

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures.
 - .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .3 Section 05 50 00 - Metal Fabrications.
 - .4 Section 09 97 13 - Steel Coating.
- 1.2 REFERENCES
- .1 American Association for State Highway and Transportation Officials (AASHTO)
 - .1 AASHTO Standard Specifications for Highway Bridges-17th Edition 2002.
 - .2 American Society for Testing and Materials International (ASTM International)
 - .1 ASTM A325M-14, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.
 - .2 ASTM A490M-14a, Standard Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.
 - .3 Canadian Standards Association (CSA International)
 - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CAN/CSA S6-14, Canadian Highway Bridge Design Code (CHBDC).
 - .4 CAN/CSA S16-14, Design of Steel Structures.
 - .5 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
 - .6 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel.
 - .7 CSA W59-13, Welded Steel Construction, (Metal Arc Welding).
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1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Shop drawing review by the Designer is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that the Designer approves the detail design inherent in the shop drawings, responsibility for which shall remain with the Fabricator submitting the shop drawings, and such review shall not relieve the Fabricator of the responsibility for meeting all requirements of the contract documents. The Contractor shall be responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or construction and for the installation of work.
 - .3 Each drawing submitted to bear signature and stamp of qualified professional engineer registered or licensed in Province of Nova Scotia, Canada.
 - .4 Indicate shop and erection details including shop splices, cuts, copes, connections, holes, bearing plates, threaded fasteners, bracing and diaphragms, and welds. Indicate welds by CSA W59 welding symbols. Indicate all bird spike locations and extents and provide specifications for spikes, as well as chemical adhesive to attach bird spikes to girder assemblies.
 - .5 Proposed welding procedures to be stamped and approved by Canadian Welding Bureau.
 - .6 Submit description of methods, temporary bracing and strengthening, sequence of erection and type of equipment proposed for use in erecting structural steel (reference Part 3 of this Section for further details / requirements for erection of structural steel for bridge).
 - .7 Falsework drawings submitted to bear signature and stamp of qualified professional engineer
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registered or licensed in Province of Nova Scotia, Canada.

- .9 The contractor shall schedule 4 weeks (20 business days) for the detailed single review of the bridge girder shop drawings. This review time will start the following business day after the contractor has submitted the shop drawings to the Departmental Representative. If additional reviews of shop drawings are required, then additional time beyond that scheduled for the initial review will be required and the time required for subsequent shop drawing reviews shall not be constituted in any way by the Contractor as a delay.

1.4 ADMINISTRATIVE_ REQUIREMENTS

- .1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting four weeks prior to beginning on-site delivery / installation of girders between Departmental Representative, General Contractor, Site Superintendent, Steel Fabricator and Steel Erector to:
- .1 Verify project requirements.
- .2 Review erection and substrate conditions.
- .3 Review engineered erection plan, traffic control / closure requirements, erection schedule, emergency measures planning, etc.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle to prevent damage.
- .2 Provide protective blocking for lifting, transportation and storing.
- .1 Exercise care during fabrication, transportation and erection so as not to damage girders, bearings, etc.
- .2 Do not notch edges of members.
- .3 Do not cause excessive stresses.
- .3 Mark mass on members weighing more than 3 tonnes.
- .4 Ensure that no portion of steel comes into contact with ground.
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- .5 Replace or repair (to the satisfaction of the Departmental Representative) any damaged or faulty components.
- .6 Provide Departmental Representative with delivery schedules minimum 7 days prior to shipping.

1.6 WASTE MANAGEMENT
AND DISPOSAL

- .1 Separate and recycle waste material in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 QUALITY ASSURANCE

- .1 Preconstruction Testing:
 - .1 Provide suitable facilities and cooperate with inspection organization, Departmental Representative in carrying out inspection and tests required.
 - .2 Adequate time shall be allotted for in both the construction and fabrication schedules to allow inspectors to complete all inspections and tests required. The construction and fabrication schedules provided for review to the Departmental Representative at the start of construction shall designate inspection task items that clearly show the time allotted for inspections and tests. Time shall also be allotted in the schedules for the review of all shop drawings as outlined in this section.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Structural steel, excluding rolled angle, HSS members and masonry plates, CSA G40.20/G40.21, grade and types 350WT Category 2. This includes all box girder webs, flanges, stiffeners, gussets and splice plates.
- .2 The box girder shall be considered a fracture critical member as per Section 12 of CSA W59-13 and Section 10 of CSA S6-14. More specifically, the bottom flange, lower 1250 mm portion of the girder web along the entire span, along with the bottom flange and web

splice plates shall all be considered fracture critical components of the structure.

- .3 All rolled angle shapes, masonry plates: to CSA G40.21M Grade 350W.
- .4 All HSS members to ASTM A500 Grade C.
- .5 High strength Type 1 bolts, nuts and washers: to ASTM A325M. Bolts to ASTM A490M approved by Departmental Representative. Bolt assemblies to be galvanized and then coated with two coats (one mid coat and one top coat; Reference Section 09 19 13).
- .6 Anchor bolts, washers and nuts: to ASTM A307, or better and galvanized.
- .7 Welding electrodes: to CSA W48 series. Filler metal shall be in accordance with Table 5- 1 of Filler Requirements for Exposed Bare Applications of CSA-G40.21M, 350A, 350AT, 400AT and ASTM A242 and SEE Steels of the CSA W59 Specification.
- .8 Stud shear connectors: to CSA W59, Clause 5.5.6 and Appendix H.
- .9 Hot dip galvanizing: to CAN/CSA G164, minimum zinc coating of 763 g/m².
- .10 Fabrication shall not commence prior to the review of shop drawings by the Departmental Representative. Any fabrication done without the reviewed shop drawings may be rejected. All steel fabrication shall be done in accordance with CSA S6, CSA W59 and in accordance with the reviewed shop drawings
- .11 Workmanship and finish shall be of the best modern general practice in the bridge fabrication and construction industry. Stressing, flame cutting and planning shall be done carefully and accurately. Particular attention shall be paid to the neatness and uniformity of finish of all parts of the work exposed to view.
- .12 Structural steel components shall be

transported in such a manner so as to avoid development of fatigue cracks and deformation. When the components are stored on the job site, they shall be placed on timbers so that they do not make contact with the ground and are supported to avoid fatigue cracking, deformation or over-stressing. They shall be stored in a location where they will not be subjected to damage or surface contamination.

- .13 Steel coatings: see Section 09 97 19 - Steel Coating.

2.2 SOURCE
QUALITY CONTROL

- .1 Steel producer qualifications: certified in accordance with CSA G40.20/G40.21.
- .2 Provide Departmental Representative prior to fabrication, with two (2) copies of steel producer certificates, in accordance with CSA G40.20/G40.21.
- .3 Submit Departmental Representative two 2 copies of mill certificates for all steel and certified test reports for Charpy V-notch tests and NDT testing.
- .4 Provide suitable facilities and cooperate with inspection organization, Departmental Representative in carrying out inspection and tests required.
- .5 Adequate time shall be allotted for in both the construction and fabrication schedules to allow inspectors to complete all inspections and tests required. The construction and fabrication schedules provided for review to the Departmental Representative at the start of construction shall designate inspection task items that clearly show the time allotted for inspections and testes.
- .6 The acceptance criteria for all welding inspections shall be based on CSA W59, Section 12, Cyclically Loaded Structures.
- .1 All welds shall be visually inspected. All full penetration welds, except those specified in webs, shall be 100% inspected by Radiographic or Ultrasonic methods. When welds

are tested by the Ultrasonic method, spot Radiography shall be performed on 10% of those welds tested.

.2 All full penetration welds in webs shall be inspected by Radiographic or Ultrasonic methods for at least 25% of the weld length. The inspection shall be performed nearest the tension flange. If defects are identified, additional inspections shall be done to determine the extent of these defects. The bottom 1800 mm of web shall be considered the web tension zone for all sections of girders.

.3 Web-to-flange fillet welds shall be subject to magnetic particle inspection in accordance with the following:

.1 Submerged arc welds: 25 percent of length.

.2 Semi-automatic welds: 50 percent of length.

.3 Manual welds: 100 percent of length.

.4 Provide suitable facilities and cooperate with inspection organization and Departmental Representative in carrying out inspection and tests required.

.4 Fillet welds for attaching gusset plates, diaphragms and stiffeners shall have 25 percent of the total weld length tested by magnetic particle inspection.

.5 All gusset plates and stiffeners for attaching diaphragms and / or bracing shall be tested for 100 percent of the weld length, measured from the tension flange and up the web for 1250 mm from the bottom of the web.

.6 The cost of additional inspection and testing made necessary by the Contractor's work not meeting these specifications shall be the responsibility of the Contractor.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Clean steel surfaces as directed by Departmental Representative when staining or defacing occurs.
- .2 Verify location of substructure units, elevations of bearing seats and location of anchor bolts before erection of structural steel; report discrepancies to Departmental Representative.
- .3 Do not disturb river banks or embankment without prior written permission of Departmental Representative.
- .4 Restrict drifting during assembly to minimum required to bring parts into position without enlarging or distorting holes, and without distorting, kinking or sharply bending metal of any unit.
 - .1 Enlarge holes if necessary by reaming only after written approval from Departmental Representative.
 - .2 Reamed holes not to exceed size of bolt used by more than 2 mm.
- .5 Fabricate and install masonry plates as indicated. Do not fasten and grout masonry plates and anchor bolts into final position on beam seats until girders in place and properly aligned.
- .6 Place anchor bolts at elevations and locations indicated. Ensure sufficient thread extension provided to completely install washers and nuts as detailed on the contract drawings.
 - .1 Protect holes against entry of water and foreign material.
 - .2 Provide heating and protection as directed by Departmental Representative and completely fill space around anchor bolts and beneath masonry plate with non-shrink grout.
 - .3 Oversized galvanized corrugated sleeves for anchor bolts provided for fit-up / relative tolerances between as-built girder and foundations. It is the Contractors

responsibility that the foundations and girders are constructed within the tolerances provided such that the masonry plates and anchor bolts can be installed without the need to enlarge holes or bend anchor bolts.

.4 The annulus between the anchor bolts and corrugated sleeves, as well as the entire bearing surface beneath the masonry plates shall be completely grouted after the girder is in place and adjusted in its final position. The grout shall be flowable non-shrink grout with strength of 50 MPa after 28 days. The deck shall not be cast until the grout beneath the masonry plates has reached 50 MPa. A high early strength grout can be used for this application. Technical specifications for the grout shall be forwarded for approval to the Departmental Representative at least 10 working days before use.

.5 Submit details of installation and methods of support to Departmental Representative for review prior to commencing protection work.

.7 The fabricator shall erect the whole of the fabricated structural steel work supplied under the Contract. The Contractor shall supply all materials, tools, equipment, plant and labour necessary for the erection of the steel work. The fabricator shall erect the structural steel in accordance with the requirements of the AASHTO specification and CSA-S6 specifications. Included in this scope of work is the setting of the girder into its final position, the installation of the anchor bolts and the full grouting of the anchor sleeves and bearing surfaces beneath the masonry plates.

.8 The method of erection of the steel girders is the responsibility of the Contractor. A fully detailed erection plan stamped by a Professional Engineer Licensed to Practice in Nova Scotia shall be provided by the contractor for review at least four weeks (20 business days) before the start of erection. The erection design shall be undertaken in accordance with CSA S6.

- .9 If the adjacent existing bridge is to be used for erecting the girders. Ensure that all components of the structure have sufficient capacity to handle all loadings during erection (including the provision to maintain a single lane of traffic during the majority of the overnight closures allotted to erect the girders. The Contractor's erection engineer shall certify that the existing structure is capable of resisting the loads imposed during all phases of construction by means of stamped erection drawings and a Design Brief that outlines the loads, load combinations, component resistances and method of analyses. The submittals shall also fully detail any strengthening that the Contractor intends to undertake on the existing structure to handle the loads imposed during the girder erection. These documents shall be forwarded to the Departmental Representative for review at least four weeks (20 working days) prior to the start of erection. The review conducted is for the sole purpose of ascertaining conformance and understanding the method of erection to be adopted. The review shall in no way be perceived as acceptance of the method and the full responsibility of the girder erection remains with the Contractor.
- .10 It is imperative that the existing bridge remain in service and be capable of carrying two lanes of undivided two way traffic throughout construction until such point as when traffic is diverted onto the new bridge and realigned approaches. The only exception to this is as outlined in Section 01 55 26 - Traffic Regulations.
- .11 The steel condition, size and strength of the existing girders, and the concrete strength and reinforcing details for the deck and foundations are unknown and as-built details of the bridge are limited to those provided in the Contract Documents. Undertake non-destructive techniques (NDT) to determine the existing bridge reinforcing (including girder prestressing) to determine the capacities of existing bridge components. Submit NDT testing

plan for review at least 10 working days before undertaking the program. Steel coupons from the girders may be taken provided the size and location are not detrimental to the load carrying capacity of the structure and meet the written approval of the Departmental Representative. Concrete core samples of the deck and abutments may be taken provided the size and location are not detrimental to the load carrying capacity of the structure and meet the written approval of the Departmental Representative. During any investigations of the existing bridge undertaken by the Contractor, maintain two lanes of two way traffic on the existing bridge unless otherwise approved in writing by the Departmental Representative.

- .12 Undertake pre-condition survey of the existing bridge prior to erection of the new bridge girders. In addition, undertake post erection condition surveys after each girder is erected. Prepare and submit a report outlining the findings of each condition survey stamped by a Professional Engineer (referred to as the Certifying Engineer). Undertake the post erection condition surveys immediately after each girder is erected. Provide prompt written notification to the Departmental Representative that the bridge is acceptable to fully re-open to two lanes of traffic stamped by the Certifying Engineer. These condition surveys are only required if the existing bridge is used for girder erection (including if existing foundations are located in the influence zone of crane, temporary shallow foundations, materials or equipment used as part of the Work).
- .13 Refer to Section 01 55 26 - Traffic Regulations for permissible closures of the existing bridge related to girder erection. Do not exceed the permitted number and lengths of closures specified. Closures are required for the following activities and conditions.
 - .1 Close both lanes of traffic on the existing bridge during lifting of girder from the existing bridge onto the new abutments (when applicable to procedure).

- .2 Close both lanes of traffic on the existing bridge during girder lifting operations where the girder is located within three (3) metres of the footprint of the existing structure.
- .14 Do not reinstate two lanes of traffic on the existing bridge until the Certifying Engineer provided written approval to do so.
- .15 Account for the stability of the new and existing foundations as well as the stability of all slopes during erection in the Engineered Erection Design. Unless proven to be acceptable, means shall be taken to avoid surcharging the new and existing foundations and slopes with cranes, equipment, temporary shallow support foundations, etc.
- .16 Infilling of Clyburn Brook to complete the girder erection is not acceptable unless otherwise approved in writing by the Departmental Representative.
- .74 Permissible staging / laydown areas to preparell for the girder erection are as indicated on the Contract Drawings.

3.2 INSTALLATION

- .1 Do falsework in accordance to CSA S269.1, (this has been withdrawn, what do we replace with) except where specified otherwise.
 - .2 Do fabrication and erection of structural steel in accordance with CAN/CSA S6. Design of Highway Bridges and AASHTO Standard Specifications for Highway Bridges.
 - .3 Do welding in accordance with CSA 59, except where specified otherwise.
 - .1 For CSA G40.20/G40.21, grade 350WT steel, deposited weld metal to have Charpy V-Notch value not lower than that of steel.
 - .2 Do welding in shop unless otherwise permitted by Departmental Representative.
 - .3 Weld only at locations indicated.
 - .4 High strength bolting: in accordance with CAN/CSA S6 and CAN/CSA S16. Use 'turn- of-nut'
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tightening method to bring bolts to the slip critical condition.

- .5 Finish: members true to line, free from twists, bends, open joints, sharp corners and sharp edges.
- .6 Allowable tolerance for bolt holes:
 - .1 Matching holes for bolts to line up so that dowel 3 mm less in diameter than hole passes freely through assembled members at right angles to such members.
 - .2 Finish holes not more than 2 mm in diameter larger than diameter of bolt unless otherwise specified by Departmental Representative. Holes shall be drilled (not punched) at all locations unless otherwise approved.
 - .3 Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from dimensioned distance between such holes.
 - .4 Centre-to-centre distance between any two groups of holes to vary not more than maximum of the following:

Centre-to-Centre distance in metres	Tolerance in plus or minus mm
less than 10	1
10 to 20	2
20 to 30	3

- .5 Correct mispunched or misdrilled members only as directed by Departmental Representative.
- .7 Span length tolerances:
 - .1 Girders and beams: plus or minus 6 mm.
 - .2 Centre-to-centre of bearing stiffeners and bearing plates: plus or minus 3 mm.
- .8 Girder support requirements:
 - .1 Support top and bottom flanges of ends of girders. Temporary bearing supports to be located at centerline of bearing points (longitudinally) directly beneath centerline of webs (transversely).
 - .2 Install girder flat and smooth except as otherwise indicated.
 - .3 As noted on drawings, bearing stiffeners

fabricated to be plumb in the longitudinal direction after all dead loads applied. In the transverse direction, stiffeners to follow 6% superelevation.

.4 Do not machine or grind flanges of girders to correct irregularities unless permitted by Departmental Representative.

.9 Shop splices:

.1 Use complete joint penetration groove welds finished flush.

.2 Details of butt joints to CSA W59.

.3 Use only as approved by Departmental Representative.

.10 Camber:

.1 Camber tolerances for plate girders to be to CSA W59.

.2 Record measurements of camber of each girder, at points indicated.

.3 Fabricate field splices to conform to required camber.

.4 Submit diagram to Departmental Representative showing camber for each girder fabricated.

.5 Advise Departmental Representative immediately when camber of fabricated girder is not within specified tolerances.

.6 Submit proposal for corrective measures.

.7 Do not undertake remedial measures until proposal has been approved by Departmental Representative.

.8 Verify stud length requirements based on as-built girder cambers and as-built top of girder elevations along span. All remedial measures to deal with as-built cambers / as-built girder elevations are the responsibility of the Contractor, including the engineered remediation plan and the detailed review of the plan. A detailed survey of the girder profiles and elevations shall be conducted by the contractor immediately after girder erection. The electronic survey file shall be forwarded in Auto CAD format to the Departmental Representative for review. Do not proceed with setting deck formwork elevations until the review of the as-built girder cambers / elevations is complete.

- .11 Shop erection:
 - .1 Support each girder on its bearing points and measure and record deflection at same points indicated for measurement of camber.
 - .2 Measure vertical and translational deflections at the top flange to web intersection points at the stations detailed on the Contract Drawings. .
 - .3 Submit diagram to Departmental Representative showing deflection measurements for each girder before delivery.
 - .4 Shop erection is not required for single span girders with no field splices.
- .12 Field splices: as indicated on drawings. Additional splices to approval of Departmental Representative.
- .13 Mark members in accordance with CSA G40.20/G40.21.
 - .1 Do not use die stamping.
 - .2 Place marking at locations not visible from exterior after erection.
- .14 Match marking: shop mark field splice components.
- .15 All bolts to be detailed and installed with threads excluded from shear planes.

3.3 FIELD QUALITY
CONTROL

- .1 Manufacturer's Field Services:
 - .1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, protecting and cleaning of steel.
 - .2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Ensure manufacturer's representative is present before installation, during critical periods of installation and during torquing of all bolted connections.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse/recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

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| <u>1.1 RELATED SECTIONS</u> | .1 | Section 01 33 00 - Submittal Procedures. |
| | .2 | Section 01 74 21 - Construction/Demolition Waste Management And Disposal. |
| <u>1.2 REFERENCES</u> | .1 | American Society for Testing and Materials International, (ASTM)
.1 ASTM A 53/A53M-07, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and seamless.
.2 ASTM A 307-07b, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength. |
| | .2 | Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
.2 CAN/CGSB-1.181-99, Ready-Mixed, Organic Zinc-Rich Coating. |
| | .3 | Canadian Standards Association (CSA International)
.1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel.
.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA-S16-01 (R2007)), Limit States Design of Steel Structures.
.4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
.5 CSA W59-03, Welded Steel Construction (Metal Arc Welding) (Imperial Version). |
| | .4 | The Environmental Choice Program
.1 CCD-047a-98, Paints, Surface Coatings.
.2 CCD-048-98, Surface Coatings - Recycled Water-borne. |
| <u>1.3 SUBMITTALS</u> | .1 | Product Data: |
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1.3 SUBMITTALS
(Cont'd)

- .1 (Cont'd)
 - .1 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
 - .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 materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY
ASSURANCE

- .1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY,
STORAGE AND
HANDLING

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

1.6 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Waste Management And Disposal.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20-04/G40.21-04, Grade 300WT.
- .2 Steel pipe: to ASTM A 53/A53M-06a extra strong, black finish.
- .3 Welding materials: to CSA W59-03.
- .4 Welding electrodes: to CSA W48-06 Series.
- .5 Bolts and anchor bolts: to ASTM A 307-04e1.
- .6 Grout: non-shrink, non-metallic, flowable, 50 MPa at 24 hours.
- .7 Stainless Steel: 316 Stainless Steel to CAN/CSA G40.21.

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 flat 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/m² to CAN/CSA-G164-M92(R2003).
- .2 Zinc primer: zinc rich, zinc rich epoxy, to CAN/CGSB-1.181-99.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of bituminous paint:

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| 2.4 ISOLATION
COATING
(Cont'd) | .1 | (Cont'd)
.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
.2 Concrete, mortar and masonry. |
| 2.5 SCHEDULE OF
ITEMS | .1 | Miscellaneous metal fabrication items include, but are not limited to, the following:
.1 Membrane drains and support members: galvanized.
.2 Decorative crashblock plaques: stainless steel.
.3 Approach slab end armouring: galvanized.
.4 Bridge Rails, supports, base plates and anchorages: galvanized.
.5 Exterior railings, guards, and non-structural protective frames; hot dip galvanized. |

PART 3 - EXECUTION

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| 3.1 ERECTION | .1 | Do welding work in accordance with CSA W59-03 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 Departmental Representative 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 bridge 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. |

3.1 ERECTION

(Cont'd)

- .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 or damaged during erection.

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.