THE ANALYSES OF PILE LOAD TESTS PERFORMED ON H-PILES DRIVEN INTO ALLUVIAL SANDS

By

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PREFACE

This report describes a comprehensive pile load testing program performed on piles driven into alluvial deposits of the Mississippi River near Alton, Illinois, at the Lock and Dam 26 (Replacement) project. This investigation was made by the United State Army Engineers District, Corps of Engineers, St. Louis, Missouri.

Thanks to the St. Louis District for funding a portion of my education at Oklahoma State University. Thanks also to Dr. Donald R. Snethen and the other members of my advisory committee at Oklahoma State University whose comments and criticism added greatly to the quality of this thesis. Thanks to Dr. Norbert O. Schmidt and Dr. Thomas F. Wolff who were my first teachers in geotechnical engineering.

Thanks to Ms. Linda Wichlan and Mr. Harry Ward for their help with the figures, and to Ms. Charlene Fries who typed the final manuscript.

Finally, my sincerest thanks and appreciation go to my wife, Louise, for her unfailing support and continuous supply of chocolate chip cookies, especially when all I was doing was drawing flow nets and watching slow direct shear tests at 2:00 in the morning.

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CHAPTER I

INTRODUCTION

In certain applications, calculations of axial pile capacity need to be verified by load testing a pile on site. The results of such a load test are usually presented as a load-deflection curve (Figure 1), a curve which relates the load applied to the pile butt to the axial deflections of the pile butt and the pile tip. If necessary, the axial capacity determined from this curve can be used to provide the basis for making changes to the initial design assumptions.

The engineer charged with analyzing the results of a pile load test is forced to make many assumptions and provide answers to the following questions: (1) What methods are available for selecting the working load from the load-deflection curve? (2) How should the effects of varying groundwater levels within a particular job site be accounted for when comparing the results of many pile load tests? (3) To what extent do different loading procedures affect the results of load tests performed on similar piles? (4) Do battered piles perform similarly to vertical piles of the same axial length? (5) How should strain rod data be reduced and put into a more meaningful form?

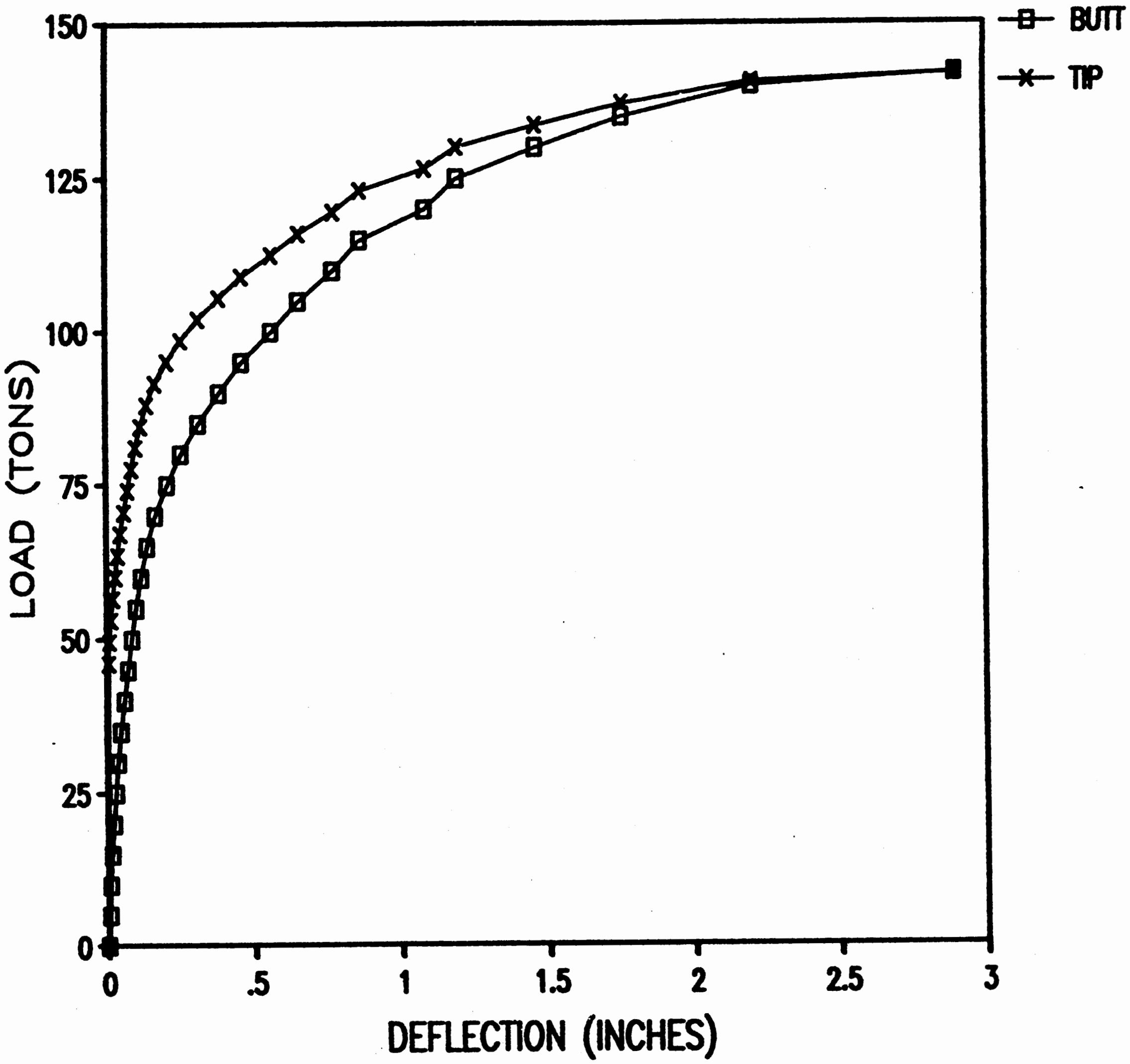

Figure 1. Typical Load-Deflection Curve for a Pile Load Test

The purpose of this thesis is to discuss various methods available to determine the axial capacity from load deflection curves, explaining the assumptions made in the method. These methods are applied to the results of 16 pile load tests and the results compared. A method for normalizing the axial capacity to account for differences in the water table location is presented. The effects of two different loading procedures and differing pile batters on the axial capacity are discussed. A method to interpret strain rod data, including development of load distribution curves, unit skin friction curves, and load transfer curves, is presented. Finally, a computer program which applies the methods of load deflection curve analyses discussed above is presented and the use of a "spread-sheet" program to analyze the strain rod data is documented.

CHAPTER II

LITERATURE REVIEW

Load Transfer

A driven pile derives its capacity from a combination of tip bearing and skin friction. The load applied to the pile butt is distributed along the pile shaft in a fashion dependent on the soil conditions. If the strain of a particular section of pile is known, then the average load in that section can be determined. Seed and Reese (26) provide the required theory:

$$P = E\ A\ dw/dz \qquad (1)$$

where

P = load remaining in the pile;

E = modulus of the pile material;

A = cross-sectional area of the pile; and

w = movement of the pile at depth z.

The change in P with respect to the change in depth is equivalent to the skin friction at that point and can be expressed

$$-dP/dz = Q_{sf} = E\ A\ (d^2w/dz^2) \qquad (2)$$

The unit skin friction is obtained by dividing Q_{sf} by the shaft area of the pile section involved and can be expressed by

$$f_o = Q_{sf}/A_s = -(1/A_s)\ (dP/dz) \qquad (3)$$

where A_s is the perimeter of the pile shaft multiplied by the length of the pile section involved.

The relation of f_o with depth along the pile is known as the transfer function, $f_o(z)$. As long as the load in the pile decreases with depth, Q_{sf} and $f_o(z)$ remain positive. Generalized shapes of dP/dz and the related transfer function $f_o(z)$ are plotted side by side in Figure 2. Vesic (33) presents equations which describe the transfer function. These equations can be used to determine the transfer function for the given foundation conditions, in turn allowing the magnitude and distribution of the skin friction to be estimated.

The use of the subgrade-reaction method as described by Seed and Reese (26) is more prevalent than the transfer function for predicting pile capacity. The subgrade reaction (t-z) method uses Equations (1) and (2) to determine a family of load distribution curves for applied loads ranging from small magnitude to the ultimate capacity of the pile. From each of these load distribution curves, the unit skin friction is determined for each pile section and divided by the assumed shear strength acting at that depth. This percentage of developed shear strength is then plotted against the corresponding movement of that pile section. This results in the load transfer curve; a typical example for a steel pile in sand is shown in Figure 3 as presented by Coyle and Sulaiman (8). This family of load transfer curves is used to relate pile movement to mobilized skin friction at various depths between the ground surface and pile tip.

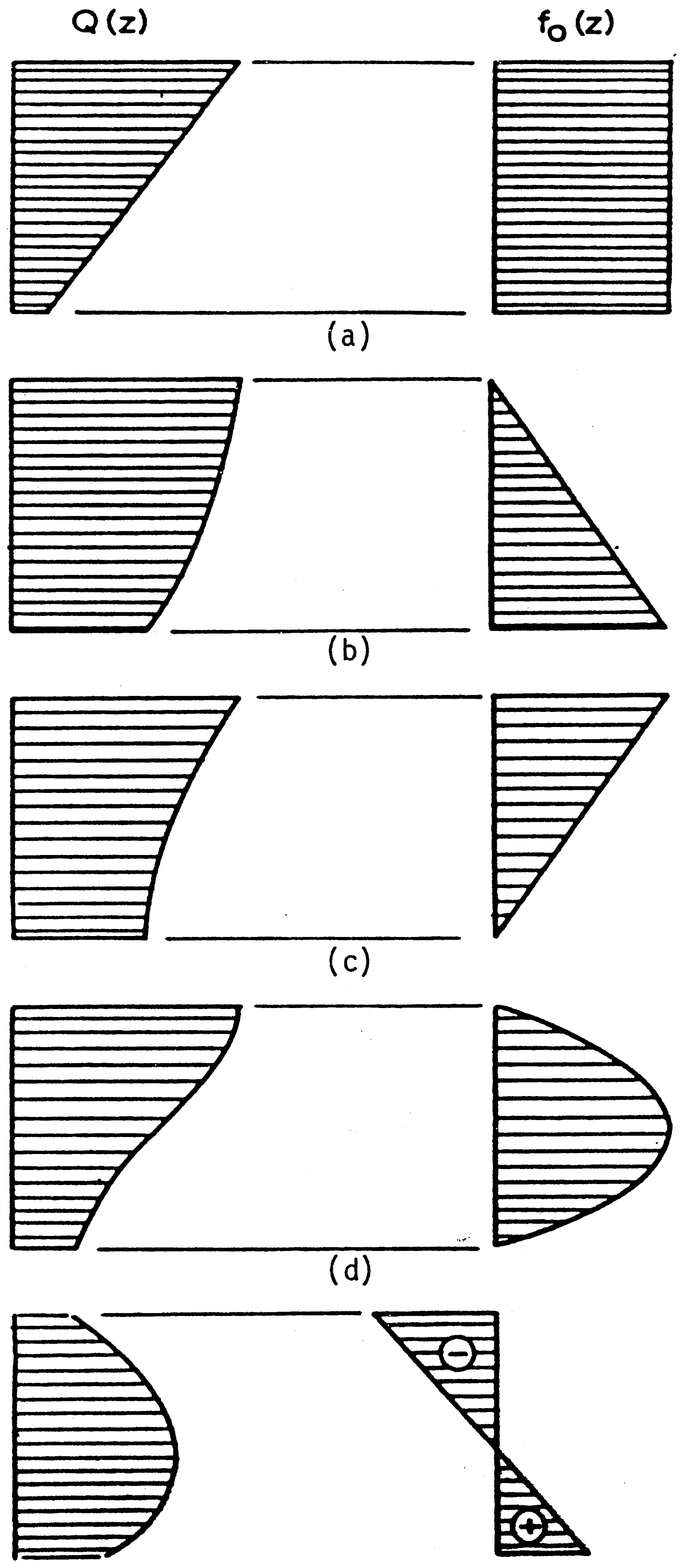

Figure 2. Typical Load Distribution and Corresponding Unit Skin Friction Curves

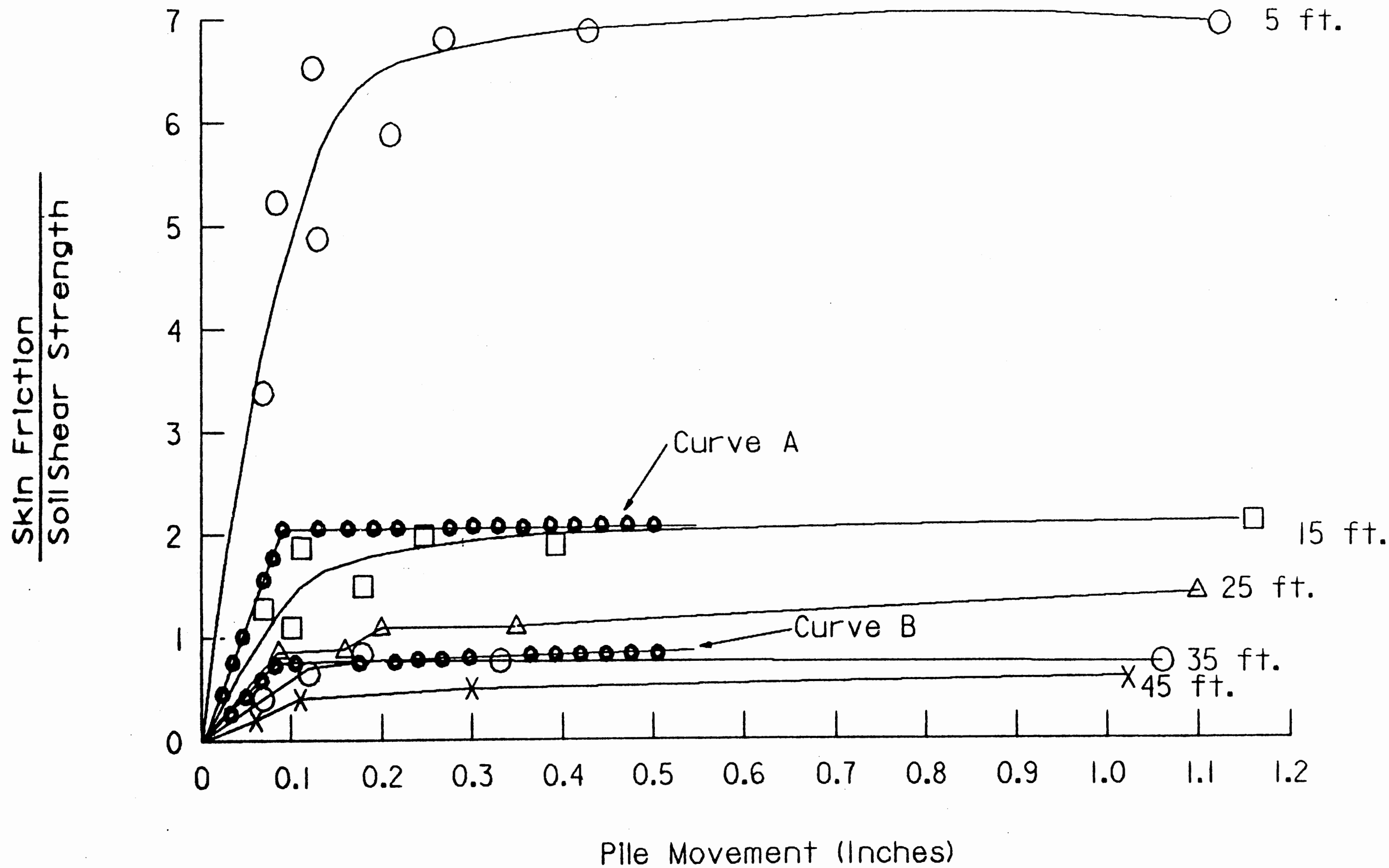

Figure 3. Load Transfer Curves for a Steel Pile in Sand

Test Pile Instrumentation and Procedures

Many load tests reported in the literature present only load deflection data measured at the pile butt. While meeting the requirements of the particular job, these results do not allow for analyses other than determination of a pile capacity, determination of failure modes (general, local, or punching failure), and rough estimates of the total skin friction and tip load.

In attempting to offset the disadvantages created by the lack of thorough instrumentation, unload/reload cycles have been included in the test procedures to allow for estimation of tip deflections. This method assumes that all elastic compression/tension of the pile is recovered upon unloading and that the permanent set of the pile butt is equal to the pile tip deflection. Unfortunately, negative skin friction forces may restrict the pile rebound, causing tip deflections to be overestimated (21). Furthermore, the unload/reload cycles, intended to overcome one shortcoming, can change the properties of the soil adjacent to the pile, thereby affecting the performance of the test pile.

Many load tests were considered complete when the applied load reached 200 percent of the required capacity. In these cases, the ultimate capacity of the test pile was not determined. Depending on the foundation conditions at the test site, it may or may not be possible to extrapolate the existing data to estimate the ultimate capacity.

Fellenius (9) suggests that pile load tests performed as part of a field investigation prior to the installation of production piles be loaded to failure or to at least 300 percent of the possible maximum applied load. Loading the test pile to failure will allow the maximum amount of data to be extracted from the load test results. In addition to the minimum recommended load levels, it seems reasonable to recommend a certain minimum level of instrumentation on test piles. This would consist of a load cell at the pile butt, and devices to measure pile butt and pile tip deflection. In addition to load deflection data at the pile butt, this would provide the engineer with measurements of pile tip deflection which can be used with Van Weele's (30) method to estimate skin friction. Even with this minimum level of instrumentation, the engineer's situation is only improved; he must still assume the distribution of skin friction along the pile.

A fully instrumented pile is considered to be one which is furnished with the devices necessary to provide the deflection and/or load at several points along the embedded length. Examples of load test programs using such technology can be found in papers by Mansur and Kaufman (23), Seed and Reese (26), and Hanna (13). These papers present not only load deflection curves, but the load distribution along the embedded portion of the test pile, the unit skin friction of the soil along the pile shaft, and the load transfer curves of the soil at various depths.

Capacity of Test Pile

Load deflection curves have been interpreted in many different ways to arrive at the working capacity of the test pile. Vesic (31) lists 15 different methods; Chellis (6) lists 16; AISC (1) lists 11;

and Fellenius (10) lists 9. Many of these methods are taken from local building codes and are relevant only if the load test is performed in an area in the jurisdiction of that particular building code. Others are subjective, depending on the user to determine the point where the additional settlement becomes disproportionate to the load increment. Still other methods may give different results, depending on the choice of scale used to plot the data.

Mansur and Focht (22) and Mansur and Kaufman (23) used a variety of methods to determine pile capacity and reported the average of the results. The methods used were: (1) tip settlement of 0.25 inch; (2) load at which the slope of the net settlement curve equals four times the elastic slope of the test pile; (3) increase in the net settlement curve was disproportionate to the increase in the applied load; (4) increase in the gross settlement curve was disproportionate to the increase in the applied load; and (5) an intersection method.

Fellenius (10) presents nine different methods which are based more in mathematical and sound geotechnical theory and less on subjective decisions made by the engineer. These methods will be presented in detail in Chapter IV and applied to the results of these new pile load tests.

CHAPTER III

DESCRIPTION OF PROJECT, FOUNDATION CONDITIONS, AND PILE LOAD TEST PROGRAM

Project Description

Construction of Locks and Dam No. 26 (Replacement) was authorized by Public Law 95-502 in October, 1978. The new locks and dam will replace the existing Lock and Dam No. 26, an aging structure put into operation in the late 1930's. Located approximately two miles downstream of the existing project near Alton, Illinois (Figure 4), Locks and Dam No. 26 (Replacement) joins a system of locks and dams on the Middle and Upper Mississippi River which provides a navigable waterway for barge traffic. All planning, design, and engineering during construction was done by the United States Army Engineer District, St. Louis.

The project consists of a concrete gated spillway with nine tainter gates, a concrete stilling basin, one 1200-foot long main lock and one 600-foot long auxiliary lock, an overflow section, and a closure section. The foundation for the concrete structures will consist of vertical and battered HP14*73 and HP14*117 steel piling driven to rock or to predetermined tip elevations.

The project is being constructed within the Mississippi River in three separate stages, each within a temporary cofferdam constructed

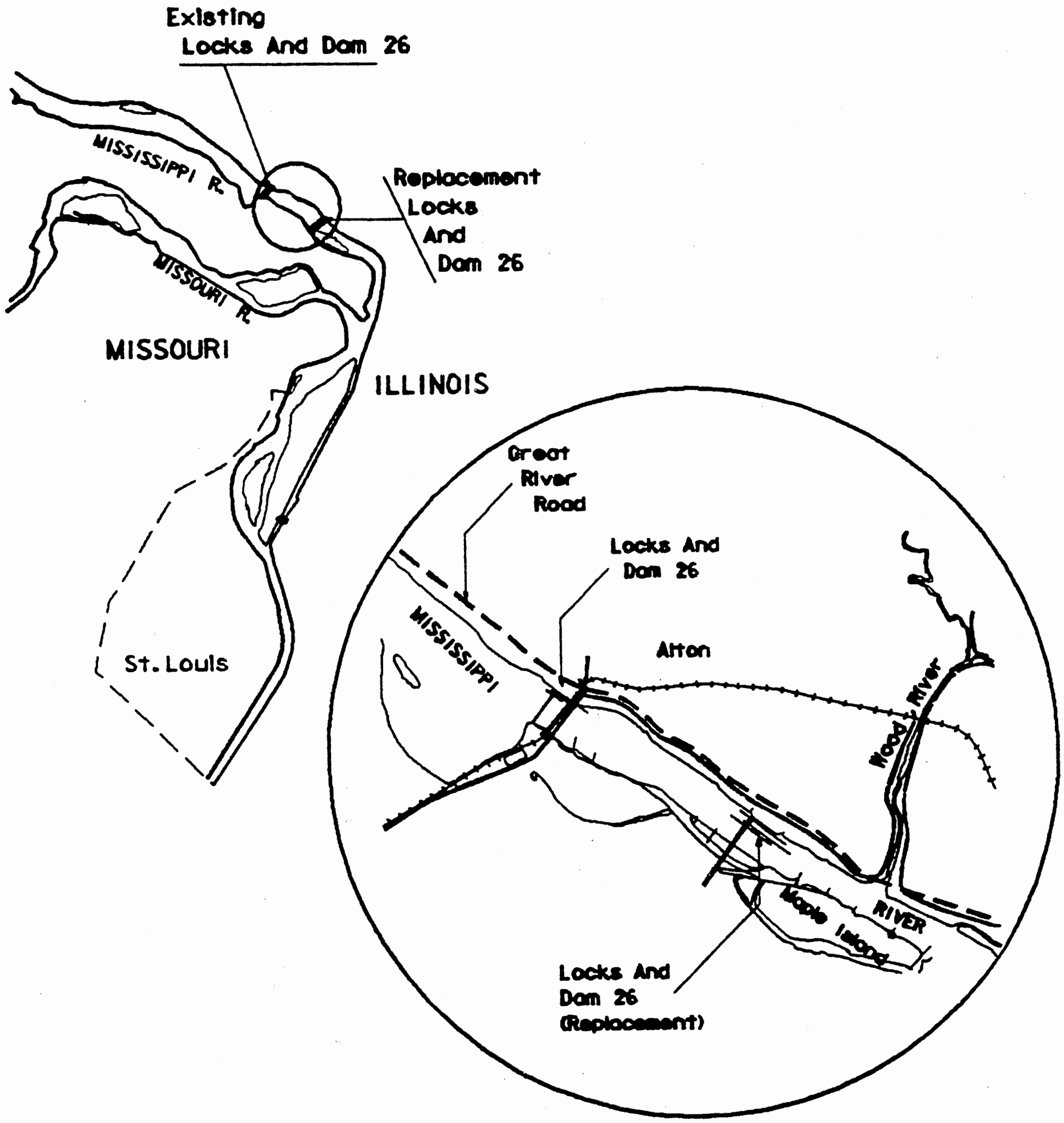

Figure 4. Location of Locks and Dam 26

of sheet pile cells. The first stage (now complete) included construction of six and one-half gatebays of the gated spillway and the included stilling basin. Figure 5 shows the relationship of the first stage construction site to the river. The second stage (presently under construction) includes construction of the main lock, two and one-half gatebays, another portion of the stilling basin, and the overflow section. The remaining structures, including the auxiliary lock and the remainder of the stilling basin, are presently in the design stage.

The pile load test program described herein was performed during the first stage construction contract. Figure 6 shows the locations of the load test areas within the cofferdam.

Foundation Conditions

General

The construction site is located on the Mississippi River at the northern extension of a broad alluvial valley known locally as the American and Columbia Bottoms. The river flows in a general southeast direction at the site. The southwestern flood plain (Missouri side) is a flat, featureless surface five to six miles wide used primarily for agriculture. The northeastern flood plain (Illinois side) is relatively narrow and is primarily industrialized. The valley is bordered on the Illiois side by steep limestone bluffs rising 200 feet or more above the flood plain. The valley bedrock at the site underlies 70 to 120 feet of overburden and consists primarily of hard, competent limestone.

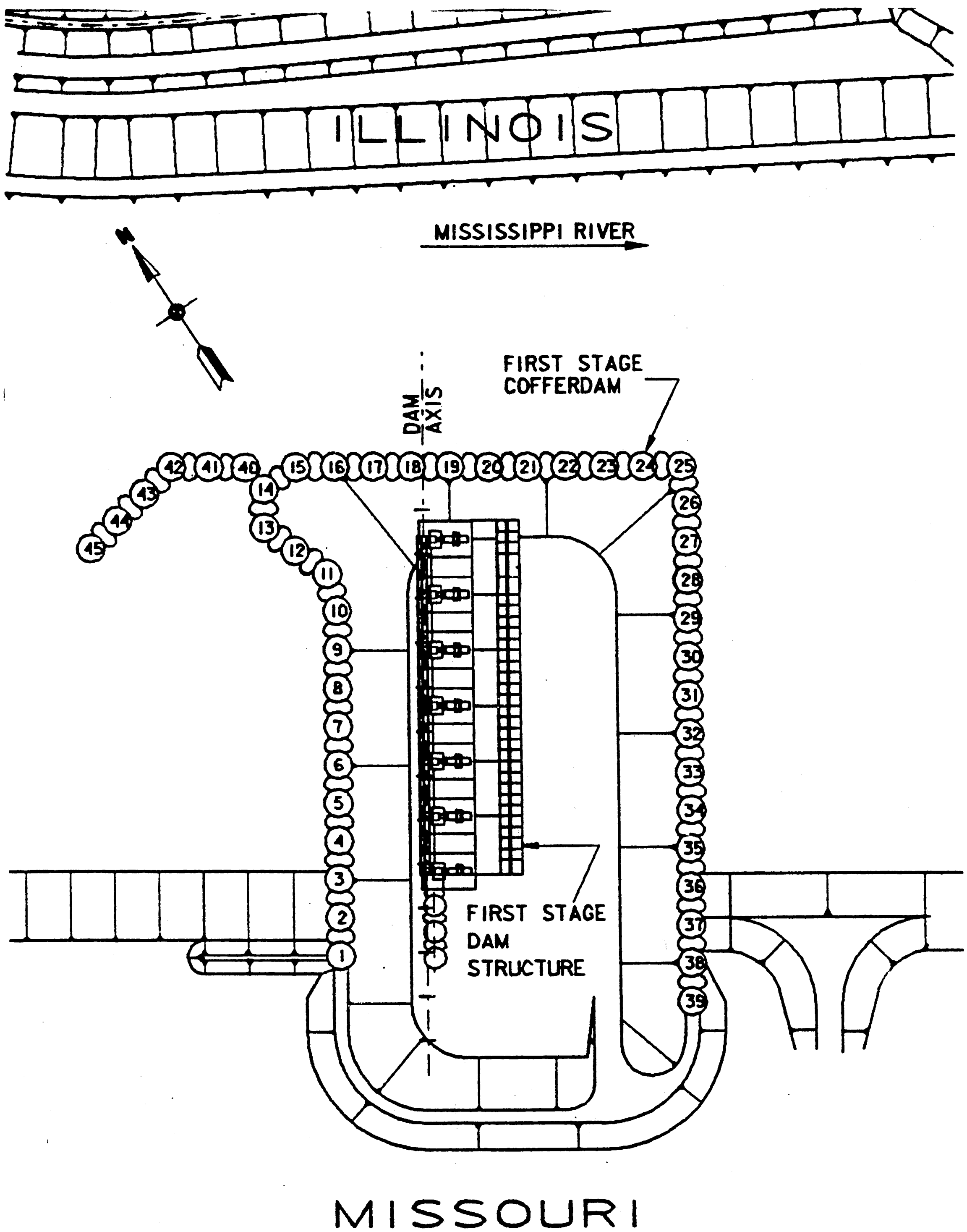

Figure 5. Diagram of First Stage Cofferdam

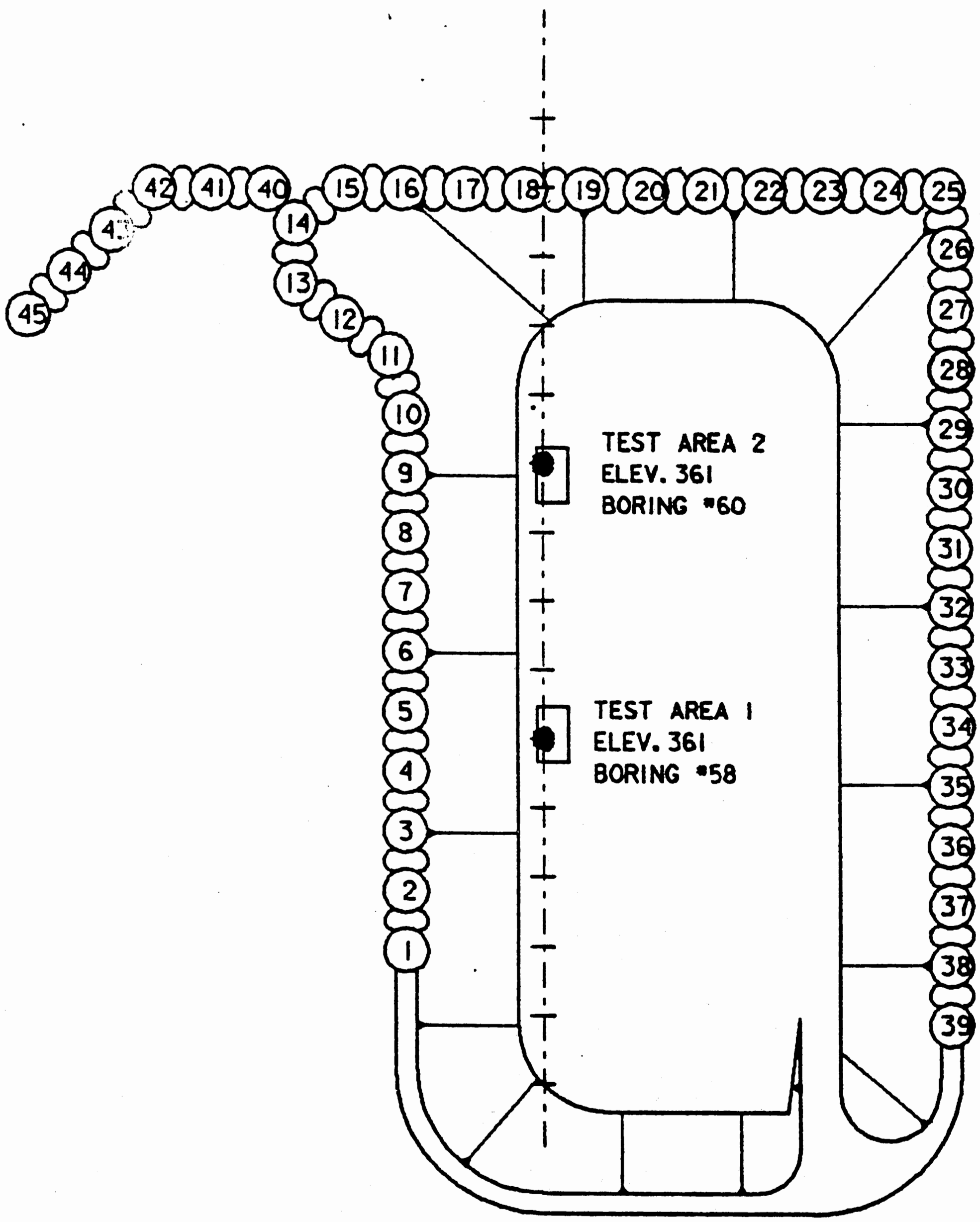

Figure 6. Location of Pile Load Test Areas 1 and 2

Overburden

The stratigraphy of the overburden at the site may be divided into two broad categories: alluvial deposits and glacial deposits. The alluvial deposits include those known as Flood Plain Deposits, Recent Alluvium, and Alluvial Outwash; the glacial deposits include those known as Wisconsinan Outwash, Illinoian Ice Contact Deposits, and Illinoian Till.

Flood Plain Deposits. These consist of clays, silts, and sands, and form the uppermost soil deposits. These materials occur at and landward of the natural levee in thicknesses of up to 50 feet but are not present at the test sites.

Recent Alluvium. The Recent Alluvium is composed of accumulated and river worked sediments which are generally clean, poorly graded sands (SP), varying in particle size from fine to coarse grained. Some samples are gravelly while materials such as silt, cobbles, or boulders may occur. Tree trunks, rip rap, cable, scrap metal, rusting automobiles, and other debris associated with the environment of a heavily industrialized river are randomly encountered in this unit. The thickness of the Recent Alluvium varies between 15 and 30 feet with Standard Penetration Test resistances typically between 15 to 35 blows per foot.

Alluvial Outwash. This unit is a gradational zone between the overlying Recent Alluvium and the underlying Wisconsinan Outwash. These materials are generally medium to coarse sands and gravelly sands (SP) with some fine sands. Any materials found in either the

Recent Alluvium or the Wisconsinan Outwash could occur in this unit. Standard Penetration Test resistance values are typically between 15 and 40 blows per foot but may vary at specific locations.

Wisconsinan Outwash. The Wisconsinan Outwash is a glacial deposit composed of materials carried beyond the glacial terminus by meltwater streams. This unit has been subjected to less fluvial action than the two units above and, therefore, has greater variability in sorting and particle size. These materials are generally medium to coarse sands and gravelly sands (SP or SW), and sandy gravels (GP); but fine sands, silty sands, and silts may be encountered. Horizons of cobble-sized pieces with occasional boulders have been encountered and can be expected to occur throughout this unit. The thickness of this unit varies between 20 and 30 feet and the Standard Penetration Test resistances are typically between 15 and 60 blows per foot with occasional refusal (more than 100 blows per foot).

Illinois Ice Contact Deposit. This is a stratified glacial drift which accumulated at the edge of a stagnant ice front. Materials in this deposit range from clays to large boulders. Because of this extreme particle size variability, this deposit is regarded as one in which any type of material may be encountered. The thickness of this unit varies between 20 and 35 feet. Standard Penetration Test resistances are typically between 25 to 70 blows per foot with occasional refusal.

Illinoian Till. The Illinoian Till is composed of ice-laid debris which exhibits little or no sorting. It consists primarily of a hard, compact, slightly fissile clayey silt matrix (up to 5 feet thick within the test site) containing varying amounts of sand and gravel with occasional cobbles and boulders. Typical Standard Penetration Test resistances vary from 25 blows per foot to refusal.

Bedrock

The bedrock underlying the site is primarily limestone and shale of the Mississippian Age which were found to be dense and hard with no evidence of extensive weathering or solution activity.

Conditions at Load Test Sites

The load tests were performed in two locations as shown in Figure 6. Test Area 1 was located in a generally cobble-free area closer to the Missouri bank of the river, and Test Area 2 was located more toward the center of the channel where intermittent cobbles and boulders were expected to cause more difficult driving. The stratigraphy of these two areas is represented by the plotted boring logs shown in Figure 7.

Laboratory Tests

The strength parameters for the foundation sands were determined by a series of consolidated-drained (S) triaxial shear tests on samples reconstituted from selected bag samples. Although the results of the shear strength testing and analyses of the Standard Penetration Test resistance values indicated that the internal friction

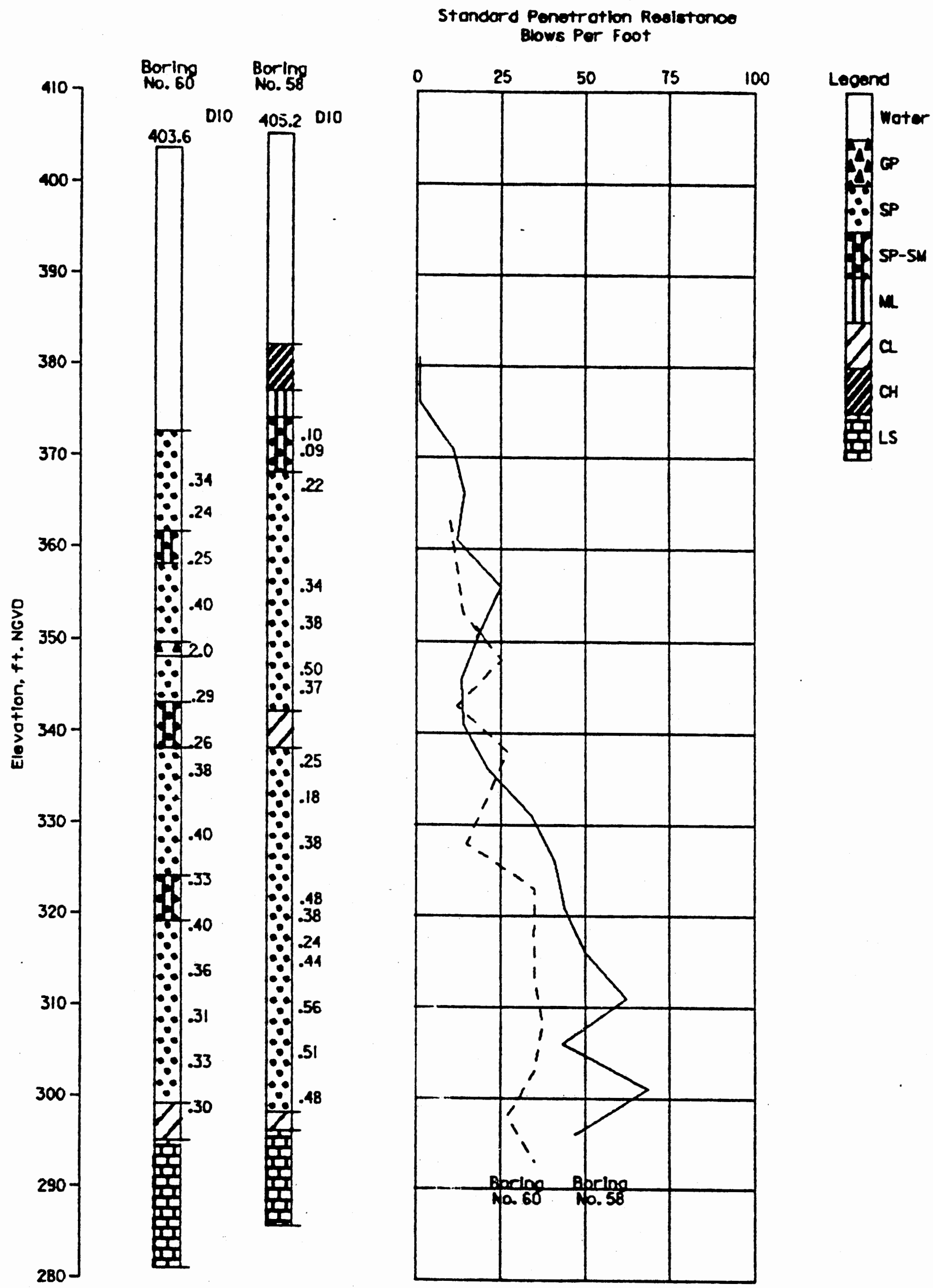

Figure 7. Foundation Conditions at Test Areas 1 and 2

angle of the sands is approximately 40°, a friction angle of 35° was chosen to represent the lowest strength that could be expected to occur. Unit weights of 110 pounds per cubic foot (dry) and 131 pcf (saturated) were chosen to represent the foundation materials. All work done herein used a friction angle of 40° and a saturated unit weight of sand of 131 pcf.

Pile Load Test Program

General

The load test program included tension and compression tests, test piles of variable embedded lengths (driven to rock or driven to an elevation above rock), variable pile batters (vertical or 1V:2.5H) and differing load procedures (ASTM "Standard" or ASTM "Quick" procedures). The load tests performed in this test program are summarized in Table 1.

Axial loads were applied to the test pile by means of a hydraulic jack acting against a reaction beam spanning between pile groups driven adjacent to the test pile. Pile butt deflections were measured by dial gage extensometers and axial pile deflections were measured using a system of strain rods and dial gage extensometers. The applied loads were measured by hydraulic load cells located between the jack and the butt of the test pile. During the load tests, the following quantities were measured with the addition of each new load increment: (1) applied load to the test pile; (2) deflection of the pile butt; and (3) relative movement between the end of the strain rod and the pile web.

TABLE 1

PHYSICAL PROPERTIES OF TEST PILES

PILE	DATE DRIVEN	DATE LOAD TEST BEGUN	DESCRIPTION OF LOAD TEST	PILE TYPE	AXIAL EMBEDDED LENGTH	BATTER 1H ON ??V	VERTICAL PROJECTED LENGTH	SURFACE ELEVATION	TIP ELEVATION
1-1	8/14/82	8/18/82	LONG VERTICAL STANDARD TENSION	HP14x73	60.75	VERTICAL	60.75	359.00	298.25
1-2	8/25/82	8/29/82	SHORT VERTICAL STANDARD TENSION	HP14x73	54.00	VERTICAL	54.00	357.70	303.70
1-3A	8/26/82	9/2/82	SHORT VERTICAL STANDARD COMPRESSION	HP14x73	54.00	VERTICAL	54.00	357.70	303.70
1-4	9/10/82	9/14/82	LONG BATTERED STANDARD TENSION	HP14x73	65.00	2.50	60.35	357.40	297.05
1-5	9/10/82	9/18/82	LONG VERTICAL QUICK TENSION	HP14x73	60.50	VERTICAL	60.50	357.70	297.20
1-6	10/7/82	10/18/82	SHORT VERTICAL QUICK COMPRESSION	HP14x73	53.00	VERTICAL	53.00	357.40	304.40
1-7	9/24/82	10/4/82	LONG VERTICAL QUICK COMPRESSION	HP14x73	59.00	VERTICAL	59.00	357.60	298.60
1-8	9/22/82	9/27/82	LONG BATTERED QUICK COMPRESSION	HP14x73	66.00	2.50	61.28	357.40	296.12
1-9	9/23/82	9/30/82	SHORT BATTERED QUICK COMPRESSION	HP14x73	58.00	2.50	53.85	357.60	303.75
2-1	8/25/82	8/30/82	SHORT VERTICAL QUICK TENSION	HP14x73	55.00	VERTICAL	55.00	357.30	302.30
2-2	8/18/82	8/24/82	SHORT BATTERED QUICK TENSION	HP14x73	59.00	2.50	54.78	359.00	304.22
2-3	8/27/82	9/3/82	LONG BATTERED QUICK TENSION	HP14x73	69.20	2.50	64.25	358.70	294.45
2-4	8/26/82	8/31/82	SHORT BATTERED STANDARD TENSION	HP14x73	58.00	2.50	53.85	359.00	305.15
2-5	9/28/82	10/6/82	SHORT BATTERED STANDARD COMPRESSION	HP14x73	59.00	2.50	54.78	358.60	303.82
2-6	9/13/82	9/23/82	LONG BATTERED STANDARD COMPRESSION	HP14x73	71.17	2.50	66.08	357.70	291.62
2-7	9/16/82	9/29/82	LONG VERTICAL STANDARD COMPRESSION	HP14x73	66.83	VERTICAL	66.83	358.50	291.67

Reaction Frames

A schematic view of the reaction frames used for compression and tension load tests is shown in Figure 8. Two rows of four piles each were driven on either side of the test pile and utilized as reaction piles. A steel beam was welded across the top of each row of piling and then the main reaction beam was bolted transversely to these four beams such that the test pile was centered under the main reaction beam.

Compression loads were applied to the test piles by means of a 500-ton capacity hydraulic jack placed between the main reaction beam and the pile butt. Tensile loads were applied to the test pile by means of a 300-ton capacity jack placed on top of the reaction beam. A steel yoke was used to transfer the load around the reaction beam to the test pile. A spherical bearing was always included between the jack and the test pile to reduce the effects of eccentricities in the applied loads.

In each load test, the reaction frame, test pile, reference beams, jack, pump, and all instrumentation were shielded from sunlight and direct effects of the elements.

Instrumentation

Load Cells. The applied loads were measured with hydraulic load cells and indicated by electronic digital readout devices. To assure the accuracy of the load measuring system, the load cells and readout devices were calibrated as pairs before the load test program by the

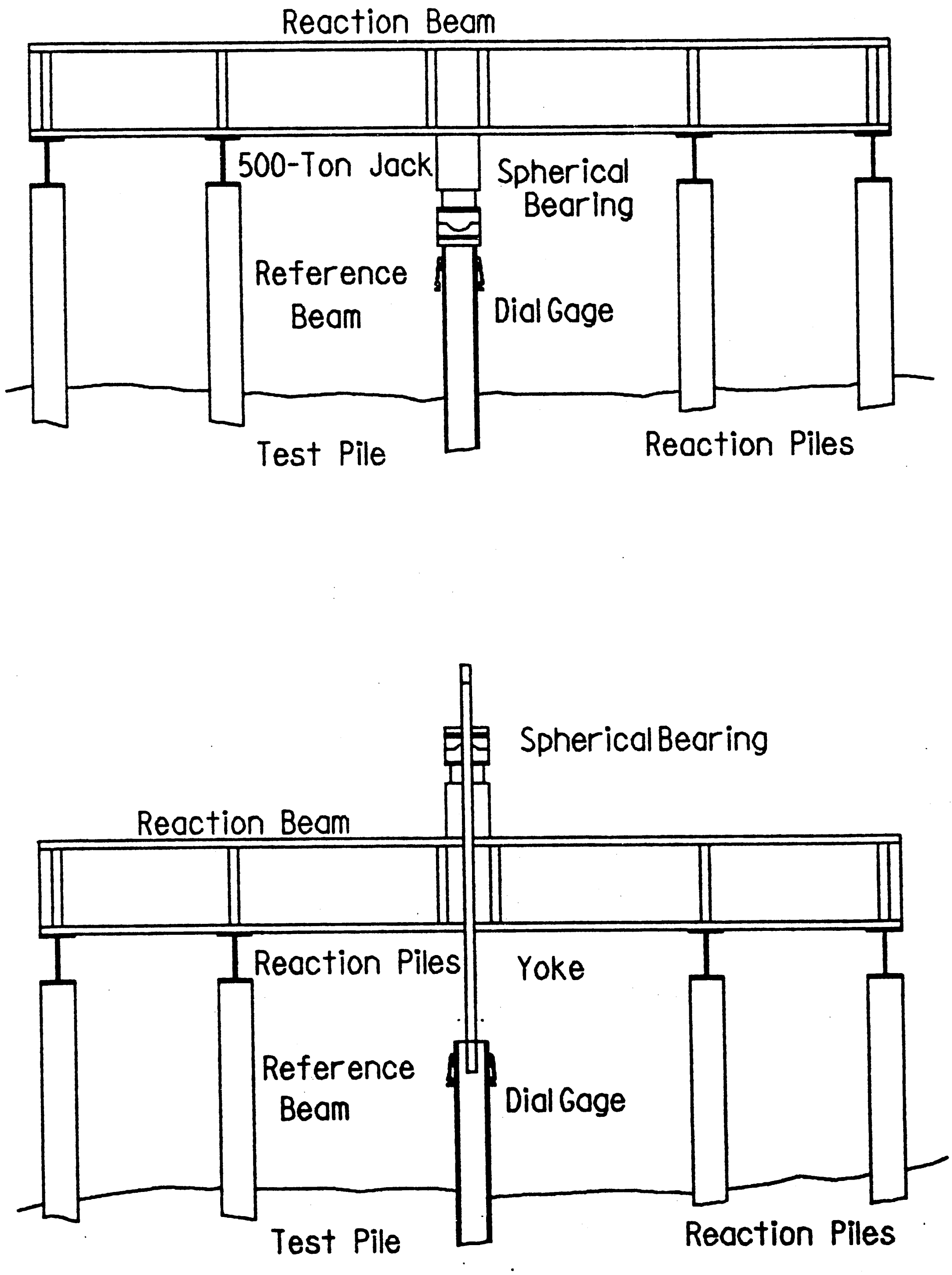

Figure 8. Schematic View of Reaction Frames

National Bureau of Standards. Each load cell was used only with the electronic readout device with which it was calibrated.

Pile Butt Movement Measurement. Dial gage extensometers with 3-inch capacity were used to measure the movement at each of the four corners of the pile butt as shown in Figure 9. These gages were firmly attached to independent reference beams, the ends of which were supported at least 10 feet from the test pile. To reduce the effects of pile bending or twisting, the mean of these four corner measurements was reported as the pile butt deflection.

Strain Rods. A system of steel rods and dial gage extensometers was utilized to measure axial deflection at the pile tip and at five equally spaced points along the embedded length of the pile. The lowest strain rod was attached to the pile approximately six inches from the pile tip. The strain rods were 9/16 inch diameter by 10 feet long, and were provided with matching male and female threads at either end. The required strain rod length was obtained by screwing the 10-foot sections together and then trimming the end. Six strain rod anchors, small steel blocks, each with a threaded hole cut in it (matching the threads at the male end of the strain rod), were welded to the pile web at the correct location before the pile was driven. These anchors served as attachment points for the strain rods. Steel channels, welded to both sides of the pile web, extended from just above the pile tip to a point above the ground surface and provided an unobstructed path for the strain rods. Three strain rods were attached to each side of the pile web. After the test pile was driven, each of the six strain rods was "fished" down within the

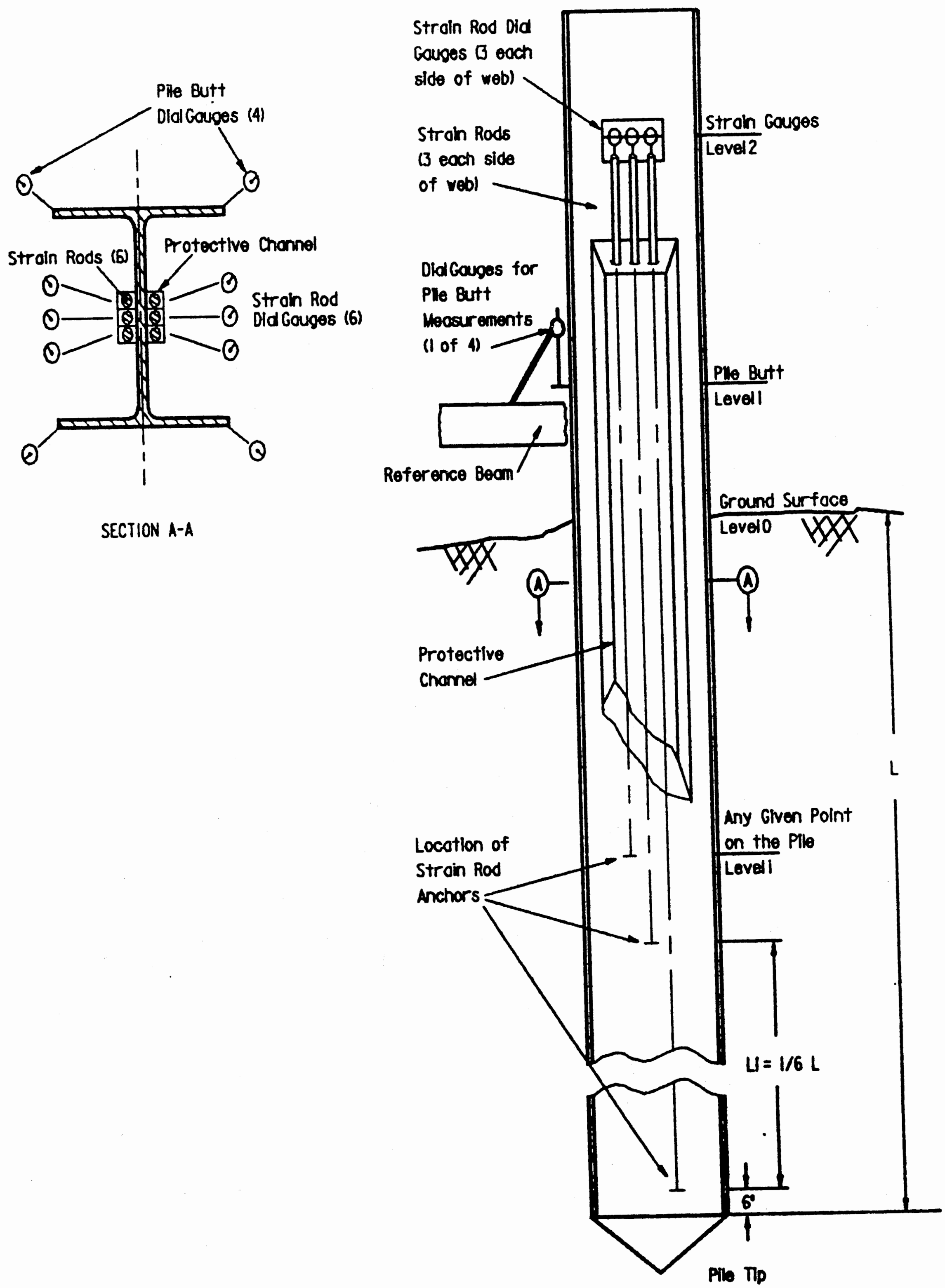

Figure 9. Schematic Diagram of Extensometer and
Strain Rod Installation

protective channel and screwed into its strain rod anchor. Figure 9 shows a schematic diagram of the strain rod instrumentation.

The relative movements between the top of each strain rod and the pile web were measured by a dial gage attached to the web of the test pile directly above the end of the strain rod. Using the measured deflection of the pile butt and the measured movement of the strain rods, the movement of the embedded portion of the test pile was determined at six points.

Test Pile Installation

Pile Driving Equipment. All of the test piles were driven with an International Construction Equipment (ICE) No. 640 hammer. This is a double acting diesel hammer with a rated energy of 40,000 foot pounds. Other pertinent data on this hammer are as follows:

Ram Weight	6,000 pounds
Rated Equivalent Ram Stroke	80 inches
Operating Speed	74-77 blows per minute

The hammer and pile were supported in 104-foot long, fixed, extended leads. The top of the leads were attached to the crane boom and the bottom of the leads were attached to a telescopic spotter. This support system provided the leads with controlled movement in three directions: vertical, side to side batter, and forward and aft batter.

Pile Driving. All of the test piles were driven to the desired tip elevation which required pile embedments of 53 to 71 feet. Barring mechanical difficulties, all of the test piles were driven their entire length without interruption. Driving records were maintained for each test pile, which included the penetration resistance in blows per foot, blows per inch for the last foot, the date, the time taken to drive the pile, the elevations of the ground surface and the pile tip, the location of the pile, and the amount, if any, that the pile was out of plumb. Figures 10 and 11 illustrate the driving records of the Group 1 and Group 2 test piles. Within each group the driving resistances were similar, with the exception of the driving resistances of the lower 20 feet of the Group 2 piles which were slightly greater than the Group 1 piles.

All of the test piles were continuously monitored during driving with a dynamic pile driving analyzer. The analyzer was used to monitor the performance of the hammer, check the pile for subsurface damage incurred during driving, and estimate a static axial capacity of the pile at the end of driving. Due to the possibility of a pile being driven into a boulder and the fact that half of the piles were to be driven to refusal on bedrock, all of the test piles were equipped with pile points to reinforce and protect the pile tip.

Load Test Procedures

General. The procedures outlined in ASTM Designation D1143-74, "Piles Under Static Axial Compressive Load" (2) were used as a framework for the compression and tension loading procedures.

ASTM Standard Procedure. The load was applied in 25-ton (compression) or 15-ton (tension) increments at a rate of two tons per minute up to a maximum applied load of 400 tons compression or 150

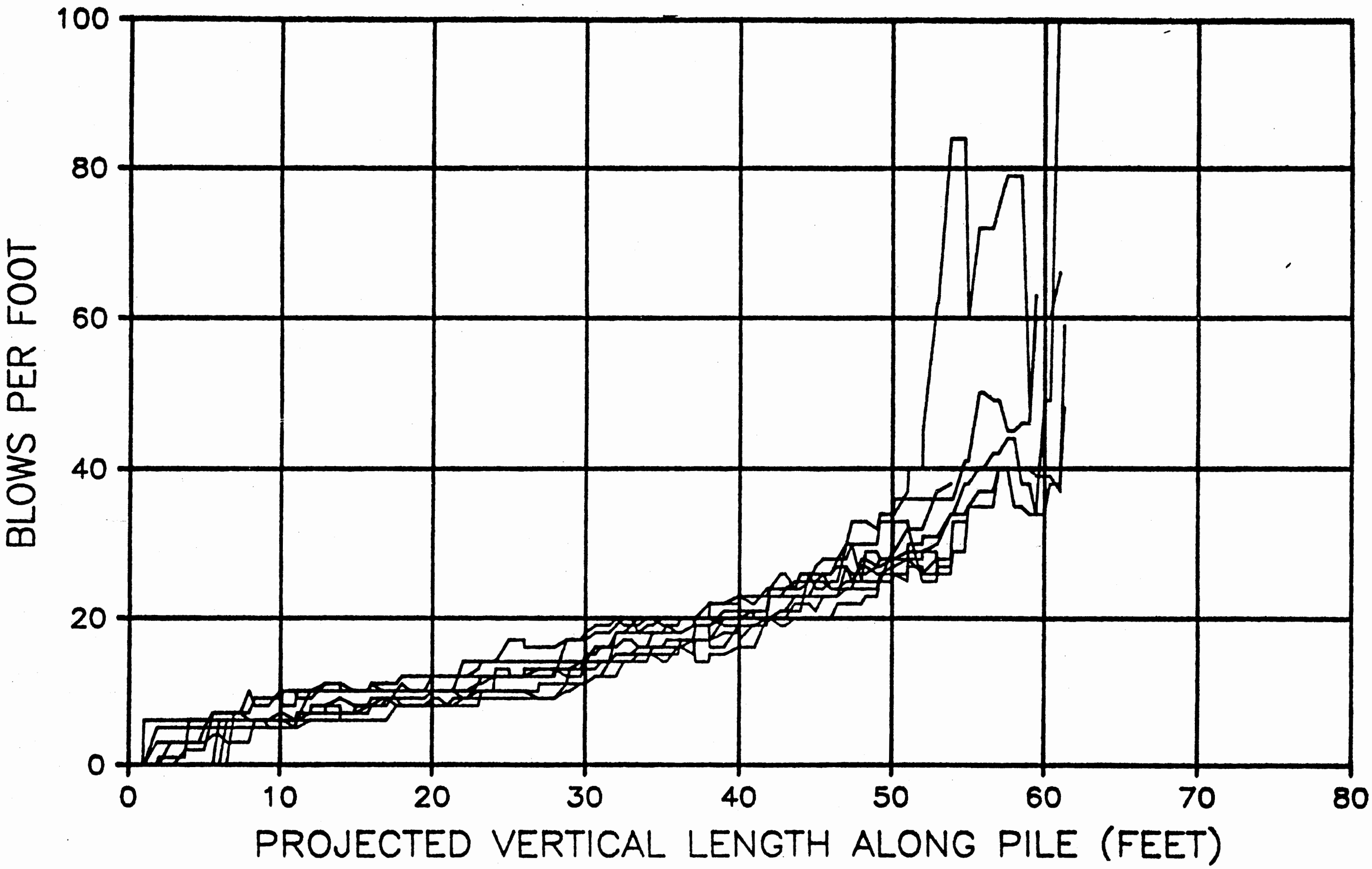

Figure 10. Pile Driving Resistance Records for Group 1 Piles

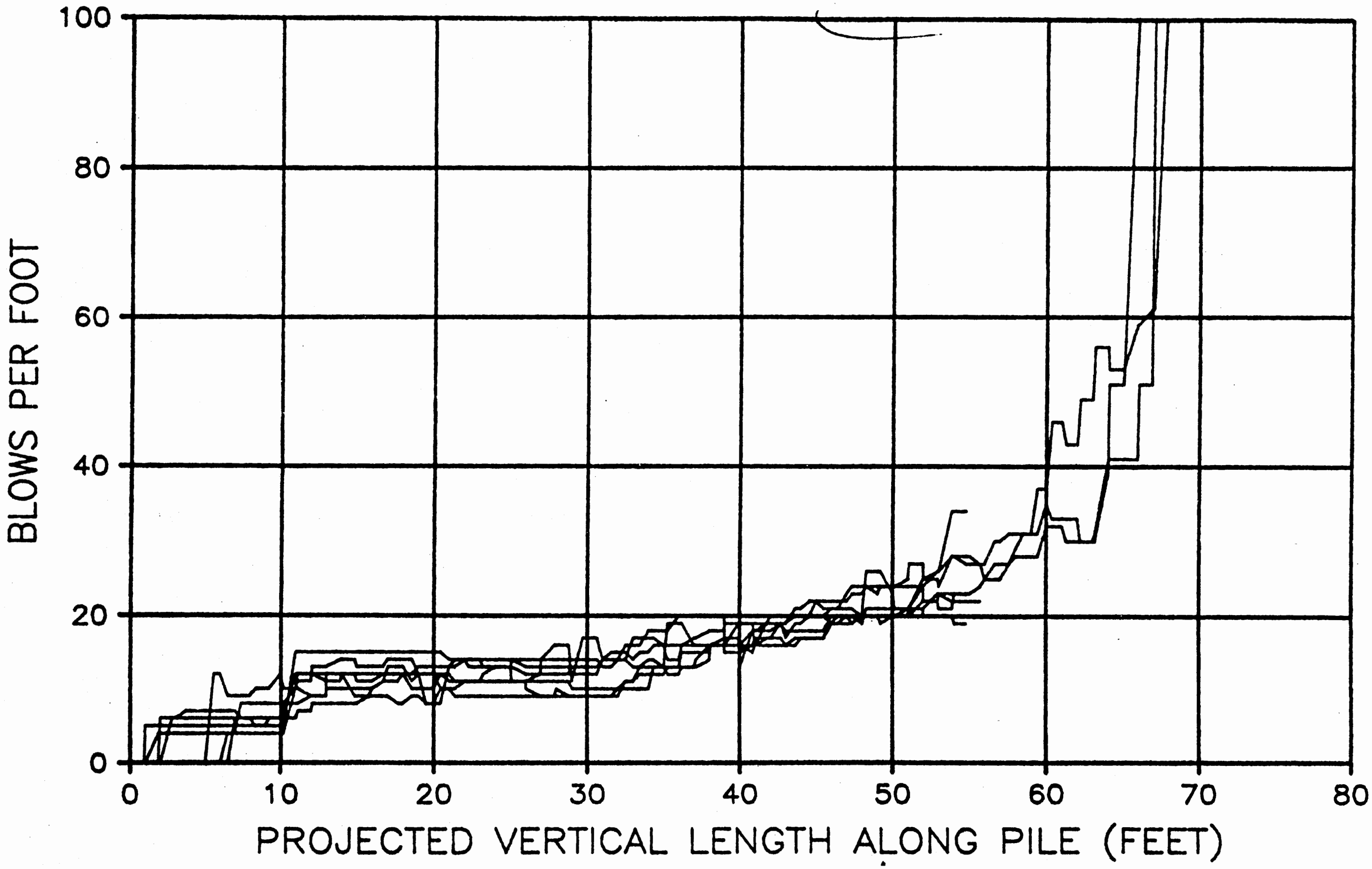

Figure 11. Pile Driving Resistance Records for Group 2 Piles

tons tension. Each increment was maintained for one hour and if the pile butt deflection did not exceed 0.01 inch for that load increment the next increment was added. If the deflection exceeded 0.01 inch, the load increment was left on for one additional hour at which time the next load increment was applied.

At 225 tons compression, or 90 tons tension, the load was left on the pile for 24 hours at which time the test pile was completely unloaded. The test pile was then reloaded at the rates listed above to the maximum load or until pile failure occurred.

ASTM Quick Loading Procedure. The load was applied in 10-ton (compression) or 5-ton (tension) increments at a rate of two tons per minute up to a maximum load of 400 tons compression or 150 tons tension. Each increment was maintained for two and one-half minutes at which time the next increment was applied regardless of the behavior of the pile butt. There was no unload/reload cycle.

Differences From ASTM Standards. Although ASTM D1143-74 was used as a framework for these loading procedures, some changes were made to completely satisfy the objectives of this load test program. These deviations were as follows:

1. ASTM D1143-74, described above, was used for both the compressive and tensile load tests.

2. The dial gage system was required to be the primary system used to measure pile butt movement. The independent, secondary measurement system was required to have the same accuracy as the primary system. Dial gages used in the primary measurement system

were required to have 0.001-inch accuracy and 3-inch travel capacity instead of 0.01 and 2.0 inches as required by the ASTM standard.

3. Measurements of applied loads, pile butt movements, and strain rod deflections were made immediately before each load increment application, and at 1-, 2-, 4-, 8-, 15-, 30-, and 60-minute intervals following the load increment. Additional measurements were made at successive 1-hour intervals during 24-hour holding periods.

4. The rate of load application during any load test was limited to two tons per minute.

5. The maximum standard compressive and tension loads were required to be left on the pile for 24 hours instead of 48 hours.

6. The time interval between load decrements during unloading was reduced from 60 to 20 minutes.

CHAPTER IV

DATA ANALYSES

Determination of Axial Capacity

Ultimate Capacity Methods

General. The axial capacity may be defined as the ultimate capacity of the pile divided by a suitable factor of safety. The term "ultimate capacity" is defined here as the load which initiates plunging failure in a compression test or rising failure in a tension test. Determination of the ultimate capacity from existing data may not be possible if the maximum specified load allowed during the load test did not cause such failure (rising or plunging failure). The following methods provide a means for generating ultimate pile capacity from existing but incomplete data. The capacities predicted by these methods may be close to the maximum load actually applied during the load test. The ultimate capacity as determined by these methods for each load test is presented in Table 2.

Chin's Method. As presented by Fellenius (10), Chin's method assumes that the load deflection curve is hyperbolic and generates a "best fit" hyperbola for the load deflection curve, the horizontal asymptote of which is considered to be the ultimate capacity. This hyperbolic function is expressed as:

TABLE 2

ULTIMATE AND WORKING LOAD CAPACITIES BY ALL METHODS

TEST PILE	TEST PILE DESCRIPTION	DEPTH TO GROUNDWATER	CORRECTION FACTOR	AS-TESTED ULTIMATE CAPACITY	DEFLECTION CRITERIA METHODS: 1/4 INCH BUTT	DEFLECTION CRITERIA METHODS: 1/4 INCH TIP	DEFLECTION CRITERIA METHODS: DAVISSONS METHOD	DEFLECTION CRITERIA METHODS: CONROY/WOLFF METHOD	TRANSITION ZONE METHODS: DeBEERS METHOD	TRANSITION ZONE METHODS: BUTLER/HOY	TRANSITION ZONE METHODS: INTERSECTION METHOD	UTLIMATE CAPACITY PREDICTIONS: BRINCH HANSEN 80% METHOD	UTLIMATE CAPACITY PREDICTIONS: CHINS METHOD	UTLIMATE CAPACITY PREDICTIONS: VAN DERVEENS METHOD
1-1	L,V,St,T	4.9 - 6.7	.75	>150 >112.5	65.0 48.8	74.7 56.0	N/A N/A	77.0 57.8	** -	N/A N/A	40.0 30.0	** -	639.0 479.3	** -
1-2	S,V,St,T	7.5 - 8.0	.71	125 88.8	44.0 31.2	52.0 36.9	N/A N/A	47.0 33.4	** -	N/A N/A	34.0 24.1	** -	190.0 134.9	135.0 95.9
1-3A	S,V,St,C	7.00	.72	325 234	125.0 90.0	180.0 129.6	211.0 151.9	N/A N/A	226.0 162.7	N/A N/A	251.0 180.7	343.0 247.0	379.0 272.9	335.0 241.2
1-4	L,B,St,T	7.00	.72	>150 >108*	144.0 103.7	160.0 115.2	N/A N/A	NO INTESECTION	** **	N/A N/A	90.0 64.8	** **	265.0 190.8	181.0 130.3
1-5	L,V,Q,T	7.00	.72	>150 >108	84.7 61.0	108.0 77.8	N/A N/A	103.0 74.2	64.0 46.1	** **	74.0 53.3	** **	267.0 192.2	225.0 162.0
1-6	S,V,Q,C	7.00	.72	>400 >288	131.0 94.3	181.0 130.3	283.0 203.8	N/A N/A	347.0 249.8	** **	306.0 220.3	** **	654.0 470.9	460.0 331.2
1-7	L,V,Q,C	7.00	.72	>400 >288	197.0 141.8	>400 >365	NO INTERSECT	N/A N/A	** **	** **	NO INTER SECTION	** **	** **	** **
1-8	L,B,Q,C	7.50	.70	>400 >280	200.0 140.0	>400 >360	NO INTERSECT	N/A N/A	** **	** **	NO INTER SECTION	** **	** **	** **
1-9	S,B,Q,C	7.00	.72	310 223	142.0 102.2	222.0 159.8	264.0 190.1	N/A N/A	274.0 197.3	290.0 208.8	244.0 175.7	321.0 231.1	469.0 337.7	361.0 259.9
2-1	S,V,Q,T	19.00	.52	140 72.8	81.0 42.1	81.0 42.1	N/A N/A	85.0 44.2	69.0 35.9	106.0 55.1	110.0 57.2	142.0 73.8	163.0 84.8	150.0 78.0
2-2	S,B,Q,T	17.50	.52	>150 >78	110.0 57.2	115.0 59.8	N/A N/A	113.0 58.8	81.0 42.1	135.0 70.2	90.0 46.8	181.0 94.1	179.0 93.1	169.0 87.9
2-3	L,B,Q,T	16.40	.54	>150 >81	63.0 34.0	70.0 37.8	N/A N/A	69.0 37.3	** **	126.0 68.0	47.0 25.4	185.0 99.9	250.0 135.0	159.0 85.9
2-4	S,B,St,T	20.00	.52	120 62.4	60.0 31.2	63.0 32.8	N/A N/A	62.0 32.2	** **	N/A N/A	48.0 25.0	** **	142.0 73.8	131.0 68.1
2-5	S,B,St,C	13.00	.59	225 133	147 86.73	164 96.76	193.0 113.9	N/A N/A	181.0 106.8	N/A N/A	161 94.99	225.0 132.8	236.0 139.2	254.0 149.9
2-6	L,B,St,C	21.50	.52	>400 >208	246 127.9	>400 >277	NO INTERSECT	N/A N/A	** **	N/A N/A	142 73.84	** **	** **	** **
2-7	L,V,St,C	20.00	.52	>400 >208	230 119.6	>400 >284	NO INTERSECT	N/A N/A	** **	N/A N/A	NO INTERSECTION	** **	** **	** **

FIRST NUMBER IS CAPACITY WITH AS-TESTED WATER CONDITIONS.
SECOND NUMBER IS AS-TESTED CAPACITY NORMALIZED ACCORDING TO WATER TABLE CORRECTION FACTOR.

N/A, METHOD NOT APPLICABLE TO TEST RESULTS.
*, TIP OF TEST PILE STUCK DURING INITAL PORTION OF LOAD TEST.
**, METHOD WAS NOT SUCCESSFUL IN DETERMINING A WORKING LOAD.

PILE DESCRIPTION:
S,L: (S)HORT PILE DRIVEN TO ELEVATION; (L)ONG PILE DRIVEN TO REFUSAL ON ROCK.
V,B: (V)ERTICAL PILE; (B)ATTERED PILE.
St,Q: (St)ANDARD ASTM LOAD PROCEDURE; (Q)UICK ASTM LOAD PROCEDURE.
T,C: (T)ENSION LOAD TEST; (C)OMPRESSION LOAD TEST.

$$P = \Delta_{Butt}/(a + b\Delta_{Butt}) \quad (4)$$

in which P is the applied load at the pile butt, Δ_{Butt} is the butt deflection, and a and b are constants. Rearranging terms leads to:

$$\Delta_{Butt}/P = a + b\Delta_{Butt} \quad (5)$$

which is the equation of a straight line relating P and Δ_{Butt}.

Accordingly each butt deflection value is divided by the corresponding applied load and this quotient is plotted against the deflection as shown in Figure 12. After some early irregularities, this group of points should form a straight line. A line of best fit is determined for the upper portion of the resulting graph, the slope and intercept of which are the constants b and a, respectively. The ultimate pile capacity is considered equal to 1/b.

Hansen's 80% Method. The Hansen 80% method (15) assumes the load deflection curve to be parabolic and develops a best fit parabola, the horizontal asymptote of which is considered to be the ultimate capacity. This parabolic function is expressed as

$$P = (\Delta_{Butt})^{1/2}/(a + b\Delta_{Butt}) \quad (6)$$

Rearranging terms leads to

$$(\Delta_{Butt})^{1/2}/P = (a + b\Delta_{Butt}) \quad (7)$$

which is the equation of a straight line relating P and Δ_{Butt}. Accordingly the square root of each deflection is divided by the applied load, and this quotient is plotted against Δ_{Butt} as shown in Figure 13. After some initial irregularities the data will become somewhat linear. The line of best fit is chosen for the data and the

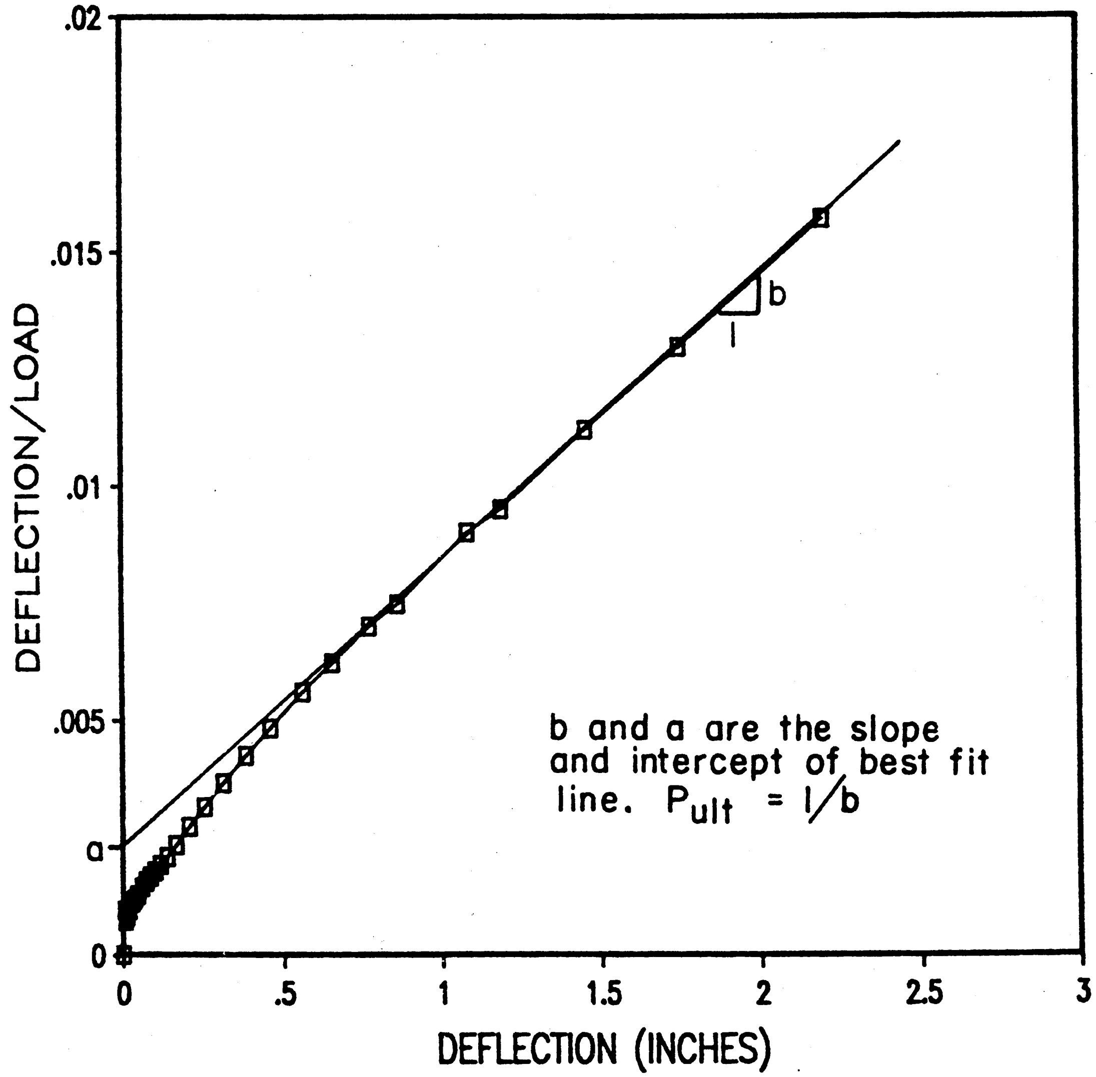

Figure 12. Load-Deflection Data Plot Using Chin's Method

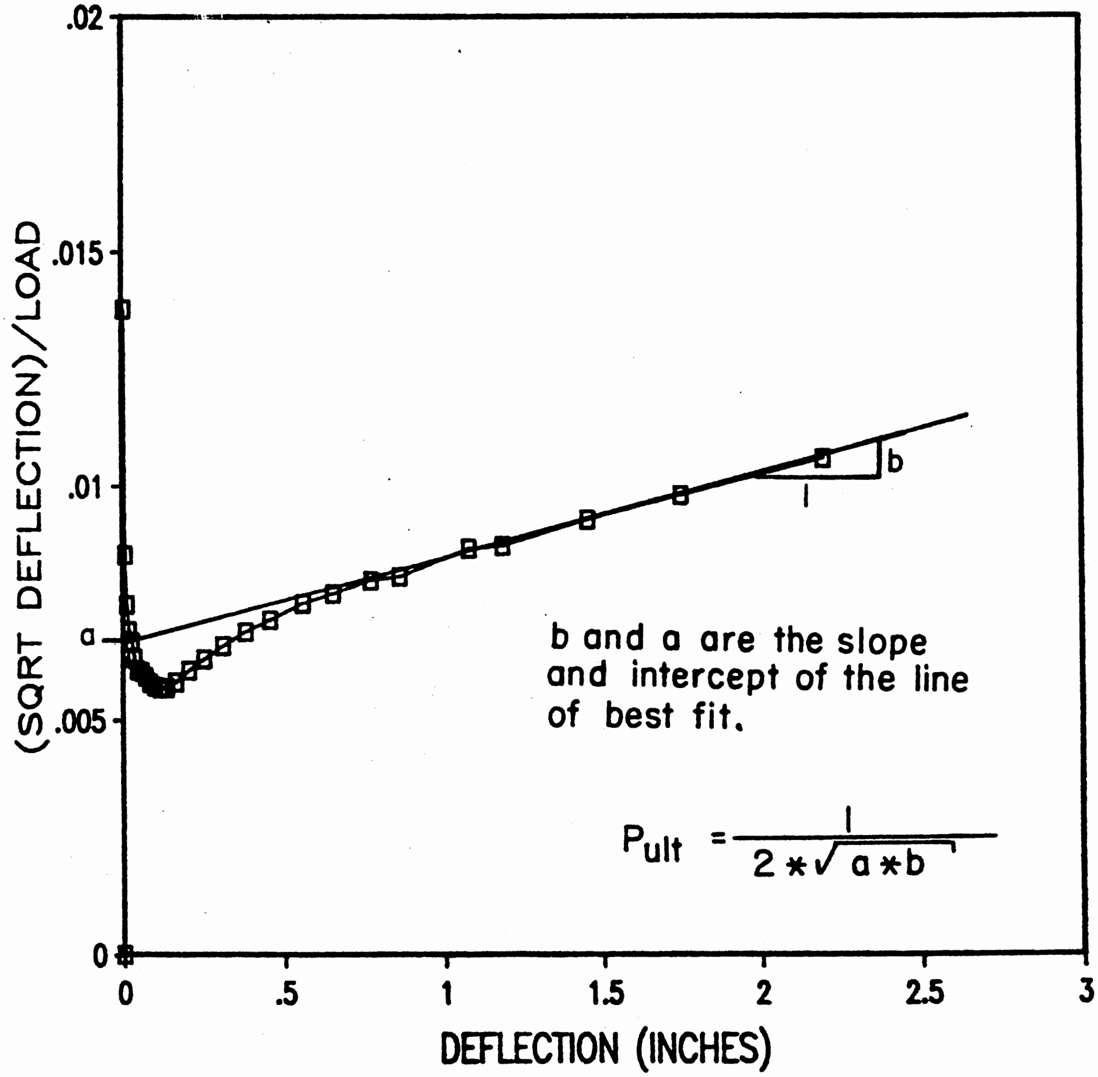

Figure 13. Load-Deflection Data Plot Using Hansen's 80% Method

value of the horizontal asymptote is calculated by the following expression:

$$P_{Ult} = 1/[2\ (a\ b)^{1/2}] \tag{8}$$

where b and a are the slope and intercept of the line of best fit for the plot.

<u>Van derVeen's Method</u>. As presented in Winterkorn and Fong (34), the following relationships were developed to describe the behavior of the pile tip. The deflection of the tip is assumed to be related to the load at the tip by the following logarithmic function:

$$P_{Tip} = P_{Ult-Tip}\ (1 - e^{-w\ \Delta_{Tip}}) \tag{9}$$

where

P_{Tip} = tip load;

$P_{Ult-Tip}$ = ultimate capacity of the soil at the pile tip;

Δ_{Tip} = tip deflection; and

w = constant.

A rearrangement of terms leads to

$$(1 - P_{Tip}/P_{Ult-Tip}) = e^{-w\ \Delta_{Tip}} \tag{10}$$

Taking the natural log of both sides leads to

$$\ln\ (1 - P_{Tip}/P_{Ult-Tip}) = -w\ \Delta_{Tip} \tag{11}$$

At this point, the assumption is made that Equation (11) also describes the behavior of the pile butt. Accordingly, values for $P_{Ult-Butt}$ are assumed, and all values of $\ln\ (1 - P_{Butt}/P_{Ult-Butt})$ are plotted against the corresponding butt deflection. P_{Butt} is the applied load at the pile butt. When the most correct value of

$P_{Ult-Butt}$ is used, the plot becomes very nearly a straight line. Van derVeen's method is illustrated in Figure 14.

Working Load Methods

General. Working load methods define the axial capacity of the pile as functions of deflection, geometry of the load deflection curve, or the shape and size of the pile. The capacities defined by these methods are usually much less than the ultimate capacity of the pile. The axial capacities determined by these methods for each load are presented in Table 2.

Deflection Criterion Methods. These methods (28) define the axial capacity as that applied load which causes a predetermined deflection, usually at the pile butt or at the pile tip. Deflections of 1/4 inch at the pile butt or 1/4 inch at the pile tip were criteria used in evaluating these pile load tests. Use of the 1/4 inch tip deflection criterion requires that direct measurements of tip movement be available. The deflection criterion methods are illustrated in Figure 15.

Davisson's Limit Method. As presented by Leonards and Lovell (21), Davisson's limit method defines the compressive axial capacity to be the applied load which causes a pile butt deflection equal to the sum of an assumed elastic pile compression and a critical tip deflection. The elastic compression of the pile shaft is calculated using the theoretical equation for elastic compression:

$$\delta_{Pile} = (P\ L)/(A\ E) \qquad (12)$$

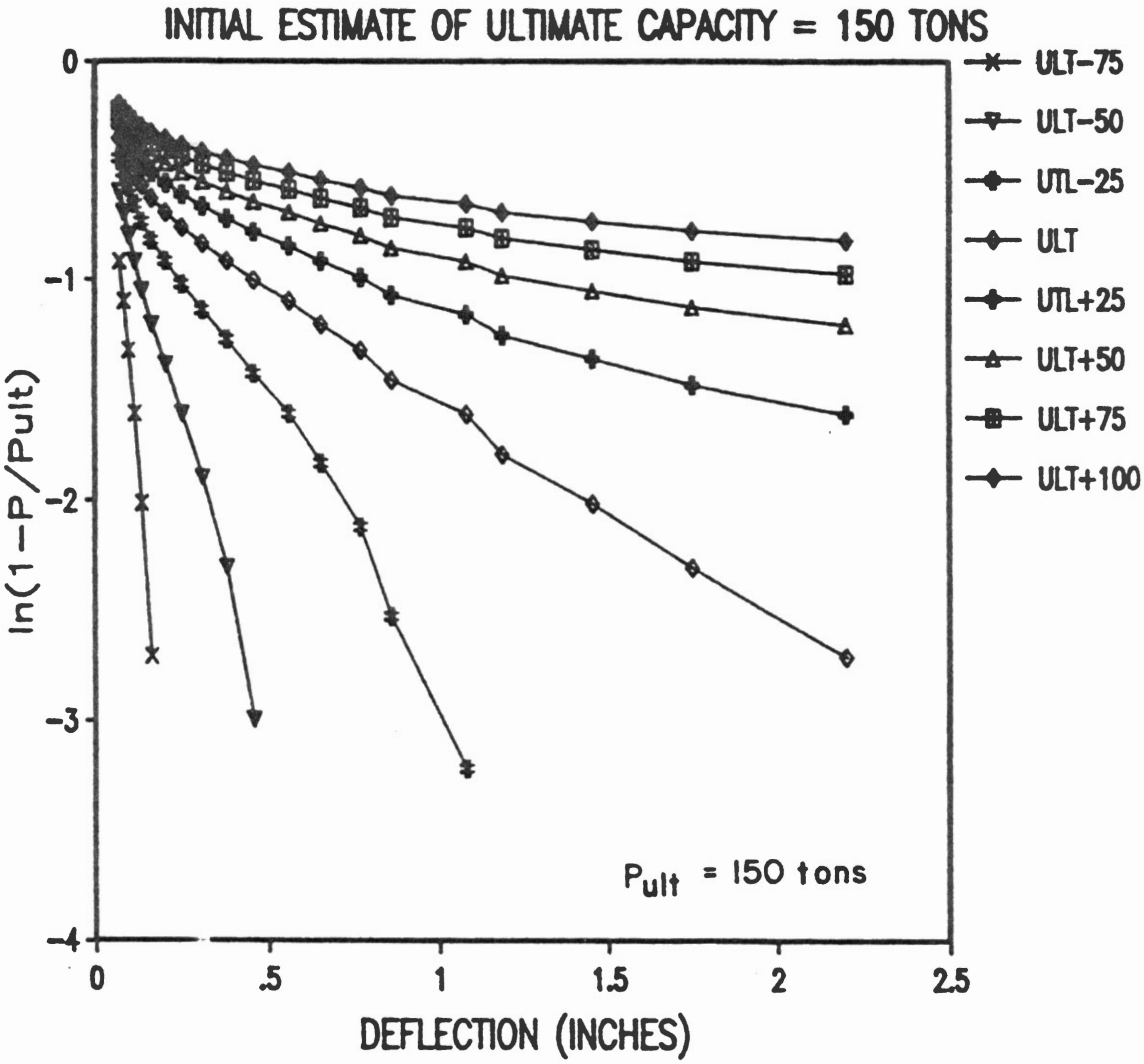

Figure 14. Load-Deflection Data Plot Using Van derVeen's Method

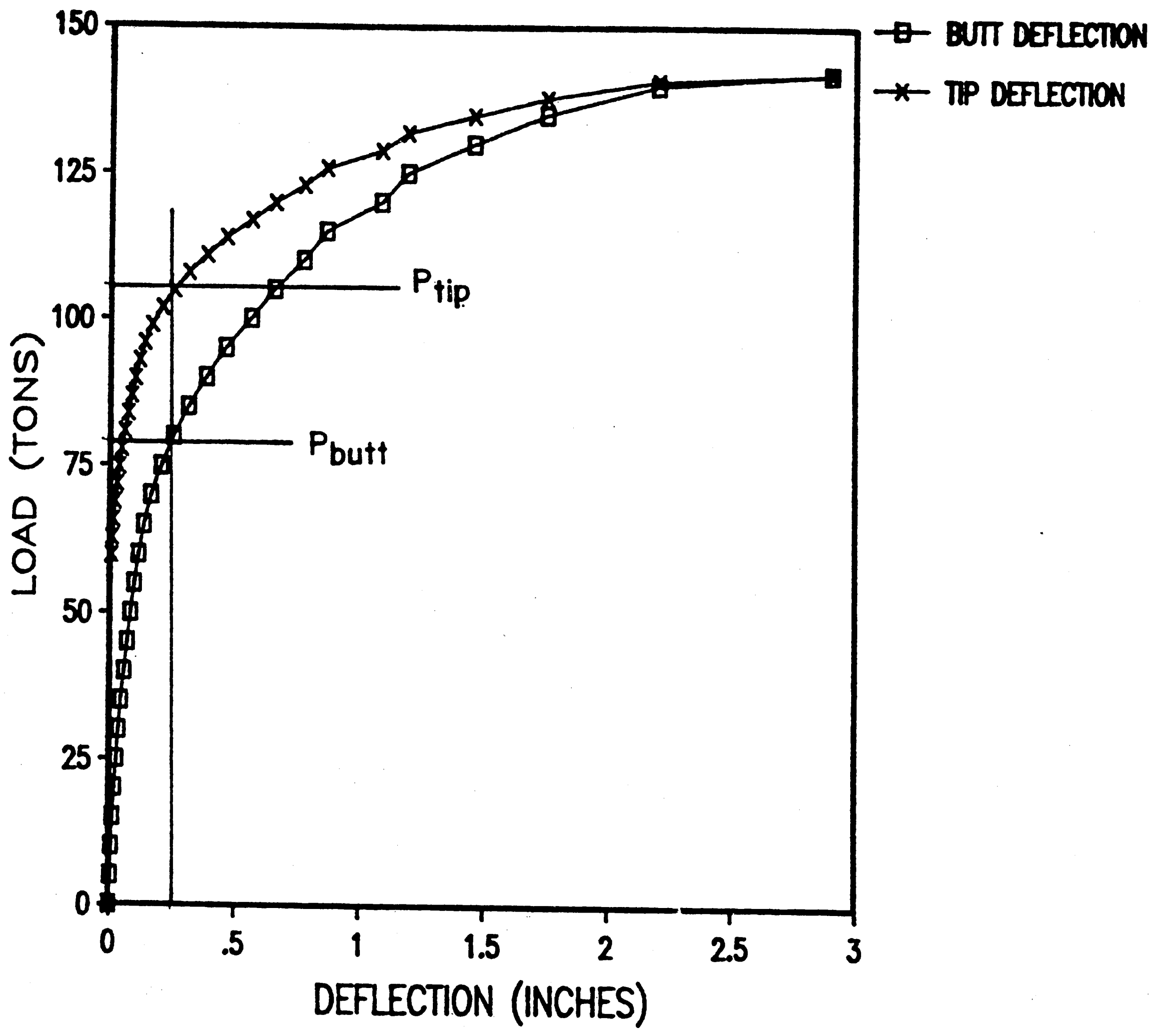

Figure 15. Load-Deflection Data Plots for Deflection Criterion Methods

where

A = cross-sectional area of the pile;

L = pile length;

P = applied load (assumed to remain constant throughout entire embedded length of the pile); and

E = Young's modulus of elasticity.

The critical tip deflection (quake) is defined as the summation of an elastic compression and a limiting plastic compression of the soil at the tip typically set equal to

$$\delta_{Quake} = 0.15 + D_B/120 \text{ in.} \tag{13}$$

where D_B is the pile diameter in inches.

The method is typically presented in graphical form as shown in Figure 16. On a plot of the load deflection curve, the elastic line of the pile is plotted offset from the plot origin a distance equal to the quake. The axial capacity is that applied load where the load deflection curve intersects the offset elastic line.

This method has been revised to make it more appropriate for use with the results of tension load tests. The assumption that the applied load remains constant within the pile shaft in a tension test is invalid. Since tip loads in a tension test must be zero (assuming the tip is not stuck and neglecting any residual stress effects), it is reasonable to assume that the load in the pile decreases linearly from the applied load at the pile top to zero at the pile tip. The elastic extension of the pile shaft is then calculated as

$$\delta_{Pile} = (P\ L)/(2\ A\ E) \tag{14}$$

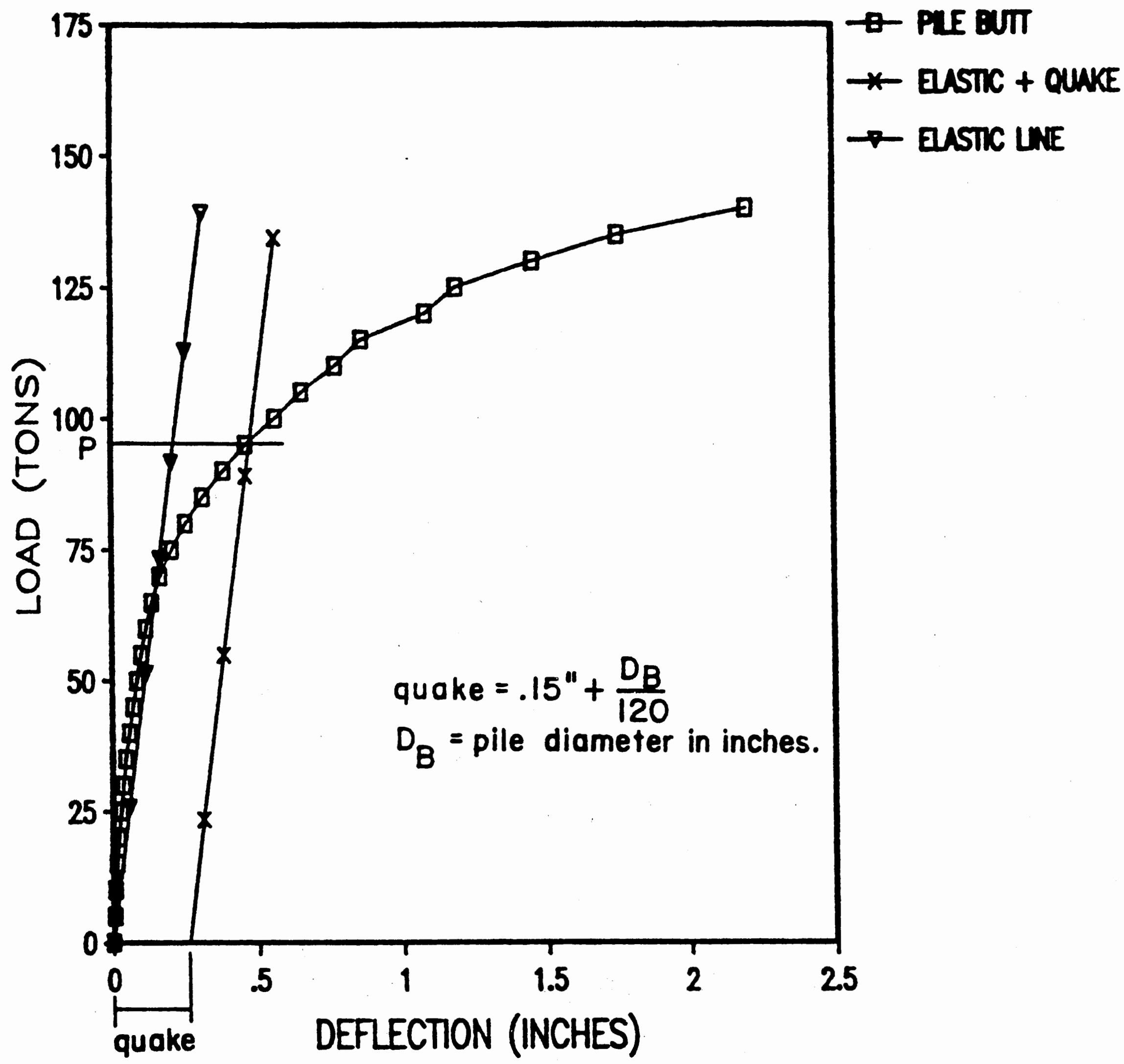

Figure 16. Load-Deflection Plot for Davisson's Limit Method

The quake was revised to include only an elastic extension of 0.15 inches of the soil at the pile tip; no plastic deformation occurred under the pile tip. As in Davisson's method, the elastic line of the pile is plotted on the load deflection curve offset from the origin a distance equal to the quake. The tensile axial capacity is that applied load at which the load deflection curve intersects the offset elastic line. This revised version was used to analyze the results of the tension pile load tests.

DeBeer's Method. When plotted to arithmetic scales, the load deflection curve appears to consist of three distinct parts: a steep initial portion, a flat terminal portion, and a smooth transition between the two. DeBeer's method provides a rationale for selecting the applied load which separates the steeper, initial portion of the load deflection curve from the flatter, terminal portion of the curve.

As presented by Fellenius (10), DeBeer's method assumes that the load deflection curve is composed of two exponential curves connected by a transition curve. If the load deflection curve is drawn on double logarithmic paper, these exponential curves will approximate two straight lines. If these lines are extended so that they intersect, this intersection defines the axial capacity. DeBeer's method is presented in Figure 17.

Method of Intersections. As presented by Mansur and Focht (22), Mansur and Kaufman (23), and Sherman et al. (28), the method of intersections is similar to DeBeer's method in that it defines the axial capacity as the intersection of two lines selected from an

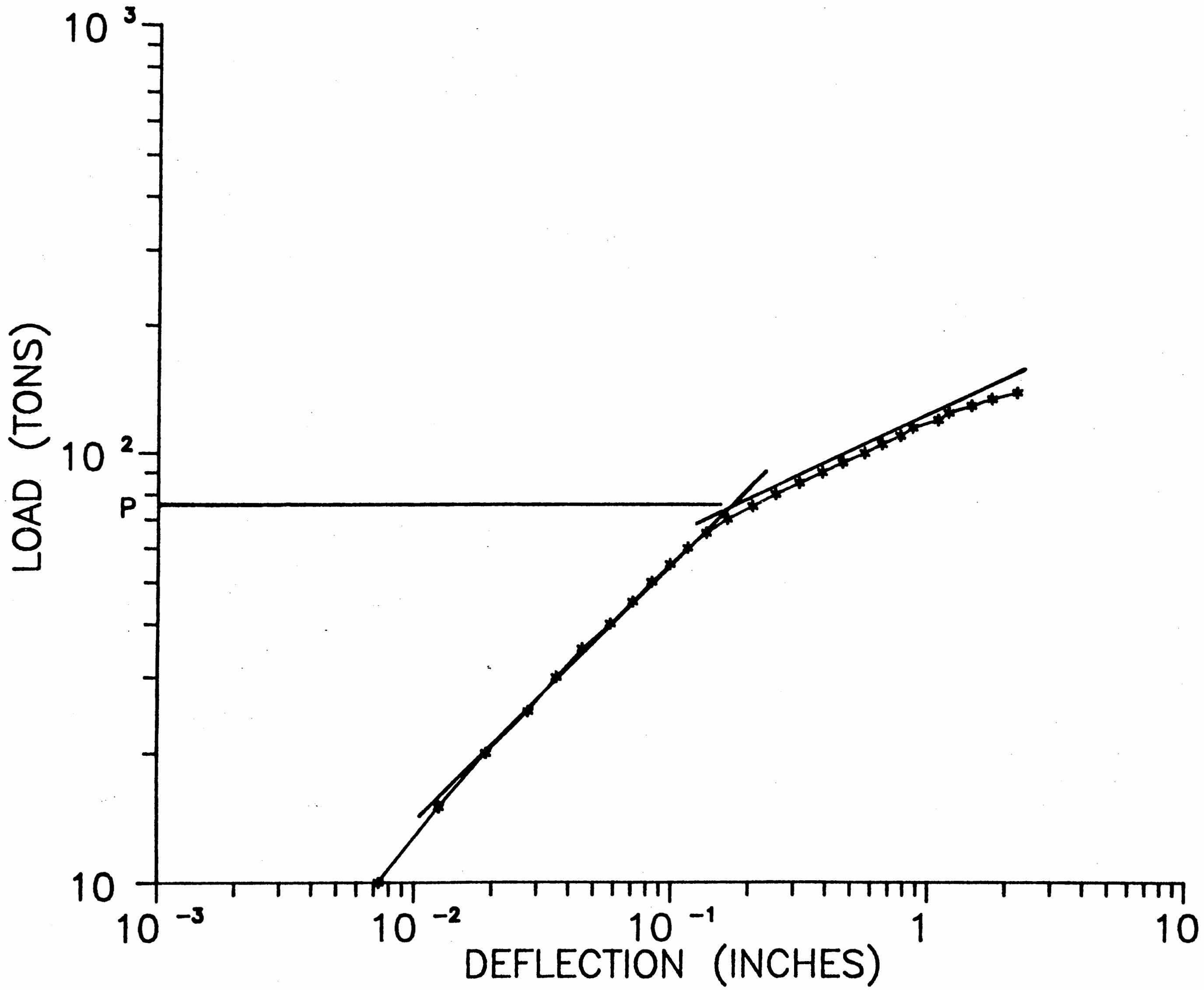

Figure 17. Load-Deflection Data Plot for DeBeer's Method

arithmetic plot of the load deflection curve rather than from a logarithmic plot. A line is drawn which best represents the initial portion of the load deflection curve, and a second line is drawn which best represents the terminal portion of the load deflection curve. These two lines are extended and their intersection is considered to be the axial capacity. This method is illustrated in Figure 18.

Butler and Hoy's Method. Butler and Hoy's (5) method defines the axial capacity as the intersection of the following two lines: the first is drawn tangent and parallel to the initial portion of the load deflection curve, and the second is drawn tangent to the point on the curve where the slope is 0.05 inch per ton. Butler and Hoy state that this method should be applied only to results of pile load tests performed using quick loading procedures. Butler and Hoy's method is presented in Figure 19.

Water Table Correction Factor

During this load test program, a dewatering system maintained the groundwater a depth of 5 to 8 feet below the surface at the Group 1 test site, and 13 to 21.5 feet below the surface at the Group 2 test site. This represents a significant difference in the physical conditions at the two load-test sites.

Additionally, when the completed structure is put into operation, the pile foundation will be totally submerged. The "as-tested" results from the test program represent a capacity of the pile with the water table located from 5 to 21 feet below the surface. It was

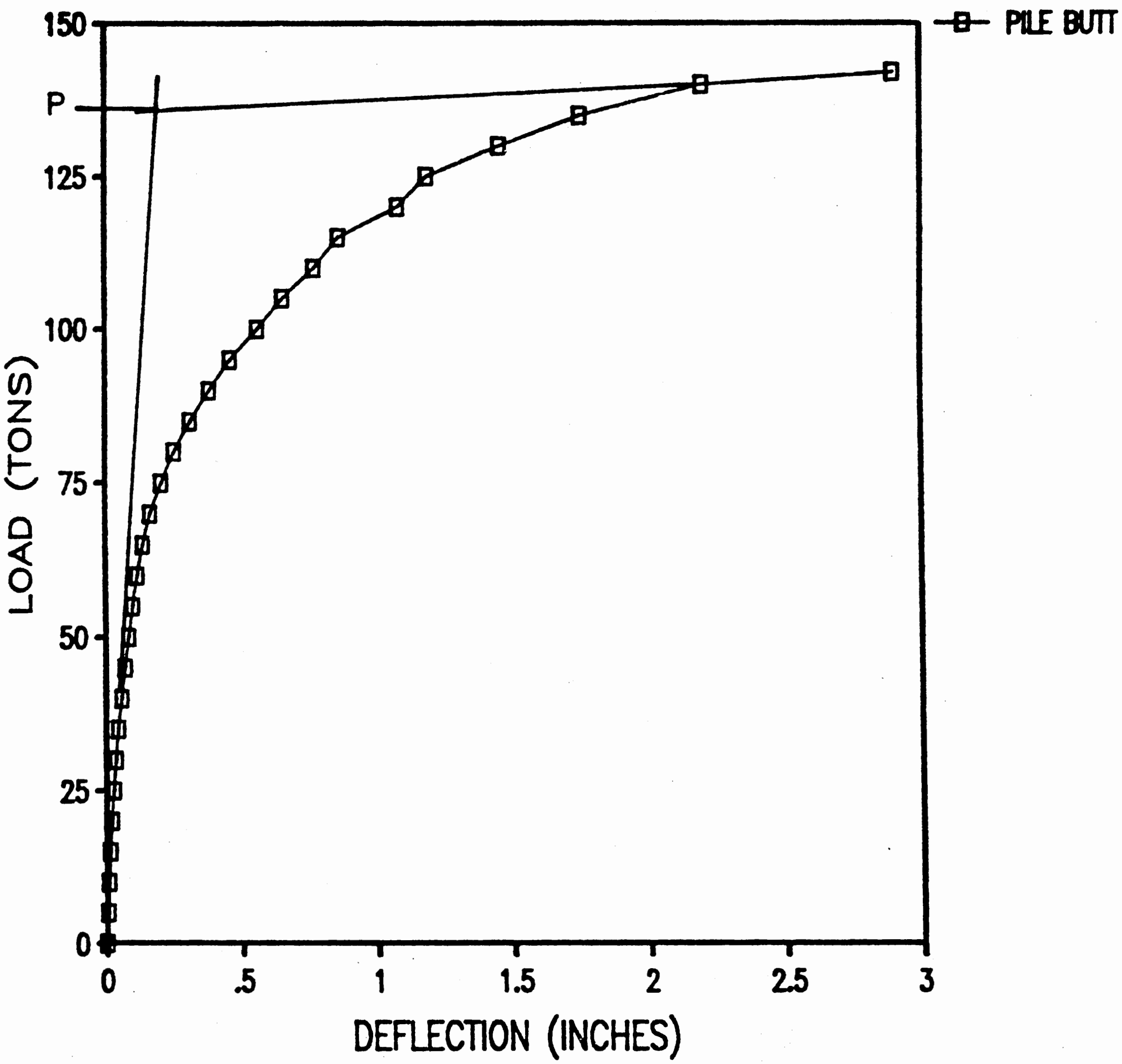

Figure 18. Load-Deflection Data Plot for Method of Intersections

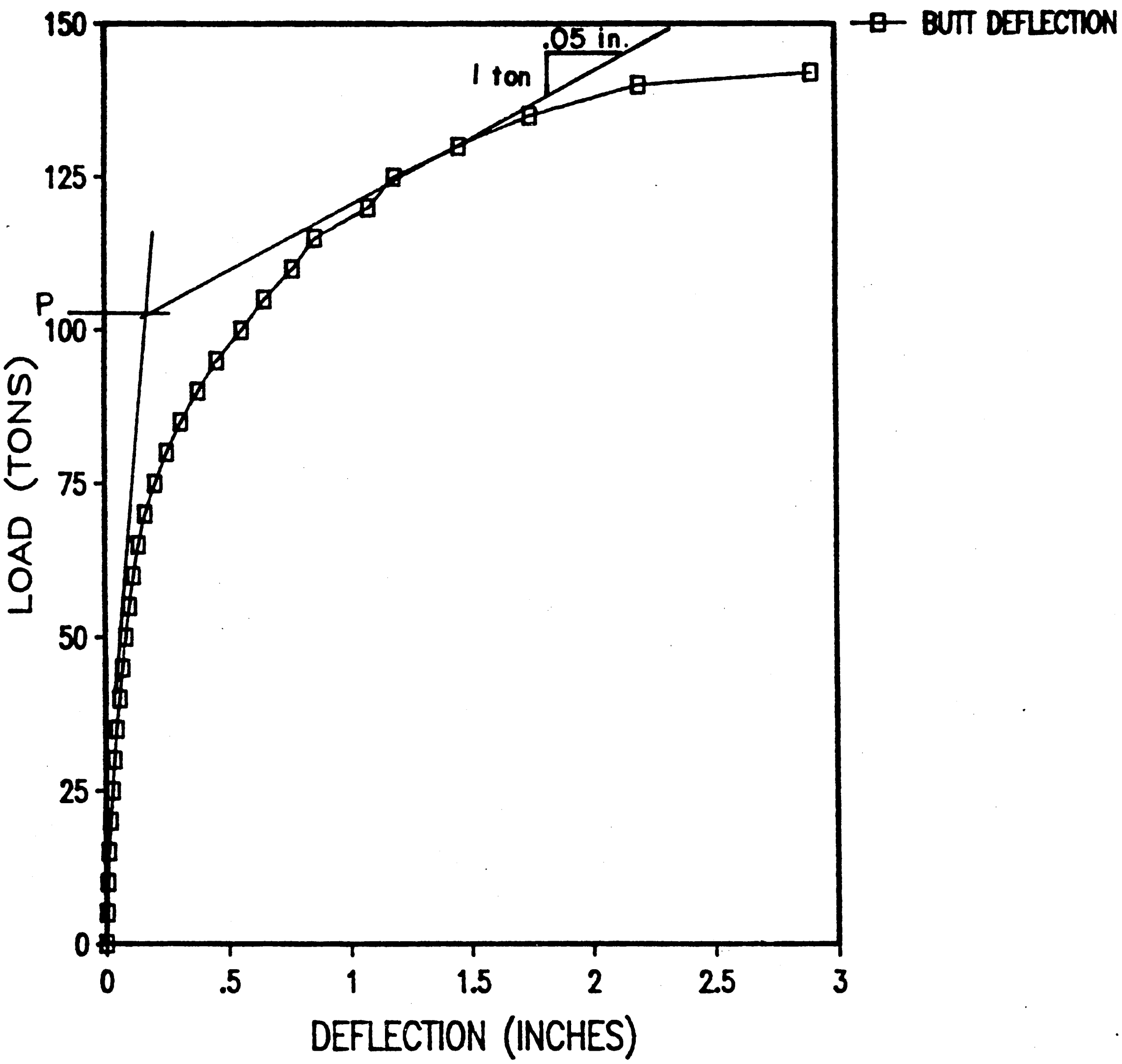

Figure 19. Load-Deflection Data Plot for Butler and Hoy's Method

assumed that submergence of the pile foundation would reduce the axial capacity of a pile to some level below the as-tested results.

To provide a way to make confident comparisons between test results of the two groups, and account for the assumed reduction in axial capacity, a method was needed to normalize the test results so the effects of differing groundwater levels would be essentially factored out of the analyses. It was decided to adjust all test results downward to a level which would represent the pile capacity with the groundwater at the surface. This would provide a basis for determining the operational capacity of the pile foundation while removing any effects of differing water table depths. To this end, the Water Table Correction Factor (11, 28) curve shown in Figure 20 was developed which correlates the depth to the water table at the time of the pile load test to a percentage decrease in the as-tested axial capacity.

The water table correction factor is defined as the ratio of the ultimate pile capacity determined for the water table at zero depth to that determined for the water table at a given depth z. Equation (15) was used to determine compressive capacities for the water table at depths between zero and 25 feet:

$$Q_{Ult} = A_T \; N_Q \; _T + P_P \; L \; K_C \; \tan \; _S \qquad (15)$$

where

0 = friction angle of sand on pile, 25°;

K_C = coefficient of lateral earth pressure, 1.25;

N_Q = bearing capacity factor, 40;

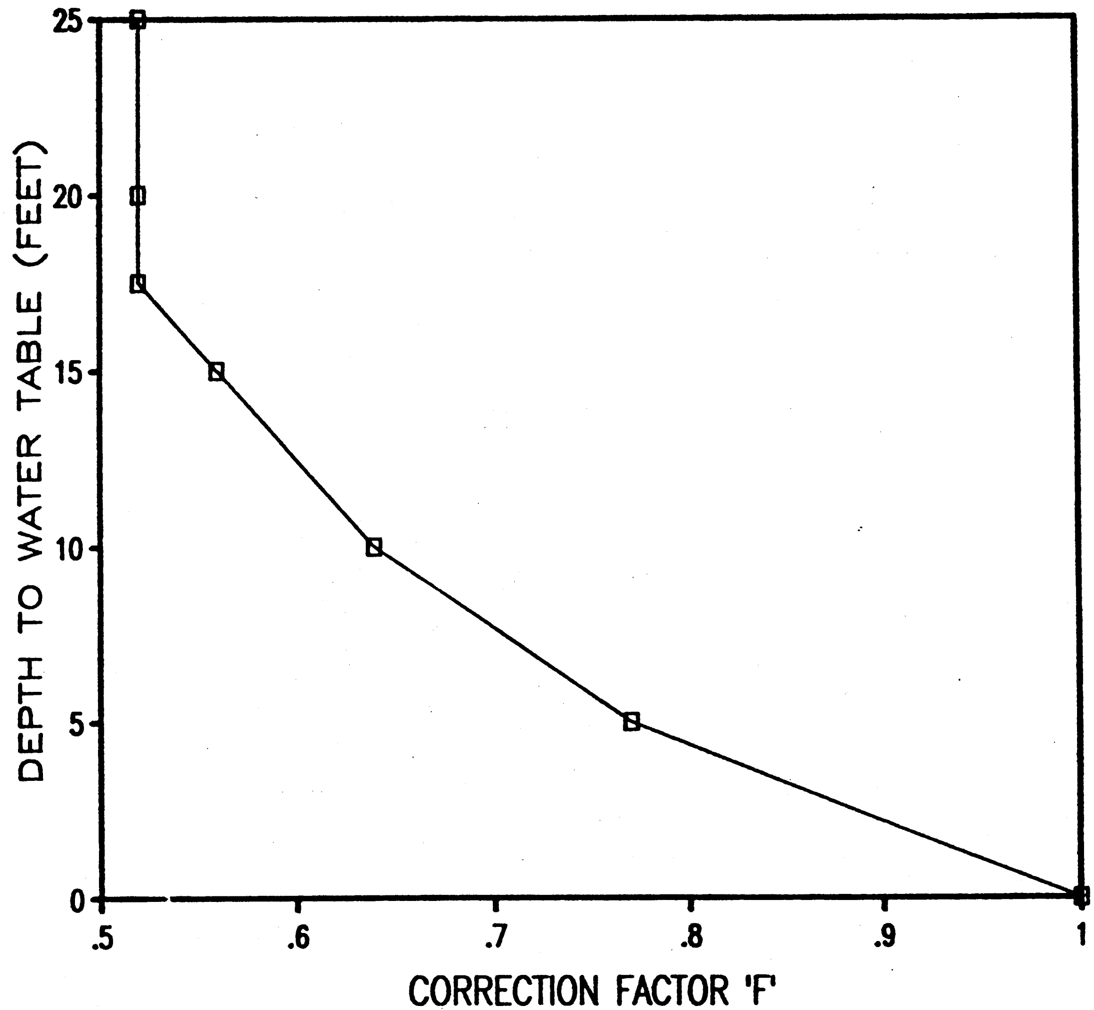

Figure 20. Water Table Correction Factor for Embedded Pile Lengths of 40 to 65 Feet

σ_T, σ_S = effective vertical overburden pressures at the pile tip and along the pile shaft; assumed to initially increase for a depth of 15 pile diameters at which point the pressure becomes constant for greater depths; γ_{Sat} and γ', the satrated and buoyant unit weights of sand, were assumed to be 131 and 68.6 pcf, respectively;

A_T, P_P = tip area and pile perimeter based on the rectangle bounded by the pile corners; and

L = pile length, 75 ft.

Given the depth to the groundwater for a given load test, the corresponding correction factor was obtained from Figure 15 and applied to all ultimate and working pile capacities determined for that test pile.

Analyses of Strain Rod Data

Development of Load Distribution Curves

General. A load distribution curve is a plot of the load remaining in the pile with respect to length. If a load is applied to a pile driven to a firm bearing layer through a soft soil, which is incapable of developing significant skin friction loads, the load in the pile tip and at all points along the pile would be equal to or very close to the load applied to the pile butt. This would occur because of the inability of the soft soil deposit to develop skin friction. In a stiffer soil deposit, one capable of generating significant skin friction, the load remaining in the pile will decrease from a maximum value at the pile butt to a minimum value at the pile tip as load is transferred to the soil through skin friction.

Reduction of Strain Rod Data. The deflection of the pile at the ground surface is the summation of the pile tip deflection and the elastic compression of the pile shaft. This is represented by

$$\Delta_{GS} = \Delta_{Tip} + \delta_{Tip-GS} \tag{16}$$

where

Δ_{GS} = movement of the pile at the ground surface;

Δ_{Tip} = movement of the pile tip; and

δ_{Tip-GS} = elastic compression of the pile between the ground surface and the pile tip.

This relationship may be extended to the deflection of any point along the pile and the elastic compression between that point and the ground surface as

$$\Delta_{GS} = \Delta_{i} + \delta_{i-GS} \tag{17}$$

This equation can be rearranged to obtain the deflection at any point if the pile deflection at the ground surface and the elastic compression of the pile shaft are known:

$$\Delta_{i} = \Delta_{GS} - \delta_{i-GS} \tag{18}$$

In these load tests, pile butt deflections were measured at a point located above the ground surface. The deflection of the pile at the ground surface may be obtained by subtracting the theoretical pile compression of the pile above the ground surface from the deflection measured at the pile butt:

$$\Delta_{GS} = \Delta_{Butt} - \delta_{GS-1} \tag{19}$$

The strain rod dial gages were attached to the pile above the point where the butt deflection measurements were made as shown in Figure 9. The strain rod gages measure the elastic compression of the pile betwen these gages and the strain rod anchor. This compression is represented in the following equation:

$$\delta_{i-2} = \delta_{i-GS} + \delta_{GS-2} \tag{20}$$

where

δ_{i-2} = elastic compression of the pile between the strain rod anchor and the point where the strain rod dial gages are attached;

δ_{i-GS} = elastic compression of the pile between the strain rod anchor and the ground surface; and

δ_{GS-2} = elastic compression of the pile between the ground surface and the point where the strain rod dial gages are attached.

Rearranging Equation (20) results in

$$\delta_{i-GS} = \delta_{i-2} - \delta_{GS-2} \tag{21}$$

Substituting Equations (19) and (21) into Equation (18) and collecting terms gives

$$\Delta_i = \Delta_{Butt} - \delta_{i-2} + \delta_{1-2} \tag{22}$$

which defines the movement of any point on the pile where a strain rod is connected with respect to the surface reference beams. δ_{1-2} is the theoretical compression of the pile between the point where the butt measurements are made and where the strain rod dial gages are attached.

Load Distribution Curve. In the following discussion, a pile section is defined as a portion of embedded pile bounded by two adjacent strain rod anchors. The average load in a pile section may be determined by the theoretical equation:

$$P_i = (\delta_i \; A \; E)/L \tag{23}$$

where

A = cross-sectional area;

L_i = length of the section;

E = Young's modulus; and

δ_i = elastic compression of the pile section.

The area, modulus, and length of the pile section are known quantities. The elastic compression is equal to the difference in the deflections measured by strain rods located at the top and bottom of the pile section:

$$P_i = (\Delta_n - \Delta_{n+1}) \; A \; E/L_i \tag{24}$$

where Δ_n and Δ_{n+1} are deflections of the top and bottom of the pile section as measured by the strain rods. By substitution of Equation (22) for Δ_n and Δ_{n+1}, the average load in the pile section is

$$P_i = (\delta_n - \delta_{n+1}) \; A \; E/L_i \tag{25}$$

where δ_n and δ_{n+1} are measurements obtained directly from the strain rods.

Equation (25) is valid for all pile sections bounded by two strain rods. The uppermost pile section, bounded by the ground surface and the uppermost strain rod anchor is a special case. The movement of the bottom of the section is defined by Equation (22), but the movement of the top of the section is Δ_{GS}, defined by Equation (19). By substituting Equations (22) and (19) into Equation (24), and collecting terms, the average load in the uppermost pile section is

$$P_i = (\delta_{i-2} - \delta_{GS-2})\ A\ E/L \tag{26}$$

Using the equations described above, the average load in each pile section can be determined and plotted at the depth of the section midpoint, resulting in a load distribution curve.

Development of Unit Skin Friction Curve

The difference between the average loads determined for two adjacent pile sections is equal to the skin friction load developed along that length of pile. The unit skin friction along this length of pile is equal to the developed skin friction divided by the shaft area of the included length of pile:

$$\tau_d = (P_n - P_{n+1})/A_{Shaft} \tag{27}$$

The length of pile used to determine A_{Shaft} in this equation is the distance between the midpoints of the pile sections involved. Plotting the unit skin friction values with respect to depth will result in a unit skin friction curve.

Development of Load Transfer Curves

A load transfer curve is the plot of the movement of a point on the pile against the percent shear strength developed at that point. The percent shear strength developed is the value of the unit skin friction divided by the available shear strength assumed to exist at that point.

The available shear strength of the sands surrounding the embedded pile has been assumed to be

$$\tau_f = \sigma_v' \tan\phi \tag{28}$$

where σ_v' is the vertical effective overburden pressure, and ϕ is the internal friction angle of the soil. The percent shear strength developed along the pile is the unit skin friction determined in Equation (27) divided by the assumed available shear strength at that location.

Because the location of the developed shear stress corresponds to the point where a strain rod is attached to the pile, the movement of the point is defined by Equation (22).

Presentation of Data

Load deflection curves, load distribution curves, unit skin friction curves, and load transfer curves obtained from each pile load test are presented in Appendix A. For each test pile, a family of five load distribution curves and unit skin friction curves were calculated, corresponding to applied loads of 50, 100, 200, 300, and 400 tons compressive or 30, 60, 90, 120, and 150 tons tension. For each test pile, five load transfer curves were developed, representing the load transfer mechanism in effect at the indicated depth.

Computer Programs Used to Analyze Data

Analyses of Strain Rod Data

The strain rod data were analyzed using MicroSoft SuperCalc, Version 4 on an IBM PC. Although originally written for business applications, the spread-sheet program with its built-in graphics package makes it a very powerful engineering tool. The spread sheets developed for each load test are presented in Appendix B.

Analyses of Load Deflection Data

The computer program PANALYS was written in Tektronix BASIC in 1982 for use on a Tektronix 4054 computer. PANALYS analyzes the load deflection data according to Chin's, Van derVeen's, Hansen's, Davisson's, revised Davisson's, Intersection, and Butler and Hoy's methods. Documentation of PANALYS is presented in Appendix C.

CHAPTER V

DISCUSSION OF DATA AND RESULTS

Determination of Axial Capacity

Ultimate Capacity Methods

Chin's Method. The method was not successful when applied to the results of compression tests on piles driven to rock. Upon inspection of this load deflection curve, it is apparent that the load test was more of an elastic compression test on the pile than a failing of the soil. Chin's method was not successful in analyzing these results because there was essentially no curvature in the load deflection curve with which to approximate a hyperbola. It has been shown that any curve can be successfully extrapolated by an asymptotic function (hyperbolic, parabolic, exponential) only if the curve can be fitted by a higher order polynomial (21).

In cases where there is sufficient curvature of the load deflection curve, the slope and y-intercept of Chin's plot is obvious and the ultimate prediction is easily determined. A false value can be determined if the method is applied to early data points or if the load test was terminated before the load deflection curve exhibited sufficient curvature (10). This is apparently the case for the prediction obtained for tension test 1-1. The method predicted an ultimate capacity of 479 tons, more than two to three times Chin's predictions of other tension tests which ranged between 74 and 192 tons.

In all cases where the load test was carried to ultimate failure, the ultimate capacity predicted by the method was from 16 to 50 percent greater than the ultimate capacity obtained by that load test. This is not surprising since the method is predicting the asymptote of a best-fit hyperbolic curve, a point that the fitted curve will never reach. In a discussion of hyperbolic modeling of shear strength, Mosher (24) points out similar unconservative predictions and suggests that only 75 to 90 percent of the asymptotic value be used as the predicted shear strength. The data obtained in this load test program affirm this suggestion.

Van derVeen's Method. The method was successful in predicting an ultimate capacity for all load tests except compression tests on piles driven to refusal on rock. Apparently, Van derVeen's method is subject to the same limiting requirement as Chin's method: i.e., the curve must be one of a high order polynomial.

Like Chin's predictions, Van derVeen's predictions were greater than the actual ultimate capacity obtained from the load tests, although only 3 to 21 percent greater. This indicates that the load deflection behavior of these test piles may be more correctly represented by this logarithmic function than by a hyperbolic function. As stated, Van derVeen's method assumes that the behavior at the tip adequately describes the behavior at the butt, implying that the pile is a rigid structure. The method might be improved by the inclusion of an elastic term in the right-hand side of Equation (11).

Choosing the "correct" curve out of the family of generated curves was not a straightforward task. Some judgment is required to do so. Qualitatively speaking, it was considerably easier to find the line of best fit in Chin's method than to select the "straightest" line in Van derVeen's plot.

Hansen's 80% Method. The 80% method was of limited usefulness in predicting ultimate capacities in this series of load tests. When the load deflection data were plotted according to Hansen's assumptions, behavior of the plotted points varied. Some sets of data points exhibited negative slope; other sets continued to curve, never exhibiting the required straight line behavior; and other sets were so scattered that a confident choice of a best fit line was difficult to make. When successful, Hansen's method had accuracies comparable to Van derVeen's method.

Working Load Methods

1/4 Inch Tip and 1/4 Inch Butt Deflection. The 1/4 inch butt deflection criteria can be applied to the results of all load tests, although it is quite conservative. The method will severely penalize the compressive capacity of a pile driven to refusal on rock. In this case, butt deflection is due solely to elastic compression of the pile, as evidence by the slope of the butt load deflection curve being equal to the slope of the elastic line of the pile. The use of a geotechnically-based failure criterion does not seem appropriate;

rather, the capacity should be based on the structural capacity of the pile.

Assuming the test pile is instrumented such that tip deflection measurements can be made, the 1/4 inch tip deflection criteria can be applied to all load test results with the exception of a pile driven to rock or other firm bearing surface. It is well documented that the ultimate bearing capacity of the soil at the pile tip is fully developed after deflections equal to 10 percent of the pile diameter, and that skin friction is fully mobilized after 0.25 to 0.30 inches of shaft movement. Given that the shaft deflection is always greater than the tip deflection, use of the 1/4 inch tip deflection criteria will ensure that all skin friction is developed and that only a portion of the tip capacity is developed.

Davisson's Limit, Revised Davisson's Limit. No distinction will be made between these methods as they are based on the same theory. Since these methods depend in part on the tip deflection, they are not successful when applied to piles driven to refusal on rock because the load deflection curve of a pile founded on rock will never intersect the offset elastic line of the pile. These methods are similar to tip deflection criterion methods except that data from the pile butt are used to obtain the required tip deflection. As such, these methods furnished results similar to those of the 1/4 inch tip deflection criteria.

DeBeer's Method. This method was useless when applied to the results of compression tests on piles driven to refusal on rock. The load deflection curves of such piles were straight lines, without the required transition curve.

The applicability of the method to tension tests may have been artificially limited by contractual limitations on maximum applied loads. When plotted on a logarithmic scale, the linear distance between the locations of early data points and those at the onset of the transition curve is small, making it difficult to confidently select lines of best fit for the initial portion of the load deflection curve. To a lesser extent, this was also a problem on the terminal portion of the curve.

DeBeer's method was easier to apply to the results of quick load tests because there were more data points on the data plots. For example, a compression test carried to 400 tons using ASTM standard load procedures produces 16 data points compared to the 40 data points obtained from such a test run using the ASTM quick load procedures.

The method clearly indicated the point within the transition which best represented the intersection of the initial and terminal portions of the load deflection curve.

Intersection Method. A major shortcoming with this method is that different results can be obtained if one or the other axis is drawn at a different scale (31). Another problem is that the choice of the straight line is subjective. In the case where the terminal portion of the load deflection curve is never quite linear, a different straight line and thus a different axial capacity could be chosen by another engineer.

Butler and Hoy's Method. Being applicable only to the results of quick load tests (5), the method was applicable to only half of the load tests included here. Of these eight tests, the terminal portion of four of them never achieved a slope as flat as 0.05 inch per ton. The axial capacity determined by Butler and Hoy's method for the remaining four was the highest of the three transition zone methods used.

Butler and Hoy's method has an advantage over the intersection method in that the subjective choice of one of the straight lines has been replaced by a mathematical constant. Fellinius (10) has proposed that the elastic line of the pile be used to represent the initial portion of the load deflection curve, thus removing all subjectivity from the choice of an axial capacity.

Effects of Load Procedure and Pile Batter on Axial Capacity

Effects of Load Procedure

The results of 12 load tests, normalized for the effects of groundwater, are presented as pairs in Table 3. Within each pair, the loading direction, pile length, and batter are the same but the loading procedures are different. The results of compression load tests on long piles driven to rock are not included here because these results are not affected by loading procedures.

The percent change (plus or minus) of the ultimate and 1/4 inch tip deflection criterion capacities of the pile tested under quick load procedures were developed with respect to the capacities of the

TABLE 3

COMPARISON OF NORMALIZED CAPACITIES OBTAINED WITH ASTM STANDARD AND ASTM QUICK LOADING PROCEDURES

Test	Test Description[1]	Ultimate Capacity	Ultimate % Change	1/4 Inch Tip Capacity	1/4 Inch Tip % Change
2-1	VQST	73	-17	42.1	+12
1-2	VStST	89		26.9	
2-2	BQST	>78[2]	>+25	59.8	+45
2-4	BStST	62		32.8	
1-5	VQLT	>108	---	77.8	+28
1-1	VStLT	>112		56.0	
2-3	BQLT	>81	---	37.8	-205
1-4	BStLT	>108[3]		115.2	
1-6	VQSC	>288	>+23	130.0	+0
1-3a	VStSC	234		129.6	
1-9	BQSC	>223	>+68	159.8	39.4
2-5	BStSC	133		96.8	

[1]The following notations are used in this table:

V = Vertical	B = Battered
Q = ASTM Quick	St = ASTM STandard
S = Short Pile	L = Long Pile
T = Tension	C = Compression

[2]"Greater than" signs (>) indicate the pile did not fail under the maximum applied load. Maximum applied load is 400 tons compression and 150 tons compression.

[3]Pile tip stuck in bedrock developing high tip load.

TABLE 4

COMPARISON OF NORMALIZED CAPACITIES OF
VERTICAL AND BATTERED PILES

Test	Test Description[1]	Ultimate		1/4 Inch Tip	
		Capacity	% Change	Capacity	% Change
2-1	VQST	73	-6.4	42.1	-42.0
2-2	BQST	>78		59.8	
1-5	VQLT	>108	---	77.8	+51.0
2-3	BQLT	>81		37.8	
1-2	VStST	89	+43.0	36.9	+11.1
2-4	BStST	62		32.8	
1-1	VStLT	>112	---	56.0	-106.0
1-4	BStLT	>108		115.2	
1-6	VQSC	>288	+29.0	130.0	-23.0
1-9	BQSC	223		159.8	
1-3a	VStSC	234	+76.0	129.6	+25.0
2-5	BStSC	133		96.8	

[1]See Table 3 for notes.

similar pile tested using the standard load procedures. With the exception of test pile 1-4, these results indicate that greater ultimate and 1/4 inch tip deflection capacities are obtained when a pile is tested using quick loading procedures. These results indicate that the initial portions of load deflection curves obtained with quick load procedures may be steeper and the terminal portion higher than load deflection curves obtained with standard load procedures.

Effects of Pile Batter

The same 12 test results were reordered and are presented in Table 4. As before, each pair is similar except that one test is from a vertical test pile and the other is from a battered test pile. The results of long piles tested in compression are not presented.

The percent change (plus or minus) of the ultimate and 1/4 inch tip deflection criterion capacities of the vertical test pile were developed with respect to the same capacities of the battered pile.

These results are inconclusive as to whether there are significant differences in the axial capacities of battered or vertical piles. These comparisons may show that the ultimate capacity of a vertical pile is greater than the capacity of a battered pile of similar length.

Discussion of Load Distribution, Skin Friction, and Load Transfer Curves

Errors in the Measured Data

Errors Due to Disregarding Residual Loads. Many of the load distribution curves showed erratic loads in the uppermost pile section and in the midpoint section where the strain rods switched from one side of the pile to the other. Similarly shaped erratic loads have been measured in other load test programs but these have been attributed to residual stresses in the pile.

Because the instrumentation system was attached to these test piles after they were driven, there is no way to measure the distribution of residual stresses remaining in the pile after driving. While residual stresses are not accounted for in these analyses, they are assumed to be present in the test piles, and if properly considered, would no doubt change these load distribution and unit skin friction curves. Proof of the existence of residual loads can be seen in the large tip loads occurring in some of the tension tests. The magnitude of such tip loads is equal to the compressive residual loads present at the pile tip (21). Tip loads of up to 65 tons were measured at the tips of these test piles.

At zero applied load, pile equilibrium requires that residual compressive stresses in the lower portions of the pile be balanced by residual tensile stresses in the upper portions with a neutral point (zero residual loads) at some intermediate point on the pile (4). Due to the granular nature and relative uniformity of the foundation stratigraphy, it is expected that the distribution of residual stresses along the pile would develop smoothly without any sharp increases or decreases in magnitude. The driving records of these piles and the exploratory borings taken in the test areas do not reveal any continuous, fine-grained foundation strata capable of causing the localized residual loads needed to affect the test results to the degree indicated. This does not discount the existence of localized pockets of such material which could have been missed by these two borings, although such pockets of soil are not believed to exist based on the results of over 400 other borings taken at the job site. It does not seem plausible that the very localized discrepancies in these load distribution curves are caused by residual loads.

Errors Due to Mechanical Devices. The calculated load in the uppermost pile section is either significantly greater or lower than the applied load, although in most cases the calculated load in the second pile section appears reasonable when compared to the applied load. The equation for the load in the uppermost section involves the strain rod dial gage, the dial gages at the pile butt, and the ruler used to make measurements during fabrication of the test pile instrumentation system. Given that an elastic compression of 0.010 inch in a 10-foot long pile section corresponds to a load of 26 tons within that section, slightly differing accuracies in any of these measurement systems may contribute to these unreasonable loads in the uppermost pile sections.

These errors could be reduced by mounting all strain rod dial gages and butt deflection measurement dial gages at the same level as close as possible to the ground surface. This would improve the calculations by reducing any errors introduced by transferring data measured at one level to another level. Although such a location will increase the difficulty of obtaining the dial gage readings, doing so will eliminate the need for including theoretical elastic compression or extension of the above ground pile portions into the equations. This will improve both the accuracy of the calculated average load in the uppermost pile section and calculated deflections along the embedded portion of the pile.

As previously described, three strain rods are attached to either side of the pile web and the corresponding dial gages are mounted back to back on both sides of the pile web. Like the calculated loads in the uppermost pile sections, the load at the pile midpoint is dependent upon measurements supplied from two separate systems, i.e., the different dial gage groups. This analysis assumes that these dial gages are attached at the same level on the pile but in actuality may not be. These differences may be contributing to the erratic loads at the pile midpoint.

Measurements of compression or extension of a pile section by strain rods located on opposite sides of the pile web will contain slight errors if there is any sweep in the pile after it is driven (sweep is defined as bending along the weak axis). This error is caused by the strain rod on the inside of the swept curve being moved upward and the rod on the outside of the swept curve being moved downward. Measurements made by strain rods located on the same side of the web will not be affected in this manner because such a bend in the pile would cause no relative movement between the rods. Errors introduced by pile bending can be reduced by installing all strain rods on one side of the H-pile web. The symmetry of the section must be maintained by the addition of a second protective channel on the uninstrumented side of the web.

Load Distribution Curves

Because no measurements or distribution of residual loads are available, the load distribution curves presented here represent only the distribution of the friction loads mobilized during the load test. The load distribution curves have a shape similar to the generalized load distribution curve shown in Figure 2d.

Unit Skin Friction Curves

The general shape of the load distribution curves suggests that the skin friction curves should be parabolically shaped. Salient values of the unit skin friction curves are presented below on a pile-by-pile basis (Table 5). The data have been broken into two groups of tension and compression tests and further categorized by long and short test piles. Portions of many curves are masked by the erratic loads encountered in the load distribution curves. Where this is the case, a note is included to this effect. The data presented represent the skin friction curve developed at the ultimate capacity of the pile or from the skin friction curve developed at the maximum applied test load.

Except for test pile 1-4 (the tip of which was stuck in the rock), both long and short tension test piles developed the parabolically shaped skin friction curves. Average maximum skin friction values of 0.95 tsf (with standard deviation of 0.33 tsf) developed in the middle to upper portion of the pile, while average values of 0.34 tsf (with standard deviation of 0.18 tsf) developed in the lowest pile section.

TABLE 5

DESCRIPTION OF SKIN FRICTION DATA AVAILABLE FROM PILE LOAD TESTS

Tension Tests

Test	Description
Short Piles	
Test 1-2	Erratic loads mask all of the data. No good data are available.
Test 2-1	Maximum skin friction developed of 0.5 tsf in the upper portion of the pile and minimum of 0.1 tsf in the lowest pile section. Portion of curves between 15 and 22 ft depth masked by erratic loads.
Test 2-2	Maximum of 1 tsf skin friction in middle portion of pile decreasing to 0.4 tsf in the lowest pile section. Parabolic shape of skin friction apparent.
Test 2-4	Maximum skin friction of 1.6 tsf developed in the middle portion of pile. Other data partially masked by erratic loads.
Long Piles	
Test 1-1	Maximum mobilized skin friction of 0.8 tsf in upper portion of pile and minimum of 0.5 tsf in the lowest pile section.
Test 1-4	Tip stuck in rock causing the pile to act like a pinned member. Skin friction of less than 0.2 tsf developed along all points of the pile.
Test 1-5	Maximum skin friction developed is 1.0 tsf in the middle portion of the pile and minimum is 0.5 tsf in the lowest pile section. Upper portion of the curve masked by erratic loads but parabolic shape apparent below 20 ft.
Test 2-3	Maximum skin friction of 0.8 tsf in middle portion of pile and minimum of 0.2 tsf in the lowest pile section. Parabolic shape of skin friction curve apparent.

Compression Tests

Test	Description
Short Piles	
Test 1-3a	Maximum skin friction of 1.8 tsf developed in upper portion of pile and minimum of 0.8 tsf in the lowest pile section. Data points between masked by erratic loads.
Test 1-6	Maximum skin friction greater than 2 tsf in middle portion of pile and minimum skin friction of 0.4 tsf developed in the lowest pile section. Parabolic shape of skin friction curve obvious.
Test 1-9	Major portions of curves masked by erratic loads. No data are available.
Test 2-5	Maximum skin friction of 1.0 tsf developed in upper portion of pile and minimum of 0.6 tsf in lowest pile section. No parabolic shape apparent.
Long Piles	
Test 1-7	Maximum skin friction masked by erratic loads. Minimum skin friction of 0.3 tsf in lowest pile section.
Test 1-8	Maximum skin friction of greater than 2 tsf developed in upper pile section. Relatively constant skin friction of 0.1 to 0.4 tsf developed at other points along pile. Upper portion of curves masked by erratic loads.
Test 2-6	Maximum skin friction of greater than 2 tsf developed in upper portion of pile and minimum of 0.2 tsf at pile tip. Data in middle portion of curves masked by erratic loads.
Test 2-7	Maximum skin friction of 1.6 tsf developed in upper portion of pile and minimum of 0.3 tsf at lowest pile section. Data in middle portion of curves masked by erratic loads.

Short compression test piles developed the parabolically shaped skin friction curves. Average maximum skin friction values of 1.6 tsf (with standard deviation of 0.4 tsf) developed in the upper portion of the piles and minimum skin friction of 0.6 tsf (with standard deviation of 0.16 tsf) developed in the lowest pile section. Long compression test piles developed relatively constant skin friction values of 0.4 to 0.8 tsf over the pile shaft.

Load Transfer Curves

The erratic loads in the load distribution curves also strongly affect the load transfer curves as indicated by the wide scatter of points in some of the load transfer curves. In these instances, a subjective curve was drawn through the points and represents the load transfer curve. Since a minimum of confidence is placed in these curves, only a general discussion of the results follows.

The mobilized skin friction at shallow depths is many times greater than the shear strength assumed to occur at that depth. Soil densification and/or increases in lateral earth pressure coefficients caused by the pile installation are suggested as two possible causes of this apparent strength increase. A more significant shortcoming may be the use of a constant earth pressure coefficient K to determine the available shear strengths. Kulhawy (20) has shown that the earth pressure coefficient in overconsolidated sands is a maximum (greater than two) at the surface and tends to reduce to the at-rest coefficent with increasing depth.

In general, the load transfer curves at shallow depths mobilize more of the available shear strength than curves at deeper depths.

Maximum mobilized skin friction was developed at deflections of less than 0.5 inches in many cases, although some curves continued to mobilize skin friction at deflections of one inch and beyond.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Ultimate Capacity Method

When the maximum load applied to the test pile during a load test is less than the ultimate capacity of the pile (i.e., the pile does not fail), methods are available which extrapolate the existing data so that the ultimate capacity of the pile can be estimated.

Three methods (Chin, Van derVeen, and Hansen's methods) were presented and used to estimate the ultimate capacity of the test piles. Chin and Van derVeen's methods were the most useful in evaluating the data. When load deflection curves from test piles loaded to failure were evaluated, both methods overestimated the ultimate capacity. Although Chin's method tended to overestimate the ultimate capacity to a greater extent than Van derVeen's method (Chin, 16 to 50% greater; Van derVeen, 3 to 21% greater), Chin's method is much easier to use and the most correct prediction is quite obvious. Van derVeen's method required quite a bit of engineering judgment to select the correct value from the generated family of curves. Hansen's method proved to be of limited usefulness in evaluating these tests.

Working Capacity Methods

Six methods (1/4 inch tip deflection, 1/4 inch gross deflection, Davisson's limit, DeBeer's method, Butler and Hoy's method, and an intersection method) were presented and used to determine working loads for these test piles. All of these methods were relatively successfully, where applicable, for providing values of working capacity for the test piles.

The intersection and Butler and Hoy's methods can be affected by subjectivity on the part of the engineer's evaluation of the data. The 1/4 inch gross deflection method is too conservative, actually penalizing longer piles. DeBeer's method provides a good way to determine the location of the transition between the inital and terminal portion of the load deflection curve. The 1/4 inch tip deflection method is the most useful method. Davisson's limit can be used to estimate the tip deflections from the load deflection curve of compression load tests. A variation of Davisson's limit, dubbed the Conroy/Wolff method, was used to evaluate the results of tension load tests.

Effects of Loading Procedures and Pile Batter on Pile Capacity

The initial portion of load deflection curves obtained from load tests performed using quick loading procedures are steeper than those obtained from load tests performed using standard loading procedures. The ultimate capacities of piles tested using quick load procedures are greater than similar piles tested using standard load procedures.

There are inconclusive data which suggest that a vertical pile may be stronger than a similar battered pile when both are driven to the same tip elevation.

Load Distribution, Unit Skin Friction, and Load Transfer Curves

Although residual stresses were not directly measured, their existence is confirmed by the significant tip loads measured in some tension tests. While not accounted for in these analyses, residual stresses have no doubt affected these results to some magnitude. Data presented here represent functions of skin friction mobilized during the application of the test loads.

The load distribution curves developed by these test piles indicate parabolically shaped skin friction curves for all tension test piles and short compression test piles. The unit skin friction curves of the tension test piles were parabolically shaped with average maximum skin friction values of 0.95 tsf in the upper portions of the piles and average minimum values of 0.3 tsf near the pile tips. The unit skin friction curves of the short compression test piles were parabolically shaped with average maximum skin friction values of 1.6 tsf in the upper portions of the piles and average minimum values of 0.6 tsf near the pile tips.

Piles driven to refusal on rock and tested in compression generally developed less skin friction than other piles, and the load distribution curves indicated relatively constant skin friction values. Maximum mobilized skin friction values of 0.4 to 0.8 tsf were measured in long compression test piles. These values were relatively constant over the entire length of the pile.

The load transfer curves obtained from shallow depths show that developed shear stresses are larger than the assumed shear strengths. In general, less of the assumed shear strength was utilized as the depth was increased. Skin friction was totally mobilized with 0.5 inch or less of deflection.

Recommendations

Maximum Applied Test Load

To maximize the amount of test data, pile load tests should be carried to ultimate failure of the test pile. If financial or scheduling constraints do not allow for this, the load test should be carried to a load level equal to 300 percent (9) of the maximum design load or to pile failure, whichever occurs first.

Ultimate and Working Capacity

When the maximum applied load is less than the ultimate capacity of the test pile, it is recommended that Chin's or Van derVeen's method be used to predict the ultimate capacity from the incomplete data. These predictions will need to be reduced by a factor of 3 to 50 percent, depending on the judgment of the engineer, the amount of data available, and the method used.

The working capacity should be based on the 1/4 inch tip deflection criteria. Allowing 1/4 inch deflection at the pile tip assures that most of the skin friction along the pile shaft and only a fraction of the tip bearing capacity has been mobilized.

If measurements of tip deflection are not available, then Davisson's limit should be used to determine the working load for compression tests and Conroy/Wolff's method should be used to determine the working load for tension tests.

Piles driven to refusal on rock and tested in compression should not be analyzed by geotechnically-based failure criteria. The working capacity of these piles should be determined through the use of structural engineering criteria.

Levels of Instrumentation

The minimum level of instrumentation should include load and dial gages to measure the applied loads and deflections at the pile butt. Additionally, at least one strain rod should be included which will provide measurements of pile tip deflections. To provide redundancy in case of mechanical failure and as a check on the data, two strain rods should be included to measure the tip deflections.

If dial gages are used to measure movements of the pile butt along with strain rods, they should be mounted at the same level, preferably as close to the ground surface as possible.

Recommended Water Table Correction Factor

While the use of a method to correct the pile capacity for the location of the water table is recommended, correction factors of 0.52 to 0.70 as presented here seem overly conservative. A method presented by Mosher (24) results in water table correction factors of 0.80 to 0.90 for water table depths similar to those reported here.

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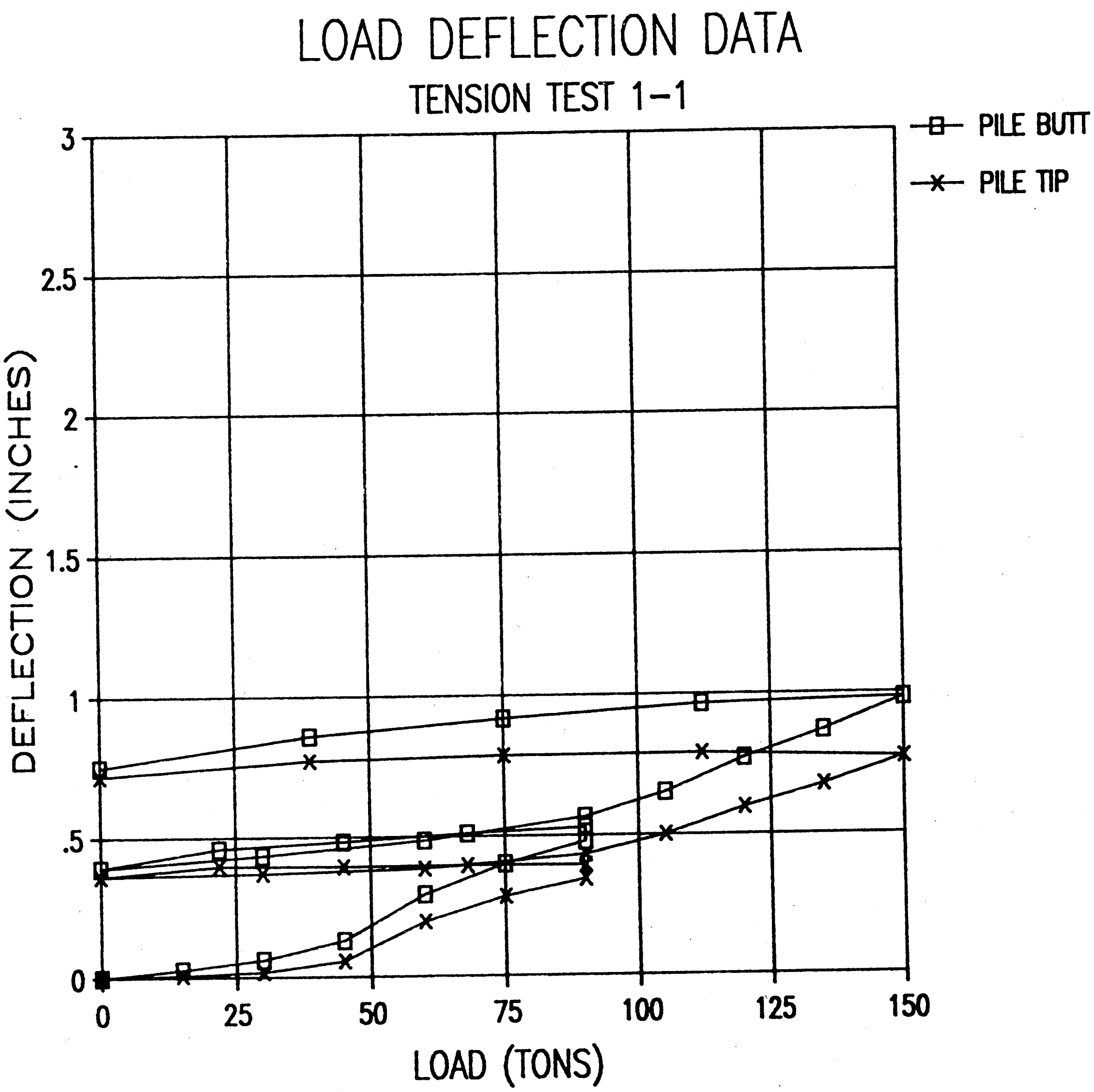
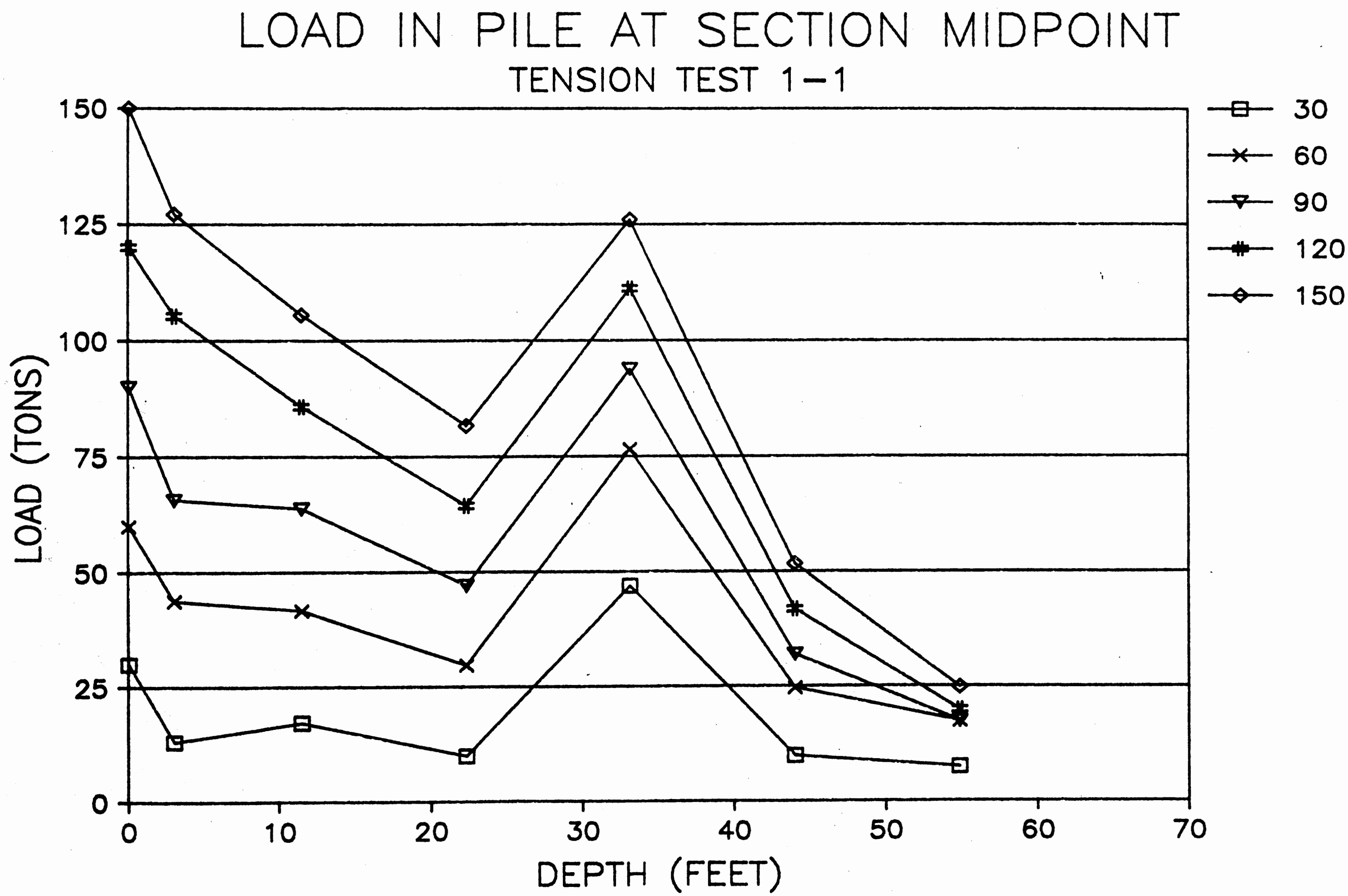
APPENDIX A

LOAD DEFLECTION, LOAD DISTRIBUTION, UNIT SKIN FRICTION, AND LOAD TRANSFER CURVES

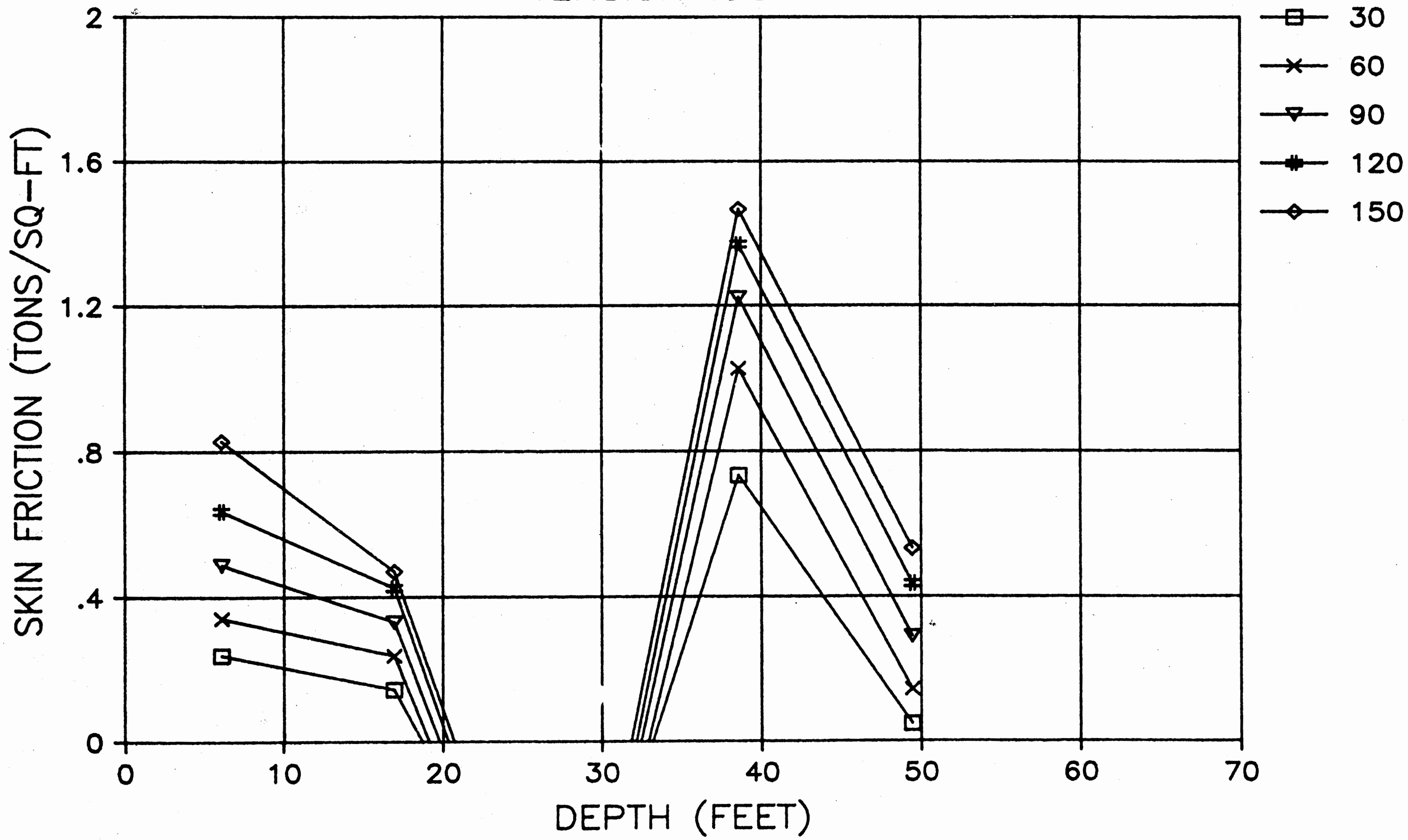

LOAD DEFLECTION DATA
TENSION TEST 1-1
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
25
50
75
100
125
150
LOAD (TONS)



LOAD IN PILE AT SECTION MIDPOINT
TENSION TEST 1-1
LOAD (TONS)
DEPTH (FEET)
0
25
50
75
100
125
150
0
10
20
30
40
50
60
70
30
60
90
120
150

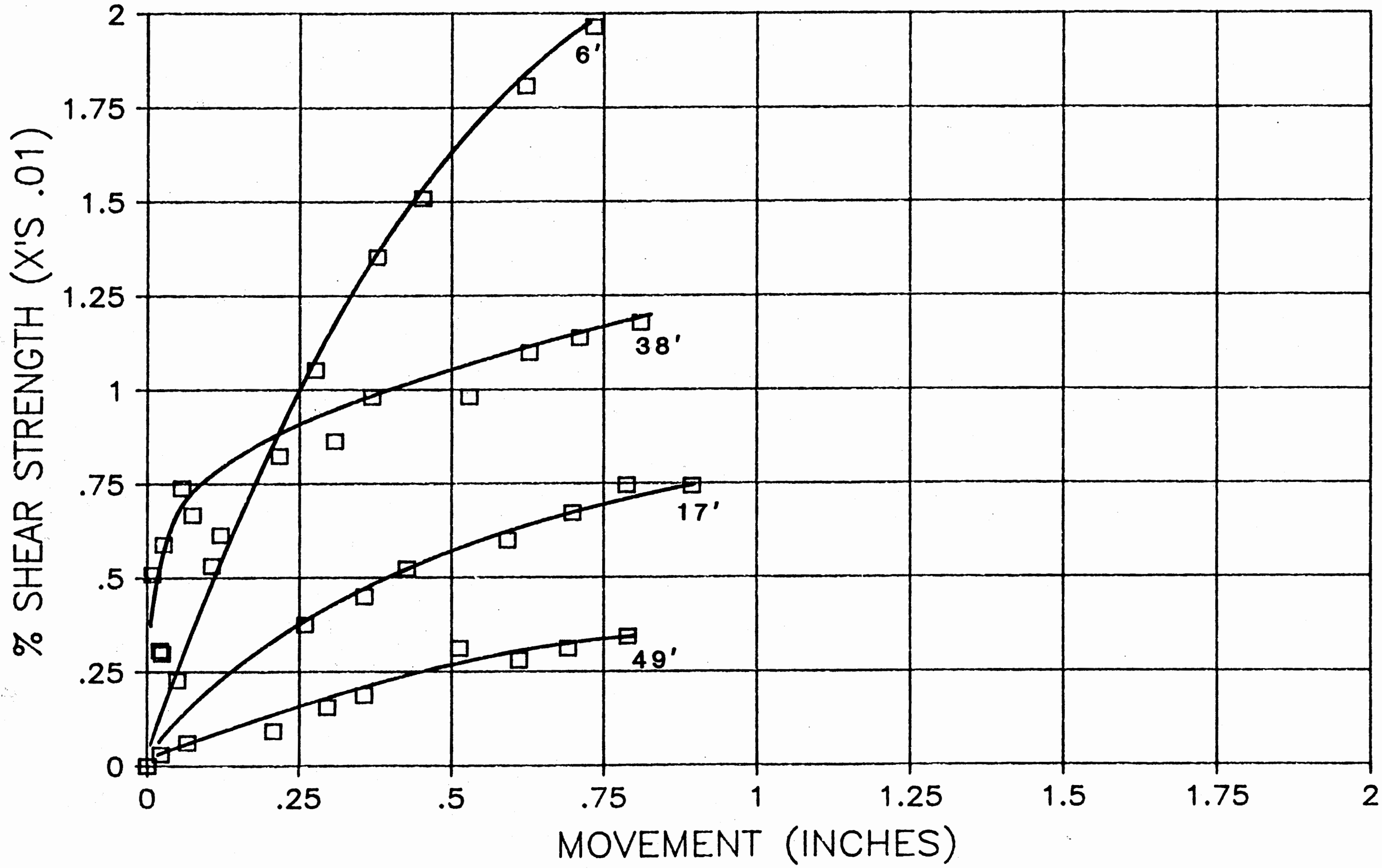
SKIN FRICTION CURVES

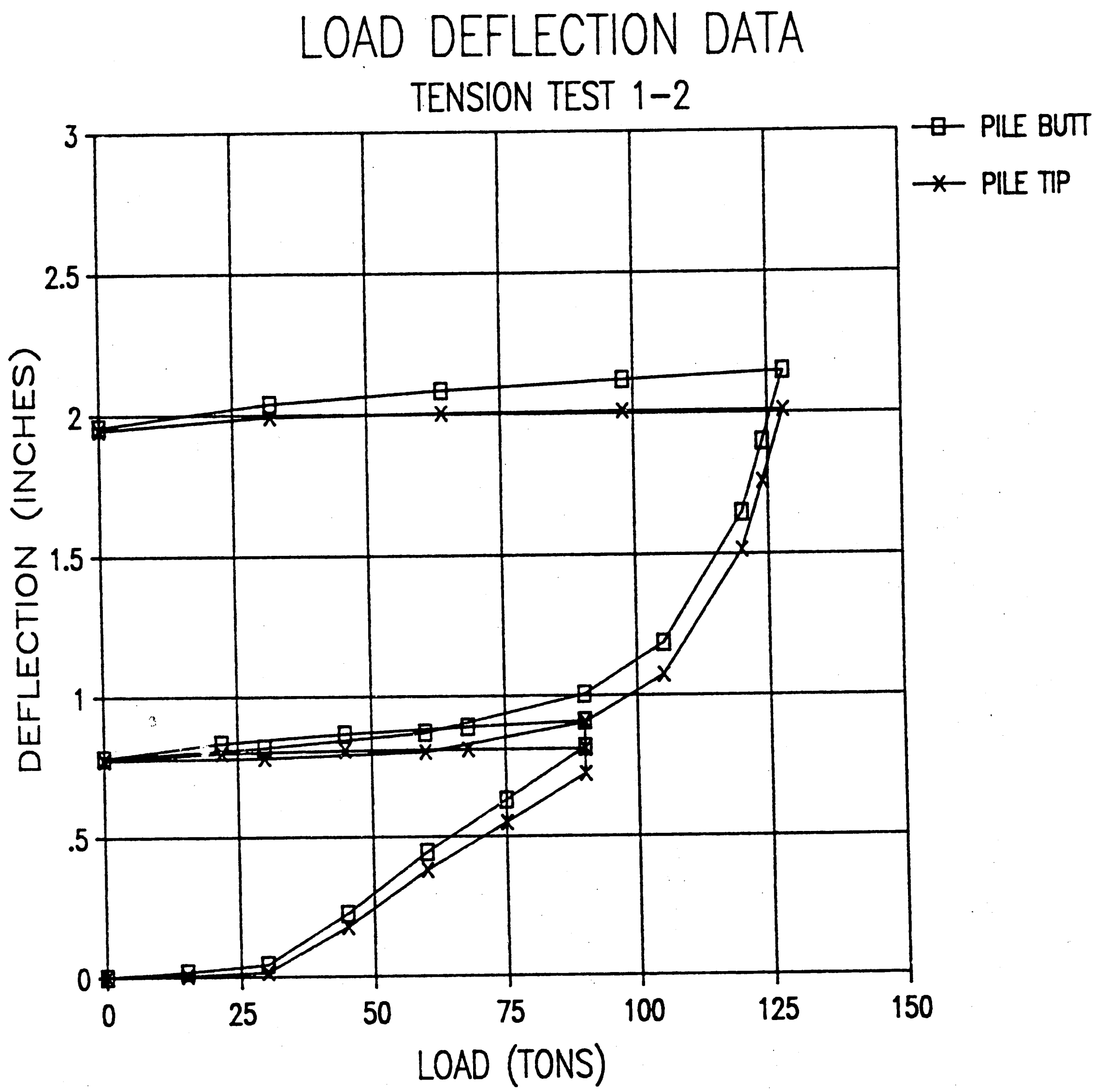
TENSION TEST 1-1

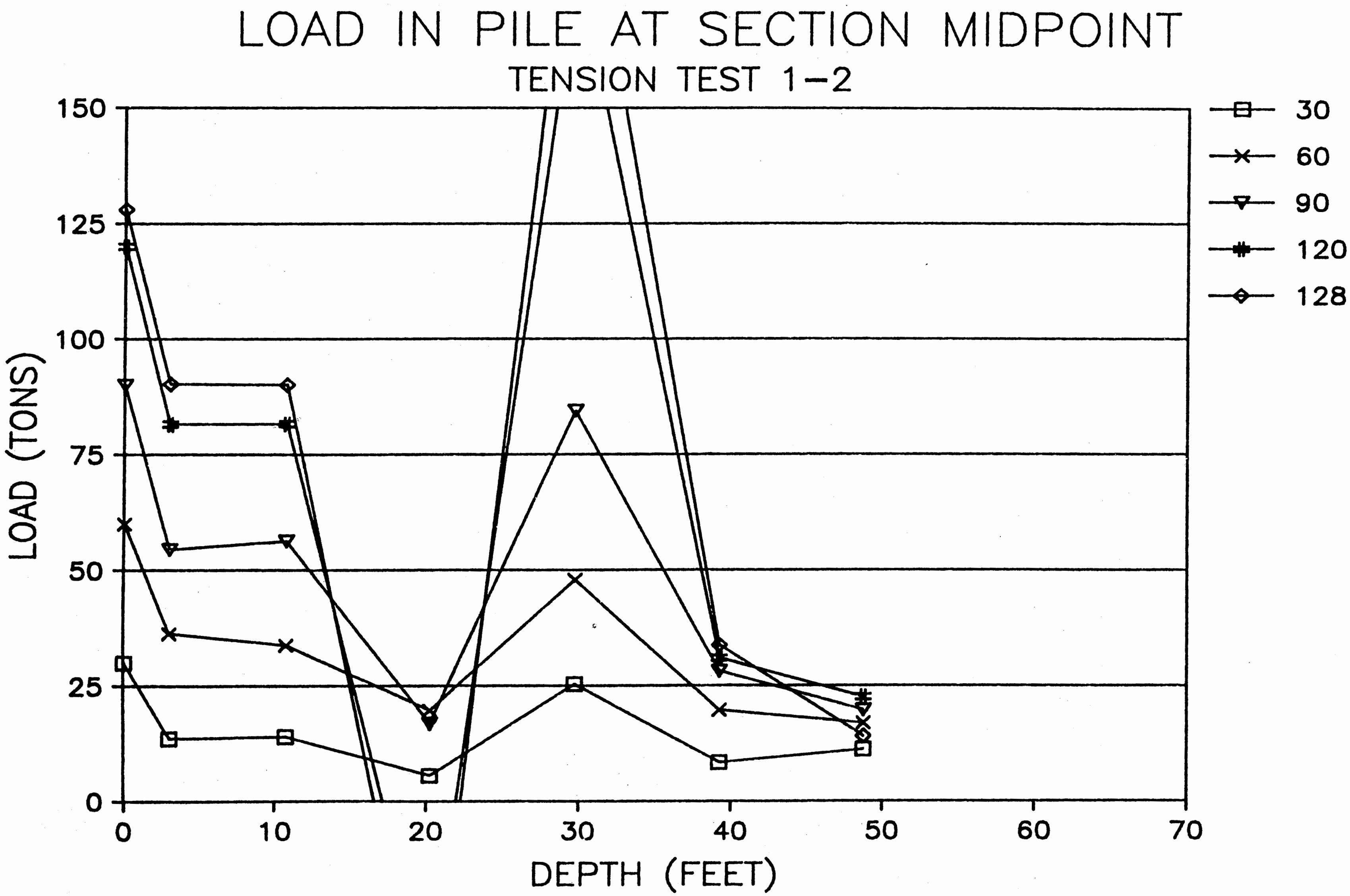


LOAD TRANSFER CURVES

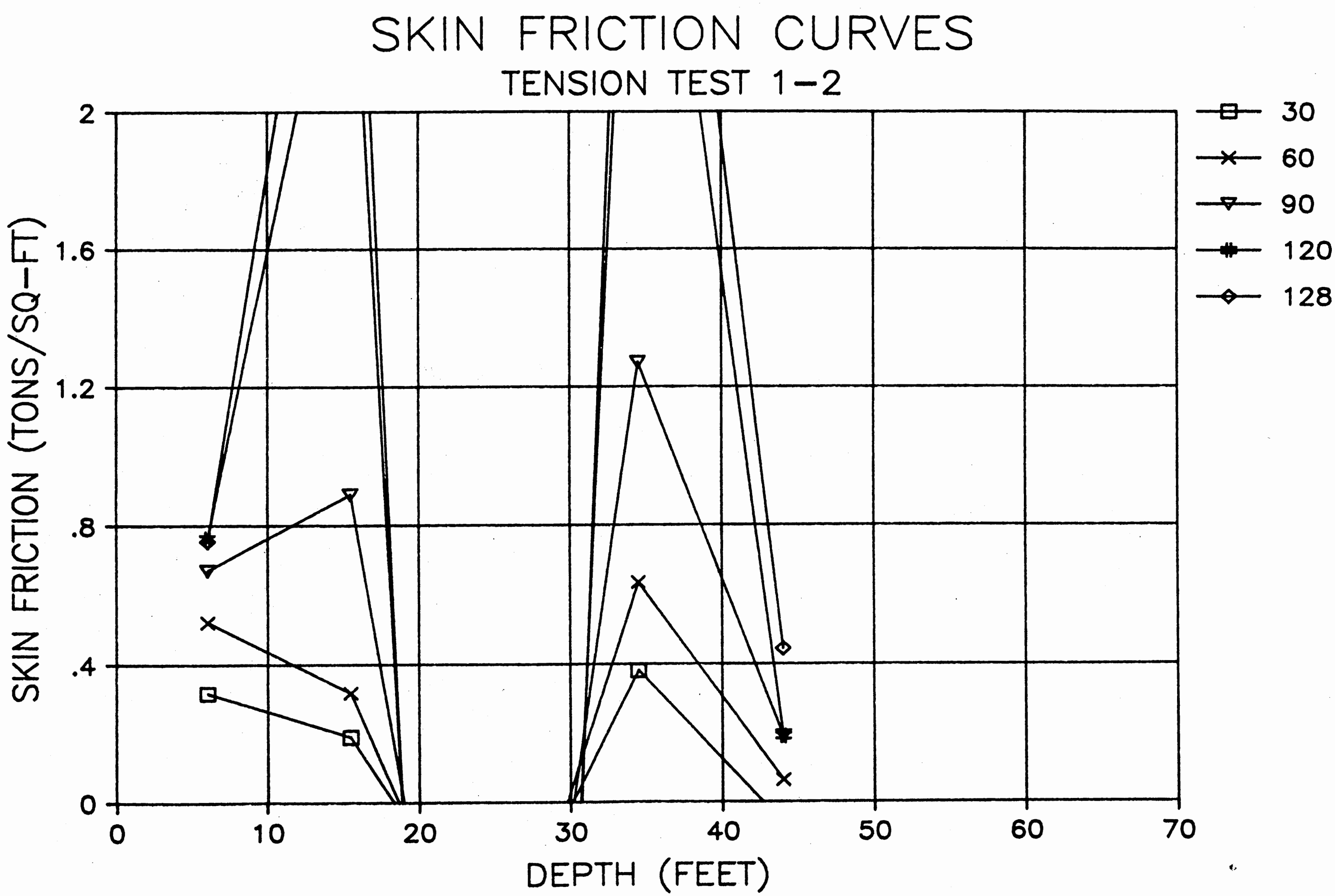
TENSION TEST 1-1




LOAD DEFLECTION DATA
TENSION TEST 1-2
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
25
50
75
100
125
150
LOAD (TONS)

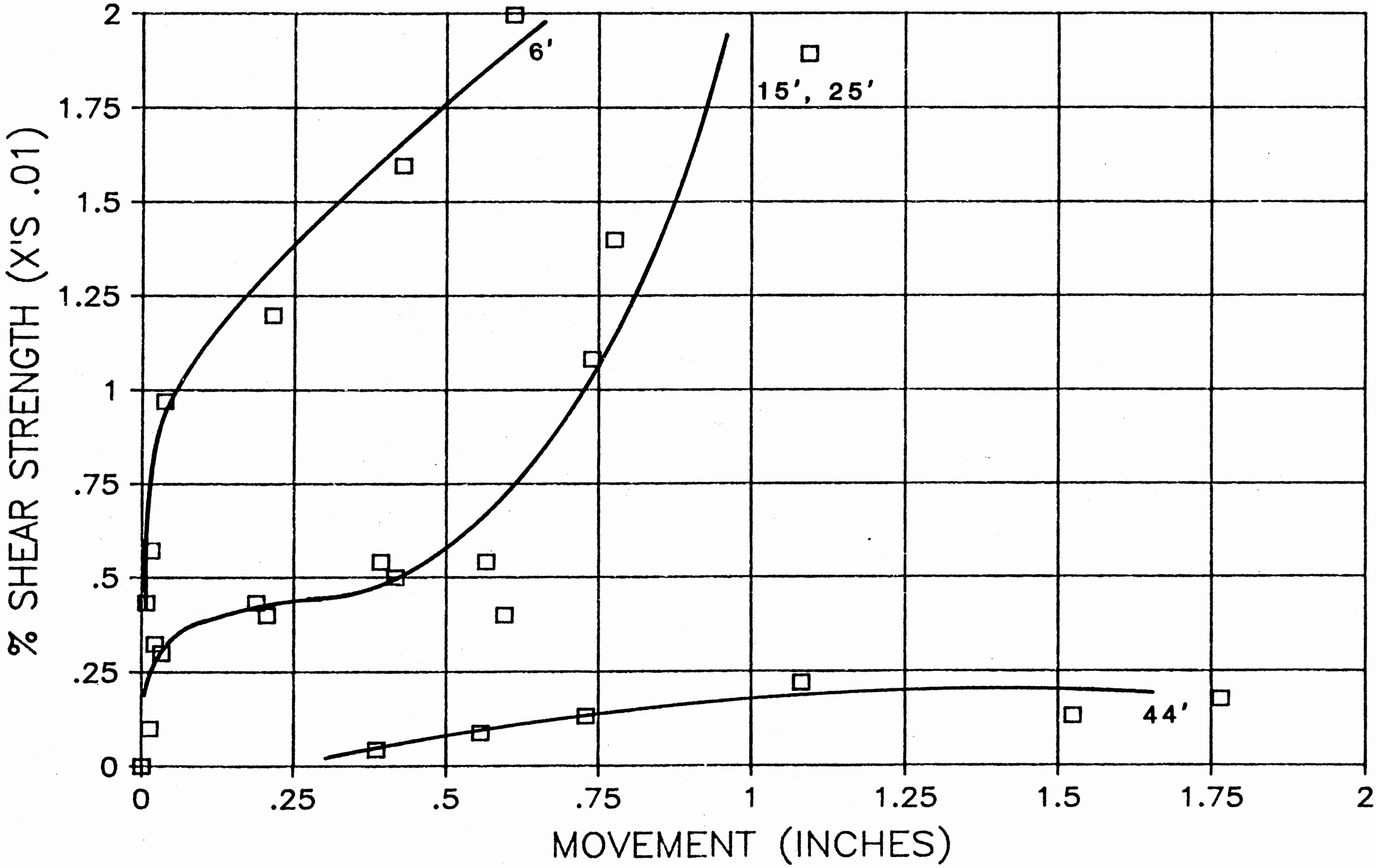


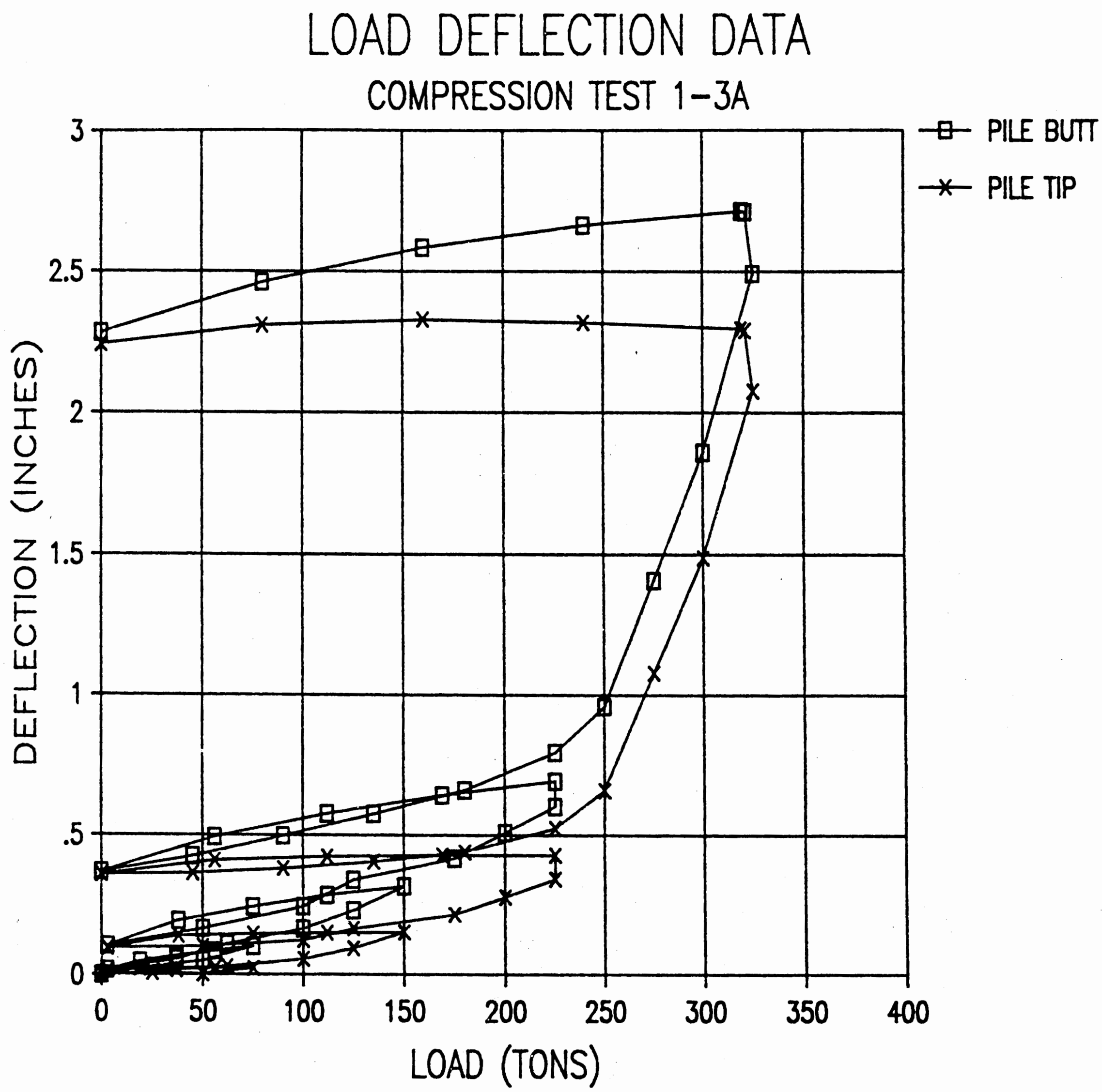
LOAD IN PILE AT SECTION MIDPOINT
TENSION TEST 1-2
LOAD (TONS)
DEPTH (FEET)
150
125
100
75
50
25
0
0
10
20
30
40
50
60
70
30
60
90
120
128

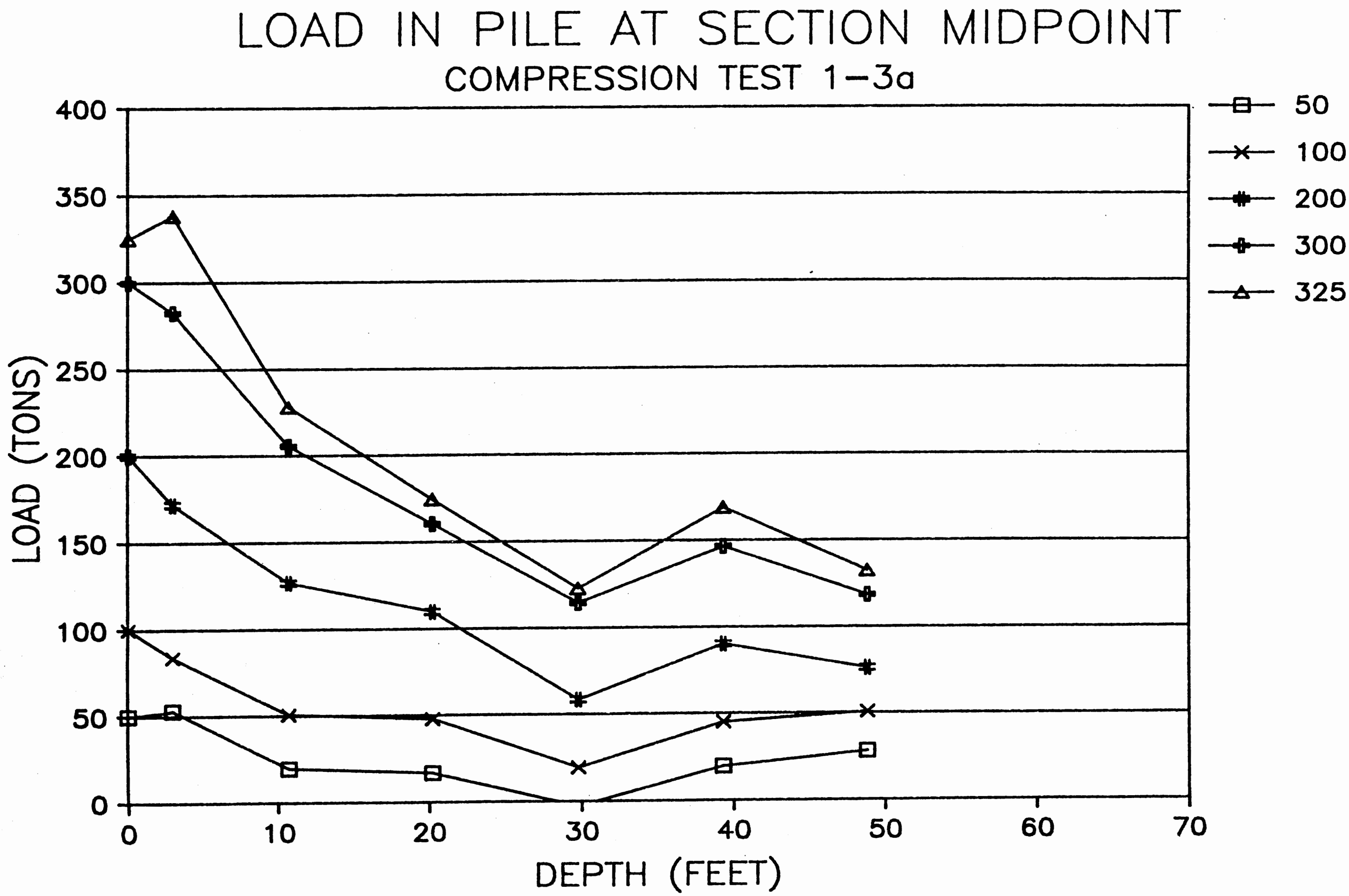

SKIN FRICTION CURVES
TENSION TEST 1-2
SKIN FRICTION (TONS/SQ-FT)
DEPTH (FEET)
0
.4
.8
1.2
1.6
2
0
10
20
30
40
50
60
70
30
60
90
120
128

LOAD TRANSFER CURVES

TENSION TEST 1-2

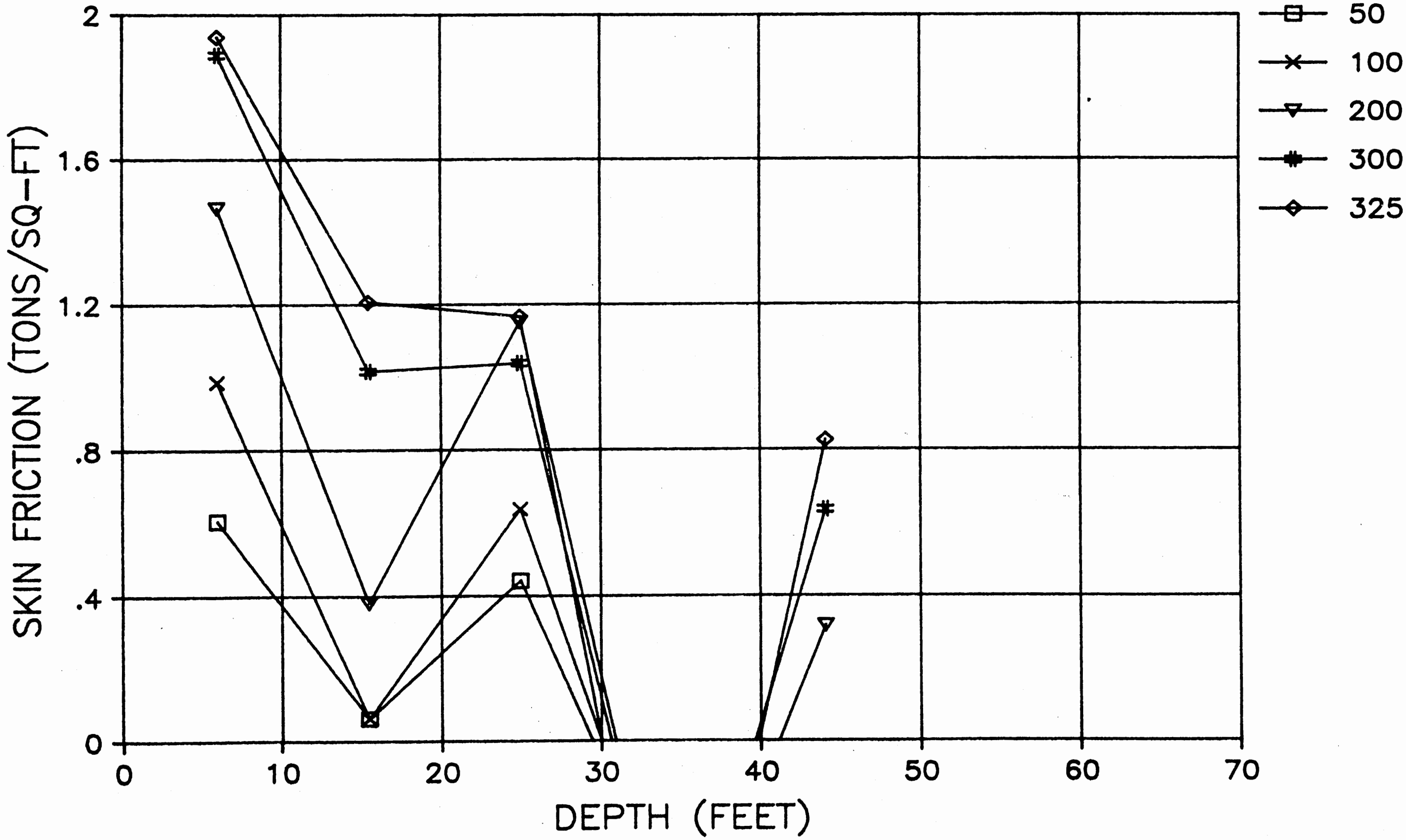



LOAD DEFLECTION DATA
COMPRESSION TEST 1-3A
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
LOAD (TONS)
0
.5
1
1.5
2
2.5
3
0
50
100
150
200
250
300
350
400

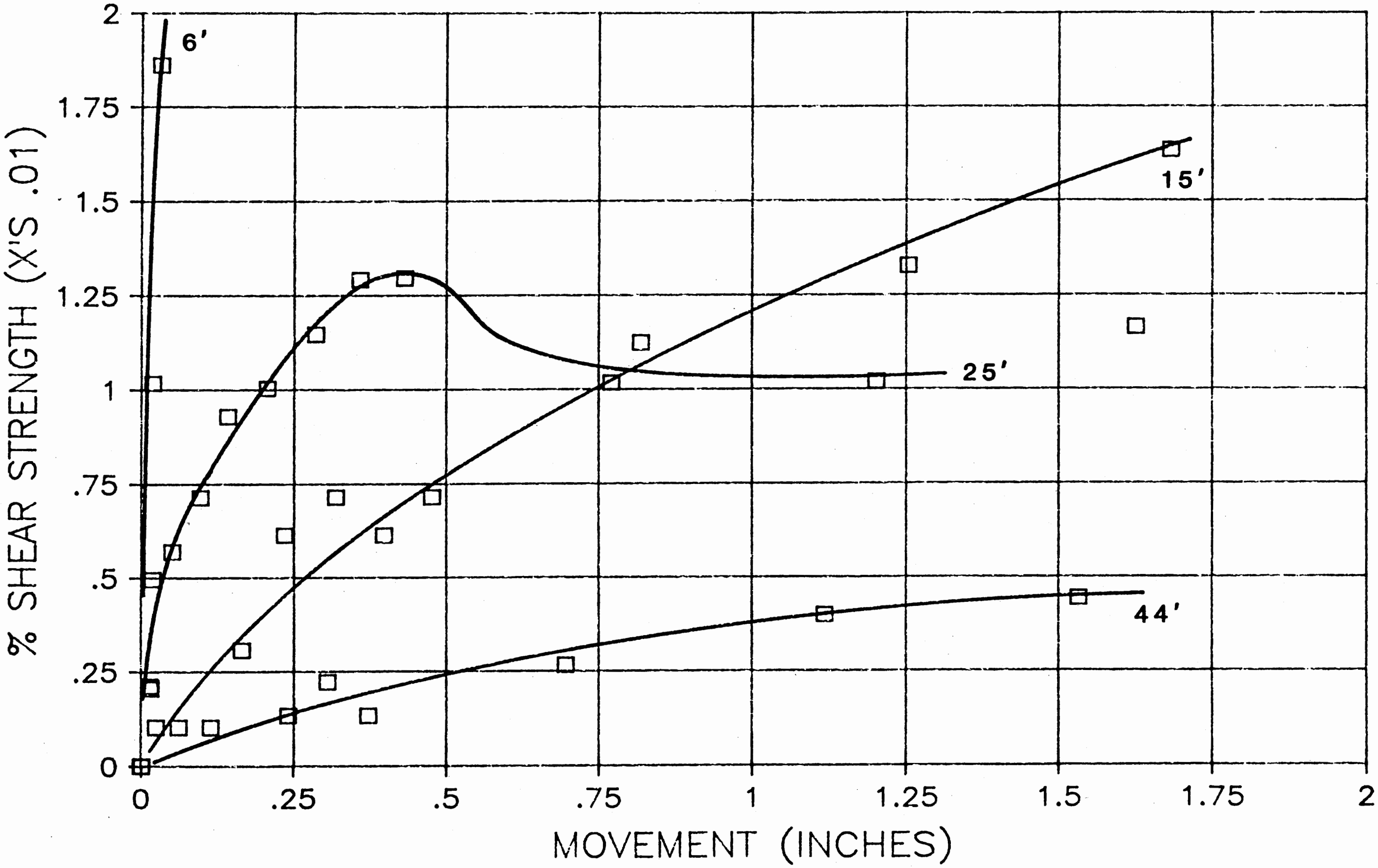

LOAD IN PILE AT SECTION MIDPOINT
COMPRESSION TEST 1-3a
LOAD (TONS)
DEPTH (FEET)
0
50
100
150
200
250
300
350
400
10
20
30
40
50
60
70
50
100
200
300
325

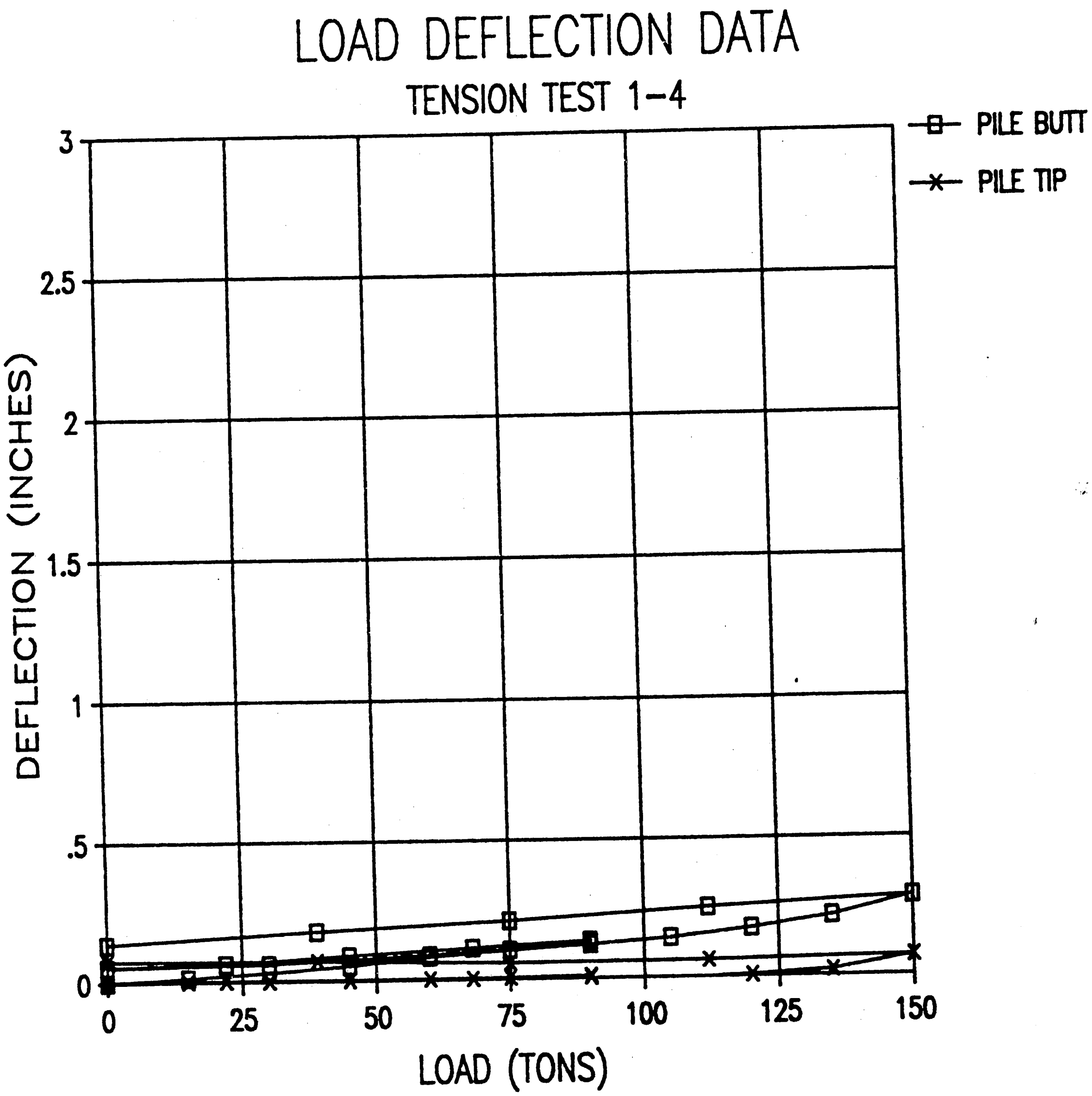
SKIN FRICTION CURVES

COMPRESSION TEST 1-3a

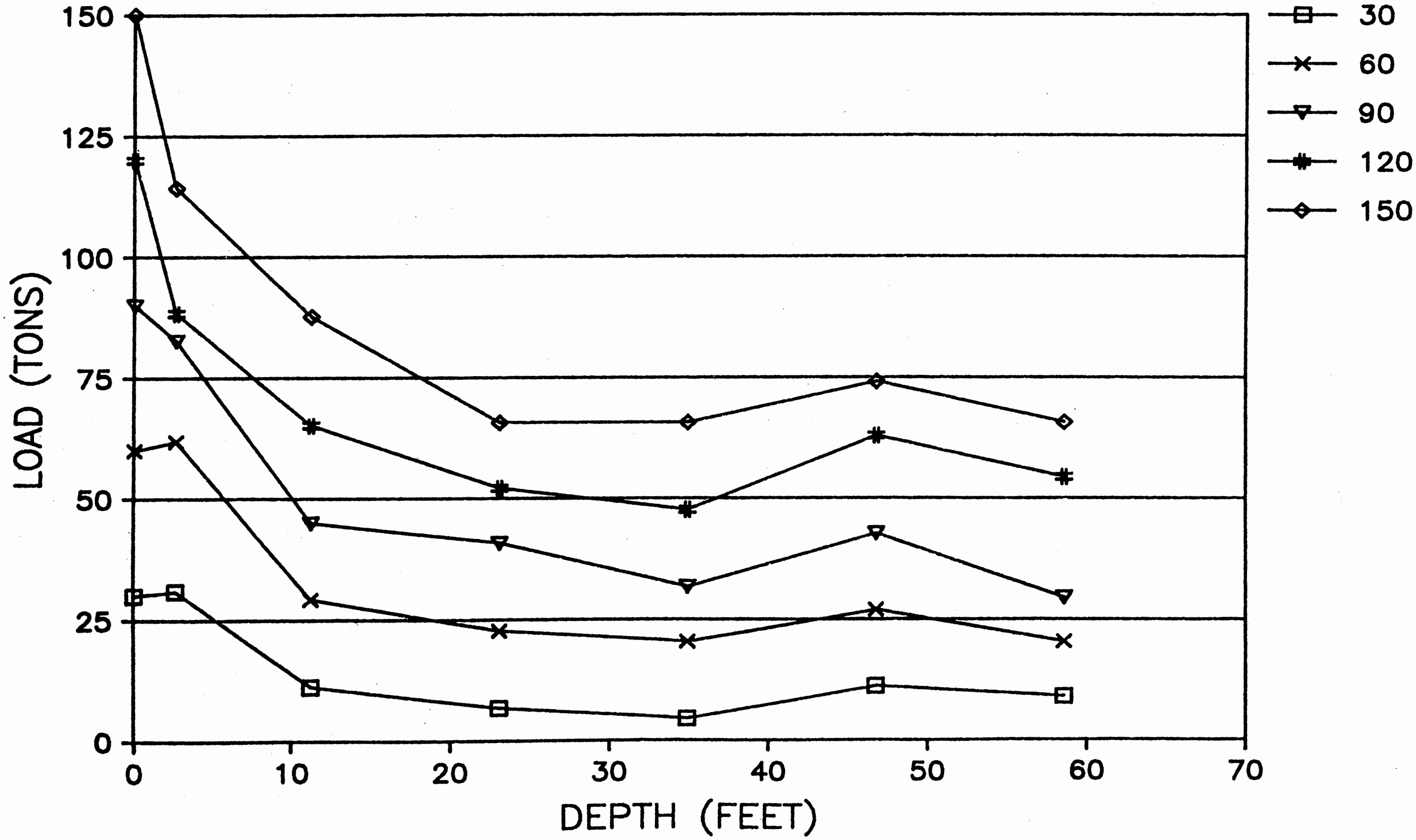


LOAD TRANSFER CURVES
COMPRESSION TEST 1–3A



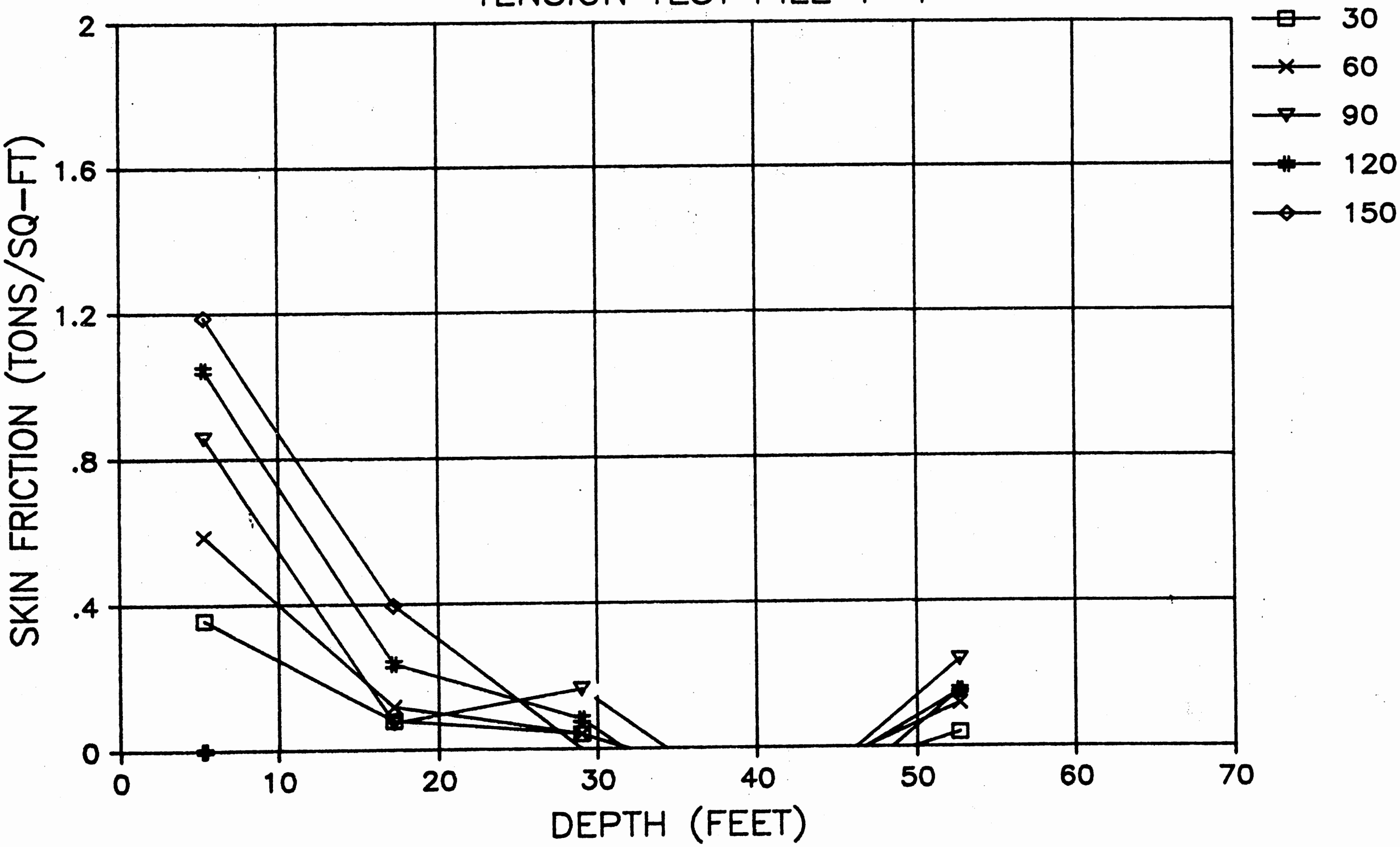

LOAD DEFLECTION DATA
TENSION TEST 1-4
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
25
50
75
100
125
150
LOAD (TONS)

LOAD IN PILE AT SECTION MIDPOINT
TENSION TEST PILE 1-4



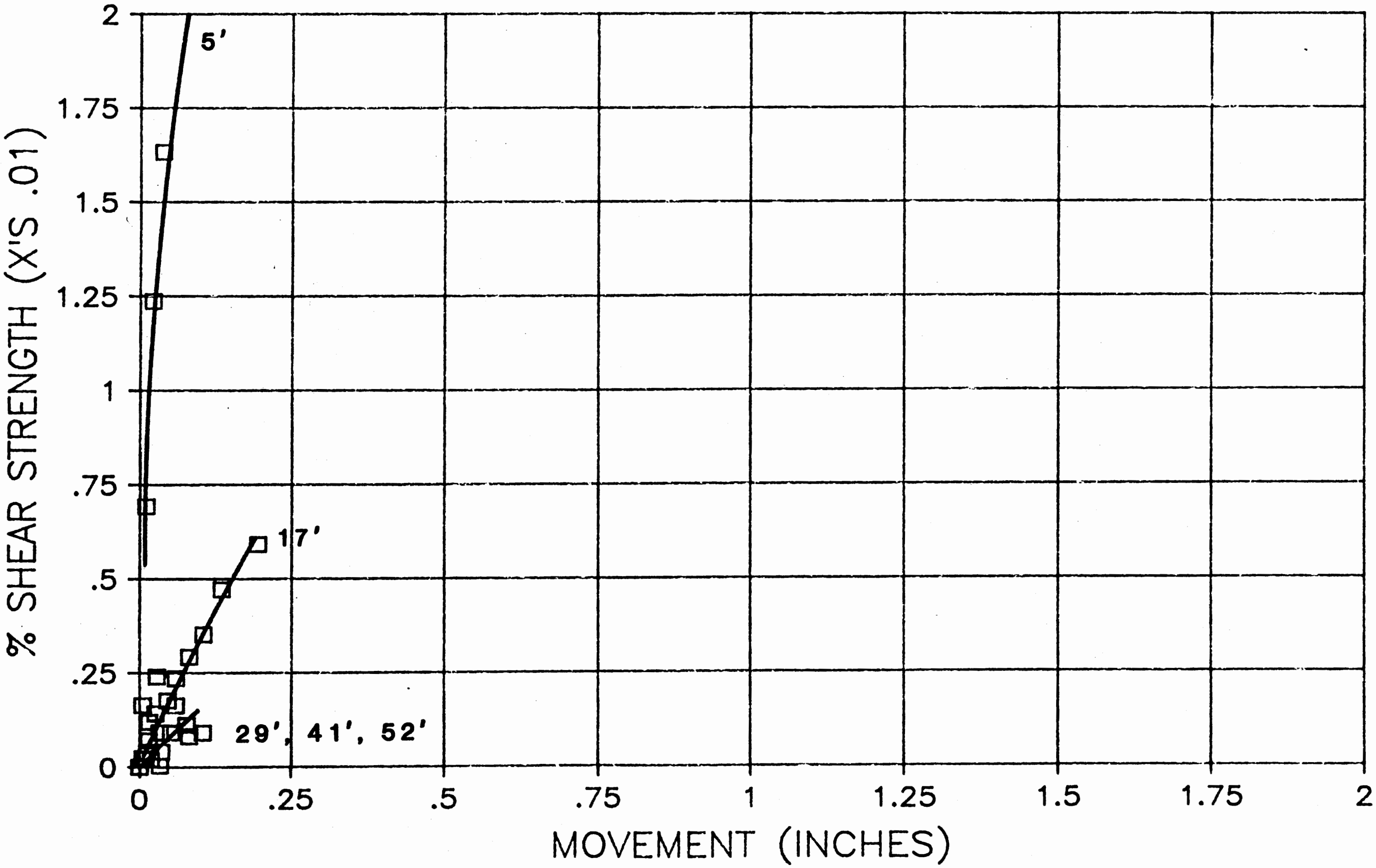
SKIN FRICTION CURVES

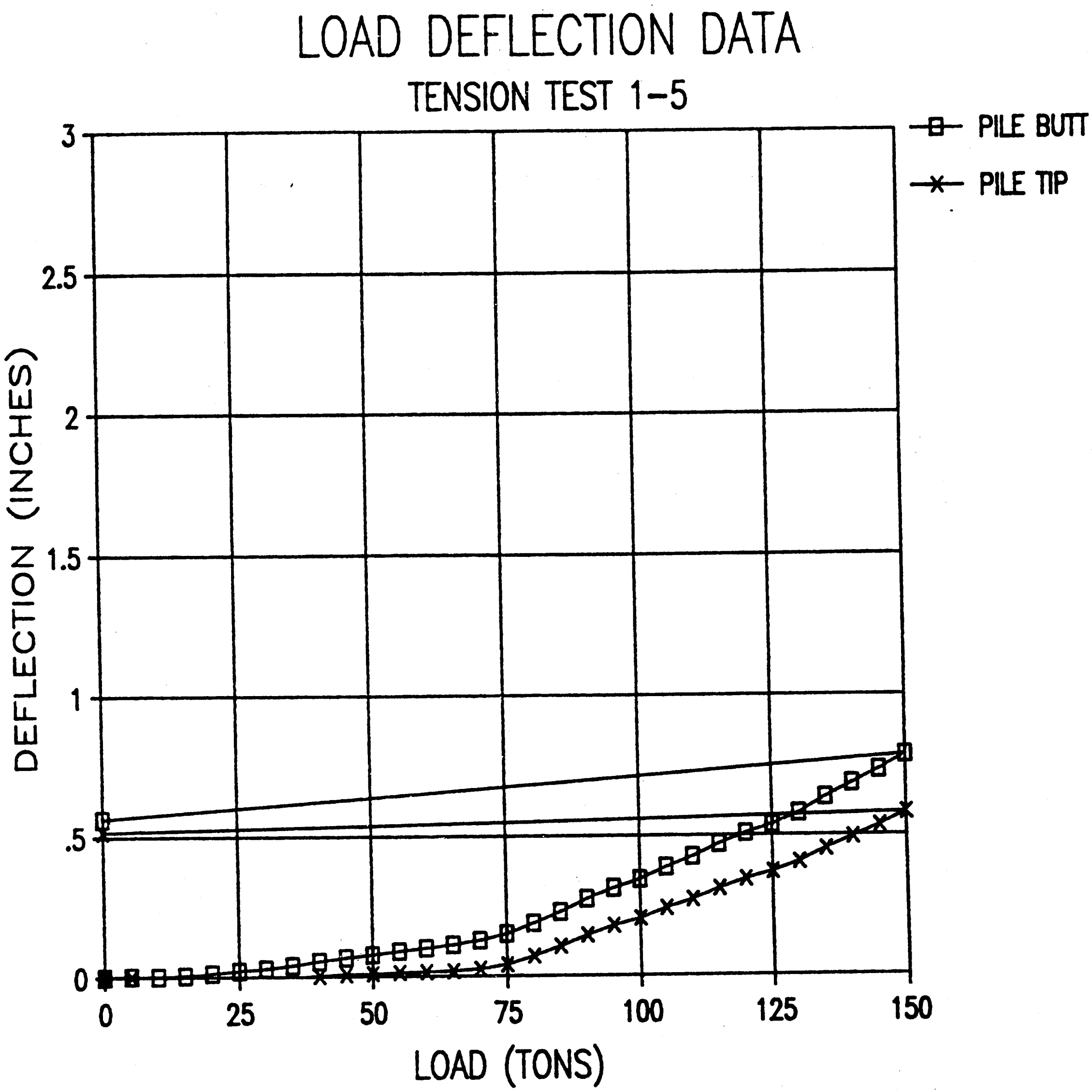
TENSION TEST PILE 1-4

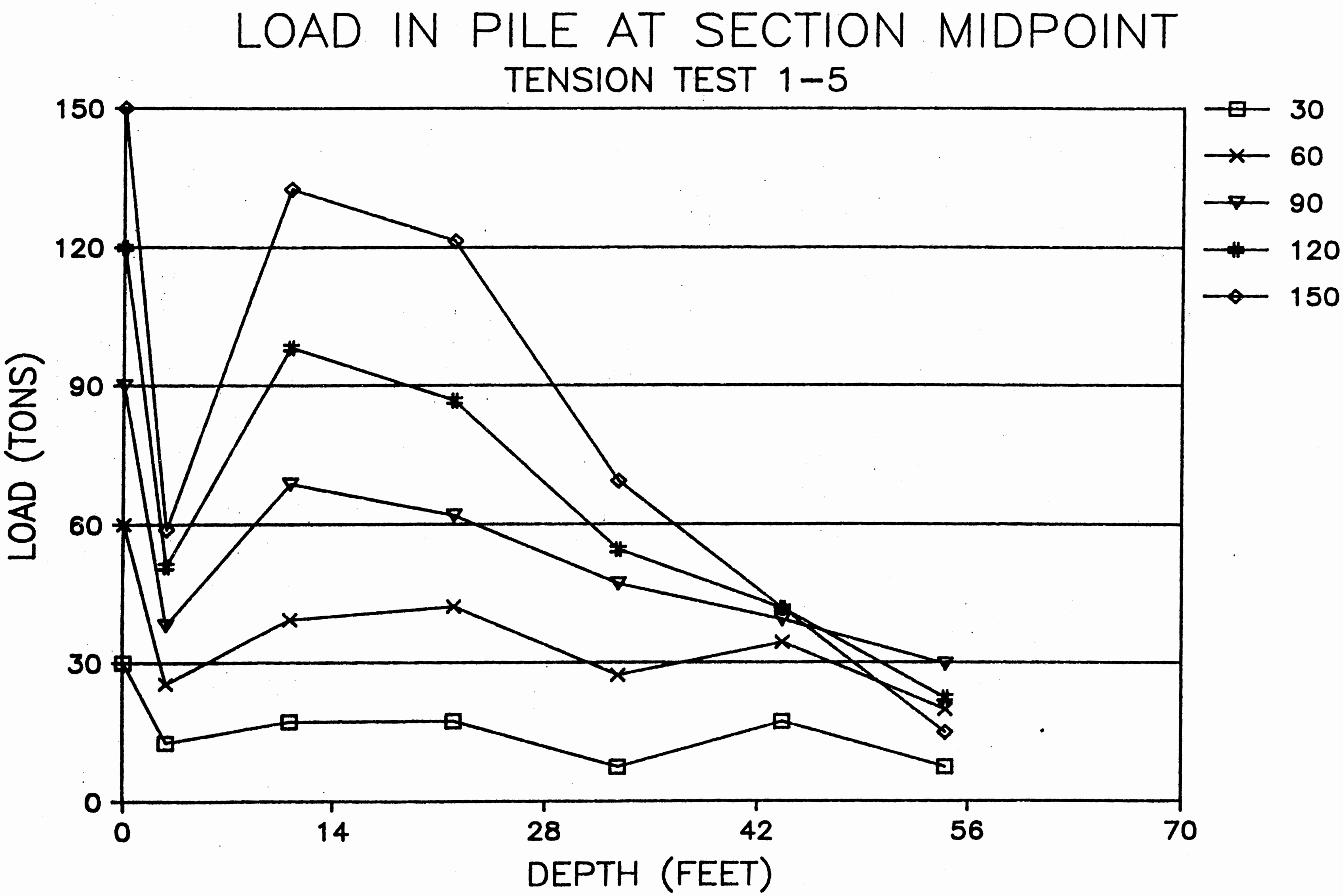


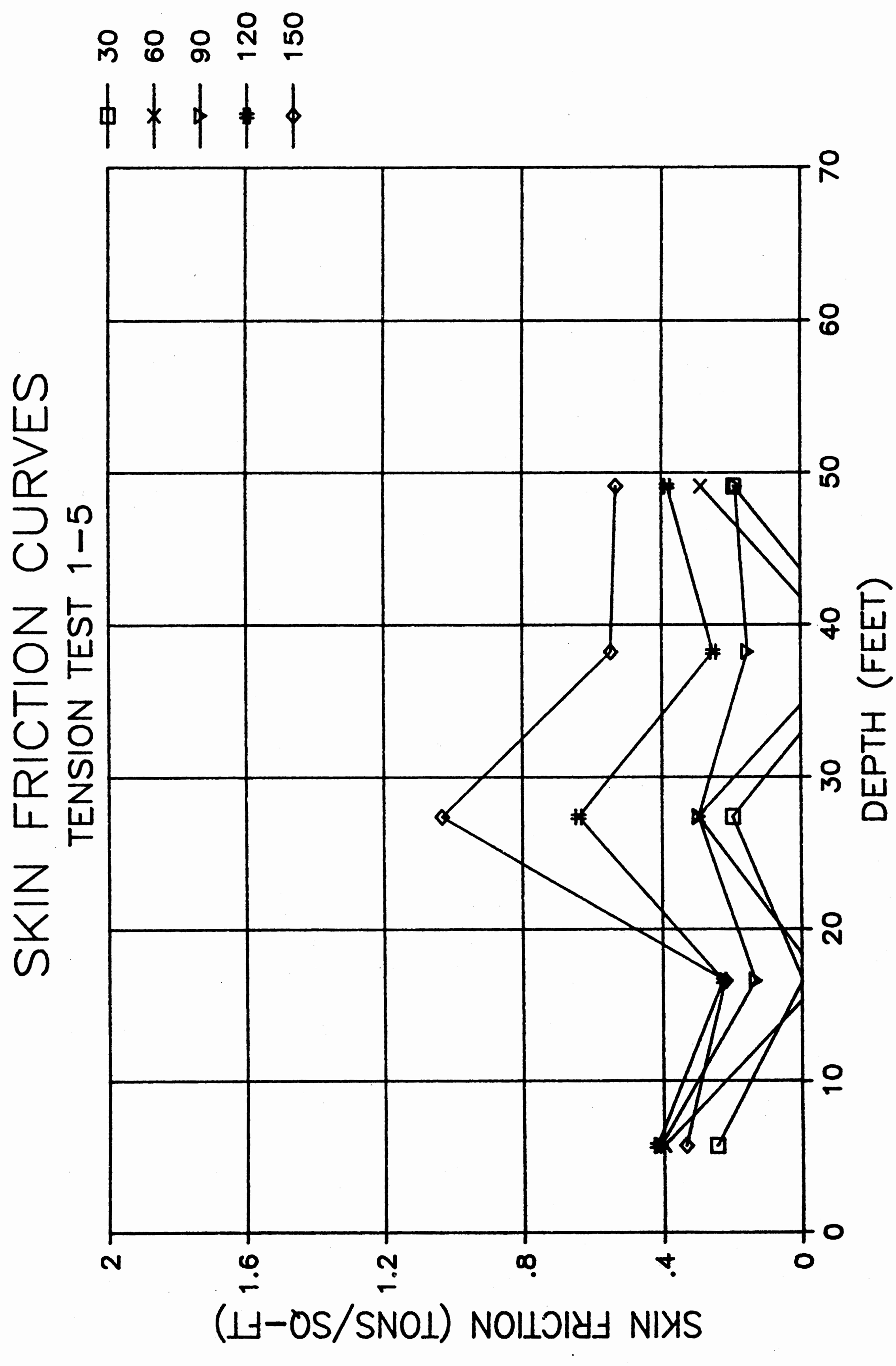
LOAD TRANSFER CURVES

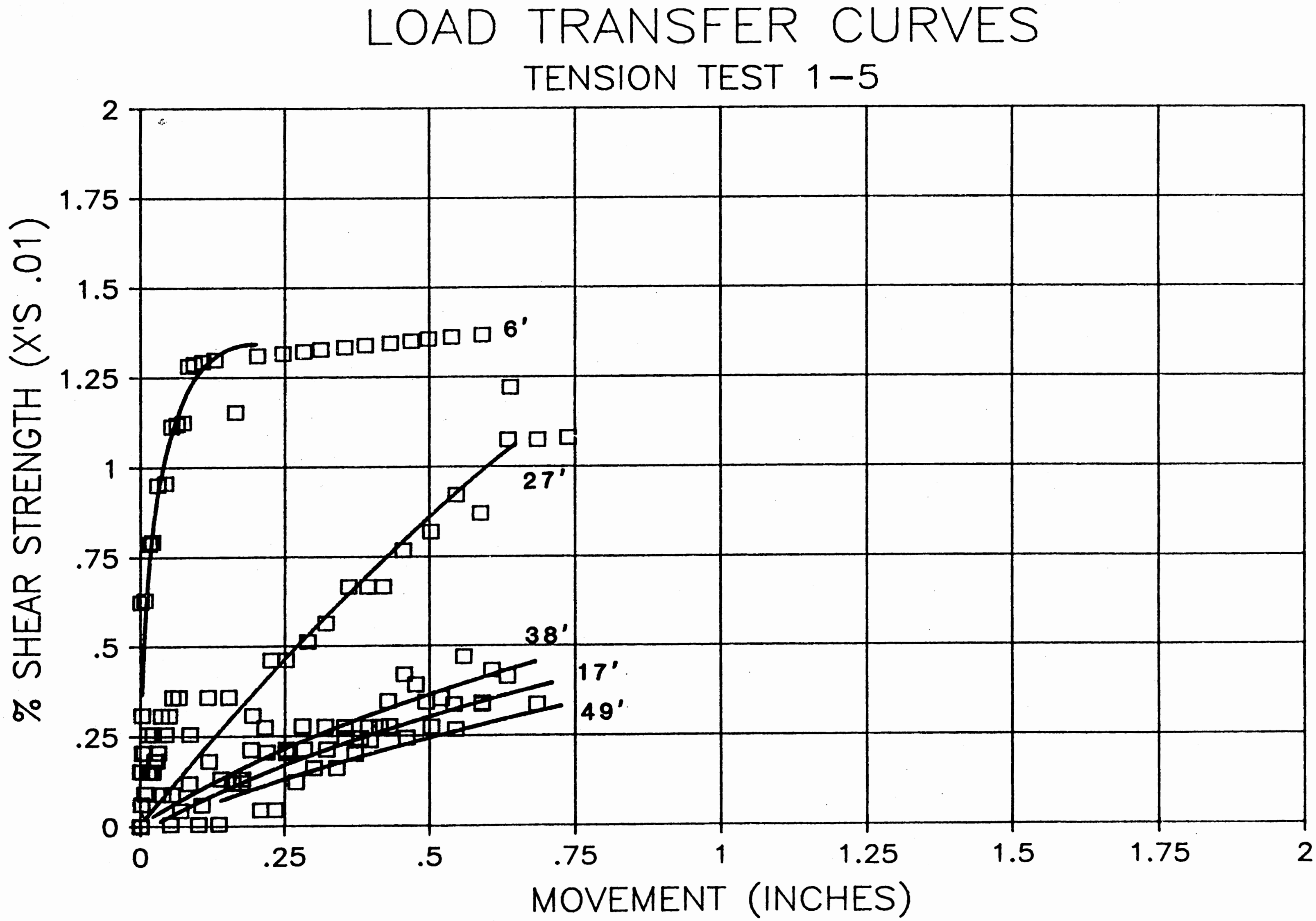
TENSION TEST 1-4

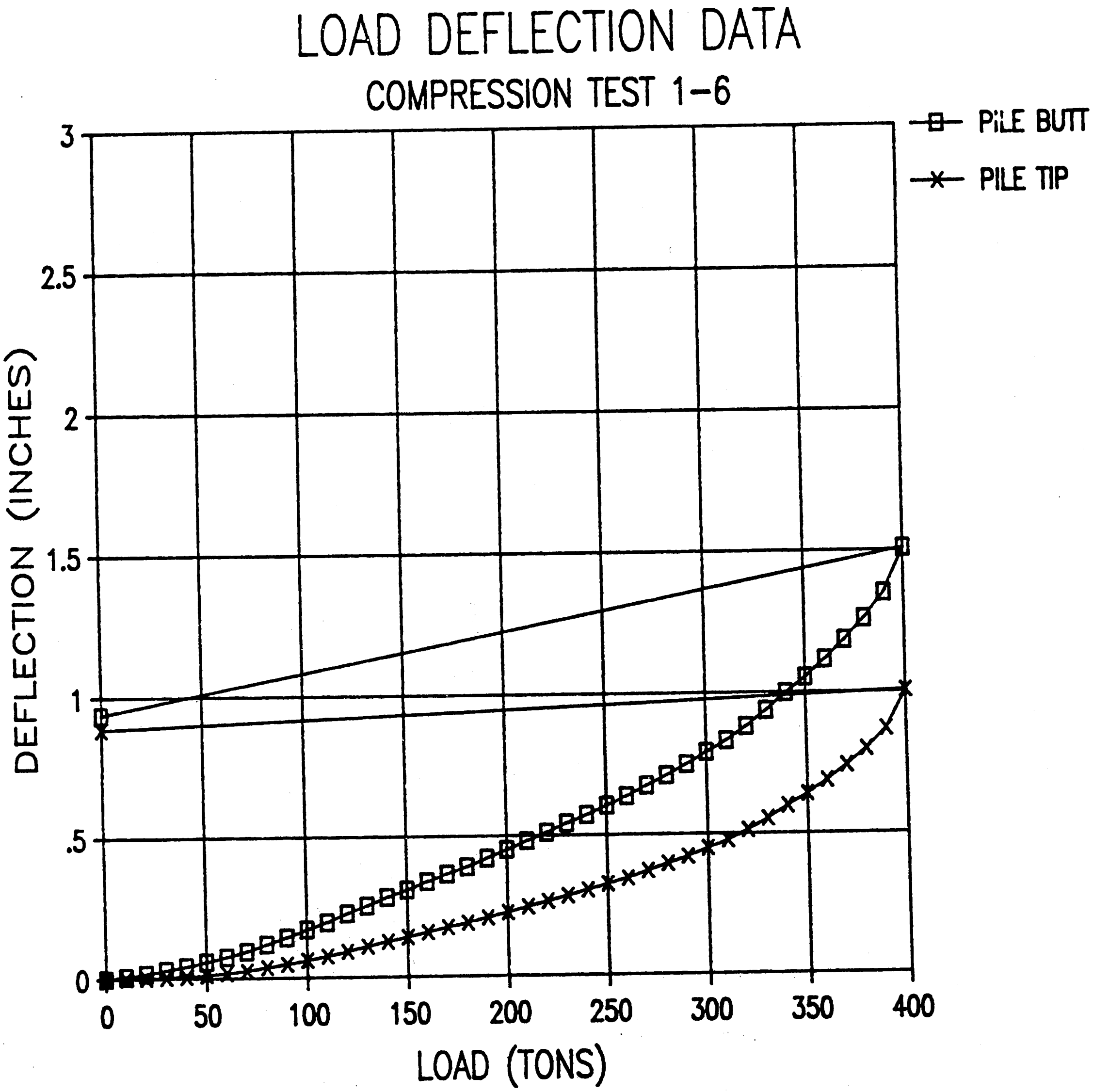


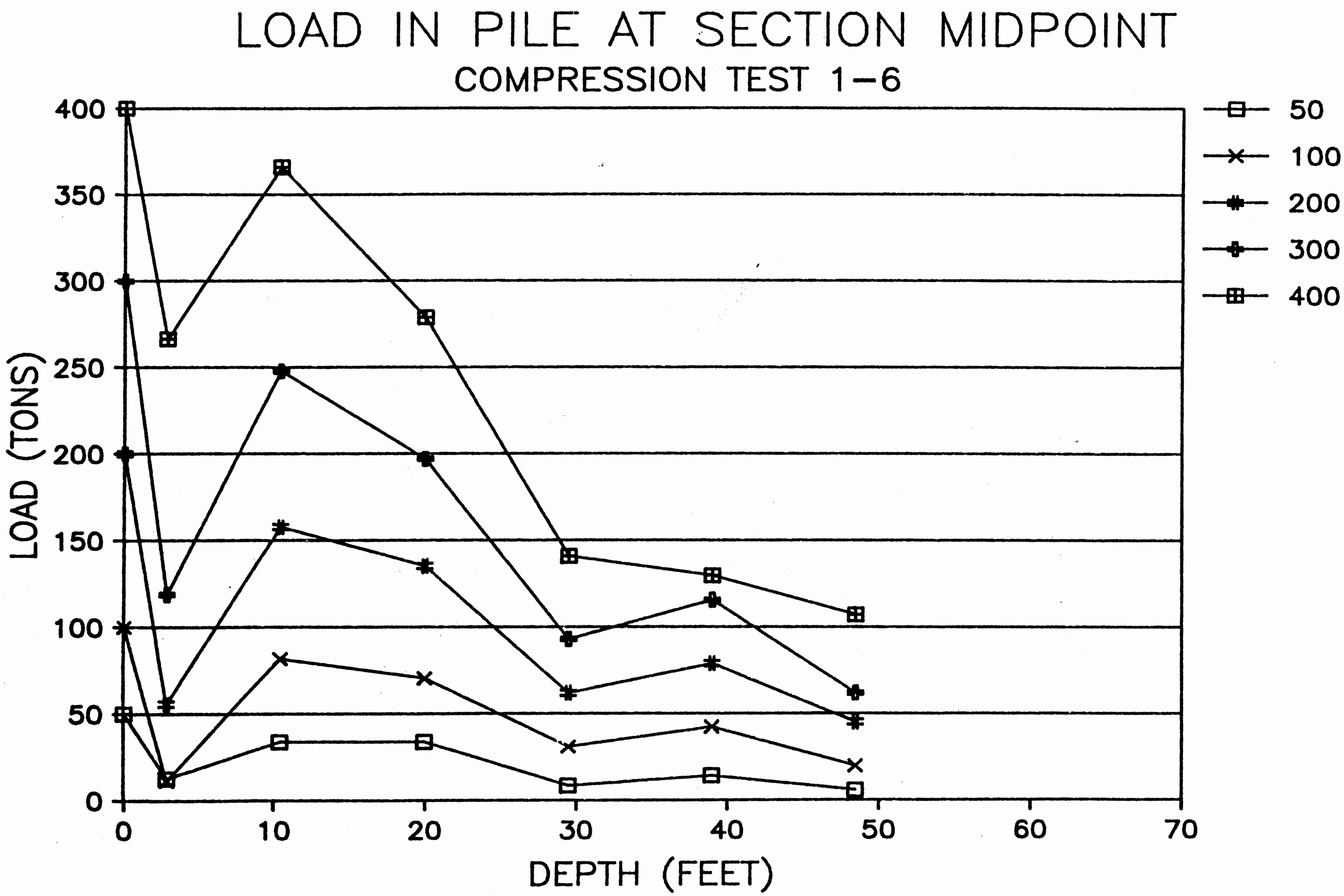

LOAD DEFLECTION DATA
TENSION TEST 1-5
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
25
50
75
100
125
150
LOAD (TONS)


LOAD IN PILE AT SECTION MIDPOINT
TENSION TEST 1-5
LOAD (TONS)
DEPTH (FEET)
0
30
60
90
120
150
0
14
28
42
56
70
30
60
90
120
150

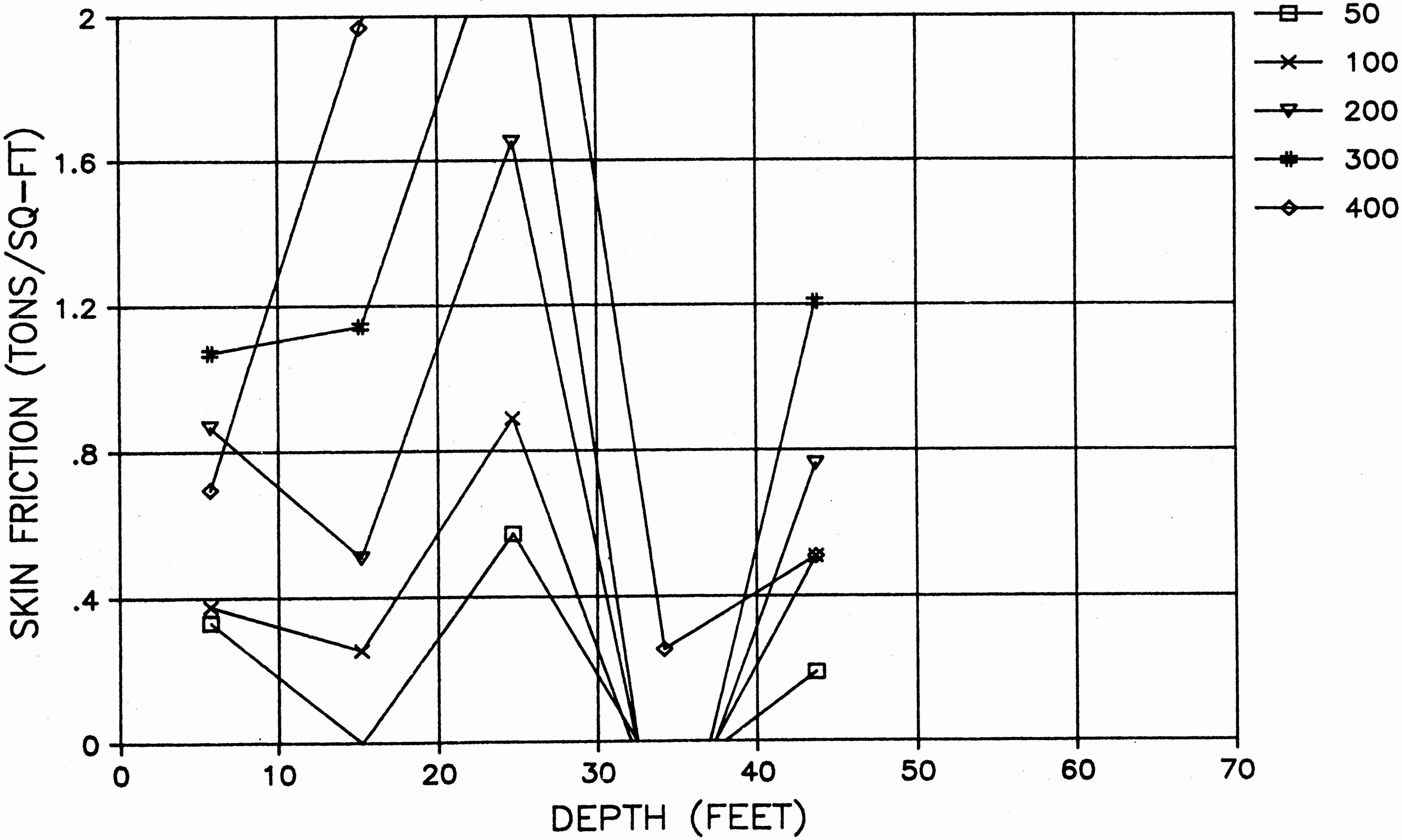

SKIN FRICTION CURVES
TENSION TEST 1-5
30
60
90
120
150
0
10
20
30
40
50
60
70
DEPTH (FEET)
2
1.6
1.2
.8
.4
0
SKIN FRICTION (TONS/SQ-FT)

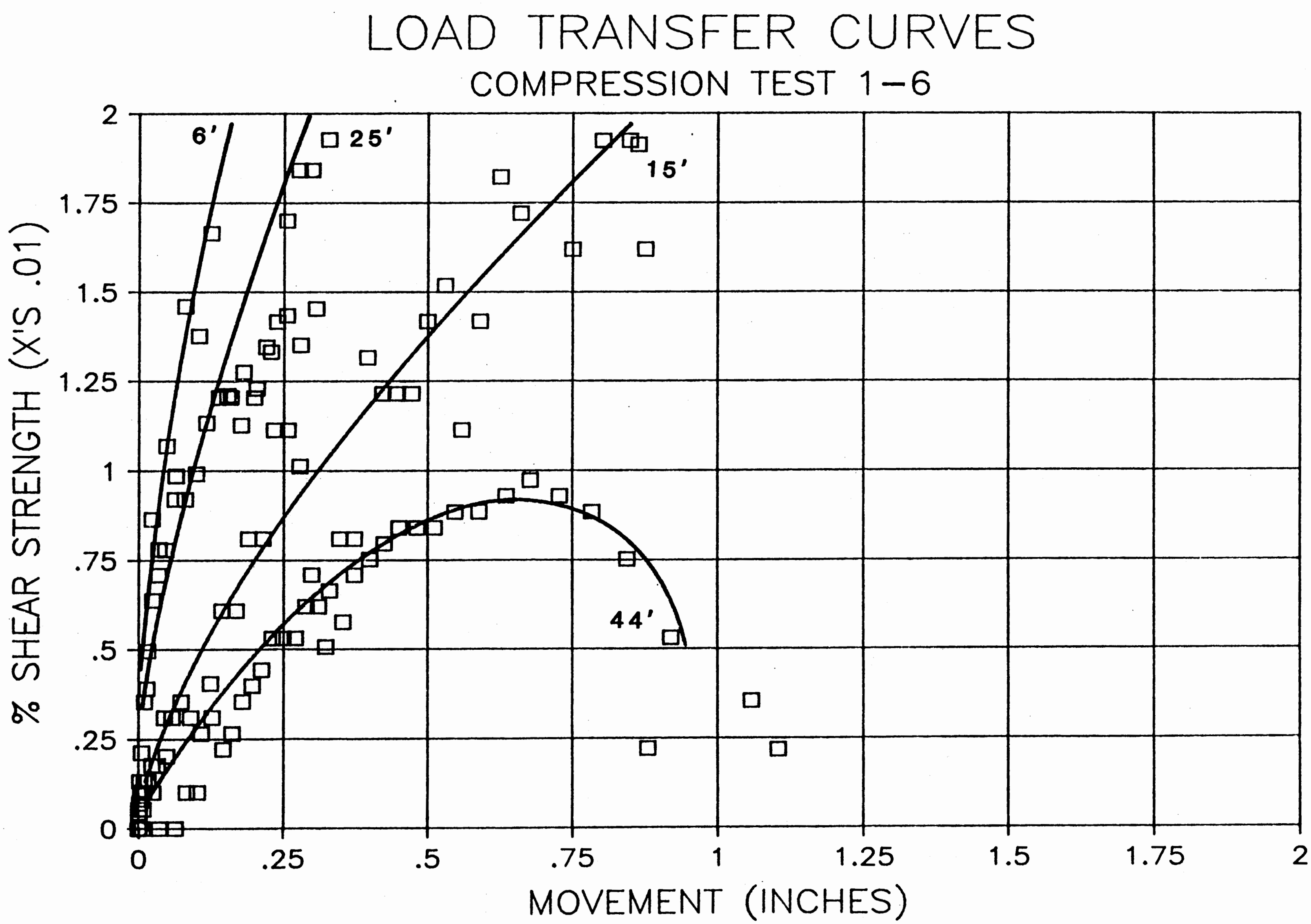

LOAD TRANSFER CURVES
TENSION TEST 1-5
% SHEAR STRENGTH (X'S .01)
MOVEMENT (INCHES)
0
.25
.5
.75
1
1.25
1.5
1.75
2
6'
27'
38'
17'
49'

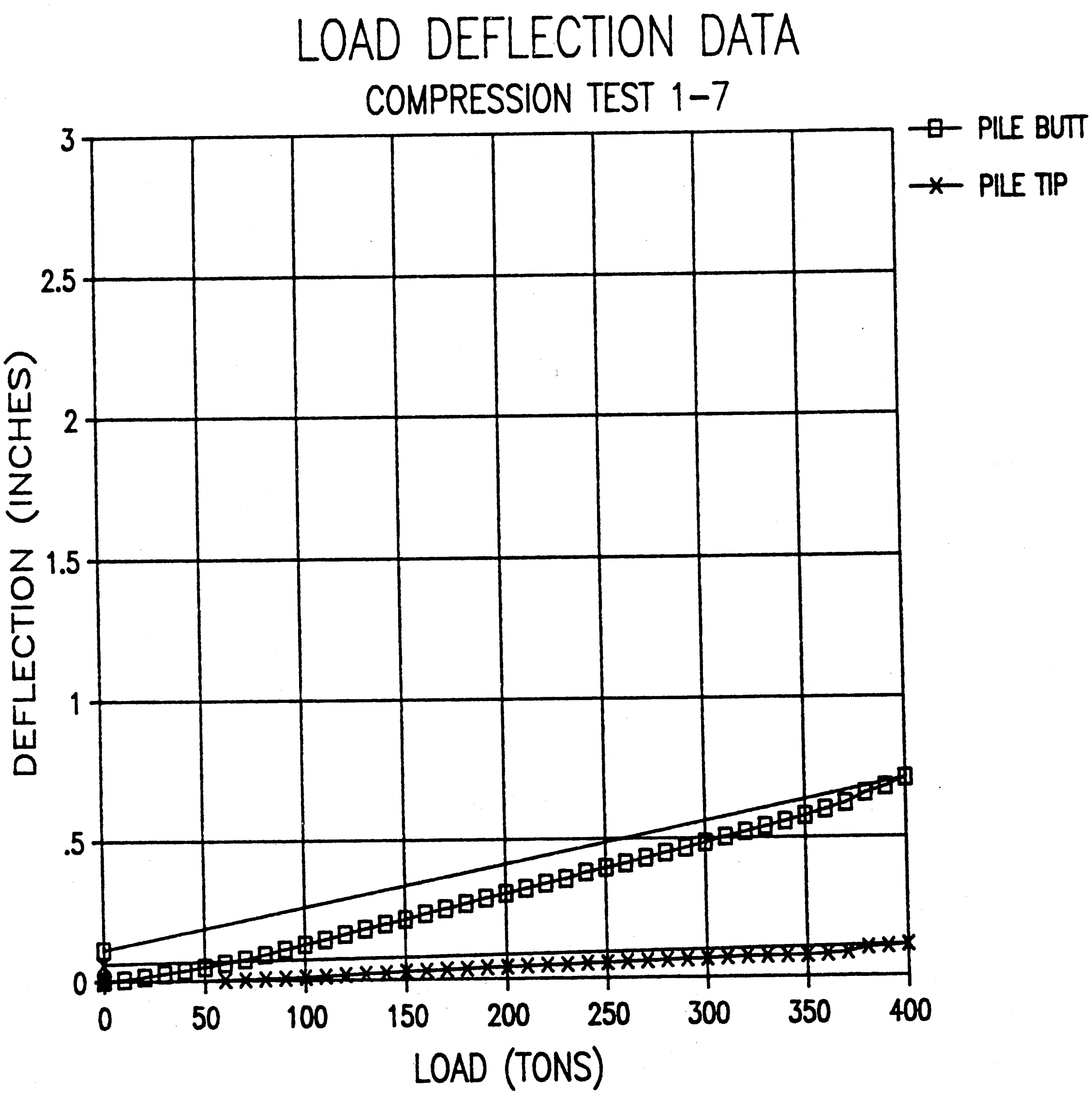

LOAD DEFLECTION DATA
COMPRESSION TEST 1-6
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400
LOAD (TONS)

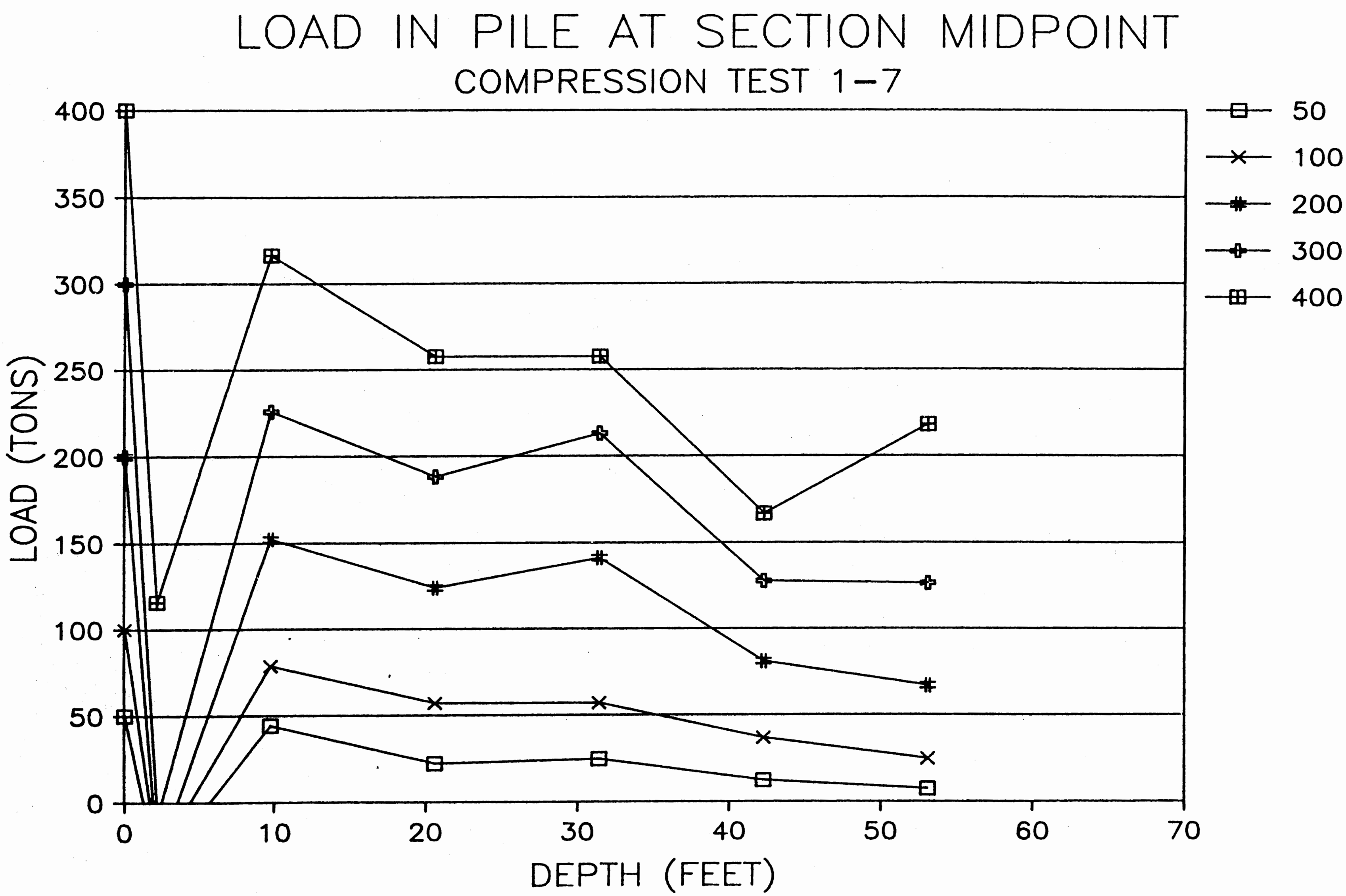

LOAD IN PILE AT SECTION MIDPOINT
COMPRESSION TEST 1-6
LOAD (TONS)
0
50
100
150
200
250
300
350
400
DEPTH (FEET)
0
10
20
30
40
50
60
70
50
100
200
300
400

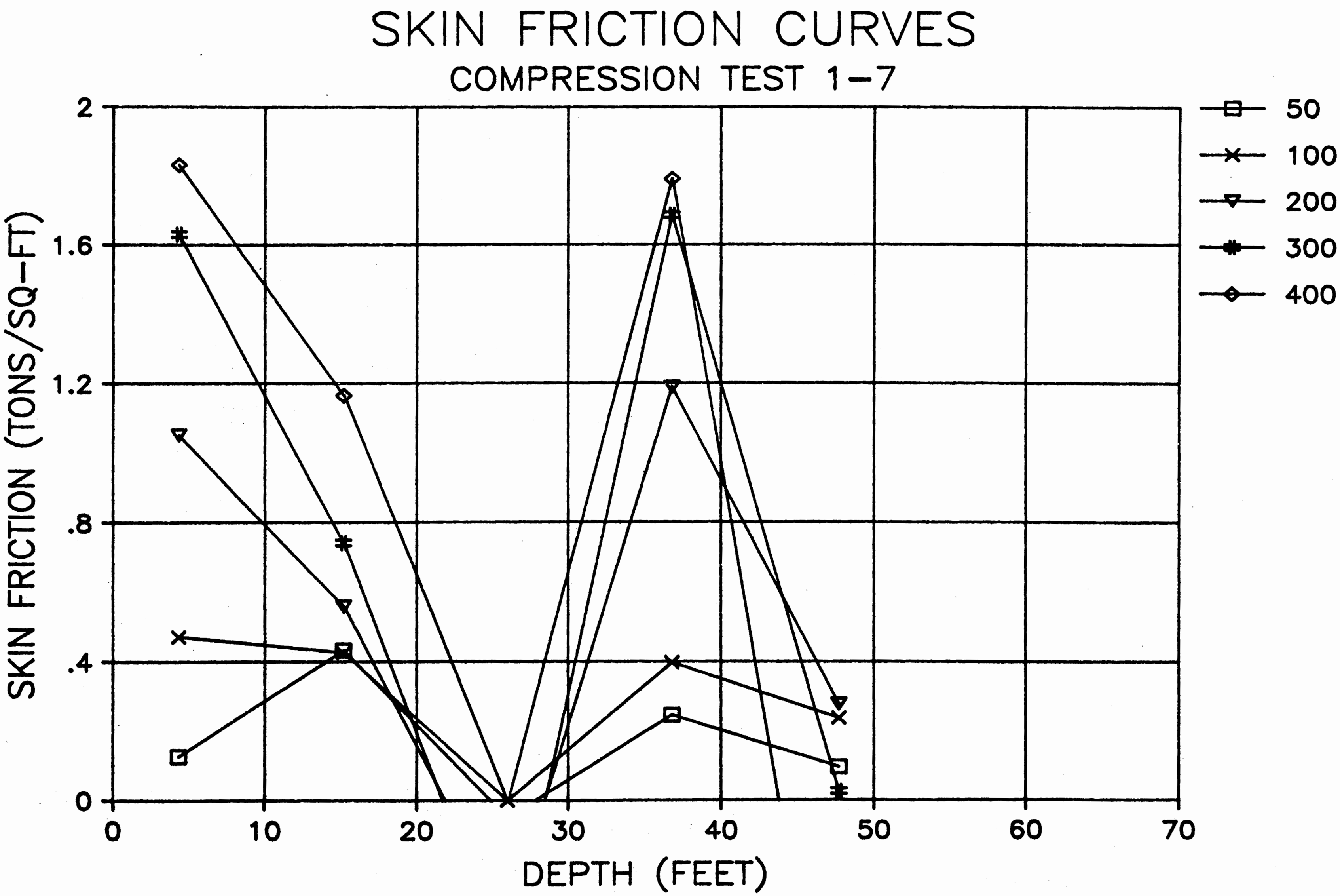
SKIN FRICTION CURVES
COMPRESSION TEST 1-6




LOAD TRANSFER CURVES
COMPRESSION TEST 1-6
% SHEAR STRENGTH (X'S .01)
MOVEMENT (INCHES)
6'
25'
15'
44'
0
.25
.5
.75
1
1.25
1.5
1.75
2

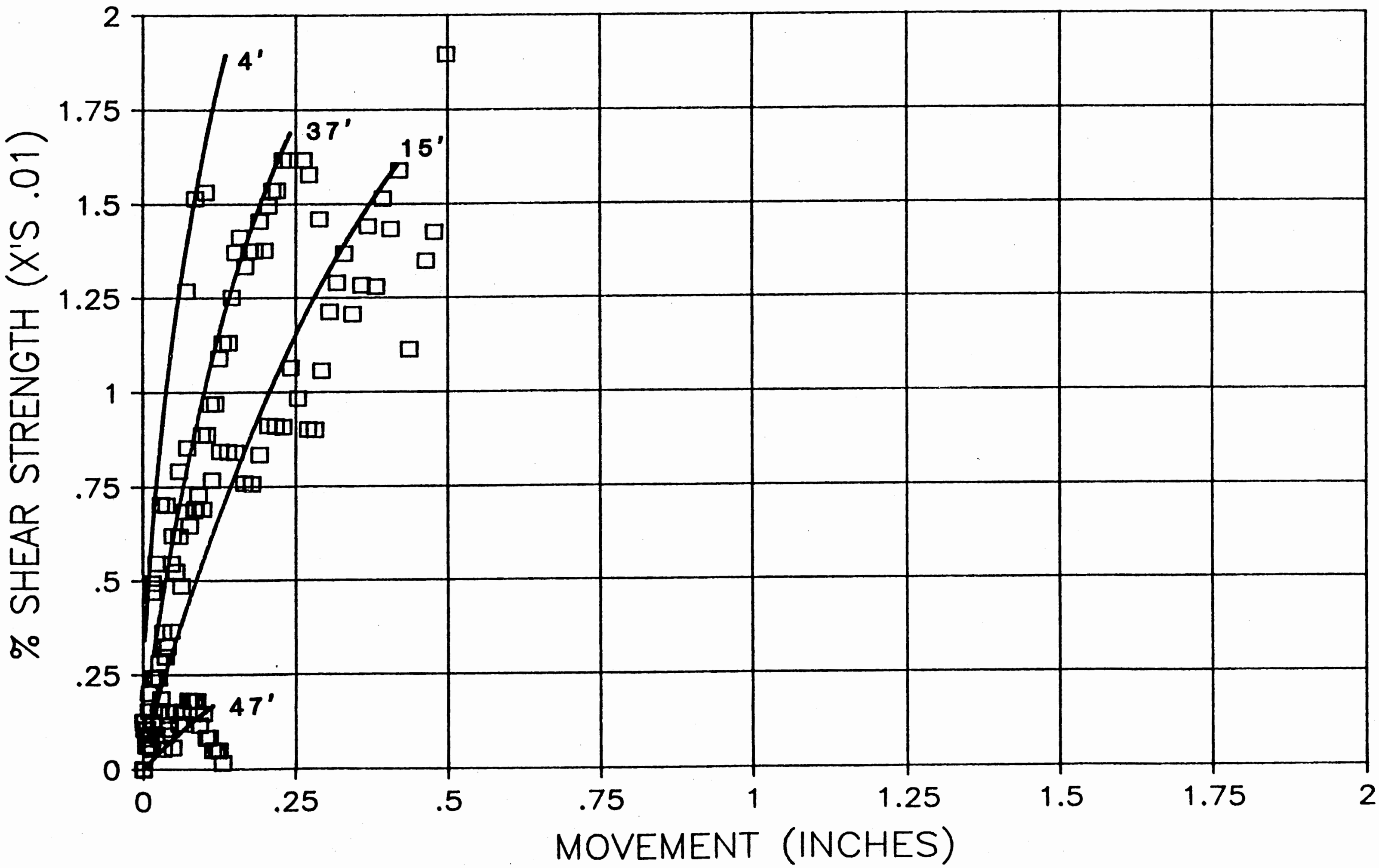

LOAD DEFLECTION DATA
COMPRESSION TEST 1-7
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400
LOAD (TONS)

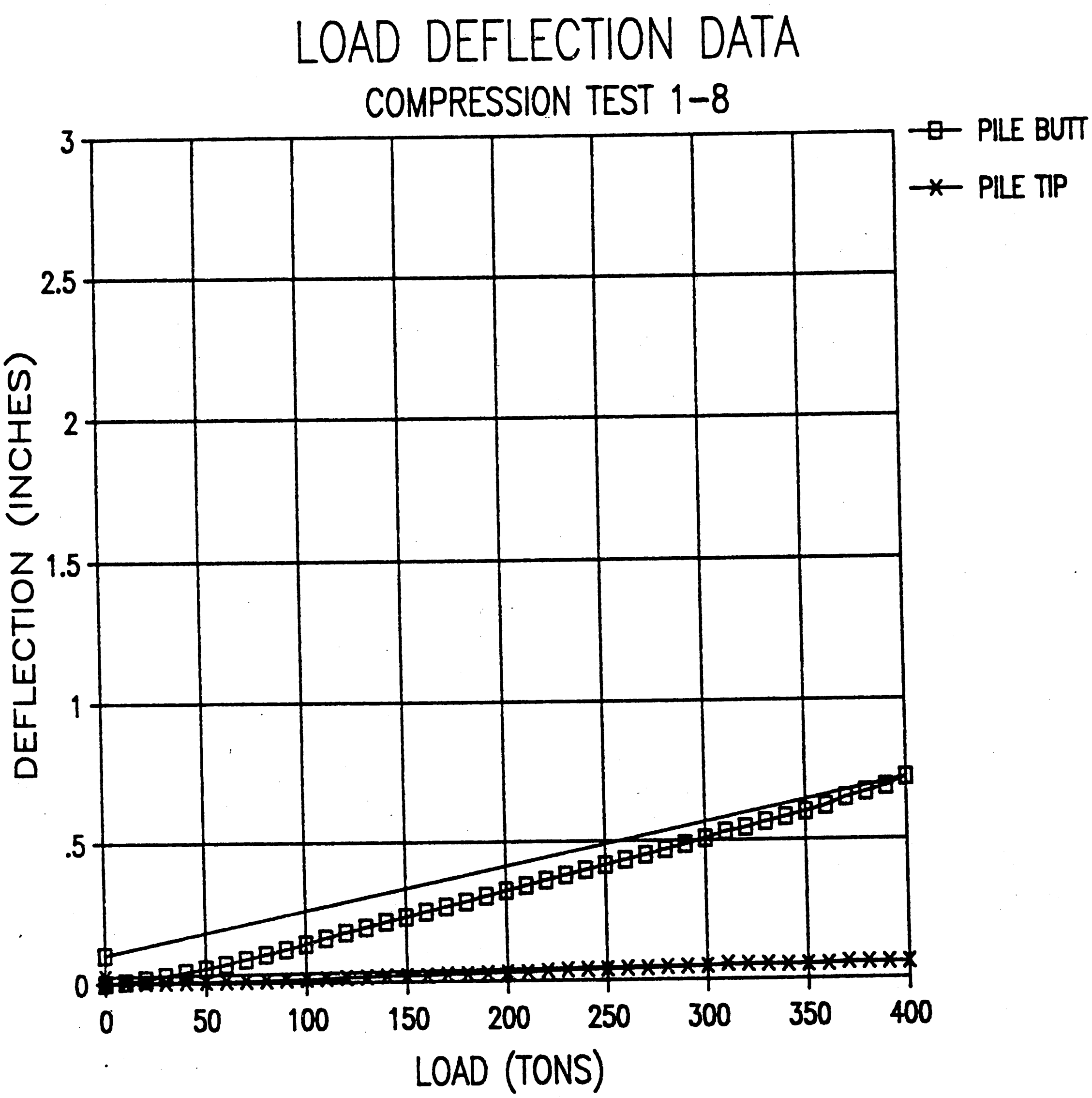

LOAD IN PILE AT SECTION MIDPOINT
COMPRESSION TEST 1-7
LOAD (TONS)
DEPTH (FEET)
400
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
50
100
200
300
400

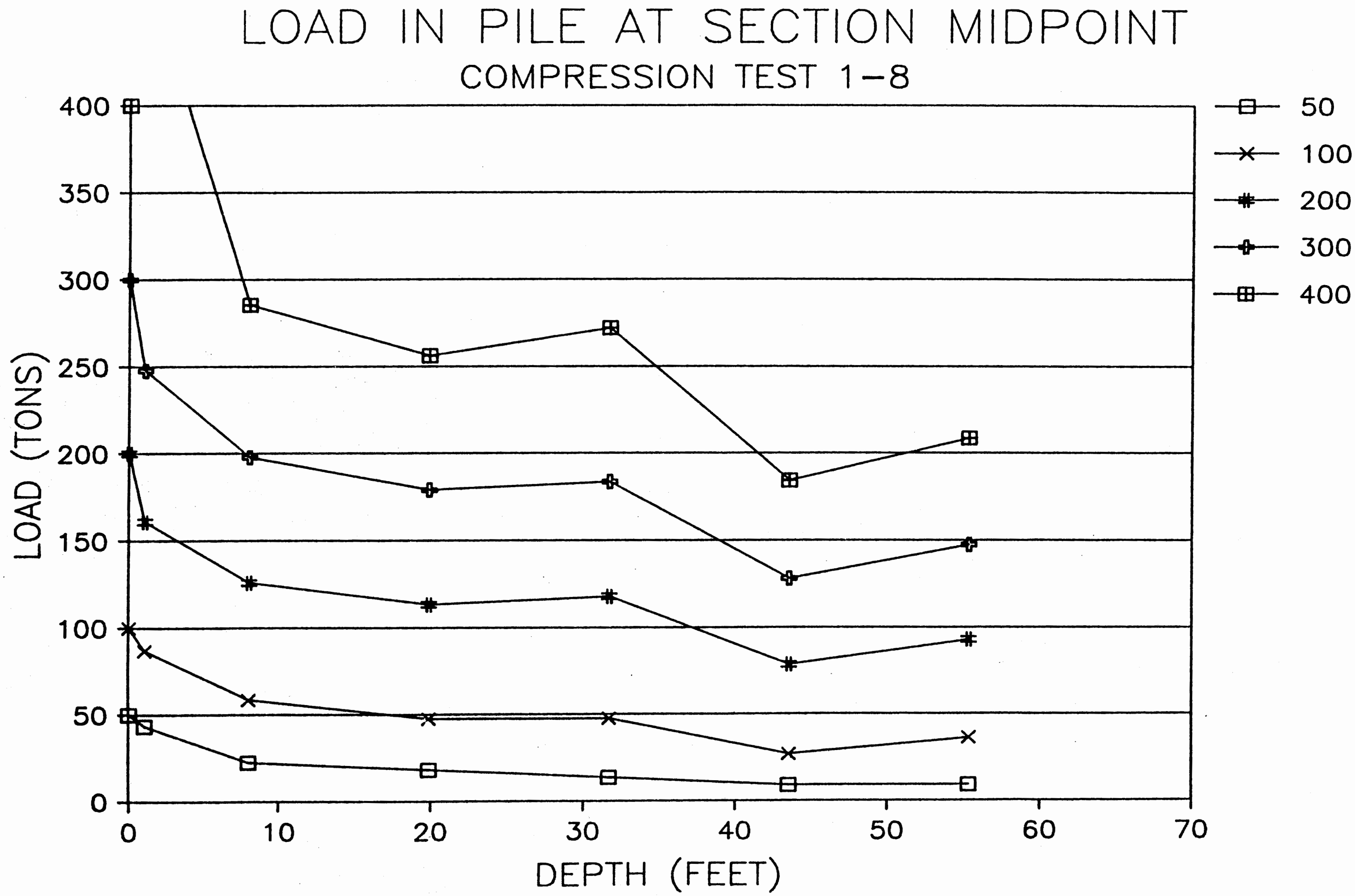

SKIN FRICTION CURVES
COMPRESSION TEST 1-7
SKIN FRICTION (TONS/SQ-FT)
DEPTH (FEET)
0
.4
.8
1.2
1.6
2
0
10
20
30
40
50
60
70
50
100
200
300
400

LOAD TRANSFER CURVES

COMPRESSION TEST 1-7

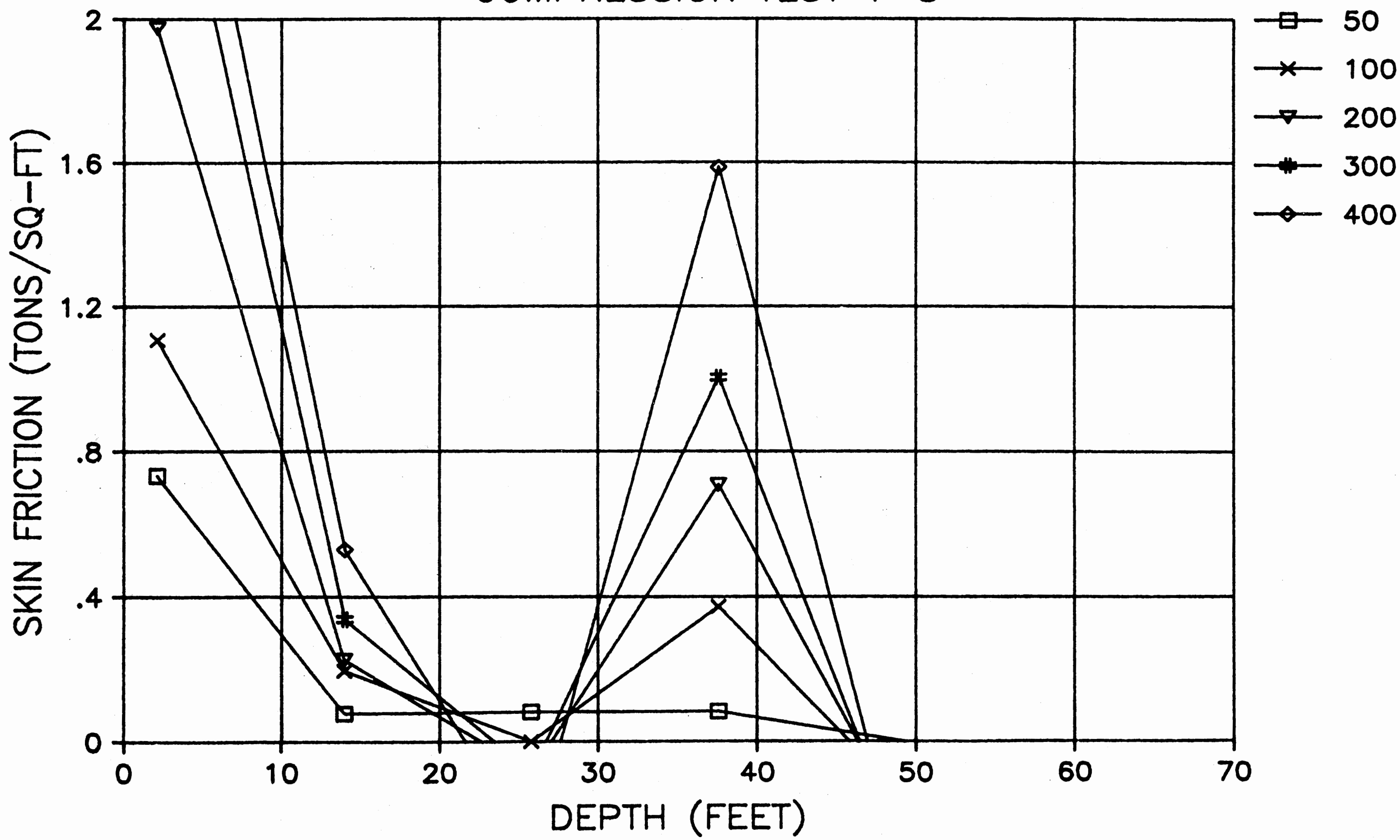



LOAD DEFLECTION DATA
COMPRESSION TEST 1-8
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400
LOAD (TONS)


LOAD IN PILE AT SECTION MIDPOINT
COMPRESSION TEST 1-8
LOAD (TONS)
DEPTH (FEET)
0
50
100
150
200
250
300
350
400
0
10
20
30
40
50
60
70
50
100
200
300
400

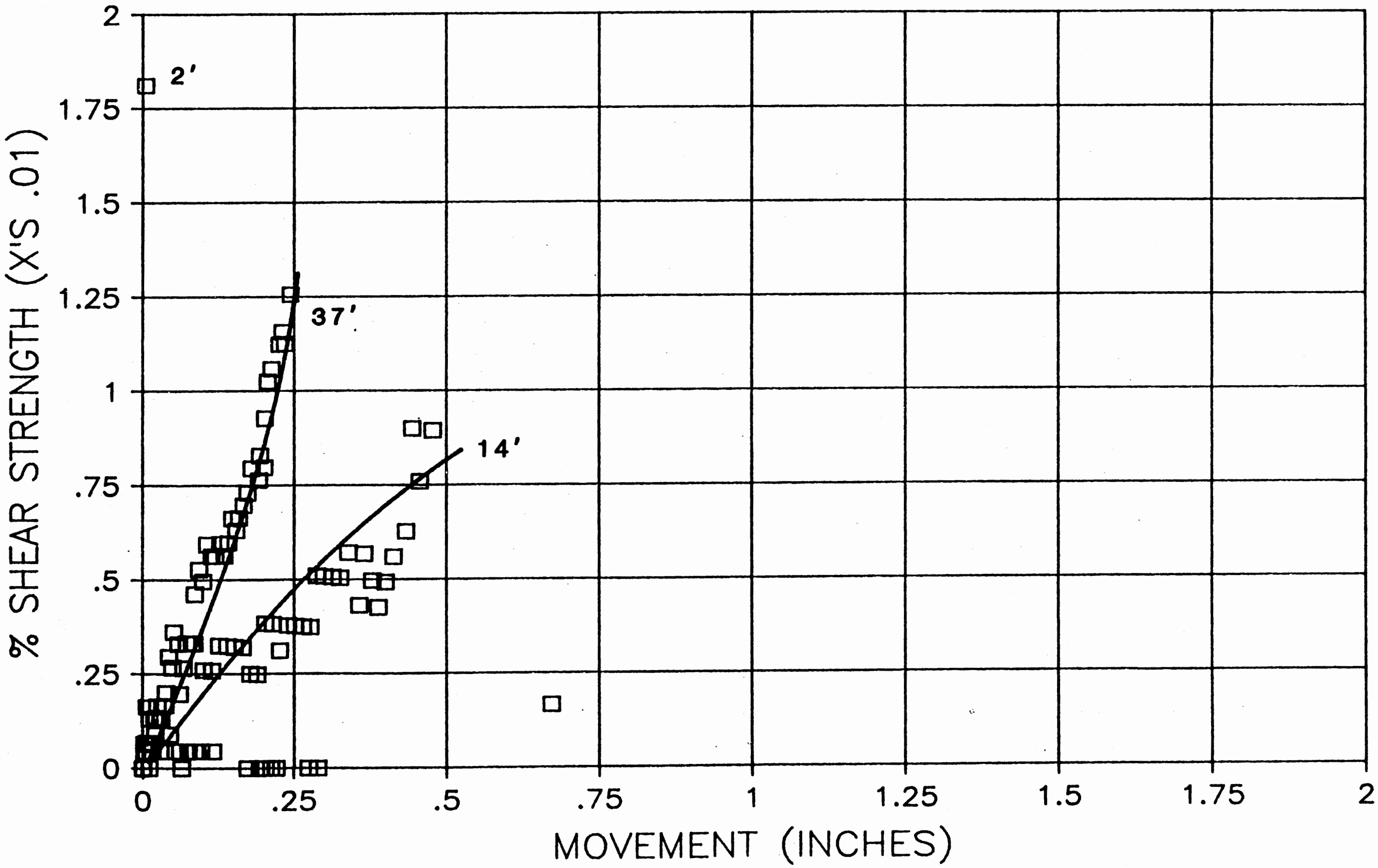
SKIN FRICTION CURVES

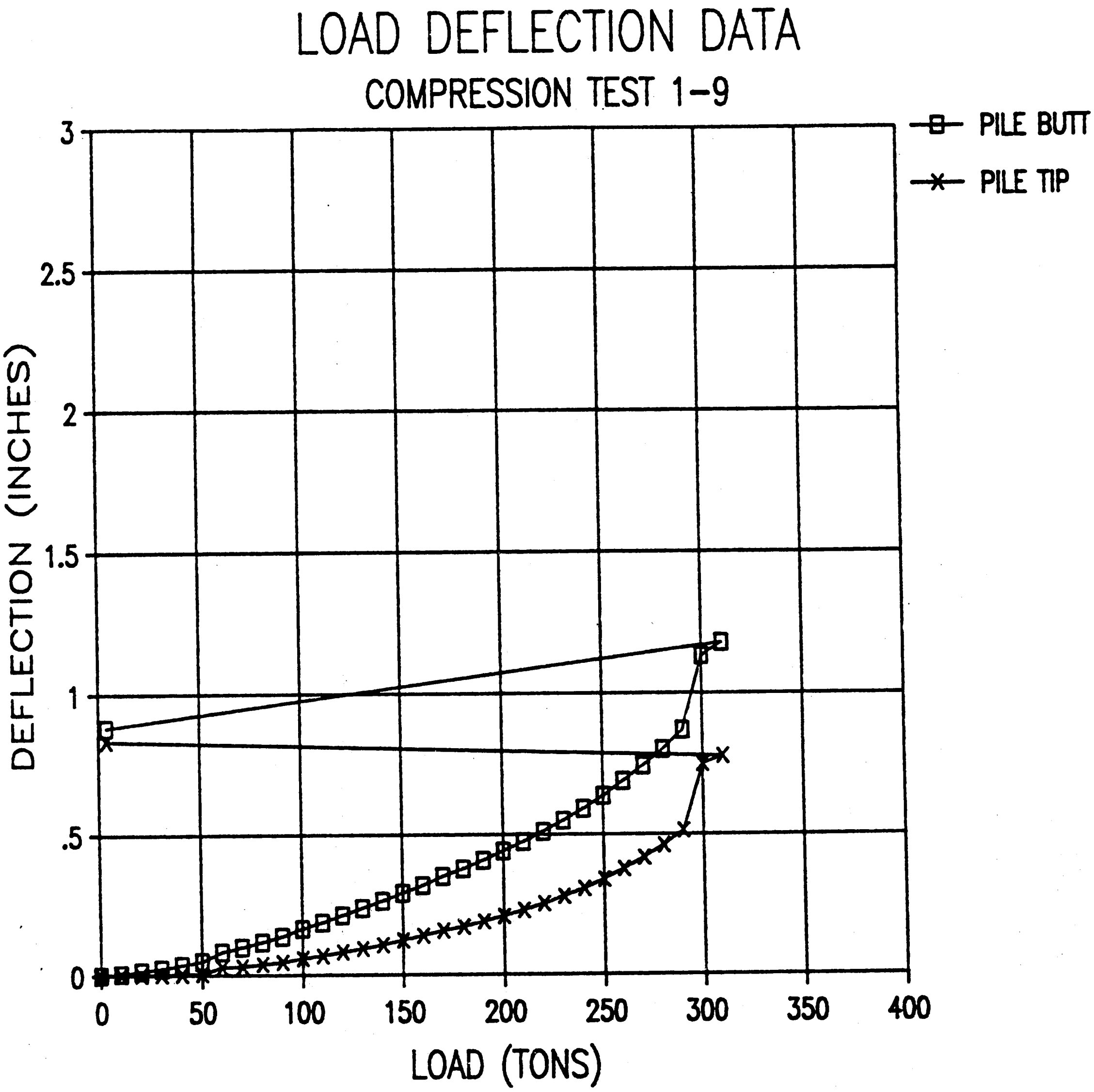
COMPRESSION TEST 1–8



LOAD TRANSFER CURVES

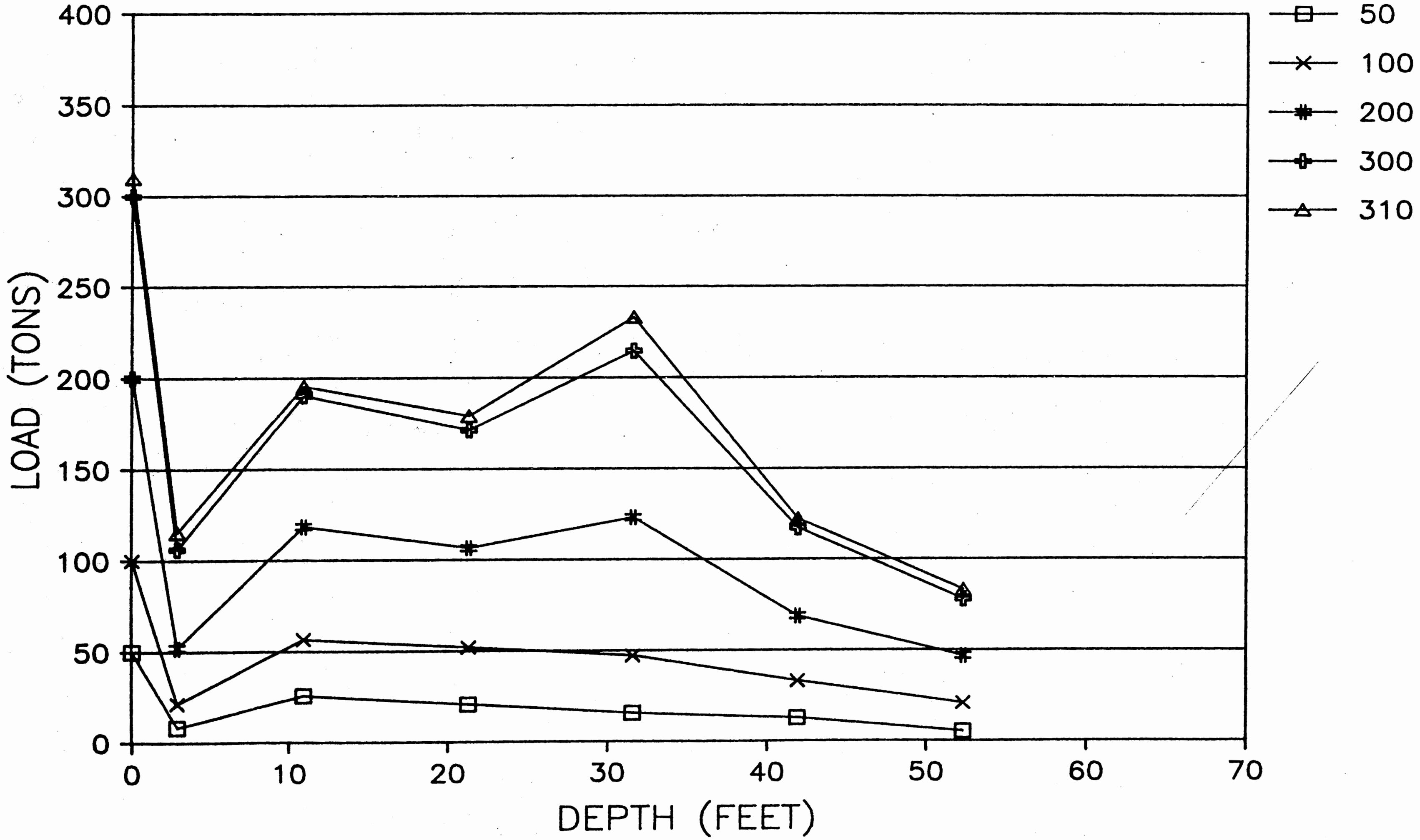
COMPRESSION TEST 1-8

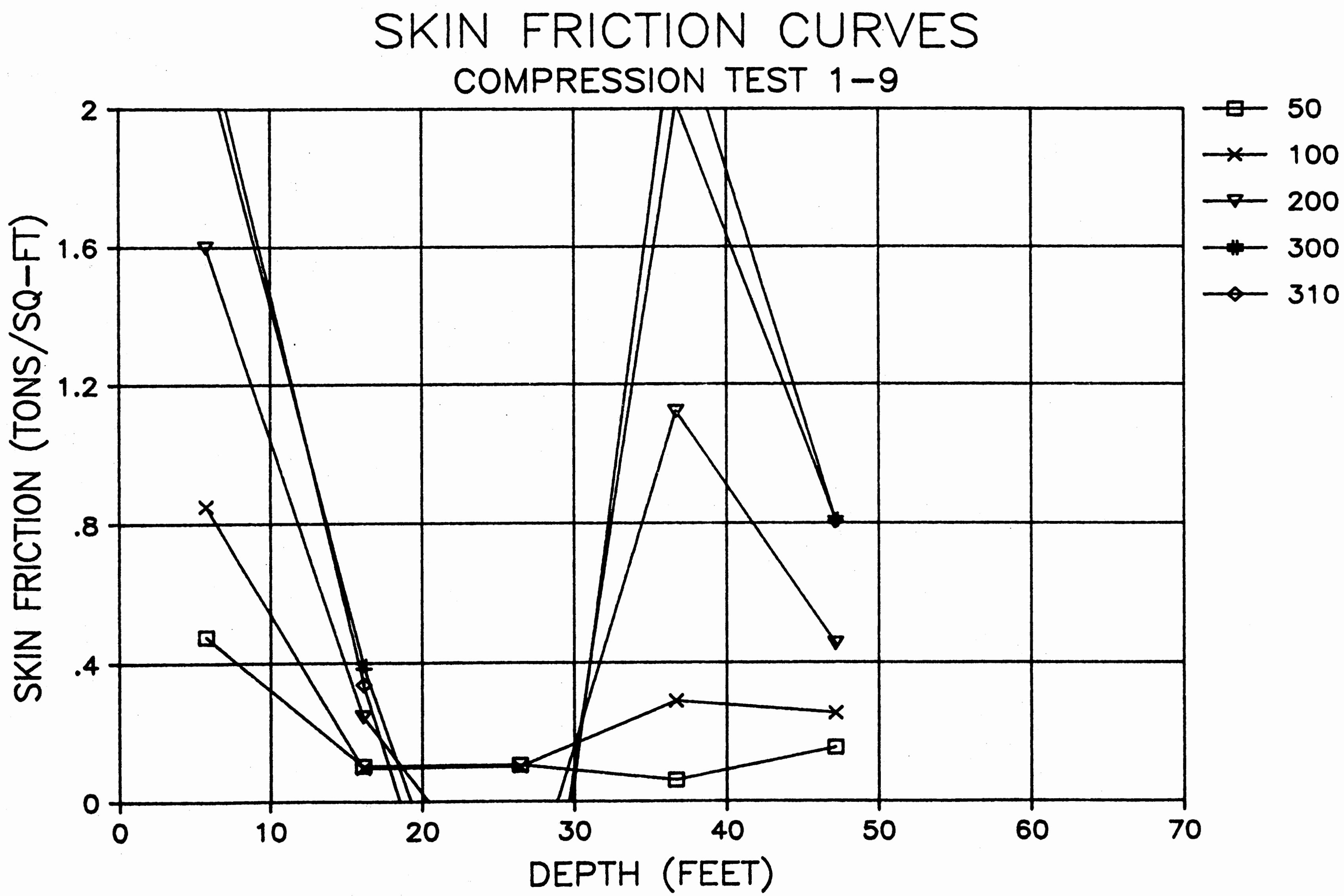



LOAD DEFLECTION DATA
COMPRESSION TEST 1-9
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
LOAD (TONS)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400

LOAD IN PILE AT SECTION MIDPOINT

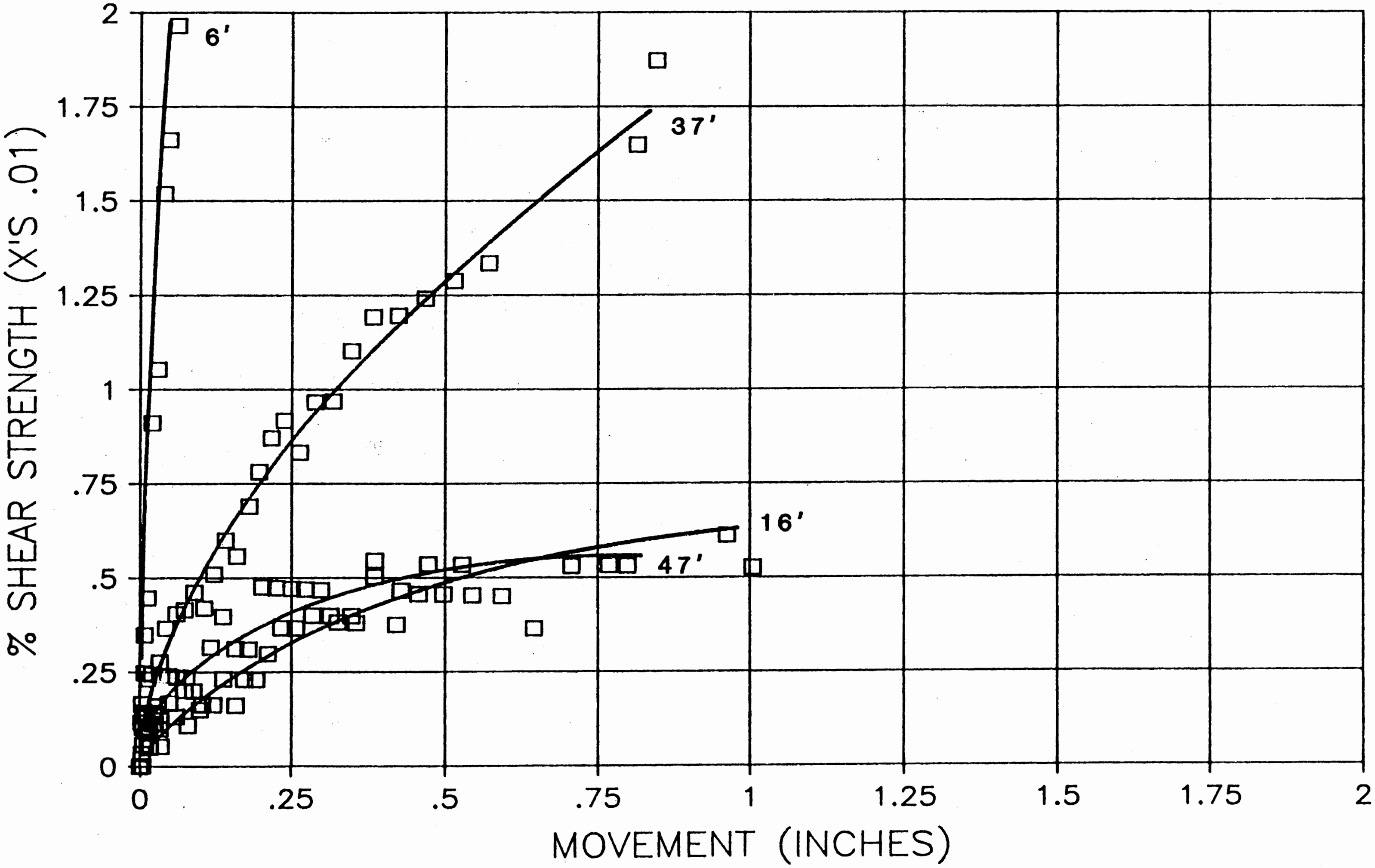
COMPRESSION TEST 1-9

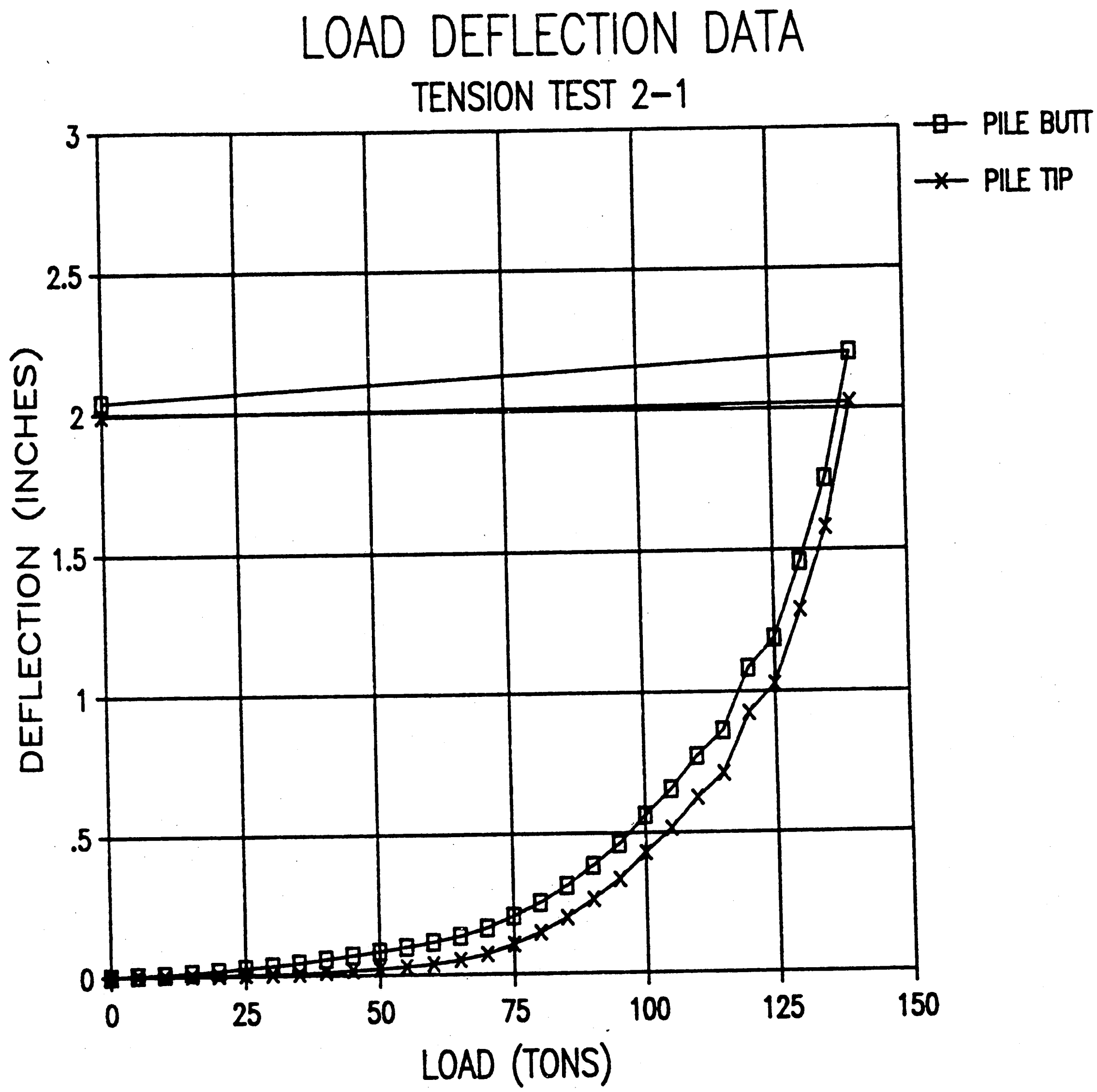


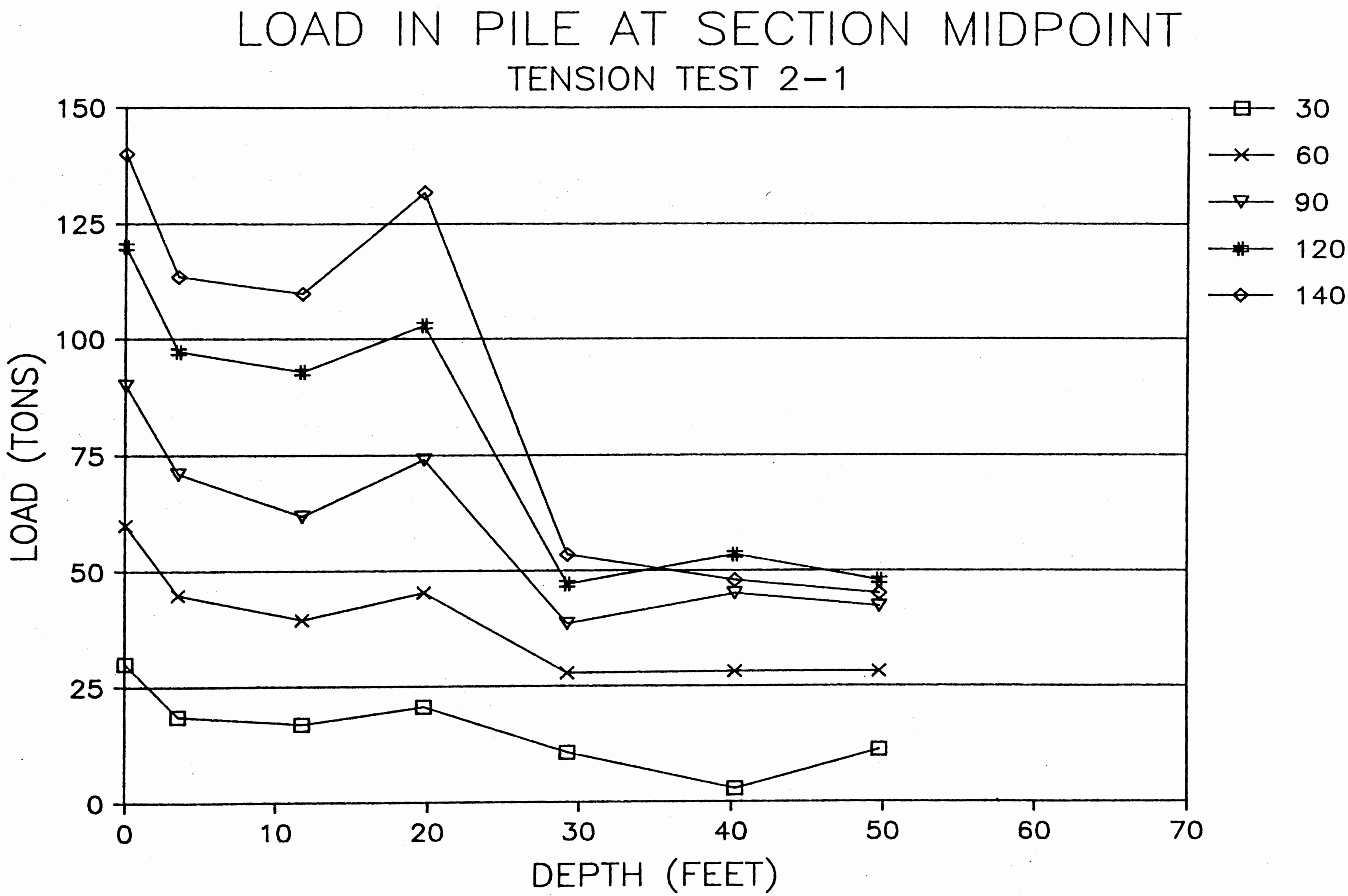

SKIN FRICTION CURVES
COMPRESSION TEST 1-9
SKIN FRICTION (TONS/SQ-FT)
DEPTH (FEET)
2
1.6
1.2
.8
.4
0
0
10
20
30
40
50
60
70
50
100
200
300
310

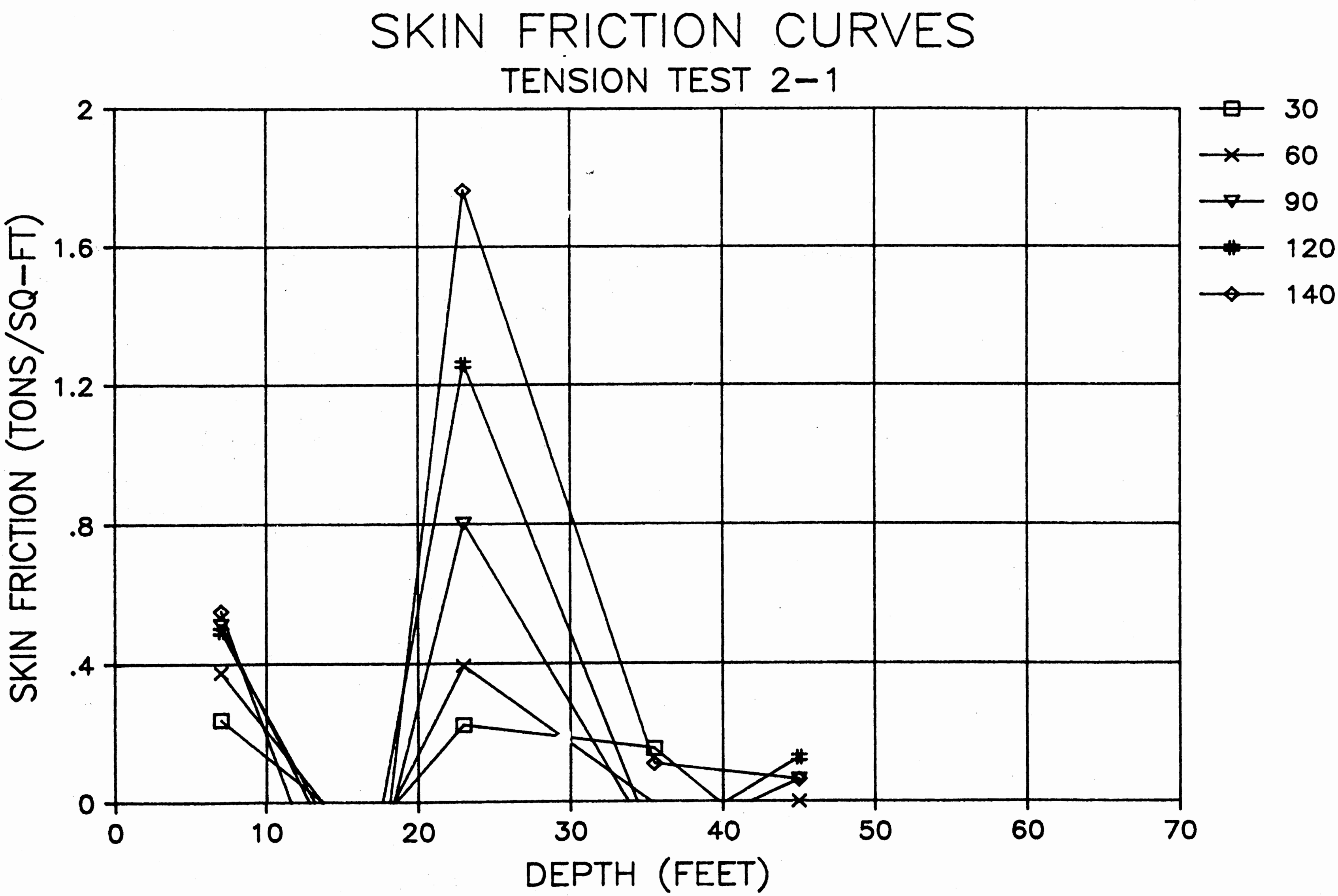
LOAD TRANSFER CURVES

COMPRESSION TEST 1-9



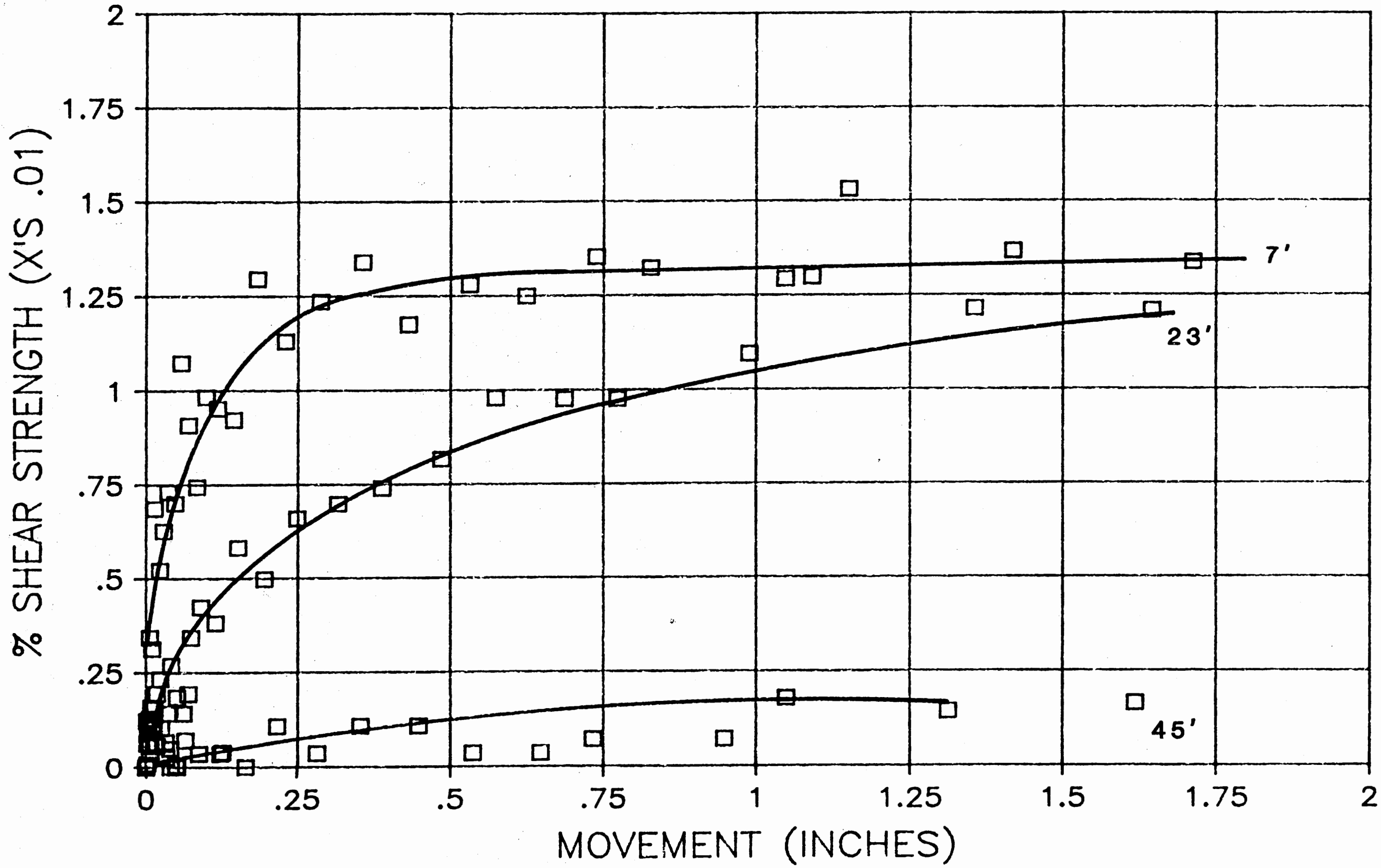

LOAD DEFLECTION DATA
TENSION TEST 2-1
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
25
50
75
100
125
150
LOAD (TONS)

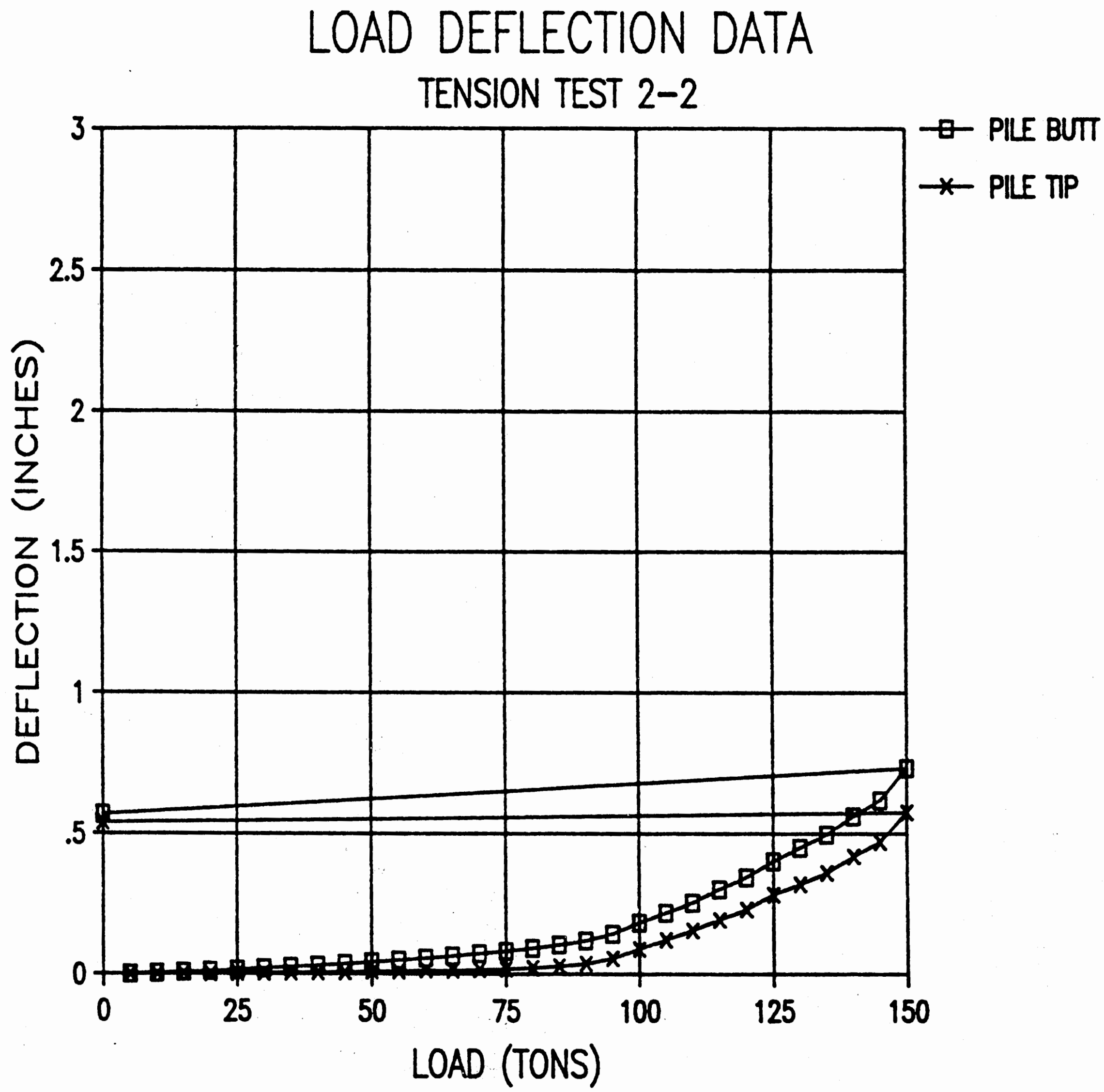

LOAD IN PILE AT SECTION MIDPOINT
TENSION TEST 2-1
LOAD (TONS)
DEPTH (FEET)
0
25
50
75
100
125
150
0
10
20
30
40
50
60
70
30
60
90
120
140

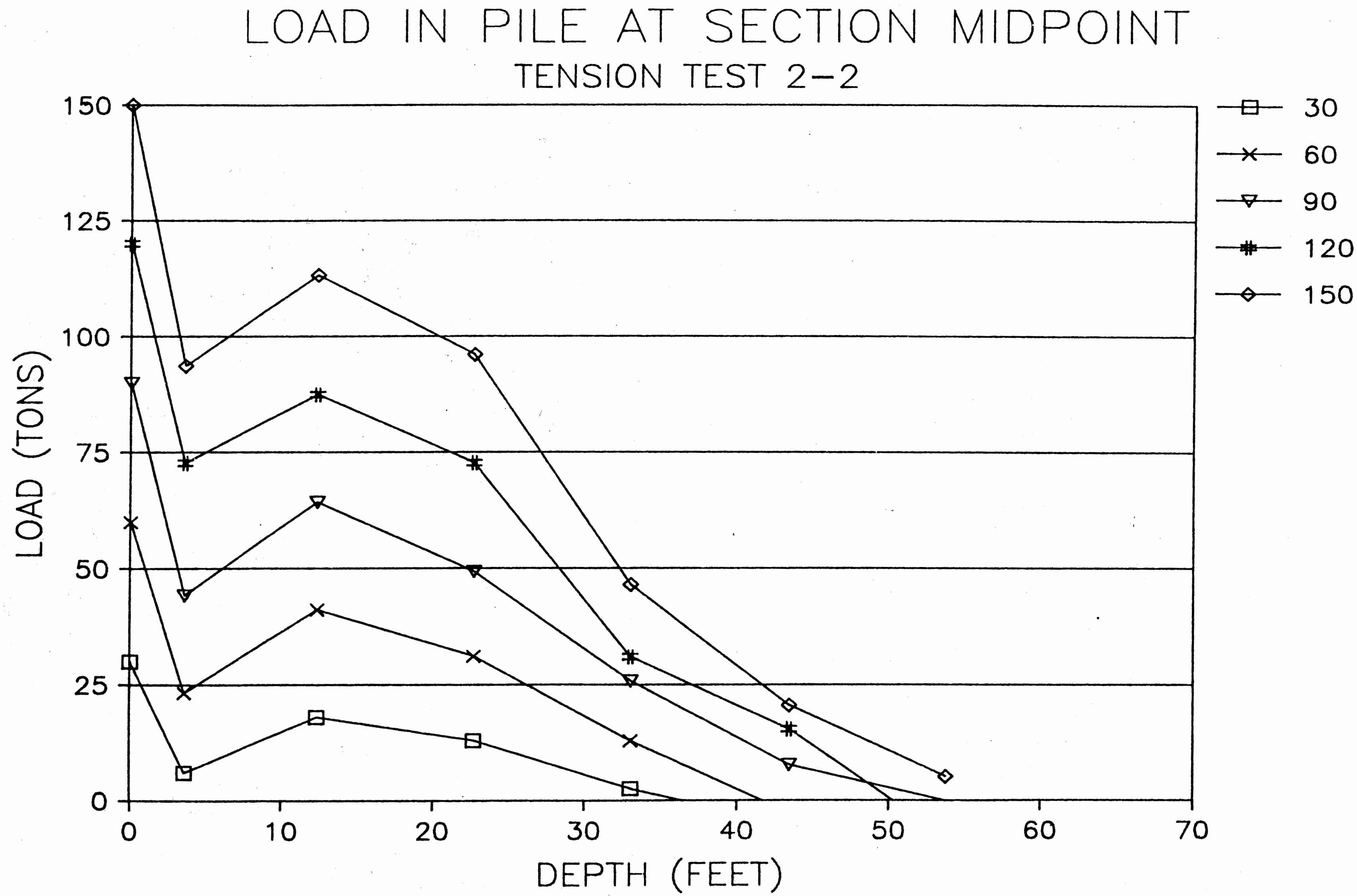

SKIN FRICTION CURVES
TENSION TEST 2-1
SKIN FRICTION (TONS/SQ-FT)
2
1.6
1.2
.8
.4
0
0
10
20
30
40
50
60
70
DEPTH (FEET)
30
60
90
120
140

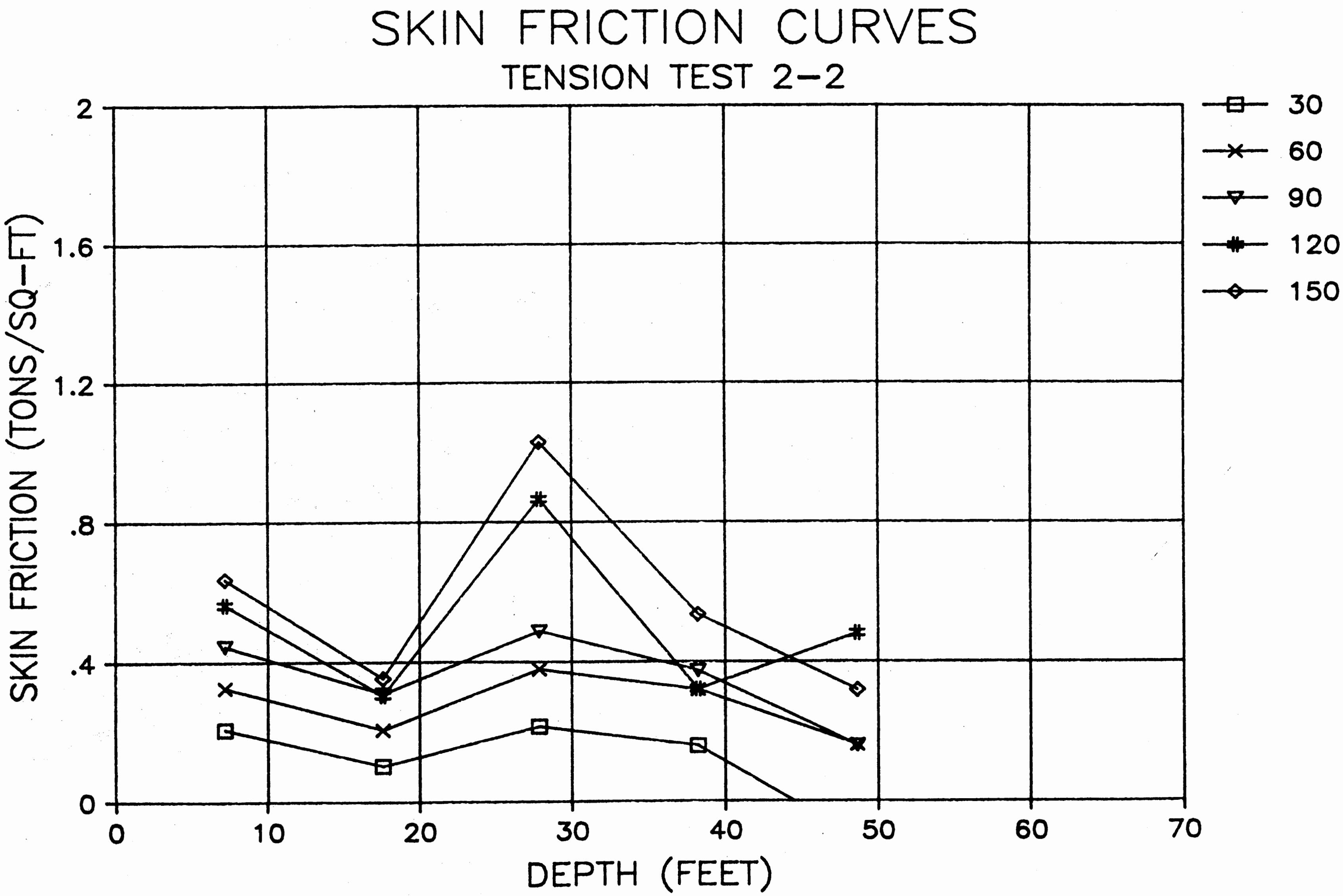
LOAD TRANSFER CURVES

TENSION TEST 2-1



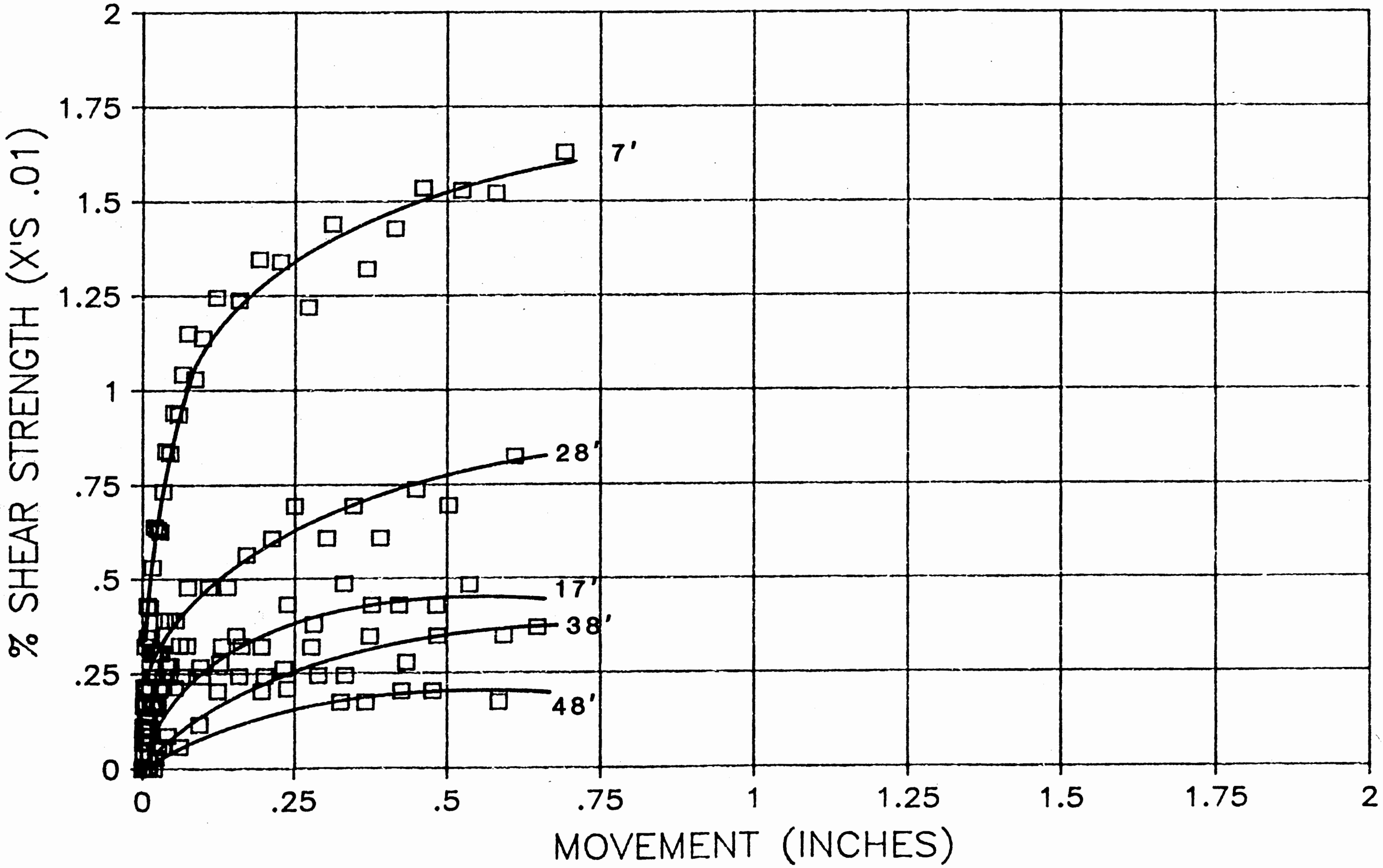

LOAD DEFLECTION DATA
TENSION TEST 2-2
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
25
50
75
100
125
150
LOAD (TONS)

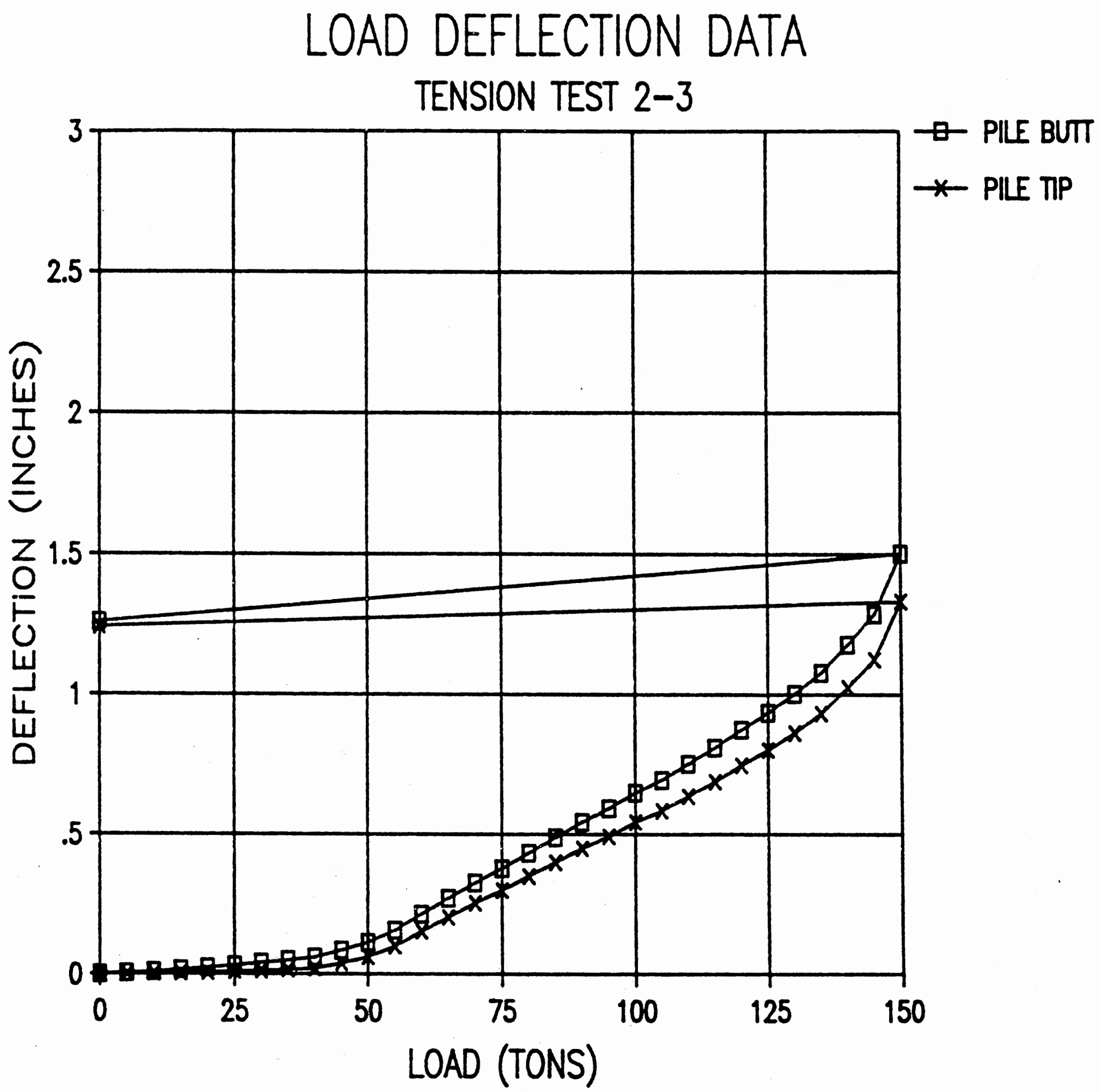

LOAD IN PILE AT SECTION MIDPOINT
TENSION TEST 2-2
LOAD (TONS)
150
125
100
75
50
25
0
0
10
20
30
40
50
60
70
DEPTH (FEET)
30
60
90
120
150

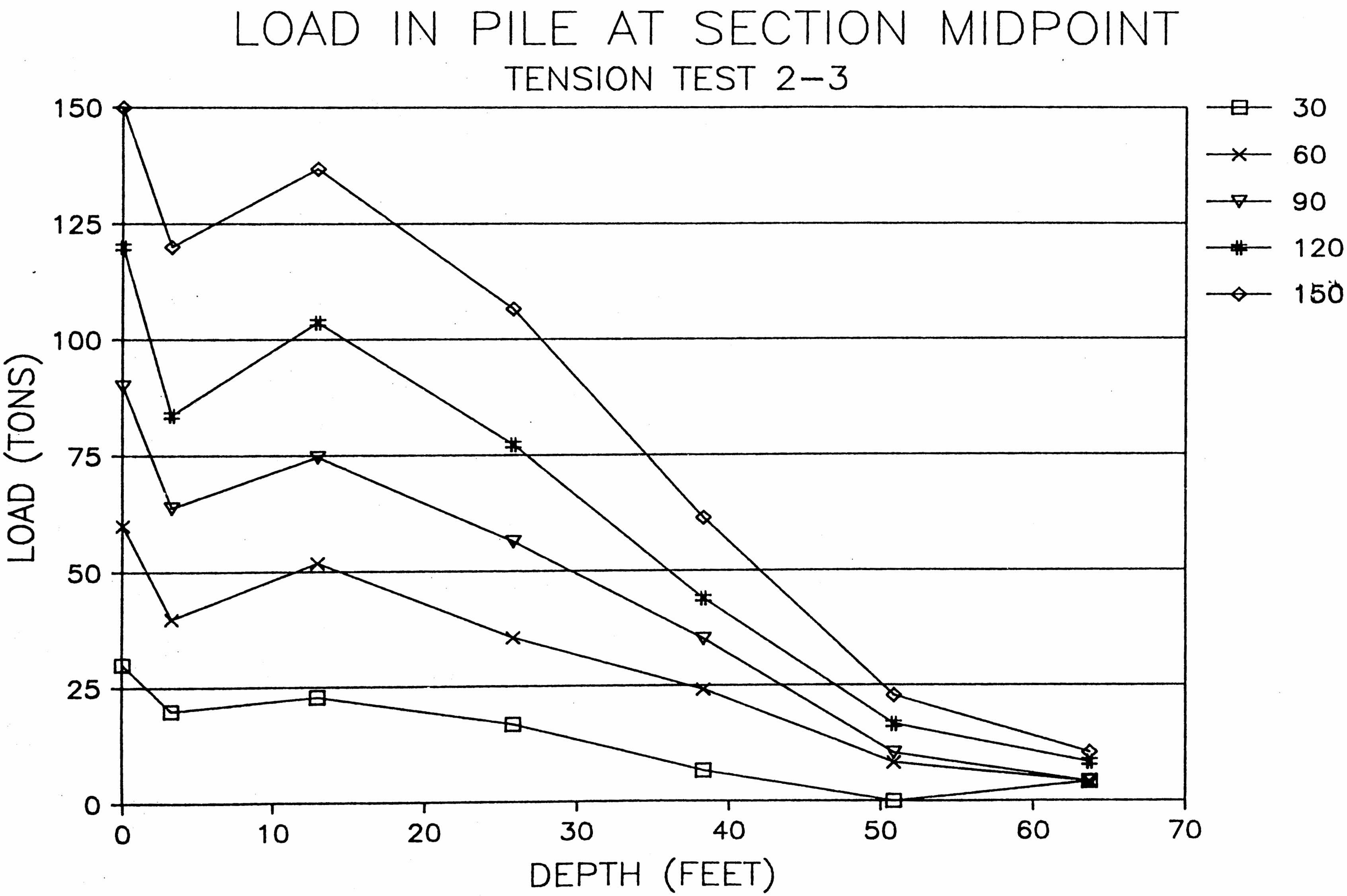

SKIN FRICTION CURVES
TENSION TEST 2-2
SKIN FRICTION (TONS/SQ-FT)
2
1.6
1.2
.8
.4
0
0
10
20
30
40
50
60
70
DEPTH (FEET)
30
60
90
120
150

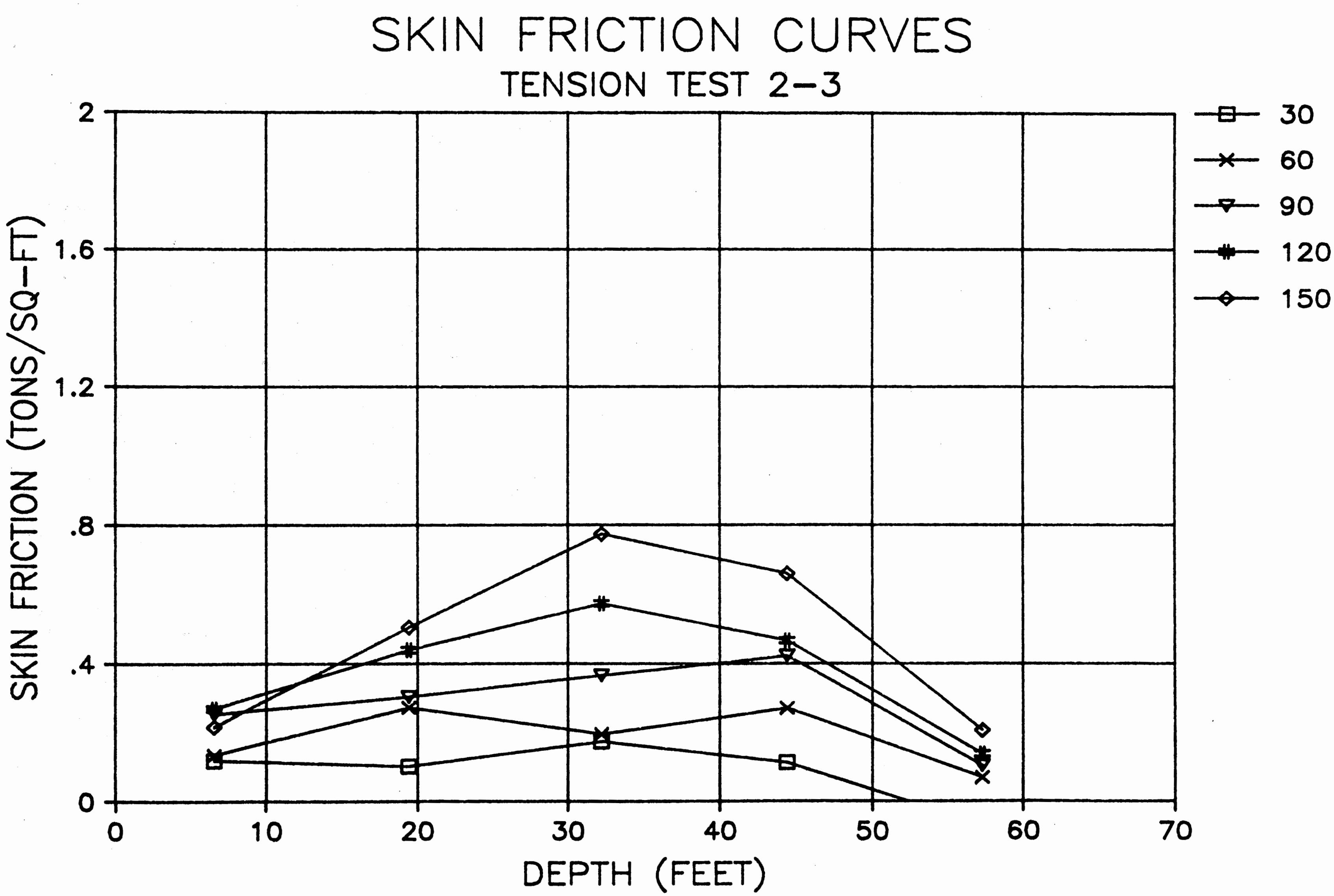
LOAD TRANSFER CURVES

TENSION TEST 2-2




LOAD DEFLECTION DATA
TENSION TEST 2-3
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
25
50
75
100
125
150
LOAD (TONS)

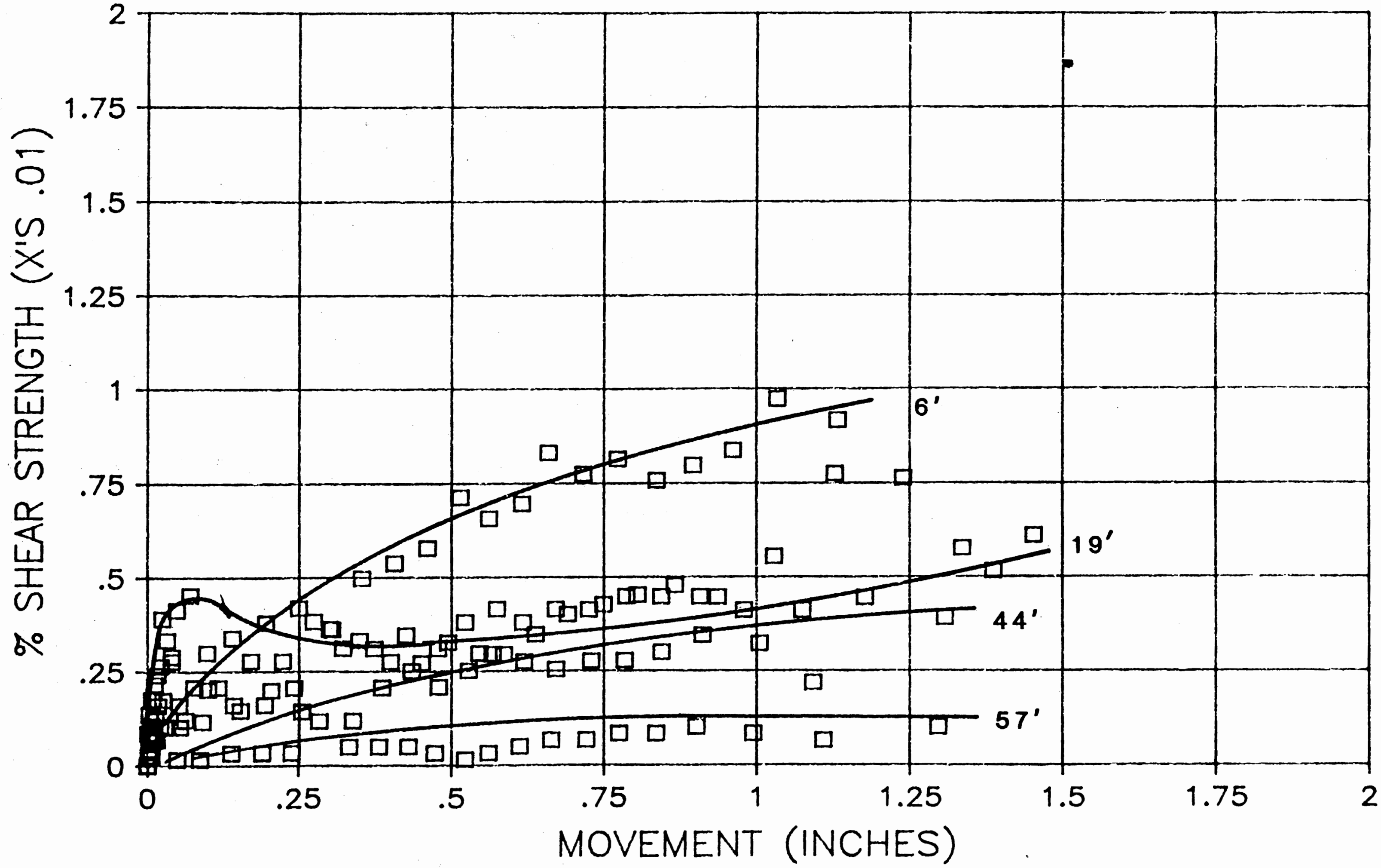

LOAD IN PILE AT SECTION MIDPOINT
TENSION TEST 2-3
LOAD (TONS)
DEPTH (FEET)
150
125
100
75
50
25
0
0
10
20
30
40
50
60
70
30
60
90
120
150

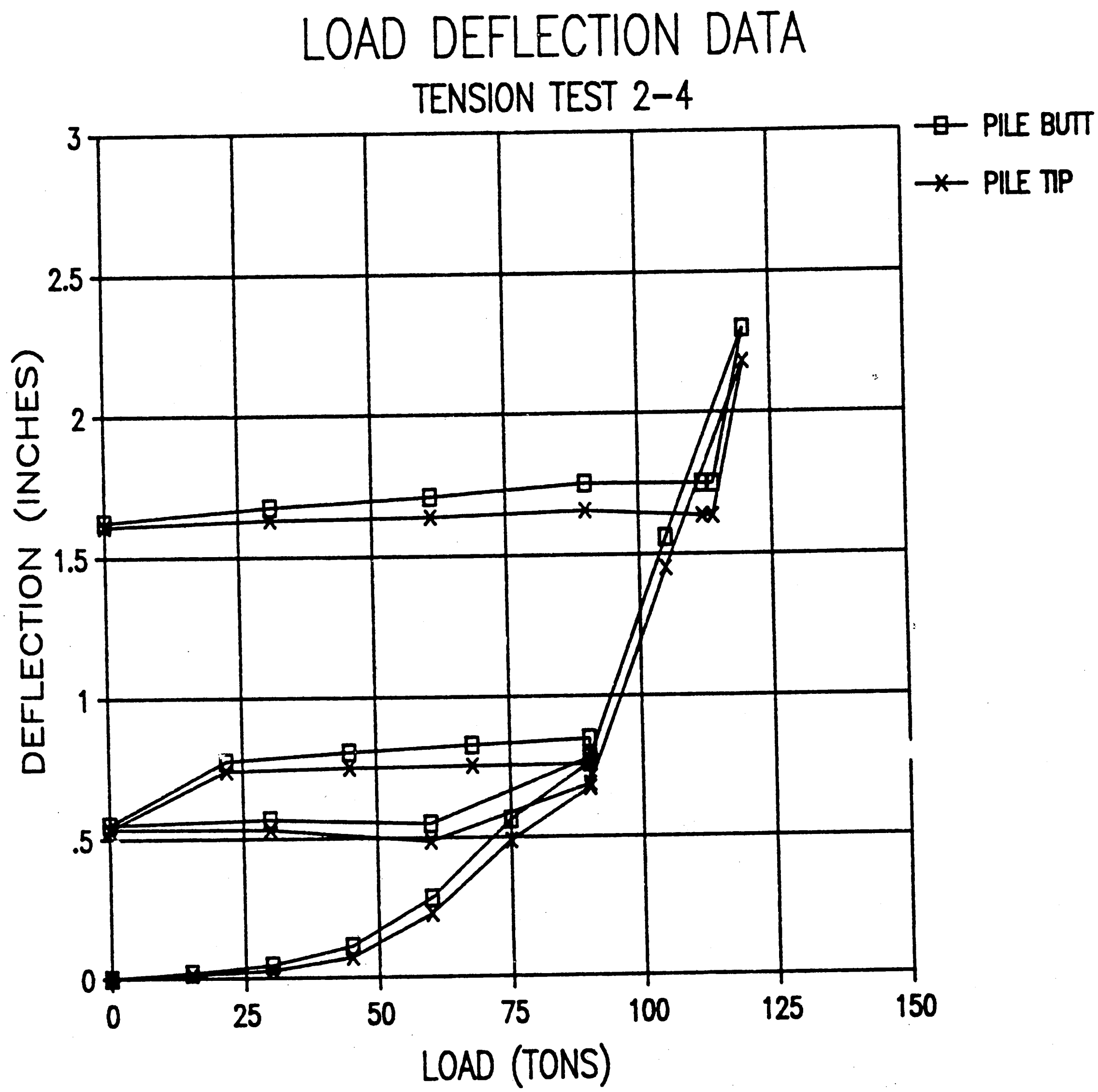


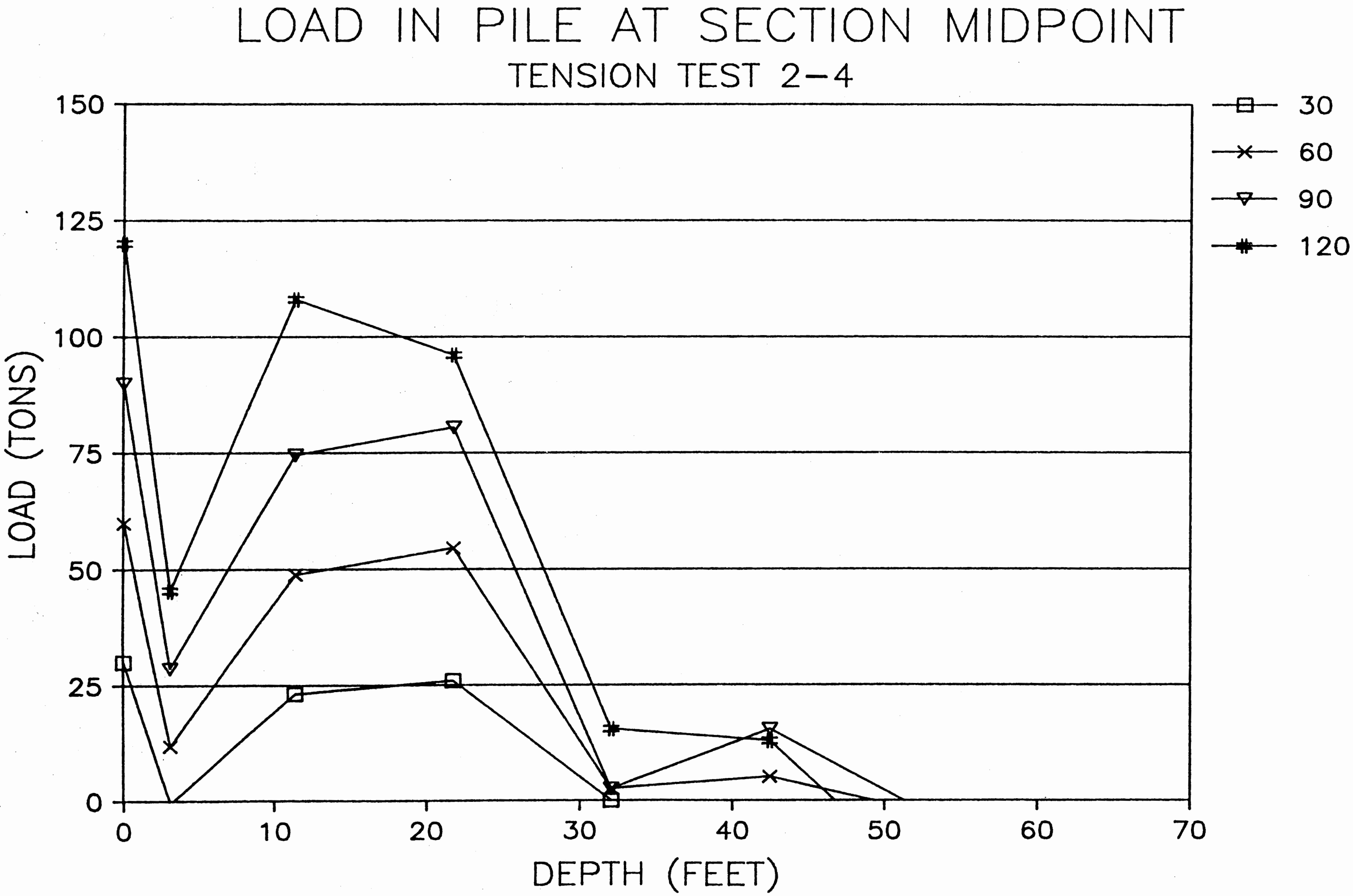
SKIN FRICTION CURVES
TENSION TEST 2-3
SKIN FRICTION (TONS/SQ-FT)
DEPTH (FEET)
0
.4
.8
1.2
1.6
2
0
10
20
30
40
50
60
70
30
60
90
120
150

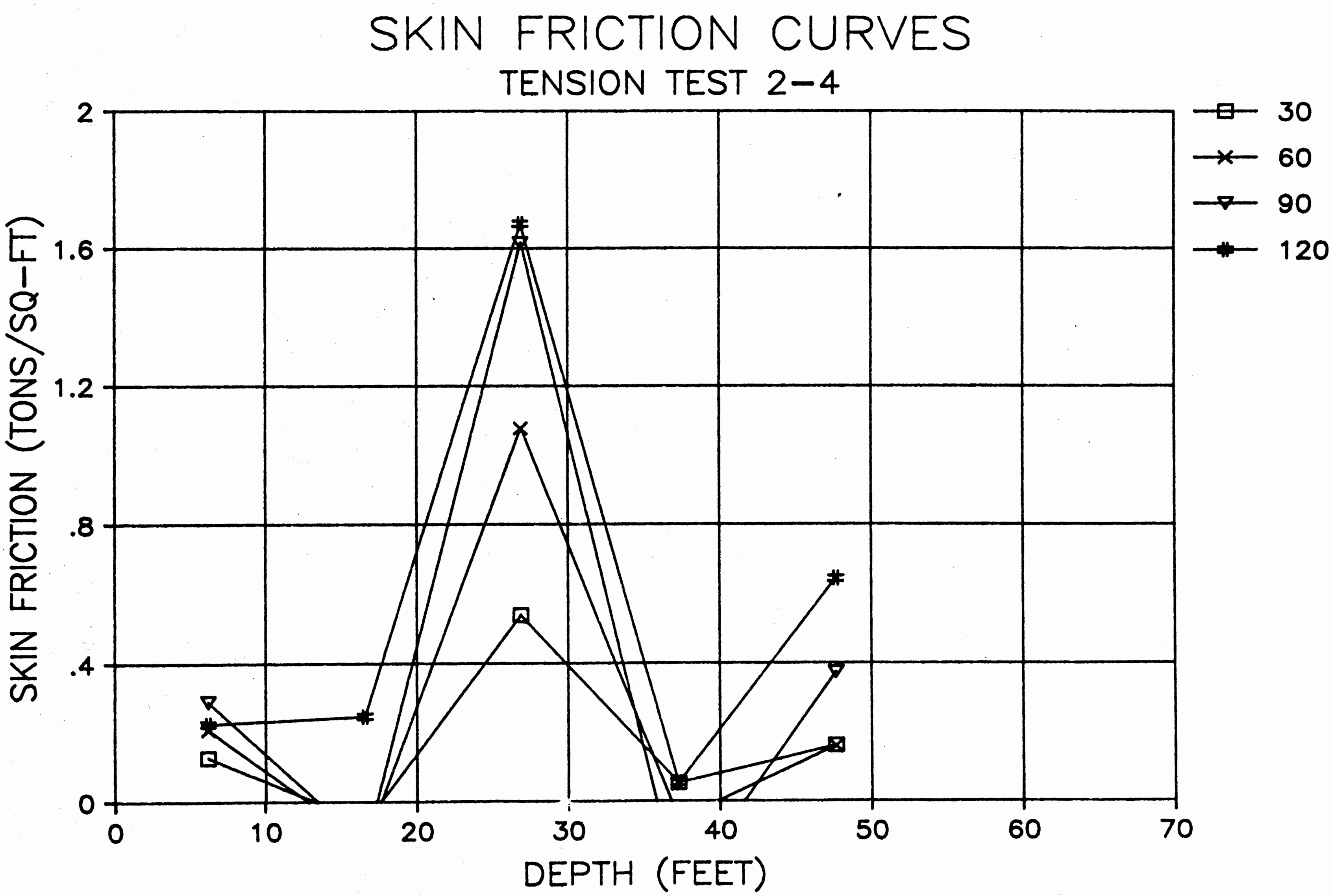
LOAD TRANSFER CURVES

TENSION TEST 2-3



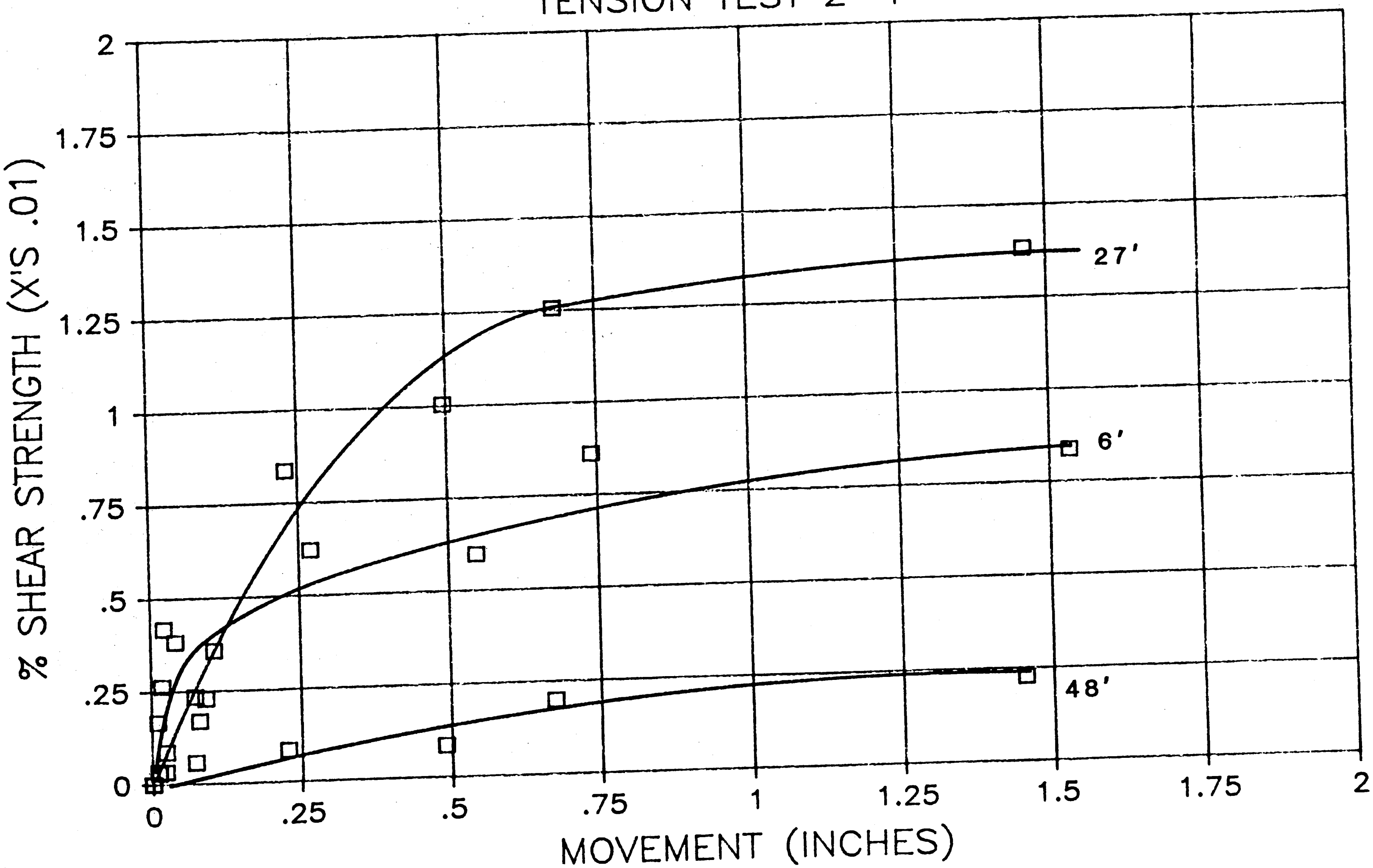

LOAD DEFLECTION DATA
TENSION TEST 2-4
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
25
50
75
100
125
150
LOAD (TONS)

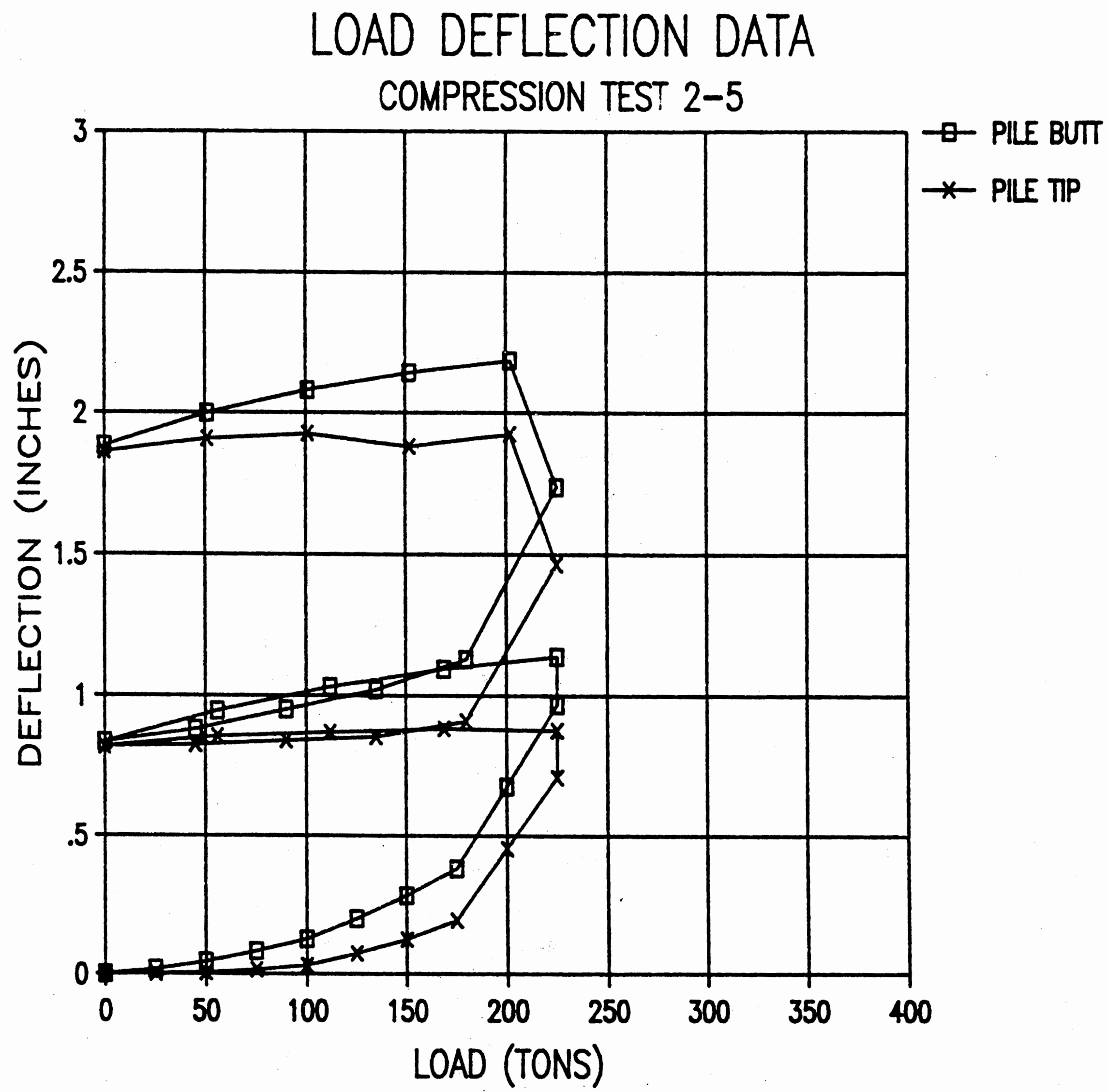

LOAD IN PILE AT SECTION MIDPOINT
TENSION TEST 2-4
LOAD (TONS)
DEPTH (FEET)
0
25
50
75
100
125
150
0
10
20
30
40
50
60
70
30
60
90
120

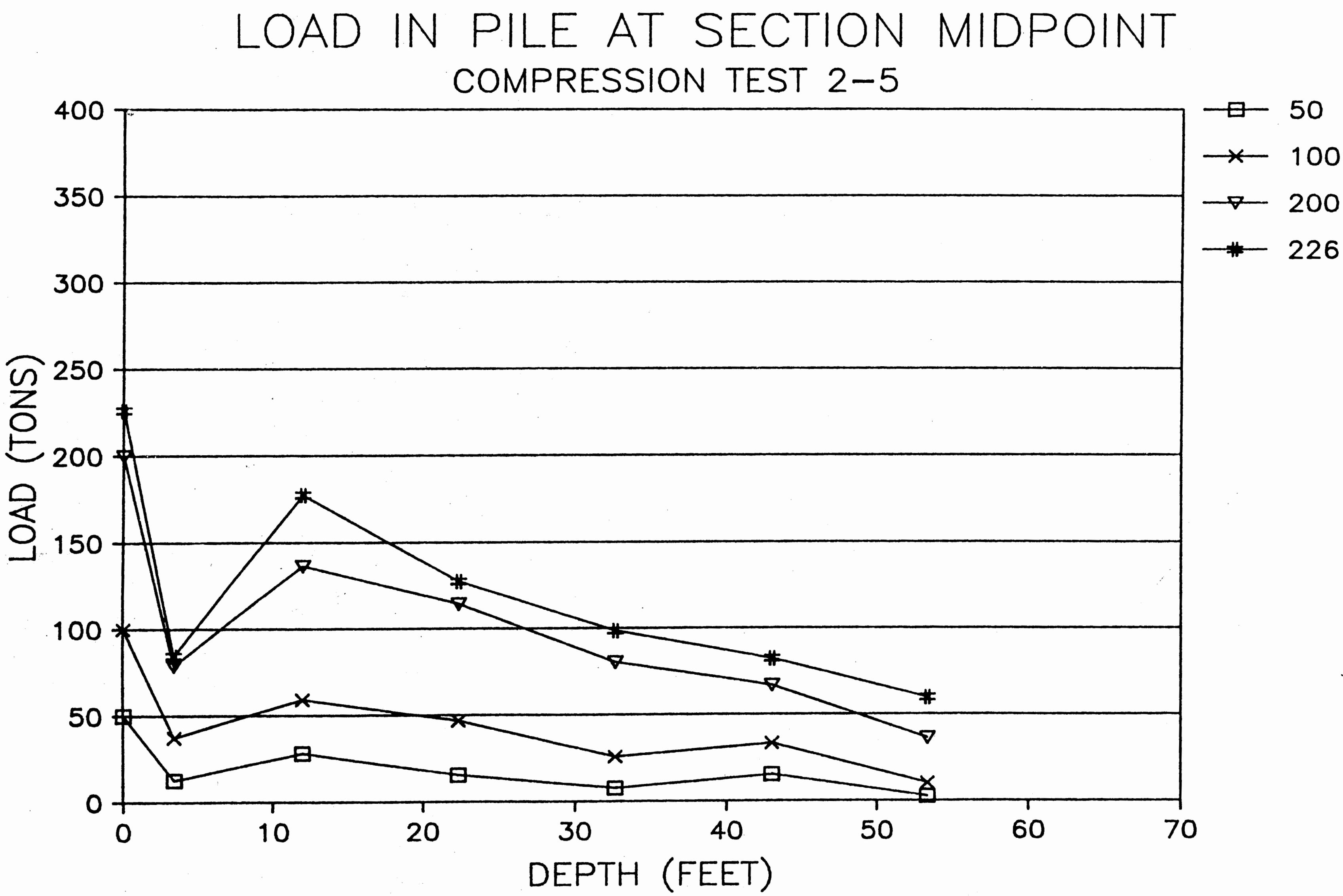

SKIN FRICTION CURVES
TENSION TEST 2-4
SKIN FRICTION (TONS/SQ-FT)
2
1.6
1.2
.8
.4
0
0
10
20
30
40
50
60
70
DEPTH (FEET)
30
60
90
120

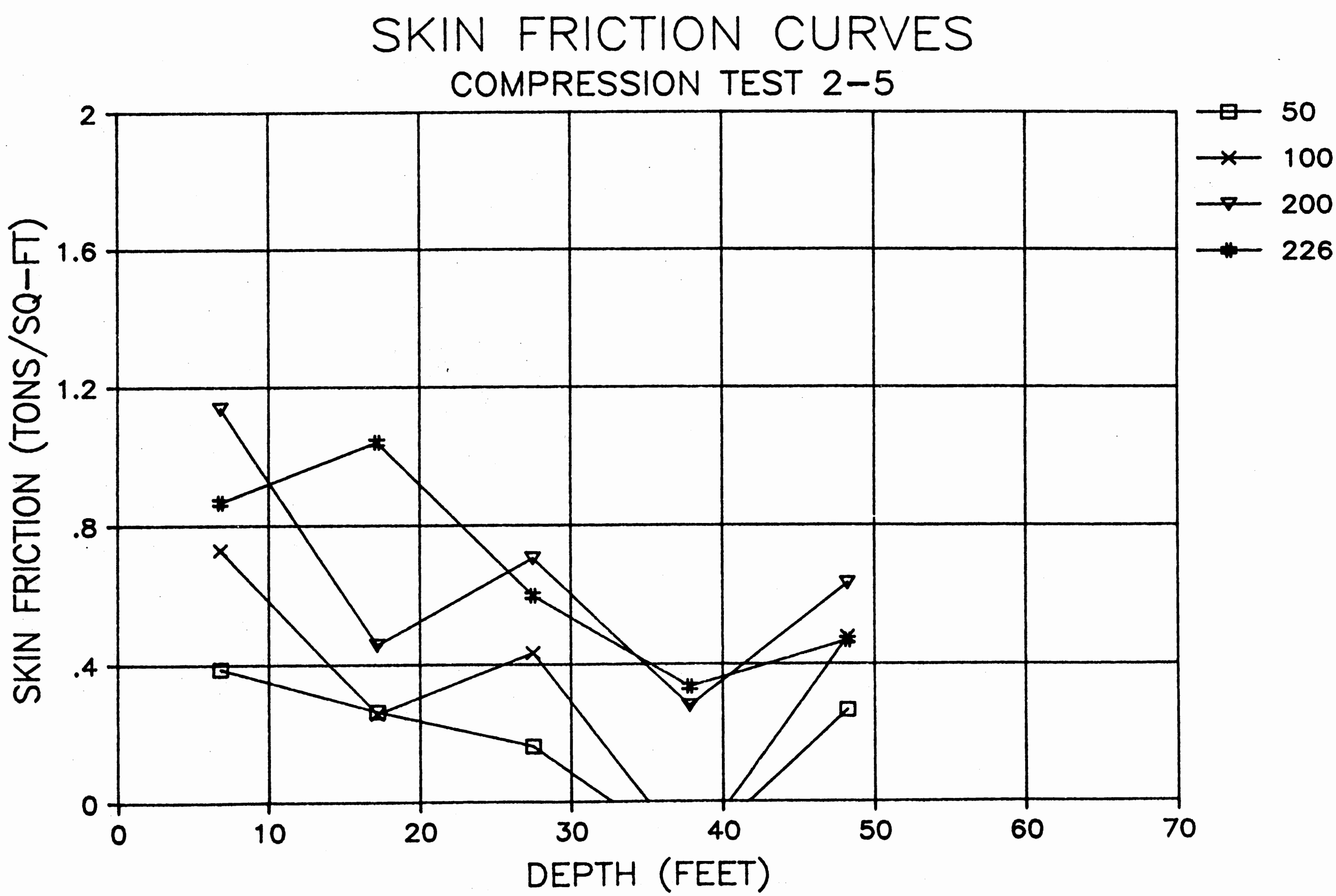
LOAD TRANSFER CURVES

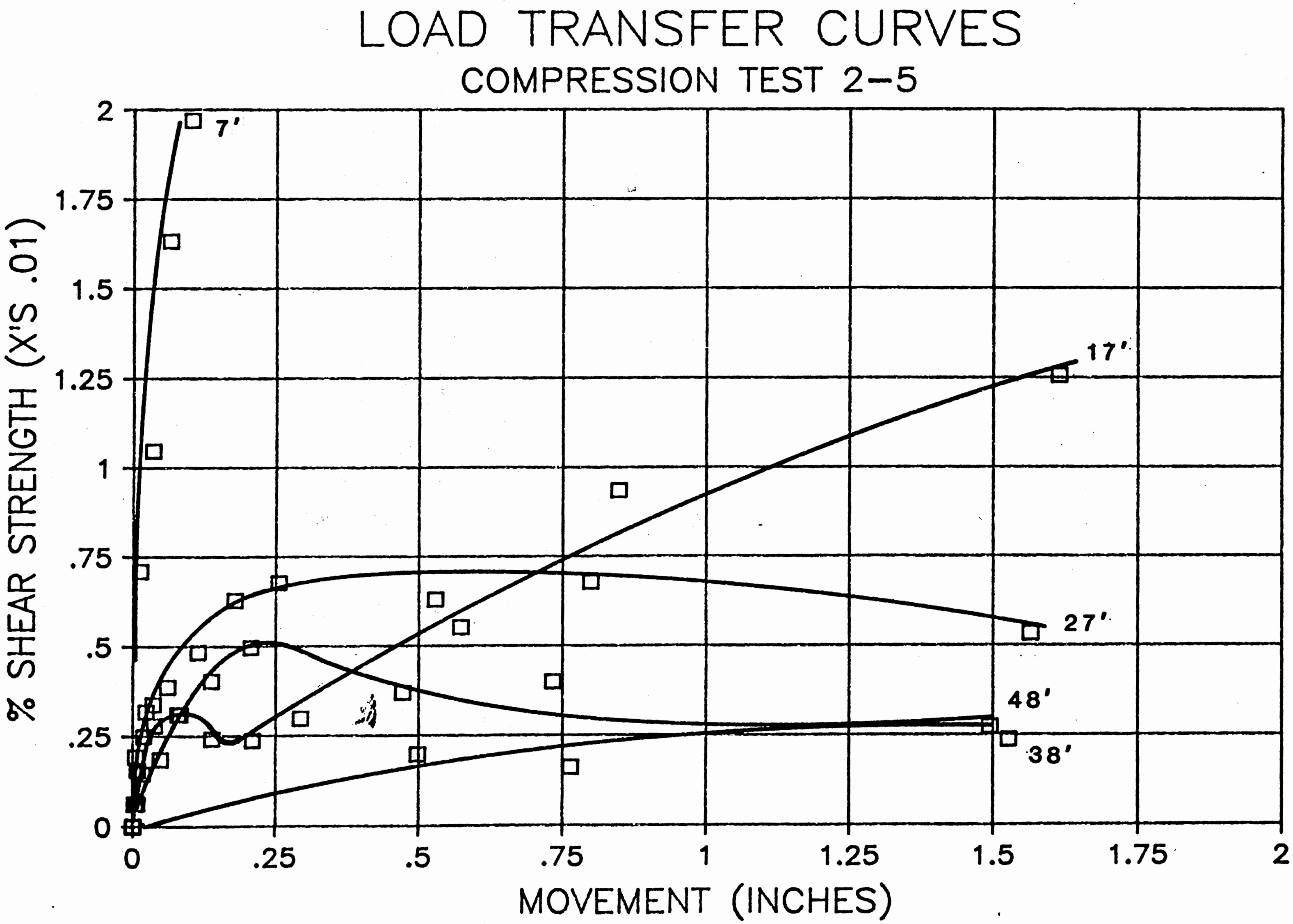
TENSION TEST 2-4

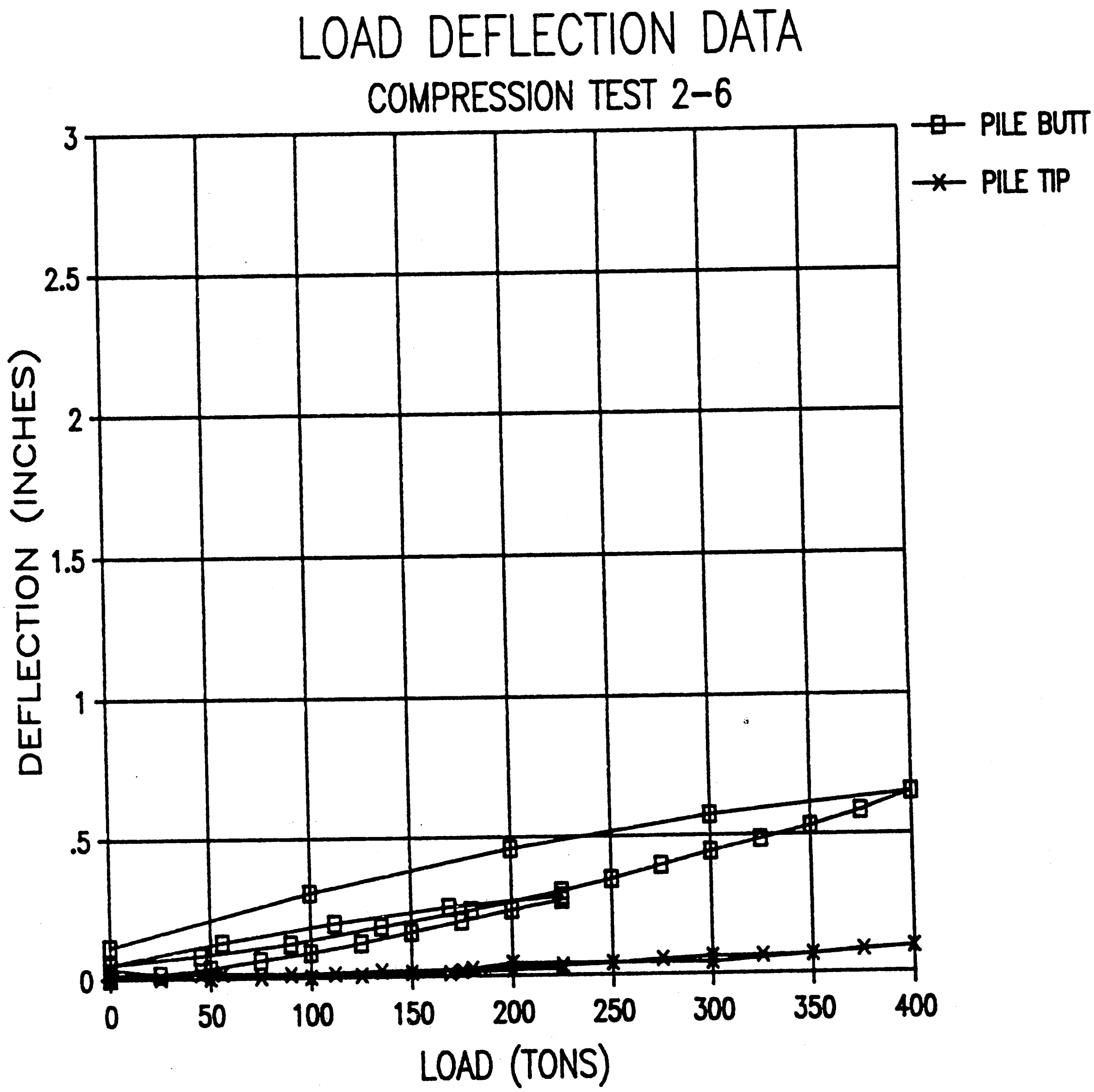


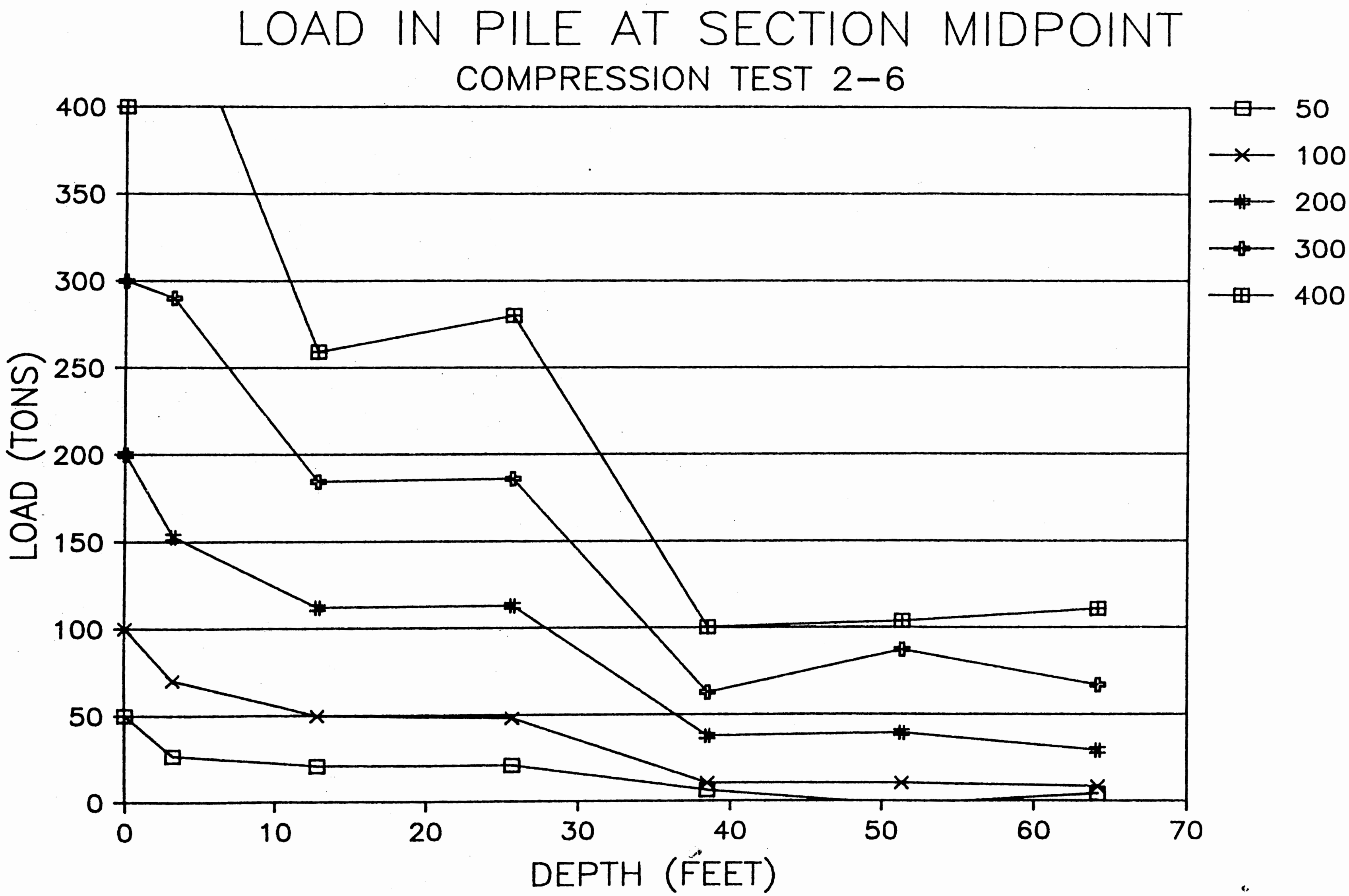

LOAD DEFLECTION DATA
COMPRESSION TEST 2-5
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
LOAD (TONS)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400

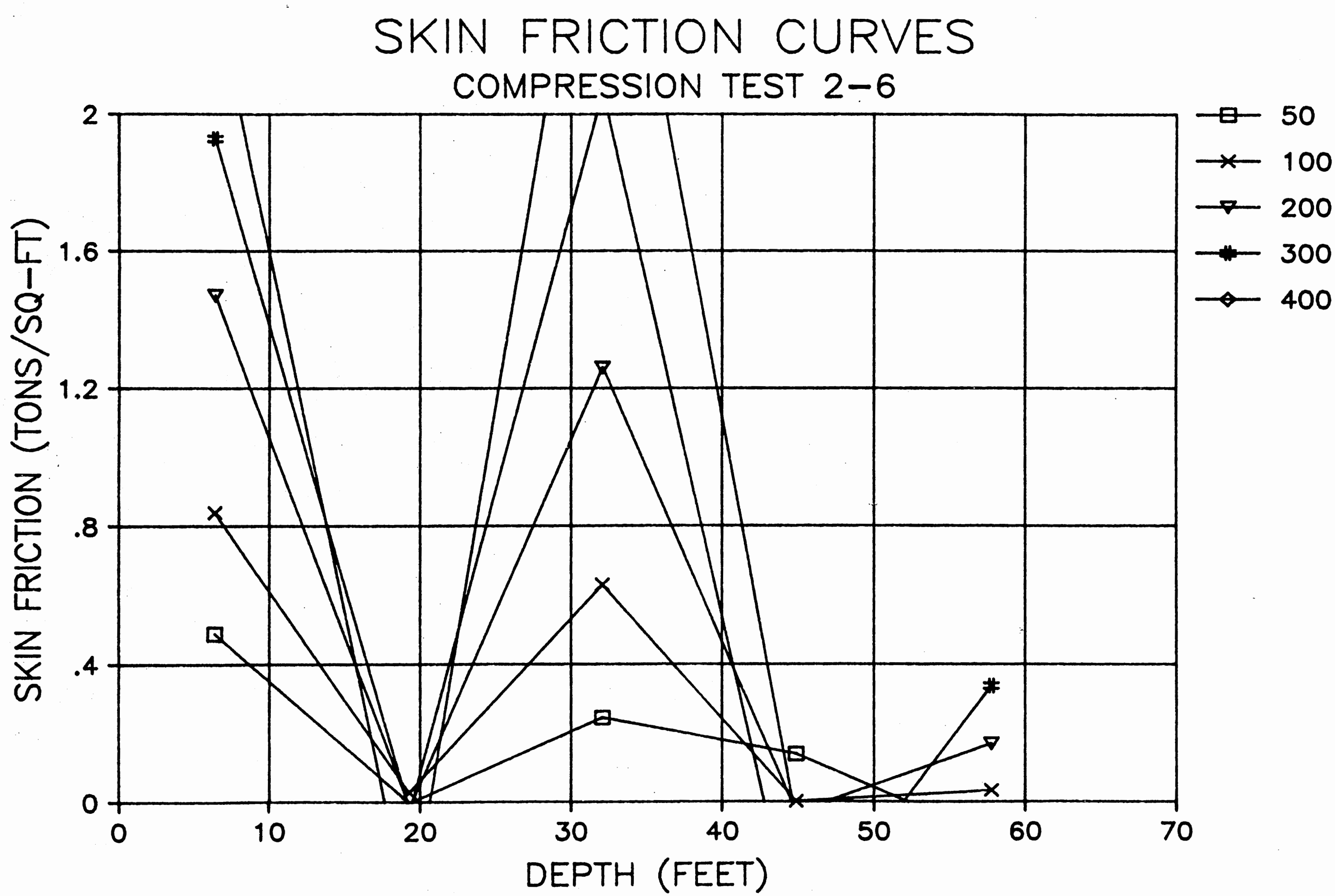

LOAD IN PILE AT SECTION MIDPOINT
COMPRESSION TEST 2-5
LOAD (TONS)
DEPTH (FEET)
0
50
100
150
200
250
300
350
400
0
10
20
30
40
50
60
70
50
100
200
226

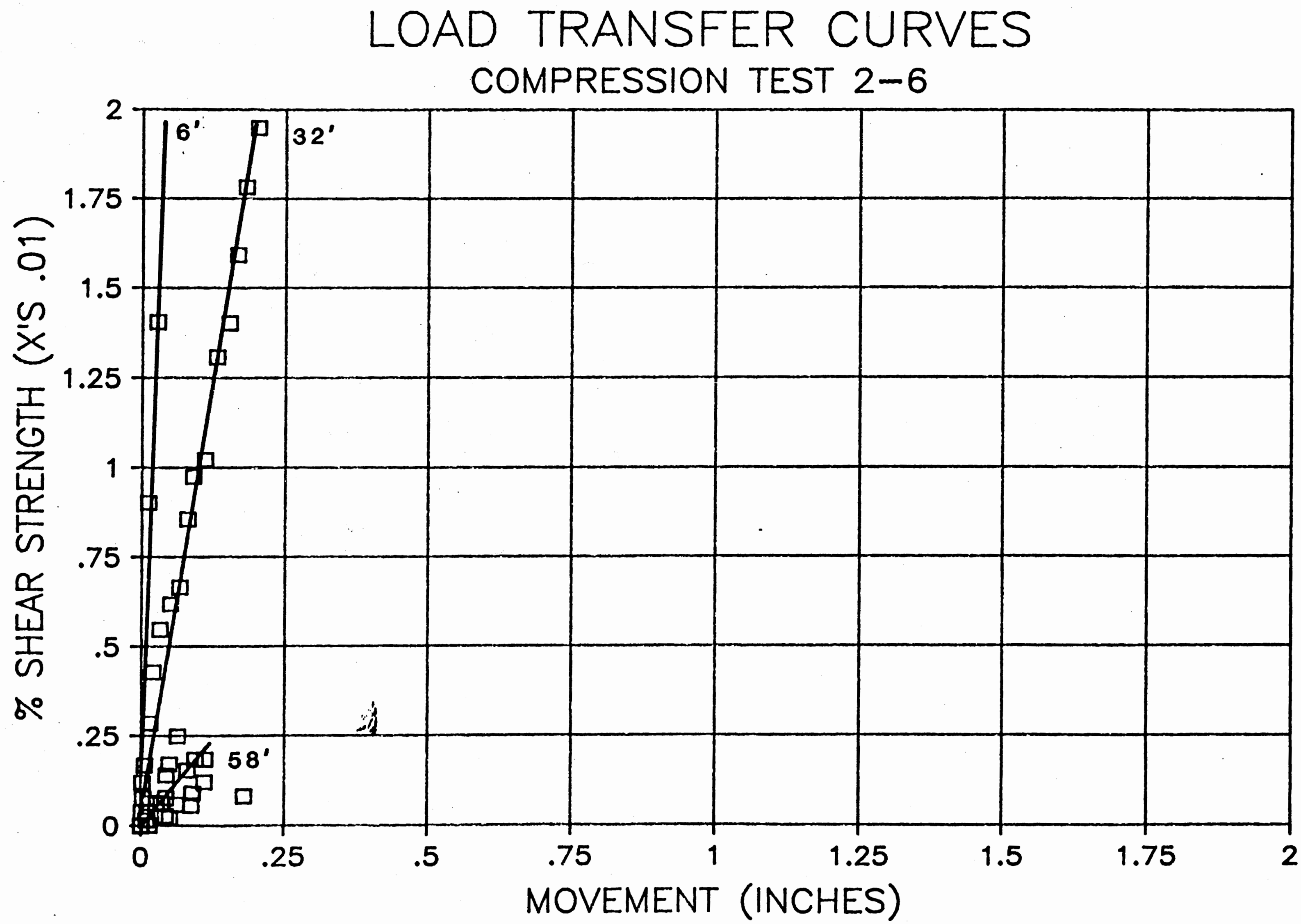

SKIN FRICTION CURVES
COMPRESSION TEST 2-5
50
100
200
226
SKIN FRICTION (TONS/SQ-FT)
2
1.6
1.2
.8
.4
0
10
20
30
40
50
60
70
DEPTH (FEET)

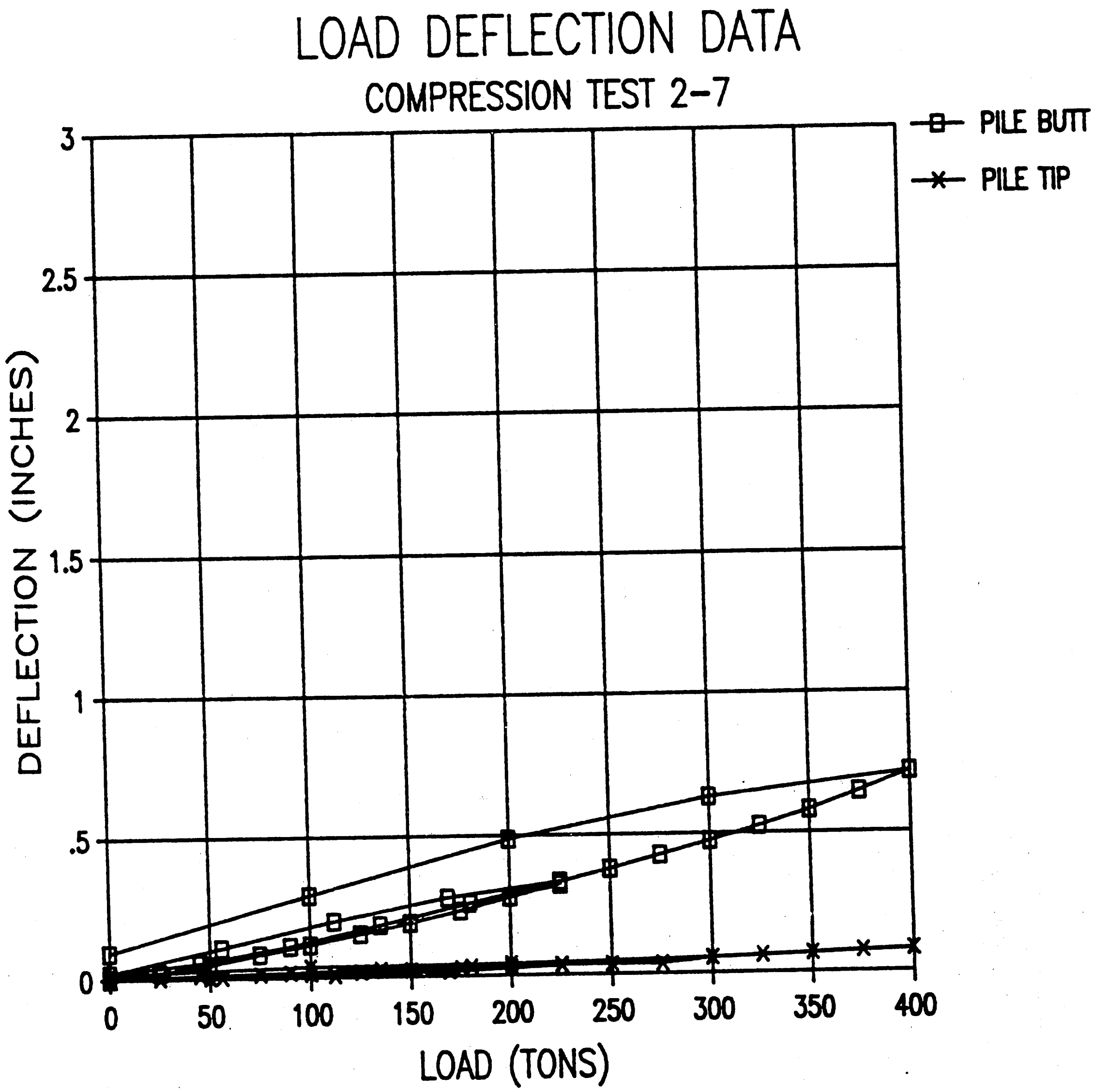

LOAD TRANSFER CURVES
COMPRESSION TEST 2-5
% SHEAR STRENGTH (X'S .01)
MOVEMENT (INCHES)
7'
17'
27'
48'
38'
0
.25
.5
.75
1
1.25
1.5
1.75
2

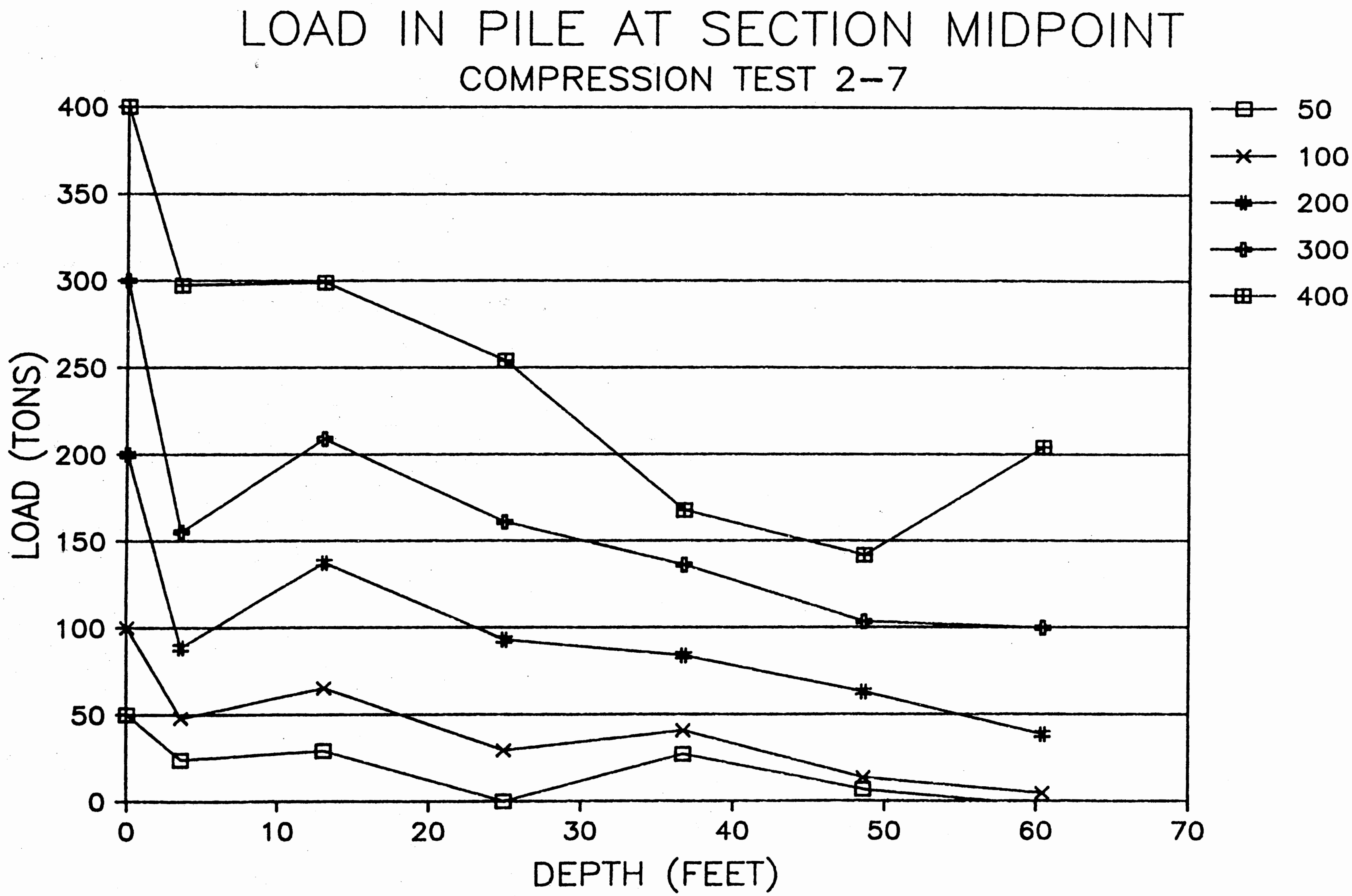

LOAD DEFLECTION DATA
COMPRESSION TEST 2-6
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400
LOAD (TONS)

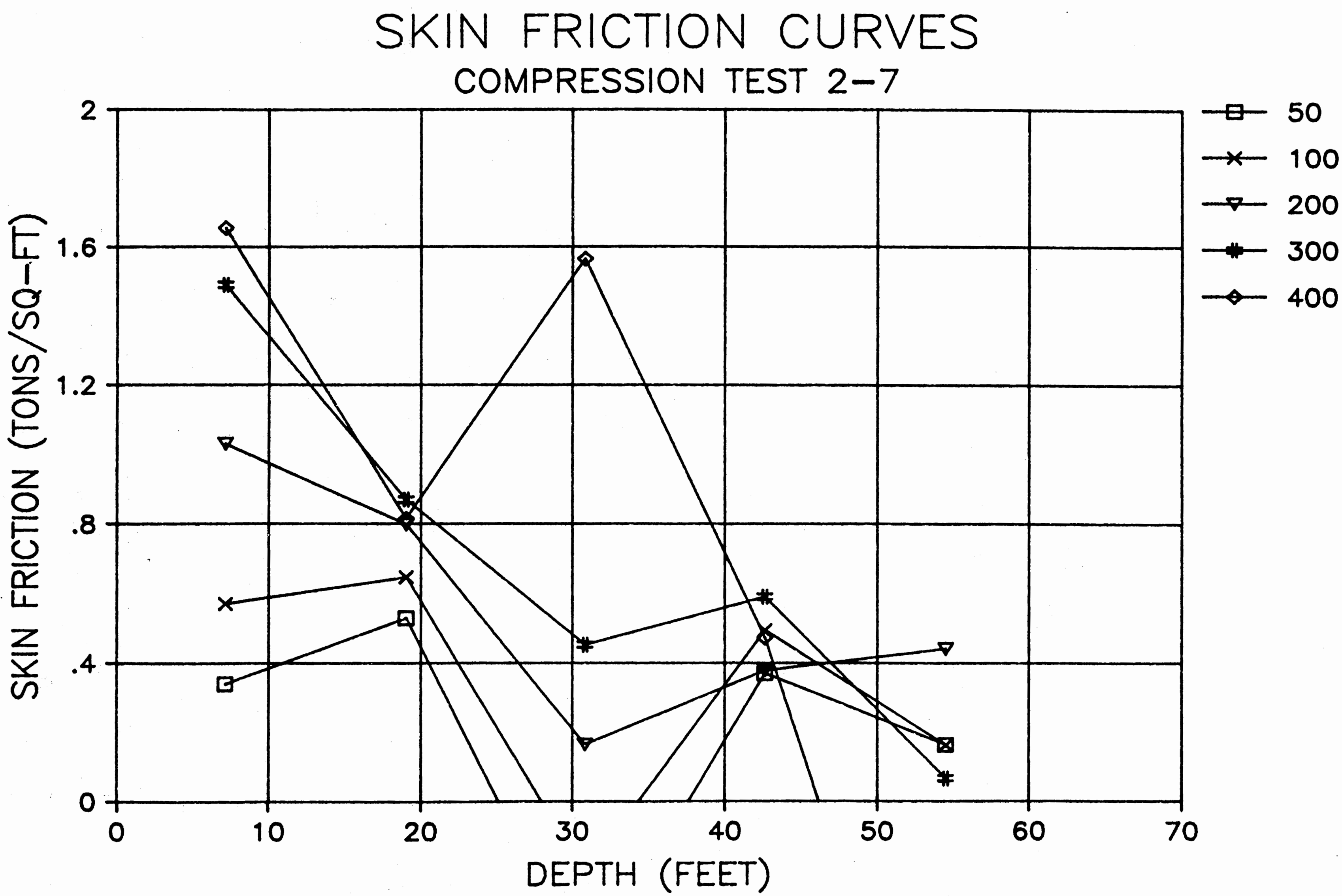

LOAD IN PILE AT SECTION MIDPOINT
COMPRESSION TEST 2-6
LOAD (TONS)
DEPTH (FEET)
0
50
100
150
200
250
300
350
400
0
10
20
30
40
50
60
70
50
100
200
300
400


SKIN FRICTION CURVES
COMPRESSION TEST 2-6
SKIN FRICTION (TONS/SQ-FT)
DEPTH (FEET)
2
1.6
1.2
.8
.4
0
0
10
20
30
40
50
60
70
50
100
200
300
400


LOAD TRANSFER CURVES
COMPRESSION TEST 2-6
% SHEAR STRENGTH (X'S .01)
MOVEMENT (INCHES)
6'
32'
58'
0
.25
.5
.75
1
1.25
1.5
1.75
2

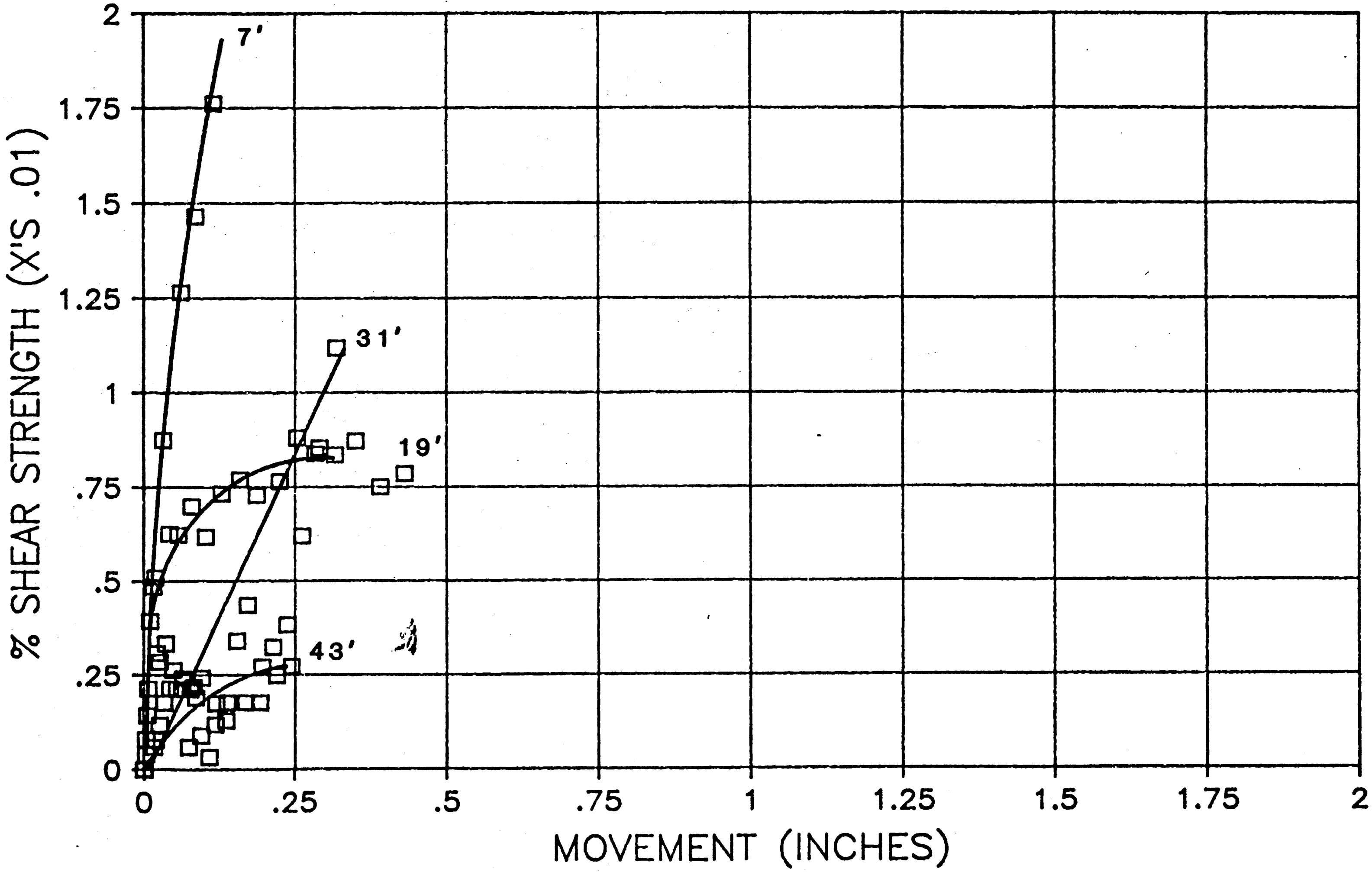

LOAD DEFLECTION DATA
COMPRESSION TEST 2-7
PILE BUTT
PILE TIP
DEFLECTION (INCHES)
3
2.5
2
1.5
1
.5
0
0
50
100
150
200
250
300
350
400
LOAD (TONS)


LOAD IN PILE AT SECTION MIDPOINT
COMPRESSION TEST 2-7
LOAD (TONS)
DEPTH (FEET)
0
50
100
150
200
250
300
350
400
0
10
20
30
40
50
60
70
50
100
200
300
400


SKIN FRICTION CURVES
COMPRESSION TEST 2-7
SKIN FRICTION (TONS/SQ-FT)
DEPTH (FEET)
0
.4
.8
1.2
1.6
2
0
10
20
30
40
50
60
70
50
100
200
300
400

LOAD TRANSFER CURVES

COMPRESSION TEST 2-7



APPENDIX B

RAW DATA AND COMPUTATION SPREAD SHEETS

A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI :: AJ :: AK :: AL

AM COMPRESSION TEST 1-1
OAD DISTRIBUTION CURVES

ATE DRIVEN =14 AUG 82
ATE TESTED =18 AUG 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	10.55	21.45	32.25	43.08	53.95	64.75
(INCHES)	126.6	257.4	387	516.96	647.4	777

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-3.03	-11.5	-22.4	-33.2	-44.0	-54.9
FOR PLOT PURPOSES ONLY	0	3.025	11.5	22.35	33.17	44.02	54.85

ILE AREA (SQ INCHES) = 21.4
OUNGS MODULUS (TSI) = 15000
IAL LENGTH (FEET) = 60.75

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -5.8

ILE PERIMETER (INCHES) 56
TO TELLTALE DIALS (INCHES).................. 54
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 18

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-6.05	-17.0	-27.8	-38.6	-49.5	-60.3
FOR PLOT PURPOSES ONLY	6.05	16.95	27.75	38.58	49.45	60.25
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3234	.6326	.9389	1.246	1.554	1.861

PLIED LOAD TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT
.00	2.597	0	2.541	0	1.838	0	2.974	0	0
15.00	2.559	.038	2.524	.017	1.807	.031	2.952	.022	.027
30.00	2.515	.082	2.497	.044	1.766	.072	2.923	.051	.0623
45.00	2.433	.164	2.439	.102	1.691	.147	2.867	.107	.13
60.00	2.197	.4	2.337	.204	1.475	.363	2.765	.209	.294
75.00	2.082	.515	2.238	.303	1.362	.476	2.665	.309	.4008
90.00	2.000	.5970	2.169	.372	1.281	.557	2.587	.387	.4782
05.00	1.817	.78	2.000	.5410	1.105	.733	2.424	.55	.6510
20.00	1.691	.906	1.884	.657	.979	.859	2.311	.663	.7713
35.00	1.584	1.013	1.794	.747	.878	.96	2.222	.752	.868
50.00	1.462	1.135	1.682	.859	.765	1.073	2.109	.865	.983

PLIED LOAD TONS)	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.6	0	.261	0	.585	0	.191	0	.75	0	.807	0
15.00	.604	.004	.269	.008	.593	.008	.211	.02	.769	.019	.827	.02
30.00	.608	.008	.276	.015	.604	.019	.229	.038	.792	.042	.852	.045
45.00	.613	.013	.288	.027	.619	.034	.25	.059	.817	.067	.88	.073
60.00	.62	.02	.298	.037	.634	.049	.271	.08	.84	.09	.904	.097
75.00	.626	.026	.308	.047	.647	.062	.287	.096	.858	.108	.922	.115
90.00	.63	.03	.317	.056	.66	.075	.304	.113	.876	.126	.94	.133
05.00	.635	.035	.326	.065	.672	.087	.319	.128	.894	.144	.957	.15
20.00	.644	.044	.34	.079	.69	.105	.341	.15	.917	.167	.982	.175
35.00	.649	.049	.349	.088	.702	.117	.356	.165	.934	.184	1.000	.1930
50.00	.654	.054	.358	.097	.715	.13	.372	.181	.952	.202	1.019	.212

LOAD AT GROUND SURFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
15.00	6.529	9.817	0	29.64	-2.46	2.477
30.00	13.06	17.18	9.907	46.93	9.844	7.431
45.00	24.01	34.36	17.34	61.75	19.69	14.86
60.00	43.80	41.72	29.72	76.57	24.61	17.34
75.00	59.17	51.54	37.15	83.98	29.53	17.34
90.00	65.70	63.81	47.06	93.86	31.99	17.34
105.00	76.65	73.62	54.49	101.3	39.37	14.86
120.00	105.3	85.89	64.40	111.1	41.84	19.81
135.00	116.2	95.71	71.83	118.6	46.76	22.29
150.00	127.2	105.5	81.74	126.0	51.68	24.77

AVERAGE DEVELOPED SHEAR STRESS (TSF)

LOAD AT GROUND SURFACE (TONS)	SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %
.00	0	0	0	0	0
15.00	.0966	.1939	-.587	.6340	-.098
30.00	.2389	.1436	-.734	.7324	.0477
45.00	.1983	.3361	-.880	.8307	.0954
60.00	.3406	.2370	-.928	1.026	.1438
75.00	.4372	.2841	-.928	1.075	.2411
90.00	.4881	.3308	-.927	1.222	.2898
105.00	.5846	.3779	-.927	1.222	.4848
120.00	.6355	.4245	-.926	1.369	.4355
135.00	.7321	.4717	-.926	1.418	.4839
150.00	.8287	.4699	-.876	1.467	.5322

% OF ESTIMATED SHEAR STRENGTH

LOAD AT GROUND SURFACE (TONS)	SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0
15.00	.2986	.3065	-.626	.5088	-.063
30.00	.7387	.2270	-.781	.5878	.0307
45.00	.6131	.5314	-.937	.6667	.0614
60.00	1.053	.3746	-.989	.8236	.0925
75.00	1.352	.4491	-.988	.8638	.1551
90.00	1.509	.5229	-.988	.9806	.1865
105.00	1.808	.5974	-.987	.9818	.3119
120.00	1.965	.6711	-.987	1.099	.2802
135.00	2.264	.7456	-.986	1.138	.3113
150.00	2.562	.7428	-.933	1.178	.3424

OR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 75
INIMUM LOAD = 0
AXIMUM LOAD = 500
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
15.00	.0238	.0198	.0198	.0078	.0088	.0078
30.00	.0559	.0489	.0449	.0259	.0219	.0189
45.00	.1195	.1055	.0985	.0735	.0655	.0595
60.00	.2774	.2604	.2484	.2174	.2074	.2004
75.00	.3790	.3580	.3430	.3090	.2970	.2900
90.00	.4533	.4273	.4083	.3703	.3573	.3503
105.00	.6219	.5919	.5699	.5289	.5129	.5069
120.00	.7340	.6990	.6730	.6280	.6110	.6030
135.00	.8266	.7876	.7586	.7106	.6916	.6826
150.00	.9374	.8944	.8614	.8104	.7894	.7794

: A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI :: AJ :: AK :: AL

DAM COMPRESSION TEST 1-2

LOAD DISTRIBUTION CURVES

DATE DRIVEN =25 AUG 82

DATE TESTED =29 AUG 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	9.5	19	20.5	38	47.5	57
(INCHES)	114	228	342	456	570	684

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-3	-10.8	-20.3	-29.8	-39.3	-48.8
FOR PLOT PURPOSES ONLY	0	3	10.75	20.25	29.75	39.25	48.75

PILE AREA (SQ INCHES) = 21.4

YOUNGS MODULUS (TSI) = 15000

AXIAL LENGTH (FEET) = 54

PILE PERIMETER (INCHES) 56

…S TO TELLTALE DIALS (INCHES)................... 42

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130

INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981

DEPTH TO WATER TABLE (FEET) = -7.5

TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 6

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-6	-15.5	-25	-34.5	-44	-53.5
FOR PLOT PURPOSES ONLY	6	15.5	25	34.5	44	53.5
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3272	.6360	.9054	1.175	1.444	1.714

APPLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT
.00	2.532	0	2.498	0	2.517	0	2.955	0	0
15.00	2.513	.019	2.483	.015	2.494	.023	2.942	.013	.0175
30.00	2.484	.048	2.46	.038	2.466	.051	2.918	.037	.0435
45.00	2.298	.234	2.282	.216	2.282	.235	2.738	.217	.2255
60.00	2.076	.456	2.067	.431	2.061	.456	2.521	.434	.4443
75.00	1.889	.643	1.884	.614	1.873	.644	2.339	.616	.6293
90.00	1.708	.824	1.69	.808	1.685	.832	2.147	.808	.818
105.00	1.327	1.205	1.33	1.168	1.303	1.214	1.793	1.162	1.187
120.00	.897	1.635	.905	1.593	.871	1.646	1.246	1.709	1.646
124.00	.614	1.918	.623	1.875	.586	1.931	1.087	1.868	1.898
128.00	.362	2.17	.374	2.124	.335	2.182	.839	2.116	2.148

APPLIED LOAD (TONS)	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.288	0	.35	0	.921	0	.859	0	.431	0	.344	0
15.00	.291	.003	.355	.005	.927	.006	.87	.011	.439	.008	.357	.013
30.00	.295	.007	.362	.012	.935	.014	.882	.023	.457	.026	.374	.03
45.00	.299	.011	.37	.02	.946	.025	.897	.038	.474	.043	.393	.049
60.00	.304	.016	.378	.028	.956	.035	.911	.052	.49	.059	.409	.065
75.00	.308	.02	.385	.035	.967	.046	.924	.065	.505	.074	.425	.081
90.00	.312	.024	.394	.044	.971	.05	.939	.08	.521	.09	.441	.097
105.00	.317	.029	.403	.053	.97	.049	.955	.096	.539	.108	.459	.115
120.00	.322	.034	.413	.063	.97	.049	.972	.113	.555	.124	.476	.132
124.00	.325	.037	.419	.069	.97	.049	.982	.123	.566	.135	.487	.143
128.00	.325	.037	.419	.069	.97	.049	.982	.123	.566	.135	.484	.14

AVERAGE DEVELOPED SHEAR STRESS (TSF)

OAD AT ROUND URFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
15.00	4.625	5.632	2.816	14.08	-8.45	14.08
30.00	13.71	14.08	5.632	25.34	8.447	11.26
45.00	22.79	25.34	14.08	36.61	14.08	16.89
60.00	36.33	33.79	19.71	47.87	19.71	16.89
75.00	45.42	42.24	30.97	53.5	25.34	19.71
90.00	54.5	56.32	16.89	64.47	28.16	19.71
05.00	68.04	67.58	-11.3	132.3	33.79	19.71
20.00	81.58	81.66	-39.4	180.2	30.97	22.53
24.00	92.63	90.11	-56.3	208.4	33.79	22.53
28.00	90.29	90.11	-56.3	208.4	33.79	14.08

OAD AT ROUND URFACE (TONS)	SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %
.00	0	0	0	0	0
15.00	.1867	.0635	-.254	.5081	-.508
30.00	.3174	.1905	-.445	.3811	-.064
45.00	.3919	.2541	-.508	.5081	-.064
60.00	.5225	.3176	-.635	.6351	.0635
75.00	.6531	.2541	-.508	.6351	.1270
90.00	.6714	.8892	-1.52	1.270	.1905
05.00	.7459	1.778	-3.24	2.223	.3176
20.00	.7643	2.731	-4.95	3.366	.1905
24.00	.6756	3.303	-5.97	3.938	.2541
28.00	.7554	3.303	-5.97	3.938	.4446

% OF ESTIMATED SHEAR STRENGTH

OAD AT ROUND URFACE (TONS)	SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0
15.00	.5707	.0999	-.281	.4325	-.352
30.00	.9698	.2996	-.491	.3244	-.044
45.00	1.197	.3995	-.561	.4325	-.044
60.00	1.597	.4994	-.702	.5406	.0440
75.00	1.996	.3995	-.561	.5406	.0880
90.00	2.052	1.398	-1.68	1.081	.1319
05.00	2.279	2.796	-3.58	1.892	.2199
20.00	2.336	4.295	-5.47	2.865	.1319
24.00	2.065	5.193	-6.59	3.352	.1759
28.00	2.308	5.193	-6.59	3.352	.3078

FOR VIEW 1
MINIMUM DEPTH = 0
MAXIMUM DEPTH= 75
MINIMUM LOAD = 0
MAXIMUM LOAD = 150
LOAD IN TONS
DEPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

FOR VIEWS 3 TO 8
MINIMUM MOVEMENT = 0
MAXIMUM MOVEMENT = 3
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
MOVEMENT IN INCHES
t-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
15.00	.0148	.0128	.0118	.0068	.0098	.0048
30.00	.0371	.0321	.0301	.0211	.0181	.0141
45.00	.2153	.2063	.2013	.1883	.1833	.1773
60.00	.4294	.4174	.4104	.3934	.3864	.3804
75.00	.6107	.5957	.5847	.5657	.5567	.5497
90.00	.7957	.7757	.7697	.7397	.7297	.7227
105.00	1.160	1.136	1.140	1.093	1.081	1.074
120.00	1.614	1.585	1.599	1.535	1.524	1.516
124.00	1.863	1.831	1.851	1.777	1.765	1.757
128.00	2.113	2.081	2.101	2.027	2.015	2.010

: A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI :: AJ :: AK :: AL

DAM COMPRESSION TEST 1-3a

LOAD DISTRIBUTION CURVES

DATE DRIVEN =26 AUG 82

DATE TESTED =2 SEPT 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6	GROUND SURFACE
(FEET)	9.8	19.3	28.8	38.4	47.9	57.4	
(INCHES)	117.6	231.6	345.6	460.8	574.8	688.8	0
FOR PLOT PURPOSES ONLY							0

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	-2.98	-10.7	-20.2	-29.8	-39.3	-48.8
FOR PLOT PURPOSES ONLY	2.983	10.72	20.22	29.77	39.32	48.82

PILE AREA (SQ INCHES) = 21.4

YOUNGS MODULUS (TSI) = 15000

AXIAL LENGTH (FEET) = 54

PILE PERIMETER (INCHES) 56

S TO TELLTALE DIALS (INCHES).................. 46

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130

INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981

DEPTH TO WATER TABLE (FEET) = -7

TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 2.75

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-5.97	-15.5	-25.0	-34.6	-44.1	-53.6
FOR PLOT PURPOSES ONLY	5.967	15.47	24.97	34.57	44.07	53.57
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3254	.6219	.8914	1.164	1.433	1.702

APPLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.271	0	.207	0	.182	0	.295	0	0	1.542	0	1.657	0	1.346	0	1.009	0	1.152	0	1.336	0
25.00	.294	.023	.22	.013	.163	.019	.352	.057	.028	1.532	.01	1.644	.013	1.332	.014	.997	.012	1.136	.016	1.314	.022
50.00	.329	.058	.246	.039	.188	.006	.39	.095	.0495	1.523	.019	1.631	.026	1.314	.032	.978	.031	1.114	.038	1.288	.048
75.00	.382	.111	.294	.087	.234	.052	.444	.149	.0998	1.515	.027	1.618	.039	1.296	.05	.956	.053	1.088	.064	1.259	.077
100.00	.437	.166	.358	.151	.293	.111	.523	.228	.164	1.509	.033	1.606	.051	1.278	.068	.934	.075	1.061	.091	1.227	.109
125.00	.485	.214	.44	.233	.371	.189	.578	.283	.2298	1.502	.04	1.591	.066	1.257	.089	.91	.099	1.035	.117	1.2	.136
150.00	.564	.293	.535	.328	.471	.289	.65	.355	.3163	1.495	.047	1.575	.082	1.235	.111	.883	.126	1.007	.145	1.171	.165
175.00	.688	.417	.612	.405	.54	.358	.78	.485	.4163	1.484	.058	1.559	.098	1.215	.131	.861	.148	.976	.176	1.135	.201
200.00	.782	.511	.704	.497	.629	.447	.875	.58	.5088	1.475	.067	1.545	.112	1.195	.151	.837	.172	.948	.204	1.105	.231
225.00	.858	.587	.811	.604	.736	.554	.955	.66	.6013	1.468	.074	1.531	.126	1.175	.171	.811	.198	.922	.23	1.077	.259
250.00	1.249	.978	1.145	.938	1.066	.884	1.33	1.035	.9588	1.459	.083	1.515	.142	1.156	.19	.785	.224	.887	.265	1.036	.3
275.00	1.7	1.429	1.591	1.384	1.513	1.331	1.78	1.485	1.407	1.451	.091	1.501	.156	1.138	.208	.763	.246	.86	.292	1.007	.329
300.00	2.149	1.878	2.043	1.836	1.956	1.774	2.245	1.95	1.868	1.436	.106	1.478	.179	1.11	.236	.732	.277	.823	.329	.965	.371
325.00	2.777	2.506	2.669	2.462	2.584	2.402	2.891	2.596	2.492	1.42	.122	1.454	.203	1.081	.265	.7	.309	.783	.369	.92	.416
.00	2.539	2.268	2.481	2.274	2.412	2.23	2.643	2.348	2.28	1.518	.024	1.634	.023	1.266	.08	.991	.018	1.123	.029	1.296	.04

LOAD AT GROUND SURFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC GS-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25.00	28.77	8.447	2.816	-5.57	11.26	16.89	.3310	.1270	.1882	-.378	-.127	1.017	.2043	.2112	-.325	-.089
50.00	53.06	19.71	16.89	-2.79	19.71	28.16	.6057	.0635	.4416	-.505	-.191	1.861	.1021	.4954	-.434	-.133
75.00	72.86	33.79	30.97	8.359	30.97	36.61	.8240	.0635	.5074	-.507	-.127	2.532	.1021	.5693	-.436	-.089
100.00	83.70	50.68	47.87	19.51	45.05	50.68	.9861	.0635	.6364	-.573	-.127	3.030	.1021	.7140	-.493	-.089
125.00	99.02	73.21	64.76	27.86	50.68	53.5	1.036	.1905	.8279	-.512	-.064	3.182	.3064	.9289	-.440	-.044
150.00	114.3	98.55	81.66	41.80	53.5	56.32	1.029	.3811	.8944	-.263	-.064	3.161	.6128	1.003	-.226	-.044
175.00	147.6	112.6	92.92	47.37	78.84	70.39	1.247	.4446	1.022	-.706	.1905	3.832	.7149	1.147	-.607	.1330
200.00	171.9	126.7	109.8	58.52	90.11	76.03	1.465	.3811	1.151	-.709	.3176	4.503	.6128	1.291	-.609	.2216
225.00	187.2	146.4	126.7	75.23	90.11	81.66	1.571	.4446	1.155	-.334	.1905	4.828	.7149	1.296	-.287	.1330
250.00	211.5	166.1	135.2	94.74	115.4	98.55	1.677	.6987	.9069	-.465	.3811	5.153	1.123	1.017	-.399	.2659
275.00	231.3	183.0	146.4	105.9	129.5	104.2	1.839	.8257	.9096	-.530	.5716	5.651	1.328	1.020	-.456	.3989
300.00	282.5	205.6	160.5	114.2	146.4	118.3	1.889	1.016	1.038	-.722	.6351	5.803	1.634	1.164	-.620	.4432
325.00	338.2	228.1	174.6	122.6	168.9	132.3	1.938	1.207	1.166	-1.04	.8257	5.955	1.940	1.308	-.894	.5762
.00	107.6	-2.82	160.5	-173.	30.97	30.97	.0563	-3.68	7.478	-4.57	>>>>>	.1730	-5.92	8.389	-3.93	>>>>>

FOR VIEW 1
MINIMUM DEPTH = 0
MAXIMUM DEPTH= 55
MINIMUM LOAD = 0
MAXIMUM LOAD = 400
LOAD IN TONS
DEPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 55
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

FOR VIEWS 3 TO 8
MINIMUM MOVEMENT = 0
MAXIMUM MOVEMENT = 3
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
MOVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
25.00	.0182	.0152	.0142	.0162	.0122	.0062
50.00	.0309	.0239	.0179	.0189	.0119	.0019
75.00	.0734	.0614	.0504	.0474	.0364	.0234
100.00	.1319	.1139	.0969	.0899	.0739	.0559
125.00	.1908	.1648	.1418	.1318	.1138	.0948
150.00	.2705	.2355	.2065	.1915	.1725	.1525
175.00	.3597	.3197	.2867	.2697	.2417	.2167
200.00	.4435	.3985	.3595	.3385	.3065	.2795
225.00	.5292	.4772	.4322	.4052	.3732	.3442
250.00	.8779	.8189	.7709	.7369	.6959	.6609
275.00	1.319	1.254	1.202	1.164	1.118	1.081
300.00	1.756	1.683	1.626	1.585	1.533	1.491
325.00	2.372	2.291	2.229	2.185	2.125	2.078
.00	2.256	2.257	2.2	2.262	2.251	2.24

A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI :: AJ :: AK :: AL

·AM TENSION TEST PILE 1-4
OAD DISTRIBUTION CURVES

ATE DRIVEN =10 SEPT 82
ATE TESTED =14 SEPT 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6	GROUND SURFACE
(FEET)	11.43	23.33	35.13	46.93	58.83	70.63	
(INCHES)	137.2	280.0	421.6	563.16	706.0	847.6	0
FOR PLOT PURPOSES ONLY							0

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	-2.65	-11.3	-23.1	-34.9	-46.8	-58.6
FOR PLOT PURPOSES ONLY	2.65	11.25	23.1	34.9	46.75	58.6

ILE AREA (SQ INCHES) = 21.4
OUNGS MODULUS (TSI) = 15000
(IAL LENGTH (FEET) = 54
ILE PERIMETER (INCHES) 56
; TO TELLTALE DIALS (INCHES)................... 73.56

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -7
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 11.25

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-5.3	-17.2	-29	-40.8	-52.7	-64.5
FOR PLOT PURPOSES ONLY	5.3	17.2	29	40.8	52.7	64.5
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.2891	.6711	1.006	1.340	1.678	2.013

'PLIED LOAD TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	2.94	0	2.969	0	3.005	0	2.932	0	0	.137	0	.101	0	.12	0	.47	0	.349	0	.141	0
15.00	2.932	.008	2.943	.026	2.983	.022	2.927	.005	.0153	.143	.006	.109	.008	.131	.011	.48	.01	.36	.011	.154	.013
30.00	2.92	.02	2.925	.044	2.954	.051	2.919	.013	.032	.15	.013	.119	.018	.141	.021	.493	.023	.377	.028	.173	.032
45.00	2.904	.036	2.899	.07	2.925	.08	2.905	.027	.0533	.155	.018	.128	.027	.152	.032	.508	.038	.394	.045	.192	.051
60.00	2.879	.061	2.866	.103	2.888	.117	2.883	.049	.0825	.163	.026	.14	.039	.169	.049	.528	.058	.419	.07	.22	.079
75.00	2.858	.082	2.843	.126	2.864	.141	2.865	.067	.104	.167	.03	.148	.047	.18	.06	.543	.073	.435	.086	.24	.099
90.00	2.835	.105	2.814	.155	2.832	.173	2.842	.09	.1308	.174	.037	.158	.057	.195	.075	.559	.089	.457	.108	.262	.121
05.00	2.822	.118	2.803	.166	2.815	.19	2.836	.096	.1425	.177	.04	.166	.065	.205	.085	.576	.106	.477	.128	.29	.149
20.00	2.791	.149	2.77	.199	2.78	.225	2.807	.125	.1745	.182	.045	.175	.074	.217	.097	.588	.118	.495	.146	.311	.17
35.00	2.751	.189	2.728	.241	2.735	.27	2.768	.164	.216	.189	.052	.187	.086	.232	.112	.608	.138	.518	.169	.337	.196
50.00	2.671	.269	2.665	.304	2.655	.35	2.712	.22	.2858	.194	.057	.197	.096	.245	.125	.624	.154	.536	.187	.357	.216

LOAD AT GROUND SURFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15.00	12.93	4.496	6.801	-2.27	2.248	4.534	.2001	-.042	.1647	-.082	-.041	.6922	-.062	.1637	-.061	-.025
30.00	30.92	11.24	6.801	4.534	11.24	9.068	.3573	.0803	.0412	-.121	.0393	1.236	.1196	.0409	-.090	.0234
45.00	38.80	20.23	11.33	13.60	15.74	13.60	.4718	.1609	-.041	-.039	.0386	1.632	.2397	-.041	-.029	.0230
60.00	61.83	29.22	22.67	20.40	26.97	20.40	.5862	.1185	.0412	-.119	.1188	2.028	.1766	.0409	-.089	.0708
75.00	64.67	38.21	29.47	29.47	29.22	29.47	.7007	.1581	>>>>>	.0045	-.004	2.424	.2356	>>>>>	.0033	-.003
90.00	82.65	44.96	40.81	31.74	42.71	29.47	.8579	.0751	.1647	-.198	.2394	2.968	.1119	.1637	-.148	.1427
105.00	80.44	56.20	45.34	47.61	49.45	47.61	.9296	.1964	-.041	-.033	.0334	3.216	.2926	-.041	-.025	.0199
120.00	88.33	65.19	52.14	47.61	62.94	54.41	1.044	.2360	.0823	-.277	.1543	3.612	.3516	.0819	-.207	.0920
135.00	106.3	76.43	58.94	58.94	69.68	61.21	1.116	.3162	>>>>>	-.194	.1533	3.859	.4712	>>>>>	-.145	.0914
150.00	114.2	87.67	65.74	65.74	74.18	65.74	1.187	.3965	>>>>>	-.153	.1526	4.107	.5908	>>>>>	-.114	.0910

OR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 75
INIMUM LOAD = 0
AXIMUM LOAD = 150
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
15.00	.0098	.0078	.0048	.0058	.0048	.0028
30.00	.0201	.0151	.0121	.0101	.0051	.0011
45.00	.0368	.0278	.0228	.0168	.0098	.0038
60.00	.0586	.0456	.0356	.0266	.0146	.0056
75.00	.0766	.0596	.0466	.0336	.0206	.0076
90.00	.0969	.0769	.0589	.0449	.0259	.0129
105.00	.1062	.0812	.0612	.0402	.0182	-.003
120.06	.1337	.1047	.0817	.0607	.0327	.0087
135.00	.1687	.1347	.1087	.0827	.0517	.0247
150.00	.2340	.1950	.1660	.1370	.1040	.0750

A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI :: AJ :: AK :: AL

AM COMPRESSION TEST 1-5
OAD DISTRIBUTION CURVES

ATE DRIVEN =10 SEPT 82
ATE TESTED =10 SEPT 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6	GROUND SURFACE
(FEET)	12.2	23.1	33.9	44.7	55.6	66.4	SURFACE
(INCHES)	146.4	277.2	406.8	536.4	667.2	796.8	0
FOR PLOT PURPOSES ONLY							0

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	-2.85	-11.2	-22	-32.8	-43.7	-54.5
FOR PLOT PURPOSES ONLY	2.85	11.15	22	32.8	43.65	54.5

ILE AREA (SQ INCHES) = 21.4
JUNGS MODULUS (TSI) = 15000
IAL LENGTH (FEET) = 60.4
ILE PERIMETER (INCHES) 56
TO TELLTALE DIALS (INCHES).................. 78

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -7
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 5

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-5.7	-16.6	-27.4	-38.2	-49.1	-59.9
FOR PLOT PURPOSES ONLY	5.7	16.6	27.4	38.2	49.1	59.9
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3109	.6541	.9604	1.267	1.576	1.882

PLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	2.983	0	2.862	0	2.655	0	2.918	0	0	.153	0	.117	0	.085	0	.41	0	.273	0	.491	0
5.00	2.983	0	2.868	.006	2.657	.002	2.923	.005	.0033	.154	.001	.118	.001	.087	.002	.41	0	.275	.002	.493	.002
10.00	2.982	.001	2.863	.001	2.652	.003	2.921	.003	.002	.156	.003	.121	.004	.091	.006	.415	.005	.279	.006	.498	.007
15.00	2.977	.006	2.859	.003	2.647	.008	2.915	.003	.005	.158	.005	.124	.007	.095	.01	.42	.01	.285	.012	.504	.013
20.00	2.968	.015	2.853	.009	2.64	.015	2.906	.012	.0128	.159	.006	.127	.01	.1	.015	.425	.015	.292	.019	.512	.021
25.00	2.958	.025	2.844	.018	2.633	.022	2.896	.022	.0218	.161	.008	.13	.013	.104	.019	.431	.021	.299	.026	.52	.029
30.00	2.951	.032	2.836	.026	2.626	.029	2.887	.031	.0295	.163	.01	.134	.017	.109	.024	.437	.027	.307	.034	.528	.037
35.00	2.943	.04	2.822	.04	2.616	.039	2.875	.043	.0405	.165	.012	.137	.02	.114	.029	.443	.033	.314	.041	.535	.044
40.00	2.932	.051	2.804	.058	2.603	.052	2.86	.058	.0548	.166	.013	.14	.023	.119	.034	.45	.04	.321	.048	.544	.053
45.00	2.921	.062	2.788	.074	2.591	.064	2.847	.071	.0678	.168	.015	.143	.026	.123	.038	.456	.046	.329	.056	.552	.061
50.00	2.913	.07	2.775	.087	2.582	.073	2.837	.081	.0778	.169	.016	.146	.029	.128	.043	.461	.051	.335	.062	.559	.068
55.00	2.903	.08	2.761	.101	2.565	.09	2.828	.09	.0903	.171	.018	.15	.033	.133	.048	.468	.058	.343	.07	.568	.077
60.00	2.893	.09	2.748	.114	2.551	.104	2.02	.098	.1015	.173	.02	.153	.036	.138	.053	.474	.064	.351	.078	.577	.086
65.00	2.882	.101	2.735	.127	2.538	.117	2.81	.108	.1133	.175	.022	.157	.04	.144	.059	.481	.071	.359	.086	.586	.095
70.00	2.869	.114	2.717	.145	2.519	.136	2.797	.121	.129	.176	.023	.16	.043	.149	.064	.488	.078	.365	.092	.594	.103
75.00	2.843	.14	2.694	.168	2.496	.159	2.776	.142	.1523	.178	.025	.164	.047	.153	.068	.494	.084	.372	.099	.602	.111
80.00	2.811	.172	2.653	.209	2.455	.2	2.741	.177	.1895	.179	.026	.168	.051	.159	.074	.5	.09	.379	.106	.609	.118
85.00	2.774	.209	2.61	.252	2.414	.241	2.702	.216	.2295	.181	.028	.171	.054	.163	.078	.505	.095	.385	.112	.614	.123
90.00	2.733	.25	2.56	.302	2.366	.289	2.655	.263	.276	.183	.03	.175	.058	.168	.083	.512	.102	.391	.118	.621	.13
95.00	2.7	.283	2.514	.348	2.325	.33	2.623	.295	.314	.185	.032	.179	.062	.174	.089	.517	.107	.397	.124	.625	.134
00.00	2.671	.312	2.484	.378	2.293	.362	2.592	.326	.3445	.186	.033	.182	.065	.178	.093	.522	.112	.403	.13	.63	.139
05.00	2.63	.353	2.432	.43	2.25	.405	2.555	.363	.3878	.188	.035	.186	.069	.184	.099	.529	.119	.409	.136	.637	.146
10.00	2.598	.385	2.391	.471	2.21	.445	2.522	.396	.4243	.189	.036	.189	.072	.189	.104	.535	.125	.415	.142	.643	.152
15.00	2.56	.423	2.339	.523	2.162	.493	2.48	.438	.4693	.191	.038	.193	.076	.195	.11	.541	.131	.421	.148	.649	.158
20.00	2.529	.454	2.294	.568	2.125	.53	2.442	.476	.507	.193	.04	.197	.08	.2	.115	.547	.137	.427	.154	.654	.163
25.00	2.499	.484	2.26	.602	2.089	.566	2.419	.499	.5378	.194	.041	.2	.083	.204	.119	.552	.142	.432	.159	.659	.168
30.00	2.455	.528	2.22	.642	2.047	.608	2.383	.535	.5783	.195	.042	.203	.086	.21	.125	.559	.149	.439	.166	.665	.174
35.00	2.413	.57	2.156	.706	1.981	.674	2.329	.589	.6348	.199	.046	.209	.092	.219	.134	.57	.16	.449	.176	.675	.184
40.00	2.375	.608	2.095	.767	1.927	.728	2.285	.633	.684	.2	.047	.213	.096	.225	.14	.576	.166	.456	.183	.682	.191
45.00	2.326	.657	2.03	.832	1.882	.773	2.254	.664	.7315	.201	.048	.217	.1	.231	.146	.585	.175	.465	.192	.689	.198
50.00	2.282	.701	1.965	.897	1.822	.833	2.209	.709	.785	.202	.049	.22	.103	.237	.152	.59	.18	.47	.197	.694	.203

OAD AT ROUND URFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.00	-1.01	0	2.477	-4.95	4.908	0	.0961	-.049	.1474	-.195	.0969	.3091	-.075	.1535	-.154	.0615
10.00	2.675	2.454	4.954	-2.48	2.454	2.477	.1450	-.049	.1474	-.097	-4e-4	.4665	-.075	.1535	-.077	-3e-4
15.00	6.360	4.908	7.431	7e-14	4.908	2.477	.1939	-.050	.1474	-.097	.0480	.6239	-.076	.1535	-.077	.0305
20.60	5.351	9.817	12.38	3e-14	9.817	4.954	.1957	-.051	.2457	-.194	.0960	.6295	-.078	.2559	-.153	.0609
25.00	9.035	12.27	14.86	4.954	12.27	7.431	.2446	-.051	.1966	-.145	.0956	.7869	-.078	.2047	-.114	.0607
30.00	12.72	17.18	17.34	7.431	17.18	7.431	.2464	-.003	.1966	-.193	.1925	.7926	-.005	.2047	-.152	.1222
35.00	16.40	19.63	22.29	9.907	19.63	7.431	.2953	-.053	.2457	-.192	.2410	.9500	-.080	.2559	-.152	.1529
40.00	15.39	24.54	27.25	14.66	19.63	12.38	.2971	-.053	.2457	-.094	.1432	.9556	-.082	.2559	-.074	.0908
45.00	19.08	27.00	29.72	19.81	24.54	12.38	.3460	-.054	.1966	-.093	.2401	1.113	-.082	.2047	-.074	.1524
50.00	18.07	31.90	34.68	19.81	27.00	14.86	.3478	-.055	.2949	-.142	.2397	1.119	-.084	.3070	-.112	.1521
55.00	21.75	36.81	37.15	24.77	29.45	17.34	.3495	-.007	.2457	-.092	.2392	1.124	-.010	.2559	-.073	.1518
60.00	25.44	39.27	42.11	27.25	34.36	19.81	.3985	-.056	.2949	-.140	.2872	1.282	-.086	.3070	-.111	.1823
65.00	29.12	44.17	47.06	29.72	36.81	22.29	.4002	-.057	.3440	-.140	.2868	1.287	-.087	.3582	-.111	.1820
70.60	28.11	49.08	52.01	34.68	34.36	27.25	.4020	-.058	.3440	.0063	.1405	1.293	-.089	.3582	.0050	.0891
75.00	31.80	53.99	52.01	39.63	36.81	29.72	.4038	.0390	.2457	.0556	.1400	1.299	.0597	.2559	.0439	.0889
80.00	30.79	61.35	56.97	39.63	39.27	29.72	.3584	.0866	.3440	.0072	.1885	1.153	.1324	.3582	.0057	.1196
85.00	34.47	63.81	59.44	42.11	41.72	27.25	.4073	.0862	.3440	.0076	.2859	1.310	.1317	.3582	.0060	.1814
90.00	38.16	68.72	61.92	47.06	39.27	29.72	.4091	.1342	.2949	.1539	.1885	1.316	.2052	.3070	.1215	.1196
95.00	41.84	73.62	66.88	44.58	41.72	24.77	.4108	.1333	.4423	.0565	.3348	1.321	.2038	.4605	.0446	.2125
00.00	40.83	78.53	69.35	47.06	44.17	22.29	.4126	.1813	.4423	.0570	.4322	1.327	.2772	.4605	.0450	.2743
05.00	44.52	83.44	74.31	49.54	41.72	24.77	.4143	.1804	.4914	.1544	.3348	1.333	.2758	.5117	.1219	.2125
10.00	43.51	88.35	79.26	52.01	41.72	24.77	.4161	.1795	.5406	.2033	.3348	1.338	.2745	.5629	.1605	.2125
15.00	47.19	93.26	84.21	52.01	41.72	24.77	.4179	.1786	.6389	.2033	.3348	1.344	.2731	.6652	.1605	.2125
20.00	50.88	98.17	86.69	54.49	41.72	22.29	.4196	.2266	.6389	.2522	.3837	1.350	.3465	.6652	.1991	.2435
25.00	49.87	103.1	89.17	56.97	41.72	22.29	.4214	.2747	.6389	.3011	.3837	1.355	.4199	.6652	.2377	.2435
30.00	48.86	108.0	96.60	59.44	41.72	19.81	.4232	.2248	.7372	.3501	.4326	1.361	.3438	.7676	.2764	.2745
35.00	61.93	112.9	104.0	64.40	39.27	19.81	.4249	.1750	.7863	.4964	.3842	1.367	.2676	.8188	.3919	.2438
40.00	60.92	120.3	109.0	64.40	41.72	19.81	.3795	.2226	.8846	.4479	.4326	1.221	.3403	.9211	.3536	.2745
45.00	59.91	127.6	113.9	71.83	41.72	14.86	.3341	.2702	.8354	.5946	.5305	1.075	.4131	.8699	.4694	.3366
50.00	58.90	132.5	121.4	69.35	41.72	14.86	.3359	.2204	1.032	.5457	.5305	1.080	.3369	1.075	.4308	.3366

OR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 75
INIMUM LOAD = 0
AXIMUM LOAD = 200
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
5.00	.0023	.0023	.0013	.0033	.0013	.0013
10.00	-.001	-.002	-.004	-.003	-.004	-.005
15.00	.0002	-.002	-.005	-.005	-.007	-.008
20.00	.0071	.0031	-.002	-.002	-.006	-.008
25.00	.0141	.0091	.0031	.0011	-.004	-.007
30.00	.0200	.0130	.0060	.0030	-.004	-.007
35.00	.0290	.0210	.0120	.0080	5e-5	-.003
40.00	.0424	.0324	.0214	.0154	.0074	.0024
45.00	.0535	.0425	.0305	.0225	.0125	.0075
50.00	.0625	.0495	.0355	.0275	.0165	.0105
55.00	.0731	.0581	.0431	.0331	.0211	.0141
60.00	.0824	.0664	.0494	.0384	.0244	.0164
65.00	.0923	.0743	.0553	.0433	.0283	.0193
70.00	.1071	.0871	.0661	.0521	.0381	.0271
75.00	.1284	.1064	.0854	.0694	.0544	.0424
80.00	.1647	.1397	.1167	.1007	.0847	.0727
85.00	.2028	.1768	.1528	.1358	.1188	.1078
90.00	.2474	.2194	.1944	.1754	.1594	.1474
95.00	.2835	.2535	.2265	.2085	.1915	.1815
100.00	.3131	.2811	.2531	.2341	.2161	.2071
105.00	.3544	.3204	.2904	.2704	.2534	.2434
110.00	.3900	.3540	.3220	.3010	.2840	.2740
115.00	.4330	.3950	.3610	.3400	.3230	.3130
120.00	.4689	.4289	.3939	.3719	.3549	.3459
125.00	.4987	.4567	.4207	.3977	.3807	.3717
130.00	.5383	.4943	.4553	.4313	.4143	.4063
135.00	.5989	.5449	.5029	.4769	.4609	.4529
140.00	.6392	.5902	.5462	.5202	.5032	.4952
145.00	.6858	.6338	.5878	.5588	.5418	.5358
150.00	.7383	.6843	.6353	.6073	.5903	.5843

: A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI

DAM COMPRESSION TEST 1-6

LOAD DISTRIBUTION CURVES

DATE DRIVEN =7 OCT 82

DATE TESTED =18 OCT 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	11.2	20.7	30.2	39.7	49.2	58.7
(INCHES)	134.4	248.4	362.4	476.4	590.4	704.4

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-2.85	-10.5	-20.0	-29.5	-39.0	-48.5
FOR PLOT PURPOSES ONLY	0	2.85	10.45	19.95	29.45	38.95	48.45

PILE AREA (SQ INCHES) = 21.4

YOUNGS MODULUS (TSI) = 15000

AXIAL LENGTH (FEET) = 53.7

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130

INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981

DEPTH TO WATER TABLE (FEET) = -7.5

PILE PERIMETER (INCHES) 56

GS TO TELLTALE DIALS (INCHES).................... 66

TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 11

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-5.7	-15.2	-24.7	-34.2	-43.7	-53.2
FOR PLOT PURPOSES ONLY	5.7	15.2	24.7	34.2	43.7	53.2
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3109	.6274	.8969	1.166	1.436	1.705

APPLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.274	0	.268	0	.256	0	.273	0	0	1.953	0	1.853	0	1.714	0	1.49	0	1.359	0	1.337	0
10.00	.279	.005	.270	.01	.262	.006	.284	.011	.008	1.951	.002	1.848	.005	1.707	.007	1.482	.008	1.351	.008	1.33	.007
20.00	.287	.013	.29	.022	.271	.015	.294	.021	.0178	1.948	.005	1.843	.01	1.7	.014	1.475	.015	1.342	.017	1.321	.016
30.00	.298	.024	.304	.036	.283	.027	.307	.034	.0303	1.944	.009	1.838	.015	1.692	.022	1.466	.024	1.334	.025	1.311	.026
40.00	.31	.036	.317	.049	.294	.038	.321	.048	.0428	1.943	.01	1.833	.02	1.685	.029	1.459	.031	1.324	.035	1.301	.036
50.00	.324	.05	.335	.067	.31	.054	.337	.064	.0588	1.94	.013	1.828	.025	1.677	.037	1.45	.04	1.314	.045	1.29	.047
60.00	.34	.066	.352	.084	.326	.07	.355	.082	.0755	1.939	.014	1.823	.03	1.67	.044	1.442	.048	1.304	.055	1.279	.058
70.00	.358	.084	.375	.107	.347	.091	.373	.1	.0955	1.935	.018	1.818	.035	1.662	.052	1.432	.058	1.293	.066	1.267	.07
80.00	.378	.104	.406	.138	.375	.119	.394	.121	.1205	1.933	.02	1.812	.041	1.653	.061	1.422	.068	1.28	.079	1.254	.083
90.00	.398	.124	.432	.164	.398	.142	.42	.147	.1443	1.93	.023	1.807	.046	1.646	.068	1.413	.077	1.269	.09	1.241	.096
100.00	.42	.146	.464	.196	.423	.167	.453	.18	.1723	1.93	.023	1.801	.052	1.637	.077	1.402	.088	1.256	.103	1.227	.11
110.00	.44	.166	.494	.226	.443	.187	.484	.211	.1975	1.928	.025	1.795	.058	1.629	.085	1.394	.096	1.247	.112	1.216	.121
120.00	.466	.192	.529	.261	.472	.216	.516	.243	.228	1.925	.028	1.789	.064	1.62	.094	1.383	.107	1.235	.124	1.202	.135
130.00	.488	.214	.561	.293	.495	.239	.547	.274	.255	1.922	.031	1.783	.07	1.613	.101	1.375	.115	1.226	.133	1.193	.144
140.00	.516	.242	.591	.323	.525	.269	.578	.305	.2848	1.92	.033	1.778	.075	1.605	.109	1.365	.125	1.215	.144	1.179	.158
150.00	.54	.266	.619	.351	.549	.293	.604	.331	.3103	1.918	.035	1.772	.081	1.598	.116	1.356	.134	1.205	.154	1.169	.168
160.00	.565	.291	.651	.383	.578	.322	.635	.362	.3395	1.915	.038	1.766	.087	1.589	.125	1.346	.144	1.193	.166	1.157	.18
170.00	.59	.316	.678	.41	.603	.347	.661	.388	.3653	1.911	.042	1.761	.092	1.582	.132	1.338	.152	1.184	.175	1.148	.189
180.00	.613	.339	.705	.437	.627	.371	.687	.414	.3903	1.906	.047	1.756	.097	1.574	.14	1.331	.159	1.175	.184	1.138	.199
190.00	.64	.366	.738	.47	.655	.399	.72	.447	.4205	1.901	.052	1.75	.103	1.565	.149	1.321	.169	1.163	.196	1.126	.211
200.00	.667	.393	.771	.503	.683	.427	.751	.478	.4503	1.9	.053	1.744	.109	1.557	.157	1.311	.179	1.152	.207	1.114	.223
210.00	.695	.421	.804	.536	.713	.457	.783	.51	.481	1.897	.056	1.738	.115	1.548	.166	1.302	.188	1.142	.217	1.103	.234
220.00	.721	.447	.836	.568	.741	.485	.814	.541	.5103	1.896	.057	1.731	.122	1.54	.174	1.293	.197	1.131	.228	1.092	.245
230.00	.752	.478	.87	.602	.771	.515	.847	.574	.5423	1.891	.062	1.725	.128	1.532	.182	1.283	.207	1.12	.239	1.08	.257
240.00	.777	.503	.902	.634	.799	.543	.878	.605	.5713	1.887	.066	1.719	.134	1.524	.19	1.274	.216	1.11	.249	1.07	.267
250.00	.807	.533	.938	.67	.83	.574	.913	.64	.6043	1.884	.069	1.713	.14	1.515	.199	1.264	.226	1.1	.259	1.058	.279
260.00	.837	.563	.973	.705	.861	.605	.947	.674	.6368	1.882	.071	1.707	.146	1.507	.207	1.254	.236	1.087	.272	1.045	.292
270.00	.871	.597	1.013	.745	.897	.641	.985	.712	.6738	1.878	.075	1.7	.153	1.498	.216	1.244	.246	1.076	.283	1.034	.303
280.00	.902	.628	1.053	.785	.929	.673	1.025	.752	.7095	1.87	.083	1.693	.16	1.488	.226	1.234	.256	1.065	.294	1.023	.314
290.00	.936	.662	1.096	.828	.966	.71	1.064	.791	.7478	1.868	.085	1.686	.167	1.479	.235	1.223	.267	1.052	.307	1.009	.328
300.00	.975	.701	1.139	.871	1.008	.752	1.11	.837	.7903	1.866	.087	1.678	.175	1.469	.245	1.212	.278	1.04	.319	.996	.341
310.00	1.014	.74	1.183	.915	1.048	.792	1.153	.88	.8318	1.86	.093	1.671	.182	1.46	.254	1.202	.288	1.028	.331	.982	.355
320.00	1.059	.785	1.235	.967	1.095	.839	1.203	.93	.8803	1.858	.095	1.663	.19	1.449	.265	1.19	.3	1.015	.344	.969	.368
330.00	1.11	.836	1.294	1.026	1.15	.894	1.263	.99	.9365	1.85	.103	1.655	.198	1.437	.277	1.176	.314	1	.359	.953	.384
340.00	1.162	.888	1.366	1.098	1.208	.952	1.328	1.055	.9983	1.845	.108	1.645	.208	1.425	.289	1.163	.327	.985	.374	.937	.4
350.00	1.215	.941	1.419	1.151	1.263	1.007	1.384	1.111	1.053	1.84	.113	1.637	.216	1.414	.3	1.151	.339	.972	.387	.924	.413
360.00	1.275	1.001	1.486	1.218	1.326	1.07	1.45	1.177	1.117	1.839	.114	1.628	.225	1.402	.312	1.138	.352	.958	.401	.908	.429
370.00	1.341	1.067	1.559	1.291	1.394	1.138	1.519	1.246	1.186	1.831	.122	1.619	.234	1.39	.324	1.125	.365	.944	.415	.892	.445
380.00	1.413	1.139	1.636	1.368	1.466	1.21	1.596	1.323	1.26	1.83	.123	1.61	.243	1.378	.336	1.11	.38	.93	.429	.876	.461
390.00	1.497	1.223	1.73	1.462	1.555	1.299	1.69	1.417	1.350	1.825	.128	1.598	.255	1.363	.351	1.094	.396	.915	.444	.857	.48
400.00	1.655	1.381	1.89	1.622	1.717	1.461	1.84	1.567	1.508	1.814	.139	1.584	.269	1.346	.368	1.072	.418	.895	.464	.835	.502

.OAD AT ROUND URFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.00	-.263	8.447	5.632	2.816	0	-2.82	.0318	.0635	.0635	.0635	.0635	.1024	.1012	.0708	.0545	.0442
20.00	4.167	14.08	11.26	2.816	5.632	-2.82	.1214	.0635	.1905	-.064	.1905	.3985	.1012	.2124	-.054	.1327
30.00	13.29	16.89	19.71	5.632	2.816	2.816	.2687	-.064	.3176	.0635	1e-14	.8644	-.101	.3541	.0545	1e-14
40.00	8.333	28.16	25.34	5.632	11.26	2.816	.2428	.0635	.4446	-.127	.1905	.7811	.1012	.4957	-.109	.1327
50.00	12.76	33.79	33.79	8.447	14.08	5.632	.3324	1e-14	.5716	-.127	.1905	1.069	2e-14	.6373	-.109	.1327
60.00	7.007	45.05	39.42	11.26	19.71	8.447	.3065	.1270	.6351	-.191	.2541	.9859	.2025	.7082	-.163	.1770
70.00	16.93	47.87	47.87	16.89	22.53	11.26	.4538	1e-14	.6987	-.127	.2541	1.460	2e-14	.7790	-.109	.1770
80.00	16.67	59.13	56.32	19.71	30.97	11.26	.4279	.0635	.8257	-.254	.4446	1.376	.1012	.9206	-.218	.3097
90.00	21.10	64.76	61.95	25.34	36.61	16.89	.5175	.0635	.8257	-.254	.4446	1.665	.1012	.9206	-.218	.3097
00.00	11.45	81.66	70.39	30.97	42.24	19.71	.3761	.2541	.8892	-.254	.5081	1.210	.4049	.9914	-.218	.3539
10.00	11.18	92.92	76.03	30.97	45.05	25.34	.3502	.3811	1.016	-.318	.4446	1.127	.6074	1.133	-.272	.3097
20.00	15.61	101.4	84.47	36.61	47.87	30.97	.3821	.3811	1.080	-.254	.3811	1.229	.6074	1.204	-.218	.2654
30.00	20.04	109.8	87.29	39.42	50.68	30.97	.4139	.5081	1.080	-.254	.4446	1.331	.8098	1.204	-.218	.3097
40.00	19.70	118.3	95.74	45.05	53.5	39.42	.4457	.5081	1.143	-.191	.3176	1.434	.8098	1.275	-.163	.2212
50.00	19.52	129.5	98.55	50.68	56.32	39.42	.4198	.6987	1.080	-.127	.3811	1.350	1.113	1.204	-.109	.2654
60.00	23.95	138.0	107	53.5	61.95	39.42	.4517	.6987	1.207	-.191	.5081	1.453	1.113	1.346	-.163	.3539
70.00	33.07	140.8	112.6	56.32	64.76	39.42	.5990	.6351	1.270	-.191	.5716	1.927	1.012	1.416	-.163	.3981
80.00	46.89	140.8	121.1	53.5	70.39	42.24	.8040	.4446	1.524	-.381	.6351	2.586	.7086	1.700	-.327	.4424
90.00	60.70	143.6	129.5	56.32	76.03	42.24	.9514	.3176	1.651	-.445	.7622	3.060	.5061	1.841	-.381	.5309
00.00	55.75	157.7	135.2	61.95	78.84	45.05	.8677	.5081	1.651	-.381	.7622	2.791	.8098	1.841	-.327	.5309
10.00	60.18	166.1	143.6	61.95	81.66	47.87	.8996	.5081	1.842	-.445	.7622	2.894	.8098	2.054	-.381	.5309
20.00	55.22	183.0	146.4	64.76	87.29	47.87	.7582	.8257	1.842	-.508	.8892	2.439	1.316	2.054	-.436	.6193
30.00	69.04	185.8	152.1	70.39	90.11	50.68	.9055	.7622	1.842	-.445	.8892	2.913	1.215	2.054	-.381	.6193
40.00	70.16	191.5	157.7	73.21	92.92	50.68	.9951	.7622	1.905	-.445	.9527	3.201	1.215	2.124	-.381	.6636
50.00	82.59	199.9	166.1	76.03	92.92	56.32	1.027	.7622	2.032	-.381	.8257	3.303	1.215	2.266	-.327	.5751
60.00	82.32	211.2	171.8	81.66	101.4	56.32	1.001	.8892	2.032	-.445	1.016	3.220	1.417	2.266	-.381	.7078
70.00	91.45	219.6	177.4	84.47	104.2	56.32	1.033	.9527	2.096	-.445	1.080	3.322	1.518	2.337	-.381	.7520
80.00	119.3	216.8	185.8	84.47	107	56.32	1.296	.6987	2.287	-.508	1.143	4.168	1.113	2.549	-.436	.7963
90.00	119.1	230.9	191.5	90.11	112.6	59.13	1.212	.8892	2.287	-.508	1.207	3.899	1.417	2.549	-.436	.8405
00.00	118.8	247.8	197.1	92.92	115.4	61.95	1.071	1.143	2.350	-.508	1.207	3.444	1.822	2.620	-.436	.8405
10.00	137.3	250.6	202.7	95.74	121.1	67.58	1.218	1.080	2.414	-.572	1.207	3.918	1.721	2.691	-.490	.8405
20.00	137.1	267.5	211.2	98.55	123.9	67.58	1.077	1.270	2.541	-.572	1.270	3.463	2.025	2.833	-.490	.8848
30.00	165.0	267.5	222.4	104.2	126.7	70.39	1.282	1.016	2.668	-.508	1.270	4.122	1.620	2.974	-.436	.8848
40.00	170.8	281.6	228.1	107	132.3	73.21	1.198	1.207	2.731	-.572	1.334	3.853	1.923	3.045	-.490	.9290
50.00	192.6	290.0	236.5	109.8	135.2	73.21	1.230	1.207	2.858	-.572	1.397	3.956	1.923	3.187	-.490	.9732
60.00	187.6	312.6	245.0	112.6	138.0	78.84	.9729	1.524	2.985	-.572	1.334	3.130	2.429	3.328	-.490	.9290
70.00	215.5	315.4	253.4	115.4	140.8	84.47	1.120	1.397	3.112	-.572	1.270	3.603	2.227	3.470	-.490	.8848
80.00	210.6	337.9	261.9	123.9	138.0	90.11	.8634	1.715	3.112	-.318	1.080	2.777	2.733	3.470	-.272	.7520
90.00	224.4	357.6	270.3	126.7	135.2	101.4	.6643	1.969	3.239	-.191	.7622	2.137	3.138	3.612	-.163	.5309
00.00	266.4	366.1	278.8	140.8	129.5	107	.6961	1.969	3.112	.2541	.5081	2.239	3.138	3.470	.2178	.3539
.00	150.2	78.84	33.79	-42.2	-2.82	-16.9	-1.62	1.016	1.715	-.889	.3176	-5.20	1.620	1.912	-.762	.2212

: A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA
M :: AN :: AO :

FOR VIEW 1
MINIMUM DEPTH = 0
MAXIMUM DEPTH= 75
MINIMUM LOAD = 0
MAXIMUM LOAD = 500
LOAD IN TONS
DEPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
10.00	.0063	.0033	.0013	.0003	.0003	.0013
20.00	.0134	.0084	.0044	.0034	.0014	.0024
30.00	.0223	.0163	.0093	.0073	.0063	.0053
40.00	.0341	.0241	.0151	.0131	.0091	.0081
50.00	.0475	.0355	.0235	.0205	.0155	.0135
60.00	.0636	.0476	.0336	.0296	.0226	.0196
70.00	.0799	.0629	.0459	.0399	.0319	.0279
80.00	.1032	.0822	.0622	.0552	.0442	.0402
90.00	.1243	.1013	.0793	.0703	.0573	.0513
100.00	.1527	.1237	.0987	.0877	.0727	.0657
110.00	.1763	.1433	.1163	.1053	.0893	.0803
120.00	.2041	.1681	.1381	.1251	.1081	.0971
130.00	.2285	.1895	.1585	.1445	.1265	.1155
140.00	.2565	.2145	.1805	.1645	.1455	.1315
150.00	.2804	.2344	.1994	.1814	.1614	.1474
160.00	.3070	.2580	.2200	.2010	.1790	.1650
170.00	.3291	.2791	.2391	.2191	.1961	.1821
180.00	.3494	.2994	.2564	.2374	.2124	.1974
190.00	.3750	.3240	.2780	.2580	.2310	.2160
200.00	.4041	.3481	.3001	.2781	.2501	.2341
210.00	.4322	.3732	.3222	.3002	.2712	.2542
220.00	.4608	.3958	.3438	.3208	.2898	.2728
230.00	.4881	.4221	.3681	.3431	.3111	.2931
240.00	.5135	.4455	.3895	.3635	.3305	.3125
250.00	.5438	.4728	.4138	.3868	.3538	.3338
260.00	.5747	.4997	.4387	.4097	.3737	.3537
270.00	.6080	.5300	.4670	.4370	.4000	.3800
280.00	.6361	.5591	.4931	.4631	.4251	.4051
290.00	.6727	.5907	.5227	.4907	.4507	.4297
300.00	.7135	.6255	.5555	.5225	.4815	.4595
310.00	.7494	.6604	.5884	.5544	.5114	.4874
320.00	.7962	.7012	.6262	.5912	.5472	.5232
330.00	.8448	.7498	.6708	.6338	.5888	.5638
340.00	.9019	.8019	.7209	.6829	.6359	.6099
350.00	.9515	.8485	.7645	.7255	.6775	.6515
360.00	1.015	.9038	.8168	.7768	.7278	.6998
370.00	1.076	.9642	.8742	.8332	.7832	.7532
380.00	1.150	1.030	.9370	.8930	.8440	.8120
390.00	1.236	1.109	1.013	.9676	.9196	.8836
400.00	1.382	1.252	1.153	1.103	1.057	1.019
.00	.9035	.8755	.8635	.8785	.8795	.8855

A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI

AM COMPRESSION TEST 1-7

OAD DISTRIBUTION CURVES

ATE DRIVEN =24 SEPT 82

ATE TESTED =4 OCT 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	9.68	20.58	31.38	42.18	53.08	63.88
(INCHES)	116.2	247.0	376.6	506.16	637.0	766.6

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-2.15	-9.76	-20.6	-31.4	-42.3	-53.1
FOR PLOT PURPOSES ONLY	0	2.153	9.755	20.61	31.41	42.26	53.11

ILE AREA (SQ INCHES) = 21.4

OUNGS MODULUS (TSI) = 15000

XIAL LENGTH (FEET) = 59

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130

INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981

DEPTH TO WATER TABLE (FEET) = -7

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-4.31	-15.2	-26.0	-36.8	-47.7	-58.5
FOR PLOT PURPOSES ONLY	4.305	15.21	26.01	36.81	47.71	58.51
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.2348	.6145	.9208	1.227	1.536	1.843

ILE PERIMETER (INCHES) 56

S TO TELLTALE DIALS (INCHES)................... 64.5 TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 13

PPLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.36	0	.271	0	.358	0	.228	0	0	1.547	0	1.577	0	1.439	0	1.564	0	1.492	0	1.576	0
10.00	.37	.01	.275	.004	.364	.006	.225	.003	.0058	1.559	.012	1.575	.002	1.434	.005	1.558	.006	1.484	.008	1.569	.007
20.00	.38	.02	.28	.009	.374	.016	.244	.016	.0153	1.546	.001	1.57	.007	1.428	.011	1.551	.013	1.474	.018	1.56	.016
30.00	.392	.032	.29	.019	.385	.027	.254	.026	.026	1.546	.001	1.565	.012	1.422	.017	1.541	.023	1.465	.027	1.549	.027
40.00	.404	.044	.299	.028	.397	.039	.265	.037	.037	1.545	.002	1.56	.017	1.414	.025	1.532	.032	1.455	.037	1.538	.038
50.00	.418	.058	.309	.038	.409	.051	.276	.048	.0488	1.543	.004	1.555	.022	1.408	.031	1.523	.041	1.446	.046	1.527	.049
60.00	.433	.073	.322	.051	.423	.065	.29	.062	.0628	1.541	.006	1.55	.027	1.4	.039	1.513	.051	1.435	.057	1.515	.061
70.00	.448	.088	.335	.064	.437	.079	.303	.075	.0765	1.539	.008	1.546	.031	1.393	.046	1.504	.06	1.424	.068	1.503	.073
80.00	.464	.104	.35	.079	.453	.095	.318	.09	.092	1.537	.01	1.541	.036	1.385	.054	1.494	.07	1.412	.08	1.49	.086
90.00	.484	.124	.367	.096	.473	.115	.336	.108	.1108	1.535	.012	1.535	.042	1.378	.061	1.482	.082	1.398	.094	1.473	.103
100.00	.502	.142	.384	.113	.495	.137	.352	.124	.129	1.532	.015	1.53	.047	1.369	.07	1.471	.093	1.384	.108	1.458	.118
110.00	.52	.16	.399	.128	.517	.159	.364	.136	.1458	1.53	.017	1.525	.052	1.361	.078	1.46	.104	1.371	.121	1.444	.132
120.00	.538	.178	.422	.151	.538	.18	.379	.151	.165	1.529	.018	1.52	.057	1.353	.086	1.448	.116	1.359	.133	1.429	.147
130.00	.555	.195	.441	.17	.561	.203	.393	.165	.1833	1.528	.019	1.515	.062	1.345	.094	1.438	.126	1.346	.146	1.415	.161
140.00	.573	.213	.458	.187	.58	.222	.409	.181	.2008	1.525	.022	1.51	.067	1.338	.101	1.426	.138	1.334	.158	1.4	.176
150.00	.59	.23	.474	.203	.598	.24	.424	.196	.2173	1.522	.025	1.505	.072	1.331	.108	1.417	.147	1.322	.17	1.388	.188
160.00	.609	.249	.493	.222	.62	.262	.441	.213	.2365	1.52	.027	1.5	.077	1.322	.117	1.405	.159	1.308	.184	1.371	.205
170.00	.627	.267	.509	.238	.64	.282	.456	.228	.2538	1.518	.029	1.495	.082	1.314	.125	1.394	.17	1.295	.197	1.357	.219
180.00	.646	.286	.525	.254	.661	.303	.469	.241	.271	1.516	.031	1.49	.087	1.307	.132	1.382	.182	1.282	.21	1.342	.234
190.00	.667	.307	.541	.27	.685	.327	.484	.256	.29	1.515	.032	1.485	.092	1.299	.14	1.371	.193	1.268	.224	1.327	.249
200.00	.684	.324	.557	.286	.706	.348	.496	.268	.3065	1.512	.035	1.48	.097	1.292	.147	1.36	.204	1.255	.237	1.312	.264
210.00	.704	.344	.572	.301	.726	.368	.51	.282	.3238	1.51	.037	1.475	.102	1.284	.155	1.35	.214	1.243	.249	1.298	.278
220.00	.723	.363	.587	.316	.746	.388	.525	.297	.341	1.508	.039	1.47	.107	1.278	.161	1.339	.225	1.23	.262	1.283	.293
230.00	.742	.382	.599	.328	.767	.409	.538	.31	.3573	1.506	.041	1.465	.112	1.269	.17	1.328	.236	1.218	.274	1.268	.308
240.00	.764	.404	.622	.351	.79	.432	.559	.331	.3795	1.503	.044	1.459	.118	1.259	.18	1.315	.249	1.202	.29	1.25	.326
250.00	.782	.422	.635	.364	.81	.452	.572	.344	.3955	1.5	.047	1.454	.123	1.252	.187	1.304	.26	1.19	.302	1.235	.341
260.00	.8	.44	.648	.377	.828	.47	.585	.357	.411	1.498	.049	1.449	.128	1.246	.193	1.294	.27	1.179	.313	1.223	.353
270.00	.822	.462	.665	.394	.848	.49	.602	.374	.43	1.497	.05	1.443	.134	1.237	.202	1.282	.282	1.165	.327	1.206	.37
280.00	.841	.481	.68	.409	.868	.51	.618	.39	.4475	1.494	.053	1.437	.14	1.229	.21	1.273	.291	1.153	.339	1.191	.385
290.00	.86	.5	.696	.425	.887	.529	.634	.406	.465	1.491	.056	1.431	.146	1.221	.218	1.262	.302	1.14	.352	1.176	.4
300.00	.878	.518	.715	.444	.907	.549	.65	.422	.4833	1.488	.059	1.426	.151	1.212	.227	1.251	.313	1.127	.365	1.16	.416
310.00	.9	.54	.732	.461	.93	.572	.669	.441	.5035	1.486	.061	1.42	.157	1.203	.236	1.239	.325	1.114	.378	1.143	.433
320.00	.923	.563	.748	.477	.948	.59	.683	.455	.5213	1.481	.066	1.412	.165	1.194	.245	1.229	.335	1.101	.391	1.128	.448
330.00	.937	.577	.766	.495	.972	.614	.7	.472	.5395	1.478	.069	1.407	.17	1.185	.254	1.217	.347	1.089	.403	1.111	.465
340.00	.954	.594	.782	.511	.992	.634	.718	.49	.5573	1.476	.071	1.4	.177	1.176	.263	1.205	.359	1.075	.417	1.094	.482
350.00	.972	.612	.797	.526	1.015	.657	.739	.511	.5765	1.472	.075	1.393	.184	1.165	.274	1.193	.371	1.062	.43	1.076	.5
360.00	.994	.634	.823	.552	1.035	.677	.759	.531	.5985	1.468	.079	1.385	.192	1.155	.284	1.18	.384	1.048	.444	1.057	.519
370.00	1.021	.661	.843	.572	1.058	.7	.78	.552	.6213	1.459	.088	1.378	.199	1.144	.295	1.168	.396	1.035	.457	1.04	.536
380.00	1.064	.704	.875	.604	1.093	.735	.814	.586	.6573	1.456	.091	1.369	.208	1.132	.307	1.155	.409	1.021	.471	1.022	.554
390.00	1.088	.728	.896	.625	1.115	.757	.835	.607	.6793	1.451	.096	1.36	.217	1.12	.319	1.142	.422	1.006	.486	1.003	.573

AVERAGE DEVELOPED SHEAR STRESS (TSF)

OAD AT ROUND URFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT						AVERAGE DEVELOPED SHEAR STRESS (TSF)					% OF ESTIMATED SHEAR STRENGTH				
	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.00	62.08	-24.5	7.431	2.477	4.908	-2.48	.7588	-.631	.0983	-.048	.1459	3.232	-1.03	.1067	-.039	.0949
20.00	-18.8	14.72	9.907	4.954	12.27	-4.95	.1159	.0951	.0983	-.145	.3402	.4935	.1548	.1067	-.118	.2214
30.00	-31.2	27.00	12.38	14.86	9.817	>>>>>	.0660	.2886	-.049	.0996	.1939	.2811	.4696	-.053	.0812	.1262
40.00	-37.5	36.81	19.81	17.34	12.27	2.477	.0700	.3357	.0491	.1001	.1934	.2983	.5463	.0534	.0816	.1259
50.00	-37.6	44.17	22.29	24.77	12.27	7.431	.1280	.4322	-.049	.2468	.0956	.5450	.7033	-.053	.2011	.0622
60.00	-37.6	51.54	29.72	29.72	14.72	9.907	.1859	.4308	>>>>>	.2962	.0951	.7918	.7011	>>>>>	.2414	.0619
70.00	-37.7	56.44	37.15	34.68	19.63	12.38	.2978	.3810	.0491	.2971	.1432	1.268	.6200	.0534	.2421	.0932
80.00	-37.7	63.81	44.58	39.63	24.54	14.86	.3557	.3797	.0983	.2980	.1912	1.515	.6179	.1067	.2428	.1244
90.00	-37.8	73.62	47.06	52.01	29.45	22.29	.3597	.5246	-.098	.4456	.1414	1.532	.8538	-.107	.3632	.0920
00.00	-31.6	78.53	56.97	56.97	36.81	24.77	.4716	.4259	>>>>>	.3981	.2379	2.008	.6931	>>>>>	.3244	.1548
10.00	-31.7	85.89	64.40	64.40	41.72	27.25	.5295	.4245	>>>>>	.4479	.2859	2.255	.6909	>>>>>	.3650	.1861
20.00	-38.0	95.71	71.83	74.31	41.72	34.68	.5336	.4717	-.049	.6436	.1391	2.272	.7676	-.053	.5244	.0906
30.00	-44.3	105.5	79.26	79.26	49.08	37.15	.5376	.5188	>>>>>	.5960	.2356	2.290	.8443	>>>>>	.4857	.1534
40.00	-38.1	110.4	84.21	91.64	49.08	44.58	.6494	.5179	-.147	.8406	.0889	2.766	.8428	-.160	.6850	.0578
50.00	-31.9	115.3	89.17	96.60	56.44	44.58	.7613	.5170	-.147	.7930	.2343	3.242	.8413	-.160	.6462	.1525
60.00	-32.0	122.7	99.07	104.0	61.35	52.01	.8192	.4667	-.098	.8428	.1845	3.489	.7595	-.107	.6868	.1201
70.00	-32.1	130.1	106.5	111.5	66.26	54.49	.8772	.4654	-.098	.8926	.2325	3.736	.7573	-.107	.7274	.1513
80.00	-32.1	137.4	111.5	123.8	68.72	59.44	.9351	.5130	-.246	1.089	.1831	3.983	.8348	-.267	.8872	.1192
90.00	-38.4	147.2	118.9	131.3	76.08	61.92	.9391	.5601	-.246	1.090	.2796	4.000	.9114	-.267	.8883	.1820
00.00	-32.2	152.2	123.8	141.2	80.99	66.88	1.051	.5592	-.344	1.189	.2787	4.476	.9100	-.374	.9688	.1814
10.00	-32.3	159.5	131.3	146.1	85.89	71.83	1.109	.5578	-.295	1.190	.2778	4.723	.9078	-.320	.9695	.1808
20.00	-32.3	166.9	133.8	158.5	90.80	76.78	1.167	.6543	-.491	1.337	.2769	4.970	1.065	-.534	1.090	.1802
30.00	-32.4	174.2	143.7	163.5	93.26	84.21	1.225	.6041	-.393	1.387	.1786	5.216	.9830	-.427	1.130	.1163
40.00	-26.2	181.6	153.6	170.9	100.6	89.17	1.283	.5538	-.344	1.388	.2262	5.463	.9012	-.374	1.131	.1472
50.00	-20.1	186.5	158.5	180.8	103.1	96.60	1.395	.5529	-.442	1.535	.1279	5.939	.8998	-.480	1.251	.0833
60.00	-20.2	193.9	161.0	190.7	105.5	99.07	1.453	.6494	-.590	1.682	.1275	6.186	1.057	-.640	1.371	.0830
70.00	-26.4	206.1	168.4	198.1	110.4	106.5	1.403	.7450	-.590	1.732	.0776	5.974	1.212	-.640	1.412	.0505
80.00	-20.3	213.5	173.4	200.6	117.8	113.9	1.461	.7926	-.541	1.636	.0763	6.221	1.290	-.587	1.333	.0497
90.00	-14.1	220.9	178.3	208.1	122.7	118.9	1.519	.8401	-.590	1.686	.0754	6.467	1.367	-.640	1.374	.0491
00.00	-7.96	225.8	188.2	213.0	127.6	126.3	1.630	.7414	-.491	1.687	.0256	6.944	1.206	-.534	1.374	.0167
10.00	-8.01	235.6	195.7	220.4	130.1	136.2	1.634	.7885	-.491	1.785	-.122	6.961	1.283	-.534	1.454	-.079
20.00	10.57	243.0	198.1	222.9	137.4	141.2	1.692	.8850	-.491	1.688	-.074	7.208	1.440	-.534	1.376	-.048
30.00	16.72	247.9	208.1	230.3	137.4	153.6	1.804	.7863	-.442	1.835	-.319	7.684	1.280	-.480	1.495	-.207
40.00	16.67	260.1	213.0	237.8	142.3	161.0	1.754	.9308	-.491	1.885	-.368	7.472	1.515	-.534	1.536	-.240
50.00	29.04	267.5	222.9	240.3	144.8	173.4	1.812	.8805	-.344	1.885	-.565	7.718	1.433	-.374	1.536	-.367
60.00	41.41	277.3	227.9	247.7	147.2	185.8	1.816	.9766	-.393	1.984	-.761	7.735	1.589	-.427	1.617	-.495
70.00	84.84	272.4	237.8	250.2	149.7	195.7	2.144	.6839	-.246	1.984	-.908	9.130	1.113	-.267	1.617	-.591
80.00	91.00	287.1	245.2	252.6	152.2	205.6	2.040	.8280	-.147	1.985	-1.06	8.688	1.347	-.160	1.617	-.687
90.00	109.6	296.9	252.6	255.1	157.1	215.5	2.044	.8751	-.049	1.937	-1.15	8.705	1.424	-.053	1.578	-.751
00.00	115.7	316.6	257.6	257.6	166.9	218.0	1.832	1.165	>>>>>	1.792	-1.01	7.804	1.896	>>>>>	1.460	-.657

OR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 75
INIMUM LOAD = .0
AXIMUM LOAD = 500
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
NIMUM MOVEMENT = 0
XIMUM MOVEMENT = 3
NIMUM % STRESS TO STRENGTH = 0
XIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
VEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
10.00	-.006	.0042	.0012	.0002	-.002	-.001
20.00	.0151	.0091	.0051	.0031	-.002	.0001
30.00	.0262	.0152	.0102	.0042	.0002	.0002
40.00	.0366	.0216	.0136	.0066	.0016	.0006
50.00	.0468	.0288	.0198	.0098	.0048	.0018
60.00	.0592	.0382	.0262	.0142	.0082	.0042
70.00	.0713	.0483	.0333	.0193	.0113	.0063
80.00	.0852	.0592	.0412	.0252	.0152	.0092
90.00	.1024	.0724	.0534	.0324	.0204	.0114
100.00	.1180	.0860	.0630	.0400	.0250	.0150
110.00	.1332	.0982	.0722	.0462	.0292	.0182
120.00	.1519	.1129	.0839	.0539	.0369	.0229
130.00	.1695	.1265	.0945	.0625	.0425	.0275
140.00	.1844	.1394	.1054	.0684	.0484	.0304
150.00	.1983	.1513	.1153	.0763	.0533	.0353
160.00	.2160	.1660	.1260	.0840	.0590	.0380
170.00	.2316	.1786	.1356	.0906	.0636	.0416
180.00	.2473	.1913	.1463	.0963	.0683	.0443
190.00	.2657	.2057	.1577	.1047	.0737	.0487
200.00	.2796	.2176	.1676	.1106	.0776	.0506
210.00	.2953	.2303	.1773	.1183	.0833	.0543
220.00	.3109	.2429	.1889	.1249	.0879	.0569
230.00	.3256	.2546	.1966	.1306	.0926	.0586
240.00	.3452	.2712	.2092	.1402	.0992	.0632
250.00	.3586	.2826	.2186	.1456	.1036	.0646
260.00	.3725	.2935	.2285	.1515	.1085	.0685
270.00	.3909	.3069	.2389	.1589	.1139	.0709
280.00	.4058	.3188	.2488	.1678	.1198	.0738
290.00	.4207	.3307	.2587	.1747	.1247	.0767
300.00	.4364	.3444	.2684	.1824	.1304	.0794
310.00	.4551	.3591	.2801	.1911	.1381	.0831
320.00	.4682	.3692	.2892	.1992	.1432	.0862
330.00	.4839	.3829	.2989	.2059	.1499	.0879
340.00	.5000	.3940	.3080	.2120	.1540	.0890
350.00	.5157	.4067	.3167	.2197	.1607	.0907
360.00	.5341	.4211	.3291	.2291	.1691	.0941
370.00	.5482	.4372	.3412	.2402	.1792	.1002
380.00	.5816	.4646	.3656	.2636	.2016	.1186
390.00	.5990	.4780	.3760	.2730	.2090	.1220
400.00	.6269	.4979	.3939	.2899	.2219	.1339

: A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI :: AJ :: AK :: AL

DAM COMPRESSION TEST 1-8
LOAD DISTRIBUTION CURVES

DATE DRIVEN =22 SEPT 82
DATE TESTED =27 SEPT 82

LENGTH OF TELLTALE RODS

	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6	GROUND SURFACE
(FEET)	8.3	20.2	32	43.8	55.7	67.5	SURFACE
(INCHES)	99.6	242.4	384	525.6	668.4	810	0
FOR PLOT PURPOSES ONLY							0

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)

	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	-1.05	-0.04	-19.9	-31.7	-43.5	-55.4
FOR PLOT PURPOSES ONLY	1.046	0.042	19.89	31.69	43.54	55.39

PILE AREA (SQ INCHES) = 21.4
YOUNGS MODULUS (TSI) = 15000
AXIAL LENGTH (FEET) = 68
PILE PERIMETER (INCHES) 56
...S TO TELLTALE DIALS (INCHES).................. 74.5

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -7.5
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 11

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)

	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-2.09	-14.0	-25.8	-37.6	-49.5	-61.3
FOR PLOT PURPOSES ONLY	2.092	13.99	25.79	37.59	49.49	61.29
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.1141	.5932	.9278	1.263	1.600	1.935

APPLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.476	0	.445	0	.496	0	.495	0	0	1.57	0	1.519	0	1.47	0	1.577	0	1.723	0	1.586	0
10.00	.484	.008	.45	.005	.502	.006	.5	.005	.006	1.568	.002	1.516	.003	1.466	.004	1.573	.004	1.721	.002	1.582	.004
20.00	.493	.017	.457	.012	.511	.015	.508	.013	.0143	1.565	.005	1.511	.008	1.46	.01	1.566	.011	1.713	.01	1.574	.012
30.00	.506	.03	.468	.023	.524	.028	.519	.024	.0263	1.562	.008	1.506	.013	1.453	.017	1.556	.021	1.703	.02	1.563	.023
40.00	.521	.045	.48	.035	.538	.042	.53	.035	.0393	1.559	.011	1.5	.019	1.445	.025	1.547	.03	1.692	.031	1.551	.035
50.00	.534	.058	.492	.047	.551	.055	.542	.047	.0518	1.555	.015	1.494	.025	1.437	.033	1.538	.039	1.68	.043	1.539	.047
60.00	.55	.074	.507	.062	.566	.07	.556	.061	.0668	1.552	.018	1.488	.031	1.429	.041	1.527	.05	1.668	.055	1.525	.061
70.00	.567	.091	.524	.079	.583	.087	.571	.076	.0833	1.55	.02	1.482	.037	1.42	.05	1.515	.062	1.654	.069	1.509	.077
80.00	.584	.108	.541	.096	.6	.104	.589	.094	.1005	1.546	.024	1.476	.043	1.411	.059	1.504	.073	1.64	.083	1.493	.093
90.00	.603	.127	.559	.114	.62	.124	.606	.111	.119	1.543	.027	1.469	.05	1.402	.068	1.492	.085	1.626	.097	1.477	.109
100.00	.622	.146	.577	.132	.64	.144	.623	.128	.1375	1.54	.03	1.463	.056	1.393	.077	1.479	.098	1.613	.11	1.46	.126
110.00	.645	.169	.597	.152	.661	.165	.642	.147	.1583	1.537	.033	1.457	.062	1.383	.087	1.466	.111	1.599	.124	1.441	.145
120.00	.665	.189	.615	.17	.682	.186	.661	.166	.1778	1.534	.036	1.451	.068	1.374	.096	1.454	.123	1.583	.14	1.425	.161
130.00	.683	.207	.632	.187	.701	.205	.677	.182	.1953	1.531	.039	1.445	.074	1.366	.104	1.444	.133	1.569	.154	1.409	.177
140.00	.704	.228	.651	.206	.722	.226	.694	.199	.2148	1.528	.042	1.439	.08	1.357	.113	1.431	.146	1.554	.169	1.393	.193
150.00	.722	.246	.668	.223	.741	.245	.71	.215	.2323	1.525	.045	1.433	.086	1.348	.122	1.42	.157	1.541	.182	1.376	.21
160.00	.745	.269	.682	.237	.766	.27	.719	.224	.25	1.523	.047	1.428	.091	1.34	.13	1.407	.17	1.527	.196	1.358	.228
170.00	.763	.287	.699	.254	.786	.29	.735	.24	.2678	1.52	.05	1.423	.096	1.332	.138	1.396	.181	1.515	.208	1.344	.242
180.00	.781	.305	.715	.27	.805	.309	.751	.256	.285	1.517	.053	1.417	.102	1.323	.147	1.385	.192	1.501	.222	1.327	.259
190.00	.803	.327	.735	.29	.826	.33	.77	.275	.3055	1.514	.056	1.41	.109	1.314	.156	1.371	.206	1.485	.238	1.309	.277
200.00	.822	.346	.751	.306	.846	.35	.787	.292	.3235	1.511	.059	1.404	.115	1.305	.165	1.36	.217	1.471	.252	1.293	.293
210.00	.042	.366	.769	.324	.865	.369	.8	.305	.341	1.508	.062	1.398	.121	1.295	.175	1.348	.229	1.457	.266	1.276	.31
220.00	.062	.386	.786	.341	.885	.389	.819	.324	.36	1.505	.065	1.392	.127	1.207	.183	1.337	.24	1.444	.279	1.261	.325
230.00	.08	.404	.803	.358	.904	.408	.836	.341	.3778	1.502	.068	1.386	.133	1.278	.192	1.326	.251	1.43	.293	1.246	.34
240.00	.899	.423	.821	.376	.923	.427	.853	.358	.396	1.499	.071	1.38	.139	1.269	.201	1.314	.263	1.416	.307	1.229	.357
250.00	.917	.441	.838	.393	.942	.446	.87	.375	.4138	1.496	.074	1.374	.145	1.26	.21	1.302	.275	1.403	.32	1.212	.374
260.00	.936	.46	.855	.41	.96	.464	.887	.392	.4315	1.493	.077	1.367	.152	1.251	.219	1.291	.286	1.389	.334	1.196	.39
270.00	.955	.479	.872	.427	.98	.484	.9	.405	.4488	1.49	.08	1.361	.158	1.242	.228	1.278	.299	1.373	.35	1.179	.407
280.00	.974	.498	.89	.445	.999	.503	.921	.426	.468	1.407	.083	1.355	.164	1.233	.237	1.266	.311	1.359	.364	1.163	.423
290.00	.993	.517	.908	.463	1.018	.522	.930	.443	.4863	1.404	.086	1.349	.17	1.224	.246	1.254	.323	1.345	.378	1.146	.44
300.00	1.015	.539	.927	.482	1.04	.544	.956	.461	.5065	1.401	.089	1.342	.177	1.214	.256	1.24	.337	1.329	.394	1.127	.459
310.00	1.045	.569	.945	.5	1.07	.574	.973	.478	.5303	1.477	.093	1.336	.183	1.204	.266	1.228	.349	1.314	.409	1.11	.476
320.00	1.058	.582	.96	.515	1.084	.588	.989	.494	.5448	1.474	.096	1.329	.19	1.195	.275	1.215	.362	1.299	.424	1.094	.492
330.00	1.079	.603	.979	.534	1.106	.61	1.007	.512	.5648	1.47	.1	1.322	.197	1.184	.286	1.202	.375	1.283	.44	1.074	.512
340.00	1.101	.625	.991	.546	1.129	.633	1.017	.522	.5815	1.466	.104	1.315	.204	1.173	.297	1.186	.391	1.266	.457	1.055	.531
350.00	1.121	.645	1.01	.565	1.15	.654	1.034	.539	.6008	1.462	.108	1.307	.212	1.162	.308	1.171	.406	1.25	.473	1.036	.55
360.00	1.142	.666	1.028	.583	1.172	.676	1.052	.557	.6205	1.459	.111	1.3	.219	1.152	.318	1.157	.42	1.233	.49	1.017	.569
370.00	1.176	.7	1.048	.603	1.207	.711	1.079	.584	.6495	1.454	.116	1.291	.228	1.14	.33	1.141	.436	1.215	.508	.995	.591
380.00	1.196	.72	1.067	.622	1.231	.735	1.095	.6	.6693	1.45	.12	1.281	.238	1.128	.342	1.126	.451	1.198	.525	.975	.611
390.00	1.221	.745	1.082	.637	1.26	.764	1.106	.611	.6893	1.445	.125	1.273	.246	1.115	.355	1.11	.467	1.178	.545	.954	.632
400.00	1.258	.782	1.111	.666	1.298	.802	1.13	.635	.7213	1.44	.13	1.262	.257	1.1	.37	1.087	.49	1.151	.572	.922	.664

LOAD AT GROUND SURFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 0S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.00	-4.10	2.248	2.267	0	-4.50	4.534	.2066	-3e-4	.0412	.0813	-.163	1.811	-.001	.0444	.0644	-.102
20.00	4.582	6.744	4.534	2.267	-2.25	4.534	.3532	.0400	.0412	.0816	-.123	3.096	.0674	.0444	.0647	-.077
30.00	13.27	11.24	9.068	9.068	-2.25	6.801	.4999	.0393	3e-17	.2046	-.164	4.382	.0662	3e-17	.1621	-.102
40.00	21.95	17.98	13.60	11.33	2.248	9.068	.5867	.0792	.0412	.1643	-.123	5.143	.1336	.0444	.1302	-.077
50.00	43.43	22.48	18.14	13.60	8.992	9.068	.7334	.0785	.0823	.0834	-.001	6.428	.1324	.0887	.0660	-.001
60.00	52.11	29.22	22.67	20.40	11.24	13.60	.8201	.1185	.0412	.1657	-.043	7.189	.1998	.0444	.1312	-.027
70.00	48.01	38.21	29.47	27.20	15.74	18.14	.8470	.1581	.0412	.2074	-.043	7.424	.2666	.0444	.1643	-.027
80.00	69.48	42.71	36.27	31.74	22.48	22.67	.9937	.1164	.0823	.1674	-.003	8.710	.1963	.0887	.1326	-.002
90.00	70.17	51.70	40.81	38.54	26.97	27.20	1.021	.1970	.0412	.2091	-.004	8.946	.3322	.0444	.1656	-.003
100.00	86.85	58.45	47.61	47.61	26.97	36.27	1.107	.1960	9e-15	.3731	-.168	9.706	.3304	1e-14	.2955	-.105
110.00	95.54	65.19	56.67	54.41	29.22	47.61	1.194	.1540	.0412	.4554	-.332	10.47	.2596	.0444	.3607	-.208
120.00	104.2	71.93	63.47	61.21	38.21	47.61	1.281	.1530	.0412	.4158	-.170	11.23	.2579	.0444	.3293	-.106
130.00	112.9	78.68	68.01	65.74	47.21	52.14	1.368	.1929	.0412	.3352	-.089	11.99	.3252	.0444	.2655	-.056
140.00	121.6	85.42	74.81	74.81	51.70	54.41	1.454	.1919	>>>>>	.4179	-.049	12.75	.3235	>>>>>	.3310	-.031
150.00	130.3	92.16	81.61	79.34	56.20	63.47	1.541	.1908	.0412	.4185	-.132	13.51	.3217	.0444	.3315	-.082
160.00	126.2	98.91	88.41	90.68	58.45	72.54	1.628	.1898	-.041	.5829	-.255	14.27	.3200	-.044	.4617	-.159
170.00	134.9	103.4	95.21	97.48	60.69	77.08	1.775	.1481	-.041	.6652	-.296	15.56	.2497	-.044	.5269	-.185
180.00	143.5	110.1	102.0	102.0	67.44	83.88	1.861	.1471	>>>>>	.6252	-.297	16.32	.2480	>>>>>	.4952	-.186
190.00	152.2	119.1	106.5	113.3	71.93	88.41	1.888	.2277	-.124	.7489	-.298	16.55	.3839	-.133	.5932	-.186
200.00	160.9	125.9	113.3	117.9	78.68	92.94	1.975	.2267	-.082	.7089	-.258	17.31	.3821	-.089	.5615	-.161
210.00	169.6	132.6	122.4	122.4	83.17	99.75	2.062	.1846	5e-16	.7096	-.300	18.07	.3113	6e-16	.5621	-.187
220.00	178.3	139.4	126.9	129.2	87.67	104.3	2.149	.2246	-.041	.7513	-.300	18.83	.3786	-.044	.5951	-.188
230.00	187.0	146.1	133.8	133.8	94.41	106.5	2.235	.2236	1e-14	.7114	-.219	19.59	.3769	1e-14	.5635	-.137
240.00	195.7	152.9	140.6	140.6	98.91	113.3	2.322	.2225	5e-16	.7530	-.261	20.35	.3752	6e-16	.5965	-.163
250.00	204.3	159.6	147.4	147.4	101.2	122.4	2.409	.2215	9e-15	.8354	-.384	21.12	.3734	1e-14	.6617	-.240
260.00	213.0	168.6	151.9	151.9	107.9	126.9	2.436	.3021	1e-14	.7954	-.344	21.35	.5093	1e-14	.6300	-.215
270.00	221.7	175.3	158.7	161.0	114.6	129.2	2.523	.3011	-.041	.8374	-.264	22.11	.5076	-.044	.6633	-.165
280.00	230.4	182.1	165.5	167.8	119.1	133.8	2.609	.3000	-.041	.8791	-.264	22.87	.5058	-.044	.6963	-.165
290.00	239.1	188.8	172.3	174.6	123.6	140.6	2.696	.2990	-.041	.9208	-.306	23.63	.5041	-.044	.7293	-.191
300.00	247.8	197.8	179.1	183.6	128.1	147.4	2.723	.3386	-.082	1.003	-.348	23.87	.5709	-.089	.7948	-.217
310.00	269.2	202.3	188.2	188.2	134.9	151.9	2.870	.2560	5e-16	.9635	-.308	25.15	.4315	6e-16	.7632	-.192
320.00	277.9	211.3	192.7	197.2	139.4	154.2	2.896	.3366	-.082	1.046	-.267	25.39	.5674	-.089	.8287	-.167
330.00	299.4	218.0	201.8	201.8	146.1	163.2	2.983	.2945	1e-15	1.006	-.309	26.15	.4965	1e-15	.7970	-.193
340.00	320.9	224.8	210.8	213.1	148.4	167.8	3.070	.2525	-.041	1.171	-.351	26.91	.4257	-.044	.9272	-.219
350.00	342.4	233.8	217.6	222.2	150.6	174.6	3.097	.2921	-.082	1.294	-.433	27.15	.4925	-.089	1.025	-.271
360.00	351.0	242.8	224.4	231.2	157.4	179.1	3.124	.3317	-.124	1.336	-.393	27.38	.5593	-.133	1.058	-.246
370.00	385.3	251.8	231.2	240.3	161.8	188.2	3.151	.3714	-.165	1.419	-.476	27.62	.6260	-.177	1.124	-.297
380.00	406.8	265.3	235.8	247.1	166.3	195.0	3.058	.5333	-.206	1.460	-.517	26.80	.8990	-.222	1.157	-.323
390.00	441.0	272.0	247.1	253.9	175.3	197.2	3.144	.4502	-.124	1.421	-.396	27.56	.7590	-.133	1.125	-.247
400.00	475.3	285.5	256.2	272.0	184.3	208.6	3.052	.5302	-.288	1.586	-.438	26.75	.8938	-.311	1.256	-.274
.00	217.4	17.98	20.40	43.07	31.47	525.9	-.479	-.044	-.412	.2098	-8.94	-4.20	-.074	-.444	.1662	-5.59

OR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 75
INIMUM LOAD = 0
AXIMUM LOAD = 500
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
10.00	.0043	.0033	.0023	.0023	.0043	.0023
20.00	.0099	.0069	.0049	.0039	.0049	.0029
30.00	.0193	.0143	.0103	.0063	.0073	.0043
40.00	.0296	.0216	.0156	.0106	.0096	.0056
50.00	.0385	.0285	.0205	.0145	.0105	.0065
60.00	.0508	.0378	.0278	.0188	.0138	.0078
70.00	.0656	.0486	.0356	.0236	.0166	.0086
80.00	.0792	.0602	.0442	.0302	.0202	.0102
90.00	.0951	.0721	.0541	.0371	.0251	.0131
100.00	.1109	.0849	.0639	.0429	.0309	.0149
110.00	.1290	.1000	.0750	.0510	.0380	.0170
120.00	.1459	.1139	.0859	.0589	.0419	.0209
130.00	.1607	.1257	.0957	.0667	.0457	.0227
140.00	.1775	.1395	.1065	.0735	.0505	.0265
150.00	.1924	.1514	.1154	.0804	.0554	.0274
160.00	.2085	.1645	.1255	.0855	.0595	.0275
170.00	.2236	.1776	.1356	.0926	.0656	.0316
180.00	.2382	.1892	.1442	.0992	.0692	.0322
190.00	.2560	.2030	.1560	.1060	.0740	.0350
200.00	.2714	.2154	.1654	.1134	.0784	.0374
210.00	.2862	.2272	.1732	.1192	.0822	.0382
220.00	.3025	.2405	.1845	.1275	.0885	.0425
230.00	.3176	.2526	.1936	.1346	.0926	.0456
240.00	.3332	.2652	.2032	.1412	.0972	.0472
250.00	.3483	.2773	.2123	.1473	.1023	.0483
260.00	.3634	.2884	.2214	.1544	.1064	.0504
270.00	.3780	.3000	.2300	.1590	.1080	.0510
280.00	.3946	.3136	.2406	.1666	.1136	.0546
290.00	.4102	.3262	.2502	.1732	.1182	.0562
300.00	.4278	.3398	.2608	.1798	.1228	.0578
310.00	.4479	.3579	.2749	.1919	.1319	.0649
320.00	.4597	.3657	.2807	.1937	.1317	.0637
330.00	.4761	.3791	.2901	.2011	.1361	.0641
340.00	.4892	.3892	.2962	.2022	.1362	.0622
350.00	.5047	.4007	.3047	.2067	.1397	.0627
360.00	.5218	.4138	.3148	.2128	.1428	.0638
370.00	.5462	.4342	.3322	.2262	.1542	.0712
380.00	.5623	.4443	.3403	.2313	.1573	.0713
390.00	.5776	.4566	.3476	.2356	.1576	.0706
400.00	.6050	.4780	.3650	.2450	.1630	.0710
.00	.7083	.7003	.6913	.6723	.6583	.4263

¦ A ¦¦ B ¦¦ C ¦¦ D ¦¦ E ¦¦ F ¦¦ G ¦¦ H ¦¦ I ¦¦ J ¦¦ K ¦¦ L ¦¦ M ¦¦ N ¦¦ O ¦¦ P ¦¦ Q ¦¦ R ¦¦ S ¦¦ T ¦¦ U ¦¦ V ¦¦ W ¦¦ X ¦¦ Y ¦¦ Z ¦¦ AA ¦¦ AB ¦¦ AC ¦¦ AD ¦¦ AE ¦¦ AF ¦¦ AG ¦¦ AH ¦¦ AI

COMPRESSION TEST 1-9

LOAD DISTRIBUTION CURVES

DATE DRIVEN =23 SEPT 82

DATE TESTED =30 SEPT 82

LENGTH OF TELLTALE RODS

	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	11.2	21.6	31.9	42.12	52.62	62.92
(INCHES)	134.4	259.2	382.8	505.44	631.4	755.0

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)

	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-2.87	-10.9	-21.3	-31.6	-41.9	-52.3
FOR PLOT PURPOSES ONLY	0	2.871	10.94	21.29	31.55	41.91	52.31

PILE AREA (SQ INCHES) = 21.4

YOUNGS MODULUS (TSI) = 15000

AXIAL LENGTH (FEET) = 58

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130

INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981

DEPTH TO WATER TABLE (FEET) = -7

PILE PERIMETER (INCHES) 56

GS TO TELLTALE DIALS (INCHES)................... 65.5

TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 13.25

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)

	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-5.74	-16.1	-26.4	-36.7	-47.2	-57.5
FOR PLOT PURPOSES ONLY	5.742	16.14	26.44	36.66	47.16	57.46
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3132	.6411	.9332	1.223	1.521	1.813

APPLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.726	0	0	0	.735	0	.38	0	0	1.688	0	1.638	0	1.698	0	1.632	0	1.49	0	1.378	0
10.00	.733	.007	.004	.004	.739	.004	.386	.006	.0053	1.688	0	1.635	.003	1.694	.004	1.629	.003	1.484	.006	1.374	.004
20.00	.743	.017	.011	.011	.748	.013	.395	.015	.014	1.685	.003	1.63	.008	1.688	.01	1.621	.011	1.478	.012	1.366	.012
30.00	.754	.028	.02	.02	.757	.022	.405	.025	.0238	1.682	.006	1.626	.012	1.68	.018	1.614	.018	1.469	.021	1.357	.021
40.00	.772	.046	.026	.026	.769	.034	.418	.038	.036	1.679	.009	1.62	.018	1.674	.024	1.606	.026	1.459	.031	1.346	.032
50.00	.793	.067	.031	.031	.786	.051	.427	.047	.049	1.676	.012	1.616	.022	1.668	.03	1.596	.036	1.449	.041	1.335	.043
60.00	.81	.084	.079	.079	.802	.067	.385	.005	.0568	1.674	.014	1.611	.027	1.661	.037	1.587	.045	1.438	.052	1.323	.055
70.00	.83	.104	.093	.093	.821	.086	.398	.018	.0753	1.671	.017	1.606	.032	1.654	.044	1.577	.055	1.427	.063	1.31	.068
80.00	.854	.128	.108	.108	.841	.106	.413	.033	.0938	1.669	.019	1.601	.037	1.648	.05	1.567	.065	1.416	.074	1.299	.079
90.00	.878	.152	.126	.126	.862	.127	.429	.049	.1135	1.666	.022	1.597	.041	1.641	.057	1.557	.075	1.405	.085	1.286	.092
100.00	.909	.183	.149	.149	.889	.154	.46	.08	.1415	1.663	.025	1.591	.047	1.631	.067	1.547	.085	1.392	.096	1.272	.106
110.00	.934	.208	.17	.17	.912	.177	.48	.1	.1638	1.66	.028	1.586	.052	1.626	.072	1.537	.095	1.381	.109	1.259	.119
120.00	.962	.236	.193	.193	.939	.204	.503	.123	.189	1.658	.03	1.581	.057	1.619	.079	1.527	.105	1.369	.121	1.247	.131
130.00	.991	.265	.215	.215	.966	.231	.526	.146	.2143	1.655	.033	1.576	.062	1.611	.087	1.518	.114	1.358	.132	1.234	.144
140.00	1.018	.292	.24	.24	.992	.257	.552	.172	.2403	1.652	.036	1.571	.067	1.604	.094	1.508	.124	1.347	.143	1.221	.157
150.00	1.05	.324	.26	.26	1.025	.29	.577	.197	.2678	1.65	.038	1.566	.072	1.598	.1	1.499	.133	1.337	.153	1.21	.168
160.00	1.085	.359	.283	.283	1.052	.317	.602	.222	.2953	1.648	.04	1.561	.077	1.59	.108	1.49	.142	1.326	.164	1.199	.179
170.00	1.116	.39	.32	.32	1.083	.348	.63	.25	.327	1.645	.043	1.555	.083	1.581	.117	1.478	.154	1.314	.176	1.185	.193
180.00	1.146	.42	.343	.343	1.111	.376	.657	.277	.354	1.642	.046	1.55	.088	1.574	.124	1.467	.165	1.301	.189	1.172	.206
190.00	1.178	.452	.372	.372	1.142	.407	.685	.305	.384	1.639	.049	1.545	.093	1.567	.131	1.457	.175	1.29	.2	1.16	.218
200.00	1.216	.49	.399	.399	1.176	.441	.715	.335	.4163	1.636	.052	1.54	.098	1.559	.139	1.446	.186	1.277	.213	1.147	.231
210.00	1.253	.527	.43	.43	1.21	.475	.749	.369	.4503	1.634	.054	1.535	.103	1.551	.147	1.437	.195	1.265	.225	1.134	.244
220.00	1.295	.569	.461	.461	1.25	.515	.78	.4	.4863	1.631	.057	1.529	.109	1.544	.154	1.426	.206	1.253	.237	1.121	.257
230.00	1.336	.61	.498	.498	1.291	.556	.819	.439	.5258	1.628	.06	1.524	.114	1.535	.163	1.415	.217	1.24	.25	1.107	.271
240.00	1.382	.656	.538	.538	1.334	.599	.857	.477	.5675	1.625	.063	1.518	.12	1.527	.171	1.403	.229	1.227	.263	1.093	.285
250.00	1.432	.706	.58	.58	1.381	.646	.901	.521	.6133	1.621	.067	1.512	.126	1.519	.179	1.392	.24	1.215	.275	1.08	.298
260.00	1.488	.762	.629	.629	1.436	.701	.95	.57	.6655	1.618	.07	1.506	.132	1.51	.188	1.38	.252	1.2	.29	1.065	.313
270.00	1.549	.823	.679	.679	1.491	.756	1.001	.621	.7198	1.615	.073	1.5	.138	1.501	.197	1.369	.263	1.188	.302	1.051	.327
280.00	1.612	.886	.731	.731	1.552	.817	1.057	.677	.7778	1.611	.077	1.494	.144	1.492	.206	1.357	.275	1.174	.316	1.037	.341
290.00	1.683	.957	.797	.797	1.623	.888	1.122	.742	.846	1.608	.08	1.487	.151	1.483	.215	1.345	.287	1.16	.33	1.021	.357
300.00	1.971	1.245	1.031	1.031	1.91	1.175	1.361	.981	1.108	1.604	.084	1.48	.158	1.474	.224	1.326	.306	1.138	.352	.996	.382
310.00	2.035	1.309	1.067	1.067	1.969	1.234	1.393	1.013	1.156	1.6	.088	1.474	.164	1.465	.233	1.31	.322	1.12	.37	.976	.402

LOAD AT GROUND SURFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC GS-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.00	-9.51	7.716	2.597	-2.62	7.643	-5.19	.0447	.1060	.1089	-.212	.2645	.1420	.1653	.1167	-.174	.1739
20.00	-5.04	12.86	5.194	2.617	2.540	>>>>>	.1390	.1587	.0530	.0014	.0525	.4465	.2476	.0577	.0012	.0345
30.00	-.566	15.43	15.58	>>>>>	7.643	0	.2853	-.003	.3254	-.158	.1575	.9110	-.005	.3480	-.129	.1035
40.00	3.904	23.15	15.58	5.235	12.74	2.597	.3300	.1567	.2161	-.155	.2089	1.054	.2444	.2316	-.127	.1374
50.00	8.374	25.72	20.78	15.70	12.74	5.194	.4755	.1024	.1059	.0614	.1554	1.510	.1597	.1135	.0502	.1022
60.00	8.186	33.44	25.97	20.94	17.83	7.791	.5202	.1546	.1051	.0642	.2069	1.661	.2411	.1126	.0525	.1361
70.00	12.66	38.58	31.17	28.79	20.38	12.99	.6153	.1536	.0496	.1740	.1524	1.965	.2395	.0531	.1422	.1002
80.00	12.47	46.30	33.76	39.26	22.93	12.99	.6600	.2595	-.115	.3370	.2049	2.100	.4049	-.123	.2762	.1347
90.00	16.94	48.87	41.55	47.11	25.48	18.18	.8055	.1515	-.116	.4475	.1503	2.572	.2363	-.124	.3659	.0989
100.00	21.41	56.59	51.94	47.11	33.12	20.78	.8502	.0962	.1008	.2895	.2543	2.715	.1500	.1081	.2367	.1672
110.00	25.88	61.73	51.94	60.20	35.67	25.97	.9453	.2027	-.172	.5075	.1998	3.019	.3161	-.185	.4149	.1314
120.00	25.69	69.45	57.14	68.05	40.76	25.97	.9900	.2549	-.228	.5645	.3048	3.161	.3976	-.244	.4615	.2004
130.00	30.16	74.59	64.93	70.67	45.86	31.17	1.085	.2001	-.120	.5132	.3027	3.465	.3121	-.129	.4196	.1998
140.00	34.63	79.74	70.12	78.52	48.48	36.36	1.180	.1991	-.175	.6230	.2482	3.769	.3105	-.188	.5093	.1632
150.00	34.44	87.45	72.72	86.37	50.95	38.96	1.225	.3050	-.285	.7327	.2472	3.912	.4758	-.306	.5991	.1625
160.00	34.25	95.17	80.51	88.99	56.05	38.96	1.270	.3035	-.177	.6814	.3522	4.054	.4734	-.190	.5572	.2316
170.00	38.72	102.9	88.30	96.84	56.05	44.15	1.314	.3019	-.178	.8438	.2451	4.197	.4710	-.191	.6900	.1612
180.00	43.19	108.0	93.50	107.3	61.14	44.15	1.410	.3009	-.289	.9550	.3501	4.501	.4694	-.309	.7800	.2302
190.00	47.66	113.2	98.69	115.2	63.69	46.75	1.505	.2999	-.344	1.065	.3491	4.805	.4678	-.369	.8706	.2295
200.00	52.13	118.3	106.5	123.0	68.79	46.75	1.600	.2451	-.345	1.122	.4541	5.100	.3823	-.370	.9172	.2986
210.00	51.94	126.0	114.3	125.6	76.43	49.34	1.644	.2435	-.237	1.018	.5580	5.251	.3799	-.254	.8322	.3669
220.00	56.42	133.8	116.9	136.1	78.98	51.94	1.689	.3495	-.402	1.182	.5570	5.394	.5452	-.431	.9662	.3663
230.00	60.89	138.9	127.3	141.3	84.07	54.54	1.784	.2409	-.294	1.185	.6085	5.698	.3758	-.315	.9685	.4001
240.00	65.36	146.6	132.5	151.8	86.62	57.14	1.829	.2931	-.404	1.348	.6075	5.840	.4573	-.433	1.103	.3994
250.00	74.48	151.8	137.6	159.7	89.17	59.73	1.924	.2921	-.460	1.458	.6065	6.144	.4557	-.493	1.192	.3988
260.00	78.96	159.5	145.4	167.5	96.81	59.73	1.969	.2906	-.461	1.462	.7639	6.287	.4533	-.494	1.196	.5023
270.00	83.43	167.2	153.2	172.7	99.36	64.93	2.014	.2890	-.408	1.518	.7094	6.430	.4508	-.437	1.241	.4665
280.00	92.55	172.3	161.0	180.6	104.5	64.93	2.109	.2342	-.409	1.575	.8144	6.733	.3653	-.438	1.288	.5355
290.00	97.02	182.6	166.2	188.5	109.5	70.12	2.103	.3397	-.465	1.632	.8124	6.715	.5299	-.498	1.334	.5341
300.00	106.2	190.3	171.4	214.6	117.2	77.91	2.148	.3919	-.903	2.015	.8093	6.858	.6113	-.967	1.648	.5321
310.00	115.3	195.5	179.2	233.0	122.3	83.11	2.243	.3371	-1.12	2.289	.8073	7.162	.5258	-1.20	1.872	.5308

FOR VIEW 1
MINIMUM DEPTH = 0
MAXIMUM DEPTH= 70
MINIMUM LOAD = 0
MAXIMUM LOAD = 400
LOAD (TONS)
DEPTH (FEET)

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

FOR VIEWS 3 TO 8
MINIMUM MOVEMENT = 0
MAXIMUM MOVEMENT = 3
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
MOVEMENT IN INCHES
t-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
10.00	.0057	.0027	.0017	.0027	-3e-4	.0017
20.00	.0118	.0068	.0048	.0038	.0028	.0028
30.00	.0190	.0130	.0070	.0070	.0040	.0040
40.00	.0287	.0197	.0137	.0117	.0067	.0057
50.00	.0391	.0291	.0211	.0151	.0101	.0081
60.00	.0472	.0342	.0242	.0162	.0092	.0062
70.00	.0611	.0461	.0341	.0231	.0151	.0101
80.00	.0701	.0601	.0471	.0321	.0231	.0181
90.00	.0952	.0762	.0602	.0422	.0322	.0252
100.00	.1206	.0986	.0786	.0606	.0476	.0396
110.00	.1403	.1163	.0963	.0733	.0593	.0493
120.00	.1640	.1370	.1150	.0890	.0730	.0630
130.00	.1866	.1576	.1326	.1056	.0876	.0756
140.00	.2100	.1790	.1520	.1220	.1030	.0890
150.00	.2359	.2019	.1739	.1409	.1209	.1059

A !! B !! C !! D !! E !! F !! G !! H !! I !! J !! K !! L !! M !! N !! O !! P !! Q !! R !! S !! T !! U !! V !! W !! X !! Y !! Z !!

APPLIED LOAD (TONS)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
160.00	.2619	.2249	.1939	.1599	.1379	.1229
170.00	.2910	.2510	.2170	.1800	.1580	.1410
180.00	.3154	.2734	.2374	.1964	.1724	.1554
190.00	.3428	.2988	.2608	.2168	.1918	.1738
200.00	.3725	.3265	.2855	.2385	.2115	.1935
210.00	.4049	.3559	.3119	.2639	.2339	.2149
220.00	.4383	.3863	.3413	.2893	.2583	.2383
230.00	.4752	.4212	.3722	.3182	.2852	.2642
240.00	.5144	.4574	.4064	.3484	.3144	.2924
250.00	.5566	.4976	.4446	.3836	.3486	.3256
260.00	.6062	.5442	.4882	.4242	.3862	.3632
270.00	.6579	.5929	.5339	.4679	.4289	.4039
280.00	.7123	.6453	.5833	.5143	.4733	.4483
290.00	.7780	.7070	.6430	.5710	.5280	.5010
300.00	1.036	.9624	.8964	.8144	.7684	.7384
310.00	1.081	1.005	.9355	.8465	.7985	.7665

: A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI

DAM COMPRESSION TEST 2-1

LOAD DISTRIBUTION CURVES

DATE DRIVEN =25 AUG 82

DATE TESTED =30 AUG 82

LENGTH OF TELLTALE RODS

	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	10.69	20.19	26.69	39.19	48.69	58.19
(INCHES)	128.3	242.3	320.3	470.28	584.3	698.3

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)

	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-3.50	-11.8	-19.8	-29.3	-40.3	-49.8
FOR PLOT PURPOSES ONLY	0	3.501	11.75	19.75	29.25	40.25	49.75

PILE AREA (SQ INCHES) = 21.4

YOUNGS MODULUS (TSI) = 15000

AXIAL LENGTH (FEET) = 68

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130

INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981

DEPTH TO WATER TABLE (FEET) = -19

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)

	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-7.00	-16.5	-23.0	-35.5	-45.0	-54.5
FOR PLOT PURPOSES ONLY	7.003	16.50	23.00	35.50	45.00	54.50

PILE PERIMETER (INCHES) 56

GS TO TELLTALE DIALS (INCHES)................... 44.25

TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 17

ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)

SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.3819	.9001	1.150	1.584	1.774	2.043

APPLIED LOAD	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE		ILLINOIS SIDE		DOWNSTREAM CORNERS MISSOURI SIDE		ILLINOIS SIDE		AVERAGE PILE BUTT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1		TELLTALE NO.2		TELLTALE NO. 3		TELLTALE NO. 4		TELLTALE NO. 5		TELLTALE NO. 6 (TIP)	
(TONS)	DR	DELTA	DR	DELTA	DR	DELTA	DR	DELTA	MOVEMENT	DR	DELTA	DR	DELTA	DR	DELTA	DR	DELTA	DR	DELTA	DR	DELTA
.00	2.999	0	2.884	0	2.763	0	2.944	0	0	.362	0	.466	0	.168	0	.402	0	.42	0	.462	0
5.00	2.997	.002	2.878	.006	2.759	.004	2.937	.007	.0048	.364	.002	.469	.003	.172	.004	.405	.003	.422	.002	.465	.003
10.00	2.991	.008	2.878	.006	2.756	.007	2.936	.008	.0073	.364	.002	.469	.003	.173	.005	.408	.006	.425	.005	.468	.006
15.00	2.985	.014	2.873	.011	2.751	.012	2.931	.013	.0125	.366	.004	.473	.007	.176	.008	.412	.01	.429	.009	.472	.01
20.00	2.978	.021	2.868	.016	2.744	.019	2.924	.02	.019	.369	.007	.475	.009	.18	.012	.416	.014	.434	.014	.478	.016
25.00	2.969	.03	2.859	.025	2.736	.027	2.915	.029	.0278	.369	.007	.478	.012	.184	.016	.422	.02	.44	.02	.485	.023
30.00	2.96	.039	2.852	.032	2.729	.034	2.906	.038	.0358	.371	.009	.481	.015	.188	.02	.427	.025	.446	.026	.492	.03
35.00	2.949	.05	2.848	.036	2.72	.043	2.893	.051	.045	.373	.011	.484	.018	.192	.024	.432	.03	.453	.033	.5	.038
40.00	2.936	.063	2.833	.051	2.71	.053	2.879	.065	.058	.375	.013	.488	.022	.195	.027	.438	.036	.46	.04	.508	.046
45.00	2.922	.077	2.821	.063	2.699	.064	2.865	.079	.0708	.378	.016	.49	.024	.2	.032	.443	.041	.466	.046	.516	.054
50.00	2.91	.089	2.808	.076	2.686	.077	2.851	.093	.0838	.379	.017	.494	.028	.204	.036	.449	.047	.474	.054	.524	.062
55.00	2.895	.104	2.793	.091	2.671	.092	2.837	.107	.0985	.38	.018	.498	.032	.208	.04	.454	.052	.481	.061	.532	.07
60.00	2.879	.12	2.775	.109	2.655	.108	2.819	.125	.1155	.382	.02	.5	.034	.213	.045	.46	.058	.488	.068	.54	.078
65.00	2.859	.14	2.754	.13	2.634	.129	2.798	.146	.1363	.384	.022	.504	.038	.218	.05	.465	.063	.495	.075	.547	.085
70.00	2.831	.168	2.725	.159	2.606	.157	2.77	.174	.1645	.386	.024	.508	.042	.222	.054	.47	.068	.501	.081	.555	.093
75.00	2.79	.209	2.684	.2	2.565	.198	2.728	.216	.2058	.388	.026	.509	.043	.226	.058	.475	.073	.507	.087	.562	.1
80.00	2.742	.257	2.638	.246	2.518	.245	2.679	.265	.2533	.389	.027	.513	.047	.23	.062	.481	.079	.513	.093	.569	.107
85.00	2.684	.315	2.578	.306	2.46	.303	2.619	.325	.3123	.391	.029	.516	.05	.235	.067	.486	.084	.52	.1	.575	.113
90.00	2.613	.386	2.507	.377	2.389	.374	2.549	.395	.383	.393	.031	.519	.053	.239	.071	.491	.089	.525	.105	.582	.12
95.00	2.538	.461	2.43	.454	2.312	.451	2.471	.473	.4598	.395	.033	.524	.058	.244	.076	.495	.093	.531	.111	.588	.126
100.00	2.438	.561	2.327	.557	2.21	.553	2.37	.574	.5613	.397	.035	.527	.061	.249	.081	.502	.1	.538	.118	.595	.133
105.00	2.342	.657	2.235	.649	2.118	.645	2.278	.666	.6543	.398	.036	.53	.064	.254	.086	.507	.105	.543	.123	.602	.14
110.00	2.226	.773	2.117	.767	2	.763	2.161	.783	.7715	.401	.039	.534	.068	.259	.091	.514	.112	.55	.13	.609	.147
115.00	2.134	.865	2.028	.856	1.909	.854	2.071	.873	.862	.403	.041	.538	.072	.263	.095	.518	.116	.555	.135	.614	.152
120.00	1.917	1.082	1.804	1.08	1.688	1.075	1.849	1.095	1.083	.404	.042	.541	.075	.268	.1	.524	.122	.561	.141	.62	.158
125.00	1.81	1.189	1.697	1.187	1.582	1.181	1.743	1.201	1.190	.407	.045	.544	.078	.273	.105	.528	.126	.567	.147	.625	.163
130.00	1.548	1.451	1.427	1.457	1.313	1.45	1.472	1.472	1.458	.408	.046	.548	.082	.277	.109	.534	.132	.572	.152	.63	.168
135.00	1.26	1.739	1.127	1.757	1.02	1.743	1.174	1.77	1.752	.409	.047	.551	.085	.282	.114	.543	.141	.577	.157	.635	.173
140.00	.809	2.19	.678	2.206	.571	2.192	.734	2.21	2.200	.411	.049	.554	.088	.288	.12	.547	.145	.582	.162	.64	.178

LOAD AT GROUND SURFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.00	5.007	2.816	4.115	-2.14	-2.82	2.816	.0398	-.035	.1411	.0132	-.127	.1043	-.039	.1227	.0088	-.072
10.00	2.374	2.816	8.231	2.14	-2.82	2.816	.1310	-.145	.1374	.0965	-.127	.3430	-.161	.1195	.0642	-.072
15.00	7.381	8.447	4.115	4.28	-2.82	2.816	.1195	.1160	-.004	.1382	-.127	.3128	.1289	-.003	.0919	-.072
20.00	16.21	5.632	12.35	4.28	2e-13	5.632	.2620	-.180	.1819	.0834	-.127	.6859	-.200	.1582	.0554	-.072
25.00	13.58	14.08	16.46	8.56	2e-13	8.447	.1991	-.064	.1782	.1668	-.191	.5214	-.071	.1550	.1108	-.107
30.00	18.58	16.89	20.58	10.7	2.816	11.26	.2390	-.099	.2228	.1536	-.191	.6256	-.110	.1938	.1021	-.107
35.00	23.59	19.71	24.69	12.84	8.447	14.08	.2788	-.133	.2673	.0856	-.127	.7299	-.148	.2325	.0569	-.072
40.00	20.60	25.34	20.58	19.26	11.26	16.89	.2673	.1276	.0297	.1558	-.127	.6998	.1418	.0258	.1036	-.072
45.00	37.42	22.53	32.92	19.26	14.08	22.53	.4098	-.278	.3082	.1009	-.191	1.073	-.309	.2680	.0671	-.107
50.00	38.61	30.97	32.92	23.54	19.71	22.53	.3469	-.052	.2116	.0746	-.064	.9083	-.058	.1841	.0496	-.036
55.00	39.80	39.42	32.92	25.68	25.34	25.34	.2841	.1741	.1634	.0066	0	.7437	.1934	.1421	.0044	0
60.00	44.81	39.42	45.27	27.82	28.16	28.16	.3752	-.157	.3936	-.007	0	.9824	-.174	.3423	-.004	0
65.00	49.81	45.05	49.38	27.82	33.79	28.16	.3637	-.116	.4864	-.116	.1270	.9523	-.129	.4230	-.077	.0716
70.00	54.82	50.68	49.38	29.96	36.61	33.79	.3522	.0348	.4381	-.129	.0635	.9221	.0387	.3811	-.086	.0358
75.00	59.83	47.87	61.73	32.1	39.42	36.61	.4947	-.371	.6684	-.143	.0635	1.295	-.413	.5813	-.095	.0358
80.00	61.01	56.32	61.73	36.38	39.42	39.42	.4318	-.145	.5718	-.059	7e-15	1.131	-.161	.4973	-.039	4e-15
85.00	66.02	59.13	69.96	36.38	45.05	36.61	.4717	-.290	.7575	-.169	.1905	1.235	-.322	.6588	-.112	.1074
90.00	71.03	61.95	74.08	38.52	45.05	42.24	.5115	-.325	.8020	-.127	.0635	1.339	-.361	.6975	-.085	.0358
95.00	76.04	70.39	74.08	36.38	50.68	42.24	.4486	-.099	.8503	-.279	.1905	1.175	-.110	.7395	-.185	.1074
100.00	81.04	73.21	82.31	40.66	50.68	42.24	.4885	-.244	.9394	-.195	.1905	1.279	-.271	.8170	-.130	.1074
105.00	82.23	78.84	90.54	40.66	50.68	47.87	.4769	-.313	1.125	-.195	.0635	1.249	-.348	.9785	-.130	.0358
110.00	91.06	81.66	94.65	44.94	50.68	47.87	.5168	-.348	1.121	-.112	.0635	1.353	-.387	.9753	-.074	.0358
115.00	96.06	87.29	94.65	44.94	53.5	47.87	.5053	-.197	1.121	-.167	.1270	1.323	-.219	.9753	-.111	.0716
120.00	97.25	92.92	102.9	47.08	53.5	47.87	.4937	-.267	1.259	-.125	.1270	1.293	-.297	1.095	-.083	.0716
125.00	106.1	92.92	111.1	44.94	59.13	45.05	.5849	-.487	1.493	-.276	.3176	1.531	-.541	1.298	-.184	.1790
130.00	107.3	101.4	111.1	49.22	56.32	45.05	.5220	-.261	1.396	-.138	.2541	1.367	-.290	1.214	-.092	.1432
135.00	108.5	107	119.3	57.78	45.05	45.05	.5105	-.331	1.389	.2479	>>>>>	1.337	-.367	1.208	.1648	>>>>>
140.00	113.5	109.8	131.7	53.5	47.87	45.05	.5504	-.586	1.764	.1097	.0635	1.441	-.651	1.534	.0729	.0358

FOR VIEW 1
MINIMUM DEPTH = 0
MAXIMUM DEPTH= 75
MINIMUM LOAD = 0
MAXIMUM LOAD = 200
LOAD IN TONS
DEPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

FOR VIEWS 3 TO 8
MINIMUM MOVEMENT = 0
MAXIMUM MOVEMENT = 3
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
MOVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES)					
	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
5.00	.0030	.0020	.0010	.0020	.0030	.0020
10.00	.0058	.0048	.0028	.0018	.0028	.0018
15.00	.0093	.0063	.0053	.0033	.0043	.0033
20.00	.0131	.0111	.0081	.0061	.0061	.0041
25.00	.0221	.0171	.0131	.0091	.0091	.0061
30.00	.0283	.0223	.0173	.0123	.0113	.0073
35.00	.0359	.0289	.0229	.0169	.0139	.0089
40.00	.0471	.0381	.0331	.0241	.0201	.0141
45.00	.0571	.0491	.0411	.0321	.0271	.0191
50.00	.0694	.0584	.0504	.0394	.0324	.0244
55.00	.0834	.0694	.0614	.0494	.0404	.0314
60.00	.0987	.0847	.0737	.0607	.0507	.0407
65.00	.1177	.1017	.0897	.0767	.0647	.0547
70.00	.1442	.1262	.1142	.1002	.0872	.0752
75.00	.1837	.1667	.1517	.1367	.1227	.1097
80.00	.2305	.2105	.1955	.1785	.1645	.1505
85.00	.2878	.2668	.2498	.2328	.2168	.2038
90.00	.3568	.3348	.3168	.2988	.2828	.2678
95.00	.4318	.4068	.3888	.3718	.3538	.3388
100.00	.5315	.5055	.4855	.4665	.4485	.4335
105.00	.6238	.5958	.5738	.5548	.5368	.5198
110.00	.7383	.7093	.6863	.6653	.6473	.6303
115.00	.8271	.7961	.7731	.7521	.7331	.7161
120.00	1.047	1.014	.9894	.9674	.9484	.9314
125.00	1.151	1.118	1.091	1.070	1.049	1.033
130.00	1.418	1.382	1.355	1.332	1.312	1.296
135.00	1.712	1.674	1.645	1.618	1.602	1.586
140.00	2.158	2.119	2.087	2.062	2.045	2.029

: A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI

DAM COMPRESSION TEST 2-2
LOAD DISTRIBUTION CURVES

DATE DRIVEN =18 AUG 82
DATE TESTED =24 AUG 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6	GROUND SURFACE
(FEET)	11.08	21.48	31.78	42.127	52.53	62.83	SURFACE
(INCHES)	132.9	257.7	381.3	505.52	630.3	753.9	0
FOR PLOT PURPOSES ONLY							0

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	-3.59	-12.4	-22.7	-33.0	-43.4	-53.8
FOR PLOT PURPOSES ONLY	3.587	12.37	22.72	33.05	43.43	53.78

PILE AREA (SQ INCHES) = 21.4
YOUNGS MODULUS (TSI) = 15000
AXIAL LENGTH (FEET) = 59.4
PILE PERIMETER (INCHES) 56
S TO TELLTALE DIALS (INCHES).................. 46.81

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -17.5
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 15.69

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-7.17	-17.6	-27.9	-38.2	-48.6	-58.9
FOR PLOT PURPOSES ONLY	7.174	17.57	27.87	38.23	48.63	58.93
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3913	.9566	1.249	1.542	1.837	2.129

APPLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
5.00	2.057	0	2.749	0	2.54	0	2.712	0	0	.242	0	.844	0	.991	0	.99	0	.351	0	.555	0
10.00	2.056	.001	2.745	.004	2.536	.004	2.709	.003	.003	.243	.001	.847	.003	.994	.003	.993	.003	.352	.001	.558	.003
15.00	2.054	.003	2.739	.01	2.531	.009	2.707	.005	.0068	.245	.003	.85	.006	.997	.006	.996	.006	.356	.005	.559	.004
20.00	2.053	.004	2.732	.017	2.526	.014	2.704	.008	.0108	.246	.004	.852	.008	1.001	.01	1.001	.011	.36	.009	.565	.01
25.00	2.05	.007	2.725	.024	2.52	.02	2.702	.01	.0153	.247	.005	.855	.011	1.005	.014	1.005	.015	.364	.013	.568	.013
30.00	2.048	.009	2.718	.031	2.513	.027	2.698	.014	.0203	.248	.006	.857	.013	1.009	.018	1.009	.019	.368	.017	.572	.017
35.00	2.045	.012	2.71	.039	2.507	.033	2.694	.018	.0255	.25	.008	.86	.016	1.013	.022	1.014	.024	.372	.021	.576	.021
40.00	2.042	.015	2.702	.047	2.501	.039	2.689	.023	.031	.251	.009	.863	.019	1.017	.026	1.018	.028	.377	.026	.58	.025
45.00	2.038	.019	2.695	.054	2.495	.045	2.685	.027	.0363	.252	.01	.866	.022	1.022	.031	1.022	.032	.382	.031	.585	.03
50.00	2.033	.024	2.687	.062	2.488	.052	2.679	.033	.0428	.254	.012	.869	.025	1.026	.035	1.027	.037	.387	.036	.589	.034
55.00	2.028	.029	2.679	.07	2.48	.06	2.673	.039	.0495	.256	.014	.872	.028	1.03	.039	1.032	.042	.392	.041	.595	.04
60.00	2.022	.035	2.67	.079	2.473	.067	2.666	.046	.0568	.257	.015	.875	.031	1.034	.043	1.038	.048	.398	.047	.598	.043
65.00	2.015	.042	2.661	.088	2.465	.075	2.659	.053	.0645	.259	.017	.878	.034	1.038	.047	1.043	.053	.403	.052	.607	.052
70.00	2.007	.05	2.652	.097	2.456	.084	2.651	.061	.073	.26	.018	.881	.037	1.042	.051	1.048	.058	.409	.058	.613	.058
75.00	2	.057	2.642	.107	2.447	.093	2.642	.07	.0818	.262	.02	.884	.04	1.046	.055	1.053	.063	.415	.064	.619	.064
80.00	1.99	.067	2.631	.118	2.437	.103	2.632	.08	.092	.264	.022	.887	.043	1.051	.06	1.058	.068	.421	.07	.625	.07
85.00	1.979	.078	2.617	.132	2.425	.115	2.62	.092	.1043	.265	.023	.891	.047	1.056	.065	1.064	.074	.427	.076	.631	.076
90.00	1.966	.091	2.602	.147	2.41	.13	2.605	.107	.1188	.267	.025	.894	.05	1.06	.069	1.069	.079	.433	.082	.637	.082
95.00	1.945	.112	2.575	.174	2.385	.155	2.58	.132	.1433	.269	.027	.897	.053	1.065	.074	1.074	.084	.438	.087	.643	.088
100.00	1.907	.15	2.534	.215	2.346	.194	2.54	.172	.1828	.271	.029	.901	.057	1.07	.079	1.08	.09	.445	.094	.649	.094
105.00	1.074	.183	2.499	.25	2.31	.23	2.505	.207	.2175	.273	.031	.904	.06	1.074	.083	1.085	.095	.45	.099	.651	.096
110.00	1.838	.219	2.461	.288	2.274	.266	2.471	.241	.2535	.274	.032	.907	.063	1.079	.088	1.09	.1	.456	.105	.653	.098
115.00	1.792	.265	2.412	.337	2.225	.315	2.423	.289	.3015	.276	.034	.912	.068	1.085	.094	1.096	.106	.462	.111	.664	.109
120.00	1.753	.304	2.366	.383	2.184	.356	2.38	.332	.3438	.279	.037	.915	.071	1.09	.099	1.101	.111	.468	.117	.669	.114
125.00	1.693	.364	2.311	.438	2.126	.414	2.326	.386	.4005	.28	.038	.919	.075	1.094	.103	1.107	.117	.475	.124	.673	.118
130.00	1.646	.411	2.262	.487	2.078	.462	2.277	.435	.4488	.282	.04	.922	.078	1.099	.108	1.112	.122	.48	.129	.685	.13
135.00	1.604	.453	2.215	.534	2.028	.512	2.226	.486	.4963	.284	.042	.925	.081	1.103	.112	1.119	.129	.487	.136	.692	.137
140.00	1.536	.521	2.151	.598	1.964	.576	2.163	.549	.561	.286	.044	.929	.085	1.109	.118	1.124	.134	.493	.142	.698	.143
145.00	1.483	.574	2.093	.656	1.907	.633	2.105	.607	.6175	.287	.045	.932	.088	1.113	.122	1.13	.14	.499	.148	.704	.149
150.00	1.364	.693	1.98	.769	1.792	.748	1.996	.716	.7315	.289	.047	.935	.091	1.119	.128	1.136	.146	.505	.154	.711	.156

OAD AT ROUND URFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.00	-1.71	5.144	0	0	-5.14	5.194	.0841	.1065	0	.1062	-.214	.2149	.1113	0	.0689	-.117
15.00	3.030	7.716	0	0	-2.57	-2.60	.1261	.1598	0	.0531	.0005	.3224	.1670	0	.0344	.0003
20.00	4.039	10.29	5.194	2.584	-5.14	2.597	.1682	.1055	.0542	.1596	-.160	.4298	.1103	.0434	.1035	-.087
25.00	5.049	15.43	7.791	2.584	-5.14	>>>>>	.1657	.1582	.1081	.1596	-.107	.4234	.1654	.0865	.1035	-.058
30.00	6.059	18.00	12.99	2.584	-5.14	>>>>>	.2077	.1039	.2159	.1596	-.107	.5309	.1086	.1729	.1035	-.058
35.00	10.80	20.58	15.58	5.168	-7.72	>>>>>	.2498	.1034	.2161	.2661	-.160	.6384	.1081	.1731	.1725	-.087
40.00	11.81	25.72	18.18	5.168	-5.14	-2.60	.2473	.1561	.2700	.2130	-.053	.6320	.1632	.2162	.1381	-.029
45.00	12.82	30.87	23.37	2.584	-2.57	-2.60	.2448	.1551	.4314	.1065	.0005	.6256	.1621	.3455	.0690	.0003
50.00	17.56	33.44	25.97	5.168	-2.57	-5.19	.2868	.1546	.4317	.1599	.0543	.7330	.1616	.3457	.1036	.0295
55.00	22.29	36.01	28.57	7.752	-2.57	-2.60	.3289	.1541	.4320	.2132	.0005	.8405	.1611	.3459	.1382	.0003
60.00	23.30	41.15	31.17	12.92	-2.57	-10.4	.3264	.2068	.3786	.3199	.1618	.8341	.2162	.3032	.2074	.0881
65.00	28.04	43.73	33.76	15.50	-2.57	>>>>>	.3684	.2063	.3789	.3733	-.053	.9416	.2157	.3034	.2421	-.029
70.00	29.05	48.87	36.36	18.09	>>>>>	>>>>>	.3659	.2590	.3792	.3736	3e-17	.9352	.2708	.3036	.2422	2e-17
75.00	33.79	51.44	38.96	20.67	2.572	>>>>>	.4080	.2585	.3794	.3738	.0533	1.043	.2702	.3039	.2424	.0290
80.00	38.53	54.01	44.15	20.67	5.144	>>>>>	.4500	.2042	.4872	.3207	.1065	1.150	.2135	.3902	.2079	.0580
85.00	39.54	61.73	46.75	23.26	5.144	>>>>>	.4030	.3102	.4875	.3741	.1065	1.030	.3243	.3904	.2425	.0580
90.00	44.28	64.30	49.34	25.84	7.716	>>>>>	.4450	.3097	.4878	.3743	.1598	1.137	.3238	.3906	.2427	.0870
95.00	49.02	66.88	54.54	25.84	7.716	2.597	.4871	.2554	.5956	.3743	.1060	1.245	.2670	.4769	.2427	.0577
00.00	53.76	72.02	57.14	28.42	10.29	>>>>>	.4846	.3081	.5958	.3745	.2130	1.238	.3221	.4772	.2428	.1159
05.00	58.49	74.59	59.73	31.01	10.29	-7.79	.5266	.3076	.5961	.4279	.3743	1.346	.3216	.4774	.2775	.2037
10.00	59.50	79.74	64.93	31.01	12.86	-18.2	.5241	.3066	.7039	.3748	.6427	1.339	.3205	.5637	.2430	.3498
15.00	64.24	87.45	67.52	31.01	12.86	-5.19	.4771	.4126	.7578	.3748	.3738	1.219	.4313	.6069	.2430	.2035
20.00	72.71	87.45	72.72	31.01	15.43	-7.79	.5637	.3050	.8656	.3217	.4808	1.441	.3189	.6932	.2086	.2617
25.00	73.72	95.17	72.72	36.18	18.00	-15.6	.5166	.4648	.7583	.3753	.6954	1.320	.4859	.6073	.2433	.3785
30.00	78.46	97.74	77.91	36.18	18.00	2.597	.5587	.4105	.8661	.3753	.3190	1.428	.4291	.6936	.2433	.1736
35.00	83.20	100.3	80.51	43.93	18.00	2.597	.6007	.4100	.7591	.5354	.3190	1.535	.4286	.6079	.3471	.1736
40.00	87.94	105.5	85.70	41.34	20.58	2.597	.5982	.4090	.9205	.4289	.3723	1.529	.4275	.7372	.2781	.2026
45.00	88.95	110.6	88.30	46.51	20.58	2.597	.5957	.4617	.8672	.5356	.3723	1.522	.4827	.6945	.3473	.2026
50.00	93.68	113.2	96.09	46.51	20.58	5.194	.6378	.3536	1.029	.5356	.3185	1.630	.3697	.8240	.3473	.1733

OR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 60
INIMUM LOAD = 0
AXIMUM LOAD = 200
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
5.00	.0002	.0002	.0002	.0002	.0002	.0002
10.00	.0025	.0005	.0005	.0005	.0025	.0005
15.00	.0045	.0015	.0015	.0015	.0025	.0035
20.00	.0077	.0037	.0017	.0007	.0027	.0017
25.00	.0115	.0055	.0025	.0015	.0035	.0035
30.00	.0157	.0087	.0037	.0027	.0047	.0047
35.00	.0192	.0112	.0052	.0032	.0062	.0062
40.00	.0240	.0140	.0070	.0050	.0070	.0080
45.00	.0284	.0164	.0074	.0064	.0074	.0084
50.00	.0332	.0202	.0102	.0082	.0092	.0112
55.00	.0382	.0242	.0132	.0102	.0112	.0122
60.00	.0447	.0287	.0167	.0117	.0127	.0167
65.00	.0507	.0337	.0207	.0147	.0157	.0157
70.00	.0584	.0394	.0254	.0184	.0184	.0184
75.00	.0654	.0454	.0304	.0224	.0214	.0214
80.00	.0739	.0529	.0359	.0279	.0259	.0259
85.00	.0854	.0614	.0434	.0344	.0324	.0324
90.00	.0981	.0731	.0541	.0441	.0411	.0411
95.00	.1209	.0949	.0739	.0639	.0609	.0599
100.00	.1586	.1306	.1086	.0976	.0936	.0936
105.00	.1916	.1626	.1396	.1276	.1236	.1266
110.00	.2269	.1959	.1709	.1589	.1539	.1609
115.00	.2731	.2391	.2131	.2011	.1961	.1981
120.00	.3126	.2786	.2506	.2386	.2326	.2356
125.00	.3686	.3316	.3036	.2896	.2826	.2886
130.00	.4151	.3771	.3471	.3331	.3261	.3251
135.00	.4608	.4218	.3908	.3738	.3668	.3658
140.00	.5238	.4828	.4498	.4338	.4258	.4248
145.00	.5796	.5366	.5026	.4846	.4766	.4756
150.00	.6918	.6478	.6108	.5928	.5848	.5828

. A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI

DAM COMPRESSION TEST 2-3
LOAD DISTRIBUTION CURVES

DATE DRIVEN =27 AUG 82
DATE TESTED =3 SEPT 82

LENGTH OF TELLTALE RODS	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	11.11	24.01	36.81	48.998	61.90	74.70
(INCHES)	133.3	288.1	441.7	587.98	742.8	896.4

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-3.26	-13.0	-25.8	-38.3	-50.9	-63.7
FOR PLOT PURPOSES ONLY	0	3.261	12.97	25.82	38.32	50.86	63.71

PILE AREA (SQ INCHES) = 21.4
YOUNGS MODULUS (TSI) = 15000
AXIAL LENGTH (FEET) = 72
SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -16.4
PILE PERIMETER (INCHES) 56
S TO TELLTALE DIALS (INCHES).................... 55.06
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 9.75

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-6.52	-19.4	-32.2	-44.4	-57.3	-70.1
FOR PLOT PURPOSES ONLY	6.521	19.42	32.22	44.41	57.31	70.11
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3557	.9802	1.343	1.689	2.055	2.418

PILE BUTT DEFLECTION (INCHES)

APPLIED LOAD (TONS)	UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	UPSTREAM CORNERS ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	DOWNSTREAM CORNERS ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT
.00	2.861	0	2.699	0	2.895	0	2.389	0	0
5.00	2.856	.005	2.696	.003	2.89	.005	2.386	.003	.004
10.00	2.849	.012	2.693	.006	2.885	.01	2.38	.009	.0093
15.00	2.84	.021	2.689	.01	2.88	.015	2.373	.016	.0155
20.00	2.831	.03	2.684	.015	2.874	.021	2.365	.024	.0225
25.00	2.82	.041	2.678	.021	2.867	.028	2.356	.033	.0308
30.00	2.807	.054	2.672	.027	2.857	.038	2.345	.044	.0408
35.00	2.794	.067	2.669	.03	2.851	.044	2.333	.056	.0493
40.00	2.778	.083	2.669	.03	2.84	.055	2.319	.07	.0595
45.00	2.755	.106	2.633	.066	2.822	.073	2.298	.091	.084
50.00	2.726	.135	2.612	.087	2.787	.108	2.269	.12	.1125
55.00	2.68	.181	2.572	.127	2.742	.153	2.225	.164	.1563
60.00	2.620	.2406	2.515	.184	2.682	.213	2.171	.218	.2139
65.00	2.562	.299	2.463	.236	2.625	.27	2.111	.278	.2708
70.00	2.505	.356	2.407	.292	2.57	.325	2.059	.33	.3258
75.00	2.453	.408	2.367	.332	2.519	.376	1.998	.391	.3768
80.00	2.395	.466	2.302	.397	2.463	.432	1.957	.432	.4318
85.00	2.342	.519	2.243	.456	2.41	.485	1.899	.49	.4875
90.00	2.286	.575	2.189	.51	2.356	.539	1.842	.547	.5428
95.00	2.238	.623	2.141	.558	2.306	.589	1.793	.596	.5915
100.00	2.182	.679	2.085	.614	2.249	.646	1.738	.651	.6475
105.00	2.134	.727	2.045	.654	2.203	.692	1.69	.699	.693
110.00	2.076	.785	1.989	.71	2.143	.752	1.632	.757	.751
115.00	2.016	.845	1.932	.767	2.084	.811	1.575	.814	.8093
120.00	1.948	.913	1.871	.828	2.018	.877	1.512	.877	.8738
125.00	1.889	.972	1.809	.89	1.956	.939	1.45	.939	.935
130.00	1.823	1.038	1.739	.96	1.89	1.005	1.382	1.007	1.003
135.00	1.748	1.113	1.67	1.029	1.812	1.083	1.305	1.084	1.077
140.00	1.645	1.216	1.565	1.134	1.713	1.182	1.207	1.182	1.179
145.00	1.531	1.33	1.464	1.235	1.603	1.292	1.099	1.29	1.287
150.00	1.316	1.545	1.245	1.454	1.387	1.508	.884	1.505	1.503

MEASURED TELLTALE DATA (INCHES)

APPLIED LOAD (TONS)	TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.809	0	.573	0	1.25	0	1.299	0	1.19	0	1.374	0
5.00	.81	.001	.575	.002	1.253	.003	1.302	.003	1.192	.002	1.378	.004
10.00	.812	.003	.579	.006	1.257	.007	1.308	.009	1.197	.007	1.381	.007
15.00	.814	.005	.583	.01	1.262	.012	1.312	.013	1.202	.012	1.387	.013
20.00	.815	.006	.587	.014	1.267	.017	1.318	.019	1.208	.018	1.393	.019
25.00	.817	.008	.589	.016	1.272	.022	1.324	.025	1.215	.025	1.4	.026
30.00	.819	.01	.594	.021	1.279	.029	1.331	.032	1.222	.032	1.408	.034
35.00	.82	.011	.598	.025	1.284	.034	1.333	.034	1.23	.04	1.415	.041
40.00	.822	.013	.601	.028	1.29	.04	1.341	.042	1.238	.048	1.424	.05
45.00	.824	.015	.605	.032	1.296	.046	1.348	.049	1.247	.057	1.433	.059
50.00	.825	.016	.61	.037	1.302	.052	1.361	.062	1.255	.065	1.441	.067
55.00	.827	.018	.614	.041	1.308	.058	1.366	.067	1.261	.071	1.448	.074
60.00	.829	.02	.618	.045	1.312	.062	1.372	.073	1.267	.077	1.453	.079
65.00	.831	.022	.622	.049	1.318	.068	1.378	.079	1.273	.083	1.459	.085
70.00	.832	.023	.626	.053	1.322	.072	1.384	.085	1.279	.089	1.465	.091
75.00	.834	.025	.629	.056	1.328	.078	1.385	.086	1.285	.095	1.471	.097
80.00	.836	.027	.633	.06	1.334	.084	1.394	.095	1.291	.101	1.478	.104
85.00	.838	.029	.637	.064	1.339	.089	1.402	.103	1.298	.108	1.484	.11
90.00	.84	.031	.64	.067	1.344	.094	1.409	.11	1.305	.115	1.491	.117
95.00	.842	.033	.645	.072	1.35	.1	1.414	.115	1.311	.121	1.499	.125
100.00	.844	.035	.649	.076	1.355	.105	1.421	.122	1.318	.128	1.507	.133
105.00	.846	.037	.652	.079	1.36	.11	1.428	.129	1.325	.135	1.513	.139
110.00	.847	.038	.656	.083	1.366	.116	1.434	.135	1.332	.142	1.52	.146
115.00	.849	.04	.66	.087	1.372	.122	1.44	.141	1.339	.149	1.527	.153
120.00	.85	.041	.664	.091	1.378	.128	1.447	.148	1.346	.156	1.534	.16
125.00	.852	.043	.668	.095	1.384	.134	1.454	.155	1.354	.164	1.542	.168
130.00	.854	.045	.672	.099	1.39	.14	1.461	.162	1.361	.171	1.549	.175
135.00	.856	.047	.675	.102	1.395	.145	1.469	.17	1.37	.18	1.558	.184
140.00	.859	.05	.681	.108	1.404	.154	1.477	.178	1.378	.188	1.567	.193
145.00	.861	.052	.687	.114	1.413	.163	1.481	.182	1.389	.199	1.577	.203
150.00	.864	.055	.694	.121	1.422	.172	1.499	.2	1.401	.211	1.59	.216

AVERAGE DEVELOPED SHEAR STRESS (TSF) | % OF ESTIMATED SHEAR STRENGTH

LOAD AT GROUND SURFACE	LOAD IN PILE AT SECTION MIDPOINT						AVERAGE DEVELOPED SHEAR STRESS (TSF)					% OF ESTIMATED SHEAR STRENGTH				
							SEC 6S-2	SEC 2-3	SEC 3-4	SEC 4-5	SEC 5-6	SEC 1-2	SEC 2-3	SEC 3-4	SEC 4-5	SEC 5-6
(TONS)	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	TAU %	TAU %	TAU %	TAU %	TAU %	%	%	%	%	%
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.00	.5838	2.074	2.090	0	-2.07	4.180	.0483	-3e-4	.0358	.0354	-.104	.1359	-3e-4	.0267	.0210	-.051
10.00.	5.269	6.221	2.090	4.390	-4.15	0	.0624	.0689	-.039	.1458	-.069	.1755	.0703	-.029	.0863	-.034
15.00	9.955	10.37	4.180	2.195	-2.07	2.090	.0765	.1032	.0340	.0729	-.069	.2151	.1053	.0253	.0432	-.034
20.00	10.54	16.59	6.270	4.390	-2.07	2.090	.0563	.1721	.0322	.1104	-.069	.1584	.1756	.0240	.0654	-.034
25.00	15.22	16.59	12.54	6.584	0	2.090	.1389	.0675	.1021	.1125	-.035	.3906	.0689	.0760	.0666	-.017
30.00	19.91	22.81	16.72	6.584	0	4.180	.1188	.1016	.1738	.1125	-.070	.3339	.1036	.1294	.0666	-.034
35.00	20.49	29.03	18.81	5e-13	12.44	2.090	.0986	.1705	.3226	-.213	.1726	.2772	.1739	.2402	-.126	.0840
40.00	25.10	31.10	25.00	4.390	12.44	4.180	.1469	.1005	.3548	-.138	.1378	.4131	.1025	.2642	-.081	.0671
45.00	29.07	35.25	29.26	6.584	16.59	4.180	.1610	.1000	.3889	-.171	.2069	.4527	.1020	.2895	-.101	.1007
50.00	30.45	43.55	31.35	21.95	6.221	4.180	.1066	.2034	.1612	.2687	.0340	.2997	.2075	.1200	.1591	.0166
55.00	35.13	47.69	35.53	19.75	8.295	6.270	.1207	.2029	.2705	.1957	.0338	.3393	.2070	.2014	.1159	.0164
60.00	39.82	51.84	35.53	24.14	8.295	4.180	.1348	.2720	.1953	.2707	.0686	.3789	.2776	.1454	.1603	.0334
65.00	44.51	55.99	39.71	24.14	8.295	4.180	.1489	.2715	.2669	.2707	.0686	.4185	.2770	.1987	.1603	.0334
70.00	45.09	62.21	39.71	28.53	8.295	4.180	.1287	.3752	.1917	.3457	.0686	.3618	.3828	.1427	.2047	.0334
75.00	49.78	64.28	45.98	17.56	18.66	4.180	.1770	.3053	.4874	-.019	.2415	.4978	.3115	.3629	-.011	.1175
80.00	54.46	68.43	50.16	24.14	12.44	6.270	.1911	.3047	.4462	.1999	.1029	.5374	.3109	.3322	.1184	.0501
85.00	59.15	72.58	52.25	30.73	10.37	4.180	.2052	.3390	.3691	.3478	.1032	.5770	.3459	.2748	.2059	.0502
90.00	63.03	74.65	56.43	35.12	10.37	4.180	.2536	.3039	.3655	.4228	.1032	.7129	.3101	.2721	.2503	.0502
95.00	60.52	80.87	58.52	32.92	12.44	8.359	.2334	.3728	.4390	.3499	.0681	.6562	.3804	.3268	.2072	.0331
100.00	73.20	85.02	60.61	37.31	12.44	10.45	.2475	.4071	.3995	.4248	.0332	.6958	.4154	.2974	.2516	.0162
105.00	77.89	87.09	64.79	41.70	12.44	8.359	.2958	.3720	.3959	.4998	.0681	.8317	.3795	.2948	.2960	.0331
110.00	78.47	93.31	68.96	41.70	14.52	8.359	.2757	.4060	.4676	.4644	.1027	.7750	.4143	.3481	.2750	.0500
115.00	83.16	97.46	73.14	41.70	16.59	8.359	.2097	.4055	.5393	.4290	.1372	.8146	.4137	.4015	.2540	.0668
120.00	83.74	103.7	77.32	43.90	16.59	8.359	.2696	.4395	.5733	.4665	.1372	.7579	.4484	.4268	.2762	.0668
125.00	88.43	107.8	81.50	46.09	18.66	8.359	.2837	.4390	.6074	.4685	.1718	.7975	.4479	.4522	.2774	.0836
130.00	93.11	112.0	85.68	48.29	18.66	8.359	.2977	.4385	.6414	.5060	.1718	.8371	.4473	.4775	.2996	.0836
135.00	97.80	114.1	89.06	54.87	20.74	8.359	.3461	.4033	.6002	.5831	.2064	.9730	.4115	.4468	.3453	.1005
140.00	106.6	120.3	96.13	52.67	20.74	10.45	.3259	.4025	.7454	.5456	.1715	.9163	.4107	.5549	.3231	.0835
145.00	111.3	128.6	102.4	41.70	35.25	8.359	.2715	.4363	1.041	.1102	.4485	.7633	.4451	.7751	.0652	.2183
150.00	120.1	136.9	106.6	61.45	22.81	10.45	.2171	.5049	.7740	.6601	.2061	.6103	.5151	.5762	.3909	.1003

OR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 75
INIMUM LOAD = 0
AXIMUM LOAD = 200
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
5.00	.0032	.0022	.0012	.0012	.0022	.0002
10.00	.0066	.0036	.0026	.0006	.0026	.0026
15.00	.0110	.0060	.0040	.0030	.0040	.0030
20.00	.0171	.0091	.0061	.0041	.0051	.0041
25.00	.0235	.0155	.0095	.0065	.0065	.0055
30.00	.0317	.0207	.0127	.0097	.0097	.0077
35.00	.0393	.0253	.0163	.0163	.0103	.0093
40.00	.0477	.0327	.0207	.0187	.0127	.0107
45.00	.0704	.0534	.0394	.0364	.0284	.0264
50.00	.0980	.0770	.0620	.0520	.0490	.0470
55.00	.1399	.1169	.0999	.0909	.0869	.0839
60.00	.1957	.1707	.1537	.1427	.1387	.1367
65.00	.2507	.2237	.2047	.1937	.1897	.1877
70.00	.3049	.2749	.2559	.2429	.2389	.2369
75.00	.3540	.3230	.3010	.2930	.2840	.2820
80.00	.4072	.3742	.3502	.3392	.3332	.3302
85.00	.4611	.4261	.4011	.3871	.3821	.3801
90.00	.5145	.4785	.4515	.4355	.4305	.4285
95.00	.5614	.5224	.4944	.4794	.4734	.4694
100.00	.6155	.5745	.5455	.5285	.5225	.5175
105.00	.6592	.6172	.5862	.5672	.5612	.5572
110.00	.7163	.6713	.6383	.6193	.6123	.6083
115.00	.7727	.7257	.6907	.6717	.6637	.6597
120.00	.8364	.7864	.7494	.7294	.7214	.7174
125.00	.8958	.8438	.8048	.7838	.7748	.7708
130.00	.9614	.9074	.8664	.8444	.8354	.8314
135.00	1.034	.9794	.9364	.9114	.9014	.8974
140.00	1.133	1.075	1.029	1.005	.9948	.9898
145.00	1.239	1.177	1.128	1.109	1.092	1.088
150.00	1.453	1.387	1.336	1.308	1.297	1.292

A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI

AM COMPRESSION TEST 2-4
OAD DISTRIBUTION CURVES

	LENGTH OF TELLTALE RODS							DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)					
ATE DRIVEN =26 AUG 82		ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
ATE TESTED =2 SEPT 82	(FEET)	11.64	22.04	32.34	42.72	53.12	63.42							
	(INCHES)	139.7	264.5	388.1	512.64	637.4	761.0	0	-3.09	-11.4	-21.7	-32.1	-42.5	-52.8
						FOR PLOT PURPOSES ONLY		0	3.091	11.38	21.73	32.07	42.46	52.81

ILE AREA (SQ INCHES) = 21.4
OUNGS MODULUS (TSI) = 15000
(IAL LENGTH (FEET) = 60
ILE PERIMETER (INCHES) 56
; TO TELLTALE DIALS (INCHES).................. 65.5
SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -20
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 11.69

	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	-6.18	-16.6	-26.9	-37.3	-47.7	-58.0
FOR PLOT PURPOSES ONLY	6.182	16.58	26.88	37.26	47.66	57.96
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3372	.9044	1.286	1.580	1.875	2.167

PLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	2.941	0	2.877	0	2.91	0	2.909	0	0	.177	0	.361	0	1.032	0	.686	0	.304	0	.634	0
15.00	2.941	0	2.841	.036	2.884	.026	2.895	.014	.019	.179	.002	.367	.006	1.042	.01	.696	.01	.313	.009	.641	.007
30.00	2.933	.008	2.795	.082	2.853	.057	2.873	.036	.0458	.183	.006	.376	.015	1.057	.025	.711	.025	.328	.024	.654	.02
45.00	2.874	.067	2.714	.163	2.785	.125	2.814	.095	.1125	.186	.009	.385	.024	1.067	.035	.728	.042	.346	.042	.674	.04
60.00	2.713	.228	2.53	.347	2.614	.296	2.645	.264	.2838	.192	.015	.395	.034	1.087	.055	.742	.056	.362	.058	.691	.057
75.00	2.444	.497	2.24	.637	2.336	.574	2.366	.543	.5628	.196	.019	.405	.044	1.102	.07	.758	.072	.379	.075	.709	.075
90.00	2.258	.683	2.029	.848	2.14	.77	2.158	.751	.763	.202	.025	.415	.054	1.117	.085	.772	.086	.396	.092	.725	.091
05.00	1.263	1.678	1.22	1.657	1.724	1.186	1.19	1.719	1.56	.207	.03	.426	.065	1.133	.101	.79	.104	.414	.11	.742	.108
20.00	.545	2.396	.486	2.391	.965	1.945	.449	2.46	2.298	.212	.035	.438	.077	1.146	.114	.806	.12	.429	.125	.752	.118

LOAD AT GROUND SURFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15.00	-4.59	10.29	10.39	>>>>>	-2.57	-5.19	.0887	-.002	.2153	.0530	.0543	.2631	-.002	.1674	.0336	.0289
30.00	-.526	23.15	25.97	0	-2.57	-10.4	.1290	-.058	.5382	.0530	.1618	.3826	-.065	.4105	.0336	.0863
45.00	-.789	38.58	28.57	18.04	1e-13	-5.19	.1208	.2073	.2182	.3721	.1075	.3584	.2292	.1697	.2354	.0573
60.00	11.93	48.87	54.54	2.577	5.144	-2.60	.2095	-.117	1.077	-.053	.1603	.6215	-.130	.8374	-.034	.0855
75.00	15.99	64.30	67.52	5.154	7.716	>>>>>	.2014	-.067	1.293	-.053	.1598	.5973	-.074	1.005	-.033	.0852
90.00	28.71	74.59	80.51	2.577	15.43	-2.60	.2901	-.123	1.615	-.265	.3733	.8604	-.135	1.256	-.168	.1990
105.00	37.11	90.02	93.50	7.731	15.43	-5.19	.2820	-.072	1.777	-.159	.4271	.8363	-.079	1.382	-.101	.2277
120.00	45.50	108.0	96.09	15.46	12.86	-18.2	.2254	.2471	1.671	.0537	.6427	.6685	.2733	1.299	.0340	.3427

FOR VIEW 1
MINIMUM DEPTH = 0
MAXIMUM DEPTH= 60
MINIMUM LOAD = 0
MAXIMUM LOAD = 200
LOAD IN TONS
DEPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

FOR VIEWS 3 TO 8
MINIMUM MOVEMENT = 0
MAXIMUM MOVEMENT = 3
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
MOVEMENT IN INCHES
t-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
15.00	.0175	.0135	.0095	.0095	.0105	.0125
30.00	.0408	.0318	.0218	.0218	.0228	.0268
45.00	.1051	.0901	.0791	.0721	.0721	.0741
60.00	.2709	.2519	.2309	.2299	.2279	.2289
75.00	.5465	.5215	.4955	.4935	.4905	.4905
90.00	.7413	.7123	.6813	.6803	.6743	.6753
105.00	1.534	1.499	1.463	1.460	1.454	1.456
120.00	2.267	2.225	2.188	2.182	2.177	2.184

A ¦¦ B ¦¦ C ¦¦ D ¦¦ E ¦¦ F ¦¦ G ¦¦ H ¦¦ I ¦¦ J ¦¦ K ¦¦ L ¦¦ M ¦¦ N ¦¦ O ¦¦ P ¦¦ Q ¦¦ R ¦¦ S ¦¦ T ¦¦ U ¦¦ V ¦¦ W ¦¦ X ¦¦ Y ¦¦ Z ¦¦ AA ¦¦ AB ¦¦ AC ¦¦ AD ¦¦ AE ¦¦ AF ¦¦ AG ¦¦ AH ¦¦ AI

AM COMPRESSION TEST 2-5
OAD DISTRIBUTION CURVES

ATE DRIVEN =28 SEPT 82
ATE TESTED =6 OCT 82

LENGTH OF TELLTALE RODS

	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	11.47	21.87	32.17	42.49	52.89	63.19
(INCHES)	137.6	262.4	386.0	509.88	634.7	758.3

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)

	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-3.40	-12.0	-22.3	-32.7	-43.0	-53.4
FOR PLOT PURPOSES ONLY	0	3.396	11.99	22.34	32.65	43.01	53.36

ILE AREA (SQ INCHES) = 21.4
OUNGS MODULUS (TSI) = 15000
IAL LENGTH (FEET) = 60

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -13

ILE PERIMETER (INCHES) 56
S TO TELLTALE DIALS (INCHES).................. 56.13 TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 9.125

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)

	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-6.79	-17.2	-27.5	-37.8	-48.2	-58.5
FOR PLOT PURPOSES ONLY	6.793	17.19	27.49	37.81	48.21	58.51
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3705	.8280	1.120	1.413	1.708	2.000

PILE BUTT DEFLECTION (INCHES)

PLIED LOAD (TONS)	UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	UPSTREAM CORNERS ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	DOWNSTREAM CORNERS ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT
.00	.364	0	.388	0	.264	0	.274	0	0
25.00	.382	.018	.404	.016	.279	.015	.293	.019	.017
50.00	.41	.046	.431	.043	.305	.041	.321	.047	.0443
75.00	.447	.083	.469	.081	.341	.077	.36	.086	.0818
00.00	.495	.131	.497	.109	.389	.125	.411	.137	.1255
25.00	.559	.195	.591	.203	.455	.191	.481	.207	.199
50.00	.642	.278	.677	.289	.536	.272	.568	.294	.2833
75.00	.736	.372	.777	.389	.631	.367	.668	.394	.3805
00.00	1.026	.662	1.077	.689	.924	.66	.966	.692	.6758
25.00	1.311	.947	1.374	.986	1.212	.948	1.264	.99	.9678
26.00	2.082	1.718	2.142	1.754	1.983	1.719	2.032	1.758	1.737

MEASURED TELLTALE DATA (INCHES)

PLIED LOAD (TONS)	TELLTALE NO. 1 DR	DELTA	TELLTALE NO. 2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	1.9	0	1.701	0	1.754	0	1.671	0	1.713	0	1.731	0
25.00	1.894	.006	1.691	.01	1.741	.013	1.659	.012	1.698	.015	1.715	.016
50.00	1.888	.012	1.678	.023	1.725	.029	1.639	.032	1.675	.038	1.692	.039
75.00	1.88	.02	1.665	.036	1.705	.049	1.616	.055	1.648	.065	1.664	.067
00.00	1.873	.027	1.651	.05	1.686	.068	1.593	.078	1.622	.091	1.636	.095
25.00	1.865	.035	1.637	.064	1.665	.089	1.567	.104	1.593	.12	1.605	.126
50.00	1.859	.041	1.624	.077	1.645	.109	1.543	.128	1.563	.15	1.572	.159
75.00	1.852	.048	1.61	.091	1.625	.129	1.518	.153	1.535	.178	1.544	.187
00.00	1.845	.055	1.593	.108	1.602	.152	1.488	.183	1.504	.209	1.508	.223
25.00	1.838	.062	1.575	.126	1.579	.175	1.461	.21	1.472	.241	1.472	.259
26.00	1.839	.061	1.571	.13	1.575	.179	1.454	.217	1.464	.249	1.459	.272

OAD AT ROUND URFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT						AVERAGE DEVELOPED SHEAR STRESS (TSF)					% OF ESTIMATED SHEAR STRENGTH				
	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	SEC GS-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25.00	6.414	10.29	7.791	-2.59	7.716	2.597	.2629	.0517	.2158	-.213	.1060	.7095	.0624	.1927	-.151	.0621
50.00	12.83	28.29	15.58	7.776	15.43	2.597	.3878	.2632	.1622	-.158	.2657	1.047	.3178	.1449	-.112	.1556
75.00	27.12	41.15	33.76	15.55	25.72	5.194	.6048	.1530	.3785	-.210	.4250	1.632	.1848	.3379	-.149	.2489
100.00	37.47	59.16	46.75	25.92	33.44	10.39	.7297	.2570	.4329	-.155	.4772	1.970	.3104	.3865	-.110	.2794
125.00	51.76	74.59	64.93	38.88	41.15	15.58	.9007	.2001	.5414	-.047	.5294	2.431	.2417	.4833	-.033	.3100
150.00	58.18	92.60	83.11	49.25	56.59	23.37	1.026	.1965	.7037	-.152	.6876	2.768	.2373	.6283	-.107	.4027
175.00	68.53	110.6	98.69	62.21	64.30	23.37	1.151	.2466	.7582	-.043	.8474	3.106	.2979	.6769	-.031	.4962
200.00	78.88	136.3	114.3	88.35	66.88	36.36	1.138	.4565	.7050	.2788	.6318	3.071	.5514	.6294	.1973	.3700
225.00	89.23	164.6	127.3	90.72	79.74	46.75	1.079	.7735	.7594	.2272	.6830	2.912	.9342	.6780	.1608	.3999
226.00	84.61	177.5	127.3	98.58	82.31	59.73	.8670	1.040	.5977	.3349	.4674	2.340	1.256	.5337	.2370	.2737

OR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 75
INIMUM LOAD = 0
AXIMUM LOAD = 250
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
25.00	.0117	.0077	.0047	.0057	.0027	.0017
50.00	.0337	.0227	.0167	.0137	.0077	.0067
75.00	.0639	.0479	.0349	.0289	.0189	.0169
100.00	.1013	.0783	.0603	.0503	.0373	.0333
125.00	.1676	.1386	.1136	.0986	.0826	.0766
150.00	.2465	.2105	.1785	.1595	.1375	.1285
175.00	.3375	.2945	.2565	.2325	.2075	.1985
200.00	.6264	.5734	.5294	.4984	.4724	.4584
225.00	.9121	.8481	.7991	.7641	.7331	.7151
226.00	1.683	1.614	1.565	1.527	1.495	1.472

A :: B :: C :: D :: E :: F :: G :: H :: I :: J :: K :: L :: M :: N :: O :: P :: Q :: R :: S :: T :: U :: V :: W :: X :: Y :: Z :: AA :: AB :: AC :: AD :: AE :: AF :: AG :: AH :: AI

DAM COMPRESSION TEST 2-6
LOAD DISTRIBUTION CURVES

DATE DRIVEN =13 SEPT 82
DATE TESTED =23 SEPT 82

LENGTH OF TELLTALE RODS

	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6
(FEET)	8.86	21.76	34.56	47.36	60.26	73.06
(INCHES)	106.3	261.1	414.7	568.32	723.1	876.7

DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)

	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
	0	-3.19	-12.8	-25.7	-38.5	-51.3	-64.2
FOR PLOT PURPOSES ONLY	0	3.190	12.83	25.68	38.48	51.33	64.18

PILE AREA (SQ INCHES) = 21.4
YOUNGS MODULUS (TSI) = 15000
XIAL LENGTH (FEET) = 68

SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -21.5

DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)

	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
	-6.38	-19.3	-32.1	-44.9	-57.8	-70.6
FOR PLOT PURPOSES ONLY	6.381	19.28	32.08	44.88	57.78	70.58

ILE PERIMETER (INCHES) 56
S TO TELLTALE DIALS (INCHES).................. 29.75
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 10.5

ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)

.3480	1.052	1.473	1.836	2.202	2.565

PILE BUTT DEFLECTION (INCHES) / MEASURED TELLTALE DATA (INCHES)

PPLIED LOAD (TONS)	UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	UPSTREAM CORNERS ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	DOWNSTREAM CORNERS ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.973	0	.823	0	.942	0	.545	0	0	1.727	0	2.019	0	1.92	0	1.595	0	1.765	0	1.285	0
25.00	.987	.014	.839	.016	.954	.012	.563	.018	.015	1.722	.005	2.011	.008	1.906	.014	1.58	.015	1.751	.014	1.271	.014
50.00	1.006	.033	.86	.037	.971	.029	.587	.042	.0353	1.716	.011	1.998	.021	1.889	.031	1.561	.034	1.732	.033	1.25	.035
75.00	1.03	.057	.89	.067	.989	.047	.626	.081	.063	1.708	.019	1.984	.035	1.869	.051	1.54	.055	1.708	.057	1.225	.06
100.00	1.05	.077	.922	.099	1.005	.063	.662	.117	.089	1.701	.026	1.969	.05	1.847	.073	1.517	.078	1.682	.083	1.198	.087
125.00	1.078	.105	.956	.133	1.032	.09	.703	.158	.1215	1.695	.032	1.955	.064	1.826	.094	1.494	.101	1.655	.11	1.17	.115
150.00	1.109	.136	1.005	.182	1.063	.121	.746	.201	.16	1.688	.039	1.941	.078	1.805	.115	1.469	.126	1.627	.138	1.139	.146
175.00	1.144	.171	1.039	.216	1.097	.155	.796	.251	.1983	1.681	.046	1.925	.094	1.782	.138	1.441	.154	1.596	.169	1.105	.18
200.00	1.171	.198	1.085	.262	1.128	.186	.844	.299	.2363	1.672	.055	1.91	.109	1.757	.163	1.414	.181	1.565	.2	1.071	.214
225.00	1.181	.208	1.132	.309	1.15	.208	.904	.359	.271	1.661	.066	1.892	.127	1.731	.189	1.385	.21	1.53	.235	1.034	.251
250.00	1.171	.198	1.21	.387	1.191	.249	.993	.448	.3205	1.651	.076	1.87	.149	1.701	.219	1.349	.246	1.485	.28	.982	.303
275.00	1.207	.234	1.259	.436	1.245	.303	1.048	.503	.369	1.641	.086	1.853	.166	1.672	.248	1.32	.275	1.45	.315	.946	.339
300.00	1.247	.274	1.316	.493	1.282	.34	1.106	.561	.417	1.63	.097	1.833	.186	1.645	.275	1.29	.305	1.418	.347	.906	.379
325.00	1.297	.324	1.37	.547	1.293	.351	1.165	.62	.4605	1.619	.108	1.813	.206	1.615	.305	1.258	.337	1.383	.382	.864	.421
350.00	1.329	.356	1.43	.607	1.32	.378	1.226	.681	.5055	1.607	.12	1.793	.226	1.584	.336	1.224	.371	1.342	.423	.822	.463
375.00	1.372	.399	1.489	.666	1.366	.424	1.295	.75	.5598	1.594	.133	1.77	.249	1.55	.37	1.186	.409	1.304	.461	.784	.501
400.00	1.419	.446	1.561	.738	1.442	.5	1.368	.823	.6268	1.579	.148	1.746	.273	1.513	.407	1.14	.455	1.26	.505	.727	.558

OAD AT ROUND URFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25.00	11.25	6.221	12.54	2.090	-2.07	0	.3136	-.105	.1749	.0694	-.035	.9012	-.100	.1108	.0378	-.016
50.00	26.69	20.74	20.98	6.270	-2.07	4.180	.4887	-.003	.2449	.1391	-.104	1.404	-.003	.1663	.0758	-.047
75.00	50.51	33.18	33.44	8.359	4.147	6.270	.6985	-.004	.4198	.0702	-.035	2.007	-.004	.2851	.0383	-.016
00.00	70.14	49.77	48.07	10.45	10.37	8.359	.8389	.0284	.6298	.0014	.0335	2.411	.0270	.4276	.0007	.0152
125.00	85.59	66.36	62.70	14.63	18.66	10.45	.9794	.0611	.8047	-.067	.1370	2.814	.0581	.5464	-.037	.0622
50.00	105.2	80.87	77.32	22.99	24.88	16.72	1.154	.0592	.9096	-.032	.1362	3.317	.0563	.6177	-.017	.0618
75.00	124.8	99.53	91.95	33.44	31.10	22.99	1.260	.1264	.9796	.0389	.1353	3.621	.1202	.6652	.0212	.0615
00.00	152.9	112.0	112.9	37.62	39.40	29.26	1.470	-.015	1.260	-.030	.1691	4.224	-.014	.8552	-.016	.0768
25.00	189.3	126.5	129.6	43.89	51.84	33.44	1.645	-.051	1.434	-.133	.3069	4.727	-.049	.9740	-.072	.1394
50.00	221.5	151.4	146.3	56.43	70.50	48.07	1.647	.0848	1.504	-.235	.3742	4.733	.0807	1.022	-.128	.1699
75.00	253.7	165.9	171.4	56.43	82.95	50.16	1.822	-.091	1.924	-.442	.5468	5.236	-.087	1.307	-.241	.2484
00.00	290.1	184.6	186.0	62.70	87.09	66.88	1.928	-.024	2.064	-.407	.3372	5.540	-.023	1.402	-.222	.1531
25.00	326.5	203.2	206.9	66.88	93.31	81.50	2.034	-.061	2.344	-.441	.1969	5.844	-.058	1.592	-.240	.0895
50.00	367.1	219.8	229.9	73.14	107.8	83.59	2.174	-.168	2.624	-.578	.4042	6.248	-.160	1.782	-.315	.1836
75.00	411.9	240.5	252.9	81.50	107.8	83.59	2.246	-.206	2.869	-.439	.4042	6.452	-.195	1.948	-.239	.1836
00.00	465.0	259.2	288.0	100.3	103.7	110.8	2.351	-.347	3.009	-.056	-.118	6.756	-.338	2.043	-.031	-.054

ɔR VIEW 1
INIMUM DEPTH = 0
AXIMUM DEPTH= 75
INIMUM LOAD = 0
AXIMUM LOAD = 500
ɔAD IN TONS
ɛPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

ɔR VIEWS 3 TO 8
ɛNIMUM MOVEMENT = 0
\XIMUM MOVEMENT = 3
.NIMUM % STRESS TO STRENGTH = 0
\XIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
ɔVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
25.00	.0108	.0078	.0018	.0008	.0018	.0018
50.00	.0259	.0159	.0059	.0029	.0039	.0019
75.00	.0465	.0305	.0145	.0105	.0085	.0055
100.00	.0663	.0423	.0193	.0143	.0093	.0053
125.00	.0936	.0616	.0316	.0246	.0156	.0106
150.00	.1259	.0869	.0499	.0389	.0269	.0189
175.00	.1580	.1100	.0660	.0500	.0350	.0240
200.00	.1878	.1338	.0798	.0618	.0428	.0288
225.00	.2124	.1514	.0894	.0684	.0434	.0274
250.00	.2527	.1797	.1097	.0827	.0487	.0257
275.00	.2920	.2120	.1300	.1030	.0630	.0390
300.00	.3298	.2408	.1518	.1218	.0798	.0478
325.00	.3631	.2651	.1661	.1341	.0891	.0501
350.00	.3969	.2909	.1809	.1459	.0939	.0539
375.00	.4390	.3230	.2020	.1630	.1110	.0710
400.00	.4918	.3668	.2328	.1848	.1348	.0818

DAM COMPRESSION TEST 2-7
LOAD DISTRIBUTION CURVES

DATE DRIVEN =16 SEPT 82
DATE TESTED =29 SEPT 82

	LENGTH OF TELLTALE RODS							DEPTHS TO MIDPOINTS OF PILE SECTIONS (FEET)					
	ROD #1	ROD #2	ROD #3	ROD #4	ROD #5	ROD #6	GROUND SURFACE	SECTION 1 (GS-TT1)	SECTION 2 (TT1-TT2)	SECTION 3 (TT2-TT3)	SECTION 4 (TT3-TT4)	SECTION 5 (TT4-TT5)	SECTION 6 (TT5-TT6)
(FEET)	12.8	24.7	36.5	48.3	60.2	72							
(INCHES)	153.6	296.4	438	579.6	722.4	864	0	-3.57	-13.1	-24.9	-36.7	-48.6	-60.4
FOR PLOT PURPOSES ONLY							0	3.567	13.08	24.93	36.73	48.58	60.43

PILE AREA (SQ INCHES) = 21.4
YOUNGS MODULUS (TSI) = 15000
AXIAL LENGTH (FEET) = 70
SATURATED UNIT WEIGHT OF SOIL (PCF) = 130
INTERNAL FRICTION ANGLE (DEGREES) = 40 (RADIANS)= .6981
DEPTH TO WATER TABLE (FEET) = -20
PILE PERIMETER (INCHES) 56
S TO TELLTALE DIALS (INCHES).................... 68
TELLTALE DIALS TO BUTT MEASUREMENTS (INCHES) 10.5

	SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
DEPTHS TO BOTTOM OF PILE SECTIONS (FEET)	-7.13	-19.0	-30.8	-42.6	-54.5	-66.3
FOR PLOT PURPOSES ONLY	7.133	19.03	30.83	42.63	54.53	66.33
ESTIMATED SHEAR STRENGTH AT BOTTOM OF SECTIONS (TSF)	.3891	1.038	1.398	1.733	2.070	2.405

APPLIED LOAD (TONS)	PILE BUTT DEFLECTION (INCHES) UPSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	DOWNSTREAM CORNERS MISSOURI SIDE DR	DELTA	ILLINOIS SIDE DR	DELTA	AVERAGE PILE BUTT MOVEMENT	MEASURED TELLTALE DATA (INCHES) TELLTALE NO. 1 DR	DELTA	TELLTALE NO.2 DR	DELTA	TELLTALE NO. 3 DR	DELTA	TELLTALE NO. 4 DR	DELTA	TELLTALE NO. 5 DR	DELTA	TELLTALE NO. 6 (TIP) DR	DELTA
.00	.434	0	.608	0	.621	0	.372	0	0	1.982	0	1.896	0	1.88	0	1.928	0	1.852	0	1.966	0
25.00	.458	.024	.628	.02	.644	.023	.395	.023	.0225	1.974	.008	1.882	.014	1.87	.01	1.91	.018	1.832	.02	1.946	.02
50.00	.48	.046	.654	.046	.665	.044	.423	.051	.0468	1.965	.017	1.866	.03	1.85	.03	1.886	.042	1.807	.045	1.922	.044
75.00	.52	.086	.686	.078	.706	.085	.458	.086	.0838	1.957	.025	1.851	.045	1.831	.049	1.862	.066	1.782	.07	1.895	.071
100.00	.548	.114	.722	.114	.74	.119	.489	.117	.116	1.948	.034	1.833	.063	1.804	.076	1.834	.094	1.752	.1	1.864	.102
125.00	.582	.148	.761	.153	.781	.16	.524	.152	.1533	1.94	.042	1.817	.079	1.782	.098	1.806	.122	1.72	.132	1.83	.136
150.00	.613	.179	.804	.196	.821	.2	.561	.189	.191	1.932	.05	1.802	.094	1.758	.122	1.78	.148	1.689	.163	1.797	.169
175.00	.654	.22	.846	.238	.865	.244	.602	.23	.233	1.925	.057	1.786	.11	1.736	.144	1.753	.175	1.656	.196	1.76	.206
200.00	.705	.271	.889	.281	.912	.291	.649	.277	.28	1.916	.066	1.769	.127	1.712	.168	1.723	.205	1.619	.233	1.716	.25
225.00	.751	.317	.928	.32	.955	.334	.693	.321	.323	1.907	.075	1.753	.143	1.688	.192	1.693	.235	1.584	.268	1.676	.29
250.00	.809	.375	.977	.369	1.008	.387	.75	.378	.3773	1.898	.084	1.736	.16	1.664	.216	1.662	.266	1.543	.309	1.625	.341
275.00	.857	.423	1.023	.415	1.054	.433	.8	.428	.4248	1.888	.094	1.717	.179	1.639	.241	1.631	.297	1.504	.348	1.577	.389
300.00	.907	.473	1.069	.461	1.102	.481	.851	.479	.4735	1.877	.105	1.698	.198	1.611	.269	1.599	.329	1.477	.375	1.547	.419
325.00	.959	.525	1.116	.508	1.151	.53	.907	.535	.5245	1.865	.117	1.678	.218	1.583	.297	1.565	.363	1.441	.411	1.502	.464
350.00	1.013	.579	1.17	.562	1.203	.582	.968	.596	.5798	1.853	.129	1.656	.24	1.552	.328	1.533	.395	1.401	.451	1.453	.513
375.00	1.075	.641	1.232	.624	1.265	.644	1.04	.668	.6443	1.837	.145	1.631	.265	1.515	.365	1.492	.436	1.355	.497	1.396	.57
400.00	1.148	.714	1.296	.688	1.333	.712	1.119	.747	.7153	1.818	.164	1.599	.297	1.471	.409	1.445	.483	1.306	.546	1.33	.636

LOAD AT GROUND SURFACE (TONS)	LOAD IN PILE AT SECTION MIDPOINT SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6	AVERAGE DEVELOPED SHEAR STRESS (TSF) SEC 6S-2 TAU %	SEC 2-3 TAU %	SEC 3-4 TAU %	SEC 4-5 TAU %	SEC 5-6 TAU %	% OF ESTIMATED SHEAR STRENGTH SEC 1-2 %	SEC 2-3 %	SEC 3-4 %	SEC 4-5 %	SEC 5-6 %
.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25.00	10.14	13.49	-9.07	18.14	4.496	0	.1886	.4079	-.494	.2467	.0813	.4847	.3929	-.353	.1423	.0393
50.00	24.03	29.22	0	27.28	6.744	-2.27	.3403	.5284	-.494	.3700	.1629	.8747	.5090	-.353	.2135	.0787
75.00	34.17	44.96	9.068	38.54	8.992	2.267	.4920	.6490	-.535	.5343	.1216	1.265	.6252	-.383	.3084	.0567
100.00	48.06	65.19	29.47	40.81	13.49	4.534	.5702	.6459	-.206	.4940	.1619	1.465	.6222	-.147	.2851	.0782
125.00	58.20	83.17	43.07	54.41	22.48	9.068	.6851	.7251	-.206	.5774	.2425	1.761	.6985	-.147	.3332	.1171
150.00	68.34	98.91	63.47	58.94	33.72	13.60	.8368	.6407	.0823	.4561	.3638	2.151	.6172	.0589	.2632	.1757
175.00	74.73	119.1	77.08	70.28	47.21	22.67	.9149	.7606	.1235	.4172	.4437	2.352	.7327	.0883	.2408	.2143
200.00	88.62	137.1	92.94	83.88	62.94	38.54	1.030	.7989	.1647	.3786	.4413	2.647	.7695	.1178	.2185	.2132
225.00	102.5	152.9	111.1	97.48	74.18	49.87	1.182	.7555	.2470	.4213	.4396	3.037	.7277	.1767	.2431	.2123
250.00	116.4	170.8	126.9	113.3	96.66	72.54	1.297	.7937	.2470	.3018	.4361	3.332	.7646	.1767	.1742	.2107
275.00	134.0	191.1	140.6	126.9	114.6	92.94	1.375	.9136	.2470	.2225	.3924	3.533	.8800	.1767	.1284	.1895
300.00	155.4	209.1	161.0	136.0	103.4	99.75	1.490	.8698	.4528	.5898	.0661	3.829	.8379	.3239	.3404	.0319
325.00	180.6	227.0	179.1	149.6	107.9	120.1	1.604	.8671	.5352	.7544	-.222	4.124	.8352	.3828	.4354	-.107
350.00	205.7	249.5	199.5	151.9	125.9	140.6	1.646	.9046	.8645	.4702	-.265	4.230	.8714	.6184	.2714	-.128
375.00	245.9	269.7	226.7	161.0	137.1	165.5	1.724	.7785	1.194	.4310	-.513	4.431	.7500	.8539	.2487	-.248
400.00	297.2	299.0	253.9	167.8	141.6	204.0	1.655	.8151	1.564	.4726	-1.13	4.253	.7851	1.119	.2728	-.545

FOR VIEW 1
IINIMUM DEPTH = 0
IAXIMUM DEPTH= 75
IINIMUM LOAD = 0
IAXIMUM LOAD = 500
OAD IN TONS
EPTH IN FEET

FOR VIEW 2
MINIMUM DEPTH = 0
MAXIMUM DEPTH = 75
MINIMUM % STRESS TO STRENGTH = 0
MAXIMUM % STRESS TO STRENGTH = 1
% OF STRENGTH
DEPTH IN FEET

OR VIEWS 3 TO 8
INIMUM MOVEMENT = 0
AXIMUM MOVEMENT = 3
INIMUM % STRESS TO STRENGTH = 0
AXIMUM % STRESS TO STRENGTH = 1
OF STRENGTH
OVEMENT IN INCHES
-z CURVE

APPLIED LOAD (TONS)	MOVEMENT AT BOTTOM OF PILE SECTION (INCHES) SECTION 1	SECTION 2	SECTION 3	SECTION 4	SECTION 5	SECTION 6
.00	0	0	0	0	0	0
25.00	.0153	.0093	.0133	.0053	.0033	.0033
50.00	.0314	.0184	.0184	.0064	.0034	.0044
75.00	.0612	.0412	.0372	.0202	.0162	.0152
100.00	.0853	.0563	.0433	.0253	.0193	.0173
125.00	.1153	.0783	.0593	.0353	.0253	.0213
150.00	.1459	.1019	.0739	.0479	.0329	.0269
175.00	.1817	.1287	.0947	.0637	.0427	.0327
200.00	.2205	.1595	.1185	.0815	.0535	.0365
225.00	.2554	.1874	.1384	.0954	.0624	.0404
250.00	.3014	.2254	.1694	.1194	.0764	.0444
275.00	.3397	.2547	.1927	.1367	.0857	.0447
300.00	.3783	.2853	.2143	.1543	.1083	.0643
325.00	.4181	.3171	.2381	.1721	.1241	.0711
350.00	.4622	.3512	.2632	.1962	.1402	.0782
375.00	.5115	.3915	.2915	.2205	.1595	.0865
400.00	.5643	.4313	.3193	.2453	.1823	.0923

APPENDIX C

DOCUMENTATION OF COMPUTER PROGRAM PANALYS

```
7/2/82
LIS
100 REM PILE DATA ANALYSIS ACCCORDING TO METHODS OUTLINED
110 REM IN PAPER BY FLLLINIOUS.
120 REM
130 REM INPUT LOAD TEST DATA INTO SYSTEM MEMORY
140 REM -----------------------------------------------------------------
150 INIT
160 PRINT "LJMAKE SURE THAT THE CORRECT TAPE IS IN THE MACHINE "
170 PRINT "JWHAT FILE IS THE LOAD TEST DATA IN? ";
180 INPUT F
190 PRINT @33,0:0,0,1
200 FIND F
210 INPUT @33:A$
220 PRINT @33,0:0,0,0
230 B$=SEG(A$,9,1)
240 IF B$<>"L" THEN 280
250 PRINT "JTHIS IS THE LAST FILE ON THE TAPEGGGGG"
260 CALL "WAIT",3
270 GO TO 100
280 FIND F
290 T=TYP(0)
300 IF T=2 THEN 340
310 PRINT "NO DATA HERE. TRY AGAINGGGG"
320 CALL "WAIT",3
330 GO TO 100
340 INPUT @33:A$,B$,D$,X$,N
350 DELETE P
360 DIM P(N,2)
370 FOR I=1 TO N
380 INPUT @33:P(I,1),P(I,2)
390 NEXT I
400 RINIT
410 PRINT "LWHICH METHOD DO YOU WANT TO USE?"
420 PRINT "1 FOR VANDERVEENS METHOD"
430 PRINT "2 FOR CHINS NETHOD"
440 PRINT "3 FOR DE BEERS' METHOD"
450 PRINT "4 FOR BRINCH HANSEN'S METHOD"
460 PRINT "5 FOR DAVISSON'S METHOD"
470 PRINT "6 FOR INTERSECTION METHOD"
480 PRINT "7 TO SEE A PLOT OF THE LOAD TEST DATA"
490 PRINT "9 TO INPUT ANOTHER DATA FILE"
500 PRINT "10 TO STOP"
510 INPUT R1
520 GO TO R1 OF 550,1020,5860,3610,1870,7740,9650,530,100,530
530 END
540 REM VANDERVEENS METHOD
550 REM -----------------------------------------------------------------
560 PAGE
570 DELETE M
580 PRINT "WHAT DO YOU WANT THE FIRST ASSUMPTION TO BE ON THE ULTIMATE"
590 PRINT "LOAD AND THE INCREMENT IN THIS LOAD AND THE MAXIMUM.LOAD? ";
600 INPUT P1,D,P2
610 M=0
620 FOR J=P1 TO P2 STEP D
630 FOR I=1 TO N
640 IF P(I,2)=>J THEN 660
650 M=M MAX -LOG(1-P(I,2)/J)
660 NEXT I
670 NEXT J
680 PAGE
690 VIEWPORT 20,120,10,80
700 WINDOW 0,INT(P(N,1))+1,0,INT(M)+0.5
```

```
710 AXIS 0.5,0.5
720 REM LABEL AXIS
730 MOVE 0,0
740 FOR I=0.5 TO P(N,1)+0.5 STEP 0.5
750 MOVE I,0
760 PRINT "HJ",I
770 NEXT I
780 MOVE 0,0
790 FOR I=0.5 TO INT(M)+0.5 STEP 0.5
800 MOVE 0,I
810 PRINT "HHHH",I
820 NEXT I
830 MOVE (P(N,1)+0.25)/2,0
840 PRINT "JJJDEFLECTION"
850 MOVE 0,(INT(M)+0.5)/2
860 PRINT " ln(1-P/Pult)";
870 MOVE P(1,1),-LOG(1-P(1,2)/P1)
880 FOR I=2 TO N
890 IF P(I,2)=>P1 THEN 930
900 DRAW P(I,1),-LOG(1-P(I,2)/P1)
910 NEXT I
920 IMAGE 3X,3D
930 PRINT USING 920:P1
940 P1=P1+D
950 IF P1>P2 THEN 970
960 GO TO 870
970 PRINT "↑DO YOU WANT TO TRY AGAIN? ";
980 INPUT Y$
990 IF Y$="NO" OR Y$="N" THEN 400
1000 GO TO 560
1010 REM ULTIMATE FAILURE ACCORDING TO CHINS' METHOD
1020 PAGE
1030 REM ---------------
1040 DELETE C,X1,Y1,T
1050 DIM C(N,2),J1(5),J2(5),T(N,2)
1060 DATA 0,0,0,-0.01,0.02,4.0E-5,-8.0E-5,4.0E-5,0,0
1070 RESTORE 1060
1080 READ J1,J2
1090 FOR I=1 TO N
1100 C(I,2)=P(I,1)/P(I,2)
1110 C(I,1)=P(I,1)
1120 NEXT I
1130 GOSUB 1820
1140 AXIS 0.25,0.002
1150 MOVE (P(N,1)+0.25)/2,0
1160 PRINT "JJJDEFLECTION"
1170 MOVE 0,(C(N,2)+1.0E-3)/2
1180 PRINT "HHHHOJHEJHFJHLJHEJHCJHTJHIJHOJHNJH/JHLJHOJHAJHD"
1190 FOR I=1 TO N
1200 MOVE C(I,1),C(I,2)
1210 RDRAW J1,J2
1220 NEXT I
1230 T=0
1240 X1=C(N,1)+C(N-1,1)
1250 Y1=C(N,2)+C(N-1,2)
1260 X2=C(N,1)↑2+C(N-1,1)↑2
1270 Z1=C(N,1)*C(N,2)+C(N-1,1)*C(N-1,2)
1280 T(2,1)=(Z1-X1*Y1/2)/(X2-X1↑2/2)
1290 T(2,2)=Y1/2-T(2,1)*X1/2
1300 FOR I=2 TO N-1
1310 X1=X1+C(N-I,1)
1320 Y1=Y1+C(N-I,2)
1330 X2=X2+C(N-I,1)↑2
1340 Z1=Z1+C(N-I,1)*C(N-I,2)
```

```
1350 T(I+1,1)=(Z1-X1*Y1/(I+1))/(X2-X1↑2/(I+1))
1360 T(I+1,2)=Y1/(I+1)-T(I+1,1)*X1/(I+1)
1370 NEXT I
1380 GOSUB 1750
1390 HOME
1400 PRINT "#POINTS   ULTIMATE LOAD"
1410 FOR I=2 TO N
1420 PRINT USING 1440:I,1/T(I,1)
1430 NEXT I
1440 IMAGE 3X,2D,8X,3D.3D
1450 REM
1460 PRINT "JJHOW MANY OF THE POINTS IN THE "
1470 PRINT "UPPER PORTION OF THE GRAPH WOULD YOU"
1480 PRINT "LIKE TO SEE THE LINE OF BEST FIT FOR? ",
1490 INPUT L
1500 GIN X9,Y9
1510 IF L>N THEN 1460
1520 RINIT
1530 GOSUB 1820
1540 MOVE 0,T(L,2)
1550 ROPEN 2
1560 DRAW C(N,1),C(N,1)*T(L,1)+T(L,2)
1570 MOVE (P(N,1)+0.25)/2,(C(N,2)+1.0E-3)/2
1580 IMAGE "THE BEST FIT FOR",X,2D,X,"POINTS"
1590 PRINT USING 1580:L
1600 RCLOSE
1610 PRINT "  "
1620 GOSUB 1780
1630 PRINT "JJTO SEE THE BEST FIT FOR ANOTHER SET, ENTER THE NUMBER"
1640 PRINT " OF POINTS. IF YOU LIKE THIS LINE ENTER 99 ";
1650 GIN X9,Y9
1660 INPUT L
1670 IF L=99 THEN 1700
1680 IF L<=N THEN 1520
1690 GO TO 1630
1700 FIX 2
1710 PRINT "JDO YOU WANT TO RETURN TO MAIN PROG.(Y or N) ";
1720 INPUT Y$
1730 IF Y$="YES" OR Y$="Y" THEN 400
1740 GO TO 1010
1750 WINDOW 0,120,0,100
1760 VIEWPORT 0,120,0,100
1770 RETURN
1780 WINDOW 0,120,0,100
1790 VIEWPORT 0,120,0,100
1800 MOVE 0,Y9
1810 RETURN
1820 WINDOW 0,P(N,1)+0.5,0,C(N,2)+1.0E-3
1830 VIEWPORT 75,125,20,100
1840 RETURN
1850 REM
1860 REM
1870 REM  *DAVISSON'S METHOD, LOAD VS DEFLECTION
1880 U2=32
1890 REM init var
1900 GOSUB 3130
1910 REM   GET X&Y DATA FROM ARRAY P
1920 GOSUB 2640
1930 PRINT "L      DAVISSON'S METHOD"
1940 RINIT
1950 REM  HEADER:
1960 GOSUB 3060
1970 PRINT "JWhich type of pile is this?"
1980 GOSUB 3370
```

```
1990 REM   QUESTIONS ABT WINDOW:
2000 GOSUB 2730
2010 PAGE
2020 REM header
2030 GOSUB 3060
2040 GIN X9,Y9
2050 REM AXIS
2060 RINIT
2070 GOSUB 2480
2080 GOSUB 3340
2090 MOVE 0,Y9
2100 PRINT "JChange window (Y) ";
2110 INPUT Y$
2120 IF Y$<>"Y" THEN 2150
2130 REM que abt window
2140 GO TO 2000
2150 REM CALCULATE Pu
2160 REM slope=AE/L
2170 S=3.0E+7*A/L/2000
2180 X7=0.15+D/120
2190 B=-S*X7
2200 REM Y=MX+B ..  W8(4)=S*X+B
2210 X2=(W8(4)-B)/S
2220 GOSUB 3030
2230 MOVE X7,W8(3)
2240 ROPEN 1
2250 DRAW X2,W8(4)
2260 RCLOSE
2270 REM FIND INTERSECTION OF CURVE AND LINE
2280 FOR I=1 TO Z9
2290 Y2=S*X(I)+B
2300 IF Y(I)<Y2 THEN 2340
2310 NEXT I
2320 PRINT " no intersection"
2330 GO TO 2420
2340 M=(Y(I)-Y(I-1))/(X(I)-X(I-1))
2350 B2=Y(I)-M*X(I)
2360 X2=(B2-B)/(S-M)
2370 Y2=M*X2+B2
2380 GOSUB 3340
2390 MOVE 0,Y9
2400 PRINT USING 2470:"JJJJPu= ";Y2;" TONS"
2410 FIX 1
2420 PRINT "Return to main prog.? (Y or N) ";
2430 GIN X9,Y9
2440 INPUT Y$
2450 IF Y$="Y" OR Y$="YES" THEN 400
2460 GO TO 1870
2470 IMAGE fa,3d.1d,FA
2480 REM  TARGET LINE FOR AXIS:
2490 REM SET WIN & VIE:
2500 GOSUB 3030
2510 AXIS @U2:I3,I4,W8(1),0
2520 REM   AXIS LABELING ROUTINE:
2530 GOSUB 2850
2540 FOR I=1 TO Z9
2550 GOSUB 3030
2560 MOVE @U2:X(I),Y(I)
2570 SCALE 2,2
2580 RDRAW @U2:J1,J2
2590 NEXT I
2600 GOSUB 3030
2610 MOVE @U2:X(1),Y(1)
2620 DRAW @U2:X,Y
```

```
2630 RETURN
2640 REM   GET DATA FROM ARRAY P
2650 Z9=N
2660 DELETE X,Y
2670 DIM X(Z9),Y(Z9)
2680 FOR I=1 TO Z9
2690 X(I)=P(I,1)
2700 Y(I)=P(I,2)
2710 NEXT I
2720 RETURN
2730 GOSUB 3340
2740 PRINT "JFor plot's max. load, use ";W8(4);" tons (Y or N)",
2750 INPUT Y$
2760 IF Y$="Y" OR Y$="YES" THEN 2790
2770 PRINT "Enter maximum load in tons  ";
2780 INPUT W8(4)
2790 PRINT "For max. deflection, use ";W8(2);" inches? ";
2800 INPUT Y$
2810 IF Y$="Y" OR Y$="YES" THEN 2840
2820 PRINT "Enter maximum deflection in inches: ",
2830 INPUT W8(2)
2840 RETURN
2850 REM  LABEL AXIS
2860 J=0
2870 FOR I=W8(1) TO W8(2) STEP I3
2880 MOVE @U2:W8(1)+J*I3,W8(3)
2890 PRINT @U2: USING 3000:"HJ";I
2900 J=J+1
2910 NEXT I
2920 J=0
2930 FOR I=W8(3) TO W8(4) STEP I4
2940 MOVE @U2:W8(1),W8(3)+J*I4
2950 RMOVE @U2:0,-0.1
2960 PRINT @U2: USING 3010:"HHHH";I
2970 J=J+1
2980 NEXT I
2990 RETURN
3000 IMAGEFA.1D.1D
3010 IMAGEFA.3D
3020 INPUT Z$
3030 VIEWPORT V1(1),V1(2),V1(3),V1(4)
3040 WINDOW W8(1),W8(2),W8(3),W8(4)
3050 RETURN
3060 REM HEADER:
3070 PRINT "JJJGROUP ";A$;"   PILE ";A$
3080 PRINT "DATE ";A$
3090 IF A$=" " THEN 3110
3100 PRINT "COMMENTS: ";A$
3110 PRINT " file ";F;"  ";Z9;" points"
3120 RETURN
3130 REM  INITIALIZE VARIABLES
3140 DELETE W8,V1,J1,J2,B,M,I3,I4
3150 DIM W8(4),V1(4),J1(5),J2(5)
3160 REM   SYMBOL:
3170 RESTORE 3180
3180 DATA 0,0,0,-1,2,1,-2,1,0,0
3190 READ J1,J2
3200 REM SET PLOTTING PARAMETES:
3210 REM WINDOW
3220 DATA 0,1,0,300
3230 READ W8
3240 REM  VIEWPORT:
3250 IF U2=32 THEN 3270
3260 DATA 10,70,10,70
```

```
3270 RESTORE 3280
3280 DATA 40,117,10,70
3290 READ V1
3300 REM   TICS:
3310 I3=0.1
3320 I4=100
3330 RETURN
3340 WINDOW 0,120,0,100
3350 VIEWPORT 0,120,0,100
3360 RETURN
3370 REM TO CALC. AREA OF PILE, ETC.
3380 PRINT "H14x 73   (1)"
3390 PRINT "H14x117   (2)"
3400 PRINT "12in. 0   (3)"
3410 PRINT "14in. 0   (4)"
3420 PRINT "16in. 0   (5)"
3430 PRINT "                    KKKK";
3440 DELETE T
3450 INPUT T
3460 IF T=>1 AND T<=5 THEN 3500
3470 PRINT "JJJEnter end-area, D :";
3480 INPUT A,D
3490 GO TO 3560
3500 RESTORE 3510
3510 DATA 21.4,14,34.4,14,11.456,12,21.206,14,24.347,16
3520 FOR I=1 TO T
3530 READ A,D
3540 NEXT I
3550 PRINT "                    length in feet: ";
3560 INPUT L
3570 PRINT ""
3580 GIN X9,Y9
3590 L=L*12
3600 RETURN
3610 REM   *BRINCH HANSEN'S METHOD, 90% AND 80% CRITERION
3620 REM     NOTE: 90% METHOD USES LINEAR INTERPOLATION BETWEEN
3630 REM           CONSECUTIVE DATA POINTS, NOT A FUNCTION FOR
3640 REM           A SMOOTH CURVE
3650 REM ----------------------------------------------------------------
3660 U2=32
3670 REM INITIALIZE VARIABLES
3680 GOSUB 5330
3690 REM set win and vie for printing
3700 GOSUB 4580
3710 PRINT "L BRINCH HANSEN'S METHOD, 90% AND 80% CRITERIONJJ"
3720 RINIT
3730 REM GET X&Y DATA
3740 GOSUB 5140
3750 PRINT "PT.  DEFL    (DEFL.↑.5) / P    LOAD"
3760 FOR I=1 TO Z9
3770 PRINT USING 3790:I,X1(I),Y0(I),Y(I)
3780 NEXT I
3790 IMAGE 2D,2X,2D.3D,2X,5D.4D,9X,3D
3800 X1=X
3810 Y1=Y0
3820 REM  90% METHOD:
3830 GOSUB 5460
3840 PRINT "JFOR 80% METHOD:"
3850 PRINT "JFOR DEFLECTION RANGE, USE"
3860 PRINT W8(1);" TO ";W8(2);
3870 PRINT "? (Y or N):";
3880 INPUT Y$
3890 IF Y$="Y" THEN 3920
3900 PRINT "Enter MIN & MAX , inches: ";
```

```
3910 INPUT W8(1),W8(2)
3920 PRINT "For Y-axis, use ";W8(3);" to"
3930 PRINT W8(4);"? (Y or N): ";
3940 INPUT Y$
3950 IF Y$="Y" THEN 3980
3960 PRINT "Enter MIN & MAX values: ";
3970 INPUT W8(3),W8(4)
3980 GIN X9,Y9
3990 GOSUB 4550
4000 AXIS @U2:I3,I4,W8(1),W8(3)
4010 REM LABEL AXIS:
4020 GOSUB 4940
4030 REM plot points:
4040 GOSUB 4480
4050 X1=X
4060 Y1=Y0
4070 REM set win & vie for printing
4080 GOSUB 4580
4090 MOVE 0,Y9
4100 PRINT "JExclude points to left of pointer."
4110 GIN X9,Y9
4120 GOSUB 4550
4130 POINTER X8,Y8,Z$
4140 IF X8<W8(1) THEN 4130
4150 FOR I=1 TO Z9
4160 IF X1(I)>X8 THEN 4190
4170 X1(I)=999
4180 Y1(I)=999
4190 NEXT I
4200 REM  LINEAR FIT:
4210 GOSUB 4650
4220 REM SET WIN & VIE FOR PRINTING:
4230 GOSUB 4580
4240 MOVE 0,Y9
4250 PRINT USING 4470:"Correlation coeff = ",R
4260 PRINT "Good enough (Y)? ";
4270 GIN X9,Y9
4280 INPUT Y$
4290 IF Y$="Y" THEN 4320
4300 RINIT
4310 GO TO 4050
4320 REM   set win for printing
4330 FIX 1
4340 GOSUB 4580
4350 REM  calculate Pu:
4360 GOSUB 5110
4370 MOVE 0,Y9
4380 PRINT USING 4460:"JJPu (80% METHOD)= ";P0;" TONS"
4390 PRINT "JRun again (Y), or return"
4400 PRINT "to main program? ";
4410 GIN X9,Y9
4420 INPUT Y$
4430 IF Y$="Y" OR Y$="YES" THEN 3710
4440 RINIT
4450 GO TO 400
4460 IMAGE FA,4D.1D,FA
4470 IMAGE FA,1D.3D
4480 FOR I=1 TO Z9
4490 GOSUB 4550
4500 MOVE @U2:X1(I),Y1(I)
4510 SCALE 2,2
4520 RDRAW @U2:J1,J2
4530 NEXT I
4540 RETURN
```

```
4550 VIEWPORT V1(1),V1(2),V1(3),V1(4)
4560 WINDOW W8(1),W8(2),W8(3),W8(4)
4570 RETURN
4580 IF U2=32 THEN 4620
4590 WINDOW 0,150,0,100
4600 VIEWPORT 0,150,0,100
4610 RETURN
4620 VIEWPORT 0,120,0,100
4630 WINDOW 0,120,0,100
4640 RETURN
4650 REM  find slope and y-intercept
4660 Z8=0
4670 X2=0
4680 Y2=0
4690 X3=0
4700 X4=0
4710 X5=0
4720 FOR I=1 TO Z9
4730 IF X1(I)=999 THEN 4800
4740 Z8=Z8+1
4750 X2=X2+X1(I)
4760 X5=Y1(I)↑2+X5
4770 Y2=Y2+Y1(I)
4780 X3=X1(I)*Y1(I)+X3
4790 X4=X4+X1(I)↑2
4800 NEXT I
4810 IF Z8<2 THEN 4050
4820 R=(X3-X2*Y2/Z8)↑2/(X4-X2↑2/Z8)/(X5-Y2↑2/Z8)
4830 R=SQR(R)
4840 M=(X3-X2*Y2/Z8)/(X4-X2↑2/Z8)
4850 B=Y2/Z8-M*X2/Z8
4860 Y2=M*W8(1)+B
4870 GOSUB 4550
4880 MOVE @U2:W8(1),Y2
4890 Y2=M*W8(2)+B
4900 ROPEN 1
4910 DRAW @U2:W8(2),Y2
4920 RCLOSE
4930 RETURN
4940 REM  SUBROUTINE TO LABEL AXIS:
4950 PRINT @U2,17:0.8,1.2
4960 J=0
4970 FOR I=W8(1) TO W8(2) STEP I3
4980 MOVE @U2:W8(1)+J*I3,W8(3)
4990 PRINT @U2: USING 5100:"HJ";I
5000 J=J+1
5010 NEXT I
5020 J=0
5030 FOR I=W8(3) TO W8(4) STEP I4
5040 MOVE @U2:W8(1),W8(3)+J*I4
5050 RMOVE @U2:0,-0.1
5060 PRINT @U2: USING 5100:"HHHHHH";I
5070 J=J+1
5080 NEXT I
5090 RETURN
5100 IMAGE FA,1D.3D
5110 REM calc Pu:
5120 P0=1/(2*SQR(M*B))
5130 RETURN
5140 REM GET X&Y DATA
5150 Z9=N
5160 DELETE X,Y,X1,Y1,Y0
5170 DIM X(Z9),Y(Z9),X1(Z9),Y1(Z9),Y0(Z9)
5180 FOR I=1 TO Z9
```

```
5190 X(I)=P(I,1)
5200 Y(I)=P(I,2)
5210 NEXT I
5220 FOR I=1 TO Z9
5230 IF X(I)>0.01 THEN 5250
5240 X(I)=0.01
5250 IF Y(I)>0.01 THEN 5270
5260 Y(I)=0.01
5270 NEXT I
5280 X1=X
5290 FOR I=1 TO Z9
5300 Y0(I)=SQR(X(I))/Y(I)
5310 NEXT I
5320 RETURN
5330 REM  INIT VARIABLES:
5340 DELETE J1,J2,W8,V1,I3,I4,I1,X3,Y3,M,B
5350 DIM J1(5),J2(5),W8(4),V1(4),I1(100)
5360 DATA 0,0,0,-1,2,1,-2,1,0,0
5370 RESTORE 5360
5380 READ J1,J2
5390 DATA 0,5,0.003,0.007
5400 READ W8
5410 I3=0.1
5420 I4=1.0E-3
5430 DATA 40,120,10,80
5440 READ V1
5450 RETURN
5460 REM  ROUTINE FOR BRINCH HANSEN'S 90% METHOD:
5470 FOR I=Z9-1 TO 1 STEP -1
5480 X2=X1(I)/2
5490 FOR J=2 TO Z9
5500 IF X(J)<=X2 THEN 5520
5510 GO TO 5540
5520 NEXT J
5530 GO TO 5570
5540 Y2=(X2-X1(J-1))*(Y(J)-Y(J-1))/(X1(J)-X1(J-1))+Y(J-1)
5550 IF Y2<0.9*Y(I) THEN 5600
5560 NEXT I
5570 PRINT "JNO SUCH POINT FOUND"
5580 PRINT "ON CURVE FOR 90% METHOD"
5590 RETURN
5600 REM
5610 REM SOUGHT X IS BETWEEN X(I)&X(I+1)
5620 S3=(X1(I+1)-X1(I))/40
5630 FOR K=X1(I) TO X1(I+1) STEP S3
5640 X3=K
5650 Y3=(X3-X1(I))*(Y(I+1)-Y(I))/(X1(I+1)-X1(I))+Y(I)
5660 T1=0.9*Y3
5670 X2=X3/2
5680 Y2=(X2-X1(J-1))*(Y(J)-Y(J-1))/(X1(J)-X1(J-1))+Y(J-1)
5690 IF ABS(Y2-T1)<1 THEN 5800
5700 NEXT K
5710 FOR K=X1(I) TO X1(I+1) STEP S3
5720 X3=K
5730 Y3=(X3-X1(I))*(Y(I+1)-Y(I))/(X1(I+1)-X1(I))+Y(I)
5740 T1=0.9*Y3
5750 X2=X3/2
5760 Y2=(X2-X1(J))*(Y(J+1)-Y(J))/(X1(J+1)-X1(J))+Y(J)
5770 IF ABS(Y2-T1)<1 THEN 5800
5780 NEXT K
5790 GO TO 5570
5800 FIX 1
5810 PRINT USING 5830:"JJPU (90% METHOD)= ";Y3;" TONS"
5820 RETURN
```

```
5830 IMAGE FA.3D.1D.FA
5840 REM
5850 REM
5860 REM   *DeBEER
5870 U2=32
5880 REM   INITIALIZE VARIABLES.
5890 GOSUB 7530
5900 REM set win and vie for printing
5910 GOSUB 6730
5920 PRINT "LDebeer's method"
5930 REM GET X&Y DATA FROM P ARRAY
5940 GOSUB 7360
5950 RINIT
5960 GIN X9,Y9
5970 GOSUB 6570
5980 AXIS @U2:0,0,W8(1),W8(3)
5990 REM LABEL AXIS.
6000 GOSUB 7100
6010 X1=X
6020 Y1=Y
6030 REM plot points.
6040 GOSUB 6500
6050 REM
6060 FOR I1=1 TO 2
6070 X1=X
6080 Y1=Y
6090 L1=1
6100 GOSUB 6730
6110 MOVE 0,Y9
6120 PRINT "JFor fit no. ";I1;" Exclude points to"
6130 PRINT "the left of the pointer.";
6140 GIN X9,Y9
6150 GOSUB 6600
6160 L1=2
6170 GOSUB 6730
6180 MOVE 0,Y9
6190 PRINT "JExclude points to the right"
6200 PRINT "of the pointer."
6210 GIN X9,Y9
6220 GOSUB 6600
6230 REM  LINEAR FIT.
6240 GOSUB 6800
6250 NEXT I1
6260 GOSUB 6730
6270 MOVE 0,Y9
6280 PRINT "JUse these lines? (Y or N): ";
6290 GIN X9,Y9
6300 INPUT Y$
6310 IF Y$="Y" THEN 6340
6320 RINIT
6330 RUN 6060
6340 REM calc intersection
6350 GOSUB 7050
6360 GOSUB 6730
6370 MOVE 0,Y9
6380 FIX 1
6390 FIX 2
6400 PRINT USING 6490:"JJINTERSECTION IS AT ";Y2;" TONS.J"
6410 PRINT "Run again (Y), or go back"
6420 PRINT "to main program? ";
6430 GIN X9,Y9
6440 INPUT Y$
6450 IF Y$="Y" OR Y$="YES" THEN 5920
6460 RINIT
```

```
6470 GO TO 400
6480 GO TO 5950
6490 IMAGE FA,3D.1D,fo
6500 FOR I=1 TO Z9
6510 GOSUB 6570
6520 MOVE @U2,X1(I),Y1(I)
6530 SCALE 2,2
6540 RDRAW @U2,J1,J2
6550 NEXT I
6560 RETURN
6570 VIEWPORT V1(1),V1(2),V1(3),V1(4)
6580 WINDOW W8(1),W8(2),W8(3),W8(4)
6590 RETURN
6600 REM  CREATE ARRAY OF GOOD VALUES
6610 GOSUB 6570
6620 POINTER X8,Y8,Z$
6630 FOR I=1 TO Z9
6640 GO TO L1 OF 6650,6670
6650 IF X1(I)>X8 THEN 6710
6660 GO TO 6690
6670 IF X1(I)>X8 THEN 6690
6680 GO TO 6710
6690 X1(I)=999
6700 Y1(I)=999
6710 NEXT I
6720 RETURN
6730 IF U2=32 THEN 6770
6740 WINDOW 0,150,0,100
6750 VIEWPORT 0,150,0,100
6760 RETURN
6770 VIEWPORT 0,120,0,100
6780 WINDOW 0,120,0,100
6790 RETURN
6800 REM  find slope and y-intercept
6810 Z8=0
6820 X2=0
6830 Y2=0
6840 X3=0
6850 X4=0
6860 FOR I=1 TO Z9
6870 IF X1(I)=999 THEN 6930
6880 Z8=Z8+1
6890 X2=X2+X1(I)
6900 Y2=Y2+Y1(I)
6910 X3=X1(I)*Y1(I)+X3
6920 X4=X4+X1(I)↑2
6930 NEXT I
6940 IF Z8<2 THEN 6060
6950 M(I1)=(X3-X2*Y2/Z8)/(X4-X2↑2/Z8)
6960 B(I1)=Y2/Z8-M(I1)*X2/Z8
6970 Y2=M(I1)*W8(1)+B(I1)
6980 GOSUB 6570
6990 MOVE @U2,W8(1),Y2
7000 Y3(I1)=M(I1)*W8(2)+B(I1)
7010 ROPEN I1
7020 DRAW @U2,W8(2),Y3(I1)
7030 RCLOSE
7040 RETURN
7050 REM  CALC INTERSECTION
7060 X2=(B(2)-B(1))/(M(1)-M(2))
7070 Y2=M(2)*X2+B(2)
7080 Y2=EXP(Y2)
7090 RETURN
7100 REM  SUBROUTINE TO LABEL AXIS:
```

```
7110 RESTORE 7120
7120 DATA "                    0.0001","0.05","J0.1","0.15","J0.2"
7130 DATA "0.3","J.4","0.5","J 1","1.5","J2","3","J5"
7140 FOR I=1 TO 13
7150 READ I$
7160 I3=VAL(I$)
7170 MOVE @U2:LOG(I3),W8(3)
7180 PRINT @U2: USING 7340:"HJJ";I$
7190 MOVE @U2:LOG(I3),W8(3)
7200 RDRAW @U2:0,0.025
7210 L1=2
7220 NEXT I
7230 MOVE W8(1)+(W8(2)-W8(1))/2,W8(3)
7240 PRINT "HHHHHHHHHHHJJJDEFLECTION (INCHES)"
7250 FOR I=1 TO 7
7260 MOVE @U2:W8(1),LOG(I4(I))
7270 MOVE @U2:W8(1),LOG(I4(I))
7280 RDRAW @U2:0.06,0
7290 PRINT @U2: USING 7350:"HHHHH";I4(I)
7300 NEXT I
7310 MOVE W8(1),(W8(4)+W8(3))/2
7320 PRINT "HHHHHHHHHLOADHHHHHJ(TONS)"
7330 RETURN
7340 IMAGE FA,FA
7350 IMAGE FA,3D
7360 REM GET X&Y DATA
7370 Z9=N
7380 DELETE X,Y,X1,Y1
7390 DIM X(Z9),Y(Z9),X1(Z9),Y1(Z9)
7400 FOR I=1 TO Z9
7410 IF P(I,1)>0 THEN 7440
7420 X(I)=LOG(0.01)
7430 GO TO 7450
7440 X(I)=LOG(P(I,1))
7450 IF P(I,2)>0 THEN 7480
7460 Y(I)=LOG(0.01)
7470 GO TO 7490
7480 Y(I)=LOG(P(I,2))
7490 NEXT I
7500 X1=X
7510 Y1=Y
7520 RETURN
7530 REM INITIALIZE:
7540 RESTORE 7570
7550 DELETE W8,V1,M,B,Y3,J1,J2,I3,I4,W7,I1,X,Y,X1,Y1
7560 DIM W8(4),V1(4),M(2),B(2),Y3(2),J1(5),J2(5),I4(7),W7(4)
7570 DATA 0,0,0,-1,2,1,-2,1,0,0
7580 READ J1,J2
7590 DATA 1.0E-3,5,5,500
7600 READ W7
7610 FOR I=1 TO 4
7620 W8(I)=LOG(W7(I))
7630 NEXT I
7640 DATA 40,125,10,80
7650 READ V1
7660 DATA 5,20,50,100,200,300,500
7670 READ I4
7680 DATA 0,0.05,0.1,0.15,0.2,0.4,0.5,1,1.5,2
7690 READ I5
7700 RETURN
7710 IMAGE FA,3D.2D,FA,3D.2D,S
7720 IMAGE 3D.1D,FA,S
7730 IMAGE FA,3D.1D,FA,S
7740 REM   INTERSECTION   METHOD
```

```
7750 REM INIT VARIABLES
7760 GOSUB 8940
7770 PRINT "LJintersection method"
7780 GOSUB 8010
7790 GIN X9,Y9
7800 CHARSIZE 2
7810 RINIT
7820 REM set window for plotting
7830 GOSUB 8600
7840 AXIS I3,I4,W8(1),W8(3)
7850 REM LABEL AXIS
7860 GOSUB 9070
7870 REM   plot pts
7880 GOSUB 9530
7890 REM  set win for printing
7900 GOSUB 8910
7910 MOVE 0,Y9
7920 PRINT "Change window? (Y or N): ";
7930 INPUT Y$
7940 IF Y$<>"Y" AND Y$<>"YES" THEN 7990
7950 PRINT "Enter min,max for X-axis"
7960 PRINT "and min,max for Y-axis"
7970 INPUT W8
7980 GO TO 7770
7990 REM   prog by D.G.K.
8000 GOSUB 8910
8010 PRINT "LM to set new location for +"
8020 PRINT "F to fix the line"
8030 PRINT "I to see location of crosses"
8040 PRINT "  and line intersections"
8050 PRINT "S to set the desired slope"
8060 PRINT "otherwise, press returnJ"
8070 GIN X8,Y8
8080 PRINT "J"
8090 GIN X9,Y9
8100 I1=1
8110 REM set win for plotting
8120 GOSUB 8600
8130 AXIS I3,I4,0,0
8140 REM label axis
8150 GOSUB 9070
8160 REM plot pts again:
8170 GOSUB 9530
8180 GOSUB 8600
8190 POINTER X1(I1),Y1(I1),Z$
8200 IF Z$="I" THEN 9280
8210 MOVE X1(I1),Y1(I1)
8220 GOSUB 8630
8230 GOSUB 8600
8240 POINTER X,Y,Z$
8250 X3=X-X1(I1)
8260 IF X3<>0 THEN 8280
8270 X3=1.0E-7
8280 M(I1)=(Y-Y1(I1))/X3
8290 B(I1)=Y-M(I1)*X
8300 GOSUB 8600
8310 ROPEN I1
8320 MOVE 0,B(I1)
8330 DRAW W8(2),W8(2)*M(I1)+B(I1)
8340 RCLOSE
8350 GOSUB 8910
8360 RAPPEND I1
8370 MOVE 0,Y9
8380 PRINT USING 8590:M(I1);" tons per inch, line ";I1
```

```
8390 RCLOSE
8400 IF Z$="" THEN 8230
8410 IF Z$="M" THEN 8720
8420 IF Z$="S" THEN 8820
8430 IF Z$="F" THEN 8510
8440 CURSOR 1000
8450 ROPEN 1000
8460 PRINT " "
8470 RCLOSE
8480 POINTER X0,Y0,Z$
8490 CURSOR 0
8500 GO TO 8400
8510 FIX I1
8520 FIX 888
8530 GOSUB 8910
8540 MOVE 0,Y9
8550 PRINT "J"
8560 GIN X9,Y9
8570 I1=I1+1
8580 GO TO 8180
8590 IMAGE fd,FA,2D
8600 WINDOW W8(1),W8(2),W8(3),W8(4)
8610 VIEWPORT V1(1),V1(2),V1(3),V1(4)
8620 RETURN
8630 SCALE 2.5,2.5
8640 ROPEN 888
8650 RDRAW J1,J2
8660 RMOVE -1,-2
8670 CHARSIZE 1
8680 PRINT I1;
8690 CHARSIZE 2
8700 RCLOSE
8710 RETURN
8720 GOSUB 8910
8730 MOVE 0,Y8
8740 ROPEN 999
8750 PRINT "  move cross"
8760 RCLOSE
8770 GOSUB 8600
8780 POINTER X1(I1),Y1(I1),Z$
8790 STPOINT I1,X1(I1),Y1(I1)
8800 RDELETE 999
8810 GO TO 8210
8820 GOSUB 8910
8830 MOVE 0,Y9
8840 PRINT "JEnter slope you want: ";
8850 INPUT M(I1)
8860 Z$="@"
8870 B(I1)=Y1(I1)-M(I1)*X1(I1)
8880 RDELETE I1
8890 GIN X9,Y9
8900 GO TO 8300
8910 WINDOW 0,130,0,100
8920 VIEWPORT 0,130,0,100
8930 RETURN
8940 REM  Initialize variables
8950 DELETE W8,V1,J1,J2,X1,Y1,I1,M,B,X,Y
8960 DIM J1(5),J2(5),W8(4),V1(4),M(20),B(20),X1(20),Y1(20)
8970 RESTORE 8980
8980 DATA 0,0,0,-1,2,1,-2,1,0,0
8990 READ J1,J2
9000 DATA 0,2,0,300
9010 READ W8
9020 DATA 40,125,10,95
```

```
9030 READ V1
9040 I3=0.1
9050 I4=50
9060 RETURN
9070 REM label axis.
9080 J=0
9090 FOR I=W8(1) TO W8(2) STEP I3
9100 MOVE W8(1)+J*I3,W8(3)
9110 PRINT USING 9260:"HJ";I
9120 J=J+1
9130 NEXT I
9140 MOVE (W8(2)-W8(1))/2,W8(3)
9150 PRINT "HHHHHHHJJdeflection (in.)"
9160 J=0
9170 FOR I=W8(3) TO W8(4) STEP I4
9180 MOVE W8(1),W8(3)+J*I4
9190 RMOVE 0,-0.1
9200 PRINT USING 9270:"HHHH";I
9210 J=J+1
9220 NEXT I
9230 MOVE W8(1),(W8(4)-W8(3))/2
9240 PRINT "HHHHHHHHHHloadHHHHHJ(tons)"
9250 RETURN
9260 IMAGE FA,1D.1D
9270 IMAGE FA,3D
9280 REM intersect
9290 GOSUB 8910
9300 MOVE 0,Y9
9310 PRINT "intersection of lines:"
9320 PRINT "              x           y"
9330 FOR I=1 TO I1-1
9340 FOR J=1 TO I1-1
9350 IF J<=I THEN 9390
9360 X3=(B(J)-B(I))/(M(I)-M(J))
9370 Y3=M(J)*X3+B(J)
9380 PRINT USING 9510:I;" and ";J;X3,Y3
9390 NEXT J
9400 NEXT I
9410 PRINT "Jlocation of crosses:"
9420 PRINT "       x       y"
9430 FOR I=1 TO I1-1
9440 PRINT USING 9520:I,X1(I),Y1(I)
9450 NEXT I
9460 PRINT "JReturn to main"
9470 PRINT "program (Y or N): ";
9480 INPUT Y$
9490 IF Y$="Y" OR Y$="YES" THEN 400
9500 GO TO 7770
9510 IMAGE fd,fa,fd,5x,FD,7x,,fd
9520 IMAGE FD,3X,1d.2d,3x,fd
9530 FOR I=1 TO N
9540 GOSUB 8600
9550 MOVE P(I,1),P(I,2)
9560 SCALE 3,3
9570 RDRAW J1,J2
9580 NEXT I
9590 GOSUB 8600
9600 MOVE P(1,1),P(1,2)
9610 FOR I=1 TO N
9620 DRAW P(I,1),P(I,2)
9630 NEXT I
9640 RETURN
9650 REM ROUTINE TO DISPLAY AND PLOT PILE LOAD TEST DATA
9660 IMAGE "LGROUP NUMBER ",FA,/,"PILE NUMBER ",FA,/,"DATE ",FA,/,FA
```

```
9670 IMAGE "FILE ",FD
9680 PRINT USING 9660:A$,B$,D$,X$
9690 PRINT USING 9670:F
9700 PRINT "J     PT.    DEFLECTION              LOAD"
9710 PRINT "                (INCHES)            (TONS)"
9720 IMAGE 5X,FD,5X,2D.3D,9X,3D.3D
9730 FOR I=1 TO N
9740 PRINT USING 9720:I,P(I,1),P(I,2)
9750 NEXT I
9760 GOSUB 9830
9770 GOSUB 10300
9780 PRINT "JJReturn to main program"
9790 PRINT "(Y or N)? ";
9800 INPUT Y$
9810 IF Y$="Y" OR Y$="YES" THEN 410
9820 GO TO 9650
9830 GIN X9,Y9
9840 I3=0.1
9850 I4=50
9860 DELETE M,J1,J2
9870 DIM M(2),J1(5),J2(5)
9880 RESTORE 9890
9890 DATA 0,0,0,-1,2,1,-2,1,0,0
9900 READ J1,J2
9910 M=0
9920 FOR I=1 TO N
9930 M(1)=M(1) MAX P(I,1)
9940 M(2)=M(2) MAX P(I,2)
9950 NEXT I
9960 M(1)=1 MAX INT(M(1)+0.5)+0.5
9970 M(2)=(INT(M(2)/100)+1)*100
9980 I4=M(2)/5
9990 I3=INT(M(1))/10
10000 WINDOW 0,M(1),0,M(2)
10010 VIEWPORT 50,125,10,80
10020 AXIS I3,I4,0,0
10030 J=0
10040 FOR I=0 TO M(1) STEP I3
10050 MOVE J*I3,0
10060 PRINT USING 10280:"HJ";I
10070 J=J+1
10080 NEXT I
10090 MOVE M(1)/2,0
10100 PRINT "HHHHHHJJDEFLECTION (IN.)"
10110 J=0
10120 FOR I=0 TO M(2) STEP I4
10130 MOVE 0,J*I4
10140 RMOVE 0,-0.1
10150 PRINT USING 10290:"HHHHHH";I
10160 J=J+1
10170 NEXT I
10180 MOVE 0,M(2)/2
10190 PRINT "HHHHHHHHHHKKKLOADHHHHHJ(TONS)"
10200 FOR I=1 TO N
10210 WINDOW 0,M(1),0,M(2)
10220 VIEWPORT 50,110,10,70
10230 MOVE P(I,1),P(I,2)
10240 SCALE 2,2
10250 RDRAW J1,J2
10260 NEXT I
10270 RETURN
10280 IMAGE FA,1D.1D
10290 IMAGE FA,3D
10300 WINDOW 0,120,0,100
```

```
10310 VIEWPORT 0,120,0,100
10320 MOVE 0,Y0
10330 RETURN
```

VITA

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Master of Science

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