WIND-LOAD BEARING STEEL STUD SYSTEMS

1. GENERAL

1.1 Related Sections

.1 Section [01330 - Submittal Procedures].

.2 Section [01355 - Waste Management and Disposal].

.3 Section [07271 - Air Barriers].

.4 Section [09250 - Gypsum Board].

1.2 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A 591/A 591M-98, Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications.

.2 ASTM A 653/A 653M-02a M-[00], Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM A 792/A 792M-02, Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.2 Canadian Standards Association (CSA)

.1 CAN/CSA-G164-M92 (R1998)], Hot Dip Galvanizing of Irregularly Shaped Articles.

.2 CSA W47.1-92 (R2001)], Certification of Companies for Fusion Welding of Steel Structures.

.3 CSA W55.3-1965 (R1998)], Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.4 CSA W59-M1989 (R2001)], Welded Steel Construction (Metal Arc Welding) (Metric Version).

.5 CSA S136-[94(R2001)], Cold Formed Steel Structural Members.

.3 Canadian General Standards Board (CGSB)

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

.4 Canadian Sheet Steel Building Institute (CSSBI)

.1 Canadian Sheet Steel Building Institute CSSBI 52M-[91], Lightweight Steel Framing Binder.

1.3 Shop Drawings

.1 Submit shop drawings in accordance with Section [01330 - Submittal Procedures].

.2 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, connection and bracing details, screw sizes and spacing, and anchors.

.3 Indicate locations, dimensions, openings and requirements of related work.

.4 Indicate welds by welding symbols as defined in CSA W59-1989 (R2001).

1.4 Samples

.1 Submit samples in accordance with Section [01330 - Submittal Procedures].

.2 Submit samples of framing components and fasteners to [Engineer] [Consultant] [if requested].

1.5 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section [01355 - Waste Management and Disposal].

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan.

.3 Fold up metal banding, flatten and place in designated area for recycling.

2. PRODUCTS

2.1 Materials

.1 Steel: to CSA S136-94(R2001), fabricated from ASTM A 653/A 653M-02a, Grade A to D steel.

.2 Zinc coated steel sheet: quality to A653M, with [Z275] designation zinc coating.

.3 Aluminum-zinc alloy coated steel sheet: to ASTM A 792/A 792M-02, commercial quality, grade[33] [37] with [AZ150] [AZ180] coating, [regular spangle] surface, chemically treated for unpainted finish.

.4 Electrolytic zinc coated, chromate treated, steel sheet: to ASTM A 591/A 591M-98, commercial quality, Grade [_____], Type [_____], [copper bearing] with proprietary

coating comprised of [_____] g/m² zinc total mass both sides, unpainted finish.

.5 Welding materials: to CSA W59-1989 (R2001) and certified by Canadian Welding Bureau.

.6 Screws: pan head, self-drilling, self-tapping sheet metal screws, corrosion protected to minimum requirements of CSSBI, length [_____] mm.

.7 Anchors: concrete expansion anchors or other suitable drilled type fasteners.

.8 Bolts, nuts, washers: hot dipped galvanized to CAN/CSA-G164-M92 (R1998), [380] [600] g/m² zinc coating.

.9 Touch up primer: zinc rich, to CAN/CGSB-1.181-99.

2.2 Steel Stud Designations

.1 Colour code steel studs in accordance with CSSBI 50M.

2.3 Metal Framing

.1 Steel studs: to CSA S136-94(R2001), fabricated from zinc coated steel, depth as indicated. Minimum steel thickness of [0.91] [1.22] [1.52] [1.91] mm.

.2 Stud tracks : fabricated from same material and finish as steel studs, depth to suit.

.1 Bottom track: single piece.

.2 Top track: [single piece] [two piece telescoping].

.3 Bridging: fabricated from same material and finish as studs, 38 x 12 x 1.22 mm minimum thickness.

.4 Angle clips: fabricated from same material and finish as studs, 38 x 38mm x depth of steel stud, 1.22 mm minimum thickness.

.5 Tension straps and accessories: as recommended by manufacturer.

2.4 Source Quality Control

.1 Prior to commencement of work, submit:

.1 [two] certified copies of mill reports covering material properties.

3. EXECUTION

3.1 General

.1 Do welding in accordance with CSA W59-1989 (R2001).

.2 Companies to be certified under Division 1 or 2.1 of CSA W47.1-92 (R2001) for fusion welding of steel structures and/or CSA W55.3-1965 (R1998) for resistance welding of structural components.

.3 Do work in accordance with CSSBI 52M.

3.2 Erection

.1 Erect components to requirements of reviewed shop drawings.

.2 Anchor tracks securely to structure at [800] mm oc maximum, unless lesser spacing prescribed on shop drawings.

.3 Erect studs plumb, aligned and securely attached with [two]screws minimum, or welded in accordance with manufacturer's recommendations.

.4 Seat studs into bottom tracks [and] [single piece top track] [two piece telescoping top track].

.5 Install 50.0 mm minimum telescoping track at top of walls where required to accommodate vertical deflection. Nest top track into deflection channel a minimum of 30.0 mm and a maximum of 40.0 mm. Do not fasten tracks together. Stagger joints.

.6 Install studs at not more than 50.0 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.

.7 Brace steel studs with horizontal internal bridging at [_____] mm maximum. Fasten bridging to steel clips fastened to steel studs with screws or by welding.

.8 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as detailed on shop drawings.

.9 Touch up welds with coat of zinc rich primer.

3.3 Erection Tolerances

.1 Plumb: not to exceed 1/500th of member length.

.2 Camber: not to exceed 1/1000th of member length.

.3 Spacing: not more than 3.0 mm from design spacing.

.4 Gap between end of stud and track web: not more than 4.0 mm.

3.4 Cutouts

.1 Maximum size of cutouts for services as follows:

Member Depth	Across Member Depth	Along Member Length	Centre to Centre Spacing (mm)
92	40 max.	105 max.	600 min.
102	40 max.	105 max.	600 min.
152	65 max.	115 max.	600 min.

.2 Limit distance from centerline of last unreinforced cutout to end of member to less than 300 mm.

END OF SECTION

METAL FABRICATIONS

1. GENERAL

1.1 Reference Standards

.1 Conform to the following reference standards in accordance with Section 01400:

.1 CAN/CSA G40.21, Structural Quality Steels.

.2 CSA G164, Hot-Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA S16.1, Steel Structures for Buildings.

.4 ASTM A325, Specifications for High Strength Steel Bolts Classes 10.9 and 10.9.3 for Structural Steel Joints.

.5 CSA W47.2. Certification of Companies for Fusion Welding of Aluminum.

.6 CSA W59, Welded Steel Construction.

.7 CSA W59.2, Welded Aluminum Construction.

.8 CSA HA Series M, Standards for Aluminum and Aluminum Alloys.

1.2 Submittals for Review

.1 Submit shop drawings in accordance with Section 01300.

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.3 Drawings to bear the stamp and signature of a professional Engineer registered in the Province of Alberta for all fabricator designed assemblies, components and connections.

.4 Include metal fabrications required for mixed liquor wasting chambers.

2. PRODUCTS

2.1 Materials

.1 Steel sections and plates: to CAN3-G40.21, Grade 300W.

.2 Stainless steel plate: to AISI Type 304, 316, or 316L as shown.

.3 Hollow Structural Sections: to CAN3-G40.21, Grade 350W.

.4 Welding materials: to CSA W59, or CSA W59.2.

.5 Bolts: steel to ASTM A325 or stainless steel to AISI Type 304, or 316, as shown.

.6 Anchor bolts: to Section 05501.

.7 Galvanizing: to CSA G164. Minimum coating 610 g/m2.

.8 Aluminum sections and plate: to CSA HA.5 Type 6061 T6 unless otherwise shown.

2.2 Protective Coatings

.1 Apply one shop coat of primer compatible with paint system defined in Section 09905 to metal items, with exception of galvanized, stainless steel, aluminum 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 7ºC.

.3 Galvanize items as required after fabrication.

2.3 Grating

.1 Design grating for loads shown or provide specified sections. Maximum allowable deflection under design load to be span/360 or 6 mm.

.2 Grating to be of the bar type with cross-bars.

.3 Weight of removable sections not to exceed 40 kg.

.4 Stairs and exterior walkways to have safety, anti-slip finish.

2.4 Access Hatches, Covers

.1 Aluminum diamond pattern plate complete with stainless steel type AISI 316 hardware.

.2 Design access hatch covers for loads shown or provide specified thickness. Maximum allowable deflection under design load not to exceed span/360 or 6 mm.

3. FABRICATION

3.1 General

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Where possible, fit and shop assemble work, ready for erection.

3.2 General Welding

.1 Where specified, members shall be fully welded and welds and sharp edges ground to a smooth contour.

.2 All welded connections shall develop the full strength of the connected elements and all joined or lapped surfaces shall be completely seal welded with a minimum 4.8 mm (3/16") fillet weld. Intermittent welding is not allowed. All welding shall be done in accordance with the latest edition of NACE RP0178.

.3 All edges of ferrous metals shall be ground to a radius by multiple passes of a power grinder as required to ensure satisfactory coating adherence. Fillets and corners must be accessible for grinding. All rough welds shall be ground to remove sharp edges, undercuts, pinholes, weld spatter and other such surface flaws and irregularities. Provide a minimum radius of 6 mm on all edges and corners.

.4 Butt-welded joints shall be used whenever possible. The use of internal bolted connections shall be avoided. Continuous lap-welded joints are permissible, but not preferred.

.5 Where possible, all connections shall be shop welded or field bolted. Field welds are not permitted unless authorized by the Engineer.

.6 Provide continuous seal welds on both sides of all welded joints.

.7 Provide minimum clearance between members in accordance with NACE RP0178.

.8 Continuously weld all welded connections to seal the mating surfaces completely.

3.3 Steel Welding

.1 Welding shall be done to written procedures tested and qualified in accordance with AWS D1.1, CSA W47.1 or ASME IX.

.2 Welders and welding operators shall be qualified in accordance with AWS D1.1, CSA W47.1 or ASME IX.

.3 Welding workmanship shall conform to CSA W59.1

.4 For pipe less than 75 mm in diameter, butt-weld to develop full strength, full penetration joints.

.5 For pipe equal to or greater than 75 mm in diameter, where not specified or shown otherwise, butt-weld to develop full strength, full penetration joints or furnish flanges, conforming to ANSI B16.5, Class 150. Where disassembly is required, flanges are sufficient.

.6 Use manual shielded metallic arc (SMAW), submerged arc (SAW), inert gas shield arc welding (GMAW), or gas tungsten arc welding (GTAW).

.7 Bevel plain pipe ends prior to welding.

.8 Joints to be welded shall be clean and dry for a distance of at least 50 mm on each side of the joint.

.9 Maintain flanges, pipes, fittings, etc. in alignment during welding. Ensure that no part of the weld is offset by more than 20% of the pipe wall thickness.

.10 Make tack welds material equal to the root pass. Tack welds which have not cracked may be incorporated in the root pass.

.11 Ensure the first bead obtains full root penetration with a minimum of weld material projecting within the pipe.

.12 Use welding materials conforming to CSA or AWS specifications.

.13 Provide electrodes compatible with the material welded and which deposit metal with strength and corrosion resistance properties at least equivalent to the base metal.

3.4 Aluminum Welding

.1 Welding shall be done to written procedures tested and qualified in accordance with CSA Standard W47.2.

.2 Welding workmanship shall conform to CSA W59.1

.3 For pipe less than 75 mm in diameter, butt-weld to develop full strength, full penetration joints.

.4 For pipe equal to or greater than 75 mm in diameter, where not specified or shown otherwise, butt-weld to develop full strength, full penetration joints or furnish flanges, conforming to ANSI B16.5, Class 150. Where disassembly is required, flanges are sufficient.

.5 All welding shall be done with an inert gas shielded arc process, either tungsten inert gas (TIG) or metal innert gas(MIG), to the requirements of CSA Standard S244.

.6 Bevel plain pipe ends prior to welding.

.7 Joints to be welded shall be clean and dry for a distance of at least 50 mm on each side of the joint.

.8 Maintain flanges, pipes, fittings, etc. in alignment during welding. Ensure that no part of the weld is offset by more than 20% of the pipe wall thickness.

.9 Make tack welds material equal to the root pass. Tack welds which have not cracked may be incorporated in the root pass.

.10 Ensure the first bead obtains full root penetration with a minimum of weld material projecting within the pipe.

.11 Use welding materials conforming to CSA or AWS specifications.

.12 Provide electrodes compatible with the material welded and which deposit metal with strength and corrosion resistance properties at least equivalent to the base metal.

3.5 Stainless Steel Welding

.1 Conform to stainless steel welding procedures tested and qualified in accordance with ASME IX, which have been sealed, signed and dated by a registered Professional Engineer.

.2 Welders and welding operators shall be qualified in accordance with either AWS D1.1, CSA W47.1 or ASME IX.

.3 For all stainless steel pipe intended to convey liquids, use inert gas backing for field and shop welds. For these services, Solar Flux or similar granular backing will not be allowed.

.4 Pickle and wash all stainless steel to remove discolouration and iron particles. Following assembly, treat all welds with pickling paste, scrub with stainless steel brushes and wash until clean. Wash the completed assembly with clean water to remove all dirt and other foreign matter.

.5 Swab all welds with a passivation solution of six percent nitric acid

.6 Neutralize and/or rinse as appropriate the joint after passivation.

.7 The Supplier shall maintain a welding record which identifies all welds related to the welder or the welding operator.

.8 The chemical analysis of the material used, as supplied by the stainless steel manufacturer, shall be available to the Engineer upon request.

.9 All equipment used in welding preparation shall be covered or faced with material that will prevent mild steel particles from contaminating the surfaces and joints of the stainless steel material.

.10 Equipment used to prepare joints such as ground clamps, wire brushes, steel wool, chisels, files and peen hammers shall be made from stainless steel. Mark these items "Stainless Steel".

.11 Grinding wheels shall be correctly selected for use on stainless steel and grinders shall be identified by a distinguishable colour to prevent accidental contamination.

.12 All metal that is to be fused during welding shall be clean of lubricants, grease, paint, fillings, and cuttings. Cleaning may be done only with alcohol or acetone. Chlorinated solvents shall not be used for cleaning purposes.

.13 Joint alignment shall be done with mechanical devices and shall be free of depressions and bumps. Under no circumstances shall heat be used in the alignment of joints.

.14 Tack welds shall be made of the same quality as the final weld. It shall be made small enough to allow them to be absorbed into the following beads, and they shall have oxides removed in advance of making the finishing weld.

.15 All scale, oxides, and discoloration shall be removed from the pipe and welds.

.16 Provide electrodes compatible with the material welded and which deposit metal with strength and corrosion resistance properties at least equivalent to the base metal.

3.6 Welding Testing and Inspection

.1 Welders

.1 As a minimum, welders will hold a Journeyman Welder's Certificate or shall have qualifications and certifications in accordance with AWS D1.1, CSA W47.1 or ASME IX.

.2 Welder shall be qualified for the processes and filler metals they are using.

.2 Weld Tests

.1 Provide 14 days advanced, written notice to the Engineer to confirm the timing for commencing and completing shop welding.

.2 The Engineer will arrange for shop weld tests to be conducted by an Independent Inspection / Testing Agency retained by the Owner.

.3 The Independent Inspection/Testing Agency may use radiography or ultrasound to test the quality of a weld. For each defective weld, additional radiography will be conducted by the Independent Inspection / Testing Agency, at three additional locations to be identified by the Engineer, in addition to a radiograph of the repaired weld. The cost of all additional inspections due to failed test results will be borne by the Contractor.

.4 The Independent Inspection/Testing Agency may use magnetic particle or liquid penetrant techniques to test the quality of a weld. All defects shall be removed and the area re-welded.

.5 In case of dispute one or more rejected welds will be cut out to verify by visual examination. Costs for additional testing will be borne by the Contractor if the weld(s) are defective and by the Owner if the weld(s) are not defective.

.6 All repairs of defective welds will be at the Contractor's expense.

.3 Hold Point

.1 After all weld fabrication and clean-up, the welded components shall be inspected and tested.

4. EXECUTION

4.1 Preparation

.1 Prevent electrolytic action between dissimilar metals and materials.

.2 Where dissimilar metals are mated, isolate all mating surfaces and bolts, nuts and washers to prevent galvanic corrosion.

.1 Clean and coat surfaces that are to be assembled or bolted together for shipment.

.2 Provide match markings on sections for ease of field erection.

.3 Ensure ease of field erection by test assembly in the shop where field assembly may be awkward or difficult.

4.2 Erection

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

.2 Provide suitable means of anchorage acceptable to Engineer such as dowels, anchor clips, bar anchors, expansion and adhesive, bolts and shields, and toggles.

.3 Make field connections with high tensile bolts to CAN/CSA-S16.1, or stainless steel bolts type 304 or 316 as applicable. Do not field weld unless indicated on drawings.

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

.5 Touch-up bolts and burnt or scratched surfaces after completion of erection with primer.

.6 Touch-up galvanized surfaces with zinc rich primer where damaged.

END OF SECTION

ANCHOR BOLTS

1. GENERAL

1.1 Description

.1 This specification details anchor bolt requirements for all equipment, machinery, and structural supports. All anchor bolts are to be cast-in-place. Substitution will only be acceptable if approved by Engineer.

1.2 Reference Standards

.1 Conform to the following reference standards in accordance with Section 01400:

.1 Alberta Building Code (ABC).

.2 CAN3 A23.3M, Design of Concrete Structures for Buildings.

.3 CSA/CAN3-S16.1-M, Steel Structures for Buildings (Limit States Design).

1.3 Submittals for Review

.1 Submit the following product information, in accordance with Section 01300, for all bolt systems not cast-in-place:

.1 Data, indicating load capacities and embedment requirements.

.2 Chemical resistance.

.3 Temperature limitations.

.4 Installation instructions.

.2 Submit samples to engineer of proposed adhesive and expansion type anchors.

1.4 Submittals for Information Only

.1 Submit shop drawings in accordance with Section 01300, clearly indicating; anchor bolt type, diameter, minimum embedment length, location, materials, projection, plates, washers, nuts, sleeves and torque requirements of anchor bolts to be used. Shop drawings to be stamped and signed by a professional engineer registered in the Province of Alberta.

1.5 Quality Control

.1 Arrange a field demonstration of correct installation procedures with bolt manufacturer, for all adhesive and expansion anchors. Notify Engineer a minimum of 48 hours in advance of the demonstration. Pull out tests will be carried out by a Testing Laboratory designated by Engineer. Pull out tests must be performed prior to the use of the anchors on site.

2. PRODUCTS

2.1 Acceptable Products

.1 Adhesive anchor bolts: Hilti, HVA adhesive anchors or Ramset / Red Head, Epcon Ceramic 6. Designs based on Hilti HY 150 HIT – HAS.

.2 Expansion anchor bolts: Hilti, HSL or HDA heavy duty anchors (where specified), or Kwik Bolt, or Ramset / Red Head, Trubolt. Designs based on Hilti Kwik bolts unless noted otherwise on drawings.

2.2 Installation Criteria

.1 Bolt sizing and spacing to manufacturer's recommendations.

.2 Use anchor bolts with due regard for edge distances, bolt spacing and available embedment depth.

2.3 Materials

.1 Select anchor bolt material according to exposure conditions or as specified on plans:

.1 External applications, areas exposed to outside air, or areas exposed to sewage gases: Stainless steel to AISI Type 316.

.2 Internal applications: Stainless steel to AISI Type 304.

.3 Permanently or intermittently submerged: stainless steel to AISI Type 316.

.4 Anchor bolts securing proprietary equipment: in accordance with the requirements of Section 11000.

.5 Nuts and washers to be of same material and of equal or greater strength than bolts. Tapered washers to be provided where mating surface not square with nut.

3. EXECUTION

3.1 General

.1 Anchor bolt holes in support frames not to exceed bolt diameter by more than 25 percent, up to a limiting maximum oversizing of 12 mm.

.2 Do not use adhesive anchors in overhead applications.

.3 Adhesive and expansion anchor bolt locations to be reviewed by Engineer prior to use or installation.

.4 Field work, including cutting and threading, will not be permitted on galvanized items. Protect dissimilar metals from galvanic corrosion by means of pressure tapes, coatings or isolators. Grout anchor bolts with non-shrink grout, where specified, in accordance with manufacturer's recommendations.

.5 Provide equipment anchor bolts with sleeves to allow fine adjustment in place. Sleeves must not reduce the capacity of the anchor bolt.

3.2 Installation

.1 Cast-in-Place Anchor Bolts

.1 Cast-in-place anchor bolts to be accurately placed and securely held in position with a template prior to and during concrete placement. Install anchor bolts complete with washers and sleeves where specified. Protect bolt threads with grease and attach nuts.

.2 Adhesive and Expansion Anchor Bolts

.1 Limit use to locations where exposure to the following on an intermittent or continuous basis is extremely unlikely:

.1 Acid concentrations greater than 10 percent.

.2 Machine or diesel oils.

.2 Adhesive anchor to be threaded or deformed for full length of embedment. Holes to be free of rust, scale, grease and oils. Embedment length as specified or to manufacturers recommendations.

.3 Install anchor bolts in strict accordance with manufacturer's specifications and recommendations including maximum hole diameter.

.4 Holes to have rough surfaces, such as can be achieved using a rotary percussion drill. Locate reinforcement using non-destructive method prior to drilling.

.5 Blow clean holes with compressed air to remove dust and standing water prior to installation.

.6 Leave adhesive anchors undisturbed and unloaded for the entire curing period. Replace anchors which have been disturbed or loaded during the adhesive curing period at Contractor's expense. Concrete temperature (not air temperature) to be compatible with manufacturer's curing requirements.

.7 Expansion anchor bolts to be free of rust, scale, grease and oils.

END OF SECTION

METAL STAIRS AND LADDERS

1. GENERAL

1.1 Related Sections

.1 Section [03300 - Cast-in-Place Concrete] Section [04051 - Masonry Procedures]: Installation of anchors.

.2 Section [03300 - Cast-in-Place Concrete]: Concrete fill to treads and landings.

.3 Section [05500 - Metal Fabrications]: Pipe railings.

.4 Section [05500 - Metal Fabrications]: Steel ladders and catwalks.

.5 Section [09911 - Interior Painting].

.6 Section [09912 - Exterior Painting].

1.2 References

.1 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM).

.1 ANSI/NAAMM MBG 531-00, Metal Bar Grating Manual.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM A 53/A 53M-02 53M-[99b], Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A 307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A 325M-00, 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 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.

.1 Canadian Standards Association (CSA)

.4 CSA W59-[M1998], Welded Steel Construction (Metal Arc Welding).

.5 National Association of Architectural Metal Manufactures NAAMM, Metal Stair Manual (AWP 510-92).

.6 Steel Structures Painting Council (SSPC), Systems and Specifications Manual, [Volume 2].

1.3 Design 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 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 [Canada] [Province of [_____]].

2. PRODUCTS

2.1 Materials

.1 Steel sections: to CSA G40.20/G40.21-98 Grade[300 W].

.2 Steel plate: to CSA G40.20/G40.21-98, Grade[260 W], pattern [_____].

.3 Floor plate: to CSA G40.20/G40.21-98, Grade [260 W].

.1 Thickness: [_____] mm.

.2 Width: [_____] mm.

.3 Design: [_____].

.4 Steel pipe: to ASTM A 53/A 53M-02 53M, standard weight, schedule 40 seamless black.

.5 Steel tubing: to CSA G40.20/G40.21-98, Grade [_____], [square] [rectangular] [round], [_____] mm wall thickness, sizes and dimensions as indicated.

.6 Metal bar grating: to ANSI/NAAMM MBG 531-00, [steel], Type [W-19-4], with [checkered plate] [abrasive] [corrugated] nosings.

.7 Welding materials: to [CSA W59-1989 (R2001)].

.8 Bolts: to ASTM A 307-02.

.9 High strength bolts: to ASTM A 325M-00.

.10 Plastic handrails: [material] extruded in profile as indicated, [_____] colour [as selected by [Engineer][Consultant]].

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 Steel Pan Stairs

.1 Fabricate stairs with [closed] [open] riser steel pan construction.

.2 Form treads [and risers] from [3] mm thick steel plate. Secure treads [and risers] to L [35 x 35 x 5] horizontal [and vertical] welded to stringers.

.3 Form wall stringers from [MC 310 x 15.8].

.4 Form outer stringers from [MC 310 x 15.8] with [5] mm thick plate fascia welded on.

.5 Form landings from [3] mm thick steel plate, reinforced by L [55 x 55 x 6] mm spaced at [400] mm oc.

.6 Provide clip angles for fastening of furring channels, where applied finish is indicated for underside of stairs and landings.

.7 Extend stringers around mid landings to form steel base.

.8 Close ends of stringers where exposed.

2.4 Plate/Grating Stairs

.1 Form treads from [6] mm 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 oc.

.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].

2.5 Pipe/Tubing Balustrades

.1 Construct balusters and handrails from [steel pipe] [steel tubing].

.2 Cap and weld exposed ends of balusters and handrails.

.3 Terminate at abutting wall with end flange.

2.6 Bar Balustrades

.1 Construct bar balustrades as follows:

.1 Balusters: [25 x 25] mm bar.

.2 Top rail: [30 x 10] mm bar.

.3 Bottom rail: [25 x 10] mm bar.

.4 Pickets: [12 x 12] mm bar at [100] mm oc.

.2 Fabricate supports for wood balustrade from [38 x 38] mm steel tubing with both ends capped and welded.

.3 Weld balustrades to stringers as indicated.

2.7 Finishes

.1 Galvanizing: hot dipped galvanizing with zinc coating [600] g/m^2 to CAN/CSA-G164-M92 (R1998).

.2 Shop coat primer: to CAN/CGSB-1.40-97.

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181-99.

2.8 Shop Painting

.1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume

.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°C.

.5 Do not paint surfaces to be field welded.

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 W59-1989 (R2001) unless specified otherwise.

.5 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.2 Installation of Plastic Handrail

.1 Apply plastic handrails in accordance with manufacturer's printed instructions, using recommended tools.

.2 Make joints and mitres neat, tight and inconspicuous. Remove surplus material from joint. Provide solid return at exposed ends of handrail.

.3 Clean and wax plastic handrails immediately prior to [building hand over] [final inspection].

END OF SECTION

HANDRAILS

1. GENERAL

1.1 Reference Standards

.1 Conform to the following reference standards in accordance with Section 01400:

.1 Industrial Health and Safety Regulations.

.2 National Building Code 1995.

.3 CGSB 1-GP-108M, Paint, Acid and Alkali Resistant, Black.

.4 CSA HA Series-M, CSA Standards for Aluminum and Aluminum Alloys.

.5 CAN3-S157-M, Strength Design in Aluminum.

.6 CSA W59.2, Welded Aluminum Construction.

.7 CSA W47.2-M, Certification of Companies for Fusion Welding of Aluminum.

1.2 Submittals for Review

.1 Submit manufacturers literature and a sample section containing fittings and connectors representative of final product to Engineer.

1.3 Submittals for Information Only

.1 Submit shop drawings in accordance with Section 01300. Drawings to indicate design loads and bear the stamp of a qualified professional Engineer registered in the Northwest Territories and Nunavut.

.2 Clearly indicate profiles, sizes, connection attachments, reinforcing, anchorages, size and type of fasteners and accessories.

.3 Include erection drawings, elevations and details where applicable.

.4 Indicate any necessary welding using CISC Standard Welding Symbols. Clearly indicate net weld lengths.

.5 Submit proof of certification to W47.2, Division 1.

1.4 Quality Assurance

.1 Welding to conform to CSA W59.2 and CSA S157.

.2 Do aluminum work to CSA S157.

2. PRODUCTS

2.1 Materials

.1 Posts - aluminum tubing alloy 6061-T6.

.2 Top rails - aluminum pipe; 6063-T5 alloy 50 mm nominal diameter.

.3 Centre rails - aluminum pipe; 6063-T5 alloy 50 mm nominal diameter.

.4 Mechanical couplings: A proprietary system of flush, mechanically fastened, non-welded connector fittings. All set screws and fastenings of to be stainless steel. Pop rivets are an unacceptable means of fastening.

.5 Fittings/Accessories - End returns, floor flanges, wall rail flanges, post sleeves, rail caps, sleeve type slip fit splices, post base plates to be of a single manufacturer's standard type to match coupling style and as required to suit application. Fittings subject to review and approval of Engineer.

.6 Bituminous paint: to CGSB 1-GP-108 Type 1.

.7 Stainless steel anchor bolts: to Section 05501.

.8 Stainless steel fasteners: AISI Type 304, or 316 as appropriate for area of application. See Section 05501.

2.2 Finishes

.1 All exposed aluminum to be given an anodic oxide treatment, in accordance with Aluminum Association AA-M12 C22 A41 Specification (clear anodized).

.2 Maximum spacing between expansion joints to be 6000 mm; match expansion joints over concrete expansion joints.

2.3 Handrail Type

.1 Type A – General

.1 Aluminum utility railings to WCB requirements, mechanically fastened and coupled with posts as shown on standard details with toe boards as required by WCB. Rails, posts and anchorages to withstand a static point load of 0.9 kN applied in any direction and at any point to the top rail as per WCB regulations. Removable handrail sections to be limited to 40 kg.

.2 Type B - Exit Stairs and Public Areas

.1 Aluminum railings to ABC requirement mechanically fastened and coupled with posts as shown on standard details with toe boards as required by WCB. Rail spacing to conform to ABC Clause 3.4.6.5(5). Rails, posts and anchorages to be fabricated to safely support ABC loads in accordance with Clause 4.1.10 (for exits and stairs).

.3 For type and location of handrails required, see structural drawings.

3. EXECUTION

3.1 Preparation

.1 Supply all connectors, anchors, sleeves, framing fastenings and other miscellaneous items or assemblies to be cast-into concrete, embedded into masonry or secured to existing concrete surfaces.

3.2 Fabrication

.1 Verify site dimensions prior to fabrication.

.2 Cut rail and post ends accurately and square and free of irregularities.

.3 Drill, tap and countersink all holes for connections to provide for positive connection.

.4 Fabricate railings from straight, clean material with sharply defined profiles. Assemble so that no disfigurement will show in finished work or impair strength of completed unit.

.5 Fabricate items with joints neatly fitted and properly secured.

.6 All rails and posts to be fabricated with 6 mm diameter drain holes located to avoid moisture collection within the section, and avoid loss of strength of section.

.7 Fabricate adjacent panels with rails aligned to preserve a continuous appearance.

.8 Do not site weld. Grind all visible welds smooth.

.9 Bend or couple rails at corners, returns or other directional changes. Do not mitre cut and weld.

.10 Provide continuous top rail wherever possible.

.11 All post to be free of splices.

.12 Railing splices to be no further than 300 mm from any post.

3.3 Installation

.1 Cooperate with other trades so as not to delay job progress.

.2 Securely anchor work in proper place where shown on reviewed drawings. Do all drilling, fitting and work of similar character to make this installation complete.

.3 Coordinate the installation of sleeves, anchors into concrete and the embedding of accessories into masonry.

.4 Install posts complete with floor flange and anchors where required. Install rails, securely anchored into place with smooth even end return bends, free from kinks, ruptures and uneven sections. Seal rails at post connections to prevent moisture penetration at junction.

.5 Join rails with splicing sleeves and seal, without gaps or rough edges.

.6 Set flanges over junctions of rail components and floor/wall surfaces.

.7 Complete installation to be secure, level, vertical, with all posts evenly spaced.

.8 Tighten all fasteners to ensure completed railing is rigid and completely free of play.

.9 Paint all aluminum surfaces in contact with concrete or masonry with two coats of alkali-resistant bituminous paint.

.10 Use stainless steel fixings for all connections and anchors.

.11 Coordinate the installation of sleeves into concrete for removable handrails.

.12 Make provisions for erection stresses and temporary bracing. Keep work in alignment at all times.

.13 Do not field weld. All field assembly to be limited to mechanical fastenings.

.14 Provide movement joints in rails over all structural expansion joints. Joints to allow for 20 mm movement minimum.

END OF SECTION