Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 30 00 - Cast-In-Place Concrete

.2 Section 05 21 00 - Steel Joist Framing

.3 Section 05 31 00 - Steel Deck

.4 Section 05 50 00 - Metal Fabrications

1.2 REFERENCES

.1 National Building Code of Canada 2015

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.40-97 Anticorrosive Structural Steel Alkyd Primer;

.2 CAN/CGSB 85.10-99, Protective Coatings for Metals;

.3 CAN/CGSB 1.181-99 Ready-Mixed Organic Zinc-Rich Coating;

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).

.1 CISC/CPMA 1-73a, 1975 Quick-Drying, One-Coat Paint for Use on Structural Steel.

.2 CISC/CPMA 2-75, 1975 Quick-Drying, Primer for use on Structural Steel.

.4 American Society for Testing and Materials International, (ASTM)

.1 ASTM A36/A36M-05, Standard Specification for Carbon Structural Steel.

.2 ASTM A307-04e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

.3 ASTM A 325-06, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.4 ASTM A 325M-05, Standard Specification for Structural Bolts, Steel, Heat Treated, 830 MPa Minimum Tensile Strength (Metric).

.5 ASTM A847/A847M-14 Standard Specification for Cold-Formed Welded and Seamless High-Strength, Low-Allow Structural Tubing with Improved Atmospheric Corrosion resistance.

.5 Canadian Standards Association (CSA International)

.1 CAN/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, Limit States Design of Steel Structures.

.4 CAN/CSA-S136-01, North American Specification for the Design of Cold-Formed Steel Structural Members;

.5 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.6 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.7 CSA W55.3-1965 (R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.6 The Society for Protective Coatings (SSPC)

.1 SSPC SP-3-82 (R2004), Power Tool Cleaning.

.2 SSPC SP-6-00 (R2004) / NACE No. 3 Commercial Blast Cleaning.

.7 Master Painters Institute

.1 MPI-INT 5.1-98, Structural Steel and Metal Fabrications.

.2 MPI-EXT 5.1-98, Structural Steel and Metal Fabrications.

1.3 DESIGN REQUIREMENTS

.1 Design details and connections to requirements of CAN/CSA-S16-01 to resist forces, moments and shears indicated.

.1 Where forces not indicated:

.1 Unless beam supports concentrated loads, design beam connections to support reactions from maximum uniformly distributed load that can be safely supported by beam in bending.

.2 Where beam supports concentrated loads, request design reactions from Departmental representative.

.3 Design connections in line with brace frames to resist lateral forces (tension and compression) indicated on the drawings.

.4 Bolts shall be bearing type, except for connections of members noted as carrying reversing axial load. For connection of members carrying reversing axial load, bolts in shear shall be slip critical, assuming a load factor of 1.5 for determining service loads.

.5 Design brace frame connections in Code specified locations of seismic activity to requirements of CAN/CSA-S16-01, Clause 27.

.6 Design moment frame connections in Code specified locations of seismic activity to requirements of CAN/CSA-S16-01, Clause 27.2.5.

1.4 SHOP DRAWINGS

.1 Submit shop details, erection drawings and fieldwork drawings in accordance with Section 01 33 00. Shop drawings must be original. Reproduction of Departmental representative's design drawings is not acceptable. Allow fifteen (15) working days for shop drawing review.

.2 Erection drawings shall indicate all information necessary for assembly, including, but not limited to, member sizes, base plate elevation, deck profile, field work details, anchor bolt size and location.

.3 Clearly indicate shop and erection details including cuts, copes, connections, holes, threaded fasteners, rivets and welds. Indicate welds by AWS welding symbols.

.4 Submit steel joist details along with design calculations.

.5 Submit, for information, final shop drawings for all mechanical and electrical equipment to be installed. Drawings to indicate overall geometry of the equipment, geometry of floor openings, and weight of the unit.

.6 Each drawing submitted shall bear the signature and stamp of a qualified professional Engineer registered in Ontario.

.7 Where a structural steel shape shown on drawings is unavailable, a shape of equal or greater section properties and structural capacity shall be substituted, upon approval by Departmental representativesat no extra cost.

.8 Do not proceed with work until final review of shop drawings.

1.5 QUALITY ASSURANCE

.1 If requested, submit certified copies of mill reports showing chemical and physical properties of steel used in this Work.

.2 Work of this Section shall be done by a structural steel fabricator/erector who is fully accredited and a current member in good standing of Canada Institute of Steel Construction.

.3 Welding shall be done by a fabricator fully certified to the conditions of CSA Qualification Code W55.3 or W47.1 respectively. Conform to CAN/CSA-S16.1 where requirements are at variance. Submit Canadian Welding Bureau certificate.

.4 An inspection and testing company shall be selected to verify that materials and fabrication, including alignment, plumbness, bearing, tolerances, connections, bolts, torque, welds, and painting conform to this specification, to CAN/CSA-S16.1, to CSA-W59, and to other applicable Standards. Welding inspections to be visual, except where non-destructive testing is deemed necessary by the Testing Agency or Departmental representative. Submit 4 copies of inspection reports, outlining progress of work, and stating whether or not it conforms to the Contract Documents.

.5 Advise Departmental representative of proposed fabrication schedule, at least ten working days prior to starting, to permit the Testing Agency to arrange for inspection of Work in the shop.

.6 Co-operate with Testing Agency and Departmental representative in providing access to the work, including scaffolding where necessary. Give minimum 24 hours notice for inspection prior to concealment of Work by fireproofing or finishes.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – 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 and corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental representative.

.5 Divert unused paint material from landfill to official hazardous material collections site approved by Departmental representative.

.6 Do not dispose of unused paint materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

Part 2 Products

2.1 MATERIALS

.1 Structural steel: to CAN/CSA-G40.21, Type 350W.

.2 HSS Sections: to ASTM A500 Grade C (Fy=345 MPa)

.3 Anchor Rods: to G40.21-300W Threaded Rod unless otherwise noted.

.4 Bolts, nuts and washers: to ASTM A325M. Bolts shall be bearing type, unless otherwise noted.

.5 Welding materials: to CSA W59

.6 Shop paint primer: to CAN/CGSB-1.40 or CAN/CGSB-1.181, (Refer to Section 2.3 below).

.7 Shop galvanizing: hot dip galvanizing to CAN/CSA-G164, minimum zinc coating of 610 g/m^2.

2.2 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA - S16.09 and in accordance with reviewed shop drawings. Mark and match-mark units for field assembly.

.2 Do not fabricate structural steel prior to receiving written acceptance from the Departmental representative of the weight of the mechanical and electrical equipment to be carried by the steel framing.

.3 Connections shall be as shown on final shop drawings. In general, use welded connections for shop work, and high strength bolts for all field connections, except as otherwise indicated.

.4 All beam connections to be two-sided unless noted.

.5 Center all bearing plates and joists under beams unless noted.

.6 Furnish templates for anchor bolt installation by others.

.7 Provide anchor bolts, bearing assemblies, inserts, wall plates and other hardware (including setting templates) for structural steel beam, joist and deck connections to cast-in-place concrete or masonry, for installation under the Work of Divisions 3 or 4.

.8 Fabricate structural steel members to provide holes for securing other work and for passage of other work through steel framing. Reinforce openings to maintain required design strength. No openings shall be made without written approval of the Departmental representative.

.9 Weld adjustable masonry anchors to structural steel, as directed by mason.

.10 Shop weld, to structural steel, anchorage devices for tie-back and lifeline anchors, davit bases, or other window-washing anchor devices, in accordance with manufacturer's instructions and reviewed shop drawings.

.11 Continuously seal members by continuous welds where indicated.

.12 Grind smooth where indicated in exposed work.

.13 Supply and install end-welded shear studs in accordance with CSA W59.

.14 Provide cambers to beams and/or purlins, as shown on the Drawings.

2.3 SHOP PAINTING

.1 Clean, prepare surfaces and shop prime structural steel to CAN3-S16.1, CAN/CSA-S136, CGSB Standards, MPI INT 5.1, and MPI-EXT 5.1;

.2 Primer to be compatible with finish coatings;

.3 Interior Steel:

.1 Surface preparation shall conform to SSPC SP-3, power tool cleaning.

.2 Primer shall be one coat oil alkyd type to CAN/CGSB 1.40 (or approved equivalent).

.3 Dry film thickness shall be 1.5 mils minimum.

.4 Exterior Steel:

.1 Clean, prepare and galvanize to CSA G164 (610g/m^2, hot dipped).

.5 Do not paint:

.1 Surfaces and edges to be field welded, or to have field installed stud shear connectors,

.2 Surfaces that are in contact at bolted friction type connections or

.3 Surfaces that are in contact with concrete or mortar.

2.4 ARCHITECTURALLY EXPOSED STEEL

.1 Shop weld connections where possible, otherwise use bolted connections.

.2 Fabricate portions of the structure in sections as large and complete as practicable. Minimize bolted and /or field welded connections.

.3 Continuously weld connection joints where exposed to view, and grind them smooth and flush with adjacent surfaces. Make exposed connections of the same material, colour and finish as base material on which they occur.

.4 Accurately form connections with exposed faces flush. Mitres and joints to be tight.

.5 Align welded seams of adjacent HSS framing, and orient seams away from view in final structure.

.6 Remove mill marks, identification, and surface imperfections by grinding smooth and flush with adjacent surfaces.

.7 Apply primer and/or paint to exposed surfaces without runs or sags. Sand down and repaint areas not acceptable to the Departmental representative.

.8 Where indicated, exterior exposed steel shall be galvanized in conformance with CAN/CSA G164.

Part 3 Execution

3.1 GENERAL

.1 Erect structural steel as indicated in accordance with CAN/CSA-S16, CAN-S136, and in accordance with reviewed shop drawings.

.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 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.

3.3 MARKING

.1 Mark materials in accordance with CAN/CSA G40.20/G40.21. 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.

3.4 ERECTION

.1 Erect structural steel as indicated in accordance with CAN/CSA-S16.1, CAN-S136, and in accordance with reviewed shop drawings.

.2 Provide necessary erection equipment, bracing, shoring and temporary flooring as required for erection and for all safety regulations. Brace and support structure during erection to ensure that it is maintained in alignment under construction and other loading and until all other construction elements contributing to stability are in place.

.3 Check anchor bolt and insert layout before erection. Arrange for correction of discrepancies.

.4 Set base plates on cleaned bearing surfaces. Solidly pack open spaces between shims with bedding mortar consisting of non-shrink grout as specified in Section 03 30 00 - Cast-In-Place Concrete.

.5 Obtain permission of Departmental representative prior to field cutting or altering of structural members not shown on Drawings.

.6 Clean field welds, bolted connections and abraded areas. Apply touch up shop primer (or zinc rich paint for galvanized steel) to bolts, welds and burned or scratched surfaces at completion of erection.

.7 Continuously seal members by continuous welds where indicated. Grind smooth.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing 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 Submit inspection reports to Departmental representative within 3 days of completion of inspection.

3.6 DEFECTIVE WORK

.1 Remove and replace, or repair, damaged or defective work, at no cost to the Contract.

.2 Contractor shall be responsible for the cost of additional testing and re-inspection made necessary by the occurrence of deficient Work.

.3 Submit in writing details of proposed method of remedial work, for approval by the Departmental representative. Details to be signed and sealed by a qualified Professional Engineer retained by the Contractor.

.4 Correction of misaligned holes or other field modifications by flame-cutting is not permissible.

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 31 00 - Steel Deck

.4 Section 09 91 23 - Interior Painting

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA-S16-01, Limit States Design of Steel Structures.

.3 CSA-S136-01, North American Specifications for the Design of Cold Formed Steel Structural Members.

.4 CSA-W47.1-03, Certification of Companies for Fusion Welding of Steel.

.5 CSA-W55.3-1965(R2003) Resistance welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.6 CSA-W59-03, Welded Steel Construction (Metal Arc Welding) Metric.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.105-M91, Quick Drying Primer.

.3 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.4 CAN/CGSB-85.100-93, Painting.

.3 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 1-73, Quick-Drying Paint for Use on Structural Steel.

.4 National Building Code of Canada 2015

1.3 QUALITY ASSURANCE

.1 Joist suppliers shall be members in good standing of the Canadian Institute of Steel Construction.

.2 An inspection and testing company shall be selected to verify materials and fabrication, including connections, bolts, welds, and painting conform to this Specification. Submit 4 copies of inspection reports, outlining progress of work, and stating whether or not it conforms to the Contract Documents.

.3 Contractor shall advise Departmental representative of scheduled start date of fabrication, at least ten working days prior to starting, in order that the testing company arrange for inspection of Work in the shop.

1.4 DESIGN OF STEEL JOISTS AND BRIDGING

.1 Design steel joists and joist bridging (including all connections to supporting elements) to carry uniform, variable or concentrated loads indicated on Drawings in accordance with CAN/CSA-S16.1 and CSA S136, and including additional loads shown on Mechanical and Electrical Drawings, and loads due to window washing hardware/anchors.

.2 The Tender Drawings are based on assumed mechanical and electrical services only. Prior to construction, the contractor shall co-ordinate the exact superimposed loads due to the Work of other Sections with the design loads of the joist designer.

.3 All joists are to be cambered for full dead load deflection. Limit live load deflection to 1/360th of span, unless otherwise noted on the drawings. Loads due to suspended/supported Mechanical and Electrical equipment shall be considered as live loads.

.4 Account for concentrated loads, due to reaction of framing members at openings, which are supported by joists.

.5 Account for reactions applied to the joists due to bracing members, hangers, cladding inserts, window washing equipment, gymnasium equipment, curtains, special lighting, suspended sound equipment or suspended partitions.

.6 Account for uplift effects due to wind loads.

.7 Design joist shoes and wall bearing plates to be centered over the webs of supporting steel girders, or at the centerlines of supporting masonry or concrete elements. Size of shoes and wall plates to be sufficient to avoid overstressing of supporting elements.

.8 Joist web members shall be located with sufficient clear space to facilitate the passage of indicated ductwork, pipes and conduits, and such clear spaces shall be lined up from joist to joist.

.9 Joist designer to be responsible for connections between bridging and supporting structure. Bridging shall not be anchored to non-load bearing masonry. Bridging shall not transmit out-of-plane forces to laterally unsupported beams/columns or to walls.

.10 At spandrel beams, connect transverse bottom chord bridging to top flanges of beam only.

.11 Where concentrated loads do not intersect OWSJ panel points, provide additional joist web diagonal between concentrated load and nearest panel point on opposite chord (by OWSJ Designer).

1.5 SHOP DRAWINGS

.1 Submit shop drawings, erection drawings, and joist design calculations in accordance with the Drawings and Specifications and Section 01 33 00, Submittal Procedures. Allow fifteen (15) working days for review.

.2 Clearly indicate joist depth, spacing, bearing and anchorage details, framed openings, accessories, bridging lines, camber and loading.

.3 Submit, for information, final shop drawings for all mechanical and electrical equipment to be installed. Drawings to indicate overall geometry of the equipment, geometry of floor openings, and weight of the unit.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – 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 and corrugated cardboard packaging material in appropriate on-site bins 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 Structural Steel for Steel joists shall conform to CSA-G40.21 and CSA-S136.

.2 Welding Materials shall conform to CSA W59.

.3 Shop Paint Primer shall conform to CAN/CGSB-1.40 and/or CAN/CGSB-1.105.

.4 Welded shear studs shall conform to CSA-W59, Appendix H.

2.2 FABRICATION

.1 Fabricate steel joists and accessories in accordance with CAN/CSA-S16.1, CSA-S136 and in accordance with reviewed shop drawings.

.2 Weld in accordance with CSA W59.

.3 Provide top and/or bottom chord extensions where indicated.

.4 Provide diagonal and horizontal bridging as required for installation.

.5 Do not fabricate joists prior to receiving written acceptance from the Departmental representative of the weight of the mechanical and electrical equipment to be installed on the slab.

2.3 SHOP PAINTING

.1 Clean, prepare surface and shop prime steel in accordance with CAN3-S16.1, and as specified in Section 05 12 23 - Structural Steel for Buildings. In exposed areas, primer to be compatible with finish coatings.

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 upon which Work of this Section depends, prior to commencing fabrication and report any discrepancies.

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 Test shear studs in accordance with CSA-W59.

.4 Submit test report to Departmental representative within 10 days after completion of inspection.

3.4 ERECTION

.1 Erect steel joists and bridging in accordance with CAN/CSA-S16.1 and reviewed shop drawings.

.2 Complete installation of all bridging and anchorages before placing construction loads on joists.

.3 Obtain written permission from Departmental representative prior to field cutting or altering joists or bridging.

.4 Clean and touch up shop primer to bolts, welds, burned or scratched surfaces at completion of erection.

.5 If a point load not shown on the joist shop drawings is hung from a joist at a location other than a panel point, and is approved by the Departmental representative and the joist designer, then the Contractor shall weld an additional web diagonal from the hanger location to the nearest panel point on the opposite chord.

.6 All pipes 50mm diameter and larger shall be hung from top chords of joists at panel points only.

3.5 DEFECTIVE WORK

.1 Remove and replace, or repair, damaged or defective work, at no cost to the Contract.

.2 Submit in writing details of proposed method of remedial work, for approval by the Departmental representative. Details to be signed and sealed by a licensed Professional Engineer retained by the Contractor.

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

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A 653/A653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A 792/A792M-06a, Standard Specification for Steel Sheet, 55%Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.79-1978(R1999), Cellular Metal and Cellular Concrete Floor Raceways and Fittings.

.2 CAN/CSA-S16-01, Limit States Design of Steel Structures.

.3 CSA-S136-01, North American Specification for the Design of Cold Formed Steel Structural Members.

.4 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.5 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.6 CSA W59-03, Welded Steel Construction, (Metal Arc Welding).

.4 Canadian Sheet Steel Building Institute (CSSBI)

.1 CSSBI 10M-06, Standard for Steel Roof Deck.

.2 CSSBI 12M-06, Standard for Composite Steel Deck.

.5 National Building Code of Canada 2015

1.3 DESIGN REQUIREMENTS

.1 Design steel deck using limit states design in accordance with CSA S136, CSSBI 10M and CSSBI 12M.

.2 Steel decking and all connectors/fasteners shall be designed to safely carry dead, live and diaphragm loads as indicated, including any variable or concentrated loads, wind uplift as required under the National Building Code, and construction loads.

.3 Deflection under live loads (including construction loads) shall not exceed:

.1 Roof Deck: 1/240th of span, except when plaster or gypsum board ceilings are suspended directly from deck, live load deflection not to exceed 1/360th of span.

.2 Floor Deck: deflection under sum of live loads, partitions and slab self-weight

not to exceed 1/360th of span.

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 Ontario.

.3 Submit design calculations.

.4 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories. Show welding and connection details for diaphragm action.

.5 Indicate details of temporary shoring of steel deck, such as location, time and duration of placement and removal of shoring for concrete fill decks.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 - 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.

1.6 QUALITY ASSURANCE

.1 Steel deck manufacturers shall be members in good standing of the Canadian Sheet Steel Building Institute.

.2 An inspection and testing company shall be selected to inspect and report on compliance with this specification. Submit 4 copies of inspection reports, outlining progress of work, and stating whether or not it conforms to the requirements of CSA-S136, CSA-W59, CSSBI standards and Contract Documents.

Part 2 Products

2.1 MATERIALS

.1 For interior surfaces not exposed to weather:

.1 Zinc-Iron Alloy (ZF) coated steel sheet: to ASTM A653/A653M, structural quality, Grade 230, 0.91mm minimum base steel thickness.

.1 For unpainted decks: with ZF75 zinc coating suitable for unpainted finish, and chemically treated (passivated).

.2 For painted decks: with ZF75 wiped coat zinc-iron alloy coating suitable

for finish painting (not passivated).

.2 For exterior surfaces exposed to weather:

.1 Zinc (Z) coated steel sheet to ASTM A 653/A653M structural quality Grade 230, with ZF75, coating, regular spangle extra smooth surface, chemically treated for unpainted finish, not chemically treated for paint finish, 0.91mm minimum base steel thickness.

.3 Acoustic insulation: fibrous glass 17.5 kg/m³ density profiled to suit deck flutes, supplied to site for installation by roofing contractor.

.4 Acoustic closures: closed cell foam rubber, profiled to deck corrugations, 25mm thick.

.5 Perimeter Closures, neoprene.

.6 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness 0.91mm. Metallic coating same as deck material.

.7 Touch-up Primer: zinc rich, ready mix to CAN/CGSB-1.181, zinc rich type.

.8 Shear studs: to CSA W59.

2.2 TYPES OF DECKING

.1 Steel roof deck: 0.91mm minimum base steel thickness, 76mm maximum deep profile or as noted, non-cellular, interlocking side laps.

Part 3 Execution

3.1 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S136, and CSSBI 10M and CSSBI 12M.

.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.

3.2 ERECTION

.1 Erect steel deck as indicated and in accordance with CSA S136, CSSBI 10M, CSSBI 12M and reviewed shop drawings.

.2 Tolerances: lay and position deck within a tolerance of 10mm with respect to edges of deck parallel to flutes and centerlines of supporting structure.

.3 Lap ends: 50 mm minimum unless noted.

.4 Connect deck to supporting members with powder-actuated nails and screws to suit base material and diaphragm shear of 10kN/mm. Deck to be used as diaphragm.

Transverse connection spacing	300mm unless noted
Longitudinal connection spacing	450mm unless noted
Side lap fastener spacing	450mm unless noted

.5 Immediately after decking is permanently secured in place, touch up surface with compatible primer where burned by welding, or otherwise damaged.

.6 Reinforce openings to CSSBI Standards, or as indicated on the drawings.

.7 Supply and install cover plates, cell closures and flashing, where indicated or required.

.8 No ceiling, lighting, sprinkler pipe, ductwork, electrical conduit or other item shall be hung from steel deck, unless shown on the drawings.

.9 Contractor shall supply and install solid blocking between the flutes of the roof deck and supporting members, where additional load due to sleepers or curbs at roof top equipment is placed on the roof deck.

.10 Upon completion of erection remove all dirt and debris from deck.

.11 Floor deck contractor shall furnish and install metal flashing to form edges of slab and trimmers around openings, where steel angles not provided under the Work of Section 05 12 23 - Structural Steel For Buildings.

3.3 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 and 300 mm as recommended by manufacturer, except as otherwise indicated.

.3 For deck openings with any one dimension greater than 300 mm and for areas of concentrated load, reinforce in accordance with structural framing details.

3.4 CONNECTIONS

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

3.5 DEFECTIVE WORK

.1 Remove and replace, or repair, damaged or defective work, at no cost to the Contract.

.2 Submit in writing, details of proposed method of remedial work, for approval by the Departmental representative. Details to be signed and sealed by a licensed Professional Engineer retained by the Contractor.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 92 00 – Sealants

.2 Section 08 11 00 – Metal Doors and Frames

1.2 REFERENCES

.1 ASTM International

.1 ASTM A 53/A 53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A 307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 CSA International

.1 CSA G40.20/G40.21-04(R2009), 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 S16-09, Design of Steel Structures.

.4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.5 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.

.3 Environmental Choice Program

.1 CCD-047-98(R2005), Architectural Surface Coatings.

.2 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.

.4 Green Seal Environmental Standards (GS)

.1 GS-11-2008, 2nd Edition, Paints and Coatings.

.5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - current edition.

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 sections plates, pipe, tubing and bolts and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

.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: 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.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - 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 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with local regulations.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W.

.2 Steel pipe: to ASTM A 53/A 53M standard weight, galvanized finish.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A 307.

.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 flat 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 Shop coat primer: in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

.3 Zinc primer: zinc rich, ready mix to in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11 .

2.4 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:

.2 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.3 Concrete, mortar and masonry.

.4 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: galvanized, 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 PIPE RAILINGS

.1 Steel pipe: 38mm nominal outside diameter, formed to shapes and sizes as indicated.

.2 Galvanize exterior and interior pipe railings after fabrication.

2.8 ACCESS LADDERS

.1 Stringers: 65 x 8 mm thick, flat steel bars.

.2 Steel Rungs: 20 mm diameter, welded to stringers at 300 mm on centre.

.3 Brackets: sizes and shapes as indicated, weld to stringers at 1050 mm on centre, or as indicated, complete with fixing anchors.

.4 Provide lockable access with pierced tabs for short shank padlock.

.5 Galvanize finish for exterior, prime paint for interior.

.6 Galvanize exterior ladders after fabrication.

2.9 TRENCH COVERS AND FRAMES

.1 Steel fabricate from 6 mm thick raised pattern plate set in L 55 x 55 x 6 frame. Include anchors at 1200 mm on centre for embedding in concrete. Supply trench covers in 1200 mm removable lengths.

.2 Finish: galvanized.

2.10 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 Weld 9mm thick steel strap anchors to channel jamb frame at 600mm on centre.

.4 Finish: galvanized.

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.

.2 Visually inspect substrate in presence of Departmental Representative.

.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 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 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA S16 or Weld field connection.

.7 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

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

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

3.3 PIPE RAILINGS

.1 Install pipe railings as indicated.

.2 Set railing standards as detailed.

3.4 ACCESS LADDERS

.1 Install access ladders in locations as indicated.

.2 Erect ladders 150mm clear of wall on bracket supports.

3.5 TRENCH COVERS

.1 Install trench covers in locations as indicated.

3.6 CHANNEL FRAMES

.1 Install steel channel frames to openings as indicated.

3.7 CLEANING

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

.2 Leave Work area clean at end of each day.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.4 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 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