STRUCTURAL STEEL

1. GENERAL

1.1 Work Included

.1 Supply and Install steel items including, but not limited to, roof framing, roof hold down assemblies, roof perimeter angles, masonry weld plates and support angles, and loose lintels as indicated on the Drawings.

.2 Galvanizing of all items exposed to exterior environment.

.3 Prime painting.

.4 Bearing plates and anchor bolts (finished to match item).

.5 Welds, bolts, washers, nuts, and shims (finished to match item).

.6 Field touch-up of primed and galvanized surfaces including field welding.

1.2 Design Standards, Code Requirements

.1 Conform to requirements of CSA S16.1, CSA-S136, CISC Code of Standard Practice for Buildings, and Provincial Construction Safety Act.

.2 Use the loads shown on Drawings and in accordance with the NBC of Canada 1995.

.3 Connections not shown on the Drawings are to be designed by a Professional Engineer registered in the Province of Manitoba. Design connections for loads shown or indicated on the Drawings.

.4 Perform all welding in accordance with requirements of CSA W59.

1.3 Qualifications

.1 All work is to be performed by a firm certified by the Canadian Welding Bureau to the requirements of CSA W47.1 in Division 2.

.2 All welders employed for erection are to possess valid "S" Classification Class "O" certificates issued by the Canadian Welding Bureau.

1.4 Inspection and Testing

.1 Shop and field inspection and testing is to be performed by an Inspection and Testing Firm appointed and paid by the City.

.2 Pay all additional costs for inspection and re-inspection due to defective workmanship or materials.

.3 If requested by the Contract Administrator, submit four (4) copies of mill test reports, properly correlated to materials actually used.

.4 Radiographic and magnetic particle inspection of welds is to be performed by the Inspection and Testing Firm, in accordance with CSA W59 and ASTM E109, when required by the Contract Administrator.

.5 Welds are to be considered defective if they fail to meet quality requirements of CSA W59.

.6 Additionally, all welds are to be visually inspected.

.7 High Tensile bolted connections are to be inspected and tested in accordance with CSA S16.1.

1.5 Shop Drawings, Submittals

.1 Submit Shop Drawings for review in accordance with the Section 01300 – Submittals.

.2 Provide a fabrication and erection schedule to the Contract Administrator prior to commencement of shop fabrication and field erection, in ample time to allow proper scheduling of inspection and testing.

.3 Submit details of typical connections and special connections for review prior to preparation of Shop Drawings.

.4 Shop Drawings and design briefs are to bear the seal and signature of a Professional Engineer registered in the Province of Manitoba.

.5 Clearly indicate profiles, sizes, spacing, and locations of structural members, connections, attachments, reinforcing, anchorage, size and type of fasteners, cambers and loads, accessories, and setting details.

.6 Include erection drawings, elevations, and details.

.7 Indicate welded connections using welding symbols in compliance with CISC Welding Standards. Clearly indicate net weld lengths.

.8 Shop Drawing review by the Contract Administrator is solely to ascertain conformance to the general design concept.

.9 Responsibility for approval of detail design inherent in Shop Drawings rests with the Contractor and review by the Contract Administrator shall not imply such approval.

.10 Review shall not relieve the Contractor of his responsibility for errors or omissions in Shop Drawings or for proper completion of the Work in accordance with the Contract Documents.

.11 Responsibility for verification and correlation of field dimensions, fabrication processes, techniques of construction, installation, and coordination of all parts of the Work rests with the Contractor.

2. PRODUCTS

2.1 Materials

.1 All materials shall be new.

.2 Structural steel: conforming to CSA G40.21, Type W with minimum yield strength of 350 MPa.

.3 Hollow structural sections: conforming to CSA G40.21, Type W, minimum yield strength of 350 MPa, Class C.

.4 Miscellaneous steel: conforming to CSA G40.21, Type W with minimum yield strength of 300 MPa.

.5 Bolts, nuts, and washers: conforming to ASTM A325; galvanized or painted to match fastened items.

.6 Welding materials: conforming to CSA W59.

.7 Interior structural steel primer: CISC/CPMA 2-75.

.8 Galvanizing: conforming to CAN/CSA-G174; touch-up with Galvalume.

.9 Monorail: to be supplied and installed under Section 14550 – Monorail and Hoists.

2.2 Fabrication

.1 Fabricate structural steel members in accordance with CSAS16.1 and CSA S136.

.2 Verify all drawing dimensions prior to commencing fabrication.

.3 Provide connections for design loads indicated on the Drawings and to NBCC.

.4 Provide for field connections to be bolted except where field welded connections are shown on the Drawings. Bolted connections shall be bearing-type connections with the thread excluded from the planes of shear.

.5 All shop connections are to be welded.

.6 All exposed welds shall be of smooth neat appearance; grind or file if required.

.7 Design and detail connections for structural steel so that corrosion potential is minimized.

2.3 Shop Priming

.1 Structural steel shall be primed at the fabrication shop.

.2 Clean all members to remove loose mill scale, rust, oil, dirt, and other foreign matter. Prepare surfaces to be primed according to SSPC SP7.

.3 Apply primer in the shop to all steel surfaces, except:

.1 Surfaces to be encased in concrete.

.2 Surfaces and edges to be field welded.

.4 Apply primer under cover, on dry surfaces only, and when surface and air temperatures are above 5°C.

.5 Maintain dry condition and 5°C minimum temperature until primer is thoroughly dry.

.6 Patch prime sharp edges and corners one coat before full coat is applied.

.7 Apply primer by brush or spray to specified dry film thickness.

3. EXECUTION

3.1 Damaged Members

.1 Repair or replace members damaged during transit or erection before securing in position.

3.2 Erection

.1 Erect structural steel in accordance with CSA S16.1 and Drawings.

.2 Field connections are to be bolted wherever possible.

.3 Do not field weld wet surfaces or during rain unless under cover.

.4 Do not weld at temperature below 5°C except with express permission of the Contract Administrator.

.5 Conform to requirements of CSA W59 for minimum preheat and interpass temperatures.

.6 Make adequate provision for all erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of necessary permanent bracing.

.7 Use only light drifting to draw parts together. Enlarge holes for bolted connections with reamers or twist drill only. Do not burn to form holes, enlarge holes, or match unfair holes.

.8 Erection error is not to exceed requirements of CSA S16.1.

.9 Obtain Contract Administrator’s written permission prior to field cutting or altering structural members.

.10 Bolt tightening to be done in accordance with Turn-of-Nut tightening as per CSA S16.1.

.11 After erection, field prime welds and touch-up abrasions and damaged surfaces.

.12 Supply to appropriate Sections items, such as masonry support weld plates, to be cast into concrete complete with necessary setting templates.

END OF SECTION

METAL DECK

1. GENERAL

1.1 Work Included

.1 Metal roof deck complete with cover plates, closures, flashing, fastenings, and installation

.2 Angle framing around openings up to 450 mm maximum in any dimension

.3 Cut openings through deck

1.2 Shop Drawings

.1 Submit Shop Drawings in accordance with Section 01300 – Submittals.

.2 Clearly indicate decking plan, deck profile dimensions and thicknesses, anchorage, supports, projections, openings and reinforcement, closures, flashings, applicable accessories, and details.

.3 Shop Drawings and design briefs are to be signed and sealed by a Professional Engineer registered in the Province of Manitoba.

1.3 Design

.1 Design deck to safely support live and dead loads shown on Drawings and in accordance with CSA S136. If applicable, ensure ponding affects are included.

.2 Maximum working stress under full live and dead loads shall not exceed 140 MPa.

.3 Live load deflection shall not exceed 1/240 of span.

2. PRODUCTS

2.1 Materials

.1 Metal: galvanized sheet steel conforming to ASTM A653M SS Grade 230 with zinc coating of Z275 galvanized.

2.2 Deck and Related Accessories

.1 Roof deck: minimum 0.76 mm thickness or as indicated on the Drawings, base sheet steel, galvaneal, three (3) equal spans, 38 mm deep profile.

.2 Roof deck to be style RD938 as manufactured by Vicwest or style P-3615 as manufactured by Canam Group.

.3 Closure strips, flashing, and cover plates: minimum 0.76 mm thickness base sheet steel, galvaneal coating, of required profiles and sizes.

2.3 Fabrication

.1 Fabricate metal deck in accordance with requirements of CSA S136, and CSSBI Standards and Drawings.

.2 Fabricate deck with interlocking side laps.

.3 Fabricate to generally span over three (3) or more supports unless shown otherwise on the Drawings.

3. EXECUTION

3.1 Damaged Members

.1 Repair or replace sections damaged during transit or erection before securing in position.

3.2 Installation

.1 Erect metal deck in accordance with requirements of CSSBI and the Drawings. Align and level deck on structural supports.

.2 Locate all end joints over supports.

.3 Lap all end joints on non-cellular deck 75 mm minimum.

.4 Maintain minimum end bearing on steel supports of 50 mm for deck up to 45 mm deep.

.5 Maintain minimum end bearing on masonry supports of 100 mm for deck up to 45 mm deep.

.6 Lay out lines of supporting steel on top surface of deck to produce accurate welds and prevent burns through deck from improper weld location.

.7 Welding shall be done by qualified welders who shall make practice welds. Prior to actual job welding, practice welds shall be made on the deck to be used to check adequacy of the welding rod amperage and burn-off rate to produce satisfactory fusion for the various welds required. Both the practice welds and actual job welds shall be inspected by the steel deck erector as to size and spacing and tested by pry tests to assure metal to metal fusion.

.8 Fasten to all supports with 20 mm diameter fusion welds at 300 mm on center maximum.

.9 Mechanically fasten sidelaps at 600 mm on center by button punch.

.10 Install angle or channel closures full length on all deck openings.

.11 Install acoustical closures over all walls.

.12 Cut all holes required in deck for roof hold downs and mechanical and electrical requirements.

.13 Reinforce openings up to 450 mm in any dimension with 55 x 55 x 6 mm steel angles. Place reinforcing angles at right angles to ribs, extend out two ribs each side and weld.

.14 Install deck to provide flat upper surface, with all flange surfaces touching a 1200 mm straight edge over structural supports.

.15 If two or more adjacent flanges on any deck section are concave or convex so that only edges or crowns touch straight edge, repair or replace deck sections.

.16 Immediately after installation, touch up welds, burned areas, and damaged areas of zinc coating with minimum two (2) coats of zinc rich primer.

END OF SECTION

METAL FABRICATIONS

1. GENERAL

1.1 Design Requirements

.1 Design details and connections, where not shown on Drawings, in accordance with CAN/CSA-S16, CSA S136, and CSA S136.1.

1.2 Quality Assurance

.1 Retain a Professional Engineer registered in the Province of Manitoba, with experience in work of comparable complexity and scope, to perform the following services as part of the Work of this Section:

.1 Design metal fabrication items as required to resist live, dead, lateral, wind, and seismic loads.

.2 Structural design.

.3 Review, stamp, and sign Shop Drawings.

.4 Conduct shop and Site inspections.

.5 Prepare and submit inspection reports.

.2 Do steel welding to CSA W59 by fabricators certified by the Canadian Welding Bureau to CSA W47.1.

1.3 Submittals

.1 Shop Drawings: Bearing professional seal and signature of the Professional Engineer responsible for the engineering design. Show work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, thicknesses, description of materials, metal finishing, as well as other pertinent data and information.

2. PRODUCTS

2.1 Materials

.1 Structural Steel Shapes, Plates: CAN/CSA-G40.20-G40.21-M, Grade 350W.

.2 Hollow Structural Steel Sections: CAN/CSA-G40.20/G40.21-M, Grade 350W, Class C.

.3 Galvanized Sheet Steel: ASTM A653/A653M Grade A, Z275 Commercial Quality zinc coating, size and shape as shown.

.4 Stainless Steel Shapes: ASTM A484/A484M, Type 304 to AISI No. 4 finish.

.5 Stainless Steel Sheet and Plate: ASTM A167, Type 304 to AISI No. 4 finish.

.6 Fasteners: Bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts hot dipped galvanized to CSA G164. For joining stainless steel components use stainless steel fasteners.

.7 Primer Paint: CISC/CPMA 2-75.

.8 Galvanized Primer Paint: Organic zinc rich primer. For galvanized fabrications where touchup is to remain unpainted in finished work: Inorganic zinc rich primer, Galvafroid by W.R. Meadows of Canada Ltd.

.9 Grout: Non-shrink, non-metallic, flowable, 24h, 15 MPa (2100 psi), pull-out strength 7.9 MPa (1150 psi).

.10 Drilled Anchors: RAWL by Anchor Construction Industrial Products or HSL by Hilti Inc. heavy-duty anchors, sizes to suit.

2.2 Fabrication

.1 Verify dimensions of installed Work before commencing fabrications and report any discrepancies to Contract Administrator.

.2 Fit and assemble Work in shop where possible. Execute work in accordance with details and reviewed Shop Drawings. Where shop fabrication is not possible, make trial assembly in shop.

.3 Seal exterior steel fabrications against corrosion in accordance with CAN/CSA S16.1.

.4 Unless indicated otherwise, provide welded connection for work of this Section.

.5 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to Contract Administrator's acceptance.

.6 Assemble members without twists or open joints.

.7 Correctly size holes for connecting Work of other Sections where such can be determined prior to fabrication. Where possible, show holes on shop drawings. Place holes not to cause appreciable reduction in strength of member.

2.3 Welding

.1 Perform welding by electric arc process.

.2 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:

.1 CSA W48: For welding materials. If rods are used, only coated rods are allowed.

.2 CSA W59: For design of connections and workmanship.

.3 CAN/CSA W117.2: For safety.

.3 Thoroughly clean welded joints and expose metals for a sufficient distance to perform welding operations.

.4 Test welds for conformance and remove work not meeting specified standards and replace to Contract Administrator's acceptance.

.5 Continuous weld all joints for the full length of each joint. Finish exposed welds smooth and flush, file, or grind as required.

2.4 Anchors and Fastening

.1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building steel. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

.2 Use self-drilling expansion type concrete anchors for attaching to masonry and concrete.

2.5 Inserts and Hangers

.1 Install inserts, hangers, and supports. Make inserts drilled type.

.2 Before openings are cut through structure, obtain Contract Administrator's written acceptance for procedures, locations and reinforcements required.

2.6 Shop Priming

.1 Clean steel to SSPC SP6 and remove loose mill scale, weld flux and splatter.

.2 Shop prime steel with one coat of primer paint to dry film thickness of 0.07 mm. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C. Paint items under cover and leave under cover until primer is dry. Follow paint Manufacturer's recommendations regarding application methods, equipment, temperature, and humidity conditions.

.3 Clean but do not prime surfaces to be field welded.

.4 Do not prime surfaces embedded in concrete, clean as if they were to be primed.

.5 Do not prime machine finished surfaces, but apply an effective anti-rust compound.

.6 Take precautions to avoid damage to adjacent surfaces.

2.7 Hot Dip Galvanizing

.1 Hot dip galvanize, after fabrication, steel metal fabrication items. 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 to 95% zinc, in accordance with Manufacturer's printed directions.

.1 Members exposed to elements when in final location.

.2 Members embedded on exterior side of exterior walls.

.3 Members imbedded in concrete.

.4 Members specified in this Section or indicated on Drawings.

.2 Hot-dip galvanize members in accordance with CAN/CSA G164 and requirements of the following ASTM standards, with minimum coating weights or thicknesses as follows:

.1 Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strips: ASTM A123/A123M; average weight of zinc coating of actual surface

.1 4.8 mm ($^{3}/_{16}$") and less member thickness: 600 g/m^2

.2 6 mm ($^{1}/_{4}$") and heavier members: 640 g/m^2

.2 Iron and Steel Hardware: ASTM A153/A153M; minimum weight of zinc coating, in gram per square meter of surface, in accordance with Table 1 for the various classes of materials used in the Work.

2.8 Stainless-Steel Finishes

.1 Directional Polish: No. 4 bright satin finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish, free of cross scratches. Run grain with long dimension of each piece.

3. EXECUTION

3.1 Examination

.1 Verify dimensions and conditions of previously installed work, upon which this Section depends, and coordinate repairs, alterations, and rectification if necessary.

.2 Obtain Contract Administrator’s written approval prior to field cutting or altering of structural members.

3.2 Erection

.1 Fit joints and intersecting members accurately. Make Work in true planes with adequate fastenings. Build and erect Work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.

.2 Perform drilling of concrete as required to fasten Work of this Section.

.3 Unless otherwise indicated, grout set work in concrete with non-shrink grout. Trowel surface smooth and flush with adjacent surfaces.

.4 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.

3.3 Field Painting

.1 Paint bolt heads, washers, nuts, field welds and previously unpainted items. Touch up shop primer damaged during transit and installation, with primer to match shop primer.

3.4 Schedule of Metal Works

.1 General: Supply and install 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: Supply and install 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:

.3 Overhead and Coiling Door Supports: Structural channel sections, selected for trueness of web and flange, with joints welded and ground smooth. Supply bar stop and bent bar anchors for anchorage to masonry or concrete as required. Fit frames with temporary spreaders to prevent frame from springing out of shape.

.4 Lintels: Size width 25 mm maximum less than width of wall. Unless otherwise shown, fabricate lintels in block walls of steel sections.

.5 Support Framing Systems: Welded construction, complete with anchors, brackets, sleeves, screws and incidentals required to complete installations. Provide steel support for interior and exterior work including and not limited to:

.1 Parapet flashing, angles, and channels to provide framing at cants, curbs, and parapets.

.2 Steel framing for louvre openings.

.3 Stainless steel channel wall framing at perimeter of glass block panels.

.4 Support brackets and welded plates.

.5 Masonry support angles.

END OF SECTION

ALUMINIUM FABRICATIONS

1. GENERAL

1.1 Design Requirements

.1 Comply with CSA S157/A157.1 for strength design in aluminium work.

.2 Design railings, balustrade, and landing construction and connections to requirements of the building code and other authorities having jurisdiction. Maximum deflection of L/360 of clear span.

.3 Floor Covers and Platform Grating: Unless otherwise indicated, minimum uniform loading of 976 kg/m^2. (200 psf) at maximum deflection of L/360 of clear span.

1.2 Quality Assurance

.1 Retain a Professional Engineer registered in the Province of Manitoba, with experience in work of comparable complexity and scope, to perform the following services as part of the Work of this Section:

.1 Design aluminium fabrication items as required to resist live, dead, lateral, wind, and seismic loads.

.2 Structural design.

.3 Review, stamp, and sign shop drawings.

.4 Conduct shop and Site inspections.

.5 Prepare and submit inspection reports.

.2 Do aluminium welding to CSA W59.2 by fabricators certified by the Canadian Welding Bureau to CSA W47.2.

1.3 Submittals

.1 Shop Drawings: Bearing professional seal and signature of the Professional Engineer responsible for the engineering design. Show work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, thicknesses, description of materials, aluminium finishing, as well as other pertinent data and information.

2. PRODUCTS

2.1 Materials

.1 Aluminium Plates, Shapes and Extrusions: 6061-T6 alloy, anodizing quality.

.2 Welding Rods, Aluminium: 5356 alloy.

.3 Grating: Rectangular grate opening, 30 mm centre bearing bars, 100 mm centre cross bars, welded construction, corners and junctions ground smooth. Weld perimeter banding bars, same size as bearing bars, at grating edges and openings. Attach welded anchors at 600 mm centres.

.4 Stair Tread Grating: Rectangular grating, 30 mm centre bearing bars, 100 mm centre cross bars, welded construction, corners and junctions ground smooth, slip resistant and colour contrast nosing. Weld perimeter banding bars, same size as bearing bars, at grating edges.

.5 Fasteners: Stainless steel bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws and machine bolts.

.6 Galvanized Primer Paint: Organic zinc rich primer. For galvanized fabrications where touch-up is to remain unpainted in finished work: Inorganic zinc rich primer, Galvafroid by W.R. Meadows of Canada Ltd.

.7 Grout: Non-shrink, non-metallic, flowable, 24h, 15 MPa (2100 psi), pull-out strength 7.9 MPa (1150 psi).

.8 Drilled Anchors: RAWL by Anchor Construction Industrial Products or HSL by Hilti Inc. heavy-duty anchors, sizes to suit.

2.2 Fabrication

.1 Verify dimensions of installed Work before commencing fabrications and report any discrepancies to Contract Administrator.

.2 Fit and assemble Work in shop where possible. Execute Work in accordance with details and reviewed Shop Drawings. Where shop fabrication is not possible, make trial assembly in shop.

.3 Unless indicated otherwise, provide welded connection for work of this Section.

.4 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to Contract Administrator's acceptance.

.5 Assemble members without twists or open joints.

.6 Correctly size holes for connecting Work of other Sections where such can be determined prior to fabrication. Where possible, show holes on shop drawings. Place holes not to cause appreciable reduction in strength of member.

2.3 Welding

.1 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:

.1 CSA W48: For welding materials. If rods are used, only coated rods are allowed.

.2 CSA W59.2: For design of connections and workmanship.

.3 CAN/CSA W117.2: For safety.

.2 Thoroughly clean welded joints and expose aluminium surfaces for a sufficient distance to perform welding operations.

.3 Test welds for conformance and remove work not meeting specified standards and replace to Contract Administrator's acceptance.

.4 Continuous weld all joints for the full length of each joint. Finish exposed welds smooth and flush, file, or grind as required.

2.4 Anchors and Fastening

.1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to building structure. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

.2 Use self-drilling expansion type concrete anchors for attaching to masonry and concrete.

2.5 Inserts and Hangers

.1 Install inserts, hangers, and supports. Make inserts drilled type.

.2 Before openings are cut through structure, obtain Contract Administrator's written acceptance for procedures, locations and reinforcements required.

2.6 Aluminium Finishes

.1 Clear Anodic Finish: AA-M12C22A41, as fabricated nonspecular mechanical finish, medium matte etched chemical finish, architectural class I clear anodic coating of minimum 18 µm (0.7 mil) thick complying with AAMA 611.

3. EXECUTION

3.1 Examination

.1 Verify dimensions and conditions of previously installed work, upon which this Section depends, and coordinate repairs, alterations, and rectification if necessary.

.2 Obtain Contract Administrator's written approval prior to field cutting or altering of structural members.

3.2 Erection

.1 Fit joints and intersecting members accurately. Make Work in true planes with adequate fastenings. Build and erect Work plumb, true, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.

.2 Perform drilling of concrete as required to fasten Work of this Section.

.3 Continuously weld connections for railings, and anchor directly to stringers. Where rails return to wall have end returns and wall brackets.

.4 Unless otherwise indicated, grout set work in concrete with non-shrink grout. Trowel surface smooth and flush with adjacent surfaces.

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

3.3 Schedule of Aluminium Works

.1 General: Supply and install 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: Supply and install following 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:

.3 Aluminium Stairs:

.1 Fabricate stringer of size, construction and attachment to structure as shown. Close exposed ends of stringers with closure plates welded to edges of exposed flange edges.

.2 Furnish treads, risers, and landing permanent aluminium plates or gratings as shown.

.3 Support treads, risers, and landings as detailed on reviewed shop drawings.

.4 Access Ladders: Construct access ladders of stringers with solid rungs rigidly secured to the stringers. Supply and install angle clips and anchor bolts to secure the ladders in place.

.5 Grating: Fabricate removable and fixed gratings in sections weighing maximum 75 kg (165 lbs) each. Secure 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.

.6 Handrails and Posts: Close open ends of handrails with 1.9 mm thick closure neatly welded. Supply railings consisting of top rail and intermediate rail, and with matching vertical standards spaced as shown.

.7 Checkered Plate Covers: Diamond shaped raised pattern, of nominal thickness shown exclusive of raised pattern.

END OF SECTION