

VOLUME 1

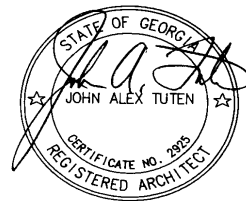
PROJECT MANUAL

SET NO. _____
PROJECT NO. 2035

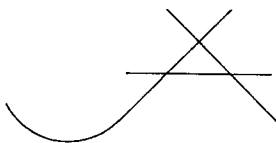
**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION**

**PHASE 4 – PE BUILDING,
ADMIN ADDITION AND NEW KITCHEN**

**FOR THE GLYNN COUNTY
BOARD OF EDUCATION**



DATE: SEPTEMBER 26, 2022



**JOHN A. TUTEN & ASSOCIATES, ARCHITECTS
4680 HIGHWAY 17 NORTH
BRUNSWICK, GA 31525
PHONE: (912) 265-8686**

**ST. SIMONS ELEMENTARY SCHOOL
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PHASE 4 – PE BUILDING, ADMIN ADDITION AND NEW KITCHEN**

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- Subcontractor Proposal Form
- Supplier Proposal Form
- Description of Bid Packages

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Form of Bid Bond – AIA A310 – 2010, “Bid Bond”

Form of Performance Bond – AIA A312 – 2010, “Performance Bond”

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General Conditions of the Contract – AIA A201 – 2007, “General Conditions of the Contract for Construction”

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**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – KITCHEN, ADMINISTRATION, AND GYMNASIUM ADDITION**

REQUEST FOR PROPOSALS

McKnight Construction Company, Inc., as Construction Manager for the Glynn County Board of Education, is accepting sealed proposals from subcontractors for the St. Simons Elementary School, Phase 4, Building Construction.

The work is all bid packages necessary to construct a new kitchen, administration offices, and gymnasium. Work includes sitework, cast in place concrete, masonry, structural steel, lightweight insulating concrete roof deck, miscellaneous rough carpentry, wood veneered architectural cabinets, EIFS, vapor barriers, roofing, insulation, fire proofing and sealants, doors, storefront and curtain wall systems, hardware, finishes, specialties, blinds, fire protection sprinkler system, plumbing, HVAC system, electrical and communication systems.

Sealed proposals must be submitted on the proposal form in the Project Manual and must be received no later than **2:00 pm on Tuesday, October 25, 2022** at the following address or subcontractors and suppliers can fax or email to bids@mcknightconstructionco.com and Construction Manager will deliver to the public opening in a sealed envelope:

Glynn County Board of Education
Maintenance Building
200 Emory Dawson Road
Brunswick, GA 31520

Owner: The Glynn County Board of Education

Architect: John A Tuten & Associates, Architects
4680 Highway 17 North
Brunswick, GA 31525
Phone: (912) 265 8686

Construction Manager: McKnight Construction Company, Inc.
635 NW Frontage Road
Augusta, GA 30907
Phone: (706) 863 7784

Proposal documents can be obtained from the office of the Architect, John A. Tuten & Associates, 4680 Highway 17 North, Brunswick, GA 31525. Application for documents must be made to the Architect in writing to debiv@johntuten.com. Proposal documents in PDF format will also be posted to the Architect's website at www.johntuten.com under Project Information for Bidders, 2035 St. Simons Elementary School New Construction.

A Pre-Proposal meeting will be held on **Thursday, October 13, 2022, at 2:00 PM** at St. Simons Elementary School Cafeteria.

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The Glynn County Board of Education and McKnight Construction Company, Inc. encourages participation by local and minority subcontractors, suppliers, and vendors.

No proposal may be withdrawn for a period of thirty (30) days after time has been called on the date of opening.

Please direct all questions to Ms. Debi Vest of John A. Tuten & Associates, Architects, via email: debiv@johntuten.com.

John A. Tuten, Architect for,
Dr. Scott Spence, Superintendent
Glynn County Schools

St. Simons Elementary School
New Construction and Modernization
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Phase 4 Bid Package

Construction Manager: McKnight Construction Company, Inc.
635 NW Frontage Road
Augusta, GA 30907
Phone: (706) 863-7784

Owner: Glynn County Board of Education
200 Emory Dawson Road
Brunswick, GA 31520

Architect John A. Tuten & Associates, Architects
4680 Highway 17 North
Brunswick, GA 31525
Phone: (912) 265-8686

Bid Documents

- Important Notes from the Construction Manager
- Schedule of Work
- Instructions to Bidders
- Subcontractor Qualification Form
- Subcontractor Proposal Form
- Supplier Proposal Form
- Description of Bid Package(s)
- Project Drawings as prepared by the Architect
- Project Specifications as prepared by the Architect
- All addenda as issued by the Architect and Construction Manager.

**PLEASE COMPLETE A THOROUGH REVIEW OF ALL DOCUMENTS
PRIOR TO BID SUBMISSION.**

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IMPORTANT NOTES FROM THE CONSTRUCTION MANAGER

1. Important Notes on Bid Preparation

- It is the responsibility of the proposers to check for Addenda issued and to include all Addenda in their pricing.
- Specification sections as referenced to in the bid package descriptions are for the convenience of bidders and in no way eliminate work required under the described package. Prospective bidders shall notify the Construction Manager if inconsistencies or discrepancies are discovered. Clarifications will be made upon written receipt prior to the deadline for questions.
- Special attention is called to the General Conditions, Supplementary Conditions, General Requirements, and Important Notes within the Project Specifications as these requirements are to be followed for all bid packages.
- Bidders of all packages shall include the pricing of any alternates affecting their work.
- Bidders certify that in submitting their proposal that they have thoroughly reviewed the contract documents, compared all documents to each other, visited the site, made allowances for the cost of the work and reported any discrepancy prior to submitting their proposal.
- **Bid Bond** – Special attention is called to bid packages requiring Bid Bonds. All Bid Bonds will be in the amount of 5% of bid and the bonding company shall be a surety company certified on the United States Department of the Treasury's Listing of Approved Sureties (Department Circular 570) and rated no less than "A" by A.M. Best ratings agency and acceptable to the Construction Manager. The form of bond shall be AIA Document A310, Current Edition.
- **Payment & Performance Bond** – Special attention is called to bid packages requiring payment and performance bonds. All bonds are 100% Performance and Payment Bonds and the bonding company shall be a surety company certified on the United States Department of the Treasury's Listing of Approved Sureties (Department Circular 570), and rated no less than "A" by A.M. Best ratings agency and acceptable to the Construction Manager. Bonds to be submitted with Seven (7) Days of award of contract.
- All proposals shall include applicable business licenses, permits, impact fees, tie-in fees, and other requirements of the local and state governing authority.
- All proposals for the bid packages shall include competent supervision, material, taxes, installation, permits, fees, cleanup, debris removal and incidental items of cost to perform the work as described in the packages. Although reference is made to the specification sections in the package descriptions, all bids for the designated packages shall include all Bid Documents and subsequent addenda.
- All bid packages shall include fire stopping of their work.
- All bid packages shall include progressive clean up and debris removal from the site daily, assistance in composite cleanup one (1) day per week with one (1) laborer per ten (10) workers for a minimum of one (1) hour but until necessary to complete cleanup, and final job clean up.
- All proposers must comply with the bid package description.

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IMPORTANT NOTES FROM THE CONSTRUCTION MANAGER

2. Important Notes concerning subcontractor behavior following contract award
- All contractors must complete a preconstruction meeting prior to performing any work on site.
 - All contractors are responsible for adequately protecting their materials as required by the project specifications. Improperly stored materials will not be accepted for use in construction.
 - All contractors are required to participate in bi-weekly subcontractor meetings if their attendance is requested by the construction manager.
 - All contractors are to submit daily reports after each day's work and prior to the start of the next day's work.
 - Any contractor penetrating a partition, floor or other work shall be responsible for the coordination, patching, and fire stopping.
 - Any contractor who demolishes a surface to install new work shall patch back to the surface's original condition if no new work is to be installed on that surface. If new work is to be installed on the patched surface, patching is required to adequately receive the new finish.
 - Any contractor disturbing any exterior work is responsible for its replacement.
 - Any contractor disturbing a grassed or finished site area shall restore the area to its original condition.
 - Any contractor disturbing existing soils shall compact areas back per the Project Specifications – Earthwork.
 - Efforts shall be made to keep the existing campus and buildings operational at all times. If a shutdown of any type is required, subcontractor is required to give two (2) weeks' notice to McKnight Construction so that coordination with the school is possible.
 - Efforts shall be made to avoid any interruption of school activities and utilities. If disruption is required, subcontractor is required to give two (2) weeks' notice to McKnight Construction so that coordination with the school is possible.
 - Trade contractors shall provide an onsite supervisor acceptable to the Construction Manager. This onsite supervisor is the only person the Construction Manager's Job Superintendent will give instructions to and coordinate all the work on this project. This onsite supervisor must be onsite at all times while work is being performed by his staff and/or his subcontractors. This site supervisor must be able to speak and understand the English language fluently. The Trade Contractor's Supervisor cannot be replaced without the consent of the Construction Manager.
 - All subcontractors must furnish Twenty-Four (24) Hour telephone numbers for Proposer's Project Manager and Job Foreman in case of emergency.
 - All subcontractors must develop and maintain a safety program as well as follow the safety program of the Construction Manager.
 - All subcontractors must provide a Drug-Free and Alcohol-Free Workplace.

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IMPORTANT NOTES FROM THE CONSTRUCTION MANAGER

- All subcontractors are required to submit submittals within 10 business days following receipt of contract or in lieu thereof a notice of intent to award.
- All subcontractors are required to submit, two (2) full sized, hard copy, shop drawings upon receipt of returned approval submittal from the construction manager.
- Music is prohibited on the jobsite.
- All subcontractors are to repair deficiencies upon notification from the construction manager within 5 business days. Failure to repair deficiencies will result in construction manager supplementing the subcontractor's resources to perform remediations at the expense of the subcontractor.
- All subcontractors acknowledge that work is taking place on an active campus, and agree to avoid interaction with students, teachers, faculty, and staff. No construction employees shall enter active school buildings for any reason unless they have received prior permission from the Construction Manager.
- There will be no contact with students. This includes verbal or physical contact. Any person having contact will be expelled from the site immediately and for the duration of the project.
- In the event OSHA or other inspecting authority levies a fine against Construction Manager due to violation(s) of a subcontractor, the subcontractor in violation of codes and regulations shall be responsible for the fine levied against the Construction Manager.
- All subcontractors must abide by all laws, ordinances, codes, and schedule inspections through Local Inspection Department and the Architect/Engineer.

3. Important Notes on Payment Terms after contract award

- Retainage of Ten Percent (10%) will be held on all bid packages. A reduction in retainage may occur per state law and with consent of the Architect, Construction Manager & Owner.
- Pay Requests are DUE to the Construction Manager on the 25th of each month. Each pay request must be accompanied by an interim release of lien.
- **Change Orders:** All change orders will include the cost of the work on site plus a maximum of 15% overhead and profit for work performed with a contractor's own forces and 7.5% for subcontract work. A detailed breakdown showing labor, materials, and equipment shall be submitted.
- Completion Date: See Schedule of Work.

4. Important Notes on Schedule

- Subcontractor will submit shop drawings and submittals within **Ten (10) Days** of contract award, unless noted otherwise.
- Subcontractor will execute subcontracts and provide certificates of insurance and required payment and performance bond within **Five (5) Days** of contract award.
- Subcontractor will begin work on site within **Five (5) Days** of Notice to Proceed.
- Subcontractor will submit all closeout documents within **Ten (10) Days** of Substantial Completion.
- Subcontractor will attend weekly or bi-weekly onsite progress meetings with the

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IMPORTANT NOTES FROM THE CONSTRUCTION MANAGER

Proposer's Project Manager and Job Foreman as scheduled by the Construction Manager.

- Subcontractor will advise and consult with Construction Manager regarding the availability of materials, cost analysis, scheduling, and value engineering.
- Subcontractor will arrange for after hours or overtime work if necessary, to meet mutually agreed upon milestone dates
- Subcontractor will provide Construction Manager with SDS Data as well as your Safety Plan within **Ten (10) Days** of Contract Award. Must be provided prior to personnel being onsite.

5. Important Notes on Insurance

Subcontractor will furnish all insurance as required by law, the Project Manual, Bid Documents and per the following:

Workers' Compensation & Employers Liability Insurance

This insurance will pay the subcontractor's obligations under appropriate worker's compensation statutes, covering all employees who perform any of the obligations of the Subcontractor under this Subcontract.

Employers Liability coverage shall provide limits of at least \$100,000 each accident for bodily injury and \$100,000 each employee for disease. The policy limit for disease shall be at least \$500,000.

Commercial General Liability Insurance

The insurance must be written on an "occurrence" basis, responding to claims arising out of occurrences which take place during the policy period. The commercial general liability form should provide limits of at least the following:

- \$1,000,000 each occurrence for bodily injury and property damage
- \$1,000,000 each incident for personal and advertising injury
- \$1,000,000 products-completed operations aggregate
- \$1,000,000 general aggregate

The general aggregate limit shall apply separately to each project. The products and completed operations coverage are to be maintained for a period of at least 2 years following the completion of the work. ISO Form CG 22 94 or its equivalent language (removing the subcontractor exception from the "Your Work" exclusion) shall not be used. There shall be no separate exclusion for liability arising out of explosion, collapse, and underground hazards (XCU) or subsidence, if the scope of Subcontractors work involves digging, excavation, grading, or use of explosives. Any deductibles under this policy must be disclosed and will be

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IMPORTANT NOTES FROM THE CONSTRUCTION MANAGER

fully assumed by the subcontractor. Coverage shall comply with the provisions of standard ISO endorsement forms CG2010 (07/04) for ongoing operations and GC 2037 (07/04) for completed operations or their equivalent. Forms that are limited to “liability arising out of your ongoing operations” or that do not extend to Products and Completed Operations are not acceptable. Said insurance shall name Owner and McKnight Construction Company, Inc. and their respective officers, directors, and employees as additional insureds.

Business Automobile Liability Insurance

This insurance shall apply to any auto, including all owned, hired, and non-owned vehicles to a combined single limit of at least \$1,000,000 each accident. Any deductibles under this policy must be disclosed and will be fully assumed by the subcontractor. Said insurance shall name Owner and McKnight Construction Company, Inc. and their respective officers, directors, and employees as additional insureds.

Commercial Umbrella Excess Liability

Umbrella Excess Liability coverage with the following minimum limits:
Each Occurrence \$1,000,000
Aggregate Limit: \$1,000,000

Said insurance shall name Owner and McKnight Construction Company, Inc. and their respective officers, directors, and employees as additional insureds.

Pollution Liability Insurance

If the Subcontractor’s work under this subcontract includes the handling and/or removal of pollutants, contaminants or other hazardous materials, then Subcontractor shall maintain Pollution Liability Insurance covering the Subcontractor’s liability for bodily injury, property damage (including the loss of use thereof) and environmental damage resulting from pollution and related clean-up costs incurred arising from the work or services to be performed.

Coverage shall be provided for both work performed on site as well as work performed during the transport and disposal of hazardous materials. The limit of liability shall not be less than \$1,000,000 per occurrence. McKnight Construction Company and Owner and their officers, directors and employees shall be named as additional insureds. If work involves the transportation of hazardous materials subcontractor’s pollution liability policy shall include the business auto and trucker’s endorsement form CA 99 48 or its equivalent.

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IMPORTANT NOTES FROM THE CONSTRUCTION MANAGER

Other Insurance Provisions

Certificates of insurance, as evidence of the insurance required by this Agreement and including the required “additional insured” and “primary insurance” endorsements, shall be furnished by Subcontractor to Contractor before any work here under is commenced by Subcontractor. The certificates of insurance shall provide that there will be no cancellation or reduction of coverage without 30 days prior written notice to the Contractor. Failure of McKnight Construction Company, Inc. to demand such certificates or other evidence of full compliance with these insurance requirements or failure of McKnight Construction Company, Inc. to identify a deficiency from evidence that is provided shall not be construed as a waiver of Subcontractor’s obligation to maintain such insurance. McKnight Construction will have the right, but not the obligation, to prohibit Subcontractor or one of its subcontractors from entering the project site until such certificates or other evidence that insurance has been placed in complete compliance with these requirements is received and approved by McKnight Construction Company, Inc.

The Subcontractor, in its agreements with subcontractors, shall require subcontractors to obtain insurance meeting the minimum limits and incorporating the contractual requirements prescribed by this Section.

McKnight Construction Company, Inc., the owner and (other requested entities) are Additional Insureds under the Commercial General Liability, AutoLiability and Umbrella Policies on a primary and non-contributory basis.

A Waiver of Subrogation in favor of the Owner and McKnight Construction Company, Inc. and their respective officers, directors, and employees shall apply to all policies required under the Subcontract.

Insurance shall be placed with insurers with an A.M. Best rating of not less than A-

- Proposer must participate in a federal work authorization program in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91 and upon contract award, must execute a Subcontractor’s Affidavit verifying compliance. Affidavit shall be provided by Construction Manager. A copy is available upon request.

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SCHEDULE OF WORK

This document describes the schedule for Phase 4 of St. Simons Elementary School New Construction and Modernization.

The construction phase schedule and associated substantial completion dates are as described below.

November 15, 2022: Notice of Award

January 9, 2023: Mobilization for Phase 4 and Begin Demo of Existing Buildings

February 1, 2023: Begin Construction on Kitchen and Administration

March 1, 2023: Begin Construction on Gymnasium

August 1, 2023: Substantial Completion on Kitchen

December 1, 2023: Substantial Completion on Administration and Gymnasium

March 30, 2024: Substantial Completion on Sitework

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INSTRUCTIONS TO BIDDERS

Instructions to Qualify

- Direct all questions to Ms. Debi Vest – debiv@johntuten.com. The deadline for questions is 4:00PM on October 19, 2022.
- Project will be awarded to the most competitive, qualified subcontractor.
- Forms may be submittal to the Construction Manager via mail or email.
 - All Phase 4 qualification forms, proposal forms, and required bid bonds must be received by 2:00PM October 25, 2022.
 - Paperwork can be mailed or hand-delivered to the address below or e-mailed to bids@mcknightconstructionco.com

Glynn County Board of Education
Maintenance Building
200 Emory Dawson Road
Brunswick, GA 31520

- Please complete the qualification form AND the proposal form in their entirety and include all requested attachments. Any form(s) that appears not to contain enough information will be sent back for resubmission and may risk missing the bid deadline.

Key Dates

- | | |
|---|------------------|
| • Bid Advertisement Begins | 10/27/22 |
| • Pre-bid / site visit | 10/13/22 2:00 PM |
| • Deadline for Questions | 10/19/22 4:00PM |
| • Deadline for receipt of completed bid documents | 10/25/22 2:00PM |
| • Estimated Posting Date of Contract Award | 11/15/22 |
| • Phase 1 Work begins | 1/9/23 |

Checklist for Bid Day

- Completed Subcontractor Qualification Form
- Completed Subcontractor Proposal Form

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SUBCONTRACTOR QUALIFICATION FORM

1. Please indicate the bid package(s) for which you are interested in qualifying.

2. Main Office Locations & Company Contacts

Please complete the table below.

Company Name	
Mailing Address	
Office Phone Number	
Project Contact	
Email Address	
Cell Phone Number	

3. Please check the box(es) that most accurately describes your Business Type.

- Corporation
- Partnership
- Limited Liability Company
- Sole Proprietor
- Minority Business Enterprise
 - o Please list your license type and number: _____

4. Licensing Information

Please provide all professional licenses required for you to perform your services.

License Number	Name of Licensee	License Limit/Level

Please check the box that most accurately describes your License Type.

- General Construction
- Electrical
- Mechanical
- Plumbing
- Fire Protection
- Other (Trade Specific License) _____

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SUBCONTRACTOR QUALIFICATION FORM

5. Please list 3 similar projects that your company has completed in the last 5 years.

Project #1	
Name of Project	
Description of Work Performed	
Owner Name Owner Phone Number Owner Email	
Architect Name Architect Phone Number Architect Email	
GC or CM Name GC or CM Phone Number GC or CM Email	
Final Contract Dollar Value	
Date Complete	

Project #2	
Name of Project	
Description of Work Performed	
Owner Name Owner Phone Number Owner Email	
Architect Name Architect Phone Number Architect Email	
GC or CM Name GC or CM Phone Number GC or CM Email	
Final Contract Dollar Value	
Date Complete	

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SUBCONTRACTOR QUALIFICATION FORM

Project #3	
Name of Project	
Description of Work Performed	
Owner Name Owner Phone Number Owner Email	
Architect Name Architect Phone Number Architect Email	
GC or CM Name GC or CM Phone Number GC or CM Email	
Final Contract Dollar Value	
Date Complete	

6. Please list your safety EMR for the past 5 years.

Present Rate	
Last Rate	
Year Before Rate	
Year Before Rate	
Year Before Rate	

7. Has your company filed any claims against a CM at Risk or General Contractor in the past 5 years, whether resolved or still pending resolution? Yes No

If yes, state the project name(s), year(s), and reason why:

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SUBCONTRACTOR PROPOSAL FORM

1. Please indicate the bid package(s) for which you are interested in qualifying.

2. Bidder Company Name: _____

3. Costs

A. Base Bid Cost: \$_____

B. Payment and Performance Bond Cost (if required per bid package):
 \$_____

4. Bid Alternates, if applicable:

A. Alternate #1: Provide and install 7 ½” of roof insulation for roof system in lieu of 7” of Insulperm and 2” of Lightweight insulating concrete.

Circle one ADD / DEDUCT \$_____

5. Bidder acknowledges receipt of the Addenda checked on the list below and confirms that the information within these addenda has been incorporated into the bid amount. *Please note that there may be more boxes than actual addenda. Do not check boxes that do not apply.*

- Addendum 1
- Addendum 2
- Addendum 3

6. Unit Prices For Applicable Bid Packages

Item	Total Units	Unit Price / CY	Total Price for 100 CY
Removal of Unsatisfactory Soil	100 CY	\$	\$
Structural fill material and placement	100 CY	\$	\$
		\$	\$
TOTAL COST OF UNITS PRICES			\$

7.

Authorized Signature

Title

Print Name

Date



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Bid package #1 – Demolition

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install the following works as prescribed within the respective listed specification sections in their designated locations as indicated on the construction plans:

Section	Description	Vol
24116	Structure Demolition	1
24119	Selective Structure Demolition	1

- Subcontractor to demolish existing structures as shown on C1.0
- Subcontractor to include cost of multiple mobilizations as required to satisfy the project's baseline schedule.
- Subcontractor to demolish and legally dispose of natural gas meter once new permanent service for kitchen is in place should service provider not assume this responsibility.
- Subcontractor to demolish and legally dispose of GA power transformer once permanent power has been provided to existing building 2010 should service provider not assume this responsibility.
- Subcontractor to clearly identify locations of any encountered existing irrigation lines during performance of their scope of work via note in their daily report for that day and via email to McKnight's designated quality control personnel. Should damage be absorbed by an irrigation line during its encounter, subcontractor to immediately notify McKnight's quality control personnel and cap or repair the line as appropriate to prevent infiltration of foreign debris into irrigation system.
- Subcontractor to remove canopies and their associated structural support, including concrete foundations.
- Subcontractor to remove existing concrete and stairs.
- Subcontractor to remove raised planter beds and surround gravel and gravel path.
- Subcontractor to remove pergola.
- Subcontractor to remove drop inlet, 4" HDPE, and associated pump.
- Subcontractor to remove pavement and sub-base material.
- Subcontractor to sawcut and prepare existing concrete masonry unit partition within building 2020 for new steel framed cased opening that is to be provided and installed by others.
- Subcontractor to structurally shore existing building 2020 following demolition of its eastern half.
- Subcontractor to include all cost for clearing not previously aforementioned herein.
- Existing gymnasium to be demolished in accordance with details on C1.1.
- Demolition subcontractor to coordinate sequencing of demolition with general contractor and other trades.

- Subcontractor to ensure that any trees designated by demolition by note 2 on sheet C1.0 that are within the future building's footprints are removed in their entirety during demolition, including any roots and root balls.



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Bid package #2 – General site preparation and development

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install the following works as prescribed within the respective listed specification sections in their designated locations as indicated on the construction plans:

Section	Description	Vol
311000	Site Clearing	2
312300	Earthwork	2
312333	Trenching	2
312500	Erosion Sedimentation Pollution Control Plan	2
312510	Comprehensive Monitoring Program	2
314000	Shoring & Underpinning	2
321300	Walk Road & Appurtenances	2
321613	Sidewalks	2
331113	Sanitary Sewage Systems	2
334000	Storm Sewage System	2

- Subcontractor to include cost of multiple mobilizations as required to satisfy the project's baseline schedule.
- Subcontractor to install and maintain all tree protection throughout the duration of project.
- Subcontractor to clearly identify locations of any encountered existing irrigation lines during performance of their scope of work via note in their daily report for that day and via email to McKnight's designated quality control personnel. Should damage be absorbed by an irrigation line during its encounter, subcontractor to immediately notify McKnight's quality control personnel and cap or repair the line as appropriate to prevent infiltration of foreign debris into irrigation system.
- Subcontractor to locate existing sanitary sewer line at north-west side of building 2010 at 36" from face of building and install cap.
- Subcontractor to remove drain line running north-east to south-west that is currently in service after new storm drainage is installed and after removal subcontractor is to adequately patch the storm structures the line was attached to.
- Subcontractor to install GAB as required for construction entrances and maintain them as appropriate through the duration of construction.
- Subcontractor to include cost for turnkey construction of concrete sidewalks as indicated on 2/D2.2.

- Subcontractor to include all cost for erosion control sediment and pollution and its comprehensive monitoring plan for the duration of the project.
- Subcontractor to include all cost for turnkey construction of new side walks as shown on C4.0.
- Subcontractor responsible for all concrete walkway appurtenances.
- Subcontractor responsible for establishing new building pads and assurance to jurisdiction having authority of building pad's compaction and its compliance with the contract documents.
- Subcontractor to include all cost for turnkey construction of new sanitary sewer systems and storm drainage systems as not previously aforementioned herein.
- Subcontractor to include all cost for trenching not previously aforementioned herein.
- Subcontractor to include all cost for clearing not previously aforementioned herein.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #3 – Concrete procurement and installation

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all footings, slab on grade, slab on deck, formed walls, housekeeping pads, stair pans, and any other works as prescribed within the respective listed specification section in their designated locations as indicated on the construction plans:

Section	Description	Vol
33000	Cast-In-Place Concrete	1
72600	Under-Slab Vapor Barrier	1

- Subcontractor does need to include the cost of rebar and welded wire fabric in their proposal.
- Subcontractor to provide all rebar materials, including welded wire fabric, necessary for the construction of footings, slab on grade, slab on deck, formed walls, housekeeping pads, and stair pans.
- Subcontractor responsible for providing and installing cast-in-place stair tread inserts as required by the project plans and specifications.
- Subcontractor to provide rebar materials in compliance with the prescriptions set forth in the project’s plans and specifications.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, subcontractor will coordinate deliveries directly with the project site superintendent.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor does not need to include the cost of sidewalks in their proposal.
- Subcontractor responsible for the procurement and installation of all concrete, concrete accessories, vapor barrier, curing compound, porous fill below grade, batter boards, form boards, expansion joint material, light towers, pumps, and any other miscellaneous materials or equipment for the installation of cast in place concrete on this project within the areas it is prescribed to be installed per the plans and specifications.
- Subcontractor responsible for installation of all concrete control joints and expansion joints per the plans and specifications.
- Subcontractor responsible to set anchor bolts that will be provided by others.
- Subcontractor responsible for installation of non-shrink grout within block-outs of steel columns.
- Subcontractor to provide all grading and excavating equipment as required for the completion of their scope of work.
- Subcontractor to install batter boards and complete building layout based on key points provided by the General Contractor’s surveyor. These points will be coordinated with the subcontractor.

- Subcontractor is responsible for backfilling around footings as required.
- Subcontractor responsible for dewatering should water be encountered during construction.
- Subcontractor agrees to working non standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor responsible for the removal of all footing spoils.
- Subcontractor responsible for the importation of sand as required to construction slab on grade subgrades.
- Subcontractor responsible for forming and pouring concrete in the applicable locations per detail C/S201C. This includes the installation of the steel bearing plate that is to be provided by others.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.
- Subcontractor to clearly identify locations of any encountered existing irrigation lines during performance of their scope of work via note in their daily report for that day and via email to McKnight's designated quality control personnel. Should damage be absorbed by an irrigation line during its encounter, subcontractor to immediately notify McKnight's quality control personnel and cap or repair the line as appropriate to prevent infiltration of foreign debris into irrigation system.
- Subcontractor to include the cost of concrete steps for the entirety of the project.
- Subcontractor to include the cost of all concrete columns within their proposal.



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Bid package #4 – Procurement of masonry materials and their installation

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all unit masonry assemblies including, but not limited to walls, platforms, partitions, and any other works as prescribed within the respective listed specifications sections in their designated locations as indicated on the construction plans.

Section	Description	Vol
42000	Unit Masonry	1
47200	Cast Stone Masonry	1
55000	Metal Fabrications	1

- Subcontractor need not provide metal fabrications but will be responsible for their layout and installation within masonry assemblies as applicable.
- Subcontractor to provide all rebar materials necessary for the complete construction of masonry partitions as required by the plans and specifications.
- Subcontractor responsible for the installation of embedded structural supports within masonry assemblies that will be provided by others.
- Subcontractor responsible for the layout and installation of steel bearing plates that will be provided by others.
- Subcontractor responsible for providing and installing grout within masonry assemblies.
- Subcontractor responsible for providing all masonry accessories, including but not limited to: masonry units, concrete masonry units, concrete building brick, brick, mortar, grout, ties, anchors, miscellaneous anchors, embedded flashing, embedded flashing adhesive, expansion joint materials, head of wall materials, and miscellaneous masonry accessories.
- Subcontractor responsible for all manpower, tools, material, and equipment required for cleaning masonry assemblies following their construction.
- Subcontractor responsible for the construction of a masonry mockup assembly as prescribed in the specifications.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, supplier will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor to provide all pea gravel above through wall flashing.
- Subcontractor agrees to working non standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor responsible for the layout of all walls and brick patterns.

- Subcontractor responsible for point up of masonry assemblies following their installation.
- Subcontractor responsible for preparing masonry assemblies as appropriate for the receipt of block fill and paint.
- Subcontractor responsible for the provision of OSHA approved scaffolding assemblies as required for the completion of their work.
- Subcontractor responsible for the provision of a competent forklift operator.
- Subcontractor responsible for topping out masonry assemblies as prescribed in the contract documents. This includes the installation of bearing plates that will be provided by others.
- Subcontractor responsible for the protection of adjacent materials and construction assemblies during the installation of their work.
- Subcontractor responsible for the procurement and installation of cast-stone masonry as indicated on the plans.
- Subcontractor responsible for adequately manning and supplying the project with materials so as to avoid any delays. Should delays result due to mismanagement of procurement, subcontractor will be responsible for all cost incurred to the project from the delay.
- Subcontractor responsible for handling the receipt of door frames provided by others. This includes unloading the material and properly storing them per the specifications.
- Subcontractor responsible for the installation of door frames and assurance of their plumbness and straightness in doing so. Should doors not fit in the openings provided, the subcontractor will be responsible for repair.
- Subcontractor responsible for the installation of mechanical, electrical, and plumbing block-outs within masonry partitions. Block out locations will be provided to the subcontractor via shop drawing submittal. In the event a mechanical, electrical, or plumbing contractor does not produce block out shop drawings to the masonry subcontractor before the masonry subcontractor is ready to assemble the partition, the mechanical, electrical, or plumbing contractor will be responsible for penetrating the partition and its repair to the appropriate rating for the assembly.
- Subcontractor to joint all masonry assemblies, even if they will not be exposed to view following their completion or not.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #5 – Structural steel

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all structural steel assemblies including, but not limited to steel columns, joist, decking, stairs, mezzanines, roof ladders, roof ladder landing, auxiliary steel to supplement roof penetrations and any other works as prescribed within the respective listed specification sections in their designated locations as indicated on the construction plans.

Section	Description	Vol
51200	Structural Steel	1
52200	Steel Joists	1
53100	Steel Deck	1
55000	Metal Fabrications	1

- Subcontractor to fabricate, deliver, handle, and erect all structural steel, temporary joist, permanent joist, stair pans, roof ladders, mezzanines, and any other miscellaneous metals required for the project per its plans and specifications.
- Subcontractor to fabricate and deliver to the project all masonry lintels and concrete anchor bolts for installation by others.
- Subcontractor is responsible for cleaning anchor bolts and installing leveling nuts onto them so as to provide a substrate for steel members to rest evenly on and at their proper elevation.
- Subcontractor is not responsible for roof decking that is to receive light weight insulating concrete.
- Subcontractor to fabricate, deliver, handle, and install all roof decking for areas that do not receive lightweight insulating concrete.
- Subcontractor to coordinate steel members that are to receive fireproofing and subcontractor is responsible for omitting any primers as applicable in order to do so. Failure to properly coordinate this will result in the cost incurred for remedy to achieve applicable fire rating being that of the subcontractor.
- Subcontractor is not responsible for the fabrication, delivery, or installation of concrete rebar, masonry rebar, or roof hatches.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.

- Subcontractor to include the cost of all necessary field measurements within their proposal.
- Subcontractor is to be provided with roof top mounted equipment layout drawings via shop drawings as well as gymnasium equipment shop drawings and their loads. Subcontractor will coordinate structural steel members supporting aforementioned equipment as appropriate. This includes the installation of supplementary angle as applicable.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as request by project superintendent as required.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule
- Subcontractor responsible for the installation of temporary handrails compliant to applicable OSHA standards and as applicable to the needs of the project.
- Subcontractor responsible for the removal of temporary handrails and their supports when they are no longer need on the project.



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Bid package #6 – Roof deck and its insulation

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all roof deck, including both tectum and metal, as well as any insulation that rest on top of the deck but below the roof system as prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
35100	Cementitious Wood Fiber Decks	1
35500	Lightweight Insulating Concrete	1
75200	Modified Bituminous Membrane Roofing – Base Bid	1
75200	Modified Bituminous Membrane Roofing – Alternate No. 1	1

- Subcontractor is to include all cost for the turnkey installation of all tectum decking.
- Subcontractor is to include all cost for the turnkey installation of all slotted galvanized metal decking.
- Subcontractor is to include all cost for the turnkey installation of all lightweight insulating concrete, including its associated insulation.
- Subcontractor is to exclude the cost of the base sheet, roof system, and flashing system as described in assemblies one and two, respectively, within specification 075200 – Modified Bituminous Membrane Roofing – Base Bid.
- Subcontractor is to exclude the cost of the insulation – bottom layer, insulation – top layer, roof system, and flashing system as described in assemblies one and two, respectively, within specification 075200 – Modified Bituminous Membrane Roofing – Alternate No. 1.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to include all cost associated with installing and maintaining all roof safety systems as required by OSHA during the performance of their work.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounding thereby, during the installation of their lightweight insulation concrete.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.

- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #7 – Base bid roof system

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all base sheet, roof system, flashing system, and their associated rough carpentry and roof accessories as prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
61053	Miscellaneous Rough Carpentry	1
75200	Modified Bituminous Membrane Roofing – Base Bid	1
76200	Sheet Metal Flashing and Trim	1
77200	Roof accessories	1

- Subcontractor is to exclude all cost for the turnkey installation of all tectum decking. This is to be installed by others.
- Subcontractor is to exclude all cost for the turnkey installation of all slotted galvanized metal decking. This is to be installed by others.
- Subcontractor is to exclude all cost for the turnkey installation of all lightweight insulating concrete, including its associated insulation.
- Subcontractor to include the cost for the turnkey installation of all roof hatches.
- Subcontractor to exclude the cost for the ladders that are to serve the roof hatches.
- Subcontractor to include the cost of all necessary roofing accessories as outlined in section 2.03 ROOFING ACCESSORIES within specification 075200 and as required for the complete installation of the base bid roof system.
- Subcontractor to include the cost for the turnkey installation of all sheet metal flashing and trim in accordance with specification 76200 – Sheet Metal Flashing and Trim.
- Subcontractor to furnish and install all roof wood blocking and fasteners required for the installation of roof membrane, roof penetrations, metal trim, and flashing.
- Subcontractor to furnish and install all flashing, counter flashings, metal coping, gutter, downspouts, roof hatches, and walk pads.
- Subcontractor to install mockups as requested by architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to include all cost associated with installing and maintaining all roof safety systems as required by OSHA during the performance of their work.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.

- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of turnkey installation of expansion joints, including expansion joint covers below the roof line within their proposal.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #7A – Alternate 01 bid roof system

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all base sheet, roof system, flashing system, and their associated rough carpentry and roof accessories as prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
61053	Miscellaneous Rough Carpentry	1
75200	Modified Bituminous Membrane Roofing – Alternate No. 1	1
76200	Sheet Metal Flashing and Trim	1
77200	Roof accessories	1

- Subcontractor is to exclude all cost for the turnkey installation of all tectum decking. This is to be installed by others.
- Subcontractor is to exclude all cost for the turnkey installation of all metal decking. This is to be provided by others.
- Subcontractor is to include all cost for the turnkey installation of all Trisotech insulation and DensDeck Prime insulation.
- Subcontractor to include the cost for the turnkey installation of all roof hatches.
- Subcontractor to exclude the cost for the ladders that are to serve the roof hatches.
- Subcontractor to include the cost of all necessary roofing accessories as outlined in section 2.03 ROOFING ACCESSORIES within specification 075200 and as required for the complete installation of the bid alternate 01 roof system.
- Subcontractor to include the cost for the turnkey installation of all sheet metal flashing and trim in accordance with specification 76200 – Sheet Metal Flashing and Trim.
- Subcontractor to furnish and install all roof wood blocking and fasteners required for the installation of roof membrane, roof penetrations, metal trim, and flashing.
- Subcontractor to furnish and install all flashing, counter flashings, metal coping, gutter, downspouts, roof hatches, and walk pads.
- Subcontractor to install mockups as requested by architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to include all cost associated with installing and maintaining all roof safety systems as required by OSHA during the performance of their work.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.

- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of turnkey installation of expansion joints, including expansion joint covers below the roof line within their proposal.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #9 – Windows, curtain walls, and glass

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all aluminum-framed entrances and storefronts, aluminum-framed entrances and storefronts' hardware, glazed aluminum curtain walls, glazing, and fire-rated glazing as well as all joint sealants associated with their installation as prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
79200	Joint Sealants	1
84113	Aluminum-Framed Entrances and Storefronts	1
84413	Glazed Aluminum Curtain Walls	1
87100	Door Hardware	1
88000	Glazing	1
88813	Fire-Rated Glazing	1

- Subcontractor to only include the cost for joint sealants and all accessories required for their installation that are required around the interior and exterior perimeters of the windows and curtain walls. All others joint sealants will be provided and installed by others.
- Subcontractor to participate in coordination meetings as requested by General Contractor.
- Subcontractor to exclude the cost of all hardware that is not to be installed within the aluminum-framed entrances and storefronts.
- Subcontractor to include the cost of all hardware that is to be installed within the aluminum-framed entrances and storefronts.
- Subcontractor to include the cost of turnkey installation of all glass.
- Subcontractor to include the cost of turnkey installation of all fire-rated glass.
- Subcontractor to include the cost of turnkey installation of all aluminum-framed entrances and storefronts, including their hardware.
- Subcontractor to include the cost of turnkey installation of all glazed aluminum curtain walls.
- Subcontractor to include the cost of mineral wool furnishment and installation above curtainwall heads per detail 1/A235.
- Subcontractor to include the cost of turnkey installation of plywood shims, as required.
- Subcontractor to include the cost of turnkey installation of break metal as required to seal any openings within the brick airspace that will not otherwise be concealed through the installation of curtainwall or aluminum entrance and storefront framing.
- Subcontractor to include the cost of turnkey installation of continuous break metal closure per detail 6/A235.
- Subcontractor to include the cost of turnkey installation of stainless steel flashing per detail 5/A321.

- Subcontractor to include the cost of turnkey installation of all metal flashing per detail 10/A321.
- Subcontractor to include the cost of turnkey installation of all door thresholds for aluminum entrances and storefronts.
- Subcontractor to install mockups as requested by architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #10 – EFIS

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all water drainage exterior insulation and finish system as prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
72430	Water Drainage Exterior Insulation and Finish System	1

- Subcontractor to include all cost for the turnkey installation of associated backer rod and sealant where the water drainage exterior insulation and finish system abuts dissimilar surfaces.
- Subcontractor to include all cost for the turnkey installation of glass mesh reinforced sheathing as a part of their exterior insulation and finish system.
- Subcontractor to include all cost for the turnkey installation of venting products that are to be embedded within the exterior insulation and finish system.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of the exterior insulation and finish system.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project’s schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project’s baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #11 – Foamed-in-place insulation

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all foamed in place insulation as prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
72119	Foamed-In-Place Insulation	1

- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of the exterior insulation and finish system.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #12 – Metal wall panels

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all formed metal wall panels as prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
74213.13	Formed Metal Wall Panels	1

- Subcontractor is to exclude the cost for the installation of air barrier that their metal wall panels are to be installed on top of. This will be installed by others.
- Subcontractor to include the cost for all associated miscellaneous materials as outlined within section 2.3 – Miscellaneous Materials of specification 74213.13 Formed Metal Wall Panels.
- Subcontractor is responsible for assurance that following the installation of the formed metal wall panels, oil canning is not present.
- Subcontractor is to include all cost associated with engaging a factory-authorized service representative to test and inspect the metal wall panel installation, including its accessories, following the subcontractor’s completion of work; with the subcontractor bearing responsibility for any repairs or remediations requested by the factory authorized personnel catalyzed by their inspection.
- Subcontractor to include the cost of cleaning their metal wall panels and their accessories following its installation as outlined in section 3.5 Cleaning and Protection within specification 074213.13 – Formed Metal Wall Panels.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of the exterior insulation and finish system.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project’s schedule.

- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #13 – Fire resistive joint systems

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all fire resistive joint systems prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
78446	Fire-Resistive Joint Systems	1

- Subcontractor to exclude all cost associated with installing caulking or sealants around mechanical, electrical, or plumbing utility penetrations above ceiling or through floor. This will be performed by others.
- Subcontractor to only include cost associated with the turnkey installation required for sealing head of wall, wall to floor, and floor to floor fire rated joints.
- Subcontractor to include all cost associated with the installation of accessories associated with fire resistive joint systems' installation as described in section 2.1 F - Accessories within specification section 78446 – Fire Resistive Joint Systems.
- Subcontractor responsible for prepping fire resistive joints as outlined in section 3.2 – Preparation within specification 78446 – Fire Resistive Joint Systems.
- Subcontractor responsible for the turnkey installation of identification for fire resistive joint systems per section 3.4 – Identification within specification 78446 – Fire Resistive Joint Systems.
- Subcontractor to include all cost associated with attending life safety inspections with the General Contractor, Owner, Architect, and Authority Having Jurisdiction and correcting any deficiencies noted thereby in order to fully construct an acceptable rated joint system as required for the receipt of a certificate of occupancy and other applicable project milestones; such as the permission to drop ceiling tiles within acoustical ceilings.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of the fire resistive joint systems.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.

- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #14 – Handrails

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all pipe and tube railings prescribed within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
55213	Pipe and Tube Railings	1

- Subcontractor to ensure compliance with all applicable building codes as enacted by the American with Disabilities Act as it relates to their pipe and tube railings prior to its fabrication or installation.
- Subcontractor to include all cost associated with the turnkey installation of pipe and tube railings; including but not limited to the raw materials required for its fabrication, fasteners for its installation, anchoring post, anchoring railing ends, and any associated miscellaneous materials.
- Subcontractor to include all cost associated with the installation of protection as outlined in section 3.8 – Protection within specification 55213 – Pipe and Tube Railings.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of the exterior insulation and finish system.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project’s schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project’s baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.

- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #15 – Casework, countertops, and window sills

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all solid surfacing lavatories, tops, window sills and all wood veneer faced architectural cabinets within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
64020	Solid Surfacing Lavatories & Tops & Window Sills	1
64113	Wood-Veneer-Faced Architectural Cabinets	1

- Subcontractor to include cost of integral Corian countertop and all associated tools, materials, equipment and supports for its installation into casework openings.
- Subcontractor to exclude cost of plumbing appurtenances associated with the Corian sinks within casework including the fitting, trim, waste, insulation kit, and water temperature guard. This is to be performed by others.
- Subcontractor to include the cost associated with performing field measurements in their proposal.
- Subcontractor to exclude the cost associated with installing any and all wood blocking required within walls to attach wood veneered architectural cabinets thereto.
- Subcontractor to include all cost associated with the turnkey installation of 2” tube steel continuous around all edges of casework countertops as noted in detail 2/A907.
- Subcontractor to ensure that following their installation of lavatories and casework furnished and installed within their scope and prescribed to be accessible by disabled persons meet the applicable requirements under the American with Disabilities Act.
- Subcontractor to include all cost associated with the turnkey installation of casework countertops and backsplashes.
- Subcontractor to clean solid surfacing lavatories, tops, and window sills following their installation per section 3.3 Adjusting and Cleaning within specification 064020 Solid Surfacing Lavatories, tops, windows and sills.
- Subcontractor to include the cost associated with the turnkey installation of all wood-veneer-faced architectural cabinets including, but not limited to, wood cabinets, wood shelving, wood furring, blocking, shims, hanging strips, shop finishing, and countertops.
- Subcontractor to include the cost associated with providing and installing all applicable products as appropriate and listed within Part 2 – Products within specification section 64113 Wood-Veneer-Faced Architectural Cabinets.
- Subcontractor to include all cost associated with the adjusting and cleaning of wood-veneered-faced architectural cabinets as outlined in section 3.3 - Adjusting and Cleaning within specification section 64113 – Wood-Veneered-Faced-Architectural-Cabinets.
- Subcontractor to include cost associated with performing field measurements.

- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of the exterior insulation and finish system.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #16 – Metal framed assemblies, ceilings and fabric wrapped panels

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all cold-formed metal framing, sheathing, joint sealants, non-structural metal framing, gypsum board, acoustical panel ceilings and fabric wrapped panels as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
54000	Cold-Formed Metal Framing	1
61600	Sheathing	1
79200	Joint Sealants	1
92216	Non-Structural Metal Framing	1
92900	Gypsum Board	1
95113	Acoustical Panel Ceilings	1
97723	Fabric Wrapped Panels	1

- Subcontractor to exclude the cost of air barrier sealant that it to be installed in conjunction with sheathing from their proposal.
- Subcontractor to include the cost of constructing temporary walls as shown on site demolition plans in order to enclose the existing gymnasium following the demolition of its northern wall.
- Subcontractor to include the cost of manipulating existing ceiling grid as required in conjunction with demolition in order to allow for the gymnasium to continue to operate during the project's construction.
- Subcontractor to install all door framings within metal framed walls. The door frames will be furnished and delivered to the jobsite by others.
- Subcontractor to layout metal stud walls based on control points that will be provided by others.
- Subcontractor to top out metal framed assemblies as shown on drawings in order to achieve their prescribed sound and smoke ratings. Head of walls at fire rated partitions will be sealed by others.
- Subcontractor is responsible for ensuring metal framed assemblies are smoke tight as required by the plans and specifications, including sealing around any penetrations made by others that extend through the rated assembly.
- Subcontractor responsible for labeling smoke rated partitions that they seal as required by the plans and specifications.
- Subcontractor to furnish and install all wood blocking as required by others; including but not limited to that needed for plumbing fixtures, casework, bathroom accessories, and visual display units.
- Subcontractor to furnish and install all exterior sheathing.

- Subcontractor to achieve the prescribed level of finish for gypsum board assemblies as designated within the specifications.
- Subcontractor responsible for all equipment necessary to complete their entire scope of work, including that necessary to receive materials and stage them throughout the building.
- Subcontractor responsible for all joint sealants prescribed to be installed within metal framed assemblies. Subcontractor is not responsible for joint sealants for windows, brick, or concrete masonry units.
- Subcontractor to furnish and install all lighting support wiring for the entire project. The electrician will be responsible for securing the furnished and installed wire to their lighting device.
- Subcontractor to provide and install all non-structural metal framing for the entire project.
- Subcontractor to provide and install all gypsum board for the entire project.
- Subcontractor to provide and install all acoustical panel ceilings for the entire project.
- Subcontractor to furnish and install all fabric wrapped panels for the entire project.
- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #17 – Joint sealants and air barrier

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all joint sealants and fluid-applied membrane air barriers as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
61600	Sheathing	1
72726.02	Fluid-applied membrane air barriers, vapor permeable	1
79200	Joint Sealants	1

- Subcontractor to exclude the cost of sheathing from their proposal. However, sealant of sheathing joints and fasteners used to secure it is the responsibility of the subcontractor.
- Subcontractor to exclude the cost of joint sealant installations around windows and within metal framing assemblies.
- Subcontractor to include the turnkey cost of joint sealant installations as required for the exterior of brick assemblies, exterior of concrete masonry unit assemblies, and exterior perimeter of louvers and door frames.
- Subcontractor to anticipate the use of multiple colors of joint sealants within each installation.
- Subcontractor responsible for sealing joints of metal framing assemblies' substrate that is to receive air barrier.
- Subcontractor responsible for all peel and stick flashing as required to seal gaps between differing substrates as required to produce a continuous substrate adequate per the plans and specifications for the receipt of air barrier.
- Subcontractor responsible for performing quality control bi-hourly during the installation of their air barrier to ensure that the minimum mil thickness for the air barrier is being achieved as required by the plans and specifications.
- Subcontractor to include all cost associated with the procurement and installation of all auxiliary materials as required for the installation of their scopes of work; including but not limited to joint sealant backing, primers, cleaners, and masking tape.
- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.

- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #18 – Door frames and hardware

- Supplier to provide all materials, their delivery, and handling necessary to furnish all hollow metal doors and frames, flush wood doors, specialty doors and frames, door hardware, and associated louvers as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
81113	Hollow Metal Doors and Frames	1
81416	Flush Wood Doors	1
83000	Specialty Doors & Frames - Fiberglass Construction	1
87100	Door Hardware	1
89000	Louvers and Vents	1

- Supplier to provide louvers that are to be installed within doors.
- Supplier to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Supplier to attend keying meeting with General Contractor, Owner, and Architect.
- Supplier to coordinate shop drawings with other trades.
- Supplier to include the cost of handling materials delivered to the project site.
- Supplier acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, supplier will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Supplier acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Supplier agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule
- Supplier agrees to synopsis any discussions made between themselves and the architect that effect the project while without presence of the general contractor in writing via email by close of business the day in which said discussions are made.



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Bid package #19 – Flooring

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all tiling, resilient base and accessories, resilient tile flooring, resilient athletic flooring, and tile carpeting as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
93000	Tiling	1
96513	Resilient Base and Accessories	1
96519	Resilient Tile Flooring	1
96566	Resilient Athletic Flooring	1
96813	Tile Carpeting	1

- Subcontractor to include the cost of preparatory work as required to mitigate any imperfections of the wall and floor substate in order to bring it to a condition suitable for the installation of wall and floor coverings within their scope of work.
- Subcontractor to include the cost of stair nosings as required per plans and specifications, excluding those cast in place within concrete stairs.
- Subcontractor to include the cost of cleaning tile following its installation.
- Subcontractor to include the cost of cleaning resilient flooring and base following its installation.
- Subcontractor to include the cost of furnishing and installing protective covering over tile and resilient flooring following its installation and cleaning.
- Subcontractor responsible for the cost of performing relative humidity test as required by the plans and specifications.
- Subcontractor to ensure that during the installation of their flooring coverings minimum sizes, patterns, and layout requirements are achieved per the plans and specifications.
- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.

- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #20 – Painting

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all joint sealants, exterior painting, interior painting, and high-performance coatings as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
79200	Joint Sealants	1
99113	Exterior Painting	1
99123	Interior Painting	1
99600	High-Performance Coatings	1

- Subcontractor to exclude the cost of joint sealants as required for brick assemblies, exterior concrete masonry unit assemblies, exterior perimeters of door framings, and all joint sealant for windows.
- Subcontractor to exclude the cost of joint sealants as required within metal framing assemblies.
- Subcontractor to include the cost of joint sealants within interior concrete masonry unit assemblies.
- Subcontractor to include the cost of joint sealants around the interior perimeter of door frames.
- Subcontractor to include the cost of joint sealants around the perimeters of all accessories that are mounted directly to the walls; including but not limited to, fire extinguisher cabinets, defibrillator cabinets, and mirrors.
- Subcontractor responsible for painting all exposed structure and systems as required by the plans and specifications.
- Subcontractor responsible for the installation of block-fill as the prescribed mill thickness as indicated within the plans and specifications.
- Subcontractor responsible for reinstalling any wall labeling to its original condition that is disturbed, removed, or covered during the installation of their paints.
- Subcontractor to anticipate the use of multiple colors of paints.
- Subcontractor to anticipate the construction of multiple mock ups during the selection of final paint colors.
- Subcontractor responsible for painting all steel substrates as required by the plans and specifications; including but not limited to stairs, stair stringers, mezzanines, and roof ladders.
- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.

- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #21 – Furnish visual display boards

- Supplier to provide all materials, their delivery, and handling as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
101100	Visual Display Boards	1

- Supplier to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Supplier to coordinate shop drawings with other trades.
- Supplier to include the cost of handling materials delivered to the project site.
- Supplier acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, supplier will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Supplier acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Supplier agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Supplier agrees to synopsis any discussions made between themselves and the architect that effect the project while without presence of the general contractor in writing via email by close of business the day in which said discussions are made.



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Bid package #22 – Install visual display board

- Subcontractor to provide all labor, tools, materials, and equipment necessary to install all visual display boards as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
101100	Visual Display Boards	1

- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project’s schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project’s baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #23 – Signage

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all signage as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
101400	Signs	1

- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



**St. Simons Elementary School
New Construction and Modernization
Phase 4**

Bid package #24 – Furnish toilet accessories and FEC

- Supplier to provide all materials, their delivery, and handling as noted within the listed specifications below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
102800	Toilet and Bath Accessories	1
104416	Fire Extinguishers & Cabinets	1

- Supplier to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Supplier to coordinate shop drawings with other trades.
- Supplier to include the cost of handling materials delivered to the project site.
- Supplier acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, supplier will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Supplier acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Supplier agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Supplier agrees to synopsizing any discussions made between themselves and the architect that effect the project while without presence of the general contractor in writing via email by close of business the day in which said discussions are made.



**St. Simons Elementary School
New Construction and Modernization
Phase 4**

Bid package #25 – Install toilet accessories and FEC

- Subcontractor to provide all labor, tools, materials, and equipment necessary to install all toilet and bath accessories, fire extinguishers and their cabinets as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
102800	Toilet and Bath Accessories	1
104416	Fire Extinguishers & Cabinets	1

- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



**St. Simons Elementary School
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Bid package #26 – Aluminum walkway covers

- Subcontractor to provide all labor, tools, materials, and equipment necessary to install all aluminum walkway covers as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
107300	Aluminum Walkway Covers	1

- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project's baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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Bid package #27 – Gymnasium equipment

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all gymnasium equipment as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
116623	Gymnasium Equipment	1

- Subcontractor responsible for providing weight information to structural steel subcontractor for use in design calculations.
- Subcontractor responsible for furnishing motors and switches to operate basketball goals.
- Subcontractor responsible for demonstrating use of basketball goals to Owner following substantial completion.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project’s schedule.
- Subcontractor to include the cost of multiple mobilizations as required to satisfy the project’s baseline schedule and as requested by the project superintendent.
- Subcontractor to protect all other’s materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of all necessary field measurements within their proposal.



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New Construction and Modernization
Phase 4**

Bid package #28 – Blinds

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all horizontal louvers and blinds as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
122113	Horizontal Louvers & Blinds	1

- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.



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Phase 4**

Bid package #29 – Roller window shades

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all roller window shades as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
122413	Roller Window Shades	1

- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.



**St. Simons Elementary School
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Bid package #30 – Fire protection piping

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all fire protection piping as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
210110	Fire Protection General Provision	2
210120	Fire Protection Standards	2
210210	Fire Protection Coordination	2
210220	Fire Protection Submittals	2
210230	Fire Protection Identification	2
210240	Fire Protection Work Closeout	2
210310	Fire Protection Excavation	2
212010	Fire Protection Sprinkler System	2

- Subcontractor required to coordinate overhead rough in locations with the general contractor, mechanical tradesman, electrical tradesmen, and plumbing tradesmen prior to the start of their work.
- Subcontractor responsible for designing a fire protection piping system that satisfies all applicable building codes as required to obtain a certificate of occupancy on the project.
- Subcontractor responsible for repairing any floors and walls to their original condition that are penetrated by subcontractor following the floor or wall's construction.
- Subcontractor responsible for making any field adjustments as directed by the project superintendent and as required to complete overhead installation should conflicts between systems ensue.
- Subcontractor responsible for all cost associated with testing their system following its construction.
- Subcontractor responsible for ensuring the proper temperature rated head is used for its intended location.
- Subcontractor is responsible for protecting heads in place following their installation as required by the project engineer until substantial completion is achieved.
- Subcontractor is responsible for participating in overhead inspections and final inspections as required to obtain permission from the authority having jurisdiction to drop ceiling tiles and occupy the building.
- Subcontractor is responsible for installing ceiling tiles in acoustical ceilings where their head is present.
- Subcontractor to include cost associated with performing field measurements.

- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.



St. Simons Elementary School
New Construction and Modernization
Phase 4

Bid package #31 – Plumbing

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all plumbing as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
220500	General Requirements, Plumbing	2
220501	Basic Materials and Methods, Plumbing	2
220529	Foundations, Hangers and Supports, Plumbing	2
220550	Plumbing Excavation	2
220553	Plumbing Identification	2
220700	Plumbing Insulation	2
221000	Plumbing Piping and Appurtenances	2
224000	Plumbing Fixtures	2

- Subcontractor's scope of work to begin 5' outside of the building.
- Subcontractor is responsible for backfilling any areas of earth they disturb. Earth is to be restored to its original elevation and condition.
- Subcontractor required to test and inspect their system as required by authority having jurisdiction and per the plans and specifications in order to obtain certificate of occupancy for the project.
- Subcontractor responsible for all cost associated with testing their system following its construction.
- Subcontractor responsible for repairing any floors and walls to their original condition that are penetrated by subcontractor following the floor or wall's construction.
- Subcontractor responsible for making any field adjustments as directed by the project superintendent and as required to complete overhead installation should conflicts between systems ensue.
- Subcontractor responsible for tagging and labeling their system as required per plans and specifications.
- Subcontractor is responsible for participating in overhead inspections and final inspections as required to obtain permission from the authority having jurisdiction to drop ceiling tiles and to occupy the building.
- Subcontractor to coordinate foundation steps as required to avoid conflict between prescribed plumbing waste and supply piping and concrete footers with the general contractor and concrete contractor.
- Subcontractor required to coordinate locations of floor drains with concrete subcontractor.

- Subcontractor required to coordinate overhead rough in locations with the general contractor, mechanical tradesman, electrical tradesmen, and fire sprinkler tradesmen prior to the start of their work.
- Subcontractor to exclude the cost of Corian lavatories that are to be installed within casework. The subcontractor should include the cost of appurtenances for these fixtures in their bid package.
- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.



St. Simons Elementary School
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Bid package #32 – Heating, ventilation, and air conditioning

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all heating, ventilation, and air conditioning as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
230500	General Requirements, HVAC	2
230501	Basic Materials and Methods, HVAC	2
230502	Sleeving	2
230529	Foundations, Hangers and Supports, HVAC	2
230550	Mechanical Excavation	2
230553	HVAC Identification	2
230593	Test-Adjust-Balance	2
230700	HVAC Insulation	2
231123	Gas Piping System	2
232310	Fans	2
233000	Air Supply and Distribution	2
233713	Grilles, Registers and Diffusers	2
234133	Air Purification System	2
237400	Rooftop Packaged Heating/Cooling Units	2
238310	Energy Management and Control System	2

- Subcontractor to include the cost associated with all equipment required to place HVAC units into their prescribed final locations.
- Subcontractor responsible for the drafting and submission of a crane lifting plan.
- Subcontractor responsible for coordinating roof penetrations with the steel subcontractor.
- Subcontractor responsible for furnishing and installing all roof curbs.
- Subcontractor is responsible for coordinating the layout of equipment pads that are to be supplied by others.
- Subcontractor is responsible for the start up of HVAC units.
- Subcontractor should intend on staged start up of HVAC units, meaning the subcontractor should anticipate that only a percentage of units will be started up at one time.
- Subcontractor is responsible for installing, maintaining, and replacing as needed temporary filters on HVAC returns within the building during its use between installation and building occupancy.

- Subcontractor responsible for coordinating block outs within masonry walls. This is to be done through the drafting and submission of supplemental shop drawings. The shop drawings should be of a level of integrity so that a mechanical tradesman need not be on site during the installation of masonry walls, but yet the mason may still install the block outs as required by referencing said shop drawings. Should the mechanical tradesmen rather chose to have a mechanical tradesman on site during all masonry installations, the aforementioned shop drawing requirement may be waived.
- Subcontractor required to test and inspect their system as required by authority having jurisdiction and per the plans and specifications in order to obtain certificate of occupancy for the project.
- Subcontractor responsible for all cost associated with testing their system following its construction.
- Subcontractor responsible for repairing any floors and walls to their original condition that are penetrated by subcontractor following the floor or wall's construction.
- Subcontractor responsible for making any field adjustments as directed by the project superintendent and as required to complete overhead installation should conflicts between systems ensue.
- Subcontractor responsible for tagging and labeling their system as required per plans and specifications.
- Subcontractor is responsible for participating in overhead inspections and final inspections as required to obtain permission from the authority having jurisdiction to drop ceiling tiles and to occupy the building.
- Subcontractor required to coordinate overhead rough in locations with the general contractor, plumbing tradesman, electrical tradesmen, and fire sprinkler tradesmen prior to the start of their work.
- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.

- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.



St. Simons Elementary School
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Phase 4

Bid package #33– Electrical

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install all electrical works as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
260500	General Requirements, Electrical	2
260501	Electrical Special Provisions	2
260519	Cable, Wire and Connectors, 600 Volt	2
260526	Grounding	2
260533	Electrical Raceways, Boxes, Fittings and Wiring Devices	2
260534	Pull and Junction Boxes	2
260535	Electrical Connections to Equipment	2
260553	Electrical Identification	2
260573	Electrical Equipment Acceptance Testing and Start-Up	2
260923	Occupancy Sensor Lighting Controls (Performance Spec)	2
262213	Dry Type Transformers	2
262400	Switchboards, Panelboards and Enclosures	2
262405	Integrated Facilities Switchboards	2
262425	Safety Switches and Fuses	2
264313	Surge Protective Devices (SPD'S)	2
265113	Interior Building Lighting	2
270528	Telephone and Data Systems Rough-In	2
275116	Public Address and Classroom Intercom Systems	2
283100	Fire Alarm Multiplex Systems (Performance Spec)	2

- Subcontractor responsible for restoring any earth they disturb to its original condition and compaction prior to its disturbance.
- Subcontractor required to have an electrical tradesman on site at all times during masonry activities that require the coordination of rough in locations within walls.
- Subcontractor required to provide temporary power to the project, including any equipment required to do so.

- Subcontractor required to provide all conduit, wire, devices, etc. as required to complete the electrical scope of work.
- Subcontractor required to coordinate electrical requirements with other subcontractors providing equipment that requires power to ensure proper power suppliers as provided.
- Subcontractor required to provide all materials, labor, and equipment to install and maintain temporary lighting on the project per OSHA requirements.
- Subcontractor required to disassemble temporary power installed at the direction of the project superintendent.
Subcontractor required to provide all labor, materials, tools, and equipment to provide the general contractors job site trailer with temporary power.
- Subcontractor shall excavate, install, and backfill all underground utilities required adhering to the specs.
- Subcontractor shall coordinate with General Contractor and GA Power as it relates to all activities associated with the installation and remove of GA Power's works.
- Subcontractor responsible for labeling all junction boxes they install.
- Subcontractor responsible for all cost associated with testing their system following its construction.
- Subcontractor responsible for repairing any floors and walls to their original condition that are penetrated by subcontractor following the floor or wall's construction.
- Subcontractor responsible for making any field adjustments as directed by the project superintendent and as required to complete overhead installation should conflicts between systems ensue.
- Subcontractor responsible for providing definitive deadlines to ongoing activities on site in specificity upon request by the general contractor.
- Subcontractor responsible for tagging and labeling their system as required per plans and specifications.
- Subcontractor responsible for the turnkey installation of equipment pads as required by the plans and specifications.
- Subcontractor responsible for turnkey construction of any temporary doors as required to protect entry into electrical rooms during construction per OSHA requirements.
- Subcontractor is responsible for participating in overhead inspections and final inspections as required to obtain permission from the authority having jurisdiction to drop ceiling tiles and to occupy the building.
- Subcontractor required to coordinate overhead rough in locations with the general contractor, plumbing tradesman, mechanical tradesmen, and fire sprinkler tradesmen prior to the start of their work.
- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.

- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of removing electrical devices specified to be demolished within their bid proposal.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.



St. Simons Elementary School
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Bid package #34 – Pest control

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install pest control as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
313116	Termite Control	2

- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.



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New Construction and Modernization
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Bid package #35 – Fencing

- Subcontractor to provide all labor, tools, materials, and equipment necessary to furnish and install fencing as noted within the listed specification below and in their designated locations as indicated on the construction plans.

Section	Description	Vol
323113	Vinyl Coated Chain Link Fencing and Gates	2

- Subcontractor responsible for restoring any earth they disturb to its original condition and compaction prior to its disturbance.
- Subcontractor to include cost associated with performing field measurements.
- Subcontractor to include all cost associated with multiple mobilizations in order to satisfy the project schedule and as requested by the project superintendent.
- Subcontractor to protect all other's materials adjacent to, and otherwise surrounded thereby, during the installation of their works.
- Subcontractor to install mockups as requested by the architect.
- Subcontractor to attend coordination meetings as requested by the General Contractor in order to coordinate design details and installation.
- Subcontractor to coordinate shop drawings with other trades.
- Subcontractor acknowledges that laydown space is limited on this project due to its proximity to the beach. As such, subcontractor will participate in multiple deliveries with materials segregated as requested by project superintendent as required.
- Subcontractor acknowledges that this is an occupied site and that delivery restrictions exist due to owner occupancy. As such, supplier will coordinate deliveries directly with the project site superintendent.
- Subcontractor agrees to working non-standard work hours and potentially overtime in order to maintain the project's schedule.
- Subcontractor to include the cost of cleaning their works following their installation to present them at the time of their substantial completion in new condition to the Owner.
- Subcontractor to include the cost of the removal of protective films from their finished products following their installation, unless instructed otherwise.

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – PE BUILDING, ADMIN ADDITION AND NEW KITCHEN**

SUPPLEMENTARY CONDITIONS

DESCRIPTION

The Supplementary Conditions modify, change, delete from, or add to the General Condition. Where any article, paragraph, subparagraph, or clause is modified, changed, deleted from or added to, the unaltered provision of that article, paragraph, subparagraph or clause will remain in effect.

SUPPLEMENTS

The following Article, Paragraph, Subparagraph and Clause numbering of Supplements is consistent with the General Conditions documents modified.

ARTICLE 1 – GENERAL PROVISIONS

- 1.1.1 Add the following:
If the bid amount is equal to or greater than one hundred thousand dollars (\$100,000.00) the Contract Documents shall also include:
 - (1) Performance Bond
 - (2) Labor and Material Payment Bond”

- 1.5.3 Add New Subparagraph 1.5.3 as follows:

“1.5.3 The Contractor will be furnished ten (10) sets of Drawings and Project Manuals. Any additional copies required by the Contractor will be furnished at the cost of reproduction and handling.”

ARTICLE 3 – CONTRACTOR

- 3.7 Add new Subparagraph 3.7.6 as follows:

“3.7.6 A Notice of Commencement must be filed by the General Contractor no later than 15 days after the General Contractor physically commences work on the project. The Notice of Commencement must be filed with the Clerk of Superior Court in the County in which the project is located and a copy of the Notice of Commencement must be posted on the project site. The General Contractor is required to give a copy of the Notice of Commencement to any person that makes a written request. A copy must be given within 10 calendar days of receipt of the request. Notice of Commencement must be submitted to the Architect with the initial pay request.”

- 3.9 Add new Subparagraph 3.9.4 as follows:

“3.9.4 Architect and Owner reserve the right to review the performance and competence of the Contractor’s superintendent and the superintendents of the Contractor’s major subcontractors. In the event that the performance of the Contractor’s superintendent or the superintendents of the major subcontractors is judged to be detrimental to the project and that his removal will be in the best interest of the Owner, and the Project; the Architect shall request the superintendent’s removal in writing. The Contractor shall, upon receipt of the written notice, remove the

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – PE BUILDING, ADMIN ADDITION AND NEW KITCHEN**

superintendent, or request his major subcontractor to remove his superintendent, from the project within two weeks and provide a suitable replacement.”

ARTICLE 7 – CHANGES IN THE WORK

7.3.11 Add new subparagraph 7.3.11 as follows:

“7.3.11 Allowance for Overhead and Profit for Change Orders: The allowance for overhead and profit combined, included in the total cost to the Owner, shall be based on the following:

1. For the Contractor, for any work performed by his own forces, fifteen percent (15%) of the cost.
2. For the Contractor, for work performed by his subcontractor, seven and one-half percent (7-1/2%) of the amount due the subcontractor.
3. For each subcontractor involved, for any work performed by his own forces, fifteen percent (15%) of the cost.
4. Cost to which overhead and profit is to be applied shall be determined in accordance with 7.3.6.
5. In order to facilitate checking of quotations for extras or credits, all proposals shall be accompanied by a complete cost breakdown including labor, materials, and subcontracts. Labor and materials shall be marked-up in the manner described above. Where major cost items are subcontracts, they shall be broken-down also.”

ARTICLE 8 – TIME

8.3 Delays and Extensions of Time--Delete Subparagraph 8.3.3 in its entirety and substitute the following:

“8.3.3 In the event Contractor is delayed at any time in the progress of the work, extension of time shall be the Contractor’s sole remedy for any such delay (except for Contractor’s right to terminate this Agreement pursuant to any applicable provisions of the Owner-Contractor Agreement), unless the same shall have been caused by acts constituting intentional interference by the Owner with Contractor’s performance of the work and where, and to the extent that such acts continue after the Contractor’s notice to the Owner of such interference. Written notice of intentional interference by the Owner must be given within twenty (20) days of the occurrence or the claim is waived. The Owner’s exercise of any of its rights under any applicable provisions of the Owner-Contractor Agreement relating to changes in the work, or requirement of correction of re-execution of any of the work, shall not, under any circumstances be construed as intentional interference with the Contractor’s performance of the work.”

8.3.4 Add new subparagraph 8.3.4 as follows:

“8.3.4 Historical climatic conditions for the period during which the work is to be performed must be considered by the Contractor before the proposal is submitted. Weather conditions shall be cause for extension of time only if the historical conditions of rain, snow, or ice are exceeded for the period of the work.

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Documentation of the presence of unusually severe weather and the extent to which the weather delayed the specific work on which the Contractor was then working must be submitted with any notice request in applying for a time extension due to this cause.”

8.3.5 Add new subparagraph 8.3.5 as follows:

“8.3.5 When the Contract time has been extended, as provided under this paragraph 8.3, such extension of time shall not be considered as justifying extra compensation to the Contractor for administrative costs or other such reasons.”

ARTICLE 9 – PAYMENTS AND COMPLETION

9.3.1. Add the new clause 9.3.1.3 as follows:

“9.3.1.3 Until the work is fifty percent (50%) complete, the Owner will pay ninety percent (90%) of the amount due the Contractor on account of progress payments. At the time the work is fifty percent (50%) complete and providing that the Contractor is on or ahead of the schedule as determined by the Architect, and the work is satisfactory, the Contractor may request in writing, prior to pay application, that the retention be reduced to five percent (5%) of the amount due. Accompanied with the written request of retainage reduction the Contractor shall include in writing, consent of surety to reduce retainage.”

9.3.1.4 Add new clause 9.3.1.4 as follows:

“9.3.1.4 The full contract retainage may be reinstated if the manner and progress of the work does not remain satisfactory to the Architect, and if the work does not remain on schedule.”

ARTICLE 11 – INSURANCE AND BONDS

11.1.2 Add the following:

“11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits:

- .1 Workers Compensation and Employers Liability
 - a. State: Statutory Limits
 - b. Employers Liability:
 - * E.L. each accident \$100,000
 - * E.L. Disease- each employee \$100,000
 - * E.L. Disease –Policy limit \$500,000
- .2 Comprehensive General Liability (including Premises - Operations; Independent Contractors Protective; Products and Completed Operations; Broad Form Property Damage); X-C/U Explosion, Collapse and Underground coverage:

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- a. Bodily Injury:
 - \$1,000,000.00 Each Occurrence
 - \$2,000,000.00 Annual Aggregate
- b. Property Damage:
 - \$1,000,000.00 Each Occurrence
 - \$2,000,000.00 Annual Aggregate
- .3. Products and Completed Operations: Same limits as Comprehensive General Liability maintained for one year after Substantial Completion.
- .4. Comprehensive Automobile Liability:
 - Bodily Injury and Property Damage
 - \$300,000.00 Each Person
 - \$500,000.00 Each Occurrence
- .5. Umbrella Excess Liability: \$1,000,000.00”

11.1.5 Add the following new paragraph:

“11.1.5 The Contractor shall file two certified copies of all policies with the Owner before exposure to loss can occur. If the Owner is damaged by the failure of the Contractor to maintain such insurance and to so notify the Owner, then the Contractor shall bear all reasonable cost properly attributable thereto.”

11.4 Performance Bond and Payment Bond – Paragraph 11.4.1 shall be superseded in its entirety by the following:

“11.4.1 If the Contract amount is equal to or greater than one hundred thousand dollars (\$100,000.00) the Contractor shall furnish both a performance bond and a payment bond, in the amount of 100% of the Contract Sum. The surety must be one, which is authorized to do business in the State of Georgia, and listed, in the most recent edition of the U.S. Treasury Department Circular 570 and be acceptable to the Owner. The Contractor shall deliver the required bonds in triplicate to the Owner not later than the date of the execution of the Contract.”

ARTICLE 15 – ARBITRATION

Delete Article 15.4 Arbitration. Insert new Article 15.4 Litigation.

“15.4 – LITIGATION

15.4.1 If contract disputes are not settled by the provisions of 15.3 Mediation, then disputes will be settled by litigation in a court of competent jurisdiction.”

END OF SUPPLEMENTARY CONDITIONS

O.C.G.A. § 13-10-91

GEORGIA CODE
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*** Current Through the 2011 Regular Session ***
*** Annotations Current Through April 22, 2011 ***

TITLE 13. CONTRACTS
CHAPTER 10. CONTRACTS FOR PUBLIC WORKS
ARTICLE 3. SECURITY AND IMMIGRATION COMPLIANCE

O.C.G.A. § 13-10-91 (2011)

§ 13-10-91. Verification of new employee eligibility; applicability; rules and regulations

(a) Every public employer, including, but not limited to, every municipality and county, shall register and participate in the federal work authorization program to verify employment eligibility of all newly hired employees. Upon federal authorization, a public employer shall permanently post the employer's federally issued user identification number and date of authorization, as established by the agreement for authorization, on the employer's website; provided, however, that if a local public employer does not maintain a website, then the local government shall submit such information to the Carl Vinson Institute of Government of the University of Georgia to be posted by the institute on the website created for local government audit and budget reporting. The Carl Vinson Institute of Government of the University of Georgia shall maintain the information submitted and provide instructions and submission guidelines for local governments. State departments, agencies, or instrumentalities may satisfy the requirement of this Code section by posting information required by this Code section on one website maintained and operated by the state.

(b) (1) A public employer shall not enter into a contract pursuant to this chapter for the physical performance of services unless the contractor registers and participates in the federal work authorization program. Before a bid for any such service is considered by a public employer, the bid shall include a signed, notarized affidavit from the contractor attesting to the following:

(A) The affiant has registered with, is authorized to use, and uses the federal work authorization program;

(B) The user identification number and date of authorization for the affiant;

(C) The affiant will continue to use the federal work authorization program throughout the contract period; and

(D) The affiant will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the same information required by subparagraphs (A), (B), and (C) of this paragraph.

An affidavit required by this subsection shall be considered an open public record once a public employer has entered into a contract for physical performance of services; provided, however, that any information protected from

public disclosure by federal law or by Article 4 of Chapter 18 of Title 50 shall be redacted. Affidavits shall be maintained by the public employer for five years from the date of receipt.

(2) A contractor shall not enter into any contract with a public employer for the physical performance of services unless the contractor registers and participates in the federal work authorization program.

(3) A subcontractor shall not enter into any contract with a contractor unless such subcontractor registers and participates in the federal work authorization program. A subcontractor shall submit, at the time of such contract, an affidavit to the contractor in the same manner and with the same information required in paragraph (1) of this subsection. It shall be the duty of any subcontractor receiving an affidavit from a sub-subcontractor to forward notice to the contractor of the receipt, within five business days of receipt, of such affidavit. It shall be the duty of a subcontractor receiving notice of receipt of an affidavit from any sub-subcontractor that has contracted with a sub-subcontractor to forward, within five business days of receipt, a copy of such notice to the contractor.

(4) A sub-subcontractor shall not enter into any contract with a subcontractor or sub-subcontractor unless such sub-subcontractor registers and participates in the federal work authorization program. A sub-subcontractor shall submit, at the time of such contract, an affidavit to the subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract, in the same manner and with the same information required in paragraph (1) of this subsection. It shall be the duty of any sub-subcontractor to forward notice of receipt of any affidavit from a sub-subcontractor to the subcontractor or sub-subcontractor with whom such receiving sub-subcontractor has privity of contract.

(5) In lieu of the affidavit required by this subsection, a contractor, subcontractor, or sub-subcontractor who has no employees and does not hire or intend to hire employees for purposes of satisfying or completing the terms and conditions of any part or all of the original contract with the public employer shall instead provide a copy of the state issued driver's license or state issued identification card of such contracting party and a copy of the state issued driver's license or identification card of each independent contractor utilized in the satisfaction of part or all of the original contract with a public employer. A driver's license or identification card shall only be accepted in lieu of an affidavit if it is issued by a state within the United States and such state verifies lawful immigration status prior to issuing a driver's license or identification card. For purposes of satisfying the requirements of this subsection, copies of such driver's license or identification card shall be forwarded to the public employer, contractor, subcontractor, or sub-subcontractor in the same manner as an affidavit and notice of receipt of an affidavit as required by paragraphs (1), (3), and (4) of this subsection. Not later than July 1, 2011, the Attorney General shall provide a list of the states that verify immigration status prior to the issuance of a driver's license or identification card and that only issue licenses or identification cards to persons lawfully present in the United States. The list of verified state drivers' licenses and identification cards shall be posted on the website of the State Law Department and updated annually thereafter. In the event that a contractor, subcontractor, or sub-subcontractor later determines that he or she will need to hire employees to satisfy or complete the physical performance of services under an applicable contract, then he or she shall first be required to comply with the affidavit requirements of this subsection.

(6) It shall be the duty of the contractor to submit copies of all

affidavits, drivers' licenses, and identification cards required pursuant to this subsection to the public employer within five business days of receipt. No later than August 1, 2011, the Departments of Audits and Accounts shall create and post on its website form affidavits for the federal work authorization program. The affidavits shall require fields for the following information: the name of the project, the name of the contractor, subcontractor, or sub-subcontractor, the name of the public employer, and the employment eligibility information required pursuant to this subsection.

(7) (A) Not later than December 31 of each year, a public employer shall submit a compliance report to the state auditor certifying compliance with the provisions of this subsection. Such compliance report shall contain the public employer's federal work authorization program verification user number and date of authorization and the legal name, address, and federal work authorization program user number of the contractor and the date of the contract between the contractor and public employer. Subject to available funding, the state auditor shall conduct annual compliance audits on a minimum of at least one-half of the reporting agencies and publish the results of such audits annually on the department's website on or before September 30.

(B) If the state auditor finds a political subdivision to be in violation of this subsection, such political subdivision shall be provided 30 days to demonstrate to the state auditor that such political subdivision has corrected all deficiencies and is in compliance with this subsection. If, after 30 days, the political subdivision has failed to correct all deficiencies, such political subdivision shall be excluded from the list of qualified local governments under Chapter 8 of Title 50 until such time as the political subdivision demonstrates to the state auditor that such political subdivision has corrected all deficiencies and is in compliance with this subsection.

(C) (i) At any time after the state auditor finds a political subdivision to be in violation of this subsection, such political subdivision may seek administrative relief through the Office of State Administrative Hearings. If a political subdivision seeks administrative relief, the time for correcting deficiencies shall be tolled, and any action to exclude the political subdivision from the list of qualified governments under Chapter 8 of Title 50 shall be suspended until such time as a final ruling upholding the findings of the state auditor is issued.

(ii) A new compliance report submitted to the state auditor by the political subdivision shall be deemed satisfactory and shall correct the prior deficient compliance report so long as the new report fully complies with this subsection.

(iii) No political subdivision of this state shall be found to be in violation of this subsection by the state auditor as a result of any actions of a county constitutional officer.

(D) If the state auditor finds any political subdivision which is a state department or agency to be in violation of the provisions of this subsection twice in a five-year period, the funds appropriated to such state department or agency for the fiscal year following the year in which the agency was found to be in violation for the second time shall be not greater than 90 percent of the amount so appropriated in the second year of such noncompliance. Any political subdivision found to be in violation of the provisions of this subsection shall be listed on www.open.georgia.gov or another official state website with an indication and explanation of each violation.

(8) Contingent upon appropriation or approval of necessary funding and in order to verify compliance with the provisions of this subsection, each year

the Commissioner shall conduct no fewer than 100 random audits of public employers and contractors or may conduct such an audit upon reasonable grounds to suspect a violation of this subsection. The results of the audits shall be published on the www.open.georgia.gov website and on the Georgia Department of Labor's website no later than December 31 of each year. The Georgia Department of Labor shall seek funding from the United States Secretary of Labor to the extent such funding is available.

(9) Any person who knowingly and willfully makes a false, fictitious, or fraudulent statement in an affidavit submitted pursuant to this subsection shall be guilty of a violation of Code Section 16-10-20 and, upon conviction, shall be punished as provided in such Code section. Contractors, subcontractors, sub-subcontractors, and any person convicted for false statements based on a violation of this subsection shall be prohibited from bidding on or entering into any public contract for 12 months following such conviction. A contractor, subcontractor, or sub-subcontractor that has been found by the Commissioner to have violated this subsection shall be listed by the Department of Labor on www.open.georgia.gov or other official website of the state with public information regarding such violation, including the identity of the violator, the nature of the contract, and the date of conviction. A public employee, contractor, subcontractor, or sub-subcontractor shall not be held civilly liable or criminally responsible for unknowingly or unintentionally accepting a bid from or contracting with a contractor, subcontractor, or sub-subcontractor acting in violation of this subsection. Any contractor, subcontractor, or sub-subcontractor found by the Commissioner to have violated this subsection shall, on a second or subsequent violations, be prohibited from bidding on or entering into any public contract for 12 months following the date of such finding.

(10) There shall be a rebuttable presumption that a public employer, contractor, subcontractor, or sub-subcontractor receiving and acting upon an affidavit conforming to the content requirements of this subsection does so in good faith, and such public employer, contractor, subcontractor, or sub-subcontractor may rely upon such affidavit as being true and correct. The affidavit shall be admissible in any court of law for the purpose of establishing such presumption.

(11) Documents required by this Code section may be submitted electronically, provided the submission complies with Chapter 12 of Title 10.

(c) This Code section shall be enforced without regard to race, religion, gender, ethnicity, or national origin.

(d) Except as provided in subsection (e) of this Code section, the Commissioner shall prescribe forms and promulgate rules and regulations deemed necessary in order to administer and effectuate this Code section and publish such rules and regulations on the Georgia Department of Labor's website.

(e) The commissioner of the Georgia Department of Transportation shall prescribe all forms and promulgate rules and regulations deemed necessary for the application of this Code section to any contract or agreement relating to public transportation and shall publish such rules and regulations on the Georgia Department of Transportation's website.

(f) No employer or agency or political subdivision, as such term is defined in Code Section 50-36-1, shall be subject to lawsuit or liability arising from any act to comply with the requirements of this Code section.

HISTORY: Code 1981, § 13-10-91, enacted by Ga. L. 2006, p. 105, § 2/SB 529; Ga. L. 2009, p. 970, § 1/HB 2; Ga. L. 2010, p. 308, § 2.A/SB 447; Ga. L. 2011, p.

794, § 3/HH 87.

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**RULES
OF
GEORGIA DEPARTMENT OF LABOR**

“GEORGIA SECURITY AND IMMIGRATION COMPLIANCE ACT” OF 2006

CHAPTER 300-10-1

**PUBLIC EMPLOYERS, THEIR CONTRACTORS AND SUBCONTRACTORS
REQUIRED TO VERIFY NEW EMPLOYEE WORK ELIGIBILITY THROUGH A
FEDERAL WORK AUTHORIZATION PROGRAM**

RULES OF GENERAL APPLICABILITY

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300-10-1-.01 Definitions.

- (1) “Commissioner” means the Commissioner of the Georgia Department of Labor.
- (2) “Federal work authorization program” means any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security (USDHS) or any equivalent federal work authorization program operated by the United States

Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603.

(3) "Public employer" means every department, agency, or instrumentality of the state or a political subdivision of the state.

(4) "Subcontractor" includes a subcontractor, contract employee, staffing agency, or any contractor regardless of its tier.

(5) "Georgia Security and Immigration Compliance Act" of 2006 means Senate Bill 529 of the 2006 Georgia General Assembly, enacted as Act 457.

Authority O.C.G.A. 13-10-90.

300-10-1-.02 Public Employers, Their Contractors and Subcontractors Required to Verify New Employee Work Eligibility Through a Federal Work Authorization Program.

(1) Pursuant to O.C.G.A. 13-10-91, every public employer, every contractor of a public employer, and every subcontractor of a public employer's contractor must register and participate in a federal work authorization program, as follows:

(a) On or after July 1, 2007, every public employer shall register and participate in a federal work authorization program to verify the work eligibility information of all new employees.

(b) No public employer shall enter into a contract for the physical performance of services within this state unless the contractor registers and participates in a federal work authorization program to verify the work eligibility information of all new employees.

(c) No contractor or subcontractor who enters into a contract with a public employer shall enter into such a contract or subcontract in connection with the physical performance of services within this state unless such contractor or subcontractor registers and participates in a federal work authorization program to verify the work eligibility information of all new employees.

(2) In accordance with O.C.G.A. 13-10-91, the requirements of paragraphs (b) and (c) of paragraph (1) shall apply to public employers, their contractors and subcontractors, as follows:

(a) On or after July 1, 2007, to public employers, contractors, or subcontractors of 500 or more employees;

(b) On or after July 1, 2008, to public employers, contractors, or subcontractors of 100 or more employees; and

(c) On or after July 1, 2009, to all other public employers, their contractors, or subcontractors.

(3) As of the date of enactment of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "Employment Eligibility Verification (EEV) / Basic Pilot Program" operated by the U. S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA). Public employers, contractors and subcontractors subject to O.C.G.A. 13-10-91 shall comply with O.C.G.A. 13-10-91 and this rule by utilizing the EEV / Basic Pilot Program. The EEV / Basic Pilot Program can be accessed from the USDHS U.S. Citizenship and Immigration Services Internet website at <https://www.vis-dhs.com/EmployerRegistration>. Information and instructions regarding EEV / Basic Pilot Program Registration, Corporate Administrator Registration, and Designated Agent Registration can be found at that website address.

(4) All rules, regulations, policies, procedures and other requirements of the EEV / Basic Pilot Program or any other federal work authorization program defined in Rule 300-10-1-.01 and permitted to be used to satisfy the requirements of O.C.G.A. 13-10-91 and these rules, shall be considered additional requirements of this rule.

(5) In accordance with O.C.G.A. 13-10-91, public employers, contractors and subcontractors may utilize any other federal work authorization program operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603, as such work authorization programs become available.

(6) A copy of these Chapter 300-10-1 rules, including any forms prescribed or available to administer and effectuate these rules, shall be published on the Georgia Department of Labor's website.

(7) In accordance with the provisions of O.C.G.A. 13-10-91, these rules in Chapter 300-10-1 do not apply to any contract or agreement relating to public transportation. Rules and forms applicable to any contract or agreement relating to public transportation may be found on the Georgia Department of Transportation's website.

(8) The rules of Chapter 300-10-1 shall be enforced without regard to race, religion, gender, ethnicity, or national origin.

Authority O.C.G.A. 13-10-91.

300-10-1-.03 Contractor and Subcontractor Evidence of Compliance.

(1) Pursuant to O.C.G.A. 13-10-91, public employers who enter into a contract for the physical performance of services within this state shall include in such contract all of the following provisions:

(a) a provision stating that compliance with the requirements of O.C.G.A. 13-10-91 and Rule 300-10-1-.02 are conditions of the contract;

(b) a provision listing the three statutory employee-number categories of “500 or more employees,” “100 or more employees,” and “fewer than 100 employees,” as identified in O.C.G.A. 13-10-91, with a space provided for the contractor to check, initial or otherwise affirmatively indicate the employee-number category applicable to the contractor; and

(c) a provision stating the contractor’s agreement that, in the event the contractor employs or contracts with any subcontractor(s) in connection with the covered contract, the contractor will secure from the subcontractor(s) such subcontractor(s’) indication of the employee-number category applicable to the subcontractor; and

(d) a provision stating that the contractor’s compliance with the requirements of O.C.G.A. 13-10-91 and Rule 300-10-1-.02 shall be attested by the execution of the contractor affidavit as shown in Rule 300-10-1-.07, or a substantially similar contractor affidavit, which document shall be attached to, and become a part of, the covered contract.

(2) Pursuant to O.C.G.A. 13-10-91, public employers shall include in all covered contracts a provision stating the contractor’s agreement that, in the event the contractor employs or contracts with any subcontractor(s) in connection with the covered contract, the contractor will secure from such subcontractor(s) attestation of the subcontractor’s compliance with O.C.G.A. 13-10-91 and Rule 300-10-1-.02 by the subcontractor’s execution of the subcontractor affidavit shown in Rule 300-10-1-.08 or a substantially similar subcontractor affidavit, and maintain records of such attestation for inspection by the public employer at any time. Such subcontractor affidavit shall become a part of the contractor/subcontractor agreement.

(3) All portions of contracts pertaining to compliance with O.C.G.A. 13-10-91 and these rules, and any affidavits related thereto, shall be open for public inspection in this state at reasonable times during normal business hours.

Authority O.C.G.A. 13-10-91.

300-10-1-.04 Public Employer Certification of Registration and Participation in a Federal Work Authorization Program.

Every public employer shall certify its registration and participation in the EEV / Basic Pilot Program (or other applicable federal work authorization program) by transmitting a copy of all documents required for the public employer’s registration and participation in such program, including a fully executed copy of the required Memorandum of Understanding and the EEV / Basic Pilot Program User Identification Number, to the public employer’s agency head or to an individual designated by the agency head to receive such certification.

Authority O.C.G.A. 13-10-91.

300-10-1-.05 Public Employer Assurance of Compliance with All New Employee Work Eligibility Verification Requirements.

Each public employer subject to O.C.G.A. 13-10-91 shall designate an individual to monitor new employee work eligibility verification required by O.C.G.A. 13-10-91 and these rules. Such public employer shall maintain a file of all written records required under these rules for public inspection. Such records shall be maintained in accordance with the public employer's applicable records retention schedule and applicable federal law. Public employers may implement additional compliance measures as they deem appropriate.

Authority O.C.G.A. 13-10-91.

300-10-1-.06 Conformity with Federal Immigration Law.

The requirements of Chapter 300-10-1 of the Rules and Regulations of the State of Georgia shall be construed in conformity with federal immigration law and requirements including, but not limited to, the Form I-9 provisions of the Employment Eligibility Verification process required pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603.

Authority Ga. L. 2006, p. 105, Section 1.

300-10-1-.07 Contractor Affidavit and Agreement.

Public employers shall use the following affidavit and agreement form, or an affidavit and agreement form that is substantially similar to that provided below, to document a contractor's compliance with the requirements of O.C.G.A. 13-10-91:

Contractor Affidavit and Agreement (Example):

CONTRACTOR AFFIDAVIT AND AGREEMENT

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm, or corporation which is contracting with (name of public employer) has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

The undersigned further agrees that, should it employ or contract with any subcontractor(s) in connection with the physical performance of services pursuant to this contract with (name of

public employer), contractor will secure from such subcontractor(s) similar verification of compliance with O.C.G.A. 13-10-91 on the Subcontractor Affidavit provided in Rule 300-10-01-.08 or a substantially similar form. Contractor further agrees to maintain records of such compliance and provide a copy of each such verification to the (name of the public employer) at the time the subcontractor(s) is retained to perform such service.

EEV / Basic Pilot Program* User Identification Number

BY: Authorized Officer or Agent
(Contractor Name)

Date

Title of Authorized Officer or Agent of Contractor

Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN
BEFORE ME ON THIS THE

____ DAY OF _____, 200__

Notary Public

My Commission Expires:

* As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV / Basic Pilot Program" operated by the U. S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

(End of Form)

Authority O.C.G.A. 13-10-91.

300-10-1-.08 Subcontractor Affidavit.

Contractors shall use the following affidavit form, or an affidavit form that is substantially similar to that provided below, to document a subcontractor's compliance with the requirements of O.C.G.A. 13-10-91:

Subcontractor Affidavit (Example):

SUBCONTRACTOR AFFIDAVIT

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with (name of contractor) on behalf of (name of public employer) has registered with and is participating in a federal work authorization program* [any of the electronic verification of work authorization programs operated by the United States Department of Homeland Security or any equivalent federal work authorization program operated by the United States Department of Homeland Security to verify information of newly hired employees, pursuant to the Immigration Reform and Control Act of 1986 (IRCA), P.L. 99-603], in accordance with the applicability provisions and deadlines established in O.C.G.A. 13-10-91.

EEV / Basic Pilot Program* User Identification Number

BY: Authorized Officer or Agent
(Subcontractor Name)

Date

Title of Authorized Officer or Agent of Subcontractor

Printed Name of Authorized Officer or Agent

SUBSCRIBED AND SWORN
BEFORE ME ON THIS THE
____ DAY OF _____, 200_

Notary Public
My Commission Expires:

* As of the effective date of O.C.G.A. 13-10-91, the applicable federal work authorization program is the "EEV / Basic Pilot Program" operated by the U. S. Citizenship and Immigration Services Bureau of the U.S. Department of Homeland Security, in conjunction with the Social Security Administration (SSA).

(End of Form)

Authority O.C.G.A. 13-10-91.

300-10-1-.09 Random Audit Program.

(1) The provisions of this rule shall not take effect until necessary funds have been specifically appropriated by the General Assembly for such purposes.

(2) It shall be the duty of the Commissioner to review compliance with the provisions of O.C.G.A. 13-10-91 and these rules by making random audits of public employers, their contractors and subcontractors who are subject to the provisions of O.C.G.A. 13-10-91.

(3) The Commissioner shall have the power and authority to employ such persons, make such expenditures, require such reports, make such investigations, and take such other action as is deemed necessary or suitable to accomplish such audits. The Commissioner of Labor and his duly authorized representatives employed for such audits shall have all the powers referred to in Code Section 34-8-88 with respect to the administration of the unemployment insurance program.

(4) All public employers, their contractors and subcontractors subject to O.C.G.A. 13-10-91 shall provide to such authorized representatives of the Commissioner, upon request, such information and documents regarding each employee hired on or after July 1, 2007 as will permit the Commissioner to verify the employer's compliance with O.C.G.A. 13-10-91 and these rules. All public employers, their contractors and subcontractors subject to O.C.G.A. 13-10-91 shall keep true and accurate records of all documents utilized to accomplish and substantiate such compliance. Such records shall be available for inspection in this state and shall be subject to being copied by the Commissioner or an authorized representative of the Commissioner at any time and as often as may be necessary. Such employers shall file such reports, summaries, and other documents as the Commissioner may request. The Commissioner or an authorized representative of the Commissioner may require from any person, employer or individual any sworn or unsworn reports deemed necessary to review compliance with O.C.G.A. 13-10-91 and these rules.

(5) The Department of Labor shall notify a public employer, its contractor(s) or subcontractor(s) subject to O.C.G.A. 13-10-91 in writing whenever it appears to the Commissioner that such employer has failed to satisfy any of the requirements of O.C.G.A. 13-10-91 or these rules. The department shall notify the U. S. Department of Homeland Security whenever the records available to the department, including records requested of and provided by a covered public employer, contractor or subcontractor, are not sufficient to verify the work eligibility of an individual in the employ of such employer.

(6) The Department of Labor shall provide state-wide education and training to assist public employers, their contractors and subcontractors in complying with the requirements of O.C.G.A. 13-10-91 and these rules.

(7) The Commissioner shall have the power and authority to adopt, amend, or rescind these rules and regulations.

Authority O.C.G.A. 13-10-91.

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – PE BUILDING, ADMIN ADDITION AND NEW KITCHEN**

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of **(Glynn County School System)** has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number – ID# is 4-7 numbers {no letters}

Date of Authorization

Name of Contractor

Name of Project

GLYNN COUNTY SCHOOL SYSTEM

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, 202____ in _____(city), _____(state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 202____.

NOTARY PUBLIC

My Commission Expires:

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – PE BUILDING, ADMIN ADDITION AND NEW KITCHEN**

Subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(3)

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with **(name of contractor)** on behalf of **Glynn County Schools** has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the subcontractor with the information required by O.C.G.A. § 13-10-91(b). Additionally, the undersigned subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the contractor within five business days of receipt. If the undersigned subcontractor receives notice that a sub-subcontractor has received an affidavit from any other contracted sub-subcontractor, the undersigned subcontractor must forward, within five business days of receipt, a copy of the notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Subcontractor

Name of Project

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, 202__ in _____ (city), _____ (state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 202__.

NOTARY PUBLIC

My Commission Expires: _____

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – PE BUILDING, ADMIN ADDITION AND NEW KITCHEN**

Sub-subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(4)

By executing this affidavit, the undersigned sub-subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract for (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract): _____ and (name of contractor): _____ on behalf of (Glynn County Schools has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned sub-subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned sub-subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the sub-subcontractor with the information required by O.C.G.A. § 13-10-91(b). The undersigned sub-subcontractor shall submit, at the time of such contract, this affidavit to (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Additionally, the undersigned sub-subcontractor will forward notice of the receipt of any affidavit from a sub-subcontractor to (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Sub-subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Sub-subcontractor

Name of Project

GLYNN COUNTY SCHOOL SYSTEM

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, 202__ in _____ (city), _____ (state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 202__.

NOTARY PUBLIC

My Commission Expires:

Request for Taxpayer Identification Number and Certification

**Give Form to the
requester. Do not
send to the IRS.**

▶ Go to www.irs.gov/FormW9 for instructions and the latest information.

Print or type. See Specific Instructions on page 3.	1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.	
	2 Business name/disregarded entity name, if different from above	
	3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only one of the following seven boxes. <input type="checkbox"/> Individual/sole proprietor or single-member LLC <input type="checkbox"/> Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ▶ _____ Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check LLC if the LLC is classified as a single-member LLC that is disregarded from the owner unless the owner of the LLC is another LLC that is not disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that is disregarded from the owner should check the appropriate box for the tax classification of its owner. <input type="checkbox"/> Other (see instructions) ▶ _____	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from FATCA reporting code (if any) _____ <small>(Applies to accounts maintained outside the U.S.)</small>
	5 Address (number, street, and apt. or suite no.) See instructions.	Requester's name and address (optional)
	6 City, state, and ZIP code	
	7 List account number(s) here (optional)	

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number											
				-			-				
or											
Employer identification number											
				-							

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	Signature of U.S. person ▶	Date ▶
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General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid)

- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See What is backup withholding, later.

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – PE BUILDING, ADMIN ADDITION AND NEW KITCHEN**

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SECTION 011000 – SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
1. Project information.
 2. Access to site.
 3. Work restrictions.

1.2 PROJECT INFORMATION

- A. The project is construction of a new Admin Addition, new Physical Education Building and new Kitchen for the existing elementary school. The Construction Manager for the project is McKnight Construction. The bid packages for this project are listed in “Construction Manager’s Documents in the Project Manual.

1.3 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section. Normal school activities will be conducted on the site throughout the construction period. Contractors must cooperate with owner to limit site noise as to cause minimum interference with classroom instruction.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 4. Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

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1.4 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes.
- C. Controlled Substances: Use of tobacco products and other controlled substances **within the building** is not permitted.
- D. Employee Identification: **Provide** identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times.
- E. Employees of contractor and subcontractors shall not talk to or interact with students.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

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SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
 - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
- C. Related Sections:
 - 1. Divisions 02 through 49 Sections for items of Work covered by allowances.

1.2 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.3 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.

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- D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include **taxes**, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.6 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. **Allowance No. 1:** Allow the sum of **Four Hundred Thousand Dollars (\$400,000.00)** for Owner's Contingency.
- B. **Allowance No. 2:** Allow the sum of **One Hundred and Thirty Thousand Dollars (\$130,000.00)** for furnishing and installing: local sound reinforcement systems at cafeteria, gymnasium, and stage; stage curtain and audio-visual system at stage and gymnasium.

END OF SECTION 012100

**ST. SIMONS ELEMENTARY SCHOOL
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SECTION 012300 – ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

- 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
- 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. **Alternate No. 1:** Modified bituminous membrane roofing system on polyisocyanurate insulation with cover board mechanically fastened through steel deck.
 - 1. **Base Bid:** Modified bituminous membrane roofing on lightweight insulating concrete.
 - 2. **Alternate:** Modified bituminous membrane roofing system on polyisocyanurate insulation with cover board mechanically fastened through steel deck.

- B. **Alternate No. 2:** Add Performance & Payment Bond cost to those bid packages requiring bid bonds.
 - 1. **Base Bid:** No Performance & Payment Bond.
 - 2. **Alternate:** Include Performance & Payment Bond Cost.

- C. **Alternate No. 3:** Cellular lightweight insulating concrete to be used.
 - 1. **Base Bid:** Use lightweight insulating concrete roof deck.
 - 2. **Alternate:** Use cellular lightweight insulating concrete.

END OF SECTION 012300

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SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections:
 - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 3. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 4. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as action submittals.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.

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1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action, informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled dates for installation.
 - i. Activity or event number.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will **not** be provided by Architect for Contractor's use in preparing submittals.
 1. Architect will post PDF files of the Contract Drawings on Architect's website.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

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- a. **Architect reserves** the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on **Architect's** receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow **fifteen (15)** days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. **Architect** will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow **fifteen (15)** days for review of each resubmittal.
- D. Identification and Information: Place a permanent label or title block on each paper copy submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately **6 by 8 inches (150 by 200 mm)** on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of subcontractor.
 - g. Name of supplier.
 - h. Name of manufacturer.
 - i. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
 - j. Number and title of appropriate Specification Section.
 - k. Drawing number and detail references, as appropriate.
 - l. Location(s) where product is to be installed, as appropriate.
 - m. Other necessary identification.
- E. Options: Identify options requiring selection by the Architect.
- F. Deviations: Identify deviations from the Contract Documents on submittals.

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- G. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
- H. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will **return submittals, without review**, received from sources other than Contractor.
1. Transmittal Form: Use **AIA Document G810**.
 2. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Indication of full or partial submittal.
 - j. Drawing number and detail references, as appropriate.
 - k. Submittal and transmittal distribution record.
 - l. Remarks.
 - m. Signature of transmitter.
 3. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- K. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

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PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 2. Action Submittals: Submit **six (6)** paper copies of each submittal, unless otherwise indicated. Architect will return **four (4)** copies.
 3. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
 5. Test and Inspection Reports Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:

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- a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
 - b. **Six (6)** paper copies of Product Data, unless otherwise indicated. Architect will return **four (4)** copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (750 by 1067 mm)**.
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
 - b. **Three (3)** opaque copies of each submittal. Architect will retain **two (2)** copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.

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3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit **one (1)** full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit **three (3)** sets of Samples.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least **three (3)** sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product **indicated in the Contract Documents**.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. PDF electronic file.
 - b. **Three (3)** paper copies of product schedule or list, unless otherwise indicated. Architect will return **two (2)** copies.

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- F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- G. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- I. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. **Use CSI Form 1.5A.** Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
 - 4. Submit subcontract list in the following format:
 - a. PDF electronic file.
 - b. Number of Copies: **Three (3)** paper copies of subcontractor list, unless otherwise indicated.
- J. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- K. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- L. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- M. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- N. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- O. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."
- P. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

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- Q. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- R. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit **digitally-signed PDF electronic file and three (3)** paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Division 01 Section "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

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3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate **action**.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- E. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- F. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

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SECTION 014000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

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- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of **five** previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Contractor's Quality-Control Manager Qualifications: For supervisory personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.
 - 1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.

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2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.

1.5 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 1. Name, address, and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.

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4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

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- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to **ASTM E 329**; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

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1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services unless otherwise specified in individual specification sections. The Owner will select the testing company and pay for quality control test.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, **and the Contract Sum will be adjusted by Change Order.**
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least **24** hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

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- E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses. .
 - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 017300 – EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.3 INFORMATIONAL SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

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2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. **Operational elements include the following:**
 - a. Fire separation assemblies.
 - b. Fire-suppression systems.
 - c. Mechanical systems piping and ducts.
 - d. Control systems.
 - e. Communication systems.
 - f. Electrical wiring systems.
 3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, **mechanical and electrical systems**, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

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2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to **Owner** that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

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3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of **96 inches (2440 mm)** in occupied spaces and **90 inches (2300 mm)** in unoccupied spaces.

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- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.

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- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to **minimize** interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. **Concrete and Masonry:** Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall

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coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Pre-installation Conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Utilize containers intended for holding waste materials of type to be stored.

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4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements of Glynn County, Georgia.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

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- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

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SECTION 024116 – STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings **and site improvements**.
2. **Removing** below-grade construction.
3. Disconnecting, capping or sealing, and **removing** site utilities.

1.2 DEFINITIONS

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

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit informational report, including Drawings, that indicates the measures proposed for protecting individuals and property, **for environmental protection and for dust control**.
- B. Schedule of Building Demolition Activities: Indicate the following:
1. Detailed sequence of demolition work, with starting and ending dates for each activity.
 2. Temporary interruption of utility services.
 3. Shutoff and capping of utility services.
- C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

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- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
- C. Pre-demolition Conference: Conduct conference at **Project site**.
 - 1. Inspect and discuss condition of construction to be demolished.
 - 2. Review and finalize protection requirements.
 - 3. Review procedures for **noise control and dust control**.
 - 4. Review procedures for protection of adjacent buildings.

1.6 PROJECT CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Hazardous Materials: Hazardous materials are present in buildings and structures to be demolished. A report on the presence of hazardous materials is attached at the end of the specification. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.
- C. On-site storage or sale of removed items or materials is not permitted.

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting demolition operations.
- B. **Perform** an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

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- C. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.2 PREPARATION

- A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.
- B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
 - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - 4. Cut off pipe or conduit a minimum of 24 inches (610 mm) below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
- C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of demolition.
- D. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to storage area **designated by Owner**.
 - 5. Protect items from damage during transport and storage.

3.3 PROTECTION

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

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- B. Temporary Protection: Erect temporary protection, such as fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."
1. Protect adjacent buildings and facilities from damage due to demolition activities.
 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.
 4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
- C. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings **and site improvements** completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 2. Maintain fire watch during and after flame cutting operations.
 3. Maintain adequate ventilation when using cutting torches.
 4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.
- C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- D. Explosives: Use of explosives is not permitted.

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3.5 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
- C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
- D. Existing Utilities: Demolish existing utilities and below-grade utility structures.
 - 1. Fill abandoned utility structures with **satisfactory soil materials** according to backfill requirements in Section 312000 "Earth Moving."
 - 2. Piping: Disconnect piping at unions, flanges, valves, or fittings.
 - 3. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.
- E. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.
 - 1. Piping: Disconnect piping at unions, flanges, valves, or fittings.
 - 2. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

3.6 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with **satisfactory soil materials** according to backfill requirements in Section 312000 "Earth Moving."
- C. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

- A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site **and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction.**

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1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

3.9 CLEANING

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

1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

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SECTION 024119 – SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Demolition and removal of selected portions of building or structure.
 2. Demolition and removal of selected site elements.
 3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Historic 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 Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.4 SUBMITTALS

- A. Schedule of Selective Demolition Activities: Indicate the following:
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Locations of proposed dust- and noise-control temporary partitions and means of egress.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

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6. Means of protection for items to remain and items in path of waste removal from building.
- B. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- C. Pre-Demolition **Photographs or Videotapes**: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before Work begins.
- D. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 1. Comply with submittal requirements in Division 01 Section "Construction Waste Management and Disposal."

1.5 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Pre-Demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
 1. Inspect and discuss condition of construction to be selectively demolished.
 2. Review structural load limitations of existing structure.
 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 5. Review areas where existing construction is to remain and requires protection.

1.6 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

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- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove the following items:
 - a. **Loose furniture and equipment.**
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are present in construction to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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 intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of **preconstruction photographs and videotapes.**
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."

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2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."

- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. **Owner** will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

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4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. 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. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain **fire watch** and portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area [**on-site**] [**off-site**] [**designated by Owner**] [**indicated on Drawings**].
 5. Protect items from damage during transport and storage.

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- C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition **and cleaned** and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Cut concrete to a depth of at least **3/4 inch (19 mm)** at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
- E. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be **recycled**, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."

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- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION 024119

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide all cast-in-place concrete, complete, in place, as indicated on the Drawings, specified herein and required for the complete installation.

1.3 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Cast-in-place concrete includes the following:
 - 1. Foundations and footings.
 - 2. Slabs-on-grade.
 - 3. Fill for steel deck.
 - 4. Foundation walls.
 - 5. Load-bearing building walls.
 - 6. Equipment pads and bases.
 - 7. Grout fill for concrete masonry walls.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.
- C. Shop drawings for Concrete Reinforcement:
 - 1. Shop drawings shall be submitted by the Contractor to the Architect and review action received prior to fabrication. When corrections are required, copies will be returned noting such. Drawings shall then be corrected and resubmitted until final review action is received.

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Coordination of shop drawing shall be such that corrections noted on one sheet that affects another drawing will be transmitted and made on all sheets and also resubmitted.

2. Shop drawings shall also include:
 - a. Location of all proposed construction joints, keying and waterstops;
 - b. Location of all openings, depressions, construction and control joints, trenches, sleeves, inserts and items affecting the reinforcement and placing of concrete.
 3. The Contractor shall be responsible for checking quantities and dimensions in accordance with contract drawings. Where discrepancies in dimensions are noted, the Contractor shall notify the Architect of such discrepancies and corrected dimensions will then be furnished by the Architect. Corrected dimensions shall be reflected on shop drawings.
 4. Contract drawings receive precedence over shop drawings unless otherwise authorized in writing.
 5. Shop drawings furnished for reinforcing steel shall contain fabrication details as well as placement drawings which are to be used in conjunction with contract drawings.
 6. Detailing and fabrication of reinforcing shall conform to ACI 315 "Details and Detailing of Concrete Reinforcement", and ACI 315R "Manual of Engineering and Placing Drawings for Reinforced Concrete Structures".
- D. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:
1. Color finishes.
 2. Normal weight aggregates.
 3. Reglets.
 4. Vapor retarder.
 5. Vapor barrier.
 6. Form liners.
- E. Submit 5 copies of laboratory test reports for concrete materials and mix design test. All concrete mix designs shall be prepared by a qualified testing laboratory.
- F. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
- G. Review Action: Submittals are reviewed for general conformance with the design concept only and are subject to all requirements of the contract documents. Contractor is responsible for dimensions, quantities and coordination with other trades. Reviews do not authorize any changes involving additional cost unless stated in separate letter or change order.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 2. ACI 311.4R, "Manual of Concrete Inspection."

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3. ACI 318, "Building Code Requirements for Reinforced Concrete."
 4. ACI 304R, "Guide for Measuring, Mixing, Transporting and Placing Concrete."
 5. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Testing Service:
1. All testing services specified in this section of these specifications shall be performed by a recognized, independent laboratory approved by the Architect and Owner.
 2. The Contractor shall furnish to the testing agency samples of all proposed material to be used which requires testing.
 3. Testing agency shall check and review proposed materials to be used for compliance with these specifications, perform all testing in accordance with referenced standards and provide all reports.
 4. Contractor shall furnish all project specifications, testing material, mill reports, design mixes and cylinders, and shall notify laboratory of concrete pouring schedules so as not to delay progress of the work.
 5. No material or mixes shall be used on project unless approved by the Architect.
 6. Materials and installed work may require testing and retesting, as directed by the Architect, at anytime during the progress of the work. Allow free access to material stockpiles and facilities at all times. Retesting of rejected material and installed work, shall be provided at the Contractor's expense.
- C. Tests for Concrete Materials:
1. Portland cement shall be sampled and tested to determine the properties in accordance with ASTM C 150.
 2. Aggregates shall be sampled and tested in accordance with ASTM C 33 (normal weight).
- D. Supervision: All reinforced concrete construction shall be performed under the personal supervision of the contractor's superintendent. This superintendent shall keep a record of all concrete poured on the job. The record shall show in detail the area poured, the time and date of the pour and weather conditions which existed at the time of the pour. Upon completion of the work, this record shall be turned over to the Architect.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.

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- C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.
- D. Forms for Cylindrical Columns and Supports: Metal, glass-fiber-reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
- E. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- F. Form Ties:
 - 1. Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
 - 2. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Steel Wire: ASTM A 1064, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 1064, welded steel wire fabric.
- D. Deformed-Steel Welded Wire Fabric: ASTM A 497.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.
 - 1. For slabs-on-grade, including thickened slab areas, use supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).
 - 3. For foundations, support reinforcing in bottom at footings with whole concrete bricks at 4'-0" on center.

2.3 CONCRETE MATERIALS

- A. Portland Cement:
 - 1. Comply with ASTM C 150, Type I.
 - 2. Use one brand of cement throughout Project unless otherwise acceptable to Architect.

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- B. Fly Ash: ASTM C 618, Type F.
- C. Normal-Weight Aggregates:
1. Comply with ASTM C 33 Class 4M and as specified. Provide aggregates from a single source for exposed concrete.
 2. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
 3. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
 4. Do not use aggregates containing soluble salts, iron sulphide, pyrite, marcasite or ochre which can cause strains on exposed concrete surfaces.
 5. Dune sand, bank run sand and manufactured sand are not acceptable.
 6. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone.
 - b. Washed gravel, either natural or crushed. Use of pit or bank run gravel is not permitted.
 - c. Maximum Aggregate Size: Not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depths of slabs nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars nor over 1" in max. size except for block fill where max. size shall not exceed ½".
- These limitations may be waived if, in the judgement of the Architect, workability and methods of consolidation are such that concrete can be placed without honeycomb or voids.
- D. Lightweight Aggregates: ASTM C 330.
- E. Water: Potable.
- F. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- G. Air-Entraining Admixture:
1. Comply with ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- H. Water-Reducing Admixture:
1. Comply with ASTM C 494, Type A.
- I. High-Range Water-Reducing Admixture:
1. Comply with ASTM C 494, Type F or Type G.
- J. Water-Reducing, Accelerating Admixture:
1. Comply with ASTM C 494, Type E.

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- K. Water-Reducing, Retarding Admixture:
 - 1. Comply with ASTM C 494, Type D.
- L. Calcium Chloride: Calcium chloride will not be permitted in concrete.

2.4 RELATED MATERIALS

- A. Preformed Expansion Joint Fillers: Premolded fillers shall meet “Specifications for Premolded Expansion Joint Fillers for Concrete Paving and Structural Construction”, ASTM D 1751.
- B. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- C. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.0336 inch thick (22 gage) with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.
- D. Slab on Grade Floor Joint Forms:
 - 1. Interior spaces: 24 ga., pre-shaped keyed type galvanized steel joint forms and stakes. Galvanizing shall be hot-dipped conforming to ASTM A 653 Grade 80 Steel G90 coating class.
 - 2. Exterior spaces: Wood or metal removable tongue and groove joint forms.
- E. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 pounds of fluosilicates per gallon.
- F. Sand Fill: Clean, manufactured or natural sand.
- G. Membrane-Forming Curing Compound: ASTM C 1315, 30% solids content minimum, Type 1, Class A.
- H. Vapor Barrier: Provide vapor barrier that is resistant to deterioration when tested according to ASTM E 1745, as follows:
 - 1. Membrane sheet not less than 10 mils thick, meeting ASTM E 1745, Class C.
- I. Nonslip Aggregate Finish: Provide fused aluminum oxide granules or crushed emery as the abrasive aggregate for a nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, non-glazing, and unaffected by freezing, moisture, and cleaning materials.
- J. Colored Wear-Resistant Finish:
 - 1. Use packaged dry combination of materials consisting of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are

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finely ground non-fading mineral oxides interground with cement. Color as selected by Architect from manufacturers' standards, unless otherwise indicated.

- K. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- L. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.
- M. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A.
- N. Epoxy Adhesive:
 - 1. ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

2.5 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
 - 1. Limit use of fly ash to not exceed 25 percent of cement content by weight.
- B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.
- C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
 - 1. Exterior Concrete, Exposure Category F:
 - a. Formed Concrete (Class F1): 4500 psi, 28-day compressive strength; 0.45 water/cement; air-entrained.
 - b. Slab on Grade (Class F2): 4500 psi, 28-day compressive strength; 0.45 water/cement; air-entrained.
 - c. Foundations (Class F0): 3000 psi, 28-day compressive strength; non-air-entrained.
 - 2. Interior Concrete:
 - a. Formed Concrete: 4000 psi, 28-day compressive strength; 564 lbs. Cement per cubic yard minimum; non-air-entrained.
 - b. Slabs on Grade: 3000 psi, 28-day compressive strength; non-air-entrained.
 - c. Foundations: 3000 psi, 28-day compressive strength; non-air-entrained.
 - 3. Concrete Masonry Grout: 2500 psi, 28-day compressive strength.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

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1. Ramps, slabs, and sloping surfaces: Not more than 4 inches.
 2. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
 3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
 4. Concrete masonry grout: not less than 8 inches and not more than 11 inches.
 5. Other concrete: Not more than 4 inches.
- E. Lightweight Structural Concrete: Lightweight aggregate and concrete shall conform to ASTM C 330. Proportion mix to produce concrete with a minimum compressive strength of 4000 psi at 28 days and a calculated equilibrium unit weight of 110 pcf plus or minus 3 pcf as determined by ASTM C 567. Concrete slump at the point of placement shall be the minimum necessary for efficient mixing, placing, and finishing. Maximum slump shall be 6 inches for pumped concrete and 5 inches elsewhere. Air entrain concrete exposed to weather according to ACI 301 requirements.
- F. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work. No water shall be added to concrete mix at job site unless approved by Architect, except where indicated on delivery ticket that water has been withheld at batch plant and total amount of water does not exceed the total amount of mix water on the approved mix design.

2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
 1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
 - a. 4.5 percent (Exposure Class F1); 5.5 percent (Exposure Class F2) for 1-1/2-inch maximum aggregate.
 - b. 4.5 percent (Exposure Class F1); 6.0 percent (Exposure Class F2) for 1-inch maximum aggregate.
 - c. 5.0 percent (Exposure Class F1); 6.0 percent (Exposure Class F2) for 3/4-inch maximum aggregate.

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- d. 5.5 percent (Exposure Class F1); 7.0 percent (Exposure Class F2) for 1/2-inch maximum aggregate.
 - 2. Other concrete not exposed to freezing and thawing (Exposure Class F0), or hydraulic pressure, or to receive a surface hardener. No air-entrainment. Maximum total air content shall not exceed 3 percent.
- E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

- A. Job-Site Mixing:
- 1. Mix concrete materials in appropriate drum-type batch machine mixer. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than 1 cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd.
 - 2. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- B. Ready-Mixed Concrete:
- 1. Comply with requirements of ASTM C 94, and as specified.
 - 2. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate the installation of joint materials, vapor barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

- A. General:
- 1. Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:
 - 2. Provide Class A tolerances for concrete surfaces exposed to view.

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3. Provide Class C tolerances for other concrete surfaces.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
- D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR BARRIER INSTALLATION

- A. General: Place vapor barrier sheeting in position with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal with manufacturer's recommended mastic or pressure-sensitive tape.

3.4 PLACING REINFORCEMENT

- A. General:
 1. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.

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2. Avoiding cutting or puncturing vapor barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at all points of contact between slabs-on-grade and vertical surfaces column pedestals, foundation walls, grade beams and elsewhere as indicated on the drawings.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Construction Joints in Slabs-on-Grade:
 1. Construction joints for slab-on-grade (floor joints) shall be tongue and groove key type wood or steel joint form. Prefabricated metal floor joint forms shall be installed as per manufacturer's instructions.
 2. All floor joints to be removed shall be painted on one side with grease or mastic to prevent bond.
 3. Galvanized steel interior floor joint forms may be set to permit simultaneous pouring of concrete on both sides. Metal form to be left in place.

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- F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.6 INSTALLING EMBEDDED ITEMS AND ANCHORS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Install dovetail anchor slots in concrete structures as indicated on drawings.
- D. Edge Forms and Screed Strips for Slabs: Set edge forms, or bulkheads and intermediate screed strips for slabs to obtain the elevations and contours in the finished slab surface. Provide and secure units to support the type of screed strips by the use of strike-off templates or accepted compacting type screeds. Screed strips are to be constructed, supported and set to avoid displacement of reinforcing steel positions.
- E. All post-installed mechanical anchors shall be tested in accordance with ACI 355.2 and shall be installed as directed by the inspected manufacturer written instructions and in accordance with the ICC-ES report.
- F. All post-installed adhesive anchors shall be tested in accordance with ACI 355.4 and shall be installed as directed by the inspected manufacturer written instructions and in accordance with the ICC-ES report.

3.7 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 - 1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

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3.8 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304R, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms:
 - 1. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 2. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309R.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- E. Placing Concrete Slabs:
 - 1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 - 2. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 - 3. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 4. Maintain reinforcing in proper position on chairs during concrete placement.
- F. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

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2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305R and as specified.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.
1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Grout-Cleaned Finish:
1. Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.
 2. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.

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3. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
 1. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish:
 1. Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
 2. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish:
 1. Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
 2. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 38 (floor flatness) and F(L) 30 (floor levelness) and minimum local tolerances of F(F) 25 and F(L) 20 measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.

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EXCEPTION: For slab surfaces scheduled to receive terrazzo, thin-set ceramic, or rubber type gymnasium flooring, and for surfaces to be stained or polished, finish surfaces to tolerances of F(F) 50 (floor flatness) and F(L) 30 (floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.

- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- E. Nonslip Broom Finish:
1. Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 2. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- F. Nonslip Aggregate Finish:
1. Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and where indicated.
 2. After completing float finishing and before starting trowel finish, uniformly spread 25 lb of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.
 3. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.
- G. Chemical Hardener Finish:
1. Apply chemical hardener finish to all exposed dry interior concrete floors exposed to view.
 2. Apply liquid chemical hardener after complete curing and drying of the concrete surface.
 3. Dilute the liquid hardener with water and apply three coats:
First Coat: 1/3 strength
Second Coat: 1/2 strength
Third Coat: 2/3 strength
 4. Evenly apply all coats and allow 24 hours drying time between coats.
 5. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instruction.
 6. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.
- H. F(L) and F(F) Exceptions:
1. F(L) tolerances and testing specified herein shall not be applicable to formed elevated concrete slab surfaces.
 2. F(L) and F(F) tolerances and testing specified shall not be applicable to surfaces within two feet of any floor joints, pre-positioned embedments, or any types of full-depth penetrations in accordance with ASTM E-1155.

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3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- D. Reinforced Masonry: Provide concrete grout for reinforced masonry lintels, bond beams and vertically reinforced cells where indicated on the drawings or as scheduled. Maintain accurate location of reinforcing steel during concrete placement. All masonry voids to be kept clean of mortar fins or obstructions to ensure complete filling of designated cells.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
- D. Provide moisture curing by the following methods:
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Use continuous water-fog spray.
 - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.
- E. Provide moisture-retaining cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

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- F. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
 - 1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
 - 1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.13 SHORES AND SUPPORTS

- A. General: Comply with ACI 347 for shoring and reshoring in multistory construction, and as specified.
- B. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted.
- C. Extend shoring at least three floors under floor or roof being placed for structures over four stories. Shore floor directly under floor or roof being placed, so that loads from construction above will transfer directly to these shores. Space shoring in stories below this level in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members where no reinforcing steel is provided. Extend shores beyond minimums to ensure proper distribution of loads throughout structure.
- D. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to support work without excessive stress or deflection.
- E. Keep reshores in place a minimum of 15 days after placing upper tier, or longer, if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

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3.14 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg. F (10 deg. C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
- C. Form-facing material may be removed 4 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.

3.15 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.16 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

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- C. Repairing Formed Surfaces:
1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
 2. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces:
1. Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
 2. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 3. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 4. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
 5. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- F. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- G. Repair methods not specified above may be used, subject to acceptance of Architect.

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3.17 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Contractor will employ a testing agency to perform tests and to submit test reports.
- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.
 - 1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
 - 4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 - 5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to the Architect within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- E. Floor Tolerance Testing: Test slab in accordance with ASTM E1155 within 24 hours of the final troweling. Provide tolerance report including key plan showing location and results of testing to the Architect.

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- F. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 033000

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SECTION 035100 – CEMENTITIOUS WOOD FIBER ROOF DECK

PART 1 – GENERAL

1.01 SCOPE

- A. The work consists of furnishing all labor, materials, accessories and equipment necessary to cover all areas indicated on the drawings with structural cement wood fiber roof deck.

1.02 QUALIFICATIONS

- A. Design of roof deck system is based on wood fiber roof deck panels as manufactured by Tectum Inc. Newark, OH. or an approved equal. The panels consist of wood fibers bonded with an inorganic hydraulic cement binder.
- B. The following manufacturers are approved provided they meet or exceed the specified requirements:
 - 1. Lamit Industries - Enviroplank
 - 2. Heraklith, Inc.

1.03 SUBMITTALS

- A. Catalog Data: Submit manufacturer's current standard published catalog, technical data, and details.

1.04 QUALITY ASSURANCE

- A. Roof Deck Supplier: Regularly engaged in production of wood fiber roof deck systems.
- B. Roof Deck Applicator: Regularly engaged and equipped for application of wood fiber roof deck systems. Applicator must be approved by roof deck supplier.

1.05 DELIVERY & STORAGE

- A. Careful job coordination will result in the simultaneous application of the roofing system to insure that the deck is not exposed to precipitation or condensation, which may cause water staining or reduce the structural strength of the deck with extended exposure.
- B. Storage: Roof deck material shall be stored on adequate level blocking and be protected from weather. Edges and surfaces of decking shall be protected during storage and erection.

1.06 DESIGN CONDITIONS

- A. Roof deck material shall be capable of supporting an average uniformly distributed load of 50 pounds per square foot minimum over maximum 72" spans.
- B. Roof deck material shall have a flame spread of 25 or less when tested in accordance with ASTM E-84 for the exposed interior surface.

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- C. The roof deck material shall be uniformly 3” thick with tolerance not to exceed plus or minus 1/8", and approximate weight of 5.5 psf.
- D. The roof deck shall have an NRC value of .60.
- E. The roof deck material must have model code listing (ICBO), (BOCA), (SBCCI).

PART 2 – PRODUCTS

2.3 LONG SPAN PLANK

- A. The roof deck material shall have a tongue and grooved and beveled edge with a 16-gauge galvanized steel channel inserted to span up to 60".
- B. Reinforcing channel shall be 16-gauge, hot dipped galvanized steel.
- C. All roof deck panels to be mechanically attached, with minimum #15 heavy duty deck screws, to the steel to achieve the wind uplift pressures as indicated on the structural drawings. Screws shall be of sufficient length to penetrate the roof deck and the supporting steel a minimum of 3/4". 2" washers must be used in conjunction with the screws. In addition to mechanical fasteners, adhesive must be placed on joist, and in tongue and groove joints as required for desired diaphragm. The adhesive must meet the requirements of AFG-01 or an approved equal.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Steel framing should be inspected by the roof deck erectors so that any discrepancies in placement, spacing, or alignment from the shop drawings can be rectified by the steel contractor before the roof deck is installed.

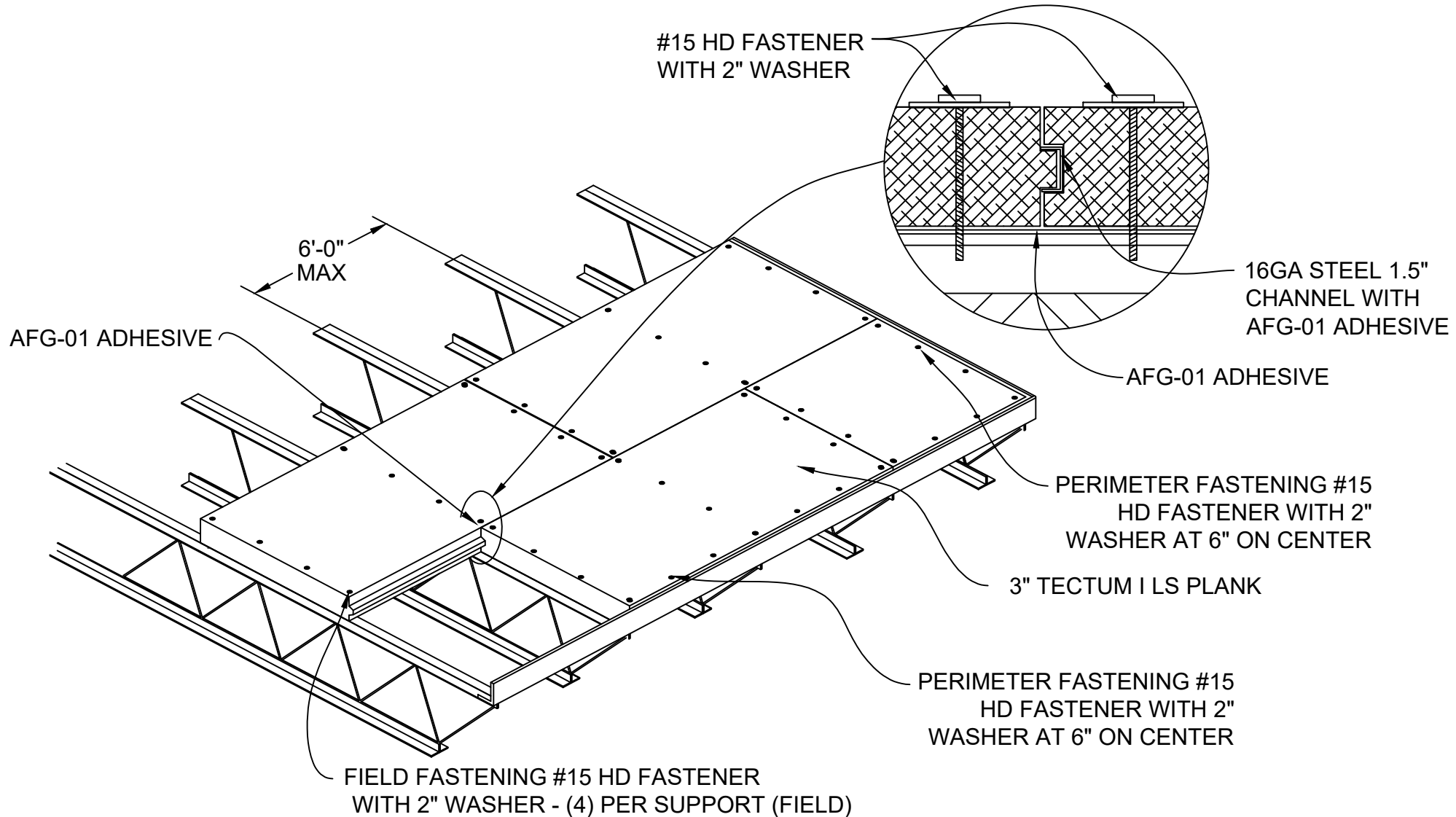
3.02 INSTALLATION

- A. Panels shall be cut to fit neatly at walls, parapets, curbs, or other openings. All openings greater than 8" in either direction must have additional structural frame support.
- B. All ends, and edges of decking must be continuously supported along the outside perimeter by the outside walls directly or by supplemental framing.

3.03 DEFECTIVE WORK

- A. Replace damage panels in accordance with manufacturers instructions or where physical properties do not meet specified requirements, as determined by architect.

END OF SECTION 035100



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**TECTUM ATTACHMENT
 PATTERN**

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SECTION 035216 – CELLULAR LIGHTWEIGHT INSULATING CONCRETE – (ALTERNATE NO. 3)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including all General and Supplementary Conditions apply to this section.

1.2 SUMMARY

- A. This section includes cast-in-place cellular lightweight insulating concrete for roof decks.
- B. Related Sections include:
 - 1. Metal Decking, Division 05000
 - 2. Rough Carpentry, Wood blocking and curbs, Division 06000
 - 3. Roof Membrane, Division 07000

1.3 DEFINITIONS

- A. Cellular Lightweight Insulating Concrete: Low-density concrete produced using preformed foam.

1.4 REFERENCES

- A. ASTM C 150, Standard Specification for Portland Cement.
- B. ASTM C 138, Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.
- C. ASTM C 172, Standard Practice for Sampling Freshly Mixed Concrete.
- D. ASTM E 329, Standard Specification for Agencies Engaged in Construction Inspection, Testing or Special Inspection.
- E. ASTM C 495, Standard Test Method for Compressive Strength of Lightweight Insulating Concrete.
- F. ASTM C 796, Standard Test Method for Foaming Agents for use in Producing Cellular Concrete Using Preformed Foam.
- G. ASTM C 869, Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete.
- H. ASTM C 578, Standard Specification for Rigid Cellular Polystyrene Thermal Insulation.

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- I. ASTM C 177, Standard Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus.
- J. ASTM C 518, Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- K. ASTM C 513, Standard Test Method for Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength.
- L. ASTM C 1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.

1.5 SUBMITTALS

- A. Product data for the cellular lightweight insulating concrete and the polystyrene insulating board indicating compliance with all applicable Approvals, Standards and required physical property values.
- B. Florida Product Approval Number, 2017 Code Version, including HVHZ Approval.
- C. Miami Dade County, Notice of Product Acceptance - NOA
- D. Shop drawings indicating polystyrene insulation layout and thicknesses, slope and drain locations, high and low point thickness from atop the structural deck.
- E. Applicator shall be a firm Approved in writing by the foam concentrate Manufacturer. The Manufacturer provided Approval letter shall mention the project by name.
- F. Certificates from manufacturers certifying that each of the following materials comply with referenced standards:
 - 1. Portland Cement
 - 2. Foaming Agent
 - 3. Admixtures
 - 4. Polystyrene (EPS) Holey Board Insulation

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualification: An independent testing agency shall be qualified in accordance with ASTM C 1077 and ASTM E 329 for testing indicated.
- B. FM Global Approval: provide cellular lightweight insulating concrete that has been evaluated by FM Approvals as part of a roof assembly and is listed in the FM RoofNav data base for Class 1 and non-combustible construction.
- C. UL Fire Resistance Ratings: where indicated, provide cellular lightweight insulating concrete identical to those assemblies tested for fire resistance per ASTM E 119 and listed in UL's Fire Resistance Directory. The cellular lightweight insulating concrete shall be UL

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Classified and listed in the current UL Fire Resistant Design Directory under Category COXX, Floor and Roof Topping Mixtures.

1.7 DELIVERY AND STORAGE

- A. Deliver materials unopened in the manufacturers original packaging or by acceptable bulk delivery.
- B. Materials shall be identifiable by manufacturers labeling.
- C. Where applicable materials shall bear the following Approval Marks:
 - 1. Underwriters Laboratories - UL
 - 2. Factory Mutual - FM
 - 3. Miami-Dade County - NOA

1.8 PROJECT CONDITIONS

- A. When air temperatures 40°F or above are predicted to occur within the first 24 hours after placement, normal application shall apply.
- B. When air temperatures are 40°F and are predicted to fall to freezing within 24 hours of placement, the placement shall be postponed.
- C. Do not place when air temperatures are 32°F or below.
- D. Do not place during precipitation, or when there is a likely expectation that precipitation will occur. Do not place upon surfaces covered with water, frost, ice or snow.

1.9 WARRANTY / GUARANTEE

- A. Upon successful completion of the project, after all post installations have been completed, furnish the Owner a roof deck system manufacturer's warranty. The warranty shall be a term type and shall be issued to the Owner at no additional cost. Specific items covered under the warranty shall include:
 - 1. The actual resistance to heat flow through the roof insulation will be at least 80% of the designed thermal resistance, provided the insulation is dry and the roof membrane is free of leaks.
 - 2. The roof insulation will remain in a re-roof able condition should the roof membrane require replacement during the original term of the warranty (excluding damage caused by fastener withdrawal during the removal of the roof cover).
 - 3. The roof insulation will not cause structural damage to the building as a result of expansion from thermal or chemical reaction.
 - 4. The roof insulation will not cause the roof membrane to leak as a result of vapor pressure build-up from batching (mixing) water used to produce the insulating concrete.
 - 5. The roof insulation warranty period shall be [value] years from the date of substantial completion.

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PART 2 – PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Manufacturers whose products are listed and meet or exceed the requirements of this specification are approved for use.
- B. Approved Manufacturer: Celcore Incorporated, www.celcoreinc.com.

2.2 MATERIALS

- A. Cement: Portland type I, I/II meeting ASTM C150
- B. Water: Shall be clean, potable, free from injurious quantities of acid, alkali, salt, oil, organic matter and other impurities. The maximum permissible chloride level is 250 ppm.
- C. Foaming Agent: Meeting ASTM C 869 when tested in accordance with ASTM C 796. Foam concentrate shall be labeled bearing FM, UL and Miami-Dade Approval Marks.
- D. Admixtures: Admixtures shall not be used unless approved in writing by the Foam Manufacturer.
- E. Insulating Board: Shall be a product of expanded polystyrene meeting ASTM C 578, 1 lb / ft³ nominal density with holes comprising approximately 3% of the gross surface area. Approved manufacturers include:
 - 1. Carpenter Company www.carpenter.com
 - 2. Cellofoam North America www.cellofoam.com
 - 3. Dyplast Products, LLC www.dyplastproducts.com
 - 4. Insulfoam www.insulfoam.com
 - 5. ThermaFoam, LLC www.thermafoam.com
- F. Curing Compound: As required by the insulating concrete manufacturer and applied in accordance with the manufacturer's instructions.

2.3 CELLULAR INSULATING CONCRETE

- A. Mix materials in strict accordance with recommendations of the foam manufacturer to yield the proper physical properties. Use the minimum amount of mix water required to produce concrete having good placement and working properties.
- B. Mix and pump the cellular lightweight insulating concrete into place using a batch plant approved by the foam manufacturer. Thoroughly blend all materials before discharging the mixer.
- C. Wet cast density: 38 - 42 lbs/ft³ (+/- 3 lbs/ft³) at the point of placement when sampled in accordance ASTM C 172 except as modified by the applicable sections of ASTM C 495. End of hose wet density shall be determined in accordance ASTM C 138. Do not rod or

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vibrate sample.

- D. Oven dry density: 26 - 36 lbs/ft³ when tested at 28 days in accordance with the applicable sections of ASTM C 495.
- E. The cellular insulating concrete shall have a minimum 28-day compressive strength of 200 - 350 psi when tested in accordance with ASTM C 495.
- F. The insulating concrete deck shall be designed to provide a minimum or average R-value of: R = 20.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Structural Concrete Deck: Verify that the surface of the structural concrete deck to receive the cellular insulating concrete is free from any materials, debris, standing water, other coverings and/or substances that may prevent bond.
- B. Steel Deck: Examine the decking for inadequate anchorage, foreign materials, debris, moisture or unevenness that would prevent proper application or adequate bond. Report inadequacies for correction.

3.2 PREPARATION

- A. Cover and protect all equipment, stands, curbs, drains, etc., prior to beginning placement of the cellular insulating concrete.
- B. Protect all elements that interface with or are beneath the insulating concrete placement from application damage or disfigurement.

3.3 INSTALLATION

- A. Place a slurry layer of cellular concrete to a minimum thickness of 1/8 inch over top of the steel deck corrugations or structural concrete deck.
- B. Immediately place the EPS holey board insulation into the fresh cellular concrete layer in a manner which causes the boards underside to make full contact with the concrete. Cellular concrete shall be caused to enter into the keying holes of the board. The insulation board shall be placed in a brick like pattern of staggered joints butted together.
- C. When required, install the EPS holey board in a stepped configuration with maximum steps of 1 inch.
- D. The installed EPS holey board layer shall be allowed to set overnight undisturbed prior to receiving topping.
- F. Place a minimum 2-inch-thick topping layer of cellular insulating concrete above the insulation board. Screed and hand finished the placement to a smooth surface.

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- G. Apply curing compound to the surface of the deck after topping placement once the layer has hardened sufficiently to receive foot traffic without causing damage. Curing shall be applied at a rate and in a manner recommended by the foam manufacturer.

3.4 FIELD QUALITY CONTROL

- A. End-of-hose wet density checks shall be taken every thirty minutes during placement. Density information shall be recorded by the placement foreman and kept as a written project record. Sampling shall be done in accordance ASTM C 172 except as modified by the applicable sections of ASTM C 495.
- B. Cylindrical test specimen shall be cast during each day's placement or at every 5000 sq/ft of placement. Specimens shall be cast in accordance with the applicable sections of ASTM C 495. Do not rod. A set of test specimens shall be considered (6) 3 x 6 cylinders. (4) specimens of each set shall be tested for compressive strength and (2) shall be for oven-dry density determination. Testing shall be conducted at age 28 days in accordance with ASTM C 495.
- C. Retesting for compressive strength and oven dry density, if required, shall be done in accordance with ASTM C 513.

3.5 PROTECTION

- A. The installed cellular insulating concrete roof deck shall be protected from work traffic for a minimum of 48 hours after topping placement. The roof deck shall be protected from concentrated loads of construction materials. Load distribution materials such as plywood shall be used by other trades when stocking materials.
- B. Coordinate installation of the roof cover such that the installed insulating concrete deck is not exposed for unnecessary extended periods of time. Membrane installation is recommended to begin within 3 to 7 days following roof deck topping placement.

3.6 REPAIRS

- A. Where required to provide a surface condition acceptable to receive the roof cover, repairs to smooth the deck surface, correct depressions or fill divots shall be done in accordance with written guidance provided by the foam concentrate manufacturer.

3.7 DEFECTIVE WORK

- A. Remove and replace any area of the roof deck placement that fails to comply with the requirements of the foam manufacturer, this specification or applicable product Approvals.

END OF SECTION 035216

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SECTION 035500 – LIGHTWEIGHT INSULATING CONCRETE ROOF DECK – BASE BID

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

1.02 SUMMARY

- A. General: Furnish labor, materials, equipment, and service to complete the lightweight insulating concrete roof deck including rigid insulation vent board in accordance with this section and the requirements of the specifications. Extent of lightweight insulating concrete shown on drawings.

1.03 SUBMITTALS

- A. Catalog Data: Submit manufacturer's current standard published catalog and technical data and details describing product and methods of mixing and application.
- B. Drawings and Details: Submit complete plans including elevations and details to clearly indicate location and installation of specified products.
 - 1. Provide roof plan showing slope and thickness of insulation.
 - 2. Provide calculations showing insulation "R" value.

1.04 QUALITY ASSURANCE

- A. Insulating Concrete Supplier: Regularly engaged in production of lightweight insulating concrete.
- B. Insulating Concrete Applicator: Regularly engaged and equipped for application of lightweight insulating concrete, and as acceptable by aggregate producer.
- C. Warranty: Provide a Twenty (20) year written guarantee from the manufacturer for the lightweight insulating concrete roof deck system to include the insulating concrete and the insulation board.
- C. Complete roof deck assembly including metal decking must be listed with FM-135 indicating compliance with the design requirements of this project.

1.05 DELIVERY & STORAGE

- A. Delivery: Deliver bulk materials in manufacturer's original undamaged package or containers with manufacturer's name and contents legibly indicated.
- B. Storage: Store material in dry well-ventilated areas.

1.06 JOB CONDITIONS

- A. Do not place lightweight insulating concrete when ambient temperature is below freezing (32 degree F, 0 degree C).

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B. Do not place lightweight insulating concrete on surfaces covered with standing water, snow or ice.

1.07 SYSTEM DESCRIPTION

A. **(Slurry Coat)** System based on Siplast Roof Insulation Systems "Insulcel".

1. "Insulcel-PB" system consisting of vented insulation set in slurry of insulating concrete and covered with insulating concrete.
2. Other approved manufacturers are:
 - a. Strong Manufacturing Co. – Pine Bluff, AK.
 - b. Vermiculite Products, Inc., Houston, TX

B. **(Top Pour)** System based on Siplast Roof Insulation Systems "Zonolite Roof Insulation".

1. "ZIC" system consisting of vented insulation set in slurry of insulating concrete and covered with insulating concrete.
2. Other approved manufacturers are:
 - a. Strong Manufacturing Co. – Pine Bluff, AK.
 - b. Vermiculite Products, Inc., Houston, TX

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Portland Cement: ASTM C 150-89, Type I, II or III.
- B. Foam concentrate: Protein based foam concentrate conforming to ASTM C 869 and ASTM C 796.
- C. Aggregate: Stabilized Vermiculite, ASTM C 332-87, Group I.
- D. Water: Clean, potable and free from deleterious amounts of acid, alkali, and organic material.
- E. Air Entraining Admixture: ASTM C 260-86
- F. Insulation Board:
 1. Insulation board shall be fabricated 24"x48" board size. Unit weight shall not exceed 1.2 pcf.
 2. Approved manufacturers:
 - a. Siplast Roof Insulation System's "Insulperm" – Dallas, TX.
 - b. Strong Manufacturing Co. – Pine Bluff, AK.
 - c. Vermiculite Products, Inc., Houston, TX
 3. Insulation board shall have a Factory Mutual label on each bundle.
- G. Corrugated Metal Forms:
 1. General: Metal deck shall be fabricated of corrugated, galvanized, high strength steel of

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shape, weight and gauge to support all construction loads that may be imposed during the installation of the lightweight insulating concrete. Metal deck shall be slotted/perforated (unless otherwise specified) to provide minimum 1.5% open area.

2. Galvanized coating shall be hot-dip conforming to ASTM A 653, G-90 galvanized coating.
3. Minimum section properties for 3 span(min.) continuous conditions are as follows:

Max. Span (ft.)	Gauge Metal	Corrugated Depth (Min.)	Minimum Properties	
			S(min.) in.	I(min.) in.
6'0"	22	1.5"	0.191	0.157

2.02 INSULATING CONCRETE DESIGN MIXES

A. Design Properties (Slurry Coat):

1. Insulcel System: (Wet Density – 38-48 lbs. pcf).
 - a. Oven Dry Density: 30 pcf minimum (ASTM C 495-86).
 - b. Compressive Strength: Min. 200 psi (ASTM C 495-86).
 - c. Water: Use minimum amount of water to produce a workable mix.

B. Design Properties (Top Pour):

1. ZIC System: 1:4 mix (1 c.f. portland cement to 4 c.f. aggregate).
 - a. Wet Density: 58 pcf, plus-or-minus 5 pcf (ASTM C 332)
 - b. Oven Dry Density: 34 pcf, plus-or-minus 3 pcf (ASTM C 495-86).
 - c. Compressive Strength: Min. 250 psi (ASTM C 495-86).
 - d. Air Entrainment: Shall be approved by aggregate manufacturer. Control so in-place concrete shall have an air entrainment volume that shall not exceed 15% of the volume aggregate used.
 - e. Water: Use minimum amount of water to produce a workable mix.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Conditions: Examine areas and conditions under which metal decking and lightweight insulating concrete deck system are to be placed. Notify architect in writing of conditions detrimental to completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Corrugated Metal Deck: Decking shall be slotted/perforated type.
- B. Jointing: End laps shall be centered over support. Lap ends a minimum of 2" and sides one full corrugation width.

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- D. Sheets shall be attached to supports by 5/8” puddle welding. At perimeter (edge and end) supports, secure at max. 6"o.c. At interior supports, secure at every corrugation.
- E. Place (3) three #12 TEK screws equidistant at each lap.

3.03 INSULATION BOARD

A. Insulation Board:

- 1. Install insulation board in accordance with manufacturer’s recommendation. Allow board to set a minimum of 12 hours overnight prior to the installation of the top pour.
- 2. Pour slurry of insulating concrete 1/8" over highest point of substrate.
- 3. Place insulation in wet slurry within 30 minutes after pouring with joints staggered in brick-like pattern.
- 4. Place insulation board in slurry in manner to provide full filling of locking/keying openings in vent board.
- 5. Vary thickness of insulation board, in conjunction with lightweight insulating concrete shall be used to provide a minimum 1/4"slope.
- 6. **Minimum thickness of insulation board to be (7) seven inches.**

3.04 INSULATING CONCRETE

B. Insulating Concrete

- 1. General:
 - a. Place in accordance with manufacturer's instruction, using equipment and procedures to avoid segregation of mix and loss of air content. Do not place top coat until insulation board has set overnight for a minimum of 12 hours.
 - b. Deposit and screed in continuous operation until entire panel or section of roof area completed. Do not vibrate or work mix except for screeding or floating.
 - c. Construct crickets around roof top equipment to provide positive slope.
- 2. Thickness:
 - a. Pour to min. thickness of 2" over top of insulation board. Increase thickness of insulation board to maintain lightweight concrete with this range.
 - b. Depth of pour and slopes shall be as shown on drawings.
- 3. Screed:
 - a. Screed all surfaces to smooth even plane or slope.
 - b. Finished surface shall be free from ridges, protrusions, or depressions.
- 4. Curing:
 - a. Air cure for no less than 72 hours in strict accordance with manufacturers written instructions.
 - b. No foot traffic on deck until curing time has lapsed.

3.05 FIELD QUALITY CONTROL

- A. The cast density shall be checked hourly at the point of placement.

3.05 ACCEPTANCE OF DECK

- A. Lightweight insulating concrete roof deck and roofing

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installers shall jointly inspect deck to verify suitability for roofing membrane.

1. Noted deficiencies shall be corrected prior to installation of roofing membrane.
- B. The finished roof deck shall provide a minimum 1/4" slope.
1. No ponding water acceptable.
- 3.06 DEFECTIVE WORK
- A. Refinish in accordance with manufacturers instructions or remove and replace lightweight insulating concrete surfaces not acceptable to receive finish roofing, or where physical properties do not meet specified requirements, as determined by architect.

END OF SECTION 035500

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SECTION 042000 – UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Concrete building brick.
3. Face brick.
4. Building (common) brick.
5. Cast Stone trim units.
6. Mortar and grout.
7. Steel reinforcing bars.
8. Masonry joint reinforcement.
9. Ties and anchors.
10. Embedded flashing.
11. Miscellaneous masonry accessories.

1.2 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.4 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
 1. Clay Masonry Unit Test: For each type of unit required, according to ASTM C 67 for compressive strength.

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2. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
3. Mortar Test (Property Specification): For each mix required, according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
4. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
5. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.
6. Prism Test: For each type of construction required, according to ASTM C 1314.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 2. Cast Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
 3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
 1. Face brick, in the form of straps of five or more bricks.
 2. Cast Stone trim.
 3. Colored mortar.
 4. Weep holes/vents.
- D. Samples for Verification: For each type and color of the following:
 1. Face brick, in the form of straps of five or more bricks.
 2. Special brick shapes.
 3. Cast Stone trim.
 4. Colored mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 5. Weep holes and vents.
 6. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

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1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
 - B. Qualification Data: For testing agency.
 - C. Material Certificates: For each type and size of the following:
 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.
 - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed brick, include test report for efflorescence according to ASTM C 67.
 - d. For masonry units, include data and calculations establishing average net-area compressive strength of units.
 2. Cementitious materials. Include brand, type, and name of manufacturer.
 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 4. Grout mixes. Include description of type and proportions of ingredients.
 5. Reinforcing bars.
 6. Joint reinforcement.
 7. Anchors, ties, and metal accessories.
 - D. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.
 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
 - E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 - F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.
- 1.7 QUALITY ASSURANCE
- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
 - B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

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- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- E. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
 - 1. Build sample panels for typical exterior and interior walls in sizes approximately **60 inches (1500 mm)** long by **48 inches (1200 mm)** high by full thickness.
 - 2. Clean one-half of exposed faces of panels with masonry cleaner indicated.
 - 3. Protect approved sample panels from the elements with weather-resistant membrane.
 - 4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Build mockups for typical exterior and interior walls and exterior fences in sizes approximately **96 inches (2400 mm)** long by **72 inches (1800 mm)** high by full thickness, including face and backup wythes and accessories.
 - a. Include a sealant-filled joint at least **16 inches (400 mm)** long in each mockup.
 - b. Include lower corner of window opening at upper corner of exterior wall mockup.
 - c. Include through-wall flashing installed for a **24-inch (600-mm)** length in corner of exterior wall mockup approximately **16 inches (400 mm)** down from top of mockup, with a **12-inch (300-mm)** length of flashing left exposed to view (omit masonry above half of flashing).
 - d. Include veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.
 - 3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
 - 4. Protect accepted mockups from the elements with weather-resistant membrane.
 - 5. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
 - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.

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- b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
- 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of **24 inches (600 mm)** down both sides of walls and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of **24 inches (600 mm)** down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

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1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
1. Do not lay masonry when air temperature is below 40 degrees, or when probable that temperatures below 40 degrees will occur before mortar is set.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide bullnose units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **2150 psi (14.8 MPa)**.
 2. Density Classification: Lightweight.
 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

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4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

C. Concrete Building Brick: ASTM C 55.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **2800 psi (19.31 MPa)**.
2. Size (Actual Dimensions): **3-5/8 inches (92 mm)** wide by **2-1/4 inches (57 mm)** high by **7-5/8 inches (194 mm)** long.

2.3 MASONRY LINTELS

A. Pre-Cast Masonry Lintels: Engineer, provide and install precast concrete lintels where underside of lintel exposed to view.

1. Design: Precast masonry lintels to be designed and constructed by the manufacturer to safely support the weight of the wall above the opening and the floor and roof dead and live tributary loads for each location without excessive deflection.
2. Each precast lintel shall have a depth of no less than 8" with 2 #5 bars at top and bottom of *precast* section with section grouted solid.
3. Where span of lintel requires a depth of greater than 8", as indicated on structural drawings, a composite member consisting of a precast section at the bottom and unit masonry section(s) at the top. The portion of the lintel above the precast section to be reinforced as indicated on structural drawings.
4. Provide minimum bearing for precast and unit masonry portions of lintels as indicated on structural drawings for width of open over which lintel is placed.
5. Lintels to be designed to center over openings. Bearing at each end of lintel to be equal.
6. High Strength Pre-cast pre-stressed concrete as manufactured by Florida Engineered Construction Products, Corp (813) 621-4641

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.

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4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Face Brick: Facing brick complying with ASTM C 216.
1. Grade: SW.
 2. Type: FBS.
 3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **8250 psi (56.88 MPa)**.
 4. Initial Rate of Absorption: Less than **30 g/30 sq. in. (30 g/194 sq. cm)** per minute when tested per ASTM C 67.
 5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 6. Size (Actual Dimensions): **3-5/8 inches (92 mm)** wide by **2-1/4 inches (57 mm)** high by **7-5/8 inches (194 mm)** long.
 7. Application: Use where brick is exposed unless otherwise indicated.
 8. Include \$350.00 per thousand brick FOB job site. This amount should be included in Base Bid price.
- C. Building (Common) Brick: ASTM C 62, Grade SW.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **8250 psi (56.88 MPa)**.
 2. Size: Match size of face brick.
 3. Application: Use where brick is indicated for concealed locations. Face brick complying with requirements for grade, compressive strength, and size indicated for building brick may be substituted for building brick.

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
- F. Aggregate for Mortar: ASTM C 144.

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1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than **1/4 inch (6 mm)** thick, use aggregate graded with 100 percent passing the **No. 16 (1.18-mm)** sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
5. Color as selected from Coosa Masonry Cement Custom Mortar Colors samples. (20 each colors)

G. Aggregate for Grout: ASTM C 404.

H. Water: Potable.

2.6 REINFORCEMENT

A. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Exterior Walls: Hot-dip galvanized, carbon steel.
3. Wire Size for Side Rods: **0.148-inch (3.77-mm)** diameter.
4. Wire Size for Cross Rods: **0.148-inch (3.77-mm)** diameter.
5. Wire Size for Veneer Ties: **0.148-inch (3.77-mm)** diameter.
6. Truss design with Spacing of Cross Rods, Tabs, and Cross Ties: Not more than **16 inches (407 mm)** o.c.
7. Provide in lengths of not less than **10 feet (3 m)**, with prefabricated corner and tee units.

B. Masonry Joint Reinforcement for Single-Wythe Masonry: Truss type with single pair of side rods.

C. Masonry Joint Reinforcement for Multiwythe Masonry:

1. Ladder type with 1 side rod at each face shell of concrete masonry plus 1 side rod for brick wythe, with moisture drop in center of cavity.

2.7 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, **G60 (Z180)** zinc coating.
3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

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- B. Corrugated Metal Ties: Metal strips not less than **7/8 inch (22 mm)** wide with corrugations having a wavelength of **7.6 to 12.7 mm** and an amplitude of **0.06 to 0.10 inch (1.5 to 2.5 mm)** made from **0.060-inch- (1.52-mm-)** thick, steel sheet, galvanized after fabrication.
- C. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least **5/8-inch (16-mm)** cover on outside face. Outer ends of wires are bent 90 degrees and extend **2 inches (50 mm)** parallel to face of veneer.
- D. Individual Wire Ties: Rectangular units with closed ends and not less than **4 inches (100 mm)** wide.
 - 1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than **2 inches (50 mm)** long may be used for masonry constructed from solid units.
 - 2. Where wythes do not align, use adjustable ties with pintle-and-eye connections having a maximum adjustment of **1-1/4 inches (32 mm)**.
 - 3. Wire: Fabricate from **1/4-inch- (6.35-mm-)** diameter, hot-dip galvanized steel wire.
- E. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section for Welding to Steel Frame: Crimped **1/4-inch- (6.35-mm-)** diameter, If retaining last option in subparagraph below, note that the MSJC Code does not allow ties made from mill-galvanized wire for interior use in spaces where humidity exceeds 75 percent.
 - 2. Tie Section: Triangular-shaped wire tie, sized to extend within **1 inch (25 mm)** of masonry face, made from **0.187-inch- (4.76-mm-)** diameter, hot-dip galvanized steel wire.
 - 3. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.8 MISCELLANEOUS ANCHORS

- A. Postinstalled Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or **ASTM F 1941**, Class Fe/Zn 5 unless otherwise indicated.
 - 3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group **1** stainless-steel bolts, **ASTM F 593**, and nuts, **ASTM F 594**.

2.9 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" Section 076200 "Sheet Metal Flashing and Trim".

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- B. Flexible Flashing: Use one of the following unless otherwise indicated:
1. Copper-Laminated Flashing: **3-oz./sq. ft.** (1.5-kg/sq. m) copper sheet bonded between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - a. **Products:** Subject to compliance with requirements, provide one of the following:
 - 1) [Advanced Building Products Inc.](#); Copper Fabric Flashing.
 - 2) [Dayton Superior Corporation, Dur-O-Wal Division](#); Copper Fabric Thru-Wall Flashing.
 - 3) [Hohmann & Barnard, Inc.](#); H & B C-Fab Flashing.
 - 4) [Phoenix Building Products](#); Type FCC-Fabric Covered Copper.
 - 5) [Sandell Manufacturing Co., Inc.](#); Copper Fabric Flashing.
 - 6) [York Manufacturing, Inc.](#); Multi-Flash 500.
- C. Application: Unless otherwise indicated, use the following:
1. Where flashing is indicated to receive counterflashing, use metal flashing.
 2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
 3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge.
 4. Where flashing is fully concealed, use flexible flashing.
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.10 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep/Vent Products: Use the following unless otherwise indicated:
1. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, **3/8-inch (9-mm)** OD by **4 inches (100 mm)** long.
- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. **Products:** Subject to compliance with requirements, provide one of the following:

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- a. [Advanced Building Products Inc.](#); Mortar Break.
 - b. [Archovations, Inc.](#); CavClear Masonry Mat.
 - c. [Dayton Superior Corporation, Dur-O-Wal Division](#); Polytite MortarStop.
 - d. [Mortar Net USA, Ltd.](#); Mortar Net.
2. Provide one of the following configurations:
- a. Strips, full-depth of cavity and **10 inches (250 mm)** high, with dovetail shaped notches **7 inches (175 mm)** deep that prevent clogging with mortar droppings.
- F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from **0.148-inch (3.77-mm)** steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
1. **Products:** Subject to compliance with requirements, provide one of the following:
 - a. [Dayton Superior Corporation, Dur-O-Wal Division](#); D/A 810, D/A 812 or D/A 817.
 - b. [Heckmann Building Products Inc.](#); No. 376 Rebar Positioner.
 - c. [Hohmann & Barnard, Inc.](#); #RB or #RB-Twin Rebar Positioner.
 - d. [Wire-Bond](#); O-Ring or Double O-Ring Rebar Positioner.

2.11 CAVITY-WALL INSULATION

- A. Closed cell spray foam insulation shown on drawings as specified in Section 072000 Spray Polyurethane Foam Insulation.

2.12 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. [Diedrich Technologies, Inc.](#)
 - b. [EaCo Chem, Inc.](#)
 - c. [ProSoCo, Inc.](#)

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2.13 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced masonry, use Type S.
 - 3. For exterior, above-grade, non-load-bearing walls and parapet walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
 - 1. Pigments shall not exceed 10 percent of portland cement by weight.
 - 2. Mix to match Architect's sample.
- E. Grout for Unit Masonry: Use ready-mixed grout of strength and consistency indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds **30 g/30 sq. in. (30 g/194 sq. cm)** per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus **1/2 inch (12 mm)** or minus **1/4 inch (6 mm)**.
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus **1/2 inch (12 mm)**.
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus **1/4 inch (6 mm)** in a story height or **1/2 inch (12 mm)** total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls do not vary from level by more than **1/4 inch in 10 feet (6 mm in 3 m)**, or **1/2 inch (12 mm)** maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than **1/8 inch in 10 feet (3 mm in 3 m)**, **1/4 inch in 20 feet (6 mm in 6 m)**, or **1/2 inch (12 mm)** maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than **1/4 inch in 10 feet (6 mm in 3 m)**, **3/8 inch in 20 feet (9 mm in 6 m)**, or **1/2 inch (12 mm)** maximum.

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4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than **1/8 inch in 10 feet (3 mm in 3 m)**, **1/4 inch in 20 feet (6 mm in 6 m)**, or **1/2 inch (12 mm)** maximum.
5. For lines and surfaces do not vary from straight by more than **1/4 inch in 10 feet (6 mm in 3 m)**, **3/8 inch in 20 feet (9 mm in 6 m)**, or **1/2 inch (12 mm)** maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than **1/4 inch in 10 feet (6 mm in 3 m)**, or **1/2 inch (12 mm)** maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than **1/16 inch (1.5 mm)** except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus **1/8 inch (3 mm)**, with a maximum thickness limited to **1/2 inch (12 mm)**.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than **1/8 inch (3 mm)**.
3. For head and collar joints, do not vary from thickness indicated by more than plus **3/8 inch (9 mm)** or minus **1/4 inch (6 mm)**.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus **1/8 inch (3 mm)**. [**Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).**]
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than **1/16 inch (1.5 mm)** from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry unless otherwise indicated:
 1. Brick; lay exposed masonry in running bond.
 2. **CMU; Base Bid CMU will be stacked bond except that fire walls will be running bond.**
 3. Do not use units with less than nominal **4-inch (100-mm)** horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than **4-inches (100-mm)**. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal **4-inch (100-mm)** horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

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- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel and fiberglass frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout **24 inches (600 mm)** under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide **1/2-inch (13-mm)** clearance between end of anchor rod and end of tube. Space anchors **48 inches (1200 mm)** o.c. unless otherwise indicated.
 - 3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 - 2. Allow cleaned surfaces to dry before setting.
 - 3. Wet joint surfaces thoroughly before applying mortar.

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- D. Tool exposed joints when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated:
 - 1. Exposed CMU “V” joint
 - 2. Exposed Brick, joint selected by architect from 3 samples of tooled joints on sample panel.
- E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 COMPOSITE MASONRY

- A. Bond wythes of composite masonry together using bonding system indicated on Drawings.
- B. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
- C. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
 - 1. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.
- D. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 - 1. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.

3.7 CAVITY WALLS

- A. Bond wythes of cavity walls together using bonding system indicated on Drawings.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- C. Parge cavity face of backup wythe in a single coat approximately **3/8 inch (10 mm)** thick. Trowel face of parge coat smooth.

3.8 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of **5/8 inch (16 mm)** on exterior side of walls, **1/2 inch (13 mm)** elsewhere. Lap reinforcement a minimum of **6 inches (150 mm)**.
 - 1. Space reinforcement not more than **16 inches (406 mm)** o.c.
 - 2. Space reinforcement not more than **8 inches (203 mm)** o.c. in foundation walls and parapet walls.

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3. Provide reinforcement not more than **8 inches (203 mm)** above and below wall openings and extending **12 inches (305 mm)** beyond openings[**in addition to continuous reinforcement**].
 - B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
 - C. Provide continuity at wall intersections by using prefabricated T-shaped units.
 - D. Provide continuity at corners by using prefabricated L-shaped units.
 - E. Cut and bend reinforcing units as directed by manufacturer for continuity at[**corners,**] returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- 3.9 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE
- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
 1. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 2. Space anchors as indicated, but not more than **24 inches (610 mm)** o.c. vertically and **36 inches (915 mm)** o.c. horizontally.
- 3.10 ANCHORING MASONRY VENEERS
- A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
 1. Fasten **screw-attached anchors through sheathing to wall framing and to concrete and masonry backup** with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 2. Insert slip-in anchors in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
 3. Embed **connector sections and continuous wire** in masonry joints. Provide not less than **2 inches (50 mm)** of air space between back of masonry veneer and face of sheathing.
 4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 5. Space anchors as indicated, but not more than **18 inches (458 mm)** o.c. vertically and **24 inches (610 mm)** o.c. horizontally, with not less than 1 anchor for each **2 sq. ft. (0.2 sq. m)** of wall area. Install additional anchors within **12 inches (305 mm)** of openings and at intervals, not exceeding **8 inches (203 mm)**, around perimeter.
 6. Space anchors as indicated, but not more than **16 inches (406 mm)** o.c. vertically and **24 inches (610 mm)** o.c. horizontally with not less than 1 anchor for each **2.67 sq. ft. (0.25 sq. m)** of wall area. Install additional anchors within **12 inches (305 mm)** of openings and at intervals, not exceeding **36 inches (914 mm)**, around perimeter.

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3.11 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry **using one of the following methods:**
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block (**this is the only acceptable method for exposed concrete masonry**).
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.
- C. Control joints may not occur in lintels, through openings in masonry walls and within 8” of bearing of a structural member.
- D. Form expansion joints in brick as follows:
 - 1. Build flanges of factory-fabricated, expansion-joint units into masonry.
 - 2. Build in compressible joint fillers where indicated.
 - 3. Form open joint full depth of brick wythe and of width indicated, but not less than **1/2 inch (13 mm)** for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."
- E. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than [**3/8 inch (10 mm)**].
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.12 LINTELS

- A. Install steel lintels where indicated.
- B. Provide **concrete or masonry** lintels where shown and where openings of more than **12 inches (305 mm)** for brick-size units and **24 inches (610 mm)** for block-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of **8 inches (200 mm)** at each jamb unless otherwise indicated.

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3.13 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of **8 inches (200 mm)**, and through inner wythe to within **1/2 inch (13 mm)** of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately **2 inches (50 mm)** on interior face.
 3. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of **8 inches (200 mm)**, and **1-1/2 inches (38 mm)** into the inner wythe. Form **1/4-inch (6-mm)** hook in edge of flashing embedded in inner wythe.
 4. At masonry-veneer walls, extend flashing through veneer, across air space behind veneer, and up face of sheathing at least **8 inches (200 mm)**; with upper edge tucked under building paper or building wrap, lapping at least **4 inches (100 mm)**.
 5. At lintels and shelf angles, extend flashing a minimum of **6 inches (150 mm)** into masonry at each end. At heads and sills, extend flashing **6 inches (150 mm)** at ends and turn up not less than **2 inches (50 mm)** to form end dams.
 6. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than **1-1/2 inches (38 mm)** or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 7. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 8. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing **1/2 inch (13 mm)** back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 9. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing **1/2 inch (13 mm)** back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
 10. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.
- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

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- E. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 - 1. Use specified weep/vent products to form weep holes.
 - 2. Use wicking material to form weep holes above flashing under brick sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
 - 3. Space weep holes **24 inches (600 mm)** o.c. unless otherwise indicated.
 - 4. Space weep holes formed from **wicking material 16 inches (400 mm)** o.c.
 - 5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
 - 6. Trim wicking material flush with outside face of wall after mortar has set.
- F. Place pea gravel in cavities as soon as practical to a height equal to height of first course above top of flashing, but not less than **2 inches (50 mm)**, to maintain drainage.
 - 1. Fill cavities full height by placing pea gravel in cavities as masonry is laid so that at any point masonry does not extend more than **24 inches (600 mm)** above top of pea gravel.
- G. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
- H. Install vents in head joints in exterior wythes at spacing indicated. Use **specified weep/vent products** to form vents.
 - 1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.14 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than [**60 inches (1520 mm)**] [**12.67 ft. (3.86 m)**].

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3.15 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Comply with structural drawing S0.1 for special inspections according to the "International Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- F. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- G. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- H. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- I. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- J. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.16 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch (19 mm). Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3 mm per 300 mm). Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

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3.17 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 - 7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
 - 8. Clean stone trim to comply with stone supplier's written instructions.
 - 9. Clean limestone units to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.18 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 (100 mm)** 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 312000 "Earth Moving."
 - 3. Do not dispose of masonry waste as fill within **18 inches (450 mm)** of finished grade.

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- 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.

END OF SECTION 042000

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SECTION 047200 – CAST STONE MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast stone trim, **including the following:**

- a. Window sills.
- b. Belt courses.

B. Related Sections:

- 1. Division 04 Section "Unit Masonry" for installing cast stone units in unit masonry.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

- 1. For cast stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

- 1. Include building elevations showing layout of units and locations of joints and anchors.

C. Samples for Initial Selection: For colored mortar.

D. Samples for Verification:

- 1. For each color and texture of cast stone required, 10 inches (250 mm) square in size.

E. Full-Size Samples: For each **shape** of cast stone unit required.

- 1. Make available for Architect's review at Project site.
- 2. Make Samples from materials to be used for units used on Project.
- 3. Approved Samples may be installed in the Work.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For **manufacturer and testing agency**.

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1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.

B. Material Test Reports: For each mix required to produce cast stone, based on testing according to ASTM C 1364.

1. Provide test reports based on testing within previous two years.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations for Cast Stone: Obtain cast stone units through single source from single manufacturer.

D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

E. Mockups: Furnish cast stone for installation in mockups specified in Division 04 Section "Unit Masonry."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone **with unit masonry work** to avoid delaying the Work.

B. Pack, handle, and ship cast stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.

2. Store cast stone units on wood skids or pallets with non-staining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

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

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1.6 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 CAST STONE MATERIALS

- A. General: Comply with ASTM C 1364 and the following:
- B. Portland Cement: ASTM C 150, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C 114. Provide natural color or white cement as required to produce cast stone color indicated.
- C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation and colors as needed to produce required cast stone textures and colors.
- D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C 33, gradation and colors as needed to produce required cast stone textures and colors.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, non-fading, and resistant to lime and other alkalis.
- F. Admixtures: Use only admixtures specified or approved in writing by Architect.
 - 1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
 - 2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
 - 3. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 4. Water-Reducing, Retarding Admixture: ASTM C 494/C 494M, Type D.
 - 5. Water-Reducing, Accelerating Admixture: ASTM C 494/C 494M, Type E.
- G. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M, Grade 60 (Grade 420). Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches (38 mm) of cast stone material.

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1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.

H. Embedded Anchors and Other Inserts: Fabricated from **stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.**

2.2 CAST STONE UNITS

A. Regional Materials: Cast stone units shall be manufactured within 500 miles (800 km) of Project site.

B. Provide cast stone units complying with ASTM C 1364 using either the vibrant dry tamp or wet-cast method.

1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.

C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

D. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch (3 mm).
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater, but in no case by more than 1/4 inch (6 mm).
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch (3 mm), whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch (3 mm) on formed surfaces of units and 3/8 inch (10 mm) on unformed surfaces.

E. Cure units as follows:

1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F (38 deg C) for 12 hours or 70 deg F (21 deg C) for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:
 - a. No fewer than five days at mean daily temperature of 70 deg F (21 deg C) or above.
 - b. No fewer than six days at mean daily temperature of 60 deg F (16 deg C) or above.
 - c. No fewer than seven days at mean daily temperature of 50 deg F (10 deg C) or above.

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- d. No fewer than eight days at mean daily temperature of 45 deg F (7 deg C) or above.
- F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- G. Colors and Textures: **Match Architect's samples (color and texture of selected units at Glynn Middle School, Brunswick, Georgia).**
- H. Color and Texture: Provide units with fine-grained texture and buff color resembling Indiana limestone.
- I. Color and Texture: Provide units with fine texture and red-brown color resembling brownstone on adjacent buildings.

2.3 MORTAR MATERIALS

- A. Provide mortar materials that comply with Division 04 Section "Unit Masonry."

2.4 SOURCE QUALITY CONTROL

- A. Engage a qualified independent testing agency to sample and test cast stone units according to ASTM C 1364.
 - 1. Include one test for resistance to freezing and thawing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SETTING CAST STONE IN MORTAR

- A. Install cast stone units to comply with requirements in Division 04 Section "Unit Masonry."
- B. Set cast stone as indicated on Drawings. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 - 2. Coordinate installation of cast stone with installation of flashing specified in other Sections.

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- C. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
- D. Set units in full bed of mortar with full head joints unless otherwise indicated.
 - 1. Set units with joints **3/8 inch (10 mm)** wide unless otherwise indicated.
 - 2. Build anchors and ties into mortar joints as units are set.
 - 3. Fill dowel holes and anchor slots with mortar.
 - 4. Fill collar joints solid as units are set.
 - 5. Build concealed flashing into mortar joints as units are set.
 - 6. Keep head joints in coping and other units with exposed horizontal surfaces open to receive sealant.
 - 7. Keep joints at shelf angles open to receive sealant.
- E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch (19 mm). Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- F. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch (10 mm). Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
- G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- H. Provide sealant joints at copings and other horizontal surfaces, at expansion, control, and pressure-relieving joints, and at locations indicated.
 - 1. Keep joints free of mortar and other rigid materials.
 - 2. Form joint of width indicated, but not less than **3/8 inch, 10 mm**.
 - 3. Prime cast stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
 - 4. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch (1.5 mm), except where variation is due to warpage of units within tolerances specified.

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3.4 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
 - 1. Remove mortar fins and smears before tooling joints.
 - 2. Remove excess sealant immediately, including spills, smears, and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.
 - 3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 5. Clean cast stone by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 6. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 047200

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SECTION 051200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- 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:

Miscellaneous Metal
Steel Joists

1.2 WORK INCLUDED

- A. The extent of structural steel work is shown on the drawings, including schedules, notes and details to show size and location of members, typical connections and type of steel.
- B. Approval by the Owner or his representative of shop drawings prepared by the fabricator indicates the fabricator has correctly interpreted the contract requirements. Approval does not relieve the fabricator of the responsibility for accuracy of detailed dimensions on shop drawings nor the general fit-up of parts to be assembled in the field.

1.3 SUMMARY

- A. This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.
- B. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
- C. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.
- D. Refer to Division 3 for anchor rod installation in concrete, Division 4 for anchor rod installation in masonry.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

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- B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 2. High-strength bolts (each type), including nuts and washers.
 3. Unfinished bolts and nuts.
 4. Structural steel primer paint.
 5. Shrinkage-resistant grout.
- C. Shop drawings prepared under supervision of a licensed Structural Engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
 3. Submit shop drawings including complete details and schedule for fabrication and shop assembly of members, and details, schedules, procedures and diagrams, showing the sequence of erection.
 4. Contractor shall check, approve and stamp all shop drawings prior to submittals to Architect.
 5. The shop drawings shall be reviewed by Architect prior to fabrication. Architect's review is for design only. Contractor is responsible for dimensions, quantities, and coordination with other trades. Engineer's review and acceptance of shop drawings is subject to all contract requirements and does not authorize any changes involving additional cost to Owner.
 6. Include details of cuts, connections, splices, camber and holes. Indicate welds by standard AWS symbols, and show size, length and type of each weld.
 7. Provide setting drawings, templates, and directions for the installation of anchor bolts and anchorages to be installed by others.
 8. Shop drawings shall be made to conform to the design drawings. Contract drawings shall take precedence over Shop Drawings.
 9. Shop drawings that include elements designed by the fabricator shall be signed and sealed by a professional engineer licensed in the State of Georgia.
- D. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.
- E. For each approved fabricator that is exempt from special inspections of shop fabrications and implementation procedures in accordance with Section 1704.2.5.2 of IBC 2012, the Contractor shall submit "Fabricator's Certificate of Compliance". Contractor shall also provide copies of fabricator's certification or building code evaluation services report and fabricator's quality control manual.

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1.5 QUALITY ASSURANCE

A. Codes and Standards:

1. Comply with provisions of following, except as otherwise indicated:
2. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."
3. AISC "Specifications for Structural Steel Buildings," including "Commentary."
4. AISC "Specification for Structural Joints using High-Strength Bolts".
5. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
6. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."

B. Fabrication and Erection Qualifications:

1. Fabricator and erector must have a minimum of five years experience with a proven record of satisfactory work.
2. Fabricator and erector must have had work of similar type of construction to be considered as "satisfactory work".
3. Fabricators must meet requirements set forth in Section 1704.2.5 of IBC 2012 except Fabricators who are exempt based on participation in the AISC Quality Certification Program and are designated an AISC-Certified Plant, Category Sbd.
4. The Architect shall be the sole judge as to whether the fabricator and erector satisfactorily meets these requirements.
5. "Steel Fabricator" and "Steel Erector" shall be an organized steel company engaged in this type of work.
6. If any fabricator or steel erector is doubtful as to whether he meets these requirements, he may submit information to the Architect at least 10 days before the bid opening in order to qualify.

C. Qualifications for Welding Work:

1. Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within the previous 12 months.
3. If recertification of welders is required, retesting will be Contractor's responsibility and shall be at no cost to the Owner.

D. Source Quality Control:

1. Materials and fabrication procedures are subject to inspection and tests in the mill, shop and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
2. Remove and replace materials or fabricated components which do not comply.

E. Design of Members and Connections:

1. All details are typical; similar details apply to similar conditions, unless otherwise indicated on the drawings. Verify dimensions at the site without causing delay in the work.
2. Notify the Architect whenever design of members and connections for any portion of the structures is not indicated on the drawings or specified herein.

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.
- B. Structural Steel Wide Flange Shapes: ASTM A992 Grade 50.
- C. Other Structural Steel Shapes, Plates, and Bars: ASTM A36.
- D. Cold-Formed Steel Tubing: ASTM A500, Grade C, Grade 50.
- E. Round HSS: ASTM A500, Grade C, Grade 50 KSI.
- F. Steel Pipe: ASTM A53, Type E or S, Grade B.
 - 1. Finish: Black, except where indicated to be galvanized.
- G. Steel Castings: ASTM A27, Grade 65-35, medium-strength carbon steel.
- H. Anchor Rods: ASTM F1554, headed type, grade 36, unless otherwise indicated.
- I. Unfinished Threaded Fasteners:
 - 1. ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.
 - 2. Provide either hexagonal or square heads and nuts, except use only hexagonal units for exposed connections.

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- J. High-Strength Threaded Fasteners:
 - 1. Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 2. ASTM F3125 "Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 Mpa Minimum Tensile Strength".
 - 3. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot-dip galvanized complying with ASTM A 153.
 - 4. Twist-off type tension-control bolt assemblies complying with ASTM F1852.
- K. Electrodes for Welding: Comply with AWS Code.
- L. Structural Steel Primer Paint: SSPC - Paint 11.
- M. Non-metallic Shrinkage-Resistant Grout:
 - 1. Premixed, non-metallic, non-corrosive, non-staining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.

2.2 FABRICATION

- A. Shop Fabrication and Assembly:
 - 1. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide parabolic camber in structural members where indicated.
 - 2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
- B. Connections:
 - 1. Weld or bolt shop connections, as indicated.
 - 2. Provide high-strength threaded fasteners for all principal bolted connections, except unfinished bolts may be used for temporary bracing to facilitate erection. Bolts through 4" wide beam flanges shall be 5/8" diameter. Other bolts shall be 3/4" diameter.
 - 3. Unless indicated or detailed otherwise on plans, all connections shall be detailed and designed by the fabricator under the direct supervision of a Professional Engineer, registered in the State of Georgia. Connections shall be designed as unrestrained flexible connections described as simple connections under Section B3 of the AISC Specifications for Structural Steel Buildings.
 - 4. Except where otherwise detailed or specified on the contract drawings, all framed connections shall be detailed and designed by the fabricator in accordance with Part 9 of the AISC Manual of Steel Construction. Framed beam connections shall be capable of transmitting a minimum of fifty percent of total capacity of beam determined from the tables in Part 3 of AISC Manual of Steel Construction for shape and span unless otherwise noted on the drawings.
 - 5. Design calculations for the connections designed by the contractor shall be submitted for the files of the architect. Calculations shall bear the seal of a Professional Engineer registered in

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- the State of Georgia. Shop drawings containing connections for which calculations have not been received will be returned unchecked as incomplete submittals.
6. Connections shall be detailed and designed with provisions for eccentricities. Minimum connection capacity to be 10 kips unless otherwise noted on the drawings.
- C. Bolt field connections, except where welded connections or other connections are indicated.
1. Provide high-strength threaded fasteners for all bolted connections.
 2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.
 3. All bolted connections shall be pretensioned.
- D. High-Strength Bolted Construction:
1. Install high-strength threaded fasteners in accordance with AISC "Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 Mpa Minimum Tensile Strength".
 2. All bolts shall have a hardened washer under the turning element.
 3. Installation of direct tension indicator bolt systems shall be in accordance with manufacturer's instructions.
 4. To the extent possible, all bolted connections shall be made with twist-off type bolts unless field clearances prohibit such bolting.
- E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- F. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- G. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints as indicated on drawings.
- H. Cooperation with Other Trades:
1. Provide holes for securing other work to structural steel framing, and for the passage of other work through steel framing members, as shown on the final shop drawings. Provide threaded nut welded to framing, and other specialty items as shown to receive other work.
 2. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
 3. All loose plates, bolts and inserts between the structural steel and work of other trades are to be furnished by the fabricator and set by other trades.
 4. All loose lintels to be furnished by the fabricator and set by other trades.

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2.3 SHOP PAINTING

- A. General:
1. Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
 2. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 3. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
 4. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
1. SP-1 "Solvent Cleaning."
 2. SP-2 "Hand-Tool Cleaning."
 3. SP-3 "Power-Tool Cleaning."
 4. SP-6 "Commercial Blast Cleaning."
 5. SP-7 "Brush-Off Blast Cleaning."
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 2.0 mils. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.
- D. Painting: Provide a two-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

2.4 SOURCE QUALITY CONTROL

- A. General:
1. Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Testing agency will perform at least one shop inspection at the start of fabrication to verify the fabricators quality assurance and quality control procedures, and qualification for exemption from shop inspections required by IBC 2012 Chapter 17. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 2. Promptly remove and replace materials or fabricated components that do not comply.
- B. Design of Members and Connections:
1. Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
 2. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

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PART 3 - EXECUTION

3.1 ERECTION

A. General:

1. Comply with AISC Specifications, AISC Code of Standard Practice, OSHA requirements, and as herein specified.
2. All steel framing shall be considered non-self-supporting steel frames as defined by Article 7.9.3 of the AISC Code of Standard Practice dated September 1, 1986.
3. Contractor shall provide all necessary temporary support until required connections or other interacting elements are complete, including all diaphragms, horizontal bracing, moment frames, braced frames, and shear walls.

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

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

D. Setting Base Plates and Bearing Plates:

1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
2. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
3. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
4. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
5. For proprietary grout materials, comply with manufacturer's instructions.

E. Field Assembly:

1. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
2. Level and plumb individual members of structure within specified AISC tolerances.
3. Splice members only where indicated and accepted on shop drawings.

F. Erection Bolts:

1. On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
2. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

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3. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- G. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
- H. Touch-Up Painting:
 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 2. Apply by brush or spray to provide minimum dry film thickness of 2.0 mils.

3.2 QUALITY CONTROL

- A. Engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.
- B. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
- D. Testing agency may inspect structural steel at plant before shipment.
- E. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any non-compliance of original work and to show compliance of corrected work.
- F. Shop-Bolted Connections:
 1. Inspect or test in accordance with AISC specifications.
- G. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 2. Perform visual inspection of all welds.
 3. Perform tests of tension and moment resisting welds using one of the following procedures:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E 94; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E 164.
- H. Field-Bolted Connections:
 1. Inspect in accordance with AISC specifications.

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- I. Field Welding: Inspect and test during erection of structural steel as follows:
 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 2. Perform visual inspection of all welds.
 3. Perform tests of tension and moment resisting welds using one of the following procedures:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E 94; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E 164.

END OF SECTION 051200

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SECTION 052200 - STEEL JOISTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- 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:
 - Structural Steel
 - Miscellaneous Metal

1.2 WORK INCLUDED

The extent of steel joists is shown on the drawings, including basic layout and type of joists.

1.3 SUMMARY

- A. This Section includes steel joists and joist girders for floor and roof framing. Types of joists required include the following:
 - 1. K-Series Open Web Steel Joists.
 - 2. LH-Series Longspan Steel Joists.
- B. Refer to Division 3 Sections for installation of anchors set in concrete.
- C. Refer to Division 4 Sections for installation of anchors set in masonry.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data and installation instructions for each type of joist and accessories.
 - 1. Include manufacturer's certification that joists comply with SJI "Specifications."
- C. Shop Drawings, Steel Joists:
 - 1. Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include the mark, number, type, location and spacing of joists and bridging.

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2. Shop drawings shall be submitted by the Contractor to the Architect and review action received prior to fabrication. When corrections are required, copies shall be returned noting such corrections.
3. The Contractor shall be responsible for the checking of quantities and dimensions. Contract drawings receive precedence over shop drawings unless authorized otherwise in writing.
4. All connections including those made in the field shall be shown and detailed. Provide templates or location drawing for installation of anchor bolts.
5. Shop drawings that include elements designed by the fabricator must be signed and sealed by professional engineer licensed in the State of Georgia. As an alternate, Design Professional shall require a signed and sealed cover letter with the shop drawings substantiating the design information. The design engineer must review and confirm in writing that the shop and erection drawings properly incorporate their design.
6. Furnish complete design analysis of all joists with shop drawings.

1.5 QUALITY ASSURANCE

- A. General: Provide joists fabricated in compliance with Steel Joist Institute (SJI) "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Quality of Fabricators:
 1. A firm experienced in fabricating joists similar to those indicated for this Project and with a record of successful in-service performance.
 2. Fabricator must be certified by SJI to manufacture joists complying with SJI standard specifications and load tables.
 3. Fabricator assumes responsibility for engineering special joists to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensible engineering analysis by a qualified professional engineer.
- C. Qualification of Field Welding: Qualify welding processes and welding operators in accordance with American Welding Society (AWS) "Structural Welding Code - Steel," AWS D1.1.
- D. Inspection: Inspect joists and girders in accordance with SJI "Specifications."

1.6 DELIVERY, STORAGE AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel: Comply with SJI "Specifications" for chord and web sections.

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- B. Steel Bearing Plates: ASTM A 36.
- C. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel.
- D. Steel Prime Paint: Comply with SJI "Specifications."

2.2 FABRICATION

- A. General: Fabricate steel joists in accordance with SJI "Specification." All joists shall be designed by the joist manufacturer to support the total load-carrying capacity shown in the Steel Joist Institute tables for the joist depth, chord designations, and span length indicated on the contract drawings.
- B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.
- C. Extended End: Provide extended ends on joists where indicated, complying with SJI "Specifications" and load tables.
- D. Ceiling Extension: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.
- E. Top Chord Extension: Provide top chord extensions on joists where indicated, complying with SJI "Specifications" and load tables.
- F. Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with SJI "Specifications."
 - 1. Provide bridging anchors for ends of bridging lines terminating at walls or beams.
- G. End Anchorage: Provide end anchorages, including steel bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications."
- H. Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.
- I. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.
 - 1. Apply one shop coat of steel prime paint to joists and accessories, by spraying, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.
- J. Sloped Joists: Where roof joists slopes exceed 1/2" in 1'-0", joist manufacturer shall increase member sizes to include effects of increase and/or decrease in member loads and spans.

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- K. Lateral Support:
 - 1. Joists shall be designed to receive lateral bracing only at locations and spacings specified for deck fasteners or for angle, channel bulb tee or other steel purlins or sub-purlins.
- L. Joists supporting roofs shall be designed for a net wind uplift calculated in accordance with the Contract Documents. Provide additional lines of bridging as required by joist manufacturer.

PART 3 - EXECUTION

3.1 ERECTION

- A. Place and secure steel joists in accordance with SJI "Specifications," final shop drawings, and as herein specified.
- B. Anchors: Furnish anchor bolts, steel bearing plates, and other devices to be built into concrete and masonry construction.
 - 1. Provide unfinished threaded fasteners for anchor bolts, unless high strength bolts indicated.
- C. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.
- D. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction. Where "open-web" joist lengths are 40 feet and longer, install a center row of bolted bridging to provide lateral stability before slackening of hoisting lines.
- E. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams. No pipes, ducts, conduits or any other mechanical or electrical component shall be suspended from joist bridging.
- F. Fastening Joists: Comply with the following:
 - 1. Field weld joists to supporting steel framework and steel bearing plates where indicated in accordance with SJI "Specifications" for type of joists used. Coordinate welding sequence and procedure with placing of joists.
- G. Touch-Up Painting: After joist installation, wire brush welded areas, abraded or rusty surfaces, and clean with solvent. Paint field-applied bolt heads and nuts and prepared surfaces on joists and steel supporting members. Use same type of paint as used for shop painting.
- H. Mechanical Supports:
 - 1. To hang or bear equipment on the joists, all equipment loads shall be applied within 4" of a panel point at chord level with application equally divided between chord members.

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2. When load is over 4" from panel point, joist manufacturer shall provide additional reinforcement for load imposed.
3. Contractor shall be responsible to provide joist manufacturer with location and magnitude of concentrated loads due to equipment. Joist manufacturer to indicate location loads and reinforcement on shop drawings.

END OF SECTION 052200

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SECTION 053100 - STEEL DECK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes steel deck units for floor applications.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
 - 1. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories.
 - a. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.
 - 2. Shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:
 - 1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members."
 - 2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel."
 - 3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."
- B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.
 - 1. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

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- C. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel for Painted Metal Deck Units: ASTM A 611, grade as required to comply with SDI specifications.
- B. Steel for Galvanized Metal Deck Units: ASTM A 653, grade as required to comply with SDI specifications.
- C. Miscellaneous Steel Shapes: ASTM A 36.
- D. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.
- E. Galvanizing: ASTM A 525, G90.
- F. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.
- G. Paint: Manufacturer's baked-on, rust-inhibitive paint, for application to metal surfaces that have been chemically cleaned and phosphate chemical treated.
- H. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.
- I. Acoustic Sound Barrier Closures: Manufacturer's standard mineral fiber closures.

2.2 FABRICATION

- A. General: Form deck units in lengths to span three or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.
- B. Non-Composite Steel Form Deck: Provide fluted sections of metal deck as permanent forms for reinforced concrete slabs.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified herein.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
- C. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.
- D. Place deck units flat and square, secured to adjacent framing without warp or deflection.
- E. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
- F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- G. Do not use floor deck units for storage or working platforms until permanently secured.
- H. Fastening Deck Units:
 - 1. Fasten floor deck units to steel supporting members by nominal 5/8- inch puddle welds or elongated welds of equal strength, spaced not more than 12 inches o.c. with a minimum of two welds per unit at each support.
 - 2. Tack weld or use self-tapping No. 8 or larger machine screws at 4 feet o.c. for fastening end closures.
 - 3. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
 - a. Use welding washers where recommended by deck manufacturer.
 - 4. Mechanical fasteners, either powder-actuated or pneumatically driven, may be used in lieu of welding. Locate mechanical fasteners and install in accordance with deck manufacturer's instructions.
- I. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.
- J. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.
- K. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.

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- L. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12 inches o.c. with at least one weld at each corner.

- M. Closure Strips:
 - 1. Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Weld into position to provide a complete decking installation.
 - 2. Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.

- N. Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
 - 1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.
 - 2. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.

- O. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

- P. Touch-Up Painting: Cleaning and touch-up painting of field welds, abraded areas, and rust spots, as required after erection and before proceeding with field painting, is included in Division 9 under "Painting."

END OF SECTION 053100

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SECTION 054000 – COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.
2. Soffit framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Soffit framing.
4. Power-actuated anchors.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by [**manufacturer and witnessed by a qualified testing agency**] [**a qualified testing agency**].

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1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

E. Research Reports:

1. For nonstandard cold-formed steel framing [**post-installed anchors**] [**and**] [**power-actuated fasteners**], from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
2. For sill sealer gasket/termite barrier, showing compliance with ICC-ES AC380.

1.4 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- B. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of **the Steel Stud Manufacturers Association**.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. AllSteel & Gypsum Products, Inc.
 2. CEMCO; California Expanded Metal Products Co.
 3. ClarkDietrich.
 4. Consolidated Fabricators Corp.; Building Products Division.
 5. Craco Manufacturing, Inc.
 6. Custom Stud.
 7. Design Shapes in Steel.
 8. Formetal Co. Inc. (The).
 9. Jaimes Industries.
 10. MarinoWARE.
 11. MBA Building Supplies.
 12. MRI Steel Framing, LLC.
- B. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

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1. Exterior Load-Bearing & Non-Load-Bearing Wall Framing to receive Metal Wall Panels: Horizontal deflection of 1/360 of the wall height.
2. Exterior Load-Bearing & Non-Load-Bearing Wall Framing to receive Brick Veneer: Horizontal deflection of 1/600 of the wall height.
3. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft..
4. Roof Rafter and Soffit Framing: Vertical deflection of 1/240 of the horizontally projected span for live loads.
5. Ceiling Joist Framing: Vertical deflection of 1/240 of the span for live loads and 1/240 for total loads of the span.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 1. Design Loads: **As indicated on Drawings.**
 2. Deflection Limits: Design framing systems to withstand **design loads** without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of **1/600** of the wall height.
 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of **120 deg F (67 deg C)**.
 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of **1/2 inch (13 mm)**.
 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Design Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200.
 1. Floor and Roof Systems: AISI S210.
 2. Wall Studs: AISI S211.
 3. Headers: AISI S212.
 4. Lateral Design: AISI S213.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

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1. Indicate design designations from UL’s “Fire Resistance Directory” or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: **As required by structural performance.**
2. Coating: **G90 (Z275) or equivalent.**

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: **0.0538 inch (1.37 mm).**
2. Flange Width: 1-5/8” minimum.
3. Section Properties: Provide studs to depth shown on drawings modify the gauge, grade of steel and face width as needed to achieve the requirements of Paragraph 2.2.

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: **0.0428 inch (1.09 mm).**
2. Flange Width: **1-1/4 inches (32 mm).**

- C. Vertical Deflection Clips: Manufacturer's standard **bypass** clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

- D. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

- a. Minimum Base-Metal Thickness: **0.0428 inch (1.09 mm).**
- b. Flange Width: [**1 inch (25 mm) plus the design gap for one-story structures**

2. Inner Track: Of web depth indicated, and as follows:

- a. Minimum Base-Metal Thickness: **0.0538 inch (1.37 mm).**
- b. Flange Width: **Sum of outer deflection track flange width plus 1 inch (25 mm).**

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- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: **0.0428 inch (1.09 mm)**.
 - 2. Flange Width: **1-5/8 inches (41 mm)**, minimum.
 - 3. Section Properties: Provide to depth shown on drawings. Modify the gauge, grade of steel and face width as needed to achieve the requirements of Paragraph 2.2.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.
 - 8. Stud kickers and knee braces.
 - 9. Hole-reinforcing plates.
 - 10. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, **Grade 36**, threaded carbon-steel **hex-headed bolts**, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by **[hot-dip process according to ASTM A153/A153M, Class C]**.
- C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on **ICC-ES AC193** as appropriate for the substrate.

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1. Uses: Securing cold-formed steel framing to structure.
- D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: **ASTM A780/A780M**.
- B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sill Sealer Gasket: Closed-cell neoprene foam, **1/4 inch (6 mm)** thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.
- F. Sill Sealer Gasket/Termite Barrier: Minimum **68-mil (1.7-mm)** nominal thickness, self-adhering sheet consisting of **64 mils (1.6 mm)** of rubberized asphalt laminated on one side to a **4-mil-(0.10-mm-)** thick, polyethylene-film reinforcement, and with release liner on adhesive side[; **formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction**].
 1. Physical Properties:
 - a. Peel Adhesion: **17.0 lb/in of width (2.9 N/mm of width)** when tested in accordance with ASTM D412.
 - b. Low-Temperature Flexibility: Pass at **minus 25 deg F (minus 32 deg C)** when tested in accordance with)ASTM D146/D146M.
 - c. Water Vapor Permeance: **0.05 perm (0.44 ng/Pa x s x sq. m)** maximum when tested in accordance with ASTM E96/E96M, Method B.
 - d. Resistance to Termite Penetration: Comply with ICC-ES AC380.

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2.9 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of **1/8 inch in 10 feet (1:960)** and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus **1/8 inch (3 mm)** from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of **1/8 inch (3 mm)**.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

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- B. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding **1/16 inch (1.6 mm)**.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

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3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to **[top and]** bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: **16 inches (406 mm)**.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed steel framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated **[on Shop Drawings]** but not more than **48 inches (1220 mm)** apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within **[12 inches (305 mm)] [18 inches (450 mm)]** of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at **[96-inch (2440-mm) centers] [centers indicated] [centers indicated on Shop Drawings]**.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of **1/8 inch in 10 feet (1:960)** and as follows:

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1. Space individual framing members no more than plus or minus **1/8 inch (3 mm)** from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

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SECTION 055000 – METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Shelf angles.
3. Metal ladders.
4. Alternating tread devices.
5. Miscellaneous steel trim.
6. Metal bollards.
7. Abrasive metal nosings, treads, and thresholds.
8. Loose bearing and leveling plates.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
3. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.2 COORDINATION

- A.** Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B.** Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Fasteners.
2. Shrinkage-resisting grout.
3. Manufactured metal ladders.
4. Alternating tread devices.
5. Metal bollards.
6. Abrasive metal nosings, treads, and thresholds.

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- B. Shop Drawings: Show fabrication and installation details. **Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.** Provide Shop Drawings for the following:
1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
 2. Shelf angles.
 3. Metal ladders.
 4. Alternating tread devices.
 5. Miscellaneous steel trim including **steel angle corner guards and loading-dock edge angles.**
 6. Metal bollards.
 7. Loose steel lintels.
- C. Delegated Design Submittals: For **ladders and alternating tread devices**, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design **ladders and alternating tread devices.**
- B. Structural Performance of Alternating Tread Devices: Alternating tread devices are to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Uniform Load: **100 lbf/sq. ft. (4.79 kN/sq. m).**
 2. Concentrated Load: **300 lbf (1.33 kN)** applied on an area of **4 sq. in. (2580 sq. mm).**
 3. Uniform and concentrated loads need not be assumed to act concurrently.

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4. Alternating Tread Device Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Comply with applicable railing loadings in Section 055213 "Pipe and Tube Railings."

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
 1. Galvanized Steel: ASTM A653/A653M, [**structural steel, Grade 33 (Grade 230)**], with **G90 (Z275)** coating; [**0.108-inch (2.8-mm)**] nominal thickness.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide **Type 304** stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 1. Provide stainless steel fasteners for fastening **aluminum and stainless steel**.
- B. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, **Grade A325 (Grade A325M)**, Type 3, heavy-hex steel structural bolts; **ASTM A563, Grade DH3, (ASTM A563M, Class 10S3)** heavy-hex carbon-steel nuts; and where indicated, flat washers.
- C. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- D. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- E. Post-Installed Anchors: **Torque-controlled expansion anchors or chemical anchors**.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with **Section 099113 "Exterior Painting."**, **Section 099123 "Interior Painting."** and **Section 099600 "High-Performance Coatings."**
- B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

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- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of **3000 psi (20 MPa)**.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing **and contour of welded surface matches that of adjacent surface.**
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

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- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, **1/8 by 1-1/2 inches (3.2 by 38 mm)**, with a minimum **6-inch (150-mm)** embedment and **2-inch (50-mm)** hook, not less than **8 inches (200 mm)** from ends and corners of units and **24 inches (600 mm)** o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports.

2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive **3/4-inch (19-mm)** bolts, spaced not more than **6 inches (150 mm)** from ends and **24 inches (600 mm)** o.c., unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately **2 inches (50 mm)** larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize **and prime** shelf angles located in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3.
- B. Aluminum Ladders:

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1. Manufacturers subject to compliance with requirements, provide products by one of the following:
 - a. Fixfast USA.
 - b. Halliday Products.
 - c. Precision Ladders, LLC.
 - d. Royalite Manufacturing, Inc.
 - e. Thompson Fabricating, LLC.
 - f. UPNOVR, Inc.
2. Source Limitations: Obtain aluminum ladders from single source from single manufacturer.
3. Space siderails 18 inches apart unless otherwise indicated.
4. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide and 1/8 inch thick.
5. Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.
6. Fit rungs in centerline of siderails; fasten by welding or with stainless steel fasteners or brackets and aluminum rivets.
7. Provide platforms as indicated fabricated from pressure-locked aluminum bar grating or extruded-aluminum plank grating, supported by extruded-aluminum framing. Limit openings in gratings to no more than [1/2 inch] [3/4 inch] in least dimension.

2.9 ALTERNATING TREAD DEVICES

- A. Alternating Tread Devices: Fabricate alternating tread devices of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Lapeyre Stair Inc.
 - b. Precision Ladders, LLC.
 2. Alternating Tread Devices to be designed by manufacturer to comply with 2018 IBC and 2018 NAPA 100, Life Safety Code.
 3. Comply with applicable railing requirements in Section 055213 "Pipe and Tube Railings."
- B. Galvanize **and prime** steel alternating tread devices, including treads, railings, brackets, and fasteners.

2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

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- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize **and prime exterior miscellaneous** steel trim.

2.11 METAL BOLLARDS

- A. Fabricate metal bollards from **Schedule 80 steel pipe [1/4-inch (6.4-mm) wall-thickness rectangular steel tubing]**.
- B. Prime steel bollards with **zinc-rich primer**.

2.12 ABRASIVE METAL NOSINGS, TREADS, AND THRESHOLDS

- A. Cast-Metal Units: Cast **aluminum**, with an integral-abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Drill for mechanical anchors and countersink. Locate holes not more than **4 inches (100 mm)** from ends and not more than **12 inches (300 mm)** o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
 - 1. Provide two rows of holes for units more than **5 inches (125 mm)** wide, with two holes aligned at ends and intermediate holes staggered.
- D. Apply bituminous paint to concealed surfaces of cast-metal units.
- E. Apply clear lacquer to concealed surfaces of extruded units.

2.13 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize bearing and leveling plates.

2.14 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for

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each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

- B. Galvanize **and prime** loose steel lintels located in exterior walls.

2.15 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.16 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with **SSPC-SP 3, "Power Tool Cleaning."**
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

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- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLATION OF SHELF ANGLES

- A. Install shelf angles as required to keep masonry level, at correct elevation, and flush with vertical plane.

3.4 INSTALLATION OF METAL LADDERS

- A. Secure ladders to adjacent construction with the clip angles attached to the stringer.
- B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.

3.5 INSTALLATION OF ALTERNATING TREAD DEVICES

- A. Secure top and bottom of alternating tread devices to construction to comply with manufacturer's written instructions.

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3.6 INSTALLATION OF MISCELLANEOUS STEEL TRIM

- A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.7 INSTALLATION OF METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
- B. Anchor bollards in place with concrete footings. Center and align bollards in holes **3 inches (75 mm)** above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- C. Fill bollards solidly with concrete, mounding top surface to shed water.

3.8 INSTALLATION OF ABRASIVE METAL NOSINGS, TREADS, AND THRESHOLDS

- A. Center nosings on tread widths unless otherwise indicated.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
- C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 079200 "Joint Sealants" to provide a watertight installation.

3.9 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.10 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.

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2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in **Section 099113 "Exterior Painting."**

- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

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SECTION 055213 – PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Aluminum **pipe and tube** railings 1-1/2” outside radius unless otherwise noted.

1.2 PERFORMANCE REQUIREMENTS

A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.

B. Structural Performance: Design, engineer and fabricate railings to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails:

- a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
- b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Top Rails of Guards:

- a. Uniform load of **50 lbf/ ft. (0.73 kN/m) applied in any direction.**
- b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

3. Infill of Guards:

- a. Concentrated load of **50 lbf (0.22 kN).**
- b. Infill load and other loads need not be assumed to act concurrently.

C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

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- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design.
- D. Samples for Verification: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
 - 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
 - a. Show method of **finishing** and **connecting** members at intersections.
- E. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- F. Welding certificates.
- G. Qualification Data: For **professional engineer**.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2, "Structural Welding Code--Aluminum."

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1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Provide allowance for trimming and fitting at site.

1.6 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Aluminum Pipe and Tube Railings:
 - a. AlumaGuard Corp.
 - b. ATR Technologies, Inc.
 - c. Blum, Julius & Co., Inc.
 - d. Braun, J. G., Company; a division of the Wagner Companies.
 - e. CraneVeyor Corp.
 - f. Hollaender Manufacturing Company.
 - g. Moultrie Manufacturing Company.
 - h. Sterling Dula Architectural Products, Inc.
 - i. Superior Aluminum Products, Inc.
 - j. Thompson Fabricating, LLC.
 - k. Tubular Specialties Manufacturing, Inc.
 - l. Tuttle Aluminum & Bronze.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

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2.3 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Structural **Pipe and Round Tubing**: ASTM B 429, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.
- C. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- D. Die and Hand Forgings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.
- E. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.4 FASTENERS

- A. General: Provide the following:
 - 1. Aluminum Railings: Type **304** stainless-steel fasteners.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated **and capable of withstanding design loads**.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Anchoring Cement: Factory-packaged, non-shrink, non-staining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

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1. Water-Resistant Product: Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage.
- B. Assemble railings in the 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. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove flux immediately.
 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- H. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- I. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form changes in direction as follows:
 1. As detailed.
 2. By inserting prefabricated **elbow fittings**.

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- K. Close exposed ends of railing members with prefabricated end fittings.
- L. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- O. For railing posts set in concrete, provide steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with steel plate forming bottom closure.
- P. For removable railing posts, fabricate slip-fit sockets from stainless-steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
 - 1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.

2.7 FINISHES, GENERAL

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

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2.8 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

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- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches (150 mm) of post.

3.4 ANCHORING POSTS

- A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch (3-mm) buildup, sloped away from post.
- C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
- D. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.5 ANCHORING RAILING ENDS

- A. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.

3.6 ATTACHING HANDRAILS TO WALLS

- A. Attach handrails to wall with wall brackets. Provide brackets with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Use type of bracket with predrilled hole for exposed bolt anchorage.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For steel-framed **gypsum board** partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.

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3.7 ADJUSTING AND CLEANING

- A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

3.8 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so 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 055213

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SECTION 061053 – MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Rooftop equipment bases and support curbs.
2. Wood blocking, **cants**, and nailers.
3. Wood furring **and grounds**.
4. Wood sleepers.
5. Plywood backing panels.
6. Sheathing on walls panels above roof to receive roofing and flashing.
7. Building wrap.

1.2 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NHLA: National Hardwood Lumber Association.
2. SPIB: The Southern Pine Inspection Bureau.
3. WWPA: Western Wood Products Association.

1.3 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

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PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPAC2.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction **and containing no arsenic or chromium.**
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat **items indicated on Drawings, and the following:**
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, **furring, stripping**, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawl spaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.

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7. Utility shelving.

- B. For items of dimension lumber size, provide **Construction or No. 2 Standard** grade lumber with **19** percent maximum moisture content of any species.
- C. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, **Exterior, AC** in thickness indicated or, if not indicated, not less than **3/4-inch (19-mm)** nominal thickness.
- B. Roofing curbs and low wall sheathing above roofs; Pressure Treated DOC PS1, Exterior AC in thickness shown on drawings.

2.5 BUILDING WRAP

- A. Self adhering 40 mil modified bitumen, Owens Corning Weatherlock, Certainteed Winterguard or GAF Weatherwatch.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners **with hot-dip zinc coating complying with ASTM A 153/A 153M.**
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as

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determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

2.7 METAL FRAMING ANCHORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 1. Use for interior locations where stainless steel is not indicated.

2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- B. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than **0.025 inch (0.6 mm)**.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate **furring**, nailers, blocking, **grounds**, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.

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- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 BUILDING WRAP INSTALLATION

- A. Completely cover exterior walls with building wrap. Install from the lowest level on the wall extending the building wrap ½” below the bottom of sheathing. Install each additional course lapping course below 4”. Lap ends 8”. Extend building wrap into window and door openings to the inside face of the studs. Seal building wrap tightly at all wall penetrations.

3.3 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

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3.4 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.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

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SECTION 061600 – SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Sheathing joint-and-penetration treatment materials.

B. Related Requirements:

1. Section 072726 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [**Project site**] <Insert location>.

1. Review air-barrier and water-resistant glass-mat gypsum sheathing requirements and installation, special details, transitions, mockups, air-leakage testing, protection, and work scheduling that covers air-barrier and water-resistant glass-mat gypsum sheathing.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Wall sheathing.
2. Sheathing joint-and-penetration treatment materials.

B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

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5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

C. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.

1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, **including list of ABAA-certified installers and supervisors employed by Installer, who work on Project.**

B. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.

C. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.

D. Evaluation Reports: For the following, from ICC-ES:

1. Air-barrier and water-resistant glass-mat gypsum sheathing.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.

B. Mockups: Build mockups to set quality standards for materials and execution **and for preconstruction testing.**

1. Build integrated mockups of exterior wall assembly, **150 sq. ft. (14 sq. m)**, incorporating backup wall construction, window, storefront, door frame and sill, ties, and other penetrations, and flashing to demonstrate crack and joint treatment and sealing of gaps, terminations, and penetrations of air-barrier sheathing assembly.
 - a. Coordinate construction of mockups to permit inspection and testing of sheathing before external insulation and cladding are installed.
 - b. Include junction with roofing membrane, **building corner condition, and foundation wall intersection.**

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- c. If Architect determines mockups do not comply with requirements, reconstruct mockups until mockups are approved.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Testing Agency Qualifications:
 1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
 2. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing: an independent agency, qualified in accordance with ASTM E329 for testing indicated, and certified by Air Barrier Association of America, Inc.
 3. Testing agency to be selected and paid by Owner.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: **Owner will engage** a qualified testing agency to perform preconstruction testing on field mockups.
- B. Mockup Testing: Air-barrier and water-resistant glass-mat gypsum sheathing assemblies are to comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.
 1. Air-Leakage-Location Testing: Mockups will be tested for evidence of air leakage in accordance with **ASTM E1186, chamber pressurization or depressurization with smoke tracers.**
 2. Air-Leakage-Volume Testing: Mockups will be tested for air-leakage rate in accordance with [ASTM E783] [or] [ASTM E2357].
 3. Notify Architect **seven** days in advance of the dates and times when mockups will be tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, are to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies are to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, **tie-ins to other installed air barriers**, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 WALL SHEATHING

- A. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.
1. Manufacturers: Subject to compliance with requirements, **provide products by the following**:
 - a. Georgia-Pacific Gypsum LLC – DensGlass Gold.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Provide fasteners of **Type 304 stainless steel**.
- B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
1. For steel framing less than **0.0329 inch (0.835 mm)** thick, use screws that comply with ASTM C1002.
 2. For steel framing from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick, use screws that comply with ASTM C954.
- C. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

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PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
 - 3. ICC-ES evaluation report for fastener.
- D. Coordinate **wall** sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Roof Sheathing:
 - a. Screw to cold-formed metal framing.
 - b. Space panels **1/8 inch (3 mm)** apart at edges and ends.

3.3 INSTALLATION OF GYPSUM SHEATHING

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.

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2. Install panels with a **3/8-inch (9.5-mm)** gap where non-load-bearing construction abuts structural elements.
 3. Install panels with a **1/4-inch (6.4-mm)** gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately **8 inches (200 mm)** o.c. and set back a minimum of **3/8 inch (9.5 mm)** from edges and ends of panels.
- D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately **8 inches (200 mm)** o.c. and set back a minimum of **3/8 inch (9.5 mm)** from edges and ends of panels.
- E. Seal sheathing joints in accordance with Tremco.
1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
- F. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing:
1. Install accessory materials in accordance with sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.
 - a. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - b. Install transition strip on roofing membrane or base flashing, so that a minimum of **3 inches (75 mm)** of coverage is achieved over each substrate.
 2. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
 3. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

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4. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply [transition strip] [preformed silicone extrusion], so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.
 - a. Transition Strip: Roll firmly to enhance adhesion.
 - b. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
5. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.
6. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
7. Seal top of through-wall flashings to sheathing with an additional 6-inch- (150-mm-) wide, transition strip.
8. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counter flashings or ending in reglets with termination mastic.
9. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.4 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing and Inspecting Agency: **Owner will engage** a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier and water-resistant glass-mat gypsum sheathing, accessories, and installation are subject to inspection for compliance with requirements. **Inspections may include the following:**
 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish mouths.
 3. Termination mastic has been applied on cut edges.
 4. Strips and transition strips have been firmly adhered to substrate.
 5. Compatible materials have been used.
 6. Transitions at changes in direction and structural support at gaps have been provided.
 7. Connections between assemblies (sheathing and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 8. All penetrations have been sealed.
- D. Tests: As determined by testing agency from among the following tests:

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1. Air-Leakage-Location Testing: Air-barrier sheathing assemblies will be tested for evidence of air leakage in accordance with **ASTM E1186, chamber pressurization or depressurization with smoke tracers.**
 2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate in accordance with **ASTM E783 or ASTM E2357.**
- E. Air barriers will be considered defective if they do not pass tests and inspections.
- F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.
- G. Prepare test and inspection reports.

END OF SECTION 061600

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SECTION 064020 – SOLID SURFACING LAVATORIES & TOPS & WINDOW SILLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Solid-surfacing-material countertops battery toilets.
 - 2. Window sills.

1.2 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.3 SUBMITTALS

- A. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated.
 - 1. Solid-surfacing materials.
- C. Samples for Verification: For the following:
 - 1. Solid-surfacing materials, 6 inches (150 mm) square.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.5 PROJECT CONDITIONS

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- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a pre-coated finish.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Avonite; Avonite, Inc.
 - b. Corian; DuPont Polymers.
 - c. Surell; Formica Corporation.
 - d. Fountainhead; International Paper, Decorative Products Div.
 - e. Swanstone; Swan Corporation (The).
 - f. Gibraltar; Wilsonart International, Div. of Premark International, Inc.

2.2 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior

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walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.3 SOLID-SURFACING-MATERIAL

- A. Quality Standard: Comply with AWI Section 400 requirements for countertops.
- B. Solid-Surfacing-Material Thickness: 1/2 inch (13 mm).
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
 - 1. Provide Architect's selections from manufacturer's full range of colors and finishes.
- D. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
- E. Install integral sink bowls in countertops in shop.
- F. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Install work level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- B. Scribe and cut to fit adjoining work and refinish cut surfaces and repair damaged finish at cuts.
- C. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
- D. Window sills: Fasten to substrate with adhesive.
 - 1. Align adjacent solid-surfacing-material countertops and form 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. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.

3.3 ADJUSTING AND CLEANING

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- A. Clean work on exposed and semi-exposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION 064020

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SECTION 064113 – WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Architectural wood cabinets.
2. Wood shelving.
3. Wood furring, blocking, shims, and hanging strips for installing architectural wood cabinets unless concealed within other construction before cabinet installation.
4. Shop finishing of architectural wood cabinets.

B. Countertops for cabinets are specified in Section 064020.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, **including panel products cabinet hardware and accessories and finishing materials and processes.**

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples for Initial Selection:

1. Shop-applied transparent finishes.

D. Samples for Verification:

1. Lumber for transparent finish, not less than **5 inches (125 mm) wide by 12 inches (300 mm) long**, for each species and cut, finished on one side and one edge.
2. Veneer leaves representative of and selected from flitches to be used for transparent-finished cabinets.
3. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
 - b. Miter joints for standing trim.
4. Exposed cabinet hardware and accessories, one unit for each type.

1.3 QUALITY ASSURANCE

A. Fabricator and Installer Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

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- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups of a single typical classroom. Room selected by Construction Manager.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood-veneer-faced architectural cabinets can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOOD CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.

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1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

2.2 WOOD CABINETS FOR TRANSPARENT FINISH

- A. Grade: **Custom.**
- B. Type of Construction: **Face frame.**
- C. Cabinet and Door and Drawer Front Interface Style: **Flush overlay.**
- D. Wood for Exposed Surfaces:
 1. Species: **Red Oak.**
 2. Cut: **Plain sliced/plain sawn.**
 3. Grain Direction: **Vertically for drawer fronts, doors, and fixed panels.**
 4. Matching of Veneer Leaves: **Random match.**
- E. Semiexposed Surfaces: Provide surface materials indicated below:
 1. Surfaces Other Than Drawer Bodies: **Compatible species to that indicated for exposed surfaces, stained to match.**
 2. Drawer Subfronts, Backs, and Sides: **Solid-hardwood lumber.**
 3. Drawer Bottoms: **Hardwood plywood.**
- F. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 1. Join subfronts, backs, and sides with **glued rabbeted joints supplemented by mechanical fasteners.**

2.3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 1. Wood Moisture Content: **8 to 13 percent.**
 2. Veneer-Faced Panel Products (Hardwood Plywood): **HPVA HP-1, made with adhesive containing no urea formaldehyde.**

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Butt Hinges: 2-3/4-inch (70-mm), five-knuckle steel hinges made from 0.095-inch- (2.4-mm-) thick metal, and as follows:

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1. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
 - C. Back-Mounted Pulls: BHMA A156.9, B02011.
 - D. Wire Pulls: Back mounted, solid **metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.**
 - E. Catches: **Magnetic catches, BHMA A156.9, B03141.**
 - F. Adjustable Shelf Standards and Supports: **BHMA A156.9, B04071; with shelf rests, B04081.**
 - G. Drawer Slides: BHMA A156.9.
 1. Grade 1 and Grade 2: Side mounted **and extending under bottom edge of drawer; partial-extension** type; **epoxy-coated steel** with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; **full-extension** type; zinc-plated-steel ball-bearing slides.
 3. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide **Grade 2.**
 4. For drawers more than 3 inches (75 mm) high but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide **Grade 1.**
 5. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide **Grade 1HD-100.**
 6. For computer keyboard shelves, provide **Grade 1HD-100.**
 7. For trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide, provide **Grade 1HD-100.**
 - H. Door and Drawer Silencers: BHMA A156.16, L03011.
 - I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 - J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
 - K. Door Locks: ANSI/BHMA A156.11, E07121.
 - L. Drawer Locks: ANSI/BHMA A156.11, E07041.
- 2.5 MISCELLANEOUS MATERIALS
- A. Furring, Blocking, Shims, and Hanging Strips: **Softwood or hardwood lumber**, kiln dried to less than 15 percent moisture content.
 - B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

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- C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.6 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets: 1/16 inch (1.5 mm) unless otherwise indicated.
- C. Complete fabrication, including assembly, **finishing**, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.7 SHOP FINISHING

- A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Finish Materials: Use finish materials that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.
- D. Transparent Finish:
 - 1. Finish: System – 4, water-based latex acrylic, or catalyzed lacquer TR2 finish.
 - 2. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to cabinets made from closed-grain wood before staining and finishing.
 - 3. Staining: **Match approved sample for color.**
 - 4. Sheen: **Satin, 31-45** gloss units measured on 60-degree gloss meter per ASTM D 523.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails **or finishing screws** for exposed fastening, countersunk and filled flush with woodwork.
 - 1. For shop finished items use filler matching finish of items being installed.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with **No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips.**
- G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
 - 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

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- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064113

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SECTION 072119 – FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Closed-cell spray polyurethane foam.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from **ICC-ES**.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

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

1. Carlisle Spray Foam Insulation
2. Certain Teed Corporation.
3. Icynene-Lapolla; Icynene.
4. Johns Manville; a Berkshire Hathaway company.
5. NCFI Polyurethanes; a division of Barnhardt Manufacturing Company.
6. Quadfoam, an Accella Brand.
7. SWD Urethane.

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2.2 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, minimum density of [**1.5 lb/cu. ft. (24 kg/cu. m)**] and minimum aged R-value at **1-inch (25.4-mm)** thickness of **6.2 deg F x h x sq. ft./Btu at 75 deg F (43 K x sq. m/W at 24 deg C)**.
1. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: **25** or less. Apply intumescent fire retardant to achieve flame-spread index if required.
 - b. Smoke-Developed Index: **450** or less.
 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.3 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.
- E. Cavity Walls: Install into cavities to **thickness indicated on Drawings**.
- F. Miscellaneous Voids: Apply according to manufacturer's written instructions.

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3.3 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 072119

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**SECTION 072430 – WATER DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM
(EIFS)**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this Section.

1.2 SUMMARY

- A. This section includes:
 - 1. Exterior insulation and finish systems (E.I.F.S.) with air/moisture barrier and drainage system.
 - 2. Exterior Insulation and Finish Systems applications over:
 - a. Masonry surfaces.
 - b. Glass mesh reinforced sheathing at soffits and fascia.
- B. Related Sections Include:
 - 1. Masonry substrates behind system specified in Division-4 Section "Unit Masonry".
 - 2. Metal stud system for exterior walls supporting sheathing behind system specified in Section 054000 Cold-Formed Metal Framing.
 - 3. Sealing joints specified in this section.

1.2 DEFINITIONS

- A. Exterior Insulation and Finish System: Exterior assembly composed of inner layer of glass mesh reinforced sheathing and/or thermal insulation board and outer layer forming protective finish coating. Assembly applied to supporting substrate of construction indicated.
 - 1. Exterior assembly composed of outer layer forming protective finish coating applied to substrate of construction indicated.
- B. System Manufacturer: Manufacturer of exterior insulation and finish system.

1.4 SYSTEM DESCRIPTION

- A. Provide system complying with following performance requirements:
 - 1. Bond Integrity: Free from bond failure within system components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
 - 2. Weathertightness: Resistant to water penetration from exterior into system and assemblies behind it or through them into interior of building which results in deterioration of thermal-insulating effectiveness or other degradation of system

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and assemblies behind system including substrates, supporting wall construction, and interior finish.

3. Fire Performance Characteristics: Provide materials and construction identical to those tested for following fire performance characteristics, per test method indicated below, by UL or other testing and inspecting agencies acceptable to authorities having jurisdiction:
4. Surfacing Burning Characteristics: Flame spread rating of 25 or less per ASTM E 84 for insulation board and protective finish coats, when each tested individually.

1.5 REFERENCED DOCUMENTS:

A. ASTM Standards: The following ASTM standards apply to work of this section:

1. B117 Test Method for Salt Spray (Fog) Testing
2. C79 Test Method for Gypsum Sheathing Board
3. C150 Specification for Portland Cement
4. C297 Test Method for Tensile Strength of Flat Sandwich Constructions in Flatwise Plane
5. C578 Specification for Performed, Cellular Polystyrene Thermal Insulation.
6. C1177 Specification for Glass Mat Gypsum for use as Sheathing
7. C1382 Test Method for Determining Tensile Adhesion Properties of Sealant When Used in Exterior Insulation and Finish Systems (EIFS) Joints
8. D522 Test Methods for Mandrel Bend Test of Attached Organic Coatings
9. D968 Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
10. D1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
11. E2134 Standard test method for Evaluating the Tensile-Adhesion Performance of and Exterior Insulation and Finish System (EIFS).
12. E2430 Standard specifications for Expanded Polystyrene (EPS) thermal insulation board of use in exterior insulation and finish systems (EIFS).
13. E2485 Standard test method for freeze/thaw resistance of exterior insulation and finish system (EIFS) and water resistive barriers.
14. D2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
15. D2370 Test Method for Tensile Properties of Organic Coatings
16. D3273 Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
17. D4541 Test Method for Pull-Off Strength of Coatings using Portable Adhesion-Testers
18. E84 Test Method for Surface Burning Characteristics of Building Materials
19. E96 Test Methods for Water Vapor Transmission of Materials
20. E119 Method for Fire Tests of Building Construction and Materials

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|-----|------|---|
| 21. | E283 | Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences |
| 22. | E330 | Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference |
| 23. | E331 | Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference |
| 24. | G23 | Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Non-metallic Materials |
| 25. | G53 | Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Non-metallic Materials |

1.6 BUILDING CODE STANDARDS:

- A. Fire Code: The provisions of the following fire codes apply to work of this section.
1. NFPA 259, test Method for Potential Heat of Building Materials.
 2. NFPA 268, “Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source.”
 3. NFPA 285, Standard Method of Test for Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components Using the Intermediate-scale, Multi-Test Apparatus.
- B. Proprietary Specifications
1. 101514 Georgia-Pacific Corporation, “Dens Glass Gold Sheathing”
 2. AATCC-127 Water Resistance: Hydrostatic Pressure Test

1.7 DESIGN REQUIREMENTS

- A. Wind Load: Design for maximum allowable system deflection, normal to the plane of the wall of L/360.
1. Design for wind load in conformance with code requirements.
- B. Moisture Control: Prevent the accumulation of water behind the EIFS system, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly.
1. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, and at the base of the wall.
 2. Air Leakage Prevention – provide continuity of air barrier system at foundation, roof, windows, doors, and other penetrations through the system with connecting and compatible air barrier components to minimize condensation and leakage caused by air movement.

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3. Vapor Diffusion and Condensation – perform a dew point analysis of the wall assembly to determine the potential for accumulation of moisture in the wall assembly as a result of water vapor diffusion and condensation. Adjust insulation thickness and/or other wall assembly components accordingly to minimize the risk of condensation. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.
- C. Impact Resistance: Provide ultra-high impact resistance unless otherwise noted.
 - D. Color Selection: Color texture to be a light reflectance value of 20 or greater.

1.8 SUBMITTALS

- A. Product Data:
 1. Manufacturer's technical data for each component of exterior insulation and finish system.
 2. Product data for each type of material to be used.
- B. Shop Drawings:
 1. Submit manufacturer's specifications, details, and installation instructions.
 2. Provide project specific details showing each unique condition.
 3. Submit complete shop drawings showing installation of system, location of control joints, location of expansion joints, junctions with other materials and location and type of joint sealant.
- C. Samples for Initial Selection Purposes:
 1. Manufacturer's standard color charts and small-scale samples indicating textural choices available.
 2. Submit sealant manufacturer's standard bead samples consisting of strips of actual products showing full range of colors available.
- D. Samples for Verification Purposes: Samples, 2' square, for each finish, color, and texture indicated; prepare samples using same tools and techniques intended for actual work.
 1. Incorporate within each sample a typical control joint filled with sealant of color indicated or selected.
- E. Installer certificates signed by manufacturer certifying that Installers comply with specified requirements.
 1. Applicators certificate of instruction.
- F. Test reports for system from qualified independent testing laboratory certifying and interpreting test results relative to system's compliance with requirements for fire performance characteristics, bond integrity, and material properties.
- G. Sealant compatibility and test reports from sealant manufacturer certifying that materials forming joint substrates of system tested for compatibility and adhesion with joint

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sealants; include sealant manufacturer's interpretation of results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.

- H. Research reports or evaluation reports of model code organization acceptable to authorities having jurisdiction which evidence system's compliance with building code in effect for Project.
 - 1. Manufacturers code compliance report
- I. Copy of product warranty.
- J. LEED Submittals: Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants used inside the weatherproofing system documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Firm regularly engaged in manufacturing products for system indicated and with min. twenty (20) successful experiences in applications similar to that required for this Project.
 - 2. Manufacturer to be a member in good standing of EIFS Industry Members Association (EIMA)
 - 3. Manufacturing facilities to be ISO 9002 certified EIFS
- B. Installer Qualifications: Engage Installer certified in writing by system manufacturer as qualified for installation of systems indicated.
 - 1. Installer to be engaged in application of EIFS for a minimum of three (3) years.
 - 2. Knowledgeable in the proper use and handling of EIFS materials and listed by manufacturer as having attended manufacturer's continuing education.
 - 3. Employ skilled mechanics that are experienced and knowledgeable in EIFS application, and familiar with the requirements of the specified work.
 - 4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.
 - 5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with manufacturer's published specifications and details and the project plans and specifications.
- C. Insulation board manufacturer requirement
 - 1. Recognized by manufacturer as capable of producing insulation board to meet system requirements and hold a valid licensing agreement with manufacturer.
 - 2. Listed by an approved agency.
 - 3. Label insulation board with information required by manufacturer, the approved listing agency, and the applicable building codes.

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- D. Single Source Responsibility: Obtain materials for system from either single manufacturer or from manufacturers approved by system manufacturer as compatible with other system components.
- E. Design and Detailing: Encapsulate insulation board by substrate at all locations; separate from exterior of building by thermal barrier having a minimum of a fifteen (15) minute finish rating.
 - 1. Manufacturer/installer responsible for design of system to comply with requirements contained in this section and the information contained on drawings.
- F. Field-Constructed Mock-Up: Prior to installation of system, erect mockups for each form of wall construction and finish required to verify selections made under sample submittals and to demonstrate aesthetic effects including those related to execution.
 - 1. Build mock-ups to comply with following requirements, using materials indicated for final work:
 - 2. Locate mock-ups on site in location and of size indicated or, if not indicated, directed by Architect.
 - 3. Erect mock-ups in presence of Architect.
 - 4. Demonstrate proposed range of color, texture, and workmanship expected in completed work.
 - 5. Construct full-scale mock-up of typical EIFS/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E283, E331, E330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.
- G. Manufacturers certificate of compliance with 2009 International Building Code (IBC)
- H. EPS board manufacturer's certificate of compliance with ASTM E2430-Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for Use in Exterior Insulation and Finish Systems (EFIS).
- I. Certificate of Compliance: Submit, as part of Shop Drawings, certification from manufacturer of product or materials furnished herein, stating that product(s) and / or material (s) being furnished comply with technical provisions contained herein.
 - 1. Any and all deviations from technical provisions of specifications shall be specifically noted.
- J. Producer's Statement of Applicability: Submit from manufacturer or other producer, a written-certified statement that producer reviewed proposed application of product on Project.
 - 1. Statement shall state that producer agrees with or does not object to Architect's specification and Contractor's selection of product for use in work

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2. Statement also states that proposed application of product on project is suitable and proper.
- K. Inspections:
1. Provide independent third-party inspection where required by code and/or contract documents.
 2. Conduct inspections in accordance with code requirements and contract documents.
- L. Pre-Installation Conference: Conduct conference at Project site for purposes of ensuring coordinated and timely execution of work of this Section; comply with Division-1 requirements.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in original, unopened packages with manufacturer's labels identifying products legible and intact.
- B. Store materials inside and under cover; keep dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, damage from construction traffic and other causes.
1. Protect coatings (pail products) from freezing and temperatures in excess of 90 degrees.
- C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location. Stack insulation board flat and off the ground.

1.11 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install system when ambient outdoor temperatures 40°F (4°C) and falling unless temporary protection and heat provided to maintain ambient temperatures above 40°F (4°C) during installation of wet materials and for 24 hours after installation or longer to allow them to become thoroughly dry and weather resistant.
- B. Provide supplementary heat for installation in temperatures less than 40 degrees F.
- C. Provide protection of surrounding areas and adjacent surfaces from application of materials

1.12 SEQUENCING AND SCHEDULING

- A. Sequence installation of system with related work specified in other sections to ensure that wall assemblies, including flashing, trim, and joint sealers, protected against damage from weather, aging, corrosion, or other causes.
- B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors

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and other wall penetrations to provide a continuous air barrier.

- C. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall.
- D. Coordinate installation of windows and doors so air barrier components are connected to them to provide a continuous air barrier.
- E. Install window and door head flashing immediately after windows and doors are installed.
- F. Install diverter flashing wherever water can enter the wall assembly to direct water to the exterior.
- G. Install copings and sealant immediately after installation of the EIFS system and when EIFS coatings are dry.
- H. Attach penetrations through EIFS to structural support and provide watertight seal at penetrations.

1.13 SYSTEM PERFORMANCE CRITERIA

- A. Installer provide fifteen (15) year guarantee of materials, installation and workmanship. Warranty to cover entire system components, including sealants, sheathing, reinforcing fabric, finish coats and other components specified in this section.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER'S:

- A. Manufacturers: materials are specified by brand names to establish a standard quality, or by performance requirements and general description of product. The architect will consider substitutions for brand names of products specified, provided the procedures set forth for substitutions are followed. The architect reserves the right to reject any material which, in his opinion, will not produce the quality of work specified herein.
- B. The specification is based on Dryvit Systems, Inc. systems as follows:
 - 1. Dryvit Systems, Inc., Outsulation MD or Dryvit Infinity as selected by Tremco.
- C. The following are acceptable manufactures if approved by Tremco, or if Tremco warranty is not to be provided:
 - 1. Sto Corporation
 - 2. Parex, Incorporated

2.2 MATERIALS

- A. Compatibility: Provide adhesive, board insulation, reinforcing fabrics, base and finish coat materials, sealants, and accessories compatible with one another and approved

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for use by system manufacturer.

- B. Provide colors and texture of protective coating to comply with following requirements:
1. Provide selection made by Architect from manufacturer's full range of standard colors and textures available for type of finish coat indicated.
- C. System consists of following components:
1. GLASS MESH REINFORCED SHEATHING
 - a) Proprietary backing units with glass mesh fiber mesh reinforcing and water-resistant coating on both faces, of type recommended by EFIS system manufacturer and complying with one of the following:
 - b) Coated Gypsum Panels: Water resistant, silicone-treated gypsum core with glass fiber mesh surface mats and manufacturer's proprietary water/vapor retarding, alkali resistant coating on both faces, ½" thick x 48" wide x 96", 108" or 120" long, weighing 2.0 lbs./s.f.
 - c) Cement-Coated Portland Cement Panels: High density portland cement surface coating on both faces, lightweight concrete core composed of portland cement and expanded ceramic aggregate; 7/16" thick x 36" wide x 36", 48", 60", 64", or 72" long; 3.2 - 3.8 lbs./s.f.
 - d) Vinyl-Coated Portland Cement Panels: Core formed in continuous process from aggregated portland cement slurry and reinforced with vinyl-coated woven glass fiber mesh embedded in both surfaces, with one face smooth and other textured; ½" thick and x 36" wide x 48", 60", and 72" long; 3 lbs./s.f.
 - e) Products: Subject to compliance with requirements, provide one of following products:
 - 1) "Dens-Glass Gold"; Georgia Pacific Corp.
 - 2) "Wonder-Board"; Modulars Inc.
 - 3) "Durock Tile Backer Board"; Durabond Div., USG Industries, Inc.
 2. SURFACE PREPARATION MATERIALS
 - a) Surface-Sealer: System manufacturer's standard adhesion intermediary designed to improve bond between substrate of type indicated and adhesive for application of insulation.
 - b) Conditioner: Water-based surface conditioner with a minimum solids content of 8% for treatment of dry, porous concrete, plaster or masonry surfaces, load bearing painted surfaces, or for protection of sheathing from moisture damage.
 - c) Leveler: Provide one of the following as required to level masonry surfaces:
 - 1) A one component factory proportioned enhanced 100% acrylic polymer based leveler for concrete, masonry, plaster/stucco surfaces and acrylic based textured coatings (for leveling up to 1/16").
 - 2) A one component factory proportioned enhanced 100% acrylic polymer based leveler with water repellent additive for concrete, masonry or plaster surfaces (for leveling up to 1/8").

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- 3) A one component factory proportioned polymer modified fiber reinforced cement based leveler with water repellent additive for concrete, masonry or plaster surfaces (for leveling up to 1/2").
- d) Air/Moisture Barrier:
 - 1) Joint Compound: Ready mixed acrylic based flexible joint compound for rough opening protection and joint treatment of wall sheathing.
 - 2) Waterproof Coating: Ready mixed acrylic-based waterproof coating for wall sheathing.
3. ADHESIVE
 - a) Adhesive for Application of Insulation: System manufacturer's standard formulation designed for indicated use, compatible with substrate and complying with following requirements:
 - 1) Cementitious Adhesives: Primer/Adhesive: One component polymer modified cement based, factory blend, and adhesive with less than 50 percent Portland cement content by weight (for use over exterior gypsum sheathing.
 - 2) Factory-mixed formulation designed for adhesive attachment of insulation to substrates of type indicated, as approved by system manufacturer.
 - 3) Either job-mixed or ready-mixed formulation indicated above.
4. RIGID BOARD INSULATION
 - a) General: Insulation to comply with requirements listed:
 - 1) Insulation to be classified by Underwriter's Laboratory (U.L.).
 - 2) Flame Spread: less than 25; Smoke Developed less than 450 in accordance with ASTM E 84.
 - 3) Dimensional Tolerance: edges square within 1/16"; thickness uniform to within 1/16".
 - b) Nominal 1.0 lb/ft³ (16 kg/m³) Expanded Polystyrene (EPS) Insulation Board in compliance with ASTM C 578 Type I requirements.
5. REINFORCING MESHES
 - a) Reinforcing Fabric: Balanced, alkali-resistant open weave glass fiber fabric treated for compatibility with other system materials; made from continuous multi-end strands with min. tensile strength of 120 lbs. and 140 lbs. in warp and fill directions, respectively, per ASTM D 1682 and complying with ASTM D 578 and following requirements:
 - b) Standard Mesh:
 - 1) Nominal 4.5 oz./sq. Yd. symmetrical, interlaced open-weave

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- glass fiber fabric made with a min. 20 percent by weight alkaline resistant coating compatible with other system products.
 - 2) Application: For application over Armor Mat
 - c) Ultra-High Impact Mesh:
 - 1) Armor Mat: Nominal 15 oz/yd² (509 g/m²), ultra-high impact, double strand, interwoven, open-weave glass fiber fabric with alkaline resistant coating compatible with other system materials.
 - 2) Application: All Areas unless otherwise noted.
 - d) Specialty Meshes:
 - 1) Corner Mat: Nominal 7.8 oz/yd² (265 g/m²), pre-creased, heavy-duty, open-weave woven glass fiber fabric with alkaline resistant coating for compatible with other system components
 - 2) Application: Typical for all corners (inside and out)
- 6. EXTERIOR FINISH SYSTEM
 - a) Base Coat Materials; General: System manufacturer's standard, job-mixed formulation of Portland cement complying with ASTM C 150, Type I, white or natural color; and system manufacturer's standard polymer-based adhesive designed for use indicated.
 - b) Cementitious Base Coats: One component polymer modified cement based factory blend, base coat with less than 50 percent Portland cement content by weight.
- 7. Waterproof Base Coat: Two component fiber reinforced acrylic-based waterproof base coat mixed with Portland cement (for use as a waterproof base coat to waterproof foundations, parapets, splash areas, trim, and other projecting architectural features).
- 8. Primer: Acrylic based tinted primer required.
- 9. Finish Coat Materials: System manufacturer's standard mixture complying with following requirements for material composition and method of combining materials:
 - a) Equal to Stolit-Lotusan premium acrylic based textured wall coating with Lotus-Effect, Pronounced self-cleaning performance.
 - b) Color Selection: The lightness value of the exterior finish color to be applied over the insulation board shall be 20% or greater, and the color fastness shall not be less than 8.

2.3 MECHANICALLY FASTENERS

- A. System manufacturer's standard corrosion-resistant fastener assemblies, complete with system manufacturer's standard washer and shaft attachments, selected for properties of

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pull-out, tensile, and shear strength required to resist design loads of application indicated, capable of pulling fastener head below surface of insulation board, and of following description:

1. For attachment to steel studs from 0.033" to 0.112" in thickness provide steel drill screws complying with ASTM C 954.
2. For attachment to light gage steel framing members (not less than 0.0179" in thickness) provide steel drill screws complying with ASTM 1002.
3. For attachment to masonry and concrete substrates provide nylon fasteners, sized to fit insulation thickness indicated and penetrate substrate to depth required to secure anchorage, with 1-7/8" diameter collar, for attachment to masonry and concrete substrates.

2.4 ELASTOMERIC SEALANTS

- A. Sealant Products: Provide manufacturer's standard chemically curing, elastomeric sealant compatible with joint fillers, joint substrates, and other related materials and complies with requirements of Division-7 section "Joint Sealers" for products corresponding to description indicated below.
1. Sealant for expansion joints between EFIS sections shall be of an ultra-low modulus designed for a minimum of 100% elongations and a minimum of 50% compressions.
 2. Sealant for perimeter seals at windows, doors and other wall penetrations shall be low modulus, designed for a minimum of 50% elongations and a minimum of 25% compression.
 3. Sealant Color: Provide color of exposed sealants to comply with following requirements:
 - a. Provide color selected by Owner/Architect from manufacturer's standard colors.

2.5 MIXING

- A. General: Comply with system manufacturer's requirements for combining and mixing materials.
1. Do not introduce admixtures, water, or other materials except as approved by system manufacturer.
 2. Mix materials in clean containers.
 3. Use materials within time period specified by system manufacturer or discard.
- B. Mix with a clean, rust-free high-speed mixer to a uniform consistency.
- C. Mix only as much material as can readily be used.
- D. Do not use anti-freeze compounds or other additives.

2.6 WATER / CEMENT

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- A. Water: Clean and potable.
- B. Cement: ASTM C 150-89 Portland Cement, Type I.

2.7 ACCESSORIES

- A. High impact rigid PVC plastic, conforming to ASTM D-1784-81, Cell Classification 13244C, Manufactured with BF Goodrich Geon Vinyls.
 - 1. Accessories include:
 - a. Starter track; Part No. STDE
 - b. Corner Bead, 1-1/4" X 1-1/4" with perforated flanges.
 - c. "J" Bead, 1" back leg, 1/2" return.
 - d. "MJ" Bead, 1-1/8" perforated flange, 1/4" return.
 - e. Stop Beads, 1-1/8" perforated flange.
 - f. Channel Reveal, 3/4" wide unless noted.
 - g. Control Joint with removable tape, 3/16" reveal.
 - h. Expansion joint, with removable tape, 1/2" reveal.
 - i. Soffit Vent, 3" wide (unless noted), with a free area of 15 sq.in. per lineal foot.
 - 2. Approved manufacturer's subject to conformance with contract requirements:
 - a. Vinyl Corp., Miami, Florida 305-648-4695
 - b. Plastic Components, Miami, Florida, 305-885-0561; 800-327-7077.
 - c. PFB (Plasti-Fab) Corporation; 888-446-5377
- B. Column Collar: Where Gypsum board abut round, or partially round concrete columns provide preformed Column Trim of inside dimension to match column diameter.
 - 1. Column Collar to be Single piece extruded aluminum of finish to match ceiling grid.
 - 2. Size: Provide edge moldings fabricated to diameter required to fit penetration exactly.
 - 3. Style: 3/4" Reveal Edge; of type to accommodate ceiling specified.
 - 4. Manufacturers; Subject to conformance with specification:
 - a. Fry Reglet Corporation.
 - b. MM Systems Corporation.
 - c. Pittcon Industries

PART 3 – EXECUTION

3.1 GENERAL

- A. Installation of E.I.F.S. system Components shall be performed by and/or supervised by Manufacturer trained Applicators only.
- B. Under no circumstances shall any of the products be altered by adding any additives, except for small amounts of clean water as directed on label antifreeze, accelerators, rapid binders, etc., are forbidden.
- C. Mix materials in accordance with manufacturers recommendations and instructions.

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1. Mix with a clean, rust-free high-speed mixer. Add water as directed on labeling.

3.2 INSTALLERS\APPLICATORS

- A. Installer to meet criteria established above under the ‘Quality Assurance’ Section.

3.3 INSPECTION

- A. Prior to application of finish system, representative of manufacturer of finish system shall examine substrate for compliance with Contract Documents and system manufacturer's specifications.

1. Advise Contractor and Architect of all discrepancies.

- B. Contractor shall correct all noted deficiencies to the satisfaction of the Manufacturer and Architect.

1. Do not proceed with work until all unsatisfactory conditions corrected.

3.4 EXAMINATION

- A. Examine substrates, with Installer present, to determine if in satisfactory condition for installation of system.

1. Do not proceed with installation of system until unsatisfactory conditions corrected.

- B. Inspect sheathing application for compliance with applicable requirement:

1. Exterior gypsum sheathing – GA-253.
2. Glass mat faced gypsum sheathing – Georgia Pacific Publication 101514.
3. Cementitious sheathing – Consult manufacturer’s published recommendations.

- C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.5 PROTECTION

- A. Protect contiguous work from moisture deterioration and soiling resulting from application of systems.

1. Provide temporary covering and other protection needed to prevent spattering of exterior finish coatings on other work.
2. Protect system, substrates, and wall construction behind them from inclement weather during installation.
3. Prevent infiltration of moisture behind system and deterioration of substrates.

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- B. Provide protection of installed materials from water infiltration into or behind them.
- C. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry.

3.6 SURFACE PREPARATION

- A. Substrate Preparation: The surface to receive the E.I.F.S. shall be structurally sound, clean, dry, and free of warpage, residual moisture or damage from moisture. Surfaces shall be uniform, with no irregularities greater than 1/8" in 4'-0".
 - 1. Remove surface contaminants and replace damaged sheathing.
 - 2. Spot surface defects in sheathing with joint compound.
 - 3. Prepare and clean substrates to comply with system manufacturer's requirements to obtain optimum bond between substrate and adhesive for insulation.
 - 4. Apply surface-sealer and/or conditioners over substrates where required by system manufacturer for improving adhesion.

3.7 INSTALLATION

- A. Install Air/Moisture Barrier and EIFS in compliance with manufacturer's published instructions.
- B. Air/Moisture Barrier Installation:
 - 1. For installation over glass mesh reinforced sheathing in compliance with ASTM C 1177:
 - 2. Protect rough openings, joints, and parapets: apply joint compound by trowel over rough openings sheathing joints, inside and outside corners, and tops of parapets. Immediately embed reinforcing mesh in the wet joint compound and trowel smooth. Embed minimum 4-inch-wide mesh at sheathing joints and minimum 9-inch-wide mesh at rough openings, inside and outside corners and tops of parapets.
 - 3. Spot fasteners with joint compound.
 - 4. Apply waterproof coating by roller over sheathing surface, including the dry joint compound, to a uniform wet mil thickness of 10 mils in one coat. Use 1/2 inch nap roller for plywood and gypsum sheathing. Use 3/4 inch nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.
 - 5. Coordinate installation of connecting air barrier components with other trades to provide a continuous airtight membrane.
 - 6. Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors, and similar penetrations through the wall assembly).
- C. Starter Track:
 - 1. Strike a level line at the base of the wall to mark where the top of the starter track terminates.
 - 2. Attach the starter track even with the line into the structure a maximum of 16

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inches on center with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8-inch penetration and galvanized or zinc coated nails for wood framing with minimum 3/4 inch penetration. Attach between studs into sheathing as needed to secure the track flat against the wall surface. For solid sheathing attach directly into sheathing at 12 inches on center maximum.

3. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS Board to be seated inside of track) and abut.
4. Install Starter Track at other EIF System terminations as designated on detail drawings: above windows and doors, at floor lines, above roof along dormers or gable end walls, and beneath windowsills with concealed flashing.
5. Strike a level line at the base of the wall to mark where the top of the starter track terminates.
6. Attach the starter track even with the line into the structure a maximum of 16 inches on center with the proper fastener: Type S-12 corrosion resistant screws for steel framing with minimum 3/8-inch penetration and galvanized or zinc coated nails for wood framing with minimum 3/4 inch penetration. Attach between studs into sheathing as needed to secure the track flat against the wall surface. For solid sheathing attach directly into sheathing at 12 inches on center maximum.
7. Butt sections of starter track together. Miter cut outside corners and abut. Snip front flange of one inside corner piece (to allow EPS Board to be seated inside of track) and abut.
8. Install Starter Track at other EIF System terminations as designated on detail drawings: above windows and doors, at floor lines, above roof along dormers or gable end walls, and beneath windowsills with concealed flashing.

D. Splice Strips for Starter Track and Flashing:

1. Starter Track, Window/Door Head Flashing and Side Wall Step Flashing: install 2-inch-wide diagonal splice strips of detail mesh at ends of head flashings. Install minimum 4-inch-wide splice strips of detail mesh between back flange of starter track, head flashings and roof/side wall step flashing. Center the mesh so it spans evenly between the back flange of the Starter Track or flashing and the sheathing. Embed the mesh in the wet joint compound and trowel smooth.
2. Apply waterproof coating over the splice strip when the joint compound is dry.

E. Backwrapping: Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.) except where the Starter Track is installed. The mesh must be wide enough to adhere approximately 4 inches of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 1/2 inches on the outside surface of the insulation board. Adhere mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed.

F. Adhesive Application and Installation of Insulation Board:

1. Rasp the lower face of insulation boards to provide a snug friction fit into the Starter Track. (Rasping prevents an outward bow at the Starter Track.)
2. Apply adhesive to the back of the insulation board with the proper size stainless steel notched trowel. Apply uniform ribbons of adhesive parallel with the

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- SHORT dimension of the board so that when boards are placed on the wall the ribbons will be VERTICAL.
3. Immediately place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply firm pressure over the entire surface of the boards to ensure uniform contact of adhesive. Bridge sheathing joints by a minimum of 8 inches. Interlock inside and outside corners.
 4. Butt all board joints tightly together to eliminate any thermal breaks in the EIFS. Care must be taken to prevent any adhesive from getting between the joints of the boards.
 5. Cut insulation board in an L-Shaped pattern to fit around openings. Do not align board joints with corners of openings.
 6. Remove individual boards periodically while the adhesive is still wet to check for satisfactory contact with the substrate and the back of the insulation board. An equal amount of adhesive must be on the substrate and the board when they are removed, as an indication of adequate adhesion. Do not use nails, screws, or any other type of non-thermal mechanical fastener.
- G. Slivering and Rasping of Insulation Board Surface
- H. EPS insulation board exposed to sunlight will develop a powdery residue on the surface. This residue must be entirely removed by rasping the surface.
- I. After insulation boards are firmly adhered to the substrate, fill any open joints in the insulation board layer with slivers of insulation or approved spray foam.
1. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.
- J. Trim, Reveals and Projecting Aesthetic Features: Attach features and trim where designated on drawings with adhesive to the insulation board or sheathing surface. Slope the top surface of all trim/features minimum 1:2 (27 degrees).
1. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
 2. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.
 3. Do not locate reveals/aesthetic grooves at high stress areas such as corners of windows, doors, etc.
 4. A minimum $\frac{3}{4}$ inch (19 mm) thickness of insulation board must remain at the bottom of the reveals/aesthetic grooves.
- K. Completion of Backwrapping: Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face to the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless-steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.
- L. Base Coat and Reinforcing Mesh Application:

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1. Apply minimum 9x12 inch diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.
 2. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
 3. Ultra-High Impact mesh application: Apply base coat over the insulation board with spray equipment or a stainless-steel trowel to a uniform thickness of approximately 1/8 inch. Work horizontally or vertically in strips of 40 inches and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt the mesh at seams. Allow the base coat to dry.
 4. Standard mesh application: Apply base coat over the insulation board and Ultra-High impact mesh, with spray equipment or a stainless-steel trowel to a uniform thickness of approximately 1/8 inch. Work horizontally or vertically in strips of 40 inches, and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Overlap mesh not less than 2-1/2 inches at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 2-1/2 inch (64 mm) overlap in each direction. Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible.
 5. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches apply waterproof base coat with a stainless-steel trowel to the weather exposed sloped surface and minimum four inches above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2-1/2 inches.
 6. Allow base coat to thoroughly dry before applying primer or finish.
- M. Primer Application: Apply primer evenly with brush, roller or proper spray equipment over the clean, dry base coat and allow to dry thoroughly before applying finish.
- N. Finish Coat Application: Apply finish directly over the primed base coat when dry. Apply finish by spraying or troweling with stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
1. Avoid application in direct sunlight.
 2. Apply finish in a continuous application, and work to an architectural break in the wall.
 3. Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results: cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
 4. Apply texture type selected by architect.
 5. Do not install separate batches of finish side-by-side.
 6. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
 7. Do not apply finish over irregular or unprepared surfaces, or surfaces not in

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compliance with the requirements of the project specifications.

3.8 JOINTS

- A. Form control joints and expansion joints at locations indicated, with space between edges of boards, prepared to receive trim accessories. Unless noted otherwise control joints in to be spaced in accordance with the following criteria:
 - 1. Maximum area between control joints: 100 Square feet. Maximum Dimension of area: 12 feet.
 - 2. Joints to be equally spaced.
 - 3. Locate at each wall offset.
 - 4. Locate appoints of system termination and at intersections with differing materials.
 - 5. Layout of joints to be approved by Architect prior to installation.
- B. Provide minimum $\frac{3}{4}$ inch wide expansion joints in the EIFS where they exist in the substrate or supporting construction, where the EIFS adjoins dissimilar construction or materials, at changes in building height, and at floor lines in multi-level wood frame construction.
- C. Provide minimum $\frac{1}{2}$ inch (13 mm) wide sealant joints at all penetrations through the EIFS (windows, doors, etc.).
- D. Provide compatible backer rod and sealant that has been evaluated in accordance with ASTM C1382, "Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish System (EIFS) Joints," and that meets minimum 50% elongation after conditioning.
- E. Provide joints so that air barrier continuity is maintained across the joint and drain joints to the exterior.

3.9 TRIM, PROJECTING ARCHITECTURAL FEATURES AND REVEALS:

- A. All trim and projecting architectural features shall have a minimum 1:2 [27 degrees] slope along their top surface.
- B. All horizontal reveals shall have a minimum 1:2 [27 degrees] slope along their bottom surface.
- C. Where trim/feature or bottom surface of reveal projects more than 2 inches from the face of the EIFS wall plane, protect he top surface with waterproof base coat.

3.10 ACCESSORIES

- A. Install rigid vinyl accessories as shown on Architect's Details or as required to complete installation of finish system.
 - 1. Install 3" soffit vent around perimeter (4 sides) of each exterior soffit or ceiling.
 - 2. Install expansion and control joints as recommended by manufacturer and as

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described above.

- B. Install accessories in full compliance with manufacturer's written recommendations.
 - 1. Accessories shall be mechanically fastened to substrate using nails or screws spaced at no more than 12" on center.
 - 2. Install accessories straight, square, and true.
 - 3. Face of accessory to be flush with surface of finish system.

3.11 INSTALLATION OF JOINT SEALANTS

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements of Division-7 section "Joint Sealers".

3.12 ACCEPTANCE

- A. The finished surface shall be of uniform thickness, texture, color appearance and free of irregularities.
 - 1. Surface to be plumb to within 1/16" in 4'-0".
 - 2. Surface to be level to within 1/16" in 4'-0".
- B. The finish shall be uniform in color, free from bleed thru of base course or mesh.
- C. EFIS and insulation system to be free from cracks and other surface imperfections.

3.13 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work.
 - 1. Promptly remove protective coatings from window and door frames, and any other surfaces outside areas indicated to receive protective coating.
- B. Provide final protection and maintain conditions, in manner acceptable to Installer and system manufacturer, which ensures system being without damage or deterioration at time of Final Acceptance.

END OF SECTION 072430

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SECTION 072600 – UNDER-SLAB VAPOR BARRIER / RETARDER

PART 1 – GENERAL

1.1 SUMMARY

A. Products Supplied Under This Section

1. Vapor Barrier, seam tape, mastic, pipe boots, detail strip for installation under concrete slabs.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM E 1745-04 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs
2. ASTM E 154-88 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs
3. ASTM E 96-95 Standard Test Methods for Water Vapor Transmission of Materials
4. ASTM E 1643-04 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

B. American Concrete Institute (ACI)

1. ACI 302.1R-96 Vapor Barrier Component (plastic membrane) is not less than 15 mils thick

1.3 SUBMITTALS

A. Quality Control / Assurance

1. Independent laboratory test results showing compliance with ASTM & ACI Standards.
2. Manufacturer's samples, literature
3. Manufacturer's installation instructions for placement, seaming and pipe boot installation

PART 2 – PRODUCTS

2.1 MATERIALS

A. Typical Vapor Barrier

1. Vapor Barrier must have the following qualities
 - a. WVTR less than or equal to 0.006 as tested by ASTM E 96
 - b. ASTM E 1745 Class A (Plastics)

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1. Vapor Barrier Products
 - a. Stego Wrap 20 mil Class A Vapor Barrier by Stego Industries (877) 464-7834.
 - b. Barrier-Bac VB-350 (31 mil) vapor retarder.
 - c. W. R. Meadows, Perminator, 20 mil.
 - d. Tex-Trude Xtreme 20 mil Vapor Barrier.

2.2 ACCESSORIES

A. Seam Tape

1. Tape must have the following qualities:
 - a. Water Vapor Transmission Rate, ASTM E 96 0.3 perms or lower

B. Vapor Proofing Mastic

1. Mastic must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower

C. Pipe Boots

1. Construct pipe boots from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Ensure that subsoil is approved by architect or geotechnical firm.
 1. Level and tamp or roll aggregate, sand, or tamped earth base.

3.2 INSTALLATION

A. Install Vapor Barrier/Retarder:

1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-04.
 - a. Unroll Vapor Barrier/Retarder with the longest dimension parallel with the direction of the pour.
 - b. Lap Vapor Barrier/Retarder over footings and seal to foundation walls.
 - c. Overlap joints 6 inches and seal with manufacturer's tape.
 - d. Seal all penetrations (including pipes) per manufacturer's instructions.
 - e. No penetration of the Vapor Barrier/Retarder is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 inches, and taping all four sides with tape.

END OF SECTION 072600

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SECTION 072726.02 – FLUID-APPLIED MEMBRANE AIR BARRIERS, VAPOR PERMEABLE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fluid-applied, vapor-permeable membrane air barriers.

1.2 RELATED REQUIREMENTS

- 1. Section 042000 "Unit Masonry" for air barrier substrates and compatibility with flashing components.
- 2. Division 07 roofing Sections for roof assembly air barriers and interface coordination.
- 3. Division 08 exterior openings sections for framing for glazed aluminum curtain walls receiving air barrier transition assembly specified in this Section.

1.3 REFERENCES

- A. References, General: Versions of the [following] [cited] standards current as of the date of issue of the project apply to the Work of this Section.
- B. ASTM International (ASTM): www.astm.org:
 - 1. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants
 - 2. ASTM C 1193 – Guide for Use of Joint Sealants
 - 3. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials
 - 4. ASTM E 96/E 96M – Standard Test Methods for Water Vapor Transmission of Materials
 - 5. ASTM E 162 – Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
 - 6. ASTM E 783 – Standard Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors
 - 7. ASTM E 1186 – Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
 - 8. ASTM E 2178 – Standard Test Method for Air Permeance of Building Materials
 - 9. ASTM E 2357 – Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- C. National Fire Protection Association (NFPA): www.nfpa.org:
 - 1. NFPA 285 – Standard Fire Test Method For Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of joint sealants with cleaning of joint sealant substrates and other operations that may impact installation or finished joint sealant work.
- B. Preinstallation Conference: Conduct conference at Project Site.

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1. Review requirements for air barrier products and installation, project and manufacturer's details, mockups, testing and inspection requirements, and coordination and sequencing of air barrier work with work of other Sections.
2. Review manufacturer's instructions for air barrier application meeting Project requirements for substrates specified, including three-dimensional video model demonstrating proper application of components at wall openings.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of air barrier product specified, including:
 1. Technical data indicating compliance with requirements.
 2. Substrate preparation instructions and recommendations.
- B. Shop Drawings: Show locations for air barrier. Show details for each type of substrate, joints, and edge conditions, including flashings, counterflashings, penetrations, transitions, and terminations.
 1. Show location of transition and accessory materials providing connectivity throughout the assemblies.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, and Air Barrier Inspector.
 1. Certification of manufacturer's approval of Installer.
- B. Manufacturer's Product Compatibility Certificate: Certify compatibility of air barrier products with adjacent materials.
- C. Fire Propagation Characteristics Certificate: From a qualified testing agency, documentation that air barrier system as a component of a wall assembly has been tested and passed NFPA 285. Include system classification number of testing agency on shop drawings.
- D. Product Test Reports: Test data for air barrier products and air barrier assembly, by qualified testing agency, indicating proposed membrane air barrier meets performance requirements, when requested by Architect.
- E. Warranty: Sample of unexecuted manufacturer and installer special warranties.
- F. Field quality control reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm with minimum [three] years' experience in installation of specified products in successful use on similar projects, employing workers trained by manufacturer, including a full-time on-site supervisor with a minimum of [three] years' experience installing similar work, able to communicate verbally with Contractor, Architect, and employees.

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- B. **Manufacturer Qualifications:** A qualified manufacturer listed in this Section with minimum five years' experience in manufacture of air barrier membrane as one of its principal products.
 - 1. Manufacturer's product submitted has been in satisfactory operation on five similar installations for at least five years.
 - 2. Manufacturer is accredited by the Air Barrier Association of America.
 - 3. **Approval of Manufacturers and Comparable Products:** Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Completed and signed Substitution Request form.
 - b. Product data, including certified independent test data indicating compliance with requirements.
 - c. Sample shop drawings from similar project.
 - d. Project references: Minimum of five installations of similar system not less than five years old, with Owner and Architect contact information.
 - e. Certificate of ABAA accreditation if required for Project.
 - f. Sample warranty.
- C. **Mockups:** Provide air barrier mockup application within mockups required in other sections, or if not specified, in an area of not less than **150 sq. ft. (14 sq. m)** of wall surface where directed by Architect for each type of backup wall construction. Include examples of surface preparation, crack and joint treatment, air barrier application, and flashing, transition, and termination conditions, to set quality standards for execution.
 - 1. Include intersection of wall air barrier with roof air barrier and with foundation wall intersection.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Accept materials on site in manufacturer's unopened original packaging.
- B. Store products in weather protected environment, clear of ground and moisture, within temperature ranges recommended by air barrier manufacturer.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. **Environmental Limitations:** Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.10 SCHEDULING

- A. Coordinate installation of membrane air barrier with completion of roofing and other work requiring interface with air barrier.
- B. Schedule work so air barrier applications may be inspected prior to concealment.
- C. Ensure air barrier materials are cured before covering with other materials.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Products: Provide air barrier products manufactured by **Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company**, Beachwood OH; (866) 321-6357; email: techresources@tremcoinc.com; www.tremcosealants.com, [or comparable products of other manufacturer approved by Architect in accordance with Instructions to Bidders and Division 01 General Requirements].

2.2 MATERIALS, GENERAL

- A. Source Limitations: Obtain air-barrier materials from single source from single manufacturer.
- B. Compatibility: Provide membrane air barrier materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by membrane air barrier manufacturer based on testing and field experience.

2.3 PERFORMANCE REQUIREMENTS

- A. General: Membrane air barrier shall be capable of performing as a continuous vapor- permeable air barrier and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Membrane air barriers shall accommodate substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without moisture deterioration and air leakage exceeding performance requirements.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.

2.4 MEMBRANE AIR BARRIER

- A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Elastomeric, UV-resistant, synthetic membrane, formulated for application in a range of 48 - 70 mils (wet), 25 - 35 mils (dry)
1. Basis of Design Product: **Tremco, Inc., ExoAir 230**.
 2. Air Permeance, ASTM E 2178: 0.004 cfm/sq. ft of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference, maximum.
 3. Vapor Permeance, ASTM E 96/E96M: Minimum 12 perms (690 ng/Pa x s x sq. m).
 4. Elongation, Ultimate, ASTM D 412, Die C: 600 percent, minimum.
 5. Combustion Characteristics: Class A, flame spread, not greater than 25; smoke developed, not greater than 450, per ASTM E 84.
 6. UV Resistance, QUV-B: Over 160 cycles of UV and water spray with no observable deterioration.
 7. VOC Content: Less than 50 g/L.

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2.5 ACCESSORY MATERIALS

- A. General: Accessory materials as described in manufacturer's written installation instructions, recommended to produce complete air barrier assembly meeting performance requirements, and compatible with air barrier membrane material and adjacent materials.
- B. Primer: Liquid primer meeting VOC limitations, recommended for substrate by membrane air barrier manufacturer, when installing modified bituminous self-adhered membranes.
 - 1. Basis of Design Product: **Tremco, Inc., ExoAir Primer.**
- C. Transitions:
 - 1. Counterflashing Strip: Modified bituminous, **40 mils (1.0 mm)** thick self-adhering composite sheet consisting of **32 mils (0.8 mm)** of SBS rubberized asphalt laminated to an **8 mils (0.2 mm)** high-density, cross-laminated polyethylene film, for counterflashing of metal flashings and for substrate transitions and for termination of air barrier to bituminous roof membranes and to air barrier terminations at openings.
 - a. Basis of Design Product: Tremco, Inc., ExoAir TWF Thru-Wall Flashing.
 - 2. High Temperature Flashing Strip and Underlayment: Butyl, **24 mil** thick self-adhering composite sheet consisting of **20 mils** of butyl laminated to **4 mil** polyethylene film; thermally stable under intermittent, non-continuous exposure up to **240 deg F (115 deg C)**.
 - a. Basis of Design Product: **Tremco, Inc., ExoAir 110AT.**
 - 3. Flashing Strip: Butyl, **22 mil** thick self-adhering composite sheet consisting of **16 mils** of butyl laminated to **6 mil** polypropylene film; thermally stable under intermittent, non-continuous exposure up to **240 deg F (115 deg C)**
 - 4. Opening Transition Assembly: Cured low-modulus silicone extrusion, with reinforcing ribs, sized to fit opening widths, [with aluminum race for insertion into aluminum framing extrusions,] with the following characteristics:
 - a. Basis of Design Product: Tremco, Inc., Proglaze ETA Engineered Transition Assembly. Tear Strength: 110 lb/in (19.3 kN/m)
 - 5. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with manufacturer's recommended silicone sealant for bonding extrusions to substrates.
 - a. Basis of Design Product: Tremco, Inc.; Spectrem SimpleSeal.
- D. Reinforcing Fabric: High strength mesh fabric consisting of open-weave glass fiber saturated with synthetic resins formulated for high moisture resistance, for reinforcing of liquid applications; not less than **2.5 oz/sq. yd (85 g/sq. m)**.
 - 1. Basis of Design Product: **Tremco, Inc., Tremco 2011.**
- E. Liquid Joint Sealants:
 - 1. ASTM C 920, single-component polyurethane, approved by air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories.
 - a. Basis of Design Product: **Tremco, Inc., Dymonic 100.**
 - 2. ASTM C 920, single-component, neutral-curing silicone, approved by air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories post installation of the membrane.

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a. Basis of Design Product: **Tremco, Inc., Spectrem 1.**

F. Sprayed Polyurethane Foam Sealant: Sprayed Polyurethane Foam Sealant: Foamed-in-place, **1.5- to 2.0-lb/cu. ft. (24- to 32-kg/cu. m)** density, with flame-spread index of 25 or less per ASTM E 162, for filling of gaps at openings and penetrations.

1. Basis of Design; Tremco Inc., Flexible Low Expanding Foam (LEF)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Condition: Before applying air barrier materials, examine substrate and conditions to ensure substrates are fully cured, smooth, clean, dry, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion, and conditions comply with manufacturer's written recommendations.

1. Verify concrete and masonry surfaces are visibly dry, have cured for time period recommended by membrane air barrier manufacturer, and are free from release agents, curing agents, and other contaminants.
2. Test for capillary moisture by method recommended in writing by air barrier manufacturer.
3. Verify masonry joints are filled with mortar and struck flush.

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

3.2 INTERFACE WITH OTHER WORK

A. Commencement of Work: Commence work once air barrier substrates are adequately protected from weather and will remain protected during remainder of construction.

B. Sequencing of Work: Coordinate sequencing of air barrier work with work of other sections that form portions of building envelope air barrier to ensure that flashings and transition materials can be properly installed and inspected. Roofing systems shall be capped and sealed, or top of walls protected, in such a way as to eliminate the ability of water to saturate the wall or interior space, both before and after, air barrier system installation. Coordinate installation of EXOAIR® 230 with the roofing trade to ensure compatibility and continuity with the roofing system.

C. Subsequent Work: Coordinate air barrier work with work of other sections installed subsequent to air barrier to ensure complete inspection of installed air barrier and sealing of air barrier penetrations necessitated by subsequent work.

3.3 PREPARATION

A. Clean, prepare, and treat substrate in accordance with air barrier manufacturer's written instructions.

1. Mask adjacent finished surfaces.
2. Remove contaminants and film-forming coatings from substrates.
3. Remove projections and excess materials and fill voids with substrate patching material.

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4. Prepare and treat joints and cracks in substrate per ASTM C 1193 and membrane air barrier manufacturer's written instructions.

3.4 APPLICATION OF ACCESSORY MATERIALS

- A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions. Install transition materials and other accessories to form connect and seal membrane air barrier material to adjacent components of building air barrier system, including, but not limited to, roofing system air barrier, exterior fenestration systems, door framing, and other openings.
- B. Primer: Apply primer to substrates when recommended by air barrier manufacturer at required rate for those substrates that will be receiving a modified bituminous self-adhered membrane. Reprime areas not covered within 24 hours.
- C. Assembly Transitions: Connect and seal exterior wall air barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
 1. Opening Transitions: Fill gaps at perimeter of openings with foam sealant and apply approved transition or accessory material
 2. Penetrations: Fill gaps at perimeter of penetrations with foam sealant and level with approved sealant. or seal transition strips around penetrating objects and terminate with approved sealant.
 3. Joints: Bridge and cover isolation joints, expansion joints, and discontinuous joints between separate assemblies utilizing approved transition or accessory materials.
 4. Changes in Plane: Apply approved sealant beads at corners and edges to form smooth transition.
 5. Substrate Gaps: Cover gaps with stainless steel sheet mechanically attached to substrate and providing continuous support for air barrier.
- D. Flashings: Seal top of through-wall flashings to membrane air barrier with a continuous bead of approved sealant recommended by air barrier manufacturer.
- E. Seal punctures, voids, and seams. Patch with approved transition and accessory materials following air barrier manufacturer's recommendations and extend repair beyond repaired areas to maintain continuity.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

- A. General: Apply fluid air-barrier material to form a seal with transition materials and accessories to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.
- B. Membrane Air Barrier: Apply fluid air barrier material in full contact with substrate to produce a continuous seal according to membrane air barrier manufacturers written instructions.

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1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, **-in a range of 25 – 35 mils (1.0-mm)** dry film thickness depending on substrate, applied in one or more equal coats, roller- or spray- applied.
 - C. Connect and seal exterior wall air-barrier membrane continuously to subsequently-installed roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, wall openings, and other construction used in exterior wall openings, using approved transitions and accessory materials.
 - D. Wall Openings: Apply approved sealant to adhere silicone extrusion to perimeter of windows, curtain walls, storefronts, doors, and louvers. Apply [opening transition assembly] [preformed silicone sealant extrusion] according to air barrier transition manufacturer’s written instructions.
 - E. Seal punctures, voids, and seams. Patch with approved transition and accessory materials following air barrier manufacturer’s recommendations and extend repair beyond repaired areas to maintain continuity.
 - F. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
 - G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.
- 3.6 FIELD QUALITY CONTROL
- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.
 - B. Testing Agency: Contractor shall engage a qualified Inspector to perform tests and inspections, including documenting of membrane air barrier prior to concealment.
 1. Inspections and testing shall be carried out at the following rate:
 - a. Up to **10,000 sq. ft. (930 sq. m)**: One inspection.
 - b. **10,001 to 35,000 sq. ft. (931 to 3,250 sq. m)**: Two inspections.
 - c. **35,001 to 75,000 sq. ft. (3,251 to 6,970 sq. m)**: Three inspections.
 - d. **75,001 to 125,000 sq. ft. (6,971 to 11,610 sq. m)**: Four inspections.
 - e. **125,001 to 200,000 sq. ft. (11,611 to 18,580 sq. m)**: Five inspections.
 - f. Over **200,000 sq. ft. (18,580 sq. m)**: Six inspections.
 2. Scope of Testing: Testing shall include the following:
 - a. Qualitative air-leakage testing per ASTM E 1186.
 - b. Quantitative air-leakage testing per ASTM E 783.
 - c. Photo documentation of work to be subsequently concealed.
 - C. Coordination of Testing: Cooperate with testing agency. Allow access to work areas and staging. Notify testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection.

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1. Do not cover Work until testing and inspection is completed and accepted.
 - D. Reporting: Forward written inspection reports to the Architect within 10 working days of the inspection and test being performed.
 - E. Correction: Correct deficient applications not passing tests and inspections, make necessary repairs, and retest as required to demonstrate compliance with requirements.
- 3.7 CLEANING AND PROTECTING
- A. Clean spills, stains, and overspray resulting application utilizing cleaning agents recommended by manufacturers of affected construction. Remove masking materials.
 - B. Protect membrane air barrier from damage from subsequent work. Protect membrane materials from exposure to UV light for period in excess of that acceptable to membrane air barrier manufacturer; replace overexposed materials and retest.

END OF SECTION 072726.02

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SECTION 074213.13 – FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal wall panels.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site**.

1. Meet with Owner, Architect, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review of procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

1. Exposed-fastener, lap-seam metal wall panels.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

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2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than **1-1/2 inches per 12 inches (1:10)**.
 - C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.
 1. Include Samples of trim and accessories involving color selection.
 - D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
 1. Metal Panels: **12 inches (305 mm)** long by actual panel width. Include fasteners, closures, and other metal panel accessories.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
 - B. Product Test Reports: For **exposed-fastener, lap-seam metal wall panels** for tests performed by a qualified testing agency.
 - C. Field quality-control reports.
 - D. Sample Warranties: For special warranties.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For metal panels to include in maintenance manuals.
- 1.6 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- 1.7 MOCKUPS
- A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Build mockup of typical metal panel assembly **as shown on Drawings**, including **corner**, one curtain wall unit, sill trim, head trim, jamb trim, including EFIS, soffit and curtain wall member, soffits, supports, attachments, and accessories.
 2. Water-Spray Test: Conduct water-spray test of metal panel assembly mockup, testing for water penetration according to AAMA 501.2.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

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4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: **20 years** from date of Substantial Completion.

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PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - 1. Wind Loads: As indicated on **Drawing S001**.
 - 2. Other Design Loads: **As indicated on Drawing S001**.
 - 3. Deflection Limits: For wind loads, no greater than **1/240** of the span.
- B. Air Infiltration: Air leakage of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** when tested according to ASTM E283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: **6.24 lbf/sq. ft. (300 Pa)**.
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: **6.24 lbf/sq. ft. (300 Pa)**.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): [**120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces**] <Insert temperature range>.

2.2 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. Provide factory-formed metal panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
- B. Products selected: PAC-CLAD, CENTRIA, ATAS INTERNATIONAL.
 - 1. 36” wide x 1-1/2” deep .050 aluminum panels, smooth texture; Kynar 500 or Hylar 5000 finish.
 - 2. Color to be selected from standard Kynar 500 and Hylar 5000 finishes.
 - 3. Aluminum Sheet: Coil-coated sheet, **ASTM B209 (ASTM B209M)**, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

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2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: **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 panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners. Fastener length selected to pass thru insulation and sheathing and penetrate framing members $\frac{3}{4}$ ".
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
 - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

- A. Fabricate and finish metal 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. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

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- 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. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. 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.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. 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. Noticeable variations in 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.
- C. Steel Panels and Accessories:
1. FEVE Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether (FEVE) resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[**for seacoast and severe environments**].
 2. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
- D. Aluminum Panels and Accessories: Accessories to match aluminum panel finish.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking, and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF METAL PANELS

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal 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 panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal 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 panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.

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8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum fasteners 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 panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
 6. Use washers or shims to create 1/8" drainage way between water barrier and inside face of wall panel.
- E. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
- 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 panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal 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. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.

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2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (610 mm)** 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 (25 mm)** deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: **Owner will engage** a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly **as directed by Architect** for water penetration according to AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

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

END OF SECTION 074213.13

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SECTION 075200 – MODIFIED BITUMINOUS MEMBRANE ROOFING – **BASE BID**

PART 1 – GENERAL

1.01 This specification is for installation over lightweight insulating concrete roof deck.

1.02 SECTION INCLUDES:

- A. Preparation of Substrate to Receive Roofing Materials
- B. Base Sheet or Roof Insulation Application to Prepared Substrate
- C. Roof Membrane Application
- D. Roof Flashing Application
- E. Incorporation of Sheet Metal Flashing Components and Roofing Accessories into the Roof System

1.03 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Sheet Metal Flashing and Trim
- B. Sheet Metal Roofing Specialties

1.04 RELATED SECTIONS

- A. Section 061053 – Miscellaneous Rough Carpentry
- B. Section 035500 – Lightweight Insulating Concrete
- C. Section 076200 – Sheet Metal Flashing and Trim

1.05 REFERENCE STANDARDS

References in these specifications to standards, test methods and codes, are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout this specification section.

ASTM	American Society for Testing and Materials Philadelphia, PA
FM	Factory Mutual Engineering and Research Norwood, MA
NRCA	National Roofing Contractors Association Rosemont, IL

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OSHA	Occupational Safety and Health Administration Washington, DC
SMACNA	Sheet Metal and Air Conditioning Contractors National Association Chantilly, VA
UL	Underwriters Laboratories Northbrook, IL

1.06 DESCRIPTION OF WORK

**ASSEMBLY 2
POWERply ADHESIVE-APPLIED OPTION**

Project Type:	New
Deck:	Lightweight insulating concrete Slope: 1/2 inch / ft.
Base Sheet:	POWERply Heavy Duty Base Sheet, mechanically attached into steel deck.
Roof System:	POWERply Standard FR, applied in cold adhesive.
Flashing System:	POWERply, torch applied or applied in cold adhesive.

**ASSEMBLY 2
POWERply TORCH-APPLIED OPTION**

Project Type:	New
Deck:	Lightweight insulating concrete Slope: 1/2 inch / ft.
Base Sheet:	POWERply Heavy Duty Base Sheet, mechanically attached into steel deck..
Roof System:	POWERply Standard FR HW, torch applied.
Flashing System:	POWERply, torch applied or applied in cold adhesive.

1.07 SUBMITTALS **All submittals which do not conform to the following requirements will be rejected.**

A. Submittals Prior to Contract Award:

1. Letter from the proposed primary roofing manufacturer confirming that the bidder is an acceptable Contractor authorized to install the proposed system.
2. Letter from the primary roofing manufacturer stating that the proposed application will comply with the manufacturer's requirements in order to qualify the project for the specified guarantee.

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B. Submittals for Construction:

1. Product data sheets for each material required, including:
 - a. Modified bitumen membrane system.
 - b. Metal accessories.
 - c. Caulks and sealants.
 - d. Roofing base ply felt.
 - e. Modified bitumen cold process adhesive.
 - f. Walktread.
2. Shop Drawings: roof plan showing locations of roof systems; walktreads; crickets and installation and flashing details.
3. Written certification from the primary roof system manufacturer that the specification has been reviewed and is acceptable and stating their intent to supply the specified warranty at the successful completion of work.
4. Warranty Specimens:
 - a. Sample copy of Manufacturer's specified roofing warranty stating obligations, remedies, limitations, and exclusions of warranty.
 - b. Certified letter indicating intent to supply Contractor Warranty from Section 01741 at the completion of work.

C. Submittals Prior to Project Close-out:

1. Certificate Of Analysis from the testing laboratory of the primary roofing materials manufacturer, confirming the physical and mechanical properties of the roofing membrane components. Testing shall be in accordance with the parameters published in ASTM D 5147 and ASTM D 7051 and indicate Quality Assurance/Quality Control data as required to meet the specified properties. A separate Certificate Of Analysis for each production run of material shall indicate the following information:
 - a) Material type
 - b) Lot number
 - c) Production date
 - d) Dimensions and Mass (indicate the lowest values recorded during the production run);
 - Roll length
 - Roll width
 - Selvage width
 - Total thickness
 - Thickness at selvage (coating thickness)
 - Weight
 - e) Physical and Mechanical Properties;
 - Low temperature flexibility
 - Peak load
 - Ultimate Elongation
 - Dimensional stability
 - Compound Stability
 - Granule embedment
 - Resistance to thermal shock

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2. Manufacturer's printed recommendations for proper maintenance of the specified roof system including inspection frequencies, penetration addition policies, temporary repairs, and leak call procedures.

1.08 QUALITY ASSURANCE

- A. **Acceptable Products:** Primary roofing products, including each type of sheet, all manufactured in the United States, shall be supplied by a single manufacturer which has been successfully producing the specified types of primary products for not less than 10 years. The primary roofing products shall have maintained a consistent composition for a minimum of five years.
- B. **Agency Approvals:** The proposed roof system shall conform to the following requirements. No other testing agency approvals will be accepted.
 1. Underwriters Laboratories Class A acceptance of the proposed roofing system.
 2. Evidence by an accredited independent testing agency or agencies that the roof configuration meets a design windload pressure of -67.5 psf or greater.
- C. **Acceptable Contractor:** Contractor shall have a minimum of 2 years experience in successfully installing the same or similar roofing materials and be certified in writing by the roofing materials manufacturer to install the primary roofing products.
- D. **Scope of Work:** The work to be performed under this specification shall include but is not limited to the following: Attend necessary job meetings and furnish competent and full time supervision, experienced roof mechanics, all materials, tools, and equipment necessary to complete, in an acceptable manner, the roof installation in accordance with this specification. Comply with the latest written application instructions of the manufacturer of the primary roofing products. In addition, application practice shall comply with requirements and recommendations contained in the latest edition of the Handbook of Accepted Roofing Knowledge (HARK) as published by the National Roofing Contractor's Association, amended to include the acceptance of a phased roof system installation.
- E. **Local Regulations:** Conform to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction.
- F. **Manufacturer Requirements:** Ensure that the primary roofing materials manufacturer provides direct trained company personnel to attend necessary job meetings, perform periodic inspections as necessary, and conducts a final inspection upon successful completion of the project.

1.09 PRODUCT DELIVERY STORAGE AND HANDLING

- A. **Delivery:** Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.
- B. **Storage:** Store materials out of direct exposure to the elements on pallets placed over clean, flat and dry surfaces. Storage of pallets over dirt, grass-covered ground or newly placed concrete may result in upward moisture transpiration and contamination of product. Store rolls of roofing on end. For roof-top storage, avoid overloading of deck and building structure. Factory packaging is not intended for job site protection. Slit factory packaging immediately upon arrival at the job site to prevent build-up of condensation and cover materials using a breathable cover such as a canvas. Polyethylene or other

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non-breathable plastic coverings shall not be used. Store flammable or temperature sensitive materials away from open flame, ignition sources or excessive heat.

- C. Handling: Handle all materials in such a manner as to preclude damage and contamination with moisture or foreign matter. Handle rolled goods to prevent damage to edges or ends.
- D. Damaged Material: Any materials that are found to be damaged or stored in any manner other than stated above will be automatically rejected, and will require removal and replacement at the Contractor's expense.

1.10 PROJECT/SITE CONDITIONS

A. Requirements Prior to Job Start:

- 1. Notification: Give a minimum of 5 days notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
- 2. Permits: Obtain all permits required by local agencies and pay all fees which may be required for the performance of the work.
- 3. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.

B. Environmental Requirements

- 1. Precipitation: Do not apply roofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied roofing, and building interiors are protected from possible moisture damage or contamination.

C. Protection Requirements

- 1. Membrane Protection: Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this project.
- 2. Torch Safety: Crew members handling torches shall be trained by an Authorized Certified Roofing Torch Applicator (CERTA) Trainer, be certified according to CERTA torch safety guidelines as published by the National Roofing Contractor's Association (NRCA), and follow torch safety practices as required by the contractor's insurance carrier. Designate one person on each crew to perform a daily fire watch. The designated crew member shall watch for fires or smoldering materials on all areas during roof construction activity, and for the minimum period required by CERTA guidelines after roofing material application has been suspended for the day.
- 3. Limited Access: Prevent access by the public to materials, tools and equipment during the course of the project.
- 4. Debris Removal: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.

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1.11 GUARANTEE/WARRANTY

- A. Roof Membrane/System Guarantee (Assembly 1): Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the manufacturer's 20 year labor and materials guarantee covering the rigid insulation, insulation fasteners/plates and roof membrane/flashing system. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and shall be issued at no additional cost to the Owner.
- > Tremco 20 year Roof Membrane/System Guarantee
- B. Roof Membrane Guarantee (Assembly 2): Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the Manufacturer's 20 year labor and materials membrane guarantee. The guarantee shall be a term type, without deductibles or limitations on coverage amount.
- > Tremco 20 Year Roof Membrane Guarantee

PART 2 – PRODUCTS

2.01 ROOFING SYSTEM ASSEMBLY/PRODUCTS

A. Base Sheet

1. Base Sheet: A smooth surfaced high strength modified bitumen membrane. The sheet shall conform to ASTM D 6163, Type III, Grade S requirements.
 - > Tremco Heavy Duty Base Sheet

2.02 DESCRIPTION OF SYSTEMS (Roofing contractor's option adhesive or torch)

- A. Roofing Membrane Assembly (adhesive-applied): A roof membrane assembly consisting of two plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) modified asphalt membrane, applied over a prepared substrate. Reinforcement mats shall be impregnated/saturated and coated each side with SBS modified bitumen blend. The roof system shall provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following typical load-strain properties at membrane failure when tested according to ASTM D2523/D2523M. Passing results shall show tensile strain at failure, at 0 deg. F (-18 deg. C), machine direction: Not less than 225 lbf/in., machine direction; and tensile strain at failure, at 0 deg. F (-18 deg. C), cross-machine direction: Not less than 200 lbf/sq. ft., cross-machine direction. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system.
- > Tremco POWERply FR roof system
1. Modified Bitumen Finish Ply
 - a) Thickness (avg): 120 mils (ASTM D 5147)
 - b) Low temperature flexibility @ -15° F: PASS (ASTM D 5147)

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- c) Peak Load @ 77°F: 81 lbf/inch (ASTM D 5147)
 - d) Peak Load @ 0°F: 120 lbf/inch (ASTM D 5147)
 - e) Ultimate Elongation (avg.) @ 77°F: 7.9% (ASTM D 5147)
 - f) Granule Embedment (max loss): 2.0 grams per sample (ASTM D 5147)
 - g) Puncture resistance: 70 lbf (ASTM E 154)
 - h) Approvals: UL Class listed (products shall bear seals of approval)
 - i) Reinforcement: fiberglass mat or other meeting the performance and Compound stability criteria
 - j) Surfacing: ceramic granules
 - > Tremco POWERply Standard FR
- B. Roofing Membrane Assembly (torch applied): A roof membrane assembly consisting of two plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) modified asphalt membrane, applied over a prepared substrate. Reinforcement mats shall be impregnated/saturated and coated each side with SBS modified bitumen blend and coated one side with a torch grade SBS bitumen blend adhesive layer. The roof system shall provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following typical load-strain properties at membrane failure when tested according to ASTM D2523/D2523M. Passing results shall show tensile strain at failure, at 0 deg. F (-18 deg. C), machine direction: Not less than 225 lbf/in., machine direction; and tensile strain at failure, at 0 deg. F (-18 deg. C), cross-machine direction: Not less than 200 lbf/sq. ft., cross-machine direction. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system.
- > Tremco POWERply FR HW torchable roof system
1. Modified Bitumen Finish Ply
- a) Thickness: 165 mils (ASTM D 5147)
 - b) Low temperature flexibility @ -10°F: PASS (ASTM D 5147)
 - c) Peak Load (avg) @ 77°F: 70 lbf/inch (5.3 kN/m) (ASTM D 5147)
 - d) Peak Load (avg) @ 0°F: 120 lbf/inch (ASTM D 5147)
 - e) Ultimate Elongation (avg.) @ 77°F: 4% (ASTM D 5147)
 - f) Dimensional Stability (max): Pass (ASTM D 5147)
 - g) Compound Stability (min): 215°F (ASTM D 5147)
 - h) Granule Embedment (max individual loss): 2.0 grams per sample (ASTM D 5147)
 - i) Approvals: UL Class listed (products shall bear seals of approval)
 - j) Reinforcement: fiberglass mat or other meeting the performance and dimensional stability criteria
 - k) Surfacing: ceramic granules
 - > Tremco POWERply Standard FR HW
- C. Flashing Membrane Assembly: A flashing membrane assembly consisting of a prefabricated, reinforced, Styrene-Butadiene-Styrene (SBS) modified asphalt membrane.
- > Tremco POWERply flashing system

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D. Liquid Flashing System: A specialty flashing system consisting of a bio-based, fully reinforced polyurethane membrane installed over a prepared or primed substrate. The flashing system consists of a basecoat and topcoat, combined with a non-woven polyester mesh. The use of the specialty flashing system shall be specifically approved in advance by the membrane manufacturer for each application.

> AlphaGuard Bio Liquid Flashing System by Tremco; Beachwood, OH

E. Substitute Roof Systems: The following substitute roof systems are approved for use in lieu of the specified roof system.

MANUFACTURER

Siplast
Irving, TX

Nailed Base – Parabase FS
Base and Stripping Ply – Paradiene 20 EG or Paradiene 20 EG TG
Finish Ply – Paradiene 30 MW FR or Paradiene 30 HT FR TG
Adhesive – SFT Adhesive
Liquid Flashing – ParaPro PMMA

MANUFACTURER

Soprema Roofing and Waterproofing, Inc.
Wadsworth, OH

Nailed Base – Modified Sopra G
Base and Stripping Ply - Sopralene 250 Sanded or Sopralene Flam 250
Finish Ply - Sopralene 250 FR GR or Sopralene 250 Flam FR GR
Adhesive – Colply EF Adhesive
Liquid Flashing – Alsan PMMA

MANUFACTURER

Johns Manville
Denver, CO

Nailed Base – Glass Base Plus
Base and Stripping Ply – DynaLastic 180 or DynaWeld 180
Finish Ply – DynaLastic 250 FR or DynaWeld Cap 250 FR
Adhesive – Premium Cold Application Adhesive
Liquid Flashing – JM PMMA

2.03 ROOFING ACCESSORIES

A. Roofing Adhesives

1. Membrane Cold Adhesive: Cold-applied bio-based low odor urethane roofing adhesive, two-part, USDA BIO Preferred, formulated for compatibility and use with specified roofing membranes and flashings.

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- > Tremco POWERply Endure Bio Adhesive by Tremco; Beachwood, OH
- 2. Mastic: An asphalt cutback mastic, reinforced with non-asbestos fibers, used as a base for setting metal flanges conforming to ASTM D 4586 Type II requirements.
- B. Sealant (low slope applications): A moisture-curing, self-leveling elastomeric sealant designed for roofing applications. The sealant shall be approved by the roof membrane manufacturer for use in conjunction with the roof membrane materials. Acceptable types are as follows:
 - > Tremco TremSeal Pro by Tremco; Beachwood, OH
- C. Ceramic Granules: No. 11 grade specification ceramic granules of color scheme matching the granule surfacing of the finish ply.
- D. Perlite Cant Strips: A cant strip composed of expanded volcanic minerals combined with waterproofing binders. The top surface shall be pre-treated with an asphalt based coating. The face of the cant shall have a nominal 4 inch dimension.
- E. Fasteners
 - 1. Insulation Fasteners: Insulation fasteners and plates shall be FM Approved, and/or approved by the manufacturer of the primary roofing products. The insulation fasteners shall provide attachment required to meet the specified uplift performance and to restrain the insulation panels against the potential for ridging. The fastening pattern for each insulation panel to be used shall be as recommended by the insulation manufacturer and approved by the manufacturer of the primary roofing products. Acceptable insulation fastener manufacturers for specific deck types are listed below.
 - a) Metal Decks: Insulation mechanical fasteners for metal decks shall be factory coated for corrosion resistance. The fastener shall conform meet or exceed Factory Mutual Standard 4470.
 - 2. Base Sheet Fasteners: Base sheet fasteners shall be approved by the manufacturer of the primary roofing products. Acceptable base sheet fasteners for specific substrate types are listed below.
 - a) Lightweight Concrete Substrates.
 - b) Metal Substrates: Manufacturer's standard #15, 2.4-inch wide barbed galvanized steel seam plate.
 - 3. Flashing Reinforcing Sheet Fasteners for Wood/Plywood Substrates to Receive Flashing Coverage: Fasteners shall be approved by the manufacturer of the primary roofing products. Acceptable fasteners for specific substrate types are listed below.
 - a) Wood/Plywood Substrates
 - A 12 gauge, spiral or annular threaded shank, zinc coated steel roofing fastener having a minimum 1 inch head.
 - > Square Cap by Maze Nails; Peru, IL
 - > Simplex Cap Nail by Simplex Nails, Inc., Americus, GA

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- F. Walktread: A prefabricated, puncture resistant polyester core reinforced, polymer modified bitumen sheet material topped with a ceramic-coated granule wearing surface.
1. Thickness: ½”
 2. Granule adhesion: 1.1 grams per sample
 3. Width: 36 in
- > Tremco TremTred by Tremco; Beachwood, OH

PART 3 – EXECUTION

3.01 PREPARATION

- A. General: Sweep or vacuum all surfaces, removing all loose aggregate and foreign substances prior to commencement of roofing.
- B. Primer for Self-Adhesive Bituminous Membranes: Apply the specified tacky primer by roller or spray in an even film. Refer to the manufacturer’s literature for the approved rate of application over various substrate types. Allow the primer to dry until it leaves a slightly sticky surface without transfer when touched.
- C. Asphaltic Primer: Prime metal and concrete and masonry surfaces with a uniform coating of the specified asphalt primer.

3.02 ROOF MEMBRANE INSTALLATION

- A. Membrane Application: Apply roofing in accordance with roofing system manufacturer's instructions and the following requirements. Application of roofing membrane components shall immediately follow application of base sheet and/or insulation as a continuous operation.
- B. Aesthetic Considerations: Construction of an aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this project. Make necessary preparations, utilize recommended application techniques, apply the specified materials including granules, and exercise care in ensuring that the finished application is acceptable to the Owner.
- C. Membrane Adhesive Application: Membrane adhesive can be applied by roller, squeegee or spray unit. Apply cold adhesive in a smooth, even, continuous layer without breaks or voids. Utilize an application rate of 2 gal/sq (0.6 to 1.0 l/m²) over irregular or porous substrates. Utilize an application rate of 2 gal/sq (0.6 to 0.8 kg/m²) for interply applications. Double the adhesive application rate at the end laps of granule surfaced sheets. Refer to the manufacturer’s inter-ply flashing detail at the locations that are to receive the specified liquid flashing system.
- D. Bitumen Consistency: Cutting or alterations of bitumen, primer, and sealants will not be permitted.
- E. Roofing Application: Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets.
1. Apply all layers of roofing perpendicular to the slope of the deck.

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2. Mechanically attach the base ply to the prepared substrate, utilizing minimum 3 inch side and end laps. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.
 3. Fully bond the finish ply to the base ply, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the torch or cold adhesive applicator. Stagger end laps of the finish ply a minimum 3 feet. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger side laps of the finish ply a minimum 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3 feet from end laps in the underlying base ply.
- F. Granule Embedment: Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot or the adhesive is soft, to ensure a monolithic surface color.
- G. Flashing Application: Cut the cant backing sheet into 12 inch widths and peel the release film from the back of the sheet. Set the sheet into place over the primed substrate extending 6 inches onto the field of the roof area and 6 inches up the vertical surface utilizing minimum 3 inch laps. Set the non-combustible cant into place dry prior to installation of the roof membrane base ply. Flash walls and curbs using the reinforcing sheet and the flashing membrane. After the base ply has been applied to the top of the cant, prime the base ply surfaces to receive the reinforcing sheet. Fully adhere the reinforcing sheet, utilizing minimum 3 inch side laps onto the primed base ply surface and up the primed wall or curb to the desired flashing height. After the final roofing ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or by application of asphalt primer; allowing primer to dry thoroughly. Torch apply the flashing into place using three foot widths (cut off the end of roll) always lapping the factory selvage edge. Stagger the laps of the flashing layer from lap seams in the reinforcing layer. Extend the flashing sheet a minimum of 4 inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall or curb to the desired flashing height. Exert pressure on the flashing sheet during application to ensure complete contact with the vertical/horizontal surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Nail the top edge of the flashing on 9 inch centers. (See manufacturer's schematic for visual interpretation).
- H. Flashing Application – wood/plywood surfaces: Flash wood/plywood parapet walls and curbs using the reinforcing sheet and the flashing membrane. The reinforcing sheet shall have minimum 3 inch side laps and extend a minimum of 3 inches onto the base ply surface and to the top of the parapet wall or curb. Nail the reinforcing sheet through the field of the sheet to the vertical wood surface on 12 inch centers from the top of the cant to top of the wall or curb. Fully adhere the remainder of the flashing reinforcing sheet that extends over the cant and roof level. Install the finish ply to extend to the top of the cant. Cut the flashing material into the desired lengths off the end of roll in three foot widths. Apply a uniform coat of the specified flashing cement to the back of the flashing sheet as well as the area to receive flashing coverage, including the exposed selvage edge of the adjacent flashing sheet. Set the flashing sheet in place and exert pressure on the sheet during application to ensure complete contact with the wall/roof surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Stagger the laps of the flashing sheet layer from the lap seams in the reinforcing ply. Check and seal all loose laps and edges. Nail the top edge of the flashing on 9 inch centers. (See manufacturer's schematic for visual interpretation).

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- I. Liquid Flashing System: Install the liquid-applied primer and flashing system in accordance with the membrane system manufacturer's printed installer's guidelines and other applicable written recommendations as provided by the manufacturer.
- J. Water Cut-Off: At end of day's work, or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to the resumption of roofing.

3.03 ROOF SYSTEM INTERFACE WITH RELATED COMPONENTS

- A. Roof Moisture Relief Vents: Completely prime the metal flanges and allow to dry prior to installation. After the base ply has been applied, mark the venting designations. Cut a 2 inch diameter core from the roof membrane assembly. Set the vent flange in mastic, centered over the core cut. Strip-in the flange using the stripping-ply material, extending a minimum of 4 inches beyond the edge of the flange. Terminate the finish ply at the flange-throat juncture of the vent. SEE ITEM: SEALANT for finish of this detail.
- B. Walktread: Cut the walktread into maximum 5 foot lengths and allow to relax until flat. Adhere the sheet using the specified plastic cement. Apply the specified cement in a 3/8 inch thickness to the back of the product in 5 inch by 5 inch spots in accordance with the pattern as supplied by the walktread manufacturer. Walk-in each sheet after application to ensure proper adhesion. Use a minimum spacing of 2 inches between sheets to allow for proper drainage.
- C. Sealant: Apply a smooth continuous bead of the specified sealant at the exposed finish ply edge transition to metal flashings incorporated into the roof system.

3.04 FIELD QUALITY CONTROL AND INSPECTIONS

- A. Site Condition: Leave all areas around job site free of debris, roofing materials, equipment and related items after completion of job.
- B. Notification Of Completion: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.
- C. Final Inspection
 - 1. Post-Installation Meeting: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters.
- D. Issuance Of The Guarantee: Complete all post installation procedures and meet the manufacturer's final endorsement for issuance of the specified guarantee.

END OF SECTION 075200

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SECTION 075200 – MODIFIED BITUMINOUS MEMBRANE ROOFING – ALTERNATE NO. 1

PART 1 – GENERAL

1.01 This specification is for installation over steel roof deck.

1.02 SECTION INCLUDES:

- A. Preparation of Substrate to Receive Roofing Materials
- B. Base Sheet or Roof Insulation Application to Prepared Substrate
- C. Roof Membrane Application
- D. Roof Flashing Application
- E. Incorporation of Sheet Metal Flashing Components and Roofing Accessories into the Roof System

1.03 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Sheet Metal Flashing and Trim
- B. Sheet Metal Roofing Specialties

1.04 RELATED SECTIONS

- A. Section 061053 – Miscellaneous Rough Carpentry
- B. Section 035500 – Lightweight Insulating Concrete
- C. Section 076200 – Sheet Metal Flashing and Trim

1.05 REFERENCE STANDARDS

References in these specifications to standards, test methods and codes, are implied to mean the latest edition of each such standard adopted. The following is an abbreviated list of associations, institutions, and societies which may be used as references throughout this specification section.

ASTM	American Society for Testing and Materials Philadelphia, PA
FM	Factory Mutual Engineering and Research Norwood, MA
NRCA	National Roofing Contractors Association Rosemont, IL

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OSHA	Occupational Safety and Health Administration Washington, DC
SMACNA	Sheet Metal and Air Conditioning Contractors National Association Chantilly, VA
UL	Underwriters Laboratories Northbrook, IL

1.06 DESCRIPTION OF WORK

**ASSEMBLY 1
POWERfast ADHESIVE-APPLIED OPTION**

Project Type:	New
Deck:	Metal Slope: 1/2 inch / ft.
Insulation - bottom layer:	Trisotech, having a thickness of 2.2 inches, mechanically attached simultaneously with the top layer of insulation.
Insulation - intermediate layer:	Trisotech, having a thickness of 2.2 inches, mechanically attached simultaneously with the top layer of insulation.
Insulation - top layer:	DensDeck Prime, having a thickness of 1/2 inch, mechanically attached.
Roof System:	POWERply Heavy Duty Base Sheet, mechanically attached; POWERply Standard FR, applied in cold adhesive.
Flashing System:	POWERply, torch applied or applied in cold adhesive.

**ASSEMBLY 1
POWERfast TORCH-APPLIED OPTION**

Project Type:	New
Deck:	Metal Slope: 1/2 inch / ft.
Insulation - bottom layer:	Trisotech, having a thickness of 2.2 inches, mechanically attached simultaneously with the top layer of insulation.
Insulation - intermediate layer:	Trisotech, having a thickness of 2.2 inches, mechanically attached simultaneously with the top layer of insulation.
Insulation - top layer:	DensDeck Prime, having a thickness of 1/2 inch, mechanically attached.
Roof System:	POWERply Heavy Duty Base Sheet, mechanically attached;

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POWERply Standard FR HW, torch applied.

Flashing System: POWERply, torch applied or applied in cold adhesive.

1.07 SUBMITTALS All submittals which do not conform to the following requirements will be rejected.

A. Submittals Prior to Contract Award:

1. Letter from the proposed primary roofing manufacturer confirming that the bidder is an acceptable Contractor authorized to install the proposed system.
2. Letter from the primary roofing manufacturer stating that the proposed application will comply with the manufacturer's requirements in order to qualify the project for the specified guarantee.

B. Submittals for Construction:

1. Product data sheets for each material required, including:
 - a. Modified bitumen membrane system.
 - b. Metal accessories.
 - c. Caulks and sealants.
 - d. Roofing base ply felt.
 - e. Modified bitumen cold process adhesive.
 - f. Walktread.
2. Shop Drawings: roof plan showing locations of roof systems; walktreads; crickets and installation and flashing details.
3. Written certification from the primary roof system manufacturer that the specification has been reviewed and is acceptable and stating their intent to supply the specified warranty at the successful completion of work.
4. Warranty Specimens:
 - a. Sample copy of Manufacturer's specified roofing warranty stating obligations, remedies, limitations, and exclusions of warranty.
 - b. Certified letter indicating intent to supply Contractor Warranty from Section 01741 at the completion of work.

C. Submittals Prior to Project Close-out:

1. Certificate Of Analysis from the testing laboratory of the primary roofing materials manufacturer, confirming the physical and mechanical properties of the roofing membrane components. Testing shall be in accordance with the parameters published in ASTM D 5147 and ASTM D 7051 and indicate Quality Assurance/Quality Control data as required to meet the specified properties. A separate Certificate Of Analysis for each production run of material shall indicate the following information:
 - a) Material type

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- b) Lot number
 - c) Production date
 - d) Dimensions and Mass (indicate the lowest values recorded during the production run);
 - Roll length
 - Roll width
 - Selvage width
 - Total thickness
 - Thickness at selvage (coating thickness)
 - Weight
 - e) Physical and Mechanical Properties;
 - Low temperature flexibility
 - Peak load
 - Ultimate Elongation
 - Dimensional stability
 - Compound Stability
 - Granule embedment
 - Resistance to thermal shock
2. Manufacturer's printed recommendations for proper maintenance of the specified roof system including inspection frequencies, penetration addition policies, temporary repairs, and leak call procedures.

1.08 QUALITY ASSURANCE

- A. Acceptable Products: Primary roofing products, including each type of sheet, all manufactured in the United States, shall be supplied by a single manufacturer which has been successfully producing the specified types of primary products for not less than 10 years. The primary roofing products shall have maintained a consistent composition for a minimum of five years.
- B. Agency Approvals: The proposed roof system shall conform to the following requirements. No other testing agency approvals will be accepted.
 - 1. Underwriters Laboratories Class A acceptance of the proposed roofing system.
 - 2. Evidence by an accredited independent testing agency or agencies that the roof configuration meets a design windload pressure of -67.5 psf or greater.
- C. Acceptable Contractor: Contractor shall have a minimum of 2 years experience in successfully installing the same or similar roofing materials and be certified in writing by the roofing materials manufacturer to install the primary roofing products.
- D. Scope of Work: The work to be performed under this specification shall include but is not limited to the following: Attend necessary job meetings and furnish competent and full time supervision, experienced roof mechanics, all materials, tools, and equipment necessary to complete, in an acceptable manner, the roof installation in accordance with this specification. Comply with the latest written application instructions of the manufacturer of the primary roofing products. In addition, application practice shall comply with requirements and recommendations contained in the latest edition of the Handbook of Accepted Roofing Knowledge (HARK) as published by the National Roofing Contractor's Association, amended to include the acceptance of a phased roof system installation.

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- E. Local Regulations: Conform to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction.
- F. Manufacturer Requirements: Ensure that the primary roofing materials manufacturer provides direct trained company personnel to attend necessary job meetings, perform periodic inspections as necessary, and conducts a final inspection upon successful completion of the project.

1.09 PRODUCT DELIVERY STORAGE AND HANDLING

- A. Delivery: Deliver materials in the manufacturer's original sealed and labeled containers and in quantities required to allow continuity of application.
- B. Storage: Store materials out of direct exposure to the elements on pallets placed over clean, flat and dry surfaces. Storage of pallets over dirt, grass-covered ground or newly placed concrete may result in upward moisture transpiration and contamination of product. Store rolls of roofing on end. For roof-top storage, avoid overloading of deck and building structure. Factory packaging is not intended for job site protection. Slit factory packaging immediately upon arrival at the job site to prevent build-up of condensation and cover materials using a breathable cover such as a canvas. Polyethylene or other non-breathable plastic coverings shall not be used. Store flammable or temperature sensitive materials away from open flame, ignition sources or excessive heat.
- C. Handling: Handle all materials in such a manner as to preclude damage and contamination with moisture or foreign matter. Handle rolled goods to prevent damage to edges or ends.
- D. Damaged Material: Any materials that are found to be damaged or stored in any manner other than stated above will be automatically rejected, and will require removal and replacement at the Contractor's expense.

1.10 PROJECT/SITE CONDITIONS

- A. Requirements Prior to Job Start:
 - 1. Notification: Give a minimum of 5 days notice to the Owner and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
 - 2. Permits: Obtain all permits required by local agencies and pay all fees which may be required for the performance of the work.
 - 3. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by OSHA, NRCA and other industry or local governmental groups.
- B. Environmental Requirements
 - 1. Precipitation: Do not apply roofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied roofing, and building interiors are protected from possible moisture damage or contamination.
- C. Protection Requirements

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1. Membrane Protection: Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this project.
2. Torch Safety: Crew members handling torches shall be trained by an Authorized Certified Roofing Torch Applicator (CERTA) Trainer, be certified according to CERTA torch safety guidelines as published by the National Roofing Contractor's Association (NRCA), and follow torch safety practices as required by the contractor's insurance carrier. Designate one person on each crew to perform a daily fire watch. The designated crew member shall watch for fires or smoldering materials on all areas during roof construction activity, and for the minimum period required by CERTA guidelines after roofing material application has been suspended for the day.
3. Limited Access: Prevent access by the public to materials, tools and equipment during the course of the project.
4. Debris Removal: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.

1.11 GUARANTEE/WARRANTY

- A. Roof Membrane/System Guarantee (Assembly 1): Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the manufacturer's 20 year labor and materials guarantee covering the rigid insulation, insulation fasteners/plates and roof membrane/flashing system. The guarantee shall be a term type, without deductibles or limitations on coverage amount, and shall be issued at no additional cost to the Owner.
 - > Tremco 20 year Roof Membrane/System Guarantee
- B. Roof Membrane Guarantee (Assembly 2): Upon successful completion of the project, and after all post installation procedures have been completed, furnish the Owner with the Manufacturer's 20 year labor and materials membrane guarantee. The guarantee shall be a term type, without deductibles or limitations on coverage amount.
 - > Tremco 20 Year Roof Membrane Guarantee

PART 2 – PRODUCTS

2.01 ROOFING SYSTEM ASSEMBLY/PRODUCTS

- A. Rigid Roof Insulation: Roof insulation shall be UL and FM approved. Insulation shall be approved in writing by the insulation manufacturer for intended use and for use with the specified roof assembly.
 1. Polyisocyanurate: A closed cell, rigid polyisocyanurate foam core material, integrally laminated between glass fiber reinforced organic facers, in full compliance with ASTM C 1289, Type II, Class 1, Grade 2 (20 psi). Panels shall have a nominal thickness of 2.2 inches. Acceptable types are as follows:
 - > Trisotech by Tremco; Beachwood, OH
 - > ACFoam II by Atlas Roofing Corporation; Atlanta, GA
 - > H-Shield by Hunter Panels, LLC, Portland, ME

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2. Gypsum Sheathing Panel: A panel composed of a gypsum based, non-structural water resistant core material integrally bonded with fiberglass mats on both sides having a nominal thickness of 1/2 inch. The panel surface shall be factory primed with a non-asphaltic primer. Acceptable types are as follows:

- > DensDeck Prime Gypsum Roof Board, by Georgia Pacific Corporation; Atlanta, GA

B. Base Sheet

1. Base Sheet: A smooth surfaced high strength modified bitumen membrane. The sheet shall conform to ASTM D 6163, Type III, Grade S requirements.

- > Tremco Heavy Duty Base Sheet

2.02 DESCRIPTION OF SYSTEMS (Roofing contractor's option adhesive or torch)

- A. Roofing Membrane Assembly (adhesive-applied): A roof membrane assembly consisting of two plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) modified asphalt membrane, applied over a prepared substrate. Reinforcement mats shall be impregnated/saturated and coated each side with SBS modified bitumen blend. The roof system shall provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following typical load-strain properties at membrane failure when tested according to ASTM D2523/D2523M. Passing results shall show tensile strain at failure, at 0 deg. F (-18 deg. C), machine direction: Not less than 225 lbf/in., machine direction; and tensile strain at failure, at 0 deg. F (-18 deg. C), cross-machine direction: Not less than 200 lbf/sq. ft., cross-machine direction. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system.

- > Tremco POWERply FR roof system

1. Modified Bitumen Finish Ply

- a) Thickness (avg): 120 mils (ASTM D 5147)
- b) Low temperature flexibility @ -15° F: PASS (ASTM D 5147)
- c) Peak Load @ 77°F: 81 lbf/inch (ASTM D 5147)
- d) Peak Load @ 0°F: 120 lbf/inch (ASTM D 5147)
- e) Ultimate Elongation (avg.) @ 77°F: 7.9% (ASTM D 5147)
- f) Granule Embedment (max loss): 2.0 grams per sample (ASTM D 5147)
- g) Puncture resistance: 70 lbf (ASTM E 154)
- h) Approvals: UL Class listed (products shall bear seals of approval)
- i) Reinforcement: fiberglass mat or other meeting the performance and Compound stability criteria
- j) Surfacing: ceramic granules

- > Tremco POWERply Standard FR

- B. Roofing Membrane Assembly (torch applied): A roof membrane assembly consisting of two plies of a prefabricated, reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) modified asphalt

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membrane, applied over a prepared substrate. Reinforcement mats shall be impregnated/saturated and coated each side with SBS modified bitumen blend and coated one side with a torch grade SBS bitumen blend adhesive layer. The roof system shall provide a roofing membrane identical to component systems that have been successfully tested by a qualified independent testing and inspecting agency to meet the following typical load-strain properties at membrane failure when tested according to ASTM D2523/D2523M. Passing results shall show tensile strain at failure, at 0 deg. F (-18 deg. C), machine direction: Not less than 225 lbf/in., machine direction; and tensile strain at failure, at 0 deg. F (-18 deg. C), cross-machine direction: Not less than 200 lbf/sq. ft., cross-machine direction. The assembly shall possess waterproofing capability, such that a phased roof application, with only the modified bitumen base ply in place, can be achieved for prolonged periods of time without detriment to the watertight integrity of the entire roof system.

> Tremco POWERply FR HW torchable roof system

1. Modified Bitumen Finish Ply

- a) Thickness: 165 mils (ASTM D 5147)
- b) Low temperature flexibility @ -10°F: PASS (ASTM D 5147)
- c) Peak Load (avg) @ 77°F: 70 lbf/inch (5.3 kN/m) (ASTM D 5147)
- d) Peak Load (avg) @ 0°F: 120 lbf/inch (ASTM D 5147)
- e) Ultimate Elongation (avg.) @ 77°F: 4% (ASTM D 5147)
- f) Dimensional Stability (max): Pass (ASTM D 5147)
- g) Compound Stability (min): 215°F (ASTM D 5147)
- h) Granule Embedment (max individual loss): 2.0 grams per sample (ASTM D 5147)
- i) Approvals: UL Class listed (products shall bear seals of approval)
- j) Reinforcement: fiberglass mat or other meeting the performance and dimensional stability criteria
- k) Surfacing: ceramic granules

> Tremco POWERply Standard FR HW

C. Flashing Membrane Assembly: A flashing membrane assembly consisting of a prefabricated, reinforced, Styrene-Butadiene-Styrene (SBS) modified asphalt membrane.

> Tremco POWERply flashing system

D. Liquid Flashing System: A specialty flashing system consisting of a bio-based, fully reinforced polyurethane membrane installed over a prepared or primed substrate. The flashing system consists of a basecoat and topcoat, combined with a non-woven polyester mesh. The use of the specialty flashing system shall be specifically approved in advance by the membrane manufacturer for each application.

> AlphaGuard Bio Liquid Flashing System by Tremco; Beachwood, OH

E. Substitute Roof Systems: The following substitute roof systems are approved for use in lieu of the specified roof system.

MANUFACTURER
Siplast

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Irving, TX

Nailed Base – Parabase FS
Base and Stripping Ply – Paradiene 20 EG or Paradiene 20 EG TG
Finish Ply – Paradiene 30 MW FR or Paradiene 30 HT FR TG
Adhesive – SFT Adhesive
Liquid Flashing – ParaPro PMMA

MANUFACTURER

Soprema Roofing and Waterproofing, Inc.
Wadsworth, OH

Nailed Base – Modified Sopra G
Base and Stripping Ply - Sopralene 250 Sanded or Sopralene Flam 250
Finish Ply - Sopralene 250 FR GR or Sopralene 250 Flam FR GR
Adhesive – Colply EF Adhesive
Liquid Flashing – Alsan PMMA

MANUFACTURER

Johns Manville
Denver, CO

Nailed Base – Glass Base Plus
Base and Stripping Ply – DynaLastic 180 or DynaWeld 180
Finish Ply – DynaLastic 250 FR or DynaWeld Cap 250 FR
Adhesive – Premium Cold Application Adhesive
Liquid Flashing – JM PMMA

2.03 ROOFING ACCESSORIES

A. Roofing Adhesives

1. Membrane Cold Adhesive: Cold-applied bio-based low odor urethane roofing adhesive, two-part, USDA BIO Preferred, formulated for compatibility and use with specified roofing membranes and flashings.
 - > Tremco POWERply Endure Bio Adhesive by Tremco; Beachwood, OH
2. Mastic: An asphalt cutback mastic, reinforced with non-asbestos fibers, used as a base for setting metal flanges conforming to ASTM D 4586 Type II requirements.

B. Primers

1. Primer: An asphalt/solvent blend meeting ASTM D 41.

C. Sealant (low slope applications): A moisture-curing, self-leveling elastomeric sealant designed for roofing applications. The sealant shall be approved by the roof membrane manufacturer for use in conjunction with the roof membrane materials. Acceptable types are as follows:

- > Tremco TremSeal Pro by Tremco; Beachwood, OH

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- D. Ceramic Granules: No. 11 grade specification ceramic granules of color scheme matching the granule surfacing of the finish ply.
- E. Perlite Cant Strips: A cant strip composed of expanded volcanic minerals combined with waterproofing binders. The top surface shall be pre-treated with an asphalt based coating. The face of the cant shall have a nominal 4 inch dimension.
- F. Fasteners
1. Insulation Fasteners: Insulation fasteners and plates shall be FM Approved, and/or approved by the manufacturer of the primary roofing products. The insulation fasteners shall provide attachment required to meet the specified uplift performance and to restrain the insulation panels against the potential for ridding. The fastening pattern for each insulation panel to be used shall be as recommended by the insulation manufacturer and approved by the manufacturer of the primary roofing products. Acceptable insulation fastener manufacturers for specific deck types are listed below.
 - a) Metal Decks: Insulation mechanical fasteners for metal decks shall be factory coated for corrosion resistance. The fastener shall conform meet or exceed Factory Mutual Standard 4470.
 2. Base Sheet Fasteners: Base sheet fasteners shall be approved by the manufacturer of the primary roofing products. Acceptable base sheet fasteners for specific substrate types are listed below.
 - a) Metal Substrates

Manufacturer's standard #15, 2.4-inch wide barbed galvanized steel seam plate.
 3. Flashing Reinforcing Sheet Fasteners for Wood/Plywood Substrates to Receive Flashing Coverage: Fasteners shall be approved by the manufacturer of the primary roofing products. Acceptable fasteners for specific substrate types are listed below.
 - a) Wood/Plywood Substrates
 - A 12 gauge, spiral or annular threaded shank, zinc coated steel roofing fastener having a minimum 1 inch head.
 - > Square Cap by Maze Nails; Peru, IL
 - > Simplex Cap Nail by Simplex Nails, Inc., Americus, GA
- H. Walktread: A prefabricated, puncture resistant polyester core reinforced, polymer modified bitumen sheet material topped with a ceramic-coated granule wearing surface.
1. Thickness: ½”
 2. Granule adhesion: 1.1 grams per sample
 3. Width: 36 in
 - > Tremco TremTred by Tremco; Beachwood, OH

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PART 3 – EXECUTION

3.01 PREPARATION

- A. General: Sweep or vacuum all surfaces, removing all loose aggregate and foreign substances prior to commencement of roofing.
- B. Primer for Self-Adhesive Bituminous Membranes: Apply the specified tacky primer by roller or spray in an even film. Refer to the manufacturer's literature for the approved rate of application over various substrate types. Allow the primer to dry until it leaves a slightly sticky surface without transfer when touched.
- C. Asphaltic Primer: Prime metal and concrete and masonry surfaces with a uniform coating of the specified asphalt primer.

3.02 SUBSTRATE PREPARATION

- A. Insulation: Install insulation panels with end joints offset; edges of the panels shall be in moderate contact without forcing applied in strict accordance with the insulation manufacturer's requirements and the following instructions. Where insulation is installed in two or more layers, stagger joints between layers. Install only as much insulation as can be made watertight within the same work day.
 - 1. Insulation - multiple layer: Mechanically attach the insulation layers simultaneously to the substrate, using the specified fasteners, at a rate of 1 fastener per 1.6 square feet of panel area (20 per 4' x 8' panel). Increase the fastening frequency by 50% at the perimeter of the roof and 100% in the corners. Stagger the panel joints between insulation layers.
- B. Base Sheet Securement to Prepared Substrate (Assembly 2): Lay the base sheet over the entire area to be roofed, lapping sides 3 inches and ends 6 inches. Using the specified fasteners, fasten each sheet every 7 inches through laps and stagger fasten the remainder of the sheet in 3 rows on nominal 9 inch centers with fasteners in each row on 10 inch centers. Increase the fastening pattern by 70% at the perimeter of the roof and 160% in the corners.

3.03 ROOF MEMBRANE INSTALLATION

- A. Membrane Application: Apply roofing in accordance with roofing system manufacturer's instructions and the following requirements. Application of roofing membrane components shall immediately follow application of base sheet and/or insulation as a continuous operation.
- B. Aesthetic Considerations: Construction of an aesthetically pleasing overall appearance of the finished roof application is a standard requirement for this project. Make necessary preparations, utilize recommended application techniques, apply the specified materials including granules, and exercise care in ensuring that the finished application is acceptable to the Owner.
- C. Membrane Adhesive Application: Membrane adhesive can be applied by roller, squeegee or spray unit. Apply cold adhesive in a smooth, even, continuous layer without breaks or voids. Utilize an application rate of 2 gal/sq (0.6 to 1.0 l/m²) over irregular or porous substrates. Utilize an application rate of 2 gal/sq (0.6 to 0.8 kg/m²) for interply applications. Double the adhesive application rate at the

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end laps of granule surfaced sheets. Refer to the manufacturer’s inter-ply flashing detail at the locations that are to receive the specified liquid flashing system.

- D. Bitumen Consistency: Cutting or alterations of bitumen, primer, and sealants will not be permitted.
- E. Roofing Application: Apply all layers of roofing free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to ensure prevention of air pockets.
 - 1. Apply all layers of roofing perpendicular to the slope of the deck.
 - 2. Mechanically attach the base ply to the prepared substrate, utilizing minimum 3 inch side and end laps. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger end laps a minimum of 3 feet.
 - 3. Fully bond the finish ply to the base ply, utilizing minimum 3 inch side and end laps. Apply each sheet directly behind the torch or cold adhesive applicator. Stagger end laps of the finish ply a minimum 3 feet. Cut a dog ear angle at the end laps on overlapping selvage edges. Using a clean trowel, apply top pressure to top seal T-laps immediately following sheet application. Stagger side laps of the finish ply a minimum 12 inches from side laps in the underlying base ply. Stagger end laps of the finish ply a minimum 3 feet from end laps in the underlying base ply.
- F. Granule Embedment: Broadcast mineral granules over all bitumen overruns on the finish ply surface, while the bitumen is still hot or the adhesive is soft, to ensure a monolithic surface color.
- G. Flashing Application: Cut the cant backing sheet into 12 inch widths and peel the release film from the back of the sheet. Set the sheet into place over the primed substrate extending 6 inches onto the field of the roof area and 6 inches up the vertical surface utilizing minimum 3 inch laps. Set the non-combustible cant into place dry prior to installation of the roof membrane base ply. Flash walls and curbs using the reinforcing sheet and the flashing membrane. After the base ply has been applied to the top of the cant, prime the base ply surfaces to receive the reinforcing sheet. Fully adhere the reinforcing sheet, utilizing minimum 3 inch side laps onto the primed base ply surface and up the primed wall or curb to the desired flashing height. After the final roofing ply has been applied to the top of the cant, prepare the surface area that is to receive flashing coverage by torch heating granular surfaces or by application of asphalt primer; allowing primer to dry thoroughly. Torch apply the flashing into place using three foot widths (cut off the end of roll) always lapping the factory selvage edge. Stagger the laps of the flashing layer from lap seams in the reinforcing layer. Extend the flashing sheet a minimum of 4 inches beyond the toe of the cant onto the prepared surface of the finished roof and up the wall or curb to the desired flashing height. Exert pressure on the flashing sheet during application to ensure complete contact with the vertical/horizontal surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Check and seal all loose laps and edges. Nail the top edge of the flashing on 9 inch centers. (See manufacturer's schematic for visual interpretation).
- H. Flashing Application – wood/plywood surfaces: Flash wood/plywood parapet walls and curbs using the reinforcing sheet and the flashing membrane. The reinforcing sheet shall have minimum 3 inch side laps and extend a minimum of 3 inches onto the base ply surface and to the top of the parapet wall or curb. Nail the reinforcing sheet through the field of the sheet to the vertical wood surface on 12 inch centers from the top of the cant to top of the wall or curb. Fully adhere the remainder of the flashing reinforcing sheet that extends over the cant and roof level. Install the finish ply to extend to the top of

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the cant. Cut the flashing material into the desired lengths off the end of roll in three foot widths. Apply a uniform coat of the specified flashing cement to the back of the flashing sheet as well as the area to receive flashing coverage, including the exposed selvage edge of the adjacent flashing sheet. Set the flashing sheet in place and exert pressure on the sheet during application to ensure complete contact with the wall/roof surfaces, preventing air pockets; this can be accomplished by using a damp sponge or shop rag. Stagger the laps of the flashing sheet layer from the lap seams in the reinforcing ply. Check and seal all loose laps and edges. Nail the top edge of the flashing on 9 inch centers. (See manufacturer's schematic for visual interpretation).

- I. Liquid Flashing System: Install the liquid-applied primer and flashing system in accordance with the membrane system manufacturer's printed installer's guidelines and other applicable written recommendations as provided by the manufacturer.
- J. Water Cut-Off: At end of day's work, or when precipitation is imminent, construct a water cut-off at all open edges. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service. Cut-offs must be completely removed prior to the resumption of roofing.

3.04 ROOF SYSTEM INTERFACE WITH RELATED COMPONENTS

- A. Walktread: Cut the walktread into maximum 5 foot lengths and allow to relax until flat. Adhere the sheet using the specified plastic cement. Apply the specified cement in a 3/8 inch thickness to the back of the product in 5 inch by 5 inch spots in accordance with the pattern as supplied by the walktread manufacturer. Walk-in each sheet after application to ensure proper adhesion. Use a minimum spacing of 2 inches between sheets to allow for proper drainage.
- B. Sealant: Apply a smooth continuous bead of the specified sealant at the exposed finish ply edge transition to metal flashings incorporated into the roof system.

3.05 FIELD QUALITY CONTROL AND INSPECTIONS

- A. Site Condition: Leave all areas around job site free of debris, roofing materials, equipment and related items after completion of job.
- B. Notification Of Completion: Notify the manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.
- C. Final Inspection
 - 1. Post-Installation Meeting: Hold a meeting at the completion of the project, attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. Complete, sign, and mail the punch list form to the manufacturer's headquarters.
- D. Issuance Of The Guarantee: Complete all post installation procedures and meet the manufacturer's final endorsement for issuance of the specified guarantee.

END OF SECTION 075200

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SECTION 075216a – ROOFING INSTALLER’S WARRANTY FOR MODIFIED BITUMEN ROOFING

PART 1 - GENERAL

1.01 ROOFING INSTALLER'S AFFIDAVIT AND WARRANTY

A. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: **Glynn County Board of Education**
2. Address: **1313 Egmont Street
Brunswick, GA 31520**
3. Building Name/Type: **St. Simons Elementary School**
3. Address: **805 Ocean Blvd.
St. Simons Island, GA 31522**
4. Area of Work: **<Insert information.>**
5. Acceptance Date: **<Insert date.>**
6. Warranty Period: **Five (5) Years**
7. Expiration Date: **<Insert date.>**

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. fire;
 - c. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - d. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - e. vapor condensation on bottom of roofing; and
 - f. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

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2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
 7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.
- E. My signature on this affidavit and warranty is also my certification that to the best of my knowledge and belief the work is installed in strict compliance with the contract documents and the manufacturer's published recommendations. During the warranty period, I pledge that work found to be not in accordance with the contract documents and manufacturer's published recommendations will be removed and replaced by the "roof installer" at no expense to the Owner.
- F. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.
1. Authorized Signature: **<Insert signature.>**
 2. Name: **<Insert name.>**
 3. Title: **<Insert title.>**

END OF SECTION 075216a

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SECTION 076200 – SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sheet metal flashing and trim:

1. Through-wall flashing.
2. Formed roof drainage system.
3. Formed rakes and soffits
4. Formed low-slope roof flashing and trim.
5. Formed wall flashing and trim.

1.2 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:

1. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft.; 90-lbf/sq. ft. perimeter uplift force, 120-lbf/sq. ft. corner uplift force, and 45-lbf/sq. ft. outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

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1. Identify material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
 4. Details of expansion-joint covers, including showing direction of expansion and contraction.
- C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Sheet Metal Flashing: **12 inches (300 mm)** long. Include fasteners, closures, and other attachments.
 2. Trim: **12 inches (300 mm)** long. Include fasteners and other exposed accessories.

1.4 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- B. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
 2. Review methods and procedures related to sheet metal flashing and trim.
 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

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1.6 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
 - 1. Finish: No. 2D (dull, cold rolled) thru wall flashing.
- B. All other sheet metal pre-painted .040 aluminum Kynar 500 or Hy lav 5000 finisher to match wall panels.
- C. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
 - 4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- C. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- E. Burning Rod for Lead: Same composition as lead sheet.
- F. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- G. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

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- H. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- J. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 - 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.4 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch-(100-mm) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.

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2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum **96-inch- (2400-mm-)** long, but not exceeding **10-foot- (3-m-)** long, sections. Furnish with **6-inch- (150-mm-)** wide joint cover plates.
1. Joint Style: Butt, with **12-inch- (300-mm-)** wide concealed backup plate and **6-inch- (150-mm-)** wide exposed cover plates.
 2. Fabricate scuppers from the following material:
 - a. Pre-painted, Metallic-Coated Steel: 0.0276 inch (0.7 mm) thick.
- B. Copings: Fabricate in minimum 96-inch- (2400-mm) long, but not exceeding 10-foot-(3-m) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight.
1. Joint Style: Butt, with 12-inch- (300-mm-) wide concealed backup plate and 6-inch-wide exposed cover plates.
 2. Fabricate copings from the following material:
 - a. Pre-painted, Metallic-Coated Steel: 0.0396 inch (1.0 mm).
- C. Expansion-Joint Cover: Fabricate from the following material:
1. Pre-painted, Metallic-coated Steel: 0.0336 inch (0.85 mm).
- D. Counterflashing: Fabricate from the following material:
1. Pre-painted, Metallic-Coated Steel: 0.0217 inch (0.55 mm).

2.6 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum **96-inch- (2400-mm-)** long, but not exceeding **12 foot (3.6 m)** long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend **6 inches (150 mm)** beyond each side of wall openings. Form with **2-inch- (50-mm-)** high end dams. Fabricate from the following material:
1. Stainless Steel: **0.0156 inch (0.4 mm)** thick.

2.7 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations

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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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
 - 1. Coat side of uncoated aluminum, stainless-steel and lead sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of 40 mil EPDM underlayment and cover with a slip sheet or install a course of 40 mil polyethylene underlayment.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 1. Space cleats not more than **12 inches (300 mm)** apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

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- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (600 mm)** of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with elastomeric sealant concealed within joints.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than **1-1/4 inches (32 mm)** for nails and not less than **3/4 inch (19 mm)** for wood screws.
1. Galvanized or Pre-painted, Metallic-Coated Steel: Use stainless-steel fasteners.
 2. Aluminum: Use aluminum or stainless-steel fasteners.
 3. Copper Use copper or stainless-steel fasteners.
 4. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with elastomeric sealant as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than **1 inch (25 mm)** into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between **40 and 70 deg F (4 and 21 deg C)**, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below **40 deg F (4 deg C)**.
 2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of **1-1/2 inches (38 mm)** except where pretinned surface would show in finished Work.
1. Do not solder pre-painted sheet.
 2. Stainless-Steel Soldering: Pretin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
 3. Copper Soldering: Tin uncoated copper surfaces at edges of sheets using solder recommended for copper work.
 4. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.
 5. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.
- J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

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- B. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of **4 inches (100 mm)** in direction of water flow.
- C. Splash Pans: Install where downspouts discharge on low-sloped roofs. Set in asphalt roofing cement compatible with roofing membrane.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at **16-inch (400-mm)** centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at **16-inch (400-mm)** centers.
 - 2. Anchor interior leg of coping with screw fasteners and washers at **18-inch (450-mm)** centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of **4 inches (100 mm)** over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing **4 inches (100 mm)** over base flashing. Lap counterflashing joints a minimum of **4 inches (100 mm)** and bed with elastomeric sealant.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

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- B. Through-Wall Flashing: Installation of formed through-wall flashing is specified in Division 4 Section "Unit Masonry Assemblies."

3.6 MISCELLANEOUS FLASHING INSTALLATION

- A. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.
- B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with [elastomeric] [butyl] sealant to equipment support member.

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

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SECTION 077200 – ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof hatches.

1.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.3 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.
- D. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
1. Size and location of roof accessories specified in this Section.
 2. Method of attaching roof accessories to roof or building structure.
 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
 4. Required clearances.
- E. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.4 COORDINATION

- A. Coordinate layout and installation of roof accessories with **roofing membrane and base flashing and** interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

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PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
 - 1. Mill Finish: As manufactured.
 - 2. Clear Anodic Finish: AAMA 611, **AA-M12C22A41, Class I, 0.018 mm** or thicker.
- B. Aluminum Extrusions and Tubes: ASTM B 221 (ASTM B 221M), manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Underlayment:
 - 1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, non-perforated.
 - 2. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D 4397.
 - 3. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.
- D. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide non-removable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 - 1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 3. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
 - 4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- F. Elastomeric Sealant: ASTM C 920, elastomeric [**polyurethane**] [**silicone**] polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

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H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 ROOF HATCH

A. Roof Hatches: Metal roof-hatch units with lids and insulated **double**-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketin and integrally formed deck-mounting flange at perimeter bottom. Basis of Design – Bilco Type NB-50T.

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

- a. Babcock-Davis. Thermal MAX Roof Hatch, www.babcockdavis.com .
- b. Bilco. Thermally Broken Roof Hatch, www.bilco.com .
- c. Nystrom. Thermal MAX R20, www.nystrom.com .

B. Type and Size: Single-leaf lid. Size shown on drawings.

C. Loads: Minimum **40-lbf/sq. ft. (1.9-kPa)** external live load and **20-lbf/sq. ft. (0.95-kPa)** internal uplift load.

D. Materials:

1. Material: Cover and frame are 11 gauge (2.3 mm) aluminum.
2. Cover: Brakeformed, hollow-metal design with 2” (50 mm) concealed polyisocyanurate insulation (R Value of 12), 4” (100 mm) beaded, overlapping flange, fully welded at corners, and internally reinforced for 40 psf (195kg/m²) live load.
3. Curb: 12” (305 mm) in height with integral capflashing, 2” (50 mm) polyisocyanurate insulation (R Value of 12), fully welded at corners, and 4-1/2” (114 mm) mounting flange with 7/16” holes (11 mm) provided for securing frame to the roof deck.
4. Gasket: Extruded EPDM rubber gasket permanently adhered to cover.
5. Hinges: Heavy-duty pintle hinges with 3/8” (9 mm) Type 316 stainless steel hinge pins.
6. Latch: Slam latch with interior and exterior turn handles and padlock hasps.
7. Lift Assistance: Compression spring operators enclosed in telescopic tubes. Automatic hold-open arm with grip handle release.
8. Performance Ratings: Complies with UL 790 Class A (burning brand test).
9. Finish: Mill finish aluminum.
10. Hardware: Engineered composite compression spring tubes and steel compression springs packed in grease. Type 316 stainless steel hinges. All other hardware is zinc plated/chromate sealed.

E. Provide roof hatch Safety Railing System.

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2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of **stainless-steel** roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof-Hatch Installation:
 - 1. Install roof hatch so top surface of hatch curb is level.

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2. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
3. Attach safety railing system to roof-hatch curb.
4. Attach ladder-assist post according to manufacturer's written instructions.

D. Seal joints with **elastomeric** sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 09 painting Sections.
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

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SECTION 078446 – FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED Submittal:

1. Product Data for Credit EQ 4.1: For fire-resistive joint systems, including printed statement of VOC content.

C. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

D. Qualification Data: For qualified Installer.

E. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:

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1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:
 - a. Fire-resistive joint system products bear classification marking of qualified testing agency.
 - b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."

C. Pre-installation Conference: Conduct conference at **Project site**.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.5 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.
- C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

- A. 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 of assemblies in or 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 per ASTM E 1966 or UL 2079:
 1. Joints include those installed in or between fire-resistance-rated **walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies**.

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2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
 3. Manufacturers: Subject to compliance with requirements, **provide products by one of the following:**
 - a. A/D Fire Protection Systems Inc.
 - b. CEMCO.
 - c. Fire Trak Corp.
 - d. Grace Construction Products.
 - e. Hilti, Inc.
 - f. Johns Manville.
 - g. Nelson Firestop Products.
 - h. NUCO Inc.
 - i. 3M Fire Protection Products.
 - j. Tremco, Inc.; Tremco Fire Protection Systems Group.
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.
1. L-Rating: Not exceeding 5.0 cfm/ft (0.00775 cu. m/s x m) of joint at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures.
 2. Manufacturers: Subject to compliance with requirements, **provide products by one of the following:**
 - a. A/D Fire Protection Systems Inc.
 - b. Grace Construction Products.
 - c. Hilti, Inc.
 - d. Johns Manville.
 - e. Nelson Firestop Products.
 - f. NUCO Inc.
 - g. Passive Fire Protection Partners.
 - h. Specified Technologies Inc.
 - i. 3M Fire Protection Products.
 - j. Tremco, Inc.; Tremco Fire Protection Systems Group.
- D. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. 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.
- F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming 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.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply fill materials so they contact and adhere to substrates formed by joints.

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3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner may engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.
- C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as the 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 joints 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 078446

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SECTION 079200 – JOINT SEALANTS

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.2 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required. Install joint sealants on ½-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint surfaces.
- D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

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- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

2.2 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: As selected by Architect from manufacturer's full range for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS

- A. 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.

2.4 LATEX JOINT SEALANTS

- A. Latex Sealant Standard: Comply with ASTM C 834 for each product of this description indicated in the Latex Joint-Sealant Schedule at the end of Part 3.

2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints: For each product of this description indicated in the Acoustical Joint-Sealant Schedule at the end of Part 3, provide manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
 - 1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- B. Acoustical Sealant for Concealed Joints: For each product of this description indicated in the Acoustical Joint-Sealant Schedule at the end of Part 3, provide manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

2.6 JOINT-SEALANT BACKING

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- 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. 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.

2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material 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. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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.

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- 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.

3.3 INSTALLATION OF JOINT SEALANTS

- 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 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.

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- F. 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 sealants 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. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.6 ELASTOMERIC JOINT-SEALANT SCHEDULE

- A. Low-Modulus Nonacid-Curing Silicone Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Provide one of the following:
 - a. 790; Dow Corning.
 - b. Silpruf; GE Silicones.
 - c. UltraPruf SCS2300; GE Silicones.
 - d. HiFlex 331; NUCO Industries, Inc.
 - e. NuFlex 309; NUCO Industries, Inc.
 - f. VP 275; Ohio Sealants, Inc.
 - g. 864; Pecora Corporation.
 - h. 890; Pecora Corporation.
 - i. PSI-641; Polymeric Systems, Inc.
 - j. Omniseal; Sonneborn Building Products Div., ChemRex Inc.
 - k. Spectrem 1; Tremco.
 2. Type and Grade: S (single component) and NS (nonsag).
 3. Class: 25.
 4. Additional Movement Capability: 50 percent movement in extension and 50 percent movement in compression for a total of 100 percent movement.
 5. Use Related to Exposure: NT (nontraffic).
 6. Uses Related to Joint Substrates: M, G, A, and O.

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7. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
 8. Applications: Typical exterior non-traffic joints and unpainted interior joints.
- B. Single-Component Pourable Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Provide one of the following:
 - a. Chem-Calk 950; Bostik Inc.
 - b. Vulkem 45; Mameco International.
 - c. Vulkem Nova 300 SSL; Mameco International.
 - d. NR-201; Pecora Corporation.
 - e. Flexiprene PSI-951; Polymeric Systems, Inc.
 - f. SL 1; Sonneborn Building Products Div., ChemRex Inc..
 2. Type and Grade: S (single component) and P (pourable).
 3. Class: 25.
 4. Use Related to Exposure: T (traffic).
 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 6. Applications: Interior and exterior floor joints.

3.7 LATEX JOINT-SEALANT SCHEDULE

- A. Latex Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Provide one of the following:
 - a. Chem-Calk 600; Bostik Inc.
 - b. NuFlex 330; NUCO Industries, Inc.
 - c. LC 160 All Purpose Acrylic Caulk; Ohio Sealants, Inc.
 - d. AC-20; Pecora Corporation.
 - e. PSI-701; Polymeric Systems, Inc.
 - f. Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
 - g. Tremflex 834; Tremco.
 2. Applications: Interior Painted Joints.

3.8 ACOUSTICAL JOINT-SEALANT SCHEDULE

- A. Acoustical Sealant for Exposed and Concealed Joints: Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Provide one of the following:
 - a. AC-20 FTR Acoustical and Insulation Sealant; Pecora Corporation.
 - b. SHEETROCK Acoustical Sealant; USG Corp., United States Gypsum Co.
 - c. Tremco Acoustical Sealant; Tremco.

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2. Applications: Joints related to Gypsum Assemblies & Ceiling Assemblies.

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SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Work under this section comprises of furnishing hollow metal doors and frames, including transom frames, sidelight and window frames with provision for glazed, paneled or louvered openings, fire labeled and non-labeled, as scheduled.
1. Steel frames.
 2. Hollow Metal Framing Systems.
- B. References: The intent of this document is that all hollow metal and its application will comply or exceed the standards identified below. The latest published edition of each reference applies.
1. ANSI - American National Standards Institute - ansi.org
 2. NFPA - National Fire Protection Association
 - a. NFPA 80 - Standard for Fire Doors and Other Opening Protectives
 - b. NFPA 101 – Life Safety Code
 - c. NFPA 105 – Standard Smoke Door Assemblies and Other Opening Protectives
 - d. NFPA 252 - Standard Method of Fire Tests of Door Assemblies.
 3. DHI - Door and Hardware Institute – Door Security + Safety Professionals
 - a. Installation Guide for Doors and Hardware.
 - b. Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames.
 - c. Recommended Locations for Builders’ Hardware for Custom Steel Doors and Frames.
 4. SDI - Steel Door Institute
 - a. SDI-105 – Recommended Erection Instructions for Steel Frames
 - b. SDI-107 – Hardware on Steel Doors (Reinforcement - Application)
 - c. SDI-111 - Recommended Details for Standard Steel Doors, Frames, Accessories, and Related Components
 - d. SDI-117 - Manufacturing Tolerances Standard Steel Doors and Frames
 - e. SDI-118 – Basic Fire Door Requirements
 - f. SDI A250.3 Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames
 - g. SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, and Frame Anchors
 - h. SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames
 - i. SDI A250.8 - SDI-100 Specifications for Standard Steel Doors and Frames
 - j. SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames
 - k. SDI A250.11 - Recommended Erection Instructions for Steel Frames
 5. BHMA - Builders Hardware Manufacturers Association
 - a. BHMA A156.115 - Hardware Preparations in Standard Steel Doors and Frames.

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- b. BHMA A156.7 - Hinge Template Dimensions.
- 6. ASTM - American Society for Testing Materials
 - a. ASTM A568/A568M-19a Standard Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements
 - b. ASTM A879/A879M-12(2017) Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
 - c. ASTM A653/A653M-19a Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - d. ASTM A924/A924M-19 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
 - e. ASTM A1008/A1008M-18 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
- 7. ICC - International Code Counsel
 - a. ICC A117.1 – Accessible and Usable Building and Facilities.
- 8. UL - Building Materials Directory; Underwriters Laboratories Inc.
 - a. UL 10B - Standard for Neutral Pressure Fire Tests of Door Assemblies
 - b. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies
 - c. UL 1784 – Air Leakage Test of Door Assemblies
- 9. NAAMM/HMMA – National Association of Architectural Metal Manufacturers/Hollow Metal Manufacturers Association
 - a. NAAMM/HMMA 840 – Guide Specification for Receipt, Storage, and Installation of Hollow Metal Doors and Frames.
- 10. WH - Certification Listings; Warnock Hersey International Inc.

1.2 SUBSTITUTIONS:

- A. All substitution requests must be submitted within the procedures and time frame as outlined in Division 1, General Requirements. Approval of products is at the discretion of the architect and their consultant

1.3 SUBMITTALS

- A. Submittals to comply with provisions of Division 01, Submittal Procedures.
- B. Product Data: Manufacturer's standard details and catalog data indicating compliance with referenced standards and manufacturer's installation instructions.
- C. Shop Drawings: Provide a schedule of doors and frames using same reference numbers for details and door openings as those on the contract documents. Shop drawings should include the following information to ensure doors and frames are properly prepared and coordinated to receive hardware.

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1. Elevations of each door and frame type.
 2. Details for door core.
 3. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 4. Locations of cutouts for glass and louvers.
 5. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 6. Mounting locations for hardware.
 7. Thickness of reinforcement/preparations for hardware.
 8. Details of anchorages, joints, field splices, and connections.
 9. Details of accessories.
 10. Details of moldings, removable stops, and glazing.
 11. Fire ratings.
 12. Finish.
- D. Samples: 12 by 12 inches (304 mm by 304 mm) cut away sample door with provisions for lockset, hinge and corner section of frame welded and prepped for specified hardware. Sample should be furnished with submittals for Owner approval. After approval return sample to door/frame supplier as confirmation of approved construction.
- E. Closeout Submittals to comply with Division 1, Closeout Submittals procedures.
- F. Furnish copies of manufacturer's warranty information and maintenance instructions.

1.4 QUALITY ASSURANCE

- A. Hollow Metal Distributor is to be a direct account of the manufacturer of the products furnished. In addition, that distributor must have in their regular employment an Architectural Hardware Consultant (AHC), Certified Door Consultant (CDC), an Architectural Openings Consultant (AOC), a Door & Hardware Consultant (DHC) or equivalent door and hardware industry experience who will be available to consult with the Architect and Contractor regarding any matters affecting the door and frame opening.
- B. Manufacturer Qualifications: Certified Member of the Steel Door Institute in good standing.
- C. Installer: Minimum five years documented experience installing products specified this Section.
- D. Certificates:
1. Manufacturer's certification that products comply with referenced standards.
 2. Hollow Metal Manufacturer must provide documentation that they are an SDI Certified Manufacturer.
- E. Fire Rated Doors and Frames: Underwriters' Laboratories, Intertek Testing Services/Warnock Hersey, and Factory Mutual labeled fire doors and frames:
1. Provide labeled fire doors and frames in accordance with Underwriters Laboratories standard UL10C Positive Pressure Fire Tests of Door Assemblies.
 2. Construct and install doors and frames to comply with current issue of NFPA 80.
 3. Manufacture Underwriters' Laboratories labeled doors and frames in strict compliance to UL procedures, and provide the degree of fire protection, heat transmission and panic loading capability indicated by the opening class.

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4. Manufacture Intertek Testing Services /Warnock Hersey labeled doors and frames in strict compliance to ITS/WH procedures and provide the degree of fire protection capability indicated by the opening class.
5. Manufacture Factory Mutual labeled doors and frames in strict compliance to FM procedures, and provide the degree of fire protection, heat transmission and panic loading capability indicated by the opening class.
6. Affix a physical label or approved marking to each fire door and/or fire door frame, at an authorized facility as evidence of compliance with procedures of the labeling agency.
7. Conform to applicable codes for fire ratings. It is the intent of this specification that doors, frames, hardware and their application comply or exceed the standards for labeled openings. In case of conflict between types required for fire protection, furnish type required by NFPA and UL.
8. Provide Temperature Rise Fire Door Assemblies in exit enclosures and exit passageway with maximum transmitted temperature end point rating of not more than 250 degrees F (121 degrees C) above ambient at the end of 30 minutes of the standard fire test exposure.
9. For openings required to be fire rated exceeding limitations of labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping

1. The use of non-vented plastic or canvas shelters that can create a humidity chamber shall be avoided to prevent rust or damage.
2. Provide cardboard wrapped or crated product to provide protection during transit and job site storage
3. Should wrappers become wet, remove immediately

B. Delivery and Site Acceptance

1. The supplier shall deliver all materials to the project site; direct factory shipments are not allowed unless agreed upon beforehand. Supplier shall coordinate delivery times and schedules with the contractor.
2. Deliver doors cardboard wrapped or crated to provide protection during transit and job site storage. Provide additional protection to prevent damage to any factory-finished doors. Mark all doors and frames with architects opening numbers as shown on the contract documents and shop drawings on the center hinge preparation location.
3. Upon delivery, check in doors and frames jointly with supplier. Inspect doors and frames upon delivery for damage, correct quantities or shortages. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the architect. Otherwise, remove and replace damaged goods as directed. Note shortages and replace immediately.

C. Storage and Protection

1. Handle, store and protect products in accordance with the manufacturers printed instructions, ANSI/SDI A250.8 – Specifications for Standard Steel Doors and Frames, A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames, or ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory

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Applied Finish Coatings for Steel Doors and Frames and NAAMM/HMMA 840 – Guide Specification for Receipt, Storage, and Installation of Hollow Metal Doors and Frames.

2. Store all materials in a dry area. All hollow metal material shall be stored so that it does not come in contact with water or moisture. Protect units from adverse weather elements.
3. Place units on 4 inch (102 mm) high wood sills to prevent rust and damage.
4. Store doors vertically under a properly vented cover, five units maximum in a stack with a ¼” space between doors to permit air circulation.
5. Store frames in an upright position with heads uppermost under cover.
6. Store assembled frames five units maximum in a stack with 2-inch (51 mm) space between frames to permit air circulation.

1.6 COORDINATION

- A. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices and recessed items.
- B. Coordinate Work with frame opening construction, door and hardware installation.
- C. Sequence installation to accommodate required door hardware.
- D. Verify field dimensions for factory assembled frames prior to fabrication.

1.7 WARRANTY

- A. Comply with Division 01 Closeout Submittals
- B. All doors and frames shall be warranted in writing by the manufacturer against defects in materials and workmanship for a period of one (1) year commencing on the date of manufacture.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design - MESKER a dormakaba Brand, Web: <http://meskerdoor.com>
 1. Acceptable Manufacturer - Curries an ASSA Abloy Company
 2. Acceptable Manufacturer - Steelcraft an Allegion Company
- B. Provide all steel doors and frames from a single SDI certified manufacturer.

2.2 GENERAL

- A. Physical performance: Units shall comply with the 1 million cycles swing test requirement per ANSI A250.4 - Level A.
- B. Finishing:
 1. Prime Gray to meet SDI A250.10

2.3 DOOR FRAMES

- A. General: Construct exterior/interior metal door frames to the following designs and gauges;

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1. Exterior Frames: Zinc-Iron Alloy-Coated galvanized steel (A40) (A60) or Zinc-Coated Galvanized steel (G90) that conforms to ASTM A 653/A653M:
 - a. Thickness:
 - 1) 16 gauge.
 2. Interior Frames in Masonry: Zinc-Iron Alloy-Coated galvanized steel (A40) (A60) or Zinc-Coated Galvanized steel (G90) that conforms to ASTM A 653/A653M:
 - a. Thickness:
 - 1) 16 gauge.
 3. Interior Frames in stud wall construction: cold rolled steel, ASTM A 1008/A 1008M.
 - a. Thickness:
 - 1) 16 gauge.
 4. Interior KD Drywall Frames (Slip-On construction): cold rolled steel, ASTM A 1008/A 1008M.
 - a. Thickness:
 - 1) 16 gauge.
- B. Flush Steel Frames:
1. Basis of Design: Mesker F-Series.
 2. Profile:
 - a. Face:
 - 1) 2 Inches face dimension and types and throat dimensions indicated on the Door Schedule.
 - 2) Custom special face dimension and types and throat dimensions indicated on the Door Schedule.
 - b. Stops:
 - 1) Standard 5/8-inch-high stops
 3. Provide reinforcements and accessories for specified hardware per SDI 250.6.
 4. Anchors: Locate adjustable anchors in each jamb 6 inches from the top of the door opening to hold frame in rigid alignment.
 - a. Exposed fastener type; recessed hole at base of jamb for countersunk fastener installation.
 - b. Snap in base anchors
 - c. Strap anchors welded to frame
 5. Fire Rating: Supply frame units bearing Labels for fire ratings indicated in Door Schedule for the locations indicated.
- C. Steel Frames for Drywall:
1. Basis of Design: Mesker FDJ-Series.
 2. Profile:
 - a. Face:
 - 1) 2 Inches face dimension and types and throat dimensions indicated on the

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- Door Schedule.
- 2) Custom special face dimension and types and throat dimensions indicated on the Door Schedule.
- b. Stops:
 - 1) Standard 5/8-inch-high stops
- 3. Provide reinforcements and accessories for specified hardware per SDI 250.6.
- 4. Anchors: Locate adjustable anchors in each jamb 6 inches from the top of the door opening to hold frame in rigid alignment.
 - a. Exposed fastener type; recessed hole at base of jamb for countersunk fastener installation.
 - b. Snap in base anchors
 - c. Strap anchors welded to frame
- 5. Fire Rating: Supply frame units bearing Labels for fire ratings indicated in Door Schedule for the locations indicated.

2.4 HOLLOW METAL FRAMING SYSTEMS

A. Hollow Metal Framing Systems:

- 1. Basis of Design: Mesker S-Series, M-Series.
- 2. Components: Construct architectural stick frame assemblies of standard frame components, fabricated as specified.
 - a. Exterior Frame Material: Zinc-Iron Alloy-Coated galvanized steel (A40) (A60) or Zinc-Coated Galvanized steel (G90) that conforms to ASTM A 653/A653M, 14 gauge galvanized steel.
 - b. Interior Frames in Masonry: Zinc-Iron Alloy-Coated galvanized steel (A40) (A60) or Zinc-Coated Galvanized steel (G90) that conforms to ASTM A 653/A653M, 16 gauge galvanized steel.
 - c. Interior Frames in stud wall construction: 16 gauge cold rolled steel, ASTM A 1008/A 1008M steel.
 - d. Include galvanized components and internal reinforcements with galvanized frames.
- 3. Frame component requirements:
 - a. Prepare required sticks at door openings and frame assemblies for hardware as specified in Section 087100.
 - b. Fabricate frame assemblies from three basic components:
 - 1) Open Sections (perimeter members) identical in configuration to standard frames.
 - 2) Closed sections (intermediate members) with identical jamb depth, face dimensions, and stops as open sections.
 - 3) Sill sections: To be flush with both faces of adjacent vertical members. Cut individual components to length and notched to assure square joints and corners.
 - c. Externally welded face joints at meeting mullions or between mullions and other frame members on the face surfaces only. Grind and finish face joints smooth.

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- d. Fabricate frame assemblies for shipment to the jobsite completely welded.
 - 1) Field joints permissible only when the size of the total assembly exceeds shipping limitations.
 - 2) Fabricate oversized frames in sections designated for splicing in the field.
 - e. Pierced and dimpled glazing beads for use with manufacturers' standard fasteners.
 - f. Provide necessary anchors for jambs, heads, and sills of assemblies.
 - g. Verify field dimensions as required. Do not begin fabrication until these dimensions have been verified and approved.
4. Accessories:
- a. Glazing Bead: Formed steel sheet; screw-attached.
5. Fire Rating: Provide factory assembled welded units bearing Labels for fire ratings indicated on the Drawings.

2.5 ACCESSORIES

- A. Anchors: Manufacturer's standard framing anchors, specified in manufacturer's printed installation instructions for project conditions.
- B. Astragals for pairs of doors: Manufacturer's standard for labeled and non-labeled openings.
- C. Plaster Guards: Same material as door frame, minimum 24 gauge (0.5 mm) minimum; provide for all strike boxes. Plaster guards not mandatory on interior after set frames.
- D. Silencers: Resilient rubber, Inserted type, three per strike jamb for single openings. Stick-on silencers shall not be permitted except on hollow metal framing systems.
- E. Glazing: Specified in Section 088000.

2.6 FABRICATION

- A. Steel Frames:
 - 1. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.
 - a. Clearances shall comply with the requirements of NFPA 80.
 - 2. Three-piece knock-down frames: Head and jamb intersecting corners die-cut, mitered at 45 degrees, with locking tabs for rigid connection when assembled.
 - 3. Factory-welded frames: Head and jamb intersecting corners mitered at 45 degrees, with back welded joints ground smooth.
 - a. Continuous face weld the joint between the head and jamb faces along their length either internally or externally. Grind, prime paint, and finish smooth face joints with no visible face seams.
 - b. Externally weld, grind, prime paint, and finish smooth face joints at meeting mullions or between mullions and other frame members per a current copy of ANSI/SDI

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A250.8.

4. Provide temporary steel spreaders (welded to the jambs at each rabbet of door openings) on welded frames during shipment. Remove temporary steel spreaders prior to installation of the frame.
- B. Tolerances shall comply with SDI-117 "Manufacturing Tolerances for Standard Steel Doors and Frames."
- C. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold-rolled or hot-rolled steel sheet.
- D. Unless otherwise indicated, provide exposed fasteners with countersunk flat or oval heads for exposed screws and bolts.
- E. Prepare doors and frames to receive mortised and concealed hardware per final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI-107 and ANSI-A115 Series specifications for door and frame preparation for hardware.
- F. Reinforce doors and frames to receive surface-applied hardware per SDI A250.6. Drilling and tapping for surface-applied hardware shall be done at Project site. Provide internal reinforcements for all doors to receive door closers and exit devices where scheduled.
- G. Locate hardware as indicated on Shop Drawings or, if not indicated, per the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2.7 FINISHES

- A. Chemical Treatment: Treat steel surfaces to promote paint adhesion.
- B. Exposed door and frame surfaces to be cleaned and treated then coated with rust inhibitive primer. Water-based primer and color paint finishes to be free of Hazardous Air Pollutants (HAPS) and Volatile Organic Compounds (VOCs). Paint to comply with ANSI A250.3 and A250.10.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that project conditions are acceptable before beginning installation of frames.
 1. Verify that completed openings to receive knock-down wrap-around frames are of correct size and thickness.
 2. Verify that completed concrete or masonry openings to receive butt type frames are of correct size.
- B. Do not begin installation until conditions have been properly prepared.
- C. Correct unacceptable conditions before proceeding with installation.

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3.2 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's printed installation instructions and with Steel Door Institute's recommended erection instructions for steel frames SDI A250.11 and NAAMM/HMMA 840.
- B. DHI – Door and Hardware Institute – Door Security + Safety Professionals – Installation Guide for Doors and Hardware
- C. Fire Doors and Frames: Install in accordance with SDI A 250.11 and NFPA 80.
 - 1. To ensure compliance with Positive Pressure criteria as required by UBC7-2, UL10C, NFPA5000 and all applicable Local, State and National Code Jurisdictions, all Doors and Frames should be checked for accurate installation per Manufacturer’s installation instructions to provide proper fire and Smoke Gasketing as tested and listed.
 - 2. Fit hollow-metal doors accurately in frames, within clearances specified in SDI A 250.11 and SDI 100. Install fire rated doors with clearances specified in NFPA 80.
- D. Comply with provisions of SDI-105, “Recommended Erection Instructions for Steel Door Frames,” unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.
 - 1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
 - 2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors. Use additional anchors as required for height per manufacturers’ installation instructions.
 - 3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices. Use additional anchors as required for height per manufacturers’ installation instructions.
 - 4. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws. Secure Sill Anchors to floor. Use additional anchors as required for height per manufacturers’ installation instructions.
 - 5. Drywall series frames are designed for installation in interior applications after construction of wood or metal stud and drywall applications. Drywall series frames are provided with adjustable jamb lock anchors for secure installation. Install frames per manufacturers’ installation instructions. Adjust anchors and secure sill and baseboard anchors as provided.
- E. Remove temporary steel spreaders prior to installation of frames.
- F. Set frames accurately in position; plumb, align and brace until permanent anchors are set. After wall construction is complete, remove temporary wood spreaders.
 - 1. Field splice only at approved locations indicated on the shop drawings.
 - 2. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.

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- G. Provide full height 3/8 inch (9.5 mm) to 1-1/2 inch (38 mm) thick strip of polystyrene foam blocking at frames requiring grouting. Apply the strip to the back of the frame to facilitate field drilling or tapping.
- H. Grouting Hollow Metal Frames:
 - 1. Provide bituminous coating on interior of grout filled jambs.
 - 2. Provide and install temporary bottom and intermediate wood spreaders to maintain proper width and avoid bowing or deforming of frame members. Refer to ANSI A250.11-2001 and NAAMM/HMMA 840.
 - 3. Comply with ANSI/SDI Standard A250.8, paragraph 4.2.2, and HMMA 820 TN01 Grouting Hollow Metal Frames, whereby grout will be mixed to provide a 4 inch (102 mm) maximum slump consistency and hand troweled into place. Do not use grout mixed to a thinner consistency.
 - 4. Provide a vertical wood brace during grouting of frame at openings over 4 foot (1219 mm) wide, to prevent sagging of frame header.
- I. Glaze and seal exterior transom, sidelight and window frames in accordance with HMMA-820 TN03.
- J. Apply hardware in accordance with hardware manufacturers' instructions and Section 087100 of these Specifications. Install hardware with only factory-provided fasteners. Install silencers. Adjust door installation to provide 1/8" at head and 1/8" at strike and hinge jamb with door undercut to meet fire ratings and floor conditions to achieve maximum operational effectiveness and appearance.

3.3 FIELD QUALITY CONTROL

- A. Fire-Rated Door Assembly Testing:
 - 1. Upon completion of the installation, test each fire door assembly to confirm proper operation of its closing device and verify that it meets all criteria of a fire door assembly per NFPA 80.
 - 2. Perform inspections by individuals with documented knowledge and understanding of the operation components of the type of door being tested per NFPA 80 and NFPA 101.
 - 3. Provide a written record to the Owner with copies available to the Authorities Having Jurisdiction (AHJ).
 - 4. Record shall list the fire door assembly and include the door number with an itemized list of hardware set components for each door opening and location in the facility.

3.4 ADJUST AND CLEAN

- A. Adjust doors for proper operation, free from binding or other defects.
- B. Clean and restore soiled surfaces. Remove scraps and debris and leave site in a clean condition.
- C. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible air-drying primer.

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- D. Properly clean and apply paint to doors and frames in accordance with HMMA-840 TN01 and ANSI A250.8 appendix B along with Manufactures recommended surface preparation for painting.

3.5 PROTECTION

- A. Protect installed products and finished surfaces from damage during construction.

END OF SECTION 081113

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SECTION 081416 – FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Solid-core doors with wood-veneer and plastic-laminate faces.
 2. Factory finishing flush wood doors.
 3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
 2. Indicate dimensions and locations of cutouts.
 3. Indicate requirements for veneer matching.
 4. Indicate doors to be factory finished and finish requirements.
 5. Indicate fire ratings for fire doors.
- C. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
1. Plastic-Laminate Door Faces: Show the full range of colors, textures, and patterns available.
 2. Faces of Factory-Finished Doors: Show the full range of colors available for stained finishes.
- D. Samples for Verification:
1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
 2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.
 3. Corner sections of plastic-laminate-clad doors, approximately 8 by 10 inches (200 by 250 mm), for each color, texture, and pattern selected.

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4. Frames for light openings, **6 inches (150 mm)** long, for each material, type, and finish required.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 1. Test Pressure: Test at atmospheric pressure.
 2. Oversize, Fire-Rated Wood Doors: For door assemblies exceeding sizes of tested assemblies, provide oversize fire door label or certificate of inspection, from a testing and inspecting agency acceptable to authorities having jurisdiction, stating that doors comply with requirements of design, materials, and construction.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Flush Wood Doors:
 - a. Algoma Hardwoods Inc.
 - b. Buell Door Company.
 - c. Chappell Door Co.

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- d. Eagle Plywood & Door Manufacturing, Inc.
- e. Eggers Industries; Architectural Door Division.
- f. Graham Wood Doors
- g. Ideal Wood Products, Inc.
- h. IPIK Door Company.
- i. Lambton Doors.
- j. Oshkosh Architectural Door Co.
- k. VT Industries Inc.
- l. Weyerhaeuser Company.

2.2 DOOR CONSTRUCTION, GENERAL

A. Doors for Transparent Finish:

1. Grade: Premium, with Grade A faces.
2. Species and Cut: Red oak, plain sliced.
3. Match between Veneer Leaves: Book match.
4. Assembly of Veneer Leaves on Door Faces: Running match.
5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
6. Stiles: Applied wood edges of same species as faces and covering edges of crossbands.

2.3 SOLID-CORE DOORS

A. Interior Veneer-Faced Doors:

1. Core: Either glued block or structural composite lumber.
2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

B. Fire-Rated Doors:

1. Construction: Construction and core specified above for type of face indicated or manufacturer's standard mineral-core construction as needed to provide fire rating indicated.
2. Blocking: For mineral-core doors, provide composite blocking with improved screw-holding capability approved for use in doors of fire ratings indicated as follows:
 - a. **5-inch (125-mm)** top-rail blocking.
 - b. **5-inch (125-mm)** bottom-rail blocking, in doors indicated to have protection plates.
 - c. **5-inch (125-mm)** midrail blocking, in doors indicated to have armor plates.
 - d. **4-1/2-by-10-inch (114-by-250-mm)** lock blocks, in doors indicated to have exit devices.
3. Edge Construction: At hinge stiles, provide manufacturer's standard laminated-edge construction with improved screw-holding capability and split resistance and with outer stile matching face veneer.

2.4 LOUVERS AND LIGHT FRAMES

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- A. Wood Beads for Light Openings in Wood Doors:
 - 1. Wood Species: Same species as door faces.
 - 2. Profile: Flush rectangular beads.
 - 3. At 20-minute, fire-rated, wood-core doors, provide wood beads and metal glazing clips approved for such use.
- B. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
 - 1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 - 1. Fabricate door and transom panels with full-width, solid-lumber, **rabbeted**, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

- A. General: Comply with AWT's "Architectural Woodwork Quality Standards Illustrated" for factory finishing.
- B. Finish doors at factory.

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- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI System TR-6 catalyzed polyurethane.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Effect: Semifilled finish.
 - 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Re-hang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

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SECTION 083000 – SPECIALTY DOORS & FRAMES – FIBERGLASS CONSTRUCTION

PART 1 - GENERAL

1.1 SCOPE AND DEFINITIONS

- A. Furnish and install doors, frames of FRP composite construction in accordance with details and schedule shown on the project drawings and as specified herein. Door and frame products of aluminum, steel or wood constructions that use FRP face sheets are strictly excluded.
- B. FRP is defined as “Fiberglass Reinforced Polyester”.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

- 1. American Society for Testing and Materials (ASTM).
- 2. Society of Automotive Engineers (SAE).
- 3. International Building Code, Plastics (Chapter 26).
- 4. ANSI A250.4 1,000,000 cycle test.

- B. Manufacturer: Company specializing in the manufacture of FRP doors and frames with a minimum of five years documented experience. All doors and frames shall be manufactured by Tiger Door LLC, 1802 Izard Street, Omaha, NE 58102, Phone: (888) 891-4416, Fax: (402) 346-0561.

- C. Referenced Standard: Where “labeled fire doors are required, Fiberglass Doors and Frames shall be UL listed and shall be tested successfully to UL10B / UL10C, UBC 7-2 standards.

- D. Process: Certify that FRP doors are manufactured via press-molding technology.

- E. Warranty: Provide written limited guarantee for FRP doors and frames as follows:

- 1. Non-fire labeled doors: Doors are guaranteed for the life of the product against delamination and failure due to corrosion from the specific chemical environments named at the time of purchase. Tiger Doors are also guaranteed for the life of the product to meet the door industry standards for flatness. Furthermore, all products are inspected prior to shipment and guaranteed against defective workmanship for a period of ten (10) calendar years after the date of purchase.
- 2. Labeled fire rated doors: Fire doors are guaranteed for 10 years against delamination.
- 3. Fiberglass door frames and windows: Fiberglass frames and windows, welded corners and chemically bonded hinge reinforcements are guaranteed for the life of the product against failure due to corrosion from the specific chemical environment named at the time of purchase. Furthermore, all products are inspected prior to shipment and guaranteed against defective workmanship for a period of ten (10) calendar years after the date of purchase.

1.3 SUBMITTALS

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- A. Product Data: Provide catalog cut of FRP door detailing internal construction and reinforcements, materials used and description of molding process.
 - B. Shop Drawings: To include the following specific information:
 - 1. Specifications relating to FRP door thickness, resin type, core material, method of construction, finish color, type of glass and glazing, anchor systems, joint construction and complete warranty information.
 - 2. Complete schedules or drawings of FRP doors and frames (and associated Builders Hardware) showing identifying mark numbers, door and frame types, typical elevations, nominal sizes, handing, actual dimensions and clearances, and required hardware preps and reinforcements.
 - 3. Supporting reference drawings pertaining to frame mounting details, door light or louver installation, hardware locations, and factory hardware cutouts and reinforcements.
 - C. Color Samples: Provide a complete set of available finish colors from the manufacturer for color selection upon request.
 - D. Installation instructions: Include manufacturer’s specific information describing procedures, sequence and required fasteners for frame and door installation.
 - E. Production of FRP doors and frames shall not proceed until final approval of submittals.
- 1.4 DELIVERY, STORAGE, AND HANDLING
- A. FRP doors and frames are to be delivered to job site in boxes with foam sheet separations.
 - B. Upon receipt of shipment, remove and inspect the doors and frames for damage.
 - C. Doors be stored indoors in a vertical position, clear of the floor, with blocking between the doors to permit air circulation between the doors and prevent damage to the door faces. Rain/water or condensation must not be allowed to collect or lay between stored doors. Do not wrap in plastic sheeting as it will promote condensation formation within. Permanent discoloration can result.
 - D. Use care in handling FRP doors and frames to prevent damage to factory finishes. Wear protective gloves and do not slide or drag doors or frames against one another.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. MFRP Doors and Frames shall be as manufactured by:
 - 1. Tiger Door LLC, Izard Street, Omaha, NE 68102, Phone: (888) 891-4416; Fax: (402) 346-0561; www.tigerdoor.com.
 - 2. Chem-Pruf Door Co. Limited, P.O. Box 4560, Brownsville, TX 78523, Phone: (800) 444-6942; Fax: (956) 544-7943; www.chem-pruf.com.

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3. Fib-R-Dor, a division of Advance Fiberglass, LLC, 8000 Counts Massie Rd., North Little Rock, AR 72113, Phone: (800) 342-7367; Fax: (501) 758-9496; www.fibrdor.com.
4. Special-Lite AF-100 FRP doors and AF-250 FRP frames.

2.2 FRP DOORS

A. Heavy Duty non-fire rated FRP Doors.

1. Design: FRP doors shall be of seamless press-molded construction. Laminated FRP face sheets shall be applied while wet and uncured to an internal door stile and rail subframe/core assembly and then press-molded under heat and pressure. The composite door panel must be integrally fused over its entire surface area, not just adhesive-bonded at perimeter stiles and rails. Doors shall remain under pressure during curing for flat, warp-free surfaces.
2. Stiles & Railes: A high-modulus pultruded FRP square or rectangular tube subframe is to be provided within the door. Tubes are to be mitered and joined internally at the corners with solid polymer blocks to yield a one-piece unit that does not require any secondary external sealing. Provide a tubular midrail across width of door at lock height, and additional horizontal rails where specific design conditions dictate. Doors shall incorporate molded-in FRP edge strips, chemically bonded to the subframe stiles, for machining of hardware mortises so as not to cut or otherwise compromise the integrity of the pultruded stiles, nor allow moisture to penetrate into the core of the door. All connections shall be chemically welded. No mechanical fasteners will be allowed. The use or inclusion of aluminum, steel, gypsum or wood into stile and rail construction is not permitted.
3. Core: For maximum rigidity and compressive strength either a triangular shaped 3/8" cell phenolic resin impregnated Kraft paper honeycomb or a plastic honeycomb with face scrim core shall be used. Molding pressure and resin gel time shall be sufficient to allow for penetration of resin into the cellular structure of the core to maximize shear and peel strengths at the skin/core interface and eliminate the possibility of delamination. The honeycomb is to be completely enclosed within the stile and rail subframe. Use of foam or balsa wood is not permitted.
4. Internal Reinforcement: High-modulus pultruded tubular FRP, high-density polymer compression blocks, or plastic compression blocking at all hardware locations, and corner locations. No wood blocking, steel or aluminum reinforcing plates, ribs or fittings shall be used. A minimum of 900 lbs. of pullout strength is required for each factory supplied hinge screw.
5. Faces: Door facings shall utilize a chemical resistant thermosetting polyester resin system with fiber reinforcing layers. Supplier shall furnish door faces as shown on the drawings and in the door elevations. Chopped strand mat layers shall be used to provide bond integrity between gelcoat, laminated facings and the internal door structure. Structural reinforcement shall be in the form of a knitted multi-layer material with layers of uni-directional glass fiber oriented in both the vertical and horizontal directions for high stiffness, impact resistance and resistance to warping.
6. Finish: The exposed FRP door faces must have an integrally molded 25/30 mils thick (wet) ultra-violet light stabilized marine grade NPG-isophthalic polyester gelcoat or an industrial urethane chemical coating color topcoat. Facings shall have a slightly textured semi-gloss finish to minimize the visual effects of wear and tear. Door face color shall

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- be selected from the manufacturer's available colors. Gelcoat may not be sprayed onto the door face as a secondary coating.
7. Astragals: All pairs of doors shall be furnished with an astragal from door manufacturer made of same pultruded FRP material as door stile rail and edge as required. Astragal shall be located on the meeting stile edge of each inactive leaf of double door pairs. Architect shall advise active leaf of door, and astragal shall be installed to cover meeting stile gap to effect seal and security.
 8. Lights: Glass per job specification shall be factory furnished, glazed and installed. Standard glass thickness is 1/4". Centered glazing shall be installed between 45 degree pultruded FRP glazing stops and vinyl foam tape with concealed compression retainers for 1/4" glazing. No exposed fasteners or exposed silicone will be allowed for securing 1/4" glazing. Stainless steel screws may be allowed for other glazing thicknesses. Offset glazing shall be installed against a molded-in 5/8" wide exterior face flange with a bed of tape caulk, square 5/8" pultruded glazing stops with stainless steel screws shall complete the installation to secure the glazing in place and cover all unsightly caulking. Double flush 1/4" glazing shall be installed with vinyl foam tape and silicone sealant at all edges to complete flush appearance. All glazing stop material shall be pultruded FRP with a minimum fiberglass content of 50%. Metal, PVC, or vinyl "Glass Kit" type lights are not acceptable for non-fire rated openings.
 9. Louvers: Fiberglass inverted V blade privacy or flat blade louvers shall be factory furnished and installed. All louvers and louver trim shall be manufactured exclusively from pultruded FRP profiles with a minimum fiberglass content of 50%. All louvers shall be coated to match door in color and sheen. Inverted V blade minimum thickness shall be 3/32" thick, flat blade louver minimum thickness shall be 3/16" thick. Adhesives for louver assembly shall meet or exceed all requirements set forth in Section 2.5.1 Mechanical Properties and test performance. Metal, PVC, vinyl or other non-fiberglass louvers are not acceptable for non-fire rated openings.
 10. Provisions for lights and louvers shall be performed during manufacture and shall not be attempted in the field. Cutouts are to be totally enclosed by pultruded FRP stiles and rails incorporated into the door structure. Light and louver cutouts that expose core material are not acceptable.

B. Fire rated FRP Doors:

1. Design: FRP doors shall be of seamless press-molded construction. Laminated FRP face sheets shall be applied while wet and uncured to an internal door stile and rail sub-frame/core assembly and then press-molded under heat and pressure. The composite door panel must be integrally fused over its entire surface area, not just adhesive-bonded at perimeter stiles and rails. Doors shall remain under pressure during curing for flat, warp-free surfaces.
2. Core: For maximum rigidity and compressive strength a fire-resistant mineral core shall be used. Molding pressure and resin gel time shall be sufficient to allow for penetration of resin into the cellular structure of the core to maximize shear and peel strengths at the skin/core interface and reduce the possibility of delamination. The mineral core is to be completely enclosed within the intumescent and FRP laminated edge perimeter.
3. Intumescent: Only Category A type door construction is permitted. All intumescents shall be molded into the door structure with a minimum of 1/8" thick perimeter FRP edge banding (prior to machining). Category B type door construction, with post applied and/or exposed edge intumescent components or products are not acceptable.
4. Faces: Door facings shall be 0.120" composite FRP sheet exterior grade, fiber reinforced plastic panel on interior and exterior faces. Colored pigment shall be maximum amount

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formulated with the resin. FRP face sheets shall be USDA acceptable, non-porous, with a maximum flame spread rating of 200, and smoke generated maximum of 450 degrees meeting Class C requirements per ASTM E84.

5. Finish: The exposed FRP door faces shall have a 3-4 mils (wet) factory applied two-part aliphatic polyurethane fully cured coating of industrial urethane. Coating shall have a minimum hardness of H to 2H. Finish shall be a slightly textured semi-gloss to minimize the visual effects of wear and tear.
6. Astragals: Provide a heavy pultruded FRP angle astragal on the meeting stile edge of each inactive leaf of double door pairs.
7. Lights: Provision for door lights shall be performed during manufacture and shall not be attempted in the field. Cutouts are to be totally enclosed by internal high-density fire-resistant mineral core composite blocks incorporated into door subframe prior to press-molding and machining, the opening is completely fused to both door skins. Vision frames shall be a commercially available UL fire rated kit. Maximum glass size shall not exceed 1296 in² for up to a 90-minute application.
8. Louvers: Provision for door louvers shall be performed during manufacture and shall not be attempted in the field. Cutouts are to be totally enclosed by internal high-density fire-resistant mineral core composite blocks incorporated into door subframe prior to press-molding and machining, the opening is completely fused to both door skins. Door louvers shall be a commercially available UL fire rated kit. Maximum louver size shall not exceed 24" x 24" for up to a 90-minute application.
9. Size limitations: The maximum double door jamb opening size shall not exceed nominal 8'-0" x 8'-0" with a Maximum single door panel size not to exceed nominal 4'-0" x 8'-0".

2.3 FRP FRAMES

A. Non-fire rated FRP Frames:

1. Design: FRP Door frames furnished under this specification shall utilize a high-modulus pultruded structural FRP shape. The frame section shall be standard double rabbeted, depth as detailed x 2" face, 3/16" thick, with integral 5/8" doorstop with 1 15/16" soffits, to match typical hollow metal configurations with 4" Head Members.
2. Corner Joints: One piece frames shall be factory joined at corners via miter connections then chemically welded with FRP material and ground visibly smooth at frame face. Mechanical joints will not be accepted in lieu of welded frames if specified.
3. Hardware Reinforcements: FRP reinforcing shall be chemically welded to door frame material at required locations. Minimum screw pullout strength of 1100 lb. per #12 x 1" sheet metal screw is required. Mechanically fastened reinforcements are not permitted.
4. Anchors:
 - a. BOLT-IN: Provide manufacturer's required number of 3/8" diameter x 4" long flat head stainless steel sleeve anchors for masonry openings, 3/8" diameter x 4" machine screw with nut and washers for structural steel openings, #14 x 4" stainless steel flat head sheet metal screws for wood or steel stud openings. Include extra anchors for additional frame height in two foot increments above 8'-0". Provide single bolt anchor at center of all headers over four feet in nominal width. Stainless Steel bolts shall be furnished by the factory.
5. Finish: Frames shall have a factory applied industrial urethane chemical coating color topcoat, to match the color and sheen of the doors, for superior weatherability. Gelcoat may not be sprayed onto the frame as a secondary coating.

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B. Fire Rated Frames:

1. Design: Fire rated FRP Door frames furnished under this specification shall utilize a high-modulus pultruded structural FRP shape. Standard frame profile is a double rabbeted 5 3/4" depth x 2" face, 3/16" thick, with integral 5/8" doorstop. The minimum frame section shall be limited to a 4" jamb depth, 1" face. Four inch header and expanded profiles are acceptable. Frame cavities shall be filled with a proprietary fire resistant composite formulation. Hollow metal or Stainless Steel frames are not acceptable.
2. Intumescent: All intumescent material shall be internal to the door structure. Post applied or exposed intumescent components or products are not acceptable.
3. Corner Joints: Jambs and header shall be joined at corners via miter connections with hidden stainless steel flat head screws. Corner screws shall not be visible on interior or exterior frame faces.
4. Anchors: Grout-In: Provide manufacturer's required number of wire or strap type masonry anchors for installation into block wall. Fill frame cavity with grout.
5. Finish: Frames shall have a 3-4 mils (wet) factory applied two-part aliphatic polyurethane fully cured coating of industrial urethane. Industrial urethane chemical coating color topcoat, to match the color and sheen of the doors, for superior weatherability. Gelcoat may not be sprayed onto the frame as a secondary coating.

2.5.1 MECHANICAL PROPERTIES AND TEST PERFORMANCE

A. Pultruded structural shapes for stiles; rails, frames, and astragals shall exhibit the following minimum longitudinal coupon properties (per ASTM):

1. Tensile strength (D638) 30,000 psi
2. Comprehensive strength (D695) 30,000 psi
3. Flexural strength (D790) 30,000 psi
4. Flexural modulus (D790) 1,600,000 psi
5. Shear strength (D2846) 4,500 psi
6. Impact, notched (D256) 25 ft-lb/in
7. Barcol hardness (D2852) 50
8. Fire Resistance (E-84) Class I

B. Core material shall exhibit the following minimum coupon properties (per ASTM):

1. Core material must comply with the International Building Code (IBC) chapter 26 requirements for use with a plastic skin.
2. Shear strength, longitudinal direction (C273) 68.2 psi
3. Shear strength, transverse direction (C273) 25.8 psi
4. Shear modulus, longitudinal direction (C273) 6940 psi
5. Shear modulus, transverse direction (C273) 1878 psi
6. Shear elongation, longitudinal direction (C393 short beam) 1.79%
7. Shear elongation, transverse direction (C393 short beam) 2.72%
8. Maximum facing stress, longitudinal direction (C393 short beam) 735 psi
9. Maximum facing stress, transverse direction (C393 short beam) 289 psi
10. Maximum core shear stress, longitudinal direction (C393 short beam) 63.8 psi
11. Maximum core shear stress, transverse direction (C393 short beam) 24.9 psi

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12. Modulus of elasticity (EI) per 1” width, longitudinal direction (C393 short beam) 4.92E+04 psi
13. Modulus of elasticity (EI) per 1” width, transverse direction (C393 short beam) 1.97E+04 psi
14. Maximum facing stress, longitudinal direction (C393 long beam) 9011 psi
15. Maximum facing stress, transverse direction (C393 long beam) 4727 psi
16. Maximum core shear stress, longitudinal direction (C393 long beam) 48.3 psi
17. Maximum core shear stress, transverse direction (C393 long beam) 23.5 psi
18. Modulus of elasticity (EI) per 1” width, longitudinal direction (C393 long beam) 1.14E+05 psi
19. Modulus of elasticity (EI) per 1” width, transverse direction (C393 long beam) 7.23E+05 psi
20. Stiffness “D”, longitudinal direction (C393 long beam) 379,270 psi
21. Stiffness “D”, longitudinal direction (C393 long beam) 260,608 psi
22. Compressive strength (C365) 53 psi
23. Compressive modulus (C365) 2110 psi
24. Density (C271) 2.42 lb/ft³

C. Adhesive shall exhibit the following minimum coupon properties (per SAE)

1. Tensile Strength (D882-83A modified) minimum 2000 psi
2. 8 day 25°C at 100% humidity Cross Peel (SAE J1553) minimum 330 psi
3. 7 day immersion in seawater Cross Peel (SAE J1553) minimum 330 psi
4. 30 day immersion in saltwater Cross Peel (SAE J1553) minimum 330 psi
5. 72 hour immersion in gasoline Cross Peel (SAE J1553) minimum 330 psi
6. 72 hour immersion in 20% sulfuric acid Cross Peel (SAE J1553) minimum 300 psi

D. ANSI A250.4 1,000,000 cycle test

1. 4’ x 8’ door (up to a full light) and frame successfully tested in excess of 1,000,000 cycles with no failure of any of the design features of the door or frame.

2.5.2 FASTENERS

- A. All fasteners for all hardware shall be type 304 CRSS (18-8 series corrosion resistant stainless steel) with no exception. No carbon steel or aluminum components shall be used.

2.5.3 HARDWARE

- A. Doors shall be factory mortised and drilled for mortise template butt hinges, with #12x2” long stainless steel screws pre-installed for hinge attachment. Provide and install hardware as listed in other section(s). If manufacturer’s standard screws do not comply, supplier shall furnish suggested screw size and type in 301 CRSS (18-8SS).
- B. Frames shall be factory machined and drilled for all hardware requiring mortises, with #12x1” long stainless steel screws pre-installed for hinge attachment.
- C. Doors shall be factory prepared for all hardware scheduled in section 087100 or as so designated in appropriate section, and shall be coordinated by contractor and installed by experienced mechanics.

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- D. Contractor shall furnish manufacturer's standard templates, installation instructions, or full size approved door and frame preparation instructions as approved by the architect and as required by door and frame manufacturer prior to door and frame factory initiated manufacture. Standard factory lead-time for production of FRP doors and frames shall commence only and when all distributor required preparation information is received and acknowledged by the door and frame manufacturer.

PART 3 – EXECUTION

3.1 IDENTIFICATION

- A. Factory mark all doors and frames using a chemical resistant plastic tag or indelible marker with identifying number, keyed to shop drawings, prior to shipment.

3.2.1 INSTALLATION

- A. Frames: Install in strict accordance with manufacturer's printed instructions. Set plumb and square, using shims for bolt-in of existing openings, or wood bracing prior to grouting of jambs. Use at least two 2x6 wood spreaders inside frame to maintain critical opening dimensions during grouting.
- B. Doors: Hang per manufacturer's printed instructions using special screws provided for hinge attachment. Install doors to swing freely and to stand open at any angle. After installation make final adjustments to hardware to allow for proper door operation and latching. All surface applied hardware shall be thru bolted.

3.3 CLEANING

- A. Clean exposed surfaces of FRP doors and frames with a mild, non-abrasive cleaner and water.
- B. Only chemical cleaning solution as recommended and available from manufacturer shall be used to assure neither finish nor door and frame properties are contaminated, nor compromised. Upon cleaner purchase, door manufacturer shall provide one package of TigerCare® directly to owner's representative and instruct owner's personnel in maintenance procedures.

END OF SECTION 083000

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SECTION 083113 – ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and frames.
2. Access door shown on drawings high on wall in Storage C112.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details material descriptions, dimensions of individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Exposed Flanges:

1. Manufacturers: Selected product is Milcor Architectural Grade Style “M” Steel Model 36” x 36” with one camlock top and bottom on opposite side from hinges. Comparable products by the following manufacturers may be submitted for approval.
 - a. ACUDOR Products, Inc.
 - b. J. L. Industries, Inc.; Activar Construction Products Group, Inc.
 - c. Larsen's Manufacturing Company.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

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SECTION 084113 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum-framed storefront systems.
2. Aluminum-framed entrance door systems.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **Project site** among Construction Superintendent, Architect, and foreman of installer.

1. **<Insert requirements>**.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
4. Include point-to-point wiring diagrams showing the following:
 - a. Power requirements for each electrically operated door hardware.

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- b. Location and types of switches, signal device, conduit sizes, and number and size of wires.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- E. Delegated Design Submittal: For aluminum-framed entrances and storefronts including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.

1.6 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.
 - 1. Build mockup of one typical classroom window.
 - 2. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing **spandrel panels, venting windows** and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.

- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.

- C. Structural Loads:

1. Wind Loads: 140 MPH.

- D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:

1. Deflection Normal to Wall Plane: Limited to **1/175 of clear span for spans of up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m).**
2. Deflection Parallel to Glazing Plane: Limited to **amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch (3.2 mm).**

- E. Structural: Test according to ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.

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2. When tested at **150** percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding **0.2** percent of span.
 3. Test Durations: As required by design wind velocity, but not less than **10** seconds.
- F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than **10 lbf/sq. ft. (480 Pa)**.
- G. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone **3** for protection.
1. Large-Missile Test: For glazing located within **30 feet (9.1 m)** of grade.
- H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
1. Temperature Change: **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

2.3 STOREFRONT SYSTEMS

- A. Manufacturers: Product specified is YKK, YHS 50 TU. Products of the following manufacturers are approved:
1. EFCO Corporation.
 2. Kawneer Company, Inc.; Arconic Corporation.
 3. OldCastle BuildingEnvelope (OBE).
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Exterior Framing Construction: **Thermally broken.**
 2. Glazing System: **Retained mechanically with gaskets on four sides.**
 3. Glazing Plane: **Front.**
 4. Finish: **Clear anodic finish.**
 5. Fabrication Method: Field-fabricated stick system.
 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 7. Steel Reinforcement: As required by manufacturer.
- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

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- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.
 - 1. Door Construction: **1-3/4-inch (44.5-mm) overall thickness, with minimum 2-inch (50.8-mm) thick**, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated, and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: **Wide stile; 5-inch (127-mm) nominal width.**
 - 3. Glazing Stops and Gaskets: Snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.
 - 4. Finish: Match adjacent storefront framing finish.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in **Section 087100 "Door Hardware."**

2.6 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."

2.7 MATERIALS

- A. Sheet and Plate: **ASTM B209 (ASTM B209M).**
- B. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B221 (ASTM B221M).**
- C. Structural Profiles: ASTM B308/B308M.
- D. Steel Reinforcement:
 - 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and

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pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.8 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding fasteners, and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, **finished to match framing system, fabricated from 300 series stainless steel.**
- B. Anchors: Three-way adjustable anchors with minimum adjustment of **1 inch (25.4 mm)** that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
- C. Concealed Flashing: **Manufacturer's standard corrosion-resistant, non-staining, nonbleeding flashing compatible with adjacent materials.**
- D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for **30-mil (0.762-mm)** thickness per coat.
- E. Rigid PVC filler.

2.9 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from **interior.**
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

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- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At interior and exterior doors, provide compression weather stripping at fixed stops.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.10 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, **AA-M12C22A41, Class I, 0.018 mm.**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.
- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Seal perimeter and other joints watertight unless otherwise indicated.
- G. Metal Protection:

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1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.
- I. Install joint filler behind sealant as recommended by sealant manufacturer.
- J. Install components plumb and true in alignment with established lines and grades.
- 3.3 INSTALLATION OF GLAZING
- A. Install glazing as specified in Section 088000 "Glazing."
- 3.4 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS
- A. Install entrance doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- 3.5 ERECTION TOLERANCES
- A. Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
 2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
 - c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
 4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

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3.6 FIELD QUALITY CONTROL

- A. Testing Agency: **Owner will engage** a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on **representative areas of aluminum-framed entrances and storefronts**.
 - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
 - 2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than **0.09 cfm/sq. ft. (0.45 L/s per sq. m)** at a static-air-pressure differential of **1.57 lbf/sq. ft. (75 Pa)**.
 - 3. Water Penetration: ASTM E1105 at a minimum **uniform and cyclic** static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. (300 Pa) and shall not evidence water penetration.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 084113

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SECTION 084413 – GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glazed aluminum curtain wall systems:
 - a. Conventionally glazed.

B. Related Requirements:

1. Section 088000 "Glazing" for curtain wall glazing.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **Project site** among General Contractor's Superintendent; Curtain Wall Contractors Superintendent and Architect's representative.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes, and statement that glazed system meets requirements of Wind-Borne-Debris impact test; large-missile test.

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each type of vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

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- C. Delegated-Design Submittal: For glazed aluminum curtain walls, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
- B. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
 - 1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- C. Product Test Reports: For glazed aluminum curtain walls, for tests performed by **[manufacturer and witnessed by a qualified testing agency] [a qualified testing agency]**.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AGM) contractors.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Testing shall be performed on mockups in accordance with requirements in "Field Quality Control" Article.

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3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 1. Glazed aluminum curtain walls shall withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
 1. Wind Loads: As indicated on Drawing S001.
 2. Other Design Loads: **As indicated on Drawings.**
- D. Deflection of Framing Members Supporting Glass: At design wind load, as follows:
 1. Deflection Normal to Wall Plane: Limited to **1/175 of clear span for spans of up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans of greater than 13 feet 6 inches (4.1 m)]**
 2. Deflection Parallel to Glazing Plane: Limited to **amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch (3.2 mm).**
- E. Structural: Test in accordance with ASTM E330/E330M as follows:
 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.

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2. When tested at **150** percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding **0.2** percent of span.
 3. Test Durations: As required by design wind velocity, but not less than **10** seconds.
- F. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than **15 lbf/sq. ft. (720 Pa)**.
- G. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined in accordance with **ASCE/SEI 7**.
- H. Energy Performance: Certified and labelled by manufacturer for energy performance. Furnish information below as part of informational submittal:
1. Thermal Transmittance (U-factor).
 2. Solar Heat Gain Coefficient (SHGC).
 3. Air Leakage.
 4. Condensation Resistance Factor (CRF).
- I. Windborne-Debris Impact Resistance: Pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone **3** shown on Drawing S001.
1. Large-Missile Test: For glazing located within **30 feet (9.1 m)** of grade.
- J. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of **180 deg F (82 deg C)**.
 - b. Low Exterior Ambient-Air Temperature: **0 deg F (minus 18 deg C)**.

2.2 SOURCE LIMITATIONS

- A. Obtain all components of curtain-wall system **and storefront system**, including framing **entrances** and accessories, from single manufacturer.

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2.3 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

- A. Specified system is YKK-YHC 300 OG. Comparable systems by EFCO Corporation and Oldcastle Building Envelope are approved.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: **Thermally broken.**
 - 2. Glazing System: **Retained mechanically with gaskets on four sides.**
 - 3. Glazing Plane: **Front.**
 - 4. Finish: **Clear anodic finish.**
 - 5. System: **Either stick or unitized system.**
 - 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 7. Steel Reinforcement: As required by manufacturer.
- C. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
 - 1. Include snap-on aluminum trim that conceals fasteners.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Entrance Door Systems: Comply with **Section 084113 "Aluminum-Framed Entrances and Storefronts"**.

2.4 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: ASTM C509 or ASTM C864. **Manufacturer's standard.**
 - 1. Color: **Black.**
- C. Glazing Sealants: **As recommended by manufacturer.**

2.5 MATERIALS

- A. Sheet and Plate: **ASTM B209 (ASTM B209M).**
- B. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B221 (ASTM B221M).**
- C. Structural Profiles: ASTM B308/B308M.
- D. Steel Reinforcement:
 - 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.

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3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

- E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of **1 inch (25.4 mm)** that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.
- C. Concealed Flashing: **Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.**
- D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for **30-mil (0.762-mm)** thickness per coat.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Physical and thermal isolation of glazing from framing members.
 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 5. Provisions for field replacement of glazing from **exterior**.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 7. Components curved to indicated radii.

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- D. Fabricate components to resist water penetration as follows:
 - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- E. Curtain-Wall Framing: Fabricate components for assembly using **manufacturer's standard assembly method**.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, **AA-M12C22A41, Class I, 0.018 mm** or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.
- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
- G. Seal joints watertight unless otherwise indicated.
- H. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

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- I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

- A. Install glazing as specified in Section 088000 "Glazing."

3.4 ERECTION TOLERANCES

- A. Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 - 1. Plumb: **1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).**
 - 2. Level: **1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).**
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to **1/2 inch (12.7 mm)** wide, limit offset from true alignment to **1/16 inch (1.6 mm).**
 - b. Where surfaces are separated by reveal or protruding element from **1/2 to 1 inch (12.7 to 25.4 mm)** wide, limit offset from true alignment to **1/8 inch (3.2 mm).**
 - c. Where surfaces are separated by reveal or protruding element of **1 inch (25.4 mm)** wide or more, limit offset from true alignment to **1/4 inch (6 mm).**
 - 4. Location: Limit variation from plane to **1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm)** over total length.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: **Owner will engage** a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on [**representative areas of glazed aluminum curtain walls**] [**mockups**] <Insert requirements>.
 - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
 - a. Perform a minimum of **three** tests in areas as directed by Architect.
 - b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to **35 and 70 percent completion.**
- C. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.

END OF SECTION 084413

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SECTION 087100 – DOOR HARDWARE

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Hardware for wood, aluminum, hollow metal doors.
- B. Hardware for fire-rated doors.
- C. Lock cylinders for doors with balance of hardware specified in other sections.
- D. Thresholds.
- E. Weatherstripping and gasketing.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.
- C. BHMA A156.1 - Standard for Butts and Hinges 2021.
- D. BHMA A156.2 - Bored and Preassembled Locks and Latches 2017.
- E. BHMA A156.3 - Exit Devices 2020.
- F. BHMA A156.4 - Door Controls - Closers 2019.
- G. BHMA A156.5 - Cylinders and Input Devices for Locks 2020.
- H. BHMA A156.6 - Standard for Architectural Door Trim 2021.
- I. BHMA A156.7 - Template Hinge Dimensions 2016.
- J. BHMA A156.16 - Auxiliary Hardware 2018.
- K. BHMA A156.18 - Materials and Finishes 2020.
- L. BHMA A156.21 - Thresholds 2019.
- M. BHMA A156.22 - Standard for Gasketing 2021.

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- N. BHMA A156.26 - Standard for Continuous Hinges 2021.
- O. BHMA A156.28 - Recommended Practices For Mechanical Keying Systems 2018.
- P. BHMA A156.36 - Auxiliary Locks 2020.
- Q. BHMA A156.115 - Hardware Preparation In Steel Doors And Steel Frames 2016.
- R. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames 2006.
- S. DHI (H&S) - Sequence and Format for the Hardware Schedule 2019.
- T. DHI (KSN) - Keying Systems and Nomenclature 2019.
- U. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames 2004.
- V. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors 1993. Also in WDHS-1/WDHS-5 Series, 1996.
- W. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- X. ITS (DIR) - Directory of Listed Products current edition.
- Y. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- Z. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- AA. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
- BB. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- CC. UL (DIR) - Online Certifications Directory Current Edition.
- DD. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- EE. UL 294 - Access Control System Units Current Edition, 6TH Edition.
- FF. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.

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- B. Sequence installation to ensure facility services connections are achieved in an orderly and expeditious manner.
- C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work of this section; require attendance by affected installers and the following:
 - 1. Architect.
 - 2. Installer's Architectural Hardware Consultant (AHC).
 - 3. Hardware Installer.
 - 4. Owner's Security Consultant.
- D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- E. Keying Requirements Meeting:
 - 1. Architect will schedule meeting at project site prior to Contractor occupancy.
 - 2. Attendance Required:
 - a. Architect.
 - b. Installer's Architectural Hardware Consultant (AHC).
 - 3. Agenda:
 - a. Establish keying requirements.
 - b. Verify locksets and locking hardware are functionally correct for project requirements.
 - c. Verify that keying and programming complies with project requirements.
 - d. Establish keying submittal schedule and update requirements.
 - 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
 - 6. Deliver established keying requirements to manufacturers.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: A detailed listing that includes each item of hardware to be installed on each door.
 - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 - 2. Comply with DHI (H&S) using door numbering scheme and hardware set numbers as indicated in Contract Documents.
 - a. Submit in vertical format.

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3. Include complete description for each door listed.
- D. Shop Drawings - Electrified Door Hardware: Include diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
 2. Elevations: Include front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
 3. Diagrams: Include point-to-point wiring diagrams that show each device in door opening system with related colored wire connections to each device.
- E. Samples for Verification (If requested by Architect):
1. Submit minimum size of 2 by 4 inch (51 by 102 mm) for sheet samples, and minimum length of 4 inch (102 mm) for other products.
 2. Submit one (1) sample of hinge, latch set, lockset, and closer illustrating style, color, and finish.
 3. Include product description with samples.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.
- I. Supplier's qualification statement.
- J. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- K. Keying Schedule:
1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- L. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- M. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- N. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.

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1.05 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.
- D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.
 - 1. Closers: 25 years, minimum.
 - 2. Exit Devices: Three years, minimum.
 - 3. Locksets and Cylinders: Three years, minimum.

PART 2 – PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Locks: Provide a lock for each door, unless it's indicated that lock is not required.
 - 1. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's Series. As indicated in hardware sets.
 - 2. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.
 - 3. Strikes:
 - a. Finish: To match lock or latch.

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- b. Curved-Lip Strikes: Provide as standard, with extended lip to protect frame, unless otherwise indicated.
 - c. Center Strike At Pairs of Doors: 7/8 inch (22.2 mm) lip.
- D. Door Pulls and Push Plates:
 - 1. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
- E. Closers:
 - 1. Provide door closer on each exterior door, unless otherwise indicated.
 - 2. Provide door closer on each fire-rated and smoke-rated door.
 - 3. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.
- F. Overhead Stops and Holders (Door Checks):
 - 1. Provide stop for every swinging door, unless otherwise indicated.
 - 2. Overhead Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop, unless otherwise indicated.
 - 3. Overhead stop is not required if a floor or wall stop has been specified for the door.
- G. Drip Guards: Provide at head of out swinging exterior doors unless protected by roof or canopy directly overhead.
- H. Weatherstripping and Gasketing:
 - 1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
 - 2. Provide door bottom sweep as indicated in hardware set, unless otherwise indicated.
- I. Fasteners:
 - 1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - a. Aluminum fasteners are not permitted.
 - b. Provide Phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
 - 2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.
 - a. Self-drilling (Tek) type screws are not permitted.
 - 3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
 - 4. Provide wall grip inserts for hollow wall construction.
 - 5. Fire-Resistance-Rated Applications: Comply with NFPA 80.
 - a. Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - b. Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

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2.02 PERFORMANCE REQUIREMENTS

- A. Provide door hardware products that comply with the following requirements:
1. Applicable provisions of federal, state, and local codes.
 - a. NFPA 101.
 2. Accessibility: ADA Standards and ICC A117.1.
 3. Fire-Resistance-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 4. Hardware on Fire-Resistance-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), testing firm acceptable to authorities having jurisdiction, or [_____] as suitable for application indicated.
 5. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
 6. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
 7. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
 8. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

2.03 HINGES

- A. Manufacturers: Conventional butt hinges.
1. BEST; dormakaba Group: www.bestaccess.com/#sle.
 2. PBB
 3. McKinney
- B. Properties:
1. Butt Hinges: As applicable to each item specified.
 - a. Standard Weight Hinges: Minimum of two (2) permanently lubricated non-detachable bearings.
 - b. Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings on heavy weight hinges.
 - c. Template screw hole locations.
 - d. Bearing assembly installed after plating.
 - e. Bearings: Concealed fully hardened bearings.
 - f. Bearing Shells: Shapes consistent with barrels.
 - g. Pins: Easily seated, non-rising pins.
 - 1) Fully plate hinge pins.
 - 2) Non-Removable Pins: Slotted stainless-steel screws.
 - h. UL 10C listed for fire-resistance-rated doors.
- C. Sizes: See Door Hardware Schedule.
1. Hinge Widths: As required to clear surrounding trim.

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2. Sufficient size to allow 180-degree swing of door.

D. Finishes: See Door Hardware Schedule.

1. Fully polish hinges, front, back, and barrel.

E. Grades:

1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.

F. Material: Base metal as indicated for each item by BHMA material and finish designation.

G. Types:

1. Butt Hinges: Include full mortise hinges.

H. Quantities:

1. Butt Hinges: Three (3) hinges per leaves up to 90 inches (2286 mm) in height. Add one (1) for each additional 30 inches (762 mm) in height or fraction thereof.

a. Hinge weight and size unless otherwise indicated in hardware sets:

- 1) For doors up to 36 inches (914 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.134 inch (3.4 mm) and a minimum of 4-1/2 inches (114 mm) in height.
- 2) For doors from 36 inches (914 mm) wide up to 42 inches (1067 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.145 inch (3.7 mm) and a minimum of 4-1/2 inches (114 mm) in height.
- 3) For doors from 42 inches (1067 mm) wide up to 48 inches (1219 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.
- 4) For doors greater than 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.

I. Applications: At swinging doors.

1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors.

J. Products:

1. Butt Hinges:

a. Concealed bearing, five (5) knuckle. CB Series

2.04 BOLTS

A. Manufacturers:

1. Trimco: www.trimcohardware.com/#sle.
2. ABH: Architectural Builders Hardware

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3. Rockwood Mfg.

B. Properties:

1. Flush Bolts:
 - a. Manual Flush Bolts: Manually latching upon closing of door leaf.
 - 1) Bolt Throw: 3/4 inch (19 mm), minimum.
 - b. Automatic Flush Bolts: Automatically latching upon closing of door leaf.
 - 1) Bolt Throw: 3/4 inch (19 mm), minimum.
2. Dustproof Strikes: For bolting into floor, provide except at metal thresholds.

C. Options:

1. Extension Bolts: In leading edge of door, one bolt into floor, one bolt into top of frame.
2. Lever extensions: Provide for top bolt at oversized doors.

D. Products:

1. Automatic / Semi-Automatic flush bolts: 3800 Series

2.05 EXIT DEVICES

A. Manufacturers:

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties:

1. Touchpads: 'T' style metal touchpads and rail assemblies with matching chassis covers end caps.
2. Latch Bolts: Stainless steel deadlocking with 3/4 inch (19 mm) projection using latch bolt.
3. Lever Design: Match project standard lockset trims.
4. Cylinder: Include where cylinder dogging or locking trim is indicated.
5. Strike as recommended by manufacturer for application indicated.
6. Sound dampening on touch bar.
7. Dogging:
 - a. Non-Fire-Resistance-Rated Devices: Hex key 1/4 inch (6 mm) hex key dogging.
 - b. Fire-Resistance-Rated Devices: Manual dogging not permitted.
8. Touch bar assembly on wide style exit devices to have a 1/4 inch (6.3 mm) clearance to allow for vision frames.
9. All exposed exit device components to be of architectural metals and “true” architectural finishes.
10. Handing: Field-reversible.
11. Fasteners on Back Side of Device Channel: Concealed - exposed fasteners not allowed.
12. Vertical Latch Assemblies' Operation: Gravity, without use of springs.

C. Grades: Complying with BHMA A156.3, Grade 1.

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1. Provide exit devices tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.

D. Options:

1. MLR: Motorized latch retraction.
2. Furnish less bottom rod (LBR) at scheduled locations to eliminate use of floor mounted strikes.
3. Electrified Device Voltage: 24 VAC.

E. Products:

1. 2000.

2.06 LOCK CYLINDERS

A. Manufacturers:

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Match existing Best key system.
3. Substitutions: Not permitted.

B. Properties:

1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
 - a. Provide cylinders from same manufacturer as locking device.
 - b. Provide cams and/or tailpieces as required for locking devices.
 - c. Provide cylinders with appropriate format interchangeable cores where indicated.

C. Grades:

1. Standard Security Cylinders: Comply with BHMA A156.5.

D. Material: Brass

E. Types: As applicable to each item specified.

F. Applications: At locations indicated in hardware sets, and as follows

1. As required for items with locking devices provided by other sections, including at elevator controls and cabinets.
 - a. When provisions for lock cylinders are referenced elsewhere in the Project Manual to this Section, provide compatible type of lock cylinder, keyed to building keying system, unless otherwise indicated.

G. Products:

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1. Rim/mortise 12E/1E-74.

2.07 MORTISE LOCKS

A. Manufacturers:

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties:

1. Mechanical Locks: Manufacturer's standard.
 - a. Fitting modified ANSI A115.1 door preparation.
 - b. Door Thickness Coordination Fitting 1-3/4 inch (44 mm) to 2-1/4 inch (57 mm) thick doors.
 - c. Latch: Solid, one-piece, anti-friction, self-lubricating stainless steel.
 - 1) Latchbolt Throw: 3/4 inch (19 mm), minimum.
 - d. Auxiliary Deadlatch: One piece stainless steel, permanently lubricated.
 - e. Backset: 2-3/4 inch (70 mm).
 - f. Lever Trim:
 - 1) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
 - 2) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs (158.2 Nm) of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
 - 3) Spindle: Designed to prevent forced entry from attacking of lever.
 - 4) Independent spring mechanism for each lever.
 - (a) Trim to be self-aligning and thru-bolted.
 - 5) Handles: Made of forged or cast brass, bronze, or stainless steel construction. Levers that contain a hollow cavity are not acceptable.
 - 6) Levers to operate a roller bearing spindle hub mechanism.
 - 7) Abrasive Lever Handles: Include a special abrasive strip on back of the hand grasp portion of lever.
2. Electrified Locks: Same properties as standard locks, and as follows:
 - a. Voltage: 24 VDC.
 - b. Function: Electrically locked (Fail Safe) or unlocked (Fail Secure), as indicated for each lock in Door Hardware Schedule.

C. Finishes: See Door Hardware Schedule.

1. Core Faces: Match finish of lockset.

D. Grades: Comply with ANSI A156.13, Series 1000, Grade 1 Operation and Strength, Grade 2 Security

E. Options:

1. Provide locksets made in a manufacturing facility to compliant with ISO 9001-Quality Management and ISO 14001-Environmental Management.

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F. Products: Mortise locks, including standard and electrified types.

1. 40H.

2.08 DOOR PULLS AND PUSH PLATES

A. Manufacturers:

1. Trimco: www.trimcohardware.com/#sle.
2. Rockwood Mfg.

B. Properties:

1. Pull Type: Straight, unless otherwise indicated.
2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
 - a. Edges: Beveled, unless otherwise indicated.

C. Grades: Comply with BHMA A156.6.

D. Material: Stainless steel, unless otherwise indicated.

E. Products:

1. Push-Pull Plates 1018-3.
2. Push 1001-3

2.09 DOOR PULLS AND PUSH BARS

A. Manufacturers:

1. Trimco: www.trimcohardware.com/#sle.
2. Rockwood

B. Properties:

1. Bar Type: Bar set, unless otherwise indicated.
2. Pulls and Handles:
 - a. Tubular Bars:
 - 1) Bar Diameter: 1 inch (25 mm).

C. Grades: Comply with BHMA A156.6.

D. Material: Stainless steel, unless otherwise indicated.

E. Products:

1. Push and Pull Bars.

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2.10 COORDINATORS

A. Manufacturers:

1. Trimco: www.trimcohardware.com/#sle.
2. Rockwood
3. ABH

B. Properties:

1. General: Non-handed devices, with field-selectable active door leaf.

C. Grades:

D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

1. Meet UL 10C for Positive Pressure.

E. Types:

1. Coordinators: Bar.

F. Installation:

1. Mounting: Provide necessary mounting brackets and filler bars to ensure proper installation of coordinator and related hardware.
2. Coordination: Properly sequence installation of other door hardware affected by placement of coordinators and carry bars.

G. Products: 3094

2.11 CARRY BARS

A. Manufacturers:

1. Trimco: www.trimcohardware.com/#sle.
2. Rockwood

B. Material: Brass with nylon rollers, unless otherwise indicated.

C. Products: As specified

2.12 CLOSERS

A. Manufacturers:

1. dormakaba commercial, dormakaba Group: www.dormakaba.com/us-en/#sle.

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2. Substitutions: Not permitted.

B. Properties:

1. Surface Mounted Closers: Manufacturer's standard.
 - a. Construction: Cast iron.
 - b. Maximum Projection from Face of Door: 2-7/16 inches (62 mm).
 - c. Mechanism: Separate tamper-resistant adjusting valves for closing and latching speeds.
 - 1) Include delayed action feature.
 - d. Hydraulic Fluid: All-weather type.
 - e. Arm Assembly: Standard for product specified.
 - 1) Include hold-open, integral stop, or spring-loaded stop feature, as specified in Door Hardware Schedule.
 - 2) Parallel arm to be a heavy-duty rigid arm.
 - 3) Where "IS" or "S-IS" arms are specified in hardware sets, if manufacturer does not offer this arm provide a regular arm mount closer in conjunction with a heavy-duty overhead stop equal to a dormakaba 900 Series.
 - f. Covers:
 - 1) Type: Standard for product selected.
 - (a) Full.
 - 2) Material: Plastic.
 - 3) Finish: Painted.

C. Grades:

1. Closers: Comply with BHMA A156.4, Grade 1.
 - a. Underwriters Laboratories Compliance:
 - 1) Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
 - (a) UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.

D. Types:

1. Rack-and-pinion, surface-mounted. 1-1/2 inches (38 mm) minimum bore.

E. Installation:

1. Mounting: Includes surface mounted installations.
2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.
3. At outswinging exterior doors, mount closer on interior side of door.
4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.

F. Products:

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1. Surface Mounted:
 - a. QDC100.

2.13 OVERHEAD STOPS AND HOLDERS

A. Manufacturers:

1. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.
2. Architectural Builders Hardware Mfg (ABH); [____]: www.abhmfg.com/#sle.
3. Trimco
4. Rockwood

B. Sizes: Manufacturer’s standard for the application.

C. Types:

1. Surface-applied.

D. Products:

1. Surface Overhead Stops and Holders:
 - a. 700 Standard Duty.
 - b. 900 Heavy Duty.

2.14 PROTECTION PLATES

A. Manufacturers:

1. Trimco: www.trimcohardware.com/#sle.
2. Rockwood Mfg.
3. Burns Mfg.

B. Properties:

1. Plates:
 - a. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
 - 1) Size: 36 inches ([____] mm) high by 1-1/2 inch (38 mm) less door width (LDW) on pull side and 2 inch (51 mm) LDW on push side of door.
 - b. Kick Plates: Provide along bottom edge of push side of every wood door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
 - 1) Size: 10 inches (254 mm) high by 2 inch (51 mm) less door width (LDW) on push side of door.
 - c. Mop Plates: Provide along bottom edge of push side of doors to provide protection from cleaning liquids and equipment damage to door surface.
 - 1) Size: 6 inch (152 mm) high by 1-1/2 inch (38 mm) less door width (LDW) on pull side and 2 inch (51 mm) LDW on push side of door.
 - d. Edges: Beveled, on four (4) unless otherwise indicated.

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- C. Grades: Comply with BHMA A156.6.
- D. Material: As indicated for each item by BHMA material and finish designation.
 - 1. Metal Properties: Stainless steel.
 - a. Metal, Standard Duty: Thickness 0.050 inch (1.27 mm), minimum.
- E. Installation:
 - 1. Fasteners: Countersunk screw fasteners
- F. Products: K0050

2.15 STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Trimco: www.trimcohardware.com/#sle .
 - 2. Rockwood
 - 3. Burns Mfg.
- B. General: Provide overhead stop/holder when wall or floor stop is not feasible.
- C. Grades:
 - 1. Door Holders, Wall Bumpers, and Floor Stops: Comply with BHMA A156.16 and Resilient Material Retention Test as described in this standard.
- D. Material: Base metal as indicated for each item by BHMA material and finish designation.
- E. Types:
 - 1. Wall Bumpers: Bumper, concave, wall stop.
 - 2. Floor Stops: Provide with bumper floor stop.
- F. Installation:
 - 1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.
- G. Products:
 - 1. Wall Bumpers 1270CVPV.
 - 2. Floor Stops 1211.

2.16 THRESHOLDS

- A. Manufacturers:

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1. National Guard Products, Inc: www.ngpinc.com/#sle.
2. Zero
3. Reese

B. Properties:

1. Threshold Surface: Fluted horizontal grooves across full width.

C. Grades: Thresholds: Comply with BHMA A156.21.

D. Products:

1. 513
2. 8513
3. 896

2.17 WEATHERSTRIPPING AND GASKETING

A. Manufacturers:

1. National Guard Products, Inc: www.ngpinc.com/#sle.
2. Zero
3. Reese

B. Properties:

1. Weatherstripping Air Leakage Performance: Not exceeding 0.3 cfm/sq ft of door opening at 0.3 inches of water pressure differential for single doors, and 0.5 cfm/sq ft of door area at 0.3 inches of water pressure differential for double doors for gasketing other than smoke control, as tested according to ASTM E283/E283M; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
2. Adhesive-Backed Perimeter Gasketing: Silicone gasket material applied to frame with self- adhesive.
3. Overlapping Astragals for Meeting Stiles: Neoprene strip gasket material held in place by aluminum housing and overlapping when doors are closed; mounted to face of meeting stile with screws; surface mounted to door.
4. Door Sweeps: Neoprene gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.

C. Grades: Comply with BHMA A156.22.

D. Products:

1. Weatherstripping: See Door Hardware Schedule.
2. Smoke Seals: See Door Hardware Schedule.
3. Meeting Stile Seals: See Door Hardware Schedule.
4. Door Bottom Seals:
 - a. Door Sweeps: See Door Hardware Schedule.
 - b. Door Bottoms: See Door Hardware Schedule.

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2.18 MISCELLANEOUS ITEMS

A. Manufacturers:

1. Trimco: www.trimcohardware.com/#sle.

B. Properties:

1. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
 - a. Single Door: Provide three on strike jamb of frame.
 - b. Pair of Doors: Provide two on head of frame, one for each door at latch side.
 - c. Material: Rubber, gray color.

C. Products:

1. Silencers.

2.19 ELECTRIFIED HARDWARE

A. Manufacturers:

1. BEST, dormakaba Group: www.bestaccess.com/#sle.

B. Properties:

1. Door Position Switches: Recessed devices with 9540 magnetic contacts.
 - a. Power Requirement: 50mA Max, 100 VDC.
2. Power Supply Units: Manufacturer's standard.
 - a. Regulatory Compliance:
 - 1) United States Compliance:
 - (a) UL listed for Class II Output.
 - (b) Comply with UL 294 Standards incorporating enhanced Access Control communications capabilities.
 - 2) Canada Compliance:
 - (a) Comply with ULC S-319 Electronic Access Control Systems.
 - b. Enclosures: Lockable NEMA Type 1, with hinged cover and knockouts.
 - c. Power: 24 VAC, 10 Amp; field-selectable.
 - d. Emergency Release Terminals: Designed to release devices upon activation of fire alarm system.
 - e. Cover to have Tamper Switch
 - f. Auxiliary contacts for remote signaling.
 - g. User-selectable time delay from 0 to 4 minutes.
 - h. Fire Alarm System Interface: Standard.
 - 1) Fire alarm terminal with green LED indicating power is available.
 - i. Output Distribution Board with indicator LEDs.
 - j. On/Off LED power indicator.
3. Power Transfers: Manufacturer's standard.

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- a. Mortised Type with Wires & Connectors:
 - 1) Listed by UL and ULC.
 - 2) Stainless steel housing and spring conduit.
 - 3) Wire Harness: Pre-installed, twelve wire, equipped with ten (10) 24 gauge wires and two 18 gauge wires.
 - 4) Accommodate 180 degree door swing.
 - 5) Quick-Connect Plugs: Pre-installed.
4. Wire Harnesses: Of sufficient length, with quick connectors.
 - a. Wire Harness End Connection to Power Supply or Junction Box: One end with bare leads.

C. Products:

1. Door Position Switches:
 - a. Supplied by the security provider
2. Power Supplies:
 - a. RPSMLR2.
3. Power Transfers:
 - a. EPT-12C.

2.20 KEYS AND CORES

A. Manufacturers:

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties: Complying with guidelines of BHMA A156.28.

1. Provide small format interchangeable core.
2. Provide Patented CORMAX keys and cores to match Owner's existing key system.
3. Provide keying information in compliance with DHI (KSN) standards.
4. Keying Schedule: Arrange for a keying meeting, with Architect, Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements.
5. Keying: Master keyed.
6. Include construction keying and control keying with removable core cylinders.
7. Supply keys in following quantities:
 - a. Grand Master Keys: 1 each.
 - b. Master Keys: 4 each.
 - c. Construction Master Keys: 6 each.
 - d. Construction Keys: 15 each.
 - e. Construction Control Keys: 2 each.
 - f. Control Keys if New System: 2 each.
 - g. Change Keys: 2 each for each keyed core.
8. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
9. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.

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10. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
11. Include installation of permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

C. Products:

1. Patented:
 - a. CORMAX

2.21 FINISHES

A. Finishes: Provide door hardware of same finish, unless otherwise indicated.

1. Finish: 630; satin stainless steel, with stainless steel 3000 series base material (former US equivalent 32D), 652; satin chromium plated over nickel, with steel base material (former US equivalent 26D), and 689; aluminum painted, with any base material (former US equivalent US28); BHMA A156.18.

B. Exceptions:

1. Where base material metal is specified to be different, provide finish that is an equivalent appearance in accordance with BHMA A156.18.
2. Hinges for Fire-Rated Doors: Steel base material with painted finish, in compliance with NFPA 80.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Correct all defects prior to proceeding with installation.
- C. Verify that electric power is available to power operated devices and of correct characteristics.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware using the manufacturer's fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.
- C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.

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- D. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- E. Use templates provided by hardware item manufacturer.
- F. Do not install surface mounted items until application of finishes to substrate are fully completed.
- G. Wash down masonry walls and complete painting or staining of doors and frames.
- H. Complete finish flooring prior to installation of thresholds.
- I. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list, unless noted otherwise in Door Hardware Schedule or on drawings.
 - 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
 - 2. For Steel Doors and Frames: See Section 6549.
 - 3. For Steel Door Frames: See Section 081213.
 - 4. For Aluminum-Framed Storefront Doors and Frames: See Section 084313.
 - 5. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
 - 6. Flush Wood Doors: See Section 081416.
 - 7. Stile and Rail Wood Doors: See Section 081433.
 - 8. Mounting heights in compliance with ADA Standards:
 - a. Locksets: 40-5/16 inch (1024 mm).
 - b. Push Plates/Pull Bars: 42 inch (1067 mm).
 - c. Deadlocks (Deadbolts): 48 inch (1219 mm).
 - d. Exit Devices: 40-5/16 inch (1024 mm).
 - e. Door Viewer: 43 inch (1092 mm); standard height 60 inch (1524 mm).
- J. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal, anchor thresholds with stainless steel countersunk screws.
- K. Include in installation for existing doors and frames any necessary field modification and field preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and fasteners for mounting new hardware and to cover existing door and frame preparations.

3.03 ADJUSTING

- A. Adjust work under provisions of Section 017000 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

3.04 CLEANING

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- A. Clean finished hardware in accordance with manufacturer's written instructions after final adjustments have been made.

3.05 PROTECTION

- A. Protect finished Work under provisions of Section 017000 - Execution and Closeout Requirements.
- B. Do not permit adjacent work to damage hardware or finish.

3.06 HARDWARE SETS

Manufacturer List

Code	Name
BE	Best Access Systems
BY	By Related Section
DM	Dorma Door Controls
NA	National Guard
PR	BEST Precision Exit Devices
SH	Dormakaba Commercial Hardware
ST	BEST Hinges and Sliding
TECT	Tectus by Simonswerk
TR	Trimco

Option List

Code	Description
1/4-20 SSMS/EA	STAINLESS MACHINE SCREWS/EXPANSION ANC.
B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
CD	CYLINDER DOGGING
PATD	CORMAX PATENTED KEYING
CSK	COUNTER SINKING OF KICK and MOP PLATES
EPT Prep	EPT Prep (full mortise)
LBR	LESS BOTTOM ROD
LD	Less Dogging
MLR	MOTORIZED LATCH RETRACTION
NRP	NON REMOVEABLE PIN STD/HEAVY WT HINGE
R	Full Size Rounded Plastic Cover
SMS-TEKS 6 X 1"	SELF DRILLING SCREWS 6 X 1"
SMS-TEKS 6 X 1/2"	SELF DRILLING SCREWS 6 X 1/2"
SN	Sex Nuts
Strike Prep	Strike Prep
Top/Bottom Flush Bolt Prep	Top/Bottom Flush Bolt Preps
TS	TOUCHBAR MONITORING SWITCH
VIB	Double Visual Indicator Option

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Finish List

Code	Description
26D	Satin Chrome
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
AL	Aluminum
BLACK	Black
GREY	Grey

Hardware Sets

Set #1

Doors: A138A, A139A, A145A, A146A, A147A, A148A, A149A, A151A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7AT14J PATD	626	BE
1	Door Closer	QDC111 R	689	SH
1	Kick Plate	K0050 10" x 2" LDW B4E-HEAVY- KP CSK	630	TR
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

Set #2

Doors: A141A, A143A, C102A

3	Butt Hinge	CB179 4.5" x 4.5" NRP	26D	ST
1	Lockset	45H-7AT14J PATD	626	BE
1	Door Closer	QDC115 R	689	SH
1	Kick Plate	K0050 10" x 2" LDW B4E-HEAVY- KP CSK	630	TR
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

Set #3

Doors: A140A, A144A

3	Butt Hinge	CB179 4.5" x 4.5" NRP	26D	ST
1	Privacy Set	45H-0L14J VIB	626	BE
1	Door Closer	QDC115 R	689	SH
1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

Set #4

Doors: A134A, A152A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7R14J PATD	626	BE
1	Door Closer	QDC111 R	689	SH

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1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

Set #5

Doors: A149B, A149C, A152B

3	Butt Hinge	CB179 4.5" x 4.5" NRP	26D	ST
1	Lockset	45H-7AT14J PATD	626	BE
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

Set #6

Doors: A153A, C101A, C111A

3	Butt Hinge	CB179 4.5" x 4.5" NRP	26D	ST
1	Storeroom Lockset	45H-7D14J PATD	626	BE
1	Door Closer	QDC115 R	689	SH
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

Set #7

Doors: A133A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Indicator Dormitory Lock	45-7TD14J PATD VIB/O	626	BE
1	Door Closer	QDC111 R	689	SH
1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270CVPV	626	TR
1	Gasketing	5050 B Head & Jambs		NA

Set #8

Doors: A153B

3	Butt Hinge	CB168 4.5" x 4.5" NRP	26D	ST
1	Storeroom Lockset	45H-7D14J PATD	626	BE
1	Door Closer	QDC115 R	689	SH
1	Stop	1270CVPV or 1211 as Req.	626	TR
3	Silencer	1229A	GREY	TR

Set #9

Doors: A136A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Passage Set	45H-0N14J	626	BE
1	Door Closer	QDC115 R	689	SH
1	Stop	1270CVPV or 1211 as Req.	626	TR
1	Gasketing	5050 B Head & Jambs		NA

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Set #10

Doors: A137A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Privacy Set	45H-0L14J VIB	626	BE
1	Overhead Stop	700 Series	626	DM
1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
3	Silencer	1229A	GREY	TR

Set #11

Doors: A154A, C110A, C115A

3	Butt Hinge	CB179 4.5" x 4.5" NRP	26D	ST
1	Storeroom Lockset	45H-7D14J PATD	626	BE
1	Door Closer	QDC115 R	689	SH
1	Stop	1270CVPV or 1211 as Req.	626	TR
1	Gasketing	5050 B Head & Jamb		NA

Set #12

Doors: A150A

1	Continuous Hinge	661HD UL X LAR	AL	ST
1	Exit Device	2103 X 1703A CD	630	PR
1	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
1	Door Closer	QDC119 R	689	SH
1	Screw Pack	8Q00473		SH
1	Drop Plate	8Q00471		SH
1	Gasket	GASKETING BY ALUM DOOR MFR		BY
1	Threshold	THRESHOLD BY ALUM DOOR MFR		BY

Set #13

Doors: A142A, A142B

1	Continuous Hinge	661HD UL x LAR	AL	ST
1	Exit Device	2103 X 1703A LD	630	PR
1	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
1	Door Closer	QDC119 R	689	SH
1	Screw Pack	8Q00473		SH
1	Drop Plate	8Q00471		SH
1	Gasket	GASKETING BY ALUM DOOR MFR		BY
1	Threshold	THRESHOLD BY ALUM DOOR MFR		BY

Set #14

Doors: C201A

1	Continuous Hinge	661HD UL X LAR	AL	ST
1	Storeroom Lockset	45H-7D14J PATD	626	BE

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1	Door Closer	QDC113 R	689	SH
1	Kick Plate	K0050 10" X 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Weatherstrip	700 NA SMS-TEKS		NA
1	Door Sweep	200 NA SMS-TEKS		NA
1	Saddle Threshold	8513 SSMS/EA		NA

Set #15

Doors: C121B

1	Continuous Hinge	661HD UL x LAR	AL	ST
1	Exit Device	2103 X 1703A CD	630	PR
1	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
1	Door Closer	QDC119 R	689	SH
1	Gasket	GASKETING BY ALUM DOOR MFR		BY
1	Threshold	THRESHOLD BY ALUM DOOR MFR		BY

Set #16

Doors: C121A

6	Butt Hinge	CB168 4.5" x 4.5" NRP	26D	ST
1	Exit Device	2208 X 4908A CD LBR	630	PR
1	Exit Device	2202 X 4902A CD LBR	630	PR
2	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
2	Door Closer	QDC115 R	689	SH
2	Kick Plate	K0050 10" X 1" LDW B4E-HEAVY-KP CSK	630	TR
2	Magnetic HO Armature	CS2595-5	689	TECT
2	Silencer	1229A	GREY	TR

NOTE: Magnetic holders will release when fire alarm is activated. Coordinate electrical requirements with the electrical and fire alarm system contractors.

Set #17

Doors: A142C

1	Continuous Hinge	661HD UL x LAR	AL	ST
1	Exit Device	2108 X 4908D CD	630	PR
1	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
1	Door Closer	QDC119 R	689	SH
1	Screw Pack	8Q00473		SH
1	Drop Plate	8Q00471		SH
1	Gasket	GASKETING BY ALUM DOOR MFR		BY
1	Threshold	THRESHOLD BY ALUM DOOR MFR		BY

Set #18

Doors: C120A

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6	Butt Hinge	CB168 4.5" x 4.5" NRP	26D	ST
1	Exit Device	2208 X 4908A CD LBR	630	PR
1	Exit Device	2202 X 4902A CD LBR	630	PR
2	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
2	Door Closer	QDC115 R	689	SH
2	Kick Plate	K0050 10" X 1" LDW B4E-HEAVY-KP CSK	630	TR
2	Stop	1270CVPV or 1211 as Req.	626	TR
2	Silencer	1229A	GREY	TR

Set #19

Doors: C117A

3	Butt Hinge	CB168 4.5" x 4.5" NRP	26D	ST
1	Exit Device	2108 X 4908D CD	630	PR
1	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
1	Door Closer	QDC115 R	689	SH
1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
1	Stop	1270CVPV or 1211 as Req.	626	TR
3	Silencer	1229A	GREY	TR

Set #20

Doors: C118A, C119A

6	Butt Hinge	CB179 4.5" x 4.5" NRP	26D	ST
1	Automatic Flush Bolt	3815L X 3815L	626	TR
1	Dust Proof Strike	3911	630	TR
1	Storeroom Lockset	45H-7D14J PATD	626	BE
1	Coordinator	3094	BLACK	TR
2	Door Closer	QDC115 R	689	SH
1	Z Astragal	572SS X HARDWARE PREP		NA
2	Mounting Bracket	3095/3096	BLACK	TR
1	Gasketing	5050 B Head & Jambs		NA

Set #21

Doors: C112A, C114A

6	Butt Hinge	CB168 4.5" x 4.5" NRP	26D	ST
1	Automatic Flush Bolt	3815L X 3815L	626	TR
1	Dust Proof Strike	3911	630	TR
1	Storeroom Lockset	45H-7D14J PATD	626	BE
1	Coordinator	3094	BLACK	TR
2	Door Closer	QDC113 R	689	SH
1	Z Astragal	572SS X HARDWARE PREP		NA
2	Mounting Bracket	3095/3096	BLACK	TR
1	Gasketing	5050 B Head & Jambs		NA

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Set #22

Doors: C103A, C104A, C105A, C106A, C107A, C108A, K104A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Privacy Set	45H-0L14J VIB	626	BE
1	Door Closer	QDC111 R SN	689	SH
1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
1	Mop Plate	KM050 6" x 1" LDW B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

Set #23

Doors: C100D, C100E

2	Continuous Hinge	661HD UL X LAR	AL	ST
1	Exit Device	2708 X 4908D CD LBR	630	PR
1	Exit Device	2702 X 4902A CD LBR	630	PR
1	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
2	Door Closer	QDC115 R	689	SH
2	Screw Pack	8Q00473		SH
2	Wall Bumper	1270CVPV	626	TR
2	Drop Plate	8Q00471		SH
1	Gasket	GASKETING BY ALUM DOOR MFR		BY
1	Saddle Threshold	8513 SSMS/EA		NA

Set #24

Doors: C102B, K103B, K103C

1	Comments	**SEE REMARKS BELOW**		BY
		NOTE: Hollow metal borrowed lite. No hardware needed		

Set #25

Doors: C100A, C100B, C100C

2	Continuous Hinge	661HD UL x LAR	AL	ST
1	Exit Device	2703 X 1703A CD LBR	630	PR
1	Exit Device	2702 X 1702A CD LBR	630	PR
2	Mortise Cylinder	1E-74 PATD	626	BE
1	Rim Cylinder	12E-72 PATD	626	BE
2	Door Closer	QDC119 R	689	SH
2	Drop Plate	8Q00471		SH
1	Gasket	GASKETING BY ALUM DOOR MFR		BY
1	Saddle Threshold	8513 SSMS/EA		NA
2	Screw Pack	8Q00473		SH

Set #26

Doors: K100A, K100B, K100C

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1 Comments **SEE REMARKS BELOW** BY

NOTE: Cased opening hollow metal frame

Set #27

Doors: C109A

6	Butt Hinge	CB179 4.5" x 4.5" NRP	26D	ST
1	Semi-Auto Flushbolt	3820	626	TR
1	Storeroom Lockset	45H-7D14J PATD	626	BE
2	Stop	1270CVPV or 1211 as Req.	626	TR
1	Z Astragal	572SS X HARDWARE PREP		NA
2	Silencer	1229A	GREY	TR

Set #28

Doors: K100D

3	Butt Hinge	CB168 4.5" x 4.5" NRP	26D	ST
1	Lockset	45H-7R14J PATD	626	BE
1	Door Closer	QDC115 R	689	SH
1	Armor Plate	KA050 36" x 2" LDW B4E CSK	630	TR
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

Set #29 - CR

Doors: K102A

1	Continuous Hinge	661HD UL 85" EPT Prep	AL	ST
1	Exit Device	MLR TS 2103 X 1703A	630	PR
1	Door Closer	QDC120 R	689	SH
1	Armor Plate	KA050 36" x 2" LDW B4E CSK	630	TR
1	Card Reader	BY OTHERS		BY
1	Power Supply	RPSMLR2		PR
1	Door Position Switch	DPS BY OWNER'S SECURITY VENDOR		BY
1	Power Transfer	EPT-12C		PR
1	Weatherstrip	700 NA SMS-TEKS		NA
1	Drip Cap	16 A FHW SMS-TEKS		NA
1	Door Sweep	200 NA SMS-TEKS		NA
1	Saddle Threshold	8513 SSMS/EA		NA

NOTE: Doors are normally closed and locked. Presentation of authorized credential at exterior credential reader retracts exit device latch bolt allowing door to be opened. Exit device is fail-secure and remains latched during fire alarm or loss of power. Free egress at all times. Request-to-Exit switch in exit device is activated upon depressing push pad, signaling authorized opening of door when exiting. Door Position Switch (DPS) monitors door position. Coordinate wiring and electrical requirements with Electrical Contractor and Security Contractor

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Set #30

Doors: K103A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7AT14J PATD	626	BE
1	Stop	1270CVPV or 1211 as Req.	626	TR
3	Silencer	1229A	GREY	TR

Set #31

Doors: K105A, K106A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Passage Set	45H-0N14J	626	BE
1	Door Closer	QDC111 R	689	SH
1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
1	Wall Bumper	1270CVPV	626	TR
3	Silencer	1229A	GREY	TR

NOTE: Mount closer on least public view

Set #32

Doors: K108A

3	Butt Hinge	CB179 4.5" x 4.5"	26D	ST
1	Lockset	45H-7R14J PATD	626	BE
1	Concealed Overhead Stop	902 S	626	DM
1	Armor Plate	KA050 36" x 2" LDW B4E CSK	630	TR
3	Silencer	1229A	GREY	TR

Set #33

Doors: K113A

1	Continuous Hinge	661HD UL X LAR	AL	ST
1	Exit Device	2103 X 1703A LD	630	PR
1	Rim Cylinder	12E-72 PATD	626	BE
1	Door Closer	QDC113 R	689	SH
1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
1	Weatherstrip	700 NA SMS-TEKS		NA
1	Drip Cap	16 A FHW SMS-TEKS		NA
1	Door Sweep	200 NA SMS-TEKS		NA
1	Handicap Threshold	513 36" 1/4-20 SSMS/EA	AL	NA

Set #34

Doors: K111A, K112A

1	Continuous Hinge	661HD UL x LAR	AL	ST
1	Storeroom Lockset	45H-7D14J PATD	626	BE
1	Door Closer	QDC119 R	689	SH
1	Kick Plate	K0050 10" x 34" B4E-HEAVY-KP CSK	630	TR
1	Weatherstrip	700 NA SMS-TEKS		NA

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1	Drip Cap	16 A FHW SMS-TEKS	NA
1	Door Sweep	200 NA SMS-TEKS	NA
1	Saddle Threshold	8513 SSMS/EA	NA

Opening List

GYMNASIUM

Opening	Hdw Set	Opening Label
C100A	25	
C100B	25	
C100C	25	
C100D	23	
C100E	23	
C101A	6	
C102A	2	
C102B	24	
C103A	22	
C104A	22	
C105A	22	
C106A	22	
C107A	22	
C108A	22	
C109A	27	
C110A	11	45
C111A	6	
C112A	21	45
C114A	21	45
C115A	11	45
C117A	19	
C118A	20	45
C119A	20	45
C120A	18	
C121A	16	
C121B	15	
C201A	14	

KITCHEN

Opening	Hdw Set	Opening Label
K100A	26	
K100B	26	
K100C	26	
K100D	28	
K102A	29	
K103A	30	
K103B	24	
K103C	24	
K104A	22	
K105A	31	

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K106A	31
K108A	32
K111A	34
K112A	34
K113A	33

ADMIN

Opening	Hdw Set	Opening Label
A133A	7	45
A134A	4	
A136A	9	45
A137A	10	
A138A	1	
A139A	1	
A140A	3	
A141A	2	
A142A	13	
A142B	13	
A142C	17	
A143A	2	
A144A	3	
A145A	1	
A146A	1	
A147A	1	
A148A	1	
A149A	1	
A149B	5	
A149C	5	
A150A	12	
A151A	1	
A152A	4	
A152B	5	
A153A	6	
A153B	8	
A154A	11	45

END OF SECTION 087100

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SECTION 088000 – GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass products.
2. Laminated glass.
3. Insulating glass.
4. Glazing sealants.
5. Glazing tapes.
6. Miscellaneous glazing materials.

B. Related Requirements:

1. Section 088813 "Fire-Rated Glazing."

1.2 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.4 PREINSTALLATION MEETINGS

A. 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.

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1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of [**glass product other than clear monolithic vision glass**] [**the following products**]; 12 inches (300 mm) square.
 - 1. Insulated laminated glazing for storefront and curtain wall systems.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass.
- B. Product Test Reports: For **fabricated glass and glazing sealants**, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved **and certified** by primary glass manufacturer.
- B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.
- 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 C1021 to conduct the testing indicated.
- E. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

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1. Install glazing in mockups specified in **Section 084413 "Glazed Aluminum Curtain Walls"** to match glazing systems required for Project, including glazing methods.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below **40 deg F (4.4 deg C)**.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain glass from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.
- C. ALL glass is to be tempered.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

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1. Design Wind Pressures: **As indicated on Structural Drawing S001.**
 - a. Wind Design Data: As indicated on Drawings.
 2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or **1 inch (25 mm)**, whichever is less.
 3. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.
- D. Windborne-Debris-Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Loads on **Drawing S001.**
1. Large-Missile Test: For glazing located within **30 feet (9.1 m)** of grade.
- E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- F. 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 **6 mm thick 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, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as **Btu/sq. ft. x h x deg F (W/sq. m x K).**
 5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
 6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. NGA Publications: **"Laminated Glazing Reference Manual" and "Glazing Manual."**
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

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- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of **the SGCC or manufacturer**. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum.
 - 1. Minimum Glass Thickness for Interior Lites: **6 mm and storefront doors**.

2.4 GLASS PRODUCTS

- A. All interior glazing: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

2.5 INSULATING GLASS

- A. All interior glazing, Fully Tempered Float Glass: ASTM C1048, Kind FT (Fully Tempered) condition A (uncoated), Type 1, (clear), Quality Q-3.
- B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
 - 1. Guardian Industries Corporation, SunGuard SuperNeutral – SNR 43, 1-5/16”; clear tempered and clear laminated. Products complying in detail with requirements and characteristics of Guardian selection above may be submitted for prior approval:
 - a. ASG Glass Company North America, Inc.
 - b. Cardinal Glass Industries
 - c. Saint-Gobain Corporation

- C. Insulated Spandrel Glass

- 1. Opaque insulated units of manufacturer of insulated vision glass with the same thickness as the vision glass. Color to be selected from manufacturers standard colors.

2.6 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

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2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: [**As selected by Architect from manufacturer's full range of industry colors**].
- B. Neutral-Curing Silicone Glazing Sealant, Class 100/50: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks:
1. Type recommended in writing by sealant or glass manufacturer.
- D. Spacers:
1. Type recommended in writing by sealant or glass manufacturer.
- E. Edge Blocks:
1. Type recommended in writing by sealant or glass manufacturer.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

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1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: **120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.**
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 2. Presence and functioning of weep systems.
 3. Minimum required face and edge clearances.
 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

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- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than **50 inches (1270 mm)**.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide **1/8-inch- (3-mm-)** minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. 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.

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- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. 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.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket 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. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

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3.7 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

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SECTION 088813 – FIRE-RATED GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fire-resistance-rated glazing.

1.2 DEFINITIONS

- A. Fire-Protection-Rated Glazing: Glazing in rated doors and openings up to 45 minutes, limited in size, and not capable of blocking radiant heat.
- B. Fire-Resistance-Rated Glazing: Glazing that prevents spread of fire and smoke and radiant heat; used in rated wall and door applications 60 minutes and above without size limitations.
- C. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- D. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.

1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product; 12 inches (300 mm) square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **Installer and glass testing agency**.
- B. Product Certificates: For each type of glass and glazing product.

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- C. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the NGA's Certified Glass Installer Program.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during remainder of construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: For each glass type, obtain from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

- 1. NGA Publications: "**Laminated Glazing Reference Manual**" and "Glazing Manual."

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- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of **the SGCC**. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.4 GLASS PRODUCTS

- A. Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class I (clear) unless otherwise indicated, Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- B. Laminated Glass: ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer unless fire-protection or fire-resistance rating is based on another product.
 - 2. Interlayer Thickness: Provide thickness as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.

2.5 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Tempered Glass: 6-mm thickness; fire-protection-rated tempered glass; complying with 16 CFR 1201, Category II.

2.6 FIRE-RESISTANCE-RATED GLAZING

- A. Fire-Resistance-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-resistance ratings indicated, based on testing in accordance with ASTM E119 or UL 263.
- B. Fire-Resistance-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, that glazing is approved for use in walls, and fire-resistance rating in minutes.
- C. Fire-Resistance-Rated Framing and Doors: Fire-resistance-rated glazing with 60-, 90-, and 120-minute ratings requires framing and doors from glass supplier, tested as an assembly complying with ASTM E119 or UL 263.
- D. Fire-Resistance-Rated Tempered Glazing Units with Clear Intumescent Interlayer: Glazing units made from two or more lites of uncoated, fully tempered, **[clear]** **[ultraclear]** float glass; with a perimeter edge seal enclosing a cavity filled with optically clear, intumescent polymer; complying with 16 CFR 1201, Category II.

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2.7 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.
- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
- C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Perimeter Insulation for Fire-Resistance-Rated Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than **50 inches (1270 mm)**.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

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2. Provide **1/8-inch- (3-mm-)** minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face fire side or protected side as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. 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.
- D. 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.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. 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.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop, so it is securely in place with joints miter cut and bonded together at corners.

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- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket 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.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 FIRE-PROTECTION-RATED GLAZING SCHEDULE

- A. Glass Type [FPGL-3]: 45-minute fire-protection-rated glazing.
- B. Glass Type [FPGL-4]: 60-minute fire-protection-rated glazing with 450 deg F (250 deg C) temperature-rise limitation in rated doors only, with a maximum vision area of 100 sq. in. (0.065 sq. m).

END OF SECTION 088813

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SECTION 089000 – LOUVERS AND VENTS

PART 1 - GENERAL

A. Section Includes:

1. Fixed, **extruded-aluminum** louvers.

1.2 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural **and seismic** performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- C. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to **SEI/ASCE 7**.
 1. Component Importance Factor is **1.0**.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.
 1. Temperature Change (Range): [**120 deg F (67 deg C), ambient; 180 deg F (100 deg C)**], material surfaces.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

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1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 2. Show mullion profiles and locations.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of metal finish required.
- E. Delegated-Design Submittal: For louvers indicated to comply with structural **and seismic** performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain louvers and vents from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.
- B. Welding: Qualify procedures and personnel according to the following:
 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- C. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5, T-52, or T6.
- B. Aluminum Castings: ASTM B 26/B 26M, Alloy 319.

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- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use **hex-head or Phillips pan-head** screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use 300 series stainless-steel fasteners.
 - 3. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Post-installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

- A. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: **Channel** unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less.
 - 1. Semi-recessed Mullions: Where indicated, provide mullions partly recessed behind louver blades so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.
 - 2. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
- F. Provide **subsills made of same material as louvers or extended sills** for recessed louvers.
- G. Join frame members to each other and to fixed louver blades with fillet **welds, threaded fasteners, or both, as standard with louver manufacturer** unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

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2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Storm-Resistant Louver:

1. Manufacturers: Product required Greenheck ESD-635. Or subject to compliance with Greenheck features and specifications, **provide products by one of the following:**
 - a. Air Balance Inc.; a Mestek company.
 - b. Air Flow Company, Inc.
 - c. Airolite Company, LLC (The).
 - d. All-Lite Architectural Products.
 - e. Construction Specialties, Inc.
 - f. Industrial Louvers, Inc.
 - g. NCA Manufacturing, Inc.
 - h. Nystrom Building Products.
 - i. Reliable Products, Inc.
 - j. Ruskin Company; Tomkins PLC.
 - k. United Enertech Corp.
 - l. American Warming & Ventilating
2. Louver Depth: **6 inches.**
3. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm) for blades and 0.080 inch (2.03 mm) for frames.**
4. Louver Performance Ratings:
 - a. Wind-Driven Rain Performance: Not less than **95** percent effectiveness when subjected to a rainfall rate of **8 inches (200 mm) per hour and a wind speed of 50 mph (22.4 m/s)** at a core-area intake velocity of **300 fpm (1.5 m/s).**
5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: **Insect screening.**

B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same kind and form of metal as indicated for louver to which screens are attached. **Reinforce extruded-aluminum screen frames at corners with clips.**
2. Finish: **Mill finish unless otherwise indicated.**
3. Type: **Rewirable frames with a driven spline or insert.**

D. Louver Screening for Aluminum Louvers:

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1. Insect Screening: Stainless steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.

2.5 BLANK-OFF PANELS

- A. Insulated, Blank-Off Panels: Laminated panels consisting of insulating core surfaced on back and front with metal sheets and attached to back of louver.
 1. Thickness: **2 inches (50 mm)**.
 2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch (0.81-mm) nominal thickness.
 3. Insulating Core: **extruded-polystyrene foam**.
 4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard **extruded-aluminum-channel frames, not less than 0.080-inch (2.03-mm) nominal thickness**, with corners mitered and with same finish as panels.
 5. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
 6. Panel Finish: **Same type of finish applied to louvers, but black color**.
 7. Attach blank-off panels with **sheet metal screws**.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.7 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with **AAMA 2604** and containing not less than **70** percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 1. Color and Gloss: **As selected by Architect from manufacturer's full range**.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- B. 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.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. 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.
- F. Protect unpainted galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 07 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

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SECTION 092216 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior and exterior ceilings, soffits and fascias.
3. Grid suspension systems for gypsum board ceilings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.
- B. Evaluation Reports: For **embossed, high-strength steel studs and tracks post-installed anchors and power-actuated fasteners**, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.4 QUALITY ASSURANCE

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of **the Certified Steel Stud Association, the Steel Framing Industry Association or [the Steel Stud Manufacturers Association]**.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

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- C. Horizontal Deflection: For wall assemblies, limited to **1/240** of the wall height based on horizontal loading of **10 lbf/sq. ft. (480 Pa)**.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
 2. Protective Coating: **ASTM A653/A653M, G40 (Z120)**, hot-dip galvanized.
- B. Studs and Tracks: ASTM C645. **Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.**
1. Steel Studs and Tracks:
 - a. Minimum Base-Steel Thickness: **As indicated on Drawings**
 - b. Depth: **As indicated on Drawings**.
- C. Slip-Type Head Joints: Where indicated, provide **one of** the following:
1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing **1-1/2-inch (38-mm)**.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Steel Thickness: [**As indicated on Drawings**] [**0.0179 inch (0.455 mm)**] [**0.0269 inch (0.683 mm)**] [**0.0296 inch (0.752 mm)**] [**0.0329 inch (0.836 mm)**] <Insert thickness>.
- E. Cold-Rolled Channel Bridging: Steel, **0.0538-inch (1.367-mm)** minimum base-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges.
1. Depth: **1-1/2 inches (38 mm)**.
 2. Clip Angle: Not less than **1-1/2 by 1-1/2 inches (38 by 38 mm)**, **0.068-inch- (1.72-mm-)** thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. Minimum Base-Steel Thickness: [**As indicated on Drawings**] [**0.0179 inch (0.455 mm)**]
 2. Depth: **As indicated on Drawings**.
- G. Cold-Rolled Furring Channels: **0.053-inch (1.34-mm)** uncoated-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges.
1. Depth: [**As indicated on Drawings**] [**3/4 inch (19 mm)**] <Insert depth>.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of **0.0329 inch (0.8 mm)**.

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3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.062-inch (1.59-mm-)** diameter wire, or double strand of **0.048-inch- (1.21-mm-)** diameter wire.

H. Z-Shaped Furring: With slotted or nonslotted web, face flange of **1-1/4 inches (32 mm)**, wall attachment flange of **7/8 inch (22 mm)**, minimum uncoated-steel thickness of **0.0179 inch (0.455 mm)**, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.59-mm-)** diameter wire, or double strand of **0.048-inch- (1.21-mm-)** diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES **AC01, AC193, AC58, [or] AC308** as appropriate for the substrate.

a. Uses: Securing hangers to structure.

b. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or **ASTM F1941 (ASTM F1941M)**, Class Fe/Zn 5, unless otherwise indicated.

2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, **0.16 inch (4.12 mm)** in diameter.

D. Flat Hangers: Steel sheet, **1 by 3/16 inch (25 by 5 mm)** by length indicated.

E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of **0.0538 inch (1.367 mm)** and minimum **1/2-inch- (13-mm-)** wide flanges.

1. Depth: **As indicated on Drawings.**

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: **0.0538-inch (1.367-mm)** uncoated-steel thickness, with minimum **1/2-inch- (13-mm-)** wide flanges, **3/4 inch (19 mm)** deep.

2. Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: **As indicated on Drawings.**

b. Depth: **As indicated on Drawings.**

3. Hat-Shaped, Rigid Furring Channels: ASTM C645, **7/8 inch (22 mm)** deep.

a. Minimum Base-Steel Thickness: **0.0179 inch (0.455 mm).**

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4. Resilient Furring Channels: **1/2-inch- (13-mm-)** deep members designed to reduce sound transmission.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, **1/8 inch (3.2 mm)** thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than **24 inches (610 mm)** o.c.
 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-

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resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: **16 inches (406 mm) o.c.**
 - 2. Multilayer Application: **16 inches (406 mm) o.c.**
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum **1/2-inch (13-mm)** clearance from jamb stud to allow for installation of control joint in finished assembly.

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- c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs **6 inches (150 mm)** o.c.
 7. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced **24 inches (610 mm)** o.c.
- E. Z-Shaped Furring Members:
 1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced [**24 inches (610 mm)**] **<Insert dimension>** o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced **24 inches (610 mm)** o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than **12 inches (305 mm)** from corner and cut insulation to fit.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than **1/8 inch (3 mm)** from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 1. Hangers: **48 inches (1219 mm)** o.c.
 2. Carrying Channels (Main Runners): **48 inches (1219 mm)** o.c.
 3. Furring Channels (Furring Members): **24 inches (610 mm)** o.c.

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- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within **[performance limits established by referenced installation standards] <Insert deflection limit>**.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not attach hangers to steel roof deck.
 - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within **[1/8 inch in 12 feet (3 mm in 3.6 m)] <Insert dimensions>** measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

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SECTION 092900 – GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

B. Samples for Verification: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.3 QUALITY ASSURANCE

A. Mockups: Build mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:

- a. Each level of gypsum board finish indicated for use in exposed locations.
- b. Each texture finish indicated.

2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.

3. Simulate finished lighting conditions for review of mockups.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

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1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Thickness: **5/8 inch (15.9 mm)**.
 - 2. Long Edges: **Tapered and featured (rounded or beveled) for prefilling.**
- B. Impact-Resistant Gypsum Board: ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M.
 - 1. Core: **5/8 inch (15.9 mm), Type X.**
 - 2. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds [Level 1] [Level 2] [Level 3] requirements.
 - 3. Indentation: ASTM C1629/C1629M, meets or exceeds **Level 3** requirements.
 - 4. Soft-Body Impact: ASTM C1629/C1629M, meets or exceeds **Level 3** requirements.

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5. Hard-Body Impact: ASTM C1629/C1629M, meets or exceeds **Level 3** requirements according to test in Annex A1.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 1. Material: **Galvanized or aluminum-coated steel sheet or rolled zinc.**
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. Expansion (control) joint.

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints, **rounded or beveled panel edges**, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use **setting-type taping or drying-type, all-purpose** compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use **setting-type, sandable topping or drying-type, all-purpose** compound.
 4. Finish Coat: For third coat, use **setting-type, sandable topping or drying-type, all-purpose** compound.
 5. Skim Coat: For final coat of Level 5 finish, use **setting-type, sandable topping compound or drying-type, all-purpose compound.**

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

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- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C954 for fastening panels to steel members from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick.
- D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than **1/16 inch (1.5 mm)** of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered

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edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than **8 sq. ft. (0.7 sq. m)** in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow **1/4- to 3/8-inch- (6.4- to 9.5-mm-)** wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide **1/4- to 1/2-inch- (6.4- to 12.7-mm-)** wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Single-Layer Application:
 - 1. On partitions/walls, apply gypsum panels **vertically (parallel to framing) or horizontally (perpendicular to framing)** unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 2. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

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B. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, **16 inches (400 mm)** minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers **and face layers separately to supports with screws.**

C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus **12-inch- (300-mm-)** long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws **16 inches (400 mm)** o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced **12 inches (300 mm)** o.c.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints **according to ASTM C840 and in specific locations approved by Architect for visual effect.**

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. LC-Bead: Use **[at exposed panel edges] <Insert requirements>.**
3. L-Bead: Use **where indicated.**

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3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, **rounded or beveled edges**, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 5: At panel surfaces that will be exposed to view.

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

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SECTION 093000 – TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Stone thresholds.
3. Waterproof membrane.
4. Crack isolation membrane.
5. Tile backing panels.
6. Metal edge strips.

1.2 REFERENCES

- A. American National Standards Institute (ANSI) A108/A118 Series for Ceramic Tile products and installation and ANSI A 137.1.
- B. Tile Council of North America (TCNA) Handbook for Ceramic, Glass and Stone Tile Installation 2011 edition.
- C. Manufacturers printed installation instructions.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- D. Samples for Verification:
 1. Full-size units of each type and composition of tile and for each color and finish required.
 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches (300 mm) square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
 3. Full-size units of each type of trim and accessory for each color and finish required.
 4. Stone thresholds in 6-inch (150-mm) lengths.
 5. Metal edge strips in 6-inch (150-mm) lengths.

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1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each type of product, signed by product manufacturer.
- C. Material Test Reports: For each tile-setting and -grouting product.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.6 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type from one source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for installation Materials: Obtain installation materials from one manufacturer to comply with manufacturer's Full System Warranty.
 - 1. Cementitious backer units.
 - 2. Self leveling underlayment
 - 3. Waterproofing membrane
 - 4. Crack isolation membrane
 - 5. Thin set mortar
 - 6. Grout
 - 7. Joint sealants
 - 8. Cleaners
 - 9. Sealers
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product. Obtain products compatible with primary manufacturers products and systems:
 - 1. Stone thresholds.
 - 2. Metal edge strips.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of each type of floor tile installation.
 - 2. Build mockup of each type of] wall tile installation.
 - 3. Mock ups of each floor and wall tile are required. The mockups should be 100 s.f. of floor and 100 s.f. of wall. The floor and wall transition must be a part of the mock ups in

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places where there are both floor and wall tile. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- E. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 WARRANTY

- A. Provide Full System Warranty from installation materials manufacturer for period of 15 years from date of substantial completion.
- B. Do not use multiple manufacturers for primary installation system products.

1.9 MAINTENANCE

- A. Do not use no-rinse enzyme cleaners on tile work.
- B. Use only cleaners and sealers approved by the installation materials manufacturer.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.

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- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

- A. See Interior Tile Installation Schedule at end of this section. Comparable Products by Marazzi, USA and IRIS USA are approved.

2.3 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Granite Thresholds: ASTM C 615, with [**polished**] [**honed**] <Insert finish> finish.
 - 1. Description: Uniform, fine-grained, white, gray or black stone as selected by architect without veining.

2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. C-Cure; C-Cure Board 990.
 - b. Custom Building Products; Wonderboard.
 - c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - d. USG Corporation; DUROCK Cement Board.
 - 2. Thickness: 1/2 inch (12.7 mm).

2.5 WATERPROOF MEMBRANE

- A. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

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1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bonsal American; an Oldcastle company; B 6000 Waterproof Membrane.
 - b. Custom Building Products; Redgard Waterproofing and Crack Prevention Membrane.
 - c. Laticrete International, Inc.; Hydro Ban.

2.6 CRACK ISOLATION MEMBRANE

- A. A self-bonding fabric and asphaltic mat designed to reduce crack transmission in ceramic tile or stone floors in extra heavy duty commercial applications applied over peel and stick primer recommended by manufacturer. Comply with ANSI A118.12 High Performance.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bonsal American; an Oldcastle company; Flexguard
 - b. Custom Building Products; Crack Buster Pro Crack Prevention Mat Underlayment.
 - c. Prima Adhesives, Inc.; Pro CBM

2.7 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
 1. Cleavage Membrane: Asphalt felt, ASTM D 226 Type 1 (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils thick.
 2. Waterproofing Membrane: specified above.
 3. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
 4. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed. Thin set additive by Custom Building Products.
- B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bonsal American; an Oldcastle company. Superior Permaflex 600
 - b. Custom Building Products. MEGAFLEX
 - c. Laticrete International, Inc. #125
 - d. Bostik as an approved manufacturer pending compliance with the contract documents.
 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

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- C. Medium-Bed, Latex-Portland Cement Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of [3/4 inch].
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bonsal American; an Oldcastle company. Permaflex 550
 - b. Custom Building Products. Marble and Granite mortar mix
 - c. Laticrete International, Inc. XLT
 - 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

2.8 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bonsal American; an Oldcastle company. B7000
 - b. Custom Building Products. CEGLITE
 - c. Laticrete International, Inc. Spectra Loc Pro
 - 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.

2.9 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 "Joint Sealants."
 - 1. Custom Building Products 100% silicone caulk-ASTM C920 rated sealant in colors matching grout. Shore A hardness 35+ for floor traffic movement joints.

2.10 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated. Skin coat and patch with acrylic additive.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; white zinc alloy exposed-edge material.
- C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.

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1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
1. Aqua Mix by Custom Building Products; heavy duty grout and tile cleaner.

2.11 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 2. Verify that concrete substrates for tile floors installed with adhesives bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1B and is sloped toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors in laundries.
 - c. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - d. Tile floors composed of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. 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 plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

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1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Floor Tile and wall tile over 12x12: **1/4 inch (6.35 mm)**.
 2. Glazed Wall Tile: 1/16 inch (1.6 mm).
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles. Sealant filled joints must be installed at a maximum distance of 10' in both directions.
1. Where movement joints occur in mud bed, apply crack isolation membrane in accordance with TCNA F125 Partial to relocate movement joints to the next nearest grout joints in tile work. Mud bed to be steel troweled smooth for proper application of sheet and liquid membranes.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
 2. Do not extend cleavage membrane waterproofing or crack isolation membrane under thresholds set in latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane waterproofing or crack isolation membrane with elastomeric sealant.
- J. Metal Edge Strips: Install at locations indicated and where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- 3.4 TILE BACKING PANEL INSTALLATION
- A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- 3.5 WATERPROOFING INSTALLATION
- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

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1. Apply waterproofing membrane in the field and overlap onto crack isolation membrane used over movement joints a minimum of 6” to create a waterproof condition.
 2. Flash and reinforce waterproofing membrane up perimeter walls and any columns, chases or field interruptions to a height of 3 inches to create a waterproof condition.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
- B. Install crack isolation membrane per TCNA F125 Partial at all mud bed and concrete slab saw cut joints to relocate movement joints to the next nearest grout joint in tile work.

3.7 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
1. Remove epoxy grout residue from tile as soon as possible.
 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.8 INTERIOR TILE INSTALLATION SCHEDULE Products selected are from Crossville, Inc., P. O. Box 1168, Crossville, Tennessee 38557; 931 484 2110; www.crossvilleinc.com and DAL TILE CORPORATION.

- A. Interior Floor Installations, Concrete Subfloor:

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1. Tile Installation F112: Cement mortar bed (thickset) bonded to concrete; TCNA F112 and ANSI A108.1B. At Kitchen, toilets, showers and janitor rooms and other tile floors with floor drains on first floor.
 - a. Bonded water proof membrane over setting bed per F122.
 - b. Thin-Set Mortar for Cured-Bed Method: Latex- portland cement mortar.
 - c. Grout: Water cleanable epoxy grout. Install movement joints in mud bed according to locations on drawings, at perimeter of tile installations where tile abuts walls or other vertical surfaces and at intervals not to exceed 8 feet in both directions.
 - d. Apply crack isolation membrane over movement joints per TCNA F125 Partial Coverage.
 - e. Apply waterproofing membrane in field and flash over crack isolation membrane and up perimeter walls and field interruptions to create a waterproof condition.
 - f. Tile selections:
 - 1) Kitchen Tile – Crossville, Cross Colors Crossdot 8x8. Comparable products by Dal Tile, Florida Tile or other manufacturers may be submitted for prior approval.
 - 2) Toilets, showers, janitor rooms and other tile rooms with floor drains (6 x6 tile).
 - a) Crossville, Gotham, <http://crossvilleinc.com/products/gotham/> .
 - b) Anatolia, http://anatoliatile.com/segment_porcelain.html .
 - c) Ilva;
<http://gstile.com/product/compact-porcelain-tile/compact-canvas/> .
- B. Interior Floor Installations, Concrete Subfloor:
 1. Lobby, corridors, Cafeteria and all other rooms with ceramic tile floor not listed above. Tile Installation TCNA F113-11 on grade concrete at all corridors and cafeteria. Medium Bed thin set.
 - a. Full coverage crack isolation membrane is to be applied per Tile Installation method TCNA F125-Full, above.
 - b. Medium Bed Portland Cement Bond Coat
 - c. Water cleanable epoxy grout.
 - d. Tile Selections (12 x 24):
 - a) Crossville, Gotham, <http://crossvilleinc.com/products/gotham/> .
 - b) Anatolia, http://anatoliatile.com/segment_porcelain.html .
 - c) Ilva;
<http://gstile.com/product/compact-porcelain-tile/compact-canvas/>
- ~~C.~~ Interior Wall Installations, Masonry or Concrete:
- D. Interior Wall Installations, Metal Studs or Furring:
 1. Tile Installation W244: Thin-set mortar on cementitious backer unit underlayment with vapor retarder membrane; TCNA W244.
 - a. Tile Type: Dal Tile 3 x 6 semi-gloss price groups 2 and 3. Comparable products by InterCeramic American Olean.
 - b. Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.

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E. Shower Receptor and Wall Installations:

1. Tile Installation TCNA B421: Thin-set mortar on waterproof membrane with integrated bonding flange for bonded membranes.
 - a. Tile Type: Dal Tile 3 x 6 semi-gloss price groups 2 and 3. Comparable products by Interceramic American Olean.
 - b. Thin-Set Mortar: Latex- portland cement mortar.
 - c. Grout: Water cleanable epoxy grout.
 - d. This is to be a fully waterproofed shower area. Apply waterproofing membrane to proper thickness, tied into drain flanges and flashed up walls to a height above the shower heads.

F. Movement Joints

1. Follow TCNA EJ 171 for all applicable movement joint conditions on all installations.

END OF SECTION 093000

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SECTION 095113 – ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.2 DEFINITIONS

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For components with factory-applied color finishes.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of full-size Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of **12-inch- (300-mm-)** long Samples of each type, finish, and color.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- E. Maintenance Data: For finishes to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.

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2. Suspension System: Obtain each type through one source from a single manufacturer.
- B. Fire Resistive Ceiling Assembly: Provide 1 hour fire rated ceilings tested and labeled by UL.
- C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
 3. Hold-Down Clips: 200.

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PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.
- B. Coating-Based Antimicrobial Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273.

2.2 AP1: 24x24x5/8” tegular lay-in, NRC 55, sag-resistant, antimicrobial treatment.

- A. Approved Products:
1. Armstrong, fine fissured.
 2. Celotex, fine fissured.
 3. USG, Radar, Clima Plus.
- B. to be used throughout building except in areas listed for AP2.”

2.3 AP2: 24x24x5/8” water-resistant Gypsum Panels with smooth vinyl face.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance".
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

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1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
- E. Hold-Down Clips: Within 15' of all exterior doors, provide manufacturer's standard hold-down clips spaced **24 inches (610 mm)** o.c. on all cross tees.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized, **G60 (Z180)**, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, **G60 (Z180)** coating designation, with prefinished, cold-rolled, **15/16-inch- (24-mm-)** wide, aluminum caps on flanges.
 1. Structural Classification: Heavy-duty system.
 2. Face Design: Flat, flush.
 3. Face Finish: Painted white.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

2.7 ACOUSTICAL SEALANT

- A. Products:
 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corp; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
 - c. Tremco Acoustical Sealant
- B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

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- C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, GENERAL

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 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, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings 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. 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 and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

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5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Space hangers not more than **48 inches (1200 mm)** o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than **8 inches (200 mm)** from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than **16 inches (400 mm)** o.c. and not more than **3 inches (75 mm)** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet (3.2 mm in 3.66 m)**. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 2. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 4. Install hold-down clips within 15 feet of exterior doors.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

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SECTION 096513 – RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Vinyl base.
 2. Vinyl stair accessories.
 3. Vinyl molding accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than **12 inches (300 mm)** long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than **12 inches (300 mm)** long.
- E. Product Schedule: For resilient base and accessory products. **[Use same designations indicated on Drawings.]**

1.3 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Coordinate mockups in this Section with mockups specified in other Sections.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F (10 deg C)** or more than **90 deg F (32 deg C)**.

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1.5 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than **[70 deg F (21 deg C)]** or more than **[95 deg F (35 deg C)]**, in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **[55 deg F (13 deg C)]** or more than **[95 deg F (35 deg C)]**.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL BASE

- A. Product Standard: ASTM F1861, Type TV (vinyl, thermoplastic).
 - 1. Group: **I (solid, homogeneous)**.
 - 2. Style and Location:
 - a. Style B, Cove.
- B. Minimum Thickness: **0.125 inch (3.2 mm)**.
- C. Height: **4 inches [As indicated on Drawings]**.
- D. Lengths: **Cut lengths 48 inches (1219 mm) long or coils in manufacturer's standard length.**
- E. Outside Corners: **Preformed.**
- F. Inside Corners: **Preformed.**
- G. Colors and Patterns: **As selected by Architect from manufacturer's full range.**

2.2 VINYL STAIR ACCESSORIES

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

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- B. Stair Treads: ASTM F2169, Type TV (vinyl, thermoplastic).
 - 1. Class: **2 pattern; embossed.**
 - 2. Group: **1 (embedded abrasive strips) and (with contrasting color for the visually impaired).**
 - 3. Nosing Style: **Square.**
 - 4. Nosing Height: **1-1/2 inches (38 mm).**
 - 5. Thickness: **1/4 inch (6 mm) and tapered to back edge.**
 - 6. Size: Lengths and depths to fit each stair tread in **one piece.**
- C. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
 - 1. Style: **Toeless, by length matching treads.**
 - 2. Thickness: **0.125 inch (3.2 mm).**
- D. Landing Tile: **Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.**
- E. Locations: **Provide vinyl stair accessories in areas indicated.** Stairs, 101A, 128, 201 & 209.
- F. Colors and Patterns: **Selected from manufacturer's standard colors.**

2.3 VINYL MOLDING ACCESSORY

- A. Description: Vinyl **cap for cove resilient floor, carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, joiner for tile and carpet transition strips.**
- B. Profile and Dimensions: **As indicated on drawings.**
- C. Locations: **Provide vinyl molding accessories in areas indicated.**
- D. Colors and Patterns: **As selected from manufacturer's standard colors.**

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
- C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.

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- D. Metal Edge Strips: **Extruded aluminum with mill finish**, nominal **2 inches (50.8 mm)** wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.
- E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than **9** pH.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed **1000 sq. ft. (304.8 sq. m)**, and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb. of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum **75** percent relative humidity level measurement.

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- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

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3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply **two** coats.
- E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

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SECTION 096519 – RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Luxury vinyl floor tile.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
 - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples: Full-size units of each color, texture, and pattern of floor tile required.
- D. Samples for Initial Selection: For each type of floor tile indicated.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, **from the same product run**, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every [50] <Insert number> boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

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- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Coordinate mockups in this Section with mockups specified in other Sections.
 - a. Size: Minimum **100 sq. ft. (9.3 sq. m)** for each type, color, and pattern **in locations directed by General Contractor.**
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F (10 deg C)** or more than **90 deg F (32 deg C)**. Store floor tiles on flat surfaces.

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than **[70 deg F (21 deg C)]** <Insert temperature> or more than **[95 deg F (35 deg C)]** <Insert temperature>, in spaces to receive floor tile during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

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1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 LUXURY VINYL FLOOR TILE

- A. Product selected is Mohawk Group, Living Local Collection; field tile Terrazzo C0180; accent tile Chromascope C0159. Submit comparable products for approval by Armstrong, Mannington, Shaw, and Forbo.
- B. Tile Standard: ASTM F1700.
 1. Class: **As indicated by product designations.**
- C. Thickness: **0.100 inch (2.5 mm).**
- D. Size: **12 by 24 inches.**

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

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- B. Concrete Substrates: Prepare according to ASTM F710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed **1000 sq. ft. (304.8 sq. m)**, and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates. Meet requirements specified by Luxury Vinyl Tile manufacturer.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles **square with room axis**.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles **in pattern of colors and sizes indicated**.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

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- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply **two** coat(s).
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

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SECTION 096566 – RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cushioned vinyl sheet flooring.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details and locations of the following:
 - 1. Floor patterns.
 - 2. Layout, colors, widths, and dimensions of game lines and markers.
 - 3. Locations of floor inserts for athletic equipment installed through flooring.
 - 4. Seam locations for sheet flooring.
- C. Samples for Initial Selection: For each type of flooring indicated.
 - 1. Game-Line and Marker Paint: Include charts showing available colors and glosses.
- D. Samples for Verification: For each type, color, and pattern of flooring indicated, 6-inch- square Samples of same thickness and material indicated for the Work.
 - 1. Seam Samples: For each vinyl sheet flooring color and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified sheet vinyl flooring Installer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For flooring to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Sheet Vinyl Flooring Installer Qualifications: An experienced Installer who has completed sheet vinyl flooring installations using seaming methods indicated for this Project and similar in

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material, design, and extent to that indicated for this Project; who is acceptable to manufacturer; and whose work has resulted in installations with a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.
- B. Store materials to prevent deterioration. Store rolls upright.

1.7 FIELD CONDITIONS

- A. Adhesively Applied Products:
 - 1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg. F or more than 95 deg F, in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.
 - 2. After post-installation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg. F or more than 95 deg F.
 - 3. Close spaces to traffic during flooring installation.
 - 4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.
- B. Install flooring after other finishing operations, including painting, have been completed.

1.8 MOISTURE TESTING

- A. Manufacturer recommendations: The work of this Section to conform with recommendations and requirements of flooring manufacturer and work defined herein. Where a conflict in the requirements exist the more stringent of the requirements shall apply.
- B. Moisture: Contractor to perform moisture tests of concrete floor slab to verify that moisture is within tolerances allowed by manufacturer. If moisture content exceeds allowable levels, contractor shall implement measures to remove moisture from slab.
 - 1. Do not install flooring until moisture content is within manufacturer's tolerances.
 - 2. Contractor to provide results to Owner, Architect, and Installer prior to start in installation.
- C. Testing Agency: Testing to be performed by qualified third party testing agency acceptable to architect.
- D. Environmental Conditions: The conditions of the space in which the testing is to be performed shall meet the following conditions for no less than 48 prior to and after the test is performed:
 - 1. Temperature: 75 degrees F +/- 10 degrees
 - 2. Humidity: 50% relative humidity +/- 10%

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- E. Testing Types: Testing shall be one of the types listed:
 - 1. Calcium Chloride Testing, using standard manufacturer’s test kits.
 - 2. Relative Humidity (RH) testing using Wagner Rapid RH Probe.
- F. Calcium Chloride Testing: Testing for moisture vapor emission rate (MEVR) shall be performed in accordance with above referenced, applicable ASTM standards and the following:
 - 1. Removal concrete coatings including curing compound.
 - 2. Commence test no sooner than 24 hours from the time the concrete curing compound was removed.
 - 3. Test shall be run for no less then 84 hours.
- G. Relative Humidity Testing: Perform tests in accordance with probe manufacturer written instructions.
 - 1. Drill hold of diameter required by probe.
 - 2. Insert probe into holes.
 - 3. Test results available without 45 minutes.
- H. Testing Frequency: Moisture testing shall be performed as required by flooring manufacturer, but no less than quantity indicated herein:
 - 1. Three (3) tests for the first 1,000 sf.
 - 2. One (1) test for each additional 1,000 sf.
- I. Testing Reports: Copies of third party testing reports to be submitted to the architect, contractor and flooring contractor prior to the installation of the flooring.

1.9 COORDINATION

- A. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

PART 2 - PRODUCTS

2.1 CUSHIONED VINYL SHEET FLOORING

- A. Manufacturers: Provide products by one of the following:
 - 1. Shaw –Rex Court 0004V
 - 2. Conner Sport Gran Plus -5.0
 - 3. Taraflex Multipurpose-5.0
 - 4. Centaur Triple Threat
 - 5. Tarkett Sports Omnisports
 - 6. Matsinc Fitflex.
- B. Material: Vinyl wear layer and rubber shock-absorbent layer, vulcanized together.

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- C. Traffic-Surface Texture: Smooth.
- D. Thickness: 5.0 mm minimum.
- E. Size: Rolls, manufactures standard size, for adhered installation.
- F. Color and Pattern: As selected by Architect from manufacturer's full range.
- G. Border: of same material as floor;
 - 1. Border Color and Pattern: As selected by Architect from manufacturer's full range to contrast with floor tile.

2.2 ACCESSORIES

- A. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer. Mapei Planipatch, Planipatch-Plus
- B. Manufactures standard sheet moisture membrane designed to restrict up to 11 pound of moisture
- C. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated.
 - 1. Adhesives shall be designed to accept up to 7 pounds of moisture
- D. Game-Line and Marker Paint: Complete system including primer, if any, compatible with flooring and recommended in writing by flooring and paint manufacturers for use indicated.
- E. Bevelled Edging: Black rubber or vinyl transition ramp edging as available from flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
 - 3. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 4. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by Floor finish manufacturer.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.
 - 1. Do not install flooring until they are same temperature as space where they are to be installed.
- F. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 FLOORING INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions.
- B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, non-staining marking device.

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3.4 SHEET FLOORING INSTALLATION

- A. Unroll sheet flooring and allow it to stabilize before cutting and fitting.
- B. Lay out sheet flooring as follows:
 - 1. Maintain uniformity of flooring direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in flooring substrates.
 - 3. Match edges of flooring for color shading at seams.
 - 4. Locate seams per approved Shop Drawings.
- C. Adhered Flooring: Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
 - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.5 GAME LINES AND MARKERS

- A. Mask flooring at game lines and markers and apply paint to produce sharp edges. Where crossing, break minor game line at intersection; do not overlap lines.
- B. Lay out game lines and markers to comply with rules and diagrams published by National Federation of State High School Associations for athletic activities indicated.

3.6 FIELD-APPLIED FINISHES

- A. Apply finish after game-line and marker paint is fully cured.
- B. Apply finish according to manufacturer's written instructions to produce a sealed surface that is ready for use.
- C. Do not cover flooring after finishing until finish reaches full cure.

3.7 CLEANING AND PROTECTING

- A. Perform the following operations immediately after completing flooring installation:
 - 1. Remove adhesive and other blemishes from flooring surfaces.
 - 2. Sweep and vacuum flooring thoroughly.
 - 3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.

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- B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
 - 1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096566

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SECTION 096813 – TILE CARPETING

PART 1 - GENERAL

1.1 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include installation recommendations for each type of substrate.
- B. LEED Submittals:
 - 1. Product Data for Credit EQ 4.3:
 - a. For carpet tile, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
 - b. For installation adhesive, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit EQ 4: For carpet and installation adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.

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6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

F. Sustainability: Provide the Statement of the Achievement Level the carpet has attained for points, based on specific Sustainable Attribute Performance for all product stages according to ANSI/NSF 140.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Master II certification level.

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- B. Fire-Test-Response Ratings: Where indicated, provide carpet tile identical to those of assemblies tested for fire response according to NFPA 253 by a qualified testing agency.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups on site. Select one complete classroom as the mock-up.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.

1.8 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.9 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, dimensional stability, excess static discharge, loss of tuft bind strength, loss of face fiber, and delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Products: Specification is based on the following:
 - 1. Mohawk Group:

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2. Milliken
 3. Interface
- B. Color: As selected by Architect from manufacturer's full range.
- C. Applied Soil-Resistance Treatment: Manufacturer's standard material <Insert treatment>.
- D. Antimicrobial Treatment: Manufacturer's standard material.
- E. Performance Characteristics: As follows:
1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D 7330.
 2. Critical Radiant Flux Classification: Not less than [0.45 W/sq. cm] [0.22 W/sq. cm].
 3. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.
 4. Tuft Bind: Not less than 10 lbf (45 N) according to ASTM D 1335.
 5. Delamination: Not less than 4 lbf/in. (18 N/mm) according to ASTM D 3936.
 6. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
 7. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).
 8. Resistance to Insects: Comply with AATCC 24.
 9. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.
 10. Colorfastness to Light: Not less than 4 after 60 AFU (AATCC fading units) according to AATCC 16, Option E.
 11. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.
 12. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.
 13. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions **1/8 inch (3 mm)** wide or wider and protrusions more than **1/32 inch (0.8 mm)** unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

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- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.
- H. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

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SECTION 097723 – FABRIC-WRAPPED PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes shop-fabricated, fabric-wrapped wall panels.

1.2 SUBMITTALS

- A. Product Data: For each type of panel edge, core material, and mounting indicated.
- B. Shop Drawings: For fabric-wrapped wall panels. Include mounting devices and details; details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge and core materials.
 - 1. Include elevations showing panel sizes and direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing from fabric-wrapped, wall panel manufacturer's full range.
- D. Samples for Verification: For the following products, prepared on Samples of size indicated below:
 - 1. Fabric: Full-width by approximately **36-inch- (900-mm-)** long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 - 2. Panel Edge: 12-inch- (300-mm-) long Sample(s) showing each edge profile, corner, and finish.
 - 3. Core Material: 12-inch- (300-mm-) square Sample at corner.
 - 4. Mounting Devices: Full-size Samples.
 - 5. Assembled Panels: Approximately 36 by 36 inches (900 by 900 mm), including joints and mounting methods.
- E. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Electrical outlets, switches, and thermostats.
 - 2. Items penetrating or covered by fabric-wrapped wall panels including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Sprinklers.
 - f. Access panels.

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- F. Product Certificates: For each type of fabric-wrapped wall panel, from manufacturer.
- G. Maintenance Data: For fabric-wrapped wall panels to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal recommendations.
- H. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Obtain fabric-wrapped wall panels from single source from single manufacturer.
- B. Fire-Test-Response Characteristics: Provide fabric-wrapped wall panels meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - a. Flame-Spread Index: **25** or less.
 - b. Smoke-Developed Index: **450** or less.
 - 2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to **NFPA 265**.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials, fabrication, and installation.
 - 1. Build mockup of typical wall area **as directed by Architect. Include intersection of wall and ceiling, corners, and perimeters.**
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- D. Pre-installation Conference: Conduct conference at **Project site**.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and fabric-wrapped, wall panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fabric-wrapped wall panels until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is

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complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

- B. Lighting: Do not install fabric-wrapped wall panels until **a permanent level of lighting** is provided on surfaces to receive fabric-wrapped wall panels.
- C. Air-Quality Limitations: Protect fabric-wrapped wall panels from exposure to airborne odors such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify locations of fabric-wrapped wall panels and actual dimensions of openings and penetrations by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 FABRIC-WRAPPED WALL PANELS

- A. Manufacturers: Subject to compliance with requirements, **provide products by one of the following:**
- B. Basis-of-Design Product: Basis of design is AVL Systems, Inc., Acoustech High Impact.
 - 1. Tackable face that is abuse resistant and extremely durable.
 - 2. Dual-density core engineered for exceptional low frequency absorption and high impact resistance.
 - 3. Lightweight for ceiling and wall installations.
 - 4. Fabric: Guilford of Maine FR701-2100 Series as selected of manufacturers 60 colors.
 - 5. Acoustical performance: ATP 1.3; 3-1/8" panel.
- C. Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 - 1. Acoustical Panel Systems (APS, Inc.).
 - 2. Armstrong World Industries.
 - 3. Conwed Designscape; an Owens Corning company.
 - 4. Kinetics Noise Control, Inc.
- D. Fabric-Wrapped Wall Panel: Manufacturer's standard panel construction consisting of facing material **laminated to front face, edges, and back edge border of core.**
 - 1. Mounting: Back mounted with manufacturer's standard **metal clips or bar hangers**, secured to substrate.
 - 2. Core: **Manufacturer's standard.**
 - 3. Edge Profile: Bevel

2.2 MATERIALS

- A. General:

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1. Minimum Recycled Content: Provide fabric-wrapped wall panels with postconsumer recycled content plus one-half of pre-consumer recycled content of percent by weight.
2. Regional Materials: Provide fabric-wrapped wall panels that have been manufactured within 500 miles (800 km) of Project site.
3. Certified Wood: Fabricate products with wood-based components produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

2.3 FABRICATION

- A. General: Use manufacturer's standard construction except as otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- C. Facing Material: Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
- D. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch (1.6 mm) for the following:
 1. Thickness.
 2. Edge straightness.
 3. Overall length and width.
 4. Squareness from corner to corner.
 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated panels, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of fabric-wrapped wall panels.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fabric-wrapped wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with fabric-wrapped, wall panel manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.

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C. Align and level fabric pattern and grain among adjacent panels.

3.3 INSTALLATION TOLERANCES

A. Variation from Plumb and Level: Plus or minus **1/16 inch (1.6 mm)**.

B. Variation of Panel Joints from Hairline: Not more than **1/16 inch (1.6 mm)** wide.

3.4 CLEANING

A. Clip loose threads; remove pills and extraneous materials.

B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

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SECTION 099113 – EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Aluminum (not anodized or otherwise coated).

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

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1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 1. Quantity: Furnish an additional 5 percent, but not less than [1 gal. (3.8 L)] of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Benjamin Moore & Co.
 2. BLP Mobile Paint Manufacturing.
 3. Duron, Inc.

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4. ICI Paints.
5. Kelly-Moore Paints.
6. Porter Paints.
7. PPG Architectural Finishes, Inc.
8. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: **As selected by Architect from manufacturer's full range.**

2.3 METAL PRIMERS

- A. Alkyd Anticorrosive Metal Primer: MPI #79.
- B. Quick-Drying Primer for Aluminum: MPI #95.

2.4 EXTERIOR ALKYD PAINTS

- C. Exterior Alkyd Enamel (semigloss): MPI #94.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

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- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- F. Aluminum Substrates: Remove surface oxidation.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

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1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
2. Testing agency will perform tests for compliance of paint materials with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Non-traffic Surfaces:
 1. Latex Aggregate/Latex System: MPI EXT 3.1 B.
 - a. Prime Coat: Latex stucco and masonry textured coating.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex **semigloss**.
- B. Steel Substrates:
 1. Alkyd System: MPI EXT 5.1D.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel (**gloss**).
- C. Galvanized-Metal Substrates:
 1. Alkyd System: MPI EXT 5.3B.
 - a. Prime Coat: Cementitious galvanized-metal primer.

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- b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
- c. Topcoat: Exterior alkyd enamel (**gloss**).

D. Aluminum Substrates:

- 1. Alkyd System: MPI EXT 5.4F.
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel (**semigloss**).

END OF SECTION 099113

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SECTION 099123 – INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
1. Concrete.
 2. Concrete masonry units (CMU).
 3. Steel.
 4. Galvanized metal.
 5. Aluminum (not anodized or otherwise coated).
 6. Wood.
 7. Gypsum board.
 8. Cotton or canvas insulation covering.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 2. Step coats on Samples to show each coat required for system.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

- A. MPI Standards:
1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

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- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Wall and Ceiling Surfaces: Provide samples of at least **100 sq. ft. (9 sq. m)**.
 - b. Other Items: Architect will designate items or areas required.
 - 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
 - 3. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F (7 deg C)**.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between **50 and 95 deg F (10 and 35 deg C)**.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than **5 deg F (3 deg C)** above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional **5** percent, but not less than [**1 gal. (3.8 L)**] of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

1. Benjamin Moore & Co.
2. BLP Mobile Paint Manufacturing.
3. Duron, Inc.
4. ICI Paints.
5. Kelly-Moore Paints.
6. Miller Paint.
7. Porter Paints.
8. PPG Architectural Finishes, Inc.
9. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
2. Non-flat Paints and Coatings: VOC content of not more than 150 g/L.
3. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
4. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.

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- o. Hexavalent chromium.
- p. Isophorone.
- q. Lead.
- r. Mercury.
- s. Methyl ethyl ketone.
- t. Methyl isobutyl ketone.
- u. Methylene chloride.
- v. Naphthalene.
- w. Toluene (methylbenzene).
- x. 1,1,1-trichloroethane.
- y. Vinyl chloride.

C. Colors: **As selected by Architect from manufacturer's full range.**

2.3 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

- 1. VOC Content: E Range of **E2**.

B. Interior Alkyd Primer/Sealer: MPI #45.

- 1. VOC Content: E Range of [**E1**] [**E2**].

C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.4 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

- 1. VOC Content: E Range of **E2**.

B. Quick-Drying Primer for Aluminum: MPI #95.

- 1. VOC Content: E Range of **E2**.

2.5 WOOD PRIMERS

A. Interior alkyd primer sealer: MPI #45.

- 1. VOC Content: E Range of **E2**.

2.6 LATEX PAINTS

A. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).

- 1. VOC Content: E Range of [**E1**] [**E2**] [**E3**].

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2.7 ALKYD PAINTS

- A. Interior Alkyd (Flat): MPI #49 (Gloss Level 1).
 - 1. VOC Content: E Range of **E2**.
- B. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).
 - 1. VOC Content: E Range of **E2**.
- C. Interior Alkyd (Gloss): MPI #48 (Gloss Level 6).
 - 1. VOC Content: E Range of **E2**.

2.8 ALUMINUM PAINT

- A. Aluminum Paint: MPI #1.
 - 1. VOC Content: E Range of [**E1**] [**E2**] [**E3**].

2.9 FLOOR COATINGS

- A. Exterior/Interior Alkyd Floor Enamel (Gloss): MPI #27 (Gloss Level 6).
 - 1. VOC Content: E Range of **E2**.
 - 2. Additives: Manufacturer's standard additive to increase skid resistance of painted surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

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3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- G. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

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- K. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- L. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.
- M. Spray-Textured Ceiling Substrates: Do not begin paint application until surfaces are dry.
- N. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
 - 1. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Tanks that do not have factory-applied final finishes.
 - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

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- a. Switchgear.
- b. Panelboards.
- c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency will perform tests for compliance with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Non-traffic Surfaces:
 1. Latex Over Latex Aggregate System: MPI INT 3.1B.
 - a. Prime Coat: Latex stucco and masonry textured coating.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex **semigloss**.
- B. Concrete Substrates, Traffic Surfaces:
 1. Alkyd Floor Enamel System: MPI INT 3.2B.

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- a. Prime Coat: Exterior/interior alkyd floor enamel (gloss).
- b. Intermediate Coat: Exterior/interior alkyd floor enamel (gloss).
- c. Topcoat: Exterior/interior alkyd floor enamel (gloss).

C. Steel Substrates:

1. Alkyd System: MPI INT 5.1E.
 - a. Prime Coat: **Alkyd anticorrosive** metal primer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd (**semigloss**).
2. Aluminum Paint System: MPI INT 5.1M.
 - a. Prime Coat: **Alkyd anticorrosive** metal primer.
 - b. Intermediate Coat: Aluminum paint.
 - c. Topcoat: Aluminum paint.

D. Galvanized-Metal Substrates:

1. Alkyd System: MPI INT 5.3C.
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd (**semigloss**).

E. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Latex System: MPI INT 5.4H.
 - a. Prime Coat: Quick-drying primer for aluminum.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (**semigloss**).

F. Dressed Lumber Substrates:

1. Alkyd System: MPI INT 6.3B.
 - a. Prime Coat: Interior alkyd primer/sealer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd (**semigloss**).

G. Wood Panel Substrates: Including **painted plywood, medium-density fiberboard, and hardboard.**

1. Alkyd System: MPI INT 6.4B.
 - a. Prime Coat: Interior alkyd primer/sealer.
 - b. Intermediate Coat: Interior alkyd matching topcoat.
 - c. Topcoat: Interior alkyd (**semigloss**).

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- H. Gypsum Board Substrates:
 - 1. Latex System: MPI INT 9.2A.
 - a. Prime Coat: Interior latex **primer/sealer**.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (**low sheen**).

- I. Cotton or Canvas Insulation-Covering Substrates: Including **pipe and duct coverings**.
 - 1. Latex System: MPI INT 10.1A.
 - a. Prime Coat: Interior latex **primer/sealer**.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (**semigloss**) [(**gloss**)].

END OF SECTION 099123

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SECTION 099600 – HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and application of high-performance coating systems on the following substrates:
 - 1. Interior Substrates:
 - a. Concrete masonry units (CMU).

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of finish-coat product indicated.
- C. Samples for Verification: For each type of coating system and in each color and gloss of finish coat indicated.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.
- E. LEED Submittals: For Credit EQ 4.2, manufacturers' product data for coatings, including printed statement of VOC content and chemical components.

1.3 QUALITY ASSURANCE

- A. Master Painters Institute (MPI) Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and coating systems indicated.
- B. Mockups: Apply benchmark samples of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each type of coating and substrate.

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- a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
 3. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 1. Quantity: Furnish an additional 5 percent, but not less than [1 gal. (3.8 L)] of each material and color applied.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
 1. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. Provide products of same manufacturer for each coat in a coating system.
- B. Chemical Components of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:

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1. Flat Paints and Coatings: VOC content of not more than 50 g/L.
2. Nonflat Paints and Coatings: VOC content of not more than 150 g/L.
3. Anticorrosive Coatings: VOC content of not more than 250 g/L.
4. Stains: VOC content of not more than 250 g/L.
5. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing 1 or more benzene rings).
6. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Naphthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.

C. Colors: **As selected by Architect from manufacturer's full range.**

2.2 BLOCK FILLERS

A. Interior/Exterior Latex Block Filler: MPI#4.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Benjamin Moore & Co.; Moorcraft, Super Craft Latex Block Filler, 285-01.
 - b. Bennette Paint Mfg. Co., Inc.; Int/Ext Acrylic Latex Block Filler, 32-4.
 - c. Cloverdale Paint; Latex Block Filler, 5700.
 - d. Columbia Paint & Coatings; High Performance, Int/Ext Acrylic Latex Block Filler, 05-055-PP.
 - e. Coronado Paint; Super Kote 5000, Commercial Latex Block Filler, 946-11.

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- f. Flex Bon Paints; Int.-Ext. 100% Acrylic Block Filler, 1151.
- g. General Paint; Block Filler, 70-224.
- h. **ICI Paints; Prep-N-Prime, Block Filler, 3010.**
- i. Kelly-Moore Paints; Fill and Prime Acrylic Block Filler, 521.
- j. Kwil-Howells Paint; Accu-Pro, Blok-Fil, 5890.
- k. Miller Paint; Ext. Block Filler, 6015.
- l. PARA Paints; Commercial Latex Block Filler, 5792.
- m. PPG Architectural Finishes, Inc.; **Interior/Exterior Latex Block Filler, 6-12.**
- n. Sherwin-Williams Company (The); PrepRite, Int/Ext Block Filler, B25W25.

2. VOC Content: Minimum E Range of **E2**.

2.3 EPOXY COATINGS

- A. Water-Based Epoxy (Interior and Exterior): MPI #115.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Benjamin Moore & Co.; Acrylic Epoxy Gloss "A", Hardener "B", M43/M44.
 - b. BLP Mobile Paint Manufacturing Company, Inc.; Mo-PoxY H2O-200; Waterborne Epoxy -White, 69-AW-6.
 - c. **ICI Paints; Devoe Coatings, Tru Glaze WB Epoxy Gloss Coating, 4408.**
 - d. Kelly-Moore Paints; Envira-Poxy, 7100.
 - e. Miller Paint; **Waterborne Epoxy Gloss, 4300/4440.**
 - f. Porter Paints; Dura-Glaze WB, Gloss Epoxy, 9371.
 - g. PPG Architectural Finishes, Inc.; Aquapon, Waterborne Epoxy, 98-1/98-98.
 - h. Sherwin-Williams Company (The); Industrial & Marine, Water Based Catalyzed Epoxy, B70W Series.
3. VOC Content: Minimum E Range of **E2**.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Masonry (Clay and CMU): 12 percent.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 4. Coating application indicates acceptance of surfaces and conditions.

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3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 1. Clean surfaces with pressurized water. Use pressure range of **1500 to 4000 psi (10 350 to 27 580 kPa) at 6 to 12 inches (150 to 300 mm)**.
 - 2. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
- E. CMU Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

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- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance with specified requirements.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Concrete Substrates, Vertical Surfaces:
 - 1. Water-Based Epoxy Coating System:
 - a. Prime Coat: Water-based epoxy (interior and exterior), MPI #115.
 - b. Intermediate Coat: **Water-based epoxy (interior and exterior), MPI #115.**
 - c. Topcoat: Water-based epoxy (interior and exterior), MPI #115.
- B. CMU Substrates:
 - 1. Water-Based Epoxy Coating System:

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- a. Prime Coat: Interior/exterior latex block filler, MPI #4.
- b. Intermediate Coat: **Water-based epoxy (interior and exterior), MPI #115.**
- c. Topcoat: Water-based epoxy (interior and exterior), MPI #115.

END OF SECTION 099600

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SECTION 101100 – VISUAL DISPLAY BOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Porcelain enamel markerboards.
 2. Vinyl-fabric-faced cork tackboards.

1.2 SUBMITTALS

- A. Product Data: For each type of visual display board indicated.
- B. Shop Drawings: For each type of visual display board required.
1. Include dimensioned elevations. Show location of joints between individual panels where unit dimensions exceed maximum panel length.
 2. Include sections of typical trim members.
 3. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and textures available for the following:
1. Chalkboards and Markerboards: Actual sections of porcelain enamel finish for each type of chalkboard and markerboard required.
 2. Vinyl-Fabric-Faced Cork Tackboards: Fabric swatches for each type of vinyl-fabric-faced cork tackboard indicated.
- D. Samples for Verification: Of the following products, showing color and texture or finish selected. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected. Prepare Samples from the same material to be used for the Work.
1. Visual Display Boards: Sample panels not less than **8-1/2 by 11 inches (215 by 280 mm)**, mounted on the substrate indicated for the final Work. Include a panel for each type, color, and texture required.
 2. Aluminum Trim and Accessories: Samples of each finish type and color, on **6-inch-(150-mm-)** long sections of extrusions and not less than **4-inch (100-mm)** squares of sheet or plate. Include Sample sets showing the full range of color variations expected.
- E. Product Certificates: Signed by manufacturers of tackboards certifying that vinyl-fabric-faced cork tackboard materials furnished comply with requirements specified for flame-spread ratings.

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1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who is an authorized representative of chalkboard manufacturer for both installation and maintenance of the type of sliding chalkboard units required for this Project.
- B. Source Limitations: Obtain visual display boards through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide vinyl-fabric-faced tackboards with the following surface-burning characteristics as determined by testing assembled materials composed of facings and backings identical to those required in this Section per ASTM E 84 by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify vinyl-fabric-faced tackboards with appropriate markings of applicable testing and inspecting agency.
 - 1. Flame Spread: 25 or less.
 - 2. Smoke Developed: 10 or less.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify field measurements before preparation of Shop Drawings and before fabrication to ensure proper fitting. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating chalkboards without field measurements. Coordinate wall construction to ensure actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
 - 1. Porcelain Enamel Markerboards:
 - a. Best-Rite Chalkboard Co.
 - b. Carolina Chalkboard Co.
 - c. Claridge Products and Equipment, Inc.
 - d. Ghent Manufacturing, Inc.
 - e. Greensteel, Inc.
 - f. Lemco, Inc.
 - g. Marsh Chalkboard Company.

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- h. Nelson Adams Company.
 - i. Platinum Visual Systems.
2. Tackboards:
- a. Best-Rite Chalkboard Co.
 - b. Carolina Chalkboard Co.
 - c. Claridge Products and Equipment, Inc.
 - d. Ghent Manufacturing, Inc.
 - e. Greensteel, Inc.
 - f. Lemco, Inc.
 - g. Marsh Chalkboard Company.
 - h. Nelson Adams Company.
 - i. Platinum Visual Systems.

2.2 MATERIALS

- A. Porcelain Enamel Chalkboards and Markerboards: Balanced, high-pressure-laminated, porcelain enamel chalkboards of 3-ply construction consisting of face sheet, core material, and backing.
- 1. Face Sheet: **0.024-inch (0.61-mm)** enameling grade steel especially processed for temperatures used in coating porcelain on steel. Coat exposed face and edges with a 3-coat process consisting of primer, ground coat, and color cover coat. Coat concealed face with a 2-coat process consisting of primer and ground coat. Fuse cover and ground coats to steel at manufacturer's standard firing temperatures, but not less than **1200 deg F (649 deg C)**.
 - a. Cover Coat: Provide manufacturer's standard, light-colored, special writing surface with gloss finish intended for use with erasable dry markers.
 - 2. Core: **3/8-inch- (9.5-mm-)** thick, particleboard core material complying with requirements of ANSI A208.1, Grade 1-M-1.
 - 3. Backing Sheet: **0.018-inch- (0.46-mm-)** thick, galvanized steel sheet backing.
 - 4. Laminating Adhesive: Manufacturer's standard, moisture-resistant, thermoplastic-type adhesive.
- B. Vinyl-Fabric-Faced Tackboards: Mildew-resistant, washable vinyl fabric complying with FS CCC-W-408, Type II, weighing not less than **13 oz./sq. yd. (440 g/sq. m)**, laminated to **1/4-inch- (6.4-mm-)** thick cork sheet. Provide fabric with a flame-spread rating of 25 or less when tested according to ASTM E 84. Provide color and texture as scheduled or as selected from manufacturer's standards.
- 1. Backing: Factory laminate cork face sheet under pressure to **1/4-inch- (6.4-mm-)** thick hardboard backing.

2.3 ACCESSORIES

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- A. Metal Trim and Accessories: Fabricate frames and trim of not less than **0.062-inch- (1.57-mm-)** thick, extruded-aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units. Keep joints to a minimum. Miter corners to a neat, hairline closure.
1. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
 2. Chalktray: Manufacturer's standard, continuous, box-type, aluminum chalktray with slanted front and cast-aluminum end closures for each chalkboard.
 3. Map Rail: Furnish map rail at top of each unit, complete with the following accessories:
 - a. Display Rail: Provide continuous cork display rail approximately **1 or 2 inches (25 or 50 mm)** wide, as indicated, integral with map rail.
 - b. End Stops: Provide one end stop at each end of map rail.
 - c. Map Hooks: Provide 2 map hooks for every **48 inches (1220 mm)** of map rail or fraction thereof.
 - d. Flag Holder: Provide one flag holder for each room.

2.4 FABRICATION

- A. Porcelain Enamel Chalkboards: Laminate facing sheet and backing sheet to core material under pressure with manufacturer's recommended flexible, waterproof adhesive.
- B. Assembly: Provide factory-assembled chalkboard and tackboard units, unless field-assembled units are required.
1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
 2. Provide manufacturer's standard vertical joint system between abutting sections of chalkboards.
 3. Provide manufacturer's standard mullion trim at joints between chalkboards and tackboards.

2.5 FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 607.1.

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine wall surfaces, with Installer present, for compliance with requirements and other conditions affecting installation of visual display boards.
 - 1. Surfaces to receive chalkboards or markerboards shall be free of dirt, scaling paint, and projections or depressions that would affect smooth, finished surfaces of chalkboards or markerboards.
 - 2. Surfaces to receive tackboards shall be dry and free of substances that would impair the bond between tackboards and substrate.
 - 3. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Deliver factory-built visual display boards completely assembled in one piece without joints, where possible. If dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.
- B. Install units in locations and at mounting heights indicated and according to manufacturer's written instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- C. Natural-Slate Chalkboards: Align and level joints between adjoining panels and apply manufacturer's recommended joint filler compound. Hone and finish joints to a continuous even plane.
- D. Coordinate Project-site-assembled units with grounds, trim, and accessories. Join parts with a neat, precision fit.

3.3 ADJUSTING AND CLEANING

- A. Verify that accessories required for each unit have been properly installed and that operating units function properly.
- B. Clean units according to manufacturer's written instructions.

END OF SECTION 101100

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SECTION 101400 – SIGNS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following types of signs:

1. Panel signs.

1.2 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Develop a sign schedule for the project. The schedule shall use door numbers from the floor plans. The schedule shall be in chart form and shall have empty columns for each door with a space for the Owner to write desired sign message. One column shall be labeled “Room Number” and another column labeled “Sign Message”.
- C. Product data for each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- D. Samples: Provide the following samples of each sign component for initial selection of color, pattern and surface texture as required and for verification of compliance with requirements indicated.
1. Samples for initial selection of color, pattern, and texture:
- a. Cast Acrylic Sheet and Plastic Laminate: Manufacturer's color charts consisting of actual sections of material including the full range of colors available for each material required.
2. Samples for verification of color, pattern, and texture selected and compliance with requirements indicated:
- a. Cast Acrylic Sheet and Plastic Laminate: Provide a sample panel not less than 8-1/2 inches by 11 inches for each material, color, texture, and pattern required. On each panel include a representative sample of the graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.

1.3 QUALITY ASSURANCE

- A. Signage shall consist of room number and room function to meet the requirements of the Americans with Disabilities Act – 1990 and ANSI A117.1-1986

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Specifications are based on products from Mohawk Systems, P. O. Box 966, Schenectady, NY 12301-0966. (518) 370-3433 or Fax (518) 370-3332; Series 200A, Sand Carved Design M308B. Also approved are:
 - a. Best Manufacturing Company – Graphite Blast
 - b. Multi-Graphics
 - c. The Southwell Company – Image Carved ADA Signs

2.2 MATERIALS

- A. All signs shall be manufactured using Graphic Process Series 200A – Sand Carved.
1. Tactile characters/symbols shall be raised the required 1/32” inches from sign face. Glue on letters are not acceptable.
 2. All text shall be accompanied by Grade 2 Braille.
 3. Perimeter borders shall be 3/8” minimum.
- B. Plaque material shall be melamine plastic laminate, approximately 1/8” thick with contrasting core color. The melamine shall be non-static, fire-retardant and self-extinguishing. The plastic laminate will be impervious to most acids, alkalies, alcohol, solvents, abrasives, and boiling water.
- C. Letterform shall be Universe 67 upper case or other sans serif of simple serif letterforms.

2.3 FASTENERS

- A. Fasteners: Use stainless steel concealed fasteners.

2.4 ANCHORS AND INSERTS

- A. Anchors and Inserts: Use nonferrous metal or hot-dipped 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.

PART 3 - EXECUTION

3.1 INSTALLATION

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- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.

3.2 CLEANING AND PROTECTION

- A. At completion of the installation, clean soiled sign surfaces in accordance with the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

3.3 SIGN SCHEDULE

ROOM #	SIGN COPY	SIGN TYPE	NUMBER OF SIGNS
ADMIN ADDITION			
A133	ELECTRICAL	C	1
A134	WORK	C	1
A136	STORAGE	C	1
A137		A4	1
A138		B	1
A139		B	1
A140		A4	1
A141		B	1
A143		B	1
A144		A4	1
A145		B	1
A146		B	1
A147		B	1
A148		B	1
A149		B	3
A151		B	1
A152		B	1
A153	ROOF ACCESS	C	2
A154	DATA	C	1
GYMNASIUM BUILDING			
C101	DATA	C	1
C102		B	1
C103		A4	1
C104		A4	1
C105		A4	1
C106		A4	1
C107		A4	1
C108		A4	1
C109	STORAGE	C	1

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ROOM #	SIGN COPY	SIGN TYPE	NUMBER OF SIGNS
C110	JANITOR	C	1
C111	ROOF ACCESS	C	1
C112	STORAGE	C	1
C113	GYMNASIUM	C	3
C114	STORAGE	C	1
C115	ELECTRICAL	C	1
C116	STAGE	C	1
C117	RAMP	C	1
C118	STORAGE	C	1
C119	STORAGE	C	1
C120	CLASSROOM BUILDING	C	1
C121	GYMNASIUM	C	1
KITCHEN BUILDING			
K100	FOOD SERVICE	C	2
K101	KITCHEN	C	1
K103	OFFICE	C	1
K104		A4	1
K105	LOCKER / TOILET	C	1
K106	JANITOR	C	1
K107	LAUNDRY	C	1
K108	DRY STORAGE	C	1
K109	COOLER / FREEZER	C	1

END OF SECTION 101400

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SECTION 102800 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Toilet and bath accessories.
2. Warm-air dryers.

1.2 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.
- D. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

1.3 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer.
- B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule. Product selections are Bradley.
 1. Products of Bobrick and ASI with equal characteristics may be provided.

1.4 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16 (ASTM B 16M), rods, shapes, forgings, and flat products with finished edges; ASTM B 30, castings.
- C. Sheet Steel: ASTM A 366/A 366M, cold rolled, commercial quality, 0.0359-inch (0.9-mm) minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).
- E. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
- F. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- G. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.2 FABRICATION

- A. General: One, maximum 1-1/2-inch- (38-mm-) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- C. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 - 1. Provide galvanized steel backing sheet, not less than 0.034 inch (0.85 mm) and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.

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- D. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
 - 1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

- A. Toilet Tissue Dispenser
 - 1. Jumbo Roll Toilet Tissue Dispenser: Fabricate cabinet and mounting plate of 18-8, type 304, 20-gage stainless steel with satin finish. Provide tumbler lock. Fabricate door of 18-8, type 304, 18-gage stainless steel with satin finish and drawn, one-piece, seamless construction. Provide wide viewing slot to reveal toilet tissue supply inside cabinet. Fabricate dispensing mechanism of high-impact rigid vinyl. Dispensing mechanism shall be chemical resistant and flame-retardant.
 - 2. Standard of Quality: Bradley Model PS900869 stainless steel twin 9-inch Jumbo Roll Toilet Tissue Dispenser.>

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- B. Paper Towel Dispenser: Provide stainless-steel paper towel dispenser complying with the following:
1. Products: Bradley Model 250-15.
 2. Surface-Mounted Type: Sized for minimum of 300 C-fold or 400 multifold paper towels without using special adapters; with hinged front equipped with tumbler lockset; and with refill indicators that are pierced slots at sides or front.
- C. Grab Bar: Provide stainless-steel grab bar complying with the following:
1. Mounting: Concealed with manufacturer's standard flanges and anchors.
 2. Gripping Surfaces: Smooth, satin finish.
 3. Outside Diameter: 1-1/4 inches (32 mm).
- D. Sanitary Napkin Disposal Unit: Provide stainless-steel sanitary napkin disposal unit complying with the following:
1. Products: Bradley Model 4722-15.
 2. Surface-Mounted Type: With seamless exposed walls; self-closing top cover; locking bottom panel with stainless-steel, continuous hinge; and removable, reusable receptacle.
- E. Mirror Unit: Provide mirror unit complying with the following:
1. Products: Bradley Model 780.
 2. Stainless-Steel, Angle-Framed Mirror: Fabricate frame from minimum nominal 0.05-inch- (1.3-mm-) thick stainless-steel angles, with square corners mitered, welded, and ground smooth.
- F. Shower Curtain Rod: Provide stainless-steel shower curtain rod with 3-inch (75-mm) stainless-steel flanges designed for exposed fasteners, in length required for shower opening indicated, and complying with the following:
1. Products: Bradley Model 9531.
 2. Heavy-Duty Rod: 1-1/4-inch (32-mm) OD; fabricated from nominal 0.05-inch- (1.3-mm-) thick stainless steel.
- G. Soap Dish: Provide stainless steel recessed soap dish.
1. Products: Bradley Model 9401 in concrete masonry walls and Model 9403 in steel stud framed walls.
- H. Shower Curtain: Provide shower curtain complying with the following:
1. Products: Bradley Model 9534.
 2. Duck Shower Curtain: Minimum 8-oz. (227-g), white, 100 percent cotton duck material with hemmed edges and corrosion-resistant grommets at minimum 6 inches (152 mm) o.c. through top hem.
 3. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

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- I. Robe Hook: Provide robe hook complying with the following:
1. Products: Bradley Model 932.
 2. Double-Prong Unit: Stainless-steel, double-prong robe hook with rectangular wall bracket and backplate for concealed mounting.
- J. Mop and Broom Holder: Provide mop and broom holder complying with the following:
1. Products: Bradley Model 9983.
 2. Mop and Broom Holder with Utility Shelf: 36-inch- (914-mm-) long unit fabricated of minimum nominal 0.05-inch- (1.3-mm-) thick stainless steel with shelf; support brackets for wall mounting; three hooks for wiping rags; four spring-loaded, rubber hat, cam-type, mop/broom holders mounted on front of shelf; and approximately 1/4-inch- (6-mm-) diameter, stainless-steel rod suspended beneath shelf for drying rags.
- K. Warm-Air Dryer: Provide one of the following in stainless steel warm-air dryer:
1. American Dryer, Extremeair.
 2. Dyson Airblade V.
 3. Xlerator XL-SB.

3.4 TOILET AND BATH ACCESSORY SCHEDULE

Room #	Mirror	Toilet Tissue Dispenser	Electric Hand Dryer	Napkin Disposal	Paper Towel Dispenser	Grab Bar	Mop & Broom Holder	Shower Rod & Curtain	Soap Dish	Robe Hook
GRAB BARS: L = L-SHAPED; S = PAIR STRAIGHT; U = U-SHAPED										
ADMIN ADDITION										
A137	1	1	1	1	1	1L				1
A140	1	1	1	1	1	1L				1
A144	1	1	1	1	1	1L				1
GYMNASIUM BUILDING										
C103	1	1	1	1	1	1L				1
C104	1	1	1	1	1	1L				1
C105	1	1	1	1	1	1L				1
C106	1	1	1	1	1	1L				1
C107	1	1	1	1	1	1L				1

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Room #	Mirror	Toilet Tissue Dispenser	Electric Hand Dryer	Napkin Disposal	Paper Towel Dispenser	Grab Bar	Mop & Broom Holder	Shower Rod & Curtain	Soap Dish	Robe Hook
C108	1	1	1	1	1	1L				1
C110							1			1
KITCHEN BUILDING										
K104	1	1	1	1	1	1L				1

END OF SECTION 102800

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SECTION 104416 – FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, **hand-carried** fire extinguishers, **mounting brackets for fire extinguishers and cabinets.**
- B. Symbols:
 - 1. FEC 1: Cabinet with Multipurpose Dry Chemical Extinguisher. (multipurpose)
 - 2. FEC 2: Cabinet with Carbon Dioxide Extinguisher. (electrical fires)
 - 3. FEC 3: Cabinet with Dry Chemical Extinguisher. (Kitchen fires)
 - 4. FE 1: Bracket Mounted Multipurpose Dry Chemical Extinguisher. (multipurpose)
 - 5. FE 2: Bracket Mounted Carbon Dioxide Extinguisher. (electrical fires)
 - 6. FE 3: Bracket Mounted Dry Chemical Extinguisher. (kitchen fires)

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher **and mounting brackets.**
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

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- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

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

1. Amerex Corporation.
2. Ansul Incorporated.
3. Badger Fire Protection.
4. Buckeye Fire Equipment Company.
5. Fire End & Croker Corporation.
6. Guardian Fire Equipment, Inc.
7. JL Industries, Inc.; a division of the Activar Construction Products Group.
8. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
9. Larsens Manufacturing Company.
10. Moon American.
11. Nystrom Building Products.
12. Pem All Fire Extinguisher Corp.
13. Potter Roemer LLC.
14. Pyro-Chem; Tyco Safety Products.
15. Strike First Corporation of America.

- B. Valves, Handles and Levers, and Instruction Labels:

1. Valves: **Nickel-plated, polished-brass body.**
2. Handles and Levers: **Stainless steel.**
3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, **and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.**

- C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated **2-A:10-B:C, 5-lb (2.3-kg)** nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

- D. Purple-K Dry-Chemical Type in Brass Container: UL-rated **80-B:C, 10-lb (4.5-kg)** nominal capacity, with potassium bicarbonate-based dry chemical in chrome-plated-brass container.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard **galvanized** steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or **black** baked-enamel finish.

- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

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1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: [**Vertical**] [**Horizontal**].

2.4 FIRE EXTINGUISHER CABINETS

- A. Cabinet Material: **Steel sheet**.
- B. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
 1. Rolled-Edge Trim: [**2-1/2-inch (64-mm)**] [**4-inch (102-mm)**] [**4-1/2-inch (114-mm)**].
- C. Cabinet Trim Material: **Aluminum sheet**.
- D. Door Material: **Aluminum sheet**.
- E. Door Style: **Center glass panel with frame**.
- F. Door Glazing: **Tempered float glass (clear)**.
- G. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 1. Provide **recessed door pull and friction latch**.
 2. Provide **continuous hinge, of same material and finish as trim**, permitting door to open 180 degrees.
- H. Accessories:
 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
 - a. Identify fire extinguisher in fire protection cabinet with the words "**FIRE EXTINGUISHER**."
 - 1) Location: Applied to **cabinet door**.
 - 2) Application Process:
 - 3) Lettering Color: **Red**.
 - 4) Orientation: **Vertical**.
- I. Finishes:

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1. Aluminum: **Clear anodic – all exterior surfaces.**
2. Steel: **Baked enamel or powder coat interior of cabinet.**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers [**and mounting brackets**] in locations indicated and in compliance with requirements of authorities having jurisdiction.
 1. Mounting Brackets: **54 inches (1372 mm)** above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

3.3 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturers' written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104416

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SECTION 107300 – ALUMINUM WALKWAY COVERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Design, fabrication, and installation of welded extruded aluminum walkway cover systems.
- B. Products Furnished but not Installed Under this Section: Column sleeves (styrofoam blockouts) or anchor bolts (if required)

1.02 REFERENCES

- A. The Aluminum Association (AA):
 - 1. The Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum.
 - 2. AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 - 3. AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- C. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7, Minimum Design Loads for Buildings and Other Structures.
- D. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 209, Specification for Aluminum and Aluminum- Alloy Sheet and Plate.
 - 2. ASTM B 221, Specification for Aluminum and Aluminum- Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. ASTM C 150, Specification for Portland Cement.
 - 4. ASTM C 404, Specification for Aggregates for Masonry Grout.
- E. American Welding Society (AWS):
 - 1. ANSI/AWS D1.2, Structural Welding Code - Aluminum.

1.03 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Design Walkways in accordance with The Aluminum Design Manual 2000.
 - 2. Comply with the wind requirements of ASCE 7.
 - 3. Provide an all welded extruded aluminum system complete with internal drainage. Non-welded systems are not acceptable.
 - 4. Provide expansion joints to accommodate temperature changes of 120 degrees F. Provide expansion joints with no metal to metal contact.

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- B. Performance Requirements:
 - 1. Grout: Compressive strength of 2000 psi, minimum.

1.04 SUBMITTALS

- A. Product Data: Manufacturer’s product information, specifications, and installation instructions for walkway cover components and accessories.
- B. Shop Drawings: Include plan dimensions, elevations, and details.
- C. Samples:
 - 1. Selection: Manufacturer’s standard range of colors for the finishes selected.
 - 2. Verification: 2-inch-square samples of each finish selected on the substrate specified.
- D. Design Data: Design calculations bearing the seal of a Registered Professional Engineer, licensed in the state where the project is located. Design calculations shall state that the walkway cover system design complies with the wind requirements of ASCE 7, the stability criteria of applicable building code, and all other governing criteria.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: At least ten years experience in the design, fabrication, and erection of extruded aluminum walkway cover systems.
- B. Installer Qualifications: Have walkway covers installed by manufacturer, third party installation is not acceptable.

PART 2 – PRODUCT

2.01 MANUFACTURERS

- A. The design is based on products fabricated by: Peachtree Protective Covers, Inc., 3255 South Sweetwater Rd., Lithia Springs, GA 30122, 770-439-2120, fax 770-439-2122.
 - 1. Comparable products by the following manufacturers also will be acceptable:
 - a. Dittmer Architectural Aluminum
 - b. Avadek Walkway Cover Systems
 - 2. Substitutions: Comparable products of other manufacturers will be considered under standard substitution procedures.

2.02 MATERIALS

- A. Aluminum Members: Extruded aluminum, ASTM B 221, 6063 alloy, T6 temper.
- B. Fasteners: Aluminum, 18-8 stainless steel, or 300 series stainless steel.
- C. Protective Coating for Aluminum Columns Embedded in Concrete: Clear acrylic.
- D. Grout:

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1. Portland Cement: ASTM C 150, Type I.
2. Sand: ASTM C 404.
3. Water: Potable.

E. Gaskets: Dry seal santoprene pressure type.

F. Aluminum Flashing: ASTM B 209, Type 3003 H14, 0.040 inch, minimum.

2.03 MIXES

A. Grout: 1-part portland cement to 3 parts sand, add water to produce a pouring consistency.

2.04 FABRICATION

A. General:

1. Shop Assembly: Assemble components in shop to greatest extent possible to minimize field assembly.
2. Welding: In accordance with ANSI/AWS D1.2.
3. Bent Construction: Factory assemble beams to columns to form one-piece rigid bents. Where used make welds smooth and uniform using an inert gas shielded arc. Perform suitable edge preparation to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints can be used if supported by engineering calculations and/or testing.
4. Deck Construction: Fabricate from extruded modules that interlock in a self-flashing manner. Positively fasten interlocking joints creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Assemble deck with sufficient camber to offset dead load deflection.

B. Columns: Provide radius-cornered tubular extrusions with cutout and internal diverter for drainage where indicated. Circular downspout opening in column not acceptable.

C. Beams: Provide open-top tubular extrusion, top edges thickened for strength and designed to receive deck members in self-flashing manner.

D. Deck: Extruded self-flashing sections interlocking into a composite unit. Provide welded plate closures at deck ends.

E. Fascia: Manufacturer's standard shape. Provide fascia splices where continuous runs of fascia are jointed. Locate splices to be in line with bents and fasten in place on hidden or non-vertical surfaces.

F. Arches: For barrel vault protective covers, provide sharp-cornered tubular extrusions.

G. Factory Finishing: Finish designations prefixed by AA comply with system established by the AAMA for designating aluminum finishes.

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- H. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.4 mils to 0.7 mils thick), complying with AAMA 611.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Verification of Conditions: Verify that all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.02 ERECTION

- A. Erect protective cover true to line, level, and plumb. Protect aluminum columns embedded in concrete with clear acrylic. Fill downspout columns with grout to the discharge level to prevent standing water. Install weep holes at top of concrete in non-draining columns to remove condensation.
- B. Provide hairline miters and fitted joints.

3.03 CLEANING

- A. Clean all protective cover components promptly after installation.

3.04 PROTECTION

- A. Protect materials during and after installation.

END OF SECTION 107300

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SECTION 107516 – GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes ground-set flagpoles made from **aluminum**.
- B. Owner-Furnished Material: Flags.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Shop Drawings: For flagpoles.
 - 1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
 - 2. Include section, and details of foundation system.
- C. Samples for Verification: For each type of exposed finish, in manufacturer's standard sizes.
- D. Delegated-Design Submittal: For flagpoles.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

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2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design flagpole assemblies.
- B. Seismic Performance: Flagpole assemblies shall withstand the effects of earthquake motions determined according to [ASCE/SEI 7] <Insert requirement>.
- C. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.
 - 1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is <Insert wind speed>.
 - 2. Base flagpole design on [polyester] [nylon or cotton] flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

2.3 ALUMINUM FLAGPOLES

- A. Aluminum Flagpoles: [Cone] [Entasis]-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of **3/16 inch (4.8 mm)**.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acme/Lingo Flagpoles, LLC.
 - b. American Flagpole.
 - c. Baartol Company.
 - d. Concord Industries, Inc.
 - e. Eder Flag Manufacturing Company, Inc.
 - f. Ewing Flagpoles.
 - g. Morgan-Francis Flagpoles and Accessories.
 - h. Pole-Tech Company Inc.
 - i. U.S. Flag & Flagpole Supply, LP.
- B. Exposed Height: **30 feet.**
- C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
 - 1. Fabricate shop and field joints without using fasteners, screw collars, or lead caulking.
 - 2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
 - 3. Flashing Collar: Same material and finish as flagpole.
- D. Sleeve for Aluminum Flagpole: [Fiberglass] [or] [PVC pipe] foundation sleeve, made to fit flagpole, for casting into concrete foundation.
 - 1. Flashing Collar: Same material and finish as flagpole.

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E. Cast-Metal Shoe Base: Made from aluminum **with same finish and color as flagpoles** for anchor-bolt mounting; furnish with anchor bolts.

1. Furnish ground spike.

2.4 FITTINGS

A. Finial Ball: Flush-seam ball to match flagpole-butt diameter.

1. **0.063-inch (1.6-mm)** spun aluminum, **finished to match flagpole**.

B. External Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous **5/16-inch- (8-mm-) diameter, braided polypropylene halyard** and **9-inch (228-mm)** cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

1. Halyards and Cleats: **Two** at each flagpole.

2. Halyard Flag Snaps: **Stainless-steel** swivel snap hooks. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

B. Sand: ASTM C 33/C 33M, fine aggregate.

C. Elastomeric Joint Sealant: **Single-component neutral-curing silicone** joint sealant complying with requirements in Section 079200 "Joint Sealants."

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.6 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, [AA-M12C22A41] [AA-M12C22A31].

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

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- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
- D. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.
- E. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.
- F. Place concrete, as specified in **Section 033000 "Cast-in-Place Concrete."** Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.
- G. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where indicated and according to **Shop Drawings and** manufacturer's written instructions.
- B. Foundation Tube: Place flagpole in tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a **2-inch (50-mm)** layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 107516

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PHASE 4 – KITCHEN FOOD SERVICE EQUIPMENT**

SECTION 114000 – FOOD SERVICE EQUIPMENT

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. Extent of food service equipment work indicated on drawings and by provisions of this Section, including schedules and equipment lists associated with either drawings or this Section.

1.02 RELATED DOCUMENTS

- A. Section 017700 – Closeout Procedures for video record of instruction and maintenance requirements.
- B. Refer to Division-22 sections for required drain traps, steam traps, atmospheric vents, valves, pipes and pipe fittings, ductwork, and other materials necessary to complete mechanical hookup of food service equipment; not work of this Section.
- C. Refer to Division-27 sections for wiring, disconnects, and other materials necessary to complete electrical hookup of food service equipment; not work of this Section.

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of food service equipment of types, capacities, and sizes required, whose products in satisfactory use in similar service for min. 5 years.
- B. Installer's Qualifications: Firm with min. 3 years of successful installation experience on projects with food service equipment similar to that required for Project.
- C. **Request for all substitutions must be submitted by mail or hand delivered no later than fifteen (15) days prior to bid date.** It is intended for the plan drawings and written documents to qualify minimum quantity and performance standards, which if met or are exceeded may qualify such equipment as an acceptable alternate source. The Architect/Consultant will determine if an item of equipment submitted as an alternate to those listed in the documents is an acceptable substitute. See 1.04 (A) for Submittal Instructions. **It is the responsibility of the FSEC to verify that any and all equipment items submitted for review as alternate(s) correspond and coordinate with the project drawings and specifications. Any project cost(s) incurred for structural, physical size, mechanical or electrical alterations to accommodate variances in approved alternate equipment will be the responsibility of Food Services Equipment Contractor supplying the equipment.**
- D. Fabricator's Qualifications:
 - 1. Where indicated units require custom fabrication, provide units fabricated by shop skilled and with min. 5 years of experience in similar work.
 - 2. Fabricate all custom equipment items at same shop.
 - 3. Where units cannot be fully shop-fabricated, complete fabrication work at Project site.
- E. Codes and Standards:
 - 1. NSF Standards:

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- a. Comply with applicable National Sanitation Foundation standards and recommended criteria.
- b. Provide each principal manufactured or fabricated item of food service equipment with NSF "Seal of Approval".
2. UL Labels:
 - a. Where available, provide UL labels on prime electrical components of food service equipment.
 - b. Provide UL "recognized marking" on other items with electrical components, signifying listing by UL, where available.
3. 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.
4. NFPA Codes: Install food service equipment in accordance with following National Fire Protection Codes (NFPA) Codes:
 - a. NFPA 54 - National Fuel Gas Code.
 - b. NFPA 70 - National Electrical Code.
 - c. NFPA No. 96 - "Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment".
5. ASME Boiler Code: Construct steam generating and closed steam heated equipment to comply with American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code; Section IV for units not exceeding 15 psig or 250°F (121°C), or Section I for higher pressure/temperature units.
6. Health Code: Install food service equipment in accordance with local health department applicable requirements.

1.04 SUBMITTALS

- A. Submit manufacturer's or shop fabricator's product information and installation instructions for each item for Food Service Equipment. For operating equipment include data or performance and operating characteristics, power/fuel consumption, and rough-in information. Provide maintenance manuals, operating instructions, parts lists, precautions against hazards, manufacturer's warranties and similar information. Mark each data sheet or brochure with Food Service Equipment Contractor name and address, project name and location, and applicable project equipment item number(s). Indicate all options to be provided.
 1. Submit five (5) copies of all submittals, shop drawings, and manufacturer's data.
- B. Shop Drawings:
 1. Submit dimensioned roughing-in drawings, at min. scale $\frac{1}{4}'' = 1'-0''$, showing mechanical and electrical requirements.
 2. Submit dimensioned fabrication drawings for custom fabricated equipment including plans, elevations, and sections, at min. scale $\frac{3}{4}'' = 1'-0''$, showing materials and gages used.
- C. Samples: Submit samples of exposed finishes for custom fabricated equipment, 8" squares of materials and 12" lengths of running members and trim.
- D. Maintenance Manuals:
 1. Submit maintenance data and parts list for each item of food service equipment.
 2. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 1.

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3. Provide instructional video tapes for Owner's permanent library describing operation and maintenance procedures suggested for equipment where tapes are specified.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver food service equipment in factory-fabricated containers designed to protect equipment and finish until final installation.
 1. Make arrangements to receive equipment at project site, or to hold in warehouse until delivery made to job site.
- B. Store food service equipment in original containers, and in location to provide adequate protection to equipment while not interfering with other construction operations.
- C. Handle food service equipment carefully to avoid damage to components, enclosures, and finish.
 1. Do not install damaged food service equipment; replace and return damaged components to equipment manufacturer.

1.06 PROJECT CONDITIONS

- A. Take field measurements to assure accurate fit of fabricated equipment.
- B. Check electrical characteristics, and water, steam, and gas pressure.
 1. Provide pressure regulating valves where required for proper operation of equipment.
- C. Electrical Requirements: Provide motors and heating elements with electrical characteristics indicated on electrical drawings.

1.07 SPECIAL PROJECT WARRANTY

- A. General Warranty: Provide written warranty signed by Food Service Equipment Supplier/Installer and Contractor, agreeing to replace/repair, if notified within two year after date of Final Acceptance, any equipment found inadequate due to defective materials, workmanship or installation, at no cost to Owner.
 1. Warranty begins the date Owner puts unit into service (first full day of student lunch program).
 2. Owner is not responsible for any expense involved in servicing of any item furnished under this contract unless it can be shown that said items were misused by Owner or that said service call was unnecessary.
 3. Owner will ask only FSEC for any warranty service or repair and shall not be expected to direct any calls to any other agency.
 4. Owner shall have continued use of defective or incorrect installed equipment until replacement is delivered.
- B. Warranty on Refrigeration Compressors:
 1. Provide written warranty, signed by manufacturer, agreeing to replace or repair, within warranty period, compressors with inadequate and defective materials and workmanship, including leakage, breakage, improper assembly, or failure to perform as required; provided manufacturer's instructions for handling, installing, protecting, and maintaining units adhered to during warranty period.
 2. Replacement limited to component replacement only, and not labor for removal and reinstallation.
 3. Warranty Period: 5 years from date of Final Acceptance.

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PART 2 – PRODUCTS

2.01 MATERIALS

- A. Stainless Steel: AISI Type 304.
 - 1. Provide non-magnetic sheets, free of buckles, waves, and surface imperfections.
 - 2. Provide No. 4 polished finish for any surfaces exposed.
 - 3. Provide self-adhesive protective paper covering on polished surfaces of stainless steel sheet work, and retain/maintain until time of final testing, cleaning, start-up, and Final Acceptance.
- B. Galvanized Steel Sheet: ASTM A 526, except ASTM A 527 for extensive forming; ASTM A 525, G90 zinc coating, chemical treatment.
- C. Steel Sheet: ASTM A 569 hot-rolled carbon steel.
- D. Stainless Steel Tube: ASTM A 554, Type 304 with No. 4 polished finish.
- E. Aluminum: ASTM B 209 sheet and plate, ASTM B 221 extrusions, 0.40-mill clear anodized finish where exposed, unless otherwise indicated.
- F. White Metal:
 - 1. Corrosion-resistant metal containing min. 21% nickel.
 - 2. Make casting free from pit marks, runs, checks, burrs, and other imperfections; rough grind, polish and buff to bright luster.
 - 3. In lieu of white metal castings, 18-8 stainless steel die-cast or stamped may be used.
- G. Plastic Materials and Components: Except for plastic laminate, provide plastic materials and components complying with NSF 51.
- H. Sound Deadening:
 - 1. Heavy-bodied resinous coating, filled with granulated cork or other resilient material, compounded for permanent, non-flaking adhesion to metal in 1/8" thick coating.
 - 2. Apply coating of sound deadening material to underside of tops, drainboards, dishtables, and sinks.
- I. Sealants:
 - 1. ASTM C 920; Type S Grade NS, Class 25, Use NT.
 - 2. Provide sealant that when fully cured and washed meets requirements of Food and Drug Administration Regulation 21 CFR 177.2600 for use in areas where in contact with food.
- J. Color: Selected by Architect from manufacturer's standard colors.
- K. Backer Rod: Closed-cell polyethylene rod stock, larger than joint width.
- L. Gaskets: Solid or hollow (not cellular) neoprene or PVC; light gray, min. 40 Shore A hardness, self-adhesive or prepared for either adhesive application or mechanical anchorage.

2.02 FABRICATED PRODUCTS

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- A. Manufacturers: Subject to compliance with requirements, provide fabrication by one of following:
 - 1. Duke Manufacturing Co.
 - 2. Atlanta Custom Fabricators, Inc.
 - 3. Delfield/Alco, div. of Alco Foodservice Co.
 - 4. Low-Temp Industries, Inc.
 - 5. Southern Equipment Fabricators, Inc.
 - 6. Titan Stainless.

- B. Refrigeration Hardware: Heavy-duty die-cast zinc, chrome-plated and polished.
 - 1. Hinges: Edge mounted, self-closing type.
 - 2. Latches: Edge mounted, arranged for locking device.
 - 3. Manufacturer: Subject to compliance with requirements, provide refrigerator hardware of one of following:
 - a. Grant Mfg. Co.
 - b. Kason Hardware Co.
 - c. Standard-Keil Co.

- C. Handles and Pulls:
 - 1. Provide stainless steel handles with No. 4 finish, or die-cast zinc with polished chrome-plated finish.
 - 2. Provide die-stamped stainless steel pulls, recessed rectangular type, with beveled edge frame.
 - 3. Manufacturer: Subject to compliance with requirements, provide handles and pulls of one of following:
 - a. Grant Mfg. Co.
 - b. Kason Hardware Co.
 - c. Standard-Keil Co.

- D. Door Slides:
 - 1. Provide stainless steel or galvanized steel door slides with min. load capacity of 100 lbs. per pair, and with positive door stop.
 - 2. Provide ball bearing rollers.
 - 3. Manufacturer: Subject to compliance with requirements, provide door slides of one of following:
 - a. Grant Mfg. Co.
 - b. Kason Hardware Co.
 - c. Standard-Keil Co.

- E. Hinges:
 - 1. Provide stainless steel hinges, continuous type or butt type as indicated.
 - 2. Manufacturer: Subject to compliance with requirements, provide hinges of one of following:
 - a. Grant Mfg. Co.
 - b. Kason Hardware Co.
 - c. Standard-Keil Co.

- F. Sliding Door Hardware:
 - 1. Provide extruded aluminum door track.
 - 2. Provide galvanized steel door sheave with nylon surface and ball bearing inner races.
 - 3. Provide stainless steel bottom guide pins, spring loaded.
 - 4. Manufacturer: Subject to compliance with requirements, provide hinges of one of following:
 - a. Grant Mfg. Co.

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- b. Kason Hardware Co.
- c. Standard-Keil Co.

G. Adjustable Shelf Supports:

- 1. Provide stainless steel shelf supports, snap-in type, and stainless steel brackets with countersunk mounting holes.
- 2. Manufacturer: Subject to compliance with requirements, provide hinges of one of following:
 - a. Grant Mfg. Co.
 - b. Kason Hardware Co.
 - c. Standard-Keil Co.

H. Catches: For hinged doors, provide permanent magnetic catch of sufficient strength to hold door shut.

I. Locks:

- 1. Manufacturer's standard brass 5-pin cabinet-type lock.
- 2. Provide two keys for each lock, keyed separately.

J. Faucets:

- 1. Cast bronze body with nickel or triple chrome plated.
- 2. Provide swing spout faucets for mounting on splash of multi-compartment sinks, one for two compartments, two for three and four compartments.
- 3. Provide deck mounted faucets where indicated.
- 4. Approved manufacturers subject to conformance with specified model:
 - a. Chicago Faucets.
 - b. Elkay Manufacturing Co.
 - c. T & S Brass and Bronze Works, Inc.

K. Lever Drains:

- 1. Provide 2", heavy cast-bronze body, removable flat stainless steel strainer, twist handle waste outlet, and one-piece connected chrome-plated brass overflow.
- 2. Manufacturer: Subject to compliance with requirements, provide hinges of one of following:
 - a. Franklin Machine Products.
 - b. Kason Hardware Co.
 - c. Standard-Keil Co.

L. Casters:

- 1. Provide min. 4" dia. wheel casters, with 1 1/8" tread width, complying with NSF standards.
- 2. Provide sealed, self-lubricating bearings, cadmium-plated or bright zinc-plated steel disc wheels, and solid synthetic rubber tires.
- 3. Provide foot brakes on 2 casters per unit.

2.03 FABRICATION OF EQUIPMENT

A. Tops:

- 1. Fabricate of 14-ga. stainless steel, with exposed edges rolled on 1/2" diameter radius, and with corners bullnosed.
- 2. Where tops adjacent to walls or adjoining equipment, turn up 6" and back 1" on 45° angle unless otherwise indicated.

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- B. Backsplashes: Cove horizontal and vertical corners.
- C. Dishtables and Drainboards:
1. Fabricate of 14-ga. stainless steel with exposed edges formed into 1½" x 190° rolled rim approximately 3" high.
 2. Provide built-in pitch of ½" min.
 3. Provide 8" high backsplashes with 2" return on 45° angle or 1½" dia. rolled rim, as indicated.
 4. Construct front rim and backsplash on drainboards with continuous level plane with sink it adjoins.
 5. Support drainboards up to 36" in length by 1" dia. stainless steel tube welded to underside of drainboard and leg gusset.
 6. Support drainboards 36" and longer with legs.
 7. Cove horizontal and vertical corners with min. ¾" radius.
- D. Framing:
1. Mount tops on 1½" x 1½" x ⅛" galvanized angle iron, or 4" wide x 12-ga galvanized channels.
 2. Mount dishtables and drainboards on 4" wide x 14-ga stainless steel channels.
 3. Run framework around entire perimeter of unit, and cross brace on 30" centers.
 4. For dishtables and drainboards, run framing from front to back at each leg location, and run additional channel lengthwise, located at center of table width and welded with ¼" studs welded at approximately 12" o.c.
 5. Provide each stud with suitable chrome-plated lock washers and cap nuts and make stud lengths such that cap nuts made up tight bringing top down snugly to framing.
- E. Legs and Cross Rails:
1. Construct legs of 1⅝" OD x 16-ga. stainless steel tubing, with fully enclosed stainless-steel bullet shaped adjustable foot with min. adjustment of 1" up or down without any threads showing.
 2. Fasten legs to 4" high stainless-steel gusset with top completely sealed by means of stainless-steel plate.
 3. Weld gusset continuously to bottom of unit framing.
- F. Drawers:
1. Lift-out type drawer body, one-piece 20" x 20" x 5" die stamped of 20-ga. stainless steel, with inside radiused corners.
 2. Construct front of double pan stainless steel, 16-ga. exterior and 20-ga. interior.
 3. Provide lock for each drawer.
 4. Fasten drawer suspension guides to 18-ga. stainless steel housing suspended from angle framing under fixed top.
- G. Cabinet Bodies:
1. Construct of 20-ga. stainless steel, with end panels formed with round corners for free standing units, and square corners for fixtures which adjoin walls or other fixtures.
 2. Provide 90° retentions on end panels at front and rear, turned in toward body of cabinet and welded for reinforcement.
 3. For cabinets with open shelving, provide double wall inner panels.
 4. Weld ends to horizontal angle or channel members to form integral cabinet base.
 5. Provide backs of same material as ends, with vertical edges turned into match edges of ends.
 6. Weld making flush joint.
- H. Inserts:

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1. Where cold pans and other inserts installed in cabinet bases, provide apron full depth of insert and of same material as bodies with reinforced openings as required.
 2. Form in openings on all sides.
- I. Sliding Doors:
1. Construct of 20-ga. stainless steel with edges formed into channel extending around all sides, forming doors $\frac{7}{8}$ " thick.
 2. Insert sound deadening material and enclose with stainless steel back panel with welded corner joints.
 3. Mount doors on sliding door hardware.
 4. Construct doors to be removable for cleaning purposes and provide with stops.
 5. Provide on each door, recessed stainless steel pulls, and locks.
- J. Hinged Doors:
1. Construct same as sliding doors.
 2. Mount on stainless steel continuous type hinges, fitted with stainless steel pulls, magnetic catches, and locks.
 3. Construct so that door face flush with cabinet body.
- K. Shelves: Construct of 14-ga. stainless steel.
1. Bottom Shelves: Extend forward and turn down at front flush with front facing of cabinet.
 2. Fixed Intermediate Shelves: Weld to front stiles and to 14-ga. stainless steel brackets so shelf is 1" away from back and ends of cabinet.
 3. Adjustable Shelves: Channel on all 4 sides, weld corners, and mount on removable stainless-steel standards.
 4. Open Base Shelving:
 - a. Construct with edges rolled down on open sides, and 2" turn up with $\frac{3}{4}$ " radius on rear and ends where adjacent to walls and other equipment.
 - b. Neatly notch corners and weld to legs.
 - c. Reinforce shelving longitudinally with 14-ga. formed channel welded to underside.
 - d. Construct removable shelves as above but fit over cross rails.
 - e. Do not exceed shelving sections of 30" long; where one section abuts another, turn down edges 1".
 5. Wall Shelves:
 - a. Construct with $1\frac{1}{2}$ " roll on front and exposed ends, and with 2" turn up on back and ends where adjacent to walls or other fixtures.
 - b. Weld all corners.
 - c. Construct wall brackets of 14-ga. stainless steel with $1\frac{1}{2}$ " flange at wall and completely welded to underside of shelf.
 - d. Fasten each bracket to wall with min. of two, $\frac{1}{2}$ " bolts anchored to wall.
 - e. Fasten shelf to wall bracket by means of studs welded to shelf, and secure with lock washer and chrome-plated cap nuts.
 - f. Install so that shelf sets $1\frac{1}{2}$ " away from wall.
 6. Overshelves:
 - a. Set shelves mounted over equipment not adjacent to walls on 1" x 14-ga. stainless steel tubular standards fitted with stainless steel base flanges.
 - b. Completely weld top of tubular standard to 14-ga. stainless support channels, run channels full width of overshelf.

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- c. Run ½" steel tension rods through counter tops and reinforcing angle framing, secure with nuts and lock washers to assure stable sway-free structure.
- d. Where shelves mounted over drainboards or dishtables, mount on upturned rolled edges omitting flanges, and scribe lower end of tube to match contour of roll.

L. Sinks:

- 1. Fabricate from 14-ga stainless steel with interior corners rounded to 1" radius, both horizontally and vertically, forming cove in bottom. Drawn sinks are not acceptable.
- 2. Construct with butt edge joints, welded and ground smooth so no evidence of welding appears.
- 3. Divide multiple compartment sinks with double wall 14-ga stainless steel partitions rounded to ½" radius on top and having corners rounded same as other corners in sinks, continuously welded in place with welds ground smooth and polished.
- 4. Provide back, bottom, and front of one continuous piece with no overlapping joints or open spaces between compartments.
- 5. Pitch bottom of each compartment, and crease to die-stamped recess to receive lever type drain, without use of solder, rivets, or welding.
- 6. Finish front and exposed ends of sink with 1½" 190° rolled edge.
- 7. Finish back and ends adjacent to walls or other fixtures with splashback.
- 8. Punch back splashback to receive wall-mounted faucets.
- 9. For sinks in worktops, construct as above but omit roll edges and splashbacks; fabricate bowls flush with work surface.

M. Cold Pans:

- 1. Fabricate from 14-ga. stainless steel lining and 20-ga. stainless steel casing.
- 2. Cove interior horizontal and vertical corners.
- 3. Insulate sides, ends, and bottom with material thermally equal to 2" thickness of fiberglass.
- 4. Sweat ½" dia. copper cooling coils to underside of cold pan, and seal in thermomastic material.
- 5. Turn down countertop 1" into pan.
- 6. Install completely concealed 1" wide plastic breaker strip.
- 7. Install 1" chrome plated drain with plug.
- 8. Provide ½" high false bottom of 14-ga. perforated stainless steel in removable sections.

2.04 REFRIGERATION EQUIPMENT

- A. General: Provide refrigeration condensing units of size and capacities indicated, consisting of compressors, condensers, receivers, motors, mounting bases, vibration isolators, refrigeration components, safety devices, electrical controls, refrigerant, and protective controls; all factory assembled and tested.
- B. Refrigerant:
 - 1. Precharge units with refrigerant.
 - 2. Provide quick-connect type piping connections to receive piping from evaporator coils.
- C. Outdoor Mounting: Provide weather-tight housing and low ambient controls for units mounted outdoors.
- D. Refrigerant Piping:
 - 1. Type ACR copper tubing, hard temper, with wrought fittings and silver solder joints.
 - 2. Insulate suction lines with ½" thick premolded foamed plastic insulation.

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- E. Electrical Wiring: Provide required wiring between electrical rough-in and refrigeration units for proper operation.
- F. Plumbing Piping: Provide required water and drain piping between plumbing rough-in and refrigeration units for proper operation.
- G. Refrigeration Specialties:
 - 1. Provide as indicated refrigerant dryer, liquid line solenoid valve, suction line filter, and expansion valve. Provide water regulating valve (for water cooled condensers only).
 - 3. Provide pump down control circuits consisting of thermostat and solenoid valve.
 - 4. Maintain box temperature from thermostat and liquid line solenoid valve, control compressor from suction pressure.

PART 3 – EXECUTION

3.01 INSPECTION

- A. Rough-In Work:
 - 1. Installers examine roughed-in mechanical and electrical services, and installation of floors, walls, columns and ceilings, and other conditions under which food service work installed; verify dimensions of services and substrates before fabricating work.
 - 2. Notify Contractor of unsatisfactory locations and dimensions of other work, and of unsatisfactory conditions for proper installation of food service equipment.
 - 3. Do not proceed with fabrication and installation until unsatisfactory dimensions and conditions corrected in manner satisfactory to Installer.

3.02 INSTALLATION

- A. General:
 - 1. Set each item of non-mobile and non-portable equipment securely in place, level and adjust to correct height.
 - 2. Anchor to supporting substrate where indicated and where required for sustained operation and use without shifting or dislocation.
 - 3. Conceal anchorages where possible.
 - 4. Adjust counter tops and other work surfaces to level tolerance of 1/16" max. offset, and max. variation from level or indicated slope of 1/16" per ft.
- B. Where indicated, or required for safety of equipment operator, anchor equipment to floor or wall.
 - 1. Where equipment indicated anchored to floor, provide legs with adjustable flanged foot.
 - 2. Install 2 anchors on each foot.
- C. Field Joints:
 - 1. Complete field-assembly joints in work (joints which cannot be completed in shop) by welding, bolting-and-gasketing, or similar methods indicated.
 - 2. Grind welds smooth and restore finish.
 - 3. Set or trim gaskets flush, except for "T" gaskets as indicated.
- D. Enclosed Spaces: Treat spaces inaccessible after equipment installation, by covering horizontal surfaces with powdered borax at rate of 4-oz. per sq. ft.

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- E. Closure Plates and Strips: Install where required, with joints coordinated with units of equipment.
- F. Cut-Outs: Provide cut-outs in food service equipment where required to run plumbing, electric, gas, or steam lines through equipment items for final connections.
- G. Sealants and Gaskets:
 - 1. Install all around each unit to make joints airtight, watertight, vermin-proof, and sanitary for cleaning purposes.
 - 2. In general, make sealed joints min. 1/8" wide, and stuff backer rod to shape sealant bead properly, at 1/4" depth.
 - 3. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of materials at joint.
 - 4. At internal-corner joints, apply sealant or gaskets to form sanitary cove, min. 3/8" radius.
 - 5. Provide sealant-filled or gasketed joints up to 3/4" joint width; metal closure strips for wider joints, with sealant application each side of strips.
 - 6. Anchor gaskets mechanically or with adhesives to prevent displacement.
- H. Piping:
 - 1. Install necessary piping from relief valves on kettles and steamers to exhaust in manner to avoid steam coming in contact with operating personnel, and in accordance with applicable codes.
 - 2. Install required piping from indirect drain connections to floor drains.

3.03 FIELD QUALITY CONTROLS

- A. Testing:
 - 1. Delay start-up of food service equipment until service lines tested, balanced, and adjusted for pressure, voltage, and similar considerations; and until water and steam lines cleaned and treated for sanitation.
 - 2. Before testing, lubricate each equipment item in accordance with manufacturer's recommendations.
 - 3. Test each item of operational equipment to demonstrate that it is operating properly, and that controls and safety devices are functioning.
 - 4. Repair or replace equipment found defective in operation, including units below capacity or operating with excessive noise or vibration.

3.04 CLEANING

- A. After completion of installation, and completion of other major work in food service areas, remove protective coverings, if any, and clean food service equipment, internally and externally.
 - 1. Restore exposed and semi-exposed finishes to remove abrasions and other damages; polish exposed-metal surfaces and touch-up painted surfaces.
 - 2. Replace work not successfully restored.
- B. Prior to date of Final Acceptance on food service equipment work, buff exposed stainless-steel finishes lightly, using power buffer and polishing rouge or grit of No. 400 or finer.
- C. Final Cleaning: After testing and start-up, and before time of Final Acceptance, clean and sanitize food service equipment, and leave in condition ready for use in food service.

3.05 CLOSEOUT PROCEDURES

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- A. Provide services of Installers technical representative, and manufacturer's technical representative where required, to instruct Owner's personnel in operation and maintenance of food service equipment.
- B. Schedule training with Owner, provide at least 7-day notice to Contractor and Architect/Engineer of training date.
- C. Provide instructional video tapes for Owner's permanent library describing operation and maintenance of system.

3.06 SCHEDULE OF FOOD SERVICE EQUIPMENT

The manufacturers' detail sheets for each item are at the end of this section and products shall comply with manufacturer's specification.

- CAN OP CAN OPENER**
Basis of design is Edlund Model attached. Approved manufacturers subject to conformance with specified model are Inova and Hobart Corp.
- CHEM PLASTIC CHEMICAL SHELVING**
Safety storage 39" W x 16D x 71H. Approved manufacturers subject to conformance with specified model are Rubber Maid and Cambro.
- COM FLTR HOLLOW CARBON FILTER SYSTEM**
Basis of design is Hobart model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
- COM-1 COMBI OVEN, ELECTRIC**
Basis of design is Rational model attached. Approved manufacturers subject to conformance with specified model are Blodgett and Alto-Shaam.
- COM-2 COMBI OVEN DOUBLE, ELECTRIC**
Basis of design is Rational model attached. Approved manufacturers subject to conformance with specified model are Blodgett and Alto-Shaam.
- CON OV CONVECTION OVEN**
Basis of design is Vulcan model attached. Approved manufacturers subject to conformance with specified model are Blodgett and Cleveland.
- DISP DISPOSAL UNIT**
Basis of design is In-Sink-Erator model attached. Approved manufacturers subject to conformance with specified model are Hobart Corp. and Salvajor Co.
- DUN-2036C** Basis of design is Advance Tabco model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.

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- DWUC DISHWASHER**
Basis of design is Moyer Diebel model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
- ECR CLNG MOUNT POWER CORD REEL BY ELECTRICAL CONTRACTOR.**
- FP FOOD PROCESSOR**
Basis of design is Hobart model attached. Approved manufacturers subject to conformance with specified model are Electrolux Dito, Robot Coupe and Univex.
- HR HOSE REEL**
Basis of design is T&S Brass and Bronze Works, Inc. Model attached.
a. Reel: Enclosed, automatic stop and retraction type.
b. Hose: 35' long 3/8" ID.
c. Accessories:
 (1) B-1420 quick connect squeeze valve.
 (2) B-1422 jet spray.
 (3) B-1423 fan spray.
 (4) B-1424 hook nozzle.
 (5) B-964 vacuum breaker.
 (6) RK-2 shut-off valve.
 (7) B-513 mixing valve.
 (8) C-CVV-1/2" horizontal check valve.
 (9) Watts 7U backflow preventer.
Approved manufacturers subject to conformance with specified model are Fisher and Chicago Faucet.
- HWS HAND WASH SINK W/KNEE VALVE**
Basis of design is Regency Tables and Sinks model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
- ICE ICE MAKER**
Basis of design is Hoshizaki model attached. Approved manufacturers subject to conformance with specified model are Ice-O-Matic and Manitowoc.
- ICE F ICE MAKER FILTER**
Basis of design is Hoshizaki model attached. Approved manufacturers subject to conformance with specified model are Ice-O-Matic and Manitowoc.
- MC MILK COOLER**
Basis of design is Traulsen model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
- MDR MOBILE DRYING RACK**
Basis of design is MetroMax model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.

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- MKH MAGNETIC KNIFE HOLDER**
Basis of design is Franklin model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
- MPR MOBILE PAN RACK**
Basis of design is Kelmax model attached. Approved manufacturers subject to conformance with specified model are Channel and New Age.
- PRU PRE RINSE UNIT**
Basis of design is T&S Brass and Bronze Works, Inc. model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
- PTR PASS-THRU REFRIGERATOR**
Basis of design is Continental model attached. Two glass doors Kitchen side. 2 SS doors Serving side. Approved manufacturers subject to conformance with specified model are Victory and The Delfield Co.
- PTW PASS-THRU WARMER**
Basis of design is FWE Model attached. Glass doors on Kitchen side. Approved manufacturers subject to conformance with specified model are Traulsen & Co. and The Delfield Co.
- RH RANGE HOOD BY MECHANICAL CONTRACTOR.**
- RIF REACH-IN FREEZER**
Basis of design is Continental model attached. Approved manufacturers subject to conformance with specified model are Victory and Traulsen & Co..
- RIR-2D REACH-IN REFRIGERATOR**
Basis of design is Continental model attached. Approved manufacturers subject to conformance with specified model are Victory and Traulsen & Co..
- S**
Basis of design is SPG Kelmax Aluminum Fixed Cantilever models attached. Approved manufacturers subject to conformance with specified model are Lakeside and Atlanta Custom Fabricators.
- S3620 SHELVING 36X20X72**
S4820 SHELVING 48X20X72
S4824 SHELVING 48X24X72
- WALL SHELVES**
Low Temp Industries – Custom fabricated.
- a. 10" wide x length of vegetable sink, 14-ga. stainless steel. Self-draining shelf constructed of steel tubes rather than sheet steel.
 - b. 14-ga. stainless steel brackets welded to shelf at max. 36" o.c.
 - c. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – KITCHEN FOOD SERVICE EQUIPMENT**

**SH W7 WALL SHELF 7' LONG
SH W9 WALL SHELF 9' LONG
SH W15 WALL SHELF 15' LONG**

SCALE Basis of design is Edlund model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.

SF SINK FAUCET
Basis of design is TMS Model B-231. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.

SINKx1 MEAT MEAT SINK
Fabricate to construction described in Part 2 of this Section. Size and shape shown on drawings.
a. Sinks: 24" x 24" x 12".
b. Drain boards each end.
c. Drain: Lever T&S Brass
d. 4 pairs of legs.

SINKx2VEG VEGETABLE PREP SINK
Size and shape shown on drawings. Fabricate to construction described in Part 2 of this Section.
a. Sinks: 24" x 24" x 12".
b. Drain boards each end.
c. Drain: Lever T&S Brass
d. 4 pairs of legs.

SINKx4 POT SINK
Size and shape shown on drawings. Fabricate to construction described in Part 2 of this Section.
Prepare for disposal unit.
a. Sinks: 24" x 24" x 12".
b. Drain boards each end.
c. Drain: Lever T&S Brass
d. 5 pairs of legs.

SL SERVING LINE
To be issued by addendum.

SMTCS SPRAY MASTER TECHNOLOGIES CENTRAL SYSTEM
Basis of design is Spray Master Technologies. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
Central Pressure Washing System components to be furnished and installed by manufacturer.
a. 1 Wall Mounted Pump
b. 1 Surface Mounted Control Panel
c. 4 Recessed Remote Stations: 2 Non-Masonry recessed, Top Tube Entry;
 1 exterior masonry recessed tube entry rear; 1 surface mounted top tube entry.
d. 1 50ft Heavy Duty Portable Hose Reel

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – KITCHEN FOOD SERVICE EQUIPMENT**

- e. 1 50ft Stainless Steel Hose Hanger
- f. 1 Hummer Jet Jr.
- g. 1 Trap Shooter

SMT will coordinate the installation with the General Contractor' construction Superintendent. Factory technicians will perform a complete turnkey installation for the SMT system. Power and water supply will be furnished by General Contractor to the location of the main pumping unit. **SMT SHOP DRAWINGS WILL SPECIFICALLY LOCATE ALL REQUIREMENTS FOR PVC CHASES INSIDE WALLS TO BE SUPPLIED BY OTHERS.** SMT will install, test, and demonstrate the system.

Central Systems to have stainless steel tubing, tees, and unions; control wiring and insulation. Furnish manufacturer's 2-year parts and installation warranty.

**SMTRR
SMTSR**

**SPRAY MASTER RECESSED REMOTE
SPRAY MASTER SURFACE REMOTE**

STMR

SONIC STEAMER

Basis of design is Panasonic Connectionless Steamer model attached. Approved manufacturers subject to conformance with specified model are Hobart, Inc. and Amana.

STMR STND

STEAMER STAND

Titan Custom per attached drawing. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.

WORK TABLES

Custom fabricated 14-ga. stainless steel top rolled down 1½" all sides. Drawers: One (1) 20-ga. stainless steel. 18-ga stainless steel undershelf turned down 1½" and hemmed ¾".

T 3060

WORK TABLE

T 3072

WORK TABLE

Work tables to have following:

- (1) 2 pairs of legs.
- (2) 2 drawers.

TD

TROUGH DRAIN

Custom fabricated stainless steel floor trough and grating.
24" X 48"

a. Trough:

- (1) 4" min. depth with 1" wide x 1" deep ledge on long sides to receive grating.
- (2) 14-ga. stainless steel.
- (3) Slope to 3" stainless steel drain with removable scrap basket

b. Grating:

- (1) To have a 1" high yellow polyester-corrugate with a non-slip grit top surface. To have tapered "I" beam construction for ease of cleaning and drainage. And can be dishwasher cleaned.
- (2) Space bars 1" o.c. and weld to two (2) ½" dia. stainless steel rods penetrating each bar.
- (3) Band all edges with 3/16" x 1" stainless steel bar

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – KITCHEN FOOD SERVICE EQUIPMENT**

- (4) Fit grate snugly to trough edges with max. 1/16" clearance all sides.
- (5) Each grate section shall not exceed 24" long.

- TS TILTING SKILLET, 40 GALLON ELECTRIC**
Basis of design is Cleveland Durapan model attached. Approved manufacturers subject to conformance with specified model are Dover Industries Groen and Market Forge Co.
- TS FILL TILT SKILLET FILLER**
Basis of design is T&S Brass and Bronze Works, Inc. model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
- UC UTILITY CART**
Basis of design is Lakeside Manufacturing, Inc. model attached. Approved manufacturers subject to conformance with specified model are Low Temp Industries, Inc. and Kelmax.
- W/D STACKED WASHER/DRYER**
Basis of design is GE Unitized Spacemaker model attached. Comparable products may be submitted for prior approval per paragraph 3.3, Instructions to Bidders.
- WICF WALK-IN COOLER / FREEZER**
Furnish and install per specification Section 114001 Walk-In Cooler Freezer.
- WSS WATER SOFTENING SYSTEM**
Water softening system is in the plumbing contract.

END OF SECTION 114000

Etlund Model 270 NSF Electric Can Opener

The only NSF Certified electric can opener available, the Edlund 270 Electric Can Opener is designed for high volume operators who open different sized cans.

CAN OP



- Heavy duty stainless steel construction.
- Two-speed motor for opening large or small cans, fast.
- Removable knife holder and knife require no tools.
- Gear and shield prevent splash-back from entering interior. Also removes without tools.
- Slot machine style lever requires minimum effort, eliminates fatigue.
- Sealed base
- NSF Certified
- Made in U.S.A.

Our 270 electric is a real eye opener.



Opens most sizes and shapes of cans. Precisely weighted and balanced, the 270 lifts even the heaviest #10 can to the knife for easy opening.



The 270 C's easy-glide slide bar mounting allows all cans larger than #10's to be opened easily. Ideal for most international can sizes.

The 270 Electric Can Opener is our flagship.

Demand for higher volume opening requirements led to the creation of the 270 electric opener. It's designed to meet the needs of commercial and non-commercial operators alike.

SPECIFICATIONS:

- 1.5 Amp, 1.2 Amp 60 Hz
- 0.8 Amp, 0.6 Amp 50 - 60 Hz

UNIT DIMENSIONS:

- 270 – 6 $\frac{3}{4}$ " x 11 $\frac{1}{2}$ " x 10" (17.2 cm x 29.2 cm x 25.4 cm)
- 270 C – 9 $\frac{3}{4}$ " x 9 $\frac{3}{4}$ " x 26 $\frac{1}{4}$ " (27.8 cm x 27.8 cm x 66.7 cm)

SHIPPING DIMENSIONS:

- 270 – 13 $\frac{3}{4}$ " x 10 $\frac{5}{8}$ " x 11 $\frac{3}{8}$ " (34.9 cm x 26.9 cm x 28.9 cm)
- 270 C – 13 $\frac{3}{4}$ " x 13" x 32 $\frac{1}{2}$ " (34.9 cm x 33.0 cm x 82.6 cm)

SHIPPING WEIGHT:

- 270 – 20 lbs. (9 kg)
- 270 C – 30 lbs. (13.6 kg)

CUBE:

- 270 – 44 cubic feet (.03 cubic meters)
- 270 C – 3.33 cubic feet (.01 cubic meters)

RECOMMENDED USAGE:

- 100-200 cans per day.



Edlund *We're in your kitchen.™*

Edlund Company, Inc., 159 Industrial Parkway, Burlington, VT 05401, USA 800-772-2126 www.edlundco.com

CHEM

Plastic Shelving for Corrosives.

Shelving Systems for Chemical Storage.
All plastic construction for corrosives.

Plastic Shelving.



39" w x 16" d x 71" H.
one liquid shelf

Adjustable Plastic Shelving with steel core.
Storage Bays: 1080w x 400d x 1800h mm.
4 no. slotted storage levels.
S.W.L: 200kgs per shelf
Shelving delivered flat packed for self assembly. (Instructions supplied)

Optional Extras:

- **Shelf Spill Trays (Moulded ABS) 980w x 400d x 50h mm. 18 litres capacity.**





701 S Ridge Avenue, Troy, OH 45374
1-888-4HOBART • www.hobartcorp.com

WATER TREATMENT SYSTEMS STEAMER/COMBI (FLASH TYPE) APPLICATIONS

HOBART

WATER TREATMENT SYSTEMS STEAMER/COMBI (FLASH TYPE) APPLICATIONS

STANDARD FEATURES

- Single cartridge hollow carbon filter system includes mounting bracket, 3/4" NPTF inlet and outlet, shut-off valve, test port, drain tempering connection, and gauge.
- Reduce Chloramine, Chlorine, Sediment, Bad Tastes and Odors, Total Organic Compounds, Tannins and Trihalomethanes
- Modular design is adaptable to accommodate changing water conditions
- Simple to install and service
- FOR COLD WATER USE ONLY
 - Min./Max. Pressure: 40 – 125 psi
 - Min./Max. Temperature: 40° – 100° F
 - CB15K-SYSTEM (00-847487-00001)
 - Rated Capacity (Gallons)*: 15,000
 - Flow Rate: 3.7 gpm
 - Weight (Shipping/Operating): 18/21 Lbs.
 - CB30K-SYSTEM (00-847487-00002)
 - Rated Capacity (Gallons)*: 22,500
 - Flow Rate: 3.0 gpm
 - Weight (Shipping/Operating): 20/28 Lbs.
- Quick-Change cartridge design for replacement without tools
- Replacement Cartridge Filters:
 - CB15K-PMKIT - 15,000 Gallon Rated Capacity (00-847487-1PMK)
 - CB30K-PMKIT - 22,500 Gallon Rated Capacity (00-847487-2PMK)
- Exterior dimensions:
 - CB15K-SYSTEM 14" w x 9" d x 23 7/8"
 - CB30K-SYSTEM 14" w x 9" d x 28 7/8"

MODELS

- CB15K-SYSTEM
- CB30K-SYSTEM

Specifications, Details and Dimensions on Reverse Side.



System has been tested and certified by NSF against NSF/ANSI Std. 42 and 53 for the reduction of chlorine, chloramine, particulate Class I, taste and odor, and cyst.



WATER TREATMENT SYSTEMS STEAMER/COMBI (FLASH TYPE) APPLICATIONS



701 S Ridge Avenue, Troy, OH 45374
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NOTICE:

- Failure to replace cartridge before end of capacity life can result in pitting, rusting and discoloration due to Chloramines and Chlorine in water supply.
- Routine filter replacement & deliming are required for warranty consideration.
- This filter does not remove scale build-up due to hardness or other contaminants that may be in water.
- Hardness will result in scale build-up. Deliming is required to remove scale build-up or use of an additional treatment such as a water softener is recommended.
- Gallon capacity will vary according to flow rate, inlet pressure and local water conditions.
- Replace cartridge if outlet pressure gauge is less than 20 psi. or before end of capacity life (Maximum cartridge operating life 1 year.)

Water Quality Statement

The fact that a water supply is potable is no guarantee that it is suitable for steam generation. Systems are not to be used where water is microbiologically unsafe or with water of unknown quality without adequate disinfections before

and after use. Other factors affecting steam generation include iron content, amount & type of chlorination, and dissolved gasses. Water supplies vary from state to state and from locations within a state.

As with all steam related products, water filtration and regular filter replacements coupled with routine Deliming are required. Your local Hobart office can recommend a water treatment or filtration system to meet the needs of your local water conditions. Contact your local Hobart representative for water treatment offerings.

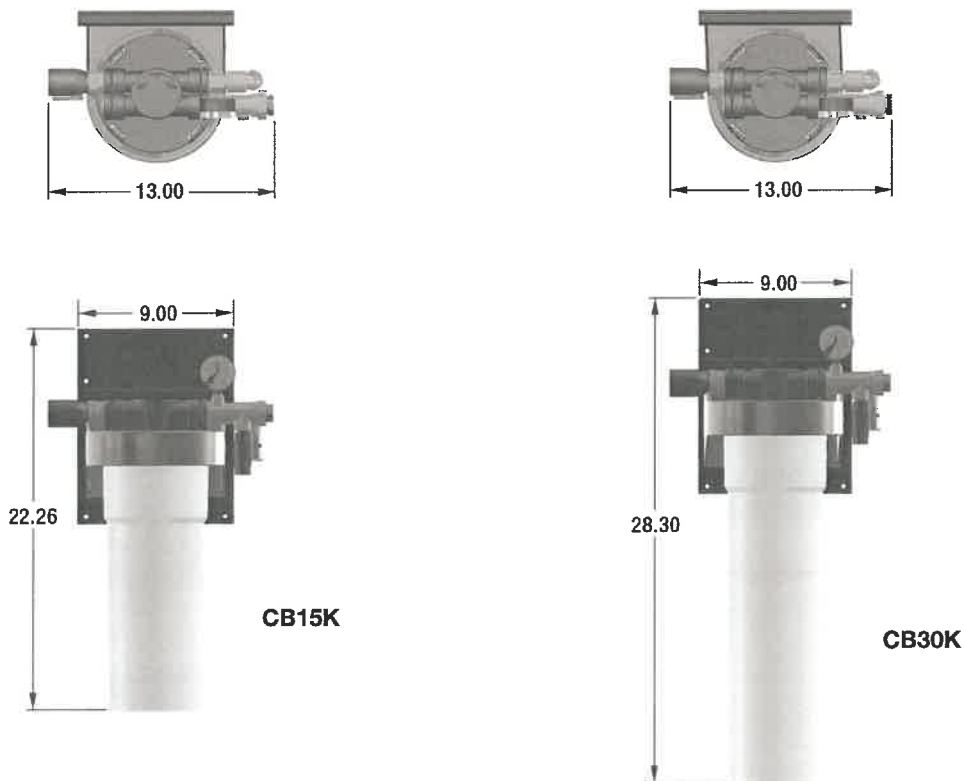
Note:

- Installation of backflow preventers, vacuum breakers and other specific code requirements is the responsibility of the owner and installer in compliance with local codes.

Recommended filter clearance needed for access:

Front 13"
Bottom 4"

This appliance is manufactured for commercial installation only and not intended for home use.



EXTERIOR DIMENSIONS:

MODEL	WIDTH	DEPTH	HEIGHT
CB15K-SYSTEM	14"	9"	23 ⁷ / ₈
CB30K-SYSTEM	14"	9"	28 ⁷ / ₈

As continued product improvement is a policy of Hobart, specifications are subject to change without notice.

COM FLTR

COM-2 FILTER	2 ea	WATER FILTRATION SYSTEM, FOR MULTIPLE APPLICATIONS Hobart Model No. CB30K-SYSTEM Single hollow carbon filter system with 30,000 gallon capacity. ANSI/NSF approved to standard 42 & 53. Reduces Chloramine, Chlorine, Sediment, Bad Tastes & Odors, Total Organic Compounds, Tannins & Trihalomethanes	\$881.06	\$1,762.12
			ITEM TOTAL:	\$1,762.12
COM-2 FILTER	1 ea	WATER FILTRATION SYSTEM, CARTRIDGE KIT RATIONAL Model No. 1900.1150US Water Filtration Double Cartridge System, for Combi-Duo models 62/62 or 62/102 or if used for more than (2) units, includes: (1) double head with pressure gauge, (2) R95H filter & (1) filter installation kit (for each additional unit add (1) additional head & additional cartridge. Maximum (4) cartridges)	\$963.55	<Alternate>
			ITEM TOTAL: <Alternate>	\$963.55
DISP	1 ea	DISPOSER	\$3,440.06	\$3,440.06



either or? or both?



COM FLTR

Strategic Equipment, LLC

12/06/2021

Item	Qty	Description	Sell	Sell Total
COM-1 FILTER	2 ea	WATER FILTRATION SYSTEM, FOR MULTIPLE APPLICATIONS	\$881.06	\$1,762.12
		Hobart Model No. CB30K-SYSTEM Single hollow carbon filter system with 30,000 gallon capacity. ANSI/NSF approved to standard 42 & 53. Reduces Chloramine, Chlorine, Sediment, Bad Tastes & Odors, Total Organic Compounds, Tannins & Trihalomethanes		
			ITEM TOTAL:	\$1,762.12
COM-1 FILTER	1 ea	WATER FILTRATION SYSTEM, CARTRIDGE KIT	\$348.74	<Alternate>
		RATIONAL Model No. 1900.1154US Water Filtration Single Cartridge System, for any iVario, single Combi model, or Combi-Duo models XS/XS, 61/61 or 61/101, includes: (1) single head with pressure gauge, R95H filter & filter installation kit		
			ITEM TOTAL: <Alternate>	\$348.74



Specification COM-1

SelfCookingCenter® SCC 102 E (10 x 18 x 26 inch/20 x 12 x 20 inch)



- Capacity**
- Ten (10) full-size sheet pans (18"x26") or Twenty (20) Steam table pans (12"x20"x2.5") GN1/1
 - Removable, swivelling hinging rack
 - Vertical distance between rails 2 5/8" (68 mm)
- Standard Features**
- Electrically heated table device for automatic cooking of meat, poultry, fish, side dishes, vegetables, egg dishes, desserts, bakery products and for automatic rethermalization
 - Mixed loads with individual supervision of each rack, depending on type, load amount, and the number of door openings
 - Individual rack signaling function
 - LED cooking cabinet and rack lighting - energy-saving, durable and low-maintenance
 - Optical rack signalling function
 - Rear-ventilated triple-pane cooking cabinet door, two hinged inside panes (for easy cleaning) with a special heat-reflecting coating
 - Combi-steamer according to DIN 18866, DIN 10535 for selective use of steam and hot air, separately, sequentially, or combined
 - Integrated Ethernet and USB port to connect to a cloud based system for administration of cooking processes, management of HACCP and service data and remote control
 - No water softening system or additional descaling is necessary
 - 2-Year parts and labor warranty
 - 5-Year steam generator warranty
 - No-charge 4-hour RATIONAL certified chef assistance program
 - Core temperature probe with 6 measuring points, including positioning aid automatic error correction in case of incorrect positioning
 - accurate regulation of moisture, adjustable, and retrievable via the control panel
 - Combi-steamer mode °F/(°C): steam: 85 to 265/(30 to 130), hot air: 85 to 575/(30 to 300), combination: 85 to 575/(30 to 300)
 - Individual programming of at least 1,200 cooking programs with up to 12 steps transferable via USB
 - Hand shower with automatic retracting system
 - Moisturising in 3 steps of °F/(°C) 85 to 500/(30 to 260)
 - high-performance fresh steam generator, pressureless, with automatic cleaning and automatic decalcification
 - Dynamic air circulation in cooking cabinet with reversing wheel fan with 5 fan speeds, programmable

- Integral, maintenance-free grease extraction system
- Single water connection as shipped, can be split connection for treated and untreated water
- Turbo fan cool down function
- Automatic adaptation to the installation location (elevation)
- Height adjustable feet +- 3/8" (10 mm)
- 304 (DIN 1.4301) stainless steel material inside and out
- Seamless interior and with rounded corners
- Demand-related energy supply
- 5 programmable proofing stages
- Automatic, pre-selected starting time with adjustable date/time
- Delta-T cooking
- UL listed as Commercial Cooking Appliance with Integral Systems for Limiting the Emission of Grease-laden Air

- Operation**
- Digital, graphically supported overview of the current cooking chamber climate, review and forecast as well as repeat and change options at the end of the cooking process
 - Remote control function for appliance using software and mobile app
 - Control second unit from the main unit (units must be connected via ethernet or network)
 - Real-time information about automatic adjustments on current cooking process
 - Self-learning operation, automatically adapts to actual usage
 - Intelligent energy-management system controls the energy and airflow, fully automated
 - Record mode – determination of the ideal cooking process for calibrated products using the core temperature probe for subsequent use without a core temperature probe, with automatic consideration of the load quantity
 - Self-configurable, user-specific operating display 8.5" TFT color monitor and touch screen with self-explanatory symbols for ease of operation
 - Application and user manuals can be viewed on the unit display for the current actions

- Safety features**
- Detergent and Care Tabs (solid detergents) for optimum working safety
 - HACCP data output and software update via the integrated Ethernet and USB port
 - Safety temperature limiter for steam generator and hot-air heating
 - VDE approved for unsupervised operation (e.g. overnight cooking or cleaning)
 - Maximum rack height 5 1/4 ft./1.60 m when original stand is used
 - Integral fan impeller brake
 - Door handle with right/left and slam function

- Cleaning and Care**
- Self-cleaning and care system for cooking cabinet and steam generator, regardless of the water pressure supplied
 - 7 cleaning stages for unsupervised cleaning and care - even overnight
 - Automatic cleaning and descaling of the steam generator
 - Automatic cleaning prompts indicating the cleaning stage and volume of chemicals in relation to the level of soiling
 - Soiling and care status are displayed on the monitor
 - Diagnostic system with automatic service notices displayed
 - Self-test function for actively checking unit's functions
 - 100% biodegradable Cleaner and Care tabs

- Ventilation approvals**
- This appliance conforms to the EPA 202 test in accordance to the ANSI/NFPA 96 "Ventilation Control and Fire Protection of Commercial Cooking Operations" Refer to UL Listing KNLZ.E148536 (America) or KNLZ7.E148536 (Canada).



Specification

SelfCookingCenter® SCC 102 E (10 x 18 x 26 inch/20 x 12 x 20 inch)

ConnectedCooking



For proper usage of ConnectedCooking a network socket according to RJ45 has to be provided. For optimal performance a cable-bound connection with a data rate of at least 10 Mb/s is the preferred connection. Alternatively W-LAN connections with appropriate W-LAN adaptors can be used.

Combi-Steam mode



Steam °F/(°C) 85 to 265/(30 to 130)



Hot air °F/(°C) 85 to 575/(30 to 300)



Combi °F/(°C) 85 to 575/(30 to 300)

iCookingControl - Automatic cooking



7 application modes for meat, poultry, fish, side dishes, egg dishes, desserts, baked goods and Finishing® (rethermalization)

HiDensityControl®



Highest steam saturation, and dynamic air mixing for perfect and even cooking

Efficient CareControl



Efficient self-cleaning CareControl recognizes soiling and scale and removes it

iLevelControl



Mixed loads with individual monitoring of every rack depending on the quantity of the load as well as the number of door openings.

Technical Specification

Dimensions	Width	Depth	Height
Exterior	42 1/8" (1,069 mm)	38 3/8" (976 mm)	41" (1,042 mm)
Incl. Vent/Handle	-	40 7/8" (1,038 mm)	43 1/8" (1,096 mm)
Shipping	45 5/8" (1,160 mm)	44 1/8" (1,120 mm)	49 1/4" (1,250 mm)

Weight	
Max Per Shelf	66 lbs
Max Load Size	198 lbs
Net	380.5 lbs
Shipping	424.5 lbs

Size	Electric, 60 Hz	Breaker	Cable connection	Running Amps
102	208V 3 PH	125A	#2	102.7 amps
102	240V 3 PH	150A	#2	119 amps
102	480V 3 PH	70A	#4	52.6 amps
102	440V 3 PH	60A	#4	48.6 amps

Not supplied with cable connection. Use copper wire only. 3Ph 4-wire system (3 wire w/ ground)-dedicated 3 pole circuit breaker required. 1 Ph L1, L2, G-dedicated 2 pole circuit breaker required. 208 v is field retrofittable to 240v. Special voltages available upon request. Do not use fuses. Supplied with an external data interface (splashwater proof LAN socket RJ45).

Thermal load and airflow requirements

Latent	1764 W
Sensible	2152 W
Unit free standing	44391 ft³/hr
One side against a wall	27969 ft³/hr
Noise values	65 dBA

Connected load electric

Hot air connection:	36 kW
Steam connection:	36 kW
Connected load electric:	37 kW

Water Requirements

Connection	3/4" GHT
Supply	Minimum 1/2" ID Drinking Quality Cold
Pressure	21-87 psi (1.5-6 bar)
Average Treated Water	2.9 gal/h
Consumption	
Min/Max Flow Rate	3 gpm/6.6 gpm
Water Drain	2" OD (50 mm) hub

Connect only to 2" (XS = 1 1/2") high-temperature resistant pipe. Water discharge temperature can be field adjusted to meet section 701.7 of the International Plumbing Code. Contact RATIONAL for back flow recommendation.

Water Quality

Untreated water can be 0 to 24.5 gr/gal (0 to 420ppm) hardness. We do not recommend treated water hardness < 5 gr/gal (86ppm) because the water could be corrosive. Sodium ion exchangers are not recommended; H+ ion exchange systems are recommended. Water that does not meet the following minimum standards will require the proper conditioning.

Contaminant	Water Requirements	If > than recommended
Sand/Particles	< 15 µm	Particle filter
Chlorine (Cl ₂)	< 0.12 gr/gal (0.2 ppm)	Active carbon filter
Chloride (Cl ₋)	< 4.68 gr/gal (80 ppm)	RO or deionization

Clearance Requirements

To facilitate servicing, we recommend leaving a 18"-20" (450-500 mm) gap on the left-hand side of the unit. If there is not 18"-20" (450-500 mm) left side clearance available, provisions for moving the unit or appliance to the left for service access must be made. These include, but are not limited to, having quick connections (water, gas, etc.) and lengthened electrical connections with flexible cords. If there are no external heat sources acting on the unit, there should be a minimum gap of 2" (50 mm) to the left, right, and back of unit. If a high temperature heat source is on the left side of the unit, the left-hand gap must be a minimum of 14" (350 mm). This gap may be reduced to 2" (50 mm) by using a heat shield (see options). Recommended clearance from unobstructed rear exhaust pipes and any surface collecting grease or flammable material; 16" (400 mm) gas, 10" (254 mm) electric. It is recommended to have a hood overhang of 6" (150 mm) to 18" (450 mm) at the front of the unit and 6" (150 mm) on the side if installed at the end of the cooking line. Please refer to the Installation Manual for further technical data and for instructions on installation and setup. Installations must comply with all local electrical, plumbing, and ventilation codes.



Specification

SelfCookingCenter® SCC 102 E (10 x 18 x 26 inch/20 x 12 x 20 inch)

ELECTRICAL OPTIONS (all 60Hz) Special voltages available upon request

Voltage / breaker / running amps / AWG	field retrofittable to 240 V	Voltage / breaker / running amps / AWG
<input type="checkbox"/> 208V 3 Ph / 125 / 102.7 / #2-	<input type="checkbox"/>	<input type="checkbox"/> 240V 3 Ph / 150/ 118.6 / #2
<input checked="" type="checkbox"/> 480V 3 Ph / 70 / 52.6 / #4 -	<input type="checkbox"/>	<input type="checkbox"/> 440V 3 Ph / 60 / 48.6 / #4

ACCESSORIES

<input type="checkbox"/> Installation Kits – include electrical, water and drainage connection	
<input type="checkbox"/> 208 or 240/60/3Ph	8720.1554US
<input type="checkbox"/> 480 or 440/60/3Ph	8720.1551US
<input checked="" type="checkbox"/> RATIONAL Cleaner Tabs without phosphorous – guarantee maximum cleaning power	56.00.210A
<input checked="" type="checkbox"/> RATIONAL Care Tabs – prevents scale deposits	56.00.562
<input checked="" type="checkbox"/> Certified installation by RATIONAL SERVICE-PARTNERS	See document
<input type="checkbox"/> RATIONAL Single Water Filter- for all single models and Combi-Duo XS/XS, 61/61 and 61/101	1900.1154US
<input type="checkbox"/> RATIONAL Double Water Filter- for Combi-Duo 62/62 and 62/102 or if used for more than 2 units	1900.1150US
<input type="checkbox"/> Preventative Maintenance Kits – door gaskets, air filters, interior light gasket, and light bulbs	87.00.523US
<input checked="" type="checkbox"/> Available stands – standard (stationary) and mobile (open or closed)	See accessories brochure
<input type="checkbox"/> Mobile catering stand – especially for heavy mobile catering usage	60.30.891
<input type="checkbox"/> Catering kit for mobile catering stand – support frame and feet	60.73.141
<input type="checkbox"/> Mobile oven racks and Finishing® plate racks – easier operation of full loads	See accessories brochure
<input type="checkbox"/> Run-in rail for mobile oven and plate racks	60.62.094
<input type="checkbox"/> Transport trolley for mobile oven and plate racks – standard and height adjustable	See accessories brochure
<input checked="" type="checkbox"/> Stackable Combi-Duo kit, – for stacking with 61 gas or electric - options: mobile or feet	See accessories brochure
<input type="checkbox"/> Heat shield – for installation next to heat source (e.g. range, grill)	60.70.393
<input type="checkbox"/> Condensation breaker – to divert steam from the unit into existing hood system	60.72.592
<input type="checkbox"/> UltraVent recirculating hood	60.74.972
<input type="checkbox"/> UltraVent Plus recirculating hood	60.74.976
<input type="checkbox"/> RATIONAL USB data-memory stick – for transferring cooking programs and HACCP data	42.00.162
<input type="checkbox"/> VarioSmoker – for a large variety of smoked products	60.73.010
<input type="checkbox"/> For ideal grilling, baking, roasting, frying, rotisserie, steaming, Finishing®, and much more	See accessories brochure

FACTORY INSTALLED OPTIONS (special order)

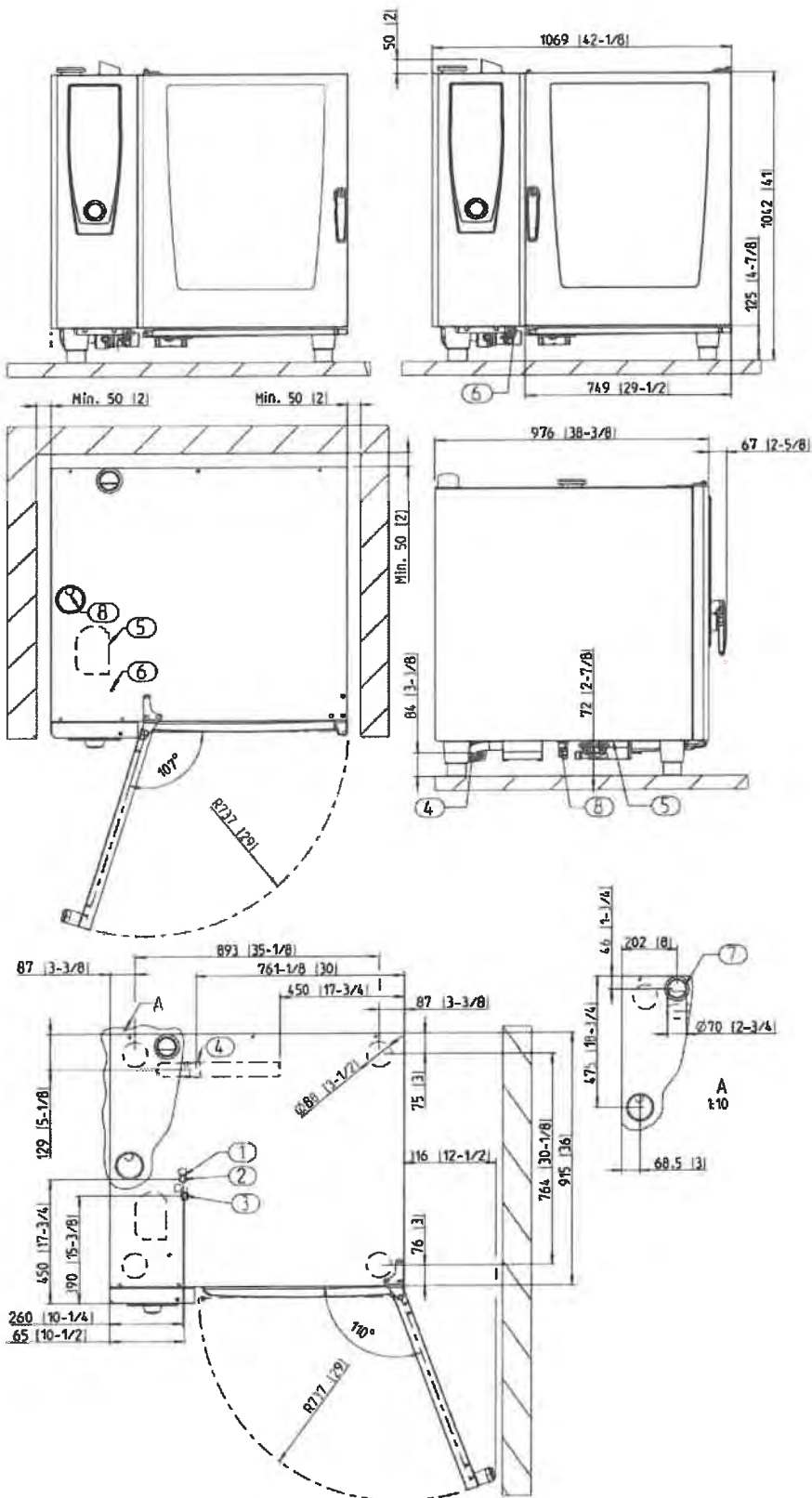
<input type="checkbox"/> Left-hinged door 208V / 240V 480V / 440V
<input checked="" type="checkbox"/> Door safety lock – handle is turned left then right before the door can be opened
<input type="checkbox"/> Sous-Vide core temperature probe, includes core temperature probe (both attach externally)
<input checked="" type="checkbox"/> Externally attached standard core temperature probe
<input type="checkbox"/> 3 Core temperature probes for iLevelControl includes core temperature probe (both attach externally)
<input type="checkbox"/> Lockable control panel cover
<input type="checkbox"/> Control panel protection
<input type="checkbox"/> Mobile oven rack package (mobile oven rack + run-in rail)
<input type="checkbox"/> Unit with special hinging racks for bakeries and supermarkets
<input type="checkbox"/> Integrated fat drain (only in conjunction with UG II or US IV stands)
<input type="checkbox"/> Marine version (electric units only)
<input type="checkbox"/> Security version



Specification

Fri Sep 06 14:00:05 CEST 2019

SelfCookingCenter® SCC 102 E (10 x 18 x 26 inch/20 x 12 x 20 inch)



1. Common water supply (cold water) "Single" water connection as shipped 2. Water supply cold water / condensate "Split" water connection 3. Water supply cold / Treated "Split" water connection 4. Water drain 5. Electrical connection wire entrance 6. Chassis Ground connection 7. Steam Vent pipe DN 2 3/4" / 70 mm 8. Splashwater-proof Ethernet socket RJ45; minimum distance 2" / 50 mm Left side clearance 20" recommended for servicing of unit without the ability to move unit while connected. Measurements in mm (Inch)

Specification/Data sheet

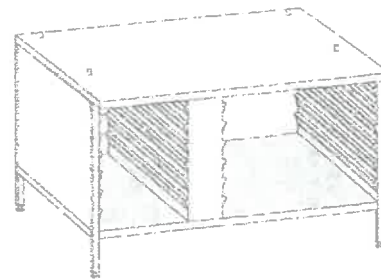
Stand UG 2 type 62/102 - Standard



Article number: 60.30.331

Description

- Standard configuration
- 7 1/1 GN pairs rails
- 7 2/1 GN pairs rails
- Rail distance 65 mm
- Free space from lowest rack to the bottom plate 57 mm
- Top panel, intermediate bottom, deep-drawn shelf rests
- Adjustable feet
- Deep-drawn beaded side panels
- Weight 45 kg
- 1067(42) mm(inch)W x 934(37) mm(inch)D x 671(26-3/8) mm(inch)H



Difference to standard

- Stand for units SelfCookingCenter® 62/102 with option integrated fat drain

Capacity†(GN-container/grids)

- 1/1 GN Grid x 7
- 1/1 GN 20 mm deep x 7
- 1/1 GN 40 mm deep x 7
- 1/1 GN 65 mm deep x 7
- 1/1 GN 100 mm deep x 4
- 2/1 GN Grid x 7
- 2/1 GN 20 mm deep x 7
- 2/1 GN 40 mm deep x 7
- 2/1 GN 65 mm deep x 7
- 2/1 GN 100 mm deep x 4
- Use of other container sizes 1/1 GN, (2/4 GN, steam pans 12" x 20", sheet pans 18" x 26"

Material

- CNS 1.4301 (CNS 304)

Project:	Quantity:	Item No:	FCSI Section:	Approval:	Date:
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Specification

COM - 2

Thu Dec 13 10:34:27 CET 2018

SelfCookingCenter® SCC Combi-Duo Open Stacking Kit feet 6" (150 mm) 62/62 E (12 x 18 x 26 inch/24 x 12 x 20 inch)



Capacity

- Twelve (12) full-size sheet pans (18"x26") or Twenty four (24) Steam table pans (12"x20"x2.5") GN1/1
- Removable, swivelling hinging rack
- Vertical distance between rails 2 5/8" (68 mm)

Standard Features

- Electrically heated device for automatic cooking of meat, poultry, fish, dishes, vegetables, egg dishes, desserts, bakery products and for automatic rethermalization
- Mixed loads with individual supervision of each rack, depending on type, load amount, and the number of door openings
- Optical rack signaling function
- LED cooking cabinet and rack lighting - energy-saving, durable and low-maintenance
- Optical rack signalling function
- Rear-ventilated triple-pane cooking cabinet door, two hinged inside panes (for easy cleaning) with a special heat-reflecting coating
- Combi-steamer according to DIN 18866, DIN 10535 for selective use of steam and hot air, separately, sequentially, or combined
- Integrated Ethernet and USB port to connect to a cloud based system for administration of cooking processes, management of HACCP and service data and remote control
- No water softening system or additional descaling is necessary
- 2-Year parts and labor warranty
- 5-Year steam generator warranty
- No-charge 4-hour RATIONAL certified chef assistance program
- Core temperature probe with 6 measuring points, including positioning aid - automatic error correction in case of incorrect positioning
- 1% - accurate regulation of moisture, adjustable, and retrievable via the control panel
- Combi-steamer mode °F/(°C): steam: 85 to 265/(30 to 130), hot air: 85 to 575/(30 to 300), combination: 85 to 575/(30 to 300)
- Individual programming of at least 1,200 cooking programs with up to 12 steps transferable via USB
- Hand shower with automatic retracting system
- Moisturising in 3 steps of °F/(°C) 85 to 500/(30 to 260)
- High-performance fresh steam generator, pressureless, with automatic filling and automatic decalcification

- Dynamic air circulation in cooking cabinet with reversing wheel fan with 5 fan speeds, programmable
- Integral, maintenance-free grease extraction system
- Single water connection as shipped, can be split connection for treated and untreated water
- Turbo fan cool down function
- Automatic adaptation to the installation location (elevation)
- Height adjustable feet +/- 3/8" (10 mm)
- 304 (DIN 1.4301) stainless steel material inside and out
- Seamless interior and with rounded corners
- Demand-related energy supply
- 5 programmable proofing stages
- Automatic, pre-selected starting time with adjustable date/time
- Delta-T cooking
- UL listed as Commercial Cooking Appliance with Integral Systems for Limiting the Emission of Grease-laden Air

Operation

- Digital, graphically supported overview of the current cooking chamber climate, review and forecast as well as repeat and change options at the end of the cooking process
- Remote control function for appliance using software and mobile app
- Control second unit from the main unit (units must be connected via ethernet or network)
- Real-time information about automatic adjustments on current cooking process
- Self-learning operation, automatically adapts to actual usage
- Intelligent energy-management system controls the energy and airflow, fully automated
- Record mode – determination of the ideal cooking process for calibrated products using the core temperature probe for subsequent use without a core temperature probe, with automatic consideration of the load quantity
- Self-configurable, user-specific operating display 8.5" TFT color monitor and touch screen with self-explanatory symbols for ease of operation
- Application and user manuals can be viewed on the unit display for the current actions

Safety features

- Detergent and Care Tabs (solid detergents) for optimum working safety
- HACCP data output and software update via the integrated Ethernet and USB port
- Safety temperature limiter for steam generator and hot-air heating
- VDE approved for unsupervised operation (e.g. overnight cooking or cleaning)
- Integral fan impeller brake
- Door handle with right/left and slam function

Combi-Duo / Stacking Kit

- Unit feet 6"/150 mm

Cleaning and Care

- Self-cleaning and care system for cooking cabinet and steam generator, regardless of the water pressure supplied
- 7 cleaning stages for unsupervised cleaning and care - even overnight
- Automatic cleaning and descaling of the steam generator
- Automatic cleaning prompts indicating the cleaning stage and volume of chemicals in relation to the level of soiling
- Soiling and care status are displayed on the monitor
- Diagnostic system with automatic service notices displayed
- Self-test function for actively checking unit's functions
- 100% biodegradable Cleaner and Care tabs

Ventilation approvals

- This appliance conforms to the EPA 202 test in accordance to the ANSI/NFPA 96 "Ventilation Control and Fire Protection of Commercial Cooking Operations" Refer to UL Listing KNLZ.E148536 (America) or KNLZ7.E148536 (Canada).



Specification

SelfCookingCenter® SCC Combi-Duo Open Stacking Kit feet 6" (150 mm) 62/62 E (12 x 18 x 26 inch/24 x 12 x 20 inch)

ConnectedCooking



For proper usage of ConnectedCooking a network socket according to RJ45 has to be provided. For optimal performance a cable-bound connection with a data rate of at least 10 Mb/s is the preferred connection. Alternatively W-LAN connections with appropriate W-LAN adaptors can be used.

Combi-Steam mode



Steam °F/(°C) 85 to 265/(30 to 130)



Hot air °F/(°C) 85 to 575/(30 to 300)



Combi °F/(°C) 85 to 575/(30 to 300)

iCookingControl - Automatic cooking



7 application modes for meat, poultry, fish, side dishes, egg dishes, desserts, baked goods and Finishing® (rethermalization)

HiDensityControl®



Highest steam saturation, and dynamic air mixing for perfect and even cooking

Efficient CareControl



Efficient self-cleaning CareControl recognizes soiling and scale and removes it

iLevelControl



Mixed loads with individual monitoring of every rack depending on the quantity of the load as well as the number of door openings.

Technical Specification

Dimensions	Width	Depth	Height
Exterior	42 3/8" (1,075 mm)	42 7/8" (1,089 mm)	62 7/8" (1,597 mm)
Incl. Vent/Handle	-	45 1/2" (1,156 mm)	65" (1,652 mm)

Weight	
Max Per Shelf	66/66 lbs
Max Load Size	132/132 lbs
Net	654 lbs
Shipping	741 lbs

Size	Electric, 60 hz	Breaker	Cable connection	Running Amps
62/62	208V 3 PH	70A/70A	#3/#3	61.4/61.4
62/62	240V 3 PH	80A/80A	#3/#3	72/72
62/62	480V 3 PH	40A/40A	#8/#8	31.5/31.5
62/62	440V 3 PH	35A/35A	#8/#8	28.8/28.8

Not supplied with cable connection. Use copper wire only. 3Ph 4-wire system (3 wire w/ ground)-dedicated 3 pole circuit breaker required. 1 Ph L1, L2, G-dedicated 2 pole circuit breaker required. 208 v is field retrofittable to 240v, 480v is field retrofittable to 440v. Special voltages available upon request. Do not use fuses. Supplied with an external data interface (splashwater proof LAN socket RJ45).

Thermal load and airflow requirements

Latent	958 W/958 W
Sensible	1236 W/1236 W
Unit free standing	26945 ft ² /h/26945 ft ² /h
One side against a wall	16986 ft ² /h/16986 ft ² /h
Noise values	65 dBA/65 dBA

Connected load electric for each unit

Hot air connection:	21.6 kW/21.6 kW
Steam connection:	18 kW/18 kW
Connected load electric:	22.1 kW/22.1 kW

Water Requirements

Connection	3/4" GHT
Supply	Minimum 1/2" ID Drinking Quality Cold
Pressure	21-87 psi (1.5-6 bar)
Min/Max Flow Rate	3 gpm/6.6 gpm/3 gpm/6.6 gpm
Water Drain	2" OD (50 mm) hub

Connect only to 2" (XS = 1 1/2") high-temperature resistant pipe. Water discharge temperature can be field adjusted to meet section 701.7 of the International Plumbing Code. Contact RATIONAL for back flow recommendation.

Water Quality

Untreated water can be 0 to 24.5 gr/gal (0 to 420ppm) hardness. We do not recommend treated water hardness < 5 gr/gal (86ppm) because the water could be corrosive. Sodium ion exchangers are not recommended; H+ Ion exchange systems are recommended. Water that does not meet the following minimum standards will require the proper conditioning.

Contaminant	Water Requirements	If > than recommended
Sand/Particles	< 15 µm	Particle filter
Chlorine (Cl ₂)	< 0.12 gr/gal (0.2 ppm)	Active carbon filter
Chloride (Cl ₋)	< 4.68 gr/gal (80 ppm)	RO or deionization

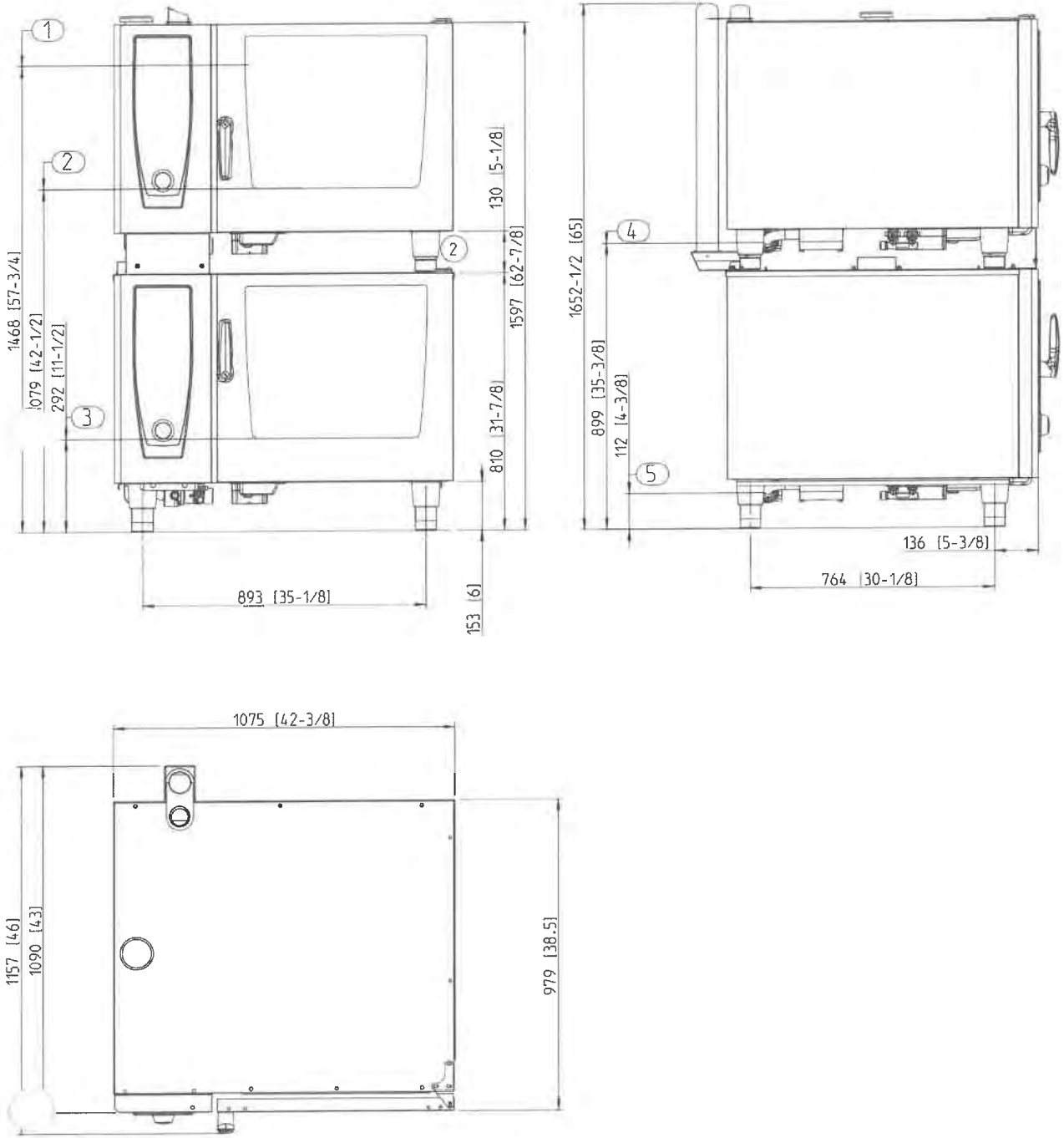
Clearance Requirements

To facilitate servicing, we recommend leaving a 18"-20" (450-500 mm) gap on the left-hand side of the unit. If there is not 18"-20" (450-500 mm) left side clearance available, provisions for moving the unit or appliance to the left for service access must be made. These include, but are not limited to, having quick connections (water, gas, etc.) and lengthened electrical connections with flexible cords. If there are no external heat sources acting on the unit, there should be a minimum gap of 2" (50 mm) to the left, right, and back of unit. If a high temperature heat source is on the left side of the unit, the left-hand gap must be a minimum of 14" (350 mm). This gap may be reduced to 2" (50 mm) by using a heat shield (see options). Recommended clearance from unobstructed rear exhaust pipes and any surface collecting grease or flammable material; 16" (400 mm) gas, 10" (254 mm) electric. It is recommended to have a hood overhang of 6" (150 mm) to 18" (450 mm) at the front of the unit and 6" (150 mm) on the side if installed at the end of the cooking line. Please refer to the Installation Manual for further technical data and for instructions on installation and setup. Installations must comply with all local electrical, plumbing, and ventilation codes.



Specification

**SelfCookingCenter® SCC Combi-Duo Open Stacking Kit feet 6" (150 mm)
62/62 E (12 x 18 x 26 inch/24 x 12 x 20 inch)**



1. Upper rack 2. Run-in rail top 3. Run-in rail bottom 4. Water drain top 5. Water drain bottom



Specification

Thu Dec 13 10:34:27 CET 2018

SelfCookingCenter® SCC Combi-Duo Open Stacking Kit feet 6" (150 mm) 62/62 E (12 x 18 x 26 inch/24 x 12 x 20 inch)

ELECTRICAL OPTIONS (all 60Hz) Special voltages available upon request

Voltage / breaker / running amps / AWG	Voltage / breaker / running amps / AWG
<input type="checkbox"/> 62 E – 208V 3 Ph / 70 / 61.4 / #3- field retrofittable to 240 V	<input type="checkbox"/> 240V 3 Ph / 80 / 70.8 / #3
62 E – 208V 3 Ph / 70 / 61.4 / #3- field retrofittable to 240 V	240V 3 Ph / 80 / 70.8 / #3
<input checked="" type="checkbox"/> 62 E – 480V 3 Ph / 40 / 31.5 / #8 - field retrofittable to 440 V	<input type="checkbox"/> 440V 3 Ph / 35/ 29.0 / #8
62 E - 480V 3 Ph / 40 / 31.5 / #8 - field retrofittable to 440 V	440V 3 Ph / 35/ 29.0 / #8

ACCESSORIES

<input type="checkbox"/> Installation Kits – include electrical, water and drainage connection– 1 needed for each unit	
<input type="checkbox"/> 208V or 240V 60/3PH	8720.1563US
<input type="checkbox"/> 480V or 440V 60/3PH	8720.1552US
<input checked="" type="checkbox"/> RATIONAL Cleaner Tabs without phosphorous – guarantee maximum cleaning power	56.00.210A
<input checked="" type="checkbox"/> RATIONAL Care Tabs – prevents scale deposits	56.00.562
<input checked="" type="checkbox"/> Certified installation by RATIONAL SERVICE-PARTNERS	See document
<input checked="" type="checkbox"/> Stand UG I for Combi Duo 62/ 62	60.30.365
<input type="checkbox"/> Stand UG I mobile for Combi Duo 62/62	60.30366
<input checked="" type="checkbox"/> 62 Preventative Maintenance Kits – door gaskets, air filters, interior light gasket, and light bulbs	87.00.521US
<input type="checkbox"/> Mobile oven racks and Finishing® plate racks – easier operation of full loads	See accessories brochure
<input type="checkbox"/> Run-in rail for mobile oven and plate racks	60.61.094
<input type="checkbox"/> Heat shield –for top unit for installation next to heat source (e.g. range, grill)	60.70.392
<input type="checkbox"/> Condensation breaker – to divert steam from the top unit into existing hood system	60.72.591
<input type="checkbox"/> RATIONAL USB data-memory stick – for transferring cooking programs and HACCP data	42.00.162
<input type="checkbox"/> VarioSmoker – for a large variety of smoked products	60.73.010
<input type="checkbox"/> For ideal grilling, baking, roasting, frying, rotisserie, steaming, Finishing®, and much more	See accessories brochure

FACTORY INSTALLED OPTIONS (special order)

<input type="checkbox"/> Left-hinged door 208V / 240V
<input type="checkbox"/> Left-hinged door 480V / 440V
<input checked="" type="checkbox"/> Door safety lock – handle is turned left then right before the door can be opened
<input type="checkbox"/> Sous-Vide core temperature probe, includes core temperature probe (both attach externally)
<input checked="" type="checkbox"/> Externally attached standard core temperature probe
<input type="checkbox"/> 3 Core temperature probes for iLevelControl includes core temperature probe (both attach externally)
<input type="checkbox"/> Lockable control panel cover
<input type="checkbox"/> Control panel protection
<input type="checkbox"/> Mobile oven rack package (mobile oven rack + run-in rail)
<input type="checkbox"/> Unit with special hinging racks for bakeries and supermarkets
<input type="checkbox"/> Integrated fat drain

OVENS

VULCAN

CON OV

**VC66E SERIES
DOUBLE DECK, DEEP DEPTH
ELECTRIC CONVECTION OVENS**

Model VC66ED
Shown with optional casters

**SPECIFICATIONS**

Double section, deep depth electric convection oven, Vulcan Model No. (VC66ED) (VC66EC). Stainless steel front, sides, top and legs. Independently operated stainless steel doors with double pane windows. Non-sag insulation applied to the top, rear, sides, bottom and doors. Porcelain enamel on steel oven interiors measure 29"w x 26 $\frac{1}{8}$ "d x 20"h. Two interior oven lights per section. Five nickel plated oven racks per section measure 28 $\frac{1}{4}$ " x 24 $\frac{1}{2}$ ". Eleven position nickel plated rack guides with positive rack stops per section. Each section heated by electric solid sheath elements rated at 12 KW. Furnished with a two speed $\frac{1}{2}$ H.P. oven blower-motor per section. Oven cool switch for rapid cool down. 208 or 240 volt, 60 Hz, 1 or 3 phase.

Exterior Dimensions:

40 $\frac{1}{4}$ "w x 45 $\frac{1}{8}$ "d (includes motor & door handles) 41 $\frac{3}{4}$ "d (includes motor only) x 70"h on 8" legs.

NSF listed. UL listed. UL listed to Canadian safety standards.

- VC66ED** Solid state temperature controls adjust from 150° to 500°F. 60 minute timer with audible alarm.
- VC66EC** Computer controls with digital time and temperature readouts. 99-hour timer with audible alarm. Roast and Hold cycle. One hundred programmable menu selections. Shelf I.D. programming.

STANDARD FEATURES

- Stainless steel front, sides, top and legs.
- Independently operated stainless steel doors with double pane windows.
- 25 total KW.
- $\frac{1}{2}$ H.P. two speed oven blower-motor.
- Moisture vent.
- Oven cool switch for rapid cool down per section.
- Porcelain enamel on steel oven interiors.
- Five nickel plated oven racks with eleven rack positions per section.
- One year limited parts and labor warranty.

OPTIONS

- Complete prison package.
 - Security screws only.
- Casters.
- Simultaneous chain driven doors.
- 480V/60 Hz/1 or 3 phase.
- Second year extended limited parts and labor warranty.

ACCESSORIES

- Stainless steel rear motor enclosure.
- Extra oven rack(s).
- Rack hanger(s).
- Stainless steel drip pan.
- Down draft flue diverter for direct vent connection.

VULCAN

a division of ITW Food Equipment Group LLC

P.O. Box 696 ■ Louisville, KY 40201 ■ Toll-free: 1-800-814-2028 ■ Local: 502-778-2791 ■ Quote & Order Fax: 1-800-444-0602

OVENS



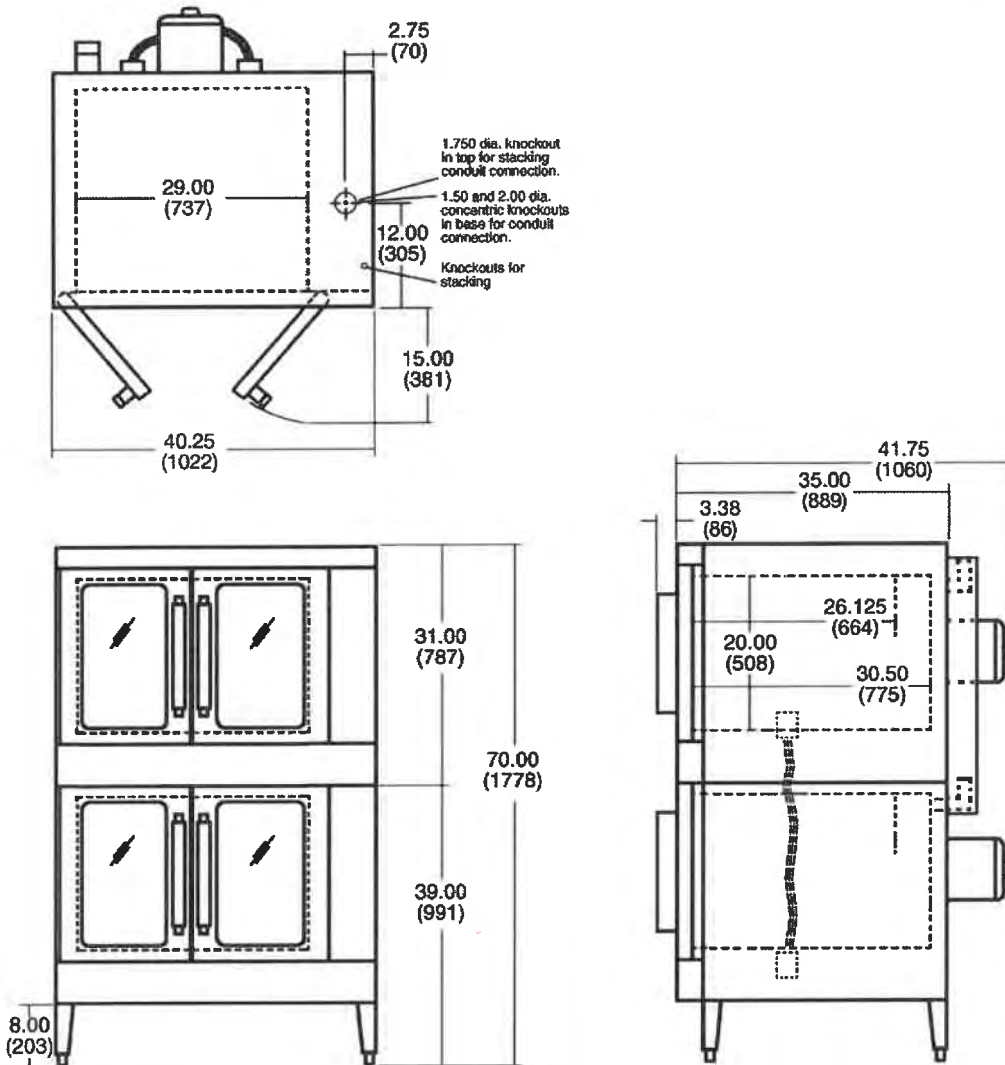
VC66E SERIES
DOUBLE DECK, DEEP DEPTH
ELECTRIC CONVECTION OVENS

OPTIONAL VOLTAGES

- 480 volt, 60 Hz, 3 phase.
- 220/380 volt, 50 Hz, 1 phase, 3 wire.
- 220/380 volt, 50 Hz, 3 phase, 4 wire.
- 240/415 volt, 50 Hz, 3 phase, 4 wire.

CLEARANCES

	Combustible	Non-Combustible
Rear	2"	2"
Right Side	4"	4"
Left Side	1"	1"



MODEL NO.	TOTAL CONN. KW	3 PHASE LOAD KW PER PHASE		NOMINAL AMPS PER LINE WIRE												WEIGHT					
				3 PHASE												1 PHASE		WITH SKIDS & PACKAGING		WITHOUT SKIDS & PACKAGING	
				208 VOLT			240 VOLT			480 VOLT			208V	240V							
				X	Y	Z	X	Y	Z	X	Y	Z			LBS.	KG	LBS.	KG			
VC66E	25	8	8	9	70	66	70	66	58	66	28	30	30	120	104	926	420	810	368		



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NOTE: In line with its policy to continually improve its products, Vulcan reserves the right to change materials and specifications without notice.

DISP

PROJECT: _____

ITEM NO.: _____



3-10 H.P. DISPOSER MODELS

Heavy-duty disposer designed for continuous operation in restaurants, hotels, hospitals and cafeterias. Food waste including steak bones is quickly and efficiently removed with this labor-saving, self-cleaning, environmentally sound disposer.

SPECIFICATIONS

- **Grind Chamber:** Corrosion Resistant Stainless Steel
- **Mounting:** 3/4" (19.1 mm) rubber mounting above grinding chamber isolates sound and eliminates vibration. Mounting is enclosed in chrome plated covers for sanitation and appearance.
- **Motor:** 3 - 10 HP Induction Motor, 1725 RPM, totally enclosed to provide protection against outside moisture. Controlled power air flow cools motor for efficiency and longer life. Built-in thermal overload protection.
- **Cutting Elements:** Stationary and rotating shredding elements made from cast nickel chrome alloy for long life and corrosion resistance, designed for reverse action grinding.
- **Main Bearings:** Double-tapered Timken roller bearings provide a shock absorbing cushion.
- **Motor Seals:** Triple lip seal protects motor from water damage. Secondary spring-loaded oil seal provides double protection against water and loss of grease.
- **Finish:** All Stainless Steel and Chrome plated. Paint-free for lasting sanitation.
- **Warranty:** 1 year full warranty from date of installation.
- **A Disposer Package includes:** 1 Mounting/Bowl Assembly, 1 Electrical Control, 1 Syphon Breaker, 1 Solenoid Valve, and 1 Flow Control Valve. The standard Flow Control Valve will be sent with the unit unless the optional valve is specified.



MODEL & HORSEPOWER/ELECTRICAL REQUIREMENTS

<input checked="" type="checkbox"/> SS-300 3 H.P.	<input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 6.0/7.4/3.7 amps, UL <input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 6.0/7.4/3.7 amps, UL , short body <input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 7.0/8.6/4.3 amps, CSA <input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 7.0/8.6/3.7 amps, NOM	<input type="checkbox"/> 415V, 50 Hz, 3 Ph, 4.9 amps <input type="checkbox"/> 220V, 50 Hz, 3 Ph, 7.2 amps <input type="checkbox"/> 380V, 50/60 Hz, 3 Ph, 4.1/3.0 amps
<input type="checkbox"/> SS-500 5 H.P.	<input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 8.6/8.8/4.4 amps, UL <input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 8.6/8.4/4.4 amps, UL , short body <input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 8.5/11.0/5.5 amps, CSA	<input type="checkbox"/> 230/460V, 50 Hz, 3 Ph, 9.0/4.5 amps <input type="checkbox"/> 415V, 50 Hz, 3 Ph, 6.0 amps <input type="checkbox"/> 380V, 50 Hz, 3 Ph, 8.9 amps
<input type="checkbox"/> SS-750 7-1/2 H.P.	<input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 9.7/12.4/6.2 amps, UL <input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 9.7/12.4/6.2 amps, UL , short body	<input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 11.7/12.6/6.3 amps, CSA
<input type="checkbox"/> SS-1000 10 H.P.	<input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 11.0/13.0/6.5 amps, UL <input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 11.0/13.0/6.5 amps, UL , short body	<input type="checkbox"/> 208-230/460V, 60 Hz, 3 Ph, 13.1/14.0/7.0 amps, CSA

NOTE: All amp ratings denote amp draw during a grind load.

ELECTRICAL CONTROLS

<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AS-101 Control Center "Aqua Saver" (Auto-Reversing)	CC-101 Control Center (Auto-Reversing)	CC-202 Control Center (Auto-Reversing)	Manual Reverse Switch (Dual Direction)	Manual Switch (Single Direction)

Our products appear on **The KCL CADalog** CD-ROM based CAD Foodservice Symbol Library. More information is available from **Kochman Consultants, Ltd.** at www.kclcad.com.



DISPOSER MOUNTING ASSEMBLIES (choose one)

Bowl Mounts

- Type A Sink Bowl Assembly: Includes bowl, water nozzle(s), bowl cover, splash baffle
- Type B Sink Bowl Assembly: Includes bowl, water nozzle(s), silver guard, splash baffle
- Type C Sink Bowl Assembly: Includes bowl, water nozzle(s), splash baffle

Collar Mounts

- #6 Collar Adaptor for welding into trough, provides 6-5/8" (168.3 mm) opening, includes splash baffle
- #7 Collar Adaptor for welding into sink, provides 6-5/8" (168.3 mm) opening, includes splash baffle and stopper

Sink Bowl Assembly Size

- 12" (304.8 mm) with one adjustable water nozzle
- 15" (381.0 mm) with one adjustable water nozzle
- 18" (457.2 mm) with two adjustable water nozzles

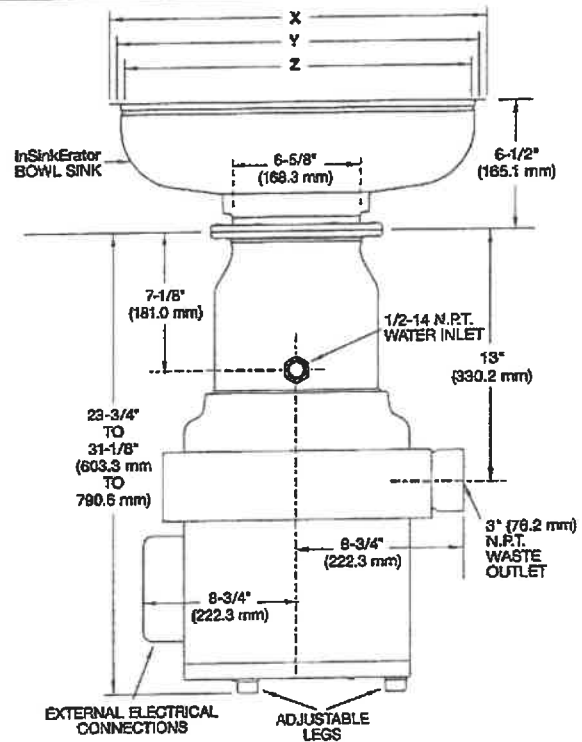
DIMENSIONS

IMPORTANT: Use dimension chart below for adaptor height in place of InSinkErat^{or} bowl sink height when mounting directly to a sink.

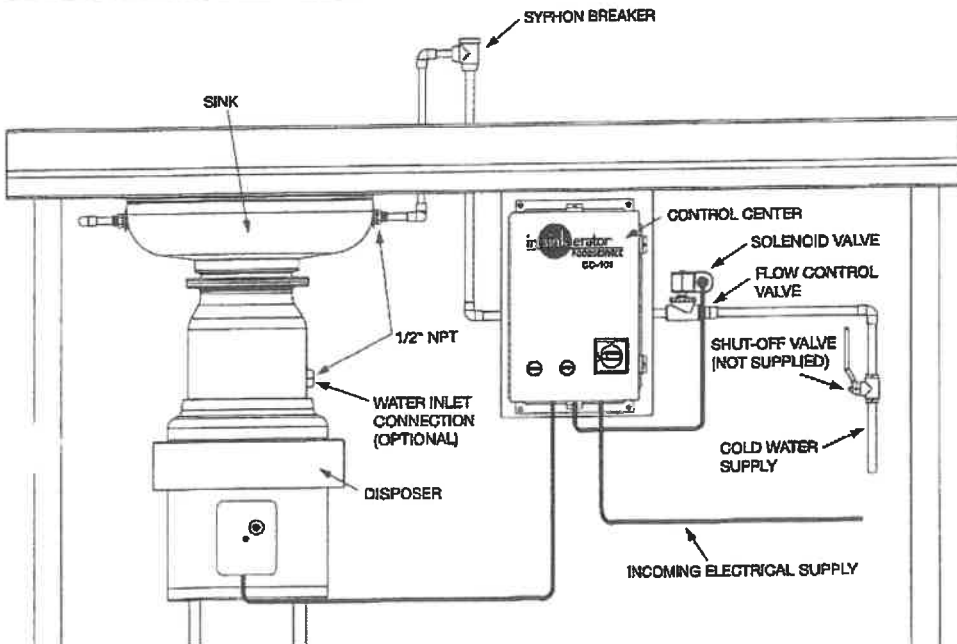
Bowl Sinks	Flange O.D. X	Work Table Hole Y	Flange I.D. Z	Height
12" (304.8 mm)	13-1/2" (342.9 mm)	12-1/4" (311.2 mm)	12" (304.8 mm)	6-1/2" (165.1 mm)
15" (381 mm)	16-1/2" (419.1 mm)	15-1/4" (387.4 mm)	15" (381.0 mm)	6-1/2" (165.1 mm)
18" (457.2 mm)	19-1/2" (495.3 mm)	18-1/4" (463.6 mm)	18" (457.2 mm)	6-1/2" (165.1 mm)
Adaptors	X	Y	Z	Height
No. 6	7-13/16" (198.4 mm)	6-7/8" (174.6 mm)	6-5/8" (168.3 mm)	1-3/16" (30.2 mm)
No. 7	9-1/8" (231.8 mm)	7-7/8" (200.0 mm)	7-5/8" (193.7 mm)	2-1/16" (52.4 mm)

NOTE:

- Adaptors are available upon request for all competitor sink bowls or cones.
- Please have sink bowl/cone type with the necessary dimensions when ordering adaptors.
- Also available as a short body model. Reduces overall height of disposer by 3" (76.2 mm).



RECOMMENDED INSTALLATION



RECOMMENDED WATER USAGE

	Standard	Optional
SS-300	8 GPM (30.3 LPM)	7 GPM (26.5 LPM)
SS-500	8 GPM (30.3 LPM)	7 GPM (26.5 LPM)
SS-750	10 GPM (37.9 LPM)	N/A
SS-1000	10 GPM (37.9 LPM)	N/A

For additional information, see Foodservice Product Information Binder.



SS SERIES FOOD WASTE DISPOSERS

Food waste disposers are a hygienic and environmentally sustainable way to manage pre- and post-consumer scraps in a foodservice establishment. The SS Series disposers are ideal for heavy-duty applications such as restaurants, schools and universities, healthcare facilities and hospitals, and government facilities.

1
YEAR
ON-SITE
PARTS & LABOR
WARRANTY

PRODUCT FEATURES & SPECIFICATIONS

SS-SERIES

- Whether you serve 25 or 2,500 people, there is an InSinkErator disposer that's designed for your operation. From the small-capacity SS-100™ model to our large-capacity SS-1000™ workhorse, InSinkErator disposers deliver superior performance, quiet operation, maximum energy efficiency, and reliable service.



SYSTEM OVERVIEW

- Stainless steel and chrome-plated finish
- Corrosion-resistant, stainless steel grind chamber
- Heavy-duty induction motor with built-in thermal overload protection
- Enclosure provides protection against outside moisture with controlled power air flow to cool motor
- Cast-nickel, chrome-alloy stationary and rotating shredding elements
- Double-tapered Timken roller bearings provide a shock-absorbing cushion
- Triple lip seal protects motor from water damage
- Secondary spring-loaded oil seal provides double protection against water and loss of grease

CLEANING

- Disposers are easy to clean and maintain
- Wipe down exterior surfaces with a wet cloth
- Use warm soapy water on the splashguard

Commercial Disposer Sizing Chart

To determine the proper size disposer, use this recommended sizing chart. Sizing recommendations are given in general terms; actual capacities vary depending on the volume and type of food waste.

Volume Processed / Application	High Buffet/Cafeteria Government	SS-300	SS-300/ SS-500	SS-500	SS-500/ SS-1000	SS-500/ SS-1000
	Medium Full Service Restaurant	SS-200	SS-300	SS-300/ SS-500	SS-500	SS-500/ SS-1000
	Low Limited Service Restaurant/Café/ Fast Casual	SS-100	SS-200	SS-300	SS-300/ SS-500	SS-1000
		SS-100	SS-100	SS-200	SS-300	SS-300/ SS-500
		Light Majority Fruits & Vegetables	Medium 50/50 Mixture	Heavy Majority Meats & Seafood	Food Waste Composition	

A complete collection of our product drawings is available for download at the **InSinkErator Revit/CAD Library**, which can be found at www.insinkerator.com/foodservice. Product information is also accessible on **The KCL CADalog**. More information is available from KCL at www.kclcad.com.



4700 21st STREET
RACINE, WI 53406
TEL: 800-845-8345
FAX: 262 554-3620
www.insinkerator.com/foodservice



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WHAT'S INCLUDED

- Base disposer: 1 mounting gasket
- Disposer packages: 1 mounting/bowl assembly, 1 electrical control, 1 syphon breaker, 1 solenoid valve, and 1 flow control valve (the standard flow control valve will be sent with the unit unless the optional valve is specified)

MODEL & HORSEPOWER/ELECTRICAL REQUIREMENTS (CHOOSE ONE)

Small Capacity Disposers



SS-100
1 HP

115/208-230V, 60 Hz, 1 Ph, 11.6/5.1/5.7 amps, **cULus**
 208-230/460V, 60 Hz, 3 Ph, 2.0/2.4/1.2 amps, **cULus**

120/208-240V, 60 Hz, 1 Ph, 11.6/5.1/5.7 amps, **NOM**
 100/200-230V, 50/60 Hz, 1 Ph, 10.4/5.2/5.4 amps

Water Usage:

5 GPM (18.9 LPM) standard water flow

3 GPM (11.4 LPM) reduced water flow (optional)

Medium Capacity Disposer



SS-200
2 HP

115/208-230V, 60 Hz, 1 Ph, 17.4/7.7/8.7 amps, **cULus**
 208-230/460V, 60 Hz, 3 Ph, 3.6/4.4/2.2 amps, **cULus**
 115/208-230V, 60 Hz, 1 Ph, 17.4/7.7/8.7 amps, **cULus, short body**

208-230/460V, 60 Hz, 3 Ph, 3.6/4.4/2.2 amps, **cULus, short body**
 208-240/460V, 60 Hz, 3 Ph, 3 Ph, 3.6/4.4/2.2 amps, **NOM**

Water Usage:

7 GPM (26.5 LPM) standard water flow

5 GPM (18.9 LPM) reduced water flow (optional)

Large Capacity Disposers



SS-300
3 HP

208-230/460V, 60 Hz, 3 Ph, 6.0/7.4/3.7 amps, **CUL**
 208-230/460V, 60 Hz, 3 Ph, 6.0/7.4/3.7 amps, **CUL, short body**
 208-230/460V, 60 Hz, 3 Ph, 7.0/8.6/3.7 amps, **NOM**

415V, 50 Hz, 3 Ph, 4.9 amps
 220V, 50 Hz, 3 Ph, 7.2 amps
 380V, 50/60 Hz, 3 Ph, 4.1/3.0 amps

Water Usage:

8 GPM (30.3 LPM) standard water flow

7 GPM (26.5 LPM) reduced water flow (optional)

SS-500
5 HP

208-230/460V, 60 Hz, 3 Ph, 8.6/8.8/4.4 amps, **CUL**
 208-230/460V, 60 Hz, 3 Ph, 8.6/8.8/4.4 amps, **CUL, short body**
 230/460V, 50 Hz, 3 Ph, 9.0/4.5 amps

415V, 50 Hz, 3 Ph, 6.0 amps
 380V, 50 Hz, 3 Ph, 8.9 amps

Water Usage:

8 GPM (30.3 LPM) standard water flow

7 GPM (26.5 LPM) reduced water flow (optional)

SS-1000
10 HP

208-230/460V, 60 Hz, 3 Ph, 11.0/13.0/6.5 amps, **CUL**
 208-230/460V, 60 Hz, 3 Ph, 11.0/13.0/6.5 amps, **CUL, short body**

Water Usage:

10 GPM (37.9 LPM) standard water flow

DISPOSER MOUNTING ASSEMBLIES (CHOOSE ONE)

Sink Collar Mounts



- #5 Sink Flange Kit**
for 3-1/2"–4" (88.9 mm–101.6 mm) sink opening (support legs are recommended)
#5 adaptors only available on small and medium capacity disposers.



- #6 Collar Adaptor Kit**
for welding into trough, for 6-5/8" (168.3 mm) opening, includes splash baffle



- #7 Collar Adaptor Kit**
for welding into sink, for 6-5/8" (168.3 mm) opening, includes splash baffle and stopper

Sink Bowl Mounts

Bowl Size

- 12" (304.8 mm) with one adjustable water nozzle
 15" (381.0 mm) with one adjustable water nozzle
 18" (457.2 mm) with two adjustable water nozzles

Kit Type



- Type A Sink Bowl Assembly**
- bowl
 - water nozzle(s)
 - bowl cover
 - splash baffle



- Type B Sink Bowl Assembly**
- bowl
 - water nozzle(s)
 - silver guard
 - splash baffle



- Type C Sink Bowl Assembly**
- bowl
 - water nozzle(s)
 - splash baffle

ELECTRICAL CONTROLS (CHOOSE ONE)

AS-101 Control Center AquaSaver®



- Automatically changes direction
- Stainless-steel housing
- Automatic shut-off with power loss
- Line disconnect
- Programmable post-flush
- Timed run
- Automatically regulates water flow to grind load

CC-101 Control Center



- Automatically changes direction
- Stainless-steel housing
- Automatic shut-off with power loss
- Line disconnect
- Programmable post-flush
- Timed run

CC-202 Control Center



- Automatically changes direction
- Stainless-steel housing
- Automatic shut-off with power loss

Manual Reverse Switch



- Manually changes direction
- Stainless-steel housing
- Automatic shut-off with power loss

Manual Switch

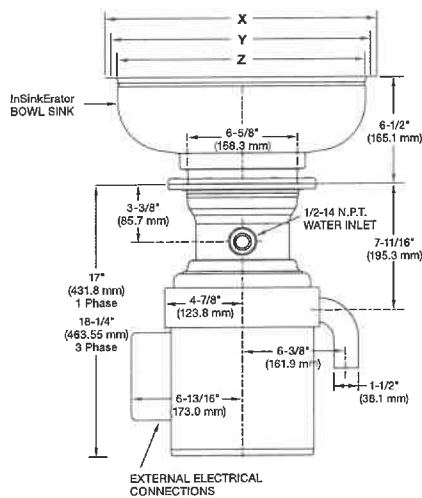


- Single direction
- Polycarbonate housing
- Automatic shut-off with power loss

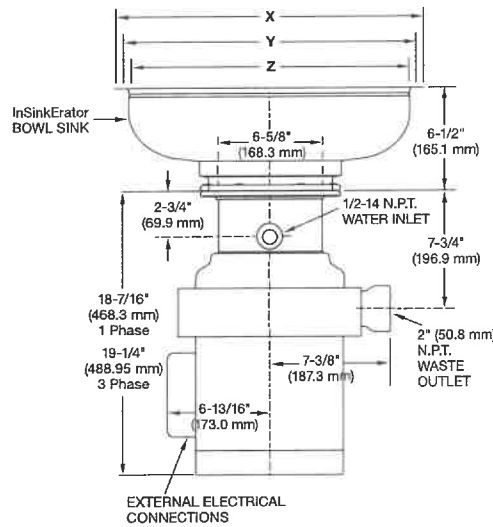
DISPOSER DIMENSIONS

Standard models shown. A short body model is available on medium and large capacity disposers. Short body models reduce overall height by 1" (25.4 mm) on medium capacity disposers and by 3" (76.2 mm) on large capacity disposers.

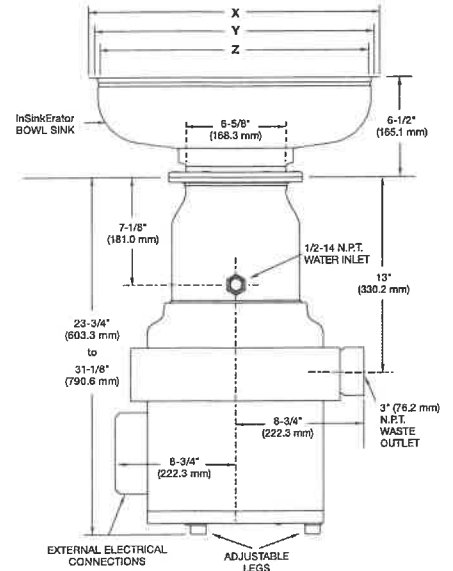
Small Capacity



Medium Capacity



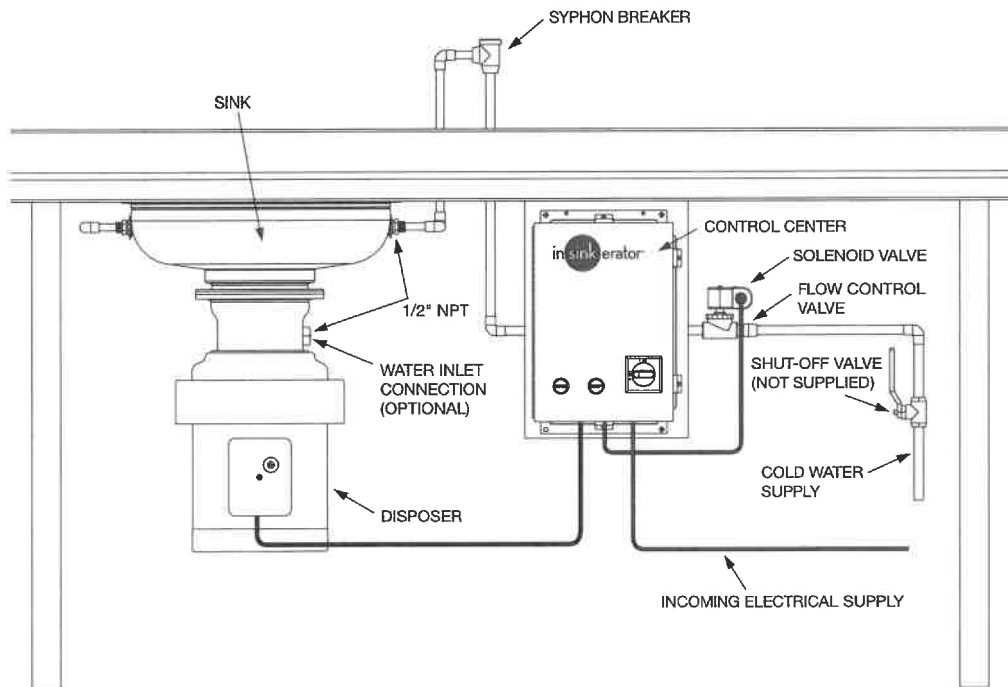
Large Capacity



If mounting directly to a sink, use dimension chart below for adaptor height in place of InSinkErator bowl sink height. **IMPORTANT: #5 adaptors only available on small and medium capacity disposers.**

Bowl Mounts	Flange O.D. X	Work Table Hole Y	Flange I.D. Z	Height
12" (304.8 mm)	13-1/2" (342.9 mm)	12-1/4" (311.2 mm)	12" (304.8 mm)	6-1/2" (165.1 mm)
15" (381 mm)	16-1/2" (419.1 mm)	15-1/4" (387.4 mm)	15" (381.0 mm)	6-1/2" (165.1 mm)
18" (457.2 mm)	19-1/2" (495.3 mm)	18-1/4" (463.6 mm)	18" (457.2 mm)	6-1/2" (165.1 mm)
Collar Mounts	X	Y	Z	Height
#5	Fits Standard Sink Opening: 3-1/2" – 4" (88.9 mm – 101.6 mm)			2-3/4" (69.9 mm)
#6	7-13/16" (198.4 mm)	6-7/8" (174.6 mm)	6-5/8" (168.3 mm)	1-3/16" (30.2 mm)
#7	9-1/8" (231.8 mm)	7-7/8" (200.0 mm)	7-5/8" (193.7 mm)	2-1/16" (52.4 mm)

TYPICAL INSTALLATION - BOWL



REPLACING A COMPETITIVE DISPOSER

- Refer to the Mounting Adaptor Guide or Video for adaptors that fit competitor sink bowls or cones.
- Have sink bowl/cone type with appropriate dimensions available when contacting Customer Service with questions or to place an order.

SAMPLE SPECIFICATION

InSinkErator Food Waste Disposer. Food waste grinding system with _____ HP disposer, _____ control panel. _____ Volts, _____ Hz, _____ Phase operation. _____ disposer mount. Syphon breaker with 1/2" NPT connections; flow control valve; (1) 24V water solenoid.

PROJECT INFORMATION

Item Number: _____

Quantity: _____

Manufacturer: InSinkErator _____

Project: _____

Address: _____

City/State/Zip: _____

Contact: _____

Phone: _____

Installer: _____

Contact: _____

Phone: _____

Model Number: _____

Electrical

Requirements:

_____ volts _____ phase

Dealer: _____

City/State/Zip: _____

Contact: _____

Phone: _____

Consultant: _____

Contact: _____

Phone: _____

DUN-2036C



ALUMINUM
DUNNAGE RACKS

STATIONARY DUNNAGE RACKS



Item #: _____ Qty #: _____
 Model #: _____
 Project #: _____

12" HEIGHT

MODEL #	Width "W"	Length "L"	No. of Legs	Height "H"	Clearance "C"	Wt.
DUN-2036	20"	36"	4	12"	10 1/4"	10 lbs.
DUN-2048	20"	48"	4	12"	10 1/4"	12 lbs.
DUN-2060	20"	60"	6	12"	10 1/4"	16 lbs.
DUN-2436	24"	36"	4	12"	10 1/4"	11 lbs.
DUN-2448	24"	48"	4	12"	10 1/4"	13 lbs.
DUN-2460	24"	60"	6	12"	10 1/4"	17 lbs.

8" HEIGHT

MODEL #	Width "W"	Length "L"	No. of Legs	Height "H"	Clearance "C"	Wt.
DUN-2036-8	20"	36"	4	8"	6 1/4"	10 lbs.
DUN-2048-8	20"	48"	4	8"	6 1/4"	11 lbs.
DUN-2060-8	20"	60"	6	8"	6 1/4"	12 lbs.
DUN-2436-8	24"	36"	4	8"	6 1/4"	9 lbs.
DUN-2448-8	24"	48"	4	8"	6 1/4"	12 lbs.
DUN-2460-8	24"	60"	6	8"	6 1/4"	13 lbs.

FEATURES:

- Heavy duty welded construction.
- 1-3/4" square tubing.
- 1500 lb. Load Capacity (Evenly distributed load).

CONSTRUCTION:

- Fully welded 1-3/4" square aluminum tube assembly.
- Legs are 1-3/4" square tubing with Plastic Feet.

MATERIAL:

6063-T52 extruded aluminum tube.

MOBILE DUNNAGE RACKS

FEATURES:

- Heavy duty welded construction.
- 1-3/4" square tubing.
- 6" Heavy Duty Casters.
- Includes Handle.
- 2000 lb. Rolling Load Capacity (Evenly distributed load).

CONSTRUCTION:

- Fully welded 1-3/4" square aluminum tube assembly.
- 6" diameter casters bolted to Base of Mobile Dunnage Rack.
- Handle secures to rack with Locking Set Screws.

MATERIAL:

6063-T52 extruded aluminum tube.



Includes Handle!

MODEL #	Width	Length	Wt.
DUN-2036C	20"	36"	35 lbs.
DUN-2048C	20"	48"	40 lbs.
DUN-2060C	20"	60"	45 lbs.

Replacement	Model #	Wt.	Qty
Mobile Dunnage Rack Handle	DUNH-1	7 lbs.	



Customer Service Available To Assist You 1-800-645-3166 8:30 am - 7:00 pm E.S.T.

For Orders & Customer Service:
 Email: customer@advancetabco.com or Fax: 631-242-6900

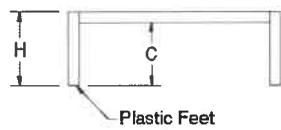
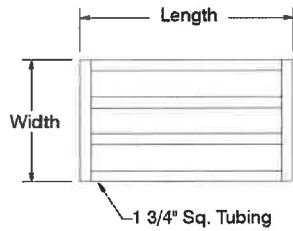
For Smart Fabrication™ Quotes:
 Email: smartfab@advancetabco.com or Fax: 631-586-2933

DIMENSIONS and SPECIFICATIONS

TOL \pm .500"

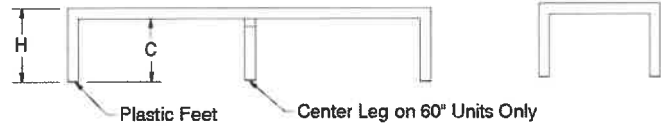
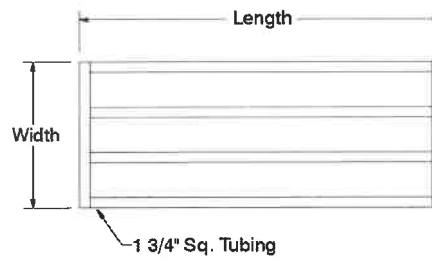
ALL DIMENSIONS ARE TYPICAL

STATIONARY DUNNAGE RACKS

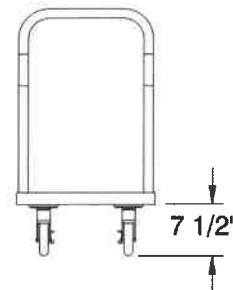
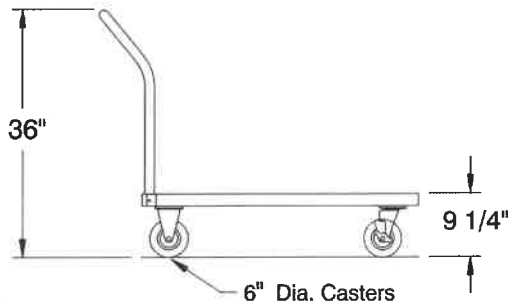
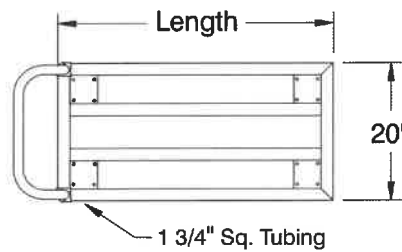


WIDTH = 20" or 24"

60" LENGTH RACKS HAVE 6 LEGS



MOBILE DUNNAGE RACKS



LENGTH = 36", 48" or 60"



REF-R

325 Wireless Boulevard, Hauppauge, NY 11788

ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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Simply Engineered Better

Project _____
Item No. DWUC
Quantity _____

201HT UNDERCOUNTER

201HT

Undercounter High Temperature
Dishwashing Machine
with Built-in Booster Heater



SPECIFIER STATEMENT

Specified unit will be Moyer Diebel Model 201HT undercounter high temperature dishwashing machine with built-in booster.

Features include 15-3/4" door opening, standard detergent and rinse-aid dispensing pumps. Built-in 70°F rise booster, and wash tank heater maintains water required temperature.

1 year parts and labor warranty.

Vent hood is not recommended as unit does not produce excessive steam. Always follow local building code guidelines.



STANDARD FEATURES

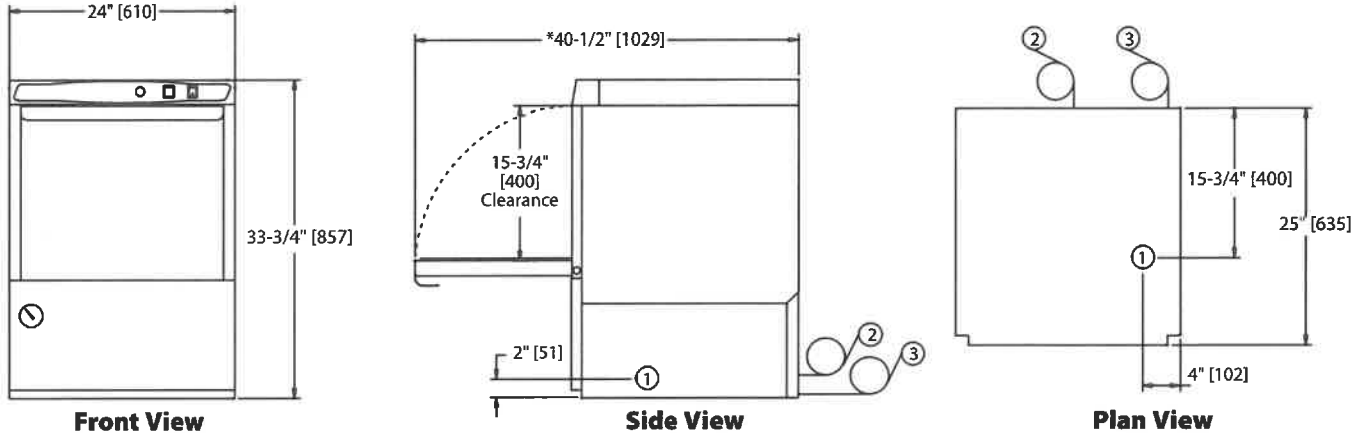
- **Multi-Power** allows for infield conversion to 208-240 volt and/or single to three phase
- **Soft Start** to protect glasses and dishes from chipping and breaking
- **Rinse Sentry** extends the rinse cycle to ensure 180°F final rinse
- **Built-in Booster** 180°F final rinse (standard 6kW 70F° rise or optional 9kW high speed recovery booster)
- **Scrub Feature** extends wash cycle for heavily soiled wares
- **Delime Feature** extends cycle up to 20 min for cleaning unit
- Pumped drain permits use of the drain connection up to 6' of which 3' can be vertical
- 25 racks per hour*
- Advance digital temperature monitoring
- Fresh water wash and pumped rinse
- Built-in detergent and rinse-aid pumps
- Advance service diagnostics
- Upper and lower interchangeable spray arms
- Stainless steel top and side panels
- Counter balance door
- Wash tank heater
- Two 20" x 20" racks, one peg and one flat
- One year parts and labor warranty

* Excludes 20 second NSF load/unload time

OPTIONS & ACCESSORIES

<input checked="" type="checkbox"/> 9kW high speed recovery booster	-
<input checked="" type="checkbox"/> Flat bottom dishrack	P/N 101273
<input checked="" type="checkbox"/> Peg dishrack	P/N 101285
<input type="checkbox"/> 6" Stand	P/N 0712393
<input type="checkbox"/> 17RS - 17" Stand	P/N 0708757
<input type="checkbox"/> 1" roller casters	P/N 0712480
<input checked="" type="checkbox"/> Drain Water Tempering Kit (factory installed)	P/N 0712382-1
<input type="checkbox"/> Low Chemical Alarm (factory installed)	P/N 0712314

Dimensions shown in inches and [millimeters]



*Note: Allow additional 3" clearance from wall.

Utilities	
1 Electrical Connection	208-240/60/1; 3 wire plus ground, (See Box). 208-240/60/3; 4 wire plus ground, (See Box).
2 Hot Water	110°F/43°C Min., hot water for 70°F/39°C rise booster. 5 ft. long 1/2" I.D. flexible fill hose with 3/4" hose connector. Flow pressure: 25-95 psi (173-656 kPa)
3 Drain Connection	5/8" [15.9] I.D. flexible reinforced hose, 6 ft. [1829] long. Max. drain flow 15 US gpm. [12.5 imp gal] Max. drain height 3 ft. [914]

SPECIFICATIONS

Capacity	
*Racks per hr.	25
Motor Horsepower	
Wash	1
Water Consumption	
Per hr. (max. use)	38.4 US gal;
Per rack	1.8 US gal;
Temperatures °F	
Wash (minimum)	150
Rinse (minimum)	180
Heating	
Tank heat, electric (kW)	2.0
Electric booster	
(kW required for 70°F rise)	6
(kW required for high speed recovery)	9
Time Cycle in Seconds	
Wash	90
Rinse	26
Drain/fill	25
Total	141

* Excludes 20 second NSF load/unload time

201HT with 70°F Rise Booster

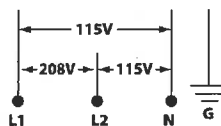
Electrical Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/1	32	40	40
240/60/1	36	40	40
208/60/3	22	30	30
240/60/3	24	30	30

201HT with 9 kW High Speed Recovery Booster

Electrical Specs.	Rated Amps	Minimum Supply Ckt. Conductor Ampacity	Maximum Overcurrent Protective Device
208/60/1	45	60	60
240/60/1	50	60	60
208/60/3	29	35	35
240/60/3	33	40	40

	Uncrated	Crated
Height	33-3/4"	39-1/2"
Width	24"	25"
Depth	25"	25-1/2"
Ship Wt. lbs/kg	178	198

* Adjustable foot height - 11/4" [45]



*Note: Electrical supply service must be a 3-wire plus ground for connection as shown.

Note: Field convertible to accept 3 phase power.

Warning: Plumbing and electrical connections should be made by qualified personnel who will observe all the applicable plumbing, sanitary and safety codes. Due to an ongoing value analysis program at Moyer Diebel, specifications in this catalog are subject to change without notice.

Moyer Diebel – USA

3765 Champion Blvd., NC 27105
336/661-1992 • Fax: 336/661-1979

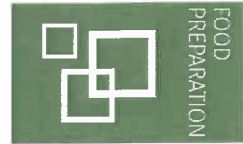
moyerdiebel.com

an Ali Group Company

FP



Project _____
AIA # _____ SIS # _____
Item # _____ Quantity _____ C.S.I. Section 114000



FP150

Continuous-Feed Food Processor



SPECIFIER STATEMENT

Specified unit will be an NSF rated Hobart continuous-feed food processor with a large, easily removable feed hopper. Food processor has all aluminum hopper and housing and is compact for easy storage. Unit can process up to 14 pounds per minute with plate speeds at 420 RPMs and the exclusive decoring screw deflects product away from plate hub for complete processing. Cutting tools available include slicing, julienne, shredding, grating and dicing plates.

MODELS

- FP150** Continuous-Feed Half Hopper Food Processor

STANDARD FEATURES

- + Red OFF, Green ON button
- + ½ HP motor with overload protection
- + Compact design
- + Front angled at 50°
- + Planetary drive
- + Large, removable full-size feed hopper
- + All-aluminum hopper and housing
- + Double Interlock switch
- + Plate speed of 420 RPMs
- + No Volt Release

ACCESSORIES (Available at extra cost)

- 3-Pack Plates: 1/16, 5/32 slicer plates, 3/16 shredder plate, 1 wall rack (15PLATE-3PACK-SS)
- 6-Pack Plates: 1/16, 5/32, 7/32, 3/8 slicer plates, 3/16 shredder plate, 3/8 dicer plate, 2 wall racks (15PLTSS-6PACK)
- 3-Peg Wall Rack: designed to hold three plates for additional plate storage
- Slicer Plates: 1/32, 1/16, 1/8, 5/32, 7/32, 5/16, 3/8
- Crimping Plate: 5/32
- Soft Slicing Plates: 5/16, 3/8, 1/2, 5/8
- Julienne Plates: 5/64, 5/32, 5/16
- Dicer Grids: 7/32, 5/16, 3/8, 1/2, 5/8, 3/4
- Shredder Plates: 1/16, 5/64, 1/8, 3/16, 7/32, 5/16, 3/8
- Grater Plate: Fine, hard cheese
- Machine Table: Adjustable height to hold Food Processor
- Adjustable height stainless steel lug cart
- Stainless steel receiving pan
- Plastic receiving pan

OPTIONS

- Maximum security correctional package

FP150 CONTINUOUS-FEED FOOD PROCESSOR

Approved by _____ Date _____ Approved by _____ Date _____



SOLUTIONS / BENEFITS

PERFORMANCE

1/2 HP Motor with Overload Protection

Large, Full-Size Feed Hopper

- + Flexibility, convenience, reduced labor
- + Supports processing capabilities for large variety of products and eliminates pre-cutting
- + Design permits continuous cutting of long products

Plate Speed of 420 RPMs

- + Precise cutting and dicing action without bruising or mashing product

Compact Design

- + Plates remove in seconds
- + Occupies minimal counterspace

EASE OF USE

Front Angled at 50°

- + 50 degree angle for ease of product loading
- + Helps to reduce operator fatigue

All-Aluminum Hopper and Housing

- + Anodized finish resists harsh cleaners
- + Easy clean up

Compact Design

- + Occupies minimal counterspace
- + Production capacity for 14 pounds per minute

SANITATION & CLEANING

All-Aluminum Hopper and Housing

- + Anodized finish resists harsh cleaners
- + Easy clean up

Large, Removable Full-Size Feed Hopper

- + Flexibility, convenience, reduced labor
- + Supports processing capabilities for large variety of products and eliminates pre-cutting
- + Design permits continuous cutting of long products

OPERATOR ASSURANCE

Double Interlock Switch

- + Prevents machine from running when pusher plate swings away or is open

No Volt Release

- + Unit will not automatically turn on if power is lost

SPECIFICATIONS

Electrical: 120/60/1, 3 conductor power cord (18 AWG) is 6 feet in length. Device available at higher voltage.

Motor: 4.8 amps. Planetary gear driven operating at 420 RPM output. 1/2 HP with overload protection.

Switches: Easy to operate (red) OFF and (green) ON switch. Pusher plate and feed hopper interlocks.

Standard Equipment: Basic unit with deflector plate and cleaning brush

Warranty: Unit has full one-year warranty on parts, labor and mileage against manufacturer's defects. Service contracts are available.

Cutting Tools: Slicer, julienne and shredder plates feature stainless steel plates with cutlery-grade stainless steel knives. Grate plates feature stainless steel cutting plates with thermoplastic support hubs. Dicing grids have molded ring construction to support stainless steel knives.

Plate combinations for dicing operations are shown in the table below:

FP150 Food Processor								
	DICEGRD-7/32	DICEGRD-5/16	DICEGRD-3/8	DICEGRD-1/2	DICEGRD-1/2L	DICEGRD-5/8	DICEGRD-5/8L	DICEGRD-3/4
SLICE-1/32-SS								
SLICE-1/16-SS								
SLICE-1/8-SS	✓	✓	✓	✓		✓		✓
SLICE-5/32-SS	✓	✓	✓	✓		✓		✓
SLICE-7/32-SS	✓	✓	✓	✓		✓		✓
SLICE-5/16-SS		✓	✓	✓		✓		✓
SLICE-3/8-SS			✓	✓		✓		✓
SFTSLC-5/16		✓	✓	✓		✓		✓
SFTSLC-3/8			✓	✓		✓		✓
SFTSLC-1/2					✓		✓	
SFTSLC-5/8							✓	

Weight: Shipping - 46 lb.; Net - 39 lb.




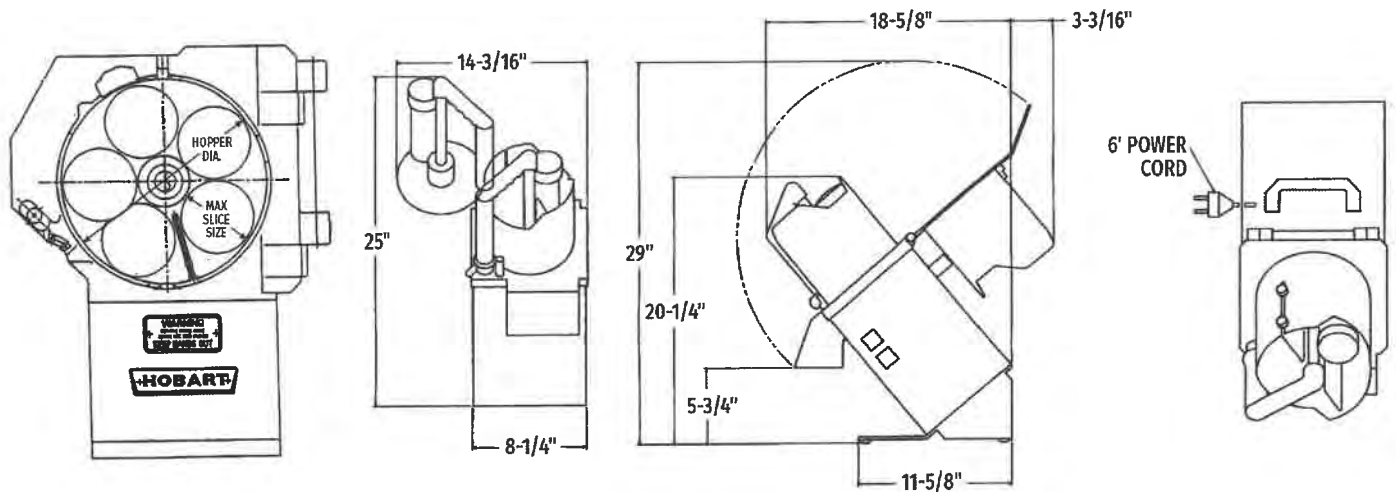
DETAILS AND DIMENSIONS

FP150

Hopper Maximum Width	6 ³ / ₈ "
Maximum Slice Size	2 ¹ / ₂ "
Usable Depth	6"
Feed Tube Diameter	2 ¹ / ₈ "

Plugs and Receptacles:

Machine Voltages	
Service Current Requirement if Plug Connected	110-120/60/1
	220-230/50/60/1
	15, 20 Amp.
Terminal Designation of Plug	2 Pole 3 Wire Grounding
NEMA Plug Configuration	5-15P
Plug Configuration	
Molded Plug on Cord	Yes
Plug - Straight/Angle	Straight
NEMA Receptable or Connector Configuration	5-15R





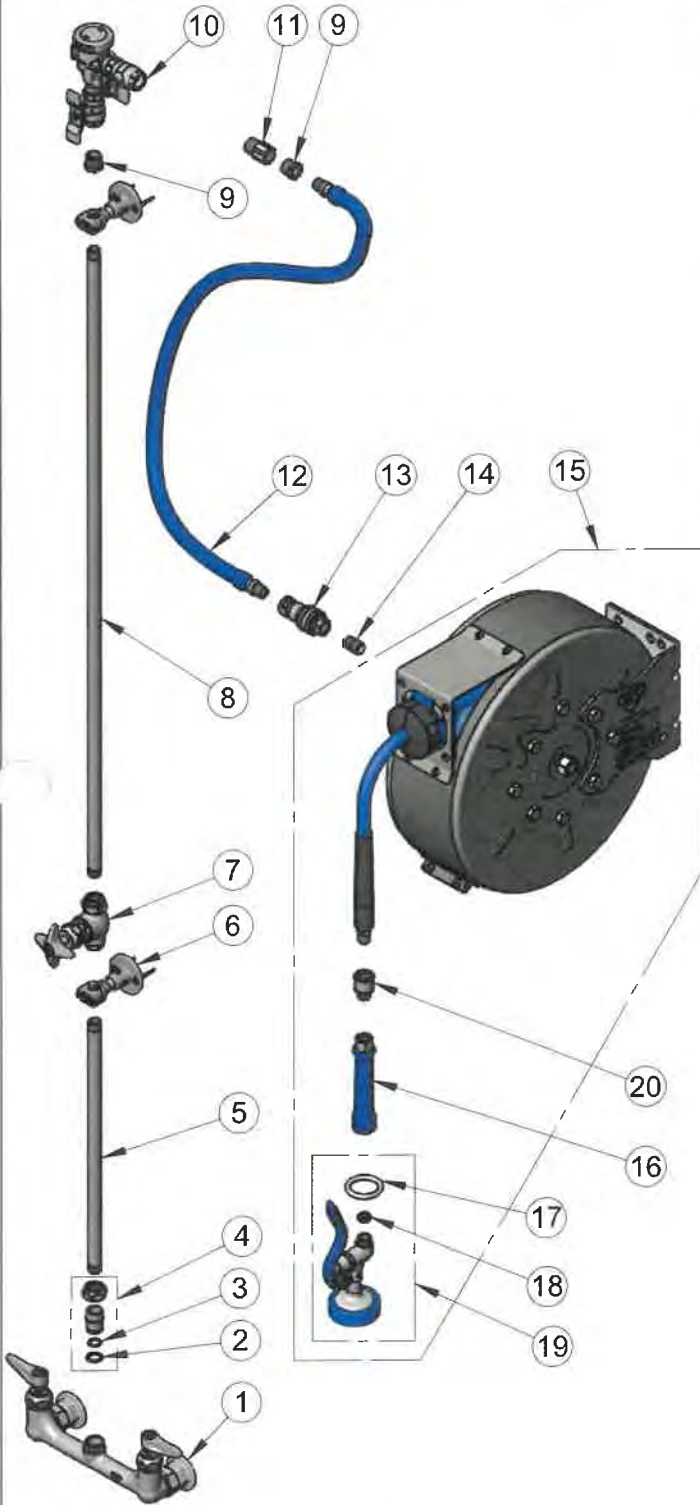
T&S BRASS AND BRONZE WORKS, INC.

2 Saddleback Cove / P.O. Box 1088
Travelers Rest, SC 29690

HR

Model No.
B-7222-C01XS1E
Item No.

Travelers Rest, SC: 800-476-4103 • Simi Valley, CA: 800-423-0150 • Fax: 864-834-3518 • www.tsbrass.com



ITEM NO.	SALES NO.	DESCRIPTION
1	B-0230-LN	8" Wall Mount Mixing Faucet
2	014200-45	Star Washer, Anti-Rotation
3	001065-45	O-Ring
4	EZ-K	EasyInstall Kit
5	000368-40	Nipple, 3/8" x 16"
6	B-0109-07	Wall Bracket
7	0RK3	Control Valve
8	002558-40	3/8" NPT x 40" Riser
9	001359-40	Hex Bushing, 1/2" NPT Male x 3/8" NPT Female
10	B-0963	1/2" NPT Continuous Pressure Vacuum Breaker w/ Integral Check Valve
11	015073-40	Check Valve w/ 1/2" NPT Adapter
12	HW-2B-36	3/8" NPT x 36" Flexible Water Hose
13	AW-5B	3/8" NPT Quick Disconnect
14	002535-25	3/8" Close Nipple
15	B-7222-C01	Enclosed Hose Reel w/ 3/8" x 30' Hose
16	012504-40	Grip Handle (Blue), 3/8" NPT
17	000907-45	Spray Valve Hold Down Ring
18	010476-45	#27 Washer
19	EB-0107	High Flow Spray Valve (Blue)
20	019652-40	3/8" NPT Live Swivel

Product Specifications:
 Closed Coated Hose Reel w/ 30' of 3/8" Hose, High Flow Spray Valve (Blue) w/ Swivel, Vacuum Breaker, 3/8" NPT Flexible Water Connector, 8" Wall Mount Mixing Faucet w/ Quarter-Turn Eterna Cartridges w/ Spring Checks & Control Valve

Product Compliance:
 NSF 61 Exempt (Non-Potable)
 2019 DOE PRSV Non-Compliant
 ASSE 1056 (VB)



T&S BRASS AND BRONZE WORKS, INC.

2 Saddleback Cove / P.O. Box 1088
Travelers Rest, SC 29690

Model No.

B-7222-C01XS1E

Item No.

Travelers Rest, SC: 800-476-4103 • Simi Valley, CA: 800-423-0150 • Fax: 864-834-3518 • www.tsbrass.com

This Space for Architect/Engineer Approval

Job Name _____ Date _____

Model Specified _____ Quantity _____

Customer/Wholesaler _____

Contractor _____

Architect/Engineer _____

B-0963
Continuous Pressure
Vacuum Breaker w/
Integral Check Valve

3/8" NPT x 36"
Flexible Water
Connector

Stainless Steel
Quick Disconnect

3/8" NPT x 40" Riser

Control Valve

(2) B-0109-07
Wall Brackets

EasyInstall
3/8" NPT x
16" Riser

Enclosed Coated Hose Reel
w/ 30' of 3/8" Hose

019652-40
3/8" NPT
Live Swivel

EB-0107
High Flow
Spray Valve
(Blue)

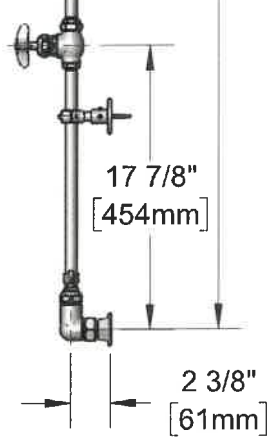
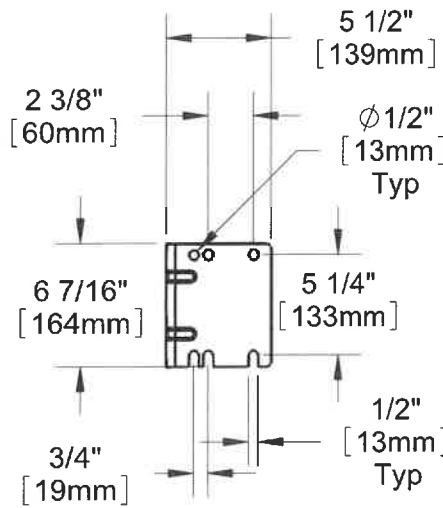
64 7/8"
[1647mm]

8" Wall Mount
Mixing Faucet,
Quarter-Turn
Eterna Cartridges
w/ Spring Checks
& Lever Handles
w/ Color Coded
Indexes

12 5/8"
[321mm]

8"
[203mm]
Adjustable From
7 3/4" to 8 1/4"
[197mm to 210mm]

Ø 2" [51mm]
Flanges w/
1/2" NPT
Female Inlets



Product Specifications:

Enclosed Coated Hose Reel w/ 30' of 3/8" Hose, High Flow Spray Valve (Blue) w/ Swivel, Vacuum Breaker, 3/8" NPT Flexible Water Connector, 8" Wall Mount Mixing Faucet w/ Quarter-Turn Eterna Cartridges w/ Spring Checks & Control Valve

Product Compliance:

NSF 61 Exempt (Non-Potable)
2019 DOE PRSV Non-Compliant
ASSE 1056 (VB)

Search for:

Go

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- COMMERCIAL AND RESIDENTIAL SWITCHES
- CHRISTMAS IN JULY?!
- June is Party Month!

Featured Product



American Permanent Ware
- 56602 RING
HEATER;120V 500W 6-
19/32 OD

Information

Products: 61391
Categories: 1
Prices: US Dollars

Currency

US Dollars

Language

Location: /Restaurant Equipment Parts

T&S - B-1400 HOSE REEL;35' HOSE

2



Product Information

T&S - B-1400 HOSE REEL;35' HOSE

Price: \$1793.13

- Tell a Friend

Product Code: 56-1162-B-1400

In Stock

Quantity: Add to Basket

Shopping Basket

Your basket is empty.

Items in cart: 0
Total: \$0.00

[View Basket](#)

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1. Hot Dog Cart Burner - Cast Iron
2. American Permanent Ware - 82533200 QUARTZ ELEMENT;240V 1800W 29 -1/8
3. American Permanent Ware - 33858 CONVEX ROLLER;
4. WITTCO - WP-111 HINGE;
5. WITTCO - WP-242 KNOB;

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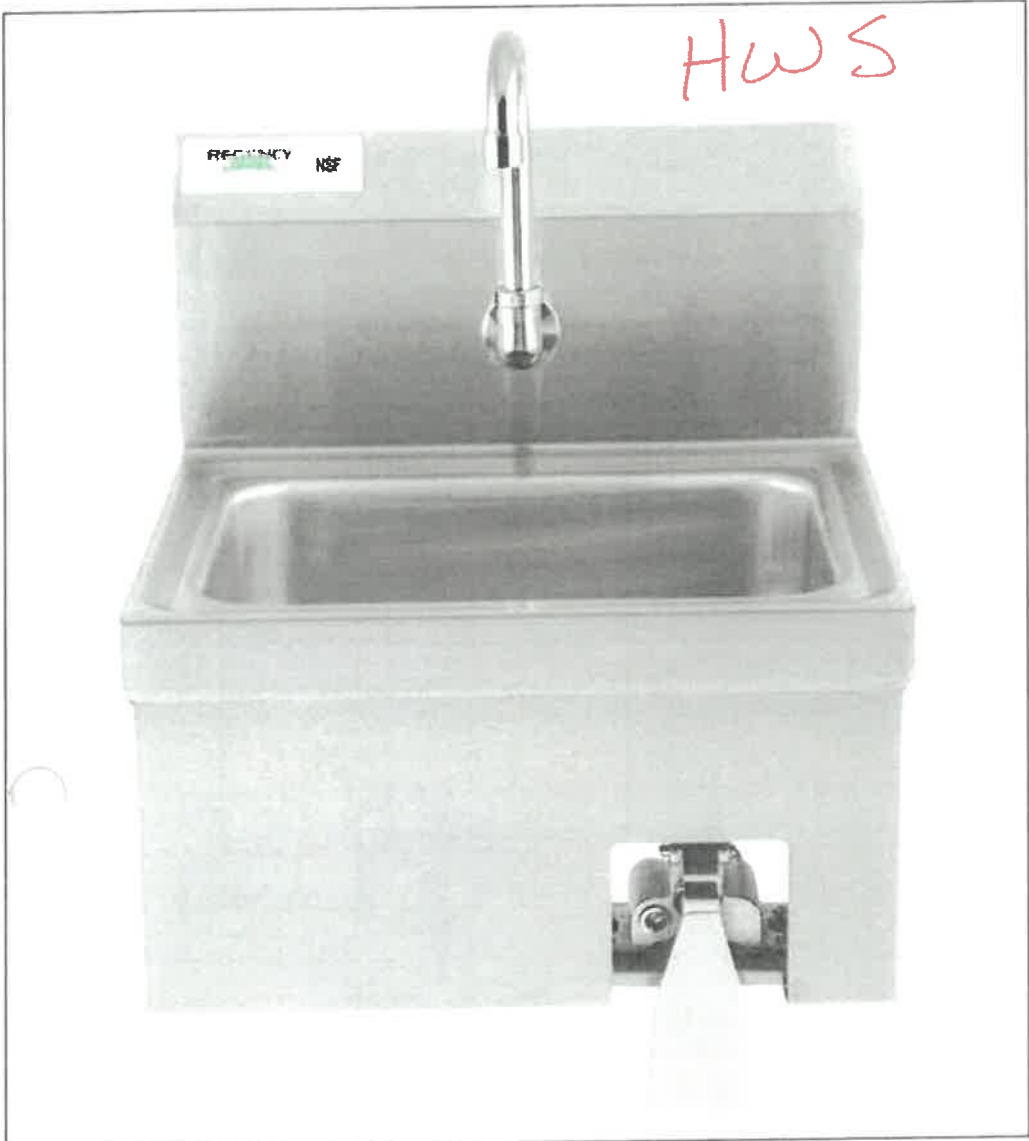
20-GAUGE STAINLESS STEEL
WALL MOUNTED SINK
 WITH HANDS-FREE FAUCET

ITEM #: _____ QUANTITY: _____

PROJECT: _____

APPROVAL: _____

DATE: _____



FEATURES

- Single, 14" x 10" x 5" sink bowl with drain basket and 9½" backsplash
- 20-gauge, type 304 stainless steel
- Knee-operated valve with hands-free operation of 4" splash mounted gooseneck faucet
- Includes 1½" IPS drain basket and no-drip countertop edge



SPECIFICATIONS

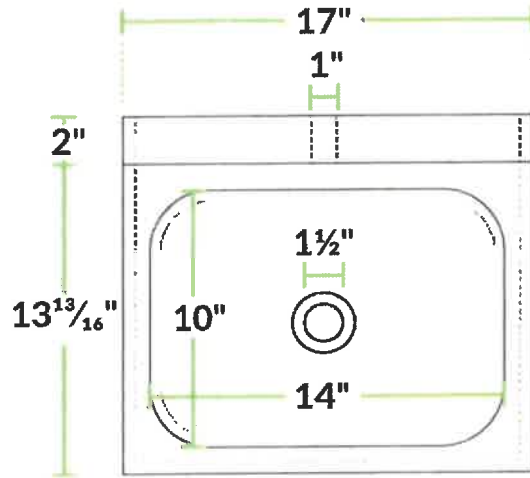
ITEM	OVERALL (LEFT TO RIGHT)	OVERALL (FRONT TO BACK)	OVERALL (HEIGHT)	BOWL (LEFT TO RIGHT)	BOWL (FRONT TO BACK)	BOWL DEPTH	Side Splash
600HS17KO	17"	15 ¹³ / ₁₆ "	18½"	14"	10"	5"	--
600HS17KOSP	17"	15 ¹³ / ₁₆ "	18½"	14"	10"	5"	Left & Right

20-GAUGE STAINLESS STEEL
WALL MOUNTED SINK
WITH HANDS-FREE FAUCET

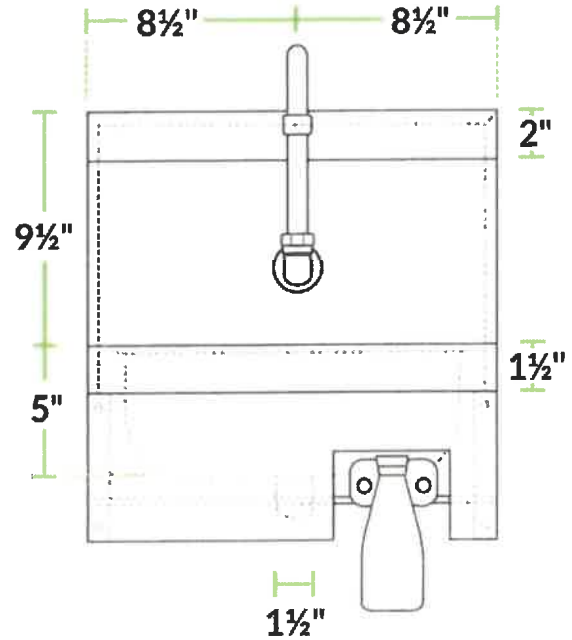
REGENCY
Tables and Sinks

600HSI7K0

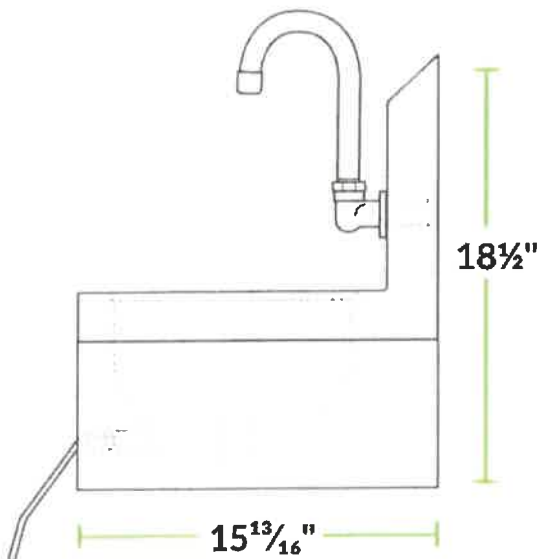
TOP



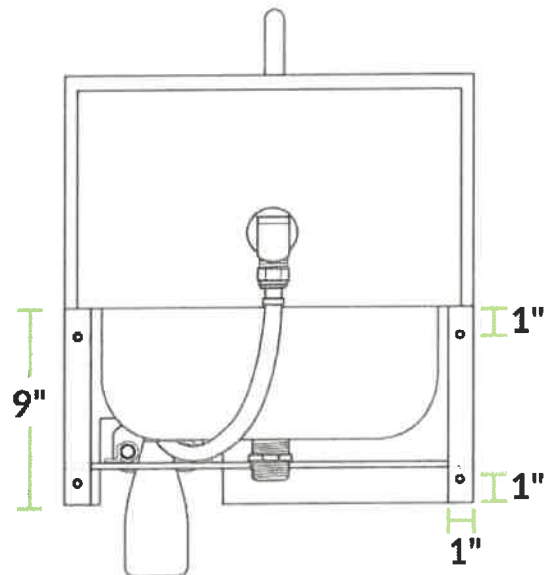
FRONT



SIDE



BACK



89166-532

ICE

SELF-CONTAINED FLAKER WITH BUILT-IN STORAGE BIN

FLAKER DIMENSIONS

W x D x H

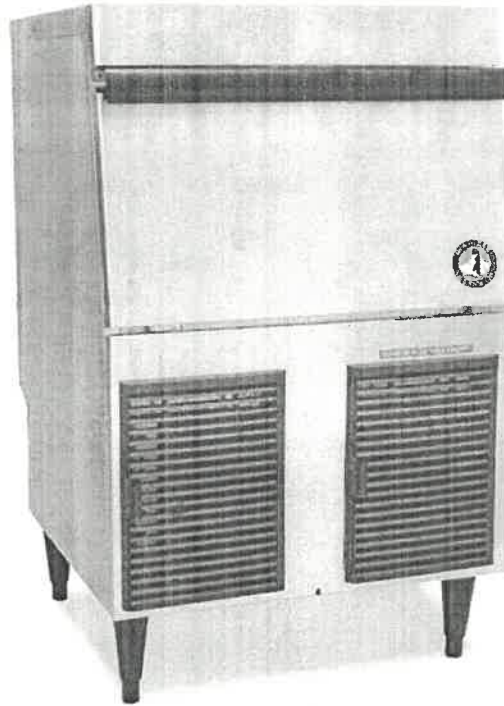
89166-532

24 x 26 x 39*

*with 6" legs

89166-532

Air-Cooled
Shown



- Up to 330 lbs. of ice production per 24 hours
- Up to 80 lbs. built-in storage
- Corrosion resistant stainless steel
- Automatic flush system designed for longer life and dependability of ice machine
- Evaporator assembly protected from peak loads
- Convenient drop down door
- Front access for easier maintenance
- Removable air filter
- Front in, front out airflow - allows for easier fit into tight spaces with no clearance needed on sides and rear
- R-404 Refrigerant
- Protected by *HoshiGuard* Antimicrobial Agent **HOSHIGUARD**

Warranty

Valid in United States, Canada, Puerto Rico, & U.S. Territories. Contact factory for warranty in other countries.

Three Year - Parts & Labor on entire machine. (Serial numbers Vxxxxx] and after.)

Five Year - Parts on: Compressor, air-cooled condenser coil.



89166-532

SELF-CONTAINED FLAKER WITH BUILT-IN STORAGE BIN

AIR-COOLED

Water Temp' F.	50°	70°	90°	
Air Temp' F.	70°	330	315	300
	80°	290	280	270
	90°	255	250	235

UTILITY CONSUMPTION

Catalog Number	KWH per 100 LBS.		Potable Water Gal. per 100 lbs.
	90/70	70/50	
89166-532	5.8	4.1	12.0

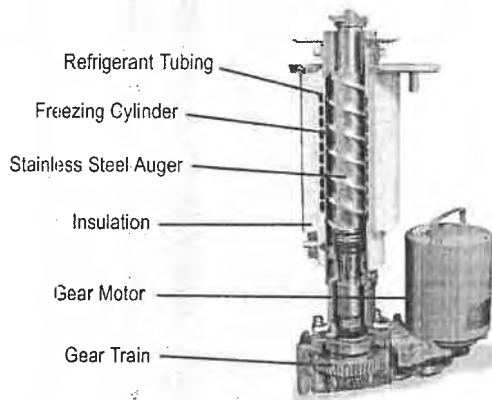
SPECIFICATIONS

Catalog Number	Condenser	Amperage	Min. Circuit Ampacity	Shipping Weight
89166-532	Air-Cooled	6.7	N/A	178 lbs.

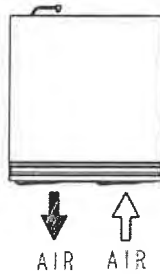
STORAGE BINS

Catalog Number	Application Capacity
89166-532	Built-in 80 lb. capacity

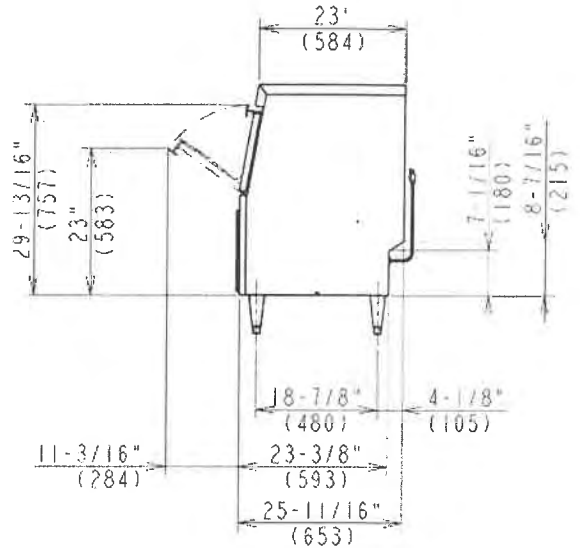
- Circuit breaker or fuse protects gear motor from overload.
- Gear motor runs one minute after termination of ice making to clear all ice from evaporator.



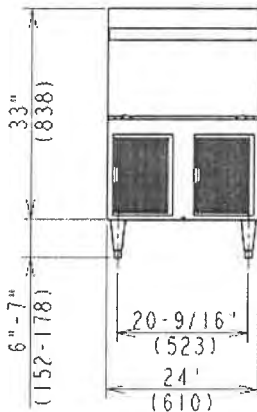
EVAPORATOR



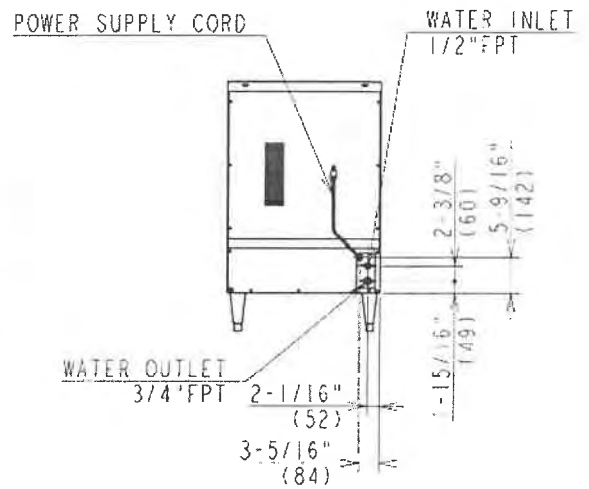
TOP VIEW



SIDE VIEW



FRONT VIEW



REAR VIEW

ELECTRICAL & PLUMBING/89166-532

- 115V
- 3/8" copper or equivalent independent potable water supply
- 3/4" FPT independent drain connection

OPERATING LIMITS

- Ambient Temp Range 45 - 100°F
- Water Temp Range 45 - 90°F
- Water Pressure 10 - 113psig
- Voltage Range 104 - 127V

SERVICE

- Panels easily removed and all components accessible for service.
- Removable/cleanable air filters



© HOSHIZAKI AMERICA, INC.





WATER FILTERS

ICE-F

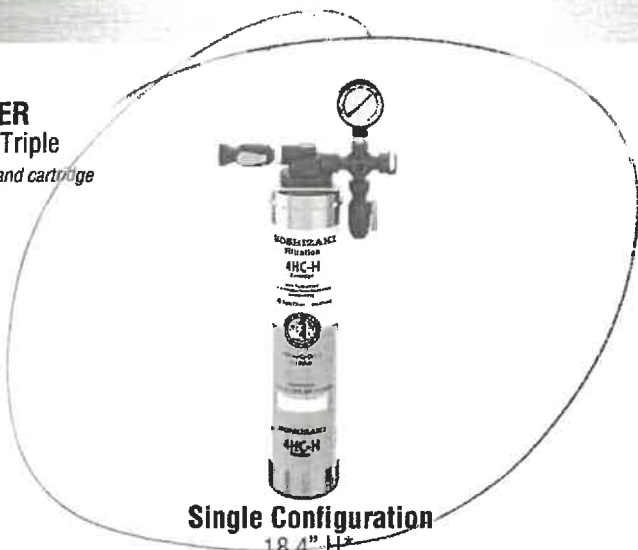


WATER FILTERS
04/03/19
Item # 13076

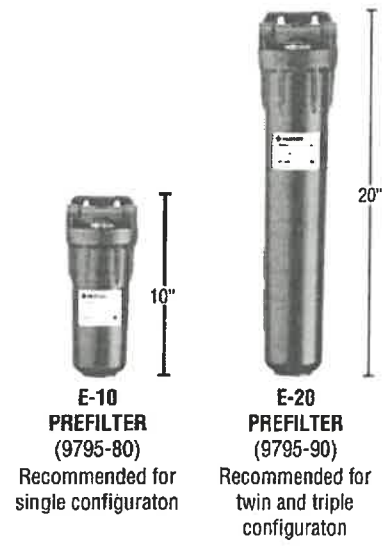
FILTRATION SYSTEMS

Item #: _____
 Project: _____
 Qty: _____
 AIA#: _____

H9320 FILTER
 Single, Double, Triple
**height includes manifold and cartridge*



E-10 PREFILTER
(9795-80)
E-20 PREFILTER
(9795-90)



- Keep ice makers functioning at full capacity
- 93.7% average reduction of chlorine from incoming water supply, eliminating tastes and odors of the ice
- Filters are rated as one (1) micron nominal producing crystal clear ice
- Decrease machine maintenance by reducing lime scale build-up

HOSHIZAKI H9320 FILTER

Available in single, double and triple configurations. Rated NSF Class 1, STD 42, for taste, odor and chlorine reduction and for mechanical filtration (95.6% removal of particles one (1) micron and larger in size.)

The H9320 Filters and their respective cartridges have been tested and listed by NSF only for the functions listed above. Check for compliance with state and local laws and regulations. Do not use where the water is microbiologically unsafe, or with waters of unknown quality without adequate disinfection before or after the unit. The H9320 filter can be used with water that may contain filterable cysts.



The H9320 System is tested and certified by NSF International against NSF/ANSI Standard 42 for the reduction of:
Std. No. 42 - Aesthetic effects
Aesthetic Effects **Mechanical Filtration**
 Bacteriostatic Effects Nominal Particulate Class 1
Chemical Reduction
 Taste & Odor
 Chlorine



Warranty:

One Year replaceable elements*
 One Year the entire system
 * Warranty applies to material defects in materials & workmanship only.

Hoshizaki reserves the right to change specifications without notice.



WATER FILTERS

FILTRATION SYSTEMS



WATER FILTERS
04/03/19
Item # 13076



Model Number	Description Flow Rate (Gal. per min.)	Undercounter KMs	KM Cubers	IM Cubers	Cubelets & Flakers	DCM/DBs
H9320-51	Single (2 GPM)	AM-50 KM-80 KM-115 KM-160 KM-230 KM-300	KM-350, 520, 660 KML-325, 500, 700 KMD-410, 460, 530 KMS-830 DKM-500	IM-200, 500	All Models	All Models
H9320-52	Twin 2 x (2 GPM)	N/A	KM-901, 1100 KMD-860 KMS-822, 1122, 1402	N/A	N/A	N/A
H9320-53	Triple 3 x (2 GPM)	N/A	KM-1301, 1340, 1601, 1900, 2200, 2600 KMH-2100 KMS-2000	N/A	N/A	N/A
H9655-11	Replacement Cartridge (1) One each					

Recommended water filter configurations based on average ice machine usage and regular filter replacement. If your operation has challenging water conditions or higher usage, then it may be necessary to use an additional filter or prefilter.



Project _____
 AIA # _____ SIS # _____
 Item # _____ Quantity _____ C.S.I. Section 114000



RMC SERIES

MILK COOLER

8 CRATE CAPACITY MODELS

M.C.

STANDARD PRODUCT FEATURES

- Stainless Steel Exterior & Interior
- Top Mounted Removable Refrigeration System
- Forced Air Refrigeration System
- Accommodates (8) 13" x 13" Crate(s) or (4) 13" x 19" Crate(s)
- Single or Double Sided
- Sliding Lift Up & Down Door(s)
- Reinforced Cabinet Exterior Bottom
- Heavy Duty Dunnage Racks Protect Cabinet & Promote Airflow
- Lockable Insulated Doors
- Metal Door Handles
- Magnetic Snap-In EZ-Clean Door Gasket(s)
- Floor Drain with Plug
- 8' Cord & Plug Attached
- Set of Four (4) 6" or 4" Factory Mounted Adjustable Casters
- 3-Year Parts & Labor Warranty
- 2-Year Additional Compressor Parts Warranty



Model Shown - RMC49D4

RMC SERIES - MILK COOLERS



This unit is listed to the applicable UL, CSA and NSF Standards by an approved NRTL. Consult the factory or unit's data plate for approval information.

ACCESSORIES & OPTIONS (*field installed)

- MCACC-BUMPER, Bumper Corner Guard Kit (4)

AVAILABLE CONFIGURATIONS

Single Access Models

- RMC34S4 8 Crate 34" Length, 4" Casters
- RMC34S6 8 Crate 34" Length, 6" Casters

Double Access Models

- RMC34D4 8 Crate 34" Length, 4" Casters ←
- RMC34D6 8 Crate 34" Length, 6" Casters

Approved by _____ Date _____ Approved by _____ Date _____

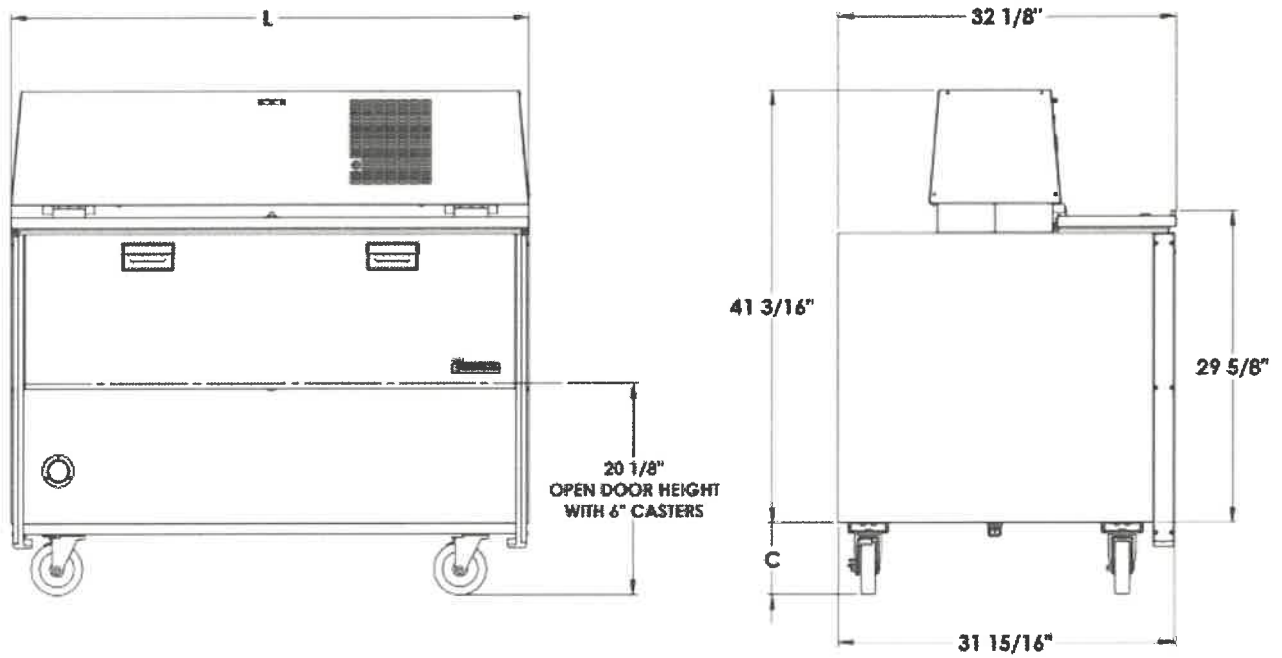


MODELS

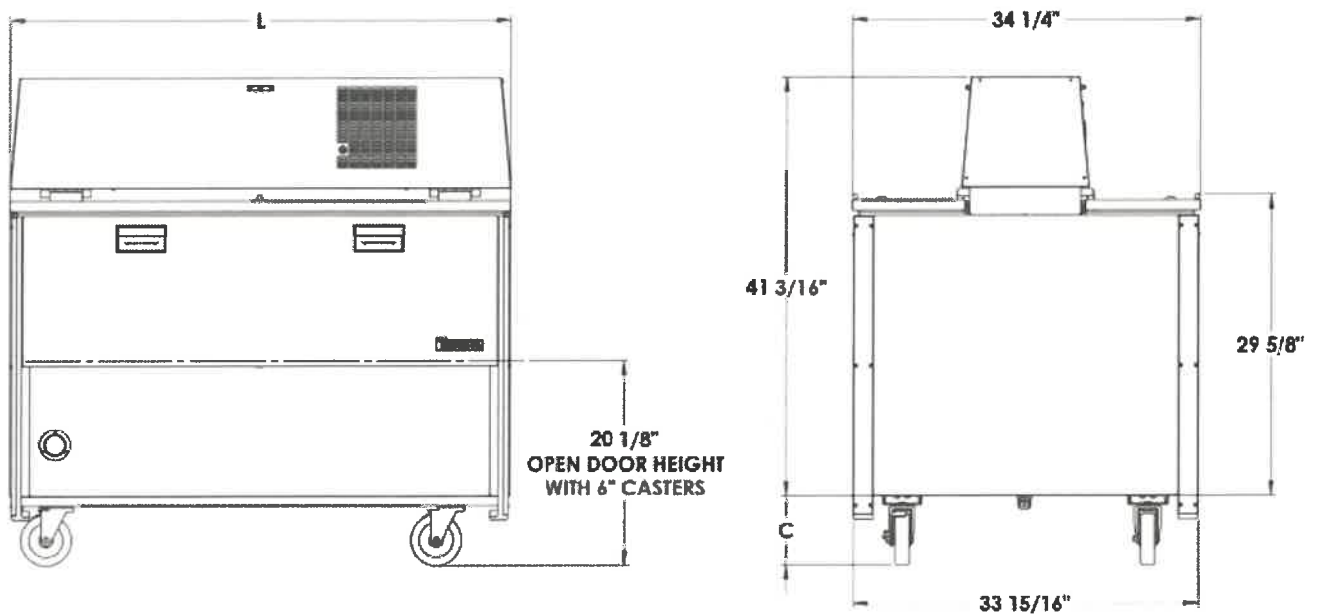
Single Access Models: RMC34S4, RMC34S6
Double Access Models: RMC34D4, RMC34D6



Single Access Models



Double Access Models





MODELS

Single Access Models: RMC34S4, RMC34S6
Double Access Models: RMC34D4, RMC34D6

MODELS	RMC34
DIMENSIONAL DATA	
Net Crate Capacity 13 x 13 in. ¹	8
Net Crate Capacity 13 x 19 in. ¹	4
Length -Overall in.	34 (86.4 cm)
Depth-Single Cabinet Only in.	32 1/8 (81.6 cm)
Depth-Double Cabinet in.	34 1/4 (87 cm)
Height-Overall on 6" Casters	48 (124.5 cm)
Net Weight uncrated lbs. (kg)	395 (179)
ELECTRICAL DATA	
Voltage	115/60/1
Single Access Full Load Amperes MDEC ²	7.2 1.85 kWh/Day
Double Access Full Load Amperes MDEC ²	7.2 1.88 kWh/Day
NEMA Plug Type	5-15P
Single Access Cabinet Volume	11.72
Double Access Cabinet Volume	12.46
REFRIGERATION DATA	
Refrigerant	R-450A
Refrigerant Amount oz. (gr)	9.5 (269)
BTU ³ /HR	1660

NOTE:

- * Figures in parentheses reflect metric equivalents.
- 1. Net Capacity cu. ft.
- 2. MDEC = Maximum Daily Energy Consumption
- 3. Based on a 90°F ambient and 20°F evaporator.



Equipped With One NEMA 5-15 P Plug

Note: When ordering please specify: Door Access, Caster Height and other options.
Continued product development may necessitate specification changes without notice.

EQUIPMENT SPECIFICATIONS

CONSTRUCTION, HARDWARE, INSULATION

Cabinet exterior and interior is constructed of stainless steel. Interior sides, back and front are also stainless steel. The exterior cabinet bottom is constructed of stainless steel. Gasket profile and material simplify cleaning and increase overall gasket life. Both the cabinet and doors are insulated with non-CFC, foamed in place polyurethane.

DOOR/ACCESS

Front sliding protects gasket(s). Lockable lift up top access door.

REFRIGERATION SYSTEM

A balanced, top mounted side and front and rear breathing, refrigeration system using environmentally friendly, non-flammable R-450A refrigerant is provided. It features an air-cooled hermetic compressor and a forced air evaporator coil. An 8' cord and plug is provided. Standard operating temperature is 34° to 38°F [1.1° to 3.3°C].

CONTROLLER

An electronic digital control is supplied standard. It includes a 3-Digit LED display, and a Fahrenheit or Celsius temperature scale display capability.

INTERIOR/DUNNAGE RACKS

Heavy duty removable dunnage racks protect cabinet and promote airflow.

WARRANTIES

Both a three year parts and labor warranty and five year compressor parts warranty.

CONTINUED PRODUCT DEVELOPMENT MAY NECESSITATE SPECIFICATION CHANGES WITHOUT NOTICE.

MDR

Metro MetroMax i Drying Rack Units

Product Number	Dimensions (D x W x H)	Weight (lbs)	Finish	Shelves	Price	Quantity
PR48VX3	24x48x69	110	Mobile		2858.67	_____

ADD: 24x36 Grid Mounted to Unit and 8 Metro Hooks



MetroMaxi Drying Rack Unit allows superior air circulation for fast drying of trays, pans, lids, pots, and all sink items. Because it promotes food safety by eliminating moisture and offers the perfect organizational set up. Furthermore, the mobile model comes with corrosion resistant polymer casters 2 swivel & 2 locking. Finally, MetroMaxi Polymer Shelving has a lifetime warranty against rust and corrosion due to its Microban antimicrobial product protection.

Therefore, the MetroMax i® Drying Rack Unit combines the corrosion resistance and strength of MetroMax i with the convenience of a drying rack unit that efficiently holds pots, pans and trays to assure proper air drying and food safety. . Consequently, it is perfect for Damp, Humid Conditions: Posts and shelves offer a lifetime warranty against rust and corrosion. Type 304 Stainless Steel wire drop-in racks offer long life performance. Corrosion-resistant, epoxy-coated tray drying racks have built-in Microban antimicrobial product protection.

PR48VX3 models come with two intermediate stainless-steel shelves that provide maximum space utilization for pots, pans, and lids. Top shelf features an epoxy coated tray drying rack with 34 slot capacity. The open grid bottom shelf is great for drying large stock and lobster pans.

Cleans Easily: MetroMaxi Drying Rack Unit open-grid shelf mats lift off easily and fit in the dish machine. Type 304 Stainless Steel wire drop-ins clean easily.

Microban® product protection is built into Shelves, Posts, and Tray Drying Rack Components: Microban® product protection inhibits the growth of stain and odor causing bacteria. It keeps the product “cleaner between cleanings.”

M KH

FRANKLIN - 51163 - 18 IN MAGNETIC KNIFE HOLDER

SKU: 51163

Price: \$37.75/ea

Shipping Info: Stock item, same day shipping M-F



18 IN MAGNETIC KNIFE HOLDER FEATURES

- 18" magnetic knife holder
- Maple wood construction with two heavy duty magnets
- Mounting hardware included

[Specs](#)

[Replaces](#)

PAN RACKS

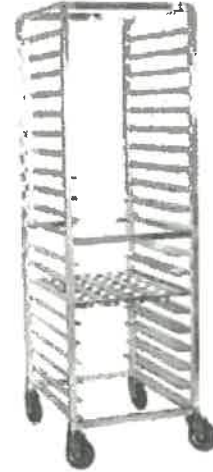
MPR

Aluminum Standard Duty Pan Racks

- Heavy duty runners, .078" thick runners
- Reinforced gussets standard, 5" Poly U swivel stem casters
- Lifetime guarantee against rust
- Freight class 300



Reinforced Socket

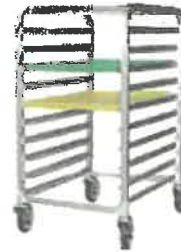


Aluminum Standard Duty Pan Rack APR2018-3

Model No.	Tray Cap	Spacing (In.)	D x L x H (In.) (mm.)		Wt. (Lbs.) (Kg.)	
End Load						
APR1018-6	10	6	26 x 21 x 70	660 x 533 x 1778	36	16
APR1218-5	12	5	26 x 21 x 70	660 x 533 x 1778	38	17
APR1518-4	15	4	26 x 21 x 70	660 x 533 x 1778	39	18
APR1818-3/65	18	3	26 x 21 x 64	660 x 533 x 1626	44	20
APR2018-3	20	3	26 x 21 x 70	660 x 533 x 1778	45	22
APR3018-2	30	2	26 x 21 x 70	660 x 533 x 1778	51	23
Side Load						
APR1026-6	10	6	18 x 29 x 70	737 x 457 x 1778	30	14
APR1226-5	12	5	18 x 29 x 70	737 x 457 x 1778	35	16
APR1526-4	15	4	18 x 29 x 70	737 x 457 x 1778	37	18
APR1826-3/65	18	3	18 x 29 x 64	737 x 457 x 1626	38	17
APR2026-3	20	3	18 x 29 x 70	737 x 457 x 1778	41	19

Aluminum Half Size Pan Racks

- Available with 304 Series 16 gauge Stainless Steel Top,
- Aluminum Top or Poly Top
- 5" Poly U swivel stem casters
- Freight Class 300



Aluminum Half Size Pan Rack with Open Top APR1018-3/38



Aluminum Half Size Pan Rack with Stainless Steel Top APR1018-3/38/SST

Half Size Pan Rack Options

Model No.	Description
/AT	Aluminum Top For Half Size Racks
/SST	Stainless Steel Top Shelf
/PT	Poly Cutting Board Top
/SB	Solid Base

Economy Knockdown Pan Racks

- Knockdown great for light duty
- Reinforced construction at stress points
- All models are End Load only
- 5" swivel stem casters
- Freight class 70



Economy Knock Down Pan Rack APRE2018-3/KDA

PRU



T&S BRASS AND BRONZE WORKS, INC.

2 Saddleback Cove / P.O. Box 1088
Travelers Rest, SC 29690

Model No.

MPZ-8WLN-06

Item No.

Travelers Rest, SC: 800-476-4103 • Simi Valley, CA: 800-423-0150 • Fax: 864-834-3518 • www.tsbrass.com

This Space for Architect/Engineer Approval

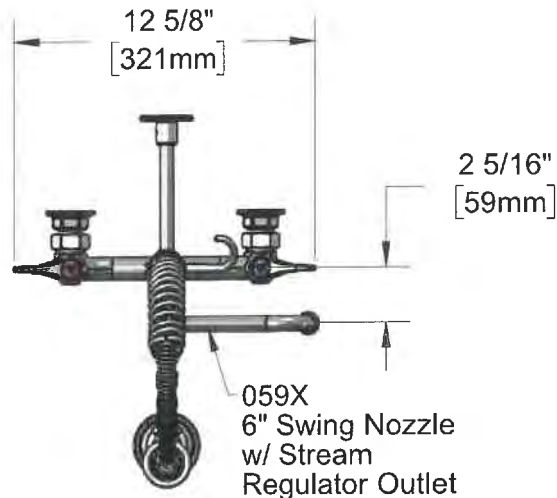
Job Name _____ Date _____

Model Specified _____ Quantity _____

Customer/Wholesaler _____

Contractor _____

Architect/Engineer _____



24" Flexible Stainless Steel Hose w/ Spring & Spray Valve

2 5/16" [59mm]

Items Not Shown for Clarity

3/8" NPT x 8" Riser

EasyInstall Lock Nut & Bushing

3 11/16" [94mm]

8" [203mm]
Adjustable From 7 3/4" to 8 1/4" [197mm to 210mm]

Quarter-Turn Eterna Cartridges w/ Spring Checks & Lever Handles w/ Color Coded Indexes

B-0107 1.15 GPM Spray Valve

5 1/16" [129mm]

Finger Hook

B-0109-01 6" Wall Bracket

EasyInstall Add-On Faucet w/ Quarter-Turn Eterna Cartridge & Lever Handle

22 1/8" [561mm]

7 3/8" [187mm]

Mounting Surface

Product Specifications:

Rinse Unit: EasyInstall 8" Wall Mount Mixing Faucet, Quarter-Turn Eterna Cartridges w/ Spring Checks, Lever Handles, Add-On Faucet w/ 6" Swing Nozzle, Compact Spring, 24" Flexible Stainless Steel Hose, 1.15 GPM Spray Valve, 6" Wall Bracket & 1/2" NPT Female Inlets

Product Compliance:

ASME A112.18.1 / CSA B125.1
NSF 61 - Section 9
NSF 372 (Low Lead Content)
2019 DOE PRSV - Class II
For Commercial Use Only



T&S BRASS AND BRONZE WORKS, INC.

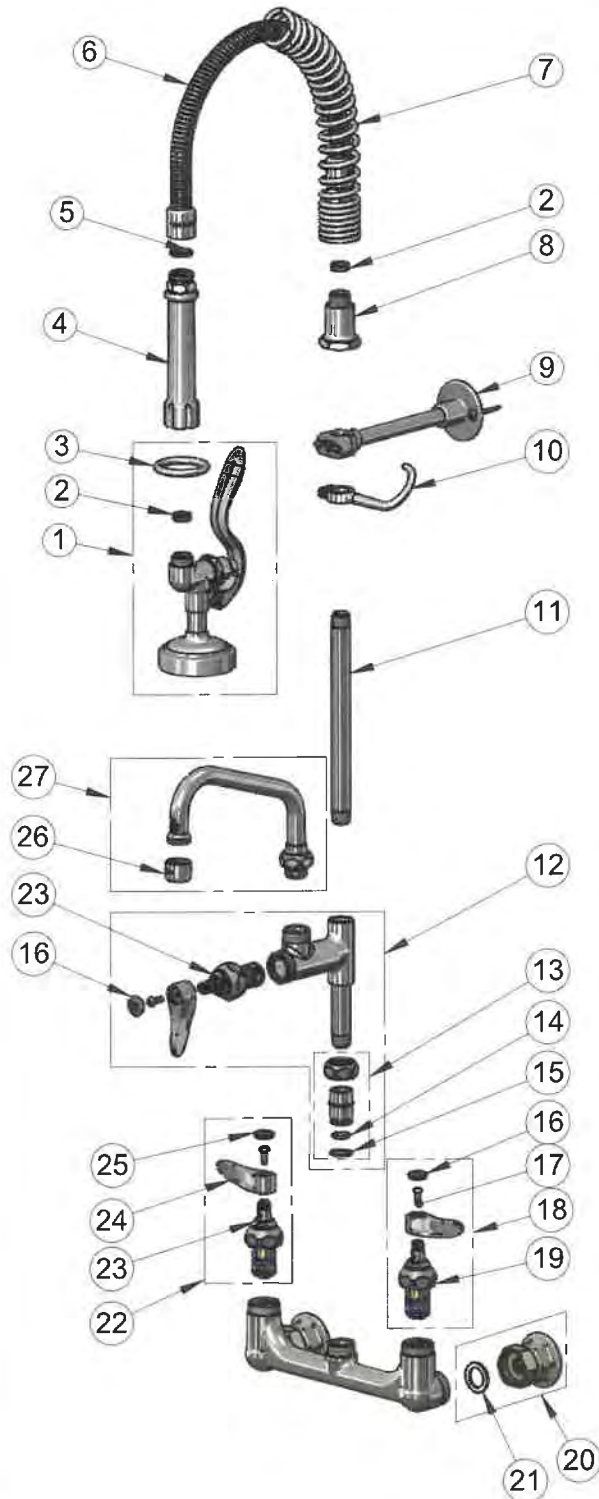
2 Saddleback Cove / P.O. Box 1088
Travelers Rest, SC 29690

Model No.

MPZ-8WLN-06

Item No.

Travelers Rest, SC: 800-476-4103 • Simi Valley, CA: 800-423-0150 • Fax: 864-834-3518 • www.tsbrass.com



ITEM NO.	SALES NO.	DESCRIPTION
1	B-0107	1.15 GPM Spray Valve
2	010476-45	#27 Washer
3	000907-45	Spray Valve Hold Down Ring
4	002987-40	Grip Handle
5	001014-45	Washer, B-0100 Hose Barrel
6	B-0024-H2A	24" Flexible Stainless Steel Hose, Less Handle
7	016795-45	Compact Spring
8	000821-40	Spring Body
9	B-0109-01	6" Wall Bracket
10	004R	Finger Hook
11	078X	3/8" NPT x 8" Riser
12	B-0155-LNEZ	EasyInstall Add-On Faucet w/ Quarter-Turn Eterna Cartridge & Lever Handle, Less Nozzle
13	EZ-K	EasyInstall Kit: Nut, Bushing, O-Ring & Lock Washer
14	001065-45	O-Ring
15	014200-45	Star Washer, Anti-Rotation
16	018506-19NS	Blue Button Index, Press-in
17	000925-45	Lab Handle Screw
18	002711-40NS	Quarter-Turn Eterna Cartridge, LTC w/ Spring Check, Handle, Index & Screw
19	012442-40NS	Quarter-Turn Eterna Cartridge, LTC w/ Spring Check
20	00AA	1/2" NPT Female Eccentric Flange
21	001019-45	Coupling Nut Washer
22	002712-40NS	Quarter-Turn Eterna Cartridge, RTC w/ Spring Check, Handle, Index & Screw
23	012443-40NS	Quarter-Turn Eterna Cartridge, RTC w/ Spring Check
24	001638-45NS	Lever Handle (New Style)
25	001193-19NS	Red Button Index, Press-in
26	B-PT	Full Flow Stream Regulator, 55/64-27
27	059X	6" Swing Nozzle w/ Stream Regulator Outlet

Product Specifications:

Pre-Rinse Unit: EasyInstall 8" Wall Mount Mixing Faucet, Quarter-Turn Eterna Cartridges w/ Spring Checks, Lever Handles, Add-On Faucet w/ 6" Swing Nozzle, Compact Spring, 24" Flexible Stainless Steel Hose, 1.15 GPM Spray Valve, 6" Wall Bracket & 1/2" NPT Female Inlets

Product Compliance:

ASME A112.18.1 / CSA B125.1
NSF 61 - Section 9
NSF 372 (Low Lead Content)
2019 DOE PRSV - Class II
For Commercial Use Only

DESIGNER LINE REFRIGERATOR

Model:

Natural Refrigerant R-290 Model

Designer Line

1-Section Extra-Wide Pass-Thru Refrigerator with Half Doors



ENERGY STAR® Qualified Commercial Refrigerator

D1RENPTHD - Stainless steel front, aluminum end panels and interior

D1RENSAPTHD - Stainless steel exterior, aluminum interior

***D1RENSSPTHD** - Stainless steel exterior and interior



2 Glass
Doors
Kitchen
side

2 SS
Doors
SERVING
SIDE

Options and Accessories

(upcharge and lead times may apply)

Stainless steel case back	Casters
Additional epoxy coated steel shelves	Pan slide assemblies
Chrome or stainless steel shelves	Custom laminates
Pass-thru (consult factory)	Special electrical req. (consult factory)
Full door	Correctional Facility Options
Hinged glass door (consult factory)	• One way security screws
Rehinging of doors (consult factory)	• Locking hasp (lock not included)
Wine rack	• Stainless steel mesh cover
	• Coverless hinges

Consult factory for other model configurations, options and accessories.

Continental
Refrigerator

Toll-Free: 800-523-7138
Phone: 215-244-1400
Fax: 215-244-9579

539 Dunksferry Road
Bensalem, PA 19020
www.continentalrefrigerator.com

Project Name:

PTR

Model Specified:

Location:

Item No:

Quantity:

AIA #:

SIS #:

Standard Model Features

REFRIGERATION SYSTEM

Self contained, performance rated "plug" refrigeration system

Natural, environmentally safe, high efficiency R-290 refrigerant¹

Refrigeration system is readily accessible on top of cabinet, separate from the "food zone"

Automatic, hot gas condensate evaporator

Expansion valve system

CABINET ARCHITECTURE

3" non-CFC polyurethane foam insulation

Smooth, polished chrome workflow door handles

Cam action, lift off hinges

Self-closing doors

Magnetic snap-in Santoprene™ door gaskets

Cylinder lock in each door

Heavy duty pilaster strips

Heavy duty, epoxy coated steel shelves

Adjustable 6" stainless steel legs

MODEL FEATURES

LED interior lighting

Electronic controller with digital display & hi-low alarm

Off-cycle defrost

Top and side air distribution ducts

Cabinet upper side panels and refrigeration "plug" system can be removed and reinstalled at job site

¹ R-290 refrigerant meets all federal and state regulatory requirements.

APPROVAL:

Model Specifications

DIMENSIONAL DATA

Net Capacity (cubic feet)	22 (623 cu l)
Width, Overall (inches)	28 1/2 (724 mm)
Depth, Overall (inches) (including handles)	38 3/4 (984 mm)
Depth (inches) (less doors)	32 (813 mm)
Depth (inches) (doors open 90°)	79 (2007 mm)
Clear Door Width (inches)	21 7/8 (556 mm)
Clear Half Door Height (inches)	27 1/2 (699 mm)
Height, Overall (inches) (including 6" legs)	83 1/4 (2115 mm)
Number of Doors	4
Number of Shelves	3
Shelf Area (square feet)	20.4 (1.9 sq m)
Tray Slide Capacity (per half section)	11

REFRIGERANT DATA

Condensing Unit Size (H.P.)	1/4
Capacity (BTU per hour)*	1940

ELECTRICAL DATA

Voltage (International)	115/60/1 (220/50/1)
Feed Wires (including ground)	3
Total Amps (International)	5.5 (3.9)
10 ft. Cord/Plug [attached] (International)	Yes (No)

SHIPPING DATA

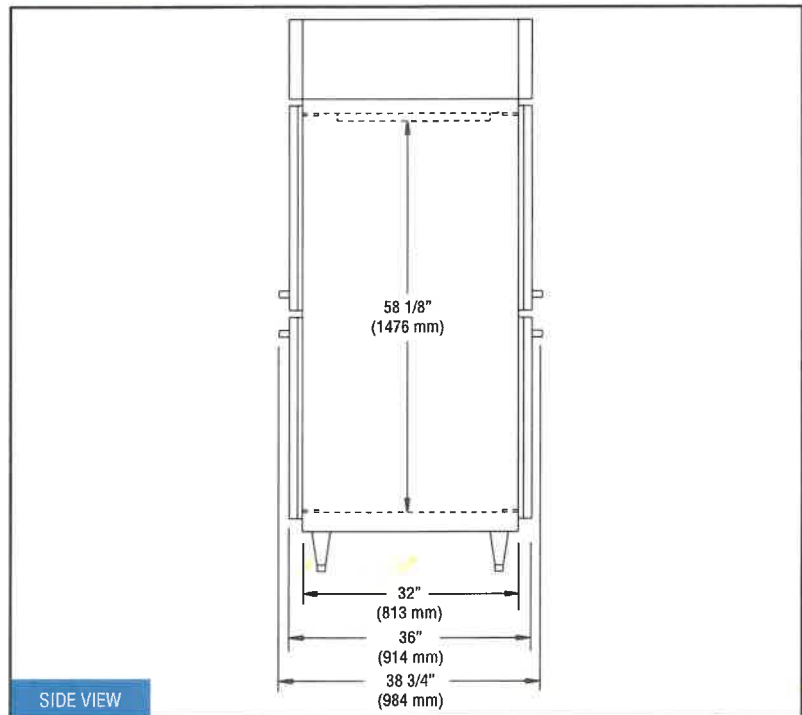
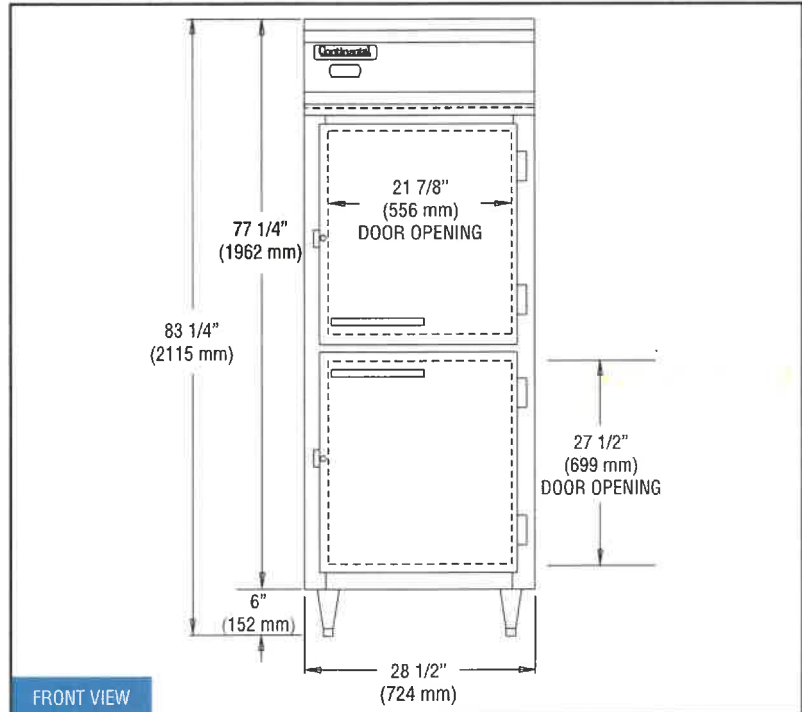
Height - Crated (inches)	85 1/2 (2172 mm)
Width - Crated (inches)	31 5/8 (803 mm)
Depth - Crated (inches)	42 (1067 mm)
Volume - Crated (cubic feet)	65 (1841 cu l)
Weight Std - Crated (pounds)	370 (168 kg)
Weight SS - Crated (pounds)	390 (177 kg)

* Rating @ +25°F evaporator, 90°F ambient
Figures in parentheses reflect metric equivalents rounded to the nearest whole unit.



Equipped with one NEMA-5-15P Plug
(varies by country)

Model Plan Views



IMPORTANT NOTE: If the cabinet is located under a low ceiling, a minimum clearance of 12" is required on top and 3" on sides.

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Fax: 215-244-9579

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Due to our continued efforts in developing innovative products, specifications subject to change without notice.



PTW PASS THRU WARMER
FWE

MODEL#:PHTT-1826-18P;

SERIES:PRECISE HUMIDITY HOLDING CART;

HERTZ:60 HZ;

VOLTS:120 VOLTS;

CONTROL PANEL:ELECTRONIC CONTROLLER;

BOTTOM BUMPER:NO BUMPER;

CASTERS:5" EZ ROLL HEAVY DUTY POLY;

DOORS (CONTROL SIDE):DUTCH GLASS DOORS;

PASS THRU DOOR (REAR):REAR DUTCH DOOR S/S;

HINGING:FRONT RT/REAR RT FIELD RVRSBLE;

DOOR HINGE:SELF-CLOSING HINGES EDMNT STYE;

DOOR LATCH:VERTICAL MAGNETIC WORK FLOW;

HANDLES:RECESSED HAND GRIPS;

SLIDES/RACKS:12 PR ADJ TRAY SLIDES AT 4.5";

SHELVES:4 STAINLESS SHELVES;

WATTS:@2192--5-20P PLUG;

MISC OPTIONS:STAINLESS STEEL TRAY SLIDES,TRI DIRECTIONAL CORD,TRAY SLIDES EXTRA 2 PR;

WARRANTY:2 YR PARTS 1 YR LABOR WARRANTY;

CRATING:STANDARD PACKAGING;

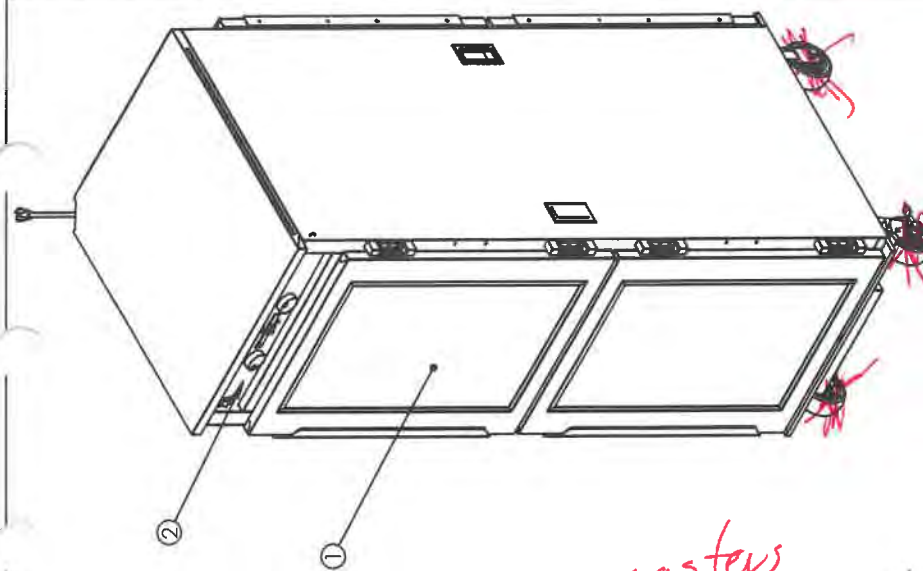
COUNTRY:UNITED STATES;

LABELS:HOT WATER WARNING-1,120 WARNING ELECTRICAL SHOCK-1,STK020;

SERIAL TAG:CERT - UL 530L,CERT - NY MEAA,LOGO - FWE,CERT - ULEPHSTOR,CERT - PATENT 8 176 844;

**S/S CLOSURE FOR PERIMETER OF PASS THRU CABINET TO CLOSE MASONRY OPENING IS TO BE PROVIDED BY OTHERS.

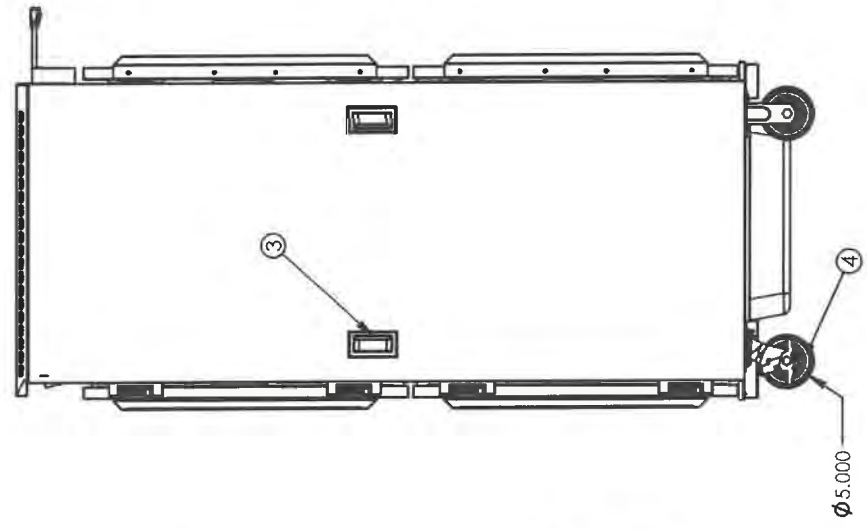
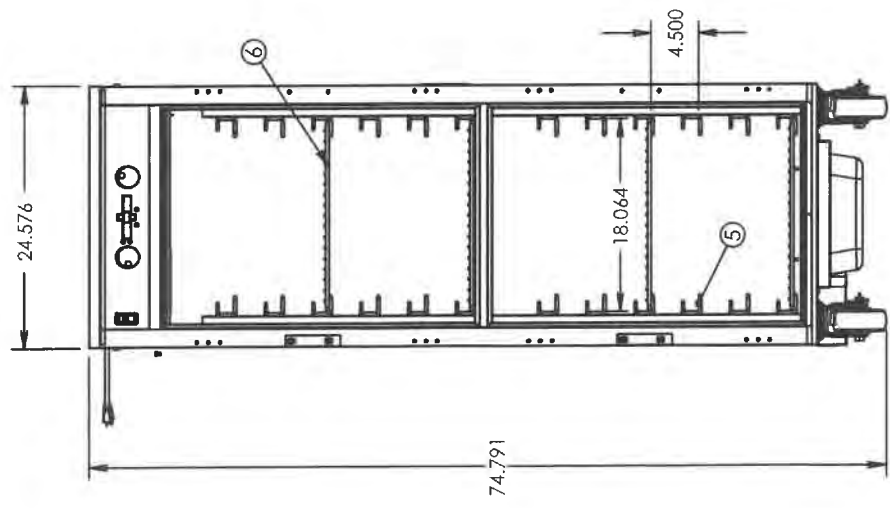
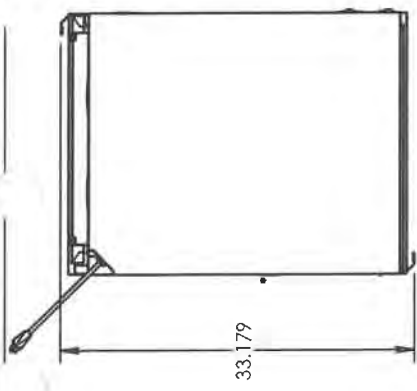
PTW



no casters

DETAIL NOTE

- ① FRONT DUTCH GLASS DOOR, SELF CLOSING HINGES
REAR DUTCH STAINLESS STEEL DOOR, SELF CLOSING HINGES
- ② ELECTRONIC CONTROL
- ③ RECESSED HAND GRIPS
- ④ 5" EZ POLY CASTERS
- ⑤ ADJUSTABLE SLIDES TO ACCOMMODATE 18X26 AND 13X18 TRAYS
- ⑥ WIRE SHELF (4)



5599 Highway 31 West
 Fontana, TN 37146
 TEL: (615) 925-2774
 FAX: (615) 626-0460
 DRAWING #: **PHIT-1826-18P**

**DIMENSIONS ARE O.D.
 UNLESS OTHERWISE SPECIFIED**
TOLERANCES:
 +/- .031 +/- 1 DEG.

DO NOT SCALE DRAWING

DESCRIPTION: **UNIVERSAL PRECISE HUMIDITY PASSTHR**

DRAWN BY: PABLO

LAST SAVED BY: pperez

REV DATE: **Tuesday, October 12, 2021 6:14:23 AM**

REV: ~~ERROR~~ ~~REVER~~ ~~ORORI~~: REV DESCRIPTION

REACH-IN FREEZER (0°F)

Model:

Designer line

1-Section Extra-Wide
Reach-In Freezer

RIF

- D1FEN - Stainless steel front, aluminum end panels and interior
- D1FENSA - Stainless steel exterior, aluminum interior
- *D1FENSS - Stainless steel exterior and interior

CONFIRM
STAINLESS STEEL



Options and Accessories

(upcharge and lead times may apply)

Stainless steel case back	Pan slide assemblies
Additional epoxy coated steel shelves	Custom laminates
Chrome or stainless steel shelves	Special electrical req. (consult factory)
Pass-thru (consult factory)	Correctional Facility Options
Shallow depth (consult factory)	• One way security screws
Half doors	• Locking hasp (lock not included)
Hinged glass door (consult factory)	• Stainless steel mesh cover
Casters	• Coverless hinges

Consult factory for other model configurations, options and accessories.

Project Name:

Model Specified:

Location:

Item No:

Quantity:

AIA #:

SIS #:

Standard Model Features

REFRIGERATION SYSTEM

Self contained, performance rated "plug" refrigeration system

Natural, environmentally safe, high efficiency R-290 refrigerant¹

Refrigeration system is readily accessible on top of cabinet, separate from the "food zone"

Automatic, hot gas condensate evaporator

Expansion valve system

Standard operating temperature is 0 to -5°F and can be adjusted to operate as low as -10°F in a 90°F ambient.

CABINET ARCHITECTURE

3" non-CFC polyurethane foam insulation

Smooth, polished chrome workflow door handle

Cam action, lift off hinges

Self-closing door

Magnetic snap-in Santoprene™ door gasket

Cylinder lock in door

Heavy duty pilaster strips

Heavy duty, epoxy coated steel shelves

Adjustable 6" stainless steel legs

MODEL FEATURES

LED interior lighting

Electronic controller with digital display & hi-low alarm

Automatic electric defrost

Top and side air distribution ducts

Cabinet upper side panels and refrigeration "plug" system can be removed and reinstalled at job site

Rehinging of door (in the field)

¹ R-290 refrigerant meets all federal and state regulatory requirements.

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Fax: 215-244-9579

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www.continentalrefrigerator.com

APPROVAL:

Model Specifications

DIMENSIONAL DATA

Net Capacity (cubic feet)	22 (623 cu l)
Width, Overall (inches)	28 1/2 (724 mm)
Depth, Overall (inches) (including handle)	35 3/8 (899 mm)
Depth (inches) (less door)	32 (813 mm)
Depth (inches) (door open 90°)	58 (1473 mm)
Clear Door Width (inches)	21 7/8 (556 mm)
Clear Door Height (inches)	58 5/8 (1489 mm)
Height, Overall (inches) (including 6" legs)	83 1/4 (2115 mm)
Number of Doors	1
Number of Shelves	3
Shelf Area (square feet)	20.4 (1.9 sq m)
Tray Slide Capacity	24

REFRIGERANT DATA

Condensing Unit Size (H.P.)	1/2
Capacity (BTU per hour)*	1590

ELECTRICAL DATA

Voltage (International)	115/60/1 (220/50/1)
Feed Wires (including ground)	3
Total Amps (International)	6.5 (4.1)
Defrost Amps (International)	4.3 (2.2)
10 ft. Cord/Plug [attached] (International)	Yes (No)

SHIPPING DATA

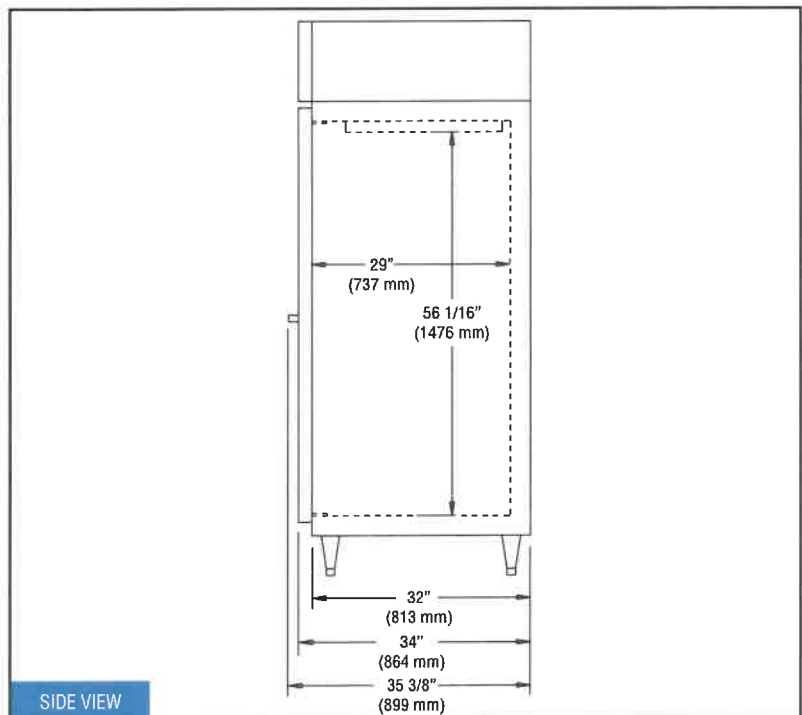
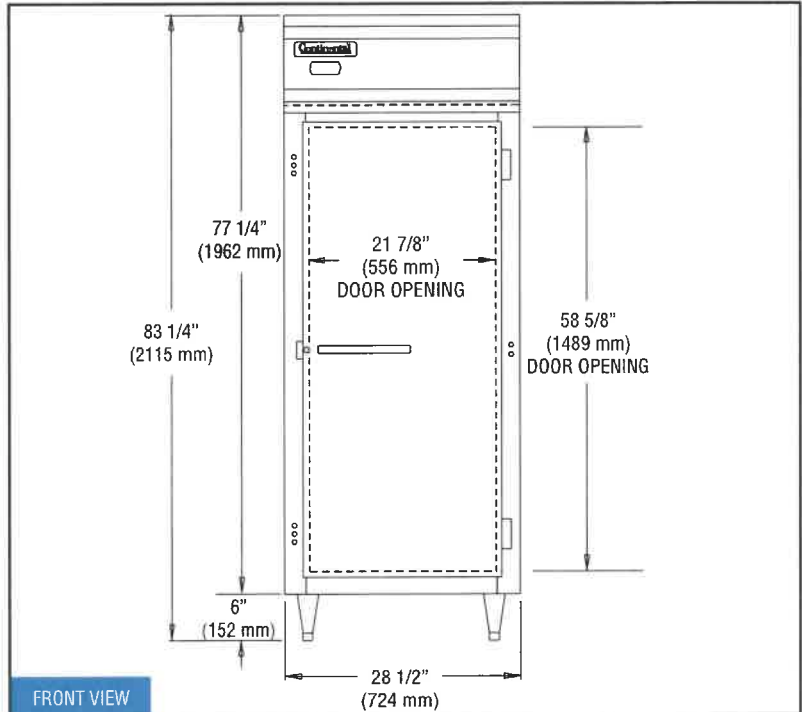
Height - Crated (inches)	85 1/2 (2172 mm)
Width - Crated (inches)	31 5/8 (803 mm)
Depth - Crated (inches)	42 (1067 mm)
Volume - Crated (cubic feet)	65 (1841 cu l)
Weight Std - Crated (pounds)	355 (161 kg)
Weight SS - Crated (pounds)	415 (188 kg)

* Rating @ -15°F evaporator, 90°F ambient
 Figures in parentheses reflect metric equivalents rounded to the nearest whole unit.



Equipped with one NEMA-5-15P Plug
 (varies by country)

Model Plan Views



IMPORTANT NOTE: If the cabinet is located directly against a wall and/or under a low ceiling, a minimum clearance of 12" is required on top and 3" on sides and rear.



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DESIGNER LINE DISPLAY REFRIGERATOR

Model:

Natural Refrigerant R-290 Model

Designer Line

1-Section Extra-Wide Reach-In Refrigerator with Half Hinged Glass Doors

D1RENGDHD - Stainless steel front, aluminum end panels and interior

D1RENSAGDHD - Stainless steel exterior, aluminum interior

* **D1RENSSGDHD** - Stainless steel exterior and interior



Options and Accessories

(upcharge and lead times may apply)

Stainless steel case back	Wine rack
Additional epoxy coated steel shelves	Casters
Chrome or stainless steel shelves	Full door
Rehinging of door (consult factory)	Special electrical req. (consult factory)
Solid doors (consult factory)	Shallow depth (consult factory)
Pan slide assemblies	Pass-thru (consult factory)

Consult factory for other model configurations, options and accessories.

Project Name:

RIR-2D

Model Specified:

Location:

Item No:

Quantity:

AIA #:

SIS #:

Standard Model Features

REFRIGERATION SYSTEM

Self contained, performance rated "plug" refrigeration system

Natural, environmentally safe, high efficiency R-290 refrigerant¹

Refrigeration system is readily accessible on top of cabinet, separate from the "food zone"

Automatic, hot gas condensate evaporator

Expansion valve system

CABINET ARCHITECTURE

3" non-CFC polyurethane foam insulation

Triple-pane, tempered hinged glass doors

Chrome-plated handles

Cam action, lift-off hinges

Self-closing doors

Magnetic snap in door gaskets

Cylinder lock in each door

Heavy duty, epoxy coated steel shelves

Heavy-duty pilaster strips

Adjustable 6" stainless steel legs

MODEL FEATURES

LED interior lighting

Top and side air distribution ducts

Off-cycle defrost

Cabinet upper side panels and refrigeration "plug" system can be removed and reinstalled at job site

Electronic controller with digital display & hi-low alarm

¹ R-290 refrigerant meets all federal and state regulatory requirements.

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APPROVAL:



Kelmax® Aluminum Fixed Cantilever Shelving

S 4820 S 3620 S 4824



STANDARD FEATURES & BENEFITS

- Kelmax Cantilever Fixed Shelving Units
- Includes frame and 2 – 4 fixed shelves (20" or 24" depths)
- For safety, front legs do not extend past the bottom shelf
- Tubular bottom shelf is standard with all kits, and is easily removed without the use of tools for cleaning – all other shelves are fixed and not adjustable or removable
- Channel and tubular shelves support 1500 lbs. per shelf – solid shelves support 900 lbs. per shelf
- Freestanding unit – does not require bolting to walls for support

AVAILABLE STYLES

***All Shelf Size and Finish Combinations May Not Be Available. Please Contact SPG for Lead Time and Availability.**

Kelmax® 4-Tier Fixed Cantilever Shelving Units	L X W X H		Weight	
	(in.)	(mm)	(lbs)	(kg)
20- inch wide shelves				
4H0310	36 x 20 x 72	914 x 508 x 1829	68	31
4H0341	48 x 20 x 72	1219 x 508 x 1829	84	38
24- inch wide shelves				
4H0317	36 x 24 x 72	914 x 610 x 1829	72	33
4H0351	48 x 24 x 72	1219 x 610 x 1829	92	41
4H0366	60 x 24 x 72	1524 x 610 x 1829	106	48





Kelmax® Aluminum Cantilever Frames & Adjustable Shelves

STANDARD FEATURES & BENEFITS

- Kelmax Cantilever Frames and Adjustable Shelves
- Tubular base dunnage shelf is standard, and easily removed without the use of tools for cleaning
- Up to 5 additional shelf positions – shelves can be added or removed without tools
- Available in two shelf depths: 20" and 24"
- Clearance between adjustable shelves is 10"
- Maximum load capacity per shelving unit is 2,800 lbs.
- Frames and adjustable shelves sold separately

AVAILABLE STYLES

- T-Bar Shelves
- Channel Shelves
- Tubular Shelves

***All Shelf Size and Finish Combinations May Not Be Available. Please Contact SPG for Lead Time and Availability.**

Kelmax® Cantilever Shelving Frames	L X W X H		Weight	
	(in.)	(mm)	(lbs)	(kg)
24- inch Deep Shelving Frames				
4H4501	36 x 24 x 72	914 x 610 x 1829	64	29
4H2977E	48 x 24 x 72	1219 x 610 x 1829	75	31
4H4500	60 x 24 x 72	1524 x 610 x 1829	86	39
4H4500E	60 x 24 x 72	1524 x 610 x 1829	86	39



SCALE

On a scale of one to ten, this scale's an 11.



Model PE-11 F
Shown with internal power supply and custom display stand.



Model PE-11 H



Model PE-20
Shown with display stand.



PE-11: 11 lb. X 0.10 oz.



PE-11: 11 lb. X 1/8 oz.



PE-11: 11 lb. X 0.005 lb.



PE-5: 5000 gm x 2 gm

FEATURES:

- NSF Certified
- Stainless steel construction
- Moisture resistant components
- 11" x 11" (28 cm x 28 cm) stainless steel platform
- Super fast response LCD display
- 115/230 Volt switchable power supply included
- Touch pad on/off tare and unit controls
- Wall mounting bracket included
- Made in U.S.A.
- Capacity 11 pounds/5000 grams
- Reads in decimal ounces, fractional ounces, decimal pounds and grams

OPTIONS:

- Quick response front mounted push button tare
- PEDS display stand
- Internal universal power supply for usage in all countries
- Additional custom configurations available to meet specific operator requirements

SPECIFICATIONS:

MODEL #	DESCRIPTION	MAX. WEIGHING RANGE	PRODUCT CODE	CASE CUBE FT3/M3	CASE WEIGHT LBS/KGS	MODEL #	DESCRIPTION	MAX. WEIGHING RANGE	PRODUCT CODE	CASE CUBE FT3/M3	CASE WEIGHT LBS/KGS
PE-11	Standard model pizza scales with touch pad controls	11 lbs. (5000 gm)	52500	1.0/.03	14/6.30	PE-5 UL	Metric version of PE-11 with internal power supply	11 lbs. (5000 gm)	54100	1.0/.03	14/6.30
PE-11 H	PE-11 with quick disconnected hip/foot tare switch	11 lbs. (5000 gm)	52520	1.0/.03	14/6.30	PE-5 ULH	With internal power supply & hip/foot tare switch	11 lbs. (5000 gm)	54120	1.0/.03	14/6.30
PE-11 F	PE-11 with base mounted quick tare button	11 lbs. (5000 gm)	52540	1.0/.03	14/6.30	PE-5 ULF	With internal power supply & front quick tare button	11 lbs. (5000 gm)	54140	1.0/.03	14/6.30
PE-11 UL	PE-11 with internal power supply 115/230 volt	11 lbs. (5000 gm)	52000	1.0/.03	14/6.30	PE-20	22 lbs. x 0.01 lb. 10 kg x 0.005 kg capacity	22 lbs. (10 kg)	Call factory	1.0/.03	14/6.30
PE-11 ULH	With dual volt internal power supply & hip/tare switch	11 lbs. (5000 gm)	52020	1.0/.03	14/6.30						
PE-11 ULF	With dual volt internal power supply & front tare button	11 lbs. (5000 gm)	52040	1.0/.03	14/6.30						



Edlund Our reputation is virtually stainless.

Edlund Company, Inc., 159 Industrial Parkway, Burlington, VT 05401 800-772-2126 www.edlundco.com

WARRANTY INFORMATION: THE EDLUND COMPANY WARRANTS THESE PRODUCTS TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF PURCHASE. THE COMPANY'S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIRING OR REPLACING WITHOUT CHARGE ANY PART OR PARTS FOUND TO BE DEFECTIVE UNDER NORMAL USE. IT IS THE RESPONSIBILITY OF THE PURCHASER TO RETURN THE ENTIRE UNIT TO THE FACTORY, TRANSPORTATION CHARGES PREPAID. THIS WARRANTY DOES NOT COVER PARTS THAT MUST BE REPLACED UNDER NORMAL USE. NO OTHER WARRANTY, WRITTEN OR VERBAL, IS AUTHORIZED BY THE COMPANY. WARRANTY INFORMATION OUTSIDE THE UNITED STATES MAY VARY, CONSULT YOUR DISTRIBUTOR.



T&S BRASS AND BRONZE WORKS, INC.

2 Saddleback Cove / P.O. Box 1088
Travelers Rest, SC 29690

Model No.

B-0231

Item No.

SF

Travelers Rest, SC: 800-476-4103 • Simi Valley, CA: 800-423-0150 • Fax: 864-834-3518 • www.tsbrass.com



ADA Compliant

This Space for Architect/Engineer Approval

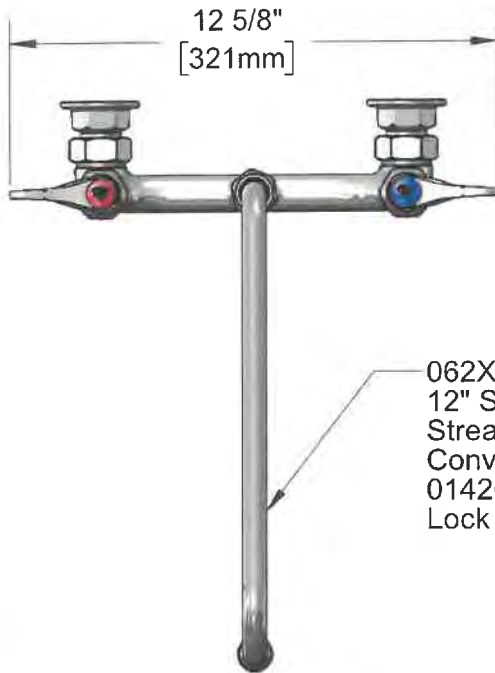
Job Name _____ Date _____

Model Specified _____ Quantity _____

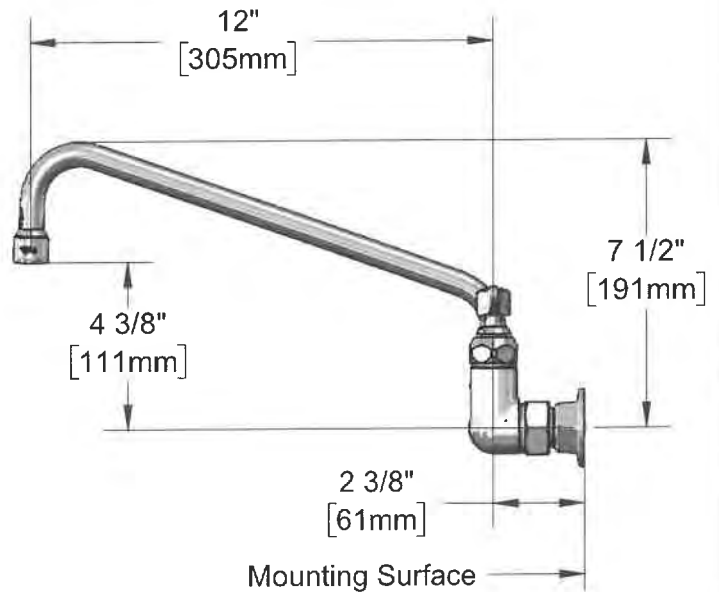
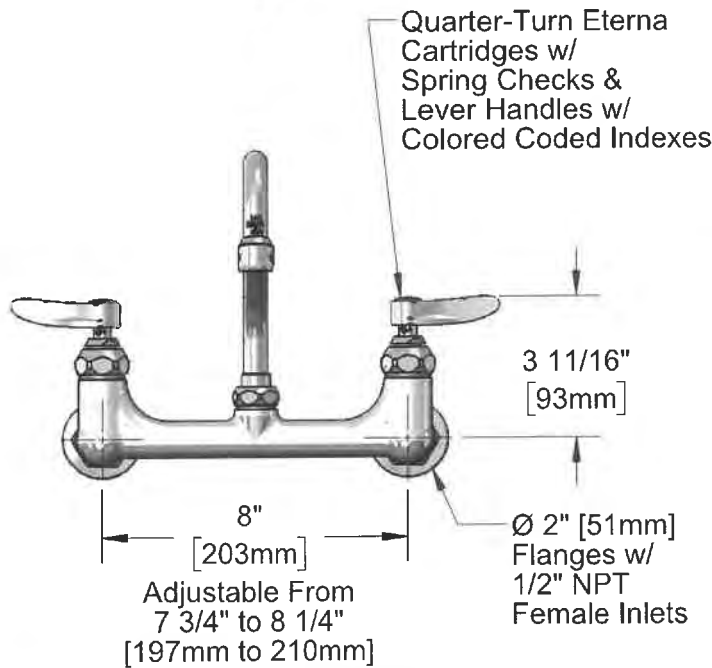
Customer/Wholesaler _____

Contractor _____

Architect/Engineer _____



062X
12" Swing Nozzle w/
Stream Regulator Outlet
Converts to Rigid w/
014200-45
Lock Washer (Included).



Product Specifications:

Wall Mount Mixing Faucet w/ Quarter-Turn Eterna Cartridges w/ Spring Checks, Lever Handles, 12" Swing Nozzle & 1/2" NPT Female Inlets

Product Compliance:

ASME A112.18.1 / CSA B125.1
NSF 61 - Section 9
NSF 372 (Low Lead Content)
ANSI A117.1 (ADA)



T&S BRASS AND BRONZE WORKS, INC.

2 Saddleback Cove / P.O. Box 1088
Travelers Rest, SC 29690

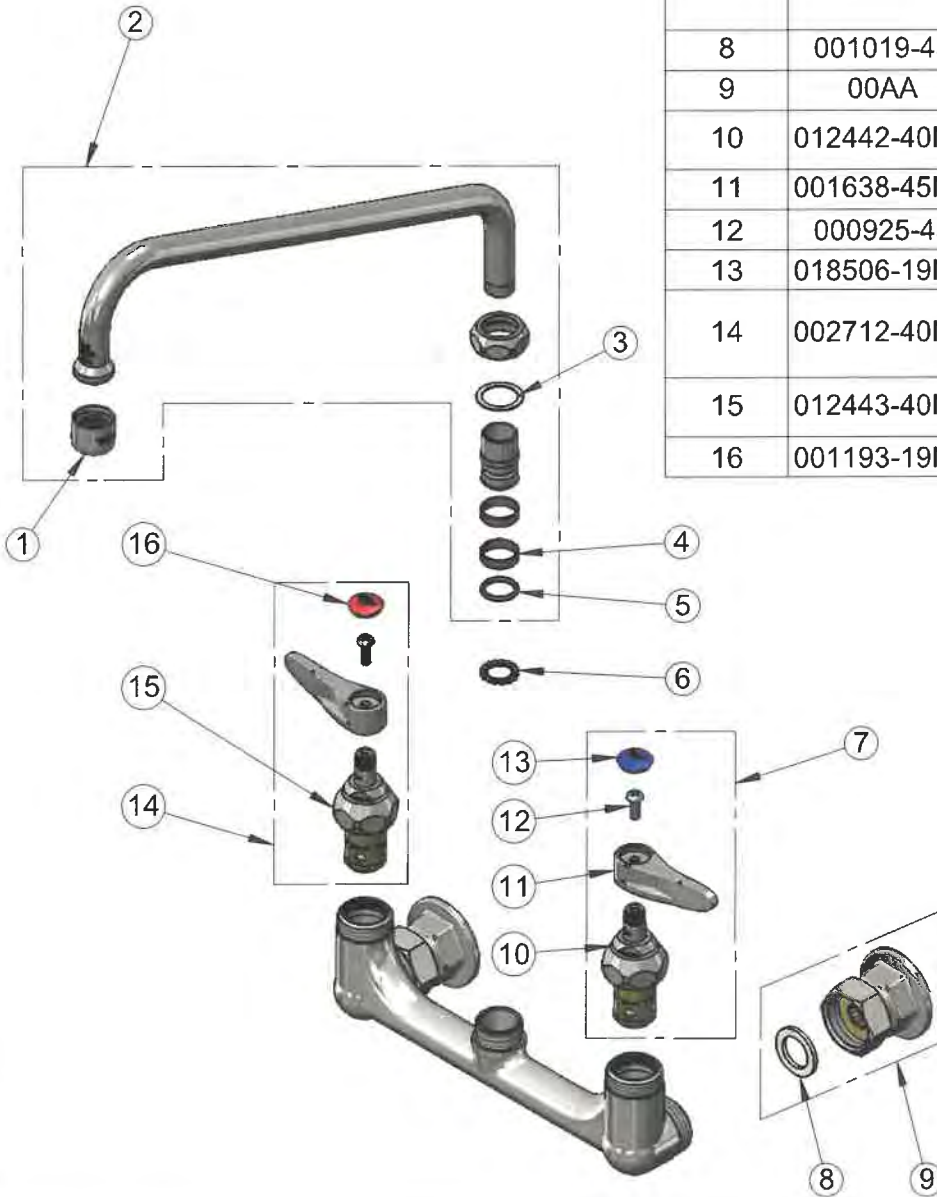
Model No.

B-0231

Item No.

Travelers Rest, SC: 800-476-4103 • Simi Valley, CA: 800-423-0150 • Fax: 864-834-3518 • www.tsbrass.com

ITEM NO.	SALES NO.	DESCRIPTION
1	B-PT	Full Flow Stream Regulator, 55/64-27
2	062X	12" Swing Nozzle
3	009538-45	Swivel Washer
4	011429-45	Swivel Sleeves (2)
5	001074-45	O-Ring
6	014200-45	Star Washer, Anti-Rotation
7	002711-40NS	Quarter-Turn Eterna Cartridge w/ Spring Check, Handle, Blue Index & Screw, LTC
8	001019-45	Coupling Nut Washer
9	00AA	1/2" NPT Female Eccentric Flange
10	012442-40NS	Quarter-Turn Eterna Cartridge w/ Spring Check, LTC
11	001638-45NS	Lever Handle (New Style)
12	000925-45	Lab Handle Screw
13	018506-19NS	Blue Button Index, Press-in
14	002712-40NS	Quarter-Turn Eterna Cartridge w/ Spring Check, Handle, Red Index & Screw, RTC
15	012443-40NS	Quarter-Turn Eterna Cartridge w/ Spring Check, RTC
16	001193-19NS	Red Button Index, Press-in

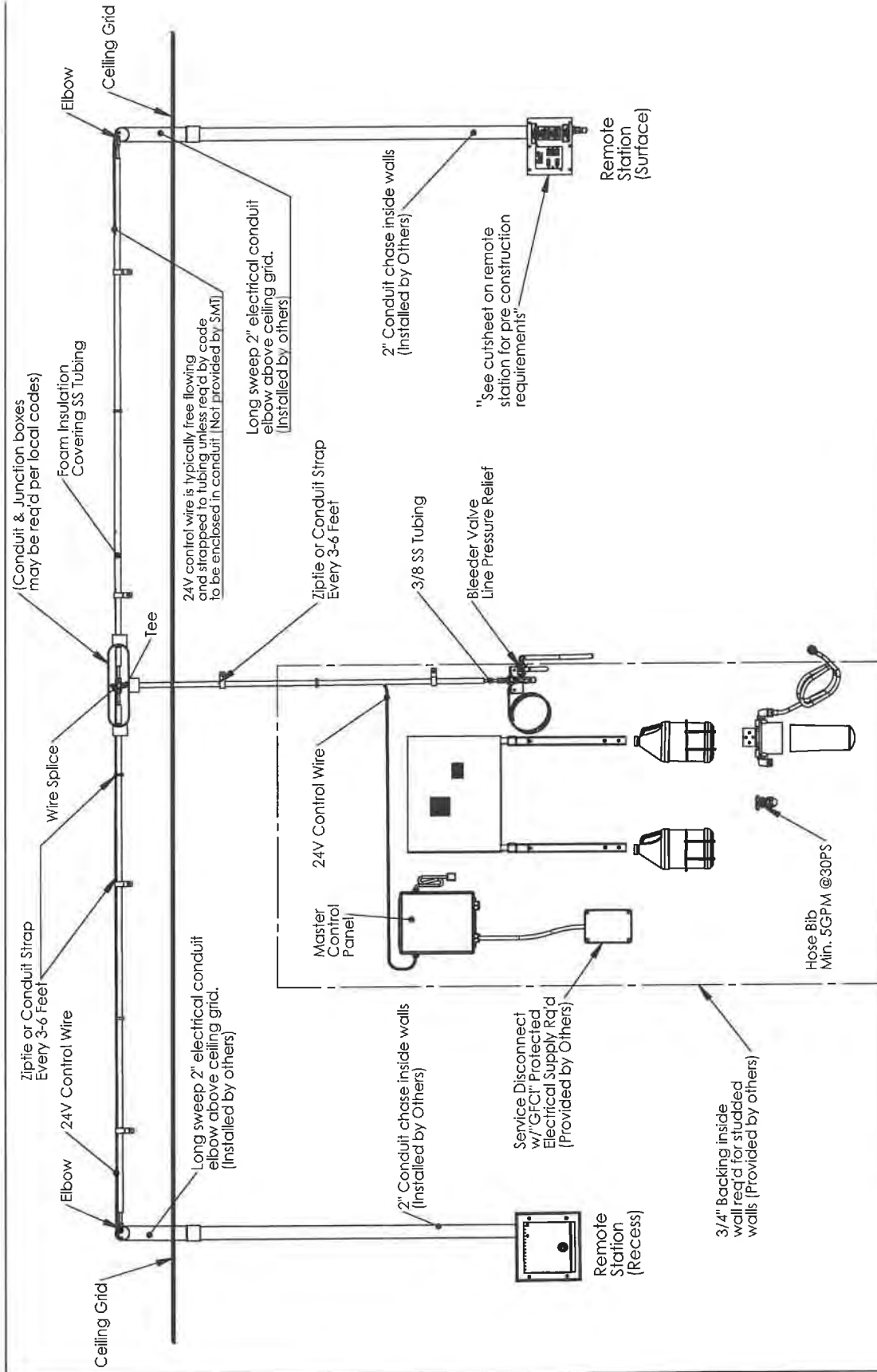


Product Specifications:
8" Wall Mount Mixing Faucet w/ Quarter-Turn Eterna Cartridges w/ Spring Checks, Lever Handles, 12" Swing Nozzle & 1/2" NPT Female Inlets

Product Compliance:
ASME A112.18.1 / CSA B125.1
NSF 61 - Section 9
NSF 372 (Low Lead Content)
ANSI A117.1 (ADA)

SMT - 600WCY Wall Mount Central System

SMTCS



NOTES:

1. SMT will not provide any chase work in the wall or above the suspended ceiling for stainless tubing or 24v control wire. All unions and tees must be accessible for servicing and check for leaks. Do not make connections in areas that will become inaccessible after construction is complete.
3. The foam insulation over tubing should be installed as the stainless steel tubing is being installed. This can be done by slipping foam tubes over the end of the stainless tubing and sliding it into place over the entire length of the run. Low voltage control cable is run along with and typically strapped to the stainless tubing running to each remote station. This 24 Volt wiring typically does not require enclosure in conduit. Check local codes for verification.
4. 600WCY- Tubing & Wire

HEAVY DUTY HOSE REEL

300-5258

FEATURES:

- » Quick Connect Socket
- » 12' High Pressure Supply Hose
- » Stainless Steel Spray Gun Hanger (*Spray Gun Sold Separately*)
- » Friction Brake
- » Locking Reel
- » Baked-On, Powder Coated Finish
- » Ergonomic Design
- » 10" Semi-Pneumatic Wheels
- » External Swivel Assembly and Friction Brake
- » Holds Up to 200' of Hose (*Hoses Sold Separately*)



HD Portable Hose Reel

Easily gather and put away your hose with this hand winding hose reel to keep your facility clear and organized.

(800) 548-3373

www.spraymastertech.com

A brand line of
Assembled Products Corporation

115 E Linden • Rogers, Arkansas 72756 USA | Office: (479) 636-5776 • Fax: (479) 636-3245



WALL & TILE BRUSH

300-8322

FEATURES:

- » Heavy Duty Spray Gun w/
Quick Coupler
- » Standard 10' Flexible
Pressure Hose
Optional 100' Custom Length
- » Rear Acing Jets Pull Cleaning
Nozzle Through
- » Forward Jet Clears Clog



Heavy Duty Spray Gun

Drain cleaning high pressure gun with 10' hose to reach and clear drains.

(800) 548-3373

www.spraymastertech.com

A brand line of
Assembled Products Corporation

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HUMMER JET JR.

300-5368

FEATURES:

- » Compatible with Wall-Mount and Portable Systems
- » Quick Connect
- » 1100PSI High Pressure Rotational Rinse
- » 10" Durable Stainless Steel Cleaning Deck
- » Low Pressure Chemical Nozzle
- » Dual Rotating Cleaning Nozzles
- » Powder-Coated Finish
- » Shut off Quick Disconnect Fittings
- » Fold Down Handles
- » Stainless Steel Castor Brackets
- » Rubber Hand Grip



Flow-Through Coupler

Designed to eliminate the mop in your commercial kitchen. With its dual rotating nozzles delivering high pressure cleaning power directly to your floor, there is no need to mop again. With 6" clearance, the Hummer Jet Jr. can fit underneath you lineup and get to areas the mop can't.

(800) 548-3373

www.spraymastertech.com

A brand line of
Assembled Products Corporation

115 E Linden • Rogers, Arkansas 72756 USA | Office: (479) 636-5776 • Fax: (479) 636-3245



STMR

Connectionless Steamer Powered by Microwave Technology

NE-2180

This Commercial Microwave Oven by Panasonic is ideal for heavy volume steaming and microwave applications in restaurants, banquets, supermarkets, delicatessens, school food service, health care and institutional catering.

- 2100* Watts of Cooking Power
- Large Oven Capacity: 1.6 Feet
- Door Opens Down to Hold Pans
- Top and Bottom Energy Feed
- Holds two 4" Tall, Full-size Steam Table Pans with Covers**



**SONIC
STEAMER.**

Panasonic ideas for life

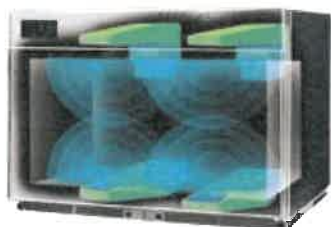




NE-2180 Connectionless Steamer Powered by Microwave Technology


Additional Features:

- Stainless Steel Cabinet and Cavity
- 4 Magnetrons (Heating Sources)
- 8 Programmable Memory Pads
- 16 Memory Capability
- 5 Power Levels
- 3-Stage Cooking
- Program List/Cycle Counter
- Programmable or Dial Timer
- Easy to Clean Air Filters
- See-Through Oven Door
- Easy to Change Interior Oven Light
- Digital Display
- Self Diagnostics
- Shift Key (AM-PM)
- Removable Center Shelf
- Volume/Tone
- Chef Technical Support
- Will Ship via UPS
- NSF & UL Commercial Approved



**Top & Bottom
Energy Feed**

Specifications

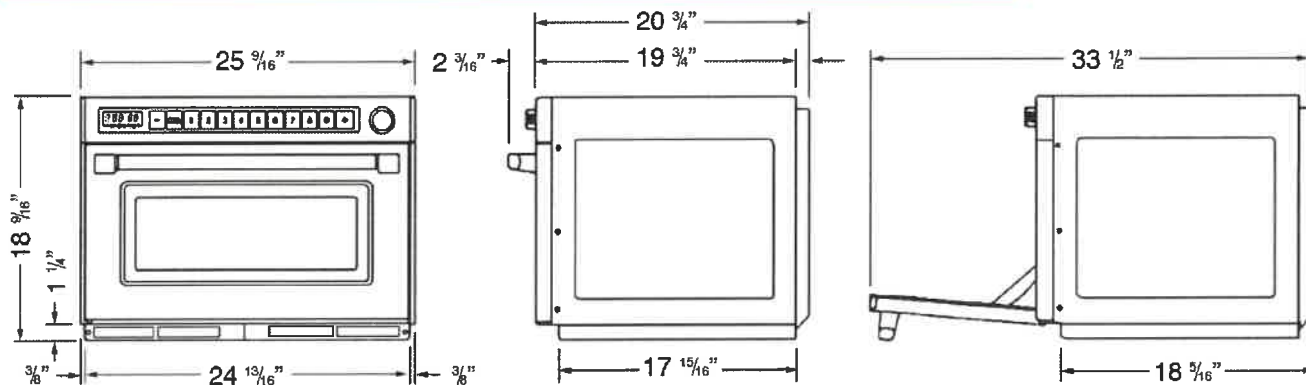
NE-2180	
Power Source	208/230-240V, 60Hz Single Phase
Receptacle Required	30 Amp, NEMA 6-30R 
Frequency	2,450MHz
Required Power	208V (20.0A), 230-240V (18.0A)
Output	2100 Watts*
Outer Dimensions (wxdxh)	25 ⁹ / ₁₆ " x 20 ³ / ₄ " x 18 ⁹ / ₁₆ "
Cavity Dimensions (wxdxh)	21 ¹ / ₁₆ " x 13" x 9 ⁷ / ₁₆ "
Net Weight	117 lbs.
Shipping Weight	128 lbs.
Shipping Box Size (wxdxh)	29 ⁷ / ₈ " x 26 ¹ / ₈ " x 22 ¹ / ₄ ", 9.9 cu. ft.
Timer	Maximum Times for Each Stage of Cooking - Hi & Med. Power=15 Min. - Low, Defrost & Hold=60 Min.
Memory Capability	16 Programs

Stainless Steel Cabinet and Cavity

The stainless steel cabinet and cavity makes for easy cleaning.

To Specify a Panasonic Commercial Microwave Oven

The NE-2180 Commercial Microwave Oven meets or exceeds all safety performance and sanitation standards set for commercial food service microwave ovens by UL, DHHS, FCC and NSF. Plus, oven shall have output power 2100 Watts*, equipped with 4 magnetrons, top and bottom energy feed, door opens down to hold pans with Grab & Go door handle, removable center shelf, 8 programmable pads, 16 memories, shift key (AM-PM), 3-stage cooking, 5 power levels (HI, MED., LOW, DEF., HOLD), programmable lock, cycle counter, volume/tone, self diagnostics, dial timer to select cooking time, video training, Chef/Test Kitchen technical support and 3 years limited warranty. 1 year parts and labor. 3 years magnetron.



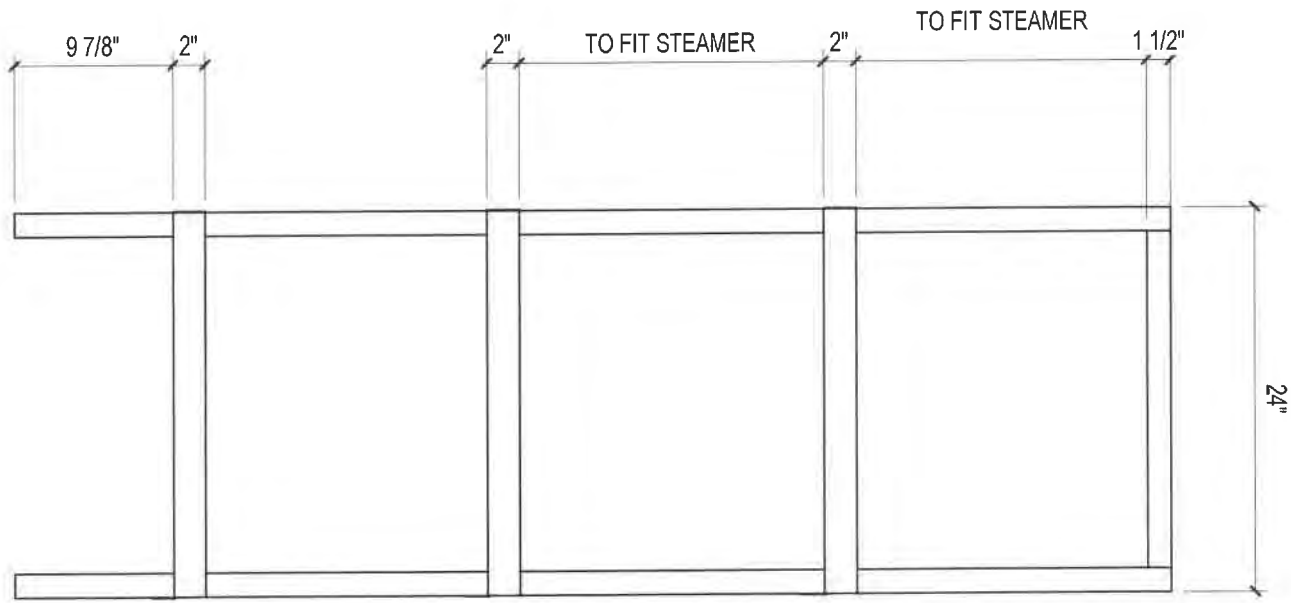
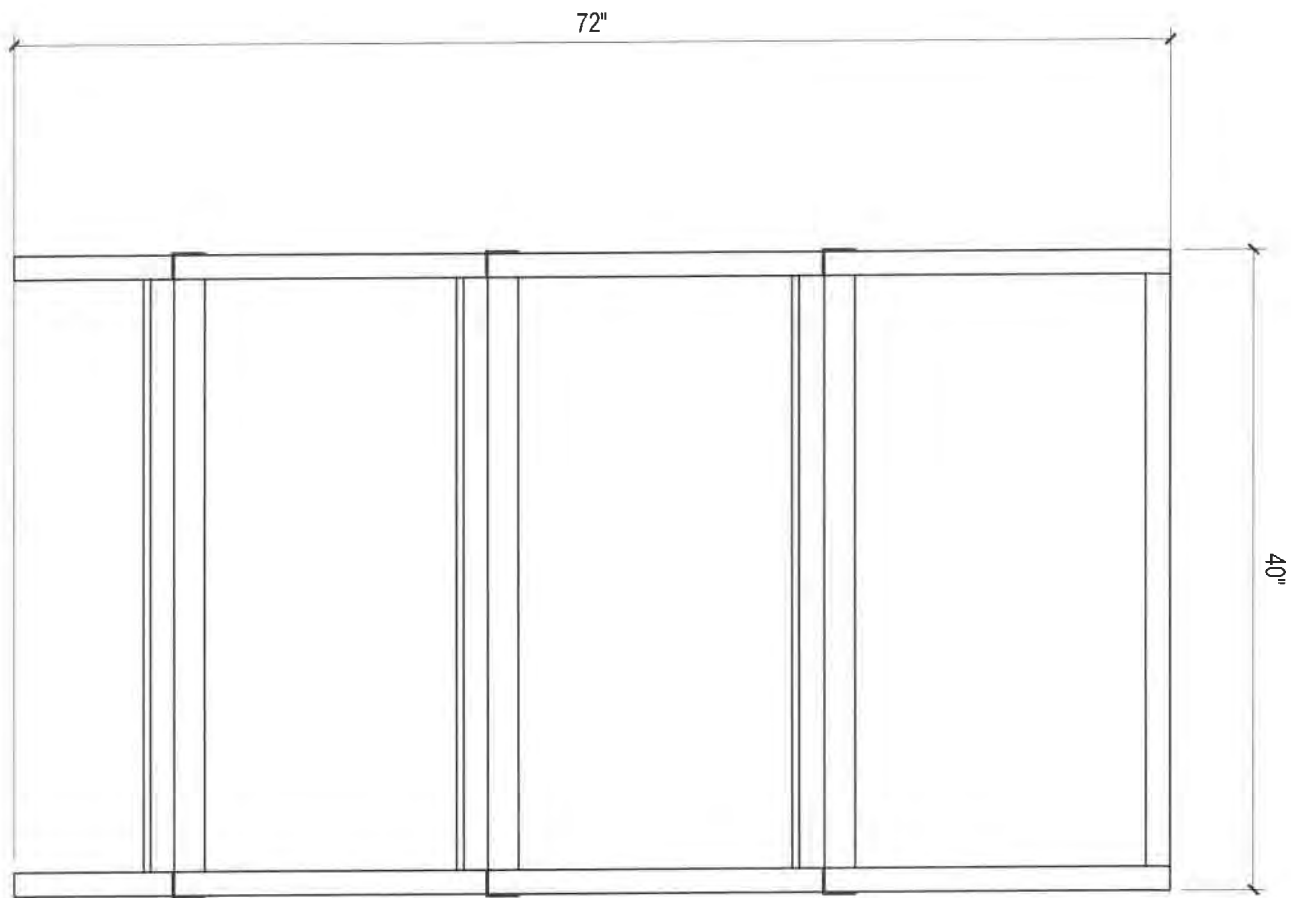
* I.E.C. 60705-88 Test Procedure. Specifications subject to change without notice.

Panasonic ideas for life

Panasonic Home & Commercial Appliance Group
Panasonic Corporation of North America
Executive Offices: One Panasonic Way, Panazip 1H-2
Secaucus, NJ 07094

Toll-free: **877-CMO-OVEN (266-6836)**
Sales Support, Recipes and Training at: www.panasonic.com/cmo
For a Panasonic Distributor/Services nearest you, 1-800-350-9590

STMR STND
SCALE: 1" = 1'-0"



TS

Project _____
 Item _____
 Quantity _____
 FCSI Section 11401 _____
 Approved _____
 Date _____

Braising Pans / Tilting Skillets

DURAPAN™ SERIES
 ELECTRIC, OPEN OR MODULAR BASE,
 30 & 40 GALLON (115 & 150 LITER)

Models

- SEL-30-TR • SEM-30-TR
- SEL-40-TR • SEM-40-TR



Open base model
 with optional Drain Drawer shown

- Space-Saving Design- No Clearance Required at rear or sides (optional Faucet and Console requires 4 1/2" on one side)
- All Stainless Steel Construction for durability and easy cleaning
- Adjustable, Electronic Thermostat controls temperature from 100°F to 425°F
- High Efficiency Heating System with even heat distribution - 14 kW's for 30 gallon models, 18 kW's for 40 gallon models
- Fast Heat-Up and Recovery Time-Preheats in 15 minutes, full capacity from cold to boiling in 60 minutes
- Spring Assist Cover with Adjustable Vent and Full Width Handle
- On/Off Switch, Thermostat Knob and Pilots, recessed to avoid breakage
- Four Stainless Steel, Level adjustable feet, rear flanged for bolting
- Serviceable from the front of the unit
- Two Pilot Lights; Green = Power on, Amber = Temperature Cycling
- Meets IPX6 Water Rating Requirements
- High Limit Safety Device set at 450°F (232°C)
- Anti-Splash Pouring Lip
- Typical approvals include UL, CSA, CE and NSF

Options & Accessories

- Sliding Drain Drawer with Splash Screen (SLD) (for SEL models only)
- Power Tilt with Hand Tilt Override (PT1)
- Double or Single Pantry Faucet (SPS14, DPS14), includes Faucet Mounting Bracket
- ~~• Double or Single Pantry Skillet Filler with 60" hose (SKF-S or BKT-S)~~
- ~~• Hot & Cold Water Pre-Rinse Spray Head with Hose (PRS-S)~~
- ~~• Voltage Options:~~
 - ~~• VOSK1, 240 Volt, 60 Hz, 3 Phase~~
 - ~~• VOSK2, 380/415 volt, 50 Hz, 3 Phase for export~~
 - VOSK3, 440/480 Volt, 60 Hz, 3 Phase
- ✓ Food Strainers for pouring spout (FS)
- ~~• Vegetable Steamers (VS)~~
- ~~• Poaching Pans (PP)~~
- ~~• Wall Mounting (WMS)~~
- ~~• In-Wall Carriers (IWCS)~~
- ~~• Pan Carriers (PCS), not available on 30 gallon models with a Tangent Draw-Off Valve~~
- ~~• 2" Tangent Draw-Off Valve (TD2), left side only~~

Short Form Specifications

Shall be CLEVELAND, Tilting Skillet;
 Model SE - 30 - TR _____ KW, 480 Volts
 holding no less than 30 gallons (_____
 liters); Complete with thermostatic and Safety
 Controls; Gallon Markings; Stainless Steel Clad;
 5/8" Cooking Surface; Hand Tilt; Spring Assist
 Cover with adjustable Vent. All Stainless Steel
 Construction. No Clearances Required.

Standard Features

- Leg or Modular Base
- Full 30/40 Gallon (115/150 Liters) Capacity Rating to Bottom of Pouring Lip
- Hydraulic Hand Tilt with quick lowering feature (HTS)
- Stainless Steel Clad 5/8" Cooking Surface Guaranteed against warpage
- Stainless Steel Coved Cornered Pans with both Gallon and Liter Markings

KE004046-89 rev C

CAPACITIES

In 4 oz. servings. Other sizes may be calculated.
 30 gallons / 115 Liters 960
 40 gallons / 150 Liters 1280

MODEL	A	B	C	D	E	F	G
SEL-30-TR	36" (915mm)	32" (812mm)	9" (229mm)	5" (127mm)	20" (508mm)	3" (76mm)	32 7/8" (835mm)
SEL-40-TR	48" (1220mm)	44" (1118mm)	12 1/8" (308mm)	8" (203mm)	22" (559mm)	6" (153mm)	44 7/8" (1140mm)

SPECIFICATIONS

CLEARANCE	APPROX. SHIPPING WEIGHTS & DIMENSIONS	
RIGHT: 1" (26mm) (4 1/2"/115mm with Faucet)	SEL-30-TR Weight - 503 lbs	SEL-40-TR Weight - 610 lbs
LEFT: 1" (26mm)	Width - 44"	Width - 48"
REAR: 1" (26mm)	Depth - 44"	Depth - 58"
	Height - 55"	Height - 54"

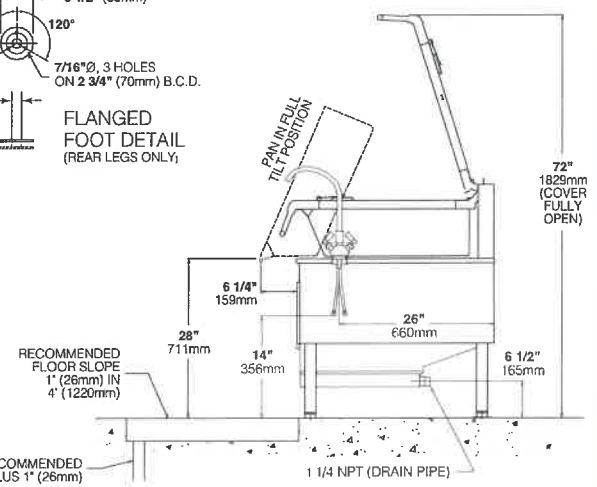
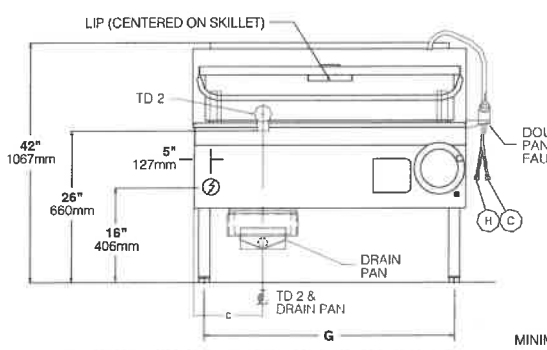
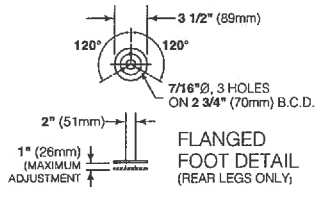
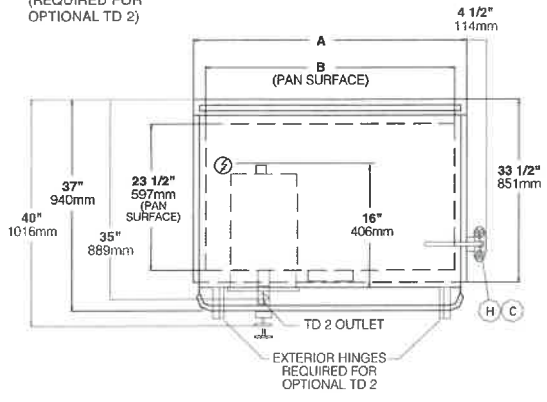
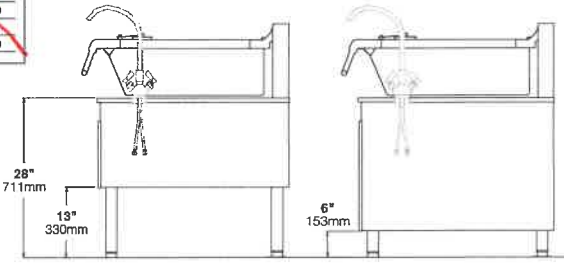
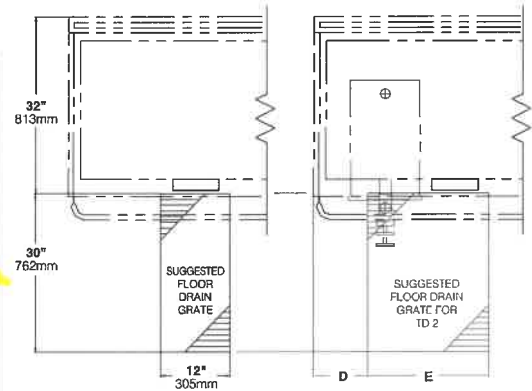
ELECTRICAL

SEL-30-TR & SEM-30-TR (Standard Wattage)						
Volts	Ph	Hz	Total Watts	Amps	Wire Size	
208	1	60	14400	69.2	4	
208	3	60	14400	40	8	
240	1	60	14400	60	6	
240	3	60	14400	34.6	8	
380	1	50	14400	37.0	8	
380	3	50	14400	21.0	10	
416	1	50	14400	34.6	8	
416	3	50	14400	20	10	
480	1	60	14400	30	6	
480	3	60	14400	17.3	10	

SEL-40-TR & SEM-40-TR (Standard Wattage)						
Volts	Ph	Hz	Total Watts	Amps	Wire Size	
208	1	60	18000	86.5	3	
208	3	60	18000	50	6	
240	1	60	18000	75	4	
240	3	60	18000	43.4	8	
380	1	50	18000	47.3	6	
380	3	50	18000	27.3	10	
416	1	50	18000	43.3	6	
416	3	50	18000	25	10	
480	1	60	18000	37.5	6	
480	3	60	18000	21.7	10	



EXTERIOR HINGES (REQUIRED FOR OPTIONAL TD 2)



NOTE: NON-STANDARD ITEMS ARE SHOWN IN GRAY

NOTES:

Cleveland Range reserves right of design improvement or modification, as warranted. Many regional, state and local codes exist and it is the responsibility of the owner and installer to comply with the codes. Cleveland Range equipment is built to comply with applicable standards for manufacturers. Included among those approval agencies are U.L., NSF, CGA, CSA, ETL and others.

(NOT TO SCALE)

Braising Pans / Tilting Skillets



TS-WM
/www.tsbrass.com) / Pot & Kettle Fillers (https://www.tsbrass.com/g/pot-kettle-fillers)
B-2313" https://www.tsbrass.com/p/pot-kettle-fillers/B-2313)
RELIABILITY BUILT IN™

@ Tilting
Skillets on
wall behind

(https://www.tsbrass.com)
Product%20Information%3A%20B-2313&body=Please%20visit%20the%20following%20product%20link%20for%20reference:%20%0Ahttps%3A%2F%2Fwww.tsbrass.com%2Fp%2Fpot-kettle-fillers%2FB-2313)

Pot & Kettle Filler, 8" Wall Mount, Vacuum Breaker, 68" Hose w/ Quick-Connect Spray Valve

search product/keyword



(https://www.tsbrass.com/images/product_images/lg/B-2313.jpg)

8" wall mount mixing faucet with polished chrome plated brass body, 68" flexible stainless steel hose with heat resistant handle, atmospheric vacuum breaker, spray valve with quick disconnect spray head and quick disconnect hook nozzle, compression cartridges with spring checks, lever handles, wall hook and 1/2" NPT female inlets. Certified to ASME A112.18.1/CSA B125.1, NSF 61-Section 9, NSF 372 and ASSE 1001.

- Pressure: 20 - 125 psi (1.38 bar - 8.62 bar)
- Temperature: 40 F - 140 F (4.44°C - 60°C)
- List Price: \$ 875.50

Attributes

- **Body-Mount:** Wall
- **Body:** 8" Centers (203 mm)
- **Inlet:** 1/2" NPT Female (13 mm)
- **Cartridge-Spindle:** 1/4 Turn Compression
- **Handle:** Lever
- **Feature:** Atmospheric VB

Features & Benefits

Product Compliance

Product Details

Legal

Downloads

Spec Drawings/Parts Explosion

(https://www.tsbrass.com/files/drawings/B-2300/B-2313.pdf#view



(https://www.tsbrass.com/download/drawings?file=files%2Fdrawings%2FB-2300%2FB-2313.pdf)

Installation Instructions

- Atmospheric Vacuum Breaker

(https://www.tsbrass.com/files/drawings/098/098-009549-45.pdf#view=Fit)



(https://www.tsbrass.com/download/drawings?file=files%2Fdrawings%2F098%2F098-009549-45.pdf)

Submittal

(https://www.tsbrass.com/files/submittals/B-2300/B-2313.pdf#vie



(https://www.tsbrass.com/download/submittals?file=files%2Fsubmittals%2FB-2300%2FB-2313.pdf)

Warranty: One Year (Limited)

(https://www.tsbrass.com/about/policies/limited-warranty)



(https://www.tsbrass.com/download/warranty?file=files%2FT%26S_Limited_Warranty.pdf)

Accessories



We've updated our Privacy Policy to support European data protection laws. We also use cookies to give you a better experience on our website. If you continue without changing your cookie settings, we assume that you consent to our use of cookies. You can always change your cookie settings at any time but if you do, you may lose some functionality on our website.

Before you continue, please read our new Privacy Policy

(https://www.tsbrass.com/files/TS_Brass_Web_Site_Privacy_Policy.pdf) and familiarize yourself with the terms.

close



T&S BRASS AND BRONZE WORKS, INC.

2 Saddleback Cove / P.O. Box 1088
Travelers Rest, SC 29690

TS FILL

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Model No.

B-2313

Item No.

This Space for Architect/Engineer Approval

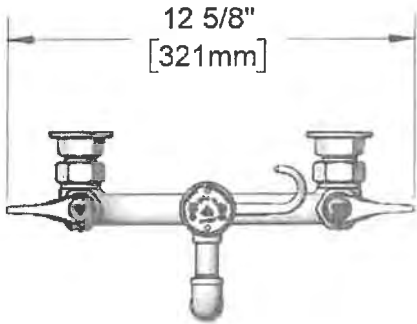
Job Name _____ Date _____

Model Specified _____ Quantity _____

Customer/Wholesaler _____

Contractor _____

Architect/Engineer _____



B-1421 Quick Disconnect Spray Valve
B-1424 Quick Disconnect Hook Nozzle



Quick Disconnect Spray Valve Accessories

EB-1420 Quick Disconnect Spray Valve

B-0104-D Wall Hook



Quarter-Turn Eterna Cartridges w/ Spring Checks & Lever Handles w/ Color Coded Indexes

Finger Hook

3 11/16" [94mm]

Ø2" [51mm] Flanges w/ 1/2" NPT Female Inlets

3 7/16" [87mm]

B-0968 3/8" NPT Vacuum Breaker

3" [76mm]

4 9/16" [116mm]
2 3/8" [61mm]

8" [203mm]

EB-0068-H 68" Flexible Stainless Steel Hose

Adjustable From 7 3/4" to 8 1/4" [197mm to 210mm]

Product Specifications:

Wall Mount Mixing Faucet, Quarter-Turn Eterna Cartridges w/ Spring Checks, Lever Handles, 3/8" NPT Vacuum Breaker, 68" Flexible Stainless Steel Hose, Quick Disconnect Spray Valve w/ Blue Handle & Blue Quick Disconnect Spray Valve, Quick Disconnect Hook Nozzle & 1/2" NPT Female Inlets

Product Compliance:

ASME A112.18.1 / CSA B125.1
NSF 61 - Section 9
NSF 372 (Low Lead Content)
ASSE 1001 (VB)
EPA Act 2005 Non-Compliant (PRSV)

T&S BRASS AND BRONZE WORKS, INC.

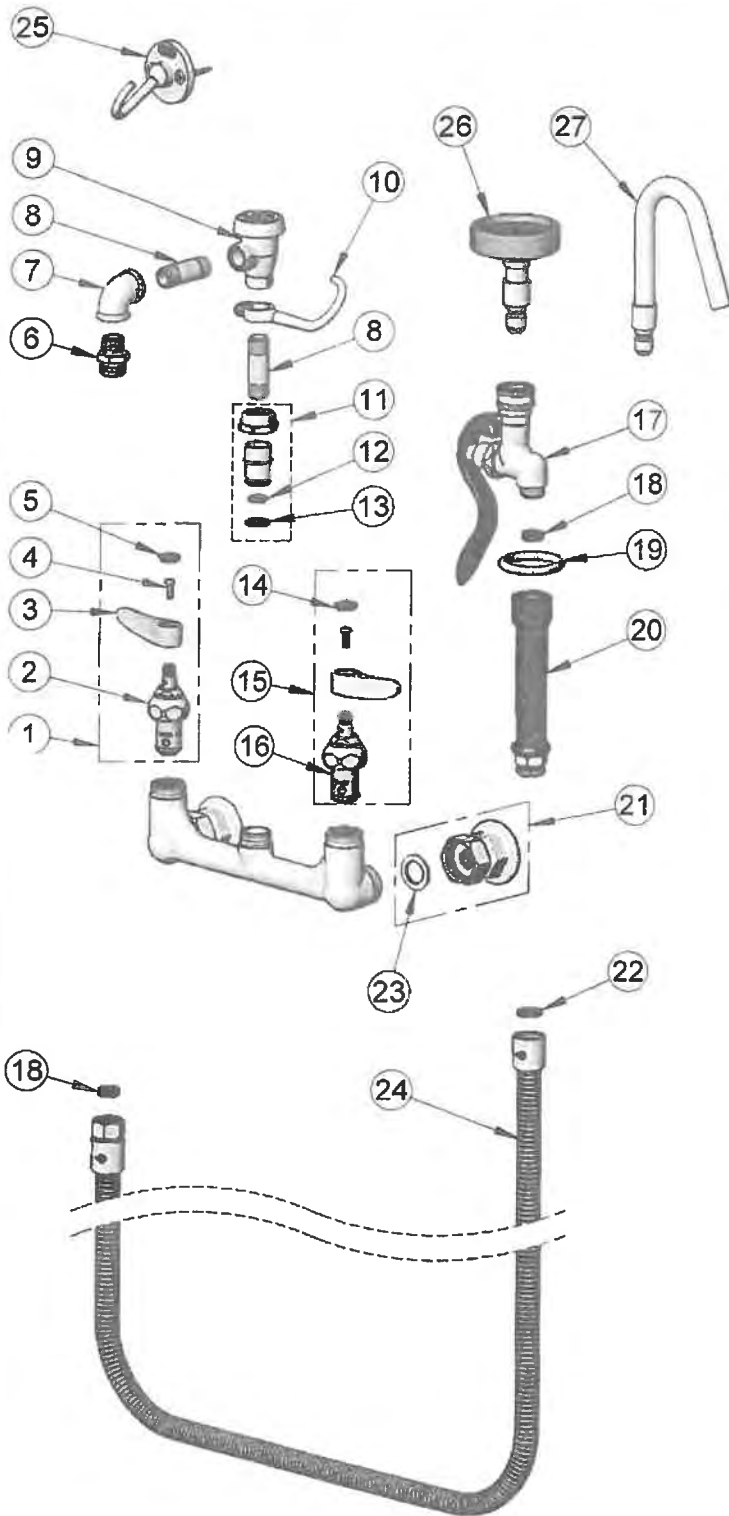
2 Saddleback Cove / P.O. Box 1088
Travelers Rest, SC 29690

Model No.

B-2313

Item No.

Travelers Rest, SC: 800-476-4103 • Simi Valley, CA: 800-423-0150 • Fax: 864-834-3518 • www.tsbrass.com



ITEM NO.	SALES NO.	DESCRIPTION
1	002712-40NS	Quarter-Turn Eterna Cartridge w/ Spring Check, Handle, Red Index & Screw, RTC
2	012443-40NS	Quarter-Turn Eterna Cartridge w/ Spring Check, RTC
3	001638-45NS	Lever Handle (New Style)
4	000925-45	Lab Handle Screw
5	001193-19NS	Red Button Index, Press-in
6	053A	Adapter, 3/8" NPT Male
7	001355-40	Elbow, 3/8 NPT
8	000357-40	Nipple, 3/8" NPT x 2"
9	B-0968	3/8" NPT Vacuum Breaker
10	004R	Finger Hook
11	EZ-K	EasyInstall Kit
12	001065-45	O-Ring
13	014200-45	Star Washer, Anti-Rotation
14	018506-19NS	Blue Button Index, Press-in
15	002711-40NS	Quarter-Turn Eterna Cartridge w/ Spring Check, Handle, Blue Index & Screw, LTC
16	012442-40NS	Quarter-Turn Eterna Cartridge w/ Spring Check, LTC
17	EB-1420	Quick Disconnect Spray Valve
18	010476-45	#27 Washer
19	000907-45	Spray Valve Hold Down Ring
20	011482-40	Blue Grip Handle
21	00AA	1/2" NPT Female Eccentric Flange
22	001014-45	Washer, B-0100 Hose Barrel
23	001019-45	Coupling Nut Washer
24	B-0068-H2A	68" Flexible Stainless Steel Hose, Less Handle
25	B-0104-D	Wall Hook
26	B-1421	Quick Disconnect High Flow Spray
27	B-1424	Quick Disconnect Hook Nozzle

Fixture Specifications:

Wall Mount Mixing Faucet, Quarter-Turn Eterna Cartridges w/ Spring Checks, Lever Handles, 3/8" NPT Vacuum Breaker, 68" Flexible Stainless Steel Hose, Quick Disconnect Spray Valve w/ Blue Handle & Blue Quick Disconnect Spray Valve, Quick Disconnect Hook Nozzle & 1/2" NPT Female Inlets

Product Compliance:

ASME A112.18.1 / CSA B125.1
NSF 61 - Section 9
NSF 372 (Low Lead Content)
ASSE 1001 (VB)
EPA Act 2005 Non-Compliant (PRSV)

UC



Lakeside Manufacturing, Inc
4900 West Electric Avenue
West Milwaukee, WI 53219 U.S.A.
800.558.8565 • 414.902.6400
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Lakeside 726 Heavy Duty 3-Shelf Guard Rail Cart (700lbs Capacity)

elakeside.com/foodservice/product/heavy-duty-3-shelf-medium-guard-rail-cart

SKU: 726



Guard rail carts eliminate spills and breakage when transporting items that could easily tumble off shelves. Ideal for any situation where you are transporting items which could fall off the cart easily. Protective guard rail helps eliminate spills and breakage of materials. Integrated push handle allows for easy maneuverability of our cart. All welded stainless steel construction allows for durability and easy sanitation. Standard handle and leg bumpers protect cart, walls and doorways from damage.

Specifications

PRODUCT INFORMATION	
Capacity (lbs)	700
Shelf Size (WxL) (in)	18 x 27
Country of Origin	US
Number of Shelves	3
Overall Size-(WxLxH) (in)	19 3/8 x 32 5/8 x 34 1/2
Shelf Clearance (in)	9

Caster Size (in)	5
Caster Type	All swivel
SHIPPING DIMENSIONS	
Weight	71 lbs 32.21 kgs
Dimensions	36 × 22.5 × 39.5 in 91.44 x 57.15 x 100.33 cm

Specification

Heavy Duty Guard Rail Utility Cart, 3-tier, open base, 700 lbs capacity, 18" x 27" shelf size, 9" shelf clearance, includes front guard rail on each shelf, (1) push handle with bumpers, (2) bumpers on front legs, welded stainless steel construction, 5" swivel casters with non-marking tread, MADE IN USA

GE Unitized Spacemaker® 3.8 cu. ft. Capacity Washer with Stainless Steel Basket and 5.9 cu. ft. Capacity Electric Dryer

WD

Model #: GUD27ESPMDG

★★★★☆ 4.3 (6198)



SALE

\$1,399.00

Save \$250.00 (16%) ~~\$1,649.00~~

- Rotary- electromechanical controls (dryer)
- 11 wash cycles
- 6 wash / rinse temperatures
- Dimensions: 75 7/8 H x 26 3/4 W x 30 7/8 D

[Learn More >](#)

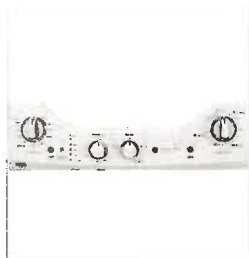
Color: Gray



FIND STORES

Feedback

ABOUT THIS PRODUCT



Rotary- electromechanical controls (dryer)

Allow fast, easy cycle selection

11 wash cycles

Cycles are designed to specifically handle various fabrics and soils

6 wash / rinse temperatures

Select the right temperature for ideal wash results

1 wash / spin speed combination

Speeds are matched to fabric type for great clothes care

Auto-load sensing with 4 water levels

Washer will automatically measure the load size and add just the right amount of water, or choose your own

Rotary-electronic controls (washer)

Simplify cycle selection

Feedback

CLAIMS & CERTIFICATIONS



For California Residents:

California Prop 65

SPECS & DETAILS

+

APPEARANCE

Color Appearance Diamond Gray

CAPACITY

Washer Capacity 3.8 cu ft

Dryer Capacity 5.9 cu ft

Wash Basket Type Stainless Steel

ECONOMICAL / QUIET

Quiet Package Quiet-By-Design

FEATURES

Fuel Type Electric

Number of Cycles 11 Washer/4 Dryer

Wash Mechanism Single Action Agitator

Washer Cycles
 Bulky Items
 Casuals
 Colors/Normal (Heavy, Normal, Light)
 Delicates
 Drain + Spin
 Speed Wash
 Whites (Heavy, Normal, Light)

Washer Options/Settings Deep Rinse (select when using fabric softener)

Dispenser Bleach
 Fabric Softener

Heat Selections 4

Feedback

Wash/Rinse Temperatures	6
Wash/Spin Speed Combinations	1
Water Levels	Adaptive Fill + 4 levels
Control Type	Rotary Electromechanical
Cottons Cycle	Auto Less Dry More Dry Optimum Dry
Delicates Cycle	Auto Less Dry More Dry
Easy Care Cycle	Auto Casuals Less Dry More Dry
Case Material	Steel
Maximum Spin Speed	800 RPM
Drum Type	Dura Drum
Additional Cycles	Dewrinkle Quick Fluff
Additional Dryer Features	Up-Front Lint Filter
Automatic Dry Control	Yes
Exhaust Options	3-Way (Rear; Left; Right)
Product Type	Stacked Washer & Dryer Combo
Timed Dry	90 Minutes
Washer Control Features	LED Indicators

Feedback

Additional Washer Features	Inlet Fill Hoses Included Lid Latch
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POWER / RATINGS

Circuit Breaker or Time Delay Fuse	30 Amp
Volts/Hertz	120/240V or 120/208V; 60Hz

WARRANTY

Labor Warranty	Limited 1-year entire appliance
Parts Warranty	Limited 1-year entire appliance
Warranty Notes	See written warranty for full details

WEIGHTS & DIMENSIONS

Cabinet Width	27.0 in
Door Open Height	54.0 in
Door Width	22.0 in
Net Weight	249.0 lb
Overall Depth	30.875 in
Overall Height	75.875 in
Overall Width	26.75 in
Depth with Door Open 90°	47.5 in

Feedback

**ST. SIMONS ELEMENTARY SCHOOL
NEW CONSTRUCTION
PHASE 4 – KITCHEN FOOD SERVICE EQUIPMENT**

SECTION 114001 – WALK-IN COOLER FREEZER

PART 1 – GENERAL

- A. Walk-in cooler/freezer shall be constructed of prefabricated, precision-formed, modular panels designed for rapid field assembly. Walk-in cooler/freezer shall be manufactured by Kolpak.
- B. Shop Drawings and Submittals:
1. Walk-in cooler/freezer shall be supplied with a complete set of installation instructions and erection drawings. All panels shall have panel identification corresponding with erection drawings to facilitate rapid and accurate field erection.
 2. Submit all condensers, cooling coil units, accessories and details for review and approval by architect.
- C. GUARANTEES:
1. Walk-in cooler/freezer panels shall be guaranteed for a period of ten (10) years after final approval against poor workmanship and defective materials. Any defect within this period shall be corrected at no charge to Owner. Refrigeration system shall be guaranteed for parts and labor for a period of two (2) years with an additional pro-rated three (3) years for parts only on the compressor.
- D. CODES AND STANDARDS:
1. NSF Standards: Comply with applicable National Sanitation Foundation (NSF) Standard 7 construction and recommended criteria. Provide equipment with a NSF "Seal of Approval."
 2. UL Labels: Where available, provide UL labels on prime electrical components. Provide UL "recognized marking" on other items with electrical components, signifying listing by UL where available. Provide UL approval of door electrical circuit assembly.
 3. ASTM E-84: Comply with fire hazard classification ASTM E-84. Panels shall be supplied with a fire hazard classification in accordance with ASTM E-84 as performed by Underwriters Laboratories. Panels shall be classified by Underwriters Laboratories as having a flame spread rating of 25 or less and a smoke rating of 450 or less.
 4. ASTM D-1929: Insulation shall be in compliance with ASTM D-1929 and D-3286 and shall provide a minimum self-ignition temperature of 650 degrees F.

PART 2 – PRODUCTS

- A. Furnish one (1) each walk-in cooler/freezer to be actual 16'-10" x 23'-9 1/2" x 8'-6 1/4" high. Cooler interior dimensions are to be 16'-2" x 8'-9 1/2" x 8'-1 5/8". Freezer interior dimensions are to be 16'-2" x 14'-0" x 7'-10 5/8".
- B. Walk-in cooler/freezer is to comply with the US Energy Independence & Security Act.
- C. Interior wall finish to be minimum 26-gauge embossed galvalume. Exterior wall finish to be minimum 26-gauge embossed galvalume. Interior ceiling finish to be minimum 26-gauge embossed galvalume. Exterior ceiling finish to be minimum 26-gauge embossed galvalume. Interior floor finish to be a minimum .100 thick smooth aluminum foamed-in-place with NSF covered

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corners. Floor to be reinforced with foamed-in place Era anti-delamination support brackets. Plywood and substrate underlayment shall not be utilized based on the new DOE requirements for minimum R-Value for 4" thick floor panels. Floor to be designed to support rolling loads up to 1,000 lbs. per sq. ft.

- D. All walk-in insulated panels shall consist of inner and outer metal pans, precision-formed on steel dies and equipped with cam action locking devices. Metal pans shall be stretcher leveled precision formed metal. Locking devices to be wrench activated precision cam locks spaced on centers not to exceed 46". All cam locks to be activated from cabinet interior. Insulation shall be 4" thick rigid, zero ozone depleting HFC 245-A blown Class 1 urethane foam classified according to UL723 (ASTM-E-84) as tested by Underwriters Laboratories.
- E. Panels shall be 100% urethane foam insulation exclusive of metal pans. Perimeter structure shall be formed of urethane insulation forming tongues and grooves to assure vapor-proof and air-tight joints. Insulation shall be foamed-in-place to bond to inner surfaces of metal pans having a thermal conductivity factor ("K") of not more than 0.133BTU/HR./Sq.ft./Degree F. /Inch. The overall coefficient of heat transfer factor ("U") shall not exceed .03 ("K" factor divided by panel thickness). The resulting "R" value or minimum assigned insulation efficiency rating shall be 31 or greater. All panels (except corner panels) shall be 11-1/2", 23", 34-1/2", and 46" wide for easy rapid assembly as selected to conform to drawings. To ensure exact alignment and **maximum strength**, corner panels shall be exact 90-degree angles and measure 12" in each horizontal exterior dimension.
- F. **Freezer Compartment** – To be fitted with 34" x 78" left swing outdoor, recessed 0" with 0" leveling sand and 0" tile and grout.
Frame exterior and plug – 26-gauge embossed galvalume
Frame interior and plug - 26-gauge embossed galvalume.
Freezer Door/Opening Accessories:
2" dial w/6" lead thermometer
Pilot light switch – 120V
Pressure relief vent, heated (Kason 1825)
Globe & Nightlight 120V – Light fixture (Kason 1803 LED w/bulb)
Handle – Kason 28 with locking assembly
Door closer – Kason 1094
FRP threshold
5 watt/ft heater wire
(2) Adjustable spring assisted hinge – Kason 1346 polished chrome
Cooler Compartment:
To be fitted with 34" x 78" left swing outdoor, recessed 0" with 0" leveling sand and 0" tile and grout.
Frame Exterior – 26-gauge embossed **Frame Interior** - 26-gauge embossed galvalume. **Plug Exterior** - 26-gauge embossed galvalume - .063 diamond tread aluminum kickplate 36" high.
Plug interior – 26-gauge embossed galvalume
Cooler Compartment Accessories:
(1 EA) Vent – pressure relief, heated Kason 1832 – allowed in walls or scientific doors (ensure not behind a masonry wall)
Cooler Door/Opening Accessories:
2" dial w/6" lead thermometer
Pilot light switch – 120V
Globe & Nightlight 120V – Light fixture (Kason 1803 LED w/bulb)

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Handle – Kason 28 with locking assembly
Door closer – Kason 1094
Tile and grout adder
(2) Hinge Adjustable/spring assisted – Kason 1346 polished chrome

- G. Provide one (1) each cooler condensing unit PC69MOP-2E, 208-230 volt, 1 phase, 8.5 MCA amps, 3/4 HP, pre-assembled remote, to maintain a constant temperature of 36 to 38 degrees F. Provide with all standard features plus low ambient kit & outdoor unit housing. Unit must be an R-404A system. Provide one (1) each low profile evaporator coils AM26-094-1ECAFOEMPR-4, 115-volt, 1 phase, 1.6 amps.
- H. Provide one (1) each Scroll freezer condensing unit PC299LZOP-2E, 208/230 volt, 1 phase, 20.6 MCA amps, 3 HP, pre-assembled remote, to maintain a constant temperature of -5 to -10 degrees F. Provide with all standard features plus low ambient kit & steel outdoor unit housing. Unit must be a R-404A system. Provide one (1) each low profile evaporator coil EL36-121-2EC-PR-4, 208-230 volt, 1 phase, 1.5 fan motor amps, 14.3 defrost heater amps.

VENDOR RESPONSIBILITIES:

- A. Food Service Contractor is responsible for delivering and installing cabinet, trim, enclosure, shelving, and refrigeration systems, start-up and checking all pressures, and pull down of units to above stated operating temperatures. FSEC is to maintain an on-site temperature check for 2 hours after start-up with a pressure gauge check at the end of this time and is to also inspect and pressure gauge check the unit the next day.
- B. All refrigerant lines shall be extended in a neat and orderly manner. All copper tubing shall be securely supported with clamps and Unistrut. All copper tubing shall be refrigerant grade A.C.R. Type “L” hard copper attached with forged or wrought copper fittings. Silver solder and/or Sil-Fos shall be used to join all refrigerant piping. Soft solder is not acceptable. Conduit, wiring and refrigerant lines will be concealed within walls, ceilings, and floors of building as much as feasible.
- C. Hard copper line sets are to be installed in accordance with acceptable refrigeration practices including utilization of all necessary line traps and line grading to maximize the flow of oil and refrigerant and/or condensate throughout the system.
- D. All refrigerant piping to be pressure tested with nitrogen at 300 psi. After the condensing unit and coil has been connected, the balance of the system shall be leak tested with all valves open. The complete system shall be evacuated with a vacuum pump. Charge, test, and adjust each unit to make it operational. Suction line shall be wrapped with ½” wall Armaflex.
- E. Drain line piping shall be A.C.R. Type “L” hard copper, properly graded and trapped outside of the compartments.
- F. All walk-in panel penetrations are to be field drilled with PVC sleeves utilized. Sleeves to be internally sealed with polyurethane foam.

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- G. Food Service Contractor is responsible for all the electrical between the electrical disconnect and all the points of connection including control wiring. All electrical conduit is to be of lock-tite type or field foamed-in-place.

- H. Food Service Contractor is to make an on-site visit prior to General Contractor performing any work related to this project to assure proper coordination of job sequence and is to make an on-site visit after General Contractor work is completed and prior to walk-in delivery to assure all dimensions are correct and that all mechanical and electrical work are correct and complete for the uninterrupted completion and integrity of the project.

GENERAL CONTRACTOR:

- A. Provide energized electrical disconnects as required mounted within 5' of the proposed condensing unit locations. Electrical disconnects to include a properly sized 120-volt circuit with circuit breaker protection.

- B. Provide a level and unobstructed 4" deep concrete depression for walk-in cabinet and remote provisions for condensing units.

- C. All work to provide:
 - a. support pads for condensers
 - b. routes of refrigerant lines to condensers (to be shown on shop drawings).
 - c. Electrical service to fan coil units and condensers (to be shown on shop drawings).
 - d. Routes of wiring for cooler and freezer alarm system.

END OF SECTION 114001

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SECTION 116623 – GYMNASIUM EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Basketball equipment.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.

B. Shop Drawings: For gymnasium equipment.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include details of field assembly for removable equipment, connections, installation, mountings, floor inserts, attachments to other work, and operational clearances.
3. Include transport and storage accessories for removable equipment.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Court layout plans, drawn to scale, and coordinated with floor inserts, game lines, and markers applied to finished flooring.

B. Qualification Data: For Installer.

C. Product Certificates: For each type of gymnasium equipment.

D. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For gymnasium equipment to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: **An entity that employs installers and supervisors who are trained and approved by manufacturer.**

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1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not install gymnasium equipment until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Verify position and elevation of floor inserts and layout for gymnasium equipment.

1.7 COORDINATION

- A. Coordinate installation of floor inserts with structural floors and finish flooring installation and with court layout and game lines and markers on finish flooring.
- B. Coordinate layout and installation of overhead-supported gymnasium equipment and suspension-system components with other construction including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of gymnasium equipment that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Basketball backboard failures including glass breakage.
 - b. Faulty operation of basketball backstops.
 - 2. Warranty Period: **Five** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain **gymnasium equipment** from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Basketball backstops and anchors shall withstand the effects of earthquake motions determined according to **ASCE/SEI 7**.

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2.3 BASKETBALL EQUIPMENT

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AALCO Manufacturing.
 2. Bison, Inc.
 3. Jaypro Sports, LLC.
 4. Performance Sports Systems.
 5. Porter Athletic Equipment Company.
 6. Spalding.
 7. Draper, Inc.
- B. General: Provide equipment complying with requirements in NFHS's "**NFHS Basketball Rules Book.**"
- C. Protruding fasteners or exposed bolt heads on front face of backboards are not permitted.
- D. Provide manufacturer's recommended connections complying with Section 055000 "Metal Fabrications" of size and type required to transfer loads to building structure.
- E. Overhead-Supported, **Wall-Braced** Backstops:
1. Stationary Type: (4 cross court goals) Manufacturer's standard assembly.
 2. Folding Type: (2 main court goals) Provide manufacturer's standard assembly for **forward-folding, front-braced** electronically operated backstop, with hardware and fittings to permit folding.
 3. Framing: Steel pipe, tubing, and shapes. Design framing to minimize vibration during play.
 - a. Single Mast Frame: **Welded** with cross bracing.
 - b. Finish: Manufacturer's standard **polyester powder-coat finish.**
 4. Goal Height Adjuster: Adjustable from **8 to 10 feet (2.4 to 3 m)** with gear-drive mechanism, locking in any position within adjustment range, with visible height scale attached to side of framing.
 - a. Operation: Manual with detachable crank handle.
- F. Backstop Safety Device: Designed to limit free fall if support cable, chains, pulleys, fittings, winch, or related components fail; with mechanical automatic reset; **6000-lb (2722-kg)** load capacity; **one per folding backstop.**
- G. Backstop Electric Operator: Provide operating machine of size and capacity recommended by manufacturer for equipment specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, and remote controls. Coordinate wiring requirements and electrical characteristics with building electrical system.

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1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operator Type: Cable drum with grooved drum and cable tension device to automatically take up cable slack and retain cable in grooves.
3. Remote-Control Station(s): NEMA ICS 6, Type 1 enclosure for **recessed or flush** mounting and momentary-contact, three-position, switch-operated control with up, down, and off functions.
 - a. Group Key Switch Control Stations: One switch per **each backstop**.
 - b. Keys: Provide **two keys** per station.
 - c. Switches, Ganged: Single faceplate with multiple switch cut-outs.
4. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop basketball equipment at fully retracted and fully lowered positions.

H. Basketball Backboards:

1. Shape and Size:
 - a. Rectangular, **72 by 48 inches (1800 by 1200 mm)** width by height, **with rounded corners**.
2. Backboard Material: With predrilled holes or preset inserts for mounting goals, and as follows:
 - a. Fiberglass: (4 cross court fixed goals) Not less than **1-1/2-inch- (38-mm-)** thick, composite backboard consisting of not less than two **3/16-inch- (5-mm-)** thick, molded fiberglass panels laminated together over faces and edges encapsulating a **3/4-inch (19-mm)** honeycomb core, reinforced at goal and backboard mountings, or a wood panel product core; with threaded inserts or embedded anchors for mounting backboard corners to support framing at standard mounting centers.
 - b. Glass: (2 main court electric folding goals) Not less than **1/2-inch- (13-mm-)** thick, transparent tempered glass complying with ASTM C 1048 Kind FT (fully tempered) and with impact testing requirements in 16 CFR 1201 Category II or ANSI Z97.1 Class A for safety glazing. **Provide glass and framing system manufactured to comply with FIBA Level 1 or Level 2 requirement that glass does not split off if broken.** Provide glass with impact-absorbing resilient rubber or PVC gasket around perimeter in a fully welded, **brushed-natural-finish, extruded-aluminum** frame, with steel subframe, reinforcement, bracing, and mounting slots for mounting backboard frame to backboard support framing.
 - 1) Standard Mount: Provide steel corner reinforcement with mounting slots for mounting backboard frame to backstop at standard mounting centers.
 - 2) Rim-Restraining Device: Complying with NCAA and NFHS rules and designed to ensure that basket remains attached if glass backboard breaks.
 - c. Steel: Single-piece, steel face sheet, not less than [**0.1046-inch (2.7-mm)**] **<Insert dimension>** nominal thickness, with **1-1/2-inch- (38-mm-)** deep, roll-

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edged perimeter flange and with steel-reinforced, welded frame welded to back side of backboard; with mounting slots for mounting backboard frame to backboard support framing at standard mounting centers.

3. Target Area and Border Markings: (2 glass backboards) Permanently etched in white color, marked in **manufacturer's standard pattern and stripe width**.
 4. Target Area and Border Markings: Marked in **black, with manufacturer's standard pattern and stripe width**.
 5. Finish: (4 fiberglass backboards) Manufacturer's standard factory-applied, white background.
- I. Goal Mounting Assembly: Compatible with goal, backboard, and support framing; with hole pattern **that is manufacturer's standard** for goal attachment.
1. Glass Backboard Goal Mounting Assembly: Goal support framing and reinforcement designed to transmit load from goal to backboard frame and to minimize stresses on glass backboard.
- J. Basketball Goals: Complete with flanges, braces, attachment plate, and evenly spaced loops welded around underside of ring.
1. Single-Rim Basket Ring Competition Goal: Materials, dimensions, and fabrication **per manufacturer's standard design**.
 2. Net Attachment: **Tube tie for attaching net to rim**.
 3. Finish: **Polyester powder-coat** finish.
- K. Basketball Nets: 12-loop-mesh net, between **15 and 18 inches (380 to 460 mm)** long, sized to fit rim diameter, and as follows:
1. Competition Cord: Antiwhip, made from white nylon cord not less than 120-gm thread and not more than 144-gm thread.
- 2.4 MATERIALS

- A. Support Cable: [**1/4-inch- (6-mm-)** diameter, 7x19] [**Manufacturer's standard**] galvanized-stranded-steel wire rope **with a breaking strength of 7000 lb (3175 kg)**. Provide fittings complying with wire rope manufacturer's written instructions for size, number, and installation method.
- B. Support Chain and Fittings: For chains used for overhead lifting, provide Grade 80 heat-treated alloy steel chains, complying with ASTM A 391/A 391M, with commercial-quality, **zinc-plated** steel connectors and hangars.
- C. General-Purpose Chain: For chains not used for overhead lifting, provide carbon steel chain, complying with ASTM A 413/A 413M, Grade 30 proof coil chain or other grade recommended by gymnasium equipment manufacturer. Provide coating type, chain size, number, and installation method complying with manufacturer's written instructions.

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- D. Castings and Hangers: Malleable iron, complying with ASTM A 47/A 47M; grade required for structural loading.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for play court layout, alignment of mounting substrates, installation tolerances, operational clearances, **accurate locations of connections to building electrical system**, and other conditions affecting performance of the Work.
 - 1. Verify critical dimensions.
 - 2. Examine wall assemblies, where reinforced to receive anchors and fasteners, to verify that locations of concealed reinforcements are clearly marked. Locate reinforcements and mark locations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written installation instructions **and competition rules indicated for each type of gymnasium equipment**. Complete equipment field assembly where required.
- B. Unless otherwise indicated, install gymnasium equipment after other finishing operations, including painting, are completed.
- C. Permanently Placed Gymnasium Equipment and Components: Install rigid, level, plumb, square, and true; anchored securely to supporting structure; positioned at locations and elevations indicated; in proper relation to adjacent construction; and aligned with court layout.
 - 1. Operating Gymnasium Equipment: Verify clearances for movable components of gymnasium equipment throughout entire range of operation and for access to operating components.
- D. Anchoring to In-Place Construction: Use anchors and fasteners where necessary to secure built-in and permanently placed gymnasium equipment to structural support and to properly transfer load to in-place construction.
- E. Connections: Connect electric operators to building electrical system.

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3.3 ADJUSTING

- A. Adjust movable components of gymnasium equipment to operate safely, smoothly, easily, and quietly, free from binding, warp, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and moving parts.

3.4 CLEANING

- A. After completing gymnasium equipment installation, inspect components. Remove spots, dirt, and debris and touch up damaged shop-applied finishes according to manufacturer's written instructions.
- B. Replace gymnasium equipment and finishes that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. **Engage a factory-authorized service representative to train** Owner's maintenance personnel to adjust, operate, and maintain gymnasium equipment.

END OF SECTION 116623

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SECTION 122113 – HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Horizontal louver blinds with **polymer** slats.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, **12 inches (300 mm)** long.
- C. Samples for Initial Selection: For each type and color of horizontal louver blind.
 - 1. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each type and color of horizontal louver blind indicated.
 - 1. Slat: Not less than **12 inches (300 mm)** long.
- E. Product Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For horizontal louver blinds with polymer slats that have been tested for compliance with NFPA 701, for tests performed by **manufacturer and witnessed by a qualified testing agency**.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Mockups: Build one mockup complete window to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

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1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet-work and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, POLYMER SLATS

- A. **Manufacturers:** Subject to compliance with requirements, **provide products by one of the following:**
 1. CACO, Inc., Window Fashions.
 2. Hunter Douglas Contract.
 3. Levolor.
 4. TimberBlindMetroShade.
- B. Flame-Resistance Rating: Comply with NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

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- C. Slats: Polymers that are lead free, UV stabilized, integrally colored, opaque, and will not crack or yellow; antistatic, dust-repellent treated.
1. Formulation: **Manufacturer's standard.**
 2. Width: **2 inches (51 mm).**
 3. Thickness: **0.125 inch (3.2 mm).**
 4. Spacing: **Manufacturer's standard.**
 5. Profile: **Crowned.**
 6. Features:
 - a. Lift-Cord Rout Holes: **Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.**
- D. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrail fully encloses operating mechanisms on three sides and ends.
1. Manual Lift Mechanism:
 - a. Lift-Cord Lock: **Variable; stops lift cord at user-selected position within full operating range.**
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 2. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Operator: **Clear-plastic wand or Dual cord.**
 - c. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
 3. Manual Lift-Operator and Tilt-Operator Lengths: **Full length of blind when blind is fully closed] [Length required to extend to 48 inches (1219 mm) above floor level when blind is fully closed].**
 4. Manual Lift-Operator and Tilt-Operator Locations: **Manufacturer's standard.**
- E. Bottom Rail: Secures and protects ends of ladders and lift cords.
1. Type: **Manufacturer's standard. Hardwood matching slats and trapezoid-shaped bottom angled for minimizing light gaps.**
- F. Lift Cord: Manufacturer's standard braided cord.
- G. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
1. Type: **Braided cord.**
- H. Valance: **Manufacturer's standard.**

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- I. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
 - 1. Type: **Two piece for pocket installation.**
 - 2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.
- J. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
- K. Colors, Textures, Patterns, and Gloss:
 - 1. Slats: **As selected by Architect from manufacturer's full range.**
 - 2. Components: **Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.**

2.3 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at **74 deg F (23 deg C)**:
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less **1/4 inch (6 mm)** per side or **1/2 inch (13 mm)** total, plus or minus **1/8 inch (3.1 mm)**. Length equal to head-to-sill dimension of opening in which blind is installed less **1/4 inch (6 mm)**, plus or minus **1/8 inch (3.1 mm)**.
 - 2. Outside of Jamb Installation: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
 - 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.

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2. Wood: Apply **manufacturer's standard** factory-applied finish complying with manufacturer's written instructions for surface preparation, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 1. Locate so exterior slat edges are not closer than **2 inches (51 mm)** from interior faces of glass and not closer than **1/2 inch (13 mm)** from interior faces of glazing frames through full operating ranges of blinds.
 2. Install mounting and intermediate brackets to prevent deflection of headrails.
 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

3.3 ADJUSTING

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

3.4 CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

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3.5 HORIZONTAL LOUVER BLIND SCHEDULE

ROOM NUMBER	BLINDS
134	1
138	1
139	1
141	1
143	1
145	1
146	1
147	1
148	1
151	1

END OF SECTION 122113

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SECTION 122413 – ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Motor-operated roller shades with **single** rollers.
2. Shades required at curtain wall openings in Room C113.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations. If supplier cannot produce shop drawings, Architect will prepare shop drawings at hourly rates to be paid by Contractor from Owner's Contingency Allowance.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified, **10 inches (250 mm)** long.

D. Samples for Initial Selection: For each type and color of shadeband material.

1. Include Samples of accessories involving color selection.

E. Samples for Verification: For each type of roller shade.

1. Shadeband Material: Not less than **10 inches (250 mm)** square. Mark interior face of material if applicable.
2. Installation Accessories: Full-size unit, not less than **10 inches (250 mm)** long.

F. Product Schedule: For roller shades.[**Use same designations indicated on Drawings.**]

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of shadeband material.

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- C. Product Test Reports: For each type of shadeband material, for tests performed by a **qualified testing agency**.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, electric operation and to set quality standards for fabrication and installation. Furnish and install one roller shade at Media Center and one roller shade at typical Classroom window.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain roller shades from single source from single manufacturer.

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2.2 MOTOR-OPERATED, SINGLE-ROLLER SHADES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Draper Inc.
 2. Hunter Douglas Contract.
 3. Levolor.
 4. MechoShade Systems, Inc.
- B. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Electric Motor: [**Manufacturer's standard**] tubular, enclosed in roller.
 - a. Electrical Characteristics: As selected by Manufacturer.
 - b. Maximum Total Shade Width: **As required to operate roller shades indicated.**
 - c. Maximum Shade Drop: Full drop at all locations.
 - d. Maximum Weight Capacity: **As required to operate roller shades indicated.**
 3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for **recessed** mounting. Provide the following for remote-control activation of shades:
 - a. Group Control Station: **Momentary**-contact, three-position, rocket style, wall-switch-operated control station with open, close and center off functions for single-switch group control. (Media Center two groups – all other rooms 1 group.)
 4. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
 5. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
1. Roller Drive-End Location: Per Shop Drawings for maintenance access.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

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- E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.
- F. Shadebands:
 - 1. Shadeband Material: **Light-filtering fabric; Shear Weave 2410 – V2124 – 3%.**
 - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Type: Heat sealed hembar.
- G. Installation Accessories:
 - 1. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open.
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
 - 2. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
 - 3. Installation Accessories Color and Finish: **As selected from manufacturer's full range.**

2.3 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
 - 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than **1:4**, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, **locations of connections to building electrical system**, and other conditions affecting performance of the Work.

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- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.
- C. Roller Shade Locations: At exterior storefront in all spaces except corridors, entrances and stairs and at Media Center curtain walls.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 122413