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**REAL PROPERTY**  
**TECHNICAL SUPPORT DIVISION**

**Technical Specifications**  
**PORT HARDY, BC**  
**FABRICATION OF 40 m LONG VEHICLE RAMP**

**March, 2020**

**TECHNICAL SPECIFICATIONS****SECTION      TITLE**

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**END OF SECTION**

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## 1 WORK INCLUDED

- .1 The work under this contract shall include the supply of equipment, labour and materials for the performance of all work as required by the Contract Documents. All replaced items, cut-offs and waste material shall be disposed by the contractor in strict accordance with provincial, local, and municipal regulations and Part 8 of the National Building Code and with the Canadian Construction Safety Code.
  
- .2 The work to be carried out under this contract includes the supply of material and fabrication of a 40 m long and 4.8 m wide vehicle ramp complete with aprons, galvanized bridge deck grating, ramp abutment hinge seats and float support shoes. The work generally consists of, but is not limited to the following items:
  - .1 Mobilisation/Demobilisation
  - .2 Supply material and fabricate one vehicle ramp complete with abutment apron, float apron, ramp abutment hinge seats, float support shoes complete with all miscellaneous steel.
  - .3 Provide protective coating on all structural steel and miscellaneous steel as called for in the specifications.
  - .4 Supply all material and install galvanized bridge deck grating on the ramp as shown on the drawings and called for in the specifications.
  - .5 Deliver the completed ramp F.O.B. a standard flat deck scow or concrete float in the Vancouver area or at a suitable barge loading facility in the Strait of Georgia. The scow or concrete float will be supplied by others. The work shall include loading the ramp complete onto a scow or concrete float. The tender shall clearly identify the intended place of delivery.

**END OF SECTION**

## 1 GENERAL

- .1 All fabrication and erection of structural steel shall comply with CSA Standard CAN3-S16.1, latest revision.

## 2 MATERIALS

- .1 Hollow structural steel sections shall conform to CSA Standard G40.20/G40.21-M, Class "C", Grade 350W.
- .2 All other rolled sections and miscellaneous plate shall be grade 300W, unless noted otherwise on the drawings, in conformance with CSA Standard G40.20/G40.21-M.
- .3 All structural steel members shall be made of the size and weight shown on the drawings unless written approval for any change is first obtained from the Departmental Representative.
- .4 Bolts, washers and nuts shall conform to ASTM specification A325.

## 3 WELDING

- .1 Welding practice and qualifications of welders and erectors of welded construction shall conform to the requirements of CSA Standards W47, W48, and W59 latest editions. The metallurgy of weld metal shall be similar to the parent material.
- .2 Unless noted otherwise, all welds shall develop the full strength of the connected members, and shall be continuous seal welds with a minimum 6 mm leg length.
- .3 Where on the drawings it is called for double sided welding; the welding details called for on the near side shall be duplicated on the far side if not called up otherwise.

## 4 INSPECTION

- .1 The Contractor shall furnish all facilities for inspecting and testing the weight, dimensions and quality of workmanship at the shop where the material is fabricated.
- .2 The Departmental Representative shall be notified well in advance of the start of work, in order to allow sufficient time for inspection of material and workmanship.

## 5 SHOP DRAWINGS

- .1 The Contractor shall prepare and submit shop drawings.
- .2 The Contractor shall submit three prints or an electronic copy in PDF of the shop drawings for the Departmental Representative's review prior to commencing fabrication. If shop drawings are not to the Departmental Representative's satisfaction, they will be returned with the notation "Resubmit". Drawings that have been returned with the notation "Reviewed" would allow fabrication to commence.
- .3 The review of shop drawings will be for size and arrangement of members and strength of connections. Any errors in dimensions shown on the shop drawings shall be the responsibility of the Contractor.

- .4 Upon completion of the project, all reviewed shop drawings shall be submitted to the Departmental Representative along with the As-Built marked drawings. In addition, diskettes containing all shop drawings in AutoCAD format shall be submitted.

## **6 COATINGS**

- .1 Except as noted below, all structural and miscellaneous steel shall be painted in accordance with the requirements of Section 09 97 19 – Exterior Metal Surfaces.
- .2 Bridge grating and all bolts, washers and nuts shall be hot dip galvanized in accordance with ASTM Specifications A-153 or A-123 or CSA G 164-M (minimum zinc coating 610 g/m<sup>2</sup>).
- .3 Damaged painted or galvanized surfaces shall be coated with Galvacon immediately after the damage has occurred. Final touch up of painted steel shall be as per Section 09 97 19 – Exterior Metal Surfaces.

**END OF SECTION**

## 1 GENERAL

- .1 The Contractor shall supply all material and bolts required for the work.
- .2 This section covers the requirements for the supply, detailing, fabrication, assembly and delivery of the steelwork shown in the Drawings and Specifications.
- .3 The latest edition of, and any standard referenced by, the following standards shall apply to the work.
  - a) CSA G40.21M - Structural Quality Steel
  - b) CSA W48.1 - Mild Steel Covered Arc - Welding Procedures
  - c) CSA W59 - Welded Steel Construction
- .4 **Alternative Details**  
All details shall, in general conform to those shown on the Drawings. Alternative details may be substituted to facilitate the Contractor's shop procedures and to suit his standard detailing practice, provided such alternative details comply in all respects with these Specifications and do not require an appreciable increase in weight of metal. The Contractor shall submit all proposed Alternate Details for review and acceptance by the Departmental Representative prior to performing any of the Work or procuring any of the material for the Alternative Details.

## 2 WORKING DRAWINGS

- .1 Working drawings shall consist of shop detail drawings, assembly diagrams and other working drawings showing details, dimensions, sizes, material and other information necessary for the complete fabrication of the steelwork.  
  
The Contractor shall submit shop drawings in accordance with Section 05 12 33. The Contractor shall allow a minimum of one (1) week for review of shop drawings by the Departmental Representative.
- .2 Discrepancies or vague references shall be clarified by the Contractor before proceeding with the fabrication of metal work; otherwise errors in dimensions shall be corrected at the Contractor's expense.

## 3 QUALIFICATIONS AND EQUIPMENT

- .1 **Contractor**  
The Contractor shall produce evidence that his plant is currently fully approved by the CWB to perform splices to the requirements of C.S.A. Specification W47.1 Div. 2.1 or better.  
  
The Contractor shall also produce evidence of satisfactory experience in the fabrication of heavy structural steelwork.  
  
The Contractor shall appoint, subject to the Departmental Representative's approval, an employee who shall assist and be responsible to the welding engineer.  
  
Unless such information has already been forwarded to the Departmental Representative, the Contractor shall submit to the Departmental Representative the names of the welding engineer, welding supervisors and shop inspectors who are to be employed on the work.

.2 Operators

The Contractor shall produce evidence that all welding operators to be employed on the work are currently qualified by the CWB in the processes in which they are to be employed on the work. Such qualifications shall have been issued within two (2) years of the commencement of fabrication.

Expired welding certificates are not acceptable for qualification; ONLY current valid qualifications will be recognized by the Departmental Representative.

The Contractor shall also produce evidence relative to each operator, that he has been executing satisfactory welding in the required processes within the six (6) month period previous to the award of this contract.

.3 Welding Equipment

All equipment to be used in the work shall be in good working order and shall be subject to the inspection of the Departmental Representative.

.4 Welding Procedures

The Contractor shall submit copies of the welding procedures which he intends to use for examination and approval by the Departmental Representative.

Such procedures shall be accompanied by documentary proof that they have been qualified previously by the Canadian Welding Bureau at the plant where the work is to be carried out.

The procedures shall include the following information: joint type, welding process, welding position, base metal specification, welding consumable specification and size, preheat requirements, amperage and voltage requirements, speed, polarity, and welding equipment, including a description of travel for automatic welding.

## 4 MATERIALS

.1 Structural Steel

Steel shall conform to the requirements as called for on the drawings.

Prior to fabrication, the Contractor shall supply to the Departmental Representative, manufacturer's mill certificates giving details of all chemical and physical properties of the steel to be used in the work.

Steel shall be supplied free of surface defects and internal discontinuities, with due regard for the end use of the steel in the contract.

Edges of all plates will be subject to inspection by the Departmental Representative. Any discontinuities will be explored and may be accepted, subject to ASTM A435.

The Departmental Representative shall be supplied with a record of all observed discontinuities.

Repairs to defective plates shall not proceed until approval of the proposed repair has been given by the Departmental Representative.

.2 Welding Consumables

Welding consumables for all processes shall be certified by the manufacturer as complying with the requirements of the following specification:

- a) Manual, shielded metal arc welding - All electrodes for manual shielded metal arc welding shall conform to A.W.S. Specifications A.5.1 classification E7018.
- b) Gas, metal arc welding - All electrodes used in the gas, metal arc welding process shall be composite electrodes conforming to A.W.S. Specification A.5.18, classification E70T-9. The use of micra wire will not be permitted.
- c) Shielding gas shall be welding grade carbon dioxide with a guaranteed dew point of -45°C.
- d) Submerged arc welding - Welding electrodes and fluxes used in the submerged arc welding process shall conform to A.W.S. Specification A.5.17 and shall produce a weld to classification F72 - EM 12 K or approved equivalent.

.3 Bolts

Bolts, nuts and washers shall be hot-dip galvanized and shall conform to the requirements of ASTM Specification A325, Type I of North American or European manufacture only.

## 5 MATERIAL STORAGE

.1 Steel

Structural material, either plain or fabricated, shall be stored at the Contractor's shop or elsewhere, above the ground upon platforms, skids, or other supports. It shall be kept free from dirt and other foreign matter, and shall be protected as far as practical from corrosion. Long members shall be supported on skids placed near enough together to prevent injury from deflection.

Prior to fabrication, all steel shall be marked for identification by the heat number and specification by a marking system approved by the Departmental Representative.

.2 Welding Consumables

All electrodes having low hydrogen coverings shall be dried for at least two (2) hours between 230°C and 260 °C before they are used. Electrodes shall be stored immediately after drying in storage ovens held at a temperature of at least 120°C. Electrodes that are not used within four (4) hours after removal from a drying or storage oven shall be re-dried before use. Electrodes which have been wet shall not be used.

Electrode wire used in submerged arc welding and gas metal arc welding shall be stored in the original container at room temperature and kept free of moisture, oil, dirt or other contaminants.

Flux used for submerged arc welding shall be dry and free of contamination from dirt, mill scale, oil or other foreign material. Fused flux shall not be used on the work.

Gas for gas metal arc welding shall be stored in marked steel bottles and shall not be subjected to temperatures in excess of 50°C nor temperatures of less than 0 °C.

## 6 PREPARATION OF MATERIAL

.1 Straightening Material

Prior to being used in fabrication, all structural steel shall be straight and free from kinks or bends. If straightening is necessary, it shall be done by methods that will not injure the metal. The steel shall not be heated unless permission is given by the Departmental Representative. Sharp kinks and bends will be cause for rejection of the steel.

## .2 Edge Preparation for Welding

The edges of plates or sections which are to be welded together shall be prepared by sawing, shearing, flame-cutting, machining, chipping or arc air gouging to the details shown on the shop drawings.

Surfaces and edges to be welded shall be smooth, uniform and free from fins, tears, cracks and other defects which would adversely affect the quality or strength of the weld. Surfaces to be welded shall also be free from loose scale, slag, rust, grease, moisture or other material that will prevent proper welding. Mill scale that withstands vigorous wire brushing, a light film of drying oil or a thin rust inhibitive coating may remain except that all mill scale shall be removed from the surfaces on which flange-to-web welds are to be made by submerged arc welding or by shielded metal arc welding with low hydrogen electrodes. Surfaces within 50 mm of any weld location shall be free from any paint or other material that would prevent proper welding or produce objectionable fumes while welding.

Edges of material thicker than specified in the following list shall be trimmed if and as required to produce a satisfactory welding edge wherever a weld among the edges to carry calculated stress:

- Sheared edges of material thicker than 12 mm
- Rolled edges of plates (other than Universal Mill Plates thicker than 10 mm)
- Toes of angles or rolled shapes (other than wide flange section thicker than 16 mm)
- Universal Mill Plates or edges of wide flange section thicker than 25 mm.

Edges may be prepared by oxygen cutting, provided a smooth and regular surface free from cracks and notches is secured, and providing that an accurate profile is secured by the use of a mechanical guide. Free hand cutting shall be done only where approved by the Departmental Representative.

In all oxygen cutting, the cutting flame shall be so adjusted and manipulated as to avoid cutting beyond (inside) the prescribed lines. Roughness of cut surfaces shall not be greater than that defined by the United States Standards Institute surface roughness value of 1,000 U.S.A.I.B46.1, Surface Texture). Roughness exceeding this value shall be removed by machining or grinding.

## .3 Edge Preparation (non-welded edges)

Steel may be cut to size by sawing, shearing, flame cutting or machining. All steel after cutting shall be marked by a method agreed to by the Departmental Representative so that its specification may be immediately identified.

Sheared edges of plates more than 16 mm in thickness shall be planed to a depth of 6 mm.

Special attention shall be given to the cutting of flange plates. Occasional gouges not in excess of 6 mm deep will be accepted in areas of low stress at the discretion of the Departmental Representative. The repair or removal of such gouges shall be to the Departmental Representative's instructions.

Corners of all exposed flame cut or sheared plates including flanges, gusset plates, etc. shall be ground to a minimum 1.5mm 45 degree bevel to facilitate painting. Re-entrant flame cuts shall be filleted to a radius of not less than 20 mm.

## 7 FABRICATION

- .1 **Marking**  
Prior to fabrication, all steel shall be marked for identification by heat number and specification by a marking system approved by the Departmental Representative.

- .2 **Bolt Holes**  
All holes for high tensile bolts shall be either punched, sub-punched and reamed, or drilled, and shall be of a nominal diameter not more than 2 mm in excess of the nominal bolt diameter.

Punched holes shall be clean cut, without torn or ragged edges. The diameter of the die shall not exceed the diameter of the punch by more than 2 mm. If a punched hole must be enlarged to admit a bolt, it shall be reamed.

Reamed holes shall be cylindrical and perpendicular to the member. Where practicable, reamers shall be directed by mechanical means. Reaming shall be done with twist drills. Drilling shall be done with twist drills. Burrs on the outside surfaces shall be removed. Poor matching of holes will be cause of rejection.

Allowable tolerance for bolt holes:

- .1 Matching holes for bolts to register so that a gauge 2 mm less in diameter than hole will pass freely through assembled members at right angles to such members.
- .2 Unless otherwise shown drill all bolt holes 1.6 mm larger than nominal bolt diameter.
- .3 Centre-to-centre distance between two holes of a group of holes to vary by not more than 2 mm from dimensioned distance between such holes.
- .4 Centre-to-centre distance between any group of holes to vary not more than following in Table 1:

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 Do not correct mis-punched or mis-drilled members without Departmental Representative's approval.
- .3 **Pin Holes**  
All holes for pins shall be drilled and reamed to a diameter tolerance of 0.5 mm. Burrs on the outside surface shall be ground flush.
- .4 **High Strength Bolts**  
Installation of high strength bolts shall be in accordance with the latest edition of the AASHTO Specification Section 10.17.4.

Sufficient bolts, nuts and washers shall be furnished to complete the entire structure with an ample surplus to replace all bolts damaged or lost.

Holes in the girder field splices shall be sub-punched and, unless otherwise specified, reamed while assembled in the shop. The assembly, including camber, alignment and accuracy of holes shall be approved by the Departmental Representative before reaming is recommended.

- .5 **Butt Joints**  
Except as called for on the drawings, butt joints will not be permitted.

The Contractor may submit an alternative butt joint design provided that such design has been pre-qualified under CSA Standard W59.

.6 Assembly and Welding Sequences

If requested by the Departmental Representative, the Contractor shall supply full details of the proposed assembly and welding sequence of any particular weld.

.7 Shop splices

.1 Locate to Departmental Representative's approval.

.2 Use complete joint penetration groove welds finished flush. Details of butt joints to CSA W59. Use only as approved by Departmental Representative.

.8 Nylon Washers

Machining of washers shall be to the manufacturer's recommendations.

Installation shall be done without use of driving of components to fit. Minor adjustments in face-to-face tolerances of hinge components may be compensated for by planning thickness of washer. If greater than 6.0 mm is to be removed (or added) the steel components shall be corrected.

The Contractor shall supply to the Departmental Representative, spares of all sizes of fabricated washers as called for the drawings at the completion of the project.

.9 Bent Plates

When bending plates, the plates shall be so taken from the stock plates that the bend line will be at right angles to the direction of rolling. The radius of the bend measured inside shall be not less than the thickness of the plate. Before bending, the corners of the plate shall be rounded to a radius of 2 mm throughout that portion of the plate at which bending is to occur.

.10 Dimensional Tolerances

The dimensions of the completed steelwork shall comply with the appropriate dimensional tolerances as specified in CSA Standard W59 Welded Steel Construction.

.11 Shipping

Structural members shall be loaded on trucks, cars or barges in such a manner that they can be transported and unloaded at their destination without being excessively stressed, deformed or otherwise damaged.

## 8.0 WELDING

.1 General

Welding shall be done by the manual, shielded metal arc, gas shielded metal arc or submerged arc processes in accordance with the approved procedures and A.W.S. D1.1 Section 4, Technique.

All Welding shall be done under cover and, in the case of gas metal arc welding, shall be done in an area free from wind or draft.

Butt welds shall be extended beyond the edges of the parts to be joined by means of start and run-off tabs providing sufficient thickness to avoid the weld burning through and with a joint preparation similar to that on the main material. For manual shielded metal arc welding, the width of the tabs shall be not less than the thickness of the thicker part being joined or 75 mm, whichever is greater. For submerged arc welding, the width of the tabs shall be not less than 75 mm. Each weld pass shall be carried far enough beyond the edge of the parts being joined to ensure sound welds in the joint. Tabs shall

be removed upon completion and cooling of the weld without damage to the parent plate, and the end of the weld made smooth and flush with the edges of the abutting parts.

In gas metal arc welding, the equipment shall be capable of sustaining a gas flow rate of from 0.85 to 1.25 m<sup>3</sup>/h.

## .2 Preheat and Interpass Temperatures

No welding shall be done when the temperature of the base metal is lower than - 20<sup>0</sup>C. At temperatures below 0<sup>0</sup>C, the steel shall be preheated to a temperature of at least 10<sup>0</sup>C in excess of that stated in Table 2.

Preheat shall be applied to all steel to be welded so that the steel within 75 mm of the weld is heated to the temperature shown in Table 2.

Preheat shall be applied in such a manner that moisture from the heating equipment does not penetrate the joint.

For all welding processes, preheat and interpass temperatures shall be maintained during welding, at temperatures not less than stated in Table2.

THICKNESS OF THICKEST PART AT POINT OF WELDING	TEMP.
Less than 20mm	none
20mm to 35mm	21°C
40mm to 60mm	66°C
Over 60mm	107°C

Table 2: Minimum preheat and interpass temperatures

Preheat temperatures above the minimum shown in Table 2 may be required for highly restrained joints if designated by the welding engineer.

Preheat temperature shall in no case exceed 200<sup>0</sup>C but there shall be no limit on interpass temperature.

Preheat requirements for tack welds shall be as in Table 2, except that where single pass tack welds are used and are to be incorporated and consumed in a weld made by the submerged arc and the gas metal arc processes, preheat is unnecessary.

## .3 Assembly

The shop assembly of the various components of the weld shall be executed in accordance with A.W.S. D1.1, Subsections 3.3 and 3.4.

Tack welding shall be done by qualified operators, using the smallest size weld required to hold the components of the assembly together. Tack welds shall not be less than 100 mm in length and shall be incorporated in the final weld.

Tack welds shall be made with 5 mm maximum size electrodes and shall be subject to the preheat requirement of the Preheat Clauses.

## .4 Welding

- .1 When CAN/CSA-G40.21 grade 350A steel is specified, deposited weld metal to have a Charpy V-Notch value not lower than that of steel.
- .2 Do welding in shop unless otherwise permitted by Departmental Representative.
- .3 Do not weld at locations where weld is not indicated.

- .4 All welds are to be continuous over the entire length of the joint unless otherwise specified.
- .5 Use minimum 6mm fillet weld unless otherwise shown.

.5 Quality and Details of Welds

The quality and details of welds shall be in accordance CSA Standard W59, Clause 12 unless noted otherwise or as specified by the Departmental Representative.

Undercut at the tow of the flange to web fillet weld will not be allowed except in regions of low stress at the discretion of the Departmental Representative.

## 9.0 QUALITY ASSURANCE

.1 Inspection

All materials, welding procedures, shop drawings, and steelwork fabrication will be inspected by the Departmental Representative to ascertain compliance with the Specifications and Drawings.

All phases of fabrication including cutting to size of plates, edge preparation of welded joints, weld assembly and welding will be subject to visual examination by the Departmental Representative.

At the discretion of the Departmental Representative's, a testing agent may be appointed ,at no expense to the Contractor, to test any completed or partially completed weld by non-destructive testing methods. Generally, fillet welds will be tested by the dry powder magnetic particle method and butt welds by ultrasonic testing, but this does not preclude the use of another method of testing deemed necessary by the Departmental Representative.

It is desirable that the inspection of welds is carried out as soon as possible after the completion of welding.

The Contractor shall be prepared to move and support the pieces being inspected so that, in general, the inspection can be done on the flat and so that a minimum of 1.25 m of headroom is available.

The Departmental Representative will attempt to schedule non-destructive testing operations so as not to interfere with the progress of the work. However, the Contractor is expected to co-operate with the Departmental Representative and the testing agency in the satisfactory expedition of inspection procedures. The Contractor shall furnish all facilities for access by the testing agency for inspection and testing. The Contractor shall ensure all slag and other residue is removed from the weld when it is completed and ready for weld inspection. Slag removal by the testing agency will be paid for by the Contractor. A minimum of 72 hour notice of any inspection stage being reached shall be given to the Departmental Representative by the Contractor.

.2 Unacceptable Work

Any work found to be unacceptable, shall be corrected in accordance CSA Standard W59. The Contractor shall bear the cost of re-inspection of welds after defects are repaired.

No repair shall be made until agreed to by the Departmental Representative.

## 10.0 COATINGS

- .1 Except as noted below, all structural and miscellaneous steel shall be painted in accordance with the requirements of Section 09 97 19 – Exterior Metal Surfaces.
- .2 Bridge grating and all bolts, washers and nuts shall be hot dip galvanized in accordance with ASTM Specifications A-153 or A-123 or CSA G 164-M (minimum zinc coating 610 g/m<sup>2</sup>).
- .3 Damaged painted or galvanized surfaces shall be coated with Galvacon immediately after the damage has occurred. Final touch up of painted steel shall be as per Section 09 97 19 – Exterior Metal Surfaces.

**END OF SECTION**

## 1 SCOPE OF WORK

- .1 All ferrous surfaces except galvanised components are to be painted.

## 2 APPLICABLE CODES

- .1 All work contained in this section shall comply with the latest edition of the following standards:

CGSB	Standards of the Canadian General Standards Board
SSPC-SP1	Solvent Cleaning (degreasing)
SSPC-SP2	Hand Tool Cleaning
SSPC-SP7	Brush-off Blast Cleaning
SSPC-SP10	Near White Blast Cleaning
SSPC-SP11	Power Tool Cleaning to Bare Metal
SSPC-GUIDE 6	Debris Containment
ASTM-03276	Recommended Practice Guide for Paint Inspection
ASTM-D3359	Method for Measuring Adhesion by Tape Test
Work Safe BC	Occupational Health and Safety Regulations BC Waste Management Act (SWEP)
SSPC-PA2	Procedure for Determining Conformance to Dry Coating Thickness Requirement

## 3 SURFACE PREPARATION

- .1 All steel surfaces to be painted shall be prepared in accordance with the SSPC Manual Volume II and the paint manufacturer's specifications.
- .2 Degrease according to SSPC-SP1 Solvent Cleaning. Remove all weld splatter and grind all welds and sharp edges. Blast clean to SSPC-SP10, Near White Metal Standard.
- .3 Minimum allowable motor anchor pattern is 50 microns (2 mils). Shape of surface profile shall be jagged and irregular, as opposed to peened.
- .4 If chloride substrates measurements are required by Departmental Representative, the chloride concentration shall be less than  $3\mu\text{g}/\text{cm}^2$  measured by Chlor-Rid test.
- .5 The surface finish shall be approved by the Departmental Representative or the paint manufacturer before application of any coatings.

## 4 PAINT APPLICATION

- .1 Coatings shall be applied in accordance with the manufacturer's specifications. All blast cleaning and shop painting shall be carried out under cover in an area protected from weather and other detrimental effects.
- .2 Paint application shall commence prior to any presence of rust bloom and within 8 hours following abrasive blasting.

- .3 Paint manufacturers recommendation for application parameters shall be consulted to identify minimum and maximum temperatures, relative humidity and dewpoint restrictions and pot life. Consult paint manufacturer for further information.

## 5 PAINT SYSTEM

- .1 All dry film thickness (DFT) shall be stated in Mils (thousands of an inch). The equivalent measurement and conversions are as follows:

One thousandth of an inch (1 mil) = 25 microns

The detailed requirements of the paint schedule are given below.

- .2 Stripe coats shall be applied to all welds, lap joints, plate edges, corners, sharp edges and any other areas where spray application of the overall coating system may result in low dry film thickness.
- .3 The following paint systems shall be used:

Coat No.	Type	Binder	Product Name	Dry Film Thickness
1	Primer	Zinc-Rich Epoxy	Interzinc 52	2.5 mils
2	Mid Coat	Polyamide Epoxy	Interseal 670HS	7 mils
2	Stripe Coat	Polyamide Epoxy	Interseal 670HS	5 mils
3	Topcoat	Polyamide Epoxy	Interseal 670HS	7 mils
-	-	-	-	16.5 mils minimum

Note: Finished coating system Dry Film Thickness shall be a minimum of 16.5 Mils (412 microns) at each spot measurement. Stripe coat not included.

- .4 Topcoat to be a light grey colour (colour code RAL 7035).
- .4.1 Additional 2 mils colour top coat of Interthane 990 shall be applied to handrails and guardrails. Handrails to have a red colour topcoat (RAL 3000) and guardrails to have a safety yellow colour topcoat (RAL 1003). The 40x220 mm ends of the top flange of the two girders shall have bright yellow reflective plates.
- .5 Coating for Non Skid Deck Surfaces. This includes the top surface of aprons and the top surface of apron finger plates.

The following paint system is approved for use in Non Skid Deck Surfacing:

Supplier	Paint System	Coats	Dry Film Thickness
Sutton Road Markings	Bimagrip Urethane Non-Skid (RS Clare, Manufacturer) Acraprime SP Polyurethane Prime	1	10 m <sup>2</sup> /l Resign 2.3 kg/m <sup>2</sup> Aggregate 4-6 kg/ m <sup>2</sup>

- .6 All bolts, washers and nuts shall be hot dip galvanised in accordance with ASTM Specifications A-153 or A-123, or CSA Specification G 164-M (minimum zinc coating 610 g/m<sup>2</sup>).

## 6 WORKMANSHIP

- .1 The Contractor shall complete a daily reporting account for Shop/Field Quality Assurance.
- .2 The Departmental Representative's may request on site monitoring during paint preparation.
- .3 Each coat, including stripe coat shall be of contrasting colors and mixed in full proportions.
- .4 The preparation of surfaces to be painted and the application of the paints shall be as specified above.
- .5 Coating shall take place as soon as practicable after inspection of cleaning, but, in any event, within eight hours and before any visible or detrimental rusting or contamination occurs.
- .6 All coating material shall be applied by airless spray unless otherwise allowed or specified by the manufacturer. Spray painting equipment shall be of ample capacity and suitable for the work and shall at all times be kept clean and in good working order. Air lines shall be equipped with water traps to positively remove condensed moisture.
- .7 No thinner shall be added to any paint in excess of the paint manufacturer's recommendations.
- .8 Prior to spray application of primer, all crevices, appurtenances, and re-entrant surfaces which would otherwise be difficult to coat by spraying, together with all weld areas shall be brushed (stripe) in order to ensure a continuous film on all surfaces, and then painted as specified.
- .9 Newly coated surfaces will be inspected when the coating has thoroughly dried and immediately before the coated member is to be removed from the paint shop for shipment. The coated surfaces may be rejected if any of the following defects are apparent and the Departmental Representative judges the coating performance and life will be impaired by these conditions:
  - a. Inadequate dry film thickness (DFT).
  - b. Runs, sags, holidays or shadowing caused by inefficient application methods.
  - c. Evidence of poor coverage at plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
  - d. Damage to shop coat due to handling before the coating is sufficiently cured or any other contributory cause.
- .10 Coated surfaces rejected by the Departmental Representative shall be made good by the Contractor at his own expense. The Contractor shall submit to the Departmental Representative his proposed method of repair to the damaged surfaces.
- .11 Damage to adjacent property, vehicles, pedestrians and other portions of the structure due to the painting operations shall be made good. No paint, equipment, scaffolding, et cetera shall obstruct traffic or pedestrians, except by written permission of the Departmental Representative, in which case proper warning signs, barricades, et cetera shall be placed, maintained and removed.

- .12 Field touch up painting shall be carried out in accordance with the paint manufacturer's specifications.
- .13 The Contractor shall provide sufficient paint for field touch-up of any damaged paint surface.
- .14 Only nylon ropes or rubber covered slings may be used for handling steel in either the Contractors shop during loading or shipment or during unloading and erection at the site. Where coatings are damaged during handling/erection, these areas shall be marked and recorded for remedial actions.

**END OF SECTION**