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Real Property & Technical Support Division

Technical Specifications

CANADIAN COAST GUARD STATION

PORT HARDY; B.C.

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END OF SECTION

1 GENERAL

- .1 The Standard General Conditions of these specifications form an integral part of this section.

2 MINIMUM STANDARDS

- .1 In the absence of other standards specified in the Contract Documents, all work is to conform to, or exceed, the minimum standards of the Canadian Government Specifications Boards, the Canadian Standards Association, the American Society for Testing of Materials, or the National Building Code of Canada, whichever is applicable.
- .2 All work to be done in accordance with Work Safe BC regulations.

3 INTERFERENCE WITH OPERATION

- .1 The Contractor shall obey all navigation regulations and conduct operations so as to interfere as little as possible with the use of berthing spaces, fairways and passages. Install and maintain any and all protection to navigation as may be required by any properly constituted authority or by the Engineer. During the course of construction and cleanup, do not dispose of surplus, waste or demolished materials in navigable waters.
- .2 The Contractor shall upon instruction of the Owner or Engineer, promptly remove any of the Contractor's equipment located outside the specified work area and obstructing any harbour operation.

4 BARRIERS, LIGHTS AND WATCHING

- .1 The Contractor shall provide all requisite barriers, fences, warning signs, lights and watching for the protection of persons and property on or adjacent to the site.

5 SITE ACCESS

- .1 The Contractor shall make his own arrangements subject to the approval of the Engineer, for access to the site. Site access shall be coordinated with the local Harbour Authority.
- .3 The Contractor shall maintain routes of travel, the Engineer being the sole judge as to what may be deemed reasonable:
- .4 The Contractor shall erect and maintain barriers, fences, lights, warning devices, and other protective devices as may be required for prevention of theft or damage of goods and protection of the public and workmen, or if so ordered by the Engineer.

6 CONSTRUCTION AREA

- .1 The Contractor shall regulate construction traffic on public areas and comply with all local ordinances in connection therewith, including load limitation and removal of debris.
- .2 The Contractor shall confine his operations on the site to those areas actually required for the work including routes and regulations approved by the Owner for haulage of materials.

7 NIGHT WORK

- .1 The Contractor shall keep proper lights each night between the hours of sunset and sunrise upon all floating plant and false-work, upon all ranges and other stakes where necessary, and upon all buoys of such size and in such locations as required by a governing authority. When work is done at night, maintain from sunset to sunrise such lights on or about the work and plant as necessary for the proper observation of the work and the efficient prosecution thereof.

8 CLEAN-UP

- .1 At all times the Contractor shall keep the site free from accumulation of waste material and debris and leave the site clean and tidy on completion.

9 TEMPORARY SERVICES

- .1 On site the Contractor shall make his own arrangements for supply of water and electricity.
- .2 The Contractor shall supply for his own use; sanitary, first aid, and all other temporary services and facilities required for the work.

10 PROGRESS REPORT

- .1 The Contractor shall keep a daily record of progress of the work available for inspection by the Engineer.
- .2 The daily record shall include particulars of weather conditions, number of men working, plant and equipment working and work performed.

11 ENGINEER'S ACCESS

- .1 The Contractor shall provide access to the work for the Engineer's inspectors and surveyors as required.

12 PERMITS AND ROYALTIES

- .1 Permits and licenses required for the Contractors work are the responsibility of the Contractor and shall be for the Contractor's account. The Contractor shall have the appropriate business license.

13 PROTECTION OF EXISTING STRUCTURES

- .1 Existing structures, adjacent marine facilities, roads, services, piping or equipment within the work area which are not to be replaced shall be properly protected from any injury or damage, direct or indirect. Any damage that is caused as a result of the operations of the Contractor shall be repaired and made good at the Contractor's expense to the satisfaction of the Engineer.

14 WEATHER

- .1 No work shall be undertaken by the Contractor when, in the opinion of the Engineer, the weather is unsuitable or unfavourable for a particular class of work. Time lost by the Contractor due to stoppage on account of adverse weather conditions may be allowed

the Contractor, at the discretion of the Engineer, as an extension of time for the completion of the work over and above the date of completion specified in the contract agreement.

15 PREVENTION OF WATER AND AIR POLLUTION

- .1 The Contractor shall comply with Federal and Provincial laws, orders and regulations concerning the control and abatement of water and air pollution.

16 SOIL DATA AND EXISTING TOPOGRAPHY

- .1 The Contractor shall notify the Engineer of any subsurface conditions at the place of the work that may differ materially from those indicated in the Contract Documents.

17 UTILITIES AND SERVICES

- .1 The Contractor shall be responsible for any damage to overhead, underwater and/or underground utilities and/or services caused by the Contractor's operations and shall repair and make good the repairs at the Contractor's own expense.
- .2 The Contractor shall be responsible, unless otherwise agreed to by the Engineer, for all temporary or construction services and utilities, and first aid facilities.

18 CARE OF FINISHED WORK

- .1 The Contractor shall protect all finished work from injury, defacement, unauthorized entry, or trespass until such time as the work described in the Contract Documents is substantially complete.

19 NOISE BY-LAWS

- .1 The Contractor shall comply with the requirements of any local or other Noise By-Laws.

20 COMPLETION OF WORK

- .1 Complete all work by March 31, 2015. The Department is in the process of obtaining a Map Reserve (Water Lot) from the Province . It is anticipated that the Map Reserve will be obtained by October 1, 2014 in which case the Contractor shall mobilize on to the site and start the work any time after October 1, 2014 . However, if the Department receives the Map Reserve for the Water Lot from the Province earlier than October 1, 2014, the Contractor may mobilize and start the work any time after receipt of the Map Reserve.

21 MATERIAL DISPOSAL

- .1 All material designated to be removed will become the property of the Contractor and will be disposed of in an environmentally acceptable manner so that they neither become a menace to marine navigation nor a nuisance to the public on adjacent or any other property.
- .2 Unless otherwise specified, all existing material to be replaced or removed will be disposed of in accordance with 20.1 above.

- .3 Conduct clean-up and disposal operations to comply with local ordinances and antipollution laws.

22 SUPPLY OF FLOAT, STEEL PILES, GANGWAY , BREAKWATER, AND TRESTLE

- .1 The float , steel piles, gangway , steel pipe breakwater float and steel access trestle and galvanized grating will be fabricated by the Contractor and ready for inspection within 12 weeks of contract award. Payment will be made FOB at the Contractor's shop/yard so that the Engineer can inspect and pay for above items prior to mobilization to the site.

23 MEASUREMENT FOR PAYMENT

- .1 General:
 - .1 Payment for work will be made at the Prices Per Unit as tendered for the various classifications of the work appearing in the "Unit Price Table" of the Form of Tender.
 - .2 Any work called for in the specifications or shown on the plans, or which is necessary for the completion of the work called for in the specifications and is not specifically listed as a separate item in the "Unit Price Table", shall be deemed incidental to the general purpose of the Contract and no separate payment will be made on account of any such work, but the cost of any such incidental work shall be included in the Price Per Unit values as tendered for the various items appearing in the "Unit Price Table".
- .2 Mobilization and Demobilization – Pay Item No. 1:
 - .1 The unit of measure will be a single fixed item. “Mobilization and Demobilization” will include all work required to supply the material, plant, and labour (including temporary sanitary facilities) to the site of the work at the start of the project and to remove all materials, plant and labour from the site at the end of the project. This item will also include all costs associated the General Conditions requirements.
- .3 Supply of Float - Pay Item No 2:
 - .1 The unit of measure will be a lump sum item for the float supplied and stored in the Contractor's yard . This item will include the supply of mooring wells and billets
- .4 Installation of Float –Pay Item No.3
 - .1 The unit of measure will a lump sum item for the float installed as specified .

- .5 Supply of new 609.6 mm Steel Piles - Pay Item No. 4:
 - .1 The unit of measure will be each meter of 609.6 mm steel piling supplied in accordance with the "Trestle Pile Table and Float Dolphin Pile Table drawing 212124-003". This item includes handling and supply of pipe material, splicing (shop splice or field splice) to achieve the lengths noted in the table, removal of unused pipe (cut-offs) at the completion of the project.

- .6 Drive/Drill 609.6 mm Piles - Pay Item No.5:
 - .1 The unit of measure will be each new 609.6 mm steel pile driven/drilled, secured, and remaining an integral part of the completed work as specified. This item also includes the supply and installation the pile lids, top header beams,

- 7 Supply of new 914.4 mm Steel Piles - Pay Item No. 6:
 - .1 The unit of measure will be each meter of 914.4 mm steel piling supplied in accordance with the "Breakwater Dolphin Pile Table drawing 212124-003". This item includes handling and supply of pipe material, splicing (shop splice or field splice) to achieve the lengths noted in the table, removal of unused pipe (cut-offs) at the completion of the project.

- .8 Drive/Drill 914.4 mm Piles - Pay Item No.7:
 - .1 The unit of measure will be each new 914.4 mm steel driven/drilled, secured, and remaining an integral part of the completed work as specified. This item also includes the supply and installation the pile lids, top header beams,

- .9 Supply New Gangway - Pay Item No. 8:
 - .1 The unit of measure will be each new gangway supplied as specified. The supply and installation of the required hardware, roller, hinges, apron/transfer plate will also be included in this item.

- .10 Install New Gangway - Pay Item No. 9:
 - .1 The unit of measure will be each new gangway installed as specified. The installation of the required hardware, roller, hinges, apron/transfer plate will also be included in this item

- .11 Supply of new steel access trestle and galvanized grating - Pay Item No. 10:
 - .1 The unit of measure for the supply of the new trestle will be a single fixed item.

- .12 Installation of new steel access trestle and galvanized grating - Pay Item No. 11:
 - .1 The unit of measure for the installation of the new trestle will be a single fixed item.

- .13 Removal and Disposal/Salvage –Pay Item No.12
 - .1 The unit of measure for all items specified to be removed and disposed of will be a single fixed item . This pay item will include the salvage and relocation of items as specified.

- .14 Supply of Steel Pipe Breakwater- Pay Item No. 13
 - .1 The unit of measure for the supply of the steel pipe breakwater will be a single fixed item.

- .15 Installation of Steel Pipe Breakwater – Pay Item No. 14
 - .1 The unit of measure for the installation of the steel pipe breakwater will a lump sum item.

- .16 Supply and installation of concrete abutment and the pile posts – Pay Item No, 15
 - .1 The unit of measure will be a lump sum item for the supply and installation of the concrete abutment and the pile posts T1 to T5

END OF SECTION

1 GENERAL

- .1 The Standard General Conditions of these specifications form an integral part of this section.

2 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 construction of the new CCG marine facility in Port Hardy comprising a 133.5 m long pile supported pedestrian access trestle, a timber mooring float and a floating steel pontoon breakwater. The work generally consists of, but is not limited to the following items:
 - .1 Mobilisation/Demobilisation
 - .2 Remove and dispose of CCG's existing approximately 3.6 m wide and 25 m long timber mooring float including the two steel pipe pile dolphins and storage shed as shown on drawing No. 212124-001. The work shall include salvage and relocation of the following items from the existing float to the new float as directed by the Engineer:
 - Two light posts and a transformer cabinet excluding electrical connections.
 - Two aluminium storage boxes and two steel safety ladders.
 - A tie-up mast and a 300 mm wide UHMWPE rub-strip for the zodiac berth.
 - .3 Supply and install a new 133.5 m long steel access trestle with galvanized grating. The trestle will provide pedestrian access from shore to the new mooring float.
 - .4 Supply and install a new 4.2 m wide and 25 m long timber mooring float including three steel pipe pile dolphins, as shown on the drawings.
 - .5 Supply and install a new floating steel pipe pontoon breakwater including three steel pipe pile dolphins, as shown on the drawings.
 - .6 Supply and install a new 1.8 m wide and 16.8 m (55') long gangway as shown on the reference drawings. The gangway has been designed by North Island Engineering Ltd. 1833 Robb Avenue, Comox, BC.

END OF SECTION

1 GENERAL

- .1 The Standard General Conditions and Supplementary General Conditions of these specifications form an integral part of this section.
- .2 Where existing works are to be removed, they shall be removed and salvaged or disposed of to the satisfaction of the Engineer.
- .3 The Contractor shall furnish all labour, materials, tools, plant and services required incidental to the completion to the full extent of the drawings and specifications for the execution of all demolition salvage and protection work specified herein.
- .4 Demolition and disposal shall be carried out in strict accordance with provincial, local, and municipal regulations and Part 8 of the National Building Code and with the Canadian Construction Safety Code.
- .5 Demolition shall be carried out in accordance with the construction schedule as approved by the Engineer.

2 REMOVAL OF DEMOLISHED MATERIAL

- .1 All material, which are not to be salvaged for the Owner, shall become the Contractor's property and the Contractor must remove it from the site.
- .2 It shall be the Engineer's decision as to which material shall be salvaged and which materials shall be disposed of.
- .3 Steel pipe piles securing the existing timber mooring float shall be completely removed. If it is not possible to remove a pile, the pile shall be cut off a minimum of 0.3 m below seabed level.

3 SALVAGE

- .1 Material to be salvaged for the Owner shall be stored as directed by the Engineer.
- .2 The following items on the existing float shall be salvaged and reinstalled on the new mooring float as directed by the Engineer:
 - Two light posts and a transformer cabinet excluding the electrical connections.
 - Two aluminium storage boxes and two steel safety ladders.
 - A tie-up mast and a 300 mm wide UHMWPE rub-strip for the zodiac berth.

4 PROTECTION

- .1 The Contractor shall protect the remaining structural elements and adjacent structures against damage from falling debris or other causes.
- .2 The Contractor shall take precautions to guard against movement or settlement of adjacent structures and remaining structural elements, provide and place shoring or bracing as required, and be responsible for the safety and support of such structures, be liable for any damage or injury caused thereby or resulting therefore. If at any time safety of any adjacent structure appears to be endangered; the Contractor shall cease operations and notify the Engineer.

END OF SECTION

1 GENERAL

- .1 The Standard General Conditions and Supplementary General Conditions form an integral part of this section.

2 MATERIALS

- .1 Steel Pipe Piles

- .1.1 Steel pipe piles shall have minimum yield strength of 310 MPa meeting the requirements of the last edition of at least one of the following specifications:

- a) ASTM A252 Grade 3
- b) API 5L Grade X46
- c) CSA Z245.1-M with the following provisions:

i) Chemical analysis of material shall show an equivalent carbon content of less than 0.30%.

ii) All welds shall be full strength and shall satisfy the requirements of either ASTM A53 or CSA Z245.1-M.

iii) Flattening tests for ductility shall be conducted in accordance with the procedure and frequency stipulated in CSA Standard Z245.1-M or ASTM Standard A53.

iv) Unless longitudinal welds are certified as conforming to the requirements of ASTM A53, CSA Z245.1-M or API 5L to the satisfaction of the Engineer, welds shall be 100 percent inspected by ultrasonic or electromagnetic inspection according to the requirements of ASTM A53. This inspection shall be conducted at the Contractor's expense.

v) The Contractor shall bear the expense of repairing and re-inspecting all rejected welds.

vi) Allowable tolerance on dimensions shall meet the requirements of CSA Z245.1-M.

- .1.2 Pipe piles shall be of straight welded pipe.

- .2 The minimum length of a pile section used in the fabrication of piles shall be 3.0 m.

- .3 Welded steel piles shall have full strength welds.

- .4 The Contractor shall provide necessary certification to demonstrate that the material meets the above standards.

3 HANDLING PILES

- .1 Piling shall be handled and stored so as to avoid over stressing or injury, and any piles bent or damaged, or in any way made defective in the opinion of the Engineer, shall be made good to his satisfaction or replaced.

4 FABRICATION

- .1 Welding practice and qualifications of fabricators and erectors of welded construction shall conform to the requirements of CSA Standards W47, W48, and W59, latest editions.
- .2 Piles shall be spliced to the required lengths in a workshop or similar suitable place that will ensure good quality splices.
- .3 Lengths to be joined shall be manipulated in jigs so that only down-hand welding is employed.
- .4 The splice shall be complete joint penetration welds and shall develop the full strength of the pile section. Splices shall be made in a manner that will ensure good alignment of the spliced parts. The number of splices shall be held to a minimum.
- .5 The longitudinal welds of pipe pile lengths to be joined shall be staggered 90 degrees.
- .6 The end profile of a pile section to be butt welded shall not have a deviation of more than 1.0 - 1.6 mm from a plane perpendicular to the axis of the pile.
- .7 Maximum deviation of the line of the pile at the splices shall be 3 mm when measured with a 3.0 m straight edge.
- .8 All pile splices shall be 100 percent inspected and tested. This inspection shall be conducted at the Contractor's expense.
- .9 Inspections of pile splices shall be by non-destructive ultrasonic tests in accordance with the requirements of AWS D1.1-75. The test results shall be made available to the Engineer. If the inspection of a weld should indicate poor alignment of the pile sections, insufficient penetration of the weld, lack of fusion, slag inclusions, porosity or any such defects, the Contractor shall take the necessary corrective measures to provide a full strength weld to the satisfaction of the Engineer. The cost of correcting defective welds and re-testing shall be borne by the Contractor.

5 INSTALLATION OF STEEL PILES

- .1 Piles shall be installed in accordance with Best Management Practice for Pile Driving and Related Operations – BC Marine and Pile Driving Contractors Association – November; 2003.
- .2 All piles shall be driven to the pile tip elevation shown on the drawing or shall be socketed into bedrock if bedrock is encountered before the specified tip elevation is reached, see Pile Plan Drawing 212124-003. All piles may be installed to final tip elevation with a standard air, diesel, hydraulic, drop or vibratory hammer. However, the ground conditions may not allow the contractor to install the piles to final pile tip elevation with a vibratory hammer. The contractor shall be prepared to drive the piles to refusal with a standard air, diesel, hydraulic or drop hammer capable of providing an effective impact energy of at least 60 kNm (~44,000 ft-lb) or as approved by the Engineer.

Trestle piles socketed into bedrock shall be driven to a final set equivalent to 10 blows per 25 mm (1") for a hammer with effective impact energy of at least 60 kNm (~44,000 ft-lb).

- .3 All pile driving equipment shall be in good mechanical condition and shall be capable of delivering the manufacturer's rated energy output and shall be operated in accordance with the manufacturer's instructions.

- .4 Pile driver leads shall be constructed in a manner which affords freedom of movement of the hammer and they shall be held in position by guys, stiff braces or by attaching to cranes or derricks so as to ensure proper support for the pile during driving. Hammer blows at all times shall be in direct line with the axis of the pile.
- .5 Steel piles shall be driven without excessive deformation of the head of the pile. The head of the pile shall be cut square and a driving cap shall be provided to hold the axis of the pile in line with the axis of the hammer.
- .6 The driving cap shall fit continuously over the top of the pile and shall project about 150 mm down over/into the pile and shall be such that the pile is held properly in line with the leads. A cushion of hardwood, fibre, plywood or other suitable material shall be placed between the driving cap and the hammer. The cushion shall be replaced if so directed by the Engineer.
- .7 Piles shall be driven in the positions shown on the drawings. Piles shall be driven and installed within a tolerance of +/- 50 mm in location and within 0.5% from the specified axial alignment. The Engineer may reject piles driven out of alignment or damaged in any way after inspection. Cost of remedial measures decided by the Engineer shall be borne by the Contractor.

6 STEEL PILE CUTTING SHOES

- .1 Pile cutting shoes will not be required.

7 CUT OFFS

- .1 After driving, piles shall be cut off at the elevations shown on the plans. In driving, sufficient length above cut off shall be allowed so that no part of the head of the pile damaged or deformed during driving remains in the work.
- .2 Piles shall be cut in a flat horizontal plane. A suitable guide shall be used to aid in cutting piles so that the cut off plane is within specified butt weld splice tolerances. If a satisfactory hand-held cut cannot be obtained, the Contractor shall cut the pile with an automatic cutter.

8 PILE DRIVING RECORDS

- .1 The Contractor shall maintain an accurate record of pile driving. The Contractor shall submit a copy of his record to the Engineer. The Contractor shall co-operate with the Engineer in maintaining these records. The Contractor shall record for each pile:
 - Pile number and location
 - Date and time driven
 - Length of pile driven
 - Type of pile driving hammer
 - Cut off elevation
 - Penetration in overburden and in bedrock
 - Tip elevation
 - Final set and hammer energy

9 TEMPORARY RESTRAINT OF DRIVEN PILES

- .1 The Contractor shall furnish sufficient labour and materials to adequately secure the piles of any given group against motion relative to others in the group.
- .2 Temporary restraints once erected and approved shall be maintained in good order until completion of the structure.

10 CORROSION PROTECTION

- .1 The outside surface of the pipe piles shall be painted. Painting shall be in accordance with the requirements of Section 00 98 00 – Painting.

END OF SECTION

1 GENERAL

- .1 All work shall be carried out in conformance with CSA Standard CAN3.A23.1-M.

2 MATERIALS

- .1 Cement shall be sulphate-resistant cement.
- .2 Fine aggregate shall conform to Clause 5.3 CSA Standard CAN3.A23.1-M.
- .3 Coarse aggregate shall conform to Clause 5.4 CSA Standard CAN3.A23.1-M group 1.
- .4 Water shall be clean and free from injurious amounts of oil, alkali, organic matter and deleterious materials.

3 CONCRETE MIXES

- .1 All concrete shall develop a 28 day compressive strength of 35 MPa minimum, unless noted otherwise on the drawings.
- .2 Minimum cement content shall be 300 kg per cubic metre.
- .3 Maximum water cement ratio shall be 0.40.
- .4 Air content shall be between 5% and 8%.
- .5 Set retarding admixtures shall not be used unless approved by the Engineer.
- .6 The concrete mix design shall be submitted to the Engineer for approval prior to placing concrete. The mix design including admixtures shall not be changed without prior approval of the Engineer.
- .7 Exposure class of concrete shall be C-1 as per CAN/CSA A23.1-M.

4 PLACING, FINISHING AND CURING CONCRETE

- .1 All concrete shall be placed in accordance with the requirements of Clause 19 CSA Standard CAN3.A23.1-M and as indicated on the drawings.
- .2 All concrete shall be placed continuously between start of placement and a control joint.
- .3 Accurate records shall be maintained for all cast-in-place and pre-cast concrete including date of placement, location, quantity, temperature and test samples taken.
- .4 The Engineer shall be notified prior to commencement of concrete placement as specified in Clause 5.0.
- .5 All defective concrete shall be removed and replaced as directed by the Engineer.
- .6 Concrete shall be vibrated adequately by means of mechanical vibrators. Rock pockets and honeycombing shall not be accepted.
- .7 Cold and hot weather concrete work shall be carried out in conformance with Clause 21 of CSA Standard CAN3.A23.1-M. Procedures for this work shall be submitted to the Engineer for approval.

- .8 All concrete shall be protected and cured in accordance with CSA Standard CAN3.A23.1-M.

5 INSPECTION AND TESTING

- .1 The Engineer shall be notified 24 hours prior to placement of concrete.
- .2 Unless noted otherwise an inspection and testing firm appointed by the Contractor shall collect and test a minimum of 3 concrete cylinders per concrete batch. One concrete cylinder shall be tested after 7 days. The remaining 2 cylinders shall be tested after 28 days. The test results shall be made available to the Engineer. This testing shall be conducted at the Contractor's expense.
- .3 The Contractor shall permit the testing firm free access to all portions of the work and shall co-operate with the testing firm in carrying out the work.

END OF SECTION

1 GENERAL

- .1 Billets to have dimensions and be positioned as shown in the plans and specifications and to be secured to the float frame with 50 mm wide nylon strapping spaced no more than 1 m.

2 MATERIAL

- .1 All billets are to be fabricated of polystyrene and coated with either polyethylene or polyurethane.
- .2 Polystyrene expanded with uniform cellular structure, free of voids. If a beaded product is to be used, beads shall be fused so that, when the product is broken by hand pressure, there is an excess of broken or sheared beads.
- .3 Polystyrene property:
- Minimum compressive strength at 10% deformation of 76 kPa.
 - Minimum flexural strength of 124 kPa.
 - Maximum water absorption by volume of 4%.
 - Minimum density of 16 kg/m³.
- .4 Polystyrene coating:
- Polyurethane/Polyurea hybrid two pass marine coating.
 - Minimum thickness of 2 mm (80 mil).

3 INSPECTION

- .1 The Engineer shall be notified at least 1 week prior to fabrication as well as 1 week prior coating of the billets.

END OF SECTION

1 WORKMANSHIP

- .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 Engineer.
- .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 6mm 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 Engineer 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 Engineer's review prior to commencing fabrication. If shop drawings are not to the Engineer'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 owner 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 00 98 00 – Painting.
- .2 All grating, bolts, inserts, 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/m²).
- .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 00 98 00 – Painting.

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 Engineer 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 00 51 00. The Contractor shall allow a minimum of one (1) week for review of shop drawings by the Engineer.
- .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 pile 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 fabricator shall appoint, subject to the Engineer's approval, an employee who shall assist and be responsible to the welding engineer.

Unless such information has already been forwarded to the Owner, the Contractor shall submit to the Engineer 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 Owner.

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 Engineer.

.4 Welding Procedures

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

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 Engineer, 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 Engineer. Any discontinuities will be explored and may be accepted, subject to ASTM A435.

The Engineer 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 Engineer.

.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 Engineer.

.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 Engineer. 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 Engineer.

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 Engineer 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 Engineer. The repair or removal of such gouges shall be to the Engineer'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 Engineer.

- .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 Engineer'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 Engineer 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 Engineer, the Contractor shall supply full details of the proposed assembly and welding sequence of any particular weld.
- .7 **Shop splices**
.1 Locate to Engineer's approval.
.2 Use complete joint penetration groove welds finished flush. Details of butt joints to CSA W59. Use only as approved by Engineer.
- .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 Owner, 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 m³/h.

.2 Preheat and Interpass Temperatures

No welding shall be done when the temperature of the base metal is lower than - 20⁰C. At temperatures below 0 ⁰C, the steel shall be preheated to a temperature of at least 10⁰C 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 Engineer.

Preheat temperature shall in no case exceed 200⁰C 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 Engineer.
 - .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 Engineer. Fender panels, mooring structures, walkways, stairs and ladders shall be in accordance with Clause 11.

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

9.0 QUALITY ASSURANCE

- .1 Inspection
All materials, welding procedures, shop drawings, and steelwork fabrication will be inspected by the Engineer to ascertain compliance with the Owner's 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 Engineer.

At his discretion and at the Owner's expense, the Engineer will appoint a testing agent 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 Engineer.

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 Engineer 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 cooperate with the Engineer 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 hours notice of any inspection stage being reached shall be given to the Engineer 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 Engineer.

10.0 COATINGS

Except as noted below, all structural steel shall be painted in accordance with the requirements of Section 00 98 00 – Painting.

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/m²).

Walkway grating shall be hot dip galvanized in accordance with CSA Specification G 164-M (minimum zinc coating 610 g/m²).

The Contractor is advised to handle all materials delicately to prevent paint damage. Nylon slings are to be used at all times when lifting lugs are not available.

Touch up all damaged surfaces immediately upon delivery and supply 2 gallons of paint for field touch-up of any damaged paint surface during the installation as per 00 98 00 – Painting.

END OF SECTION

1 GENERAL

- .1 The Standard General Conditions and Supplementary General Conditions of these specifications form an integral part of this section.
- .2 All work shall be carried out in accordance with Specification CAN/CSA 086.1-M, latest revision and in accordance with Best Management Practices (BMP) for the use of treated wood in aquatic environments.
- .3 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

2 PRODUCT

- .1 Lumber Material
 - .1.1 Lumber grades shall conform to the requirements of the N.L.G.A. Standard Grading Rules for Canadian Lumber, latest revision.
 - .1.2 All lumber except the deck planks for the float shall be D.Fir-L(N), No. 1 Structural grade or better as called for on the drawings. Timber deck planks shall be WR Cedar(N), No. 2 Structural grade or better.
 - .1.3 All lumber, unless specified otherwise, shall be properly air dried and seasoned, containing not more than 19% moisture.
- .2 Fasteners
 - .2.1 All bolts, nuts and washers shall be hot dip galvanized in accordance with Specification CAN/CSA G164-M.
 - .2.2 Bolt holes in timber shall be bored to provide driving fit. Holes for drift bolts shall be 2 mm undersize and longer than the drift bolts.
 - .2.3 All bolts to meet the requirements of Standard ASTM - A325.
 - .2.4 Deck planks shall be fastened with 100 long galvanized nails at each face at each contact.
- .3 Wood Preservative
 - .3.1 All preservative treatment, inspection and re-treatment shall be in accordance with Specification CAN/CSA 080-M, latest edition.
 - .3.2 All lumber except deck planks, tie-rails, tie-rail risers and rub-boards on float and breakwater shall be given a full-cell creosote treatment in accordance with the Best Management Practices for Creosote, to a net retention of 224 kg per m³ (14 lb/c.f.) and to a minimum penetration of 22 mm (7/8 inch).
 - .3.3 All creosote treated lumber for the mooring float shall be pre-cut, pre-drilled and pre-assembled prior to receiving the creosote treatment.

- .3.4 All timber tie-rails, tie-rail risers and rub-boards on float and breakwater shall be given a CCA or ACZA preservative treatment in accordance with the Best Management Practices.
- .3.5 All treated timbers shall be incised before treatment.
- .3.6 All cedar deck planks shall be untreated.

3 EXECUTION

- .1 All timber, which has been given a preservative treatment, shall be carefully handled to avoid breaking through the treated surfaces. Cant hooks and rafting dogs shall not be used on timbers. No spikes shall be driven into timbers except to tack the timbers in their final position. If spikes are used, they shall be fully driven and left in.
- .2 Bolt holes and countersunk holes shall be filled with CCA or ACZA preservative and the bolts shall be dipped in CCA or ACZA preservative concentrate before the bolts are placed.
- .3 All structural timber used in the work shall be carefully and accurately placed in accordance with the drawings.

END OF SECTION

1 SCOPE OF WORK

- .1 All ferrous surfaces except galvanised components are to be painted. This includes:
- Steel pipe piles and posts.
 - All structural and miscellaneous steel.

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)

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).
- .4 The surface finish shall be approved by a representative of the Owner 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.

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 Strip 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 for painting of steel pipe piles, pile caps and miscellaneous steel attached to painted metal:

Coat No.	Type	Binder	Product Name	DFT Mil	WFT Mil	Comments
1	Full Coat	Polyamide Cured Epoxy	Interseal 670HS	8	9.7	8 to 10 mils
2	Strip Coat	Polyamide Cured Epoxy	Interseal 670HS	(4)	4.9	3 to 5 mils
3	Full Coat	Polyamide Cured Epoxy	Interseal 670HS	8	9.7	8 to 10 mils
-	-	-	-	16	-	-

Note: Finished coating system DFT shall be a minimum of 16 Mil (400 microns) at each spot measurement. Strip coat not included.

- .4 Top coat to be a light grey colour except for **handrails on the trestle which shall have a red top coat and guardrails which shall have a yellow top coat. The gangway shall have a red top coat.**
- .5 All grating, 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/m²).

6 WORKMANSHIP

- .1 The preparation of surfaces to be painted and the application of the paints shall be as specified above.
- .2 Coating shall take place as soon as practicable after inspection of cleaning, but, in any event, within two hours and before any visible or detrimental rusting or contamination occurs.
- .3 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.
- .4 No thinner shall be added to any paint in excess of the paint manufacturer's recommendations.
- .5 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.
- .6 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 Engineer or his representative, in his judgement, believes 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.
- .7 Coated surfaces rejected by the Engineer shall be made good by the Contractor at his own expense. The Contractor shall submit to the Engineer his proposed method of repair to the damaged surfaces.
- .8 Damage to adjacent property, vehicles, pedestrians and other portions of the structure due to the painting operations shall be made good without additional expenses to the Owner. No paint, equipment, scaffolding, et cetera shall obstruct traffic or pedestrians, except by written permission of the Owner's Representative, in which case proper warning signs, barricades, et cetera shall be placed, maintained and removed without additional expense to the Owner.
- .9 Field touch up painting shall be carried out in accordance with the paint manufacturer's specifications.
- .10 The Contractor shall provide sufficient paint for field touch-up of any damaged paint surface.

END OF SECTION