

PART 1 - GENERAL

- 1.1 Description .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, channel waler ties at tie-rod level, end wall closure plates, wall panel support clips on new H-piles, H-piles erection bracings, sleeves, galvanized steel ladder assemblies, holdfasts, grab bars and threaded rods.
- 1.2 Related Sections .1 Section 01 74 21 Construction/Demolition Waste Management & Disposal.
- .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.
- 1.3 Measurement Procedures .1 Tie-Rods: Tie-rod assemblies complete with plates, brackets and nuts will be measured by the unit supplied and acceptably installed in the work.
- .2 Holdfasts: Galvanized holdfasts will be measured in units supplied and acceptably installed in the work, including galvanizing.
- .3 Grab Bars: Galvanized grab bars will be measured in units supplied and acceptably installed in the work, including galvanizing.
- .4 Wall Panel Support Clips: will be measured in units supplied and acceptably installed in the work.
- .5 H-Pile Erection Bracings: will be measured in linear meters, (LM), supplied and acceptably installed and removed in the work.
- .6 Miscellaneous Steel: The supply, fabrication and

installation of the end wall and corner wall closure plates and channel waler ties at tie-rod level will be measured as a lump sum item.

- .7 Galvanized ladder assemblies for concrete wall panels: Include cost of supply, fabrication, galvanizing, and installation in Type 'B' and 'D' Precast Wall Panel payment item.
- .8 Galvanized ladder assemblies for cast-in-place concrete wall and wall beam: Include cost of supply, fabrication, galvanizing, and installation in cast-in-place payment items.
- .9 Cathodic protection plate assemblies: Include cost of supply, fabrication and installation in cathodic protection payment item.
- .10 Miscellaneous anchors, rods, 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 A123/A123M-12, Standard Specification for Zinc, (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A307-12 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 - .3 ASTM A325-10, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - .4 ASTM B209M-10, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

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- .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 Source Quality Control
 - .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 Procedure and Welder Qualification for Underwater Welding
 - .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 Shop Drawings

- .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 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.
- .4 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, C sections, threaded rods and

- .2 rods to CSA G40.20/G40.21, Grade 300W.
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 shall be with Galvicon, as manufactured by Kenco Division, Southern Coatings and Chemical Company Inc.
- .8 Tie-Rods: Threaded 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 Anchorage adhesive: See Section 03 30 00 Cast-in-Place Concrete.

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.
- .5 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.2 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.