

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 05 21 00 - Steel Joist Framing.
- .2 Section 05 31 00 - Steel Decking.
- .3 Section 05 50 00 - Metal Fabrications.
- .4 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel.
 - .2 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM F3125/F3125M-15a, Standard Specification for Structural Bolts, Steel and Alloy Steel, Heat Treated.
- .2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).
 - .1 Handbook of Steel Construction, 10th Edition.
 - .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA G40.20/G40.21-13, 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-S16-14, Design of Steel Structures.
 - .4 CAN/CSA-S136-12, North American Specifications for the Design of Cold Formed Steel Structural Members.
 - .5 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel.
 - .6 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
 - .7 CSA W55.3-08(R2013), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .8 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
- .4 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.
- .5 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 Shop Drawings:
 - .1 Provide drawings stamped and signed by professional engineer registered or licensed in the Province of New Brunswick, Canada.
- .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.
- .4 Fabrication drawings:
 - .1 Submit fabrication drawings showing designed assemblies, components and connections that are stamped and signed by qualified professional engineer licensed in the Province of New Brunswick, Canada.
- .5 Source Quality Control Submittals:
 - .1 If requested, submit one copy of mill test reports.
 - .1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.
 - .2 Provide mill test reports certified by metallurgists qualified to practice in the Province of New Brunswick, Canada.

1.4 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.

Part 2 Products

2.1 DESIGN REQUIREMENTS

- .1 Design details and connections to be in accordance with the requirements of CAN/CSA-S16 to resist forces, moments, shears and allow for movements indicated.
- .2 Shear connections:
 - .1 Select framed beam shear connections from an industry accepted publication such as CISC "Handbook of Steel Construction" when connection for shear only (standard connection) is required.

- .2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.
- .3 For composite construction select or design minimum end connection to resist reaction resulting from factored movement resistance as tabulated in the CISC "Handbook of Steel Construction" assuming 100% shear connection with depth of steel deck and/or slab shown on drawings.
- .4 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in the Province of New Brunswick, Canada for non-standard connections.

2.2 MATERIALS

- .1 Structural steel: to CSA-G40.20/G40.21 Grade 300W for channels, angles, and plates and Grade 350W for W-sections and HSS.
- .2 Anchor bolts: to CSA-G40.20/G40.21, Grade 300W.
- .3 Bolts, nuts and washers: to ASTM A325M.
- .4 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.
- .5 Shop paint primer: to CISC/CPMA2-75 solvent reducible alkyd, grey.
- .6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m².
- .7 Shear studs: to CSA W59, Appendix H.
- .8 Sag rods: to CSA-G40.20/G40.21, Grade 300W.

2.3 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with approved shop drawings.
- .2 Install shear studs in accordance with CSA W59.
- .3 Continuously seal members by continuous welds where indicated.

2.4 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 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.
- .3 Apply one coat of primer in shop to steel surfaces except:
 - .1 Surfaces to be encased in concrete.

- .2 Surfaces to receive field installed stud shear connections.
- .3 Surfaces and edges to be field welded.
- .4 Faying surfaces of slip-critical connections.
- .5 Below grade surfaces in contact with soil.
- .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 from bolts, nuts, sharp edges and corners before prime coat is dry.

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 GENERAL

- .1 Structural steel work: 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.

3.3 CONNECTION TO EXISTING WORK

- .1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas to Departmental Representative for direction before commencing fabrication.

3.4 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.

3.5 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with approved erection drawings.
- .2 Field cutting or altering structural members: to approval of Departmental Representative.

- .3 Clean with 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.

3.6 FIELD QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.
- .2 The Inspection and Testing Company will carry out vertical and horizontal alignment checks, torque testing, and inspection of representative connection welds.
- .3 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.
- .4 Submit test reports to Departmental Representative within 2 weeks of completion of inspection.
- .5 Test shear studs in accordance with CSA W59.

3.7 FIELD PAINTING

- .1 Paint in accordance with Section 09 91 23 - Interior 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.

3.8 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials for reuse and/or recycling in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 05 12 23 - Structural Steel for Buildings.
- .2 Section 05 31 00 - Steel Deck.
- .3 Section 05 50 00 - Metal Fabrications.
- .4 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

- .1 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
 - .1 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.
 - .2 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-S16-14, Limit States Design of Steel Structures.
 - .3 CSA-S136-12, Cold Formed Steel Structural Members.
 - .4 CSA-W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .5 CSA-W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .6 CSA-W59-13, Welded Steel Construction (Metal Arc Welding).

1.3 QUALITY ASSURANCE

- .1 If requested, submit one copy of mill test reports. 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 Supply affidavit prepared by fabricator of structural steel joists stating that materials and products used in fabrication conform to this specification.

1.4 DESIGN OF STEEL JOISTS AND BRIDGING

- .1 Design steel joists and bridging to carry loads indicated in joist schedule shown on drawings in accordance with CAN/CSA-S16.
- .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 1/300 of span and deflection due to specified total load to 1/240 of span.
- .5 Submit two copies of calculations and joist design drawings for typical joists for Departmental Representative at least 4 weeks prior to fabrication and/or delivery.

1.5 SHOP DRAWINGS

- .1 Submit shop details and erection drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit drawings stamped and signed by qualified professional engineer licensed in the province of New Brunswick, Canada.
- .3 Indicate on erection drawings, relevant details such as joist mark, depth, spacing, bridging lines, bearing, anchorage and details.
- .4 Provide 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.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site containers for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
- .5 Dispose of unused paint material at official hazardous material collections site approved by Departmental Representative.
- .6 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other locations where it will pose health or environmental hazard.

Part 2 Products

2.1 MATERIALS

- .1 Open web steel joists:
 - .1 Acceptable material: to CSA-G40.20/G40.21.
- .2 Structural steel: to CSA-G40.20/G40.21.

- .3 Welding materials: to CSA-W59.
- .4 Shop paint primer: to CISC/CPMA-2.
- .5 Shear studs: to CSA-W59, Appendix H.

2.2 FABRICATION

- .1 Fabricate steel joists and accessories as indicated in accordance with CAN/CSA-S16.1 and CSA-S136 and in accordance with approved shop drawings.
- .2 Weld in accordance with CSA-W59.
- .3 Provide top and bottom chord extensions where indicated.
- .4 Provide diagonal and horizontal bridgings and anchorages as indicated.

2.3 SHOP PAINTING

- .1 Clean, prepare and shop prime surfaces of steel joists to CAN/CSA-S16.
- .2 Clean members of loose mill scale, rust, oil, dirt and other foreign matter. Prepare surfaces in accordance with SSPC SP1 brush blast.
- .3 Apply one coat of CISC/CPMA 2 primer to steel surfaces 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.
- .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 GENERAL

- .1 Structural steel work: 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 and/or CSA-W55.3 for resistance welding.
- .4 Provide certification that welded joints are qualified by Canadian Welding Bureau.

3.2 CONNECTION TO EXISTING WORK

- .1 Verify dimensions and condition of existing work; report any discrepancies and potential problem areas to Departmental Representative for direction before commencing fabrication.

3.3 FIELD QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.
- .2 Testing laboratory will inspect representative joists for integrity, accuracy of fabrication and soundness of welds. Testing laboratory will also monitor test loading of joists used by manufacturer to verify design and check representative field connections. Departmental Representative will determine extent of and identify all inspections.
- .3 Submit test report to Departmental Representative within 2 weeks after completion of inspection.
- .4 Test shear studs in accordance with CSA-W59.

3.4 ERECTION

- .1 Erect steel joists and bridging as indicated in accordance with CAN/CSA-S16 and in accordance with approved erection drawings.
- .2 Complete installation of all bridging and anchorages before placing construction loads on joists.
- .3 Field cutting or altering joists or bridging that are not shown on shop drawings: to approval of Departmental Representative.
- .4 Clean and touch up shop primer to bolts, welds, burned or scratched surfaces at completion of erection.

3.5 FIELD PAINTING

- .1 Paint: in accordance with Section 09 91 23 - Interior Painting.
- .2 Touch up all damaged surfaces and surfaces without shop coat with CISC/CPMA-2 in accordance with manufacturers' recommendations.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 05 12 23 - Structural Steel for Buildings.
- .2 Section 05 21 00 - Steel Joist Framing.
- .3 Section 05 50 00 - Metal Fabrications.
- .4 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A653/A653M-15e1, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A792/A792M-10(2015), Specification for Steel Sheet, 55%Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA C22.2 No.79-16, Cellular Metal and Cellular Concrete Floor Raceways and Fittings.
 - .2 CAN/CSA-S16-14, Limit States 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(R2014), Certification of Companies for Fusion Welding of Steel Structures.
 - .5 CSA W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .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.

1.3 DESIGN REQUIREMENTS

- .1 Design steel deck using limit states design in accordance with CSA S136 and CSSBI 10M.
- .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 1/240 of span, except that when plaster or gypsum board ceilings are hung directly from deck, live load deflection 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 CAN/CSA-S16.1, Appendix 'G'.

1.4 SHOP DRAWINGS

- .1 Submit shop drawings, erection and shoring drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in the Province of New Brunswick, Canada.
- .3 Submit design calculations if requested by Departmental Representative.
- .4 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacing, projections, openings, reinforcement details and accessories.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.
- .2 Divert unused metal from landfill to metal recycling facility approved by Departmental Representative.
- .3 Dispose of unused paint material at official hazardous material collections site approved by Departmental Representative.
- .4 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .5 Dispose of unused caulking material at official hazardous material collections site approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Zinc-iron Alloy (ZF) coated steel sheet: to ASTM A653/A653M structural quality Grade 230, with ZF75 coating, for interior surfaces not exposed to weather, painted finish, 3.2 mm minimum base steel thickness.
- .2 Decks to be painted: zinc-iron alloy coated decks suitable for finish painting.
- .3 Zinc (Z) coated steel sheet: to ASTM A653/A653M structural quality Grade 230, with ZF75, coating, regular spangle surface, chemically treated for unpainted finish, not chemically treated for paint finish, for exterior surfaces exposed to weather, 3.2 mm minimum base steel thickness.
- .4 Closures: as indicated in accordance with manufacturer's recommendations.
- .5 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness of 0.76 mm for upper roof and 1.22 mm for lower roof. Metallic coating same as deck material.

- .6 Primer: zinc rich, ready mix.
- .7 Shear studs: to CSA W59.

2.2 TYPES OF DECKING

- .1 Steel roof deck: 0.76 mm minimum base steel thickness for upper roof, 1.22 mm minimum base steel thickness for lower roof, 38 mm maximum deep profile, non-cellular, interlocking side laps.

Part 3 Execution

3.1 GENERAL

- .1 Examine work of other trades over which roof deck will be applied for conformity to drawings. Report all discrepancies to Departmental Representative before beginning work on the roof system.
- .2 Structural steel work: in accordance with CAN/CSA-S136 and CSSBI 10M.
- .3 Welding: in accordance with CSA W59, except where specified otherwise.
- .4 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel.

3.2 ERECTION

- .1 Erect steel deck as indicated and in accordance with CSA S136 and CSSBI 10M and in accordance with approved erection drawings.
- .2 Butt ends: to 1.5 to 3 mm gap. Install steel cover plates over gaps wider than 3 mm.
- .3 Lap ends: to 50 mm minimum.
- .4 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned by welding.

3.3 CLOSURES

- .1 Install closures in accordance with approved details.

3.4 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 with any one dimension between 150 to 450 mm as recommended by manufacturer, except as otherwise indicated.
- .3 For deck openings with any one dimension greater than 450 mm and for areas of concentrated load, reinforce in accordance with structural framing details, except as otherwise indicated.

3.5 CONNECTIONS

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 05 12 23 - Structural Steel for Buildings.
- .2 Section 05 31 00 - Steel Deck.
- .3 Section 05 50 00 - Metal Fabrications.
- .4 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .3 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- .2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
 - .1 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.
 - .2 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-S16-14, Limit States Design of Steel Structures.
 - .3 CSA-S136-12, Cold Formed Steel Structural Members.
 - .4 CSA-W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .5 CSA-W55.3-08, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .6 CSA-W59-13, Welded Steel Construction (Metal Arc Welding).
- .4 Canadian Sheet Steel Building Institute (CSSBI)
 - .1 CSSBI 50M-06E, Lightweight Steel Framing Manual.
 - .2 CSSBI SSF 03-17, Care and Maintenance of Prefinished Sheet Steel Building Products.
 - .3 CSSBI Technical Bulletin Vol. 7, No. 2, Standard Thicknesses for Canadian Lightweight Steel Framing Applications.

1.3 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 structural metal trusses and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by qualified professional engineer licensed in the province of New Brunswick, Canada.
 - .2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, anchorage and bearing details, and screw sizes and spacing. Show pitch, span, camber, configuration and spacing of trusses. Indicate connector types, thicknesses, sizes, locations and design value.
 - .3 Indicate locations, dimensions, openings and requirements of related work.
 - .4 Indicate welds by welding symbols as defined in CSA W59.
 - .5 Submit stress diagram or print-out of computer design indicating design load for truss members. Indicate allowable load and stress increase.
 - .6 Indicate arrangement of webs or other members to accommodate ducts and other specialties.
 - .7 Show lifting points for storage, handling and erections.
 - .8 Show location of lateral bracing for compression members.

1.4 QUALITY ASSURANCE

- .1 If requested, submit one copy of mill test reports to Departmental Representative.
- .2 Provide Certificate of Quality Compliance from truss manufacturer upon completion of fabrication.
- .3 Provide Certificate of Quality Compliance upon satisfactory completion of installation.

1.5 DESIGN OF STRUCTURAL METAL TRUSSES

- .1 Design trusses, bracing and bridging in accordance with CAN/CSA-S136 for loads shown on drawings and minimum uniform and minimum concentrated loadings stipulated in NBC commentary.
- .2 Design trusses and anchorages for uplift forces as indicated.
- .3 Ensure trusses are manufactured to consider load effects due to fabrication, erection and handling.
- .4 Limit roof truss deflection due to specified live load to 1/300 of span and deflection due to specified total load to 1/240 of span.

- .5 Submit two copies of calculations and truss design drawings for typical trusses for Departmental Representative at least 4 weeks prior to fabrication and/or delivery.

1.6 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 structural metal trusses from nicks, scratches, and blemishes.
 - .3 Protect trusses during transportation, site storage and installation in accordance with CSSBI SSF 03.
 - .4 Handle and protect galvanized materials from damage to zinc coating.
 - .5 Replace defective or damaged materials with new.
 - .6 Provide bearing supports and bracings. Prevent bending warping and overturning of trusses.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site containers for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
- .5 Dispose of unused paint material at official hazardous material collections site approved by Departmental Representative.
- .6 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other locations where it will pose health or environmental hazard.

Part 2 Products

2.1 MATERIALS

- .1 Steel: to CAN/CSA S136, fabricated from ASTM A653/A653M, Grade 340 steel.
- .2 Welding materials: to CSA-W59 and certified by Canadian Welding Bureau.

- .3 Shop paint primer: to CISC/CPMA-2.
- .4 Shear studs: to CSA-W59, Appendix H.

2.2 FABRICATION

- .1 Fabricate structural metal trusses and accessories as indicated in accordance with CAN/CSA-S16 and CSA-S136 and in accordance with reviewed shop drawings.
- .2 Weld in accordance with CSA-W59.
- .3 Bridging: fabricated from same material and finish as trusses.

2.3 SHOP PAINTING

- .1 Apply one coat of CISC/CPMA 2 primer to steel surfaces 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.
- .2 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
- .3 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
- .4 Strip paint bolts, nuts, sharp edges and corners before prime coat is dry.

Part 3 Execution

3.1 GENERAL

- .1 Structural steel work: in accordance with CAN/CSA-S16 and CSA-S136.
- .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 and/or CSA-W55.3 for resistance welding.
- .4 Provide certification that welded joints are qualified by Canadian Welding Bureau.

3.2 CONNECTION TO EXISTING WORK

- .1 Verify dimensions and condition of existing work; report any discrepancies and potential problem areas to Departmental Representative for direction before commencing fabrication.

3.3 FIELD QUALITY CONTROL

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Departmental Representative.
- .2 Testing laboratory will inspect representative trusses for integrity, accuracy of fabrication and soundness of welds. Testing laboratory will also monitor test loading of trusses used by manufacturer to verify design and check representative field connections. Departmental Representative will determine extent of and identify all inspections.
- .3 Submit test report to Departmental Representative within 2 weeks after completion of inspection.
- .4 Test shear studs in accordance with CSA-W59.

3.4 ERECTION

- .1 Erect trusses, bracing and bridging in accordance with CAN/CSA-S136 and in accordance with reviewed shop and erection drawings.
- .2 Indicated lifting points to be used to hoist trusses into position.
- .3 Make adequate provisions for handling and erection stresses.
- .4 Exercise care to prevent out-of-plane bending of trusses.
- .5 Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing and decking are installed.
- .6 Complete installation of all bridging and anchorages before placing construction loads on trusses.
- .7 Field cutting or altering trusses or bridging that are not shown on shop drawings: to approval of Departmental Representative.
- .8 Clean and touch up shop primer to bolts, welds, burned or scratched surfaces at completion of erection.
- .9 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 FIELD PAINTING

- .1 Paint: in accordance with Section 09 91 23 - Interior Painting.
- .2 Touch up all damaged surfaces and surfaces without shop coat with CISC/CPMA-2 in accordance with manufacturers' recommendations.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 30 00 - Cast-in-Place Concrete.
- .2 Section 05 12 23 - Structural Steel for Buildings.
- .3 Section 05 21 00 - Steel Joist Framing.
- .4 Section 05 31 00 - Steel Deck.
- .5 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM A53/A53M-12, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A269-15a, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - .3 ASTM A307-14e1, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel.
 - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA-S16.1-14, Limit States Design of Steel Structures.
 - .4 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding) (Imperial Version).
- .3 The Environmental Choice Program
 - .1 CCD-047a-98(R2005), Paints, Surface Coatings.
 - .2 CCD-048-95(R2006), Surface Coatings - Recycled Water-borne.

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
 - .1 For finishes, coatings, primers and paints.

- .2 Shop Drawings
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Storage and Protection:
 - .1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
 - .2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 22 - Construction/Demolition Waste Management and Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material in appropriate on-site containers for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

Part 2 Products

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W for channels, angles, and plates and Grade 350W for W-sections and HSS.

- .2 Steel pipe: to ASTM A53/A53M extra strong unless noted otherwise on drawings, galvanized finish.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

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 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Zinc primer: zinc rich, ready mix.

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 SHOP PAINTING

- .1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.

2.6 ANGLE LINTELS

- .1 Steel angles: prime painted, sizes indicated for openings. Provide 150 mm minimum bearing at ends.

.2 Weld or bolt back-to-back angles to profiles as indicated.

.3 Finish: shop painted.

2.7 HANDRAIL

.1 Steel pipe: nominal outside diameter as indicated, formed to shapes and sizes as indicated.

.2 Galvanize exterior pipe railings after fabrication. Shop coat prime interior railings after fabrication.

2.8 CHANNEL FRAMES

.1 Fabricate frames from steel, sizes of channel and opening as indicated.

.2 Weld channels together to form continuous frame for jambs and head of openings, sizes as indicated.

.3 Finish: prime coat painted.

Part 3 Execution

3.1 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 HANDRAIL

.1 Install handrail in locations indicated.

- .2 Anchor handrail to concrete as indicated.

3.3 CHANNEL FRAMES

- .1 Install steel channel frames to openings as indicated.

3.4 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 05 12 23 – Structural Steel for Buildings.
- .2 Section 05 31 00 – Steel Decking.
- .3 Section 05 50 00 - Metal Fabrications.
- .4 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

- .1 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)
 - .1 ANSI/NAAMM MBG 531-09, Metal Bar Grating Manual.
- .2 ASTM International
 - .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A3125M-15a, tandard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
 - .2 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .4 CSA International
 - .1 CSA G40.20/G40.21-13, 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 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
- .5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 National Association of Architectural Metal Manufactures (NAAMM)
 - .1 AMP 510-92, Metal Stair Manual.
- .7 The Society for Protective Coatings (SSPC)
 - .1 Systems and Specifications Manual, Volume 2, 2008 Edition.

1.3 SYSTEM REQUIREMENTS

- .1 Design metal stair, balustrade and landing construction and connections to NBC vertical and horizontal live load requirements.

- .2 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for stairs and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of New Brunswick, Canada.
 - .2 Indicate construction details, sizes of steel sections and thickness of steel sheet.

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 with Common Product Requirements and 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 off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect stairs from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SYSTEM DESCRIPTION

- .1 Design Requirements:
- .2 Design metal stair, balustrade and landing construction and connections to NBC vertical and horizontal live load requirements.
- .3 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

2.2 MATERIALS

- .1 Steel sections: to CSA G40.20/G40.21 Grade 300 W.
- .2 Steel plate: to CSA G40.20/G40.21, Grade 260 W,
 - .1 Thickness: 3 mm.

- .3 Floor grating: to CSA G40.20/G40.21, Grade 260 W.
 - .1 Thickness: 25 mm.
 - .2 Width: 278 mm.
 - .3 Design: Serrated-Surface Grating.
- .4 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless black.
- .5 Welding materials: to CSA W59.
- .6 Bolts: to ASTM A307.
- .7 High strength bolts: to ASTM A3125M.

2.3 FABRICATION

- .1 Fabricate in accordance with NAAMM, Metal Stair Manual.
- .2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.
- .3 Accurately form connections with exposed faces flush:
 - .1 Make mitres and joints tight.
 - .2 Make risers of equal height.
- .4 Grind or file exposed welds and steel sections smooth.
- .5 Shop fabricate stairs in sections as large and complete as practicable.

2.4 PLATE/GRATING STAIRS

- .1 Form steel grating treads and landings from metal bar grating to profile indicated and secure to stringers and supports as indicated. Form landings of steel grating and reinforce as required.
- .2 Form stringers from MC 310 x 15.8.

2.5 PIPE/TUBING BALUSTRADES

- .1 Construct balusters and handrails from steel pipe.
- .2 Cap and weld exposed ends of balusters and handrails.
- .3 Terminate at abutting wall with end flange.

2.6 FINISHES

- .1 Shop coat primer: to CAN/CGSB-1.40.

2.7 SHOP PAINTING

- .1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.
- .2 Apply one coat of shop primer except interior surfaces of pans.
- .3 Apply two coats of primer of different colours to parts inaccessible after final assembly.

- .4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.
- .5 Do not paint surfaces to be field welded.

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 stairs and ladders installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative and Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed Consultant.

3.2 INSTALLATION OF STAIRS

- .1 Install in accordance with NAAMM, Metal Stair Manual.
- .2 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.
- .3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.
- .4 Do welding work in accordance with CSA W59 unless specified otherwise.
- .5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.3 CLEANING

- .1 Leave Work area clean at end of each day.
- .2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .3 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.4 PROTECTION

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

END OF SECTION