MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE

DRY MILLS STORAGE BARN

BGS PROJECT NO: 3289

ADDENDUM NO. 2

DECEMBER 19,2022

All bidders are hereby notified that the CONTRACT DOCUMENTS on DRY MILLS STORAGE BARN are amended only in respects set out below and all bids shall be submitted for the work described in the plans and specifications as amended by this ADDENDUM NO. 2.

1. Bid Date Extension
    a. See attached revised 00 11 13 “Notice to Contractors”
2. Lot clearing and removals
    a. Bidders shall include in Base bid tree clearing, grubbing, stump removal, and removal of existing embankment for an area not to exceed 3500 sq’.
    b. Bidders shall include in Base bid removal of 250 yards of fill from existing embankment creating a 30’ cleared area southerly from tree line to new garage facility.
        i. Area to be graded to blend in with existing site grades using existing fill.
3. Gravel Clarification
    a. Bidders shall include in Base bid new gravel only on the 2-16’ aprons in front of each overhead door. Remainder of parking areas and roadways to be graded smooth with existing. Apron construction shall consist of 18” of MDOT Type D gravel, MIRAFI 500X Geotextile fabric, and 6” of MDOT Type A gravel.
        i. In the event additional gravel is desired by owner for roadways and approaches it will be handled via a change order with the GC.
4. Stone Drip Edge
    a. As detailed in the revised CO.1 issued in Addendum NO. 1, a stone drip edge is required 36” wide from foundation wall along the exterior of both 70’ walls.
        i. The detail of material “River Rock” shall be changed to 3” crushed clean stone.
5. Loam specifications
    a. Do not include any loam in Base Bid. All backfills, ramps, and embankments shall be finished to a maximum 3/1 slope using materials from excavated embankment. In the event the material is not suitable, owner will negotiate a change order with GC for suitable material.
6. Site removals
    a. Bidders shall include in Base bid removal and disposal of all excavated material not re-used for project to also include trees, stumps, any debris…..etc.
7. Specification:
    a. Remove Specification 08 51 13 Aluminum Windows from Addendum #1
    b. Add attached specifications below
        i. 01 78 23 Operation and Maintenance Data
        ii. 07 92 00 Joint Sealants
        iii. 08 11 00 Hollow Metal Doors and Frames

iv. 08 51 13 Aluminum Windows
v. 08 81 00 Glass and Glazing
vi. 09 96 00 High Performance Industrial Coatings

8. Additional Bid Questions:

1. **Question 1**: Concrete specification section 3.4 says concrete testing by owner. It was mentioned at the pre-bid meeting to be by GC. Please clarify
    a. Bidders shall include in Base bid all required construction testing completed by certified 3rd party testing company at the expense of the General Contractor. All reports shall be shared with owner and Engineer.
2. **Question 2**: Concrete specifications are unclear as to whether there is a slab sealer going after being wet cured. Please clarify and if so how many coats?
    a. 3 coats of slab sealer are required after wet curing. 3M Cornerstone Floor sealer/Finish or approved equal applied per manufacturer specifications.
3. **Question 3**: There should be Addendums listed on the Bid Form that should be filled in with date and acknowledge receipt of by GC's?
    a. 00 41 13 paragraph 1. Is an acknowledgement by the Bidder they have included any Addenda. I always recommend bidders hand write on the bid form Addendum 1, 2,…..etc acknowledged.
4. **Question 4:** *The details for the gravel in front of the two entrance aprons are below. They call for 12" of gravel below finish grade. The finish grade is gravel for this project. Can you get clarification as to what they are calling finish grade and the depth of the material?*
    a. See detail 2. Gravel Clarification above. The finish grade it appears you are inquiring of is top of concrete floor.
5. **Question 5**: I don't see a requirement for a sill seal below the exterior wall plate. Please clarify.
    a. Bidders shall include the installation of foam sill seal between all wood surfaces and concrete. Owens Corning 7-1/2" comfort seal or approved equivalent.
6. **Question 6**: I don't see any details for the canopies over the pass doors on the sides of the building. Is there a ceiling, trim, etc….need details.
    a. Canopy framing details are on plan sheet S5.0 detail I/S1.0.
    b. Exposed framing on interior
    c. Exterior should match garage specifications for trim, roofing & flashing.
7. **Question 7:** The drawings show a continuous soffit vent but no roof ridge vent. Is this correct?
    a. Bidders shall include a vented ridge incorporated with the steel roofing system.
8. **Question 8:** The specs call for a Centria SRS metal roof panel. It also calls for a 2" height. The Centria SRS panel is 3" height. Please clarify.
    a. Centria panels are available it 2" height. CENTRIA SRS 2 STRUCTURAL STANDING SEAM ROOFING SYSTEM. Or approved equivalent system.
9. **Question 9:** The specs mention a snow retention system for the roof. What is the extent of this? Full length all eaves? Specs also mention gutters and downspouts. I don't see any shown on the drawings.
    a. Remove from project requirements snow retention system and gutter and downspouts.

00 11 13
Notice to Contractors

MDIFW Dry Mills Storage Barn BGS Project number 3289

Construction of a wood framed storage building

The cost of the work is approximately $ 460,000. The work to be performed under this contract shall be completed on or before the Final Completion date of *14 November 2023*.

1. Submit bids on a completed Contractor Bid Form, plus bid security when required, all scanned and included as an attachment to an email with the subject line marked "**Bid for *MDIFW Dry Mills Storage Barn***" and addressed to the Bid Administrator at: BGS.Architect@Maine.gov and richard.parker@maine.gov, so as to be received no later than **2:00:00 p.m.** on ***05 January, 2023***.

   Bid submissions will be opened and read aloud at the time and date noted above at the Bureau of General Services office, accessible as a video conference call. Those who wish to participate in the call must submit a request for access to BGS.Architect@Maine.gov.

   Any bid received after the noted time will not be considered a valid bid and will remain unopened. Any bid submitted by any other means will not be considered a valid bid. The Bid Administrator may require the Bidder to surrender a valid paper copy of the bid form or the bid security document in certain circumstances.

   Questions on the bid opening process shall be addressed to the Bid Administrator: Joseph H. Ostwald, Director, Division of Planning, Design & Construction, Bureau of General Services, 77 State House Station, Augusta, Maine 04333-0077, BGS.Architect@Maine.gov.

2. The bid shall be submitted on the Contractor Bid Form (section 00 41 13) provided in the Bid Documents. The Owner reserves the right to accept or reject any or all bids as may best serve the interest of the Owner.

3. Bid security *is required* on this project.
   If noted above as required, the Bidder shall include a satisfactory Bid Bond (section 00 43 13) or a certified or cashier's check for 5% of the bid amount with the completed bid form submitted to the Owner. The Bid Bond form is available on the BGS website.

4. Performance and Payment Bonds *are required* on this project.
   If noted above as required, or if any combination of Base Bid and Alternate Bids amounts selected in the award of the contract exceeds $125,000.00, the selected Contractor shall furnish a 100% contract Performance Bond (section 00 61 13.13) and a 100% contract Payment Bond (section 00 61 13.16) in the contract amount to cover the execution of the Work. Bond forms are available on the BGS website.

5. Filed Sub-bids *are not required* on this project.

6. There *are no* Pre-qualified General Contractors on this project.
   If Pre-qualified General Contractors are identified for this project, the name of each company, with their city and state, are listed below.

7. An on-site pre-bid conference *will* be conducted for this project.
   If a pre-bid conference is scheduled, it is *mandatory* for General Contractors and optional for Subcontractors and suppliers. Contractors who arrive late or leave early for a mandatory meeting may be prohibited from participating in this meeting and bidding. *Dry Mills Fish Hatchery, 158 Weymouth Road, Gray Maine, November 29, 2022 at 10am. .*

8. Bid Documents - full sets only - will be available on or about *November 17, 2022* and may be obtained *no cost* from:
   HDR
   5201 South Sixth Street Road
   Springfield, IL 62703
   217-585-8300
   Rozanne.Elmore@hdrinc.com

9. Bid Documents may be examined at:
   AGC Maine
   188 Whitten Road
   Augusta, ME 04330
   Phone 207-622-4741 Fax 207-622-1625

   Construction Summary
   734 Chestnut Street
   Manchester, NH 03104
   Phone 603-627-8856 Fax 603-627-4524

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Requirements for Contractor-furnished, manufacturers' operation and maintenance (O&M) data, including:
      a. Required operation and maintenance data groupings into operation and data manuals and timing of such Submittals.
      b. Requirements for paper copies of operation and maintenance data and related Electronic Documents.
      c. Content of operation and maintenance data Submittals.
   2. Requirements for furnishing program code and configuration files

B. Scope:
   1. Contractor shall submit operation and maintenance data, and related information, in accordance with this Section and requirements elsewhere in the Contract Documents, as instructional and reference information for use by: (a) Owner's operation and maintenance personnel, and (b) others retained by or working for Owner.
   2. In addition to operation and maintenance data expressly required elsewhere in the Contract Documents, also submit operation and maintenance data for:
      a. All equipment and systems, including facility equipment, plumbing equipment, electrical equipment, and other equipment.
      b. Valves, gates, actuators, and related accessories.
      c. Instrumentation and control devices and systems.
      d. Building materials, systems, and finishes that need post-construction troubleshooting, cleaning, or maintenance, such as roofing, doors, windows, paint and coatings, other finishes, and other items.

C. Related Requirements:
   1. Section 01 33 00 - Submittal Procedures.
   2. Section 01 78 36 - Warranties.

1.2 SUBMITTALS

A. Closeout Submittals: Submit the following:
   1. Operation and Maintenance Data:
      a. Submit operation and maintenance data, required by the Contract Documents, grouped into operation and maintenance manual Submittals indicated in Table 01 78 23-A.
      b. Where operation and maintenance data required by the Contract Documents, is not expressly indicated in table 01 78 23-A, obtain written clarification or interpretation from Engineer prior to preparing and transmitting such Submittal.
      c. For each required operation and maintenance manual Submittal, furnish preliminary Submittal and final Submittal. Timing of preliminary and final operation and maintenance manual Submittals, and differences between preliminary and final Submittals, are indicated in this Section.

   2. Preliminary Operation and Maintenance Manual Submittals:
      a. Paper Copies: Three copies, exclusive of copies required for Contractor's use.
      b. Submit to entity indicated in Section 01 33 00 – Submittal Procedures, by the earlier of: 90 days following approval of Shop Drawings and product data Submittals, or 14 days prior to starting training of operation and maintenance personnel, or 14 days prior to field quality control testing at the Site.

c. Do not perform checkout, startup, and training without Engineer's acceptance of preliminary operation and maintenance data Submittals for the associated Work.

3. Final Operation and Maintenance Manual Submittals: Furnish final Submittal prior to Substantial Completion of the associated Work, unless submittal is required prior to an interim Milestone.
   a. Paper Copies: Three copies, exclusive of copies required for Contractor's use.
   b. Work will not be eligible for Substantial Completion until associated, required final operation and maintenance data Submittals are accepted by Engineer.

1.3 PAPER COPIES OF O&M MANUALS

A. Binding and Cover:
   1. Bind each operation and maintenance manual in durable, permanent, stiff-cover binder(s), comprising one or more volumes per copy, as necessary.
   2. Binders shall be not less than one inch wide and maximum of three inches wide. Binders for each copy of each volume shall be same size and color.
   3. Binders shall be locking three-ring ("D"-ring) type, or three-post type. Three-ring binders shall be riveted to back cover and include plastic sheet lifter (page guard) at front and back of each volume.
   4. Do not overfill binders.
   5. Covers shall be oil-, moisture-, and wear-resistant, including identifying information on cover and spine of each volume.
   6. Indicate the following information on cover of each volume:
      a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title.
      b. Name or type of material or equipment covered in the manual.
      c. Volume number, if more than one volume is submitted, listed as "Volume __ of __", with appropriate volume-designating numbers filled in.
      d. Name of Project and, when applicable, Contract name and number.
      e. Name of building or structure, as applicable.
   7. Provide the following information on spine of each volume:
      a. Title: "OPERATING AND MAINTENANCE INSTRUCTIONS". For submittal of preliminary operation and maintenance data, include the word, "PRELIMINARY" in the title.
      b. Name or type of material or equipment covered in the manual.
      c. Volume number, when more than one volume is submitted, listed as "Volume __ of __", with appropriate volume-designating numbers filled in.
      d. Project name and building or structure name.

B. Pages:
   1. Print pages in paper copies of operation and maintenance manuals on 30-pound (minimum) paper, 8.5-inch by 11-inch size.
   2. Reinforce binding holes in each individual paper sheet with plastic, cloth, or metal. When published, separately-bound booklets or pamphlets are part of manuals, reinforcing of pages within booklet or pamphlet is not required.
   3. Furnish each page with binding margin not less than 3/4-inch wide.
   4. Properly punch each paper page with holes suitable for associated binding. Provide not less than 3/8-inch of paper between outer edge of punched holes and edge of paper. Manuals with improperly punched holes will be returned to Contractor as unacceptable.
   5. In paper copies of manuals, each page in each copy shall be properly bound-through by the binder's rings or posts. Paper manuals where some pages are not so bound will be returned to Contractor as unacceptable.

C. Drawings:

1. Bind into operation and maintenance manuals drawings, diagrams, and illustrations up to and including 11-inch by 17-inch size, with reinforcing and punched holes specified for paper pages.
2. Drawings or sheets larger than 11-inch by 17-inch shall be:
    a. Paper Copies: Neatly folded and inserted into clear plastic pockets bound into the manual. Neatly and permanently label each pocket with printed text indicating content and drawing numbers. Include not more than two drawings or sheets per pocket.
    b. Electronic Documents Copies: Included in electronic file at appropriate location.

D. Copy Quality and Document Clarity:
1. Provide original-quality copies. Documents in operation and maintenance manuals shall be either original manufacturer-printed documents or first-generation photocopies indistinguishable from originals. If original is in color, copies shall be in color. Manuals with copies that are unclear, not completely legible, off-center, skewed, or where text or drawings are cut by binding holes, are unacceptable. Pages that contain approval or date stamps, comments, or other markings that cover text or drawing are unacceptable.
2. Clearly mark, using ink, to indicate all components of materials and equipment on catalog pages for ease of identification. In standard or pre-printed documents, indicate options furnished and cross out inapplicable content. Using highlighters to so indicate options furnished is unacceptable.

E. Organization:
1. Indexed tabs between major categories of information, such as operating instructions, preventive maintenance instructions, and other major subdivisions of data in each manual.

1.4 ELECTRONIC DOCUMENTS O&M MANUALS

A. Electronic Documents of Operation and Maintenance Manuals:
1. Each Electronic Document copy of operation and maintenance data shall include all information included in the corresponding paper copy.
2. File Format:
    a. Unless otherwise required by Section 01 33 00 - Submittal Procedures, operation and maintenance data Electronic Documents shall be “portable document format” (PDF) files.
    b. Electronic Documents shall be electronically searchable upon delivery.
    c. Electronic Documents shall not be password-protected and shall not be protected against Owner’s or facility manager’s copying and printing such files for Owner’s or facility manager’s use in operating and maintaining the facility.
    d. Electronic Documents shall open to its first page.
    e. Submit each operation and maintenance manual as a single Electronic Document file, unless file size is over-large, in which case divide into as few separate files, each with similar filename, as possible.
    f. Within each Electronic Document, provide bookmarks for the following:
        1) Each chapter and subsection indicated in the corresponding printed copy document’s table of contents.
        2) Each figure.
        3) Each table.
        4) Each appendix and attachment.

1.5 CONTENT OF OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance Manual Content – General:
1. Prepare each operation and maintenance manual specifically for the Project. Include in each manual all pertinent instructions, as-constructed drawings as applicable, bills of materials, technical information, installation and handling requirements, maintenance and repair instructions, and other information required for complete, accurate, and comprehensive data for safe and proper operation, maintenance, and repair of materials and equipment furnished for the Project. Include in manuals specific information required in the Specification

Section for the material or equipment, data required by Laws and Regulations, and data required by authorities having jurisdiction.

2. Provisions of this Article were written for equipment. Where operation and maintenance data are required for building products, such as finishes, openings, thermal and moisture protection, and similar items, comply with this Article to the extent practical and reasonable for the associated item.
3. Completeness and Accuracy:
    a. Operation and maintenance manuals that include language stating or implying that the manual's content may be insufficient or stating that the manual's content is not guaranteed to be complete and accurate are unacceptable.
    b. Operation and maintenance manuals shall be complete and accurate.
    c. Operation and maintenance manuals shall indicate the specific alternatives and features furnished, and the specific operation and maintenance provisions for the material or equipment furnished.
4. Provide dividers and Include manufacturer's information, diagrams, schematics, and equipment cutaways. Avoid submitting catalog excerpts unless they are the only document available showing identification or description of particular component of the equipment. Where published documents, included in operation and maintenance data, pertain to multiple models or types, mark the literature to indicate specific material or equipment supplied. Marking may be in the form of checking, arrows, or underlining to indicate pertinent information, or by crossing out or other means of obliterating information that does not apply to the materials and equipment furnished.
5. Identify each equipment item consistent with names and identification numbers shown or indicated in the Contract Documents, rather than manufacturer's model numbers.
6. Neatly type data not furnished in computer-printed text. Handwriting, except for strikeouts, arrows, and the like, is unacceptable.
7. Include copy of warranty in accordance with the Contract Documents, including Section 01 78 36 - Warranties.
8. Include copy of proposed service contract, when applicable.
9. When copyrighted material is used in operation and maintenance manuals, obtain¬ copyright holder's written permission to use such material in the operation and maintenance manual.

B. Differences Between Preliminary and Final Operation and Maintenance Manuals:
    1. In preliminary operation and maintenance manuals, include flysheet or placeholder for information to be included in final operation and maintenance manual Submittal.
    2. In final operation and maintenance manuals, include information such as the following, as applicable for the associated materials and equipment:
        a. Equipment data that requires collection after startup, for example: (1) system and equipment balancing reports, including those for HVAC systems; and (2) final settings for electrical switchgear, automatic transfer switches, and circuit breakers: and (3) materials and equipment field testing results.

C. Initial Documents in Operation and Maintenance Manuals:
    1. Table of Contents:
        a. Provide table of contents in each volume of each operation and maintenance manual.
        b. In table of contents and not less than once in each chapter or section, identify materials and equipment by their functional names. Thereafter, abbreviations and acronyms may be used if their meaning is clearly indicated in a table bound at or near beginning of each volume. Using material or equipment model or catalog designations for identifying items is unacceptable.
    2. Equipment Record:
        a. Provide "Equipment Record" section of operation and maintenance manual immediately following the table of contents. "Equipment Record" section is not required for operation and maintenance data for other than equipment (such as building materials and finishes).

b. Provide “Equipment Record” on forms included as this Section’s Attachments 1, 2, and 3.
c. For instrumentation and control equipment, International Society of Automation (ISA) data sheets are acceptable in lieu of the forms included as this Section’s Attachments 1, 2, and 3.
d. This Section’s Attachments 1, 2, and 3 are available from Engineer as “fillable PDF forms”.
e. Complete in detail each section of “Equipment Record”. Merely referencing the associated equipment’s operation and maintenance data for nameplate, maintenance, spare parts, lubricants, or other required information, is unacceptable.
f. For equipment or systems with multiple, separate components (for example, motor and gearbox), fully completed “Equipment Record” is required for each component.
g. Operation and maintenance data Submittals without complete and accurate “Equipment Record” sheets are unacceptable.

D. Operation and Maintenance Instructions:
1. Safety Considerations:
a. Submit written descriptions of safety considerations relating to operation and maintenance procedures for materials and equipment.
b. Describe safety devices and alarms provided with materials and equipment and proper operation and use.
c. Indicate procedures for proper, safe operating and maintenance of materials and equipment furnished, including manufacturer’s recommended personal protection equipment, apparatus, and devices not furnished under the Contract.
d. Describe recommended safety-related training for personnel operating and maintaining the subject materials or equipment.
e. Include in appendix to operation and maintenance manual manufacturers’ relevant “safety data sheets” (SDS), formerly “material safety data sheets” (MSDS).
f. Engineer’s review of operation and maintenance data expressly does not extend to adequacy, completeness, and accuracy of SDS or other safety and protection practices and procedures indicated in the operation and maintenance data.
2. Operation:
a. Include in operation and maintenance data Submittals complete, detailed written operating instructions for each material or equipment item including: function; operating characteristics; limiting conditions; and regulation and control. Also include, as applicable, written descriptions of alarms generated by equipment and proper responses to such alarm conditions.
b. Include pre-startup instructions and checklists and complete startup instructions for each material and equipment item.
c. Indicate recommended operating instructions for all operating modes and conditions, with associated recommendations for safe operation.
d. Explain available controls and instrumentation and associated function(s).
e. Indicate required shutdown checklists and procedures for: normal shutdown, emergency shutdown, and long-term shutdowns.
f. Troubleshooting instructions.
3. Maintenance – General:
a. Include in operation and maintenance data complete, written instructions for necessary and recommended maintenance, including mechanical maintenance and electrical/instrumentation and controls maintenance, as applicable.
b. Include in operation and maintenance data complete instructions for necessary assembly, disassembly, installation, re-installation, storage, and shipping for materials and equipment.
c. Tools: Include list of required maintenance tools and equipment.
d. Spare Parts and Extra Materials:

1) Submit complete instructions for ordering replaceable parts, including reference numbers (such as shop order number or serial number) that will expedite the ordering process.
2) Submit manufacturer's recommended inventory levels for spare parts, extra stock materials, and consumable supplies for the initial two years of operation. Consumable supplies are items consumed or worn by operation of materials or equipment, and items used in maintaining the operation of material or equipment, including items such as lubricants, seals, reagents, and testing chemicals used for calibrating or operating the equipment. Include estimated delivery times, shelf life limitations, and special storage requirements.
3) Also refer to this Article's provision, "Bills of Materials", below, for additional requirements regarding ordering replacement parts.

4. Routine and Preventative Maintenance:
   a. Submit complete, detailed, written instructions for routine and preventive maintenance including all information and instructions to keep materials, equipment, and systems properly lubricated, adjusted, and maintained so that materials, equipment, and systems function economically throughout their expected service life. Instructions shall include:
      1) Written explanations with illustrations for each routine and preventive maintenance task such as inspection, adjustment, anchor bolt torque checks, lubrication, calibration, cleaning, replacement of filters, and the like.
      2) Recommended schedule for each routine and preventive maintenance task.
      3) Lubricants:
         a) Provide lubrication charts indicating recommended types of lubricants, frequency of application or change, and where each lubricant is to be used or applied.
         b) Table of alternative lubricants.
5. Major Maintenance:
   a. Include detailed, written instructions and illustrations for required periodic (non-routine, non-preventative) maintenance.
   b. Indicate relative level of training and expertise required to perform such maintenance and recommended tools and equipment.
6. Special Maintenance:
   a. Include maintenance instructions for long-term shutdowns and storage.

E. Bills of Materials:
1. Include in operation and maintenance manuals complete bills of material or parts lists for materials and equipment furnished. Lists or bills of material may be furnished on a per-drawing or per-equipment assembly basis. Bills of material shall indicate:
2. Manufacturer's name, physical address, telephone number, internet website address.
3. Manufacturer's local service representative's or local parts supplier's name, physical address, telephone number, internet website address, and e-mail addresses.
4. Manufacturer's shop order and serial number(s) for materials, equipment or assembly furnished.
5. For each part or piece include the following information:
   a. Parts cross-reference number. Cross-reference number shall be used to identify the part on assembly drawings, Shop Drawings, or other type of graphic illustration where the part is clearly shown or indicated.
   b. Part name or description.
   c. Manufacturer's part number.
   d. Quantity of each part used in each assembly.
   e. Current unit price of the part at the time the operation and maintenance manual is submitted. Price list shall be dated.

F. Record Copy of Shop Drawings, Product data, and Other Previously Approved and Accepted Submittals:

1. Submit original-quality copies of each approved and accepted (as applicable) Shop Drawing, product data Submittal, written results of source quality control activities, and other Submittals, updated to indicate as-installed condition. Do not include prior Submittals that were not approved or were not accepted. Reduced drawings are acceptable only when reduction is to not less than one-half original size and all lines, dimensions, lettering, and text are completely legible on the reduction.

G. Electrical Schematics, Diagrams, and Information:
   1. Submit complete electrical schematics and wiring diagrams, including complete point-to-point wiring and wiring numbers or colors between all terminal points.
   2. Include as-constructed drawings of layouts of electrical panels (such as switchgear and motor control centers) and control panels.

H. NFPA 70 (National Electric Code) Documentation:
   1. Include in operation and maintenance manuals for electrically-powered equipment documented calculations of: (1) arc-fault current, equipment available fault current and (2) short-circuit current rating (SCCR), provided as part of equipment Submittals.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 ATTACHMENTS

A. The following, bound after this Section's "End of Section" designation, are part of this Section:
   1. Attachment 1 - Equipment Data and Spare Parts Summary form (one page)
   2. Attachment 2 - Recommended Maintenance Summary form (one page)
   3. Attachment 3 - Lubrication Summary form (one page)

END OF SECTION

ATTACHMENT 1

Equipment Record

Equipment Data and Spare Parts Summary

Project Name	Specification Section:
Equipment Name	Year Installed:
Project Equipment Tag No(s).	

Equipment Manufacturer		Project/ Order No.
Address		Phone
Website	Web Site	E-mail
Local Representative/Service Center		
Address		Phone
Website	E-mail	

MECHANICAL NAMEPLATE DATA

Equip.			Serial No.	
Make			Model No.	
ID No.	Frame No.	HP	RPM	Cap.
Size	TDH	Imp. Size	CFM	PSI
Other:				

ELECTRICAL NAMEPLATE DATA

Equip.				Serial No.				
Make				Model No.				
ID No.	Frame No.	HP	V.	Amp.	Hertz	PH	RPM	SF
Duty	Code	Ins. Cl.	Type	NEMA	C Amb.	Temp. Rise	Rating	
Other:								

SPARE PARTS PROVIDED PER CONTRACT

Part No.	Part Name	Quantity

RECOMMENDED SPARE PARTS

Part No.	Part Name	Quantity

ATTACHMENT 2

Equipment Record

Recommended Maintenance Summary

Equipment Description	Project Equip. Tag No(s).	

RECOMMENDED BREAK-IN MAINTENANCE (FIRST OIL CHANGES, ETC.)	INITIAL COMPLETION * FOLLOWING START-UP							
	D	W	M	Q	S	A	RT	Hours

RECOMMENDED PREVENTIVE MAINTENANCE	PM TASK INTERVAL *							
	D	W	M	Q	S	A	RT	Hours

***** **D = Daily** **W = Weekly** **M = Monthly** **Q = Quarterly** **S = Semiannual** **A = Annual** **Hours = Run Time Interval**

ATTACHMENT 3

Equipment Record

Lubrication Summary

Equipment Description	Project Equip. Tag No(s).

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

Lubricant Point						
Lubricant Type		Manufacturer	Product	AGMA #	SAE #	ISO
	1					
	2					
	3					
	4					
	5					

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sealing all joints which will permit penetration of dust, air or moisture.

B. Related Specification Sections include but are not necessarily limited to:
   1. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 302.1R, Guide for Concrete Floor and Slab Construction.
   2. ASTM International (ASTM):
      a. C834, Standard Specification for Latex Sealants.
      b. C920, Standard Specification for Elastomeric Joint Sealants.
      c. C1521, Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.
   3. Underwriters Laboratories, Inc. (UL).

B. Qualifications: Sealant applicator shall have minimum five years experience using products specified on projects with similar scope.

1.3 DEFINITIONS

A. Defect(ive): Failure of watertightness or airtightness.

B. Finish sealant: Sealant material per this specification applied over face of compressible sealant or expanding foam sealant specified, to provide a finished, colored sealant joint.

C. Installer or Applicator:
   1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
   2. Installer and applicator are synonymous.

D. "Seal," "sealing" and "sealant": Joint sealant work.

1.4 SUBMITTALS

A. Shop Drawings:
   1. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Manufacturer's recommendations for joint cleaner, primer, backer rod, tooling and bond breaker.
   2. Certification from sealant manufacturer stating product being used is recommended for and is best suited for joint in which it is being applied.
   3. Certification of applicator qualification.

B. Test Results:
   1. Provide adhesion test results for each sealant sample including adhesion results compared to adhesion requirements.
   2. Manufacturer's authorized factory representative recommended remedial measures for all failing tests.

C. Samples:

1. Color chart.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver material in manufacturer's original unopened containers with labels intact: Labels shall indicate contents and expiration date on material.

1.6 PROJECT CONDITIONS

A. Schedule installation of sealant work after completion of penetrating item installation but prior to covering or concealing of openings.

B. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

C. During installation provide masking and drop cloths to prevent sealant materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Compressible sealant:
      a. Schul International Company, LLC.
      b. Emseal by Sika.
      c. Norton.
      d. Sandell Moisture Protection Systems.
   2. Expanding foam sealant:
      a. M-D Building Products, Inc.
      b. DAP Products, Inc.
      c. FAI International, Inc.
   3. Polyether sealants:
      a. Master Builders Solutions.
      b. Chem Link.
      c. Tremco Commercial Sealants & Waterproofing.
   4. Polysulfide rubber sealant:
      a. Pecora Corporation.
      b. Master Builders Solutions.
      c. PolySpec by ITW Polymers Sealants.
   5. Polyurea joint filler:
      a. Dayton Superior Corporation.
      b. Euclid Chemical Company.
      c. L&M by LATICRETE International, Inc.
      d. Master Builders Solutions.
   6. Polyurethane sealants:
      a. Pecora Corporation.
      b. Sika.
      c. Master Builders Solutions.
      d. Tremco Commercial Sealants & Waterproofing.
   7. Silicone sealants:
      a. Chem Link.
      b. GE Silicones.
      c. Dow.
      d. Tremco Commercial Sealants & Waterproofing.
   8. Backer rod, compressible filler, primer, joint cleaners, bond breaker:
      a. As recommended by sealant manufacturer.

2.2 MATERIALS

A. Sealants - General:
   1. Provide colors matching materials being sealed.
   2. Where compound is not exposed to view in finished work, provide manufacturer's color which has best performance.
   3. Nonsagging sealant for vertical and overhead horizontal joints.
   4. Sealants for horizontal joints: Self-leveling pedestrian/traffic grade.
   5. Joint cleaner, primer, bond breaker: As recommended by sealant manufacturer.
   6. Sealant backer rod and/or compressible filler:
      a. Closed cell polyethylene, polyethylene jacketed polyurethane foam, or other flexible, nonabsorbent, non-bituminous material recommended by sealant manufacturer to:
         1) Control joint depth.
         2) Break bond of sealant at bottom of joint.
         3) Provide proper shape of sealant bead.
         4) Serve as expansion joint filler.

B. Compressible Sealant:
   1. Foamed polyurethane strip saturated with polymerized polybutylene waterproofing coated on front face with nonreactive release agent that will act as bond breaker for applied sealant.
      a. Schul "Sealtite B".
   2. Adhesive: As recommended by sealant manufacturer.

C. Expanding Foam Sealant:
   1. One or two component moisture cured expanding urethane.
   2. Shall not contain formaldehyde.
   3. Density: Minimum 1.5 PCF.
   4. Closed cell content: Minimum 70%.
   5. R-value: Minimum 5.0/IN.
   6. Flame spread: Less than 25.
   7. Smoke developed: Less than 25.

D. Polyether Sealant:
   1. Silyl-terminated polyether polymer.
   2. ASTM C920, Type S, Grade NS, Class 50, Use NT, M, A, and O.
      a. Master Builders Solutions MasterSeal 150.
      b. Chem Link DuraLink.
      c. Tremco Dymonic FC.

E. Polysulfide Rubber Sealant:
   1. One or two component.
   2. Meet ASTM C920.
      a. Pecora Synthacalk GC2+.
      b. PolySpec THIOKOL 2235.

F. Polyurea Joint Filler:
   1. Two component, semi-rigid material for filling formed or saw-cut control joints in interior concrete slabs.
      a. Dayton Superior Corporation "Joint Fill, Joint Seal, Joint Saver II" as required for condition and recommended by manufacturer.
      b. Euclid Chemical Company "EUCO QWIK" joint.
      c. L&M "Joint Tite 750".
      d. Master Builders Solutions MasterSeal “CR100" control joint filler.
   2. Comply with ACI 302.1R performance recommendations regarding control and construction joints.
   3. Color: Gray.

G. Polyurethane Sealant:
   1. One or two components.

2. Paintable.
3. Meet ASTM C920 Type S or Type M, Grade NS or P, Class 25, Use NT, T, M, A and O.
    a. Pecora Dynatrol-IXL, Dynatrol II, Urexpan NR-200, NR-201.
    b. Sika Chemical Corporation Sikaflex-1a, Sikaflex-2C NS/SL.
    c. Master Builders Solutions MasterSeal NP-1, NP-II, SL-1 SL-2.
    d. Tremco Dymonic or Dymeric, Vulkem 116,227,45,245.

H. Silicone Sealant:
1. One component.
2. Meet ASTM C920, Type S, Grade NS, Class 25, Use NT, G, A, O.
    a. Chem Link DuraSil.
    b. GE Silpruf, Silglaze II.
    c. GE Sanitary 1700 sealant for sealing around plumbing fixtures.
    d. Dow 786 for sealing around plumbing fixtures.
    e. Dow 7565, 790, 791, 795.
    f. Tremco Spectrem 1, Spectrem 3, Tremsil 600.
3. Mildew resistant for sealing around plumbing fixtures.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before use of any sealant, investigate its compatibility with joint surfaces, fillers and other materials in joint system.

B. Use only compatible materials.

C. Where required by manufacturer, prime joint surfaces.
1. Limit application to surfaces to receive sealant.
2. Mask off adjacent surfaces.

D. Provide joint depth for joints receiving polyurea joint filler in accordance with manufacturer's recommendations.

3.2 INSTALLATION

A. Install products in accordance with manufacturer's instructions and UL requirements.

B. Clean all joints.

C. Make all joints water and airtight.

D. At changes in direction of joints, joint intersections and where sealant joints interface with other construction, install continuous sealant as necessary to ensure a weather-tight seal.

E. Make depth of sealing compounds, except expanding foam and polyurea sealant, not more than one-half width of joint, but in no case less than 1/4 IN nor more than 1/2 IN unless recommended otherwise by the manufacturer.

F. Provide correctly sized backer rod, compressible filler or compressible sealant in all joints to depth recommended by manufacturer:
1. Take care to not puncture backer rod and compressible filler.
2. Provide joint backer rod as recommended by the manufacturer for polyurea joint filler.

G. Apply bond breaker where required.

H. Tool sealants using sufficient pressure to fill all voids.

I. Upon completion, leave sealant with smooth, even, neat finish.

J. Where piping, conduit, ductwork, etc., penetrate wall, seal each side of wall opening.

K. Install compressible sealant to position at indicated depth.

1. Size so that width of material is twice joint width.
2. Take care to avoid contamination of sides of joint.
3. Protect side walls of joint (to depth of finish sealant).
4. Install with adhesive faces in contact with joint sides.
5. Install finish sealant where indicated.

L. Install expanding foam sealant to minimum 4 IN depth or thickness of wall being penetrated if less than 4 IN or as indicated on Drawings.
   1. Provide adequate fire rated backing material as required.
   2. Hold material back from exposed face of wall as necessary to allow for installation of backer rod and finish sealant.
      a. Allow expanding foam sealant to completely cure prior to installing backer rod and finish sealant.
   3. Trim off excess material flush with surface of the wall if not providing finished sealant.

3.3 SEALANT WORK

A. General:
   1. Work includes but is not limited to: Sealing all joints which will permit penetration of dust, air, or moisture.
   2. Refer to SCHEDULE for materials to be used.

B. Concrete joints:
   1. Flooring joints.
   2. Isolation joints.
   3. Joints between paving or sidewalks and building.
   4. Construction, control and expansion joints.
   5. Joints between precast roof units and between precast roof units and walls.

C. Flashing, reglets and retainers.

D. Wood siding and trim.

E. Exterior Insulation and Finish System joints.

F. Openings:
   1. Perimeters of door and window frames, louvers, grilles, etc.
   2. Door thresholds shall be set in a full bed of sealant.
   3. Glass and glazing: See specification Section 08 81 00.

G. Plumbing fixtures.

H. Penetrations of walls, floors and decks.

I. Other joints where sealant, expanding foam sealant or compressible sealant is indicated.

3.4 SCHEDULE

A. Furnish sealant as indicated for the following areas:
   1. Exterior areas:
      a. Above grade: Polyurethane.
      b. Below grade: Polyurethane.
   2. Interior areas:
      a. Noncorrosive areas:
         1) Wet exposure: Polyurethane.
         2) Dry exposure: Polyurethane, unless noted otherwise.
   3. Compressible sealant: Where indicated.
   4. Exterior wall penetrations: Expanding urethane foam, with finish sealant.
      a. Finish sealant:
         1) Exterior side:
            a) Above grade: Polyether.
            b) Below grade: Polyurethane.

2) Interior side:
   a) Noncorrosive area:
      (1) Wet exposure: Polyurethane.
      (2) Dry exposure: Polyurethane, unless noted otherwise.

5. Interior concrete slab formed or saw-cut control joints: Polyurea joint filler.

END OF SECTION

SECTION 08 11 00
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal doors and frames.

B. Related Specification Sections include but are not necessarily limited to:
   1. Section 08 70 00 - Finish Hardware.
   2. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
      a. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   2. National Association of Architectural Metal Manufacturers (NAAMM):
      a. Hollow Metal Manufacturers Association (HMMA).
   3. Steel Door Institute (SDI):
      a. 117, Manufacturing Tolerances for Standard Steel Doors and Frames.
      b. All SDI publications.
   4. Steel Door Institute/American National Standards Institute (SDI/ANSI):
      a. A250.6, Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
      b. A250.7, Nomenclature for Standard Steel Doors and Steel Frames.
      c. A250.8, Specifications for Standard Steel Doors and Frames.
      d. A250.10, Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
      e. A250.11, Recommended Erection Instructions for Steel Frames.

B. Qualifications: Manufacturer must be current member of SDI, and NAAMM (HMMA).

C. Wipe coat galvanized steel is not acceptable as substitute for galvanizing finish specified.

1.3 DEFINITIONS

A. As identified in SDI/ANSI A250.7.

1.4 SUBMITTALS

A. Shop Drawings:
   1. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
   2. Schedule of doors and frames using same reference numbers as used on Drawings.
   3. SDI certification.

B. Contract Closeout Information:
   1. Operation and Maintenance Data:
      a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store doors and frames in accordance with SDI/ANSI A250.11.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Metal doors and frames:
      a. Ceco Door by ASSA ABLOY.
      b. Steelcraft by Allegion PLC.
      c. Curries by ASSA ABLOY.

2.2 MATERIALS

A. Steel Sheet: Hot-dipped galvannealed steel, ASTM A653, A60 coating.

B. Frames: Hot-dipped galvannealed steel, ASTM A653, A60 coating.

C. Supports and Reinforcing: Hot-dipped galvannealed steel, ASTM A653, A60 coating.

D. Inserts, Bolts and Fasteners: Manufacturer's standard.

E. Primer: Manufacturer's standard coating meeting SDI/ANSI A250.10.

F. Galvannealed Coating Repair: See Specification Section 09 96 00.

G. Thermal Insulation: Polyurethane, CFC free.

H. Sound Insulation: Fiberglass batt insulation or impregnated Kraft honeycomb.

2.3 ACCESSORIES

A. Frame Anchors:
   1. Jamb anchors:
      a. Masonry wire anchors: Minimum 0.1875 IN wire, galvanized.
      b. Existing wall anchor: Minimum 18 GA, galvanized.
      c. Stud partition and base anchors: Minimum 18 GA, galvanized.

2.4 FABRICATION

A. General:
   1. SDI/ANSI A250.8.
   2. Fabricate rigid, neat in appearance and free from defects.
   3. Form to sizes and profiles indicated on Drawings.
      a. Beveled edge.
   4. Fit and assemble in shop wherever practical.
   5. Mark work that cannot be fully assembled in shop to assure proper assembly at site.
   6. Continuously wire weld all joints, dress exposed joints smooth and flush.
   7. Fabricate doors and frames to tolerance requirements of SDI 117.
   8. Fit doors to SDI clearances.
   9. All doors shall be handed.
   10. Hinge cut-out depth and size on doors and frames shall match hinge specified in Specification Section 08 70 00.
   11. Design and fabricate doors to requirements of the building code.

B. Hollow Metal Doors:
   1. General:
      a. 1-3/4 IN thick.
      b. Fabricate with flush top caps.
         1) Thickness and material to match door face.
         2) Exterior doors: Seal weld top cap to door face and grind smooth and flush.
         3) Interior doors:
            a) Attach top cap to door with concealed fasteners or by welding.
            b) Factory seal if attached with fasteners.

c) No exposed fasteners will be accepted.

c. Continuously wire weld all joints and dress, smooth and flush.

2. Exterior:
   a. Doors 48 IN wide, or less: SDI/ANSI A250.8, Level 3, and physical performance level A, Model 2.
      1) Face sheet minimum thickness: 16 GA.
      2) Insulated: Minimum R10.
3. Interior:
   a. Doors 48 IN wide, or less: SDI/ANSI A250.8, Level 2, and physical performance level "B", Model 2.
      1) Face sheet minimum thickness: 18 GA.
   b. Sound insulated, minimum STC-35.

C. Hollow Metal Frames:
   1. Door frames:
      a. Provide 2 IN face at all heads, jambs and mullions for frames in stud walls.
      b. Provide 4 IN face at head where noted on Drawings or required by wall construction.
      c. 26 GA galvannealed steel boxes welded to frame at back of all hardware cutouts.
      d. Steel plate reinforcement welded to frame for hinge, strikes, closers and surface-mounted hardware reinforcing.
         1) All plate reinforcement shall meet size and thickness requirements of SDI/ANSI A250.8.
      e. Split type frames not acceptable.
         1) All horizontal and vertical mullions and transom bars shall be welded to adjacent members.
      f. Conceal all fasteners.
      g. Frames shall be set up, all face joints continuously wire welded and dressed smooth.
      h. Exterior (up to 4 FT wide): 16 GA.
      i. Exterior (over 4 FT wide): 14 GA.
      j. Interior: 16 GA.
      k. Provide removable spreaders at bottom of frame.

D. Prepare for finish hardware in accordance with hardware schedule, templates provided by hardware supplier, and SDI/ANSI A250.6.
   1. Locate finish hardware in accordance with SDI/ANSI A250.8.
   2. See Specification Section 08 70 00 for hardware.
   3. Prepare doors for swing direction indicated.
      a. Preparing doors for non-handed hinges is not acceptable.

E. After fabrication, clean off mill scale and foreign materials and prime with rust inhibiting primer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install doors and frames in accordance with SDI/ANSI A250.11, the building code and manufacturer's instructions.

B. Plumb, align, and brace frames securely until permanently anchored.
   1. After completion of walls, remove temporary braces and spreaders.
   2. Anchor frames with minimum of three anchors per jamb.
      a. Number and location of anchors shall be in accordance with SDI and frame manufacturer's recommendations.

C. At new masonry or metal stud construction, place frames in conjunction with construction of walls or partitions.
   1. Masonry construction: Anchor frames using masonry wire anchors.

2. Metal stud construction:
    a. Anchor frames using steel stud anchors.
    b. Attach wall anchors with self-tapping screws.

D. At concrete, precast concrete or existing masonry construction, place frames in rough opening using existing opening anchors.

E. Use plastic plugs to keep silencer holes clear during construction.

F. Immediately after erection, sand smooth rusted or damaged areas.
    1. Touch-up with rust-inhibiting primer.
    2. Finish paint door and frame in accordance with Specification Section 09 96 00.

G. Install three silencers on strike jamb of single door frame and two on head of double door frame.
    1. See Specification Section 08 70 00.

H. Protect doors and frames during construction.

END OF SECTION

SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Aluminum windows.

B. Related Sections include but are not necessarily limited to:
   1. Section 07 92 00 - Joint Sealants.
   2. Section 08 81 00 - Glass and Glazing.
   3. Section 09 96 00 - High Performance Industrial Coatings.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Architectural Manufacturers Association (AAMA):
      a. 904, Voluntary Specification for Multi-Bar Hinges in Window Applications
      b. 1503, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
      c. 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
   2. ASTM International (ASTM):
      a. A924, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
      b. C1363, Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
      c. E283, Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
      d. E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference.
      e. E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
   3. American Welding Society (AWS):
      a. D1.2, Structural Welding Code - Aluminum.

1.3 DEFINITIONS

A. Installer or Applicator:
   1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
   2. Installer and applicator are synonymous.

1.4 SUBMITTALS

A. Shop Drawings:
   1. Product technical data for framing system and major accessories including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Hardware being provided by window manufacturer.
      c. Glass being provided by window manufacturer in factory glazed units.
      d. Manufacturer's installation instructions.
   2. Elevation drawings indicating window dimensions and details.

B. Samples:

1. After initial color selection, provide 2 x 3 IN minimum sample of each color and finish selected.

C. Informational Submittals:
1. Qualifications of testing laboratory.
2. Test results.
3. Warranty.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store units in vertical position off ground with wood spacers between each unit.

1.6 WARRANTY

A. Five year warranty of weathertightness of installation.
1. Air and water integrity and structural adequacy of units and hardware, including sealants and sealing within and around perimeter of installation.
2. Signed jointly by fabricator, installer, and contractor.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
1. Thermally broken windows:
a. Wausau Metals Corp., 2250-T Series.
b. Kawneer Company Inc., 8225-T Series.
c. EFCO Windows, Series 510.

2.2 MATERIALS

A. Extruded Aluminum: 6063T5 alloy.

B. Sealants: As specified in Section 07 92 00.

C. Thermal Insulator: Poured in place polyurethane, self-adhering to adjacent aluminum surfaces.

D. Weatherstripping: Sponge neoprene.

2.3 ACCESSORIES

A. Screens:
1. 18 x 16 mesh aluminum wire screens.
2. Secure to aluminum shapes with vinyl spline.
3. Hold in place with spring loaded plungers.
4. Removable to inside of building.
5. Finish same as window frames.

B. Flashing:
1. Minimum 0.040 IN aluminum.
2. Finish to match window frames.
3. Mill finish if concealed.

2.4 FABRICATION

A. General:
1. Fully degrease and clean members prior to assembly or application of protective coatings.
2. Weld by methods recommended by manufacturer and AWS D1.2 to avoid discoloration at welds.
3. Grind exposed welds smooth and restore finish.
4. Ease corners of cut edges to a radius of approximately 1/64 IN.
5. Conceal fasteners wherever possible.

6. Fit and assemble work at shop to maximum extent possible.
7. Maintain true continuity of line and accurate relation of planes and angles.
8. Provide secure attachment and support at mechanical joint, with hairline fit of contacting members.
9. Reinforce work as necessary to withstand wind loadings and to support system.
10. Separate dissimilar metal with paint or preformed separators to prevent corrosion.
    a. See Section 09 96 00.
11. Separate metal surfaces at moving joints with plastic inserts or other nonabrasive concealed inserts to permanently prevent freeze-up of joint.
12. Reinforce frames for hardware.
13. Structural steel reinforcement hot-dip galvanized after fabrication meeting G-90, ASTM A924, requirements.

B. Construct Window Frames (Casement, Fixed and Projected):
1. Cope and mechanically fasten together at corners or mitre at corners and heliarc weld on nonexposed surfaces, leaving only hairline joinery.
2. Seal weathertight.
3. Do not use joinery methods which discolor finish.

C. Thermal Insulator: Provide minimum 1/4 IN separation between exterior and interior metal surfaces after bridge is removed.

D. Weatherstripping:
1. Thermally broken type windows:
    a. Casement and projected:
        1) Provide two rows of fin type extruded neoprene weatherstrips extending around perimeter of sash at both inner and outer overlap contacts.
        2) Provide corners which are securely staked and joined.
        3) Provide units which are easily replaceable.

E. Window Hardware:
1. General:
    a. Locking device and strikes: White bronze and/or non-magnetic stainless steel.
    b. All hardware elements that bridge sash or frame thermal barrier: Reinforced nylon, deirin or suitable non-metallic, low conductivity material.
    c. Custodial key operation: Secure sash in closed position and automatically lock in washing position.
    d. Safety keys removable only in closed position.
2. Projected:
    a. Two balance arms with adjustable non-abrasive friction pivots or adjustable non-abrasive friction shoes to support sash in any open position.
    b. Concealed, four-bar friction hinges meeting AAMA 904.
    c. Two locks when sash are more than 4 FT wide.
    d. Use incorporated stop within hinge in lieu of Life Safety hold open device when four-bar friction hinges are used.
3. Glass: See Section 08 81 00 for types of glass to be installed under this Section.

F. Fasteners:
1. Finish exposed fasteners to match finish of system.
2. Provide Phillips flat head screws where exposed.

G. Finish: AAMA 2605 Fluoropolymer paint; color to be AA-MA10C22A31+, clear anodized.

2.5 SOURCE QUALITY CONTROL

A. General Test Requirements:
1. Utilize independent testing laboratories specifically qualified to conduct all performance tests required.

2. Performance tests may be conducted in manufacturer's laboratories provided they are witnessed and certified by qualified independent testing laboratory personnel.
3. Perform all tests on "Test Unit":
    a. Full-sized window unit for project or a minimum 5 x 8 FT unit mounted in test chamber in exact accordance with job conditions including anchorage system, sealing, etc.
    b. Test unit to be completely assembled and glazed.
        1) Thermal tests may be conducted on 4 x 6 FT unit.
4. Test air infiltration first, water resistance second.
    a. Other tests may be in any order.
5. Test data on vertical pivot windows will be accepted for fixed windows for condensation resistance, thermal, temperature exposure and acoustical tests provided the fixed windows are the same as the vertical windows tested in the following respects:
    a. Same frame section (or same family of extrusions).
    b. Same basic metal mass inside and outside.
    c. Identical thermal break.
    d. Same type of glazing.

B. Test Requirements:
1. Air infiltration test:
    a. With sash and ventilators closed and locked, test in accordance with ASTM E283.
    b. Air infiltration, in CFM/FT of crack length, at pressure differential of 6.24 PSF as follows:
        1) Fixed windows: 0.06 maximum, all others 0.10 maximum.
2. Water resistance test:
    a. Mount glazed unit in its vertical position, continuously supported around outside perimeter with sash and ventilators closed and locked.
    b. Test in accordance with ASTM E331.
    c. No uncontrolled leakage allowed, with pressure differential of 6.24 PSF.
3. Uniform load deflection test:
    a. Test in accordance with ASTM E330.
    b. Subject unit to load of 25 PSF applied to outside of window and 25 PSF applied to inside of window.
    c. Maximum allowable deflection of any unsupported span: L/175.
    d. No glass breakage, permanent damage to fasteners, hardware parts, support arms or activating mechanisms, or any other damage which would cause window to be inoperable will be allowed.
4. Uniform load structural test:
    a. Test in accord with ASTM E330.
    b. Subject unit to loads indicated below.
    c. Stabilize pressure and maintain it for minimum period of 10 seconds.
    d. No glass breakage, permanent damage to fasteners, hardware parts, support arms or activating mechanisms or any other damage which would cause window to be inoperable will be allowed.
    e. Maximum permanent deformation of any main frame, sash or ventilator member: 0.4% of its span.
    f. After performing Uniform Load Structural Test, increase loads 1-1/2 times and perform safety test.
5. Projected ventilator torsion:
    a. Remove ventilator, deglaze and support horizontally on fulcrums at diagonally opposite corners with other top corner secured in same plane between fulcrums clamped above and below.
    b. Apply 15 LB load acting vertically downward at free corner of ventilator.
    c. Deflection at free corner: 0.121A (A is area in square foot of ventilator being tested).
    d. Measure deflection from original position of free corner.
6. Projected, latch rail horizontal load:

a. Support unglazed ventilator by clamping stiles, 6 IN from latch rail to horizontal supports under jambs.
b. Apply 30 LB concentrated load to center of span of latch rail, perpendicular to plane of ventilator.
c. Deflection at point of load application: 0.062 IN, maximum.

7. Projected, latch rail vertical load:
   a. Clamp stiles of each unglazed ventilator to vertical supports 6 IN from latch rail.
   b. Apply 30 LB concentrated load at center of span of latch rail, parallel to plane of ventilator.
   c. Deflection at point of load application: 0.062 IN, maximum.
8. Projected, intermediate frame rail torsion:
   a. Place unglazed window frame in horizontal position.
   b. Apply 40 LBF-IN (10 LB load on 4 IN lever arm measured from extremity of rail) to center of span of each intermediate horizontal rail.
   c. Deflection at point of load application: 0.070 IN, maximum.
9. Projected, intermediate frame rail vertical load:
   a. Clamp jambs of unglazed unit to vertical support 6 IN from test rail.
   b. Apply 30 LB concentrated load at center span of each intermediate rail parallel to plane of window.
   c. Deflection at point of load application: 0.062 IN, maximum.
10. Projected balance arm test:
    a. Test all arms if two or more ventilators are in unit.
    b. Support unglazed unit at 45-DEG angle to vertical and clamp frame its full height.
    c. Open ventilator 45 DEG with balance arms in compression, and block in level position at both friction shoes.
    d. Apply 60 LB vertical concentrated load at each free corner of ventilator for 1 minute.
    e. After removal of loads, balance arms shall function normally with no apparent damage.
11. Condensation resistance test:
    a. Perform on "test unit," except size may be 3 x 4 FT, minimum.
    b. Test in accordance with AAMA 1503.
    c. CRF (Condensation Resistance Factor): 50, minimum.
12. Thermal test:
    a. Perform on "test unit" except size may be 4 x 6 FT, minimum.
    b. Test in guarded hot box ASTM C1363, with an exterior temperature of 18 DEGF, an interior of 68 DEGF and 15 MPH fan-generated wind velocity on exterior.
    c. "U" value: not to exceed 0.65 BTU/HR/SQFT/DEGF.
    d. Calculated "U" values from smaller units or data or theoretical assumptions will not be acceptable.
13. Temperature exposure test:
    a. Perform on "test unit" except size may be 4 x 6 FT, minimum.
    b. Maintain interior chamber temperature at 70 DEGF.
    c. Reduce exterior ambient temperature to minus 15 DEGF.
14. Structural thermal barrier tension test:
    a. Test urethane filled sections of aluminum.
    b. Mechanically secure interior and exterior faces of 12 IN section in horizontal position.
    c. Apply heat tape to exterior face to control surface temperature at 180 DEGF 5 minutes before loading, as indicated by a thermocouple wire operated by an automatic controller.
    d. Apply direct tension (pull) using a Universal testing machine set in 12,000 LB load range.
    e. Test results: No loss of bond at 4000 LB IN/IN/MIN.
15. Structural thermal barrier shear test:
    a. Test urethane filled sections of aluminum.
    b. Mechanically secure interior face of 12 IN section in vertical position.

c. Apply heat tape to exterior face to control surface temperature at 180 DEGF 5 minutes before loading, as indicated by a thermocouple wire operated by an automatic controller.
d. Apply load to exterior face by a bearing plate resting on top of exterior face, using Universal Testing machine set in 12,000 LB load range at a strain rate of 0.050 IN/IN/MIN.
e. Test results: No loss of bond at 5500 LB loading.

16. Structural thermal barrier combined torsion and shear test:
a. Test urethane filled sections of aluminum.
b. Secure interior face of 12 IN section in horizontal position.
c. Apply heat tape to exterior face to control surface temperature at 180 DEGF 5 minutes before loading, as indicated by a thermocouple wire operated by an automatic controller.
d. Apply load to bearing plate centered on portion of glazing pocket to exterior side of thermal barrier, using a Universal Testing machine set in the 12,000 LB load range.
e. Test results: No loss of bond at 3900 LB load applied at strain rate of 0.05 IN/IN/MIN.

PART 3 - EXECUTION

3.1 INSTALLATION

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

B. Set units plumb, level, and true to line.

C. Anchor securely in place.

D. Separate metal surfaces from sources of corrosion or electrolytic action.
1. See Section 09 96 00.

E. Set sill and base members in a bed of sealant.

F. Provide joint fillers or gaskets for weathertight construction.

G. Seal all joints within and at perimeter of system.

H. Provide sealant color to match finish of system at exposed locations.

I. Provide sealants compatible with aluminum system and recommended for use with this type of installation.

J. See Section 07 92 00 for sealants.

3.2 FIELD QUALITY CONTROL

A. Installation supervised or inspected by manufacturer's authorized representative.

END OF SECTION

SECTION 08 81 00
GLASS AND GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass and glazing.

B. Related Specification Sections include but are not necessarily limited to:
   1. Section 07 92 00 - Joint Sealants.
   2. Section 08 11 00 - Hollow Metal Doors and Frames.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American National Standards Institute (ANSI):
      a. Z97.1, Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
   2. ASTM International (ASTM):
      a. C864, Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
      b. C1036, Standard Specification for Flat Glass.
      c. C1048, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
      d. C1376, Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.
      e. E119, Standard Test Methods for Fire Tests of Building Construction and Materials.
      f. E2190, Standard Specification for Insulating Glass Unit Performance and Evaluation.
   3. Code of Federal Regulations (CFR):
      a. Title 16 - Commercial Practices, Chapter ii - Consumer Product Safety Commission (CPSC), Subchapter B - Consumer Product Safety Act Regulations:
         1) 16 CFR 1201, Safety Standard for Architectural Glazing Materials.
   4. Glass Association of North America (GANA):
      a. Glazing Manual.
   5. Insulating Glass Certification Council (IGCC).
   6. Insulating Glass Manufacturers Alliance (IGMA):
      a. TM-3000, North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use.
   7. National Fire Protection Association (NFPA).
      a. 80, Standard for Fire Doors and Other Opening Protectives.
      b. 251, Standard Methods of Tests of Fire Resistance of Building Construction and Materials.
      c. 252, Standard Methods of Fire Tests of Door Assemblies.
      d. 257, Standard on Fire Test for Window and Glass Block Assemblies.
   8. Underwriters Laboratories, Inc. (UL):
      a. 9, Standard for Fire Tests of Window Assemblies.
      b. 10B, Standard for Fire Tests of Door Assemblies.
      c. 263, Standard for Fire Tests of Building Construction and Materials.

1.3 DEFINITIONS

A. Installer or Applicator:
   1. Installer or applicator is the person actually installing or applying the product in the field at the Project site.
   2. Installer and applicator are synonymous.

B. Safety Glazing: Glazing meeting the requirements of the building code and CPSC 16 CFR 1201.

C. Other terms as identified in CSPC 16 CFR 1201.

1.4 SUBMITTALS

A. Shop Drawings:
   1. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's installation instructions.
      c. Certification that glass has been tested and approved for use in fire resistance rated doors or walls.
         1) Copies of all test criteria.
   2. Certification that insulating glass units meet requirements of IGCC and are certified by IGCC to ASTM E2190.

B. Samples:
   1. Two, 12 x 12 IN sample of each type, color, and thickness specified.
      a. Samples are not required for clear monolithic glass.

C. Informational Submittals:
   1. Warranty.

1.5 WARRANTY

A. Provide manufacturer's written 10 year warranty to cover deterioration of glass, glass units, coatings and ceramic frit.
   1. Insulating glass units shall be warranted against failure of hermetic seal resulting in fogging or film formation on the interior glass surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:
   1. Glass:
      a. Guardian Glass by Guardian Industries.
      b. Insulite Glass Co., Inc.
      c. NSG/Pilkington.
      d. Oldcastle Building Envelope.
      e. Vitro Architectural Glass.
      f. Viracon.
   2. Gaskets, glazing compounds, setting blocks, spacers, sealant, sealant tape, etc., as recommended by glass manufacturer, glass unit fabricator.

2.2 MATERIALS

A. General:
   1. ASTM C1036.
      a. Clear glass: Type I, Class 1, Quality Q3.
      b. Tinted glass: Type I, Class 2, Quality Q3.
   2. Thickness: 1/4 IN, unless noted otherwise.

B. Heat Strengthened and Fully Tempered Glass: ASTM C1048.
   1. General use: Kind HS.
   2. Safety glazing: Kind FT.
      a. Meet requirements of ANSI Z97.1 and CSPC 16 CFR 1201.
   3. Condition:
      a. Clear or tinted vision glass: Condition A.

b. Spandrel Glass (ceramic coated): Condition B.
c. Coated vision glass: Condition C.
1) ASTM C1376, Kind CV or CO.

2.3 MANUFACTURED UNITS

A. Insulating Glass Units:
1. ASTM E2190, Class A.
2. Two lites of glass separated by a hermetically sealed air space.
a. Spacer: Stainless steel "warm edge" spacer.
1) Thickness: 1/2 IN.
2) Color: Black.
b. Perimeter Sealant: Silicone.
1) Color: Black.

2.4 ACCESSORIES

A. Glazing Compounds:
1. Non-sag, non-stain type.
2. Pigmented to match frame units not requiring painting.
3. Compatible with adjacent surfaces.
4. One- or two-part polyurethane or silicone sealant for use in setting glass.
a. Provide glazing compounds which will not be affected by chemicals stored in rooms where glazing compounds are used.

B. Sealant Tape: Butyl rubber sealant tape or ribbon having a continuous neoprene shim.

C. Gaskets:
1. Flexible polyvinyl chloride or neoprene.
a. ASTM C864.
b. Provide gaskets which will not be affected by chemicals stored in rooms where gaskets are used.
2. Extruded of profile and hardness required to receive glass and provide a watertight installation.
3. Provide gaskets in accordance with NFPA in fire resistance rated glazing.

D. Setting Blocks and Spacers:
1. Neoprene or EPDM, compatible with sealants used.
a. ASTM C864.

E. Compressible Filler Stock: Closed cell polyethylene or polyethylene jacketed polyurethane foam.

F. Shims, Clips, Screws and Other Miscellaneous Items: As required by condition.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with recommendations of manufacturer, GANA Glazing Manual and IGMA TM-3000.

B. Install setting blocks in adhesive or sealant.

C. Install spacers inside and out, of proper size and spacing, for all glass sizes larger than 50 united inches, except where gaskets are used for glazing.

D. Provide 1/8 IN minimum bite of spacers on glass.

E. Spacer thickness to equal sealant width.

F. Prevent sealant exudation from glazing channels of insulating glass which is more than 1/2 IN thick; colored, heat absorbing, coated or laminated glass sizes larger than 75 united inches; and other glass more than 9/32 IN thick or larger than 125 united inches.
   1. Leave void at heel (or install filler) at jambs and head.
   2. Do not leave void (or install filler) at sill.

G. Miter cut and bond gasket ends together at corners.

H. Immediately after installation, attach crossed streamers to framing held away from glass.

I. Use polysulfide-based glazing sealants in window assembly and as perimeter sealant around frames in areas which may be exposed to chlorine gas or chlorine liquid splash or spillage.
   1. See Specification Section 07 92 00 for sealants.

3.2 FIELD QUALITY CONTROL

A. Do not install glass with edge damage.

B. Do not apply anything to surfaces of glass.

C. Remove and replace damaged glass.

3.3 CLEANING

A. Maintain glass reasonably clean during construction, so that it will not be damaged by corrosive action and will not contribute to deterioration of other materials.

B. Wash and polish glass on both faces not more than seven days prior to acceptance of work in each area.
   1. Comply with glass manufacturer's recommendations.

3.4 SCHEDULES

A. General:
   1. Provide safety glazing for all applications where required by the building code and CPSC 16 CFR 1201.
   2. Provide heat strengthened glazing for all general use applications where safety glazing is not required.

B. Glass Type 1: Clear Monolithic Glass.
   1. Color: Clear

END OF SECTION

SECTION 09 96 00
HIGH PERFORMANCE INDUSTRIAL COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. High performance industrial coatings (HPIC).
   2. Any other coating, thinner, accelerator, inhibitor, etc., specified or required as part of a complete System specified in this Specification Section.
   3. Minimum surface preparation requirements.

B. Related Specification Sections include but are not necessarily limited to:
   1. Division 26 - Electrical.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. ASTM International (ASTM):
      a. B499, Standard Test Method for Measurement of Coating Thicknesses by the Magnetic Method: Nonmagnetic Coatings on Magnetic Basis Metals.
      b. D3359, Standard Test Methods for Rating Adhesion by Tape Test.
      c. D4258, Standard Practice for Surface Cleaning Concrete for Coating.
      d. D4259, Standard Practice for Abrading Concrete.
      e. D4261, Standard Practice for Surface Cleaning Concrete Masonry Units for Coating.
      f. D4262, Standard Test Method for pH of Chemically Cleaned or Etched Concrete Surfaces.
      g. D4263, Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
      h. D4414, Standard Practice for Measurement of Wet Film Thickness by Notch Gages.
      i. D4541, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
      j. D6132, Standard Test Method for Nondestructive Measurement of Dry Film Thickness of Applied Organic Coatings Using an Ultrasonic Gage.
      k. D6677, Standard Test Method for Evaluating Adhesion by Knife.
      l. D7091, Standard Practice for Nondestructive Measurement of Dry Film Thickness of Nonmagnetic Coatings Applied to Ferrous Metals and Nonmagnetic, Nonconductive Coatings Applied to Non-Ferrous Metals.
      m. D7234, Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
      n. E337, Standard Test Method for Measuring Humidity with a Psychrometer (the Measurement of Wet- and Dry-Bulb Temperatures).
      o. F1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
      p. F2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
   2. Environmental Protection Agency (EPA).
   3. International Concrete Repair Institute (ICRI):
      a. 310.2, Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
   4. NACE International (NACE).
   5. National Association of Pipe Fabricators (NAPF):
      a. 500-03, Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings:
         1) 500-03-04, Abrasive Blast Cleaning for Ductile Iron Pipe.

2) 500-03-05, Abrasive Blast Cleaning for Cast Ductile Iron Fittings.

6. NSF International (NSF).
   a. 61, Drinking Water System Components - Health Effects.
7. The Society for Protective Coatings (SSPC):
   a. PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
   b. SP 1, Solvent Cleaning.
   c. SP 2, Hand Tool Cleaning.
   d. SP 3, Power Tool Cleaning.
   e. SP 16, Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
8. The Society for Protective Coatings/ NACE International (SSPC/ NACE):
   a. SP 5/ NACE No. 1, White Metal Blast Cleaning
   b. SP 6/ NACE No. 3, Commercial Blast Cleaning.
   c. SP 7/ NACE No. 4, Brush-off Blast Cleaning.
   d. SP 10/ NACE No. 2, Near-White Blast Cleaning.
   e. SP 13/ NACE No. 6, Surface Preparation of Concrete.

B. Qualifications:
   1. Coating manufacturer's technical representative shall be a NACE Certified Coatings Inspector, Level 3 minimum.
   2. Applicators shall have minimum of 10 years of experience in application of similar products on similar project.
      a. Provide references for minimum of three different projects completed in last five years with similar scope of work.
      b. Include name and address of project, size of project in value (coating) and contact person.

C. Miscellaneous:
   1. Furnish coating through one manufacturer unless noted otherwise.

D. Deviation from specified MIL thickness or product type is not allowed without written authorization of Engineer.

E. Material shall not be thinned unless approved, in writing, by coating manufacturer's technical representative.

1.3 DEFINITIONS

A. Applicator:
   1. Applicator is the person actually installing or applying the product in the field, at the Project site, or at an approved shop facility.

B. Approved Factory Finish: Finish on a product in compliance with the finish specified in the Specification Section where the product is specified.

C. Appurtenant Surface: Accessory or auxiliary surface attached to or adjacent to a surface indicated to be coated.

D. Corrosive Environment:
   1. Immersion in or subject to:
      a. Condensation, spillage or splash of a corrosive material such as water, wastewater or chemical solution.
      b. Exposure to corrosive caustic or acidic agent, chemicals, chemical fumes, chemical mixture, or solutions.
      c. For purposes of this Specification Section, corrosive environments include:
         1) Outdoor areas not otherwise identified as highly corrosive.
         2) Piping galleries.
         3) Surfaces within 2 FT of high water level.

E. Outdoor Atmosphere or Surface: Outdoor atmosphere or surface exposed to weather and/or direct sunlight.

F. Finished Area: A room or area that is listed in or has finish called for on Room Finish Schedule or is indicated on Drawings to be coated.

G. Holiday:
   1. A void, crack, thin spot, foreign inclusion, or contamination in the coating that significantly lowers the dielectric strength of the coating.
   2. May also be identified as a discontinuity or pinhole.

H. HPIC: High performance industrial coatings.
   1. Epoxies, urethanes, vinyl ester, waterborne vinyl acrylic emulsions, acrylates, silicones, alkyds, acrylic emulsions and any other coating listed as a HPIC.

I. Indoor Atmosphere or Surface: Indoor atmosphere or surface not exposed to weather and/or direct sunlight.

J. Immersion Service:
   1. Any surface immersed in water or some other liquid.
   2. Surface of any pipe, valve, or any other component of the piping system subject to frequent wetting.
   3. Surfaces within two feet above high water level in water bearing structures.

K. Piping System: Pipe, valves, fittings and accessories.

L. Surface Hidden from View:
   1. Within pipe chases.
   2. Between top side of ceilings and underside of floor or roof structures above.

M. Vapor Space: Interior space within tankage, closed structures, or similar elements that is above the low liquid line and subject to the accumulation of fumes, vapor and/or condensation.

1.4 SUBMITTALS

A. Certifications:
   1. Applicator experience qualifications.
      a. No submittal information will be reviewed until Engineer has received and approved applicator qualifications.
   2. NACE inspector certification.
   3. NACE inspector experience qualifications.
   4. Certification that High Performance Coating Systems proposed for use have been reviewed and approved by a NACE Certified Coatings Inspector employed by the coating manufacturer.
      a. Submittals not including this certification will be returned without review.

B. Shop Drawings:
   1. Product technical data including:
      a. Acknowledgement that products submitted meet requirements of standards referenced.
      b. Manufacturer's surface preparation instructions.
      c. Manufacturer's application instructions.
         1) Manufacturer's standard details, including but not limited to penetrations, transitions, and terminations for:
            a) High-build coatings on concrete.
            b) Secondary containment coatings.
            c) Other special conditions as applicable.
      d. If products being used are manufactured by Company other than listed in the MATERIALS Article of this Specification Section, provide complete individual data sheet comparison of proposed products with specified products including:
         1) Application procedure.
         2) Coverage rates.

3) Certification that product is designed for intended use and is equal or superior to specified product.

e. Contractor's written plan of action for containing airborne particles created by blasting operation and location of disposal of spent contaminated blasting media.

f. Coating manufacturer's recommendation on abrasive blasting.

g. Coating manufacturer's technical representative's written statement attesting that applicator has been instructed on proper preparation, mixing and application procedures for coatings specified.

h. Manufacturer's recommendation for universal barrier coat.

i. Manufacturer's recommendation for providing temporary or supplemental heat or dehumidification or other environmental control measures.

2. Manufacturer's statement regarding applicator instruction on product use.

C. Samples:

1. Manufacturer's full line of colors for Engineer's preliminary color selection.
2. After preliminary color selection by Engineer provide two, 3 x 5 IN samples of each final color selected.

D. Informational Submittals:

1. Approval of application equipment.
2. Applicator's daily records:
   a. Submit daily records at end of each week in which coating work is performed unless requested otherwise by Engineer's on-site representative.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver in original containers, labeled as follows:

1. Name or type number of material.
2. Manufacturer's name and item stock number.
3. Contents, by volume, of major constituents.
4. Warning labels.
5. VOC content.

B. Store materials in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 DEGF.

1.6 PROJECT CONDITIONS

A. Verify that atmosphere in area where coating is to take place is within coating manufacturer's acceptable temperature, humidity and sun exposure limits.

1. Provide temporary heating, shade and/or dehumidification as required to bring area within acceptable limits.
   a. Provide temporary dehumidification equipment properly sized to maintain humidity levels required by coating manufacturer.
   b. Provide clean heat with heat exchanger type equipment sufficient in size to maintain temperature on a 24 HR basis.
      1) Vent exhaust gases to outdoor environment.
      2) No exhaust gases shall be allowed to vent into the space being coated or any adjacent space.
2. Do not apply coatings in snow, rain, fog or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. High Performance Industrial Coatings:
   a. Carboline Protective Coatings.

b. PPG.
c. The Sherwin-Williams Company.
d. Tnemec.

B. "Or-Equal" Submittals:
1. Materials by other manufacturers are acceptable provided that they are established as being compatible with and of equal quality to the coatings of the manufacturers listed.
2. Provide satisfactory documentation from the proposed "or-equal" manufacturer that proposed materials meets or exceeds the following:
a. Is of the same generic resin.
b. Requires comparable surface preparation.
c. Has comparable application requirements.
d. Meets the same VOC levels or better.
e. Provides the same finish and color options.
f. Is suitable for the intended service.
g. Resistance to abrasion and physical damage.
h. Resistance to chemical attack.
i. Resistance to UV exposure.
j. Ability to recoat in future.
k. Dry film thickness per coat.
1) Where manufacturer's product data sheet indicates a minimum MIL thickness per coat that is greater than specified herein, MIL thickness for entire coating system shall be increased proportionately.
l. Minimum and Maximum time between coats.
m. Compatibility with other coatings.
n. Temperature limitations in service and during application.
o. Type and quality of recommended undercoats and topcoats.
p. Ease of application.
q. Ease of repairing damaged areas.
r. Stability of colors.
3. The cost of all testing and analyzing of the proposed substitute materials shall be borne by the CONTRACTOR.

2.2 MATERIALS

A. Coatings used for indoor finishes shall meet the requirements of the building code.

B. Coatings shall comply with the VOC limits of EPA.

C. For unspecified materials such as thinner, provide manufacturer's recommended products.

D. High Performance Industrial Coatings:

COATING CODE	GENERIC DESCRIPTION	MANUFACTURER	
		TNEMEC	SHERWIN WILLIAMS
AAP	Aliphatic Acrylic Polyurethane	Series 1095 Endurashield	Acrolon Ultra
MPE	Multi-Purpose Epoxy	Series N69 Hi-Build Epoxoline II	Macropoxy 646
STEP	Surface-Tolerant Epoxy Primer	Series 135 Chembuild	Macropoxy 646
ZRU	Zinc-Rich Urethane	Series 94-H_20 Hydro-Zinc	Corothane 1 Galvapak

2.3 COATING SYSTEMS:

A. The following tables indicate coating systems by material and environment unless a specific application is indicated.

B. Ferrous Metals (Structural and Miscellaneous Metals):

Environment/ Application	Surface Preparation	Prime Coat	Intermediate Coats	Finish Coat
Indoor atmospheric	SSPC-SP 6/ NACE No. 3	3.0 to 4.0 MIL MPE	3.0 to 4.0 MIL MPE	3.0 to 4.0 MIL MPE
Outdoor atmospheric	SSPC-SP 6/ NACE No. 3	2.5 to 3.5 MIL ZRU	3.0 to 5.0 MIL MPE	2.5 to 3.5 MIL AAP
Hollow Metal Doors	SSPC-SP 3	2.5 to 3.5 MIL STEP		2.5 to 3.5 MIL AAP

PART 3 - EXECUTION

3.1 ITEMS TO BE COATED

A. Outdoor Surfaces, including but not limited to:
   1. Hollow metal doors.
      a. Items specifically noted on Drawings to be coated.

3.2 ITEMS NOT TO BE COATED

A. General: Do not coat items listed in this Article, unless noted otherwise.

B. Items with Approved Factory Finish: These items may require repair of damaged coated areas or coating of welded connections.

C. Electrical Equipment.

D. Moving parts of mechanical and electrical units where coating would interfere with the operation of the unit.

E. Code labels, equipment identification or rating plates and similar labels, tagging and identification.

F. Contact surfaces of friction-type structural connections.

G. Aluminum Surfaces, except:
   1. Where specifically shown in the Contract Documents.
   2. Where in contact with concrete.
   3. Where in contact with dissimilar metals.
   4. Appurtenant surfaces as described in the ITEMS TO BE COATED article.

H. Architectural Finishes:
   1. Outdoor concrete indicated to receive another finish.
   2. Standing and running trim.
   3. Aluminum windows, curtainwall and storefront framing systems.
   4. Finish hardware.
   5. Glass and glazing.
   6. Standing seam metal roof, fascia, trim, soffit and accessories.

3.3 EXAMINATION

3.4 PREPARATION

A. General:
   1. Prepare surfaces to be coated in accordance with coating manufacturer's instructions and this Specification Section unless noted otherwise in this Specification Section.
      a. Where discrepancy between coating manufacturer's instructions and this Specification Section exists, the more stringent surface preparation shall be provided unless approved otherwise, in writing, by the Engineer.
   2. Remove all dust, grease, oil, compounds, dirt and other foreign matter which would prevent bonding of coating to surface.
   3. Adhere to manufacturer's recoat time surface preparation requirements.
      a. Surfaces that have exceeded coating manufacturer's published recoat time and/or have exhibited surface chalking shall be prepared prior to additional coating in accordance with manufacturer's published recommendations.
         1) Minimum SSPC-SP 7/ NACE No. 4 unless otherwise approved by Engineer.

B. Protection:
   1. Protect surrounding surfaces not to be coated.
   2. Remove and protect hardware, accessories, plates, fixtures, finished work, and similar items; or provide ample in-place protection.
   3. Protect code labels, equipment identification or rating plates and similar labels, tagging and identification.

C. Prepare and coat before assembly all surfaces which are inaccessible after assembly.

3.5 APPLICATION

A. General:
   1. Thin, mix and apply coatings by brush, roller, or spray in accordance with manufacturer's installation instructions.
      a. Application equipment must be inspected and approved in writing by coating manufacturer.
   2. Temperature and weather conditions:
      a. Do not coat surfaces when surface temperature is below 50 DEGF unless product has been formulated specifically for low temperature application and application is approved in writing by Engineer and coating manufacturer's technical representative.
      b. Avoid coating surfaces exposed to hot sun.
      c. Do not coat damp surfaces.
   3. Apply materials under adequate illumination.
   4. Provide complete coverage to MIL thickness specified.
      a. Thickness specified is dry MIL thickness.
   5. Evenly spread to provide full, smooth coverage.
      a. All coating systems are "to cover."
         1) In situations of discrepancy between manufacturer's square footage coverage rates and MIL thickness, MIL thickness requirements govern.
      b. When color or undercoats show through, apply additional coats until coating is of uniform finish and color.
      c. Finished coating system shall be uniform and without voids, bugholes, holidays, laps, brush marks, roller marks, runs, sags or other imperfections.
   6. If so directed by Engineer, do not apply consecutive coats until Engineer has had an opportunity to observe and approve previous coats.
   7. Work each application of material into corners, crevices, joints, and other difficult to work areas.
   8. Provide coating manufacturer’s recommended details at all terminations, penetrations, embedments, cracks, joints and changes in substrate direction.

9. Avoid degradation and contamination of blasted surfaces and avoid inter-coat contamination.
    a. Clean contaminated surfaces before applying next coat.
    b. Intercoat surface cleanliness shall be inspected and approved by the Engineer prior to application of each coat.
10. Smooth out runs or sags immediately, or remove and recoat entire surface.
11. Allow preceding coats to dry before recoating.
    a. Recoat within time limits specified by coating manufacturer.
    b. If recoat time limits have expired re-prepare surface in accordance with coating manufacturer's printed recommendations.
12. Allow coated surfaces to cure prior to allowing traffic or other work to proceed.
13. Coat all aluminum in contact with dissimilar materials.
14. When coating rough surfaces which cannot be backrolled sufficiently, hand brush coating to work into all recesses provided that the maximum DFT is not exceeded.
15. Backroll surfaces if coatings are spray applied.

B. Employ services of coating manufacturer's technical representative to ensure that field-applied coatings are compatible with factory-applied or existing coatings.
    1. Certify through material data sheets.
    2. Perform test patch.
        a. Prepare existing coating surface to receive specified coating system.
        b. Apply coating to a minimum 1 SQFT area and allow to cure in accordance with manufacturer's recommendations.
        c. Evaluate adhesion to existing coating:
            1) Concrete or Masonry substrates: ASTM D4541.
            2) All other substrates: ASTM D6677 and ASTM D3359 (X-cut method).
    3. If field-applied coating is found to be not compatible, require the coating manufacturer's technical representative to recommend, in writing, product to be used as barrier coat, thickness to be applied, surface preparation and method of application.
        a. Perform test patch as described above.
    4. At Contractor's option, coatings may be removed, surface re-prepared, and new coating applied using appropriate coating system listed in the MATERIALS Article, Coating Systems paragraph of this Specification Section.
        a. All damage to surface as result of coating removal shall be repaired to original condition or better by Contractor at no additional cost to Owner.

C. Prime Coat Application:
    1. Apply structural steel and miscellaneous steel prime coat in the factory.
        a. Prime coat referred to here is prime coat as indicated in this Specification.
            1) Prime coating applied in factory (shop) as part of Fabricator's standard rust inhibiting and protection coating is not acceptable as replacement for specified prime coating.
    2. Prime all surfaces indicated to be coated.
        a. Apply prime coat in accordance with coating manufacturer's written instructions and as written in this Specification Section.
    3. Prime ferrous metals embedded in concrete to minimum of 1 IN below exposed surfaces.
    4. Apply zinc-rich primers while under continuous agitation.
    5. Brush or spray bolts, welds, edges and difficult access areas with primer prior to primer application over entire surface.
    6. Touch up damaged primer coats prior to applying finish coats.
        a. Restore primed surface equal to surface before damage.
    7. All surfaces of steel lintels and steel components of concrete lintels used in wall construction shall be completely coated with both prime and finish coats prior to placing in wall.

D. Finish Coat Application:

1. Apply finish coats in accordance with coating manufacturer's written instructions and in accordance with this Specification Section; manufacturer instructions take precedent over these Specifications.
2. Touch up damaged finish coats using same application method and same material specified for finish coat.
    a. Prepare damaged area in accordance with the PREPARATION Article of this Specification Section.

3.6 FIELD QUALITY CONTROL

A. Application Deficiencies:
1. Surfaces showing runs, laps, brush marks, telegraphing of surface imperfections or other defects will not be accepted.
2. Surfaces showing evidence of fading, chalking, blistering, delamination or other defects due to improper surface preparation, environmental controls or application will not be accepted.
    a. Epoxy surfaces showing evidence of chalking or amine blush shall be prepared and recoated as follows:
        1) Solvent clean surfaces in accordance with SSPC-SP1 and abrasive blast in accordance with SSPC-SP7/ NACE No. 4.
        2) Recoat with intermediate and finish coats in accordance with coating system specified herein.

B. Provide protection for coated surfaces.
1. Surfaces showing soiling, staining, streaking, chipping, scratches, or other defects will not be accepted.

C. Contractor Performed Testing:
1. Provide ongoing testing and inspection, including but not limited to the following:
    a. Measurement and recording of environmental conditions as specified herein.
    b. Measurement and recording of substrate conditions as specified herein.
    c. Thickness Testing:
        1) Wet film thickness during application in accordance with ASTM D4414.
        2) Dry Film Thickness (DFT) in accordance with SSPC-PA 2.
        3) Engineer may measure coating thickness at any time during project to assure conformance with these Specifications.
    d. Bond Strength:
        1) Bond strength testing will be required by the Owner where there is reason to suspect the integrity of the coating system.
        2) Measure bond strength of the coating in accordance with:
            a) Steel substrate: ASTM D4541.
            b) Concrete substrate ASTM D7234.
        3) The number of test sites and locations to be tested shall be determined by the Owner after application of coating. The Contractor will apply the dollies, perform the tests and repair the coating in the presence of the Owner.
            a) For each test that fails, two additional tests shall be performed in the adjacent area.
            b) Further bond tests may be performed to determine the extent of potentially deficient bonded areas at no additional cost to the Owner.
        4) Repairs shall be made by applicator in strict accordance with manufacturer’s recommendations. Any coated areas that do not pass the bond strength tests shall be removed and replaced at the expense of the Contractor.

D. Instrumentation:
1. Provide instrumentation as necessary to measure and record atmospheric and substrate conditions, including but not limited to:
    a. Dry Film Thickness Gauge:
        1) Ultrasonic: ASTM D6132.
        2) Magnetic: ASTM B499.

b. Wet Film Thickness Gauge: ASTM D4414.
c. Sling Psychrometer: ASTM E337.
d. Surface Temperature Gauge.
e. Anemometer.
f. Moisture Meter.
g. Adhesion test apparatus:
    1) Steel: ASTM D4541.
    2) Concrete: ASTM D7234.

E. Maintain Daily Records:
1. Record the following information during application:
    a. Date, starting time, end time, and all breaks taken by applicators.
    b. Air temperature.
    c. Relative humidity.
    d. Dew point.
    e. Moisture content and pH level of concrete or masonry substrates prior to coating.
    f. Surface temperature of substrate.
    g. Provisions utilized to maintain work area within manufacturer's recommended application parameters including temporary heating, ventilation, cooling, dehumidification and provisions utilized to mitigate wind-blown dust and debris from contaminating the wet coating.
    h. For outdoor coating, also record:
        1) Sky condition.
        2) Wind speed and direction.
    i. Record environmental conditions, substrate moisture content and surface temperature information not less than once every 4 HRS during application.
        1) Record hourly when temperatures are below 50 DEGF or above 100 DEGF.
2. Record the following information daily for the coating manufacturer's recommended curing period:
    a. Date and start time of cure period for each item or area.
    b. For outdoor coating, also record:
        1) Sky conditions.
        2) Wind speed and direction.
        3) Air temperature.
            a) Dry Bulb.
            b) Wet Bulb.
        4) Relative humidity.
        5) Dew point.
        6) Surface temperatures.
    c. Record environmental conditions not less than once every 4 HRS.
        1) Record hourly when temperatures are below 50 DEGF or above 100 DEGF.
    d. Provisions utilized to protect each item or area and to maintain areas within manufacturer's recommended curing parameters.
3. Format for daily record to be computer generated.

F. Provide wet paint signs.

3.7 CLEANING

A. Clean coating spattered surfaces.
1. Use care not to damage finished surfaces.

B. Upon completion of coating, replace hardware, accessories, plates, fixtures, and similar items.

C. Remove surplus materials, scaffolding, and debris.

3.8 COLOR SCHEDULE

A. Per owner’s requirements or as directed in the drawings.

END OF SECTION