

PART 1 - GENERAL

1.1 RELATED WORK .1 Steel Deck: SECTION 05 31 00.

- 1.2 REFERENCES
- .1 ASTM A307-14, Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.
 - .2 ASTM A325-14, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - .3 ASTM A572/A572M-15, Specification for High-Strength Low Alloy Columbium-Vanadium Structural Steel.
 - .4 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.
 - .5 ASTM A449-14, Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use.
 - .6 ASTM A153/A153M-09, Standard Specification for Zinc (Hot-Dip) Coatings on Iron and Steel Hardware.
 - .7 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.
 - .8 CAN/CSA-S16-09, Design of Steel Structures.
 - .9 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel.
 - .10 CSA W55.3-08(R2013), Certification of Companies for Resistance Welding of Steel and Aluminum.
 - .11 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
 - .12 CISC/CPMA 2-75, Quick-Drying, Primer for use on Structural Steel.
 - .13 CISC/CPMA Standard 1-73a, Quick Drying, One Coat Paint for Use on Structural Steel.
 - .14 ASTM A500/A500M-13, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

- 1.3 SOURCE QUALITY CONTROL
- .1 Prior to commencing work, submit two (2) certified copies of mill reports covering chemical and physical properties of steel used in this work.
- 1.4 DESIGN OF DETAILS AND CONNECTIONS
- .1 Design and detail connections in accordance with requirements of CAN/CSA-S16.1 and also to resist forces, moments and shears where indicated.
- .2 Where connection forces are not indicated, the connection shall be detailed to resist 50% of the total uniformly distributed factored load capacity of the members, and 75% of tensile capacity of bracing members.
- .3 For non-standard connections, submit sketches and design calculations stamped and signed by a qualified professional engineer registered in the Province of Nova Scotia.
- .4 For standard connections, select details from CISC Handbook of Steel Construction to ensure structural adequacy. Submit all standard connections for each structural steel member size. Connections shall be stamped and signed by a qualified professional engineer registered in the province of Nova Scotia.
- .5 Submit all connection designs and sketches as connections are available to review in order to expedite the review process.
- 1.5 SHOP DRAWINGS
- .1 Submit connection details and erection drawings in accordance with Section 01 33 00.
- .2 On erection drawings, indicate member size, base plate elevation, anchor bolt size and location and information necessary for assembly.
- .3 Submit shop details of all standard connections and non-standard connections to be used in the connection of structural steel members. Identify on erection drawings the location of all non-standard connections.
- .4 All submitted drawings to bear signature and seal of professional engineer registered in Province of Nova Scotia for all fabricator designed assemblies, components and connections.
- .5 Indicate welds by welding symbols as defined in CSA W59.
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PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Structural steel: to CAN/CSA- G40.21 (Grade 345 MPa) and ASTM-A572 (Grade 350W) for columns and beams, Grade 300 W for angles, plates and channels, CAN/CSA G40.21 (Grade 250W) for bars, CAN/CSA- G40.21 (Grade 350W) and/or ASTM A500 (Grade 345 MPa), Class C for hollow structural sections.
 - .2 Anchor bolts: to ASTM A307 and to ASTM A449.
 - .3 Chemical anchors: diameter and embedment as noted on the Project Drawings. If embedment is not noted provide the standard embedment as noted by the manufacturer. Install anchors as per the manufacturer's recommendations. Manufacturer's representative to provide training to the installer regarding proper installation.
 - .1 Acceptable Products:
 - .1 Hilti HIY HI150 - Max Chemical Adhesive complete with Hilti HAS-E rods.
 - .2 AC100 Chemical Adhesive by Powers Fasteners complete with A307 threaded rod.
 - .3 Set Epoxy by Simpson Strongtie complete with A307 threaded rod.
 - .4 Expansion Anchors: diameter and embedment as noted on the Project Drawings. If embedment is not noted provide the standard embedment as noted by the manufacturer. Install anchors as per the manufacturer's recommendations. Manufacturer's representative to provide training to the installer regarding proper installation.
 - .1 Acceptable Products:
 - .1 Kwik Bolt 3 by Hilti
 - .2 Hex Head Power Bolt by Power Fasteners
 - .3 Wedge, all by Simpson Strongtie
 - .5 Bolts, nuts and washers: to ASTM A325.
 - .6 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.
 - .7 Shop paint primer: to CISC/CPMA 2.
- 2.2 FABRICATION
- .1 Fabricate structural steel in accordance with CAN/CSA-S16.1 and in accordance with reviewed shop drawings.

- 2.2 FABRICATION
(Cont'd)
- .2 Continuously weld connection joints of architecturally exposed steel and grind smooth and flush with adjacent surfaces.
 - .3 Provide holes for attachment of other work only when and where approved by the Departmental Representative or as shown on the drawings.
 - .4 Provide bearing plates with anchor bolts for steel beams unless otherwise indicated.
 - .5 Where finished surfaces of steel are to be left exposed to view, fabricate to AISC specifications for architecturally exposed steel including straightness.
 - .6 Remove mill marks, identification and surface imperfections of exposed steel by grinding smooth and flush with adjacent surfaces.
 - .7 Exposed welds to be continuous for length of each joint. File or grind exposed welds smooth and flush.
- 2.3 SHOP PAINTING
- .1 For locations where steel is to be top coated with an architectural paint, steel is to be primed as per CAN CISC/CPMA 2-75. All other steel is to be primed with CAN CISC/CPMA 1-73a except where members are to be field welded, are in contact at bolted friction type connections or are to be encased in concrete where no primer is required. For locations where an architectural top coat is required refer to architectural drawings.

PART 3 - EXECUTION

- 3.1 GENERAL
- .1 Do welding in accordance with CSA W59.
 - .2 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 When requested by Departmental Representative, provide certification that all welded joints are qualified by the Canadian Welding Bureau.

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- 3.2 MARKING
- .1 Mark materials in accordance with CSA-G40.20. 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 for fit and match.
- 3.3 ERECTION
- .1 Erect structural steel, as indicated and in accordance with CAN/CSA- S16.1 and in accordance with reviewed erection drawings.
 - .2 Verify dimensions and conditions of existing work before commencing fabrication and report discrepancies or problems to the Departmental Representative. Do not proceed until notified by Departmental Representative.
 - .3 Obtain written permission of Departmental Representative prior to field cutting or altering of structural members.
 - .4 Clean with mechanical brush and touch up shop primer to bolts, welds and burned or scratched surfaces at completion of erection.
 - .5 Assume full responsibility for the integrity of structure during erection. Make necessary provision for all erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of necessary permanent bracing and frames.
 - .6 Set column base plates and loose bearing plates with steel shims to proper elevation, true and level, ready for grouting-in.
 - .7 Restrict drifting during assembly to minimum required to bring parts into position without enlarging or distorting holes and without distorting, kinking or sharply bending metal of any unit. If, in the opinion of the Departmental Representative, holes must be enlarged to admit bolts, they are to be reamed and larger size bolts used. Reamed holes not to exceed size of bolt used by more than 2mm.
- 3.4 FIELD QUALITY CONTROL
- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.
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3.4 FIELD QUALITY
CONTROL
(Cont'd)

.2 Testing laboratory may use ultra- sonic testing procedures to verify soundness of some representative shop and field welds. In principal structural members, shop and field welds will be X-rayed. Representative bolted connections will be checked with torque wrench. Departmental Representative will determine location and extent of all testing.

PART 1 - GENERAL

- 1.1 RELATED WORK .1 Structural Steel: Section 05 12 23
- 1.2 REFERENCES .1 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 CAN/CGSB 1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 CSA S136-12, North American Specification for the Design of Cold-Formed Steel Structural Members.
- 1.3 DESIGN CRITERIA .1 Compute structural capacity of steel deck using limit states design.
- .2 Steel deck and connections to safely carry dead, live and diaphragm loads as indicated.
- .3 Deflection under specified live load to not exceed 1/360th of span for floor deck.
- .4 Deflection under specified live load is to not exceed 1/360th of span for roof deck.
- 1.4 SHOP DRAWINGS .1 Each drawing submitted to bear the signature and stamp of qualified professional engineer registered in Province of Nova Scotia.
- .2 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.
- 1.5 SOURCE QUALITY CONTROL .1 Prior to commencing work, submit two (2) certified copies of mill reports covering chemical and physical properties, including recycled content of steel used in this work.
- .2 Fabricator, as practicably as possible (preferably 90% or greater), to maximize the recycled steel content for all the floor and roof deck. Provide certification (mill reports) certifying breakdown of

1.5 SOURCE QUALITY .2 (Cont'd)
CONTROL the pre-consumer, post- industrial and post-consumer
(Cont'd) content percentages of the steel deck.

1.6 WASTE .1 Collect, separate and recycle all site generated
MANAGEMENT AND waste materials in accordance with Section 01 74 21.
DISPOSAL .2 Coordinate all work related to Section 01 74 21 with
Contractor.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Roof deck: 38mm deep profile fabricated from
zinc-iron alloy (ZF) wipe coated steel to ASTM
A653/A653M, structural quality Grade A. See
Structural drawings for locations of the different
profile deck locations.
.1 22 gauge (nominal thickness 0.76mm) or 20ga
(nominal thickness 0.91mm) as indicated on Structural
drawings.
.2 Connections: 4-19mm effective dia. puddle welds
per transverse support (every flute)
.3 Sidelaps to be button- punched at 150mm o.c.
unless otherwise shown.
.4 Weld deck to perimeter angle or beams with 19mm
effective dia. Puddle welds at 150 mm c/c.
.2 Deck manufacturer to provide:
.1 Continuous angle support at all support
locations where deck changes span direction.
.2 20 gauge cold formed metal closures at
perimeter free edges.
.3 Cover plates, cell closures and flashings: steel
sheet with minimum base steel thickness 22 gauge.
Metallic coating same as roof deck material.
.4 Closures to external walls.
.5 Primer: zinc rich ready mix to CAN/CGSB-1.181.

2.2 FABRICATION .1 Include in Work of this Section steel angles, cover
plates, cell closures, fasteners, stiffeners, and
accessories as required. Fabricate sheet metal
accessories of same material and finish as deck, and
in not less than 18 ga.

2.2 FABRICATION
(Cont'd)

- .2 Fabricate to meet specified requirements of CAN/CSA S136 and to support superimposed loading as shown on structural Drawings.
- .3 Form deck units to provide male and female interlocking side lap joints.
- .4 Fabricate units to provide for joints between abutting panel ends with:
 - .1 End laps to occur over supports only.
 - .2 50mm overlap, swaged and sized to provide smooth joint.
 - .3 Ends squared and finished to ensure minimum space between panels.
- .5 Span deck units over at least three or more supports wherever possible, but no less than two (2) spans. Increase thickness of metal to compensate for continuity when it is not possible to have deck span over two (2) or more supports.
- .6 Provide for ribs to bear on beams parallel to flutes when tops of such beams are at same elevation as deck bearing. Weld ribs of deck to beams at 50mm unless indicated otherwise.
- .7 Holes in deck:
 - .1 Incorporate as required for services, and as indicated on Drawings. Verify size and location of holes before commencing fabrication.
 - .2 For holes greater than 300mm in dimension for floor deck and 400mm for roof deck across flutes, provide framing as indicated on Structural Drawings.
 - .3 For holes from 150mm to 300mm across flutes of floor or roof deck, reinforce with 50mm x 50mm x 6mm structural steel angles. Install angles across flutes at both ends of holes, weld to deck with 25mm long tack welds at 150mm beyond each side of opening.
 - .4 For holes from 300mm to 400mm across flutes of roof deck, reinforce with 50mm x 50mm x 6mm structural steel angles. Install angles across flutes at both ends of holes, weld to deck with 25mm long tack welds at 150mm o.c. on each side, and extend 400mm beyond each side of opening.
 - .5 Holes of less than 200mm require no reinforcing.

PART 3 - EXECUTION

- 3.1 EXAMINATION .1 Verify, before delivery of materials to site, that Work to receive decking is located correctly, and at proper levels. Do not proceed with erection until conditions are satisfactory.
- 3.2 ERECTION .1 Include hoisting and erection equipment in Work of this Section.
- .2 Level and align deck units with panels parallel to each other and perpendicular to supports. Locate panel ends only over supports and to ensure minimum 50mm bearing. Install steel packing to level units if necessary. Install cover plates to provide full extent of supporting deck surface over each area, including expansion joints and intersections of panels that span in different directions.
- .3 Lap ends of panels no less than 50mm and fasten to steel bearing supports by welding as specified in clause 2.1.
- .4 Reinforce deck elements at top and bottom by a continuous web where they are cut longitudinally 50mm or more from a vertical web.
- .5 Secure closures, plates and accessories by screws or welding. Tack weld end closures at 1200mm o.c. and side closures at 900mm o.c.
- .6 Install interior cell closures in flutes intersecting vertical surfaces exposed to view, at tops of interior walls and partitions extended to deck, and as otherwise indicated on Drawings. Secure cell closures by welding, sheet metal screws or adhesive as suitable for material.
- 3.3 ADJUSTMENT AND CLEANING .1 Touch up adjacent primed surfaces burned, scratched or otherwise damaged during erection with prime paint to match shop coat, when erection is completed.
- .2 Paint over bare areas on galvanized surfaces and welds and zinc rich paint.
- .3 Replace dented, punctured or weld perforated deck where exposed to view.