SPECIFICATIONS FOR TAPERTUBE™ PILES

PART 1 – GENERAL

1.0 1.01 DESIGN AND PERFORMANCE REQUIREMENTS

A. Job Conditions

1. Do not drive piles until excavation or filling in the area they are to occupy has been completed to the design grades shown on the Drawings. The option of driving piles from a higher elevation than the design grades shown on the Contract Drawings shall be subject to approval.

B. Alignment and Tolerances

1. After splicing, deviations in straightness in the undriven portion of the pile shall not exceed 3/8 inch in 40 feet.
2. After installation, the alignment of the pile axis measured at the top of the pile shall not deviate from that shown on the Drawings by more than two percent. The deviation in straightness of any point on the pile axis below the top of the pile shall not exceed four percent of the length measured from cut-off elevation.
3. A light source lowered to the bottom of the pile shall remain visible. However, if eye contact with the light source is lost, a measurement will be made by the Subcontractor with an inclinometer and the results furnished to the Engineer for review. If the bending or deviation in straightness of the pile is within the limit stated in 1.01 B.2 above, such pile would be approved.
4. Piles at cut-off elevation shall not deviate laterally from required location by more than 3 inches.

1.0 1.02 SUBMITTALS

A. Submit the following:

1. Mill test reports or independent laboratory test reports for Tapertube piles.
2. Tapertube pile details.
3. A complete description of each pile hammer, including condition, operational characteristics, rated energy, date of purchase, and date and description of last overhaul.
4. A complete description of the driving equipment.
5. The proposed procedure for splicing pile.
6. The proposed sequence for driving all piles and proposed procedure for placing concrete into the pile.

7. Proposed concrete mix and method of concrete placement.
8. As-built schedule accurately showing the driven location of all piles signed and sealed by a licensed surveyor.
9. Submit details of any reinforcing to be used in piles.

PART 2 – MATERIALS

A. Tapertube Piles

1. Tapered section to be polygonal in section, having 12 equal sides joined by a single longitudinal butt weld, and having a top and bottom diameter, length and minimum thickness as shown on the drawings. The Tapertube material will be have a minimum yield stress of 50,000 p.s.i. The Tapertube seam(s) shall be welded with a minimum 90% weld penetration with a 12" return each end. A cast steel conical driving point made from ASTM A-148 90/60 material shall be welded to the bottom of this section.
2. Cylindrical pipe section to have a diameter and minimum thickness as shown on the drawings. Pipe to meet all requirements of ASTM A 252 Gr. 3; minimum yield strength of 50,000 p.s.i.
3. The top of the tapered section is to be rounded so that the inside diameter will match the inside diameter of the pipe. The sections shall be joined by a 100% butt weld.
4. The Tapertube piles shall be manufactured by DFP Foundation Products, LLC. P.O. Box 688 Franklin Lakes, NJ 07417-0688 Phone 201-337-5748 FAX 201-337-9022. Tapertube piles may also be purchased through a licensed supplier or may be obtained from an authorized pipe supplier.

B. Concrete

1. Concrete shall have a minimum compressive strength of _____ p.s.i. and meet code requirements. The Owner shall designate and pay for concrete inspection

PART 3 – EXECUTION

3.01 ## 3.01 INSTALLATION

A. Pile Driving Equipment

1. Use rigid frame, fixed-lead type driving equipment capable of supporting pile firmly in vertical position or to required batter.
2. Unless otherwise approved, leads shall be of sufficient length so that use of a follower will not be necessary.

3. Use an approved driving head designed to properly fit the head of the pile to prevent damage to the top of the pile during driving.
4. Use an approved cap block cushion such as Nylatron, as manufactured by Polypenco, may be submitted for approval.

B. Pile Hammer

1. Use a pile hammer that will deliver a minimum of _____ foot-pounds energy. Hammer used shall be subject to approval by the Engineer prior to use. Keep hammer in good mechanical condition.

C. Welding and Splicing

1. Perform all welding in accordance with requirements for shielded metal arc welding of AWS D1.1 for buildings or D1.5 for bridges and other structures.
2. Only use welders qualified by tests prescribed by AWS D1.1 or D1.5 as applicable.
3. Splice sections of pipe in conformance with the Drawings.
4. Mechanical splices such as DFP S-1800 may be used with the approval of the engineer.

D. Pile Driving

1. Driving operations shall be performed only in the presence of a qualified Inspector designated by the Engineer.
2. Top of pile shall be normal to the driving force. Maintain accurate alignment of the pile, hammer and leads to minimize bowing of pile during impact of the hammer ram.
3. Drive indicator piles using PDA measurements to establish preliminary driving criteria for load test piles.
4. Production piles to be driven to the minimum driving criteria used for the successful load tests.
5. At the completion of the driving operation on a pile, the pile shall be undamaged, free of leaks and other defects and in compliance with the requirements of this Section.
6. Cut piles off at cut-off elevation shown on the Drawings as soon as practical after driving.

E. Corrections of Deficiencies

1. If a pile does not comply with the alignment or location requirements specified herein, the Engineer will calculate the load capacity requirements of that pile, or, if in a pile group, each pile in that pile group, based on the actual, “as-driven” alignment and locations. If the calculation indicates that the loading on that pile or, if in a pile group, on any pile in that pile group, exceeds 110 percent of the design load, then the Subcontractor shall perform such remedial work as the Engineer, in his sole discretion, may approve, including but not limited to redriving

piles, furnishing and driving additional piles at locations approved by Engineer and modifying concrete or reinforcement steel.

2. In the case of a pile with some deficiency that affects load capacity, the Engineer will calculate the load capacity requirements of that pile, based on its actual “as-driven” location and inclination. If the calculation indicates that the loading on the pile exceeds some reduced allowable loading less than the design load, then the Subcontractor shall perform such remedial work as the Engineer, in his sole discretion, may approve, including but not limited to redriving piles, furnishing and driving additional piles at locations approved by the Engineer and modifying concrete or reinforcement steel.
3. If a pile fails to comply with the requirements of this Section and the Engineer determines that modification to concrete or reinforcement steel, or the driving of additional piles is necessary, the Engineer will perform all required redesign and detailing.
4. Costs for corrective measures will be borne by the Subcontractor unless the deficiencies are the result of obstructions.

3.02 PILE FILLING

A. Concrete Placement

1. Fill all approved piles with concrete.
2. Cover piles not immediately filled with concrete with caps to prevent any material from entering them.
3. Before concreting, each pile shall have water and other materials removed.
4. The Engineer will re-inspect all piles immediately prior to filling with concrete. Fill the piles with concrete in one continuous operation by method which will prevent the segregation of ingredients. Adjust the rate of concrete placement as necessary to prevent void formation.

3.03 FIELD TESTS

A. Inspection

1. Cooperate with the Engineer and furnish services as may be required for inspecting and obtaining data. Typical of these services shall be the measurement of length of piles, painting foot marks on piles and furnishing light for inspecting piles.
2. The Engineer will keep a record of each pile driven. Such record will include the following data:
    a. Date of driving
    b. Pile number
    c. Type and size of pile
    d. Type, number, and location of splices
    e. Length before driving
    f. Length of cut-off
    g. Hammer type and size

h. Hammer speed and stroke.
i. Blows per foot of driven length, and blows per inch for the final driving.
j. The time pile driving is started, interrupted, resumed and stopped.
k. Description of any unusual circumstances affecting the driving of the particular pile
l. Sounded length of each pile
m. Slope of pile
n. Lowest elevation at which light source is fully visible and elevation at which eye contact with light source is lost

3. After all piles for each pile group have been driven, the Engineer will inspect each pile by means of a light source lowered to the bottom. If eye contact with the light source is lost in any pile, that pile will be further tested by the Subcontractor's Qualified Agent with an inclinometer. Prior to placing concrete, the Engineer shall certify that pile is clear and dry. After the piles have been inspected and found satisfactory, concrete may be placed.

B. Pile Load Tests

1. Perform pile load tests in accordance with the code.
2. Submit detailed drawings of the load test set-up and procedures for approval by the Engineer.
3. The Engineer shall be responsible for inspecting the load tests and prepare the necessary reports.
4. The Subcontractor will provide calibrations for the hydraulic ram and gages, and furnish the equipment required to monitor the pile settlement during testing.

END OF SECTION