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| Version | Date | Description of Revisions |
| 1 | August 30, 2006 | Approved final document. |
| 2 | November 13, 2009 | Modified ‘Related Section’ |
| 3 | March 15, 2011 | Minor changes from Legal |
| 4 | June 5, 2012 | Added References and Replacement Parts Sections |
| 5 | July 3, 2012 | Reformatted to Remove White Space |
| 6 | April 22, 2015 | General formatting |
| 7 | April 11, 2016 | Phase 1 Update (AV) |
| 8 | February 15, 2017 | Updated the listed manufacturers, added in some performance specifications and standards for those that were removed, and removed the subsection on hinged manhole covers. (CPD) (AV) |

# GEneral

## Related Sections

#### Section 01300 – Submittals

#### Section 05120 – Structural Steel

#### Section 05500 – Metal Fabrications – General

#### Section 05510 – Metal Stairs

#### Section 05512 – Metal Handrails

#### 11700 – Elevated Water Storage Tank

## References

### Comply with the latest edition of the following statutes codes and standards and all amendments thereto.

#### American Society for Testing and Materials (ASTM)

##### ASTM A36/ A36M-14; Standard Specification for Carbon Structural Steel.

##### ASTM A276/A276M-16a; Standard Specification for Stainless Steel Bars and Shapes.

##### ASTM B429/B429M-10e1; Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.

##### ASTM B632/B632M-15, Standard Specification for Aluminum-Alloy Rolled Tread Plate.

#### American National Standards Institute (ANSI)

##### ANSI ASC A14.3-2008; American National Standards for Ladders – Fixed – Safety Requirements.

#### Ontario Building Code (OBC) O. Reg. 312/12

#### Occupational Health and Safety Act R.S. O. 1990, c.O.1.

#### American Iron and Steel Institute (AISI)

#### Underwriters Laboratories (UL), Underwriters laboratories Canada (ULC)

## Measurement and Payment

### All costs associated with the work of this Section shall be included in the price(s) for Item No(s). \_\_\_ in the Bid Form.

# submittals

### Submit shop drawings in accordance with Division 1. Drawings shall indicate design loads and shall bear the seal and signature of a qualified Professional Engineer.

### Clearly indicate profiles, sizes, materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, size and type of fasteners and accessories.

### Include erection drawings, elevations and details where applicable. Indicate any necessary welding using CISC Standard Welding Symbols. Clearly indicate net weld lengths.

# PRODUCTS

## Steel Lintels and Shelf Angles

### ASTM A36/A36M-14, hot dip galvanize after fabrication in accordance with ASTM A123G164.

### Where lintel or shelf angle size is not shown, design lintels to OBC 9.20.5.2 Lintel Support.

### Provide adjustable anchors for lintels and shelf angles.

## Embedded Support Frames for Grating

### Angle support frames to be embedded in concrete or anchored on concrete shall designed by Contractor in accordance with the Contract Drawings and the current OBC and OSHA., unless indicated otherwise.

### Welded anchors for support frames shall be of same material as per Contract Drawings.

## Floor Plate and Grating

### Design Requirements:

#### Visit the site and measure existing floor plate openings to be replaced or modified

#### Design floor plates and frames.

#### Subdivide floor plates with side larger than 1,000 mm by reinforcing each subdivision with stiffeners.

#### Size floor plate to fit existing embedded frames with clearances between frames and floor plates not exceeding 3 mm on any side.

#### Limit deflection under a concentrated mid span load of 1.0 kN to 1/360th of the span, and under superimposed 2.5 kN/m2 uniformly distributed load, 6 mm maximum. Provide angle stiffeners as required.

#### Provide recessed handles or lifting holes. Provide gastight lifting holes or handles for plates on process and sanitary sumps.

#### Provide hinges for floor plates that are opened often like covers for sumps and accesses.

#### Where floor plates indicated to be removable, fabricate plates with 2 handles and weight not more than 20 kg.

### Fabricate angle frames and border bars with the following features:

#### Corners neatly fitted, welded and mitred.

#### Shop weld border bars.

#### Provide strap anchors welded to angle frames for casting into concrete.

#### Size angle frames to fit the floor plate with clearances between frames and the floor plate not exceeding 3 mm on any side.

#### Material: as noted on the Contract Drawings

#### Minimum floor plate thickness 10 mm.

#### Surface shall be raised-lug pattern or diamond tread, unless shown on Contract Drawings.

### Fabricate galvanized checkered plate a minimum 6 mm thick with 50 mm thick Styrofoam SM insulation and a 1.3 mm thick galvanized back-pan secured to the underside of the checkered plate.

### Grating Slip Resistant Surface:

#### Provide where indicated on the Contract Drawings.

#### The non-slip surface shall be listed as slip resistant by Underwriters Laboratories.

#### The surface shall have a minimum coefficient of kinetic friction of 0.8.

#### The surface shall have minimum bond strength of 13.7 MPa.

## Ladders

### Fabricate ladders with rails, rungs, landings, and cages to meet the applicable requirements of OBC, OSHA, CFR Part 1910.27, and ANSI ASC A14.3-2008.

#### Concentrated load of 1.1 kN plus 30 percent impact on rungs.

#### Maximum rung deflection of l/360.

#### Concentrated load of 1.1 kN plus 30 percent impact between consecutive attachments.

#### Self closing gates at landings.

#### Ladder extender when access is to be achieved by bending down on knee.

### Flat Bar Ladders:

#### Punch rails, pass rungs through rails, and weld on outside.

#### Weld brackets to the ladder for fastening ladder to wall.

#### All material shall be stainless steel or galvanized steel as noted on the Contract Drawings.

### Ladder Safety Handle or Ladder Extender:

#### Provide aluminum “T” safety handles for ladders as shown on Contract Documents.

#### Acceptable product: MSU aluminum ladder and “T” safety handle or Equivalent.

## Safety Climb Device

### General:

#### Conforms to ANSI ASC A14.3-2008 and OSHA CFR Part 1910.27 .

#### Belt and harness shall withstand minimum drop test of 113 kg in 1.8 m free fall.

#### Fall Prevention System Material: Stainless steel, AISI Type 316.

### Components and Accessories:

#### Main Components: Sleeve or Trolley, Safety Harness, and Carrier or Climbing Rail.

#### Ladder rung clamps with stainless steel, AISI Type 316, mounting brackets and hardware.

#### Removable extension kit with tie-down rod or trolley gate, mandrel, and carrier rail for ladders under manholes and hatches.

### Manufacturers and Products:

#### Canadian Safety Equipment Inc., North Safety Products Canada

#### TS Group (Ontario), TS Safety Rail System.

#### Or Equivalent

## Platforms

### Material: as noted on the Contract Drawings

### Design framing members and connections in accordance with AA30 and other applicable standards.

### Design’s Qualification: Calculations and shop drawings required for the Contractor’s design must be stamped by a Professional Engineer.

### Design Criteria:

#### Comply with the requirements of the OBC.

#### Uniform Service Load: 5.0 kPa minimum.

#### Maximum Deflection: 6 mm or L/240.

#### For support points, use locations indicated on Contract Drawings. Point loads at all support points are F: 12 kN maximum. If additional support points are required, design and provide additional members that will safely resist new loads at no additional cost.

#### Do not use existing building framing as part of lateral load resisting system.

#### Design platforms to accommodate openings for piping, ducting, and electrical services as shown on the Contract Drawings.

### Design and provide other items such as grating, stairs, railing, bolts, welds, anchors, etc. in compliance with the requirements of this Section.

### Field measure areas around equipment prior to fabrication. Design platforms and grating so that gaps around the perimeter of equipment do not exceed 75 mm clearance.

## Lifting Hooks

### Design hooks to withstand loads imposed with a minimum safety factory of 3.

### Hot-dip galvanize steel lifting hooks after fabrication.

### Cast hooks into concrete slab or beams at the location(s) shown. Do not weld hooks to structural steel beams without prior written authorization from the Consultant.

## Protective Steel Angle

### Fabricate hot-dip galvanized steel angles for casting into concrete as indicated on the Contract Drawings.

### Use headed anchor studs of a minimum 12 mm diameter in diameter by 150 mm long. Space studs at 400 mm.

# EXECUTION

## General

### Coordinate the works of this Section with the requirements of Section 11700 – Elevated Water Storage Tank.

## Floor Plate

### Install floor plate covers in accordance with detailed shop drawings.

### Accurately position floor plates prior to welding or bolting, such that covers are level with floor surface.

### Grind all field welds smooth.

### Grind all projected corners and edges above finish floor to bevel edges to level with finish floor.

### Use stainless steel anchors.

## Access Covers

### Accurately position prior to placing concrete, such that covers are flush with the floor surface.

### Protect from damage resulting from concrete placement. Thoroughly clean exposed surfaces of any concrete spillage in order to obtain a clean, uniform appearance.

## Safety Climb Device System

### Install in accordance with the manufacturer’s instructions.

### Furnish additional accessories required to complete the system for each ladder.

### Furnish one harness for each ladder equipped with a safety climb device.

### Furnish pivot sections at platforms, landings, and roofs.

### When installed to required height, the fall prevention system shall be rigid and an integral part of the structure.

## Field Quality Control

### Clean off dirt on installed floor plate surfaces.

**END OF SECTION**