

PART 1 - GENERAL

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| 1.1 | <u>Description</u>           | .1 | Work specified in this section is for:<br>.1 The supply and install of rubber tire fender units, including restraint chains with tension adjusters and all mounting hardware.  |
| 1.2 | <u>Related Work</u>          | .1 | Cast-in-place Concrete - Section 03 30 00.   |
| 1.3 | <u>References</u>            | .1 | American Society for Testing and Materials (ASTM International)<br>.1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.<br>.2 ASTM A307-14, Standard Specification for Carbon Steel Bolts, 60,000 PSI Tensile Strength.<br>.3 ASTM A391-07(R2012), Standard Specification for Grade 80 Alloy Steel Chain.<br>.2 CSA-S16-14, Design of Steel Structures.<br>.3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).<br>.4 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.<br>.5 PIANC (International Navigation Association), Guidelines for the Design of Fender Systems: 2002. |
| 1.4 | <u>Operating Environment</u> | .1 | Fender unit locations will be located as shown on the drawings.  |
| 1.5 | <u>Shop Drawings</u>         | .1 | Furnish shop drawings for anchorage and installation plan.   |

PART 2 PRODUCTS

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|-----|---------------------------------|----|---|
| 2.1 | <u>Rubber Tire Fender Units</u> | .1 | Rubber tire fender units to be of good quality, salvaged from existing wharf, four (4) ply rubber tires as determined by the Departmental Representative with sizes as shown on the drawings. |
|-----|---------------------------------|----|---|

Tires to be in satisfactory condition with no permanent deformity.

- .2 Bolts, nuts and washers shall conform to ASTM A307 and hot dipped galvanized unless specified otherwise.
- .3 Miscellaneous steel: Grade 350W, hot-dipped galvanized after fabrication.
- .4 Hot-dip galvanized to ASTM A123 with minimum zinc coating to 600 g/m<sup>2</sup>.

2.2 D-Fender System

- .1 D-fender system to be of good quality, salvaged from existing wharf as determined by the Departmental Representative with sizes as shown on the drawings. D-fenders to be in satisfactory conditions with no permanent deformity.
- .2 Hardware to match that specified in 2.1 herein.

PART 3 - EXECUTION

3.1 Installation of Fenders

- .1 Installation of the fender components and the complete fendering system, to be as per the drawings.
- .2 Do not make alterations to system components without the written permission of the Departmental Representative.

**END OF SECTION**

PART 1 - GENERAL

- 1.1 Description of Work .1 This section specifies requirements for the following items:
- .1 Ladders
  - .2 Mooring cleats and bollards
  - .3 Light Pole Bases
- 1.2 Reference Standards .1 ASTM A307-14, Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.
- .2 CAN/CSA-G40.21-13, Structural Quality Steels.
  - .3 ASTM A123-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - .4 ASTM A48-03 (R2012), Gray Iron Castings
- 1.3 Related Work .1 Refer to other Specification Sections for related information.
- .2 Refer to Section 01 33 00 for Shop Drawing/Submissions requirements.
- 1.4 Submissions .1 Shop Drawings:
- .1 Clearly indicate the following items:
    - .1 General arrangements, dimensions, clearance locations and directions of assemblies as installed on structures.
    - .2 Locations, sizes and installation tolerances of anchor bolts, eye bolts and embedded parts.
    - .3 Types of materials used, finishes and core thickness.
    - .4 All other pertinent details and accessories.
  - .2 Product Data/Samples:
    - .1 Provide product data and manufacturers brochures for the mooring cleats and bollards.
  - .3 Test Results:
    - .1 Provide test results for the galvanized items.

- .4 Submissions
  - .1 Provide submissions in accordance with Section 01 33 00.

PART 2 - PRODUCTS

2.1 Miscellaneous Materials

- .1 Hardware and miscellaneous items must meet the following specifications:
  - .1 Machine bolts, lag bolts, drift bolts, anchor bolts, nuts, washers to ASTM A307 (minimum).
  - .2 Steel plates, ladder rungs, holdfasts and miscellaneous steel: to CSA G40.21, Grade 350W.
  - .3 Do not use items manufactured or fabricated from scrap steel of unknown chemical composition or physical properties.
  - .4 Hot dip galvanize bolts, anchor bolts, nuts, washers, pip sleeves, steel plates, rungs, holdfasts, U-bolts and any other miscellaneous steel to ASTM A123/A123M with minimum zinc coating of 600 g/m<sup>2</sup>. All sharp corners, edges and weld splatter to be ground smooth prior to galvanizing.
  - .5 The material requirements for installation of light poles are given in the electrical sections/drawings.
  - .6 Weld quality and workmanship shall comply with CSA standard W47.1 and W59. Welders to be certified by Canadian Welding Bureau.

2.2 Marine Bollards and Cleats

- .1 Bollards: ductile iron casting (spheroidal graphite cast iron) to ASTM A536.
  - .1 50 tonne:
    - .1 Safe working load: 490 kN.
    - .2 Minimum factor of safety against failure: 3.0.
- .2 Cleats:
  - .1 10 tonne:
    - .1 Safe working load: 980 kN.
- .3 All fixing hardware to be hot dip galvanized as per ASTM A123.
- .4 Grout: shrinkage compensating non-metallic.
- .5 Paint:
  - .1 Supply the bollards with a high performance protective coating system. Protective coating system to consist of blast cleaning, supply and

application of an inorganic zinc primer coat, and two (2) or more coats of immersion grade epoxy and the proper curing of the coatings.

.2 Surface preparation, application and the dry film thickness (DFT) of each coat shall be as recommended by the paint manufacturer. The total DFT of the coating system shall, however, not be less than 350um (14 mils).

.3 Supply the complete coating system from the same paint manufacturer and each component of the system must be compatible with the rest of the systems.

.4 Colours:

.1 To be confirmed by the Departmental Representative.

### PART 3 - EXECUTION

#### 3.1 Ladders

.1 Assemble ladder units including uprights and install completed units in locations shown on plan or as indicated by the Departmental Representative.

.2 Countersink bolts on exterior face of ladder.

.3 Ladder upright joint design capacities are as follows, unless specified otherwise:

.1 Tension members: 50% of member maximum capacity.

.2 Shear members: 50% of member maximum capacity.

.3 Compression members:

.1 Grind member flush, fillet weld (min 5mm) all around, 60% of members thickness.

.2 Complete penetration weld.

.4 Ladder upright shop drawing required.

#### 3.2 Mooring Cleats and Bollards

.1 Install mooring cleats and bollards as shown on drawings and fasten to concrete deck and curb using anchor bolts as recommended by the manufacturer. Allow for 25 mm of grout under base, unless noted otherwise.

.2 Do not make alternations to any components without written permission of the Departmental Representative.

- 3.3 Setting and Grouting .1 Set bollards/cleats at locations and elevations as indicated.
- .1 After tightening of anchor bolts or positioning wedges, grout under base.
  - .2 Confirm temperatures of foundation, air, base and grout are within range specified by grout manufacturer.
- .2 Do not grout until location of anchor bolts and bollards have been approved by the Departmental Representative.

**END OF SECTION**