1.0 GENERAL

1.1 REFERENCES

.1 Provide timber piling in accordance with the following standards (latest revision) except where specified otherwise.

.2 Canadian Standards Association (CSA)

.1	CAN3-O56M	Round Wood Piles (Metric Version).
.2	CSA-O80 SERIES	Wood Preservation.
.3	CSA-O86	Engineering Design in Wood.

.3 American Society for Testing and Materials (ASTM)

.1	ASTM D1143	Standard Test Method for Piles Under Static Axial Compressive Load.

1.2 SUBMITTALS

.1 Provide the following submittals.

.2 A detailed description of the pile driving equipment at least 30 days prior to mobilizing piling equipment to the Site. Include the following as applicable: type and make of the hammer; hammer mass; hammer energy rating and efficiency factor; details, mass, and dimensions of the driving cap and follower; and the type of leads.

.3 Manufacturer's affidavit indicating the type of wood, and certifying that the pile and treatment materials meet the specified requirements, prior to delivering materials to the Site.

.4 Details of points or shoes, including material, shape, and dimensions at least 10 days prior to their use.

.5 The pile installation record within 48 hours after driving of the pile is completed.

.6 A detailed plan of the pile load tests at least 10 days prior to conducting any test. Include the following: details of the equipment and apparatus to be used such as the load platform, hydraulic jacks, pumps, pressure gauges, reaction beams, surveyor's level, target rod, and dial gauges; details of reaction piles; and certification of the calibration of the jack and pressure gauge combination.

.7 Results of the pile load test within 24 hours after the test has been completed.

.8 A record plan at the completion of the pile driving operation showing the actual locations and elevations of all of the piles.

1.3 QUALITY CONTROL

.1 Provide a qualified supervisor to oversee the pile driving [and load testing] operations.

.2 Pile Installation Records: During pile driving operations, prepare the following installation records for each pile:

.1 Project and Contract names, and name and signature of the Contractor's personnel responsible for quality control including preparation of records.

.2 Date of driving and site conditions.

.3 Specified pile identification, location, orientation, and tip and cutoff elevations.

.4 Diameter and initial length of the pile.

.5 Penetration and number of blows.

.6 Elevation, time, and duration of any interruption in driving or any erratic or unusual pile behaviour.

.7 Other pertinent information, including any required by the Minister.

.3 Pile Load Testing:

.1 Notify the Minister at least 48 hours prior to installing test piles and the start of load testing.

.2 Install test piles and complete the load testing as specified, in the presence of the Minister, prior to proceeding with any other pile installation.

.3 Install test piles using the same pile materials and driving equipment that will be used for the other piles.

.4 Provide and install brackets and reference beams for checking the test pile driving operation.

.5 Align the jacks with the pile and properly place the deformation measuring devices and reference beams. Support the reference beams beyond the influence of the pile and loading mechanism. The reference beams are to be of metal sections and be rigid in their reaction against the dial gauges.

.6 Load test the pile using the [Standard Loading Procedure] in accordance with ASTM D1143.

.7 Do not incorporate reaction [or test piles] in the permanent Work. [Test piles may be incorporated in the Work subject to the results of the load test, its condition, and the authorization of the Minister.]

.8 Interpret the results of the pile load test in accordance with the following:

.1 [ ]

.9 [ ].

1.4 QUALITY ASSURANCE

.1 The Minister will inspect the pile driving operation including hammer and cap performance, pile alignment, penetration, heaving, and re-tapping; [and the pile load testing operation.]

.2 The Minister will determine the ultimate pile capacity in accordance with the following:

.1 [ ]

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Inspect each shipment of material and timely replace any damaged materials.

.2 Unload, handle, and store piles according to the manufacturer's recommendations to prevent damage to the surface treatment and the pile. Do not handle piles using cant-hooks, pike poles, or other devices that may penetrate, break or damage the treated surface.

2.0 PRODUCTS

2.1 MATERIALS

.1 Provide materials in accordance with the following.

.2 Timber Piles:

.1 Pile design load is [ ].

.2 Douglas Fir or Western Larch in accordance with CAN3-O56M. Pressure treat piles in accordance with CSA-O80 SERIES with 100% creosote or creosote petroleum to a minimum retention of 140 kg/m^3.

.3 Provide timber piles of the sizes, and of sufficient lengths to attain the elevations specified in the Contract Documents after removal of all broomed, split or otherwise damaged portions. Do not splice timber piles to obtain the specified length.

3.0 EXECUTION

3.1 PILE DRIVING EQUIPMENT

.1 Provide a hammer that meets the following criteria.

.1 For gravity hammers: Not less than 1.5 t or not less than the combined weight of the driving head and the pile, with a drop not to exceed 3 m.

.2 For steam operated hammers: Total energy to be developed not less than 11 kJ/blow.

.3 For diesel operated hammers: Total energy to be developed not less than 16 kJ/blow.

.4 For compressed air hammers: Total energy to be developed not less than [ ] kJ/blow.

.2 Provide leads that allow freedom of hammer movement and that support the pile during driving. Do not use driving extensions.

.3 Provide a driving cap or follower fitted with a suitable shock-block to hold the axis of the pile in line with the axis of the hammer. Provide a suitable follower when the area of the pile head is greater than the area of the hammer face.

.4 Provide bands, collars, or other devices to protect the piles against splitting and brooming.

3.2 INSTALLATION

.1 Drive the piles at the locations and to the orientations and the tip elevations specified in the Contract Documents.

.2 Continuously drive the pile, without any pauses, until the specified minimum tip elevation has been attained.

.3 Where required by soil conditions, provide steel points or shoes as authorized by the Minister. Shape the tip of the pile so that the point or shoe fits evenly and symmetrically, and provides uniform bearing.

.4 If the piles fail to obtain the specified penetration, provide a heavier hammer, use pre-drilling or other means authorized by the Minister to obtain the specified penetration. Discontinue the driving operation if the resistance to the penetration causes splitting or shattering of the pile.

.5 During piling, the Minister may revise the required tip elevation for any pile, if necessary, using the pile driving data.

.6 Record the elevation of the top of each pile after all the piles in a group have been driven to the specified tip elevation.

.7 Re-tap any piles that have heaved more than [ ] mm. Do not re-tap any pile earlier than 24 hours after the initial driving without authorization of the Minister.

.8 Trim the top of the piles to the plane and elevations specified in the Contract Documents. Remove broomed, splintered, or other damaged sections.

3.3 INSTALLATION TOLERANCES

.1 Location: Maximum deviation of [+/-75] mm at the cutoff level from the specified location.

.2 Elevation: Maximum deviation of [+/-25] mm at the specified cutoff or driving elevation.

.3 Orientation: Maximum deviation of [2%] of the pile length from plumb or the specified batter.

3.4 REPAIR OF DAMAGED OR IMPROPERLY INSTALLED PIPES

.1 Extract and re-drive or provide replacement piles as directed by the Minister to correct piles that are damaged or have been driven out of alignment.

.2 Treat all cuts or breaks in the surface of the piles and bolt holes with 3 coats of hot creosote oil. Allow the previous coat to dry before applying succeeding coats.

.3 After the creosote has dried, apply a saturation coat of coal-tar pitch to the pile heads.

END OF SECTION