

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.
 - .3 Section 31 61 13.01 - Timber Fender Pile Installation.
 - .4 Section 31 62 19.01 - Timber Fender Piles
- 1.2 Reference Standards
 - .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM F3125-19, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
 - .2 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
 - .2 CSA-S16.1-14, Design of Steel Structures.
 - .4 CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.
 - .5 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
 - .6 CSA W59-18 (or latest edition), Welded Steel Construction (Metal Arc Welding).
- 1.3 Shop Drawings
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submissions/Shop Drawings.
 - .2 Submit shop drawing for pile driving templates to Departmental Representative for review at least 2 weeks prior to fender pile installation.
 - .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

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| 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. |
| | | .3 | All environmental and live loads that may be applied during pile driving activities. |
| 1.5 | Protection | .1 | Protect templates from damage. Repair damage to templates, formwork or concrete arising from operations to satisfaction of <i>Departmental Representative</i> 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. |
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PART 2 - PRODUCTS | | | |
| 2.1 | Materials | .1 | Steel sections and plates: to CAN/CSA-G40.20 and CAN/CSA-G40.21, Type 350 W. |
| | | .2 | Welding Materials: to CSA W59. |
| | | .3 | Bolts, nuts and washers: to ASTM A307 or ASTM F3125/F3125M. |
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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 and Installation | .1 | Position and hold template in location to receive piles with an accuracy which will ensure piles are within tolerances specified. |
| | | .2 | Install pile template prior to the driving of timber fender piles. |
| | | .3 | Modify pile template and resubmit to Departmental Representative for review if results from initial dive inspection are unsatisfactory or |

insufficient, in accordance with Section 31 61
13.01 - Timber Fender Pile Installation.

3.3 Removal of
Templates

- .1 Avoid any damage to piling when removing templates.
- .2 When instructed by *Departmental Representative* move templates from project site.

END OF SECTION

PART 1 - GENERAL

- 1.1 Description of Work .1 This Section includes but is not limited to 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 upon request to the Departmental Representative.
- 1.2 Related Work .1 Refer to other specification sections for related information.
- 1.3 Submissions .1 Submit methodology for carrying out the work to the Departmental Representative for review. Methodology to include protection for adjacent and existing works designated to remain.
- 1.4 Protection .1 Prevent movement, settlement or damage of adjacent structures and components of the facility not specifically identified for removal. Provide 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 facilities, structures, roadways, pipelines, electrical systems modified to facilitate work of this project to be repaired at the Contractor's cost to the satisfaction of the Departmental Representative to match pre-construction condition and surrounding finishes.

PART 2 - PRODUCTS

- 2.1 Materials .1 Not Used.

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.

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| | .3 | Provide temporary power and lighting 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 their own cost and to the satisfaction of the Departmental Representative. |
| 3.2 | Removal | |
| | .1 | Remove items indicated. Full removal of component is expected, unless partial removal is specifically noted. |
| | .2 | Do not disturb adjacent structures designated to remain in place (including those not specifically designated for removal). |
| | .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, unless otherwise noted. |
| | .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. |

END OF SECTION

PART 1 - GENERAL

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| 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. |
| | | .3 | Section 31 09 18.01 - Pile Driving Templates - Fender Piles. |
| | | .4 | Section 31 62 19.01 - Timber Fender Piles. |
| 1.2 | Submissions | .1 | Methodology: <ul style="list-style-type: none">.1 Provide methodology including type of pile driving equipment to carry out the work..2 Submit methodology to Departmental Representative minimum 2 weeks prior to fender pile installation..3 Include methodology to ensure that pile tip is located in proper alignment and to specified tolerances at harbour bottom prior to |
| | | .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. |
| | | .2 | Notify the Departmental Representative immediately if sub-surface conditions at site differ from those indicated. |
| | | .3 | Design is based on subsurface information inferred from the surrounding site records. Pile installation details are based on this information. Installation must be reviewed by the Departmental Representative's Geotechnical Engineer to confirm design assumptions and final acceptance criteria. Coordinate all work to facilitate the Departmental Representative's observations and review. |
| 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 start of pile driving. |

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| 1.6 | Delivery, Storage
And Handling | .1 | Protect piles form damage due to excessive bending stresses, impact, abrasion, or other damages due to storage and handling. |
| | | .2 | Replace damaged piles to satisfaction of the Departmental Representative. |
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| 1.7 | Inspection of Work | .1 | Pile Installation procedures are to be coordinated with the Departmental Representative minimum two (2) weeks prior to the pile installation. The method of advancing pile to specified tip elevation must be reviewed and approved by the Departmental Representative prior to starting work. |
| | | .2 | The Departmental Representative will review Work during the advancement of piles. Contractor to provide access and assistance as required to facilitate the review. Pile tip elevation and driving records must be reviewed and accepted by the Departmental Representative. |

PART 2 - PRODUCTS

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| 2.1 | Materials | .1 | Supply full length piles as indicated in accordance with Section 31 62 19.01 - Timber Fender 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. |

PART 3 - EXECUTION

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| 3.1 | Equipment
Requirements | .1 | Equipment information:
.1 Prior to commencement of pile installation operation, submit to Departmental Representative for review, details of equipment for installation of piles. |
| | | .2 | Hammer for Timber Piles:
.1 Supply a hammer of suitable size to advance the piles to specified tip elevation without pile damage. The hammer selected must be sufficient energy so as not to |

damage the piles. Acceptance of the hammer chosen by the Contractor will be on confirmation of reaching required pile tip elevation, as determined by the Departmental Representative.

- .2 When the required penetration is not obtained, either provide a larger hammer or take other measures acceptable to the Departmental Representative. All piles damaged due to over driving to be replaced at no additional cost to the Contract. Reinforce pile tip and head as required to resist driving loads.

- 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 Final tip and cut-off elevations.
 - .6 Other pertinent information such as interruption of continuous driving, pile damage.
 - .7 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. Piles with damaged heads, as determined by the Departmental Representative, will be rejected.
 - .2 Use steel driving shoes to protect pile toes during driving to the approval of the Departmental Representative.
 - .3 Hold piles securely and accurately in position while driving.
 - .4 Deliver hammer blows in direct axis of pile.
 - .5 Reinforce pile heads if necessary.
 - .6 Re-drive piles lifted during driving of adjacent piles.

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- .7 Cut off piles neatly at elevations indicated, to slope or profile as indicated. Provide sufficient length above cut-off elevation so that part damaged during driving is cut off.
 - .8 Remove cut-off lengths from site on completion of work.
 - .9 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.
 - .10 Shape bottom of pile so that shoe will have full bearing on pile prior to driving. Install pile shoes using spikes.
 - .12 Drive each pile to a minimum penetration of tip elevation indicated on the drawings, or to driving resistance in competent soil, as determined by the Departmental Representative. The required driving resistance is to be 4 blows for the last 25mm of penetration.
- 3.5 Driving Tolerances
- .1 Fender piles to be driven to achieve the following:
 - .1 Pile heads to be within 50 mm of locations indicated.
 - .2 Piles to be within 100 mm of location indicated at harbour bottom.
 - .2 Piles not to be more than 1% of length out of alignment.
- 3.6 Obstructions
- .1 Where obstruction is encountered that causes sudden and unexpected change in penetration resistance or deviation from specified tolerances, advise Department Representative and submit for their review the Contractor's proposed method(s) for achieving specified penetrations and tolerances. Incorporate review comments in the proposed method(s) and proceed with the work.
- 3.7 Damaged or Defective Piles
- .1 Remove rejected pile and replace with a new, and if necessary, a longer pile.

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

END OF SECTION

PART 1 - GENERAL

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| 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. |
| | | .5 | Section 05 50 00 - Metal Fabrications. |
| | | .3 | Section 31 09 18.01 - Pile Driving Templates - Fender Piles. |
| | | .4 | Section 31 61 13.01 - Timber Fender Pile Installation |
| 1.2 | Reference Standards | .1 | American Society for Testing and Materials International (ASTM)
.1 ASTM A307-14, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
.2 ASTM B111-1974 (or latest edition), Wire Nails, Spikes and Staples.
.3 ASTM F3125-18 (or latest edition), Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength. |
| | | .2 | Canadian Standards Association (CSA International)
.1 CSA-G40.20-13/G40.21-13 (of latest edition), General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.
.2 CSA G164-18 (or latest edition), Hot Dipped Galvanizing of Irregularly Shaped Articles.
.3 CAN/CSA O56-10 (R2015), Round Wood Piles.
.4 CAN/CSA-080 Series 15- Wood Preservation.
.5 CSA W59-18, Welded Steel Construction. |
| | | .3 | National Lumber Grading Association (NLGA)
.1 NLGA standard grading rules for Canadian Lumber 1980 edition or most recent edition at time of tendering. |
| 1.3 | Submissions | .1 | At least two weeks prior to finalizing timber order, submit a schedule of pile lengths for review. |

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- .2 Submit methodology for field treatment.
 - .3 Submit specifications and tolerances from fender piling manufacturer to Departmental Representative at least two weeks prior to finalizing timber order.
 - .4 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 field applied preservative.
 - 1.5 Inspection
 - .1 All timber piles to be inspected and accepted by Departmental Representative prior to being incorporated in the work.
 - .2 Notify Departmental Representative not less than 7 days prior to delivery on site to arrange inspection and acceptance of timber fender piles.
 - 1.6 Measurement for Payment
 - .1 Supply and installation of timber piling will be measured in accordance with Section 01 29 00. All equipment, shoes, and cap plates are considered incidental to work.

PART 2 - PRODUCTS

- 2.1 Materials
 - .1 Round Wood Piles:
 - .1 Fender Piles: Red pine to CAN/CSA-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 CAN/CSA-056, and shall

determine final acceptance when piles are delivered to site.

.2 Timber Treatment:

- .1 Preservative treatment to CAN/CSA-080 Series 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 Field Inspection: Provide same information as included under Plant Inspection and facilitating the inspection in the field.
 - .3 Filling in and submitting a pre-printed 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: Same as pile preservative.

.3 Miscellaneous Hardware: Refer to specification Section 05 50 00.

2.2 Wood Preservation

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

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- 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 preservative, as specified herein, regardless of plant treatment type.
- .3 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.
- .4 Treat field cuts and any abrasions with minimum of two liberal applications, using either spray or brush.
- .5 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.
- .6 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.
- .7 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 steel driving shoes.

3.4 Installation

- .1 Install fender piles in accordance with Section 31 61 13.01 - Timber Fender Pile Installation, including Departmental Representative inspection requirements.
- .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, unless note otherwise.
- .4 Treat tops of cut off piles with two liberal coats of copper naphthenate. Apply this procedure regardless of type of preservative used for initial treatment of pile.

END OF SECTION