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## SECTION 133419 - METAL BUILDING SYSTEMS

### PART 1 - GENERAL

#### 1.1 SCOPE OF WORK:

The structural systems in this scope consist of pre-engineered structure, metal siding, metal roof system, exit doors with hardware, exterior windows, and overhead doors. There will be (4) exhaust fans through the roof and will require a curb and flashing. There will be (6) supply fans in the exterior walls that will require flashing. The scope also includes metal stairs and railings, railings for ramps, ladder with safety cage, loading dock equipment, interior GWB walls, ACT ceiling, interior fences and gates, doors and windows, bollards.

Code Requirements: Authority Having Jurisdiction: Codes and standards will be those enforced by the local County or State Agency and as listed:

2020 Florida Building Code

2018 NFPA 1 Fire Code

2020 Florida Plumbing Code

2020 Florida Mechanical Code

2020 Florida Fuel Gas Code

2017 Florida Electric Code (NFPA 70)

2020 Florida Energy Conservation Code

Location: 37021 GATOR BLVD, BELLE GLADE FL, 33430

#### 1.2 LOAD REQUIREMENTS

Roof Loading: Conform to 2020 Florida Building Code.  
Dead Load: As required by manufacturer's system.

Ground Snow Load: 2020 Florida Building Code.

Roof Snow Load: 2020 Florida Building Code.

Wind Loading: 160 MPH, per 2020 Florida Building Code .

Seismic Loading: 2020 Florida Building Code.

Ice Load 2020 Florida Building Code.

#### 1.3 BUILDING DESCRIPTION

**tellus Building:** Pre-engineered insulated structure.

**Size & Area:** 200'-8.5" x 123'-0", 24,687 sf (gross footprint).

**Height:** 24'- 10.5" eave height (LP @ top of bent).

**Structural frame:** Low Rigid Frame, Double Slope, Straight Columns,

**Exterior-Framed** (Bypass) Girt: Galvanized Z girt with Vinyl Batt insulation.

**Roof Purlins:** Acrylic/White coated Z purlins primed or galvanized.

**Roof:** Insulated roof system sloped to match existing

**Walls:** Metal wall panels to match existing over Batt Insulation.

## **1.4 INSTRUCTION TO BIDDERS**

Base bid for structural frame is to be factory primer finish.

## **1.5 SUMMARY**

Section Includes:

- Manufacturers
- Metal Building Systems
- Structural-Steel Framing
- Metal Roof Panels
- Metal Wall Panels
- Thermal Insulation
- Doors and Frames
- Overhead Sectional Door
- Accessories
- Painting

## **1.6 DESIGN BASIS AND DESIGN CRITERIA**

The engineer for the metal buildings shall design, fabricate, and erect the pre-engineered metal building system and associated items to withstand all loads to which they will be subjected. These shall include but are not limited to, live and dead loads, wind, seismic, structural movement, thermally induced loads, in-service use conditions that the building will experience, and exposure to the weather, all without failure.

The unbraced length of compression flanges shall be carefully controlled to assure that the member is truly able to develop the stresses caused by the design loading without lateral buckling taking place. Of particular concern are members where the top or bottom flange may shift between tension and compression at different points along the member's length depending on loading and support conditions. The inflection point shall not be considered a brace point unless an actual brace is physically inserted at that point.

Compression regions of primary frames must be adequately braced against buckling. Bracing provided by inclined angle flange bracing from frame to open web joist or purlin must be carefully evaluated for adequacy.

Primary frames shall be braced against lateral buckling. (INTENT) Both the strut (brace) and the secondary framing member into which it ties (beam, purlin, joist) shall be adequate in strength and behavior characteristics to provide resistance against lateral buckling of the primary framing member that they are intended to brace. The primary framing member(s) shall be adequately braced against lateral buckling so that they are capable of developing that allowable compression stress used in their design.

Deflections at service loading shall be carefully checked in cases where high strength materials are used or limited design is employed.

Total load deflection shall be applicable to decking, purlins, open web joist, beams, frames, trusses, etc. This requirement applies to each component individually. Deflection may not be based on live load alone. Smaller deflections may control if specific conditions warrant.

Design each member and assemblage of members to withstand stresses resulting from combinations of loads that cause the maximum stresses in that member or assemblage as prescribed in the MBMA's Design Practices Manual and other applicable codes and standards.

## 1.7 DEFINITIONS

**Contract Documents:** Any and all documents, including codes, studies, design drawings, specifications, sketches, practices, and data sheets, that the purchaser has transmitted or otherwise communicated, either by incorporation or reference, and made part of the legal contract agreement or purchase order between the purchaser and the supplier.

**Engineer of Record:** Purchaser's authorized representative with overall authority and responsibility for the engineering design, quality, and performance of the civil works, structure, foundations, materials, and appurtenances described in the contract documents.

The engineer of record shall be licensed as defined by the laws of the locality in which the work is to be constructed, and be qualified to practice in the specialty discipline required for the work described in the contract documents.

**Inspector:** The party responsible for verifying the quality of all materials, installations, and workmanship furnished by the manufacturer/supplier. The inspector shall be qualified by training and experience and hold certifications or documentation of their qualifications. Unless otherwise specified in the contract documents, the inspector shall be an independent party retained by the purchaser.

**Manufacturer:** The party who produces and warrants the performance of the materials provided in accordance with the contract documents. The materials are manufactured in a controlled process using standard codes, specifications, tests and possibly include shop drawings to assist in proper application, installation and/or use. The term manufacturer shall apply also to the manufacturer's subcontractor(s) and/or vendor(s).

**Owner:** The party who has authority through ownership, lease, or other legal agreement over the site wherein the building will be used.

**Professional Engineer:** An engineer, other than the engineer of record licensed as defined by

the laws of the locality in which the building is to be constructed, and qualified to practice in the specialty discipline required for the work described in the contract documents.

*purchaser:* The party who awards the contract to the supplier. The purchaser may be the owner or the owner's authorized agent.

**Supplier:** The party responsible for supplying the building in accordance with the contract documents.

**Bay Spacing:** Dimension between main frames measured normal to frame (at centerline of frame) for interior bays, and dimension to the girt line on the end bays.

**Building Length:** See drawings and details.

**Building Width:** See drawings and details.

**Clear Span:** Distance between supports of beams, girders, or trusses (measured from lowest level of connecting area of a column and a rafter frame, or knee).

**Eave Height:** Vertical dimension from finished floor to eave (the line along the sidewall formed by intersection of the planes of the roof and wall).

**Clear Height under Structure:** Vertical dimension from finished floor to the lowest point of any part of primary or secondary structure, not including crane supports, located within clear span.

**Terminology Standard:** Refer to Metal Building Manufacturer's Association's "Low Rise Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

**Associated Components:** Any product or assembly not defined as part of the customary metal building system.

The metal building system shall be defined as all components and assemblies necessary to form a watertight exterior structure, including roof, walls, exterior personnel doors, overhead coiling doors, and accessories.

## 1.8 ACTION SUBMITTALS

**Product Data:** For each type of metal building system component, include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

- Structural-Steel Framing
- Metal Wall Panels
- Metal Roof Panels
- Thermal Insulation
- Doors and Frames
- Overhead Sectional Door
- Non-Shrink Grout
- Painting
- Accessories

**Shop Drawings:** Submit for review the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.

**Anchor-Bolt Plans:** Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate column reactions at each location.

**Structural-Framing Drawings:** Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.

**Metal Roof and Wall Panel Layout Drawings:** Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners. Include wall-mounted items including doors, fans.

**Accessory Drawings:** Include details of the following items, at a scale of not less than 1 1/2 inches per 12 inches:

Flashing and Trim

Gutters

Downspouts

Louvers

Personnel Door

Overhead Coiling Door

Drawings to coordinate structural frame with foundations

**Samples for Verification:** For each type of exposed finish required, prepared on Samples of sizes indicated below:

**Metal Panels:** Nominal 12 inches long by actual panel width. Include fasteners, closures, and other exposed panel accessories.

**Flashing and Trim:** Nominal 12 inches long. Include fasteners and other exposed accessories.

**Vapor-Retarder Facings:** Nominal 6-inch square Samples.

**Accessories:** Nominal 12-inch long Samples for each type of accessory.

**Door Schedule:** For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.

**Door Hardware Schedule:** Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

**Delegated-Design Submittal:** For metal building systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in Florida responsible for their preparation.

## 1.9 CODES AND STANDARDS

Material, engineering, fabrication, delivery and erection shall, as a minimum, meet the following codes unless modified by this specification or related drawings. In the event that a conflict arises between any of these codes or standards, or between any codes and standards or these specifications or drawings, the more stringent requirements shall govern. The requirements and provisions of this specification shall also control even though they may be more demanding than "standard and common industry practice."

**Codes:** Florida family of codes as follows:

2020 Florida Building Code



2018 NFPA 1 Fire Code

2020 Florida Plumbing Code

2020 Florida Mechanical Code

2020 Florida Fuel Gas Code

2017 Florida Electric Code (NFPA 70)

2020 Florida Energy Conservation Code

The AISI Specification for the design, fabrication, and erection of structural steel for buildings.

The Metal Building Manufacturers Association (MBMA) Recommended Design Practices Manual, Recommended Guide Specifications for Metal Building Systems, and Low Rise Building Systems Manual.

The AISI Specification for Design of Cold-Formed Steel Structural Members, and Design of Light Gage Steel Diaphragms.

The AWS Standard Code for Arc and Gas Welding in Building Construction

The provisions and recommendations of the Steel Joist Institute.

All requirements of the Federal Occupational Safety and Health Act.

Factory Mutual Property Loss Prevention Data Sheets 1-28, 1-31, and 1-54.

Factory Mutual Standards 4880 and 4881.

Applicable provisions of the American Society for Testing and Materials.

The ASCE Minimum Design Loads for Buildings and Other Structures, ASCE 7, shall be used as a minimum where other standards do not specifically govern.

## **1.10 INFORMATIONAL SUBMITTALS**

Qualification Data: For qualified erector, manufacturer, professional engineer, surveyor and testing agency.

Welding certificates.

Metal Building System Certificates:

For each type of metal building system, from manufacturer:

Letter of Design Certification: Signed and sealed by a qualified professional engineer licensed in Florida. Include the following:

Name and location of Project.

Order number.

Name of manufacturer.

Name of Contractor.

Building dimensions including width, length, height, and roof slope.

Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.

Governing building code and year of edition.

Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration. All loads shall be specific to, Florida.

Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.

Building-Use Category: Indicate category of building use and its effect on load importance factors.

AISC Certification for Category MB: Include statement that metal building system and components were designed and produced in an AISC-Certified Facility by an AISC-Certified Manufacturer.

Erector Certificates: For each product, from manufacturer.

Manufacturer Certificates: For each product, from manufacturer.

Material Test Reports: For each of the following products:

Structural steel including chemical and physical properties.

Bolts, nuts, and washers including mechanical properties and chemical analysis.

Tension-control, high-strength, bolt-nut-washer assemblies.

Shop primers.

Non-shrink grout.

Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor-retarder facings. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.

Source quality-control reports as required to comply with metal building manufacturer requirements to maintain an approved fabrication facility.

Special Inspection Reports: At completion of fabrication, the approved fabricator shall submit a certificate of compliance to the AHJ stating that the materials supplied, and work performed by the fabricator are in accordance with the construction documents.

Field quality-control reports as required by Berkley County Building Inspector.

Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

Special Inspection Report: At completion of erection, the approved erector shall submit a certificate of compliance to the AHJ stating that the materials supplied, and work performed by the erector are in accordance with the construction documents.

Material Samples:

12 inch sample of roofing and siding including specified style and texture

Fasteners for roofing and siding

Color chips of selected colors

Warranties: Each individual item as required in this specification

### **1.11 CLOSEOUT SUBMITTALS**

Metal Wall and Roof panels: Maintenance literature, warranties, information for the type and color of paint, repair procedures and contact information for manufacturer and local representative.

Overhead Sectional Doors: Manufacturer's literature, maintenance manuals, warranties, parts catalogue, type of paint and contact information for manufacturer and local representative.

Fans: Intake and exhaust fans Maintenance literature, warranties, .

Personnel Doors and Door Hardware: Manufacturer's literature, maintenance manuals, warranties, parts catalogue, type of paint if factory painted and contact information for manufacturer and local representative.

### **1.12 QUALITY ASSURANCE**

Manufacturer Qualifications: A qualified manufacturer and member of MBMA. The metal building and the manufacturer's professional engineer shall have a minimum of 5 years' experience in successful design of similar projects.

The construction superintendent shall have a minimum of 5 years experience in the erection of pre-engineered metal buildings and at least two years of experience in the erection of pre-engineered metal building of the size and complexity specified in the contract documents.

AISC Certification for Category MB: An AISC-Certified Manufacturer that designs and produces metal building systems and components in an AISC-Certified Facility.

The manufacturer shall be responsible for quality control of all materials and workmanship.

Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer licensed in the state of Florida.

Manufacturer's construction documents shall comply with 2021 SCBC Section 1603 and shall be sealed by the manufacturer's professional engineer.

Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

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

Source Limitations: Obtain metal building system components, (including roof system, primary framing and secondary framing) from single source from single manufacturer.

The purchaser or inspector shall have the right to inspect all materials and workmanship and shall have unrestricted access to fabrication shops and work sites at all times during which the work is being performed.

Inspections or approvals from purchaser shall in no way relieve the manufacturer or supplier from any obligations to perform the work in accordance with the contract documents.

The purchaser may reject improper, inferior, defective, or unsuitable materials and workmanship.

All rejected materials and workmanship shall be replaced as directed by purchaser.

Welding Qualifications: Qualify procedures and personnel according to the following:

AWS D1.1, "Structural Welding Code - Steel."

AWS D1.3, "Structural Welding Code - Sheet Steel."

Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.

Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to metal building systems including, but not limited to, the following:

Condition of foundations and other preparatory work performed by other trades.

Structural load limitations.

Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delay.

Required tests, inspections, and certifications.

Unfavorable weather and forecasted weather conditions.

Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:

Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.

Structural limitations of purlins and rafters during and after roofing.

Flashings, special roof details, and condition of other construction that will affect metal roof panels.

Temporary protection requirements for metal roof panel assembly during and after installation.

Roof observation and repair after metal roof panel installation.

Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:

Compliance with requirements for support conditions, including alignment between and attachment to structural members.

Structural limitations of girts and columns during and after wall panel installation.

Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.

Provisions for temporary protection where required for metal wall panel assembly during and after installation.

Wall observation and repair after metal wall panel installation.

### **1.13 DELIVERY, STORAGE, AND HANDLING**

Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

Stack metal panels horizontally on platforms or pallets, covered with suitable weather tight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage.

### **1.14 PROJECT CONDITIONS**

Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

Field Measurements:

Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.

Established Dimensions for Metal Panels: Fabricate panels in the plant to the greatest extent possible. Field fabrication and trimming shall be only upon approval by the Owner's Representative. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

## **1.15 COORDINATION**

Coordinate sizes and locations of anchor-bolt inserts into foundations with architectural and engineering documents. Metal building designer shall locate and size the anchor bolts and provide that information to Contractor. Isomer will design the embedment and include the anchor bolts as part of the cast in place concrete foundation design.

Coordinate installation of wall penetrations with architectural and engineering documents.

Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak proof, secure, and noncorrosive installation.

## **1.16 WARRANTY**

**GENERAL:** Furnish (5) year manufacturer's warranty for pre-engineered building systems and components.

**METAL ROOF:** Special Weather tightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period. Warranty Period: 25 years from date of Substantial Completion

Workmanship Warranty: Three years from date of Substantial Completion.

**METAL WALL PANELS:** Standard Manufacturer's Warranty: Manufacturer shall warrant for a period of two years that the wall system materials shall be free from defects. The wall systems contractor shall warrant for a period of one year that the installation workmanship will be free of defects.

**Special Warranty on Metal Wall Panel Finishes:** Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

**Exposed Panel Finish:** Deterioration includes, but is not limited to, the following:

- Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- Cracking, checking, peeling, or failure of paint to adhere to bare metal.

Finish Warranty Period: 20 years from date of Substantial Completion.

## **PART 2 – PRODUCTS**

### **2.1 MANUFACTURERS**

Basis for Design shall be Butler Manufacturing Company; a BlueScope Steel company. Available manufacturers offering acceptable metal building systems include, but are not limited to the following:

American Steel Building Co., Inc.

Ceco Building Systems; Division of NCI Building Systems, L.P.  
Chief Buildings; Division of Chief Industries, Inc.  
Star Building Systems; an NCI company  
Covenant Building Systems  
Kirby Building Systems  
Nucor Building Systems

Other companies: Subject to compliance with requirements, submittal and approval

## **2.2 METAL BUILDING SYSTEMS**

Description: Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.

Provide metal building system of size and with bay spacing, roof slopes, and spans indicated.

Primary-Frame Type: Rigid Clear Span: Solid-member, structural-framing system with interior columns as shown.

End-Wall Framing: Refer to drawings

Secondary-Frame Type: Manufacturer's standard purlins and joists and exterior-framed (bypass) girts.

Eave Height: Refer to architectural drawings

Bay Spacing: Refer to architectural drawings

Roof Slope: Refer to drawings

Roof System: Basis-of-Design Product: Subject to compliance with requirements, provide a painted to match existing (Butler-Cote 500FP) galvalume metal roof to match existing by Butler Manufacturing Company or a comparable product approved by the Owner's Representative.

Exterior Wall System: Basis-of-Design Product: Subject to compliance with requirements, wall panels to match existing. Any alternate product must be approved for performance levels specified. Submit independent test reports for performance requirements and provide calculations certified by a professional engineer verifying that the product meets specified loading requirements.

## **2.3 METAL BUILDING SYSTEM PERFORMANCE**

Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified professional engineer licensed in Florida, using performance requirements and design criteria indicated.

Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."

Design Loads: As required by Florida codes and the Scope of Work

Deflection Limits: Design metal building system assemblies to withstand design loads with deflections no greater than those required by ASCE/SEI 7 or the following, whichever is more stringent:

Purlins and Rafters: Vertical deflection of  $1/240$  of the span.

Girts: Horizontal deflection of  $1/180$  of the span if required.

Metal Roof Panels: Vertical deflection of  $1/180$  of the span.

Metal Wall Panels: Horizontal deflection of  $1/180$  of the span.

Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.

Drift Limits: Engineer building structure to withstand design loads with drift limits no greater than the following:

Lateral Drift: Maximum of  $1/300$  of the building height.

Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.

Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.

Air Infiltration for Metal Roof Panels: Air leakage through assembly of not more than 0.05 cfm/sq. ft. of roof area when tested according to ASTM E 1680 at static test-pressure difference of 12.0 psf.

Air Infiltration for Metal Wall Panels: Air leakage through assembly of not more than 0.03cfm/sq. ft. of wall area when tested according to ASTM E 283 at static-air-pressure difference of 1.57 lbf/sq.

Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E 1646 at a static test-pressure difference of 12.0 psf.

Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E 331 at a wind-load design pressure of not less than 10 psf

Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

Thermal Performance:

Metal Roof Panel Assemblies:



R-Value: = R 22 insulated system

Metal Wall Panel Assemblies:

R-Value = R 13 plus R 3.8 (Stud wall) by others

Solar Reflectance Index: Not less than 0.67 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

## 2.4 STRUCTURAL STEEL FRAMING

Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated on Architectural drawings. No web or flange member shall be less than ¼ " thick.

Rigid Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns (two per frame) located Columns lines B & C .

Frame Configuration: Double Slope, refer to building description. Refer to architectural drawings for direction of slope.

Exterior Column Type: Uniform depth / **Straight**

Rafter Type: Uniform depth or Tapered.

End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:

End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet

End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.

Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet.

Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch wide flanges.

Depth: As required.

Finish: Painted White

Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch wide flanges.

Depth: As required. (Note: Provide Z-shaped sections with the interior leg down or C-shaped section with both legs down)

Finish: Galvanized

Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.

Flange Bracing: Minimum 2-by-2-by-1/8-inch structural-steel angles or 1-inch diameter, cold-formed structural tubing to stiffen primary-frame flanges.

Sag Bracing: Minimum 1-by-1-by-1/8-inch structural-steel angles.

Base or Sill Angles: Minimum 3-by-2-inch zinc-coated (galvanized) steel sheet.

Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.

Secondary End-Wall Framing: Manufacturer's standard sections fabricated from zinc-coated (galvanized) steel sheet.

Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.

Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

Bracing: Provide adjustable wind bracing as follows:

Rods: ASTM A 36; ASTM A 572, Grade 50; or ASTM A 529, Grade 50 ; minimum ½ inch diameter steel; threaded full length or threaded a minimum of 6 inches at each end.

Cable: ASTM A 475, ¼-inch diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.

Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.

Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.

**Pinned-Base Columns:** Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads. **All columns are to have pinned base plates.**

Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels. Design must meet local codes or Factory Mutual requirements, whichever is the most stringent.

Bracing: Provide wind bracing using any method specified above, at manufacturer's option. Prior to final design submittal, manufacturer must coordinate with Owner's Representative the location of all bracing located in the walls.

Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide hot-dip galvanized bolts for structural-framing components that are galvanized.

Materials: W-Shapes: ASTM A 992; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55 ASTM A 36.

Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55 .

Plate and Bar: ASTM A 36; ASTM A 572, Grade 50 or 55; or ASTM A 529, Grade 50 or 55

Steel Pipe: ASTM A 53, Type E or S, Grade B.

Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

Structural-Steel Sheet: Hot-rolled, ASTM A 1011, Structural Steel (SS), Grades 30 through 55, or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70; or cold-rolled, ASTM A 1008, Structural Steel (SS), Grades 25 through 80, or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70.

Metallic-Coated Steel Sheet: ASTM A 653, Structural Steel (SS), Grades 33 through 80 or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80 with G60 coating designation; mill phosphatized. G90

Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, Structural Steel (SS), Grades 33 through 80 or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80; with G90 coating designation.

Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792, Structural Steel (SS), Grade 50 or 80; with Class AZ50 coating

Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A, carbon-steel, hex-head bolts; ASTM A 563 carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.

Finish: Plain

High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563 heavy-hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers

Finish: Hot-dip zinc coating, ASTM A 153/A, Class C

Anchor Bolt Coordination: Coordinate anchor bolt strength, diameter and location with Isomer structural engineering drawings. It shall be the responsibility of the metal building designer to furnish the bolt diameter and reactions to the Isomer engineers.

Unheaded Anchor Bolts: ASTM A 36

Configuration: Straight.

Nuts: ASTM A 563 hex carbon steel.  
Plate Washers: ASTM A 36 carbon steel.  
Washers: ASTM F 436 hardened carbon steel.  
Finish: Hot-dip zinc coating, ASTM A 153, Class C

Headed Anchor Bolts: ASTM F 1554, Grade 36  
Configuration: Straight.  
Nuts: ASTM A 563 heavy hex carbon steel.  
Plate Washers: ASTM A 36 carbon steel.  
Washers: ASTM F 436 hardened carbon steel.  
Finish: Hot-dip zinc coating, ASTM A 153, Class C

Threaded Rods: ASTM A 36/A  
Nuts: ASTM A 563 hex carbon steel.  
Washers: ASTM F 436 hardened carbon steel.  
Finish: Hot-dip zinc coating, ASTM A 153, Class C

Prime / paint shall be in accordance with SSPC Painting Manual. Polyvinylidene fluoride (PVDF) shall be factory applied on the exposed side if specified in the contract documents.

## **2.5 GENERAL STRUCTURAL STEEL FINISH**

Primary Frames  
Clean all steel per SSPC-SP2.

Factory cover all steel with one coat of gray water reducible alkyd primer paint formulated to equal or exceed the performance requirements of Federal Specification TT-P-636D, TT-P-664C and SSPC Paint-25 to a minimum coating thickness of 1.0 mil.

Secondary Structure- Roll-Formed

Clean all steel per SSPC-SP8 or SSPC-SP6.  
Material shall have a hot dipped zinc coating per ASTM A653 G-30 specification followed by one coat of clear acrylic finish. The acrylic coated galvanized steel will equal or exceed the performance requirements of Federal Specification TT-P-66-4D and SSPC Paint-25 to a minimum coating thickness of 1.0 mil.

Roof Purlins

Clean all steel per SSPC-SP8 or SSPC-SP6.  
Material shall have a hot dipped zinc coating per ASTM A653 G-30 specification followed by one coat of clear acrylic finish. The acrylic coated galvanized steel will equal or exceed the performance requirements of Federal Specification TT-P-66-4D and SSPC Paint-25 to a minimum coating thickness of 1.0 mil.

Basis for Design: Metal Roof Panels to match existing.

The metal roof system where insulation is specified shall be one batt of glass fiber blanket insulation with laminated vapor retarder and insulation support system.

Metal Panel

Material: match existing Coordinate with purlin spacing and wind uplift requirements. Where the roof is used for diaphragm support, the designer shall establish the metal gage should it require a heavier gage.

Exterior Finish: match existing

Clips: Manufacturer's standard, floating type to accommodate thermal movement; fabricated from stainless-steel sheet.

Joint Type: Mechanically seamed, double folded, (360 deg Pittsburgh double-lock)

Panel Coverage: 24 inches

Panel Height: 2 3/4 inch (includes seam)

Uplift: 1-90 windstorm classification.

## **2.8 NON INSULATED METAL WALL PANELS**

Description: match existing

Comply with the following: Submittals; Quality Assurance; Delivery, Storage and Handling; and Field Quality Control.

## **2.9 THERMAL INSULATION**

Faced Metal Building Insulation: ASTM C 991, Type II-16, glass-fiber-blanket insulation; 0.5-lb/cu. ft. density; continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.

Vapor-Retarder Facing: ASTM C 1136-12, with permeance not greater than 0.02 perm when tested according to ASTM E 96/E-10, Desiccant Method. Basis for Design WMP50 by Lamtech Corporation This vapor retarder to be laminated to the fiberglass batt of the MR-24 metal roof system and wall panel installation.

WMP50 flame spread of 5 and smoke development of 25 per UL1728. Color to be white.

Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

Comply with the following: Submittals; Quality Assurance; Delivery, Storage and Handling; and Field Quality Control

## **2.10 DOORS AND FRAMES**

General: Comply with the following: Submittals; Quality Assurance; Delivery, Storage and Handling; and Field Quality Control.

Personnel Doors and Frames:

Steel Doors: 1-3/4 inches thick; fabricated from 0.052-inch nominal-thickness, metallic-coated steel face sheets; of seamless, hollow-metal construction; with 0.064-inch

nominal-thickness, inverted metallic-coated steel channels welded to face sheets at top and bottom of door.

Design: Flush panel

Core: Polyurethane foam with U-factor rating of at least 0.70

View Panel: Manufacturers standard for approximate size of 100 square inches

Steel Frames: Fabricate 2-inch wide face frames from 0.064-inch nominal-thickness, metallic-coated steel sheet.

Type: Factory welded. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.

Hardware:

Provide hardware for each door leaf as shown on drawings.

Anchors and Accessories: Manufacturer's standard units, galvanized according to ASTM A 123/A.

Fabrication: Fabricate doors and frames to be rigid; neat in appearance; and free from defects, warp, or buckle. Provide continuous welds on exposed joints; grind, dress, and make welds smooth, flush, and invisible.

Materials:

Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.

Finishes for Personnel Doors and Frames:

Prime Finish: Factory-apply manufacturer's standard primer immediately after cleaning and pretreating.

Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.11 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

Finish Coat: Manufacturers standard to match wall panels. (option: personnel doors may be field painted)

Glazing: Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear), 3/16 inch thick.

## **2.11 OVERHEAD SECTIONAL DOORS AND FRAMES**

General: Comply with the following: Submittals; Quality Assurance; Delivery, Storage and Handling; and Field Quality Control. Doors are to be approved by Factory Mutual.

Structural performance. Provide overhead coiling door capable of withstanding the effects of gravity loads and the following loads and stresses without evidence of permanent deformation of door components for rated for local wind loads acting inward or outward.

Provide Manufacturer's standard channel frame.

Submittals: Product Data, Operation Manuals, and Maintenance Manuals.

Shop Drawings including plans, elevations, sections, details and attachments to other work

Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance.

Manufacturer. Basis for Design: The Overhead Company, Inc. Standard Sectional steel door model 426 insulated aluminum door with a minimum R- value of 7. Provide manufacturer's standard 2 year warranty for parts and labor.

Steel Door Sections: Zinc-coated (galvanized) cold-rolled structural steel sheet; complying with ASTM A 653/A, G90 coating designation.

Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operational life specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

Comply with NFPA 70.

Operation Speed: 1/2 foot per second

Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets fitted to the top and bottom of exterior doors.

Counterbalancing Mechanism: Adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to door.

Finishes for Overhead Sectional doors to be factory finished to match wall panels.

Finishes for Overhead Sectional door frames and components are as noted in Field Painting

## **2.12 FANS AND LOUVERS**

Louvers: none.

Fans: coordinate MEP requirements for intake and exhaust fans

## **2.13 ACCESSORIES**

General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories (at the factory to greatest extent possible) by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

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.

Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets,

fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.

Clips: Manufacturer's standard, formed from stainless-steel sheet, designed to withstand negative-load requirements.

Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

Closure Strips: Manufacturer's standard flexible strips as required to ensure weathertight construction.

Sky-Web Fall Protection and Insulation Support System: 1,000 denier polyester yarn interwoven on a normal 1/2" square grid coated with a fire retardant and ultraviolet stabilized PVC-based binder. Color to be white. Install per manufacturer's written instructions.

Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.

Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.

Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

Closure Strips: Manufacturer's standard flexible strips as required to insure watertight construction.

Control joints: As required by wall panel manufacturer or as required by the Metal Building contractor's Design.

Flashing and Trim: Formed from 0.022-inch nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels. Provide flashing and trim 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.

Opening Trim: Formed from 0.034-inch nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

Gutters: Formed from 0.055-inch nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."

Gutter Supports: Fabricated from same material and finish as gutters.

Strainers: Bronze, copper, or aluminum wire ball type at outlets.



Gutter size: Standard Recommend by Manufacturer

Downspouts: Formed from 0.055-inch nominal-thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot long round sections, minimum 6 inch diameter, complete with formed elbows and offsets.

Mounting Straps: Fabricated from same material and finish as gutters.

Downspout size: Standard Recommend by Manufacturer

#### Miscellaneous Materials:

Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.

Fasteners for Metal Roof Panels: Manufacturer's standard Type 304 stainless-steel installed in predrilled holes.

Fasteners for Metal Wall Panels: Manufacturer's standard Type 304 stainless-steel installed in predrilled holes.

Fasteners for Flashing and Trim: Blind fasteners where possible. Where exposed to view use manufacturer's standard galvanized, stainless steel or aluminum as appropriate finished to match the surrounding area.

Blind Fasteners: High-strength aluminum or stainless-steel rivets.

Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities. Nonmetallic, Shrinkage-Resistant

Grout: ASTM C 1107-14, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

Metal Panel Sealants: Sealant Tape: Basis of design is Butler Panlastic Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard.

Joint Sealant: ASTM C 920-14; one-part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

## 2.14 SOURCE QUALITY CONTROL

Special Inspector: The Metal Building Contractor shall engage a qualified special inspector to perform the tests and inspections required by IBC 2015. Submit reports to the Owner's Representative. Special inspector will verify that manufacturer maintains detailed

fabrication and quality-control procedures and will review the completeness and adequacy of those procedures to perform the Work.

Special inspections will not be required if fabrication is performed by manufacturer registered and approved by authorities having jurisdiction to perform such Work without special inspection. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

Testing: Test and inspect shop connections for metal buildings according to the following:

Bolted Connections: Shop-bolted connections shall be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325-14 or A 490 Bolts."

Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1-2015 and the following inspection procedures, at inspector's option:

Liquid Penetrant Inspection: ASTM E 165-12.

Magnetic Particle Inspection: ASTM E 709-14; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

Ultrasonic Inspection: ASTM E 164-13

Radiographic Inspection: ASTM E 94

Product will be considered defective if it does not pass tests and inspections.

Submit mill certification for structural bolts, structural steel, wall and roof covering shall be submitted to the purchaser upon delivery of the materials.

Prepare test and inspection reports.

## **2.15 FABRICATION**

General: Design components and field connections required for erection to permit easy assembly. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly. Make shop connections by welding or by using high-strength bolts. Join flanges to webs of built-up members by a continuous, submerged arc-welding process. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web so flange compressive strength is within allowable limits for any combination of loadings. Weld clips to frames for attaching secondary framing.

Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2.  
Shop prime primary framing with specified primer immediately after fabrication..  
Factory cover steel with 1 coat of gray water-reducible alkyd primer paint formulated to equal or exceed performance requirements SSPC-Paint 25.  
Minimum Coating Thickness: 1.0 mil.

Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.  
Make shop connections by welding or by using non-high-strength bolts.

Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

## **2.16 PAINTING**

Field painting of metal building components as noted herein will be by the Metal Building Contractor.

Field Painting Preparation: Where building components are cut, drilled weathered or otherwise damaged during shipment, storage or installation they shall be cleaned, and prepared per manufacturer's written instructions and recommendations and touchup painted using primers as recommended by the manufacturer. Primers shall be compatible with Manufacturer's primer and field painting.

Basis for Design Paint System: Tnemec Company, Inc. Items to be field painted are as follows:

Personnel Doors and Frames.

1st Coat: Endura-Shield Series 1075 by Tnemec at 4.0 – 6.0 dry mils.

Color: To be selected by Owner's Representative.

Overhead Sectional Frames and Components

1st Coat: Endura-Shield Series 1075 by Tnemec at 4.5 – 6.5 dry mils.

Color: To be selected by Owner's Representative.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

Before erection proceeds, survey elevations and locations of concrete surfaces and locations of anchor bolts, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.

Proceed with erection only after unsatisfactory conditions have been corrected.

All work shall be in accordance with federal standards and instructions of OSHA, *IBC 20015* and state and local codes, including any additional requirements by state or agencies that have jurisdiction where the building is to be constructed.

### **3.2 PREPARATION**

Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

### **3.3 ERECTION OF STRUCTURAL FRAMING**

Erect metal building system according to manufacturer's written erection instructions and erection drawings.

Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

**Base and Bearing Plates:** Clean concrete and masonry bearing surfaces of bond reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

Set plates for structural members on wedges, shims, or setting nuts as required.

Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of structure. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

**Primary Framing and End Walls:** Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325-14 or A 490 Bolts" for bolt type and joint type specified.

**Joint Type:** Snug tightened or pretensioned.

**Secondary Framing:** Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.

Provide rake or gable purlins with tight-fitting closure channels and fasciae.

Locate and space wall girts to suit openings such as doors and windows.

Provide supplemental framing at entire perimeter of openings, including doors, fans, louvers, and other penetrations of roof and walls.

**Bracing:** Install bracing in roof and sidewalls where indicated on erection drawings. Designer is to coordinate openings and future passage ways. Tighten rod bracing to avoid sag.

**Steel Joists and Joist Girders:** Install joists, girders, and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders," joist manufacturer's written instructions, and requirements in this Section.

Before installation, splice joists delivered to Project site in more than one piece.

Space, adjust, and align joists accurately in location before permanently fastening.

Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.

Bolt joists to supporting steel framework using high-strength structural bolts unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325-14 or A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

**Framing for Openings:** Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

**Erection Tolerances:** Maintain erection tolerances of structural framing within AISC 303-16.

Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

### **3.4 METAL PANEL INSTALLATION, GENERAL**

**Examination:** Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

**General:** Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement. Field cut metal panels only with the approval of the Owner's Representative. Each location where field cutting is to be addressed shall have separate approval. Field cutting of metal panels by torch is not permitted. Install metal panels perpendicular to structural supports unless otherwise indicated. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws. Locate and space fastenings in uniform vertical and horizontal alignment. Lap metal flashing over metal panels to allow moisture to run over and off the material.

**Metal Protection:** Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

**Joint Sealers:** Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers,

and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.

Prepare joints and apply sealants to comply with requirements by manufacturer unless detailed otherwise.

### **3.5 METAL ROOF PANEL INSTALLATION**

General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations. For lengths exceeding manufacturer's recommended lengths, panel endlaps shall be swaged at least 6 inches. Expansion joints for panel lengths exceeding manufacturer's standards shall be located by the Metal Building Engineer. Manufacturer's standard details shall be submitted for approval.

Standing-Seam Metal Roof Panels: Roof Panels shall be seamed using Manufacturer's standard seaming process. The seam shall be a 360 degree "Pittsburgh" seam using a heavy duty electric roll forming machine. Insure that manufacturer's sealant is continuously and completely engaged in the seam prior to starting the seam roll process. Clearly show on shop drawings where roof panels are fixed and the direction in which thermal expansion takes place. Provide attachment clips and flashing details which fully allow for thermal movement of the system based on the environment and conditions of use of the building. The flashing of penetrations such as vents, roof hatches or mechanical curbs shall not restrict the thermally induced movement of roof panels that is expected to take place. The anticipated expansion / contraction shall not exceed the attachment clip travel capacity. Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.

Install clips to supports in predrilled holes.

Install pressure plates at locations indicated in manufacturer's written installation instructions.

Provide metal closures at peaks, rake edges, rake walls and each side of ridge caps.

Install ridge caps as metal roof panel work proceeds.

Flash and seal metal roof panels with weather closures at eaves and rakes.

Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within offset of adjoining faces and of alignment of matching profiles. Excessive panel creep will not be accepted.

Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

### **3.6 METAL WALL PANEL INSTALLATION**

General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.

Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing. Shim or otherwise plumb substrates receiving metal wall panels. When building height requires two rows of metal panels at gable ends, align joint of gable panels over metal wall panels at eave height. Use manufacturer's standard stack extrusion, typical at all vertical panel extensions and use extrusion appropriate to detail required.

Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.

Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Install screw fasteners with power tools having controlled torque adjusted to anchor to the specified torque without damage to washer, screw threads, or panels. Install screws in predrilled holes. Install flashing and trim as metal wall panel work proceeds. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and as necessary for waterproofing. Align bottom of metal wall panels and fasten with manufacturer's standard detail. Install with manufacturer's standard base extrusion. Handle and apply sealant and backup according to sealant manufacturer's written instructions.

Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls. Flash and seal wall panels with weather closures under eaves and rakes, along lower panel edges, and at perimeter of all openings.

Use stainless-steel fasteners for exterior and interior applications. Locate and space fastenings in true vertical and horizontal alignment. Fasteners shall be installed with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Weatherproof escutcheons or flashing shall be provided for pipe, conduit, cable tray, and duct penetrations at exterior walls.

Installation Tolerances: Shim and align metal wall panels within installed tolerance of 3/8 inch in 20 feet, noncumulative, on level, plumb, and on location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

### **3.7 THERMAL INSULATION INSTALLATION**

Fiberglass batt insulation with a vapor retarder face shall be installed at locations where Butlerib II metal wall panels and MR-24 roof panels require insulation. Installation shall be per manufacturer's written instructions. Where roof and wall panels are insulated, the insulation facing at the junction of the wall and roof shall be taped with the manufacturers standard vapor retarding tape to insure a continuous vapor barrier.

### **3.8 DOOR AND FRAME INSTALLATION**

General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.

Personnel Doors and Frames: Install doors and frames according to SDI A250.8-2014. Fit non-fire-rated doors accurately in their respective frames, with the following clearances:

Between Doors and Frames at Jambs and Head: 1/8 inch

At Door Sills with Threshold: 3/8 inch

At Door Sills without Threshold: 3/4 inch

Field Glazing: Clean channel surfaces and prime as recommended by sealant manufacturer. Cut glass to required size for measured opening; provide adequate edge clearance and glass bite all around. Do not install glass that has significant edge damage or other defects. Install setting blocks at quarter points, set in a bed of sealant if heel bead is used. Install spacers inside and out, all around, where liquid or plastic/mastic compounds are used. Replace glass that is broken or damaged to ensure that each piece of exterior glass

is airtight and watertight through normal weather/temperature cycles and through normal door operation.

**Door Hardware:** Mount units at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

Install surface-mounted items after finishes have been completed on substrates involved. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

Set thresholds for exterior doors in full bed of butyl-rubber sealant.

**Sectional Door: Framing for Openings:** Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed. Securely attach to structural framing. Install per manufacturer's written instruction.

### **3.9 ACCESSORY INSTALLATION**

**General:** Install accessories with positive anchorage to building and weathertight mounting.

Provide for thermal expansion. Coordinate installation with flashings and other components. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

**Flashing and Trim:** Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant. Install exposed flashing and trim that is without excessive oil-canning, 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 to result in waterproof and weather-resistant performance.

**Expansion Provisions:** Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

**Gutters:** Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 24 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

**Downspouts:** Join sections with 1-1/2-inch 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. Tie downspouts to underground drainage



system indicated on civil drawings. Some small buildings may not be tied to drainage system. For those buildings, provide elbows at base of downspouts and direct water to splash blocks.

**Louvers:** Set louvers complete with necessary hardware, anchors, dampers, weather guards, and equipment supports according to manufacturer's written instructions. Locate and place louver units level, plumb, and at indicated alignment with adjacent work. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection. Provide perimeter reveals and openings of uniform width for sealants and joint fillers. Protect galvanized and nonferrous metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals. Install concealed gaskets, flashings and joint fillers as louver installation progresses, where weathertight louver joints are required. Use sealant as specified by metal wall panel manufacturer.

### **3.10 FIELD QUALITY CONTROL**

Submit erection quality-control reports as required by Berkley County Building inspector (AHJ) or at minimum to comply with metal building erectors requirements to maintain certification.

**Tests and Inspections: High-Strength, Field-Bolted Connections:** Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325-14 or A 490 Bolts."

**Welded Connections:** In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1-2015 and the following inspection procedures, at inspector's option:

Liquid Penetrant Inspection: ASTM E 165-12

Magnetic Particle Inspection: ASTM E 709-15; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

Ultrasonic Inspection: ASTM E 164-13

Radiographic Inspection: ASTM E 94

Should it become necessary, the owner reserves the right to engage a qualified testing agency to perform additional tests and inspections. Prepared test and inspection reports would be submitted to the Contractor and Owner's Representative. Products would be considered defective if they do not pass tests and inspections. Defective products would be required to be repaired to the owner's satisfaction or replaced without additional expense to the owner.

**Special Inspection Report:** At completion of erection, the approved erector shall submit a certificate of compliance to the AHJ stating that the materials supplied and work performed by the erector are in accordance with the construction documents.

### **3.11 ADJUSTING**

**Doors:** After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

**Door Hardware:** Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.

### 3.12 CLEANING AND PROTECTION

Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."

Apply a compatible primer of same type as shop primer used on adjacent surfaces.

Metal Panels: (applies to both roof and wall panels) Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer and paint.

Replace hardware that does not function properly and replace damaged doors or frames determined by Owner's Representative to be damaged and unable to be successfully repaired.

Louvers: Provide temporary protective covering where needed and approved by the louver manufacturer. Remove protective covering at the time of Substantial Completion. Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Owner's Representative, remove damaged units and replace with new units. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 133419