Part 1 General

1.1 SCOPE OF WORK

.1 The work of this section includes, but is not necessarily limited to, the supply of all material, labour and equipment necessary for the supply, erection and connection of structural steel as indicated on the drawings associated with the ventilation areas at the South end of the greenhouse expansion.

.1 Work of this section does not include the steel framing of the greenhouse which is specified under Section 13 34 23 - Steel Building Systems.

1.2 RELATED WORK

.1 Section 03 30 00 - Cast-in-Place Concrete

.2 Section 05 31 00 - Steel Decking.

1.3 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA-S16, Limit States Design of Steel Structures.
.4 CAN/CSA-S136, Cold Formed Steel Structural Members.
.5 CSA-S136.1, Commentary on CSA Standard S136.
.6 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
.7 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding.
.8 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members used in Buildings.
.9 CSA W59, Welded Steel Construction (Metal Arc Welding).

1.4 DESIGN REQUIREMENTS

.1 Submit shop drawings, including fabrication and erection documents and materials list, in accordance with Section 01 33 00 – 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 P.E.I.

1.5 SOURCE QUALITY CONTROL

.1 Submit certified copies of mill reports covering chemical and physical properties of steel used in this work when requested.

1.6 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Each drawing submitted shall bear the signature stamp of a structural engineer registered in the Province of P.E.I. for the current calendar year.

.3 Indicate shop and erection details, including cuts, copes, connections, holes, bolts and welds. Indicate welds by welding symbols defined in the latest edition of CSA W59.

.4 Submit description of methods, sequence of erection and type of equipment proposed for use in erecting structural steel. This submission or its approval shall not relieve the Contractor of his responsibility for providing proper methods, equipment, workmanship and safety precautions.

.5 Reproduction of structural drawings in any form will not be accepted for preparation of steel erection drawings.

.6 Contractor will not be allowed to fabricate steel in field. All steel shall be shop fabricated.

.7 No substitution of sizes will be allowed without the prior approval from the Engineer.

Part 2 Products

2.1 MATERIALS

.1 Structural Steel: to CAN/CSA-G40.21, Grade 350 W; HSS Sections: Class C, Grade 350W, or ASTM A500.

.2 Anchor Bolts: to CAN/CSA-G40.21, Grade A307.

.3 Bolts, Nuts and Washers: to ASTM A307 and ASTM A325.

.4 Welding Materials: to CSA W48 Series and CSA W59.

.5 Hot Dip Galvanizing: galvanize steel, where indicated, to CSA G164, minimum zinc coating of 600 g/m^2.

.6 Shear Studs: to CSA W59, Appendix H.

Part 3 Execution

3.1 FABRICATION

.1 Fabricate structural steel, as indicated, in accordance with CAN/CSA-S16.1 and in accordance with shop drawings.

.2 Reinforce openings to maintain required design strength.

.3 Provide punched holes for attachment of other work. Prepare holes as per specific sub-trade requirements.

.4 Verify dimensions of existing work before fabricating steel.

.5 Where required install shear studs in accordance with CSA W59.

3.2 SHOP PAINTING/PROTECTION

.1 Provide isolation coatings where required to prevent corrosion.

.2 Galvanize steel parts as shown on drawings.

3.3 MARKING

.1 Mark materials in accordance with CSA-G40.20. 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/splices, etc., for fit and match.

3.4 ERECTION

.1 Erect structural steel as indicated in accordance with CAN/CSA-S16.1 and in accordance with shop drawings.

.2 Continuously seal members by continuous welds where indicated. Grind smooth.

.3 Obtain written permission of Consultant prior to field cutting or altering of structural members not shown on drawings.

.4 Touch up shop primer to bolts, welds and burned or scratched surfaces at completion of erection. Touch up is also required for galvanized steel with cold galvanizing paint. All weld surfaces shall be ground smooth before touch up.

3.5 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship shall be carried out by testing laboratory designated or approved by Structural Engineer.

.2 The Contractor will pay costs of tests.

.3 Tolerances for structural members shall be as per CAN/CSA-S16.1, Clause 26.9, and erection tolerances as per Clause 28.7.

.4 All other erection tolerances as per CISC code of standard practice for structural steel, Clause 7 in Appendix "D."

.5 If any deviation is measured from the above tolerance limits, the Contractor will be required to repair or replace the work in question at his expense.

3.6 WELDING REQUIREMENTS

.1 Steel fabrication and erection company shall be certified by CWB as per CSA W47.1, Div. 1 or 2.1. The fabrication and erection company shall provide the copy of the Certificate from CWB for their certification.

.2 The Steel Contractor shall provide the CWB approved procedure data sheets for all welded joints, deck, V pans, reinforcing steel and studs pertaining to this project. Contractor is also required to provide the copy of Welder's qualifications certificate (CWB) for all welders to be used for this project in shop and in the field erection.

.3 Welders employed in the field shall have certification from CWB to weld in all positions.

END OF SECTION

Part 1 General

1.1 SCOPE OF WORK

.1 The work of this section includes, but is not necessarily limited to, the supply of all material, labour and equipment necessary for the supply and installation of steel deck, as indicated on the drawings. Work shall also include, but is not necessarily limited to:

- .1 Provide openings in steel deck according to locations shown on drawings. The Contractor shall coordinate exact location and size of openings with the Architectural, Greenhouse, Mechanical and Electrical trades.
- .2 Welding or riveting of deck to support steel.
- .3 Closures at small openings around columns, etc.
- .4 Field check of all dimensions and conditions.

1.2 RELATED WORK

.1 Section 03 20 00 – Concrete Reinforcement.

.2 Section 03 33 00 – Cast-In Place Concrete.

.3 Section 05 12 23 – Structural Steel for Buildings.

1.3 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA-S16.1, Limit States Design of Steel Structures.
- .2 CSA-S136, Cold Formed Steel Structural Members.
- .3 CSA W47.1, Certification of Companies for Fusion Welding of Steel Structures.
- .4 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members used in Buildings.
- .5 CSA

.2 Canadian Sheet Steel Building Institute (CSSBI):

- .1 CSSBI 10M, Standard for Steel Roof Deck.
- .2 CSSBI 12M, Standard for Composite Steel Deck.

1.4 DESIGN REQUIREMENTS

.1 Structural design of steel decking by Limit States Design.

.2 Steel decking shall safely carry dead, live and lateral loads, diaphragm action, and composite deck action as indicated. Deck shall be designed for snow build-up as indicated on drawings.

.3 Deflection under live load shall not exceed 1/240th of span.

.4 Deck thickness of 0.76 mm as shown on drawings is minimum. Deck thickness may be increased to sustain the loads.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00 – Submittal Procedures.

.2 Clearly indicate decking plan, profile, dimensions, core thickness, connections to supports and spacings, projections, openings and reinforcement details and accessories.

Part 2 Products

2.1 MATERIALS

.1 Sheet Steel: to ASTM A653 SS, Grade 230 steel, Hot Dipped Galvanized.

.2 Cover plates, cell closures and flashings: galvanized steel sheet with minimum steel core thickness of 0.92 mm.

.3 Steel deck: 0.76 mm minimum base thickness, 76 mm deep profile.

Part 3 Execution

3.1 ERECTION

.1 Erect metal decking as indicated to manufacturer's instructions.

.2 Immediately after decking is permanently secured in place, touch up surfaces with zinc rich galvanized paint primer where burned by welding. Welds shall be cleaned before touch up.

.3 Welding: in accordance with CSA W59.

.4 Riveting of decking to structure is permitted.

.5 Install connections in accordance with CSSBI recommendations.

3.2 CLOSURES

.1 Where metal decking rests on concrete walls, fill web spaces with neoprene closures as recommended by manufacturer and to satisfaction of Architect.

.2 Attach galvanized metal cell closures at locations required to contain poured concrete (pourstops) as recommended by manufacturer.

3.3 WELDING REQUIREMENTS

.1 See Clause 3.6, Section 05 12 23.

3.4 OPENINGS AND AREAS OF CONCENTRATED LOADS

.1 Framing of deck openings up to 150 mm shall be as recommended by manufacturer, except as otherwise indicated on drawings.

.2 For deck openings over 150 mm square and for areas of concentrated load, reinforce in accordance with structural framing details. The framing for all openings is required as per typical detail. Coordinate openings with Mechanical, Electrical and Architectural trades as well as greenhouse supplier. All openings may not be shown on structural drawings.

3.5 CONNECTIONS

.1 Weld decking to supporting steel perpendicular to deck span as shown on shop drawings.

3.6 FIELD QUALITY CONTROL

.1 The Contractor shall take special care with welding deck and V Pans to steel. Mark all locations of steel supporting members before welding.

.2 Burn through holes in steel deck and V Pans due to welding shall be kept to a minimum. No more than 5% holes in deck compared to number of welds required will be accepted. If number of holes is more than 5%, the contractor will be required to replace deck and V Pans at no cost to the Owner.

.3 If the weld is missed and a hole is burned through the deck, the Contractor shall examine the top chord of joist for damage. If the joist is damaged, the Contractor will be responsible to replace or repair the joist at no cost to the Owner and to the satisfaction of the Structural Consultant in consultation from the joist manufacturer and designer. Steel Contractor is required to provide a certificate with P.Eng. stamp stating that he has examined all joists for burn holes and the holes are not detrimental to the deck and joists design.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 – Common Product Requirements.

.3 Section 09 91 13 - Exterior Painting.

1.2 REFERENCES – ALL STANDARDS USED SHALL BE OF LATEST EDITION

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A53/A53M-, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Steamless.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.40, Anti-corrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.181, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CAN/CSA-S16.1, 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,Welded Steel Construction (Metal Arc Welding) (Imperial Version).

.4 The Environmental Choice Program

.1 CCD-047a, Paints, Surface Coatings.

.2 CCD-048, Surface Coatings - Recycled Water-borne.

1.3 SUBMITTALS

.1 Product Data:

.2 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

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

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling, Unloading, Storage and Protection

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.

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 standard weight, black and 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, 15 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 round 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 g/m^2 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.

2.4 ISOLATION COATING

.1 Isolate aluminum 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 STEEL BOLLARDS

.1 6" Diameter steel fabrication schedule 40 pipe with concrete fill by General Contractor and painting by Section 09 91 23 –Painting.

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 Consultant 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 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 01 33 00 - Submittal Procedures.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

- .1 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .3 ASTM A325M, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.40, Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.181, Ready-Mixed Organic Zinc-Rich Coating.
- .3 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.

.3 Canadian Standards Association (CSA International)

- .1 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped articles.
- .2 CSA W59, Welded Steel Construction (Metal Arc Welding/Imperial Version).

.4 National Association of Architectural Metal Manufactures (NAAMM)

- .1 AMP 510, Metal Stair Manual.

.5 Steel Structures Painting Council (SSPC), Systems and Specifications Manual, Volume 2.

1.3 SYSTEM DESCRIPTION

.1 Design Requirements: Open riser galv. steel stair with grating treads & landing and galvanized guards & railings.

- .1 Design metal stair, balustrade and landing construction and connections to NBC vertical and horizontal live load requirements. Landing can have post supports in addition to anchoring to concrete foundation wall.
- .2 Detail and fabricate stairs to NAAMM Metal Stairs Manual.
- .3 Rise and runs, stain width, nosings, guards & railings, etc. to be in compliance with part 3 of National Building Code of Canada (NBCC-2010).

1.4 SUBMITTALS

.1 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets:
  - .1 For finishes, coatings, primers and paints.

.2 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 33 00 - 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 PEI.

1.5 QUALITY ASSURANCE

.1 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, and manufacturer's installation instructions.

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 Divert unused metal materials from landfill to metal recycling facility.

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.

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

.4 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless black.

.5 Steel tubing: to CAN/CSA-G40.20/G40.21.

.6 Metal bar grating: to ANSI/NAAMM MBG 531, steel, Welded or Riveted Types.

.7 Welding materials: to CSA W59.

.8 Bolts: to ASTM A307.

.9 High strength bolts: to ASTM A325M.

.10 Galvanization: to CSA G164, minimum zinc coating to 600 g/m^2.

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 METAL BAR GRATING STAIR TREADS & LANDINGS

.1 Fabricate stairs with welded bar grating or premanufactured riveted bar gratings, with galvanized finishes.

.2 Leading edges of treads and landings to have checkerplate nosings typical.

.3 Grating design to suit spans and loadings.

.4 Secure Treads/landings to supporting structure/stringers to NAAMM standards.

.5 Boarding bar thickness and depths to suit structural performance requirements.

2.4 BALUSTRADES

.1 Construct balusters and handrails from steel pipe and bars. Design to meet NAAMM standards and be in compliance w/ National Building Code of Canada (NBCC-2010).

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

.3 Bolt or weld balustrades to stringers.

2.5 FINISHES

.1 Galvanization: to CSA G164, minimum zinc coating to 600 g/m^2.

.2 Site touch-up all damage to galv. coating w/ zinc rich paint to CAN/CGSB-1.131.

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