CENTRAL DNR FACILITIES BUILDING IMPROVEMENTS
SAUK, COLUMBIA & JUNEAU COUNTIES
DEPARTMENT OF NATURAL RESOURCES
STATEWIDE, WISCONSIN

TECHNICAL SPECIFICATIONS VOLUME 2 of 3
BID DOCUMENT

Division Project No. **24B2B**

OCTOBER 7, 2025

FOR
THE STATE OF WISCONSIN
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES DEVELOPMENT
STATE OF WISCONSIN ADMINISTRATION BUILDING - 7TH FLOOR
101 EAST WILSON STREET - P.O. BOX 7866
MADISON, WISCONSIN 53707

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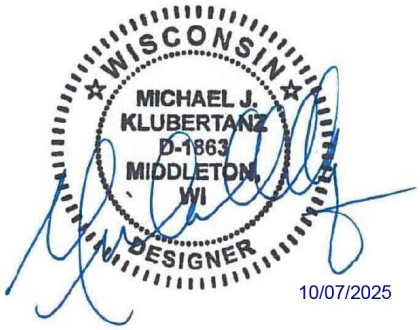

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SECTION 02 05 00
COMMON WORK RESULTS FOR EXISTING CONDITIONS
BASED ON DFD MASTER SPECIFICATION DATED 10/01/2012

P A R T 1 - G E N E R A L

SCOPE

This section provides information common to two or more technical site work specification sections or items that are of a general nature, and not included in other sections. This section applies to ALL site work, as applicable. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Referenced Organizations
- Referenced Documents
- Quality Assurance
- Safety
- Permits
- Construction Limits
- Submittals
- Off Site Storage
- Codes
- Certificates and Inspections

PART 2 - MATERIALS
- Barricades, Signs, and Warning Devices
- Temporary Plastic Barrier Fencing

PART 3 - EXECUTION
- Maintenance of Site and Building Access/Egress
- Continuity of Existing Traffic/Parking and Traffic Control
- Protection and Continuity of Existing Utilities
- Protection of Existing Work and Facilities
- Stormwater/Excavation Water Management

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

REFERENCED ORGANIZATIONS

Applicable provisions of Division 1 shall govern all work under this section.

Abbreviations of organizations referenced in these specifications are as follows:

AASHTO	American Association of State Highway and Transportation Officials
ACPA	American Concrete Pipe Association
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
FHA	Federal Highway Administration
EPA	Environmental Protection Agency
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association

NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
STI	Steel Tank Institute
UL	Underwriters Laboratories Inc.
WDNR	State of Wisconsin Department of Natural Resources
WISDOT	State of Wisconsin Department of Transportation

REFERENCED DOCUMENTS

Where reference is made to the "SSHSC", it shall mean the pertinent sections of the State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications. Where reference is made to the "SSSWC", it shall mean pertinent sections of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition. Where reference is made to the "BMPH", it shall mean the Wisconsin Construction Site Best Management Practice Handbook, current edition as published by the WDNR. Method of measurement and basis of payment sections in referenced documents shall not apply.

QUALITY ASSURANCE

Provide materials and products as required by individual specification sections. Refer to Section GC - General Conditions of the Contract regarding substitutions.

Provide quality assurance testing and reporting as required by individual specification sections.

SAFETY

Contractor is solely responsible for worksite safety.

Perform all work in accordance with applicable OSHA, state and local safety standards.

Contact Diggers Hotline at 1-800-242-8511 in accordance with statutory requirements. Request that non-member utilities and private utilities be located by the appropriate parties.

PERMITS

Unless otherwise noted in the Contract Documents, Contractor shall be responsible for obtaining and paying for all permits necessary to complete the work.

CONSTRUCTION LIMITS

Construction Limits are indicated on the drawings. In the absence of such a designation on the drawings, confine work to the minimum area reasonably necessary to undertake the work as determined by the DFD Construction Representative. In no case shall construction activities extend beyond state property lines or construction easements.

The Contractor shall restore all disturbed areas in accordance with the drawings and specifications. If plans and specifications do not address restoration of specific areas, these areas will be restored to pre-construction conditions as approved by the DFD Construction Representative.

Coordinate work under this project with work by Owner and other contractors on the site.

SUBMITTALS

Refer also to Section GC - General Conditions of the Contract and Division 1.

Submit manufacturer's shop drawings, product data, samples, substitutions and operation and maintenance (O&M) data for approval as required by individual specification sections.

Unless otherwise noted, provide 6 copies of each submittal. Submit to project architect/engineer (A/E) unless otherwise directed by DFD Construction Representative at the Pre-Construction Meeting.

OFF SITE STORAGE
Refer to Division 1.

In general, the payments for materials stored off site will only be considered in instances where there is limited space available for storage on the site. Prior approval by the DFD Construction Representative, together with the execution of a Storage Agreement will be required.

CODES
Comply with the requirements of all applicable, local, state and federal codes.

CERTIFICATIONS AND INSPECTIONS
Refer to Section GC - General Conditions.

Obtain and pay for all required sampling, testing, inspections, and certifications except those expressly listed as provided by the A/E or other third party in the Contract Documents. Deliver originals of certificates and documents to the DFD Construction Representative w/I 3 days; provide copies to the A/E. Include copies of the certifications and documents in the O&M Manual.

P A R T 2 - M A T E R I A L S

BARRICADES, SIGNS, AND WARNING DEVICES
Traffic barricades, traffic signs, and warning devices shall meet the requirements of applicable OSHA standards and the FHA Manual of Uniform Traffic Control Devices (MUTCD).

TEMPORARY PLASTIC BARRIER FENCING
UV stabilized high-density polyethylene barrier fence free of holes tears and other defects. Provide 4' tall fence in diamond or rectangular pattern. Fencing shall be "safety orange" color, unless otherwise noted.

Posts for temporary plastic barrier fencing shall be 5' tall, minimum 12 gauge, painted metal posts.

P A R T 3 - E X E C U T I O N

MAINTENANCE OF SITE AND BUILDING ACCESS/EGRESS
Unless otherwise shown or directed, maintain existing access and egress to the facility throughout construction. Maintain ANSI A117 compliant access for disabled persons, delivery access, emergency vehicle access, and emergency egress. Do not interrupt access and egress without prior written approval from the DFD Construction Representative.

CONTINUITY OF EXISTING TRAFFIC/PARKING AND TRAFFIC CONTROL
Refer also to Section GR - General Requirements.

Do not interrupt or change existing traffic, delivery, or parking without prior written approval from the DFD Construction Representative. When interruption is required, coordinate schedule with the Owner agency to minimize disruptions. When working in public right-of-way, obtain all necessary approvals and permits from applicable municipalities and WISDOT.

When Contractor's activities impede or obstruct traffic flow, Contractor shall provide traffic control devices, signs and flaggers in accordance with other Contract Documents and the current version of the MUTCD, or as shown on the Drawings.

PROTECTION AND CONTINUITY OF EXISTING UTILITIES
Verify the locations of any water, drainage, gas, sewer, electric, drainage, gas, sewer, electric, telephone/communication, fuel, steam lines or other utilities and site features which may be encountered in

any excavations or other sitework. All lines shall be properly underpinned and supported to avoid disruption of service.

Do not interrupt or change existing utilities without prior written approval from the DFD Construction Representative, affected utilities and users. Notify all users impacted by outages a minimum of 48 hours in advance of outage. Notification shall be provided in writing and describe the nature and duration of outages and provide the name and number of Contractor's foreman or other contact.

Any service connections encountered which are to be removed shall be cut off at the limits of the excavation and capped in accordance with the requirements of applicable codes and any specifications governing such removals.

PROTECTION OF EXISTING WORK AND FACILITIES

Verify the locations of, and protect, any signs, paved surfaces, buildings, structures, landscaping, streetlights, utilities, and all other such facilities that may be encountered or interfered with during the progress of the work. Take measures necessary to safeguard all existing work and facilities that are outside the limits of the work or items that are within the construction limits but are intended to remain. Report any damage to existing facilities to the DFD Construction Representative immediately. Correct and pay for all damages.

STORMWATER/EXCAVATION WATER MANAGEMENT

Control grading around structures, pitch ground to prevent water running into excavated areas.

Pits, trenches within building lines and other excavations shall be maintained free of water.

Provide trenching, pumping, other facilities required.

Notify Architect/Engineer if springs or running water are encountered in excavation; provide discharge by trenches, drains, pumping to point outside of excavation. Provide information to Architect/Engineer of points and areas that water will be discharged. At the Engineer's option, the Contractor shall drain the spring to the storm sewer system by the use of field tile.

Be responsible for control measures to prevent damage from flooding, erosion, and sedimentation to on-site and off-site areas.

END OF SECTION

SECTION 02 41 13
DEMOLITION
BASED ON DFD MASTER SPECIFICATION DATED 9/17/2014

P A R T 1 - G E N E R A L

SCOPE

The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to provide for the demolition of site work and such features as required in these specifications and on the drawings. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Submittals
- Record Drawings
- Safety
- Permits
- Disconnection of Services
- Removal/Salvaging of Items

PART 2 - MATERIALS
- Equipment

PART 3 - EXECUTION
- Protection of Existing Work and Facilities
- Demolition
- Building Demolition
- Transportation and Disposal of Demolition Waste

RELATED WORK

Applicable provisions of the General Conditions and Division 1 shall govern work under this section.

Section 02 05 00 – Common Work Results for Existing Conditions

SUBMITTALS

For utilities or other services requiring removal or abandonment in-place, submit materials documenting completion of such work.

Submit record drawings.

Submit copies of records documenting recycling or disposal of demolition materials from the site.

RECORD DRAWINGS

Maintain record drawings showing actual locations of utilities and other features encountered, and any deviations from the original design. Show actual limits of removal and demolition.

SAFETY

Verify that all gas and electrical utilities have been abandoned or disconnected and associated hazards mitigated, prior to beginning any demolition.

Take all necessary precautions while dismantling piping containing gas, gasoline, oil or other explosive or toxic fluids or gases. Purge lines and contain materials in accordance with all applicable regulations. Store such piping outdoors until fumes are removed.

Maintain a clean and orderly site. Remove debris at end of each workday.

Burning of debris is not permitted.

If hazardous materials are not anticipated, but encountered, terminate operations and contact the DFD Construction Representative immediately. Follow all applicable local, state and federal regulations pertaining to hazardous materials.

PERMITS

Unless otherwise noted, Contractor shall be responsible for obtaining and paying for all permits necessary to complete demolition work.

If necessary, file and maintain Notification of Demolition and/or Renovation and Application for Permit Exemption (WDNR Form 4500-113) in accordance with the Wisconsin Administrative Code Chapter NR447.

DISCONNECTION OF SERVICES

Prior to starting removal and/or demolition operations be responsible and coordinate disconnection of all existing utilities, communication systems, alarm systems and other services.

Disconnect all services in manner which insures continued operation in facilities not scheduled for demolition.

Disconnect all services in manner which allows for future connection to that service.

Disconnect services to equipment at unions, flanges, valves, or fittings wherever possible.

REMOVAL/SALVAGING OF ITEMS

Carefully remove all items that are scheduled to be salvaged.

Secure salvaged items to allow for future movement; provide pallets, skids and other devices as necessary. Secure all loose parts.

Provide crates, padding, tarps and other measures necessary to protect salvaged items during storage. Store items in secure location, safe from vandalism, weather, dust and other adverse elements.

Where salvaged items are indicated to be turned over to Owner, deliver to location on property where designated by Owner.
Where indicated to be incorporated into new work, store the salvaged item in secure location until trade responsible for re-installation mobilizes his equipment and storage facilities to the site, or otherwise accepts responsibility for the salvaged item.

P A R T 2 - M A T E R I A L S

EQUIPMENT

Use Contractor's normal equipment for demolition purposes and which meets all safety requirements imposed on such equipment.

P A R T 3- E X E C U T I 0 N

PROTECTION OF EXISTING WORK AND FACILITIES

Take all measures necessary to safeguard all existing work and facilities which are outside the limits of the work.

Verify the locations of, and protect, any buildings, structures, utilities, paved surfaces, signs, streetlights, utilities, landscaping and all other such facilities that are intended to remain or be salvaged.

Make such explorations and probes as necessary to ascertain any required protection measures that shall be used before proceeding with demolition.

Provide and maintain adequate catch platforms, warning lights, barricades, guards, weather protection, dust protection, fences, planking, bracing, shoring, piling, signs, and other items required for proper protection. Provide protection for workmen, public, adjacent construction and occupants of existing building(s).

Report damage of any facilities or items scheduled for salvaging to the DFD Construction Representative.

Repair or replace any damaged facilities that are not scheduled for demolition.

Explosives shall not be used for demolition.
Keep streets, walks and all other adjacent paved areas clean and swept clear of dirt, mud and debris deposited as a result of this operation.

Protect surrounding area from dust. Control rodents, and other vermin associated with demolition operations.

DEMOLITION
Remove all equipment, fixtures and other materials scheduled for salvage prior to beginning demolition operations.

Demolish and remove all buildings and structures scheduled for demolition as shown on the plans.

Abandon gas, electric and communication utilities in accordance with local utility company requirements, or applicable substantive requirements if considered private.

Carry out vehicle loading as necessary within the project boundaries or as defined or indicated on the drawings, but not in locations that block vehicular traffic on the streets or pedestrian traffic on adjacent public walks.

Dismantle structure components in an orderly manner to provide complete stability of the structure at all times. Provide bracing and shoring where necessary to avoid premature collapse of structure.

Conduct demolition operations and the removal of rubbish and debris in such a way that a minimum of nuisance dust is caused. Constantly sprinkle rubbish and debris with water if necessary to keep nuisance dust to a minimum.

Where necessary to prevent collapse of any construction, install temporary shores, underpinning, struts or bracing. Do not commence demolition work until all temporary construction is complete.

BUILDING DEMOLITION
Proceed with demolition in a systematic manner, from top of structure to ground. Complete demolition work above each floor or tier before disturbing supporting members on lower levels.

Neatly saw or cut joints at the limits of removal; whenever possible, locate cutes at existing joints.

Patch or repair any damaged surfaces or structural members at the limits of removal.

Remove structural framing members and lower to ground by hoists, derricks or other suitable means.

Remove all existing flooring in accordance with plans. Leave exposed existing sub flooring or surface in suitable condition for receiving new finished flooring.

Locate demolition equipment and remove structure so as to not impose excessive loads to supporting walls, floors or framing.

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

TRANSPORTATION AND DISPOSAL OF DEMOLITION WASTE

Transport and dispose all demolition waste in accordance with local, state, and federal guidelines.

Whenever possible, or otherwise required by the Contract Documents, recycle demolition waste.

Demolition waste shall be disposed of at a landfill or dumpsite designed and approved to accept the given waste.

Maintain records documenting recycling and disposal of demolition waste. Record description of material, date removed, quantity removed, method of transport and recycling/disposal destination.

END OF SECTION

SECTION 03 08 00
COMMISSIONING OF CONCRETE
BASED ON DFD MASTER SPECIFICATION DATED 03/01/14

P A R T 1 - G E N E R A L

SCOPE
This section includes commissioning forms for construction verification and functional performance testing. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Reference
- Submittals

PART 2 - PRODUCTS
- (Not Used)

PART 3 - EXECUTION
- Commissioning Forms
- CV-03 30 00 Cast in Place Concrete
- CV-03 30 10 Cast in Place Concrete for Site Work

RELATED WORK
Section 01 91 01 – Commissioning Process

REFERENCE
Applicable provisions of Division 1 shall govern work under this section.

SUBMITTALS
Reference the General Conditions of the Contract for submittal requirements.

Reference Section 01 91 01 Commissioning Process for Construction Verification Checklist and Functional Performance Test submittal requirements.

P A R T 2 – P RO D U C T S

(Not Used)

P A R T 3 – E X E C U T I O N

COMMISSIONING FORMS
Commissioning forms are to be filled in as work progresses by the individuals responsible for installation and shall be completed for each installation phase.

Provide a description of the work completed since the last entry, the percentage of the total work completed for the system for that area and the step of installation or finalization.

Circle Yes or No for each commissioning form item. If the information requested for an item does not apply to the given stage of installation for the system, list it as “N/A”. Explain all discrepancies, negative responses or N/A responses in the negative responses section.

Once the work is 100% complete and the responses to each item are complete and resolved for a given commissioning forms group, mark as complete, initial and date in the spaces provided.

Provide copies of the commissioning forms to the commissioning agent 2 days prior to construction progress meetings.

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CV-03 30 00 – Cast in Place Concrete

Identification/Tag: _____
Location:_____

A) PRE-POURING CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below) 1)	2)
				YES NO	YES NO
				YES NO	YES NO
				YES NO	YES NO
				YES NO	YES NO
				YES NO	YES NO
				YES NO	YES NO
				YES NO	YES NO
				YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS: _____	DATE: _____

Question Details

1) Shop drawings, product data and samples have been submitted and approved.
2) All materials are as designed, specified, and approved.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

B) POURING CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)									
				1)	2)	3)	4)	5)	6)	7)	8)	9)	10)
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS:		______________			DATE:		______________		

Question Details

1) Reinforcement sized correctly, placed as designed and supported properly.
2) Forms are clean and are placed, plumb, true and square.
3) Forms are properly shored and braced and maintained in accordance with ACI 301 to support loads that might be applied until concrete structure can support such loads.
4) Anchor bolts and other embedded items are accurately located to elevations required.
5) Granular fill is of proper gradation and base is placed level, compacted and true.
6) Level of compaction is verified by a qualified testing agency and approved.
7) Concrete is placed in suitable weather and temperature conditions. If required, cold/hot weather placement requirements are performed in accordance with ACI.
8) Qualified testing agency has verified proper slump, air content, water cement ratio and air temperature is as specified at each frequency specified.
9) Compressive test cylinders were cast at time of placement and compressive strength testing by qualified testing agency has been performed, in the specified intervals and the compressive-strength test values are at or above those specified.
10) Construction joints are properly located and, for slabs on grade, contraction joints are installed or sawed in the appropriate time interval, in locations indicated at the proper width and depth.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

C) POST POURING CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below) 1)	2)	3)
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS: _____		DATE: _____

Question Details

1) Type of finish specified has been applied and approved by architect.
2) Curing measures were undertaken and the concrete is properly cured as specified.
3) Defective areas including but not limited to spalls, pop-outs, honeycombs, rock pockets and cracks are properly repaired and patched.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

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CV-03 30 10 – Cast in Place Concrete for Site Work

Identification/Tag: _____
Location:_____

A) PRE-POURING CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)		
				1)	2)	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
❑ CHECKLIST GROUP COMPLETE				INITIALS:	_____	DATE: _____

Question Details

1) Shop drawings, product data and samples have been submitted and approved.
2) All materials are as designed, specified, and approved.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

B) POURING CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)									
				1)	2)	3)	4)	5)	6)	7)	8)	9)	
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	
❑ CHECKLIST GROUP COMPLETE				INITIALS:	_______________				DATE:	_______________			

Question Details

1) Reinforcement sized correctly, placed as designed and supported properly.
2) Forms are clean and are placed, plumb, true and square.
3) Forms are properly shored and braced and maintained in accordance with ACI 301 to support loads that might be applied until concrete structure can support such loads.
4) Embedded dowels are accurately located to elevations required.
5) Granular fill is of proper gradation and base is placed level, compacted and true.
6) Level of compaction is verified by a qualified testing agency and approved.
7) Concrete is placed in suitable weather and temperature conditions. If required, cold/hot weather placement requirements are performed in accordance with ACI.
8) Qualified testing agency has verified proper slump, air content, water cement ratio and air temperature is as specified at each frequency specified.
9) Compressive test cylinders were cast at time of placement and compressive strength testing by qualified testing agency has been performed, in the specified intervals and the compressive-strength test values are at or above those specified.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

C) POST POURING CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below) 1)	2)	3)
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS: _____		DATE: _____

Question Details

1) Type of finish specified has been applied and approved by architect.
2) Curing measures were undertaken and the concrete is properly cured as specified.
3) Defective areas including but not limited to spalls, pop-outs, honeycombs, rock pockets and cracks are properly repaired and patched.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

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SECTION 03 10 00
CONCRETE FORMING AND ACCESSORIES
BASED ON DFD MASTER SPECIFCATION DATED 9-10-2024

PART 1 - GENERAL

SCOPE

Section includes concrete forming and accessories, including form-facing material for cast-in-place concrete, form liners, insulating concrete forms, and shoring, bracing, and anchoring. The work under this section consists of providing all work, materials, labor equipment and supervision necessary to provide concrete forming as required in these specifications and the drawings.

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Related work specified elsewhere:

03 08 00 – Commissioning of Concrete

03 20 00 – Concrete Reinforcing

03 30 00 – Cast-In-Place Concrete

03 30 10 – Cast-In-Place Concrete for Site Work

REFERENCES

Incorporated Guides and References

American Concrete Institute (ACI):

ACI 347 – Guide to Formwork for Concrete.

Specifications

American Concrete Institute (ACI):

ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.
ACI 301 - Specifications for Structural Concrete.
ACI 303.1 – Specification for Cast-In-Place Architectural Concrete.
ACI 306.1 – Specification for Cold Weather Concreting.
ACI 308.1 – Specification for Curing Concrete.
ACI 315 - Details and Detailing of Concrete Reinforcement.
ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
ACI 347R - Guide to Formwork for Concrete

ASTM International (ASTM):

ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C595 - Standard Specification for Blended Hydraulic Cements
ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection
ASTM E2634 - Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems

PS1 – Construction and Industrial Plywood

DEFINITIONS

Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.

Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

PRE-INSTALLATION MEETINGS

Preinstallation Conference: Conduct conference at the site of the first concrete work.

Review the following:

Special inspection and testing and inspecting agency procedures for field quality control.
Construction, movement, contraction, and isolation joints.
Forms and form-removal limitations.
Shoring and reshoring procedures.
Anchor rod and anchorage device installation tolerances.

SUBMITTALS

Product Data: For each of the following:

Exposed surface form-facing material.
Concealed surface form-facing material.
Forms for cylindrical columns.
Pan-type forms.
Void forms.
Form liners.
Insulating concrete forms.
Form ties.
Waterstops.
Form-release agent.

Material Certificates: For each of the following, signed by the manufacturer:

Form Materials and form-release agents.

Qualification Data: For testing and inspection agency.

Research Reports: For insulating concrete forms indicating compliance with International Code Council Acceptance Criteria AC353.

Field quality-control reports.

Minutes of preinstallation conference.

QUALITY ASSURANCE

Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

Testing and Inspection Agency Qualifications: An independent agency, acceptable to the AE and DFD, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

PART 2 - PRODUCTS

PERFORMANCE REQUIREMENTS

Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."

Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

Design, engineer, erect, shore, brace, and maintain insulating concrete forms in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

Design cross ties to transfer the effects of the following loads to the cast-in-place concrete core:

FORM-FACING MATERIALS

As-Cast Surface Form-Facing Material:

Provide continuous, true, and smooth concrete surfaces.

Furnish in largest practicable sizes to minimize number of joints.

Acceptable Materials: As required to comply with Surface Finish designations specified in Section 03 30 00 "Cast-In-Place Concrete", and as follows:

Plywood, metal, or other approved panel materials.

RELATED MATERIALS

Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

Formulate form-release agent with rust inhibitor for steel form-facing materials.
Form release agent for form liners shall be acceptable to form liner manufacturer.

PART 3 - EXECUTION

FORMWORK INSTALLATION

Work shall conform to ACI 117 and ACI 301, except as modified requirements of these Contract Documents.

Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 03 30 00 "Cast-In-Place Concrete" for as-cast finishes.

Limit concrete surface irregularities as follows:

Surface Finish-1.0: ACI 117 Class D, 1 inch.
Surface Finish-2.0: ACI 117 Class C, 1/2 inch.
Surface Finish-3.0: ACI 117 Class B, 1/4 inch.
Surface Finish-4.0: ACI 117 Class A, 1/8 inch.

Construct forms tight enough to prevent loss of concrete mortar.

Minimize joints.
Exposed Concrete: Symmetrically align joints in forms.

Construct removable forms for easy removal without hammering or prying against concrete surfaces.

Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
Install keyways, reglets, recesses, and other accessories, for easy removal.

Do not use rust-stained, steel, form-facing material.

Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

Construction and Movement Joints:

Construct joints true to line with faces perpendicular to surface plane of concrete.

Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

Contraction (Control) Joints in Slabs-on-Ground: Construct contraction joints in slabs-on-ground to form panels of patterns as shown. Use inserts 1/4-inch-wide x 1/4 of slab depth, unless otherwise indicated.

Form contraction joints by inserting premolded hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. After concrete has cured, remove inserts and clean groove of loose debris.

Contraction joints may be formed by saw cuts as soon after slab finishing as possible without dislodging aggregate.

Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

REMOVING AND REUSING FORMS

Formwork Not Supporting Concrete: Formwork not supporting concrete such as sides of beams, walls, columns and similar parts of the structure, may be removed after cumulatively (not necessarily consecutively) curing at a concrete temperature not less than 50°F for 24 hours after placing concrete, provided the concrete is sufficiently hard so as not to be damaged by form removal operations and provided curing and protection operations are maintained for the remainder of the curing period. If ambient air temperatures remain below 50°F, if retarding agents are used, or if Type II and Type V Portland cement is used, then this specified minimum period should be increased as required to safely remove the forms without damage to the concrete. Where such forms also support formwork for slab or beam soffits, the removal times of the latter shall govern.

Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

Records of Weather Conditions:

The GPC shall be responsible for keeping records of weather conditions to be used in the decision on when to remove forms

Forms reused in the work shall be repaired and cleaned.

Split, frayed, delaminated, or otherwise damaged facing material will not be acceptable for exposed surfaces.

Forms intended for successive concrete placement shall have surfaces cleaned, fins and laitance removed, and align and secure joints to avoid surface offsets.

New form coating compound shall be applied to reused forms. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions.

Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed.

Apply in compliance with manufacturer's instructions. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

Do not use patched forms for exposed concrete surfaces unless approved by Architect.

FIELD QUALITY CONTROL

Special Inspections: Engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

Inspections:

Inspect formwork for shape, location, and dimensions of the concrete member being formed.

Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

Where special formed surface finish requirements are required, verify forming materials comply with requirements.

Adequacy of formwork, shoring, and reshoring to support vertical and lateral loads during construction is sole responsibility of GPC.

END OF SECTION 03 10 00

SECTION 03 20 00
CONCRETE REINFORCING
BASED ON DFD MASTER SPECIFICATION DATED 9/10/2024

PART 1 - GENERAL

SCOPE

Section includes concrete reinforcing including steel reinforcement bars and welded-wire reinforcement. The work under this section consists of providing all work, materials, labor equipment and supervision necessary to provide concrete reinforcing as required in these specifications and the drawings.

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Related work specified elsewhere:

03 08 00 – Commissioning of Concrete

03 10 00 – Concrete Forming and Accessories

03 30 00 – Cast-In-Place Concrete

03 30 10 – Cast-In-Place Concrete for Site Work

REFERENCES

Specifications

American Concrete Institute (ACI):

- ACI SP-066 – ACI Detailing Manual
- ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.
- ACI 315 - Standards on Details and Detailing of Concrete Reinforcement.
- ACI 318 - Building Code Requirements for Structural Concrete and Commentary.
- ACI 440.1R-15 (2015) “Guide for the Design and Construction of Structural Concrete Reinforced with Fiber-Reinforced Polymer Bars”, ACI Committee 440, American Concrete Institute

ACI 440.3R-12 (2012) “Guide Test Methods for Fiber-Reinforced Polymers (FRPs) for Reinforcing or Strengthening Concrete Structures” ACI Committee 440, American Concrete Institute
ACI 440.4R-04 (Reapproved 2011) “Prestressing Concrete Structures with FRP Tendons” ACI Committee 440, American Concrete Institute
ACI 440R-07 (2007) “Report on Fiber-Reinforced Polymer (FRP) Reinforcement for Concrete Structures,” ACI Committee 440, American Concrete Institute
ACI 440.5-08 (2008) “Specification for Construction with Fiber-Reinforced Polymer Reinforcing Bar”, ACI Committee 440, American Concrete Institute

ASTM International (ASTM):

ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes
ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
ASTM A775 – Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A884 – Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
ASTM A934 – Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
ASTM A955 - Standard Specification for Deformed and Plain Stainless Steel Bars for Concrete Reinforcement
ASTM A1022 - Standard Specification for Deformed and Plain Stainless Steel Wire and Welded Wire for Concrete Reinforcement
ASTM A1055 - Standard Specification for Zinc and Epoxy Dual-Coated Steel Reinforcing Bars
ASTM A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM D3963 – Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.
ASTM D7957 (2017) “Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement”, American Society for Testing and Materials (ASTM International)

American Welding Society (AWS)

AWS D1.4 – Structural Welding Code – Reinforcing Steel

CRSI – Manual of Standard Practice
CRSI – Placing Reinforcing Bars

PREINSTALLATION MEETINGS

Preinstallation Conference: Conduct conference at Devil’s Lake State Park.

Review the following:

Special inspection and testing and inspecting agency procedures for field quality control.
Construction contraction and isolation joints.
Steel-reinforcement installation.

SUBMITTALS

Product Data: For each of the following:

Each type of steel reinforcement

Material Test Reports: For the following, from a qualified testing agency:

Steel Reinforcement:

For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.

Field quality-control reports.

Minutes of preinstallation conference.

QUALITY ASSURANCE

Testing Agency Qualifications: An independent agency, acceptable to the AE and DFD, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

DELIVERY, STORAGE, AND HANDLING

Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.

Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

STEEL REINFORCEMENT

Reinforcing Bars: ASTM A615/A615M, **Grade 60**, deformed.

Epoxy-Coated Reinforcing Bars:

Steel Bars: ASTM A615/A615M, **Grade 60**, deformed bars.

Epoxy Coating:ASTM A934/A934M with less than 2 percent damaged coating in each 12-inch bar length.

REINFORCEMENT ACCESSORIES

Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.

For dual-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.

For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

For stainless steel reinforcement, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.

Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

Finish: Plain**.**

FABRICATING REINFORCEMENT
Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

PREPARATION
Protection of In-Place Conditions:

Do not cut or puncture vapor retarder.

Repair damage and reseal vapor retarder before placing concrete.

Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

STEEL REINFORCEMENT INSTALLATION
Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

Accurately position, support, and secure reinforcement against displacement.

Locate and support reinforcement with bar supports to maintain minimum concrete cover.

Do not tack weld crossing reinforcing bars.

Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

Provide concrete coverage in accordance with ACI 318.

Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

Splices: Lap splices as indicated on Drawings.

Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.

Stagger splices in accordance with ACI 318.

Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.

Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

JOINTS

Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

Place joints perpendicular to main reinforcement.

Continue reinforcement across construction joints unless otherwise indicated.

Do not continue reinforcement through sides of strip placements of floors and slabs.

Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

INSTALLATION TOLERANCES

Comply with ACI 117 and tolerances listed below.

Reinforcement location

Placement of non-prestressed reinforcement
When member depth (or thickness) is 4 in. or less
.....±1/4 in.

When member depth (or thickness) is over 4 in. and not over 12 in.
.....±3/8 in.

When member depth (or thickness) is over 12 in.
.....±1/2 in.

Concrete cover measured perpendicular to concrete surface
When member depth (or thickness) is 12 in. or less
..... –3/8 in.

When member depth (or thickness) is over 12 in.
..... –1/2 in.

Reduction in cover shall not exceed 1/3 the specified concrete cover.

Reduction in cover to formed soffits shall not exceed 1/4 in.

Vertical deviation for slab-on-ground reinforcement
..... ±3/4 in.

Clearance between reinforcement or between reinforcement and embedment
One-quarter specified distance not to exceed
.....±1 in.

Distance between reinforcement shall not be less than the greater of the bar diameter or 1 in. for unbundled bars.

For bundled bars, the distance between bundles shall not be less than the greater of 1 in. or a bar diameter derived from the equivalent total area of all bars in the bundle.

Spacing of non-prestressed reinforcement, measured along a line parallel to the specified spacing Except as noted below.....±3 in.

Stirrups, the lesser of ±3 in. or ±1 in. per ft of beam depth

Ties, the lesser of ±3 in. or ±1 in. per ft of least column width

The total number of bars shall not be fewer than that specified.
Placement of prestressing reinforcement or prestressing ducts, measured from form surface

Horizontal deviation
Element depth (or thickness) 24 in. or less .....±1/2 in.
Element depth (or thickness) over 24 in. ..... ±1 in.

Vertical deviation
Element depth (or thickness) 8 in. or less ..... ±1/4 in.
Element depth (or thickness) over 8 in. and not over 24 in.
..... ±3/8 in.
Element depth (or thickness) more than 24 in..... ±1/2 in.

Longitudinal location of bends in bars and ends of bars

At discontinuous ends of corbels and brackets ... ±1/2 in.
At discontinuous ends of other elements ..... ±1 in.
At other locations..... ±2 in.

Embedded length of bars and length of bar laps
No. 3 through 11 bar sizes ..... –1 in.
No. 14 and 18 bar sizes..... –2 in.

Bearing plate for prestressing tendons, deviation from specified plane
..... ±1/4 in. per ft, but not less than ±1/8 in.

FIELD QUALITY CONTROL
Special Inspections: Engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

Inspections:
Steel-reinforcement placement.
Steel-reinforcement mechanical splice couplers.
Steel-reinforcement welding.
FRP-reinforcement placement.

Manufacturer's Inspections: Engage manufacturer of structural thermal break insulated connection system to inspect completed installations prior to placement of concrete, and to provide written report that installation complies with manufacturer's written instructions.

END OF SECTION 03 20 00

SECTION 03 30 00
CAST-IN-PLACE CONCRETE
BASED ON DFD MASTER SPECIFICATION DATED 9/10/2024
PART 1 - GENERAL

SCOPE

Section includes cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes. The work under this section consists of providing all work, materials, labor equipment and supervision necessary to provide cast in-place concrete as required in these specifications and the drawings.

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

The basis for designing concrete mixtures and demonstrating compliance with carbon budget targets shall be in accordance with:

National Ready Mixed Concrete Association (NRMCA) Cradle-to-Gate Life Cycle Assessment of Ready-Mixed Concrete Manufactured by NRMCA Members – Version 3 (or later).

National Ready Mixed Concrete Association, NRMCA Member Industry Average EPD for Ready Mixed Concrete – Version 3 (or later).

Related work specified elsewhere:

03 08 00 – Commissioning of Concrete

03 10 00 – Concrete Forming and Accessories

03 20 00 – Concrete Reinforcing

03 30 10 – Cast-In-Place Concrete for Site Work

REFERENCES

Incorporated Guides and References

American Concrete Institute (ACI):

ACI 302.1R – Guide for Concrete Floor and Slab Construction.
ACI 305R - Hot Weather Concreting.

Specifications

American Concrete Institute (ACI):

ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.
ACI 301 - Specifications for Structural Concrete.
ACI 303.1 – Specification for Cast-In-Place Architectural Concrete.
ACI 306.1 – Specification for Cold Weather Concreting.
ACI 308.1 – Specification for Curing Concrete.
ACI 315 - Details and Detailing of Concrete Reinforcement.
ACI 318 - Building Code Requirements for Structural Concrete and Commentary.

ASTM International (ASTM):

ASTM A820 – Standard Specification for Steel Fibers for Fiber-Reinforced Concrete.
ASTM C33 – Standard Specification for Concrete Aggregates.
ASTM C94 – Standard Specification for Ready-Mixed Concrete.
ASTM C150 – Standard Specification for Portland Cement.
ASTM C156 – Standard Test Method for Water Loss (From a Mortar Specimen) Through Liquid Membrane-Forming Curing Compounds for Concrete.
ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
ASTM C595 – Standard Specification for Blended Hydraulic Cements
ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use in Concrete.
ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars.
ASTM C1059 – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.
ASTM C1240 – Standard Specification for Silica Fume Used in Cementitious Mixtures.
ASTM C1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
ASTM E1745 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

DEFINITIONS

Cementitious Materials: Materials that have cementing value if used in grout, mortar, or concrete, including Portland cement, blended hydraulic cements, expansive cement, fly ash, raw or calcined natural pozzolan, ground glass pozzolan, slag cement, and silica fume

Water/Cement Ratio (w/cm): Ratio of mass of water, excluding that absorbed by aggregate, to the mass of cementitious materials in a mixture, stated as a decimal

Concrete Category and Classes:

Freezing and Thawing (F) Category:

F0: Concrete not exposed to freezing and thawing cycles
F1: Concrete exposed to freezing and thawing cycles with limited exposure to water
F2: Concrete exposed to freezing and thawing cycles with frequent exposure to water
F3: Concrete exposed to freezing and thawing exposure to deicing chemicals.

Sulfate (S) Category. Water Soluble Sulfate ($SO4^{2-}$) in soil, percent by mass:

S0: SO42 < 0.10
S1: 0.10 ≤ SO42 < 0.20
S2: 0.20 ≤ SO42 < 2.00
S3: SO42 > 2.0

In Contact with Water (W) Category:

W0: Concrete dry in service, Concrete in contact with water and low permeability in not required.
W1: Concrete in contact with water where low permeability is not required.
W2: Concrete in touch with water where low permeability is required.

Corrosion Protection of Reinforcement (C):

C0: Concrete dry or protected from moisture
C1: Concrete exposed to moisture but not to an external source of chlorides
C2: Concrete exposed to moisture and an external source of chlorides form deicing chemicals, sault, brackish water, seawater, or spray for the sources.

Aggregate Class Designations:

Severe Weather Regions:

1S: Footings, foundations, columns and beams not exposed to weather, interior floor slabs to be given coverings.
2S: Interior floors without coverings
3S: Foundation walls above grade, retaining walls, columns, slabs, and beams exposed to weather
4S: Pavements, driveways and curbs, walks, garage floors, exposed floors or waterfront structures, subject to frequent wetting.
5S: Exposed architectural concrete.

Cured Concrete: Concrete that has undergone the process of maintaining satisfactory temperature and moisture conditions. This allows the hydration of the cement and reaction of supplementary cementitious materials (SCMs), leading to improved strength and durability.

Curing Period: Duration of time in which continuous curing procedures are employed.

When Testing is not performed to determine the curing period, cure concrete for at least 7 days.

When strength basis testing is performed to determine curing period, maintain curing procedures until test results meet or exceed requirements. Concrete must reach a minimum of 70% of the required specified concrete strength.

Dry Concrete: The measure of concrete at 80% relative humidity at 40% of the concrete slab-on-ground depth.

Self-Consolidating Concrete (SCC): a highly workable concrete that can flow through densely reinforced or complex structural elements under its own weight and adequately fill voids without segregation or excessive bleeding without the need for vibration.

Floor Flatness Number, FF, flatness relates to the bumpiness of the floor: even, plane, homoloidal, free of undulation. For the purposes of this test method, flatness will be measured by calculating curvature value, q, between all 12-in. reading points separated by 24 in. The curvature value is the difference between successive elevation differences. The mean and standard deviation of all the curvature values for a given test section are then converted according to the equations in this test method to get the dimensionless FF Flatness Number.

Floor Levelness Number, FL, levelness describes the tilt or pitch of the slab: horizontal, normal to the direction of gravity. For the purposes of this test method, levelness will be measured by collecting elevation differences at points spaced 10 ft apart and that will be described by the FL Levelness number (dimensionless).

Floor Levelness, (FL), tolerances only apply to non-sloping slabs-on-grade and suspended slabs shored at time of testing. Floor Levelness tolerances shall not apply to slabs placed on unshored form surfaces, shored surfaces after removal of shores, or pitched slab surfaces per ACI 302.

Overall FF/FL numbers represent minimum values acceptable for all combined local floor test sections representing the specified floor finish area per ACI 302. D. Local FF/FL test areas shall be defined as follows per ACI 302.

Areas bounded by construction or control joints for slabs-on-ground.

Areas bounded by columns and/or wall lines for elevated structural slabs. No less than one-half bay size

PREINSTALLATION MEETINGS

Prior to submitting design mixtures, contractor shall hold a meeting to review detailed requirements for preparing final concrete design mixes and to establish procedures for placing, finishing, curing, and protecting concrete to meet required quality under anticipated conditions. Representatives of each entity directly concerned with cast-in-place concrete to attend, including the following. It is recommended that these meetings be scheduled at least 30 days prior to each major class of concrete placed. Multiple meetings may be required.

Architect
General Contractor/Construction Manager
Installer (Concrete subcontractor)
Independent testing agency

Review the following:

Concrete mixtures – specification and constructability requirements
Scheduling and details for placement
Contact information of responsible persons during placement
Placement procedures and rate of placement

Jobsite adjustments permitted and decision process
Cold and hot weather requirements
Concrete protection
Concrete inspection and field quality control
Testing frequency, sampling location,
Initial curing facilities and site access for strength test and other specimens
Field-cured cylinders curing and intent of results

Minutes of the meeting shall be recorded, typed, reproduced and distributed by the Contractor to all parties concerned within five working days of meeting. Minutes shall include a statement by admixture manufacturer(s) indicating that proposed mix design and placing can produce concrete quality required by this Section.

Contractor shall notify Architect at least 10 days prior to scheduled date of meeting.

SUBMITTALS

Product Data: For each of the following, if used for concrete mixtures.

Portland cement.
Fly ash.
Slag cement.
Blended hydraulic cement.
Silica fume.
Performance-based hydraulic cement
Natural or other pozzolanic materials
Mineral Fillers
Aggregates.
Admixtures.
Fiber reinforcement.
Vapor retarders.
Curing materials.
Joint fillers.
Repair materials.

Concrete Mixtures: For each concrete mixture, submit the following:

Mixture identification by class.

Type and source information on concrete materials proposed for use including:
- Cementitious Materials
- Aggregates
- Mineral Fillers
- Admixtures
- Water
- Fibers, and other additions.

Compressive strength, f'c, applicable for the class.

Required average compressive strength, f'cr, for each class of concrete.

Documentation of strength test records of similar class of concrete used to establish standard deviation in accordance with ACI 301, when test records exist.

Documentation of compliance with f'cr of proposed mixture(s) and test age

Strength of concrete at other specified ages

The applicable durability exposure classes for each class of concrete

w/cm of proposed concrete mixtures, when specified.

Nominal maximum aggregate size or size number (ASTM C33) of coarse aggregate

Target slump or slump flow

Air content of concrete assigned to Exposure Classes F1, F2, and F3

Density, if specified

Documentation of compliance with maximum limits on supplementary cementitious materials for concrete assigned to Exposure Class F3

Cementitious materials and documentation of tests or service for concrete assigned to Exposure Class S1, S2, and S3

Documentation on chloride content of concrete mixtures for conformance to limits in Exposure Class C – calculated total chloride or measured water-soluble chlorides by ASTM C1218/C1218M, expressed as a percentage of cementitious materials.

Documentation on alkali aggregate reactivity for concrete assigned to Exposure Class W1 or W2, as specified.

Intended placement method.

Equilibrium density of lightweight concrete and correlated density of fresh concrete, if specified

Intended placement method.

Documentation supporting other specified requirements of concrete mixtures.

Anticipated changes to concrete mixtures for anticipated routine variability of in materials, and changes in project conditions, weather, test results, or other circumstances that warrant adjustments.

Laboratory Test Reports – For evaluating concrete materials and mix design tests.
Field test records per ACI 301-10, Section 4.

Shop Drawings:

Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

Location of construction joints is subject to approval of the Architect.

Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

- Concrete Class designation.
- Location within Project.
- Exposure Class designation.
- Formed Surface Finish designation and final finish.
- Final finish for floors.
- Curing process.
- Floor treatment if any.

Qualification Information for the following:

Installer: Include copies of applicable ACI certificates.

Ready-mixed concrete manufacturer.

Testing agency retained by the contractor for field quality control: Include conformance to ASTM C1077 or ASTM E329 and copies of ACI certificates of testing technicians.

Concrete Mixture Certification for each class of concrete:

Signed and sealed by professional engineer licensed in the state of the project.

Documentation of test results indicating compliance with specified requirements for each concrete mixture

Identify characteristics of each mixture that will be used for quality assurance during construction.
Testing agency retained by the contractor for field quality control: Include conformance to ASTM C1077 or ASTM E329 and copies of ACI certificates of testing technicians.

Material Certificates: For each of the following, provided by the material supplier:

- Cementitious materials.
- Aggregates.
- Admixtures.
- Fiber reinforcement.
- Curing compounds.
- Floor and slab treatments.
- Bonding agents.
- Adhesives.
- Vapor retarders.
- Semirigid joint filler.
- Joint-filler strips.
- Repair materials.

Material Test Reports: For the following, from a qualified testing agency:

- Portland cement.
- Fly ash.
- Slag cement.
- Blended hydraulic cement.
- Silica fume.
- Performance-based hydraulic cement.
- Aggregates.
- Admixtures:
    - Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

Research Reports:

For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

Performance data for ASTM C494 Type S admixtures.

For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

Preconstruction Test Reports: For each mix design as specified.

Field quality-control reports.

Minutes of preinstallation conference.

QUALITY ASSURANCE

Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician or an ACI Concrete Flatwork Technician with experience installing and finishing concrete, incorporating permeability-reducing admixtures.

Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

Concrete shall be supplied from concrete plants with current certification under the NRMCA Certification of Ready Mixed Concrete Production Facilities, certification or approval by a state or highway agency or equivalent. Criteria of equivalent certification shall be included in the submittal.

Quality Control personnel with responsibility for concrete mixtures shall document qualifications demonstrating knowledge and experience with concrete technology and development of performance-based concrete mixtures. certified as an NRMCA Concrete Technologist Level 2, or equivalent. Details covered in equivalent certification program shall be documented in the submittal.

When requested, the manufacturer shall furnish a Quality Plan.

Documentation that the concrete supplier participated in supplying data to the NRMCA Cradle-to-Gate Life Cycle Assessment of Ready-Mixed Concrete.

Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

Personnel performing laboratory tests to be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor to be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

Testing Agency Qualifications: Independent testing agency complying with the requirements of ASTM C1077 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

Personnel performing field tests for acceptance shall be certified as ACI Concrete Field-Testing Technician Grade

Personnel conducting laboratory tests for acceptance shall be certified as ACI Concrete Strength Testing Technician or ACI Concrete Laboratory Testing Technician – Level I, or equivalent.

Test results for the purpose of acceptance shall be certified by a registered design professional employed with the Testing Agency

Field Quality-Control Testing Agency Qualifications: An independent agency**,** acceptable to the AE and DFD, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

Personnel conducting field tests to be qualified as an ACI Concrete Field-Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

Concrete In-Situ Relative Humidity and pH:

ASTM F2170-11 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs using In-Situ Probes.

ASTM F710-11 – Standard Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

Digital "Reader" and calibrated relative humidity sensors

Factory-calibrated "Smart Sensors" using Touch-n-Sense TM technology or similar testing equipment.

National Institute of Standards for Testing (NIST) – traceable factory calibration.

Wide range pH paper and distilled or de-ionized water.

PRECONSTRUCTION TESTING

Preconstruction Testing Service: Engage a qualified testing agency to perform specified testing on concrete mixtures.

Include the following information in each test report:

Admixture dosage rates.
Slump.
Air content.
Seven-day compressive strength.
28-day compressive strength.

DELIVERY, STORAGE, AND HANDLING

Comply with ASTM C94/C94M and ACI 301.

FIELD CONDITIONS

Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

Do not use frozen materials or materials containing ice or snow.

Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.

Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

Maintain concrete temperature at time of discharge to not exceed 95 deg F.

Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

WARRANTY

Manufacturer's Warranty: Manufacturer agrees to furnish replacement sheet vapor retarder/termite barrier material and accessories for sheet vapor retarder/ termite barrier and accessories that do not comply with requirements or that fail to resist penetration by termites within specified warranty period.

Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

CONCRETE, GENERAL

ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

CONCRETE MATERIALS

Source Limitations:

Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.

Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.

Obtain aggregate from single source.

Obtain each type of admixture from single source from single manufacturer.

Cementitious Materials:

Portland Cement: ASTM C150/C150M, Type I.

Fly Ash: ASTM C618/C618M.

Slag Cement: ASTM C989/C989M.

Silica Fume: ASTM C1240/C1240M

Ground Glass Pozzolan: ASTM C1866/C1866M

Hydraulic cement: ASTM C1157/C1157M

Normal-Weight Aggregates: Coarse and fine aggregates that conform to ASTM C33, Class 3S coarse aggregate or better, graded.

Nominal maximum size of coarse aggregate.

Provide documentation of tests or service record of adequate strength/durability for aggregates that do not conform to ASTM C33

Alkali-Silica Reaction: Comply with one of the following:

Aggregates are determined to be non-reactive: ASTM C1260 14-day expansion less than or equal to 0.10%, or ASTM C1293 1-year expansion less than or equal to 0.04%.

Aggregate and cementitious materials combination determined to be innocuous: ASTM C1567 14-day expansion less than or equal to 0.10%

Alkali content in concrete:

For aggregate with C1260 expansion between 0.1 and 0.3 percent or C1293 expansion between 0.04 and 0.12 percent – concrete alkali content shall be less than 4 lb/C.Y..

For aggregate with C1260 expansion between 0.3 and 0.45 percent or C1293 expansion between 0.12 and 0.24 percent – concrete alkali content shall be less than 3 lb/C.Y..

Alkali content is determined by weight of Portland cement content in mixture multiplied by the equivalent alkali content of Portland cement.

Maximum Coarse-Aggregate Size: 1 inch nominal.

Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

Mineral Filler: ASTM C1797

Lightweight Aggregate: ASTM C330/C330M, Size: See Concrete Classes below.

Heavyweight Aggregate: ASTM C637/C637M

CHEMICAL ADMIXTURES

Admixtures to be used in the concrete mixture shall be submitted for approval as part of the mixture design. No other admixtures will be allowed except those listed without the Architect's approval.

Air-Entraining Admixture: ASTM C260/C260M.

Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride in steel-reinforced concrete.

Air-Entraining Admixture: ASTM C260/C260M
Water-Reducing Admixture: ASTM C494/C494M, Type A.
Retarding Admixture: ASTM C494/C494M, Type B or D.
Accelerating Admixture: ASTM C494/C494M Type C or E
Extended Set-Retarding Admixture: ASTM C494/C494M Type B or D
Workability-Retaining Admixture: ASTM C494/C494M Type S
High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
Shrinkage-Reducing Admixture: ASTM C494/C494M Type S
Viscosity Modifying Admixtures: ASTM C494/C494M Type S
Alkali-Silica Reaction Inhibiting Admixture: ASTM C494/C494M Type S
Corrosion-Inhibiting Admixture: ASTM 1582/C1581M
Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C494/C494M, Type C.

Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

Water and Water Used to Make Ice: ASTM C1602/C1602M.

VAPOR RETARDERS

Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

Low-Temperature Flexibility: Pass at minus 15 deg F; ASTM D146/D146M.
Puncture Resistance: 224 lbf minimum; ASTM E154/E154M.
Water Absorption: 0.1 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D570.
Hydrostatic-Head Resistance: 231 feet minimum; ASTM D5385.

CURING MATERIALS

Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

Color:
Ambient Temperature Below 50 deg F: Black.
Ambient Temperature between 50 deg F and 85 deg F: Any color.
Ambient Temperature Above 85 deg F: White.

Curing Paper: 8-feet-wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

Water: Potable or complying with ASTM C1602/C1602M.

RELATED MATERIALS

Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.
Application: Mirror Lake State Park Residence and Garage, See A510.

Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

Types I and II, nonload bearing for bonding hardened or freshly mixed concrete to hardened concrete.

Floor Slab Protective Covering: 8-feet-wide cellulose fabric.

REPAIR MATERIALS

Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

Application: Devil's Lake Rock Elm Shelter 1054 Plans, See sheet A220.

Cement Binder: ASTM C150/C150M Portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.

Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

CONCRETE MIXTURES, GENERAL

Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301 (ACI 301M).

Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete assigned to Exposure Class F3 as follows:

Fly Ash or Other Pozzolans: 25 percent by mass.

Slag Cement: 50 percent by mass.

Silica Fume: 10 percent by mass.

Total of Fly Ash or Other Pozzolans, Slag Cement, and Silica Fume: 35 percent by mass

Total of Fly Ash or Other Pozzolans and Silica Fume: 50 percent by mass.

Admixtures: Use admixtures in accordance with manufacturer's written instructions.

Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

Use water-reducing admixture in pumped concrete, and concrete with a w/cm below 0.50**.**

CONCRETE MIXTURES

Requirements for different classes of concrete mixtures for different locations or structural members shall be as indicated below.

For members where control of curling or reduction in the potential for cracking is required and as designated in Contract documents, submit data on the length change characteristics of the concrete mixture tested in accordance with ASTM C157. Perform ASTM C157 tests and submit data showing length change not exceeding 0.05% after 7 days of moist curing followed by 21 days of air drying.

The installer and manufacturer shall coordinate to establish properties of the fresh concrete to facilitate placement and finishing with reduced potential for segregation and bleeding. Factors shall include but are not limited to slump or slump flow, setting time, method of placement, rate of placement, hot and cold weather placement, curing, and concrete temperature. Selection of fresh concrete properties shall be submitted.

Contractor shall indicate reportable changes in sources of materials and quantities when such changes are necessary to ensure constructability, performance of concrete and compliance with the specification requirements. The contractor is permitted to make minor adjustments less than the reportable deviations noted in the original submittal to concrete mixtures to ensure uniformity of concrete without a re-submittal for review or approval.

Class C: Normal-weight concrete used for interior slabs-on-ground.

Exposure Class: ACI 318 F1S0W0C0.

Minimum Compressive Strength: 4000 psi at 28 days.

Maximum w/cm: 0.50.

Aggregate: 2S**.**

Maximum Size Aggregate: 1 inch.

Cementitious Material color: gray**.**

Slump Limit: 4 inches, plus or minus 1 inch.

Air Content:

Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

CONCRETE MIXING

Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish batch ticket information.

Project-Site Mixing: Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M. Mix concrete materials in appropriate drum-type batch machine mixer.

For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.

Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added.
Record approximate location of final deposit in structure.

PART 3 - EXECUTION

EXAMINATION

Verification of Conditions:

Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.

Do not proceed until unsatisfactory conditions have been corrected.

PREPARATION

Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

Daily access to the Work.

Incidental labor and facilities necessary to facilitate tests and inspections.

Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.

Security and protection for test samples and for testing and inspection equipment at Project site.

INSTALLATION OF EMBEDDED ITEMS

Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded

INSTALLATION OF VAPOR RETARDER

Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

Application: Install at slab replacements at Devil’s Lake State Park Toilet Shower Buildings 1025 & 1026, see A250 & A260, only if an existing sub-slab vapor barrier is discovered.

Install vapor retarder with longest dimension parallel with direction of concrete pour.

Face laps away from exposed direction of concrete pour.

Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.

Lap joints 6 inches and seal with manufacturer's recommended tape.

Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.

Seal penetrations in accordance with vapor retarder manufacturer's instructions.

Protect vapor retarder during placement of reinforcement and concrete.

Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

JOINTS

Construct joints true to line, with faces perpendicular to surface plane of concrete.

Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.

Place joints perpendicular to main reinforcement.

Continue reinforcement across construction joints unless otherwise indicated.

Do not continue reinforcement through sides of strip placements of floors and slabs.

Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.

Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

Doweled Joints:

Install dowel bars and support assemblies at joints where indicated on Drawings.
Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

CONCRETE PLACEMENT

Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.

Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

Measure, batch, mix, deliver, and provide delivery ticket for each batch of concrete in accordance with ASTM C94/C94M.

Water is permitted to be added to a batch of concrete at the project site before placement provided that the amount of water added does not exceed the allowed amount indicated on the delivery ticket. Water addition shall only be permitted before any portion of the load is discharged. Samples for quality assurance tests shall be obtained after water addition and additional mixing in accordance with ASTM C94/C94M.

It is permitted to add water to the concrete mixture during transportation to the jobsite when concrete is transported in truck mixers equipped with automated water measurement and slump or slump flow monitoring equipment in accordance with ASTM C94/C94M.

Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.

Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

If a section cannot be placed continuously, provide construction joints as indicated.
Deposit concrete to avoid segregation.

Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.

Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

Do not use vibrators to transport concrete inside forms.

Insert and withdraw vibrators vertically at uniformly spaced locations 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 lose plasticity.

At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

Do not place concrete floors and slabs in a checkerboard sequence.

Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

Maintain reinforcement in position on chairs during concrete placement.

Screed slab surfaces with a straightedge and strike off to correct elevations.

Level concrete, cut high areas, and fill low areas.

Slope surfaces uniformly to drains where required.

Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.

Do not further disturb slab surfaces before starting finishing operations.

FINISHING FLOORS AND SLABS

Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

Float Finish:

When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.

Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.

Apply float finish to surfaces to receive trowel finish.

Trowel Finish:

After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.

Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.

Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

Do not add water to concrete surface.

Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.

Apply a trowel finish to surfaces to be covered with ceramic .

Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

Slabs on Ground:

Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch and also no more than 1/16 inch in 2 feet.

INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

CONCRETE CURING

Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.

Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.

Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305.1, before and during finishing operations.

Curing Formed Surfaces: Comply with ACI 308.1 as follows:

Cure all formed concrete surfaces, including underside of beams, supported slabs, footings, columns, walls, and other similar surfaces.

Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.

If forms remain during curing period, moist cure after loosening forms.

If removing forms before end of curing period, continue curing for remainder of curing period, as follows:

Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.

Continuous Sprinkling: Maintain concrete surface continuously wet.

Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.

Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.

Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

Recoat areas subject to heavy rainfall within three hours after initial application.

Maintain continuity of coating and repair damage during curing period.

Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

Begin curing immediately after finishing concrete. Cure all unformed surfaces, including floors and slabs, concrete floor toppings, footings, walls, columns, and other similar exposed surfaces.
Interior Concrete Floors: James – see Matt’s note

Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

Lap edges and ends of absorptive cover not less than 12 inches.

Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

Cure for not less than seven days.

Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

Water.

Continuous water-fog spray.

TOLERANCES

Conform to ACI 117 and tolerances listed below.

Concrete properties:

Slump: See Concrete Mixes paragraph above.

Air Content: See Concrete Mixes paragraph above.

JOINT FILLING

Application: Mirror Lake State Park Residence and Garage, See A510.

Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

Overfill joint, and trim joint filler flush with top of joint after hardening.

CONCRETE SURFACE REPAIRS

Defective Concrete:

Repair and patch defective areas when approved by Architect.
Remove and replace concrete that cannot be repaired and patched to Architect's approval.

Repairing Unformed Surfaces:

Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

Correct low and high areas.

Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
After concrete has cured at least 14 days, correct high areas by grinding.

Correct localized low areas 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.

Correct other low areas scheduled to receive floor coverings with a repair underlayment.

Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

Feather edges to match adjacent floor elevations.

Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.

Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.

Place, compact, and finish to blend with adjacent finished concrete.

Cure in same manner as adjacent concrete.

Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.

Dampen cleaned concrete surfaces and apply bonding agent.

Place patching mortar before bonding agent has dried.

Compact patching mortar and finish to match adjacent concrete.

Keep patched area continuously moist for at least 72 hours.

Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

Repair materials and installation not specified above may be used, subject to Architect's approval.

FIELD QUALITY CONTROL

Special Inspections: Engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

Unless otherwise specified, the testing agency shall be responsible for providing containers and securing means with the contractor for initial curing at the jobsite for standard-cured strength test specimens used for determining acceptance of concrete and shall be responsible for maintaining and transporting these specimens to the laboratory in accordance with ASTM C31/C31M; and shall be responsible for verifying that standard-cured and field-cured strength specimens, when specified, are cured in accordance with ASTM C31/C31M

Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.

Testing agency to report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

Test reports of concrete strength to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, including the following as applicable to each test and inspection:

Project name.
Name of testing agency.
Names and certification numbers of field and laboratory technicians performing inspections and testing.
Name of concrete manufacturer.
Date and time of inspection, sampling, and field testing.
Date and time of concrete placement.
Location in Work of concrete represented by samples.
Date and time sample was obtained.
Truck and batch ticket numbers.
Specified compressive strength and test age.
Concrete mixture designation.
Results of tests of fresh concrete performed.
Information on storage and curing of test specimens, including curing method and maximum and minimum temperatures during initial curing period.
Compressive strength test results at required test ages and type of fracture of specimen tested.

The contractor shall be responsible for providing space, water, and source of electrical power for storage of test specimens during the initial curing period at the jobsite. Storage of test specimens shall be in a secured location and the testing agency shall be provided access.

Concrete Delivery Tickets: For each load delivered, collect and submit three copies of delivery tickets that include the reporting requirement of ASTM C94/C94M and include additional information as specified. Record jobsite addition of water or admixtures with a signature of person requiring the adjustment.

Inspections:

Headed bolts and studs.
Verification of concrete mixtures delivered consistent with submittals.
Concrete placement, including conveying and depositing.
Curing procedures and maintenance of curing temperature.
Verification of concrete strength before removal of shores and forms from beams and slabs.
Batch Plant Inspections: As required.

Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M and tests shall be performed in accordance with the following requirements:

Testing Frequency: Obtain one composite sample for each class of concrete at least once per day, once for each 150 C.Y. of concrete, or once for each 5000 S.F. surface area for slabs and walls.
If the total volume of concrete for a class is such that frequency of testing required is less than five tests, then samples shall be obtained from at least five randomly selected batches or from each batch if fewer than five batches are used.

Slump: ASTM C143/C143M:

One test on each sample obtained to prepare strength test specimens

Additional tests as needed to monitor control of batches

Concrete Temperature: ASTM C1064/C1064M:

One test on each sample obtained to prepare strength test specimens

One test hourly when ambient temperature is 40°F or lower or 90°F or higher

Compressive Strength Specimens: ASTM C31/C31M:

For strength specimens to be standard cured for acceptance of concrete, cast a set of cylinders and cure specimens at the jobsite in accordance with ASTM C31/C31M. Cast at least two specimens for each age that strength will be tested for information and additional reserve specimens as needed. Strength test results at the designated age shall be the average of two 6 × 12-in. or three 4 × 8-in. specimens.

If required, cast additional sets of cylinders for field-curing in accordance with ASTM C31/C31M

Transport specimens to the lab within 48 hours after casting and cure them in accordance with final curing requirements of ASTM C31/C31M until tested.

Compressive-Strength Tests: ASTM C39/C39M.

Test specimens for compressive strength at 7 days or at an alternative early age as required and one set at 28 days or at an alternate test age as designated for specified strength.
Acceptance of concrete shall be based on strength test results of standard cured cylinders in accordance with ASTM C31 and tested at 28 days in accordance with ASTM C39. Strength test results at the designated age shall be the average of two 6 × 12 inch or three 4 × 8 inch specimens.

When strength cylinders are made, tests of slump, air content, temperature and density shall be made and recorded with the strength test results.

Strength of each concrete class shall be deemed satisfactory when both of the following criteria are met:

The average of three consecutive compressive-strength tests equals or exceeds specified compressive strength

Any individual compressive-strength test result does not fall below specified compressive strength, $f'c$:

by more than 500 psi when $f'c \leq 5000$ psi

by more than $0.1f'c$ when $f'c > 5000$ psi

When compressive strength tests fail to meet the provisions of (d), follow procedure in ACI 301 for evaluation of concrete strength tests.

When it is deemed necessary to evaluate the adequacy of concrete strength, at least 3 cores shall be obtained from the portion of the structure represented by the low strength tests. Cores shall be removed and conditioned in accordance with ASTM C42. The strength of cores shall comply with the following:

Average strength of 3 cores $\geq 0.85f'c$

Individual core strength $\geq 0.75 f'c$

A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.

Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

Additional Tests:

Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.

Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

PROTECTION

Protect all concrete surfaces including but not limited to the following:

Protect from petroleum stains.
Diaper hydraulic equipment used over concrete surfaces.
Prohibit vehicles from interior concrete slabs.
Prohibit use of pipe-cutting machinery over concrete surfaces.
Prohibit placement of steel items on concrete surfaces.
Prohibit use of acids or acidic detergents over concrete surfaces.
Protect liquid floor treatment from damage and wear during the remainder of construction period.
Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03 30 00

SECTION 03 30 10
CAST-IN-PLACE CONCRETE FOR SITE WORK
BASED ON DFD MASTER SPECIFICATION DATED 5/1/2025

PART 1 GENERAL

SCOPE

The work under this section consists of providing all work, materials, labor and supervision necessary to provide cast-in-place concrete as required for site concrete such as steps. Requirements of this section do not apply to structural concrete such as manholes, duct banks, buildings, or retaining structures. Structural concrete work is included in 03 30 00. Included in the section are the following topics:

RELATED WORK

Applicable provisions of Division 01 govern work under this Section.

03 30 00 – Cast-In-Place Concrete
03 08 00 – Commissioning of Concrete

REFERENCES

Incorporated Guides and References

American Concrete Institute (ACI):
- ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.
- ACI 305R - Hot Weather Concreting.
- ACI 306R – Cold Weather Concreting.
- ACI 309R – Guide for the Consolidation of Concrete.
- ACI 347 – Guide to Formwork for Concrete.

State of Wisconsin, Department of Transportation (WisDOT):
- Standard Specifications for Highway and Structure Construction (SSHSC)
- Construction and Materials Manual (CMM)

SUBMITTALS

Mix Design: Submit mix design for review at least ten days prior to use. Mix design shall be derived from tests performed by a qualified testing laboratory or from previous tests performed on aggregate from same source.

Product Data: Submit product data for joint fillers, curing compound, admixtures, reinforcing, and all other concrete components.

Delivery Tickets: Submit delivery tickets to DFD Construction Representative for each load of concrete delivered to project.

Test Reports: Submit reports for laboratory and field tests required under "Testing" article.

Joint Layout Plan: Submit a joint layout plan for approval prior to starting work.

Make submittals in accordance with Division 01.

QUALITY ASSURANCE

Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

Manufacturer certified according to National Ready Mixed Concrete Association's "Certification of Ready Mixed Concrete Production Facilities."

Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

TESTING

Contractor shall arrange and pay for concrete testing by a qualified testing agency, acceptable to State and independent of Contractor.

Testing agency shall test concrete to measure slump, entrained-air content, temperature, and compressive strength to determine compliance with specifications. Furnish test apparatus and cylinders, perform on-site sampling and testing, and have compressive strength cylinders tested by a qualified laboratory.

- On-site tests shall be performed under observation of A/E unless waived.
- Perform slump, air content, and temperature tests prior to concrete placement each day, whenever there is a change in consistency of concrete, and when concrete cylinders are prepared. If measured slump, air content, or temperature falls outside specified limits, immediately check another portion of same batch. In event of a second failure, concrete shall be rejected.
- During progress of work, prepare three test cylinders per **100 cu yd** fraction thereof for each class of concrete placed each day. Identify samples, moist cure in accordance with ASTM C31, and ship samples to testing laboratory for one 7-day compressive strength test and two 28-day tests.
- Test procedures shall be in accordance with ASTM C31, C39, C143, C172, C231, and C1064.
- Cost of tests, including materials and transportation, shall be paid by Contractor and shall be considered incidental to the various items of concrete work.

The Quality Management Program (QMP) provisions of the referenced WisDOT SSHSC sections do not apply to this concrete work.

NOTIFICATION
Notify DFD and AE 48 hr. prior to placing any concrete.

PART 2 PRODUCTS

CONCRETE
Concrete shall be in accordance with WisDOT SSHSC, Section 501, for grade A, air entrained concrete.

CLASS	Min. Comp. Strength, PSI	Slump, In.	Min. Cement. Lbs/ Cu Yd	Max. Water-Cement Ratio	Air Content, % By Volume	Use
A	4,000 (28-day)	1-4, 2 ½ for slip form	565	0.45	6-8	Pavements, curbs, sidewalks, slabs, pole bases, manhole benches

Use epoxy coated rebar unless otherwise specified.

REINFORCEMENT
Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

Reinforcing Bars and Tie Bars: ASTM A615, Grade 60, deformed steel bars, epoxy-coated in accordance with ASTM A775, with less than 2 percent damaged coating in each 12-inch bar length.

Dowel Bars: ASTM A615, Grade 60, plain steel bars, epoxy-coated in accordance with ASTM A775.

Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

FORMS
Forms may be either stationary or slip-form type. If slip forms are used, finished product shall be of quality equal to that produced by stationary forms.

Provide forms of steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects, extending full depth of concrete.

Coat forms with a form release agent which will not discolor or deface surface of concrete.

EXPANSION JOINT FILLER
Expansion joint filler meeting requirements of WisDOT SSHSC, Subsection 415.2.

CURING COMPOUND
Curing compounds and curing agents meeting requirements of WisDOT SSHSC, Subsection 415.2.

ADMIXTURES
Admixtures to be used in the concrete mixture shall be submitted for approval as part of the mixture design. No other admixtures will be allowed except those listed without the A/E's approval.

Air-Entraining Admixture: ASTM C 260/C 260M.

Water reducing admixture shall conform to ASTM C494, Class A.

Other admixtures which do not adversely affect strength and durability of concrete may be used with permission of A/E, if used in strict accordance with manufacturer's instructions. Care shall be exercised to ensure that the admixture does not increase or decrease air content outside of allowable limits. Do not use salt or chemical anti-freeze admixtures.

PART 3 EXECUTION

PREPARATION FOR CONCRETE

Remove loose material from compacted subgrade. Moisten subgrade to provide a uniformly damp condition.

Set clean forms to required grades and lines, rigidly braced and secured. Provide minimum concrete thicknesses as indicated on Drawings.

Check tolerances as follows (slip form methods shall produce equivalent results):

- Top of form: 1/8 in. in 10 ft.
- Alignment of vertical face: 1/4 in. in 10 ft.

Adjust manholes and utility structures to grade.

JOINTS

General: Form construction, expansion, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

- When abutting existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

CONCRETE PLACEMENT

Mix and place concrete in accordance with the following.

Place concrete in accordance with the most stringent of either ACI 304 or this section.

Concrete must be placed within the timeframe specified in WisDOT SSHSC 501. Retarders may be used if approved by the DFD Construction Representative and AE.

Before placing concrete, remove debris, ice, snow, and other foreign materials from the subgrade or formwork.

Remove standing water from subgrade. Dry and compact subgrade in accordance with the requirements of Division 2. Do not place concrete on soft or frozen subgrade.

Place and secure steel reinforcement prior to placing concrete.

Position and secure expansion joint material, sleeves, waterstops and other embedded items prior to placing concrete. Place embedded items in accordance with the most stringent of either drawings or manufacturer recommendations.

Apply bonding agent to existing concrete surfaces requiring a bond with new concrete.

Convey concrete from truck to final position by method that will prevent separation. Unless otherwise approved, limit free fall of concrete to 4’ maximum height to avoid separation.

Place concrete continuously so that concrete is deposited on or adjacent to concrete that is still plastic. When placing of concrete is temporarily halted or delayed, provide construction joints.

Place concrete in lifts not exceeding 18”.

Consolidate concrete by mechanical vibration. Allow vibrator to penetrate the full depth of the slab or lift. Overlap previously vibrated areas by 25%.

After striking off and consolidating concrete, smooth surface by screeding and floating. Test surface for trueness with a 10 ft straightedge. Remove surface irregularities and refloat repaired areas to provide a continuous, smooth finish of uniform texture.

Work edges of slabs and formed joints with edging tool to form a 1/4 in. radius.

After floating and when excess moisture has disappeared, provide broom finish by drawing a fine-hair broom perpendicular to direction of travel.

After 24 hours, remove forms, clean ends of joints, and repair honeycombed areas by means approved by the AE.

SIDEWALK STEPS

Concrete work shall meet the requirements of Division 3, and WisDOT SSHSC, Sections: 602.

Provide Standard Duty concrete sidewalk with a minimum thickness shown on the plans for all sidewalk steps.f 5-inches.

Dowel replacement concrete adjacent to existing slabs or to building walls or retaining walls with epoxy coated reinforcing rod set into the new slab 12" and into the structural wall 4" at 18" on centers.

Unless otherwise noted, joint all replacement concrete work to match adjacent work. Generally provide square layout of joints, subject to the DFD Construction Representative's approval. Consult with AE and DFD Construction Representative before laying out joints for large areas and areas of intersecting walks.

Hand tool all joints outside of concrete pavement areas and stamped concrete.

Remove and replace, at no cost to the Owner, any adjacent slabs not noted for removal, but which are broken or cracked by the Contractor's activities.

Contractor shall review sidewalk step grades with the AE prior to concrete placement to verify that positive drainage will be provided. Contractor shall provide minor adjustment of sidewalk grades as requested by the AE to provide positive drainage. Contractor shall be responsible for remedial actions required to provide positive drainage for all areas identified following placement of surface materials where this requirement has not been met.

COLD WEATHER PLACING

Protect concrete work from physical damage or reduced strength caused by frost, freezing actions, or low temperatures, in compliance with ACI 306R and as specified below.

1. When air temperature falls to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 60 deg F (50 deg F for heavy sections) and not more than 90 deg F at point of delivery.

- Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials. Verify forms, reinforcing steel, and adjacent concrete surfaces are entirely free of frost, snow and ice before placing concrete.
- During seasons when atmospheric temperatures may be expected to drop below 40 deg F, concrete shall be protected by covering with impermeable paper and not less than 12 in. of loose dry hay or straw or thick insulating blankets. Retain covering for ten days.

HOT WEATHER PLACING

When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305R and as specified below.

- Cool ingredients before mixing to maintain concrete temperature at time of placement below 90 deg F. Mixing water may be chilled, or chopped ice may be used to control temperature provided water equivalent of ice is calculated in total amount of mixing water.
- Cover reinforcing steel with water-soaked burlap if it becomes too hot to prevent steel temperature from exceeding the ambient air temperature immediately before embedment in concrete.
- Spray forms, reinforcing steel, and subgrade just before concrete is placed.
- Do not use set-control admixtures, unless approved by A/E.

CURING

Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Cure formed and unformed concrete for seven days or until 75 percent of the required 28-day compressive strength is obtained, whichever is less.

For standard gray concrete, methods may include plastic sheets, constant wetting of surface with water, curing paper, or commercial curing compound. Apply curing compound at not less than 200 sq ft per gal in accordance with manufacturer's recommendations.

REPAIR AND PROTECTION

Analyze and repair defects or deficiencies per Section 424 of the WisDOT CMM. Repair or replace broken or defective concrete. Remove surface stains.

Exclude traffic from concrete until the specified curing period is complete (generally 7 days). Protect concrete from damage until Substantial Completion.

Prior to final inspection, sweep concrete and wash free of stains, dirt, and other foreign materials.

FIELD QUALITY CONTROL

Provide testing as described in Quality Assurance and Testing sections above.

Concrete Delivery Tickets: For each load delivered, collect and submit three copies of delivery tickets that include the reporting requirement of ASTM C94/C94M and include additional information as specified. Record jobsite addition of water or admixtures with a signature of person requiring the adjustment.

Compressive Strength Specimens: ASTM C31/C31M:

For strength specimens to be standard cured for acceptance of concrete, cast a set of cylinders and cure specimens at the jobsite in accordance with ASTM C31/C31M. Cast at least two specimens for each age that strength will be tested for information and additional reserve specimens as needed. Strength test results at the designated age shall be the average of two 6 × 12-in. or three 4 × 8-in. specimens.

If required, cast additional sets of cylinders for field-curing in accordance with ASTM C31/C31M

Transport specimens to the lab within 48 hours after casting and cure them in accordance with final curing requirements of ASTM C31/C31M until tested.

Compressive-Strength Tests: ASTM C39/C39M.

Test specimens for compressive strength at 7 days or at an alternative early age as required and one set at 28 days or at an alternate test age as designated for specified strength.
Acceptance of concrete shall be based on strength test results of standard cured cylinders in accordance with ASTM C31 and tested at 28 days in accordance with ASTM C39. Strength test results at the designated age shall be the average of two 6 × 12 inch or three 4 × 8 inch specimens.

When strength cylinders are made, tests of slump, air content, temperature and density shall be made and recorded with the strength test results.

Strength of each concrete class shall be deemed satisfactory when both of the following criteria are met:

The average of three consecutive compressive-strength tests equals or exceeds specified compressive strength.

Any individual compressive-strength test result does not fall below specified compressive strength, $f'c$:

by more than 500 psi when $f'c \leq 5000$ psi

by more than $0.1f'c$ when $f'c > 5000$ psi

When compressive strength tests fail to meet the provisions of (d), follow procedure in ACI 301 for evaluation of concrete strength tests.

When it is deemed necessary to evaluate the adequacy of concrete strength, at least 3 cores shall be obtained from the portion of the structure represented by the low strength tests. Cores shall be removed and conditioned in accordance with ASTM C42. The strength of cores shall comply with the following:

Average strength of 3 cores $\geq 0.85f'c$

Individual core strength $\geq 0.75f'c$

A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

Additional Tests:

Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.

Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents. Concrete loads that do not meet the on-site field test criteria will be rejected.

END OF SECTION

SECTION 04 08 00
COMMISSIONING OF MASONRY
BASED ON DFD MASTER SPECIFICATION DATED 02/27/15

P A R T 1 - G E N E R A L

SCOPE
This section includes commissioning forms for construction verification and functional performance testing. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Reference
- Submittals

PART 2 - PRODUCTS
- (Not Used)

PART 3 - EXECUTION
- Commissioning Forms
- CV-04 20 00 Unit Masonry

RELATED WORK
Section 01 91 01– Commissioning Process

REFERENCE
Applicable provisions of Division 1 shall govern work under this section.

SUBMITTALS
Reference the General Conditions of the Contract for submittal requirements.

Reference Section 01 91 01 Commissioning Process for Construction Verification Checklist and Functional Performance Test submittal requirements.

P A R T 2 – P RO D U C T S

(Not Used)

P A R T 3 – E X E C U T I O N

COMMISSIONING FORMS
Commissioning forms are to be filled in as work progresses by the individuals responsible for installation and shall be completed for each installation phase.

Provide a description of the work completed since the last entry, the percentage of the total work completed for the system for that area and the step of installation or finalization.

Circle Yes or No for each commissioning form item. If the information requested for an item does not apply to the given stage of installation for the system, list it as “N/A”. Explain all discrepancies, negative responses or N/A responses in the negative responses section.

Once the work is 100% complete and the responses to each item are complete and resolved for a given commissioning forms group, mark as complete, initial and date in the spaces provided.

Provide copies of the commissioning forms to the commissioning agent 2 days prior to construction progress meetings.

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CV-04 20 00 – Unit Masonry

Identification/Tag: _____
Location:_____

A) PRE-INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)			
				1)	2)	3)	
				YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	
❑ CHECKLIST GROUP COMPLETE				INITIALS:	_____	DATE:	_____

Question Details

1) Shop drawings, product data and samples have been submitted and approved.
2) All materials are as designed, specified, and approved.
3) Mock-ups have been done and approved.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

B) INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)						
				1)	2)	3)	4)	5)	6)	7)
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS:	_______________			DATE:	_______________	

Question Details

1) Weather conditions are acceptable for installation or proper steps have been taken for cold weather installations.
2) Site conditions are in compliance with requirements for installation.
3) Substrate true and level and reinforcing dowels properly placed.
4) Units installed level, true, and plumb
5) Reinforcing, ties, anchors and accessories installed as designed and in correct spacing.
6) Joints are full, tight and solid.
7) Control/expansion joints have been installed as designed and/or as required.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

C) CLEANING CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)		
				1)	2)	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
				YES NO	YES NO	
❑ CHECKLIST GROUP COMPLETE				INITIALS:	_____	DATE: _____

Question Details

1) Final cleaning has been done by method specified.
2) Excess materials removed and exposed surfaces cleaned.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

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SECTION 04 20 00
UNIT MASONRY
BASED ON DFD MASTER UNIT MASONRY SPECIFICATION DATED 06/03/14

PART 1 - GENERAL

SCOPE

This section describes the products and execution requirements relating to furnishing and installation of Unit Masonry and related items for this project. Included are the following topics:

RELATED WORK

Applicable provisions of Division 01 govern work under this Section.
Section 01 91 01 – Commissioning Process
Section 04 08 00 – Commissioning of Masonry

REFERENCE STANDARDS

Abbreviations of standards organizations referenced are as follows:
ACI American Concrete Institute
ASCE American Society of Civil Engineers
ASTM American Society for Testing and Materials
TMS The Masonry Society

MATERIAL FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

None, except for extra face brick required to be turned over to Owner.

Preliminary Review Coordination Note: Does the Owner have attic stock of masonry for repointing work?

SUBMITTALS

Shop Drawings: Submit shop drawings for architectural precast concrete sills and coping, and stainless steel flashing, barriers and receivers for counterflashing.

Product Data: Submit manufacturer's product data for each type of masonry unit, accessory and other manufactured products.

Samples for Final Approval of Appearance: Color and aggregate matched mortar laid between 3 bricks that approximate the color of the existing brick.

Samples for Verification: Representative sample of sand from the existing mortar joints along with sample of sand intended to be used for pointing work. Provide a sample for each color of mortar to be matched. (Preliminary Review Coordination Note: It appears from the photos that the mortar at the chimney does not match the mortar at the walls. Should it match at the end of the project? Are there other locations to match?)

Samples for Verification: Remove intact samples of existing mortar with no or little weathering that represent variations of color within the existing mortar.

As-Built Operations and Maintenance Masonry Manual: A binder with the listing of all materials utilized in the masonry work including source, brands, type, and/or manufacturer's literature as appropriate for potential future maintenance, shall be turned over to the Owner upon Substantial Completion of the masonry work.

COORDINATION

Examine all parts of the supporting structure and the conditions under which the masonry work is to be installed and notify the Contractor in writing of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the installation of masonry work until unsatisfactory conditions have been corrected in a manner acceptable to this Section contractor.

Review installation procedures of other work by Subcontractors whose work must be coordinated with the masonry work.

The Contractor shall coordinate all work.

Consult with all Subcontractors and material suppliers whose involvement will be affected by the work of this Section.

QUALITY ASSURANCE

Source Limitations for Masonry Units and Mortar Materials: One source from a single manufacturer for each product utilized.

Sample Panel Required:

Create a sample panel of pointing work at a location to be selected by the A/E on an existing wall of the building. Include stone watertable, stone sill, brick and one eave bracket support stone in the sample panel. Create a full-wall-height sample panel the width of a window plus a minimum 16 inches to both sides of the window. Create the sample panel all to ensure compliance with design intent and evaluate quality of materials, techniques, suitability of power tools, and workmanship.

Start no further pointing work until a dry, minimum seven-day old, sample panel has been viewed and approved for overall appearance by the Owner and A/E. The approved sample panel shall serve as the standard for wall appearance comparison.

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 the Owner and A/E in writing.

Preinstallation Conference: Conduct conference at Project before commencing masonry work.

DELIVERY, STORAGE AND HANDLING

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.

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

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

Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

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

PROJECT/SITE CONDITIONS

Protection of Masonry: Cover partially completed pointing work when construction is not in progress. Extend cover a minimum of 24 inches down and hold cover securely in place.

Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed. Immediately remove grout, mortar, and soil that come in contact with such masonry. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface. Protect sills, ledges, and projections from mortar droppings. Protect surfaces of window and door frames, including similar products with painted and integral finishes, from mortar droppings. Use cant strips or similar devices on the scaffold boards against the wall to prevent mortar spattering off of the scaffold braces or directly on the wall below. 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.

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. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

MASONRY UNITS, GENERAL

Provide special shapes or sizes as indicated on the Drawings or where cutting of units would expose the cut in the completed work.

Referenced masonry unit standards allow a certain percentage of units to exceed tolerances and to contain chips, cracks or other imperfections exceeding limits stated in the standard. Do not use units where such imperfections, including tolerances that vary more than the amount stated in the standard, will be exposed in the completed Work.

FACE BRICK FOR REBUILDING EXISTING BRICK WALLS

Materials: Face brick shall be made from materials, fired, and manufactured in one batch to comply with all applicable requirements of ASTM C216, Grade SW, Type FBS, typically cored; except where superseded by more stringent requirements mentioned herein. ASTM C652 Class H40V brick meeting all other requirements of this specification except for the void area may also be used. Brick which have been significantly surface-coated prior to firing or siliconed, or similarly surface-treated after firing are not permitted.

Physical Properties: All face brick shall have physical properties that conform to the following specific requirements in Table 1:

Test	Units	Average of 5 Bricks	Individual
Compressive Strength	psi	8,500 min.	7,500 min.
Modulus of Rupture (net area)	psi	1,200 min.	800 min.
Water Absorption (24 hr. cold)	%	--	8 max.
Initial Rate of Absorption	grams per min. per 30 sq. in.	5 min.	3 min.
Initial Rate of Absorption	grams per min. per 30 sq. in.	20 max.	25 max
Efflorescence			None
Autoclave Expansion (age of 1 month)	%	0.10 max.	0.20 max.
Must meet one of the following requirements:			
C/B Ratio	--	0.76 max.	0.78 max.
* Water Absorption (24 hr. cold)			
Fire Clay	%	--	2 max.
Shale	%	--	5 max.
** Frost Resistance Durability Factor	--	--	70 min.

* For mixtures of fire clay and shale, prorate values listed as requirements

** DF = 3.2/PV + 2.4 P3

DF = Frost-Resistance Durability Factor

PV = Total Intruded Pore Volume (cm^3/g)

P3 = Pore Volume with Diameters Greater than 3µm (%)

TABLE 1: ADDITIONAL FACE BRICK PHYSICAL PROPERTY REQUIREMENTS

Testing Standards: Sampling and testing of face brick shall be done in accordance with ASTM C67, except as follows. Brick may be heated in a ventilated oven to 900F and, upon retesting, shall still comply with all the specific physical property requirements and with results similar to that obtained prior to heating in the oven. Testing of brick for moisture expansion by autoclaving shall be conducted in accordance with the time, temperature, pressure, and moisture conditions required by ASTM C151. Pore size distribution of brick shall be determined by mercury intrusion porosimetry using applicable procedures of ASTM D4284. Pore volumes shall be measured between pore diameters of 100µm and 0.01µm using a porosimeter. Pressure readings shall be converted to pore diameters with the angle of contact of the mercury assumed at 130 degrees.

The Contractor shall make necessary brick available when requested, for physical tests conducted by a testing laboratory selected and employed by the Owner to check for compliance of brick with the specifications. In the event the test results show the brick to be in noncompliance with the specifications, the Contractor shall reimburse the Owner for the testing costs.

Size: Except where drawings require otherwise, face brick shall be of Utility size and shall have dimensions of 3-5/8" x 3-5/8" x 11-5/8". Size differences between brick shall not exceed three percent in any dimension.

Quantity: Provide face brick required to complete brickwork as indicated on the Drawings and as herein specified. Where face brick are used in a wall with both faces exposed to the weather, the wall shall be built of the same face brick throughout. Provide special brick as indicated on the Drawings or otherwise required for a complete installation, with same size, surface texture and color range on all exposed surfaces to match adjacent brick. The Contractor to note ASTM C216 allows up to five percent broken brick, unless otherwise stipulated.

Furnish and deliver 1/4 of a percent of the amount of each type of brick installed to the Owner's designated local storage area upon completion of the work.

Storage: All brick shall be stored at the site of manufacture and/or the project site for a minimum time period of 4 weeks after completion of manufacture and before being incorporated into the structure.

Approved Appearance: The following face brick have been offered to the Owner as face brick meeting the physical property requirements specified herein. Any one of the following face brick also have the appearance approved by the Owner for this project.

1. Brickcraft Brick – Harvard Mods.
2. McAvoy BrickCobset Faceset Mod
3. General Shale – Allendale Hill Mods.

Ordering: As soon as possible after award of contract, the Contractor shall place the order for any one of the previously listed face brick, so that the brick can be delivered in sufficient time to avoid construction delays. The Contractor shall be satisfied and be able to show that the proposed brick fully complies with the requirements of the Contract Documents in all respects. The Contractor shall also make the face brick manufacturer, vendor and/or supplier responsible to the Contractor for meeting these specifications. Transportation shall include shrink-wrap weather protection or other protection as required by the Contractor.

Sampling and Testing: Upon completion of firing of all face brick for this Project and notification by the Contractor, the Owner will have made an impartial sampling and check testing of such face brick. No face brick shall leave the site of manufacture for use in this Project until after this sampling and check testing is completed and indicates that the face brick comply with the physical property requirements of the Contract Documents. The Contractor will be notified immediately of the results of the sampling and check testing. Brick approved and needed for use on this Project shall not be sold to others, and only brick from the same run shall be shipped to the project site. In the event the tests indicate noncompliance, the face brick are automatically rejected.

Delivery, Unloading and Storage: Upon delivery of brick to the job site, the Contractor shall immediately have each load sampled and compared with the approved sample, and shall report any deviations immediately. All units used in the work shall conform to requirements specified herein. Any improper brick shall be culled out and immediately removed from the site. Brick shall be resorted or culled as necessary, especially when plant palletized, to avoid spotty or irregular ranges of color or texture in the finished walls. The responsibility for meeting these specifications and the approved sample rests with the Contractor. Brick shall be carefully unloaded and neatly stacked on or near the project site, undamaged, and adequately protected at all times.

CONCRETE MASONRY UNITS

Materials and Physical Properties: Concrete block units shall be made from materials and manufactured to comply with all applicable requirements of ASTM C90, Solid Units of Normal Weight, typically cored. No integral water repellent is permitted.

Concrete brick units shall be made from materials and manufactured to comply with all applicable requirements of ASTM C55, Normal Weight, cored or uncored to be used with concrete block units as infill.

Source: All units shall be from one source and of uniform color and texture.

Size: Concrete block units shall be 7-5/8" x 15-5/8" x thickness indicated on Drawings. Concrete brick may be of size as appropriate to facilitate the work.

Special Shapes: Provide where required for lintels, corners, jambs, sash, movement joints, headers, bond beams, and other special conditions specifically indicated including applications which cannot be produced by cutting of standard size units.

Protection: Concrete masonry units shall be protected from the elements for a minimum time of seven days immediately prior to being incorporated into the Work.

MORTAR AND GROUT MATERIALS

Portland Cement: Shall conform to ASTM C150, Type I. Only one brand and kind of Portland cement from one source shall be used for the work unless prior written approval is obtained from the A/E. Brands are subject to approval of the A/E based upon the mortar color desired and obtainable by use of the various brands readily available. No white cement or nonstaining cement will be required.

Lime: Shall be pressure-hydrated, non air-entrained and conform to ASTM C207, Type S.

Masonry Sand for CMU: Shall be clean, sharp, free from loam, silt, vegetable matter, salts, and other injurious substances, and shall conform to ASTM C144. Sand is further subject to approval of the A/E, based on mortar color desired and obtainable by use of local sands readily available, and shall be from one source.

Masonry Sand for Pointing: Shall be clean, rounded, free from loam, silt, vegetable matter, salts, and other injurious substances, and shall conform to ASTM C144. Sand is further subject to approval of the A/E, based on mortar color desired and obtainable by use of local sands readily available, and shall be from one source. Match sand to the sand of the existing adjacent mortar.

Aggregate for Grout: ASTM C404.

Water: Shall be potable, fresh, clean, clear, and free of injurious amounts of oil, acid, alkali, salts, organic matter or other detrimental substances, and handled in clean containers.

Plasticizer: Not permitted.

Water Repellent: Not permitted.

Coloring Pigments: Not permitted.

Other Admixtures: Shall not be used at any time and will not be knowingly approved. Use of special air-entraining admixtures, chlorides or nitrates, with or without approval, will be sufficient cause to require removal and replacement of all masonry work containing or treated with same.

The autoclave expansion of the cementitious portion of the mortar materials, when mixed in proportions required under "mortar mixes," shall not exceed one-half percent when tested according to ASTM C151. The air content of any mortar required under "mortar mixes" shall not exceed six percent when tested according to ASTM C231 and/or ASTM C173 and/or ASTM C457.

CONTINUOUS MASONRY JOINT REINFORCEMENT

Materials and Coatings: Use prefabricated electrically flush or butt welded wire units, truss type, not less than 10-feet long, with matching corner units, fabricated from cold drawn steel wire complying with ASTM A82. Provide galvanized (zinc coated) units conforming to Class B requirements of ASTM A153 in all exterior walls and in interior corridors or partitions enclosing wet or high moisture areas. For other interior walls, coating of wire units may conform to Class 3 requirements of ASTM A641.

MASONRY CLEANERS

Not permitted.

MORTAR MIXES

Conventional Job Mixed Mortar: Measure materials for mortars by volume, in a manner whereby proportions can be controlled within two percent. Mix materials dry and then water to bring to proper consistency for use. Mix materials in the approved type machine mixer of adequate capacity for 3 to 5 minutes after all materials have been introduced, until materials are evenly distributed throughout the batch and the mixture is uniform in color with a workable consistency.

Silo Metered and Bulk Container Mortar: Shall comply with ASTM C1714. Use materials specified hereinbefore and proportion mixes as specified hereinafter. Add water and mix according to system manufacturer's recommendations.

Use maximum water consistent with good workability and freedom from smearing the face of masonry work. Use no mortar that has stood more than one hour after initial mixing. Mortar less than one hour old shall be reasonably retempered as necessary to maintain its workability, but used before it is one hour old or otherwise discarded. No anti-freeze ingredient or contaminate of any type will be permitted.

Mortar for Pointing Brick and Stone: Shall be ASTM C270, Type O, Cement-Lime Mortar conforming to the proportion specification requirements. (1:2:5-6). See requirements for sand above.

The proportions listed above are Portland cement, lime, damp loose sand, respectively by volume. The proportions are listed only as samples for the required type mortars and shall be modified as necessary, within tolerances, to suit the particular masonry sand being used.

PART 3 - EXECUTION

EXAMINATION

Examine Work of other Section Contractors on which or to which unit masonry is to be built, supported or attached, to determine completeness and proper alignment to receive unit masonry. Do not commence masonry work until all related noncompliant work has been corrected.

Before installation of masonry, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

PREPARATION

Establish lines, levels, and coursing. Protect from disturbance.

Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent bracing.

INSTALLATION, GENERAL

Use full size units without cutting where possible. If cutting is required to provide a continuous pattern or to fit adjacent construction, cut units with motor-driven saws to provide cuts that are straight and true, resulting in clean, sharp unchipped edges of the units. Allow typical cut units to surface dry before laying. Install cut units with cut surfaces and, where possible, cut edges concealed.

TOLERANCES

Dimensions and Locations of Elements: For dimensions in cross section or elevation do not vary by more than minus 1/4 inch or plus 1/2 inch.

For location of elements in plan do not vary from that indicated by more than minus ± 1/2 inch in 20 feet or ± 3/4 inch total.

Lines and Levels: For bed joints, do not vary from level by more than ± 1/4 inch in 10 feet, or ± 1/2 inch maximum.

For horizontal lines, do not vary from level by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or ½ inch maximum.

For vertical lines and surfaces for two course wall, do not vary from plumb by more than 1/8 inch.

For lines and surfaces, do not vary from straight or plane by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.

For faces of adjacent exposed masonry units, do not vary from flush alignment by more than ± 1/8 inch.

Joints: For bed joints, do not vary from thickness indicated by more than ± 1/8 inch.

If the above tolerances cannot be met due to previous construction, notify the A/E.

LAYING MASONRY WYTHES

Lay out walls in advance for alignment of head joints with uniform joint thicknesses and for accurate location of openings, movement joints, returns, and offsets. Maintain horizontal joint plane through all wythes of masonry. Fully bond intersections, and external and internal corners. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

Bond Pattern for All Masonry: Lay masonry in 1/2 running bond. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4 inch horizontal face dimensions at corners or jambs.

Adjusting Units: Adjust the final position of each masonry unit while the mortar is still plastic. To replace or reposition a unit after mortar has begun to set, remove the unit, replace the mortar with plastic mortar, and replace the unit.

Tooling: Tool all mortar joints exposed in the finished work, including the bed joint directly above flashing.

Tool exposed joints when “thumb-print” hard with a round jointer, slightly larger than width of joint and of sufficient length to obtain a straight and true mortar joint. Tooling shall be performed so that the mortar is

compressed and the joint surface is sealed and in intimate contact with the edge of the masonry unit. This may require some craft persons to complete work after normal working hours. All crafts persons involved in the project shall utilize new hardened steel jointers of the same size when beginning to lay masonry on the project.
Stopping and Resuming Work: Stop off horizontal run of masonry by racking back 1/2 length of unit in each course from those in course below. Do not tooth except where necessary around openings. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar.

Built-in Work: As construction progresses, build in items specified in this and other Sections. Include built-in metal frames, anchor bolts, reglets, and other items to be built into the work supplied by other Section Contractors. Bed anchors of hollow metal frames in mortar joints. Build in items plumb and level. Fill in solidly with masonry around built-in items. Use ASTM C 476 grout or job mortar with high flow to slush full voids between masonry and hollow metal door frames.

Cutting and Fitting: Cut and fit masonry units for chases, pipes, conduit, sleeves, ductwork, door and window openings. Cooperate fully with other Contractors to ensure correct size, shape and location.

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 the core.

Fill cores in concrete masonry units directly under lintels with mortar or grout.

Fill cores in concrete masonry units with mortar or grout above and below where portions of anchors are to be installed.

Mortar Bedding and Jointing
For Face Brick: Lay units with filled bed and head joints. Butter ends with sufficient mortar to fill head joints and set into place. Do not deeply furrow bed joints or slush head joints. Head and bed joints will be considered full when the average joint solidity is 90 percent or greater, with no voids in that half of the joint nearest the exterior face of the masonry.
For Concrete Masonry Units: Lay units with face shells fully bedded in mortar and with head joints of depth equal to bed joints. For starting courses on concrete, lay units fully bedded in mortar, including areas under cells.

Bed and head joints in masonry shall be of a nominal 3/8 inch thickness.

MASONRY JOINT REINFORCEMENT
Install entire length of longitudinal wire in mortar bed joints with a minimum cover of 3/4 inch on exterior side of walls.

Do not bend typical continuous masonry joint reinforcement in the construction process.

Lap continuous masonry joint reinforcement ends a minimum of 6 inches.

Space continuous masonry joint reinforcement a minimum of 16 inches on center vertically.

Provide reinforcement no more than 8 inches above and below wall openings and extending 12 inches beyond openings. Such reinforcement is in addition to continuous reinforcement when not coincident.

Interrupt joint reinforcement in a wythe wherever a movement joint occurs.

Provide continuity at concrete masonry wall intersections by using prefabricated T-shaped units or wire mesh with cores filled.

Provide continuity at corners by using prefabricated L-shaped units.

REBUILDING EXISTING BRICK AND STONE MASONRY

Cut out damaged and deteriorated masonry with care in a manner to prevent damage to any adjacent remaining materials.

Support structure as necessary in advance of cutting out units.

Cut away loose or unsound adjoining masonry as directed.

Salvage whole units for reconstruction. Clean bricks of mortar and debris.

Mortar Mix: Colored and proportioned to match existing adjacent masonry assemblies. Allow for multiple matches per building if needed.

Ensure that anchors are correctly located and built in.

Match and align with existing, with joints and coursing true and level, faces plumb and in line.

Prevent mortar from staining face of surrounding masonry and other surfaces.

- Cover sills, ledges, and projections to protect from mortar droppings.
- Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
- Immediately remove mortar in contact with exposed masonry and other surfaces.
- Install built in masonry work to match and align with existing, with joints and coursing true and level, faces plumb and in line. Build in all openings, accessories and fittings.

RE-POINTING EXISTING BRICK AND STONE MASONRY

Perform repointing prior to cleaning masonry surfaces.

Contractor shall inspect all wall areas and quantify repair locations over and above those identified on drawings.

Rake out and repoint joints to the following extent:

- All joints in areas indicated.
- Joints where mortar is missing or where they contain holes.
- Cracked joints where cracks are visible to the eye during routine inspection and of any depth.
- Joints where they sound hollow when tapped by metal object.
- Joints where they are worn back 1/4 inch or more from surface.
- Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
- Joints where they have been filled with substances other than mortar.
- Joints indicated as sealant-filled joints.

Cut out loose or disintegrated mortar in joints to minimum uniform depth of 1 inch or until sound mortar is reached.

Provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, use air jet or flush joints to remove dust and loose debris.

Use power tools only after test cuts determine no damage to masonry units will result.

Pre-moisten joint and apply mortar. Pack tightly in maximum 1/4 inch layers. Form a smooth, compact concave joint to match existing. Moist cure for 72 hours.

Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.

LAYING, PROTECTION AND CLEANING

All masonry shall be in final acceptance condition within 24 hours after laying and shall be maintained in that condition, by meeting or exceeding the degree of cleanliness required, demonstrated on the approved sample panel.

Lay masonry utilizing all necessary care to achieve cleanliness. Remove excess mortar from exposed exterior and interior masonry surfaces as the work progresses and before it tenaciously adheres to the faces of the masonry. Remove mortar protrusions and smears as pointing work is performed and as masonry units are laid and tooled, as scaffolds are raised, and at the start of the next day's work, leaving the surface of the masonry clean and finished. Use calcimine brushes, stiff fiber brushes, other similar masonry units, burlap, rags, carpet remnants, rubber floats, or other approved means. (Cleaning of masonry the morning after laying by the same masons who laid the masonry the previous day, using stiff fiber brushes with or without water and sand, and concentrating on cleaning the field of the masonry units has also been successfully used to achieve an appearance matching or exceeding the cleanliness of the approved sample panel.) **Use of chemical cleaning or harsh physical cleaning will not be permitted**. Included as chemical cleaners and prohibited are most manufactured masonry cleaning solutions or compounds.

Equipment or methods and techniques utilized, reduced productivity, as well as weather conditions experienced will not relieve this Section contractor of required compliance.

Protection shall be provided to prevent mortar spattering and maintain masonry in a clean condition so that the masonry is satisfactory for acceptance when masonry work is completed. This may require covering portions of finished masonry which is below new work in progress with polyethylene, canvas, or other approved means. Cover tops of unfinished walls and new work during inclement weather and at the end of each day's work to prevent moisture entry. Extend covering a minimum of 24 inches down both sides of wall, and hold covering securely in place. Hair-pin type devices frequently spaced have been successfully used in the past. When practical, lay masonry from the top floor down.

No final washdown is required unless removal of earthy construction dirt or dust is necessitated by extremely unusual site conditions.

If any masonry is not cleaned as required by these specifications, or if walls have an unsatisfactory appearance upon completion of work, such violations will require additional work by this Section contractor for producing acceptable masonry at no extra cost to the Owner. This is not to be construed as a Contractor's option. Procedures must be submitted by this Section contractor and samples approved by all other parties to the contract prior to proceeding with such work.
Upon completion of masonry work on exterior walls, inform Contractor so that covers on top of walls installed by this Section contractor can be maintained until roofing and roof edge work has been completed.

ADJUSTMENT
Should any Contractor use or attempt to use chemical cleaning utilizing acid or strong alkali based materials, or should any Contractor use or attempt to use harsh physical cleaning such as sand blasting or pressure water jetting; such actions will be construed as nonperformance causing the Owner damages which shall be liquidated by reducing payment to the Contractor in the amount of $2.50 per square foot of masonry involved.

MASONRY WASTE DISPOSAL
Except for extra stock of face brick required to be turned over to the Owner, excess masonry materials are this Section contractor’s property and shall be removed from the Project site upon completion of unit masonry work.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel angle framing for ceiling penetrations in Mirror Lake Shop Building, see A520.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Structural Drawings: Requirements for metal grating.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.

F. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2022.

G. ASTM F3125/F3125M - 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; 2023.

H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Verify roof insulation thickness at roof ladder locations to confirm ladder dimensions.

B. Information Submittals - Preparatory:
   1. Welders' Certificates: (Upon request) Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

1.05 QUALITY ASSURANCE

A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Angles, Plates and Channels: ASTM A 36/A 36M.

B. Plates: ASTM A283/A283M.

C. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

D. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

A. Angles for framing penetrations through roof structure.

2.04 FINISHES - STEEL

A. Prime paint steel items.

B. Prime Painting: One coat.

2.05 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components as indicated on drawings.

D. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

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

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

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

SECTION 05 52 00
METAL RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Free-standing railings at steps. See detail 5 on A101 for Reedsburg Depot.

1.02 REFERENCE STANDARDS

A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2023.

D. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.

1.03 SUBMITTALS

A. Review Submittals - Preparatory:

1. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Layout shall include fitting wood members as detailed.

1.04 QUALITY ASSURANCE

A. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months.

B. Source Limitations: Obtain each type of interior handrail and railing through one source from a single manufacturer.

1.05 PROJECT CONDITIONS

A. Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Coordinate sequencing and scheduling of installation with Lead Contractor.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.

C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E 935.

D. Allow for expansion and contraction of members and building movement without damage to connections or members.

E. Dimensions: See drawings for configurations and heights.

F. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, splice connectors, flanges, escutcheons, and wall brackets.

2.02 STEEL RAILING SYSTEM

A. Steel Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black and galvanized finish, as indicated. Size as detailed.

B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

C. Exposed Fasteners: Zinc Coated Wedge anchors.

D. Straight Splice Connectors: Steel welding collars.

2.03 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure. Coordinate relationship of wood items specified in Section 06 20 00 to be field installed.

B. Fit and shop assemble items in largest practical sections, for delivery to site.

C. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

D. Fit and shop assemble components in largest practical sizes for delivery to site. Assemble handrails and 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.

E. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

F. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and 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.

G. Welded Joints:

1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.04 STEEL FINISHES

A. Shop duplex coating (galvanize and paint) for fabricated items exposed to the weather including columns and column bases enclosed in masonry piers.

1. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.
2. Prep for paint over galvanize ASTM D6398.
3. Paint using EPS-4 as described in Section 09 91 13.
4. Galvanizer/Duplex coating shop to provide touch up paint to the site.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Field anchor as detailed. Minimize field welding to greatest extent possible.

D. Touch up shop painted items after installation with manufacturers recommended product. Match color.

3.04 TOLERANCES

A. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

B. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

3.05 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

B. Touchup Painting: Clean and touchup painting of field welds, bolted connections, and abraded areas of shop paint.

3.06 PROTECTION

A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the 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

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SECTION 06 10 53.01
MISCELLANEOUS ROUGH CARPENTRY - ROOFING
BASED ON DFD MASTER SPECIFICATION DATED 03/12/15

SCOPE

The work under this section includes all labor, material, equipment and related services necessary to install rough framing and blocking.

PART 1 - GENERAL

In the event that the Contractor wishes to make improvements in materials and/or techniques, or is required to make improvements by his material manufacturer in order to obtain guarantees, he shall make written request stating in full the nature of the proposed changes and stating that the changes, if approved, will be accomplished at no additional cost to contract.

REFERENCES

ALSC PS 20 - American Softwood Lumber Standard.
APA - American Plywood Association.

QUALITY ASSURANCE

Any existing wood decking, framing members, fascia and/or other roof related trim containing more than 19% moisture or showing evidence of rotting, shall be defined as "bad" and removed and replaced with new material. Notify the DFD representative concerning the “bad” areas. Wood replacement costs will be negotiated after bidding and are not to be included in Contractor’s bid, unless noted or specified otherwise.

All lumber used on this project shall be graded by an agency certified by ALSC.

Pressure Treated Plywood and Lumber: These products shall not be specified or provided for use in roofing projects as a substrate material intended to receive mechanical fasteners used to secure metal roof panels, panel clips, metal coping, roof penetration curbs cap and Counterflashing, all other metal flashing, roofing insulation and membrane installations that are a part of the roof system.

The manufacture shall approve of all mechanical fasteners used to secure all roof system components.

PART 2 – PRODUCTS

MATERIALS

Softwood Lumber: ALSC PS20, grade No. 2 or better; 19 percent maximum moisture content, size as detailed or required.

Sheathing: APA certified; CDX fir plywood; PS 1 type.

- Thickness: As detailed or required.
- Bond Classification: Exterior
- Span Rating: 24
- Edges: Tongue and Groove for adjoining units. Square for non-adjoining units.

Fasteners: Sizes and lengths to suit conditions.

Wood to Wood: Double hot-dipped, galvanized nails.

Wood to Concrete or Masonry: Zinc alloy expansion shield or case hardened steel lag.

Wood to Metal: #10 stainless steel sheet metal screws flat heads.

Other products, not specifically described, but required for a complete and proper installation of the work in this section, shall be selected by the Contractor subject to approval by the DFD Project Manager

PART 3 - EXECUTION

INSTALLATION

Refer to the detail drawings included with these specifications. Install material as follows for new or corrective work, where required.

Inspect existing wood deck, remove and replace deteriorated deck with like lumber and thickness material. This work will be accomplished as stated under QUALITY ASSURANCE in this section. Agency Representative shall verify deterioration. Contractor shall take digital photos of all areas and send to Owner as they occur.

Shim, provide and securely fasten all new and existing wood nailers and blocking as detailed or required. Use longest lengths practical to minimize joints; stagger all joints a minimum of 8". Unless noted otherwise all materials shall be fastened using two rows of fasteners @ 24" O.C. staggered.

Where not otherwise required, fasten new sheathing to new and existingstructural components with appropriate fasteners @ 8" O.C. at the edge and 16” O.C. in the field of the sheathing. Gap sheathing 1/16" on all edges prior to fastening.

Curb all roof openings at penetrations through the roof deck (except roof drains, plumbing vents and penetrations/projections to be flashed using pitch pans).

The Contractor shall raise all existing curb and pipe penetrations to be a minimum height above the roof system of 8".

***** END OF SECTION *****

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SECTION 06 30 00
EXTERIOR CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Repair and patching with wood of wood components including but not limited to existing siding (DLSP Park Headquarters, sheet A210), trim, soffit, and existing wood windows.

B. Replacement of existing wood components indicated to be replaced except for those specified in another sections. See Sections 07 46 23, 08 14 01 for components not included in this Section.

C. Opening framing and trim for RASP Shop Louver. See A800.

D. Structural dimension lumber framing.

E. Exposed timber structural framing.

F. Sheathing.

G. Preservative treated wood materials.

H. Concealed wood blocking, nailers, and supports.

I. Screen assembly for screened porch.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 46 23 - Wood Siding: Siding, trim, wood cladding and weather barrier for Poynette State Game Farm Carpenter Shop.

C. Section 08 14 01 - Fabricated Wood Doors: Custom fabricated wood doors to be installed at Devil's Lake State Park South Shore Pump House and Rocky Arbor State Park.

D. Section 08 80 00 - Glazing: Replacing glass pane in existing wood window where indicated.

E. Section 09 91 13 - Exterior Painting: Scrape, patch with non-wood filler, prime and paint of exterior wood components.

F. Section 09 91 23 - Interior Painting: Scrape, patch with non-wood filler, prime and paint of interior wood components.

G. Section 32 31 29 - Wood Fences and Gates: Exterior Fence and Gate at Rocky Arbor State Park.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. PS 1 - Structural Plywood; 2023.

D. PS 2 - Performance Standard for Wood Structural Panels; 2018.

E. PS 20 - American Softwood Lumber Standard; 2025.

1.04 DEFINITIONS

A. Repair: Re-fasten or re-adhere wood members in place, insert wooden plugs and backing where indicated, remove splintered wood per Section 06 30 00. See paragraph titled Repair/Patch in Part 3 of this Section for more detailed requirements.

B. Patch: Fill voids and gaps in wooden assemblies that allow water to collect or pass through the assemblies with non-wood filler prior to painting per Section 09 91 13.

C. Perimeter Joint Sealant: Apply joint sealant at the edge of the indicated assembly and penetrations through the indicated assemblies per Section 07 92 00.

D. Remove and Install New: Includes removal of items or assemblies, replacement of wooden items and reinstallation per Section 06 30 00. See paragraph titled Remove and Install New in Part 3 of this Section for more detailed requirements.

1.05 SUBMITTALS

A. Provide submittal packages that contain all the information identified in the submittal groups identified below. Follow any instructions regarding coordinating submittal timing between submittals of different sections.

B. Review Submittals - Preparatory:
   1. Product Data: Provide technical data on wood preservative materials.
   2. Product Data: Provide manufacturer's product data sheets for post bases, post caps and hangers. Indicate size, coatings, and selected options.
   3. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. Species: Douglas Fir-Larch or Spruce-Pine-Fir, unless otherwise indicated.
   2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
   3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
   4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.02 DIMENSION LUMBER

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Framing (Stud, Joist and Beam).
   1. Lumber: S4S.
   2. Species and Grade: As indicated below.
   3. Machine stress-rated (MSR) as shown below.
   4. See Factory Wood Treatment paragraph below for preservative treatment requirements.

D. Wood Material Specifications:

WOOD MATERIAL SPECIFICATIONS								
SPECIES TYPE	USAGE	Fb	Ft	Fv	$F_{c\perp}$	Fcll	E	Emin
HEM FIR (HF) NO.2	2x8 & LARGER UNO	850	525	150	405	1,300	1,300,000	470,000
SPRUCE-PINE-FIR (SPF) NO.2	2x6 & SMALLER UNO	875	450	135	425	1150	1,400,000	510,000
TREATED SP NO.2 DENSE	PLATES ON CONC. OR CMU	1450	775	175	660	1750	1700000	510,000

E. Miscellaneous Framing, Blocking, Nailers:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 TIMBERS

A. Sizes: Actual sizes as indicated on drawings, Rough (unsurfaced).

B. Moisture Content: S-dry (23 percent maximum).

C. Beams and Posts 5 inches and over in thickness:
   1. Species and Grade: Comply with the following design values in accordance with applicable building code:
      a. Fb-single; minimum extreme fiber stress in bending: 1200 psi.
      b. E; minimum modulus of elasticity: 1,500,000 psi.

2.04 EXPOSED BOARDS, SIDING, TRIM FOR REPAIRS AND REPLACEMENTS

A. Moisture Content: Kiln-dry (15 percent maximum).

B. Surfacing: Match existing adjacent.

C. Species: Match existing adjacent.

D. Size: (In descending order or precedence) As indicated, or match item to be replaced or match existing adjacent of same type.

2.05 CONSTRUCTION PANELS

A. Concealed Roof Sheathing: PS 1 type, rated Structural I Sheathing.
   1. Bond Classification: Exterior.
   2. Span Rating: 24.
   3. Grade C-C.
   4. Edges: Tongue and Groove.

B. Miscellaneous Panels: Plywood, PS 1, Grade C-C, Exterior Exposure. 3/4 inch unless indicated otherwise.

2.06 ACCESSORIES

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
   3. Hardware shall be commercial quality and type of nails, bolts, and screws required to securely hold members in place in accordance with National Design Specification for Wood Construction.
      a. Nails: ASTM F1667.
      b. Wood Screws: ANSI/ASME B18.6.1.
      c. Bolts and Nuts: ANSI/ASME B18.2.1.
      d. Lag Screws: ANSI/ASME B18.2.1.
      e. Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

B. Metal Framing Accessories:
   1. Post Bases, Post Caps, Hurricane Ties, Sloped Hangers: Formed steel components sized and shaped for the indicated assemblies. See sheets A230, A231, A510, A511.
   2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

3. Manufacturers:
    a. Alpine Engineered Products, Inc.
    b. Cleveland Steel Specialty Co.
    c. KC Metals Products, Inc.
    d. Simpson Strong-Tie Co., Inc.
    e. Southeastern Metals Manufacturing Co., Inc.
    f. USP Structural Connectors.

C. Accessory Door Hardware: Where indicated replace existing with new in-kind replacements.
    1. Reference Key Note 16 on A211.
    2. Reference Key Notes 5 & 6 on A241 and A242.

FACTORY WOOD TREATMENT

A. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    1. Comply with requirements of AWPA M4.
    2. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    3. Provide treated lumber at locations indicated on drawings.
        a. See detail 5 A231, 8 A511 and 9 A511.

PART 3 EXECUTION

3.01 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

B. Where wood framing is in contact with concrete or masonry, separate wood with No.15 felt bond break.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.03 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.

E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.

F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.

3.04 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.05 BOLTING / PINNING / SCREWING

A. Bore bolt and pin holes in wood 1/16 inch maximum oversize.

B. Bore holes for screws and lag screws first for the same depth and diameter of the shank and then bore the remainder of the space to be occupied by the threaded portion of the fastener not larger in diameter than the root of the tread. Do not drive screws into place. Install all screws using a screwing action.

C. Provide texture matched and size-matched wooden plugs for bored holes.

3.06 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.07 INSTALLATION OF CONSTRUCTION PANELS

A. Miscellaneous Panels at Vertical and Horizontal Locations: Secure panels to framing members, with ends staggered (where applicable) and over firm bearing.
   1. Screw panels to wood framing. Staples are not permitted.

B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. At long edges provide solid edge blocking where joints occur between roof framing members.
   2. Nail panels to framing; staples are not permitted.
   3. Install in accordance with recommendations of APA.

3.08 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.09 REPAIR/PATCH

A. Re-fasten or re-adhere wood members in place, insert wooden plugs and backing where indicated, remove splintered wood per Section 06 30 00.

B. Core drill existing irregular holes in siding and provide texture-matched and size-matched plug patches fastened to backing board fastened to the inside face of the existing siding. See details 2 A241, 13 A241, and 2 A241.

C. Re-fasten or re-adhere materials to be repaired in a manner that matches existing assemblies.
   1. Provide fasteners that match those used in the existing construction.

3.10 REMOVE AND INSTALL NEW:

A. Unless noted otherwise the terms "Remove" and "Install New" includes the following:
   1. Remove indicated items, including the assocated assembly, if needed, to fit new work to old.
   2. Prepare existing adjacent items by removing unsound portions of the materials in contact with new work and shape the adjacent items to accept new work.
   3. Form new items to match the original existing items indicated to be replaced and shape contact points match to the existing adjacent items.
   4. Re-fasten or re-adhere new work to existing materials.
   5. Prep for patching and perimeter joint sealant.

B. Provide materials texture matched to the existing adjacent materials.

3.11 TOLERANCES FOR

A. Framing Members: 1/4 inch from true position, maximum.

B. Finishes: Match adjoining existing construction to 1/8" inch maximum from the lines and planes of adjoining materials.

3.12 CLEANING

A. Waste Disposal:
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 83 16

FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fiberglass reinforced plastic panels.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern work under this Section.

1.03 REFERENCE STANDARDS

A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2023, with Editorial Revision.

B. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

C. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2022.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

E. ISO 2812-1 - Paints and Varnishes - Determination of Resistance to Liquids - Part 1: Immersion in Liquids Other than Water; 2017.

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
   2. Shop Drawings: Indicate dimensions, adjacent construction, materials, thicknesses, field jointing, tolerances, colors, finishes, integration of adjacent components, and anchorages.
      a. Dimensions shall be field verified at each installation location to ensure factory cut panels fit recommended tolerances at corner joints.
      b. Mark panels to corresponding room installation locations.

B. Review Submittals - Samples:
   1. Samples: Selection and verification samples for finishes, colors and textures. Submit two samples of each type of panel, trim and fastener.

C. Closeout Submittals:
   1. Warranty Documentation.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provider of advanced installer training.

B. Installer Qualifications:
   1. Having completed manufacturer's training.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

1.07 FIELD CONDITIONS

A. Do not begin installation until building is enclosed, permanent heating and cooling equipment is in operation, and residual moisture from plaster, concrete or terrazzo work has dissipated.

B. During installation, and within 48 hours prior to installation, maintain ambient temperature and relative humidity within limits required by type of panel adhesive used and recommendation of panel adhesive manufacturer.

1.08 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace FRP panels that fail within specified warranty period.
   1. Failures shall include but not be limited to substantial defects in material and workmanship, rotting, rusting, corrosion, development of structural surface cracks, or requiring painting or refinishing.
   2. Warranty Period: Ten years from date of Substantial Completion.

B. Installer's standard form in which installer agrees to repair or replace FRP panels that fail due to poor workmanship or faulty installation within one year from substantial completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fiberglass Reinforced Plastic Panels:
   1. Crane Composites, Inc; www.cranecomposites.com.
   2. Marlite, Inc; www.marlite.com.
   3. Panolam Industries International, Inc; www.panolam.com.

2.02 PANEL SYSTEMS

A. Wall Panels:
   1. Panel Size: 4 by 8 feet.
   2. Panel Thickness: 0.10 inch.
   3. Surface Design: Embossed.
   4. Color: As selected by Architect from manufacturer's standard options.
   5. Attachment Method: Adhesive only, sealant joints, no trim.

2.03 MATERIALS

A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
   1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Impact Strength: Greater than 6 ft lb force per inch, when tested in accordance with ASTM D256.
   4. Chemical Cleanability: Excellent chemical resistance to common cleaners and detergents when tested in accordance with ISO 2812-1.
   5. Product Identification: Finish side identification and confirmation of meeting Class A interior finish requirements after installation and while in service, without labels.

B. Adhesive: Type recommended by panel manufacturer.

C. Panel Seam Sealant: Two-part urethane sealant as recommended by FRP panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.
   1. Examine substrate surfaces to determine that corners are plumb and straight, that surfaces are smooth, sound and uniform, that nails or screw fasteners are countersunk, and that joints and cracks are filled flush and smooth with adjoining surfaces.
   2. Do not begin panel installation until substrate surfaces are in satisfactory condition.

C. Do not begin ceiling installation until services above ceiling are complete except for final trim

3.02 INSTALLATION

A. Install panels in accordance with manufacturer's Installation Guide.

B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.

C. Pre-drill fastener holes in panels, 1/8 inch greater in diameter than fastener, spaced as indicated by panel manufacturer.

D. Apply full bed of adhesive to the back side of the panel using trowel recommended by adhesive manufacturer.

E. Apply panels to seams flush and pattern aligned with adjoining panels.

F. Install panels with manufacturer's recommended gap for panel field and corner joints.

G. Drive fasteners to provide snug fit, and do not over-tighten.

H. Place trim on panel before fastening edges, as required.

I. Fill channels in trim with sealant before attaching to panel.

J. Seal gaps at perimeter, between panels and inside corners with specified two part sealant to prevent moisture intrusion.

K. Remove excess sealant after paneling is installed and prior to curing.

3.03 CLEANING

A. Clean components of foreign material without damaging finished surface.

B. Hand rub smooth surfaces with polishing cream.

3.04 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

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SECTION 07 08 00
COMMISSIONING OF THERMAL AND MOISTURE PROTECTION
BASED ON DFD MASTER SPECIFICATION DATED 02/27/15

P A R T 1 - G E N E R A L

SCOPE
This section includes commissioning forms for construction verification and functional performance testing. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Reference
- Submittals

PART 2 - PRODUCTS
- (Not Used)

PART 3 - EXECUTION
- Commissioning Forms
  - CV-07 21 00 Thermal Insulation
  - CV-07 31 13 Asphalt Shingles
  - CV 07 31 24 Granular Coated Steel Shingle
  - CV-07 53 23 Ethylene-Propylene-Diene-Monomer Roofing

RELATED WORK
Section 01 91 01– Commissioning Process

REFERENCE
Applicable provisions of Division 1 shall govern work under this section.

SUBMITTALS
Reference the General Conditions of the Contract for submittal requirements.

Reference Section 01 91 01 Commissioning Process for Construction Verification Checklist and Functional Performance Test submittal requirements.

P A R T 2 – P RO D U C T S

(Not Used)

P A R T 3 – E X E C U T I O N

COMMISSIONING FORMS
Commissioning forms are to be filled in as work progresses by the individuals responsible for installation and shall be completed for each installation phase.

Provide a description of the work completed since the last entry, the percentage of the total work completed for the system for that area and the step of installation or finalization.

Circle Yes or No for each commissioning form item. If the information requested for an item does not apply to the given stage of installation for the system, list it as “N/A”. Explain all discrepancies, negative responses or N/A responses in the negative responses section.

Once the work is 100% complete and the responses to each item are complete and resolved for a given commissioning forms group, mark as complete, initial and date in the spaces provided.

Provide copies of the commissioning forms to the commissioning agent 2 days prior to construction progress meetings.

CV-07 21 00 – Thermal Insulation

Identification/Tag: _____
Location:_____

A) PRE-INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below) 1)	2)	3)	4)
				YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS:		DATE:	

Question Details

1) Product data has been submitted and approved.
2) All materials are as designed, specified, and approved.
3) Materials are undamaged and in original packing.
4) Installation crew is qualified and certified.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

B) INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)									
				1)	2)	3)	4)	5)	6)	7)			
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO			
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO			
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO			
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO			
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO			
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO			
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO			
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO			
❑ CHECKLIST GROUP COMPLETE				INITIALS:	______________				DATE:	______________			

Question Details

1) Substrate is clean with all projections removed and prepared for installation.
2) Insulation installed in specified thickness for each application and type.
3) Insulation is cut to fit around obstructions tightly.
4) Insulation edges are butt tightly and joints are staggered.
5) Friction fit batt insulation is cut to fit between framing members.
6) Faced batt insulation is installed toward warm side of construction.
7) All insulation systems are installed as specified and in accordance with manufacturer's recommendations

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

CV-07 31 00 – Shingle Roofing

Identification/Tag: _____
Location:_____

A) PRE-INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)				
				1)	2)	3)	4)	5)
				YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS:			DATE:	

Question Details

1) Shop drawings, product data and samples have been submitted and approved.
2) All materials are as designed, specified, and approved.
3) Materials are undamaged and in original packing.
4) Installation crew is qualified and certified.
5) Pre-roofing conference has been held (if applicable).

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

B) INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below) 1)	2)	3)	4)	5)	6)	7)
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS:	_______________			DATE:	_______________	

Question Details

1) Substrate is acceptable and prepared for installation.
2) Underlayment installed as specified and in accordance with manufacturer’s written instructions.
3) All wood cants, blocking, curbs and nailers are securely anchored to roof deck.
4) Shingle roofing is installed as specified, in accordance with manufacturer's recommendations.
5) Valley installation method installed as specified (Woven; Closed-Cut; Open).
6) Ridge vents installed as specified.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

CV-07 53 23 – Ethylene-Propylene-Diene-Monomer Roofing

Identification/Tag: _____
Location:_____

A) PRE-INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)					
				1)	2)	3)	4)	5)	
				YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	
				YES NO	YES NO	YES NO	YES NO	YES NO	
❑ CHECKLIST GROUP COMPLETE				INITIALS:		_____		DATE:	_____

Question Details

1) Shop drawings, product data and samples have been submitted and approved.
2) All materials are as designed, specified, and approved.
3) Materials are undamaged and in original packing.
4) Installation crew is qualified and certified.
5) Pre-roofing conference has been held (if applicable).

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

B) SURFACE & INSULATION INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below) 1)
				YES NO
				YES NO
				YES NO
				YES NO
				YES NO
				YES NO
				YES NO
				YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS: _____ DATE: _____

Question Details

1) Substrate is acceptable and prepared for installation.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

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C) MEMBRANE INSTALLATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)					
				1)	2)	3)	4)	5)	6)
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
				YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
❑ CHECKLIST GROUP COMPLETE				INITIALS: _____				DATE: _____	

Question Details

1) Membrane panels sized to minimize field seams.
2) Membrane allowed to rest a minimum of 30 minutes in position prior to seaming.
3) Membrane cleaned per specifications prior to seaming.
4) All field seams a minimum of 3” and rolled perpendicularly to seam with steel roller.
5) Adhered membrane installed as specified and according to roofing system manufacturer’s written instructions (if applicable).
6) All field seams in membrane cleaned and sealed with sealant at conclusion of day.

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

D) FLASHING INSTALLATION & FINALIZATION CHECKS

Date	Description of Work Performed	% Complete	Initials	Questions (See details below)									
				1)	2)	3)	4)	5)					
				YES NO	YES NO	YES NO	YES NO	YES NO					
				YES NO	YES NO	YES NO	YES NO	YES NO					
				YES NO	YES NO	YES NO	YES NO	YES NO					
				YES NO	YES NO	YES NO	YES NO	YES NO					
				YES NO	YES NO	YES NO	YES NO	YES NO					
				YES NO	YES NO	YES NO	YES NO	YES NO					
				YES NO	YES NO	YES NO	YES NO	YES NO					
				YES NO	YES NO	YES NO	YES NO	YES NO					
❑ CHECKLIST GROUP COMPLETE				INITIALS:		_____			DATE:	_____			

Question Details

1) Cured flashing provided at waterdam portion of the roof edge/fascia at all roof perimeters.
2) Totally bond (95 to 100%) all flashing to its substrate and round all exposed corners.
3) A minimum 6” x 6" patch of uncured flashing provided for all T-seams.
4) All field seams in flashing cleaned and sealed with sealant at conclusion of day.
5) Required tests and inspections have been performed and results are acceptable (if applicable).

Negative Responses

Group/ Item	Date Found	Found By	Location	Reason for Negative Response	Resolved	Date Resolved	Resolution
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		
					YES / NO		

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation and vapor retarder in ceiling construction.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 27 00 - Air Barriers: Separate air barrier materials.

1.03 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2023.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

C. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C; 2024.

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.06 SEQUENCING

A. Sequence work to ensure air barrier materials are in place before beginning or continuation of work in this section.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation in Metal Framed Ceiling: Batt insulation with integral vapor retarder.

2.02 MINERAL FIBER BLANKET INSULATION MATERIALS

A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
   4. Formaldehyde Content: Zero.
   5. Facing: Aluminum foil, flame spread 25 rated; one side.
   6. Products:
      a. CertainTeed Corporation: www.certainteed.com.
      b. Johns Manville: www.jm.com.
      c. Owens Corning Corporation: www.ocbuildingspec.com.

2.03 ACCESSORIES

A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation and adhesive.

B. Verify substrate surfaces are flat, free of irregularities or materials or substances that may impede adhesive bond.

3.02 BATT INSTALLATION

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

B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Install with factory-applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

F. Tape insulation batts in place.

G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

H. Tape seal tears or cuts in vapor retarder.

I. Coordinate work of this section with construction of air barrier seal, see Section 07 27 00.

3.03 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water-resistive barriers to be placed behind wood siding at PSGF Carpenter Shop. See sheet A700.

1.02 RELATED REQUIREMENTS

A. Section 07 46 23 - Wood Siding: Overlaying Assembly. See section for mockup requirements.

1.03 REFERENCE STANDARDS

A. AATCC Test Method 127 - Test Method for Water Resistance: Hydrostatic Pressure; 2018, with Editorial Revision (2019).

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.04 SUBMITTALS

A. Product Data: Provide data on material characteristics.

B. Shop Drawings: Provide drawings of special joint conditions.

C. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.05 MOCK-UPS

A. See Section 07 46 23.

PART 2 PRODUCTS

2.01 WATER-RESISTIVE BARRIERS

A. Description: Materials installed behind exterior wall coverings; designed to prevent liquid water from further penetration into exterior wall assembly. Primary materials include mechanically applied sheets; accessory materials include flashings and seam tapes.

B. Air Barrier Sheet, Mechanically Fastened:

1. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for at least 5 hours, when tested in accordance with AATCC Test Method 127.
2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 90 days of weather exposure.
3. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, Class A, when tested in accordance with ASTM E84.
4. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2-1/2 inches wide, compatible with sheet material; unless otherwise indicated.

2.02 FASTENERS

A. Air- and Moisture-Sealing Insulation Fasteners: Preassembled fastener units consisting of sealing washer, screw, and gasketing tube.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions comply with requirements of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

B. Underlap existing weather barriers to remain. Coordinate detailing of existing to new transitions with the A/E following removal of existing siding / mockup.

C. Mechanically Fastened Sheets:
   1. Install sheets in shingle fashion to shed water; align horizontally.
   2. Overlap seams as recommended by manufacturer, 6 inches, minimum.
   3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches, minimum.
   4. Attach to framed construction with fasteners extending through sheathing into framing, and space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.
   5. Install water-resistive barrier over jamb flashings.
   6. Install head flashings under water-resistive barrier.
   7. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.

3.04 FIELD QUALITY CONTROL

A. Owner's Inspection and Testing:
   1. Allow access to work areas and staging.
   2. Notify Owner in writing of schedule for work of this section to allow sufficient time for testing and inspection.
   3. Do not cover work of this section until testing and inspection is accepted.

B. Obtain approval of installation procedures from water-resistive barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

END OF SECTION

SECTION 07 31 13
ASPHALT SHINGLES - SBS POLYMER MODIFIED
BASED ON DFD MASTER SPECIFICATION DATED (08/28/2025)

PART 1 - GENERAL

SCOPE

This Section consists of providing all labor, material, equipment, and supervision necessary to provide a water shedding polymer modified asphalt shingle roof system, complete, in place, as shown on the drawings and specified herein. This Section also includes an SBS Modified Bitumen transition strip at asphalt shingle to metal flashing to EPDM materials as shown on sheet A240.

Installation of Step Flashings
Installation of Shingles at Headwall
Installation of Shingles at Valley
SBS Modified Bitumen Sheet
Workmanship
Cleaning

RELATED SECTIONS

Applicable provisions of Division 1 shall govern work under this Section.
06 10 53.01 – Miscellaneous Rough Carpentry – Roofing – Additional requirements regarding existing substrates and roof carpentry.
07 31 13.01 – Asphalt Shingle Roofing Modifications – Requirements for modifying existing roof at Devil's Lake State Park Concessions Building.
07 63 00 - Sheet Metal Roofing Specialties.

REFERENCES STANDARDS

ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D3018 - Class A Asphalt Shingles Surfaced with Mineral Granules.
ASTM D3161 - Wind-Resistance of Asphalt Shingles.
ASTM D3462 - Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
ASTM D3909 - Standard Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules
ASTM D4586 - Asphalt Roof Cement, Asbestos Free.
ASTM D601 - Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing
ASTM-D6294 - Standard Test Method for Corrosion Resistance of Ferrous Metal Fastener Assemblies Used in Roofing and Waterproofing
ASTM D7158 - Standard Test Method for Wind Resistance of Asphalt Shingles
ASTM D8257 - Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing.
ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials
ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings
ASTM F1667 - Standard Specification for Driven Fasteners
International Building Code (IBC) – Current addition adopted by the State of Wisconsin
NRCA - Roofing and Waterproofing Manual
Underwriters Laboratory (UL) - Fire Hazard Classifications

DEFINITIONS

Manufacturer:
Manufacturer and Supplier are used interchangeably and are the company that assembles the various material products for installation of the roof system.

Roof Assembly:
A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly can include an underlayment, a thermal barrier, insulation, and/or a vapor retarder.

Roof Covering:
The covering applied to the roof deck for weather resistance, fire classification or appearance.

Roof Deck:
The flat or sloped surface constructed on top of the exterior walls of a building or other supports for the purpose of enclosing the story below or sheltering an area, to protect it from the elements, not including its supporting members or vertical supports.

Roof System:
A system designed to weatherproof and improve building thermal resistance. A roof system consists of a roof covering and other interacting roofing components and may include a vapor retarder, thermal barrier, insulation or other similar substrate. The system does not include the roof deck unless it is part of a single component serving as the roof covering and the roof deck.

Roof Ventilation:
The natural or mechanical process of supplying conditioned or non-conditioned air to, or removing such air from, attics, cathedral ceilings or other enclosed spaces over which a roof assembly is installed.

SME:
Subject Matter Expert. DFD's designated expert concerning this building envelope / roofing.

Roofing System Contractor:
The Manufactures "Certified" Contractor who has received Manufacturers training on installing the Roof System Components specified.

GUARANTEE / WARRANTY

The following information shall be included on all guarantee and warranty documents:

State of Wisconsin Agency, city or township, street address where work is performed, building name, DFD Project number, all roof areas involved (denoted by letter or number) as indicated on the drawings, and total square footage of all roof areas involved in the scope of Work.

The Contractors Performance-Payment Bond is only required to apply to this trade section during the construction period and the first year of the guarantee period. Said Bond shall not apply to any extended guarantee period beyond the first year. Such extended guarantees are limited to the applicable Contractor and Manufacturer as herein specified.

STATE OF WISCONSIN GUARANTEE

State of Wisconsin Roof System Guarantee: Provide **five (5) year** written guarantee that warranties all roofing and flashing furnished under the Contract, is watertight and free from defects in materials and workmanship for the duration, as stipulated in the contract-required guarantee form.

The Roofing System Contractor and GPC shall perform a minimum of two (2) roof system inspections during the term of this guarantee. The first inspection shall be approximately two (2) years after the installation date; the second and final inspection shall be performed within the last 6-months of the five (5) year guarantee. The Roofing System Contractor and GPC shall contact the Agency contact to arrange for a site visit date. If available, the Agency contact shall accompany the Contractor(s) during the inspection. The Roofing System Contractor in conjunction with the GPC shall submit written inspection reports by e-mail to the DFD SME and Agency contact within 5 working days after the inspection is performed, and prior to the expiration date of the guarantee.

A copy of the required State of Wisconsin Roof System 5-yr Guarantee form is located at the end of this Section and may also be acquired electronically at :
https://doa.wi.gov/Pages/DoingBusiness/MasterSpec_Div7.aspx

The General Prime Contractor and all sub-contractors shall review the guarantee and requirements of this section prior to submitting a Bid for all Work.

ASPHALT SHINGLE MANUFACTURER MATERIAL WARRANTY

Manufacturer's Standard Pro-Rated Material Warranty: Provide shingle manufacturers' standard minimum **forty (40) year** guarantee against material defects.

The following information shall be included on all guarantee and warranty documents:
State of Wisconsin (Owner), Agency, city or township, street address where work was performed, building name, Owner Project number, Owner (DOA) building number, all roof areas involved and total sq. ft. area of all roof areas.

Include and provide all product(s), labor and installation methods necessary and as specified herein, including manufacturer requirements not found specified herein, as required by the manufacturer to obtain the specified warranty requested herein.

Existing re-installed and new metal flashing and new wood blocking mechanical securement shall be covered in the State guarantee but not the manufacturer system warranty specified herein.

QUALITY ASSURANCE

Roof System shall be applied by Manufacturer's "certified" roofing applicator familiar with products and their current installation procedures.

Follow the Manufacturers current written instructions regarding application and storage except where superseded by more stringent requirement specified herein.

If the Roofing System Contractor wishes to make improvements in materials and/or techniques or is required to make improvements by the manufacturer to obtain guarantees/warranties, he shall make written request stating in full the nature of the proposed changes and stating that the changes, if approved, will be accomplished at no additional cost to contract.

The Roofing System Contractor is required to have been in business for a minimum of three years, and within the past three years, the Roofing System Contractor shall be able to document the successful completion of a minimum of three projects of similar size and / or scope as compared to the Work as specified in this Section. Backup documentation / verification shall be a submittal requirement.

All system components required by the Manufacturer, included in construction documents or otherwise, shall be provided and installed by the Contractor to achieve the Manufacturer's warranty. Manufacturer required components not specified in construction documents shall need written approval and be required as part of the submittal package. System components listed in the construction documents but not otherwise warranted by the Manufacturer, shall be upgraded to achieve Manufacturer warranty at time of bid, if not listed herein. **Components installed that do not meet the above-listed criteria shall be cause for rejection of work**.

The Roofing System Contractor shall provide all equipment recommended by the Manufacturer for proper installation of the materials specified.

The Roofing System Contractor shall take multiple digital photos daily and throughout the duration of the Project. All photos shall be identified by the roof area where the photos are taken. These include but are not limited to:

- existing conditions,
- various stages of demolition,
- the entire installation starting at the roof deck and continuing throughout all roof system layers, various metal flashing details, transitions, penetrations, penetration height

changes, over-all views of the field, all roof areas in difficult watertight locations, and mechanical fastening that is hidden from view, or otherwise concealed beneath the completed work,

- completed Work.

WORK SEQUENCE

Sequence all work with the other Work of the contract, so as not to necessitate construction traffic from this or other trades over unprotected roof assembly surfaces.

Coordinate the Work with the installation of associated envelope, air and / or vapor barriers, screening, mechanical, roofing, waterproofing, flashings, and roof accessories, specified under other sections, as the Work of this section proceeds.

Sequence the Work to prevent any unnecessary deterioration of installed roofing assembly elements, by minimizing the use of newly constructed and existing roof assemblies for storage, walking surface, and equipment.

JOB CONDITIONS

The GPC shall maintain at the jobsite at least 1 copy of the latest version of the Manufacturers installation manual/ handbook, including details and technical information concerning application techniques, for all primary roofing system materials required by the work. The GPC shall also maintain at least one copy each of the construction set specification and drawings, "Request for Information" (RFI), "Construction Bulletin" (CB) and "Change Order" (CO) documents, and all other approved signed submittals throughout construction. Documents shall be stored and readily accessible to the Roofing System installation crews.

The Roofing System Contractor shall maintain, at the jobsite, at least one physically accessible copy of the Safety Data Sheets (SDS) manual, for all Roofing System materials used on this Project or stored on the jobsite.

Work, once begun, leaves the building subject to leakage and therefore it must be considered in a state of emergency when weather threatens. The existing building shall be protected by the Contractor from moisture entering through any roof or parapet area (even in unforeseen weather conditions), for the life of the Project, and for maintaining a weathertight condition during the entirety of construction. **The GPC shall be responsible for all damage to property due to moisture infiltration**.

An effective watertight seal between existing roofing and new roofing is required at the end of each day's work. Temporary seals shall be removed upon installation of new permanent work.

Load roofing debris directly into trucks by means of approved chutes or other controlled means. Throwing or dropping shall not be permitted. All such gravel, rubbish, debris, etc. shall be removed from the site and disposed of by the GPC. All debris / material shall be controlled to prevent uncontrolled exiting from roof level. All debris shall be picked up continuously to prevent straying. Avoid damaging property as much as possible by limiting the number of locations where trucks may be loaded. **The GPC shall be responsible for all damage to property.**

DELIVERY, STORAGE, AND HANDLING

The Roofing System Contractor shall make no deliveries to the Project site until a storage area has been identified for the Project, and the DFD's Project Representative and the user Agency Representative has approved onsite deliveries. The State shall not accept delivery, nor shall the State be responsible for any materials or equipment stored on the premises.

Deliver materials in original unopened containers of packaging clearly labeled with Manufacturer's name, brand name, instructions for use, all identifying numbers and UL labels. Labels shall be maintained throughout the duration of the Project.

Materials used on the job shall be stored in such a manner as not to create a nuisance or hazard.

Materials shall be stored on clean, raised platforms, with breathable, weather protective covering when stored outdoors. The Roofing System Contractor shall provide continuous protection from all materials, against weathering and exposure to moisture.

Store and handle all materials in a manner which does not damage the material. Materials contaminated with any foreign substance shall constitute damage. All damaged materials shall not be considered suitable for installation and shall be rejected and removed from the jobsite.

Adhesives, primers, coatings, sealants, and similar materials shall be stored in compliance with the temperature set by the Manufacturer of that specific product.

Store flammable products away from any ignition source – sparks, open flame, etc.

Select and operate material handling equipment that allows for the safe storage of materials. The Roofing System Contractor shall replace or make good any damage, loss, or injury caused by the improper use of material handling equipment. Do not use material handling equipment in a manner which overloads any portion of the building.

Storage of materials on completed work or within the building is prohibited.

SUBMITTALS

All submittals shall be in electronic format. The GPC shall upload accepted submittals in eBuilder.

Prior to the start of Roofing System work, electronically submit to the A/E for review and acceptance. The following submittals as required herein:

List of all materials proposed for use on the project, starting at the roof deck and identified by manufacturer's name, size, thickness, type or grade. List shall be submitted on Roofing System Contractor's letterhead stationery. The Roofing System Contractor shall state the following at the bottom of the material list submittal: "**New products installed on this project do not contain asbestos**".

Manufacturers current product data sheets for supplied products with specific product size/thickness noted.

Shop drawings showing any proposed detail/specification changes as required to obtain the specified warranty.

The manufacturer's most current version of installation and detail manual edited to include only the system being installed. Manual to include fastening location and shingle layout (offset).

Manufacturers certification that Contractor has received training and is certified by the Manufacturer to install specified products.

Roofing System Contractors Project Specific Quality Assurance Plan, at a minimum the plan shall include:

- Project name, address, number, manufacturer and subcontractor(s)
- Project scope and approach to project
- Emergency contact information

- Project Quality Assurance Manager name (Office) and role
- Project Quality Control Manager name (On-site) and role
- Project personnel and certifications
- Inspections and tests to be performed, by whom and when
- Control of nonconformance items to protect the quality of the installation
- Project completion inspections.

The GPC shall submit in eBuilder a Site-Specific Safety Report prior to or no later than 5 working days from the preconstruction meeting, describing in detail the Roofing System Contractor's implementation of specific OSHA regulations, worker safety program methods / means, roof perimeter safety and identification of the "watch person" required at all roof levels. Identify fire extinguisher and their locations, all equipment/operators on roof/ground in setup/storage area and travel routes used while performing the work.

The GPC is responsible for all Category I Non-Friable Asbestos Containing Material (ACM) disturbed within the roof assembly during any and / all facets of this project. Contractor shall submit electronic copies of test results including a drawing indicating locations where test samples are taken. Contractor replacing the roof system is required to take a minimum of two samples of existing roof system(s) components encountered starting at the roof deck including existing vapor retarder, to be sent to an accredited testing lab. Take one sample at the base flashing and one sample from the field of the roof. Additional samples are required where roof areas are not of the same roof system or installation period. Each test result shall properly identify the Owner Project Number, project location, building name, building number & roof area / location where the test sample was taken. Laboratory fees and associated removal and disposal charges shall be the responsibility of the Contractor at no additional cost the project.

The samples must be collected by an Asbestos Inspector or Exterior Asbestos Supervisor with current accreditation as required by DHS 159. The Contractor shall have certified staff or hire an accredited third-party consultant at no additional cost to the project.

Any impact of asbestos materials or assumed asbestos materials, must be conducted by workers properly trained and currently certified in accordance with DHS 159.

The GPC shall submit an electronic copy of the necessary regulatory notification for asbestos removal or an electronic copy of test results indicating the roofing materials intended for removal do not contain asbestos. (Refer to General Requirements Article "HAZARDOUS SUBSTANCES – ASBESTOS, LEAD AND POLYCHLORINATED BIPHENYLS (PCB'S)" for additional information.)

Laboratory results must be submitted prior to start of work.

SAMPLES

The Roofing System Contractor shall submit representative samples of available shingle colors for selection by the A/E. Deliver sample(s) where directed.

MOCKUPS

None required.

INSTALLATION MEETING

Prior to the start of construction, the GPC shall schedule an installation meeting. It is required that the GPC's Project Manager and Superintendent; and Roofing System Superintendent and/ or Foreman attend an installation meeting. Coordinate attendance with these representatives: DFD Project Representative,

SME, the user Agency contact, and the A/E. All required and accepted submittals for this Section and related work shall be uploaded to eBuilder prior to the meeting.

For buildings with radiant heating cables for roofing, the General Prime Contractor shall set up a meeting between the Roofing System Contractor, radiant heating cable installers and other contractors as required to coordinate the attachment and final location of the radiant heating cable for roofing system.

PART 2 - PRODUCTS

PERFORMANCE REQUIREMENTS

Roof Assembly shall have a UL Class A Fire Hazard Classification. All exceptions shall be approved in writing by the DFD SME.

MANUFACTURERS AND MATERIALS

All products installed on this Project shall be compatible with one another and approved by the Manufacturer for use in the Manufacturers tested roof assembly / system.

Unapproved Manufacturer products installed on the Project shall be cause for rejection of the roof system in its entirety and shall be completely replaced at no cost to the Project.

Use of salvaged materials shall be considered cause for rejection of the roof system in its entirety and shall be completely replaced at no cost to the Project, unless specified herein. Salvaged or used materials are unacceptable and shall be removed from the Project site.

LAMINATED ARCHITECTURAL POLYMER MODIFIED ASPHALT SHINGLE: Multi-layer UL Class A asphalt shingle consisting of a fiberglass reinforcement mat, impregnated and coated on both sides with SBS polymer modified asphalt. Shingles shall be surfaced with mineral granules embedded in the coating and have a factory-applied adhesive for self-sealing after installation. Shingles shall have algae protection technology against blue-green algae discoloration. Shingles shall meet or exceed the following standards: UL 2218 Class IV, ASTM D3018 Type 1, ASTM D3161 Type 1 Class F, ASTM D3462 and ASTM D7158 Class H. Material shall bear label(s) indicating compliance. All shingle bundles shall have the same lot number. Color as selected by the Agency from the Manufacturers standard colors.

HIP and/or RIDGE SHINGLE: Shingle manufacturers UL Class A asphalt shingle approximately 12 inches wide consisting of a fiberglass reinforcement mat, impregnated and coated on both sides with SBS polymer modified asphalt. Shingles shall be surfaced with mineral granules embedded in the coating and have a factory-applied adhesive for self-sealing after installation. Shingles shall have algae protection technology against blue-green algae discoloration. Shingles shall meet or exceed the following standards: UL 2218 Class IV, ASTM D3018 Type 1, ASTM D3161 Type 1 Class F, ASTM D3462 and ASTM D7158 Class H. Color as selected by the Agency from the Manufacturers standard colors.

STARTER SHINGLE: Shingle manufacturers pre-formed starter, minimum 2 inches wider than field shingle exposure.

ICE & WATER PROTECTION MEMBRANE: Shingle manufacturers high-temperature rated, granular-free surface, self-adhering modified bitumen sheet with a polyethylene surface. Designed for use under asphalt shingle and metal roofing, Minimum 40 mils thick with a minimum service temperature rating of 250^0 F. ASTM D-1970.

SYNTHETIC UNDERLAYMENT: Shingle manufacturers premium breathable synthetic underlayment designed for use on roof decks as a water-resistant layer beneath asphalt roofing shingles. Underlayment to have a minimum moisture vapor transmission of 15 perms per ASTM E-96. Underlayment to be a component of a UL Listed ANSI/UL 790 Class A System when used with UL Class A shingles. Material shall bear label(s) indicating compliance.

SHINGLE NAILS: Galvanized, stainless-steel, aluminum or copper roofing nails with 11- or 12-gauge shank and 3/8" head. Nails to be of sufficient length to penetrate plywood deck or, a minimum of one inch into wood board deck. Nails shall comply with ASTM F1667.

RIDGE VENT: Shingle over ridge vent: Shingle manufacturers ridge vent manufactured from polypropylene with integral reinforcement. Capable of securing specified ridge shingle to vent with nails without breakage. Vent to have an internal weather filter, 18 sq. in. of net free area per lineal foot, external wind baffles with weep holes and weathertight end plugs. Tested to resist wind driven rain up to 110 mph.

SBS MODIFIED BITUMEN SHEET: Base sheet and cap sheet used for lapping over metal ridge flashing for transition to shingles per detail 7 on sheet A240. Provide products approved by manufacturer and compatible with manufacturer's warranty requirements. Cap sheet: SBS polymer modified granule-surfaced fiberglass cap sheet, ASTM D3909. Color coordinate granules color for compatibility with the shingles selected by Owner. Base sheet: SBS Polymer Modified Fiberglass Base Sheet, ASTM D4601, Type 2.

STATIC VENT: Galvanized construction with non-corrosive internal screen and a slant back. Vent to provide 50 sq. in. of net free area per vent. Color as selected by Agency.

MISCELLANEOUS

Retrofit Pipe Flashing: Pre-molded split polymer boot integrally locked into a rigid aluminum base flange. Stainless steel clamps to secure split watertight. Use only where pipe flashing cannot be slid over top of pipe.

Pipe flashing: All-steel weatherproof pipe flashing. 2-piece with a telescoping sleeve that allows for varying pipe heights as well as roof and pipe expansion and contraction. Top telescoping sleeve shall grip the pipe and form a weather-tight seal.

Plumbing Vent Pipe Extension: Prefabricated plumbing pipe extension. OMG Tubos Vent Pipe Extension or equal.

Plastic Cement: ASTM D4586, Type II. Product shall be asbestos free.

Flashing Tape: Minimum 4-inch-wide self-adhering tape with a polypropylene film surface and non-asphaltic, butyl-modified adhesive. Minimum 20 mil thickness. Where required to obtain adequate adhesion, use manufacturer's recommended primer.

Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A or O; FS TT-S-00230C, Type II, Class A; one-part polyurethane base, elastomeric joint sealing compound such as Sika Chemicals "Sikaflex 1a", Sonneborn-Contech "Sonolastic NP1" or Tremco "Vulkem 116" or "Dymonic".

Other products, not specifically described, but required for a complete and proper installation of the work in this section shall be selected by the Contractor subject to approval by Owner.

PART 3 - EXECUTION

EXAMINATION

Examine the areas and conditions under which work in this section shall be installed. Notify the DFD's Project Representative and GPC of any conditions detrimental to the proper and timely completion of the Work (safety or otherwise). The Roofing System Contractor shall not proceed until the unsatisfactory conditions have been corrected.

The Roofing System Contractor to inspect the underside of the structural deck for spray-applied insulation or fireproofing, as well as interior components attached to the deck. Notify DFD's Project Representative, GPC and A/E of such items that could be damaged or dislodged from deck during normal construction activities. The Roofing System Contractor shall take every precaution to prevent damage to or, the release of components from the interior building envelope during construction. The GPC is responsible for all damage to the building interior or its contents that occur as a direct cause of the Work, and due to the Roofing System Contractors methods and mean practice to accomplish the Work required herein.

SITE CONDITIONS

NOTE: Proceeding with the work shall signify the Roofing System Contractor's acceptance of the substrate that is to be covered by this Work.

Apply roofing materials in dry weather. All roofing materials installed during a rain/ snow/ precipitation event shall be removed and replaced with dry materials at the Roofing System Contractor's expense.

Do not apply roofing if the ambient temperature is below 32 degrees Fahrenheit. Installation of any roofing material at an ambient temperature below 32 degrees Fahrenheit shall be rejected.

The GPC shall provide special protection or avoid any heavy traffic on work to remain.

Existing materials designated to remain, which are damaged or defaced prior to the installation of new Work, shall be replaced at the GPC's expense to like new condition. Do not store equipment or materials on completed work.

Extend plumbing vent stacks as necessary to provide a minimum height of 8" above the finished roof surface. Adjust existing stack height as required so that the joint between the extension and the existing pipe occurs below the roof flashing.

Install all rooftop mounted equipment in a Manufacturer approved, watertight manner, and repair any damage to sheet metal or other components related to connection and protection of the roof system.

Prevent materials from entering and clogging gutters and conductors including those drains on adjacent low slope roof areas.

Protection of surfaces: Take every precaution to prevent water leakage, or debris falling into the building interior, or other such occurrences. Contractor is responsible for any and all damage to the building interior or its contents that occur as a direct cause of the Work and due to the Contractors methods and mean practice to accomplish the Work required herein.

Wall surfaces shall be protected with tarpaulins or other suitable cover to prevent damage, staining or discoloration that might result from operations such as removal, disposal, replacement or removing of equipment or materials to the roof surface. Windows, doorways, docks, walkways, etc. may require special protection measures.

SUBSTRATE PREPARATION

The Roofing System Contractor shall verify that the substrate is clean, dry, free from sharp projections and depressions, and that all surfaces and site conditions are ready to receive new materials. All areas shall be void of moisture and all other debris prior to the start of Roofing System construction.

The Roofing System Contractor shall take whatever action is necessary to prevent dirt, debris, and toxic fumes from entering the building during the Work required by this Section.

The Roofing System Contractor shall verify that existing decking, wood blocking, curbs, and nailing flanges are securely anchored, and that roof openings and penetrations are in place, set, and braced.

The Roofing System Contractor shall notify the DFD Construction Representative, GPC and the A/E if the existing deck has uncovered holes, is found to be improperly fastened, deteriorated, decayed, or deformed, or in any way preventing proper installation or drainage of the new system.

INSTALLATION OF ICE & WATER PROTECTION MEMBRANE

Existing system nail and/or staple fasteners shall be removed during demolition, not hammered into the decking. Clean and prepare the existing deck to receive the new roof system.

Install per specifications and in accordance with the manufacturer's additional detailed instructions, directly to the deck substrate as follows:

Extend ice & water protection membrane down fascia a distance that will be covered by fascia metal, drip edge, or gutter.

Extend up slope from eave a minimum of 6 feet.

Provide full width sheet of ice & water protection membrane centered down entire length of valley. Ensure the membrane is tightly pressed into valley line. Extend down and overlap onto ice & water protection membrane at eave.

Overlap horizontal laps a minimum of 3-inches and end laps a minimum of 6-inches.

At intersecting wall lines apply a minimum 18-inch-wide sheet, entire length of wall, that extends up the wall 6-inches. Prime wall if necessary to achieve bond to wall. Seal top of ice & water backup protection membrane to wall.

After installation of valley metal, seal edges of metal with minimum 4-inch width strip of ice & water protection membrane or flashing tape.

After installation of eave metal provide a minimum 4-inch wide strip of ice & water protection membrane or flashing tape adhered to underlying ice & protection membrane and eave metal deck flange.

INSTALLATION OF SYNTHETIC UNDERLAYMENT

Clean the entire roof surface to remove loose nails, staples, granules, wood dust/particles and other debris prior to installation of underlayment.

Install one layer of synthetic underlayment parallel with eave over the entire roof deck area including over self-adhering ice & water backup protection membrane. Overlap horizontal laps (side laps) a minimum of 2-inches, overlap vertical joints (end laps) a minimum of 6-inches. Offset all vertical joints.

Install synthetic underlayment over edge metal along eaves.

Install synthetic underlayment under edge metal along rakes.

At hips and unvented ridges overlap synthetic underlayment a minimum of 6-inches from each side.

At vented ridges cut synthetic underlayment even with opening in ridge.

At intersecting wall lines extend synthetic underlayment up the wall 6-inches. Seal top of synthetic underlayment to ice & water backup protection membrane and wall.

Seal synthetic underlayment watertight to penetrations.

At valleys, cover ice & water protection membrane with synthetic underlayment.

Lay smooth without wrinkles. Secure underlayment sufficiently until shingles are installed. Do not use synthetic underlayment as a temporary roof. Provide shingle roof covering at the end of each day.

INSTALLATION OF POLYMER MODIFIED ASPHALT SHINGLE:

Clean the entire synthetic underlayment surface to remove loose nails, staples, granules, wood dust/particles and other debris prior to installation of asphalt shingles.

During application take precautions not to scuff, mar or in any way damage the shingle surface. Replace damaged shingle(s) immediately.

Provide manufacturers' starter course along eaves and rakes. Install starter course 1/2" beyond eave and rake metal edge with self-sealing strip toward outer edge.

Layout and fasten starter course approximately 12" o.c. and 2 to 3 inches up from outer edge. Ensure joints of starter course and fasteners do not occur at joints of overlying shingles.

Apply shingles up and diagonally across the roof surface with the manufacturer's specified shingle off set and exposure to the weather. Keep shingle courses straight and in alignment during application.

Do not use shingles less than 12-inches in width.

Roofing System Contractor to observe shingle installation during application to ensure uniform color blending and alignment. Replace shingles as necessary as determined by the SME, Division Representative and A/E.

Attach shingles with a minimum of 4 nails per full shingle, located in the Manufacturers specified fastening area.

Drive nails perpendicular to deck surface and flush with the shingle surface in the manufacturers specified fastening area. Do not install nails above or below fastening areas, crooked, under-driven or over-driven breaking surface of shingle with nail head. Do not drive nails into cracks in the roof deck. Immediately replace the affected shingle with improper nailing.

Check coursing periodically throughout installation and re-align as required by use of a chalk snap line to provide a proper, straight and true vertical and horizontal installation, per manufacturer instructions.

Re-check coursing prior to reaching the ridge and adjust to allow equal shingle exposure after shingle over ridge vent and/or shingle ridge caps are installed.

INSTALLATION OF PIPE FLASHINGS

Flash all penetrations as shingling progresses up the slope of the roof.

Plumbing Vent Flashing:

Install shingles up past pipe penetration to a point that the next 2 courses will cover the upper flange. Seal shingles to pipe prior to installation of pipe flashing. Cut shingles neatly around pipe penetration and flashing.

Check that plumbing vent extends 2 to 5 inches above base sleeve of flashing. Adjust pipe height as necessary.

Provide pipe flashing centered over pipe, adjust flashing if pitch adjustment is required. Secure flashing to roof deck using available slots in flange. Seal top of fasteners with cone shaped sealant.

Fixed Top Pipe Flashing:

Use appropriate split boot flashing interlaced and stepped in with the shingles.

Set preformed flange in a light layer of plastic cement and fasten along all edges. Shingles shall overlap upper and sides of preformed flange, trim neatly around and set in a light layer of plastic cement.

Leave the lower part of flange exposed. Cover exposed fasteners with cone shaped sealant.

INSTALLATION OF HIP SHINGLES

Cut field shingles even with hip taking care not to cut underlayment.

Provide a starter layer of hip shingles, with a full adhesive strip towards lower portion of hip.

Provide a single layer of manufacturers specified hip shingles along the entire hip at recommended exposure. Trim the bottom of hip shingles even with eaves.

Apply hip shingles centered on hip with straight, even coverage along each side of hip.

Fasten each hip shingle with two (2) nails, one each side, of sufficient length to penetrate plywood deck or, a minimum of one inch into wood board deck. Install nails approximately one inch up from edge and covered by the overlying shingle but not past the sealant strip.

INSTALLATION OF RIDGE SHINGLES

Cut field shingles even with non-vented ridge or, opening in ridge having a ridge vent installed, taking care not to cut underlayment.

Provide ridge vent the full length of the ridge. The cut-to-fit section, as required to fit the ridge length, shall not be the first or the last section installed. If opening in ridge extends beyond the area over heated (insulated) space, seal off opening at unheated portion, with a strip of ice & water protection membrane sealed to last shingle course.

Starting at the opposite direction of prevailing winds, provide a starter layer of ridge shingles, with adhesive strip towards exposure.

Provide single layer of manufacturers specified hip shingles along the remaining ridge at recommended exposure.

Fasten each ridge shingle with two (2) nails of sufficient length to penetrate plywood deck or a minimum of one inch into wood board deck. Install nails approximately one inch up from edge and covered by the overlying shingle but not past the sealant strip.

INSTALLATION OF STEP FLASHINGS

Provide individual flashing over each course of shingles including starter course. Fasten each flashing piece to the roof deck along top edge with 2 fasteners.

Along sidewalls provide a prefabricated kickout diverter flashing piece to divert water away from wall and where applicable, into gutter.

Each flashing piece to overlap the previous by 2" and placed just up the roof for the exposed edge of the shingle that will overlap it, so that it is not visible when the overlapping shingle is installed.

Shingle covering flashing shall trimmed ¼" away from the vertical leg of the flashing and be set in a light application of plastic cement.

Seal top of step flashing and kickout diverter with flashing tape adhered well to wall and flashing.

INSTALLATION OF SHINGLES AT HEADWALL

Provide shingles up the roof until a course(s) must be trimmed to fit at the base of the vertical element (curb, wall, chimney, etc.)

The last course shall be trimmed so that a maximum of 4-inches extends above exposure line.

Seal top edge watertight until apron flashing is installed.

INSTALLATION OF SHINGLES AT VALLEY

Open style valley shall have 8" minimum metal exposure at eave and 6" minimum metal exposure at ridge.

Shingles entering valley shall be long enough to secure to deck without penetrating valley metal.

Neatly trim shingles overlapping valley metal in a straight line. Remove one-inch from the upper corner of the shingle on a 45^0 angle to direct water into the valley. Take care as to not scratch or cut valley metal.

Lightly apply plastic cement to the valley metal and the previous course of shingles.

SBS MODIFIED BITUMEN SHEET

Base sheet and cap sheet used for lapping over metal ridge flashing for transition to shingles per detail 7 on sheet A240. Install products approved by manufacturer and compatible with manufacturer's warranty requirements to transition from metal flashing at ridge to asphalt shingles. Adhere base sheet over top of metal flashing and to asphalt shingles at perimeter of flashing. Adhere cap sheet over base sheet.

WORKMANSHIP

The following items may be cause for rejection or repair in whole or part of the roof system. Corrective action necessary will be determined by the SME, Division Representative and A/E.

- Wrinkles in the Asphalt Shingle Roof System
- Blistering of Asphalt Shingles of any size;
- Delamination or warping of installed material from any surface;
- Delamination of flashing from any adhered surface;
- Improper nailing
- Cuts, holes, tears, punctures, or damage to the Asphalt Shingles or flashing of any kind.

CLEANING

Inspect this and adjacent roof systems, gutters, downspouts, and the grounds below the work area and remove debris associated with this Project.

Repair or replace defaced shingle or disfigured finishes caused by Work in this Section. In areas where finished surfaces are soiled by any source caused by Work of this Section, consult with Manufacturer for cleaning advice, product recommendations, and conform to their instructions.

***** END OF SECTION *****

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STATE OF WISCONSIN
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES DEVELOPMENT (DFD)
DOA-4522 (R10/01/12)

Mailing Address: **Post Office Box 7866, Madison, WI 53707-7866**
Street Address: **101 E. Wilson Street, 7th Floor, Madison, WI 53702**
Phone: **608 / 266-2731**; *FAX*: **608 / 267-2710**
http://www.doa.state.wi.us/DFD

State of Wisconsin - Roofing System 5-yr Guarantee

State Agency/Location/Address _____

Building Name _____Bldg. No. _____Roof Area(s) _____

D.S.F. Project No. _____Project Total Sq. Ft. _____Manufacturer _____

Type of Roofing System _____Prime Contractor _____

Shingle Warranty Registration No._____ Warranty web site _____

Date of Completion _____ State Guarantee Starts_____State Guarantee Expires _____

List Additional Manufacturer Warranty and/or Guarantee Submittals Required

(submit all of the additional warranty/ guarantees required at the same time along with this guarantee)

Total System Warranty -Yes ☐ No ☐ Membrane Warranty -Yes ☐ No ☐ Metal Guarantee -Yes ☐ No ☐

Subject to the terms, conditions and limitations stated herein, we, the undersigned hereby jointly and severally guarantee that the roofing system installed on the above named building, will remain in a watertight condition, free from leaks and defects in materials or workmanship, for a period of five (5) years from the date of completion; and that we will at our expense, make or cause to be made such permanent repairs to said roofing system having defects in any of the materials and workmanship applied by or through the undersigned, as may be necessary to restore to compliance with the specifications or replace said roofing system in a water tight condition without defects as hereinafter defined. **Contractor shall perform a minimum of two (2) roof system inspections during the term of this guarantee with final inspection performed within last 6-months of term. Submit written inspection/repair and location reports to DFD Project Manager and Agency Representative.**

This guarantee is made subject to the following terms and conditions: The term "defect" shall include leak(s), faulty installation, installation of other than specified materials, and the following,

- Built-Up and Modified Bitumen Roofing Systems: Ridges, blisters, buckles, wrinkles, fishmouths, voids or splits in the membrane or bituminous flashings, slippage of components, insufficient attachment of vapor retarders and/or insulation, deteriorated insulation, sound barrier components, bare spots or inadequate coverage by aggregate or protective coating, and loose sheet metal.

- Single Ply Membrane Roofing Systems: Defective and/or excessive deterioration of the roofing sheet or flashing, inadequate or failed perimeter restraint to include wood blocking, insufficient attachment of vapor retarders and/or insulation, deteriorated insulation, insufficient or deteriorated ballast and loose sheet metal.

- Shingle/Tile/Slate Roofing Systems: Broken, cracked, split, curled, spalled, blistered, unsealed or otherwise deteriorated shingles, tile or slate units, non-seated, non-secure nails/fasteners backing out or exposed, wrinkled underlayment; installation on loose, buckled or deteriorated sheathing/decking.

- Cold Liquid-Applied Membrane System: Improper surface preparation, premature or excessive deterioration in mil. coating, bare spots, insufficient mil coverage, non-adherence of membrane, blistering, air pockets or cratering in membrane, fasteners backing out, loose or exposed and loose sheet metal.

- Metal Roofing Systems: Loose components/fasteners, excessive buckling, oil-canning, and damaged finish.

- Sheet Metal Roof Flashing- Skylight Panels: Loose, unsecured metal flashing, panels and associated cleats, anchors, clips, wood blocking, fasteners, inadequate, improper, loose and sealant.

The term "roofing system" shall mean all the materials above the structural roof deck associated with the roof system that are furnished under this contract and the workmanship for installing such materials as required per the manufacuture's installation instructions to achieve a watertight system.

No work will be done on said roof by the State, including, but without limitation, work in connection with flues, vents, drains, sign braces, antennas, railings, platforms or other equipment fastened to or set on the roof, and no repairs or alterations will be made to said roof, unless the undersigned are first notified and given the opportunity to make the necessary roofing application recommendations with respect thereto, and such recommendations are complied with by the State. Failure to observe this condition shall render this guarantee null and void.

In the event leak(s) or defects should occur, the User Agency shall notify the undersigned parties in writing at the addresses listed below within thirty (30) days of discovery of leak(s) or defects. If repairs are not initiated within ten (10) days from the date of receipt of written notice that leaks or defects exist, the State is hereby authorized to have repairs made to the roofing system as is required without invalidating this guarantee, and the undersigned agrees to pay all costs for repair or replacement of leak(s) or defects in roofing system within thirty (30) days from the date such repairs or material replacement have been completed and approved by the State.

In the event that the State has notified the Contractor of the need to repair leak(s) through the roofing system and an emergency condition exists which requires immediate repair to avoid substantial damage to the State, the State may make such temporary repairs as may be essential and such action shall not be a breach of this Guarantee, so long as the State complies with other provisions of the Guarantee.

This Guarantee is in lieu of all other warranties expressed or implied, including warranties of merchantability or fitness for any particular purpose. No representatives of the parties herein named have the authority to make any representations other than those stated herein.

Specifically excluded from this guarantee is any and all damages to said roof system, the building or contents therein caused by any one or combination of the following,

- Acts or omissions of the State.
- Damage resulting from natural disasters; i.e., windstorm (exceeding velocity of 70 miles per hour), hail, flood, hurricane, lightning, or other phenomena of the elements.
- Damage resulting from the building structure failing to have adequate strength to support all live and dead loads, including water and snow loads, or any damage resulting from any other structural defects or failures.
- Damage resulting from objects, misuse or abuse of the roofing system, or traffic, recreational activities, or storage of material on the roofing system.
- Discharge of vegetable, mineral, animal oils, greases, solvents, or chemicals such as industrial wastes, upon the roof surface, unless originally designed for such purpose and prior written approval is received.

IN WITNESS WHEREOF, this instrument has been duly executed,

PRIME CONTRACTOR	**ROOFING CONTRACTOR**
(If the Roofing Contractor is also the Prime Contractor, only one signature in either signature block is required)	
Signature _____	Signature _____
Name/Title _____	Name/Title _____
Date _____	Date _____
Address _____	Address _____
Telephone _____	Telephone _____
Seal	Seal

SECTION 07 31 13.01
ASPHALT SHINGLE ROOFING MODIFICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for adding stack vent penetrations at existing asphalt shingle roof

B. Reference Exhibit A to this section immediately following this section, to see details of the existing manufacturer warranty.

1.02 RELATED REQUIREMENTS

A. See 07 31 13 - Asphalt Shingles: Requirements specified within 07 31 13.01 are supplementary to the requirements of 07 31 13. All requirements of 07 31 13 apply to the work of this section.

1.03 SUBMITTALS

A. Product Data: Provide data indicating products used for the work of this section if other than those specified in 07 31 13.

B. Manufacturer's Installation Instructions: Indicate installation criteria and procedures for adding a penetration to an existing roof.

C. Manufacturer's Certificate: Certify installer as qualified and authorized to perform the modification.

D. Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture of roofing systems similar to those required for this project, with not less than 5 years of documented experience.

B. Installer Qualifications: Company specializing in installing asphalt shingles, with at least 3 years of documented experience. Installer shall be qualified and authorized by the warranty holder for the existing roof to make the repair for continuation of the warranty.

1. The installing contractor of the existing 2019 roof was Hasheider Roofing & Siding of Prairie Du Sac.

1.05 FIELD CONDITIONS

A. Do not perform the work of this section if temperatures are below 45 degrees F.

1.06 WARRANTY

A. Perform work to meet manufacturer's requirements for continuing warranty coverage of the roof.

B. Arrange for manufacturer's representative to inspect the work of this section. Provide a certificate of continuing warranty coverage for the modifications made as part of this contract.

PART 2 PRODUCTS

2.01 REFERENCES

A. See product requirements specified in Section 07 31 13 Asphalt SBS Shingles. If the warranty-holding manufacturer of the existing roof requires alternate products, use the submittal process to coordinate the use of alternate products. See Quality Assurance requirements in 07 31 13.

PART 3 EXECUTION

3.01 EXAMINATION

A. Coordinate and verify the intended roof penetration locations.

1. Do not cut existing metal flashings, metal edges, joists, beams.

B. Verify roof openings are correctly framed.

C. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.02 PREPARATION

A. Broom clean deck surfaces before installing underlayment or eave protection.

B. Protect surrounding areas and adjacent surfaces from damage during execution of this work.

3.03 INSTALLATION

A. Cut penetration through existing asphalt shingle roofing system and wood sheathing deck.
   1. Oversize opening through roof no more than 1 inch greater than the outside diameter of the roof penetrating item.

B. Maintain existing underlayment adjacent to penetration.

C. Maintain shingles up-slope and side-slope from the boot/sleeve of the pipe flashing. Remove portions of shingles directly below the boot/sleeve of the pipe flashing.

D. Remove fasteners in the existing shingles that interfere with placement of the base of the flashing.

E. Pre-place concentric beads of roofing sealant at bottom of the flashing flange.

F. Place the flange of the pipe flashing above existing underlayment and between shingles to direct water toward the outer surface of the roof assembly. Fasten pipe flashing to deck using nails through the flange in locations that will be covered by shingles above.

G. Place beads of sealant between the top of the flashing flange and the shingles above. Place daubs of roofing sealant just large enough to cover the tops of the nails through the flange at each nail.

H. Replace all nails that were removed from adjacent shingles and place a bead of sealant at each nail. Conceal nail heads below the overlapping shingles without damaging the adjacent shingles.

3.04 INSTALLATION - METAL FLASHING AND ACCESSORIES

A. Install flashings in accordance with NRCA requirements and SMACNA Architectural Sheet Metal Manual requirements.

B. Secure in place with nails at 12 inches on center, and conceal fastenings.

3.05 PROTECTION

A. Touch-up, repair, or replace damaged asphalt shingles or accessories before Date of Substantial Completion.

END OF SECTION

Enhanced Limited Warranty Registration Information

Devils Lake State Park
3911 Fish Hatchery Road
Fitchburg, WI, 53711, USA

9/18/2025

Subject: Your GAF System Plus™ Warranty

Thank you for choosing GAF Roofing Products to protect your property.

Hasheider Roofing & Siding Ltd, a GAF Factory Certified Contractor, has registered your GAF System Plus™ Warranty, and addendum(s) if applicable, on your behalf. We hope you enjoy the peace of mind that comes from protecting the roof that protects your property.

Please keep this document in a safe place, as you will need it in the unlikely event that you need to make a claim, or if you should sell your property and would like to transfer your warranty to the new owner.

Please feel free to contact us if you have any questions. Again, thank you very much for choosing GAF, the best choice in roofing!

Sincerely
Certified Contractor Services

GAF Enhanced Limited Warranty Registration Information

Warranty: System Plus™

Installation Date: 5/17/2019

Installed Property Address: Steep Slope 150 Squares
S5975 Park Road
S5975 Park Road
Baraboo, WI, 53913, USA

Contractor Address: Hasheider Roofing & Siding Ltd
E10412 County Rd O
Prairie du Sac, WI, 53578, US

Phone: (608) 643-2121

Products Installed:

Timberline HD®,
Tiger Paw™,
StainGuard,
Cobra® SnowCountry®,
WeatherWatch®,
Seal-A-Ridge®,
Pro-Start®

1874164

Warranty Registration #

We protect what matters most™

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SECTION 07 31 24
GRANULAR COATED STEEL SHINGLE
BASED ON DFD MASTER SPECIFICATION DATED (R02/06/17)

PART 1 - GENERAL

SCOPE

The work under this section includes all labor, material, equipment and related services necessary to install granular coated steel self ventilating shingles vapor retarder and synthetic membrane, associated roofing system components including metal flashing and roof related construction as required to receive the manufacturer warranty as specified herein.
Record documents shall include digital photos.

RELATED WORK

Applicable provisions of Division 1 shall govern work under this Section. Contractor shall consult these provisions in detail prior to proceeding with work.

See unit pricing for sheathing panel replacements discovered during performing the work of this section.

07 63 00 -Sheet Metal Roofing Specialties.

In the event that the Contractor wishes to make improvements in materials and/or techniques, or is required to make improvements by the material manufacturer in order to obtain the manufacturer warranty, the Contractor shall make written request stating in full the nature of the proposed change(s) and furthermore state that the changes, if approved, will be accomplished at no additional cost to contract.

REFERENCES STANDARDS

APA – American Plywood Association.

ASTM D522 – 93a – Coating Flexibility Test.

ASTM D2247 – 100% Relative Humidity Test.

ASTM D2794 – 93 – Reverse Impact Test.

ASTM E108 & UL 790 – Class A, B & C Fire Rated.

ASTM G 26 – Accelerated Weathering Test.

CCMC Traffic Load Test.

CCMC Uniform (Snow Load Test) Load.

NBS 23 – Hail Resistance Test

NRCA - Roofing and Waterproofing Manual.

UL 580 & UL 1897 – Roof Deck Construction and Roofing Systems, Uplift Resistance.

UL 2218 – Class 4 Rating – Impact Resistance.

GUARANTEE AND WARRANTIES

State of Wisconsin Roof System Guarantee: Provide written **five (5) year** guarantee warranting all roofing and flashing required under contract, to be watertight and free from defects in materials or workmanship for period of time, as stipulated in guarantee form.

Contractor shall perform a minimum of two (2) roof system inspections during the term of this guarantee. The first inspection shall be approximately two (2) years after installation date on five (5) year guarantee with final inspection performed within last 6-months of five (5) year guarantee. Contact the Agency Contact to arrange for a site visit date. Agency Contact will accompany the Contractor. Submit written inspection reports, e-mailed to Owner (DFD Project Manager) and Agency Contact immediately after inspection is performed and prior to guarantee expiration.

It is recommended that the Contractor take digital photos of the finished work for their files and future reference.

A copy of the required State of Wisconsin Roof System 5-yr Guarantee form shall be a part of this Section and located at the end of this Section and may be acquired at the following State website; doa.wi.gov/DFD

Contractors Performance-Payment Bond is only required to apply to this trade section during the construction period and the first year of the guarantee period. Said Bond shall not apply to any extended guarantee period beyond the first year. Such extended guarantees are limited to the applicable Contractor and manufacturer as herein specified.

Roofing Contractor shall sent application request for warranty(s) required herein to the manufacturer prior to start of Work.

Manufacturer's Standard Pro-Rated Warranty: Provide manufacturer's granular coated steel shingle/shake standard **fifty (50) year** warranty against material defects and 120 mph wind, hail stone penetration warranty and surface coating degradation.

Manufacturer's Non-Prorated Period Protection Warranty: Coverage shall include a minimum of **twenty (20) years** non-prorated protection including cost of labor to remove and replace part or all of the shingle system affecting performance, include replacement of any or all manufacturer products and components included in the system warranty through the non-prorated and annually declining prorated duration of the warranty.

Non-prorated protection guarantee is available from the following manufacturers;

Decra Roofing System
Metro Roof Products

The following information shall be included on all guarantee and warranty documents:
State of Wisconsin (Owner), Agency, city or township, street address where work was performed, building name, Owner Project number, Owner (DOA) building number, all roof areas involved and total sq. ft. area of all roof areas.

Manufacturer material and installation requirements may vary concerning issuance of the non-prorated protection warranty.

Include and provide all product(s), labor and installation methods necessary and as specified herein, including manufacturer requirements not found specified herein, as required by the approved manufacturer to obtain the specified warranty requested herein.

All products used for adhesive and/or adherence purposes and sealants approved and/or supplied by the manufacturer shall be covered by the manufacturer non-prorated protection warranty specified herein and the State Guarantee.

Existing re-installed and new metal flashing and new wood blocking mechanical securement shall be covered in the State guarantee but not the manufacturer system warranty specified herein.

Shop fabricated metal flashing materials as specified in Section 07 63 00 and herein or as required for a complete watertight system may be provided in lieu of manufacturer fabricated metal flashing and shall be covered by the five (5) year State guarantee.

QUALITY ASSURANCE
Refer to "Submittals - Technical and Other Document" for number of submittal required.

A pre-construction meeting will be held at the site prior to the start of the work. See submittals required. All required submittals shall be delivered to the DFD Project Manager at the meeting for review, in the amount specified.

Prior to the start of construction, it is required that the Contractor's foreman and A/E and DFD SME shall be in attendance at preconstruction/pre-installation meeting(s).

Roofing Contractor shall be recognized by the manufacturer of the roof system as an "approved" or "authorized" Contractor applicator of their system and all associated products.

Contractor shall have been in business for a minimum of three (3) years and within the past three (3) years the Contractor shall be able to document the successful completion of a minimum of three (3) projects of similar size and/or scope of the Work as specified in this Section. Backup documentation/verification may be requested by the Owner.

Roofing Contractor shall notify the manufacturer in writing of their intent to obtain all system material and send application for the warranty for work required herein. Warranty application document sent to the manufacturer shall include a current date, indicate the Owner Project Number, bid document technical Section(s), composition of roof system to be installed per bid documents and be signed by the Roofing Contractor.

Manufacturer shall provide Roofing Contractor with a current date written documentation reply stating the receipt of Contractor request including warranty application and statement that the Roofing Contractor is an ”approved and authorized Contractor applicator” in good standing, for the work specified herein. A copy of this letterhead documentation shall be submitted to Owner at the preconstruction meeting. Such document shall include a current date, acknowledgement the Owner Project Number, bid document technical Section(s), include the roofing Contractor business name, certification status, year of issue and duration of such status.

Changes or variations to the roof system composition as required herein shall be approved by the Owner, in writing. Changes provided by the Contractor without Owner written approved shall be cause for rejection of the Work in its entirety.

Roofing Contractor on-site Foreman shall be approved by the manufacturer and shall remain on-site throughout the duration of the project.

Contractor workers employed on this project shall be recognized by the manufacturer of shingle roof system as “approved” or “authorized” applicator(s) and/or within the past two (2) years, the worker shall be able to document the successful completion of a minimum of three (3) projects of similar size and/or scope of the Work as specified in this Section.

All roofers by trade, and employed on this project shall have a certificate of successful completion of training, if available from a manufacturer, for the system to be installed. Construction trade employees other than roofers shall not be allowed to perform the work required herein pertaining to the physical placement/installation of any and all of the roof system components specified herein.

Manufacturer certificate of successful completion of training for each roofer employed on this project shall be submitted to Owner, if available. Document shall be up to date, indicate worker name, certification status, year of issue and duration of such status.

Contractor shall provide a list of all workers to be employed on this project. The list shall indicate each of the workers by name and their construction trade and shall include the Project foreman and Contractor main office contact person.

List shall include after-hour/weekend emergency phone contact personal and their office and cell phone numbers, for use in case of emergency situations.

Labors, sheet metal workers or other non-roofer employees shall not be allowed to perform the actual installation of any part of manufacturer warranted roof system required by this Section without manufacturer documentation of proper training, as required herein.

Contractor shall obtain and provide Owner with the manufacturer’s most current dated three-ring or spiral-bound installation and detail manual.

Contractor shall perform work required using details provided within the specifications, on the drawings or as required by the manufacturer for a proper watertight installation and to allow issuance of warranties required herein.

All system components not specifically identified herein but required by the manufacturer for the roof system installed by the Work required in this Section shall be provided and included in the manufacturer watertight warranty as required herein. System components required by the Work in this Section but otherwise not considered as warranted by the manufacturer shall be upgraded to manufacturer specific products at the time of bid such that they are included in the Work and therefore covered by the warranty required herein.

Provide all equipment recommended by the manufacturer for proper installation of the materials specified.

Roofing installations shall comply with fire resistive rating as defined in the Wisconsin Administrative Code. Required rating on these roofs: U.L. Class A.

It is the responsibility of the General Prime Contractor to obtain the services of a competent licensed sub-contractor to perform the Work required by these bid documents.

Electrical: For removal and reinstallation of roof curb-mounted exhaust fans and associated covers, ventilators, electrical equipment associated wiring connections at the unit(s).

Agency: Responsible for disconnect where wiring must be pulled or cut and conduits relocated to allow installation of the new roof system.

Plumbing: To re-lead drain pipe, repair and/or reset the roof drain bowls to interior piping.

Mechanical/HVAC: For removal of belt, chain driven and/or electrical exhaust fans and associated flex connection and duct runs/piping and its associated roof curb penetration.

The Contractor shall raise all existing mechanical and electrical trades' roof system penetrations to a minimum height above the roof system of 8".

Contractor shall notify the Agency Contact 24 hours in advance of all Electrical, Plumbing and Mechanical disconnections.

It is the responsibility of the Agency to perform inspection of the roof areas to be replaced by this project and to provide the following services:

Agency is responsible for the following: Existing Electrical, Plumbing and Mechanical installations and associated equipment pipe and duct runs shall be identified/verified by the State Agency as in use or be spray painted in ORANGE by the Agency if they are abandoned or shall be abandoned and shall be removed by this roofing Contractor, and verify that the electrical run is terminated, prior to start of work by Contractor. Electrical conduct runs lying directly on the existing roof membrane, or fastened to perimeter wall or metal flashing or coping shall be relocated by the Agency prior to start of work.

PRODUCT DELIVERY, STORAGE AND HANDLING

Make no deliveries to the project site until ready to install or approved storage area is provided. The State will not accept delivery nor will the State be responsible for any materials or equipment stored on the premises.

Deliver materials in original unopened containers of packaging clearly labeled with manufacturer's name, brand name, instructions for use, all identifying numbers and U.L. labels.

Deliver materials in sufficient quantity to allow work to proceed without delays.

Materials used on the job must be stored in such a manner as not to create a nuisance or hazard.

Store materials on clean, raised platforms, with breathable, weather protective covering when stored outdoors. Provide continuous protection from materials against weathering and moisture absorption.

Factory applied "shrink-wrapping" is not considered to be an acceptable weather protective covering. Store rolled goods on end; do not double stack rolls. Improper storage practices will be grounds for rejection of questionable materials.

Store primers, coatings, sealants and similar materials between 60 degrees and 80 degrees Fahrenheit.

Contaminated and Damaged Materials: Remove damaged or contaminated materials from site.

DO NOT store materials in a manner which will overload any portion of the building.

Handle all materials in a manner which will not damage the material. All damaged materials shall be removed from project site.

Select and operate material handling equipment and store materials as not to damage existing construction or applied roofing, and without overloading the building structural system.

SUBMITTALS - TECHNICAL AND OTHER DOCUMENTS
At the preconstruction meeting and prior to start of work, submit the following for approval by Owner.

Prior to the start of any work, bring all of the following submittals as required herein to the pre-construction meeting in the amount specified below, for review and approval by DFD Project Manager.

The following information shall be included on all submitted documents:

Agency/Location/Address where work is performed obtained from the Agency Contact listed to include Building Name, Bldg. State Number, Roof Areas, DFD Project Number and total sq. ft. of all roof areas.

MANUFACTURER WARRANTY ACKNOWLEDGEMENT
Upon receiving the Contract Offer from the Owner, Contractor shall immediately notify the manufacturer of intent to purchase the product and to obtain the warranty as specified by this Section.

Submit: Three (3) copies of the Contractors dated notification letter sent to the membrane supplier.

Submit: Three (3) copies, on manufacturer letterhead, stating acknowledgement of such notice and agreement to provide the warranty required by this Section. The letterhead acknowledgement shall include the date such letter was issued, Owner Project title, Project number, Section number(s), manufacturer representative signature and be addressed to the Roofing Contractor.

CONTRACTOR AND WORKER QUALIFICATION

Submit: Three (3) copies of manufacturer current written documentation stating the Contractor is an "approved Contractor applicator" in good standing, for the work specified herein. Document shall be up to date, indicate Contractor name, certification status, year of issue and duration of such status.

Submit: Three (3) copies of the manufacturer certificate of successful completion of training, if available, for each roofer employed on this project. Document shall be up to date, indicate worker name, certification status, year of issue and duration of such status.

Submit: Three (3) copies of a list of all workers to be employed on this project. The list shall indicate each workers name and trade. Project supervisor and main contact person shall be identified.

MANUFACTURER INSTALLATION INSTRUCTIONS

Submit: One (1) copy of the manufacturer most current version, complete edition paper-copy installation and detail 3-ring or spiral bound manual. Partial submittals taken from within the bound manual are not acceptable.

GRANULAR COATED STEEL SHINGLE/SHAKE MANUFACTURE LOCATION**:**

Submit: Three (3) copies of manufacturer labeling data indicating location of the production plant to verify plant location acceptance, see PART 2 – PRODUCT, MATERIAL herein.

GRANULAR COATED STEEL SHINGLE/SHAKE & ASSOCIATED METAL COLOR CHART**:**

Submit: One (1) copy of an original color chart of each product to the used on the project. Agency Representative shall notify the DFD Project Manager and Contractor via e-mail as to the color selected.

GRANULAR COATED STEEL SHINGLE/SHAKE ASTM D3462 "CERTIFICATION":

Submit: Three (3) copies of manufacturer "certified" documentation concerning ASTM D3462.

GRANULAR COATED STEEL SHINGLE/SHAKE WEIGHT VERIFICATION:

Submit: Three (3) copies of manufacturer documentation concerning minimum weight per square. Agency Representative shall select shingle color and send color choice verification via e-mail to DFD Project Manager and Contractor.

MATERIAL LIST

Submit: Three (3) copies of a list of all materials intended for use on the project, starting at the roof deck and identified by manufacturer's name, size, thickness, type or grade. List shall be submitted on Contractor's letterhead stationery. Submit product data sheets for all materials not included in manufacturer manual.

Contractor shall state the following at the bottom of the material list submittal:

"New products installed on this project do not contain asbestos".

ASBESTOS TESTING

Submit: Three (3) copies of test results including a drawing indicating location where tests samples are taken. Contractor replacing the roof system is required to take a minimum of two (2) samples of existing roof system(s) components encountered starting at the roof deck including all membranes encountered, to be sent to a testing lab. **Take two (2) samples to include shingle, asphalt membrane, I & W membrane and any mastic encountered.** Additional samples are required where roof areas are not of the same roof system or installation period.

Test Laboratory results paperwork shall properly identify the Owner Project No., project location, bldg. name, bldg. number & roof area/location where the test sample was taken.

Test lab and associated removal and disposal charges shall be the responsibility of the Contractor at no additional cost to the project.

A Contractor owner or employee shall have taken the exterior asbestos supervisor course and possess current documentation that they are an 'Exterior Asbestos Supervisor' able to take existing roof system samples as required to be tested for possible asbestos contamination.

All workers removing asbestos must be certified to perform the work.

ASBESTOS – POSITIVE RESULTS
Submit: Three (3) copies of the necessary regulatory notifications for asbestos removal or three (3) copies of sample test results indicating the roofing materials slated for removal do not contain asbestos. (Refer to General Requirements Article "HAZARDOUS SUBSTANCES – ASBESTOS, LEAD AND POLYCHLORINATED BIPHENYLS (PCB'S)" for additional information.)

Test lab results must be submitted prior to start of work

RECYCLED MATERIALS:
Submit: Three (3) copies of a Recycled Waste Management Plan to Owner for review. Include recycle business name, address, contact, and phone number where all recycled roofing material removed by this project will be delivered.

SAFETY REPORT
Submit: One (1) copy of a written report to be given to the Agency Representative at the preconstruction meeting, describing in detail the Contractors implementation of specific OSHA regulations, Contractor's worker safety program methods/means, roof perimeter safety and identification of the "watch person" required at all roof levels. Identify fire extinguisher and their locations, all equipment/operators on roof/ground in setup/storage area and travel routes used while performing the work.

MSDS DATA:
Submit: One (1) copy of all MSDS paperwork for each product used on this project to be given to the Agency Representative at the preconstruction meeting.

EMERGENCY AND OFFICE CONTACT PHONE LIST:
Submit: One (1) copy of the Contractor's office superintendent and job foreman daytime, after hours and weekend phone contact numbers to be given to the Agency Representative at the preconstruction meeting.

Contractor shall maintain the following at the Project site throughout construction. One (1) copy of the specifications, drawings, addenda, value enhancement, change order and all approved submittals at the project site throughout construction.

One (1) copy of the latest version of the manufacturer handbook including details and technical information concerning application techniques for all primary roofing system materials required by the work.

One (1) copy of the Material Safety Data Sheets (MSDS) manual for all materials used on this project.
SUBMITTALS – FINAL DOCUMENTS REQUIRED UPON COMPLETION OF THE WORK:

Prior to final payment, submit the following to Owner as one (1) package including a cover page listing all documents sent:

The following information shall be included on all guarantees, warranty and other submittal documents:

Agency, city or township, street address where work was performed, building name, Owner Project number, Owner (DOA) building #, all roof areas involved and total sq. ft. of all roof areas.

DIGITAL PHOTOS:
Provide digital camera photos throughout the project as required by these specifications and/or requested by Owner. Contractor shall take multiple digital camera photos of the following to be submitted electronically, via e-mail to Owner.

Contractor shall take and submit digital camera photos' of the various difficult watertight locations and mechanical fastening that will be hidden from view or otherwise concealed beneath the completed work. Multiple photos shall be taken of the entire installation starting at the roof deck and continuing throughout the roof system installation as it progresses in layers, as required per specification.

Contractor shall take and submit digital camera photos of all changes to the scope of work to include existing conditions as the work takes place in its various stages [of demolition and] of the new Work as it takes place throughout its various stages

Provide digital camera photos' of the completed work. Photos shall include the various metal flashing details, transitions and penetration height changes and in general an over-all view of the field of all roof areas. Photos shall be identified by the roof area where photos are taken.

RECYCLED MATERIALS
Submit: One (1) copy of material final destination Recycled Waste Management Plan to include all delivery receipts. Include recycle business name, address, contact, and phone number where all recycled roofing material removed by this project have been delivered.

Upon completion, Contractor shall submit a final summary of the progress reports, including the percentage of recycled waste (weight or volume) to the quantity of waste that would have been otherwise land filled.

Submit: Recycler receipt for all deliveries showing all received product their weight and % calculation as described in GENERAL REQUIREMENTS, Article 38.

Submit: One final summary of the total sq. ft. bulk sum of all recycled waste material.

WASTE MANIFEST:
Submit: Two (2) copies of the Waste Manifest Records to DFD Project Manager if required in accordance with General Requirements Article "HAZARDOUS SUBSTANCES – ASBESTOS, LEAD AND POLYCHLORINATED BIPHENYLS (PCB'S)".

STATE OF WISCONSIN ROOF GUARANTEE:
Submit: One (1) original guarantee as required herein. (Refer to GUARANTEE article in Part 1 of this Section).

MANUFACTURER ROOF WARRANTY
Submit: One (1) of the original membrane suppliers warranty of all membrane warranties required herein. (Refer to GUARANTEE article in Part 1 of this Section).

MISCELLANEOUS METAL WARRANTY:
Submit: One (1) original of manufacturer warranty as required by Specification Section 07 63 00.

SETTLEMENT CERTIFICATE:
Submit: One (1) copy of each document.

PART 2 - PRODUCTS

MANUFACTURER SUPPLIERS AND MATERIALS
All products used in this installation shall be compatible with one another.

Use new materials only; salvaged or used materials are unacceptable.

Owner has pre-approved specific manufacturers.

Approved Shingle Manufactures:

Decra Roof Systems, Corona, California
Metro Roof Products, Oceanside, California

Manufacturer shall have had granulated coated steel shingle in production and use on roof systems for a minimum of fifteen (15) years.

Unapproved manufacturer and products installed on the Project shall be cause for rejection of the roof system in its entirety and shall be completely replaced by the Contractor at no cost to the Project.

All associated products not specifically mentioned herein but required by the manufacturer for a proper, complete and warranty specified installation shall be included in the bid and provided by the Contractor.

Use new materials only; salvaged or used materials are unacceptable and shall be removed from the site and be recycled.

All products used in this installation shall be compatible with one another and the shingle intended for use.
Granular Coated Steel Roofing Shingle and Shake: Fire, wind and hail resistant roofing shakes as follows:

26 gauge metals coated with “Zincualume” (Aluminum-Zinc Alloy) corrosion inhibitors and epoxy or acrylic primers, base coating, ceramic coated (ceramically-fired) stones, overgrazed.
Sealants: One-part polyurethane type, as recommended by the shake roofing panel manufacturer

Trim, shake cap, fascia, Z-bar metal al to match stone coated panels and color, other miscellaneous flashing products and accessories of not less than 28 gauge steel, not specifically described, but required for a complete an proper installation of the work in this section.

Self-ventilating shingle and shakes shall be required.

Synthetic Underlayment: ASTM D226, ASTM E-108 Class A Fire, “Sharkskin-Ultra” weight per roll 45#/10sq. roll; “Titanium-UDL”, weight per roll 45#/10sq. roll. The aforementioned products have been approved by the Owner for use unless the manufacturer requires the use of their synthetic underlayment to obtain warranty required herein.

Manufacturer’s products in use less than 10-years are not acceptable.

Cap-nails are required and this requirement shall over-ride manufacturer acceptance of synthetic underlayment fastening with staples, roofing nails, cap-staples, or other type fasteners.

Installing synthetic membrane just ahead of granulated coated steel shingle installation shall not reduce total amount of cap-nail fasteners required to be installed in the systhetic membrane.

Self-Adhering Ice & Water Backup Protection Membrane: Polyethylene surfaced, self adhering modified bitumen such as W.R. Grace Ice and Water Shield or as approved by the manufacturer as compatable with their shingle or required to obtain the manufacturer non-protated warranty.

Provide zinc strips at shingle ridge where the roof wear surface is exposed to a very moist, damp, heavily wooded area or shaded area that does not allow for proper evaporation and drying.

Fungi and Mildew Inhibitor Strips: Zinc 20 oz. sheet stock.

Provide matching color ridge vent shingles as manufactured recommended and provided by the manufacture and proper minimum exposure per manufacturer’s printed instructions.

Fasteners: Manufacturer shall provided and approve of all screw fasteners and their length as required for a proper warranted system.

Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A or O; FS TT-S-00230C, Type II, Class A; one-part polyurethane base, elastomeric joint sealing compound such as Sika Chemicals "Sikaflex 1a", Sonneborn-Contech "Sonolastic NP1" or Tremco "Vulkem 116" or “Dymonic".

Other products, not specifically described, but required for a complete and proper installation of the work in this section shall be selected by the Contractor subject to approval by Owner.

PART 3 - EXECUTION

EXAMINATION

Examine the areas and conditions under which work in this section will be installed. Notify the Owner of any conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

Proceeding with the work shall signify the Contractor’s acceptance of the substrate being covered by this Work.

SITE CONDITIONS

Apply roofing in dry weather. This roofing system may be installed over synthetic membrane during rain events only if the synthetic membrane was previously installed in dry weather.

This roof system may be applied in colder weather, but not during freezing rain or snow events. Contractor shall obtain and submit manufacturer cold weather limitations.

Existing materials designated to remain, which are damaged or defaced as a result of the work shall be replaced at Contractor's expense to like new condition.

Install all rooftop mounted equipment in a watertight manner and repair any damage to sheet metal or other components related to connection and protection of the roof system.

Prevent materials from entering and clogging roof drains and conductors including those drains on adjacent low slope roof areas. Remove roof drain plugs when no work is taking place or when rain is forecast.

Protection of surfaces: Take every precaution to prevent water leakage, or debris falling into the building interior, or other such occurrences. Contractor is responsible for any and all damage to the building interior or its contents that occur as a direct cause of the Work and due to the Contractors methods and mean practice to accomplish the Work required herein.

Wall surfaces shall be protected with tarpaulins or other suitable cover to prevent damage, staining or discoloration that might result from operations such as removal, disposal, replacement or removing of equipment or materials to the roof surface. Windows, doorways, docks, walkways, etc. may require special protection measures.

Contractor shall layout a cloth or canvas tarp ground cover that will not easily tear from dropped debris, to catch all falling debris during demolition and installation. Protection provided shall extend beyond eave or edge slide-off and/or drop-off areas a minimum of 10'-0". After removal of ground cover, Contractor shall walk the area beyond and under the debris drop-off area to clean up all debris by use of a wheel-magnet and eye-sight.

The same ground cover protection shall be provided under and/or around dump truck or dump box locations at or along side the building.

Provide 3-sided enclosures at all building entry areas to allow access to the building during demolition and construction activity. Minimum enclosure construction requirements are as follows;

Building entry enclosure shall start at a minimum of 10'-0" beyond the building eave or edge slide-off and/or drop-off area.

Over-head: ¾" CDX plywood mechanically fastened or secured to minimum of 4 wood scaffolding planks securely fastened over properly braced walk-through 6'-0" steel scaffolding.

Side: ¾" CDX plywood mechanically fastened or secured to each side of the walk-through steel scaffolding to provide complete enclosure.

Disposal of materials: All materials to be disposed of shall be loaded directly into trucks or drop-off dump-box by means that will prevent damage to existing or new surfaces and to control pollution. Free-fall of debris from heights over 15' will not be allowed.

Contractor is responsible for any charges, such as landfill fees, incurred for disposal of materials.

SUBSTRATE PREPARATION

Plan work and take whatever action is necessary to prevent dirt and debris from entering the building during the Work required by this Section.

Cedar shingle and shakes shall be completely removed to expose the deck.

Clean and prepare existing asphalt [deck] shingle roof system to receive new self vented granulated coated steel shingle over synthetic membrane over entire deck including over all self-adhering ice & watershield where applied to deck.

Remove and dispose of the existing cedar shingle/shake roof system to expose the existing deck. This includes but is not limited to, all of the existing shingles, felts, metal edge, apron, stepflashing, counterflashing, ridge vents and other associated roof system materials and replace with new products.

Existing system nail and/or staple fasteners shall be removed during demolition, not hammered into the decking. Dispose of all materials that are not intended for reuse. Clean and prepare existing deck to receive the new roof system. Provide additional fasteners for existing wood decking found to be loose or to have insufficient or improper or insufficient fastening.

Continual cleanup shall be of utmost importance, as this is a natural area.

Metal trimmings and used or broken knife blades shall be accounted for at all times. Trim and blades shall not be discarded, but kept in a safe location for proper daily disposal.

50-yr warranty porcelain enamel steel shake over manufacture recommended water repellant synthetic membrane over existing or new roof deck. Supply and install new manufacturer associated component edge metal, apron, stepflashing, counterflashing, valley and all required miscellaneous metal flashing for a complete system installation. Replace and extend all gravity vents to be minimum 8” above highest side of the shingle surface . Replace existing gutter and downspouts with a seamless gutter system. Align new gutters to be level and drain properly to previously [new] established downspout areas. Mechanically fasten and properly seal all joints with specified sealant. Shingle and edge metal shall have proper overhang and positive drainage into the new gutter to avoid water and ice buildup behind the gutter. Inspect decking: Replace any warped, rotted or otherwise structurally unsound material. Notify Owner if existing deck is unacceptable for the new Work.

Sweep the entire roof to remove loose granules and other debris.

Verify that wood blocking, curbs and nailers are securely anchored and that roof openings and penetrations are in place and set and braced.

Verify that the substrate is clean, dry and free from sharp projections and depressions and that all surfaces and site conditions are ready to receive new materials.

INSTALLATION OF NEW ROOF SYSTEM

Note to Contractor:

Instruct all applicators employed on the project to actually read and become familiar with the manufacturer’s written installation instructions as printed on the product wrapper and/or obtained from the manufacturer, and the specific DFD installation requirements within this specification. A copy of the manufacturer’s installation instructions and these specifications shall be kept on site for the duration of the project.

Material and installation requirements herein shall take precedence over manufacturer recommended materials and installation instructions unless such Work prevents manufacturer authorization of warranty specified herein.

The manufacture shall approve of all system mechanical fasteners used to secure all roof system components.

Contractor shall take multiple digital photos to be submitted electronically to the Owner as required in "submittal" section of this specification.

Prior to installation, sweep the entire roof deck to remove loose nails, staples, granules, wood dust/particles and other debris and verify that all nails or other fasteners in decking are flush to deck substrate.

Self-Adhering Ice & Water Backup Protection Membrane: Install per specifications and in accordance with the manufacturer's additional detailed instructions, directly to the deck substrate as follows:

Eave Edge: Over deck, starting at 1-1/2" beyond the eave and rake edge, up slope a minimum of 5'-0" (two (2) courses) from the roof eave, or more, to achieve a minimum of no-less than a 5'-0" width deck coverage up the slope beyond the exterior finished (heated area) wall of the building.

Rake Edge: Over deck, starting at 0'-6" minimum lap onto the eave edge self-adhering ice & water backup protection membrane application and 1-1/2" beyond the rake edge and adhered to fascia, up slope and over the ridge onto the opposite side slope, 0'-6" minimum.
Continue through valley areas to be a minimum of 2'-0" beyond centerline of valley onto the opposite slope, both directions.

Digital Photos: Contractor shall take multiple digital photos of all end-of-valley locations showing all phases of the watertight work required, identify all digital photos per each location and send digital photos to the DFD Project Manager at end of the project construction phase and prior to final payment.

Deck Penetrations: Over deck, one (1) course wide around all penetration in the field of the roof including curbs, plumbing, mechanical or electrical piping, dormers, other vertical field or roof installations. One (1) course width at all roof to wall locations or other vertical installations. Membrane shall turn up onto all vertical penetrations 4" minimum.

Edge metal shall be fabricated and sized to conceal the self-adhering ice & water backup protection membrane lapped onto fascia. (See Section 07 63 00.)
Edge metal intended to be lapped by another edge metal installation shall be field-cut and notched as required prior to installation to achieve a proper tight-fitting lap. Edge metal shall have proper lap, minimum 1" maximum 2".

Edge metal intended to lap other edge metal installations shall be hand compressed prior to installation to achieve a tight fit at the lap. Nails through the edge metal laps are not acceptable.

Install synthetic underlayment over the entire roof deck area including over self-adhering ice & water backup protection membrane to prevent the shingle from adhering to the self-adhering ice & water backup protection membrane.

Omission of the synthetic underlayment over the self-adhering ice & water backup protection membrane shall result in rejection of the work.

Use of synthetic membrane approved herein allows the Contractor to remove all existing shingles, cover the roof deck with one (1) layer of underlayment lapped and mechanically fastened with cap-nails and per manufacturer instructions prior to starting installation of the shingles specified herein.

Synthetic membrane warranty shall be available for the length of the shingle roof warranty.

Cap-nail fastening of synthetic membrane is mandatory, without exception.

Prior to synthetic membrane and shingle installation, sweep the entire roof surface to remove loose nails, staples, granules, wood dust/particles and other debris and verify that all fasteners in membrane installation are installed true and flush.

At Eave: Install synthetic underlayment over edge metal.

At Rake: Install synthetic underlayment under edge metal.

Shingles Installation over the synthetic underlayment:

If applicable, install manufacturer supplied starter course.

New shingles shall overhang eave and rake metal edge 3/8" minimum and/or per manufacturer instructions.

Apply shingles with manufacturer's required shingle exposure to the weather.

Provide 'Fungi and Mildew Inhibitor Strips', Zinc 20 oz. sheet stock. Install Zinc strip at ridge and where roof meets wall areas to provide a minimum 3" exposure with a ¾" hem at leading edge.

Copper shall not be used in the roof system as it is not a compatible product.

Counterflashing may be zinc where roof meets wall areas. Receiver portion of 2-pc counterflashing shall be color matched prefinished metal.
Check coursing periodically throughout installation and re-align as required by use of a chalk snap line to provide a proper, straight and true vertical and horizontal installation, per manufacturer instructions.

Re-check coursing prior to reaching the ridge and adjust to allow equal shingle exposure after shingle over ridge vent and/or shingle ridge caps are installed.

Periodically during each day of installation, at the end of each day and again at completion, the Contractor foreman shall review the installation from the ground, to assure that all shingles are lying flat and proper. Improper substrate condition shall be removed or corrected each day to allow for proper shingle lay down.

Cut opening in decking at ridge to meet the minimum requirement for a vented space.

CLEANING
Touch up areas where granulated coating received damage, using paint kit supplied by the manufacturer to properly match roof system color.

Clean roof surface and replace damaged shakes.

Sweep the entire roof surface to remove loose granules and other debris.

Clean all existing and new gutters and downspouts to be free of roofing debris including shingle and metal cuttings, nails and shingle granules to allow for unobstructed, proper water flow.

Inspect adjacent roof systems, their drain strainers and the grounds below the work area and remove debris associated with this project.

Repair or replace defaced or disfigured finishes caused by work of this Section. In areas where finished surfaces are soiled by the work of this Section, consult manufacturer of surfaces and manufacture of product causing the stain for cleaning advice, product recommendation and conform to their instructions.

***** END OF SECTION *****

STATE OF WISCONSIN
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES DEVELOPMENT (DFD)
DOA-4522 (R10/01/12)

Mailing Address: **Post Office Box 7866, Madison, WI 53707-7866**
Street Address: **101 E. Wilson Street, 7th Floor, Madison, WI 53702**
Phone: **608 / 266-2731**; *FAX*: **608 / 267-2710**
http://www.doa.state.wi.us/DFD

State of Wisconsin - Roofing System 5-yr Guarantee

State Agency/Location/Address _____

Building Name _____Bldg. No. _____Roof Area(s) _____

D.S.F. Project No. _____Project Total Sq. Ft. _____Manufacturer _____

Type of Roofing System _____Prime Contractor _____

Shingle Warranty Registration No._____ Warranty web site _____

Date of Completion _____ State Guarantee Starts_____State Guarantee Expires _____

List Additional Manufacturer Warranty and/or Guarantee Submittals Required

(submit all of the additional warranty/ guarantees required at the same time along with this guarantee)

Total System Warranty -Yes ☐ No ☐ Membrane Warranty -Yes ☐ No ☐ Metal Guarantee -Yes ☐ No ☐

Subject to the terms, conditions and limitations stated herein, we, the undersigned hereby jointly and severally guarantee that the roofing system installed on the above named building, will remain in a watertight condition, free from leaks and defects in materials or workmanship, for a period of five (5) years from the date of completion; and that we will at our expense, make or cause to be made such permanent repairs to said roofing system having defects in any of the materials and workmanship applied by or through the undersigned, as may be necessary to restore to compliance with the specifications or replace said roofing system in a water tight condition without defects as hereinafter defined. **Contractor shall perform a minimum of two (2) roof system inspections during the term of this guarantee with final inspection performed within last 6-months of term. Submit written inspection/repair and location reports to DFD Project Manager and Agency Representative.**

This guarantee is made subject to the following terms and conditions: The term "defect" shall include leak(s), faulty installation, installation of other than specified materials, and the following,

- Built-Up and Modified Bitumen Roofing Systems: Ridges, blisters, buckles, wrinkles, fishmouths, voids or splits in the membrane or bituminous flashings, slippage of components, insufficient attachment of vapor retarders and/or insulation, deteriorated insulation, sound barrier components, bare spots or inadequate coverage by aggregate or protective coating, and loose sheet metal.

- Single Ply Membrane Roofing Systems: Defective and/or excessive deterioration of the roofing sheet or flashing, inadequate or failed perimeter restraint to include wood blocking, insufficient attachment of vapor retarders and/or insulation, deteriorated insulation, insufficient or deteriorated ballast and loose sheet metal.

- Shingle/Tile/Slate Roofing Systems: Broken, cracked, split, curled, spalled, blistered, unsealed or otherwise deteriorated shingles, tile or slate units, non-seated, non-secure nails/fasteners backing out or exposed, wrinkled underlayment; installation on loose, buckled or deteriorated sheathing/decking.

- Cold Liquid-Applied Membrane System: Improper surface preparation, premature or excessive deterioration in mil. coating, bare spots, insufficient mil coverage, non-adherence of membrane, blistering, air pockets or cratering in membrane, fasteners backing out, loose or exposed and loose sheet metal.

- Metal Roofing Systems: Loose components/fasteners, excessive buckling, oil-canning, and damaged finish.

- Sheet Metal Roof Flashing- Skylight Panels: Loose, unsecured metal flashing, panels and associated cleats, anchors, clips, wood blocking, fasteners, inadequate, improper, loose and sealant.

The term "roofing system" shall mean all the materials above the structural roof deck associated with the roof system that are furnished under this contract and the workmanship for installing such materials as required per the manufacuture's installation instructions to achieve a watertight system.

No work will be done on said roof by the State, including, but without limitation, work in connection with flues, vents, drains, sign braces, antennas, railings, platforms or other equipment fastened to or set on the roof, and no repairs or alterations will be made to said roof, unless the undersigned are first notified and given the opportunity to make the necessary roofing application recommendations with respect thereto, and such recommendations are complied with by the State. Failure to observe this condition shall render this guarantee null and void.

In the event leak(s) or defects should occur, the User Agency shall notify the undersigned parties in writing at the addresses listed below within thirty (30) days of discovery of leak(s) or defects. If repairs are not initiated within ten (10) days from the date of receipt of written notice that leaks or defects exist, the State is hereby authorized to have repairs made to the roofing system as is required without invalidating this guarantee, and the undersigned agrees to pay all costs for repair or replacement of leak(s) or defects in roofing system within thirty (30) days from the date such repairs or material replacement have been completed and approved by the State.

In the event that the State has notified the Contractor of the need to repair leak(s) through the roofing system and an emergency condition exists which requires immediate repair to avoid substantial damage to the State, the State may make such temporary repairs as may be essential and such action shall not be a breach of this Guarantee, so long as the State complies with other provisions of the Guarantee.

This Guarantee is in lieu of all other warranties expressed or implied, including warranties of merchantability or fitness for any particular purpose. No representatives of the parties herein named have the authority to make any representations other than those stated herein.

Specifically excluded from this guarantee is any and all damages to said roof system, the building or contents therein caused by any one or combination of the following,

- Acts or omissions of the State.
- Damage resulting from natural disasters; i.e., windstorm (exceeding velocity of 70 miles per hour), hail, flood, hurricane, lightning, or other phenomena of the elements.
- Damage resulting from the building structure failing to have adequate strength to support all live and dead loads, including water and snow loads, or any damage resulting from any other structural defects or failures.
- Damage resulting from objects, misuse or abuse of the roofing system, or traffic, recreational activities, or storage of material on the roofing system.
- Discharge of vegetable, mineral, animal oils, greases, solvents, or chemicals such as industrial wastes, upon the roof surface, unless originally designed for such purpose and prior written approval is received.

IN WITNESS WHEREOF, this instrument has been duly executed,

PRIME CONTRACTOR	**ROOFING CONTRACTOR**
(If the Roofing Contractor is also the Prime Contractor, only one signature in either signature block is required)	
Signature _____	Signature _____
Name/Title _____	Name/Title _____
Date _____	Date _____
Address _____	Address _____
Telephone _____	Telephone _____
Seal	Seal

SECTION 07 46 23
WOOD SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board siding for Walls.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 06 30 00 - Exterior Carpentry: Building framing and siding substrate.

C. Section 07 25 00 - Weather Barriers: Water-resistive barrier under siding.

D. Section 07 62 00 - Sheet Metal Flashing and Trim: Product requirements for metal flashings and trim associated with wood siding for placement by this section.

E. Section 07 92 00 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

F. Section 09 91 13 - Exterior Painting: Backpriming and finish.

1.03 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide data indicating materials, fastening methods, jointing details, sizes, finishes, and accessories.
      a. Physical characteristics of components shown on shop drawings.
      b. Storage and handling requirements and recommendations.
      c. Installation instructions and recommendations.
   2. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.

B. Review submittals - Samples:
   1. Selection samples: Collection of samples for selection by AE.
   2. Confirmation Samples: Submit two samples 12 x 12 inch in size illustrating surface texture and colors.
   3. Samples: Submit two samples 12 by 12 inches in size to applicator of finish paint for use in preparation of finish samples.

C. Information Submittals - Preparatory:
   1. Manufacturer's qualification statement.
   2. Installer's qualification statement.

D. Closeout Submittals:
   1. Maintenance data.
   2. Warranty terms and forms completed in Owner's name identifying the project, substantial completion date.

1.04 QUALITY ASSURANCE

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

B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum three years of documented experience.

1.05 MOCK-UPS

A. Construct mock-up on the building incorporating required materials and workmanship. Include exterior carpentry scope, wood siding scope, exterior painting scope.
   1. Include repairs and replacements at one dormer including work at siding, trim windows.
   2. Include repairs and replacements at soffit and roof edge.
   3. Include siding replacements including a contiguous portion of the south wall that includes siding, full window trim, corner interface with soffit.

B. Mock-up may remain as part of work.

1.06 FIELD CONDITIONS

A. Do not install siding when air temperature or relative humidity are outside manufacturer's limits.

1.07 WARRANTY

A. Manufacturer's Standard Warranty: Transferable limited warranty.
   1. Warranty Period: Fifty years prorated from date of Substantial Completion.

PART 2 PRODUCTS

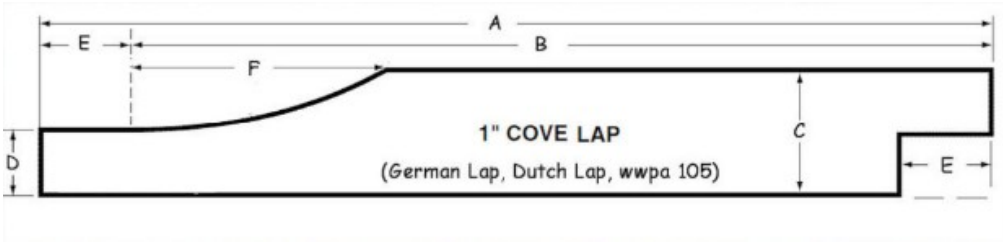
2.01 PERFORMANCE REQUIREMENTS

A. Comply with local wind load resistance requirements of ASCE 7.

2.02 WOOD SIDING MATERIALS

A. Grade lumber in accordance with the following:
   1. Solid wood boards: Southern Pine or Ponderosa Pine, #2 un-finished.

B. Profile: Dutch Lap:
   1. A = 6 inches.
   2. B = 5 1/2 inches.
   3. C = 3/4 inch.



2.03 ACCESSORIES

A. Weather Barrier: As specified in Section 07 25 00.

B. Nails: Corrosion resistant type; nonstaining, of size and strength to securely and rigidly retain the work; prefinished to match siding finish.

C. Flashing: Prefinished as specified in Section 07 62 00.

D. Prime Paint: See EPS 10 in Section 09 91 13.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates are ready to receive work.

B. Verify that water-resistive barrier has been correctly and completely installed over substrate.

C. Do not begin until unacceptable conditions have been corrected.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

A. Install siding and trim.

B. Fasten siding securely in place, level and plumb.
   1. Arrange for orderly nailing pattern. Nail each stud.
   2. Install siding for natural shed of water.
   3. Position cut ends over bearing surfaces, and sand cut edges smooth and clean.

C. Seal exposed wood substrates exposed to weather to prevent water accumulation and moisture intrusion.
   1. Seal penetrations.
   2. Seal exposed cuts of siding and trim; use of field-applied coatings is not permitted.

D. Install metal flashings at heads of wall openings and at horizontal intersection of dissimilar materials.

E. Seal joints except the overlapping horizontal lap joints. Seal around penetrations. Paint exposed cut edges.

3.03 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION

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SECTION 07 53 23.02
ETHYLENE-PROPYLENE-DIENE TERPOLYMER ROOFING (EPDM) - ADHERED
BASED ON DFD MASTER SPECIFICATION DATED (3/31/2025)

PART 1 – GENERAL

SCOPE

This Section consists of providing all labor, material, equipment, and supervision necessary to provide a weather and watertight roof system with an adhered EPDM roof covering complete, in place, as shown on the drawings and specified herein.

RELATED SECTIONS

Applicable provisions of Division 01shall govern work under this Section.

See unit pricing for sheathing panel replacements discovered during performing the work of this section.

07 63 00 - Sheet Metal Roofing Specialties

REFERENCE STANDARDS

ANSI / SPRI IA-1 2021; Standard Field Test Procedure for Verifying the Suitability of Roof Substrates and Adhesive, or equivalent test procedure.

ASTM C1177 - Standard Test Method for Materials finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing

ASTM C1289 – Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

ASTM-D6294 - Standard Test Method for Corrosion Resistance of Ferrous Metal Fastener Assemblies Used in Roofing and Waterproofing
ASTM D4637 - Vulcanized Rubber Sheet used in Single Ply Roof Membrane.
Factory Mutual (FM) – 4470 Examination Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for Use in Class 1and Noncombustible Roof Deck Construction
NRCA - Roofing and Waterproofing Manual, 2023
International Building Code (IBC) – Current addition adopted by the State of Wisconsin
International Energy Conservation Code (IECC) - Current addition adopted by the State of Wisconsin
SMACNA – Architectural Sheet Metal Manual, current edition
Underwriters Laboratory (UL) - Fire Hazard Classifications

DEFINITIONS

Manufacturer:
Manufacturer and Suppliers are used interchangeably and are the company that assembles the various material products for installation of the Roof System.

Roof Assembly:
A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly can include an underlayment, a thermal barrier, insulation, and/or a vapor retarder.

Roof Covering:
The covering applied for weather resistance, fire classification or appearance.

Roof Deck:
The flat or sloped surface constructed on top of the exterior walls of a building or other supports for the purpose of enclosing the story below, or sheltering an area, to protect it from the elements, not including its supporting members or vertical supports.

Roof System:
A system designed to weatherproof and improve building thermal resistance. A roof system consists of a roof covering and other interacting roofing components and may include a vapor retarder, thermal barrier, insulation or other similar substrate. The system does not include the roof deck unless it is part of a single component serving as the roof covering and the roof deck.

SME:
Subject Matter Expert. Division of Facility Development's (DFD) designated expert concerning this building envelope / roofing.

Roofing System Contractor:
The Manufactures approved and authorized Contractor installing the Roof System Components included in the Elastic Sheet Membrane Warranty.

GUARANTEE / WARRANTY

The following information shall be included on all guarantee and warranty documents:

State of Wisconsin Agency, city or township, street address where work is performed, building name, DFD project number, all roof areas involved (denoted by letter or number) as indicated on the drawings, and total square footage of all roof areas involved in the scope of Work.

The Contractors Performance-Payment Bond is only required to apply to this trade section during the construction period and the first year of the guarantee period. Said Bond shall not apply to any extended guarantee period beyond the first year. Such extended guarantees are limited to the applicable Contractor and Manufacturer as herein specified.

STATE OF WISCONSIN GUARANTEE

State of Wisconsin Roof System Guarantee: Provide **five (5) year** written guarantee that warranties all roofing and flashing furnished under the Contract, is watertight and free from defects in materials and workmanship for the duration, as stipulated in the contract-required guarantee form.

The Roofing System Contractor and General Prime Contractor (GPC) shall perform a minimum of two (2) roof system inspections during the term of this guarantee. The first inspection shall be approximately two (2) years after the installation date; the second and final inspection shall be performed within the last 6-months of the five (5) year guarantee. The Roofing System Contractor and GPC shall contact the Agency Representative to arrange for a site visit date. If available, the Agency Representative shall accompany the Contractor(s) during the inspection. The Roofing System Contractor in conjunction with the GPC shall submit written inspection reports by e-mail to the DFD SME and Agency Representative within 5 working days after the inspection is performed, and prior to the expiration date of the guarantee.

A copy of the required State of Wisconsin Roof System 5-yr Guarantee form is located at the end of this Section and may also be acquired electronically at : https://doa.wi.gov/Pages/DoingBusiness/MasterSpec_Div7.aspx

The General Prime Contractor and all sub-contractors shall review the guarantee and requirements of this section prior to submitting a Bid for all work.

ELASTIC SHEET MEMBRANE MANUFACTURER WARRANTY

Provide the membrane suppliers NDL ("No-Dollar-Limit") Total System" warranty covering defects in workmanship, membrane and all associated roof system components supplied by the membrane supplier for a period of twenty (20) years with a wind speed coverage of 72 miles per hour from the date of substantial completion of the roof.

All new roof system components, including, but not limited to insulation, Manufacturer fabricated metal flashing, pre-molded products, fasteners, adhesive, sealants, and accessories, shall be covered by the Manufacturer NDL ("No-Dollar-Limit") / "Total System" warranty specified herein.

QUALITY ASSURANCE

The Roofing System Contractor is required to be recognized by the Manufacturer, as an "approved" and "authorized" Contractor applicator of the roof membrane system and all associated products and components as specified herein.

Roof System shall be applied by Manufacturer's authorized roofing applicator familiar with products and their current installation procedures.

Follow Manufacturer's current written instructions regarding application and storage except where superseded by more stringent requirement specified herein.

If the Roofing System Contractor wishes to make improvements in materials and/or techniques or is required to make improvements by the membrane supplier to obtain guarantees / warranties, he shall make written request stating in full the nature of the proposed changes and stating that the changes, if approved, will be accomplished at no additional cost to contract.

The Roofing System Contractor shall schedule an onsite installation meeting with the GPC, the DFD's Project Representative and the A/E. The meeting shall occur within the first two days of the start of Roofing System construction. The purpose of the meeting is for the A/E to review and document scope of project and installation procedures with the Contractor.

The Roofing System Contractor is required to have been in business for a minimum of three years, and within the past three years, the Roofing System Contractor shall be able to document the successful completion of a minimum of three projects of similar size and/or scope as compared to the work as specified in this Section. Backup documentation / verification shall be a submittal requirement.

A minimum of two site visits shall be performed by the Manufacturer during construction: at minimum 1st week, and at the final Warranty Inspection. Reports from these visits shall be submitted by the Roofing System Contractor / GPC within five working days in DFD's Project Management Information System (PMIS).

All system components required by the Manufacturer, included in construction documents or otherwise, shall be provided and installed by the Contractor in order to achieve the Manufacturer's warranty. Manufacturer required components not specified in construction documents shall need written approval and be required as part of the submittal package. System components listed in the construction documents but not otherwise warranted by the Manufacturer, shall be upgraded to achieve Manufacturer warranty at time of bid, if not listed herein. **Components installed that do not meet the above-listed criteria shall be cause for rejection of work**.

The Roofing System Contractor shall provide all equipment recommended by the Manufacturer for proper installation of the materials specified.

The Roofing System Contractor shall take multiple digital photos daily and throughout the duration of the project. All photos shall be identified by the roof area where the photos are taken. These include but are not limited to:

- existing conditions,
- various stages of demolition,
- the entire installation starting at the roof deck and continuing throughout all roof system layers, various metal flashing details, transitions, penetrations, penetration height changes, over-all views of the field, drains and scuppers, all roof areas in difficult watertight locations, and mechanical fastening that is hidden from view, or otherwise concealed beneath the completed work,
- completed work.

WORK SEQUENCE

Sequence all work with the other work of the contract, so as not to necessitate construction traffic from this or other trades over unprotected roof assembly surfaces.

Coordinate the work with the installation of associated envelope, air and/or vapor barriers, screening, mechanical, roofing, waterproofing, flashings, and roof accessories, specified under other sections, as the work of this section proceeds.

Sequence the work to prevent any unnecessary deterioration of installed roofing assembly elements, by minimizing the use of newly constructed and existing roof assemblies for storage, walking surface, and equipment.

JOB CONDITIONS

The GPC shall maintain at the jobsite at least 1 copy of the latest version of the Manufacturer's installation manual / handbook, including details and technical information concerning application techniques, for all primary roofing system materials required by the work. The GPC shall also maintain at least one copy each of the construction set specification and drawings, "Request for Information" (RFI), "Construction Bulletin" (CB) and "Change Order" (CO) documents, and all other approved signed submittals throughout construction. Documents shall be stored and readily accessible to the Roofing System installation crews.

The Roofing System Contractor shall maintain, at the jobsite, at least one physically accessible copy of the Safety Data Sheets (SDS) manual, for all Roofing System materials used on this project or stored on the jobsite.

Work, once begun, leaves the building subject to leakage and therefore it must be considered in a state of emergency when weather threatens. The existing building shall be protected by the Contractor from moisture entering through any roof or parapet area (even in unforeseen weather conditions), for the life of the project, and for maintaining a weathertight condition during the entirety of construction. **The GPC shall be responsible for all damage to property due to moisture infiltration**.

An effective watertight seal between existing roofing and new roofing is required at the end of each day's work. Temporary seals shall be removed upon installation of new permanent work.

Load roofing debris directly into trucks by means of approved chutes or other controlled means. Throwing or dropping shall not be permitted. All such gravel, rubbish, debris, etc., shall be removed from the site and disposed of by the GPC. All debris / material shall be controlled to prevent uncontrolled exiting from roof level. All debris shall be picked up continuously to prevent straying. Avoid damaging property as much as possible by limiting the number of locations where trucks may be loaded. **The GPC shall be responsible for all damage to property.**

DELIVERY, STORAGE, AND HANDLING

The Roofing System Contractor shall make no deliveries to the project site, until a storage area has been identified for the project, and the DFD's Project Representative and the user Agency Representative has approved onsite deliveries. The State shall not accept delivery, nor shall the State be responsible for any materials or equipment stored on the premises.

Deliver materials in original unopened containers of packaging clearly labeled with Manufacturer's name, brand name, instructions for use, all identifying numbers and U.L. labels. Labels shall be maintained throughout the duration of the project.

Materials used on the job shall be stored in such a manner as not to create a nuisance or hazard.

Materials shall be stored on clean, raised platforms, with breathable, weather protective covering when stored outdoors. The Contractor shall provide continuous protection from all materials, against weathering and exposure to moisture.

Shrink wrap is not considered to be an acceptable weather protective covering. Shrink wrapping of materials is a known cause for exposure to moisture, either from manufacturing or condensation. Ventilation cuts shall be made to all shrink wrapped materials to allow for exhaust of moisture. All materials shall subsequently be covered with weather protective covering after the ventilation process. **Materials damaged in the ventilation process shall be considered unsuitable for installation and shall be rejected**.

Store and handle all materials in a manner which does not damage the material. Materials contaminated with any foreign substance shall constitute damage. All damaged materials shall not be considered suitable for installation and shall be rejected and removed from the jobsite.

Adhesives, primers, coatings, sealants, and similar materials shall be stored in compliance with the temperature set by the Manufacturer of that specific product.

Store flammable products away from any ignition source – sparks, open flame, etc.

Select and operate material handling equipment that allows for the safe storage of materials. The Roofing System Contractor shall replace or make good any damage, loss, or injury caused by the improper use of material handling equipment. Do not use material handling equipment in a manner which overloads any portion of the building.

Storage of materials on completed work or within the building is prohibited.

SUBMITTALS

All submittals shall be in electronic format. The GPC shall upload accepted submittals in DFD's PMIS.

Prior to the start of Roofing System work, electronically submit to the A/E for review and acceptance. The following submittals as required herein:

Membrane Manufacturer's "Assembly Letter" listing all major materials to be used, attachment method and spacing, UL Assembly Classification, and Manufacturer sample warranty indicating length and type of warranty.

Membrane Manufacturer's letter stating the Roofing System Contractor is an "approved" and "authorized" applicator of the specified Roof System and all associated products and components.

List of all materials proposed for use on the project, starting at the roof deck and identified by manufacturer's name, size, thickness, type or grade. List shall be submitted on Roofing System Contractor's letterhead stationery. The Roofing System Contractor shall state the following at the bottom of the material list submittal: "**New products installed on this project do not contain asbestos**".

The manufacturer's current product data sheets for supplied products with specific product size / thickness noted.

The manufacturer's shop drawing showing the required patterns for adhesive bead layout including additional bead around board perimeter.

Adhesive pull test results using test procedure ANSI / SPRI IA-1 2021; Standard Field Test Procedure for Verifying the Suitability of Roof Substrates and Adhesive, or equivalent test procedure.

Manufacturer's letter stating pull test results achieved are sufficient for system requirements and warranty requirements.

Shop drawings showing any proposed detail / specification changes as required to obtain the specified warranty.

The manufacturer's most current version of installation and detail manual edited to include only the system being installed.

Roofing System Contractors Project Specific Quality Assurance Plan, at a minimum the plan shall include:

- Project name, address, number, manufacturer and subcontractor(s)
- Project scope and approach to project
- Emergency contact information
- Project Quality Assurance Manager name (Office) and job title
- Project Quality Control Manager name (On-site) and job title
- Project personnel and certifications
- Inspections and tests to be performed, by whom and when
- Control of nonconformance items to protect the quality of the installation
- Project completion inspections.

The GPC shall submit in DFD's PMIS a Site-Specific Safety Report at the Pre-Construction meeting (reference General Conditions, Article 15). The report shall describe in detail the Roofing System Contractor's implementation of specific OSHA regulations, worker safety program methods / means, roof perimeter safety and identification of the "watch person" required at all roof levels. Identify fire extinguisher and their locations, all equipment / operators on roof / ground in setup / storage area and travel routes used while performing the work.

The GPC is responsible for all Category I Non-Friable Asbestos Containing Material (ACM) disturbed within the roof assembly during any and / all facets of this project. Contractor shall submit electronic copies of test results including a drawing indicating locations where test samples are taken. Contractor replacing the roof system is required to take a minimum of two samples of existing roof system(s) components encountered starting at the roof deck including existing vapor retarder, to be sent to an accredited testing lab. Take one sample at the base flashing and one sample from the field of the roof. Additional samples are required where roof areas are not of the same roof system or installation period. Each test result shall properly identify the Owner project number, project location, building name, building number & roof area / location where the test sample was taken. Laboratory fees and associated removal and disposal charges shall be the responsibility of the Contractor at no additional cost the project.

The samples must be collected by an Asbestos Inspector or Exterior Asbestos Supervisor with current accreditation as required by DHS 159. Contractor shall have certified staff or hire an accredited third-party consultant at no additional cost to the project.

Any impact of asbestos materials or assumed asbestos materials must be conducted by workers properly trained and currently certified in accordance with DHS 159.

NOTE – POSITIVE RESULTS
The GPC shall submit an electronic copy of the necessary regulatory notification for asbestos removal or an electronic copy of test results indicating the roofing materials intended for removal do not contain asbestos. (Refer to General Requirements Article "HAZARDOUS SUBSTANCES – ASBESTOS, LEAD AND POLYCHLORINATED BIPHENYLS (PCB'S)" for additional information.)

Laboratory results must be submitted prior to start of work.

SAMPLES
None required.

MOCKUPS
None required.

INSTALLATION MEETINGS
Prior to the start of construction, the GPC shall schedule an installation meeting. It is required that the GPC's Project Manager and Superintendent; and Roofing System Superintendent and/or Foreman attend an installation meeting. Coordinate attendance with these representatives: DFD Project Representative, SME, the user Agency Representative, and the A/E. All required and accepted submittals for this Section and related work shall be uploaded to DFD's PMIS prior to the meeting. Hold meeting concurrent with Asphalt Shingles pre-installation meeting.

PART 2 - PRODUCTS

PERFORMANCE REQUIREMENTS
Roof Assembly shall have a U.L. Class A Fire Hazard Classification. All exceptions shall be approved in writing by the DFD SME.

MANUFACTURERS AND MATERIALS
All products installed on this project shall be compatible with one another and approved by the Manufacturer for use in the Manufacturers tested roof assembly / system and included in the Manufacturers NDL warranty. All associated products required by the Manufacturer for a complete warranty specified installation shall be approved and provided by the Manufacturer.

Unapproved Manufacturer products installed on the project shall be cause for rejection of the roof system in its entirety and shall be completely replaced at no cost to the project.

All products installed on this project shall have been in production, and in field use (with field installed data upon request), for a minimum of ten years. Products that do not have a production and field history of at least ten years installed on this project shall be rejected and shall be completely replaced at no cost to the project.

Use of salvaged materials shall be considered cause for rejection of the roof system in its entirety and shall be completely replaced at no cost to the project, unless specified herein. Salvaged or used materials are unacceptable and shall be removed from the project site.

ELASTIC SHEET MEMBRANE: EPDM (Ethylene Propylene Diene Terpolymer) thermoset roof membrane meeting or exceeding ASTM D4637, Type I.

Reinforcement: None
Color: Black
Thickness: 60-mil +/- 10%
Fire retardant: As required to obtain a UL Class A rating

Uncured Flashing: Uncured black 55-60-mil EPDM elastomer that cures in place after installation.

Cured Flashing: ASTM D4637, Type I; Non-reinforced black 60-mil EPDM elastomer.

Self-Adhering Flashing: Nominal 60-mil-thick uncured EPDM elastomer membrane, laminated to adhesive.

Membrane Bonding Adhesive: Solvent-based adhesive designed to bond EPDM membrane to a variety of substates. Water-based adhesives are not acceptable.

Cements, Tapes, Sealants and Accessories: Foam and/or solvent based adhesives and related prepping and cleaning agents required for the installation of membrane, flashing, seaming, etc.

Insulation / Cover Board Adhesive: One or two-part low rise expanding polyurethane adhesive designed for adhering insulation and cover board to various substrates.

Perimeter Securement Strip: Reinforced EPDM elastomer with a pre-applied splice tape along one edge.

Insulation / Reinforcement Strip and Accessories Fasteners: Designed for use with fastening plates to secure insulation and reinforced termination strips to various types of substrates. Fasteners have a drill point tip and buttress thread design to reduce back-out. Fasteners shall have a coating providing corrosion resistance exceeding the requirements of FM 4470. Thread diameter as required by the manufacturer to obtain warranty.

Insulation / Reinforced Strip Fastener Plates: Galvalume coated metal plates designed for use with fasteners listed above for attachment of insulation and reinforced termination strips. Plates shall exceed the corrosion resistance requirements of FM 4470. Plate diameter shall be 3-inch minimum for securing insulation and 2-inch minimum for securing reinforced strips.

VAPOR RETARDER

Vapor Retarder: 6-mil polyethylene.

Vapor Retarder Tape: Polyethylene tape designed to adhere to polyethylene and other surfaces. 3M™ Polyethylene Tape 483 or accepted equal.

COVER BOARD

Pre-primed Fiberglass Faced Gypsum Board: ASTM C1177; high density gypsum core with primed fiberglass facings on each side. Thickness as required by construction drawings, maximum board size 4’x4’.

MISCELLANEOUS

Termination Bar: ASTM B209, Series 3000, Temper H-14; minimum 0.10" thick, 1.25" wide aluminum with reverse bend for sealant application. Shall be approved and supplied by the membrane manufacturer.

Metal Batten Strip: Galvalume® AZ 55, .040" minimum with pre-punched holes. Shall be approved and supplied by the membrane manufacturer.

Water Block Sealant (Mastic): Gun grade butyl base rubber designed to provide a seal when used in compression. Not for use as an exposed sealant.

Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A or O; FS TT-S-00230C, Type II, Class A; one-part polyurethane base, elastomeric joint sealing compound such as Sika Chemicals "Sikaflex 1a", Sonneborn-Contech "Sonolastic NP1" or Tremco "Vulkem 116" or "Dymonic".
Pourable Sealer: One or 2-part polyurethane or other sealer intended for use by the membrane provider to seal provider approved penetrations accessories components. The sealer and penetrations accessories components shall be included in the membrane supplier warranty.

Other products, not specifically described, but required for a complete and proper warranted system installation as required by this section shall be selected by the Contractor to be included in the work, identified on a materials list and subject to the approval of DFD's Project Representative.

PART 3 – EXECUTION

EXAMINATION

Examine the areas and conditions under which work in this section shall be installed. Notify the DFD's Project Representative and GPC of any conditions detrimental to the proper and timely completion of the work (safety or otherwise). The Roofing System Contractor shall not proceed until the unsatisfactory conditions have been corrected.

The Roofing System Contractor shall inspect the underside of the structural deck for spray-applied insulation or fireproofing, as well as interior components attached to the deck. Notify DFD's Project Representative, GPC and A/E of such items that could be damaged or dislodged from deck during normal construction activities. The Roofing System Contractor shall take every precaution to prevent damage to or the release of components from the interior building envelope during construction. The GPC is responsible for all damage to the building interior or its contents that occur as a direct cause of the work, and due to the Roofing System Contractors methods and mean practice to accomplish the work required herein.

SITE CONDITIONS

NOTE: Proceeding with the work shall signify the Roofing System Contractor's acceptance of the substrate that is to be covered by this work.

Apply roofing materials in dry weather. All roofing materials installed during a rain / snow/ precipitation event shall be removed and replaced with dry materials at the Roofing System Contractor's expense.

Do not apply roofing if the ambient temperature is below 32 degrees Fahrenheit. Installation of any roofing material at an ambient temperature below 32 degrees Fahrenheit shall be rejected.

The GPC shall provide special protection or avoid any heavy traffic on work to remain.

Existing materials designated to remain, which are damaged or defaced prior to the installation of new work, shall be replaced at the GPC's expense to like new condition. Do not store equipment or materials on completed work.

Extend plumbing vent stacks as necessary to provide a minimum height of 8" above the finished roof surface. Adjust existing stack height as required so that the joint between the extension and the existing pipe occurs below the roof flashing.

Install all rooftop mounted equipment in a Manufacturer approved, watertight manner, and repair any damage to sheet metal or other components related to connection and protection of the roof system.

Prevent materials from entering and clogging roof drains and conductors. Remove roof drain plugs when no work is taking place or when rain is forecast.

SUBSTRATE PREPARATION

Clean surfaces of all residual materials as necessary to ensure adequate bond of new material.

The Roofing System Contractor shall verify that the substrate is clean, dry, free from sharp projections and depressions, and that all surfaces and site conditions are ready to receive new materials. All areas shall be void of moisture and all other debris prior to the start of Roofing System construction.

The Roofing System Contractor shall take whatever action is necessary to prevent dirt, debris, and toxic fumes from entering the building during the work required by this Section.

The Roofing System Contractor shall verify that wood blocking, curbs, and nailing flanges are securely anchored, and that roof openings and penetrations are in place, set, and braced.

Existing drains indicated on the drawings to remain shall be cleaned and prepared to receive new flashing, and new clamps, bolts, nuts, etc., Drill and tap new holes and bolts as needed.

Provide replacement cast-iron or aluminum drain strainers matching existing retainer ring where existing strainers are missing, damaged or plastic.

The Roofing System Contractor shall notify the DFD Construction Representative, GPC and the A/E if the existing deck has uncovered holes, is found to be deteriorated, decayed, or deformed, or in any way preventing proper installation or drainage of the new system.

INSTALLATION OF VAPOR RETARDER

Clean surfaces prior to application. Surfaces shall be dry and free of dust and foreign material.

Loose lay one-ply of polyethylene vapor retarder across substrate. Overlap all joints a minimum of 6-inches.
Prime substrate, using roller or brush, with manufacture’s solvent-based primer in a manner and rate specified by the manufacturer.
Allow primer to dry tacky to the touch.
Turn vapor retarder up at all perimeters, curbed and pipe penetrations a height equal to the insulation thickness. Seal all terminations. Roll with a weighted roller to fully mate each roll to the substrate. **INSTALLATION OF COVER BOARD**
Clean surfaces prior to application. Surfaces shall be dry and free of dust and foreign material. Remove all contaminates prior to application of cover board.

Correct any warped, curled, deformed or damaged insulation board prior to application of cover board.

Install cover boards with edges in moderate contact without forcing. Cut cover board to fit neatly to perimeters of roof areas and around penetrations and projections.

Install with one joint continuous and end joint staggered a minimum of 12". Stagger cover board joints a minimum of 12” from underlying insulation joints.

Fill gaps between ¼ inch and ½ inch wide with spray foam insulation. Gaps over ½ inch shall be filled with specified cover board.

The cover board shall be adhesively attached with "full (splatter) spray" or with beads of adhesive. Provide beads of adhesive in a pattern and size as specified by the manufacturer at the following rate:

Field beads shall be spaced a maximum of 12 inches on center plus a bead of adhesive around the perimeter of each board and around penetrations.

Perimeter Zone 3 feet wide shall be spaced a maximum of 6 inches on center plus a bead of adhesive around the perimeter of each board and around penetrations.

Corner Zone 3 feet shall be spaced a maximum of 4 inches on center plus a bead of adhesive around the perimeter of each board and around penetrations.

Weight adhesively adhered cover board sufficiently to bond cover board to underlying substrate.

INSTALLATION OF ROOF MEMBRANE

Install membrane in accordance with the membrane supplier's recommendations and the following:

Use largest membrane panels practical to minimize field seams; lap all seams perpendicular to or in the direction of flow.

Correct any warped, curled, deformed or damaged cover board prior to application of membrane.

Clean surfaces of all debris, contaminates, etc. prior to installing membrane.

Unroll membrane over the insulation and position without stretching. Allow membrane to relax approximately 30 minutes or more, per membrane supplier's instructions, prior to adhering and seaming. Remove all wrinkles that impede the flow of water.

Apply bonding adhesive to underlying substrate and backside of membrane in accordance with manufacturers specifications. Do not apply adhesive to lap / seaming areas.

Broom membrane to ensure full (90 to 100%) contact with underlying substrate and eliminate blisters, wrinkles, etc.

Clean all laps with manufacturer's approved solvents and/or primers. All bonding surfaces must be free of dirt, moisture, etc. Apply cleaner / primer a minimum of one inch beyond matting surface.

Seam membrane together, following manufacturers direction regarding splicing application**.**

Panels jointed utilizing seam / splice tape shall use minimum width tape as required to meet terms of the warranty. Tape to extend beyond overlying top panel as required. Trim panel as necessary.

Adhesive seams shall be a minimum of four (4) inches wide. Lap sealant shall be applied to adhesive seams before the end of each day but not before seam has set for two (2) hours. Lap joints to be cleaned before installing sealant.

Seam through a roof drain or prefabrication boot and sheet wrinkles through a seam are not allowed.

Roll seam first perpendicular to seam the entire length of seam then parallel to seam for the entire length of seam.

Terminate and seam membrane in accordance with accepted shop drawings.

Fasten membrane to walls, curbs, slope changes over 1 in 12, and other protrusions using reinforced termination strips. Fasten strips using screw and plate twelve (12) inches o.c. maximum. Bond horizontal portion of reinforced termination strip to underlying substrate.

Edge of plate shall be 1/4" - 1/2" from deck to wall / curb juncture.

Where field seams cross forming a "T" joint, provide an adhered patch of uncured flashing with rounded corners or preformed joint cover adhered over "T" joint.

At vertical field splices, provide an adhered patch of uncured flashing with rounded corner or adhered preformed joint cover centered over joint.

INSTALLATION OF ROOF FLASHINGS

All flashings and terminations shall be done in accordance with detail drawings or approved shop drawings.

Totally bond (95 to 100%) all flashing to its substrate and round all exposed corners.

1/4" bridging of flashing material, measured across the face, is maximum allowable.

All cured flashing vertical field splices shall be overlaid with a piece of uncured flashing or preformed joint cover centered over the field splice at the angle change.

Forming of all uncured flashings shall be done with the aid of a hot air gun during “cold” weather. Do not stretch flashings.

Flashing at curbs, expansion joints, etc. shall extend up to and terminate on top of horizontal surface.

Provide intermediate attachment of flashing when height of flashing exceeds five (5) feet.

Flash penetrations, such as soil vent stacks in accordance with manufacturers' instructions using prefabricated units where possible. Flash other penetrations using field fabricated flashings.

Roofing membrane to be flashed at the end of each day with the top edge of the flashing sealed with caulk strip, sealant or mastic to prevent water entry.

Top and side edges of all wall flashings are to be sealed with a caulk strip / compression bar, provide a 1" x 1/8" continuous bead of water stop mastic behind the membrane before installing bar.

WORKMANSHIP

In part the following items may be cause for rejection or repair in whole or part of the roof system. Corrective action necessary will be determined by the SME, Division Representative and A/E.

- Wrinkles in membrane or flashing in excess of 2" in any direction or within 2-feet of a field seam;
- Bubbles in membrane or flashing of any size, caused by outgassing or otherwise;
- Blistering of membrane or flashing of any size;
- Tenting / bridging of membrane or flashing of 2" or more off of any planar surface (excluding flashing boots);
- Delamination or warping of installed material from any surface;
- Delamination of flashing from any adhered surface;

- Cuts, holes, tears, punctures, or damage to the membrane or flashing of any kind. Repair of membrane damage shall consist of EPDM membrane that extends a minimum of 3" beyond the damage in all directions. At a minimum, a minimum 6"x6" EPDM membrane patch overlaid with a minimum 12"x12" EPDM membrane patch. Round all corners of patch material.

CLEANING

Inspect adjacent roof systems, their drain strainers, and the grounds below the work area and remove debris associated with this project.

Repair or replace defaced or disfigured finishes caused by work in this Section. In areas where finished surfaces are soiled by any source caused by work of this Section, consult with Manufacturer for cleaning advice, product recommendations, and conform to their instructions.

***** END OF SECTION *****

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STATE OF WISCONSIN
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES DEVELOPMENT (DFD)
DOA-4522 (R10/01/12)

Mailing Address: **Post Office Box 7866, Madison, WI 53707-7866**
Street Address: **101 E. Wilson Street, 7th Floor, Madison, WI 53702**
Phone: **608 / 266-2731**; *FAX*: **608 / 267-2710**
http://www.doa.state.wi.us/DFD

State of Wisconsin - Roofing System 5-yr Guarantee

State Agency/Location/Address _____

Building Name _____Bldg. No. _____Roof Area(s) _____

D.S.F. Project No. _____Project Total Sq. Ft. _____Manufacturer _____

Type of Roofing System _____Prime Contractor _____

Shingle Warranty Registration No._____ Warranty web site _____

Date of Completion _____ State Guarantee Starts_____State Guarantee Expires _____

List Additional Manufacturer Warranty and/or Guarantee Submittals Required

(submit all of the additional warranty/ guarantees required at the same time along with this guarantee)

Total System Warranty -Yes ☐ No ☐ Membrane Warranty -Yes ☐ No ☐ Metal Guarantee -Yes ☐ No ☐

Subject to the terms, conditions and limitations stated herein, we, the undersigned hereby jointly and severally guarantee that the roofing system installed on the above named building, will remain in a watertight condition, free from leaks and defects in materials or workmanship, for a period of five (5) years from the date of completion; and that we will at our expense, make or cause to be made such permanent repairs to said roofing system having defects in any of the materials and workmanship applied by or through the undersigned, as may be necessary to restore to compliance with the specifications or replace said roofing system in a water tight condition without defects as hereinafter defined. **Contractor shall perform a minimum of two (2) roof system inspections during the term of this guarantee with final inspection performed within last 6-months of term. Submit written inspection/repair and location reports to DFD Project Manager and Agency Representative.**

This guarantee is made subject to the following terms and conditions: The term "defect" shall include leak(s), faulty installation, installation of other than specified materials, and the following,

- Built-Up and Modified Bitumen Roofing Systems: Ridges, blisters, buckles, wrinkles, fishmouths, voids or splits in the membrane or bituminous flashings, slippage of components, insufficient attachment of vapor retarders and/or insulation, deteriorated insulation, sound barrier components, bare spots or inadequate coverage by aggregate or protective coating, and loose sheet metal.

- Single Ply Membrane Roofing Systems: Defective and/or excessive deterioration of the roofing sheet or flashing, inadequate or failed perimeter restraint to include wood blocking, insufficient attachment of vapor retarders and/or insulation, deteriorated insulation, insufficient or deteriorated ballast and loose sheet metal.

- Shingle/Tile/Slate Roofing Systems: Broken, cracked, split, curled, spalled, blistered, unsealed or otherwise deteriorated shingles, tile or slate units, non-seated, non-secure nails/fasteners backing out or exposed, wrinkled underlayment; installation on loose, buckled or deteriorated sheathing/decking.

- Cold Liquid-Applied Membrane System: Improper surface preparation, premature or excessive deterioration in mil. coating, bare spots, insufficient mil coverage, non-adherence of membrane, blistering, air pockets or cratering in membrane, fasteners backing out, loose or exposed and loose sheet metal.

- Metal Roofing Systems: Loose components/fasteners, excessive buckling, oil-canning, and damaged finish.

- Sheet Metal Roof Flashing- Skylight Panels: Loose, unsecured metal flashing, panels and associated cleats, anchors, clips, wood blocking, fasteners, inadequate, improper, loose and sealant.

The term "roofing system" shall mean all the materials above the structural roof deck associated with the roof system that are furnished under this contract and the workmanship for installing such materials as required per the manufacuture's installation instructions to achieve a watertight system.

No work will be done on said roof by the State, including, but without limitation, work in connection with flues, vents, drains, sign braces, antennas, railings, platforms or other equipment fastened to or set on the roof, and no repairs or alterations will be made to said roof, unless the undersigned are first notified and given the opportunity to make the necessary roofing application recommendations with respect thereto, and such recommendations are complied with by the State. Failure to observe this condition shall render this guarantee null and void.

In the event leak(s) or defects should occur, the User Agency shall notify the undersigned parties in writing at the addresses listed below within thirty (30) days of discovery of leak(s) or defects. If repairs are not initiated within ten (10) days from the date of receipt of written notice that leaks or defects exist, the State is hereby authorized to have repairs made to the roofing system as is required without invalidating this guarantee, and the undersigned agrees to pay all costs for repair or replacement of leak(s) or defects in roofing system within thirty (30) days from the date such repairs or material replacement have been completed and approved by the State.

In the event that the State has notified the Contractor of the need to repair leak(s) through the roofing system and an emergency condition exists which requires immediate repair to avoid substantial damage to the State, the State may make such temporary repairs as may be essential and such action shall not be a breach of this Guarantee, so long as the State complies with other provisions of the Guarantee.

This Guarantee is in lieu of all other warranties expressed or implied, including warranties of merchantability or fitness for any particular purpose. No representatives of the parties herein named have the authority to make any representations other than those stated herein.

Specifically excluded from this guarantee is any and all damages to said roof system, the building or contents therein caused by any one or combination of the following,

- Acts or omissions of the State.
- Damage resulting from natural disasters; i.e., windstorm (exceeding velocity of 70 miles per hour), hail, flood, hurricane, lightning, or other phenomena of the elements.
- Damage resulting from the building structure failing to have adequate strength to support all live and dead loads, including water and snow loads, or any damage resulting from any other structural defects or failures.
- Damage resulting from objects, misuse or abuse of the roofing system, or traffic, recreational activities, or storage of material on the roofing system.
- Discharge of vegetable, mineral, animal oils, greases, solvents, or chemicals such as industrial wastes, upon the roof surface, unless originally designed for such purpose and prior written approval is received.

IN WITNESS WHEREOF, this instrument has been duly executed,

PRIME CONTRACTOR	**ROOFING CONTRACTOR**
(If the Roofing Contractor is also the Prime Contractor, only one signature in either signature block is required)	
Signature _____	Signature _____
Name/Title _____	Name/Title _____
Date _____	Date _____
Address _____	Address _____
Telephone _____	Telephone _____
Seal	Seal

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including sheet metal panning and sill at MLSP Residence and Garage. See Sheet A510.

B. Fabricated sheet metal flashing and counterflashing for louvers at Mirror Lake Shop Building. See A530.

C. Fabricated sheet metal flashing and counterflashing for louvers at RASP Shop Building. See A800.

D. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 63 00 Sheetmetal Roofing Specialties: Sheetmetal for roofing assemblies. Coordinate coating colors for work at MLSP Residence.

C. Section 08 91 00 Louvers: Coordinate coating colors for work at Louvers.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

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

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2024).

G. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide manufacturer's data sheet for sheet material.

B. Review Submittals - Samples:
   1. Selection Samples: Submit manufacturer's color sample set for selection by AE.
   2. Confirmation Samples: Submit two samples 6 by 6 inches in size illustrating metal finish color.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 3 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

1.07 WARRANTY

A. Manufacturer's 20 year warranty on flashing finish.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

A. Pre-Finished 24 gage Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.028 inch thick base metal, shop pre-coated with PVDF coating.
   1. Application: Mirror Lake Shop Building on A530.
   2. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
   3. Color: As selected by Architect from manufacturer's standard colors.

B. Pre-Finished Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 18 gauge, 0.040 inch thick; plain finish shop pre-coated with silicone modified polyester coating.
   1. Application: MLSP Residence and Garage (panning and sill) on sheet A510, and RASP Shop Building at louver on sheet A800.
   2. Fluoroethylene Vinyl Ether (FEVE) Coating: Superior performing organic powder coating, AAMA 2605; base coat with clear top coat of FEVE coatings.
   3. Color: As selected by Architect from manufacturer's standard colors.

2.02 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.03 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers. Color match exposed fasteners.

B. Primer Type: Zinc chromate.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

PART 3 EXECUTION

3.01 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.02 INSTALLATION

A. Comply with drawing details.
   1. SMACNA Architectural Sheet Metal Manual2012.

B. Insert flashings and counterflashings to form tight fit; secure in place. Seal flashings with sealant.

C. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

D. Apply recommended sealant/adhesive compound between metal flashings and felt flashings.

E. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

F. Seal metal joints watertight.

END OF SECTION

SECTION 07 63 00
SHEET METAL ROOFING SPECIALTIES
BASED ON DFD MASTER SPECIFICATION DATED (02/06/17)

PART 1 – GENERAL

SCOPE

The work under this section includes all labor, material, equipment and related services necessary to install all roof related sheet metal. Record documents to include digital photos.

PART 1 - GENERAL
- Scope
- Related Work
- Reference Standards
- Guarantee
- Quality Assurance
- Product Delivery, Storage and Handling
- Submittals - Technical and Other Documents

PART 2 - PRODUCTS
- Sheet Metal Materials
- Other Materials

PART 3 - EXECUTION
- Fabrication
- Workmanship
- Installation
- Cleaning

RELATED WORK

Applicable provisions of Division 01 shall govern work under this Section. The Contractor shall consult these provisions in detail prior to proceeding with work.

See unit pricing for sheathing panel replacements discovered during performing the work of this section.

07 62 00 – Sheet Metal Flashing and Trim: Coordinate to match color for the work at MLSP Residence and Garage. See sheet A510.

07 31 13 – Asphalt Shingles

07 31 24 – Granular Coated Steel Shingle

07 53 23 - Ethylene-Propylene-Diene-Monomer Roofing

In the event that the Contractor wishes to make improvements in materials and/or techniques, or is required to make improvements by his material manufacturer in order to obtain guarantees/warranties, he shall make written request stating in full the nature of the proposed changes and stating that the changes, if approved, will be accomplished at no additional cost to contract.

REFERENCE STANDARDS
AISI – American Iron and Steel Institute.

ASTM A653 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

ASTM D2244 – Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

ASTM D4214 – Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

NRCA - Roofing and Waterproofing Manual.

SMACNA - Architectural Sheet Metal Manual.

GUARANTEE
See roofing section for requirements of sheetmetal guarantees.

Contractor and all sub-contractors shall review the guarantee and requirements of this Section prior to providing a quote for the Work required by this Section.

The Contractors Performance-Payment Bond is only required to apply to this trade section during the construction period and the first year of the guarantee period. Said Bond shall not apply to any extended guarantee period beyond the first year. Such extended guarantees are limited to the applicable Contractor and manufacturer as herein specified.

Manufacturer's Warranty: Provide the sheet metal manufacturer's standard **twenty (20) year** warranty stating at a minimum that the metal finish will not chalk in excess of an eight (8) rating, or fade in excess of a five (5) rating, when tested in accordance with ASTM D2244 and ASTM D4214.

The following information shall be included on all guarantee and warranty documents:
State of Wisconsin (Owner), Agency, city or township, street address where work was performed, building name, Owner Project number, Owner (DOA) building number, all roof areas involved and total sq. ft. area of all roof areas.

QUALITY ASSURANCE
Contractor shall be recognized by the manufacturer of the sheet metal as an "approved" or "authorized" applicator. Within the past five (5) years, the contractor shall be able to document the successful completion of a minimum of three (3) projects of similar size and scope of the work specified in this section.

Provide all equipment recommended by the manufacturer for proper installation of the materials specified.

PRODUCT DELIVERY, STORAGE AND HANDLING
Store all products in accordance with applicable provisions of Division 1 and Sections 07 31 13, 07 31 24, and 07 53 23.02**.**

Stack preformed material to prevent twisting, bending or abrasion and to provide ventilation.

Prevent contact with materials during storage, which may cause discoloration, staining or damage.

SUBMITTALS - TECHNICAL AND OTHER DOCUMENTS
See Sections 07 31 13, 07 31 24 & 07 53 23, SUBMITTALS - TECHNICAL AND OTHER DOCUMENTS.

Contractor shall submit actual samples of pre-finished sheet metal showing the exact color(s), metal type and texture(s) available for selection.

Contractor will be notified of any additional required submittals at the pre-construction meeting.

PART 2 - PRODUCTS

All products used in this installation shall be compatible with materials used in Sections 07 31 13, 07 31 24 & 07 53 23.

SHEET METAL MATERIALS
Prefinished Galvanized: ASTM A653, G-90; 24 gauge galvanized steel coated with a minimum 70% Kynar (Kynar 500) flouropolymer resin of 0.9-1.1 mil total dry film thickness and primed on the reverse side a wash coat of 0.3-0.4 mil dry film thickness. Color to be chosen from the manufacturer's standard color selection at the preconstruction meeting. Texture shall be smooth.

Galvanized: ASTM A653, G-90; galvanized steel. Thickness as follows:

22 gauge galvanized steel for continuous cleats.

24 gauge for metal edge, coping, flashing, seamless-gutter/downspouts, expansion joint, pourable sealer pans, sleeves and hoods.

Stainless Steel: AISI, Type 304, No. 2D; 26 gauge stainless steel.

OTHER MATERIALS

Fasteners: Where not specified, size fasteners to suit conditions.

Metal to Wood, at exposed locations: #10 x 1-1/2" stainless steel screws with metal capped neoprene or PVC washers.

Metal to Wood (concealed locations): 1-3/4" hot-dipped galvanized roofing nails.

Sealant: ASTM C920, Type S, Grade NS, Class 25, Use NT, M, G, A or O; FS TT-S-00230C, Type II, Class A; one-part polyurethane base, elastomeric joint sealing compound such as Sika Chemicals "Sikaflex 1a", Sonneborn-Contech "Sonolastic NP1" or Tremco "Vulkem 116" or “Dymonic".

Flexible Flashing: 0.045" EPDM or 0.020" vinyl.

Concrete Splach Block for Roof: ½ Trough Shaped - 18”Lx10”Wx3”H, nominal.

Concrete Splash Block for Ground Level: ½ Trough Shaped - 30”Lx12”Wx3”H.

Downspouts for Richland Center Building: Corrugated round, sized to match existing. Provide embossed downspout straps (universal conductor band) to match the existing but with spacers between the downspout and wall. See Figure 1. Match downspout material for band and spacer.

Figure 1 - Richland Center Existing Downspout Strap (Universal Conductor Band)

Downspouts for other buildings: Corrugated rectangular, sized to match existing.

Other products, not specifically described, but required for a complete and proper installation of the work in this section shall be selected by the Contractor subject to the approval of Owner.

PART 3 - EXECUTION

Refer to the drawings included with these specifications.

Fabricate and install all material in accordance with the latest edition of SMACNA, the best-accepted practices of the industry and these specifications.

FABRICATION

Fabricate new sections as detailed. Form sections true to shape, accurate in size, square and free from distortion or defects. Do not “punch” metal at brake points.

Form all pieces in lengths of 8'-0" or 10'-0" where practical. Sections less than 3' long are unacceptable unless that section comprises the entire run.

Unless detailed otherwise, hem exposed edges on underside 1/2"; fabricate vertical faces with bottom edge formed outward 3/4" at 45 degrees and hemmed to form drip.

Outside corners shall be prefabricated such that the outside face of section is broken at corner; seam at corner is unacceptable. Miter and seam top of outside and inside corners using rivets and specified polyurethane or manufacturer recommended and approved sealant. Corner pieces shall be a minimum of 18” in length, in both directions from the corner.

WORKMANSHIP

Make all work weather and watertight throughout; provide allowances for material expansion and contraction.

All valley and valley edge/fascia installations shall be recorded from deck to finish by taking digital photo’s of the installation as each product is applied over the preceding product. Digital photos shall be properly identified as to their location on the roof and sent to the DFD Project Manager electronically.

Contractors workers shall carry a container or apron to deposit all metal cut offs, droppings or other debris created by the work. Waste shall not be dropped to the roof and ground.

Sections shall be uniform, accurately fitted so as to line up straight and true and rigidly secured in place, without kinks or buckles. Joints at corners and angles shall be smooth, tight and neatly mitered and seamed.

Unless detailed otherwise, lap all vertical joints between adjacent sections a minimum of 2".

Where metal is hooked to a continuous cleat, crimp metal to cleat along entire length.

INSTALLATION

Counterflashing Receiver:

Install new receiver as detailed or where required.

Notch and lap joints 3" between sections.

Apply sealant at the joint between the receiver and the masonry wall where receiver is not part of a thru-wall flashing; DO NOT APPLY SEALANT between masonry and thru-wall flashings.

Counterflashing:

Fasten counterflashing to receiver with stainless steel sheet metal screws @ 24" O.C.

Notch and lap joints 3" between sections; bayonet joints are unacceptable. Do not fasten joints between sections.

Counterflashing shall be creased longitudinally just enough to provide a spring action that will hold bottom edge firmly against flashing.

Gutter:

Fabricate new gutter to match existing size and conform to profile of existing brackets.

Provide 24 gauge prefinished steel gutter and new hangers per manufacturer specifications.

Temporarily hang gutters from fascia using roofing nails through the top of the back leg only @ 12" O.C. Install hanger straps @ 24” O.C. and secure to fascia with two stainless screws as detailed. Gutters shall have a net positive slope of 1/8" per foot between the high point and downspouts.

Downspouts:

Install downspouts and associated elbows in locations shown on the roof plan as follows:

Gutter outlets shall extend into downspout a minimum of 3”. Upper end of outlet tube shall be flanged ½” and riveted and to inside of gutter. Provide removable strainers at all outlets.

Fasten downspouts with hangers at eight (8) feet O.C. Install an additional hanger one foot from the top and bottom, and within one foot of all elbows.

Provide concrete splash blocks at bottom of each downspout.

Mount downspout a minimum of 1” off all surfaces.

Roof Edge: (For asphalt/wood shingle roofs.)

Fabricate roof edge metal with a 4” minimum roof deck flange and 2” minimum fascia coverage or as required to conceal ice protection membrane lapped onto the fascia substrate.

Notch and lap joints 3" between sections.

Install sections in accordance with Section 07 31 13, 07 31 24.

Roof Edge: (Snap-On – For use with single ply roof, only.)

Install reinforced EPDM strip prior to the waterdam portion of the edge assembly.

Secure waterdam over outside edge as detailed and secure with specified fasteners @ 6" O.C. through horizontal and vertical faces.

Fully adhere field sheet over waterdam in accordance with Section 07 53 23.

Install concealed splice plates, snap-on fascia cover and associated hardware in accordance with the manufacturer's detailed instructions.

Valley Metal:

Valley metal to be prefinished 22 gauge, minimum 18” wide stock.

Fabricate valley metal with a one inch high inverted “V” down the center for open-style valleys

Fasten valley metal sections along top edge only. Lap sheets a minimum of 8” and seal seams with two (2) beads of sealant. Notch ¾” lock seams on underlying sheet to facilitate laps.

Apply ice protection membrane and felt underlayment in accordance with Section 07 31 13.

Miscellaneous Flashings:

Install appropriate flashings at all exhausts, vents and penetrations not specifically called out but required.

Remount and secure all rooftop equipment. Use threaded fasteners.

CLEANING

The work areas including the roof and ground below shall be inspected on a daily basis for waste/droppings.

Properly dispose of all cut offs, droppings and other debris on a daily basis to avoid damage or injury to others and/or owners property.

***** END OF SECTION *****

SECTION 07 77 10

SCREEN PORCH SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum framing system and accessories for screen porch assemblies.

B. Screen Fabric.

C. Metal Framed Screen Door.

1.02 RELATED REQUIREMENTS

A. Section 06 30 00 - Exterior Carpentry: Substrate framing and trim.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: Substrate cladding.

C. Section 07 92 00 - Joint Sealants: Sealants for sealing gaps.

1.03 REFERENCE STANDARDS

A. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

B. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

1.04 SUBMITTALS

A. Review Submittals - Preparatory:

1. Product Data: Manufacturer's product datasheet identifying product dimensions, features, accessories.
2. Shop Drawings: Indicate assembled dimensions.

B. Review Submittals - Samples:

1. Manufacturer's color sample set.
2. Trim/Framing, screen, accessory: Assembly with one 12 inch long framing/trim, screen fabric and screen fabric retaining component.

C. Information Submittals - Preparatory:

1. Manufacturer's qualification statement.

D. Closeout Submittals:

1. Document manufacturer’s standard warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

1.06 WARRANTY

A. Section Specific Warranty: Provide manufacturer's standard warranty as described in this section. Document the warranty as defined under the Submittals heading of this section.

PART 2 PRODUCTS

2.01 SCREEN MOUNTING AND TENSIONING ASSEMBLIES

A. Extruded Aluminum Framing System:

1. Provide complete system configured to attach to substrate framing, including:
    a. Framing members with connectors.
    b. Spline/Retaining Item.
    c. Fasteners.
    d. Screen as specified below.

B. Manufacturers/Products:

a. Screen Tight; Fast Track: www.screentight.com.
b. Barrette Outdoor Living: EZ Handrail, Screen Handrail: www.ezhandrail.com.
c. ScreenHouse: S Series: www.screen-house.com.

C. Finish: Through Color PVC:
1. Exposed Fasteners: Color matched to framing/trim.
2. Color: White (Confirm with A/E at time of submittals).

2.02 COMPONENTS

A. Screen Door:
1. Size: 36 inches wide by 80 inches tall.
2. Rail and Stile Construction:
a. Material: Extruded Aluminum.
b. Head rail and stile width: Narrow, approximating 4 inches.
c. Either of the following:
1) Narrow Bottom Rail.
2) Bottom rail assembly: Dual rail assembly with metal panel insert or kickplate.
(a) Minimum height: 10 inches.
(b) Maximum height: 20 inches.
3. Interchangeable single pane tempered glass and screen.
a. Manufacturer's standard screen fabric.
4. Door Hardware: Manufacturer's options complying with the following:
a. Lever handle.
b. Lockable.
c. Material / Finish: To be selected from manufacturer's options.
1) Finish options to include:
(a) Black.
(b) Stainless/Nickel (Brushed or satin).
(c) Bronze.
(d) Brass.
(e) White.
d. Bottom sweeps or drop seal.
e. Automatic closer, with adjustment for closing speed.

B. Manufacturers:
1. Provia: Superview; www.provia.com.
2. Larson: Platinum; www.larsondoors.com.
3. ScreenHouse: Series 2600; www.screen-house.com.

C. Screen Fabric:
1. Fiberglass Screen:
a. Mesh: 18 x 16.
b. Yarn: 0.011 inch.
c. Color: Charcoal.

2.03 ACCESSORIES

A. Hardware shall be commercial quality and type of nails, bolts, and screws required to securely hold members in place in accordance with National Design Specification for Wood Construction.
1. Nails: ASTM F1667.
2. Wood Screws: ANSI/ASME B18.6.1.
3. Bolts and Nuts: ANSI/ASME B18.2.1.
4. Color match exposed fasteners to the adjacent materials.

B. Provide trim to fit tight to existing siding.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify substrate surfaces are ready to receive new work.

3.02 INSTALLATION

A. Screen System:
   1. Install system in accordance with manufacturer's written instructions.
   2. Provide manufacturer's recommend trim and connectors for an insect tight fit.
   3. Install screen with consistent tension between panels of screen fabric.

B. Doors:
   1. Install door hardware.
   2. Install screen and turn over glass pane to Owner.
   3. Adjust for smooth and balanced door movement and insect tight installation.

3.03 QUALITY ASSURANCE

A. Review installation with A/E and Owner to review insect tight installation.

3.04 TOLERANCES

A. Screen: Maximum Variation From True Position: 1/8 inch.

B. Doors:
   1. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
   2. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

END OF SECTION

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SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-sag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Installation of sealant at floor joints.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: Application of sealants for non-roof metal trim & screen wall specialties.

C. Section 07 63 00 - Sheet Metal Roofing Specialties: Products and application of sealants for metal trim at roofing.

D. Section 07 77 10 - Screen Porch Specialties: Application of sealants for screen porch.

E. Section 08 71 00 - Door Hardware: Application of sealant below exterior door thresholds in sealant.

F. Section 08 80 00 - Glazing: Glazing sealants and accessories.

G. Section 09 30 00 - Tiling: Products and application of sealant at tile control joints and changes in plane.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).

B. ASTM C834 - Standard Specification for Latex Sealants; 2017 (Reapproved 2023).

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

E. ASTM C1311 - Standard Specification for Solvent Release Sealants; 2022.

F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants; 2023.

G. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).

H. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

I. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

1.04 SUBMITTALS

A. Review Submittals - Preparatory:

1. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
    a. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
    b. List of backing materials approved for use with the specific product.
    c. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
    d. Substrates the product should not be used on.
    e. Substrates for which use of primer is required.
    f. Substrates for which laboratory adhesion and/or compatibility testing is required.
    g. Installation instructions, including precautions, limitations, and recommended backing materials and tools.

h. Sample product warranty.
i. Certification by manufacturer indicating that product complies with specification requirements.
j. Instructions for repairing and replacing failed sealant joints.

2. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

B. Review Submittals - Samples:

1. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
2. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

C. Closeout Submittals:

1. Document warranty for the work of this section.

1.05 QUALITY ASSURANCE

A. Maintain one copy of each referenced document covering installation requirements on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

D. Nondestructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.

1. Record results on Field Quality Control Log.
2. Repair failed portions of joints.

E. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

F. Sample Color Verification: At locations identified by A/E, install selected color of sealant at interior and exterior building locations agreed upon with Architect and Owner for final approval.

1.06 WARRANTY

A. Extended Period: Correct work in accordance with the terms of Article 25 "Warranties" of the General Conditions of the General Prime Contractor Contract for a duration of not less than 2 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nonsag Sealants:

1. Adhesives Technology Corporation: www.atcepoxy.com.
2. Bostik Inc: http://www.bostik.com/us/en_US/.
3. Dow Corning Corporation: https://www.dow.com/en-us/product-technology/pt-adhesives-sealants.html.
4. Franklin International, Inc: www.titebond.com.
5. Henry Company: www.henry.com.
6. Hilti, Inc: www.us.hilti.com.
7. Master Builders Solutions by BASF: www.master-builders-solutions.com/en-us.
8. Lucas Products: www.rmlucas.com.
9. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
10. Pecora Corporation: www.pecora.com.
11. The QUIKRETE Companies: www.quikrete.com.
12. Sherwin-Williams Company: www.sherwin-williams.com.
13. Sika Corporation: www.sika.com.
14. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com.
15. W.R. Meadows, Inc: www.wrmeadows.com.

16. Novagard Solutions: www.novagard.com.
17. csl Silicones Inc: www.cslsilicones.com.

B. Self-Leveling Sealants:
1. Adhesives Technology Corporation: www.atcepoxy.com.
2. Bostik Inc: http://www.bostik.com/us/en_US/.
3. Dayton Superior Corporation: www.daytonsuperior.com.
4. Dow Corning Corporation: https://www.dow.com/en-us/product-technology/pt-adhesives-sealants.html.
5. Master Builders Solutions by BASF: http://www.master-builders-solutions.com/en-us.
6. Lucas Products: www.rmlucas.com.
7. Pecora Corporation: www.pecora.com.
8. The QUIKRETE Companies: www.quikrete.com.
9. Sherwin-Williams Company: www.sherwin-williams.com.
10. Sika Corporation: www.sika.com.
11. SpecChem: www.specchem.com.
12. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com.
13. W.R. Meadows, Inc: www.wrmeadows.com.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
a. Wall expansion and control joints.
b. Joints between door, window, and other frames and adjacent construction.
c. Joints between different exposed materials.
2. Interior Joints: Interior joints to be sealed include, but are not limited to, the following items.
a. Joints between door, window, and other frames and adjacent construction.
3. Do Not Seal:
a. Intentional weep holes in masonry.
b. Joints indicated to be covered with [<>]expansion joint cover assemblies [<>].
c. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
d. Joints where sealant installation is specified in other sections.
e. Joints between suspended ceilings and walls.
f. Weepholes in window frames.

B. Type JS-2 - Exterior Joints: Use non-sag silyl-terminated polyether/polyurethane sealant, unless otherwise indicated.
1. Type JS-6 - Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
2. Type FLR-2 - Control and Expansion Joints in Exterior Concrete Slabs. Self-leveling polyurethane "traffic-grade" sealant.

C. Type JS-3 - Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Type JS-5 - Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
2. Type JS-1 - Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; clear.

D. Interior Wet Areas: Restrooms; fixtures in wet areas include plumbing fixtures.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 NONSAG JOINT SEALANTS

A. Type JS-1 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
   1. Color: Clear.
   2. Products:
      a. ARDEX Engineered Cements; ARDEX SX: www.ardexamericas.com.
      b. Dow Corning Corporation: Silicone 786 Silicone Sealant.
      c. General Electric: Sanitary 1700 Sealant.
      d. LATICRETE International, Inc; LATICRETE LATASIL: www.laticrete.com.
      e. Merkrete, by Parex USA, Inc; Merkrete Colored Caulking: www.merkrete.com.
      f. Pecora Corporation; 890NST Sanitary Silicone Sealant. Class 50: www.pecora.com.
      g. Sherwin Williams; White Lightening Silicone.
      h. Sika Corporation; Sikasil GP: www.usa.sika.com.

B. Type JS-2 - Silyl-Terminated Polyether (STPE) and Polyurethane (STPU) Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Hardness Range: 15 to 25, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's full range.
   4. Service Temperature Range: Minus 75 to 300 degrees F.
   5. Products:
      a. Sika: SikaHyflex-150 LM.
      b. SIka; MasterSeal NP 150 Tint Base.
      c. Franklin International Inc.; WeatherMaster Sealant: www.titebond.com.
      d. Sherwin-Williams Company; Loxon H1: www.sherwin-williams.com.
      e. Tremco Commercial Sealants and Waterproofing; Dymonic FC: www.tremcosealants.com.

C. Type JS-3 - Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 35 percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Products:
      a. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
      b. Lucas Products: #9600 Joint & Termination Sealant. www.rmlucas.com.
      c. Sherwin-Williams Company; Loxon S1: www.sherwin-williams.com.
      d. Sika Corporation; Sikaflex-1a: www.usa.sika.com.
      e. Sika Corporation; Sikaflex-15 LM: www.usa.sika.com.
      f. Sika Corporation; Sikaflex-2c NS: www.usa.sika.com.
      g. Tremco Commercial Sealants & Waterproofing; Dymonic 100: www.tremcosealants.com.
      h. W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com.

D. Type JS-5 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging, paintable; not intended for exterior use.
   1. Color: To be selected by Architect from manufacturer's full range.
   2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).
   3. Products:
      a. Pecora Corporation; AC-20 + Silicone Acrylic Latex Caulking Compound: www.pecora.com.
      b. Sherwin-Williams Company; White Lightning 3006 Siliconized Acrylic Latex Caulk: www.sherwin-williams.com.
      c. Sherwin-Williams Company; 850A Acrylic Latex Caulk: www.sherwin-williams.com.
      d. Sherwin-Williams Company; 950A Siliconized Acrylic Latex Caulk: www.sherwin-williams.com.

e. Sherwin-Williams Company; Bolt Quickdry Siliconized Acrylic Latex Caulk: www.sherwin-williams.com.
f. Sherwin-Williams Company; Powerhouse Siliconized Acrylic Latex Sealant: www.sherwin-williams.com.
g. Tremco Commercial Sealants & Waterproofing; Tremflex 834: www.tremcosealants.com.
h. Substitutions: See Section 01 25 00 - Substitution Procedures for requirements.

E. Type JS-6 - Non-Curing Butyl Sealant: Solvent-based; ASTM C1311; single component, non-sag, non-skinning, non-hardening, non-bleeding; vapor-impermeable; intended for fully concealed applications.

2.05 SELF-LEVELING JOINT SEALANTS

A. Type FLR-2 - Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's full range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Products:
a. Lucas Products: #4400 Self-Leveling Modified Urethane. www.rmlucas.com.
b. Sika Corporation; Sikaflex-1c SL: www.usa.sika.com.
c. Sika Corporation; Sikaflex-2c SL: www.usa.sika.com.
d. W. R. MEADOWS, Inc; POURTHANE SL: www.wrmeadows.com.
e. Substitutions: See Section 01 25 00 - Substitution Procedures for requirements.

2.06 ACCESSORIES

A. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

B. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

C. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

D. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

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

B. Provide joint sealant installations complying with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

H. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

SECTION 08 08 00
COMMISSIONING OF EXTERIOR BUILDING ENVELOPE
BASED ON DFD MASTER SPECIFICATION DATED 02/27/15

P A R T 1 - G E N E R A L

SCOPE

This section includes commissioning forms for construction verification and functional performance testing. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Reference
- Submittals

PART 2 - PRODUCTS
- (Not Used)

PART 3 – EXECUTION
- Commissioning Forms
  - CV-08 11 00 Metal Doors and Frames
  - CV 08 14 00 Wood Doors
  - CV 08 16 13 Fiberglass Doors
  - CV-08 51 13 Aluminum Windows
  - CV-08 52 00 Wood Windows

RELATED WORK

Section 01 91 01– Commissioning Process

REFERENCE

Applicable provisions of Division 1 shall govern work under this section.

SUBMITTALS

Reference the General Conditions of the Contract for submittal requirements.

Reference Section 01 91 01 Commissioning Process for Construction Verification Checklist and Functional Performance Test submittal requirements.

P A R T 2 – P RO D U C T S

(Not Used)

P A R T 3 – E X E C U T I O N

COMMISSIONING FORMS

Commissioning forms are to be filled in as work progresses by the individuals responsible for installation and shall be completed for each installation phase.

Provide a description of the work completed since the last entry, the percentage of the total work completed for the system for that area and the step of installation or finalization.

Circle Yes or No for each commissioning form item. If the information requested for an item does not apply to the given stage of installation for the system, list it as “N/A”. Explain all discrepancies, negative responses or N/A responses in the negative responses section.

Once the work is 100% complete and the responses to each item are complete and resolved for a given commissioning forms group, mark as complete, initial and date in the spaces provided.

Provide copies of the commissioning forms to the commissioning agent 2 days prior to construction progress meetings.

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CV-08 11 00 – Metal Doors and Frames

Identification/Tag: _____
Location:_____

Group/Item	Group/Task Description			Submitted	Delivered
A	*MODEL VERIFICATION - FRAME*				
1	Manufacturer				
2	Model				
3	Gauge				
4	Depth				
5	Finish				
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Group/Item	Group/Task Description			Submitted	Delivered
B	*MODEL VERIFICATION - DOOR*				
1	Manufacturer				
2	Model				
3	Gauge				
4	Depth				
5	Finish				
6	Handle Location				
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Group/Item	Group/Task Description			Response	
C	*PHYSICAL CHECKS*				
1	All components are free from physical damage.			YES	NO
2	All components present.			YES	NO
3	Hardware provided per door schedule.			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____
D	*INSTALLATION-FRAME*				
1	Opening square, true and plumb.			YES	NO
2	Opening prepared for installation.			YES	NO
3	Imbeds and anchors installed.			YES	NO
4	Frame set plumb and true.			YES	NO
5	Backer rod and sealant provide around perimeter of each side of frame.			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____
E	*INSTALLATION-DOOR*				
1	Door installed true and plumb.			YES	NO
2	Hardware and accessories installed.			YES	NO
3	Door and hardware operation verified and free from restrictions of movement.			YES	NO
4	All components undamaged, adjusted and cleaned.			YES	NO
5	Key(s) provided to owner in quantity specified (if applicable).			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Negative Responses

Group/ Item	Date Found	Found By	Reason for Negative Response	Resolved	Date Resolved	Resolution
				YES / NO		
				YES / NO		
				YES / NO		

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CV-08 14 01 – Fabricated Wood Doors

Identification/Tag: _____
Location:_____

Group/Item	Group/Task Description			Submitted	Delivered
A	*MODEL VERIFICATION*				
1	Fabricator				
2	Description				
3	Material				
4	Depth				
5	Finish				
6	Handle Location				
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Group/Item	Group/Task Description			Response	
B	*PHYSICAL CHECKS*				
1	All components are free from physical damage.			YES	NO
2	All components present.			YES	NO
3	Hardware provided per door schedule.			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____
C	*INSTALLATION*				
1	Frame set plumb and true.			YES	NO
2	Door installed true and plumb.			YES	NO
3	Hardware and accessories installed.			YES	NO
4	Door and hardware operation verified and free from restrictions of movement.			YES	NO
5	All components undamaged, adjusted and cleaned.			YES	NO
6	Key(s) provided to owner in quantity specified (if applicable).			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Negative Responses

Group/ Item	Date Found	Found By	Reason for Negative Response	Resolved	Date Resolved	Resolution
				YES / NO		
				YES / NO		
				YES / NO		
				YES / NO		
				YES / NO		

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CV-08 16 13 – Fiberglass Doors

Identification/Tag: _____
Location:_____

Group/Item	Group/Task Description			Submitted	Delivered
A	*MODEL VERIFICATION -*				
1	Manufacturer				
2	Model				
3	Gauge				
4	Depth				
5	Finish				
6	Handle Location				
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Group/Item	Group/Task Description			Response	
B	*PHYSICAL CHECKS*				
1	All components are free from physical damage.			YES	NO
2	All components present.			YES	NO
3	Hardware provided per door schedule.			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____
C	*INSTALLATION*				
1	Frame set plumb and true.			YES	NO
2	Door installed true and plumb.			YES	NO
3	Hardware and accessories installed.			YES	NO
4	Door and hardware operation verified and free from restrictions of movement.			YES	NO
5	All components undamaged, adjusted and cleaned.			YES	NO
6	Key(s) provided to owner in quantity specified (if applicable).			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Negative Responses

Group/ Item	Date Found	Found By	Reason for Negative Response	Resolved	Date Resolved	Resolution
				YES / NO		
				YES / NO		
				YES / NO		
				YES / NO		
				YES / NO		

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CV-08 51 13 – Aluminum Windows

Identification/Tag: _____
Location:_____

Group/Item	Group/Task Description			Submitted	Delivered
A	*MODEL VERIFICATION*				
1	Manufacturer				
2	Model				
3	Width / Height (in / in)			/	/
4	Material / Gauge			/	/
5	Finish				
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Group/Item	Group/Task Description			Response	
B	*PHYSICAL CHECKS*				
1	All components are free from physical damage.			YES	NO
2	All components present.			YES	NO
3	Hardware provided per window schedule.			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____
C	*INSTALLATION*				
1	Opening square, true and plumb.			YES	NO
2	Opening prepared for installation.			YES	NO
3	Imbeds and anchors installed.			YES	NO
4	Head and sill flashing installed.			YES	NO
5	Vapor barrier is properly sealed to frame.			YES	NO
6	Windows set plumb and level.			YES	NO
7	Weep holes directed down and away from window.			YES	NO
8	Caulking and backer rod installed with proper tolerances.			YES	NO
9	All components undamaged and cleaned.			YES	NO
10	Factory seal of window is undamaged.			YES	NO
11	Window and hardware operation verified and free from restrictions of movement (if applicable).				
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Negative Responses

Group/ Item	Date Found	Found By	Reason for Negative Response	Resolved	Date Resolved	Resolution
				YES / NO		
				YES / NO		
				YES / NO		
				YES / NO		
				YES / NO		

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CV-08 52 00 – Wood Windows

Identification/Tag: _____
Location:_____

Group/Item	Group/Task Description			Submitted	Delivered
A	*MODEL VERIFICATION*				
1	Manufacturer				
2	Model				
3	Width / Height (in / in)			/	/
4	Material				
5	Finish				
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Group/Item	Group/Task Description			Response	
B	*PHYSICAL CHECKS*				
1	All components are free from physical damage.			YES	NO
2	All components present.			YES	NO
3	Hardware provided per window schedule.			YES	NO
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____
C	*INSTALLATION*				
1	Opening square, true and plumb.			YES	NO
2	Opening prepared for installation.			YES	NO
3	Imbeds and anchors installed.			YES	NO
4	Head and sill flashing installed.			YES	NO
5	Vapor barrier is properly sealed to frame.			YES	NO
6	Windows set plumb and level.			YES	NO
7	Weep holes directed down and away from window.			YES	NO
8	Caulking and backer rod installed with proper tolerances.			YES	NO
9	All components undamaged and cleaned.			YES	NO
10	Factory seal of window is undamaged.			YES	NO
11	Window and hardware operation verified and free from restrictions of movement (if applicable).				
❑ **CHECKLIST GROUP COMPLETE**		**INITIALS:**	_____	**DATE:**	_____

Negative Responses

Group/ Item	Date Found	Found By	Reason for Negative Response	Resolved	Date Resolved	Resolution
				YES / NO		
				YES / NO		
				YES / NO		
				YES / NO		
				YES / NO		

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SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Thermally insulated hollow metal doors with frames.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 92 00 - Joint Sealants: Sealing joints between door frames and adjacent construction.

C. Section 08 71 00 - Door Hardware.

D. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

E. Section 09 91 13 - Exterior Painting: Field painting.

F. Section 09 91 23 - Interior Painting: Field painting.

G. Division 26 and 28: Connection to related powered and access control accessories.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2023, with Editorial Revision.

G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.

H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

I. BHMA A156.115 - Hardware Preparation in Steel Doors and Frames; 2016.

J. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

K. ITS (DIR) - Directory of Listed Products; Current Edition.

L. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

N. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.

O. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2014.

P. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, manufacturer's published instructions, including any special installation instructions relating to this project and finishes; and one copy of referenced standards/guidelines.
   2. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.

B. Supplier: A company experienced in the builders' hardware industry representing hollow metal products for a minimum of two (3) years, and can call upon an AHC, registered Architectural Hardware Consultant, for consultation during the full extent of the project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
   2. Curries, an Assa Abloy Group Company: www.assaabloydss.com.
   3. Mesker, dormakaba Group: www.meskeropeningsgroup.com.
   4. Republic Doors, an Allegion brand: www.republicdoor.com.
   5. Steelcraft, an Allegion Brand: www.allegion.com/.
   6. Technical Glass Products: www.tgpamerica.com.
   7. Amweld: www.amweld.com.

2.02 PERFORMANCE REQUIREMENTS

A. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Manufacturers standard for application indicated.
   5. Typical Door Face Sheets: Flush.
   6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
   7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 2 - Seamless.
      d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
      e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
   2. Core Material: Polystyrene, 1 lbs/cu ft minimum density.
   3. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
   4. Door Thickness: 1-3/4 inches, nominal.
   5. Weatherstripping: Refer to Section 08 71 00.

C. Interior Doors, Non-Fire Rated:
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 2 - Seamless.
      d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
   2. Core Material: polystyrene.
   3. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Exterior Door Frames: Face welded type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.
   3. Provide applied metal drip at head of frame.
   4. Weatherstripping: Separate, see Section 08 71 00.

D. Interior Door Frames, Non-Fire Rated: Face welded type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

2.05 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.

B. Glazing: As specified in Section 08 80 00, factory installed.

C. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

D. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Coordinate frame anchor placement with wall construction.

C. Coordinate installation of conduit box at head of frame and flexible conduit in frame to electric strike doors at electrified doors identified in Hardware Schedule with Division 26.

D. Install door hardware as specified in Section 08 71 00.

E. Comply with glazing installation requirements of Section 08 80 00.

F. Coordinate installation of electrical connections to powered hardware items.

3.03 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.04 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

SECTION 08 14 01
FABRICATED WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated wood doors; See Door Schedules on A242 and A800.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing.

D. Section 09 91 13 - Exterior Painting: Field finishing of doors.

1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

D. PS 20 - American Softwood Lumber Standard; 2025.

E. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Indicate door materials and construction; species, grade, hardware.
   2. Shop Drawings: Show doors and frames, elevations, beveling, hardware locations, factory finishing, cutouts for glazing and other details.

B. Review Submittals - Samples:
   1. Samples: Submit two samples of door construction, 12 by 12 inch in size.

C. Information Submittals - Preparatory:
   1. Manufacturer's qualification statement.
   2. Installer's qualification statement.

D. Closeout Submittals:
   1. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section, with not less than three years of documented experience.
   1. Company with at least one project within past five years with value of woodwork within at least 20 percent of cost of woodwork for this project.

C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 PROJECT CONDITIONS

A. Coordinate the work with the existing conditions and door hardware installation.

PART 2 PRODUCTS

2.01 DOORS

A. Doors: See requirements on Door Schedules on sheets A242 andA800 and the details referenced therein.
   1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A.
   2. Laminated solid wood lumber.

2.02 DOOR MATERIALS

A. Solid Wood: Species Douglas Fir-Larch or Spruce-Pine-Fir. #2 per PS 20.

B. Moisture Content: S-dry or MC19.

C. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch thick; finish.

D. Glazing: See section 08 80 00.

2.03 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Fabricate doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

C. Fit doors to existing frames: Provide edge clearances in accordance with the quality standard specified.

2.04 FINISHES - WOOD VENEER DOORS

A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
   1. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
      a. Opaque:
         1) System - OP-2, Catalyzed Lacquer.
         2) Color: As selected by Architect.
         3) Sheen: Flat.

B. Factory finish doors in accordance with approved sample. Stain colors shall be selected from manufacturer's full line.

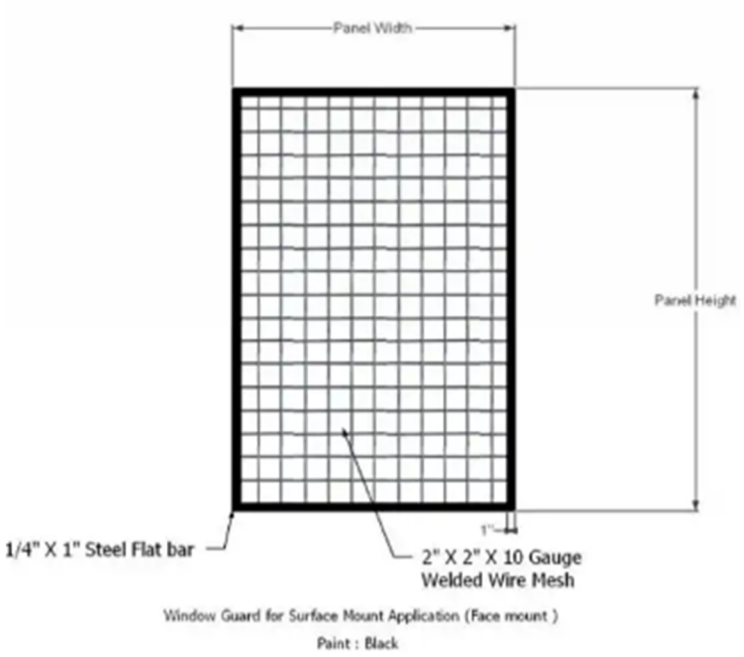
C. Seal edges as required by manufacturer’s standards to meet lifetime warranty.

2.05 ACCESSORIES

A. Glazing: See Section 08 80 00.

B. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

C. Mesh Guards at Glazing.
   1. Provide a single mesh panel to cover all glazing in each door slab.
   2. Surface mounted: Provide holes for screw fastening to door.
   3. Mesh: 10 ga. welded wire steel mesh on 2 inch by 2 inch spacing.
   4. Frame: 1/4 inch x 1 inch flatbar.
   5. Factory coated: Color to be selected by AE from manufacturer's standard options.



D. Door Hardware: See Section 08 71 00.

E. Fasteners shall be commercial quality and type of nails, bolts, and screws required to securely hold members in place in accordance with National Design Specification for Wood Construction.
   1. Nails: ASTM F1667.
   2. Wood Screws: ANSI/ASME B18.6.1.
   3. Bolts and Nuts: ANSI/ASME B18.2.1.

F. For hardware, use manufacturer provided har.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

B. Field-Finished Doors: Trimming to fit is acceptable.
   1. Adjust width of non-rated doors by cutting equally on both jamb edges.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of new doors with installation of frames and hardware.

E. Coordinate installation of glazing.

F. Seal all job site sawn surfaces with two coats of polyurethane.

3.03 TOLERANCES

A. Comply with specified quality standard for fit and clearance tolerances.

B. Comply with specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE - SEE DRAWINGS

END OF SECTION

SECTION 08 16 13
FIBERGLASS DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fiberglass doors.

B. Fiberglass door frames.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 92 00 - Joint Sealants: Sealing joints between door frames and adjacent construction.

C. Section 08 71 00 - Door Hardware.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2024.

C. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2022.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023d.

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide manufacturer's standard details, installation instructions, hardware and anchor recommendations.
   2. Shop Drawings: Indicate layout and profiles; include assembly methods.
      a. Indicate product components, including hardware reinforcement locations and preparations, accessories, finish colors, patterns, and textures.
      b. Indicate wall conditions, door and frame elevations, sections, materials, gauges, finishes, location of door hardware by dimension, and details of openings; use same reference numbers indicated on drawings to identify details and openings.

B. Review Submittals - Samples:
   1. Selection Samples: Submit two complete sets of color chips, illustrating manufacturer's available finishes, colors, and textures.
   2. Verification Samples: Submit door surface samples for each finish specified, 10 inches by 10 inches in size, illustrating finishes, colors, and textures.
   3. Door Corner Sample: Submit corner cross sections, 10 inches by 10 inches in size, illustrating construction, finish, color, and texture.

C. Information Submittals - Preparatory:
   1. Manufacturer's Qualification Statement.
   2. Installer's Qualification Statement.

D. Closeout Submittals:
   1. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer; include detailed terms of warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum 5 years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified, with minimum 5 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Deliver pre-assembled doors and frames with braces, spreaders, and packaging as required to prevent damage.

C. Store materials in original packaging, under cover, protected from exposure to harmful weather conditions and from direct contact with water.
   1. Store at temperature and humidity conditions recommended by manufacturer.
   2. Do not use non-vented plastic or canvas shelters.
   3. Immediately remove wet wrappers.

D. Store in position recommended by manufacturer, elevated minimum 4 inches above grade, with minimum 1/4 inch space between doors.

1.07 WARRANTY

A. Provide ten (10) year manufacturer warranty covering materials and workmanship, including degradation or failure due to chemical contact. Include any required upcharge for 10 year finish warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fiberglass Reinforced Plastic Doors:
   1. Corrim: www.corrim.com.
   2. Edgewater FRP Door: www.edgewaterfrp.com.
   3. Tiger Door LLC : www.tiger.overly.com.

2.02 DOOR AND FRAME ASSEMBLIES-FIBERGLASS REINFORCED DOORS

A. Door: Factory-fabricated, prepared and machined for hardware.
   1. Operation: Manual.
   2. Physical Endurance: Swinging door cycle test to ANSI/SDI A250.4, Level A (1,000,000 cycles) minimum; tested with hardware and fasteners intended for use on project.
   3. Screw-Holding Capacity: Tested to 890 pounds, minimum.
   4. Surface Burning Characteristics: Flame spread index (FSI) of 0 to 25, Class A, and smoke developed index (SDI) of 450 or less, when tested in accordance with ASTM E84.
   5. Flammability: Self-extinguishing when tested in accordance with ASTM D635.
   6. Clearance Between Door and Frame: 1/8 inch, maximum.
   7. Clearance Between Bottom of Door and Finished Floor: 1/2 inch, maximum; not less than 1/4 inch clearance to threshold.
   8. Provide frame anchors that allow for variation in rough opening size; field cutting of doors or frames to fit is not permitted.

2.03 COMPONENTS

A. Doors: Fiberglass construction with reinforced core.
   1. Type: As indicated on drawings, including swinging doors.
   2. Thickness: 1-3/4 inch, nominal.
   3. Core Material: Manufacturer's standard core material for application indicated.
   4. Construction:
      a. Fiberglass faces laminated to core with an applied gel coating, or molded in one piece including gel coating on each side.
   5. Face Sheet Texture: Pebble grain.
   6. Door Panel Configuration: As indicated on door schedules on sheets A250 & A260/.
   7. Subframe and Reinforcements: Fiberglass pultrusions, polymer foam, stainless steel, aluminum, or carbon steel; no wood.
   8. Waterproof Integrity: Provide factory fabricated edges, cut-outs, and hardware preparations of fiberglass reinforced plastic (FRP); provide cut-outs with joints sealed independently of glazing, louver inserts, or trim.

9. Hardware Preparations: Factory reinforce, machine, and prepare for door hardware including field installed items; provide solid blocking for each item; field cutting, drilling or tapping is not permitted; obtain manufacturer's hardware templates for preparation as necessary.

B. Door Frames: Provide type in compliance with performance requirements specified for doors.
1. Type: Factory assembled with chemically welded joints.
2. Non-Fire-Rated:
a. Fiberglass reinforced plastic (FRP) with gel-coating matching doors.
3. Corner Joints: Mitered with concealed corner blocks or angles of same material as frame; fiberglass and aluminum joined with screws; steel and stainless steel spot welded; sealed watertight with silicone sealant field assembly of knockdown frames is acceptable if needed to fit frame to existing opening.
4. Hardware Cut-outs: Provide continuous backing or mortar guards of same material as frame, with watertight seal.
5. Frame Anchors: Stainless steel, Type 304; provide three anchors in each jamb for heights up to 84 inches with one additional anchor for each additional 24 inches in height.
6. Reinforcing: Provide manufacturer's standard reinforcing at hinge, strike, and closer locations.

2.04 FINISHES

A. Gel Coating: Ultraviolet (UV) stabilized polyester finish.
1. Thickness: Minimum 15 mils, 0.015 inch wet thickness, plus/minus 3 mils, 0.003 inch.
2. Color: As selected by Architect from manufacturer's standard line of colors.

2.05 HARDWARE

A. Door Hardware: See Section 08 71 00.

2.06 ACCESSORIES

A. Stops for Glazing and Louver: Fiberglass, unless otherwise indicated or required by fire rating; provided by door manufacturer to fit factory made openings, with color and texture to match door; fasteners shall maintain waterproof integrity.
1. Glazed Openings: Provide removable stops on interior side.
2. Opening Sizes and Shapes: As indicated on drawings.

B. Louvers for Non-Fire-Rated Doors: Same materials, construction, finish, and color as door; fixed vanes, 45 degree sloped vanes.
1. Insect Screens: Fiberglass mesh.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify actual dimensions of openings by field measurements before door fabrication; show recorded measurements on shop drawings.

B. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

A. Remove existing doors and frames and dispose of all removed materials in accordance with local authorities having jurisdiction.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Clean and prepare substrate in accordance with manufacturer's directions.

D. Protect adjacent work and finish surfaces from damage during installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions; do not penetrate frames with anchors.

B. Set units plumb, level, and true-to-line, without warping or racking doors, and with specified clearances, anchor in place.

C. In masonry walls, anchor frames into masonry mortar joints; fill jambs with grout as walls are laid up. Open ports in existing wall if needed for access. Patch wall.

D. Repair or replace damaged installed products.

3.04 ADJUSTING

A. Lubricate, test, and adjust doors to operate easily, free from warp, twist or distortion, and to fit watertight for entire perimeter.

B. Adjust hardware for smooth and quiet operation.

C. Adjust doors to fit snugly and close without sticking or binding.

3.05 CLEANING

A. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance.

END OF SECTION

SECTION 08 51 13

ALUMINUM WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Extruded aluminum windows with operating sash, including sill and head flashing.

B. Operating hardware.

C. Insect screens.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between window frames and adjacent construction.

B. Section 08 80 00 – Glazing: Provide manufacturer's equivalent to GLT-12..

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022, with Errata (2023).

B. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

C. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2021.

D. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.

E. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.

F. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

G. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2024.

I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

K. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2002 (Reapproved 2010).

L. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2023).

M. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).

N. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015 (Reapproved 2023).

1.04 SUBMITTALS

A. Review Submittals - Preparatory:

1. Product Data: Include component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
2. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements.

B. Review Submittal - Samples:
   1. Manufacturer's color sample set.

C. Information Submittals - Preparatory:
   1. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
      a. Evidence of AAMA Certification.
      b. Evidence of WDMA Certification.
      c. Evidence of CSA Certification.
      d. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
   2. Manufacturer's qualification statement.
   3. Installer's qualification statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of AAMA CW-10.

B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and 24 hours after installation of sealants.

1.08 WARRANTY

A. See Conditions of the Contract and General Requirements for additional warranty requirements.

B. Insulated Glass Warranty: Provide insulating glass manufacturer's written twenty(20) year warranty, agreeing to, within specified warranty period, furnish FOB project site, replacement units for insulating glass units which have defective hermetic seals (excluding that due to glass breakage); defined to include intrusion of moisture or dirt, internal condensation at temperatures above -20°F, deterioration of internal glass coatings, and other visual evidence of seal failure or performance failure; provided manufacturer's instructions for handling, installation, protection and maintenance have been adhered to during warranty period.

C. Warranty: Provide manufacturer's standard warranty for performance and installation. Any additional warranty requirements desired by the owner shall be negotiated with window supplier separate from the building contract.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Aluminum Windows Manufacturers:
   1. Boyd Aluminum: www.boydaluminum.com.
   2. Kawneer: www.kawneer.com.
   3. Manko Window Systems, Inc: www.mankowindows.com.
   4. Tubelite: www.tubeliteinc.com .
   5. Wausau Window and Wall Systems: www.wausauwindow.com.
   6. YKK AP America Inc[<>]: www.ykkap.com.

2.02 ALUMINUM WINDOWS

A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
   1. Frame Depth: 3-1/2 inch.
   2. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
   3. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   4. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
   5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   6. Thermal Movement: Design to accommodate thermal movement caused by 180 degrees F surface temperature without buckling stress on glass, joint seal failure, damaging loads on structural elements, damaging loads on fasteners, reduction in performance or other detrimental effects.

B. Horizontal Sliding Type:
   1. Construction: Thermally broken.
   2. Provide screens.
   3. Exterior Finish: High performance organic coatings.
   4. Interior Finish: High performance organic coatings.

2.03 PERFORMANCE REQUIREMENTS

A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
   1. Performance Class (PC): LC.

B. Design Pressure (DP): In accordance with applicable codes.

2.04 COMPONENTS

A. Frames: Thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.

B. Glazing: Manufacturer’s equivalent to GLT-12 as specified in 08 80 00.

C. Sills: extruded aluminum; sloped for positive wash; fit under sash and connect to frame as designed by window manufacturer; one-piece full width of opening.

D. Insect Screen Frame: Rolled aluminum frame of rectangular sections; fit with adjustable hardware; nominal size similar to operable glazed unit.

E. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to achieve effective weather seal.

F. Sealant and Backing Materials: As specified in Section 07 90 05.

2.05 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Concealed Steel Items: Profiled to suit mullion sections; galvanized in accordance with ASTM A123/A123M.

2.06 HARDWARE

A. Sash lock: Lever handle with cam lock.

2.07 FINISHES

A. High Performance Organic Coatings: AAMA 2604; multiple-coat, thermally cured fluoropolymer system.

B. Finish Color: As selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 PRIME WINDOW INSTALLATION

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

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install sill.

E. Provide thermal isolation where components penetrate or disrupt building insulation. Apply expanding foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

F. Coordinate attachment and seal of perimeter air barrier and vapor retarder materials.

G. Install operating hardware not pre-installed by manufacturer.

H. *Install glass in accordance with requirements; see Section 08 80 00.*

I. Install perimeter sealant in accordance with requirements specified in Section 07 92 00.

3.02 FIELD QUALITY CONTROL

A. Provide field testing of installed aluminum windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.

1. Perform tests on three individual windows in designated locations as indicated on drawings.
2. Conduct tests on individual windows prior to 50 percent completion of this work.
3. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf.
4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf.
    a. Maximum allowable rate of air leakage is 1.5 times specified rate of 0.10 cfm/sq ft as indicated in AAMA/WDMA/CSA 101/I.S.2/A440.

B. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.03 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.04 CLEANING

A. Remove protective material from factory finished aluminum surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

END OF SECTION

SECTION 08 52 00
WOOD WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Factory-fabricated wood windows.

B. Glazing.

C. Operating hardware.

D. Insect screens.

E. Wood trim for exterior finishing.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern work under this Section.

B. Section 06 30 00 - Exterior Carpentry: Rough opening framing.

C. Section 07 25 00 - Weather Barriers: Sealing frames to water-resistive barrier installed on adjacent construction.

D. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

E. Section 09 91 13 - Exterior Painting: Site finishing wood surfaces.

F. Section 09 91 23 - Interior Painting: Site finishing wood surfaces.

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights; 2022, with Errata (2023).

B. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products; 2021.

C. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors; 2002 (Reapproved 2018).

D. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015 (Reapproved 2023).

E. WDMA I.S.4 - Water-Repellent Preservative Non-Pressure Treatment for Millwork; National Wood Window and Door Association; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Review Submittals - Preparatory:
   1. Product Data: Show component dimensions.
   2. Shop Drawings: Indicate opening dimensions.

C. Review Submittals - Samples:
   1. Samples: Two samples 6 inches long illustrating window frame section.

D. Information Submittals - Preparatory:
   1. Manufacturer's Certificate: Certify that products furnished meet or exceed specified requirements.

2. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
    a. Evidence of AAMA Certification; label or other documentation.
    b. Evidence of WDMA Certification.
    c. Evidence of CSA Certification.
    d. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.
3. Manufacturer's qualification statement.
4. Installer's qualification statement.

E. Information Submittals - During Execution:
1. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

F. Closeout Submittals:
1. Specimen warranty.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing commercial wood windows with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and after installation of sealants.

1.09 WARRANTY

A. See Conditions of the Contract and General Requirements for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 WOOD WINDOWS

A. Wood Windows: Wood frame and sash, factory fabricated and assembled.
1. Exterior Finish: Primed.
2. Interior Finish: Primed.
3. Site paint per: 09 91 13 & 09 91 23.
4. Configuration: As indicated on drawings.
5. Window Product Types: AP - Awning, hopper, projected window and FW - Fixed window, in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
6. Factory glazed; wet glazing method.
7. Wood Species: Clear pine, preservative treated using treatment type suitable for required finish.
8. Frame and Sash Members: Mortise and tenon joints. Glue and steel pin joints to hairline fit, weather tight.
9. Weather Stop Flange: Continuous at perimeter of unit.
10. Clearances and Shim Spacing: Minimum required for installation and dynamic movement of perimeter seal.
11. Internal Drainage of Glazing Spaces to Exterior: Weep holes.
12. Sash:
    a. Fixed sash at DLSP South Shore Pump House, See A240.
    b. Twin casement sashes, interior opening at RASP Shop Building, See A800.

2.02 COMPONENTS

A. Glazing: Single glazed, clear, uncoated with glass thickness as recommended by manufacturer for specified wind conditions.

B. Frames: Flush solid wood glass stops of screw fastened type, sloped for positive drainage.
   1. Match profile of the existing windows.

C. Sills: Brake formed, 24 gauge sloped for positive drainage; fits under sash and projects at least 1/2 inch beyond exterior face of wall; single piece full width of opening.

D. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to effect weather seal.

E. Fasteners: Galvanized steel.

F. Sealant and Backing Materials: See Section 07 92 00 of types as indicated.

G. Wood for Casings and Trim: Clear pine, clear preservative treated, of type suitable for required finish.

H. Flashing: Provide related flashings, with necessary anchors and attachment devices.

I. Sealant for Setting Sills, Stools, Aprons, and Sill Flashing: Non-curing butyl type.

2.03 HARDWARE

A. Sash lock: Match existing hardware.

2.04 FABRICATION

A. Fabricate frame and sash members with mortise and tenon joints. Glue and steel pin joints to hairline fit, weather tight.

B. Transparent Finish: Scarf joints permitted if wood matches in color and grain texture.

C. Provide weather stop flange at entire perimeter of unit.

D. Fabricate components with minimum clearances and shim spacing around perimeter of assembly yet allowing installation and dynamic movement of perimeter seal.

E. Arrange fasteners to be concealed from view.

F. Provide internal drainage of glazing spaces to exterior through weep holes.

G. Assemble insect screen frame, miter and reinforce frame corners. Fit mesh taut into frame and secure. Fit frame with four spring loaded steel pin retainers.

H. Factory glaze window units.

I. Double weatherstrip operable units.

PART 3 EXECUTION

3.01 INSTALLATION

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

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

D. Install sills.

E. Coordinate installation with seal of perimeter air and vapor barrier materials as specified in Section 07 25 00.

F. Install operating hardware.

3.02 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inch per 3 ft non-cumulative or 1/8 inch per 10 ft, whichever is less.

3.03 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.

B. Provide field testing of installed wood windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.

1. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf.

C. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.04 ADJUSTING

A. Adjust hardware for smooth operation and secure weathertight closure.

3.05 CLEANING

A. Remove protective material from factory finished surfaces.

B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.

C. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

D. Section 08 14 01 - Fabricated Wood Doors: Glazed lites in doors.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM C1036 - Standard Specification for Flat Glass; 2021.

E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

F. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

H. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

K. ASTM F1233 - Standard Test Method for Security Glazing Materials And Systems; 2021.

L. GANA (GM) - GANA Glazing Manual; 2022.

M. GANA (SM) - GANA Sealant Manual; 2008.

N. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.

O. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (2016).

Q. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.

R. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.

S. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.01 SUBMITTALS

A. Review Submittals - Preparatory Group:

1. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

2. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors. Coordinate the following information with product in Section 08 43 13 and 08 44 13; unit u-value, center of glass u-value and solar heat gain coefficient.

B. Closeout Submittals:
1. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.02 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.

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

1.03 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.04 WARRANTY

A. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Float Glass Manufacturers:
1. Cardinal Glass Industries: www.cardinalcorp.com.
2. Guardian Industries Corp: www.sunguardglass.com.
3. Pilkington North America Inc: www.pilkington.com/na.
4. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
1. Design Pressure: Calculated in accordance with ASCE 7.
2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
4. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
1. In conjunction with weather barrier related materials described in other sections, as follows:
a. Water-Resistive Barriers: See Section 07 25 00.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
   3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
   4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
   5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float or Tempered glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category II impact test requirements.
   2. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

2.04 INSULATING GLASS UNITS

A. Manufacturers:
   1. Glass: Any of the manufacturers specified for float glass.
   2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

B. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
   4. Spacer Color: Aluminum.
   5. Edge Seal:
      a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
   6. Color: Black.
   7. Purge interpane space with dry air, hermetically sealed.

C. GLT-12Insulating Glass Units: Security glazing.
   1. Applications:
      a. Glazed lites in exterior doors.
      b. Glazed sidelights and panels next to doors.
      c. Other locations required by applicable federal, state, and local codes and regulations.
   2. Space between lites filled with argon.
   3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
      a. Tint: Gray.
      b. Low-E Coating, Basis of Design: Vitro Architectural Glass, Solarban 60 on #2 surface.
   4. Inboard Lite: Laminatedfloat glass, 1/4 inch thick, minimum. 0.030 PVB layer.
      a. Tint: Clear.
   5. Tint: Clear.
   6. Total Thickness: 1 inch.
   7. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.24, nominal.
   8. Visible Light Transmittance (VLT): 70 percent, nominal.
   9. Solar Heat Gain Coefficient (SHGC): 0.38, nominal.

2.05 GLAZING UNITS

A. GLT-1 - Monolithic Interior Vision Glazing:
   1. Applications: As scheduled.
   2. Glass Type: Annealed float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.

B. GLT-4 - Monolithic Safety Glazing: Non-fire-rated:
   1. Applications:
      a. Glazed lites in doors, except fire doors.
      b. Glazed sidelights to doors, except in fire-rated walls and partitions.
      c. Other locations required by applicable federal, state, and local codes and regulations.
      d. Other locations indicated on drawings.
   2. Glass Type: Fully tempered safety glass as specified.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.

C. GLT-8 - Laminated Glass: Two layers 1/8 inch float glass laminated in accordance with ASTM C1172.
   1. Plastic Interlayer:
      a. Polyvinyl Butyral (PVB) Interlayer: 0.030 inch thick, minimum.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, and paint.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

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SECTION 08 91 00

LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface mount louvers for garage at Mirror Lake State Park. See remodel note #4 on sheet A510.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 62 00 - Sheet Metal Flashing and Trim: Sill flashing.

C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Specification for Anodized Architectural Aluminum; 2024.

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2023.

C. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices; 2021, with Editorial Revision (2022).

1.04 SUBMITTALS

A. Review Submittals - Preparatory:

1. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

PART 2 PRODUCTS

2.01 LOUVERS

A. Stationary Louvers: Horizontal blade, extruded aluminum construction.

1. Configuration: Configured for surface mounting to sheathing with integral nailing flange and facing flange to cover and contain cut edge of vinyl siding (J-Channel Style).
2. Material: 0.019" thick aluminum with baked enamel finish.
3. Color: White
4. Depth: 3/4 inch.
5. Size: 14 inches by 18 Inches.
6. Screen: Fiberglass insect screen.
7. Blades: Straight.

2.02 ACCESSORIES

A. Fasteners and Anchors: Aluminum.

B. Sealant for Setting Sills and Sill Flashing: JS-2 type as specified in Section 07 92 00.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared openings are ready to receive this work and opening dimensions are as indicated on shop drawings.

B. Verify that field measurements are as indicated.

3.02 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

D. Secure louver frames in openings with concealed fasteners.

3.03 CLEANING

A. Clean surfaces and components.

END OF SECTION

SECTION 09 05 61

COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
   1. Thin-set ceramic tile.

B. Preparation of new and existing concrete floor slabs for installation of floor coverings.

C. Testing of concrete floor slabs for moisture and alkalinity (pH).

D. Testing of floor flatness at areas receiving large format tile.

E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
   1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

F. Patching compound.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 01 40 00 - Quality Requirements: Additional requirements relating to testing agencies and testing.

C. Section 03 30 00 - Cast-in-Place Concrete: Moisture emission reducing curing and sealing compound for slabs to receive adhered flooring, to prevent moisture content-related flooring failures; to remain in place, not to be removed.

D. Section 03 30 00 - Cast-in-Place Concrete: Concrete admixture for slabs to receive adhered flooring, to prevent moisture content-related flooring failures.

E. Section 03 30 00 - Cast-In-Place Concrete: Limitations on curing requirements for new concrete floor slabs and coordination of any other special requirements affecting concrete floor preparations.

F. Section 03 30 00 - Cast-In-Place Concrete: Performance values for floor flatness tolerances for cast-in-place concrete.

1.03 REFERENCE STANDARDS

A. ASTM E1155 - Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers; 2020.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

A. Provide submittal transmittals that include all submittal items identified in each submittal group below.

B. Review Submittals - Preparatory:
   1. Testing Agency's Report:
      a. Description of areas tested; include floor plans and photographs if helpful.
      b. Summary of conditions encountered.
      c. Moisture and alkalinity (pH) test reports.
      d. Adhesive bond and compatibility test report.
      e. Copies of specified test methods.
      f. Recommendations for remediation of unsatisfactory surfaces.
      g. Submit report to Architect.
      h. Submit report not more than two business days after conclusion of testing.
   2. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
      a. Moisture and alkalinity (pH) limits and test methods.
      b. Manufacturer's required bond/compatibility test procedure.
   3. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
      a. Manufacturer's qualification statement.
      b. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
      c. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
      d. Manufacturer's installation instructions.
      e. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

1.06 QUALITY ASSURANCE

A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.

B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
   1. Submit evidence of experience consisting of at least 3 test reports of the type required, with Owner's project contact information.

C. Contractor's Responsibility Relating to Independent Agency Testing:
   1. Provide access for and cooperate with testing agency.
   2. Confirm date of start of testing at least 10 days prior to actual start.
   3. Allow at least 4 business days on site for testing agency activities.
   4. Achieve and maintain specified ambient conditions.
   5. Notify Architect when specified ambient conditions have been achieved and when testing will start.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 CONCRETE FLOOR FLATNESS TESTING

A. Minimum floor flatness performance at completion of cast-in-place concrete is indicated in Section 03 30 00. Where large format tile is installed, maximum allowable floor flatness tolerances shall be no more than 1/8 inch in 10 feet and 1/16 inch in 24 inches. Large format tile locations not meeting this standard shall have leveling compound installed. Refer to Division 1 Allowances when applicable.
   1. At locations receiving large format tile measure floor flatness to confirm tolerances are within industry acceptable range as stated above.

3.02 CONCRETE SLAB PREPARATION

A. Refer to Section 03 30 00 for responsibilities of all contractors to protect concrete floors from contamination. Start of work by flooring contractor indicate acceptance of conditions.

B. Follow recommendations of testing agency.

C. Perform following operations in the order indicated: (Moisture testing shall occur a minimum of 60 days prior to installation of flooring systems, with any required remediation efforts to begin immediately after test results.)
   1. Preliminary cleaning.
   2. Internal relative humidity tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
   3. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
   4. Specified remediation, if required.
   5. Patching, smoothing, and leveling, as required to meet manufacturer's requirements.
   6. Other preparation specified by flooring manufacturer.
   7. Adhesive bond and compatibility test.
   8. Protection of installed flooring.

3.03 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F1869. Obtain instructions if test results are not within the following limits:
   1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
   2. At floors to receive finish materials, perform three tests for the first 1000 square feet and at least one additional test for each additional 1000 square feet.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as required. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.05 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes and as follows.

D. Verify that new and existing concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity. Obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer. Testing procedures shall be:

1. Maximum allowable moisture levels for each type of floor finish shall be received from flooring suppliers prior to testing.
2. At floors to receive finish materials, perform three tests for the first 1000 square feet and at least one additional test for each additional 1000 square feet.
3. Select test locations to provide information about moisture distribution across the entire floor slab, especially areas of potential high moisture. For slabs on-grade and below-grade, include a test location within three feet of each exterior wall.

E. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.

F. In the event that test values exceed floor covering manufacturer's limits, perform remediation as required. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

G. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.

1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.

C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.07 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.08 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.09 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.10 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION

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SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 SCOPE

A. General Prime Contractor to provide (including supply and install) the work of this section including Safings.

B. Plumbing contractor to provide piping, drain and urinal assemblies per Division 22 requirements.

C. Plumbing contactor to perform flood testing of the installed safing / drain assemblies per Section 22 05 14 Plumbing Specialties.

D. Provide NobleSealant product to Section 10 21 13.19 Plastic Toilet Compartments contractor for sealing floor penetrations made while installing partition pilasters.

1.02 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Tile for shower receptors.

D. Sealant at tile control joints.

E. Non-ceramic trim.

1.03 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

C. Section 10 21 13.19 Plastic Toilet Compartments: Sealing safing at partition floor fasteners.

D. Section 22 05 14 - Plumbing Specialties: Flood Testing.

1.04 REFERENCE STANDARDS

A. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2019.

B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.

C. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.

D. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2019.

E. ANSI A137.3/A108.19/A108.20 - American National Standard Specifications for Gauged Porcelain Tile and Gauged Porcelain Tile Panels/Slabs; 2021.

F. TCNA (HB-GP) - Handbook for Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs Installation; 2023.

1.05 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

B. Review Submittals - Samples:
   1. Samples: Two units each of each tile and each non-ceramic tile.
   2. Samples: Grout color sample set for selection by A/E.

C. Information Submittals - Preparatory:
   1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

2. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

1.06 DEFINITIONS

A. LHT- Large and heavy tile.

B. Lippage- Condition of one edge of a tile is higher than the adjacent tile.

1.07 PERFORMANCE REQUIREMENTS

A. Dynamic Coefficient of Friction: For walkway surfaces, install products with the following values as determined by testing identical products per the DCOF AcuTest as described in ANSI A137.1.
   1. Level Surfaces: 0.42 Minimum.
   2. Step Treads: 0.42 Minimum.

1.08 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

C. Documents on Site: Maintain one copy of ANSI A108/A118/A136, TCNA (HB), ANSI A137.3/A108.19/A108.20, and TCNA (HB-GP) on site.

1.09 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.10 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: Refer to Master Color Schedule on ID drawings for product selection.

B. Other Manufacturers:
   1. Ceramic Tileworks.
   2. Daltile.
   3. Submit products from the other manufacturers to A/E for pre-bid approval.

2.02 TRIM AND ACCESSORIES

A. Ceramic Bullnose and Cove as indicated on the Master Color Schedule.

2.03 SETTING MATERIALS

A. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.
   1. Applications: Use this type of bond coat where indicated, and where no other type of bond coat is indicated.
   2. Products:
      a. Custom Building Products; Porcelain Tile Professional Thin-Set Mortar: www.custombuildingproducts.com.
      b. LATICRETE International, Inc; LATICRETE 254 Platinum: www.laticrete.com.
      c. Mapei Corporation[<>]: Ultraflex LFT. www.mapei.com.
      d. Merkrete, by Parex USA, Inc; Merkrete 720 Marble Pro: www.merkrete.com.
      e. TEC, an H.B. Fuller Construction Products Brand; [Full Flex Premium Thin Set Mortar]: www.tecspecialty.com.

B. Improved Latex-Portland Cement Mortar Bond Coat for Large and Heavy Tile: ANSI A118.15.
   1. Applications: Use this type of bond coat where indicated and where no other type of bond coat is indicated.
   2. Products:
      a. Custom Building Products; Complete Contact-LFT Premium Rapid Setting Large Format Tile Mortar, with Multi-Surface Bonding Primer: www.custombuildingproducts.com.
      b. LATICRETE International, Inc; 4-XLT Rapid: www.laticrete.com.
      c. Mapei Corporation[<>]: Ultraflex LFT Rapid. www.mapei.com.
      d. Merkrete, by Parex USA, Inc; Merkrete 720 Marble Pro: www.merkrete.com.
      e. ProSpec, an Oldcastle brand; Medium Bed Permaflex 550: www.prospec.com.
      f. TEC, an H.B. Fuller Construction Products Brand; Ultimate Large Tile Mortar: www.tecspecialty.com.

2.04 GROUTS

A. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
   1. Applications: Use where indicated on drawings and where no other type of grout is indicated.
   2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
      a. At large format tile install wider grout joints as required by industry standards.
   3. Color: As selected by Architect from manufacturer's full line.
   4. Products:
      a. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com.
      b. Merkrete, by Parex USA, Inc; Merkrete Pro Grout: www.merkrete.com.
      c. Mapei; Keracolor Ultracolor Plus FA. www.mapei.com.

2.05 MAINTENANCE MATERIALS

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, modified silane polymer, or urethane sealant; moisture- and mildew-resistant type.
   1. Applications: Tile control and expansion joints.
   2. Color: As selected by Architect from manufacturer's full line.
   3. Products:
      a. ARDEX Engineered Cements; ARDEX SX: www.ardexamericas.com.
      b. LATICRETE International, Inc; LATICRETE LATASIL: www.laticrete.com.
      c. Mapei; Mapesil T. www.mapei.com.
      d. General Electric: Sanitary 1700 Sealant.
      e. Dow Corning Corporation: Silicone 786 mildew resistant.
      f. Pecora Corporation: 898 Sanitary Silicone Sealant.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
   1. Composition: Water-based colorless silicone.
   2. Products:
      a. Merkrete, by Parex USA, Inc; Merkrete Revive: www.merkrete.com.
      b. Miracle Sealants Company: 511 Impregnator: www.miraclesealants.com.
      c. Gundlack Grout Sealer GS02 or GW09.
      d. Custom Building Products: TileLab Grout and Tile Sealer.
      e. Mapei: UltraCare Grout Sealer. www.mapei.com.

2.06 THICK-BED MATERIALS

A. Mortar Bed Materials: Portland cement, sand, latex additive, and water.
   1. Products:
      a. AVM Industries, Inc; AVM Crete 6460: www.avmindustries.com.
      b. LATICRETE International, Inc; LATICRETE 3701 Fortified Mortar Bed: www.laticrete.com.
      c. Miracle Sealants Company: 511 Impregnator: www.miraclesealants.com.
      d. MAPEI Corporation: Modified Mortar Bed.
      e. Merkrete, by Parex USA, Inc.; Merkrete Underlay C: www.merkrete.com.

f. Miracle Sealants Company: 511 Impregnator: www.miraclesealants.com.

2.07 ACCESSORY MATERIALS

A. Safings at showers and floors by Noble Company:
   1. Drain Flashing: Noble Drain Flashing, ANSI A118.10; composite sheet membrane made from chlorinated polyethylene(CPE) with non woven fiber laminated to both sides.
   2. Sealant: NobleSealant 150, for seal at drain flashing and floor drain.
   3. Floor Sheet Membrane: NobleSeal TS, Non-plasticized Chlorinated Polyethylene (CPE) with non-woven fiber laminated to both sides.
   4. Bond Coat for Membrane: NobleBond EXT thin set.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile. Refer to Section 09 05 61 for floor flatness guidelines.

B. Verify wall surfaces are smooth and flat within tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 05 61.
   2. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Vacuum clean surfaces and damp clean.

B. Seal substrate surface cracks with filler.

C. Install Safing membrane in accordance to manufacturer's recommendations and TCNA guidelines.
   1. Install membrane over construction and expansion control joints in existing concrete as recommended by manufacturer and according to TCA recommendations. Install soft joint at tile as recommended.
   2. Install full coverage membrane over tile areas on new and existing concrete slabs on grade and topping slabs over structural framing per manufacturer's recommendation.
   3. Turn up floor sheets up wall 3" above the high point of the floor. Fold corners or provide bond preformed corners to sheet.
   4. Patch any damaged Safing components in accordance with the manufacturer instructions.

D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19 , manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings. Large format tile shall have a 33 percent offset bonding pattern.

C. Where required by tile manufacturer install mortar type in thickness as required for large and heavy tile (LHT).
   1. Mortar at large format tile shall be installed with notched trowel in one direction to achieve minimum 95% coverage. Circular or other motion application is prohibited.
   2. Apply full bed of mortar to backside of large format tile.

D. At large format tile, in accordance to ANSI A108.02, grout joints shall be at least three times the actual facial variation of the tile, but never less than 1/16 inch.

E. For large format tile use mechanical edge leveling system to align edges.

F. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

G. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

H. Form internal angles square and external angles bullnosed.

I. Sound tile after setting. Replace hollow sounding units.

J. Keep control and expansion joints free of mortar, grout, and adhesive.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated on drawings. Use standard grout unless otherwise indicated on drawings.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

N. Apply grout sealer to all joints.

O. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete slab on grade substrates with crack isolation membrane. Install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with polymer modified grout per ANSI A118.7.

3.05 INSTALLATION - SHOWERS AND SHOWER ROOM WALLS

A. At tiled showers install in accordance with TCNA (HB) Method B421C-23 . Install waterproofing membrane at walls. Extend waterproofing 1 feet beyond high point of the shower depression.

B. Grout with latex-Portland cement grout.

3.06 INSTALLATION - WALL TILE

A. Over interior concrete and masonry install in accordance with TCA Handbook Method W202, thin-set with dry-set or latex-portland cement bond coat and polymer modified grout per ANSI A118.7 with applied sealer.

3.07 CLEANING

A. Clean tile and grout surfaces.

3.08 PROTECTION

A. Do not permit traffic over finished floor surface for 2 days after installation.

END OF SECTION

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SECTION 09 67 00
FLUID-APPLIED FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid-applied flooring.

B. Moisture testing of concrete floors.

1.02 RELATED REQUIREMENTS

A. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

B. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.03 REFERENCE STANDARDS

A. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 2022.

B. ASTM D638 - Standard Test Method for Tensile Properties of Plastics; 2022.

C. ASTM D905 - Standard Test Method for Strength Properties of Adhesive Bonds in Shear by Compression Loading; 2008 (Reapproved 2021).

D. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser; 2019.

E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.

F. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2023.

G. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; 2013.

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.

B. Information Submittals - Preparatory:
   1. Manufacturer's Installation Instructions (Upon Request): Indicate special procedures, perimeter conditions requiring special attention, and application rate for each coat.
   2. Applicator's Qualification Statement:
      a. Identify 10 projects and provide photo documentation of comparable completed projects. Include projects with broadcast flake, kitchen/food preparation areas.
      b. Submit letter from manufacturer stating that the installer is in good standing with the flooring manufacturer.

C. Closeout Submittals:
   1. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.05 QUALITY ASSURANCE

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

B. Applicator Qualifications: Company specializing in performing the work of this section.
   1. Minimum 3 years of documented experience.
   2. Approved by manufacturer.

C. Supervisor Qualifications: Trained by product manufacturer, under direct full time supervision of manufacturer's own foreman.

1.06 MOCK-UPS

A. Construct mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
   1. Number of Mock-Ups to be Prepared: One for FAF - 1.
   2. Use same materials and methods for use in the work.
   3. Create mockups on portable boards.
   4. Minimum Size: 36 inches by 36 inches.

B. Obtain approval of mock-up by Architect before proceeding with work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store resin materials in a dry, secure area.

B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.08 FIELD CONDITIONS

A. Maintain minimum temperature in storage area of 55 degrees F.

B. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fluid-Applied Flooring:
   1. Crossfield Products Corp (Including Dex-O-Tex): www.crossfieldproducts.com.
   2. Key Resin Company: www.keyresin.com.
   3. Sherwin-Williams High-Performance Flooring: www.sherwin-williams.com/resin-flooring.
   4. Sika Corporation: www.sikafloorusa.com.
   5. Terrazzo & Marble Supply Companies: www.tmsupply.com.

2.02 FLUID-APPLIED FLOORING SYSTEMS

A. FAF-1, Fluid-Applied Flooring: Urethane Cement base with colorflake and slip resistant polyaspartic top-coat.
   1. Basis of Design: Key Urecon Chip / Flake #100:
      a. System Description: Urecon SL, three-component urethane resin modified cementitious topping broadcasted with silica aggregate, grouted with Key 520 Epoxy and broadcast with colored chips and sealed with Key 511 UV Light Resistant Clear Epoxy and Key 467 Aliphatic Urethane with white ultrafine mesh (240) Aluminum Oxide added to topcoat.
      b. Chips/Color: Match pattern / color described in the Master Color Schedule.
   2. Thickness: 3/16 to 1/4 inch.
   3. Texture: Cleanable textured finish with Anti-Skid grit.
   4. Sheen: Satin.
   5. Acceptable Products:
      a. Sherwin Williams; FasTop Multi Topcoat T100: www.industrial.sherwin-williams.com.
      b. Sika; SikaFloor PurCem SLB with trowel cove base: usa.sika.com.
      c. Terroxy; Urethane Concrete Slurry: www.tmsupply.com.

2.03 ACCESSORIES

A. Primer: Type recommended by fluid-applied flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.

C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of materials to subfloor surfaces.

D. Verify floor surfaces were prepared under Section 09 05 61 to meet application requirements for smoothness and level.

E. Cementitious Subfloor Surfaces: Verify that substrates are ready for fluid-applied flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 05 61.
   2. Obtain instructions if test results are not within limits recommended by fluid-applied flooring manufacturer.
   3. Do not apply fluid applied flooring on slabs less than 28 days old.

F. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Prepare substrate in accordance with manufacturer's written guidelines and this Section.

B. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.

C. Prepare concrete surfaces according to ICRI 310.2R to surface profile CSP-3.

D. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

E. Vacuum clean substrate.

F. Apply primer to surfaces required by flooring manufacturer.

3.03 INSTALLATION - FLOORING

A. Apply in accordance with manufacturer's instructions.

B. Apply each coat to minimum thickness required by manufacturer.

C. Finish to smooth level surface.

3.04 PROTECTION

A. Prohibit traffic on floor finish for 48 hours after installation.

B. Barricade area to protect flooring until fully cured.

END OF SECTION

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SECTION 09 91 13
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Materials for backpriming woodwork. See Section: 07 46 23 Wood Siding & 06 30 00 Exterior Carpentry.

D. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
   1. Exterior hollow metal doors and frames.
   2. Metal roof penetration framing.
   3. Surfaces indicated for removal of existing paint an application of new.
   4. New wood items slated for new paint.

E. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   5. Non-metallic roofing and flashing.
   6. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
   7. Marble, granite, slate, and other natural stones.
   8. Floors, unless specifically indicated.
   9. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
   10. Glass.
   11. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 07 46 23 - Wood Siding: Prime painting and backpriming using the system defined herein.

C. Section 09 91 23 - Interior Painting.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2023.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials; 2020.

D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

1.04 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide complete list of products to be used, with the following information for each:
      a. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
      b. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
      c. Manufacturer's installation instructions.

d. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

B. Review Submittals - Samples:
1. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
a. Where sheen is specified, submit samples in only that sheen.
b. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.

C. Information Submittals - Preparatory:
1. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
2. Manufacturer's Instructions: Indicate special surface preparation procedures.
3. Maintenance Data: Submit data including product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
4. Manufacturer Certificate: Paint manufacturer's certificate indicating that the paint applicator is a known applicator and remains in good standing with manufacturer.
5. Applicator Qualifications: Submit documentation of successful completion of 10 similar projects.

D. Maintenance Materials:
1. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
a. See contract Conditions and General Requirements for procedures and requirements, for additional provisions.
b. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
c. Label each container with color in addition to the manufacturer's label.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in patching and coating existing wood structures with minimum 6 years experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Sherwin Williams (SW). www.sherwin-williams.com.
   2. Hallman-Lindsay (HL). www.hallmanlindsay.com.
   3. Behr Process Corporation: www.behr.com.
   4. Benjamin Moore: www.benjaminmoore.com.
   5. Diamond Vogel Paints: www.diamondvogel.com.
   6. PPG Paints: www.ppgpaints.com.

C. Primer Sealers: Same manufacturer as top coats.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.

B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

C. Colors: As indicated in Color Schedule.
   1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
   2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 PAINT SYSTEMS - EXTERIOR

A. EPS 1 Ferrous Material Primed & Un-primed: Acrylic Semi-Gloss:
   1. (SW) Prep surface with SSPC-SP2. One coat ProCryl Universal Primer and two coats Sher-Cryl HPA High Performance Acrylic B66-300 Series.
   2. (HL) Prep surface with SSPC-SP2. One coat Metalguard DTM Acrylic Primer/finish 338 and two coats Rustoleum High Performance DTM Acrylic 3800.

B. EPS 5 Ferrous Metal (Primed Ferrous metal (including existing louver)and Hollow Metal Doors and Frames): Satin/Semi-Gloss:
   1. (SW) One coat Pro Indusrial Pro-Cryl Universal Primer B66-310 Series, one coat Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss K46-1150 Series.
   2. (HL) One coat Metalguard DTM Acrylic Primer/finish 338 and two coats two coats Rustoleum High Performance DTM Acrylic 3800.

C. EPS 7 Concrete Block: 100% Acrylic Latex over 100% Acrylic Block Filler certifiable to ph13, meets Wind Driven Rain Test TT-C-555B surface to be pinhole free:
   1. (SW) 1 coat Pro Industrial Heavy Duty Block Filler. Two coats Pro Industrial Multi-Surface Acrylic B66-1560 Series Eg-Shel.
   2. (SW) 1 coat Pro Industrial Heavy Duty Block Filler. Two coats FlexTemp Exterior Acrylic Satin.
   3. (SW) 1 coat Pro Industrial Heavy Duty Block Filler. Two coats Self-Cleaning Acrylic Coating - Satin.
   4. Or comparable as approved by A/E.

D. EPS 10 Wood: 100% Acrylic Latex Satin: *(FR Note: Need to confirm this is optimal)*
   1. (SW) Two coats Duration Exterior Acrylic Coating. Satin. (combination primer/finish).
   2. (HL) Two coats Generation 100% Acrylic Exterior L-Sheen 144. (combination primer/finish).

2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.

H. Ferrous Metal:
   1. Coordinate surface preparation in accordance with requirements of selected paint/coating supplier recommendations.
   2. Solvent clean according to SSPC-SP 1.
   3. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
   4. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer. Protect from corrosion until coated. Apply rust converter as required.

I. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.
   1. On surfaces to be repaired. Fill surface irregularities that can catch and hold water with filler prior to paint.

J. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with tinted primer.

K. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's written instructions.

D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

F. Apply each coat to uniform appearance.

G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.

H. Use tack cloth to remove dust and particles just prior to applying next coat.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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SECTION 09 91 23
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Materials for backpriming woodwork.

D. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Refer to Architectural Drawings for metal fabrications to be painted.
   2. Refer to Interior Drawings for wall and ceiling paint scope.
   3. Painting contractor shall review both architectural and interior Drawings for complete paint scope.
   4. Hollow metal doors and frames.
   5. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In finished areas, paint shop-primed items.

E. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
   6. Marble, granite, slate, and other natural stones.
   7. Floors, unless specifically indicated.
   8. Ceramic and other tiles.
   9. Brick, architectural concrete, cast stone, integrally colored plaster, and stucco.
   10. Glass.
   11. Concrete masonry units in utility, mechanical, and electrical spaces.
   12. Acoustical materials, unless specifically indicated.
   13. Concealed pipes, ducts, and conduits.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 05 50 00 - Metal Fabrications: Shop-primed items.

C. Section 06 30 00 - Exterior Carpentry: Architectural woodwork to be stained.

D. Section 08 11 13 - Hollow Metal Doors and Frames: Frames and doors to be field painted.

E. Section 09 91 13 - Exterior Painting.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; Current Edition.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2024.

C. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating; 2023.

D. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).

E. SSPC-SP 2 - Hand Tool Cleaning; 2018.

1.05 SUBMITTALS

A. Review Submittals - Preparatory:
   1. Product Data: Provide complete list of products to be used, with the following information for each:
      a. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
      b. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
      c. Manufacturer's installation instructions.
      d. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

B. Review Submittals - Samples:
   1. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
      a. Where sheen is specified, submit samples in only that sheen.
      b. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.

C. Information Submittals - Preparatory:
   1. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
   2. Manufacturer's Instructions: Indicate special surface preparation procedures.
   3. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
   4. Applicator Qualifications: Submit documentation of successfull completion of 10 similar projects.

D. Maintenance Materials:
   1. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
      a. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
      b. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing patching and coating existing wood structures with minimum 6 years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent, at temperatures less than 5 degrees F above the dew point, or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 fc measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:
1. Base Manufacturer: Sherwin Williams (SW). www.sherwin-williams.com.
2. Halman-Lindsay (HL): www.hallmanlindsay.com.
3. Behr Process Corporation: www.behr.com.
4. Benjamin Moore: www.benjaminmoore.com.
5. Diamond Vogel Paints: www.diamondvogel.com.
6. PPG Paints: www.ppgpaints.com.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
4. Supply each paint material in quantity required to complete entire project's work from a single production run.
5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: As indicated in Color Schedule.
1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
2. Extend colors to surface edges; colors may change at any edge as directed by Architect.
3. In finished areas, diffusers, grilles, registers, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
4. In unfinished areas: Paint all woodwork, doors and metal frames, convectors, ladders, railings, gratings and the like.

2.03 PAINT SYSTEMS - INTERIOR

A. IPS 1 Wood (i.e. trim): 100% Acrylic Latex, Satin, Non-blocking:
   1. (SW) One coat Premium Interior Wall and Wood Primer B28W8111 and two coats ProClassic Waterborne Acrylic, Semi-Gloss B31-1100 Series.
   2. (HL) One coat Aqua Kote Enamel Undercoater 231 and two coats Duratech 100% Acrylic Satin Enamel 318.

B. IPS 2 Painted Plywood (i.e. trim): 100% Acrylic Latex, Satin, Non-blocking:
   1. (SW) One coat PrepRite ProBlock Latex Primer/Sealer B51-600 Series and two coats ProClassic Waterborne Acrylic, Semi-Gloss B31-1100 Series.
   2. (HL) One coat Stainguard 100% Acrylic Primer 526 and two coats Duratech 100% Acrylic Stain Enamel 318.

C. IPS 4 Ferrous Metal (Unprimed): 100% Acrylic Latex Satin/Semi-Gloss, Non-blocking:
   1. (SW) One coat ProCryl Universal Primer B66-310 Series, two coats Pro Industrial Multi- Surface Acrylic B66-1550 Series.
   2. (HL) One coat Metalguard DTM Acrylic Primer/finish 338 and two coats Duratech 100% Acrylic Satin Enamel 318.

D. IPS 5 Ferrous Metal (Primed Ferrous metal and Hollow Metal Doors and Frames): Satin/Semi-Gloss:
   1. (SW) One coat Pro Indusrial Pro-Cryl Universal Primer B66-310 Series, one coat Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss K46-1150 Series.
   2. (HL) One coat Metalguard DTM Acrylic Primer/finish 338 and two coats two coats Rustoleum High Performance DTM Acrylic 3800.

E. IPS 32 Painting Existing Lockers:
   1. Water based alkyd.

2.04 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been adequately prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
   1. Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application. Fill damaged/indented and holes in all wall surfaces from equipment removal flush with wall surface. Spot prime.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete:
   1. 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.
   2. Clean concrete according to ASTM D4258. Allow to dry.

H. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.

I. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

J. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
   2. Prepare surface according to SSPC-SP 2.

K. Ferrous Metal:
   1. Coordinate surface preparation in accordance with requirements of selected paint/coating supplier recommendations.
   2. Solvent clean according to SSPC-SP 1.
   3. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
   4. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer. Protect from corrosion until coated.

L. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

M. Existing Painted Hollow Metal to Receive Paint:
   1. Remove loose paint, dirt and grime. Sand edges of paint chipping tapered smooth.
   2. Wipe frames down with solvent cleaner.

N. Metal Doors and/or Frames to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions.

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Hollow Metal Doors and Frames: Doors and frames shall be painted with sprayer, no exceptions.

G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

H. Sand wood and metal surfaces lightly between coats to achieve required finish.

I. Use tack cloth to remove dust and particles just prior to applying next coat.

J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 10 21 13.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 10 28 00 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

1.04 SUBMITTALS

A. See contract Conditions and General Requirements for procedures and requirements.

B. Provide submittal transmittals that include all submittal items identified in each submittal group below.

C. Review Submittals - Preparatory:
   1. Product Data: Provide data on panel construction, hardware, and accessories.
   2. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

D. Review Submittals - Samples:
   1. Samples: Submit two samples of partition panels, 6 x 6 inch in size illustrating panel finish, color, and sheen.

E. Information submittals - Preparatory:
   1. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments:
   1. See the Master Color Schedule to see the selected basis of design product. Products with plastic panels that don't match the color and texture of the basis of design product to the satisfaction of the A/E will not be accepted. Bidders may send a pre-bid substitution request for pre-approval.
   2. ASI Accurate Partitions: www.asi-accuratepartitions.com.
   3. ASI Global Partitions: www.asi-globalpartitions.com.
   4. Hadrian: www.hadrian-inc.com.
   5. Metpar Corp: www.metpar.com.
   6. Scranton Products Co., Inc: www.scrantonproducts.com.
   7. Substitutions: See contract Conditions and General Requirements for procedures and requirements.

2.02 PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286, floor-mounted headrail-braced.

B. Doors:
   1. Thickness: 1 inch.
   2. Width: 28 inch.
   3. Width for Handicapped Use: 36 inch.
   4. Height: 55 inch.

C. Panels:
1. Thickness: 1 inch.
2. Height: 55 inch.

D. Pilasters:
1. Thickness: 1 inch.
2. Width: As required to fit space; minimum 3 inch.

2.03 ACCESSORIES

A. Pilaster Shoes: Stainless steel, satin finish, 3 inches high; concealing floor fastenings.

B. Head Rails: Extruded aluminum, anti-grip profile.

C. Wall and Pilaster Brackets: Stainless steel; manufacturer's standard type for conditions indicated on drawings.

D. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.

E. Door Hardware: Stainless steel, manufacturer's standard finish.
1. Door Latch: Slide type with exterior emergency access feature.
2. Door Strike and Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch.
3. Provide door pull for out swinging doors.
4. Hinges shall be calibrated to close to 10º.
5. Provide wall bumper where doors swing towards adjacent wall.

F. Coat Hook: One per compartment, mounted on door.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

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

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Electric hand/hair dryers.

C. Mirrors.

1.02 RELATED REQUIREMENTS

A. Applicable provisions of Division 1 govern the work of this section.

B. Section 06 10 00 - Rough Carpentry and 09 21 16 - Gypsum board Assemblies: Concealed supports for accessories, including in wall framing and plates.

C. Section 10 21 13.19 - Plastic Toilet Compartments.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2022.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.

E. ASTM C1036 - Standard Specification for Flat Glass; 2021.

F. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2024.

G. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2022.

1.04 SUBMITTALS

A. See contract Conditions and General Requirements for procedures and requirements.

B. Provide submittal transmittals that include all submittal items identified in each submittal group below.

C. Review Submittals - Preparatory:
   1. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

D. Review Submittals - Samples:
   1. Samples: Submit two samples of partition panel, illustrating color and finish.

E. Information Submittals - Preparatory:
   1. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Commercial Toilet, Shower, and Bath Accessories:
   1. AJW Architectural Products: www.ajw.com.
   2. ASI - American Specialties, Inc: www.americanspecialties.com.
   3. Bradley Corporation: www.bradleycorp.com.
   4. Bobrick Washroom Equipment Inc: www.bobrick.com.
   5. PSiSC Manufacturer of Columbia Accessories: www.psisc.com.
   6. Substitutions: See contract Conditions and General Requirements for procedures and requirements.

B. Provide products of each category type by single manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.

B. Stainless Steel Sheet: ASTM A666, Type 304.

C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

F. Adhesive: Two component epoxy type, waterproof.

G. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

H. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

2.04 COMMERCIAL TOILET ACCESSORIES

A. Grab Bars - Concealed Flange:
   1. Grab Bars: Stainless steel, 1-1/2 inches outside diameter, minimum 0.05 inch wall thickness, nonslip grasping surface finish, exposed flange mounting with torx head screws; 11 ga closure plate at bottom of bar. Length and configuration as indicated on drawings.
      a. American Specialties, Inc.: 3800 Series.
      b. Bobrick: B-6806.99.
      c. Bradley: Equal with concealed anchors and secured flanges.

B. Coat Hook Strip:
   1. American Specialties, Inc. 1307.
   2. Bobrick B-232.
   3. Bradley 9943.
   4. Gamco HCS1.

C. Liquid Soap Dispenser:
   1. American Specialties, Inc. 5001-SS; Comparable by:
   2. Bobrick.
   3. Bradley.

D. Sanitary Napkin Disposal-Surface Mounted:
   1. American Specialties, Inc. 0852.
   2. Bobrick B-270.
   3. Bradley 4781-11.

E. Stainless Steel Shelf:
   1. American Specialties 0692-812 by 24 inches.
   2. Bobrick B-298 by 24 inches.
   3. Bradley 758 by 24 inches.

F. Sharps Disposal:
1. www.Plastic Products.com, 143002 Locking Wall Cabinet.
2. Sharpstar In-Room Container/Enclosure System.

G. Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
2. Size: As scheduled on Drawings.
3. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners, and tamperproof hanging system; bright annealed or satin finish.
4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.

2.05 ELECTRIC HAND/HAIR DRYERS

A. Electric Hand Dryers: Traditional fan-in-case type, with downward fixed nozzle.
1. Operation: Automatic, sensor-operated on and off.
2. Mounting: Wall-mounted - surface.
3. Cover: Stainless steel with brushed finish.
a. Tamper-resistant screw attachment of cover to mounting plate.
4. Air Velocity: 18,000 linear feet per minute, minimum, at full power.
5. Heater: 500 W, minimum, at full power.
6. Fan/Heater Control: Field adjustable down to approximately half-speed with corresponding reduction in heat output.
7. Total Wattage: 1400 W, maximum.
8. Runtime: Field adjustable or automatic, up to 35 seconds.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.

D. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations and indicated on accessory schedule on drawings.

D. Mounting Heights and Locations: As required by accessibility regulations and as indicated on drawings.

END OF SECTION

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