

**SECTION 02300****PILING****02300.01 GENERAL****A. Description**

Piling shall include, but not necessarily be limited to, the manufacturing, furnishing, treating, painting, coating, driving, jetting, and cutting off of all types of piling that may be specified for bulkheads, buildings, jetties, fenders, dolphins, and incidental structures. Provisions are also outlined herein, and the Contractor shall always provide for all necessary test piles, testing, loading, and the tabulation of results.

The type, material, and details of the piling to be used shall be in accordance with the Contract Documents.

**B. Related Work Included Elsewhere**

1. Concrete reinforcement; Section 03200.
2. Portland cement concrete; Section 03310.
3. Structural steel; Section 05100.
4. Rough carpentry; Section 06100.
5. Painting; Section 09900.

**C. Quality Assurance**

1. Materials

The Engineer will inspect all materials before and/or after installation to ensure compliance with the Contract Documents.

2. Field Tests

- a. Test Piling

The depth of penetration of the length of piling for a Project or a part of the Project will generally be determined by driving test piles. As a general rule, the Plans or "Special Provisions" will indicate penetrations, bearing values, and/or tip elevations desired. From this information, the Contractor shall order and drive the test piling. The actual safe bearing value of the test piling shall then be determined by methods subsequently described. Then from the test pile data and behavior, the Contractor shall order the permanent or

remainder of the piling required to complete the Contract, including the shell tip length needed for cast-in-place piles, all of which is subject to the Engineer's approval.

The provisions for driving test piles, while applying primarily to the so-called bearing piles, also apply to piles supporting bulkheads, fenders, and jetties. Although the methods for testing piles and sheet piling for bulkheads, fenders, and jetties may differ from bearing piles, acceptable lengths must still be calculated from driving test and test sections of sheet piling piles before ordering the permanent piles, and/or sheet piling.

While the above is the usual procedure, there will be cases wherein length of piles must be determined without the benefit of test piles, load tests, borings, and other data. This usually involves piles required for emergency or temporary work, as well as piles for falsework, form supports, cofferdams, and piles, which are driven by the Contractor for his own use in building the project. For such piles, the Contractor shall submit to the Engineer for review and approval Plans for the design of the temporary structure, which shall include all information relative to the piles to be used, i.e. size, length, penetration, bearing value, etc.

When tapered shells are used for piles of footings where the footing is below the existing and proposed ground line, the diameters of the piles at cutoff elevation shall not be less the nominal butt size specified or shown on the Plans. When tapered shells are used for the piles of footings, where the footings are above the existing ground line, the diameters of the piles at the existing ground line shall not be less than the normal butt size specified or shown on the Plans. When tapered shells are used for trestles or bents, the diameters of the piles 10 feet below existing or finished ground line, the diameter of the lower, shall not be less than the nominal butt size specified or shown on the Plans, unless otherwise indicated in the "Special Provisions". The Engineer will have the option of determining the tapered tip lengths to be used.

b. Bearing Value

The determination of the bearing value shall be primarily obtained from observation and reporting of the behavior of the test pile from the time first placed in the leads until it attains practical refusal or reaches a stratum designated by the Plans or set forth by the Engineer. To furnish the Contractor with a guide as to the probable supporting value at each position, the Engineer will compute the safe bearing value from the following formulas:

$$P = \frac{2WH}{S+1.0} \quad \text{for drop hammers}$$

$$P = \frac{2WH}{S+1.0} \quad \text{for single acting power hammers}$$

$$P = \frac{2E}{S+1.0} \quad \text{double acting power hammers}$$

Where P = safe bearing value in pounds  
 W = weight in pounds of striking parts of hammer  
 H = height of fall in feet  
 E = approved hammer energy per blow in foot-pounds for double-acting, differential-acting, and diesel hammers  
 S = the average penetration in inches per blow for the last several inches of penetration

The foregoing formulas are applicable only when:

- 1) The hammer is operating properly and at the manufacturer's recommended speed in the case of a power hammer;
- 2) The head of the pile is not broomed or crushed;
- 3) The penetration is reasonably quick and uniform;
- 4) There is no discernable bounce after the blow;
- 5) A follower is not used.

If the Contract does not provide for test loading, the results of the aforesaid formula as applied to the test piles shall be used to designate the proposed penetration or lengths of piles. However, each pile shall have its driving record evaluated to assure its ability to carry the intended load.

c. Load Test

If, however, the Project does provide for test loading, the results obtained as aforesaid shall be held in abeyance until the specified test loads are applied. No test load shall be applied until the piles have been in place at least 24 hours after final driving. The platform for the load test shall be designed by the Contractor so that the load may be applied symmetrically in increments. The total load may be applied in not less than one 8-hour working day in equal increment spaced 2 hours apart so that 20% of the total load is added at each increment. In lieu of placing a superimposed load, the load may be applied with hydraulic jacks with suitable yokes and pressure gages; but for this alternate method, the Contractor is responsible for having all gages and jacks calibrated by suitable testing agency, making all arrangements necessary to prove to the Engineer that the load recorded by the gages is as precise as refined installations can allow. The Engineer will observe and

measure the supports of the yokes because any yielding or motion thereof would conceal the reliability of the loads recorded by the gages. Changes in temperature shall be accounted for in establishing the test procedure and installation.

The Engineer will make all measurements to record the effect of the test load upon the pile, and the continuous application of the specified load for a period of 48 hours after the addition of the final increment shall not produce a permanent settlement greater than 1/4 inch at the top of the pile. This maximum settlement should not be increased by continuous application of the specified load for a period of an additional 60 hours. The Engineer will begin his readings, which will be accurate to 1/32 inch, before the first load increment is placed and measure any settlement as each increment is placed; and the Contractor shall leave the load on the pile for at least 108 hours. 50% of the load, supported as afore described, shall be taken as a safe bearing value.

The County reserves the right to require the Contractor to make the load test as aforesaid, even if not specified in the Contract Documents in the event the behavior of the test pile or other piles upon observation and analysis by above formulas indicates any peculiarity, erratic action, or otherwise cause suspicion as to reliability of its safe bearing value. In this case, the load test will be paid for as extra work as specified in the "General Provisions".

d. Test Piles and Load Test Data Application

Unless otherwise provided in the "Special Provisions", the permanent piles or the remainder of the piles in the Project shall be driven or placed so that the tip elevations are in about the same position as the results of the load test and test piles satisfactorily completed indicate, unless the underlying strata is so irregular or the tests are so widely spaced as to make the Engineer extend the test or test loads, or order the lengths of piles between tests varied to suit aforesaid conditions.

If cast-in-place concrete piles are planned, the tests and load tests shall be made to the pile without the concrete filling.

Usually, the "Special Provisions" or Plans will indicate that test piles or piles subjected to testing and load testing shall be in permanent pile locations, and every effort shall be made to use the pile as a permanent pile in the completed structure. An exception would be for treated timber piles wherein; untreated timber piles are prescribed to be first driven at locations adjacent to foundations so as the length of the piles to be treated can be ascertained as accurately as possible.

**D. Submittals**

1. Where the length of piles must be determined without the benefit of test piles, load tests, borings, or other data, such as for emergency or temporary work, as well as piles for falsework, form supports, and other miscellaneous uses, the Contractor shall submit to the Engineer for review and approval plans for the design of the temporary structure, which shall include all information relative to the piles to be used, i.e., size, length, penetration, bearing value, etc.
2. The Contractor shall have the hammer manufacturer's manual available for the Engineer's use at the project site prior to the start of the pile driving operation.
3. On all special, marine, or water projects and pile bents, the Contractor shall prepare and submit to the Engineer a plan of his proposed driving method. This plan must be approved prior to any pile driving.
4. Shop drawings shall be submitted as specified in the "General Provisions" for pile tips and caps, which shall furnish general product information and dimensions.

**02300.02 MATERIALS****A. Materials Furnished by the County**

The County will not furnish any materials for piling.

**B. Contractor's Options**

1. The Contractor may furnish timber piles of any of the species permitted under AASHTO M 168 except that all treated piles shall be Southern Yellow Pine unless otherwise noted.
2. The Contractor may treat the timber piles with any of the materials specified in Section 02300.03 unless otherwise noted.
3. The Engineer will specify the most widely accepted material for each specific piling function. It is further the intention of these Specifications to permit the use of all approved manufactured types of piling. No pile types shall be substituted or interchanged without the written permission of the Engineer.

**C. Detailed Material Requirements**

1. Shells or Casings for Cast-in-Place Concrete Piles

Casings shall be rolled or formed from a single piece of metal having not more than one continuous electrically welded seamless or butt seam type joint. The metal casings shall be new material meeting the requirements of ASTM A 36, A 252, AISI

1008, 1010, or 1015. The metal in the fabricated casings shall have a minimum yield strength of 28,000 psi.

Where pile shells or casings (for cast-in-place concrete piles) of 9 gage and thicker are specified, the design and assumption is based upon the fact that the shell shall be driven without internal support or the use of cores or mandrels. For such shells, the minimum thickness shown assumes and requires that the members have approved deformations to increase their strength to withstand driving. Any shell not having such deformations or other approved arrangements shall be of sufficient thickness and strength so that the shell will hold its original form and show no harmful distortion after it and adjacent piles have been driven.

In some cases, a definite pile type, such as corrugated, spirally corrugated, plain pipe, fluted, etc., will be specified for design reasons in order to secure a certain appearance, strength, resistance or supporting capacity. In such cases, no changes or substitutions will be permitted.

Tips shall be electrically welded to the casings. The tips shall be conical in shape, manufactured from pressed, cast, or forged steel and will be approved by the Engineer prior to use.

2. Reinforcement for Cast-in-Place Concrete Piles

Reinforcement for cast-in-place concrete piles shall be as specified in Section 03200.02.

3. Concrete for Cast-in-Place Concrete Piles

Concrete for cast-in-place concrete piles shall be Mix No. 3 as specified in Section 03310.03.

4. Steel Bearing Piles

Steel bearing piles shall consist of structural steel meeting the requirements of ASTM A 36.

5. Steel Sheet Piles

Steel sheet piles shall meet the requirements of ASTM A 328.

6. Steel Sheet Pile Accessories

Steel for accessories to sheet piles, such as shapes for wales, caps, and miscellaneous items, shall meet the requirements of ASTM A 36. High strength bolts shall meet the requirements of Section 05100.02.

7. Timber Piling

Timber piling shall meet the requirements of AASHTO M 168.

8. Timber Preservatives

Preservatives and pressure treatment for timber shall meet the requirements of AASHTO M 133. The kind of treatment and amount of preservative shall be as specified on the Plans or in the “Special Provisions”.

a. Creosote

Timber treated with creosote solutions shall retain the following minimum quantities of preservatives:

For piling	12 pounds per cubic foot
For lumber in water and up to 5 feet above mean low water	12 pounds per cubic foot
For lumber 5 feet or more above mean low water and at or below ground	8 pounds per cubic foot

b. Oil-Borne Treatment

Oil-borne preservative treatment (other than creosote) shall have the following minimum dry net retention if not specified on the Plans or in the “Special Provisions”:

AWPA Standard P 8

Pentachlorophenol (Southern Pine)	0.60 pounds per cubic foot
Pentachlorophenol (Douglas Fir, Oak, or Gum)	0.50 pounds per cubic foot

c. Water-Borne Treatment

Water-borne preservative treatment shall have the following minimum dry net retention if not specified on the Plans or in the “Special Provisions”:

AWPA Standard P 5

Chromated Copper Arsenate, Type A, B, or C	0.40 pounds per cubic foot
Ammoniacal Copper Arsenate	0.50 pounds per cubic foot

## 9. Coal-Tar Pitch

Coal-tar pitch for waterproofing shall meet the requirements of AASHTO M 118.

## 10. Paint

Paint for wood shall meet the requirements of Federal Specification TT-P-102, Class B.

## 11. Copper

Copper for timber pile heads shall meet the weight per square foot and gage requirements of ASTM B 152.

**02300.03 EXECUTION****A. General**

The Contractor is responsible for ordering and delivery to the project site piles of the proper type and length.

**B. Storage and Handling**

In storage and handling of shells or casings for cast-in-place concrete piles, the methods must be such as to avoid deforming the member by denting. Where the Plans call for painting or coating the shells before driving, additional methods of storing and handling are required so that the paint or coat may dry and the dry film is not scratched, discolored, or otherwise damaged.

Steel H piles and sheet piling are least likely to require special storage and handling methods, except where same are required to be painted or coated. Steel H piles and sheet piling must, however, be protected against any abuse, which would permanently deform the member or bend its flanges.

**C. Preparation for Driving**

Piling shall not be driven until after excavation is completed. Furthermore, where piling is to be driven through a compacted embankment, no piles, including test piling, shall be driven until the embankment has been completed to planned preliminary dimensions.

The Contractor shall construct an adequate template. This template shall be properly aligned and positioned to assure that piling is driven plumb.

## 1. Pile Cap

The heads of all piling shall be equipped with a cap or cushion so that the energy imparted by the hammer can be transmitted to the pile without injury to the top or

butt. Where the top or butt of a pile is greater than the moving or striking face of the hammer, the driving head or cap shall be designed to cover the entire surface of the top of the pile and distribute the blow of the hammer evenly to top of the pile. For steel shells or casings, the driving cap shall be such that the blow of the hammer is distributed evenly to the entire periphery of the shell. For steel H piles, the driving head must distribute the energy of the hammer's blow evenly to flanges and web. Generally, the driving head or cap for timber piling shall have a suitable protective device to prevent damage to the pile top. For timber piles, the use of a cap or driving head may be omitted where the Contractor is willing to take the responsibility. For manufactured piles, driving heads, mandrels, or other devices recommended by the manufacturers shall in all cases be obtained and used by the Contractor. No interchanging or substitution of recommended devices will be accepted unless the Contractor and/or manufacturer is willing to accept all responsibility for damage or delay caused thereby.

Driving heads and cushions for temporary sheet piling shall be at the option of the Contractor. Driving heads and cushions used on permanent sheet piling shall be of proper configuration and construction to prevent damage to the piling.

Prior to any capping or placing of a driving head, the top of the pile, shall be sawed, cut, or shaped, so that it is normal to the axis of the moving parts of the hammer.

## 2. Pile Tips

Timber piles shall be pointed where driving conditions require. The point must be symmetrical. In no case, however, shall the tip or point be less than 4-inch diameter.

Furthermore, timber piles may have the tips or bottoms shod with a metal shoe or point when shown on the Plans, described in the "Special Provisions", or directed by the Engineer to facilitate perforation of hard strata. Any tip or point, irrespective of whether forged or pressed, shall be subject to the approval of the Engineer before use. The tip shall be electrically welded and guaranteed for permanent fixity.

Shells or casings for cast-in-place concrete piles shall be shod with conical shaped tips or points of cast or pressed steel as recommended by the manufacturer except that flat steel plates for tips or points are excluded.

Steel H piles shall be driven without any special treatment to the bottom unless indicated otherwise on the Plans or in the "Special Provisions".

## D. Splicing

Splicing of timber piles will not be permitted. In the event of an isolated timber pile penetrating below planned top, it shall be replaced or supplemented by an additional pile, unless the structure above can be changed without detriment.

If splicing of steel H piles and shells for cast-in-place concrete piles is necessary, they shall be spliced as indicated on the Plans by electric arc welding in accordance with latest AWS

Structural Welding Code for the full periphery. The number of splices permitted must be compatible with driving conditions at the site and the standard lengths of piling produced by manufacturers.

Where a manufactured pile type is designed to be spliced by screwing two pieces together or by the use of couplings or collars, and the details for the splice are not shown on the Plans, the device must be submitted to the Engineer and approved before use.

The provisions outlined above shall apply to sheet piling.

#### **E. Pile Driving**

1. Piles shall be driven with approved hammers. An approved hammer is one, which has been accepted and rated by the Engineer prior to use. Any hammer, which does not perform satisfactorily on piles being driven, notwithstanding previous approval of the hammer or type of hammer, shall be replaced by a hammer acceptable to the Engineer.
2. The hammer to be used for driving permanent piles shall be the same hammer that was used to drive the test piles. If the Contractor changes hammers, he must drive additional test pile(s) at his expense before driving the permanent piles even if the energy ratings of the hammers are identical.
3. Power hammers are defined for the purpose of these Specifications to mean a hammer which has a driving ram actuated by steam, air, or diesel power.
4. Power hammers shall be operated at speeds recommended by the manufacturer for the bearing value stipulated.
5. Hammer energy is defined for the purpose of these Specifications as the approved rate energy per blow of the power hammer.
6. The manufacturer's energy rating may or may not be accepted. Tests may be designated and required by the Engineer to determine the acceptability and energy rating of power hammers. The County will not pay costs or expenses of test for approval and energy rating of any hammer.

The minimum rated striking energy of the hammer to be used in driving piles is as follows:

- a. untreated and treated timber piles - 6000 per blow;
- b. steel bearing piles weighing 57 foot-pounds or less and cast-in-place concrete pile shells 14 inches in diameter or less -1300 foot per pounds per blow;

- c. steel H piles weighing more than 57 pounds per foot and cast-in-place concrete pile shells greater than 14 inches in diameter, precast and prestressed concrete piles will be specified in the "Special Provisions".

When considering the hammer for approval, the ratio of the weight of the pile to the weight of the striking unit shall be evaluated to determine the adequacy of the hammer.

7. All pile driving, plumb and/or batter, shall be done using leads or spuds held rigidly in position to maintain the axial alignment of the hammer, pile, and leads during driving. Leads or spuds shall be constructed in such a manner to afford freedom of movement of the hammer during the driving phases. Fixed leads are defined as leads attached to the crane boom at the top, and rigidly held in position at the bottom, to prevent movement of the leads. If necessary, intermediate supports of leads may be required to provide rigidity and axial alignment of hammer, pile, and leads.

Regardless of the type of leads used, the Contractor shall be responsible for driving the piles within the tolerance as specified without injury to the piles. Any leads that do not produce satisfactory end results in the driving of piling shall be ordered removed from the work.

No driving shall be done with the hammer out of the leads.

On all special, marine, or water projects and pile bents, the leads shall be of sufficient length so that the use of a follower will not be necessary. Long piles and batter piles may require guides at intervals and additional support to prevent excessive bending and buckling under the hammer blow. Piles may be held in place and alignment by templates or checkerboards consisting of heavy timbers or structural steel shapes. If the template or checkerboard is of sufficient height to maintain multiple point fixity along the length of the piles and the bottom of driving leads or spuds fixed to the template or checkerboard, then the top of the leads or spuds may swing by a crane in pendulum fashion, provided that the hammer, pile, and leads are maintained in identical axial alignment during the entire driving.

Special permission may be granted by the Engineer to use swinging leads or spud in isolated circumstances such as proximity to power lines or traffic.

The driving of piling with followers shall be avoided if practicable and shall be done only with prior written permission of the Engineer. When followers are used, one pile from each group of ten shall be a long pile driven without a follower or one from each support, whichever gives the most piles as long piles, and shall be used as a test pile to determine the average bearing power of the group or support.

8. The use of water jets will only be permitted with the written authorization of the Engineer.

9. Where piling must perforate strata, which resists driving, the Contractor is directed and shall be prepared to auger or drill holes through same. The size of the auger or drill to be used shall not be larger than the nominal diameter of round pile or the minimum diameter of a circle in which an H pile will fit and shall meet with the approval of the Engineer before use, with the Engineer as the sole judge as to the size of auger. After the hole is completed, the pile shall be inserted; and if there is a space between the outside of the pile and the wall of the augured hole, dry sand shall be used to completely fill the voids between the pile and the walls of the hole. Driving shall then be completed after which any remaining voids are to be completely filled with dry sand.
10. Piles shall be driven with a variation of not more than 1/4 inch per foot from the vertical or from the batter shown on the Plans. If the pile can be moved into place by use of a manual "come along", then no further review is necessary.

**F. Defective Piles**

1. The pile shall be withdrawn and replaced by a new and, if necessary, longer pile.
2. A second pile shall be driven adjacent to the defective or low pile.
3. A sufficient portion of the footing extended to properly embed the pile.
4. Timber piles shall not be spliced without specific permission of the Engineer.
5. Any pile pushed up by the driving of adjacent piles shall be redriven to the required bearing value.

**G. Timber Pile Cutoff**

1. The tops of all piles, except timber piles, which support timber caps, shall be cut off at the elevations indicated on the Plans and on a true plane perpendicular to the axis of the pile unless otherwise specified.
2. Timber piles which support timber caps shall be cut off in such a manner to insure that the plane of the bottom of the cap will bear fully on the pile head. (Chain saws shall not be utilized for this purpose, and guides must be employed for whatever other tools are used.) No shimming between the timber cap and pile head will be allowed.

**H. Treatment for Timber Pile Heads**

For the treatment of timber pile heads, paint with three coats of a mixture of 60% creosote oil and 40% coal-tar pitch. Cover with 26 gage galvanized pure iron sheet metal. The metal covering shall be bent down over sides of piles a distance of at least 2 inches and firmly nailed with galvanized nails. When required, 16-ounce copper shall be substituted and used instead of

the sheet metal. In this case, the painting shall be the same, but the copper shall be installed with copper nails.

### **I. Concreting Cast-In-Place Piles**

1. Reinforcement shall be formed into a unit, the bars being securely fastened together to form a cage, which shall be positioned and held at the given uniform distance from the shell.
2. Tie bars and bands for reinforcing cages of foundation (footing) piles may be tack welded provided a certified welder is used.
3. Tie bars, bands, and spacer lugs for bents or column piles shall not be tack welded to any of the main reinforcing bars with the following exception. If the Contractor desires, he may place a band at the top and bottom of the pile cage and weld all main bars thereto. However, the remainder of the intersections of ties and main bars shall be fastened by tie wiring.
4. After the pile shells have been accepted and the reinforcing unit is ready, the shells shall be filled with concrete. No concrete shall be placed in any casing or shell until all driving within a radius of 15 feet has been completed, nor until all the shells for any unit of the structure (pier, bent, abutment, etc.) have been driven to their final penetration and accepted by the Engineer. In the event that this procedure cannot be followed, all driving within the above limits shall be discontinued until the concrete in the last pile poured has set at least three days.
5. Immediately prior to concreting, water or other foreign substances found in a shell shall be removed. The concrete shall be deposited in one continuous operation. The restriction for dropping concrete more than 5 feet will not apply. Mixing and placing of concrete shall be in accordance with the provisions of Sections 03300.03 and 03310.03. Reinforcing steel cages shall be set and fastened in proper position in the pile before any concrete filling is placed, except that when the reinforcing steel cage extends 6 feet or less below the top of the pile, the concrete filling may be placed to the bottom of these bars before they are set and fastened in proper position in the pile; and then the concrete filling shall be continued to completion, all in a continuous operation. Concrete deposited in piles shall be thoroughly compacted with mechanical vibrators from the bottom of reinforcing steel cages to the tops of piles during and immediately after placing concrete. Care shall be exercised to obtain workable concrete of uniform consistency in order to prevent water gain, the formation of stone pockets, honeycomb, or other defects.
6. Freshly concreted piles shall not be disturbed in any way nor shall any loads be allowed upon any of them until all concrete has been in place at least 72 hours. The exposed surface of cast-in-place concrete piles shall be cured with two layers of burlap, which shall be kept continuously wet for a period of seven days.

**J. Cold Weather Protection**

Provisions for protecting cast-in-place concrete in piles during cold weather shall be as follows: for heads of cast-in-place concrete piles projecting above the ground and where water is not normally present, protection of concrete from cold weather shall be done by enclosing the heads of the piles and heating the atmosphere therein as prescribed in Section 03300.03. Where the piles are in an excavated trench, the heads may be inundated with water to a minimum depth of 1 foot over the pile heads, if the temperature of the water is maintained at 40°F or warmer. For trestle or bent piles, however, projecting above water and/or ground, concrete placed in cold weather must be protected in the same manner as prescribed for a concrete structure.

**02300.04 METHOD OF MEASUREMENT****A. Piling**

Measurement for piling will be made on a length basis for each size and pile installed. The measured length of all piling (permanent and test) will be taken from the tip up to final cutoff unless otherwise described in the “Special Provisions”. For test piles not utilized as permanent piles, the measurement for cutoff will be at the same elevation as the nearest proposed permanent pile or to actual top of test pile, whichever is lower. Where piling designated as test piles is accepted for use in the permanent structure, measurement will still be made as test piles; and no additional allowance will be made in other piling items.

**B. Timber Sheet Piling**

Timber sheet piling will be measured on the basis of the number of 1000 board feet (MBM) satisfactorily completed and accepted. Computation of quantities will be based on nominal thickness of lumber, the length of the sheet piling, and the average depth of the sheet piling from cutoff at the top to the tip of the sheet piling in the completed structure. No allowance will be made for waste. All lumber required (wales, shear blocks, etc.) will be measured for payment except piles, which will be measured separately as Piling.

**C. Steel Sheet Piling**

Steel sheet piling will be measured on the basis of the number of pounds of steel sheet piling satisfactorily completed and accepted. Computation of quantities will be based on the weight of the section utilized times the number of linear feet of steel sheet piling in the completed structure.

**D. Pile Points**

Measurement for pile points will be made by counting the number of pile points satisfactorily affixed and accepted.

**E. Load Tests**

Measurement for load tests, when specified, will be made and classified on an each basis, and such tests will be counted for the ones satisfactorily performed and accepted.

**F. Non Measured Items**

1. No measurement will be made of test pieces of sheet piling.
2. No measurement will be made for pile splices.
3. No measurement will be made for auguring.
4. No measurement will be made for any cleaning, painting or coating of piling.
5. No measurement will be made for piling not accepted by the Engineer.

**02300.05 BASIS OF PAYMENT**

1. Payment will be made at the unit prices bid. The prices bid shall include furnishing all materials, labor, tools, equipment, and incidentals necessary to satisfactorily complete the work as shown and specified in strict accordance with the Contract Documents, and accepted by the Engineer.
2. The price bid for furnishing and installing piling shall include the following:
  - a. Hardware for piling,
  - b. Pile splices,
  - c. Auguring or drilling required by field conditions or if called for in the "Special Provisions",
  - d. Cleaning, painting, or coating of piling,
  - e. Piles for temporary structures, or driven for the Contractor's convenience, or for any piles not shown on the Plans or itemized in the Proposal.
3. No payment will be made for the following:
  - a. Piling not accepted as satisfactory by the Engineer such as: piles not properly driven, piles with questionable safe bearing values, piles damaged during driving, or piles driven below planned cutoff, nor for the removal of any pile rejected by the Engineer as unsatisfactory.
  - b. Delays incurred by performing load test(s) not specifically called for on the Proposal Form.

- c. Test pieces of sheet piling as the cost of the same shall be included in the pertinent sheet-piling item(s).
- d. Reinforcing steel and concrete in cast-in-place piling, as cost thereof shall be included in the pertinent piling item(s).

**B. Piling**

Payment for piling will be made at the price bid per linear foot, complete in place.

**C. Timber Sheet Piling**

Timber sheet piling (including wales, shear blocks, etc.), complete in place, will be paid for at the unit price bid per 1000 board foot measurement (MBM) irrespective of member sizes, grades, or type. The price bid shall include furnishing all materials, preservative treatments, timber connectors, painting, and galvanizing. The Basis of Payment will not include the cost of piles, which will be paid for separately as Piling.

**D. Steel Sheet Piling**

Steel sheet piling, complete in place, will be paid for at the unit price bid per pound. The price bid shall include furnishing all material, painting, coating, wales and tie rods.

**E. Pile Points**

Payment for pile points will be made at the price bid each. The price bid shall include furnishing all labor, materials, and equipment necessary to affix the pile points.

**F. Load Tests**

Payment for satisfactorily performed load tests will be made at the price bid each regardless of the method of testing utilized.