

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 05 50 00 – Metal Fabrications.

**1.2 REFERENCES**

- .1 ASTM International
  - .1 ASTM A153/A153M-16a, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
  - .2 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - .3 ASTM A325M-14, Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 Ksi Minimum Tensile Strength.
  - .4 ASTM A490M-14a, Standard Specification for High Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.
  - .5 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .6 ASTM A792/A792M-10(2015), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - .7 ASTM D523-14, Standard Test Method for Specular Gloss.
  - .8 ASTM D822-13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-41-GP-6M-83, Sheets, Thermosetting Polyester Plastics, Glass Fiber Reinforced.
- .3 CSA International
  - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CAN/CSA-S16-14, Design of Steel Structures.
  - .3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Sheet Steel Building Institute (CSSBI)
  - .1 CSSBI 30M-06, Standard for Steel Building Systems.
  - .2 CSSBI, Design in Cold Formed Steel-2006.
  - .3 CSSBI Bulletin B15-07, Snow, Wind and Earthquake Load Design Criteria for Steel Building Systems.
  - .4 CSSBI Sheet Steel Fact Sheet # 3-2006, Care and Maintenance of Prefinished Sheet Steel Building Products.
  - .5 CSSBI S8-08: Quality and Performance Specification for Prefinished Sheet Steel Used for Building Products.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

- .1 Material Safety Data Sheets (MSDS).
- .6 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual.
    - .1 MPI #23, Oil Alkyd Primer.
    - .2 MPI #79, Alkyd. Anti-Corrosive for Metal.
- .7 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)
  - .1 SMACNA - IAQ Guideline for Occupied Buildings under Construction, 2007.

### **1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal building materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada.
  - .2 Indicate on drawings related provisions required for mechanical, electrical and other work.
  - .3 Submit complete calculated thermal design analysis based on ASHRAE zone method or tests certified by independent analysis signed and sealed by professional engineer registered or licensed in Manitoba, Canada.
  - .4 Submit erection drawings in accordance with CSSBI 30M as follows:
    - .1 Erection drawings showing foundation loads, anchor bolt setting details, part numbers, connections and assembly details.
    - .2 Submit description of methods and sequence of erection and type of equipment proposed for use in erecting structural frame.
  - .5 Indicate details including cuts, copes, connections, holes, threaded fasteners, rivets and welds. Indicate welds by CSA welding symbols.
  - .6 Indicate anchor bolt setting plan and anchor bolt details. Co-ordinate with installer and others as required.
- .4 Certificates:
  - .1 Submit certification that building is in accordance with contract requirements signed and sealed by professional engineer registered or licensed in Manitoba, Canada.
  - .2 Submit structural analysis certification of building system signed and sealed by professional engineer registered or licensed in Manitoba, Canada.
  - .3 Submit certification stating design criteria used and loads assumed in design, which places sole responsibility for design of building components with steel building systems manufacturer signed and sealed by professional engineer registered or licensed in Manitoba, Canada.

- .5 Manufacturer's Field Reports: submit to Owner manufacturer's written report, within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

#### **1.4 QUALITY ASSURANCE**

- .1 Provide certification from steel building systems manufacturer that erector is qualified to erect system.
- .2 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
  - .1 After delivery and storage of products, and when preparatory work is complete but before installation begins.
  - .2 Twice during progress of Work at 50% and 80% complete, or as determined by DFO Representative.
  - .3 Upon completion of Work, after cleaning is carried out.

#### **1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
  - .1 Protect prefinished steel sheet during fabrication, transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.
  - .2 Handle and protect galvanized materials from damage to zinc coating.
    - .1 During storage space surfaces of galvanized materials to permit free circulation of air.
  - .3 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .4 Store and protect metal building materials from nicks, scratches, and blemishes.
  - .5 Replace defective or damaged materials with new.

### **Part 2 Products**

#### **2.1 SYSTEM DESCRIPTION**

- .1 Type: rigid frame.
- .2 Roof slope: minimum 3:12.
- .3 Wall system: pre-finished, insulated, metal wall. Exterior panels to be minimum 26 ga. thick.
- .4 Roof system: pre-finished, insulated, metal roof. Exterior panels to be minimum 26 ga. thick.
- .5 Girts and purlins: pre-finished, cold-formed, channels or z-sections.

## 2.2 DESIGN REQUIREMENTS

- .1 Structural design for the building structural system to be provided by the metal building system manufacturer in accordance with the most recent versions of the Manitoba Building Code and the National Building Code of Canada.
- .2 Structural design to include all miscellaneous structural steel framework required for openings such as doors and windows, and for support of a mural on the building's exterior (Owner to provide size, weight, and other required design information for mural). Structural design shall also provide for multiple lifting points within the workshop and boat storage areas, as indicated on the contract drawings. Maximum lifting capacity of each of lift point is to be 0.5 tonnes. Use a live load factor of 1.5 and an impact factor of 1.1 in the design of the lifting points.
- .3 Design steel building system to withstand dead loads and live loads including ceilings, sprinklers, mechanical and electrical systems, material handling systems, impact loads, as required.
- .4 Building to be designed as Occupancy Group F3 – Low-Hazard Industrial.
- .5 Minimum clear height between finished floor and underside of roof beams/rigid frame:
  - .1 For Boat Storage: 10.8 m at underside of ridge
  - .2 For Workshop: 3.05 m at lowest point
- .6 Maximum deflection:
  - .1 Roof cladding under full design load: 1/180 of clear span.
  - .2 Wall cladding under specified wind effects: 1/90 of clear span.
- .7
- .8 Boat Storage and Workshop to be designed as Occupancy Group F3 – Low-Hazard Industrial.
- .9 Effective thermal resistance: minimum 5.02 RSI for walls and minimum 10.43 RSI for roof or as required by the Province of Manitoba,
- .10 Design building walls and roof to allow for thermal movement of component materials caused by ambient temperature range of 80 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.
- .11 Ensure total absence of condensation on interior surfaces under following minimum condition:
  - .1 Interior: 22 degrees C, 30% relative humidity (RH), still air.
  - .2 Exterior: - 40 degrees C, 50 km/h wind.
- .12 Ensure building is weathertight.
- .13 Provide for positive drainage to exterior of condensation occurring within wall construction and water entering at joints.
- .14 Design building enclosure elements to accommodate, by means of expansion joints, any movement in element itself and between element and building structure caused by structural movements without permanent distortion, damage to infills, racking of joints, breakage of seals, water penetration or glass breakage.

## 2.3 MATERIALS

- .1 Structural steel: to CSA G40.20/G40.21.
- .2 Structural Bolts: to ASTM A325 complete with nuts and washers.
- .3 Anchor Bolts: to ASTM A307 complete with nuts and washers.
- .4 Welding materials: to CSA W59.
- .5 Steel sheet, zinc-coated: to ASTM A653/A653M.
- .6 Steel sheet, aluminum-zinc alloy coated: to ASTM A792/A792M.
- .7 Plastic sheets: to CAN/CGSB-41-GP-6M.
- .8 Screws: corrosion resistant purpose made, head colour to match attached sheet.
- .9 Plastic sealants and adhesives as recommended by plastics manufacturer.
- .10 Insulation: as recommended by steel building systems manufacturer.
- .11 Insulation adhesive: purposely made for insulation type and steel liner sheet, incombustible after initial set.
- .12 Vapour barrier and sealing tape: as recommended by steel building systems manufacturer.
- .13 Sealants: as recommended by sealant manufacturer and in accordance with Section 07 92 00 - Joint Sealants.

## 2.4 COMPONENTS

- .1 Wall System – Prefinished Metal Insulated Wall Panels constructed as follows:
  - .1 Exterior sheet-wall: factory preformed steel sheet (min. thickness of 26 ga.), prefinished from manufacturer's standard profiles. Include closures, gaskets, caulking, flashing and fasteners to effect weather tight installation.
    - .1 Cut ends of sheets square and clean.
  - .2 Exterior corners-wall: of material to match finish and profile of adjacent cladding material, shop cut and brake formed to correct angle.
  - .3 Accessories to exterior wall cladding, brake or bend to shape, of material.
  - .4 Interior liner sheet-wall: factory preformed steel sheet, prefinished of manufacturer's standard profiles, with interlocking side lap. Install sealant material in interlocking lap.
    - .1 Cut ends of sheets square and clean.
  - .5 Sub-girts and clips: factory preformed steel sheet.
- .2 Roof System – Prefinished Metal Insulated Roof Panels constructed as follows:
  - .1 Exterior sheet-roof: factory preformed steel sheet (min. thickness of 26 ga.), prefinished from manufacturer's standard profiles. Include closures, gaskets, caulking, flashing and fasteners to effect weather tight installation.
    - .1 Cut ends of sheets square and clean.
  - .2 Accessories to roof cladding: brake or bend to shape, of material.
  - .3 Sub-purlins and clips: factory preformed steel sheet.

- .4 Diagonal web members: factory preformed steel sheet, shop cut and formed to profile.
- .5 Gussets, lateral spacers: factory preformed steel sheet, shop cut and formed to profile.
- .6 Snow guards: along entire north side, south side near MUA.
- .3 Valley gutters:
  - .1 Form valley gutters from material and finish to match roof cladding material to size and profile with outlets as indicated. Provide:
    - .1 Support straps and fastenings,
    - .2 Flute fillers and sealants,
    - .3 Leaf screens and dams for outlets.
    - .4 Snow guards, over all man-doors and overhead doors.

## **2.5 FABRICATION**

- .1 Fabricate structural members in accordance with shop drawings and to CAN/CSA-S16.
  - .1 Tolerance to CSSBI 30M.
- .2 Provide holes for attachment of other work, as indicated.
- .3 Reinforce openings to maintain design strength.

## **2.6 FINISHES**

- .1 Clean, prepare surfaces and shop prime structural steel to CAN/CSA-S16 except where members are zinc coated or zinc-aluminum alloy coated.
- .2 All external cladding, flashing, copings, and trim to be Polyester Powder Coated (PPC).
- .3 Colours by Owner.
- .4 Interior wall faces to be 16 mm plywood to a height of 3 m, colour: White (as approved by Owner).

## **Part 3 Execution**

### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for metal building installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate.
  - .2 Inform DFO Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.

### **3.2 ERECTION**

- .1 Do work in accordance with CSSBI 30M except where specified otherwise.

- .2 Erect structural frame in accordance with shop drawings and to CAN/CSA-S16.
  - .1 Erection tolerances not to exceed those specified in CSSBI 30M.
- .3 Prepare galvanized structural steel surfaces for field welding by removing zinc before welding.
  - .1 After welding, chip away flux and prime with MPI #23.
- .4 Obtain written permission from DFO Representative prior to field cutting or altering of structural members.
- .5 Touch up with shop primer bolts, rivets, welds and burned or scratched surfaces where exposed at completion of erection.
- .6 Install wall cladding assemblies ensuring completed installation.
- .7 Secure sub-girts to structural wall supports.
- .8 Secure roof cladding sheets to structural purlins.
  - .1 Terminate sheet ends over structural supports.
- .9 Secure side laps.
- .10 Continuously seal end and side laps.
- .11 Install roof assemblies ensuring completed installation.
- .12 Install interior panels to ensure continuous vapour barrier.
- .13 Install necessary closures, gaskets, caulking sealants and flashings.
- .14 Install insulation and vapour retarder to maintain continuity of thermal and moisture protection to building elements and spaces.
- .15 Fit insulation closely around and behind electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .16 Keep insulation away from hot surfaces chimneys and gas vents.
- .17 Do not compress insulation to fit into spaces.
- .18 For roof system, apply insulation in ceiling to form continuous thermal barrier in conjunction with vapour barrier formed by ceiling panels.
- .19 For roof system, ensure continuous vapour barrier seal by pre-caulking joints of ceiling panel.

### **3.3 FIELD QUALITY CONTROL**

- .1 Manufacturer's Services:
  - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
  - .2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
  - .3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

**3.4 CLEANING**

- .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

**3.5 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal building system installation.

**END OF SECTION**