

Part 1 General**1.1 DESCRIPTION**

- .1 This section includes all expertise, labour, materials, equipment and services for the supply, delivery and installation of structural steel for buildings in compliance with drawings, the present section and contractual documents.
- .2 Work includes all structural steel shown on shop drawings, cast-in-concrete elements and anchoring bolts.

1.2 REFERENCE STANDARDS

- .1 The following standards and publications are referred to this section of the specifications and are an integral part of such. Their requirements apply without being restrictive in nature with regard to other requirements of the present section.
- .2 ASTM International Inc.
 - .1 ASTM A240/A240M-14, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.
- .4 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
 - .1 Handbook of the Canadian Institute of Steel Construction.
 - .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.
- .5 CSA Group (CSA)
 - .1 CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16-01(R2007), Limit States Design of Steel Structures.
 - .4 CAN/CSA-S136-07, North American Specifications for the Design of Cold Formed Steel Structural Members.
 - .5 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.
 - .6 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
 - .7 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .8 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
- .6 Master Painters Institute
 - .1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.
 - .2 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.

- .7 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International

- .1 NACE No. 3/SSPC SP-6-06, Commercial Blast Cleaning.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 The Contractor shall prepare and submit to the Department Representative within two (2) weeks following reception of documents issued for construction, a calendar indicating shop drawing remittance and fabrication schedule. The calendar must reflect detailed requirements of the contract and be updated on a regular basis. Transmit updates of calendar to the Department Representative.
- .3 Erection drawings:
 - .1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:
 - .1 Description of methods.
 - .2 Sequence of erection.
 - .3 Type of equipment used in erection.
 - .4 Temporary bracings.
 - .2 Submit this procedure at least two (2) weeks prior to commencing erection works.
- .4 Fabrication drawings:
 - .1 Sketches and calculations must be signed by an engineer registered or licensed in Nunavut, Canada. The services of this engineer are to be retained and paid by the Contractor.
 - .2 Prior to commencing fabrication, submit to the Department Representative for review and comments, one (1) copy and one (1) reproducible, of shop drawings and construction erection drawings for frame and structures describing all elements necessary to perform work in accordance with drawings and specifications. The Contractor must not undertake fabrication of frame components until shop and construction erection drawings have been reviewed by the Department Representative.
 - .3 Shop and construction erection drawings shall be delivered to the Department Representative in a timely manner so that he may be provided with at least fifteen (15) working days to examine them.
 - .4 Shop and construction erection drawings must bear the signature and stamp of the Department Representative who has designed the assembly details and is engineer registered or licensed in Nunavut, Canada. The services of this engineer are to be retained and paid by the Contractor.
 - .5 Keep an updated shop drawing log up to date. An electronic copy (.xlsx format) of the record shall systematically accompany shop drawing submittals. After having received reviewed drawings, resubmit the revised record based on the status of each drawing, such as:
 - .1 No corrections noted
 - .2 Make corrections as indicated
 - .3 Re-submit

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- .4 Rejected
- .5 Structures and assemblies must be calculated in accordance with the requirements of CAN/CSA S16, to resist forces, moments, shears and allow for movements indicated.
- .6 Shop and construction erection drawings must refer to contract number and related engineering drawing. The complete project title, including names of an engineer registered or licensed in Nunavut, Canada, the Department Representative and the Contractor must appear on each drawing.
- .7 The Contractor is authorized to use engineering drawings issued for construction as construction erection drawings, however, the title box must be replaced by that of the Contractor and the Department Representative's stamp must be removed.
- .8 Drawings, with or without annotations by the Department Representative, will be returned to the Contractor, who will review such drawings and resubmit them to the Department Representative for examination and comments. However, if the Department Representative finds that too many revisions are required, he shall return the drawings without annotating them; in addition, if the drawings need to be submitted more than twice, the Department Representative shall withhold funds from the Contractor to pay for the costs of the Department Representative's additional reviews.
- .9 The Contractor is solely responsible for the accuracy of his drawings; he cannot claim any supplement for delays caused by the discovery, on site, of errors or omissions on his own drawings, even if they have been previously examined by the Department Representative.
- .10 The Contractor shall have a quality control program, subject to the Department Representative's approval, such as the generally accepted requirements of ISO 9002. This program shall be submitted to the Department Representative prior to contract signature.
- .11 The Department Representative reserves the right to inspect the Contractor's factory work and that of his suppliers and sub-contractors at any time during working hours. Cooperation during visits shall be in compliance with CAN/CSA-S16.
- .12 Welding procedure
- .1 Prior to fabrication, submit to the Department Representative for review, shop welding procedures. Field welding procedures shall also be submitted, as required.
- .2 The Contractor must comply with the provisions of CAN/CSA-W47.1: Certification of Companies for Fusion Welding of Steel Structures. The Contractors, as well as all personnel involved in welding will be accredited in Division 1 or 2 of the Canadian Welding Bureau. At the request of the Department Representative, submit certifications for Specialized Contractor.
- .13 Samples:
- .1 Provide certificates of Quality Compliance from steel fabricator attesting to the chemical analysis and physical properties for steel used in fabrication and deliver these documents to the Department Representative.
- .14 Test report
- .1 Submit to the Department Representative for review, mill test report including the chemical make-up, physical properties, etc.
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- .2 At the Department Representative's request, submit quality report and factory non-destructive testing reports. These reports must indicate parts inspected and tests performed.

1.4 DEPARTMENT REPRESENTATIVE'S AUTHORIZATION / APPROVAL

- .1 When required in compliance with the requirements of the present section, the Department Representative's authorization/approval shall not be considered to have been given until in writing or recorded in the ratified minutes by all persons present at a site meeting which the Department Representative attended.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.
- .2 Deliver materials in manufacturer's original, undamaged containers with identification labels intact.
- .3 Packaging Waste Management in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

Part 2 Products**2.1 DESIGN REQUIREMENTS**

- .1 Design details and connections in accordance with requirements of CAN/CSA-S136 and CAN/CSA-S16 to resist forces, moments, shears and allow for movements indicated.
- .2 Unless otherwise indicated, structures must be at least equivalent to those detailed in Tables 3-37 and 3-38 of the Handbook of Steel Construction published by the Canadian Institute of Steel Construction.
- .3 Unless otherwise indicated, beam structures must be able to resist the following at both ends when:
 - .1 Shear resistance is 120% of the beam flexural resistance taking into consideration that the top is laterally supported across entire span;
 - .2 Shear resistance is 50% of the beam shear resistance.
- .4 End plates and angles for beams shall be at least 8 mm thick and have at least 6 mm weld beads.
- .5 The bending strength of a member not detailed on drawings and for which load calculations are not given must have full bending strength of the weakest section of member.
- .6 Unless otherwise indicated, weld surfaces in contact with stiffeners via a continuous fillet weld on each side of plate. Use minimum size fillet according to requirements of CSA W59 standard based on stiffener thicknesses.
- .7 Submit splices for approval. Unless otherwise indicated, design splices to develop 100% of compression and bending resistance.
- .8 Anticipate a closing plate at least 6 mm thick at the top of tubular steel columns.
- .9 Unless otherwise indicated on drawings, all factory built-up work must be welded. If bolted assemblies are specified, high strength anchor bolts will be used. Use a minimum of two bolts per bolted assembly (including those made using concrete anchors).
- .10 Unless otherwise indicated on drawings, all field built-up structures must be bolted assemblies (bearing type joints) except for bracings and rigid assemblies (able to resist a moment) which must be friction type with value $k_s = 0.33$ and $c_1 = 0.82$ and suitable cleaning. Contractor may use higher values only if he is able to demonstrate to the Department Representative that the surfaces in contact at the time of erecting meet the requirements permitting use of such values.
- .11 Crossbracing structures must be designed taking into consideration crossbracing type Conventional Construction ($R_d = 1.5$, $R_o = 1.3$), as per the requirements of article 27.11 of CAN/CSA-S16 standard.
- .12 Crossbracing structures will be friction type for loads indicated on drawings or bearing type joints for loads calculated according to the requirements of article 27.11 of CAN/CSA-S16 standard, by using the method that provides the greatest number of bolts; however, preparation of contact surfaces will be done for friction-type assemblies.
- .13 When the load to be transferred is not indicated on drawings, welds shall be calculated to attain full strength of the structures that it joins.

- .14 Eccentric assemblies or those located on a single side of beam pan cannot be used unless it is impossible to detail a symmetrical structure.
- .15 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Nunavut, Canada for non-standard connections.

2.2 MATERIALS

- .1 Laminate or welded channels, plates and bars: to CSA-G40.20 and CSA-G40.21. Grade 350W, except angles (L) and channels (C) and plates that may be Grade 300W.
- .2 Tubular steel channels: in compliance with specifications of CSA-G40.20 and CSA-G40.21 or ASTM A500. Use Grade 350W, Class C, unless otherwise indicated on drawings.
- .3 Embedded plates: to CSA-G40.21, Grade 300W.
- .4 Anchor bolts: to ASTM A307, unless otherwise indicated on drawings.
- .5 High strength anchor bolts: to ASTM A193/A193M, unless otherwise indicated on drawings.
- .6 Bolts, nuts and washers: to ASTM A325 or ASTM A490/A490M.
- .7 Welding materials: to CSA W59, CSA W48 Series and certified by Canadian Welding Bureau.
- .8 Shop paint primer: to CISC/CPMA2-75 solvent reducible alkyd, grey.
- .9 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m².
- .10 Shear studs: to CSA W59, Appendix H.
- .11 Stainless Steel: Type 316 to ASTM240

2.3 FABRICATION

- .1 All materials shall be new.
- .2 All structural elements must be factory fabricated at the Subcontractor's location.
- .3 Strict compliance with the requirements of CAN/CSA-S16 is required, as with the details shown on shop drawings.
- .4 Camber beams as specified on drawings.
- .5 Finish ends of hollow channels with 6 mm minimum end plates. Plan for inspection and flow ports. Pre-cut hollow structural sections to be filled with urethane (see architectural drawings for location).
- .6 Avoid creating areas where water and dust will accumulate in structural steel framing. Drill drainage holes as needed.
- .7 Any member in which fabrication tolerances have not been respected or has poorly executed welds may be rejected by the Department Representative.

2.4 SHOP PAINTING

- .1 Shop prime structural steel in accordance with CISA/CPMA Standard 2-75 except where members are in contact with concrete, to be embedded in concrete, or those that must maintain faying surfaces for friction-type connections.

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- .2 Bolt heads, nuts and washers, and field-welded surfaces or damaged surfaces must be primed or touched up using the same paint system.
 - .3 Perform work in shop described in sub-articles below in strict compliance with the requirements of article 28 of CAN/CSA-S16 standard.
 - .4 Before applying quick-dry paint, all grease and oil must be removed in accordance with SP1-63 SSPC "Solvent Cleaning" and all steel must be cleaned according to a suitable method to eliminate loose rust, scaling, grime, welding flux, etc., equivalent to illustrated standard DST 2 of VIS-1 SSPC "Guide and Reference Photographs by Dry Abrasive Blast Cleaning". Use of anti-splatter product is required for exposed steel portions of open web joist beams, HSS round posts, bracing and exposed beam connections.
 - .5 Primer may not be applied if the steel surface is wet due to rainfall or condensation, or if the relative humidity is higher than 85%, and if the ambient temperature may fall below 0°C before primer is dry enough for handling.
 - .6 Primer may not be applied if its temperature is higher than 15°C and steel surfaces for application of primer are between 5°C and 35°C.
 - .7 All primer work must be done according to primer manufacturer's recommendations and as per requirements of the present section by following the most rigorous requirements.

Part 3 Execution**3.1 APPLICATION**

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 SITE VERIFICATION

- .1 Verify all dimensions and elevations on site (through surveys) before commencing fabrication of structural elements. Verification must take place in a timely manner to avoid creating delays on site.

3.3 SUBSTITUTIONS

- .1 Any substitutions for materials specified in articles 2 or profiles indicated on drawings must be approved in writing by the Department Representative, who may require that design calculations be submitted justifying the substitution requested.

3.4 GALVANIZATION

- .1 Steel that is exposed to weather must be hot dip galvanized in compliance with the most recent version of CAN/CSA-G164 standard.
- .2 All previously-cleaned surfaces must be dry and free of dust and debris at the time of galvanization.
- .3 Raw welds and sharp edges must be smoothed and burrs removed.
- .4 Galvanization will be performed by hot dip to obtain a continuous zinc layer with uniform thickness that adheres perfectly to all steel surfaces and ensures complete protection following installation.
- .5 Each part to be galvanized must be done so in a single infusion, and as needed, vent holes must be anticipated during fabrication.
- .6 No further fabrication is permitted following galvanization.
- .7 For galvanization purposes, the Contractor may reinforce parts deemed to be too thin or possibly warp during galvanization.
- .8 Preparation of surfaces to be touched up by power tools in accordance with requirements of SSPC-SP3 – Power Tool Cleaning, and visual inspection must be in compliance with SSPC-VIS 3.
- .9 Touch-ups to galvanized steel further to defects or welding or cutting: use zinc rich coating according to ASTM A-780 and CGSB CAN/CGSB-1.181 and recognized by Underwriters' Laboratories as part of coating components program, ZRC Galviline Repair Galvanizing Compound from ZRC Worldwide, or equivalent. Coating dry film must contain 95% weight metallic zinc. The product must be applied as per the manufacturer's recommendations and portion to be repaired must be suitably prepared.

3.5 DELIVERY, STORAGE AND HANDLING

- .1 Load, transport and deliver steel to the site. Take necessary precautions to avoid damaging members and their painted surfaces during handling and transportation.

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- .2 Ensure that painted surfaces are not placed face to face but rather separated by wooden blocks, Styrofoam spacers, or other suitable materials.
 - .3 Use nylon straps to raise materials, and if necessary, use cradles or crates.
 - .4 Firmly secure steel using chains and protective cushions to transportation vehicles to avoid horizontal motion. Protect metal edges with rubber, burlap or wood. Do not load small sections within U channels or beams.
 - .5 Unload in location as indicated. Provide equipment and labour to unload without causing damage and place on wooden blocks.
 - .6 Choose suitably sized wooden blocks and space them correctly to avoid steel from coming into contact with ground.

3.6 EXPOSED STEEL PORTIONS

- .1 All exposed steel portions as per structural and/or architectural drawings must meet the criteria of the CISC-AESS Guide, for:
 - .1 Columns, marquees: AESS 3;
 - .2 Structure, marquees: AESS 2;
 - .3 Others: AESS 1.

3.7 CAST-IN-PLACE MEMBERS

- .1 All cast-in-place steel members and those exposed to weather conditions will be hot dip galvanized in compliance with CAN/CSA-G164.
- .2 Nelson type connectors will be subject to a special inspection program before plates are installed.

3.8 CONCRETE ANCHORS

- .1 Contractor is to anticipate expansion anchors, epoxy/chemical type concrete fasteners, masonry anchors and anchoring bolts at the base of columns.

3.9 MARKING

- .1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.
- .2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.10 ERECTION

- .1 The proposed technique and equipment used to erect the frame are subject to the Department Representative's review. However, such review does not relieve the Contractor of his sole responsibility for selection of technique and equipment mobilization to perform the work quickly and safely.
- .2 Firmly secure temporary bracings, falsework and guy wires of suitable resistance to resist loads due to extreme winds or other, until final structural elements have been installed.
- .3 Leave temporary bracings in place if the permanent stability of the construction depends on the work of other trades until such work is completed.

- .4 Frame shall be erected in strict compliance with the requirements of article 29 of CAN/CSA-S16 standard.
- .5 Notify the Department Representative as soon as possible of any defects in the assembly of factory fabricated structural members and comply with Department Representative's decision with regard to corrections to be made.
- .6 Straighten slightly kinked members before assembling them on site and replace all structural elements that are damaged if the Department Representative doubts their performance.
- .7 It is strictly forbidden to make assembly welds on site unless indicated on shop drawings or previously approved by the Department Representative.
- .8 It is strictly forbidden to cut, pierce or modify structural members in any manner on site by flame cutting unless the Department Representative's prior written approval has been obtained.
- .9 After erection is complete, apply a coat of paint to field welds and bolted joints, and touch up surfaces that were burned or scratched during work.

3.11 FIELD QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship must be provided by the contractor. The contractor must provide the services of a Testing Laboratory that shall provide the Department Representative with a written report of all the tests performed.
- .2 The testing laboratory shall perform test to verify bolt torque, plumbness and straightness of structure.
- .3 The testing laboratory shall perform non-destructive testing on the following welds:
 - .1 End-to-end welds: radiography
 - .2 End-to-end welds: magnetic particle testing
 - .3 Full T penetration weld: ultrasonic
- .4 Testing will be performed on a number of randomly selected welds according to the following:
 - .1 Fillet weld: 25%;
 - .2 Factory full penetration weld: 25%;
 - .3 Field full penetration weld: 100%.
- .5 If the defects surpass the limits of CSA W59, the laboratory shall perform tests along entire weld length. Contractor shall repair all defects. Once repaired, laboratory shall inspect repaired portions until satisfactory. Repairs and additional testing will be at the Contractor's cost.
- .6 Welds must respect the criteria of CSA W59 to be considered acceptable.
- .7 The Testing Laboratory shall provide a complete inspection report to the Departmental Representative. This report will be necessary before acceptance of work.

3.12 FIELD PAINTING

- .1 Paint in accordance with Section 09 91 00- Painting.
 - .1 Touch up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-6 except as specified otherwise. Apply in accordance: MPI Architectural Painting Specification Manual.

3.13 CLEANING

- .1 Clean in accordance with Section 01 74 11- Cleaning.
- .2 Waste Management: in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.
- .2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
 - .1 CISC/CPMA 2-75-1975, Quick-Drying, Primer for Use on Structural Steel.
 - .2 CISC/CPMA 1-73a-1975, Quick-Drying, One-Coat Paint for Use on Structural Steel.
- .3 CSA International
 - .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA S16-14, Design of Steel Structures.
 - .3 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel.
 - .4 CSA W55.3-08(2013), Certificate of Companies for Resistance Welding of Steel and Aluminum.
 - .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding) [Metric].
- .4 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.

1.2 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 steel joist framing 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 Nunavut, Canada.
 - .2 Indicate on erection drawings, relevant details such as joist mark, depth, spacing, bridging lines, bearing, anchorage and details.
 - .3 Indicate particulars, on shop drawings, relative to joist geometry, framed openings, splicing details, bearing and anchorage. Include member size, properties, specified and factored member loads, and stresses under various loadings, deflection and camber.
- .4 Delegated Design Submittals.

1.3 QUALITY ASSURANCE

- .1 Submit 2 copies of mill test reports at least 4 weeks prior to fabrication of steel joists and accessories. Reports to show:
 - .1 Chemical and physical properties.
 - .2 Other details of steel to be incorporated into work.
 - .3 Certification by qualified metallurgists confirming that tests conform to requirements of CSA G40.20/G40.21
- .2 Submit affidavit prepared by fabricator of structural steel joists stating that materials and products used in fabrication conform to this specification.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 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 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.

Part 2 Products**2.1 DESIGN CRITERIA**

- .1 Design steel joists and bridging to carry loads indicated on structural plans. Provide, where requested on structural plans, the required rigidity (Moment of inertia).
- .2 Design joists and anchorages for uplift forces as indicated.
- .3 Ensure joists are manufactured to consider load effects due to fabrication, erection and handling.
- .4 Limit roof joist deflection due to specified live load to 1/360 of maximum of span.
- .5 Limit floor joist deflection due to specified live load to 1/360 of maximum of span.

2.2 MATERIALS

- .1 Open web steel joists: to CSA S16.
- .2 Structural steel: to CSA G40.20/G40.21.
- .3 Welding materials: to CSA W59.
- .4 Shop paint primer: to CISC/CPMA-2-75, grey.
- .5 Shear studs: to CSA W59, Appendix H.

2.3 FABRICATION

- .1 Fabricate steel joists and accessories as indicated in accordance with CSA S16 and in accordance with approved shop drawings.
- .2 Weld in accordance with CSA W59.
- .3 Provide bottom chord extensions where indicated.
- .4 Provide diagonal and horizontal bridgings and anchorages as indicated.
- .5 Weld studs to top chords for attachment purposes.
- .6 Install shear studs in accordance with CSA W59.

2.4 SHOP PAINTING

- .1 Clean, prepare and shop prime surfaces of steel joists to SSPC SP6 and CSA S16.
 - .2 Clean members of loose mill scale, rust, oil, dirt and other foreign matter. Prepare surfaces to SSPC SP1 brush blast.
 - .3 Apply one coat of CISC/CPMA 2 primer to steel surfaces to achieve dry film thickness of .065 mm to .080 mm maximum except:
 - .1 Surfaces to be encased in concrete.
 - .2 Surfaces to receive field installed stud shear connectors and steel decks.
 - .3 Surfaces and edges to be field welded.
 - .4 Faying surfaces of friction-type connections.
 - .5 Below grade surfaces in contact with soil.
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- .4 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
- .5 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
- .6 Strip paint bolts, nuts, sharp edges and corners before prime coat is dry.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for steel joist framing installation in accordance with manufacturer's written instructions.
 - .1 Inform the Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

3.2 INSTALLATION

- .1 Do structural steel work: to CSA S16.
- .2 Do welding: in accordance with CSA W59.
- .3 Ensure installers are certified to CSA W47.1 for fusion welding and CSA W55.3 for resistance welding.
- .4 Submit certification that welded joints are qualified by Canadian Welding Bureau.

3.3 FIELD QUALITY CONTROL

- .1 Inspection will be carried out by the Departmental Representative.

3.4 ERECTION

- .1 Erect steel joists and bridging as indicated to CSA S16 and in accordance with approved erection drawings.
- .2 Complete installation of bridging and anchorages before placing construction loads on joists.
- .3 Field cutting or altering joists or bridging must be submitted to the Departmental Representative for approval.
- .4 Clean and touch up shop primer to bolts, welds, burned or scratched surfaces at completion of erection.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Waste Management: in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by steel joist framing installation.

END OF SECTION

Part 1 General**1.1 DESCRIPTION**

- .1 This section includes all materials, equipment, services for the supply, delivery and installation of steel decking, and all that is necessary for complete execution of steel decking work.
- .2 Work includes steel decking for overall project and all stud shear connections shown on drawings, cover plates, side-lap fasteners for steel decking in proximity to columns and directly in rigid assemblies, all supports that could be required for openings shown on drawings and those required to meet the needs of other disciplines.

1.2 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .2 CSA Group
 - .1 CSA C22.2 No.79-2016, Cellular Metal and Cellular Concrete Floor Raceways and Fittings.
 - .2 CSA S16-14, Design of Steel Structures.
 - .3 CSA S136-12, North American Specification for the Design of Cold Formed Steel Structural Members.
 - .4 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .5 CSA W55.3-09(R2014), Certification of Companies for Resistance Welding of Steel and Aluminum.
 - .6 CSA W59-13, Welded Steel Construction, (Metal Arc Welding).
- .3 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 10M-13, Standard for Steel Roof Deck.
 - .2 CSSBI 12M-15, Standard for Composite Steel Deck.
- .4 Green Seal Environmental Standards (GS)
 - .1 GS-11-Edition 3.2 (2015), Paints and Coatings.

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 steel decking 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 Nunavut, Canada.

- .2 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.
- .3 Indicate details of temporary shoring of steel deck, such as location, time and duration of placement and removal of shoring for concrete fill decks.

1.4 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 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect decking from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products**2.1 DESIGN CRITERIA**

- .1 Design steel deck to CSA S136.
- .2 Steel deck and connections to steel framing to carry dead, live and other loads including lateral loads, diaphragm action, composite deck action, and uplift as indicated.
- .3 Deflection under specified live load not to exceed 1/360 of span.
- .4 Where vibration effects are to be controlled as indicated, dynamic characteristics of decking system to be designed to be in accordance with CSA S16.

2.2 MATERIALS

- .1 Zinc (Z) coated steel sheet: to ASTM A653/A653M structural quality Grade 230, with ZF75, coating, regular spangle surface, chemically treated for unpainted finish, for exterior surfaces exposed to weather,
- .2 Closures: as indicated in accordance with manufacturer's recommendations.
- .3 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness of 0.76 mm minimum. Metallic coating same as deck material.
- .4 Shear studs: to CSA W59.

2.3 TYPES OF DECKING

- .1 Steel roof deck: see specifications on structural plans.
- .2 Composite steel floor deck: see specifications on structural plans.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for steel decking installation in accordance with manufacturer's written instructions.
 - .1 Inform the Departmental Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed the Departmental Representative.

3.2 INSTALLATION

- .1 Structural steel work: in accordance with CSA S136.
- .2 Welding: in accordance with CSA W59, except where specified otherwise.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel and/or CSA W55.3 for resistance welding.

3.3 ERECTION

- .1 Erect steel deck as indicated and in accordance with CSA S136 and in accordance with approved erection drawings.
- .2 Butt ends: Install steel cover plates over gaps wider than 3 mm.
- .3 Prior to concrete placement, steel deck to be free of soil, debris, standing water, loose mill scale and other foreign matter.
- .4 Temporary shoring, if required, to be designed to support construction loads, wet concrete and other construction equipment. Do not remove temporary shoring until concrete attains 75% of its specified 28 day compression strength.
- .5 Place and support reinforcing steel as indicated.

3.4 CLOSURES

- .1 Install closures in accordance with approved details.

3.5 OPENINGS AND AREAS OF CONCENTRATED LOADS

- .1 No reinforcement required for openings cut in deck which are smaller than 150 mm square.
- .2 Frame deck openings greater than 150 mm with detail on structural plans.

3.6 CONNECTIONS

- .1 Install connections in accordance with CSSBI recommendations as indicated.

3.7 DESIGN CRITERIA

- .1 Steel deck units must have panels of minimum thickness and nominal profile depth in compliance with drawings and be able to support the loads indicated on drawings. Steel decking units must have interlocking side laps. Steel floor decks must be high adherence type.
- .2 Design deck units to span continuously over three (3) spans.
- .3 Butt panels above supports so that their ends overlap by at least 50 mm.
- .4 For members not in contact with deck (primary tension members lower than secondary tension members) add a support post (HSS 201 x 102 x 6.4 by 200 mm long, for example) between deck and bearing member to respect nail spacing.
- .5 Secure steel decking using power driving deck fasteners as indicated on plans. Unless otherwise indicated on drawings, space steel decking fastenings to supports at maximum 150 mm o/c and connect adjacent sections to steel decking by interlocking and securing with screws at maximum 300 mm o/c.
- .6 Align fastenings for clearance between fastenings and side laps and perimeter edges of panels or deck groove side to be as recommended by the manufacturer.
- .7 Use power driving deck fasteners cartridges of suitable driving rate to meet cartridge nail head clearances as recommended by the manufacturer.
- .8 Before commencing work, perform test fixations in the presence of the manufacturer representative to determine suitable driving rate to ensure appropriate cartridge nail release.
- .9 Submit technical datasheets and a letter attesting that the Contractor has received instructions and recommendations to install fastening system.
- .10 It is strictly forbidden to make cavities on site 150 mm dia. or larger (or sides measuring 150 mm) without reinforcing the deck around these openings. Reinforcing details must be shown on shop drawings and submitted to the Departmental Representative for review.
- .11 Secure angles, 75 mm x 75 mm x 6 mm, before columns.
- .12 Secure serrated closures in locations to receive cast-in-place concrete as per manufacturer's recommendations.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.

3.9 PROTECTION

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

END OF SECTION