

ITEM 10551.0412 M - TREATED TIMBER PILES

DESCRIPTION:

This work shall consist of installing treated timber piles for a timber harborwalk in accordance with the contract plans and specifications, and at locations shown in the contract plans or as directed by the engineer. Work under this item shall include furnishing pile driving equipment, installing pile shoes, and performing static pile tests to verify design pile lengths and to confirm the design load capacity of the piles.

MATERIALS:

A. Timber Piles

The provisions of Subsection 720-02 for Treated Timber Piles shall apply except as modified herein.

Timber piles shall be one piece from butt to tip. The minimum diameter of the piles shall be 305 mm at a section one meter from the butt, measured under the bark and their diameters shall not exceed 400 mm at the butt. The minimum diameter of the pile tips shall be 203 mm, measured under the bark.

Piles shall be rated to 72 kN. Pile lengths will be verified by the engineer after submission of static pile test reports.

Pile butts shall be sawed square and the tips shall be sawed square or tapered to a point not less than 100 mm in diameter. Piles shall be cut above the ground swell and shall have a uniform taper from butt to tip. A line from the center of the butt to the center of the tip shall not fall outside the center of the pile at any point more than 1% of the length of the pile. All knots shall be trimmed off flush with the body of the pile. Piles with sufficient checks to cause weakness will be rejected.

Piles shall be treated with creosote oil in conformance with American Wood Preservers' Association Standards C3 and C14. Minimum net retention shall be as required for material in contact with soil.

Piles shall be marked with a horizontal line at 300 mm intervals and the distance from distance from the pile tip at 1500 mm intervals.

The engineer reserves the right to inspect all new piles at the manufacturer's plant before shipment. Upon arrival at the site the piles will be inspected by the engineer and any piles which do not comply with the specifications will be rejected and shall be removed from the site by the contractor.

B. Pile Shoes

Pile shoes shall conform to the requirements of Subsection 720-05 except material acceptance will be by manufacturer's certification.

The contractor shall submit certifications on all materials to be used in this item.

CONSTRUCTION DETAILS:

The requirements of Subsection 551-3 shall apply except as modified herein.

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A. Test Piles

1. General: Static pile tests will be used to verify design pile lengths and to confirm design load capacity of piles.
 - a. Furnish test piles 1500 mm longer than production piles.
 - b. Actual length of piles will be based on results of static pile tests.
2. Pile Tests: Arrange and perform the following pile tests:
 - a. Axial Compressive Static Load Test: ASTM (D)1143.
3. Equip each test pile with two telltale rods, according to ASTM (D)1143, for measuring deformation during load test.
4. Drive test piles at locations indicated to a tip elevation below final cutoff elevation equal to pile length specified as basis of bid or, to refusal, whichever occurs first. Piles will be considered as driven to refusal when five blows of hammer are required to produce a total penetration of 6 mm or less.
 - a. Allow a minimum of seven days to elapse after driving test piles before starting pile testing.
5. Provide pile reaction frame, anchor piles, equipment, and instrumentation with sufficient reaction capacity to perform tests. Notify the engineer at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.
 - a. Number of Test Piles: Two single piles.
6. Driving Test Piles: Use test piles identical to those required for project and drive with appropriate pile-driving equipment operating at rated driving energy to be used in driving permanent piles.
 - a. Pile Design Load: 72kN or as indicated on contract plans.
7. Approval Criteria: Allowable design capacity of test piles shall be one-half of the load that results in the lesser of the following two values:
 - a. Net settlement, after deducting rebound, of not more than 0.25 mm/1000 kg of test load.
 - b. Gross settlement of not more than 25 mm, provided that load-settlement curve shows no sign of failure.
8. Driving Records: Prepare driving records for each test pile, compiled and attested to by a qualified professional engineer. Include same data as required for driving records of permanent piles.
9. Test piles that comply with requirements, including location tolerances, may be used on the project.

B. Driving Piles

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All timber piles, including test piles, shall be driven with power or gravity hammers. Water jets shall only be used when, in the opinion of the engineer it is necessary to do so in order to obtain the required penetration. Pile shoes shall be furnished, as needed, for the installation of the timber piles and shall be paid for under this item.

The heads of all timber piles shall be protected during driving by caps of approved designs. When the area of any timber pile is greater than that of the face of the hammer, a suitable cap shall be provided to distribute the blow of the hammer throughout the cross-section of the pile and thus avoid, as far as possible, the tendency to spilt or shatter the pile. Collars or bands shall be provided where necessary to protect the timber piles against brooming and splitting.

Continuously drive piles to elevations or penetration resistance indicated or established by static load testing of piles. Establish and maintain axial alignment of leads and pile before and during driving.

Spudding: Drive spud piles through overlying highly resistant strata or obstructions and withdraw for reuse.

Predrilling: Provide pre-excavated holes for piles driven within 4.5 m of existing structures or underground utilities, to depths indicated. Drill holes with a diameter less than the largest cross-section dimension of pile. Firmly seat pile in predrilled hole by driving with reduced energy before starting final driving.

Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.

Pile Splices: Splices will not be permitted.

Driving Tolerances: Drive piles without pile heads exceeding the following tolerances:

1. Location: 100 mm from location indicated after initial driving, and 150 mm after pile driving is completed.
2. Plumb: Maintain 25 mm in 3 m from vertical, or a maximum of 100 mm, measured when pile is above ground in leads.
3. Batter Angle: Maximum 25 mm in 3 m from required angle, measured when pile is above ground in leads.

Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances. Fill holes left by withdrawn piles as directed by the engineer.

Rejected piles may be abandoned and cut off as directed by the engineer. Leave rejected piles in place and install new piles in locations as directed by the engineer.

Fill holes left by withdrawn piles with cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures unless the holes are filled by new piles. Place and compact in lifts not exceeding 1800 mm.

Cut off butts of driven piles square with pile axis and at elevations indicated.

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Driving Record: Maintain accurate driving records for each pile, compiled and attested to by a qualified professional engineer. Include the following data:

1. Project name and number.
2. Name of Contractor.
3. Pile species.
4. Pile location in pile group and designation of pile group.
5. Sequence of driving in pile group.
6. Pile dimensions.
7. Ground elevation.
8. Elevation of tip after driving.
9. Final tip and cutoff elevations of pile after driving pile group.
10. Records of re-driving.
11. Elevation of splices.
12. Type, make, model, and rated energy of hammer.
13. Weight and stroke of hammer.
14. Type of pile-driving cap used.
15. Cushion material and thickness.
16. Actual stroke and blow rate of hammer.
17. Pile-driving start and finish time; and total driving time.
18. Time, pile-tip elevation, and reason for interruptions.
19. Record of number of blows for each 300 mm of penetration, and number of blows per 25 mm for the last 150 mm of driving.
20. Pile deviations from location and plumb.
21. Record preboring, jetting, or special procedures used.
22. Record of unusual occurrences during pile driving.

C. Field Quality Control

Dynamic pile testing shall be performed as detailed in the contract plans.

The cost for this work shall be paid for under a separate item for dynamic pile testing.

D. Bolt Hole Treatment

Bolt holes for attaching framing lumber shall be treated with creosote oil by means of an approved device which will apply the creosote oil to the inside of the hole. Any unfilled holes shall be treated with creosote oil and shall be plugged with creosoted plugs.

METHOD OF MEASUREMENT:

This work will be measured as the number of meters of driven, acceptable timber piles measured below the cut off elevation in accordance with the plans, specifications, and orders of the engineer.

BASIS OF PAYMENT:

The unit price bid per meter of timber pile shall include the cost of furnishing all labor, materials, equipment including pile driving machinery, static pile tests, pile shoes, bolt hole treatments and all else necessary and incidental to complete the work described in this specification, in the contract plans or directed by the engineer. The cost for field quality control activities (high-strain

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dynamic monitoring and low-strain integrity measurement) shall be paid for under a separate item for dynamic pile testing.