

1 ASSEMBLY - GENERAL

- 1.1 The work of this section includes the provision of all design, labour, materials, equipment and services required to fabricate and install stair construction as required for a complete project. The work includes, but is not necessarily limited to, the items referenced herein:
- 1.1.1 Interior Stairs
 - 1.1.2 Interior Ladders
 - 1.1.3 Interior Railings and Guards
- 1.2 Reference Standards: National Association of Architectural Metal Manufacturers (NAAMM) Metal Stairs Manual.
- 1.3 Refer to space data sheets and Section C2020 - Stair Finishes for finishes requiring special construction provision by this section.
- 1.4 Fabricator and installers shall have a minimum of 5 years experience in the successful installation of the systems specified in this section. Precast manufacturers shall be certified to [CSA-A251] in the category of stairs and landings.

2 ASSEMBLY DESIGN CRITERIA

- 2.1 Design stairs, ladders, rails, guards and landing construction and connections to NBC vertical and horizontal live load requirements.
- 2.2 Design general use stairs and exit stairs to design requirements and to OBC.
- 2.3 Construct stair of concrete and/or steel only. Construct rails and guards of steel. In addition, design to meet following:
- 2.3.1 Cast-in-place concrete – [CSA A23.3].
 - 2.3.2 Precast concrete – [CSA A23.4].
 - 2.3.3 Steel – [CAN/CSA-S 16. 1], National Association of Architectural Metal Manufacturers (NAAMM) metal stairs manual.
- 2.4 Design and fabricate metal stairs to following NAAMM classifications:
- 2.4.1 Stairs in prime area of building - Commercial class, closed riser design.
 - 2.4.2 Circulation stairs - Commercial class, closed riser design.
 - 2.4.3 Stairs at service areas - Service Class, open or closed riser design.
 - 2.4.4 Stairs at roof and mechanical rooms etc. - Industrial Class, open or closed riser design.
- 2.5 Hot dip galvanize metal stair and ladder components subject to salt, chemical, or water exposure. Prime paint for other conditions.

- 2.6 Stairwells are to be designed with no open areas below stairs and landings, which present a personal security problem.
- 2.7 Provide minimum one (1) stairwell, which accesses the roof level. This could also be provided through a mechanical penthouse area.

3 ASSEMBLY COMPONENTS

3.1 CAST IN PLACE CONCRETE STAIRS

3.1.1 **General:**

3.1.1.1 Submittals: Submit shop drawings of stairs, ladders, rails, and guards to fully illustrate, size, shape location and all necessary reinforcement, connections, and anchorage details. Where applicable show details of foundations, formwork and reinforcing steel. Shop drawing shall bear the seal of a registered Professional Engineer licensed to practice in the Province of Ontario.

3.1.1.2 Quality Assurance: Provide concrete testing to [CSA-A23.2] by testing laboratory engaged by [Design Builder].

3.1.1.3 Warranty: Provide 1 year extended warranty against defects in materials and quality of work including spalling, cracking, splitting, and deformation for a total warranty period of 2 years.

3.1.2 **Design:**

3.1.2.1 Design of concrete structures for buildings to [CSA-A23.3-M94].

3.1.3 **Materials/Finishes:**

3.1.3.1 Materials to [CSA-A23.1] and [CSA-A23.4].

3.1.3.2 Concrete to achieve minimum compressive strength of 30 Mpa at 28-day strength.

3.1.3.3 Floor hardener: non-metallic, pre-mixed.

3.1.3.4 Steel anchorages to [CSA-G40.2 I-M] Grade 300W

3.1.3.5 Non-shrink grout premixed composition of non-metallic aggregate, cement, water reducing and plasticizing agents, of pouring consistency, capable of developing compressive strength of 50 MPa at 28 days.

3.1.3.6 Surface sealer to [CAN/CGSB-25.20], Type 2, water based, clear where applicable.

3.1.3.7 Non-slip carborundum nosing inserts with wing type anchors on exposed concrete stair finishes. Provide 2 inserts per tread.

3.1.4 **Fabrication/Installation:**

- 3.1.4.1 Fabricate and erect formwork in accordance with [CSA-S269.3] to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by [CSA-S269.1].
- 3.1.4.2 Build in anchors, sleeves, and other inserts required to accommodate work.
- 3.1.4.3 Fabricate reinforcing steel in accordance with [CSA-A23.1] and [ANSI/ACI 315].
- 3.1.4.4 Carry out reinforcement, concrete, and finishing work in accordance with [CSA-A23.1].
- 3.1.4.5 Cast in sleeves, inserts, and non-slip nosing inserts.
- 3.1.4.6 Grout or bolt in railings and guards.

3.2 METAL STAIRS, GUARDS, AND RAILINGS.

3.2.1 **General:**

3.2.1.1 Submittals: Submit shop drawings in accordance with Section 01340 - Shop Drawings, Product Data, Samples and Mock-ups. Indicate materials, core thickness, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories. All shop drawings to be stamped and signed by a professional engineer registered in the Province of Ontario.

3.2.1.2 Reference Standards: Do welding work in accordance with [CSA W59-1984].

3.2.2 **Design:**

3.2.2.1 Design metal stairs, balustrades and landing construction and connections to NBC vertical and horizontal live load requirements.

3.2.2.2 Detail and fabricate stairs to NAAMM Metal Stairs Manual [fourth edition 1982].

3.2.3 **Materials/Finishes:**

3.2.3.1 Steel material to [CSA-G40.21].

3.2.3.2 Welding material to [CSA W59].

3.2.3.3 Bolts to [ASTM A307].

3.2.3.4 High strength bolts to [ASTM A325].

3.2.3.5 Commercial class: concrete filled metal pan.

3.2.3.6 Service and Industrial class: preformed steel or aluminum grating; preformed steel checker plate.

- 3.2.3.7 Non-slip carborundum nosing inserts with wing type anchors. Provide 2 inserts per tread in metal pan stairs.
- 3.2.3.8 Metal Stair Railings and Guards: Steel bars, pipes, and rods to [CSA-G40.21], [ASTM A53].
- 3.2.4 **Fabrication/Installation:**
- 3.2.4.1 Fabricate steel stairs, ladders, rails, and guards in accordance with [CAN/CSA-S16.1-4], NAAMM metal stair manual, reviewed shop drawings and as follows:
- 3.2.4.2 Fabricate in largest piece possible.
- 3.2.4.3 Fabricate rails and balustrades from bars, pipes, and/or rods. Provide 50mm nominal outside diameter pipe handrail.
- 3.2.4.4 Cap exposed end of handrails and balusters. Terminate at abutting wall with end flange.
- 3.2.4.5 Continuously weld connections between rails and balustrades.
- 3.2.4.6 Extend stringers and bent plates around mid landings to form steel base between stringers and around perimeter at wall junctions.
- 3.2.4.7 Fabricate ladders from steel bars, angles, rods and/or pipes.
- 3.2.4.8 Provide metal cage around ladders in accordance with the requirements of applicable Provincial regulations.
- 3.2.4.9 Close ends of stringers where exposed.
- 3.2.4.10 Fabricate stairs with closed riser steel pan construction
- 3.2.4.11 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure.
- 3.2.4.12 Weld connections where possible, otherwise use 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.
- 3.2.4.13 Accurately form connections with exposed faces flush; mitres and joints tight. Make risers of equal height.
- 3.2.4.14 Construct balusters and handrails from steel pipe and flat steel plates. Cap and weld exposed ends of balusters and handrails. Turn ends of wall handrails. Terminate at abutting wall with end flange.
- 3.2.4.15 Shop Painting:
 - 3.2.4.15.1 Clean surfaces in accordance with Steel Structures Painting Council SSPC-SP2

- 3.2.4.15.2 Shop apply one coat primer for all steel components except interior surfaces of pans. Shop coat primer to [CAN/CGSB-1.40].
- 3.2.4.15.3 Hot dip galvanize to [CAN/CSA-G164]. Apply Zinc rich primer to [CAN/CGSB-1.181].

End of Section