

PART 1 - GENERAL

1.1 RELATED WORK

- .1 Section 01 33 00 Submittal Procedures
- .2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .3 Section 03 30 00 Cast in Place Concrete.
- .4 Section 26 42 00-Cathodic Protection.
- .5 Section 05 50 50-Miscellaneous Fender Details.

1.2 REFERENCES

- .1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.
- .2 CAN/CSA G164 Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA S16.1 Limit States Design of Steel Structures.
- .4 CSA W48 Filler Metals and Allied Materials for Metal Arc Welding (Developed in cooperation with the Canadian Welding Bureau).
- .5 CSA W59 Welded Steel Construction (Metal Arc Welding).
- .6 All Standards used shall be of latest edition.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 Submittal Procedures.
- .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

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

criteria and physical requirements.

1.5 MEASUREMENT FOR
PAYMENT

- .1 See Section 01 29 00-Payment Procedures for payment details.

1.6 WASTE MANAGEMENT AND
DISPOSAL

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

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA G40.20/G40.21, Grade 350W.
- .2 Welding materials: to CSA W59.
- .3 Welding electrodes: to CSA W48 Series.
- .4 Bolts and anchor bolts: to ASTM A307. weldable.
- .5 All HSS round material shall conform to ASTM A500, Grade C with a minimum yield stress of 317 MPa.
- .6 All bolts to be ASTM Grade A325.
- .7 All new steel must be coated as per specification Section 26 42 00.
- .8 All sleeves shall be Grade 316 stainless steel.
- .9 All bolted connections to be coated in Loctite 222.
- .10 All new round pipe used in the mooring line rail around the perimeter of the new bollard base (at breasting dolphin #3) shall conform to ASTM A234-Grade B with a minimum yield stress of 240 MPa. All pipe to be 152 mm nominal

pipe size, schedule 80 galvanized pipe with a minimum wall thickness of 11 mm.

2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- .4 Machine bolts will have standard heads, nuts and when in position will be of sufficient length to permit a full nut and two washers. Thread shall be coarse threads series as specified in latest ANS/B1-1 having class 2A tolerances.

2.3 FINISHES

- .1 See Section 26 42 00 for coating requirements.
- .2 All new ladders to be hot-dipped galvanized prior to installation. After installation, the pile coating and bare steel on the ladder is to be touched up using coating system specified in Section 26 42 00.
- .3 All hardware and restrain chains shall be hot dipped galvanized.
- .4 All pad-eyes mounted to concrete surfaces shall be hot dipped galvanized.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Do welding work in accordance with CSA W59, latest edition, unless specified otherwise.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor

- clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Exposed fastening devices to match finish and be compatible with material through which they pass.
 - .5 Make field connections with bolts to CAN/CSA S16.1, or weld.
 - .6 Touch up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.
 - .7 Take necessary care in the handling of all galvanized/coated steel parts to prevent damage to the coatings. Evidence of damage shall be cause for rejection. Touch up surfaces with zinc rich primer where burned by field welding or damaged. As per the approval from Departmental Representative.

3.2 MISCELLANEOUS METALS

- .1 Do steel work in accordance with CAN/CSA S16.1.
- .2 Underwater welding shall be done in accordance with AWS D3.6M:2010 for Class B welds. All other welding shall be done in accordance with CAN/CSA standard W59. Capacity of welds shall be to W59.
- .3 The contractor shall provide a weld sample for sectioning to demonstrate the quality of welding and weld procedures for all underwater welds prior to starting the installation of the repair plates.
- .4 Specimens shall be in accordance with Fillet Weld Break and Macrotech Test Specimens identified in Figure 5.8 (A) of AWS D3.6M:2010.
- .5 Two specimens shall be provided from each welder performing the work (i.e.

each welder has to produce two (2) test specimens). The welding procedures should match those for the project.

3.3 CONNECTION TO
EXISTING WORK

- .1 Verify dimensions, alignment, elevations and condition of existing work before commencing fabrication and report any discrepancies and potential problem areas to the consultant and await instructions.

PART 1 - GENERAL

1.1 RELATED WORK

- .1 Section 01 33 00 Submittal Procedures
- .2 Section 01 74 21 -
Construction/Demolition Waste
Management And Disposal.
- .3 Section 05 50 00 Metal Fabrication.
- .4 Section 26 42 00-Cathodic Protection.

1.2 REFERENCES

- .1 See Section 05 50 00-Metal Fabrication
for metal fabrication.

1.3 SHOP DRAWINGS

- .1 Submit shop drawings in accordance
with Section 01 33 00 Submittal
Procedures.
- .2 Indicate materials, thicknesses,
finishes, connections, joints, method
of anchorage, number of anchors,
reinforcement, details, and
accessories.

1.4 QUALITY ASSURANCE

- .1 All metal fabrication must meet the
quality assurance requirements of
Section 05 50 00.
- .2 All sleeve connections must be designed
and sealed by a Professional Engineer
licensed to practice in the province
of New Brunswick.
- .3 All steel fender panels including the
connections to the 610 mm diameter
pipes must be designed and sealed by a
Professional Engineer licensed to
practice in the province of New
Brunswick. The panels must be design
for the loads outlined on drawing S1
of the contract documents.
- .4 The pinned connections between the
alignment fender panels must be
designed and sealed by a professional
engineer licensed to practice in the
province of New Brunswick.

1.5 MEASUREMENT FOR
PAYMENT

- .1 See Section 01 29 00- Payment
Procedures for payment details.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel Panel & Accessories Requirements:
 - .1 Steel sections and plates: to CAN/CSA G40.20/G40.21, Grade 350W.
 - .2 Welding materials: to CSA W59.
 - .3 Welding electrodes: to CSA W48 Series.
 - .4 All HSS round material shall conform to ASTM A500, Grade C.
 - .5 All fasteners and hardware to be hot-dipped galvanized or stainless steel.
 - .6 All sleeves shall be Grade 316 stainless steel.
 - .7 All chains and connectors to be hot dipped galvanized with a minimum diameter of 38 mm and a minimum working load limit of 17 Tonnes.
 - .8 All fender panels must be a closed box steel panel with a minimum outside plate thickness of 9.5 mm.
- .2 Cone Fender Requirements:
 - .1 All new 800 cone fenders to provide a minimum energy absorption of 220 kN-m and a maximum reaction of 460 kN at a temperature of 20 °C.
 - .2 In addition to the cone fenders outlined on the drawings, the contractor must supply two additional 800 cone fenders for independent testing.
 - .3 All new 900 cone fenders to provide a minimum energy absorption of 338 kN-m and a maximum reaction of 684 kN at a temperature of 20 °C.
- .3 UHMW-PE Facing Requirements:
 - .1 All UHMW-PE shall be a minimum of 60 mm thick.
 - .2 All UHMW-PE shall be black, UV stabilized material.
 - .3 All UHMW-PE shall meet the following standards:

Material Properties	Unit	Material Type		Test Method
		Virgin	Regenerated	
Melting Point	°C	137-143	137-143	ASTM D3418
Density	g/cm ³	0.94-0.95	0.95-0.96	ISO 1183-1
Notched Impact Strength (Charpy)	kJ/m ²	140-170	100-130	ISO 11542-2
Abrasion Index (Sand-Slurry)	100	100-110	130-150	ISO 15527
Yield Strength	N/mm ²	15-20	15-20	ISO 527-1
Elongation at Break	%	50+	50+	ISO 527-1
Dynamic Friction (UHMW-PE to Steel)	N/A	0.15	0.15	ISO 8295
Hardness	Shore D	63	63-66	ISO 868
Operating Temperature	°C	-80 - +80	-80 - +80	N/A
Thermal Expansion	K ⁻¹	2.00E-04	2.00E-04	DIN 53752
Molecular Weight	g/mol	4.20E+06	4.20E+06	Viscometric

2.2 FABRICATION

- .1 See Section 05 50 000-Metal Fabrication for fender fabrication requirements.
- .2 All cone fenders to be fabricated to meet the performance standards defined above in Part 2.1.2-Cone Fender Requirements.

2.3 FINISHES

- .1 See Section 26 42 00 for coating/galvanizing requirements.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise.
- .2 Erect all fender panels plumb, square and true.
- .3 Exposed fastening devices to match finish and be compatible with material

- through which they pass.
- .4 Touch up field welds, bolts and burnt or scratched surfaces after completion of erection with a full coating system as per Section 26 42 00.
 - .5 Take necessary care in the handling of all galvanized/coated steel parts to prevent damage to the coatings. Evidence of damage shall be cause for rejection. Touch up surfaces with a full coating system as per Section 26 42 00 where burned by field welding or damaged.
 - .6 All bolted connections to be coated in Loctite 222.