PART 1 – GENERAL

1.1 Related Work

.1 Refer to other Specifications Sections for related information.

.2 Refer to **Section 01 33 00** for Shop Drawing/Submissions requirements.

1.2 References

.1 ASTM A252-93 (or latest edition), Specification for Welded and Seamless Steel Pipe Piles.

.2 ASTM A307-94 (or latest edition), Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.3 ASTM A325M-93 (or latest edition), Specification for High-Strength Bolts for Structural Steel Joints.

.4 ASTM A490M-93 (or latest edition), Specification for High-Strength Steel Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.

.5 CAN/CSA-G40.20-M92 (or latest edition), General Requirements for Rolled or Welded Structural Quality Steel.

.6 CAN/CSA-G40.21-M92 (or latest edition), Structural Quality Steels.

.7 CAN/CSA-S16.1-94 (or latest edition), Limit States Design of Steel Structures.

.8 CSA W47.1-92 (or latest edition), Certification of Companies for Fusion Welding of Steel Structures.

.9 CSA W47.1S1-M1989, Supplement No. 1-M1989 to W47.1-1983.

.10 CSA W48.1-M1991 (or latest edition), Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.

.11 CSA W59-M1989 (or latest edition), Welded Steel Construction (Metal Arc Welding).

.12 CSA W59S1-M1989, Supplement No. 1-M1989, Steel Fixed Offshore Structures, to W59-M1989.

.13 CGSB 1-GP-171M-79 (or latest edition), Coating, Inorganic Zinc.

1.3 Shop Drawings

.1 Submit shop drawings in accordance with **Section 01 33 00** - Submissions/Shop Drawings.

.2 Indicate the following items:

.1 Material
.2 Anchorage, field control and alignment methods
.3 Design parameters
.4 Tolerance for driving pile
.5 Removable members
.6 Alternatives

1.4 Design Criteria

.1 Design templates to safely withstand following loads:

.1 All gravity loads to which template shall be subjected.
.2 Lateral loads to firmly hold pile in position when driving.

1.5 Protection

.1 Protect templates from damage. Repair damage to templates, formwork or concrete arising from operations to satisfaction of *Departmental Representative* at no extra cost.

1.6 Measurement for Payment

.1 No measurement will be made under this section. Include costs in items of work that require templates.

PART 2 - PRODUCTS

2.1 Materials

.1 Steel sections and plates: to CAN/CSA-G40.20 and CAN/CSA-G40.21, Type 300 W.

.2 Welding Materials: to CSA W59.

.3 Bolts, nuts and washers: to ASTM A307 or ASTM A325M.

PART 3 - EXECUTION

3.1 Fabrication

.1 Fabricate structural steel for templates in accordance with CAN/CSA-S16.1 and reviewed shop drawings.

.2 Welding in accordance with CSA W59.

.3 Welding companies shall be qualified under provisions of CSA W47.1.

3.2 Positioning

.1 Position and hold template in location to receive piles with an accuracy which will ensure piles are within tolerances specified.

.2 Before driving batter piles set templates to within 10 mm of elevations indicated on shop drawings.

3.3 Placing Batter Piles

.1 Remove members in templates as necessary to place batter piles. Replace members prior to placing other batter piles or driving of batter piles. Indicate members to be removed for this operation on shop drawings. Mark them "Removable".

3.4 Removal of Templates

.1 Avoid any damage to piling when removing templates.

.2 When instructed by *Departmental Representative* move templates from project site.

PART 1 - GENERAL

1.1 Description of Work

This Section includes but is not limited to the the following:

.1 All normal removals as required to complete the work. All items to be verified by a site visit prior to submission of a tender. All available plans of the existing structure are available for viewing at the Project Manager's office, 2nd floor, 1713 Bedford Row, Halifax, N.S.

.2 Any derricks, gas lines or buildings to be removed by others unless otherwise indicated.

1.2 Related Work

.1 Refer to other specification sections for related information.

.2 Refer to **Section 01 33 00** for Shop Drawing/Submission requirements.

1.3 Submissions

.1 Methodology:
.1 When requested provide methodology for carrying out the work

.2 Provide submission in accordance with **Section 01 33 00.**

1.4 Protection

.1 Prevent movement, settlement or damage of adjacent structures. Provided bracing and shoring as required. In event of damage, immediately replace such items or make repairs to approval of *Departmental Representative* and at no additional cost to *Departmental Representative*.

.2 Prevent debris from going adrift and becoming a menace to navigation.

.3 All damage to existing structures, roadways, pipelines, electrical systems not specified for removal to be repaired at the

Contractor's cost to the satisfaction of the *Departmental Representative*.

1.5 Measurement for Payment

.1 Sitework, demolition and removals will be measured in accordance with **Section 01 29 00.**

PART 2 - PRODUCTS Not applicable.

PART 3 - EXECUTION

3.1 Preparation

.1 Inspect site and verify with *Departmental Representative* items designated for removal and items to be preserved.

.2 Locate and protect utility lines. Preserve in operating condition active utilities traversing site.

.3 Provide temporary power and lighting as shown on the plan or as required by the *Departmental Representative*.

.4 Existing fill and vent pipes, oil waste tanks and underground storage tanks to be protected from any damages. All repairs to damages as a result of Contractor's operations to be at his cost and to the satisfaction of the *Departmental Representative*.

3.2 Removal

.1 Remove items indicated.

.2 Do not disturb adjacent structures designated to remain in place.

.3 At end of each day's work, leave work in safe condition so no part is in danger of toppling or falling.

3.3 Disposal of Material

.1 Disposal of materials not designated for salvage or re-use in work, will be the contractor's responsibility, and must be disposed of off-site.

.2 The material to be disposed is to be transported and disposed of in an environmentally acceptable manner to the satisfaction of the *Departmental Representative*, and in accordance with any local, Municipal, Provincial and Federal restrictions and regulations.

3.4 Restoration

.1 Upon completion of work, remove debris, trim surfaces and leave work site clean.

.2 Reinstate areas and existing works outside areas of demolition to conditions that existed prior to commencement of work. Match condition of adjacent, undisturbed areas.

PART 1 - GENERAL

1.1 Related Work

.1 Refer to other Specification Section for related information.

.2 Refer to **Section 01 33 00** for Shop Drawings/Submissions requirements.

1.2 Submissions

.1 Methodology:
.1 Provide methodology including type of pile driving equipment to carry out the work.

.2 Provide submissions in accordance with **Section 01 33 00.**

1.3 Existing Sub-Surface Conditions

.1 Sub-surface investigation reports may be available for inspection.

1.4 Protection

.1 Protect public and construction personnel, adjacent structures and work of other sections from hazards attributes to pile driving operations or any other operations.

1.5 Scheduling of Work

.1 Submit schedule of planned sequence of driving to *Departmental Representative* for review, not less than 2 weeks prior to commencement of pile driving for structure.

1.6 Measurement for Payment

.1 This item will not be measured separately.

PART 2 - PRODUCTS

2.1 Materials

.1 For material requirements refer to **Section 02457**, Wood Piles.

.2 Provide equipment of sufficient capacity to handle full length piles without cutting and splicing.

.3 Pile lengths indicated are based on lengths estimated to remain in completed structure.

.4 Splicing of piles will not be permitted unless specifically agreed to by the *Departmental Representative*.

PART 3 - EXECUTION

3.1 Equipment Requirements

.1 Equipment information: prior to commencement of pile installation operation, submit to *Departmental Representative* for review, details of equipment for installation of piles. For impact hammers give manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer and mass of driving cap.

.2 Hammer:
Hammers to weigh between 817 - 1,000 kg and be capable of developing a blow at normal speed of 20340 joules. When required penetration is not obtained by use of hammers complying with minimum requirements, either provide larger hammer or take other measures, acceptable to *Departmental Representative*. Drop hammers are permitted. All piles damaged due to over driving to be replaced at the Contractor's cost.

.3 Leads:
.1 Construction pile driver leads to provide free movement of hammer. Hold leads in position at top and bottom, with guys, stiff braces, or other means approved by *Departmental Representative*, to ensure support to pile while being driven.

.4 Followers:
.1 When permitted, provide followers of such size, shape, length and mass to permit driving pile in desired location to required depth and resistance.

Provide followers with socket or hood carefully fitted to top of pile to minimize loss of energy and prevent damage to pile.

3.2 Preparation

.1 Ensure that conditions at pile locations are adequate to support pile driving operation. Make provision for access and support of piling equipment during performance of work.

3.3 Field Measurement

.1 Maintain accurate records of driving for each pile, including:
- .1 Type and make of hammer, stroke or related energy.
- .2 Other driving equipment including water jet, driving cap, cushion.
- .3 Pile size, length and location.
- .4 Sequence of driving piles.
- .5 Number of blows per metre for entire length of pile and number of blows per 25 mm for last 100 mm.
- .6 Final tip and cut-off elevations.
- .7 Other pertinent information such as interruption of continuous driving, pile damage.
- .8 Record elevation taken on adjacent piles during driving of each pile.

.2 **Provide *Departmental Representative* with three copies of records.**

3.4 Driving

.1 Use driving caps to protect piles.

.2 Hold piles securely and accurately in position while driving.

.3 Deliver hammer blows in direct axis of pile.

.4 Reinforce pile heads if necessary.

.5 Do not drive piles within a radius of 8 m of concrete which has been in place less than 3 days.

.6 Redrive piles lifted during driving of adjacent piles.

.7 Use of water jet:

.1 Use water jets only with written permission of *Departmental Representative*.

.2 When water jets are permitted number of jets and volume and pressure of water must be sufficient to freely erode material immediately adjacent to pile. Plant must be capable of delivering water pressure of at least 690kPa as measured at two 20 mm nozzles.

.3 Restriction: stop jetting at a minimum of 1 m above tip elevation of piles previously driven within 2 m of jet, except where piles are to be carried to rock surface. Drive piles down beyond depth of jetting until required resistance is obtained. If there is evidence that jetting has disturbed load-bearing capacities of previously installed piles, restore bearing capacity of those piles by redriving. Redrive where necessary after jetting operations in area have been completed.

.8 Cut off piles neatly and squarely at elevations indicated. Provide sufficient length above cut-off elevation so that part damaged during driving is cut off.

.9 Remove cut-off lengths from site on completion of work.

.10 Installation of each pile will be subject to acceptance by *Departmental Representative*. *Departmental Representative* will be sole judge of acceptability of each pile with respect to final driving resistance and depth of penetration. *Departmental Representative* to accept final driving of all piles prior to removal of pile driving rig from site.

.11 Shape bottom of pile so that shoe will have full bearing on pile prior to driving. Install pile shoes using spikes as shown.

.12 Drive each pile to a minimum penetration of tip elevation indicated on the drawings, or to driving resistance, as determined by the *Departmental Representative*.

3.5 Driving Tolerances

.1 Pile heads to be within 50 mm of locations indicated.

.2 Piles not to be more than 2% of length out of alignment.

3.6 Damaged or Defective Piles

.1 Remove rejected pile and replace with a new, and if necessary, a longer pile.

.2 No extra compensation will be made for removing and replacing or other work made necessary through rejection of a defective pile.

PART 1 - GENERAL

1.1 Related Work

.1 Refer to other Specification Sections for related information.

.2 Refer to **Section 01 33 00** for Shop Drawing/Submission requirements.

1.2 Reference Standards

.1 CAN/CSA-080 Series M89 (or latest edition)- Wood Preservation (including CSA preliminary standard 080.31-M1989).

.2 AWPA P7-85 (or latest edition)- Creosote for Brush or Spray Treatment for Field Cuts (American Wood Preservers Association).

.3 NLGA standard grading rules for Canadian Lumber 1980 edition or most recent edition at time of tendering.

.4 CAN/CSA-G164-M92 (or latest edition) - Hot Dip Galvanizing of Irregularly Shaped Articles.

.5 ASTM A307-94 (or latest edition), Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

.6 ASTM B111-1974 (or latest edition), Wire Nails, Spikes and Staples.

.7 CAN/CSA-G40.21-M92 (or latest edition), Structural Quality Steels.

.8 CSA W59-M1989 (or latest edition), Welded Steel Construction (Metal Arc Welding).

1.3 Submissions

.1 At least two weeks prior to finalizing timber order, submit a schedule of pile lengths for review.

.2 Submit methodology for field treatment.

.3 Provide submissions in accordance with **Section 01 33 00**.

1.4 Protection

.1 Avoid dropping, bruising or breaking of wood fibres.

.2 Avoid breaking surfaces of treated piles.

.3 Do not damage surfaces of treated piles below cut-off elevation by boring holes or driving nails or spikes into them to support temporary material or staging. Support staging in rope slings carried over tops of piles or by attaching to pile clamps of approved design.

.4 Treat cuts, breaks or abrasions on surfaces of treated piles, bolt holes and field cuts in accordance with CAN/CSA-080 using Copper naphthenate.

1.5 Inspection

.1 All timber piles to be inspected and accepted by *Departmental Representative* prior to being incorporated in the work.

1.6 Measurement for Payment

.1 Consider shoes and cap plates incidental to installation of piles.

.2 Supply of timber piling will be measured in accordance with **Section 01 29 00.**

.3 Installation of timber piling will be measured in accordance with **Section 01 29 00.**

.4 Mobilization of equipment will be considered incidental to installation of piles.

.5 Base tender on number and lengths of piles indicated on the plan.

.6 *Departmental Representative* will establish actual number and lengths of piles installed from driving records.

.7 Adjustments in contract price due to changes in number and lengths of piles will be based on unit prices established in Contract.

PART 2 - PRODUCTS

2.1 Materials

.1 Round Wood Piles: Red pine to CAN3-056, with minimum butt size of 300 mm and tip

diameter in accordance with Table A-1. Order length to suit conditions indicated. *Departmental Representative* shall be sole judge as to quality and dimension of piles or equal to CAN3-056.

.2 Timber Treatment:

.1 Preservative treatment to CAN/CSA-080 Series - M89 for Marine Construction Coastal Waters. Where assay retentions are not indicated, they are to be taken as 1.5 times the indicated gauge retention. Creosote preservative will not be permitted for fender piles.

.2 Make arrangements for timber testing by:

.1 Plant Inspection: Provide treatment plant identification, date of treatment, list of various pieces in the charge, charge number, plant assay testing results, concentration and type of preservative used, duration of treatment, gauge retention, species of wood; and make arrangements with the treatment plant to locate bundles, move bundles, break open bundles and carry out other measures to facilitate the inspection.

.2 Filling in and submitting a preprinted form, agreed to by the *Departmental Representative*, containing the above information.

.3 The *Departmental Representative* may test in the plant or in the field or may choose to not test some charges at either the plant or the field.

.4 Timber will be protected during handling, shipping, offloading and field handling, by use of suitable equipment and procedures. Use rope or fabric strap slings on site for moving

bundles or individual timbers, rather than metal grabs, chains or cables.

.5 Field treatment: Copper naphthenate as per AWPA.

.3 Miscellaneous Hardware: Hardware must meet the following specifications:

.1 Machine bolts, drift bolts, nuts, round plate washers: to ASTM A307

.2 Spikes: to CSA B111

.3 Pile shoes: fabricated from steel plate minimum 6 mm thickness. Steel plate to CSA-G40.21, Grade 300W. Welding to CSA W59. No galvanizing required.

.4 Hot dip galvanize bolts, nuts, washers and spikes to CSA G164 with minimum zinc coating of 600 g/m$^2$.

.5 All hardware galvanized unless otherwise shown on plans or specified.

2.2 Wood Preservation .1 Wood piles are to be treated with wood preservative treatment as specified.

PART 3 - EXECUTION

3.1 Handling Timber .1 Timber will be protected during handling, shipping, offloading and field handling, by use of suitable equipment and procedures. Use rope or fabric strap slings on site for moving bundles or individual timbers, rather than metal grabs, chains or cables.

3.2 Handling Treated Timber .1 Handle treated material to avoid damage causing alteration in original treatment.

.2 Treat in field, spike holes, boreholes, plugged holes, cuts and any damage to treated material, using Copper naphthenate, as specified herein, regardless of plant treatment type.

.3 Provide methodology pertaining to heating and application. Apply to dry surfaces, wherever possible.

.4 Treat boreholes, using a pressurized container with an extension rod, to produce a fine spray in the holes with one application. Alternately a cylindrical brush may be used.

.5 Treat field cuts and any abrasions with minimum of two liberal applications, using either spray or brush.

.6 In addition, field cuts and underwater damaged areas will receive a coating of plastic compound, capped with lead flashing secured with galvanized roofing nails. Plastic compound not to be water soluble and is subject to approval.

.7 Environmental Concern: Ensure no spillage or excess application of field preservative. Provide workmen with sufficient training and protective gear to properly and safely handle the treated materials and to apply field treatment, so as to prevent undue hazard to themselves, others, or the environment.

.8 **Contain all debris and leachates (films on water surface) within the area of the work by using containment facilities such as floating booms or screens.**

3.3 Preparation

.1 Protect pile heads during driving and hold in position by using a combination cushion-driving head and pilot. Closely fit driving heads to top of pile, and extend down sides of pile for at least 75 mm. Where necessary protect pile heads by means of heavy steel straps of wrought iron rings.

.2 Equip piles with metal shoes.

3.4 Installation

.1 Install piles in accordance with **Section 02451.**

.2 During driving restrain lateral movement of piling at intervals not exceeding 6 m over length between ground surface and driving head.

.3 Cut off fender piles giving a bevel of 4H:1V. Cut off bearing piles horizontally.

.4 Treat tops of cut off bearing piles with two liberal coats of copper naphthenate and a minimum 13 mm of tar roofing felt, folded over sides of pile and securely fastened. Saturate felt with copper naphthenate preservative and cover with 20 gauge or thicker galvanized metal or aluminum sheet, completely covering felt. Apply this procedure regardless of type of preservative used for initial treatment of pile. **This procedure is not required for tops encased in concrete.**