

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
 - .2 Section 05 50 00 - Metal Fabrications
 - .2 Section 31 62 18 - Steel Sheet Piles
- 1.2 DELIVERY, STORAGE AND HANDLING
- .1 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.
 - .2 Replace damaged piles as directed by Engineer.
- 1.3 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate waste materials for in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- 1.4 EXISTING CONDITIONS
- .1 Sub-surface investigation report may be obtained from PWGSC Charlottetown. Refer also to borehole logs on sheets M5, M6 and M7.
 - .2 Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated and await further instructions from Engineer.
- 1.5 SCHEDULING
- .1 Submit schedule of planned sequence of installing piles to Departmental Representative for review, not less than two weeks prior to commencement of pile installation.
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PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Provide equipment to handle full length piles without cutting and splicing.
 - .2 Do not splice piles without written approval of Departmental Representative. When permitted, provide details for Departmental Representative's review. Design details of splice to bear dated signature stamp of Professional Engineer registered or licensed in the Province of PEI, Canada.

PART 3 - EXECUTION

- 3.1 EQUIPMENT
- .1 Prior to pile installation, submit to Departmental Representative for review, details of equipment for installation of piles.
 - .1 Impact hammers: provide manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and pile cushions.
 - .2 Non-impact methods of installation such as augering, jacking, vibratory hammers or other means: provide full details of characteristics necessary to evaluate performance.
 - .2 Hammer:
 - .1 When required criteria cannot be achieved with the proposed hammer, use larger hammer and take other measures as required.
 - .3 Leads:
 - .1 Construct pile driver leads to provide free movement of hammer. Hold leads in position at top and bottom with guys, stiff braces, or other means to ensure support to pile while being drive.
 - .2 Length: except for piles driven through water, provide sufficient length of leads to ensure that use of follower is unnecessary.
 - .3 Swing Leads: Obtain approval from Engineer prior to using swing leads. Firmly guy top and bottom to hold pile in position during driving operation.

3.2 PREPARATION

- .1 Ensure that ground conditions at pile locations are adequate to support pile installing 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 and length, location of pile in pile group, location or designation of pile group.
 - .4 Sequence of driving piles in group.
 - .5 Number of blows per meter for entire length of pile and number of blows per 25 mm for last 1,000 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 before and after driving of each pile.
- .2 Provide Engineer with three (3) copies of records.

3.4 DRIVING

- .1 Use driving caps and cushions to protect piles. Reinforce pile heads as required by Engineer. Piles with damaged heads as determined by Engineer will be rejected.
- .2 Hold piles securely and accurately in position while driving.
- .3 Deliver hammer blows along axis of pile.
- .4 Re-strike already driven piles lifted during driving of adjacent piles to assure set.
- .5 Cut off piles neatly and squarely at elevations as indicated.
- .6 Remove cut off lengths from site on completion of work.

3.5 DESIGN
LOAD CAPACITY

- .1 Installation of each pile will be subject to approval of Departmental Representative.
 - .1 Departmental Representative will be sole judge of accept- ability of each pile with respect to final driving resistance, depth of penetration or other criteria used to determine load capacity.
 - .2 Install each pile to pile tip elevation as indicated.

3.6 OBSTRUCTIONS

- .1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, proceed as directed by Engineer.

3.7 REPAIR/
RESTORATION

- .1 Pull out rejected piles and replace with new piles.
- .2 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.

3.8 PROTECTION

- .1 Arrange pile installation operations and methods to avoid damages to adjacent existing structures. When damages occur, remedy damaged items to restore to original or better condition at own expense.

PART 1 - GENERAL

- 1.1 RELATED SECTIONS
- .1 Section 01 33 00 - Submittal Procedures
 - .2 Section 01 45 00 - Quality Control
 - .3 Section 31 61 13 - Pile Foundations, General Requirements
- 1.2 MEASUREMENT PROCEDURES
- .1 Measure installation of piles in metres of pile acceptably incorporated into work following trimming and cutting of the piles. Measurement will be taken from the final pile tip elevation to the top of pile elevation remaining in the work.
 - .2 Supply and installation of pile shoes will be considered incidental to the work.
 - .3 Extra piling to replace damaged piles will be considered incidental to the work and will not be measured for payment.
- 1.3 REFERENCES
- .1 Canadian General Standards Board (CGSB):
 - .1 CAN/CGSB-1.171M-98, Inorganic Zinc Coating.
 - .2 Canadian Standards Association (CSA):
 - .1 CSA W47.1-92(R1998), Certification of Companies for Fusion Welding of Steel Structures.
 - .2 CSA W47.1S1-M1989, Supplement No.1-1989 to W47.1-1983, Certification of Companies for Fusion Welding of Steel Structures.
 - .3 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding.
 - .4 CSA W59-M1989, Welded Steel Construction (Metal Arc Welding) (Metric Version).
 - .5 CSA W59S1-M1989, Supplement No.1-M1989, Steel Fixed Offshore Structures, to W59-M1989, Welded Steel Construction (Metal Arc Welding).
- 1.4 SHOP DRAWINGS
- .1 Submit shop drawings for the pile shoes in accordance with Section 01 33 00 - Submittal Procedures.
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- 1.5 WASTE MANAGEMENT AND DISPOSAL
- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .2 Divert unused metal materials from landfill to metal recycling factory as approved by Engineer.
 - .3 Unused paint or coating material must be disposed of at an official hazardous material collections site as approved by Engineer.
 - .4 Unused paint and coating materials must not be disposed of into sewer system, into streams, lakes, onto ground or in any other location where it will pose a health or environmental hazard.

PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Welding Materials: to CSA W48.
 - .2 Steel Plates: to CSA-G40.20/G40.21, Type and Grade 350.
 - .3 Pile Driving Shoes: to CSA-G40.20/G40.21, Grade 300.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Install piling in accordance with Section 31 61 13 - Pile Foundations, General Requirements.
 - .2 Install driving shoes on each H-pile.
 - .3 Hold piles securely and accurately in position while driving.
 - .4 Deliver hammer blows in direct axis of pile.
 - .5 The steel H-piles are to be driven vertically or by pre-drilling into the sandstone bedrock if the pile tip elevation cannot be achieved by impact hammer.

3.1 INSTALLATION
(Cont'd)

- .6 If the Contractor discovers that he cannot achieve pile tip criteria by the impact method, he will be responsible for the additional cost associated with the installation of the H-piles by pre-drilling 500mm diameter holes into the sandstone bedrock to a minimum depth of 2.5 metres into the bedrock, including the supply and installation of the underwater concreting and any additional excavation required.
- .7 All piles are to be installed a minimum of 2.5 metres into the bedrock as shown on the drawings. The bottom elevations may vary depending on the exact elevation of the bedrock.
- .8 Prior to commencement of pile installation submit to Engineer for approval details of equipment and method to be used for the installation of the piles.
- .9 Cut off piles squarely at required elevation.
- .10 Touch up scratches on uncoated surfaces with two applications of coal tar epoxy before and after driving.

3.2 TOLERANCES

- .1 H-piles are to be installed to the elevation shown on the plan and specified herein.
- .2 Deviations from the vertical in any direction shall not exceed 1 in 50.
- .3 Twisted piles must be pulled and re-driven in such a manner so the face of the H-pile is square with the face of the wall. Maximum rotation tolerance about the axis of the pile layout to be +/- 1 degree.
- .4 At the mud line, the piles are to be +/- 30mm of the location indicated on the drawings for the direction parallel to the wharf, with no two adjacent piles having a centerline spacing less than 2,500mm. Tolerance at the top of the wharf will be +/- 15mm.

3.3 WELDING

- .1 Weld to CSA W59 and CSA W59 S1.
- .2 Welding certification of companies: to CSA W47.1 and CSA W47.1S1.

3.4 ACCEPTANCE
CRITERIA

- .1 Installation of each pile will be subject to approval of Engineer. Engineer will be sole judge of acceptability of each pile with respect to final depth of penetration or other criteria used to determine bearing capacity or pile stability. Engineer to approve final driving of each pile prior to removal of pile driving equipment.
- .2 Any pile which becomes displaced as the result of the setting of adjacent piles shall be reset as per pile setting criteria.
- .3 Piles shall be reset after 24 hours of the end of installation of that pile until it can be demonstrated that the permanent pile capacity meets the specified capacity criteria.