Part 1 GENERAL

1.1 GENERAL REQUIREMENTS

1. Conform to Sections of Division 1 as applicable.

1.2 RELATED WORK

1. Steel members indicated and identified on Structural Drawings

2. Firestopping and smoke seals: Section 07 84 00, Penetration Firestopping.

3. Finish painting: Section 09 91 00, Painting and Finishing.

1.3 REFERENCES

ASTM A53-90b - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A123-89a - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153-82 (1987) - Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307-92a - Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength
ASTM A325M-92a - Specification for High-Strength Bolts for Structural Steel Joints [Metric]
ASTM A366M-91 - Specification for Steel Sheet, Carbon, Cold-Rolled, Commercial Quality
ASTM A570M-92 - Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
ASTM A 653/A653M-96 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
CAN/CGSB-1.40-M89 - Primer, Structural Steel, Oil Alkyd Type
CAN/CGSB-1.81-M90 - Air Drying and Baking Alkyd Primer for Vehicles and Equipment
CAN/CGSB-1.181-92 - Ready Mixed Organic Zinc Rich Coating
CAN/CSA-G40.20-M92 - General Requirements for Rolled or Welded Structural Quality Steel
CAN/CSA-G40.21-M92 - Structural Quality Steels
CAN/CSA-G164-M92 - Hot Dip Galvanizing of Irregularly Shaped Articles
CAN/CSA-S16.1-M89 - Limit States Design of Steel Structures
CSA W47.1-92 - Certification of Companies for Fusion Welding of Steel Structures
CSA W48 Series - Electrodes
CSA W48.1-M91 - Carbon Steel Covered Electrodes for Shielded Metal Arc Welding
CSA W59-M89 - Welded Steel Construction (Metal Arc Welding)
CAN/CSA-W117.2-M87 - Safety in Welding, Cutting and Allied Processes
SSPC - Steel Structures Painting Council, "Steel Structures Painting Manual Vol. 2"

1.4 SYSTEM DESCRIPTION

1. Design Requirements

1. Generally, Drawings give information on specific shape and dimensions required and in certain cases, load imposed. For items where load information is only indicated, provide steel supports and anchorage for general design indicated, sized to suit specified loads. Provide bracing as may be required to counter lateral loads and dynamic stresses where vibration of support equipment may occur.

2. Comply with OBC, for design of all stressed members.

1.5 SUBMITTALS

1. Shop Drawings:

1. Submit shop drawings in accordance with G.C. 5 of General Conditions of the Contract. Show and describe in detail work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, gauges, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

2. Shop drawings indicating structural components shall bear professional stamp and signature of professional engineer licensed to design structures and registered in Province of Ontario.

2. Certification:

1. Submit certification from registered professional structural Engineer registered in province of Ontario, who shall affix his/her seal and signature to certificate, stating structure is capable of supporting its own weight and specified live loads.

1.6 QUALITY ASSURANCE

1. Welder Qualifications:

1. Execute welding by firm certified in accordance with CSA W47.1 Division 1 or 2.1.

2. Operators employed on Work shall be qualified per CSA W47.1 for work as specified herein.

Part 2 PRODUCTS

2.1 MATERIALS

1. Steel, Structural Quality, WWF, W-Shapes, HSS Sections and Structural Tees: CAN/CSA-G40.20-M and CAN/CSA-G40.21-M, Grade 350W.

2. Steel, Structural Quality, Plates, Bars, Angles and C-channels: CAN/CSA-G40.20-M and CAN/CSA-G40.21-M, Grade 300W.

3. Sheet Steel: Commercial Quality ASTM A366M stretcher levelled or temper rolled.

4. Steel Pipe: ASTM A53 standard weight, Schedule 40 seamless black.

5. Perforated Metal: Round perforations, staggered pattern, 16ga., 9.5mm (3/8") diameter holes on 13mm (1/2") staggered field pattern.

6. Welding Materials: Conform to CSA W48.1-M and CSA W59-M

7. Fasteners (Concrete Anchors, Toggle Bolts, and Hammer Driver Bolts) :Star Expansion, Hilti (Canada) Ltd. or Ucan Fastening Products.

8. Metal Filler: Polyester based, White 'Lightnin' by Marson Canada Inc. or Combo or First choice by Dura Chemicals Ltd.

9. Primer: Conform to following requirements:

    1. CAN/CGSB-1.40-M.

2.2 PREFABRICATED ITEMS

1. **Areaway Gratings**: 50 mm (2") deep of hot dipped galvanized steel and designed to sustain forces specified herein. Provide galvanized fastening clips. Manufactured by:

    - Borden Metal Products (Canada) Ltd.
    - Fisher and Ludlow

2. **Checker Plate Treads and Landings**: 6mm (1/4") thick, diamond checker plate with integral nosing and toe slip. Provide welded clip angles for treads.

2.3 FABRICATION

1. Fit and assemble work in shop where possible. Execute work according to details and reviewed shop drawings. Where full shop assembly is not possible, make trial assembly in shop.

2. Do welding to CSA W59-M. File or grind welds smooth and flush where exposed to view and where specifically indicated on Drawings.

3. Fit joints and intersecting members accurately. Make work in true planes with adequate fastening.

4. Supply fastenings, anchors, accessories required for fabrication of work of this Section. Such items occurring on or in exterior wall or slab shall be hot dip galvanized.

5. Fastenings include without being limited to anchor bolts, machine bolts, toggle bolts,

self drilling anchor, lag screws, expansion shields, sleeves, brackets, washers and nuts. Supply bolts with all washers and nuts required for complete installation. Provide lock washers where vibrations may occur.

6. Make exposed metal fastenings and accessories of same material, texture, colour and finish as base metal on which they occur unless otherwise indicated or specified. Keep exposed fastenings to an absolute minimum evenly spaced and neatly laid out. Make fastenings of permanent type unless otherwise indicated.

7. Shop Welding:

   1. Execute welding to avoid damage or distortion to Work. Should there be, in opinion of the Owner's Designee or Inspection and Testing Company, doubt as to adequacy of welds, they shall be tested for efficiency and any work not meeting Standards shall be removed and replaced with new work satisfactory to Owner's Designee. Carry out welding in accordance with following Standards:

      CSA W48-M: for electrodes (If rods are used, only coated rods are allowed)
      CSA W59-M: for design of connections and workmanship
      CAN/CSA-W117.2-M: for safety

   2. Clean welded joints and steel exposed for sufficient space to properly perform welding operation. Neatly finish welds. Welds which will be exposed to view and finish painted shall be continuous and ground smooth.

8. Shop Painting:

   1. Do not prime non-ferrous metals.

   2. After fabrication, blast clean ferrous metals exposed in finished work, SSPC SP6. Clean, brush, scrape and remove oil, grease and extraneous matter from other surfaces, solvent clean to SSPC SP1.

   3. After cleaning mask edges with duct tape to be field welded.

   4. Prime Finish: After cleaning, except where specified otherwise, apply full, smooth priming coat in shop. Work paint into corners and open spaces and deliver to Site with primer undamaged and to satisfaction of the Owner's Designee. (Commercial blast cleaned surfaces are to be primed immediately).

9. Hot Dip Galvanizing:

   1. After fabrication, hot dip galvanize specific miscellaneous steel items indicated on Drawings and/or called for herein. Straighten shapes and assemblies true to line and plane after galvanizing. Repair damaged galvanized surfaces with brush or spray-applied anti-corrosion coating containing 92-95% zinc, in accordance with manufacturer's printed directions.

2. Galvanize following: Members exposed to elements when in final location; members embedded on exterior side of exterior walls; members imbedded in concrete; members specified in this Section or indicated on Drawings.

3. Hot-dip galvanize steel members specified to be galvanized except galvanized sheet steel, in accordance with CAN/CSA-G164-M and requirements of following ASTM Standards, with minimum coating weights or thicknesses as specified:

   - Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123; average weight of zinc coating per m^2 (sq ft) of actual surface, less than 6 mm (1/4") thickness members, 605 g (2 oz); 6 mm (1/4") or heavier thickness members, 710 g (2.3 oz).

   - Iron and Steel Hardware: ASTM A153; minimum weight of zinc coating, in (ounces per sq ft) of surface shall be in accordance with Table 1 of ASTM A153, for various classes of materials used on Work.

4. Galvanized steel sheet to ASTM A 653/A653M -Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process , coating designation Z275 (G90), minimized spangle and chemically treated. Weight of zinc coating, 275 g/m^2 (1-1/4 oz per sq ft) on both sides of sheet.

Part 3 EXECUTION

3.1 INSTALLATION

1. Build and erect work plumb, true, square, straight, level and accurate to sizes detailed, to reviewed shop drawings, free from distortion or defects detrimental to appearance and performance.

2. Insulate metals where necessary to prevent corrosion due to contact between dissimilar metals and between metals and masonry, concrete or plaster. Use bituminous paint, butyl tape, building paper or other approved means.

3. Supply instructions, templates, and, if necessary, supervise installation of fastenings or accessories requiring to be built-in by other Sections of Work.

4. After erection and installation, clean work and apply field touch of same formula as shop coat primer to damaged or unpainted surface of shop primed material. Work primer into joints, crevices, interstices and open spaces.

5. Weld as specified herein.

3.2 CONNECTIONS

1. Main member connections shall be welded or bolted with high tensile strength bolts and double angle connections as listed in CISC Code of Standard Practice for Structural Steel.

2. Bolted Connections

    1. High strength bolted connections shall be bearing type using M20 (3/4") bolts conforming to ASTM A325M. Secondary members may be bolted with machine bolts.

    2. Perform high tensile bolted connections in accordance with CAN/CSA-S16.1-M and be field tested. Accurately space holes of size 1.6 mm (1/16") larger than nominal diameter of bolt. High tensile bolt connections shall be bearing (friction) type unless noted otherwise. Provide compressor or electrical equipment capable of supplying and maintaining required pressure at wrench. Make connections without use of erection bolts, some high tensile bolts will serve that purpose. Nuts or bolts, except high tensile bolts, shall be prevented from becoming loose by burring bolt thread, by welding or by lock washers or lock nuts.

3. Fasteners

    1. Supply fasteners, anchors and accessories required for erection of work of this Section. Ensure items occurring on or in exterior wall or slab are hot dipped galvanized.

    2. In concrete and masonry, use epoxy injection anchor for vibration and heavy loads, and where anchors may be close to edge or close to adjacent anchors.

    3. Use sleeve anchors in hollow block and brick for light static loads.

    4. Use ULC approved drop-in anchors for pipe and sprinkler systems suspended from concrete ceiling.

    5. Use wedge anchors for light to medium static loads in concrete.

    6. Use concrete screws for light static loads in concrete, block and masonry.

    7. Use heavy load expansion anchors for heavy static, vibratory or impact loading in concrete.

4. Welding

    1. Welds on exterior work shall be continuous to provide proper weathering.

    2. Take necessary safety precautions in accordance with CSA Standards when welding is carried out in cold weather.

    3. No welding of galvanized products is allowed. Hot-dip galvanized steel members are to be bolted with concealed connections.

3.3 SCHEDULES

1. General: Provide miscellaneous metal work indicated on Drawings and not included in work of other Sections in addition to items listed below. Where items are required to be built into masonry, concrete or other work supply such items to respective Sections with all anchors and accessories for building in.

2. Itemized List: Provide following metal work unless specifically designated to be supplied only. List supplied herein is not necessarily complete and shall be augmented by thorough inspection of Drawings and all other requirements to complete Work. Each item shall be as indicated on Drawings and as detailed on reviewed shop drawings:

    1. Areaway Grating: Fabricate removable and fixed gratings for grade level areaways in sections weighing maximum 75 kg (165 lbs) each. Rectangular grating shall have 75% free area and have both trim and structural edge banding bars where edges are exposed at removable sections. Fix removable grating in place with minimum of 4 clips per panel. Weld fixed gratings at approximately 400 mm (16") oc with 25 mm (1") fillets. Provide hot dipped galvanized edge angles with welded on bar anchors at 600 mm (24") oc; weld and grind corner and junctions.

    2. Ladders: Construct mezzanine access ladder and cage to details indicated by welding rod rungs to bar stringers. Secure stringers to wall surfaces with flanged and bolted connections to expansion sleeves. Construct stringer extension members with welded and ground junctions. Unless otherwise indicated, hot dip galvanize ladders.

    3. Support Framing Systems: Provide fabricated steel support for interior pipe handrails, support system for washroom vanities, shelving, counter and other framing systems indicated, complete with anchors, brackets, sleeves, screws and incidentals required to complete installations. Secure to wall and/or floor in semi concealed manner to support vanities greater than 2 m (6') in length or where end of vanity is not supported by abutting wall.

    4. Hangers for Light Enclosures: Supply metal light hanger supports to Section 06410, Carpentry and Millwork for installation.

    5. Fourth Floor Service Stair, Guards and Railing: Provide fabricated steel stair stringers, framing, treads, landings, perforated metal panel guards and guard supports, and railings as described on drawings.

    6. Sheet Steel Covers: Supply sheet steel covers fabricated of minimum 0.9 mm (1/32") thick galvanized steel sheet to Division 15, Mechanical and 16, Electrical requiring covers over temporarily unused sleeves in vertical plane. Openings in slabs and openings in other horizontal planes shall be structurally sound to suit application and size of opening and shall be in conformance with OBC requirements.

    7. Provide steel sections which are:

        - Not indicated and identified on Structural Drawings, unless noted to be supplied by another Section of Specifications.

OR

- Not noted on Drawings to be supplied by another Section of Specifications.

OR

- Not specified under another Section of Specifications.

3. Provide such items complete with anchors, brackets, bearing plates and other accessories required for installation.

4. Where steel sections are required to be built into masonry or concrete, supply such members to respective trades for building in.

5. Work shall include, without being limited to:

- Steel lintels (loose), including those required over masonry openings and recesses for mechanical or electrical services.

- Where lintels cannot be supported on masonry, provide plates anchored flush into column or wall and weld lintel thereto to satisfaction of the Owner's Designee.

- Steel framing for louvre openings.

- Hot dip galvanized channel wall framing at perimeter of glass block panels.

6. Miscellaneous Items: Provide items complete with anchors, brackets, sleeves, screws and other incidentals required and as detailed. Where steel items or supports are required to be built into masonry or concrete, supply such members to respective trades.

End of Section 05 99 00