

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section 01330 - Submittal Procedures.
- .2        Section 05310 - Steel Deck.

**1.2                REFERENCES**

- .1        American Society for Testing and Materials International, (ASTM)
  - .1        ASTM A36/A36M-01, Specification for Structural Steel.
  - .2        ASTM A193/A193M-01b, Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
  - .3        ASTM A307-00, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - .4        ASTM A325-02, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  - .5        ASTM A325M-00, Specification for High-Strength Bolts for Structural Steel Joints Metric.
- .2        Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB-85.10-99, Protective Coatings for Metals.
- .3        Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
  - .1        CISC/CPMA 1-73b, Quick-Drying, One-Coat Paint for Use on Structural Steel.
  - .2        CISC/CPMA 2-75, Quick-Drying, Primer for use on Structural Steel.
- .4        Canadian Standards Association (CSA International)
  - .1        CAN/CSA G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2        CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3        CAN/CSA-S16-01, Limit States Design of Steel Structures.
  - .4        CAN/CSA-S136-94(R2001), Cold Formed Steel Structural Members.
  - .5        CSA-S136.1-95(R2001), Commentary on CSA Standard S136.
  - .6        CSA W47.1-92(R2001), Certification of Companies for Fusion Welding of Steel Structures.
  - .7        CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding.
  - .8        CSA W55.3-1965(R1998), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
  - .9        CSA W59-M1989(R2001), Welded Steel Construction (Metal Arc Welding) Metric.

- .5 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.
- .6 The Society for Protective Coatings (SSPC)
  - .1 SSPC SP-6/NACE No. 3-00, Commercial Blast Cleaning.

### **1.3 DESIGN REQUIREMENTS**

- .1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-S136.1 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 "Handbook of the Canadian Institute 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 Submit sketches and design calculations stamped and signed by qualified professional engineer licensed in Province of Manitoba, Canada for non standard connections.

### **1.4 SHOP DRAWINGS**

- .1 Submit shop drawings including fabrication and erection documents and materials list in accordance with Section 01330 - Submittal Procedures.
- .2 Erection drawings: indicate 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.
- .3 Ensure Fabricator drawings showing designed assemblies, components and connections are stamped and signed by qualified professional engineer licensed in the province of Manitoba, Canada.

### **1.5 QUALITY ASSURANCE**

- .1 Provide structural steel Fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

### **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Structural steel: to CAN/CSA-G40.20/G40.21 Grade 350W.
- .2 Anchor bolts: to CAN/CSA-G40.20/G40.21, Grade 300W.
- .3 Bolts, nuts and washers: to ASTM A325.
- .4 Welding materials: to CSA W48 Series CSA W59 and certified by Canadian Welding Bureau.
- .5 Shop paint primer: to CISC/CPMA1 Standard I-73a.
- .6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m<sup>2</sup>.
- .7 Shear studs: to CSA W59, Appendix H.

**2.2 FABRICATION**

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

**2.3 SHOP PAINTING**

- .1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16 except where members to be encased in concrete.
- .2 Clean members, remove loose mill scale, rust, oil, dirt and other foreign matter. Prepare surface according to SSPC-SP-6.
- .3 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of 1.5 to 2 mils, 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 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 from 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 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 Contract Administrator 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 and in accordance with CAN/CSA-S16 and in accordance with reviewed erection drawings.
- .2 Field cutting or altering structural members: to approval of Contract Administrator.
- .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.

#### **3.5 FIELD QUALITY CONTROL**

- .1 Inspection and testing of materials and workmanship will be carried out by testing laboratory designated by Contract Administrator.
- .2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Contract Administrator.
- .3 Submit test reports to Contract Administrator within 2 weeks of completion of inspection.
- .4 The City will pay costs of tests as specified in Section 01293 - Payment Procedures: Testing Laboratory Services.

- .5 Test shear studs in accordance with CSA W59.

**3.6 FIELD PAINTING**

- .1 Paint in accordance with Section 09900 – Finish Painting.
  - .1 Touch up damaged surfaces and surfaces without shop coat with primer to SSPC-SP-6 except as specified otherwise. Apply in accordance with CAN/CGSB 85.10.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section 01330 - Submittal Procedures.
- .2        Section 04051 - Masonry Procedures: Installation of anchors.
- .3        Section 05310 - Steel Deck.

**1.2                REFERENCES**

- .1        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.
- .2        Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)
  - .1        CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.
- .3        Canadian Standards Association (CSA International)
  - .1        CSA-G40.20/G40.21-98, 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-S136-94(R2001), Cold Formed Steel Structural Members.
  - .4        CSA-W47.1-92(R2001), Certification of Companies for Fusion Welding of Steel Structures.
  - .5        CSA-W55.3-1965(R1998), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
  - .6        CSA-W59-M1989(R2001), Welded Steel Construction (Metal Arc Welding) Metric.

**1.3                QUALITY ASSURANCE**

- .1        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 and CSA-S136.
- .2        Design joists and anchorages for uplift forces as indicated.
- .3        Ensure joists are manufactured to consider load effects due to fabrication, erection and handling.

- .4 Limit roof joist deflection due to specified live load to 1/360 of span.
- .5 Submit 4 copies of calculations and joist design drawings for joists for Contract Administrator review 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 01330 - Submittal Procedures.
- .2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in province of Manitoba, 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.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Open web steel joists:
  - .1 Acceptable material: steel to CSA-G40.20/G40.21 and CSA-S136.
- .2 Structural steel: to CSA-G40.20/G40.21 and CSA-S136.
- .3 Welding materials: to CSA-W59 with CSA-W59S1.
- .4 Shop paint primer: to CISC/CPMA-1-73a.
- .5 Shear studs: to CSA-W59, Appendix H with CSA-W59S1.

### **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 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 bridgings and anchorages as indicated.

## **2.3 SHOP PAINTING**

- .1 Clean, prepare and shop prime surfaces of steel joists to CAN/CSA-S16 CAN/CGSB-85.100.
- .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 1-73a primer to steel surfaces to achieve maximum dry film thickness of 1.5 to 2.0 mils 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 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 discrepancies and potential problem areas to Contract Administrator 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 Contract Administrator.
- .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. Engineer Consultant will determine extent of and identify all inspections.

- .3 Submit test report to Contract Administrator within 7 days after completion of inspection.
- .4 The City will pay costs of tests as specified in Section 01293 - Payment Procedures: Testing Laboratory Services.

### **3.4 ERECTION**

- .1 Erect steel joists and bridging as indicated in accordance with CAN/CSA-S16 and in accordance with reviewed 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 designer of joists and to approval of Contract Administrator.
- .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 09900 – Finish Painting.
- .2 Touch up all damaged surfaces and surfaces without shop coat with CISC/CPMA-1-73a in accordance with manufacturers' recommendations to CAN/CGSB-85.10.

**END OF SECTION**

**Part 1            General**

**1.1                RELATED SECTIONS**

- .1        Section 01330 - Submittal Procedures.
- .2        Section 09900 - Finish Painting.
- .3        Section 05121 - Structural Steel for Buildings.

**1.2                REFERENCES**

- .1        American Society for Testing and Materials International, (ASTM)
  - .1        ASTM A653/A653M-01a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .2        ASTM A792/A792M-01a, 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-S16.1-94(R2000), Limit States Design of Steel Structures.
  - .3        CSA-S136-94(R2001), Cold Formed Steel Structural Members.
  - .4        CSA W47.1-92(R2001), Certification of Companies for Fusion Welding of Steel Structures.
  - .5        CSA W55.3-1965(R1998), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
  - .6        CSA W59-M1989(R2001), Welded Steel Construction, (Metal Arc Welding) Metric.
- .4        Canadian Sheet Steel Building Institute (CSSBI)
  - .1        CSSBI 10M-96, 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 gypsum board ceilings are hung directly from deck, live load deflection not to exceed 1/360 of span.

#### **1.4 SHOP DRAWINGS**

- .1 Submit shop drawings erection and shoring drawings in accordance with Section 01330 - Submittal Procedures.
- .2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in Province of Manitoba, Canada.
- .3 Submit design calculations if requested by Contract Administrator.
- .4 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.

#### **1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials.

### **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, unpainted finish, 0.76 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, not chemically treated for paint finish, for exterior surfaces exposed to weather, 0.76 mm minimum base steel thickness.
- .4 Aluminum-zinc alloy (AZ) coated steel sheet: to ASTM A792/A 792M structural quality grade 230, with AZ 150, AZ 180 coating, surface, not chemically treated for paint finish, for exterior surfaces exposed to weather, 0.76 mm minimum base steel thickness.
- .5 Closures: in accordance with manufacturer's recommendations.
- .6 Cover plates, cell closures and flashings: steel sheet with minimum base steel thickness of 0.76 mm. Metallic coating same as deck material.
- .7 Primer: zinc rich, ready mix to CAN/CGSB-1.181.
- .8 Caulking: to Section 07900.

#### **2.2 TYPES OF DECKING**

- .1 Steel floor deck: 0.76 mm minimum base steel thickness, 38 mm maximum deep profile, composite non-cellular, interlocking side laps.

**Part 3 Execution**

**3.1 GENERAL**

- .1 Structural steel work: in accordance with CAN/CSA-S136 and CSSBI 10M.
- .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 and CSSBI 10M and in accordance with reviewed erection drawings.
- .2 Lap ends: to 50 mm minimum.
- .3 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 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, 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 01330 - Submittal Procedures.
- .2        Section 03300 - Cast-in-Place Concrete.
- .3        Section 04080 - Masonry Reinforcement and Connectors.
- .4        Section 04051 - Masonry Procedures.
- .5        Section 05121 - Structural Steel.
- .6        Section 05310 - Steel Deck.
- .7        Section 05510 - Metal Stairs and Ladders.
- .8        Section 09900 - Finish Painting.

**1.2            REFERENCES**

- .1        American Society for Testing and Materials International, (ASTM)
  - .1        ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2        ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
  - .3        ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2        Canadian General Standards Board (CGSB)
  - .1        CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
  - .2        CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.
- .3        Canadian Standards Association (CSA International)
  - .1        CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
  - .2        CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3        CAN/CSA-S16.1-01, Limit States Design of Steel Structures.
  - .4        CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
  - .5        CSA W59-1989(R2001), Welded Steel Construction (Metal Arc Welding) (Imperial Version).
- .4        The Environmental Choice Program
  - .1        CCD-047a-98, Paints, Surface Coatings.

- .2 CCD-048-98, 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 01330 - Submittal Procedures.
  - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01330 - Submittal Procedures. Indicate VOC's:
    - .1 For finishes, coatings, primers and paints.
- .2 Shop Drawings
  - .1 Submit shop drawings in accordance with Section 01330 - 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 01610 - Basic 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.
- .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 for recycling in accordance with Waste Management Plan.

- .4 Divert unused metal materials from landfill to metal recycling facility approved by Contract Administrator.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 350W.
- .2 Steel pipe: to ASTM A53/A53M to thickness shown 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, 30 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  $600 \text{ g/m}^2$  to CAN/CSA-G164.
- .2 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.
- .3 Shop coat primer: to CAN/CGSB-1.40.
- .4 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

### **2.4 ISOLATION COATING**

- .1 Isolate aluminium 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 PIPE RAILINGS**

- .1 Steel pipe: formed to shapes and sizes as indicated and as required to NBC 2005.
- .2 Shop coat prime interior railings after fabrication.

**2.7 ACCESS LADDERS**

- .1 Stringers: 9.5 x 63.5 mm thick, steel.
- .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 1500 mm on centre, complete with fixing anchors.
- .4 Prime paint for interior.

**2.8 CHANNEL FRAMES**

- .1 Fabricate frames from steel channel, sizes of channel to match existing and opening as indicated.
- .2 Weld channels together to form continuous frame for jambs and head of openings, as indicated.
- .3 Finish: galvanized.

**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 Contract Administrator 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 PIPE RAILINGS**

- .1 Install pipe railings to stairs.
- .2 Set railing standards in concrete. Grout to fill hole. Trowel surface smooth and flush with adjacent surfaces.

### **3.3 ACCESS LADDERS**

- .1 Install access ladders in locations as indicated.
- .2 Erect ladders 180 mm clear of wall on bracket supports.

### **3.4 CHANNEL FRAMES**

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

### **3.5 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 SECTIONS**

- .1        Section 01330 - Submittal Procedures.
- .2        Section 03300 - Cast-in-Place Concrete.
- .3        Section 04051 - Masonry Procedures.
- .4        Section 05500 - Metal Fabrications.
- .5        Section 09900 – Finish Painting

**1.2                REFERENCES**

- .1        American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)
  - .1        ANSI/NAAMM MBG531-00, Metal Bar Grating Manual.
- .2        American Society for Testing and Materials International, (ASTM)
  - .1        ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2        ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .3        ASTM A325M-02, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .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.
  - .3        CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
  - .4        CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .4        Canadian Standards Association (CSA International)
  - .1        CSA W59-1989(R2001), Welded Steel Construction (Metal Arc Welding/Imperial Version).
- .5        National Association of Architectural Metal Manufactures (NAAMM)
  - .1        AMP 510-[92], Metal Stair Manual.
- .6        Steel Structures Painting Council (SSPC), Systems and Specifications Manual, Volume 2.

**1.3 SYSTEM DESCRIPTION**

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

**1.4 SUBMITTALS**

- .1 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01330 - Submittal Procedures.
- .2 Shop Drawings
  - .1 Submit shop drawings in accordance with Section 01330 - Submittal Procedures.
  - .2 Indicate construction details, sizes of steel sections and thickness of steel sheet.
  - .3 Submit shop drawing bearing stamp of a qualified professional engineer registered in Province of Manitoba.

**1.5 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.

**1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Steel sections: to CAN/CSA-G40.20/G40.21 Grade 300 W.
- .2 Steel plate: to CAN/CSA-G40.20/G40.21, Grade 260 W.
  - .1 Floor plate: to CAN/CSA-G40.20/G40.21,
  - .2 Design: [ ].
- .3 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless black.

- .4 Steel tubing: to CAN/CSA-G40.20/G40.21, round, sizes and dimensions as indicated.
- .5 Metal bar grating: to ANSI/NAAMM MBG 531, steel
- .6 Welding materials: to CSA W59.
- .7 Bolts: to ASTM A307.
- .8 High strength bolts: to ASTM A325M.

## **2.2 FABRICATION**

- .1 Fabricate to 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; mitres and joints tight. 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.

## **2.3 PLATE/GRATING STAIRS**

- .1 Form treads from 6mm thick steel plate to profile indicated, and secure to stringers with L 35 x 35 x 5 supports. Form landings from 6 mm thick steel plate, reinforced by L 55 x 55 x 6 spaced at 600 mm on centre.
- .2 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.
- .3 Form stringers from MC 310 x 15.8.

## **2.4 PIPE/TUBING BALUSTRADES**

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

## **2.5 FINISHES**

- .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m<sup>2</sup> to CAN/CSA-G164.
- .2 Shop coat primer: to CAN/CGSB-1.40.

- .3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

## **2.6 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 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.

### **3.2 CLEANING**

- .1 Perform cleaning as soon as possible 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**