SECTION 703 -- PILES AND PILE DRIVING

703.01 -- Description

1. This work shall consist of furnishing, driving, trimming, and extending all bearing and sheet piles. They shall be driven and/or placed in accordance with the requirements of these *Specifications* at the locations, elevation, penetration, and bearing shown in the plans.

2. Only one type of concrete piling may be used in any one structure. Before construction begins, the Contractor shall advise the Engineer in writing which type is to be furnished at each structure.

703.02 -- Material Requirements

1. All materials shall conform to the requirements in Table 703.01.

Table 703.01

Material Requirements

Applicable Materials	Section
Portland Cement Concrete	1002
Reinforcing Steel	1020, 1023, 1024
Epoxy Coated Reinforcing Steel	1021
Structural Steel (Bearing Piles)	1045
Steel Sheet Piles and Sheet Pile Corners	1056
Sheet Zinc	1053
Sheet Aluminum	1054
Precast Piles	705

2. a. Pipe pile shall meet the requirements in ASTM A 252, Grade 2.

b. Sheet pile and sheet pile corners shall meet the requirements in ASTM A 328/A 328M.

c. "H" pile and other pile shall meet the requirements in ASTM A 6/A 6M.

3. a. The Contractor shall furnish piles for each structure in accordance with the itemized list in the plans showing the number and lengths of all piles required.

b. The lengths included in the plans shall be based on the lengths which are to remain in the completed structure.

c. The Contractor shall, without additional compensation, increase the lengths given to provide for removal of piles damaged while driving and for additional lengths as may be necessary to suit the Contractor's method of operation.

d. Heat numbers shall be stamped on each pile.

e. Approved manufacturers of prefabricated pile points are shown on the NDR Approved Products List.

4. Downgraded or salvaged piles are not to be used.

5. Storing and Handling Steel Piling:

a. Piles shall be stored on suitable skids or platforms. Steel piles shall be kept free from accumulations of dirt, oil, or other foreign matter.

b. If the Contractor uses steel bearing piles or sheet piles for falsework, trackways, or any other purpose than shown in the plans, such use will be at his/her own risk and any damaged piles shall be rejected for use as material in the permanent structure.

6. Manufacture of Cast-In-Place Concrete Piles:

a. Piles shall be constructed in accordance with the details shown in the plans.

b. (1) The class of concrete used in cast-in-place concrete piles shall be as shown in the plans. Maximum slump for concrete used in cast-in-place piling shall be 6 inches.

(2) (i) When the plans allow for the use of more than one class of concrete, the Contractor shall advise the Engineer, in writing, of the class of concrete to be used before the date of beginning the concrete work.

(ii) No change shall be made in the concrete class without written permission of the Engineer.

c. Pile shells for cast-in-place concrete bearing piles shall be metal shells of the type, size, and gauge indicated in the plans.

d. After driving and before the placing of any concrete, the Engineer shall examine each shell throughout its entire length. If any shell is broken or otherwise defective, the Contractor shall remove and replace the shell or abandon the defective shell and drive a new shell. The Engineer will choose the location of the new shell.

e. Reinforcement shall be furnished, handled, stored, and placed in accordance with the requirements of Section 707.

f. (1) All shells for cast-in-place concrete piles supporting bents, piers, or abutments shall be fully driven before any pile in that unit is filled with concrete.

(2) Water inside the shells shall be removed before the concrete is placed.

g. (1) Concrete shall be placed continuously and shall be vibrated only in the areas which contain reinforcing steel.

(2) The forms shall be overfilled, the surplus concrete struck-off, and the top surface finished to a uniform, even texture.

h. Concrete shall be placed in accordance with the requirements of Section 705.

703.03 -- Construction Methods

1. Preparation for Driving Piles:

a. The Contractor shall complete foundation pile pit excavations before driving the piles. After the piles are driven, all loose and displaced material shall be removed, leaving a smooth solid bed to serve as a concrete form.

b. The Hammer Data sheet is required for the wave equation analysis. (The wave equation is a computer program that analyzes the hammer-pile system.) The Contractor shall submit a completed data sheet for each hammer to be used, to the NDR Bridge Engineer, at least 21 days before its use. The NDR Bridge Engineer will notify the Contractor, within 10 days of the receipt of the hammer data, as to whether or not the hammer is acceptable. A typical Hammer Data sheet is shown in Figure 703.01.

c. Wood or steel cable shall not be allowed for use as a hammer cushion.

d. Wood can be used as a pile cushion.

e. The wave equation analysis may indicate that the hammer system may not be able to drive the pile to minimum penetration without damage to the pile. In this case, the Contractor shall modify the hammer system and submit a new Hammer Data sheet to the Bridge Engineer. The new data shall be analyzed to determine if the modifications to the hammer system are adequate to allow the pile to be driven to minimum penetration without damage.

f. Hammers will not be replaced or changed unless authorized by the Engineer. The Contractor shall submit a new Hammer Data sheet if hammers are changed.

g. (1) The Contractor, when using a single-acting diesel hammer, shall be required to have a measuring rod rigidly fixed to the hammer which will indicate the ram stroke in feet. The measuring rod shall be divided into 1 inch increments and shall be readable from the ground.

(2) The Contractor may provide a saximeter for the Department's use.

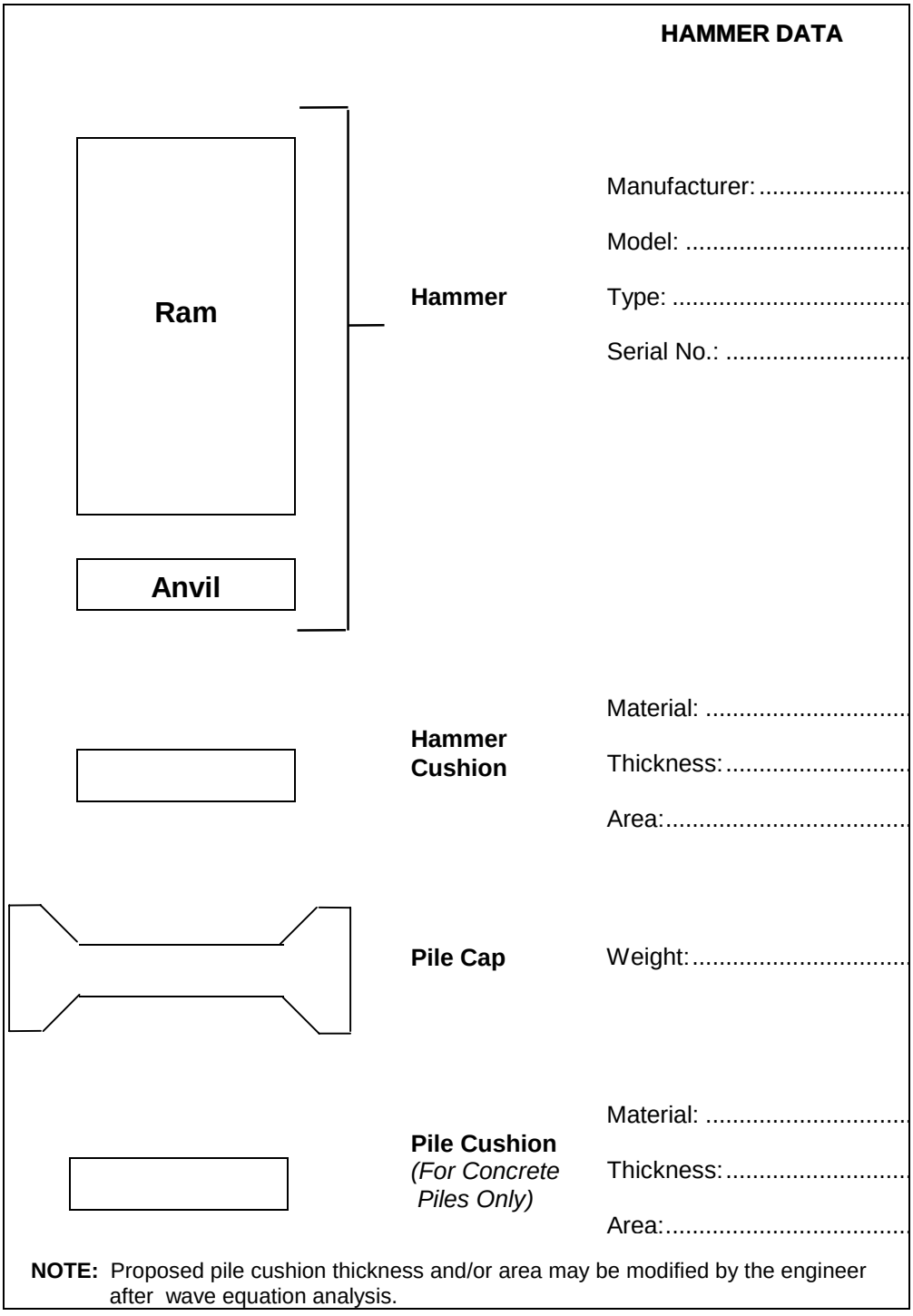
h. The Contractor, when using a double-acting diesel hammer, shall furnish an appropriate gauge and chart to measure the bounce chamber pressure and resulting hammer output. The gauge shall be readable from the ground.

i. If fresh cushioning material has been inserted over the head of the pile, the penetration measurements for the purpose of determining the final bearing values shall not be made until at least 10 blows are struck.

j. Piles shall not be driven without the use of a closely fitting cap or driving head. This cap or driving head shall be of such design as to distribute the blow of the hammer throughout the cross section of the pile.

k. Full length piles shall be used where practical. Optional field splices will be allowed for steel "H" piling, pipe piling, and cast-in-place pile shells as follows:

Figure 703.01



NOTE: Proposed pile cushion thickness and/or area may be modified by the engineer after wave equation analysis.

(1) One optional field splice will be allowed on piling more than 39.4 feet long and less than 78.8 feet long. Two optional field splices will be allowed for piling over 78.8 feet long and less than 118.1 feet long. Three optional field splices will be allowed for piling over 118.1 feet long. The method of splicing shall be as shown in the plans.

(2) Prefabricated pile splices of an approved type and source will be allowed for use on steel "H" piling, pipe piling, and cast-in-place pile shells. The splices shall be attached and welded in place in accordance with the manufacturer's recommendations.

(3) Preidentified splices shall be made before driving the pile, and the shortest side of the splice will be placed in the ground first.

l. Except where piles are driven through water, the use of a follower pile will not be allowed.

m. (1) All welding to be done on steel piles shall be in accordance with the plans and pertinent requirements of Section 708, except that proof of the welder's qualifications will not be required.

(2) Welders shall be experienced in pile welding.

2. Pile Driving Methods:

a. (1) Concrete and steel bearing piling shall be driven with a steam, air, or diesel hammer developing a manufacturer's rated energy such that when all known values are substituted in the applicable dynamic formula, "P" (safe load in tons) shall be not less than 125 percent of the required design bearing when an "S" (penetration rate) of 0.05 inch per blow is assumed. In no case shall a power hammer have a ram weight of less than 1,985 pounds nor develop a manufacturer's rated energy of less than 14.750 ft-lb.

(2) Water or air jets may be used to assist in driving the piling.

(3) Concrete and steel bearing piles may be driven with a gravity hammer for the first half of the pile's penetration below ground provided that the bearing of the driven pile does not exceed one-third of the design bearing.

(4) Steel pipe, "H" pile, and cast-in-place piling may be driven with a vibratory hammer for the first half of the driven length.

b. (1) Concrete sheet piles shall be driven with a steam hammer, air hammer or diesel hammer capable of developing an energy of 5,900 ft-lb per blow, a 1,984 pounds gravity hammer dropped 40 inches maximum, or a combination of water or air jets and hammer.

(2) Steel sheet piling shall be driven with a steam hammer, air hammer, diesel hammer, vibratory hammer, gravity hammer, or a combination of water or air jets and hammer.

(3) Concrete sheet piling may be placed in narrow trenches or drilled holes. The trench depth shall not be more than 40 inches above the bottom of the sheet pile in its final position. The last 40 inches of sheet piling shall be driven in accordance with Paragraph 2. a. of this Subsection.

(4) Steel and concrete sheet piles shall not be driven without the use of a closely fitting cap or driving head. This cap or driving head shall be of such design as to distribute the blow of the hammer throughout the cross section of the pile.

c. When gravity hammers are allowed the following requirements will apply:

(1) The minimum weight of gravity hammers which may be used for driving timber piles, shells for cast-in-place concrete pipe piles, and steel bearing piles shall be as shown in Table 703.02.

Table 703.02

Minimum Gravity Hammer Weight

Design Bearing Capacity of Pile in Tons	Gravity Hammer Weight in Pounds
8 – 12	2,000
More than 12 – 15	2,500
More than 15 – 22	2,800
More than 22 – 28	3,000
More than 28 – 37	3,500
More than 37 – 50	4,000

(2) The weight of the gravity hammer for driving precast concrete bearing piles shall not be less than 30 percent of the weight of the pile and never less than 2,000 pounds.

d. The fall of gravity hammers shall be regulated so as to avoid damage to the piles.

e. (1) No pile shall be driven without the use of leads. Pile driver leads shall be designed to afford free movement of the hammer and shall support the pile and hammer in proper position during driving. The stroke of the hammer shall be accurately in line with the axis of the pile. Leads, pile, and hammer shall be held in proper vertical or battered alignment to place the piles within the tolerances allowed.

(2) Swinging leads may be used with steam, air, or diesel hammers if the results obtained meet all requirements of these *Specifications*.

(3) Pile driver leads used with gravity hammers shall be guyed, braced, or fixed.

f. When water or air jets are used, the number of jets and the volume and pressure at the jet nozzles shall be sufficient to freely erode the material adjacent to the pile. Before the desired penetration is reached, the jets shall be withdrawn and the piles shall be driven with the hammer to secure the final penetration.

g. (1) The Contractor has the option of starting piling in augured holes.

(2) Augured hole length shall not exceed 30 percent of the below-ground length of the pile.

(3) Augured hole diameters shall not be more than 2 inches larger than the pile.

3. Driving of Bearing and Sheet Piles:

a. Piles shall be driven to the depth and bearing shown in the plans or to "practical refusal", whichever occurs first.

b. (1) Piles not driven plumb or to the batter indicated in the plans shall be rejected.

(2) No variation greater than 1/4 inch per foot (2 percent) from vertical or the batter line indicated shall be allowed.

(3) In no case shall the top of a bearing pile be out of line more than 3 inches.

(4) The tops of sheet piles shall not be out of position by more than 2 inches.

(5) Adjacent sheets shall not be out of line with each other by more than 0.4 inch.

c. (1) Broken, split, or misplaced piles shall be withdrawn and properly replaced; or, with the permission of the Engineer, a second pile may be driven in place thereof.

(2) Piles driven below cutoff grade shall be withdrawn and replaced with new piles.

d. Should the driving of any pile cause previously driven piles to rise, the Contractor shall drive them back to their prescribed elevations.

4. Determination of Bearing Capacity:

a. (1) The Engineer shall compute the bearing capacity of every pile. The bearing capacity of at least 1 pile in each substructure (i.e., bent, abutment, or pier) shall be determined at 5 foot penetration intervals.

(2) When the driving has been interrupted for more than 2 hours, the pile shall be driven at least 12 inches before the determination of the bearing value is made.

(3) Should the 2-hour interruption occur when the piling is within 12 inches of cutoff, then the bearing capacity shall be taken in the last 10 blows just before reaching cutoff elevation.

(4) An explanatory note should be included on the pile driving report when the pile was driven less than 12 inches or when less than 10 blows were averaged for the bearing capacity due to an unforeseen interruption.

(5) The purpose of driving the pile at least 12 inches is to determine the uniformity of bearing capacity between piling and is not intended to determine a setup factor.

b. To insure accurate bearing capacity:

(1) The head of the pile shall not have any broomed or crushed fibers.

(2) The pile penetration shall be quick and at uniform rate.

(3) Deviations or problems shall be noted by the Engineer on the driving report.

c. The bearing capacity of piles shall be computed from one of the following formulas:

Dynamic Formulas

$P =$	$\frac{3.5\ WH}{S+0.35}$	x	$\frac{W}{W+M}$	For gravity hammers.
$P =$	$\frac{3.5\ E}{S+0.1}$	x	$\frac{W}{W+M}$	For steam hammers.
$P =$	$\frac{3.0\ E}{S+0.1}$	x	$\frac{W}{W+M}$	For driving steel, steel shell, and pipe piles with diesel hammers.
$P =$	$\frac{1.6\ E}{S+0.1}$			For driving mandrel driven pile shells.
$P =$	$\frac{7.0\ E}{S+0.1}$	x	$\frac{W}{W+M}$	For driving concrete bearing pile with diesel hammers.

Where:

P = the safe load, in tons.

W = the weight of the ram, in tons.

M = the weight of the pile and driving cap, in tons.

S = the average penetration, in inches, of the pile per blow for the last 5 blows for gravity hammers or the last 10 blows for steam and diesel hammers.

H = the height of fall of the ram, in feet (less twice the height of bounce for gravity and steam hammers), or the stroke in feet for diesel hammers.

E = the energy per blow in foot-tons. For double-acting steam hammers, the value of E shall be taken from the manufacturer's published values. For single-acting steam hammers, E = W x H.

For diesel hammers, the value of E in foot-tons shall be in accordance with Table 703.03 and Table 703.04.

Table 703.03

Energy (Foot-Tons) for Single-Acting Diesel Hammers

Hammer Designation	Manuf. Energy Rating (Ft-Tons)	Ram Weight (Tons)	Hammer Fall (feet) 4	5	6	7	8	9	10	11
McKiernan-Terry										
DE-30 & DE-30B	**11.900**	1.400	5.6	6.9	8.1	9.2	10.3			
DE-33	**14.025**	1.650	6.6	8.1	9.5	10.9	12.2			
DA-35B	**11.900**	1.400	5.6	6.9	8.1	9.2	10.3			
DE-40	**17.000**	2.000	8.0	9.8	11.5	13.2	14.7			
DE-50B	**21.250**	2.500	10.0	12.3	14.4	16.5	18.4			
DE-70B	**29.750**	3.500	14.0	17.2	20.2	22.5	25.8			
DE-33-30-20	**16.480**	1.650	6.6	8.1	9.5	10.9	12.2	13.5	14.7	15.9
Delmag										
D-12	**11.250**	1.375	5.5	6.7	7.9	9.0	10.1			
D-15	**13.550**	1.650	6.6	8.1	9.5	10.9	12.2			
D-16-32	**19.670**	1.760	7.0	8.6	10.1	11.6	13.0	14.4	15.7	17.0
D-22	**19.890**	2.420	9.7	11.9	14.0	16.0	17.9			
D-19-32	**21.400**	2.095	8.4	10.3	12.1	13.8	15.4	19.0	18.4	
D-30	**27.100**	3.300	13.2	16.2	19.0	21.8	24.4			
D-25-32	**29.130**	2.757	11.0	13.5	15.9	18.1	20.3	22.3	24.3	
Kobe										
K-13	**12.600**	1.435	5.7	7.0	8.3	9.5	10.6			
K-22	**20.650**	2.425	9.7	11.9	14.0	16.0	17.8			
K-25	**25.350**	2.755	11.0	13.5	15.9	18.2	20.4	22.5		
K-35	**35.400**	3.860	15.4	18.9	22.2	25.5	28.6	31.6		
Mitsubishi										
M-14-S	**13.000**	1.485	5.9	7.3	8.6	9.8	11.0			
M-23	**22.500**	2.530	10.1	12.4	14.6	16.7	18.7			
Ice										
40S	**20.000**	2.000	8.0	9.8	11.5	13.2	14.8	16.4	17.9	
42S	**21.000**	2.044	8.2	10.0	11.8	13.5	15.1	16.7	18.3	
30S	**11.25**	1.500	6.0	7.4	8.7	9.9				

Table 703.04

Double-Acting Diesel Hammers

Hammer Designation	Manuf. Energy Rating (Ft-Tons)	Ram Weight (Tons)	Ram Fall (Feet)
Link-Belt Hammers			
440	9.10	2.000	4.5
520	13.13	2.535	5.0
McKiernan-Terry Hammers			
DA-35B	10.50	1.400	7.5
DA-55B	18.75	2.500	7.6

d. When using double-acting diesel hammers, the hammer energy shall be read from the bounce chamber pressure gauge and computed from the bearing chart. The hammer energy used to compute pile bearing shall not exceed the manufacturer's energy rating.

e. (1) If piling driven to the prescribed depth fail to obtain the required bearing capacity, the Engineer shall temporarily suspend driving.

(2) The Engineer will reevaluate pile requirements and notify the Contractor of proposed revisions within 2 NDR work days from the time driving was suspended.

f. Soil-Setup Factor:

(1) In certain silt, clay, or very fine sand soils, the initial bearing computed by the formulas in this Section may not accurately represent the ultimate bearing capacity of the pile. In such cases, the Engineer will request data to calculate soil-setup factors.

(2) (i) Whenever a setup factor is to be established for a group (i.e., abutment, bent, or pier), 2 representative piles shall be driven to within 2 feet of the cutoff elevation shown in the plans and allowed to rest undisturbed for 36 hours.

(ii) In the case of twin bridges, each shall be considered a separate bridge for the determination of soil setup factors.

(3) (i) After 36 hours have elapsed, the hammer shall be warmed up on Pile #1 and this pile driven to cutoff elevation. The bearing of Pile #1 is not reliable if the hammer is not warmed up.

(ii) The hammer shall then be placed on Pile #2 and the bearing computed on the basis of the average penetration of the first 10 blows. This pile shall be driven to cutoff and the bearing also computed on the basis of the average penetration of the last 10 blows required to bring the pile to cutoff elevation.

(iii) The bearing capacity computed on the basis of the first 10 blows shall be reported to the Engineer, and NDR will determine a setup factor. This factor may then be used to increase the computed bearing of the other piles in the group.

(iv) The soil-setup factor shall be determined by a ratio of two computed bearing loads for the same pile. The computed bearing load determined for the first ten (10) blows after a piling that has tested undisturbed for a minimum of 36 hours is Bearing initial (B) as determined in paragraph (3) (ii). The bearing computed on the basis of the average penetration of the last 10 blows required to bring the pile to cutoff elevation is known as Bearing achieved (B_a), as determined in paragraph (3) (ii). The soil-setup factor is the ratio of Bearing initial (B) divided by Bearing achieved (B_a).

(4) The Engineer may monitor the pile driving during the set up determination with the Pile Driving Analyzer. The Engineer shall prepare the pile for dynamic testing, and the Contractor shall attach and detach the gauges.

5. Static Pile Load Test:

a. The Contractor shall perform static pile load tests according to ASTM D 1143 test methods when required in the plans. A minimum of 2 weeks before any pile installation, the Contractor shall submit a proposal for a test apparatus.

b. All test results shall be documented in a report and submitted to the Engineer within 3 NDR work days following completion of the test.

c. The Contractor shall furnish all testing equipment and personnel to conduct the test. The Engineer may approve, disapprove, or modify the Contractor's proposal.

d. The integrity of the test frame during the test operation will be the Contractor's responsibility.

6. Test Piles:

a. Test Piles shall be driven at the locations shown on the plans. The Contractor shall give the Engineer a 7-day notice as to when he/she proposes to drive each test pile. The Engineer shall monitor each test pile with a Pile Driving Analyzer.

b. When the pile order lengths are indicated as "tentative" on the plans, the final order lengths shall be based on results obtained from the test pile driving.

c. The Department will provide the Pile Driving Analyzer and gauges.

d. The test piles shall be restruck a minimum of 36 hours after initial driving to determine a soil-setup factor. The restrike will be monitored with the Pile Driving Analyzer.

e. The Contractor shall bolt 2 accelerometers and 2 strain transducers to the pile before driving is started. The holes or anchors for the accelerometers and strain transducers will have been predrilled by Department personnel while the pile was still on the ground.

f. The Contractor may be required to stop the hammer for wave speed determination after the first few blows.

g. The Contractor shall drive the pile until the transducers are near the ground surface or as directed by the Engineer, at which time the Contractor shall stop the hammer and remove the accelerometers and strain transducers.

h. The Contractor shall continue driving the pile to cutoff elevation or as directed by the Engineer.

i. The time delay occurring when driving a pile monitored by the Pile Driving Analyzer will normally range from 30 to 60 minutes.

j. The test pile shall be incorporated into the foundation and become a load bearing pile.

k. The Engineer will provide final order lengths to the Contractor within 3 NDR work days after the test pile is driven.

l. Test piles and the service piles shall be driven with the same hammer for each structure.

7. Practical Refusal:

a. "Practical refusal" occurs when the actual bearing capacity is 2.0 times design bearing capacity and exceeds 75 tons for timber piles or 100 tons for precast concrete, steel, pipe, or steel pile shells.

b. (1) If a pile is at "practical refusal", driving shall be suspended. When "practical refusal" is reached before the pile has been driven to the specified minimum depth, the Engineer may require the Contractor to supplement the equipment with an adequate jetting system. By this means, the Contractor shall loosen the pile and continue to drive to the specified depth.

(2) The Engineer may require predrilling through the material that is causing premature refusal for subsequent piling.

8. Elevation of Piles and Cutoff:

a. Piles shall be driven to the specified depth and cut off at the elevation shown in the plans, or the entire order length may be driven if the pile top is not damaged.

b. (1) (i) Prestressed concrete piling shall be cut off to the shape specified.

(ii) A saw cut, to the depth of the prestressing strands, shall be made at cutoff elevation around the perimeter of the pile.

(iii) The Contractor shall remove the excess portion of the concrete pile after cutting the reinforcing strands.

(iv) After the saw cut is completed, a chipping tool shall be used to expose the prestressing strands for burning.

(2) The Contractor shall remove and replace piles that have broken or damaged pile butts.

9. Extensions, Splices, Build-Ups, and Overdriving:

a. The Engineer shall approve all extensions, build-ups, or splices on concrete piles. When authorized, they shall be made as follows:

(1) After driving is completed, the concrete at the end of the pile shall be cut away leaving the stub's reinforcing bars exposed for 20 inches.

(2) The cut of the concrete shall be perpendicular to the axis of the pile.

(3) Additional bars of the same size and number as original bars, together with spiral reinforcing, shall then be fastened securely to the projecting steel and the necessary formwork placed. Care shall be taken to prevent leakage along the pile.

(4) The concrete shall be of the same mix as that used in the original pile.

(5) Just before placing concrete, the top of the pile shall be thoroughly wetted and covered with a thin coating of mortar (1 part cement and 2 parts fine aggregate for concrete).

(6) The forms shall remain in place until test cylinders made during the progress of the work and subjected to the same curing conditions have attained a compressive strength of at least 2,030 psi.

b. A driving splice may be constructed instead of a build-up splice. The steel sleeve shall be fitted over the top of the driven pile, and a length of the same type of piling shall be placed in the top section of the sleeve. The piling shall be seated together by short blows with the hammer before full driving forces are applied. The allowable length of the extension will be determined by the Engineer.

10. Prefabricated Cast Steel Pile Points:

a. Piles requiring prefabricated pile point protection are shown in the plans.

b. The piles shall be cut off to provide a good fit with the prefabricated point.

c. Flanges shall be beveled 0.3 inch to prepare for the attaching welds, and the points shall be attached to the pile by an 0.3 inch (minimum) single bevel groove weld across the full width of the pile flanges.

11. Painting:

a. Exposed surfaces of all piles above finished ground line or stream shall be painted.

b. Steel bearing piles, steel pile shells, pipe piles, and steel sheet piles shall be painted in accordance with the requirements of Section 709.

703.04 -- Method of Measurement

1. a. The unit of measurement for bearing piling will be the linear foot. The quantity shall be the authorized length of piles in the completed structure.

2. a. Sheet piling will be measured for payment by the square foot. The area is obtained by multiplying the length of the sheets driven by the manufacturer's nominal driving width of each sheet.

b. The quantity paid will be the authorized square feet of sheet piling in the completed structure.

3. "Test Pile" and "Static Pile Load Test" are measured by the each.

4. A pile allowance is not authorized for quantities greater than those ordered by the Engineer or for piles subsidiary to other items of work (i.e., test piles).

5. All cutoff material shall become the property of the Contractor and shall be disposed of in a manner satisfactory to the Engineer.

703.05 -- Basis of Payment

1.

Pay Item	**Pay Unit**
Test Pile _____	Each (ea)
Concrete _____ Piling	Linear Foot (LF)
Pipe Piling	Linear Foot (LF)
_____ inch x _____ lb Steel Piling	Linear Foot (LF)
Steel Sheet Piling	Square Foot (SF)
Concrete _____ Sheet Piling	Square Foot (SF)
Static Pile Load Test	Each (ea)

2. Authorized "cutoff" of bearing and sheet piling shall be paid for at 60 percent of the piling's contract unit price. No payment is made for "cutoff" beyond the order length.

3. Splices ordered by the Engineer shall be paid for at 5 times the unit bid price for HP steel piling, pipe piling, and cast-in-place piling; and at 20 times the unit bid price for driving and build-up splices for precast/prestressed concrete piling.

4. Separate payment, at the contract unit price, is provided for piling extensions needed to reach to cutoff elevation, bearing capacity, and/or practical refusal.

5. Payment will not be made for the establishment of the first soil-setup factor in any group. Any additional setup factor, in each group, ordered by the Engineer will be paid for at the rate of $750.00 each.

6. The work performed by the Contractor in conjunction with the use of the Department's Pile Driving Analyzer shall be considered subsidiary to the piling.

7. a. Overdriving length is paid for at 40 percent of the contract unit price of the piling. A pile is overdriven when the Engineer determines that the pile must be driven deeper than the specified depth and no extension to the order length is necessary.

b. Payment length shall be the difference between the original cutoff elevation and the actual elevation of the top of the pile in-place in the structure.

8. Furnishing and attaching cast steel pile points will not be paid for directly but shall be considered subsidiary to the piling.

9. Pile jetting or augering is a Contractor's option and shall be performed at no additional cost to the Department.

10. Optional field splices are subsidiary to the pile payment.

11. The pile used in the pay item "Test Pile _____" is subsidiary to this pay item.

12. The Contractor shall replace and redrive broken or damaged cast-in-place concrete pile shells at no additional cost to the Department.

13. The Contractor shall remove and replace piles that have broken or damaged butts at no additional cost to the Department.

14. No payment will be made for broken piles or piles that are ordered and are not used.

15. Payment is full compensation for all work prescribed in this Section.