

PART 1 - GENERAL

1.1 PRICING

- .1 All costs associated with the work required by and associated with this Section shall be included as part of the Contract Price and in the price listed in item #1 of the Bid Form

1.2 GENERAL INSTRUCTIONS

- .1 Read and conform to:
 - .1 the General Conditions and the Supplementary Conditions of the Contract.
 - .2 Division 01 requirements and documents referred to therein.

1.3 SUMMARY

- .1 Provide labour, materials, Products, equipment and services to complete the pre-engineered building work specified herein. This includes all structural steel components above grade including, but is not necessarily limited, to:
 - .1 Primary structural steel: Welded plate section columns and beams for bolted field assembly.
 - .2 Secondary structural steel: Roof purlins and wall girts, cross bracing, hoist beam and support~~support for field divider curtain track~~, and lateral support for masonry walls.
 - .3 Support beams for cantilevered components and conventional framing interface.
 - .4 Standing seam roof cladding and gutter assembly.
 - .5 Insulated wall assembly.
 - .6 Eave overhangs, internal gutters, seals, metal flashings, copings, and closures.
 - .7 Rigid frame and miscellaneous framing, rough opening frame.
 - .8 Auxiliary materials required for a complete installation.
- .2 Related Requirements: Specifications throughout all Divisions of the Project shall be read as a whole, and may be directly applicable to this Section. Related requirements provided below are for convenience purposes only:
 - .1 Section 07 21 00 - Building Insulation.
 - .2 Section 07 42 46 - Insulated-Core Metal Wall Panels

1.4 REFERENCES

- .1 Definitions:
 - .1 "Post-Disaster Building": means a building that is essential to provision of services in event of a disaster. This facility is classified as post disaster as defined in the OBC.
 - .2 "Operational and Functional Component" and "OFC": means components within building which are directly associated with the function and operation of the facility. OFCs consist of architectural components, building services components, and building contents. Items specified herein may be designated as OFCs and may need to be designed in accordance with performance requirements specified herein and in Section 13 48 50.

- ~~.2 Reference Standards: Latest published editions of reference standards listed in this Section in effect as of the closing date and time of the Request for Tenders for the Contract, including any amendments adopted, are applicable unless otherwise indicated.~~
- ~~.1 Reference Standards: Unless otherwise indicated in this Section or the Building Code, the latest published editions of reference standards as of the Project's Bid Closing deadline apply.~~
- ~~.2 ASTM International~~
 - ~~.1 ASTM A325M: Standard Specification for High-Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat-Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength (Withdrawn-Replaced by ASTM F3125)~~
 - ~~.2 ASTM A792/A792M: Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process~~
- ~~.3 CSA Group~~
 - ~~.1 CSA G40.20/G40.21: General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel~~
 - ~~.2 CSA S136-16: North American specification for the design of cold-formed steel structural members~~
 - ~~.3 CSA S16: Design of steel structures~~
 - ~~.4 CSA A660: Certification of Manufacturers of Steel Building Systems~~
 - ~~.5 CSA W47.1: Certification of companies for fusion welding of steel~~
 - ~~.6 CSA W47.2: Certification of companies for fusion welding of aluminum~~
 - ~~.7 CSA W59: Welded Steel Construction~~
 - ~~.8 CSA W59.2: Welded Aluminum Construction~~
- ~~.4 Canadian Sheet Steel Building Institute (CSSBI)~~
 - ~~.1 CSSBI 30: Standard for Steel Building Systems~~
- ~~.5 ISO~~
 - ~~.1 ISO 14025: Environmental labels and declarations — Type III environmental declarations — Principles and procedures~~

1.5 DEFINITIONS

- .1 The following definitions per CSSBI 30 apply to this Section:
- .2 Pre-Engineered Metal Building System: means an integrated assembly of manufactured steel structural components and cladding components specifically designed by the manufacturer to support and transfer loads and provide a complete or partial building shell
- .3 Structural Framing: means the steel framework consisting of primary members (rigid frames, beams, girders, trusses, arches, rafters, columns), secondary members (purlins, joists, struts, bracing, tension rods, girts, eave struts, base angle and channel, header, jambs, sills and other structural items) and all necessary hardware.
- .4 Cladding: means the exposed exterior wall and roof skin of any material type and combination including fasteners and attachments, weather sealants, trim, flashing, fascia, and closures, as applicable.

1.6 PREINSTALLATION MEETINGS

- .1 Pre-installation Meetings: Schedule and hold a pre-installation meeting at the Project site at least one week before beginning work on this Section to coordinate activities with related Subcontractors.
 - .1 Required Attendance: Subcontractor performing work of this Section, representatives from manufacturers and fabricators involved in or affected by installation.
 - .2 Notification: Notify Consultant and Owner of scheduled meeting dates in advance; minimum 72 hour notice required.
 - .3 Agenda:
 - .2 Review progress of related construction activities and preparations for particular activity under consideration.
 - .3 Make note of required sequencing and coordination with materials and activities that have preceded or will follow.
 - .1 Reporting: Record significant discussions, agreements, and disagreements, including required corrective measures and actions.
 - .2 Distribution: Distribute minutes of the meeting to each party present and to other parties requiring information not more than 72 hours after meeting.

1.7 SEQUENCING

- .1 Coordinate installation with other related Sections.
- .2 Supply items to be installed by other Sections in ample time to avoid delays.
- .3 Supply necessary measurements, templates, and instructions to ensure smooth progression of construction activities.
- .4 Arrange for manufacturer's technical representative to review procedures and conditions prior to commencing work.

1.8 SUBMITTALS

- .1 Product Data: Submit manufacturer's product characteristics, catalogue cuts, installation instructions and other relevant information for each material and product used for pre-engineered building work specified in this Section.
- .2 Shop Drawings: Submit Shop Drawings indicating material layouts, details of construction, connections, and relationship with adjacent construction. As a minimum indicate following:
 - .1 Include plans, elevations, sections and details as applicable.
 - .2 Show size, location, projection of anchor bolts, grid lines, structural members, connection details, and related elements.
 - .3 Clearly mark components and parts, and provide erection Drawings for identification and parts assembly.
 - .4 Indicate field-measured dimensions on Shop Drawings.
- .3 Delegated Design Submittals:
 - .1 Engineering design completion of pre-engineered building work is delegated to Contractor based on structural design criteria indicated in Contract Documents.
 - .2 Submit Shop Drawings for work of this Section that bear the stamp of a Professional Engineer registered in Province of Ontario.

- .3 Submit copy of structural calculations upon request by Consultant.
- .4 Embodied Carbon / Environmental Product Declarations (EPDs): When available, submit product-specific or industry-wide EPDs conforming to ISO 14025 or other recognized environmental Product declaration framework meeting following criteria:
 - .1 EPD Scope: Must cover Cradle-to-Gate (A1 to A3) as a minimum.
 - .2 EPD Impact Categories: Must report Global Warming Potential (GWP) in form of unit of kgCO₂e/declared unit as a minimum.
 - .3 Product Options: Give preference to Products with compliant documentation when choice is at Contractor's option.
- .5 Material Ingredient Disclosure: When available, submit documentation disclosing chemical inventory of materials to at least 0.1% (1000ppm) meeting following criteria:
 - .1 Standard: Health Product Declaration (HPD) Open Standard, Cradle to Cradle v2 (Basic level) or Cradle to Cradle v3 (Bronze level), International Living Future Institute (ILFI) Declare, or other approved material ingredient declaration framework.
 - .2 Product Options: Give preference to Products with compliant documentation when choice is at Contractor's option.
- .6 Welding Certificate: Submit certification for welding firms and welders to verify compliance with welding qualifications specified in this section.

1.9 CLOSEOUT SUBMITTALS

- .1 Operating and Maintenance Data: Submit care and maintenance instructions for pre-engineered building to be included in building operation and maintenance manual.
- .2 Warranty Documentation: Submit copy of extended warranties specified in this Section.

1.10 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Provide Products for work of this Section by manufacturer with at least 10 years' experience manufacturing such materials.
 - .1 Steel building system manufacturer must be certified to CSA A660.
 - .2 Provide on-site supervision by a qualified technical representative during erection.
- .2 Installer Qualifications: Engage an entity with at least five years' experience installing, erecting, or assembling work similar in material, design, and extent to that shown on Drawings and Schedules, and whose work has resulted in construction with a track record of successful in-service performance.
- .3 Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - .1 Steel: to CSA W47.1 and CSA W59
 - .2 Aluminum: to CSA W47.2 and CSA W59.2
 - .3 Stainless Steel: to CSA W47.1 (Annex K) and CSA W59.
- .4 Professional Engineer's Qualifications: Employ Professional Engineer licensed to practice in Province of Ontario who carries professional liability insurance and has at least five years' experience providing engineering services of similar kind, scope, and complexity.
 - .1 Professional Engineer's Responsibility:
 - .5 production and review of Shop Drawings,

- .6 design and certification of pre-engineered building, including attachments for foundation, in accordance with applicable codes and regulations,
- .7 stamping and signing of each Shop Drawing and associated calculations
- .8 Single Source Responsibility: Obtain primary materials for this Section from a single source by a single manufacturer, and secondary materials from sources recommended by manufacturers of primary materials.

1.11 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle pre-engineered building materials in accordance with manufacturer's written instructions.
- .2 Protect pre-finished sheet steel during handling and storage as per CSSBI Bulletin No. 9.

1.12 FIELD CONDITIONS

- .1 Field Measurements: Verify actual dimensions of construction contiguous with pre-engineered building by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- .1 Provided requirements of Contract Documents are satisfied, the following manufacturers may supply Products for work this Section:
 - .1 Butler Manufacturing Company;
 - .2 Robertson Building Systems
 - .3 Steelway Building Systems
 - .4 [Behlen Industries](#)
 - .5 [Varco Pruden](#)

2.2 PERFORMANCE / DESIGN CRITERIA

- .1 Design Intent: Architectural Drawings and details are diagrammatic and are only intended to show design concept, aesthetics, interfacing requirements, configuration, components and arrangements. They are not intended to identify or solve completely problems of thermal and structural movements, assembly framing, engineering design, fixings and anchorages.
- .2 Structural Performance: Provide pre-engineered building capable of withstanding the effects of the following loads in accordance with requirements of Ontario Building Code (Part 4, Structural Design) ([geographical location - Newmarket](#)):
 - .1 Wind Loads: Determined in accordance with OBC requirements for the project's geographical location, with a 1 in 50-year return probability.
 - .2 Roof Snow Loads: Determined in accordance with OBC requirements for the project's geographical location.
 - .3 Seismic Loads: Determined in accordance with OBC requirements for the project's geographical location.
 - .4 Dead Loads: Account for loads attributable to weight of building system construction, including roof, framing, and covering materials.

- .5 Collateral Loads: Include additional imposed loads required by Contract Documents, such as sprinklers, mechanical, electrical, and ceiling systems.
- .6 Design cold-formed metal framing used for the work of this Section to CAN/CSA S136.
- .7 Design structural steel framing used for the work of this Section to CAN/CSA S16.
- .3 Deflections:
 - .1 Calculate deflections using only bare frame method. Do not use reductions based on engineering judgment unless actual calculations for the stiffness are included in the design for the specific project.
 - .2 Design frame bases assuming "pinned" connections to prevent moment transfer to foundations.
 - .3 Limit lateral deflections due to wind and gravity loads to $\{H/500\}$, where H is the building height at the eaves.
 - .4 Limit deflections of roof purlins to $\{L/180\}$ under snow and wind loading.
 - .5 Limit lateral deflections of wall girts to $\{L/180\}$ where girts brace metal siding and $\{L/720\}$ where girts brace masonry walls.
- .4 Rain Screen Principle:
 - .1 Design exterior envelope cladding systems based on Rain Screen Principle advocated by NRCC and Provide for drainage of water entering building envelope wall systems.
 - .2 Provide gaskets, baffles, overlaps, seals and compartmentalization where required to achieve appropriate pressure equalization in exterior envelope cavity wall design. Maintain integrity of continuous air barrier/vapour retarder system with adjacent surrounding air barrier/vapour retarder.
 - .3 Incorporate means of draining moisture to exterior. Design drainage system to provide clear, internal paths of drainage of any trapped moisture within construction to exterior. Ensure weep water discharges in a manner that avoids staining of architectural finishes, collecting in puddles or formation of icicles.
- .5 Thermal Movements: Ensure roof and wall framing allow for thermal movement without causing buckling, joint seal failure, undue stress on fasteners, or other detrimental effects.
 - .1 Temperature Change (Range): 67 deg C (120 deg F), ambient; 100 deg C (180 deg F), material surfaces.
- .6 Condensation Control: Ensure no condensation on interior surfaces under the following conditions:
 - .1 Interior: 22 degrees C, 30% relative humidity (RH), still air.
 - .2 Exterior: Determined according to OBC Climatic Design Conditions for the project's geographical location (assume January Temperature at 1% return).
- .7 Accommodate structural movement with expansion joints and clips without causing permanent distortion, damage to infills, joint racking, seal breakage, water penetration, or glass breakage.

2.3 MATERIALS

- .1 Steel: to CAN/CSA G40.21, with a minimum yield strength of 350 MPa. Steel must be shop primed with a 30-day primer.
- .2 Bolts: to ASTM A325M, complete with nuts and washers. Provide heavy, hexagon head high strength structural bolts, of standard size and required lengths for the thickness of members joined and the type of connection.

- .3 Welded Materials: in accordance with CSA W59 standards.
- .4 Shop-Applied Zinc-Rich Primer Paint: As recommended by manufacturer.
- .5 Galvanized Steel Sheet: to ASTM A792, structural quality grade A, with AZ165 coating, regular spangle surface, and passivated for unpainted finish. For paint finish, use AZ150 unpassivated coating.
- .6 Pre-Finished System for Steel Sheet Exposed to the Exterior: zinc-coated material with a factory-applied paint system conforming to CSSBI Technical Bulletin No. 7.
- .7 Screws: corrosion-resistant, purpose-made, concealed screws.

2.4 INSULATION

- .1 Refer to Section 07 21 00 - Building Insulation.

2.5 METAL ROOFING SYSTEM Roof type R-2, basis of design Robertson Thermal Systems (RST)

- .1 Exterior sheet-roof: factory preformed steel sheet aluminum zinc alloy coated, minimum core thickness 0.61 mm (24 Ga), standing seam roof panels with locking seam formed around concealed sliding panel clip and sealant. Include closures, gaskets, caulking, flashing and fasteners to effect weathertight installation.
- .2 Roof liner: factory preformed steel sheet, zinc coated, prefinished from manufacturer's standard profiles and colours. Minimum core thickness 0.61 mm (24 Gauge) and prefinished to 5000 paint series. Install roof liner on top of roof purlins, caulked and sealed to Provide roof vapour barrier.
- .3 Install thermal spacers, hat bar and continuous 9mm rigid insulation thermal break over roof liner to accommodate thickness of insulation and attachment of panel clips and exterior roof sheet. Sealants as recommended by manufacturer.
- .4 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.

2.6 METAL CLADDING SYSTEM

- .1 Insulated metal panel system as specified in Section 07 42 46 - Insulated-Core Metal Wall Panels.

2.7 ACCESSORIES

- .1 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.

2.8 FABRICATION

- .1 Fabricate structural members according to Shop Drawings and CAN/CSA S16.1.
- .2 Construct frames from welded plate section columns and roof beams, including necessary splice plates for bolted field assembly. Provide high-strength bolts for frame member assembly.
- .3 Reinforce openings to maintain the design strength of structure.

- .4 Factory weld base plates, cap plates, compression splice plates, and stiffener plates with shop-fabricated connection holes.
- .5 Fabricate columns and roof beams with pre-drilled holes for attachment of secondary structural members and bracing, except as noted for field work on the manufacturer's erection Drawings.
- .6 Use welded "H" sections or cold-formed "C" sections for exterior columns.
- .7 Fabricate beams and posts with pre-drilled holes for secondary structural member attachment, except as specified for field work.
- .8 Shop-fabricate splice plates and base clips with bolt connection holes. Factory weld base plates, cap plates, compression splice plates, and stiffener plates with shop-fabricated connection holes.
- .9 Substitute intermediate frames for end-wall roof beams and corner posts as required.
- .10 Ensure necessary endwall posts and connection holes to the intermediate frame are shop-fabricated.
- .11 Design secondary structures, including purlins and girts, to support specified design loads. Place bracing as indicated on reviewed Shop Drawings.
- .12 Attach diagonal bracing, consisting of hot-rolled rod, to columns and roof beams.
- .13 Install cold-formed flange braces, purlin braces, and similar components as indicated on Drawings.
- .14 Cladding Accessories: Brake or bend accessories to shape, using material and finish that matches the roof cladding or wall cladding.

2.9 TOLERANCES

- .1 Ensure tolerances comply with CSSBI 30M.
- .2 Provide holes for the attachment of other work as indicated on the Drawings.

2.10 SHOP FINISHING

- .1 Clean, prepare surfaces, and shop prime structural steel in accordance with CAN/CSA S16.1, except where members are zinc-coated, zinc-aluminum alloy coated, or to be encased in concrete.
 - .1 Commercially blast clean frames and end structures to SSPC-SP2, SSPC-SP3 or SSPC-SP66 before painting with manufacturer's standard zinc-rich primer.
- .2 Purlins and Girts: Cold form for galvanized coil~~Hot-dip galvanize purlins and girts.~~

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verify actual site conditions and location of adjacent materials prior to commencing work. Notify Consultant in writing of any conditions which would be detrimental to the installation. Commencement of work implies acceptance of previously completed work.

3.2 INSTALLATION

- .1 Installation, generally: Install work of this Section in strict accordance with manufacturer's written installation instructions and reviewed Shop Drawings. Supplement manufacturer's

installation instructions with additional installation requirements specified in this Section to produce specified work results.

3.3 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
- .3 Connect major structural members using high-tensile bolts through pre-punched or predrilled holes for precise alignment.
- .4 Do not field cut, drill, or alter structural members without written approval from the metal building system manufacturer's professional engineer.
- .5 Include support for adjacent structural members as indicated on Structural Drawings. Set structural framing accurately in locations and to elevations indicated in accordance with CSA and CSSBI standards referenced in this section. Maintain structural stability of the frame during erection.
- .6 Base and Bearing Plates
 - .1 Preparation: Clean concrete and masonry bearing surfaces of materials that may impair bond, and roughen surfaces before setting plates. Clean the bottom surface of plates.
 - .2 Setting Plates: Set plates for structural members on wedges, shims, or setting nuts as required.
 - .3 Alignment and Adjustment: Align and adjust structural framing before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact with framing before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Level and plumb individual members of the structure. Allow for temperature differences between the time of erection and the mean temperature when the structure will be completed and in service.
- .7 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 maintain a level base-line elevation. Moist-cure grout for at least seven days after placement. Make field connections using high-strength bolts installed according to manufacturer's instructions.
- .8 Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
 - .1 Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 - .2 Locate and space wall girts to suit openings such as doors and windows.
 - .3 Provide supplemental framing at the entire perimeter of openings, including doors, windows, ventilators, and other roof and wall penetrations.
- .9 Bracing
 - .1 Install bracing in roof and sidewalls where indicated on erection drawings.
 - .2 Tighten rod and cable bracing to avoid sag.
 - .3 Locate interior end-bay bracing only where indicated.
- .10 Framing for Openings: Provide shapes of proper design and size to reinforce openings and carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

3.4 PROTECTION

- .1 Protect pre-engineered building from damage, soiling and contaminating substances resulting from construction activities or caused by work of other trades.
- .2 Where soiling or spills have occurred, remove spills and soiling from adjacent surfaces using cleaning procedures recommended in writing by affected material's manufacturer. Do not use materials or process that can damage finishes, surfaces, or construction.
- .3 Promptly replace pre-engineered building work damaged during construction that cannot be satisfactorily repaired.

3.5 CLEANING AND WASTE MANAGEMENT

- .1 Cleaning: Maintain clean construction area at the end of each day. When activities of this Section are complete, remove materials, tools, equipment and rubbish.
- .2 Waste Management and Disposal: sort waste for reuse, recycling, or disposal, as specified. Remove recycling bins and containers from site and dispose of contents at the appropriate waste disposal facilities.

END OF SECTION