

PART 1 - GENERAL

<u>1.1 Description</u>	.1	The work under this section covers all metal fabrication items including, but not limited to:
	.1	Supply and installation of tie rods, end brackets, wall panel support clips on new H-piles, HSS wheel guard, chocks and end plates, paired HP sections at corners, channel waler ties at tie-rod level, bollard base quarter rounds, sleeves, galvanized steel ladder assemblies on the encasement wall, grab bars, rubber tire fender supports, new mooring cleats, bollards, and metal shroud supports.
	.2	Removal, refurbishment and reinstallation of existing mooring cleats on new wheel guards.
	.3	Supply and installation of steel closure plates at wall repairs in existing SSP wall behind concrete encasement.
<u>1.2 Related Sections</u>	.1	Section 02 41 13 Site Work, Preparation and Removal.
	.2	Section 03 30 00 Cast-in-Place Concrete.
	.3	Section 03 41 00 Precast Structural Concrete.
	.4	Section 06 30 00 Treated Dimension Timber.
	.5	Section 31 62 16 Steel H Piles.
<u>1.3 Measurement Procedures</u>	.1	<u>Tie-Rods</u> : Tie-rod assemblies complete with plates, brackets and nuts will be measured by the unit supplied and acceptably installed in the work.
	.2	<u>Ladders</u> : Galvanized ladder assemblies on new concrete encasement wall will be measured in units supplied and acceptably installed in the work. To include supply and installation of wood ladder uprights.
	.3	Galvanized ladder assemblies for concrete wall panels: Include cost of supply, fabrication, galvanizing, and installation in Type 'B' precast wall panel payment

item.

- .4 Grab Bars: Galvanized grab bars will be measured in units supplied and acceptably installed in the work, including galvanizing.
- .5 Wheel Guards: Galvanized wheel guard assemblies, including isolation membrane, will be measured in linear metres, (LM), supplied and acceptably installed in the work, including galvanizing.
- .6 Wall Panel Support Clips: will be measured by the unit supplied and acceptably installed in the work.
- .7 Refurbished Mooring Cleats: Existing mooring cleats removed, cleaned, sand-blasted, galvanized and reinstalled will be measured by the unit refurbished and acceptably installed in the work.
- .8 New Mooring Cleats: will be measured by the unit supplied and acceptably installed in the work, including galvanizing.
- .9 Bollards: will be measured by the unit supplied and acceptably installed in the work, including galvanizing and related quarter-round galvanized steel embedments in bollard bases.
- .10 Rubber Tire Fenders: will be measured by the unit supplied and acceptably installed in the work, including all plates and fasteners as detailed on the plans.
- .11 Tire Fender Support Racks: will be measured by the unit supplied and acceptably installed in the work, including galvanizing. One unit consists of a rack of three tires.
- .12 Power Center Shroud Supports: galvanized posts for the support of the metal shrouds will be measured by the unit supplied and acceptably installed in the work. One unit will consist of a pair of posts for the support of one shroud.

- .13 Miscellaneous Steel: The supply, fabrication and installation of the end wall closure plates, channel waler ties at tie-rod level and welded HP sections at corners will be measured as a lump sum item.
- .14 Miscellaneous anchors, bolts, nuts, washers, clips, plates, sleeves, angles and fasteners will not be measured separately for payment but will be considered as incidental to the work for which they are supplied. This includes all welding, cutting, drilling and other work necessary to complete the project.

1.4 References

- .1 American Welding Society (AWS)
 - .1 AWS D3.6M:2010, Underwater Welding Code.
- .2 American Society for Testing and Materials International (ASTM).
 - .1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - .2 ASTM A123/A123M-12, Standard Specification for Zinc, (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A307-12 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - .4 ASTM A325-10, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - .5 ASTM B209M-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
- .3 Canadian Standards Association (CSA)
 - .1 CSA-G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steels.
 - .2 CSA-S16-09, Design of Steel Structures.
 - .3 CSA-W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
 - .4 CSA-W47.2-11, Certification of companies for fusion welding of aluminum.

		.5	CSA-W48-06 (R2011), Filler Metals and Allied Metals for Metal Arc Welding.
		.6	CSA-W55.3-08, Certification of companies for resistance welding of steel and aluminum.
		.7	CSA-W59-03 (R2008), Welded Steel Construction (Metal Arc Welding).
		.8	CSA-W59.2-M1991 (R2008), Welded Aluminum Construction.
1.5	<u>Source Quality Control</u>	.1	The Contractor is to provide written documentation from the Canadian Welding Bureau certifying that all welders used for this work are qualified to the requirements of CSA-W47.1, Division 1 or 2.1 or CSA-W47.2.
		.2	Provide written procedures to Departmental Representative for review and approval indicating methods to be used for all welding on this project.
		.3	Provide evidence to the Department Representative of current qualifications of welders.
1.6	<u>Procedure and Welder Qualification for Underwater Welding</u>	.1	No underwater welding is to proceed until qualification of welding procedure and performance qualifications to Section 5, "Qualification" and verification of procedure and performance qualification to Section 6, "Inspection" as per AWS D3.6M, has taken place.
		.2	Contractor is responsible to provide satisfactory evidence to the Departmental Representative that the procedure and welders have been qualified and a verification of procedure and performance qualification has been carried out. No production welding is to be done prior to this submission being approved by the Departmental Representative.
1.7	<u>Shop Drawings</u>	.1	Submit fabrication and erection documents and material lists in accordance with Section 01 33 00 Submittal Procedures.
		.2	It is the responsibility of this Contractor to field confirm the exact locations and construction of related work to which work under this section connects to, or

is supported on.

- .3 Indicate all details and information necessary for assembly and installation purposes such as, description of methods, type of equipment proposed for use, method of cleaning existing steel sheet pile surfaces and temporary bracing, clamps etc. for bringing and holding new angles tight to the existing steel sheet pile surface during the welding operations.
- .4 Each drawing submission shall bear signature and stamp of qualified Professional Engineer registered or licensed to practice in the Province of New Brunswick, for all assemblies, components, details and connections not shown on the drawings.
- .5 Review of procedure and erection drawings will extend to general design concept only. This review does not relieve the Contractor of the responsibility for accuracy of the detail dimensions, general fit-up of parts to be assembled, adequacy of proposed methods and procedures or for errors or defects contained in the details.

1.8 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.

1.9 Waste Management and Disposal

- .1 Divert unused metal materials from landfill to an approved metal recycling facility approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 Materials

- .1 Steel angle clips, plates and rods to CSA G40.20/G40.21, Grade 300W.

- .2 HSS, H piles and W sections to CSA G40.20/G40.21, Grade 350W.
- .3 Welding Electrodes (underwater): to be wet welding electrodes, Thyssen Nautica 20, Hydroweld FS, or approved equal.
- .4 Welding Electrodes (above water): to CSA W48 Series.
- .5 Structural Bolts: to ASTM A325.
- .6 Galvanizing: Hot Dip to ASTM A123/A123M. (610g/m²).
- .7 Galvanizing Touch-Up/Repair:
 - .1 Touch-up galvanizing for repair to damaged galvanized surfaces and refurbishing of mooring cleats and bollard shall be with Galvicon, as manufactured by Kenco Division, Southern Coatings and Chemical Company Inc.
- .8 Tie Rods: Thread bar (ASTM A615) Grade 75.
 - .1 To be supplied by Dywidag, or approved alternate.
 - .2 Nuts to be hex-type, 100 mm long, capable of developing a stress of 517 MPa in anchor rod.
- .9 Underwater anchorage adhesive: See Section 03 30 00 Cast-in-Place Concrete.
- .10 Above water anchorage adhesive: See Section 03 30 00 Cast-in-Place Concrete.
- .11 Stainless steel threaded anchors: AISI type 304 stainless steel. Stainless steel anchors shall be provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener.
- .12 Tire Fenders: To be used rubber tires of good quality as approved by the Departmental Representative. Size

as indicated on plans.

- .13 Wood uprights for ladders: See Section 06 30 00
Treated dimension timber.
- .14 Pipe: Pipe for bollards and quarter-rounds to be to
ASTM A53, grade 240, standard weight, (SCH. 40).
- .15 Isolation membrane for wheel guards: SBS rubberized
asphalt compound, self-adhering type, reinforced with
cross laminated polyethylene film, nominal thickness
of 40 mils (1.0 mm).

2.2 Fabrication - General

- .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 Provide adequate drainage at low points of all closed
sections. Indicate drain hole locations on shop
drawings.

PART 3 - EXECUTION

3.1 General

- .1 Do steel work in accordance with CSA-S16.
- .2 Do welding work in accordance with CSA W47.1 or
CSA W47.2 unless specified otherwise.
- .3 Erect metal work square, plumb, square, and true,
accurately fitted, with tight joints and intersections.
- .4 Take necessary care in the handling of all galvanized
steel parts to prevent damage to the galvanized coating.
Evidence of damage shall be cause for rejection.
Damage may be touched-up if approved by
Departmental Representative.

3.2 SSP Anchorage
for Concrete Encasement

- .5 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
- .1 Preparation and Cleaning:
 - .1 Clean all fouling, marine growth and corrosion from surface of existing steel sheet piling in area of welding.
 - .2 Cleaning of existing surfaces to be by waterjet or other approved method.
 - .3 Degree of cleaning to be as required for proper fit and welding of new work to existing as per CSA W59, and AWS D3.6M.
- .2 Installation:
 - .1 Install new work as indicated and in accordance with CAN/CSA-S16 and reviewed shop drawings.
 - .2 Provide temporary bracing, clamping or other approved means of holding the new steel angle sections tight to the prepared surface of the existing steel sheet piling as required until permanent welded connections are completed.
- .3 Patching:
 - .1 Patch openings in existing steel sheet piling using 6.0 mm thick steel plate. Tack weld in place to cover openings to prevent loss of concrete during placement.
- .4 Welding:
 - .1 Do welding in accordance with CSA-W59 for above water welding and AWS D3.6 for underwater welding.
 - .2 Companies to be certified under Division 1 or 2.1 of CSA-W47.1 for fusion welding of steel structures and/or CSA-W55.3 for resistance welding of structural components.
 - .3 In addition to requirements of 3.2.3.1 and 3.2.3.2, all underwater welding to be in strict accordance with AWS D3.6M, Specification for Underwater Welding.
 - .4 All underwater welds to be Class 'B' in

accordance with AWS D3.6M, Specification
for Underwater Welding.

3.3 Welding Inspection

- .1 The Contractor is responsible to assure that materials, fabrication, and examination procedures for all welding conforms to CSA W59 or W59.2.
- .2 Quality assurance inspection and testing of welds will be carried out by a Testing Agency designated by Departmental Representative.
- .3 Provide safe access and working areas for inspection and testing on site, as required by Testing Agency and as authorized by Departmental Representative.
- .4 Inspection or testing by Departmental Representative will not augment or replace Contractor's quality control nor relieve him of his contractual responsibility.

3.4 Preparation of Mooring
Cleats

- .1 Clean and prepare existing mooring cleats to be reinstalled in the work to SSPC SP6, Commercial Blast Cleaning.
- .2 Hot dip Galvanize to ASTM A123/123M, (610 g/m²).
- .3 Install in new work as indicated on plans.