



Eddy Building – Detached Addition : Addendum #4

DATE: October 22, 2024

Hobbs Architects, PA
159 West Salisbury Street
PO Box 1457
Pittsboro, North Carolina 27312

ADDENDUM #4:

TO: All bidders of record, which have received plans and specifications for the project referred to above.

This Addendum No. 4 forms a part of the Contract Documents and modifies the original Drawings and Specifications dated September 6, 2024, as noted below. Acknowledge receipt of this addendum in the space provided on the Bid Form. Failure to do so may subject bidder to disqualification.

This addendum consists of 46 pages of information including: three (3) specifications sections.

General:

- A. **Bidders are reminded that the bid date is now October 30 at 1:30 pm at the front desk of the Donald W. Eddy Building, 4300 Reedy Creek Rd, Raleigh, NC 27607**
- B. Bidders are reminded that the Pre-Bid Conference was mandatory for General Contractors.
- C. All email correspondence should be sent to the following:
 - Chevon Moore, Hobbs Architects, at cmoore@hobbsarchitects.com
 - Krista Millard, Hobbs Architects, at kmillard@hobbsarchitects.com

Specification Sections:

- D. **Table of Contents**
 - Add Section 074116 Insulated Metal Roof Panels
 - Add Section 074213 Insulated Metal Wall Panels
- E. **Section 074116 – Insulated Metal Roof Panels**
 - Add section included in this addendum
- F. **Section 074213 Insulated Metal Wall Panels**
 - Add section included in this addendum
- G. **Section 087100 Door Hardware**
 - Replace with section included in this addendum

Clarifications/Questions and Answers:

1. What height do the nellie stevens need to be? Plant schedule says Con or BB.

1. RESPONSE: The Nellie Stevens holly trees are to be 4 feet high.
2. For the door schedule door #100 storefront Door. The specs provide group numbers but per the schedule the hardware tag is blank, Can you please provide a group number to price the scope.
 1. RESPONSE: See revised Section 087100 Door Hardware included in this addendum. Door #100 is to receive Hardware Group No. 1. Doors #103 and #104 are to receive Hardware Group No. 2.
3. Can you please provide the panel profile and width, the panel thickness for the roof and walls as well as the panel gauge.
 1. RESPONSE: Please see Sections 074116 Insulated Metal Roof Panels and 074213 Insulated Metal Wall Panels included in this addendum.
4. Drawings are shown with Insulated Metal panels on both roof and walls – also says see specifications. Once we review the specs, they mention standard single-skin panels with blanket insulation. Which is correct – Drawings or Specifications?
 1. RESPONSE: Walls and roofs to be Insulated Metal Panels. Please see Sections 074116 Insulated Metal Roof Panels and 074213 Insulated Metal Wall Panels included in this addendum.
5. In looking at the elevations and detail 2 on A501, it appears the downspouts tie into the storm drainage system. We see nothing on the civil drawings for this. Please clarify.
 1. RESPONSE: Downspouts are to be located at north end/rear of the building, one each at the east and west gutters. Downspouts are to elbow out above the concrete apron shown on A-101 and spill into concrete splash guards set upon the concrete apron.
6. Does the building steel get painted?
 1. RESPONSE: Yes, see Specification Section 099123 Interior Painting included in the project manual.
7. Door Hardware Sub RFI: Do you know what hardware sets apply to each opening for the Eaddy Building Addition? There are multiple sets listed but none noted on the door schedule.
 1. RESPONSE: See revised Section 087100 Door Hardware included in this addendum. Door #100 is to receive Hardware Group No. 1. Doors #103 and #104 are to receive Hardware Group No. 2.
8. Since the existing loading dock will need to remain accessible to the public will footings/walls need to be poured in two sections with one section being completed before the next is started?
 1. RESPONSE: Sequencing, means, and methods shall be the responsibility of the General Contractor. The existing loading dock south of Alternates G-1A and G-1B (outside the construction zone) must remain accessible to the public throughout the project.
9. 3/S301 shows section of slab between new wall and existing wall as “elevated”. This will require formwork and shoring which can’t be removed due to accessibility.

1. RESPONSE: Means and methods of completing the contract documents are the responsibility of the General Contractor. To that end, we see no reason that leaving formwork or shoring under the elevated slab would be problematic as long as it did not interfere with structural capacity of the walls or slab.
10. Addendum 3 states that the GC is responsible for all site permitting costs and that there is no building permit required for the project. SCO projects typically don't have permit costs that are incurred by the GC and the only inspections are by the designer of record and SCO inspects the electrical. Is this the case for this project.
 1. RESPONSE: Addendum 3 is correct that there is no building permit required for the project; the AHJ for building inspections is the designer of record and SCO. However, City of Raleigh is the AHJ for all site related permits, fees, etc., and GC's will be responsible for securing all required site permits through the City of Raleigh. GC's shall include in their bids any permit fees, tap fees, etc. incurred by the City of Raleigh.
11. Keynote 08 on sheet A-101 ALT references a new guardrail at the rear of the loading dock. Please confirm this new guardrail should be included in Alternate G-1A and not in the base bid.
 1. RESPONSE: Confirmed; keynote 08 on A-101 ALT is only part of Alternate G-1A.
12. What is the scope of work for the interior painting? Is all framing and metal panels for the metal building to be painted after installation? Is everything to be painted one color or will there be multiple colors selected?
 1. RESPONSE: All exposed interior steel framing shall be painted per Section 099123 Interior Painting included in the project manual. Interior of insulated metal panels will be factory finished and will not be painted after installation. All exposed interior steel framing will be one color.
13. The exterior painting specs note fiber cement board. There is no fiber cement board on this project correct? Is the exterior metal panels to be painted in the field?
 1. RESPONSE: Correct, there is no fiber cement board on this project; remove all references to fiber cement board. The exterior of insulated metal panels will be factory finished and will not be painted after installation.
14. There are no fire extinguishers shown on the life safety plan. Will any new fire extinguishers be required for this new building?
 1. RESPONSE: Yes, provide 5 fire extinguishers per Specification Section 10 44 16 Fire Extinguishers included in the Project Manual.
15. There is a specification section for recessed dock lifts. Is this the lift that is to be provided inside the new building as part of Alternate G-2? Or are these lifts to be provided at the new loading dock with the new dock bumpers?

1. RESPONSE: Specification Section 11 13 00 Recessed Dock Lifts applies to the dock lift inside the building that is part of Alternate G-2.
16. Metal duct specification section 23 31 13-3.9 references duct cleaning of new and existing duct systems before testing, adjusting, and balancing. Please confirm no existing duct systems in the existing building is supposed to be cleaned.
 1. RESPONSE: Confirmed, no existing duct systems are to be cleaned.
 17. Can you share who the current controls provider is? The controls need to be integrated into the current system and I want to make sure that I am providing a number from the current controls group.
 1. RESPONSE: Siemens currently provides controls for the building. You may reach out to Clay Graham, Client Service Manager at Siemens Industry, Inc., (919)272-7340 or (919)465-5254.

END OF ADDENDUM #4

SECTION 074116 - INSULATED METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Standing-seam-profile, foamed-insulation-core metal roof panels.
- B. Related Requirements:
 - 1. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface, allowing it to melt and drain off slowly.

1.2 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:
 - 1. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
- B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): www.astm.org:
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A 792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM A 240 – Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - 5. ASTM C 518 - Standard Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 6. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
 - 7. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.
 - 8. ASTM D 1622 - Apparent Density of Rigid Cellular Plastics.
 - 9. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 - 10. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 - 11. ASTM D 6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics
 - 12. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
 - 13. ASTM E 84 - Test Methods for Surface Burning Characteristics of Building Materials.

14. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
15. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
16. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

D. National Fire Protection Association (NFPA)

1. NFPA 259 – Test Method for Potential Heat of Building Materials.
2. NFPA 285 – Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies.
3. NFPA 286 – Fire Test of Evaluating Conditions of Wall and Ceiling Finish to Roof Fire Growth.

1.3 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal panel assemblies and accessories from a single manufacturer approved under an accredited third-party quality control program
- B. Installer Qualifications: Experienced Installer [certified by metal panel manufacturer] with minimum of five years' experience with successfully completed projects of a similar nature and scope.
 1. Installer's Field Supervisor: Experienced mechanic [certified by metal panel manufacturer] supervising work on site whenever work is underway.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, metal panel installer, metal panel manufacturer's technical representative, inspection agency and related trade contractors.
- B. Coordinate building framing in relation to metal panel system.
- C. Coordinate openings and penetrations of metal panel system.

1.5 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, and special details. Make distinctions between factory and field assembled work.
 1. Include data indicating compliance with performance requirements.
 2. Indicate points of supporting structure that must coordinate with metal panel system installation.

3. Include structural data indicating compliance with performance requirements and requirements of local authorities having jurisdiction.
- C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification:
 1. Provide 12-inch- (305 mm) long section of each metal panel profile.
 2. Provide color chip verifying color selection.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Test Results: Indicating compliance of products with requirements.
- B. Qualification Information: For Installer
- C. Accreditation Certificate: Indicating that manufacturer is accredited under an accredited third-party Quality Control Program, including IAS AC472 and based upon chapter 17 of the International Building Code (IBC).
- D. Warranty:
 1. Submit manufacturer's written two (2) year limited warranty providing panels to be free from defects in materials and workmanship, beginning from the date of substantial completion excluding coil coatings (paint finishes) that are covered under a separate warranty.
 2. The installation contractor shall issue a separate warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's warranty.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping. Protect painted surfaces with a protective covering before shipping.
 1. Deliver, unload, store, and erect metal panels and accessory items without deforming panels or exposing panels to surface damage from weather or construction operations.
 2. Store in accordance with Manufacturer's written instructions.
 3. Shield foam insulated metal panels from direct sunlight until all components are installed.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of insulated metal roof panels to be performed in accordance with manufacturers' written installation instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate insulated metal roof panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, insulated metal roof panels, and other manufactured items so as not to be damaged or deformed. Package insulated metal roof panels for protection during transportation and handling.
- B. Unload, store, and erect insulated metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack insulated metal roof panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store insulated metal roof panels to ensure dryness, with positive slope for drainage of water. Do not store insulated metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on insulated metal roof panels during installation.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of insulated metal roof panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two (2) years from date of Substantial Completion.
 - 3. The installation contractor shall issue a separate warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace insulated metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.
- C. Special No-Dollar-Limit Weathertightness Warranty: Manufacturer agrees to repair or replace insulated metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design Manufacturer: Subject to compliance with requirements, provide products by Metl-Span, a Nucor company; Lewisville, Texas Tel: 972.221.6656; Email: info@metlspan.com or comparable product by one of the following:
 - 1. Kingspan Insulated Panels, info@kingspanpanels.us, +1(888)332-5862
 - 2. All Weather Insulated Panels, sales@awipanel.com, +1(888)970-2947

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide insulated metal roof panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E72:
 - 1. Wind Loads: As indicated on Drawings. Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
 - a. Roof Panel Wind Uplift Testing: Certify capacity of metal panels by testing proposed assembly per ASTM E 72 or ASTM E 1592.
 - b. Roof Panel Snow Loads: 25 lbf/sq. ft.
 - 2. Other Design Loads: As indicated on Drawings.
 - 3. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/180 of the span with no evidence of failure.
- B. Air Infiltration: Air leakage of not more than 0.023 cfm/sq. ft. when tested in accordance with ASTM E1680 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 12 lbf/sq. ft.

- C. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E1646 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 20 lbf/sq. ft.
- D. Watertightness: No water penetration when tested in accordance with ASTM E2140 for hydrostatic-head resistance.
- E. FM Approvals Listing: Provide insulated metal roof panels and component materials that comply with requirements in FM Approvals 4471 as part of a panel roofing system and that are listed in FM's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
 - 1. Fire/Windstorm Classification: Class 1A-90.
 - 2. Hail Resistance: SH.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.3 INSULATED METAL ROOF PANELS, GENERAL

- A. Provide factory-formed metal roof panels fabricated from two sheets of metal with insulation core foamed in place during fabrication with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
 - 1. Panel Performance:
 - a. Flatwise Tensile Strength: 30 psi when tested in accordance with ASTM C297/C297M.
 - b. Humid Aging: Volume increase not greater than 6.0 percent and no delamination or metal corrosion when tested for seven days at 140 deg F and 100 percent relative humidity in accordance with ASTM D2126.
 - c. Heat Aging: Volume increase not greater than 2.0 percent and no delamination, surface blistering, or permanent bowing when tested for seven days at 200 deg F in accordance with ASTM D2126.
 - d. Cold Aging: Volume decrease not more than 1.0 percent and no delamination, surface blistering, or permanent bowing when tested for seven days at minus 20 deg F in accordance with ASTM D2126.
 - e. Fatigue: No evidence of delamination, core cracking, or permanent bowing when tested to a 20 lbf/sq. ft. positive and negative wind load and with deflection of L/180 for 2 million cycles.
 - f. Autoclave: No delamination when exposed to 2 psi pressure at a temperature of 212 deg F for 2-1/2 hours.
 - g. Fire-Test-Response Characteristics: Class A in accordance with ASTM E108.
 - 2. Insulation Core Foam: Foam using a non-CFC blowing agent, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.

- a. Closed-Cell Content: 90 percent when tested in accordance with ASTM D6226.
- b. Density: 2.0 to 2.6 lb/cu. ft. when tested in accordance with ASTM D1622.
- c. Compressive Strength: Minimum 20 psi when tested in accordance with ASTM D1621.
- d. Shear Strength: 26 psi when tested in accordance with ASTM C273/273M.

2.4 STANDING-SEAM-PROFILE, FOAMED-INSULATION-CORE METAL ROOF PANELS

- A. Panels: Vertical ribs along one side of exterior face sheets are mechanically seamed on-site with vertical ribs of adjacent exterior face sheets. Concealed clips in the seams are anchored to supports by screws through the interior face sheet. Interior face sheets provide a tongue-and-groove interlock at joints.
1. Basis of Design: Metl-Span, CFR Insulated Metal Panel.
 2. Panel Coverage: 42 inches.
 3. Panel Thickness: 4.0 inches.
 4. Exterior Face Sheet:
 - a. Material: G-90 Galvanized Coated Steel, ASTM A 653 or Aluminum-Zinc Alloy-Coated Steel, ASTM A792/A792M, structural quality, Grade 50, Coating Class AZ50, prepainted by the coil-coating process per ASTM A 755/A 755M.
 - b. Nominal Thickness: 22-gauge coated thickness with stucco embossed surface.
 - c. Finish: Two-coat fluoropolymer system.
 - d. Color: As selected by Architect from manufacturer's premium colors.
 5. Interior Face Sheet:
 - a. Material: Metallic-coated steel sheet.
 - b. Nominal Thickness: 26-gauge thickness, with stucco embossed Mesa profile.
 - c. Finish: Polyester two-coat system.
 - d. Color: As selected by Architect from manufacturer's standard colors.
 6. Endlaps: Provide panels with factory endlaps, notching, swedging and backer plates; where panel lengths permit.
 7. Low Eave Treatment: Provide cutback for trim/gutter installation; where panel lengths permit.
 8. Insulation Core: Polyurethane with zero ozone depletion potential blowing agent
 - a. Closed Cell Content: 90% or more as determined by ASTM D 6226
 - b. Compressive Strength: As required to meet structural performance requirements and with a minimum of 22 psi as determined by ASTM D 1621
 - c. Shear Strength: As required to meet structural performance requirements and with a minimum of 36 psi as determined by ASTM C 273
 - d. Tensile Strength: As required to meet structural performance requirements and with a minimum of 41 psi ASTM D 1623
 - e. Minimum Density: 2.0 pcf (32 kg/m³) as determined by ASTM D 1622
 9. Thermal-Resistance Value (R-Value): R-30 in accordance with ASTM C1363.
 10. Clips: Manufacturer's standard clips to accommodate thermal movement.

- a. Clip Size and Spacing: As indicated on approved Shop Drawings

2.5 PANEL FACING MATERIALS

- A. Metallic-Coated Steel Sheet: Facings of zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

2.6 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, minimum ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 coating designation. Provide manufacturer's standard sections as required for support and alignment of insulated metal roof panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system, including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of insulated metal roof panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as insulated metal roof panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match insulated metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as exterior facings of insulated metal roof panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent insulated metal roof panels.
- D. Gutters: Formed from same material, finish, and color as exterior facings of panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, of size and metal thickness in accordance with manufacturer's recommendations. Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.
- E. Downspouts: Formed from same material, finish, and color as exterior facings of roof panels. Fabricate in 10 ft.-long sections, complete with formed elbows and offsets, of size and metal thickness in accordance with manufacturer's recommendations. Finish downspouts to match gutters.

- F. Roof Curbs: Fabricated from same material, finish, and color as exterior facings of roof panels, 0.048-inch nominal thickness; with bottom of skirt profiled to match roof panel profiles and with welded top box and integral full-length cricket. Fabricate curb subframing of 0.060-inch-nominal thickness, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Finish roof curbs to match metal roof panels.
 - 1. Insulate roof curb with 1-inch-thick, rigid insulation
- G. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide EPDM or PVC sealing washers for exposed fasteners.
 - 1. Galvanized-Steel Fasteners: Provide exposed fasteners with heads matching color of insulated metal roof panels by means of plastic caps or factory-applied coating.
- H. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in insulated metal roof panels and remain weathertight; and as recommended in writing by insulated metal roof panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.7 FABRICATION

- A. Fabricate and finish insulated metal roof panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate insulated metal roof panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with manufacturer's recommendations.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by insulated metal roof panel manufacturer.
 - a. Size: As recommended by insulated metal roof panel manufacturer for application but not less than thickness of metal being secured.

2.8 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Exterior Facings and Accessories:
 1. Two-Coat Fluoropolymer: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- D. Interior Facings:
 1. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, insulated metal roof panel supports, and other conditions affecting performance of the Work.
 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
- B. Examine roughing-in for components and systems penetrating insulated metal roof panels to verify actual locations of penetrations relative to seam locations of insulated metal roof panels before installation.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages in accordance with ASTM C754 and insulated metal roof panel manufacturer's written recommendations.

3.3 INSTALLATION OF INSULATED METAL ROOF PANELS

- A. General: Install insulated metal roof panels in accordance with manufacturer's written instructions and approved Shop Drawings in orientation, sizes, and locations indicated on Drawings. Anchor insulated metal roof panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal roof panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
 - 2. Shim or otherwise plumb substrates receiving insulated metal roof panels.
 - 3. Flash and seal insulated metal roof panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by insulated metal roof panels are installed.
 - 4. Install screw fasteners in predrilled holes.
 - 5. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 6. Install flashing and trim as insulated metal roof panel work proceeds.
 - 7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 8. Align bottoms of insulated metal roof panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 9. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Anchor Clips: Anchor insulated metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by insulated metal roof panel manufacturer.
- E. Lap-Seam, Foamed-Insulation-Core Metal Roof Panels: Fasten insulated metal roof panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Lap ribbed or fluted sheets one full-rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or applications not true to line.

2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of insulated metal roof panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Provide sealant tape at lapped joints of insulated metal roof panels and between panels and protruding equipment, vents, and accessories.
 5. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to weatherproof panels.
- F. Standing-Seam, Foamed-Insulation-Core Metal Roof Panels: Fasten insulated metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
1. Install clips to supports with self-tapping fasteners.
 2. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so cleat, insulated metal roof panel, and factory-applied side-lap sealant are completely engaged.
- G. Batten-Seam, Foamed-Insulation-Core Metal Roof Panels: Fasten insulated metal roof panels to supports with concealed clips at each batten-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
1. Apply caps to insulated metal roof panel seams, fully engaged to provide weathertight joints.
- H. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal joints of insulated metal roof panels, using sealant or tape as recommend by manufacturer as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
- I. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete insulated metal roof panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by insulated metal panel manufacturers; or, if not indicated, provide types recommended in writing by metal roof panel manufacturer.
- J. Flashing and Trim: Comply with performance requirements and manufacturer's written installation instructions. Provide concealed fasteners where possible and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
 - K. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
 - L. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
 1. Provide elbows at base of downspouts to direct water away from building.
 - M. Roof Curbs: Install flashing around bases where they meet metal roof panels.
 - N. Pipe and Conduit Penetrations: Fasten and seal to metal roof panels as recommended by manufacturer.
- 3.4 FIELD QUALITY CONTROL
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed insulated metal roof panel installation, including accessories. Report results in writing.
 - B. Remove and replace applications where tests and inspections indicate that they do not comply with specified requirements.
 - C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
 - D. Prepare test and inspection reports.
- 3.5 CLEANING AND PROTECTION
- A. Remove temporary protective coverings and strippable films, if any, as insulated metal roof panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of insulated metal roof panel installation, clean finished surfaces as recommended by insulated metal roof panel manufacturer. Maintain in a clean condition during construction.
 - B. Replace insulated metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074116

SECTION 07 42 13 – INSULATED METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Foamed-insulation-core concealed fastener metal wall panels, with related metal trim and accessories.

1.2 RELATED REQUIREMENTS

- A. Division 06 Section “Sheathing”
- B. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing items in addition to items specified in this Section.
- C. Division 13 Section "Metal Building Systems" for steel framing supporting metal panels.

1.3 REFERENCES

- A. American Architectural Manufacturer's Association (AAMA): www.aamanet.org:
 - 1. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
- B. American Society of Civil Engineers (ASCE): www.asce.org/codes-standards:
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM): www.astm.org:
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A 792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. ASTM A 240 – Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
 - 5. ASTM C 518 - Standard Test Method for Steady State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 6. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
 - 7. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.
 - 8. ASTM D 1622 - Apparent Density of Rigid Cellular Plastics.
 - 9. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
 - 10. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 - 11. ASTM D 6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics
 - 12. ASTM E 72 - Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
 - 13. ASTM E 84 - Test Methods for Surface Burning Characteristics of Building Materials.

14. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 15. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 16. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
- D. National Fire Protection Association (NFPA)
1. NFPA 259 – Test Method for Potential Heat of Building Materials.
 2. NFPA 285 – Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies.
 3. NFPA 286 – Fire Test of Evaluating Conditions of Wall and Ceiling Finish to Roof Fire Growth.

1.4 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal panel assemblies and accessories from a single manufacturer approved under an accredited third-party quality control program
- B. Installer Qualifications: Experienced Installer [certified by metal panel manufacturer] with minimum of five years' experience with successfully completed projects of a similar nature and scope.
 1. Installer's Field Supervisor: Experienced mechanic [certified by metal panel manufacturer] supervising work on site whenever work is underway.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Prior to erection of framing, conduct preinstallation meeting at site attended by Owner, Architect, metal panel installer, metal panel manufacturer's technical representative, inspection agency and related trade contractors.
 1. Coordinate building framing in relation to metal panel system.
 2. Coordinate openings and penetrations of metal panel system.

1.6 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, and special details. Make distinctions between factory and field assembled work.
 1. Include data indicating compliance with performance requirements.
 2. Indicate points of supporting structure that must coordinate with metal panel system installation.
 3. Include structural data indicating compliance with performance requirements and requirements of local authorities having jurisdiction.
- C. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.
- D. Samples for Verification:
 1. Provide 12-inch- (305 mm) long section of each metal panel profile.

2. Provide color chip verifying color selection.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Results: Indicating compliance of products with requirements.
- B. Qualification Information: For Installer
- C. Accreditation Certificate: Indicating that manufacturer is accredited under an accredited third-party Quality Control Program, including IAS AC472 and based upon chapter 17 of the International Building Code (IBC).
- D. Warranty:
 1. Submit manufacturer's written two (2) year limited warranty providing panels to be free from defects in materials and workmanship, beginning from the date of substantial completion excluding coil coatings (paint finishes) that are covered under a separate warranty.
 2. The installation contractor shall issue a separate warranty against defects in installed materials and workmanship, beginning from the date of substantial completion of the installation.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Manufacturer's Warranty: Executed copy of manufacturer's warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping. Protect painted surfaces with a protective covering before shipping.
 1. Deliver, unload, store, and erect metal panels and accessory items without deforming panels or exposing panels to surface damage from weather or construction operations.
 2. Store in accordance with Manufacturer's written instructions.
 3. Shield foam insulated metal panels from direct sunlight until all components are installed.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of insulated metal roof panel systems that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace insulated metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.

- b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.
- C. Special No-Dollar-Limit Weathertightness Warranty: Manufacturer agrees to repair or replace insulated metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 1. Warranty Period: Twenty (20) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Basis of Design Manufacturer: Subject to compliance with requirements, provide products by Metl-Span, a Nucor company; Lewisville, Texas Tel: 972.221.6656; Email: info@metlspan.com or comparable product by one of the following:
 1. Kingspan Insulated Panels, info@kingspanpanels.us, +1(888)332-5862
 2. All Weather Insulated Panels, sales@awipanel.com, +1(888)970-2947

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide metal panel system meeting performance requirements as determined by application of specified tests by a qualified testing facility on manufacturer's standard assemblies.
 1. Wind Loads: Determine loads based on applicable building code, wind speed, importance factor, exposure category, and internal pressure coefficient indicated on drawings.
 - a. Wind Negative Pressure: Certify capacity of metal panels by testing of proposed assembly.
 2. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/180 of the span with no evidence of failure.
- B. Fire Performance Characteristics: Provide metal panel systems with the following fire-test characteristics determined by indicated test standard as applied by testing and inspection agency acceptable to authorities having jurisdiction.
 1. Surface-Burning Characteristics: The insulating core shall have been tested per ASTM E 84. The core shall have:
 - a. Flame spread index: 25 or less.
 - b. Smoke developed index: 450 or less.
 2. Room Test Performance: FM Global 4880: The panel assembly shall not support a self-propagating fire which reaches any limits of the 50' high corner test structure as evidenced by flaming or material damage of the ceiling of the assembly.
 3. Fire Propagation: The fire assembly shall meet the requirements of the standard for NFPA 285
 4. Fire Growth: The fire assembly shall meet the requirements of the standard for NFPA 286
 5. Potential Heat: Determined in accordance with NFPA 259

6. IBC Chapter 26: Panel Performance under the above test methods, shall meet the requirements of IBC, Chapter on foam plastics.
- C. Air Infiltration, ASTM E 283:
 1. Maximum 0.0002 cfm/sq. ft. (0.001 L/s per sq. m) at static air pressure difference of 1.57 lbf/sq. ft. (75 Pa).
 2. Maximum 0.0009 cfm/sq. ft. (0.005 L/s per sq. m) at static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
 3. Maximum 0.01 cfm/sq. ft. (0.050 L/s per sq. m) at static-air-pressure difference of 20 lbf/sq. ft. (958 Pa).
- D. Water Penetration Static Pressure:
 1. ASTM E 331: No uncontrolled water penetration at a static pressure of 20 lbf/sq. ft. (958 Pa).
 2. ASTM E 331 Modified (2-hour duration): No uncontrolled water penetration at a static pressure of 6.24 lbf/sq. ft. (300 Pa).
- E. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.
- F. Thermal Performance: When tested in accordance with ASTM C 518, Measurement of Steady State thermal Transmission, the panels shall provide a k factor of 0.114 btu/sf/hr/deg F at a 35° F (1.67° C) mean temperature.

2.3 INSULATED METAL WALL PANELS

- A. Concealed Fastener, Insulated Metal Panel with foam core: Structural metal panel consisting of flush, smooth exterior metal sheet, and interior metal sheet with a Light Mesa profile, with factory foamed-in-place polyurethane core in thermally-separated profile, with tongue-and-groove panel edges, attached to supports using concealed fasteners.
 1. Basis of Design: Metl-Span, CF Architectural Vertical Metal Wall Panel
 2. G-90 galvanized coated steel conforming to ASTM A 653 or AZ-50 aluminum-zinc alloy coated steel, conforming to ASTM A 792/A 792M, minimum grade 33, pre-painted by the coil-coating process per ASTM A 755/A 755M.
 - a. Exterior Face Sheet: 22 gauge thickness, with stucco embossed surface and reveals.
 1. Finish: Fluoropolymer two-coat system
 2. Color: As selected by Architect from manufacturer's premium colors.
 - b. Interior Face Sheet: 26 gauge thickness, with stucco embossed Light Mesa profile.
 1. Finish: Polyester two-coat system.
 2. Color: As selected by Architect from manufacturer's standard colors.
 3. Panel Width: 36 inches
 4. Panel Thickness: 2.5 inches
 5. Insulating Core: Polyurethane with zero ozone depletion potential blowing agent
 - a. Closed Cell Content: 90% or more as determined by ASTM D 6226
 - b. Compressive Strength: As required to meet structural performance requirements and with a minimum of 22 psi as determined by ASTM D 1621

- c. Shear Strength: As required to meet structural performance requirements and with a minimum of 36 psi as determined by ASTM C 273
 - d. Tensile Strength: As required to meet structural performance requirements and with a minimum of 41 psi ASTM D 1623
 - e. Minimum Density: 2.0 pcf (32 kg/m³) as determined by ASTM D 1622
 - f. Thermal Resistance R-Value: [21.9] deg. F * hr * sq. ft./Btu (K * sq. m/W) per ASTM C 518 at 35 degrees Fahrenheit mean temperature.
6. Heat Transfer Coefficient (U-factor): [.046] Btu/hr * sq. ft. * deg. F (W/K * sq. m) as determined by ASTM C 1363 at 35 degrees Fahrenheit mean temperature. Tested specimen must include at least two engaged side joints.

2.4 METAL WALL PANEL ACCESSORIES

- A. General: Provide complete metal panel assemblies incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings. Provide required fasteners, closure strips, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panels.
- C. Panel Clips: ASTM A 653/A 653M, G90 (Z180) hot-dip galvanized zinc coating, one-piece, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
- D. Panel Fasteners: Self-drilling or Self-tapping screws and other acceptable fasteners recommended by metal panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating, with weathertight resilient washers.
- E. Joint Sealers:
 - 1. Sealants: Provide Tape Mastic Sealants, Non-skinning sealants, and Urethane Sealants in accordance with manufacturers standards
 - 2. Vertical Joint Gasket: Manufacturers standard EPDM gasket. Color: Black

2.5 FABRICATION

- A. General: Provide factory fabricated and finished metal panels, trim, and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept sealant providing weathertight seal.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings.

2.6 FINISHES

- A. Finishes, General: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
- B. Exterior Face Sheet Coil-Coated Finish System
 - 1. Fluoropolymer Two-Coat System: 0.2 – 0.3 mil primer with 0.7 - 0.8 mil 70 percent PVDF fluoropolymer color coat, [meeting solar reflectance index requirements].
 - a. Basis of Design: Metl-Span, Fluoropolymer.
- C. Interior Face Sheet Coil-Coated Finish System
 - 1. Polyester Two-Coat System: 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat

- a. Basis of Design: Metl-Span, Igloo White

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine metal panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal panels.
1. Inspect framing that will support insulated metal panels to determine if support components are installed as indicated on approved shop drawings and are within tolerances acceptable to metal panel manufacturer and installer. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal panels.
 2. Panel Support Tolerances: Confirm that metal panel supports are within tolerances acceptable to metal panel manufacturer but not greater than the following:
 - a. 1/4 inch (6 mm) in 20 foot (6100 mm) in any direction.
 - b. 3/8 inch (9 mm) over any single wall plane.
 - c. Girt Spacing 8 feet (2438 mm) or more: 1/4 inch (6 mm) out only.
 - d. Girt Spacing Less Than 8 feet (2438 mm): 1/8 inch (3 mm) out only.
 - e. CF Architectural girt spacing less than 4 feet (1219 mm): 1/16 inch (1.5 mm) inch out only.
- B. Correct out-of-tolerance work and other deficient conditions prior to proceeding with insulated metal panel installation.

3.2 METAL PANEL INSTALLATION

- A. Concealed-Fastener Insulated Metal Panels with foam core: Install metal panel system in accordance with manufacturer's written instructions, approved shop drawings, and project drawings. Install metal panels in orientation, sizes, and locations indicated. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to metal framing using screws, fasteners, sealants, and adhesives recommended for application by metal panel manufacturer.
1. Fasten metal panels to supports with fasteners at each location indicated on approved shop drawings, at spacing and with fasteners recommended by manufacturer.
 2. Cut panels in field where required using manufacturer's recommended methods.
 3. Provide weatherproof jacks for pipe and conduit penetrating metal panels.
 4. Dissimilar Materials: Where elements of metal panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by metal panel manufacturer
- C. Attach panel flashing trim pieces to supports using recommended fasteners and joint sealers
- D. Joint Sealers: Install sealants where indicated and where required for weatherproof performance of metal panel assemblies
1. Seal panel base assembly, openings, panel head joints, and perimeter joints using sealants indicated in manufacturer's instructions
 2. Seal wall panel joints; apply continuously without gaps in accordance with manufacturer's written instructions, approved shop drawings, and project drawings
 3. Prepare joints and apply sealants per requirements of Division 07 Section.

3.3 ACCESSORY INSTALLATION

- A. General: Install metal panel accessories with positive anchorage to building and weather tight mounting; provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.
 - 2. Comply with details of assemblies utilized to establish compliance with performance requirements and manufacturer's written installation instructions.
 - 3. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently weather resistant.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: General Contractor will engage an independent testing and inspecting agency acceptable to Architect to perform field tests and inspections and to prepare test reports.
- B. Water-Spray Test: After completing portion of metal panel assembly including accessories and trim, test 2-bay area selected by Architect for water penetration, according to AAMA 501.2.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective films immediately in accordance with metal panel manufacturer's instructions. Clean finished surfaces as recommended by metal panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Architect.

END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
4. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Aluminum-Framed Entrances and Storefronts"
5. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
6. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

- C. NFPA – National Fire Protection Association
 - 1. NFPA 70 – National Electric Code
 - 2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
 - 3. NFPA 101 – Life Safety Code
 - 4. NFPA 105 – Smoke and Draft Control Door Assemblies
 - 5. NFPA 252 – Fire Tests of Door Assemblies

- D. ANSI - American National Standards Institute
 - 1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
 - 2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
 - 3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
 - 4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
 - 5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

- 1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
- 2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

- 1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
- 3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
- 4. Door Hardware Schedule:

- a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
- b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
- c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:

- a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
- b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
- c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
- d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
- e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
- f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule

- e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
- f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

- 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

- 1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
- 2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
- 3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
- 4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

- 1. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
- 2. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks
 - a) Schlage L Series: 3 years
 - 2) Exit Devices
 - a) Falcon: 10 years
 - 3) Closers
 - a) LCN 4000 Series: 30 years
 - 4) Automatic Operators
 - a) LCN: 2 years
 - b. Electrical Warranty
 - 1) Locks
 - a) Schlage: 1 year

1.08 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fabrication
 - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
 - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 - 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- C. Cable and Connectors:
 - 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
 - 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
 - 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
 - 2. Acceptable Manufacturers and Products:
 - a. McKinney TB series
 - b. Stanley FBB series
- B. Requirements:
 - 1. Provide hinges conforming to ANSI/BHMA A156.1.
 - 2. Provide five knuckle, ball bearing hinges.
 - 3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
 - 4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Select
 - b. ABH

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin EPT-10
2. Acceptable Manufacturers and Products:
 - a. Securitron CEPT-10
 - b. Security Door Controls PTM

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 MORTISE LOCKS

A. Manufacturers and Products:

1. Owner Preferred Manufacturer and Product:
 - a. Schlage L9000 series
2. Acceptable Manufacturers and Products:
 - a. Accurate 9000/9100 series
 - b. Corbin-Russwin ML2000 series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Provide motor based electrified locksets that comply with the following requirements:
 - a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
 - b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case.
 - c. Low maximum current draw – maximum 0.4 amps to allow for multiple locks on a single power supply.
 - d. Low holding current – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - e. Connections – provide quick-connect Molex system standard.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - b. Lever Design: 17.

2.08 EXIT DEVICES

A. Manufacturers and Products:

1. Owner Preferred Manufacturer and Product:
 - a. Falcon 24/25 series
2. Acceptable Manufacturers and Products:
 - a. Sargent 19-43-GL-80 series
 - b. Precision Apex series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide flush end caps for exit devices.
7. Provide exit devices with manufacturer's approved strikes.
8. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide electrified options as scheduled.
14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.09 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage/Von Duprin PS900 Series
2. Acceptable Manufacturers and Products:
 - a. Securitron BPS series
 - b. Security Door Controls 600 series

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.

- g. AC input and DC output monitoring circuit w/LED indicators.
- h. Cover mounted AC Input indication.
- i. Tested and certified to meet UL294.
- j. NEMA 1 enclosure.
- k. Hinged cover w/lock down screws.
- l. High voltage protective cover.

2.10 CYLINDERS

A. Manufacturers:

- 1. Scheduled Manufacturer and Product:
 - a. Schlage Primus
- 2. Acceptable Manufacturers and Products:

B. Requirements:

- 1. Provide uncombined cylinders/cores, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

2.11 KEYING

A. Scheduled System:

- 1. Existing key system:
 - a. Provide uncombined cylinders/cores to Owner for keying.

B. Requirements:

- 1. Construction Keying:
 - a. Replaceable Construction Cores.
 - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - a) 3 construction control keys
 - b) 12 construction change (day) keys.
 - 2) Replace temporary cores with permanent cores, Owner to key permanent cores.
- 2. Permanent Keying:
 - a. Provide permanent cylinders/cores to Owner for keying.
 - b. Quantity: Furnish in the following quantities.
 - 1) Change (Day) Keys: 3 per cylinder/core.
 - 2) Permanent Control Keys: 3.
 - 3) Master Keys: 6.

2.12 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Telkee
2. Acceptable Manufacturers:
 - a. HPC
 - b. Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.13 DOOR CLOSERS

A. Manufacturers and Products:

1. Owner Preferred Manufacturer and Product:
 - a. LCN 4040XP series
2. Acceptable Manufacturers and Products:
 - a. Corbin-Russwin DC8000 series
 - b. Sargent 281 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.

7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.14 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4600 series
2. Acceptable Manufacturers and Products:
 - a. Norton 6000 series
 - b. Besam Power Swing

B. Requirements:

1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
5. Provide drop plates, brackets, and adapters for arms as required for details.
6. Provide actuator switches and receivers for operation as specified.
7. Provide weather-resistant actuators at exterior applications.
8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below. Cylinders: Refer to "KEYING" article, herein.
9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.15 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Ives
2. Acceptable Manufacturers:
 - a. Trimco
 - b. Burns
- B. Requirements:
 1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.16 PROTECTION PLATES

- A. Manufacturers:
 1. Scheduled Manufacturer:
 - a. Ives
 2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco
- B. Requirements:
 1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
 2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
 3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.17 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

- A. Manufacturers:
 1. Scheduled Manufacturers:
 - a. Glynn-Johnson
 2. Acceptable Manufacturers:
 - a. Rixson
 - b. ABH
- B. Requirements:
 1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
 2. Provide friction type at doors without closer and positive type at doors with closer.

2.18 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Trimco
 - b. Burns

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.19 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Zero International
2. Acceptable Manufacturers:
 - a. National Guard
 - b. Reese

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.20 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:

- a. Ives
2. Acceptable Manufacturers:
 - a. Burns
 - b. Trimco
- B. Requirements:
 1. Provide "push-in" type silencers for hollow metal or wood frames.
 2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
 3. Omit where gasketing is specified.

2.21 DOOR POSITION SWITCHES

- A. Manufacturers:
 1. Scheduled Manufacturer:
 - a. Schlage
 2. Acceptable Manufacturers:
 - a. GE-Interlogix
 - b. Sargent
- B. Requirements:
 1. Provide recessed or surface mounted type door position switches as specified.
 2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.22 FINISHES

- A. FINISH: BHMA 626/652 (US26D); EXCEPT:
 1. Hinges at Exterior Doors: BHMA 630 (US32D)
 2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
 3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
 4. Protection Plates: BHMA 630 (US32D)
 5. Overhead Stops and Holders: BHMA 630 (US32D)
 6. Door Closers: Powder Coat to Match
 7. Wall Stops: BHMA 630 (US32D)
 8. Latch Protectors: BHMA 630 (US32D)
 9. Weatherstripping: Clear Anodized Aluminum
 10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

3.03 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.

- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- M. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.04 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.05 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.06 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Hardware Group No. 01

Provide each SGL door(s) with the following:

QTY	EA	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT10 CON	⚡ 689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-99-NL-OP-110MD-CON 24 VDC	⚡ 626	VON
1	EA	RIM HOUSING	20-079	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
			(OWNER PROVIDED)		
1	EA	LONG DOOR PULL	9264F 36" O	630-316	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	RAIN DRIP	142AA	AA	ZER
1	SET	GASKETING	BY DOOR/FRAME MANUFACTURER		
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	655A-223	A	ZER
1	EA	WIRE HARNESS	CON-XXX (LAR)	⚡	SCH
1	EA	WIRE HARNESS	CON-6P	⚡	SCH
1	EA	CREDENTIAL READER	SUPPLIED BY ACCESS CONTROL PROVIDER	⚡	
1	EA	DOOR CONTACT	SUPPLIED BY ACCESS CONTROL PROVIDER	⚡	
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC COORDINATE POWER SUPPLY QUANTITIES AND LOCATION WITH SECURITY PROVIDER	⚡ LGR	SCE
1	EA	DIAGRAM	ELEVATION		DLR
1	EA	DIAGRAM	POINT TO POINT		DLR

COORDINATE WITH ALL RELATED TRADES. ENTRY BY CREDENTIAL OR KEY OVERRIDE.
 PRESENTING VALID CREDENTIAL TO READER WILL MOMENTARILY RETRACT LATCHBOLT AND ALLOW ENTRY.
 UPON LOSS OF POWER, DOOR IS SECURE. DOOR IS ALWAYS AVAILABLE FOR FREE EGRESS.
 DOOR CONTACT/RX TIED TO ACCESS CONTROL SYSTEM FOR MONITORING.

Hardware Group No. 02

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
1	EA	CONT. HINGE	112XY EPT	628	IVE
1	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 17A	626	SCH
1	EA	PRIMUS CORE	20-740	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	566A-223	A	ZER
1	EA	SILENCER	SR64	GRY	IVE

END OF SECTION