

PART 1 - GENERAL

1.1 RELATED WORK

- .1 Section 04 22 00 - Concrete Unit Masonry

1.2 REFERENCES

- .1 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers' Association (CPMA).
 - .1 CISC/CPMA1-(73b), Quick Drying, One-Coat Paint for Use on Structural Steel.
 - .2 CISC/CPMA2-(75), Quick-Drying, Primer for use on Structural Steel
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-G40.20-13 General Requirements for Rolled or Welded Structural Quality Steel
 - .2 CAN/CSA-G40.21-13 Structural Quality Steels.
 - .3 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .4 CAN/CSA-S16:19 Limit States Design of Steel Structures.
 - .5 CAN/CSA-S136-16 Cold-Formed Steel Structural Members.
 - .6 CSA W47.1:19, Certification of Companies for Fusion Welding of Steel Structures.
 - .7 CSA W48-2018 Filler Materials and Allied Materials for Metal Arc Welding.
 - .8 CSA W55.3-08 (R2018), Certification of Companies for Resistance Welding of Steel and Aluminum.
 - .9 CSA W59-18, Welded Steel Construction.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings including Fabrication and Erection documents and materials list in Accordance with Section 01 33 00- Submittal Procedures.
- .2 Ensure Fabricator designed assemblies, components, and connections, and drawings are stamped and signed by qualified professional Engineer licensed in the province of Ontario.

1.4 DESIGN DETAILS AND CONNECTIONS

- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 CAN/CSA-S16S1 and CAN/CSA-S136/CAN/CSA-S136S1-04.1 to resist forces, moments, shears and allow for movements indicated.
- .2 If the connection for shear only (standard connection) is required:
 - .1 Select framed beam shear connections from an industry-accepted publication such as "Handbook of the Canadian Institute of Steel Construction".
 - .2 If Shears are not indicated, select or design connections to support reaction from maximum uniformly distributed to the load that can be safely supported by beam in bending, provided no point loads act on beam.

1.5 QUALITY ASSURANCE

- .1 If requested submit copies of mill test reports, showing chemical and physical properties and other details of steel to be incorporated into work prior to fabrication of structural steel. Mill test reports shall be certified by metallurgists qualified to practice in the province of Ontario.

- .2 Ensure Fabricator of structural steel, in addition, provides an affidavit stating that materials and products used in fabrication conform to applicable material and products standards called for by design drawings and specifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Structural steel: to CAN/CSA-G40.21 Grade as indicated on structural drawings.
- .2 Anchor bolts: to CAN/CSA-G40.21, Grade 300W.
- .3 Bolts, nuts and washers: to ASTM A 325, ASTM A 325M, ASTM A490, ASTM A490M
- .4 Welding materials: to CSA W59 and certified by the Canadian Welding Bureau.
- .5 Shop paint primer: to CISC/CPMA2.
- .6 Hot dip galvanizing: galvanized steel, where indicated, to CAN/CSA-G164, minimum zinc coating of (600) g/m².

2.2 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.
- .2 Continuously seal members by a continuous weld (grind smooth)

2.3 SHOP PAINTING

- .1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16 (except where members to be encased in concrete).
- .2 Apply paint undercover, on dry surfaces when surface and air temperature are above 10° C.
- .3 Maintain dry condition and 10°C minimum temperature until paint is thoroughly dry.
- .4 Strip paint from bolts, nuts, sharp edges and corners before a prime coat is dry.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Structural steelwork: in accordance with CAN/CSA-S16
- .2 Welding: in accordance with CSA W59.
- .3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.2 MARKING

- .1 Mark materials in accordance with CAN/CSA-G40.20-04 and CAN/CSA-G40.21-04. Do not use die stamping. If 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.

3.3 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with reviewed erection drawings.
- .2 Field cutting or altering structural members; to the approval of Departmental Representative.
- .3 Clean with a mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.
- .4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.4 FIELD QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship will be carried out by test Laboratory designated by Departmental Representative.
- .2 Provide safe access and working areas for testing on-site, as required by testing agency and as authorized by Departmental Representative.
- .3 Departmental Representative will pay costs of tests.

3.5 HOT DIP GALVANIZING

- .1 All exterior steel including an exterior canopy to be hot-dip galvanized.

3.6 FIELD PAINTING

- .1 Paint in accordance with Section 09 91 99 - Painting for Minor Works.
 - .1 Touch up all damaged surfaces and surfaces without shop coat with primer to CAN/CGSB-1.40 except as specified otherwise. Apply in accordance with CGSB 85-GP-14M.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

- .1 Section 05 12 00 - Structural Steel.

1.2 REFERENCE STANDARDS

- .1 CAN3-S136-16.
- .2 Canadian Sheet Steel Building Institute Standards (CSSBI) for Steel Roof Deck.
- .3 CSA W59-18
- .4 CAN/CGSB-1-GP-40.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings.
- .2 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details, and accessories.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Deck: ASTM A653/A653M, Grade 230, Zinc-Iron Alloy coating ZF75.
- .2 Zinc-rich paint – organic, ready mixed:

2.2 TYPES OF DECKING

- .1 Roof Deck: 0.91 minimum base steel thickness, 38 mm deep profile, fluted, @152 o/c, non-cellular, overlapping side laps unless noted on drawing.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Coordinate deck openings with Departmental Representative and approved shop drawings.
- .2 Erect metal decking as indicated to manufacturer's instructions.
- .3 Immediately after the decking is permanently secured in place, touch-up galvanized surface with primer where burned by welding.
- .4 Fastening requirements shall be as noted on structural drawings.

- .5 The decking shall be continuous over at least 3 spans with ends lapped 50 mm minimum over supports.

3.2 STORAGE

- .1 Decking shall be stored on wood supports above the grade and sloped so as to allow runoff along down flutes.

3.3 ACCESSORIES

- .1 Provide all required closures, reinforcing sheet steel and flashing.

3.4 OPENINGS AND AREAS OF CONCENTRATED LOADS

- .1 Framing of deck openings 100 to 300 mm shall be as recommended by manufacturer except as otherwise indicated on structural drawings. No reinforcement required for openings cut in deck, which are smaller than 100 mm where the minimum distance between unreinforced openings is 1200 mm transverse and one span longitudinally.

3.5 FIELD QUALITY CONTROL

- .1 Inspection and testing of material and workmanship will be carried out by testing laboratory.
- .2 Quality assurance shall be in conformance with industry standards.
- .3 Damaged decking shall be replaced at Departmental Representative's discretion.

3.6 REVIEW OF CONSTRUCTION

- .1 Review of construction by the Departmental Representative and inspection and testing by an independent inspection is to ascertain general conformity with design documents. The review does not relieve the contractor from carrying out his own quality control and making the work accurate and in conformity with the drawings and specification.
- .2 Exercise care when welding to avoid piercing the deck or damage to the supporting joists. Any damage to supporting structure is to be reported to the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED WORK

- .1 Section 03 30 00 - Cast-in-place Concrete.

1.2 REFERENCE STANDARDS

- .1 Do welding work to CSA W59-18 unless specified otherwise.

1.3 DESIGN CRITERIA

- .1 Design and install all ladders and their attachment and anchorage systems to Ontario Building Code including to SB-8 supplemented as follows:
 - .1 Provide two sets of anchorage near top of ladder.
 - .2 Use only anchors backed by manufacturer's pull-out rating for applicable support material.
- .2 Design and install all ladders in accordance with Ontario Ministry of Labour Engineering Data Sheet 2-04 "Fixed Access ladders" except as additionally indicated or noted.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sections plates bolts and include product characteristics, performance criteria, physical size, finish, and limitations.
 - .2 Submit two copies of WHMIS MSDS.
 - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.5 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance 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 off ground and in dry location and 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 MATERIALS

- .1 Bolts and anchor bolts: to ASTM A307.
- .2 Aluminum sheet: plain, 3 mm minimum thickness, finish clear anodized.
- .3 Metal Bar Grating: to ANSI/NAAMM BG 531, with serrated bearing bars min. 32mm deep.

2.2 FABRICATION

- .1 Fabricate work square, true, straight, and accurate to required size, with joints closely fitted and properly secured.
- .2 Use self-tapping shake- proof round headed screws on items requiring assembly by screws or as indicated.
- .3 Where possible, fit and shop assemble work, ready for erection.
- .4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

- .1 Steel ladders and landings to be galvanized. Galvanizing: Hot dip galvanizing with a min. coating of 600 gm. Zinc per sq.m. to CAN/CSA G164-M92(R2003).
- .2 Shop painting:
 - .1 Power Tool Clean interior surfaces in accordance with SSPC-S.P.2-82.
 - .2 Apply one coat of shop primer to ferrous metal items, with exception of those to be galvanized.
 - .3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, or grease. Do not paint when temperature is lower than 7°C.
 - .4 Clean surfaces to be field welded, do not paint.
 - .5 Galvanize ladders and landings, bollards.
 - .6 Visual characteristics to conform to Section 09 91 00.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar, and masonry.
 - .3 Wood.

2.5 ALUMINUM AIR CURTAINS

- .1 Provide aluminum air curtains suspended from structure above including all fasteners, attachment angles.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 ERECTION

- .1 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .2 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .3 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .4 Supply components for work by other trades in accordance with shop drawings and schedule.
- .5 Make field connections with bolts to CSA S16.
- .6 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.
- .7 Touch up galvanized surfaces with zinc primer where burned by field welding.

3.3 MISCELLANEOUS METALWORK ITEMS

- .1 Examine the drawings and specifications and provide all miscellaneous metalwork items required for the proper execution of this project including:
 - .1 Ladders and landings for ladders
 - .2 Bollards
 - .3 Aluminum Air Curtains

3.4 STEEL BOLLARDS

- .1 Supply and install steel bollards.
- .2 Bollards shall be structural HSS pipe columns extending min. 1800mm below grade and securely set in concrete.
- .3 Fill bollards with concrete and trowel top to slightly domed profile.

3.5 **ACCESS LADDERS**

- .1 Stringers:
 - .1 Min. 65 x 10mm thick, steel flats, spaced 450mm apart.
- .2 Rungs:
 - .1 Min. 20 mm diameter solid re-bar welded to stringers @ 300mm o.c.
 - .2 Locate rungs min. 150mm clear of wall faces unless noted otherwise.
 - .3 Locate lowest rung max. 300mm from floor
- .3 Brackets:
 - .1 Min. 150mm x 10mm welded to stringers at max 3000mm o.c. complete with min. 16mm diameter fixing anchor.
- .4 At side-step access ladders extend ladder min. 1200mm above landing.

3.6 **ALUMINUM AIR CURTAINS**

- .1 Install aluminum air curtains as indicated, adequately secured to building structural system unless otherwise shown

3.7 **CLEANING**

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

3.8 **INSPECTION**

- .1 The Departmental Representative responsible for the production of the shop drawings for access ladders and landings shall provide periodic field review during fabrication and erection and shall submit reports in accordance with Section 01 30 00 indicating fabrication and installation is in accordance with the reviewed, stamped shop drawings.

3.9 **PROTECTION**

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

-END OF SECTION-