiling.
   1) Refer to electrical drawings for electrical connections.

2.07 SHADE BANDS

A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
   1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends). Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
   2. Shade Band and Shade Roller Attachment:
      a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch in diameter for manual shades, and less than 2.55 inches for motorize shades are not acceptable.
      b. Provide for positive mechanical engagement with drive/brake mechanism.
      c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable/replaceable with a snap-on/snap-off spline mounting, without having to remove shade roller from shade brackets.
      d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
      e. Any method of attaching shade band to roller tube that requires the use of adhesive, adhesive tapes, staples, and/or rivets is not acceptable.

2.08 COMPONENTS

A. Access and Material Requirements:
   1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
   2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
   3. Use only engineered plastics by DuPont for plastic components of shade hardware.
      a. Styrene based plastics, polyester, or reinforced polyester are not acceptable.

B. Operated Chain Drive Hardware and Brackets for Manual Operation:
   1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
   2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
3. Provide shade hardware system that allows for removable regular and/or reverse roll fasciae to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.

4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.

5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.

6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.

7. Provide shade hardware constructed of minimum 1/8-inch thick plated steel or heavier as required to support 150 percent of the full weight of each shade.

8. Drive Bracket / Brake Assembly:
   a. MechoShade Drive Bracket model M5 shall be fully integrated with MechoShade accessories, including, but not limited to, SnapLoc fascia, center supports, and connectors for multi-banded shades.
   b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8-inch steel pin.
   c. The brake shall be an over-running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. in the stopped position.
   d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
   e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
   f. Drive Chain: #10 qualified stainless steel chain rated to 90-pound minimum breaking strength. Nickel plate chain shall not be accepted.

C. Shade Hardware and Shade Brackets for Motorized Operation:
   1. Provide shade hardware constructed of minimum 1/8-inch thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.
   2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
   3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis.
between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade subject to manufacturer’s design criteria).

4. Provide positive mechanical engagement of drive mechanism to shade roller tube. Do not rely on friction fit connections for drive mechanism to shade roller tube.

2.09 MOTOR CONTROL SYSTEMS

A. IQ Intelligent Motors: Specifications and design of shade motors and motor control system are based on the IQ Intelligent motor logic control system manufactured by MechoShade Systems.

1. Motor Control System:
   a. Provide power to each shade motor via individual 3 conductor line voltage circuits connecting each motor to the relay based motor logic controllers (IQ).
   b. Control system components shall provide appropriate (spike and brown out) over-current protection (+/- 10 percent of line voltage) for each of the four individual motor circuits and shall be rated by UL or ETL as a recognized component of this system and tested as an integrated system.
   c. Motor control system shall allow each group of four shade motors in any combination to be controlled by each of four local switch ports, with up to fourteen possible sub-group combinations via local 3-button wall switches and all at once via a master 3 button switch. System shall allow for overlapping switch combinations from two or more local switches.
   d. Multiple subgroups from different IQ Motors shall be capable of being combined to form groups operated by a single 3 button wall switch, from either the master port or in series from a local switch port.
   e. Each shade motor shall be accessible (for control purposes) from up to four local switches and one master switch.
   f. Control system shall allow for automatic alignment of shade hem bars in stopped position at 25 percent, 50 percent, and 75 percent of opening heights, and up to three user-defined intermediate stopping positions in addition to all up/all down, regardless of shade height, for a total of five positions. Control system shall allow shades to be stopped at any point in the opening height noting that shades may not be in alignment at these non-defined positions).
   g. Control system shall have two standard operating modes: Normal mode allowing the shades to be stopped anywhere in the window’s opening height and uniform mode, allowing the shades to only be stopped at the predefined intermediate stop positions. Both modes shall allow for all up/all down positioning.
   h. Control system components shall allow for interface with both audiovisual system components and building fire and life safety system via a dry contact terminal block.
   i. Control system components shall allow for interface with external analog input control devices such as solar activated controllers, 24 hour timers, and similar items; via a dry contact terminal block.
j. Reconfiguration of switch groups (as specified in Paragraph 2.09-A-1-c above) shall not require rewiring of the hardwired line voltage motor power supply wiring, or the low voltage control wiring. Reconfiguration of switch groups shall be accomplished within the motor control device (IQ/MLC).

2. Wall Switches:
   a. Five-position architectural flush mounted switches for solar control and two-positions for blackout control with metal cover plate and no exposed fasteners.
   b. Connect local wall switches to control system components via low voltage (12v DC) 4 conductor modular cable equipped with RJ-11 type connectors supplied, installed and certified under Division 16.
   c. Connect master wall switches to control system components via low voltage (12v DC) 6 conductor modular cable equipped with RJ-12 type connectors supplied, installed and certified under Division 26.
   d. Set switches to provide 5 stops, except that black out shades shall be up/down only.

2.10 ACCESSORIES

A. Fasteners: Not fewer than two fasteners per bracket, fabricated from metal non-corrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

B. Guide Cables: Provide manufacturer's standard guide cables, aluminum mounting blocks, clevis connectors, and hooks as required to control shades at sloping walls.

2.11 FABRICATION

A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
   1. Comply with manufacturer's edge clearance standards and recommendations.
   2. Shades shall be fabricated from a single roll of fabric without seams.

B. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shade cloth to roll true and straight without shifting sideways more than 1/8 inch in either direction per 8 feet of shade height due to warp distortion or weave design. Fabricate hem as follows:

C. Provide battens in standard shades as required to ensure proper tracking and uniform rolling of the shade bands. Contractor shall be responsible for ensuring that the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, Contractor shall be responsible for establishing appropriate standards to ensure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
D. Shades shall be railroaded. Provide seams in railroaded multi-width shade bands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, ensure proper use of seams or battens as required to, and ensure the proper tracking of the railroaded multi-width shade bands.

1. Double hem shades having different colors on outside and inside.

E. Hembars and Hempockets: Fabric hempocket with RF-welded seams, including welded ends. Hemweights shall be of appropriate size and weight for shade band and must be continuous inside a sealed hempocket. Match hempocket construction for all shades in same rooms.

2.12 FINISHES

A. Finishes: Fascia, Closure, and Closure Mounts:

1. Aluminum Components: PPG Duracron baked enamel in custom colors as indicated.

2. Steel Components: Cadmium-plated, satin-finished, or bonderized prior to painting with manufacturer's standard baked-enamel finish in custom colors as indicated.

3. Custom Color: Match ceiling finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Ensure that painting and other finishing operations have been completed before proceeding with installation. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

A. Surfaces shall be thoroughly cleaned prior to installation.

3.03 INSTALLATION

A. General: Install materials and systems in accordance with the manufacturer's recommendations, and in proper relation to adjacent construction.

B. Attach the tracks securely to concealed framing with self-drilling self-tapping steel screws in accordance with approved Contract Drawings.

C. Install roller shades level, plumb, square, and true. Allow clearances for window operation hardware, and located so shade band is not closer than 2 inches to interior face of glass. Allow proper clearances for window operation hardware.

1. Maximum Variation of Gap at Window Perimeter: 1/4-inch per 8 feet ±1/8-inch of shade height.

2. Maximum Offset from Level: 1/16-inch per 5 feet of shade width.

D. Fabric shall hang flat, without buckling or distortion. The edges shall hang straight without raveling. An unguided roller shade cloth shall roll true and straight, without shifting sideways more than 1/8-inch in either direction due to warp distortion, or weave design.
E. Motor Control: To control the responsibility for performance of motorized roller shade systems, assign the design, engineering, and installation of motorized roller shade systems, motors, controls, and low voltage electrical control wiring specified in this Section to a single manufacturer and their authorized installer/dealer. Architect will not produce a set of electrical drawings for the installation of control wiring for the motors, or motor controllers of the motorized roller shades. Power wiring (line voltage), shall be provided by the Contractor for the roller shade installer/dealer in accordance with the requirements provided by the manufacturer. Coordinate the following with the roller shade installer/dealer:

1. Contractor shall provide power panels and circuits of sufficient size to accommodate roller shade manufacturer’s requirements, as indicated on the mechanical and electrical drawings.
2. Main Contractor shall coordinate with requirements of roller shade installer/dealer, before inaccessible areas are constructed.
3. Roller shade installer/dealer shall run line voltage as dedicated home runs (of sufficient quantity, in sufficient capacity as required) terminating in junction boxes in locations designated by roller shade dealer.
4. Roller shade installer/dealer shall provide and run all line voltage (from the terminating points) to the motor controllers, wire all roller shade motors to the motor controllers, and provide and run low voltage control wiring from motor controllers to switch/control locations designated by the Architect. All above-ceiling and concealed wiring shall be plenum-rated, or installed in conduit, as required by the electrical code having jurisdiction.
5. Contractor shall provide conduit with pull wire in all areas, which might not be accessible to roller shade contractor due to building design, equipment location, or schedule.

3.04 ADJUSTING

A. Adjusting: Adjust roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
   1. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 CLEANING

A. Cleaning: Clean roller shade surfaces after installation, according to manufacturer’s recommendations.

B. Remove finger marks, smears, and other visual soiling from exposed surfaces upon completion of the installation. Take care not to damage the fabric when cleaning it.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner’s maintenance personnel to adjust, operate, and maintain systems
3.07 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Stainless steel countertops.
   1. Refer to Section 064150 for plastic laminate countertops.
   2. Refer to Section 123661 for simulated stone countertops.

B. Related Sections:
   1. Section 013300 - Submittal Procedures.
   2. Section 051213 - Architecturally Exposed Structural Steel.
   3. Section 105613 - Metal Storage Shelving

1.02 REFERENCES

A. American Society of Civil Engineers (ASCE):
   1. 8-02 (2003) - Specification for the Design of Cold-Formed Stainless Steel Structural Members.

B. American Institute of Steel Construction (AISC):
   1. 9 002 - Welding of Stainless Steels and Other Joining Methods.

1.03 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item where applicable.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of stainless steel countertops.

1.04 FIELD CONDITIONS

A. Field Measurements: Verify measurements of cabinets and location of final installation.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Steel: 16 gage gavanized sheet steel.
   1. Finish: As selected by Architect.

B. Stainless Steel: AISI Type 304, 14 gage, as produced by Soupcan Inc., or equal.
   1. Stainless Steel: with suede polished finish.
2.02 COUNTERTOPS

A. Stainless Steel Counter Type SS-2:
   1. Seams and Joints: Welded and ground smooth. Polish all seams to match adjacent metal.
   2. Access Holes: Provide as required to allow plumbing and electrical connections. Coordinate with plumbing fixture submittals.
   3. Field Joints: Welded, ground smooth, and polished to match adjacent metal.

2.03 ACCESSORY ITEMS

A. Miscellaneous Steel Trim: Provide shapes and sizes as required for profiles shown. Provide cutouts, fittings, and anchorages as required for coordination of assembly and installation of other work.
B. Anchoring Cement: Design is based on the use of Por-Rok, manufactured by Minwax Construction Products Division.
C. Sound Deadening: Manufacturer's standard sound deadening mastic coating, thickness as required.
D. Mastic and Trim: Prestige mastic and stainless steel trim strips as required for a neat appearance.

2.04 FABRICATION

A. Fabricate of shapes and sizes as detailed on Contract Drawings. Verify that design of rail will meet local codes.
   1. Perform operations prior to finishing.
   2. Fabricate work true to detail with sharp, clean profiles, formed, straight, and free from defects.
      a. Comply with AESS quality as specified in Section 051213.
      b. Metal shall be free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
   4. Grind and polish welds on exposed finished surfaces with No. 320 grit to blend with texture of adjacent surfaces.
   5. Provide No. 4 satin polished finish on all surfaces exposed to view.
B. Protection: Hand wrap with burlap for shipment and installation.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install work in accordance with the manufacturer's recommendations.
   1. Bond sheet metal to solid core tops with mastic.
   2. Reinforce, sound-deaden, and support tops and shelves not bonded to solid core.
B. Countertops:
   1. Seal equipment to walls with mastic and trim as required.
   2. Install in as large pieces as possible to minimize field joints.

3.02 CLEANING

   A. Upon completion, clean surfaces of assemblies thoroughly and polish metals and glass.

3.03 PROTECTION

   A. Take action to protect assembly components from soiling and damage.

END OF SECTION
1.01 SUMMARY

A. Section Includes:
   1. Simulated surface stone countertops.

B. Refer to Section 064150 for solid surface countertops installed on casework.

C. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 064150 - Casework Countertops.
   5. Section 079200 - Joint Sealants: General requirements for sealants.

1.02 REFERENCES

A. ASTM International (ASTM):

B. California Code of Regulations (CCR):

C. Architectural Woodwork Institute (AWI):
      a. Section 11 - Countertops.

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Refer to Section 018113 regarding procedures for implementing sustainable design requirements.

B. Coordination: Coordinate source of solid surface countertops in this Section with work of Section 079200.
1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit specifications and other technical data for each type of manufactured product required.
   1. Include instructions for handling, storage, installation, and protection of each type of countertop material.

B. Shop Drawings: Submit complete fabrication and setting drawings to the Architect in accordance with the provisions of Section 013300.
   1. Cutting and setting drawings indicating sizes, dimensions, sections, and profiles of solid surface units.
   2. Sections, dimensions, layout drawings, and other details showing relationships with related work.

C. Samples: With submission of bid, and in accordance with the provisions of Section 013300, submit samples representing finish and extent of color, veining, special markings, and any other natural variations or characteristics to be expected in the material.
   1. Submit three sets of full-size samples of each surface finish required, with specified sealer applied to one-half of the solid surface face.
   2. Submit samples of grout, joint sealants, and backer rods in colors selected by the Architect.

D. Quality Control Submittals:
   1. Manufacturer and installer of solid surface countertops shall submit qualifications to Architect for evaluation and acceptance prior to submission of bid.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Materials & Resources Submittals: Refer to Section 018113 for additional information on LEED submittals.
   1. Letter Template for MR Credit 2: Letter template, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
      a. Comply with Section 017419 Construction Waste Management and Disposal.
   2. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   3. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer's Qualifications: In the case of proprietary mortar and grout manufacturers, provide materials licensed by the Tile Council of America (TCNA).
   2. Installer's Qualifications: Solid surface work shall be executed by skilled mechanics who are experienced in setting of solid surface of the type indicated and who can perform necessary field cutting as solid surface is set.

B. Field Samples: Provide full size sample of each type of countertop approximately 4 feet in length in location designated by Architect. Provide materials and colors specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Handling: Handle solid surface carefully to prevent chipping, breakage, soiling, or other damage. Do not use pinch or wrecking bars without protecting edges of solid surface with wood or other rigid materials.

1.08 FIELD CONDITIONS

A. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers of Quartz Countertop Products:

B. Design is based on the use of accessory products manufactured by the following:
   1. Dow Corning Corporation, Midland, MI (517)496-4586, (800)662-0661, with sales offices in Irvine, CA (949)757-5000.
   2. GE Silicones, General Electric Company, Waterford, NY (800)255-8886, with sales offices in La Puente, CA (213)686-0252.
   3. Pecora Corporation, Harleysville, PA (215)723-6051, (800)523-6688, with sales offices in Los Angeles, CA (218)826-9007.

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.
2.02 REGULATORY REQUIREMENTS

A. Waste Management: Comply with CALGreen 5.408.1 - Construction Waste Management. Establish a construction waste management plan for the diverted material.
   1. Recycle or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition waste in accordance with CALGreen 5.408.1.3 - Waste Stream Reduction Alternative.

2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 2 - Construction Waste Management: Divert 75 percent of construction waste from landfill in accordance with County requirements and to achieve LEED certification point as defined by the U.S. Green Building Council.
      a. Note that excavated soils and land-clearing debris (organic material) does not count toward construction waste credits, but all material shall be disposed of responsibly.
   2. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.
   3. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 20 percent of the total materials value.

2.04 MATERIALS

A. Engineered Quartz Surfacing Countertops: Homogeneous mixture containing 93% pure quartz with additions of high performance polyester resin, pigments, and special effects with polished/honed finish.
   1. Type QZ-1 at Building 2 is based on CaesarStone quartz surfacing with polished finish at countertops, as manufactured by CaesarStone.
      a. Size, thickness, and color as indicated on the Contract Drawings.
   2. Type QZ-2 at Buildings 1 and 2 is based on Silestone quartz surfacing with polished finish at countertops, as manufactured by Constantin USA.
      a. Size, thickness, and color as indicated on the Contract Drawings.

B. Accessories:
   1. Grommets: Black 3-inch diameter vinyl grommet with cap for wire access hole, as manufactured by Doug Mockett & Company, or equal.
   2. Countertop Segment Anchors: Tite Joint Fasteners.
   3. Mounting Adhesive: Structural grade silicone or epoxy adhesive recommended by solid surfacing manufacturer.
2.05 RELATED MATERIALS

A. Sealants: Design is based on the use of **Type D2** Silicone General Purpose and Sanitary Sealant specified in Section 079200.

B. Cleaner: Provide cleaners of proper formulation for kind of stones, finishes, and applications indicated, and as recommended by solid surface producer. Do not use acid-type cleaning agents or other cleaning compounds containing caustic or harsh fillers, except where expressly approved by solid surface producer for type of condition involved.
   1. Verify that cleaner changes neither color nor gloss of the surface material.

2.06 MIXES

A. Proprietary Materials: Commercially prepared, factory-packaged products requiring mixing at the site of the work shall be mixed in accordance with the manufacturer's published instructions.

2.07 FABRICATION

A. Engineered Quartz Countertops:
   1. Provide matching fascia and backsplash where applicable.
   2. Thickness and edge detail as shown on Contract Drawings.
   3. Color: As selected by Architect from any color in manufacturer's standard palette.
   4. Sealant: Color matched silicone type as specified in Section 079200.
   5. Comply with quartz surface material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
   6. Align seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

2.08 SOURCE QUALITY CONTROL

A. Obtain each color, grade, finish, type, and variety of solid surface from a single source with resources to provide materials of consistent quality in appearance and physical properties.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Verify that grounds, anchors, plugs, frames, rough plumbing, and electrical work, mechanical work, and similar items in or behind the finish have been installed before proceeding with the installation.

3.02 PREPARATION

A. Protection:
   1. Protect solid surface from staining by mortar and grout materials during installation.
   2. Keep solid surface dry while in packages. Take precautions to prevent staining of solid surface units before they are set. Do not install stained stone.
   3. Protect exposed surfaces from contact with sealant primer.
3.03 INSTALLATION

A. Quartz Surface: Install quartz surface countertops in accordance with the requirements of *AWS* Chapter 11, as applicable, and manufacturer's recommendations.

B. Sealant Application: Apply sealants in accordance with the general requirements of Section 079200.
   1. Surface of sealant shall be installed slightly below exposed surface, maximum 1/16-inch.
   2. Seal penetrations through finished surfaces.

3.04 ADJUSTING

A. Touch up stained, scratched, or otherwise discolored surfaces to match original shop finish or samples. Replace portions of work cut or otherwise damaged too badly to repair by touch up.

3.05 CLEANING

A. Cleaning: Clean casework, counters, shelves, hardware, fittings and fixtures.
   1. Remove marks, glue residue, and soiling from all exterior and interior surfaces for dust-free condition.
   2. Sanitary cleaning, if necessary, will be performed by Owner.

3.06 PROTECTION

A. After installation, protect countertops from damage for duration of construction until substantial completion.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Walk-off entrance grid assemblies and grid-recess frames at building entrances indicated on Contract Drawings.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.
   4. Section 017823 - Operation and Maintenance Data.
   5. Section 033100 - Structural Concrete.
   6. Division 22 Plumbing Sections: Mat recess drainage.

1.02 REFERENCED STANDARDS

A. ASTM International (ASTM):
   3. D 2047-11 - Test Method Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.

B. California Code of Regulations (CCR):
   1. Title 24, Part 2- California Building Code (CBC), 2013 edition:
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings, and Public Housing:
         1) Division 3 - Building Blocks.
            a) Section 11B-302 - Floor or Ground Surfaces.
               (1) 11B-302.1 - General.
            b) Section 11B-303 - Changes in Level.
               (1) 11B-303.2 - Vertical.
               (2) 11B-303.3 - Beveled.
         2) Division 4 - Accessible Routes.
            a) Section 11B-403 - Walking Surfaces.
C. American Architectural Manufacturers Association (AAMA):
   1. 611-12 - Voluntary Specification for Anodized Architectural Aluminum (Revised).

D. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

B. Coordination: Coordinate installation of floor recess for mat with work of Section 033000.

C. Coordination: Coordinate installation of mat recess drain with work of Division 22.

1.04 SUBMITTALS

A. Product Data: In accordance with the provisions of Section 013300, submit complete manufacturer's descriptive literature and specifications, including product specifications, installation, and maintenance instructions.

B. Shop Drawings: In accordance with the provisions of Section 013300, submit comprehensive Shop Drawings describing fabrication and installation of entrance mats.
   1. Show layout and types of grates and frames not less than half-scale sections of typical installations, details of patterns or designs, anchors, and accessories, and field measurements of slab recess to receive frames grates, as applicable.

C. Samples: In accordance with Section 013300, submit manufacturer's standard carpet samples, as follows:
   1. Samples for Selection Purposes: Actual sections of grate and frame material in a convenient, but representative size, showing colors, textures, finishes, and patterns indicated on Contract Drawings.
   2. Samples for Verification Purposes: Not less than 6-inch square sections of grate material and 6-inch length of frame material in selected colors and finishes for each type of grate and frame specified.

D. Closeout Submittals: Operations and Maintenance data.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for MR Credit 5: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
B. Indoor Environmental Quality Submittals:
   1. Product Data for IEQ Credit 5: For entryway mats, documentation including printed statement indicating product complies with requirements for a permanent installation to capture dirt and particulates from entering building.

1.06 CLOSEOUT SUBMITTALS

   A. Operation and Maintenance Data: In accordance with Section 017823, submit manufacturer's printed instructions for cleaning, drying, maintaining, and rehandling of removable entrance mat units.

1.07 FIELD CONDITIONS

   A. Field Measurements: Prepare Shop Drawings based on field measurements taken at site specifically for work of this Section.

1.08 WARRANTY

   A. Provide manufacturer's warranty against defects in materials and workmanship for a period of not less than 5 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

   A. Acceptable Manufacturers:
      3. Reese Enterprises, Inc., Huntington Beach, CA (714)841-5525, (800)334-8823.

   B. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based or equal products of other manufacturers accepted in advance in accordance with Section 012500.

2.02 REGULATORY REQUIREMENTS

   A. Regulations:
      1. Slip Resistance: Comply with CBC Section 11B-302 and CBC Section 403.
         a. Floor tile products shall comply with a DCOF (dynamic coefficient of friction) value of 0.42 minimum for level interior floors when wet, as specified in ANSI A137.1, Section 9.6 - DCOF AcuTest.
      2. Floor mats shall comply with applicable codes, including CBC Section 11B-302 and CBC 11B-303.
         a. Floor mats shall be recessed and level with adjacent flooring, securely attached to floor with a maximum vertical height of 1/4-inch above adjacent floor surface in accordance with CBC 11B-303.2, or have a beveled edge with a 1:2 maximum slope not higher than 1/2-inch above adjacent floor surface in accordance with CBC 11B-303.3.
2.03 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 10 percent of the total value of the materials in the project.
   2. MR Credit 5 - Regional Materials: Use building materials or products that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of the project site for a minimum of 10 percent of the total materials value.

B. LEED Goals for Indoor Environmental Quality: For additional information on LEED goal requirements, refer to Section 018113.
   1. IEQ Credit 5 - Indoor Chemical and Pollutant Source Control: Permanent entryway mats complying with requirements for a permanent installation to minimize and control pollutant entry into building complying with criteria laid out in the LEED Reference Guide.

2.04 PERFORMANCE CRITERIA

A. Flammability in accordance with ASTM E 648, Class 1, Critical Radiant Flux, minimum 0.45 watts/m².

B. Slip resistance in accordance with ASTM C 1028, Coefficient of Friction, minimum 0.60 for accessible routes.

C. Standard rolling load performance is 1500 lb./wheel (load applied to a solid 5 inches x 2 inches wide polyurethane wheel, 1000 passes without damage).

2.05 MATERIALS

A. Aluminum Extrusions: Provide tread rails, transverse (key-locking) bars and self-anchoring mat-recess frames extruded from ASTM B 221 alloy 6063-T5 aluminum.
   1. Finish: Clear anodized aluminum.
   2. Protective Coating: Zinc chromate primer, applied to aluminum surfaces in contact with concrete.

B. Nylon Carpeting:
   1. Tufted cut pile 5/32-inch high, polyamide nylon 80 Dtex tetralobal fibers, 35 ounces per square yard weight, with 100 mil vinyl back coating.
   2. Carpet fiber weight loss maximum 1.3 percent when wear-tested in accordance with Taber Abraser method, ASTM D 3884, for 3000 cycles with H-10 wheel and 1000 gram weight.

C. Fasteners: Stainless steel screws and anchors for securing frames together and to floors.

D. Grout: Latex grout filler as recommended by manufacturer.
2.06 COMPONENTS

A. Entrance Mats: Design is based on Model Gridline G6 with Level Base Frame and Drain Pan, as manufactured by Construction Specialties, or equal.
   2. Grid: Stainless steel Type 304.
      a. Grid spacing 0.235".
      b. Openings 0.145" wide.
   3. Load Capacity: 500 pounds of rolling load.
   4. Finish: No 4 satin finish.


C. Drain Pan: 0.050" aluminum pan.

D. Drain: General purposed PVC drain with stainless steel strainer provided by manufacturer.

2.07 FABRICATION

A. Shop fabricate mats as single units where possible. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes.
   1. Miter corners in framing elements with hairline joints or provide pre-fabricated corner units without joints.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification: Verify that surfaces to receive mats or grates are flat and level. Substrate shall meet tolerance of 1/8" over 10 feet in accordance with ACI 302.

B. Examine the substrates and conditions under which the work is to be performed, and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Coat all aluminum surfaced in contact with concrete or grout with zinc chromate primer.

3.03 INSTALLATION

A. General: Install work in accordance with manufacturer's recommendations as accepted by the Architect.
   1. Set top level with adjacent floor level.
   2. Secure frame with masonry lag fastener at 24" oc. Secure frame with expansion anchors.
   3. After frame is secured in recess, fill area inside horizontal leg of angle frame with latex grout to provide a level surface for support of grid members.
   4. Set drain pan in latex screed.
   5. Secure frame to floor with stainless steel lag fasteners.
B. Coordinate installation of mat recess frames with the related work of other Sections.

C. Adjust alignment, level, and edge clearances for accuracy and uniformity.

3.04 PROTECTION

A. Upon completion of frame installations, provide temporary filler of plywood or medium density fiberboard in grate recesses, cover frames with protective flooring, and maintain protection until construction traffic has ended.

B. Install floor mats in place when no further wheeled construction traffic will occur and wet type operations including painting and decorating are complete.

END OF SECTION
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Custom stone bench for placement beneath lobby stair.

B. Related Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 018113 - Sustainable Design Requirements.

1.02 REFERENCES

A. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with applicable Credit descriptions for more specific procedural requirements of Section 018113.

B. Preinstallation Meeting: Plan method of installation at interior location by normal crane install prior to building closure unless other means of installation

1.04 SUBMITTALS

A. Product Data: Submit manufacturer’s product data, storage and handling requirements and recommendations, installation methods and available colors, styles, patterns and textures in accordance with the provisions of Section 013300.
   1. Submit catalog cut sheets noting size and shape for each seat type.

B. Shop Drawings: Submit manufacturer’s shop drawings, including plans and elevations, indicating overall dimensions.

C. Samples: Submit manufacturer’s samples of materials, finishes, and colors.

D. Warranty: Manufacturer’s standard warranty.

1.05 SUSTAINABLE DESIGN SUBMITTALS

A. Material & Resources Submittals:
   1. Product Data and Certification Letter for MR Credit 4: Indicate percentages by weight of post-consumer and pre-consumer recycled
content for products having recycled content. Include statement indicating costs for each product having recycled content.

1.06 QUALITY ASSURANCE

A. Delivery: Persons handling specified products shall be authorized or otherwise acceptable to manufacturer.

B. Manufacturer’s Qualifications: Manufacturer regularly engaged in manufacture of site furnishings.

C. Product Support: Products are supported with complete engineering drawings and design patents.

D. Production: Orders are filled within a 40-day schedule.

E. Facility Operator: Certified welders and machine operators.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage: Store materials in clean, dry area in accordance with manufacturer’s instructions. Keep materials in manufacturer’s original, unopened containers and packaging until installation.

C. Handling: Protect materials and finish during handling and installation to prevent damage.

D. Inspect components for damage upon delivery.

1.08 WARRANTY

A. Products will be free from defects in material and workmanship for a period of three years from the date of invoice.

1. Warranty does not apply to damage resulting from accident, alteration, misuse, tampering, negligence, or abuse.

B. Manufacturer/Supplier shall, at its option, repair, replace, or refund the purchase price of any items found defective upon inspection by an authorized service representative of the manufacturer/supplier.

C. Purchasers should be aware that normal use of these high quality products can result in superficial damage affecting the finish. Minor cracks, nicks, and dents are to be considered normal wear and tear, and are not the responsibility of the manufacturer.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. Landscape Forms Inc., Kalamazoo, MI (800)430-6209,
2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals for Materials & Resources: For additional information on LEED goal requirements, refer to Section 018113.
   1. MR Credit 4 - Recycled Content: Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20 percent of the total value of the materials in the project.

2.03 PERFORMANCE CRITERIA

A. Performance Requirements:
   1. Vinyl Fabric shall meet the following requirements:
      a. Non-flammable, complying with NFPA 260/UFAC Class A.
      b. Anti-microbial/mildew resistant.
      c. Stain resistant.
      d. Waterproof.
      e. Anti-skid.

2.04 SEATING

A. Milenio Bench, designed by Escofet, Barcelona, Spain: Reinforced through-color cast stone, a proprietary blend of portland cement, sand, aggregate, and color admixture.
   1. Use only one brand, type, and source of cement for all bench sections.
   2. Provide integral colored concrete with UV and fade resistant lightfast color pigments.
   3. Reinforce with steel bar framework.
   5. Weight: 1500 to 2242 pounds, depending on shape.
   6. Finish: Acid-etched with waterproofed finish.
   7. Color: As selected by Architect from manufacturer’s standard colors.

B. Water: Clean and potable.

C. Fasteners: None

2.05 FABRICATION

A. Formwork: Fabricate forms sufficiently rigid to meet casting tolerances. Coat formwork with form release agent.

B. Casting: Fabricate units to required profiles and sizes. Execute work accurately to specified tolerances and free of chipped or broken edges.

C. Curing: Protect units from exposure to weather until concrete strength is adequate for form removal. Cure under identical conditions.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that surface where seating will be located is smooth and flat.

3.02 PREPARATION

A. Seating components are very heavy. Take precautions to protect surrounding floor surfaces from damage.
B. Verify precise location of seating base on floor surface prior to installation.

3.03 INSTALLATION
A. Install freestanding seating in locations indicated on Contract Drawings as recommended by manufacturer.

3.04 ADJUSTING
A. Finish Damage: Contact manufacturer for assistance to repair minor damages to finish as approved by Architect.

3.05 CLEANING
A. Clean benches promptly after installation in accordance with manufacturer's instructions.
B. Do not use harsh cleaning materials or methods that could damage finish.

3.06 PROTECTION
A. Protect installed benches to ensure that benches will be without damage or deterioration at time of Substantial Completion.

END OF SECTION
HYDRAULIC PASSENGER ELEVATORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Pre-engineered hydraulic passenger elevators, holeless type, including:
   1. Piping for the hydraulic system.
   2. Brackets, bolts, connections, and labor to install guide rails.
   3. Electrical wiring from the controller in the machinery room to the elevator components.
   4. Foundation bolts, connections, and earthquake provisions to secure the elevator equipment in the machine room.
   5. Machinery guards required by Code.
   6. Fire emergency recall at ground level.
   7. Guarding and protecting the hoistway openings with barricades while the elevator installation is in progress.
   8. Appurtenances and accessories.
   9. Deferred design submittals for elevator guiderails and support brackets.
   10. State elevator inspection.

B. Related Work Provided in Other Sections:
   1. Hoistways:
      a. Legal hoistways plumb within 1 inch per 100 feet.
      b. Supports for rail brackets spaced as required by accepted elevator Shop Drawings.
      c. 5000-pound capacity hoist beam centered over rails at top of hoistway. Remove after elevator installation if required for legal overhead clearance.
      d. Ventilation of hoistway.
      e. Erection of front hoistway wall after entrances have been installed.
      f. Bevel cants (15 degrees from vertical) over any rear or side wall ledges that project 2 inches or more into the hoistway.
      g. Sill support angle across full width of hoistway at each opening.
      h. Building supports that resist deflection in excess of 1/4-inch under 0.5g horizontal seismic acceleration from elevator.
   2. Pits:
      a. Waterproofing, sump pump if required, and indirect waste drain.
      b. Buffer supports and rail load supports.
      c. Steel ladders.
d. Power for lighting and convenience outlets.

3. Machine Rooms: If not MRL type, provide:
   a. Fire-rated, lockable, self-closing door.
   b. Heating and ventilation.
   c. Power for lighting and convenience outlets.
   d. Fire extinguisher.
   e. Telephone and paging cable connections at controller.
   f. Fused 120-volt, 20-amp, single-phase power supply to controller for car lights.
   g. Mainline power feeders to terminals of each elevator controller unit, including protected lockable OFF switch. Disconnect switch located within sight of machine.

4. Related Work:
   a. Temporary power to install, test, and adjust elevator.
   b. Underground trenching and backfilling where underground routing of piping is required.
   c. Cutouts to accommodate hall buttons and signals.
   d. Filling, grouting, drywall patching, and decorating after fixtures, door sills, and door frames are in place.
   e. Protection of cabs, entrances, and special finishes from damage and after installation.
   f. Finish flooring in cab.

C. Referenced Sections:
   1. Section 012500 - Substitution Procedures.
   2. Section 013300 - Submittal Procedures.
   3. Section 017823 - Operation and Maintenance Data.
   4. Section 099100 - Painting.
   5. Division 26 Sections - Electrical.

D. Deferred Design Data: The work of this Section may be affected by the deferred design submittal procedures described in Section 013300.

1.02 REFERENCES

A. California Code of Regulations (CCR):
   1. Title 8 - Industrial Relations:
      a. Division 1 - Department of Industrial Relations.
         1) Chapter 4 - Division of Industrial Safety.
            a) Subchapter 6, Elevator Safety Orders.
               (1) Group 3 - New Elevator Installations:
                  (a) Article 20 - Hoistways, Hoistway Enclosures, and Related Construction for Electric Elevators.
                     i) § 3120.0 - 3120.12

B. California Code of Regulations (CCR):
   1. Title 24, Part 2 - California Building Code (CBC), 2013 edition:
         1) Section 1007 - Accessible Means of Egress:
            a) 1007.4 - Elevators.
         2) Section 1008 - Doors, Gates and Turnstiles:
            a) 1008.1.8 - Door Operations.
   1) Division 3 - Building Blocks.
      a) Section 11B-308 - Reach Ranges.
   2) Division 4 - Accessible Routes.
      a) Section 11B-407 - Elevators.
         3) 11B-407.1 - General.
         4) 11B-407.2 - Elevator Landing Requirements.
            b) 11B-407.2.1 - Car Controls.
               i) 11B-407.2.1.2 - Size and Shape.
               ii) 11B-407.2.1.4 - Location.
               iii) 11B-407.2.1.5 - Signals.
            c) 11B-407.2.2 - Hall Signals.
               ii) 11B-407.2.2.2 - Visible Signals.
               iii) 11B-407.2.2.3 - Audible Signals.
            d) 11B-407.2.3 - Hoistway Signs.
               ii) 11B-407.2.3.1 - Floor Designation.
               iii) 11B-407.2.3.2 - Car Designation.
   (1) 11B-407.3 - Elevator Door Requirements.
      i) 11B-407.3.4 - Door and Signal Timing.
      ii) 11B-407.3.5 - Door Delay.
   (2) 11B-407.4 - Elevator Car Requirements.
      a) 11B-407.4.1 - Car Dimensions.
      b) 11B-407.4.2 - Floor Surfaces.
      c) 11B-407.4.3 - Platform to Hoistway Clearance.
      d) 11B-407.4.4 - Leveling.
      e) 11B-407.4.5 - Illumination.
      f) 11B-407.4.6 - Elevator Car Controls.
         i) 11B-407.4.6.2 - Buttons.
            (i) 11B-407.4.6.2.1 - Size and Shape.
            (ii) 11B-407.4.6.2.3 - Illumination.
      (g) 11B-407.4.7 - Designators and Indicators of Car Controls.
         i) 11B-407.4.7.1 - Buttons.
            (i) 11B-407.4.7.1.3 - Symbols.
            (ii) 11B-407.4.7.1.4 - Visible Indicators.
            (iii) 11B-407.4.7.1.5 - Button Spacing.
      (h) 11B-407.4.8 - Car Position Indicators.
      (i) 11B-407.4.9 - Emergency Communication.
      (j) 11B-407.4.10 - Support Rail.
   5) Division 7 - Communication Elements:
      a) Section 11B-703 - Signs:
         (1) 11B-703.3 - Braille.
   c. Chapter 16 - Structural Design.
   1) Section 1607 - Live Loads.
      a) Section 1607.8.1 - Elevators.
   2) Section 1616 - Additional Requirements [DSA-SS/CC]:
      a) Section 1616.1.27, ASCE 7 Section 13.6.10.1.1 - Elevators Guide Rail Support.
b) Section 1616.1.28, ASCE 7 Section 13.6.10.4 - Retainer Plates.
d) Chapter 30 - Elevators and Conveying Systems.
  1) Section 3001 - General.
     a) Section 3001.2 - Referenced Standards.
     b) Section 3001.3 - Accessibility.
  2) Section 3002 - Hoistway Enclosures.
     3) Section 3002.3 - Emergency Signs.
     4) Section 3002.4 - Elevator Car to Accommodate Ambulance Stretcher.
  5) Section 3003 - Emergency Operations.

C. American National Standards Institute (ANSI):

D. American Welding Society (AWS):
   1. D1.1 - Structural Welding Code - Steel.

E. National Electrical Manufacturer's Association (NEMA):

F. National Fire Protection Association (NFPA):

1.03 DEFINITIONS

A. Hydraulic elevator work includes systems in which car is hoisted either directly or indirectly by action of a hydraulic plunger and cylinder, complete with other components and devices required for safely operating elevators of rated speed and capacity.

1.04 SUBMITTALS

A. General: Make submittals in accordance with provisions of Section 013300.

B. Product Data: Submit complete manufacturer's descriptive literature and specifications.

C. Shop Drawings: Submit complete Shop Drawings comprehensively describing fabrication and installation of elevators.
   1. Include three sets of wiring diagrams.

D. Samples: Submit the following:
   1. The manufacturer's standard palettes for the selection of plastic laminate colors and texture.
      a. When selection has been made, submit samples 6 inches by 6 inches in size, for review and acceptance.
   2. Samples, 6 inches by 6 inches in size, in colors stipulated by the Architect, for review and acceptance, of the following:
      a. Baked enamel finishes.
      b. Metal finishes.
      c. Plastic laminate materials.
d. Plastic diffuser materials.
e. Ceiling materials.

E. Deferred Approval Submittals: Elevator guide rails and support brackets.
1. Refer to the deferred approval submittal procedures described in Section 013315.

F. Quality Control Submittals:
1. Design Data: Submit structural engineering calculations of static and dynamic loads imposed, by elevator and equipment systems proposed for use, on the building structure.
   a. Furnish calculations prepared and signed by a structural engineer currently licensed to practice in the Error! Not a valid filename. in the discipline or disciplines required.
2. Certificates: Submit certified copies of approvals by the State Elevator Division.
3. Manufacturer's Field Reports: Submit report of full-load running test, including comparison of results with specified requirements.

1.05 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Data: In accordance with Section 017823, provide three copies of renewal parts catalog and maintenance instructions.

B. Warranty Documentation: Submit copies of written warranty, as signed by the manufacturer, agreeing to repair or replace defective work during the warranty period.

1.06 QUALITY ASSURANCE

A. Qualifications: Installer's Qualifications: The manufacturer, or a firm qualified and approved by the manufacturer to perform the work.

1.07 FIELD CONDITIONS

A. Protect open hoistways and entrances during construction.

B. Field Measurements: Prepare required Shop Drawings based on field measurements taken specifically for the work of this Section.

1.08 WARRANTY

A. Provide a 5-year warranty on entire elevator system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

B. Acceptable Manufacturers of Elevator Accessories:

C. Like materials shall be the products of one manufacturer and shall be either the ones upon which the design is based, or equal products of a manufacturer accepted in advance in accordance with Section 012500.

D. Product Limitations: Proprietary controllers and related parts are prohibited.

2.02 REGULATORY REQUIREMENTS

A. Elevator Regulations: Comply with the applicable codes and regulations of governmental agencies having jurisdiction. Where those requirements conflict with this Specification, or where they conflict with each other, comply with the more stringent provisions. Notify the Architect prior to proceeding. Secure, and pay for fees associated with, state approvals.

1. Manufacture hoistway entrances in accordance with UL requirements. Provide UL label.
2. Comply with seismic code requirements.
3. Secure, and pay for, fees associated with, Error! Not a valid filename. of approvals.
4. Hoistway entrances shall be in accordance with UL requirements. Provide UL label.
5. Comply with the applicable requirements of CCR Title 8.
6. Comply with the applicable requirements of CBC Chapter 30 (CCR Title 24, Part 2), and CCR Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders for elevator safety standards regulated by the Department of Industrial Relations, Occupational Safety and Health Standards Board. (DOSH 01/06)
   a. In addition to requirements contained in CCR Title 8, design of elevators in schools shall comply with requirements of CBC 1614.1.15 and 1614.1.16.
   b. Comply with applicable requirements of CBC 3001.3, Section 11B-407 relative to accessibility requirements.
   c. Comply with CBC Section 3003 with regard to emergency operations.

B. Accessibility Regulations:

1. Comply with CBC Chapter 11B relative to elevator accessibility.
   a. Door Operation: Elevator hoistway and car doors shall open and close automatically, in accordance with CBC 11B-407.3.2.
   b. Door Size: Minimum clear width for elevator doors shall be 36 inches, in accordance with CBC Table 11B-407.4.1.
   c. The car inside shall allow for turning of a wheelchair. Refer to Table 11B-407.4.1 for dimension requirements.
2. Comply with the applicable requirements of CBC Chapter 30 (CCR Title 24, Part 2), and California Elevator Safety Construction Code
(CESCC) CCR Title 8, Division 1, Chapter 4, Subchapter 6, Elevator Safety Orders for elevator safety standards regulated by the Department of Industrial Relations, Occupational Safety and Health Standards Board. (DOSH 01/06).

a. In addition to requirements contained in CCR Title 8, design of elevators in community colleges shall comply with requirements of CBC 1615.10.17 (ASCE 7 Section 13.6.10.1.1) and 1615.10.18 (ASCE 7 Section 13.6.10.1.4).

3. Comply with the accessibility requirements for elevators:
   a. Elevators shall comply with the general requirements of accessibility in accordance with CBC 11B-407.
   b. Comply with applicable requirements of CBC Section 3001.3, relative to accessibility. All elevators shall accommodate a wheelchair.

4. Provide elevator with self-leveling device that brings car to floor landings within a tolerance of 1/2-inch under normal loading and unloading conditions. The clearance between the car platform sill and the edge of the hoistway landing shall be no greater than 1-1/4 inches, in accordance with CBC 11B-407.4.3.

5. Provide a reopening device that will function to stop and reopen a car door and adjacent hoistway door in case the car door is obstructed while closing. This device shall be capable of sensing an object or person in the path of a closing door without requiring contact for activation at a nominal 5 inches and 29 inches above the floor, in accordance with CBC 11B-407.3.

6. Provide minimum acceptable time from notification that a car is answering a call (lantern and audible signal) until the doors of the car start to close using formula given in CBC 11B-407.3.4.

7. Minimum acceptable time for the doors to remain open shall be not less than five seconds, in accordance with CBC 11B-407.3.5.

8. Centerline of elevator floor buttons shall be no higher than 48 inches above the finish floor for side approach and 48 inches for front approach, in accordance with reach range requirements of CBC 11B-308.

9. Floor buttons shall be provided with visual and audible indicators to show when each call is registered. The visual indicators shall be extinguished when each call is answered, in accordance with CBC 11B-407.2.2.1.

10. Provide two-way emergency communication device in accordance with CBC 11B-407.4.9.
    a. Emergency handset shall be positioned no higher than 4 feet above floor and handset cord shall be a minimum of 2'-5" in length. It shall be identified by a raised telephone symbol and corresponding Braille lettering complying with CBC 11B-703.3, and located adjacent to the device.
    b. If emergency telephone system is located in a closed compartment, the compartment door hardware shall be lever type conforming to provisions of CBC 1008.1.8.
    c. Emergency communications shall not require voice communications.
d. Maximum height for elevator floor buttons shall be 48 inches.
e. Control buttons shall be located on a front wall at center opening
car doors, and at the side wall or at the front wall next to the
doors if car has side opening.

11. Passenger car controls shall have a minimum dimension of 3/4-inch
and shall be raised 1/8-inch plus-or-minus 1/32-inch above the sur-
rounding surface. in accordance with CBC 11B-407.2.1.2.

12. Control buttons shall be illuminated in accordance with CBC 11B-
407.4.6.2.3. shall have square shoulders, and shall be activated by a
mechanical motion that is detectable. Control buttons shall be desig-
nated by 5/8-inch minimum raised characters and standard raised
symbols that conform to CBC 11B-407.4.6.2.1immediately to the left
of the control button. A Braille symbol shall be located immediately
below the numeral, character or symbol. A minimum clear space of
3/8-inch or other suitable means of separation shall be provided be-
tween rows of control buttons in accordance with 11B-407.4.1.7.5.

13. Raised characters shall be white on a black background, in
accordance with CBC 11B-407.2.3.2.

14. Controls and emergency equipment identified by raised symbols shall
include, but not limited to, door open, door close, alarm bell, emer-
gency stop, and telephone. Call button for main entry floor shall be
designated by a raised star at the left of the floor designation in ac-
cordance with CBC 11B-407.4.7.1.3.

15. Visual car position indicator shall be provided above the car control
panel or over the door to show the position of the elevator in the
hoistway. As the car passes or stops at floor served by the elevators,
the corresponding numerals shall illuminate, and an audible signal
shall sound. Numerals shall be a minimum of 1/2-inch high. The au-
dible signal shall be no less than 20 decibels with a frequency no
higher than 1500 Hz. An automatic verbal announcement of the floor
number at which a car stops on which a car passes may be substi-
tuted for the audible signal in accordance with CBC 11B-407.4.7.1.

16. Centerline of the hall call button shall be within 42 inches of the
floor. Buttons shall be a minimum of 3/4-inch in size and shall be
raised 1/8-inch plus-or-minus 1/32-inch above surrounding surface.
The button designating the up direction shall be on top. Visual indi-
cation shall be provided to show each call registered and extin-
guished when answered. Objects adjacent to, and below, hall call
buttons shall not project more than 4 inches from the wall. Hall call
buttons shall be internally illuminated with a white light over the
entire surface of the button in accordance with CBC 11B-407.2.2.

17. Handrails: One handrail shall be provided preferably on the rear wall
of the car. Rail shall be smooth, and the inside surface shall be at
least 1-1/2 inches clear of the walls at a nominal height of 32 inches
from the floor in accordance with CBC 11B-407.4.10. (Nominal
equals +1 inch.) Thirty two inches are required to reduce interfer-
ce with car controls where lowest button is centered at 35 inches
above floor.
18. Minimum illumination at the car controls, threshold, and the landing when the car and landing doors are open, shall not be less than 5 foot-candles, in accordance with CBC 11B-407.4.5.

19. Hall Lantern: A visual and audible signal shall be provided at each hoistway entrance indicating to the prospective passenger the car answering the call and its direction of travel in accordance with CBC 11B-407.2.2.3, as follows:
   a. Visual signal for each direction shall be a minimum of 2-1/2-inches high by 2-1/2 inches wide, and be visible from the proximity of the hall call button in accordance with Figure 11B-407.2.2.2.
   b. Audible signal shall sound once for the up direction and twice for the down direction, or shall have a verbal enunciators that say "UP" or "DOWN".
   c. Centerline of the fixture shall be located a minimum of 6 feet in height from the floor of the lobby.
   d. Use of in-car lanterns, located in or on the car door jambs, visible from the proximity of the hall call buttons and conforming to the above requirements shall or will be acceptable.
   e. Use of arrow shapes is preferred for visible signals.

20. Door Jamb Marking:
   a. Passenger elevator landing jambs on each elevator floor shall have the number of the floor on which the jambs are located designated by raised characters that are a minimum of 2 inches in height and located 60 inches above the floor to centerline of numbers on the jamb panels on both sides of the door so they are visible from within the elevator, conforming to CBC 11B-407.2.3.1.
   b. On the main entry level, a raised five-pointed star shall be placed to the left of the raised character. The outside diameter of the star shall be 2 inches and all points shall be of equal length. Raised characters, including the star, shall be white on a black background. Refer to CBC Figure 11B-407.2.3.1.
   c. Contracted Grade 2 Braille complying with CBC 11B-703.3 shall be placed below the corresponding raised characters and the star. The Braille translation for the star shall be "MAIN". The raised characters shall otherwise comply with CBC 11B-407.4.7.1.3. Refer to CBC Table 11B-407.4.7.1.3. Permanently applied plates are acceptable if they are permanently fixed to the jambs.

21. Location: Passenger elevators shall be located near a major path of travel and provisions shall be made to ensure that they remain accessible and usable at all times the building is occupied in accordance with CBC 1007.4.

2.03 PERFORMANCE CRITERIA

A. Sound Criteria: Limit overall elevator noise emissions to the following maximum A-weighted sound pressure levels in any mode of operation:
   1. 80 decibels measured 3 feet from any piece of equipment in the machine room.
2. 50 decibels measured 5 feet above the cab floor near the center during all sequences of operation, including door operation, exhaust air blower and annunciators.
3. 45 decibels measured in the elevator lobby from a point 10 feet from the elevator doors.

2.04 SYSTEM DESCRIPTION

A. Design is based on performance requirements as specified in this Section.

B. Design requirements are based on standard pre-engineered elevators. Where components are not otherwise indicated, provide standard components produced by manufacturer as required for a complete system.
1. Major functions shall be microprocessor controlled, including car allocation, logic functions, door control, speed sensing, and position.

C. Contractor shall verify that equipment proposed for use will dimensionally fit into spaces available. Revisions to design of machine rooms or hoistways to accommodate a manufacturer's specific requirements will not be considered for approval unless a request is made 10 days before submittal of bids.

D. Elevator No. 1: Design is based on one of the following:
1. ThyssenKrupp EnduraMRL Twinpost Above Ground.
2. Otis HydroFit Holeless MRL Hydraulic.
3. Type: Pre-engineered passenger elevator with Class A loading capacity.
6. Speed: 150 feet per minute.
7. Stops and Openings: Two stops, two openings, two in-line at front.
8. Door Opening: 3 feet 6 inches wide by 7 feet high. UL B-label.
   a. Dual-speed side opening.
9. Car Dimensions:
   a. Inside Clearance: 6 feet 8 inches wide by 5 feet 5 inches deep to front return deep to front return and 5 feet 8 inches to face of door.
   b. Ceiling Height: 7 feet 11 inches clear, with additional height available by removing ceiling section.
10. Car Operation:
11. Door Operation: Microprocessor controlled, direct current powered, with limited door reversal and nudging.
12. Signals: Impulse signal fixtures, digital car position indicator in car, all floor markings in car, car riding lantern, illuminated standard hall and car pushbuttons, directional arrows, audible floor chime.
13. Protection pads with hooks,
14. Other Features: Braille and Arabic plates, alarm bell, touch-release telephone cabinet, and cordless phone, fire emergency operation in accordance with ASME/ANSI A17.1, reduced voltage starting, certificate frame, in-car direction lantern, emergency car light, car roller guides, and single speed cab fan.
15. Provide all additional optional features and provisions for disabled persons.
E. Hydraulic Power Unit: Provide “soft-start” type motor starter.
   1. The power unit shall be specifically designed and manufactured for
elevator service. Include a positive displacement rotary screw type
pump, polyphase squirrel cage induction type motor, submersible
pump unit, oil reservoir, hydraulic control valves, fill strainer, tank
strainer in the suction line, oil level gauge, and drip pan.
   a. Provide emergency stop switch in pit accessible from pit access
door.

2. Power Unit Isolation: Mount the power unit on vibration dampeners
equivalent to Mason Industries Model BR designed to compress a
minimum of 0.2 inches under load and isolate the power unit from
the building structure. Enclose the power unit with sound insulated
steel panels.
   a. Vibration isolation pads shall be designed and installed for the
specific weight and configuration of the unit installed.
   b. Provide an in-line silencer on the hydraulic piping equal to Min-
nesota Elevator MEI Part No. 19316–19319 as appropriate.
   c. Provide flexible couplings to reduce pipe-borne noise where the
hydraulic lines attach to the pump capable of withstanding pres-
sures specified by the elevator manufacturer and comply with
code requirements. Acceptable manufacturers include Maxton
Manufacturing, Quality Elevator Products, and United Elevator
Corporation.

3. Controller: Provide microprocessor-based controller to control start-
ing and stopping, and to prevent damage to motor from overload or
excess current. Enclose the controller in a steel cabinet with louvered
door, designed for mounting on wall of power unit.
   a. Provide Y-delta start type where 150 feet per minute speed is
specified.

4. Hydraulic Control System: Pre-adjusted at factory and fully adjusta-
ble for maximum smoothness. Provide manual lowering system at
slow speed in event of power failure.

5. Leveling Device: Automatic 1/4-inch tolerance regardless of load or
direction of travel.

6. Provide an oil control device and pressure switch.

7. Provide keyswitch in an operating panel to permit elevator to be op-
erated from top of car, with all car button rendered inoperative. Con-
trols shall be continuous pressure up/down on top of car.

8. Provide hydraulic oil heater. Do not allow the pump to cycle with the
elevator cab remaining stationary.

9. Provide a neoprene pad between the plunger and elevator cab.

   1. Plunger and Cylinder: Hydraulic jack shall consist of plunger and cylinder of steel pipe, accurately turned, ground and polished smooth with no sharp edges, and equipped with packing gland, bronze bearing, brackets, stop ring, bulkhead plate, fastening plate for car, oil line connector, air bleeder, and oil collector ring.
      a. Provide a safety bulkhead in the cylinder, designed to safely lower the car in the event of the failure of the bottom cylinder head. Cylinder shall be a minimum of 2 inches greater diameter than plunger.
      b. Holeless Type: Low-friction, lip seal type packing with drip ring on package glands. Mount on each side of cab.
   2. Hydraulic Muffler: Provide a blowout proof-muffler in the oil line near the power unit, designed to reduce pulsation and noise which may be present in the flow of the hydraulic fluid.
   3. Platen Plate Isolation: Mount the platen plate on vibration dampers designed to isolate the platen plate from the car frame.

2.05 Hoistway Equipment

A. Guides and Buffers:
   1. Guide Rails: Planed steel tees erected plumb and securely fastened to the hoistway framing by heavy steel brackets. Matched guide rail section ends shall be tongued and grooved, forming joints fastened with steel splice plates.
      a. Sections shall not be less than 15 pounds per lineal foot to span 10-foot 2-inch maximum support spacing.
   2. Car Guide Shoes: Travel of car shall be guided by rubber-tired roller guides mounted on top and bottom of car frame to engage guide rails.
   3. Buffers: Provide spring buffers and mounting channels in the elevator pit. Provide a buffer striking plate on the underside of the car frame platform to compress spring buffer before plunger reaches down limit of travel.

B. Hoistway Entrances:
   1. shall be provided at each elevator hoistway opening. The entrances shall include unit frames, flush design hollow metal door panels, sight guards, sills, strut angles, headers, hanger covers, fascia, toe guards, dust covers, and hardware.
      a. Frame assembly shall meet required fire resistance rating.
      b. Exterior doors shall be of the "sun door" type specifically constructed to resist the exterior elements, especially exposure to local solar and weather conditions.
   2. Sills, struts, headers, hanger covers, and unit frames shall be erected prior to the erection of front walls and set in proper relationship to the car guide rails. Door panels shall be installed after the walls are finished.
   3. Hoistway Finishes:
      a. Doors and Frames: No. 4 satin polished Type 304 or 316 stainless steel.
      b. Elevator jambs on all levels or floors shall have the number of the floor on which the jamb is located designated by minimum 2" high
raised Arabic numerals conforming to CBC 11B-407.2.3.1 and Con- 
tracted Grade 2 Braille conforming to CBC 11B-703.3 Locate at 5 feet 
above floor on jamb panel at both sides of the door so that they are 
visible from within the elevator. Braille shall be placed below the cor-
responding Arabic numerals. Numerals and star shall be white on 
black background.

C. Hall Panel, Indicators, and Fixtures:
1. Hall Operating Panel: Furnish a single push button at each terminal 
and a pair of buttons at intermediate landings. Buttons shall illumi-
nate when pressed to indicate calls are registered and remain illumi-
nated until calls are answered. Finish shall No. 4 satin polished 
stainless steel.

D. Lobby Call Station: Provide call station at ground floor that combines call 
bUTTONs, fire department switch, and signage in compliance with applica-
table codes.: 
1. Signage shall be etched text in Helvetica font, and shall include: 
a. WARNING: 3/4-inch high letters. 
b. ELEVATORS SHALL NOT BE USED IN CASE OF FIRE OR 
ELECTRICAL EMERGENCY. USE DESIGNATED EXITS: 
1/4-inch high letters. 
c. NO SMOKING: 3/4-inch high letters. 
d. BY ORDER OF THE FIRE CHIEF: 1/4-inch high letters.
2. Finish of call station shall be No. 4 satin polished stainless steel.
3. Fasteners shall be concealed.
4. Provide additional signs or instructions that are required at lobby el-
evator by local authority.
   a. Submit signage requirements to Architect prior to preparation of 
Shop Drawings. Incorporate new signage requirements as di-
rected by Architect.
5. Elevator jambs on all levels or floors shall have the number of the 
floor on which the jamb is located designated by minimum high 
raised Arabic numerals conforming to CBC 11B-407.2.3.1 and Con-
tracted Grade 2 Braille conforming to CBC 11B-703.3 Locate at 5 feet 
above floor on jamb panel at both sides of the door so that they are 
visible from within the elevator. Braille shall be placed below the cor-
responding Arabic numerals. Numerals and star shall be white on 
black background.

2.06 CAR EQUIPMENT
A. Enclosure:
1. Car Frame and Platform: Car frame which supports the elevator plat-
form and enclosure shall be made of structural steel members. Plat-
form shall be constructed with two layers of 1-inch thick plywood, 
exterior grade. Paint edges and 2-inch wide perimeter strip with fire-
retardant paint.
   a. Recess surface of platform to accommodate specified finish 
flooring.
   b. Threshold (Sill): Heavy duty aluminum.
2. Car Enclosure: Provide manufacturer's standard characteristics and optional features as specified or detailed on Contract Drawings.
   a. Two-speed fan mounted above suspended ceiling.
   b. Protective pads of fire resistant quilted duck and S-pad hooks. Provide one set per elevator.
   c. Canopy: Reinforced 14 gage cold-rolled steel with hinged exit.
      1) Finish: Two coats factory-applied reflective powder coating.

B. Doors: Door operation shall comply with CBC Section 3003 for emergency procedures, and CBC Section 3001.3 for accessibility, including references to Chapter 11B.
   1. Door Operator: A door operator with direct current motor shall open and close the car and hoistway doors. Passenger elevator car and hoistway doors shall open simultaneously. Provide interlocks on each hoistway door designed to prevent the operation of the elevator unless all doors are closed and locked. An electric contact on the car door shall prevent operation of the elevator unless the car door is closed. Doors shall open automatically when the car is leveling at a landing and close after a predetermined time interval or immediately on pressing a car push button. Open time shall be in accordance with CBC Chapter 30 requirements for accessibility.
   2. Door Closing Protective Devices:
      a. Door Edge: Elevator car shall have an infrared curtain device on the leading edge of the door. Should this device engage an obstruction while the doors are closing, it shall automatically reverse the car and hoistway doors. Doors shall remain open until the expiration of the time interval and then close automatically.
      b. Provide an appropriate diagnostic tool to troubleshoot or program the elevator to the fullest extent possible.
   3. Door Hangers and Tracks: Hangers and tracks shall be provided for car and hoistway doors. Tracks shall be steel with working surfaces contoured to match the hanger sheaves. Hanger sheaves shall be polyurethane tires and sealed bearings.

C. Car Panel, Indicators, and Fixtures:
   1. Car Operating Panel: Furnish manufacturer's traditional operating panel signal indicators in the car containing registration push buttons for each landing, EMERGENCY STOP switch, ALARM push button, DOOR OPEN push button, and light switch. Buttons shall be 3/4-inch diameter minimum, raised or flush. Buttons shall illuminate at least 5 footcandles when pressed to indicate calls are registered and remain illuminated until calls are answered. Locate centerline of buttons at required height above floor in accordance with disabled access regulations. Finish of panel shall match adjacent surfaces unless otherwise indicated on Contract Drawings.
      a. Finish: No. 4 satin polished finish.
2. Alarm Bell: Provide an electric signal bell in, or adjacent to, the elevator hoistway, connected to the alarm button in the car operating panel.
   a. Telephone: Provide compartment and telephone line rough in for hands-free telephone handset in each car. Include identification and instructions for use.
      1) Handset and final connection will be provided by Owner.
      2) If telephone system is located in a closed compartment, the compartment door hardware shall be lever type conforming to CBC Section 1008.1.8 type of lock and latch.

3. Provide audible chime to indicate car arrival in accordance with ADA requirements.


D. Braille Plates: Provide No. 4 satin polished (brushed) finish stainless steel Braille plates with rounded raised Braille and Arabic indications, on the car operating panels adjacent to the appropriate buttons and switches.
   1. Characters shall be 2 inches high, raised 1/32-inch, upper case, sans serif, with Contracted Grade 2 Braille located directly below.

E. Star of Life Plates: Medical emergency elevators shall be identified by the international symbol (Star of Life) for emergency medical services.
   1. Size: Not less than 3 inches in any direction.
   2. Mounting: Permanently attach to each side of the hoistway door frame on the portion of the frame at right angles to the hallway or landing area. Each symbol shall be mounted not less than 78 inches and not more than 84 inches above the floor level at the threshold.
   3. Fabricate to match Braille plates.

F. Manufacturer Nameplates: No visible company name or logo is permitted.

2.07 CAR FINISHES

A. Car Finishes (Passenger):
   1. Doors: Stainless steel No. 4 satin polished (brushed) finish.
   2. Control Panel and Fixtures: No. 4 satin polished stainless steel.
   3. Front Returns: Plastic laminate in color and finish selected from manufacturer's standard by Architect. Stainless steel No. 4 satin polished (brushed) finish.
      a. (brushed)
   5. Ceiling: Suspended type.
      a. Six-panel No. 4 satin polished (brushed) stainless steel suspended metal pan ceiling with one LED downlight per panel for a total of six downlights.
   6. Handrail: Continuous stainless steel No. 4 satin polished finish cylindrical bar with a diameter of 1-1/2 inches. Mount on rear wall with 1-1/2-inch clearance. Return ends to wall.
   7. Floor: Match finish of first floor lobby. As indicated on Contract Drawings.
   8. Base: Stainless steel No. 4 satin polished finish.
2.08 OPERATION

A. Operate elevators from buttons in the car and at each landing. When the car is idle with the doors closed and with no call registered, pressure on the hall button at another floor shall automatically call the car to that floor. Registration of a call shall illuminate the light in each hall station and prevent registration of another call until the trip is completed.

B. Protective Control Device: If the system is low on oil, or if the car fails to reach an upper floor within a predetermined time, the car shall automatically return to the lowest floor and the doors shall open to permit passenger egress. The doors shall then close and all control buttons except door open button in car shall be inoperative.

2.09 EMERGENCY SYSTEMS

A. Emergency Service (Firemen's Key): A key operated switch shall be provided at the main floor closest to grade level. The key shall be removable on the ON or OFF positions. When the switch is in the ON position, elevator shall return non-stop to the main floor, and the doors shall open and remain open.
1. Place controls behind touch release panel.

B. A self-contained emergency lighting system including battery and automatic recharger shall be provided in the elevator cars. Surface mounted light fixture shall be fastened to the cab structure at the proper height. Unit shall supply light continuously upon power failure, and automatically recharge itself upon restoration of main power. Unit shall have test button or signal light to indicate condition of power supply.

C. In the event of normal power supply failure, elevators shall be arranged to operate from a battery pack power source. Provide circuitry so that after normal power failure each elevator shall lower to the lowest landing, open its doors, and park with the doors closed until normal power is restored.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to commencing elevator installation, examine hoistways, hoistway openings, pits, and machine rooms. Verify critical dimensions. Examine supporting structure and other conditions which affect elevator work to be installed. Do not proceed with elevator installation until unsatisfactory conditions have been corrected.

B. Verify that drains in elevator pits are connected to sanitary sewer system, and not to storm sewer system, to prevent petroleum products from contaminating ground water.

3.02 INSTALLATION

A. General: Comply with manufacturer's instructions and recommendations for work required during installation.

B. Install plunger-cylinder unit plumb and accurately located for elevator car position and travel. Anchor securely in place.
C. Welded Construction: Provide welded connections for installation of elevator work where bolted connections are not required for subsequent removal or normal operation, adjustment, inspection, maintenance, and replacement of worn parts.

D. Sound Isolation: Mount rotating and vibrating elevator equipment and components on vibration-absorption mounts, designed to effectively prevent transmission of vibrations to structure.

E. Install piping without routing underground, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.

F. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimensions at each landing.

G. Grout sills with non-staining, non-shrink grout. Set units accurately aligned with and slightly above finished floor landings.

H. Noise Mitigation Measures:
   1. Isolate hydraulic lines from the building structure at all points of attachment using specified isolators between unistruts supporting the pipe clamps and the building to prevent rigid connection between the pipe and the building. Select isolators based on the actual load to compress 0.20 inches. Do not route the elevator hydraulic piping in any wall or ceiling of adjacent habitable space.
   2. Isolate hydraulic pipe penetrations at walls, floors, and ceilings by providing a 1-inch gap filled with mineral wool safing and sealed with backer rod and acoustical sealant. Provide isolated pipe supports within 8 inches of the penetration.
   3. Provide radiused bends in hydraulic piping, do not use 90 degree joints.

3.03 SYSTEMS STARTUP

A. Acceptance Testing: Upon nominal completion of elevator installation, and before permitting either temporary or permanent use of elevator, perform acceptance testing as required by code and regulations.

3.04 FIELD QUALITY CONTROL

A. Operating Tests: Load elevator to its rated capacity and operate continuously for 30 minutes over its full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of pump motor during 30 minute test period. Record failures of elevator to perform as required. Car speed shall be within plus-or-minus 5 percent, of average speed in up and down directions, regardless of load.

B. Noise Emission Tests:
   1. Perform tests to verify compliance with sound criteria specified in Article 2.03.

C. Advise Owner, Architect, and inspection department of governing agencies in advance of dates and times tests are to be performed on elevators.
D. In the event operation does not meet requirements, promptly adjust or replace defective equipment and make good other work damaged by corrective repairs.

3.05 CLOSEOUT ACTIVITIES

A. Demonstration: Instruct Owner's personnel in proper use, operations, and daily maintenance of elevator. Review emergency provisions, including emergency access and procedures to be followed at time of operation failure and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.

B. Make a final check of elevator operation, with Owner's personnel present and just prior to date of Substantial Completion to determine that control systems and operating devices are functioning properly.

3.06 PROTECTION

A. Provide and maintain suitable protective coverings, barriers, devices, signs, and other protective measures throughout remainder of construction period to protect elevator work from damage or deterioration.

B. Provide inspection and maintenance service during period of temporary service.

C. Passenger elevators shall not be used for construction related activities.

3.07 MAINTENANCE

A. Furnish 24-hour a day, 7-day a week call back maintenance service of the equipment for a period of 3 months following date of Notice of Completion. Service shall include regular examinations of the installation during regular working hours, and shall include necessary adjustments, lubrication, cleaning, supplies and parts to keep equipment in operation.

1. Provide 24-hour callback service for minor adjustment of equipment during guaranty period at no additional cost to Owner.

B. Partial Completion: The Owner may accept the elevator for use and place it into regular service before the entire installation has been completed and accepted. The elevator subcontractor shall perform full-maintenance service on the elevator accepted for interim use including 24-hour per day call back service. The 12-month contract maintenance and concurrent warranty period shall not commence until all work is completed and the elevators have been granted final acceptance.

C. Continuing Maintenance: Provide a proposal for continuing maintenance service, in the form of a full maintenance agreement for 1 year, starting at the expiration of the guaranty maintenance period. Proposal shall be based on Contractor's standard form, stating frequency of service coverage, terms, conditions, and escalation.

END OF SECTION