

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).

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- .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 piles set templates to within 10 mm of elevations indicated on shop drawings.
- 3.3 Placing Piles
- .1 Remove members in templates as necessary to place piles. Replace members prior to placing other piles or driving of 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 following:
- .1 All normal removals as required to complete the work, including but not limited to:
 - .1 All elements of the existing finger, pilework wharf.
 - .2 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.
 - .3 Any derricks, gas lines or buildings to be removed by others unless otherwise indicated.
- 1.2 Site Information
- .1 Results of prior soundings, soil borings and soil investigations may be available for inspection at offices of Public Works and Government Services Canada, P.O. Box 2247, 1713 Bedford Row 2nd Floor, Halifax, N.S. B3J 3C9
 - .2 Results of most recent soundings are included with the drawings. This data is made available for tendering purposes only. It should be noted that this information may differ from present site conditions.
 - .3 The Contractor will be responsible for making his own interpretation of soil conditions at any location, other than borehole locations. Borehole descriptions shown on the logs are only descriptive of conditions at locations described by boreholes themselves.
- 1.3 Related Work
- .1 Refer to other specification sections for related information.

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- .2 Refer to **Section 01 33 00** for Shop Drawing/Submission requirements.
- 1.4 Submissions
- .1 Methodology:
Provide methodology for carrying out the work.
- .2 Provide submission in accordance with **Section 01 33 00**.
- 1.5 Protection
- .1 Prevent movement, settlement or damage of adjacent structures. 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 Provide protection of water intake lines located adjacent to the work area. 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 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.
- .4 The contractor must ensure timbers are not permitted to go adrift during removal operations. Containment booms and regular cleaning of debris from the harbour bottom must occur in conjunction with the removal operations.
- .5 The contractor must exercise caution during removals adjacent to the existing wharf structure.
- .6 Saw-cut existing asphalt/concrete deck to limits of removals where new deck structure ties into the existing wharf deck.
- .7 Existing electrical service on the structure is to be removed. Salvage teck cables and light standard for property of Harbour Authority.

3.3 Disposal of Material

- .1 Disposal of materials not designated for salvage or reuse in work, will be the

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Sitework, Demolition and Removals

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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 Subsurface 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 31 62 19 Wood Piles** and **Section 31 62 26 Steel Pipe Piles**.
 - .2 Provide equipment of sufficient capacity to handle full length piles without cutting and splicing.

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- .3 Pile lengths indicated are supply lengths with an allowance for cut off.
- .4 Splicing of timber 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 - Timber Piles:
 - .1 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 Hammer - Steel Pipe Piles
 - .1 Hammers to be capable of developing a blow at normal speed of 66 000 joules. Piles to be driven to bedrock, refusal as determined by departmental representative.
- .4 Leads:
 - .1 Construction pile driver leads should 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.

.5 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 re-driving. 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 acceptable 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 refusal 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 AWWA 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**.

Wood Piles

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- 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 an approved waterborne preservative.
- 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

Wood Piles

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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 Pile Supply Schedule:
 - .1 Timber piles (bearing and fender) to be supplied in the lengths indicated on the drawings.
- .3 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 Field Inspection: Providing same information as above 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.

Wood Piles

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- .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: An approved waterborne preservative as per AWP A P7.
 - .4 Miscellaneous Hardware: Hardware must meet the following specifications:
 - .1 Machine bolts, drift bolts, nuts, round plate washers: to ASTM A307.
 - .2 Anchor bolts to be secured to concrete with an approved epoxy anchorage system
 - .3 Spikes: to CSA B111
 - .4 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.
 - .5 Hot dip galvanize bolts, nuts, washers and spikes to CSA G164 with minimum zinc coating of 600 g/m².
 - .6 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

Wood Piles

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- 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 an approved waterborne preservative, as specified herein, regardless of plant treatment type.
 - .3 Provide methodology pertaining to waterborne preservative 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

Wood Piles

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- 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 31 61 13.**
- .2 Fender piles are to be secured to the timber wales with 25 mm diameter galvanized machine bolts. Where the piles fall in line with the concrete caps, or on the end of the wharf where no timber wale is available, the piles are to be fastened to the concrete deck with a 25 mm diameter anchor bolt secured to the deck with an approved epoxy anchorage system.
- .2 During driving, restrain lateral movement of piling at intervals not exceeding 6 m over length between ground surface and driving head.
- .3 Fender piles are to be cut bevelled as shown on the drawings.
- .4 Treat tops of cut off all timber piles with two liberal coats of preservative.

PART 1 - GENERAL

- 1.1 Related Work .1 Refer to other Specification Sections for related information.
- 1.2 References .1 API 5L-1995 (or latest edition), Line Pipe (American Petroleum Institute).
- .2 ASTM A252-93 (or latest edition), Welded and Seamless Steel Pipe Piles.
- .3 CGSB 1-GP-171M-79 (amended 1982 - or latest edition), Coating, Inorganic Zinc.
- .4 CGSB 1-GP-184Ma-83 (or latest edition), Coating, Coal Tar-Epoxy.
- .5 CAN/CSA-G40.21-M92 (or latest edition), Structural Quality Steels.
- .6 CSA W47.1-92 (or latest edition), Certification of Companies for Fusion Welding of Steel Structures.
- .7 CSA W47.1S1-M1989, Supplement No. 1-M1989 to W47.1-1983.
- .8 CSA W59-M1989 (or latest edition), Welded Steel Construction (Metal Arc Welding).
- .9 CSA W59S1-M1989 (or latest edition), Supplement No. 1-M1989, Steel Fixed Offshore Structures, to W59-M1989.
- .10 CSA-Z245.1-95 (or latest edition), Steel Line Pipe.
- 1.3 Transportation and Delivery .1 Upon arrival at the site promptly inspect pipe piles and give written report to Departmental Representative on condition of all piles received. Ensure pipe piles are properly marked in accordance with **Clause 2.1.2.3** of this section.
- 1.4 Measurement for Payment .1 Supply and installation of steel pipe piles will be measured in accordance with **Section**

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Steel Pipe Piles

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- 01 29 00** and will include all incidental costs for handling, testing, marking and transportation of pipe piles from supplier to site.
- .2 Consider pile shoes and caps as incidental to supply of piles.
 - .3 Mobilization of equipment will be considered incidental to installation of piles.
 - .4 Churn drilling or any other methods employed to reach specified tip elevation will be incidental to work.
- 1.5 Quality Assurance
- .1 Inspection and testing of steel piling material may be carried out by a testing laboratory designated by Departmental Representative at any time during course of work. When undertaken by Departmental Representative, inspection and testing of pipe pile materials will in accordance with ASTM A252.
 - .2 Materials inspected or tested by Departmental Representative which fail to meet contract requirements will be rejected.
 - .3 Materials failing to meet contract requirements may be rejected at any time in course of work.
 - .4 Where tests or inspections by designated testing laboratory reveal that the pipe pile material fails to meet the specified requirements, the Contractor shall be responsible for all costs associated with this inspection and/or testing. The Contractor shall pay costs for any additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.
- 1.6 Shop Drawings
- .1 Submit shop drawings in accordance with **Section 01 33 00** - Submissions/Shop Drawings.
 - .2 Indicate the following items:

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Steel Pipe Piles

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- .1 pile shoe details
- .2 pile cap details

PART 2 - PRODUCTS2.1 Materials

- .1 Steel pipe: spiral weld, of sizes and wall thicknesses dicated, plain cut ends to API 5L and ASTM A252, grade 3.
- .2 Pipe material to have following minimum properties:
 - .1 Yield strength: 310 MPa.
 - .2 Tensile strength: 455 MPa.
 - .3 Each length of pile will be marked at the supplier either by stencilling or other means to show manufacturer's name, heat number, kind of pipe, size, weight, length, wall thickness, specification number and grade. Pipe pile material not marked in this way will be rejected.
- .3 Pipe chemical composition: to CAN/CSA-Z245.1
- .4 Pipe allowable tolerances:
 - .1 Deviation from straight line, specified diameter, wall thickness and out-of-roundness on body of pipe and at pipe ends to conform to API 5L. Pipe to be checked for deviations before leaving supplier.
- .5 Pile driving shoes: to CAN/CSA-G40.21, Grade 350 WT.
- .6 Steel pile caps: to CAN/CSA-G40.21, Grade 350 WT.
- .7 Welding electrodes: to CSA W48 series.

PART 3 - EXECUTION3.1 Fabrication

- .1 Fabricate full length piles to eliminate splicing during installation wherever possible. Splicing during installation shall not be done without written permission of Departmental Representative.

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Steel Pipe Piles

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- .2 Submit details of planned use of pile material stock to Departmental Representative for approval prior to start of fabrication. Reuse cut-off lengths as directed by Departmental Representative.
 - .3 Allowable tolerance on axial alignment to be 0.25% as measured by a 3m straight edge.
 - .4 Allowable deviation from straight line over total length of fabricated pile to conform to the applicable CSA standard.
 - .5 Install pile shoes and caps in accordance with the manufacturer's details, as required and as reviewed on shop drawings.
 - .6 Repair defective welds only on authority of Departmental Representative. Welds which show evidence of having been repaired without authorization may be rejected. Make repairs in accordance with CSA W59 and CSA W59S1.
 - .7 All pipe pile splices to be full penetration butt welds.
- 3.2 Installation
- .1 Install piling in accordance with **Section 02451** - Pile Foundations, General
 - .2 Driving shoes may be installed during shop fabrication or as part of field work.
- 3.3 Welding
- .1 Weld in accordance with CSA W59 and CSA W59S1.
 - .2 Welding certification of companies shall be in accordance with CSA W47.1 and CSA W47.1S1.