Gainesville Regional Utilities

Deerhaven Generating Station

History of Construction

Coal Combustion Residual Surface Impoundment System

Prepared for:

Gainesville Regional Utilities
Deerhaven Generating Station
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Gainesville, Florida 32653

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1.0 Introduction

Title 40, Part 257 of the Code of Federal Regulations, as published in the Federal Register, Vol. 80, No. 74, on 17 April 2015 (CCR rule), requires the compilation of a history of construction for coal combustion residual (CCR) surface impoundments (§257.73(c)). This report presents a description of the history of construction developed based on the information available at the time of preparation of this report. This document should be updated per §257.73(c)(2) in the event that additional information is found concerning the design, construction, or historic stability of the surface impoundment system.

2.0 CCR Surface Impoundment System Ownership and Location

Gainesville Regional Utilities (GRU) owns and operates a CCR surface impoundment system unit located at the Deerhaven Generating Station (site). The site is located at 10001 NW 13th Street, Gainesville, Florida 32653; the GRU administrative office is located at 301 SE 4th Avenue, Gainesville, Florida 32601. The unit has not been assigned an identification number by the state. A map showing the location of the impoundment system on the most recent United States Geological Survey 7.5-minute quadrangle map is included in Attachment A. The map also presents topographic conditions around the site.

3.0 CCR Surface Impoundment System Description

The impoundment system includes two ash ponds (i.e., Ash Cell #1, Ash Cell #2) which are used to precipitate bottom ash from ash sluice water pumped from the site's coal-fired process (i.e., Unit #2). The ash ponds also temporarily retain blowdown water from various site processes, predominantly from the site's cooling towers; sluiced ash represents a very small fraction of the total process water stream routed to these ponds. The two ash ponds are located adjacent to two pump back ponds (i.e., Pump Back Cell #1, Pump Back Cell #2). The pump back ponds, which are not CCR surface impoundments, retain decant water from the ash ponds prior to onsite water treatment and reuse. The site is a zero discharge facility and process water at the site is continuously recycled. Decant water drains to the pump back ponds by means of subsurface culverts. A concrete vault structure surrounds each culvert inlet; these structures (referred herein to as stoplog structures) are presented in Figure 1. One side of each stoplog structure allows the entry of decanted water by means of stacked, treated-wood dimensional planks. GRU may add/remove these planks to control the water level in the ash ponds. These planks control migration of the precipitated bottom ash into the culvert inlets.

Piezometers installed in the impoundment peripheral embankment are used to qualitatively monitor for potential impoundment seepage areas. These piezometers consist of 2-inch polyvinyl chloride (PVC) pipe installed in 3-inch boreholes. These boreholes were advanced into the embankments of the surface impoundment system using a truck-mounted drill rig in July 2015 (UES 2015). The bottom of the piezometers consists of 0.01-inch slotted PVC pipe with 6/20 washed silica sand poured around the pipe to fill the gap between the pipe and the borehole. The top 2 feet of the borehole was packed with a 30/60 fine sand seal to the ground surface. Piezometer locations (shown as P-X, where "X" represents the piezometer number) are also depicted in Figure 1.

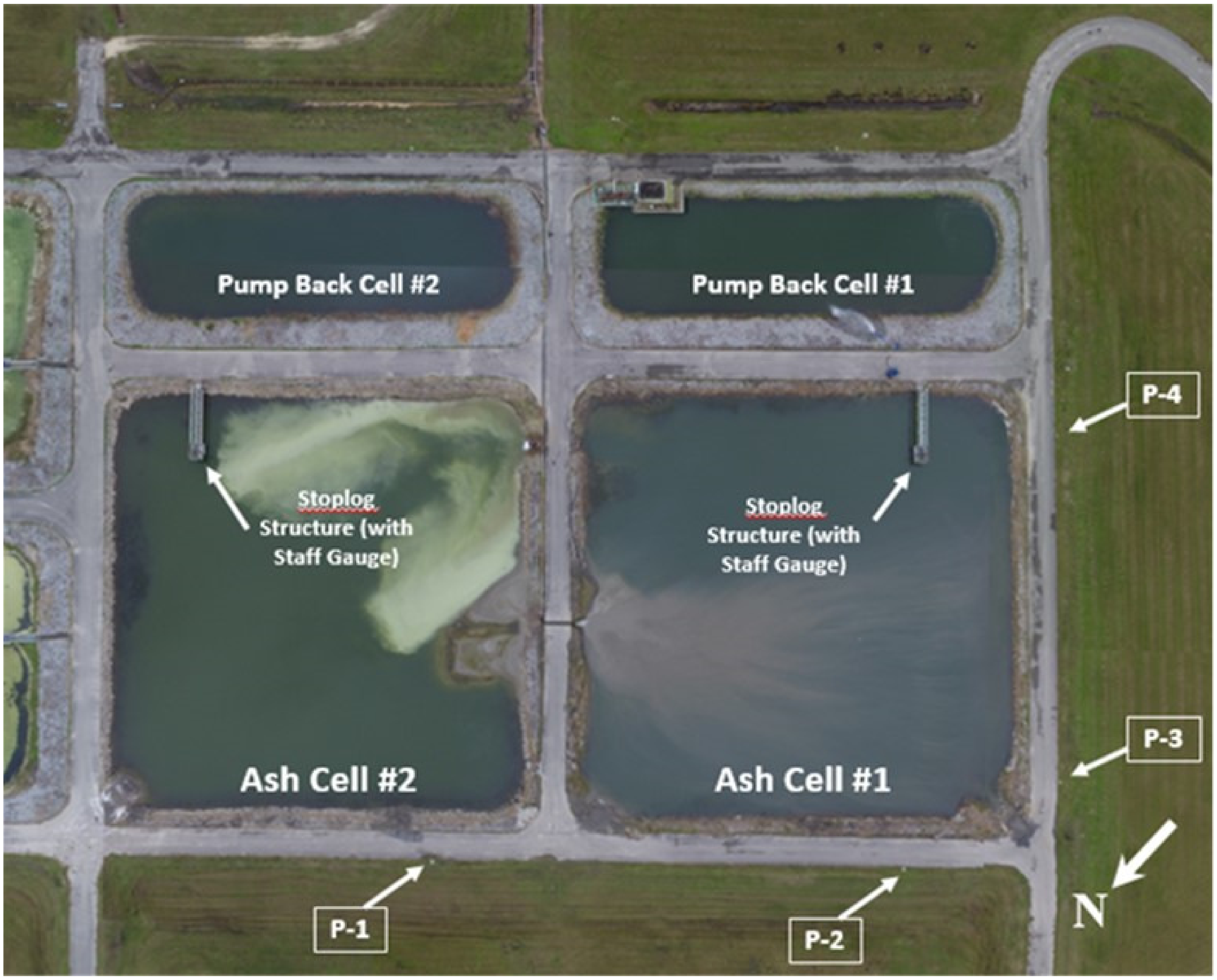


Figure 1. Aerial View of the CCR Surface Impoundment System (IWCS 2016)

4.0 Watersheds

As described in the site certification application submitted by the Gainesville/Alachua County Regional Electric, Water & Sewer Utilities Board (RUB 1977), the site is located in the Turkey Creek and the Rocky Creek basin watersheds. The Turkey Creek basin covers an area of approximately 13,000 acres while the Rocky Creek basin covers an area of approximately 21,000 acres (RUB 1977)). However, the surface impoundment system appears to be located exclusively in the Turkey Creek basin as presented in a figure showing existing surface drainage by RUB (1977). Attachment A presents the topographic conditions around the site and the impoundments; the impoundment system ash ponds are marked (i.e., with a red arrow and a red box) in the bottom right hand corner of the map included in Attachment A.

Georeferenced 2014 aerial imagery of the site was obtained from the Florida Department of Environmental Protection's Land Boundary Information System (FDEP 2014) and a georeferenced, current watershed boundary dataset (USGS 2016) was placed over this imagery. This imagery and watershed boundary information is presented as Figure 2 and shows that the surface impoundment system (located at the approximate center of the image) is located just inside the Sanchez Prairie Watershed, which covers an area of approximately 29,000 acres.

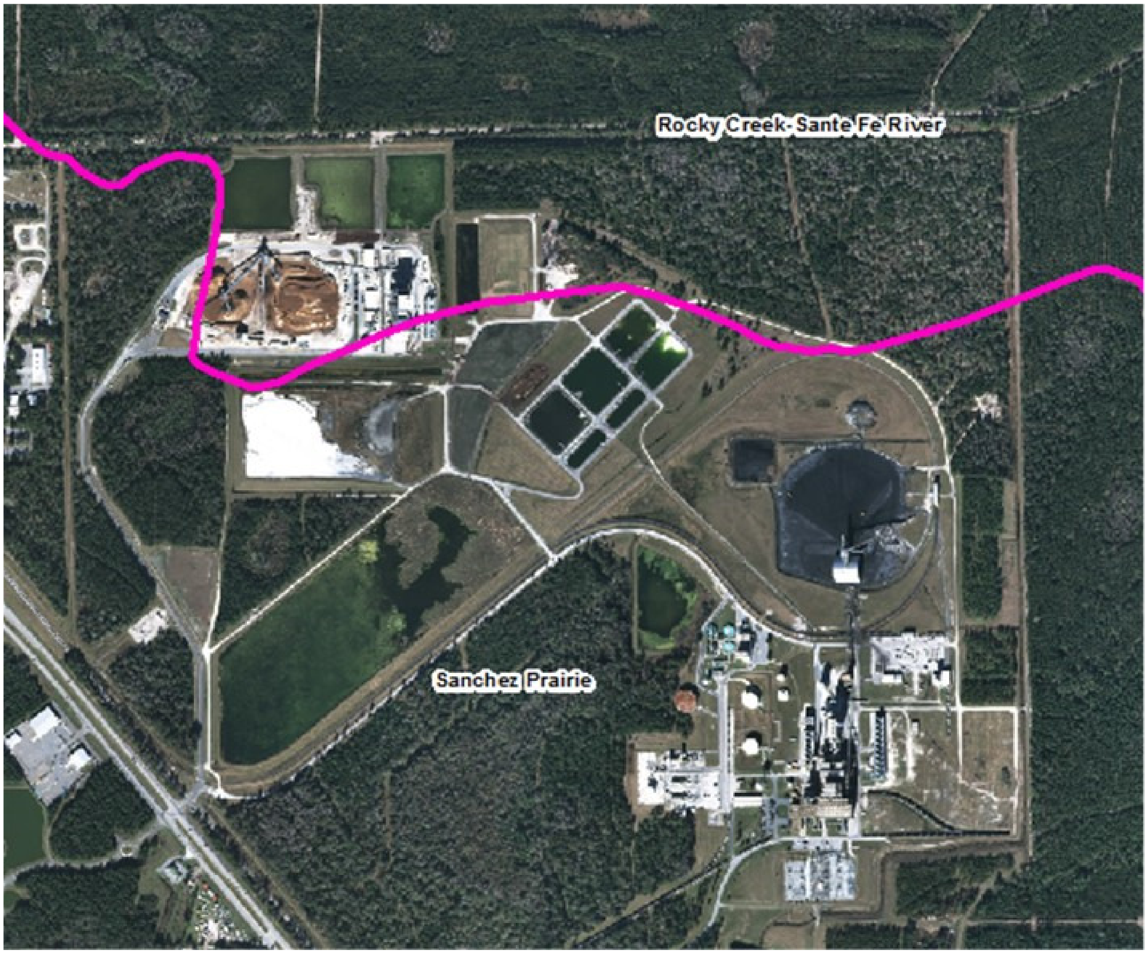


Figure 2. Surface Impoundment System and Watershed Locations (FDEP 2014, USGS 2016)

5.0 Foundation Properties

As part of a study of site subsurface conditions (Breedlove and Associates 1977), 21 borings were advanced at locations across the site. RUB (1977) presents soil stratification and the elevation of the surficial groundwater table inferred from the study in a series of cross-sections (i.e., Figure 2.4-6 to 2.4-11). It appears that the closest borehole location to the surface impoundment system (i.e., No. 12) shows a depth to groundwater of approximately 4 feet, but in general, depths to groundwater across the site in this study were approximately 3-4 feet, with the greatest and shallowest depth of 6 feet and 1 foot, respectively. Additional studies conducted in 1974 in the improved site area (i.e., nineteen total borings) revealed depths to groundwater from 6 inches to 6 feet below the surface. RUB (1977) notes that groundwater elevations vary seasonally and are dependent on antecedent rainfall conditions. According to RUB (1977) (i.e., Table 2.4-1), the CCR surface impoundment system was constructed over natural soil strata consisting of:

- sands, clayey sands and disseminated organic matter (to an approximate depth of 8 feet);
- sands, clayey sands, clays and phosphate grains and pebbles (to an approximate depth of 17 feet);
- clay, sandy clay, interbedded lenses of sandstone, siltstone and sandy phosphatic limestone (to an approximate depth of 110 feet);
- limestone (to an approximate depth of 1,020 feet)

Each of the ten split-spoon borings (i.e., up to 30 feet below grade) performed at the site in January 1974 suggested the presence of continuous clayey strata beginning from 3.5 feet to 13 feet below grade (RUB 1977). Clay strata was also encountered from 5 to 13 feet below grade at each of nine split-spoon borings (i.e., up to 30-100 feet below grade) performed in August 1974; various clay strata were penetrated continuously down to a 100-foot depth (RUB 1977). The encountered clays were extremely stiff, often requiring 100 blows of the driving hammer to achieve less than a foot of split-spoon penetration (RUB 1977). Based on laboratory testing of three undisturbed Shelby tube samples, Jones Edmunds (1978) reported the permeability of the clayey strata to range from 1.8×10^{-8} to 2.53×10^{-8} cm/s.

B&M (1978) reported data from 70 borings conducted at the site. Samples were collected for classification and engineering characterization of the subsurface materials in the immediate vicinity of the Unit #2 facilities, which includes the surface impoundment system. Samples were collected to measure water content, Atterberg Limits, unconfined compressive stress and strain, unit weight, permeability, and particle size distribution. A copy of this report with borehole logs is presented in Attachment D.

6.0 Construction Methods

6.1 Overview and Construction Timeline

This section presents details of the methods used for construction of the surface impoundment system based on an as-built drawing set (included as Attachment B); information presented in the construction specifications for Contract 29C (Yard Structures III Bid Documents, included as Attachment C); and pay applications submitted by the impoundment system construction contractor, Square G Construction Company, Inc. of Florida (referred herein as *Square G*). Figure 3 presents an approximate timeline of the construction phases for the surface impoundments, based on the Square G pay applications.

Figure 3. Timeline of CCR Surface Impoundment Construction Activities

6.2 Land Clearing and Site Preparation

The vegetation in the impoundments area was cleared and the area was grubbed/stripped and leveled. The B&M (1981) construction drawings (i.e., drawings Y70-3, Y81-2, Y82-3) suggest that unsuitable material (e.g., materials containing debris, roots, organic matter, rocks) was excavated and removed from the entire area designated for impoundment system construction to achieve the design grades; unsuitable materials in some areas was up to 10 feet in elevation. The excavated material, if acceptable, was stockpiled and used as topsoil for the final grading. The cleared areas were then roughened by discing or scarifying to a depth of 6 inches, wetted or dried as required to obtain the correct moisture content, and approved by the Engineer responsible for construction oversight prior to receiving the first layer of embankment material.

6.3 Slurry Wall Construction

The CCR surface impoundment system is adjacent to several non-CCR ponds; a total of 6 ponds are located in the same area. A bentonite clay slurry wall containment system was installed beneath the embankment surrounding the entire pond group. A detailed cross-section of the position and geometry of the slurry wall is included in Figure 4, as presented in section 70-N-82 in drawing Y82-3 (B&M 1981).

Initially, a clay liner was proposed for the ash ponds. However, a slurry trench cut-off wall in lieu of clay liner was evaluated for the ash ponds as the lowest bidder (Square G) proposed this as a cost and time-saving alternative (Wolfe 1980, RUB and Square G 1980). The Florida Department of Environmental Regulation (now the Florida Department of Environmental Protection) approved use of the slurry wall on 13 May 1980; this approval was received after the award of the contract to Square G (Oven 1980, RUB and Square G 1980, Gregg 1980). Therefore, the construction specifications for Contract 29C originally did not include specifications for ash pond slurry wall construction. Contract 29C, Section 2E does provide specifications applicable to installation of a soil-bentonite slurry wall around the secure landfill located at the site. Mezger-Zanoni (1980a) reported that the soil-bentonite slurry wall proposed for the impoundment system is the same as that proposed for secure landfill as Alternative Bid No. 3. Therefore, the specifications for this alternative bid are presented in Section 2E of the construction specifications. A description of slurry wall construction was developed based on information presented in B&M (1980) and the communication letters prepared by RUB, B&M, Square G, and ECI, Inc. (i.e., the slurry wall contractor).

As shown in Figure 4, the top of the slurry wall is at an elevation of approximately 184 feet National Geodetic Vertical Datum of 1929 (NGVD29). It appears that the embankment and compacted clay blanket were constructed to an elevation of 184 feet before the installation of slurry wall.

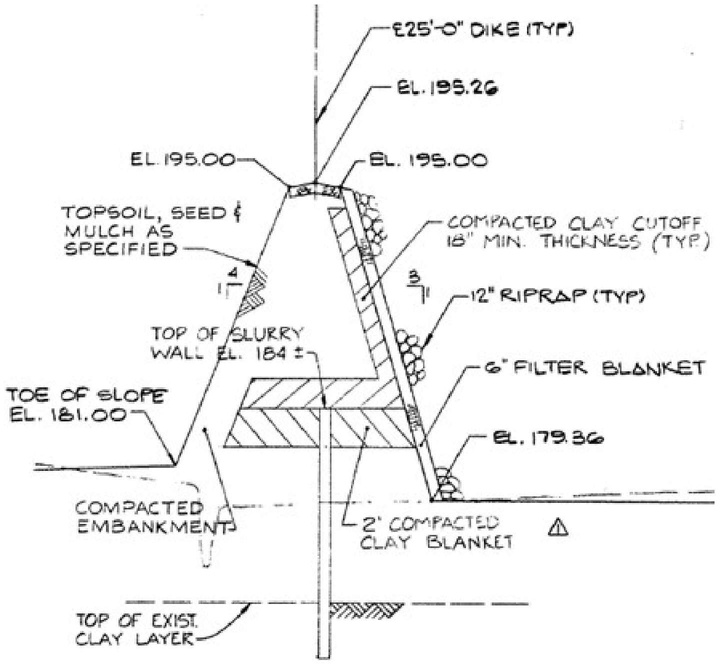


Figure 4. Cross-Section View of Surface Impoundment Embankment with Slurry Wall (B&M 1981)

The slurry wall was constructed with a (minimum) thickness of 2.5 feet and was keyed a minimum depth of 3 feet into an existing natural clay layer that underlies the impoundments (B&M 1981). Post-slurry wall construction testing shows that the slurry wall achieved a permeability of approximately 2.1×10^{-8} to 4.3×10^{-8} cm/s (Shallard 1980). The specifications called for a slurry wall with a maximum permeability of 1×10^{-7} cm/s for a period of at least 10 years. The inspection and testing of the slurry wall was performed by Universal Engineering Testing Company, an independent consultant retained by the contractor and approved by B&M (Mezger-Zanoni 1980b).

Trench excavation was conducted in a manner so that the excavation point was always at least 75 feet from the toe of the backfill being placed in the trench from. The stability of the excavated trench was maintained by introducing slurry at the starting point of excavation. The level of slurry was maintained above the existent groundwater level and the surface of the slurry in the trench was required to be within three feet of the top of the trench at all times. The slurry consisted of a stable colloidal suspension of pulverized Wyoming sodium bentonite in water which was initially mixed and allowed to hydrate before introduction into the trench. All mixed slurry was required to be stored under constant circulation until application. The properties of in-place slurry were required to be in the following ranges:

- Viscosity ≥ 40 seconds Marsh at 68 °F
- Filtrate loss ≤ 30 milliliters in 30 minutes
- Specific Gravity ≥ 1.03 grams per cubic centimeter and ≤ 1.30 grams per cubic centimeter
- pH ≥ 8

In the event that the properties of the in-place slurry did not meet these specifications, the slurry mix had to be adjusted. Addition of water was not permitted. ECI (1980) provided a proposed quality control program along with a frequency for material monitoring and the slurry, backfill, and trench excavation process. Mezger-Zanoni (1980b) suggests that groundwater or storm runoff was used to mix the slurry and a filtrate loss test on the slurry was not required. The contractor was required to check the slurry trench bottom and remove any unacceptable materials encountered (e.g., boulders, gravel, excessive sediments). The construction contractor was required to probe the entire bottom of the trench using a suitable measuring device with projecting markers over a 1-foot interval under observation by the construction consultant. The trench had to be inspected and approved by the construction consultant prior to backfill placement.

Following slurry placement, a backfill comprised of either a mixture of slurry and soils excavated from trenching operations, or from an approved borrow source was introduced in the trench; backfill was placed only after inspection and approval by the consultant. Slurry was added to the backfill to the point that the backfill produced a slump cone reading of 3 to 6 inches as tested according to ASTM C 143-66. Backfill material was comprised of well-graded silty or clayey sands with a minimum content of 20-30 percent plastic fines and a minimum bentonite content of 1%. Soil backfill was required to be mixed into a homogenous mass devoid of lumps of clay, silt, or pockets of sand and gravel. Sluicing with water was prohibited. The backfill was initially placed by lowering the material to the bottom of the trench in a clamshell bucket until the backfill surface rose above the slurry level and a slope at the angle of repose was formed from the bottom of the trench to the surface. Subsequently, backfill was pushed into the trench in a manner that it progressively slid down the slope of previously placed backfill. Backfilling followed the trench excavation process as closely as possible to minimize sloughing; the toe of the backfill was always maintained within 200 feet of the bottom of the excavation.

6.4 Embankment Construction

6.4.1 Clay Blanket

A 2-foot thick compacted clay blanket was installed to encapsulate the top section of the slurry wall. The blanket was extended outward to the inside surface of the embankment. Additional compacted clay with a (minimum) 18-inch thickness was placed and extended upward along the inside surface of the impoundments as a cutoff wall. B&M (1980) did not include dedicated construction specifications for the clay blanket. In the absence of specifications for clay blanket material and installation, it is assumed that the blanket was installed per the specifications included in the Natural Clay Construction section (i.e., Section 2B). Suitable clay was specified as cohesive material conforming to AASHTO Classification Group A-2-6, A-6, or A-2-7; Unified Classification Group CL, CH, SC or OH; and generally free from rock and calcareous material.

Clay was placed in 8-inch maximum uncompacted layers and then compacted to a minimum density of 90% as determined by AASHTO T99. Wetting or drying was conducted as necessary to achieve the required density and to maintain a moisture content of the clay at the time of placement within 1% below and 3% above the optimum moisture content, as determined by AASHTO T99.

Following clay installation, percolation tests were conducted to verify that the seepage rate of the material did not exceed 1 x 10^{-7} cm/s. In the event the clay did not meet the seepage performance standard, the undesirable clay would have been removed and replaced.

Cover material was placed over the clay in a 12-inch maximum uncompacted layer and then compacted to a minimum 70% density. The moisture content of the cover was kept at a level which allowed achievement of the specified density. Filter blanket and riprap was installed over the cover layer.

6.4.2 Embankment Earthwork

As presented in the as-built drawing set (B&M 1981), the embankments surrounding the ash ponds were constructed to a total height of approximately 195 feet NGVD29, which appears to be approximately 15-16 feet above the pre-existing grade. The outer slopes of the embankments were graded with a 4:1 (horizontal to vertical) configuration while the inner slopes were graded with a 3:1 configuration. Each of the ash ponds which make up the surface impoundment system is approximately 365 feet wide by 365 feet long between embankment centerlines. Detailed embankment material and placement method specifications are presented in sections 2A-2-A-4 and 2A-3-K, respectively, of the construction specifications (Attachment C).

The embankment was placed on ground surfaces which had been compacted by rolling, roughened by discing or scarifying (the top six inches), and wetted or dried to achieve correct moisture content. Embankment material was then placed and compacted in either 8-inch or 12-inch layers (maximum uncompacted thickness), depending on whether or not the areas were required to achieve 95% compaction; 8-inch layers were used in areas requiring 95% compaction. As specified, the maximum density at optimum water content was required to be achieved for cohesive soils, according to AASHTO T99. Specified relative densities were required to be achieved for cohesionless soils according to ASTM D2049; ASTM D2922; ASTM 1970; and the US Department of Interior, Bureau of Reclamation, Earth Manual, 2nd Edition, Designation E-12. Areas without a specified level of compaction were required to achieve 90 percent maximum density and 70 percent relative density for cohesive and cohesionless soils, respectively. All installed embankment material was wetted or dried to obtain the specified density when compacted and the moisture content at the time of placement was required to not be more than 1% below and not more than 3% above the optimum moisture content, per AASHTO T99.

The embankments are comprised of friable sandy or silty clay containing fine material sufficient to provide a dense mass free of voids and capable of satisfactory compaction. The following materials were specifically excluded as unacceptable: material containing gravel, stones, shale particles greater in dimension than one-half the depth of the layer to be compacted, roots or other organic matter, refuse, ashes, cinders, frozen earth or other unsuitable material. The construction specifications note the presence of a suitable clay stockpile which was allowed for use in the embankments provided that:

- A sufficient amount of sand was thoroughly disced into the clay to make it workable.
- The material was capable of being compacted to the density specified.
- The material was capable of meeting performance requirements.

Six-inch thick limerock roads were constructed over the 25-foot wide embankments, centered on each embankment crest. Universal Engineering Sciences advanced Standard Penetration Tests (SPT) in the embankment surrounding the surface impoundment system at 4 locations in July 2015. Shelby tube samples were collected from the SPTs and these samples were used for Direct Shear and Triaxial tests, and to evaluate the engineering properties embankment soils. Additional, detailed results from this analysis are available in UES (2015).

6.4.3 Filter Blanket and Riprap Placement

Filter blanket material (e.g., well-graded, crushed rock) was placed over the inside surface of the impoundment embankments as a base for riprap armor. Detailed material and installation specifications for filter blanket are presented in sections 2A-2-A-10 and 2A-3-N, respectively, of the construction specifications (Attachment C). Prior to placement, the surface over which the filter blanket was to be placed had to be uniformly trimmed and dressed according to drawing cross sections within a 2-inch tolerance of the theoretical slope line and grades. Areas below the allowed tolerance were required to be brought to grade by filling with filter blanket material. The final surface was required to be approved by the supervising engineer prior to filter blanket placement. Any damages to the surface of the filter blanket foundation were required to be repaired prior to additional installation work.

The filter blanket material was then placed (placement by dumping down the slope was prohibited) and uniformly spread to a thickness of 6 inches. Placement and spreading through means which would cause the segregation of particles sizes within the filter was prohibited. Compaction of the filter blanket material was not required, but the completed blanket was required to have a reasonably even surface free from mounds, depressions or windrows.

Riprap was placed over the filter blanket to assist in protecting the slopes from erosion. Similar to the filter blanket, the construction contractor was required to trim and dress riprap placement areas to bring them within a 2-inch tolerance of the theoretical slope lines and grades. In the event the areas were lower than the tolerance limit, the contractor was required to achieve the slope lines and grades by filling with riprap. Riprap was placed in a manner so as to produce a reasonably well-graded mass of rock with a minimal, practicable percentage of voids. Detailed material and installation specifications for riprap are presented in sections 2A-2-A-11 and 2A-3-O, respectively, of the construction specifications (Attachment C). The full thickness of riprap was placed at one time in a fashion to avoid the displacement of the base material. Finished, in-place riprap was required to be free of objectionable clusters of small stones or large stones. Hand placement was only required if necessary to achieve the desired results. A tolerance of up to 4 inches from the required slope lines and grades was allowed as long as it was not continuous over an area greater than 200 square feet.

6.4.4 Topsoil and Vegetation Placement

Unarmored (i.e., without riprap) embankment surfaces appear to have received topsoil which consisted of the most suitable onsite materials obtained during excavation and stripping activities or from borrow material, when required. Prior to placement, embankment surfaces were cleared of all objects larger than 3 inches in diameter and loosened by discing or scarifying to a 2-inch depth in compacted areas. Topsoil was required to be applied in a 4 to 6-inch thick layer. Following application, additional objects larger than 2 inches in diameter were to be removed to prevent interference with planting/maintenance operations. The topsoil areas were then loosened and pulverized to a depth of at least 3 inches. Detailed material and installation specifications of topsoil are presented in sections 2A-2-A-9 and 2A-3-M, respectively, of the construction specifications (Attachment C).

Prepared seedbeds received dolomite (i.e., 2 tons per acre) and fertilizer (i.e., 400 lbs per acre). Following seed application, areas were mulched with partially decomposed vegetative mulch consisting of straw with stalks of wheat, rye, oats or hay from fields of pangola, peanut, coastal Bermuda, or bahia grass. Seeded areas were required to be watered until a flourishing cover was obtained. Detailed material and application specifications for vegetation are presented in Section 2G.

6.5 Culverts and Stoplog Structures

Each of the ash ponds in the surface impoundment system has a single decant water discharge point; a culvert pipe connects each ash pond to the adjacent pump back pond. The B&M (1981) drawing set (i.e., drawings U9-4, UP54-3, UP55-1) shows that the culverts are 12 inches in diameter, comprised of glass fiber-reinforced pipe, and that each pipe contains a worm gear-type butterfly valve. Each pipe has an inlet and outlet invert elevation of 177 and 175 feet (NGVD29), respectively. Under normal operating conditions, the pipe inlet and outlet inverts may be under water by up to 16 and 11 feet deep, respectively.

As described in Section 3, each culvert inlet is surrounded by a concrete vault stoplog structure. The stoplog structures are approximately 8-feet long, 8-feet wide and, including the foundation, 25-feet tall (as presented in drawing S224-2, B&M 1981). The inward-facing wall of the stoplog structures was constructed with 4-inch slots which allow the installation/removal of stacked wooden planks. The wooden planks provide a barrier against sediment migration into the culvert pipe and adjacent pump back pond.

7.0 Dimensional Drawings

A drawing set certified as conforming to construction records (B&M 1981) was reviewed to identify and analyze drawings providing details on the construction of the surface impoundment system. Table 1 presents a list of all available impoundment-related drawings with a short description of the information provided in the drawings. The drawings identified in Table 1 are included as Attachment B.

Table 1. Summary of Surface Impound System Construction Drawings

Drawing Number	Description
Y70-3	Plan view with elevation of the key points of the system
Y82-3	Cross-sectional view along the length of the system
Y81-2	Cross-sectional view along the width of the system
Y89-2	Crossing structure grading details for access roads located on top of the embankments
S224-2	Plan, section and detail views for stoplog structures. High water level shown as 193'-0"
S227-2	Plan and section views for the stoplog structure bridge
S228-3	Plan, section and detail views for crossing structure
U9-4	Plan view of the system with pre-existing grades, detail callouts and location callouts
UP46-1	Piping details
UP48-2	Piping details
UP50-3	Pipe, pipe fitting, and pipe routing/location details
UP52-3	Pipe at crossing and pipe connection details
UP54-3	Valve list and connection schedule
UP55-1	Piping design tables

The location of the piezometers (i.e., labeled as monitoring wells in Sheets 1, 2 and 3) and the stoplog structures (see Sheets 3 and 4) are presented in a 13 April 2015 topographic survey drawing set of the surface impoundment system, included as Attachment E.

8.0 Instrumentation

The water level in each pond is monitored using a staff gauge painted on the side of each stoplog structure of each ash pond. A series of piezometers (i.e., P-1, P-2, P-3, P-4) located in the outer embankment of the ash ponds are used to qualitatively monitor for potential seepage areas. For annual inspection reports, the water level elevations in these piezometers are compared to the water level elevations in the adjacent ash pond to assist in identifying potential seepage areas. The locations of the staff gauges and the piezometers are presented in Figure 1 and in the topographic survey included as Attachment E.

The piezometers were installed 12 (i.e., for P-1, P-2, P-3) or 8 (i.e., for P-4) feet beneath the embankment surface. Piezometers P-2, P-3 and P-4 are used to assist in detecting potential seepage areas in the outer embankment of Ash Cell #1 and P-1 is used to assist in detecting potential seepage areas in the outer embankment of Ash Cell #2.

Please note that water level information for piezometer 4 (i.e., P-4) was previously not included in inspection records completed for the CCR surface impoundments; the monthly inspection form which documents piezometer water level information was adjusted (January 2016) to include data from this monitoring point.

9.0 Area-Capacity Curves

Area-capacity curves are defined in §257.53 as "graphic curves which readily show the reservoir water surface area, in acres, at different elevations from the bottom of the reservoir to the maximum water surface, and the capacity or volume, in acre-feet, of the water contained in the reservoir at various elevations." Figure 5 depicts area-capacity curves for the total (i.e., including the areas and volume of both ash ponds) surface impoundment system as a function of elevation (NGVD29). The area-capacity of the impoundments were developed based on the dimensions presented in Drawing Y81-2 and Y82-3 included in Attachment B and a mathematical equation for the volume of a truncated pyramid. It should be noted that the maximum normal operating level for the CCR surface impoundment system is 193 feet NGVD29; the volume associated with 2 feet of freeboard provides additional storage in the event of a contingency.

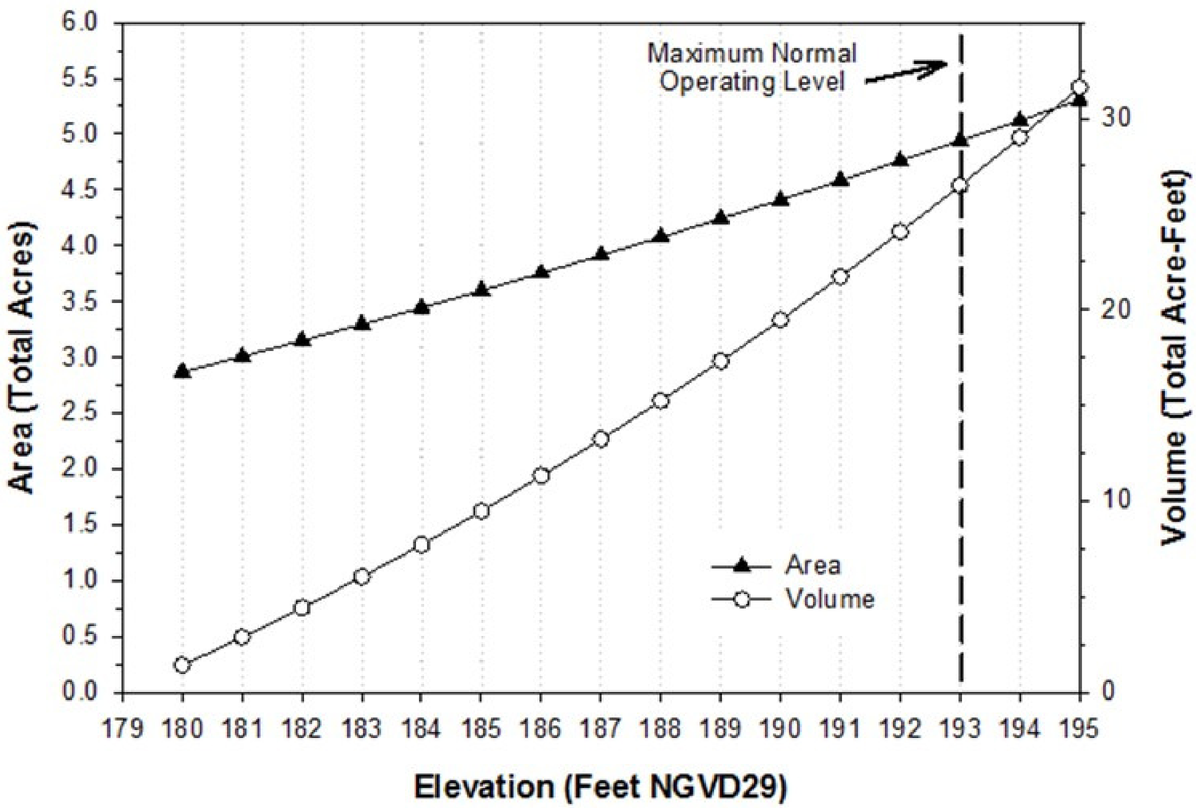


Figure 5. Surface Impoundment System Area-Capacity Curves

10.0 Spillways and Diversion Features

The CCR surface impoundment system does not have any spillways or other diversion features. All decanted water is routed by gravity through culverts which empty into adjacent pump back ponds, as described previously.

11.0 Construction Specifications and Provisions for Monitoring, Maintenance and Repair

A copy of the original B&M (1980) construction specifications are included as Attachment C. These specifications were the primary source of information used to develop a description of the surface impoundment system construction methods. Provisions for operating, monitoring and repair of the impoundment system are presented in the standard operating procedures for these ponds (GRU 2015). As described in GRU (2015), the impoundments are inspected and monitored on a weekly and monthly basis by qualified GRU personnel. The impoundments are inspected annually by a qualified professional engineer.

12.0 Previous Indications of Instability

At the time of development of this history of construction, no previous records or knowledge of embankment instability were found. Based on visual observations of the structural element components (i.e., inlet structures, earth embankments, and outlet structures) of the surface impoundment system and pump back ponds, CDM Smith reported that the impoundments appeared to be structurally sound (US EPA 2014). A slope stability and liquefaction potential analysis conducted by Universal Engineering Sciences (UES 2015) concluded that the factors of safety for both slope stability and liquefaction potential meet the requirements promulgated in the CCR rule.

13.0 References

B&M (1978). Subsurface Information for the Deerhaven Generating Station Site, Near Hague, Florida for the City of Gainesville, Florida, Deerhaven Unit 2. Prepared for the Gainesville, Alachua County Regional Electric, Water & Sewer Utilities Board by Burns and McDonnell.

B&M (1980). Deerhaven Generating Station – Unit 2, Bid Documents, Contract 29C – Yard Structures III. Prepared for the City of Gainesville, Florida, by Burns and McDonnell.

B&M (1981). Deerhaven Generating Station - Unit 2 Construction, Contract 29C – Yard Structures III. Drawing set conforming to construction records. Prepared for the City of Gainesville, Florida – Alachua County Regional Utilities Board, by Burns and McDonnell. Revised 1 July 1981.

Breedlove and Associates (1977). An Evaluation of Alternatives to the Present Releasing of Deerhaven Generating Station Blowdown into Turkey Creek. 109-76-08.

Degrove (2015). Map Showing Topographic Survey of A Part of Sections 26 and 27, Township 8 South, Range 19 East, Alachua County, Florida. Survey conducted by Degrove Surveyors, Inc., 13 April 2015.

ECI (1980). Letter from Engineered Construction International, Inc. to Ms. Dena Mezger-Zanoni of Burns and McDonnell, 5 May 1980.

FDEP (2014). Land Boundary Information System. http://www.labins.org/index.cfm accessed 17 May 2016.

Gregg, J. (1980). Letter dated 21 May 1980 from Mr. James R. Gregg of Square G Construction Company Inc. to Ms. Dena Mezger-Zanoni of Burns & McDonnell.

GRU (2015). Gainesville Regional Utilities Deerhaven Generating Station Coal Combustion Residual Pond and Pump Back Pond Operations and Maintenance Plan. Prepared for Gainesville Regional Utilities by Innovative Waste Consulting Services, LLC, November 2015.

IWCS (2016). CCR Surface Impoundment System and Pump Back Ponds. Composite Aerial Imagery. Deerhaven Generating Station, Gainesville, Florida. Photographs taken 8 January 2016.

Jones Edmunds (1978). Proposed Facilities for Coal Storage, Ash Disposal and Evaporator Residue Disposal -Deerhaven Generating Station. Prepared by Jones Edmunds & Associates, Inc., Gainesville, FL.

Mezger-Zanoni, D. (1980a). Letter from Ms. Dena Mezger-Zanoni of Burns and McDonnell to Mr. Mike Kurtz of the City of Gainesville, 11 April 1980.

Mezger-Zanoni, D. (1980b). Letter from Ms. Dena Mezger-Zanoni of Burns and McDonnell to Mr. James Gregg of Square G Construction Company, 30 May 1980.

Oven, H.S. (1980). Letter from Mr. Hamilton S. Oven of the Florida Department of Environmental Regulation to Mr. Mike Kurtz of the Gainesville-Alachua County Regional Utilities Board, 13 May 1980.

RUB (1977). Site Certification Application, Deerhaven Station Unit 2, Vol. 1. Amended Application for Certification for The Deerhaven Unit 2 Steam Electric Generating Facility. Submitted to the Florida Department of Environmental Regulation by Gainesville/Alachua County Regional Electric, Water & Sewer Utilities Board, 9 December 1977.

RUB and Square G (1980). Contract between RUB and Square G Construction Company, Inc of Florida to executed the scope of work outlined in Contract No. 29C – Yard Structure III, 5 May 1980.

Shallard, S. (1980). Deerhaven Generating Station Contract 29C Permeability Test. Letter to Mr. James Gregg of Square G. Construction from S. Geoffrey Shallard of Engineered Construction International, Inc., 30 October 1980.

US EPA (2014). Assessment of Dam Safety of Coal Combustion Surface Impoundments. Final Report. Gainesville Regional Utilities Deerhaven Plant, Gainesville, Florida. Prepared for U.S. Environmental Protection Agency, Washington, D.C. by CDM Smith, May 2014.

UES (2015). Geotechnical Exploration Services, Slope Stability and Liquefaction Potential Analysis, Process Pond Impoundment Dikes, Deerhaven Generating Station (DGS), 10001 NW 13th Street, Gainesville, Alachua County, Florida. Prepared by Universal Engineering Sciences for Innovative Waste Consulting Services, LLC., 20 November 2015.

USGS (2015). Alachua Quadrangle, Florida-Alachua Co., 7.5-Minute Series. Prepared by U.S. Department of the Interior, U.S. Geological Survey, 2015.

USGS (2016). Coordinated effort between the United States Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS), the United States Geological Survey (USGS), and the Environmental Protection Agency (EPA). The Watershed Boundary Dataset (WBD) was created from a variety of sources from each state and aggregated into a standard national layer for use in strategic planning and accountability. Watershed Boundary Dataset for Alachua County, Florida. http://datagateway.nrcs.usda.gov accessed 18 May 2016

Wolfe, K. (1980). Letter from Mr. K.E. Wolfe of Burns & McDonnell to the City of Gainesville, 14 April 1980.

Attachment A

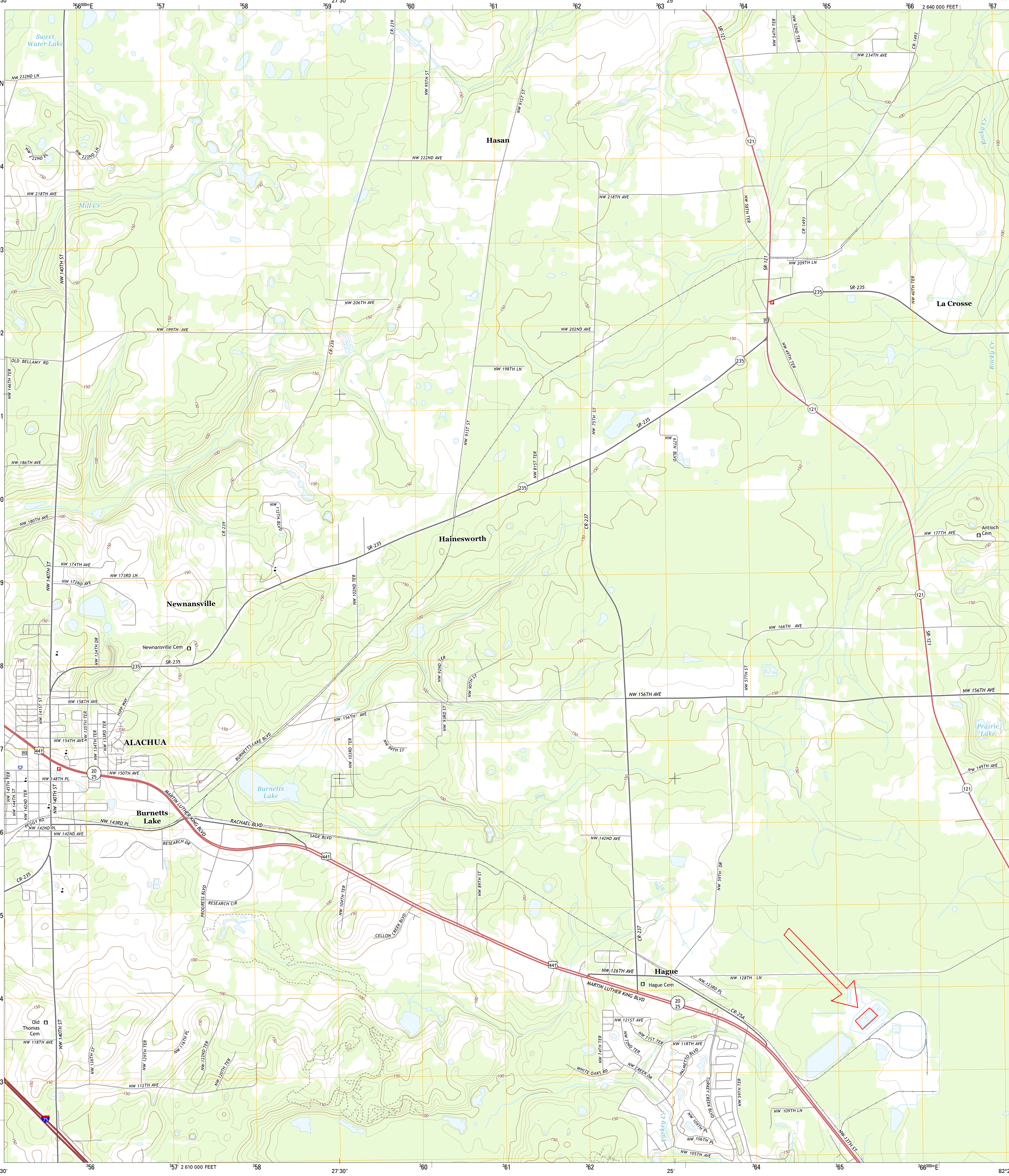
Location of CCR Surface Impoundment System on USGS (2015) Topographic Map

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

ALACHUA QUADRANGLE
FLORIDA-ALACHUA CO.
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 17R
10 000-foot ticks: Florida Coordinate System of 1983 (north zone)

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, October 2013
Roads.....HERE, ©2013 - 2014
Names.....GNIS, 2015
Hydrography.....National Hydrography Dataset, 2013
Contours.....National Elevation Dataset, 2012
Boundaries.....Multiple sources; see metadata file 1972 - 2015
Public Land Survey System.....BLM, 2015

MN GN
5° 37' 100 MILS
0° 43' 13 MILS
UTM GRID AND 2015 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
LP
LN
Grid Zone Designation
17R

SCALE 1:24 000

KILOMETERS 1 0.5 0 1 2
METERS 1000 500 0 1000 2000
MILES 1 0.5 0 1
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

FLORIDA
QUADRANGLE LOCATION

1 Mikesville
2 Worthington Springs
3 Brooker
4 High Springs
5 Monteocha
6 Newberry
7 Gainesville West
8 Gainesville East

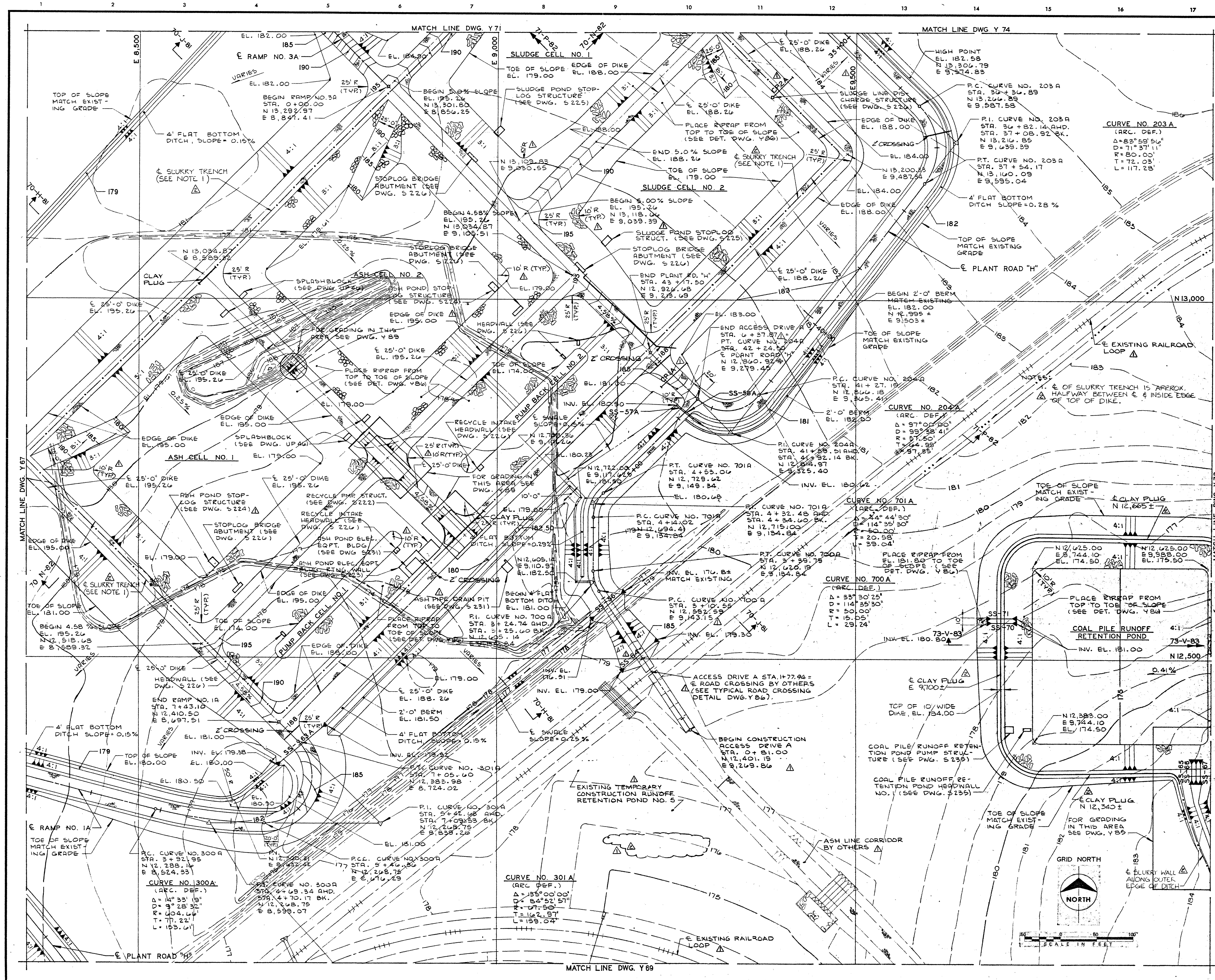
ADJOINING QUADRANGLES

ROAD CLASSIFICATION
Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

ALACHUA, FL
2015

Attachment B

Detailed Dimensional Drawings of CCR Surface Impoundment System



NO.	DATE	BY	REVISION
1	3-11-80	DJB	REVISED PER ADDENDUM NO. 2
	4-3-80	MBB	ADDED NOTE PER ADDENDUM NO. 3
	4-7-80	MBB	REVISED NOTE FOR CLARIFICATION
	4-22-80	DMZ	ISSUED AS BID
2	5-29-80	GWB	ADDED SLURRY WALL & SLURRY TRENCH. (E-16) REVISED NOTE 1 (L-10) DELETED NOTE
	5-30-80	DMZ	ISSUED
3	6-30-81	DJB	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT NO. 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION
UNIT 2

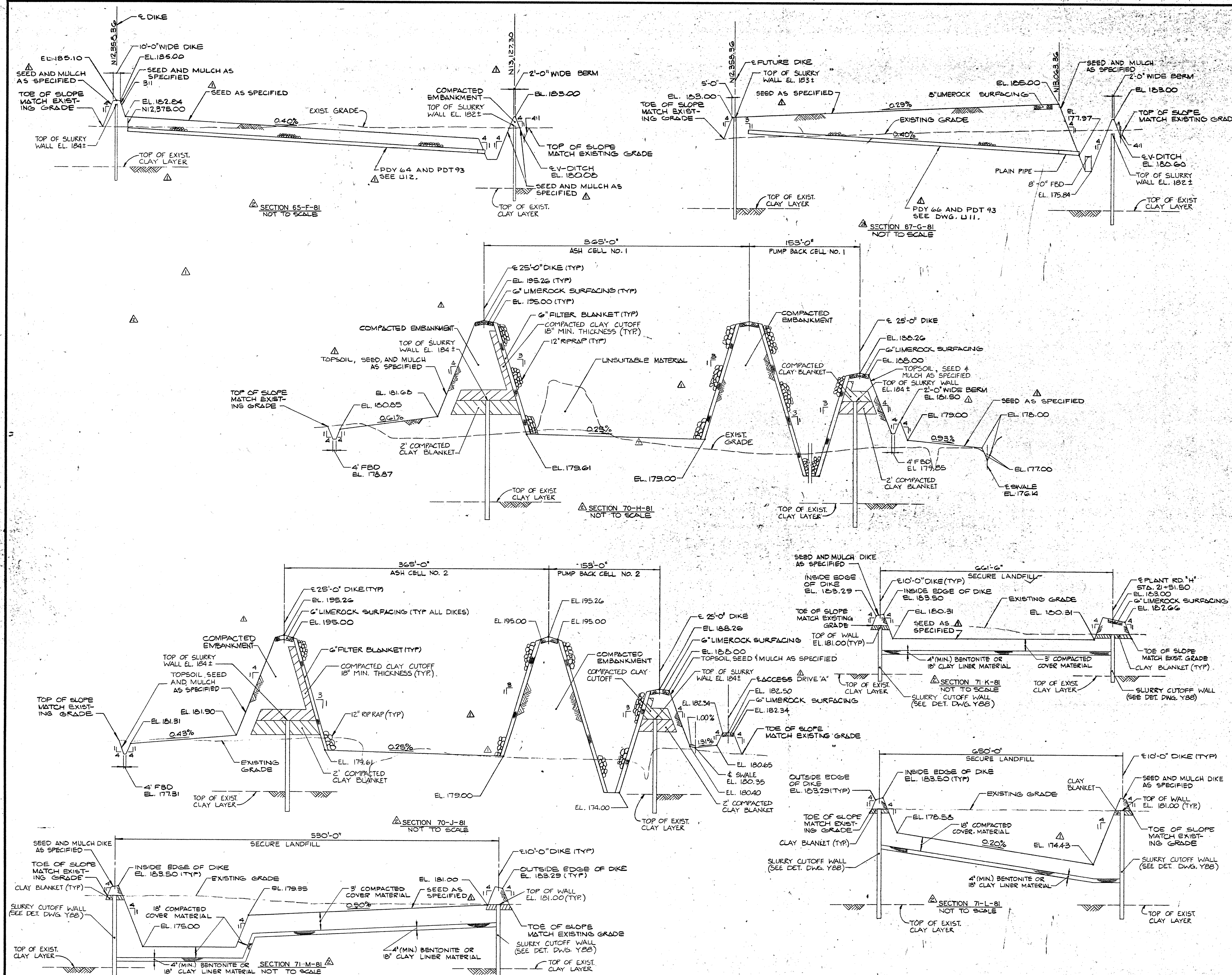
CITY OF GAINESVILLE/
GAINESVILLE-ALACHUA COUNTY
REGIONAL UTILITIES BOARD

FLORIDA

GRADING PLAN 7

Burns & McDonnell
Engineers – Architects – Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. Y70 — REV. 3
DESIGNED HUTCHESON	
DETAILED WISEMAN	PROJECT 76-077-1
CHECKED DMZ	SHEET OF SHEETS



NO.	DATE	BY	REVISION
1	3-10-80	DJB	REVISED & ADDED NOTES FOR CLARIFICATION.
	3-12-80	TDW	(F-9, J-6) REVISED TIMBER POLE LINER PROTECTION
	3-21-80	DMZ	ISSUED WITH ADDENDUM NO. 3
	4-22-80	DMZ	ISSUED AS BID
2	6-13-80	GWB	REVISED PER ALTERNATE BIDS NO. 3 & NO. 4.
	6-24-80	DMZ	ISSUED
	7-1-81	DJB	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT NO. 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION
UNIT 2

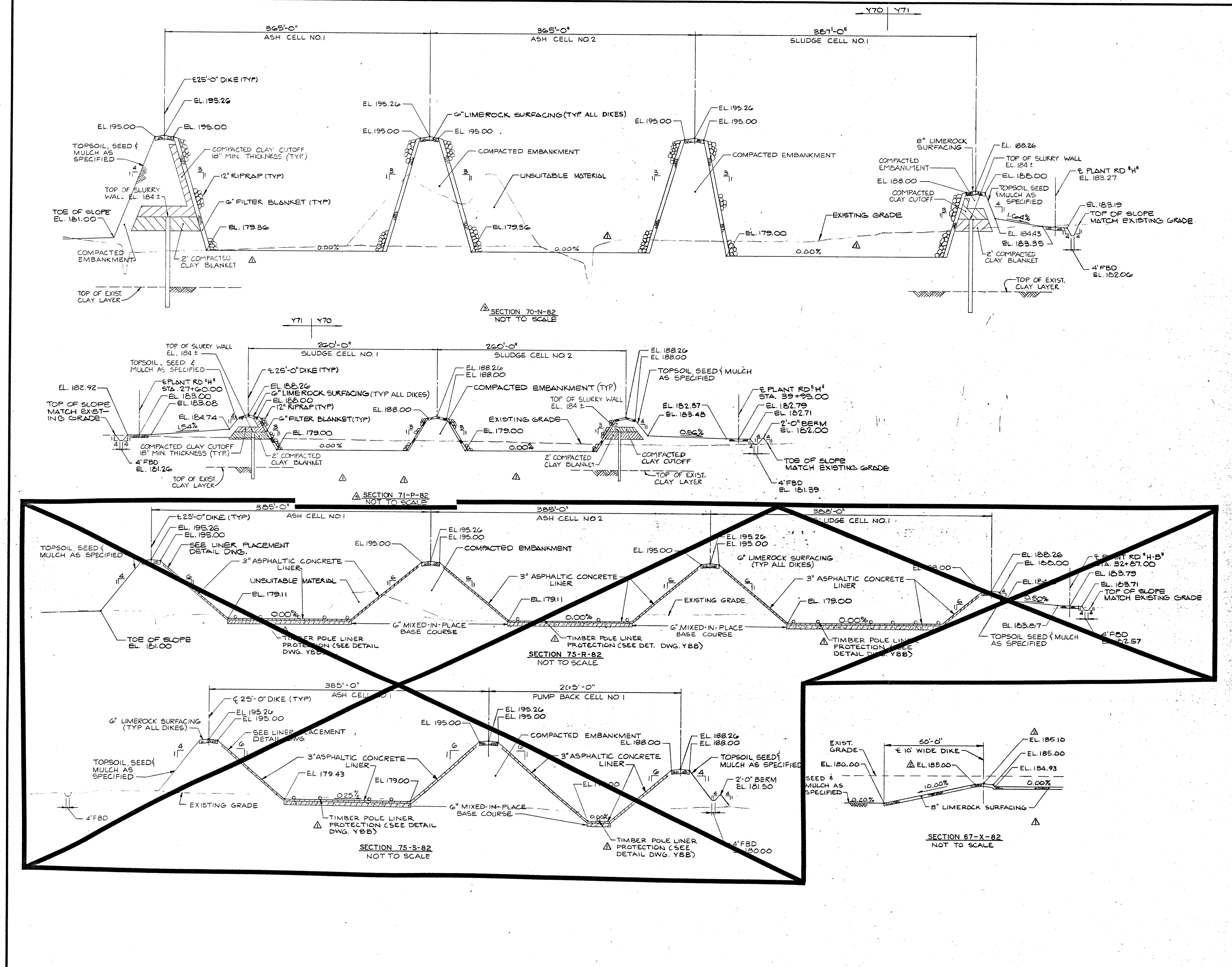
CITY OF GAINESVILLE/
GAINESVILLE-ALACHUA COUNTY
REGIONAL UTILITIES BOARD

FLORIDA

GRADING SECTIONS 2

Burns & McDonnell
Engineers–Architects–Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. Y81 REV. 2
DESIGNED HUTCHESON	
DETAILED MADDOCK	PROJECT 76-077-1
CHECKED DMZ	SHEET OF SHEETS



NO.	DATE	BY	REVISION
1	3-11-80	DJB	ADDED TIMBER POLE LINER PROTECTION & NOTE TO SECTIONS 70-N-82, 70-P-82, 75-R-82, & 75-S-82. (K-14) ADDED SECTION 67-X-82
	3-21-80	DMZ	ISSUED WITH ADDENDUM NO.3
2	4-7-80	MBB	REVISED EL FOR CLARIFICATION
	4-22-80	DMZ	ISSUED AS BID
3	6-12-80	GWB	REVISED PER ALTERNATE BIDS NO. 3 & NO. 4
	6-24-80	DMZ	ISSUED
	7-1-81	DJB	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT NO. 29C
YARD STRUCTURES III

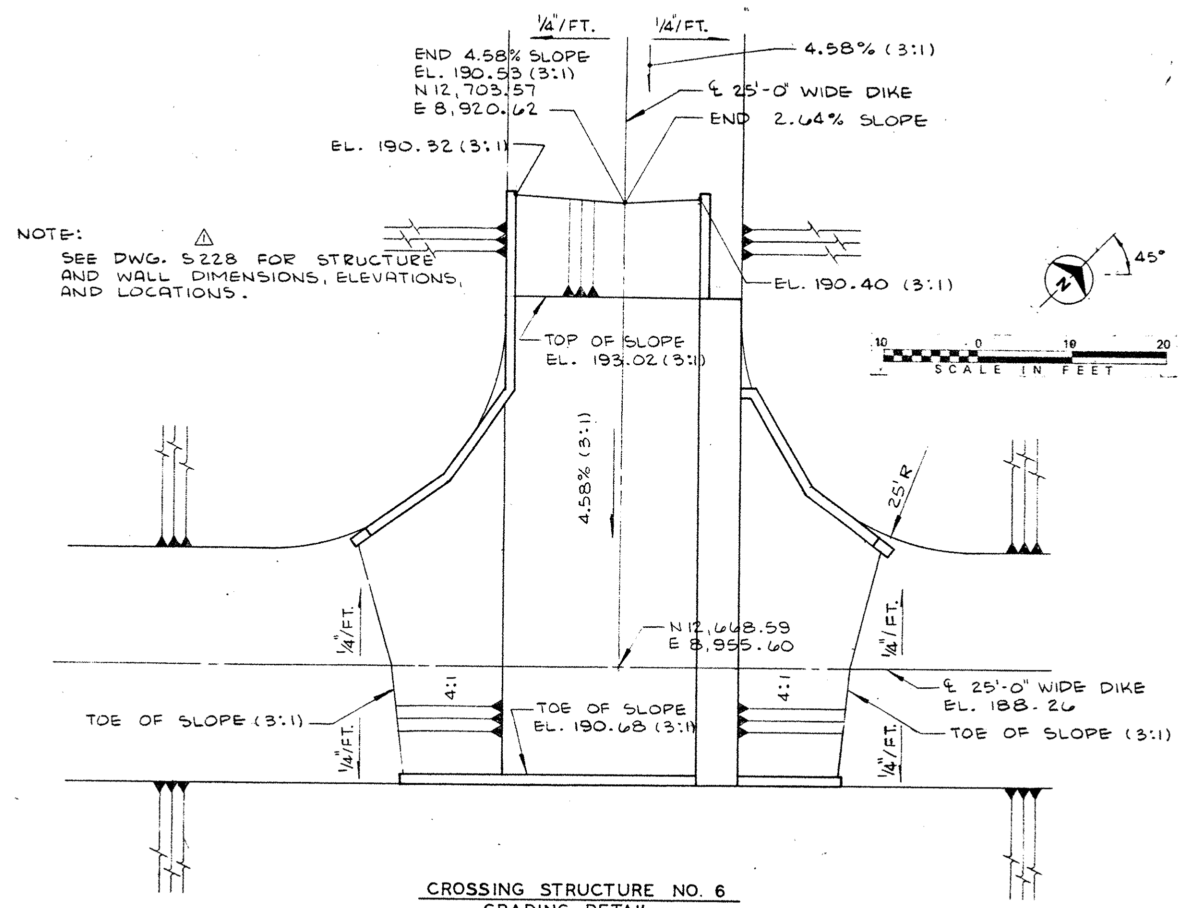
DEERHAVEN GENERATING STATION UNIT 2

CITY OF GAINESVILLE/
GAINESVILLE-ALACHUA COUNTY
REGIONAL UTILITIES BOARD
FLORIDA

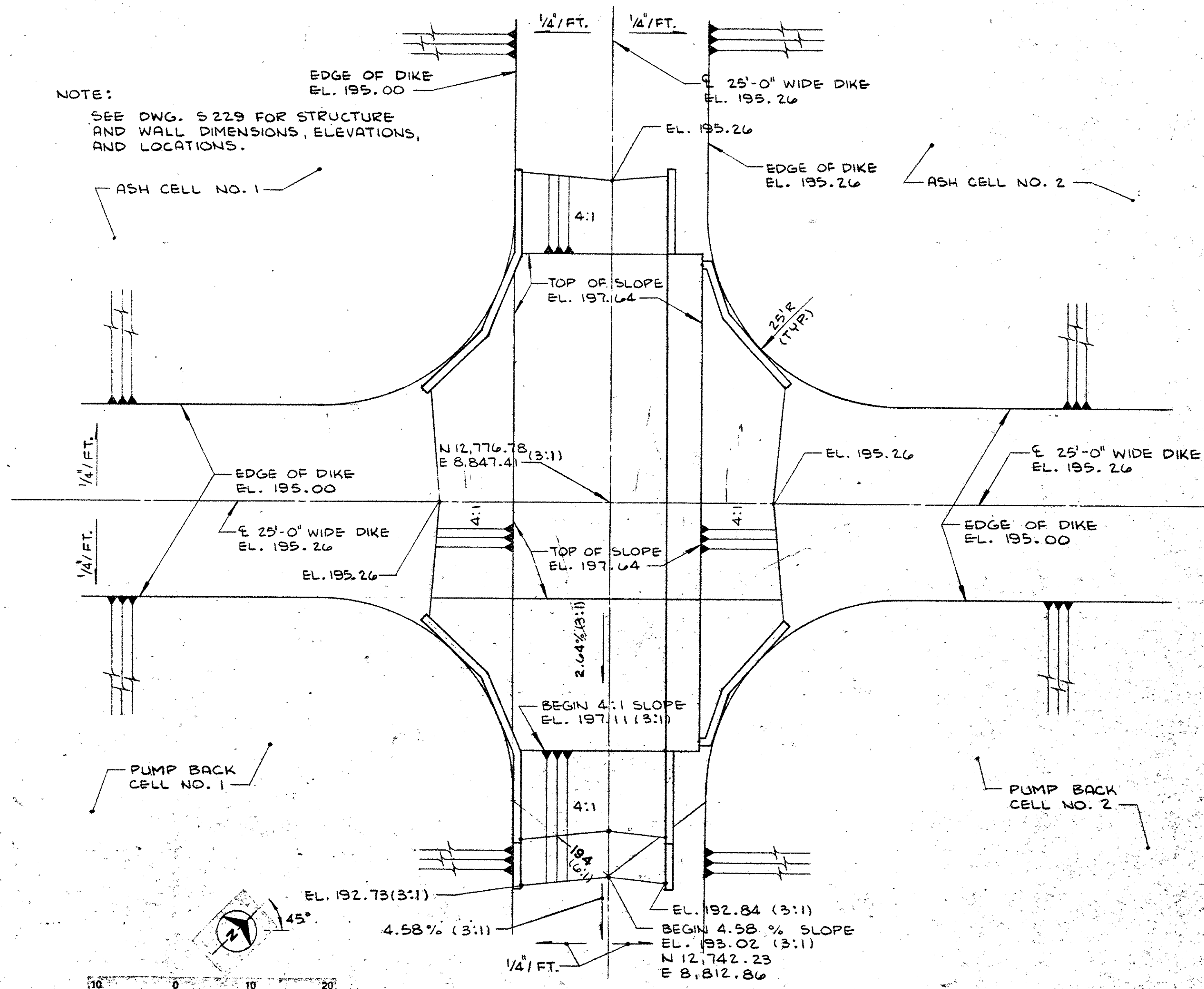
GRADING SECTIONS 3

Burns & McDonnell
Engineers-Architects-Consultants
KANSAS CITY, MISSOURI

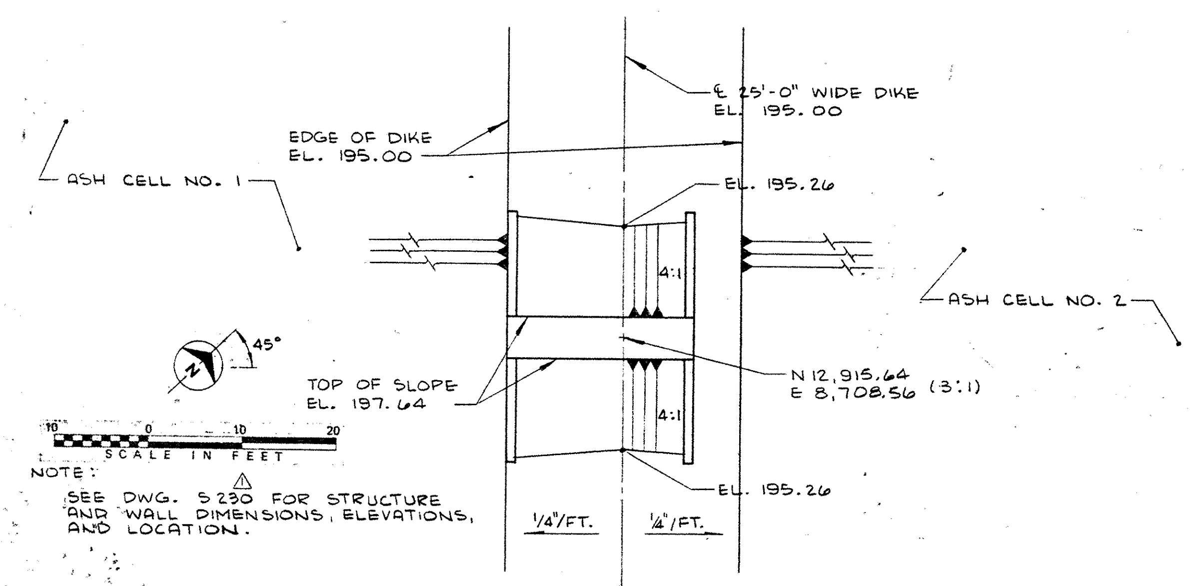
DATE FEB. 18, 1980	DRAWING NO. Y82 REV. 3
DESIGNED HUTCHESON	
DETAILED MADDOCK	PROJECT 76-077-1
CHECKED DMB	SHEET OF SHEETS



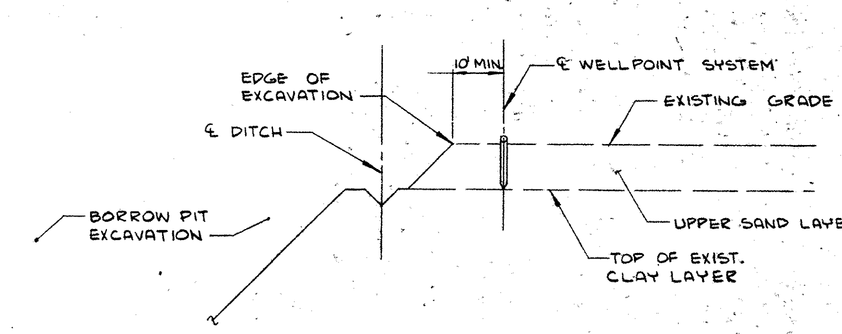
CROSSING STRUCTURE NO. 6
GRADING DETAIL
NOT TO SCALE



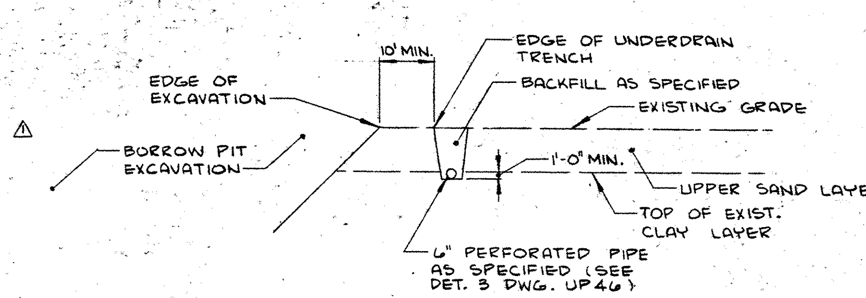
CROSSING STRUCTURE
NO. 7 GRADING DETAIL
NOT TO SCALE



CROSSING STRUCTURE
NO. 8 GRADING DETAIL
NOT TO SCALE



TYPICAL SECTION
WELLPOINT DEWATERING SYSTEM
NOT TO SCALE



TYPICAL SECTION
UNDERDRAIN DEWATERING SYSTEM
NOT TO SCALE

NO.	DATE	BY	REVISION
1	3-4-80	TDW	A-2 & H-2) REVISED NOTES FOR CLARIFICATION. (H-9) ADDED TYP. SECT. WELLPT. DEWATERING SYSTEM. (H-13) ADDED TYP. SECT. UNDERDRAIN DEWATERING SYSTEM.
	3-5-80	DMZ	ISSUED WITH ADDENDUM NO. 1.
	4-22-80	DMZ	ISSUED AS BID
2	7-1-81	DJB	CONFORMING TO CONSTRUCTION RECORDS

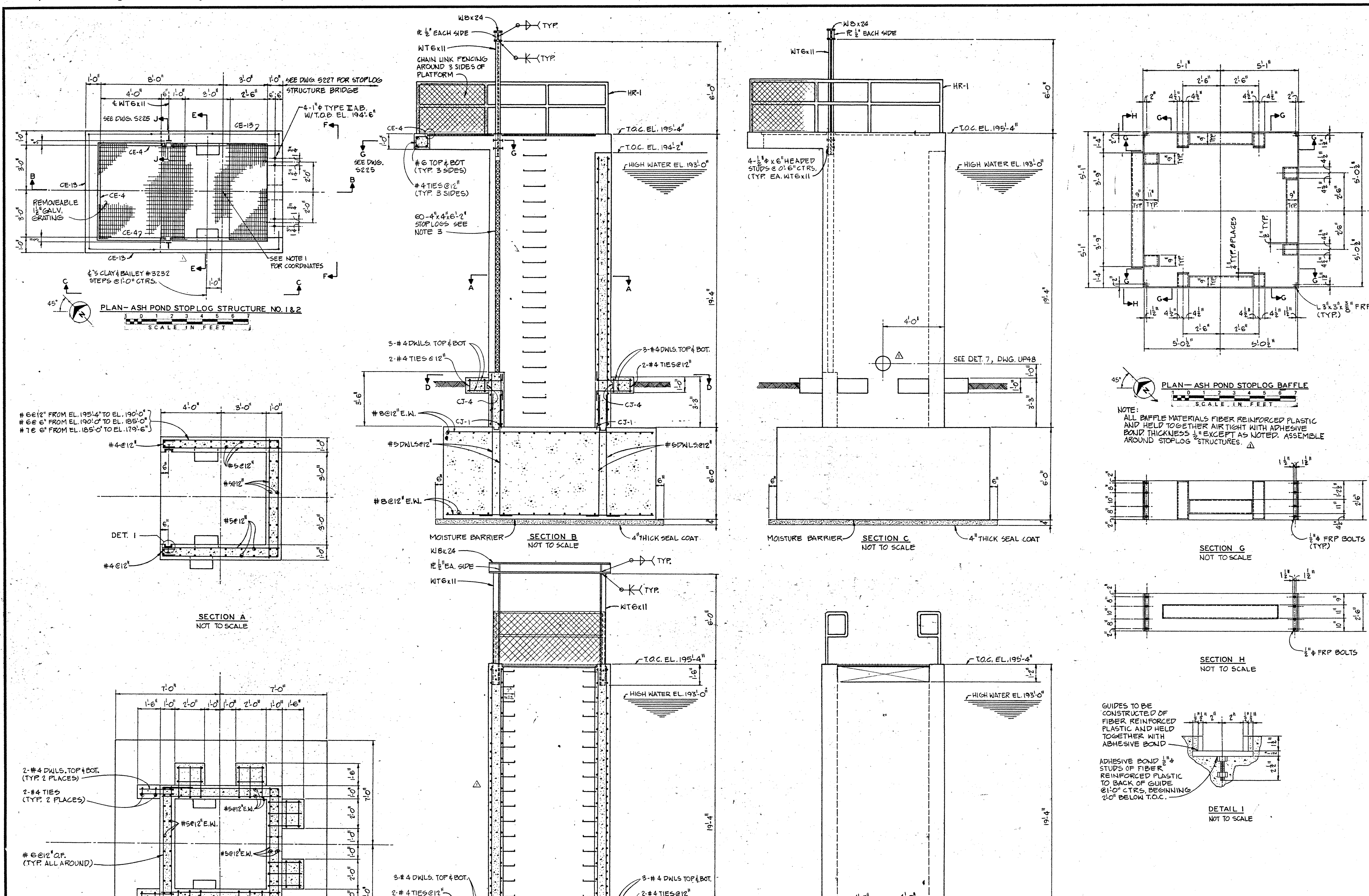
CONTRACT NO. 29C
YARD STRUCTURES III

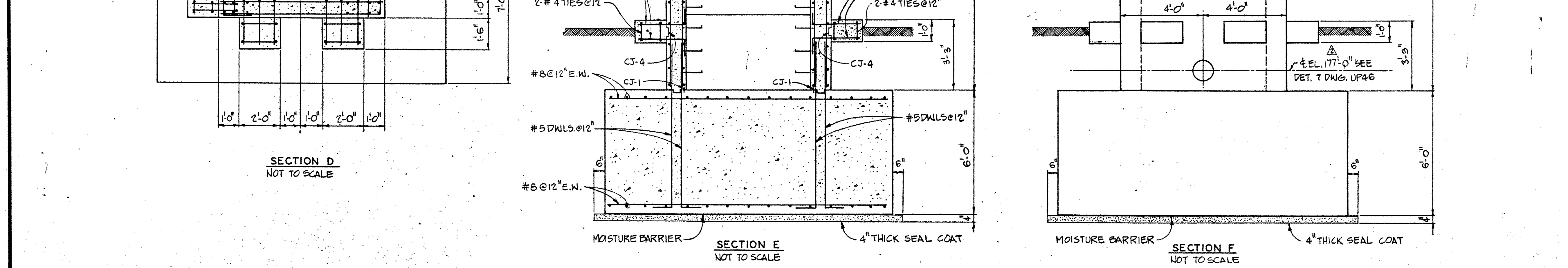
DEERHAVEN GENERATING STATION
UNIT 2
CITY OF GAINESVILLE/
GAINESVILLE-ALACHUA COUNTY
REGIONAL UTILITIES BOARD
FLORIDA

GRADING DETAILS 5

Burns & McDonnell
Engineers-Architects-Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. Y 89 — REV. 2
DESIGNED MEZGER-ZANONI	PROJECT 76-077-1
DETAILED WISEMAN	SHEET OF SHEETS
CHECKED DMZ	





NOTES:

1. [redacted] ASH PONDS [redacted] COORDINATES
STRUCTURE NO. 1. N. 12,626.45 ; E. 8,607.52
STRUCTURE NO. 2. N. 13,016.66 ; E. 8,995.74
2. ALL CONCRETE SURFACES, INSIDE AND OUTSIDE; ABOVE AND BELOW GRADE SHALL BE COATED WITH CHEMICAL RESISTANT COATINGAS PER SPEC.
3. LUMBER FOR STOPLOGS SHALL BE PLANED SOUTHERN PINE OR ENGR. APPROVED EQUAL. LUMBER SHALL BE FREE OF DECAY, BLEMISHES AND SAPWOOD CONFORMING TO PS-20 (DEPARTMENT OF COMMERCE-NATIONAL BUREAU OF STANDARDS) LUMBER SHALL BE INJECTED WITH CREOSOTE UNTIL A MINIMUM NET RETENTION OF 10 lb/CU.FT. HAS BEEN REACHED.

NO.	DATE	BY	REVISION
1	4-22-80	GAN	REVISED AS PER ADDENDUM NO. 1, 2 & 4
	4-22-80	DMZ	ISSUED AS BID
2	5-27-80	GAN	REVISED PIPE EL.
	6-24-80	DMZ	ISSUED
	6-21-82	GAN	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURE III

DEERHAVEN GENERATING STATION UNIT 2

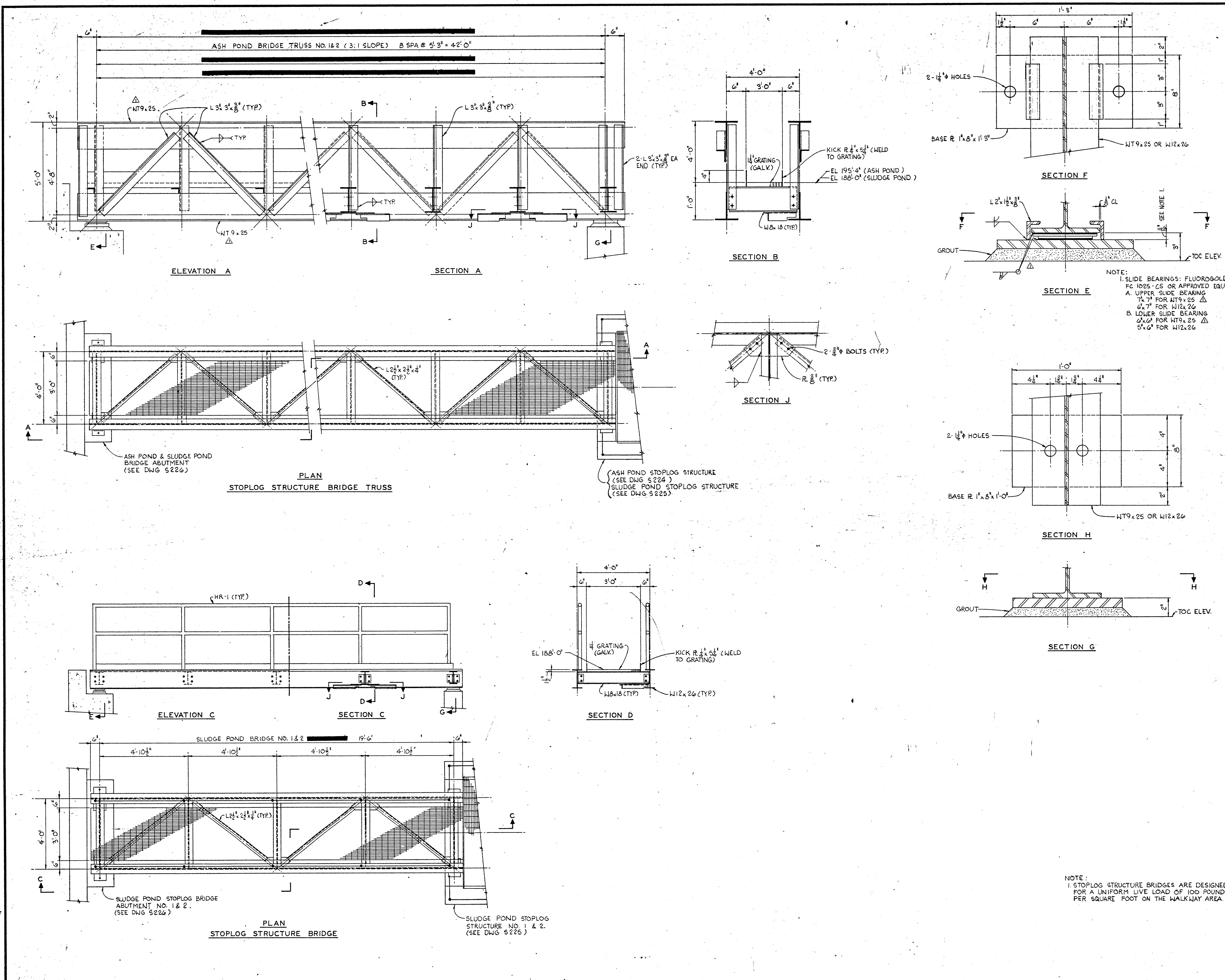
CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD

FLORIDA

ASH POND STOPLOG STRUCTURE NO. 1 & NO. 2

Burns & McDonnell
Engineers-Architects-Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. S224 — REV. 2
DESIGNED EDINGER	
DETAILED BEAMAN	PROJECT 76-077-1
CHECKED PAS	SHEET OF SHEETS



NO.	DATE	BY	REVISION
1	4-22-80	GAN	REVISED AS PER ADDENDUM NO. 4
	4-22-80	DMZ	ISSUED AS BID
2	6-21-82	GAN	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURE III

DEERHAVEN GENERATING STATION UNIT 2

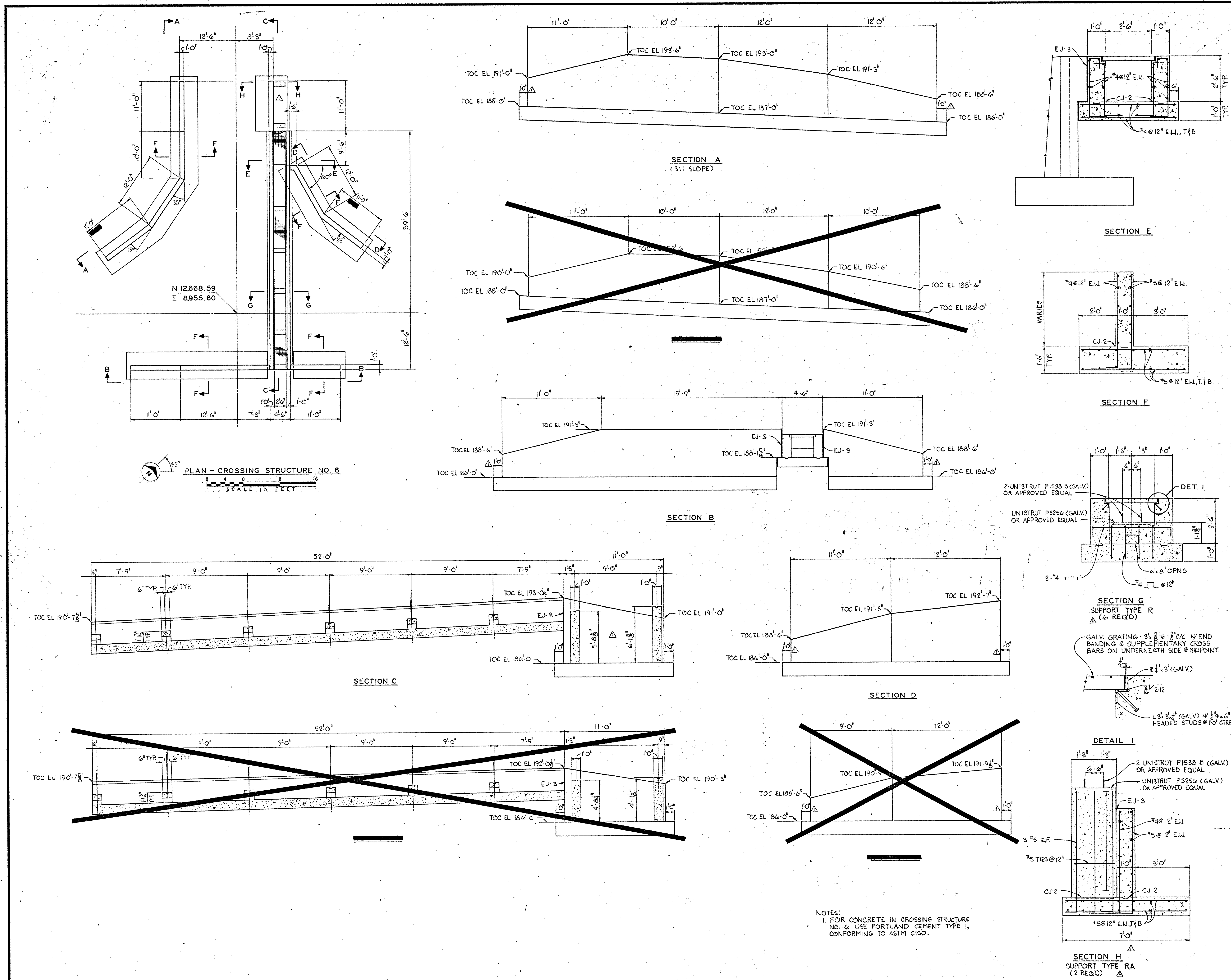
CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD

FLORIDA

STOPLOG STRUCTURE BRIDGES

Burns & McDonnell
Engineers–Architects–Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. S227 – REV. 2
DESIGNED EDINGER	
DETAILED NACE	PROJECT 76-077-1
CHECKED PDS	SHEET OF SHEETS



NO.	DATE	BY	REVISION
△	4-22-80	GAN	REVISED AS PER ADDENDUM NO. 1 & 2
	4-22-80	DMZ	ISSUED AS BID
△	6-20-80	GAN	CLARIFIED SUPPORT TYPE
	6-24-80	DMZ	ISSUED
△	6-21-82	GAN	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION UNIT 2

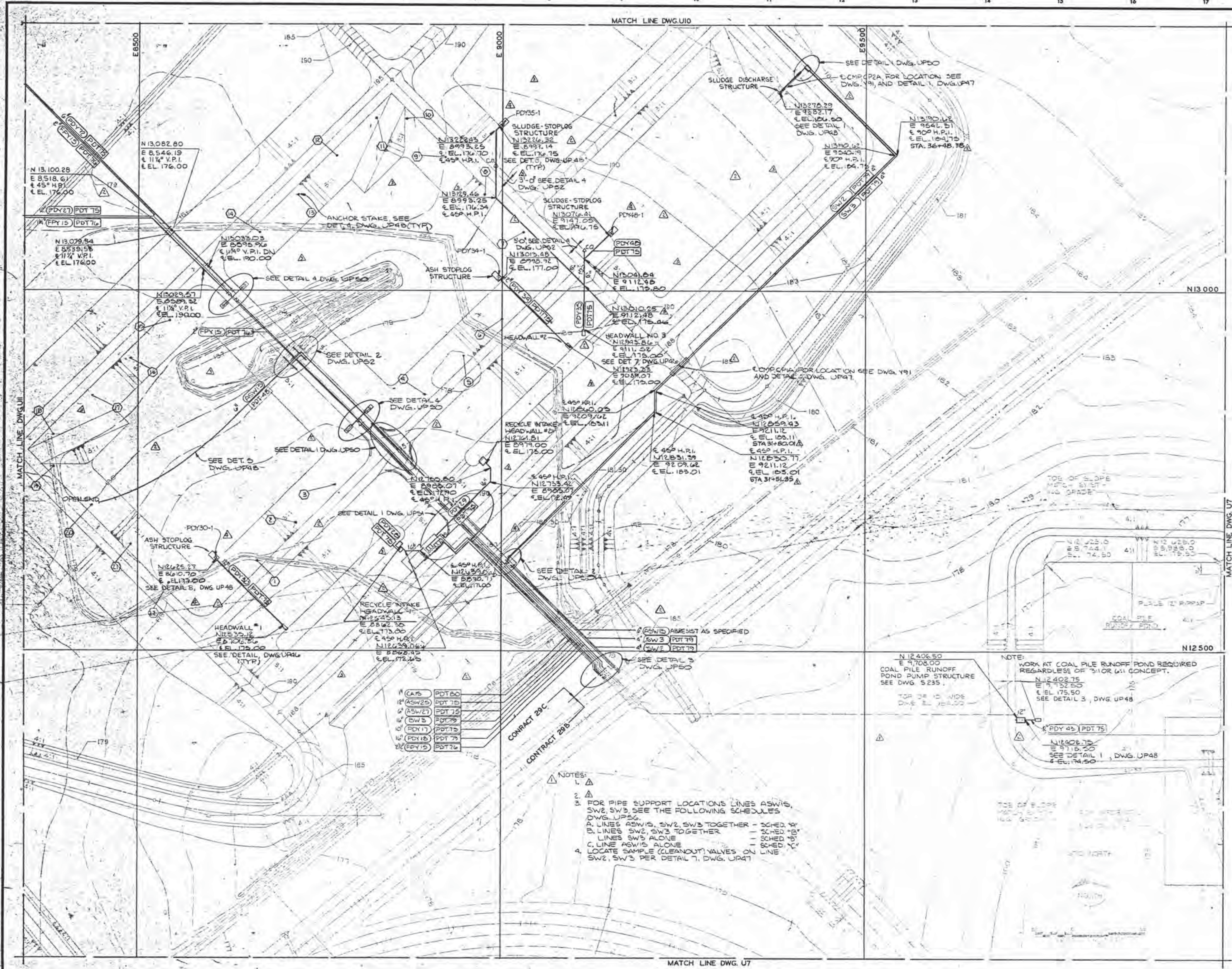
CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD

FLORIDA

CROSSING STRUCTURE NO. 6

Burns & McDonnell
Engineers - Architects - Consultants
KANSAS CITY, MISSOURI

DATE	FEB. 18, 1980	DRAWING NO.	S228 – REV. 3
DESIGNED	EDINGER	PROJECT	76-077-1
DETAILED	NACE	SHEET	OF SHEETS
CHECKED	MS		



NO.	DATE	BY	REVISION
1	3-4-80	CLA	REVISED & REISSUED PER ADDENDUM NO.1
	3-5-80	DMB	ISSUED
2	3-12-79	CLA	REVISED & REISSUED PER ADDENDUM NO.3
	3-21-80	DMB	ISSUED
	4/22/80	DMZ	ISSUED AS BID
3	6-18-80	REC	DELETE NOTES 1 & 2, LINES PDY52 THRU 63. MOVED LINE PDY 35 & ADD 6" SIZE
	6-24-80	DMZ	ISSUED
4	1-3-82	SBM	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION
UNIT 2

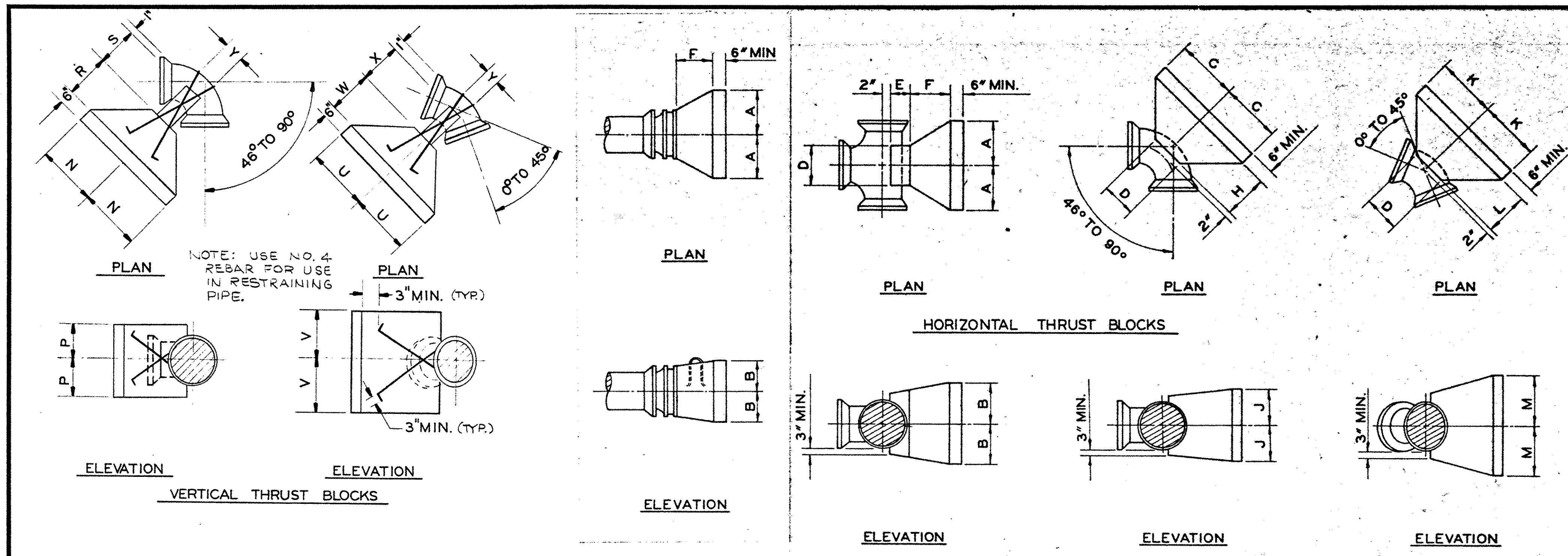
CITY OF GAINESVILLE/
GAINESVILLE-ALACHUA COUNTY
REGIONAL UTILITIES BOARD

FLORIDA

YARD UTILITIES - ASH & SLUDGE PONDS (3:1)

Burns & McDonnell
Engineers-Architects-Consultants
KANSAS CITY, MISSOURI

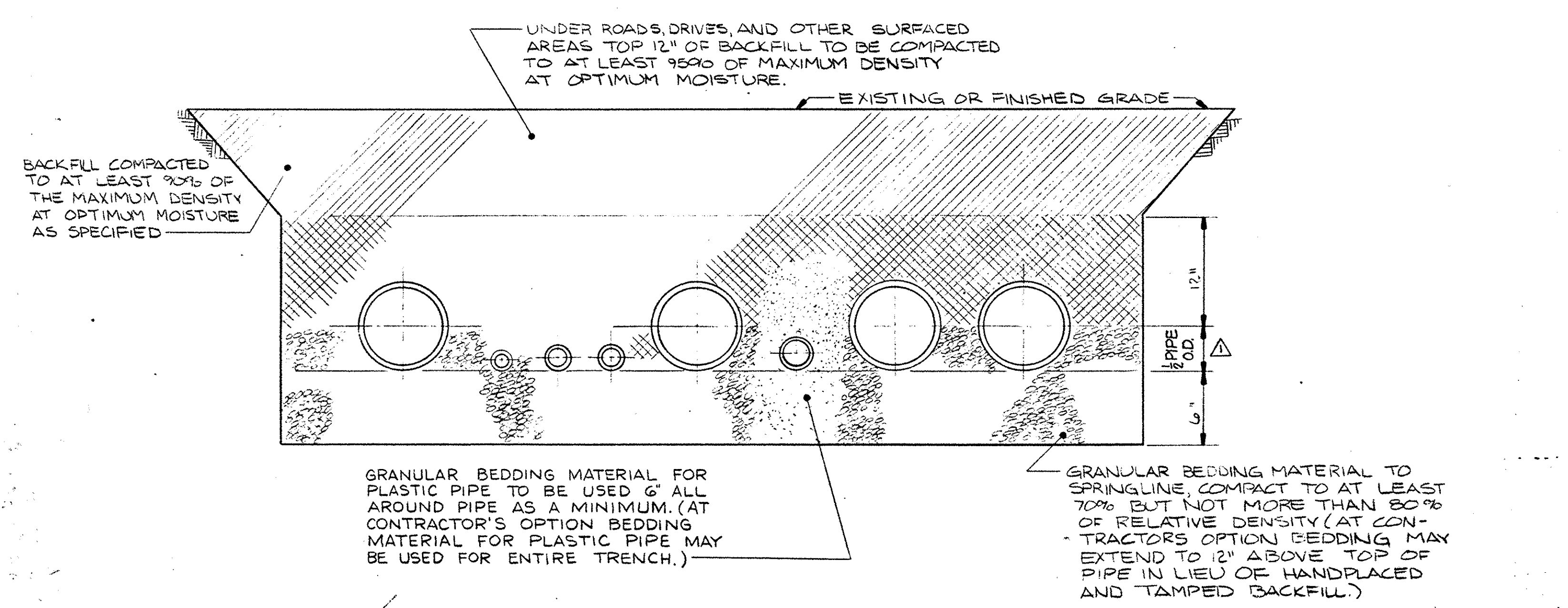
DATE FEB. 6, 1980	DRAWING NO. U9 REV. 4
DESIGNED DOMBROSKI	
DETAILED C. ALLEN	PROJECT 75-077-1
CHECKED Barrett	SHEET OF SHEETS



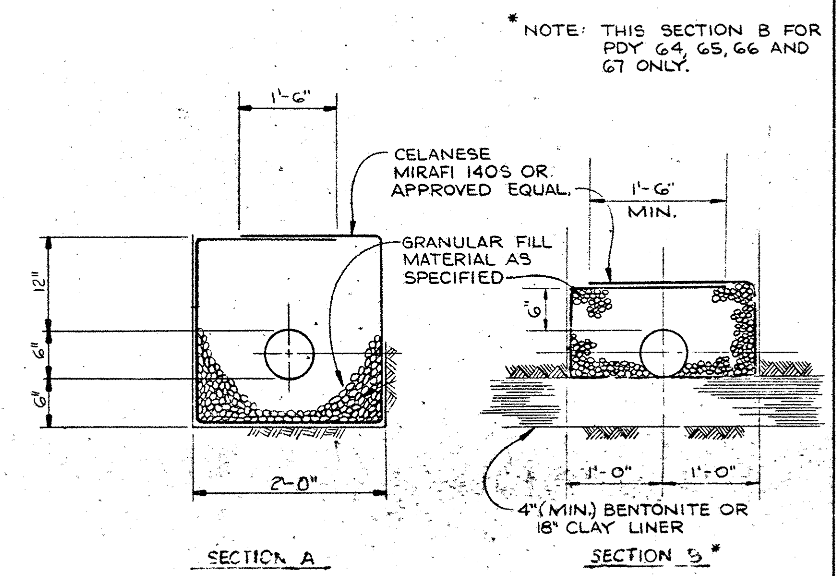
DETAIL 1
THRUST BLOCK DETAILS

THRUST BLOCK TABLE																					
SYSTEM	A	B	C	D	E	F	H	J	K	L	M	N	P	R	S	T	U	V	W	X	Y
PDY 18, BW 3	1'-8"	1'-8"	2'-0"	1'-9"	1'-0"	9"	1'-2"	1'-11"	1'-6"	3"	5"	2'-9"	2'-9"	2'-9"	1'-6"	5"	2'-5"	2'-5"	2'-2"	1'-0"	6"

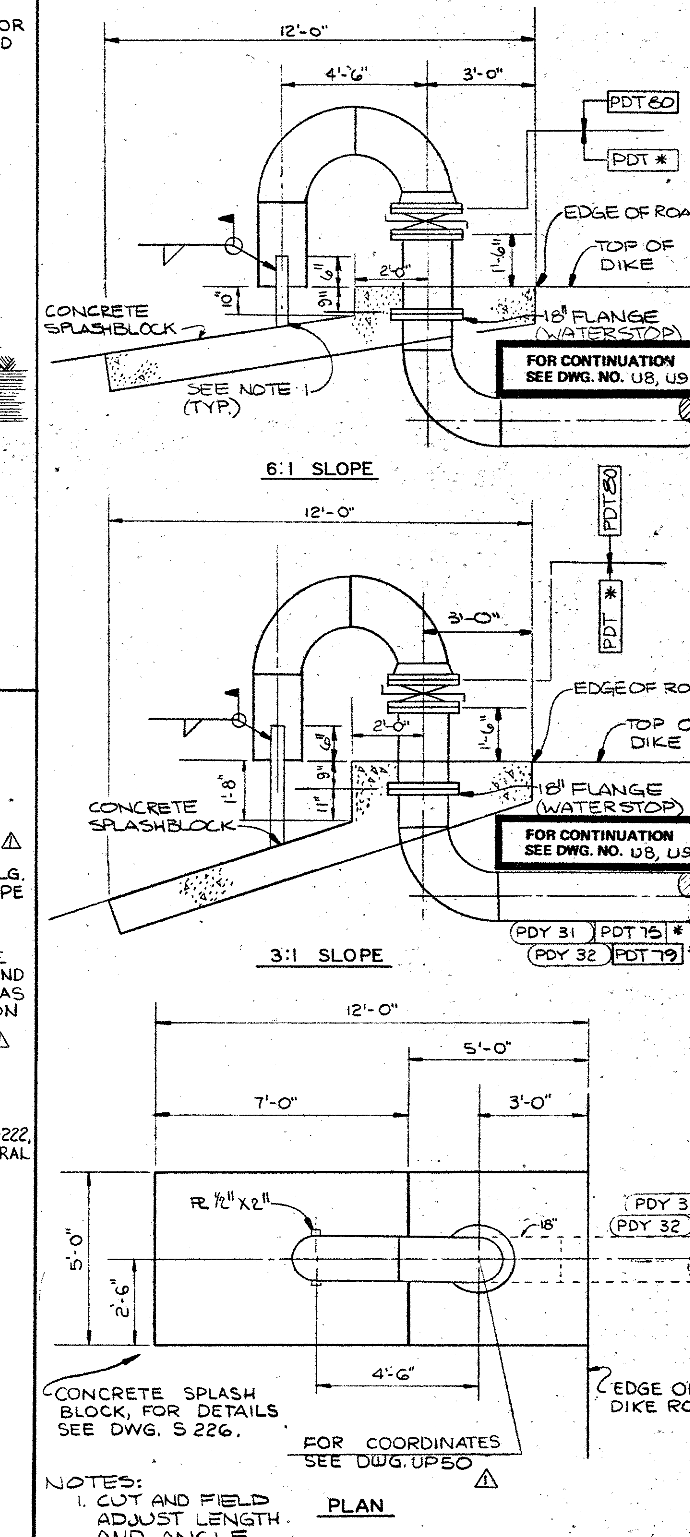
RESTRAINED JOINT TABLE									
SYSTEM	HORIZONTAL			VERTICAL			TEE	DEAD END	
	22° 30'	45°	90°	22° 30'	45°	90°			NOTES:
PDY 18, BW 3	11	19	32	17	28	42	47	59	1) ALL VALUES SHOWN ARE IN FEET. 2) ALL JOINTS FALLING WITHIN THE DISTANCES FROM THE FITTING ON THE TABLE SHALL BE RESTRAINED OR THE FITTING MAY BE THRUST BLOCKED IN ACCORDANCE WITH THE THRUST BLOCK TABLE.



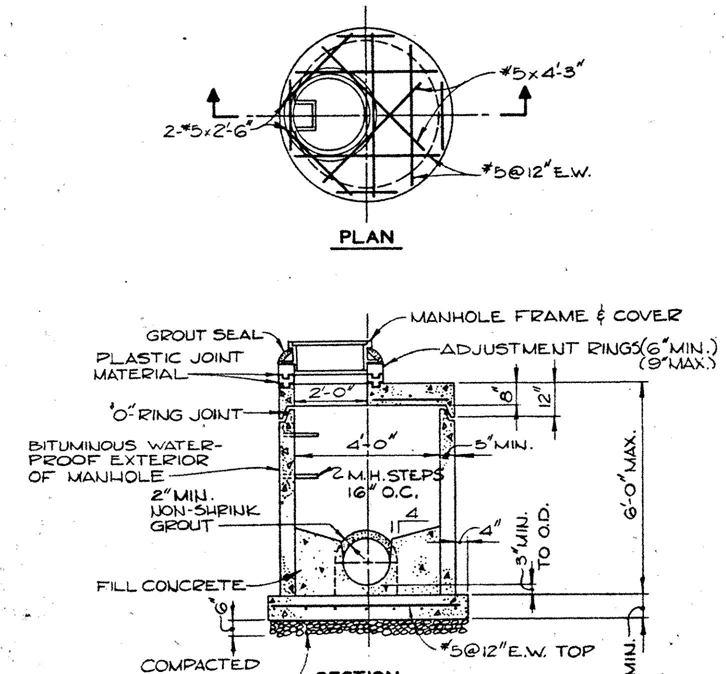
DETAIL 2
MULTIPLE YARD PIPE TRENCH
NOT TO SCALE



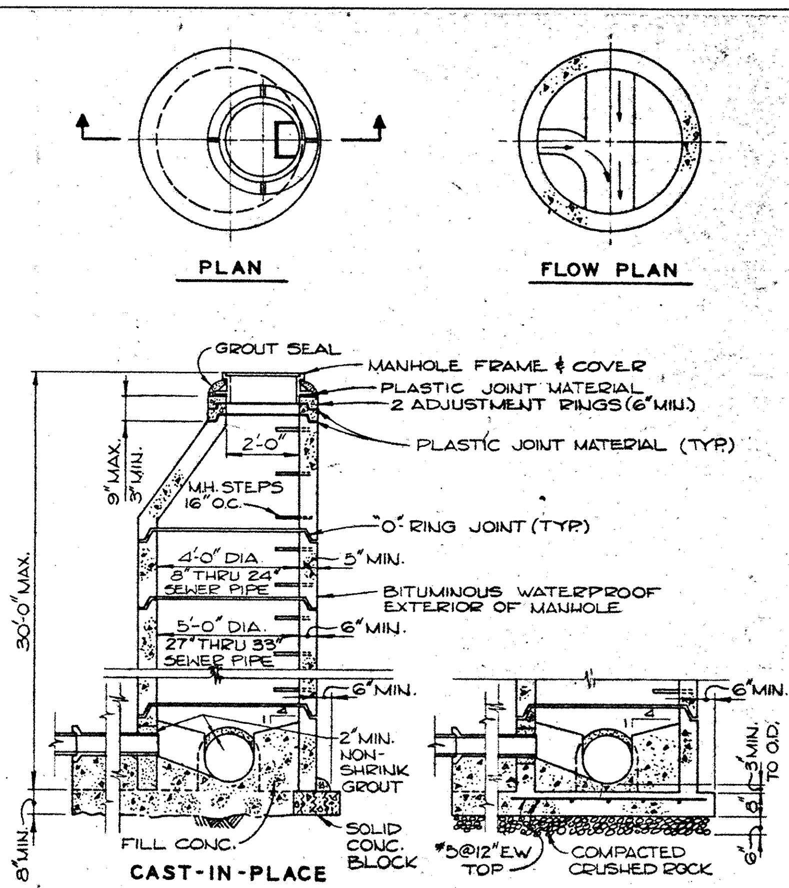
DETAIL 3
PERFORATED PIPE
EMBEDMENT DETAILS



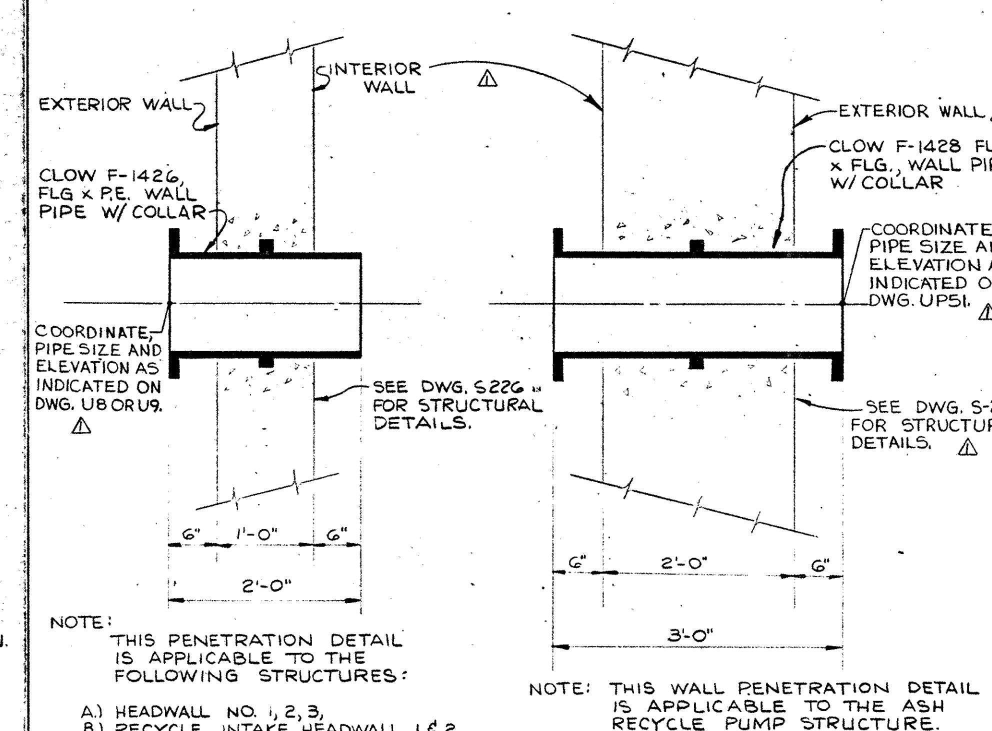
DETAIL 6
PLANT DRAIN DISCHARGE HEADER AT THE ASH PONDS
N.T.S.



SHALLOW PRECAST CONCRETE MANHOLE DETAIL 4
NOT TO SCALE



PRECAST MANHOLE DETAIL 5
NOT TO SCALE



DETAIL 7
WALL PIPE PENETRATIONS
N.T.S.

NO.	DATE	BY	REVISION
1	3-12-80	R.W.D.	REVISED AND REISSUED PER ADDENDUM #3
	3-21-80	DMB	ISSUED
	4/22/80	DMZ	ISSUED AS BID
	1-7-82	SBM	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION
UNIT 2

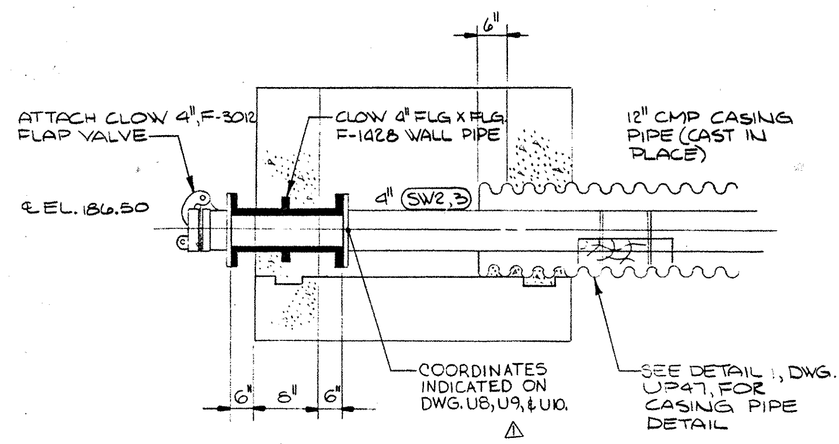
CITY OF GAINESVILLE/
GAINESVILLE-ALACHUA COUNTY
REGIONAL UTILITIES BOARD

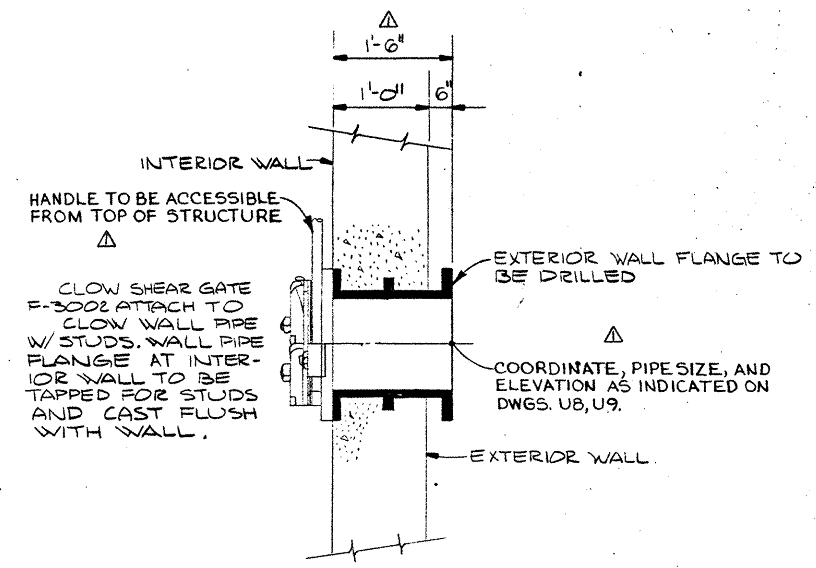
FLORIDA

MISCELLANEOUS PIPING DETAILS I

Burns & McDonnell
Engineers–Architects–Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. UP 46 — REV. 1
DESIGNED DOMBROSKI	
DETAILED ALLEN	PROJECT 76-077-1
CHECKED Bennett	SHEET OF SHEETS

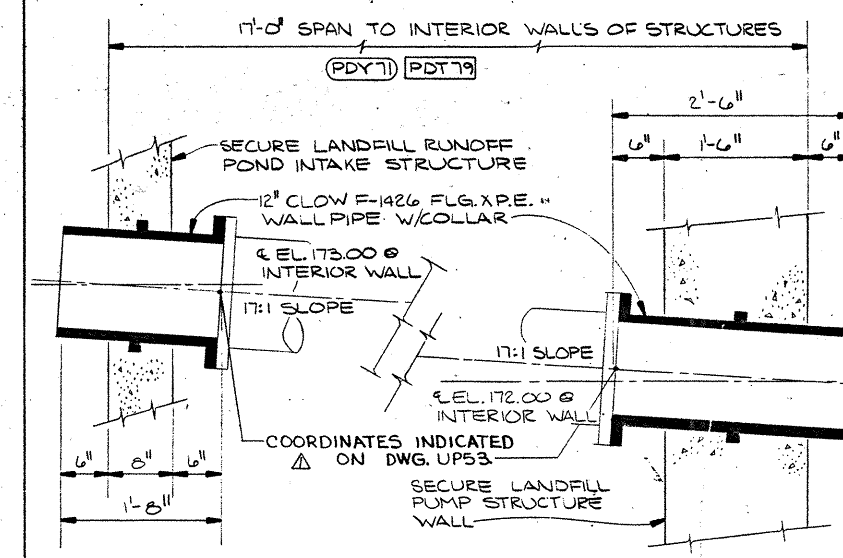




SLUDGE LINE DISCHARGE STRUCTURE NO. 1 & 2
(SEE DET. DWG. S226)

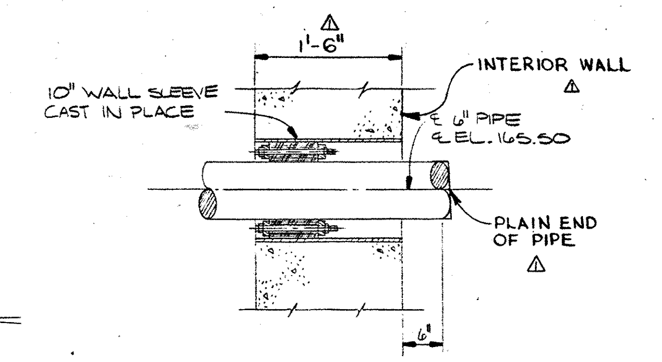
COAL PILE RUNOFF POND PUMP STRUCTURE
(SEE DET. DWG. S235)

DETAIL 1
STRUCTURE WALL PENETRATIONS
N. T. S.



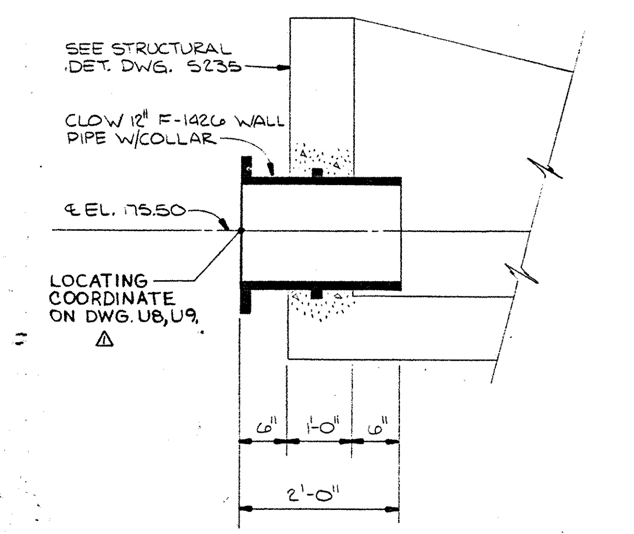
NOTE: DUE TO THE DESIGN DIMENSIONS THESE WALL PIPES MUST BE CAST ON A SLOPE, AS INDICATED INSTALLATION OF THE PIPE PRIOR TO CASTING IS SUGGESTED.

DETAIL 2
SECURE LANDFILL PUMP AND INTAKE STRUCTURE WALL PENETRATIONS
N. T. S.

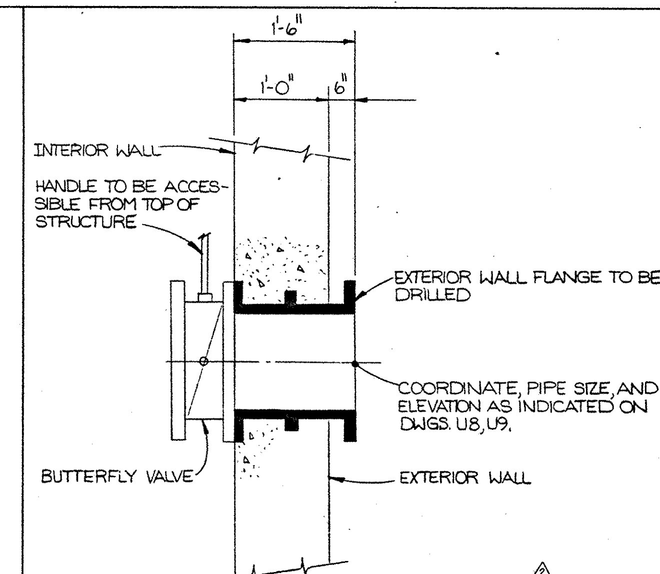


SEAL PIPE W/ "LINK-SEAL" MODULAR WALL & CASING SEALS AS MANUFACTURED BY THE THUNDERLINE CORP. OF WAYNE MICH. INSTALL SO AS TO PROVIDE A HYDROSTATIC SEAL & INSULATION BETWEEN PIPE AND OPENING.

WALL SLEEVE AND SEAL

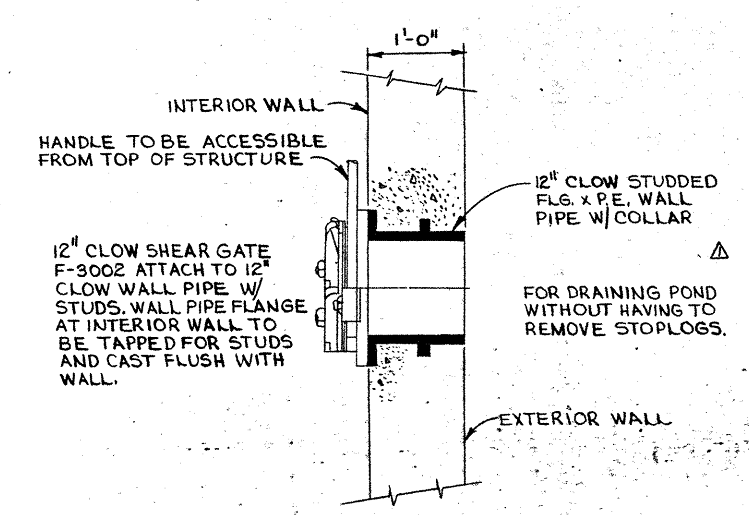


DETAIL 3
COAL PILE RUNOFF POND HEADWALL PENETRATION
N.T.S.

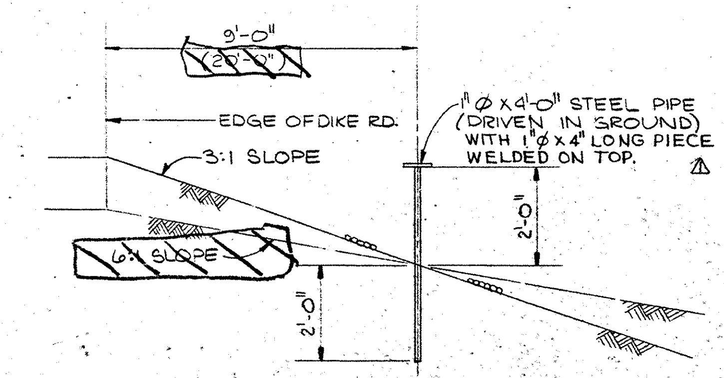


ASH POND STOPLOG STRUCTURE NO.1 AND NO. 2.
(SEE DWG. S224)
SLUDGE POND STOPLOG STRUCTURE NO. 1 AND NO. 2.
(SEE DWG. S225)

DETAIL 8.
STRUCTURAL WALL PENETRATIONS
N.T.S.

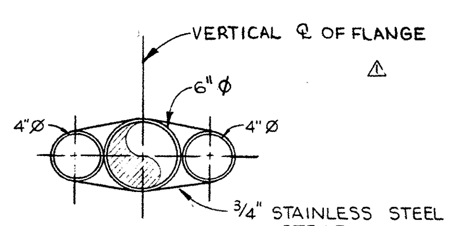


DETAIL 7
ASH POND STOPLOG STRUCTURE NO.1 AND NO.2
(SEE DWG. S224)
SLUDGE POND STOPLOG STRUCTURE NO.1 AND NO.2
(SEE DWG. S225)

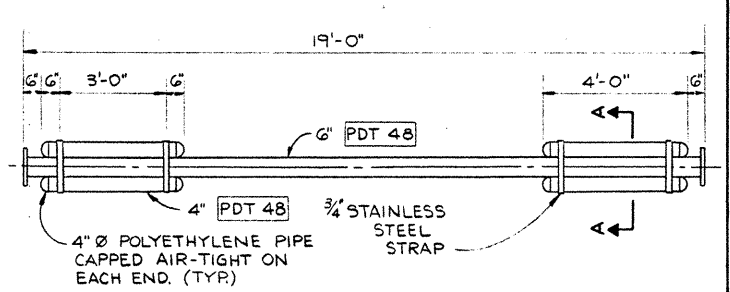


DETAIL 4
DIFFUSER PIPE ANCHOR STAKE
NOT TO SCALE

ANCHOR STAKE SCHEDULE		
NO.	COORDINATES ±	
	3:1 SLOPE	~~6:1 SLOPE~~
1	N12624. E 8664.	~~N12755. E 8602.~~
2	N12677. E 8717.	~~N12788. E 8655.~~
3	N12730. E 8770.	~~N12969. E 8835.~~
4	N12853. E 8895.	~~N13022. E 8888.~~
5	N12906. E 8947.	~~N13188. E 8934.~~
6	N12959. E 9000.	~~N13241. E 8881.~~
7	N13081. E 9028.	~~N13294. E 8828.~~
8	N13134. E 8975.	~~N13333. E 8789.~~
9	N13187. E 8922.	~~N13340. E 8754.~~
10	N13240. E 8869.	~~N13301. E 8719.~~
11	N13240. E 8825.	~~N13248. E 8662.~~
12	N13187. E 8772.	~~N13195. E 8609.~~
13	N13134. E 8719.	~~N13015. E 8428.~~
14	N13081. E 8666.	~~N12962. E 8375.~~
15	N12957. E 8542.	~~N12909. E 8382.~~
16	N12904. E 8489.	~~N12870. E 8283.~~
17	N12851. E 8436.	~~N12834. E 8290.~~
18	N12798. E 8383.	~~N12795. E 8329.~~
19	N12754. E 8383.	~~N12742. E 8382.~~
20	N12701. E 8436.	~~N12689. E 8435.~~
21	N12648. E 8489.	~~NA~~
22	N12595. E 8542.	~~NA~~



SECTION A



DETAIL 5
ASH PIPE FLOATATION SYSTEM
NOT TO SCALE
(15 ASSEMBLIES REQUIRED)

NO.	DATE	BY	REVISION
1	3-5-80	R.W.D.	REVISED AND REISSUED PER ADDENDUM # 1 & 3
	3-21-80	D.M.B.	ISSUED
	4/22/80	DMZ	ISSUED AS BID
2	1-7-82	SBM	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION
UNIT 2

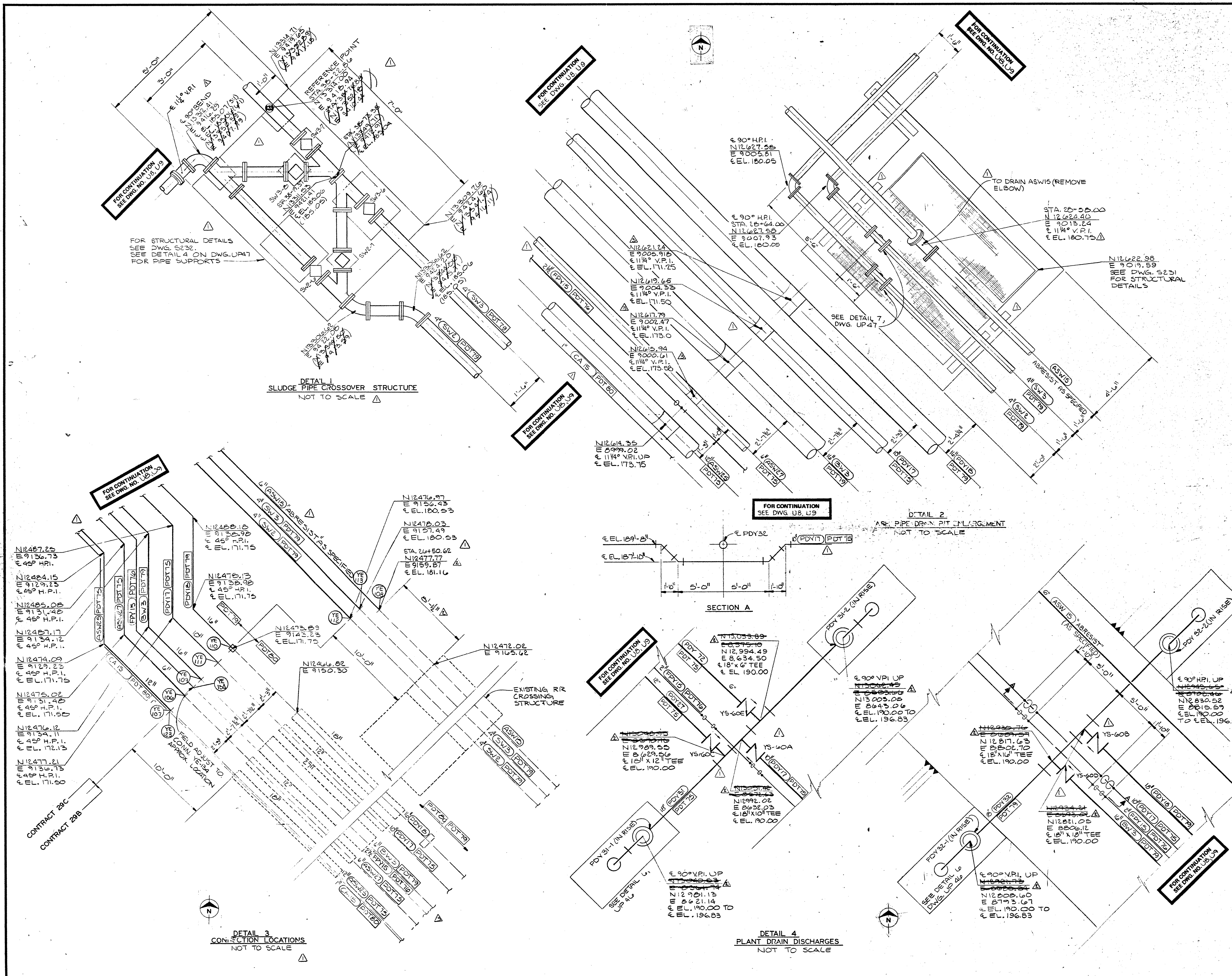
CITY OF GAINESVILLE/
GAINESVILLE-ALACHUA COUNTY
REGIONAL UTILITIES BOARD

FLORIDA

MISCELLANEOUS PIPING DETAILS III

Burns & McDonnell
Engineers-Architects-Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. UP48 REV. 2
DESIGNED GERBER	
DETAILED ALLEN	PROJECT 76-077-1
CHECKED Bennett	SHEET OF SHEETS



NO.	DATE	BY	REVISION
1	3-12-80	CLA	REVISED & REISSUED PER ADDENDUM NO. 3
	3-21-80	DMB	ISSUED
	4/22/80	DMZ	ISSUED AS BID
2	6-18-80	REC	REV. CO-ORDINATES DET 3, 4
	6-24-80	DMZ	ISSUED
3	1/19/82	JDS	CONFORMING TO CONSTRUCTION RECORDS

1 SEE NOTES ON DWG. U7.

CONTRACT 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION UNIT 2

CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD

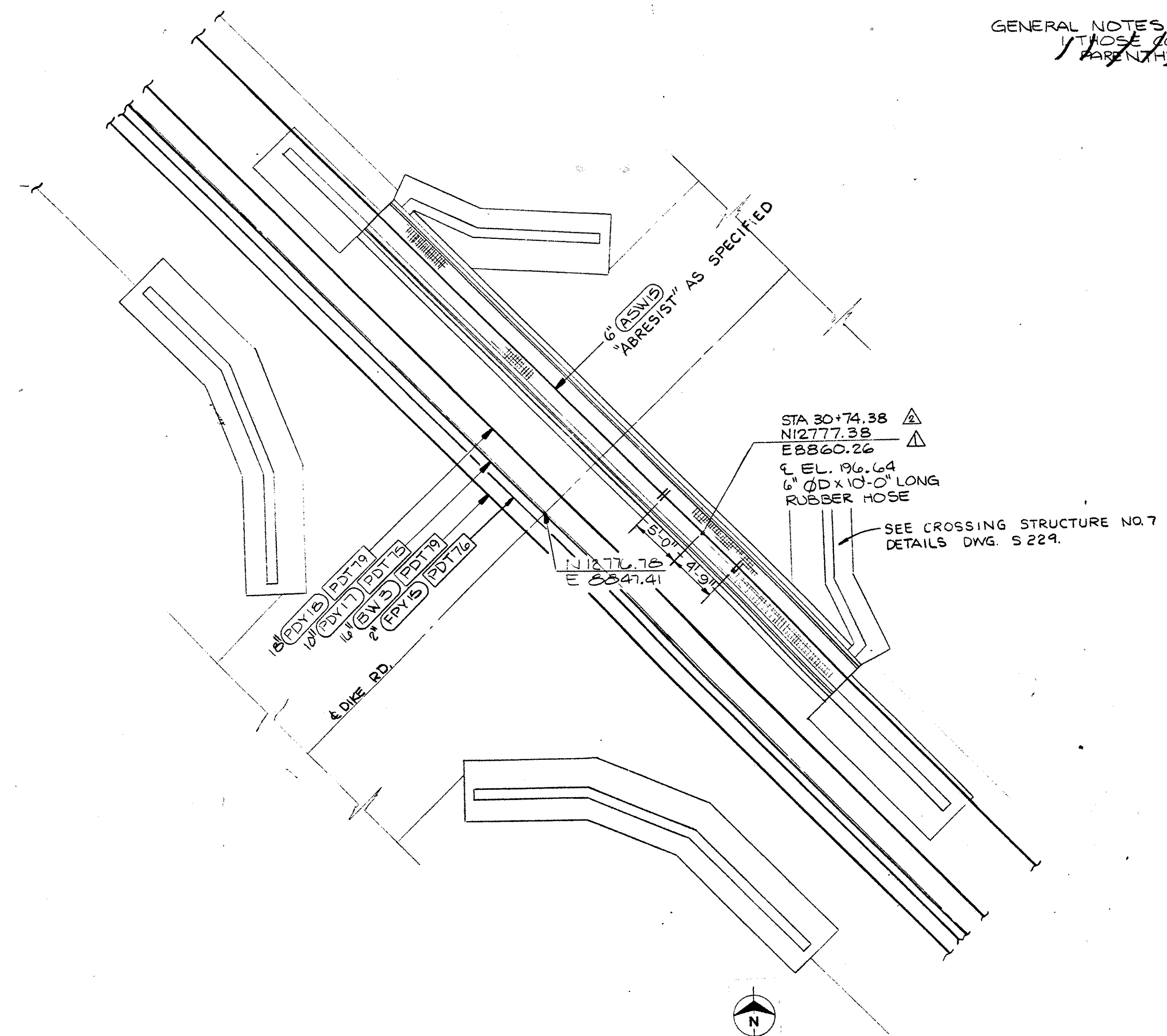
FLORIDA

YARD ENLARGEMENT DETAILS I

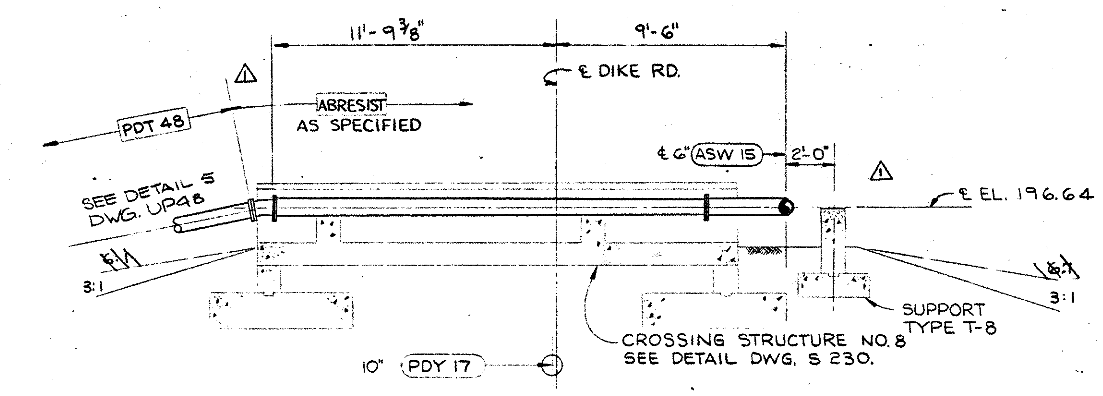
Burns & McDonnell
Engineers–Architects–Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. UP50 REV. 3
DESIGNED DOMBROSKI	
DETAILED C. ALLEN	PROJECT 76-077-1
CHECKED Bennett	SHEET / OF SHEETS

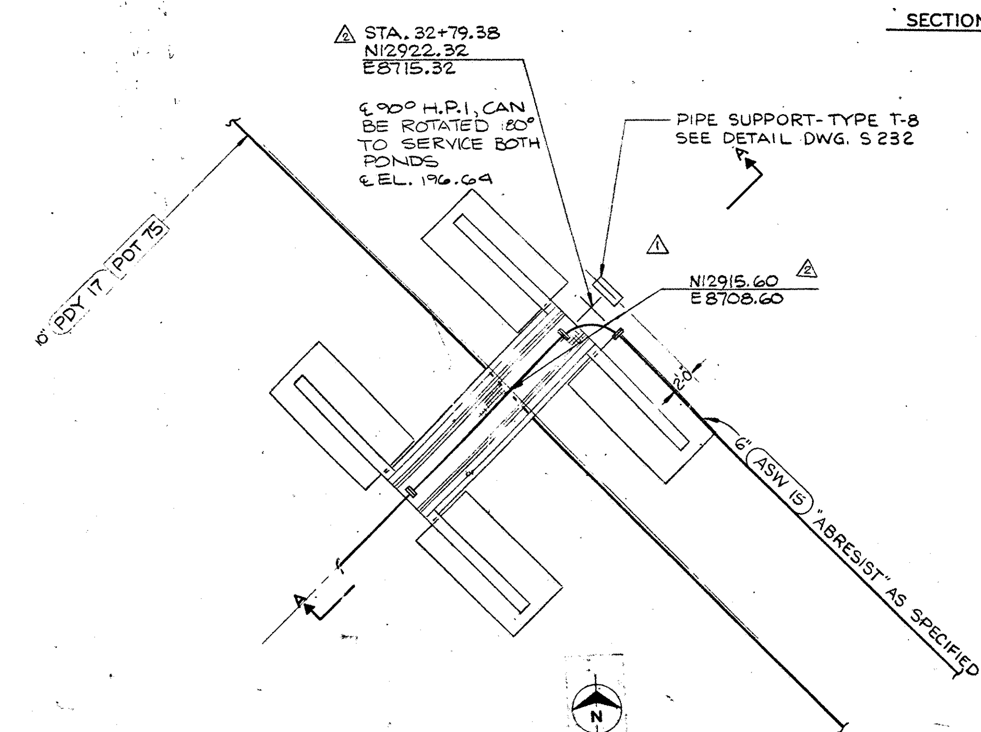
GENERAL NOTES:
1. THOSE COORDINATES GIVEN IN PARENTHESIS ARE 1/1 DESIGN RATIO



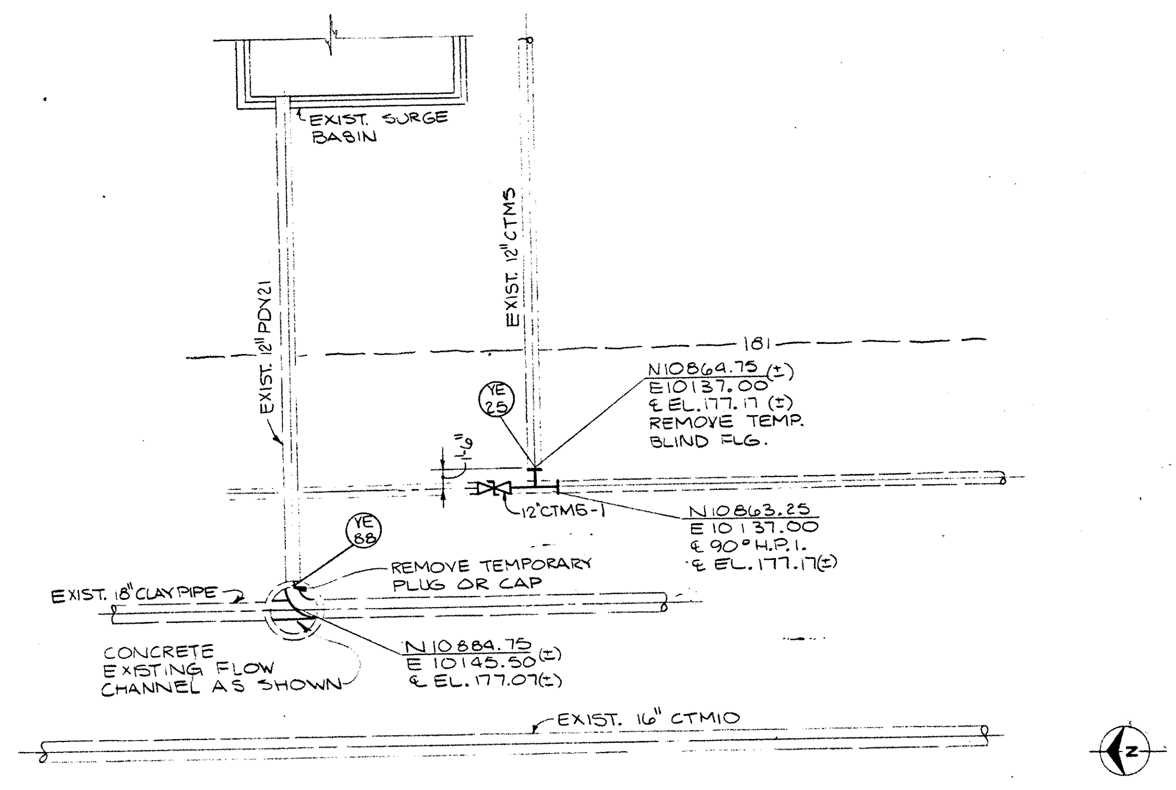
DETAIL 1
PIPING AT CROSSING STRUCTURE NO.7
FOR CONTINUATION SEE DWGS. U8 OR U9



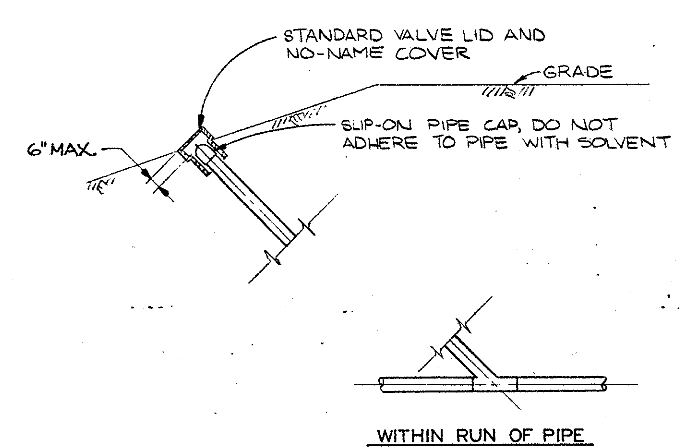
SECTION A



DETAIL 2
PIPING AT CROSSING STRUCTURE NO.8
FOR CONTINUATION SEE DWGS. U8 OR U9



DETAIL 3
CONNECTIONS YE2S AND YE6S ARE TO BE MADE AFTER ASH PONDS ARE OPERATIONAL.



DETAIL 4
TYPICAL CLEANOUT PIPING FOR NON-METALLIC PIPE

NO.	DATE	BY	REVISION
1	3-13-80	CLA	REVISED & REISSUED PER ADDENDUM NO.3
	3-21-80	DMB	ISSUED
	4/22/80	DMZ	ISSUED AS BID
2	6-17-80	REC	DET. 1, REV. HOSE LOCATION DET. 2, REV. LOCATION DET. 4, DELETE 45° ELL
	6-24-80	DMZ	ISSUED
3	1-19-82	JDS	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION UNIT 2

CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD

FLORIDA

YARD ENLARGEMENT DETAILS III

Burns & McDonnell
Engineers-Architects-Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. UP52 REV. 3
DESIGNED DOMBROSKI	
DETAILED C. ALLEN	PROJECT 76-077-1
CHECKED Bennett	SHEET OF SHEETS

VALVE NO.	SIZE (INCHES)	VALVE TYPE	END CONNECTIONS	PRESSURE CLASS	OPERATOR TYPE	REMARKS
ASW25-1	8	CHECK	FLANGE	125		
ASW/CV-55	8	BUTTERFLY	WAFER OR FLANGE	150	WORM GEAR	LIMIT SWITCHES
ASW25-3	8	CHECK	FLANGE	125		
ASW/CV-56	8	BUTTERFLY	WAFER OR FLANGE	150	WORM GEAR	LIMIT SWITCHES
ASW25-5	8	CHECK	FLANGE	125		
ASW/CV-57	8	BUTTERFLY	WAFER OR FLANGE	150	WORM GEAR	LIMIT SWITCHES
ASW26-1	8	BUTTERFLY	WAFER OR FLANGE	150	MOTOR	SEE SPECIFICATIONS, ARTICLE 17F-2, YS-43
ASW27-1	3	CHECK	FLANGE	125		
ASW27-2	3	BUTTERFLY	WAFER OR FLANGE	150	LATCHING LEVER	
ASW27-3	3	CHECK	FLANGE	125		
ASW27-4	3	BUTTERFLY	WAFER OR FLANGE	150	LATCHING LEVER	
ASW27-5	3	CHECK	FLANGE	125		
ASW27-6	3	BUTTERFLY	WAFER OR FLANGE	150	LATCHING LEVER	
PDY27-1	12	CHECK	FLANGE	125	WORM GEAR	
PDY27-2	12	BUTTERFLY	WAFER OR FLANGE	150		
PDY27-3	12	CHECK	FLANGE	125		
PDY27-4	12	BUTTERFLY	WAFER OR FLANGE	150	WORM GEAR	
PDY31-1	18	BUTTERFLY	FLANGE	150	WORM GEAR	
PDY31-2	18	BUTTERFLY	FLANGE	150	WORM GEAR	
PDY32-1	18	BUTTERFLY	FLANGE	150	WORM GEAR	
PDY32-2	18	BUTTERFLY	FLANGE	150	WORM GEAR	
PDY72-1	2	CHECK	FLANGE	125		
PDY72-2	2	BUTTERFLY	WAFER OR FLANGE	150	LATCHING LEVER	
PDY72-3	4	CHECK	FLANGE	125		
PDY72-4	4	BUTTERFLY	WAFER OR FLANGE	150	LATCHING LEVER	
PDY72-5	4	CHECK	FLANGE	125		
PDY72-6	4	BUTTERFLY	WAFER OR FLANGE	150	LATCHING LEVER	
SW2-6	4	PLUG	FLANGE	150	LEVER	
SW2-7	4	PLUG	FLANGE	150	LEVER	
SW3-6	4	PLUG	FLANGE	150	LEVER	
SW3-7	4	PLUG	FLANGE	150	LEVER	
SW3-8	4	PLUG	FLANGE	150	LEVER	
PDY30-1	12	BUTTERFLY	FLANGE	150	WORM GEAR	
PDY34-1	12	BUTTERFLY	FLANGE	150	WORM GEAR	
PDY35-1	6	BUTTERFLY	FLANGE	150	WORM GEAR	
PDY48-1	6	BUTTERFLY	FLANGE	150	WORM GEAR	

CONNECTION DESIGNATION	NUMBER & SIZE	TYPE OF CONNECTION	FUNCTION	CONTENTS	MAX. OPERATING CONDITIONS PSIG	MAX. OPERATING CONDITIONS °F	LINE NUMBER	REMARKS
YE25	1-12"	BUTT WELD	UNIT 1 COOLING TOWER DRAIN & BLOWDOWN	WATER	ATM	100	CMT5	
YE88	1-12"	MANHOLE	PLANT DRAINS TO PLANT DRAIN SUMP	WATER	ATM	100	PDY21	
YE106	1-6"	F.R.P. FLANGE	ASH POND BLOWDOWN TO WTP	WATER	30	100	ASW27	REMOVE BLIND FLANGE
YE107	1-12"	F.R.P. FLANGE	ASH RECYCLE TO ASH SLUICE SUMP	WATER	25	100	ASW25	REMOVE BLIND FLANGE
YE108	1-6"	FIXED FLANGE	ASH SLURRY TO ASH POND	ASH SLURRY	60	190	ASW15	REMOVE BLIND FLANGE
YE109	1-16"	D.I. SPIGOT	STP BACKWASH	WATER	35	100	BW3	REMOVE CAP AND CONNECT HUB TO EXISTING SPIGOT
YE110	1-16"	P.E. STEEL	PLANT DRAINS TO ASH POND	WATER	35	100	PDY18	REMOVE CAP AND CONNECT WITH STYLE 62 DRESSER COUPLING
YE111	1-10"	F.R.P. FLANGE	COAL PILE RUNOFF TO ASH POND	WATER	45	100	PDY17	REMOVE BLIND FLANGE
YE112	1-4"	D.I. FLANGE	SLUDGE WASTE FROM WTP	SLUDGE	36	100	SW2	REMOVE BLIND FLANGE
YE113	1-4"	D.I. FLANGE	SLUDGE WASTE FROM WTP	SLUDGE	36	100	SW3	REMOVE BLIND FLANGE
YE123	1-1"	3000# SOCKET WELD	C.A. TO ASH POND PUMP STRUCTURE	AIR	100	125	CA15	REMOVE CAP
YE134	1-2½"	FLANGE	SEAL WATER SUPPLY	WATER	50	100	FPY15	REMOVE BLIND FLANGE
ASH POND BLOWDOWN PUMPS (3) (CONTRACT 9, DRAWING 5)								
YA	3-3"	150# F.F.	DISCHARGE NOZZLE	WATER	22	100	ASW27	
YB	3-½"	N.P.T.	SEAL WATER	WATER	15	100	FPY15	
ASH RECYCLE PUMPS (3) (CONTRACT 9, DRAWING 1)								
YA	3-8"	150# F.F.	DISCHARGE NOZZLE	WATER	21	100	ASW25	
YB	3-½"	N.P.T.	SEAL WATER	WATER	15	100	FPY15	
ASH LANDFILL RUNOFF POND PUMPS (2) (CONTRACT 9, DRAWING 6)								
YA	2-4"	150# F.F.	DISCHARGE NOZZLE	WATER	40	100	PDY27	
YB	2-½"	N.P.T.	SEAL WATER	WATER	15	100	FPY15	

CONNECTION DESIGNATION	NUMBER & SIZE	TYPE OF CONNECTION	FUNCTION	CONTENTS	MAX. OPERATING CONDITIONS PSIG	MAX. OPERATING CONDITIONS °F	LINE NUMBER	REMARKS
SECURE LANDFILL RUNOFF PUMPS (2) (CONTRACT 9)								
YA	2-4"	150# F.F.	DISCHARGE NOZZLE	WATER	30	100	PDY72	
YB	2-½"	N.P.T.	SEAL WATER	WATER	15	100	FPY15	
SECURE LANDFILL DRAIN PUMP (1) CONTRACT 9)								
YA	1-2"	150# F.F.	DISCHARGE NOZZLE	WATER	32	100	PDY72	
YB	1-½"	N.P.T.	SEAL WATER	WATER	15	100	FPY15	

NO.	DATE	BY	REVISION
1	3-12-80	R.W.D.	REVISED AND REISSUED PER ADDENDUM #3
	3-21-80	D.M.B.	ISSUED
	4/22/80	DMZ	ISSUED AS BID
2	6-16-80	REC	(A1) ASW/CV-55,56,57 WERE ASW25-2,4,&6
	6-24-80	DMZ	ISSUED
3	1/21/82	JDS	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION UNIT 2

CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD

FLORIDA

VALVE LIST AND CONNECTION SCHEDULE

Burns & McDonnell
Engineers–Architects–Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. UP 54 – REV. 3
DESIGNED DOMBROSKI	
DETAILED C. ALLEN	PROJECT 76-077-1
CHECKED Bennett	SHEET OF SHEETS

PDT 75

Size of pipe	14 inches to 24 inches	12 inches and smaller
SCHEDULE AND MATERIAL OF PIPE	FILAMENT-WOUND GLASS-FIBER REINFORCED PIPE ASTM D2996 AS SPECIFIED IN DIVISION 17	FILAMENT-WOUND GLASS-FIBER REINFORCED PIPE ASTM D2996 CAST GLASS-FIBER REINFORCED PIPE ASTM D 2997 AS SPECIFIED IN DIVISION 17
STOP VALVES	125-POUND CAST IRON ASTM A126-CLASS B GATE, GLOBE OR ANGLE VALVES OR 150-POUND CAST IRON ASTM A126-CLASS B ASTM A48 CLASS 40 BUTTERFLY VALVES AS SHOWN	125-POUND CAST IRON ASTM A126-CLASS B GATE, GLOBE OR ANGLE VALVES OR 150-POUND CAST IRON ASTM A126-CLASS B ASTM A48 CLASS 40 BUTTERFLY VALVES AS SHOWN
CHECK VALVES	125-POUND CAST IRON ASTM A126-CLASS B SWING CHECK VALVES	125-POUND CAST IRON ASTM A126-CLASS B SWING CHECK VALVES
FITTINGS	COMPRESSION MOLDED, CUSTOM FABRICATED. GLASS FILAMENT OR FILAMENT WOUND PIPE MITERED AND BONDED TOGETHER	COMPRESSION MOLDED, CUSTOM FABRICATED GLASS FILAMENT, OR FILAMENT WOUND PIPE MITERED AND BONDED TOGETHER AND AS SPECIFIED IN DIVISION 17.
TYPE OF PIPING JOINTS	ADHESIVE BONDED BELL AND SPIGOT EXCEPT WHERE FLANGED JOINTS ARE SHOWN OR REQUIRED TO CONNECT TO VALVES OR EQUIPMENT	ADHESIVE BONDED BELL AND SPIGOT OR ADHESIVE BONDED COUPLING EXCEPT WHERE FLANGED JOINTS ARE SHOWN OR REQUIRED TO CONNECT TO VALVES OR EQUIPMENT
ADHESIVE	PIPE MANUFACTURER'S STANDARD FOR THE SERVICE	PIPE MANUFACTURER'S STANDARD FOR THE SERVICE
FLANGES	FILAMENT WOULD OR COMPRESSION MOLDED. DRILLING PATTERN TO MATCH ANSI B 16.5 CLASS 150.	FILAMENT WOUND OR COMPRESSION MOLDED. DRILLING PATTERN TO MATCH ANSI B 16.5 CLASS 150.
FLANGE BOLTS	ASTM A307, GRADE B CARBON STEEL WITH HEXAGON NUTS AND BOLTS	ASTM A307, GRADE B CARBON STEEL WITH HEXAGON NUTS AND BOLTS
GASKETS	¼" FULL FACE RUBBER SHORE A DUROMETER OF 50 ± 5	3/16" FULL FACE RUBBER SHORE A DUROMETER OF 50 ± 5

PDT 76

Size of pipe	1 inch to 12 inches
SCHEDULE AND MATERIAL OF PIPE	POLY VINYL CHLORIDE (PVC) 1120 PIPE CONFORMING TO ASTM D2241, PRESSURE CLASS 160 PSI, PROVIDE STEEL PIPE EQUIVALENT OUTSIDE DIAMETER.
STOP VALVES	150-POUND CAST IRON ASTM A126-CLASS B OR ASTM A48-CLASS 40 RUBBER LINED BUTTERFLY VALVES AS SHOWN
CHECK VALVES	
FITTINGS	SOCKET TYPE SCHEDULE 40 PVC FITTINGS CONFORMING TO ASTM D2466. INCLUDE ALL NECESSARY ADAPTERS TO CONNECT PVC PIPING TO OTHER PIPING MATERIALS.
TYPE OF PIPING JOINTS	SOLVENT CEMENT JOINTS CONFORMING TO ASTM D2564.
BACKING RINGS	NOT APPLICABLE
FLANGES	FLAT FACED, DRILLING PATTERN TO MATCH ANSI B16.5 CLASS 150
FLANGE BOLTS	0 - 399°F STANDARD
GASKETS	BUNA-N

070271

PDT 79

Size of pipe	3 inches thru 48 inches	
SCHEDULE AND MATERIAL OF PIPE	DUCTILE IRON AWWA C151 CLASS 50: 6-INCHES AND LARGER CLASS 51: SMALLER THAN 6-INCHES	
STOP VALVES	150-POUND CAST IRON ASTM A126-CLASS B OR ASTM A48 CLASS 40 BUTTERFLY VALVES, 125-POUND CAST IRON ASTM 126-CLASS B GATE VALVES, 150-POUND SEMI-STEEL RUBBER LINED ECCENTRIC PLUG VALVE	
CHECK VALVES	125-POUND CAST IRON ASTM A126-CLASS B SWING CHECK VALVES	
COATING AND LINING	CEMENT LINED INSIDE, STD THICKNESS, WITH A BITUMINOUS COATING INSIDE AND OUTSIDE	
FITTINGS	DUCTILE IRON OR CAST IRON AWWA C110 WITH PRESSURE RATING CLASS OF 150 POUNDS ELBOWS SHALL BE LONG RADIUS UNLESS OTHERWISE NOTED.	
TYPE OF PIPING JOINTS	MECHANICAL JOINT, PUSH-ON, FLANGED WHERE INDICATED.	
BACKING RINGS	NONE REQUIRED	
FLANGES	FLAT FACED, CLASS 150 CONFORMING TO AWWA C115	
FLANGE BOLTS	ASTM A307 GRADE B CARBON STEEL WITH HEXAGON NUTS AND BOLTS	
GASKETS	MECHANICAL JOINT OR PUSH ON - RUBBER AWWA C111.	

PDT 80

Size of pipe	2½ inches to 30 inches	2 inches and smaller
SCHEDULE AND MATERIAL OF PIPE	STANDARD WEIGHT SEAMLESS CARBON STEEL ASTM A53 - GRADE A OR ELECTRIC RESISTANCE WELDED CARBON STEEL ASTM A53 - GRADE B.	SCHEDULE 80 SEAMLESS CARBON STEEL ASTM A106 GRADE B.
STOP VALVES	125-POUND CAST IRON ASTM A126 - CLASS B GATE, GLOBE OR ANGLE VALVES OR 150-POUND CAST IRON ASTM A126 - CLASS B OR ASTM A48 CLASS 40 BUTTERFLY VALVES AS SHOWN.	200-POUND BRONZE ASTM B61 GATE, GLOBE, OR ANGLE VALVES AS SHOWN.
CHECK VALVES	125-POUND CAST IRON ASTM A126 - CLASS B SWING CHECK VALVES.	200-POUND BRONZE ASTM B61 LIFT CHECK VALVES.
FITTINGS	STANDARD WEIGHT BUTT WELDING ELBOWS SHALL BE LONG RADIUS UNLESS OTHERWISE NOTED.	3000-POUND SOCKET WELDING ELBOWS SHALL BE LONG RADIUS UNLESS OTHERWISE NOTED.
TYPE OF PIPING JOINTS	BUTT WELDING EXCEPT WHERE FLANGED JOINTS ARE SHOWN.	SOCKET WELDING EXCEPT WHERE FLANGED JOINTS ARE REQUIRED.
BACKING RINGS	SPLIT RING	
COATING	AS SPECIFIED IN DIVISION 17	AS SPECIFIED IN DIVISION 17
FLANGES	150-POUND WELD NECK FLAT-FACED.	150-POUND SOCKET WELDING
FLANGE BOLTS	0-399 F STANDARD	0-399 F STANDARD
GASKETS	BUNA-N.	BUNA-N

PDT 83

Size of pipe	14 inches to 24 inches	12 inches and smaller
SCHEDULE AND MATERIAL OF PIPE	FILAMENT-WOUND GLASS-FIBER REINFORCED PIPE ASTM D2996 AS SPECIFIED IN DIVISION 17	FILAMENT-WOUND GLASS-FIBER REINFORCED PIPE ASTM D2996 CAST GLASS-FIBER REINFORCED PIPE ASTM D 2997 AS SPECIFIED IN DIVISION 17
STOP VALVES	150-POUND STAINLESS STEEL ASTM A351-GRADE CF8M GATE, GLOBE, ANGLE OR BUTTERFLY VALVES AS SHOWN	150-POUND STAINLESS STEEL ASTM A351-GRADE CF8M GATE, GLOBE, ANGLE OR BUTTERFLY VALVES AS SHOWN
CHECK VALVES	150-POUND STAINLESS STEEL ASTM A351-GRADE CF8M SWING CHECK VALVES	150-POUND STAINLESS STEEL ASTM A351-GRADE CF8M SWING CHECK VALVES
FITTINGS	COMPRESSION MOLDED, CUSTOM FABRICATED. GLASS FILAMENT OR FILAMENT WOUND PIPE MITERED AND BONDED TOGETHER	COMPRESSION MOLDED, CUSTOM FABRICATED GLASS FILAMENT, OR FILAMENT WOUND PIPE MITERED AND BONDED TOGETHER AND AS SPECIFIED IN DIVISION 17
TYPE OF PIPING JOINTS	ADHESIVE BONDED BELL AND SPIGOT EXCEPT WHERE FLANGED JOINTS ARE SHOWN OR REQUIRED TO CONNECT TO VALVES OR EQUIPMENT	ADHESIVE BONDED BELL AND SPIGOT OR ADHESIVE BONDED COUPLING EXCEPT WHERE FLANGED JOINTS ARE SHOWN OR REQUIRED TO CONNECT TO VALVES OR EQUIPMENT
ADHESIVE	PIPE MANUFACTURER'S STANDARD FOR THE SERVICE	PIPE MANUFACTURER'S STANDARD FOR THE SERVICE
FLANGES	FILAMENT WOULD OR COMPRESSION MOLDED. DRILLING PATTERN TO MATCH ANSI B 16.5 CLASS 150.	FILAMENT WOUND OR COMPRESSION MOLDED. DRILLING PATTERN TO MATCH ANSI B 16.5 CLASS 150.
FLANGE BOLTS	ASTM A307, GRADE B CARBON STEEL WITH HEXAGON NUTS AND BOLTS	ASTM A307, GRADE B CARBON STEEL WITH HEXAGON NUTS AND BOLTS
GASKETS	¼" FULL FACE RUBBER SHORE A DUROMETER OF 50 ± 5	3/16" FULL FACE RUBBER SHORE A DUROMETER OF 50 ± 5

PDT 93

Size of Pipe	4 inches to 15 inches	
SCHEDULE AND MATERIAL OF PIPE	1. STANDARD AND PERFORATED PVC SEWER PIPE CONFORMING TO ASTM 2729	
TYPE OF PIPING JOINTS	BELL AND SPIGOT CONFORMING TO ASTM D2729	
FITTINGS	PVC CONFORMING TO ASTM D2729	

PDT NO. 48

Size of pipe	All Sizes	
SCHEDULE AND MATERIAL OF PIPE	HIGH DENSITY POLYETHYLENE PLASTIC PIPE AS SPECIFIED IN DIVISION 17 OF THE SPECIFICATIONS.	
STOP VALVES		
COATING		
FITTINGS		
TYPE OF PIPING JOINTS	FLANGED	
BACKING RINGS		
FLANGES	HIGH DENSITY POLYETHYLENE FLANGE ADAPTER WITH 150-POUND STEEL SLIP-ON FLANGE.	
FLANGE BOLTS	ASTM A307 GRADE B HOT-DIPPED GALVANIZED CARBON STEEL WITH HEXAGON NUTS AND BOLTS.	
GASKETS		

NO.	DATE	BY	REVISION
1	3-19-80	CLA	REVISED AND RE-ISSUED PER ADDENDUM NO. 3
	3-21-80	DMB	ISSUED
	4/22/80	DMZ	ISSUED AS BID
	1/19/82	JDS	CONFORMING TO CONSTRUCTION RECORDS

CONTRACT 29C
YARD STRUCTURES III

DEERHAVEN GENERATING STATION UNIT 2

CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD

FLORIDA

PIPING DESIGN TABLES

Burns & McDonnell
Engineers Architects Consultants
KANSAS CITY, MISSOURI

DATE FEB. 18, 1980	DRAWING NO. REV.
DESIGNED GERBER	UP55 — 1
DETAILED C. ALLEN	PROJECT 76-077-1
CHECKED	SHEET OF SHEETS

Attachment C

Construction Specifications of the CCR Surface Impoundment System

CONTRACT 29C

YARD STRUCTURES

INDEX

DRAWINGS - REVISIONS

DIVISION 17: YARD PIPING

17A - GENERAL REQUIREMENTS

17B-PIPING SYSTEM MATERIAL

17C - PIPE INSTALLATION

17D - FIELD TESTING

17E - VALVES AND ACCESSORIES

17F - PIPING SPECIALS

17G - PUMP INSTALLATION

17H - MANHOLES

DIVISION 18 - ROADS, DRIVES, AND WALKS

18A - LIMEROCK SURFACE COURSE

18B - BITIMINOUS PRIME AND TACK COAT

3. DRAWING Y85:

   a. At location (A,3) change "E 9978.0" to "E 9988.0."

   b. At location (J,17) add "3+86.00" in detail title.

4. DRAWING A86:

   a. Delete building coordinates on floor plan.

   b. Add "Fill With Grout" to note on Bond Beam on "Bearing Wall at High Point" detail.

   c. Revise 9'-4" dimension on floor plan to 9'-3-3/4".

   d. Correct dimensions of Gravel Stop height on "Bearing Wall at High Point" detail to 7 1/8" and 5/8".

   e. Revise "Isometric of Scupper" and "Scupper Detail" per sketch no. SK-077-29C-8.

5. DRAWING A87:

   a. Indicate "screen" to be galvanized in detail of "Fan in Masonry Wall."

   b. Correct dimensions on "Head" of "Door Details" to read 2", 1'-10", and 2".

   c. Correct "½" Expansion Bolts" on Type C Hook Detail to "½" Ø Expansion Anchors."

6. DRAWING S223:

   a. Section D: Revise the size of rebars in box slab as #7@12 for bars along the width and as #6 @ 12 for bars along the length of the wall to agree with Section C.

   b. Section C and Section F: Add 2# 5 x 4'-6" long. Add bars in retaining wall at abrupt change in wall height.

7. DRAWING S224:

   a. Include in the bid the work of assembling "ASH POND STOPLOG BAFFLE" around Ash Pond Stop-Log structure at El. 179'-3".

   b. Delete sixteen Clay & Bailey #3232 steps, indicated in Section C, on the outside of the S-W wall. Delete 3/16" galv. chain indicated in Section C and provide continuous handrail on top of S-W wall.

8. DRAWING S225: Delete twelve Clay & Bailey steps on S-E wall and 3/16" galv. chain, both indicated in Section C. Provide continous hand rail on top of S-E wall.

DRAWINGS:

1. DRAWING Y0-1: Revised drawing enclosed with this addendum supercedes drawing Y0.

2. DRAWING Y67-1: Revised drawing enclosed with this addendum supercedes drawing Y67.

3. DRAWING Y68: At drawing location (E,13), change "Y65" to "Y63."

4. DRAWING Y70: At drawing location (L,10), add the following note:

   "1. For Manhole locations, see U dwgs."

5. DRAWING Y71: At drawing location (E,14), add the following note:

   "3. For manhole locations, see U dwgs."

6. DRAWING Y72-1: Revised drawing enclosed with this addendum supercedes drawing Y72.

7. DRAWING Y73-1: Revised drawing enclosed with this addendum supercedes drawing Y73.

8. DRAWING Y75: At drawing location (A,15), add the following note:

   "2. For manhole locations, see U dwgs."

9. DRAWING Y77-1: Revised drawing enclosed with this addendum supercedes drawing Y77.

10. DRAWING Y80: At drawing locations (J,14) and (L,3), change "Y86" to "Y87."

11. DRAWING Y81-1: Revised drawing enclosed with this addendum supercedes drawing Y81.

12. DRAWING Y82-1: Revised drawing enclosed with this addendum supercedes drawing Y82.

13. DRAWING Y83-1: Revised drawing enclosed with this addendum supercedes drawing Y83.

14. DRAWING Y85: For "Detail 2" add the following note:

    "For pump structure details, see dwg. S237."

15. DRAWING Y86-1: Revised drawing enclosed with this addendum supercedes drawing Y86.

16. DRAWING Y87-1: Revised drawing enclosed with this addendum supercedes drawing Y87.

17. DRAWING U8-2: Revised drawing enclosed with this addendum supercedes drawing U8-1.

18. DRAWING U9-2: Revised drawing enclosed with this addendum supercedes drawing U9-1.

19. DRAWING U10-1: Revised drawing enclosed with this addendum supercedes drawing U10.

20. DRAWING U11-1: Revised drawing enclosed with this addendum supercedes drawing U11.

21. DRAWING U12-1: Revised drawing enclosed with this addendum supercedes drawing U12.

22. DRAWING UP43-1: Revised drawing enclosed with this addendum supercedes drawing UP43.

23. DRAWING UP44-1: Revised drawing enclosed with this addendum supercedes drawing UP44.

24. DRAWING UP46-1: Revised drawing enclosed with this addendum supercedes drawing UP46.

25. DRAWING UP47-1: Revised drawing enclosed with this addendum supercedes drawing UP47.

26. DRAWING UP48-1: Revised drawing enclosed with this addendum supercedes drawing UP48.

27. DRAWING UP50-1: Revised drawing enclosed with this addendum supercedes drawing UP50.

28. DRAWING UP51-1: Revised drawing enclosed with this addendum supercedes drawing UP51.

29. DRAWING UP52-1: Revised drawing enclosed with this addendum supercedes drawing UP52.

30. DRAWING UP53-1: Revised drawing enclosed with this addendum supercedes drawing UP53.

31. DRAWING UP54-1: Revised drawing enclosed with this addendum supercedes drawing UP54.

32. DRAWING UP55-1: Revised drawing enclosed with this addendum supercedes drawing UP55.

ACKNOWELDGEMENT:

Each bidder shall acknowledge receipt of this Addendum No. 3 by his signature below, and shall attach a copy of this Addendum to his bid.

BURNS & McDONNELL
Engineering Company

* * * * *

CERTIFICATION BY BIDDER

The undersigned acknowledges receipt of this Addendum No. 3 and the Bid submitted is in accordance with information, instructions and stipulations set forth herein.

Bidder: ______________________________

By: ______________________________

Date: ______________________________

9. DRAWING S227:

   a. The steel section ST 9 x 25 should read as WT 9 x 25.

   b. Section E: Weld slide bearing backing plate to structural steel by 1/8 inch fillet weld.

10. DRAWING S231: Add a concrete pad 18'-0" x 4'-0" x 1'-0" thick, with #4 @ 12" O.C. rebars each way at mid-depth, on S-E face of Ash Pond Electrical Equipment Building Foundation with expansion joint EJ-2, 18'-0" long, between the foundation and the pad.

11. DRAWING S232: Indicate the bent plate for the pipe support in Section C as ½" thick.

12. DRAWING S235:

   a. Indicate construction joint at El. 182'-6" in Sections A, B, C, and D for perimeter walls only, to be of type CJ-8 with water stop instead of type CJ-9.

   b. The 8'-6" dimension in Section H should be 7'-0".

   c. Provide #6 @ 12 dowels instead of #5 @ 12 for wall in Section J.

13. DRAWING S236: Indicate construction joint at El. 181'-6" in Sections A, B, C, and D for perimeter walls only to be type CJ-8 with waterstop instead of type CJ-9.

14. DRAWING S237: Indicate construction joint at El. 182'-3" in Sections A, B, and C for perimeter walls only to be type CJ-8 with waterstop instead of type CJ-9.

15. DRAWING UP47: Add two ½" x 4" headed studs welded to the embedded steel plate on both Detail 4 and Detail 6.

ACKNOWLEDGEMENT:

Each Bidder shall acknowledge receipt of this Addendum No. 4 by his signature below, and shall attach a copy of this Addendum to his bid.

BURNS & McDONNELL
Engineering Company

* * * * *

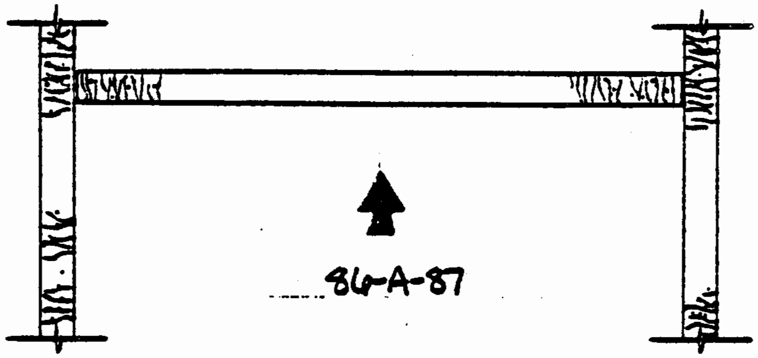
CERTIFICATION BY BIDDER

The undersigned acknowledges receipt of this Addendum No. 4 and the Bid submitted is in accordance with information, instructions and stipulations set forth herein.

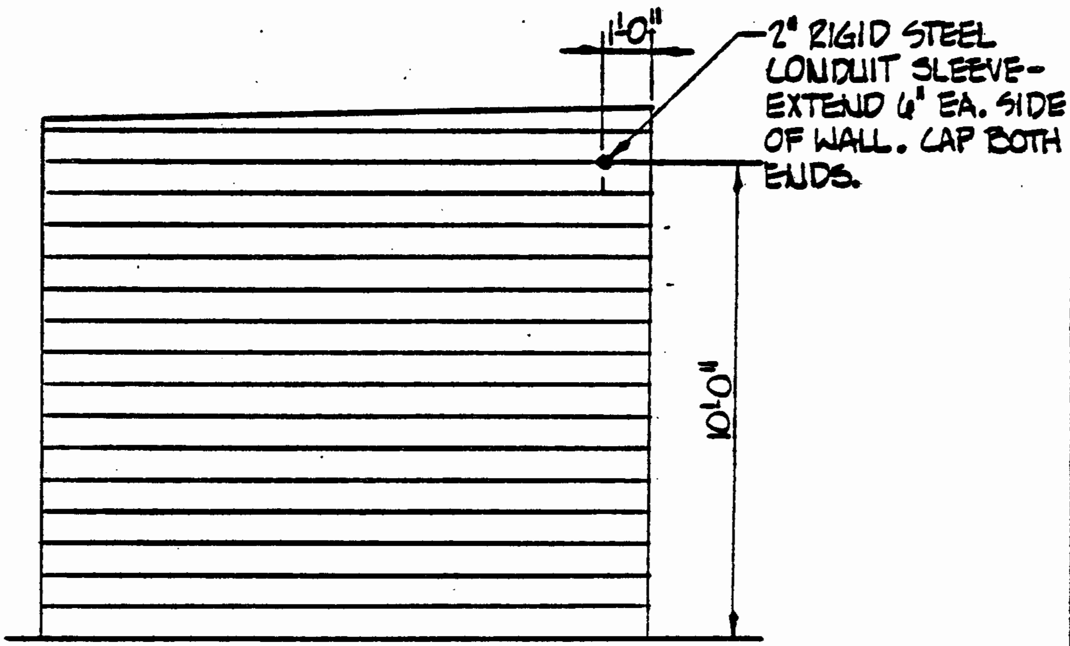
Bidder: ______________________________

By: ______________________________

Date: ______________________________



PARTIAL FLOOR PLAN

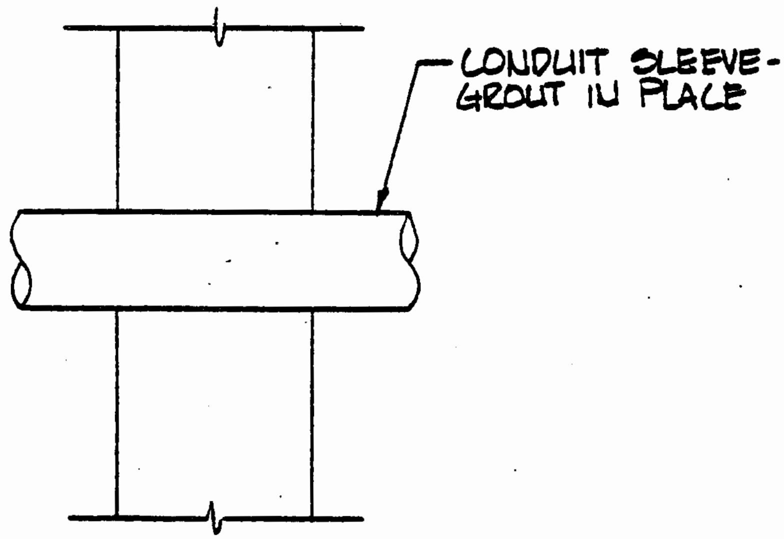


ELEVATION 86-A-87

ADDENDUM NO. 1

date MAR. 5, 1980	DEERHAVEN GENERATING STATION UNIT 2 CITY OF GAINESVILLE GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD FLORIDA	project 76-077-1
ref. dwg. no. A86 & A87		contract 29C-YARD STRUCTURES III
Burns & McDonnell Engineers Architects Consultants Kansas City, Missouri		SK-077-29C-1

form GCO-1-8 051978



CONDUIT THROUGH MASONRY WALL

NOT TO SCALE

ADDENDUM NO. 1

date MAR. 5, 1980	DEERHAVEN GENERATING STATION UNIT 2 CITY OF GAINESVILLE GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD FLORIDA	project 76-077-1
ref. dwg. no. A87		contract 29C-YARD STRUCTURES III
Burns & McDonnell Engineers Architects Consultants Kansas City, Missouri		SK-077-29C-2

Form GCO-1-8 051978

Form GCO-1-8 051978

date MARCH 5, 1980

ref. dwg. no. Y69

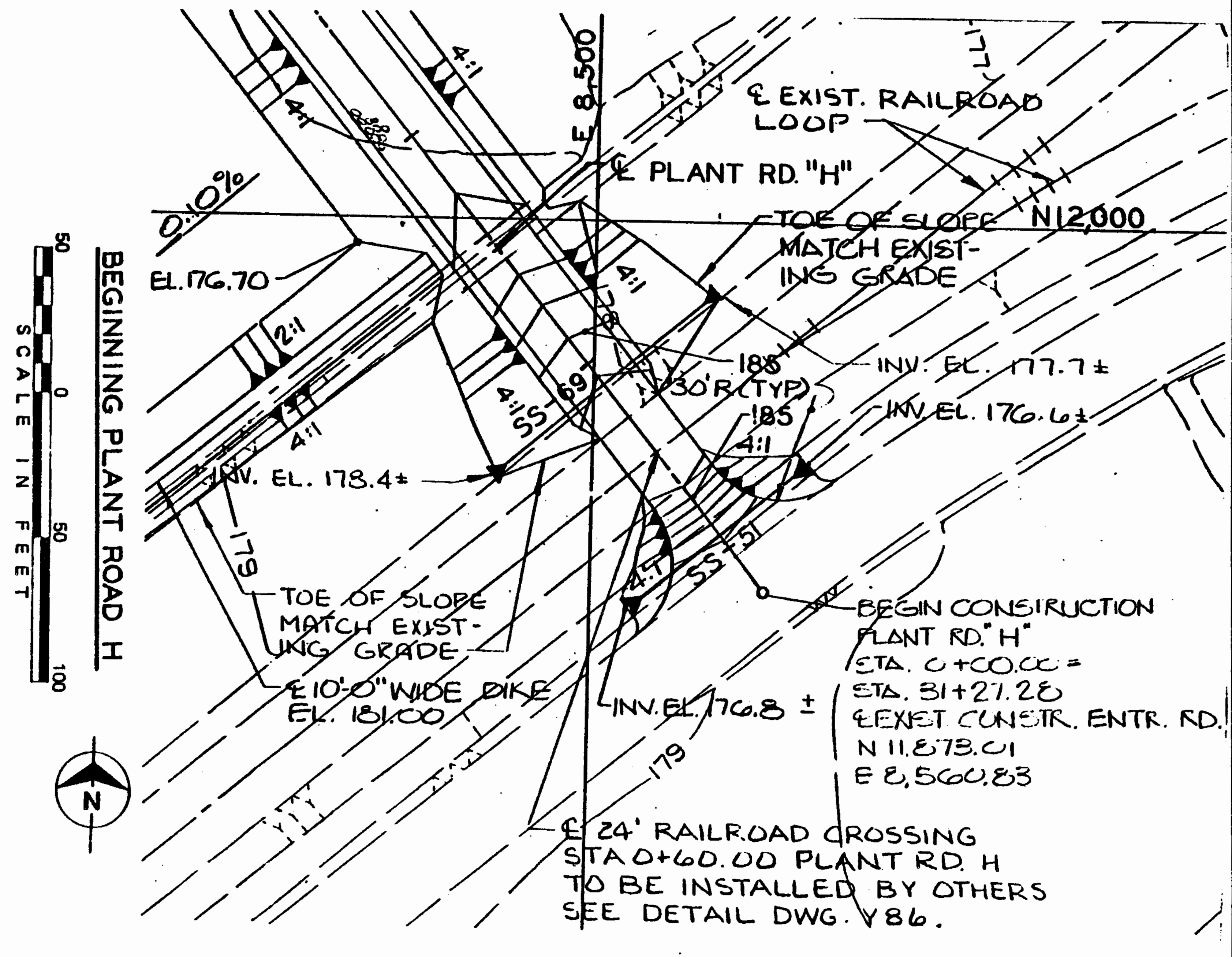
Burns & McDonnell
Engineers
Architects
Consultants
Kansas City, Missouri

project 76-077-1

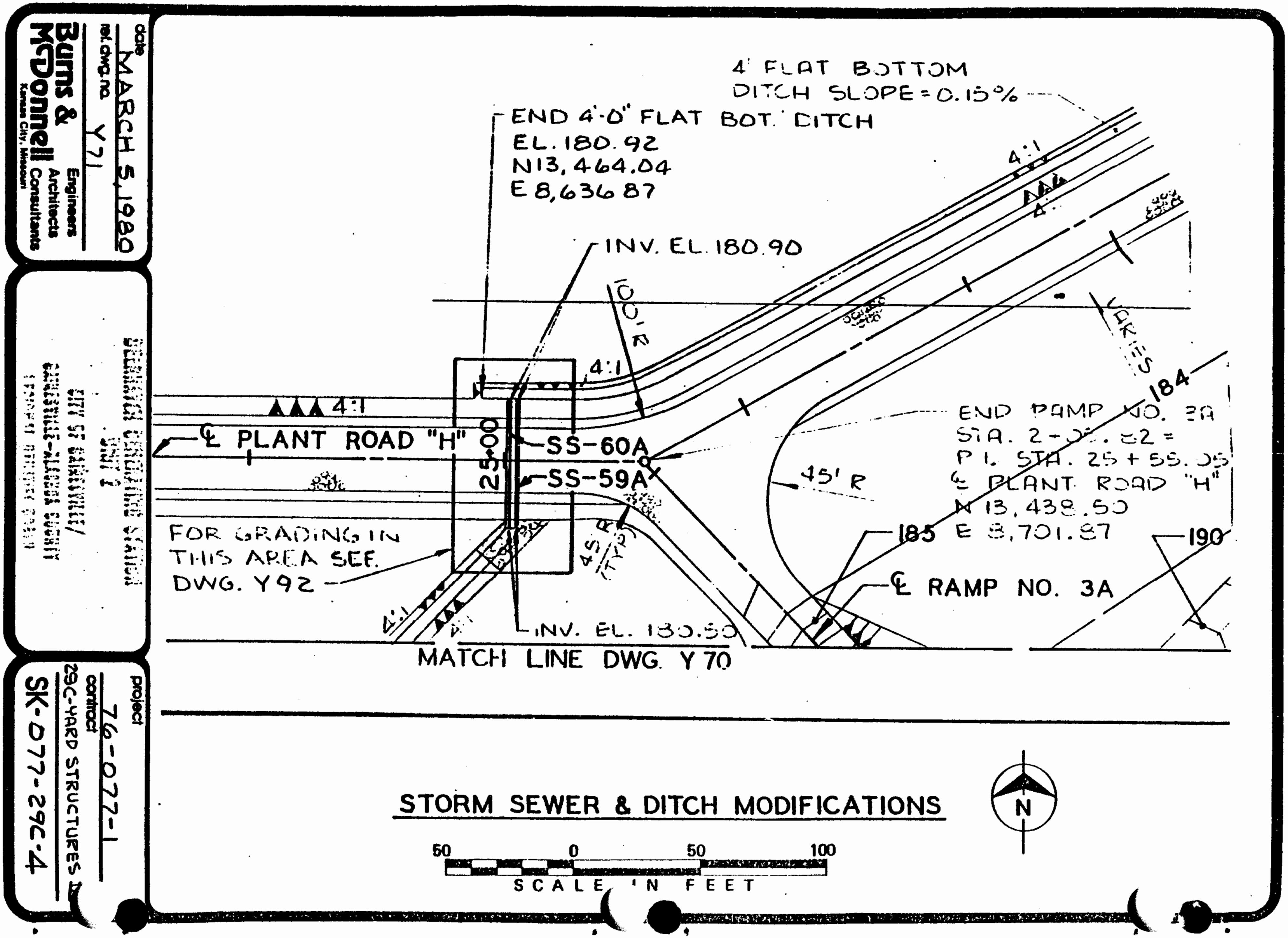
contract 29C-YARD STRUCTURES III

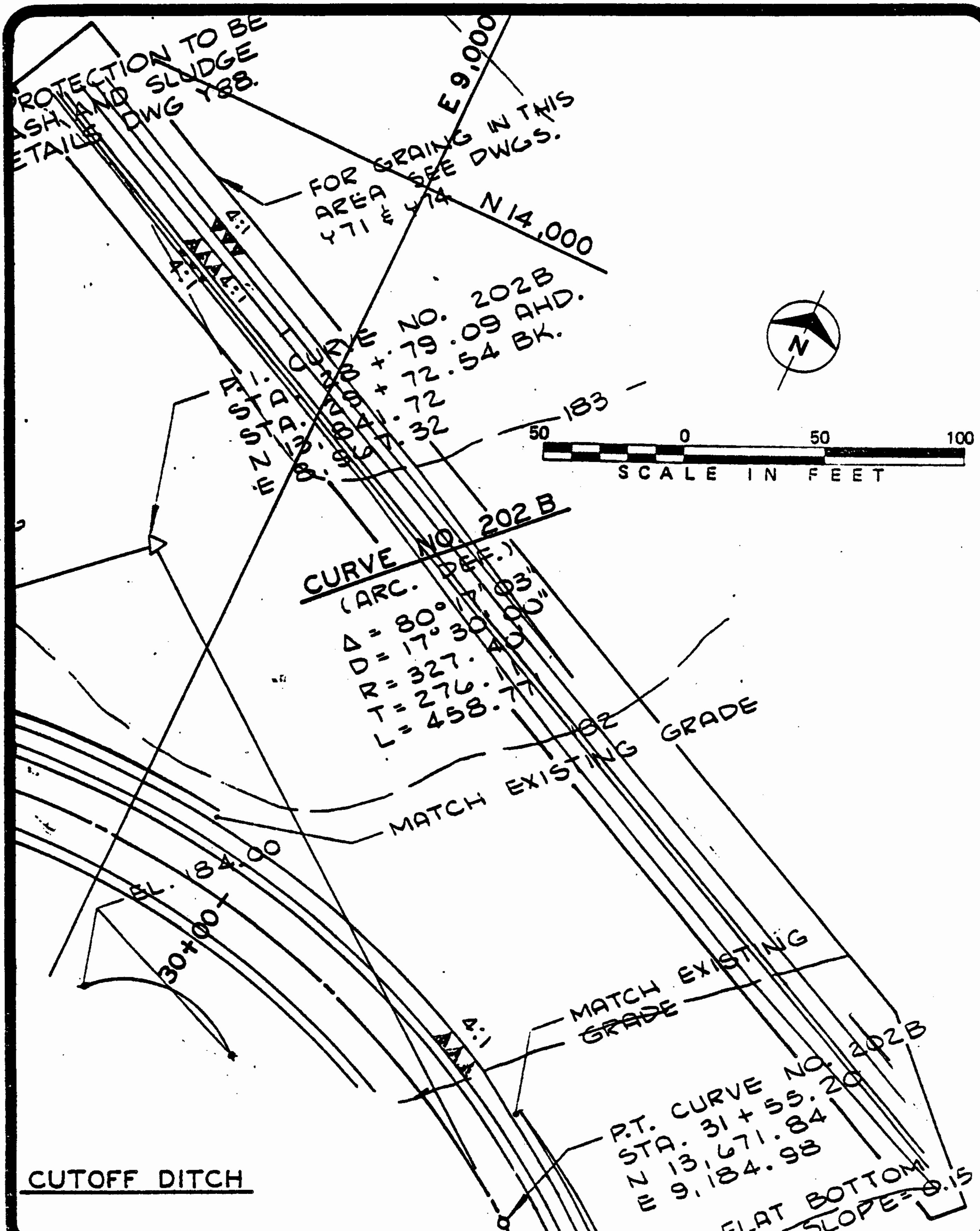
SK-077-29C-3

BEGINNING PLANT ROAD H



Form GCO-1-8 051978





Form GCO-1-8 051978

date MARCH 5, 1980	DEERHAVEN GENERATING STATION UNIT 2	project 76-077-1
ref. dwg. no. Y75	CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY	contract 29C-YARD STRUCTURES III
Burns & McDonnell Engineers Architects Consultants Kansas City, Missouri		SK-077-29C-5

Form GCO-1-8 051978

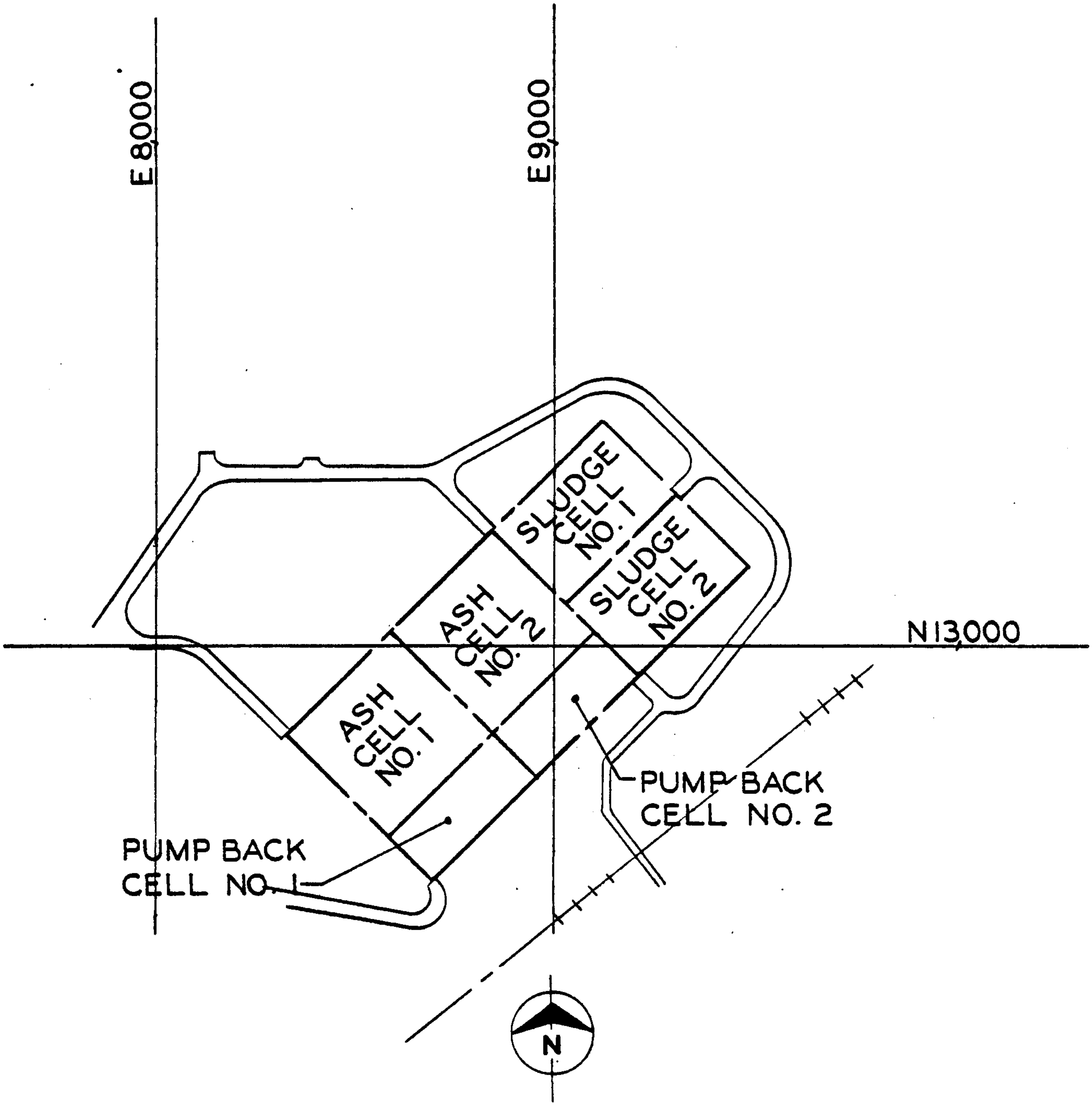
CASING PIPE SCHEDULE

CASING NO.	LENGTH	INVERT ELEVATION		INVERT COORDINATES		SLOPE FT./FT.	SIZE	CMP GA.
		UPPER	LOWER	UPPER	LOWER			
CP1A	50'	182.12	181.94	N12,912.55 E 9,263.18	N12,877.19 E 9,227.82	0.0035	30"	16
CP1B	50'	182.16	182.00	N12,926.70 E 9,277.34	N12,891.34 E 9,241.98	0.0032	30"	16
CP2A	40'	186.00	185.80	N13,278.82 E 9,382.70	N13,307.10 E 9,410.98	0.0050	12"	16
CP2B	45.92'	186.00	185.77	N13,312.76 E 9,369.96	N13,345.23 E 9,402.43	0.0050	12"	16
CP3A	40'	184.81	184.75	N13,420.25 E 9,312.69	N13,391.97 E 9,340.97	0.0017	12"	16
CP3B	50'	184.81	184.74	N13,485.31 E 9,277.34	N13,449.95 E 9,312.70	0.0014	12"	16
CP4A	40'	186.00	185.80	N13,461.97 E 9,199.55	N13,490.25 9,227.83	0.0050	12"	16
CP4B	45.92	186.00	185.77	N13,542.58 E 9,140.16	N13,575.05 E 9,172.63	0.0050	12"	16

date MARCH 5, 1980
ref. dwg. no. Y91

Burns & McDonnell
Engineers Architects Consultants
Kansas City, Missouri

project 76-077-1
contract 29C-YARD STRUCTURES III
SK-077-29C-6

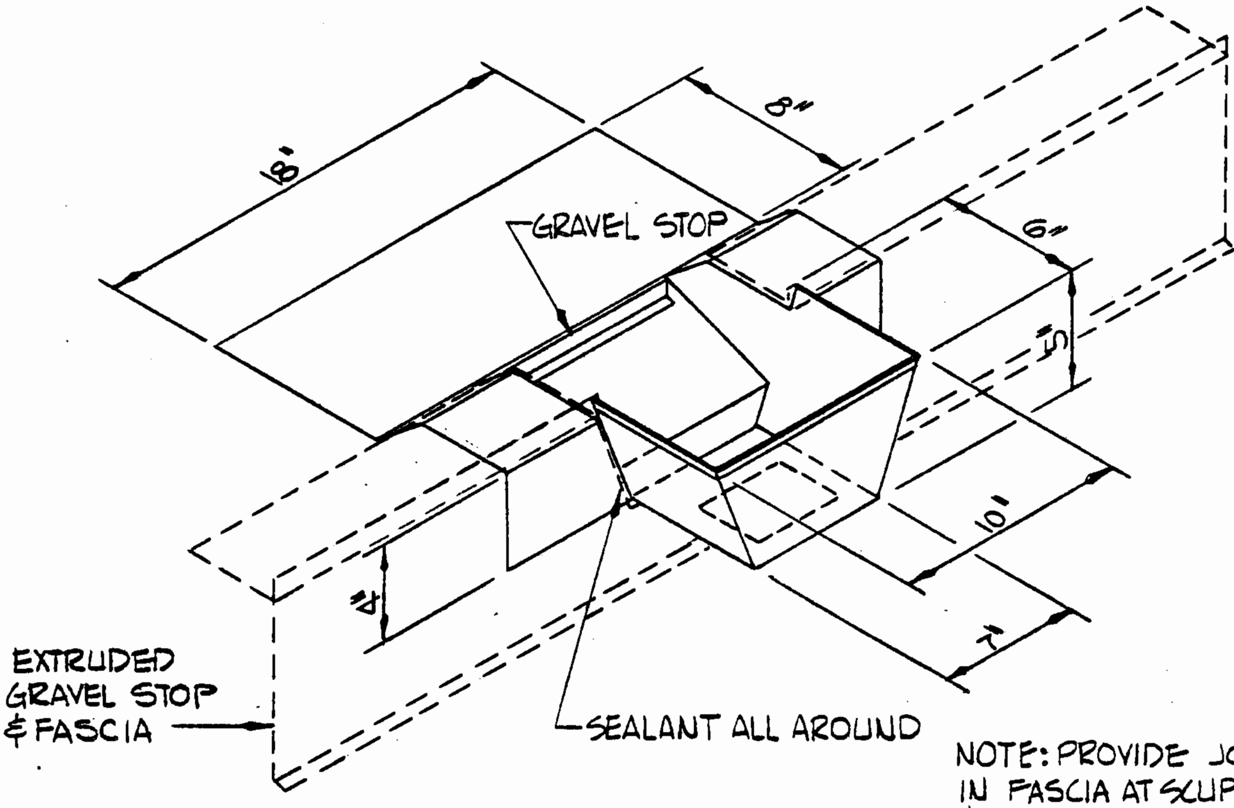


ASH, SLUDGE, & PUMP BACK CELL LABELING

400 0 400 800
SCALE IN FEET

date MARCH 17, 1980 ref. dwg. no. Y62 & Y63 Burns & McDonnell Engineers Architects Consultants Kansas City, Missouri	DEERHAVEN GENERATING STATION UNIT 2 CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY [illegible]	project 76-077-1 contract 29C-YARD STRUCTURES III SK-077-29C-7

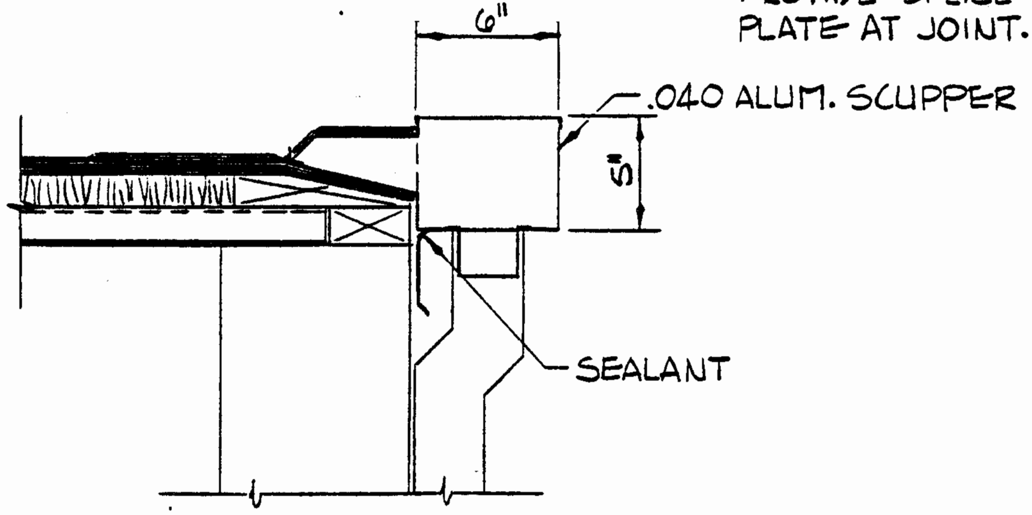
Form GCO-1-8 051978



ISOMETRIC OF SCUPPER

NOT TO SCALE

NOTE: PROVIDE JOINT IN FASCIA AT SCUPPER & NOTCH FASCIA AROUND SCUPPER. PROVIDE SPLICE PLATE AT JOINT.



SCUPPER DETAIL

NOT TO SCALE

ADDENDUM NO. 4

date MARCH 28, 1980 ref. dwg. no. A86 Burns & McDonnell Engineers Architects Consultants Kansas City, Missouri	DEERHAVEN GENERATING STATION UNIT 2 CITY OF GAINESVILLE GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD FLORIDA	project 76-077-1 contract 29C-YARD STRUCTURES III SK-077-29C-8

2A	Topsoil from Stockpile Northwest of Coal Pile Runoff Retention Pond	1,200	cu yd	$ 1.00	$ 1,200.00
2B	Clay Excavation and Stockpiling	25,000	cu yd	$ 1.00	$ 25,000.00
2C	- Bentonite - Stored on Site for Owner's future use	200	tons	$ 120.00	$ 24,000.00

Amount included in Base Bid for above tabulated quantities TOTAL $ 180,200.00

The following rates shall be used for adjusting the Contract Price upward or downward if the services of field service personnel are required for more or less than the number of days and trips set forth in Article IB-6. (Applies to Alternate Bid No. 3 only).

	Adjustment Rates	
	Per Day	Per Trip
Bentonite	$ 350.00	$ 1000.00
Slurry Wall	$ 500.00	$ 1000.00

CASH ALLOWANCE: (See Article IB-6A.)

The base bid price shall include the following amount as a cash allowance for work to be defined in detail subsequent to the award of the Contract. The Contract Price shall be adjusted in the final settlement by the difference between cash allowance and the cost of any work authorized with the costs determined in accordance with the provisions of Article GC-10B.

Division	Item	Cash Allowance
All	Undefined	$250,000

If no work is authorized, the entire cash allowance shall be deducted from the Contract Price.

SCHEDULE OF ADJUSTMENT UNIT PRICES FOR ADDITIONAL, OMITTED, OR CHANGED WORK:

In the event the Work indicated or specified in the Contract Documents is increased or decreased, the following unit prices shall apply to changes in the Work under Article GC-10B.4.b. These rates shall be inclusive of overhead, profit and other supplemental cost of subcontractors and prime contractors.

Item No.	Item	Unit	Unit Price
1.	Unclassified Excavation, Section 2A		
	A. Excavation for site work by machine	cu yd	$ 1.94
	B. Excavation for structures and foundation by machine	cu yd	3.50
	C. Excavation for pipe trenching	cu yd	3.50

	D. Excavation by hand in restricted area	cu yd	5.00
	E. Removal of excess excavation	cu yd	1.94
2.	Embankment, Section 2A		
	A. Compacted Embankment by Machine	cu yd	2.50
	B. Compacted Fill by Hand	cu yd	6.50
3.	Riprap, Section 2A		
	A. Stone, In-Place	ton	75.00
	B. Sand-Cement Type, In-Place	cu yd	150.00
	C. Fabriform, In Place	sq yd	30.00
4.	Backfilling in Pipe Trenches, Section 2A		
	A. Granular Fill Material	cu yd	22.75
	B. Granular Bedding Material	cu yd	12.75
	C. Native Soil	cu yd	2.50
5.	Liner Construction		
	A. Clay, In-Place, Section 2B	sq yd	2.50
	B. Bentonite, 4 lb./S.F., In-Place, Section 2C	sq yd	3.75
	C. Asphaltic Concrete Surface Course, In-Place, Section 2D	sq yd	20.00
6.	Seeding, Section 2G	sq yd	0.15
7.	Form Work Including Labor, Section 3A	sq ft	3.00
8.	Reinforcing Steel, In-Place Including Detailing, Section 3B	lb	0.55
9.	Concrete (4000 psi), In-Place, Section 3C		
	A. Addition, Type I Cement	cu yd	450.00
	B. Deletion, Type I Cement	cu yd	400.00

	C. Addition, Type II Cement	cu yd	450.00
	D. Deletion, Type II Cement	cu yd	400.00
	E. Moisture Barrier, Section 3C	sq ft	0.38
	F. Concrete Finish, Section 3C		
	(1) Float Finish	sq ft	0.20
	(2) Hand Trowelled Finish	sq ft	0.30
	(3) Burlap Finish	sq ft	0.24
10.	Openings Through Concrete— Furnish and Install, Section 3C		
	A. Type CO-8 or CO-9		
	(1) 12" or less in diameter or equivalent area	each	150.00
	(2) Larger than 12" but less than 30" diameter or equivalent area	each	300.00
	B. Type CO-16 or CO-17		
	(1) 12" or less in diameter or equivalent area	each	160.00
	(2) Larger than 12" but less than 30" diameter or equivalent area	each	340.00
11.	Structural Steel Including Detailing, Fabricating and Erecting Section 5A (as defined in AISC Code excluding anchor bolts)	lb	2.00
12.	Miscellaneous Steel Including Detailing, Fabricating and Erecting including Edge Plates, Angles, Handrail Grating, Checkered Plate, Section 5A	lb	2.50
13.	Type I Anchor Bolt Assemblies (Furnished and Installed)	lb	4.00
14.	Type II Anchor Bolt Assemblies (Furnished and Installed)	lb	4.00
15.	Chemical Resistant Coating on Concrete Surfaces, Section 7G	sq ft	1.75

16	Chemical Resistant Coating on Steel Surface, Section 7G	sq ft	2.10

The prices set forth above are not subject to price adjustment clauses.

COMPLIANCE SUBMITTALS:

All Compliance Submittals which require Engineer's acceptance prior to the manufacture or fabrication of the materials and equipment to be furnished shall be submitted within 60 days following the Date of contract, and in accordance with the following schedule:

Days After Date of Contract	Type of Drawing or Submittal
60	Asphaltic Concrete Job-Mix Data (Alternative Bid No. 2)
30	Concrete Mix Design and Aggregate Data
30	Reinforcing Steel Details
60	Structural Steel
60	Miscellaneous Steel
60	Piping Material and Equipment
60	Pump Outline Drawings
60	Mechanical Materials and Equipment
60	Piping Specials
60	All Other Specified Submittals

Submittals requiring revision shall be resubmitted within 14 days after receiving Engineer's review action copies.

DELIVERY:

The delivery of the equipment and material shall be in accordance with the following schedule:

Days After Date of Contract	Equipment and Material
30	Bentonite (if alternative bid is selected)
40	Reinforcing Steel

N/A	Pumps
120	Pipe and Valves

FIELD WORK SCHEDULE:

This bid is based on using Open Shop labor for all work on the project site and the undersigned will commence work upon Notice of Award and move onto the site 10 days after the Date of Contract, or Notice to Commence Work at the Site. (See Aricle GC-2).

The undersigned agrees that time is of the essence in the performance of the Work included in this contract.

All work necessary to make the following major phases of the work or items of work ready and available for the Owner's use shall be completed within the following contract times:

Days After the Date Stated in the Notice to Commence Work at the Site					Phase or Item of Work
Base Bid	Alt. No. 1 (bent)	Alt. No. 2 (asphalt)	Alt. No. 3 (Slurry)	Alt. No. 4 (Slurry)	N/A = not affected by alternative bid and time is same as for base bid) (Ash pond system includes all six ponds)
10	10	[illegible]	10	10	Move in and commence work
60	60	60	60	60	Order all required equipment and material
90	90	90	90	90	Complete Temporary Construction Runoff Pond No. 1
80	80	80	80	N/A	Complete clearing and grubbing borrow area
120	120	N/A	N/A	110	Complete coal yard areas based on assumption that work can continue in concurrent segments without delays between segments. (Day for day extensions will be granted for delays between segments).
120	120	N/A	N/A	110	Complete coal yard ready to receive coal
40	40	40	N/A	40	Commence ash pond system embankments
230	170	230	N/A	170	Complete ash pond system embankments
40	40	40	N/A	40	Commence ash pond system structures
170	160	170	N/A	150	Complete ash pond system structures
200	180	200	N/A	180	Substantial completion electrical equipment building (desired ASAP)

190	190	N/A	190	165	Commence secure landfill cut-off walls
230	220	N/A	210	180	Complete secure landfill cut-off walls
290	280	N/A	270	260	Complete secure landfill area
As soon as access to structure available.					Complete concrete floor - stock-out tower
126	110	126	N/A	95	Complete recycle pump structure - pump back pond
260	250	N/A	240	230	Complete secure landfill pump structure
250	240	N/A	N/A	220	Complete ash landfill pump structure
280	280	280	280	260	Complete installation of piping systems ready for testing.
290	260	290	260	240	Substantial completions as required for preliminary plant operation and testing
300	300	300	300	280	Complete finish grading and seeding
330	330	330	330	310	Complete all work

EQUIPMENT AND MATERIAL DATA:

The Bidder will furnish equipment and material as follows:

1. Air Conditioner, make and model no. Trane - PTHA - 1501 - JA
2. Fiberglass Pipe, mfgr. Fibercast or Fowlco
3. Valves, steel over 2" size, mfgr. As Specified
4. Valves, steel under 2" size, mfgr. As Specified
5. Valves, plug, mfgr. and model As Specified
6. Valves, butterfly, mfgr. and type As Specified
7. Seal water pumps, mfgr. and type Not Required-Addendum No. 3

DIVISION 1 - GENERAL REQUIREMENTS

1-1 SUMMARY OF WORK

A. DESCRIPTION OF PROJECT:

1. The Deerhaven Generating Station is in Alachua County on U.S. 441 about 10 miles northwest of the City of Gainesville near Hague, Florida. The station is of the indoor type and contains one 1250 psig, 950 F, 80-MW gas-oil fired unit.
2. The site is served by Seaboard Coast Line and Louisville and Nashville Railroad and has spur tracks adjacent to the generating station and fuel oil tanks. Fuel oil delivery is currently by truck.
3. This project includes the addition of a semi-indoor 1800-psig, 1000/1000 F, 235-MW pulverized coal-fired unit-type plant to be located contiguous to the existing station.
4. Commercial operation date for Unit 2 is scheduled for first quarter 1981.

B. WORK UNDER THIS CONTRACT:

1. Work shall include construction of embankments, linings, cut-off trenches, concrete and masonry structures, roads, piping, construction runoff retention pond, ash ponds, sludge ponds, pump-back ponds, concrete floors, and other miscellaneous Work including installation and erection of equipment, material, testing, and placing systems and equipment in service as specified.
2. This Contract includes, but is not limited to, the following items which are listed for the convenience of the Contractor in understanding the scope of the work:
   a. Furnishing temporary equipment and material required to accomplish the Work.
   b. Earthwork including pond and landfill, embankments, linings, grading, clearing, grubbing, etc.
   c. Reinforced concrete structures.
   d. Masonry structures.
   e. Structural and miscellaneous iron including castings and roadway grating.
   f. Waterproofing and roofing.
   g. Hardware and finishes.
   h. Yard piping, wells and equipment erection.
   i. Mechanical and minor electrical work.
   j. Roads and drives.
   k. All other Work as indicated and as specified including all services and Work required to place the installed equipment in operation.
3. In general work is part of the new addition to Deerhaven Generating Station.
4. Complete performance of the Work requires furnishing everything necessary to construct runoff retention pond, ash ponds, sludge ponds, other ponds, related structures and piping, ash and secure landfill areas, and make the disposal systems and equipment installed ready for commercial operation including natural and forced drainage systems,

except where specific mention is made that the equipment, material and work will be furnished by others.

C. OTHER CONTRACTS:

1. Other contracts related to this contract will include equipment Contracts and construction contracts which will include all general construction, mechanical and electrical work. All contracts have a completion schedule. Each item of equipment, phase of construction work, and each contract must be completed and all equipment operational by the scheduled dates to permit placing Unit 2 in commercial operation as soon as possible.
2. Other contracts and contractors related to this contract include the following:
   a. Construction Contracts:
      (1) Some contractors currently engaged in construction and erection work at the site include the following:

Contract Number	Contractor	General Scope of Work
3	Riley Stoker	Erection of Steam Generator
18	Midwest Conveyor	Erection of Coal Handling Equipment
19	Marley Cooling Tower Company	Cooling Tower
28	Greenhut Construction Company	Structural - Building Work
29A	Wood-Hopkins Construction Co.	Yard Structures I - coal Handling Structures
29B	Greenhut Construction Company	Yard Structures II - Yard Buildings and Yard Piping Work
31	Atlas RR Construction Company	Railroad Track
32	Prairie Tank and Construction Co.	Field Erected Tanks
33	Unicon Corporation	Breeching Steel, Breeching, and Installation
34	W. W. Gay	Erection of Machinery
35	National Valve and Manufacturing Co.	Power Piping
40	Alford Timber Company	Tree Removal - Work Completed

      (2) Contracts for construction work to be issued concurrently or subsequent to this Contract include the following:

Contract Number	General Scope of Work and Description of Areas
36	Power Wiring
56	Water Treatment Plant

      (3) Copies of contracts issued previously or concurrently with this Contract are available for inspection at the office of the Engineer or at the jobsite.

1-1 SUMMARY OF WORK: continued

b. Equipment Contracts:

(1) Contracts for furnishing equipment and material have been awarded and some of the items have been delivered and stored at the jobsite. Other material will be delivered subsequently.

1a (2) Responsibility for receiving, installing, and initial operation of equipment is summarized by contract number in the following table:

Contract Number	Equipment or Material Included in Contract	Contractor or Manufacturer	Contractor Responsible for: Unload, Storing Contr. No.*	Install Contr. No.	Initial Operation Contr. No.
9	Pumps*	Worthington	29C	29C	29C
17B	Ash Pipe*	M. H. Detrick	29B	29B & C	35 & 29C

*This Contractor is only responsible for pumps and pipe installed under this Contract and not the other pumps and pipe included under Contracts 9 & 17B.

D. PROVIDED BY OWNER:

1. Under other contracts the Owner will provide the following:
   a. Pumps as follows:
      (1) Three ash recycle pumps.
      (2) Three pond blow-down pumps.
      (3) Two landfill runoff pumps.
      (4) Two secure landfill runoff pumps.
      (5) One secure landfill drain pumps.
   b. Ash sluice pipe and fittings in general in 18-foot long lengths.
   c. Pipe lines up to the point of interface with lines installed under this Contract.
   d. Doors for ash pond electrical equipment building.
   e. Other items as specified or indicated to be provided by others.
   f. Electrical wiring and instrument tubing.
2. For this Contract the Owner will provide the following:
   1b a. Utility poles for pond liner protection.
   b. Water for hydrostatic testing. Electric and water utilities as specified.
   c. Operating labor for placing equipment in service.
   d. Operating labor as required to treat and discharge water from construction runoff ponds indicated or constructed under this Contract but only after the acceptance of new ponds for operation.

E. CONTINUOUS SERVICE OF EXISTING FACILITIES:

1. Owner required services for operation of system as set forth in ARTICLE IB-3 C.
2. Owner will require use of RR loop track and coal storage area during coal deliveries.
3. Owner will require use of the ash, sludge, and pump back pond during start-up of the system and a portion of both landfill areas when unit is placed in initial start-up and testing phase.

1-1 SUMMARY OF WORK: continued

4. Once unit is placed in operation, continuous use of one pond of each type will be required.

F. COORDINATION:

1. The pipelines must match and line up with lines installed under Contract 29B. The roads must match and line up with RR crossing.
2. The work areas in the coal yard must be coordinated with erection schedule for Contract 18 and construction schedule for Contract 29A. The entire coal yard area will not be available for lining and grading at one time. It may be necessary due to the urgent need for coal handling facilities, to require this contractor to periodically discontinue work in certain areas because of priorities and schedules under other contracts.
3. Continuous access corridors are required to the conveyor structures.

1-2 ADMINISTRATIVE MATTERS

A. INITIAL COORDINATION SUBMITTALS: Within ten (10) days after the Date of Contract, Contractor shall submit to Engineer for review and acceptance:

1. A preliminary Work progress and procurement schedule,
2. A tentative schedule of Compliance Submittals,
3. A tentative schedule of values for partial pay purposes, and
4. Certification of insurance or copies of policies, all as described in the Contract Documents.

B. INITIAL COORDINATION CONFERENCE: Within twenty days after the Date of Contract, a conference will be held at Deerhaven Generating Station to review initial coordination submittals, Compliance Submittals, review procedures for handling Compliance Submittals, review procedures for payment of Contractor, discuss equipment details, discuss site use and establish a working understanding between the parties as to their relationships during conduct of the Work.
The conference shall be attended by:

1. Contractor's Project Manager and his Superintendent.
2. Representatives of principal Subcontractors performing construction of structures or special slurry cut-off walls, if accepted.
3. Engineer's Resident Project Representative.
4. Owner or his representative.

C. WORK PROGRESS AND PROCUREMENT SCHEDULE:

1. Contractor shall submit to Engineer for acceptance a detailed Work progress and procurement schedule within thirty (30) days after the Date of Contract.
2. The schedule shall show the Work in a graphic format suitable for displaying scheduled and actual progress or a network diagram and shall be submitted on a reproducible media.
3. The schedule shall show the Work broken down into major phases and key items. Schedule shall include anticipated time for design, approval of submittals, fabrication, delivery for equipment and materials not readily available upon two months' notice from a supplier or

D. PERFORMANCE TESTS:
1. Equipment and Materials Furnished under this Contract:
a. Owner may conduct acceptance tests after installation to determine if the equipment and materials installed as part of the Work perform as specified and as guaranteed. Final acceptance of equipment and materials and start of guarantee period will be based on acceptable results of such tests.
b. Contractor will be notified so that he can have a representative, or manufacturer's representative, present during any tests of equipment or materials if desired, but without additional cost to Owner.
c. The tests will be made as set forth in the Specifications unless the interested parties mutually agree upon some other manner of testing.
2. Equipment and Materials Furnished by Others:
a. Contractor shall not be required to participate in the testing of equipment.

1-9 PLACING EQUIPMENT, MATERIALS AND SYSTEMS IN OPERATION

A. SPECIAL REQUIREMENTS: Special requirements for placing specific equipment, materials and systems into operation are covered in the technical divisions of these specifications.

B. RESPONSIBILITY AND TAGGING:
1. The Owner will accept equipment and systems for operation that have been placed into successful operation by the Contractor. "Acceptance for operation" means that the Owner will release the Contractor from operation of the particular equipment, system, or portion of the work, and will assume responsibility for operation and routine maintenance by supplying his own operating and maintenance personnel. "Routine maintenance" includes lubrication and minor adjustments, but does not include repairs, realignment, flange tightening, gasket replacement, valve repacking, strainer cleaning, or work resulting from defective material or workmanship. Acceptance for operation and placing in service does not relieve the Contractor from responsibilities related to defective materials and workmanship; neither does it constitute final acceptance for making final payment.
2. Acceptance for operation will be made in writing by the Owner and appropriate tags shall be attached to valves and controls. Contractor's personnel shall not operate any equipment or material tagged by the Owner without obtaining proper authorization in accordance with Owner's tagging procedures.
a. Contractor will be notified so that he can if he desires have a representative, or manufacturer's representative, present during any tests of equipment or materials for which manufacturer's field service is not specified.
b. The tests will be made as set forth in the Specifications unless the interested parties mutually agree upon some other manner of testing.

C. EQUIPMENT AND MATERIALS FURNISHED BY OTHERS: Contractor may observe the performance testing of equipment at his expense but is not required to be present during this testing.

1-10 LIST OF DRAWINGS

A. CONTRACT DRAWINGS: Each sheet of the Contract Drawings prepared by Engineer as a basis for this Contract bears the following general title:

DEERHAVEN GENERATING STATION UNIT 2

Individual sheet numbers and titles are:

Dwg No	Title
Y0	General Site Plan
Y62	Site Plan
Y63	Clearing & Grubbing Limits
Y64	Grading Plan 1
Y65	Grading Plan 2
Y66	Grading Plan 3
Y67	Grading Plan 4
Y68	Grading Plan 5
Y69	Grading Plan 6
Y70	Grading Plan 7
Y71	Grading Plan 8
Y72	Grading Plan 9
Y73	Grading Plan 10
Y74	Grading Plan 11
Y75	Alternative Grading Plan
Y76	Road Profiles 1
Y77	Road Profiles 2
Y78	Ramp Profiles
Y79	Unassigned
Y80	Grading Sections 1
Y81	Grading Sections 2
Y82	Grading Sections 3
Y83	Grading Sections 4
Y84	Unassigned
Y85	Grading Details 1
Y86	Grading Details 2
Y87	Grading Details 3
Y88	Grading Details 4
Y89	Grading Details 5
Y90	Unassigned
Y91	Storm Drainage Details 1
Y92	Storm Drainage Details 2
Y93	Storm Drainage Details 3
Y94	Unassigned
Y95	Unassigned

1-10 LIST OF DRAWINGS: continued

A86	Ash Pond Electrical Equipment Plan and Details
A87	Ash Pond Electrical Equipment Building Details
S1	Standard Details
S2	Standard Details
S3	Standard Details
S4	Standard Details
S5	Standard Details
S222	Recycle Pump Structure
S223	Ash Pond Electrical Equipment Building Retaining Wall
S224	Ash Pond Stoplog Structure Nos. 1 & 2
S225	Sludge Pond Stoplog Structure Nos. 1 & 2
S226	Headwalls & Bridge Abutments
S227	Stoplog Structure Bridges
S228	Crossing Structure No. 6
S229	Crossing Structure No. 7
S230	Crossing Structure No. 8 and Slurry Wall Crossing Nos. 1 & 2
S231	Ash Pipe Drain Pit Structure & Ash Pond Elec. Equip. Bldg.
S232	Pipe Supports
S233	Unassigned
S234	Concrete Slab on Stockout Tower & Stair Tower Guard Posts
S235	Coal Pile Runoff Pond Pump Structure & Headwall & Temp. Construction Runoff Pond No. 1 Outlet
S236	Secure Landfill Runoff Retention Pond Pump Structure and Intake Structure
S237	Ash Landfill Pump Structure
S238	Unassigned
S239	Unassigned
S240	Unassigned
M35	HVAC & Plumbing Ash Pond Electrical Equipment Building
U7	Drawing Reference & Legend
U8	Yard Utilities - Ash & Sludge Ponds (6:1)
U9	Yard Utilities - Ash & Sludge Ponds (3:1)
U10	Yard Utilities - Secure Landfill
U11	Yard Utilities - Ash Landfill
U13	Unassigned
UP43	Isometric Details I
UP44	Isometric Details II
UP45	Unassigned
UP46	Miscellaneous Piping Details I
UP47	Miscellaneous Piping Details II
UP48	Miscellaneous Piping Details III
UP49	Unassigned
UP50	Yard Enlargement Details I
UP51	Yard Enlargement Details II
UP53	Valve List, Piping Schedules
UP54	Unassigned
UP55	Piping Design Tables

1-10 LIST OF DRAWINGS: continued

B. REFERENCE DRAWINGS: The following listed reference drawing is included in the bound set of drawings for information:

Dwg. No.	Title
Midwest L-114	Floor Plans Structural Steel Design Layout Stockout Tower El. 286'-3", El. 306'-3", and El. 324'-3"

Drawings of existing facilities and facilities under construction are available for inspection at Deerhaven Generating Station.

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DIVISION 2 - SITE WORK

2A - SITE PREPARATION AND EARTHWORK

2A-1 GENERAL

A. DESCRIPTION:

1. This Section includes site preparation activities and certain items of earthwork common to other related work as necessary to complete the Work.
2. Related Work Specified Elsewhere:
   a. Natural Clay Construction: SECTION 2B.
   b. Bentonite Soil Sealant: SECTION 2C.
   c. Slurry Wall Construction: SECTION 2E.
   d. Storm Drainage System: SECTION 2F.
   e. Roads, Drives, and Walks: DIVISION 18.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American Association of State Highway and Transportation Officials Standard Method of Test (AASHTO):
      (1) T99 - The Moisture-Density Relations of Soils Using a 5.5-Pound (2.5 Kg) Rammer and a 12-Inch (305 mm) Drop.
      (2) T104 - Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Test.
      (3) M147 - Materials for Soil Aggregate Subbase, Base, and Surface Courses.
      (4) M80 - Coarse Aggregate for Portland Cement Concrete.
   b. American Society for Testing and Materials (ASTM):
      (1) D2049 - Relative Density of Cohesionless Soils.
      (2) D2922 - Test for Density of Soil and Soil-Aggregate in Place by Nuclear Method.
      (3) ASTM 1970, 5th Edition, Special Procedures for Testing Soil and Rock for Engineering Purposes (STP 479), "Burmister Method."
   c. U.S. Department of Interior, Bureau of Reclamation, Earth Manual, 2nd Edition, Designation E-12, Relative Density of Cohesionless Soils, Alternative Method.
   d. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction.

C. JOB CONDITIONS:

1. Lines and grades shall be as indicated. Engineer will designate bench marks, base lines, and reference points as necessary to permit the Contractor to lay out and construct the work properly.
2. Maintain carefully all bench marks, monuments, and other reference points and replace as directed if disturbed or destroyed.
3. Explosives: Blasting will not be permitted.
4. Disposition of Utilities:
   a. Adequately protect from damage all active utilities and remove or relocate only as indicated or specified.

b. Report inactive and abandoned utilities encountered in excavating and grading operations. Remove, plug, or cap as directed.

5. Make provisions for temporarily accommodating flows in existing facilities to be relocated or disturbed.

2A-2 EQUIPMENT AND MATERIALS

A. MATERIALS:

1. Materials Encountered:
   a. All materials encountered, regardless of type, character, composition, and condition thereof, shall be unclassified.
   b. Excavation shall include all materials found within the designated limits for excavation.
   c. Determine quantity of various materials to be excavated prior to submitting Bid Form. If encountered, remove rock at no extra cost to Owner.
   d. Arrangements for entry to site for purpose of conducting subsurface investigations, including test borings, shall be made with Engineer.
   e. Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands exclusive of clayey and silty material--materials which are free-draining and for which impact compaction will not produce a well-defined moisture-density relationship curve and for which the maximum density by impact methods will generally be less than by vibratory methods.
   f. Cohesive materials include silts and clays generally exclusive of sands and gravel--materials for which impact compaction will produce a well-defined moisture-density relationship curve.
2. Waste Materials:
   a. Includes materials unsuitable for use in the Work.
      (1) Unsuitable materials include all material that contains debris, roots, organic matter, frozen matter, rock (with any dimension greater than one-half the loose layer thickness) or other materials that are determined by Engineer as too wet or otherwise unsuitable for providing a stable subgrade or stable foundation for structures.
      (2) Suitable materials include material that is free of debris, roots, organic matter, refuse, ashes, cinders, frozen matter and, which is free of rock with any dimension greater than one-half the specified loose layer thickness.
   b. Remove unsuitable materials from work area as excavated.
   c. Deposit waste materials in locations and within areas designated by Engineer and as indicated.
   d. Grade seed, and areas indicated to remain and leave them free draining and with an orderly and neat appearance.
3. Borrow Materials:
   a. Refers to all fill materials and topsoil obtained from approved locations either on or off the jobsite.
   b. Borrow shall include all clearing and grubbing, excavating, handling, and final disposal of materials as specified. Borrow, if required, to bring the embankments to the lines and grades indicated, shall be furnished by the Contractor, as specified, without additional compensation.

c. Borrow areas either on or off site shall be:
  (1) Arranged for by Contractor at no additional cost to Owner.
  (2) Subject to approval by Engineer.
d. Material removed from borrow areas shall be as approved by Engineer.
e. Upon completion of on-site borrow operations, if any, backfill borrow areas with unsuitable material from excavations, designated stockpiles and waste areas.
   All overburden removed during clay borrow operations, and not used in the Work, shall also be replaced in the borrow area.

f. Leave borrow areas graded to drain, seeded and to present a neat appearance. Construct ditches as required to drain low areas to natural drainage channels.

4. Embankment Material:
   a. Includes suitable approved material from excavations stockpiles and borrow areas.

   b. Embankment material shall be friable sandy or silty clay containing fine material sufficient to provide a dense mass free of voids and capable of satisfactory compaction.
   c. Do not use material containing gravel, stones, or shale particles greater in dimension than one-half the depth of the layer to be compacted.
   d. Material shall be free of roots or other organic matter, refuse, ashes, cinders, frozen earth or other unsuitable material.
   e. All suitable clay stockpiled by others east of the track hopper shall be used for embankment material.
      (1) A sufficient amount of sand shall be thoroughly disked into the clay to make it workable.
      (2) The material shall be capable of being compacted to density specified.
      (3) The material shall be capable of meeting performance requirements.
5. Cover Material:
   a. Shall be generally cohesionless material free of debris, roots, organic matter, rock or other materials that are determined by Engineer as unsuitable for providing a stable subgrade.
   b. Shall be defined as having a gradation with 100 percent passing a No. 1 sieve, 75 percent passing a No. 4 sieve, and not more than 10 percent passing a No. 200 sieve.
   c. Use as cover over natural clay or bentonite liners as specified in SECTION 2B and SECTION 2C, respectively.
6. Trench Stabilization Material: Material shall be as follows:
   a. As specified for granular fill material, or
   b. Conform to AASHTO M147, Grading A or B, well graded, with not more than 10 percent passing No. 200 sieve.
7. Granular Fill Material:
   a. Material shall be crushed stone or crushed natural gravel with the following gradation:

Sieve Size (Square Openings)	Percent Passing (By Weight)
1"	100
3/4"	90-100
3/8"	30-65
No. 4	5-25
No. 8	0-10
No. 16	0-5

b. Material shall not have a loss of more than 15 percent after 5 cycles when tested for soundness with sodium sulfate as described in AASHTO T104.

c. Use for the following:
  (1) Pipe embedment for other than plastic pipe.
  (2) Trench stabilization.

8. Granular Bedding Material:

a. Material shall be crushed stone or natural sand with the following gradation:

Sieve Size (Square Openings)	Percent Passing (By Weight)
3/8"	100
No. 4	95-100
No. 16	65-98
No. 50	5-35
No. 100	0-7

b. Material shall not have a loss of more than 15 percent after 5 cycles when tested for soundness with sodium sulfate as described in AASHTO T104.

c. Use for plastic pipe embedment.

9. Topsoil Materials:

a. Includes those materials obtained from stripping and excavation which are most suitable and stockpiled for such purpose, or

b. Borrow when required.

10. Filter Blanket Material:

a. Material shall conform to all applicable requirements of AASHTO M80 and shall be reasonably well graded within the following limits:

Sieve Size (Square Opening)	Percent Passing (By Weight)
4-inch	100
3-inch	80-100
2-inch	70-90
3/4-inch	45-60
No. 4	20-30
No. 10	5-15
No. 40	0-5

b. Gradation shall not vary from low limit on one sieve to high limit on adjacent sieve or vice versa.

c. Shall be reasonably free from lumps or balls of clay, organic matter, objectionable coatings or other foreign materials and shall be durable and sound.

d. Shall be reasonably free from flat and/or elongated particles in an amount exceeding 20 percent. Flat or elongated defined to be no greater in length than 5 times the average thickness.
e. Crushed rock conforming to the gradation specified may be used.
f. Furnish Engineer certification from an approved laboratory that the material conforms to these specifications.

11. Riprap Material:
a. All stone shall be durable and of suitable quality to ensure permanence in the structure and in the climate in which it is to be used.
b. Boulders or quarried rock may be used and shall be graded as follows:

Weight in Pounds Per Stone	Percent of Total Weight Lighter Than or Passing
300	100
150	55-75
50	25-45
2-inch screen	5-15

c. Quantity of rock with an elongation greater than 3:1 shall not exceed 20 percent of the mass. No stone shall have an elongation greater than 4:1.
d. Material shall be free from cracks, seams, or other defects that would tend to increase its deterioration from natural causes.
e. Objectionable quantities of dirt, sand, clay and rock fines will not be permitted.
f. Not more than 10 percent of the stone shall show splitting, crumbling, or spalling when subjected to 5 cycles of the sodium soundness test as required by AASHTO T104.
g. Furnish Engineer certification from an approved laboratory that the material conforms to these specifications.
h. In lieu of conforming to above specified test requirements, material with a proven history of satisfactory performance will be approved for use in the work provided certification of this history is acceptable to the Engineer.
i. Contractor shall furnish a sample of stone for acceptance.
j. Acceptable alternative riprap materials:
(1) Filter point sytle mats of Fabriform as manufactured by Construction Techniques, Inc., or approved equal.
(2) Sand-cement meeting the requirements of the FDOT Standard Specifications for Road and Bridge Construction, Section 530-Riprap.

12. Weed Killer: Weed killer shall be "Krovar I" as manufactured by E. I. duPont or equal product approved by Engineer and meeting Federal, State, and local regulations controlling the use of this material.

B. EQUIPMENT:
1. Compaction equipment shall conform to the following requirements and be subject to the approval of the Engineer.
a. Tamping Rollers:
(1) Tamping roller may be towed or self-propelled.

(2) Rollers shall have staggered uniformly spaced knobs or feet. When fully loaded, they shall exert at least 300 psi on combined area of tamping feet in contact with ground.
(3) Rollers shall be equipped with cleaning fingers maintained at full length to prevent accumulation of material between feet.
(4) Maintain all equipment in good repair.

b. Rubber-tired rollers shall have two axles, not less than 9 wheels with pneumatic tires, a rigid steel frame, and a body suitable for ballast loading.
c. Power tampers shall be used for compaction of material in areas where it is impractical or unsafe to use heavy equipment, and as directed by the Engineer.
d. Vibratory compactor shall have a steel drum 42 inches in diameter, with a vibrating force of 300 pounds per cycle per inch of drum width and a vibrating frequency of 1,200 cycles per minute.
e. Vibatory plate compactor shall be used for compaction of material in areas where it is impractical or unsafe to use heavy equipment, and as directed by the Engineer.

2A-3 PERFORMANCE

A. CLEARING AND GRUBBING:

1. Perform clearing and grubbing where indicated to perform excavation, trenching, embankment, borrow and other work required.
2. Clearing:
   a. Clearing includes felling and disposal of trees, brush, and other vegetation.
   b. Conduct work in a manner to prevent damage to property and to provide for the safety of employees and others.
   c. Keep operations within areas indicated.
3. Grubbing:
   a. Removal and disposal of tree stumps and roots larger than 3 inches in diameter.
   b. Remove to a depth of at least 18 inches below existing grade elevation.
   c. Backfill all excavated depressions with approved material and grade to drain.

B. DISPOSAL OF DEBRIS:

1. Dispose of noncombustible debris by burying on the site in location approved by the Engineer.
2. Place debris buried on the site a minimum of 5 feet below finished grade in approved areas. Indicate locations of buried debris on Contractor-furnished construction record drawings.
3. Contractor may claim and salvage any timber or other debris which he may consider of value, but shall not delay in any manner either this contract or other work with salvaging operations.

4. Combustible waste material and debris shall be burned on site in accordance with DIVISION 1.

C. STRIPPING:
1. Remove topsoil from areas within limits of excavation, trenching, borrow and areas designated to receive embankment and compacted fill.
2. Scrape areas clean of all brush, grass, weeds, roots and other materials.
3. Strip to a minimum depth of 6 inches, but to a sufficient depth to remove excessive roots in heavy vegetation or brush areas and as required to segregate topsoil.
4. Stockpile topsoil in areas designated where it will not interfere with construction operations or existing facilities. Stockpiled topsoil shall be reasonably free of subsoil, debris, and stones larger than 2-inch diameter.
5. Dispose of waste on the site at locations indicated and as approved by the Engineer.

D. SHEETING AND BRACING:
1. Requirements:
   a. Use as necessary to conform with the following:
      (1) Federal and state laws and local ordinances.
      (2) To protect life, property and the work.
      (3) To avoid excessively wide cuts in unstable material.
   b. Use is mandatory where construction is adjacent to existing structures and utilities.
2. Approved Materials:
   a. Provide on site prior to start of excavation in each section, and make such adjustments as are required to meet unexpected conditions.
   b. Space and arrange sheeting and bracing as required to exclude adjacent material and according to the stability of excavation slopes.
   c. Remove simultaneously with backfilling, except as otherwise approved, and fill voids left after withdrawal with sand or other approved material.
   d. Leave in place when required by conditions of supported material and cut off at approved elevation below the surface.
      (1) No higher than one foot below finished surface grade, and
      (2) No lower than one foot above top of buried pipe or conduits.

E. DEWATERING:
1. Control grading around excavations to prevent surface water from flowing into excavation areas.
2. Drain or pump as required to continually maintain all excavations, structures and trenches free of water or mud from any source, and discharge to approved drains or channels that drain to a construction runoff retention pond. Commence when water first appears and continue until work is complete to the extent that no damage will result from hydrostatic pressure, flotation, or other causes.

3. Use pumps of adequate capacity to ensure rapid drainage of area, and construct and use drainage channels and subdrains with sumps as required. Drain to construction runoff retention ponds.
4. Remove unsuitable excessively wet subgrade materials and replace with approved backfill material.

F. STOCKPILING:
1. Stockpile in amounts sufficient for and in a manner to segregate materials suitable for the following:
   a. Topsoiling.
   b. Constructing embankments and fills.
   c. Backfilling.
   d. Cover material.
   e. Waste only.
2. Do not obstruct or prevent access to the following:
   a. Roads and driveways.
   b. Utility control devices.
   c. Ditches or natural drainage channels.
3. Perform in a manner to avoid endangering the work, or stability of banks or structures.
4. Maintain safe distance between toe of stockpile and edge of excavation or trench.
5. Stockpile in other areas when adjacent structures or other restrictions prohibit sufficient storage adjacent to the Work.
6. After construction is completed, stockpile all excess suitable material in area indicated. Grade stockpile to drain, and seed.

G. COMPACTION:
1. Compact subgrades, fills, embankments and backfills using spreading equipment, tamping rollers, rubber-tired rollers, vibratory compactors, or power tampers, as required to obtain reasonable uniformity.
2. Perform within moisture content range as specified to obtain required results with equipment used.
3. Achieve minimum densities specified as referenced to:
   a. Cohesive soils - Maximum density at optimum moisture, AASHTO T99.
   b. Cohesionless soils - Relative density.
      (1) ASTM D2049.
      (2) ASTM D2922.
      (3) ASTM 1970 (STP 479).
      (4) U.S. Department of Interior, Bureau of Reclamation, Earth Manual, 2nd Edition, Designation E-12.
4. Compact areas not otherwise specified or indicated to a minimum of:
   a. Cohesive soils - 90 percent maximum density.
   b. Cohesionless soils - 70 percent relative density.

H. SITE GRADING:
1. Excavate, fill, compact fill, and rough grade to bring project area to subgrades and elevations indicated:
2. Rock:

a. If encountered in grading areas , the provisions contained herein shall apply.
b. Backfill to grade, with earth compacted in place after removing rock to 24 inches below finished grade.

3. Fill:
a. Fill as required to raise existing grades to the new grades as indicated.
b. Perform as specified in "EMBANKMENT," this Section.
c. Remove all debris subject to termite attack, rot, or corrosion from areas to be filled.

4. Rough Grading:
a. Grade and compact all areas within the project, including excavated and filled sections, and adjacent transition areas reasonably smooth and free from irregular surface changes.
b. Degree of finish shall be that ordinarily obtained from blade grader or scraper operations, except as otherwise specified.
c. Finished rough grades shall generally be not more than 0.25-foot above or below established grade or approved cross-sections with due allowance for topsoil.
d. Tolerance for areas within 10 feet of structures shall not exceed 0.15-foot above or below established subgrade.
e. Finished subgrades for roads, drives and surfaced areas shall not be lower than indicated, nor higher than 0.1-foot above that indicated.
f. Finish all ditches, swales, and gutters to drain readily.
g. Unless otherwise indicated, slope the subgrade evenly to provide drainage away from building and structure walls in all directions at a grade not less than 1/4-inch per foot.
h. Provide roundings at top and bottom of banks and at other breaks in grade.

I. EXCAVATION:

1. General:
a. Perform excavation by any recognized method of good practice to complete the job in the most expeditious manner.
b. Take precautions to ensure no damages to existing facilities or equipment, or other work.

2. Trenching:
a. Extent of Work:
(1) Includes excavation, sheeting, bracing and all operations necessary for the preparation of trenches for bedding of pipes and all appurtenances thereto.
(2) Remove material as required for alignment and elevation of work as indicated.
b. Equipment and Methods:
(1) Types of equipment and methods may be at Contractor's option, where structures or other facilities are not endangered.
(2) Equipment and methods shall be subject to approval of jurisdictional agency where stability or usefulness of other facilities may be impaired.

(3) Perform by hand methods when required to save existing culverts, utilities or other structures above or below ground.
(4) Maximum length of open trench shall be limited as necessary to conform to local codes.

c. Side Walls:
(1) Make vertical below top of pipe.
(2) Make vertical or sloped from a plane 12 inches above top of pipe down to top of pipe.
(3) Make vertical or sloped as required for stability, above a plane 12 inches above top of pipe.
(4) Sheet and brace where necessary.
(5) Excavate without undercutting.

d. Trench Depth:
(1) Depth shall be sufficient to provide the minimum bedding requirements for the pipe being placed.
(2) Do not exceed depth indicated where conditions of bottom are satisfactory.
(3) Increase depth as necessary to remove unsuitable supporting materials.

e. Trench Bottom:
(1) Protect and maintain when suitable natural materials are encountered.
(2) Remove rock fragments and materials disturbed during excavation or raveled from trench walls.
(3) Restore to proper subgrade with granular fill material or compacted backfill as approved by the Engineer.

f. Trench Stabilization: Compact in lifts not exceeding 6 inches to approved firm condition with penumatic or vibratory equipment.

g. Trench Width:
(1) Excavate trench to a minimum width which will permit satisfactory jointing of the pipe and thorough tamping of bedding.
(2) Maintain trench widths below a plane 12 inches above top of pipe as follows:

	Trench Width	
Nominal Pipe Size	Minimum	Maximum
Less than 24"	Pipe od + 1'	Pipe od + 2'
24" to 60"	Pipe od + 1'	Pipe od + 2'

(3) Maximum trench width limitations shall apply beginning 3 feet from manhole or structure walls.
(4) Maximum width shall be as near the minimum specified as can be controlled by construction equipment and methods utilized.
(5) Restore trench width to maximum specified when overexcavated at no additional cost to the Owner.
(a) Trench widths over maximum shall be restored with granular material specified for the type of pipe material being used, for a minimum height of twelve (12) inches above top of pipe.
(b) Obtain approval of Engineer before proceeding.

h. Trenching Under Existing Utilities: The pipe trench walls shall be maintained vertical under existing duct banks and other utilities. This shall be accomplished by driving steel H-section beams each side of the utility and placing timber lagging between the beams. All excavation under utilities shall be by hand methods.

i. Trenching Across Drainage Ditches: Open cuts through existing drainage ditches shall be provided with protection from flows entering the trench. Methods of blocking and disposing of flows shall be by methods as approved by the Engineer.

j. Test Pits (Contractor's Option):
  (1) Excavate test pits sufficiently in advance of trenching to enable adequate planning of construction procedure.
  (2) Locate as follows:
    (a) Where unstable material is suspected that may require special protective measures.
    (b) Where ground water may require special handling methods.
    (c) Where approved.
    (d) Where interference or conflict with other utilities or structures could affect alignment of pipe.
  (3) With lateral dimension not less than minimum trench width specified for location excavated.
  (4) To depth required to obtain information desired.

k. Fill Areas: Perform trenching in fill areas only after compacted fill has reached an elevation of not less than one foot above the top of the pipe.

3. Structures: Perform as specified for "Trenching," and as follows:
  a. Excavate area adequate to permit efficient erection and removal of forms.
  b. Trim to neat lines where details call for concrete to be deposited against earth.
  c. Excavate by hand in areas where space and access will not permit use of machines.
  d. Notify Engineer immediately when excavation has reached the depth indicated. Do not proceed further until approved.
  e. Restore bottom of excavation to proper elevation in areas overexcavated for structures supported by footings, with concrete.

J. BACKFILLING:

1. Trenches: Perform as specified for "Embankment," this section, with the following additional provisions:
  a. Complete promptly after approval to proceed.
    (1) Upon completion of pipe embedment.
    (2) Only after concrete encasement (when required) has attained 70 percent of design strength.
  b. Use hand methods to a plane 12 inches above top of pipe.
  c. Use approved mechanical methods where hand backfill is not required.
  d. Until compacted depth over conduit exceeds 3 feet, do not drop fill material over 5 feet. Distance may then be increased 2 feet for each additional foot of cover.
  e. Ensure thorough compaction of fill under and around the conduit for the full length.
  f. Accomplish without inundation or flooding.

g. Backfill failing to meet required densities shall be removed or scarified and recompacted as necessary to achieve specified results.
h. All backfill under existing utilities shall be granular pipe embedment, vibratory compacted to 70 percent relative density.

2. Granular Pipe Embedment:
   a. Materials shall be as follows:
      (1) For plastic pipe, bedding shall be as specified for granular bedding material.
      (2) For all other pipe, bedding shall be as specified for either granular bedding material or granular fill material.
   b. Place granular bedding to conform to the following:
      (1) Level bottom layer at proper grade to receive and uniformly support pipe barrel throughout its length.
      (2) Form depression under each joint such that no part of bell or coupling is in contact with trench when pipe is placed in position.
      (3) Add second layer simultaneously to both sides of the pipe with care to avoid displacement.
      (4) Complete promptly after approval to proceed.
      (5) Substitute for any part of earth backfill to within 2 feet of final grade at Contractor's option.
   c. Compact granular bedding as follows:
      (1) In lifts not exceeding 12 inches in compacted depth.
      (2) Rod, spade, or use pneumatic or vibratory equipment as follows:
         (a) As required to obtain not less than 70 percent relative density as determined by test methods specified.
         (b) Throughout depth of embedment.
   d. Include arch or total concrete encasement as follows:
      (1) In locations indicated or approved by Engineer.
      (2) Construct full width of trench.
      (3) Place 4000-psi concrete, plain or reinforced, conforming to DIVISION 3, as required.
      (4) Start and terminate encasement at a pipe joint.
      (5) Install keyed construction joints coincident with pipe joints at 30- to 36-foot intervals. Provide separation of at least 75 percent of cross-section area at construction joints. Do not run horizontal steel through joint.
      (6) Suitably support and block pipe to maintain position and prevent flotation.
      (7) Place promptly after installation of granular bedding.
      (8) Protect against damage by heavy equipment with layer of earth.
   e. Include concrete cradle as follows:
      (1) In locations designated by Engineer to reinforce unstable trench bottom.
      (2) Place on undisturbed trench bottom or on stabilized subbase.
      (3) Construct full width of trench.
      (4) Place 4000-psi concrete, plain or reinforced, conforming to DIVISION 3, as required.
      (5) Start and terminate cradle at a pipe joint.
      (6) Place without horizontal construction joints other than indicated.

(7) Suitably support and block pipe to maintain position and prevent flotation.
(8) Provide anchorage where approved.

3. Structures:
   a. Backfill only after concrete has attained 70 percent design strength.
   b. Backfill adjacent to structures only after, in the opinion of Engineer, a sufficient portion of the structure has been built to resist the imposed load.
   c. Remove all debris from excavation prior to placement of material.
   d. Use material free of gravel, rock, or shale particles larger than 2 inches within one foot of structure.
   e. Perform backfilling simultaneously on all sides of structures.
   f. Place backfill in level layers within compacting ability of equipment used.
   g. Exercise extreme care in the use of heavy equipment in areas adjacent to structures.
   h. Accomplish compaction without inundation or flooding.
   i. Compact as specified.

K. EMBANKMENT:
1. Placement:
   a. Place embankment to the contours and elevations indicated, using suitable approved material from excavations or borrow areas.
   b. Place fill material in 8-inch maximum layers (uncompacted depth) in areas requiring 95 percent compaction and in 12-inch maximum layers (uncompacted depth) in all other embankment areas.
   c. Place embankment only on ground surfaces which have been compacted by rolling, roughened by discing or scarifying to 6 inches deep, wetted or dried as required to obtain correct moisture content, and approved by Engineer.
   d. Do not place frozen earth in fill and do not place fill on a frozen surface.
2. Compaction: Obtain compaction by normal methods and equipment during the placing and grading of layers or to the minimum density specified for particular locations.
3. Perform any wetting or drying of the material as required to obtain the specified density when compacted and to maintain moisture content at time of placement to not more than one percent below or more than three percent above optimum as determined by AASHTO T99.

L. SUBGRADE PREPARATION:
1. General:
   a. Excavate or backfill as required to construct subgrades to the elevations and grades indicated.

b. Remove all unsuitable material and replace with approved fill material, and perform all wetting, drying, shaping, and compacting required to prepare a suitable subgrade.

2. Subgrade for Fills and Embankments: Roughen by discing or scarifying and wet or dry top 6 inches as required to ensure bond with fill or embankment.
3. Subgrade for Roadways, Drives, Parking Areas:
   a. Extend subgrade as indicated.
   b. Compact subgrade embankments to 90 percent except for the top six inches.
   c. Compact the top six inches of subgrades for traffic areas, including pond dike tops, in embankment or excavation to a minimum of 95 percent for cohesive and 80 percent for cohesionless soils as determined by test methods specified.
4. Subgrades for Concrete Slabs on Grade: Compact subgrade in embankment areas and in the top six inches in excavation areas to a minimum of 95 percent for cohesive and 80 percent for cohesionless soils as determined by test methods specified.

M. TOPSOILING:
1. Place topsoil on all outside slopes of pond dikes.
2. Subgrade Treatment:
   a. Clear site of vegetation heavy enough to interfere with proper grading and tillage operations.
   b. Clear surfaces of all stones or other objects larger than 3 inches in thickness or diameter, all roots, brush, wire, grade stakes, or other objectionable material.
   c. Loosen subgrade by discing or scarifying to a depth of 2 inches wherever compacted by traffic or other causes to permit bonding of the topsoil to the subgrade.
3. Placement:
   a. Distribute over required areas without compaction other than that obtained with spreading equipment.
   b. Place to extent material is available within following limits:
      (1) Not less than 4 inches in depth.
      (2) Do not exceed 6 inches in depth.
   c. Shape to contours shown.
   d. Grade to match contours of adjacent areas and permit good natural drainage.
4. After topsoil has been spread, clear surface of stones or other objects larger than 2 inches in thickness or diameter and all other objects that might interfere with planting and maintenance operations.
5. Protect topsoiled areas from the elements until grass is established. Repair eroded areas as required.
6. Keep paved areas clean. Promptly remove topsoil or other dirt dropped on surfacing.

N. FILTER BLANKET:
1. Foundation Preparation:

a. Areas on which filter blankets are to be placed shall be uniformly trimmed and dressed to conform to cross sections indicated within an allowable tolerance of plus or minus 2 inches from the theoretical slope lines and grades.
b. Where such areas are below the allowable minus tolerance limit they shall be brought to grade by filling with filter blanket material.
c. Slopes shall be approved by Engineer prior to placing filter blanket materials.

2. Placement of Filter Blanket Materials:
   a. Place on the slopes within the limits as indicated.
   b. Direct dump down the slope from the top shall not be permitted.
   c. Material shall be spread uniformly on the prepared base, in a neat and satisfactory manner to a thickness of six (6) inches.
   d. Placing or spreading of material by methods which will tend to segregate particle sizes within the filter will not be permitted.
   e. Any damage to the surfaces of the filter blanket foundation during the placing of the filter blanket material shall be repaired before proceeding with the Work.
   f. Compaction of the filter blanket material will not be required, but it shall be finished to present a reasonably even surface free from mounds, depressions or windrows.

O. RIPRAP:
1. Foundation Preparation:
   a. Trim and dress areas requiring riprap to conform to cross-sections indicated within an allowable tolerance of plus or minus 2 inches from the theoretical slope lines and grades.
   b. Where such areas are below the allowable minus tolerance limit, they shall be brought to grade by filling with riprap.
2. Placement of Riprap:
   a. Place on the slopes within the limits as indicated.
   b. Place riprap on the prepared base in such a manner as to produce a reasonably well-graded mass of rock with a minimum practicable percentage of voids.
   c. Place to its full course thickness in one operation in a manner to avoid displacing the base material.
   d. Finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Hand-place only if necessary to secure the desired results.
   e. A tolerance of plus or minus 4 inches from the slope lines and grades will be allowed to the extremes that such a tolerance shall not be continuous over an area greater than 200 square feet.
   f. Maintain the riprap protection until accepted and replace any material displaced by any cause.
3. Placement of Alternative Riprap Materials:
   a. Install Fabriform according to manufacturer's recommendations with a minimum six-inch thick mat thickness.
   b. Install sand-cement according to requirements of FDOT Standard Specifications for Road and Bridge Construction, Section 530 - Riprap. No filter blanket will be required with this material.

P. WEED KILLER:
1. Use in the following areas:
   a. Road subgrades and dike tops indicated to receive limerock surfacing.
   b. Interior pond subgrades indicated to receive bituminous liner material.
2. Shall be used in accordance with manufacturer's recommendations and all local, state, and federal regulations.

Q. MAINTENANCE AND REPAIR:
1. Maintenance:
   a. Protect newly graded and topsoiled areas from actions of the elements.
   b. Settling or erosion occurring prior to landscaping shall be filled and repaired and grades reestablished to the required elevations and slopes.
2. Correction of Settlement:
   a. Under provisions of the guarantee, Contractor is responsible for correcting any settlement in excess of the amount of the specified grading tolerance for the specific areas of embankments or backfill and damages created thereby within one year after acceptance of the Work.
   b. Make repairs within 10 days from and after due notification by Owner of embankment or backfill settlement and resulting damage.
   c. Make own arrangements for access to the site for purposes of repair.

R. BASE BID QUANTITIES:
1. Include in the base bid the quantities indicated and in addition include the following quantites:

Item	Estimated Quantity
a. Embankment material from stockpile east of the track hopper	130,000 CY
b. Topsoil material from stockpile northwest of coal pile runoff retention pond	1,200 CY

2. The Contract Price shall be adjusted in the final settlement using the unit prices in the Bid Form for adjusting the difference between the specified base bid quantities and the quantities actually provided.

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2B - NATURAL CLAY CONSTRUCTION

2B-1 GENERAL

A. DESCRIPTION:

1. This Section includes activities associated with the excavation and dewatering of an on-site clay borrow pit, and the installation of natural clay material in the following areas as base bid construction:
   a. Natural clay liner for the ash, sludge, and pump back cells.
   b. Natural clay liner for coal yard and coal pile runoff retention pond.
   c. Natural clay cutoff walls around, and liner in, secure landfill.
   d. Natural clay liner for ash landfill.
2. Related Work Specified Elsewhere:
   a. Site Preparation and Earthwork: SECTION 2A.
   b. Yard Piping: DIVISION 17.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American Association of State Highway and Transportation Officials Standard Method of Test (AASHTO):
      (1) T99 - The Moisture-Density Relations of Soils Using a 5.5-Pound (2.5-Kg) Rammer and a 12-Inch (305 mm) Drop.
   b. American Society for Testing and Materials (ASTM):
      (1) D2049 - Relative Density of Cohesionless Soils.
      (2) D2922 - Test for Density of Soil and Soil-Aggregate in Place by Nuclear Method.
      (3) ASTM 1970, 5th Edition, Special Procedures for Testing Soil and Rock for Engineering Purposes (STP479), "Burmister Method."
   c. U.S. Department of Interior, Bureau of Reclamation, Earth Manual, 2nd Edition, Designation E-12, Relative Density of Cohesionless Soils, Alternative Method.

C. COMPLIANCE SUBMITTALS:

1. Submit as specified in DIVISION 1.
2. Includes, but not limited to certified test results that material meets specifications.

2B-2 EQUIPMENT AND MATERIALS

A. MATERIALS:

1. Suitable clay material for liner construction shall be cohesive material, as specified in SECTION 2A, and shall conform to the following:
   a. AASHTO Classification Group A-2-6, or A-6, or, A-2-7
   b. Unified Classification CL, CH, SC, or OH.
   c. Generally free of rock and calcareous material.

2B - NATURAL CLAY CONSTRUCTION: continued

2. Suitable clay material for the cutoff wall construction shall generally conform to the above requirements except as follows:
   a. Material classified as AASHTO A-7-5 or A-7-6, and material with small amounts of calcareous material distributed through it will be allowed.
3. Cover material shall be as specified in SECTION 2A.
4. All materials shall be subject to approval of the Engineer.

B. EQUIPMENT:
1. All equipment shall be subject to approval of Engineer.
2. Compaction equipment shall be as specified in SECTION 2A.

2B-3 PERFORMANCE

A. BORROW PIT DEWATERING:
1. General:
   a. Perform as specified in SECTION 2A and as follows.
   b. Dewatering of surface sand layer and excavation in clay shall be continuous until completion of borrow operations.
   c. Control grading around excavations to prevent surface water from flowing into excavation areas.
      (1) Construct temporary dike around top edge of excavation as required to divert surface water. Minimum dike section shall be 18 inches high with 4-foot top width.
      (2) Make provisions to prevent surface water from entering through areas used as construction access ramps.
   d. Dewatering of surface sand layer shall be by underdrain system or wellpoint system, as specified below, at Contractor's option.
2. Underdrain System:
   a. Construct a trench as indicated to a depth of at least one foot into the underlying existing clay layer.
   b. Slope trench such that water will be conveyed to a collection point.
   c. Install in the trench a 6-inch diameter perforated pipe as indicated in Piping Design Table 93. Wrap pipe in Mirafi-140S filter cloth or approved equal.
   d. Backfill trench with cohesionless material having the following gradation:

Sieve Size	Percent Passing (by weight)
No. 4	90-100
No. 8	30-90
No. 16	0-30
No. 100	0-5

   e. Install a sump at the collection point and connect peripheral drain pipe to sump.
   f. Install a pump of adequate capacity to handle the flow of water into the sump.

2B - NATURAL CLAY CONSTRUCTION: continued

g. Keep sump dewatered at all times and pump water from sump to drainage channels which convey runoff to Temporary Construction Runoff Retention Pond No. 1.
h. Underdrain system may be left in place or removed after completion of borrow operations at Contractor's option.

3. Wellpoint System:
   a. Install perimeter wellpoint system so as to lower groundwater level to top of underlying existing clay layer.
   b. Construct a ditch at the top of the clay layer within the wellpoint system to collect water that passes beneath the wellpoints.
   c. Slope ditch such that water will be conveyed to a collection point and install a pump of adequate capacity to handle the flow of water.
   d. Keep ditch dewatered at all times and pump water from ditch to drainage channels which convey runoff to Temporary Construction Runoff Retention Pond No. 1.
   e. Remove entire wellpoint system after completion of construction.

B. EXCAVATION:
1. At Contractor's option, excavation for on-site borrow pit and for clay cutoff wall construction may be accomplished by using unbraced open-cut, sheeting and bracing, or a combination thereof.
2. Excavate borrow pit to lines and grades necessary to obtain clay required for construction. Keep operations within limits of borrow area indicated except with approval of Engineer.
3. Excavate for cutoff walls to a depth of at least two feet into the underlying existing clay layer.
4. Unbraced slopes shall be as flat as required to maintain sides of excavation throughout borrow operations, but in no case shall be steeper than 1.5 horizontal to 1 vertical. If slopes become unstable during excavation or while pit is open, Contractor must take immediate action to stabilize sides of excavation by installing sheeting and bracing, flattening slopes, or by other methods acceptable to the Engineer. This shall be done at no additional cost to the Owner.
5. Compact areas to be used as borrow pit access ramps as specified in SECTION 2A.

C. SHEETING AND BRACING:
1. Use as specified in SECTION 2A.
2. Use in areas other than those specified is at Contractor's option.

D. GRADING:
1. Place and compact embankment for pond dikes as specified in SECTION 2A.
2. Prepare all subgrades to receive clay, as specified in Article 2A-3.L.1., prior to placing clay liner.

E. CLAY PLACEMENT:

1. Clay material shall not be placed until authorized by the Engineer.
2. Place clay material on approved subgrade or in cutoff wall excavation in 8-inch maximum layers (uncompacted depth).
3. Compact clay to obtain a minimum density of 95 percent in the ponds, ash landfi secure landfill, and coal yard, and 90 percent in the cutoff wall as determined by AASHTO T99.
4. Perform any wetting or drying of the material as required to obtain the specified density when compacted and to maintain moisture content at time of placement to not more than one percent below or more than three percent above otpimum as determined by AASHTO T99.
5. Place and compact clay to lines and grades indicated.

F. TESTING:

1. After clay liner has been placed and compacted, percolation tests will be made by the Engineer on the pond bottoms, dikes, ash and secure landfill, and in the coal yard as required.
2. The seepage rate of finished liners shall not exceed the following rates per foot of water depth at any point:
   a. In the ash, sludge, and pump back ponds, the ash and secure landfills, 1×10^{-7} cm/sec.
   b. In the coal yard and coal pile runoff retention pond, 5×10^{-8} cm/sec.
3. In the event the percolation rate exceeds the specified value, the undesirable material shall be removed and replaced at no additional cost to the Owner.

G. COVER PLACEMENT:

6e 1. Cover material over clay layer in ponds landfills and coal yard, and dike above cutoff wall, shall not be placed until authorized by the Engineer.
2. Place material in 12-inch maximum layers (uncompacted depth).
3. Compact to a minimum density of 70 percent in all areas except top six inches of ramps, pond bottoms, coal yard, and landfills which shall be compacted to 80 percent as determined by test methods specified. Moisture content shall be maintained at the level necessary to achieve the specified density.
4. Place to lines and grades indicated.
5. Place filter blanket and riprap, as specified in SECTION 2A, on cover layer in ponds as indicated.

H. BORROW PIT CLOSURE:

1. Upon completion of borrow operations, backfill borrow pit with unsuitable material from excavations, designated stockpiles and waste areas.
2. Grade area to leave it free draining and with an orderly and neat appearance.
3. Seed area as specified in SECTION 2G.

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2C - BENTONITE SOIL SEALANT

2C-1 GENERAL

A. DESCRIPTION:
  1. This Section includes activities associated with the installation of a bentonite soil sealant to be used in the following construction (Alternative Bid No. 1):
    a. Liner for ash, sludge and pump back cells.
    b. Liner for coal yard and coal pile runoff retention pond.
    c. Liner for secure landfill.
    d. Liner for ash landfill.
  2. Related Work Specified Elsewhere:
    a. Site Preparation and Earthwork: SECTION 2A.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Association of State Highway and Transportation Officials Standard Method of Test (AASHTO).
      (1) T180 - Moisture-Density Relations of Soils Using a 10-pound (4.54 Kg) Rammer and an 8-inch (457 mm) Drop.
    b. American Society for Testing and Materials (ASTM):
      (1) D2049 - Relative Density of Cohesionless Soils.
      (2) D2922 - Test for Density of Soil and Soil-Aggregate in Place by Nuclear Method.
      (3) ASTM 1970, 5th Edition, Special Procedures for Testing Soil and Rock for Engineering Purposes (STP 479), "Burmister Method."
    c. U.S. Department of Interior, Bureau of Reclamation, Earth Manual, 2nd Edition, Designation E-12, Relative Density of Cohesionless Soils, Alternative Method.

C. SUBMITTALS:
  1. Information to be submitted with bid:
    a. Modified bentonite manufacturer:
      (1) Name.
      (2) History of past projects.
    b. Manufacturer's standard catalog information.
    c. Qualifications of contractor who will perform bentonite installation which shall include completion of at least two projects of similar scope and magnitude. Names of Owners and locations of previous projects to be included with information.
    3 d. Guarantee:
      (1) Fully guarantee all materials and workmanship to meet specified liner permeability requirements for a period of not less than thirty (30) years under normal operation and weathering.

      (2) Guarantee to be submitted with bid in writing.
  2. Compliance Submittals:
    a. Submit as specified in DIVISION 1.
    b. Includes, but not limited to, certified test results for all testing done during construction.

2C-2 EQUIPMENT AND MATERIALS

A. MATERIALS:

1. General Requirements:
   a. Material shall be a free-flowing, high-swelling Wyoming-type sodium bentonite soil sealant.
   b. All material shall be first-quality products selected specifically for the purposes of this work and which have been satisfactorily demonstrated by prior use to be suitable and durable for containing contaminated wastes from the areas specified to be lined.
2. Acceptable Products:
   a. Volclay PLS-50, manufactured by American Colloid Co., Stokie, Illinois.
   b. International Seal, manufactured by International Minerals and Chemical Corp., Detroit, Michigan.
   c. Or Approved Equal.
3. Cover material shall be as specified in SECTION 2A.
4. All materials shall be subject to approval of the Engineer.

B. EQUIPMENT:

1. Spreading equipment shall be an agricultural seed or lime spreader.
2. Mixing equipment shall be a rotary mill or drum mixer.
3. Compaction equipment shall be a vibratory compactor or, either a flat-steel wheel roller or a sled-type compactor which has been approved by the Engineer after a demonstration of its effectiveness. Sheepsfoot rollers will not be allowed.
4. Other suitable equipment may be used with approval of the Engineer.

2C-3. PERFORMANCE

A. SHIPMENT AND STORAGE:

1. Conform to the applicable requirements of DIVISION 1 for shipment.
2. Contractor shall be responsible for protecting bulk or bagged material stored on-site from action of the elements.

B. MANUFACTURER'S FIELD SERVICES:

1. Provide as specified in DIVISION 1.
2. Manufacturer's field services shall be required during installation of the modified bentonite.

C. TESTS:

1. Earthwork compaction tests as specified.
2. Percolation tests will be made by the Engineer on the lined areas as required.
3. Seepage rate of finished liners shall not exceed 1×10^{-7} cm/sec per foot of water depth at any point on ash, sludge, and pump back pond bottoms, inside slopes of dikes, and secure and ash landfills, and 5×10^{-8} cm/sec in the coal yard and coal pile runoff retention pond.
4. In the event the percolation rate exceeds the specified rate, the undesirable material shall be removed and be replaced with modified bentonite-treated material at no additional cost to the Owner.

D. INSTALLATION:

1. Material shall be installed by Contractor in strict accordance with Engineer-approved manufacturer's recommendations.
2. Material shall not be placed until authorized by the Engineer.
3. Material shall be applied in pure form with no foreign materials intermixed.
4. bentonite seal shall be installed as follows:
   a. The top 6 inches (minimum) of the areas designated to receive modified bentonite shall be Unified Soil Classification SM type soil compacted to 85 percent maximum density as determined by AASHTO T180 at optimum moisture content ±2 percent.
   b. Spread modified bentonite over the entire surfaces to receive modified bentonite treatment as follows:
      (1) In the amount of 215 lbs per 100 square feet in an east-west direction and 215 lbs per 100 square feet in a north-south direction in the ash, sludge, and pump back ponds.
      (2) In the amount of 200 lbs per 100 square feet in an east-west direction and 200 lbs per 100 square feet in a north-south direction in the ash and secure landfills.
      (3) In the amount of 210 lbs per 100 square feet in an east-west direction and 210 lbs per 100 square feet in a north-south direction in the coal yard and coal pile runoff retention pond.
   c. The modified bentonite shall be thoroughly mixed into the top 4 to 6 inches of soil by means of the equipment specified to satisfaction of Engineer.
   d. Compact the modified bentonite-treated mixture to 85 percent of maximum density as determined by AASHTO T180 at optimum moisture content ±2 percent.
   e. Minimum compacted layer thickness shall be 4 inches.
   f. Contractor shall work only on an area that can be completed in one working day.
5. Seal around structures, pipes, and appurtenances as follows:
   a. Structures to be installed as indicated and as specified.
   b. Material around interior pond, landfill, or coal yard structures to be installed as indicated.
   c. Soil to be thoroughly intermixed with bentonite in the amount of 1 part bentonite to 4 parts soil, by volume, prior to backfilling.
      (1) Soil and bentonite shall be blended dry.
      (2) Hand apply and hand compact dry mixture as specified herein.
   d. Backfill material shall be placed as specified in DIVISION 2.
6. Cover material:
   a. Install only after authorization of Engineer.
   b. Install so as not to damage bentonite-treated material.
   c. Place material in 12-inch maximum layers (uncompacted depth).
   d. Compact to a minimum density of 80 percent relative density, in the top six inches of the ramps, pond bottoms, coal yard, and landfills, and 70 percent relative density in all other areas as determined by test methods specified. Moisture content shall be maintained at the level necessary to achieve the specified density.
   e. Place to lines and grades indicated.
   f. Place filter blanket and riprap, as specified in SECTION 2A, on cover layer in ponds as indicated.

2C - BENTONITE SOIL SEALANT: continued

7. All bentonite soil-sealant liners to be hydrated with fresh water as required by bentonite manufacturer immediately after installation of cover material.

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2D - BITUMINOUS LINER MATERIALS

2D-1 GENERAL

A. DESCRIPTION:

1. This Section includes hot-mix asphaltic concrete liner materials, mixed-in-place bitumious base materials, equipment, placement, and testing to be used for lining the ash, sludge, and pump back ponds (Alternative Bid No. 2).
2. Related Work Specified Elsewhere:
   a. Site Preparation and Earthwork: SECTION 2A.
   b. Bituminous Prime and Tack Coat: SECTION 18B.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American Society for Testing and Materials (ASTM):
      (1) C29 - Test for Unit Weight of Aggregate.
      (2) C117 - Test for Materials Finer than No. 200 Sieve in Mineral Aggregates by Washing.
      (3) C127 - Test for Specific Gravity and Absorption of Coarse Aggregate.
      (4) C128 - Test for Specific Gravity and Absorption of Fine Aggregate.
      (5) C131 - Test for Abrasion of Coarse Aggregate by Use of the Los Angeles Machine.
      (6) C136 - Test for Sieve or Screen Analysis of Fine and Coarse Aggregate.
      (7) C183 - Sampling Hydraulic Cement.
      (8) D75 - Sampling Stone, Slag, Gravel, Sand, and Stone Block for Use as Highway Materials.
      (9) D140 - Sampling Bituminous Materials.
      (10) D242 - Mineral Filler for Sheet Asphalt and Bituminous Concrete Pavements.
      (11) D977 - Emulsified Asphalt.
      (12) D979 - Standard Methods of Sampling Bituminous Paving Mixtures.
      (13) D1559 - Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.
   b. American Association of State Highway and Transportation Officials (AASHTO):
      (1) M29 - Sand for Bituminous Mixtures.
      (2) M6 - Vitified Clay Pipe, Extra Strength, Standard Strength and Perforated.
      (3) T101 - Standard Method of Determining Swell Characteristics of Aggregates when Mixed with Bituminous Materials.
      (4) T102 - Spot Test of Asphaltic Materials.
   c. Federal Specifications (FS):
      (1) SS-A-706(D) - Asphalt, Petroleum: Road and Pavement Construction. (Asphalt Cement)
   d. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction:
      (1) Section 320 - Hot-Bituminous Mixtures - Plant, Methods and Equipment.

C. SUBMITTALS:

1. Samples: Furnish samples as specified. Samples shall be delivered to the laboratory designated by the Engineer. Sampling shall be under the observation of the Engineer when required.
   a. Furnish samples of aggregates and asphalt cement to be used in the Work at least 30 days prior to beginning production of the mixed-in-place bituminous base and the hot-mix asphaltic concrete liner mixtures. Sampling methods shall conform to the following:
      (1) Asphalt cement: ASTM D140.
      (2) Coarse and Fine Aggregates: ASTM D75.
      (3) Mineral Filler: ASTM C183, paragraphs 3, 4, and 6.
   b. Furnish at least one sample from each 300 tons of the hot-mixed asphaltic concrete liner being produced. Sampling method shall conform to ASTM D979.
   c. Completed Liner: Core or saw undamaged samples of the size and number required by the Engineer.
      (1) Take samples in sets of three at locations designated by Engineer.
      (2) Replace liner material at sample locations with fresh bituminous mixture and thoroughly compact repaired area.
   d. Furnish additional samples prior to and during construction of the number and size requested by the Engineer.
2. Job-Mix Formula: Hot-mixed Asphaltic Concrete Liner Material.
   a. Formula shall indicate the definite percentage of each sieve fraction, percentage of asphalt, and the temperature of the completed mixture as it is to be discharged from the mixer.
   b. Formula shall be furnished by Contractor 30 days prior to beginning production of paving mixtures, and approved by Engineer following testing of the aggregates and bitumen before any bituminous mixtures are manufactured.
   c. Formula shall permit adjustments of the bitumen content and aggregate gradation within the limits of the gradation table specified to improve the paving mixtures as required by Engineer.
   d. Restrict formula to values such that application of the following tolerances will not cause the limits in the gradation table to be exceeded.

Material	Hot-Mixed Asphaltic Concrete Liner
Aggregate passing No. 4 sieve or larger	±4 percent
Aggregate passing No. 10 and 40 sieves	±3 percent
Aggregate passing No. 200 sieve	1.0 percent
Asphalt	±0.3 percent

D. TESTING:

1. Engineer will test all materials and mixes to determine conformance with these specifications. Tests will be performed without cost to the Contractor.

E. JOB CONDITIONS:

1. Weather Limitations: Hot-mix asphaltic concrete and mixed-in-place bituminous base shall not be mixed or placed when the ambient temperature is below 40 degrees F.

2D-2 EQUIPMENT AND MATERIALS

A. EQUIPMENT:

1. Maintain all equipment, tools, and machines used in the performance of the Work required by this Section in a satisfactory working condition at all times.
2. Equipment shall be industry standard equipment designed to accomplish the work for which it is used.
3. Equipment shall conform to FDOT Section 320.
4. All equipment shall be subject to the approval of the Engineer.

B. MATERIALS:

1. Aggregates:
   a. Hot-Mix Asphaltic Concrete Liner
      (1) General Requirements: Aggregate shall be inert, noncarbonate crushed stone, crushed gravel, crushed vitrified clay pipe, screenings, sand, and mineral filler, as approved by Engineer prior to use in the work, and defined as follows:
         (a) Coarse Aggregate - Retained on a No. 10 sieve.
         (b) Fine Aggregate - Passing the No. 10 sieve and retained on a No. 200 sieve.
         (c) Mineral Filler - Passing a No. 200 sieve.
         (d) Aggregate shall not contain more than 0.75 percent soft fragments nor more than 0.5 percent clay, coal or lignite.
      (2) Coarse Aggregate:
         (a) Crushed stone shall consist of inert, noncarbonate, clean, sound, durable fragments free from an excess of soft, or disintegrated pieces, dust, dirt, or other objectionable matter.
         (b) Crushed gravel shall be sound, durable, free from adherent coatings of clay, dirt, dust, and other objectionable matter. Crushed gravel shall contain at least 75 percent by weight of crushed pieces having two or more fractured surfaces.
         (c) Crushed Vitrified Clay Pipe shall conform to AASHTO M65 and shall be resistant to sulfuric acid.
         (d) Particle shape shall be generally spherical or conical and contain not more than 20 percent by weight of flat and elongated particles defined as follows:
            1. Flat particle - Ratio of width to thickness greater than three.
            2. Elongated particle - Ratio of length to width greater than three.
         (e) Percentage of wear shall not exceed 40 after 500 revolutions as determined by ASTM C131.
      (3) Fine Aggregate:
         (a) Fine aggregate shall be angular and may be any approved combination of natural sand and manufactured sand prepared by crushing stone.

(b) Natural sand content shall be restricted as required to produce a mixture having the specified Marshall test properties.
(c) Fine aggregate shall conform to AASHTO Standard M29 except as follows:
1. Aggregate or combinations which do not conform to the gradation table in paragraph 3 of AASHTO M29 may be used, provided the finished mixture conforms to the gradation or gradations specified.

(4) Mineral Filler: Mineral filler shall conform to ASTM D242.
(5) Swell Test (for Bituminized Aggregate): Test shall conform to AASHTO Standard T101. Aggregate shall not swell more than 1.5 percent.
(6) Stripping Test (for Aggregates): Test shall show no detrimental amount of stripping when tested as follows:
(a) Mix sample of aggregate and bitumen to be used at the temperature specified, then spread in a loose, thin layer and allow to air season for 24 hours.
(b) Place portion of the sample, not over one-half the capacity of the jar, in a glass jar and completely cover with distilled water.
(c) Fit jar with tight screw cap and allow to stand for a period of 24 hours.
(d) Shake jar vigorously for a period of 15 minutes.
(e) Examine sample of the mixture for stripping.
(f) If stripping occurs, the aggregate will be rejected or an acceptable method of treatment specified to change the material from a hydrophilic to hydrophobic state as requested by Engineer.

b. Mixed-in-place bituminous base:
(1) General Requirements: Aggregate shall be sands in the ash pond area as approved by the Engineer.
(2) Sands shall be free from an excess of soft, or disintegrated pieces, dust, dirt, or other objectional matter.

2. Asphalt:
a. For hot-mixed asphaltic concrete liner asphalt cement shall conform to FS SS-A-706D AC-20 (penetration grade 60-70) and show a negative spot when subjected to the spot test specified in AASHTO T102, using the standard naptha specified in paragraph 3.
b. For mixed-in-place bituminous base emulsified asphalt shall conform to ASTM D977, Type SS-1.

C. MIXES:
1. Hot-mixed asphaltic concrete liner:
a. Composition of the Mix: Hot-mixed asphaltic concrete mixtures shall consist of aggregates and asphalt cement within the following limits:

A S P H A L T M I X T U R E S

Sieve Designation (Square Opening)	*Percentage Passing (By Weight) Type A	Type B	Type C
3/4-inch	100	100	-----
1/2-inch	85-100	95-100	-----
3/8-inch	-----	-----	100

No. 4	55-80	60-80	90-97
No. 8	-----	45-60	70-85
No. 10	35-60	-----	-----
No. 30	-----	28-39	45-52
No. 40	18-30	-----	-----
No. 100	-----	16-25	20-28
No. 200	5-12	8-15	10-16
Asphalt Cement	6.5-9.0	6.5-8.5	7.5-9.5

*Based on uniform specific gravities.

b. Aggregate Gradations: Gradation of aggregate shall be determined conforming to ASTM C117 and C136.

c. Mixture Test Properties: Laboratory test specimens of the mix, combined in proportions of the job-mix formula, will be tested by the Engineer in accordance with ASTM D1559. Test properties shall be as follows for the liner mixture:

Marshall Stability .... 1200 minimum
Number of compaction blows 75
Marshall flow 8-16
Percent air voids - laboratory specimen.........3-5
Percent voids filled with asphalt........... 75-82

2. Mixed-in-place bituminous base shall consist of existing sands mixed with 14 percent ± 2 percent of emulsified asphalt (SS-1).

2D-3 PERFORMANCE

A. PREPARATION OF MIXTURE:

1. Hot-mix asphaltic concrete liner shall be produced in a mixing plant conforming to FDOT SECTION 320.
   a. Preparation of mixture shall be as specified in FDOT SECTION 330-6.
   b. Temperature of the mix as it is discharged from the mixer shall be 300 degrees F ±25 degrees F.
2. Mixed-in-place bituminous base shall be prepared by one of the following methods:
   a. Grader and Road-Mixer Method.
      (1) Windrow aggregate material that is to receive the bituminous material.
      (2) Flatten windrow of aggregate and apply bitminous material by means of a pressure distributor.
      (3) First application of bituminous material shall not exceed one-half of the total quantity required and there shall be at least three applications of the bituminous material.
      (4) Mixing operation shall be carried on in the central portion of the base.
      (5) Reshape windrow to a uniform cross-section as necessary before subsequent applications of bituminous material so that bituminous material will be applied to the mixed material at a uniform rate.
      (6) Before mixing with a grader, the treated aggregate shall be given a preliminary mixing with either a spring-tooth harrow, a disk, or a

rotary speed mixer immediately after each application of bituminous material.
(7) When using a road mixer, the treated aggregate shall be mixed after each application of bituminous material.
(8) Continue mixing until the mixture is free from lumps, homogeneous, and of uniform color.
(9) Mixing shall be performed in such a manner as to prevent segregation of the various aggregate sizes or loss of the fine aggregate, and to agitate the entire mixture without distrubing the base.
(10) More bituminous material or aggregate may be added after mixing at Engineer's direction if mixture does not contain the proper amount of bituminous material.
(11) After preparation, the bituminous mixture shall be windrowed on one side of the area to be lined.

b. Traveling - Plant Method
(1) Windrow aggregate material that is to receive the bituminous material.
(2) The application of the bituminous material shall be made so that the resulting mixture will be homogeneous and uniform in color.
(3) If one operation of the traveling plant does not produce a uniform bituminous mixture, the windrow shall be remixed with the traveling plant, grader, road mixer, or by other methods approved by the Engineer.
(4) More bituminous material or aggregate may be added after mixing at Engineer's direction if mixture does not contain the proper amount of bituminous material.

B. TRANSPORTATION OF HOT-MIXED ASPHALTIC CONCRETE LINER MATERIAL:
1. Haul trucks shall be as specified in PART 2D-2. Provide trucks of such size, operating speed, and condition to ensure orderly and continuous operation.
2. When necessary to prevent adhesion of mixture to truck beds, coat truck beds with a minimum quantity of paraffin oil, lime solution, or other approved material.
3. Haul trucks shall make no direct frame contact with the paver, and shall not bear down on the paver during dumping operations.
4. Deliveries shall be made so that spreading and rolling of all the mixture prepared for a day's run can be completed during daylight.
5. Deliver to the area to be paved in such a manner that the temperature at the time of dumping into the spreader will not be less than hereinafter specified.
6. Hauling over freshly laid material will not be permitted.
7. Loads wet excessively by rain will be rejected.

C. PLACING MIXTURE:
1. Subgrade: Prepare as specified in SECTION 18B.
2. Mixed-in-place bituminous base:
a. Spread windrow of mixture uniformly upon the base.
b. Spreading shall be done in such a manner that segregation will be kept to a minimum.
c. The finished surface will be smooth and of uniform texture.

d. Care shall be taken to smooth out junctions of successive operations.
e. Unless the mixture can be spread to the final cross section and compacted the same day as mixed, it shall be left in the windrow.

3. Hot-mixed Asphaltic Concrete Liner.
   a. Temperature of Mixture shall be within the range determined by Engineer and not be less than 235 degrees F when dumped into the mechanical spreader or it will be rejected.
   b. Automatic screed controls shall be actuated by the following grade references installed by Contractor:
      (1) An erected stringline on each side of the first strip placed in each course, independently actuating screed control mechanisms on each side of the paver.
      (2) A traveling stringline operated on the adjacent completed strip, and an erected stringline on the subgrade or previously completed pavement course, independently actuating screed control mechanism on each side of the paver for the second and all successive strips of each course.
      (3) Erected stringlines will be required on only one side of the first paving strip of each course for all pavements having a width of 24 feet or less providing automatic slope controls produce finish transverse slopes within the specified tolerances for smoothness and grade.
   c. Adjust spreader and regulate speed so the surface of the course is smooth and of such depth that when compacted it will conform to the cross section, grade, and contour as indicated.
   d. Paving Strips:
      (1) Begin on high side of a section of an area with a one-way slope.
      (2) Place in strips with a minimum width of 10 feet.
      (3) Roll, leaving a 6-inch unrolled strip adjacent to the area on which additional material is to be laid, except when the work is to be discontinued.
      (4) Place strips in succeeding order while the unrolled 6-inch section of the adjoining strip is hot and in a readily compactable condition, and roll.
      (5) Paving strips shall be of such length as determined by Engineer, before placing the succeeding strips.
      (6) Place material as nearly continuous as possible.
      (7) Paving strips shall be as approved by Engineer.
   d. Handwork:
      (1) Use a sufficient number of experienced shovelers and rakers following the spreading machine to produce a course that will conform to all requirements specified.
      (2) In areas where use of machine spreading is impractical, place mixture on dumpboards outside the area to be paved, distribute by hot shovels and spread with hot rakes in a uniformly loose layer of such thickness that when compacted it will conform to the required grade and thickness.
      (3) Rakers shall not be permitted to stand in hot mix without stilt sandals.
   e. Contact Surfaces:
      (1) Defined as previously constructed.

(2) Coat with a thin coat of hot bituminous material prior to placing the bituminous mixture.

D. COMPACTION OF MIXTURES:

1. Rollers:
   a. Use three-wheeled, pneumatic and steel-wheeled rollers as approved by the Engineer.
   b. Begin as soon after placing as mixture will bear the roller without undue displacement. Delays in rolling freshly-spread mixture will not be permitted.
2. Operation of Rollers:
   a. Only competent and experienced men shall operate rollers.
   b. Do not exceed speeds of 3 miles per hour for steel-wheeled rollers and 5 miles per hour for pneumatic rollers, and at all times speed shall be slow enough to avoid displacement of the mixture.
   c. Moisten wheels to prevent adhesion of the mixture to the wheels, but an excess of water will not be permitted.
   d. Provide a minimum of one steel-wheeled roller.
   e. Pass over the unprotected edge of the course only when the laying of the course is to be discontinued for such length of time as to permit the mixture to become cold.
3. Mixed-in-place bituminous base.
   a. Roll surface longitudinally.
   b. Rolling shall start at the edges and progress toward the center.
   c. Successive trips shall overlap by at least 1/2 the width at the roller.
   d. Roll entire surface twice in this manner, unless additional rolling is directed by the Engineer.
4. Hot-mixed Asphaltic Concrete Liner
   a. Rolling Order: Roll pavement in the following order:
      (1) Transverse joints (on pond bottoms only).
      (2) Longitudinal joints at adjacent completed paving strip.
      (3) Outside edge of first and last paving strips not adjacent to completed pavement.
      (4) Breakdown rolling beginning on the low side and progressing toward the high side.
      (5) Second rolling beginning at the low side and progressing toward the high side.
      (6) Finish rolling.
   b. Joint Rolling:
      (1) Roll joints directly behind the paving operation.
      (2) Make first pass with approximately a 6-inch width of roll on the joint and the remainder supported by the previously completed mat.
      (3) Shift position of roll on joint in 6- to 8-inch increments on successive passes and continue rolling until a thoroughly compacted neat joint is obtained.
   c. Breakdown Rolling:
      (1) Use either steel-wheeled or pneumatic rollers.
      (2) Operate with drive wheels or rolls nearest the paver.
      (3) Roll as close to the paver as possible without causing undue displacement of the mat.

d. Second Rolling:
(1) Use pneumatic or vibratory rollers specified.
(2) Accomplish while paving mix is still at a temperature that will result in maximum density and following breakdown rolling as closely as possible.
(3) Continue rolling until the mix is thoroughly and uniformly compacted to the specified density but make not less than three complete coverages of the mat.

e. Finish Rolling:
(1) Use two-axle or three-axle tandem rollers specified.
(2) Roll while mat is of sufficient temperature to permit removal of roller marks.
(3) Continue rolling until all roller marks have been removed and a uniform surface texture is obtained.

f. Hand Tampers:
(1) Use in all places not accessible to the rollers.
(2) Weight of tamper shall not be less than 25 pounds, with a tamping face of not more than 50 square inches.
(3) Use while mixture is hot.

5. Repair:
a. Repair any mixture that becomes mixed with foreign material or is in any way defective.
b. Remove and replace with fresh mixture and compact to the density of the surrounding area.
c. Do not skin-patch an area that has been rolled.

E. JOINTS:
1. General Requirements:
a. Joints shall present the same texture, density, and smoothness as other sections of the course.
b. Carefully make joints in such manner as to ensure a continuous bond between the contact surface of the course.
c. Paint with a thin, uniform coat of hot bituminous material just before the fresh mixture is placed on all contact surfaces of previously constructed pavements.
d. Transverse joints will not be allowed in pavement on slopes. Paving will be performed in such a manner that paving strips will be continuous from top to toe of slopes.

2. Transverse Joints (on pond bottoms only):
a. Pass roller over the unprotected end of freshly laid mixture only when the laying of the course is to be discontinued or for hot-mixed asphaltic concrete liner when delivery of mixture is interrupted to the extent that the unrolled material may become cold.
b. Cut back previously laid course to expose an even, vertical surface for the full thickness of the course.
c. Rake fresh material against the joint, thoroughly tamping with hot tampers, and smoothing with hot smoothers, followed by rolling.

3. Longitudinal Joints:
a. Cut back edge to expose an even vertical surface for the full thickness of the previously laid course prior to constructing the adjacent base or liner.

b. Rake fresh mixture against the joint, thoroughly tamping for hot-mixed asphaltic concrete tamp with hot tampers and smoothing with hot smoothers. After tamping roll joint thoroughly.
c. Joints shall not be irregular, honeycombed, or poorly compacted.

F. PROTECTION OF PAVEMENT:
1. Protect base and liner from all traffic of any kind until it has cooled and hardened, and in no case less than six hours.

G. SURFACE SMOOTHNESS:
1. Tests:
a. Make tests after completion of the final rolling.
b. Correct the irregularities that exceed the specified tolerances or that retain water on the surface, as requested by Engineer.
2. Tolerances:
a. Measure with a 10-foot straightedge, applied both parallel and at right angles to the centerline of the paved area.
b. Smoothness tolerances shall be:
(1) Liner - ±1/4-inch.
(2) Base - ±1/4-inch.

H. DENSITY:
1. Density of completed hot-mixed asphaltic concrete liner shall be equal to or greater than 97 percent of the density of a laboratory specimen made from the same day's mixture and compacted in accordance with ASTM D1559.

J. WAYBILLS AND DELIVERY TICKETS:
1. Submit waybills and delivery tickets to Engineer for each load of paving mixture placed in completed portions of the project.
a. Submit at the end of each day pavement is placed.
b. Submit as each load is dumped in the hopper of the paver when requested by Engineer.
2. Submit waybills and refinery analysis for each load of bituminous material on the day received.
a. Certificates shall indicate:
(1) Penetration.
(2) Specific gravity.
(3) Temperature.
(4) Net weight or gallonage of shipment.

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2E - SLURRY WALL CONSTRUCTION

2E-1 GENERAL

A. DESCRIPTION:
1. This Section includes activities associated with the installation of soil-bentonite (S-B) slurry cutoff walls for seepage control around the secure landfill cell. (Alternative Bid No. 3.)
2. Installation of the slurry walls shall be performed by, or under the supervision of, a qualified slurry trench contractor.
3. Inspection and testing of the slurry trench shall be performed by an independent consultant, retained by the Contractor, and acceptable to the Engineer:
   a. Acceptable consultant: Resource Management Products, 2940 Malmo Drive, Arlington Heights, Illinois 60005, Mr. Edward H. Grody.
4. Related Work Specified Elsewhere:
   a. Site Preparation and Earthwork: SECTION 2A.
   b. Yard Piping: DIVISION 17.

B. QUALITY ASSURANCE:
1. American Society for Testing and Materials (ASTM):
   a. C143 - Slump of Portland Cement Concrete.
2. American Petroleum Institute (API):
   a. 13A - Oil-Well Drilling - Fluid Materials.
   b. RP-13B - Standard Procedure for Testing Drilling Fluids.

C. SUBMITTALS:
1. Information to be submitted with bid:
   a. Name of slurry trench contractor.
   b. Qualifications of slurry trench contractor which shall include the following:
      (1) At least three years' experience in slurry trench construction.
      (2) Completion of at least two projects of similar scope and magnitude. Names of Owners and locations of previous projects to be included with information.

A4 2. Guarantee:
   a. To be submitted in writing with bid.
   b. Fully guarantee all materials and workmanship to meet the required maximum permeability of 1×10^{-7} cm/sec. for a period of not less than 10 years.
3. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Includes, but not limited to, the following:
      (1) Certification that materials meet specifications.
      (2) Test Results: Independent lab or consultant.

2E-2 EQUIPMENT AND MATERIALS

A. EQUIPMENT:
1. All equipment shall be subject to the approval of the Engineer.

2E - SLURRY WALL CONSTRUCTION: continued

2. Trenching equipment shall have the capability of excavating trench to the required depths.
3. The width of the excavating bucket shall be at least the specified width of the cutoff wall.

B. MATERIALS:
1. Bentonite used in preparing slurry shall be pulverized natural Wyoming sodium bentonite and shall meet API Standard 13A.
2. Potable water shall be used to manufacture slurry. If water other than potable water is proposed for use, it shall be the responsibility of the Contractor that the resulting slurry meets the necessary standards to ensure a stable excavation.

2E-3 PERFORMANCE

A. MIXING SLURRY:
1. Bentonite slurry shall be a stable colloidal suspension of pulverized Wyoming sodium bentonite in water.
2. The bentonite will be initially mixed with water in a centrifugal digestor, colloidal mixer, venturi flash-mixer, or any method that achieves complete dispersion of the bentonite particles.
3. After mixing, the slurry shall be allowed to hydrate before introduction into the trench, hydration being defined as the stabilizing of the viscosity and filtrate loss properties.
4. Hydration may be accomplished by:
   a. Maintenance of high speed circulation until process is complete.
   b. Storage in a tank or pond with a low speed circulation system.
5. Slurry shall be stored under essentially constant circulation until used.

B. TESTING:
1. The following properties shall be measured according to procedures defined in API RP-13B:
   a. Viscosity.
   b. Filtrate loss.
   c. Specific gravity.
2. The properties of the slurry in the trench shall be within the following optimum ranges:
   a. The viscosity shall not be less than 40 seconds Marsh at 68 degrees F.
   b. The filtrate loss shall not be more than 30 ml in 30 minutes.
   c. The specific gravity of the slurry shall not be less than 1.03 gm/cc nor greater than 1.30 gm/cc.
   d. The pH of the slurry shall not be less than 8.
   e. If the properties of the slurry in the trench do not meet the requirements, the addition of recently made slurry shall be required for correction.
   f. Addition of water will not be permitted.

C. EXCAVATION:

1. Excavation shall be carried to final depth at the point where excavation is started and entire depth of cut shall be carried along the trench line.
2. Slurry shall be introduced into the trench at the beginning of excavation.
3. The level of the slurry shall be maintained above the existing ground water level and not more than 3 feet below the top of the trench at all times during excavation.
4. Stability of the excavated trench shall be maintained at all times for its full depth.
5. The rate of trench excavation shall be such that the excavation is at least 75 feet from the toe of the backfill being placed in the trench.
6. Material suitable for backfilling the trench shall be stockpiled for reuse. Stockpiles shall be located so that slurry draining from the excavated material will not contaminate natural surface runoff.
7. The Contractor shall provide a suitable measuring device, with projecting markers at 1-foot intervals, and shall probe the entire bottom of the trench under the observation of the Consultant.
8. The slurry cutoff trench shall be keyed into the underlying existing clay layer to a minimum depth of 3 feet.
9. When the bottom of the slurry trench has been reached, the foundation surface shall be checked for boulders, gravel, or excessive sediment. Any such material encountered shall be removed by an air lift pump, clamshell, or similar equipment.
10. If the density of the slurry exceeds the specified limits, or becomes unworkable, the slurry shall be cleaned by recirculating, screening, or other approved method to decrease the sand content.

D. TRENCH BACKFILL:

1. Preparation:
   a. Material for trench backfilling shall be composed of a mixture of slurry and soils obtained from the excavation of the trench or from an approved borrow source.
   b. Backfill shall consist of well-graded silty or clayey sands with a minimum of 20 to 30 percent plastic fines.
   c. Minimum bentonite content shall be 1 percent.
   d. Soil shall be thoroughly mixed with the slurry to form a homogenous mass just prior to the backfilling operation. The mass shall be free from lumps of clay or silt and pockets of sand and gravel.
   e. Sluicing with water shall not be permitted.
   f. A sufficient amount of slurry shall be added to the backfill to produce a slump cone reading of 3 to 6 inches tested in accordance with ASTM C 143-66.
2. Placement:
   a. No backfill material shall be placed until trench has been inspected and approved by the Consultant.
   b. Initially, backfill shall be placed by lowering the material to the bottom of the trench in a clamshell bucket until the surface of the backfill rises above the slurry level in the trench and a slope at the

angle of repose has been formed from the bottom of the trench to the surface.

c. Free dropping of backfill material into the trench, or any other backfilling operation which will produce segregation of the material, shall not be permitted.

d. Backfill material shall be pushed into the trench in a manner that will cause the material to slide progressively down the slope of previously placed backfill.

e. Backfilling operations shall follow the excavation operations as closely as possible to minimize sloughing and at no time shall the bottom of the excavation be farther than 200 feet ahead of the toe of the backfill.

f. If necessary, the excavation shall be delayed sufficiently to permit backfilling operations to catch up.

g. All pipes penetrating walls shall be installed after placement of backfill:

(1) Use shoring to maintain trench through wall.

(2) Replace backfill and repair liner as required to ensure tie-in to walls.

h. Crossing structures shall be installed as indicated after installation of the slurry walls.

3. Permeability of the finished wall shall not exceed 1×10^{-7} cm/sec.

E. CLEANUP:

1. After completion of wall construction, all remaining materials shall be disposed of as follows:

a. Excess slurry shall be removed from the site.

b. Excess suitable material from trench excavation shall be stockpiled in areas indicated.

c. Unsuitable material shall be disposed of in waste areas designated by Engineer.

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2F - STORM DRAINAGE SYSTEM

2F-1 GENERAL

A. DESCRIPTION:
1. This Section includes storm drainage pipe and appurtenances, and inlet and outlet structures.
2. Related Work Specified Elsewhere:
   a. Site Preparation and Earthwork: SECTION 2A.
   b. Concrete: DIVISION 3.

B. QUALITY ASSURANCE:
1. Applicable Standards:
   a. American Society for Testing and Materials (ASTM):
      (1) A48 - Gray Iron Castings.
      (2) C76 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.
      (3) C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Flexible, Watertight, Rubber Gaskets.
   b. American Association of State Highway and Transportation Officials (AASHTO):
      (1) M36 - Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains.
      (2) M190 - Bituminous Coated Corrugated Metal Culvert Pipe and Arches.
   c. American Water Works Association (AWWA):
      (1) M9 - Installation of Concrete Pipe.

C. COMPLIANCE SUBMITTALS:
1. Submit as specified in DIVISION 1.
2. Includes, but not limited to, the following:
   a. Certification from the manufacturer that culvert pipe material conforms to the specifications.
   b. Reinforcing steel schedules.

2F-2 MATERIALS

A. REINFORCED CONCRETE:
1. Conform to applicable requirements of DIVISION 3.
2. Concrete shall be 4,000-psi concrete.

B. IRON CASTINGS: Conform to ASTM A48, of the type and size indicated.

C. CORRUGATED METAL PIPE:
1. Pipe shall conform to AASHTO M36 or M190 steel and be either:
   a. Full-circle riveted type with lap joint construction.
   b. Spiral with continuous lock or welded joints.
2. Coating, where indicated, shall be AASHTO M190 Type A.
3. End sections shall be galvanized metal with toe plates.
4. All pipe shall be 2-2/3-inch by 1/2-inch corrugations unless otherwise noted.

5. Pipe shall be of size, length and gauge thickness as indicated.
6. Coupling bands shall conform to AASHTO M36 and as follows:
   a. "Two-piece" coupling bands for full-circle riveted and continuous lock seam pipe.
   b. Hugger-type bands with "O"-rings for continous welded pipe.

D. REINFORCED CONCRETE PIPE:
1. Design of circular pipe to conform to ASTM C76 except as modified herein.
2. Furnish in lengths of not less than 8 feet, except fittings, closure pieces and specials.
3. Joints shall be rubber and concrete to conform to ASTM C443. Rubber gaskets shall be of O-ring cross section.
4. Select an independent testing laboratory to perform testing and inspection of all material except reinforcing steel. Laboratory shall be acceptable to Owner.

2F-3 PERFORMANCE

A. EXCAVATION, TRENCHING AND BACKFILLING: Perform excavation, trenching and backfilling of trenches and excavation and backfilling for storm drainage structures as specified in SECTION 2A.

B. PIPE INSTALLATION: Pipe may be either corrugated metal or reinforced concrete, at Contractor's option, unless otherwise indicated. All pipe shall be carefully laid true to lines and grades indicated. Any pipe which is not in true alignment or which shows undue settlement after laying shall be taken up and relaid at the Contractor's expense.
1. Corrugated Metal Pipe:
   a. Install to conform to manufacturer's recommendations.
   b. Lift or roll pipe to protect coating. Do not drag over gravel or rock. Avoid striking rocks or hard objects when lowering into trench.
      (1) Pipe on which coatings have been damaged may be rejected at the site of the work regardless of previous approvals.
   c. Join pipe sections with firmly bolted coupling bands of the same material as the pipe.
   d. Install pipe with longitudinal laps at the side or quarter points, and with inside circumferential laps pointing downstream.
   e. Install lower portion of two-piece connecting band before positioning succeeding pipe length. Make sure corrugations of band and pipe sections line up.
   f. Backfill pipe in layers six inches deep, deposited simultaneously on each side of pipe. Thoroughly tamp each layer. Do not compact by puddling or jetting with water.
   g. Attach end sections with bolted coupling bands.
   h. Install end sections where indicated.
2. Reinforced Concrete Pipe:
   a. Install to conform to AWWA M9 and as follows:
   b. Perform jointing to conform to pipe manufacturer's recommendations.
   c. Clean joints thoroughly, and coat bell and spigot and gasket with recommended lubricant before jointing.

2F - STORM DRAINAGE SYSTEM: continued

d. Check position of rubber gasket with feeler prior to shoving pipe home.
e. Fill exterior pipe with a 1:2 cement mortar of pouring consistency and cover with a waterproof paper or cloth diaper wired in position. Rod mortar with a stiff wire curved to the radius of the pipe.
f. Fill interior of joint with stiff mix of 1:1 cement mortar troweled into place to provide a continuous smooth surface across joint (pipe 24 inches in diameter and larger).
g. Completely cover all steel appurtenances with hot asphalt after installation and before backfilling.
h. Install end sections where indicated in accordance with manufacturer's recommendations.

C. CASTINGS: Install all castings as indicated.

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2G - SEEDING

2G-1 GENERAL

A. DESCRIPTION:

1. This Section includes seedbed preparation, seeding, mulching, and fertilizing of areas specified and indicated, and all areas disturbed by construction.

B. QUALITY ASSURANCE:

1. Applicable Standards: Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction.

C. SUBMITTALS:

1. Certificates:
   a. Seed shall be accompanied by certificate from vendor that seed meets requirements of these specifications.
   b. Fertilizer shall be accompanied by certificate from vendor that fertilizer meets requirements of these specifications.

2G-2 MATERIALS

A. SEED:

1. Seed shall conform to all applicable laws of the State of Florida.
2. Seed shall be labeled according to the U.S. Department of Agriculture Federal Seed Act and shall be furnished in containers with tags showing seed mixture, purity, germination, weed content, name of seller, and date on which seed was tested.
   a. Seed shall meet the following minimum percentage requirements for purity and germination:

Seed Name	Purity	Germination
Bermuda MK37	98	85
Argentine Bahia	90	85
Perennial Rye Grass	98	90
Brown Top Millet	--	--

   b. Moldy seed or seed that has been damaged in storage shall not be used.
   c. 50 percent of Argentine Bahia seed shall be scarified.

B. FERTILIZER:

1. Fertilizer shall comply with FDOT Section 982 - Commercial Fertilizer.
   a. Chemical designation of 10-10-10 with FTE 503 trace materials.
   b. Uniform in composition.
   c. Free flowing and suitable for application with approved equipment.
2. Deliver to site in labeled bags or containers.

C. MULTCH:
1. Vegetative Mulch: Mulch shall be straw with stalks of wheat, rye, oats, or hay from fields of pangola, peanut, coastal bermuda, or bahia grass, and shall be partially decomposed.

D. DOLOMITE: Dolomitic limestone shall be suitable for agricultural use delivered to the site on the ground.

2G-3 PERFORMANCE

A. SEEDBED PREPARATION:
1. Dispose of any growth, rocks, or other obstructions which might interfere with tilling, seeding, or later maintenance operations.
2. Thoroughly loosen and pulverize topsoil to a depth of at least three inches.
3. Maintain tilled areas until seeded and mulched, to provide a smooth area with no gullies or depressions.

B. DOLOMITING:
1. Apply dolomite at the rate of 2 tons per acre to properly prepared seedbeds.
2. Incorporate dolomite into the soil to a depth of at least 4 inches by discing, harrowing, or raking.

C. FERTILIZING:
1. Apply fertilizer at the rate of 400 pounds per acre to properly prepared seedbeds and sodbeds.
2. Incorporate fertilizer into the soil to a depth of at least 2 inches by discing, harrowing or raking.

D. SEEDING:
1. Seed mixture and rate of application shall be as follows:

Seed Name	Quantity Per Acre
Bermuda MK37	10 lbs
Argentine Bahia	50 lbs
Perennial Rye	1/2 bushel
Brown Top Millet	20 lbs*

* Reduced to 5 pounds on slopes greater than 4:1.

2. No seeding shall be done when the ground is unduly wet, or otherwise not in a tillable condition.
3. Methods of Application:
   a. Dry Seeding: Accomplish sowing by use of approved equipment, having drills no more than 4 inches apart.
      (1) Drill seed to an average depth of 1/2-inch.
      (2) Overlap successive seed strips to provide uniform coverage. Repeat where skipped areas appear after a show of green.
   b. Hydraulic Seeding: Mix seed with water and constantly agitate. Do not add seed to water more than 4 hours before application.

(1) On slopes of 2 horizontal to 1 vertical or flatter, apply seed separately from fertilizer. Cover seed with soil to an average depth of 1/2-inch by raking or other approved methods.

E. MULCHING:

1. Apply a mulch covering to slopes steeper than 6 horizontal to 1 vertical only.
2. Apply vegetative mulch at the rate of 2-1/2 tons per acre by means of a mechanical spreader or other approved methods.
3. Cut in mulch to a depth of 3 to 4 inches.
4. Immediately following the application of the mulch, water the seeded area in one watering, in sufficient amount to penetrate the seedbed to a minimum depth of 2 inches. Perform so as not to cause erosion or damage to the seeded surface.

F. MAINTENANCE:

1. Erect and maintain signs or barricades to exclude traffic from seeded areas.
2. Seeded Areas: Perform maintenance until the acceptance of the completed contract.
   a. Water seeded areas as required by good practice, and as necessary to obtain a flourishing cover.
   b. Any portion of the seeded surface which becomes gullied or otherwise damaged, or the seeding becomes damaged or destroyed, shall be repaired at no additional cost to the Owner.

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DIVISION 3 - CONCRETE

3A - FORMS

3A-1 GENERAL

A. DESCRIPTION:
  1. This Section includes formwork for concrete.
  2. Related Work Specified Elsewhere:
    a. Concrete: SECTION 3C.
    b. Steel Reinforcement: SECTION 3B.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Concrete Institute (ACI):
      (1) ACI 318 - Building Code Requirements for Reinforced Concrete.
      (2) ACI 347 - Recommended Practice for Concrete Formwork.

3A-2 EQUIPMENT AND MATERIALS

A. MATERIALS FOR FACING:
  1. Where concrete will be exposed to view after construction:
    a. Smooth finish exterior grade plywood at least 5/8-inch thick.
    b. Steel.
  2. Where concrete will not be exposed to view after construction:
    a. Exterior grade plywood at least 5/8-inch thick.
    b. Steel.
    c. Wood fiberboard.
    d. Dressed lumber free of loose knots.
  3. Treat forms to prevent bonding to concrete with lacquer, form oil or other acceptable material. Material shall not stain or cause injury to exposed concrete surfaces or affect them in any manner to prevent bond of specified surface application.
  4. Clean forms of sawdust, dust, dirt, and other foreign materials.

B. FORM TIES:
  1. Break-back, coil, or screw-type, except where otherwise specified.
  2. Water seal coil type in walls below grade and walls of water-bearing structures.
  3. Coil-type shall leave conical depression in concrete.
  4. Space as required against pressure of fresh concrete.

C. CHAMFER STRIPS:
  1. 3/4-inch chamfer except where otherwise indicated.
  2. Place in all forms to provide chamfer where concrete will have exposed projecting corners.

3A-3 PERFORMANCE

A. FORM CONSTRUCTION:
1. Conform to ACI 318 and ACI 347.
2. Adequately brace, stiffen and support forms to prevent perceptible deflection or settlement, and to hold plumb or level and true to line.
3. Construct sufficiently tight to prevent mortar leakage.
4. Avoid offsets between adjacent forms and construct so that shores, braces and stiffening members are in line with those below.
5. Space studs and stringers as required to support facing against concrete pressure but not more than 12 inches for 5/8-inch plywood or 16 inches for 3/4-inch plywood.
6. Use wales, strongbacks, shores and bracing as required.
7. Form all necessary openings or chases for piping, ductwork and similar items where indicated or as required for the Work.
8. Construct forms to be removable in sections without marring concrete surface.
9. Surface of forms shall provide smooth, dense, plane surface to finished concrete where exposed to view.
10. Contractor shall be responsible for structural adequacy of formwork.

B. TIME IN PLACE FOR FORMS:
1. No shores, bracing, supports or other formwork shall be loosened or removed until the concrete members supported thereby have acquired sufficient strength to support safely their own weight and any other possible loads.
2. The minimum time between concrete placement and form removal shall be determined either by field-cured test specimens or in accordance with the time specified for the member involved.
3. If Contractor elects to determine the required time by means of test specimens, all costs in connection therewith shall be his responsibility.
4. Test specimens shall be made, field-cured and tested as specified in SECTION 3C. No forms or supports shall be loosened or removed until tests indicate strength of members as follows:

Structural Member	Percent of design compressive or flexural strength
Unshored slab and beam forms for forms which can be removed without disturbing shores	70
Slab or beam shoring	85
Wall, column and beam side forms	40

5. If field-cured test cylinders or beams are not used as the basis for determination of time in place for formwork, the following criteria shall apply:

Structural Member	Time in Place for Forms*
Slab or beam shoring	12 days
Slab forms or beam soffits	7 days
Wall, column and beam side forms	18 hours

*These periods are a cumulative number of days or fractions thereof, not necessarily consecutive, during which the temperature of the concrete surface is above 50 degrees F.

C. REMOVAL OF FORMS: Remove forms in a manner to avoid damage to the structure, with particular care for corners and edges.

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3B - STEEL REINFORCEMENT

3B-1 GENERAL

A. DESCRIPTION:
  1. This Section includes steel reinforcement bars, ties, bolsters, chairs supports and accessories.
  2. Related Work Specified Elsewhere:
    a. Concrete: SECTION 3C.
    b. Forms: SECTION 3A.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Society for Testing and Materials (ASTM):
      (1) A82 - Cold Drawn Wire.
      (2) A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
      (3) A615 - Deformed Billet Steel Bars for Concrete Reinforcement.
    b. American Concrete Institute (ACI):
      (1) ACI 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures, as modified by interim reports.
      (2) ACI 318 - Building Code Requirements for Reinforced Concrete.
    c. American Welding Society (AWS):
      (1) AWS D12.1 - Recommended Practice for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction.
      (2) AWS B3.0 - Standard Qualification Procedures for Welders.

C. SUBMITTALS:
  1. Compliance Submittals:
    a. Submit as specified in DIVISION 1.
    b. Include, but not limited to, the following:
      (1) Complete bar schedule, bar details and erection drawings to conform to ACI 315.
      (2) Each type of bar marked with identification corresponding to identification tag on bar.
      (3) Erection drawings shall be clear, easily legible and to a minimum scale of:
        (a) 1/4-inch = 1 foot.
        (b) 1/8-inch = 1 foot if bars in each face are shown in separate views.
      (4) Size and location of all openings.

D. DELIVERY, STORAGE AND HANDLING:
  1. Store steel reinforcement blocked up off the ground and in orderly stacks.
  2. Store only bars with the same identifying label in the same stack.

E. TESTING:
  1. Perform at the mill for each heat.
  2. Submit certified test results to Engineer upon request.

3B-2 EQUIPMENT AND MATERIALS

A. REINFORCEMENT BARS, TIES AND STIRRUPS:

1. Materials:
   a. Conform to ASTM A615, Grade 60 except as otherwise specified.
   b. Column ties and stirrups of any size and all #3 bars shall conform to ASTM A615, Grade 40 unless otherwise indicated.
2. Fabrication of Bars:
   a. Fabricate with cold bends conforming to the recommended dimensions shown in ACI 318.
   b. Field fabrication will be allowed only if Contractor has equipment to properly fabricate steel.
   c. Attach metal tags with identifying mark.
   d. Contractor may at his option continue steel reinforcement through openings in walls and slabs, then field-cut the opening.

B. WELDED WIRE FABRIC:

1. Conform to ASTM A185 using bright basic wire conforming to ASTM A82.
2. Wire gauges #11 and smaller shall be galvanized.

C. BOLSTERS, CHAIRS AND ACCESSORIES:

1. Conform to ACI 315 and the Manual of Standard Practices of the Concrete Reinforcing Steel Institute.
2. Provide all spacers, bolsters, chairs, ties, and other devices necessary to properly space, place, support and fasten steel reinforcement in place during the concrete placement.
3. Metal accessories shall be galvanized or plastic coated where legs will be exposed in finished concrete surfaces.
4. Do not use rocks, broken bricks, wood blocks, or concrete fragments for support of steel reinforcement.
5. Bolsters, chairs and accessories used for Grade slab reinforcement shall not puncture the moisture barrier.

D. PRECAST CONCRETE BLOCK BAR SUPPORTS:

1. May be used only for bar supports in slabs on ground.
2. Blocks shall be made with a minimum of nine sacks of cement per cubic yard and have a compressive strength of 6,000 psi in seven days.
3. Each block shall have a minimum of 9 square inches of bearing area. Space as required by the particular condition of weight, bearing surface and rigidity of the steel reinforcement.

3B-3 PERFORMANCE

A. PLACEMENT OF STEEL REINFORCEMENT:

1. Place in accordance with Chapters 7 and 12 of ACI 318 and the Manual of Standard Practice of the Concrete Reinforcing Steel Institute.
2. Tie securely with 16-gauge or larger annealed iron wire.
3. Place to maintain concrete cover to conform to Chapter 7 of ACI 318 unless otherwise indicated.

4. Splice steel to conform to Chapter 12 of ACI 318.
   a. Lapped splices shall be not less than 30-bar diameters for A615, Grade 40 steel and 42-bar diameters for A615, Grade 60 steel unless otherwise indicated or as required in accordance with ACI 318.
   b. Splices shall be staggered and located at mid-span for top steel and at support for bottom steel of flexural members unless otherwise indicated or as marked on compliance submittal by Engineer.
   c. Use arc-weld splices:
      (1) For bar sizes No. 14 and No. 18.
      (2) For bars smaller than No. 14 where indicated.
      (3) In other locations at Contractor's option.
   d. Cadweld splices of Type C Series may be used as an alternative to arc-welded splices.
   e. Arc-welds shall be full penetration butt welds using low-hydrogen type electrodes of Class AWS A5.5 Class E90XX-D1, G or M for shielded metal-arc welding. Arch-welded splices may be tested by Owner. Contractor shall pay for testing and correcting of the defective welds.
5. Lap welded wire fabric not less than the length of one mesh plus 2 inches unless otherwise indicated.

* * * * *

3C - CONCRETE

3C-1 GENERAL

A. DESCRIPTION:
  1. This Section includes concrete and related items.
  2. Related Work Specified Elsewhere:
    a. Forms: SECTION 3A.
    b. Steel Reinforcement: SECTION 3B.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Society for Testing and Materials (ASTM):
      (1) C31 - Making and Curing Concrete Compression and Flexure Test Specimens in the Field.
      (2) C33 - Concrete Aggregates.
      (3) C39 - Compressive Strength of Cylindrical Concrete Specimens.
      (4) C40 - Organic Impurities in Sands for Concrete.
      (5) C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
      (6) C78 - Test for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
      (7) C88 - Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
      (8) C94 - Ready-Mixed Concrete.
      (9) C143 - Slump of Portland Cement Concrete.
      (10) C150 - Portland Cement.
      (11) C172 - Sampling Fresh Concrete.
      (12) C192 - Making and Curing Concrete Test Specimens in the Laboratory.
      (13) C231 - Air Content of Freshly Mixed Concrete by the Pressure Method.
      (14) C233 - Testing Air-Entraining Admixtures for Concrete.
      (15) C260 - Air-Entraining Admixtures for Concrete.
      (16) C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
      (17) C494 - Chemical Admixtures for Concrete.
      (18) C595 - Blended Hydraulic Cements.
      (19) C618 - Standard Specification for Fly Ash and Raw Calcined Natural Pozzolans for Use in Portland Cement Concrete.
      (20) D1752 - Preformed Expansion Joint Fillers for Concrete.
    b. American Concrete Institute (ACI):
      (1) ACI 211.1 - Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete.
      (2) ACI 211.2 - Recommended Practice for Selecting Proportions for Structural Lightweight Concrete.
      (3) ACI 214 - Recommended Practice for Evaluation of Compression Test Results of Field Concrete.
      (4) ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
      (5) ACI 305 - Committee Report on Hot-Weather Concreting.
      (6) ACI 306 - Committee Report on Cold-Weather Concreting.
      (7) ACI 309 - Recommended Practice for Consolidation of Concrete.

(8) ACI 313 - Bin Wall Design and Construction.
(9) ACI 318 - Building Code Requirements for Reinforced Concrete.
(10) ACI 506 - Recommended Practice for Shotcreting.

c. Associated General Contractors (AGC) of America, Mixer Manufacturers Bureau Concrete Mixer Standards.
d. National Bureau of Standards (NBS) Specifications for Scales.
e. National Ready-Mix Concrete Association, "Truck Mixer, and Agitator Standards of the Truck Mixer Manufacturers' Bureau."

2. Acceptable Manufacturers: Specified in PART 3C-2.

C. SUBMITTALS:

1. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Include, but not limited to, the following:
      (1) Grouts.
      (2) Expansion joint materials.
      (3) Sealants.
      (4) Waterstops.
2. Test Reports: Submit as specified in DIVISION 1 and PART 3C-2.

3C-2 MATERIALS

A. CONCRETE:

1. Materials:
   a. Portland Cement Type II or Type IP (MS) for all structures unless indicated otherwise. Type II shall conform to ASTM C150. Type IP (MS) shall not contain more than 25 percent pozzolan. Fly ash shall not be used at batching plant.
   b. Fine Aggregate:
      (1) Conform to ASTM C33.
      (2) Approved service record of at least 3 years.
      (3) Limits of fineness modulus shall be 2.3 to 3.1.
      (4) Maintain fine aggregate free of ice and frozen lumps.
   c. Coarse Aggregate:
      (1) Conform to ASTM C33.
      (2) Blast furnace slag will not be permitted.
      (3) Maintain coarse aggregate free of ice and frozen lumps.
      (4) Grading Requirements: From 1-inch to No. 4 for all concrete unless otherwise specified.
   d. Mixing Water:
      (1) Only potable water will be acceptable without testing. Expense of testing water shall be paid by contractor.
      (2) Non-potable water may be used if it produces concrete with at least 95 percent of the strength of similar specimens made with potable water, subject to approval of qualitative analysis.
   e. Admixtures:
      (1) Water Reducing Type:
         (a) Conform to ASTM C494, Type A.
         (b) Conform to manufacturer's recommendations for use.
         (c) Technical assistance of the manufacturer's field representative shall be furnished upon request.

(2) Air-Entraining Type:
(a) Conform to ASTM C260.
(b) Conform to manufacturer's recommendations for use.
(c) Technical assistance of the manufacturer's field representative shall be furnished upon request.
(d) Testing of air-entraining admixtures shall conform to ASTM C233.
(3) Other Admixtures: Used only with Engineer's written concurrence.
(a) Water Reducing, Retarding Type: Conform to ASTM C494, Type D and shall not contain any chloride ions added during manufacture.

2. Laboratory Testing of Materials for Use in Concrete:
a. An approved independent testing laboratory shall be selected and paid by Contractor to perform all required laboratory tests of materials proposed for use in the production of concrete and to determine mix proportions when laboratory trial batches are required.
b. The laboratory shall report the results of the testing and mix designs as follows:
(1) Engineer, Kansas City Office (1 copy).
(2) Resident Project Representative, Field Office (1 copy).
(3) Contractor (1 copy).
(4) Concrete supplier (1 copy).
(5) Owner (2 copies).
c. Contractor shall deliver representative samples of all proposed concrete materials to the laboratory for the following testing:
(1) Fine Aggregate:
(a) ASTM C33 as amended by PART 3C-2 "Concrete-Materials."
(b) ASTM C40.
(c) ASTM C88.
(2) Coarse Aggregate:
(a) ASTM C33 as amended by PART 3C-2 "Concrete-Materials."
(b) ASTM C88.
(3) Mixing water, if other than potable water is proposed for use and in the opinion of Engineer there is reason to suspect its acceptability:
(a) With the design mix the laboratory shall make two concrete test cylinders using proposed water and two concrete test cylinders using potable water conforming to ASTM C192.
(b) All cylinders shall be tested conforming to ASTM C39. Age of cylinders at test shall be 28 days unless an earlier age is authorized.
(4) Air-entraining admixture shall be tested conforming to ASTM C233.

3. Concrete Qualities Required:
a. Compressive Strength:
(1) Minimum 28-day strength = 4000 psi for all construction unless otherwise indicated.
(2) Minimum 28-day strength = 3000 psi for fill concrete and seal coats.
b. Slump of concrete shall be 3 inches plus or minus 1 inch.
c. Air Content: 4 to 6 percent.

4. Mix Proportions:
a. Concrete shall be homogeneous, readily placeable and uniformly workable; proportioned to conform to ACI 211.1.

b. Mix proportions for all concrete unless otherwise specified shall be selected preferably on the basis of field experience; but in the case where sufficient or suitable strength test data is not available, concrete shall be proportioned on the basis of laboratory trial mix design.

(1) Field experience using test results within the preceding 90 days with the materials and plant to be employed may be the basis of mix proportioning provided that not less than 30 consecutive satisfactory compressive strength tests on concrete using the proposed materials with a similar mix are available. A compressive strength test is defined as the average 28-day compressive strength of two companion cylinders made conforming to ASTM C172 and ASTM C31 and tested conforming to ASTM C39. The standard deviation of such tests shall be computed as a basis for design of the mix. The design average strength shall exceed the specified strength in accordance with the following formulae:

(a) When standard deviation is less than 500 psi, Design Average Strength = Specified Minimum Strength + 1.343 x Standard Deviation.

(b) When standard deviation is greater than 500 psi, Design Average Strength = Specified Minimum Strength -500 + 2.326 x Standard Deviation.

(c) Submit previous test data, calculated standard deviation, and the proposed mix proportions to Engineer for approval prior to placing concrete.

(2) When laboratory trial batches are used as a basis for determining mix proportions, all such work shall be performed by the laboratory as specified in this PART "Laboratory Testing of Materials for Use in Concrete."

(a) Laboratory trial batches shall be used to establish a water-cement ratio compression strength curve with at least three points, each representing the strength of a separate trial batch. At least one point shall be above and one below the strength required. Each point on the curve shall represent the average of at least three specimens tested at 28 days or an earlier age when approved by Engineer. The slump and air content shall be at the maximum limits specified in this PART "Concrete Qualities Required."

(b) A point on the water-cement ratio compressive strength curve shall be selected that will provide an average strength at least 1200 psi greater than the specified minimum strength.

(c) Laboratory reports establishing mix proportions shall be sent to Engineer, and his approval obtained prior to placing all concrete.

5. Measurement of Materials:

a. General Requirements:

(1) Conform to ACI 304.

(2) Measure materials within one percent by weight for aggregates and cement, and within 1-1/2 percent by volume or weight for water.

b. Apparatus:

(1) Beam or springless dial-type scale conforming with NBS - "Specifications for Scales."

(2) Volumetric measurement of water shall be performed with an approved automatic valve.

6. Mixing and Delivery:
   a. Conform to ACI 304.
   b. Cement temperature when added to mix shall not exceed 170 degrees F.
   c. Batch Plant Mixer:
      (1) Conform to Mixer Manufacturers Bureau Concrete Mixer Standards, AGC, adequate to handle one or more full-sack batches.
      (2) Charge with 5 percent to 10 percent of the mixing water both in advance and after the addition of aggregates and cement.
      (3) Charge with remaining water uniformly with the other materials.
      (4) Avoid charging in excess of manufacturer's rating.
      (5) Discharge mixed concrete completely prior to recharging.
      (6) Mixing Time:
         (a) Start immediately when all ingredients except the last of the water are in the mixer.
         (b) Minimum mixing time shall conform with mixer manufacturer's instructions, but not be less than the following:

Capacity of Mixer Cubic Yards	Minimum Time of Mixing, Minutes
1 or less	1 minute
2	1 minute, 15 seconds
3	1 minute, 30 seconds
4	1 minute, 45 seconds
5	2 minutes
6	2 minutes, 15 seconds

Add 15-second mixing time for each additional cubic yard of concrete.

   d. Mixing of Concrete at Plant Off Jobsite:
      (1) Mix concrete in central mixer or truck mixer. Transport in truck mixer turning at agitation speeds only.
      (2) Water added to concrete having a slump below the specified minimum shall be at Contractor's risk. If the water added produces a slump greater than the specified maximum, the concrete will be rejected. If water is added the concrete shall be remixed for a minimum of 25 revolutions.
      (3) Truck mixer shall conform to "Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers Bureau," of the National Ready-Mix Concrete Association.
      (4) Ready-mixed concrete shall be produced and delivered conforming to ASTM C94 as applicable.
      (5) Contractor shall furnish Owner with a concrete delivery ticket for each load of concrete. The ticket shall have the following information recorded:
         (a) Ticket number.
         (b) Time batched.
         (c) Time arrived on jobsite.
         (d) Amount of concrete (by volume).

(e) Mix number.
(f) Amount of all water added at jobsite by Contractor.

B. GROUT:
1. Plain Grout:
a. 1 part portland cement to 2 parts sand by volume.
b. Keep water to a minimum as required for placing by the dry packing method.
c. Place after the mixed grout has been allowed to stand for two hours.
d. The sand and cement shall be as specified for concrete.
2. Nonshrinking Grout:
a. Required for setting handrail posts, for setting equipment recommended by the manufacturer to be set with nonshrinking grout, and in other places indicated.
b. Grout shall be non-metallic, as manufactured by one of the following:
(1) Crystex, L and M Construction Chemicals, Inc.
(2) Five Star grout, U. S. Grout Corporation.
(3) Masterflow 713 grout, Master Builder's Company.
(4) Sauereisen F-100, Sauereisen Cements Company.
(5) Supreme Grout, Gifford-Hill & Company.
c. Prepare and place conforming to manufacturer's printed instructions.
3. Grout for Bonding:
a. 1 part cement to 1-1/2 parts sand by weight.
b. Keep water to a minimum.

C. BONDING AGENT:
1. Provide moisture insensitive, epoxy-resin bonding agent as manufactured by one of the following:
a. Epoxtite; W. R. Grace.
b. Euco Epoxy; Euclid Chemical Company.
c. Sikastix 370; Sika Chemical Company.
2. Use where indicated or specified.
3. Use in conformance with manufacturer's printed instructions.

D. CONCRETE ACCESSORIES:
1. Water Stops:
a. Serrated polyvinyl chloride equal to one of the following.
(1) Servicized/Durajoint Type 13, W. R. Grace Company.
(2) 6-inch heavy-duty Flextrip, Water Seals, Inc.
(3) Vulco VP 8044, Heavy Vulcan Metal Products Company.
2. Elastomeric Water Stop Joint:
a. Water Stop Sealant: Two component polysulfide system as manufactured by one of the following:
(1) Hornflex L, Davis-Culler.
(2) Sikaflex Polysulfide Sealant, Sika Chemical Corporation.
(3) Synthacalk GC-2, Pecora, Inc.
b. Primer: Product compatible with sealant and manufactured by sealant manufacturer.
c. Backup Rod:
(1) Material shall be butyl rubber, neoprene or polyethylene foam.

(2) 100 percent closed cell, nonabsorptive.
(3) Flexible, round rod of indicated diameter.

3. Expansion Joints:
   a. Expansion Joint Filler: Premolded cork of thickness indicated and conforming to ASTM D1752, Type II, cork.
   b. Bond Breaker: Polyethelene strip.
   c. Joint Sealant: Two component polysulfide system as manufactured by one of the following:
      (1) Hornflex L, Davis-Culler.
      (2) Sikaflex Polysulfide Sealant, Sika Chemical Corporation.
      (3) Synthacalk GC-2, Pecora, Inc.
4. Dovetail Anchor Slots: 24-gauge zinc alloy, 1-inch wide back x 1-inch deep x 5/8-inch throat as manufactured by one of the following:
   a. Gateway Products.
   b. Heckmann Building Products, Inc.
   c. Hohmann & Barnard, Inc.

E. CURING AGENT:
   1. Liquid membrane forming compound conforming to ASTM C309, Type 1. ASTM C309 Type 2 shall be used as specified in PART 3C-3 "Hot Weather Concreting."

F. MOISTURE BARRIER:
   1. Extent of Work: Install moisture barrier between the base and concrete slab on grade as indicated.
   2. Materials:
      a. One of the following:
         (1) Laminated with polyethylene film or both surfaces of reinforced-fibered Kraft. Manufactured by Sisalkraft Division, St. Regis Paper Company - "Moistop."
         (2) Polyethylene film, 6-mil thickness, black, as manufactured by:
            (a) Gering Plastics Co., Dept. of Monsanto - "Ger-Pak."
            (b) Ethyl Corp. - Visqueen Division, Baton Rouge, La.
            (c) Cadillac Plastic and Chemical Co. - "Construction Film."
      b. Adhesive or tape recommended by moisture barrier manufacturer.

3C-3 PERFORMANCE

A. PREPARATION FOR CONCRETE PLACEMENT:
   1. Openings Through Concrete: Provide openings through concrete as indicated and for the proper installation of all equipment, piping, wiring, ductwork and similar items, installed under this contract.
   2. Installation of Embedded Items:
      a. Provide for accurate installation of embedded items installed under this Contract.
      b. Securely fix floor drains in place to prevent flotation while placing concrete. Uniformly and accurately slope finish floor slab toward the drains.
      c. Embedded items shall be as indicated or specified, or as selected by Contractor and approved by Engineer.

d. Protect pipe sleeves from moisture during cold weather.
e. Grease anchor bolt threads to protect from concrete splatter.

3. Installation of Joints:
   a. Construction Joints:
      (1) Location:
         (a) Locate joints, which are not indicated or specified, in conformance with ACI 318.
         (b) Obtain Engineer's approval of joints located by Contractor prior to preparation of reinforcing steel drawings.
      (2) Preparation and Installation:
         (a) Clean and break laitance or other foreign material from bonding surface.
         (b) Tighten forms remaining in place (where applicable) to prevent seepage between forms and hardened concrete.
         (c) Provide water stops keys as indicated or specified and as required in any new construction joint requested by Contractor. Provide shear keys at all construction joints.
      (3) Waterstops:
         (a) Install in all construction joints where indicated.
         (b) Install conforming to manufacturer's printed instructions.
         (c) All joints and splices of pvc waterstop shall be 100 percent fused.
   b. Expansion Joints:
      (1) Location: As indicated.
      (2) Install expansion joint filler of premolded cork of the thickness as indicated.
      (3) Completely cover the top surface of the joint filler with a polyethelene strip bond breaker prior to sealing joint.
      (4) Seal top of expansion joint with joint sealant applied conforming to manufacturer's instructions. Depth of sealant shall be 1/2 the joint width unless otherwise indicated. During cold weather protect joint from moisture prior to installation of joint sealant.
4. Cutting and Bonding to Existing Concrete: (if required)
   a. Cutting Existing Concrete:
      (1) Use methods and equipment that will avoid damage to adjacent parts of the structure from heavy blows or vibration.
      (2) Cut existing concrete with power concrete saw where possible to prevent spalling and chipping and to form neat straight edge.
      (3) Remove all loose or cracked pieces resulting from cutting existing concrete, leaving only sound, undamaged concrete adjacent to new work.
      (4) Leave access opening edges with a neat, true grout surface to the opening size indicated.
      (5) Cut reinforcing steel with sufficient length remaining for bending and lapping into new construction as required per SECTION 3B.

b. Bonding to Existing Concrete:
(1) Roughen concrete by use of a pneumatic chipping hammer or other approved means.
(2) Thoroughly clean the concrete surface and apply the bonding agent. Place the fresh concrete after the bonding agent becomes tacky.

5. Installation of Moisture Barrier:
a. Install moisture barrier on the base, lapping joints a minimum of 6 inches.
b. Exercise care to avoid puncturing or tearing the material during installation and patch tears as they occur.
c. Seal lapped joints and patches with a pressure-sensitive adhesive or tape not less than 2 inches wide.

B. PLACING OF CONCRETE:
1. Conventional Placing:
a. General Requirements:
(1) Conform to ACI 304.
(2) Bonding surfaces shall be clean, free of laitance and foreign materials.
(3) Face horizontal bonding surfaces with 1-inch-thick coat of fresh "grout for bonding." Wet all other surfaces.
(4) Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavation and forms.
(5) Use forms for all concrete except where otherwise indicated or specified.
(6) Do not place concrete that has partially hardened or has been contaminated by foreign materials.
(7) Prevent mud or foreign materials from entering the concrete or forms during placement operations.

b. Conveying:
(1) Convey concrete from the mixer and deposit in place by methods which will prevent the segregation or loss of materials.
(2) Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to provide a practically continuous flow of concrete at the delivery end.
(3) Aluminum conveying equipment shall not be used.

c. Depositing:
(1) Place concrete in continuous horizontal lifts not to exceed 2 feet, and place concrete against bulkheads and keyways at vertical joints.
(2) Maximum free drop of concrete shall be 5 feet in walls 10 inches or less in thickness with 1-foot additional drop allowed for each inch of wall thickness over 10 inches, with a maximum drop of 10'-0".
(3) When moisture barrier is used, keep lapped joints closed and take precautions to avoid puncturing the barrier.

d. Consolidation of Concrete:
(1) Consolidate concrete in conformance with ACI 309. Characteristics and application of concrete vibrators shall be as set forth in Table I of the Report.
(2) Provide an adequate number of vibrators of sufficient capacity to keep up with the maximum rate of concrete placement. Keep on hand adequate standby equipment in good operating condition.

(3) Vibrate concrete only until the concrete is thoroughly consolidated and the voids filled as evidenced by the leveled appearance of the concrete at the exposed surface and the embedment of the surface aggregate.
(4) Insert internal vibrators vertically to the full depth of the layer being placed and into the previous layer. Do not drag vibrators through the concrete. Insert and withdraw vibrator slowly with the vibrator running continuously so that no hole will be left in the concrete. Do not flow concrete from one location to another by use of a vibrator.
(5) Consolidate concrete layer to full depth when using a surface vibrator. Use thinner layers or more powerful vibrator if necessary to achieve complete consolidation.
(6) Use form vibrators only where sections are too thin or where sections are inaccessible for internal vibrators.

e. Time Requirements:
(1) Place concrete at a sufficient rate to assure that lifts below have not taken initial set before fresh concrete is deposited.
(2) Place concrete within 45 minutes after mixing. This period may be extended to 1 hour and 30 minutes provided that the combined air temperature, relative humidity and wind velocity are such that the plasticity of the fresh concrete is satisfactory for placement and consolidation and that the specified mixing water is not exceeded. Concrete which has partially set shall not be retempered but shall be discarded.

f. Placing Concrete at Joints:
(1) Bed horizontal joints with 1 inch of grout for bonding.
(2) Take precautions to ensure tight, well-bonded construction joints with no air pockets or voids.
(3) Take special precautions to avoid bending or displacing waterstop while placing concrete around it.
(4) Delay construction at a joint a minimum of 16 hours where placement is continued past joint except where otherwise indicated.

C. FINISHING:
1. Unformed Surfaces:
a. Screed Finish:
(1) Use as first stage for all concrete finishes.
(2) Use as final finish on surfaces that will be covered by additional concrete, grout placement, mortar setting bed except as otherwise specified, or earth backfill.
(3) Immediately after screeding, use a wood float, darby or bullfloat to eliminate high and low spots and to embed large aggregate. This shall be done in a manner to produce even, uniform surfaces so that surface irregularities do not exceed 3/8-inch in 10 feet when used as final finish.

b. Floated Finish:
(1) Use as second stage of broomed, and troweled finish.
(2) Use as final finish on all areas unless indicated or specified otherwise.

(3) Float with mechanical float. Hand floating will be permitted only in areas inaccessible to mechanical float.
(4) On surfaces not to receive troweled finish, finish with wood or cork float after mechanical floating to a true uniform surface so that surface irregularities do not exceed 1/8-inch in 10 feet, except at floor drains.

c. Broomed Finish:
(1) Use as final finish on all slabs as indicated.
(2) After floated finish draw a stiff bristle broom across the surface making uniform corrugations, perpendicular to the direction of traffic, not more than 1/16-inch deep.

d. Troweled Finish:
(1) Use as final finish on floors and on other unformed surface as indicated or specified.
(2) Trowel with steel trowel, mechanical or hand, to obtain a smooth, dense finish. The final troweling shall be done after the concrete has become hard enough so that no mortar adheres to the edge of trowel and a ringing sound is produced as the trowel passes over the surface.
(3) Do not trowel before surface water has evaporated or been removed with a squeegee.
(4) Finish to a true uniform surface so that surface irregularities do not exceed 1/8-inch in 10 feet, except at floor drains.
(5) Do not add sand or cement to the floor surface.

e. Contraction Joints:
(1) Locate as indicated.
(2) Maintain true alignment with straightedge.
(3) Joints shall be grooved except where sawed joints or preformed joints are indicated.
(4) Grooved Joints:
(a) Perform during the finishing process.
(b) Width of groove shall not exceed 1/4-inch.
(c) Depth of groove shall be at least 1 inch.
(5) Sawed Joints:
(a) Cut joints with power blade as soon as concrete surface is firm enough to resist tearing or damage by the blade and before random shrinkage cracks can occur. (Usually required 4 to 12 hours after finishing.)
(b) Make joints approximately 1/8-inch wide with depth as indicated.
(c) Seal with the same type sealant specified for water stop sealant.
(6) Install preformed joints as recommended by manufacturer.

2. Formed Surfaces:
a. Repair surface defects as specified in this PART "Repair of Defective Surfaces," except for surfaces against which fill material or concrete is to be placed.

3. Repair of Defective Surfaces:
a. Defined as any concrete surface showing misalignment, rock pockets, poor joints, holes from ties, voids, honeycomb, or any other defective area.
b. Repairing:

(1) Repair as soon as forms have been removed.
(2) Chip surface back to minimum depth of 1/2-inch, chip edges perpendicular to surface, prewet depression and brush with neat cement immediately before patching.
(3) Patch surfaces using stiff mortar with same sand-cement ratio as original concrete and with minimum water for placing. Blend with white cement to match concrete color.
(4) Compact mortar into depressions so that after curing, hole is filled and mortar is flush with surface. Use hammer and ramming rod for compacting the holes.
(5) Moist-cure for three days or use curing compound.
(6) Engineer shall be notified of areas containing major defects or where reinforcing steel is exposed prior to determination of repair method.

D. CURING: Cure all concrete by one of the following methods:

1. Leaving in forms for a minimum of seven days. Keep formwork wet to prevent drying of concrete surfaces.
2. Use of saturated bats, soaker hoses, or sprinkler for a minimum of seven days. Keep concrete continuously wet.
3. Using one coat of a liquid membrane forming compound conforming to ASTM C309, Type 1. Apply immediately after removal of forms (which have been continuously wet); or in case of a slab, after the concrete has been finished and is hardened sufficiently to walk on.
4. Using polyethylene sheets applied in full contact with surfaces.
5. Curing of concrete during hot or cold weather shall conform to this PART "Hot Weather Concreting" and "Cold Weather Concreting."

E. HOT WEATHER CONCRETING:

1. When the temperature is 90 degrees F or above, or is likely to rise above 90 degrees F within the 24-hour period after concrete placement; or when there is any combination of high air temperature, low relative humidity and wind velocity which would impair concrete strength or quality, follow the recommendations of ACI 305.
2. Concrete shall have a maximum temperature of 85 degrees F during placement.
3. Dampen subgrade and forms with cool water immediately prior to placement of concrete.
4. Protect freshly placed concrete immediately after placement so that the rate of evaporation as determined by ACI 305 (Figure 2.15) does not exceed 0.2-pound per square foot per hour.
5. Protect concrete with suitable insulation if rapidly decreasing nighttime temperatures occur, which would cause thermal shock to concrete placed during warm daytime temperatures.
6. Protect the concrete with temporary wet covering during any appreciable delay between placement and finishing.
7. Begin curing unformed surfaces immediately after finishing and continue for 24 hours. Curing shall consist of application and maintenance of water saturated material to all exposed surfaces; horizontal, vertical and otherwise. After the 24-hour interval, continue curing, using one of the following methods:

a. Moist curing for six days.
b. Application of one coat of curing compound conforming to ASTM C309, Type 2.
c. Application and maintenance of curing paper or heat-reflecting plastic sheets for six more days.

8. Begin curing formed concrete immediately after placing. Curing shall consist of keeping forms continuously wet for 24 hours. Thereafter, continue curing using one of the following methods:
   a. Loosen forms and position soaker hose so that water runs down along concrete surfaces. Continue for six days.
   b. Strip forms and apply curing compound conforming to ASTM C309, Type 2. Do not allow concrete surfaces to dry prior to application of curing compound.

F. COLD WEATHER CONCRETING:

1. When the temperature is 40 degrees F or is likely to fall below 40 degrees F during the 24-hour period after concrete placement, follow the recommendations of ACI 306 to prevent loss of concrete strength or quality.
2. Minimum temperature for concrete as mixed shall be as indicated on lines 2, 3 and 4 of Table 1.4.1 of ACI 306. Maximum temperature for concrete as mixed shall be 10 degrees F greater than the corresponding minimum temperature.
3. Place and maintain concrete so that its temperature is never less than the temperature indicated on line 1 of Table 1.4.1 of ACI 306. Maintain the required temperature for the time duration indicated on Table 1.4.2 of ACI 306.
4. Monitor temperature of concrete in place at corners or edges of formwork as applicable.
5. Do not expose concrete to carbon monoxide or carbon dioxide fumes from heaters or engines. Oil or coke burning salamanders will not be permitted. Personnel shall be present at all times to maintain safe, continuous operation of heating system.
6. Control temperature and humidity of protected concrete so that excessive drying of concrete surfaces does not occur.
7. Calcium chloride will not be permitted as a concrete accelerator or to thaw frozen subgrade prior to concrete placement.
8. The maximum allowable temperature drop during the first 24-hour period after protection is discontinued shall be as indicated on line 5 of Table 1.4.1 of ACI 306.

G. LOW STRENGTH CONCRETE:

1. Low-Strength Concrete:
   a. Defined as concrete whose 28-day test (average of two cylinder breaks) is less than the minimum 28-day strength required.
   b. Remove and replace with acceptable concrete when the quality and location of the low-strength concrete is such that Engineer considers the strength of durability of the structure is impaired and so orders.
   c. Low-strength concrete shall be considered defective work as defined in GENERAL CONDITIONS.

2. Potentially Low-Strength Concrete:
   a. Defined as concrete whose 7-day and 14-day test (average of two cylinders) is less than 70 percent and 85 percent, respectively of the specified minimum 28-day compressive strength. The designated percentage for strength shall be adjusted if the history of the cement being used in the concrete mix produces a higher or lower compressive strength at the 7-day and 14-day tests.
   b. Potentially low-strength concrete shall remain accessible with no other work performed that relates to, or depends upon, the questionable concrete until a final decision as to the disposition of the concrete is made by Engineer.
3. Construction delays caused by low-strength or potentially low-strength concrete shall not relieve Contractor from responsibility for late completion even though extensions of time may be granted.

H. MISCELLANEOUS CONCRETE ITEMS:
1. Concrete Seal Coat:
   a. Apply to the ground surface immediately beneath all "on-grade" slabs and footings where indicated or specified.
   b. Seal coat shall consist of a 4-inch concrete slab.
   c. Accurately screed so that the top of the seal coat will not be higher than the bottom elevation of structural slabs or footings to be placed thereon.
   d. Do not place seal coat until after all excavating, in the area have been completed and all drain lines, conduits and other items under the area are completed and properly backfilled and compacted.
2. Equipment Bases:
   a. Construct equipment bases, pads, and foundations as indicated or, when not indicated, conforming to equipment manufacturer's requirements.
   b. Reinforce conforming to typical detail unless otherwise indicated.
   c. Equipment bases shall include concrete, reinforcing steel, form work as required, and anchor bolts. Place grout for equipment installed under this contract.
   d. Finish top area of bases between anchor bolts and forms with a troweled finish.

I. TESTING:
1. Field Testing of Concrete and Making of Concrete Test Cylinders During Construction:
   a. Contractor shall furnish test equipment, test cylinder molds, and trained personnel to perform all required field tests, make the required concrete test cylinders and deliver test cylinders to the testing laboratory. The prescribed tests shall be made in the presence of or with the concurrence of the Owner.
   b. Concrete sampling for tests and cylinder making shall be done conforming to ASTM C172.
   c. Perform the following tests:
      (1) Prepare concrete test cylinders for laboratory testing as follows:
         (a) Obtain cylinder molds from the laboratory, Universal Engineering Testing Company, Gainesville, Florida.

(b) Do not use concrete used in making slump or air tests.
(c) Make not less than one set of cylinders (6 cylinders) from each day's pour for each 150 cubic yards of concrete or fraction thereof nor less than one set for each 5,000 square feet of slab top surface area.
(d) Test cylinders shall be made and cured for the first 24 hours in accordance with ASTM C31.
(e) Pack cylinders in crates padded with foam rubber or damp sawdust. Keep continuously moist and at proper temperature during transit and deliver to laboratory, Universal Engineering Testing Company;, immediately after the one-day "on-the-jobsite" curing period.

(2) Slump Test conforming to ASTM C143.
(3) Air Content Test conforming to ASTM C231.
(4) Discard concrete used for slump and air tests.
(5) Slump and Air Test results shall be furnished to the Universal Engineering Testing Company, Gainesville, Florida, for inclusion in the Cylinder Test Reports.

2. Laboratory Testing of Concrete During Construction:

a. An independent testing laboratory, Universal Engineering Testing Company, Gainesville, Florida, will be selected and paid by the Owner to perform the required laboratory tests and statistical evaluations of concrete being used in the work.

b. The laboratory will report the results of all testing and statistical evaluations as specified in DIVISION 1.

(1) Engineer, Kansas City Office (1 copy).
(2) Resident Project Representative, Field office (1 copy).
(3) Contractor (1 copy).
(4) Concrete supplier (1 copy).
(5) Owner (2 copies).

c. Testing Field-Made Concrete Test Cylinders:

(1) The laboratory shall start curing the test cylinders conforming to ASTM C192 immediately upon receipt from Contractor.
(2) The laboratory shall test all cylinders conforming to ASTM C39, testing two at 7 days of age and two at 28 days of age. The average strength of the two cylinders (same age) shall be used as the result of the test.
(3) When the average compressive strength of the two 7-day tests is less than 70 percent of the specified minimum 28-day compressive strength, two cylinders shall be tested at 14 days.
(4) If the average strength of the two 14-day tests is less than 85 percent of the minimum 28-day compressive strength, the Contractor may, at his discretion and expense, and with Engineer's approval, take field cores on the 15th day after placement of the potentially low-strength concrete and within 24 hours have the laboratory test these cores (ASTM C42). The potentially low-strength concrete will be accepted if the average of the core tests is 85 percent or greater of the specified 28-day compressive strength.
(5) Contractor may, at his expense, make additional cylinders and have 3-day compression tests made of critical concrete placements where an early knowledge of strength is beneficial.

d. Contractor shall have the right to observe all phases of concrete cylinder curing and testing. Should Contractor observe any deviations from the prescribed testing procedures that he considers detrimental to concrete strength test results, he shall immediately notify Owner in writing.

e. The Contractor shall make arrangements with and pay to the testing laboratory if he wants additional copies of test reports.

f. Compliance With Strength Provisions:

(1) The laboratory shall maintain and submit with each test report a current stastistical evaluation (average strength and standard deviation - ACI 214) of the concrete quality, starting when ten each of 7- and 28-day tests have been performed. The evaluation shall be based on a moving average of the latest 10 test results.

(a) Should the statistical data indicate an unacceptable combination of average strength and standard deviation, Contractor shall take immediate corrective action. Noncompliance after two warnings from Engineer will be sufficient to refuse additional concrete from the noncomplying concrete supplier.

(b) Should the statistical data indicate an excessive margin of safety, the concrete mix may be modified subject to approval.

3. Preparation and Testing of Field-Cured Test Cylinders and Beams:

a. In addition to concrete test cylinders specified in the preceding Article, Contractor may prepare cylinders or beams to be field-cured and tested as a basis for determining time in place for formwork.

b. Cure field-cured test cylinders or beams on the project site under the same conditions as the concrete which the test specimens represent until proposed time of form removal.

c. Deliver concrete cylinders to the laboratory for immediate testing.

d. Field-cured flexural test specimens (beams) may be delivered to the laboratory for testing or may be tested at the jobsite on test apparatus furnished by the Contractor.

e. Field testing of flexural test specimens shall conform to ASTM C78 and be observed by Engineer. Design flexural strength shall be 20 percent of the specified design compressive strength.

f. The average strength of two cylinders or beams of the same age shall be considered as one test.

g. Testing of field-cured test cylinders and beams to determine time in place for form work will be selected and paid by the Contractor.

J. DAMPPROOFING: Exterior faces of walls below grade shall receive two coats of Dehydratine 4 as manufactured by A. C. Horn of Construction Products Division of W. R. Grace & Company or approved equal as indicated.

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DIVISION 4 - MASONRY

4A - MASONRY MORTARS

4A-1 GENERAL

A. DESCRIPTION:
  1. This Section includes mortar and grout for the following unit masonry materials:
    a. Concrete masonry units.
  2. Related Work Specified Elsewhere:
    a. Concrete Masonry Units - SECTION 4B.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Society for Testing and Materials (ASTM):
      (1) C144 - Aggregate for Masonry Mortar.
      (2) C150 - Portland Cement.
      (3) C207 - Hydrated Lime for Masonry Purposes.
      (4) C270 - Mortar for Unit Masonry.
      (5) C404 - Aggregates for Masonry Grout.
  2. Do not change source or brands of masonry mortar materials during the course of Work.

C. SUBMITTALS:
  1. Compliance Submittals:
    a. Submit as specified in DIVISION 1.
    b. Includes, but not limited to the following:
      (1) Specifications of materials.
      (2) Instructions for use.

D. DELIVERY, STORAGE AND HANDLING:
  1. Store materials off the ground and in dry location.
  2. Store in a manner to prevent deterioration or intrusion of foreign materials.

E. JOB CONDITIONS: Specified in each applicable section, this Division.

4A-2 EQUIPMENT AND MATERIALS

A. MATERIALS:
  1. Portland Cement: Conform to ASTM C150, Type 1, nonstaining, without air entrainment. Natural color.
  2. Hydrated Lime: Conform to ASTM C207, type S, high-calcium lime.
  3. Aggregates:
    a. Conform to ASTM C144, except for joints less than 1/4-inch, use aggregate graded with 100 percent passing No. 16 sieve.
  4. Water: Clean and free of deleterious materials which would impair strength or bond.

5. Admixtures:
   a. Do not use water repellents, plasticizing agents, anti-freeze liquid, salts, or other substances to lower freezing point of mortar.
   b. Do not use calcium chloride in mortar.

B. MORTAR MIXES:
   1. Mortar for Unit Masonry: Conform to ASTM C270, except limit materials to those specified herein, and limit ratio by volume, as follows:
      a. Type S:
         (1) Proportions:
            (a) Not more than 1/2-part lime per 1 part portland cement.
            (b) Aggregate not less than 2-1/4 and not more than 3 times the sum of the volumes of the cement and lime used.
         (2) Use in the following locations:
            (a) All concrete masonry unit walls.
      b. Grout for Bar Reinforcement:
         (1) Proportions:
            (a) 1 part portland cement.
            (b) 2 parts minimum to 3 parts maximum damp loose sand.
            (c) 2 parts coarse aggregate conforming to ASTM C404.
         (2) Use in the following locations where grout space is larger than 3 inches in its least dimension.
            (a) Reinforced vertical cells.
            (b) Bond beams.
            (c) Where items embedded into hollow concrete masonry unit cells.

4A-3 PERFORMANCE

A. MEASUREMENT AND MIXING:
   1. Conform to ASTM C270.
   2. The method of measuring materials shall be such that the specified proportions of the mortar materials can be controlled and accurately maintained.
   3. Mix all cementitious materials for at least 3 minutes with a maximum amount of water to produce a workable consistency. Mix in a mechanical batch mixer and completely empty prior to placing the succeeding batch therein.

B. INSTALLATION:
   1. Mortar may be retempered on the board to maintain satisfactory consistency.
   2. Do not use mortar which has greatly stiffened or in which the cementing material has started to set.
   3. Use and place mortar in final position within 2-1/2 hours.
   4. Specific installation instructions applicable to each material specified are as specified in their respective Section, this Division.

C. CLEANING AND REPAIR: Specified in each applicable Section, this Division.

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4B - CONCRETE MASONRY UNITS

4B-1 GENERAL

A. DESCRIPTION:
   1. This Section includes the following:
      a. Concrete masonry units.
      b. Concrete brick.
      c. Precast concrete lintels.
   2. Related Work Specified Elsewhere:
      a. Masonry Mortar: SECTION 4A.
      b. Masonry Accessories: SECTION 4C.
      c. Wall Insulation: SECTION 7A.
      d. Flashings and Sheet Metal: SECTION 7D.
      e. Joint Fillers: SECTION 7F.

B. QUALITY ASSURANCE:
   1. Applicable Standards:
      a. American Society for Testing and Materials (ASTM):
         (1) C55 - Concrete Building Brick.
         (2) C90 - Hollow Load-Bearing Concrete Masonry Units.
         (3) C145 - Solid Load-Bearing Concrete Masonry Units.
         (4) C33 - Concrete Aggregates.
         (5) A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

C. SUBMITTALS:
   1. Compliance Submittals:
      a. Submit as specified in DIVISION 1.
      b. Includes, but not limited to, the following:
         (1) Manufacturer's specifications.
   2. Test Reports or Certificates:
      a. Submit as specified in DIVISION 1.
      b. Submit certificate or test reports certifying that masonry units furnished meet or exceed the requirements of this specification.

D. DELIVERY, STORAGE AND HANDLING:
   1. Stack concrete masonry units aboveground on platform which allows air circulation under stacked units.
   2. Cover and protect concrete masonry units from the elements and soiling from earth or other materials.

4B-2 MATERIALS

A. HOLLOW LOAD-BEARING UNITS:
   1. Conform to ASTM C-90, Grade N for all concrete masonry work.
   2. Conform to ASTM C90, Type I Moisture Controlled Units.
   3. Nominal dimensions of 16-inch length x 8-inch height x width indicated.
   4. Normal weight aggregate units of concrete aggregate conforming to ASTM C33 for a minimum dry net weight of 125 pcf.

4B - CONCRETE MASONRY UNITS: continued

B. CONCRETE BUILDING BRICK:
1. Conform to ASTM C55, Grade N for exterior walls, Type 1 moisture-controlled units.

C. PRECAST CONCRETE LINTELS:
1. Construct of precast reinforced concrete with same face texture as wall in which lintel is to be built, and scored vertically to resemble mortar joints.
2. Reinforcing bars to conform to ASTM A615.
3. Construct length for 8-inch minimum bearing each side of opening, except as indicated.
4. Top of lintels marked to indicate lintel schedule number and the number and size of reinforcing bars.
5. Lintel size and reinforcing as indicated.

D. SPECIAL SHAPES:
1. Construct where indicated and where required for lintels, corners, jambs, sash, control joints, headers, bonding and other special conditions.
2. Provide square corner units at all window, door and louver jambs, outside corners, columns and pilasters, and in other locations indicated.
3. Provide solid block units at window and louver sills, and in other locations indicated.

E. MASONRY MORTAR: Specified in SECTION 4A.

4B-3 PERFORMANCE

A. GENERAL:
1. Build masonry construction to the thickness indicated.
2. Cut units with motor driven saw designed to cut masonry with clean, sharp, unchipped edges. Cut units as required to fit pattern indicated and to fit adjoining work neatly. Use full units without cutting wherever possible.
3. As the work progresses, build in all items, openings and recesses as required for the work of other trades. Where built in items are embedded in masonry cells, place layer of metal lath in the joint below and rod mortar or grout into core.
4. Lay up walls plumb and true, with courses level, accurately spaced and coordinated with other work.
5. When stopping and resuming work, step back 1/2 masonry unit length in each course. Do not tooth. Clean exposed surfaces of set masonry. Remove loose masonry units and mortar prior to laying fresh masonry.

B. JOB CONDITIONS:
1. Do not lay masonry units when temperature is below 40 degrees F, except under the following conditions:
   a. Heat all materials and maintain air temperature at 40 degrees F on both sides of wall for period of 72 hours after laying.

2. Do not use frozen materials or materials coated with ice or frost. Remove and replace masonry work damaged by frost or freezing.
3. Do not wet concrete masonry units.
4. Protect partially completed walls against weather, when work is not in progress, by covering top of walls with strong, waterproof, nonstaining membrane. Extend membrane at least 2 feet down both sides of wall and anchor securely in place.

C. INSTALLATION:

1. Bonding and Coursing:
   a. Lay concrete masonry units in running bond with vertical joints located at center of masonry units in alternate courses below.
   b. Bond and interlock each course at corners unless otherwise indicated. Do not use units with less than 4 inches horizontal face dimension at corners or jambs.
   c. Bond intersecting walls with continuous wire reinforcement as specified in SECTION 4C.
   d. Coordinate joints with those of adjoining walls.
   e. Install lintels with minimum bearing of 8 inches at each jamb unless otherwise indicated.
2. Joints:
   a. Lay walls with 3/8-inch joint and to maintain coursing.
   b. Tool joints concave which are exposed, including joints in finished and unfinished areas.
   c. Cut joints flush which are concealed or covered with other materials.
   d. Rake out mortar in preparation for application of caulking or sealants where indicated.
   e. Mortar Beds for Hollow Units:
      (1) Lay with full mortar coverage on horizontal and vertical face shells.
      (2) Lay with full mortar coverage on horizontal and vertical face shells and webs in all courses of the following:
         (a) Columns and pilasters.
         (b) Starting course on footings or solid foundation walls.
         (c) Where adjacent to cells or cavities to be filled with grout.
   f. Mortar Beds for Solid Units:
      (1) Lay with full mortar coverage on horizontal and vertical joints.
3. Masonry Accessories and Built in Work:
   a. Install the following items as masonry work progresses as indicated and as specified in their applicable Sections.
      (1) Reinforcing, ties, anchors and other accessories.
      (2) Through-wall flashing and built in sheet metal work.
      (3) Control and expansion joint fillers.
      (4) Precast lintels.
      (5) Frames, inserts, piping, conduit.
      (6) Anchor bolts.
   b. Where built-in items, excluding bar reinforcement, are embedded in cores of hollow masonry units, install metal lath in joint below and rod mortar or grout into core.

D. REPAIR AND POINTING:

1. Remove and replace masonry units which are loose, chipped, broken, stained, or otherwise damaged. Replace with new units to match. Install in fresh mortar or grout and point to match adjacent work.
2. During tooling of joints, enlarge any voids or holes as necessary, except weep holes, and completely fill with fresh mortar.

E. CLEANING: Clean exposed concrete masonry units by dry brushing at the end of each day's work and after final pointing to remove mortar spots and droppings.

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4C - MASONRY ACCESSORIES

4C-1 GENERAL

A. DESCRIPTION:
  1. This Section includes masonry accessories for concrete masonry units, and includes the following items:
    a. Continuous wire reinforcing.
    b. Horizontal and vertical bar reinforcement.
  2. Related Work Specified Elsewhere:
    a. Masonry Mortar: SECTION 4A.
    b. Concrete Masonry Units: SECTION 4B.
    c. Flashing and Sheet Metal: SECTION 7D.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Society for Testing and Materials (ASTM):
      (1) A82 - Cold-Drawn Steel Wire For Concrete.
      (2) A116 - Zinc-Coated (Galvanized) Iron or Steel Farm-Field and Railroad Right-of-Way Wire Fencing.
      (3) A615 - Deformed Billet Steel Bars for Concrete Reinforcement.
  2. Acceptable Manufacturers: Proprietary names are specified for material identification. Similar products of the manufacturers listed below are acceptable.
    a. Continuous Wire Reinforcing:
      (1) AA Wire Products Company.
      (2) Dur-O-Wal.
      (3) Hohmann and Barnard, Inc.

C. SUBMITTALS:
  1. Compliance Submittals:
    a. Submit as specified in DIVISION 1.
    b. Includes, but not limited to, the following:
      (1) Specifications, catalog cuts.
      (2) Installation instructions.

D. DELIVERY, STORAGE AND HANDLING:
  1. Deliver all materials to site in manufacturer's original carton or packaging containing manufacturer's name, accessory type, and gauge.
  2. Store all masonry accessories to prevent corrosion and deformation.

4C-2 EQUIPMENT AND MATERIALS

A. CONTINUOUS WIRE REINFORCEMENT:
  1. Prefabricated welded wire units in straight lengths of not less than 10 feet, with matching corner and tee units.
  2. Fabricated from cold-drawn steel wire conforming to ASTM A82, with deformed side rods and plain cross rods.
  3. Unit width of 1-1/2 to 2 inches less than wall or partition thickness.
  4. Truss type:

a. Fabricated with single pair of 3/16-inch side rods and 9-gauge continuous diagonal cross rods to form a truss design spaced not more than 16 inches oc.
b. Dur-O-Wal Truss Design.

5. Finish:
   a. Mill-galvanized with minimum 0.8-oz zinc coating to conform to ASTM A116, Class 3.

B. BAR REINFORCEMENT:
1. Deformed steel bars to conform to ASTM A615, Grade 60.
2. Sizes as indicated.
3. Use for the following locations:
   a. Vertical cell reinforcement.
   b. Bond beams.

4C-3 PERFORMANCE

A. PREPARATION:
1. Prepare all surfaces to receive masonry anchors as required by type of anchor.
2. Build in all anchors as work progresses.

B. INSTALLATION:
1. Continuous wire reinforcement:
   a. Install continuous horizontal joint reinforcing in all masonry walls.
   b. Fully embed side rods in mortar for entire length with a minimum mortar cover of 5/8-inch on exterior side of wall and 1/2-inch at other locations.
   c. Lap reinforcement a minimum of 6 inches.
   d. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" Sections. Lap 6 inches at splices.
   e. Space reinforcing as follows:
      (1) 16 inches oc vertically, and in bed joint of top course.
      (2) Wall openings greater than 1'-0" width: In two horizontal joints, 8 inches oc, both immediately above lintel and immediately below sill. Extend reinforcing a minimum of 2'-0" beyond jambs of opening.
2. Bar Reinforcement:
   a. Align all cells of masonry units to maintain a clear, unobstructed, continuous cell.
   b. Install bars with length as great as possible where splices are required, lap bars 30 bar diameters and wire tie.
   c. Locate splices in vertical wall cells 1/5 to 1/4 of wall height from top or bottom of wall.
   d. Hook bars into bond beams as indicated.

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DIVISION 5 - METALS: STRUCTURAL AND MISCELLANEOUS

5A - STEEL

5A-1 GENERAL

A. DESCRIPTION:

1. This Section includes fabrication and erection of the structural steel and other steel or metal items as defined in AISC Manual, Code of Standard Practice.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American Institute of Steel Construction (AISC):
      (1) Manual of Steel Construction.
      (2) Quality Criteria and Inspection Standards.
   b. American Welding Society Structural Welding Code (AWS D1.1 Code).
   c. American Society for Testing and Materials (ASTM):
      (1) A6 - General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use.
      (2) A36 - Structural Steel.
      (3) A53 - Welded and Seamless Steel Pipe.
      (4) A108 - Cold-Finished Carbon Steel Bars and Shafting.
      (5) A120 - Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses.
      (6) A123 - Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strip.
      (7) A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
      (8) A307 - Low-Carbon Steel Externally and Internally Threaded Standard Fasteners.
      (9) A325 - High-Strength Bolts for Structural Steel Joints, Including Suitable Nuts and Plain Hardened Washers.
      (10) A449 - Quenched and Tempered Steel Bolts and Studs.
      (11) A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
      (12) A563 - Specifications for Carbon Steel Nuts.
   d. Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation "Specifications for Structural Joints Using ASTM A325 Bolts or A490 Bolts" as approved by AISC.
   e. Steel Structures Painting Council (SSPC) - Steel Structures Painting Manual.
2. Acceptable Manufacturers: Specified in part 5A-2 and 5A-3.
3. Welder Qualifications:
   a. Welders shall be previously qualified (within the past twelve months) by passing the tests prescribed in the AWS Standard Qualification Procedure, or by passing such other tests as the Engineer may accept.
   b. Submit two certified copies of the qualification records, if requested, to Engineer as evidence of qualification to the above-mentioned code.

4. Inspection: Material or workmanship will be subject to inspection in the shop and field.

C. SUBMITTALS:
 1. Compliance Submittals:
  a. Submit as specified in DIVISION 1.
  b. Includes, but not limited to, the following:
   (1) Fabrication and erection drawings for all work.
   (2) All necessary information for the fabrication, including filler metal for welds, of the component part of the structure, presented on drawings to conform to recognized standard practice, AISC Manual Part 5, and AWS Code.
   (3) Drawings indicating stud shear connector spacing regardless of whether connectors are shop applied or field applied.
   (4) Drawings showing each piece including anchor bolts marked for identification to correspond to erection drawings.
   (5) Fabricator's drawings may include reproductions from Contract Drawings but responsibility for checking all dimensions shown remains with Contractor. Reproducibles of Contract Drawings will be furnished to Contractor as specified in DIVISION 1.
 2. Mill Tests:
  a. Perform for each melt of material used in the fabrication.
  b. Furnish two copies of each certified mill test to Engineer upon request.

D. DELIVERY, STORAGE AND HANDLING: Handle and store all steel and appurtenances as specified in DIVISION 1.

5A-2 MATERIALS

A. GENERAL:
 1. Steel: Conform to ASTM A36, as designated in the AISC Manual, Part 1, unless otherwise indicated or specified.
 2. Connection Bolts, Nuts and Washers: Conform to ASTM A325, unless otherwise indicated or specified.
 3. Anchor Bolts:
  a. Conform to ASTM A307 using A36 steel, unless otherwise indicated to be stainless steel or high strength.
  b. Machine Bolts: Conform to ASTM A307.
  c. High Strength: Conform to ASTM A449 with nuts conforming to ASTM A563, Grade B for bolts with diameters less than or equal to 1-1/2 inches. Use grade A for bolts greater than 1-1/2 inches diameter.
 4. Handrail: Conform to ASTM A53, Type E or S, Grade B; ASTM A106, Grade B; or ASTM A120 (with minimum yield strength of 33,000 psi).
 5. Pipe for Structural Uses: Conform to ASTM A53, Type E or S, Grade B, or ASTM A106, Grade B.
 6. Square and Rectangular Tubing: Conform to ASTM A500.
 7. Grating:
  a. Main bars: Conform to ASTM A 569, Grade 1015.
  b. Cross bars: Conform to ASTM A 569, Grade 1010.

5A - STEEL: continued

8. Shear Stud Connectors: Manufacture from cold-finished carbon steel conforming to ASTM A 569, Grade 1015 or 1020.
9. Welding:
   a. Use E70 electrodes for shielded metal arc welding and F7 series electrodes for submerged arc.
   b. Select filler metal as required by AISC Manual, Part 5, Section 1.17.
10. Galvanizing: Galvanize steel after fabrication to conform to ASTM A123 and ASTM A153, where indicated or specified.

B. STEEL FABRICATION:
1. Fabricate all steel to conform to AISC specifications, codes and standards.
2. Permissible variations for sweep, camber, length and cross-section of all steel members shall conform to ASTM A6, AISC "Manual of Steel Construction, Part 1" and AISC "Quality Criteria and Inspection Standards" unless indicated otherwise.
3. Fabricator shall mark all shear connector locations (if field-applied) by means of center punch and paint circle or other approved means so that field layout of shear connectors is not required. Do not paint shear connector contact surface.
4. Welding:
   a. All welding shall be shielded metal arc or submerged arc.
   b. Conform to AWS Code, AISC Manual Part 4 and the AISC Quality Criteria and Inspection Standards.
   c. Inspection of welds will be in accordance with the AWS Code to determine the acceptability of welds. Correct defective welds.
5. Shop Connections:
   a. Weld, rivet, or bolt at Contractor's option except when otherwise indicated or specified.
   b. Shop portions of connections may be welded equivalent to any bolted connection specified if Engineer concurs.
   c. Welded connections shall be as indicated or in accordance with acceptable alternative designs.
      (1) Welds of connection angles to beam webs shall conform with AISC Manual Part 4, Tables III and IV with particular regard for minimum web thickness. Provide longer connection angles or reinforce web as required.
      (2) All butt joint groove welds shall be complete penetration welds unless otherwise indicated and shall conform to the applicable standards in AISC Manual Part 4 with special emphasis on maintaining root opening. Accomplish this for single-bevel butt joint welds by using backup plates or by chipping out and welding on the opposite side.
      (3) Prepare weld bevels with a mechanically guided cutting torch or by grinding.
      (4) Remove all run-out tabs.
   d. Bolted connections shall conform with AISC Manual Part 4.
      (1) All bolted connections shall be made with 3/4-inch A325 bolts, nuts and washers unless otherwise indicated or specified.

(2) Capacity of beam connections shall be equal to that specified in AISC Manual Part 4, Tables I and II for ASTM A325 bolts in friction-type connections with the size of bolts and the number of bolt rows indicated.

(3) Use no less than the minimum number of rows of bolts for a given beam size as required by Tables 1 and 2 of AISC Manual, Part 4.

6. Provisions for Field Connections:
   a. Provide with bolted connections unless otherwise indicated or specified.
   b. Provide for field welding only when so indicated or when detail clearances make bolting impractical.
   c. Provide all members to be field welded with bolted erection connections adequate to resist erection stresses prior to field welding.
   d. All steel connections shall use either ASTM A325 bolts.

C. COLUMN BASE AND EQUIPMENT ANCHOR BOLTS:
1. Furnish for all columns and equipment furnished and installed under this Contract, and as required to install all equipment furnished by others for installation under this Contract unless otherwise indicated.
2. Install as indicated.
3. Galvanize after fabrication sleeved anchor bolts full length and nonsleeved anchor bolts from top of anchor bolt to 2 inch embedment in concrete foundation including exposed nuts.

D. HANDRAIL:
1. 1-1/2-inch nominal (1.9-inch outside diameter) round black standard-weight pipe.
2. Post spacing shall not exceed 6 feet from center to center.
3. Form and weld all handrail. Grind all welds smooth and even with the surface of the pipe, including field welds required for erection.
4. Carefully form all handrail where change of direction or elevation occurs. Provide rounded corners to avoid hazardous conditions where sloping handrail meets horizontal handrail.
5. Furnish pipe sleeves for posts of handrail sections indicated to be removable.
6. Handrail posts shall be vertical (plumb) unless otherwise indicated.
7. Hot-dip galvanize after fabrication.

E. EDGE ANGLES AND PLATES:
1. Furnish around openings as indicated.
2. Keep plates flush at intersections and fillet-weld to give a neat appearance at the exposed intersecting surfaces.
3. Hot-dip galvanize after fabrication.
4. Properly align, level and plumb before concrete is placed.

F. KICK PLATES:
1. Furnish at the edge of uncovered openings and at the edge of walkways and platforms, except as otherwise indicated.
2. Hot-dip galvanize after fabrication.

G. STEEL FLOOR GRATING:

1. One-piece, resistance-welded steel construction without notching of bearing or cross bars before welding.
2. Main Bars:
   a. Thickness: 3/16-inch.
   b. Depth: 1-1/4-inch unless indicated otherwise.
   c. Spacing: Not more than 1-3/16 inches on centers.
   d. Configuration of Top Surface of Main Bars: Serrated with flat tops unless otherwise indicated. Sharp saw-tooth edges shall not be permitted.
3. Cross Bars:
   a. Spacing: 4 inches on centers.
   b. One of the following shapes:
      (1) Hexagon with 5/16-inch diameter of inscribed circle.
      (2) Rectangular 1/2-inch x 3/16-inch.
      (3) Square 1/4-inch with spiral twist.
      (4) Round 21/64-inch diameter.
4. Fabrication:
   a. Main bars shall be vertical within a tolerance of 0.10-inch per inch of depth.
   b. Longitudinal bow (before fastening to supports) shall be less than 1/200 of the length.
   c. Transverse bow before fastening to supports shall be less than 3/8-inch in 3 feet.
   d. Crossbars shall not deviate from a straight line perpendicular to the main bars by more than 3/16-inch in 3 feet.
   e. Crossbars shall match crossbars of adjacent sections to form a continuous pattern of straight lines.
   f. Panel width and length tolerances shall be ±1/4 inch.
   g. Provide all openings in grating indicated and as required for installation of all piping, wiring and equipment installed under this Contract.
   h. Band all openings 4 inches and larger with a metal bar same size as main bearing bar. Weld to each bearing bar with a 3/16-inch fillet weld 3/4-inch long. Tack weld to all crossbars.
   i. Trim-band all locations as follows:
      (1) Open end of grating at head of a ladder.
      (2) Manway opening.
      (3) Hinged sections.
      (4) Grating panels with four crossbars or less.
      (5) Other locations as indicated.
5. Shop Finish:
   a. Hot-dip galvanize after fabrication.
6. Openings in Grating: Furnish for other contracts as indicated:
7. Manufacturer: Grating shall be manufactured by one of the following:
   a. Blaw Knox, Pittsburgh, Pennsyvlania.
   b. Dravo Corporation, Pittsburgh, Pennsylvania.
   c. IKG Industries.
   d. Klemp Corporation, Chicago, Illinois.
   e. Borden Metal Products Company, Elizabeth, New Jersey.

H. STAIRS: (If Required)
1. General Construction:
   a. Stringer sizes indicated are minimum acceptable size.
   b. Cross-brace stringers to provide lateral stability where the horizontal run exceeds 12 feet.
   c. Provide struts and hangers where indicated, or as otherwise required for proper support.
2. Treads:
   a. Open riser type with serrated grating conforming to "Steel Floor Grating" as specified herein, with main bars 1-1/4-inch x 3/16-inch unless indicated otherwise.
   b. Provide standard checkered plate nosing.
   c. Bolt tread to each stringer with a minimum of two 3/8-inch bolts.
3. Grating Landings:
   a. Landings shall be of serrated grating conforming to "Steel Floor Grating" as specified herein, with 1-1/4-inch x 3/16-inch main bars unless indicated otherwise.
   b. Provide subframing so that grating span will not exceed 3'-6".
   c. Provide nosing as specified for "Treads" at the head of all stairs.

I. CHECKERED PLATE: (If Required)
1. Plate shall be of thickness indicated with surface deformations of the four-way type.
2. Hot-dip galvanize plate after fabrication.
3. Fasten in place with screws spaced at 18 inches with a minimum of one at each corner of each piece or as otherwise indicated.
4. Screws shall be 3/8-inch countersunk stainless steel of Allen head type.
5. Provide 1-inch holes at each corner of checkered plate sections.

J. STUD SHEAR CONNECTORS: (If Required)
1. General:
   a. Conform to specification for Stud Shear Connectors in AISC Manual Part 5.
   b. Use 1/2-inch diameter by 4-inch headed-type stud shear connectors unless otherwise indicated.
   c. Number and spacing shall be as indicated.
2. Manufacturer: Connectors shall be manufactured by one of the following
   a. KSM Products, Inc., Morrestown, New Jersey.
   b. Nelson Stud Welding Company, Lorain, Ohio.
3. Stud Shear Connector Welding:
   a. Workmanship and quality control shall conform to AWS Code for "Stud Welding" and recommendations of the connector manufacturer.
   b. Stud shear connectors shall be shop or field welded at Contractor's option.
   c. Stud welding, equipment, and power requirements for stud welding shall conform to manufacturer's recommendations.
   d. Clean stud shear connector weld area of scale, rust, oil, paint and any other foreign substance that would inhibit sound welds.

4. Inspection: Workmanship of the stud shear connector welding will be verified as follows:
   a. Studs shall be at least 1/8-inch shorter after welding.
   b. Studs shall have a 360-degree weld fillet at base with no undercut.
   c. Any stud having a questionable weld will be subjected to a bend test by bending the stud away from its axis until failure occurs but not exceeding 30 degrees. Failure should occur in the stud, not in the weld. Replace studs that do not bend 30 degrees without failure or otherwise do not meet these Specifications.

K. CONCRETE AND MASONRY ANCHORS:
1. Manually expanded anchor type. Serrated type anchors shall not be used.
2. Furnish sizes indicated and install to conform to manufacturer's printed instructions.
3. Anchors shall be manufactured by one of the following:
   a. Phillips Drill Company, Inc., Michigan City, Indiana.
   b. Star Expansion Industries Corporation, Mountainville, New York.
   c. U.S. Expansion Bolt Company, York, Pennsylvania.

L. SHOP PAINTING:
1. Surface Preparation: Prepare all surfaces except galvanized (or otherwise specified) in accordance with SSPC-SP1 and SP6.
2. Shop Coat: Inorganic zinc rich primer (ethyl silicate base), 3 mils dry.
   a. Carboline - CZ11.
   b. Cook - 411-A-101.
   c. Mobil - 13F12.
   d. Tnemec - Tneme-Zinc 90-92E.
3. Apply shop coat to all steel, including connections except for the following surfaces:
   a. Where encased in concrete, apply paint on exposed faces only.
   b. Within 3 inches adjacent to field welds.
4. Application:
   a. Preparation of surfaces to be painted shall be in accordance with "Steel Structure Painting Councils" specification.
   b. Prepare only the amount of surface which can be painted the same working day to prevent rerusting of the surface.
   c. Remove grease, weld spatters, burrs and sharp edges prior to painting.
   d. Apply paint in strict accordance with manufacturer's written instructions.

5A-3 PERFORMANCE

A. PREPARATION:
1. Field-check location and elevation of anchor bolts and footings.

5A - STEEL: continued

B. STEEL ERECTION:

1. Erect all steel to conform to AISC specifications, codes and standards, AISC Quality Criteria and Inspection Standard or any local, State or Federal Codes which may exceed such requirements.
2. Protect steel from entrapped water that can cause damage from freezing or corrosion.
3. Baseplates:
   a. Grout under baseplates with a flowable nonshrink grout, taking special care not to disturb their grade and alignment.
   b. Flowable nonshrink grout shall be one of the following:
      (1) Masterflow 713 grout, Master Builders Company, Cleveland, Ohio.
      (2) Saurereisen F100, Saurereisen Cement Company, Pittsburgh, Pennsylvania.
      (3) Five Star Grout, U. S. Grout Corporation, Old Greenwich, Connecticut.
   c. Cut off exposed edges of the grout at 45 degrees along the edges of the baseplates after grout has acquired its initial set.
4. Erection Bracing:
   a. Provide all necessary temporary struts, ties, cables, temporary flooring, planking and scaffolding in connection with the erection of the structural steel or support of erection machinery.
   b. Place as required to maintain proper position against loads from erection equipment, construction material and wind.
   c. Leave bracing in place until sufficient steel connections, concrete slabs, exterior walls, and roof decks are in place to ensure stability of the structure.
5. Connections:
   a. Unless otherwise indicated, or clearance is insufficient, connections shall be bolted friction type.
   b. Tighten high-strength bolts to correct bolt tension in accordance with AISC Manual, Part 5, "Specification for Structural Joints using A325 or A490 Bolts."
   c. Furnish the inspecting wrench and one man to assist the Engineer when inspections are performed.
   d. Provide Skidmore-Wilhelm Bolt-Tension calibrator or approved equal for adjusting inspection wrench and/or calibrated wrench in accordance with AISC Manual, Part 5.
   e. Load Indicators:
      (1) The use of load indicators is an acceptable alternative to the requirements of paragraph 6.c. and 6.d. above in determining specified minimum bolt tension.
      (2) Use Coronet Load Indicators as manufactured by Cooper and Turner, Inc., East Hartford, Connecticut, or an approved equal.
      (3) Install in accordance with manufacturer's written instructions.
   f. All steel connections shall use ASTM A325 bolts unless indicated otherwise.
   g. Welded Connections:
      (1) Make welded connections as indicated and leave all erection bolts in place after completion of welding unless otherwise indicated.
      (2) Reinforce connections when members requiring fillet welds are not in contact.

(3) Use backup bars or spacer bars on all butt welds where root opening exceeds 3/16-inch.
(4) Remove all run-out tabs.

6. Welding and Welders:
   a. The requirements for erection welding and welders shall be the same as specified for steel fabrication.
   b. All welds shall be stamped with a mark identifying the welder. Remove welders from work after two defective welds.
7. Protect pipe sleeves, other anchorage members and concrete bases from deleterious materials at all times, and from water which may cause ice damage during freezing weather.
8. Handrail:
   a. Form and weld all handrail. Grind all welds smooth and even with the surface of the pipe.
   b. Carefully fit all handrail where change of direction or elevation occurs.
   c. Install all rails and posts plumb, level, straight and true and in alignment.
   d. Top rail shall clear all fixed objects by at least 3 inches vertically and horizontally.
   e. Furnish and install plates, bolts, and additional items as indicated or required for fastening to supporting members.
9. Grating:
   a. Space fasteners as required to overcome irregularities and maintain grating contact with supports. Minimum anchorage of each panel will be two fasteners at each end and one fastener at each intermediate support.
   b. All grating shall be removable unless otherwise indicated.
   c. Unless indicated as fixed, fasten with galvanized clips using welding studs.
   d. Where indicated as fixed, and if not galvanized, fasteners shall be 3/16-inch fillet welds 3/4-inch long.
   e. All grating shall be removable unless otherwise indicated.
10. Shear Stud Connectors: The requirements for field installed shear stud connectors shall be the same as specified for shop-installed connectors.
11. Field Painting: Surface preparation, priming and finish coating are specified in SECTION 9A.

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5B - STEEL JOISTS

5B-1 GENERAL

A. DESCRIPTION:
1. This Section includes steel joists, bridging, and accessories.

B. QUALITY ASSURANCE:
1. Applicable Standards:
   a. Steel Joists Institute (SJI): "Standard Specifications for Open Web, Long Span and Deep Long Span Steel Joists."
   b. Steel Structures Painting Council (SSPC) - Steel Structures Painting Manual.
2. Inspection and Tests:
   a. The materials to be furnished shall be subject to inspection in the mill, shop, and field.
   b. Joists shall be inspected by the manufacturer before shipment to ensure compliance of materials and workmanship with the Specifications.
   c. Welders shall be qualified for type of work required.

C. COMPLIANCE SUBMITTALS:
1. Submit as specified in DIVISION 1.
2. Include, but not limited to, the following:
   a. Fabrication and erection details, including end supports and bridging.
   b. Splices, welding sequences, and procedures for field splices if required.
   c. Two certified copies of all mill reports or laboratory reports covering the chemical and physical properties of the steel used in the Work if requested by the Engineer.

D. DELIVERY, STORAGE AND HANDLING:
1. Exercise care at all times to avoid damage through careless handling and storage.
2. Unload joists and stack either by crane or by hand.
3. Dumping or dropping of joists will not be permitted.

5B-2 MATERIALS

A. GENERAL REQUIREMENTS:
1. Joists series and sizes indicated are based on joists listed by SJI.
2. Steel used in the fabrication of joists, design and working stresses, and fabrication and erection procedures shall conform to the requirements of SJI, unless otherwise specified.
3. Contractor shall be responsible for all errors of fabrication and for the correct fitting of the joists in the field.
4. Joists shall be fabricated from new materials.

5B - STEEL JOISTS: continued

B. FABRICATION:
1. Connections: Joist members shall be joined by either resistance or arc welding in a manner that will produce a finished connection of the strength required.
2. Holes: Holes shall not be made or enlarged by burning.
3. Joists with cracked or improper welds, or joists otherwise damaged so as to affect their structural properties, will not be allowed.
4. Bearing and Anchorage:
   a. Bearing surfaces of the joist shall be in the same plane with full bearing on the supporting wall or beam.
   b. Provide for anchors as required and as indicated.
5. Bridging: Conform to SJI for type and quantity unless otherwise indicated.
6. Accessories: Furnish fittings and framing for openings, anchors, joist extensions, ceiling extensions, and as required.

C. SHOP PAINTING:
1. Surface Preparation: Prepare all surfaces except galvanized in accordance with SSPC-SP2 or SSPC-SP3.
2. First Coat: Medium oil alkyd, red lead, iron oxide primer, 2 mils dry.
   a. Cook - Armorcote Metal Primer 391-N-162.
   b. Mobil - Red Lead Oxide Primer 13-R-825.
   c. Tnemec - Red Metal Primer 10-99.

5B-3 PERFORMANCE

A. ERECTION:
1. Repair or replace damaged joists according to manufacturer's recommendations. Repair shall be made so that joist capacity is not reduced.
2. Fasten all joists in place prior to receiving construction loads.
3. Bridging:
   a. Install all bridging and bridging anchors before receiving construction loads.
   b. Bridging shall support the top chords against lateral movement and shall hold the steel joists in the plane indicated.
   c. Anchor the ends of bridging lines terminating at walls or beams at top and bottom chords.
   d. Anchor bridging to steel joists by welding or bolting.
   e. Welds for attachment of bridging shall not damage the joist members.
4. During the construction period, exercise care to avoid excessive concentrated loads. Distribute loads so as not to exceed carrying capacity of steel joists.

B. FIELD PAINTING: Surface preparation, priming and finish coating are specified in SECTION 9A.

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4 5C - METAL ROOF DECKS

5C-1 GENERAL

A. DESCRIPTION:

1. This Section includes structural metal roof deck and accessories.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American Iron and Steel Institute (AISI):
      (1) Design of Light-Gauge Cold-Formed Structural Steel Members.
   b. American Society for Testing and Materials (ASTM):
      (1) A446 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, Physical (Structural) Quality.
      (2) A525 - Steel Sheet, Zinc Coated (Galvanized) by the Hot-Dip Process, General Requirements.
      (3) A611 - Steel, Cold-Rolled Sheet, Carbon, Structural.
   c. American Welding Society Structural Welding Code (AWS D1.1 Code).
2. Qualification of Welding Work:
   a. Welding processes, qualification of welding operators and welding inspection shall be in accordance with AWS D1.1 Code.
   b. Prior to actual erection, welders shall demonstrate to the Engineer their ability to weld metal roof deck.

C. SUBMITTALS:

1. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Include, but not limited to, the following:
      (1) Complete erection layouts, details, and installation instructions.
      (2) Details and layout of roof decking, showing lengths, locations, and markings of roof decking to correspond with the sequence and procedure to be followed in installing and fastening the decking.
      (3) Method of fastening and installation of accessories.
      (4) The size and number of holes to be cut in decking.

5C-2 MATERIALS

A. METAL DECK:

1. General Requirements:
   a. Deck design shall conform to AISI.
   b. Metal deck shall be formed from galvanized steel sheets conforming to ASTM A446, Grade A, and coated in accordance with ASTM A525.
      (1) The coating shall be class A60.
   c. Cut deck units to required lengths so that end joints will occur on supporting members. Lap ends not less than 2 inches.
2. Deck Type: (1-1/2-inch)
   a. 1-1/2-inch depth, 18 gauge.
   b. Inland-Ryerson Type "B", H. H. Robertson "Q" Deck Section 3, or approved equal.

3. Length of Individual Sheets: Extend over 3 or more supports where possible.

B. ACCESSORIES:
1. Furnish with the following:
   a. Cover plates - 18-gauge.
   b. Valley plates - 18-gauge.
   c. Recessed sump pans - 14-gauge.
   d. Metal closures (20-gauge) or neoprene filler.
2. Finish: Same as for metal deck.

5C-3 PERFORMANCE

A. ERECTION:
1. Conform to fabrication and erection drawings and manufacturer's printed instructions.
2. Fasten to every beam or joist by electric arc welding to conform to instructions and as follows:
   a. Place deck and adjust to proper bearing and alignment before being permanently fastened.
   b. Reinforce all openings to maintain design load requirements.
   c. Fasten deck to steel framing according to manufacturer's recommendations except in no case shall fastening be less than following:
      (1) At end and intermediate supports and at perimeter of roof: 3/4-inch diameter plug welds spaced at 12 inches on center.
      (2) Side lap connections: 1-1/2-inch-long welds spaced at 24 inches on center or button punched at 24 inches on center.
   d. Install deck with all accessories and provide closures as required to prevent the flow of bitumen through the joints.
3. Welding:
   a. The type and spacing of welds shall be as specified.
   b. Blowholes will be cause for rejection.
   c. Weld all metal fillers and closure pieces to the roof deck.

B. FIELD PAINTING: Surface preparation, priming and finish coating are specified in SECTION 9A.

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DIVISION 6 - WOOD AND PLASTICS

6A - ROUGH CARPENTRY

6A-1 GENERAL

A. DESCRIPTION:
  1. This Section includes rough carpentry as indicated and as follows:
    a. Miscellaneous Framing.
    b. Nailing strips, edge plates, blocking, sleepers.
    c. Related materials.
    d. Temporary doors.
    e. Wood Preservatives.
  2. Related Work: Specified Elsewhere:
    a. Wood Forms: SECTION 3A.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. Federal Specifications (FS):
      (1) FF-B-561 - Bolts, (Screw), Lag.
      (2) FF-B-575 - Bolts, Hexagon and Square.
      (3) FF-B-588 - Bolt, Toggle: Expansion Sleeve, Screw.
      (4) FF-H-111 - Shelf and Miscellaneous: Hardware, Builders.
      (5) FF-H-116 - Hinges, Hardware, Builders.
      (6) FF-N-105 - Nails, Brads, Staples and Spikes; Wire, Cut and Wrought.
      (7) FF-N-836 - Nut: Square, Hexagon, Cap, Slotted, Castle, Knurled, Welding and Single Ball Seat.
      (8) FF-P-101 - Padlocks.
      (9) FF-S-111 - Screw, Wood.
      (10) FF-S-325 - Shield, Expansion; Nail, Expansion; Nail, Drive Screw (Devices, Anchoring, Masonry).
    b. U.S. Department of Commerce - National Bureau of Standards (NBS), Product Standards (PS):
      (1) PS-1 - Construction and Industrial Plywood.
      (2) PS-20 - American Softwood Lumber Standard, for Yard, Structural, and Shop Use.
    c. American Plywood Association (APA).
    d. American Wood Preserves Association (AWPA).
    e. Southern Pine Information Bureau (SPIB).
    f. National Grading Rules (NGR).
  2. Lumber: Contractor shall use lumber produced in the state of Florida whenever possible, but shall provide species of lumber and treatments as specified. Lumber grading and wood species classifications shall conform to PS-20. Identify all lumber by applicable association grade marks. Grade stamp shall contain:
    a. Symbol of Grading Agency.
    b. Mill number.
    c. Grade of lumber.

d. Species or species grouping or combination designation.
e. Rules under which graded.
f. Condition of seasoning at time of manufacture.

3. Plywood grading and species classification shall conform to species classification, type of grades, and grademarking and certification requirements of PS-1. Identify each sheet of plywood with the grade trademark which shall contain the following:
   a. Grades of veneer of panel face and panel back.
   b. Species Group Number.
   c. Type - exterior or interior.
   d. Identification index if applicable.
   e. Product Standard governing manufacture.
   f. Mill number.

C. SUBMITTALS:
1. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Include, but not limited to, the following:
      (1) Samples of exposed framing members and surfaces indicated to be a part of the finished project to show textures and color of material.
      (2) Fabrication shop drawings: Framing layouts, and other drawings necessary to proper installation of work.
   c. Certificates indicating compliance with the grading rules required.
      (1) Schedules showing species furnished.
2. Certificates:
   a. Submit certificate for wood preservatives by treating plant stating that material has been pressure treated as specified with name of preservative, process used and quantity retained per cubic foot of wood.

D. DELIVERY STORAGE AND HANDLING:
1. Keep materials dry. Store lumber and plywood with provisions for air circulation within the stack.
2. Store wood materials a minimum of 6 inches above ground on sleepers of sufficient spacing to prevent warpage.
   a. Protective Covers: Cover storage stacks with a protective waterproof covering providing proper air circulation and ventilation. Storage of seasoned materials in wet or damp areas is prohibited.
   b. Store materials for which maximum moisture content is specified, only in areas where relative humidity has been reduced to a level where specified moisture content can be maintained with a tolerance of plus or minus 1 percent.
3. Handle all materials in a manner to prevent damage or warping.

6A-2 MATERIALS

A. GENERAL REQUIREMENTS:
1. Lumber shall be free of decay, stain, blemishes and sapwood, conforming to PS-20.
2. Plywood shall conform to PS-1.

B. MISCELLANEOUS LUMBER:
1. Provide wood for support or attachment of other work such as miscellaneous framing, cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes required or indicated, worked to shapes shown, and as follows:
   a. Moisture Content: 15 percent maximum for lumber items not specified to receive wood preservative treatment.
   b. Grade: Construction Grade light framing size lumber of any species, or board size lumber, as required. Provide Construction Grade boards (RIS or WCLIB) or No. 2 boards (SPIB or WWPA).

C. PLYWOOD:
1. Plywood Exposed - Exterior:
   a. Temporary Doors:
      (1) Structural II, C-D INT, Exterior Glue-APA.
      (2) Two plywood sheets laminated, 3/4-inch thickness each sheet.

D. RELATED MATERIALS:
1. Rough Hardware:
   a. Bolts: FS-FF-B-575.
   b. Nuts: FS-FF-N-836.
   c. Masonry Expansion Devices: FS-FF-S-325.
   d. Lag screws and Bolts: FS-FF-B-561.
   e. Toggle Bolts: FS-FF-B-588.
   f. Wood Screws: FS-FF-S-111.
   g. Nails and staples. FS-FF-N-105.
   h. Metal Nailing Discs: Flat caps, min. 1-inch-diameter, min. 30-gauge sheetmetal (galvanized). Formed to prevent dishing.
2. Builders Hardware: For temporary doors.
   a. Hinges - Half-surface: FS-FF-H-116.
   b. Hasp and Staple: FS-FF-H-111.
   c. Padlock and Key: FS-FF-P-101.
3. Plastic Fabric: Reinforced.
   a. Reinforced plastic fabric for building enclosures.
   b. 100-pound minimum tear strength.
   c. Type T-55FR as manufactured by Griffolyn Company, Inc.

E. TREATED WOOD:
1. Lumber requiring treatment; aboveground service.
   a. Nailers, blocking and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   b. Sleepers, blocking, furring and similar concealed members in contact with masonry or concrete.
   c. Elsewhere as indicated.
2. Lumber requiring treatment; ground contact service:
3. Wood Preservative Treatment:
   a. Water-borne preservative Chromated Copper Arsenate (CCA) conforming to AWPA standard P5 and applied by pressure process conforming to AWPA C2.

b. Retention of CCA dry salts in wood for aboveground service shall be 0.25 pcf of wood. Retention in wood for ground contact service shall be 0.40 pcf of wood.

c. Wood shall be kiln dryed to a maximum moisture content of 15 percent after treatment.

d. Liberally brush with the same preservative all field cut surfaces, bolt holes, and machined areas. Conform to AWPA Standard M4.

6A-3 PERFORMANCE

A. PREPARATION:

1. Examine all surfaces to receive rough carpentry materials.
   a. Verify that surfaces have been prepared to the tolerances and dimensions indicated and required.
   b. Verify that required rough hardware and anchors have been properly installed.
2. Thoroughly clean the supporting members of all debris, dirt, oil, grease and any other substances detrimental to the proper installation of materials specified in this section.

B. INSTALLATION:

1. Tolerances: Install all lumber and plywood that is indicated to be a permanent part of the project, within the following dimensional tolerances.
   a. Sills, joists, beams, ledgers, purlins, sole plates, cap plates. Variation from level - 1/4-inch in 8 feet.
   b. Studs, columns, posts: Variation from plumb - 1/8-inch in 8 feet.
   c. Edge Strips at Gravel Stops: Variation from level or slope indicated - 1/8-inch in 8 feet.
   d. Miscellaneous nailers, furring, cleats - 1/8-inch in 10 feet.
2. General Requirements:
   a. Discard units of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate the work with a minimum of joints or the optimum jointing arrangement.
   b. Fit carpentry work to other work. Scribe and cope as required for accurate fit.
   c. Set carpentry work accurately to required levels and lines with members plumb and true.
   d. Shim with metal or slate for bearing on concrete and masonry substrates. Where indicated, grout with 1:3 Portland cement-sand grout for full-bearing.
   e. Securely attach carpentry work to substrates by anchoring and fastening as indicated and as required by recognized standards.
      (1) Provide washers under bolt heads and nuts in contact with wood.
      (2) Nail plywood to comply with the recommendations of the American Plywood Association.
3. Fasteners: Use common wire nails, except as otherwise indicated or specified herein. Use finishing nails for exposed work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Install fasteners without splitting of wood; predrill as required. Do not drive

threaded friction type fasteners; turn into place. Tighten bolts and lag screws at installation and retighten as required for tight connections prior to closing in or at completion of work.

4. Wood Grounds, Nailers, Blocking and Sleepers:
   a. Provide where indicated and where required for screeding or attachment of other work. Form to shape and cut as required for true line and level of work to be attached or screeded.
   b. Attach to substrates securely with anchor bolts or other attachment devices as indicated and as required to support applied loading. Countersink bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry as work progresses, cutting to fit masonry unit size involved. Anchor to formwork before concrete placement.
5. Framing: Conform to applicable recommendations of NFPA for the fabrication and installation of wood framing.
6. Plywood: Comply with the recommendations of the American Plywood Association (APA) for the fabrication and installation of plywood work. Provide thickness indicated or if not indicated, as recommended by APA "Plywood Construction Guide."
7. Nailer Plates:
   a. Drill and countersink plates at centers required below. Diameter and depth of countersink shall be sufficient to receive bolt heads and washers or nuts and washers without projection beyond the surface of the plates.
   b. At roof edges, use 2-inch-thick stock by width as indicated. Drill holes for bolts at 4-foot centers and countersink.
      (1) On concrete deck. Set 3/8-inch self-drilling inserts at 4-foot centers. Install bottom plate using 3/8-inch bolts and washers. Nail top plate with 9d nails at 12-inch centers.
      (2) On Metal Deck: Install bottom plate using No. 14x2R self-drilling and tapping sheet metal screws at 4-foot centers. Drill holes in bottom plate so they occur in top flat area of deck.
8. Miscellaneous Blocking: Install as indicated. Countersink as required for bolt anchors.
9. Installing Related Materials: Conform to the manufacturer's recommendations, instructions and specifications.

C. ADJUST AND CLEAN:

1. Adjust and clean all items for proper alignment and as required for installation of finish treatment.
2. Protect all wood materials installed on exterior surfaces as a substrate for finish coverings with a protective waterproof covering, until finish coverings have been installed.

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7A - WALL INSULATION

7A-1 GENERAL

A. DESCRIPTION:
  1. This Section includes insulation for the following applications:
    a. Loose cavity wall insulation.
  2. Related Work Specified Elsewhere:
    a. Roof Insulation: SECTION 7B.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. Federal Specifications (FS):
      (1) HH-I-574 Insulation, Thermal (Perlite).
      (2) HH-I-585 Insulation, Thermal (Vermiculite).
  2. Acceptable Manufacturers:
    a. Loose Granular Insulation:
      (1) Grace Construction Products - Zonolite.
      (2) Grefco, Inc.
  3. Thermal Conductivity: The thicknesses shown are for the thermal conductivity (k-value at 75 degrees F) specified for each material. Provide adjusted thicknesses as required and approved by Engineer-Architect for the use of material having a different thermal conductivity.

C. SUBMITTALS:
  1. Compliance Submittals:
    a. Submit as specified in DIVISION 1.
    b. Includes, but not limited to, the following:
      (1) Specifications.
      (2) Installation instructions.

D. DELIVERY, STORAGE AND HANDLING:
  1. Protect from deterioration. Do not allow insulation materials to become wet or soiled, or covered with ice or snow. Conform to manufacturer's recommendations for handling, storage and protection during installation.

7A-2 MATERIALS

A. LOOSE GRANULAR INSULATION:
  1. Perlite: Expanded volcanic aggregate conforming to FS HH-I-574; thermal conductivity (k-value at 75 degrees F) of 0.35; conforming to recommendations of the Perlite Institute, Inc.
  2. Vermiculite: Expanded or exfoliated micaceous mineral aggregate conforming to FS HH-I-585; Type I; thermal conductivity (k-value at 75 degrees F) of 0.50.
  3. When used as cavity-wall or masonry-cell insulation, provide treatment of the perlite or vermiculite aggregate for water repellency.

7A-3 PERFORMANCE

A. PREPARATION:

1. Examine the substrate and the conditions under which the insulation work is to be performed for unsatisfactory conditions. Do not proceed with the insulation work until unsatisfactory conditions have been corrected.
2. Remove excess mortar, other projections, and deleterious substances which would affect installation.

B. INSTALLATION:

1. General:
   a. Conform to manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
2. Loose Granular Masonry Cell Insulation:
   a. Pour granular insulation into cavities to completely fill the void spaces.
   b. Maintain inspection ports to show presence of insulation at the extremities of each pour area. Close ports only as directed after complete coverage has been confirmed.
   c. Limit fall of insulation to one story in height, but not to exceed 20'-0".
   d. Install where indicated.

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7B - ROOF INSULATION

7B-1 GENERAL

A. DESCRIPTION:
1. This Section includes the following:
   a. Vapor barrier.
   b. Rigid insulation board.
2. Related Work Specified Elsewhere:
   a. Metal Roof Deck: SECTION 5C.
   b. Wood Nailers: SECTION 6A.
   c. Coal Tar Bitumen Roofing: SECTION 7C.
   d. Flashings and Sheet Metal: SECTION 7D.

B. QUALITY ASSURANCE:
1. Applicable Standards:
   a. Federal Specifications (FS):
      (1) HH-I-529 - Perlite Mineral Aggregate Board - Roof Insulation.

2. Acceptable Manufacturers: Proprietary names are specified for material identification. Similar products of manufacturers listed below are acceptable.
   a. Insulation: Perlite.
      (1) Celotex Corporation.
      (2) Grefco, Inc.
      (3) Johns-Manville.
   b. Mechanical Fasteners:
      (1) E. S. Products, Inc.
      (2) Grefco, Inc.
      (3) Construction Fasteners, Inc.
   c. Vapor Barrier and Adhesives: (Vinyl)
      (1) Lexsuco, Inc.
      (2) Reflecto-Barrier Sales Co. Inc.

C. SUBMITTALS:
1. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Include, but not limited to, the following:
      (1) Specifications.
      (2) Installation instructions.

D. DELIVERY, STORAGE AND HANDLING:
1. Deliver materials to project site in manufacturer's original unopened packaging with labels legible and intact.
2. Do not overload the structure with the storage of materials or equipment on the deck or concentrated in one location.
3. Store rigid insulation in a dry, well ventilated location to prevent moisture absorption or water penetration and to provide circulation of air under and around the stacked material.

E. JOB CONDITIONS:
1. Do not install insulation when temperature is 40 degrees F or below, during rain or wet weather, or when deck surfaces are wet.
2. Do not proceed with installation of roof insulation unless installation of roofing can follow immediately and will be installed over insulation on the same day.

7B-2 MATERIALS

A. BASIC MATERIALS: Conform to the following:
1. Vapor Barrier:
   a. Vinyl plastic sheets, Lexsuco Vapor Barrier as manufactured by Lexsuco, Inc.
2. Insulation Board: Insulation provided shall have a minimum "C" value of .36. Board size: 1-1/2 inches.
   a. Perlite ~~FS-HH-I-529~~.
3. Mechanical Fasteners: Permafastener as manufactured by Grefco, Inc.

7B-3 PERFORMANCE

A. PREPARATION:
1. Clean roof deck free of all debris, dirt and dust, frost or after effects of freezing, grease or any other foreign materials. Surface shall be smooth and free of ragged condition at panel joints and opening edges.
2. Correct deck surfaces in poor alignment, loose welds, improper support, unrequired holes or projections, voids and low spots.
3. Realign curbs, nailers, projecting structural members, and other roof accessories where defective or not properly installed.
4. Do not proceed until conditions are satisfactory.

B. INSTALLATION-APPLICATION:
1. Application of Vapor Barrier on Metal Decks With Mechanical Fastening of Insulation:
   a. Lay vapor barrier dry, and install in the same direction as the ribs of the steel deck.
   b. Lap sides 2 inches and ends 6 inches. Seal laps with sufficient adhesive to ensure a tight seal.
   c. Smooth out all wrinkles and air pockets.
2. Application of Rigid Insulation:
   a. General:
      (1) Apply insulation on roof decks where indicated.
      (2 Cut and fit insulation neatly around all vertical surfaces to provide not over 1/2-inch clearance or as indicated.
      (3) Lay only amount of insulation that can be completely covered with roofing felts on the same day. Where work is stopped or at end of working day, protect all edges from water penetration or moisture with cutoff strips.
      (4) Provide 8-inch-wide cutoff strips of 15-pound felt.
      (5) Remove cutoff strips at beginning of next day's work.

b. Application on Metal Deck With Mechanical Fastening:
   (1) Lay insulation boards in single layer.
   (2) Place layer dry. Butt all edges tightly together, but do not force in place.
   (3) Lay boards with long dimensions perpendicular to ribs of metal deck, in parallel courses and with transverse joints staggered with those of adjacent courses. All edges shall be supported and shall not occur over rib openings on metal deck with rib opening greater than 3/4-inch.
   (4) Drive metal fasteners through all insulation boards into metal deck using fasteners per board as required by insulation manufacturer to meet FM requirements. Place fasteners maintaining an unbroken pattern. Do not drive fasteners into voids of metal deck. Length of fasteners and method of fastening shall be as recommended by manufacturer of insulation.

C. FIELD QUALITY CONTROL:
   1. Protect insulation work from exposure to moisture, damage and deterioration, primarily by prompt installation of roofing system. Remove and replace insulation work which has become wet, damaged or deteriorated before proceeding with roofing systems.

D. CLEANUP: Remove all debris, tar, adhesives, and spillage from work area and adjacent areas and leave in a clean condition.

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7C - BUILT-UP COAL-TAR BITUMEN ROOFS - GRAVEL SURFACED

7C-1 GENERAL

A. DESCRIPTION:
  1. This Section includes built-up gravel surfaced roof system over rigid insulation.
  2. Related Work Specified Elsewhere:
    a. Wood Nailers: SECTION 6A.
    b. Roof Insulation: SECTION 7B.
    c. Flashings and Sheet Metal: SECTION 7D.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Society for Testing and Materials (ASTM):
      (1) D43 - Creosote for Priming Coat with Coal-Tar Pitch in Dampproofing and Waterproofing.
      (2) D227 - Coal-Tar Saturated Roofing Felt for Use in Waterproofing and in Constructing Built-Up Roofs.
      (3) D450 - Coal-Tar Pitch for Roofing, Dampproofing and Waterproofing.
      (4) D1863 - Mineral Aggregates for Use on Built-Up Roofs.
      (5) D2626 - Asphalt Base Sheet For Use in Construction of Built-Up Roofs.
      (6) D290 - Asphalt-Saturated Asbestos Felts for Use in Waterproofing and in Constructing Built-Up Roofs.
    b. Federal Specifications (FS):
      (1) SS-C-153 - Cement, Bituminous Plastic.
      (2) TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
  2. Regulatory Agencies:
    a. Underwriters' Laboratories (UL).
    b. Factory Mutual (FM).
  3. Acceptable Manufacturers:
    a. Celotex Corporation.
    b. Koppers, Inc.
  4. Installer Qualifications: Roofing system installers shall be approved by materials manufacturer.

C. SUBMITTALS:
  1. Compliance Submittals:
    a. Submit as specified in DIVISION 1.
    b. Include, but not limited to, the following:
      (1) Specifications.
      (2) Installation Instructions.
  2. Manufacturer's Certificates:
    a. Submit as specified in DIVISION 1.
    b. Certify that bituminous materials, roofing fabrics, and other roofing materials comply with the requirements specified in this section.

D. DELIVERY, STORAGE AND HANDLING:
1. Deliver materials to the project site sealed in the manufacturer's original packaging with the labels legible and intact.
2. Handle all materials in a manner to prevent breakage of packaging or damage to the materials.
3. Storage:
a. Store in a dry, well ventilated, weathertight place to prevent moisture absorption or water penetration, and to provide circulation of air under and around the materials.
b. Stack bitumen and adhesive containers with lid-end up.
c. Keep all labels intact and legible until containers are emptied.
d. Do not overload the structure with the storage of material or equipment on the deck or concentrated in one location.

E. JOB CONDITIONS:
1. Do not apply roofing and fabric flashing materials while the following conditions exist:
a. Temperature: Less than 45 degrees F unless special precautions are taken as recommended by roofing material manufacturer.
b. Weather: During the presence of rain, ice or snow.
c. Wind: During wind velocities exceeding 25 miles per hour.
2. Clean the interior surfaces of bitumen heating vats and transporting equipment and the working surfaces of tools of all foreign material and materials that would effect the proper installation of roofing materials.

F. ROOFING GUARANTEE:
1. Contractor shall guarantee the roof covering system against leaking as follows:
a. Guarantee shall be for two years from the date of substantial completion as specified in General Conditions.
b. Guarantee shall cover the following:
(1) All built-up roof coverings and fabric base flashings.
(2) Repair of the faulty areas of the roof covering system.

7C-2 MATERIALS

A. BASIC MATERIALS: All materials shall conform to the following:
1. Primer, Creosote - ASTM D43.
2. Bitumen, Coal-Tar - ASTM D450 Type III except for softening point or Koppers Bitumen.
3. Felts, Coal-Tar Pitch Saturated - ASTM D227.
4. Felts, Asbestos, Asphalt Saturated - ASTM D250.
5. Roofers Cement, - FS SS-C-153 Type I, Asphalt Base; Type II, Tar Base where specified.
6. Aggregates - ASTM D1863.

B. BITUMEN REQUIREMENTS:
1. Softening Point Temperature Range: Coal-Tar Bitumen - as per manufacturers' specifications.

2. Heating and Application Temperatures: Type A - Coal-Tar Pitch, heat to 400 degrees F, maintain at 300 to 375 degrees F.

C. CONSTRUCTION OF ROOF COVERINGS (per 100 square feet):
1. Felt: 4 plies of 15-pound tar saturated felt.
2. Bitumen: 25 pounds, Type A coal-tar pitch between each ply of felt.
3. Surface Coating: 75 pounds, Type A, coal-tar pitch flood coat.
4. Aggregates: Gravel - 400 pounds.

D. CONSTRUCTION OF MEMBRANE FLASHINGS: As specified in PART 7C-3.

7C-3 PERFORMANCE

A. PREPARATION:
1. Remove unrequired projections of concrete, mortar, nails, bolts, nailers, fins, etc.
2. Remove and replace with new material any insulation which has become wet, damaged, loose, or in poor alignment.
3. Prepare substrate to prevent hot bitumen from entering the building or drains.
4. Do not proceed with installation of roof covering until surfaces are satisfactory.

B. INSTALLATION OF ROOF COVERINGS:
1. Felts:
   a. When starting the application of roofing felts use appropriate width starting strips of felt to achieve the specification ply build-up at that point, so that successive plies laid single fashion will produce the ply requirement. Begin starter courses at low point of deck.
   b. Use felts from rolls that are 36 inches wide.
   c. Roll out felts transverse to the deck slope so that direction of water flow is over the laps and not into them.
   d. Over the insulation surface apply 4 plies of felt lapped 27-1/2 inches. Mop between each lap with hot coal-tar pitch. Install at flashings as specified under "Installation of Membrane Flashings."
   e. Overlap ends of all connecting plies not less than 10 inches. End stripping or taping of these laps will not be permitted.
2. Surface Coating: Uniformly coat the entire surface of the roofing membrane with hot coal-tar bitumen into which, while still hot, embed the aggregates.

C. INSTALLATION OF MEMBRANE FLASHINGS: Construct flashings to the details and specifications of the roof covering manufacturer and as follows:

1. Flashings at Gravel Stops and Scuppers:
   a. Extend bottom 2 plies of roof felts at least 6 inches beyond roof edge. After remaining felts and coal tar pitch of roofing membrane are applied, fold the extended bottom layers up and over the remaining layers and mop plies in place.
   b. Set scupper flange in a solid troweling of asphalt base roofers cement and secure to nailer.
   c. Set 2 plies of roof felts in roofers cement over scupper flange and 6" beyond.
   d. Set gravel stop flange in a solid troweling of asphalt base roofers cement and secure as recommended by manufacturer.
   e. Apply flood coat of coal-tar pitch and embed aggregates to gravel stop lip.

D. WORKMANSHIP:
1. Broom or press all layers of felts into bitumen. Take care to avoid wrinkles, buckles, kinks, tearing and other deformations that will result in formation of air pockets and blisters. In no case shall felts touch felts without an inner layer of required bitumen or roofers cement.
2. Roofing work shall be watertight for normal weather exposures, and not deteriorate in excess of normal weathering.

E. FIELD QUALITY CONTROL:
1. Cross Sectioning for Inspection:
   a. The roofing contractor may be required to cut the roofing at any point for a cross section to determine if proper quantities of material have been used.
   b. If membrane is found lacking in weight or number of plies, the Engineer-Architect may, at his discretion, require additional material be added to bring the roof up to specifications.
2. Repairs: Repair cross sectioned area as follows:
   a. Fill cutout areas with plies of roofing felt flush with surface of roofing.
   b. Install same number of felts as originally used, in hot pitch, lapping each ply 6 inches out on roofing, at ends and sides for each roofing ply.
3. Expense:
   a. If cross sections indicate roofing complies with specifications, the expense of the cross sectioning will be paid by Owner.
   b. If cross sectioning indicates roofing does not comply with specifications, expense of cross sectioning and additional material shall be paid by the Contractor.

F. CLEANUP:
1. Clean bitumen from all gravel stops, fascias, scuttles, roof drain dams and other roof items.
2. Remove excess aggregates from roof drain sumps.
3. Clean work area of all debris including areas surrounding the structure and beneath roof.

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7D - FLASHING AND SHEET METAL

7D-1 GENERAL

A. DESCRIPTION:
  1. This Section includes the following items:
    a. Metal flashings.
    b. Metal gravel stops and fascia trim.
    c. Metal scuppers and downspouts.
    d. Laminated through-wall flashing.
  2. Related work specified elsewhere:
    a. Built-up roofing: SECTION 7C.
    b. Sealants and caulking: SECTION 7E.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Iron and Steel Institute (AISI).
    b. American Society for Testing and Materials (ASTM):
      (1) A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.
      (2) A526 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality.
      (3) B32 - Solder Metal.
      (4) B69 - Rolled Zinc.
      (5) B370 - Copper Sheet and Strip for Building Construction.
      (6) B209 - Aluminum-Alloy Sheet and Plate.
    c. Federal Specifications (FS):
      (1) QQ-L-201 - Lead Sheet.
      (2) SS-C-153 - Cement, Bituminous, Plastic.
      (3) TT-C-494 - Coating Compound, Bituminous, Solvent Type, Acid Resistant.
    d. National Roofing Contractors Association (NRCA).
    e. Sheet metal and Air Conditioning Contractors' National Association (SMACNA).
  2. Acceptable Manufacturers: As specified in PART 2, this Section.

C. SUBMITTALS:
  1. Compliance Submittals:
    a. Submit as specified in DIVISION 1.
    b. Include, but not limited to, the following:
      (1) Specifications of materials and installation.
      (2) Catalog cuts.
      (3) Details of fabrication and installation.

D. DELIVERY. STORAGE AND HANDLING:
  1. Store all materials or fabricated items in a manner to protect from warping, staining, or other damage.

7D-2 EQUIPMENT AND MATERIALS

A. BASIC MATERIALS:
  1. Zinc Coated Steel Sheet:
    a. Commercial quality carbon steel sheet with minimum of 0.20 percent copper content conforming to ASTM A526; hot-dip galvanized conforming to ASTM A525, G90.
    b. Gauge as indicated.
    c. Use for the following items or locations:
      (1) Sheet metal indicated.
  2. Copper Laminated Sheet Flashing:
    a. Copper sheet, bonded between 2 sheets of bituminous impregnated karft paper or bituminous saturated fabric.
    b. 5 ounces of copper per square foot at copings, 3 ounces of copper per square foot for all other flashings.
    c. Use for the following items or locations:
      (1) Through-wall flashing:
        (a) Heads of exterior doors, windows, louvers.
        (b) Sills of exterior windows, louvers.
        (c) Bottom of all exterior masonry walls.
    d. Manufacturer:
      (1) Sandell Manufacturing Company, Inc. - Copper Fabric.
      (2) St. Regis - Copper Semoured Sisalkraft.
      (3) Wasco Products, Inc. - Copper Fabric.
  3. Aluminum:
    a. Conform to ASTM B209, alloy 3003, temper H14, mill finish.
    b. Use for the following items or locations:
      (1) Downspouts - .032" thickness.
      (2) Scuppers - .040" thickness.

    c. Use for the following items or locations:
      (1) Downspouts.

B. PREFORMED PRODUCTS:
  1. Extruded Aluminum Roof Edge Fascia and Gravel Stop:
    a. Conform to ASTM B221, alloy 6063-T52, mill finish.
    b. 12B and S minimum gauge.
    c. Furnish complete with formed aluminum joint covers and flashing assembly, and with prefabricated, mitered and welded corner units.
    d. Use for the following items or locations:
      (1) Gravel stop and fascia.
  2. Strainer Units:
    a. Fabricated of minimum 0.062-inch diameter, non-corrosive, compatible wire or wire mesh, with 1/2-inch maximum spacing of wires, bee-hive design.
    b. One required for each scupper outlet.

C. MISCELLANEOUS MATERIALS:
  1. Solder and fasteners for metal work as recommended by sheet metal manufacturer and as required by installation.
  2. Primers, adhesives, tapes and fasteners for nonmetallic work as recommended by flashing manufacturer and as required by installation.
  3. Roofing cement to conform to FS SS-C-153, type I, asphaltic.

4. Bituminous coating to conform to FS TT-C-494, cold applied bituminous mastic, compounded for 15-mil dry film thickness.

7D-3 PERFORMANCE

A. GENERAL:
1. Fabricate all metal work required by this section conforming to profiles and details indicated, and the standard industry practices as shown by SMACNA in the Architectural Sheet Metal Manual and NRCA in the "Here's How to Make A Roof Drain."
2. Coordinate the work with other work for the correct sequencing of items which make up the weatherproofing system.
3. Install all exterior flashing and sheet metal to make the work watertight.

B. PREPARATION:
1. "Broom clean" roof surfaces and other areas receiving flashing or sheet metal work.
2. Tighten and realign loose wood nailers and blocking.
3. Straighten warped or bent metal sheets and preformed metal flashings.

C. FABRICATION AND INSTALLATION:
1. Through-wall Flashings:
   a. Start flashing 1/2-inch from exterior face of wall. Extend through wall stopping 1/2-inch from interior face of wall.
   b. Lap joints at least 4 inches. Splice multilayer material. Seal joints with asphalt mastic.
2. Roof Edge Fascia and Gravel Stop:
   a. Install at roof edge as indicated.

   c. Space joints 10'-0" oc and lap each length 4 inches. Secure together with concealed splice plate or slip joining member designed to allow for expansion and contraction.
   d. Set roof flange in plastic cement bed and secure to nailer as recommended by manufacturer.
   e. Install prefabricated units at corners.
3. Scrupper:
   a. Fabricate as indicated.
4. Downspouts:
   a. Fabricate in 10'-0" lengths, and telescope upper sections into lower sections 1-1/2 inches minimum.
   b. Provide elbows away from building at open downspout ends.
   c. Secure to wall with 1/16-inch x 1-inch straps of same material as downspout. Attach downspout to strap with sheet metal screws. Attach strap to masonry wall with expansion bolts.
   d. Locate straps at downspout top, bottom, horizontal joint, and at 10'-0" oc maximum.
5. Downspout Strainers: Fit tightly in each drain outlet.

D. REPAIRING AND CLEANING:

1. As work progresses, clean surfaces of all dirt, grease, oils, flux, adhesives, sealants, or other foreign substances.
2. Leave work clean and free of stains.
3. Repair or replace all damaged work.

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7E - SEALANTS AND CAULKING

7E-1 GENERAL

A. DESCRIPTION:
1. This Section includes sealants and caulking for application in the following general locations:
   a. Joints around perimeter of door, window, and louver frames.
   b. Joints at penetration of walls, decks, and floors by piping and other services or equipment.
   c. General caulking.
2. Related Work Specified Elsewhere:
   a. Joints in concrete: SECTION 3C.
   b. Joint Fillers: SECTION 7F.

B. QUALITY ASSURANCE:
1. Applicable Standards:
   a. Federal Specifications (FS):
      (1) TT-S-00227 - Sealing Compound; Elastomeric Type, Multi-Component (For Caulking, Sealing And Glazings In Building and Other Structures).
2. Acceptable Manufacturers:
   a. Sealants and Caulking:
      (1) Gibson-Homans Co..
      (2) Pecora Chemical Corporation.
      (3) Products Research and Chemical Corporation.
      (4) Sika Chemical Corp.
      (5) Sonneborn/Contech, Inc.
      (6) Tremco Manufacturing Company.
      (7) W. R. Grace & Company.
      (8) W. R. Meadows, Inc.
   b. Sealant Backer Rod:
      (1) Dow Corning Corporation.
      (2) Products Research & Chemical Corp.
      (3) Tremco Manufacturing Company.
      (4) Denver Foam.
3. Manufacturer shall have a minimum of 5 years of successful experience in the production of types of sealants and caulking compounds required.
4. Installation contractor shall have a minimum of two years' successful experience in the application of the types of materials required.

C. SUBMITTALS:
1. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Includes, but not limited to, the following for each type of sealant, caulking or associated material required.
      (1) Specifications.
      (2) Installation instructions.
      (3) Color charts.
      (4) Samples: Submit 3 samples of each color of each type of sealant or caulking compound exposed to view.

D. DELIVERY, STORAGE AND HANDLING:
1. Deliver all materials in original sealed containers with labels and inscriptions legible and intact.
2. Store all materials in areas suitable to prevent deterioration or shortened working life.

E. JOB CONDITIONS:
1. Do not proceed with application under adverse weather conditions, or when temperature is below 40 degrees F or above manufacturer's recommended limitations.
2. Proceed with application only when forecasted weather conditions are favorable for proper cure and development of bond strength.

F. WARRANTY:
1. Submit as specified in DIVISION 1.
2. Submit written warranty for elastomeric sealants, agreeing to repair or replace sealants which fail to perform as airtight or watertight joints; or fail in joint adhesion, weather resistance, stain resistance, or general durability.
3. Warranty to be signed by installation contractor and Contractor.
4. Warranty period is fifteen years.

7E-2 EQUIPMENT AND MATERIALS

A. GENERAL:
1. Before purchase of each specified sealant, investigate its compatibility with the joint surfaces, joint fillers, and other materials in the joint system.
2. Provide only materials (manufacturer's recommended variation of the specified materials) which are known to be compatible with the actual installation conditions, subject to approval of Engineer-Architect.

B. ELASTOMERIC SEALANTS:
1. Two-Component Polysulfide Sealant:
   a. Conform to FS TT-S-00227, Class A, Type II nonsag. (Use Type I self-leveling for horizontial floor joints.)
   b. Sealant shall bear the Thiokol Chemical Corporation seal of approval.
   c. Colors: No. 516 Off White.
   d. Pecora Chemical Corp. GC-5.
   e. Use in the following locations:
      (1) Exterior and interior joints around perimeter of door and louver frames.
      (2) Exterior and interior joints at penetration of walls, decks and floors by piping, conduit and other services or equipment.
      (3) Thresholds.
      (4) Interior general caulking and sealing.

C. MISCELLANEOUS MATERIALS:
1. Joint Cleaner: Type as recommended by the sealant or caulking compound manufacturer, for the joint surfaces to be cleaned.

2. Joint Primer/Sealer: Type as recommended by the sealant manufacturer, for the joint surfaces to be primed or sealed.
3. Bond Breaker Tape:
   a. Polyethylene tape or other plastic tape as recommended by the sealant manufacturer.
   b. To be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant.
   c. Self-adhesive tape wherever applicable.
4. Sealant Backer Rod:
   a. Compressible rod stock.
   b. Closed cell polyethylene foam, butyl rubber foam, neoprene foam, or other flexible, permanent, durable nonabsorptive material as recommended for compatibility with sealant by sealant manufacturer.
   c. Rod shall be of size and shape to control joint depth, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back side and provide a highly compressible backer to minimize the possibility of sealant extrusion when joint is compressed.
   d. Dow Corning Corp. - Ethafoam SB.

7E-3 PERFORMANCE

A. JOINT SURFACE PREPARATION:
1. Clean joint surfaces immediately before application of sealant or caulking compound.
2. Remove dirt, oil, grease, insecure coatings, moisture, corrosion, loose aggregate, and other substances which would interfere with bond.
3. Etch concrete and masonry joint surfaces as follows:
   a. Remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with bond and performance.
   b. Etch with 5 percent solution of muriatic acid, neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.

B. APPLICATION:
1. Conform to manufacturer's printed instructions except where indicated otherwise.
2. Prime or seal joint surfaces as required.
3. Install sealant backer rod for sealants except where indicated to be omitted.
4. Install bond breaker tape as required to ensure that elastomeric sealants will perform properly. Use when applying polysulfide or other polymer-type sealants over asphalt impregnated joint fillers.
5. Use only proven application techniques which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides.
6. Mix only amount of two-component sealants which can be applied within working life.

7. For polysulfide sealants, conform to standards issued by Thiokol Chemical Corporation except where more stringent requirements are indicated or specified otherwise, or have been issued by sealant manufacturer.
8. Install sealants to depths as indicated or, if not indicated as recommended by sealant manufacturer, within the following limitations:
   a. For normal moving joints sealed with elastomeric sealants, but not subject to traffic, fill joints to a depth equal to 50 percent of joint width, but neither more than 1/2-inch depth nor less than 1/4-inch depth.
   b. For joints sealed with non-elastomeric sealants and caulking compound, fill joint to a depth of 75 to 125 percent of joint width.
9. Unless indicated otherwise, tool joint sealant to a slightly concave surface, slightly below adjoining surfaces. Joint shall be weathertight.
10. Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces such as exposed aggregate panels and similar rough textures.
11. Remove excess and spillage of compound promptly as the work progresses. Clean the adjoining surfaces as required to eliminate evidence of spillage, without damage to adjoining surfaces or finishes.
12. Cure sealants and caulking compounds conforming to manufacturer's printed instructions to achieve strength and surface durability. Do not cure in a manner which would alter materials modulus of elasticity or other characteristics.

C. FIELD QUALITY CONTROL:
1. After nominal cure of exterior joint sealants which are exposed to weather, test for water leaks as follows:
   a. Flood joint exposure with water directed from a 3/4-inch garden hose and connected to water system with 30-psi minimum static water pressure.
   b. Hold hose perpendicular to wall face, 2'-0" from joint, and move stream of water along joint at approximate rate of 20 feet per minute.
   c. Test approximately 5 percent of total joint system, in locations which are typical of every joint condition, and which can be inspected easily for leakage on opposite face.
   d. Perform tests in presence of Engineer-Architect.
2. Repair sealant installation at leaks or, if leakage is excessive, replace sealant installation as required.

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7F - JOINT FILLERS

7F-1 GENERAL

A. DESCRIPTION:

1. This Section includes joint fillers in the following general locations:
   a. Expansion and control joints in masonry walls.
   b. Joints between tops of walls and structural members.
   c. Pipe and conduit penetrations through walls, floors and roofs.
   d. Other joints specified or indicated.
2. Related Work Specified Elsewhere:
   a. Joint Fillers in Concrete: SECTION 3C.
   b. Sealants and Caulking: SECTION 7E.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American Society for Testing and materials (ASTM):
      (1) D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
2. Acceptable Manufacturers:
   a. Sponge Rubber Joint Filler:
      (1) Williams Products, Inc.
      (2) A. C. Horn Co.
      (3) W. R. Meadows, Inc.
   b. Cork Joint Filler:
      (1) J&P Petroleum Products, Inc.
      (2) W. R. Meadows, Inc.
      (3) Sonneborn/Contech, Inc.
   c. Urethane Joint Filler - Aerosol Foam:
      (1) Insta-Foam Products, Inc.

C. SUBMITTALS:

1. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Includes, but not limited to, the following:
      (1) Specifications.
      (2) Catalog cuts.
      (3) Installation details.
      (4) Samples: 3 samples of each joint filler.

D. DELIVERY, STORAGE AND HANDLING:

1. Store all joint filler materials in a manner to prevent absorption of moisture, warping, or other damage.

7F-2 EQUIPMENT AND MATERIALS

A. GENERAL:

1. Size and shape: As indicated, or if not indicated as recommended by the joint filler manufacturer for the joint size and condition.
2. Compressibility: Specified hardness and compressibilities are intended to establish requirements for normal or average conditions, whenever a

range of hardness or compressibility is available for a product, conform to manufacturer's recommendation for the specific condition or use.

3. Color: Manufacturer's standard color which has the best overall performance characteristic for application indicated.
4. Compatibility: Before purchase of each joint filler, confirm that it is compatible with the substrate, sealants, and other materials in the joint system.
5. Adhesives:
   a. Pressure sensitive adhesives compatible with each material in the joint system may be applied to one face of joint filler to facilitate installation and permanent anchorage.
   b. Do not allow adhesives to contaminate sealant bond surfaces in joint system.

B. CONTROL-EXPANSION JOINT FILLERS

1. Cork Joint Filler:
   a. Conform to ASTM D1752, Type II.
   b. Resilient, non-extruding type premolded cork, thickness as indicated.
   c. W. R. Meadows, Inc. - Cork.
   d. Use in the following locations:
      (1) Interior concrete masonry unit wall intersections.
2. Sponge Rubber Joint Filler:
   a. Resilient, non-extruding, open cell type premolded rubber.
   b. Conform to ASTM D1752, Type I.
   c. A. C. Horn Company - Cementone Sponge Rubber 3329.
   d. Use in the following locations:
      (1) Joints between top of concrete masonry unit walls and bottom of beam or ceiling.

C. MISCELLANEOUS FILLERS:

1. Urethane Joint Filler - Aerosol Foam:
   a. Rigid urethane foam formed from aerosol dispensing unit.
   b. Waterproof, fire retardant.
   c. Suitable for field application and purpose intended.
   d. Insta-Foam Products, Inc. - Froth Pak.
   e. Use in the following locations:
      (1) Pipe and conduit flashing through masonry walls as indicated.

7F-3 PERFORMANCE

A. INSTALLATION:

1. Conform to joint filler manufacturer's recommendations for each type of joint filler required unless more stringent requirements are specified or indicated.
2. Set units at proper depth or position in joint to coordinate with other work, including the installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between the ends of joint filler units.

7F - JOINT FILLERS: continued

3. Recess exposed edges or faces of exposed joint fillers slightly behind adjoining surfaces, so that compressed units will not protrude from the joint.

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7G - CHEMICAL-RESISTANT COATING - WALLS

7G-1 GENERAL

A. DESCRIPTION:

1. This Section includes chemical-resistant coating of concrete surfaces as indicated. The cast iron manhole steps, inside the face of sleeves and exposed faces of the steel plate embedded in concrete using type II cement shall also receive chemical resistant coating.

2. Related Work Specified Elsewhere:
   a. Concrete - SECTION 3C.
   b. Steel - SECTION 5A.
   c. Protective Coatings - SECTION 9A.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American Society For Testing and Materials (ASTM):
      (1) D450 - Coal-Tar Pitch For Roofing, Dampproofing and Waterproofing.
2. Acceptable Manufacturers: Specified in PART 7G-2.
3. All materials used in chemical-resistant coating system shall be suitable for the purpose intended.
4. Chemical-Resistant Coating Applicator must be familiar with the application of the system specified and approved by the manufacturer.

C. SUBMITTALS:

1. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Includes, but not limited to, the following:
      (1) Specifications for materials.
      (2) Installation instructions.

D. DELIVERY, STORAGE AND HANDLING:

1. Deliver all materials in containers or cartons bearing the manufacturer's original labels.
2. Protect materials to keep clean, dry, and within manufacturer's temperature limitations.

7G-2 EQUIPMENT AND MATERIALS

A. COLD-APPLIED COAL-TAR EPOXY (Chemical-Resistant Coating):

1. Coal-tar epoxy coating (two-component).
2. Manufacturers:
   a. Carboline - CM 14.
   b. Cook - 920-B-221.
   c. Koppers Company, Inc. 300-M.
   d. Tnemec - Tnemec Tar 46-413.

7G-3 PERFORMANCE

A. SURFACE PREPARATION:

1. Examine surfaces to receive epoxy coating for conditions that will affect installation, permanence, or quality of work. Do not apply epoxy materials until conditions are satisfactory.
2. Repairing of cracks, holes, and voids is specified in SECTION 3C.
3. Protect other work from spillage of materials and prevent materials from penetrating and clogging drains.
4. Clean concrete substrate free of loose aggregate, protrusions, dirt, dust, oil, grease, asphalt, curing compound or other substances which would affect installation of coating.
5. Sandblast or etch concrete surfaces as required by coal-tar epoxy manufacturer.
6. Steel Surfaces Shop primed with inorganic zinc-rich primer (including grating support beam in ash pipe drain pit structure) shall be field touched-up with inorganic zinc-rich paint of the same type and by the same manufacturer as the shop coat. Surface preparation for surfaces to be touched-up shall be SSPC-SP6, Commercial Blast.
7. Unprimed steel surfaces, including embedded plates, shall be sandblasted to SSPC SP 5, white metal blast, immediately preceding application of coating.

B. INSTALLATION:

1. General:
   a. Prepare and apply materials conforming to manufacturer's printed instructions and as specified.
   b. Do not proceed with epoxy coating until vents, piping, conduit, and other projections through the substrate have been completed.
2. Cold-Applied Coal-Tar Epoxy:
   a. Apply as chemical-resistant coating on concrete and steel surfaces where indicated.
   b. Allow concrete to age a minimum of 7 days after normal cure before application of coating.
   c. Apply coal-tar epoxy as follows:
      (1) First Coat: Coal-tar epoxy with minimum 55 percent solids by volume (thin 1:1) applied at 2 mils dry to concrete surfaces only.
      (2) Second Coat: Coal-tar epoxy with minimum 55 percent solids by volume applied at 7 mils dry (8 mils dry to steel surfaces).
      (3) Third Coat: Same as second coat.
      (4) System Total: 16 mils minimum dry film.
   d. Pretreat first coat as required by manufacturer if second coat is not applied within manufacturer's specified time limit.
   e. Do not apply when atmospheric temperature is less than 50 degrees F.
   f. Allow coating to cure a minimum of 7 days before immersion.
   g. When applying over steel surfaces shop coated with inorganic zinc-rich primer, apply a wet mist coat and allow tiny bubbles to form. When bubbles disappear in 1 to 2 minutes, apply a full wet coat at specified mil thickness.
   h. Apply to steel surfaces only after erection.

C. CLEANING AND REPAIRING:

1. Clean all work which is soiled and replace or restore work damaged by the installation of coal-tar epoxy coating.

* * * * *

DIVISION 9 - FINISHES

9A - PROTECTIVE COATINGS

9A-1 GENERAL

A. DESCRIPTION:

1. Work included in this Section:
   a. Coating of interior and exterior surfaces as specified herein.
   b. Coating includes surface preparation, priming, finish coats, inspection, cleaning, and tough-up of surfaces and equipment in addition to shop priming and surface treatment specified elsewhere.
   c. Touch-up for all work included in this contract.
   d. Finish painting for areas specified.
2. Provide complete finish painting for the following:
   a. Ash Pond Electrical Equipment Building, interior and exterior surfaces.
   b. Contents of Ash Pond Electrical Equipment Building, including machinery, equipment and accessories furnished in this Contract.
   c. Bridge structures over Ash Pond and Sludge Pond.
   d. Finish paint all surfaces with appropriate coatings specified in ARTICLE 9A-2.B, COATING SYSTEMS.
3. Provide touch-up for all galvanized work included in this contract. (See COATING SYSTEMS, 9A-2.B.6)
4. Specific Surfaces to be Painted:
   a. All ungalvanized ferrous metal items in this contract shall receive one complete coat of prime paint, including shop or field applied coatings and touch-up, in addition to other coatings specified.
   b. Paint all non-ferrous pipe and conduit in finish painted areas, including aluminum, plastic, copper and galvanized.
5. Surfaces Not to be Painted:
   a. Concrete, except where specified or indicated.
   b. Glass, rubber, neoprene and finish plated items.
   c. Factory finished items, except where indicated.
   d. Nameplates, code stampings and other manufacturer's identification.
   e. Mechanical and electrical shafts, linkages or sensing devices.
   f. Galvanized items, except where specified or indicated.

6. Related Work Specified Elsewhere:
   a. Shop Painting and Coatings - All applicable divisions.
   b. Factory Prefinished Items - All applicable divisions.
   c. Chemical-Resistant Coating: SECTION 7G.
7. Colors:
   a. Color of paints and finishes shall match approved color samples.
   b. Colors shall be as follows:
      (1) Concrete Block, Interior Surfaces - Tnemec, No. 2049.
      (2) Structural and Miscellaneous Steel, Interior and Exterior - Tnemec, No. 2049.
      (3) Hollow Metal Doors and Frames - Tnemec, No. 2047.
      (4) Machinery and Equipment - Tnemec, No. 2047.
      (5) Electrical Cabinets and Panels, Factory Finished - Touch up as specified to match color of finish paint.

B. QUALITY ASSURANCE:
1. Applicable Standards:
   a. American National Standards Institute (ANSI):
      (1) A 13.1 - Scheme for the Identification of Piping Systems.
      (2) Z 53.1 - Safety Color Code for Marking Physical Hazards.
   b. Steel Structures Painting Council (SSPC) Surface Preparation Specifications:
      (1) SP 1 - Solvent Cleaning. Removes oil grease, soil, etc., with other methods to remove rust, paint, and mill scale.
      (2) SP 2 - Hand Tool Cleaning. Removes loose mill scale, rust, paint. Not intended to remove all scale or rust.
      (3) SP 3 - Power Tool Cleaning. Removes loose material. Not intended to remove all scale or rust.
      (4) SP 4 - Flame Cleaning of New Steel. Acetylene flame and wire brush to remove all unbonded scale and rust.
      (5) SP 5 - White Metal Blast Cleaning. Removes all scale, rust, foreign matter. Leaves surface gray-white uniform metallic color.
      (6) SP 6 - Commercial Blast Cleaning. Two-thirds of each square inch free of all visible residues; remainder only light discoloration.
      (7) SP 7 - Brush-Off Blast Cleaning. Removes only loose material, remaining surface tight and abraded to give anchor pattern.
      (8) SP 8 - Pickling. After solvent cleaning remove all mill scale, rust, rust scale, and oxide by acid immersion and hot water rinse 140 degrees or more.
      (9) SP 10 - Near-White Blast Cleaning. At least 95 percent of each square inch shall be free of all visible residues.
2. Acceptable Manufacturers: Proprietary names and codes are specified for material identification from these manufacturers.
   a. Carboline Company.
   b. Cook Paint and Varnish.
   c. Koppers Company, Inc.
   d. Mobil Chemical Company.
   e. Themec Company, Inc.
3. Painter Qualifications:
   a. Painting shall be applied only by qualified and experienced personnel.
   b. Submit the name of the painting subcontractor to the Engineer-Architect for approval along with a list of his most recent jobs, including the names of owners and architects who can be contacted for reference.
4. Include on label of container:
   a. Manufacturer's name and stock number.
   b. Type of paint and generic name.
   c. Color name and number.
   d. Instructions for reducing, if applicable.
   e. Mixing and application instructions.
   f. Drying or curing time.
   g. Storage and temperature limits.

5. Sampling of Materials:
   a. All materials to be used will be subject to testing for compliance with Specifications.
   b. Owner will provide testing.
6. Fungus Control: Organic coatings shall pass fungus growth test as specified in Federal Test Method Standard No. 141, Method 6271.1.

C. COMPLIANCE SUBMITTALS:
1. Submit as specified in DIVISION 1.
2. Includes, but not limited to, the following:
   a. Label analyses of all coating materials proposed for use if other than paint products listed in ARTICLE 9A-2.B, Coating Systems.
   b. General catalog including color charts, product description and application data materials to Engineer-Architect.
   c. Minimum of three (3) color samples of selected colors on 3-inch by 5-inch boards.
      (1) Colors to be exact match of existing colors, where required.
      (2) Each card to bear color identification and surfaces on which color will be used.
      (3) One approved color sample will be returned to the Contractor and will be kept at project site for reference.
      (4) No painting will be started until color samples are approved and available for reference.

D. SUBSTITUTIONS:
1. Request as specified in General Conditions.
2. Equivalent products of manufacturers listed in ARTICLE 9A-1.B, ACCEPTABLE MANUFACTURERS, may be substituted for paint listed in ARTICLE 9A-2.B, COATING SYSTEMS, provided such substitutions are approved by the Engineer-Architect.
3. Sufficient proof in the form of product data, samples, manufacturer's certification, etc., shall be submitted to determine that the proposed substitution is equivalent to the paint specified.
4. Submit a list of complete paint systems, surfaces to be painted and specified paint for which substitution is to be made. Follow format of ARTICLE 9A-2.B, COATING SYSTEMS.
5. Provide generic name and label analysis for all substitute materials.

E. DELIVERY, STORAGE AND HANDLING:
1. Delivery of Materials:
   a. Deliver in sealed containers with labels and inscriptions legible and intact.
   b. Allow sufficient time for testing if required.
2. Storage of Materials:
   a. Store only acceptable materials on project site.
   b. Provide separate area and suitable containers for storage of coatings, and related equipment.

9A-2 MATERIALS

A. GENERAL:

1. Materials furnished for each coating system shall be products of a single manufacturer and shall be compatible to the substrate. When shop-painted surfaces are to be coated, ascertain whether finish materials will be compatible with shop coating. If the specified paint is not compatible with the shop coat, one complete barrier type coating shall be applied as follows before applying the specified coatings: First Coat: Barrier type coating, 2 mils dry.
   a. Carboline - Rustbond 8HB
   b. Cook - Barrier Coat 391-Y-142.
   c. Mobil - Chromox Primer 13-R-50.
   d. Tnemec - Chem-Prime 37-77.
2. Start of work by applicator will signify acceptance of surface to be painted.

B. COATING SYSTEMS:

1. Metal:
   a. Surfaces:
      (1) Surfaces primed with inorganic zinc rich primers.
      (2) Structural and miscellaneous steel.
      (3) Bridge structures over Ash Pond and Sludge Pond.
   b. Surface Preparation: SSPC-SP1 and SP3. Use special care to remove all oil from bolts and plates at structural bolted connections.
   c. Touch-up paint to be by same manufacturer as prime paint.
   d. Color of touch-up paint to match color of prime paint.
   e. Field-spotting Coat: Organic zinc rich primer, 3 mils dry.
      (1) Carboline - 676.
      (2) Cook - 920-A-171.
      (3) Mobil - 13-G-14.
      (4) Tnemec - 90-93.
   f. Second Coat: High build epoxy, 5 mils dry.
      (1) Carboline - 191 HB.
      (2) Cook - 920-W-965.
      (3) Mobil - 89 Series.
      (4) Tnemec - Series 66 HB.
   g. Special Application Procedure: When applying high build epoxy over zinc primer, apply a wet mist coat first to allow tiny bubbles to form. When bubbles disappear in 1 to 2 minutes, apply full wet coat at specified mil thickness.
2. Metal:
   a. Surfaces:
      (1) Surfaces painted with conventional primers (other than inorganic zinc).
      (2) Unprimed surfaces.
      (3) Hollow metal doors and frames.
      (4) Bar joists.
      (5) Bare pipe, steel or cast iron.

b. Surfaces: Shop primed equipment and appurtenances, interior and exterior exposure, ambient temperature (150 degrees F and under).
c. Surface Preparation: SSPC-SP 1 and light sanding for primed surfaces, SSPC-SP3 for bare steel surfaces. Remove rust, clean, and dry.
d. First Coat: Primer or field-spotting coat, alkyd red primer, 2 mils dry; dry to recoat 2-4hours at 75 degrees F.
(1) Carboline - AD29.
(2) Cook - 391-N-083.
(3) Mobil - 13-R-31.
(4) Tnemec - 4-55.
e. Second Coat: Alkyd resin enamel, 2 mils dry.
(1) Carboline - AD-51.
(2) Cook - 800 Series.
(3) Mobil - Series 12.
(4) Tnemec - Series 2.
f. Third Coat: Alkyd resin enamel, 2 mils dry.

3. Galvanized Metal Surfaces:
a. Surfaces - interior exposure ambient temperature.
(1) Interior exposed metal decking.
(2) Trim, sleeves and closures in finish painted areas.
b. Surface Preparation: SSPC-SP1.
c. First Coat: Vinyl wash primer, 1/2-mil dry.
(1) Carboline - 1037 WP.
(2) Cook - 900-Y-002.
(3) Mobil - 13-Y-8.
(4) Tnemec - 32-1210.
d. Second Coat: Alkyd resin enamel, 2 mils dry.
(1) Carboline - AD-51.
(2) Cook - Series 800.
(3) Mobil - Series 12.
(4) Tnemec - Series 2.
e. Third Coat: Alkyd resin enamel, 2 mils dry.

4. Concrete Block:
a. Surfaces: Interior, normal exposure.
b. Surface Preparation: Remove form oil, laitance, dust and all surface deposits. Fill all cracks.
c. First Coat: Latex block filler.
(1) Carboline - 3329.
(2) Cook - 827-W-100.
(3) Mobil - 79-W-8.
(4) Tnemec - 54-560.
d. Second Coat: Acrylic latex or acrylic emulsion, 1-1/2 mils dry.
(1) Carboline - 3300.
(2) Cook - Akrylx SFR.
(3) Mobil - Series 42.
(4) Tnemec - Series 6.
e. Third Coat: Acrylic latex or acrylic emulsion or vinyl acrylic, 1-1/2 mils dry.

5. Uninsulated Piping and Conduit, Other than Steel:
  a. Surfaces:
    (1) Piping and conduit in finish painted areas.
    (2) Galvanized, copper, or aluminum piping and conduit.
  b. Surface Preparation: SSPC-SP1 remove dirt, grease, oil and all surface deposits.
  c. First Coat: Vinyl wash primer, 1/2-mil dry.
    (1) Carboline - 1037 WP.
    (2) Cook - 900-Y-002.
    (3) Mobil - 13-Y-8.
    (4) Tnemec - 32-1210.
  d. Second and Third Coat: Same paint as that on surface adjacent to pipe, or as follows:
    (1) Carboline - AD51.
    (2) Cook - Series 800.
    (3) Mobil - 12 Series.
    (4) Tnemec - Series 2.
6. Galvanized Metal Surfaces Touch-up:
  a. Surfaces:
    (1) Galvanized items which are not scheduled to be finish painted.
    (2) Exterior and interior where exposed galvanized surface has been damaged during erection.
  b. Surface Preparation: SSPC-SP3 to SSPC-SP6 quality. Remove grease and oil.
  c. Field Touch-up: Apply one coating organic zinc rich coating at 3 mils dry.
    (1) Carboline - 676.
    (2) Cook - 920-A-171.
    (3) Mobil - 13-G-14.
    (4) Tnemec - 90-93.
7. Machinery and Equipment:
  a. Surfaces: Factory-finished.
    (1) Unit heaters, panelboards, control panels, motor control centers, etc.
  b. Surface Preparation: SSPC-SP1.
  c. Spot Priming and Finish Touch-up:
    (1) Primer and finish coating to be compatible with coating system used on each item and suitable for service intended.
    (2) Spot prime and finish touch-up damaged areas. If machinery or equipment is damaged or scratched considerably, repaint entire item.
    (3) Finish coating color to match color of each item.
8. Plastic:
  a. Surfaces: Plastic or plastic coated piping and conduit where specified to receive paint.
  b. Surface Preparation: Clean and Dry. Remove grease and oil.
  c. First Coat: Water base latex paint or an oil base primer, after applying a test patch to determine compatibility with the plastic.
  d. Second and Third Coat: Same paint as that on surface adjacent to pipe, after testing compatibility with prime coat.

9. Concrete Block:
   a. Surfaces: Exterior, normal exposure.
   b. Surface Preparation: Clean, dry, free of all foreign materials. Fill all cracks.
   c. First Coat: 5 percent silicone resin in petroleum solvent at 100 square feet per gallon.
      (1) Cook - 331-C-020.
      (2) Koppers - Silicone penetrant.
      (3) Mobil - 46-V-6.
      (4) Tnemec - 50-60.
   d. Second Coat: Same as first coat after 48-hour dry at 75 degrees F.

9A-3 PERFORMANCE

A. SURFACE PREPARATION:
1. Prepare surfaces as specified for each coating system conforming to Steel Structures Painting Council Specifications outlined in PART 9A-1.
   a. If grease or oils are present, SP 1 - Solvent Cleaning must precede any other method specified.
   b. Surface irregularities such as weld spatter, burrs, sharp edges, or masonry voids, must be eliminated prior to specified surface preparation.
2. Approval of surface preparation quality by Engineer-Architect is required for all areas prior to application of coating system.
3. When blasting is required, depth of profile will be as specified for the system, but in no instance will it exceed 1/3 of the coating dry film.
4. Repainting on prepainted surfaces:
   a. Solvent Cleaning SP1 for any oil or grease.
   b. Remove all loose paint and use Power Tool Cleaning - SP 3 to develop anchor profile.
5. Prepare only those areas which will receive the first coat of the system on the same day.

B. APPLICATION:
1. Apply coatings in accordance with paint manufacturer's recommendations. Application will be subject to inspection by representatives of the Engineer and manufacturer.
2. After Engineer's approval of surface preparations, apply first coat of the system the same day. Use properly designed brushes, rollers and spray equipment for all application.
3. Painting shall remain 6 inches away from unprepared surface of any substrate. When steel is blasted, do not coat the last 6 inches of the blasted area until unprepared adjacent surface is prepared.
4. Paint Shall be Applied as Follows:
   a. Spray - High build paint, where recommended by the paint manufacturer, unless otherwise specified.
   b. Brush - All other surfaces.

c. Paint Glove - Glove-type applicators will be permitted for small piping, providing the specified dry film thickness is obtained.

5. Spray Application:
   a. Spray painting will not be permitted in areas where fire hazard or equipment damage would result therefrom, including air intakes, fans, energized equipment and other areas as directed by the Engineer.
   b. All equipment will be checked and in proper working condition before starting any application.
   c. A moisture trap shall be placed in line between air supply and pressure pot and gun. Trap shall be opened slightly to give continuous bleed.
   d. Regulators and gauges shall control air flow to both pressure pot and spray gun.
   e. Spray guns will be held perpendicular to the surface being painted to reduce dry overspray from angle application.
6. Environmental Conditions:
   a. Atmospheric temperature must be 50 degrees F or higher during application, unless approved by coating manufacturer. Stop painting when freezing temperature may occur within 6 hours.
   b. Exterior applications shall be made at wind velocities less than 20 mph.
   c. Relative humidity must be less than 85 percent and the surface to be painted must be at least 5 degrees F above the dew point.
   d. Erect temporary shelters to enclose areas if necessary to meet these requirements.
   e. Install exhaust blowers or fans to provide adequate ventilation in any confined area.
7. Protection:
   a. Cover or otherwise protect surfaces not being painted, areas not to be painted, and the work of other trades. Remove protective materials when appropriate.
   b. Provide signs to indicate fresh paint areas.
   c. Mask, remove, or otherwise protect finish hardware, machined surfaces, grilles, lighting fixtures, and prefinished units as necessary.
   d. Provide cover to prevent paints from entering orifices in electrical or mechanical equipment.
   e. Where paint spraying is permitted, the Contractor shall take special precautions to protect surrounding surfaces and equipment, and he shall be totally responsible for resulting damage.
   f. Provide daily cleanup of both storage and working areas and removal of all paint refuse, trash, etc.

C. INSPECTION:
1. Use wet film gauges to check each application about every 15 minutes in order to correct low or heavy film build immediately.
2. Use dry film gauge to check each coat when dry, and the total system when completed.

3. A sling psychrometer will be available from Engineer in the immediate area of the job for periodic checks on both relative humidity and temperature limits.
4. Check temperature of the substrate at regular intervals to be certain surface is 5 degrees above the dew point.

D. CLEANING:
1. Touch up and restore damaged finishes to original condition as required.
2. Remove spilled, dripped or splattered paint from all surfaces.

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DIVISION 16 - ELECTRICAL

16A - CONDUIT AND ACCESSORIES

16A-1 GENERAL

A. DESCRIPTION:
  1. This Section includes all conduit, fittings, and accessories and miscellaneous work.
  2. Conduit stubouts and sleeves are to be installed as shown on Drawing S231 and A86.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American National Standards Institute (ANSI).
    b. American Society for Testing and Materials (ASTM).
    c. Federal Specifications (FS).
    d. National Electrical Code (NEC).
    e. National Electrical Manufacturer's Association (NEMA).
    f. Underwriters' Laboratories, Inc. (UL).
  2. Acceptable Manufacturers:
    a. Rigid Steel Conduit:
      (1) Robroy Industries, Pittsburgh Standard.
      (2) Triangle Conduit and Cable Company, Inc.
      (3) Republic Steel Corporation.
    b. Wall Entrance Seals: O. Z. Electrical Manufacturing Company, Type WSK.

C. SUBMITTALS:
  1. Compliance Submittals:
    a. Submit as specified in DIVISION 1.
    b. Includes, but not limited to, the following:
      (1) Catalog cuts.

D. JOB CONDITIONS: Consider all locations to be nonhazardous.

16A-2 EQUIPMENT AND MATERIALS

A. RIGID STEEL CONDUIT:
  1. Hot-dipped galvanized mild ductile steel, circular in cross section with uniform wall thickness sufficiently accurate to cut clean threads.
  2. Each length threaded on both ends and threads protected by same process as used on each length.
  3. All scale, grease, dirt, burrs and other foreign matter removed from inside and outside prior to application of coating material.
  4. Galvanized by the hot-dip process as follows:
    a. Interior and exterior surfaces coated with a solid, unbroken layer of 99 percent virgin zinc by dipping.
    b. Coating not to show fixed deposits of copper after four 1-minute immersions in a standard copper sulfate solution.

c. One coat of zinc chromate finish on inside and outside surfaces to prevent oxidation and white rust.

5. Couplings and elbows fabricated, coated and finished by the same process as conduit.

B. PVC JACKETED RIGID STEEL CONDUIT:

1. Conduit with PVC jacket shall be galvanized inside and outside by the hot-dip or electro-galvanizing process.
2. Conduits shall have interior and exterior protected with coating of zinc galvanizing and shall have galvanized or metalized zinc protected threads.
3. Galvanizing shall be protected with a permanently fused-on exterior sheet of polyvinyl chloride with thickness of 20 mils.
4. Furnish Pittsburg Standard Conduit Company "Plasti-Bond" or approved equal.
5. Conduit shall bear Underwriters' Laboratories label on each length.

16A-3 PERFORMANCE

A. INSTALLATION:

1. General Requirements:
   a. Location:
      (1) Install conduit as near as possible to the routing indicated.
      (2) Shift locations as required to avoid interference with other equipment and piping being installed.
   b. Cap all conduits after cleaning.
   c. Carefully ream ends of all conduit lengths after cutting to eliminate sharp burrs.
2. Cast-In-Concrete and Block-In-Wall Installation:
   a. Install where specified or indicated.
   b. Use long radius elbows except on risers where curved portion of elbow would extend above the finished floor or foundation.
   c. Make all joints watertight after installation by coating all finished joints with Koppers Bitumastic No. 50 waterproof paint.
   d. Tie securely in place to prevent movement when concrete is poured.
   e. Cap ends of all conduit before concrete is poured.
   f. Slope finished floor away from conduit risers.
   g. Clean out all conduits immediately after concrete work is finished.
3. Buried Installation:
   a. Install where specified or indicated.
   b. Bury conduits a minimum of 18 inches below finish grade unless otherwise indicated.
   c. Before burying or trenching check with Engineer as to existing grade conditions and the possibility of future coordination problems.
   d. Slope conduits away from conduit risers where possible.
   e. Use long radius bends at all risers unless otherwise indicated.
   f. Provide all entrance seals where conduit enters the building or subgrade walls/floors from exterior underground.
   g. Maintain 2-foot separation from underground piping.

h. Make all joints watertight after installation by coating all finished joints with a vinyl plastic compound as recommended by the manufacturer of PVC jacketed conduit.

i. Cap ends of all conduit before backfilling.

4. Rigid Steel Conduit: Permitted for exposed, concealed, cast-in-concrete applications, and concrete block wall sleeves.
5. PVC Jacketed Rigid Steel Conduits: Install for direct buried application and conduit stubouts out of buildings.

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DIVISION 17 - YARD PIPING

17A - GENERAL REQUIREMENTS

17A-1 GENERAL

A. DESCRIPTION:

1. This Division includes furnishing all material, equipment, and labor for the complete installation and testing of all yard piping, valves, tanks, pumps, manholes and piping specials included in the following:

System	PDT
ASW - Ash Sluice Water	48,75,80
BW - Backwash	79
CA - Compressed Air	80
PDY - Plant Drain Yard	75,79,80,93
SW - Sludge Waste	79

B. QUALITY ASSURANCE:

1. Applicable Standards: As specified in each applicable SECTION.
2. Acceptable Manufacturers: As specified in each applicable SECTION.

17A-2 EQUIPMENT AND MATERIALS

A. YARD PIPING SYSTEM MATERIAL:

1. The piping design tables (PDT) tabulate the valve and piping material to be used for each line in a piping system. In some cases the piping design tables indicate a general type of material and a detailed specification for that type is included in this Division.
2. The line number and piping design table applicable for each line is indicated on the "U" and "UP" drawings. In a case where the applicable piping design table is changed within a piping system, the exact location of the change is indicated on the "U" and "UP" drawings.
3. The piping design tables are included in the drawings.

B. SMALL PIPING:

1. The small piping indicated shows the general layout of most pipelines 2 inches and smaller. The routing indicated is general and does not necessarily fix the exact location except where exact location dimensions are noted on the drawings.
   All small piping shall be buried at a minimum depth of 3'-0".
2. Fabricate and erect piping 2 inches and smaller in accordance with the following:
   a. Lines shall deviate from the arrangements shown as required in order to avoid interference with other work and to provide a neat installation. Piping shall be arranged so that it does not interfere with access to equipment for maintenance. Reroute and arrange as directed and approved by the Engineer with all labor and material furnished by this Contractor.
   b. The specific arrangements shown on the small piping shall not be varied.

c. Standard reducers shall be used for pipe size reductions. Bushings shall not be used for pipe size reductions.
d. Provide offsets, fittings, unions, drains, hangers and supports to make a complete installation.
e. Use tees for all branch connections, unless otherwise indicated.
f. Furnish and install all of the valves, strainers and special items indicated on the drawings.
g. Furnish and install unions in piping systems using screwed joints as follows:
   (a) Install so lines may be broken for maintenance, valves may be removed and equipment disconnected.
   (b) Install on lines which are erected without unions and which, in the opinion of the Engineer, cannot be properly maintained.
   (c) Install dielectric unions wherever copper pipe is joined to iron or steel pipe.

17A-3 PERFORMANCE

A. FIELD MEASUREMENTS:
1. Make all field measurements necessary to determine line and grade and ensure installation of all piping as indicated.
2. Perform all required field or shop cutting and fitting.

B. INSTALLATION: As specified in SECTION 17C.

C. CONNECTIONS: Install all valves, vents, ties, flanges, manholes, and other accessories as indicated and as specified.

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17B - PIPING SYSTEM MATERIAL

17B-1 GENERAL

A. DESCRIPTION:

1. This Section covers specific requirements of piping material in addition to the general requirements as shown on the Piping Design Tables.
2. Related Work Specified Elsewhere:
   a. Site Preparation: DIVISION 2.
   b. Pipe Installation: SECTION 17C.
   c. Field Testing: SECTION 17D.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American National Standards Institute (ANSI):
      (1) B16.5 - Steel Pipe Flanges and Flanged Fittings.
   b. American Society for Testing and Materials (ASTM):
      (1) A48 - Gray Iron Castings.
      (2) A53 - Welded and Seamless Pipe.
      (3) A74 - Cast Iron Soil Pipe and Fittings.
      (4) A106 - Seamless Carbon Steel Pipe for High-Temperature Service.
      (5) A126 - Gray Iron Castings for Valves, Flanges and Pipe Fittings.
      (6) A307 - Low Carbon Steel Externally and Internally Threaded Standard Fasteners.
      (7) B61 - Standard Specification for Steam or Valve Bronze Castings.
      (8) C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
      (9) D2996 - Standard Specification for Centrifugally Cast Reinforced Thermosetting Resin Pipe.
   c. American Water Works Association (AWWA):
      (1) C110 - Gray Iron and Ductile Iron Fittings 3" through 48" for Water and other Liquids.
      (2) C111 - Rubber Gasket Joints for Cast Iron and Ductile Iron Pressure Pipe and Fittings.
      (3) C115 - Flanged Cast Iron and Ductile Iron Pipe with Threaded Flanges.
      (4) C151 - Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand Lined Molds for Water or other Liquids.

C. SUBMITTALS:

1. Compliance Submittals:
   a. Submit as specified in DIVISION 1.
   b. Include, but not limited to, the following:
      (1) Manufacturer catalogue cuts on material being supplied.
      (2) Pipe Specification.
      (3) Bill of Material.
      (4) Complete details of fittings, specials and fabrication procedures.

17B-2 EQUIPMENT AND MATERIALS

A. FIBERGLASS PIPE:
1. Acceptable Manufacturers:
   a. A.O. Smith.
   b. Bondstrand.
   c. Fibercast.
2. Shall conform to the requirements of Piping Design Table No. 75 and as specified herein.
3. General:
   a. Fillers or bulking agents are allowed only to the extent required for viscosity control. They shall be restricted to a level not to exceed 5 percent by weight and shall not interfere with the operator's ability to visually inspect the pipe.
   b. The reinforcing glass fibers shall be commercial grade and have a finish compatible with the resin system.
   c. The interior liner of the pipe shall be a minimum of 20 mils in thickness. This surface shall not contain dyes or fillers which can hinder visual inspection.
   d. All fiberglass reinforcements shall be impregnated with resin.
   e. All exterior surfaces of the pipe above grade shall be protected against ultraviolet degradation. This may be accomplished by an inhibiter added to the resin or by painting with a paint compatible with the resin and glass.
   f. All structural capabilities of the pipe shall neglect any strength the liner might contribute.
   g. Any hole cut in the pipe exposing the reinforced wall shall be coated with resin as per manufacturer's recommendations to prevent exposure of the glass fibers.
   h. If the pipe has to be cut in the field, the work shall be performed in strict accordance with the manufacturer's recommendations.
   i. Pipe shall have a thermal coefficient of linear expansion no greater than 13 x 10^{-6} in/in/degrees F as determined by ASTM D696.
4. Fittings:
   a. Shall be furnished by the pipe manufacturer.
   b. The completed fitting shall be capable of withstanding all design criteria required of the pipe.
5. Joints:
   a. The completed joint shall be capable of withstanding all design criteria required of the pipe.
   b. Resin and pastes required shall be furnished by the pipe manufacturer.
   c. All joints on nongravity systems shall be heat cured until completely cured.
6. Design Criteria:
   a. Design with a factor of safety against ultimate failure of 2.0 as a result of the following:
      (1) External load.
      (2) Internal load.

(3) Combination of both.

b. Loads:

(1) External loads: Depth of cover as indicated plus H20 live load.

(2) Internal Loads:

(a) Normal working pressure as follows: 65 psi maximum.

(b) Test pressures as specified in SECTION 17D.

(3) Soil Weight: 125 pounds per cubic foot.

(4) Water table at grade.

c. Spanning Capabilities (for aboveground installation):

(1) Neglect any strength liner might contribute.

(2) Base on simple beam with less than 1/2-inch deflection.

(3) Minimum spanning lengths at 125 degrees F: 10 feet.

(4) Capable of maintaining spanning capability for 50 years.

d. Shall be capable of handling the following fluids:

(1) Temperature Range: 40 to 120 degrees F.

(2) pH: 2-11.

(3) Solids: 0-10 percent.

7. Fiberglass installers shall be certified as specified in Section 17C.

B. DUCTILE IRON PIPE:

1. Acceptable Manufacturers:

a. Clow.

b. Mead Pipe Co.

c. U.S. Pipe Co.

d. Engineer-approved equal.

2. Shall conform to the requirements of Piping Design Table No. 79 and as specified herein.

3. All fittings on pressure lines shall be either thrust blocked or have the joints restrained. Size of blocks and number of restrained joints shall be as indicated. Restrained joints shall be used when thrust blocks cannot be poured against undisturbed earth without interfering with other piping systems. Concrete for thrust blocks shall be poured so fitting joints are not encased. Method of restraining joint must be approved by Engineer.

4. Special requirements for lines SW2 and SW3.

a. Provide all fittings and pipe with flanged joints.

b. Pipe shall have drain valves at intervals not to exceed 100 feet. Drain valves shall be ball valves and shall be installed as indicated.

c. Locate all flanges a minimuim of 24 inches from the edge of a support unless otherwise indicated.

C. STEEL PIPE:

1. Pipe Joints:

a. Screwed fittings 2-inch and smaller shall be as follows:

(1) 300-pound malleable iron screwed fittings conforming to ANSI B16.3, or 2000-pound, 3000-pound or 6000-pound forged-steel threaded fittings conforming to ANSI B16.11.

(2) Of the same material as the pipe to which they connect.

(3) Galvanized when used with galvanized pipe.

b. Socket weld fittings 2-inch and smaller shall be as follows:
  (1) 3000-pound, 6000-pound or 9000-pound forged-steel socket-welded fittings conforming to ANSI B16.11.
  (2) Of the same material as the pipe to which they connect.
c. Malleable-iron unions 2-inch and smaller shall be as follows:
  (1) 300-pound malleable-iron unions with a ground joint of bronze to iron.
  (2) Galvanized when used with galvanized pipe.
  (3) Used only on piping systems which allow screwed piping joints.
d. Flanged steel unions 2-inch and smaller shall be as follows:
  (1) Forged-steel slip-on flanges with raised faces for use with spiral wound gaskets.
  (2) Have the same pressure and temperature ratings as the forged-steel valves in the system.
  (3) Of the same material as the pipe to which they connect.
e. Steel butt welding fittings shall be as follows:
  (1) Forged or wrought steel conforming to ANSI B16.9.
  (2) Of the same material and schedule as the pipe to which they connect.
  (3) Cast fittings are not acceptable.
  (4) Elbows shall be long radius unless otherwise indicated.
f. Backing rings for butt-welded joints shall be as follows:
  (1) Rectangular machined solid ring for pipe having a wall thickness greater than 1/2-inch.
  (2) Split ring with knock-off spacer nubs for pipe having a wall thickness of 1/2-inch or less.
  (3) Special machined if required for connection to equipment.
g. Steel pipe flanges shall be as follows:
  (1) Forged steel conforming to ANSI B16.5.
  (2) Slip-on or weld neck as indicated on the drawings for 150-pound class and weld neck type only for 300-pound class and higher.
  (3) Constructed of the same material as the pipe to which they connect.
  (4) Have surface finish in accordance with MSS SP-6.
  (5) Flat face when connected to 125-pound cast-iron valves or fittings and as otherwise specified or indicated.
h. Flange bolting materials shall be as follows:
  (1) Standard bolting materials for temperatures of 400 F to 750 F shall be as follows:
    (a) ASTM A193 Grade B7, alloy steel stud-bolts threaded the entire length.
    (b) ASTM A194 Grade 2H, carbon steel hexagon nuts.
  (2) Standard bolting materials for temperatures of 399 F and below shall be as follows:
    (a) ASTM A307 Grade B, carbon steel bolts.
    (b) ASTM A307 Grade B, carbon steel hexagon nuts.

2. Coating:
  a. Coat all buried pipe and wrap to conform to AWWA C203.
  b. At the Contractor's option, piping smaller than 4 inches may be coated with mill-applied polyethylene plastic coating, "X-Tru-Coat."

Coating thicknesses shall be as follows:

Pipe Diameter	Coating Thickness
0 - 1-1/2 inches..........	0.025-inch
1-5/8 - 4 inches..........	0.030-inch
4-1/2 - 12 inches.........	0.060-inch

Double half-lap wrap field joints with polyethylene tape, "X-Tru-Tape," per manufacturer's instructions.

c. Coat all interior and exposed exterior pipe with shop-applied primer, Koppers 622.

D. HIGH-DENSITY POLYETHYLENE PIPE:

1. High-density polyethylene plastic pipe shall conform to the requirements of Piping Design Table No. 48 and as specified herein.
2. The high-density polyethylene plastic pipe shall be Driscopipe 7600 Industrial Pipe as manufactured by Phillips Products Company, Inc., or Engineer-approved equal.
3. High-density polyethylene plastic pipe shall be used in the ash pond area as indicated.
4. Minimum wall thickness: 0.602 inches.
5. Design working pressure: 150 psi.
6. Flanged fittings having a design working pressure of 150 psi shall be used.
7. Fifteen (15) sections of pipe shall be supplied in 19-foot lengths.e

E. DRESSER COUPLINGS:

1. Dresser style 38 (or style 62 where indicated) steel couplings with pipe stops removed, complete with rubber gaskets and bolts.
2. Have middle ring thickness not less than the adjoining pipe wall thickness.
3. Have harness assembly as indicated on the drawings.
4. Coat buried couplings as specified in SECTION 17C.

F. GASKETS:

1. Spiral-wound gaskets shall be as follows:
   a. Spiral-wound type 304 stainless steel with asbestos filler and carbon-steel gauge rings.
   b. Have a nominal thickness of 0.175-inch with a 1/8-inch-thick gauge ring.
   c. Flexitallic Style CG or approved equal.
2. Oil-proof asbestos gaskets shall be as follows:
   a. Heavy-duty compressed asbestos with Buna-N binder.
   b. 1/16-inch-thick full-faced for flat-faced flanges, punched for bolts and pipe opening.
   c. 1/16-inch-thick ring for all raised faced flanges.
   d. Crane Packing Company Style 888 or approved equal.
3. Compressed asbestos gaskets shall be as follows:
   a. Heavy-duty compressed asbestos.
   b. 1/16-inch-thick full-faced for flat-faced flanges, punched for bolts and pipe opening.

c. 1/16-inch-thick ring for all raised faced flanges.
d. Crane Packing Company Style 333 or approved equal.

4. Buna-N gaskets shall be as follows:
   a. Heavy-duty Buna-N.
   b. 1/16-inch-thick full-faced for all pipe sizes 10 inches and smaller.
   c. 1/8-inch-thick full-faced for all pipe sizes 12 inches and larger.
   d. Punched for bolts and pipe opening.
   e. Crane Packing Company Style 900 or approved equal.
5. Teflon gaskets shall be as follows:
   a. 1/16-inch-thick teflon.
   b. Full-faced for flat-faced flanges, punched for bolts and pipe opening.
   c. Ring type for all raised-faced flanges.
   d. Crane Packing Company Style 68C or approved equal.
6. Red rubber gaskets shall be as follows:
   a. 1/8-inch-thick full-faced for flat-faced flanges unless otherwise noted in PDT, punched for bolts and pipe openings.
   b. O-ring for bell-and-spigot joints.
7. Flexicarb gaskets shall be as follows:
   a. Spiral-wound type 304 stainless steel with flexicarb filler and carbon-steel gauge rings.
   b. Have a nominal thickness of .175-inch with a 1/8-inch-thick gauge ring.
   c. Flexitallic Style GC or approved equal.

G. PIPING DESIGN TABLES:

1. The Piping Design Tables (PDT) tabulate the valve and piping materials to be used for each specific design.
2. The Piping Design Table to be used for each pipeline is indicated and scheduled on the contract drawings.

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17C - PIPE INSTALLATION

17C-1 GENERAL

A. DESCRIPTION:

1. This Section includes the installation of piping and accessories specified in this Division.
2. Supply all bolts, nuts, gaskets and other material necessary for complete installation of all yard piping systems as indicated. This includes materials necessary for connections to all interfaces with other contracts and Owner-supplied equipment.
3. Related Work Specified Elsewhere:
   a. Site Work: DIVISION 2.
   b. Piping System Materials: SECTION 17B.
   c. Field Testing: SECTION 17D.

B. QUALITY ASSURANCE:

1. Applicable Standards:
   a. American Water Works Association (AWWA):
      (1) C206 - Field Welding of Steel Water Pipe Joints.
      (2) C600 - Installation of Gray and Ductile Iron Water Mains and Appurtenances.
      (3) C601 - Disinfecting Water Mains.
      (4) M11 - Design and Installation of Steel Pipe.
   b. American Welding Society (AWS).
   c. American Society of Testing and Materials (ASTM).
      (1) D2321 - Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
2. Qualification of Welders:
   a. Welding operators shall be qualified in accordance with AWS "Standard Qualification Procedure."
   b. Qualification tests shall be certified by the Contractor.
   c. All costs incident to qualification tests shall be paid by the Contractor.
3. Qualification of fiberglass pipe installers:
   a. All personnel installing fiberglass pipe must be certified by Peabody Testing through their established certification program.
   b. Certification shall consist of completion of a training course that is acknowledged by the manufacturer to cover all essential variables for handling, assembling, and adhesive bonding of the fiberglass product the candidate will be joining.
   c. The subjects covered by the training course shall include, but not necessarily be limited to, the following: preparation equipment, joint preparation, fitting, bonding, curing, repair/maintenance methods, systems testing, and general review.
   d. All certified personnel must be kept on file with the field engineer.
   e. All costs incident to certification shall be paid by the Contractor.
   f. Owner representatives shall be allowed to observe certification classes.
   g. Certification arrangements and information can be received from Mr. Ed Jain. Phone (415) 573-6000.

C. HANDLING:
1. Handle pipe in a manner to ensure installation in sound, undamaged condition using proper equipment, tools, and methods as follows:
   a. Suitable slings or skids.
   b. Without hooks in contact with joint surfaces.
   c. Provisions for preventing contact with adjacent units during moving or storage.
   d. Protection for all pipe ends such as beveled ends, flanges, mechanical joints, plain ends, threads, etc., prior to shipping to jobsite.
   e. Do not drop or impact the pipe.
2. Pipe damaged during transporting or handling which, in the opinion of the Engineer, cannot be satisfactorily repaired will be rejected.

17C-2 EQUIPMENT AND MATERIALS

A. EQUIPMENT AND MATERIALS: As specified in each applicable Section.

17C-3 PERFORMANCE

A. PIPE INSPECTION AND REPAIR:
1. All pipe shall be subject to the approval of the Engineer.
2. Repair all mortar coatings with an epoxy grout applied as recommended by the manufacturer. Prepare cracks in lining by routing or grooving an opening 7/8 of the lining thickness in depth and a minimum of 1/2-inch wide at the surface.
3. Pipe sections damaged by handling which, in the opinion of the Engineer, cannot be satisfactorily repaired shall be rejected. This shall include, but is not limited to, broken bells and spigots, bent bell-and-spigot rings, and similar damage.

B. CLEANING:
1. Thoroughly clean interior of all pipe, fittings, and joints before installation.
2. Exclude foreign matter during discontinuances of installation as follows:
   a. Close ends with snug-fitting board containing several small holes near the center.
   b. Prevent water from filling trench.
   c. Remove all water, mud, sand, and other undesirable materials from trench prior to removal of end board.
3. Do not place tools, clothing, or other materials at any time in pipe.
4. Check air in pipe for gas after prolonged periods of enclosure, and replace with fresh air before resuming construction.
5. Flush clean immediately prior to final fitting of system.

C. LAYING:
1. Lay pipe according to the plans and laying schedule prepared by pipe manufacturer and as follows:
   a. Lay pipe such that fittings and other appurtenances are at the required locations.

b. Construct field connections true to line, facing, and position without undue strain on the pipe, fittings, and equipment.
c. Do not permit laying of pipe in water or on blocks except when encasement is to be provided.
d. Brace or anchor as required to prevent displacement of pipe during embedment or encasement operations.
e. Perform only when weather and trench conditions are suitable.
f. Install steel pipe conforming to AWWA M11.
g. Conform to lines, grades and elevations as indicated.
h. Maintain alignment and grade with batter boards at intervals as necessary but not to exceed 50 feet.

D. WELDING OF STEEL PIPE:
1. Field welding shall be in accordance with AWWA C206, and performed only by qualified welders.
2. Field welding procedures utilizing continuous feed self-shielded flux-cored electrode will be allowed as approved by the Engineer.

E. PROTECTIVE FIELD COATINGS:
1. Steel Pipe:
a. Coat welded joints of buried pipe with one coat of Kopper's Bitumatic "high Build" tar epoxy gel maintaining a minimum dry thickness of 30 mils or one wrapping (at 1/2-width lap) of hot-applied Tapecoat 20 with primer, conforming to manufacturer's printed instructions.
b. Coat buried Dresser Couplings, valves, harnesses, tie rods, flanged joints, and any other buried metal items with one coat of Kopper's Bitumastic "High Build" tar epoxy gel, conforming to manufacturer's printed instructions and maintaining a minimum dry thickness of 30 mils. The coating shall be sufficiently cured and approved by the Engineer prior to backfilling. The Contractor may accelerate the curing by heating the coating to 120 degrees F for 2 or 3 hours. All equipment and procedures used to heat the coating shall be subject to the approval of the engineer.
c. Check all coal tar enamel coated buried pipe with a holiday detector prior to backfilling operations to determine presence of voids or damage to coating. Repair all defects in coatings to satisfaction of Engineer prior to backfilling.
d. Touch up all damaged surfaces of coating of nonburied pipe after pipe is installed with one coat of Kopper's 622.

F. EXCAVATION, TRENCHING, BEDDING AND BACKFILLING: Conform to DIVISION 2 and as follows:
1. Excavate to provide alignment and depth as indicated.
2. Remove rock and other obstructions to provide clearance of trench width and depth as specified.
3. Overexcavate and backfill to foundation grade with approved compacted material as directed by the Engineer, if necessary to assure firm pipe foundation.
4. Adequately drain trenches during installation and maintain in dewatered condition throughout installation, bedding, and backfill operations.
5. Provide with bell holes where required for joints.

6. Backfill only with material approved by the Engineer. Backfill and compact by hand in 6-inch layers to a point one foot above the top of pipe.
7. Place remainder of backfill and compact as specified in DIVISION 2.
8. Utilize sheeting as required to ensure that trench width does not exceed maximum width specified for type of pipe being installed.

G. INSTALLATION OF OWNER-SUPPLIED PIPE:

1. Contractor shall install the following owner-supplied pipe:
   a. Abresist - ASW 15.
      (1) The Abresist pipe is furnished by M.H. Detrick under Contract 17B.
      (2) All pipe and material will be delivered by rail and truck for unloading and storage by Contract 29B.
      (3) Material furnished by Contract 17B for installation by this contract includes 800 feet of pipe and fittings as detailed on the drawings if a 6:1 ash pond sideslope is used, and 650 feet if a 3:1 sideslope is used.
      (4) Handling, storage and installation instructions are included herein.
      (5) Pipe is flanged and comes in 18-foot lengths.
2. Contractor shall take custody of pipe listed in this Section and install under this contract from points of storage in the Owner's storage yard at the jobsite.
3. Be responsible for the pipe from loss or damage received until the work is complete and accepted by the Owner.
4. Replace any pipe damaged or lost while in custody of the Contractor.
5. Handling, storage and installation of the piping shall be in accordance with the manufacturer's instructions and under the direction of the Engineer and the manufacturer's field service personnel. The manufacturer's field service personnel will not be available continuously. Services provided at no charge and the corresponding rates for additional services shall be as specified in DIVISION 1-8.

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HANDLING, STORAGE, INSTALLATION, OPERATION AND MAINTENANCE OF ABRESIST PIPE AND FITTINGS

A. Handling

ABRESIST Pipe has a ceramic lining of 7/8" thick fused cast basalt. This extremely hard material will give you years of trouble free service, but it is a ceramic material which requires care in handling and storage.

1. Under no circumstances should any lifting device, such as a fork lift, ever be used on the inside of ABRESIST Pipe to move it.

2. Care should be taken to avoid banging pipes into each other.

3. Pipe with fixed flanges may be lifted with hooks in the bolt holes only.

4. Pipe without fixed flanges should be lifted with a wire rope sling or comparable equipment.

5. ABRESIST Pipe normally is shipped in canvas topped containers, allowing crane unloading from above.

6. Normal care should be taken to avoid damage to flanges.

B. Storage

1. ABRESIST Pipe may be stored in the field with minimal protection. If it is going to be out for many months, you may want to cover it to protect the primer paint coat.

2. ABRESIST Pipe can be stacked six or seven layers high, but 4" x 4" wood spacers must be used.

3. We recommend that Elbows and other fittings be laid on the ground. Do not pile on each other.

C. Installation

1. Visually check pipes for damage that may have occurred after delivery.

2. Clean flange and pipe facings with a wire brush to assure good gasket fit.

3. Tighten bolts evenly to avoid leaks.

4. We recommend touching up primer paint where scratches and other loss of paint has occurred; then a good finished coat of paint.

D. <u>Operation and Maintenance</u>

1. Visually check the elbows and expansion pieces within one year after start up.

2. If no unusual wear is found, subsequent checks every two years should be enough.

3. Expansion pieces will wear more than other pieces and should be checked at least once a year.

4. Repaint the pipeline when necessary to maintain the steel casing.

17D - FIELD TESTING

17D-1 GENERAL

A. DESCRIPTION:
  1. This section includes requirements for hydrostatic testing of the systems.
  2. Related Work Specified Elsewhere:
    a. Piping System Material: SECTION 17B.
    b. Pipe Installation: SECTION 17C.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Water Works Association (AWWA):
      (1) M11 - Design and Installation of Steel Pipe.
      (2) C600 - Installation of Cast-Iron Water Mains.
      (3) C900 - Polyvinyl Chloride (PVC) Pressure Pipe 4-inch through 12-inch for water.

17D-2 EQUIPMENT AND MATERIALS

A. GENERAL:
  1. All equipment and materials used to perform the tests shall be subject to the approval of the Engineer.
  2. Furnish all required materials and equipment for the testing to include, but not limited to, the following:
    a. Necessary piping connections.
    b. Test pumping equipment.
    c. Water meter.
    d. Pressure gauge - calibrated by Owner.
    e. Bulkheads, supports, struts, strong backs, etc.
    f. All miscellaneous items required.
    g. Air compressor.

B. WATER: Water for performing the tests may be obtained from the Owner's existing Water System at a rate of 50 gpm. Provide all hose required to get water from source to pipe.

17D-3 PERFORMANCE

A. GENERAL:
  1. All test methods shall be subject to the approval of the Engineer.
  2. All tests shall be performed by the Contractor.
  3. Protect all plant equipment and material from damage resulting from leakage during the tests, and repair or replace if damaged.
  4. Do not proceed with test without approval of Engineer.

B. SPECIAL REQUIREMENTS:

1. Bulkhead and support piping during hydrostatic testing to prevent any damage to pipe or structures. Damage resulting from inadequate bulkhead or supports shall be repaired by the Contractor at his expense.
2. Fill pipeline, with adequate venting facilities installed and open, at a rate not exceeding the venting capacity.
3. Test steel pipe conforming to applicable sections of AWWA M11 and as specified herein.
4. Test cast iron and ductile iron pipe conforming to applicable sections of AWWA C600.

C. HYDROSTATIC TESTING:

1. Apply after the pipeline has been completely filled with water.
2. Apply in such a manner that the required pressure can be obtained and maintained for the duration of the tests.
3. Measure at the low point in the system with a tested, properly calibrated, and approved pressure gauge and in accordance with the following table:

System	Test Medium	Test Pressure (psig)	Duration of Test	Leakage
Ash Sluice Water (ASW).	Water	50	2 hours	0
ASW15................	Water	210	2 hours	0
Backwash (BW)..........	Water	50	2 hours	0
Compressed Air (CA)....	Air	150	2 hours	0
Plant Drain Yard (PDY).	Water	5	2 hours	0
PDY 17,18,27,72......	Water	50	2 hours	0
Sludge Waste (SW)......	Water	35	2 hours	0

D. AIR TESTS:

1. Systems being air tested shall be tested as follows:
   a. Equipment and methods used to perform the tests shall be subject to approval of the Engineer.
   b. Plug ends of pipe system and cap or plug all connections to withstand internal test pressures.
   c. Allow two minutes for air pressure to stabilize, and then introduce additional compressed air if needed to raise internal pressure to the specified test pressure.
   d. There shall be no decrease in the internal pressure of the line for the specified duration of the test.

E. REPAIRS: If the tests discloses leakage greater than that specified, the Contractor shall, at his expense:

1. Locate and repair the defective pipe, joint, or joints.
2. Repeat the above tests until the leakage is within the specified allowance.

* * * * *

17E - VALVES AND ACCESSORIES

17E-1 GENERAL

A. DESCRIPTION:

1. Provide all valves required to complete the piping systems as indicated on the drawings. All valves of a particular type shall be supplied by the same manufacturer.
2. The valves required include, but are not limited to the following:
   a. Valves 2-1/2 inches and larger indicated on the valve lists. The valve list indicates which valves are furnished by others.
   b. Valves 2 inches and smaller indicated on the drawings.

B. QUALITY ASSURANCE:

1. Applicable Codes and Standards:
   a. Design, fabricate, assemble and test equipment and materials in accordance with the following codes and standards:
      (1) ANSI B16.5 - Steel Pipe Flanges, and Flanged Fittings.
      (2) ANSI B16.25 - Butt Welding Ends.
      (3) ANSI B16.34 - Steel Butt-Welding End Valves.
      (4) ANSI B31.1 - Code for Pressure Piping, Power Piping Section, hereinafter referred to as the Power Piping Code.
      (5) ANSI B16.1 - Cast Flange Fittings.
      (6) ASTM 48 - Gray Iron Castings.
      (7) ASTM A105 - Forgings, Carbon Steel for Piping Components.
      (8) ASTM A126 - Gray Iron Castings for Valves, Flanges and Pipe Fittings.
      (9) ASTM A182 - Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service.
      (10) ASTM A216 - Carbon Steel Castings Suitable for Fusion Welding for High-Temperature Service.
      (11) ASTM A217 - Martensitic Stainless Steel and Alloy Steel Castings for Pressure Containing Parts Suitable for High Temperature Service.
      (12) ASTM A351 - Austenitic Steel Castings for High Temperature Service.
      (13) ASTM B26 - Aluminum Alloy Sand Castings.
      (14) ASTM B61 - Steam or Valve Bronze Castings.
2. Acceptable Manufacturers:
   a. Bronze and cast-iron valves shall be manufactured by Crane, Lunkenheimer, Powell, Stockham, Walworth or approved equal.
   b. Steel valves 2-1/2-inch and larger shall be manufactured by the following:
      (1) 150- and 300-pound class - Crane, Lunkenheimer, Pacific, Powell, Rockwell-Edwards, Stockham, Walworth, Hopkinson or approved equal.
      (2) 600-, 900-, 1500- and 2500-pound class - Crane, Dewrance, Pacific, Hopkinson, Powell, Rockwell-Edwards, R.P.&C. or Walworth.
   c. Steel valves 2-inch and smaller shall be manufactured by the following:
      (1) 600-pound class - Crane, Hancock, Kerutest, Rockwell-Edwards, R.P.&C., Vogt, Smith, or Walworth.

(2) 1500-pound and 2500-pound class - Conval, Hancock, Kerutest, Rockwell-Edwards, or Yarway. Anderson Greenwood double block valves are acceptable for instrument root valves where double valves are required.

d. Butterfly valves shall be manufactured by Allis-Chalmers, B.I.F. Industries, Centerline, Crane, Dezurik, Dresser, Jamesbury, Keystone, Henry Pratt, TRW Mission or Rockwell.

3. Factory Tests:
   a. Conduct all standard factory tests and all tests required by the applicable codes and standards.
   b. Submit certificates of completion of factory tests as compliance submittals.

C. SUBMITTALS:
1. Submit as specified in Division 1.
2. Compliance Submittals required shall include the following:
   a. A valve list for all valves 2-1/2 inches and larger showing the following:
      (1) Tag Number.
      (2) Manufacturer.
      (3) Pressure and Temperature Ratings.
      (4) Body Material.
      (5) Trim Materials.
      (6) Manufacturer's model or figure number.
   b. A valve list for all valves 2 inches and smaller showing the following:
      (1) The type of valve to be used for each service.
      (2) Manufacturer, pressure and temperature rating, body material, trim material and manufacturer's model or figure number for each type of valve.
   c. A cross-section drawing for each different model or figure number valve indicating the following:
      (1) Details and features of construction.
      (2) Materials of construction.
      (3) Weld end preparation.
   d. Certificate of completion of factory tests.

D. DELIVERY, STORAGE, AND, HANDLING:
1. Ship valves 2-1/2-inch and larger to the project site tagged with the valve number shown on the drawings.
2. Ship all valves with suitable end covers to prevent entrance of foreign material into valve body.
3. Protect valve threads, stems and handwheels from damage.

17E-2 EQUIPMENT AND MATERIALS

A. Design and construct all valves to conform to the following valve specification tables.

B. Valve body materials shall be as specified on the piping design tables.

C. Valves not listed on the specification tables but required by the piping design tables are as follows:
  1. Ball Valves:
    a. Valves 2-1/2-inch and larger shall be as follows:
      (1) Carbon steel body, ball, steam and plug.
      (2) Teflon seats.
      (3) Flanged ends.
      (4) Unit body construction.
      (5) Positive shutoff.
      (6) Pressure class in accordance with piping design table.
      (7) 3-inch valves shall be 8 inches long.
    b. Valves 2-inch and smaller shall be as follows:
      (1) Carbon steel body, ball, stem and plug.
      (2) Teflon seats.
      (3) Socket weld or flanged ends.
      (4) Pressure class in accordance with the piping design table.

* * * * *

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GATE VALVE SPECIFICATION TABLE

Pressure Class	Size	Type	Bonnet Joint	Disc Type	Stem Material	Disc and Seat Facing	Back Seat	End Connections	Notes
600 lb. 900 lb. 1500 lb. 2500 lb.	4" and Larger	Inside Screw	Pressure Seal	Flexible Wedge	11.5-14% Chrome	Stellited	Integral Stellited	Butt Welding	*1, 2, 3, 6, 8, 11*
	2½" and 3"	Inside Screw	Pressure Seal[7]	Flexible Wedge	11.5-14% Chrome	Stellited	Integral Stellited	Butt Welding	*6, 8*
1500 & 2500 lb.	2" and Smaller	Use Globe Valve Specification							
600 lb.		Inside Screw	Bolted or No-Bonnet	Solid Wedge	11.5-14% Chrome	Stellited Seat Facing	Fixed	Socket Welding	
150 lb. 300 lb. 400 lb.	2½" and Larger	Inside Screw Nonrising Stem	Bolted	Flexible Wedge	11.5-14% Chrome	As Recommended by Mfr.	Removable Cu-Ni or S.S.	See Valve List	*4, 5, 6, 9, 3*
125 lb. 250 lb.	2½" and Larger	Inside Screw Nonrising Stem	Bolted	Solid Wedge	Bronze	Bronze	Removable Bronze	See Valve List	
150 lb. 200 lb. 300 lb.	2" and Smaller	Rising Stem	Union	Solid Wedge	Bronze	Nickel Alloy	Integral	Screwed[12]	*9*

NOTES:

[1] *Provide factory-installed single-valve bypass.*

[2] *Provide totally enclosed bevel gear operator with handwheel.*

[3] *Bypass valves shall conform to the specifications for globe valves of the same pressure class.*

[4] *Provide factory-installed single-valve bypass on all valves 8" and larger when used for steam service.*

[5] *Flexible wedge not required on valves 4" and smaller in 150-pound class.*

[6] *Provide grease fitting on yoke bearing.*

[7] *A globe valve with a seal welded bonnet is also acceptable.*

[8] *Bonnet venting connections and piping shall be furnished when noted on valve list if required by valve design.*

[9] *Provide renewable seat rings.*

[11] *Provide air wrench adapter for valves 8 inches and larger.*

[12] *Provide solder ends when solder joints are specified on Piping Design Table.*

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CHECK VALVE SPECIFICATION TABLE

Pressure Class	Size	Type	Bonnet Joint	Hinge Pin & Bearing	Disc and Seat Facing	End Connections	Notes
900 lb. 1500 lb. 2500 lb.	4" and Larger	Piston Lift	Pressure Seal		Stellited	Butt Welding	1, 2
	2½" and 3"	Piston Lift	Pressure Seal or Welded		Stellited	Butt Welding	1, 2
1500 lb. 2500 lb.	2" and Smaller	Piston Lift	Welded		As recommended by manufacturer	Socket Welding	1
600 lb.		Piston Lift	Bolted or Welded		As recommended by manufacturer	Socket Welding	1
150 lb. 300 lb. 400 lb. 600 lb.	2½" and Larger	Swing	Bolted	As Recommended by Mfr.	As Recommended by Mfr.	See Valve List	
125 lb. 250 lb.	2½" and Larger	Swing	Bolted	Bronze	Bronze	See Valve List	3
150 lb. 200 lb. 300 lb.	2" and Smaller	Horizontal Lift	Union		Nickel Alloy	Screwed [4]	3

NOTES: [1]*Provide stellited or chrome-plated piston guides.*
[2]*Provide equalizer line or passage connecting area above piston to valve outlet to equalize pressure above piston.*
[3]*Provide renewable seats and disc.*
[4]*Provide solder ends when solder joints are specified on piping design table.*

ECCENTRIC PLUG VALVE SPECIFICATION TABLE

<table>
<tr><th>Pressure Class</th><th>Size</th><th>Body</th><th>Bonnet Joint</th><th>Gland</th><th>Packing</th><th>Bearings</th><th>Plug Facing</th><th>Operator</th><th>End Connection</th><th>Notes</th></tr>
<tr><td rowspan="3">150 lb.</td><td>5" and larger</td><td>soft rubber lined semi-steel</td><td>Bolted</td><td>Bolted</td><td>Buna</td><td>Alloy 20</td><td>Neoprene</td><td>Worm gear</td><td>Flanged</td><td>(1) Worm gear operators shall be totally enclosed with position indicator.</td></tr>
<tr><td>3" to 4"</td><td>soft rubber lined semi-steel</td><td>Bolted</td><td>Bolted</td><td>Buna</td><td>Alloy 20</td><td>Neoprene</td><td>Wrench</td><td>Flanged</td><td rowspan="2">(2) Furnish wrench with each wrench operated valve.</td></tr>
<tr><td>2½" and smaller</td><td>Alloy 20</td><td>Bolted</td><td>Bolted</td><td>Buna</td><td>Alloy 20</td><td>Neoprene</td><td>Wrench</td><td>Flanged</td></tr>
</table>

BUTTERFLY VALVE SPECIFICATION TABLE

Pressure Class	Size	Disc	Seat	Shaft Type	Shaft Material	Shaft Bearings	Operator	End Connections	Notes
150-pound minimum working pressure	6" through 20"	Ni-Resist or Bronze	Buna-N or Rubber	Solid or Stub	Type 304 Stainless Steel	Bronze, Nylon or Reinforced Teflon	See Valve List	See Valve List	1,2
	2½" to 4"	Ni-Resist or Bronze	Buna-N or Rubber	Solid or Stub					1,3
150-pound minimum working pressure	2" & Smaller	Ni-Resist or Bronze	Buna-N or Rubber	Solid or Stub	Type 304 Stainless Steel		Latching Lever	Wafer	4

NOTES: [1] *Discs shall have polished seating edges.*
[2] *Worm Gear operators shall be totally enclosed with position indicator and shall be designed to hold valve in intermediate position without creep. Provide crank or handwheel.*
[3] *Valves for ethylene glycol service shall have B.P.T. (Nordel) seating material.*
[4] *Wafer type for valves 2½ inches and smaller.*

RUBBER LINED BUTTERFLY VALVE SPECIFICATION TABLE

Pressure Class	Size	Body	Disc	Seat	Shaft Type	Shaft Material	Shaft Bearings	Operator	Bolting Pattern	Notes
150 lb.	6" and larger	Wafer Type, Rubber lined iron or steel	Rubber Coated iron or steel	Integral with body liner	Solid	316L Stainless Steel 2.75% Moly.	Nylon or Reinforced Teflon	Worm gear	Standard ANSI 150 lb. drilling	(1) Worm gear operators shall be totally enclosed with position indicator, and shall be designed to hold valve in intermediate position without creep. Provide Crank or Handwheel.
	4" and smaller	Wafer Type, Rubber lined iron or steel	Rubber Coated iron or steel	Integral with body liner	Solid	316L Stainless Steel 2.75% Moly.	Nylon or Reinforced Teflon	Latching Lever	Standrad ANSI 150 lb. drilling	

17F - PIPING SPECIALS

17F-1 GENERAL

A. DESCRIPTION:

1. Provide all piping specials in accordance with the specifications and the following:
   a. Furnish, install and test all specials complete and ready for operation.
   b. Furnish complete with all necessary miscellaneous pipe, valves, unions, fittings, auxiliaries, and isolating valves whether indicated on the drawings or not, but required.
   c. Furnish accessories such as gauge glasses, pressure gauges, and other instruments of equal quality to those similar items which are specified hereinafter.
   d. Insulate and cover in accordance with the pipe system to which they attach.
   e. Include all necessary supports, foundations, and equipment pads including anchor bolts, grout, shims, dowels and concrete as required by the manufacturer, as specified, and as indicated on the drawings. All supports, foundations, and equipment pads are subject to the Engineer's approval.
2. Piping specials are designated by a number preceded by the letter; YS i.e., "YS-1.," etc.; these designations are used in the specifications and on the drawings.
3. Piping connected to specials which must vary from the drawings because of requirements peculiar to the particular equipment furnished, shall be furnished and installed as required to make a complete and workable installation without additional cost to the Owner; this requirement shall include changes required in the piping systems because of design changes made by the manufacturer between the time of design and the time of installation and because of equipment furnished of different manufacturer or type than that specified.

B. QUALITY ASSURANCE:

1. Applicable Codes and Standards:
   a. Design, fabricate, assemble, install and test equipment and materials in accordance with the following codes and standards:
      (1) ANSI B31.1 - Code for Pressure Piping, Power Piping Section, hereinafter referred to as the Power Piping Code.
2. Factory Tests:
   a. Conduct all standard factory tests and all tests required by the applicable codes and standards.
   b. Submit certificates of completion of factory tests as Compliance Submittals.

C. SUBMITTALS:
1. Submit as specified in DIVISION 1.
2. Compliance Submittals required shall include the following:
a. A list of all piping specials by special number showing the manufacturer and the manufacturer's model or figure number as applicable.
b. Detail drawings and manufacturer's descriptions for each piping special as follows:
(1) Drawings showing general arrangement detail dimensions and all clearances required for installation, operation and maintenance.
(2) Details of all external connections which must be made.
(3) Electrical connection drawings for all equipment requiring electrical connections complete with schematic diagrams of internal wiring.
(4) Static and dynamic loadings.
(5) Certificates of completion of factory tests.
(6) Operation and maintenance data.
(7) Instruction books.

D. DELIVERY, STORAGE AND HANDLING:
1. Suitably protect all equipment and material for storage at the jobsite. Seal all openings and do not remove until equipment is ready for connection.
2. Tag all piping specials, including all components shipped loose, with the special number.
3. Where spare, replacement, or additional parts are required for the piping specials, these items shall be delivered to the Owner immediately upon receipt at the jobsite. Parts shall be packaged and sealed for long-term storage and be securely and visibly labeled as to part, function, and name of equipment to which they apply.

17F-2 LIST AND DESCRIPTION OF PIPING SPECIALS

YS-19 INSULATED UNION

A. Insulated unions 2-inch and smaller shall be as follows:
1. Have nylon or micarta bushings and Buna-N gaskets.
2. Used wherever copper pipe is joined to iron or steel pipe or equipment and where indicated.
3. Shall be installed as indicated.

YS-20 AIR RELEASE ISOLATION VALVE

A. Shall be butterfly valve as specified.

B. End connections shall be flanged.

C. Size: 3 inches.

D. Shall be installed as indicated.

YS-30 COMBINATION AIR RELEASE VALVES

A. Shall be as manufactured by Valve and Primer Corp.

B. Design Criteria:
1. Capable of exhausting large amounts of air when line is being filled.
2. Capable of allowing air to reenter line immediately if vacuum should occur.
3. Capable of exhausting small pockets of air which collect when line is operating under pressure.

C. Construction:
1. Valve inlet: 125 lb flange.
2. Material:
a. Body, Cover, Lever Frame - Cast Iron
b. Float - Stainless Steel
c. Seat - Buna-N
d. All other Internal Parts - Stainless Steel

D. Inlet size: 3 inches.

E. Shall be installed as indicated.

YS-31 AIR HOSE BIBS

A. Air hose bibs shall be 3/4-inch DeZurik Fig. No. 120S eccentric valves or Engineer approved equal.

B. Air hose bibs shall have bronze body, resilient plug, stainless steel bearings and screwed end connections.

C. Provide with Chicago Pneumatic No. 36841Y hose coupling. Couplings shall be of malleable iron construction with resilient gaskets.

D. Install air hose bibs in lines as indicated.

YS-34 PRESSURE GAUGES

A. General:
1. Accuracy: 1/2 of 1 percent of scale range.
2. Case: Aluminum or high-impact polypropylene reinforced with glass fiber. Provide solid front face and blowout back.
3. Dial: White laminated plastic with black markings.
4. Accessories: Provide pulsation dampeners pressure gauges which have a "P" under Accessories in the table below. Provide diaphragm seals for pressure gauges which have a "D" under Accessories in the table below.

B. Line Mounted Pressure Gauges: (Spec Type A2)
1. Manufacturer: McDaniel.
2. Size: 6-inch diameter face.

C. Differential Pressure Gauges: (Spec Type B2)
1. Manufacturer: Mid-West Instruments, Catalog Model No. 120.
2. Sensing Element: Free-Floating Piston Magnet.
3. Case: Pressure housing of aluminum; safe working pressure of 5000 psi.
4. Size: 2-1/2-inch dial.
5. Connections: Bottom pressure connection.

D. Provide pressure gauges as follows:

Tag Number	Spec Type	Line Number	Scale Range	Accessories
PDY/P-11	A2	PDY 27	0-100 psi	P,D
PDY/P-12	A2	PDY 27	0-100 psi	P,D
PDY/P-13	A2	PDY 72	0-100 psi	P,D
PDY/P-14	A2	PDY 72	0-100 psi	P,D
PDY/P-15	A2	PDY 72	0-100 psi	P,D
ASW/P-12	A2	ASW27	0-100 psi	P,D
ASW/P-13	A2	ASW27	0-100 psi	P,D
ASW/P-14	A2	ASW27	0-100 psi	P,D
ASW/P-15	A2	ASW25	0-100 psi	P,D
ASW/P-16	A2	ASW25	0-100 psi	P,D
ASW/P-17	A2	ASW25	0-100 psi	P,D

E. Instrument Root Valves:
1. Furnish and install root valves for all pressure gauges.
2. Root valves shall be gate valves conforming to the piping design table of the line to which they are connected except for the CWT lines which shall be YS-27.
3. Root valves shall be 1/2-inch size, except as otherwise indicated on the drawings.
4. Instrument root valves are not indicated on the drawings.

YS-40 Y-TYPE STRAINERS

A. Y-Type strainers shall be as follows:
1. Body shall be same material and body rating as valves in the Piping Design Tables on which the strainer is installed.
2. Baskets shall be stainless steel as follows:
   a. YS-40A - 20 mesh for water.
3. Armstrong, Leslie, Crane or Engineer approved equal. Dimensions are based on Leslie.

B. Y-Type strainers shall be installed as indicated.

YS-41 WATER HOSE BIBS

A. Water hose bibs shall be Crane Bronze Hose Valve No. 58 with 3/4-inch threaded garden hose connections.

B. Water hose bibs shall have bronze body and stem, brass base and disc holder and composition disc.

C. Install water hose bibs in lines as indicated.

YS-43 MOTOR-OPERATED VALVE

A. Motor-operated valve shall be a 150-pound butterfly as specified in PDT 75.

B. All valves shall be furnished complete with motor operators as follows:
1. Philadelphia Gear Corporation - Limitorque type SMB/HBC or Engineer approved equal.
2. Motor voltage shall be 460-volt, 3-phase, 60-hertz.
3. Control voltage shall be 120-volt, single-phase, 60-hertz.
4. Provide opening and closing torque switches.
5. Provide 4 train-geared limit switches.
6. Provide 120-volt, ac, single-phase, 60-hertz, space heater in limit switch compartment and motor. Space heater leads shall terminate in limit switch compartment at main terminal strip.
7. Equip with a permanently mounted handwheel that is disengaged under all conditions of motor operation.
8. Reversing motor starter and wiring will be furnished by others.
9. Closing time shall be 60 seconds.

YS-48 SIGHT FLOW INDICATORS

A. Sight flow indicators shall be Johnson Porthole Series Flapper type, Schutte and Koerting or approved equal.

B. Sight flow indicators shall be as follows:
1. Suitable for pressures to 75 psig.
2. Suitable for temperatures to 150 degrees F.
3. Have cast-iron bodies with tempered glass windows.
4. Have screwed ends.

C. Indicators shall be furnished and installed as indicated.

YS-54 FLOW SWITCHES

A. Flow switches shall be McDonnell series FS4-3T or Engineer approved equal.

B. Flow switches shall be brass with monel trim. End connections shall be threaded.

C. Switch elements shall be as follows:
1. Interrupting rating: 120 volts ac, 4 amps or 125 volts dc, 0.5 amps.
2. Enclosure: NEMA 1 with threaded conduit connection.
3. Type of switch: snap action contact (mercury switch contacts not acceptable).

17F - PIPING SPECIALS: continued

D. Tag each flow switch with a permanently attached solid brass or aluminum tag with tag numbers as shown below stamped clearly into the metal.

E. Provide flow switches as follows:
1. Flow switches shall be assigned tag numbers FPY/FS-15 through FPY/FS-27.
2. All are on line number FPY-15.
3. All have a maximum flow of 15 gpm.
4. All are 3/4" size.
5. All are model number FS4-3T3.

YS-60 RUBBER FLAPPER SWING CHECK VALVE

A. Series 100B as manufactured by Valve and Primer Corporation.

B. Disc and body shall be lined with Buna-N synthetic rubber.

C. Coat buried valve as specified in SECTION 17C.

3 D. Provide and tag valves as follows:

Tag Number	Line Number	Operating Pressure	Operating Temperature	Size
YS-60A	PDY 17	45 psi	100°F	10"
YS-60B	PDY 18	35 psi	100°F	18"
YS-60C	PDY 27	50 psi	100°F	12"
YS-60D	BW 3	35 psi	100°F	16"
YS-60E	PDY 72	35 psi	100° F	6"

f. The annulus between the well screen and casing and the wall of the hole shall be backfilled with loose surface sand to the ground surface.
g. The wells shall be capable of producing at a rate equal to the capacity of the pumps when pumped continuously.
h. Subsurface information is available as specified in DIVISION 1.

Table 1

Well	Location	Approximate Plant Coordinations
SW-1	SW corner of coal-pile runoff pond.............	N 12390 E 9665
SW-2A	Ash ponds................	N 12575 E 8985
SW-2B	Ash ponds................	N 12585 E 8985
SW-3A	Ash Landfill.............	N 13150 E 7890
SW-3B	Secure Landfill..........	N 13415 E 8050

B. Seal Water Pumps
1. Pump shall be submersible type capable of being installed and operating in a 4-inch inside diameter well casing, as manufactured by Jacuzzi Brothers, Inc.
2. Materials:
   a. Discharge head - bronze.
   b. Impeller - Lexan.
   c. Pump casing - stainless steel.
   d. Screen - plastic.
   e. Motor - stainless steel.
   f. Accessories: Pump shall be furnished with manufacturer's standard control box, standard accessories, and lightning arrester.
3. Install in locations shown on drawings complete with any piping and fittings required. Test and place into proper operation.
4. Motors shall be as follows:
   a. 1/2 hp and smaller: 115 volt, single phase, 60 hertz, ac.
   b. 3/4 hp and larger: 460 volt, three phase, 60 hertz, ac.
   c. 1.0 Service Factor
5. Provide seal water pumps as follows:

Service	Tag Number	Number Required	Capacity (gpm)	Head (ft)
Recycle	YS-61-A	2	18	110
Coal Pile Runoff	YS-61-B	1	6	65
Ash Landfill	YS-61-C	1	6	65
Secure Landfill	YS-61-D	1	9	65

YS-62 FLOATING BAFFLE

17F - PIPING SPECIALS: continued

A. All materials shall be of fiberglass construction, including 1/2-inch fiberglass plate, 9x11x1/2 fiberglass rectangular sections, 3x3x3/8 fiberglass angles, and 1/2-inch-diameter fiberglass bolts.

B. Baffle shall float level with 50 percent above water surface and 50 percent below water surface.

C. The ends of all rectangular sections shall be sealed with 1/2-inch plate so as to be airtight.

D. 1/2-inch wear plates shall be attached to the rectangular sections that scrape against the stop-log structure.

E. Rectangular sections, wear plates, and end plates shall be firmly held in place by an adhesive bond which conforms to the fiberglass manufacturer's recommendations.

F. If fiberglass is cut at any time exposing glass fibers, a resin coating shall be applied to protect the fibers.

G. Baffle shall be constructed as shown on drawing S224.

YS-63 TIE-DOWN ROPE

A. Manufacturer: American Manufacturing Company, Inc., or Engineer approved equal.

B. Quantity Required: 2 Sections, each 200 feet long.

C. Description: Rope shall be 3/4 inch diameter with a minimum allowable working load of 1,420 pounds.

D. Material: Nylon

E. Ropes shall be used to anchor the free end of the floating polyethylene pipe in ash pond.

YS-64 SOLENOID VALVES:

A. Solenoid valves shall be 120 V/480 V, ½" ASCO #DF8211C94.

B. Tag each solenoid valve with a permanently attached solid brass or aluminum tag with tag numbers as shown below stamped clearly into the metal.

C. Solenoid valves shall be assigned tag numbers FPY/SV-15 through FPY/SV-27.

D. Install complete with all required fittings.

* * * * *

17G PUMP INSTALLATION

17G-1 GENERAL

A. DESCRIPTION·

1. Install equipment and materials in PART 17G-2 to include all expert and common labor, rigging, blocking, scaffolding, tools, construction materials and services to remove from on-site storage and install as specified.
2. Assume full responsibility for all equipment and materials upon taking over equipment and materials in storage, until installation as specified is complete and accepted by the Owner.

B. DELIVERY, STORAGE AND HANDLING·

1. Take custody of equipment and material listed in PART 17G-2 and installed under this contract from points of storage in the Owner's plant or other storage yard at the jobsite.
2. Be responsible for the safety and protection from loss or damage of all equipment and material received until the work is complete and accepted by the Owner.
3. Protect all equipment and material during installation against corrosion, moisture deterioration, mechanical injury, and accumulation of dirt or other foreign matter to include the following:
   a. Keep all pipe and equipment connections closed until ready for connection.
   b. Replace or restore to original condition any equipment or material damaged or lost while in custody of the Contractor.
   c. Spot paint all equipment and material where the shop coat of paint has been damaged.

17G-2 EQUIPMENT AND MATERIALS

A. PUMPS:

1. Pumps are furnished by Worthington under Contract 9.
2. All equipment shall be delivered, unloaded, and stored by this Contract.
3. Items furnished under Contract 9 for installation by this contract are as follows:

Qty	Description	Dimension	Weight
3	Ash Recycle	204"x52"x30"	2800 lb
3	Ash Pond Blowdown	216"x36"x24"	2800 lb
2	Landfill Runoff	144"x36"x24"	2800 lb
2	Secure Landfill Runoff	210"x36"x24"	2800 lb
1	Secure Landfill Drain	264"x36"x24"	2800 lb

17G-3 PERFORMANCE

A. Install equipment and materials in strict accordance with the manufacturer's instructions.

B. All tolerances in alignment and leveling, and the quality of all workmanship shall be in accordance with the manufacturer's instructions.

C. All tolerances in alignment and leveling, and the quality of all workmanship shall be in accordance with the manufacturer's published standards.

D. Copies of all required drawings and manufacturer's instruction books will be made available to the contractor prior to the start of any work.

E. Installation of the pumps shall include the following items of work:
1. Level, align, and grout pit covers.
2. Mount pump on pit covers and align with mating flanges on suction and discharge piping.
3. Install all accessories furnished under Contract 9.
4. Install all piping and tubing complete as shown on Worthington Drawing ready for external piping. Drawing will be made available to successful bidder.
5. Complete makeup of discharge connections.
6. Start pumps and insure pumps are operating satisfactorily.

* * * * *

17H - MANHOLES

17H-1 GENERAL REQUIREMENTS

A. DESCRIPTION:
  1. This Section includes manholes for the Plant Drain Yard (PDY) system.
  2. Related work specified elsewhere:
    a. Concrete: DIVISION 3.

B. QUALITY ASSURANCE:
  1. Applicable Standards:
    a. American Society for Testing and Materials (ASTM).
      (1) C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
      (2) C478 - Precast Reinforced Concrete Manhole Sections.

17H-2 EQUIPMENT AND MATERIALS

A. PRECAST CONCRETE MANHOLES: Precast units shall meet the following requirements:
  1. Equal or exceed provisions of ASTM C478. Manhole design and construction shall be approved in writing by the Engineer.
  2. Include risers, cone, cover and frame, and steps. Base shall be cast-in-place concrete in conformance with DIVISION 3 - CONCRETE.
  3. Rubber gaskets shall be of the O-ring type.
  4. Join manhole sections with rubber and concrete joints conforming with ASTM C443, paragraph 18.
  5. Install manhole steps at 12 inches on center vertical.
  6. Apply two coats of Kopper's Bitumastic No. 50 to the exterior surface.

B. MANHOLE COVERS AND FRAMES: As indicated on the drawings.

C. MANHOLE STEPS: No. 3232 as manufactured by Clay & Bailey or approved equal.

17H-3 PERFORMANCE

A. INSTALLATION: As indicated on the drawings and specified in DIVISION 3.

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DIVISION 18 - ROADS, DRIVES, AND WALKS

18A - LIMEROCK SURFACE COURSE

18A-1 GENERAL

A. DESCRIPTION:
   1. This Section includes limerock surface course and method of depositing.
   2. Related Work Specified Elsewhere:
      a. Site Preparation and Earthwork: SECTION 2A.

B. QUALITY ASSURANCE:
   1. Applicable Standards:
      a. American Association of State Highway and Transportation Officials (AASHTO):
         (1) T99 - Test for the Moisture Density Relations of Soils Using a 5.5-Pound Rammer and a 12-Inch Drop.
      b. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction (Exclusive of Sections on Method of Measurement and Basis of Payment).
         (1) Section 200 - Limerock Base.
         (2) Section 911 - Limerock Material for Limerock Base and Stabilized Base.

C. COMPLIANCE SUBMITTALS:
   1. Submit as specified in DIVISION 1.
   2. Includes, but not limited to, certification that material conforms to specifications.
      a. Certificates shall be prepared by a recognized testing laboratory.
      b. Contractor shall furnish Engineer certified copies of test reports.

18A-2 EQUIPMENT AND MATERIALS

A. EQUIPMENT:
   1. Maintain all equipment, tools, and machines used in the performance of the work required by this Section in a satisfactory working condition at all times.
   2. Equipment shall be industry standard equipment designed to accomplish the work for which it is used and shall conform to FDOT Section 200-3.
   3. Equipment shall be subject to the approval of the Engineer.

B. MATERIALS:
   1. General: Limerock surface course shall consist of aggregate specified and shall be subject to final approval of the Engineer.
   2. Aggregate shall be limerock material and shall conform to FDOT Section 911 as follows:
      a. Material shall be classified either as Ocala Formation or as Miami Oolite Formation. Limerock material which is mined above the 28th degree parallel in the State of Florida will be considered and tested only as Ocala Limerock and material mined below such parallel only as

Miami Limerock. Material of only one formation may be used on this contract.

b. The minimum percentage of carbonates (of calcium and magnesium) in the limerock material shall be in accordance with the following:
   (1) Ocala Limerock: 95
   (2) Miami Limerock: 70
   (3) For any one day's shipment, up to 15 percent of all material may be deficient in the carbonates by up to one percent less than minimum.

c. The organic matter contained in limerock material shall not exceed one-half of one percent of the material.

d. Limerock material which shows a significant tendency to air slake, or to undergo chemical change under exposure to the weather will not be acceptable.

e. For Ocala limerock material the liquid limit shall not exceed 35 and all limerock materials shall be nonplastic.

f. Limerock material shall not contain flinty or other hard pieces, in sufficient quantity to prevent proper bonding or the obtaining of a smooth surface, free from excessive pits and pockets.

g. Gradation and size requirements shall be as follows:
   (1) At least 97 percent by weight of the material shall pass a 3-1/2-inch sieve and the material shall be graded uniformly down to dust.
   (2) The fine material shall consist entirely of dust of fracture.
   (3) All crushing or breaking-up which might be necessary in order to meet such size requirements shall be done before the material is placed on the road.

18A-3 PERFORMANCE

A. GENERAL REQUIREMENTS:

1. Stockpiles:
   a. Clear and level storage sites prior to stockpiling.
   b. Place in the manner and at locations designated by Engineer, providing separate stockpiles for materials from separate sources.
2. Cold-Weather Limitations:
   a. Surface course construction shall be prohibited when atmospheric temperature is below 35 degrees F.
   b. Do not place surface course on frozen subgrade.
   c. Protect surface course and subgrade in freezing weather and repair areas damaged by freezing by reshaping and recompacting.
3. Preparation of Subgrade:
   a. Clean of all foreign substances.
   b. Correct any ruts or soft yielding spots or any areas with inadequate compaction.
   c. Engineer will inspect for adequate compaction and surface tolerances.
4. Grade Control: Establish and maintain by means of grade stakes placed in lanes parallel to the centerline of the area to be surfaced and spaced so string lines may be stretched between stakes.

18A - LIMEROCK SURFACE COURSE: continued

B. MIXING AND PLACING OF MATERIALS:
   1. Methods for mixing, placing, and compacting limerock surface course shall conform to FDOT Section 200.
   2. Surface testing shall conform to FDOT Section 200-7.

C. MAINTENANCE: Maintain finished surface course in a condition satisfactory to the Engineer until completion of the contract.

D. WAYBILLS AND DELIVERY TICKETS: Submit for each load of surfacing material daily to the Engineer during progress of work.

* * * * *

18B - BITUMINOUS PRIME AND TACK COAT

18B-1 GENERAL

A. DESCRIPTION:
1. This Section shall consist of the application of liquid bituminous material, having penetrating properties, to a prepared subgrade and to a mixed-in-place bituminous base in the ash, sludge and pump back cells, and to a limerock surface course on roads.
2. Related Work Specified Elsewhere:
   a. Limerock Surface Course: SECTION 18A.
   b. Site Preparation and Earthwork: SECTION 2A.

B. QUALITY ASSURANCE:
1. Applicable Standards:
   a. American Society for Testing and Materials (ASTM):
      (1) D140 - Sampling Bituminous Materials.
      (2) D977 - Emulsified Asphalt.
   b. Federal Specifications (FS):
      (1) SS-A-706d - Asphalt, Petroleum: Road and Pavement Construction (Asphalt Cement).
   c. Florida Department of Transportation Standard Specifications for Road and Bridge Construction.
      (1) Section 300 - Prime and Tack Coats for Base Courses.
2. Samples and Testing:
   a. Tests to determine conformance with all requirements for material quality and properties specified herein will be performed by an independent laboratory approved by the Engineer and compensated by the Contractor.
   b. Obtain representative samples of material in accordance with ASTM D140 for testing. Furnish Engineer sufficient material for testing from each sample at the time obtained.
   c. Furnish specific schedule for sampling to provide Engineer the opportunity to observe sampling.
   d. Quality control testing will be performed during construction by a testing laboratory retained by the Owner.

C. COMPLIANCE SUBMITTALS:
1. Submit as specified in DIVISION 1.
2. Includes, but not limited to, the following:
   a. Test result reports from testing laboratory indicating conformance with the specifications.
   b. Certification of conformance with the specifications.

18B-2 EQUIPMENT AND MATERIALS

A. EQUIPMENT:
1. General Requirements:
   a. Furnish and maintain all equipment, tools and machines used in performance of the Work required by this Section in satisfactory working condition at all times.

b. All equipment designated for use in this Work shall be subject to approval by the Engineer.

2. Bitumen Distributor:
   a. Distributor shall be of the pressure type with insulated tanks.
   b. The use of gravity distributors will not be permitted.
   c. The distributor shall be designed and equipped with the necessary accessories and instruments to provide for the uniform application of bituminous material on various widths of surface at readily determined and controlled rate of 0.05 to 4.0 gallons per square yard.
   d. The maximum allowable variation from any specified rate of application shall not exceed 10 percent.
   e. Distributor and booster tanks shall be so maintained at all times that no dripping of bituminous material will occur from any part of the equipment.
   f. The minimum equipment for an approved distributor truck shall be as follows:
      (1) A positive displacement-type bitumen pump powered so that uniform distribution of the bituminous material at the rate specified will be obtained. No bypassing of the material to the tank during distribution operations will be permitted. The speed of the pump shall be controlled either by the driver or by the operator on the rear of the truck. A metering device shall be provided to furnish accurate information as to the amount of material being pumped in order to ensure accurate control of the spread.
      (2) A heating device, as an integral part of the truck, which will heat the material to, and maintain it at, the required temperature. The device shall be of a low-pressure type with separate low pressure blower and high-pressure spray nozzle to provide fast and adequate heating before and during the spreading operations.
      (3) A pump or other device for circulating and agitating the bituminous material during the heating process.
      (4) Devices and charts to provide for accurate and rapid predetermination and control of the amount of bituminous material being applied, including a tachometer of the auxiliary wheel type, reading speed in feet per minute, and a suitable instrument for recording, in feet, the total distance traveled.
      (5) A dial indicator, mounted in full view of the operator, that will show accurately the quantity of bituminous material in the tank.
      (6) An accurate thermometer, mounted on the tank and capable of being read from the ground, that will show the temperature of the bituminous material in the tank.
      (7) A full circulating swinging spray bar capable of spraying various widths of from 6 inches to at least 12 feet. When extensions are used, they shall also be of the full circulating type. The spray bar shall have a minimum lateral movement to each side of 6 inches and shall have adjustments to permit the surface to be treated from various heights.
      (8) A pressure gauge, pump tachometer or other approved device for controlling the amount of bituminous material being pumped through the spray bar.

(9) A hand hose and nozzle attachment to be used for spotting skipped areas, and areas inaccessible to the distributor.
(10) Spray-bar nozzle valves which are operated by levers so that all valves may be quickly opened or closed in one operation by the operator at the rear of the distributor.
(11) Dual pneumatic tires. Dual axles will not be permitted unless they are equipped with dual tires.

3. Heating Equipment (Storage Tanks):
   a. Steam coils and equipment for producing steam, or approved type retort heater manufactured for heating asphaltic products, at Contractor's option so designed that steam will not be introduced into the material.
   b. An armored thermometer with a range from 100 to 400 degrees F, fixed to tank in a manner such that it can be easily read from the ground and will continuously indicate temperature of bituminous material.

B. MATERIALS:
1. Bituminous prime coat may be either RC 250 or RC 70, conforming to the requirements of FDOT Section 300.
2. Bituminous tack coat may be either RS-2, SS-1, or SS-1 H, conforming to the requirements of FDOT Section 300.

18B-3 PERFORMANCE

A. PREPARATION OF SURFACE:
1. Remove all loose and objectionable material from surface.
2. Surface shall be approved by Engineer prior to application of prime coat.
3. Correct any ruts, soft-yielding spots or any other areas deemed unsuitable by the Engineer as follows:
   a. For subgrade repair as specified for "SUBGRADE PREPARATION," SECTION 2A.
   b. For limerock surface course repair as specified for "LIMEROCK SURFACE COURSE," SECTION 18A.
4. Sprinkle surface with water immediately in advance of application of prime coat, if surface is excessively dry.

B. APPLICATION OF BITUMINOUS PRIME AND TACK COAT:
1. Apply by means of an approved bituminous distributor.
2. Apply bituminous prime and tack coats only when atmospheric temperature in the shade is above 40 degrees F, and the atmospheric and surface conditions are such as will permit satisfactory penetration and adhesion of prime or tack coat.
3. The approximate quantity of bituminous prime to be used shall be as follows:
   a. For limerock surface course on roads, not less than 0.10 gallon per square yard.
   b. For subgrade beneath hot-mix asphaltic concrete liner on side slopes in ash, sludge, and pump back ponds, 4.0 gallons per square yard.

4. The approximate quantity of bituminous tack to be used on the mixed-in-place bituminous base on the pond bottoms and ramps shall be between 0.02 and 0.08 gallons per square yard.
5. The bituminous prime and tack coats shall be uniformly applied at the rate so designated and in one application.
6. Any spots that are missed in the initial application or any areas which develop that do not have a uniform spread or penetration shall be hand sprayed as directed by Engineer.
7. If directed by Engineer, areas deemed to have excess bituminous prime shall be blotted with approved material.
8. The primed limerock surfacing shall be covered by an application of cover material as specified in FDOT Section 300-6.5.
9. Allow primed surface to cure for not less than 48 hours without being disturbed.
10. Allow tack coated surface to cure as directed by the Engineer.
11. Traffic shall be kept off the bituminous material until it has cured.
12. Maintain prime coated and tack coated surface until the succeeding layer of pavement has been placed.
13. In the event traffic has caused holes or breaks in the prime coated or tack coated surface, such holes or breaks shall be repaired, as directed by the Engineer, at no additional expense to the Owner.

* * * * *

SOUTHERN CULVERT

AN OPERATION OF

P.O. Box 460 • Pinellas Park, Florida 33565 Phone: (813) 544-8811

Telegram from Western Union 4-7-80

ECI shall fully guarantee all material and workmanship to meet a permeability of 1 x 10^{-7} centimeters per second for a period of not less than 10 years.

Jeff Shallard

ECI Inc.

Reference: Deerhaven 29C

yard structures

James R. Gregg

James R. Gregg

Vice-President

Square G. Const Inc

CORRUGATED METAL PIPE

PRECAST BOX CULVERTS

REINFORCED CONCRETE PIPE

* INTERFACE WITH CONTRACT NO. -. CONTRACTOR NEED NOT FILL IN SCHEDULE FOR THIS ITEM AT THIS TIME.
** CONTRACTOR MUST FILL IN EQUIP. & MANPOWER ITEMS.

PROPOSED SCHEDULE

CONTRACTOR Square G Construction Company, Inc.

PHASE OF WORK	WEEKS: 0 NOTICE TO COMMENCE WORK AT THE SITE · 5 · 10 · 15 · 20 · 25 · 30 · 35 · 40 · 45 · 50 · 55 · 60 · 65 · 70
PIPING	
SLUDGE WASTE PIPING	
8 ASH LANDFILL & DITCH	
A) EXC./EMBANKMENT	
B) LINER INSTALLATION	
C) PLANT YARD DRAINS PIPING	
D) PUMP STRUCT.	
E) FINAL GRADING	
9 SECURE LANDFILL & POND	
A) EXC./EMBANKMENT	
B) CUTOFF WALLS	
C) LINER INSTALLATION	
D) PLANT Y. DRAIN PIPE	
E) PUMP STRUCT.	
F) FINAL GRADING	
10 STOCKOUT TOWER STRUS	
11 ROADS	
A. GRADING	
B) LIMEROCK SURFACING	
12 FINAL GRADING, TOP SOIL, SEEDING MULCHING, ETC.	
MAJOR EQUIP. **	
SCRAPERS	4 8 12 — 8 — 2 1
FRONT END LOADERS	0 1 2 5 — 3 — 2 — 1
BACKHOE	0 2 3 — 2 — 1 — 0
DOZERS	2 5 8 — 6 — 4 — 2
DUMP TRUCKS	1 2 3 — 5 — 8 — 10 — 7 — 5 — 3 — 1
COMPACTORS	1 2 2 3 — 2 — 1
OTHER	3 6 10 — 14 — 11 — 7 — 4 3
MANPOWER PRIME CONTR.	7 18 30 30 — 32 — 34 — 31 — 36 — 30 — 26 — 30 18 15 14 6
MANPOWER SUBS	7 12 20 21 — 28 — 35 — 42 — 44 — 45 — 43 — 31 25 16 8 3
TOTAL JOB MANPOWER	

PROCUREMENT & DESIGN
CONSTRUCTION
SOLID VERTICAL LINE INDICATES COMPLETION OF ALL WORK

CONTR. TO COMPLETE

DATE 5-5-80
DESIGNED — Taylor
DETAILED
CHECKED

GAINESVILLE FLORIDA & RUB
DEERHAVEN UNIT 2

Burns & McDonnell

CONTRACT NO. 29C
PROJECT NO. 76-077-1
DRAWING NO. REV.

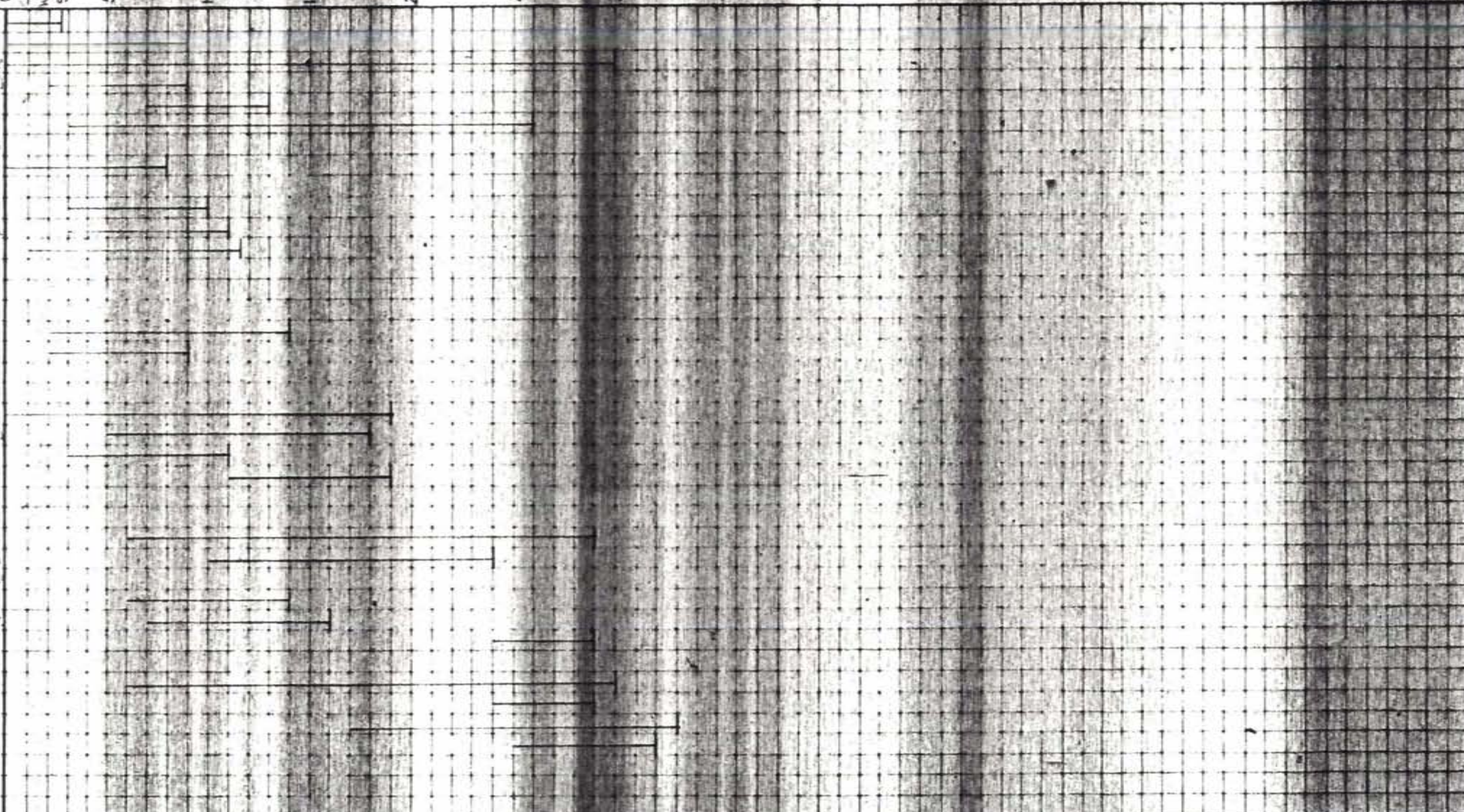
NOTE:
COMPLETION OF STRUCT. MEANS COMPLETE INCLUDING EQUIP. SET IN PLACE, MATERIALS INSTALLED & READY FOR ELECTRICAL CONNECTIONS

PROPOSED SCHEDULE

CONTRACTOR Square G Construction Company, Inc.

PHASE OF WORK | WEEKS: 0 NOTICE TO COMMENCE WORK AT THE SITE, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70

1 MOVE-IN & SET-UP
2 ORDER EQUIP. & MTL.
3 EQUIP. & MTL. DELIVERY
A) BENTONITE (IF USED)
B) PUMPS
C) PIPE
4 CLEARING & GRUBBING
A) TEMP. CONSTR. RUN-OFF RET. POND NO. 1
B) ASH PONDS
C) ASH & SLUDGE LANDFILL
D) CLAY BORROW PIT (IF USED)
5 TEMP. CONSTR. RUNOFF RET. POND NO. 1
A) EXCAVATION
B) OUTLET STRUCT.
6 COAL YARD & EQUIP. PILE RUNOFF RET. POND
A) EXC./EMBANKMENT
B) LINER INSTALLATION
C) POND PUMP STRUCT.
D) FINAL GRADING
7 ASH, SLUDGE & PUMPBACK PONDS
A) EXC./EMBANKMENT
B) LINER INSTALLATION
C) ASH & SLUDGE POND STOPLOG STRUCT.
D) RECYCLE PUMP STRUCT.
E) ASH POND ELEC. EQUIP. BLDG.
F) PIPE X-ING STRUCT.
G) ASH PIPE DRAIN PIT.
H) FINAL GRADING
I) ASH SLUICE WATER
MANPOWER PRIME CONTR.
MANPOWER SUBS
TOTAL JOB MANPOWER



- - - - - - PROCUREMENT & DESIGN
——— CONSTRUCTION
| SOLID VERTICAL LINE INDICATES COMPLETION OF ALL WORK

CONTR. TO COMPLETE

DATE	5-5-80
DESIGNED	C.F. TAYLOR
DETAILED	
CHECKED	

GAINESVILLE FLORIDA & RUB
DEERHAVEN UNIT 2

Burns & McDonnell

CONTRACT NO. 28C
PROJECT NO. 76-077-1
DRAWING NO. REV.

Attachment D

B&M (1978) - Subsurface Information for the Deerhaven Generating Station Site

Subsurface Information

for the

Deerhaven Generating Station Site

Near

Hague, Florida

for the

City of Gainesville, Florida

Deerhaven Unit 2

"THERE IS NO EXPRESS OR IMPLIED GUARANTEE AS TO THE ACCURACY OR COMPLETENESS OF THE INFORMATION AND DATA CONTAINED HEREIN, NOR OF THE INTERPRETATION THEREOF BY THE OWNER, BURNS & McDONNELL ENGINEERING COMPANY, OR ANY OF THEIR REPRESENTATIVES.

THE SUBSURFACE INFORMATION AND DATA CONTAINED HEREIN DO NOT FORM A PART OF ANY CONTRACT DOCUMENT ISSUED BY THE OWNER."

1978

76-077-1

5

Gainesville
Alachua County
Regional Electric
Water & Sewer
Utilities Board

904-374-2910

Burns & McDonnell
Engineers – Architects – Consultants
KANSAS CITY, MISSOURI

SUBSURFACE INFORMATION RECEIPT

Date: ____________________

Burns & McDonnell Engineering Company, Inc.
Post Office Box 173
Kansas City, MO 64141

Project Deerhaven Unit 2 Addition - Gainesville, Florida

Contract No. ____________________

Project No. 76-077-1

The undersigned acknowledges receipt of the SUBSURFACE INFORMATION requested for the contract identified above and acknowledges that such SUBSURFACE INFORMATION must be returned to Burns & McDonnell to obtain refund of deposit on the Contract Documents.

The undersigned further acknowledges and agrees there is no express or implied guarantee as to the accuracy or completeness of the information and data received, nor of the interpretation thereof by the Owner, Burns & McDonnell Engineering Company, or any of their representatives; and, the subsurface information and data received herein DO NOT form a part of any contract document issued by the Owner.

Description of Subsurface Information received:

1. Boring Logs

2. Laboratory Test Results

____

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____

____
Company

____
By

a.

SUBSURFACE INFORMATION RECEIPT

Date: ____________________

Burns & McDonnell Engineering Company, Inc.
Post Office Box 173
Kansas City, MO 64141

Project Deerhaven Unit 2 Addition - Gainesville, Florida

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Company

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By

Subsurface Information

for the

Deerhaven Generating Station Site

Near

Hague, Florida

for the

City of Gainesville, Florida

Deerhaven Unit 2

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1978

76-077-1

Burns & McDonnell
Engineers - Architects - Consultants
KANSAS CITY, MISSOURI

TABLE OF CONTENTS

INTRODUCTION:

Burns and McDonnell was authorized to contract for the performance of a subsurface investigation in November of 1977 by the City of Gainesville Florida. The investigation was performed to aid in the design of the proposed Unit #2 facilities.

The major work, consisted of a field drilling and sampling investigation along with laboratory testing that was performed by Ware-Lind Engineers, Inc. between November and March of 1977 and 1978.

The area investigated was located on the existing Deerhaven Generating Station. This area is shown on the attached general location map.

PURPOSE AND SCOPE:

The purpose of the investigation was to obtain information about the general classification and engineering characteristics of the subsurface material in the immediate vicinity of the proposed Unit #2 facilities. The investigation was conducted solely to provide data necessary for design purposes. Note, it should be recognized by the reader that the information contained herein may not be directly applicable to all types of construction activities. It is recommended that a Geotechnical Engineer be consulted for advice in applying this data.

FIELD INVESTIGATION:

Seventy rotary wash borings were made at the approximate locations shown on the boring location plan. Logs of these borings are contained in Appendix III of this document.

The location of borings were surveyed by the Owner. Elevations of borings were approximately determined by interpolation using a two foot contour map. The location and elevation of the borings should be considered accurate only to the degree implied by the method used.

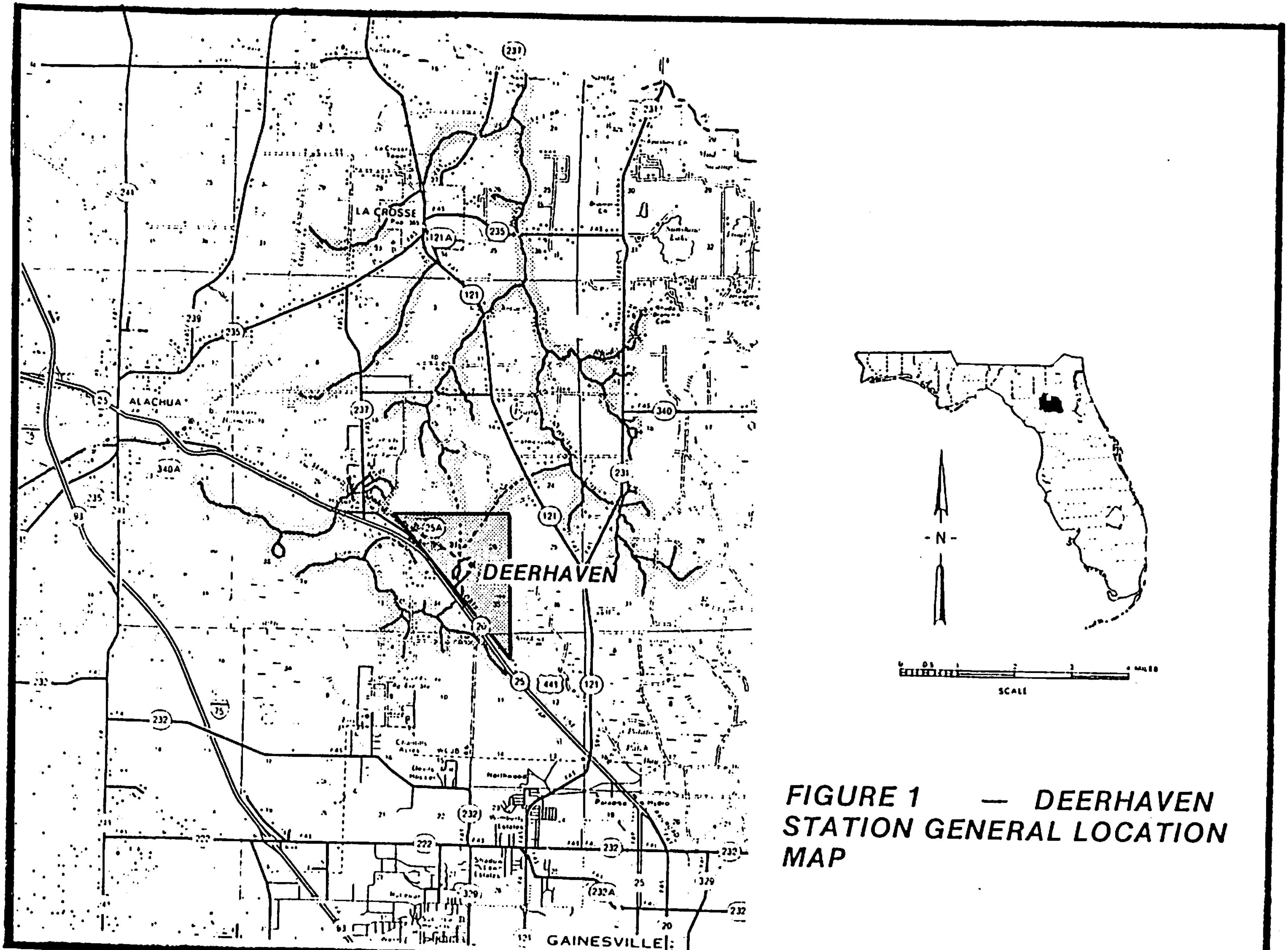


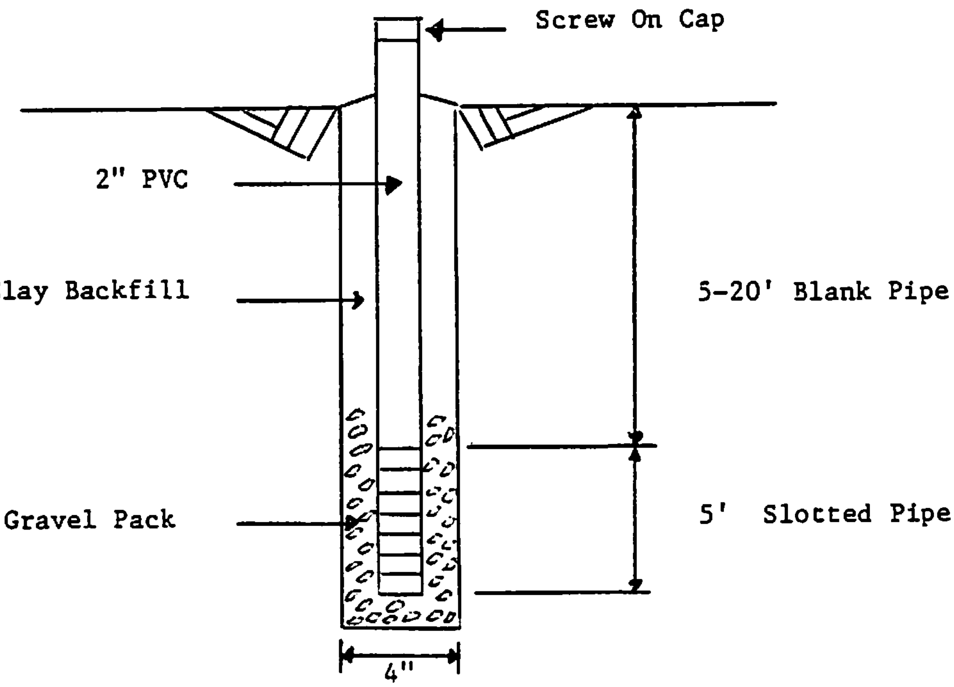
FIGURE 1 — DEERHAVEN STATION GENERAL LOCATION MAP

The borings were drilled with truck mounted Failing drill rigs using a four inch rotary wash bit. Sampling methods employed included the use of the standard penetration test performed according to ASTM D1586, and thin walled shelby tubes pushed according to ASTM D1587. Water level readings were made in the drill holes at the times and conditions stated on the boring logs.

Five piezometers were installed to monitor the groundwater level. These are located as shown on the boring location plan. Readings are listed below:

Piezometer Number	Bottom Elevation	Water Elevation	Date Measured
TH-26	164 MSL	183 MSL	12/1/77
TH-27	164 MSL	185 MSL	12/14/77
TH-28	169 MSL	185 MSL	12/14/77
TH-29	179 MSL	185 MSL	12/14/77
U-50	174 MSL	182 MSL	12/10/77

Typical installation detail is shown below.



One test pit was excavated to a depth of approximately 12-feet below the ground surface in the area of the proposed track hopper. The location of the test pit and the data obtained is contained in Appendix I of this document.

Soil resistivity measurements were taken to determine grounding requirements in the area of the proposed unit. In addition, measurements were made, at several locations, using a copper-sulfate half cell to determine the nature of cathodic protection for burried conduits. Data gatered is contained in Appendix II of this document.

All field activities were observed by Geotechnical Engineers of Burns and McDonnell Engineering Company.

LABORATORY TESTING:

The purpose of the laboratory testing was to obtain engineering parameters necessary for the design of the Deerhaven Unit #2 facilities.

Laboratory testing was performed by Ware-Lind Engineers, Inc. Results of the laboratory tests are contained in Appendix IV of the document.

ADDITIONAL SUBSURFACE INFORMATION:

Additional subsurface information pertaining to the Deerhaven site has been prepared by others. This subsurface information includes, but is not limited to a report prepared by Florida State Engineers, Inc. in April of 1969, a report prepared by Ardamen & Associates, Inc. in March of 1967 and reports by Breedlove and Associates, Inc., and Jones, Edmonds and Associates, Inc.

ADDRESS OF DRILLING AND TESTING CONTRACTOR:

Ware-Lind Engineers, Inc.
P.O. Box 10115
Jackson MS 39206
(601) 956-4467

APPENDIX I

TEST PIT DATA

Test Pit Data

Location: N 12280 E 11060 Elevation: 189 MSL

Initial Pit Dimensions: 12' x 14' x 12' (L x W x H)

Date Made: 12/8/77 Time Begun: 12:45 p.m.

Observations:

Water entered slowly at a depth of 5.5 feet below the ground surface at 1:00 p.m.

Water Levels:

Time		Test Pit*	Piezometer TH-29*
12:30 p.m.	12/8	--	4.8 Ft.
1:14		--	6.0
1:32		10.0 Ft.	---
1:36		--	6.4
1:45		9.4	---
2:00		9.0	6.6
2:15		8.5	6.6
3:50		7.3	6.5
9:10 a.m.	12/9	4.9	4.3
9:20 a.m.	(Began pumping pit, pumping rate ≈ 150 gpm)		
9:30		5.6	---
9:38		Pit Dry	

Final Pit Dimensions: 15 x 15 x 7 (L x W x H)

*Water levels were measured from ground surface to top of water.

APPENDIX II

SOIL RESISTIVITY AND HALF CELL DATA

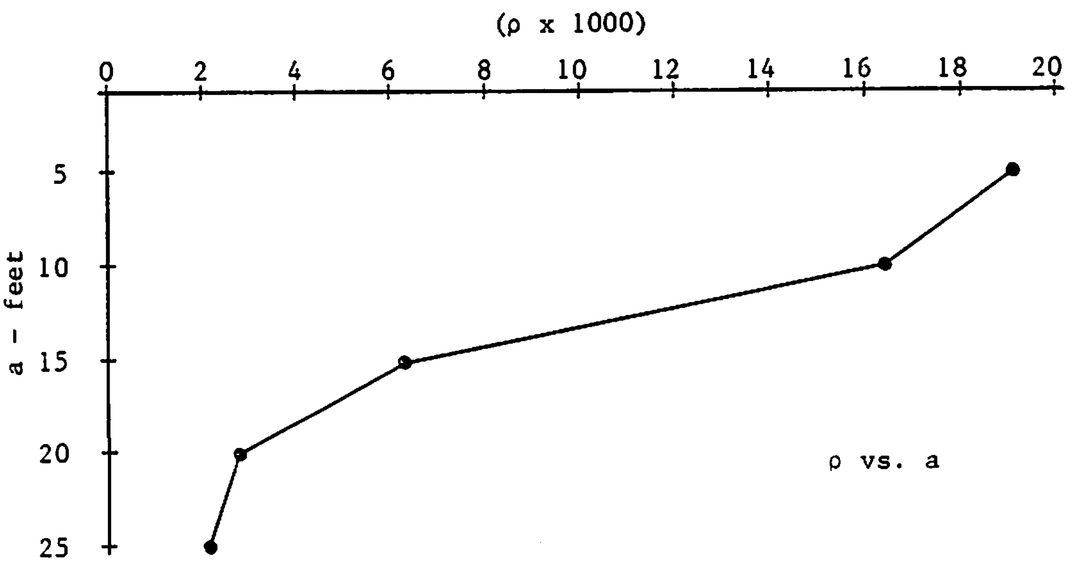
SURFACE RESISTIVITY DATA

Location of Test: N 10250 E 10400

Test Date: December 7, 1977

Observers: Duryee and Zey

a (feet)	R (ohms)	191.5(a X R) = ρ in ohm-cm
5.0	20.0	19,150 ohm-cm
10.0	8.8	16,852 ohm-cm
15.0	2.2	6,319 ohm-cm
20.0	0.8	3,064 ohm-cm
25.0	0.49	2,346 ohm-cm



COPPER SULFATE HALF CELL DATA

Meter Used: Burns & McDonnell Triplett volt-ohm meter

Model: 630 - NS Type 2

Resistance/Volt: 100,000 - 200,000

Scales Used: 12v, 3v

Material Providing Ground: Six inch Diameter Pipe coated with Koppers 50

Soil Temperature: 51°F (measured six inches below ground)

Soil Moisture: Natural moisture and saturated with tap water

Test Date: December 9, 1977

Observers: Hustad and Zey

Distance between pipe and half cell: 2.5 feet

Location of Test	Reading
N 10525 E 10270	0.55 volts
N 10700 E 10270	0.55 volts
N 10800 E 10100	0.52

Readings same for both moisture conditions and scales

APPENDIX III

BORING LOGS

Prepared by Burns & McDonnell Company

BORING LOGS

LEGEND AND NONMENCLATURE

Items shown on boring logs refer to the following:

1. Depth - Depth below reference elevation, ground surface unless otherwise shown.

2. Symbol - A generalized graphical profile of the material encountered.

3. Sample Number - Types designated by letter and symbols.

   DB - Relatively undisturbed sample, obtained by penetration of a Denison double tube sampler, using a 3-inch diameter thin walled inner tube.

   SS - Split-Spoon sample, obtained by driving 2-inch split spoon to determine penetration resistance and allow classification.

   NX - Rock core, obtained using a 3-inch diameter double tube core barrel and carbide drill bit.

   ST - Relatively undisturbed sample, obtained by penetration of minimum 3-inch diameter thin-wall Shelby tube.

4. Description - Description of material according to the Unified Soil Classification: word description gives soil constituents, consistency or density, and other appropriate classification characteristics. Geologic names, where appropriate, are used. A solid line indicates stratigraphic change; a dashed line indicates approximate location of stratigraphic change.

5. Blow Count - 3/6/9 - Numbers indicate blows per 6-inches of sampler when driven by a 140-pound hammer falling freely 30-inches. The Standard Penetration Resistance is the number of blows for the last 12-inches of penetration of the split-spoon sampler, e.g. 15.

6. Unit Dry Weight - Dry density obtained by laboratory tests.

7. Graphical Presentation of Laboratory Data

   The upper scale refers to the soil cohesion. The lower scale refers to the soil water content at various states, i.e. plastic limit, natural water content, liquid limit.

LOG OF BORING NO. L-1 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 14000, E 6425	DRILLING DATE: 12/3/77 TO
GROUND ELEVATION: 179 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: 3.2 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
0–10		SS-1	Gray and brown silty sand, very loose, fine grained, poorly graded, wet, trace of medium sand	1/2/3		
5		SS-2		1/0/0		
		SS-3		1/0/1		
10–18			Gray clayey sand, med. dense, med. plasticity, moist, some thin intermittent sand and clay seams			
		SS-4		5/8/12		● (water content ≈ 20)
15						
18–		ST-5	White and gray sand, loose to med. dense, fine to med. grained, moist, trace of clay and coarse sand			
20						

LOG OF BORING NO. L-1 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
25		ST-6	-with increasing clay content 22' to 24' -grading to silty sand with high caliche content 24'-25'		71	
30		ST-7	Lt. gray and tan silty clay, very stiff, damp, some sand seams and calite filled joints			
	TD					

LOG OF BORING NO. L-2 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 13100, E 6440	DRILLING DATE: 12/3/77 TO
GROUND ELEVATION: 180 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: 3.3 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Lt. gray and brown silty sand, very loose, fine grained, poorly graded, wet, trace of medium sand	1/1/2		
5		SS-2		1/1/3		
		SS-3	-becomes medium dense with increasing clay content below 8.5'	9/10/12		
10						
		ST-4	Gray silty clay with interbedded silty sand, soft, friable, moist, some claiche		81	
15						
		ST-5	Tan clay, soft to medium stiff, high plasticity, damp, some caliche		73	128
20						

LOG OF BORING NO. L-2 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

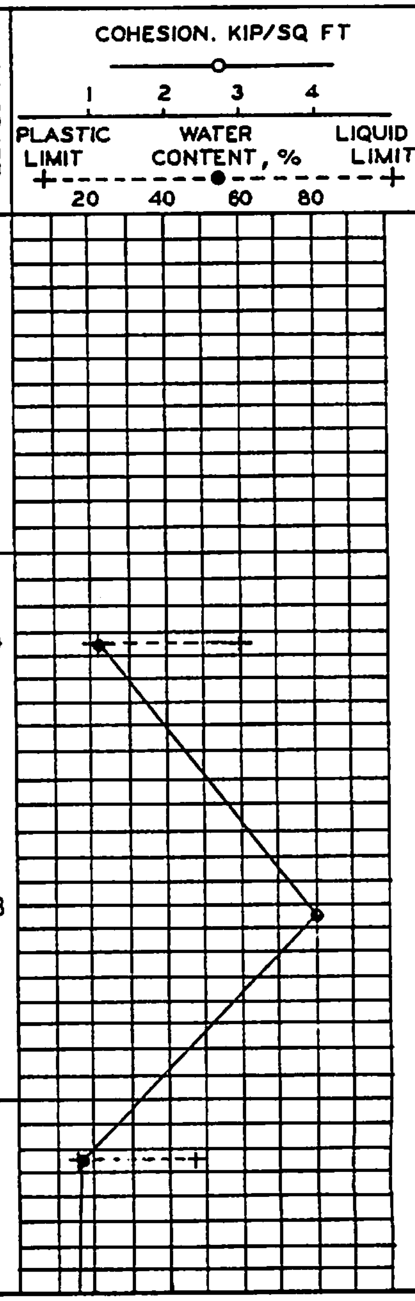
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
		ST-6	Tan sandy clay, hard, damp, medium plasticity, some thin sand seams		107	
25						
		ST-7			108	
30	TD					

LOG OF BORING NO. L-3 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12100, E 6430	DRILLING DATE: 12/3/77 TO
GROUND ELEVATION: 180 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: 5.3 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, fine grained, poorly graded, wet	4/5/5	
5		SS-2	-with tree roots 4.5' to 6'	1/2/5	
		ST-3	Lt. gray and blue gray silty clay, very stiff, moist, medium plasticity, some sand		104
10					
		ST-4	-with thin sand seams and some caliche below 13'		53
15					
		ST-5	Lt. gray and tan sandy clay, hard, damp medium plasticity		
20					



LOG OF BORING NO. L-3 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		ST-6	-with fine sand seams 23' to 25'		117	
25						
		ST-7	-with increasing sand content below 28'		117	
30	TD					

LOG OF BORING NO. L-4 SHEET 1 OF 2

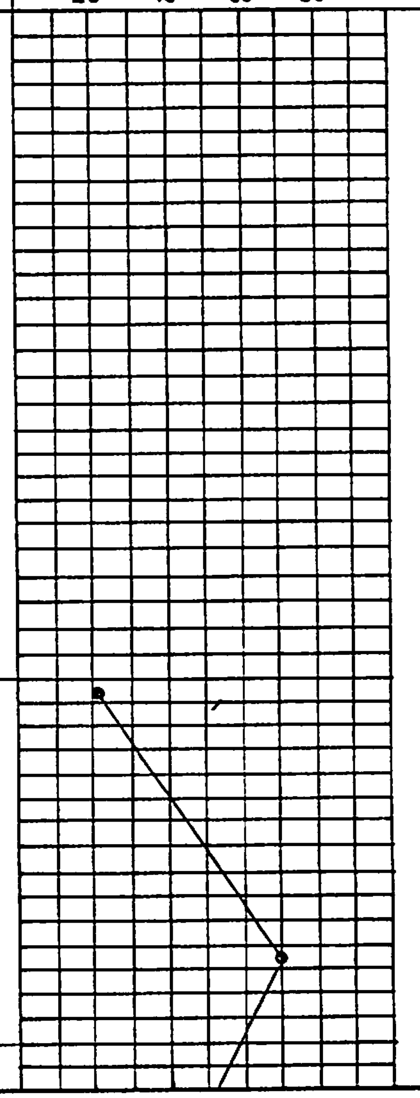
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 14100, E 7380	DRILLING DATE: 12/3/77 TO
GROUND ELEVATION: 182 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: 3.2 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose to medium dense, poorly graded, fine grained wet, trace of medium sand	2/3/4	
5		SS-2	-dark brown below 5'	1/5/8	
		SS-3		5/7/12	
10					
		SS-4	Gray and white clayey sand, very stiff, friable, moist, with caliche fragments	5/6/12	
15					
		ST-5	-grades to silty clay 19.5' to 21'		64
20					

COHESION, KIP/SQ FT: 1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



LOG OF BORING NO. L-4 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
25		ST-6	Lt. gray sandy silt, soft, friable, moist, with caliche		90	
30		ST-7	Lt. gray and tan sandy clay, hard, damp, medium plasticity			

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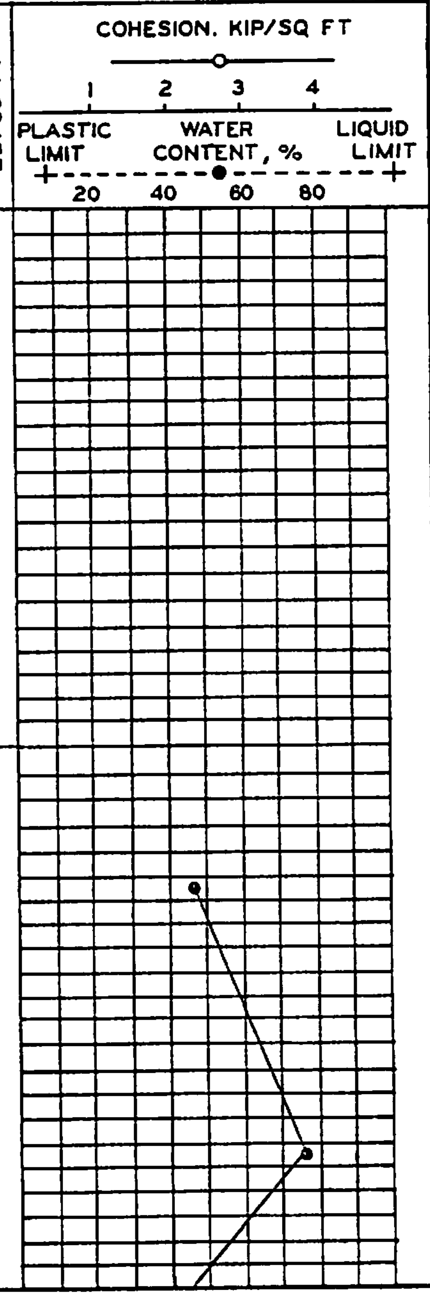
LOG OF BORING NO. L-5 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 13100, E 7400
GROUND ELEVATION: 183 MSL
DEPTH TO WATER IN BORING: 3.2 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/3/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: 12/10/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

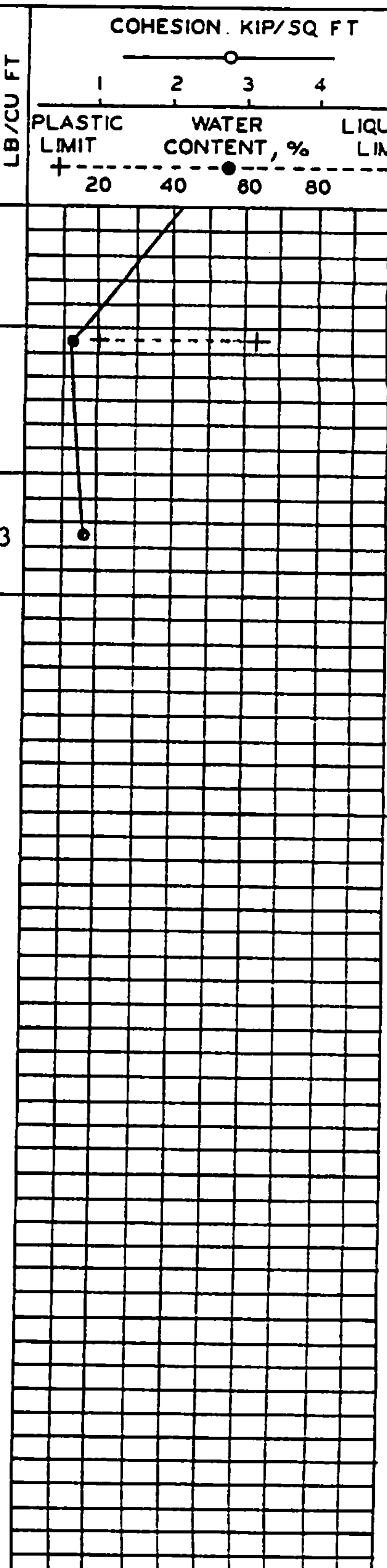
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, very loose, fine grained, poorly graded, wet	2/2/2	
5		SS-2		1/1/2	
			-becomes medium dense below 7'		
		SS-3		5/7/9	
10					
		ST-4	Gray sandy clay with interbedded green silty clay, soft, friable, moist, some caliche fragments		
15			-with thin sand lenses throughout		
		ST-5	-with thin seams of very stiff clay below 18'		
20					



LOG OF BORING NO. L-5 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6			
25			Gray green silty clay, hard, damp, trace of sand		
		ST-7	Lt. gray and tan sandy clay, hard, damp, medium plasticity		113
30	TD				



LOG OF BORING NO. L-6 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 14050 , E 8350
GROUND ELEVATION: 185 MSL
DEPTH TO WATER IN BORING: 2.6 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/4/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: 12/10/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Brown silty sand, loose, fine grained, poorly graded, wet	2/2/5		
5		SS-2		0/1/0		
		SS-3		3/4/6		
10						
		SS-4	-becomes dense with thin seams of clayey sand below 13.5'	11/20/16		
15						
		ST-5	Blue gray sandy clay, stiff, moist, with caliche nodules			108
20			-silty sand seams below 21'			

LOG OF BORING NO. L-6 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

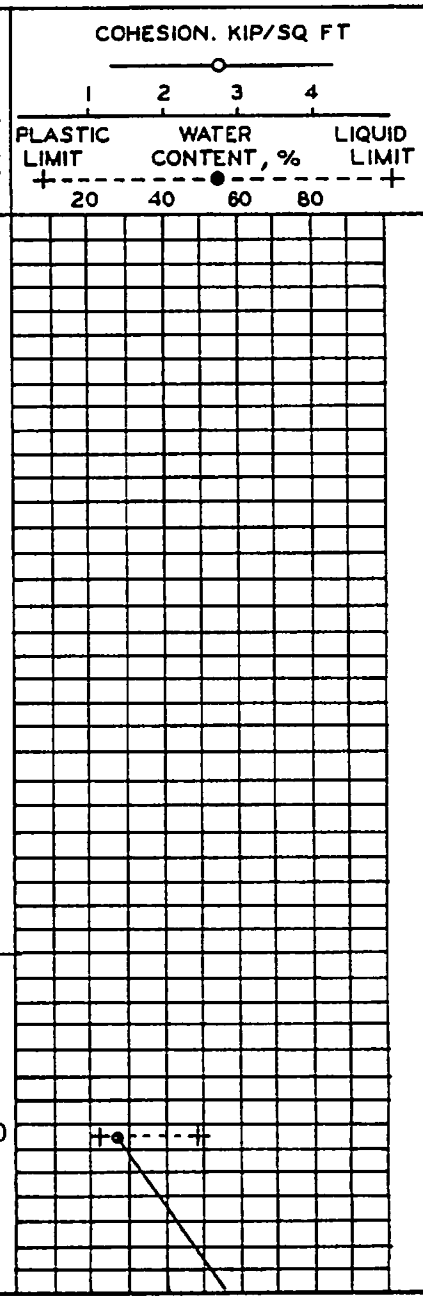
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
25		ST-6	Lt. tan and gray silty clay, soft, moist, friable, with caliche			
30		ST-7	White limey sand, very loose, chalky, friable, with some hard nodules			
	TD					

LOG OF BORING NO. L-7 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 13150, E 8380	DRILLING DATE: 12/4/77 TO
GROUND ELEVATION: 185 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: 2.5 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, fine to medium grained, poorly graded, wet	3/2/3	
5		SS-2		2/1/3	
		SS-3	-becomes dark brown and med. dense below 8.5'	3/5/7	
10					
		SS-4	-dense with lower silt content below 13'	14/21/22	
15			Blue gray sandy clay, stiff, moist, friable some caliche nodules		
		ST-5			100
20					



LOG OF BORING NO. L-7 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		ST-6			55	
25			-hard cemented seams ½' to 1' thick 25' to 26'			
		ST-7	Lt. gray sandy silt, damp, chalky, friable		79	
30	TD					

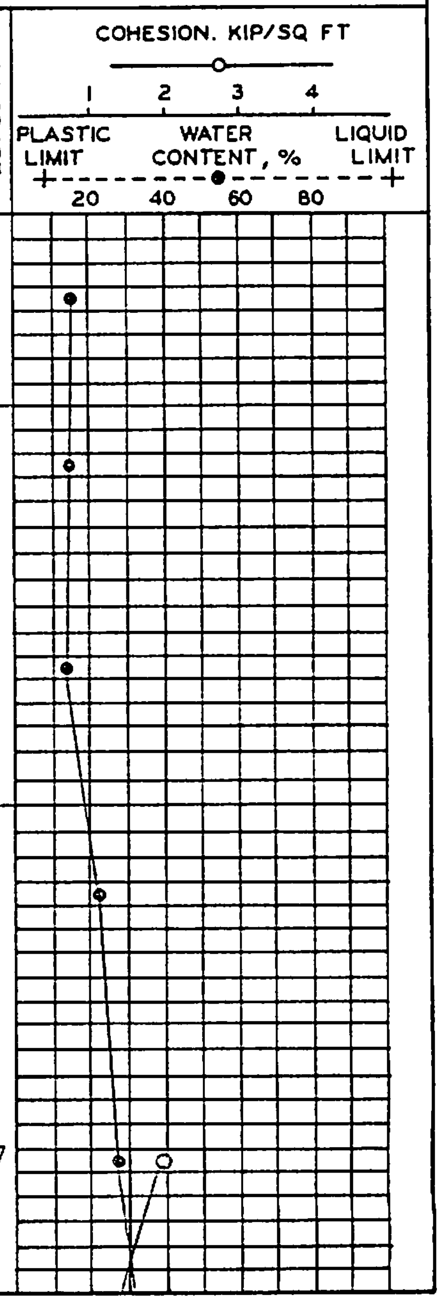
LOG OF BORING NO. AP-8 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12725, E 8400
GROUND ELEVATION: 183 MSL
DEPTH TO WATER IN BORING: N.D.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/13/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: Not Measured
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-1	Brown silty sand, loose fine grained, poorly graded, wet		98
5		SS-2	Lt. tan clayey sand, medium dense, fine to medium grained, poorly graded, moist	3/4/7	
		ST-3	-with lower clay content below 8.5'		115
10					
		ST-4	Blue green silty clay, some sand, very stiff, moist, medium plasticity		102
15			-with sand seams throughout		
		ST-5	-with some caliche nodules below 18'		97
20					



LOG OF BORING NO. AP-8 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		ST-6	White clayey silt with caliche nodules, soft, moist, trace plasticity		82	
25						
		ST-7			85	
30	TD					

LOG OF BORING NO. AP-9 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12550, E 8800
GROUND ELEVATION: 182 MSL
DEPTH TO WATER IN BORING: 0.6 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/8/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: 12/12/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Brown silty sand, loose, poorly graded, fine grained, wet	2/4/1		
5		SS-2		1/3/7		
		SS-3	-becomes dark brown with trace of medium sand below 8.5'	1/1/6		
10						
		SS-4	-Lt. tan and medium dense with increasing clay content below 13'	6/7/11		
15						
		SS-5	-gray below 15'	8/9/10		
20						

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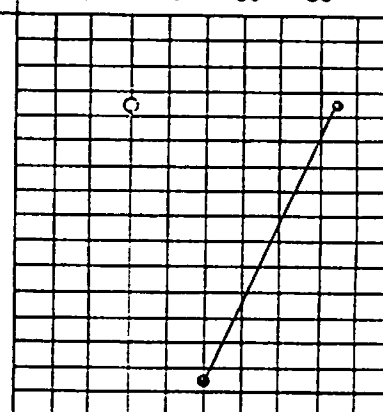
LOG OF BORING NO. AP-9 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Olive green and tan silty clay very stiff, damp, blocky structure, friable		51
25					
		ST-7	-with blue green silty clay seams and caliche nodules below 28'		74
30					
	TD				

COHESION KIP/SQ FT
1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT
20 40 60 80



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LOG OF BORING NO. AP-10 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12300, E 8830
GROUND ELEVATION: 181 MSL
DEPTH TO WATER IN BORING: Surface
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/8/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: 12/10/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1 2 3 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20 40 60 80)
		SS-1	Lt. Gray silty sand, very loose, fine grained, poorly graded, wet	1/1/1		
5		SS-2	-medium dense with some clay 5' to 8'	2/4/7		
10		SS-3	-dense with clay seams below 8'	8/14/17		
15		SS-4		8/17/24		
		SS-5		14/12/14		
20			Blue green silty clay, very stiff, damp, trace of sand			

LOG OF BORING NO. AP-10 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
			Lt. Brown silty clay, hard, damp, with caliche nodules			
25		ST-6			95	
		ST-7	-with 6" dark brown organic seam 29' - 29.5'		63	
30	TD					

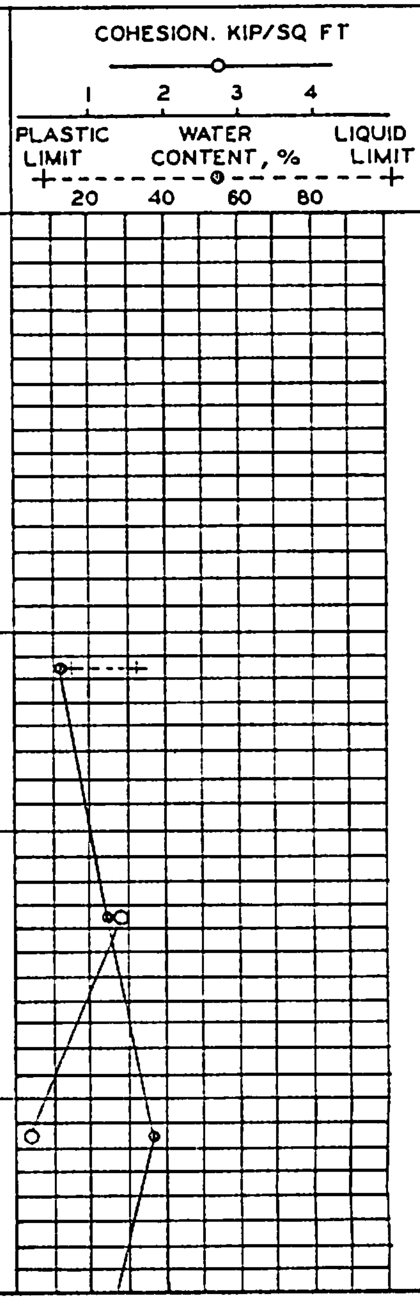
LOG OF BORING NO. AP-11 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12000 , E 8450
GROUND ELEVATION: 182 MSL
DEPTH TO WATER IN BORING: 2.7 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/6/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: 12/10/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained, wet	2/3/2	
5		SS-2	-medium dense and gray with a trace of clay below 4.5'	3/5/8	
10		SS-3	Gray clayey sand, medium dense, moist trace plasticity	6/9/11	
15		ST-4	Blue gray sandy clay, very stiff, moist, with caliche nodules and ½" - 1" sand seams		101
20		ST-5	Gray green clayey silt, soft, wet, with fine sand and caliche, some marine shells and chert gravel		88



LOG OF BORING NO. AP-11   SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
			Badly weathered limestone, with interbedded soft caliche, moderately hard with well cemented seams, trace of gravel and marine shells			
25		SS-6		13/28/25 (3)		
30		SS-7		8/16/37		
	TD					

LOG OF BORING NO. AP-12 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12350, E 8200	DRILLING DATE: 12/4 TO 12/5/77
GROUND ELEVATION: 182 MSL	COMPLETION DEPTH: 30.5 FT.
DEPTH TO WATER IN BORING: 2.6 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
0–10		SS-1	Gray silty sand, very loose, poorly graded, fine grained, wet	1/1/1		
5		SS-2		2/2/3		
		SS-3	-becomes dense with trace of clay below 8'	6/10/15		
10–17.5			Lt. gray silty clay, stiff, moist, with caliche nodules			
15		ST-4			103	
17.5–		ST-5	Lt. gray sandy silt, soft, damp, with some caliche and gravel		90	
20						

LOG OF BORING NO. AP-12 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
		ST-6			77	
25			-hard cemented seam 26' to 27'			
		ST-7	Blue gray silty clay, stiff, moist, medium plasticity			
30		SS-8	Badly weathered limestone, hard friable, chalky	9/50 (11)		

LOG OF BORING NO. AP-13   SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12380, E 8500	DRILLING DATE: 12/6/77 TO
GROUND ELEVATION: 183 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: Surface	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Brown and gray silty sand, med. dense, poorly graded, fine to medium grained, wet	4/5/10		
5		SS-2		7/9/20		
		SS-3	-with thin green silty clay seams below 8.5'	3/6/10		
10						
		SS-4	-dense below 13'	7/12/22		
15						
		SS-5	-with increasing number of clay seams below 18.5'	11/11/11		
20			Gray green silty clay, some sand, very stiff, moist, some sand seams			

LOG OF BORING NO. AP-13 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		ST-6	-brown and gray 23 - 25'		70	
25		ST-7	Badly weathered limestone, broken hard seams interbedded with soft limey silt seams, some marine fossils			
30	T.D.					

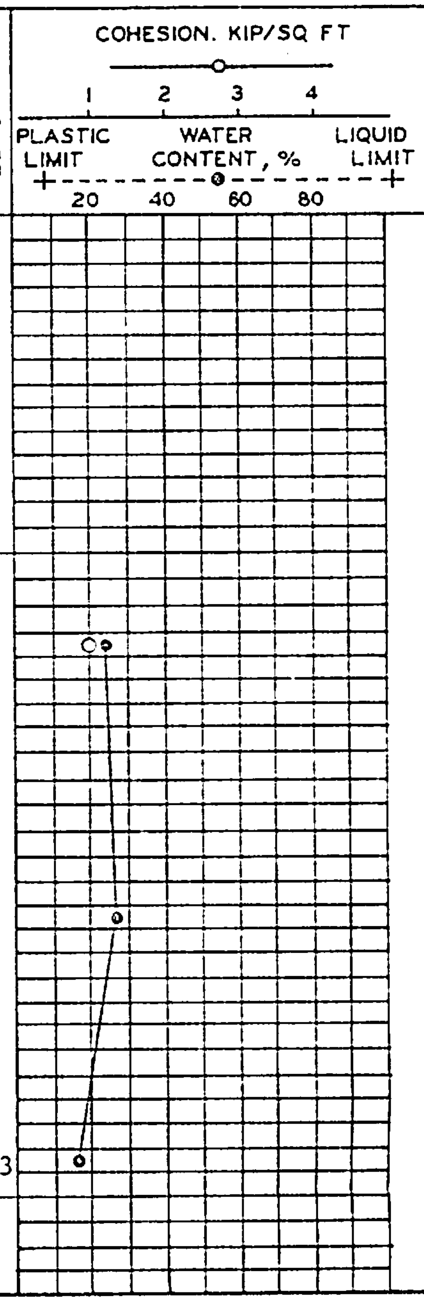
LOG OF BORING NO. RR-14 SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10500, E 6900
GROUND ELEVATION: 177 MSL
DEPTH TO WATER IN BORING: 6.2 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/6/77 TO
COMPLETION DEPTH: 20 FT.
DATE WATER MEASURED: 12/10/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown and gray silty sand, medium dense, poorly graded, fine grained, trace of med. sand	7/10/10	
5		SS-2		9/12/11	
		ST-3	Gray green silty clay, hard, damp, medium plasticity, with caliche and sand seams		99
10					
		ST-4	-with tan silty clay below 13.5'		93
15					
		ST-5			113
20	TD				



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LOG OF BORING NO. RR-15   SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10950 , E 7730

GROUND ELEVATION: 177 MSL

DEPTH TO WATER IN BORING: 7.7 Ft.

DRILLING COMPANY: WARE LIND ENGRS.

DRILLING RIG: FAILING - 750

DRILLING TYPE: WASH BORE

DRILLING DATE: 12/6/77 TO

COMPLETION DEPTH: 20 FT.

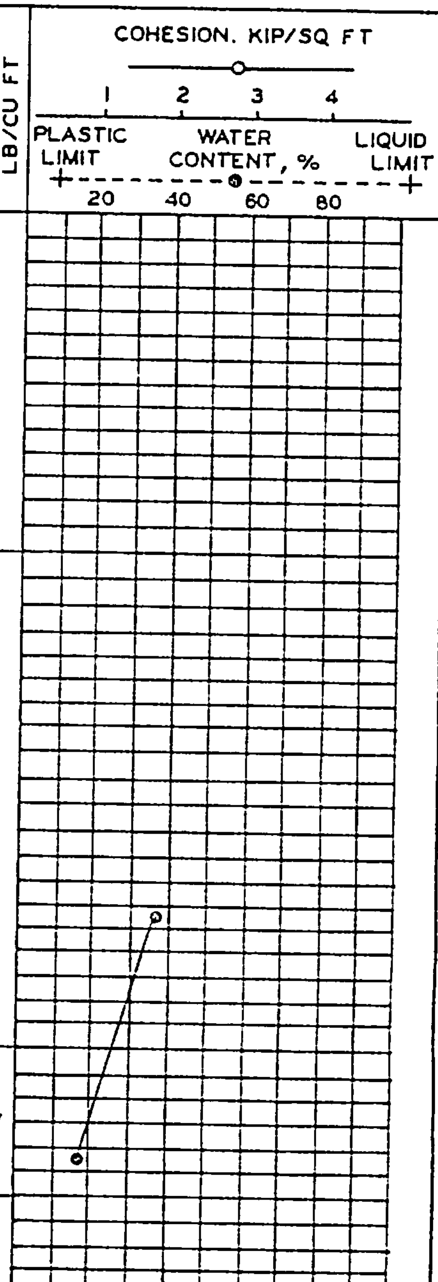
DATE WATER MEASURED: 12/10/77

DRILLERS: POWELL, BREWER

ENGINEERS: DURYEE, ZEY

HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown and gray silty sand, medium dense, poorly graded, fine grianed, moist	2/6/8	
5		SS-2		6/16/13	
		ST-3	Gray green silty clay, stiff, damp, with caliche and a trace of sand		
10			-with sand seams 8' to 10'		
15		ST-4	-becomes very stiff below 13'		86
20		ST-5	Lt. gray and tan sandy clay, hard, damp, med. plasticity		107
	TD				



LOG OF BORING NO. RR-16

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

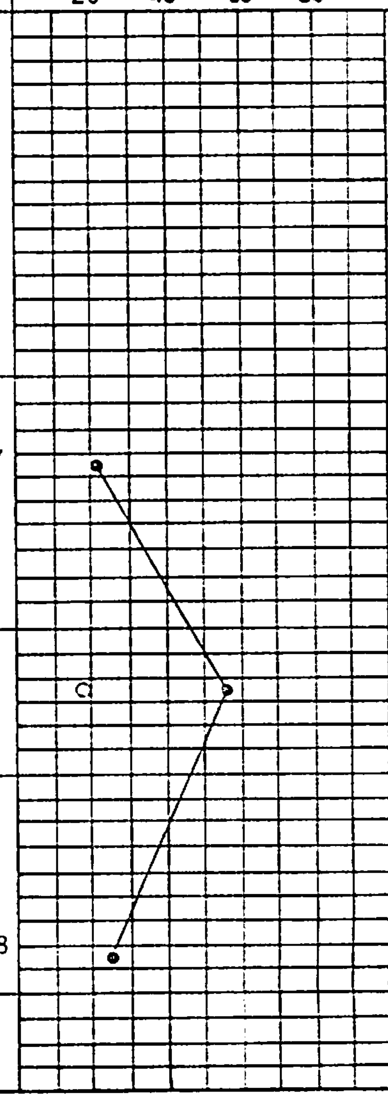
LOCATION: N 11320, E 7800
GROUND ELEVATION: 178 MSL
DEPTH TO WATER IN BORING: 2.0 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/6/77 TO
COMPLETION DEPTH: 20 FT.
DATE WATER MEASURED: 12/10/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
0–7.5		SS-1	Brown and gray silty sand loose, wet, trace of clay	3/4/6	
5		SS-2	-medium dense with tree roots below 5'	6/12/16	
7.5–12.5		ST-3	Blue gray sandy clay, very stiff, damp, with caliche and thin sand seams		107
10–15		ST-4	White clayey silt, stiff, friable, chalky		69
15–20			Blue gray silty clay, hard, damp, with thin sand seams		
20		ST-5	-with tan sandy clay below 19		98
	T.D				

COHESION, KIP/SQ FT: 1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



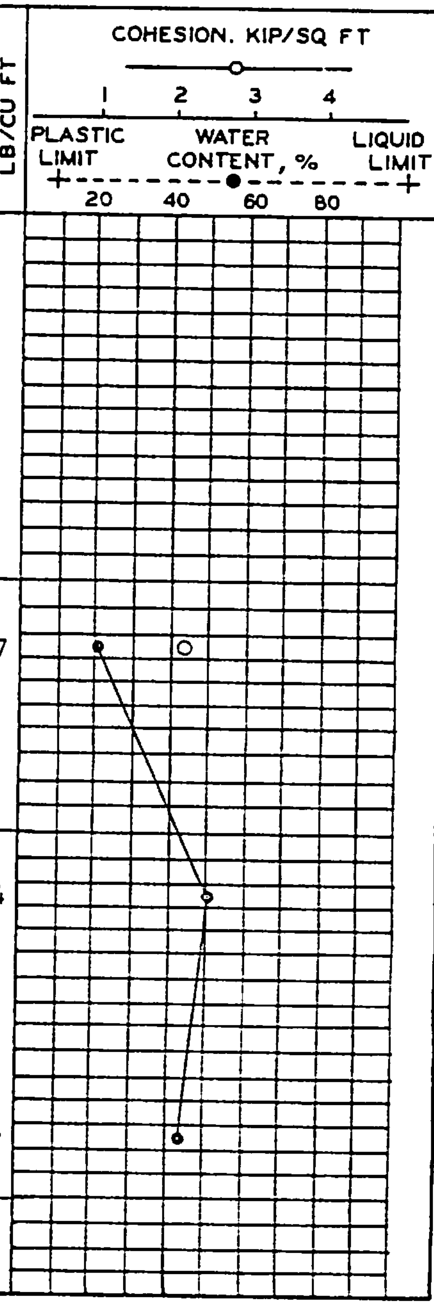
LOG OF BORING NO. RR-17 SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11700, E 8250
GROUND ELEVATION: 180 MSL
DEPTH TO WATER IN BORING: 2.5 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/6/77 TO
COMPLETION DEPTH: 20 FT.
DATE WATER MEASURED:
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
0–7.5		SS-1	Brown and gray silty sand, med. dense, poorly graded, fine to med. grained, wet	4/4/10	
5		SS-2		3/3/10	
7.5–12.5		ST-3	Blue gray sandy clay, very stiff, damp, with caliche and sand layers		107
12.5–20		ST-4	Gray and white clayey silt, soft chalky, with chert gravel and sand seams		74
		ST-5			77
20	T.D.				



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LOG OF BORING NO. RR-18

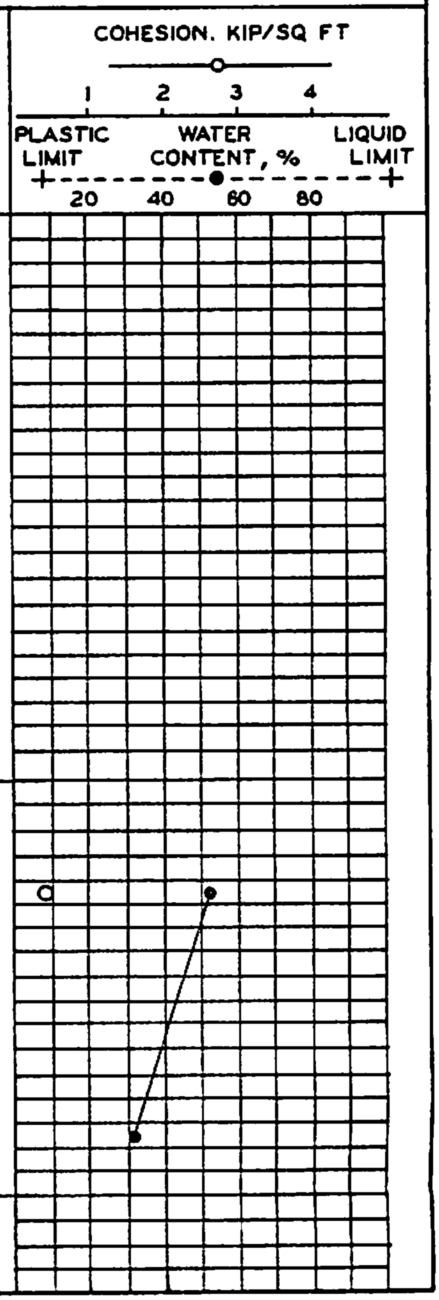
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12060, E 8700
GROUND ELEVATION: 181 MSL
DEPTH TO WATER IN BORING: N.D.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/8/77 TO
COMPLETION DEPTH: 20 FT.
DATE WATER MEASURED: Not Measured
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, med. dense, poorly graded, fine grained, wet, with organic fragments	6/12/6	
5		SS-2	-with clayey sand seams 5.5' to 9.5'	2/6/12	
		SS-3		5/8/12	
10					
		ST-4	White clayey silt, very stiff friable, low plasticity, moist, some caliche nodules		75
15					
		ST-5			92
20	T.D				

COHESION, KIP/SQ FT
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT

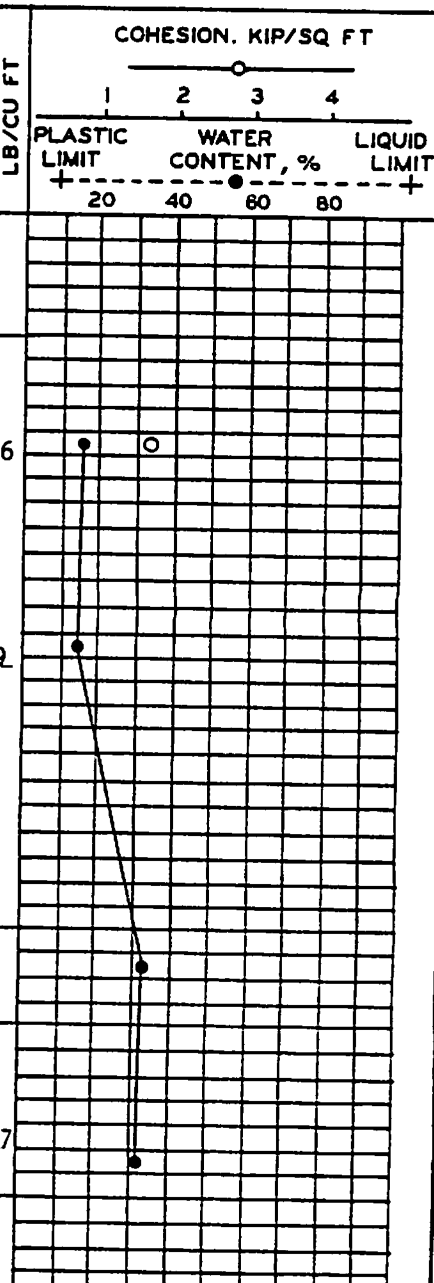


LOG OF BORING NO. RR-19   SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12460, E 9200	DRILLING DATE: 12/13/77 TO
GROUND ELEVATION: 182 MSL	COMPLETION DEPTH: 20 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, very loose, poorly graded, fine grained, wet	2/1/2	
5		ST-2	Gray clayey sand, very stiff, moist, medium plasticity		116
		ST-3			119
		SS-4		11/10/11	
15			Green silty clay, very stiff, moist, med. plasticity		
		ST-5	White clayey silt, very stiff, low plasticity, moist, with caliche nodules.		97
20	T.D.				



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LOG OF BORING NO. RR-20 SHEET 1 OF 1

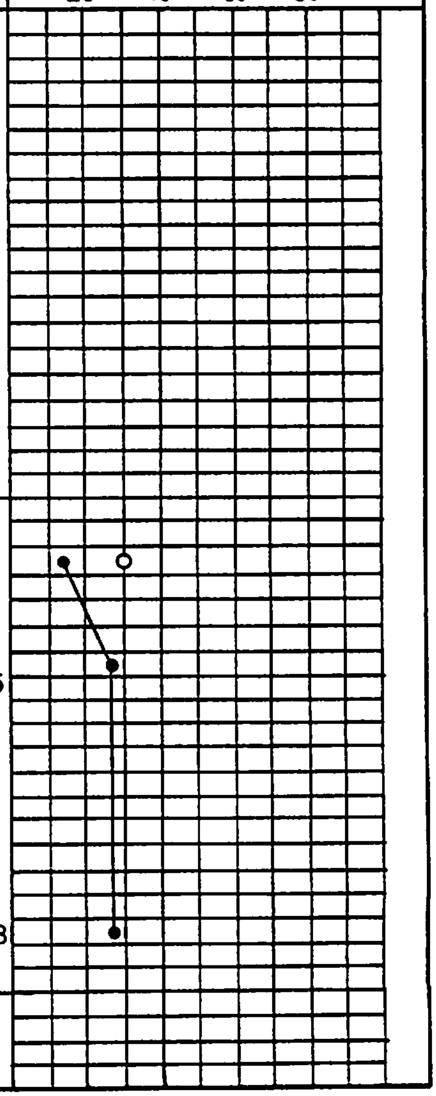
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12900, E 9750
GROUND ELEVATION: 182 MSL
DEPTH TO WATER IN BORING: N.D.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/13/77 TO
COMPLETION DEPTH: 20 FT.
DATE WATER MEASURED: Not Measured
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
0–10		SS-1	Lt. tan and brown silty sand, loose, poorly graded, fine grained, moist	2/3/3	
5		SS-2		3/2/5	
10–20		ST-3	Blue gray silty clay, very stiff, moist, med. plasticity, some seams		116
		ST-4			95
15			-caliche nodules below 13'		
		ST-5			98
20	T.D				

COHESION, KIP/SQ FT: 1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



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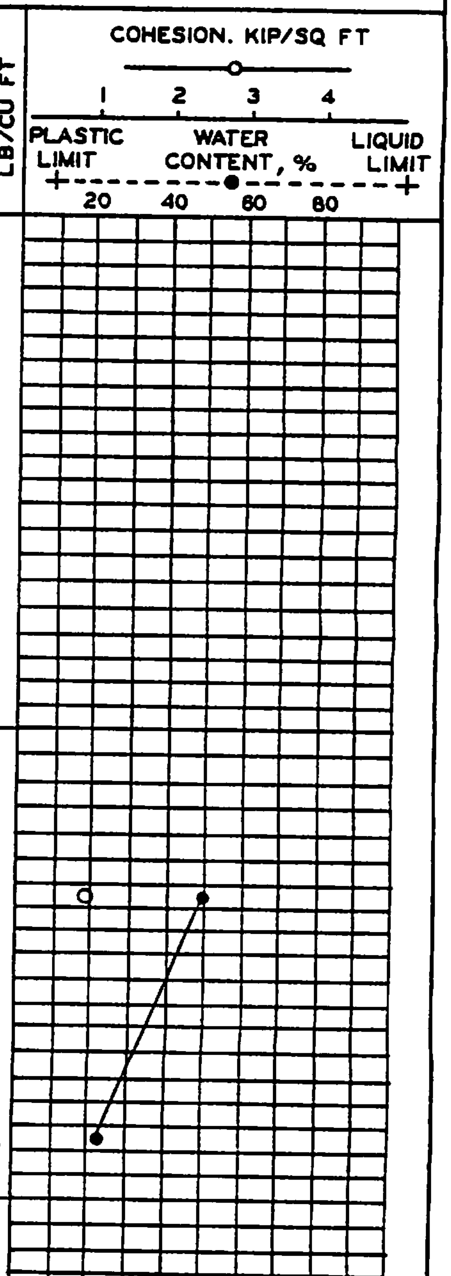
LOG OF BORING NO. RR-21 SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 13180 , E 10375
GROUND ELEVATION: 187 MSL
DEPTH TO WATER IN BORING: N.D.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/13/77 TO
COMPLETION DEPTH: 20 FT.
DATE WATER MEASURED: Not Measured
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown and lt. tan silty sand, loose, poorly graded, fine grained, moist	4/4/6	
5		SS-2	-becomes wet below 6'	3/2/4	
		SS-3	-dark brown below 8'	3/3/5	
10					
		ST-4	Blue gray silty clay, stiff, moist, med. plasticity, with caliche nodules and sand seams		74
15					
		ST-5	-brown fine sand seams below 19'		105
20	T.D				

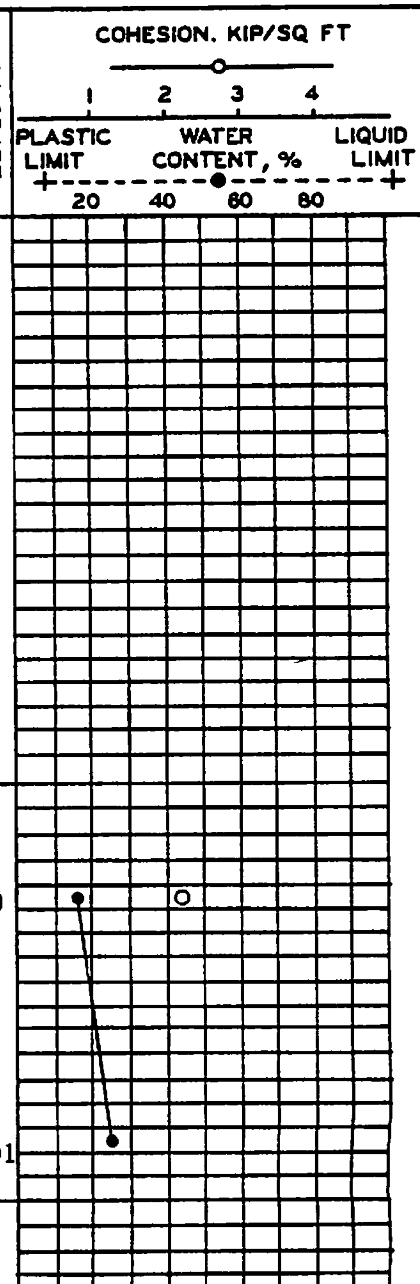


LOG OF BORING NO. RR-22 SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12770, E 10980	DRILLING DATE: 12/14/77 TO
GROUND ELEVATION: 188 MSL	COMPLETION DEPTH: 20 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, very loose, poorly graded, fine grained, moist	3/2/4	
5		SS-2	-becomes wet below 5'	1/2/3	
		SS-3	-dark brown below 8.5'	2/2/2	
10					
		ST-4	Blue gray silty clay, very stiff, moist, medium plasticity, some caliche nodules and sand seams		110
15					
		ST-5			101
20	T.D.				



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LOG OF BORING NO. RR-23 SHEET 1 OF 1

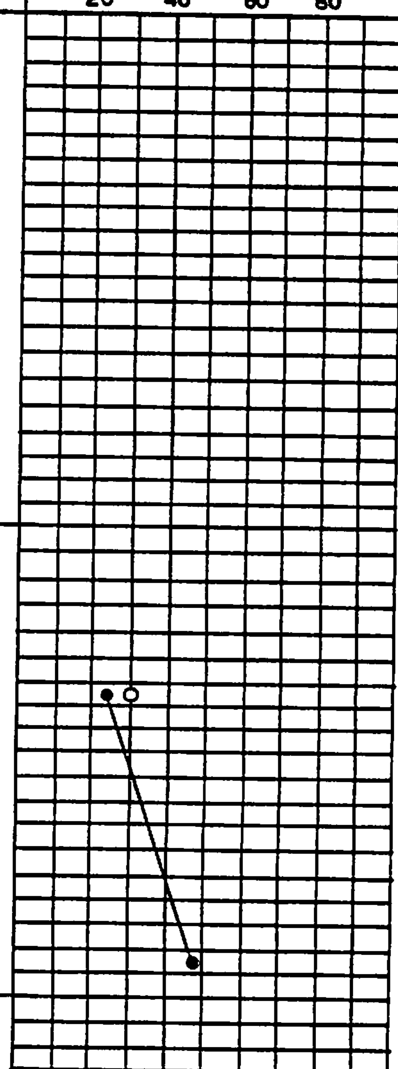
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11620, E 10900
GROUND ELEVATION: 187 MSL
DEPTH TO WATER IN BORING: 5.5 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 11/30/77 TO
COMPLETION DEPTH: 20 FT.
DATE WATER MEASURED: 12/3/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown and gray silty sand, loose, poorly graded, fine grained, damp	2/5/4	
5		SS-2		2/1/3	
10		SS-3	-medium dense and below 8.5'	3/6/11	
		ST-4	Gray and Lt. tan sandy clay, very stiff, moist, medium plasticity, with sand and silty clay seams, some caliche filled joints		97
15					
20		ST-5	-with some interbedded sandy silt below 18'		71
	T.D				

COHESION, KIP/SQ FT
1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT
20 40 60 80



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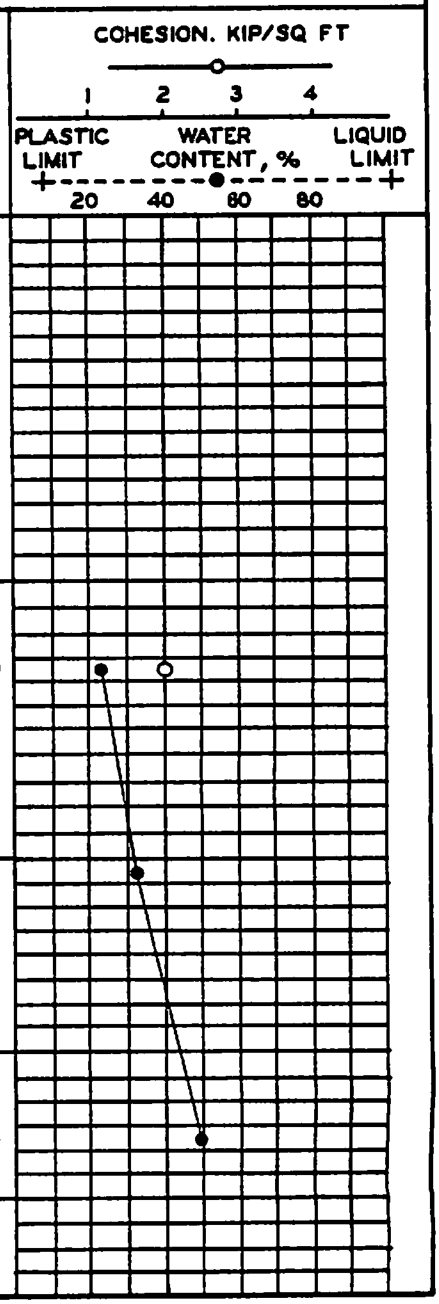
LOG OF BORING NO. RR-24 SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11340, E 10420	DRILLING DATE: 11/30/77 TO
GROUND ELEVATION: 186 MSL	COMPLETION DEPTH: 20 FT.
DEPTH TO WATER IN BORING: 5.5 Ft.	DATE WATER MEASURED: 12/3/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, med. dense, poorly graded, fine grained, damp	4/6/7	
5		SS-2	-very loose and wet below 4.5'	1/1/2	
10		ST-3	Gray clayey sand, med. dense, moist, trace plasticity		106
		ST-4	Lt. brown silty sand, med. dense, poorly graded, fine grained, moist, some clay		
15		SS-5		10/11/17	
		ST-6	Lt. gray green silty clay, stiff, moist, med. plasticity, some caliche		72
20	T.D.				



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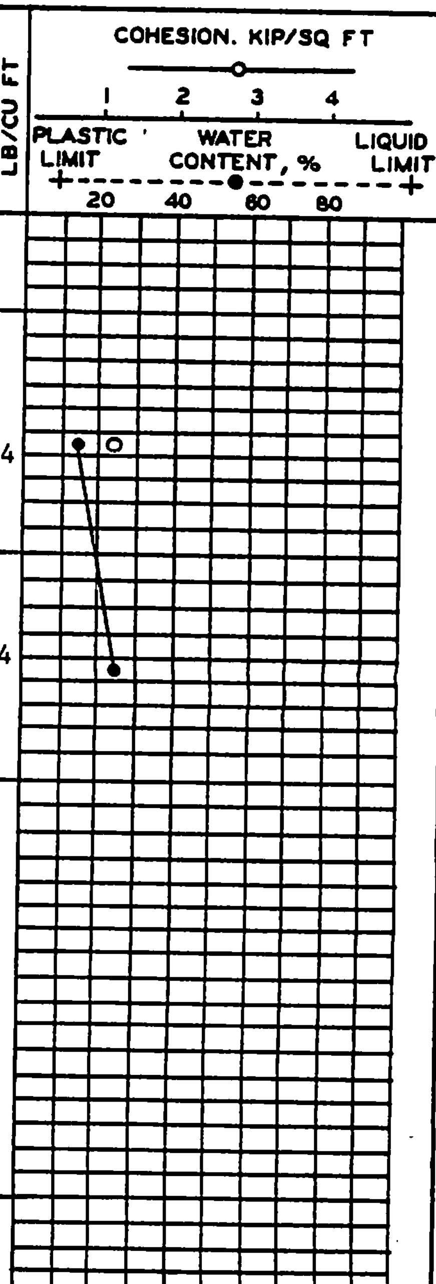
LOG OF BORING NO. RR-25 SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12050, E 9100	DRILLING DATE: 12/13/77 TO
GROUND ELEVATION: 178 MSL	COMPLETION DEPTH: 20 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Brown silty sand, very loose, poorly graded, wet		
		SS-1	Brown and gray sandy clay, stiff, moist, medium plasticity	2/1/2	
5		ST-2	-very stiff and highly oxidized below 4'		114
		ST-3	White clayey silt, very stiff, damp, trace plasticity, with caliche nodules		94
10					
15		ST-4	Badly weathered limestone, hard, well cemented seams interbedded with soft chalky silt		
		ST-5			
20	T.D.				

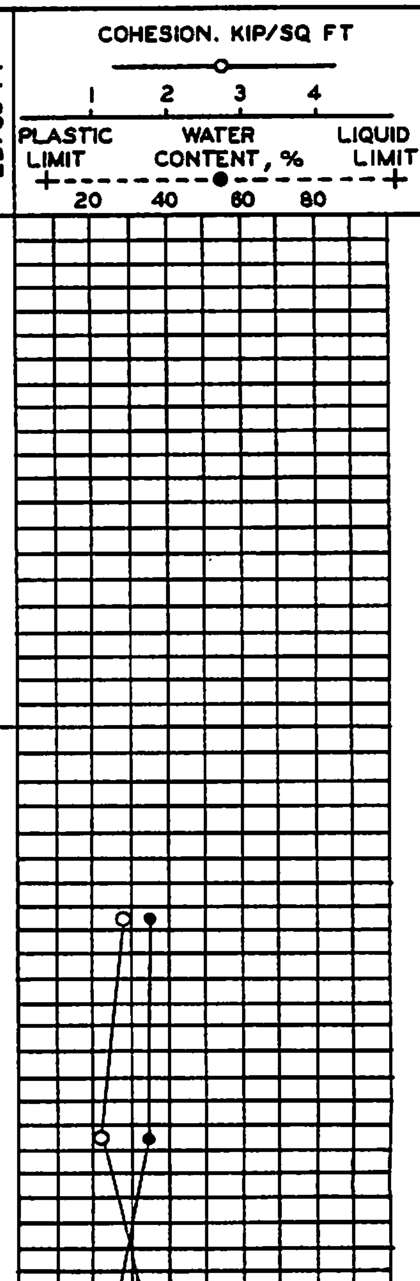


LOG OF BORING NO. TH-26 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12160, E 11040	DRILLING DATE: 11/30/77 TO
GROUND ELEVATION: 189 MSL	COMPLETION DEPTH: 79 FT.
DEPTH TO WATER IN BORING: 6.0 Ft.	DATE WATER MEASURED: 12/1/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

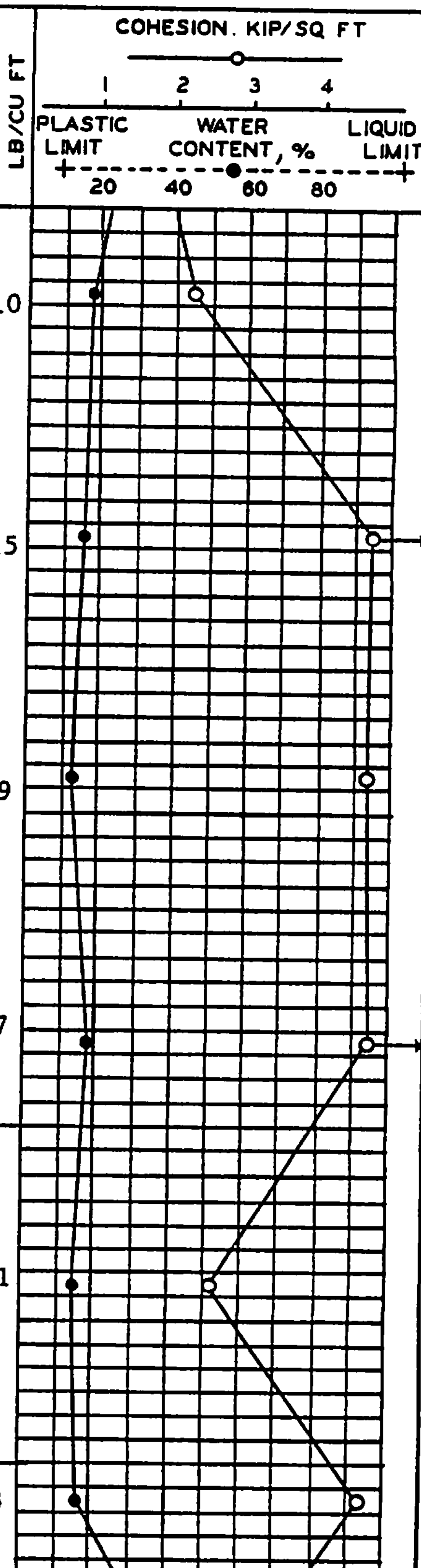
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Lt. tan silty sand, loose, poorly graded, fine grained, moist	4/3/4	
5		SS-2	-very loose and wet 4.5' - 6'	1/1/1	
		SS-3		3/3/7	
10					
		ST-4	White silty clay, very stiff, damp, medium plasticity		89
15			-lt. gray and tan below 15'		
		ST-5			87
20					



LOG OF BORING NO. TH-26 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
25		ST-6	Lt. gray and tan sandy clay, hard, damp, med. plasticity		110
30		ST-7	-with interbedded silty sand seams 28' - 30'		115
		ST-8			119
35			-with higher clay content below 35'		
40		ST-9	-with vertical sand filled joint 38' - 40'		107
45		ST-10	Lt. Gray clayey sand, hard, damp, low plasticity, with thin seams of clue green clay		121
50		ST-11	Lt. gray silty sand, dense, moist, low plasticity, trace of clay		113



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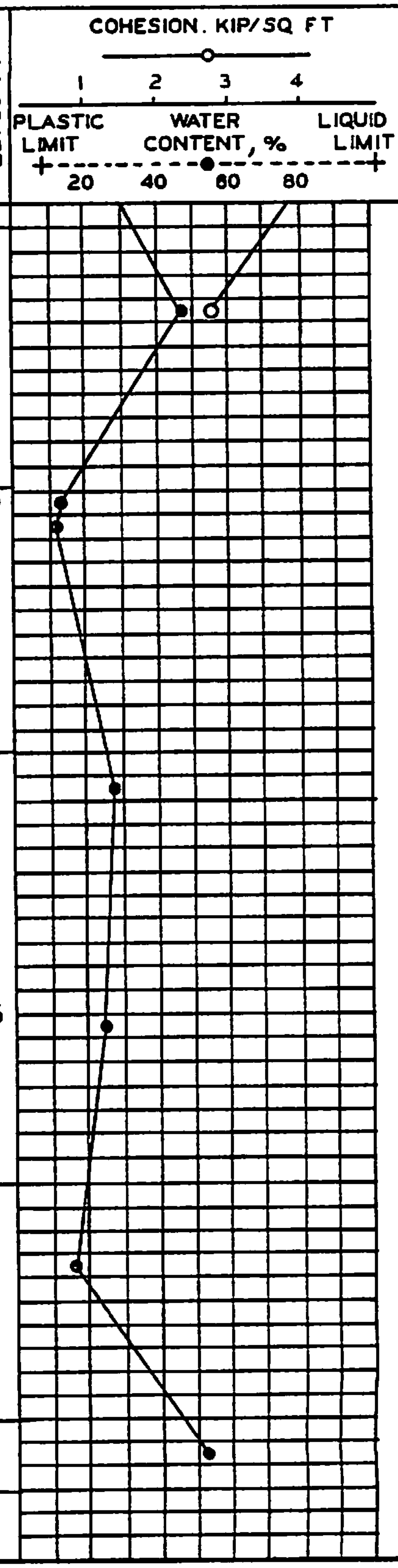
Engineers-Architects-Consultants

LOG OF BORING NO. TH-26 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		ST-12	Blue green silty clay, hard, moist, medium plasticity, some calcareous filled joints		66
60		ST-13 ST-14	Lt. tan silty sand, very dense, poorly graded, fine to med. grained, moist	50 (7)	119
65		SS-15	Gray sandy clay, hard, moist, medium plasticity	14/18/28	
70		ST-16	-with interbedded sand seams		106
75		ST-17	White sand, very dense, poorly graded, fine to medium grained, moist, some cemented seams throughout	28/50 (7)	
		SS-18	Gray clay with cemented seams, hard, moist	50 (2)	
80	TD				

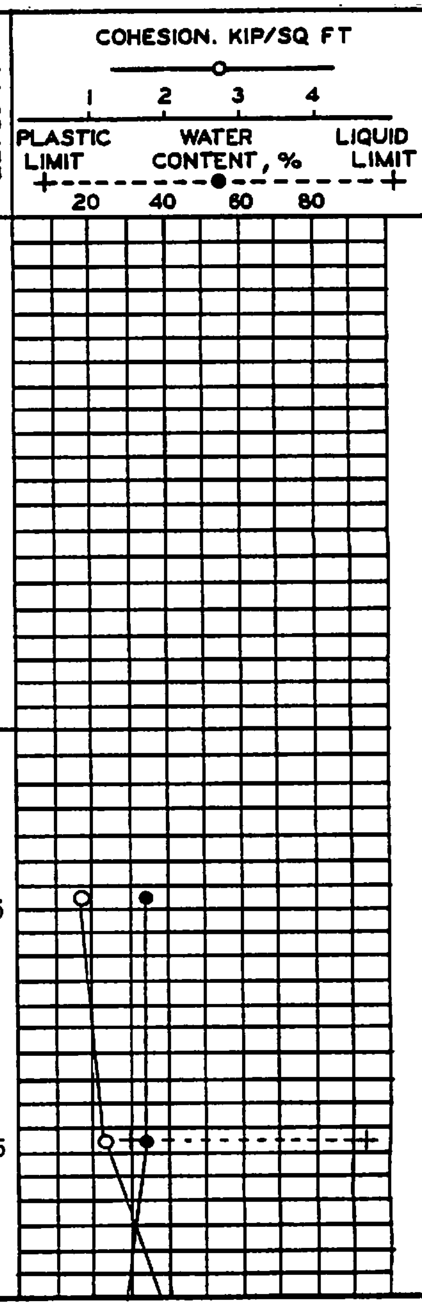


LOG OF BORING NO. TH-27 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12220 , E 11080	DRILLING DATE: 11/30 TO 12/1/77
GROUND ELEVATION: 189 MSL	COMPLETION DEPTH: 79.5 FT.
DEPTH TO WATER IN BORING: 4.5 Ft.	DATE WATER MEASURED: 12/14/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

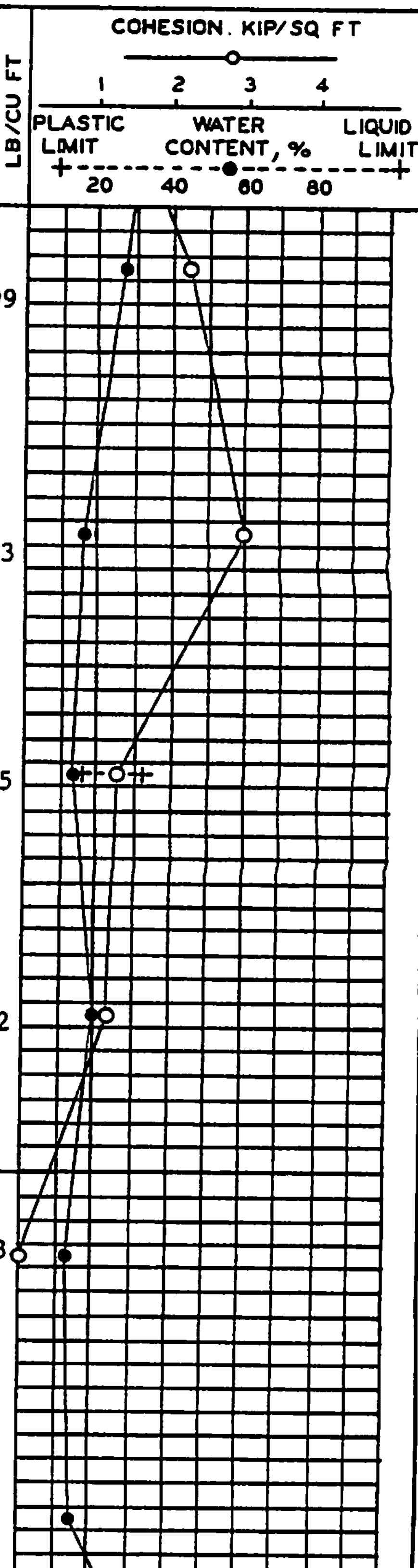
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Brown silty sand, loose, poorly graded, fine grained, damp		
		SS-1		4/5/5	
5		SS-2	-becoming wet below 4.5'	2/2/2	
		SS-3	-medium dense below 8'	4/4/7	
10					
			Lt. blue gray silty clay, very stiff, moist, some interbedded sand		
		ST-4			85
15					
		ST-5	-stiff below 18'		85
20					



LOG OF BORING NO. TH-27 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Lt. gray and tan sandy clay, hard, damp, medium plasticity		
		ST-6			99
25					
		ST-7			113
30					
		ST-8			115
35					
		ST-9	-increasing sand content below 38'		102
40					
		ST-10	Lt. blue green clayey sand, very stiff, moist, trace plasticity		123
45					
		SS-11	-decreasing clay content below 48.5'	24/28/25 (3)	
50					

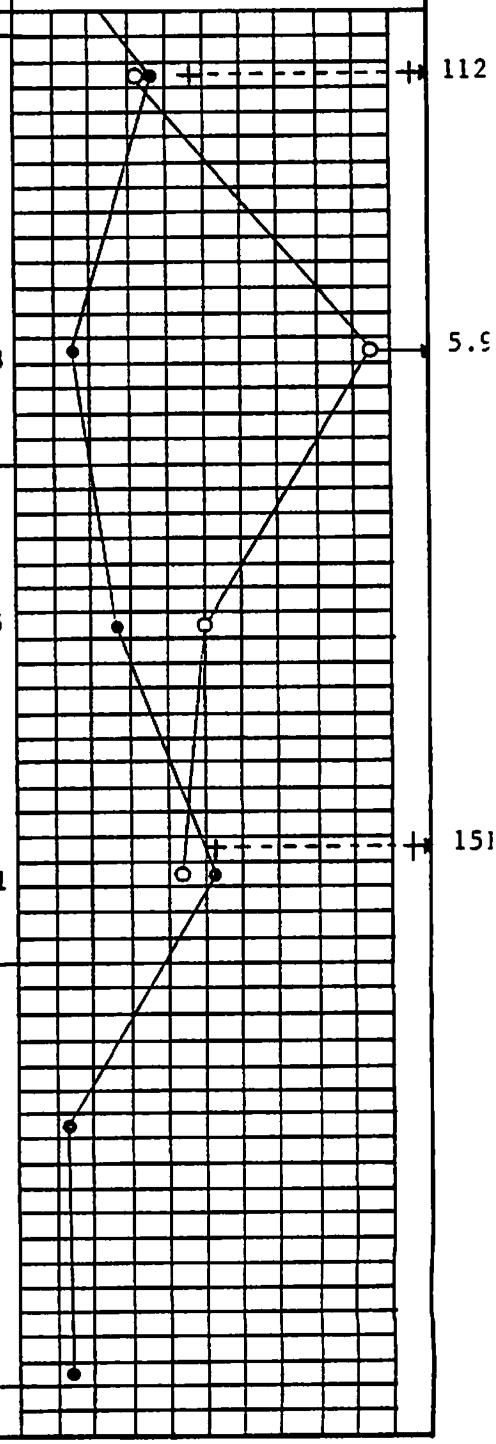


LOG OF BORING NO. TH-27 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		ST-12	Blue green clay, hard, moist, medium plasticity, trace of sand -with calcareous filled joints 53' to 55'		85
60		ST-13			118
65		ST-14	Lt. brown silty clay, very stiff to hard, moist, medium plasticity -calcareous filled joints 63' to 65'		95
70		ST-15			71
75		SS-16	Lt. brown and white sand, very dense, poorly graded, fine to medium grained, damp, some thin cemented seams	35/40 (6)	
		SS-17		30/36(6)	
80	TD				

COHESION. KIP/SQ FT: 1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



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LOG OF BORING NO. TH-28 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

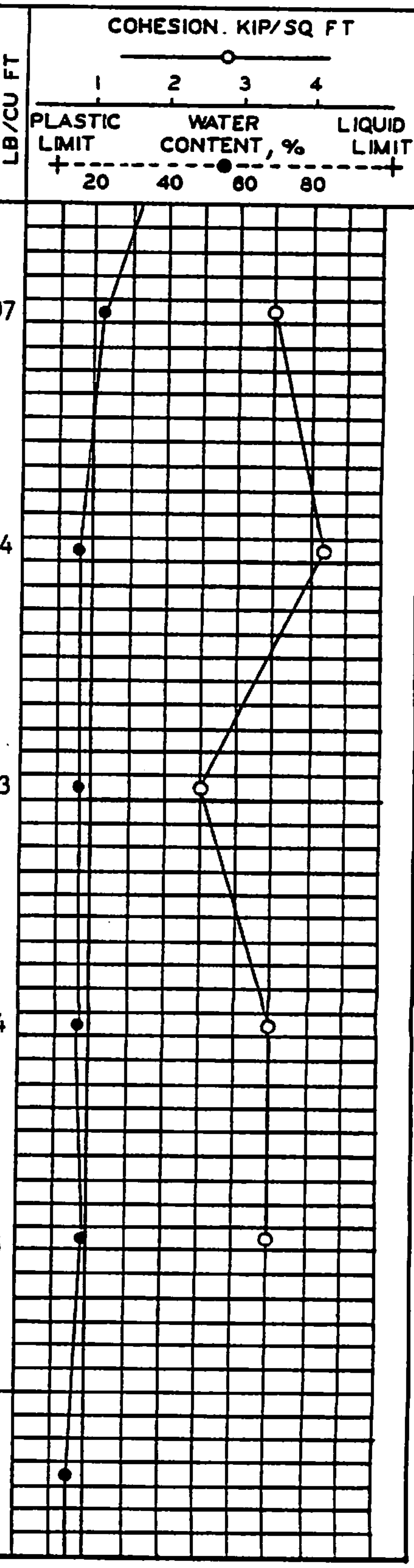
LOCATION: N 12340 , E 11080	DRILLING DATE: 12/1 TO 12/2/77
GROUND ELEVATION: 189 MSL	COMPLETION DEPTH: 80 FT.
DEPTH TO WATER IN BORING: 4.3 Ft.	DATE WATER MEASURED: 12/14/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Brown silty sand, loose, poorly graded, fine to med. grained, moist	3/4/5		
5		SS-2	-very loose and wet below 4.5'	1/2/3		
		SS-3		1/2/2		
10			Lt. Blue sandy clay very stiff, moist, medium plasticity			
		ST-4	-caliche below 14.5'		98	
15			Lt. gray sandy silt, medium stiff, moist chalky, trace plasticity			
		ST-5				
20						

LOG OF BORING NO. TH-28 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

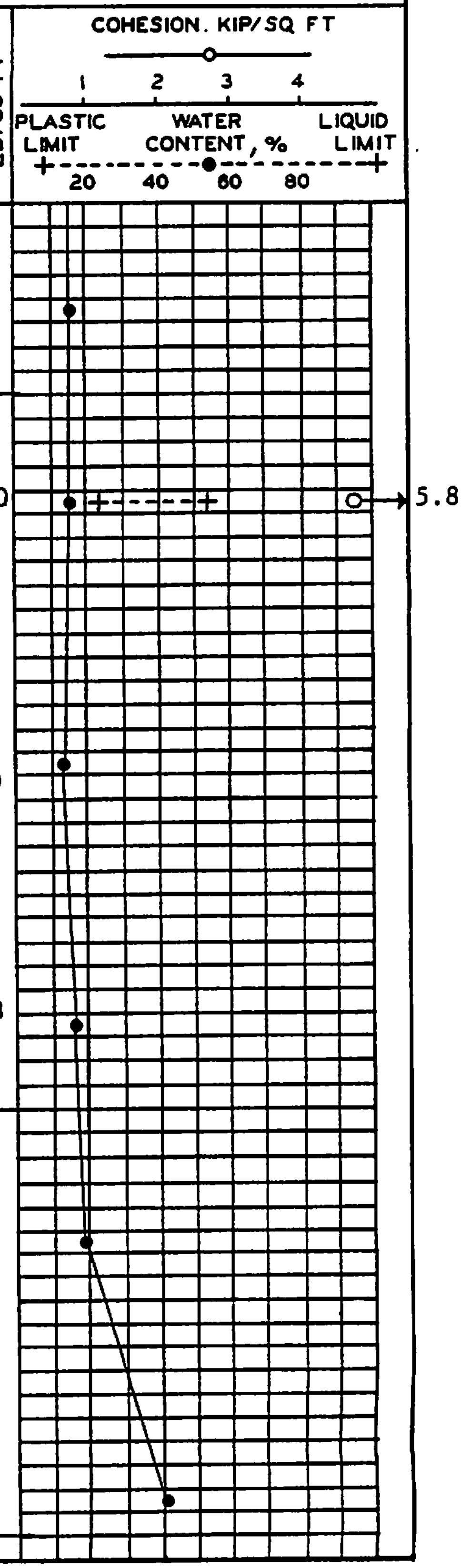
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Lt. gray and tan sandy clay, hard, damp, medium plasticity		
25		ST-6			107
30		ST-7			114
35		ST-8	-with sand filled joints and lower clay content below 33'		113
40		ST-9			114
45		ST-10	-blue green below 43'		115
			Lt. blue green clayey sand, very dense, moist, trace plasticity		
50		SS-11		23/26/40	



LOG OF BORING NO. TH-28 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		SS-12		28/25/34	
		ST-13	Blue green sandy clay, hard, damp, trace plasticity, some calcareous filled joints		120
60					
65		ST-14	-with interbedded sand seams 63' to 65'		119
70		ST-15	-Lt. tan below 68'		108
		SS-16	Lt. tan sand, very dense, poorly graded, fine to medium grained moist	50 (6)	
75					
80	TD	SS-17		44/22/30	



LOG OF BORING NO. TH-29 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12280, E 11065	DRILLING DATE: 12/2/77 TO
GROUND ELEVATION: 189 MSL	COMPLETION DEPTH: 80 FT.
DEPTH TO WATER IN BORING: 4.3 Ft.	DATE WATER MEASURED: 12/14/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
			Brown silty sand, loose, poorly graded, fine to med. grained, moist			
		SS-1		4/4/5		
5		SS-2	-wet below 4.5'	2/2/2		
		SS-3		3/2/6		
10			Lt. blue gray silty clay, stiff, moist, medium plasticity			
		ST-4			92	
15			-with sand seams 16' to 17'			
		ST-5	-very stiff with caliche nodules below 18'		102	
20						

LOG OF BORING NO. TH-29 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
	ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		112
25				
	ST-7			
30		-with sand seams 32' to 35'		
	ST-8	-decreasing clay content below 33'		
35				
	ST-9	Lt. tan clayey sand, hard, damp, trace plasticity, some calcareous filled joints		
40				
	ST-10	-lt. blue green below 43'		
45				
	SS-11	Lt. blue green silty sand, very dense, poorly graded, fine grained, moist	25/21/30	
50				

COHESION, KIP/SQ FT: 1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80

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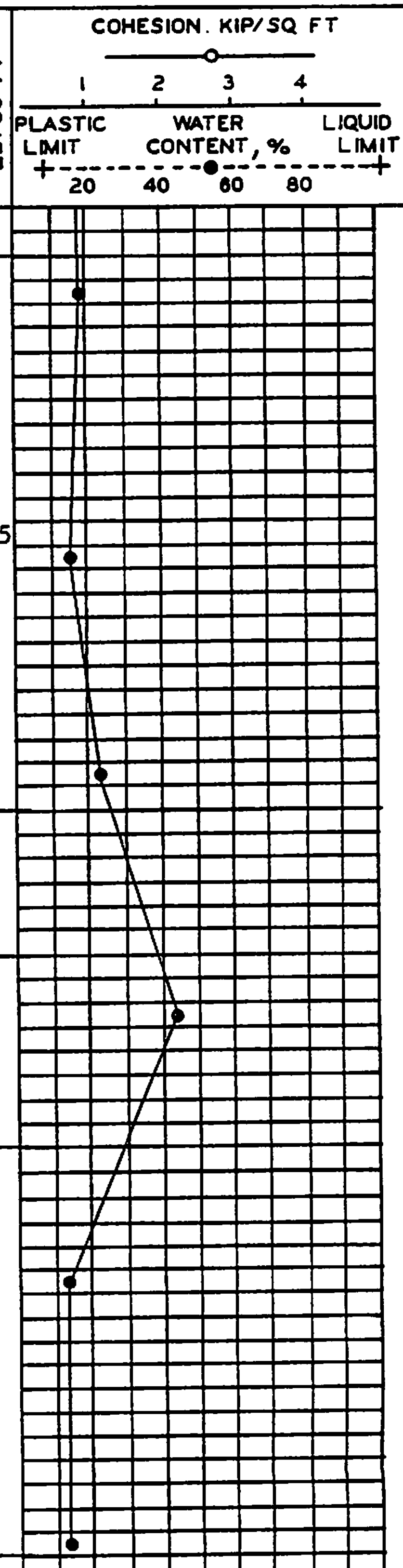
LOG OF BORING NO. TH-29 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		SS-12	Lt. blue green sandy clay, hard, moist, medium plasticity	19/26/30	
		ST-13	-increasing clay content below 58'		115
60					
		ST-14			98
65			Lt. tan silty sand, dense, moist, fine to medium grained		
		ST-15	Lt. brown silty clay, hard, moist, medium plasticity		78
70					
		SS-16	White sand, very dense, poorly graded, fine grained, damp	23/34/50 (4)	
75					
80	TD	SS-17		50 (7)	



LOG OF BORING NO. SH-30 SHEET 1 OF 2

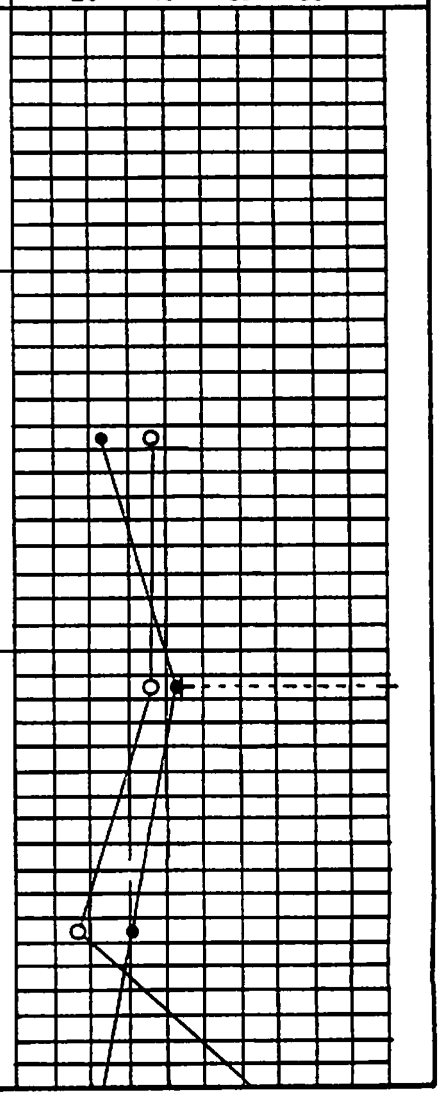
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12000, E 10700
GROUND ELEVATION: 187 MSL
DEPTH TO WATER IN BORING: N.D.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/2/77 TO
COMPLETION DEPTH: 50 FT.
DATE WATER MEASURED: Not Measured
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
	SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	3/4/6	
5	SS-2		5/5/6	
		Lt. blue sandy clay very stiff, moist, medium plasticity		
	ST-3			104
10		-with caliche nodules below 8'		
	ST-4	Lt. gray and tan sandy clay, hard, damp, medium plasticity		78
15				
	ST-5	-with blue clay filled joints 18' to 20'		93
20				

COHESION, KIP/SQ FT: 1, 2, 3, 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80



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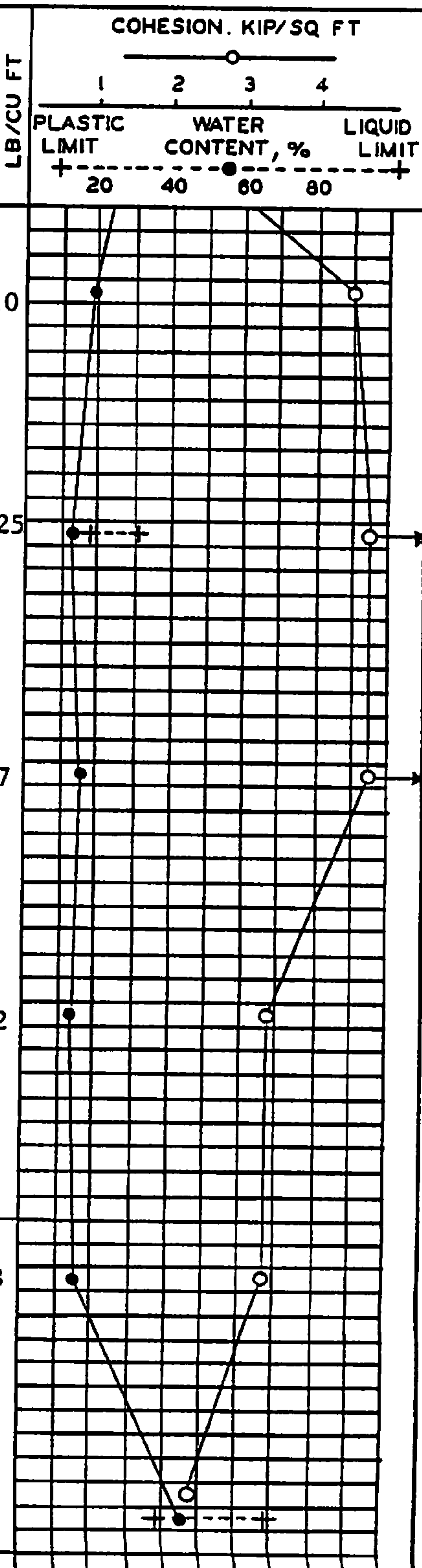
LOG OF BORING NO. SH-30 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6			110
25					
		ST-7			125
30					
		ST-8			117
35					
		ST-9	-with increasing sand content below 38'		122
40					
		ST-10	Blue green silty clay, hard, damp, medium plasticity, some sand		118
45					
			-with calcareous filled joints 43' to 45'		
		ST-11			77
50	TD				



LOG OF BORING NO. CS-31 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12220, E 10470	DRILLING DATE: 12/7/77 TO
GROUND ELEVATION: 187 MSL	COMPLETION DEPTH: 59.5 FT.
DEPTH TO WATER IN BORING: 65. Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1 2 3 4); PLASTIC LIMIT / WATER CONTENT, % / LIQUID LIMIT (20 40 60 80)
		SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	2/4/6		
5		SS-2		2/2/7		
		SS-3	Gray clayey sand, medium dense, trace plasticity, fine to medium grained, damp	4/6/10		
10						
		ST-4	Lt. blue gray silty clay, very stiff, moist, medium plasticity, trace of caliche		110	
15						
		ST-5	-becoming sandier and tan below 18'		78	
20						

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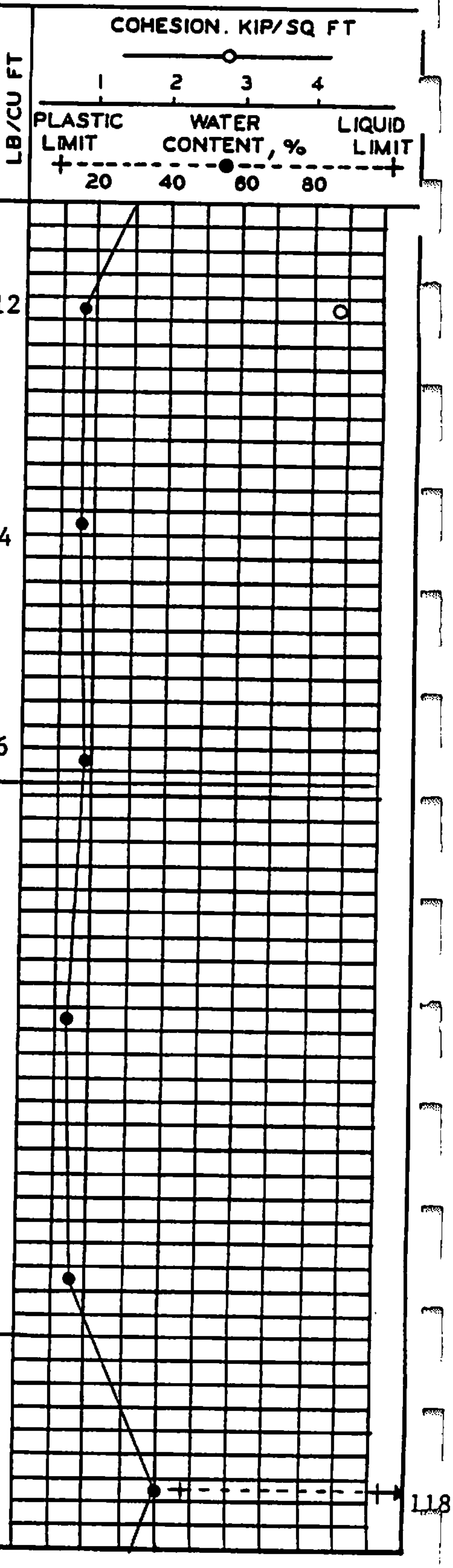
LOG OF BORING NO. CS-31 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
25		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity -with sand seams and sand filled joints 23' to 25'		112
30		ST-7			114
35		ST-8	-with calcareous filled seams 33' to 33.5'		116
40		SS-9	Brown silty sand, very dense, poorly graded, fine to medium grained, damp, some thin cemented seams throughout	18/20/30 (5)	
45		SS-10	-increasing clay content and blue gray below 43'	14/16/32	
50		ST-11	Blue green silty clay, hard, damp, medium plasticity, friable		82



LOG OF BORING NO. CS-31 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		ST-12	-calcareous filled joints 48' to 50' -increasing sand content below 53'		104
		SS-13	Lt. green silty sand, very dense, poorly graded, damp, some thin cemented seams	24/26 (4)	
60	TD				

COHESION, KIP/SQ FT: 1, 2, 3, 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80

LOG OF BORING NO. CS-32 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12000 , E 10500	DRILLING DATE: 12/7/77 TO
GROUND ELEVATION: 187 MSL	COMPLETION DEPTH: 60 FT.
DEPTH TO WATER IN BORING: 6.5 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

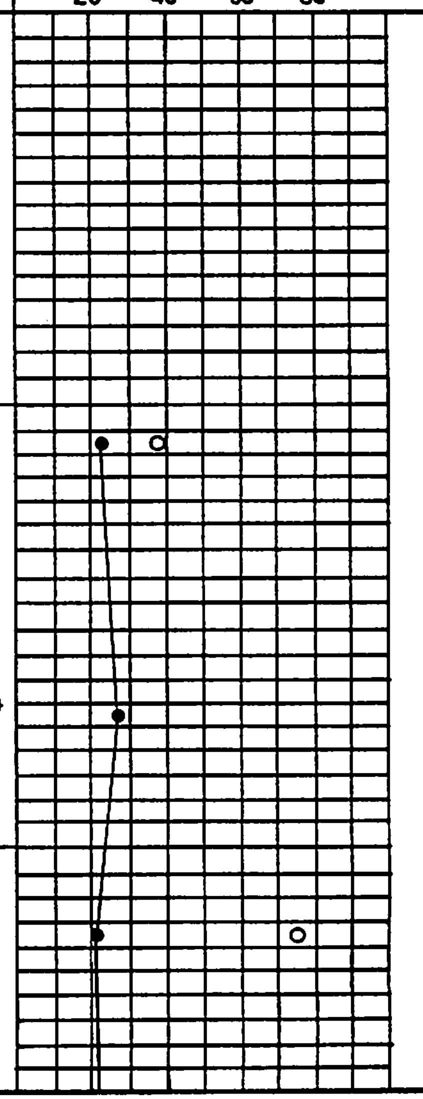
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Gray silty sand, loose, poorly graded, fine grained, moist	3/3/4	
5		SS-2	-with clay seams and organic fragments below 4.5'	1/1/4	
		ST-3	Lt. blue gray silty clay, very stiff, moist, medium plasticity, some caliche nodules and sand seams		103
10					
		ST-4			94
15					
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		108
20					

COHESION, KIP/SQ FT

1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT

20 40 60 80



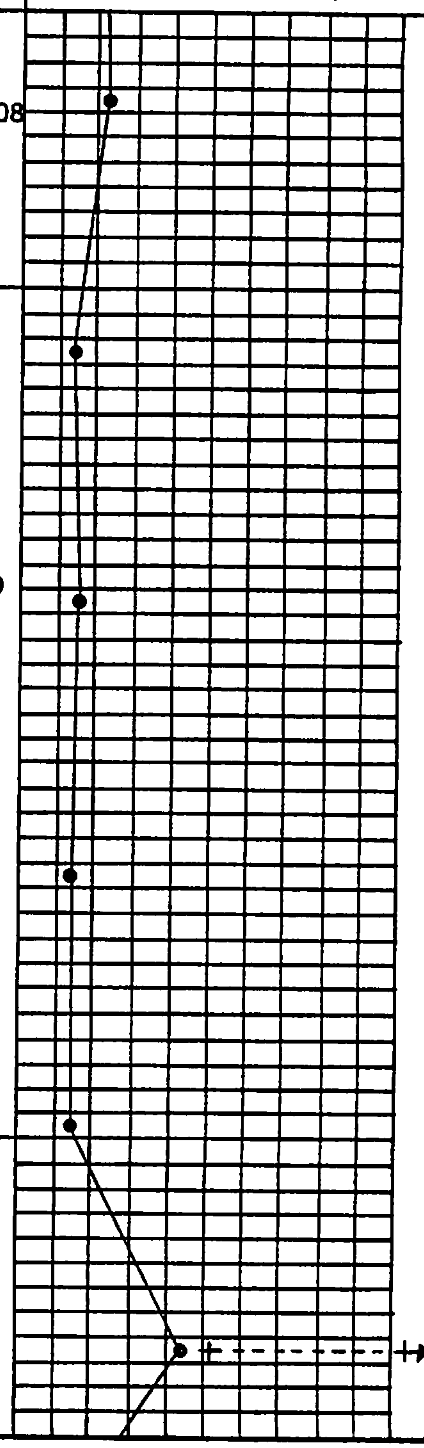
LOG OF BORING NO. CS-32 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	-with sand seams below 23'		108
25					
		ST-7	Lt. gray silty sand, some clay, very dense, poorly graded, fine grained, damp, slightly cemented		
30					
		ST-8			119
35					
		SS-9	-increasing clay content below 38'	16/26/28	
40					
		SS-10		12/16/23	
45			Blue green silty clay, hard, damp, high plasticity, friable, brittle, some cemented seams		
		SS-11		20/21/25	
50					

COHESION, KIP/SQ FT: 1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



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LOG OF BORING NO. CS-32 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

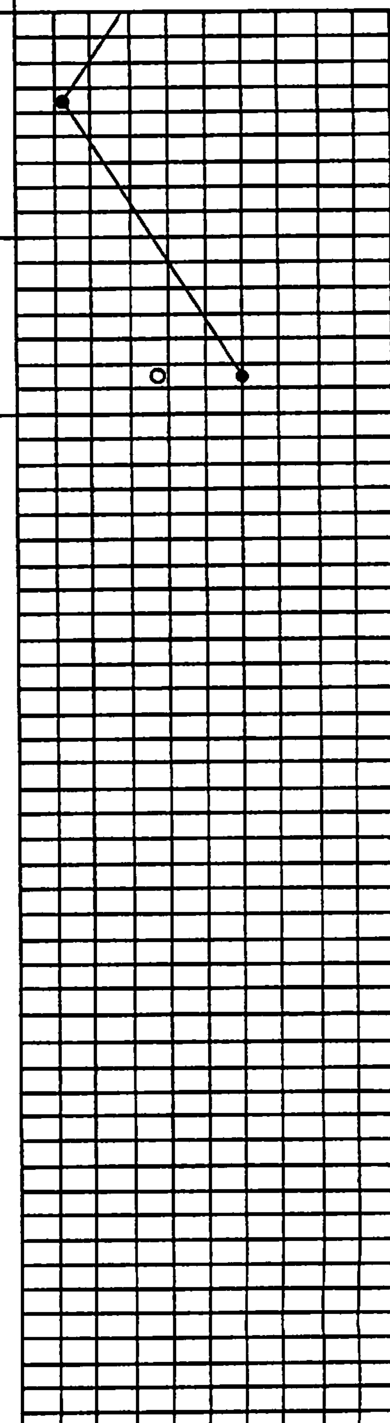
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		SS-12	Lt. green silty sand, very dense, poorly graded, fine to medium grained, damp	50 (6)	
60		ST-13	Gray silty clay, very stiff, damp, high plasticity, some sand seams		65
	TD				

COHESION. KIP/SQ FT

1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT

20 40 60 80

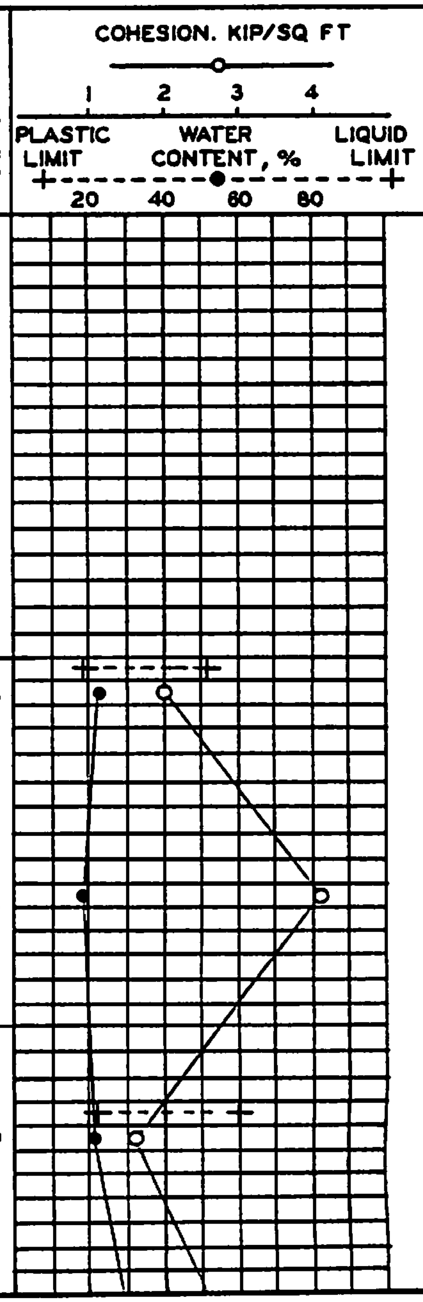


LOG OF BORING NO. CS-33 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11800, E 10500	DRILLING DATE: 12/7/77 TO
GROUND ELEVATION: 187 MSL	COMPLETION DEPTH: 59 FT.
DEPTH TO WATER IN BORING: 6.5 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

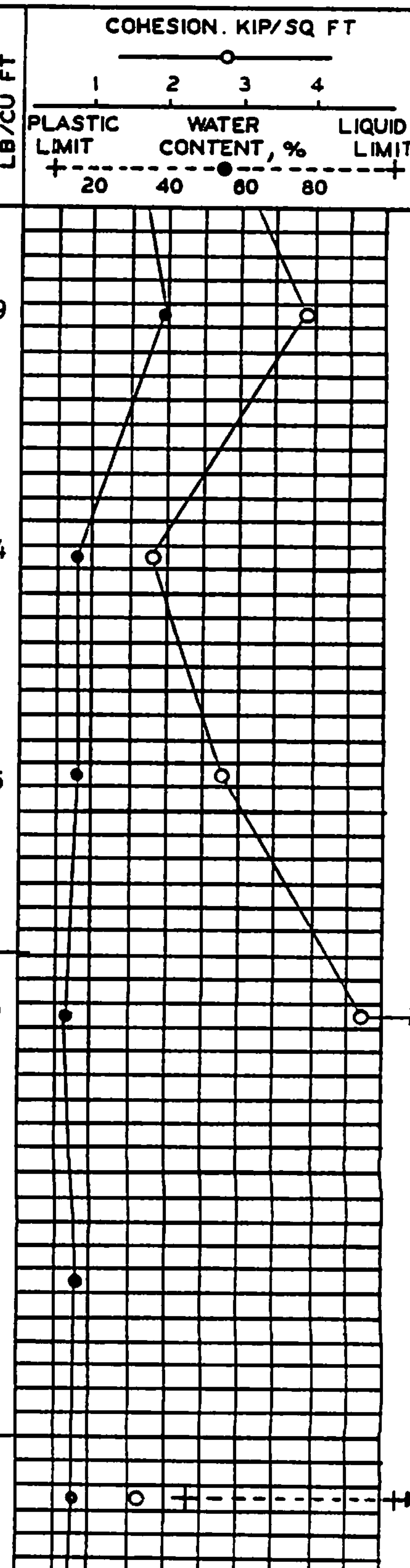
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Brown and gray silty sand, loose, poorly graded, fine grained wet		
		SS-1		3/4/5	
5		SS-2	-very loose below 4.5'	1/1/3	
		ST-3			
10			Gray green sandy clay, very stiff, damp medium plasticity, with sand seams and caliche nodules		106
		ST-4			111
15					
			Lt. gray and tan sandy clay, hard, damp, medium plasticity		
		ST-5			106
20					



LOG OF BORING NO. CS-33 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6			99
35					
		ST-7	-increasing sand content below 28'		114
40					
		ST-8			115
45					
		ST-9	Lt. gray clayey sand, dense, damp, trace plasticity		125
50					
		SS-10		16/13/16	
		ST-11	Lt. green silty clay, hard, damp, high plasticity		93



LOG OF BORING NO. CS-33 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1 2 3 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20 40 60 80)
			Lt. green silty sand, very dense, poorly graded, fine to medium grained, moist			
55		SS-12		20/35 (6)		
		SS-13	-with cemented seams below 58.5'	50 (5)		
60	TD					

LOG OF BORING NO. CS-34

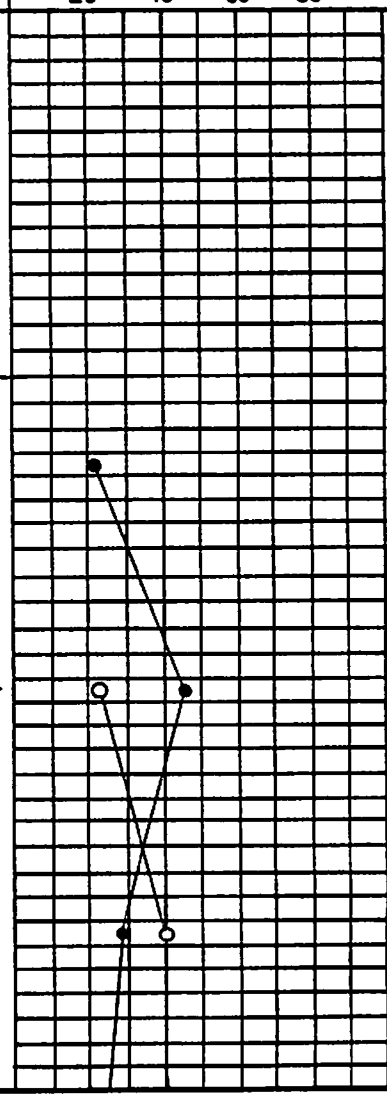
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11600, E 10500	DRILLING DATE: 12/8/77 TO
GROUND ELEVATION: 187 MSL	COMPLETION DEPTH: 60 FT.
DEPTH TO WATER IN BORING: 5.5 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, very loose, poorly graded, fine grained, wet	1/1/0	
5		SS-2	-loose with organic fragments below 4.5'	4/5/5	
		SS-3	Lt. blue gray sandy clay, stiff damp, medium plasticity, some caliche nodules and organic fragments	5/5/8	
10					
		ST-4	-with thin sand seams 13' to 15'		74
15					
		ST-5	-with trace of gravel 18' to 20'		99
20					

COHESION, KIP/SQ FT: 1, 2, 3, 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80

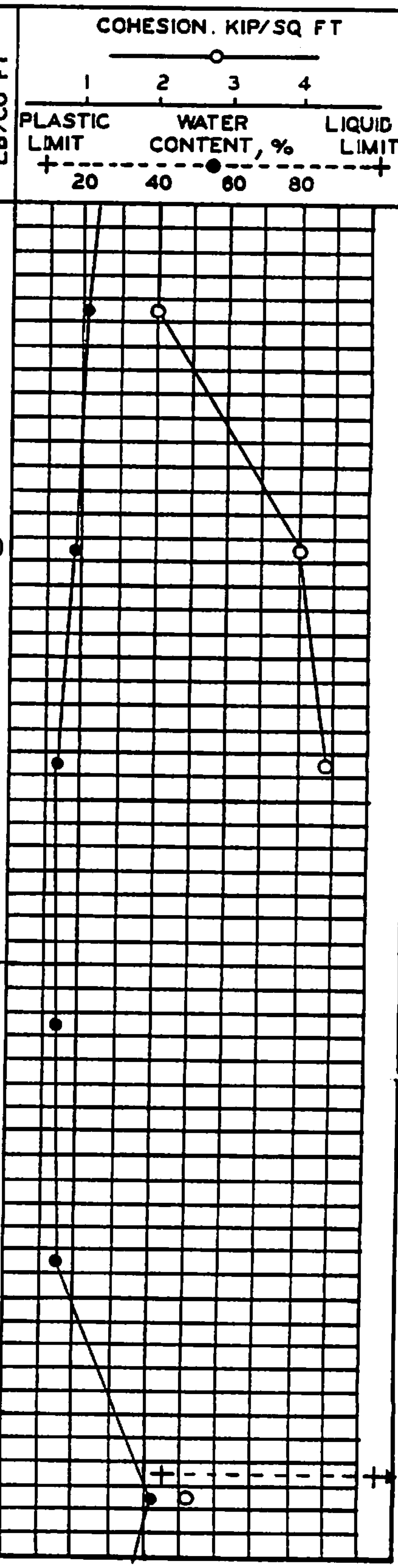


Barns & McDonnell
Engineers-Architects-Consultants

LOG OF BORING NO. CS-34 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		107
25					
		ST-7	-with sand seams 28' to 30'		110
30					
		ST-8	-increasing sand content below 33'		120
35					
		SS-9	Gray green clayey sand, very dense, damp, with clay seams and sandstone seams	15/20/28	
40					
		SS-10	-increasing clay content below 43'	11/16/25	
45					
50		ST-11	Blue green silty clay, hard, damp, medium plasticity, trace of sand		81



LOG OF BORING NO. CS-34 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

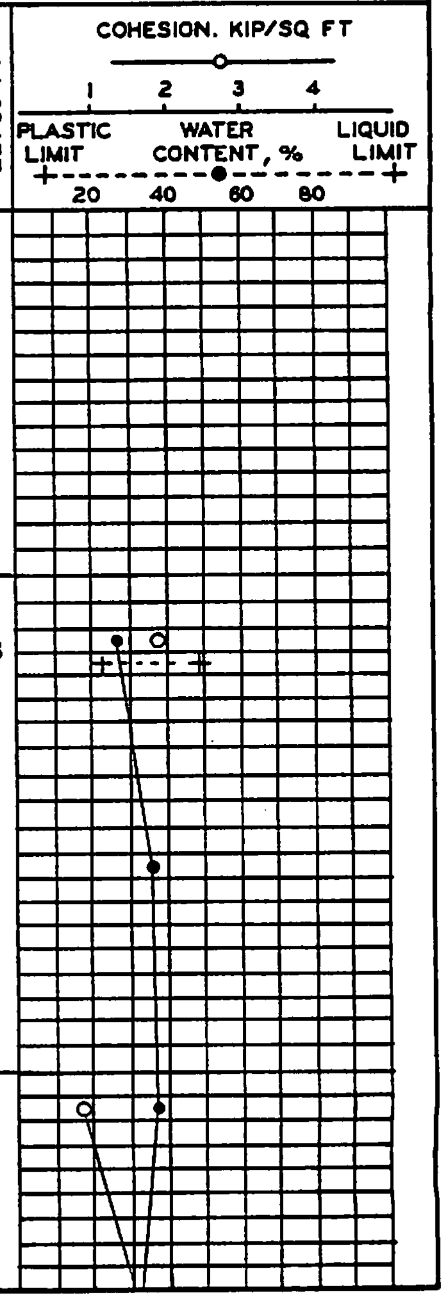
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
55		SS-12	Lt. green silty clay, hard, damp, high plasticity, some seams of sand and sandstone	17/33 (6)		
60		SS-13		27/25 (6)		
	TD					

LOG OF BORING NO. CH-35

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11200, E 10500	DRILLING DATE: 12/1/77 TO
GROUND ELEVATION: 186 MSL	COMPLETION DEPTH: 60 FT.
DEPTH TO WATER IN BORING: 4.8 Ft.	DATE WATER MEASURED: 12/3/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, medium dense, poorly graded, fine grained, moist	10/8/8	
5		SS-2		5/11/18	
		ST-3	Lt. blue gray sandy clay, very stiff, moist, medium plasticity, some silt and caliche nodules		103
10					
		ST-4	-thin sand seams below 13.5'		
15					
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		83
20					



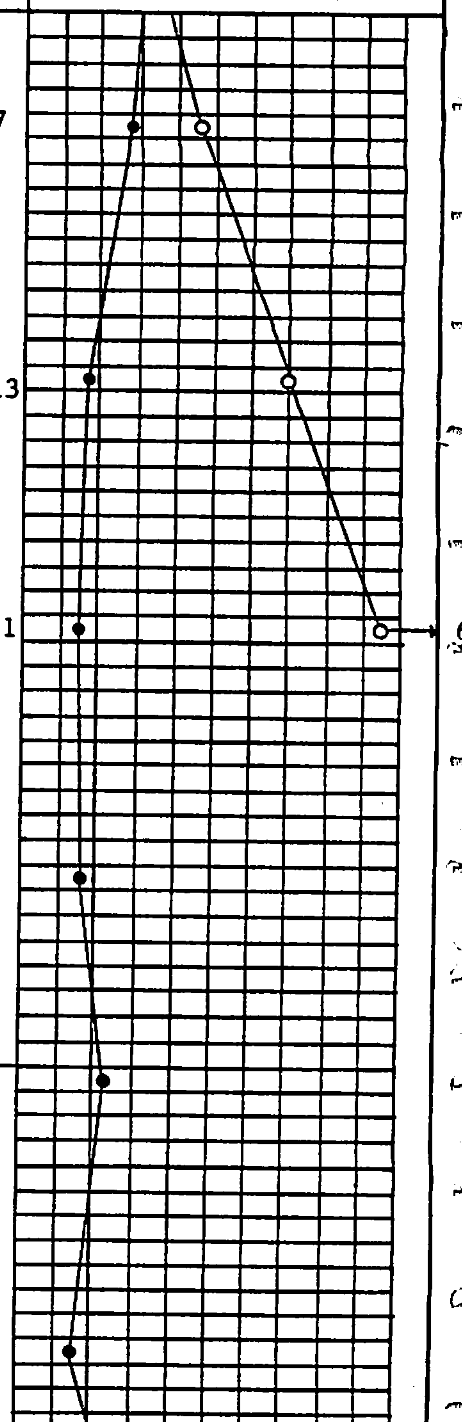
LOG OF BORING NO. CH-35 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6			97
25					
		ST-7	-increasing sand content below 28'		113
30					
		ST-8			121
35					
		SS-9		16/26/24	
40					
		ST-10	Gray clayey sand, very dense, fine to medium grained, moist, with silty sand seams		103
		SS-11		26/35 (3)	
45			-clay seam 44' to 44.5'		
		SS-12	-cemented seams below 48'	60 (5)	
50					

COHESION, KIP/SQ FT: 1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



LOG OF BORING NO. CH-35 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
55						
		SS-13		24/27(6)		
60	TD					

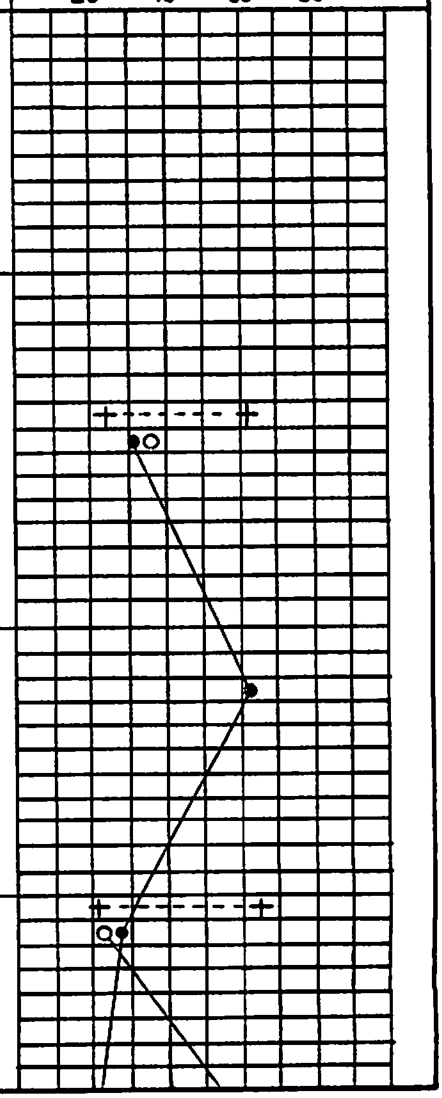
LOG OF BORING NO. CC-36 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11000, E 10500	DRILLING DATE: 12/12/77 TO
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 60 FT.
DEPTH TO WATER IN BORING: 2.2 Ft.	DATE WATER MEASURED: 12/13/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Lt. brown silty sand, loose, poorly graded, fine grained, moist	2/2/3	
5		SS-2		5/5/6	
		ST-3	Lt. blue gray silty clay, some sand, very stiff, moist, medium plasticity, with caliche nodules and sand seams		96
10					
		ST-4	White clayey silt, medium stiff, moist, friable, low plasticity		57
15					
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		95
20					

COHESION, KIP/SQ FT: 1, 2, 3, 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80



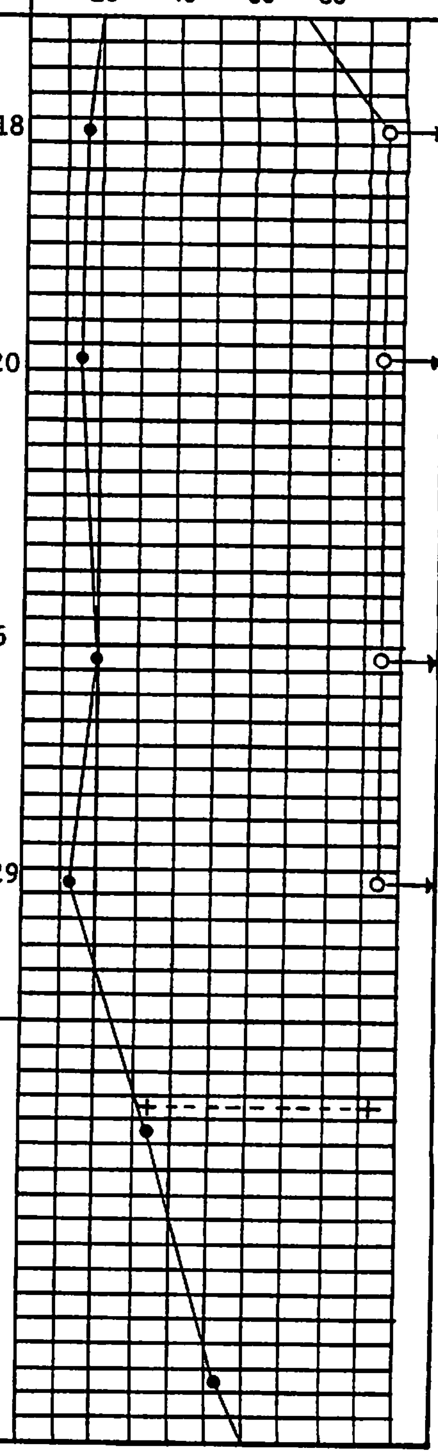
LOG OF BORING NO. CC-36 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	-with sand seams 23' to 25'		118
25					
		ST-7			120
30					
		ST-8			116
35					
		ST-9	-increasing sand content below 38'		129
40					
		SS-10	Lt. green silty clay with interbedded silty sand and cemented seams, very dense, damp	50 (8)	
45					
		SS-11		19/18/25	
50					

COHESION, KIP/SQ FT: 1 2 3 4

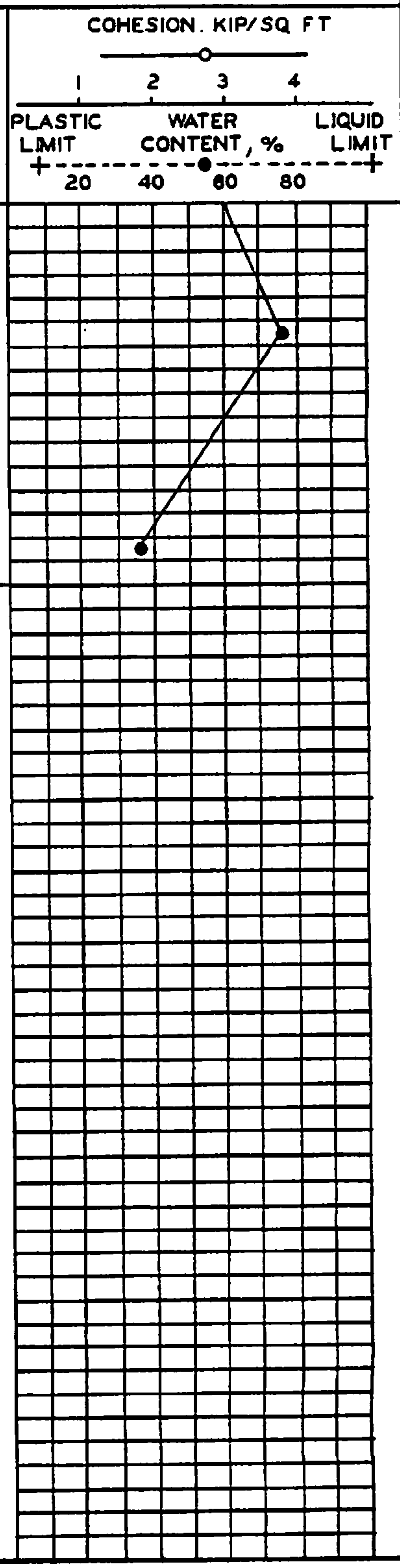
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



LOG OF BORING NO. CC-36 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT / PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT
		SS-12		13/28/22 (4)		
55						
		SS-13		30/17/33		
60	TD					



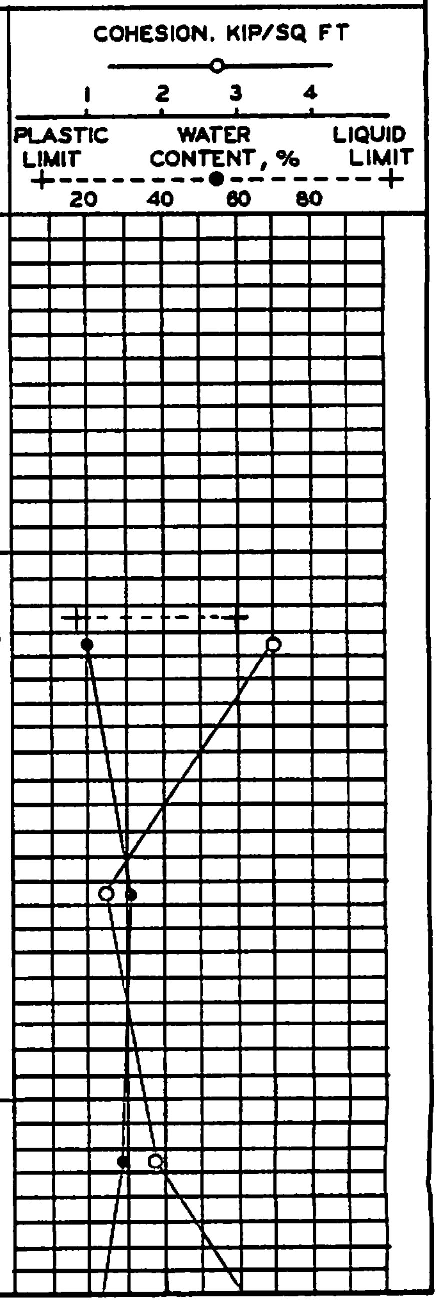
LOG OF BORING NO. CC-37 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10800, E 10500
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: 2.4 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/12/77 TO
COMPLETION DEPTH: 60 FT.
DATE WATER MEASURED: 12/13/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

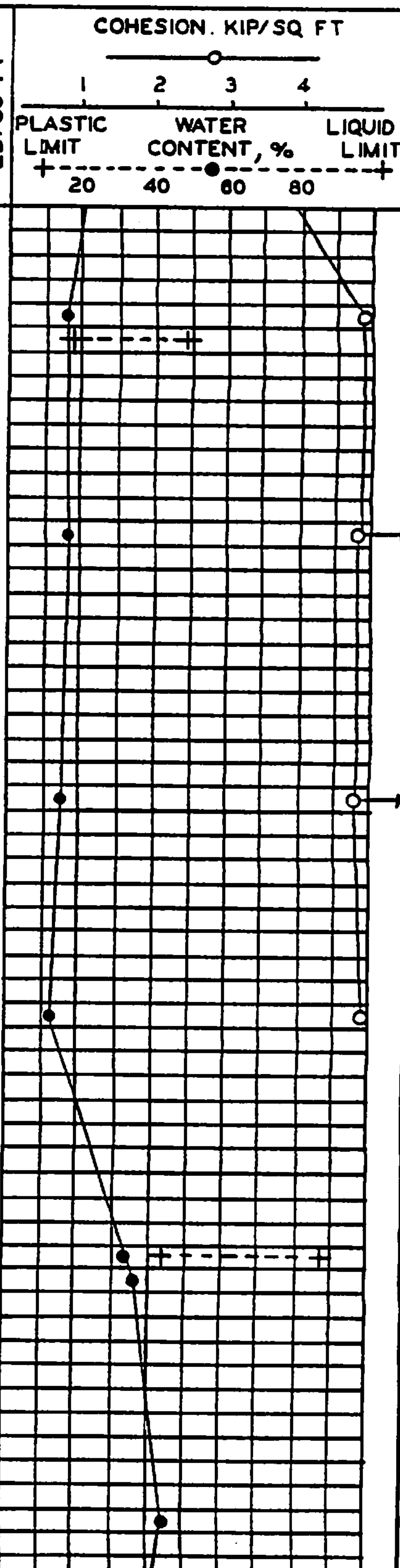
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Lt. Brown silty sand, medium dense, poorly graded, fine grained, damp	6/5/8	
5		SS-2	-loose with organic fragments below 4.5'	1/2/3	
		ST-3	Lt. Blue gray silty clay, very stiff, moist, medium plasticity, some thin sand seams		109
10					
		ST-4	-with caliche nodules below 13'		93
15					
		ST-5	Lt. gray and tan sandy clay, very stiff, damp, medium plasticity		86
20					



LOG OF BORING NO. CC-37 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		-hard below 23'		
25	ST-6			117
30	ST-7			118
35	ST-8	-with calcareous filled joints 33' to 35'		125
40	ST-9	-increasing sand content below 38'		129
	ST-10			
45	SS-11	Lt. green silty clay, hard, damp, high plasticity, partly cemented	50 (5)	
50	SS-12		17/24/26 (2)	



LOG OF BORING NO. CC -37 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

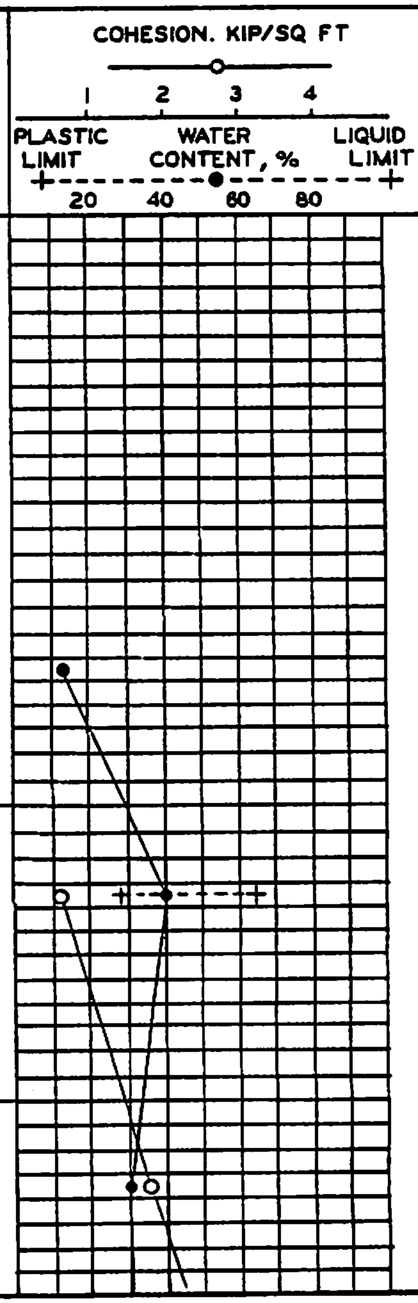
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		SS-13	-sand seams Below 54'	26/50 (7)		
55			Lt. green silty sand, very dense, poorly graded, fine grained, moist, some clay and cemented seams			
		SS-14		19/21/33		
60						

LOG OF BORING NO. CC-38 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10600, E 10500	DRILLING DATE: 12/10/77 TO
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 59.5 FT.
DEPTH TO WATER IN BORING: 1.9 Ft.	DATE WATER MEASURED: 12/12/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING -	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

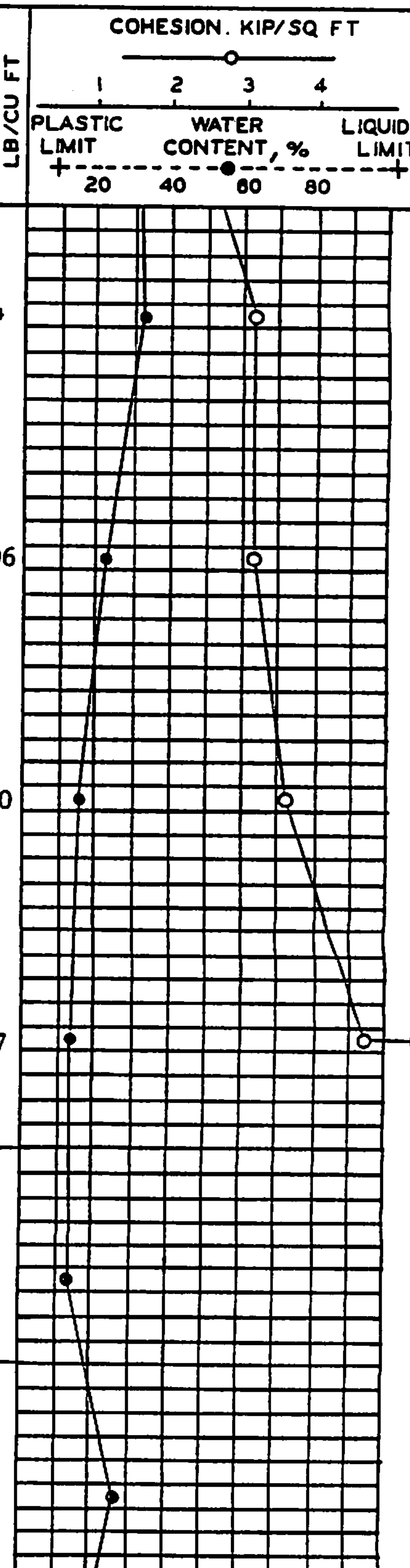
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Lt. gray clayey sand, very loose, moist, low plasticity, fine grained	1/2/1	
5		SS-2	-medium dense below 4.5'	7/7/13	
		ST-3			119
10					
		ST-4	Lt. blue gray silty clay, stiff, moist, medium plasticity, some caliche nodules and sand lenses		85
15					
		ST-5	Lt. gray and tan sandy clay, very stiff, damp, medium plasticity		91
20					



LOG OF BORING NO. CC-38 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT / PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT
		ST-6	-hard below 23'		94	
25						
		ST-7	-with sand filled joints 28' to 30'		106	
30						
		ST-8			120	
35						
		ST-9	-with calcareous filled joints 38' to 40'		127	
40						
		SS-10	Lt. gray and tan clayey sand, very dense, damp, low plasticity	21/26/24		
45						
		SS-11	Gray silty clay, hard, damp, medium plasticity, with thin cemented seams	50 (2)		
50						



Burns & McDonnell
Engineers-Architects-Consultants

LOG OF BORING NO. CC-38 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		SS-12	Gray green clayey sand, very dense, damp trace plasticity, some thin cemented seams	32/50 (7)		
55						
		SS-13	-with alternating silty clay and silty sand seams below 58.5'	33/50 (6)		
60	TD					

Burns & McDonnell
Engineers-Architects-Consultants

LOG OF BORING NO. CC-39   SHEET 1 OF 3

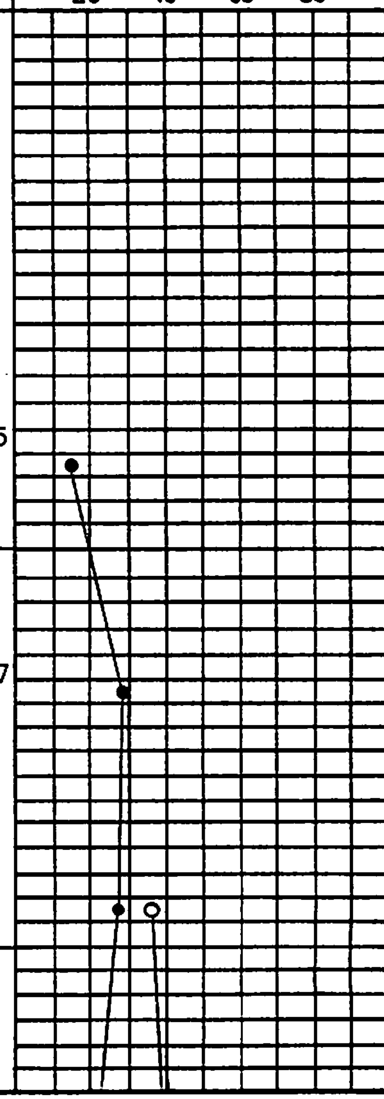
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10400, E 10500
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: 2.5 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/2/77 TO
COMPLETION DEPTH: 60 FT.
DATE WATER MEASURED: 12/4/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine to medium grained, moist	4/4/4	
5		SS-2		3/4/4	
		ST-3			115
10					
		ST-4	Lt. blue gray silty clay, very, stiff, damp, med. plasticity, with some sand seams and caliche nodules		97
15					
		ST-5			98
20					

COHESION, KIP/SQ FT
1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT
20 40 60 80



Barns & McDonnell
Engineers-Architects-Consultants

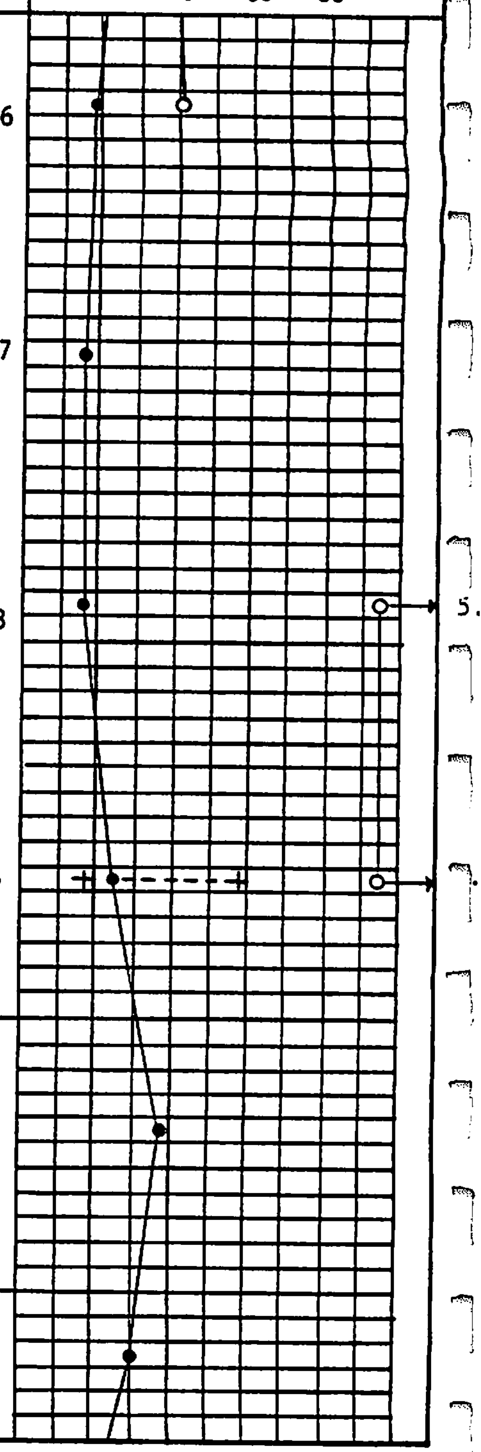
LOG OF BORING NO. CC-39 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
25		ST-6	Lt. gray and tan sandy clay, very stiff, damp, medium plasticity, some thin sand seams		106
30		ST-7	-with calcareous filled joint 28' to 30'		117
35		ST-8	-hard below 33'		118
40		ST-9			107
45		SS-10	Gray and brown silty clay, very stiff, damp, medium plasticity	9/9/12	
50		SS-11	Lt. gray and brown silty sand, very dense, damp	50 (3)	

COHESION, KIP/SQ FT: 1, 2, 3, 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80



LOG OF BORING NO. CC-39 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

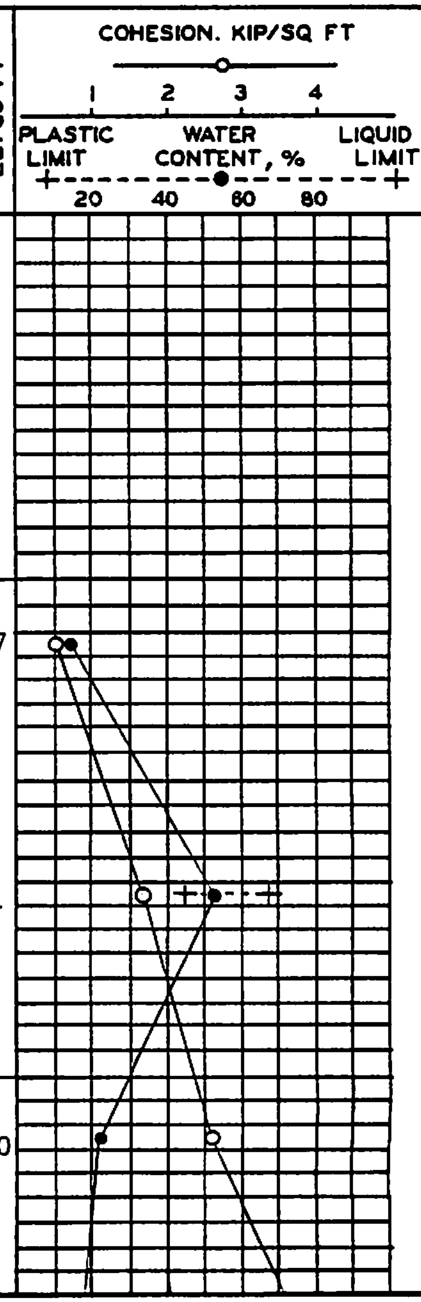
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		SS-12	-with cemented seams throughout	50 (3)		
55						
		SS-13	Gray clayey silt, very dense, damp, trace plasticity and fine sand	11/14/36 (3)		
60	TD					

LOG OF BORING NO. CT-40 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11080, E 10590	DRILLING DATE: 12/3/77 TO
GROUND ELEVATION: 185 MSL	COMPLETION DEPTH: 40 FT.
DEPTH TO WATER IN BORING: 4.0 Ft.	DATE WATER MEASURED: 12/4/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

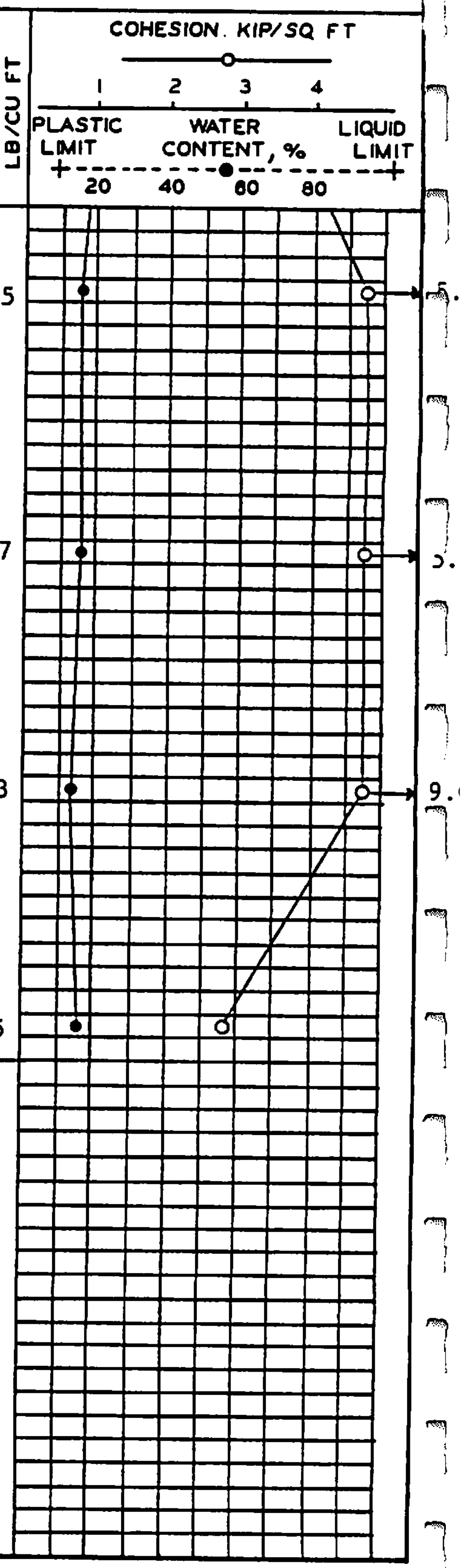
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	3/2/3	
5		SS-2	-medium dense and wet below 4.5'	3/5/6	
		ST-3	Lt. tan clayey sand, dense, moist, medium plasticity		117
10					
		ST-4	-medium dense below 13'		71
15					
		ST-5	Lt. gray and tan sandy clay, very stiff, moist, medium plasticity		100
20					



LOG OF BORING NO. CT-40 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	-hard and damp below 23'		115
25					
		ST-7			117
30					
		ST-8			123
35					
		ST-9	-with caliche nodules below 38'		125
40	TD				



LOG OF BORING NO. CT-41 SHEET 1 OF 2

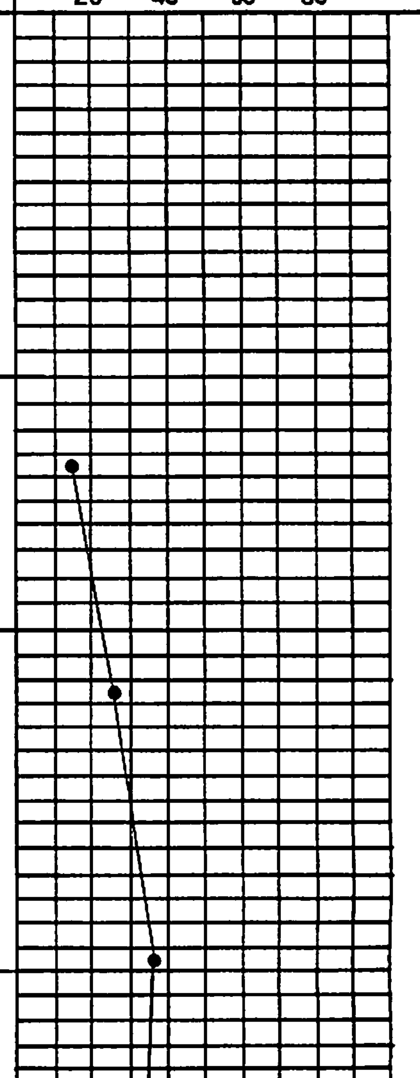
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11000, E 10650
GROUND ELEVATION: 185 MSL
DEPTH TO WATER IN BORING: 3.9 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/1/77 TO
COMPLETION DEPTH: 40 FT.
DATE WATER MEASURED: 12/4/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained, damp, some organic material	1/2/2	
5		SS-2		1/2/3	
		SS-3	Gray clayey sand, medium dense, moist, low plasticity, some sand and caliche nodules	6/8/10	
10					
		ST-4	Lt. blue gray sandy clay, very stiff, moist, medium plasticity, with caliche nodules		102
15					
		ST-5			97
20					

COHESION, KIP/SQ FT: 1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



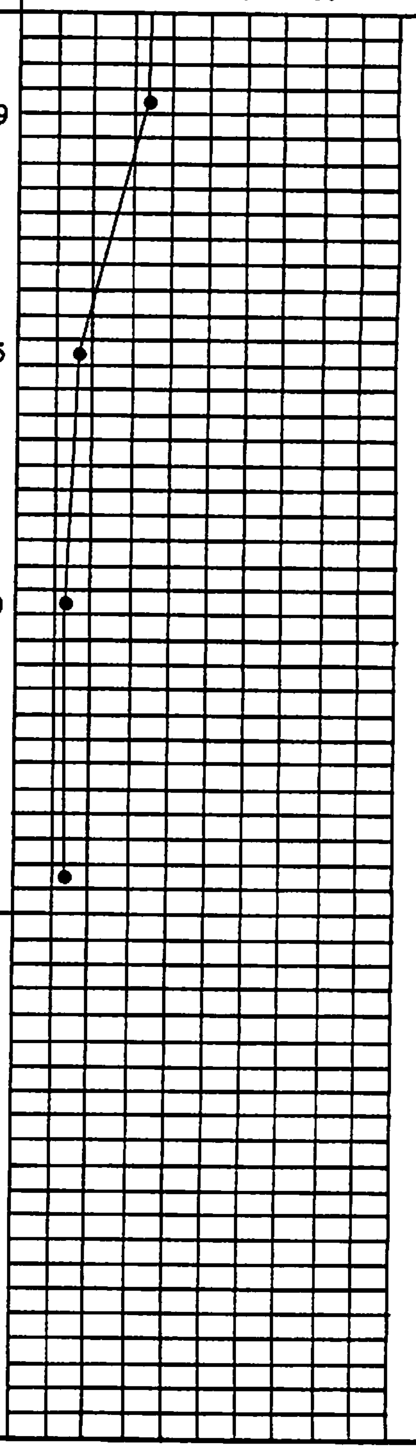
LOG OF BORING NO. CT-41 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		89
25					
		ST-7	-sand seams and calcareous filled joints 28' to 30'		115
30					
		ST-8			119
35					
		SS-9	-increasing sand content below 38'	11/10/15	
40					

COHESION, KIP/SQ FT: 1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80

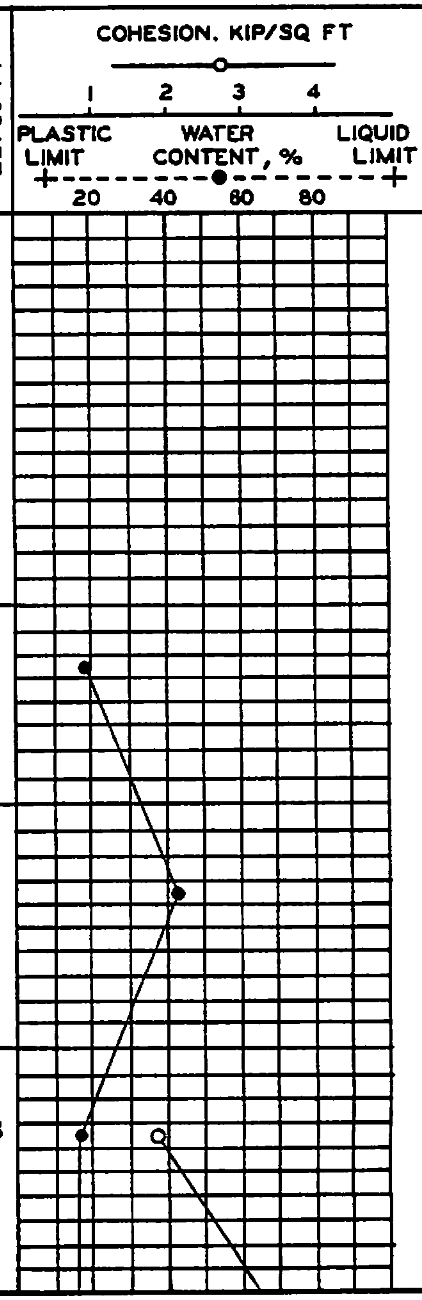


LOG OF BORING NO. CT-42 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10920, E 10590	DRILLING DATE: 12/2/77 TO
GROUND ELEVATION: 185 MSL	COMPLETION DEPTH: 40 FT.
DEPTH TO WATER IN BORING: 4.0 Ft.	DATE WATER MEASURED: 12/4/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

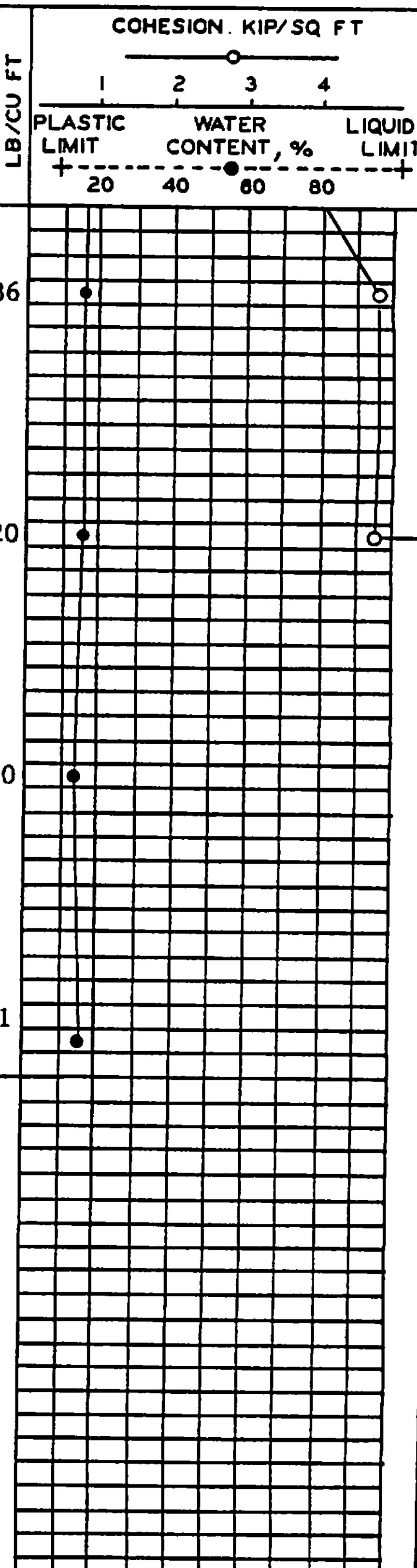
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	4/3/3	
5		SS-2	-medium dense below 5'	4/6/6	
10		SS-3	Lt. blue gray clayey sand, medium dense, damp, trace plasticity, some caliche nodules	3/6/11	
15		ST-4	Lt. gray sandy silt, medium dense, damp, chalky		78
20		ST-5	Lt. blue green and tan silty clay, hard, damp, medium plasticity		108



LOG OF BORING NO. CT-42 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		136
25					
		ST-7	-with clay filled joints 28' to 30'		120
30					
		ST-8	-with caliche nodules 33' to 35'		120
35					
		ST-9	-increasing sand content below 38'		121
40	TD				



LOG OF BORING NO. CT-43 SHEET 1 OF 2

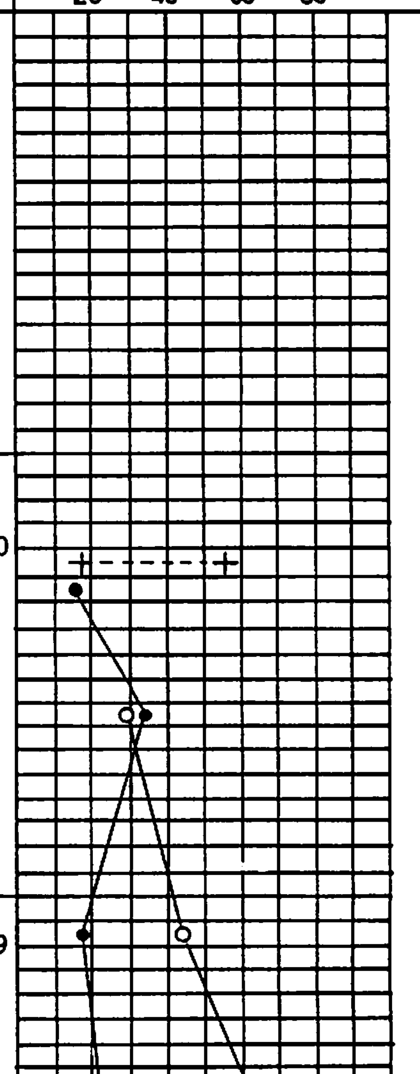
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10840, E 10650
GROUND ELEVATION: 185 MSL
DEPTH TO WATER IN BORING: 4.0 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/3/77 TO
COMPLETION DEPTH: 40 FT.
DATE WATER MEASURED: 12/4/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained moist	3/3/3	
5		SS-2	-very loose and wet below 4.5'	1/2/2	
		SS-3		8/8/13	
10		ST-4	Lt. tan silty clay, stiff, moist, medium plasticity		110
15		ST-5	-with sand seams and caliche nodules below 13'		89
20		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		109

COHESION, KIP/SQ FT: 1, 2, 3, 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80



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LOG OF BORING NO. CT-43 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

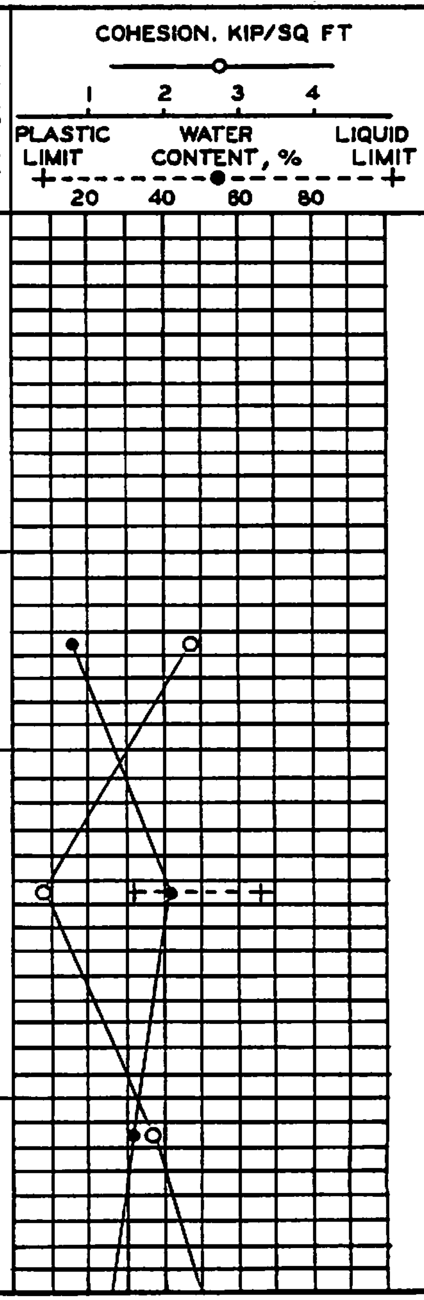
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		ST-7	-with clay seams and a trace of gravel 18' to 20'		98	
25						
		ST-8	-with trace of caliche nodules 28' to 30'		113	
30						
		ST-9	-increasing sand content below 33'		119	5.
35						
		ST-10	-with some blue green sandy clay		124	10.
40	TD					

LOG OF BORING NO. CT-44 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10760, E 10590	DRILLING DATE: 12/2/77 TO
GROUND ELEVATION: 185 MSL	COMPLETION DEPTH: 40 FT.
DEPTH TO WATER IN BORING: 3.8 Ft.	DATE WATER MEASURED: 12/4/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 750	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

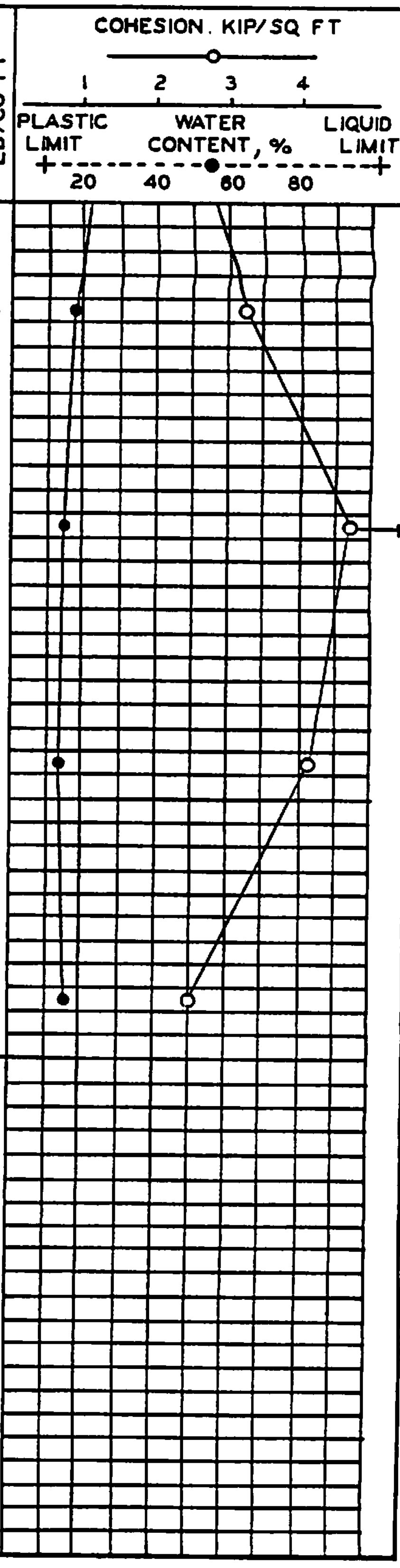
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown and gray silty sand, loose, poorly graded, fine grained, moist	4/3/3	
5		SS-2	-becomes wet below 4.5'	1/2/5	
10		ST-3	Green and gray clayey sand, hard, damp, medium plasticity, some silt		114
15		ST-4	Blue gray silty clay, stiff, moist, medium plasticity, with caliche nodules		85
20		ST-5	Lt. gray and tan sandy clay, very stiff, damp, medium plasticity		95



LOG OF BORING NO. CT-44 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	-with sand seams and calcareous filled joints 23' to 30'		112
25					
		ST-7	-increasing sand content below 28'		120
30					
		ST-8			121
35					
		ST-9			119
40	TD				



LOG OF BORING NO. CT-45 SHEET 1 OF 2

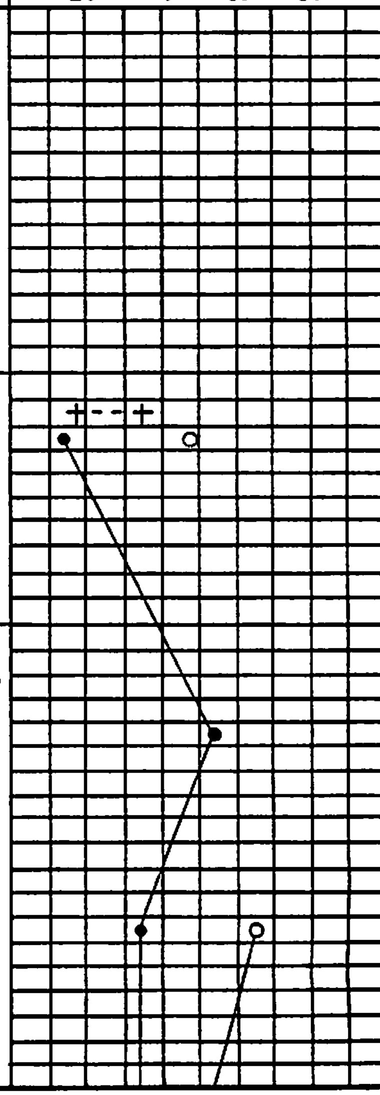
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10680, E 10650
GROUND ELEVATION: 185 MSL
DEPTH TO WATER IN BORING: 2.2 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 750
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/2/77 TO
COMPLETION DEPTH: 40 FT.
DATE WATER MEASURED: 12/4/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown and gray silty sand, loose, poorly graded, fine grained, moist	6/3/4	
5		SS-2	-medium dense and wet below 4.5'	3/5/19	
10		ST-3	Gray green clayey sand, hard, damp, medium plasticity, some sand		118
15		ST-4	Lt. Blue gray silty clay, stiff, damp, medium plasticity, with caliche nodules		77
20		ST-5			93

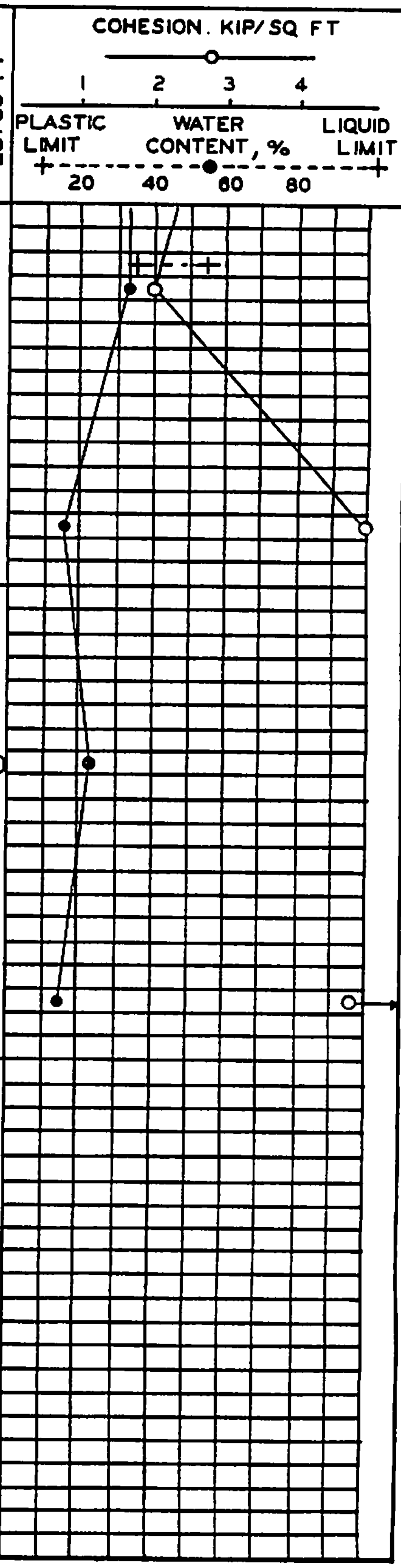
COHESION, KIP/SQ FT: 1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



LOG OF BORING NO. CT-45 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
25		ST-6	Blue green clayey silt, very stiff, damp, trace, plasticity, slightly cemented, friable		91
		ST-7			115
30			Lt. gray and tan sandy clay, hard, damp, medium plasticity		
35		ST-8	-with sand seams and calcareous filled joints below 34'		110
40	TD	ST-9			122



LOG OF BORING NO. S-46 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10550, E 10360	DRILLING DATE: 12/10/77 TO
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 79.5 FT.
DEPTH TO WATER IN BORING: 1.9 Ft.	DATE WATER MEASURED: 12/12/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1 2 3 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20 40 60 80)
		SS-1	Brown silty sand, medium dense, poorly graded, fine grained, moist	5/6/5		
5		SS-2	Lt. tan clayey sand, very stiff moist, medium plasticity	8/9/10		
		ST-3				
10			Lt. blue gray silty clay, very stiff, moist, medium plasticity			
		ST-4	-with caliche nodules below 13'			
15						
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity			
20						

LOG OF BORING NO. S-46 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1 2 3 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20 40 60 80)
		ST-6				
25						
		ST-7	-with caliche nodules 28' to 30'			
30						
		ST-8	-with a trace of caliche nodules 33' to 35'			
35						
		ST-9				
40						
		ST-10				
45			Lt. tan clayey sand, very dense poorly graded, fine to med. grained, with thin cemented seams throughout			
		SS-11		63 (6)		
50						

LOG OF BORING NO. S-46 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

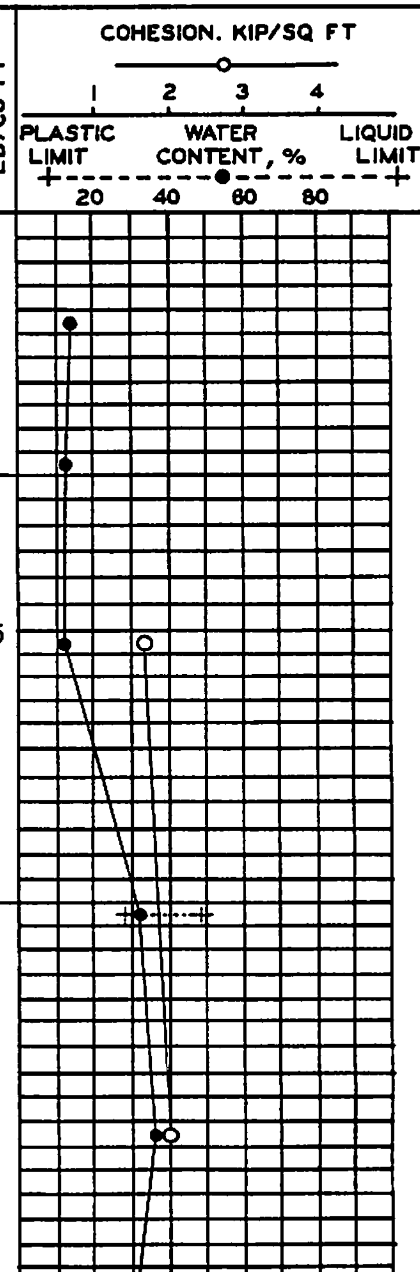
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
55		SS-12	-with clay seams 54' to 54.5'	24/15/35		
60		SS-13	Lt. green silty clay, hard, damp, high plasticity, some interbedded sand	17/21/32		
65		SS-14		50 (3)		
70		SS-15	White sand, very dense, poorly graded, fine to med. grained, damp, with thin clay seams and cemented zones throughout	18/30/50		
75		SS-16		50 (7)		
		SS-17	Lt. green silty clay, hard, damp, partly cemented	21/30(5)		
80	TD					

LOG OF BORING NO. S-47 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10550, E 10410	DRILLING DATE: 12/10/77 TO
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 79 FT.
DEPTH TO WATER IN BORING: 2.3 Ft.	DATE WATER MEASURED: 12/12/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, medium dense, poorly graded, fine to med. grained, wet	5/9/10	
5		SS-2		11/11/14	
		ST-3	Brown and Lt. gray sandy clay, very stiff, moist, medium plasticity		125
10		ST-4			
15			Lt. blue gray silty clay, very stiff, moist, medium plasticity, some caliche nodules		92
		ST-5			85
20					



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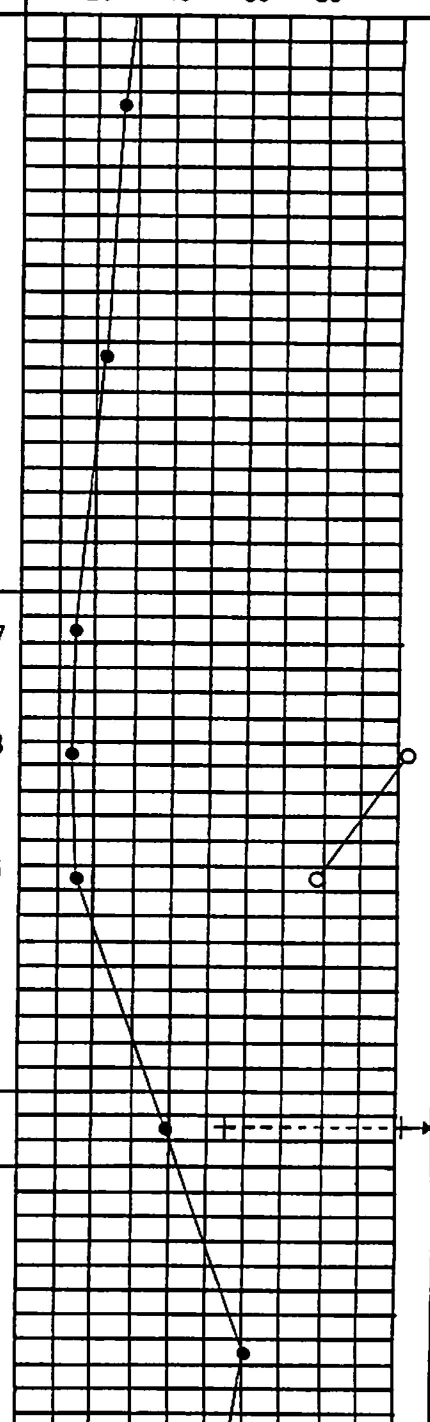
LOG OF BORING NO. S-47 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
25		ST-6	-with increasing caliche content below 23'		
30		ST-7			
35		ST-8	Lt. blue green and gray sandy clay, hard, damp, medium plasticity		117
		ST-9			118
40		ST-10			115
45		ST-11	Lt. green silty clay, hard, damp, high plasticity		81
			Lt. tan and green clayey sand, very dense, poorly graded, fine to medium grained, with thin sandstone seams		
50		SS-12		50 (5)	

COHESION, KIP/SQ FT: 1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



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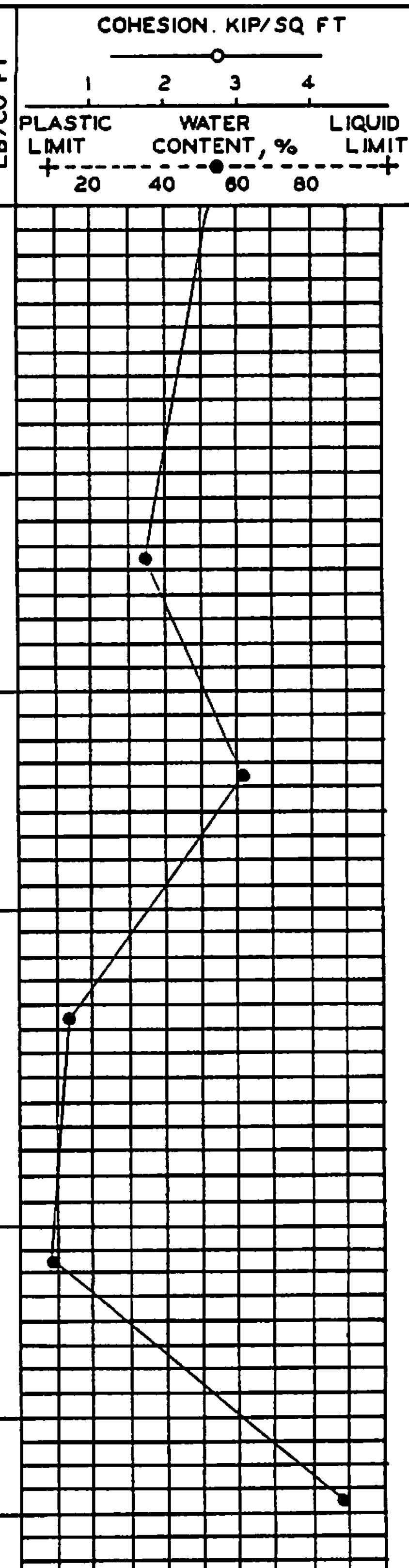
LOG OF BORING NO. S-47 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		SS-13		75 (2)	
60		SS-14	Lt. tan sandy clay, hard, damp, medium plasticity, some thin interbedded sandstone seams	23/25/40	
65		SS-15	Lt. green clayey silt,hard, damp, low plasticity, some cemented seams and sand seams	50 (3)	
70		SS-16	White sand, very dense, poorly graded, fine grained, damp, some thin clay seams -sandsone seams 69.5' to 73.5'	36/30 (4)	
75		SS-17	Lt. green silty clay, hard, damp, high plasticity, partly cemented	50 (6)	
		SS-18	Lt. Tan sandy clay, hard, damp, with thin cemented seams	50 (7)	
80	T.D.				



LOG OF BORING NO. U-48 SHEET 1 OF 3

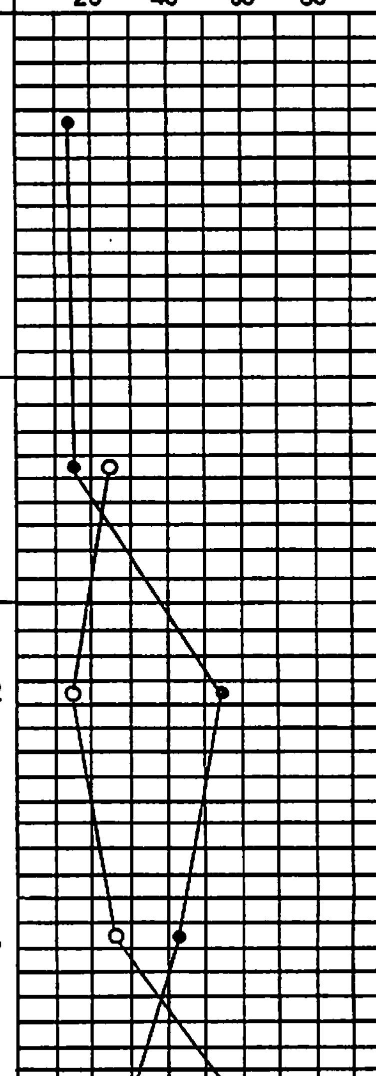
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10450, E 10350	DRILLING DATE: 12/9/77 TO
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 80 FT.
DEPTH TO WATER IN BORING: 2.2 Ft.	DATE WATER MEASURED: 12/2/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING – 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, medium dense, poorly graded, fine to med. grained, wet	5/12/8	
5		SS-2		2/2/7	
		ST-3	Lt. gray sandy clay, very stiff, moist, medium plasticity		117
10					
		ST-4	Lt. gray silty clay, very stiff, moist, medium plasticity, some caliche		72
15					
		ST-5			85
20					

COHESION, KIP/SQ FT: 1 2 3 4

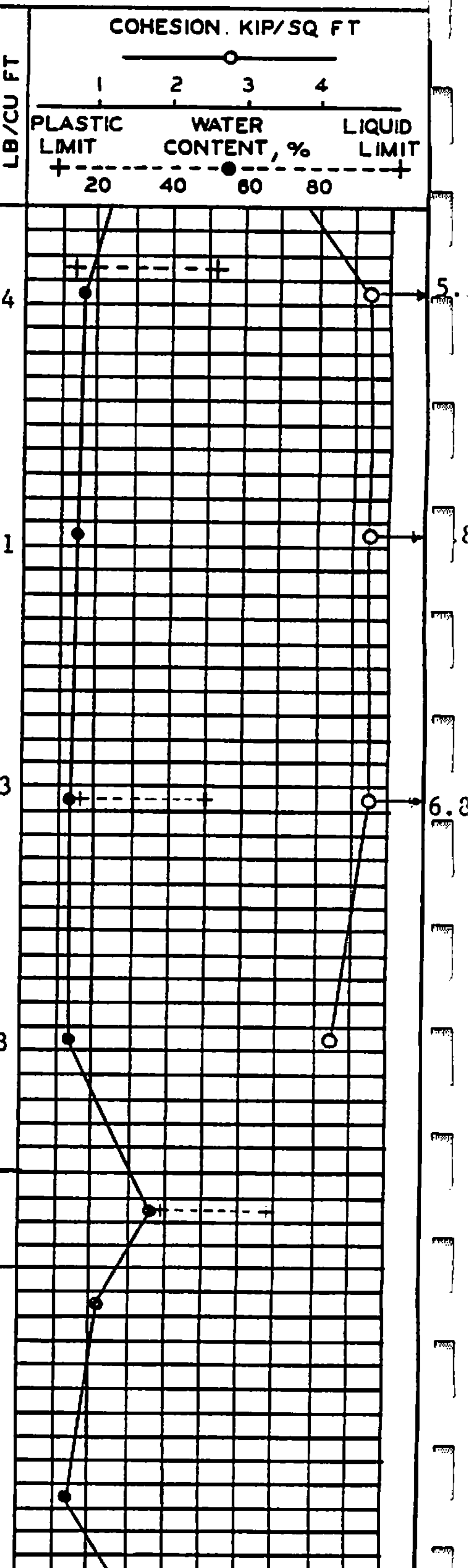
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



LOG OF BORING NO. U-48 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. Gray and tan sandy clay, hard, damp, medium plasticity		114
25					
		ST-7			121
30					
		ST-8			123
35					
		ST-9	-Decreasing clay content below 38'		123
40					
		ST-10	Lt. green silty clay, hard, damp, high plasticity		
		SS-11	Lt. green and lt. tan clayey sand, very dense, poorly graded, fine grained, some cemented seams	50/25 (3)	
45					
		SS-12		50 (2)	
50					



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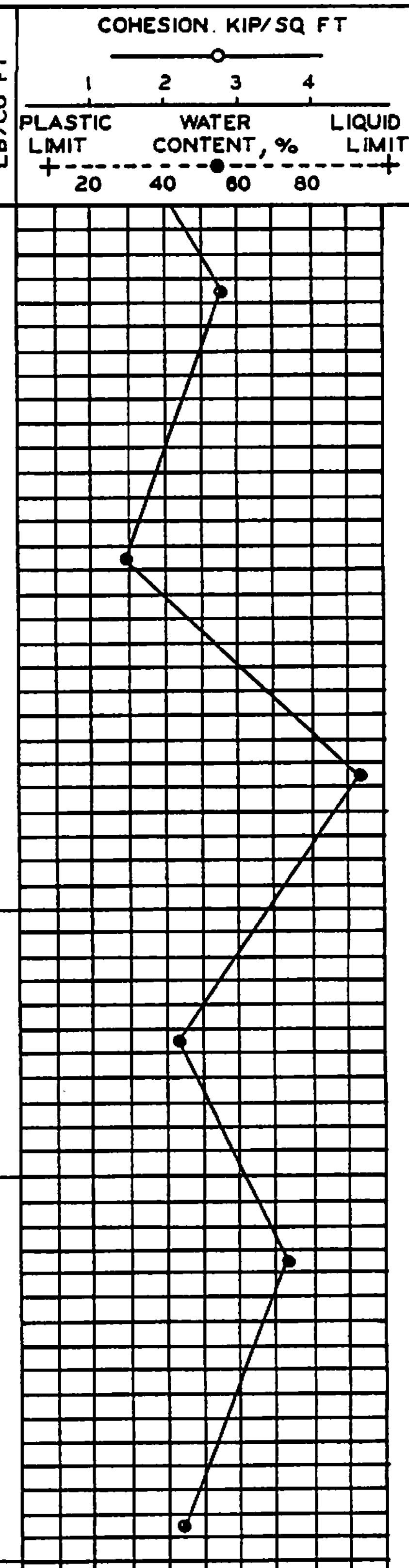
LOG OF BORING NO. U-48 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		SS-13	-Lt, gray below 54'	25/36/44	
60		SS-14	-with fine sand seams below 53.5'	22/16/32	
65		SS-15	-increasing clay content below 63.5'	65 (5)	
70		SS-16	Lt. gray and lt. tan sand, with clay seams, medium dense, moist	16/13/15	
75		SS-17	Lt. gray and lt. tan silty clay, hard, damp, med. plasticity, some caliche nodules	54 (6)	
80	T. D.	SS-18		36/24/25	

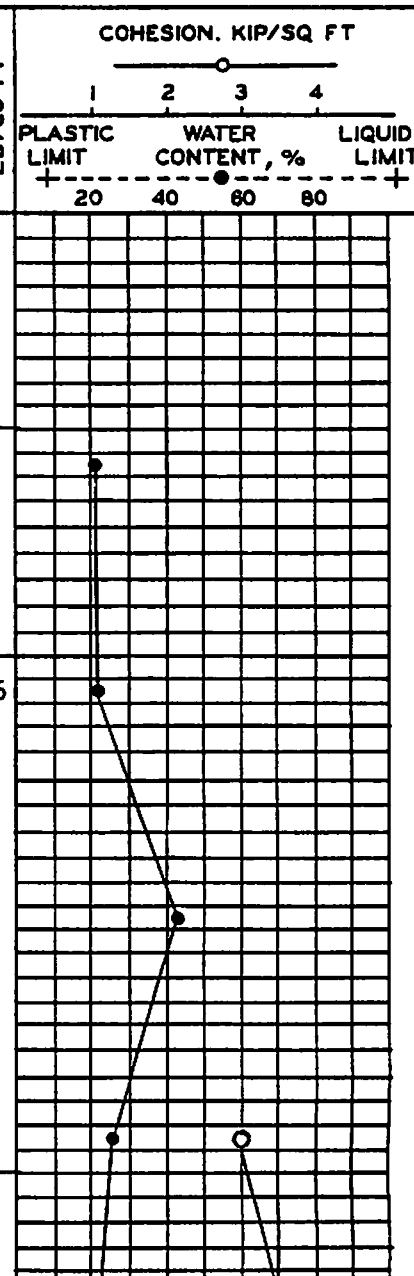


LOG OF BORING NO. U-49 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10450, E 10450	DRILLING DATE: 12/9/77 TO
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 79.5 FT.
DEPTH TO WATER IN BORING: 2.2 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

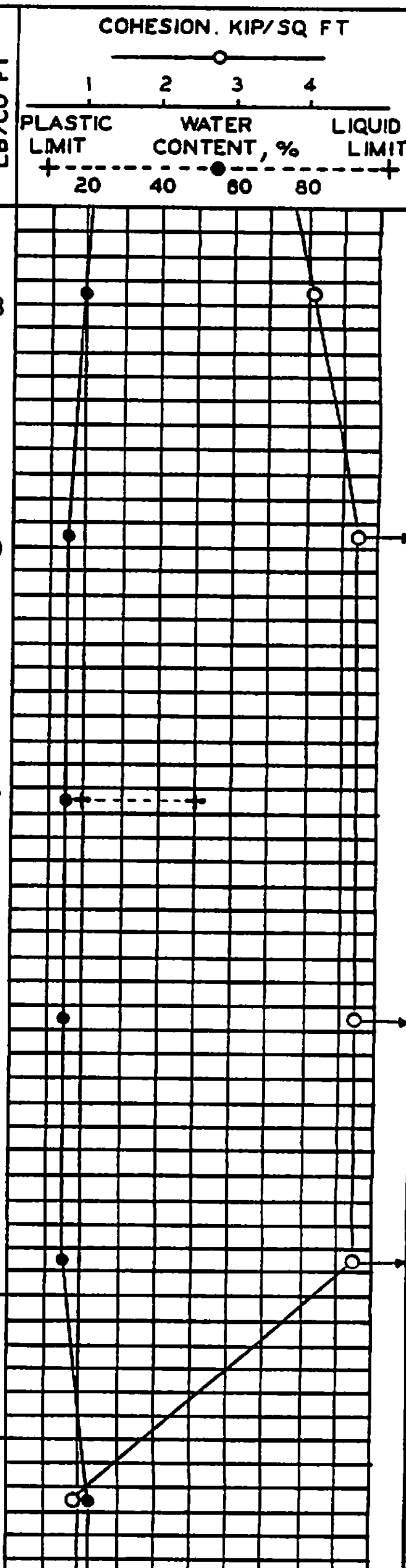
DEPTH, FT.	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
	SS-1	Brown silty sand, very loose, poorly graded, fine grained, wet	1/1/2	
5	SS-2	Gray clayey sand, medium dense, moist, some interbedded silty sand and caliche	3/5/6	
	ST-3			
10		Lt. blue gray silty clay, very stiff, moist, med. plasticity some caliche nodules		106
	ST-4	-with increasing caliche content 13' to 15'		
15				
	ST-5			99
20				



LOG OF BORING NO. U-49 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

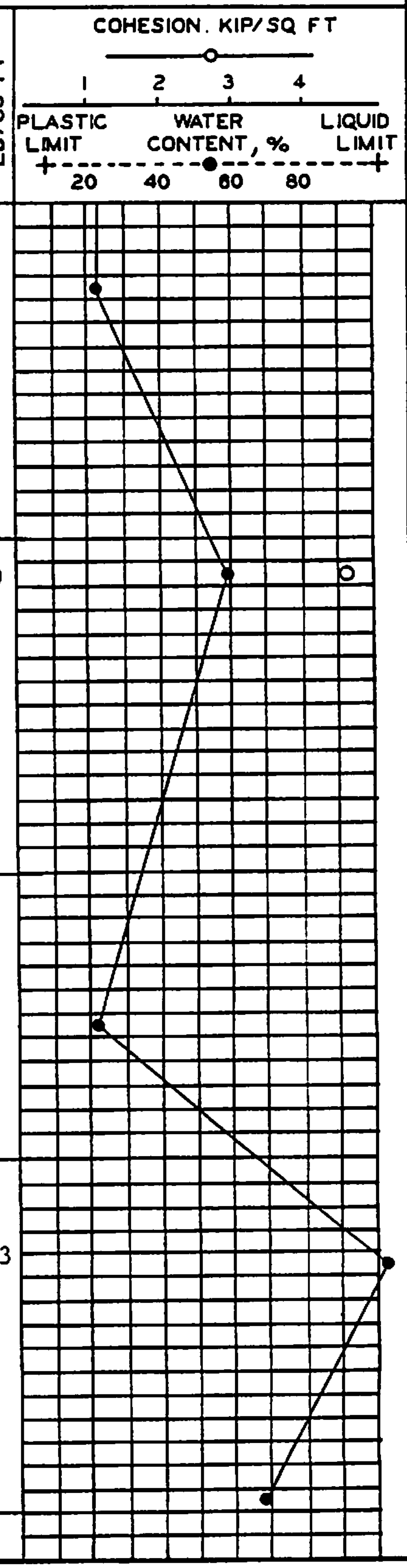
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. gray and tan sandy clay, hard, damp, med. plasticity		108
25			-with calcareous filled joints 24' to 25'		
		ST-7	-with some chert nodules 28' to 30'		119
30					
		ST-8			113
35					
		ST-9	-with interbedded silty clay 43' to 44'		121
40					
		ST-10			117
45			Gray silty clay, hard, damp, high plasticity		
		ST-11	Gray clayey sand, very dense, damp, trace plasticity		97
50					



LOG OF BORING NO. U-49 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		ST-12	-with some cemented sandstone seams below 50'	50 (4)	
		ST-13			
60			Gray clayey silt, very dense, damp, trace plasticity, friable, some cemented seams		59
65		SS-14		50 (6)	
70		SS-15	Gray sand, very dense poorly graded, fine grained, damp, some thin seams of clay and sandstone	8/29/21 (3)	
75		ST-16	Lt. green silty clay, hard, damp, high plasticity, partly cemented LL - 201 PL - 122		43
		SS-17		32/50(6)	
80	T.D.				



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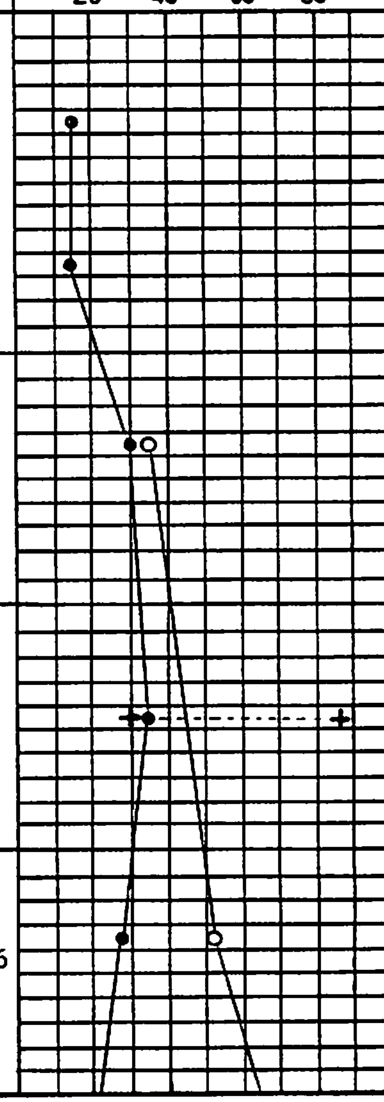
Engineers-Architects-Consultants

LOG OF BORING NO. U-50 SHEET 1 OF 4

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10375, E 10400	DRILLING DATE: 12/6/77 TO
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 98 FT.
DEPTH TO WATER IN BORING: 2.1 Ft.	DATE WATER MEASURED: 12/10/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Brown and gray silty sand, loose, poorly graded, fine grained, moist	4/3/2		
5		SS-2	-medium dense below 5'	3/10/16		
		ST-3	Lt. blue gray sandy clay, very stiff, moist, medium plasticity		99	
10						
		ST-4	Lt. blue green silty clay, very stiff, moist, med. plasticity with caliche nodules		86	
15						
		ST-5	Lt. Gray and tan silty clay, very stiff, damp, med. plasticity		96	
20						



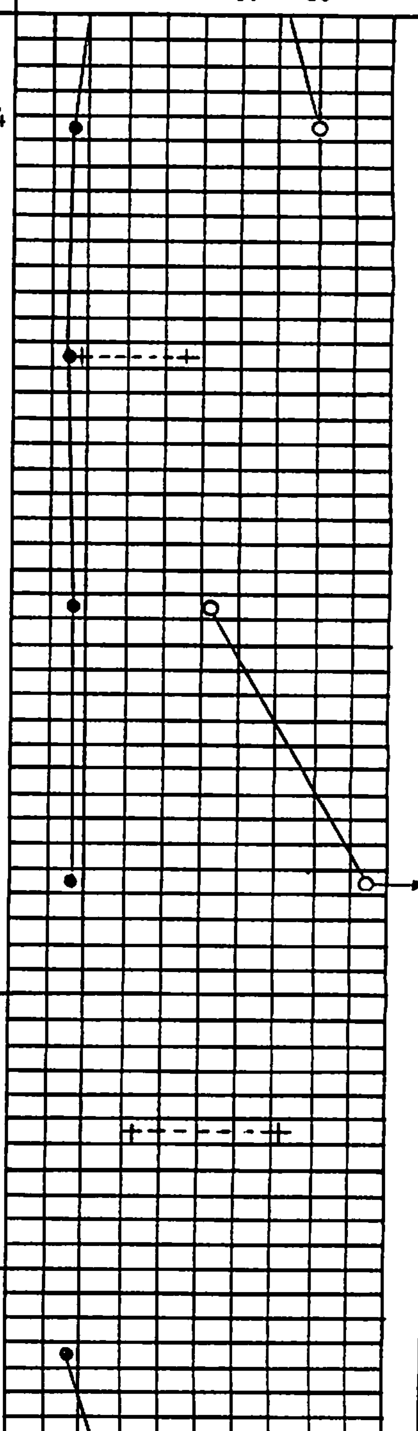
LOG OF BORING NO. U-50 SHEET 2 OF 4

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		114
25					
		ST-7			117
30					
		ST-8	-with phosphate nodules 33' to 35'		115
35					
		ST-9	-decreasing sand content below 38'		115
40					
		ST-10	Lt. green silty clay, hard, damp, high plasticity, friable, some calcareous filled joints		
45					
		SS-11	Lt. tan clayey sand, very dense poorly graded, fine grained, damp	50 (6)	
50					

COHESION, KIP/SQ FT: 1, 2, 3, 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80



Burns & McDonnell
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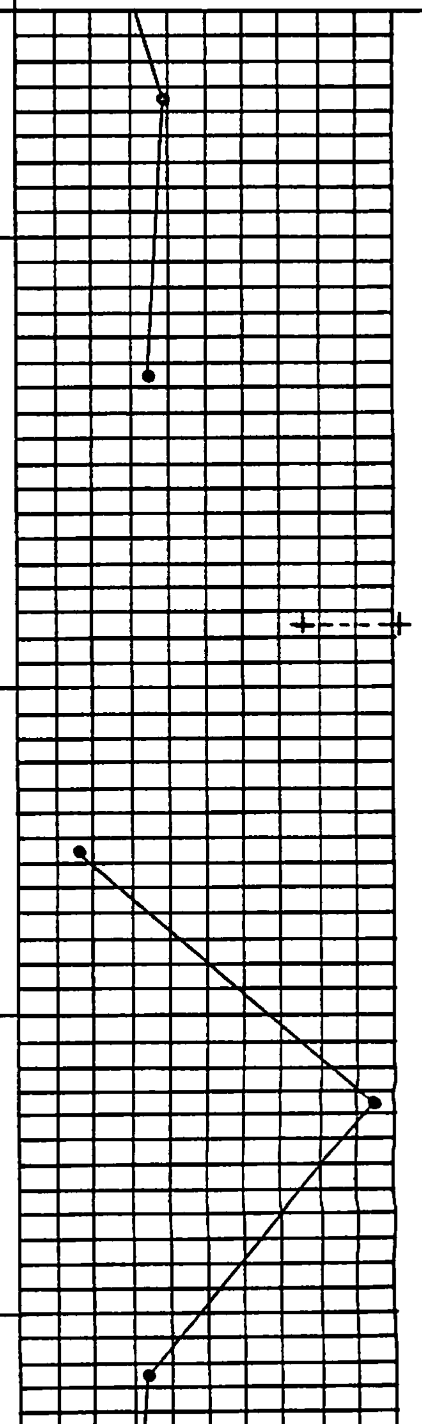
LOG OF BORING NO. U-50 SHEET 3 OF 4

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT 1 2 3 4 / PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT 20 40 60 80
55		SS-12	-with thin sandstone seams below 53'	60 (6)		
60		SS-13	Lt. green silty clay, hard, damp, high plasticity	18/17/28		
		ST-14				
65		DB-15				
70		SS-16	White sand, very dense, poorly graded, fine to med. grained, damp, some thin cemented seams	47/50 (4)		
75		ST-17	Lt. green silty clay, hard, damp, high plasticity, numerous sand seams			
80		SS-18		48/13/16		



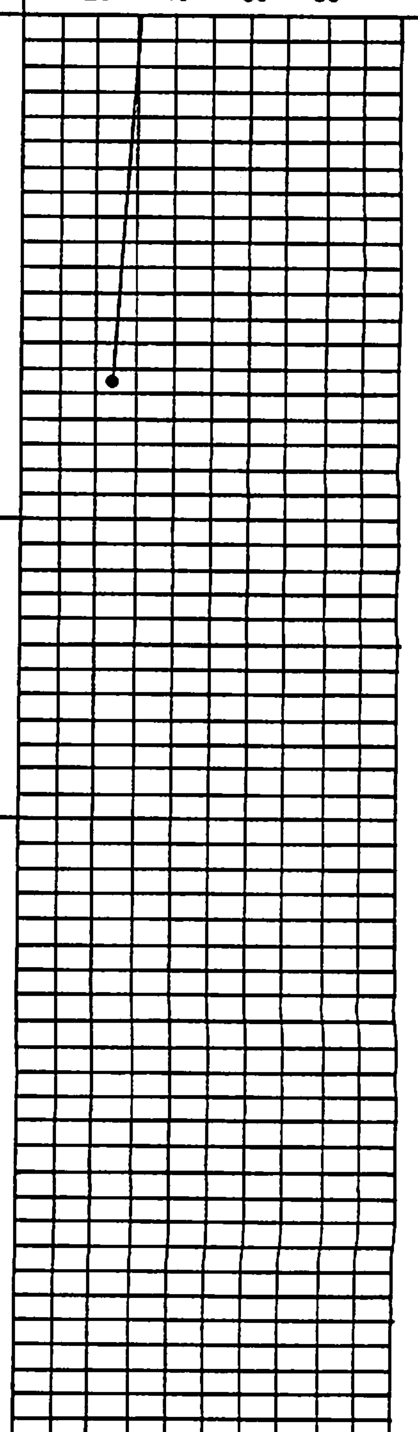
LOG OF BORING NO. U-50 SHEET 4 OF 4

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
85			Lt. green sand with alternating sandstone seams, very dense, poorly graded, fine to med. grained, damp		
		SS-19		34/25 (2)	
90					
95		NX Core	White limestone seams, badly weathered, hard, well cemented, seams are 1-3" thick with interbedded sandy clay Recovery = 33%, RQD=0		
	TD				
100					

COHESION, KIP/SQ FT: 1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



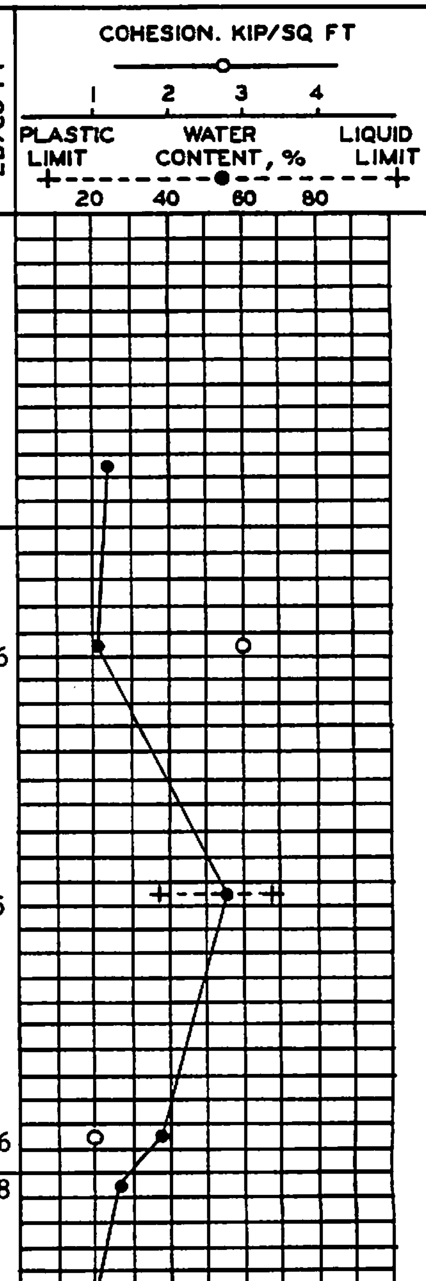
LOG OF BORING NO. U-51 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10240, E 10400
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: 2.2 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/7/77 TO 12/8/77
COMPLETION DEPTH: 79 FT.
DATE WATER MEASURED: 12/10/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine to medium grained, moist	1/2/3	
5		SS-2	-white below 4.5'	3/4/6	
		ST-3	Lt. blue gray silty clay, very stiff, med. plasticity, moist, some caliche nodules		106
10					
		ST-4	-stiff below 13'		65
15					
		ST-5			86
20					98



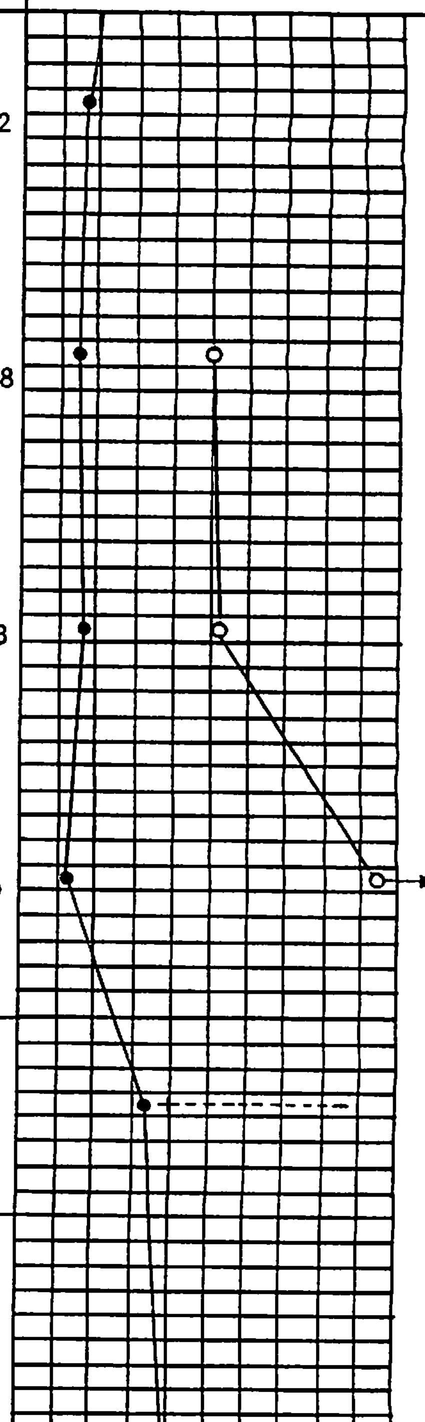
LOG OF BORING NO. U-51 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
25		ST-6	Lt. gray and tan sandy clay, hard, damp, med. plasticity		92
30		ST-7			118
35		ST-8	- with calcareous filled joints 33' to 35'		113
40		ST-9			126
45		ST-10	Lt. Green silty clay, hard, damp, high plasticity, brittle friable		
50			Lt. green clayey sand, hard, damp, med. plasticity, some cemented seams		

COHESION, KIP/SQ FT: 1 2 3 4

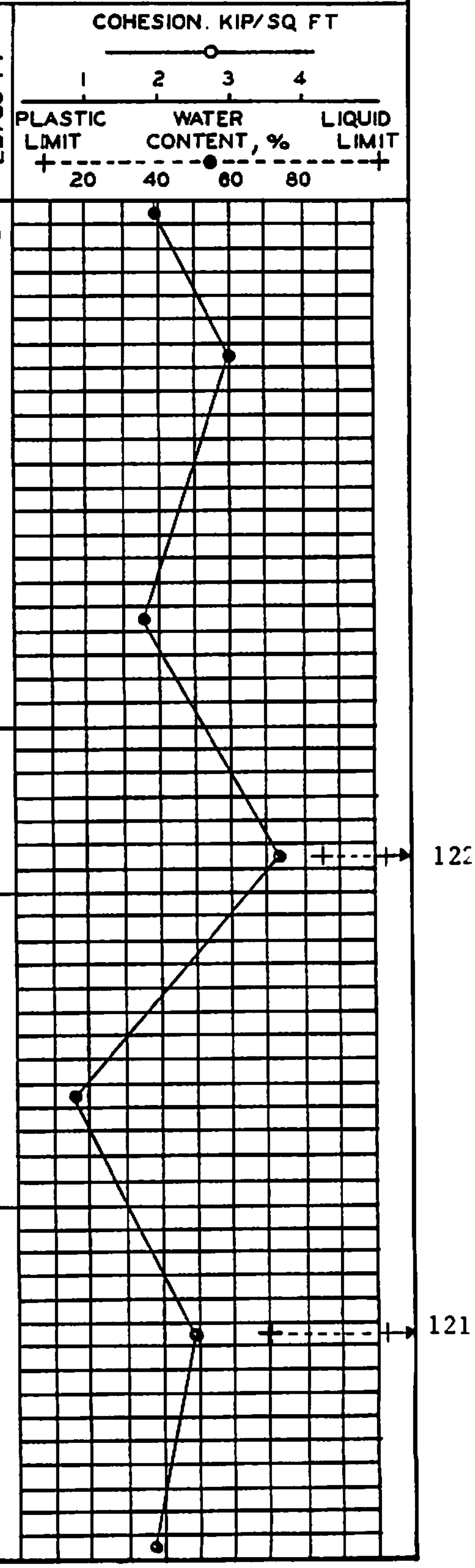
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



LOG OF BORING NO. U-51 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-11			79
		SS-12	-with thin hard cemented seams	50 (3)	
55					
		SS-13		15/25/29	
60					
		SS-14	Lt. green silty clay, hard, damp, high plasticity	26/50 (5)	
65					
		SS-15	Lt. tan sand, very dense, poorly graded, fine to med. grained, damp, some cemented seams	30/50 (6)	
70					
		SS-16	Lt. green silty clay, hard, damp, high plasticity, slightly cemented	28/20/36	
75					
		SS-17		50 (6)	
T.O.					



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LOG OF BORING NO. U-52 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10100, E 10450
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: Surface
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/8/77 TO
COMPLETION DEPTH: 80 FT.
DATE WATER MEASURED: 12/14/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

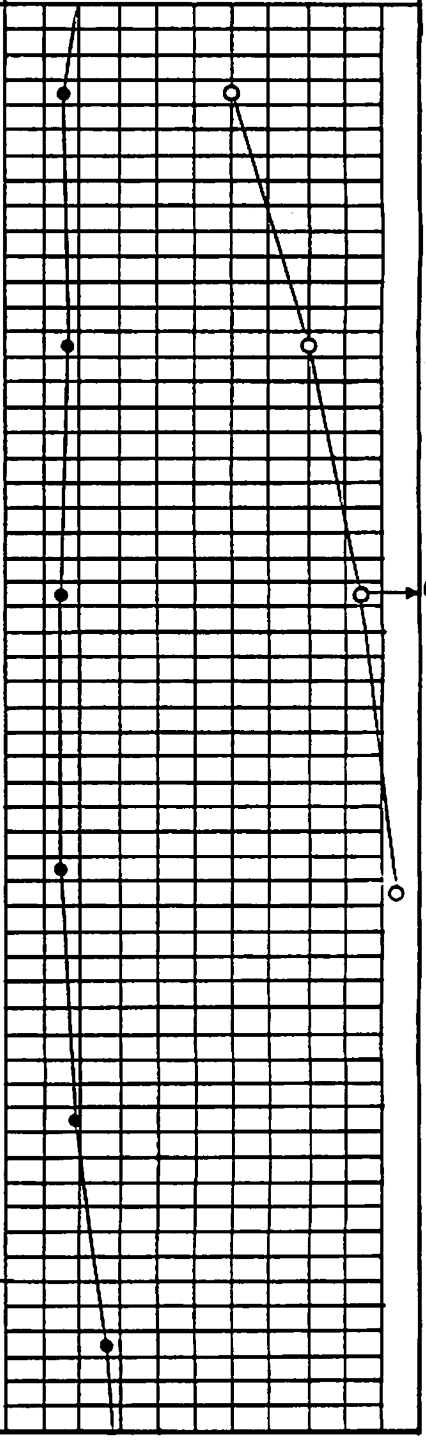
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Brown silty sand, medium dense, poorly graded, fine to med. grained, moist	11/10/6		
5		SS-2		3/6/11		
		SS-3		9/6/9		
10			Lt. blue gray silty clay, very stiff, moist, med. plasticity some caliche nodules			
		ST-4			87	
15						
		ST-5	-with increasing caliche content below 18'			
20						

LOG OF BORING NO. U-52 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. gray and tan sandy clay, hard damp, med. plasticity		115
25					
		ST-7			115
30					
		ST-8	-with phosphate nodules 33' to 35'		120
35					
		ST-9	-with calcareous filled joints 38' to 40'		124
40					
		ST-10			103
45					
		SS-11	Lt. green clayey sand, very dense, fine grained, poorly graded, moist	50 (5)	
50					

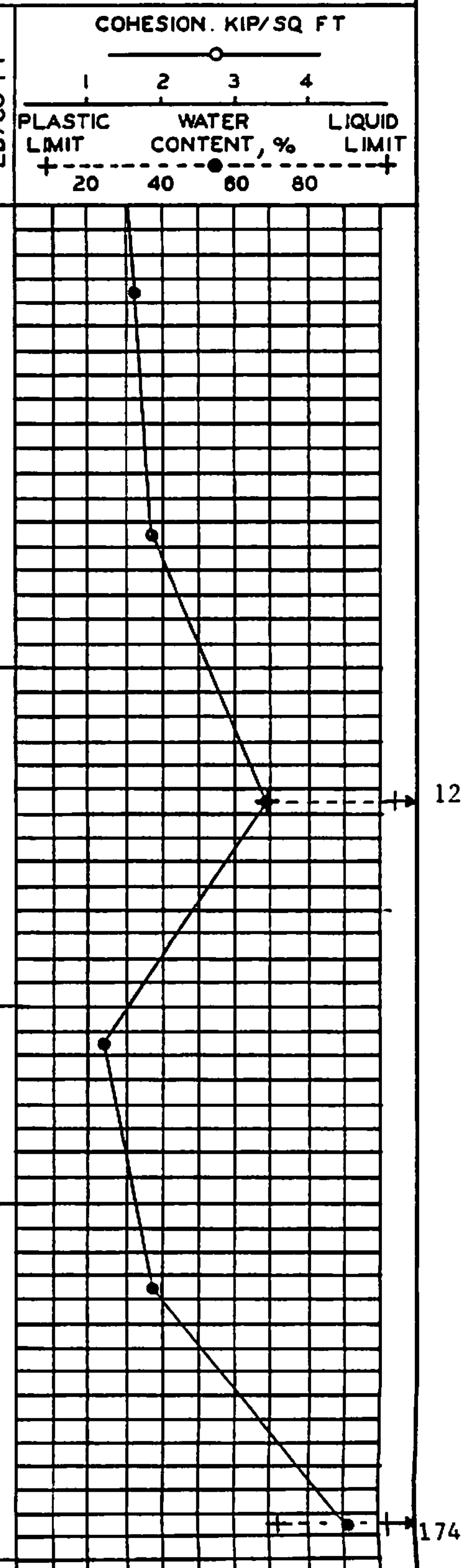
COHESION, KIP/SQ FT: 1, 2, 3, 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80



LOG OF BORING NO. U-52 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
	SS-12	-with thin cemented seams throughout	65 (3)	
55				
	SS-13		30/50 (1)	
60				
	SS-14	Lt. green silty clay, hard, damp, high plasticity, partly cemented	21/35/50 (3)	
65				
	SS-15	Lt. tan silty sand, very dense poorly graded, fine to med. grained, with cemented seams	67 (6)	
70				
	SS-16	Lt. green silty clay, hard, damp, high plasticity, partly cemented LL - 177 PL - 108	17/20/22	
75				
	ST-17			48
80	T.D.			

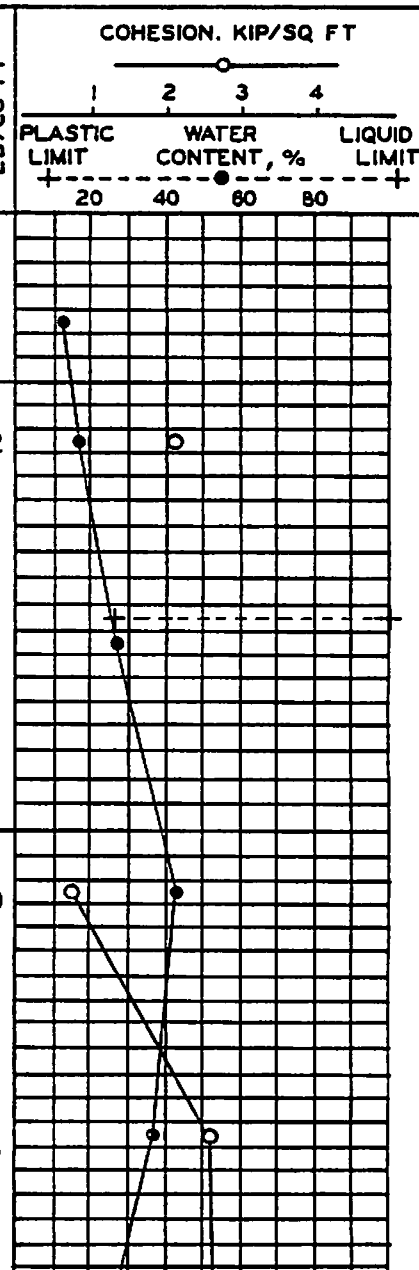


LOG OF BORING NO. U-53 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10100 , E 10350	DRILLING DATE: 12/8/77 TO 12/9/77
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 80 FT.
DEPTH TO WATER IN BORING: 0.5 Ft.	DATE WATER MEASURED: 12/14/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

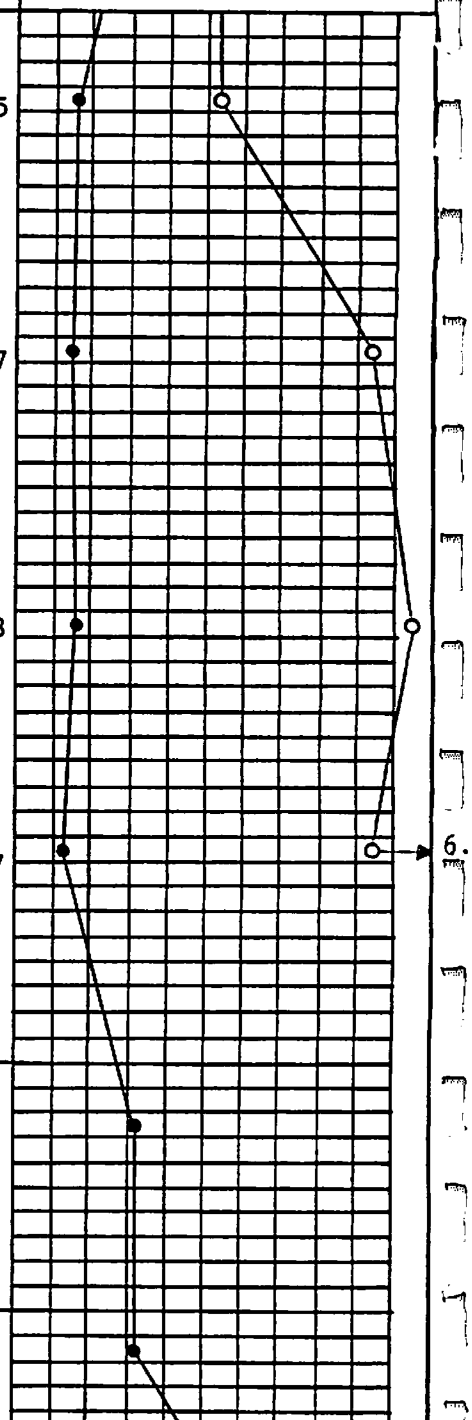
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, medium dense, poorly graded, fine grained wet	6/9/10	
5		ST-2	Lt. blue gray sandy clay, very stiff, moist, high plasticity		112
10		ST-3			94
		ST-4	Lt. blue gray silty clay, very stiff, moist, med. plasticity, some caliche		80
15		ST-5	-increasing sand content below 18'		85
20					



LOG OF BORING NO. U-53 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) — PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		115	
25						
		ST-7			117	
30						
		ST-8			118	
35						
		ST-9	-increasing sand content below 38'		117	6.0
40						
		SS-10	Lt. green silty clay, hard, damp, high plasticity, some cemented seams	36/38 (6)		
45						
		SS-11	Lt. tan clayey sand, hard, damp, with cemented seams	50 (3)		
50						

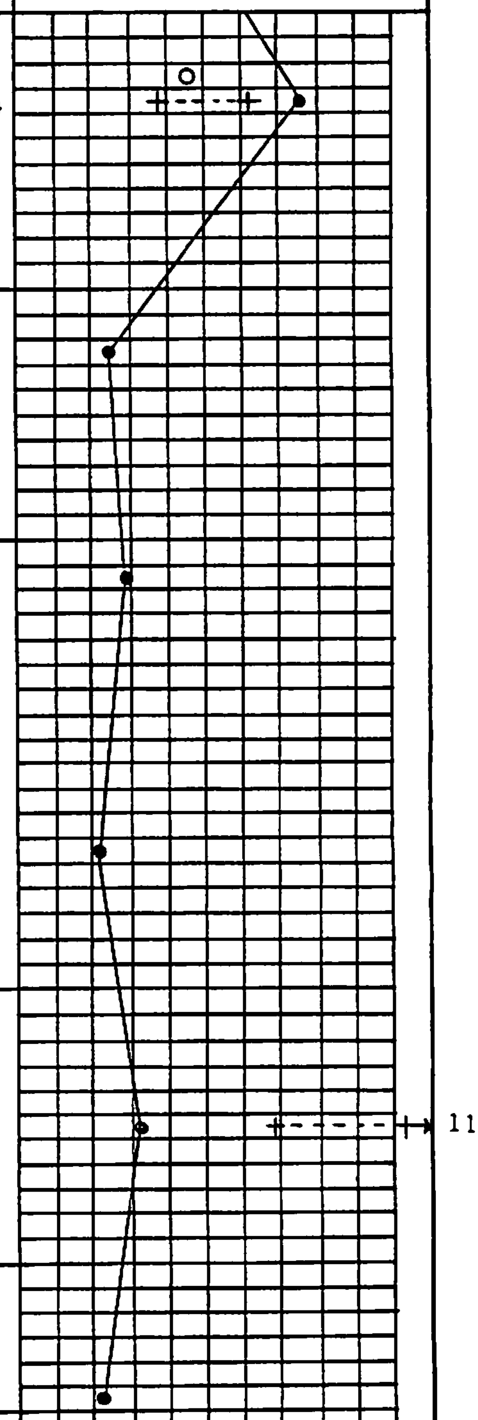


LOG OF BORING NO. U-53 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
55		ST-12	Lt. green silty clay, hard, damp, high plasticity, partly cemented		54
60		SS-13	Lt. tan sandy clay, hard, moist, medium plasticity -cemented seams 59' to 60'	50 (2)	
65		SS-14	Lt. tan sand, very dense, poorly graded, fine to medium grained damp, thin cemented seams throughout	50 (4)	
70		SS-15		50 (2)	
75		SS-16	Lt. green silty clay, hard, damp, high plasticity, brittle partly cemented	25/25 (6)	
80	T.D.	SS-17	Lt. tan clayey sand, very dense, damp, with thin cemented seams	35/30 (5)	

COHESION, KIP/SQ FT
1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT
20 40 60 80

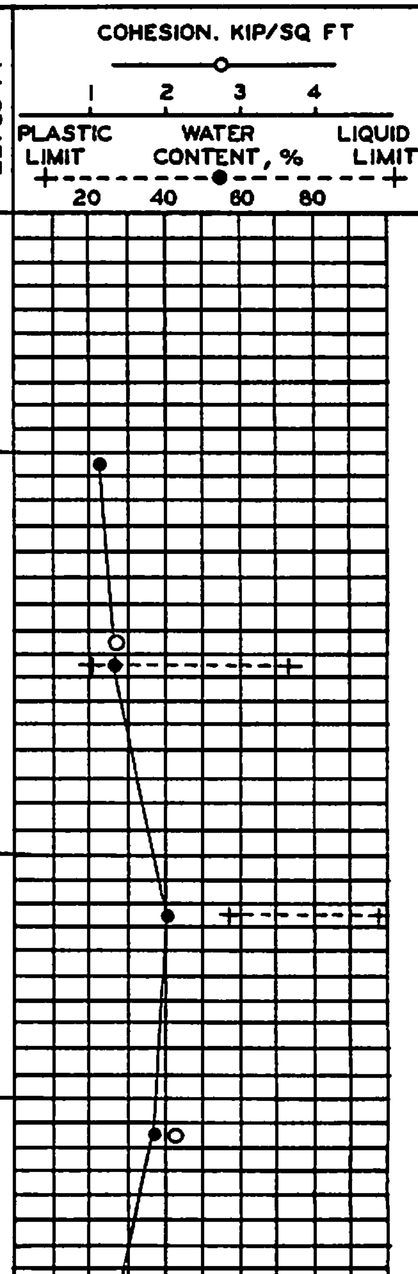


LOG OF BORING NO. CP-55 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12600, E 10100	DRILLING DATE: 12/14/77 TO
GROUND ELEVATION: 188 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
0–5		SS-1	Brown silty sand, medium dense, poorly graded, fine to medium grained, moist	3/6/8	
5–12.5		SS-2	Lt. blue gray silty clay, very stiff, moist, med. plasticity, some sand and caliche nodules	2/3/5	
		ST-3			
12.5–17.5		ST-4	White clayey silt, dense, damp, trace plasticity, with caliche nodules		82
17.5–		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		82



LOG OF BORING NO. CP-55 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

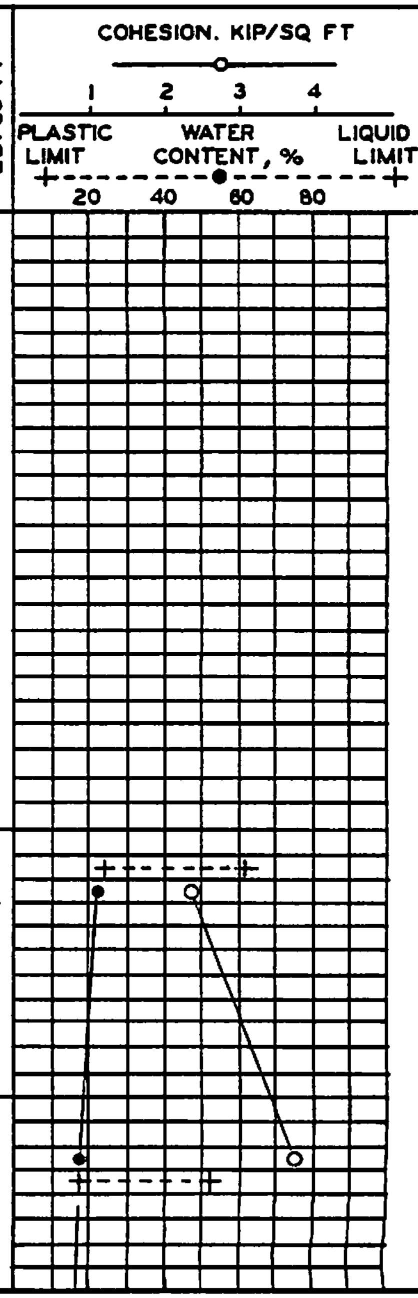
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		ST-6	-with some blue sandy clay 23' to 25'		111	
25						
		ST-7	-increasing sand content and Lt. green 28' to 30'		122	
30	TD					

LOG OF BORING NO. CP-56 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12400, E 10020	DRILLING DATE: 12/12/77 TO
GROUND ELEVATION: 187 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Lt. brown silty sand, loose, poorly graded, fine grained moist	3/3/4	
5		SS-2		5/4/5	
10		SS-3	-white and dense below 8.5'	9/12/18	
15		ST-4	Lt. blue gray silty clay, very stiff, damp, medium plasticity, some sand and caliche nodules		104
20		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		112



LOG OF BORING NO. CP-56 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
25		ST-6	-with calcareous filled joints 23' to 25'		114	
30	TD	ST-7	-increasing sand content below 28'		118	

Burns & McDonnell
Engineers-Architects-Consultants

LOG OF BORING NO. CP-57 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12400 , E 9800
GROUND ELEVATION: 185 MSL
DEPTH TO WATER IN BORING: N.D.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/12/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: Not Measured
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1 2 3 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20 40 60 80)
		SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	2/3/4		
5		ST-2	Lt. blue gray sandy clay, very stiff, moist, medium plasticity, some caliche nodules		112	
		ST-3			108	
10						
		ST-4	-with thin sand seams 13' to 15'			
15						
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		109	
20						

LOG OF BORING NO. CP-57 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		ST-6			113	
25						
			-lt. blue green below 28'			
		ST-7			120	
30	TD					

LOG OF BORING NO. CP-58 SHEET 1 OF 2

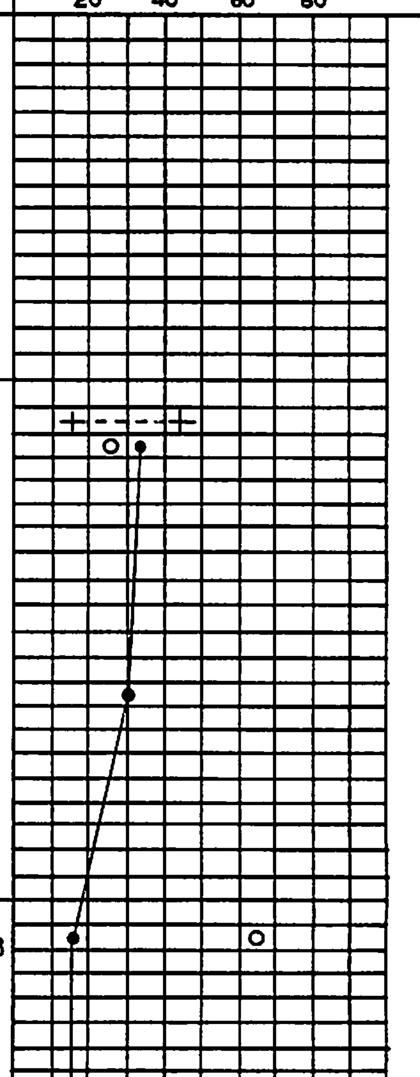
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12150, E 10000
GROUND ELEVATION: 186 MSL
DEPTH TO WATER IN BORING: N.D.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/12/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: Not Measured
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Brown silty sand, loose, poorly graded, fine grained, moist		
		SS-1		2/3/5	
5		SS-2		5/5/3	
		ST-3	Lt. blue gray silty clay, very stiff, moist, medium plasticity, with caliche nodules		95
10					
		ST-4			95
15					
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		113
20					

COHESION, KIP/SQ FT
1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT
20 40 60 80



LOG OF BORING NO. CP-58 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1 2 3 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20 40 60 80)
		ST-6			114	
25						
		ST-7			114	
30						

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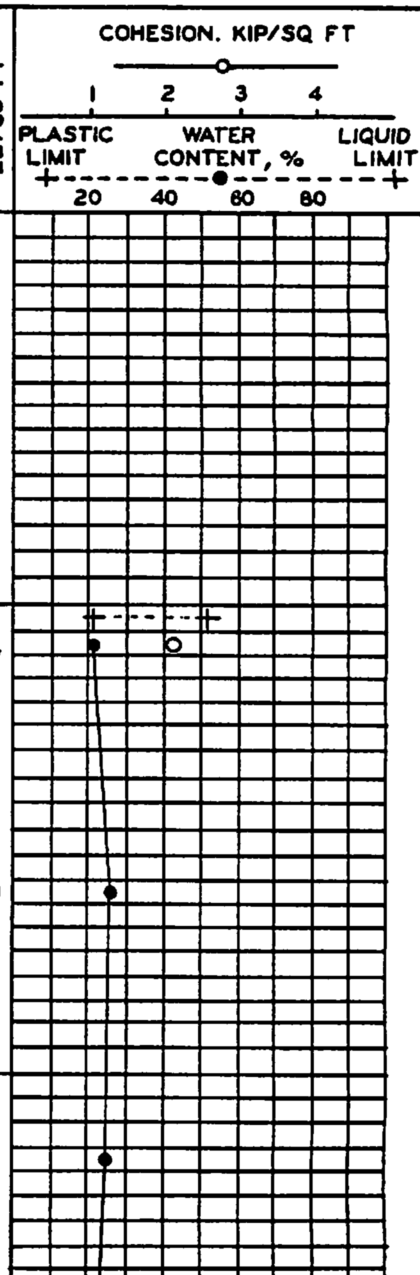
LOG OF BORING NO. CP-59 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 12150, E 9800	DRILLING DATE: 12/12/77 TO
GROUND ELEVATION: 185 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Brown silty sand, loose, poorly graded, fine grained, moist		
		SS-1		2/2/4	
5		SS-2		3/3/3	
		ST-3	Lt. blue gray sandy clay, very stiff, moist, medium plasticity, some caliche nodules		107
10					
		ST-4	-increasing sand, content 13' to 15'		100
15					
		ST-5	lt. green silty clay, stiff, moist, medium plasticity, some caliche nodules		95
20					



LOG OF BORING NO. CP-59 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		108	
25						
		ST-7			110	
30	TD					

LOG OF BORING NO. CP-60 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

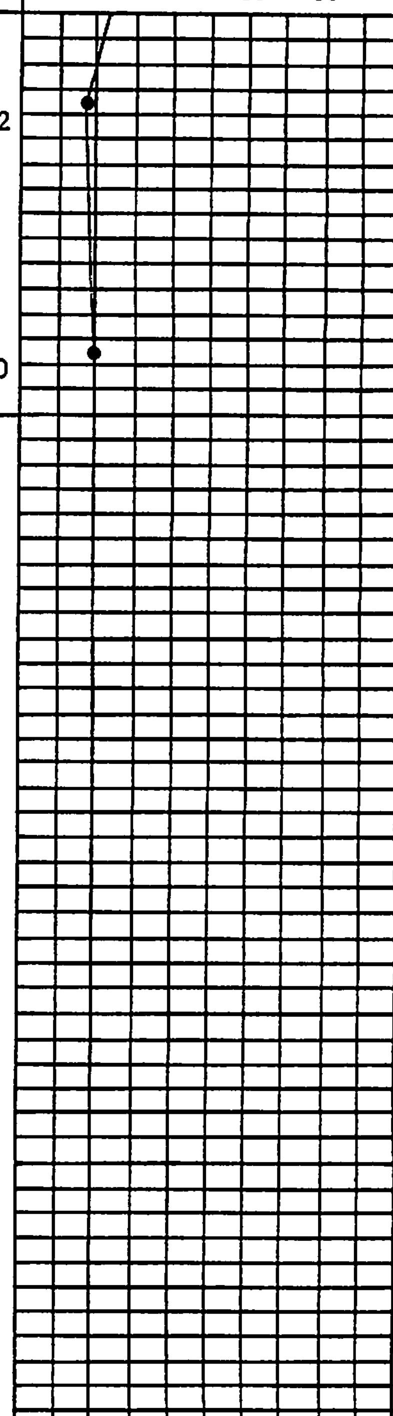
LOCATION: N 11900, E 9850	DRILLING DATE: 12/12/77 TO
GROUND ELEVATION: 185 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	2/3/5		
5		SS-2	-medium dense below 4.5'	4/4/8		
		ST-3	Lt. Blue gray silty clay, very stiff, moist, medium plasticity, some sand and caliche nodules		93	
10						
		ST-4	-with thin sand seams 13' to 15'		120	
15						
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		93	
20						

LOG OF BORING NO. CP-60 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		ST-6			112	
25						
		ST-7			110	
30						
	TD					



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LOG OF BORING NO. CP-61 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11900, E 10000	DRILLING DATE: 12/12/77 TO
GROUND ELEVATION: 186 MSL	COMPLETION DEPTH: 30 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

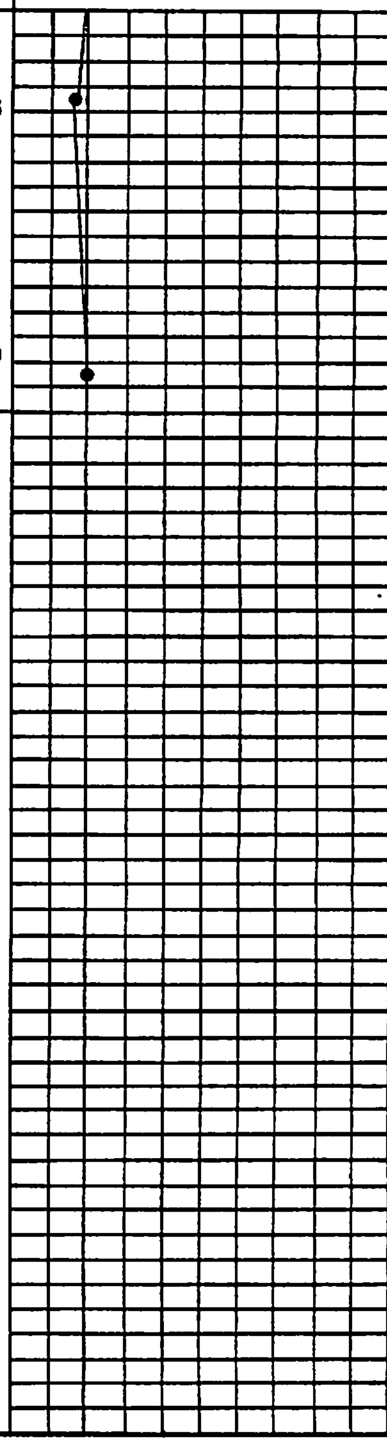
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
		SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	2/3/4		
5		SS-2	-medium dense below 4.5'			
		ST-3	Lt. blue gray sandy clay, very stiff, moist, medium plasticity		107	
10						
		ST-4	-with sand seams below 13'		99	
15						
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		102	
20						

LOG OF BORING NO. CP-61 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6			113
25					
		ST-7			110
30	TD				

COHESION, KIP/SQ FT: 1 2 3 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



LOG OF BORING NO. RP-64 SHEET 1 OF 1

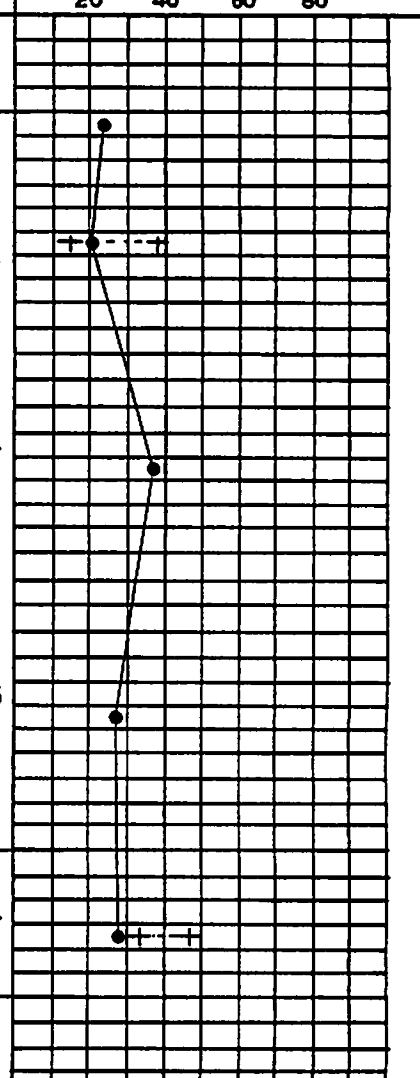
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11680, E 8930
GROUND ELEVATION: 176 MSL
DEPTH TO WATER IN BORING: N.D.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/13/77 TO
COMPLETION DEPTH: 20 FT.
DATE WATER MEASURED: Not Measured
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Brown silty sand, very loose poorly graded, fine grained moist		
		SS-1	Lt. blue gray sandy clay, very stiff, moist, medium plasticity	1/1/2	
5		ST-2			111
		ST-3	-with caliche nodules below 8.5'		84
10					
		ST-4			95
15					
		ST-5	White clayey silt, very dense, damp, low plasticity, with caliche nodules		94
20	TD				

COHESION, KIP/SQ FT: 1, 2, 3, 4
PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80



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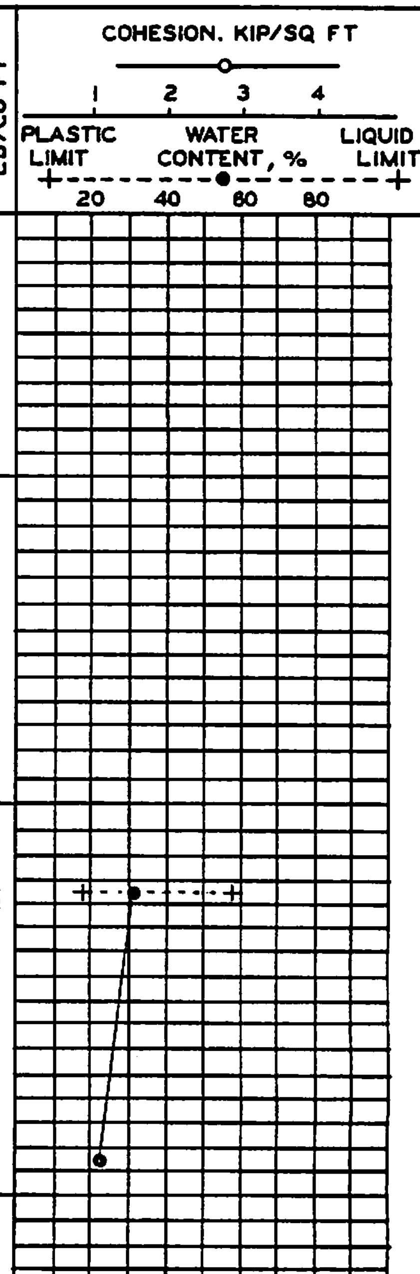
LOG OF BORING NO. RP-65 SHEET 1 OF 1

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 1150, E 9100	DRILLING DATE: 12/14/77 TO
GROUND ELEVATION: 178 MSL	COMPLETION DEPTH: 20 FT.
DEPTH TO WATER IN BORING: N.D.	DATE WATER MEASURED: Not Measured
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING-1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
0–5		SS-1	Black silty sand, medium dense, poorly graded, fine to med. grained, moist, slightly organic (fill)	2/4/8	
5		SS-2		1/3/5	
5–11.5		ST-3	Brown silty sand, loose, poorly graded, fine grained, moist, some organic fragments		
11.5–20		ST-4	Lt. blue gray sandy clay, very stiff, moist, medium plasticity, some caliche nodules		96
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		103
20	TD				



LOG OF BORING NO. FS-66 SHEET 1 OF 3

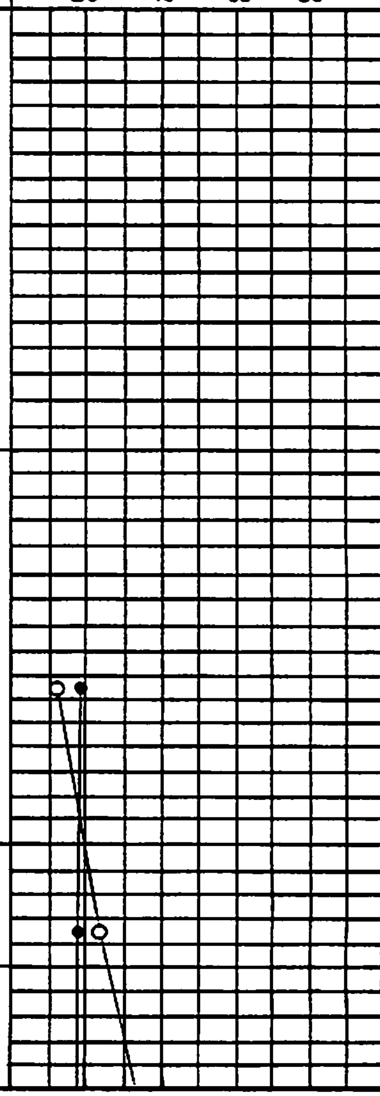
CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11350, E 9670	DRILLING DATE: 12/13/77 TO
GROUND ELEVATION: 186 MSL	COMPLETION DEPTH: FT.
DEPTH TO WATER IN BORING: Caved	DATE WATER MEASURED: 12/14/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Lt. tan silty sand, very loose, poorly graded, fine grained, moist	1/1/2	
5		SS-2	-medium dense below 5'	1/7/12	
		SS-3		4/5/6	
10			Lt. blue gray sandy clay, stiff moist, medium plasticity		
		ST-4	-sand lenses 13' to 15'		109
15					
		ST-5	Lt. green silty clay, very stiff, moist, medium plasticity		94
20					

COHESION, KIP/SQ FT: 1 2 3 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20 40 60 80



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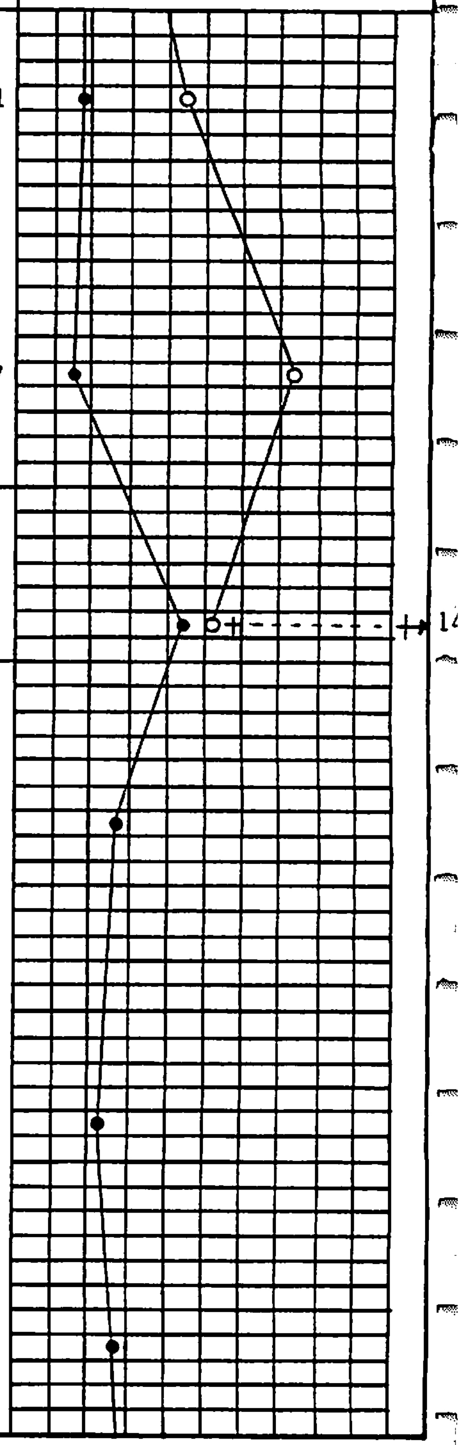
LOG OF BORING NO. FS-66 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity		111
25					
		ST-7	-with calcareous filled joints 28' to 30'		117
30					
		ST-8	Lt. green silty clay, very stiff, damp, high plasticity		74
35					
		ST-9	Lt. green silty sand, very dense, poorly graded, fine to medium grained, with thin cemented seams throughout		
		SS-10		50 (5)	
40					
		SS-11	-with hard cemented zone 47' to 52'	40/15 (5)	
45					
		SS-12		50 (1)	
50					

COHESION, KIP/SQ FT: 1, 2, 3, 4

PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT: 20, 40, 60, 80



LOG OF BORING NO. FS-66 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT / WATER CONTENT, % / LIQUID LIMIT (20, 40, 60, 80)
		SS-13	-some sandy clay seams below	21/25/24		
55						
		SS-14		20/15/19		
60	TD					

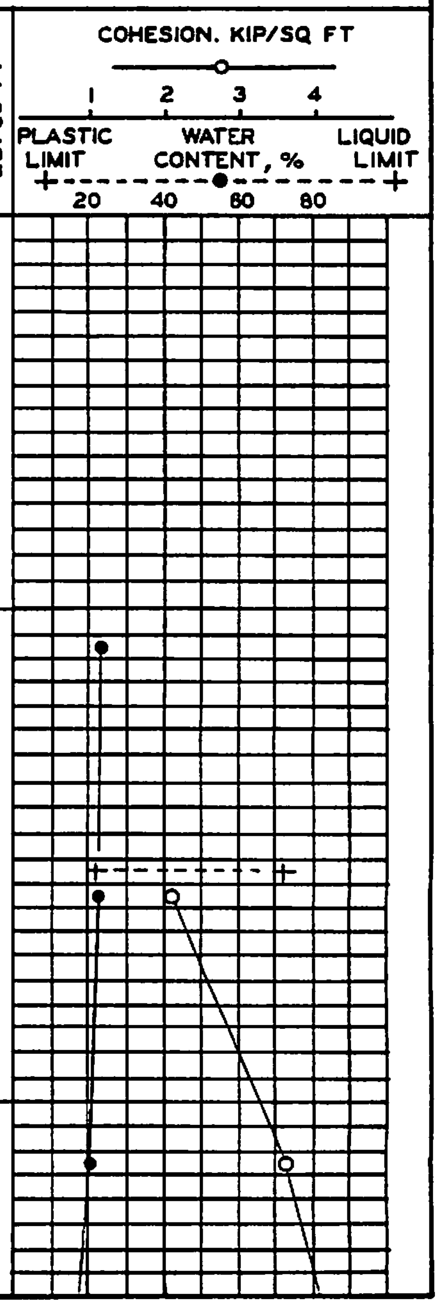
LOG OF BORING NO. LH-67 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 1150, E 9680
GROUND ELEVATION: 182 MSL
DEPTH TO WATER IN BORING: 4.2 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/4/77 TO
COMPLETION DEPTH: 30 FT.
DATE WATER MEASURED: 12/13/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

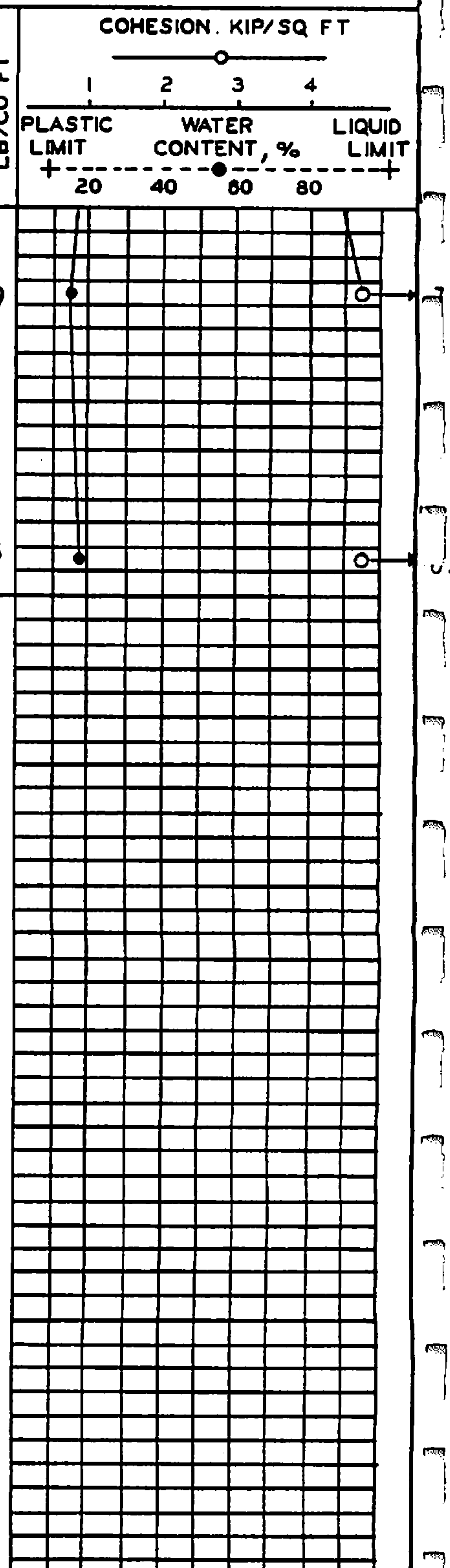
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	3/4/5	
5		SS-2	-medium dense and white below 4.5'	3/5/14	
		ST-3	Lt. blue gray, sandy clay, very stiff, moist, medium plasticity		98
10			-with sand seams 8' to 10'		
		ST-4			101
15			-increasing sand content below 14'		
		ST-5	Lt. gray and tan sandy clay, hard, damp, medium plasticity		108
20					



LOG OF BORING NO. LH-67 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6			119
25					
		ST-7	-with caliche nodules below 28'		115
30	TD				

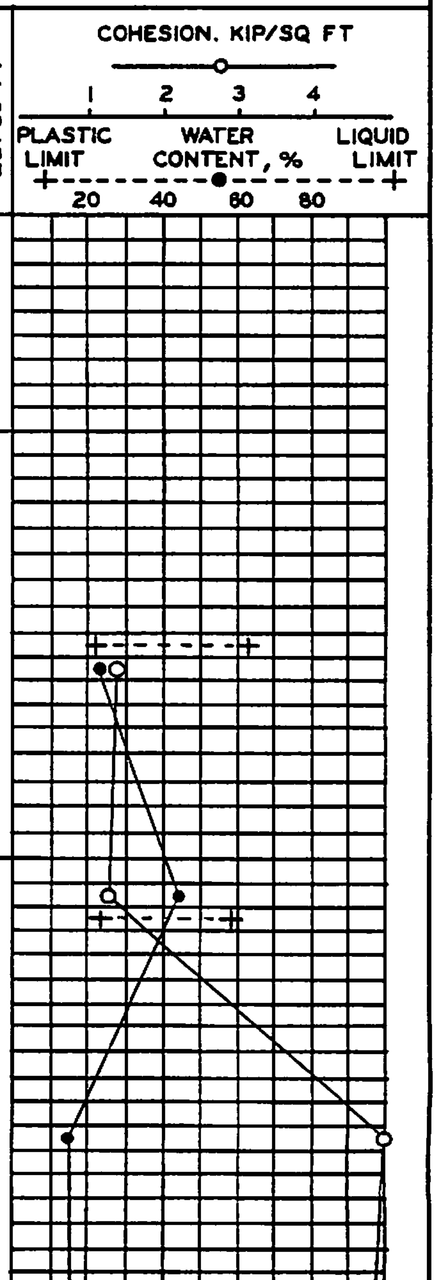


LOG OF BORING NO. C-68 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11140, E 10250	DRILLING DATE: 12/3/77 TO
GROUND ELEVATION: 184 MSL	COMPLETION DEPTH: 40 FT.
DEPTH TO WATER IN BORING: 3.0 Ft.	DATE WATER MEASURED: 12/4/77
DRILLING COMPANY: WARE LIND ENGRS.	DRILLERS: POWELL, BREWER
DRILLING RIG: FAILING - 1500	ENGINEERS: DURYEE, ZEY
DRILLING TYPE: WASH BORE	HOLE SIZE: 4-INCH

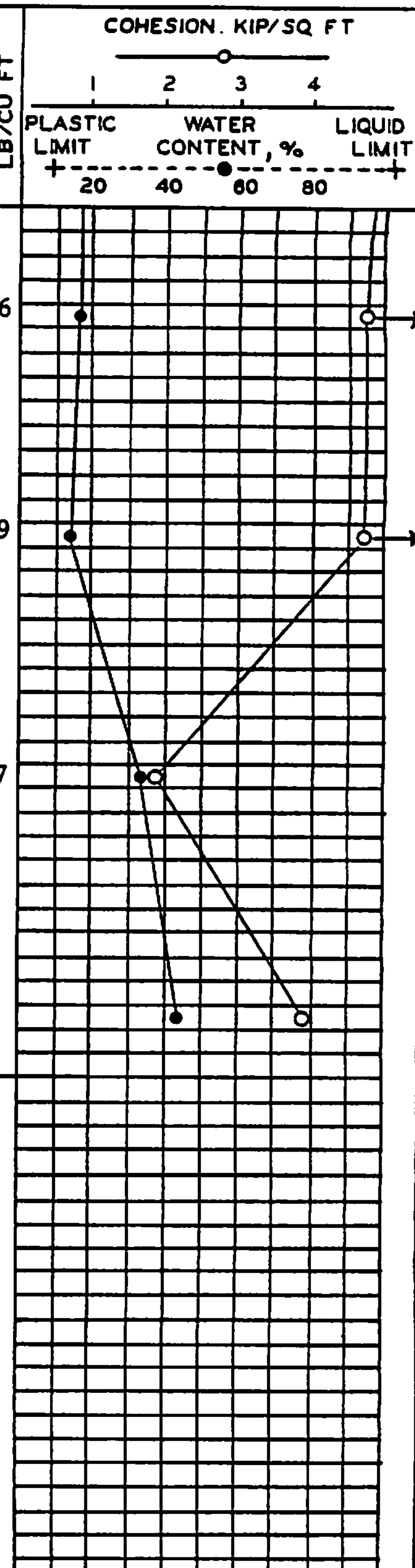
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained, moist, some organic material	3/3/5	
5		SS-2	Lt. blue gray sandy clay, stiff moist medium plasticity, some sand and caliche nodules	7/3/6	
		ST-3			105
10					
		ST-4	Lt. gray and tan sandy clay, hard, damp, medium plasticity		79
15					
		ST-5			117
20					



LOG OF BORING NO. C-68 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT; PLASTIC LIMIT / WATER CONTENT, % / LIQUID LIMIT
		ST-6			116	
25						
		ST-7	-with caliche nodules 28' to 35'		119	
30						
		ST-8	-gray green below 33'		87	
35						
		ST-9	-with cemented seams below 38'		82	
40	TD					
45						



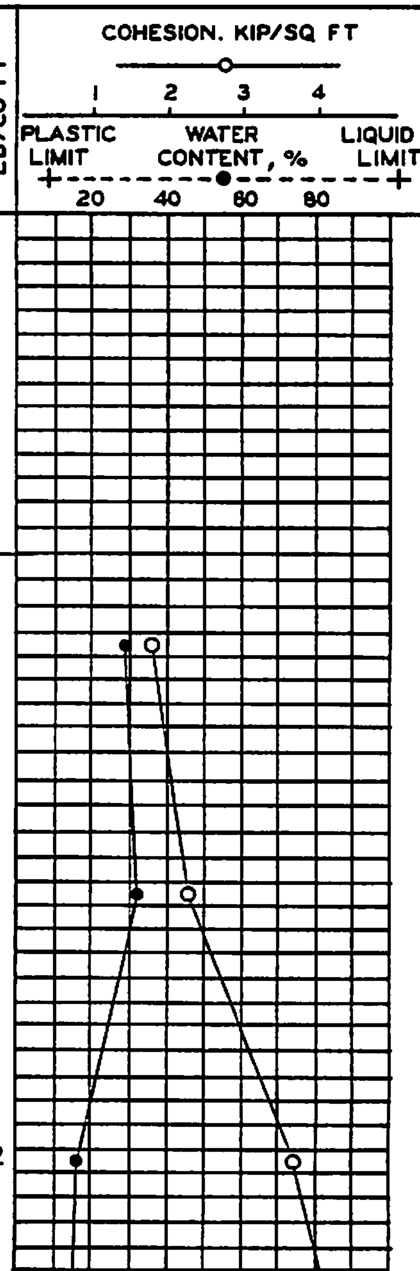
LOG OF BORING NO. WW-69 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 11140, E 10400
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: 3.2 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/3/77 TO
COMPLETION DEPTH: 40 FT.
DATE WATER MEASURED: 12/13/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

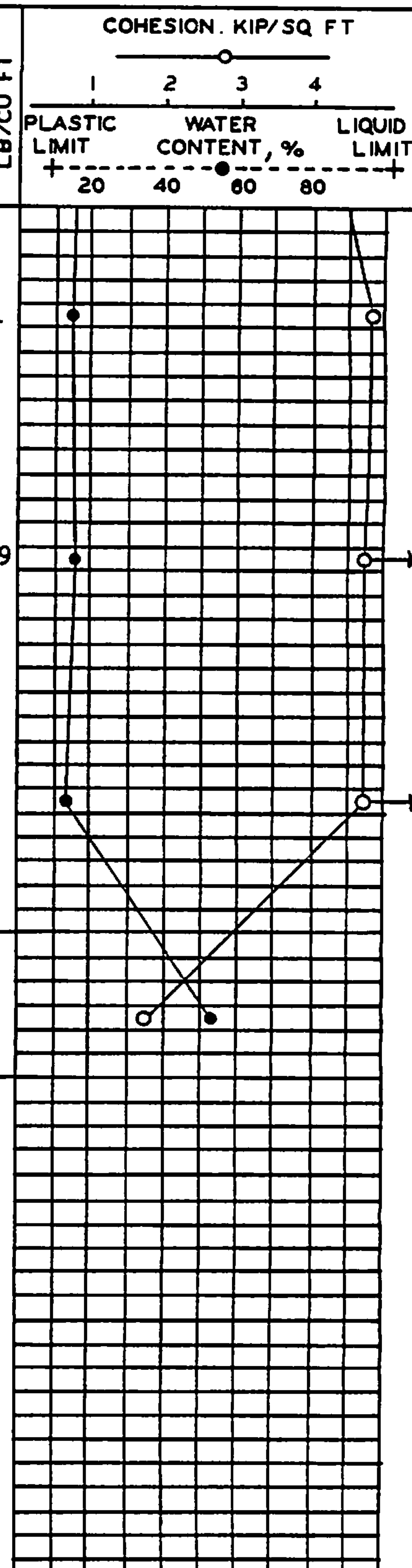
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained, wet	2/3/3	
5		SS-2	-medium dense and white below 4.5'	3/6/14	
		ST-3	Lt. gray and tan sandy clay, very stiff, damp, medium plasticity		97
10					
		ST-4	-hard below 13'		88
15					
		ST-5	-with caliche nodules 18' to 20'		112
20					



LOG OF BORING NO. WW-69   SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
25		ST-6			121
30		ST-7			119
35		ST-8	-increasing sand content below 33'		126
40		ST-9	Lt. tan silty clay, stiff, damp, medium plasticity, with caliche nodules		69
	TD				



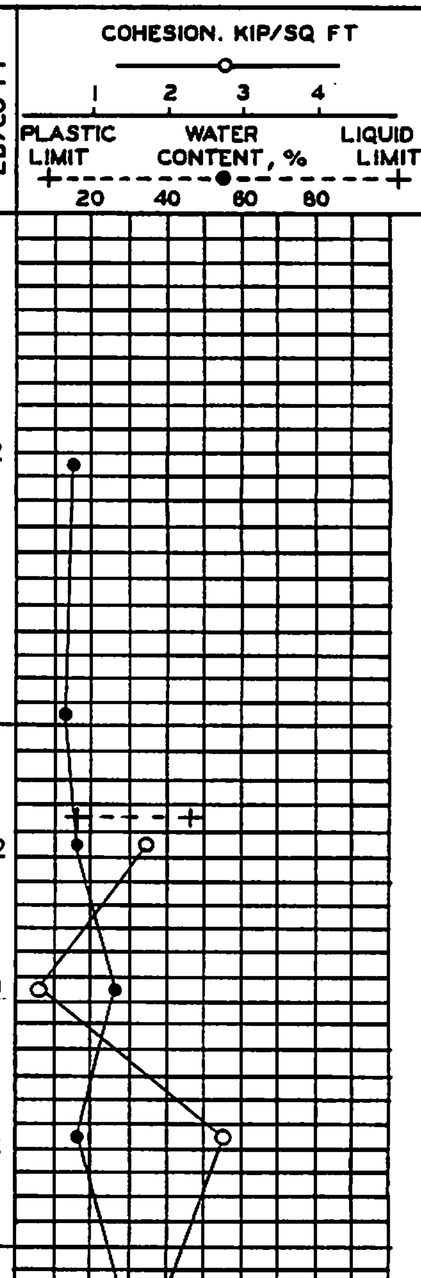
LOG OF BORING NO. FG-70 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10650, E 10400
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: 1.0 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/4/77 TO 12/5/77
COMPLETION DEPTH: 54.5 FT.
DATE WATER MEASURED: 12/6/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, medium dense, poorly graded, fine to med. grained wet	5/10/10	
5		ST-2			112
		SS-3		9/12/13	
10		SS-4		9/8/8	
		ST-5	Gray sandy clay, hard, damp, medium plasticity		112
15		ST-6	-with sand seams and sand filled joints below 15'		99
20		ST-7			112



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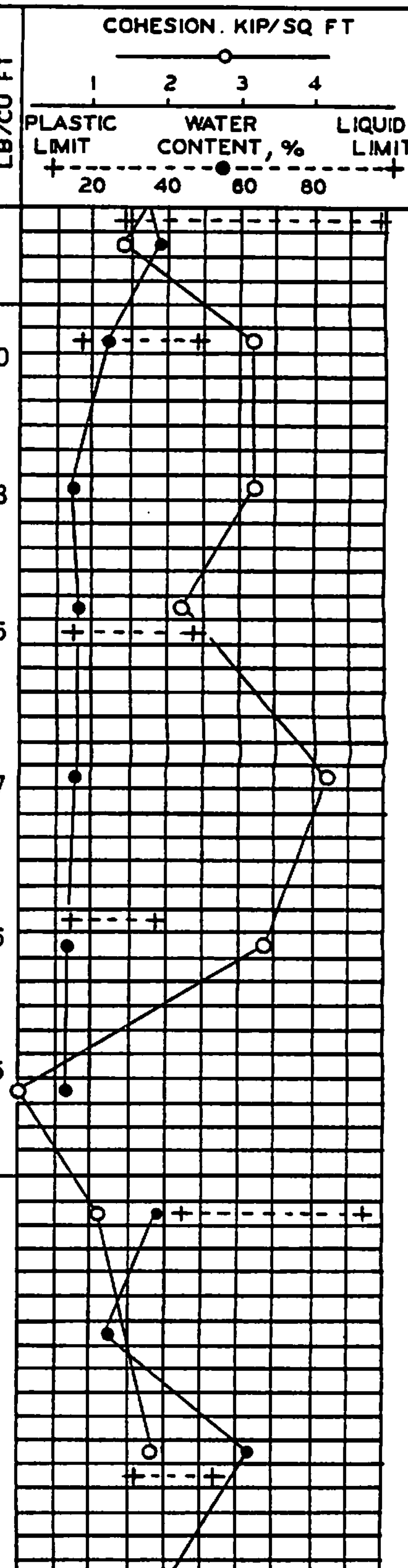
LOG OF BORING NO. FG-70 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-8	Lt. green silty clay, stiff, moist, medium plasticity		83
25		ST-9	Lt. gray and tan sandy clay, hard, damp, medium plasticity		100
		ST-10	-with sand seams 24' to 26'		118
30		ST-11	-with some calcareous filled joints		115
35		ST-12			117
		ST-13			125
40		ST-14	-increasing sand content below 39'		115
		ST-15	Green silty clay, stiff, moist medium plasticity, some sand		79
45		ST-16	-with thin sandstone seams below 45'		
50		ST-17			68



LOG OF BORING NO. FG-70 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		SS-18	Lt. green sand, very dense, poorly graded, damp, with cemented seams	25/22/40		
		DB-19				
		DB-20				
55	TD					

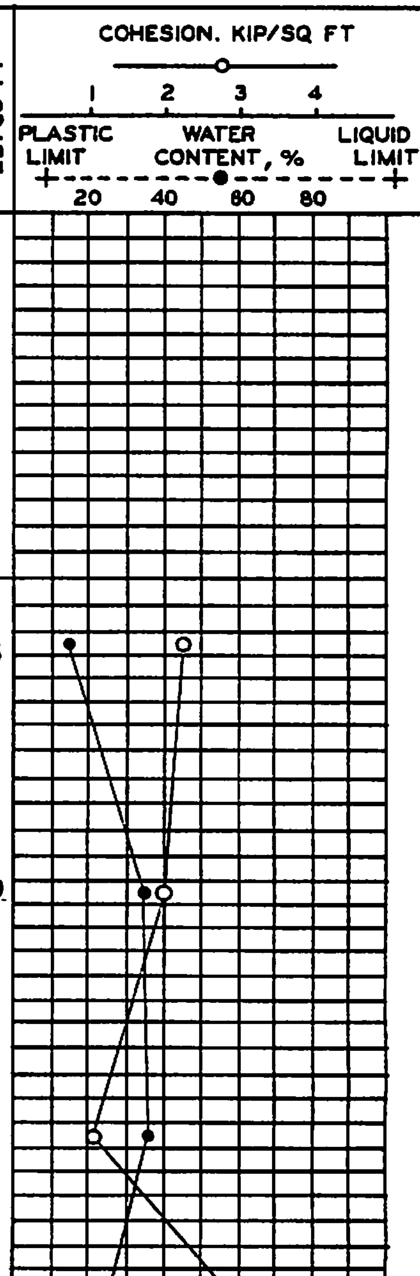
LOG OF BORING NO. FG-71 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10800, E 10400
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: 2.3 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/6/77 TO
COMPLETION DEPTH: 60 FT.
DATE WATER MEASURED:
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

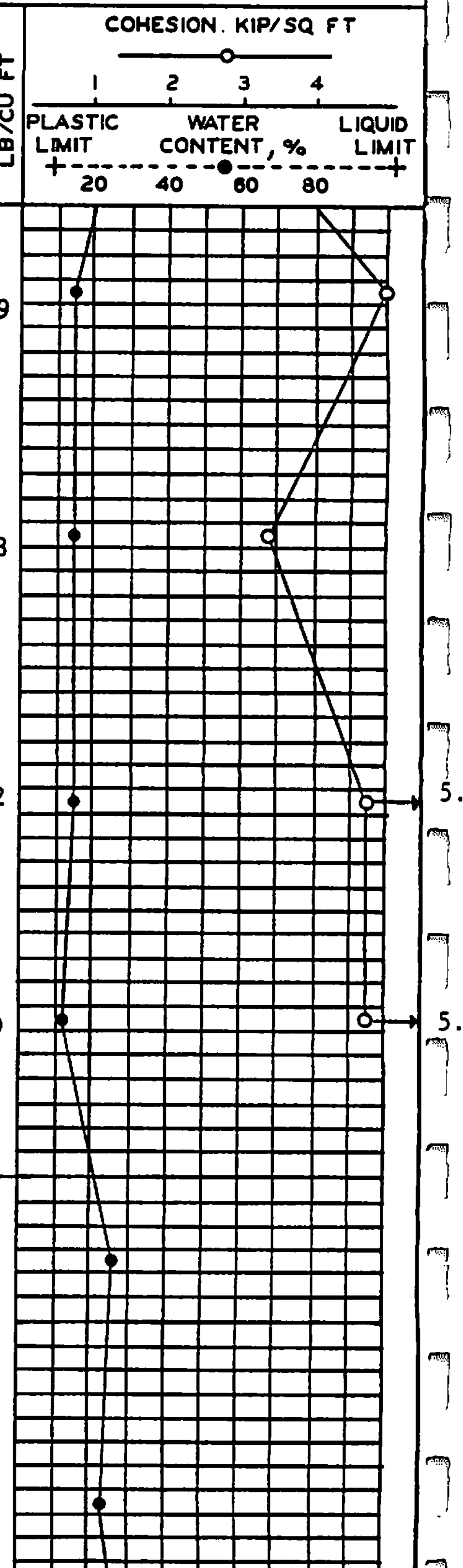
DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		SS-1	Brown silty sand, loose, poorly graded, fine grained, wet	5/3/3	
5		SS-2		2/3/3	
		ST-3	Lt. blue green sandy clay, very stiff, damp, medium plasticity		115
10					
		ST-4	-with caliche nodules 13' to 15'		79
15					
		ST-5	-hard below 18'		84
20					



LOG OF BORING NO. FG-71 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
		ST-6	Lt. gray and tan sandy clay, damp, medium plasticity		119
25					
		ST-7			118
30					
		ST-8			122
35					
		ST-9	-with cemented seams below 38'		129
40					
		SS-10	Lt. gray clayey sand, very dense, damp, with thin cemented seams throughout	70 (4)	
45					
		SS-11		70 (3)	
50					



LOG OF BORING NO. FG-71   SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4) / PLASTIC LIMIT, WATER CONTENT, %, LIQUID LIMIT (20, 40, 60, 80)
		SS-12		28/50(5)		
55			-with cemented lenses 57' to 58.5' and 59' to 60'			
60	TD					

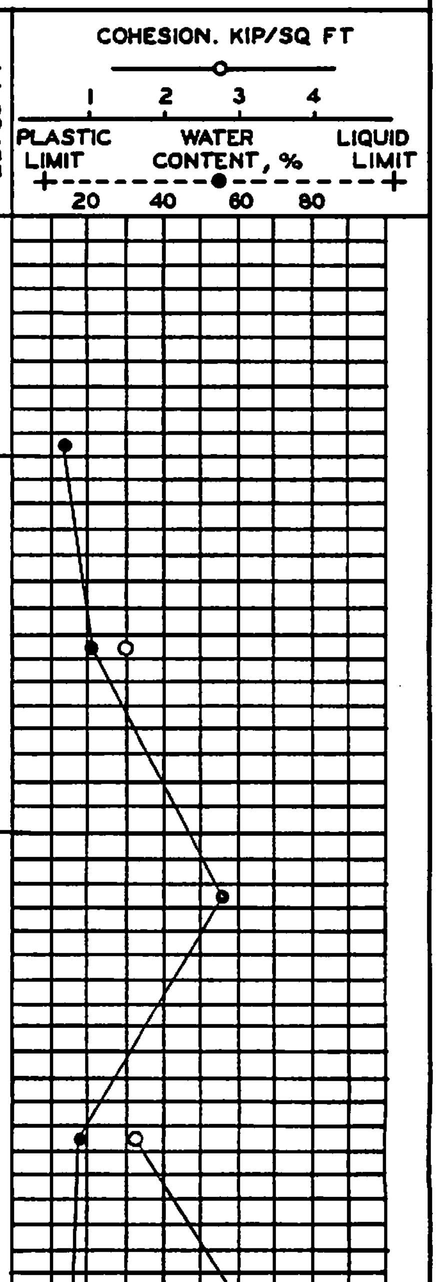
LOG OF BORING NO. FG-72 SHEET 1 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10950, E 10400
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: 3.0 Ft.
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/6/77 TO
COMPLETION DEPTH: 59 FT.
DATE WATER MEASURED: 12/13/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

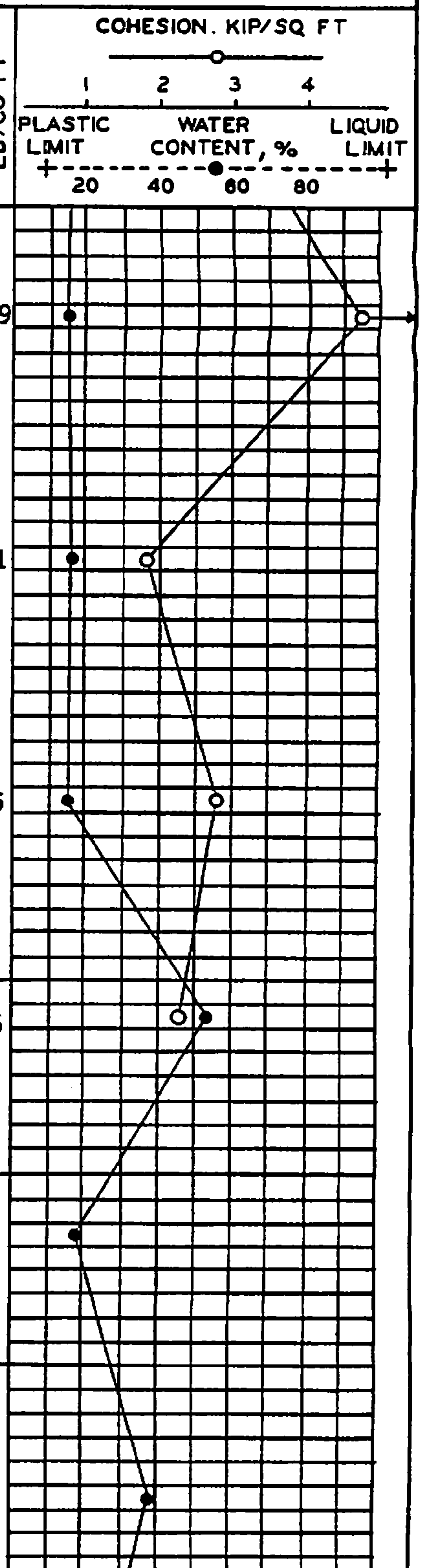
DEPTH, FT.	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
	SS-1	Brown silty sand, loose, poorly graded, fine grained, moist	5/2/5	
5	SS-2	-medium dense and white below 4.5'	3/5/11	
		Lt. blue gray sandy clay, very stiff, moist, medium plasticity, with some caliche nodules		
10	ST-3			104
15	ST-4	Lt. gray and tan sandy clay, hard, damp, medium plasticity		66
20	ST-5			102



LOG OF BORING NO. FG-72 SHEET 2 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
25		ST-6			119
30		ST-7	-with caliche nodules 28' to 30'		111
35		ST-8			115
40		ST-9	Lt. green silty clay, hard, damp, friable, high plasticity, some sand		56
45		SS-10	Lt. tan clayey sand, very dense, damp, with cemented seams	50 (6)	
50		SS-11	White sand, very dense, poorly graded, fine grained, damp, with cemented seams	33/50 (6)	

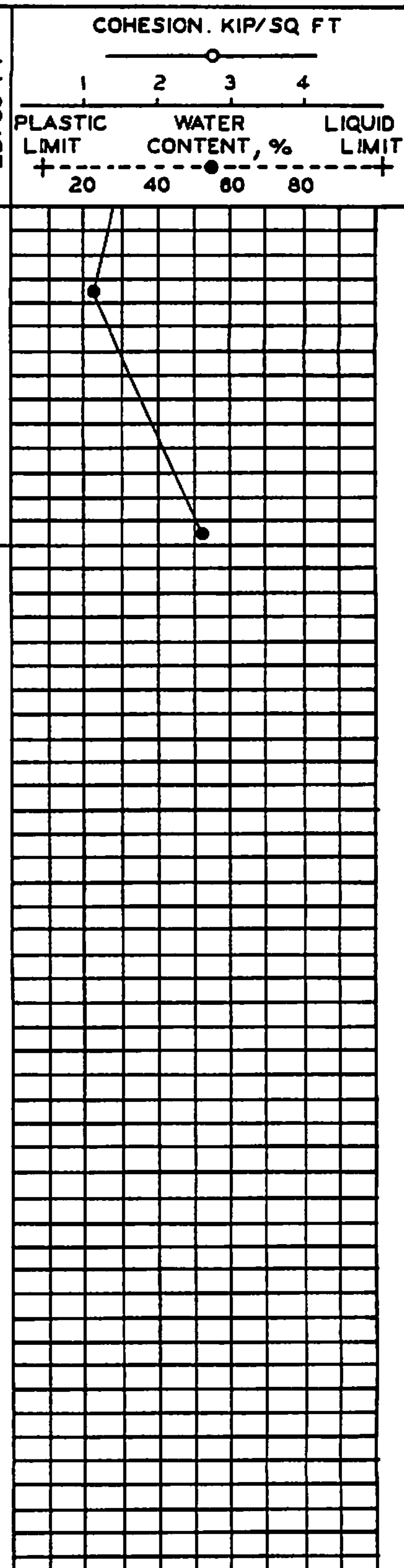


Burns & McDonnell
Engineers-Architects-Consultants

LOG OF BORING NO. FG-72 SHEET 3 OF 3

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT
			Lt. tan clayey sand, very dense, damp, with cemented seams		
		SS-12		25/36/72	
55					
		SS-13		50 (6)	
	TD				
60					



LOG OF BORING NO. U-73 SHEET 1 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

LOCATION: N 10500, E 10380
GROUND ELEVATION: 184 MSL
DEPTH TO WATER IN BORING: Surface
DRILLING COMPANY: WARE LIND ENGRS.
DRILLING RIG: FAILING - 1500
DRILLING TYPE: WASH BORE

DRILLING DATE: 12/13/77 TO
COMPLETION DEPTH: 46 FT.
DATE WATER MEASURED: 12/14/77
DRILLERS: POWELL, BREWER
ENGINEERS: DURYEE, ZEY
HOLE SIZE: 4-INCH

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT – WATER CONTENT, % – LIQUID LIMIT (20, 40, 60, 80)
0–5			Brown silty sand, loose, poorly graded, fine grained wet			
10		ST-1	Lt. blue gray silty clay, very stiff, damp, med. plasticity, some caliche and sand seams			
		ST-2	-increasing amount of caliche below 12'			
15		ST-3				
		ST-4				
20		ST-5				

LOG OF BORING NO. U-73 SHEET 2 OF 2

CITY OF GAINESVILLE, FLORIDA
DEERHAVEN UNIT NO. 2
PROJECT NO. 76-077-1

DEPTH, FT.	SYMBOL	SAMPLE NO.	DESCRIPTION OF MATERIAL	BLOW COUNT	UNIT DRY WEIGHT LB/CU FT	COHESION, KIP/SQ FT (1, 2, 3, 4); PLASTIC LIMIT — WATER CONTENT, % — LIQUID LIMIT (20, 40, 60, 80)
		ST-6	Lt. gray and tan sandy clay, hard, damp, medium plasticity			
25						
		ST-7				
30		ST-8				
		ST-9	-with calcareous filled seams 33' to 35'			
35		ST-10				
		ST-11	-with calcareous filled seams 38' to 40'			
40		ST-12				
45		ST-13	Lt. green silty clay, hard, damp, high plasticity			
	TD					

APPENDIX IV

LABORATORY TEST RESULTS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN, % at 0.5 σ_1	STRAIN, % at σ_1	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
L-1	SS-1	1.5-3.0	fine sand											*	
	SS-2	4.5-6.0	fine sand											*	
	SS-4	13.5-15.0	sandy clay	18.5										*	
	ST-5	18.0-20.0	could not find											*	
	ST-6	23.0-25.0	silty clay	50.0							70.8				
	ST-7	28.0-30.0	clay, calcareous	25.8	68	24	44								$k = 1.01 \times 10^{-8}$ cm/sec
L-2	SS-1	2.5-4.0	fine sand, sl clayey											*	
	SS-2	4.5-6.0	fine sand											*	
	SS-3	8.5-10.0	clayey fine sand											*	
	ST-4	13.0-15.0	silty clay	42.1							81.2				
	ST-5	18.0-20.0	clay	50.9	128	52	76				73.4				
	ST-6	23.0-25.0	sandy clay	22.9							106.8				$k=1.21 \times 10^{-8}$ cm/sec
	ST-7	28.0-30.0	sandy clay	21.0	62	21	41				108.1				Minus 200 = 57.7%
L-3	SS-1	1.5-3.0	fine sand											*	
	ST-3	8.0-10.0	sandy clay	22.4	60	22	38				104.1				
	ST-4	13.0-15.0	clay	80.0							52.5				
	ST-5	18.0-20.0	sandy clay	18.2	46	17	29								$k=1.42 \times 10^{-8}$ cm/sec Minus 200 = 64.6%

* SEE ATTACHED CURVE SHEETS

WARE LIND ENGINEERS

WARE LIND ENGINEERS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_1	STRAIN,% at σ_1					
L-3	ST-6	23.0-25.0	sandy clay	15.9							117.4				
	ST-7	28.0-30.0	sandy clay	17.1							117.4				Minus 200 = 63.8%
L-4	SS-3	8.5-10.0	fine sand											*	
	SS-4	13.5-15.0	sandy clay	20.7											
	ST-5	18.0-20.0	sandy clay	70.1							63.7				Minus 200 = 72.2%
	ST-6	23.0-25.0	calcareous material	32.4	36	29	7				89.8				
	ST-7	28.0-30.0	sandy clay	17.9	49	18	31								$k = 1.93 \times 10^{-8}$ cm/sec Minus 200 = 61.3%
L-5	SS-2	4.5-6.0	clayey fine sand											*	
	ST-4	13.0-15.0	silty clay, calcareous	47.3											
	ST-5	18.0-20.0	silty clay, calcareous	76.2											
	ST-6	23.0-25.0	clay with sand seams	12.5	63	20	43								$k = 6.63 \times 10^{-8}$ cm/sec
	ST-7	28.0-30.0	sandy clay	17.0							113.1				
L-6	SS-2	4.5-6.0	fine sand, slightly clayey											*	
	SS-3	8.5-10.0	fine sand											*	
	ST-5	18.0-20.0	clay, calcareous	34.1	108	33	75								$k = 3.59 \times 10^{-7}$ cm/sec Minus 200 = 37.3%
	ST-6	23.0-25.0	silty clay	40.0											
	ST-7	28.0-30.0	silty clay, calcareous	32.0											

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at $0.5\sigma_f$	STRAIN,% at σ_f					
L-7	SS-4	13.5-15.0	fine sand											*	
	ST-5	18.0-20.0	sandy clay	26.5	48	22	26				99.7				$k = 0.97 \times 10^{-4}$ cm/sec Minus 200 = 78.4%
	ST-6	23.0-25.0	sandy clay, very calcareous	81.7							54.9				
	ST-7	28.0-30.0	silty clay	45.3	65	45	20				79.4				
AP-8	ST-1	1.0-3.0	silty fine sand	15.6										*	Direct shear
	SS-2	4.5-6.0	silty fine sand	15.4											
	ST-3	8.0-10.0	clayey fine sand	14.3										*	Direct shear
	ST-4	13.0-15.0	clayey sand	21.5							101.9				
	ST-5	18.0-20.0	sandy clay	27.5				3.85	0.7	10.0	97.1				
	ST-6	23.0-25.0	silty clay	39.3				0.92	1.5	5.8	82.1				
	ST-7	28.0-30.0	silty clay	38.9				1.21	2.7	6.3	84.8				
AP-9	SS-2	4.5-6.0	clayey fine sand											*	
	SS-4	13.5-15.0	fine sand											*	
	ST-6	23.0-25.0	clay	84.8	185	57	128	3.05	0.6	1.8	51.1				
	ST-7	28.0-30.0	clay	50.0							74.0				
AP-10	SS-1	1.5-3.0	fine sand with org. mat.											*	
	SS-3	8.5-10.0	clayey fine sand											*	

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN % at 0.5 σ_1	STRAIN % at σ_1					
AP-10	SS-5	18.5-20.0	clayey fine sand	14.0											
	ST-6	23.0-25.0	silty clay with calcareous material	27.6				2.98	0.9	2.0	95.0				
	ST-7	28.0-30.0	clay, calcareous	65.4							62.9				
AP-11	SS-2	4.5-6.0	clayey fine sand											*	
	SS-3	8.5-10.0	fine sandy clay	10.9	32	15	17								Minus 200 = 77.6%
	ST-4	13.0-15.0	sandy clay with sand pockets	24.7				2.73	1.2	5.5	100.7				
	ST-5	18.0-20.0	silty clay	36.9				0.39	1.2	6.8	88.1				
	SS-6	23.5-25.0	silty clay	17.8											
	SS-7	28.5-30.0	silty clay	38.5											
AP-12	SS-3	8.5-10.0	clayey fine sand											*	
	ST-4	13.0-15.0	sandy clay	25.0	72	21	51				102.7				
	ST-5	18.0-20.0	calcareous material	32.6	37	33	4				90.2				
	ST-6	23.0-25.0	silty clay, calcareous	51.7							76.7				
	ST-7	28.0-29.0	sandy clay	23.9											
	SS-8	29.0-30.5	silty clay	17.2											
AP-13	SS-1	1.5-3.0	fine sand											*	
	SS-3	8.5-10.0	clayey fine sand											*	

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN % at $0.5\,\sigma_f$	STRAIN % at σ_f					
AP-13	ST-6	23.0-25.0	clay, slickensided	53.5				1.38	0.8	3.1	69.8				
	SS-7	28.5-30.0	silty clay	13.0											
RR-14	SS-1	1.5-3.0	silty fine sand											*	
	ST-3	8.0-10.0	silty clay with calcareous cementations	23.6				2.02	0.4	4.7	98.9				
	ST-4	13.0-15.0	sandy clay	27.5							93.1				
	ST-5	18.0-20.0	sandy clay	18.4							112.6				
RR-15	SS-1	1.5-3.0	silty fine sand											*	
	ST-3	8.0-10.0	No sample												
	ST-4	13.0-15.0	clay	38.5							86.2				
	ST-5	18.0-20.0	sandy clay	19.3							107.1				
RR-16	SS-1	1.5-3.0	fine sand											*	
	ST-3	8.0-10.0	sandy clay	21.5							106.5				
	ST-4	13.0-15.0	clay, slightly silty, with sand partings	55.8				1.79	2.0	4.8	68.9				
	ST-5	18.0-20.0	sandy clay	24.7							98.0				
RR-17	SS-1	1.5-3.0	silty fine sand											*	
	ST-3	8.0-10.0	sandy clay with calcareous nodules	20.8				4.47	1.3	9.1	106.7				
	ST-4	13.0-15.0	silty clay, calcareous	50.4							74.1				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f					
RR-17	ST-5	18.0-20.0	silty clay	43.4							77.3				
RR-18	SS-1	1.5-3.0	silty fine sand, organic											*	
	ST-4	13.0-15.0	clay, calcareous												Triaxial
	ST-5	18.0-20.0	fine sand, calcareous	31.1							92.4				
RR-19	SS-1	1.5-3.0	clayey sand											*	
	ST-2	4.0-6.0	sandy clay	16.2				3.12	0.9	4.7	116.2				
	ST-3	8.0-10.0	clayey sand	15.2							118.8				
	SS-4	13.5-15.0	silty fine sand, slightly clayey	31.7											
	ST-5	18.0-20.0	silty clay	30.8							96.7				
RR-20	SS-1	1.5-3.0	fine sand											*	
	ST-3	10.0-12.0	sandy clay with organic material	13.7				2.97	1.7	7.8	115.5				
	ST-4	13.0-15.0	clay, calcareous	27.8							95.4				
	ST-5	18.0-20.0	sandy clay, calc.	28.0							97.9				
RR-21	SS-1	1.5-3.0	fine sand											*	
	ST-4	13.0-15.0	silty clay, calcareous	49.8				1.86	0.7	1.8	74.4				
	ST-5	18.0-20.0	clayey sand, calc.	22.5							105.2				
RR-22	SS-1	1.5-3.0	silty fine sand											*	

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
RR-22	ST-4	13.0-15.0	sandy clay	17.3				4.44	0.7	7.6	109.5				
	ST-5	18.0-20.0	sandy clay	24.9							100.6				
RR-23	SS-1	1.5-3.0	fine sand											*	
	ST-4	13.0-15.0	clay, calcareous with sand seams	23.4				2.98	0.8	5.5	97.2				
	ST-5	18.0-20.0	silty clay, calcareous	48.6							70.5				
RR-24	SS-1	1.5-3.0	silty fine sand											*	
	ST-3	8.0-10.0	sandy clay, calc.	22.4				4.02	1.5	5.1	106.2				
	ST-4	13.0-14.0	clayey sand	30.6											unable to run density
	ST-6	18.0-20.0	clay	49.5							72.3				
RR-25	SS-1	1.5-3.0	sandy clay											*	
	ST-1	4.0-6.0	sandy clay with roots	14.0				2.44	1.2	5.8	113.6				
	ST-3	8.0-10.0	calcareous material	23.7							93.9				
	ST-4	14.0-15.0	No sample												
	ST-5	20.0-22.0	No sample												
TH-26	ST-4	13.0-15.0	silty clay	34.7				2.28	0.5	1.1	88.6				
	ST-5	18.0-20.0	silty clay, calcareous	34.3				2.18	1.3	5.1	86.9				
	ST-6	23.0-25.0	sandy clay	18.0				4.66	0.5	2.0	109.7				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
TH-26	ST-7	28.0-30.0	sandy clay	16.9				12.03	1.3	6.5	114.5				
	ST-8	33.0-35.0	clayey fine sand												Triaxial
	ST-9	38.0-40.0	clayey fine sand												Triaxial
	ST-10	43.0-45.0	sandy clay	14.9				5.23	1.1	3.3	121.4				
	ST-11	48.0-50.0	clayey fine sand, calc.												Triaxial
	ST-12	53.0-55.0	clay with calc. seam												Triaxial
	ST-13	58.0-58.5	clayey sand	12.4							119.2				
	SS-14	58.5-59.0	silty fine sand, slightly clayey	11.2											
	ST-15	63.0-65.0	sandy clay	28.3											
	ST-16	68.0-70.0	clay with sand pockets	24.2							106.3				
	ST-17	73.0-75.0	silty fine sand, slightly clayey	18.0											
	SS-18	78.0-78.5	clay	52.3											
TH-27	ST-4	13.0-15.0	sandy clay, calc.												Triaxial
	ST-5	18.0-20.0	sandy clay	33.7	93	30	63	2.34	1.1	10.0	85.0	2.74			
	ST-6	23.0-25.0	sandy clay, calc.												Triaxial
	ST-7	28.0-30.0	sandy clay												Triaxial
	ST-8	33.0-35.0	sandy clay, calc.		31	16	15					2.83			Triaxial Minus 200 = 77.2%

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN % at $0.5\sigma_f$	STRAIN % at σ_f					
TH-27	ST-9	38.0-40.0	sandy clay, calc.												Triaxial
	ST-10	43.0-45.0	clayey fine sand												Triaxial
	SS-11	48.0-50.0	silty clay	15.1											
	ST-12	53.0-55.0	clay	37.1	112	46	66	3.14	0.3	1.0	85.0	2.85		*	
	ST-13	58.0-60.0	sandy clay	16.1				11.89	1.1	2.5	117.5				
	ST-14	63.0-65.0	clay	27.0				4.97	0.6	2.9	95.2				
	ST-15	68.0-70.0	clay, slickensided	51.6	151	51	100	4.32	0.4	1.1	71.4				
	SS-16	73.0-74.0	silty fine sand	12.9											
	SS-17	78.0-79.5	silty fine sand	14.1											
TH-28	ST-4	13.0-15.0	sandy clay	25.3				2.14	0.7	3.3	98.5				
	ST-5	18.0-20.0	calcareous material	50.6	52	47	5								No quart sample
	ST-6	23.0-25.0	sandy clay	22.7				7.03	1.5	10.9	107.0				
	ST-7	28.0-30.0	sandy clay	16.6				8.41	0.9	6.9	114.2				
	ST-8	33.0-35.0	sandy clay	17.5				5.05	1.0	5.8	112.7				
	ST-9	38.0-40.0	sandy clay	18.1				6.96	0.7	1.8	114.1				
	ST-10	43.0-45.0	clay with sand seams	19.0				6.94	1.1	4.4	114.9				
	SS-11	48.5-50.0	silty clay	16.2											

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
TH-28	SS-12	53.0-55.0	silty clay	16.9											
	ST-13	58.0-60.0	sandy clay	16.0	53	22	31	11.56	0.6	1.7	120.0	2.74			Swell Test Minus 200 = 55.3%
	ST-14	63.0-65.0	sandy clay	13.3							119.0				
	ST-15	68.0-70.0	clay with sand seams	18.1							107.5				
	SS-16	73.5-74.0	silty fine sand, slightly clayey	19.6											
	SS-17	78.5-80.0	silty fine sand, clayey	40.3											
TH-29	SS-1	1.5-3.0	fine sand											*	
	SS-2	4.5-6.0	fine sand											*	
	SS-3	8.5-10.0	fine sand											*	
	ST-4	13.0-15.0	sandy clay	30.7				1.72	0.8	4.4	92.3				
	ST-5	18.0-20.0	sandy clay	24.9							102.1				
	ST-6	23.0-25.0	sandy clay	16.0				6.83	1.1	10.0	112.4				
	ST-7	28.0-30.0	sandy clay		51	18	33					2.68			Swell Test Minus 200 = 74.5%
	ST-8	33.0-35.0	sandy clay		37	17	20					2.75			Swell Test Minus 200 = 67.7%
	ST-9	38.0-40.0	sandy clay		48	23	15					2.80			Swell Test Minus 200 = 77.5%
	ST-10	43.0-45.0	sandy clay		60	20	40					2.62			Swell Test Minus 200 = 66.0%
	SS-11	48.5-50.0	silty fine sand, clayey	17.6											

* SEE ATTACHED CURVE SHEETS

WARE LIND ENGINEERS

PLATE 1

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_1	STRAIN,% at σ_1					
TH-29	SS-12	53.5-55.0	sandy clay	19.7											
	ST-13	58.0-60.0	sandy clay	15.7							115.3				
	ST-14	63.0-65.0	clay, calcareous	24.0							98.0				
	ST-15	68.0-70.0	clay	41.8							78.2				
	SS-16	73.0-75.0	silty fine sand	12.6											
	SS-17	78.0-80.0	silty fine sand	13.2											
SH-30	ST-3	8.0-10.0	sandy clay	22.9				3.52	1.4	6.5	104.3				
	ST-4	13.0-15.0	sandy clay	42.5	100	43	57	4.73	1.2	3.6	77.8				Minus 200 = 44.0%
	ST-5	18.0-20.0	clay, slightly sandy, slickensided												Triaxial
	ST-6	23.0-25.0	sandy clay	19.6				9.02	1.4	11.8	110.0				
	ST-7	28.0-30.0	sandy clay	12.7	30	19	11	14.58	0.9	2.0	124.8				Minus 200 = 69.4%
	ST-8	33.0-35.0	sandy clay	16.7				11.74	1.4	7.6	117.3				
	ST-9	38.0-40.0	sandy clay	14.4				6.73	1.5	4.4	121.7				
	ST-10	43.0-45.0	sandy clay	15.7				6.85	1.4	6.5	118.1				
	ST-11	48.0-50.0	clay	44.8	69	39	30	4.90	1.4	2.5	76.8				Swell test
CS-31	ST-4	13.0-15.0	sandy clay	18.9				3.50	0.9	4.0	110.2				
	ST-5	18.0-20.0	clay	46.3							78.3				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at $0.5\sigma_f$	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
CS-31	ST-6	23.0-25.0	sandy clay	17.8				8.74	1.0	10.0	112.3				
	ST-7	28.0-30.0	sandy clay	17.8							113.9				
	ST-8	33.0-33.5	sandy clay	19.6							116.1				
	SS-9	38.5-40.0	sandy clay	13.2											
	SS-10	43.5-45.0	sandy clay	15.5											
	ST-11	48.0-50.0	clay	39.9	118	47	71				81.9				
	ST-12	53.0-55.0	sandy clay	23.2				6.37	1.1	5.5	104.2				
	SS-13	58.5-60.0	sandy clay	18.1											
CS-32	ST-3	8.0-10.0	sandy clay	22.9				3.72	0.8	20.0	103.3				
	ST-4	13.0-15.0	clay	28.2							94.1				
	ST-5	18.0-20.0	sandy clay	20.6				7.58	1.4	13.6	107.5				
	ST-6	23.0-25.0	sandy clay	21.5							108.3				
	ST-7	28.0-30.0	sandy clay	14.1											
	ST-8	33.0-35.0	silty fine sand	15.9							119.3				
	SS-9	38.5-40.0	sandy clay	13.9											
	SS-10	43.5-45.0	sandy clay	14.2											
	SS-11	48.5-50.0	clay	43.8	125	51	74								

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN, % at 0.5 σ_f	STRAIN, % at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
CS-32	SS-12	53.5-55.0	silty clay	11.4											
	ST-13	58.0-60.0	clay	59.7				3.85	0.6	1.6	64.5				
CS-33	ST-3	8.0-10.0	silty clay	23.1	51	20	31	4.08	1.1	10.0	106.1				
	ST-4	13.0-15.0	sandy clay	19.0				8.29	1.0	6.5	111.2				
	ST-5	18.0-20.0	sandy clay	20.8	60	21	39	3.27	0.5	1.8	106.0				Minus 200 = 60.0%
	ST-6	23.0-25.0	sandy clay	34.8				7.70	0.8	7.6	98.7				
	ST-7	28.0-30.0	sandy clay	17.3				3.61	1.1	4.4	113.5				
	ST-8	33.0-35.0	sandy clay	17.5				5.63	0.5	2.9	115.1				Minus 200 = 69.0%
	ST-9	38.0-39.0	sandy clay	14.1				15.14	0.5	8.6	125.0				
	SS-10	43.5-45.0	silty fine sand, clayey	17.3											
	ST-11	48.0-50.0	clay	15.9	119	46	73	3.24	0.5	1.2	93.4				
	SS-12	53.5-55.0	silty fine sand, clayey	14.2											
	SS-13	58.5-60.0	sandy clay	22.9											
CS-34	SS-3	8.5-10.0	sandy clay	20.6											
	ST-4	13.0-15.0	clay												Triaxial
	ST-5	18.0-20.0	sandy clay	28.6				4.05	1.1	6.2	98.5				
	ST-6	23.0-25.0	sandy clay	21.2				3.99	1.1	3.0	106.5				

*SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f					
CS-34	ST-7	28.0-30.0	sandy clay	18.9				8.13	0.7	4.7	110.3				
	ST-8	33.0-35.0	sandy clay	14.5				8.83	1.9	8.3	120.4				
	SS-9	38.5-40.0	sandy clay	14.1											
	SS-10	43.5-45.0	sandy clay	14.6											
	ST-11	48.0-50.0	clay	40.8	107	45	62	5.29	0.9	1.9	81.4				
	SS-12	53.5-55.0	clay	28.9											
	SS-13	58.5-60.0	silty fine sand	26.2											
CH-35	ST-3	8.0-10.0	silty clay	27.0	49	22	27	3.81	0.7	3.6	102.7				Unable to run swell test
	ST-4	13.0-15.0	silty fine sand, clayey	36.5											
	ST-5	18.0-20.0	clay	38.2				1.95	0.5	1.5	83.2				
	ST-6	23.0-25.0	sandy clay	28.3				4.61	0.6	4.4	97.0				Minus 200 = 53.3%
	ST-7	28.0-30.0	sandy clay	17.7				7.09	0.5	3.6	112.7				
	ST-8	33.0-35.0	sandy clay	14.6				13.16	1.1	6.5	121.0				
	SS-9	38.5-40.0	sandy clay	17.4											
	ST-10	43.0-44.0	sandy clay	21.9							103.1				Minus 200 = 80.5%
	SS-11	44.0-45.5	sandy clay	21.8											
	SS-12	48.5-49.0	clayey sand, calc.	15.7											

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at $0.5\sigma_f$	STRAIN,% at σ_f					
CH-35	SS-13	58.5-60.0	clayey sand, calc.	50.5											
CC-36	ST-3	8.0-10.0	silty clay	31.2	61	24	37	3.47	1.1	6.2	96.4				
	ST-4	13.0-15.0	silty clay	61.2							56.7				
	ST-5	18.0-20.0	sandy clay	27.7	64	21	43	2.53	0.4	2.2	94.6				Minus 200 = 56.8%
	ST-6	23.0-25.0	sandy clay	15.8				12.92	2.9	18.2	118.1				
	ST-7	28.0-30.0	sandy clay	14.9				15.93	2.2	15.5	120.4				
	ST-8	33.0-35.0	sandy clay	19.8				12.41	1.3	8.0	115.8				
	ST-9	38.0-40.0	sandy clay	12.1				11.04	2.3	7.2	129.2				
	SS-10	43.5-45.0	clay, slightly sandy	34.2	92	34	58								
	SS-11	48.5-50.0	sandy clay	53.5											
	SS-12	54.0-55.5	silty clay	76.5											
	SS-13	58.5-60.0	silty clay	38.0											
CC-37	ST-3	8.0-10.0	sandy clay	20.1	60	18	42	7.01	2.6	7.4	109.3				
	ST-4	13.0-15.0	clayey sand	31.0				2.52	0.8	3.3	92.5				
	ST-5	18.0-20.0	sandy clay	28.9				3.66	0.7	2.3	86.1				
	ST-6	23.0-25.0	sandy clay	16.5	49	18	31	9.82	2.2	16.4	117.4				Minus 200 = 61.9%
	ST-7	28.0-30.0	sandy clay	16.9				11.95	1.8	14.5	117.7				

* SEE ATTACHED CURVE SHEETS

WARE LIND ENGINEERS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at $0.5\sigma_f$	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
CC-37	ST-8	33.0-35.0	sandy clay	14.5				16.65	3.0	16.5	125.3				
	ST-9	38.0-40.0	sandy clay	12.4				9.96	2.3	6.2	129.0				
	ST-10	43.5-44.0	clay, calcareous	33.0	86	44	42								
	SS-11	44.0-44.5	clay	35.8											
	SS-12	48.5-50.0	clay	44.9											
	SS-13	53.5-55.0	clay	36.0											
	SS-14	58.5-60.0	clay	46.3											
CC-38	ST-3	8.0-10.0	sandy clay												Direct shear Minus 200 = 76.1%
	ST-4	13.0-15.0	silty clay	40.0	64	28	36	1.13	1.1	2.9	84.9				
	ST-5	18.0-20.0	clay	30.4				3.35	0.5	2.2	91.3				
	ST-6	23.0-25.0	sandy clay	33.3				6.29	0.7	3.3	93.8				
	ST-7	28.0-30.0	sandy clay	21.7				6.23	0.8	3.6	105.7				
	ST-8	33.0-35.0	sandy clay	16.0				7.30	0.8	4.7	120.3				
	ST-9	38.0-40.0	sandy clay	12.8				13.28	1.6	7.3	126.8				
	SS-10	43.5-45.0	sandy clay	11.6											
	SS-11	48.5-50.0	silty clay	27.9											
	SS-12	53.5-55.0	silty fine sand, clayey	14.9											

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_1	STRAIN,% at σ_1					
CC-38	SS-13	58.5-60.0	silty fine sand, clayey	24.5											
CC-39	ST-3	8.0-10.0	clayey fine sand											*	Direct shear
	ST-4	13.0-15.0	calcareous material	29.1							96.6				
	ST-5	18.0-20.0	clay	27.4				3.54	0.7	5.1	98.3				
	ST-6	23.0-25.0	sandy clay	18.0				4.11	0.7	2.2	106.0				
	ST-7	28.0-30.0	sandy clay	17.4							116.8				
	ST-8	33.0-35.0	sandy clay	17.3				10.39	1.1	4.7	118.3				
	ST-9	38.0-40.0	sandy clay	25.4	59	19	40	10.91	0.9	6.0	107.0				
	SS-10	43.5-45.0	clay	39.0											
	SS-11	48.5-50.0	silty clay	30.1											
	SS-12	53.5-55.0	silty fine sand	17.7											
	SS-13	58.5-60.0	clay	46.3											
CT-40	SS-1	1.5-3.0	clayey fine sand											*	
	SS-2	4.5-6.0	fine sand											*	
	ST-3	8.5-10.0	sandy clay with sand seams	15.1				1.19	0.4	1.8	116.7				
	ST-4	13.0-15.0	calcareous material	51.6	68	45	23	3.23	1.7	4.8	70.8	2.82	*		
	ST-5	18.0-20.0	sandy clay	22.3				5.26	0.7	4.2	99.9				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at $0.5\sigma_f$	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
CT-40	ST-6	23.0-25.0	sandy clay	17.5				11.32	0.7	6.7	114.9				
	ST-7	28.0-30.0	sandy clay	16.3				11.36	1.5	14.5	116.5				
	ST-8	33.0-35.0	sandy clay	14.3				18.09	1.1	8.1	123.0				
	ST-9	38.0-40.0	sandy clay	16.0				5.41	1.2	4.4	124.7				
CT-41	SS-3	8.5-10.0	sandy clay	14.7											
	ST-4	13.0-15.0	sandy clay	27.1							102.3				
	ST-5	18.0-20.0	sandy clay	36.1							96.9				
	ST-6	23.0-25.0	sandy clay	34.4							88.5				
	ST-7	28.0-30.0	sandy clay	17.3							114.7				
	ST-8	33.0-35.0	sandy clay	12.5							118.6				
	SS-9	38.5-40.0	sandy clay	14.5											
CT-42	SS-1	1.5-3.0	clayey fine sand											*	
	SS-2	4.5-6.0	fine sand											*	
	SS-3	8.5-10.0	sandy clay	19.5											Minus 200 = 65.3%
	ST-4	13.0-15.0	calcareous material	42.3							77.9				
	ST-5	18.0-20.0	sandy clay	17.6				3.73	0.4	2.2	107.9				
	ST-6	23.0-25.0	sandy clay	17.7				9.50	1.3	8.3	136.3				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
CT-42	ST-7	28.0-30.0	sandy clay	15.9				13.41	1.5	9.2	119.9				
	ST-8	33.0-35.0	sandy clay	14.3							120.2				
	ST-9	38.0-40.0	sandy clay	15.4							121.4				
CT-43	ST-4	10.0-12.0	very sandy clay	16.2	55	18	37	5.17	1.4	3.3	114.3	2.67	*		Minus 200 = 81.1%
	ST-5	13.0-15.0	sandy clay	34.1				2.94	0.5	4.9	88.9				
	ST-6	18.0-20.0	sandy clay	18.0				4.47	1.4	3.5	108.6				Minus 200 = 54.4%
	ST-7	23.0-25.0	sandy clay	26.5				8.36	0.6	2.6	98.1				
	ST-8	28.0-30.0	sandy clay	17.9				7.37	1.1	6.2	112.7				
	ST-9	33.0-35.0	sandy clay	16.6				10.76	1.8	7.6	119.0				
	ST-10	38.0-40.0	sandy clay	14.6				20.55	1.4	5.3	123.6				
CT-44	ST-3	8.0-10.0	sandy clay	16.9				4.88	1.1	5.6	114.2				
	ST-4	13.0-15.0	very calc. sandy clay	40.6	66	31	35	0.94	1.6	5.1	84.8				
	ST-5	18.0-20.0	clay	31.1				3.54	0.6	4.7	94.8				
	ST-6	23.0-25.0	sandy clay	19.1				6.64	0.9	12.8	111.5				Minus 200 = 63.3%
	ST-7	28.0-30.0	sandy clay	15.6				10.45	1.5	9.6	119.6				
	ST-8	33.0-35.0	sandy clay	13.8				8.10	0.9	5.5	120.5				
	ST-9	38.0-40.0	sandy clay	15.9				4.94	1.8	4.9	118.6				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN, % at $0.5\,\sigma_1$	STRAIN, % at σ_1					
CT-45	SS-1	1.5-3.0	clayey fine sand											*	
	SS-2	4.5-6.0	fine sand											*	
	ST-3	8.0-10.0	sandy clay	14.1	34	17	17	4.85	1.3	4.4	117.9				Minus 200 = 71.7%
	ST-4	13.0-15.0	sandy clay	53.6							77.0				
	ST-5	18.0-20.0	sandy clay	34.5				6.65	1.1	6.4	93.0				
	ST-6	23.0-25.0	sandy clay, calc.	32.2	55	35	20	4.00	0.8	2.0	90.9				
	ST-7	28.0-30.0	sandy clay	16.6				9.98	1.1	4.0	114.8				
	ST-8	33.0-35.0	sandy clay	21.9							110.4				
	ST-9	38.0-40.0	sandy clay	14.9				12.37	1.3	6.9	121.8				
S-47	SS-1	1.5-3.0	silty fine sand	14.1										*	
	SS-2	4.5-6.0	clayey fine sand	12.4											
	ST-3	8.0-10.0	clayey fine sand	11.4				3.40	1.4	5.5	125.0				
	ST-4	13.0-15.0	sandy clay with calcareous material		49	29	20					2.93	*		
	ST-5	18.0-20.0	clay, slightly sandy												Triaxial
	ST-6	23.0-25.0	sandy clay with calcareous material	27.4											
	ST-7	28.0-30.0	sandy clay with calcareous material	22.3											
	ST-8	33.0-35.0	sandy clay with calcareous material	15.6							117.3				unable to trim

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN % at $0.5\sigma_f$	STRAIN % at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
S-47	ST-9	36.0-38.0	silty fine sand	14.7				10.33	1.6	3.3	117.7				
	ST-10	38.0-40.0	sandy clay, slightly silty with calc. mat.												Triaxial
	ST-11A	43.0-44.0	clay, slightly sandy												unable to trim
	ST-11B	44.0-45.0	clay with calcareous material	39.2	122	55	67					2.67	*		
	SS-12	48.5-49.0	clay, slickensided	60.7											
	SS-14	58.5-60.0	fine sand, sl. clayey	35.4										*	
	SS-15	63.5-65.0	silt and siltstone	63.0	NP	NP	NP								
	SS-16	68.5-69.5	fine sand, slightly silty	14.4										*	
	SS-17	73.5-74.0	clay with calcareous material	9.0											
	SS-18	78.5-79.0	sandy clay	88.2										*	
U-48	SS-1	1.5-3.0	silty fine sand	13.9										*	
	SS-2	4.5-6.0	clayey sand											*	
	ST-3	8.0-10.0	clayey fine sand	15.5				2.50	1.2	3.2	116.8				
	ST-4	13.0-15.0	clay with sand pockets	52.9				1.54	1.2	3.7	72.7				
	ST-5	18.0-20.0	clay with sand pockets and calc. material	32.1				2.65	0.7	4.4	85.0				
	ST-6	23.0-25.0	sandy clay with calcareous material	18.5	51	14	37	10.97	1.8	16.4	113.8			*	
	ST-7	28.0-30.0	sandy clay with sand pockets	15.1				13.64	1.0	8.4	120.6				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_1	STRAIN,% at σ_1					
U-48	ST-8	33.0-35.0	sandy clay with calcareous material	13.3	50	16	34	13.63	1.4	10.9	123.2			*	
	ST-9	38.0-40.0	sandy clay	14.2				8.65	0.9	3.2	123.5				
	ST-10	43.0-44.0	clay, slightly silty	36.3	67	39	28								unable to run unit dry weight
	SS-11	44.0-45.0	sandy clay	22.0											
	SS-12	48.0-48.5	clayey sand	14.4										*	
	SS-13	53.5-55.0	sandy clay, calc.	56.6											
	SS-14	58.5-60.0	sandy clay	29.3											
	SS-15	63.5-64.0	silty clay, calcareous	87.2											
	SS-16	68.5-70.0	clayey fine sand	43.1										*	
	SS-17	73.5-74.0	sandy clay, calc.	73.4											
	SS-18	78.5-80.0	sandy clay, calc.	44.4											
U-49	SS-2	4.5-6.0	sandy clay	20.9										*	
	ST-3	8.0-10.0	clayey fine sand	22.1	NP	NP	NP					2.78	*		
	ST-4	13.0-15.0	calcareous material with gray clay	42.3											unable to trim samples for triax.
	ST-5	18.0-20.0	sandy clay	26.1				5.96	0.9	10.0	99.1				
	ST-6	23.0-25.0	sandy clay	20±											Triaxial
	ST-7	28.0-30.0	sandy clay	16±											Triaxial

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN, % at $0.5\sigma_f$	STRAIN, % at σ_f					
U-49	ST-8	33.0-35.0	silty clay		50	20	30					2.68	*	*	
	ST-9	38.0-40.0	sandy clay, calc.	15±											Triaxial
	ST-10	43.0-45.0	sandy clay	15.7				11.96	0.4	2.4	117.1				
	ST-11	48.0-50.0	clayey fine sand, calc.	22±											Triaxial
	SS-12	53.5-54.5	clayey sand	23.3											
	ST-13	58.0-60.0	clay with claystone fragments	58±											Triaxial
	SS-15	68.5-70.0	clayey sand	21.8										*	
	ST-16	73.0-75.0	clay, slightly silty		201	122	79					2.55	*		
	SS-17	78.5-80.0	silty clay, sl. sandy	67.2											
U-50	SS-1	1.5-3.0	sandy clay	16.0										*	
	SS-2	4.5-6.0	silty fine sand	15.3										*	
	ST-3	8.0-10.0	sandy clay with clay pockets	30.1				3.49	0.4	4.7	99.3				
	ST-4	13.0-15.0	clay with numerous calcareous nodules		86	30	56					2.83	*		
	ST-5	18.0-20.0	silty clay	28±											Triaxial
	ST-6	23.0-25.0	sandy clay	17±											Triaxial
	ST-7	28.0-30.0	silty clay		45	19	26					2.77	*	*	
	ST-8	33.0-35.0	sandy clay	18±											Triaxial

* SEE ATTACHED CURVE SHEETS

WARE LIND ENGINEERS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
U-50	ST-9	38.0-40.0	clayey sand	17±											Triaxial
	ST-10	43.0-45.0	clay		71	33	38								unable to trim consolidation sple.
	SS-11	48.5-49.0	clayey fine sand	17.8											
	SS-12	53.5-54.0	sandy clay	38.4											
	SS-13	58.5-60.0	sandy clay	34.7											
	ST-14	63.0-64.0	silty clay		103	76	27								unable to trim consolidation sple.
	SS-16	68.5-69.5	silty fine sand	17.7										*	
	ST-17	73.5-75.0	sandy clay, calc.	95.0											
	SS-18	78.5-80.0	silty fine sand, slightly clayey	34.3											
	SS-19	88.5-89.5	silty fine sand, slightly clayey	24.1											
U-51	SS-2	4.5-6.0	silty fine sand	24.2										*	
	ST-3	8.0-10.0	sandy clay with calcareous material	20.8				5.96	1.0	6.7	106.2				
	ST-4	13.0-15.0	calcareous material	57.4	69	37	32				65.2	2.92	*		
	ST-5	18.0-20.0	clay, slightly sandy	35±											Triaxial
	ST-6	23.0-25.0	sandy clay	18.4								2.74	*	*	
	ST-7	28.0-30.0	sandy clay	16±											Triaxial
	ST-8	33.0-35.0	sandy clay	18±											Triaxial

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN % at $0.5\sigma_f$	STRAIN % at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
U-51	ST-9	38.0-40.0	clayey fine sand	12±											Triaxial
	ST-10	43.0-45.0	clay, slightly sandy	33.2	84	40	44								
	ST-11	50.0-52.0	sandy clay	36±											Triaxial
	SS-12	53.5-55.0	sandy clay, sl. silty	60.0											
	SS-13	58.5-60.0	sandy clay, sl. silty	35.8											
	SS-14	63.5-64.5	silty clay, sl. sandy	73.8	122	85	37								
	SS-15	68.5-69.5	silty fine sand	17.0										*	
	SS-16	73.5-75.0	silty clay, sl. sandy	48.9	121	70	51								
	SS-17	78.5-79.0	silty fine sand	37.9											
U-52	SS-1	1.5-3.0	silty fine sand	12.7										*	
	SS-2	4.5-6.0	silty fine sand	19.1										*	
	SS-3	8.5-10.0	silty clay	21.0											
	ST-4	13.0-15.0	clay with calc. mat.	33.0							87.2				
	ST-5	18.0-20.0	sandy silt with siltstone	29.7											
	ST-6	23.0-25.0	sandy clay, calcareous	16±											Triaxial
	ST-7	28.0-30.0	clayey fine sand	17±											Triaxial
	ST-8	33.0-35.0	clayey fine sand	15±											Triaxial

* SEE ATTACHED CURVE SHEETS

WARE LIND ENGINEERS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at $0.5\sigma_1$	STRAIN,% at σ_1					
U-52	ST-9	38.0-40.0	clayey fine sand	15±											Triaxial
	ST-10	43.0-45.0	clayey fine sand with calcareous material	18.6							102.8				
	SS-11	48.5-50.0	sandy clay	26.9											
	SS-12	53.5-54.0	silty clay	32.5											
	SS-13	58.5-60.0	sandy clay	37.0										*	
	SS-14	63.5-65.0	sandy clay	68.4	127	69	58								
	SS-15	69.0-69.5	silty fine sand	24.0											
	SS-16	73.5-75.0	silty clay	37.2	177	108	69								
	SS-17	78.0-80.0	clay	91.5	174	72	102				47.7	2.59	*		
U-53	SS-1	1.5-3.0	silty fine sand	12.3										*	
	ST-2	4.0-6.0	sandy clay	17.5				4.14	1.4	11.0	112.3				
	ST-3	8.0-10.0	clay, slightly silty	29.4	101	26	75				93.6	2.74	*		
	ST-4	13.0-15.0	sandy clay with calcareous material	43.1				1.43	1.9	6.1	79.8				
	ST-5	18.0-20.0	sandy clay, sls.	37.4				5.17	1.0	2.9	84.5				
	ST-6	23.0-25.0	clayey fine sand	17±											Triaxial
	ST-7	28.0-30.0	clayey fine sand	15±											Triaxial
	ST-8	33.0-35.0	clayey sand, calc.	16±											Triaxial

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN, % at $0.5\sigma_1$	STRAIN, % at σ_1	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
U-53	ST-9	38.0-40.0	clayey sand	12±											Triaxial
	SS-10	44.0-45.0	silty clay	31.0											
	SS-11	49.0-49.5	sandy clay	31.5											
	ST-12	53.0-55.0	clay, slickensided	76.2	61	39	22	4.68	0.6	1.4	54.3				
	SS-13	58.5-59.0	silty clay	25.5										*	
	SS-14	63.5-64.0	sandy clay	29.7											
	SS-15	68.5-69.0	silty fine sand with sandstone fragments	22.1										*	
	SS-16	73.5-74.5	sandy clay	31.7	111	69	42								
	SS-17	79.0-80.0	sandy clay	21.2											
CP-55	SS-1	1.5-3.0	fine sand											*	
	SS-2	4.5-6.0	sandy clay	22.1											
	ST-3	8.0-10.0	clay, calcareous	27.2	72	20	52	2.87	0.9	4.5	99.8				$k = 8.04 \times 10^{-8}$ cm/sec
	ST-4	13.0-15.0	calcareous material	40.4	98	57	41				82.0				
	ST-5	18.0-20.0	clay	38.2				4.24	0.7	2.2	82.1				
	ST-6	23.0-25.0	sandy clay	19.5							111.4				
	ST-7	28.0-30.0	sandy clay	13.3							121.7				
CP-56	SS-2	4.5-6.0	fine sand											*	

*SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f					
CP-56	ST-4	13.0-15.0	clay	22.6	61	23	38	4.83	0.8	11.3	103.7				
	ST-5	18.0-20.0	sandy clay	19.0	51	17	34	7.37	1.3	10.6	112.4				Minus 200 = 64.3%
	ST-6	23.0-25.0	sandy clay	18.0							113.7				
	ST-7	28.0-30.0	sandy clay	15.8							117.9				
CP-57	ST-2	5.0-7.0	sandy clay	17.3	42	18	24	3.97	2.5	12.7	112.2				
	ST-3	8.0-10.0	sandy clay	19.5							108.1				
	ST-5	18.0-20.0	sandy clay	20.2				2.65	0.4	1.5	109.2				
	ST-6	23.0-25.0	sandy clay	19.7							113.0				
	ST-7	28.0-30.0	sandy clay	14.8				13.44	0.7	3.6	119.9				
CP-58	SS-2	4.5-6.0	fine sand											*	
	ST-3	8.5-10.0	clay	34.2	43	16	27	2.64	2.2	9.1	94.9				
	ST-4	13.0-15.0	sandy clay	30.2							94.5				
	ST-5	18.0-20.0	sandy clay	17.8				6.44	1.3	10.0	113.3				
	ST-6	23.0-25.0	sandy clay	18.1							114.4				
	ST-7	28.0-30.0	sandy clay	18.4							113.8				
CP-59	SS-2	4.5-6.0	fine sand with organic matter											*	
	ST-3	8.5-10.5	sandy clay	21.0	50	21	29	4.21	1.2	4.0	106.5				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f					
CP-59	ST-4	13.0-15.0	sandy clay	26.4							100.3				
	ST-5	18.0-20.0	sandy clay	25.2							94.9				
	ST-6	23.0-25.0	clay	20.6				7.25	1.6	18.2	107.5				
	ST-7	28.0-30.0	sandy clay	19.8							109.9				
CP-60	SS-1	1.5-3.0	silty fine sand											*	
	ST-3	8.0-10.0	sandy clay	27.4				1.30	1.5	5.5	93.1				
	ST-4	13.0-15.0	sandy clay and gravel	14.8				1.41	1.3	4.8	120.4				
	ST-5	18.0-20.0	sandy clay	32.3				4.55	0.8	2.5	92.7				
	ST-6	23.0-25.0	sandy clay	18.4							112.4				
	ST-7	28.0-30.0	sandy clay	19.8							109.8				
CP-61	SS-1	1.5-3.0	silty fine sand											*	
	ST-3	8.0-10.0	sandy clay	20.4				6.81	3.6	18.2	106.5				
	ST-4	13.0-15.0	sandy clay	22.7							99.4				
	ST-5	18.0-20.0	sandy clay	22.6				5.55	0.6	3.3	101.6				
	ST-6	23.0-25.0	sandy clay	17.9							112.7				
	ST-7	28.0-30.0	sandy clay	20.0							110.4				
RP-64	SS-1	1.5-3.0	clay, slightly sandy	23.1											

*SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at $0.5\,\sigma_f$	STRAIN,% at σ_f					
RP-64	ST-2	4.0-6.0	sandy clay	20.2	38	15	23				110.6				Minus 200 = 71.4%
	ST-3	8.0-10.0	clay	36.7							83.6				
	ST-4	13.0-15.0	sandy clay	27.4							95.4				
	ST-5	18.0-20.0	silty clay	28.1	47	34	13				93.8				
RP-65	SS-1	1.5-3.0	fine sand with wood fragments											*	
	ST-3	8.0-10.0	clayey fine sand											*	
	ST-4	13.0-15.0	sandy clay	30.9	57	18	39				96.4				
	ST-5	18.0-20.0	sandy clay	23.2							103.1				Minus 200 = 58.6%
FS-66	ST-4	13.0-15.0	clayey sand	19.5				1.07	1.8	6.2	109.3				
	ST-5	18.0-20.0	sandy clay	29.8				2.48	0.6	1.5	93.8				
	ST-6	23.0-25.0	sandy clay	19.3				4.63	0.7	2.3	110.6				
	ST-7	28.0-30.0	sandy clay	16.1				7.34	1.6	8.6	116.7				
	ST-8	33.0-35.0	clay	44.4	147	59	88	5.09	1.1	2.2	73.5				
	ST-9	38.0-38.5	clay	27.4											
	SS-11	43.5-44.5	silty clay	21.9											
	SS-12	48.5-48.5+	sandy clay	27.2											
	SS-13	53.5-55.0	silty fine sand, clayey	31.4											

* SEE ATTACHED CURVE SHEETS

WARE LIND ENGINEERS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN, % at 0.5 σ_f	STRAIN, % at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
FS-66	SS-14	58.5-60.0	silty fine sand, clayey	29.6											
LH-67	ST-3	8.0-10.0	sandy clay	24.1							97.7				
	ST-4	13.0-15.0	sandy clay	23.2	72	22	50	4.32	0.9	13.6	100.7				
	ST-5	18.0-20.0	sandy clay	20.5				7.15	1.1	13.6	107.6				Minus 200 = 56.9%
	ST-6	23.0-25.0	sandy clay	15.3				14.49	1.2	10.9	119.2				
	ST-7	28.0-30.0	sandy clay	19.3				12.13	0.8	3.3	114.6				
C-68	ST-3	8.0-10.0	clay, very calcareous		62	21	41								Triaxial
	ST-4	13.0-15.0	sandy clay	44.4	59	23	36	2.63	0.6	6.9	78.7				Minus 200 = 65.0%
	ST-5	18.0-20.0	sandy clay	15.1				10.06	1.0	8.7	116.6				
	ST-6	23.0-25.0	sandy clay	17.2				13.40	1.4	18.2	116.0				Minus 200 = 62.1%
	ST-7	28.0-30.0	sandy clay	14.5				13.48	1.1	11.8	119.3				
	ST-8	33.0-35.0	clay	33.1				3.83	1.0	1.8	87.1				
	ST-9	38.0-40.0	sandy clay	43.0				7.94	0.6	1.5	82.4				
WW-69	ST-3	8.0-10.0	sandy clay	29.1				3.64	0.4	6.9	96.9				
	ST-4	13.0-15.0	sandy clay	31.1				4.68	0.6	2.9	88.1				
	ST-5	18.0-20.0	sandy clay	18.1				7.37	0.7	8.4	111.5				
	ST-6	23.0-25.0	sandy clay	14.9				9.72	1.2	13.2	120.5				

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLIDATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_1	STRAIN,% at σ_1					
WW-69	ST-7	28.0-30.0	sandy clay	16.5				13.38	1.0	4.4	119.2				
	ST-8	33.0-35.0	clayey fine sand, calcareous												Triaxial
	ST-9	38.0-40.0	clay	52.6				3.42	0.7	2.2	69.0				
FG-70	SS-1	1.5-3.0	fine sand											*	
	ST-2	4.0-6.0	silty fine sand	16.4										*	Direct shear
	SS-3	7.0-8.5	silty fine sand											*	
	SS-4	9.5-11.0	sandy clay	13.3											
	ST-5	12.0-14.0	sandy clay	18.0	46	16	30	3.40	0.7	9.1	112.2				Minus 200 = 54.8%
	ST-6	15.0-17.0	clay, slightly sandy, calcareous												Triaxial
	ST-7	18.0-20.0	sandy clay with sand seam												Triaxial
	ST-8	21.0-23.0	clay	39.3	100	29	71	2.91	0.5	3.3	82.8				
	ST-9	24.0-26.0	sandy clay		49	18	31								Triaxial Minus 200 = 47.6%
	ST-10	27.0-29.0	sandy clay with traces of lignite												Triaxial
	ST-11	30.0-32.0	sandy clay		48	15	33								Triaxial Minus 200 = 54.6%
	ST-12	33.0-35.0	sandy clay, calc.												Triaxial
	ST-13	36.0-38.0	sandy clay		37	15	22								Triaxial Minus 200 = 67.1%
	ST-14	39.0-41.0	clayey fine sand												Triaxial

* SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

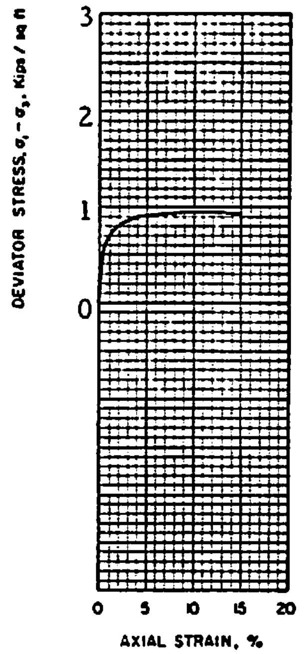
BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS LL	PL	PI	UNCONFINED COMPRESSION STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f	UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
FG-70	ST-15	42.0-44.0	clay	39.1	95	45	50	2.23	1.6	2.9	78.9				unable to run unit dry weight
	ST-16	44.0-44.5	silty clay	25.3											
	ST-17	47.5-48.0	clay	64.3	53	31	22	3.77	1.2	3.2	67.9				
	SS-18	51.0-52.5	silty clay	18.9											
	DB-19	53.5-54.0	sandstone	13.7											
	DB-20	54.0-54.5	sandstone	10.9											
FG-71	ST-3	8.0-10.0	sandy clay	15.2				4.71	2.0	8.4	115.4				
	ST-4	13.0-15.0	sandy clay, very calc.												Triaxial
	ST-5	18.0-20.0	clay	36.2				2.05	0.6	2.2	83.8				
	ST-6	23.0-25.0	sandy clay	14.7				10.16	1.1	10.0	119.2				
	ST-7	28.0-30.0	sandy clay	15.1				6.98	0.8	3.3	118.0				
	ST-8	33.0-35.0	sandy clay	14.5				10.25	1.1	4.4	121.6				
	ST-9	38.0-40.0	sandy clay	11.0				10.61	1.1	3.6	129.1				
	SS-10	43.5-44.0	sandy clay	25.6											
	SS-11	48.5-49.0	silty fine sand, clayey	23.1											
	SS-12	53.5-54.5	clay	32.3											
FG-72	SS-2	4.5-6.0	sandy clay	13.5											

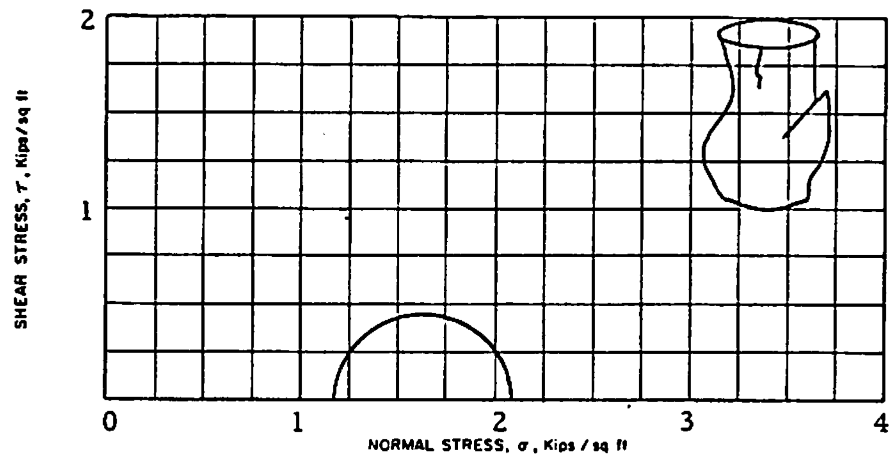
*SEE ATTACHED CURVE SHEETS

SUMMARY OF SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	DEPTH (ft)	CLASSIFICATION	WATER CONTENT %	ATTERBERG LIMITS			UNCONFINED COMPRESSION			UNIT DRY WEIGHT	SPECIFIC GRAVITY	CONSOLI-DATION	MECHANICAL ANALYSIS	REMARKS
					LL	PL	PI	STRESS KSF	STRAIN,% at 0.5 σ_f	STRAIN,% at σ_f					
FG-72	ST-3	8.0-10.0	sandy clay	20.9				3.02	1.1	5.8	104.4				
	ST-4	13.0-15.0	sandy clay	56.2							65.9				
	ST-5	18.0-20.0	sandy clay	18.8				3.28	0.6	2.2	101.5				
	ST-6	23.0-25.0	sandy clay	14.8				13.15	1.1	13.6	118.6				
	ST-7	28.0-30.0	sandy clay	18.3				3.79	0.9	4.7	110.8				
	ST-8	33.0-35.0	sandy clay	16.9				5.59	0.6	3.6	115.2				
	ST-9	38.0-40.0	clay, blocky, slicken-sided, brittle												Triaxial
	SS-10	43.5-44.0	sandy clay	19.5											
	SS-11	48.0-49.0	sandy clay	39.4											
	SS-12	53.5-55.0	silty fine sand	21.7											
	SS-13	58.5-59.0	silty clay	51.5											
Bag	1	11.0	fine sand											*	Direct shear Relative density
Bag	2	11.0	fine sand											*	Direct shear Relative density

* SEE ATTACHED CURVE SHEETS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	50.9			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	75.4			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.20			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	0.90			
TIME TO FAILURE, min		t_f	14.5			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

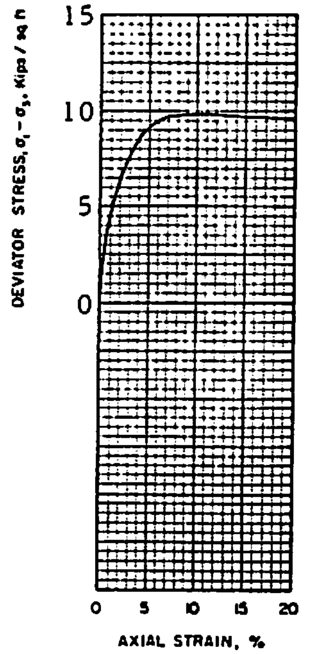
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clay, calcareous				
LL	PL	PI		G_s

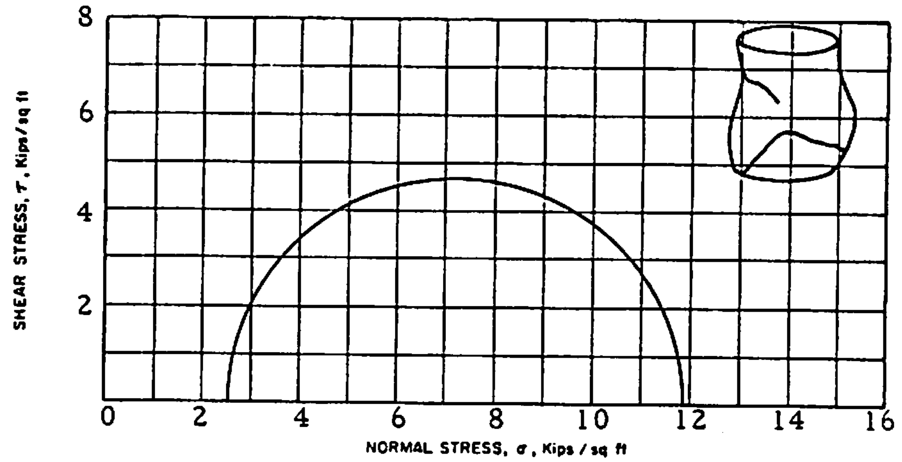
REMARKS ______

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. RR-18	SAMPLE NO. ST-4	DEPTH 15.0 ft	DATE 3/9/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	13.3			
INITIAL	VOID RATIO	e_o				
INITIAL	SATURATION, %	S_o				
INITIAL	DRY DENSITY, lb / cu ft	γ_d	119.1			
BEFORE SHEAR	WATER CONTENT, %	w_c				
BEFORE SHEAR	VOID RATIO	e_c				
BEFORE SHEAR	SATURATION, %	S_c				
BEFORE SHEAR	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
FINAL	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.60			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.30			
TIME TO FAILURE, min		t_f	24.0			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

SHEAR STRENGTH PARAMETERS

ϕ = ________ Degrees

tan ϕ = ________

c = ________ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

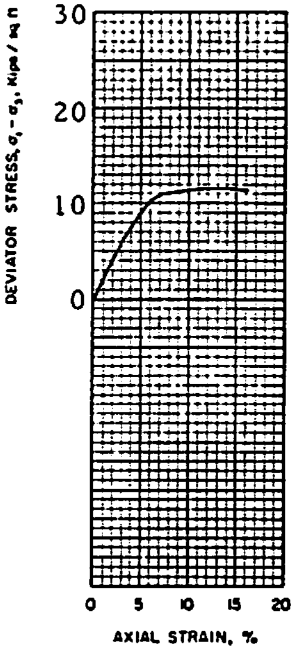
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray clayey fine sand				
LL	PL	PI		G_s

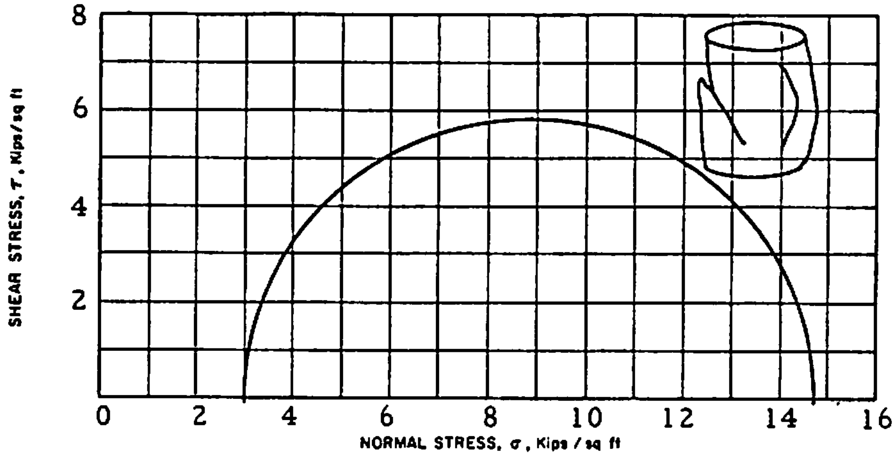
REMARKS ________

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-26	SAMPLE NO. ST-8	DEPTH 35.0 ft	DATE 3/9/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = ________ Degrees

tan ϕ = ________

c = ________ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	19.1			
INITIAL	VOID RATIO	e_o				
INITIAL	SATURATION, %	S_o				
INITIAL	DRY DENSITY, lb / cu ft	γ_d	106.5			
BEFORE SHEAR	WATER CONTENT, %	w_c				
BEFORE SHEAR	VOID RATIO	e_c				
BEFORE SHEAR	SATURATION, %	S_c				
BEFORE SHEAR	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
FINAL	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	3.00			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	11.62			
TIME TO FAILURE, min		t_f	17.5			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in		D_o	1.41			
INITIAL HEIGHT, in		H_o	3.00			

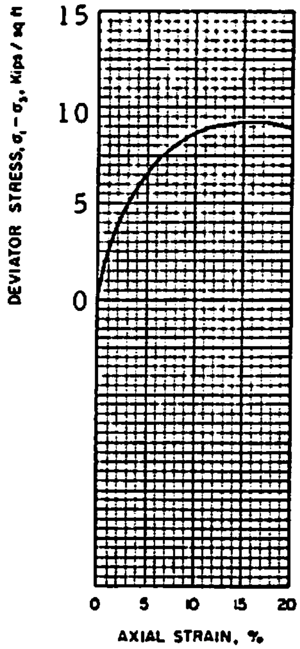
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed		
CLASSIFICATION Light gray and tan clayey fine sand			
LL	PL	PI		G_s

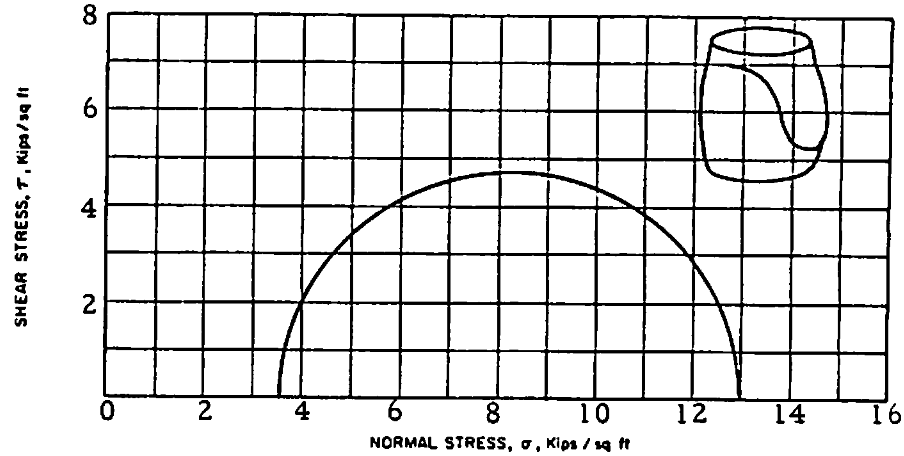
REMARKS ________

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-26	SAMPLE NO. ST-9	DEPTH 40.0 ft	DATE 3/9/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

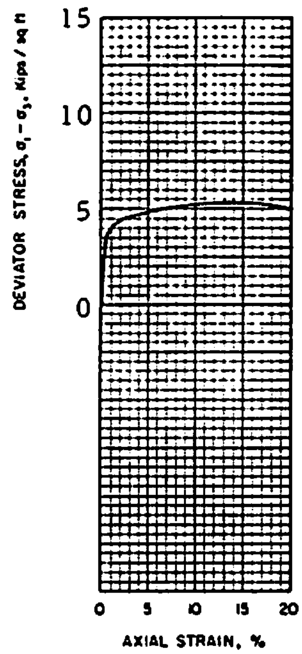
TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	17.2			
INITIAL	VOID RATIO	e_o				
INITIAL	SATURATION, %	S_o				
INITIAL	DRY DENSITY, lb / cu ft	γ_d	113.3			
BEFORE SHEAR	WATER CONTENT, %	w_c				
BEFORE SHEAR	VOID RATIO	e_c				
BEFORE SHEAR	SATURATION, %	S_c				
BEFORE SHEAR	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
FINAL	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	3.60			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.21			
TIME TO FAILURE, min		t_f	23.5			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

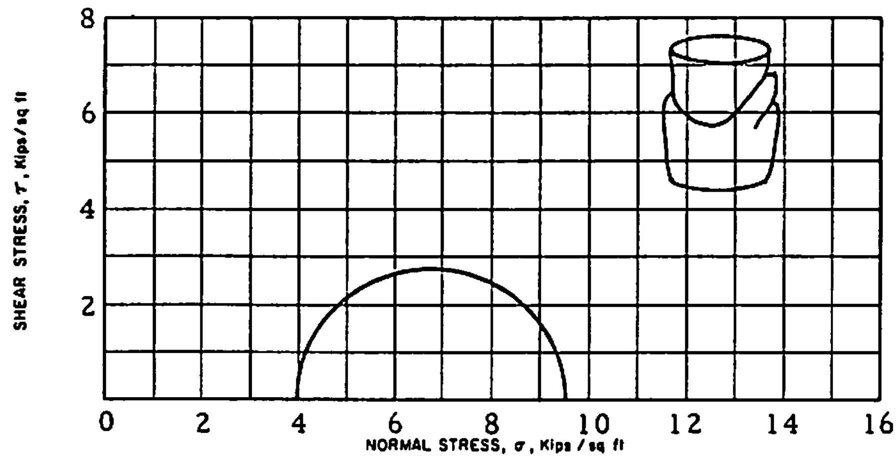
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray clayey fine sand, calcareous				
LL	PL	PI		G_s

REMARKS ______

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-26	SAMPLE NO. ST-11	DEPTH 50.0 ft	DATE 3/9/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

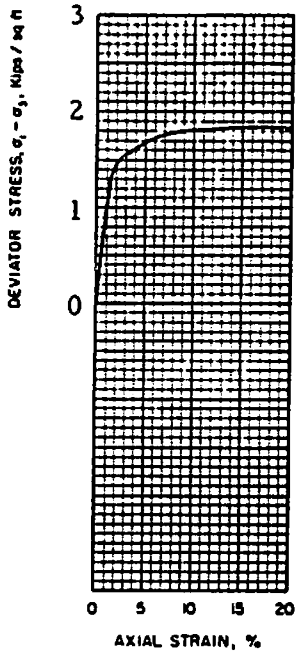
TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	47.8			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	65.6			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	4.00			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	5.39			
TIME TO FAILURE, min		t_f	21.5			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

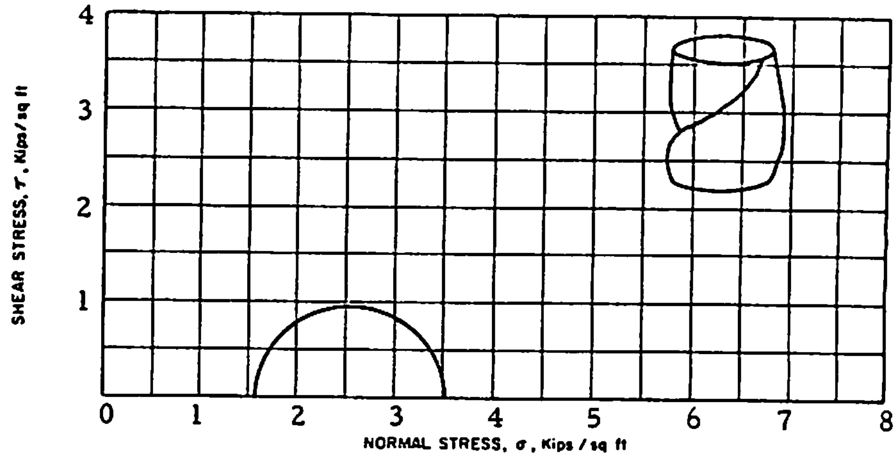
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Green clay, with vertical seam of calcareous material				
LL	PL	PI		G_s

REMARKS ______

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-26	SAMPLE NO. ST-12	DEPTH 55.0 ft	DATE 3/9/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = ________ Degrees

tan ϕ = ________

c = ________ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	33.8			
INITIAL	VOID RATIO	e_o				
INITIAL	SATURATION, %	S_o				
INITIAL	DRY DENSITY, lb / cu ft	γ_d	84.9			
BEFORE SHEAR	WATER CONTENT, %	w_c				
BEFORE SHEAR	VOID RATIO	e_c				
BEFORE SHEAR	SATURATION, %	S_c				
BEFORE SHEAR	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
FINAL	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.60			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	1.84			
TIME TO FAILURE, min		t_f	21.0			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

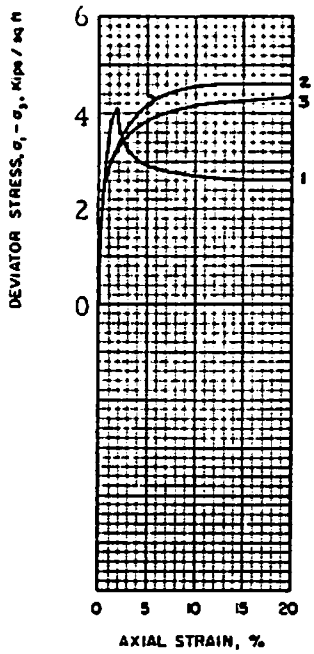
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed		
CLASSIFICATION Light gray sandy clay, calcareous			
LL	PL	PI	G_s

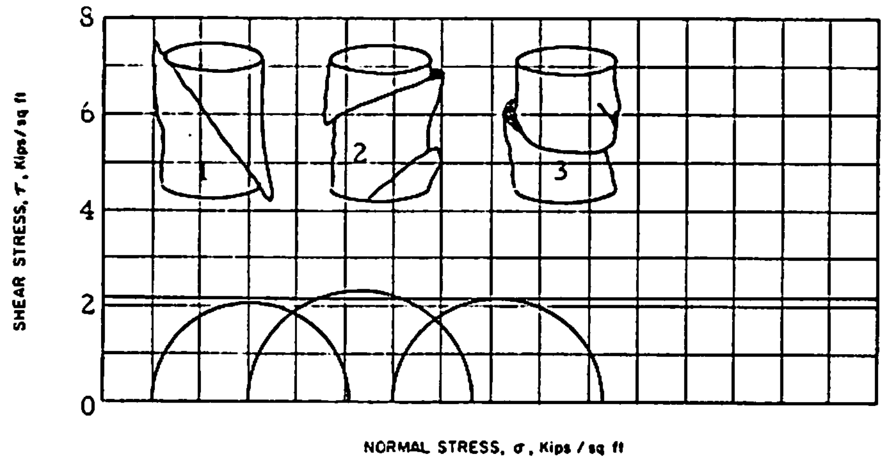
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-27	SAMPLE NO. ST-4	DEPTH 15.0 ft	DATE 3/9/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 2.2 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

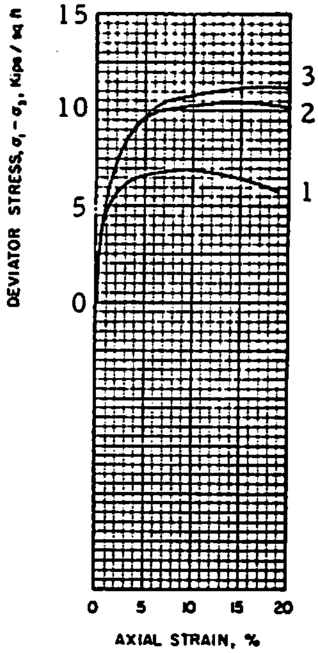
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	46.2	27.0	27.3	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	76.2	98.4	99.3	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	4.07	4.59	4.31	
TIME TO FAILURE, min		t_f	3.5	20.5	20.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$	2.69	4.59	4.31	
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

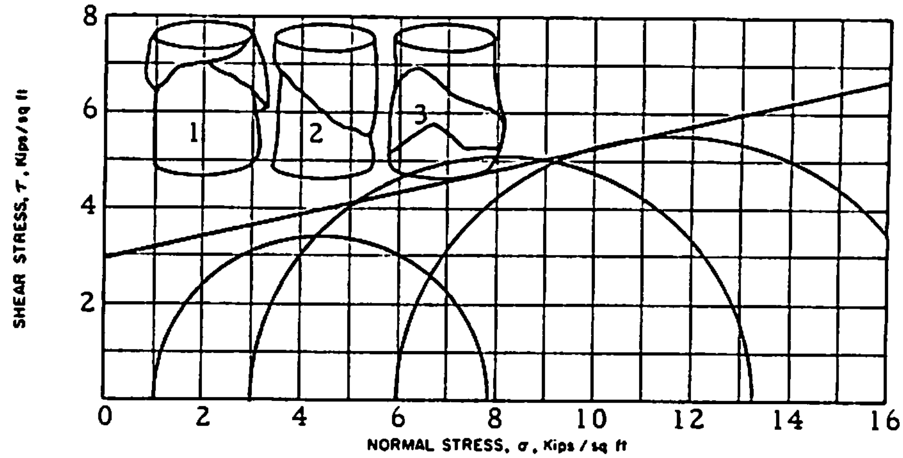
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay, calcareous				
LL	PL	PI		G_s

REMARKS Sample No. 1 contained significantly more calcareous material

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-27	SAMPLE NO. ST-6	DEPTH 25.0 ft	DATE 3/9/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 13 Degrees

tan ϕ = 0.231

c = 3.00 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	21.1	17.8	17.9	
INITIAL	VOID RATIO	e_o				
INITIAL	SATURATION, %	S_o				
INITIAL	DRY DENSITY, lb / cu ft	γ_d	110.7	114.3	113.5	
BEFORE SHEAR	WATER CONTENT, %	w_c				
BEFORE SHEAR	VOID RATIO	e_c				
BEFORE SHEAR	SATURATION, %	S_c				
BEFORE SHEAR	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
FINAL	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	6.82	10.24	11.12	
TIME TO FAILURE, min		t_f	11.5	21.0	21.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

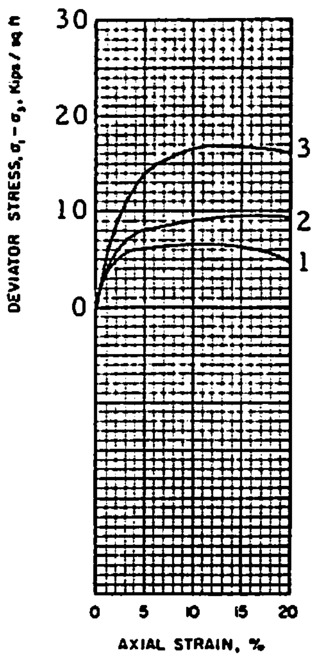
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay				
LL	PL	PI		G_s

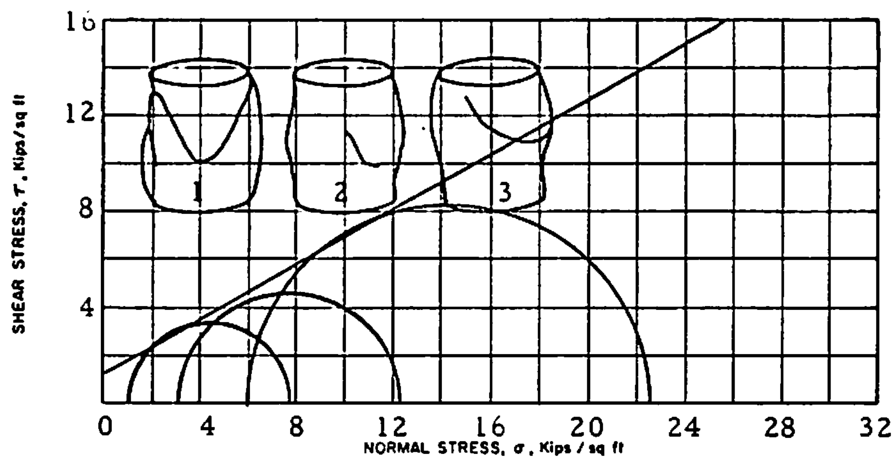
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-27	SAMPLE NO. ST-7	DEPTH 30.0 ft	DATE 3/10/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 30 Degrees

tan ϕ = 0.577

c = 1.3 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

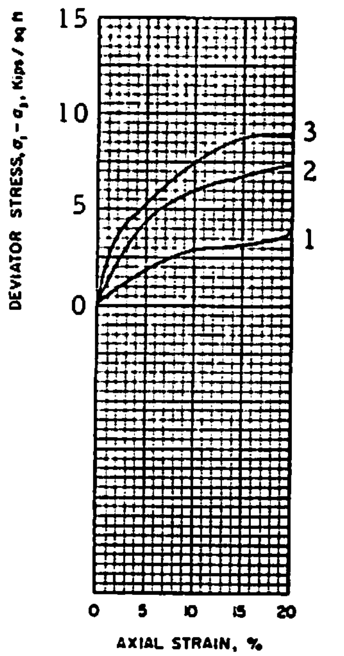
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	14.0	13.5	13.4	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	104.2	117.4	120.7	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	6.43	9.44	16.55	
TIME TO FAILURE, min		t_f	14.5	21.0	21.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
Strain @ σ ult			20.0	21.0	21.5	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$	5.53	9.44	16.55	
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

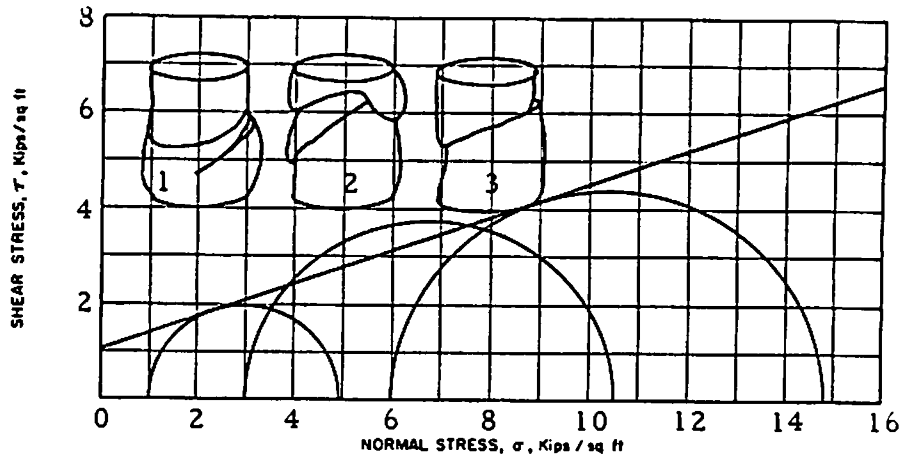
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay, calcareous				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-27	SAMPLE NO. ST-8	DEPTH 35.0 ft	DATE 3/13/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 18.5 Degrees

tan ϕ = 0.334

c = 1.10 Kips / sq ft

METHOD OF SATURATION None

			1	2	3	
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	20.4	20.4	19.5	
INITIAL	VOID RATIO	e_o				
INITIAL	SATURATION, %	S_o				
INITIAL	DRY DENSITY, lb / cu ft	γ_d	100.6	102.5	102.4	
BEFORE SHEAR	WATER CONTENT, %	w_c				
BEFORE SHEAR	VOID RATIO	e_c				
BEFORE SHEAR	SATURATION, %	S_c				
BEFORE SHEAR	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
FINAL	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	3.93	7.42	8.69	
TIME TO FAILURE, min		t_f	20.5	20.5	21.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

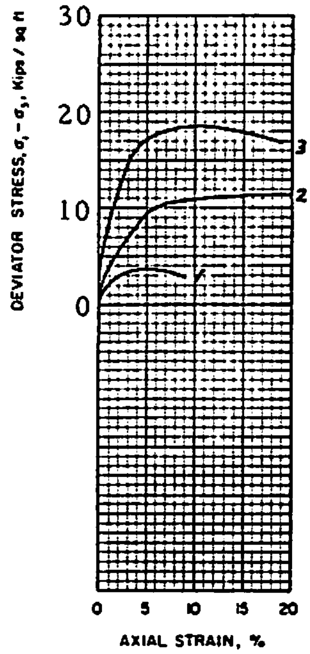
☒ CONTROLLED STRAIN

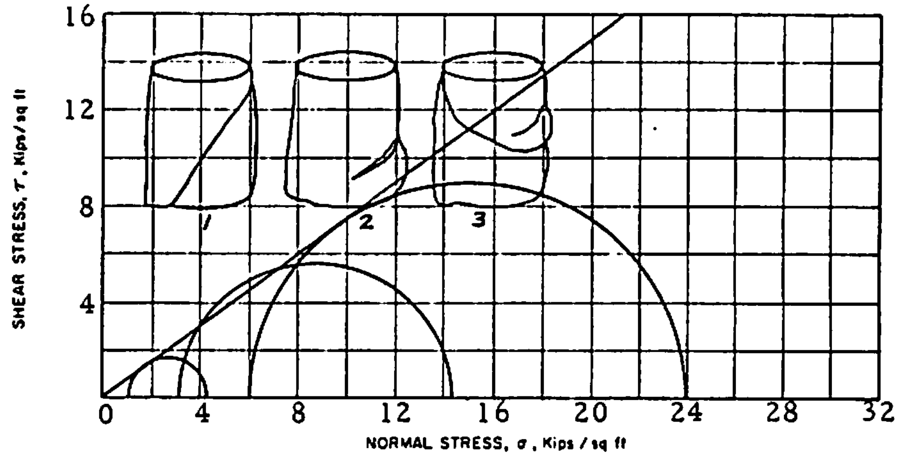
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan sandy clay, calcareous				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-27	SAMPLE NO. ST-9	DEPTH 40.0 ft	DATE 3/13/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 37 Degrees

tan ϕ = 0.753

c = 0 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	11.8	12.6	11.5	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	118.3	125.2	124.8	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	3.52	11.45	17.87	
TIME TO FAILURE, min		t_f	4.50	21.0	17.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

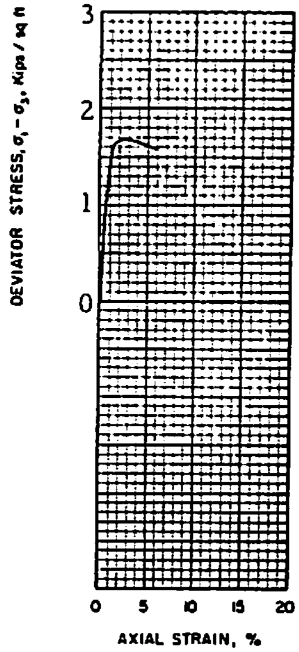
☒ CONTROLLED STRAIN

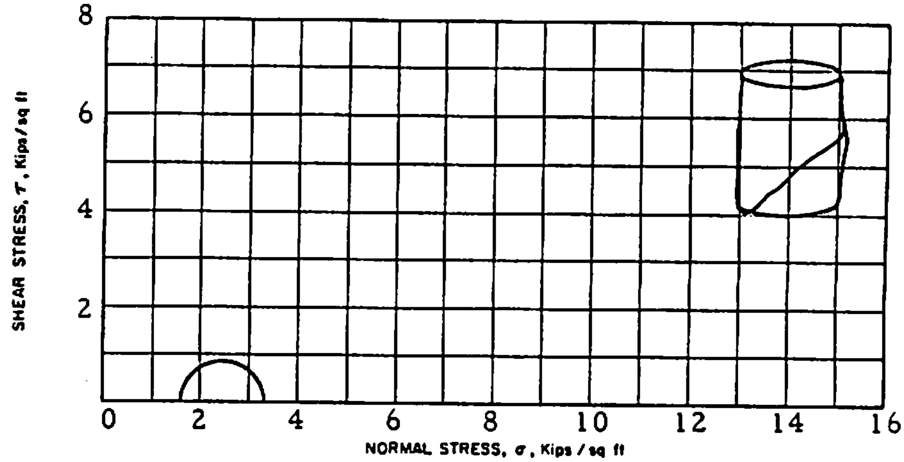
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed		
CLASSIFICATION Light gray and tan clayey fine sand			
LL	PL	PI	G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. TH-27	SAMPLE NO. ST-10	DEPTH 45.0 ft	DATE 3/14/78

TRIAXIAL COMPRESSION TEST RESULTS





TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	30.2			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	93.1			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_c				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.60			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	1.70			
TIME TO FAILURE, min		t_f	2.0			
RATE OF STRAIN, per cent / min			1.0			
Strain @ σ ult, %			7.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$	1.70			
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

SHEAR STRENGTH PARAMETERS

ϕ = ________ Degrees

tan ϕ = ________

c = ________ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

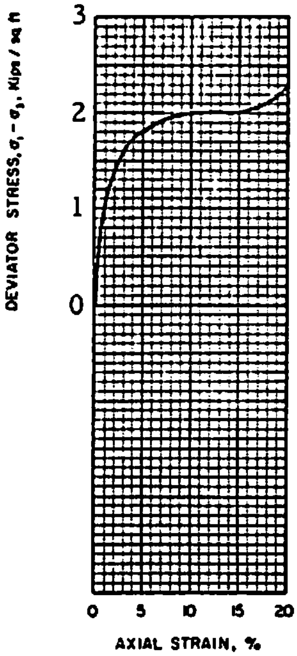
☒ CONTROLLED STRAIN

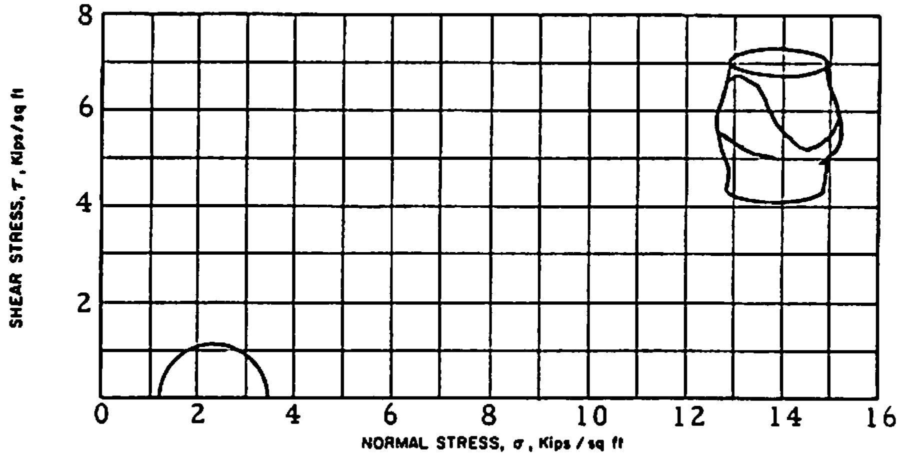
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan clay, slightly sandy, slickensided				
LL	PL	PI		G_s

REMARKS ________

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. SH-30	SAMPLE NO. ST-5	DEPTH 20.0 ft	DATE 3/14/78

TRIAXIAL COMPRESSION TEST RESULTS





TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	46.0			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_o	73.6			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_b				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.20			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	2.24			
TIME TO FAILURE, min		t_f	20.5			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

SHEAR STRENGTH PARAMETERS

ϕ = ________ Degrees

tan ϕ = ________

c = ________ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

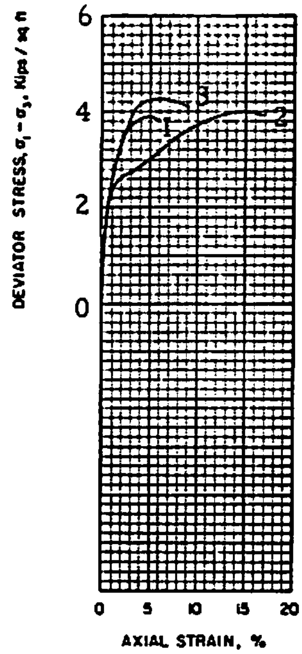
☒ CONTROLLED STRAIN

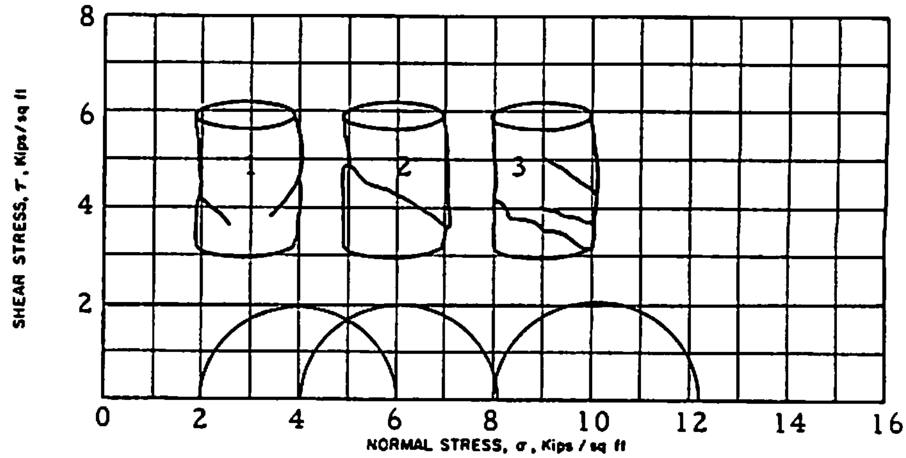
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clay				
LL	PL	PI		G_s

REMARKS ________

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. CS-34	SAMPLE NO. ST-4	DEPTH 15.0 ft	DATE 3/14/78

TRIAXIAL COMPRESSION TEST RESULTS





TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	37.8	35.6	41.2	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	84.6	86.8	81.5	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	3.99	4.07	4.31	
TIME TO FAILURE, min		t_f	4.0	13.5	6.00	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 2.0 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

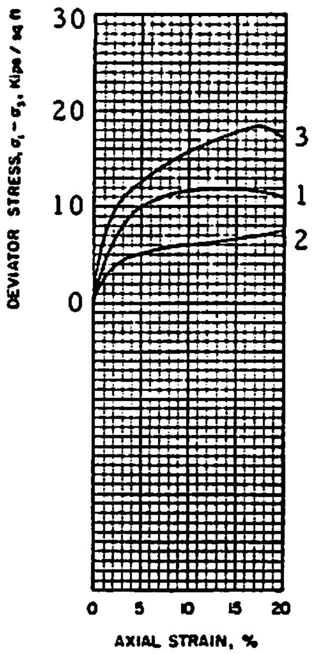
☒ CONTROLLED STRAIN

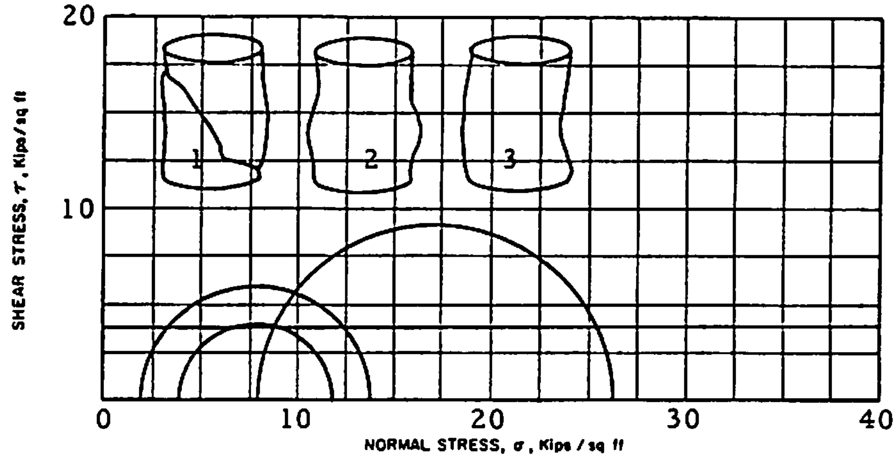
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clay, slightly sandy				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. S-47	SAMPLE NO. ST-5	DEPTH 19.5 ft	DATE 1/8/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 3.9 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	15.9	18.5	14.6	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	115.1	115.1	124.7	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	11.65	7.83	18.20	
TIME TO FAILURE, min		t_f	15.0	18.5	20.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

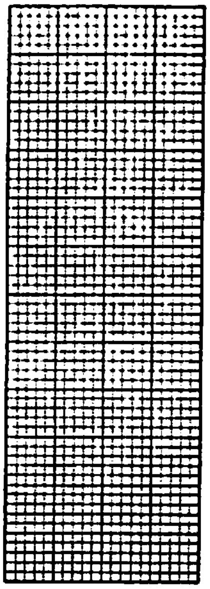
☒ CONTROLLED STRAIN

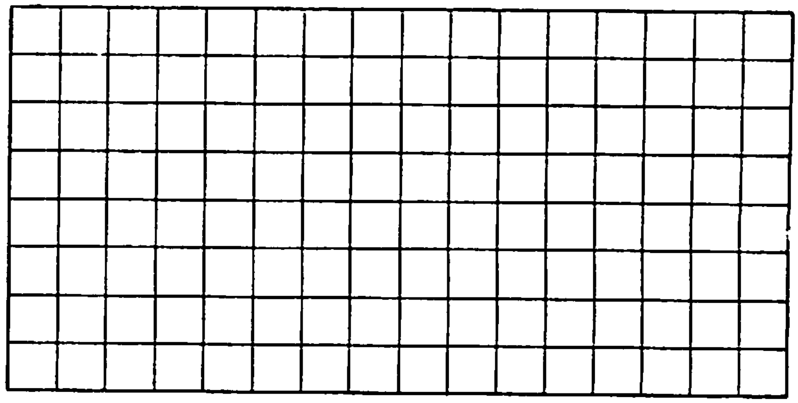
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan sandy clay, slightly silty with calcareous material				
LL	PL	PI		G_s

REMARKS Sample No. 3 contained less calcareous material.

PROJECT DEERHAVEN POWER PLANT GAINESVILLE, FLORIDA			
BORING NO. S-47	SAMPLE NO. ST-10	DEPTH 39.0 ft	DATE 1/9/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION ______

☐ CONTROLLED STRESS

☐ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	42.3			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d				
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3				
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$				
TIME TO FAILURE, min		t_f				
RATE OF STRAIN, per cent / min						
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o				
INITIAL HEIGHT, in.		H_o				

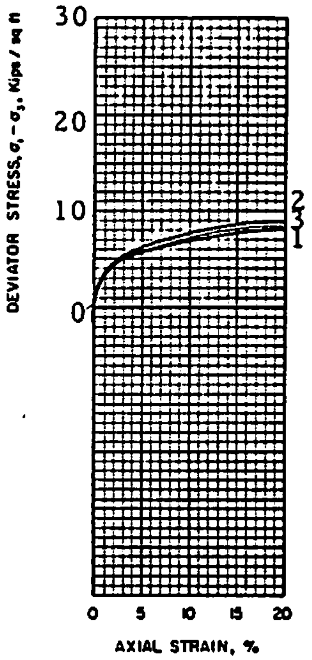
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION	Light gray to white calcareous material with gray clay			
LL	PL	PI		G_s

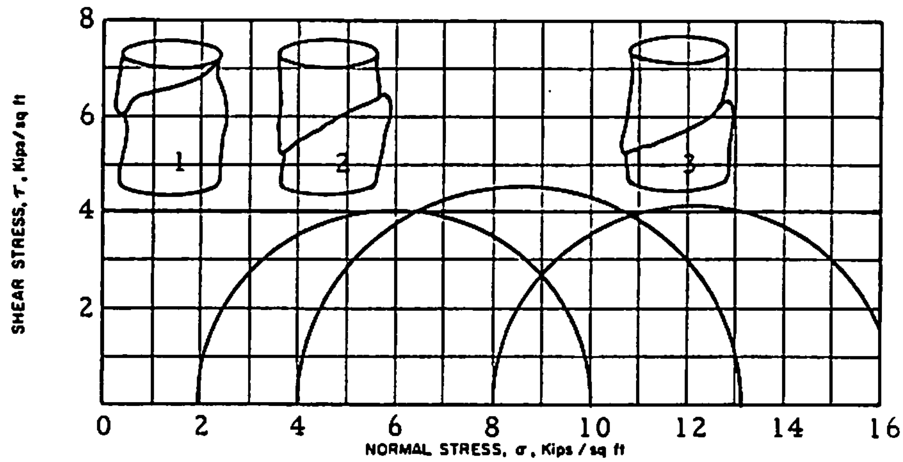
REMARKS 90% of Samples 1, 2 and 3 were calcareous material. None of the samples could be trimmed.

PROJECT	DEERHAVEN POWER PLANT		
	GAINESVILLE, FLORIDA		
BORING NO. U-49	SAMPLE NO. ST-3	DEPTH 14.5 ft	DATE 1/19/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 4.1 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	19.9	19.5	22.7	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	109.7	109.9	105.3	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	8.02	8.99	8.18	
TIME TO FAILURE, min		t_f	18.5	20.0	18.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

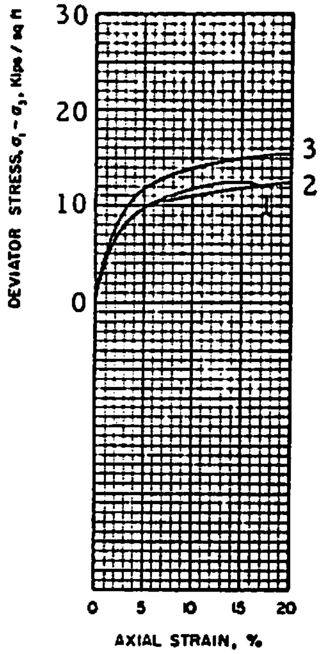
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay with calcareous material				
LL	PL	PI		G_s

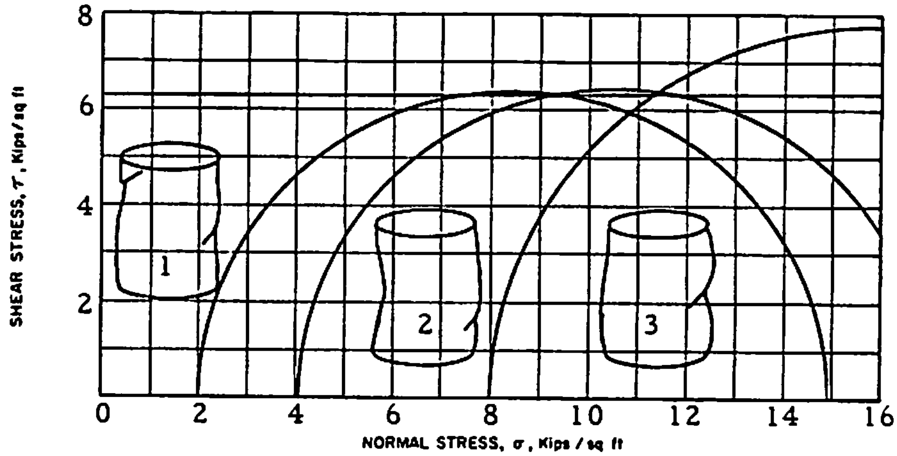
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-49	SAMPLE NO. ST-5	DEPTH 24.5 ft	DATE 1/9/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 6.4 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	14.5	15.9	16.9	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	119.1	118.9	118.1	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	12.86	12.82	15.72	
TIME TO FAILURE, min		t_f	16.5	20.0	20.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

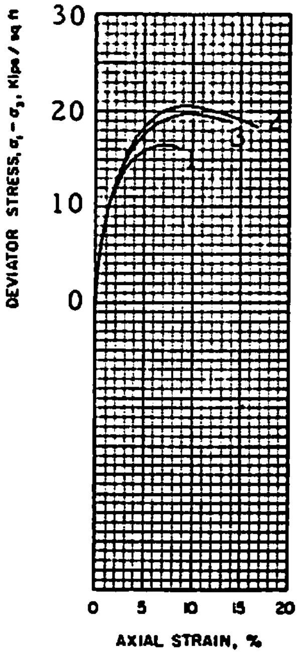
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay with calcareous material				
LL	PL	PI		G_s

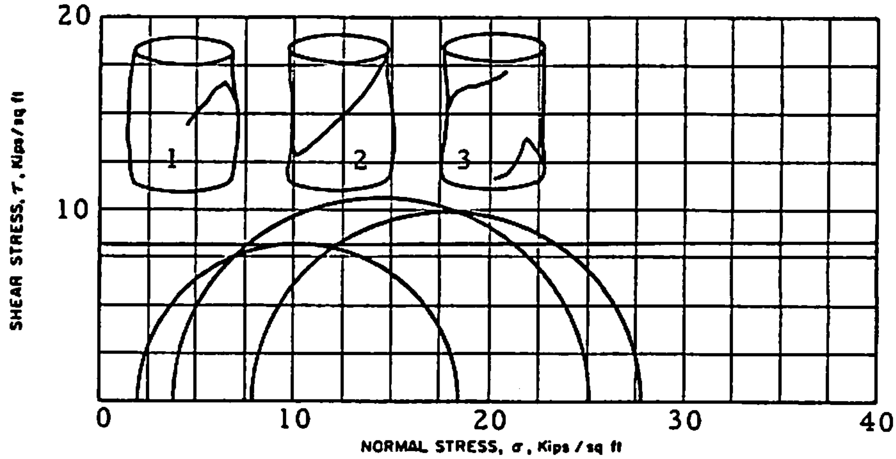
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-49	SAMPLE NO. ST-6	DEPTH 29.5 ft	DATE 1/10/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 8.2 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

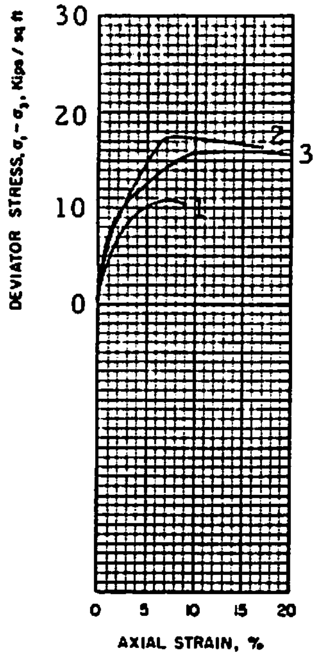
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	14.1	14.8	15.5	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	122.6	121.1	120.9	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	16.43	20.79	20.00	
TIME TO FAILURE, min		t_f	9.0	12.0	13.5	
RATE OF STRAIN, per cent / min						
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

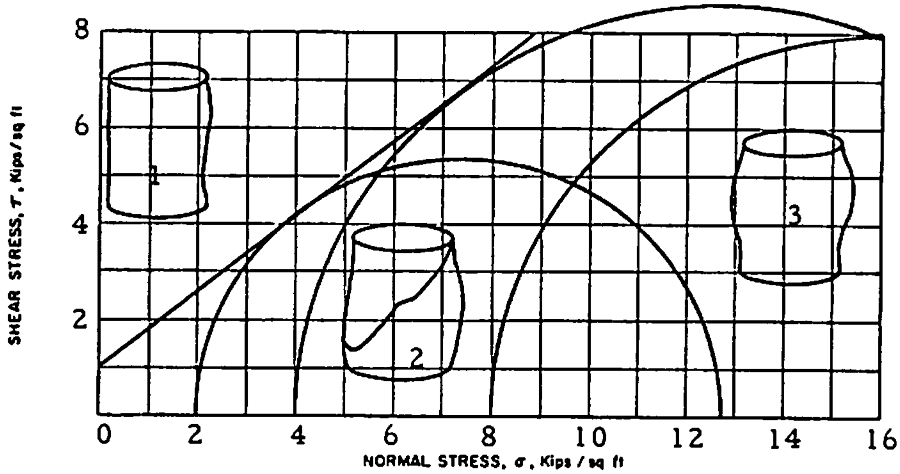
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan sandy clay, slightly silty with calcareous material				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-49	SAMPLE NO. ST-8	DEPTH 39.5 ft	DATE 1/10/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 38.5 Degrees

tan ϕ = 0.795

c = 1.0 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

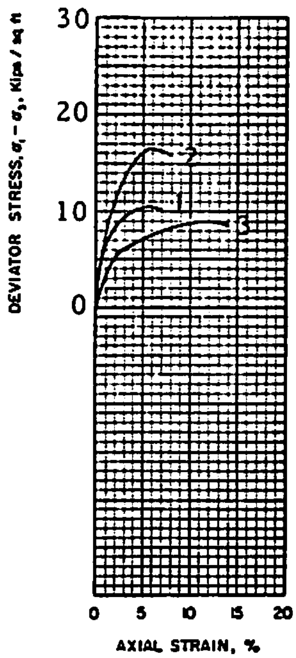
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	22.2	22.5	38.4	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	95.4	98.1	81.5	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	10.76	17.46	16.00	
TIME TO FAILURE, min		t_f	8.0	11.0	17.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

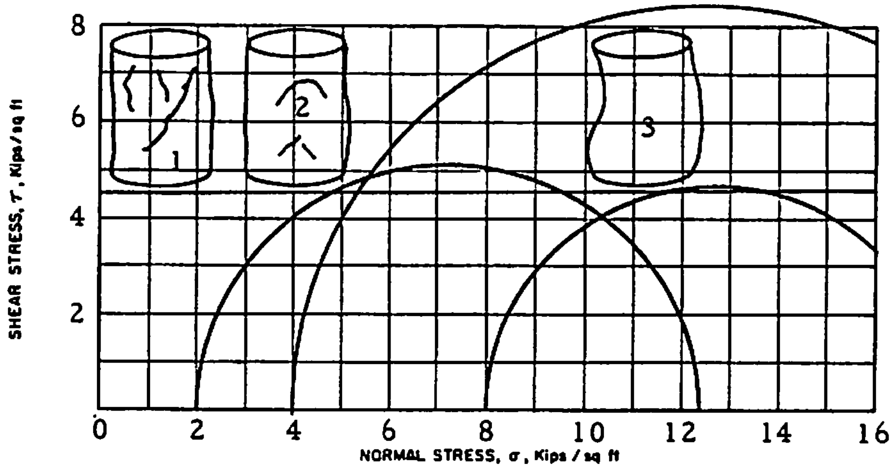
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan clayey fine sand, slightly silty with calcareous material				
LL	PL	PI		G_s

REMARKS Sample No. 3 not the same composition as Nos. 1 and 2.

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-49	SAMPLE NO. ST-10	DEPTH 49.0 ft	DATE 1/10/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 4.65 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

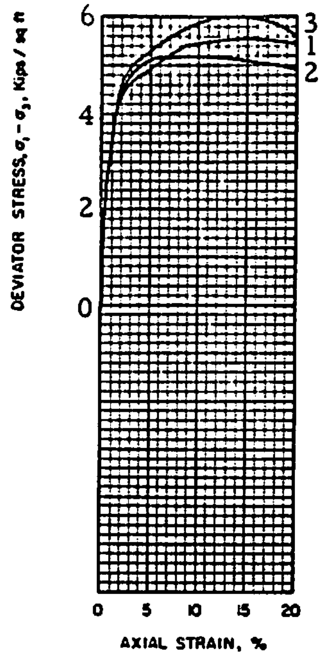
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	60.7	57.7	33.5	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	57.2	59.0	84.5	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	10.39	16.88	9.31	
TIME TO FAILURE, min		t_f	6.5	8.0	13.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

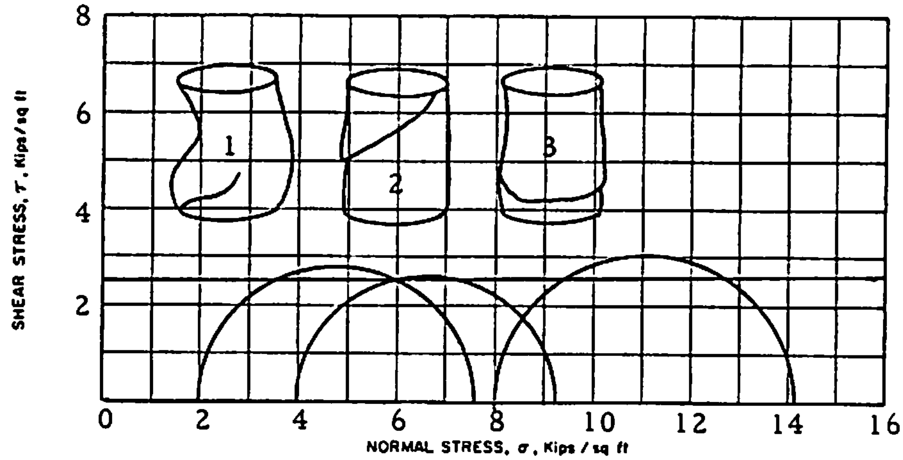
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray clay, crumbly congolmerated structure with claystone concretions				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-49	SAMPLE NO. ST-12	DEPTH 60.0 ft	DATE 1/11/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 2.60 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	28.3	30.3	26.1	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	94.9	93.5	99.1	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	5.61	5.22	6.03	
TIME TO FAILURE, min		t_f	14.5	8.0	12.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

CONTROLLED STRESS

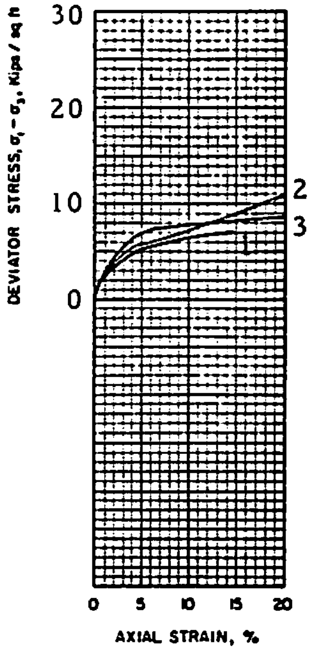
[X] CONTROLLED STRAIN

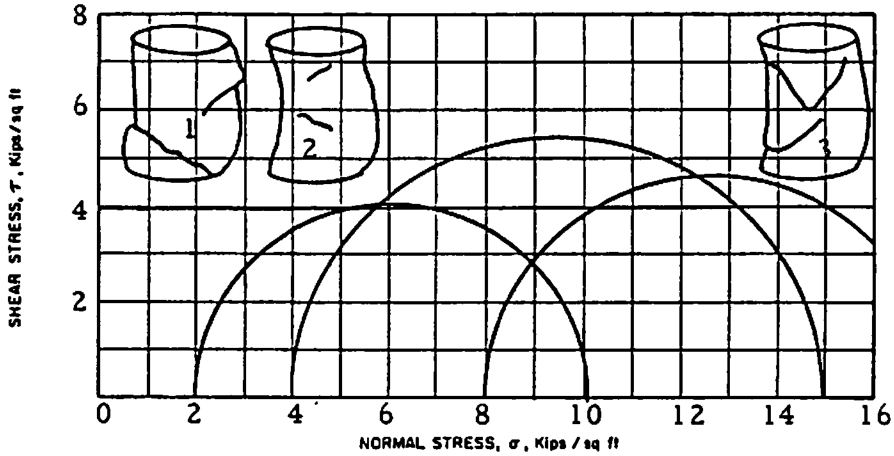
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray silty clay, slightly sandy				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-50	SAMPLE NO. ST-5	DEPTH 19.5 ft	DATE 1/11/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 4.0 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

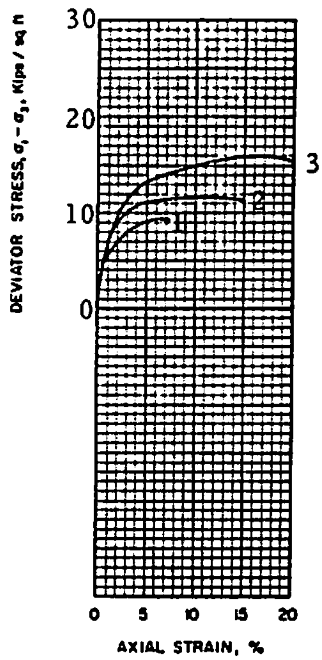
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	17.3	16.2	17.4	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	114.9	115.2	113.5	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	8.03	10.97	9.18	
TIME TO FAILURE, min		t_f	15.5	19.5	19.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

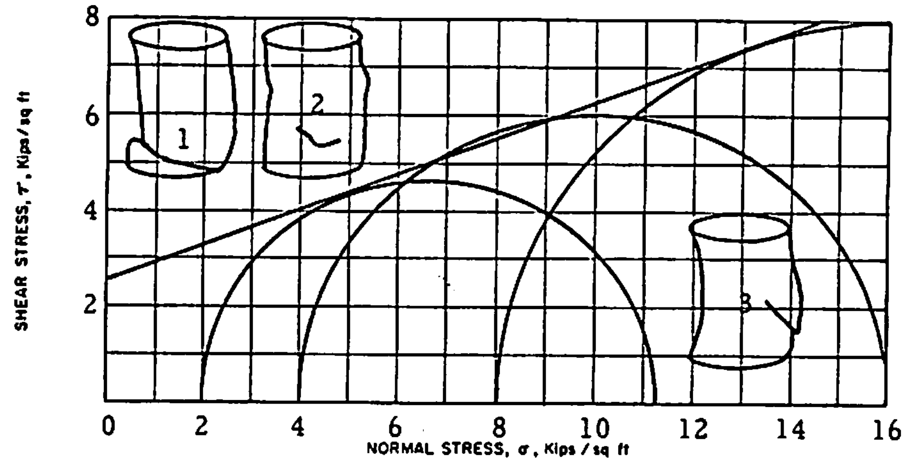
TYPE OF TEST	Quu	TYPE OF SPECIMEN	Undisturbed
CLASSIFICATION	Tan and light gray sandy clay with sand pockets		
LL	PL	PI	G_s

REMARKS

PROJECT	DEERHAVEN POWER PLANT		
	GAINESVILLE, FLORIDA		
BORING NO. U-50	SAMPLE NO. ST-6	DEPTH 24.0 ft	DATE 1/12/78

TRIAXIAL COMPRESSION TEST RESULTS





TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	18.7	18.9	14.5	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	112.9	113.7	118.3	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.22	11.97	15.97	
TIME TO FAILURE, min		t_f	8.5	16.0	19.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

SHEAR STRENGTH PARAMETERS

ϕ = 20 Degrees

tan ϕ = 0.364

c = 2.55 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

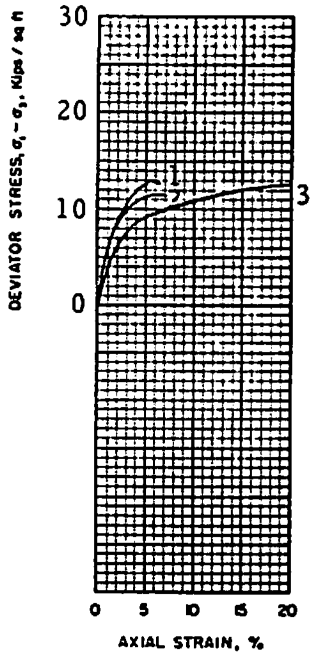
☒ CONTROLLED STRAIN

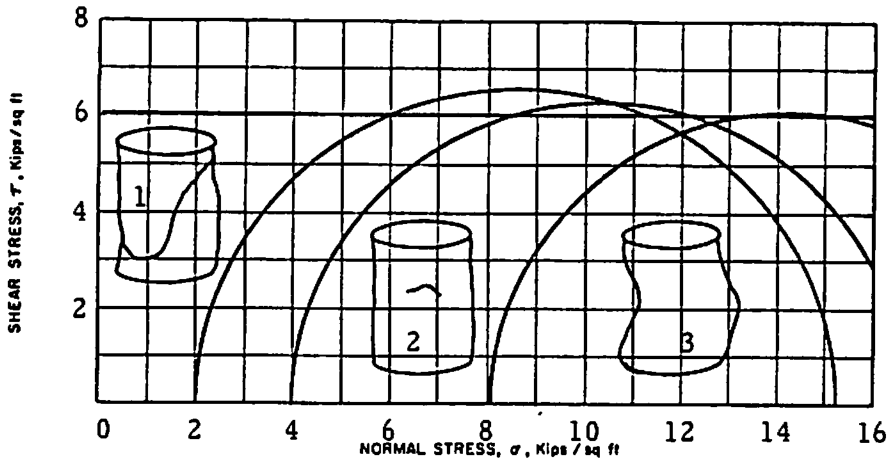
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan sandy clay				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-50	SAMPLE NO. ST-8	DEPTH 34.0 ft	DATE 1/12/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 6.17 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

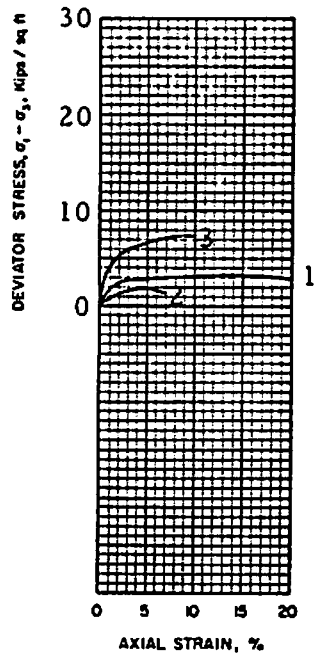
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	16.5	18.2	16.9	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	118.1	112.5	113.5	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	13.16	12.62	12.34	
TIME TO FAILURE, min		t_f	7.5	6.5	20.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

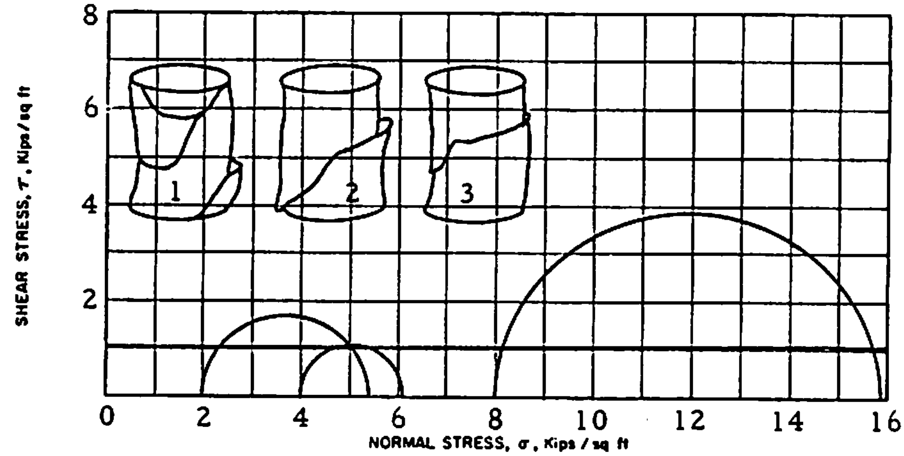
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clayey sand				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-50	SAMPLE NO. ST-9	DEPTH 39.0 ft	DATE 1/12/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 1.02 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	37.5	35.1	26.4	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	84.3	87.2	98.1	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	3.42	2.05	7.77	
TIME TO FAILURE, min		t_f	15.0	4.0	10.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

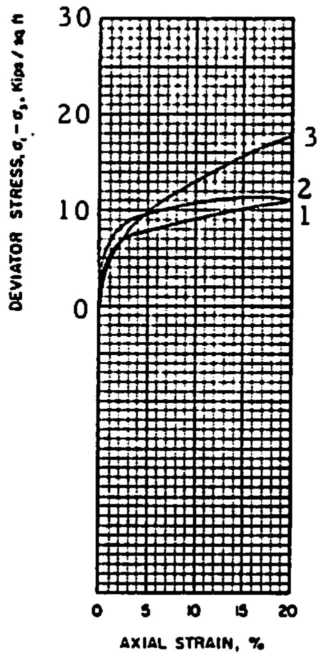
☒ CONTROLLED STRAIN

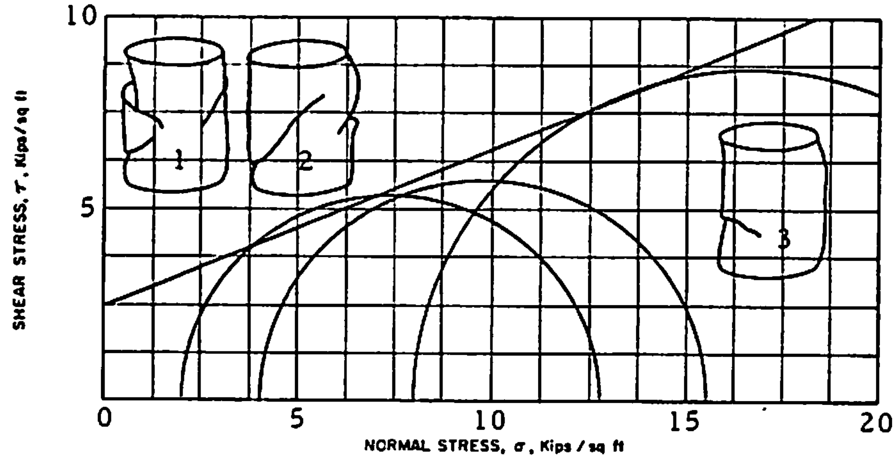
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Green and tan clay, slightly sandy (Samples 1 & 2);				
Light gray and tan sandy clay (Sample 3)				
LL	PL	PI		G_s

REMARKS Sample No. 2 was slickensided

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-51	SAMPLE NO. ST-5	DEPTH 19.5 ft	DATE 1/12/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 22.5 Degrees

tan ϕ = 0.414

c = 2.5 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

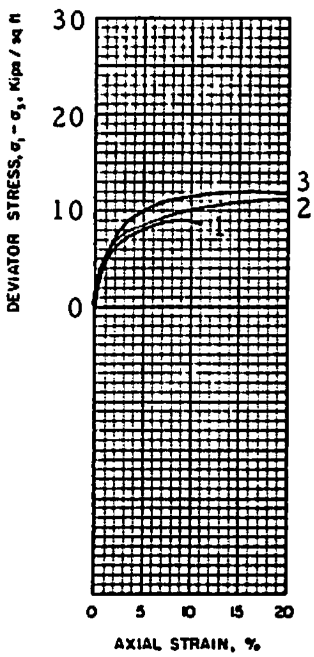
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	16.7	16.1	14.5	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	116.7	117.5	119.6	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	10.81	11.68	17.53	
TIME TO FAILURE, min		t_f	19.5	18.5	20.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

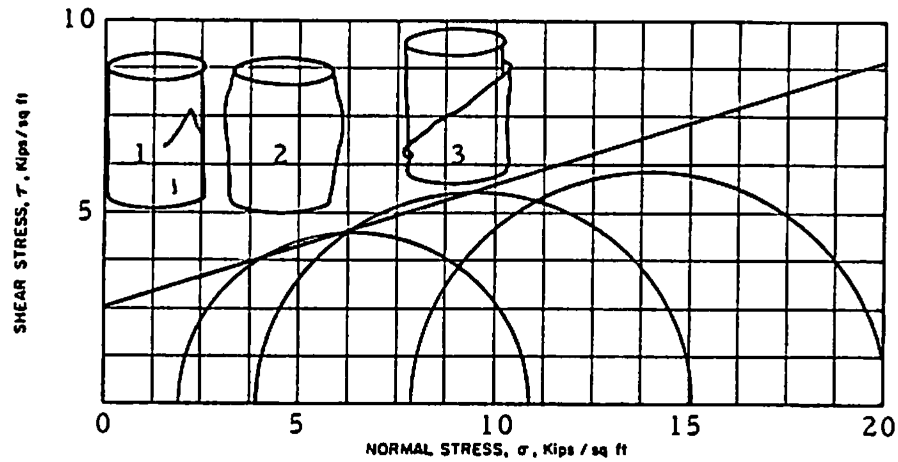
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan sandy clay				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-51	SAMPLE NO. ST-7	DEPTH 29.5 ft	DATE 1/13/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 17.8 Degrees

tan ϕ = 0.321

c = 2.6 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	18.3	18.0	16.8	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	113.9	115.4	108.4	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.00	11.16	12.18	
TIME TO FAILURE, min		t_f	10.0	20.0	17.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

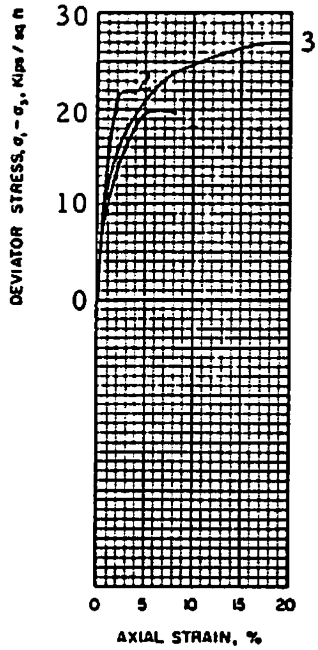
☒ CONTROLLED STRAIN

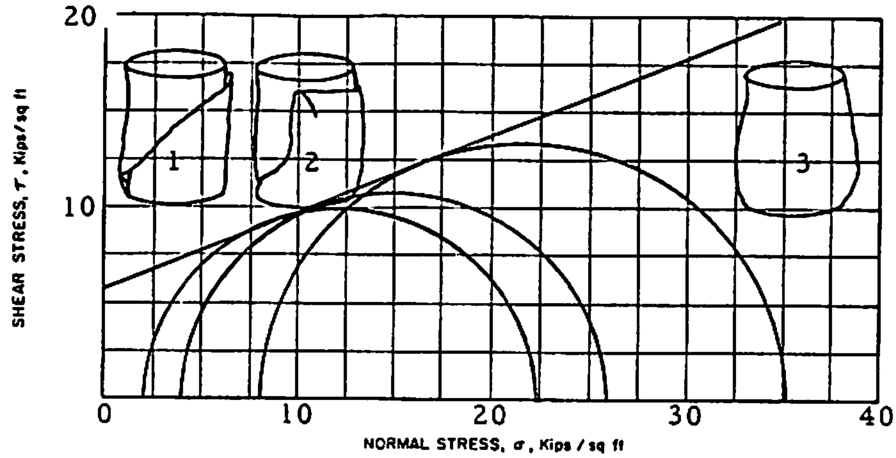
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan sandy clay with calcareous material				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-51	SAMPLE NO. ST-8	DEPTH 34.5 ft	DATE 1/13/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 22.0 Degrees

tan ϕ = 0.404

c = 5.8 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	13.6	11.8	12.1	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	123.5	128.4	126.9	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	20.11	22.00	27.12	
TIME TO FAILURE, min		t_f	10.0	8.5	17.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

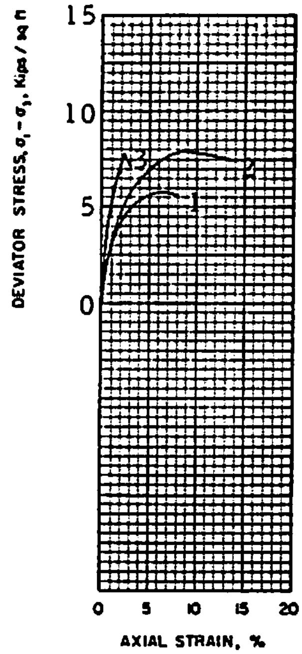
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray clayey fine sand with calcareous material				
LL	PL	PI		G_s

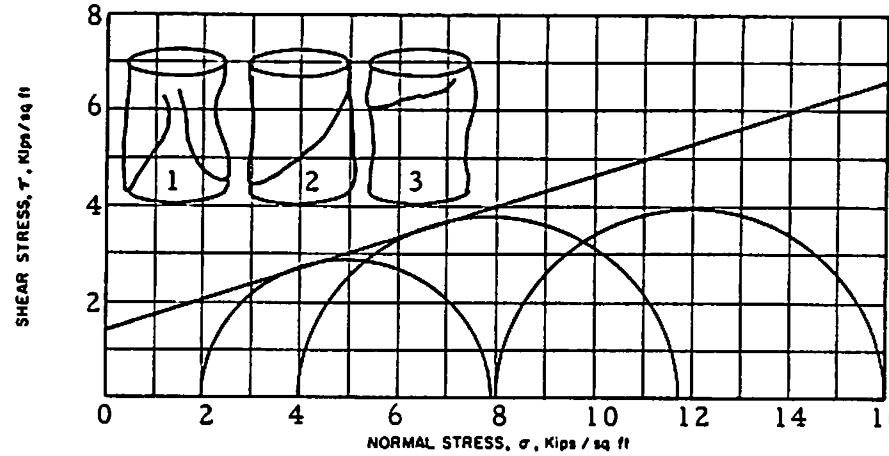
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-51	SAMPLE NO. ST-9	DEPTH 39.5 ft	DATE 1/14/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 18.0 Degrees

tan ϕ = 0.325

c = 1.45 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	35.6	33.5	47.1	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	81.7	84.5	71.0	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	5.78	7.71	7.83	
TIME TO FAILURE, min		t_f	5.5	8.5	4.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

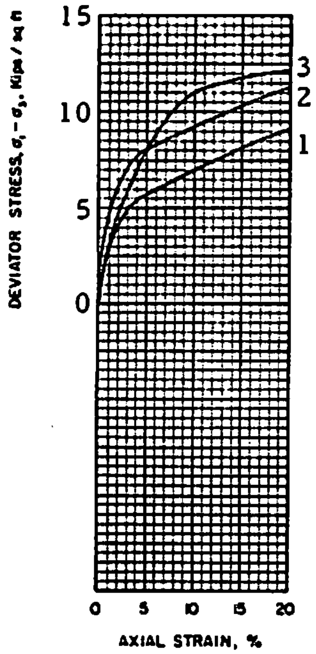
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray sandy clay				
LL	PL	PI		G_s

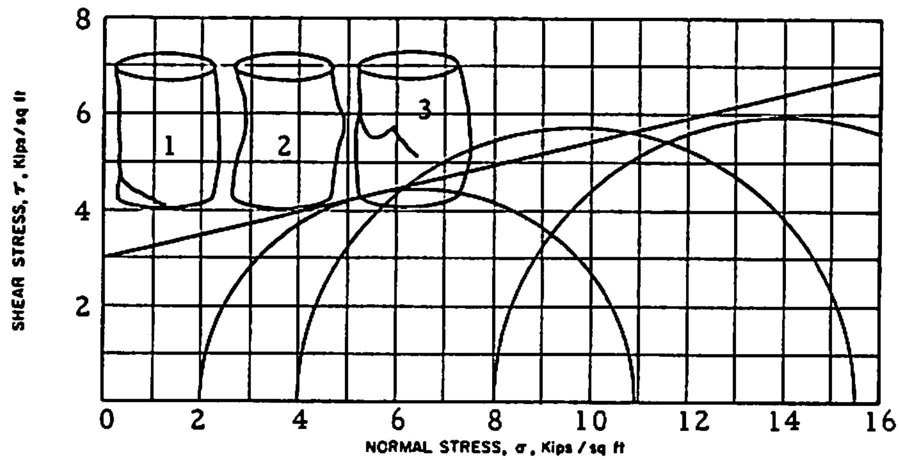
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-51	SAMPLE NO. ST-11	DEPTH 50.5 ft	DATE 1/13/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 13.5 Degrees

tan ϕ = 0.24

c = 3.00 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	16.0	16.3	17.0	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	114.8	116.0	114.2	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.03	11.45	12.09	
TIME TO FAILURE, min		t_f	19.0	20.5	19.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

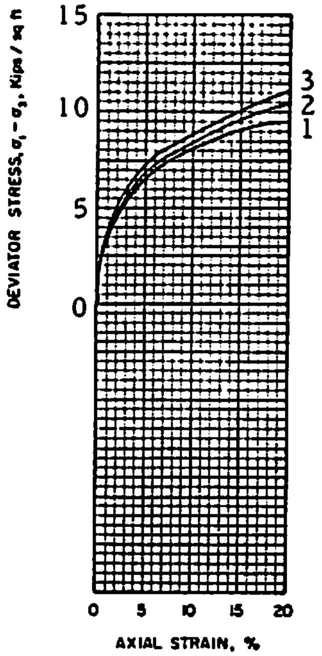
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay with calcareous material				
LL	PL	PI		G_s

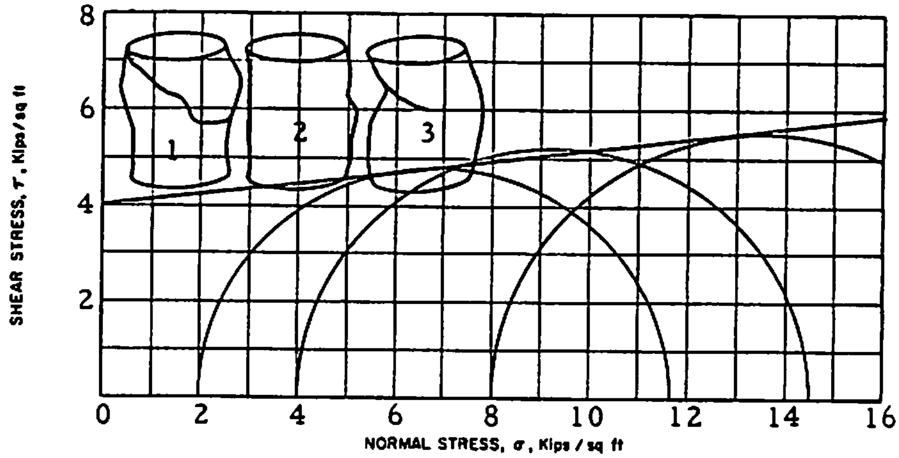
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-52	SAMPLE NO. ST-6	DEPTH 24.5 ft	DATE 1/16/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 6.5 Degrees

tan ϕ = 0.114

c = 4.0 Kips / sq ft

METHOD OF SATURATION None

			1	2	3	
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	16.7	16.7	16.6	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	115.5	115.4	115.7	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.63	10.41	11.13	
TIME TO FAILURE, min		t_f	20.0	20.0	20.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

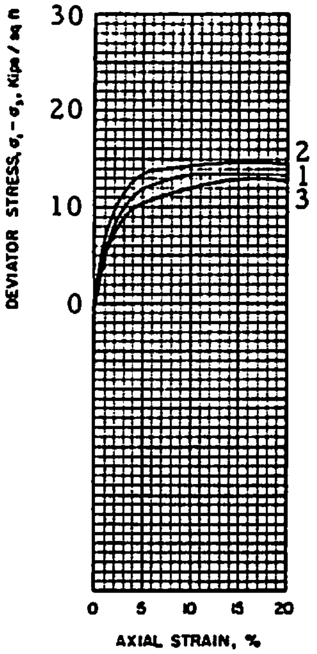
☒ CONTROLLED STRAIN

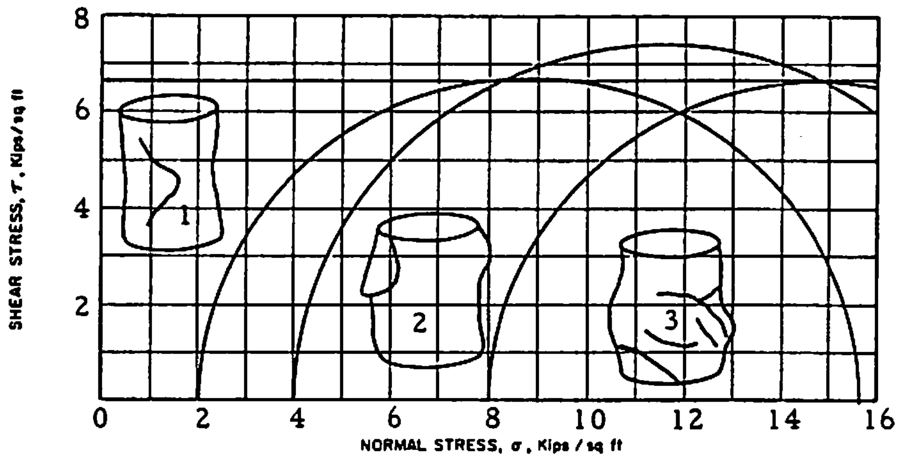
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clayey fine sand				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-52	SAMPLE NO. ST-7	DEPTH 29.5 ft	DATE 1/17/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 6.8 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

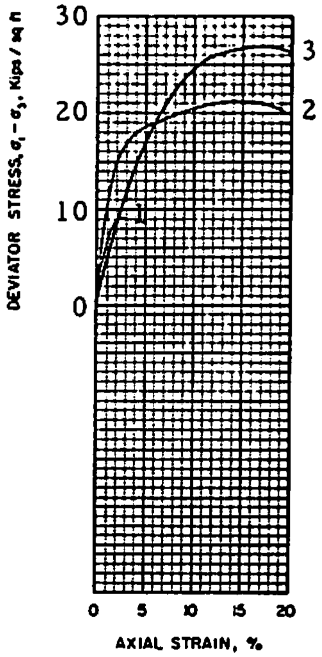
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	14.8	12.0	16.1	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	120.8	122.9	118.3	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	13.60	15.00	13.67	
TIME TO FAILURE, min		t_f	14.0	21.0	20.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

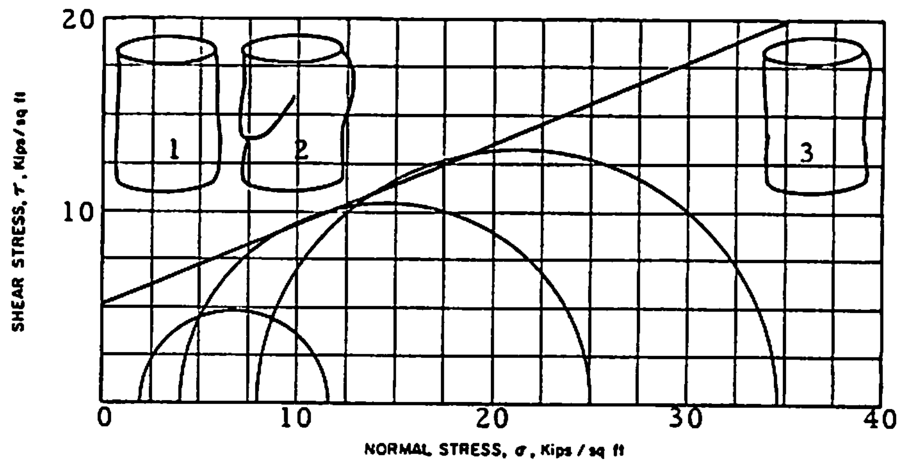
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan clayey fine sand with sand pockets				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-52	SAMPLE NO. ST-8	DEPTH 34.5 ft	DATE 1/17/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 23.0 Degrees

tan ϕ = 0.424

c = 5.3 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

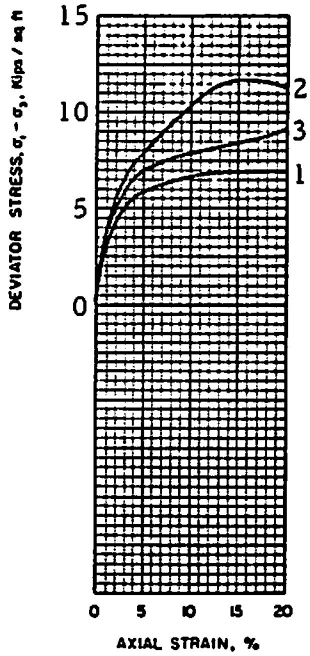
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	15.4	12.8	13.5	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	123.1	124.8	124.6	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.56	21.30	26.45	
TIME TO FAILURE, min		t_f	3.0	14.5	21.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

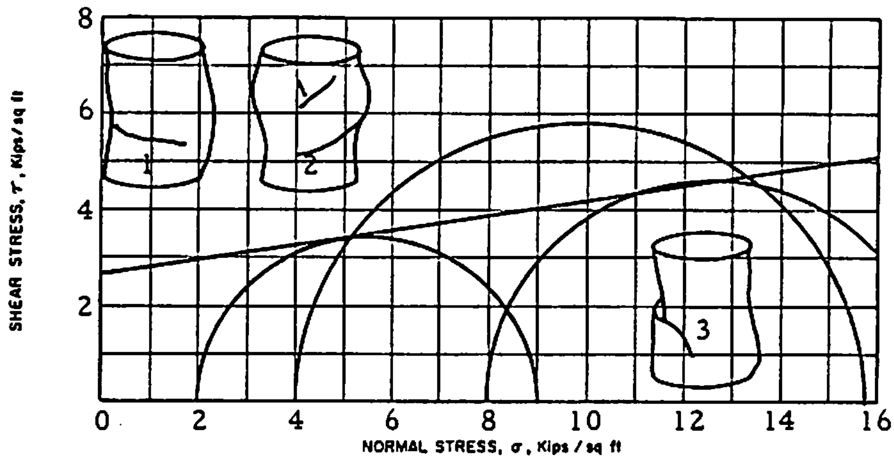
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clayey fine sand, slightly silty				
LL	PL	PI		G_s

REMARKS Membrane leak on Sample No. 1

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-52	SAMPLE NO. ST-9	DEPTH 39.0 ft	DATE 1/18/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 8.5 Degrees

tan ϕ = 0.149

c = 2.70 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

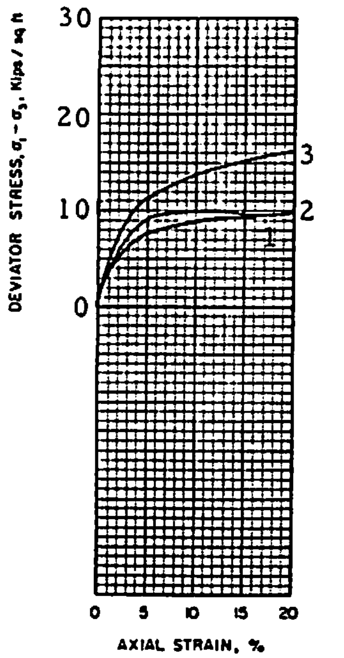
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	17.2	14.0	17.3	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	114.6	119.7	114.3	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	7.03	11.74	9.08	
TIME TO FAILURE, min		t_f	20.0	17.0	21.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

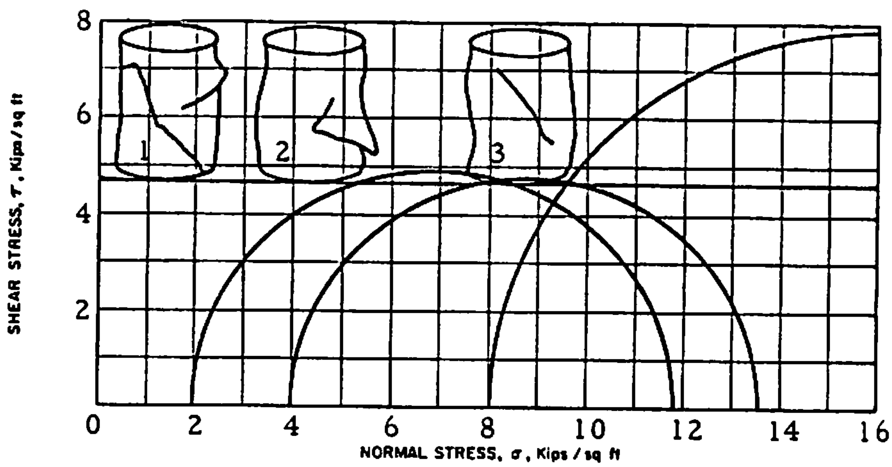
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clayey fine sand with sand pockets				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-53	SAMPLE NO. ST-6	DEPTH 24.5 ft	DATE 1/18/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 4.7 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

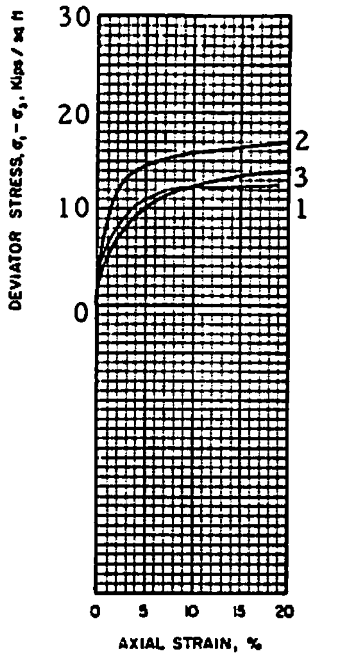
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	15.6	16.5	13.0	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	116.6	115.8	123.7	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.79	9.48	15.83	
TIME TO FAILURE, min		t_f	12.0	18.0	21.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

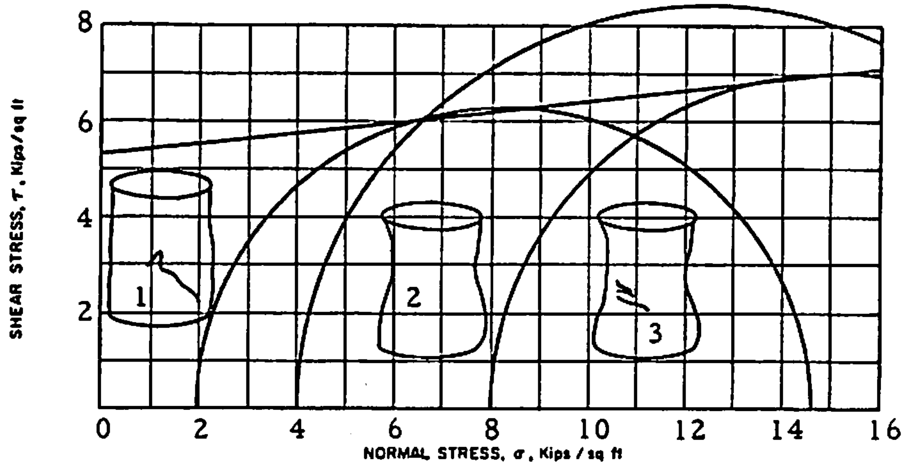
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and gray clayey fine sand with calcareous material				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-53	SAMPLE NO. ST-7	DEPTH 29.5 ft	DATE 1/18/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 6.5 Degrees

tan ϕ = 0.114

c = 5.3 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

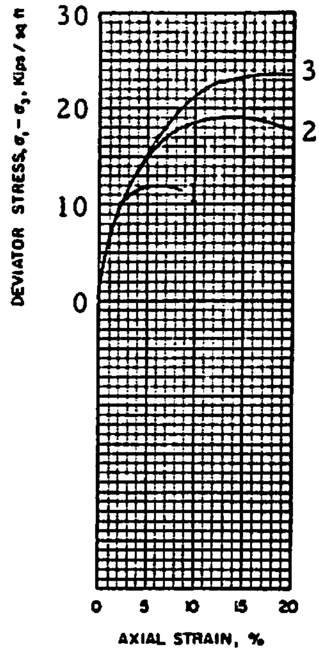
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	16.7	14.5	16.8	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	117.2	122.0	116.6	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	12.55	17.09	14.01	
TIME TO FAILURE, min		t_f	20.0	20.5	18.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

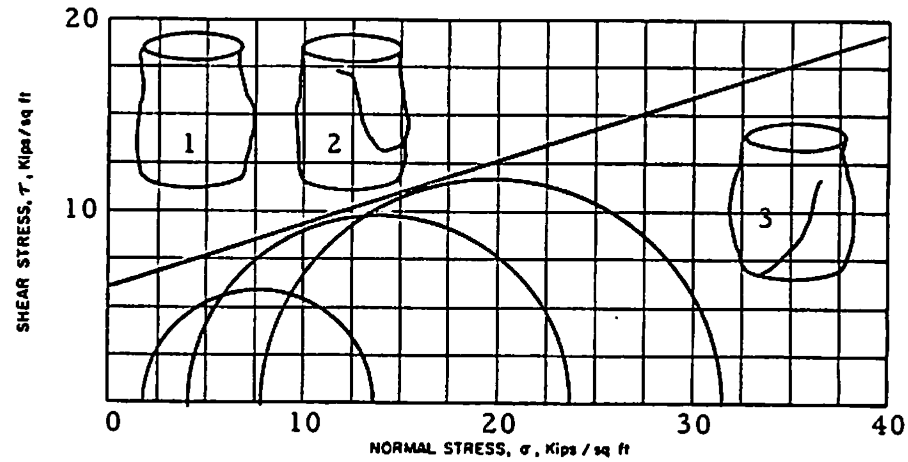
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan clayey sand with calcareous material				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-53	SAMPLE NO. ST-8	DEPTH 34.5 ft	DATE 1/19/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 18.0 Degrees

tan ϕ = 0.325

c = 6.0 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	11.1	12.6	12.2	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	124.4	115.6	116.5	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.00	4.00	8.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	11.62	18.94	23.55	
TIME TO FAILURE, min		t_f	4.5	15.5	18.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

☐ CONTROLLED STRESS

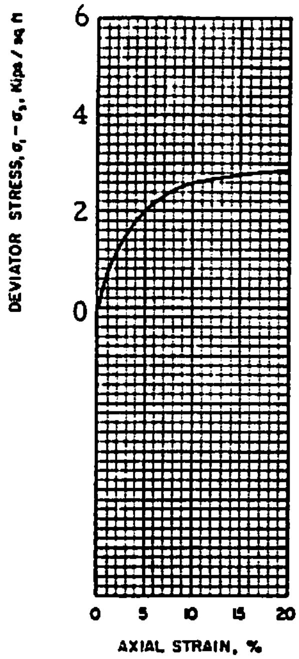
☒ CONTROLLED STRAIN

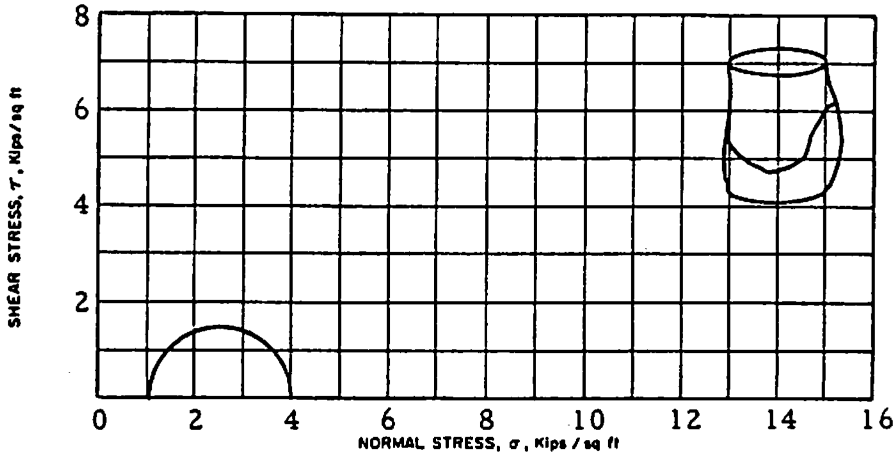
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clayey sand				
LL	PL	PI		G_s

REMARKS Apparent membrane leak in Sample No. 1.

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. U-53	SAMPLE NO. ST-9	DEPTH 39.0 ft	DATE 1/19/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

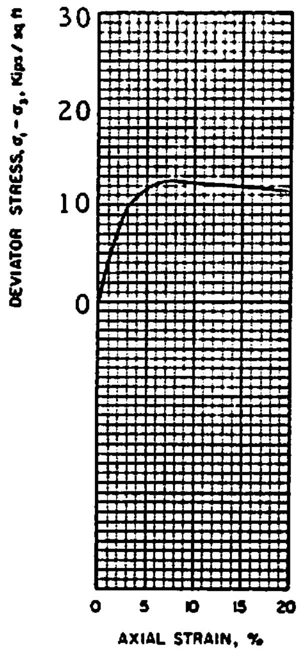
				1			
TEST NO.				1			
INITIAL	WATER CONTENT, %		w_o	22.9			
	VOID RATIO		e_o				
	SATURATION, %		S_o				
	DRY DENSITY, lb / cu ft		γ_d	104.8			
BEFORE SHEAR	WATER CONTENT, %		w_c				
	VOID RATIO		e_c				
	SATURATION, %		S_c				
	FINAL BACK PRESSURE Kips / sq ft		u_o				
FINAL	WATER CONTENT, %		w_f				
	VOID RATIO		e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft			σ_3	1.00			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$		2.91			
TIME TO FAILURE, min			t_f	20.0			
RATE OF STRAIN, per cent / min				1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$					
INITIAL DIAMETER, in.			D_o	1.41			
INITIAL HEIGHT, in.			H_o	3.00			

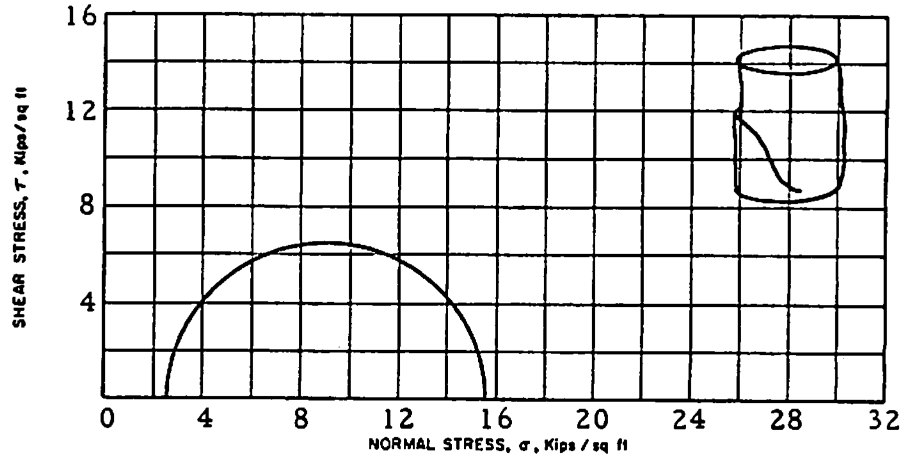
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray clay, very calcareous				
LL	PL	PI		G_s

REMARKS ______

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. C-68	SAMPLE NO. ST-3	DEPTH 10.0 ft	DATE 3/14/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

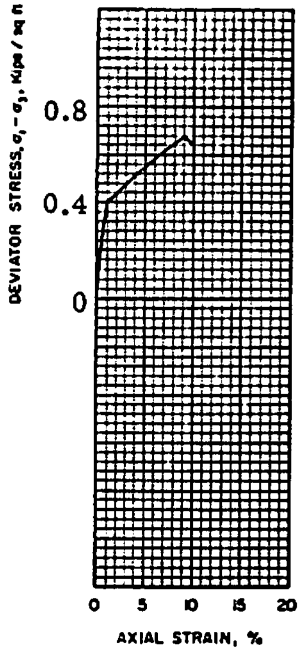
TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	13.0			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	126.0			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	2.60			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	12.57			
TIME TO FAILURE, min		t_f	18.0			
RATE OF STRAIN, per cent / min			1.0			
Strain @ σ ult, %			20.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$	11.50			
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

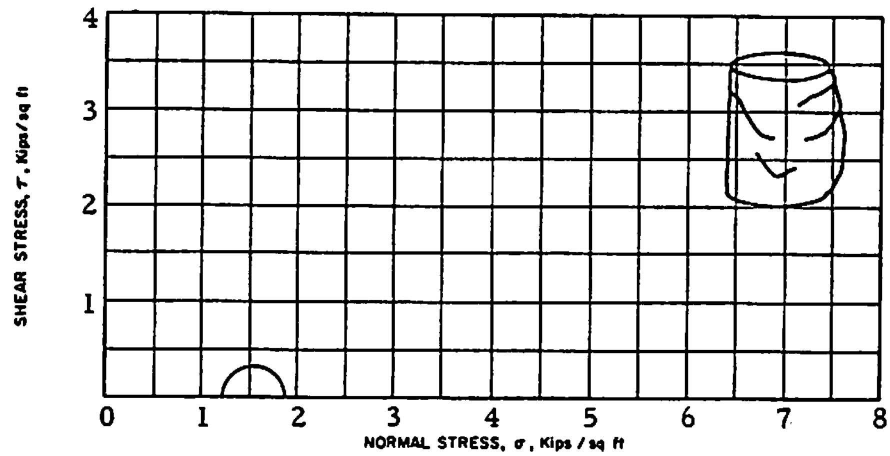
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan clayey fine sand, calcareous				
LL	PL	PI		G_s

REMARKS ______

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. WW-69	SAMPLE NO. ST-8	DEPTH 35.0 ft	DATE 3/14/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

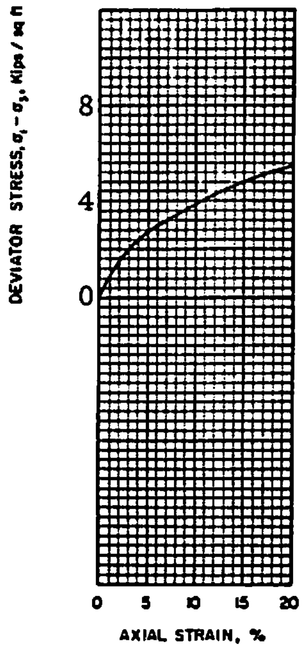
TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	26.6			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	99.1			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.20			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	0.69			
TIME TO FAILURE, min		t_f	9.0			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

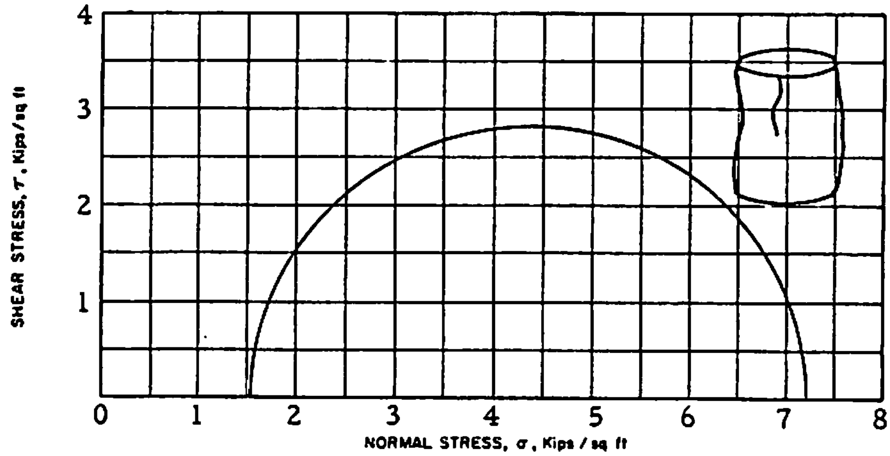
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray clay, slightly sandy and calcareous				
LL	PL	PI		G_s

REMARKS ______

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-6	DEPTH 17.0 ft	DATE 3/14/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	17.1			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	112.5			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.60			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	5.64			
TIME TO FAILURE, min		t_f	20.5			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

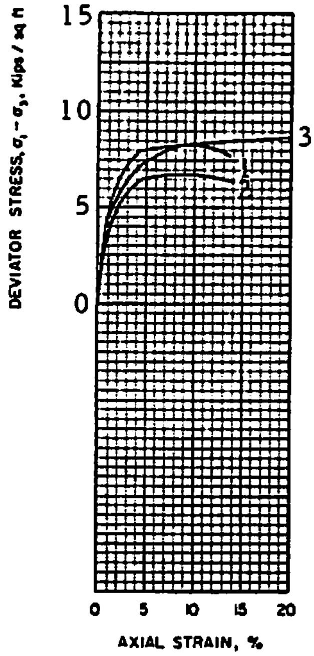
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan sandy clay with vertical sand seam				
LL	PL	PI		G_s

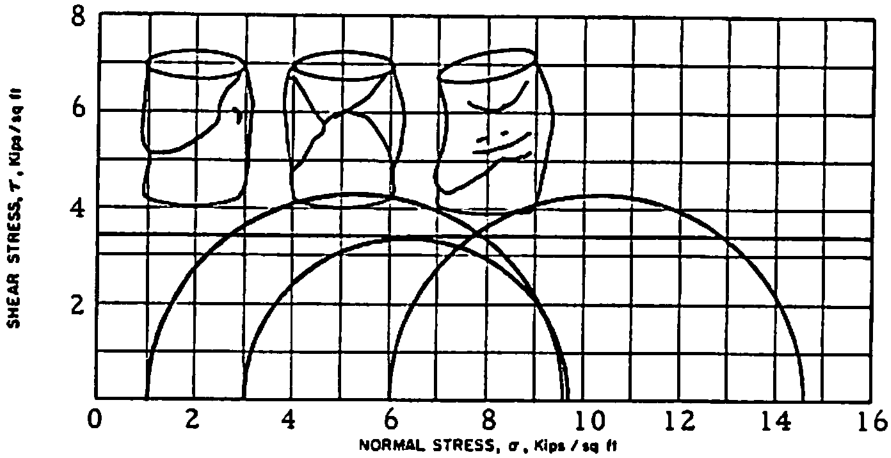
REMARKS ______

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-7	DEPTH 20.0 ft	DATE 3/15/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 0 Degrees

tan ϕ = 0

c = 3.30 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

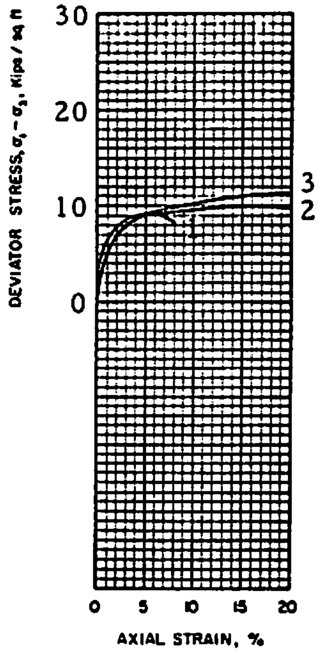
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	21.4	26.9	23.7	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	100.1	94.7	100.2	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	8.25	6.48	8.52	
TIME TO FAILURE, min		t_f	11.5	14.5	20.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

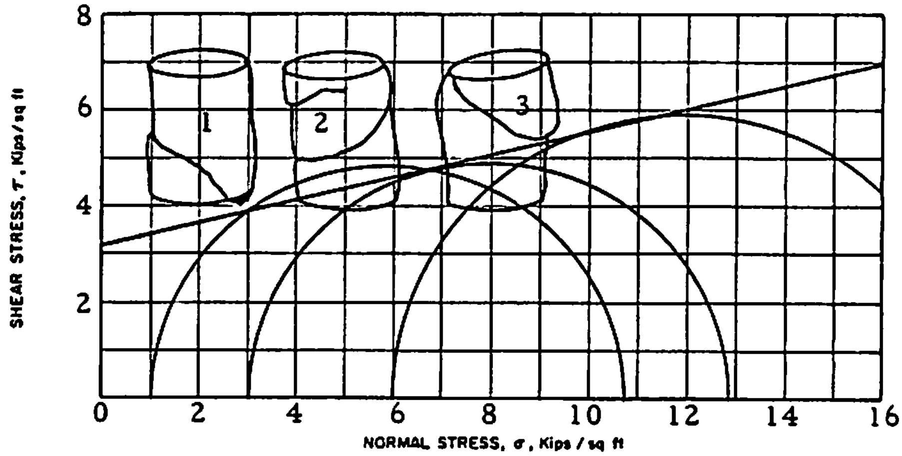
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay, calcareous				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-9	DEPTH 26.0 ft	DATE 3/15/78

TRIAXIAL COMPRESSION TEST RESULTS





TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	15.2	16.0	15.1	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_o	119.1	117.2	118.5	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.72	9.90	11.73	
TIME TO FAILURE, min		t_f	10.5	21.0	21.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

SHEAR STRENGTH PARAMETERS

ϕ = 12.5 Degrees

$\tan \phi$ = 0.222

c = 3.25 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

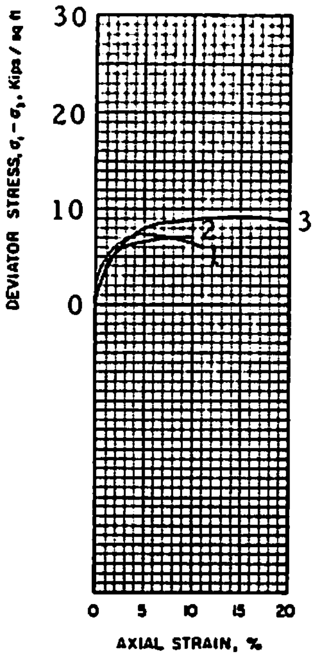
☒ CONTROLLED STRAIN

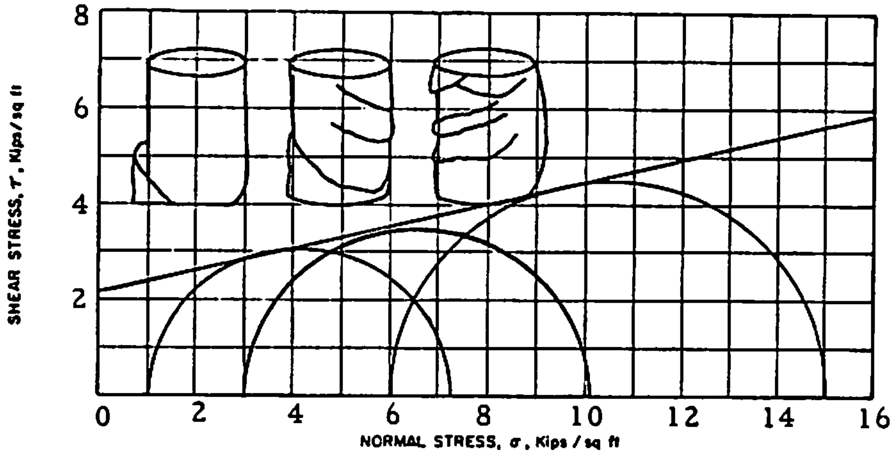
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay with traces of lignite				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-10	DEPTH 29.0 ft	DATE 3/16/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 13 Degrees

tan ϕ = 0.231

c = 2.2 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

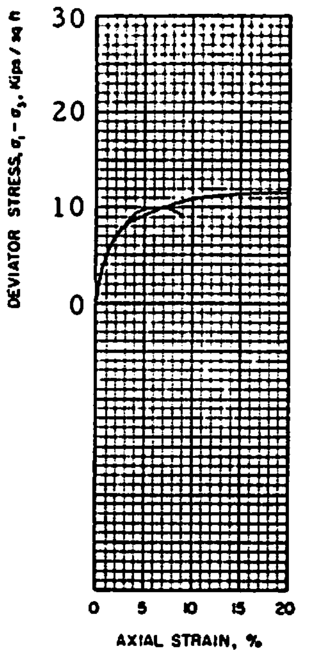
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	17.5	17.2	17.0	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	115.9	114.6	115.1	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	6.68	7.15	9.02	
TIME TO FAILURE, min		t_f	8.5	6.5	21.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

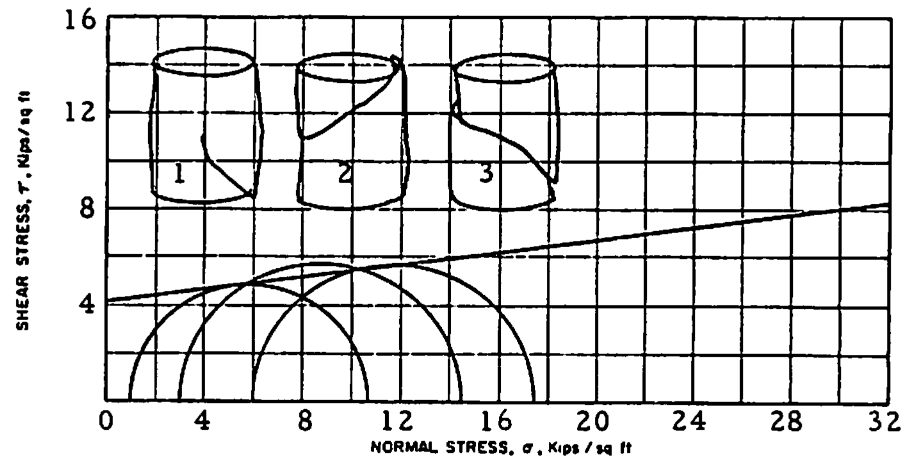
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay, calcareous				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-11	DEPTH 32.0 ft	DATE 3/16/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 7.5 Degrees

tan ϕ = 0.132

c = 4.20 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	15.1	15.8	17.7	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	119.0	117.5	116.4	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	9.88	11.45	11.30	
TIME TO FAILURE, min		t_1	6.5	21.0	14.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

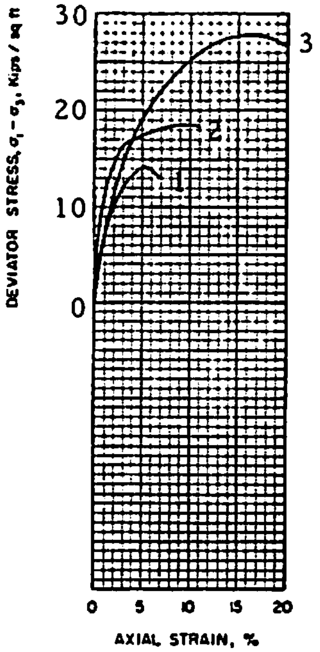
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray sandy clay, calcareous				
LL	PL	PI		G_s

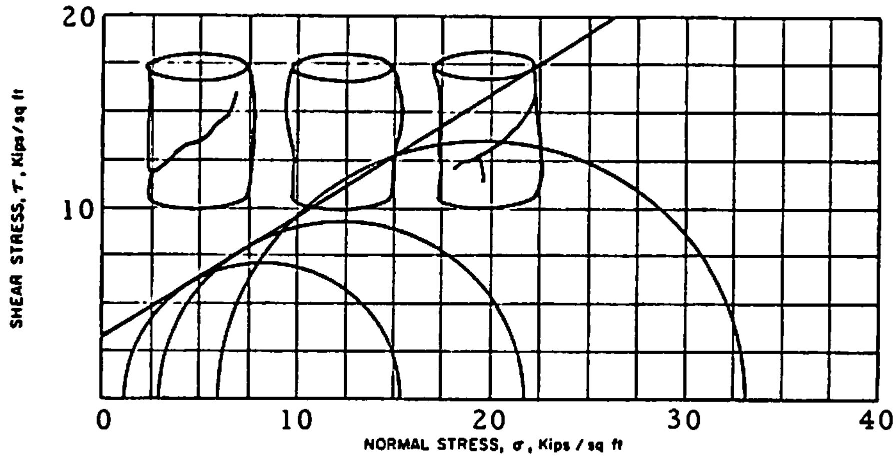
REMARKS Sample No. 3 developed membrane leak - note significant w% increase during test

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-12	DEPTH 35.0 ft	DATE 3/16/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 32 Degrees

tan ϕ = 0.625

c = 3.4 Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

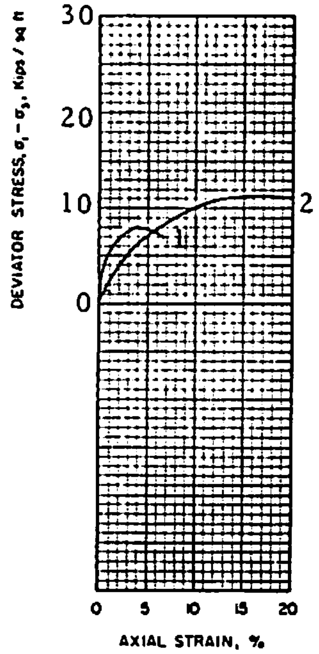
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	12.5	12.5	12.4	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_o	124.4	123.8	128.0	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	14.19	18.47	27.17	
TIME TO FAILURE, min		t_f	6.0	12.0	22.0	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

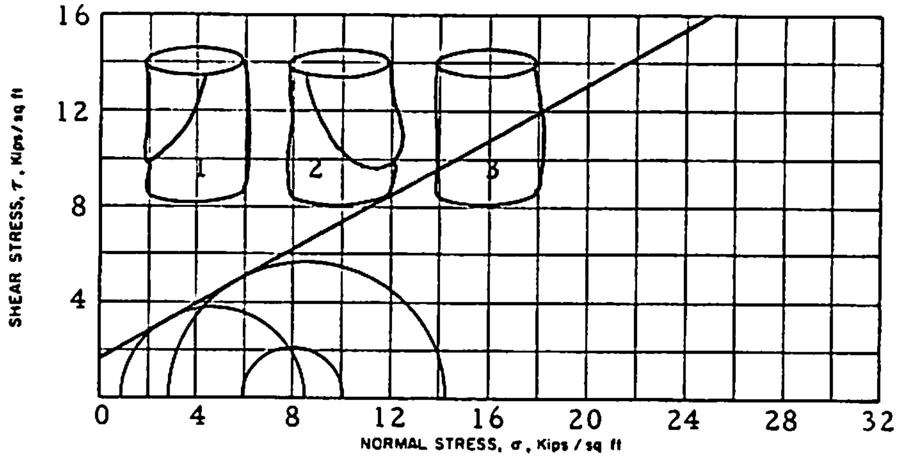
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan and light gray clayey fine sand, calcareous				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-13	DEPTH 38.0 ft	DATE 3/17/78

TRIAXIAL COMPRESSION TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 30 Degrees

tan ϕ = 0.576

c = 1.70 Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	11.8	13.4	13.2	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	108.6	116.4	118.0	
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f			17.1*	
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.00	3.00	6.00*	
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	7.44	11.15	3.92	
TIME TO FAILURE, min		t_f	4.5	20.0	2.5	
RATE OF STRAIN, per cent / min			1.0	1.0	1.0	
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41	1.41	1.41	
INITIAL HEIGHT, in.		H_o	3.00	3.00	3.00	

CONTROLLED STRESS

[X] CONTROLLED STRAIN

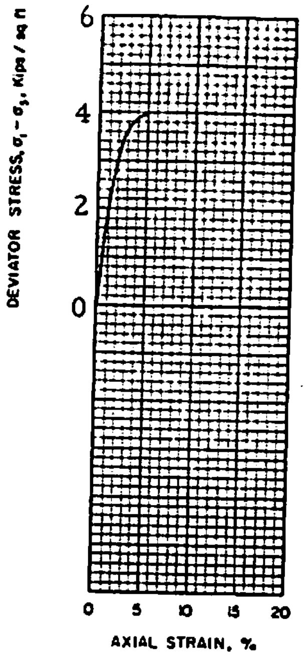
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan clayey fine sand				
LL	PL	PI		G_s

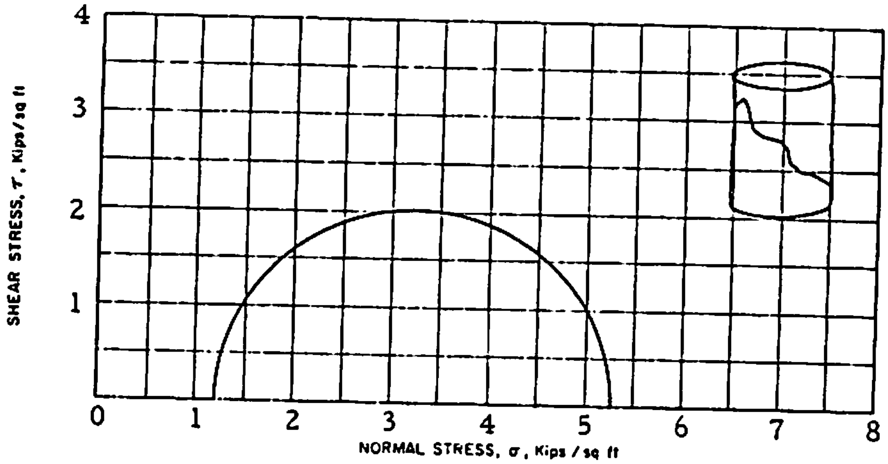
REMARKS *Sample No. 3 developed a membrane leak - note significant increase in w% during test

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-14	DEPTH 41.0 ft	DATE 3/17/78

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = ______ Degrees

tan ϕ = ______

c = ______ Kips / sq ft

METHOD OF SATURATION None

TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	35.1			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	79.3			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	1.20			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	4.00			
TIME TO FAILURE, min		t_f	5.5			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

☐ CONTROLLED STRESS

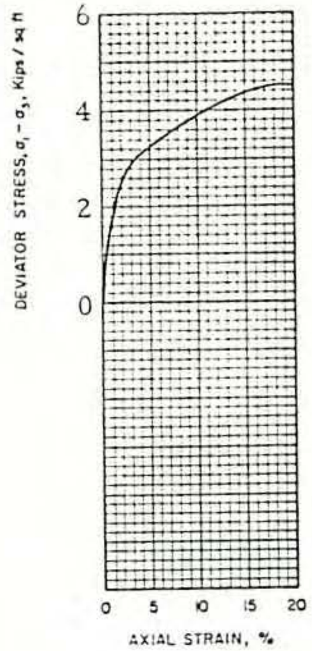
☒ CONTROLLED STRAIN

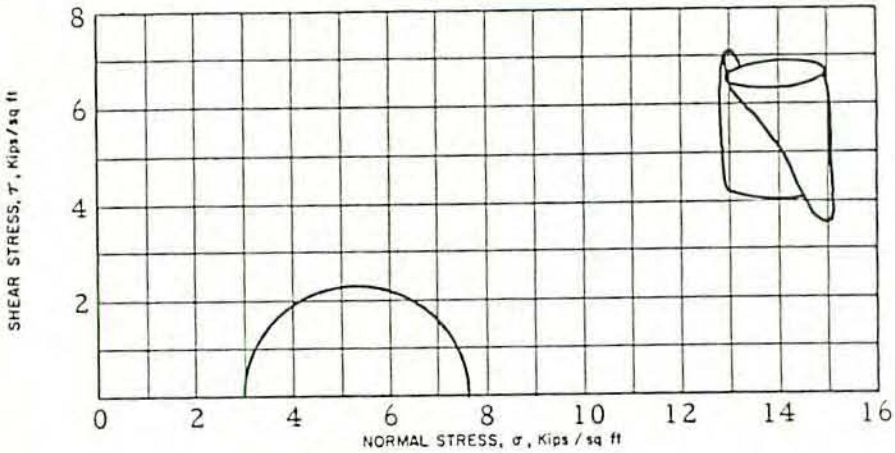
TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Light gray and tan sandy clay, very calcareous				
LL	PL	PI		G_s

REMARKS ______

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-71	SAMPLE NO. ST-4	DEPTH 15.0 ft	DATE 3/17/78

TRIAXIAL COMPRESSION TEST RESULTS





TEST NO.			1			
INITIAL	WATER CONTENT, %	w_o	52.4			
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	55.6			
BEFORE SHEAR	WATER CONTENT, %	w_c				
	VOID RATIO	e_c				
	SATURATION, %	S_c				
	FINAL BACK PRESSURE Kips / sq ft	u_o				
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
MINOR PRINCIPAL STRESS, Kips / sq ft		σ_3	3.00			
MAX DEVIATOR STRESS Kips / sq ft		$(\sigma_1 - \sigma_3)_{max}$	4.59			
TIME TO FAILURE, min		t_f	20.5			
RATE OF STRAIN, per cent / min			1.0			
ULT DEVIATOR STRESS, Kips / sq ft		$(\sigma_1 - \sigma_3)_{ult}$				
INITIAL DIAMETER, in.		D_o	1.41			
INITIAL HEIGHT, in.		H_o	3.00			

SHEAR STRENGTH PARAMETERS

ϕ = ________ Degrees

tan ϕ = ________

c = ________ Kips / sq ft

METHOD OF SATURATION None

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TYPE OF TEST Quu	TYPE OF SPECIMEN Undisturbed			
CLASSIFICATION Tan clay, blocky, slickensided, brittle structure				
LL	PL	PI		G_s

REMARKS ________

PROJECT DEERHAVEN POWER PLANT		
GAINESVILLE, FLORIDA		
BORING NO. FG-72	SAMPLE NO. ST-9	DEPTH 40.0 ft DATE 3/17/70

TRIAXIAL COMPRESSION TEST RESULTS

WARE LIND ENGINEERS

BORING NO.: TH-27 DEPTH: 54.0 ft

MATERIAL: Green clay, slightly sandy

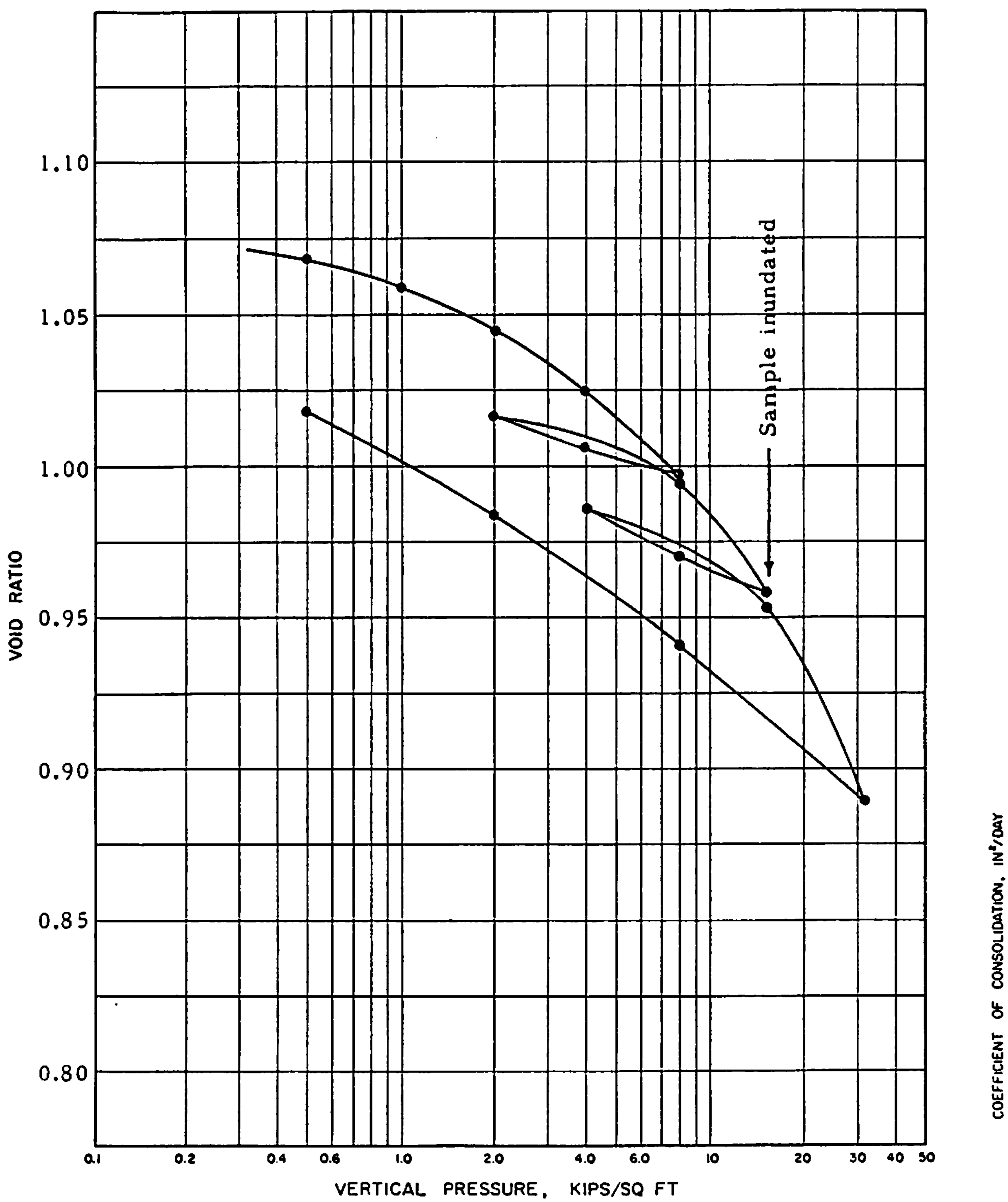
e_o = 1.0747

UNIT DRY WEIGHT: 85.7 LB/CU FT

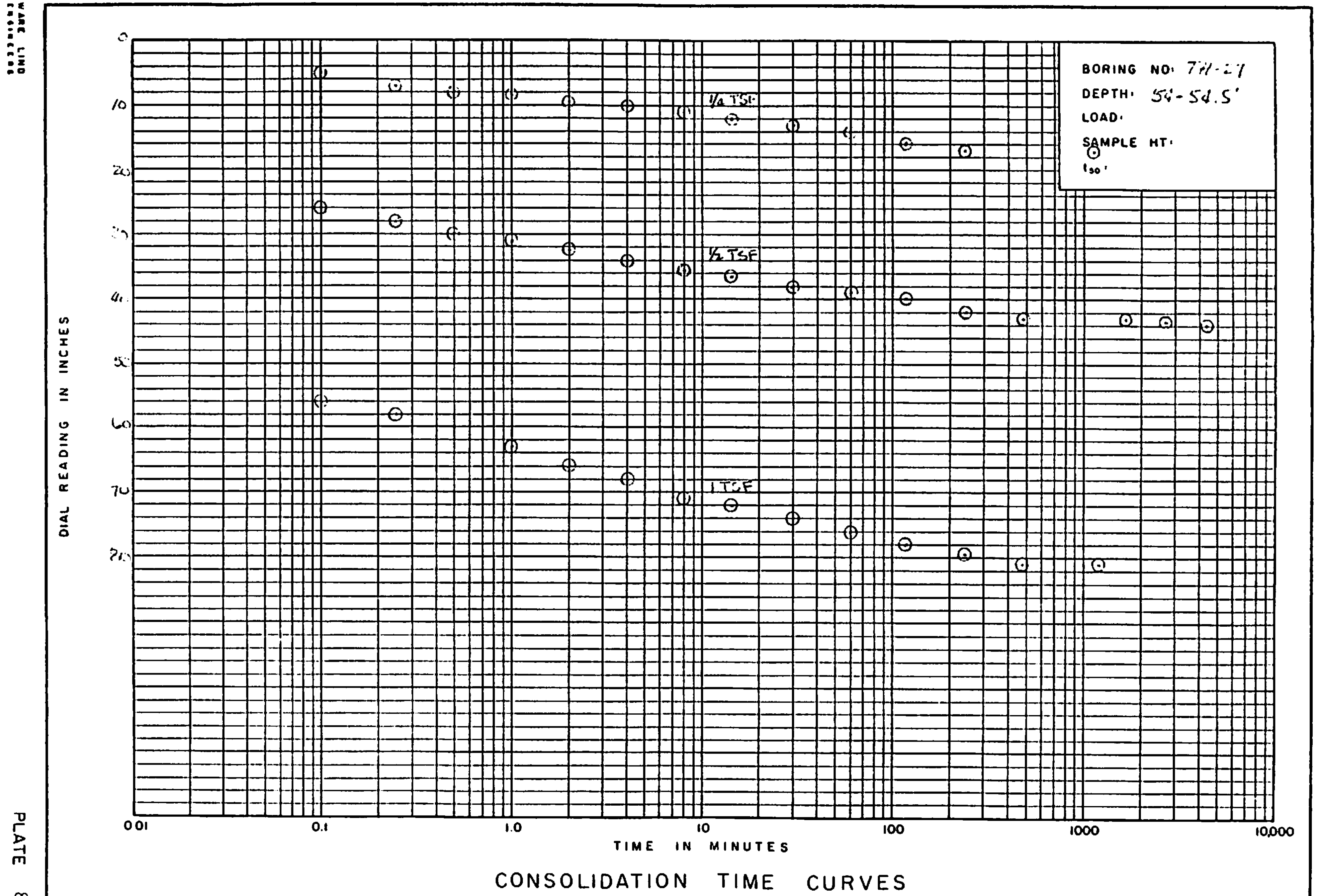
WATER CONTENT: 36.2 %

LIQUID LIMIT: 112

PLASTIC LIMIT: 46

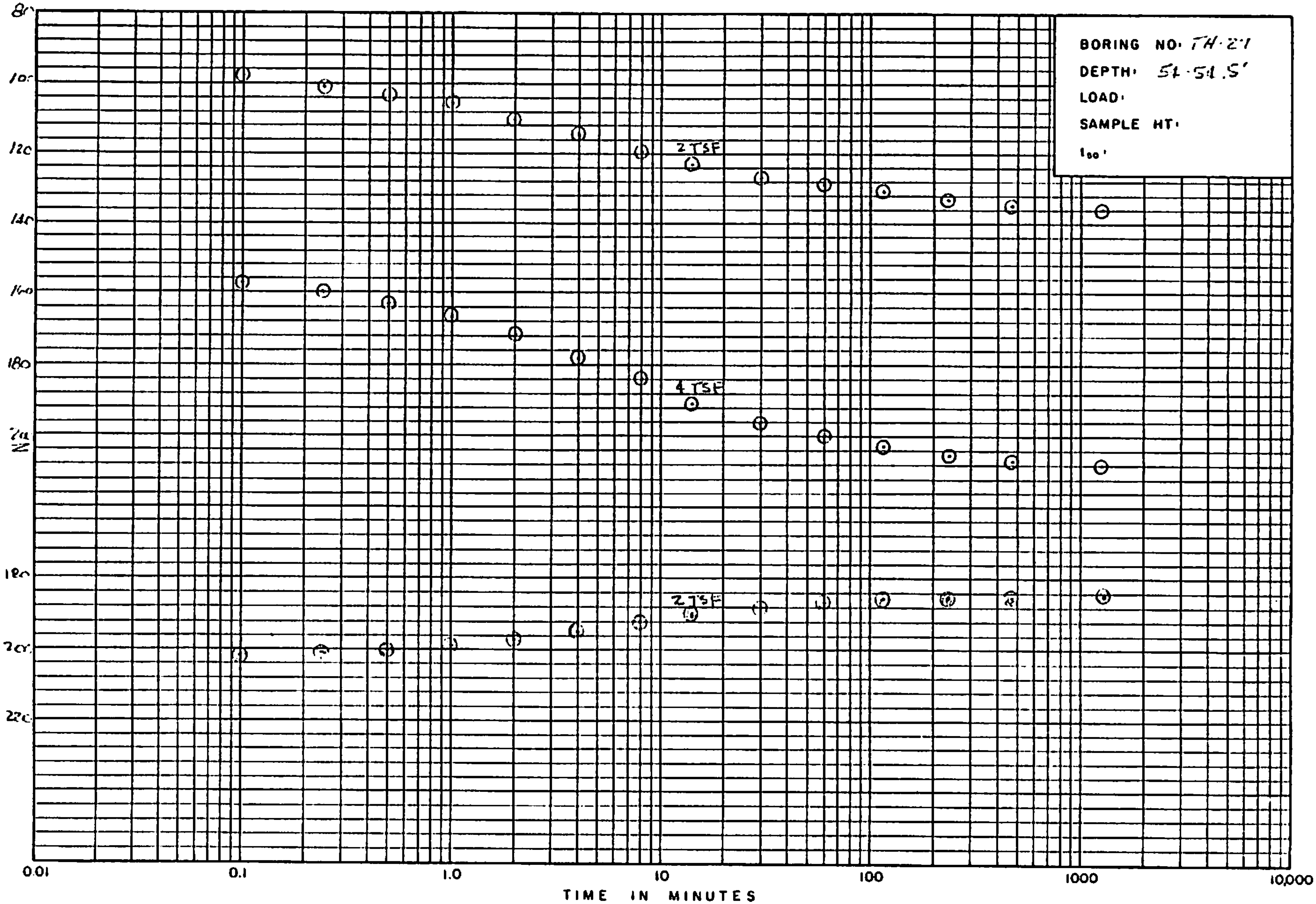


CONSOLIDATION TEST RESULTS

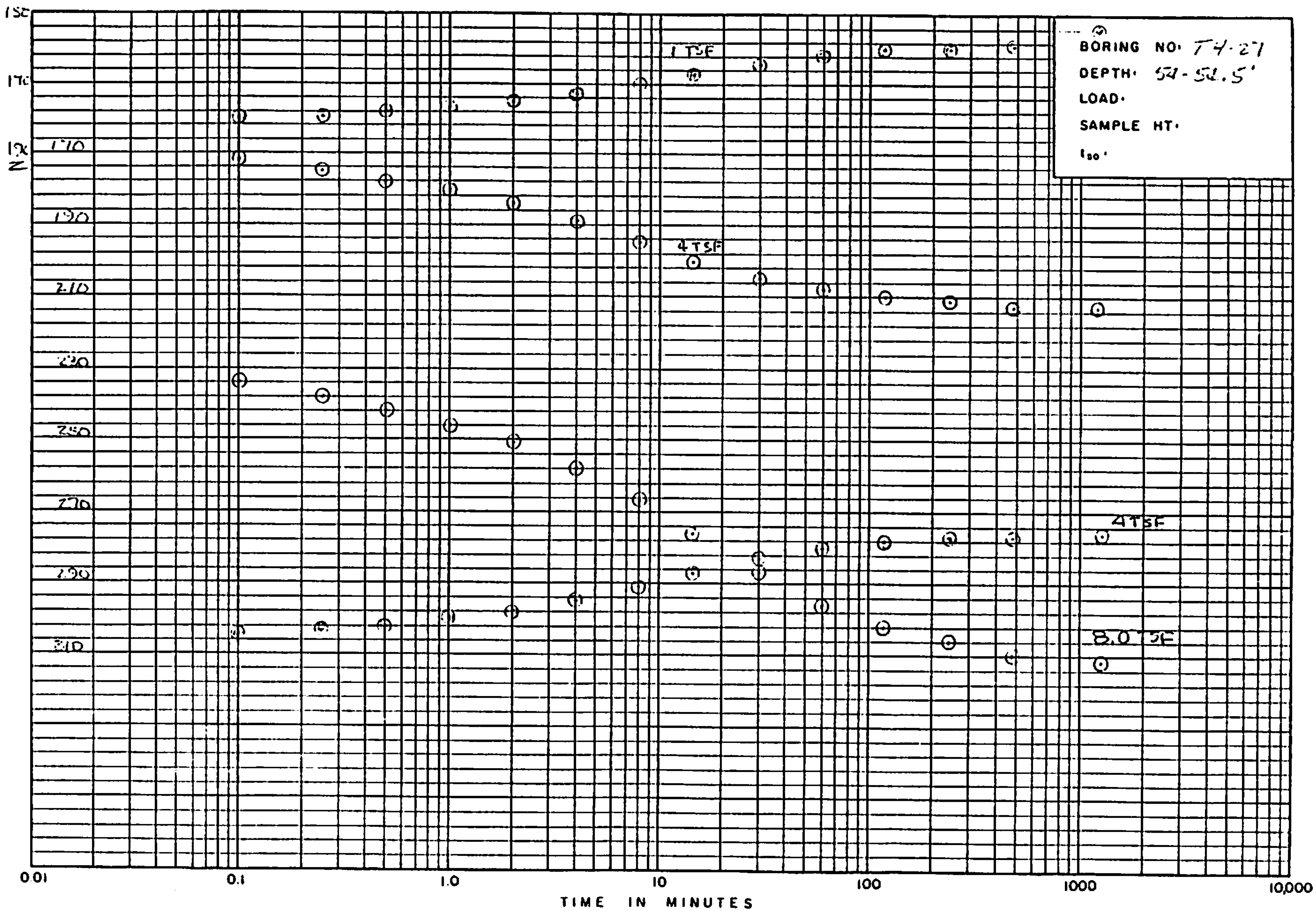


CONSOLIDATION TIME CURVES

PLATE 8C

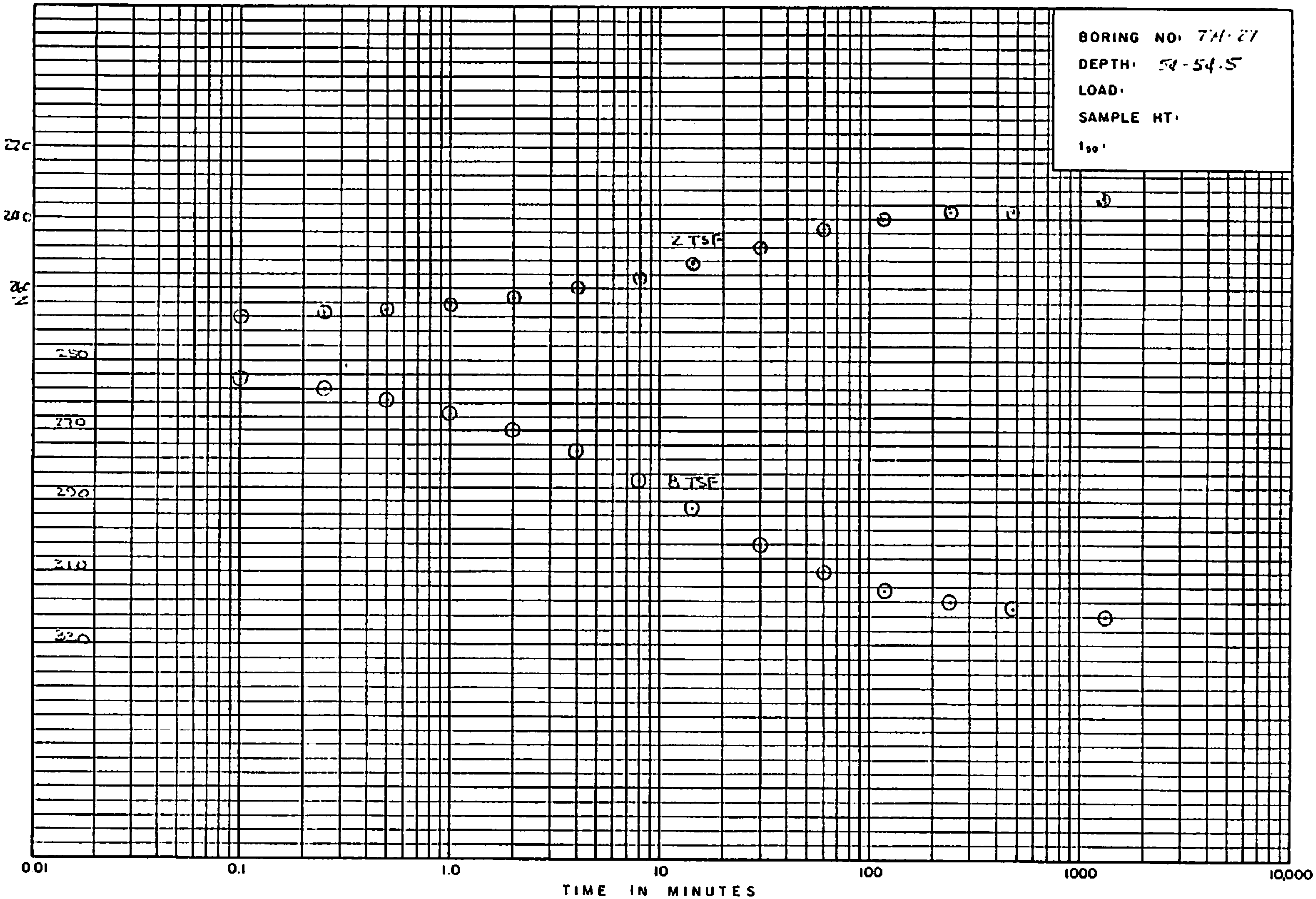


CONSOLIDATION TIME CURVES

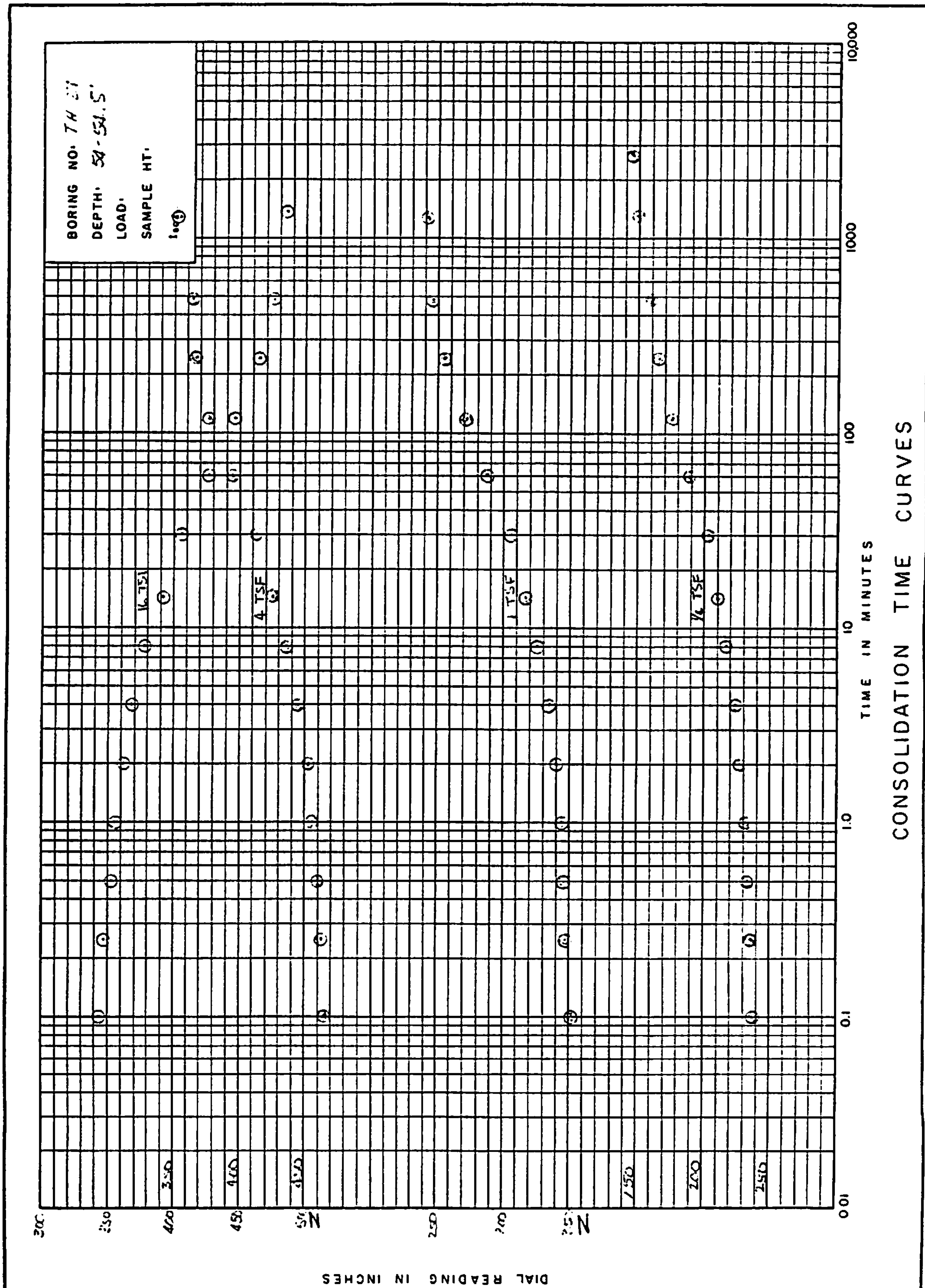


CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES



WARE LIND ENGINEERS

BORING NO.: CT-40 DEPTH: 14.5 ft

MATERIAL: Light tan to cream-white calcareous material

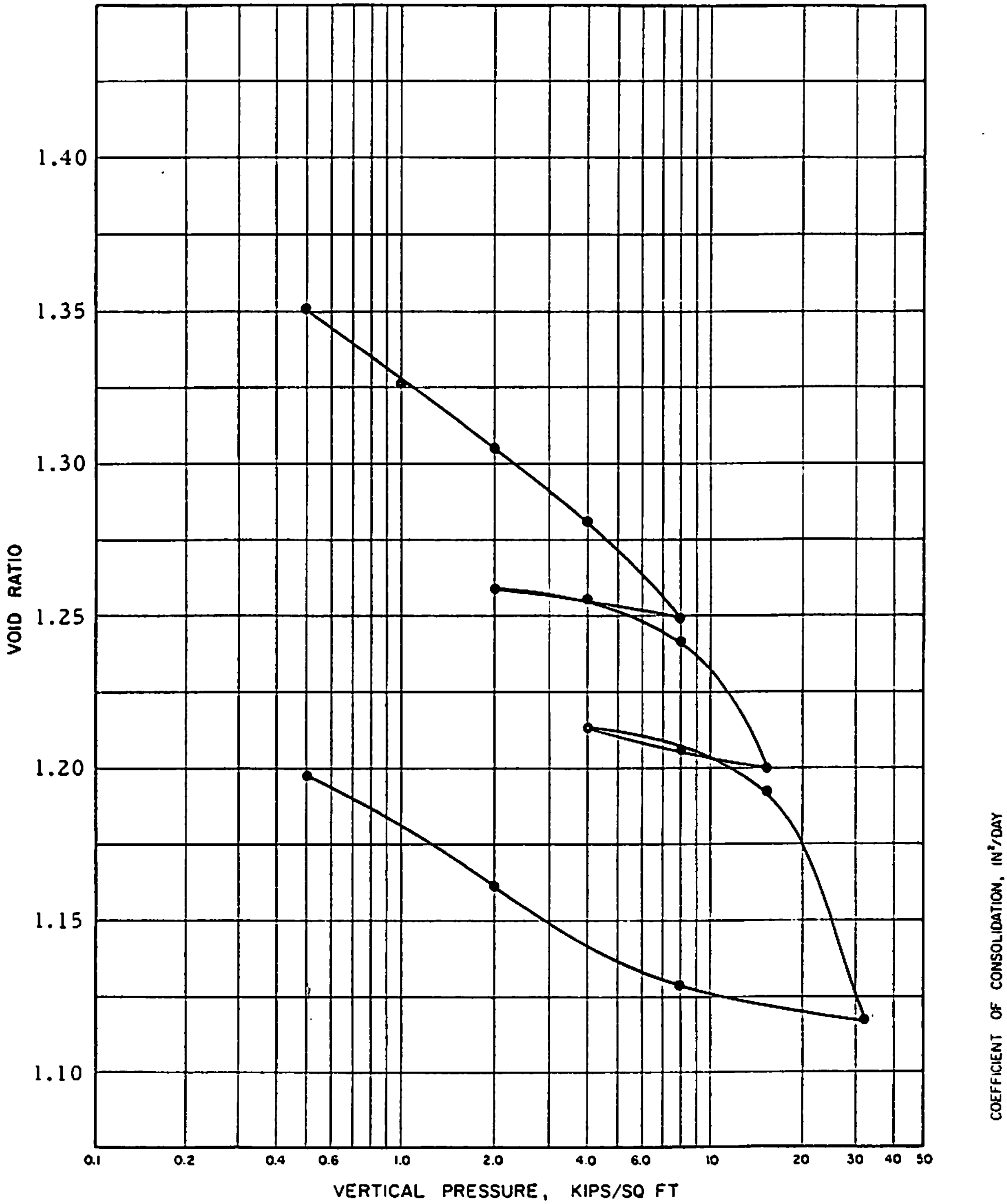
$e_o = 1.3630$

UNIT DRY WEIGHT: 74.5 LB/CU FT

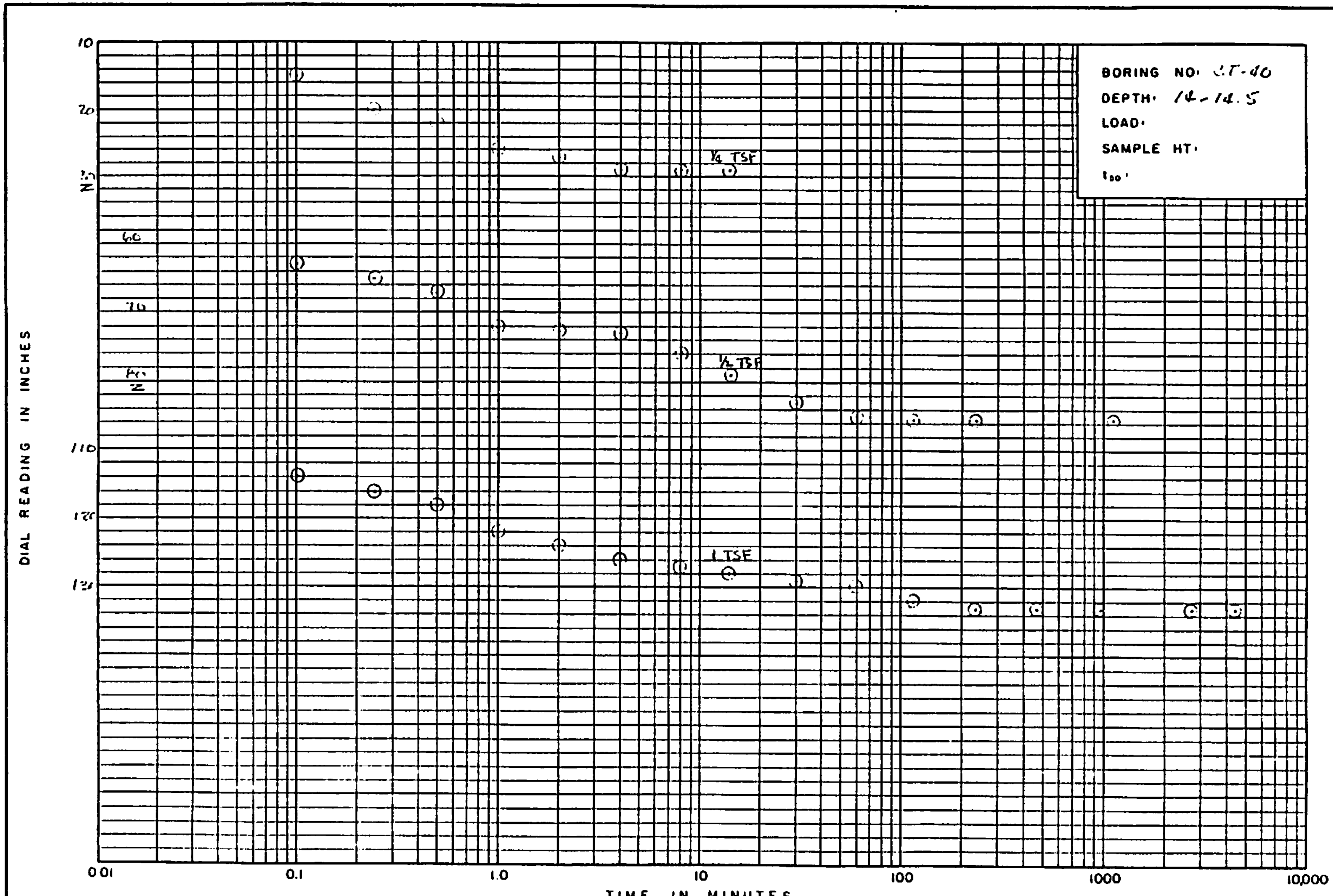
WATER CONTENT: 45.1 %

LIQUID LIMIT: 68

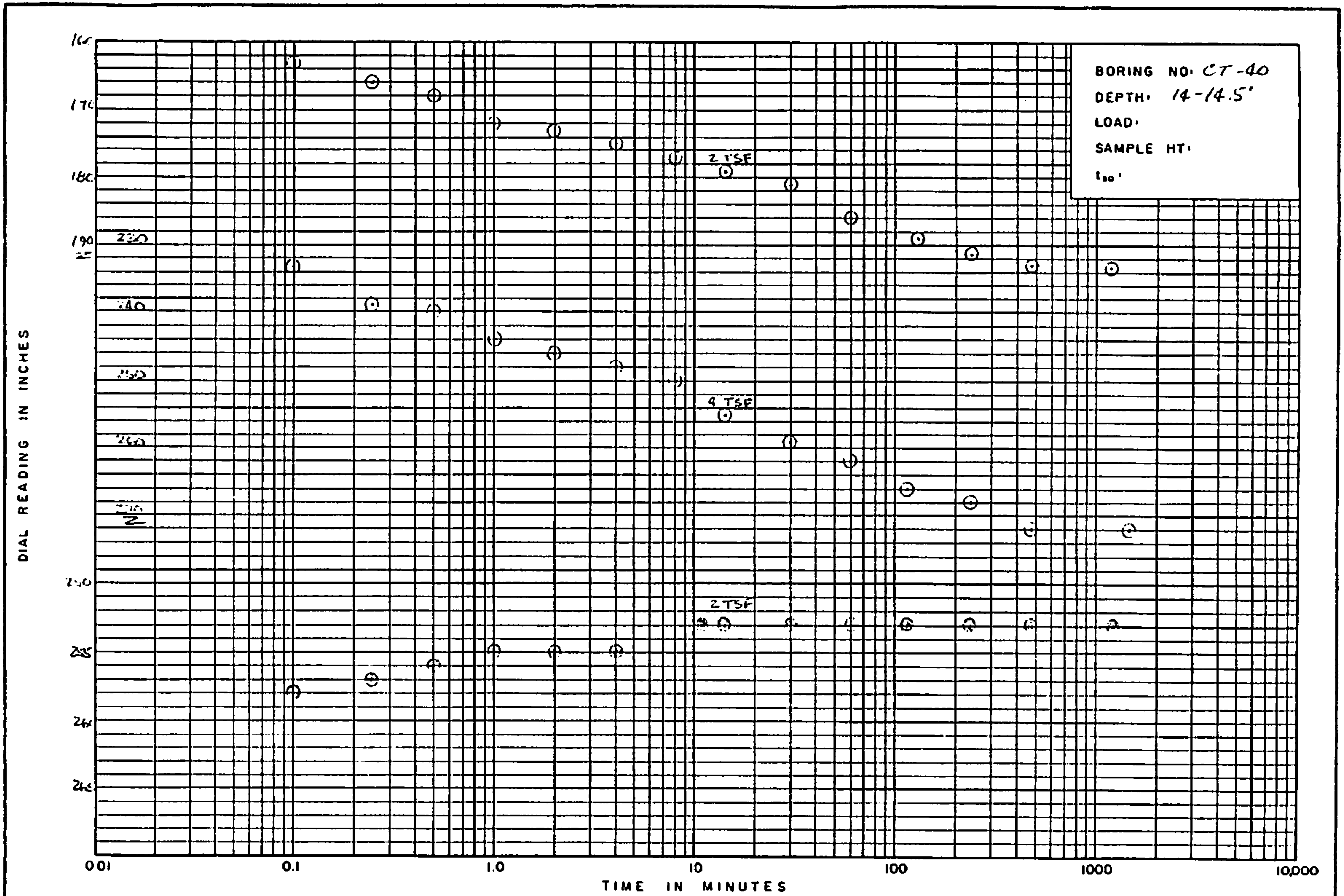
PLASTIC LIMIT: 45



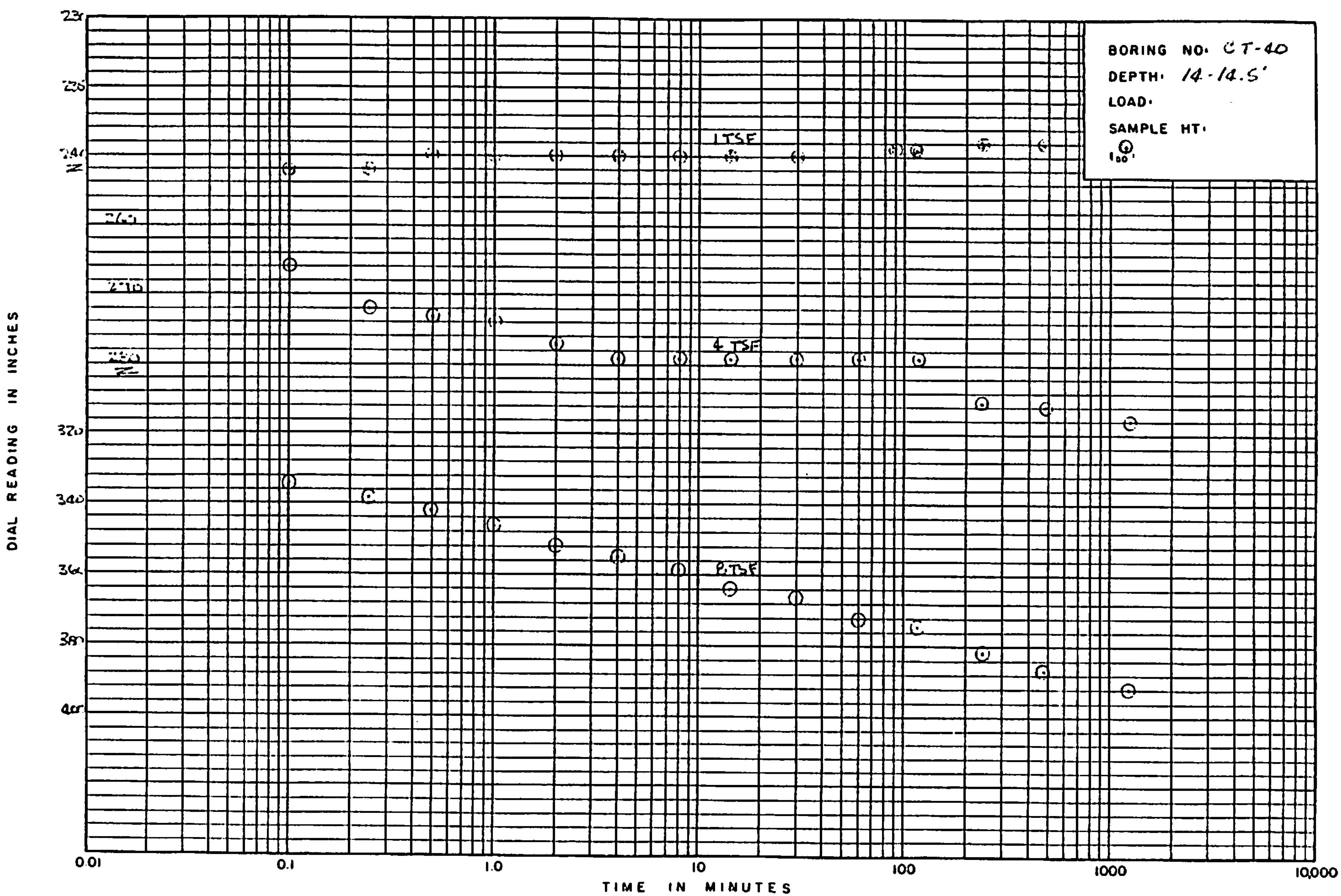
CONSOLIDATION TEST RESULTS



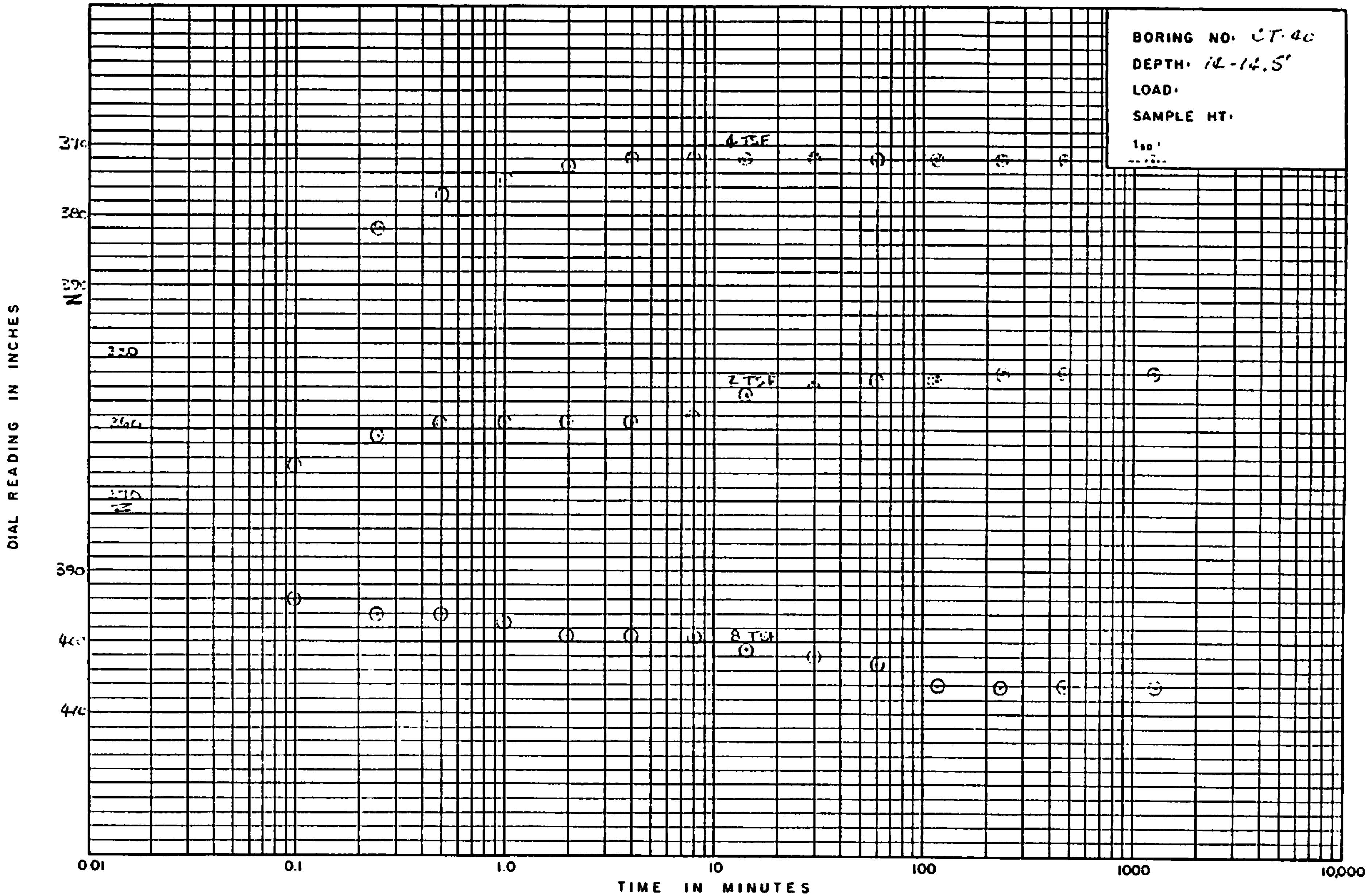
CONSOLIDATION TIME CURVES



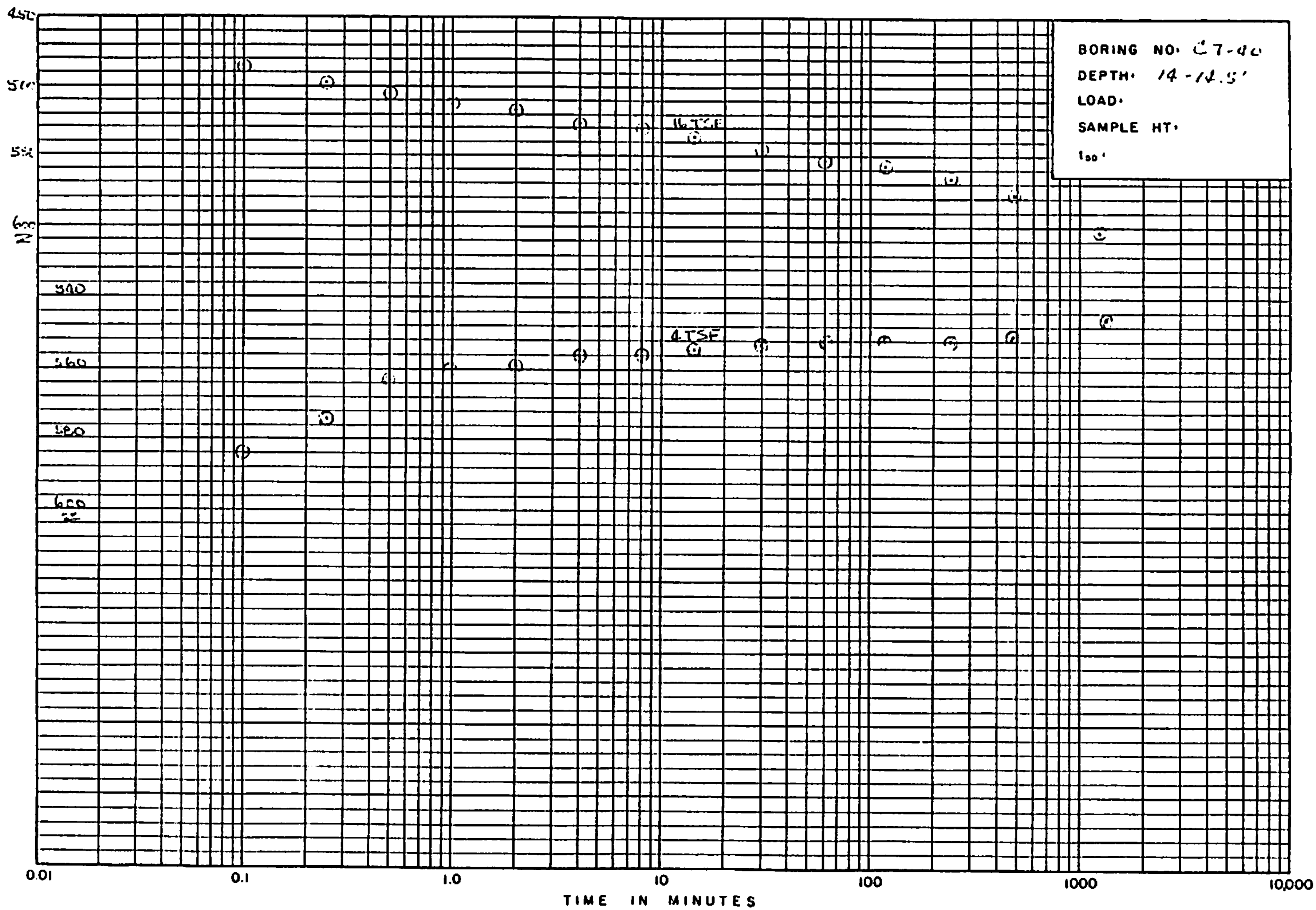
CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES



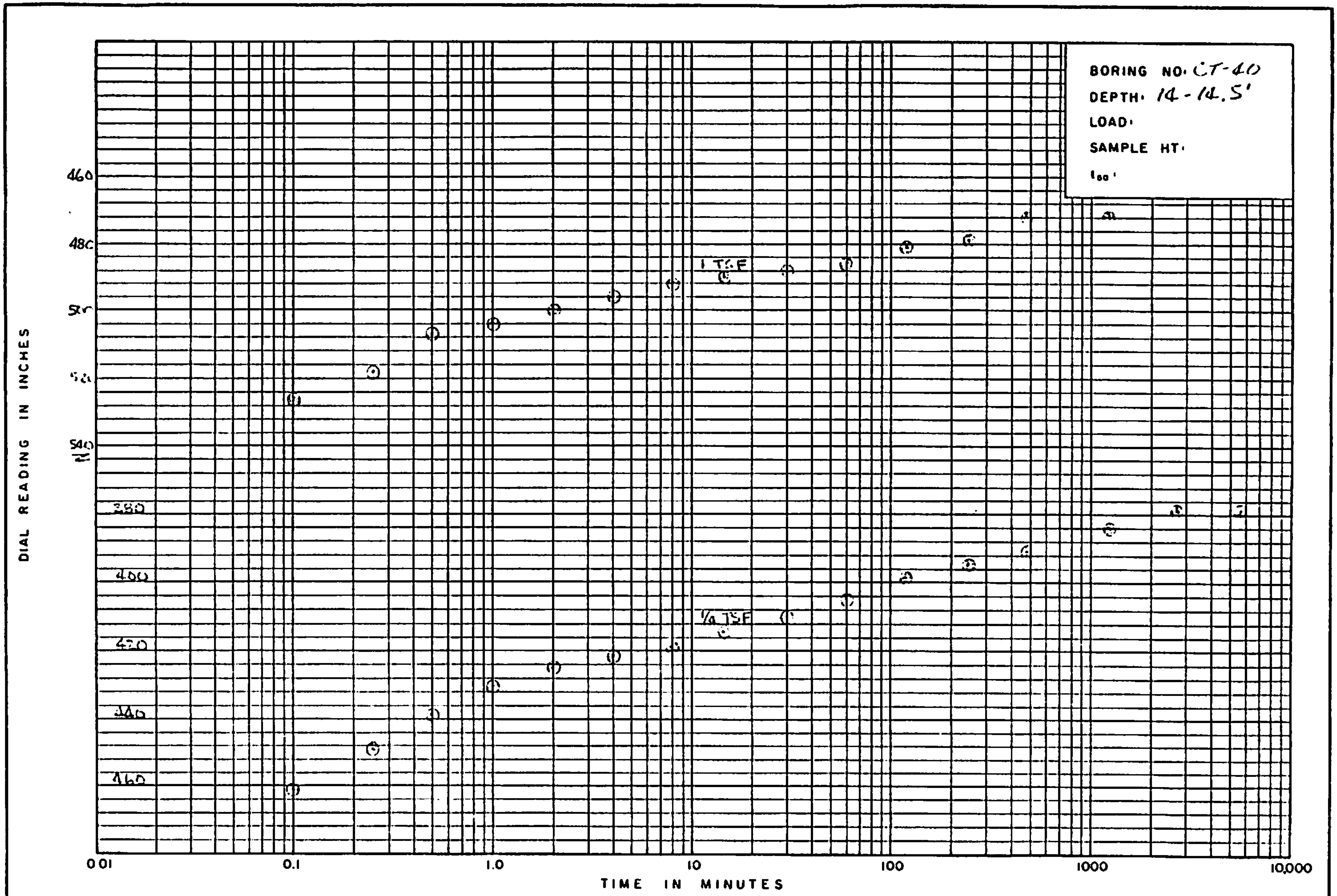
CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES

PLATE 96

WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES

BORING NO.: CT-43 DEPTH: 10.5 ft

MATERIAL: Light gray very sandy clay

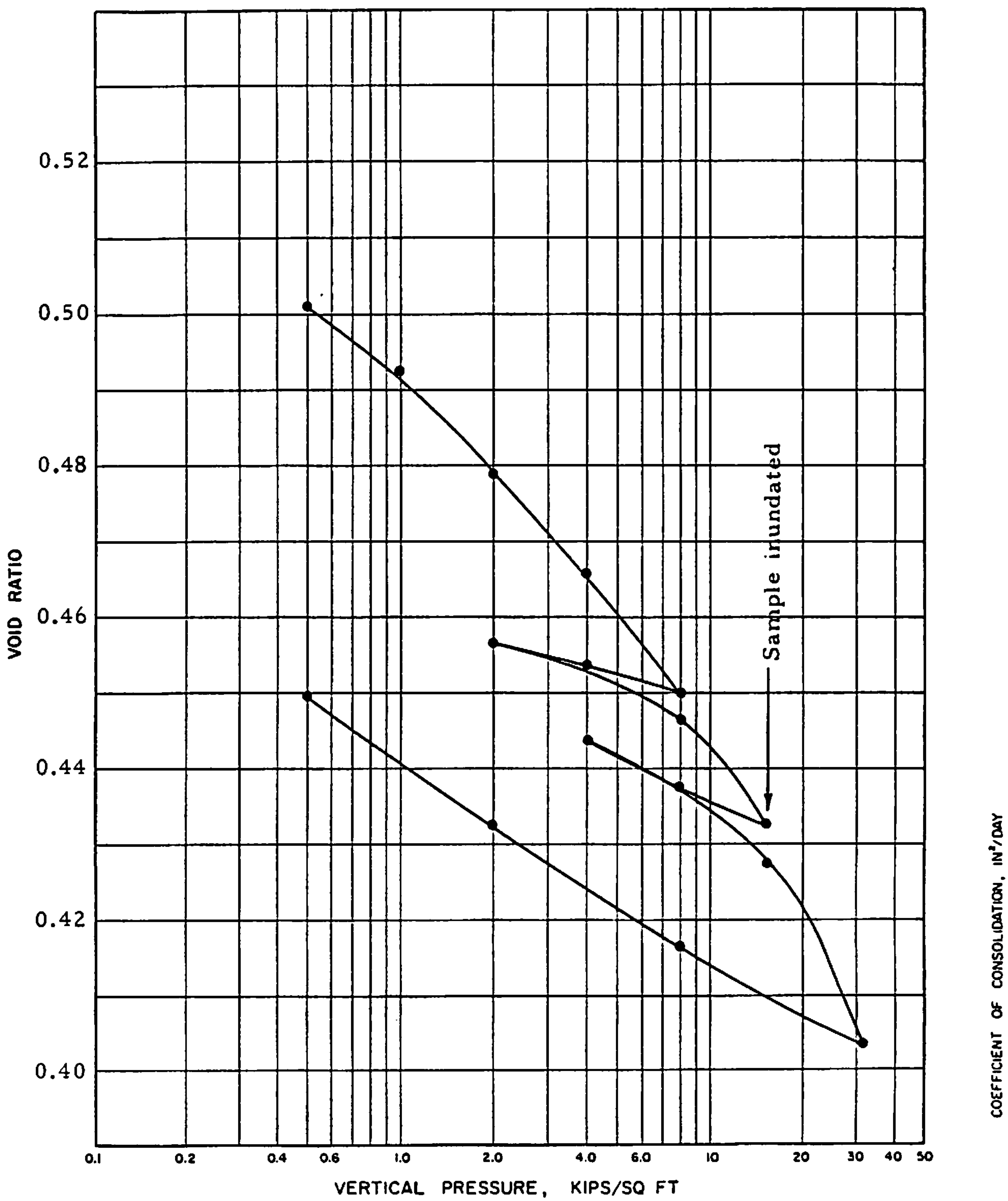
$e_o = 0.5110$

UNIT DRY WEIGHT: 110.3 LB/CU FT

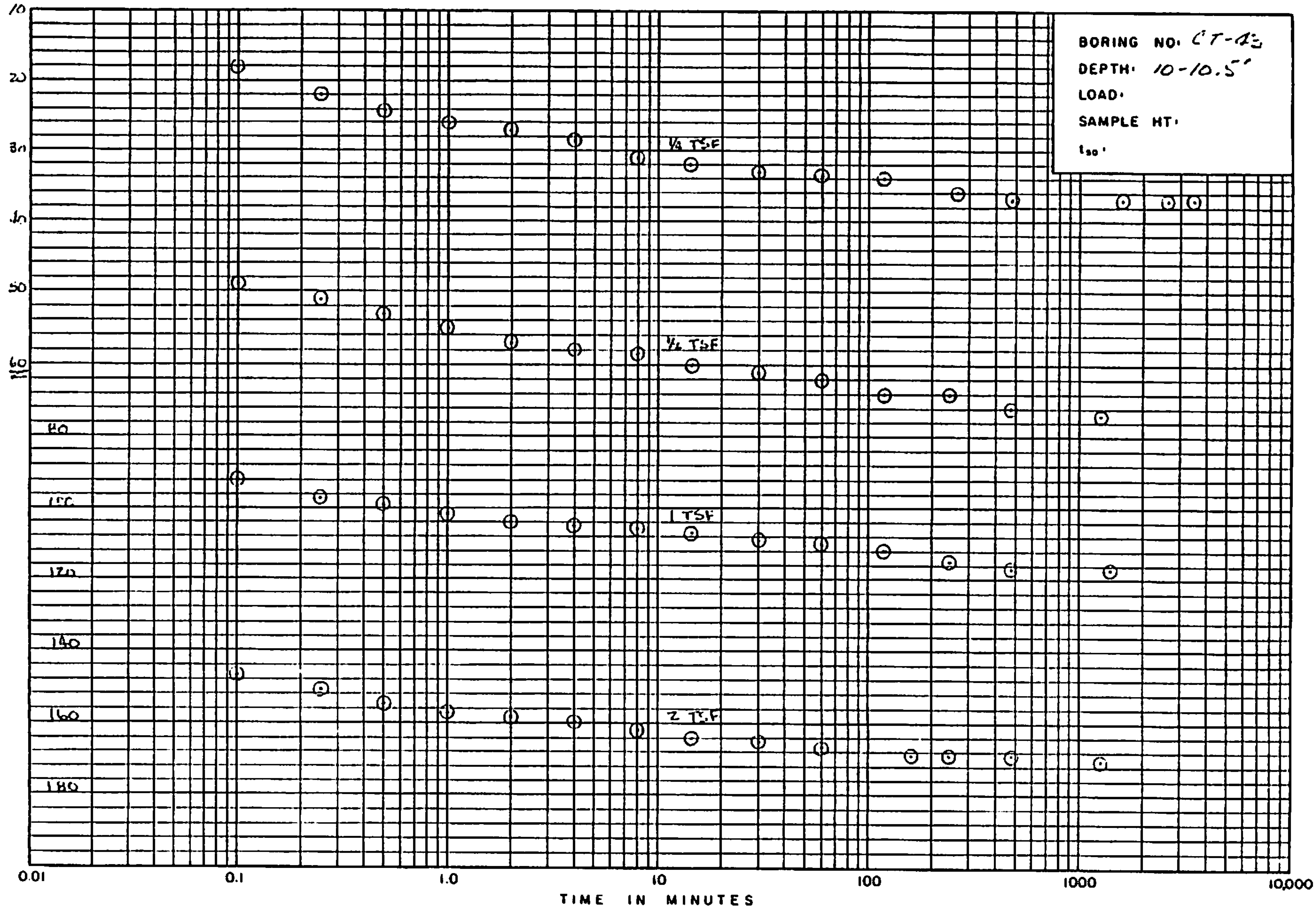
WATER CONTENT: 16.6 %

LIQUID LIMIT: 55

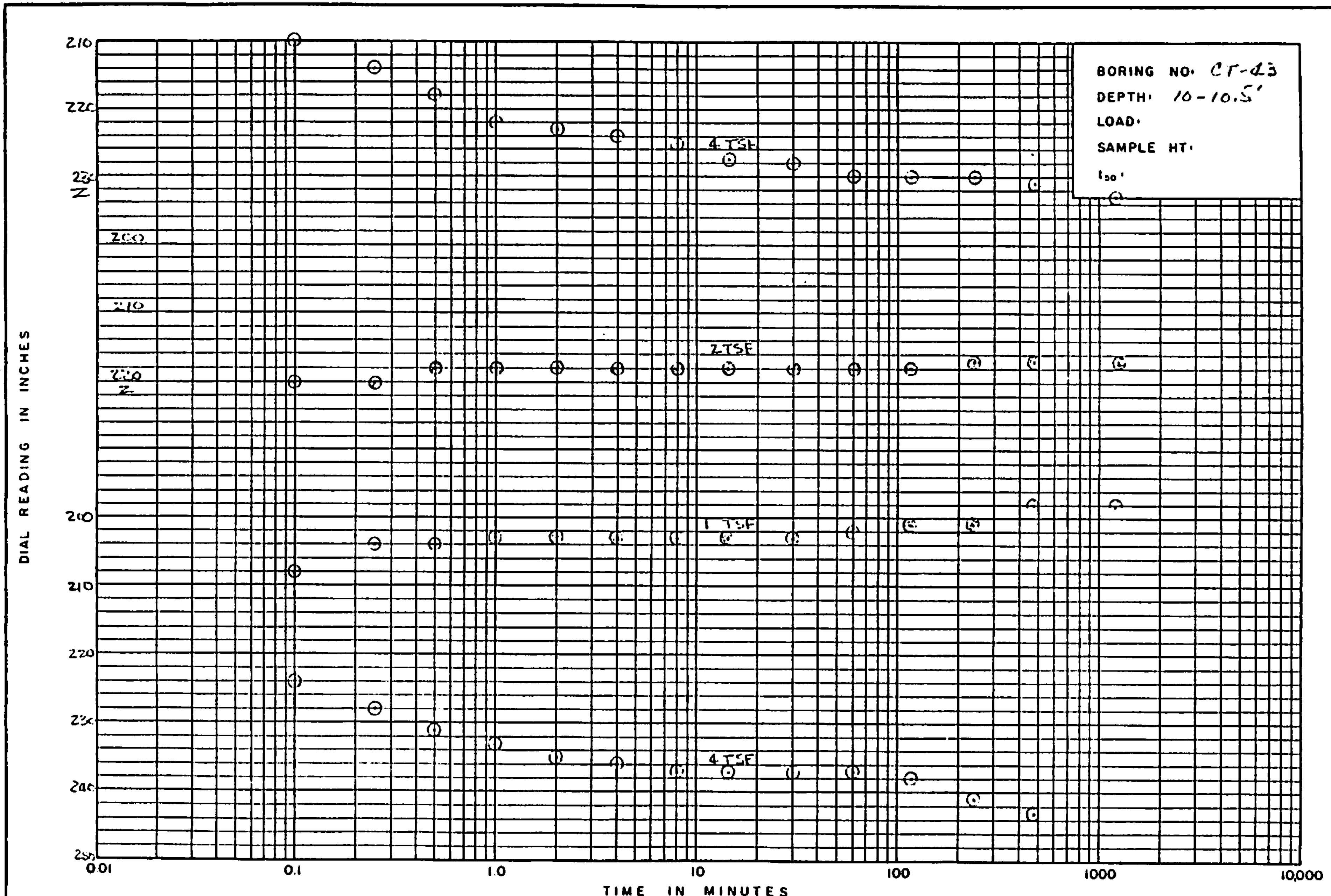
PLASTIC LIMIT: 18



CONSOLIDATION TEST RESULTS

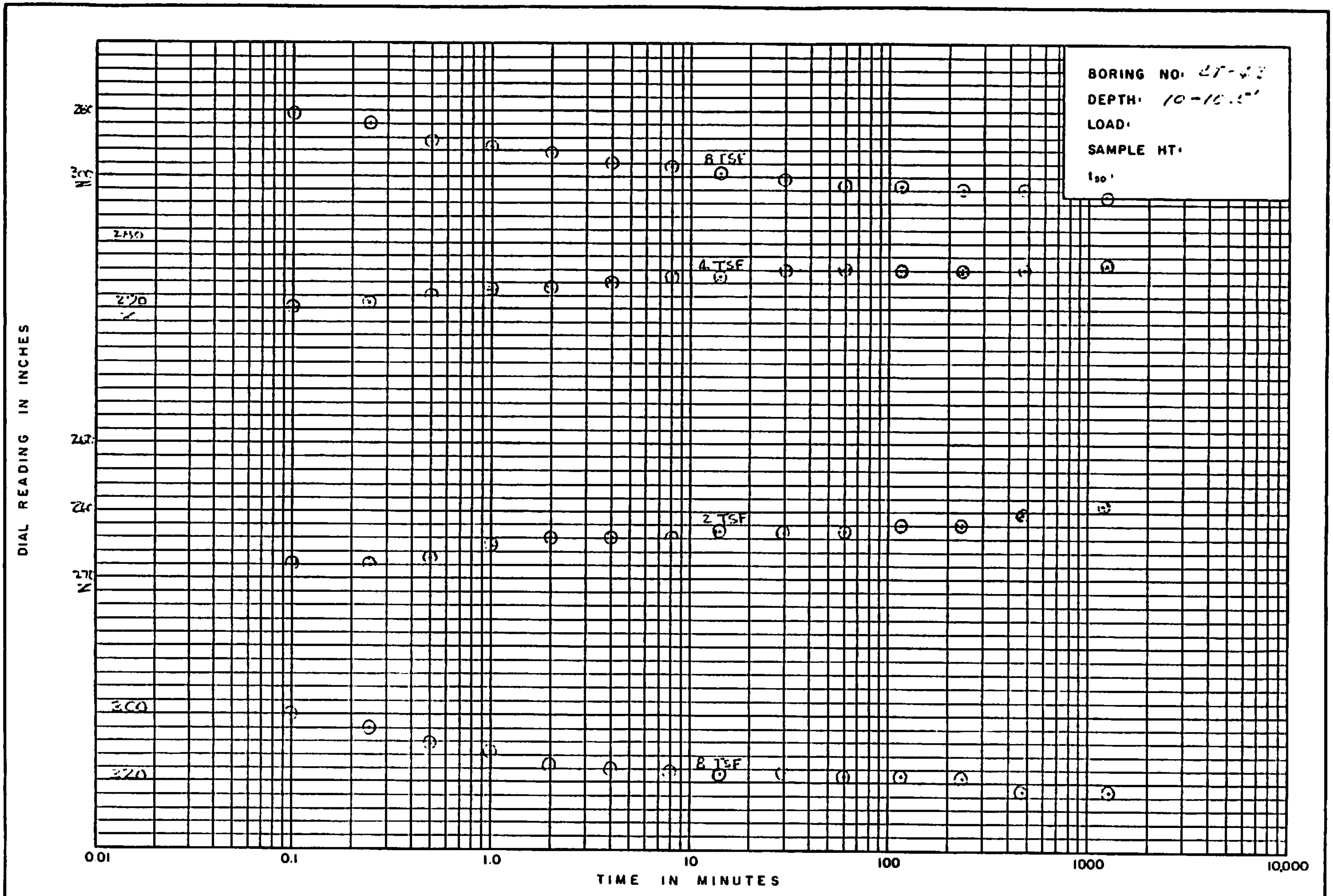


CONSOLIDATION TIME CURVES

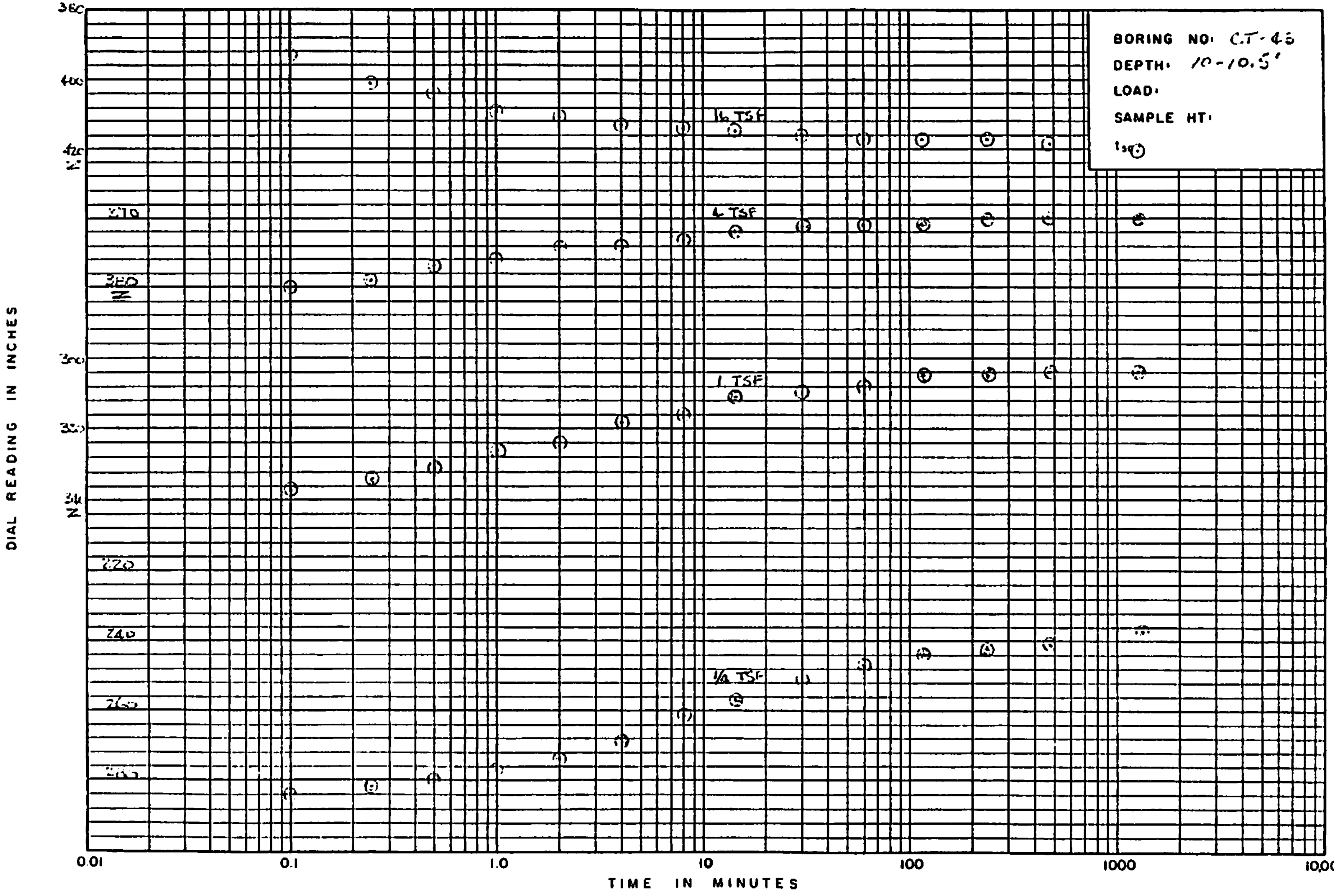


CONSOLIDATION TIME CURVES

PLATE 10



CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES

BORING NO.: S-47 DEPTH: 14.5 ft

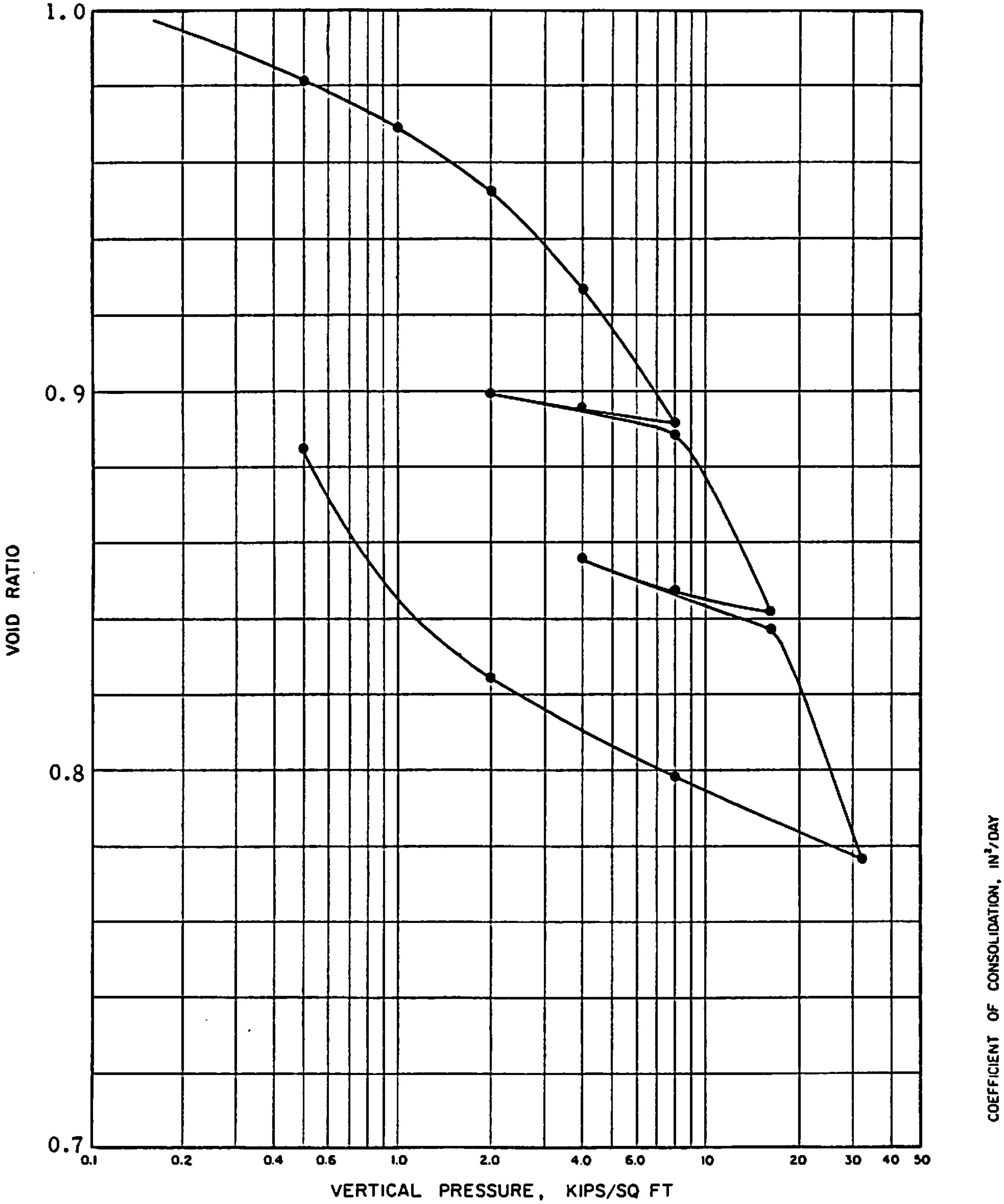
MATERIAL: Stiff light gray very calcareous clay with gravel and claystone fragments $e_o = 1.000$

UNIT DRY WEIGHT: 91.5 LB/CU FT

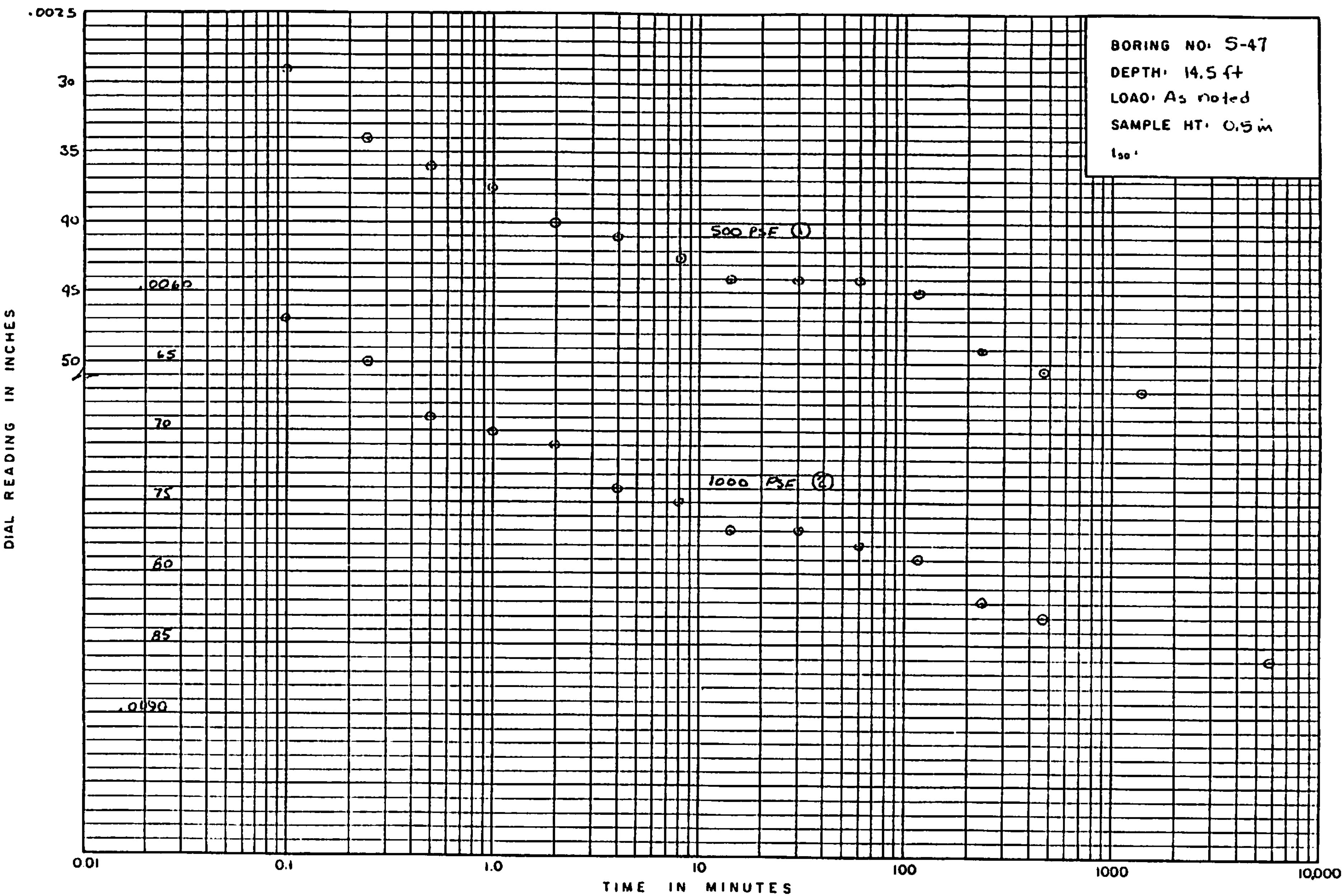
WATER CONTENT: 31.9 %

LIQUID LIMIT: 49

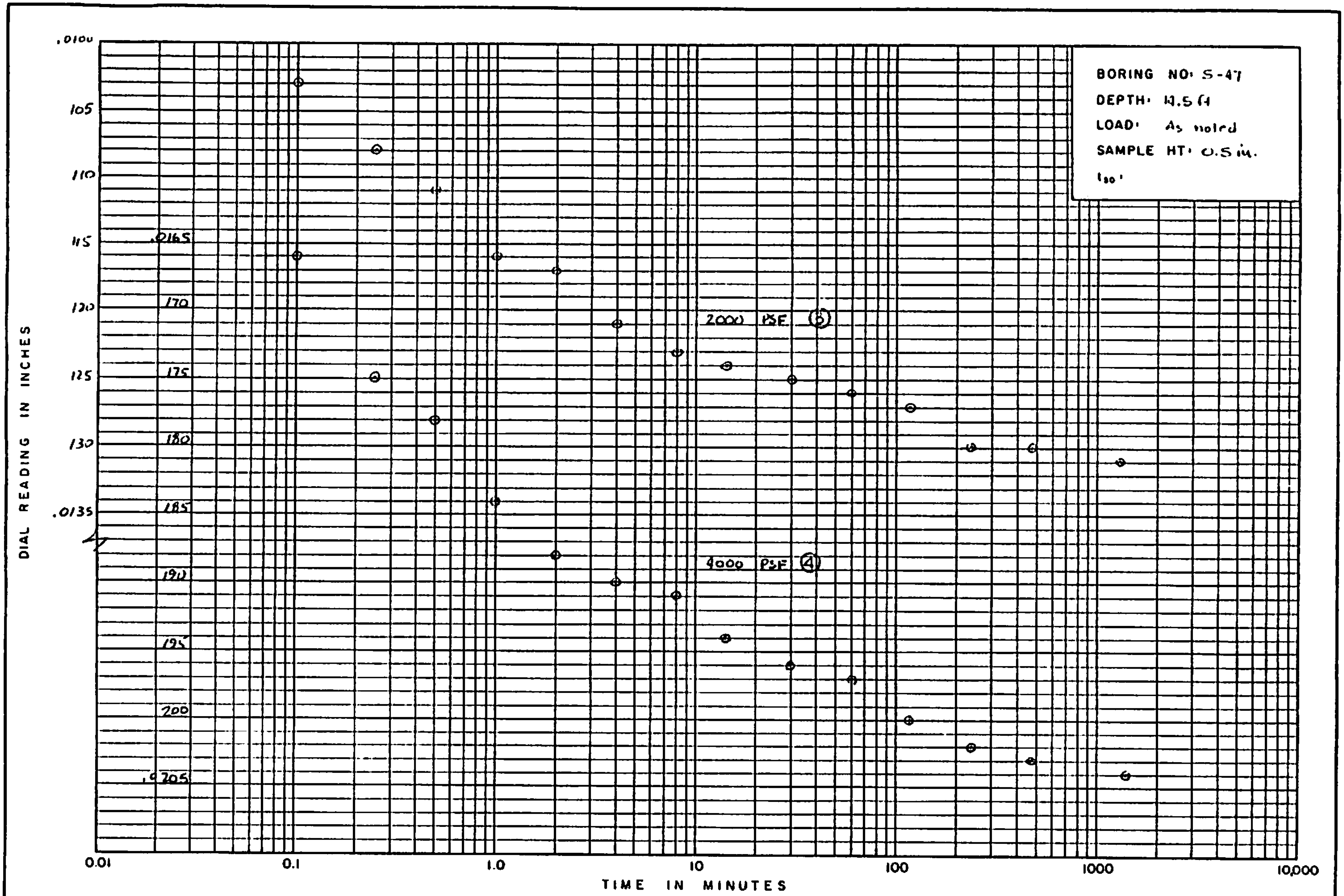
PLASTIC LIMIT: 29



CONSOLIDATION TEST RESULTS

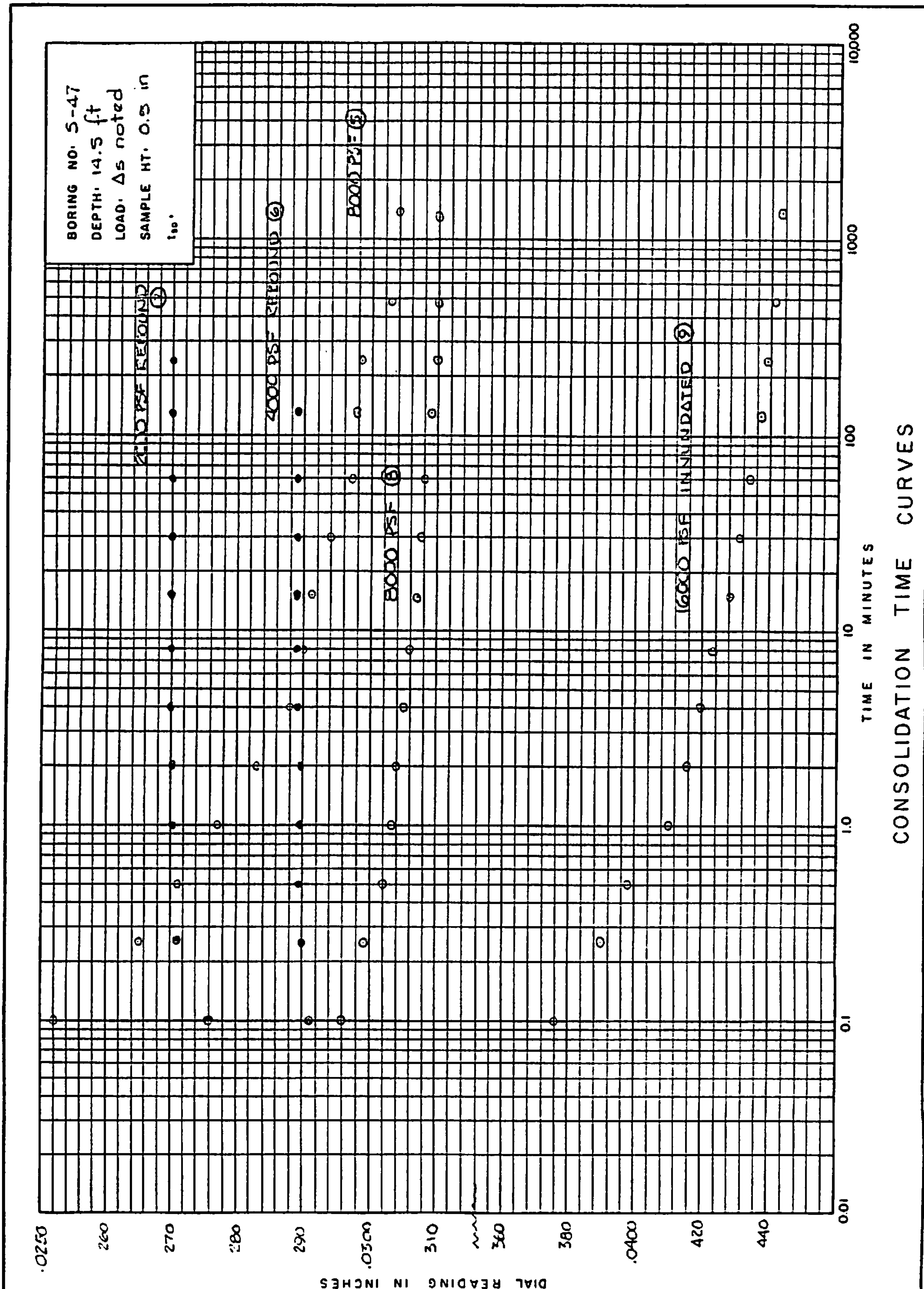


CONSOLIDATION TIME CURVES

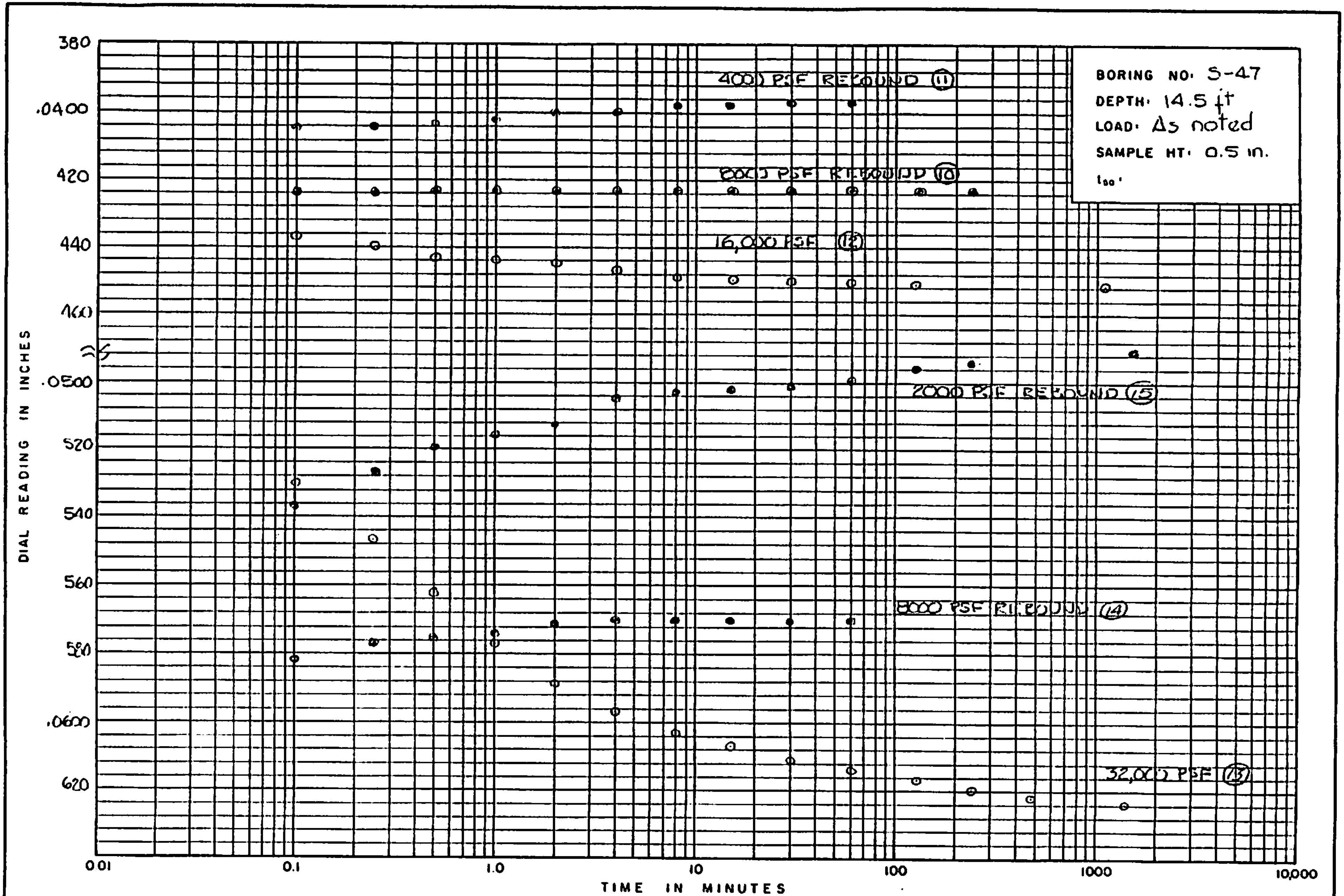


CONSOLIDATION TIME CURVES

PLATE 105

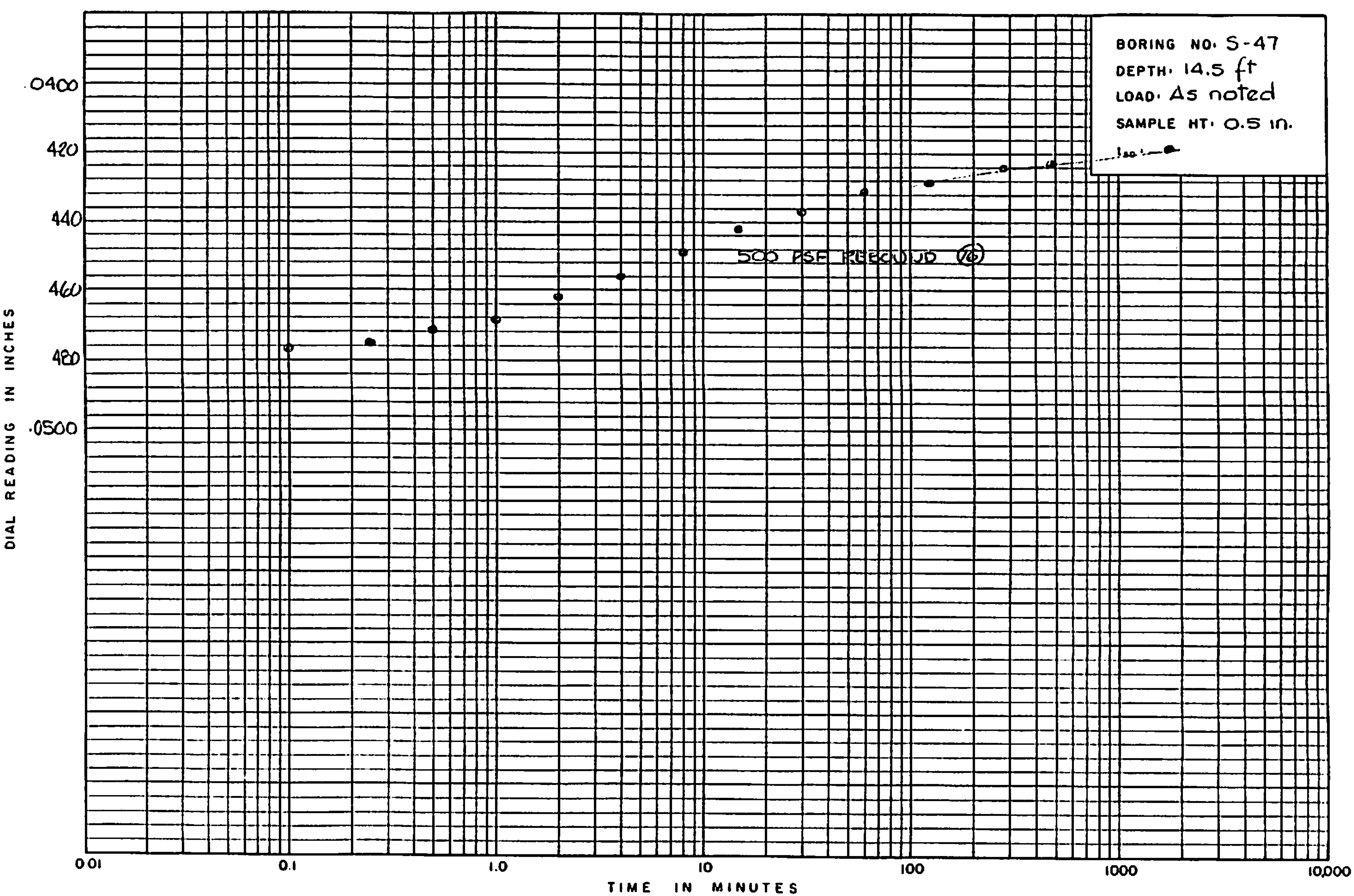


BORING NO. S-47
DEPTH: 14.5 ft
LOAD: As noted
SAMPLE HT. 0.5 in
2000 PSF REBOUND ⑦
4000 PSF REBOUND ⑥
8000 PSF ⑤
8000 PSF ⑧
16000 PSF INUNDATED ⑨
.0250
260
270
280
290
.0300
310
360
380
.0400
420
440
DIAL READING IN INCHES
0.01
0.1
1.0
10
100
1000
10,000
TIME IN MINUTES
CONSOLIDATION TIME CURVES

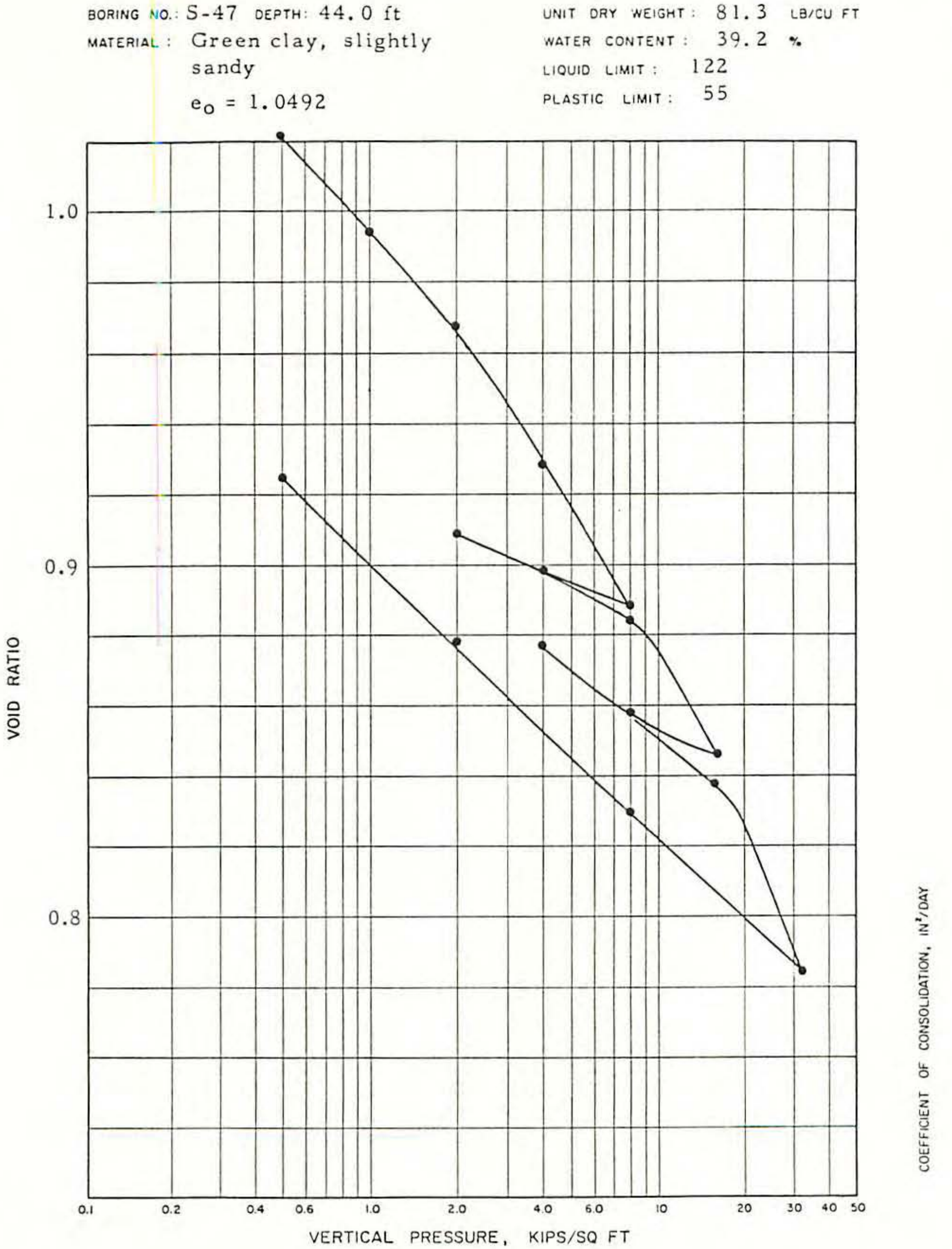


CONSOLIDATION TIME CURVES

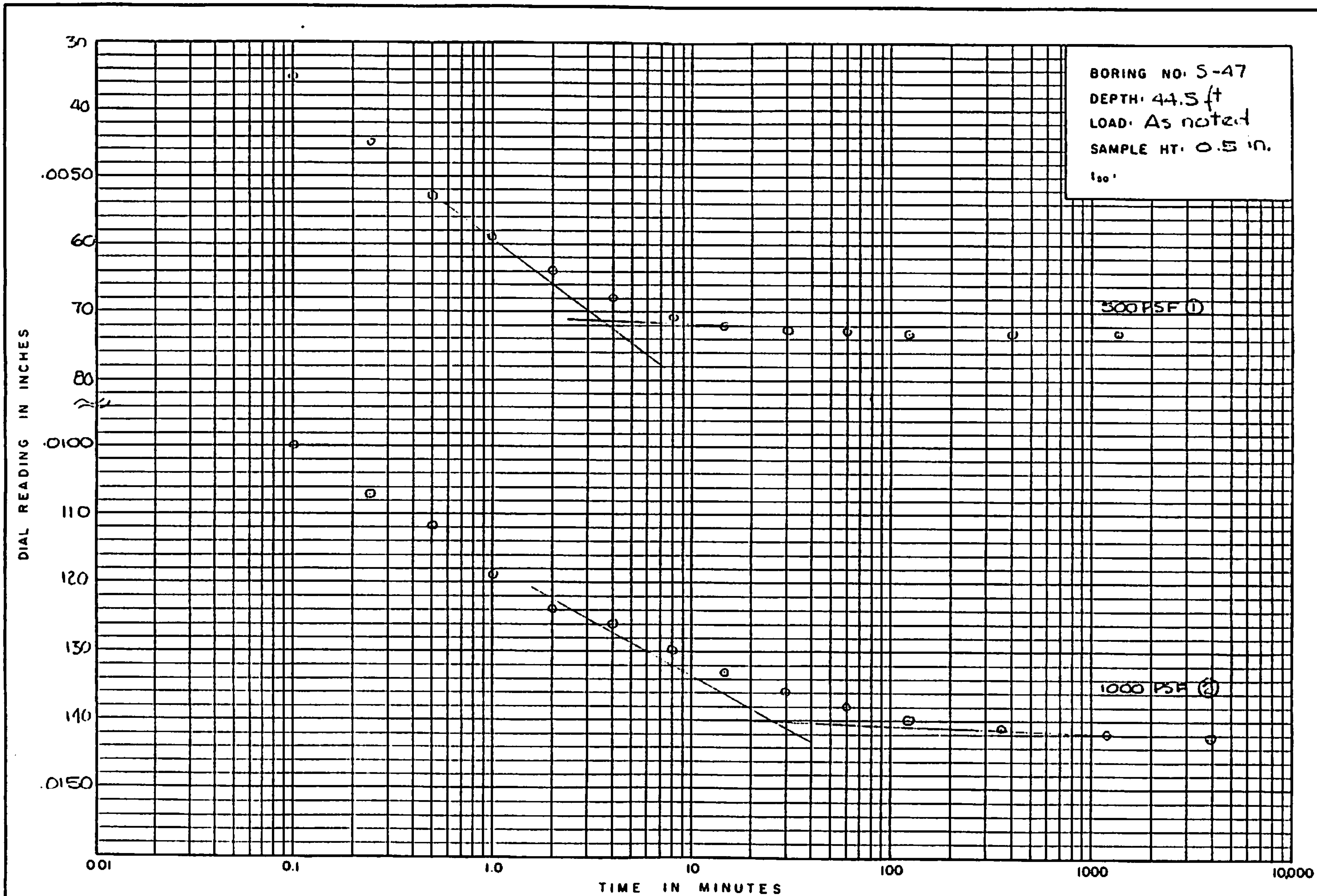
WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES



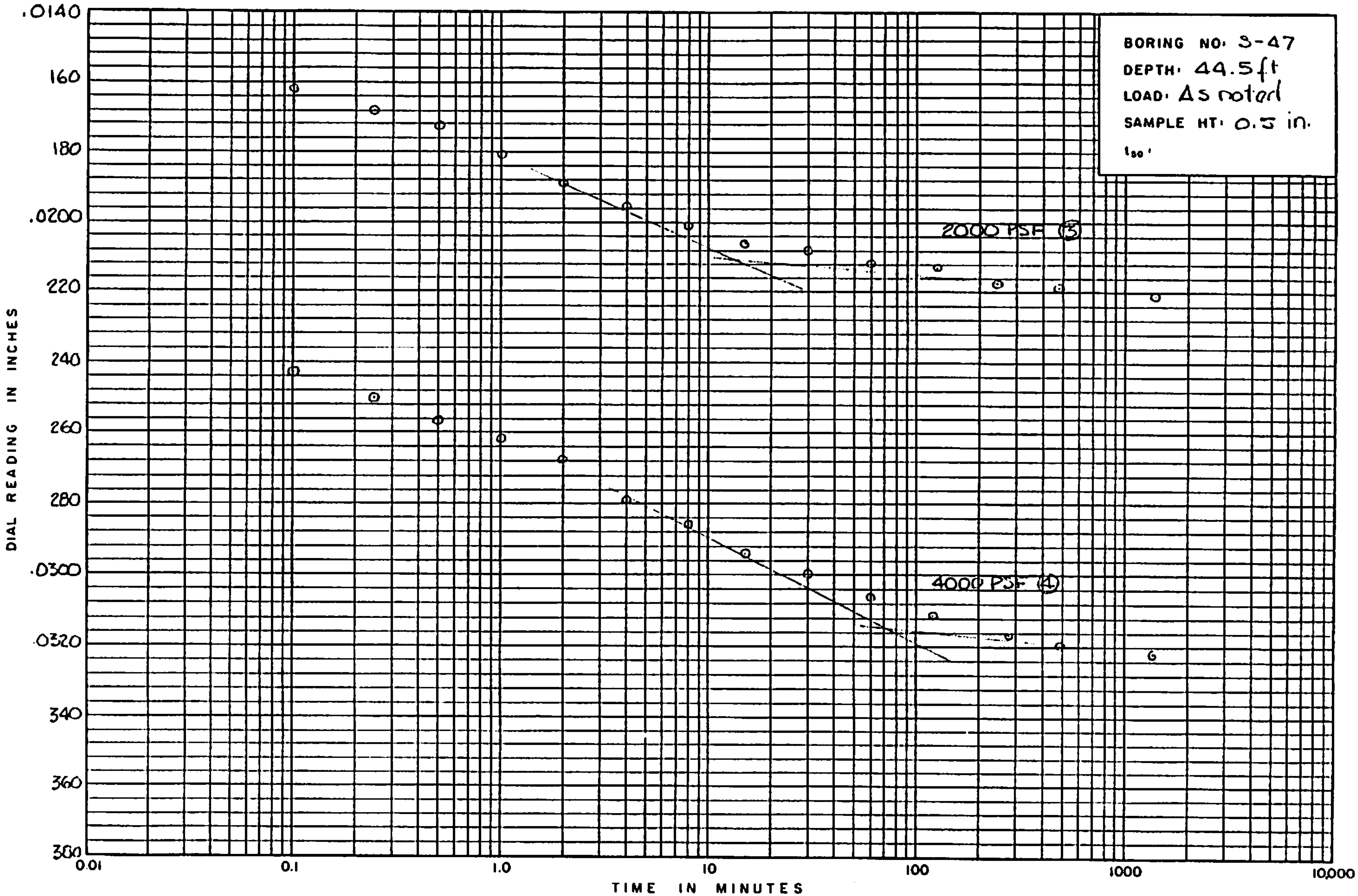
CONSOLIDATION TEST RESULTS



CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS

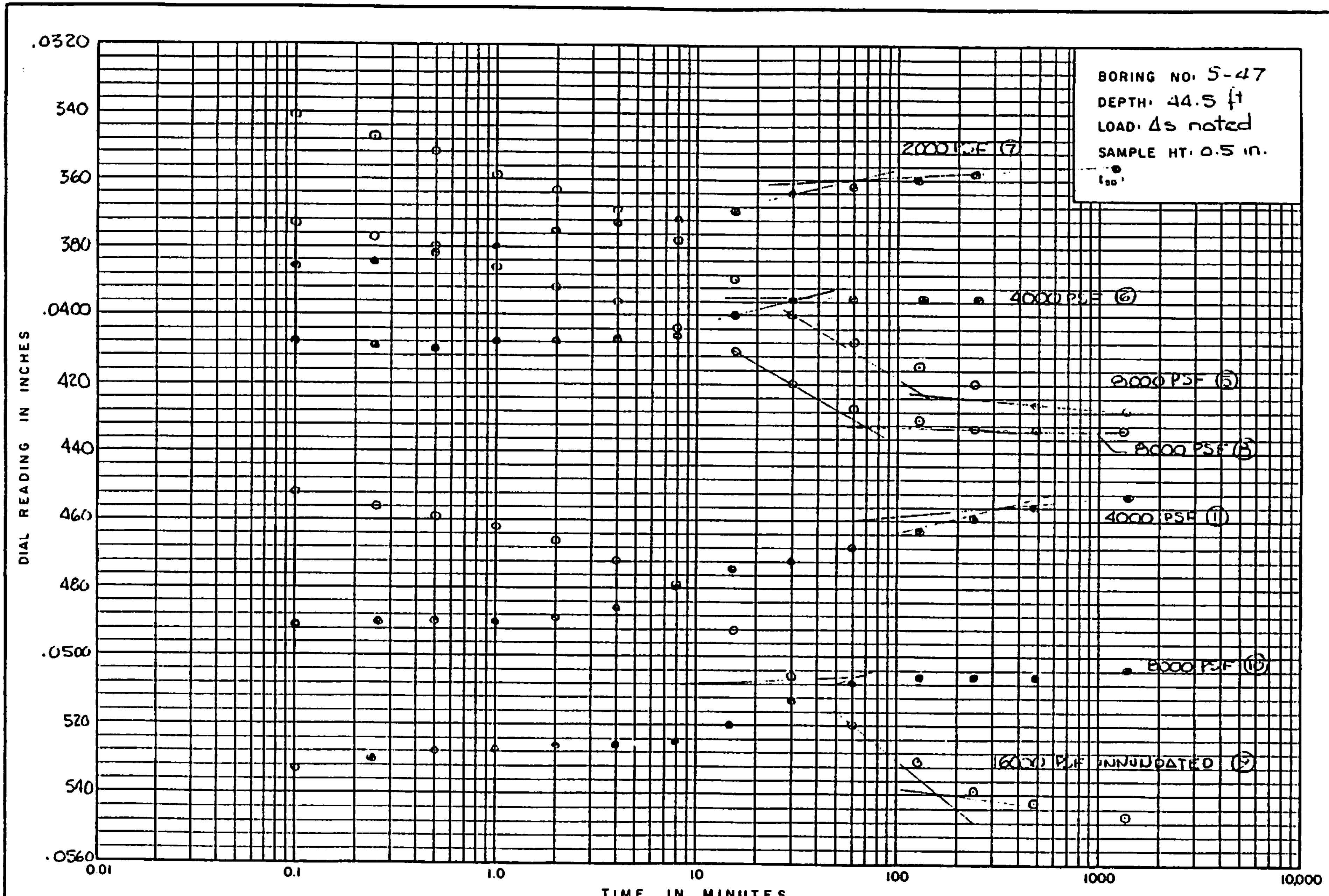
PLATE 11(



CONSOLIDATION TIME CURVES

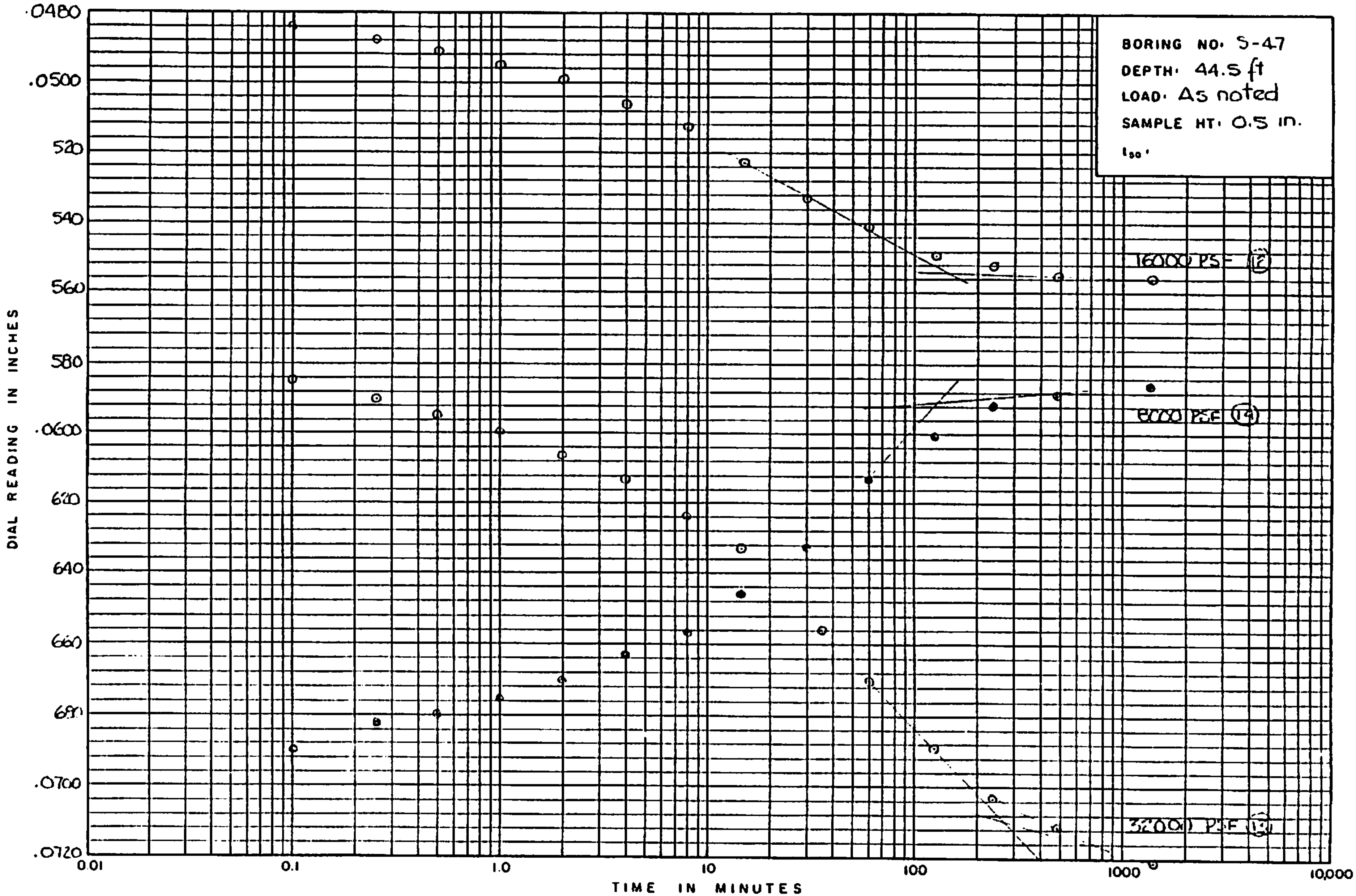
WARE LIND ENGINEERS

PLATE 111

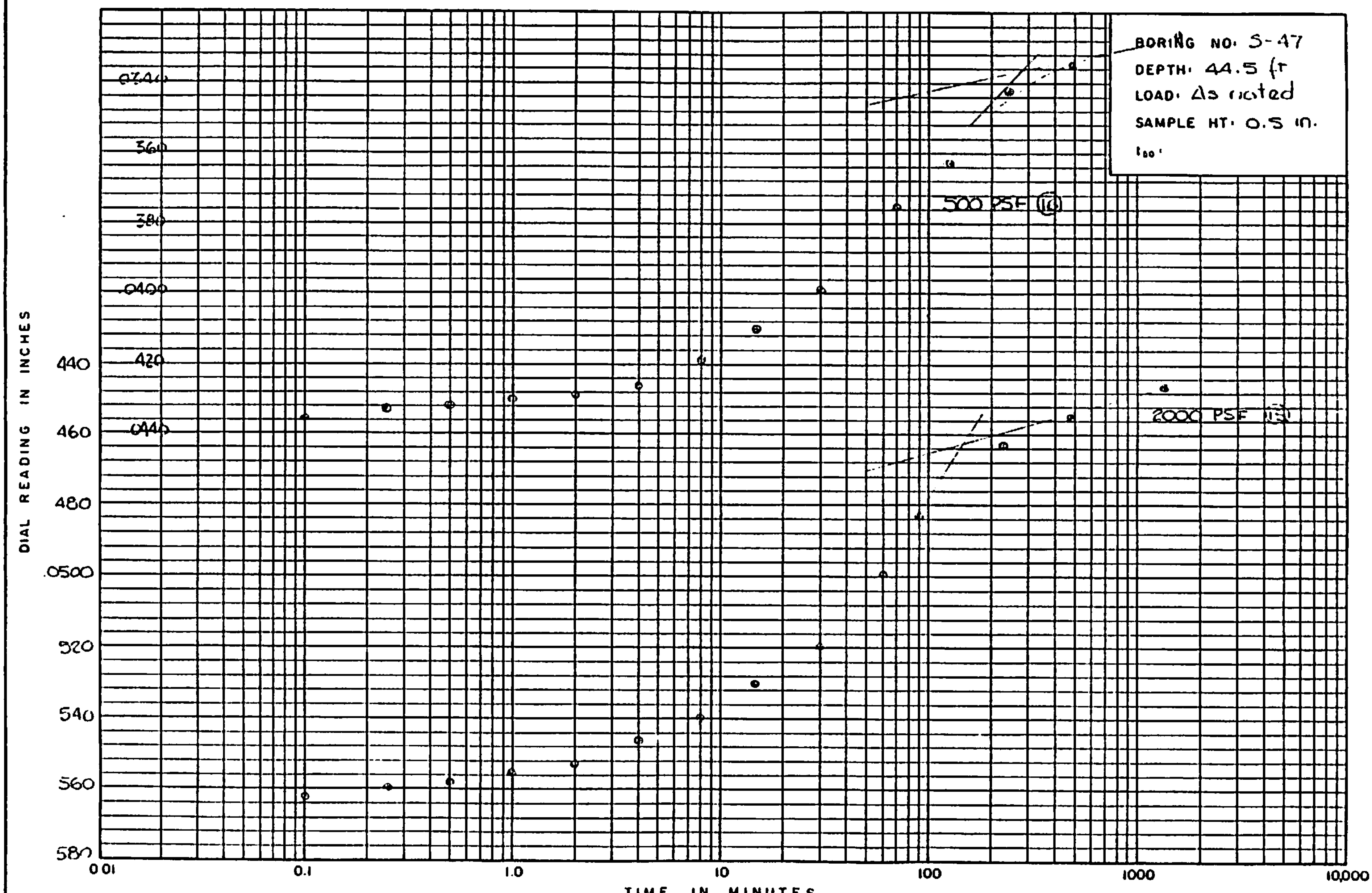


CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS

BORING NO.: U-49 DEPTH: 9.5 ft

MATERIAL: Stiff light gray to green and tan very sandy clay with calcareous nodules

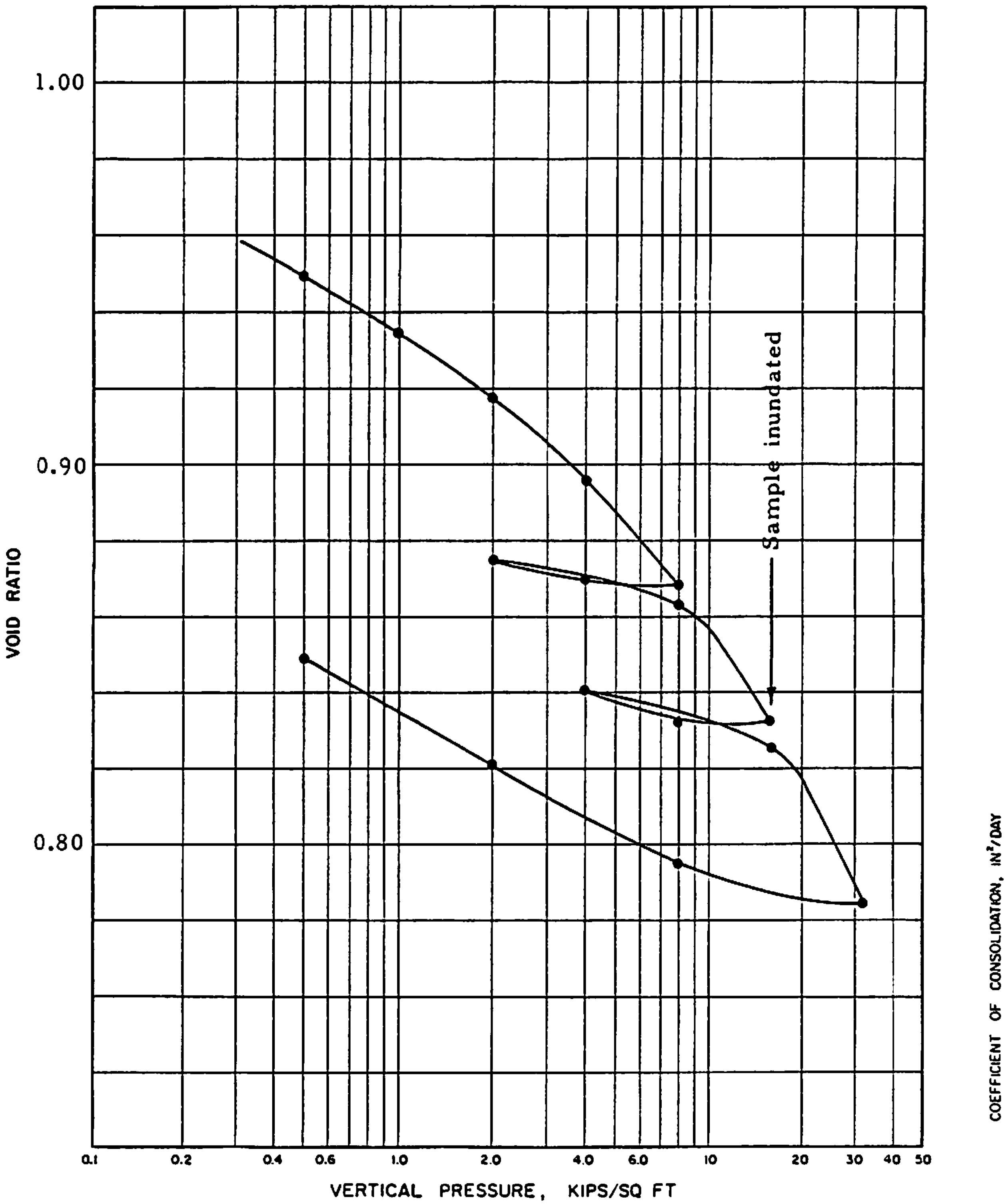
$e_o = 0.9640$

UNIT DRY WEIGHT: 106.0 LB/CU FT

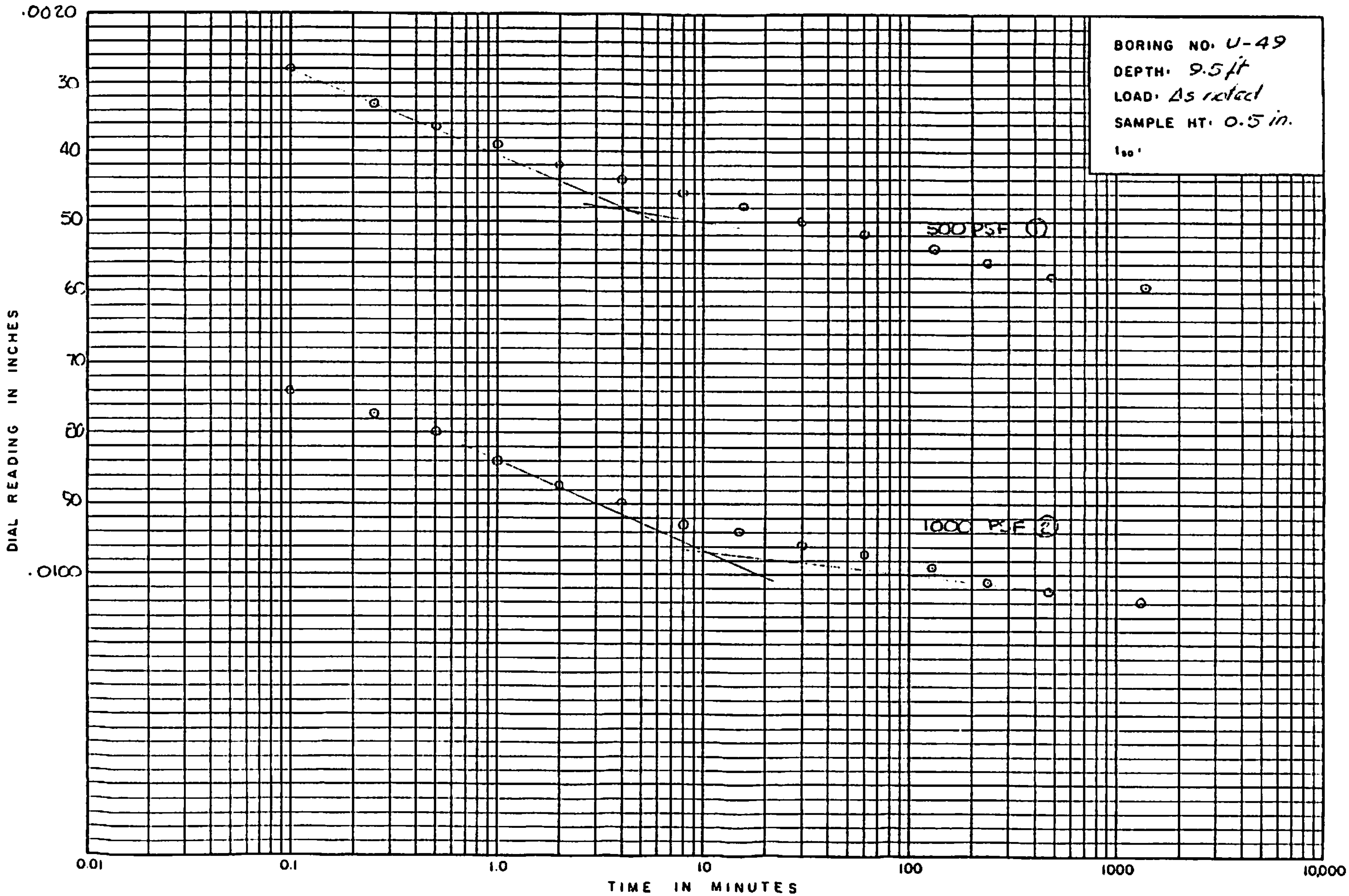
WATER CONTENT: 22.1 %

LIQUID LIMIT: NP

PLASTIC LIMIT: NP

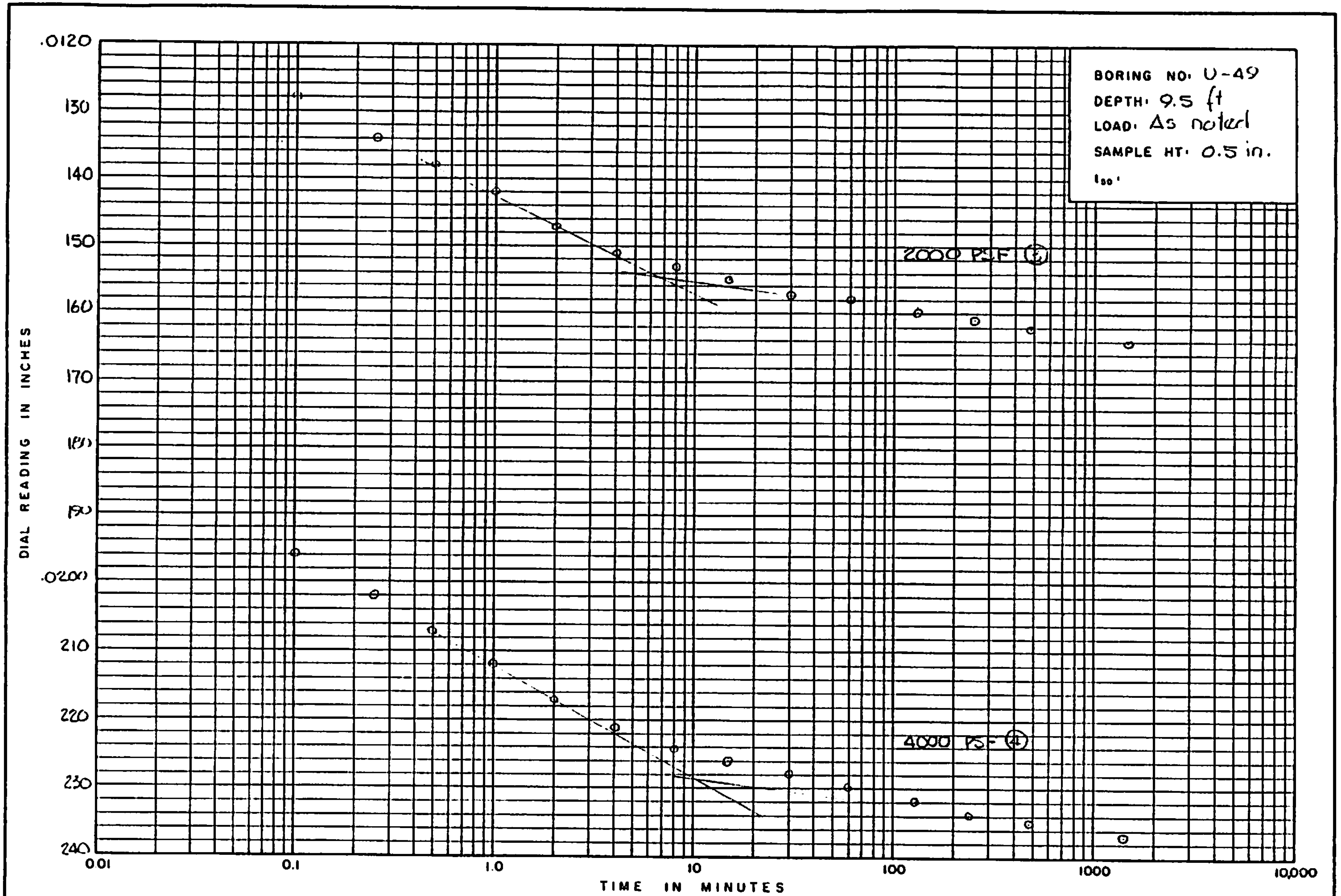


CONSOLIDATION TEST RESULTS

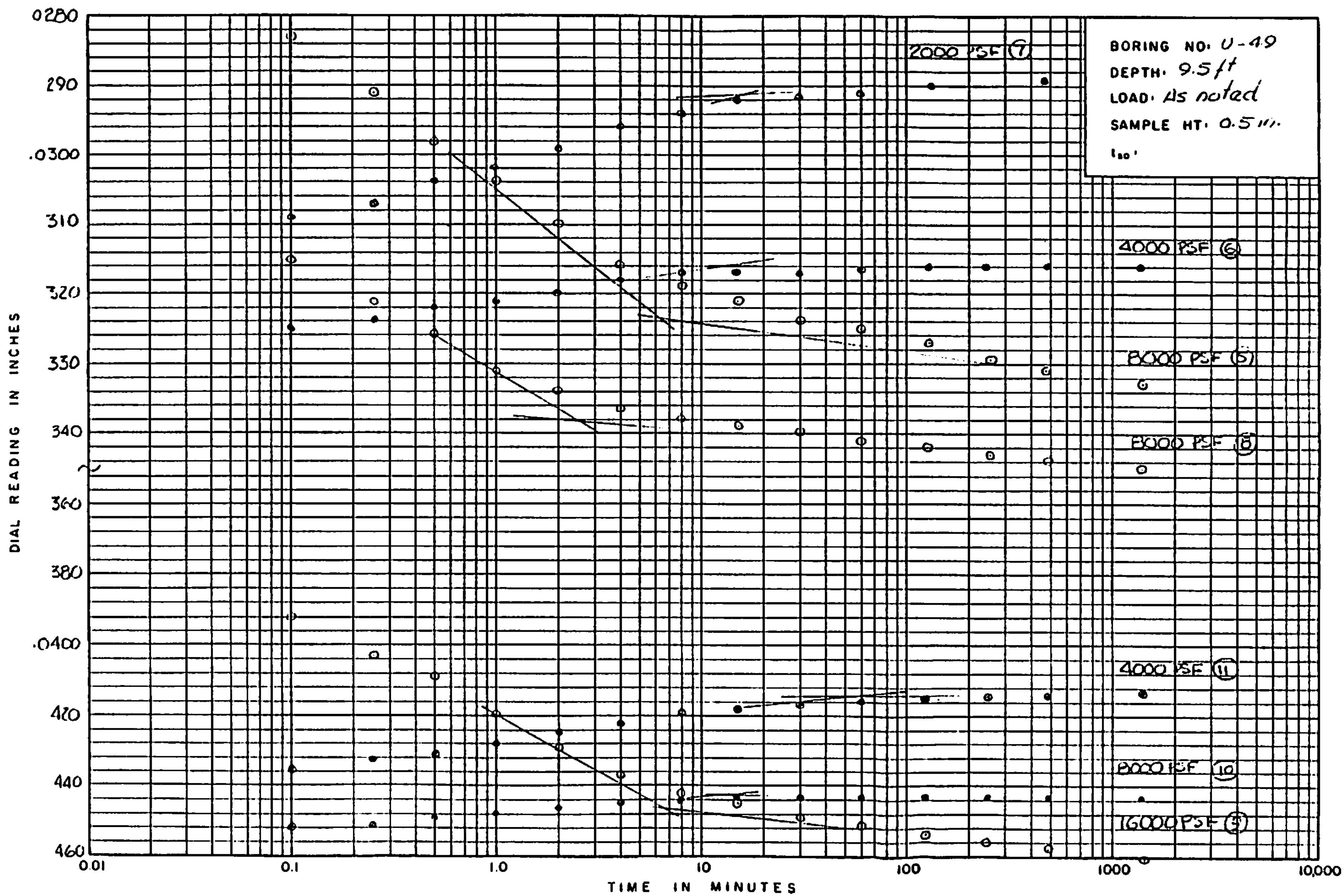


CONSOLIDATION TIME CURVES

PLATE 11C

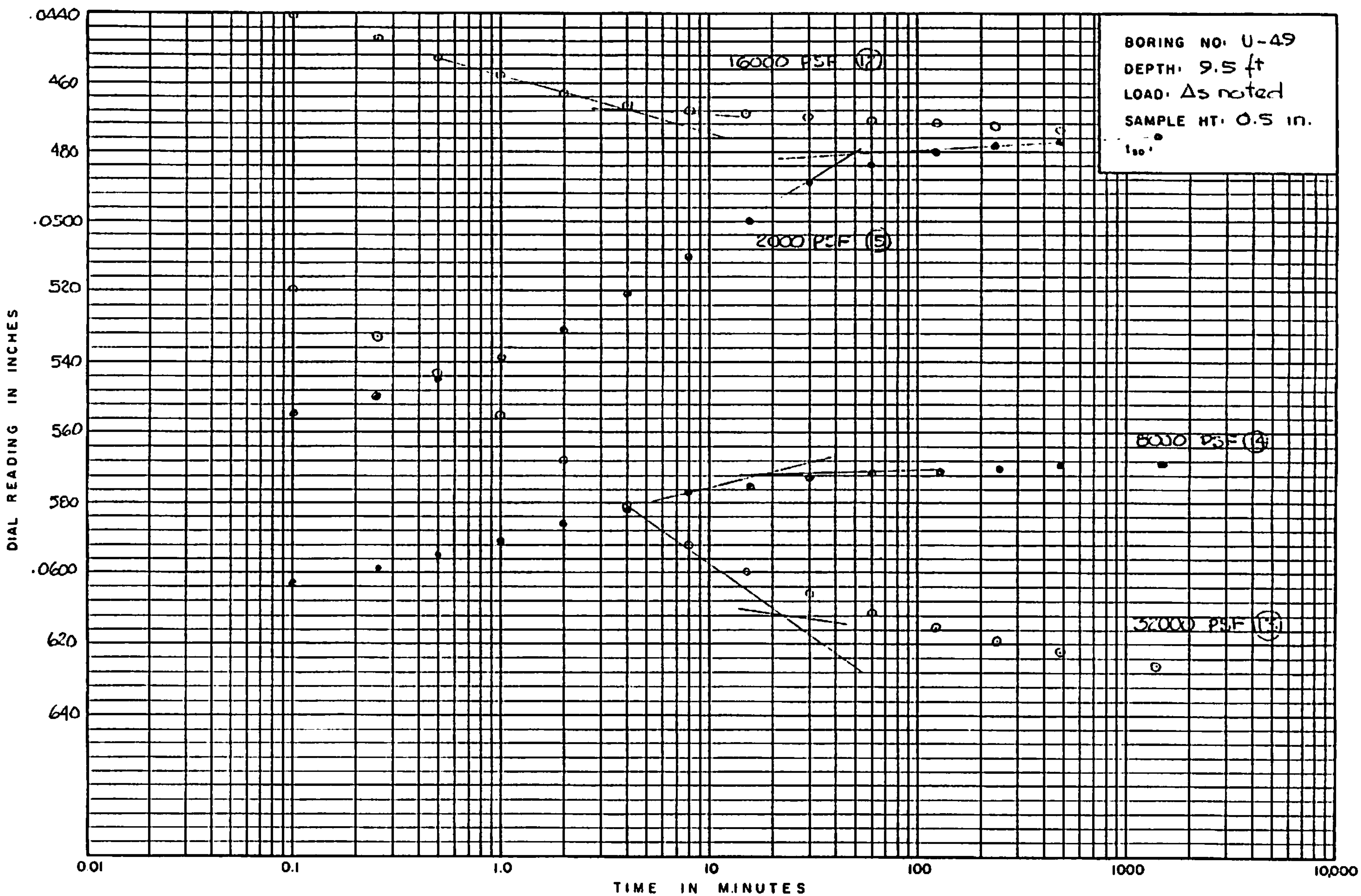


CONSOLIDATION TIME CURVES

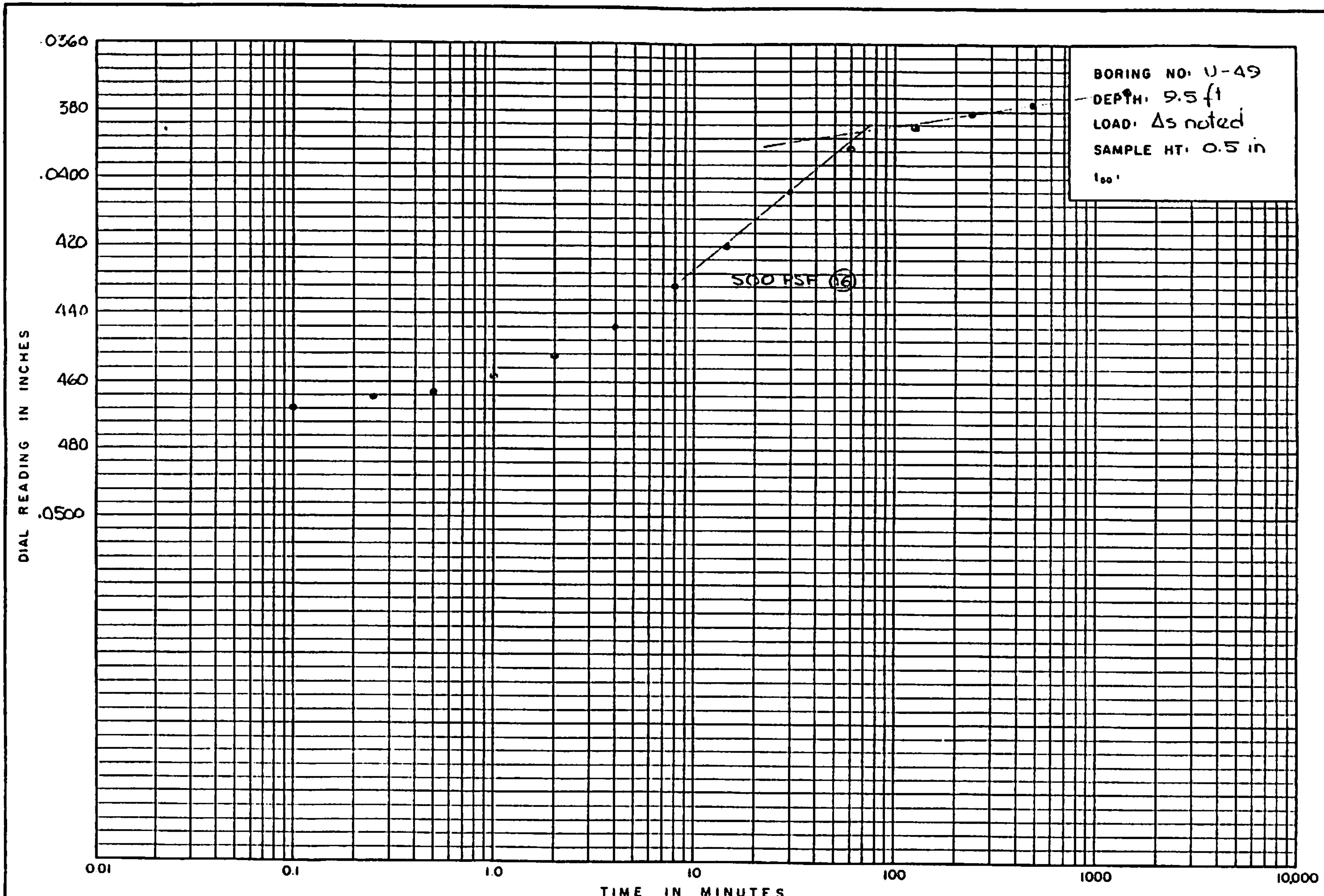


CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES

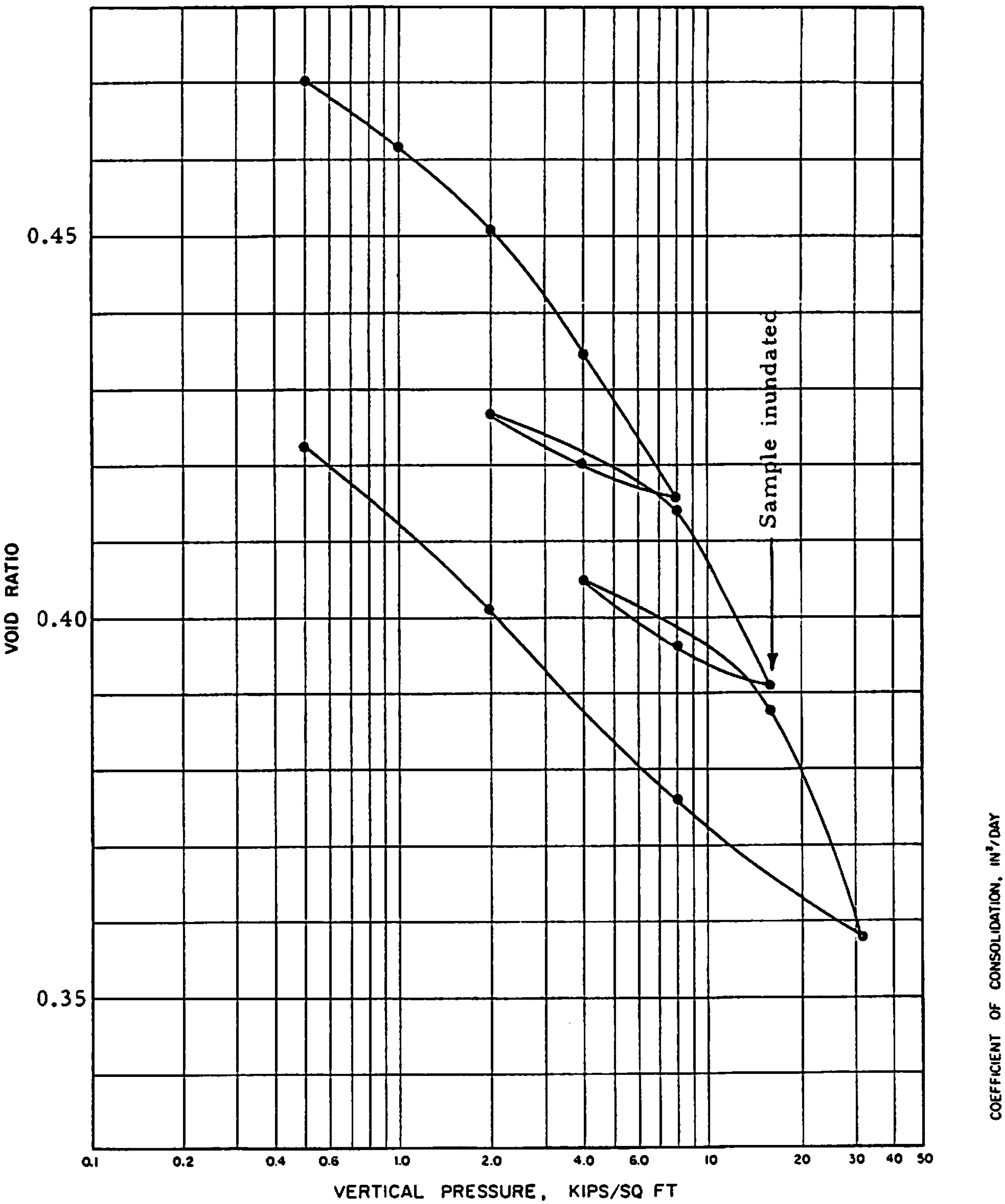


CONSOLIDATION TIME CURVES

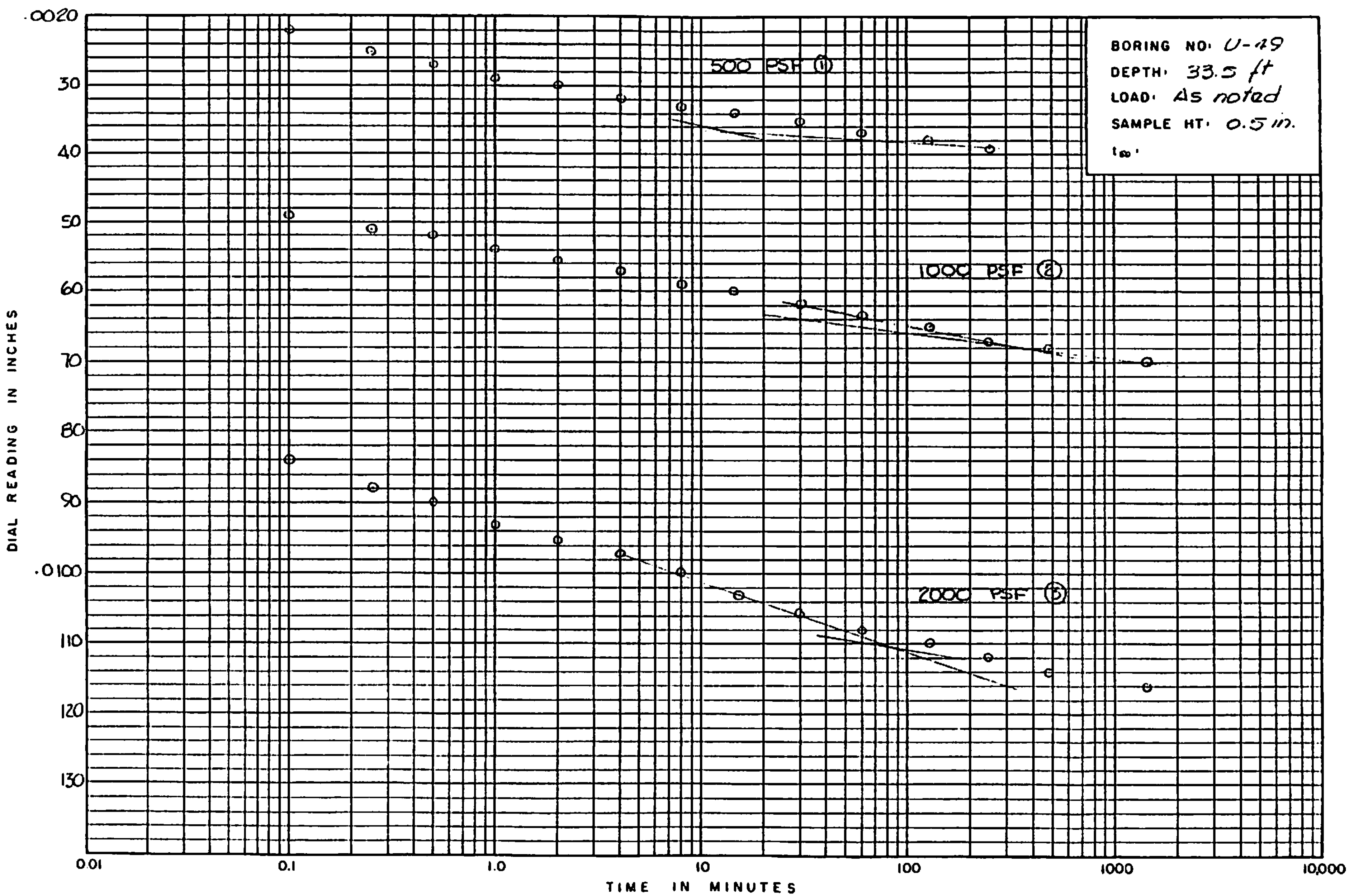
PLATE 120

BORING NO.: U-49 DEPTH: 33.5 ft
MATERIAL: Very stiff yellow sandy clay
e_o = 0.4806

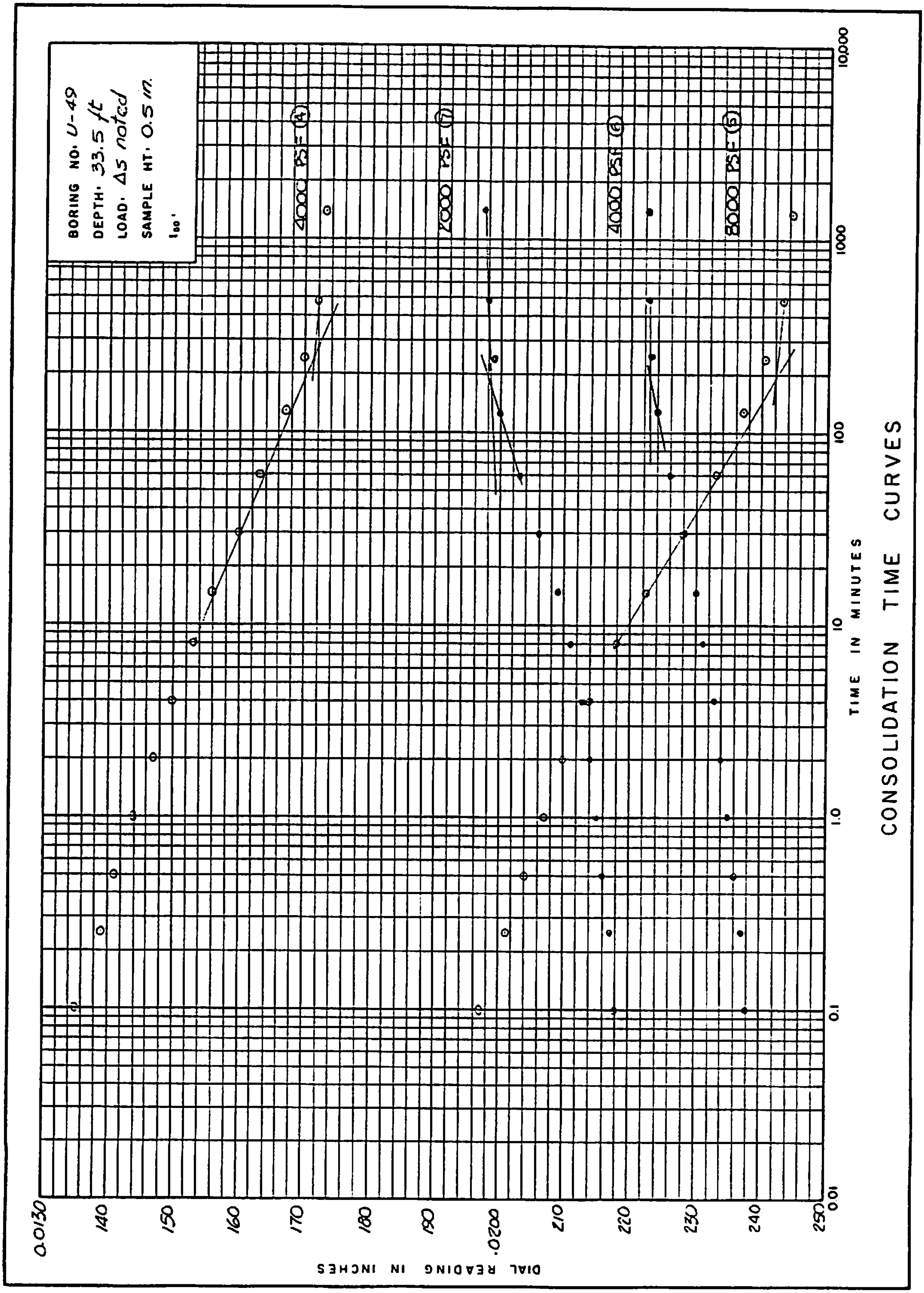
UNIT DRY WEIGHT: 112.9 LB/CU FT
WATER CONTENT: 17.6 %
LIQUID LIMIT: 50
PLASTIC LIMIT: 20



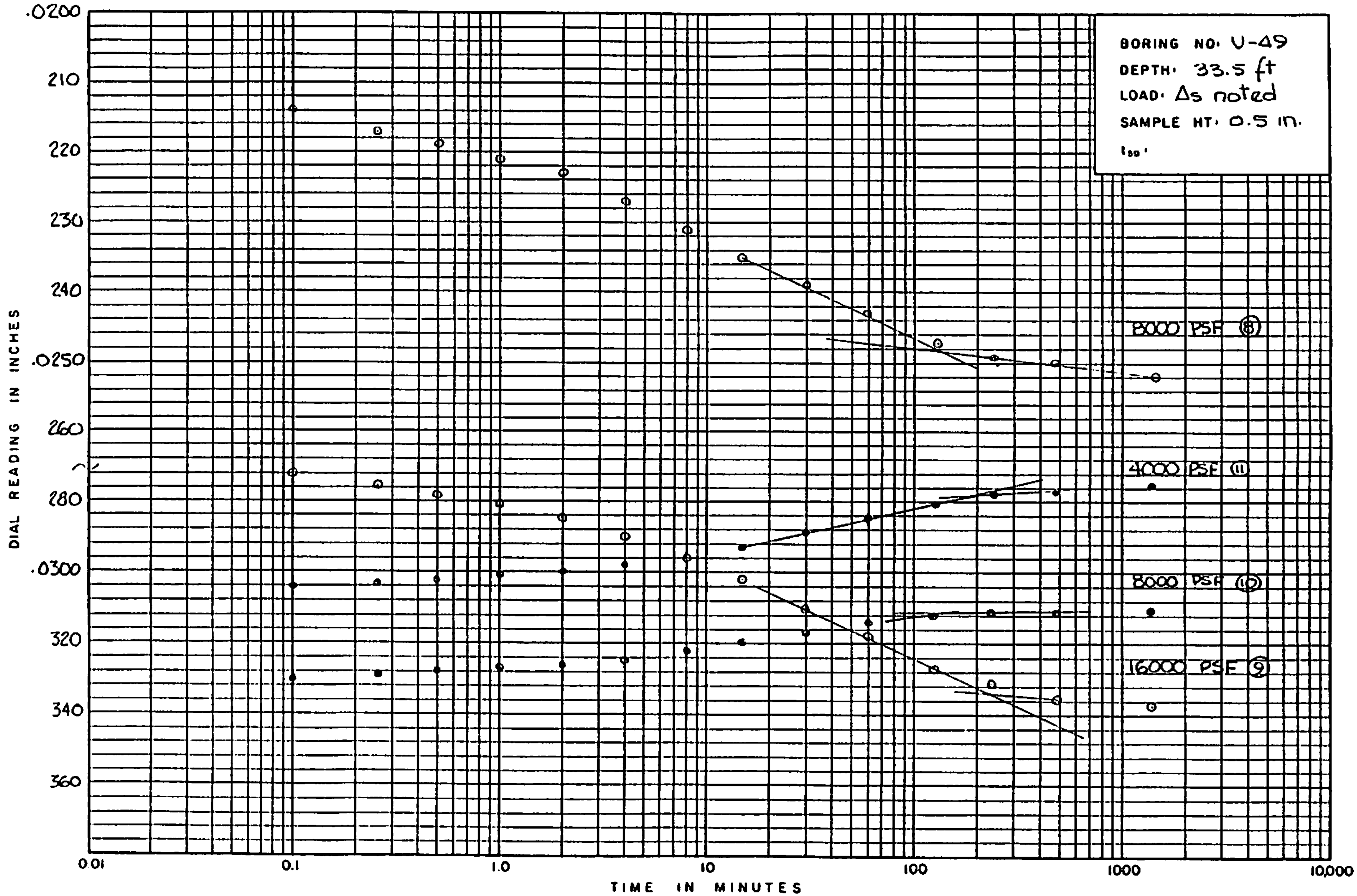
CONSOLIDATION TEST RESULTS



CONSOLIDATION TIME CURVES

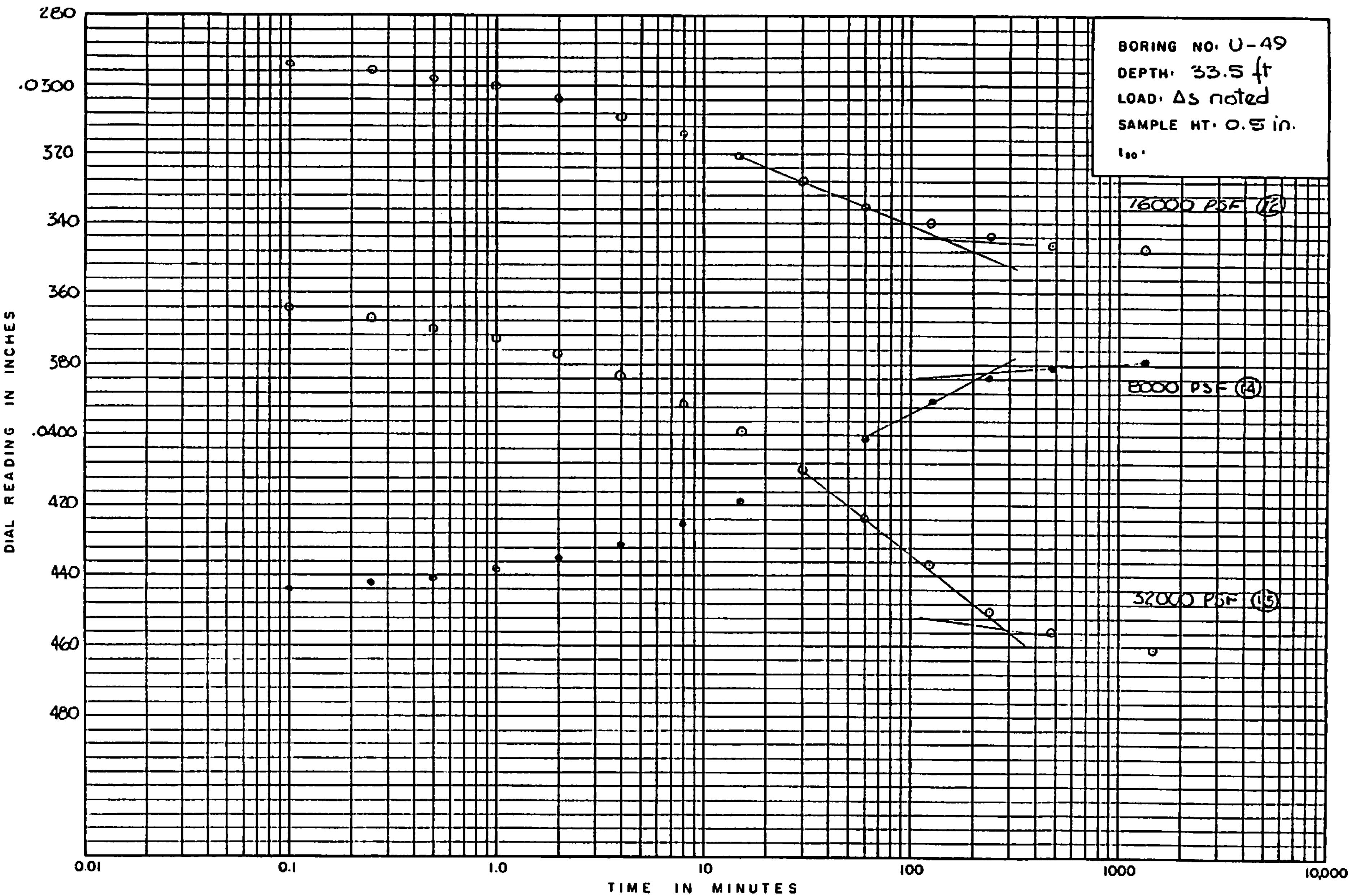


CONSOLIDATION TIME CURVES



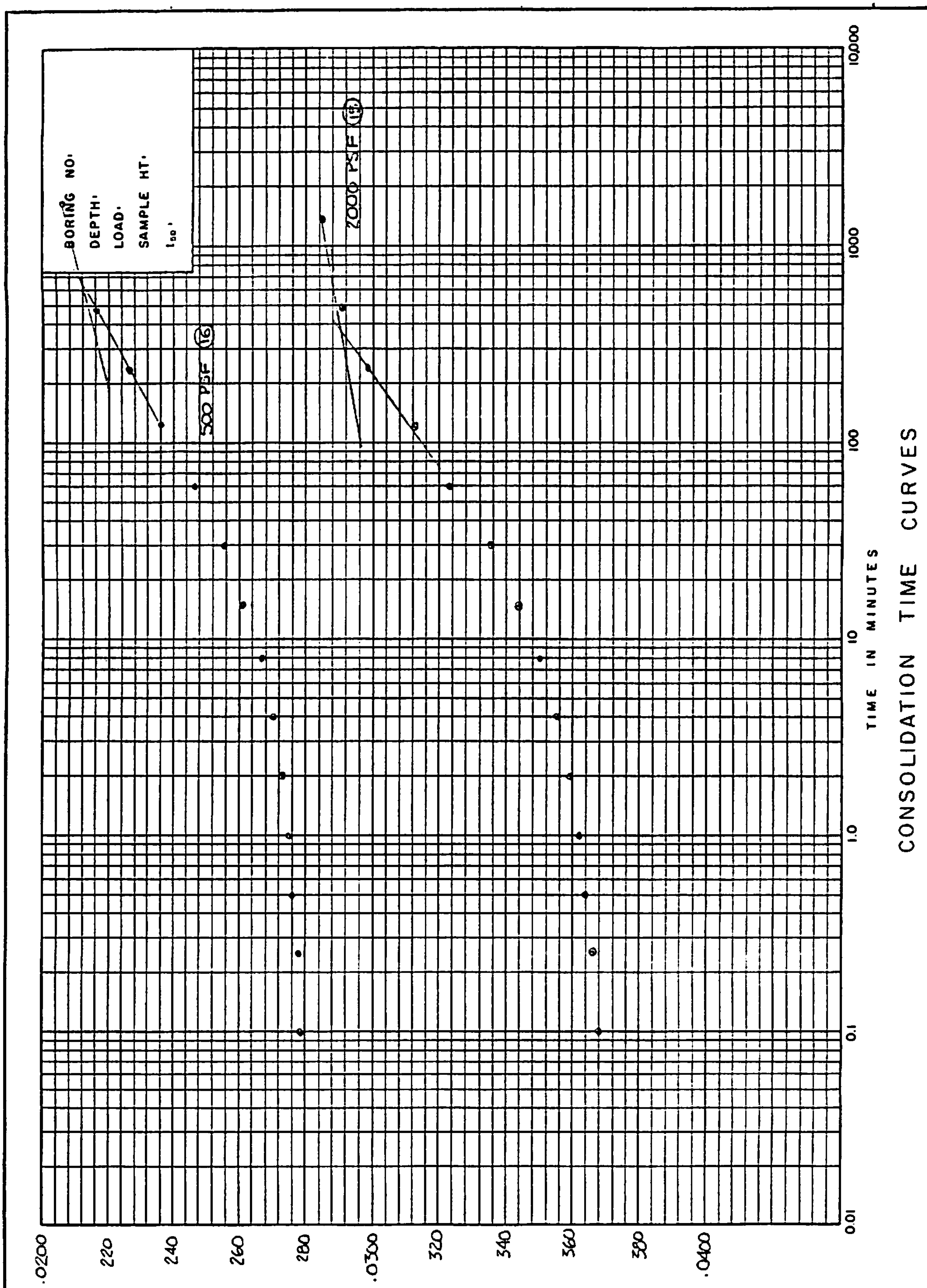
CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES

PLATE 125



CONSOLIDATION TIME CURVES
TIME IN MINUTES
DIAL READING IN INCHES
BORING NO:
DEPTH:
LOAD:
SAMPLE HT:
t_{50}:
500 PSF (16)
2000 PSF (17)
0.01
0.1
1.0
10
100
1000
10,000
.0200
220
240
260
280
.0300
320
340
360
380
.0400

BORING NO.: U-49 DEPTH: 73.5 ft

MATERIAL: Hard green clay, brittle, approaching claystone in texture

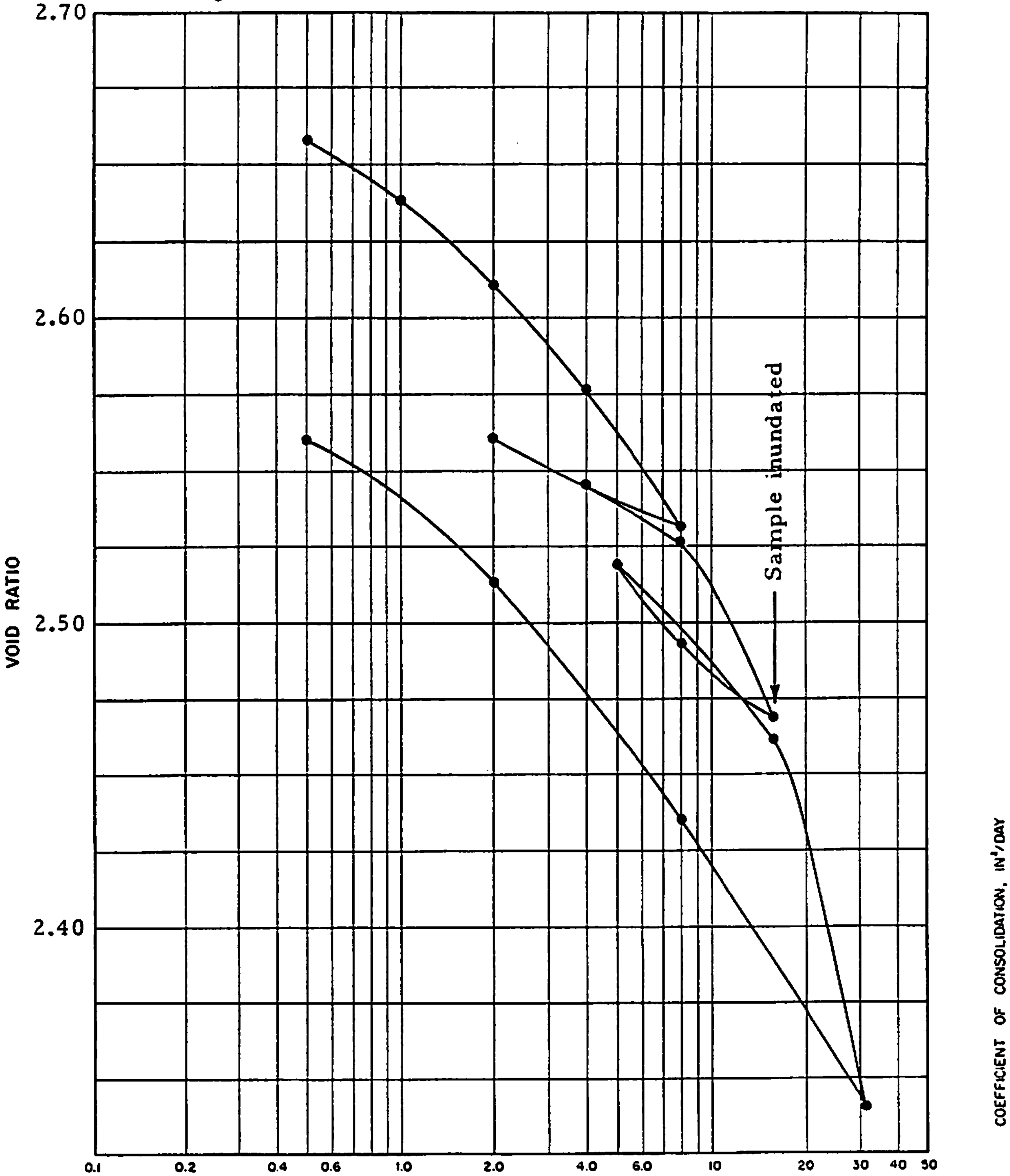
$e_o = 2.723$

UNIT DRY WEIGHT: 42.7 LB/CU FT

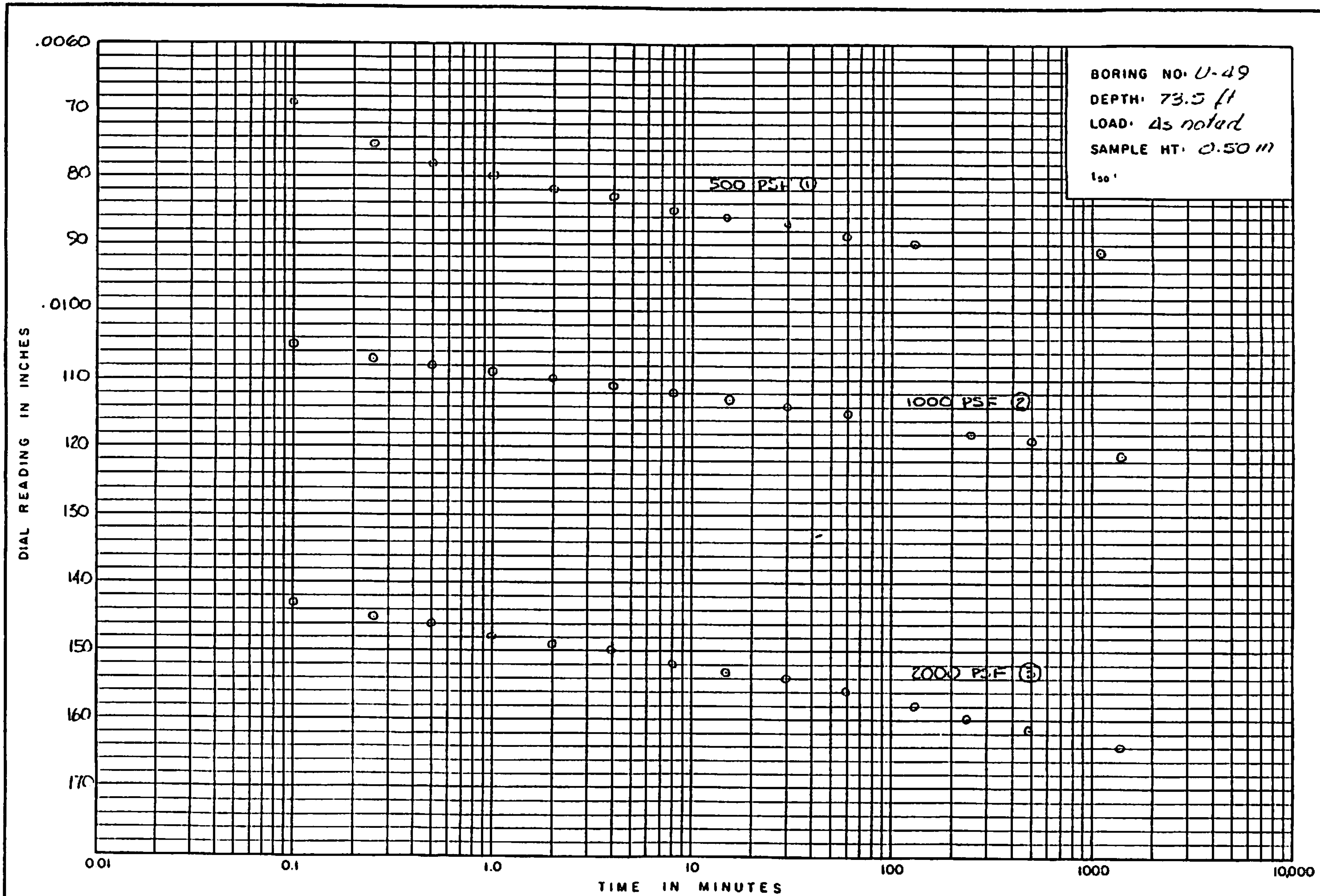
WATER CONTENT: 102.1 %

LIQUID LIMIT: 201

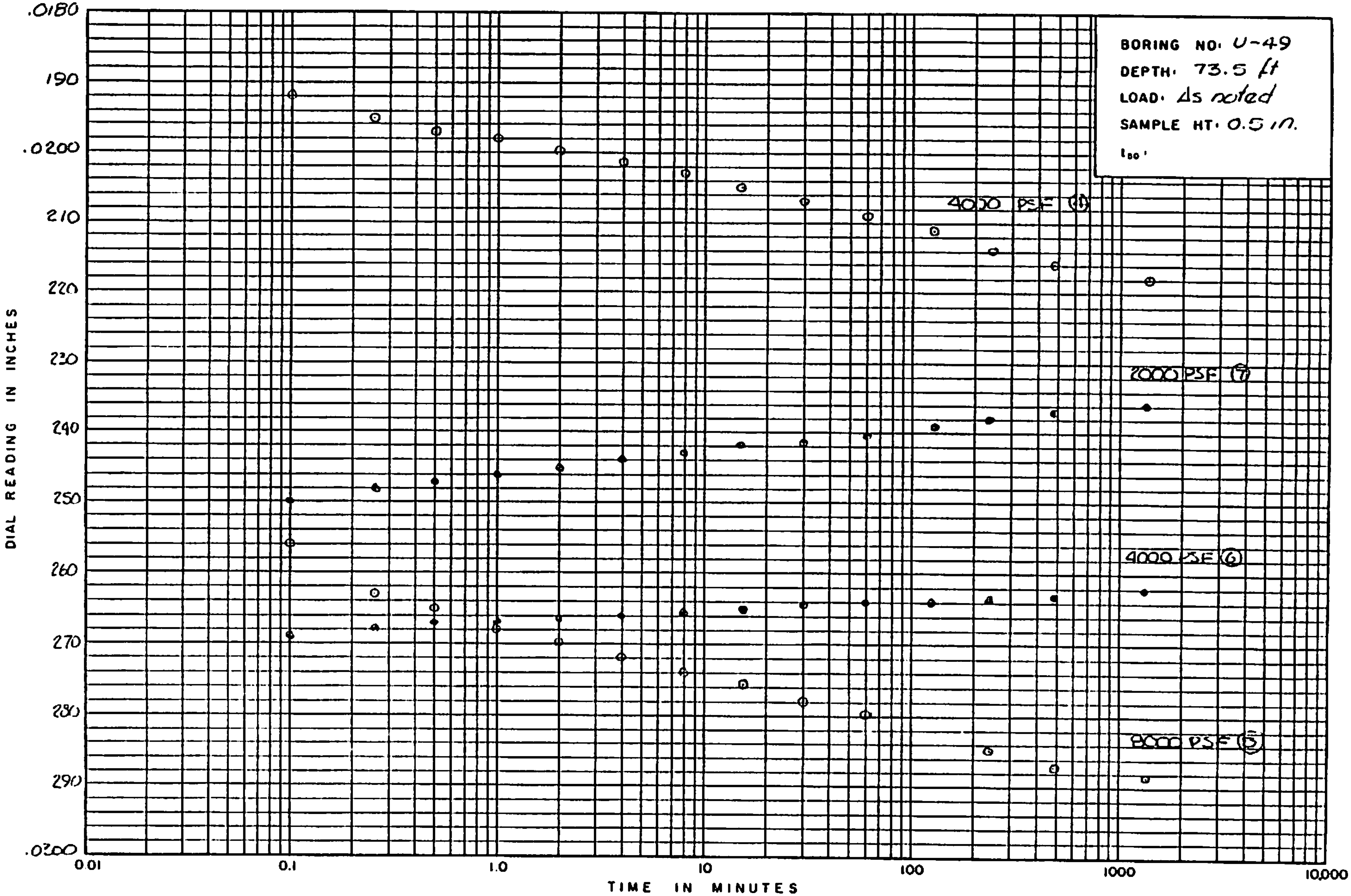
PLASTIC LIMIT: 122



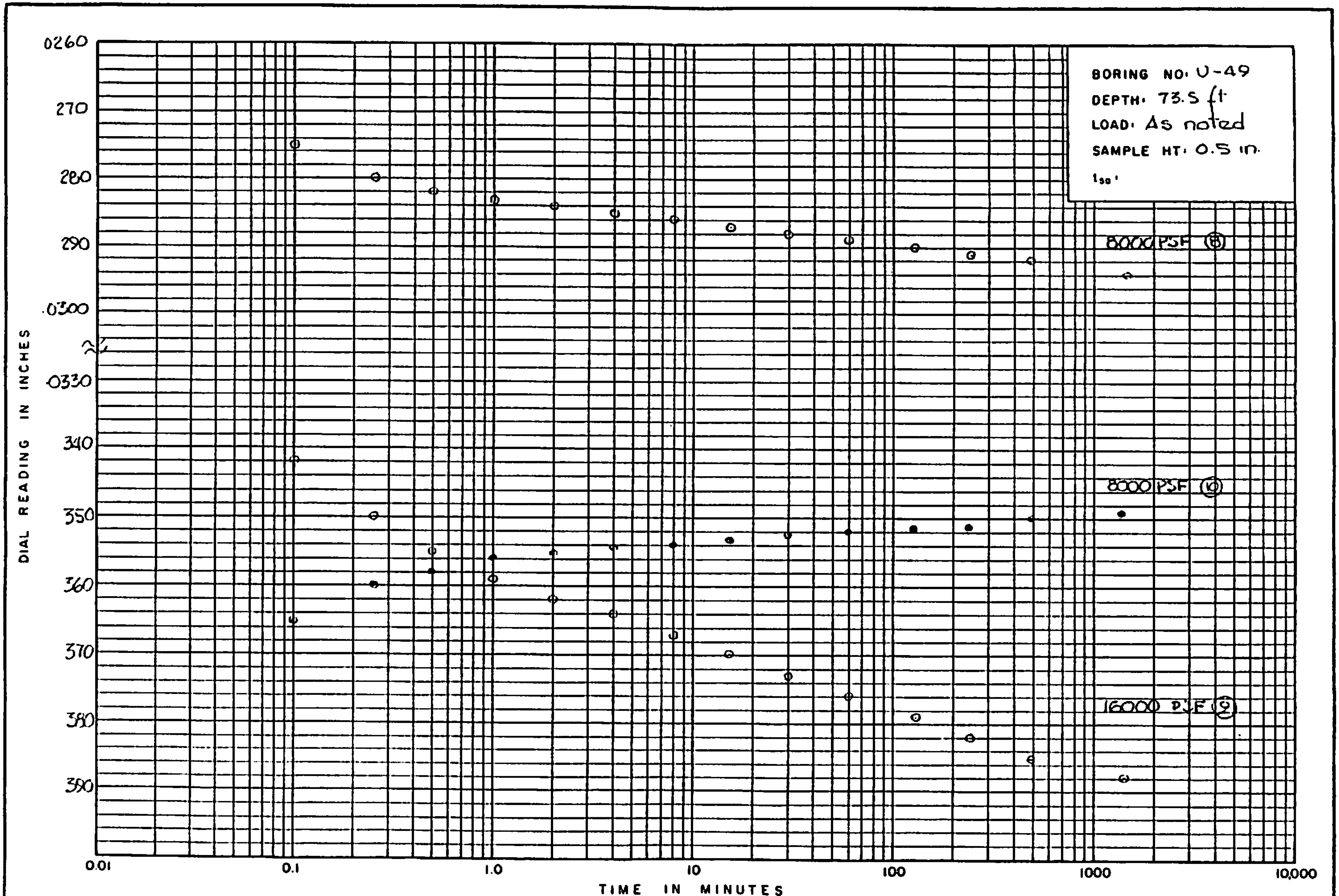
CONSOLIDATION TEST RESULTS



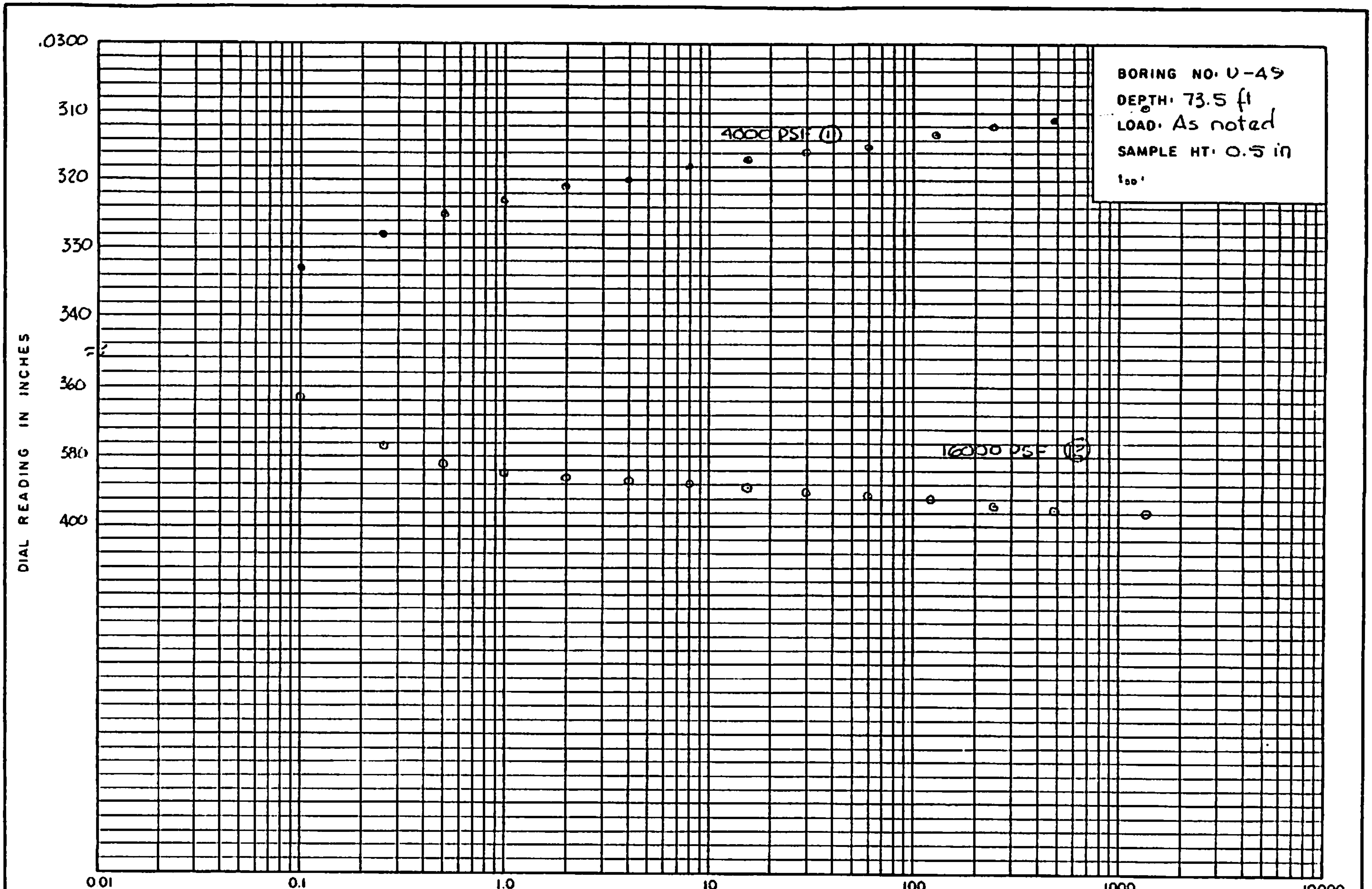
CONSOLIDATION TIME CURVES



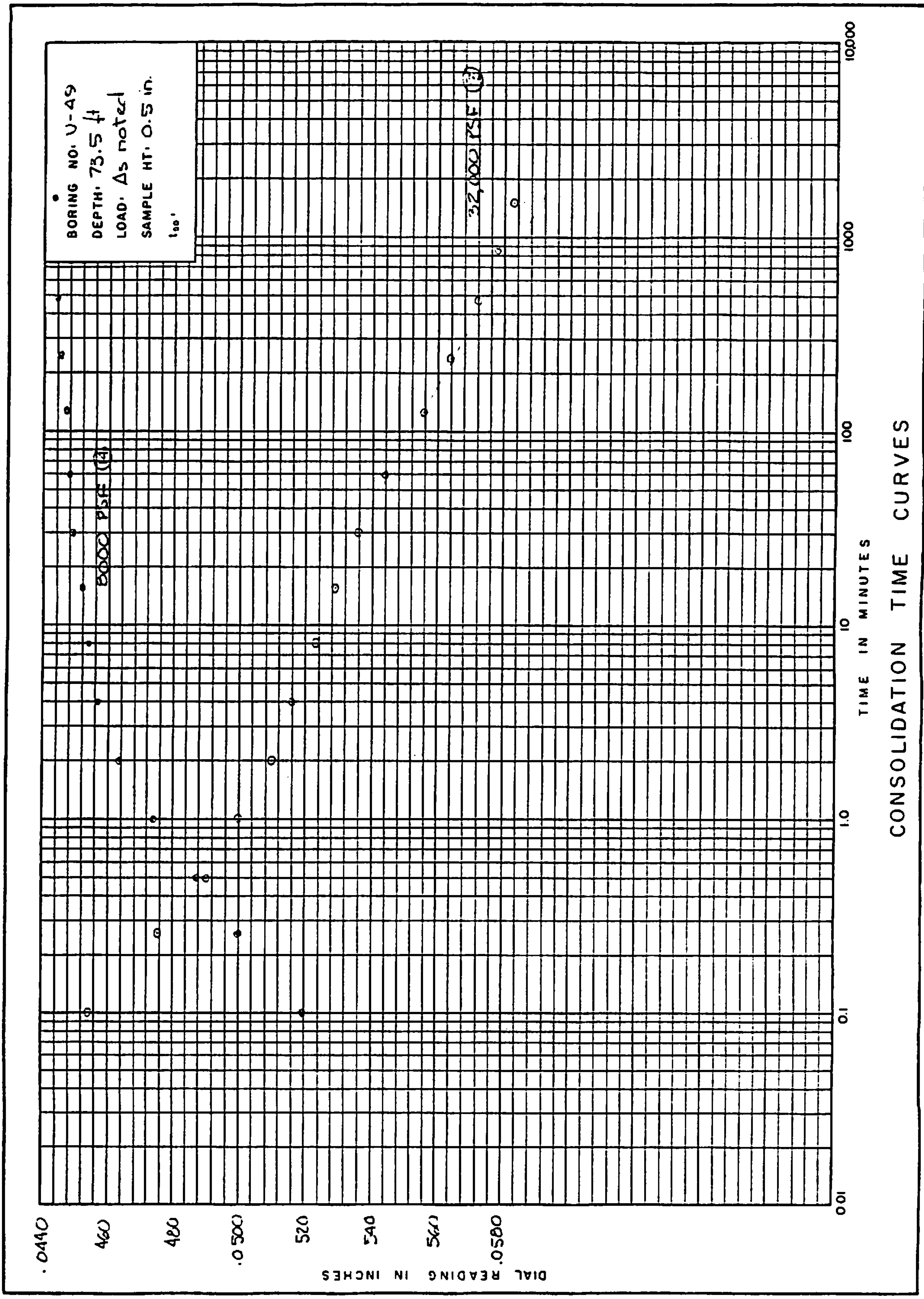
CONSOLIDATION TIME CURVES

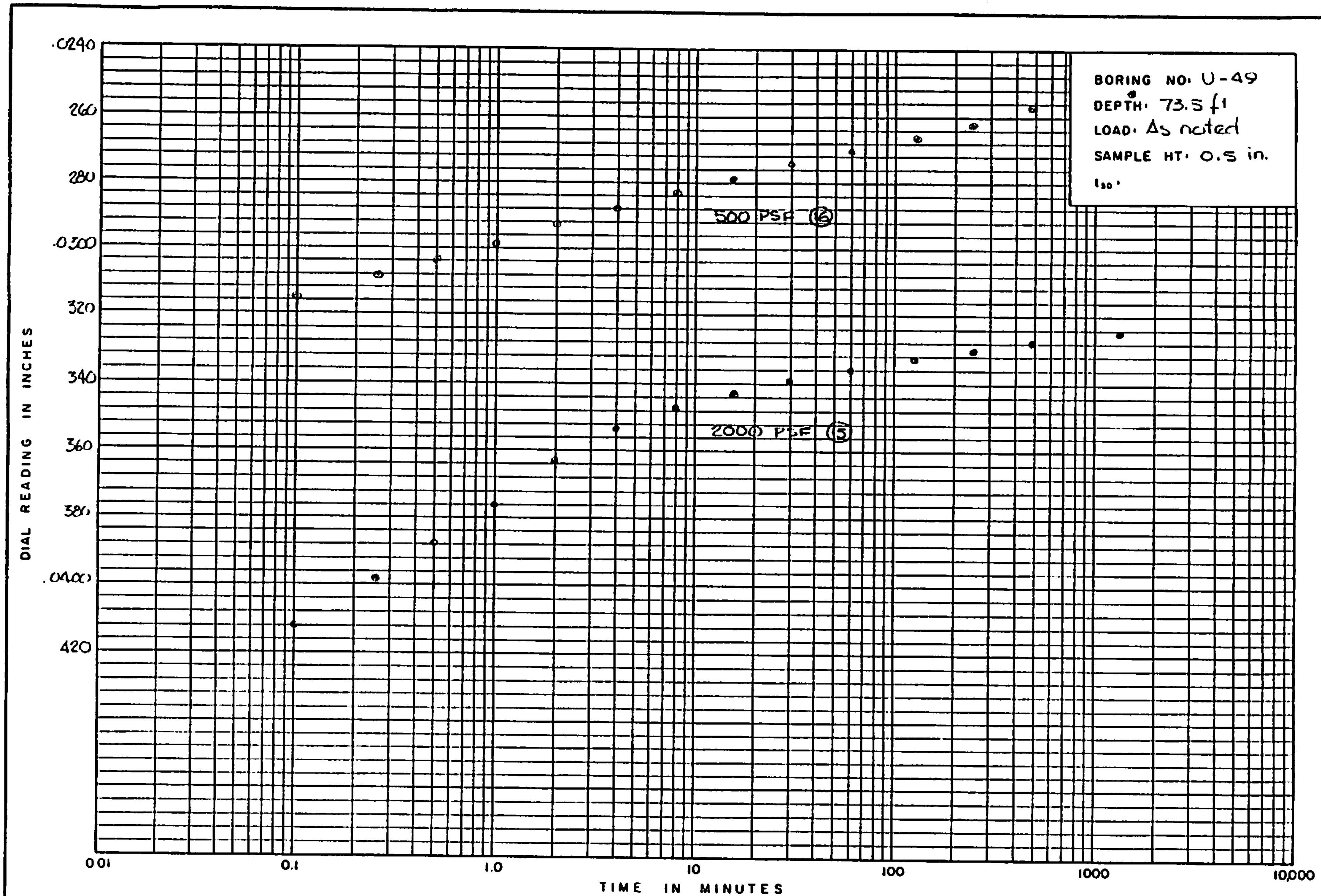


CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES


BORING NO: U-49
DEPTH: 73.5 ft
LOAD: As noted
SAMPLE HT: 0.5 in.
8000 PSF (4)
32,000 PSF
DIAL READING IN INCHES
.0440
460
480
.0500
520
540
560
.0580
TIME IN MINUTES
0.01
0.1
1.0
10
100
1000
10,000
CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES

BORING NO.: U-50 DEPTH: 14 ft

MATERIAL: Light gray and tan clay with numerous calcareous nodules

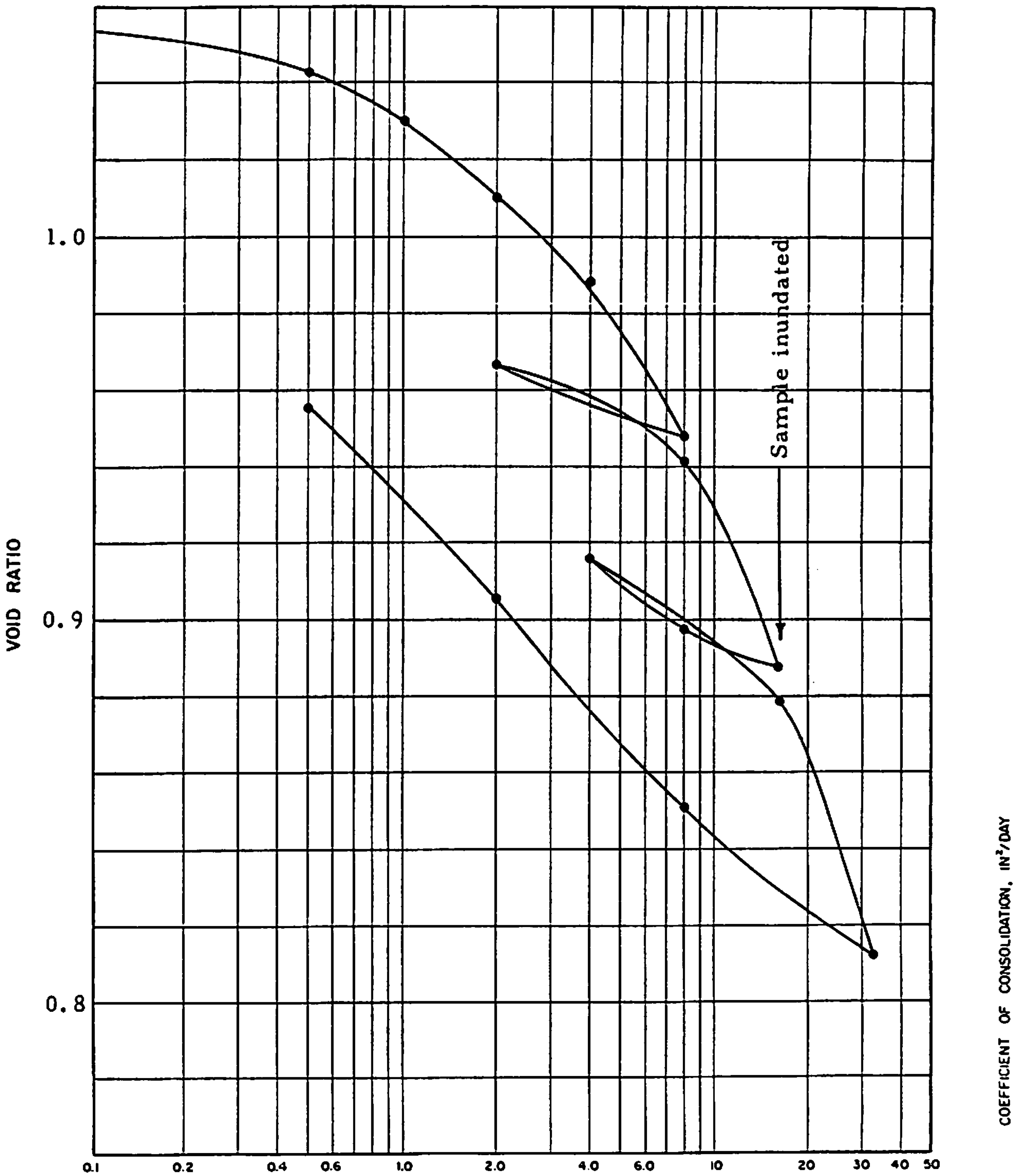
$e_o = 1.0534$

UNIT DRY WEIGHT: 86.0 LB/CU FT

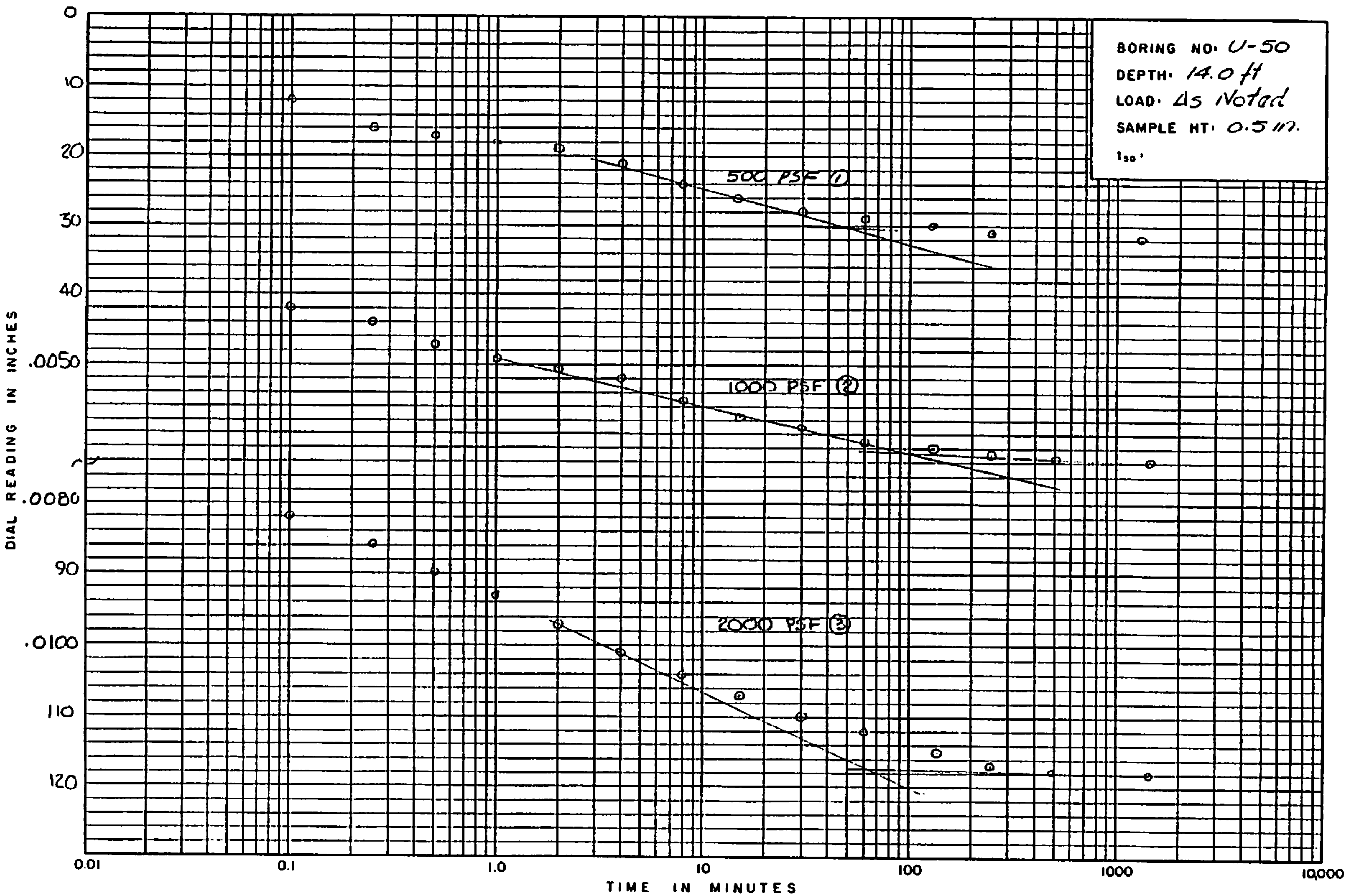
WATER CONTENT: 34.8 %

LIQUID LIMIT: 86

PLASTIC LIMIT: 30



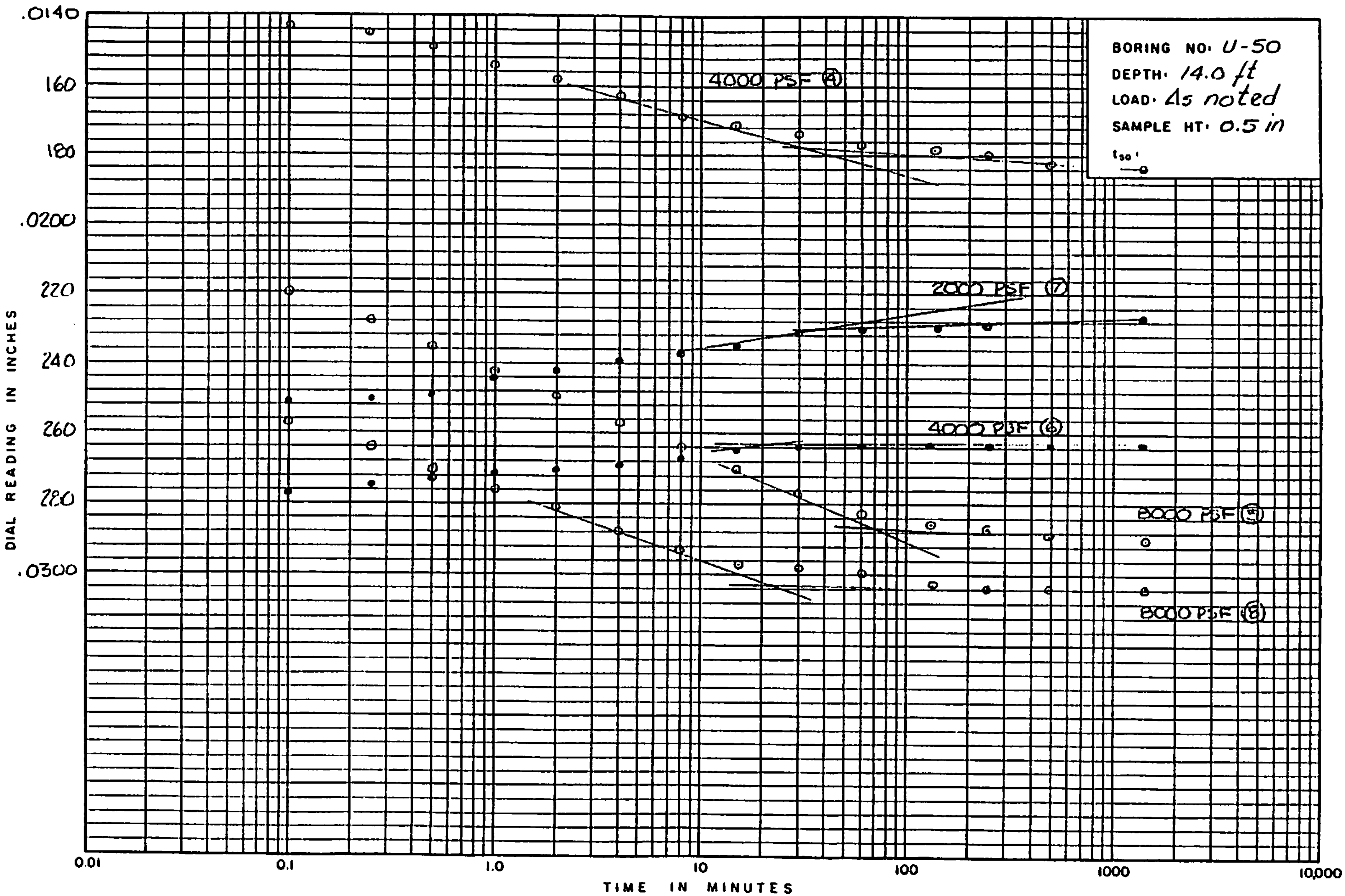
CONSOLIDATION TEST RESULTS



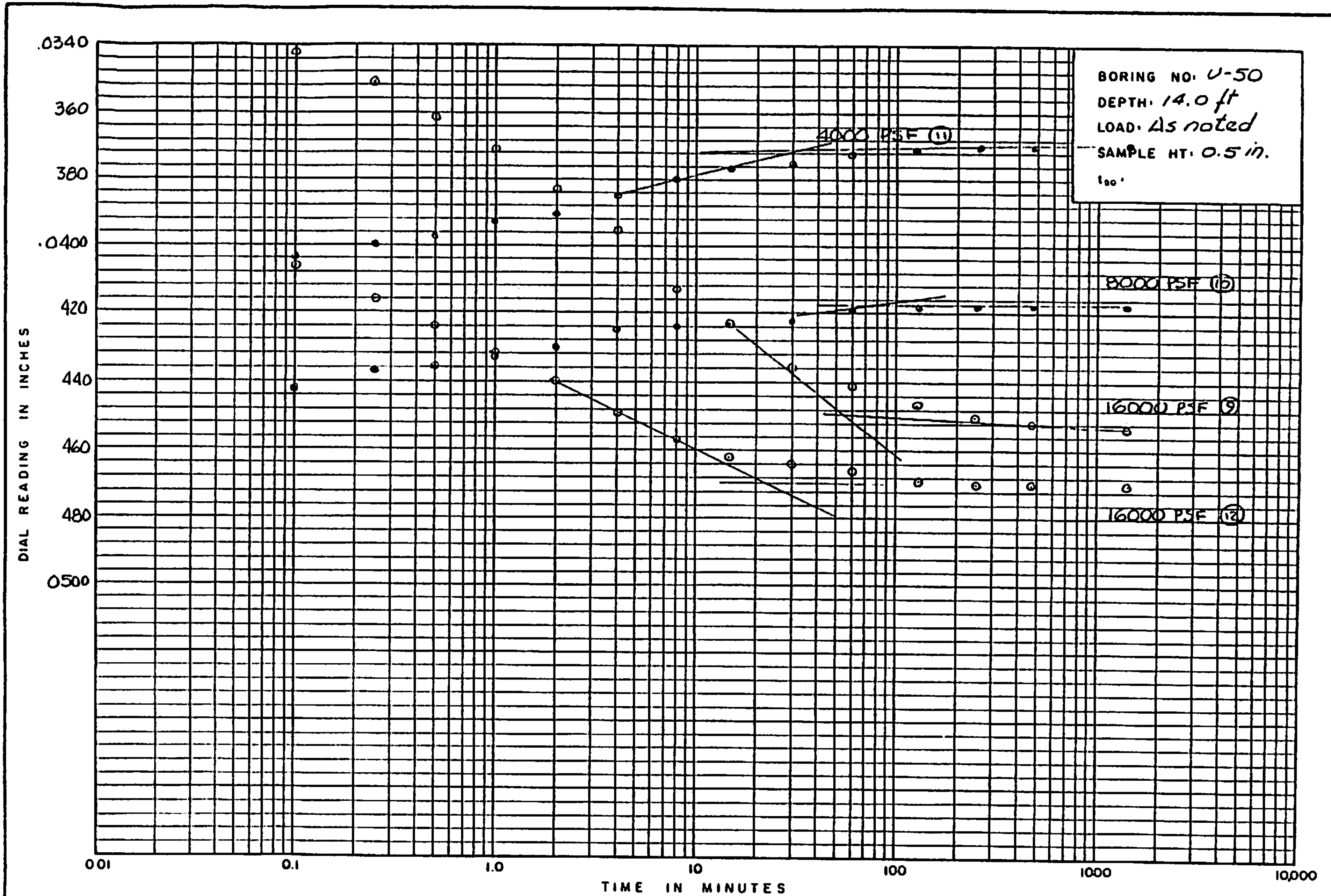
CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS

PLATE 135

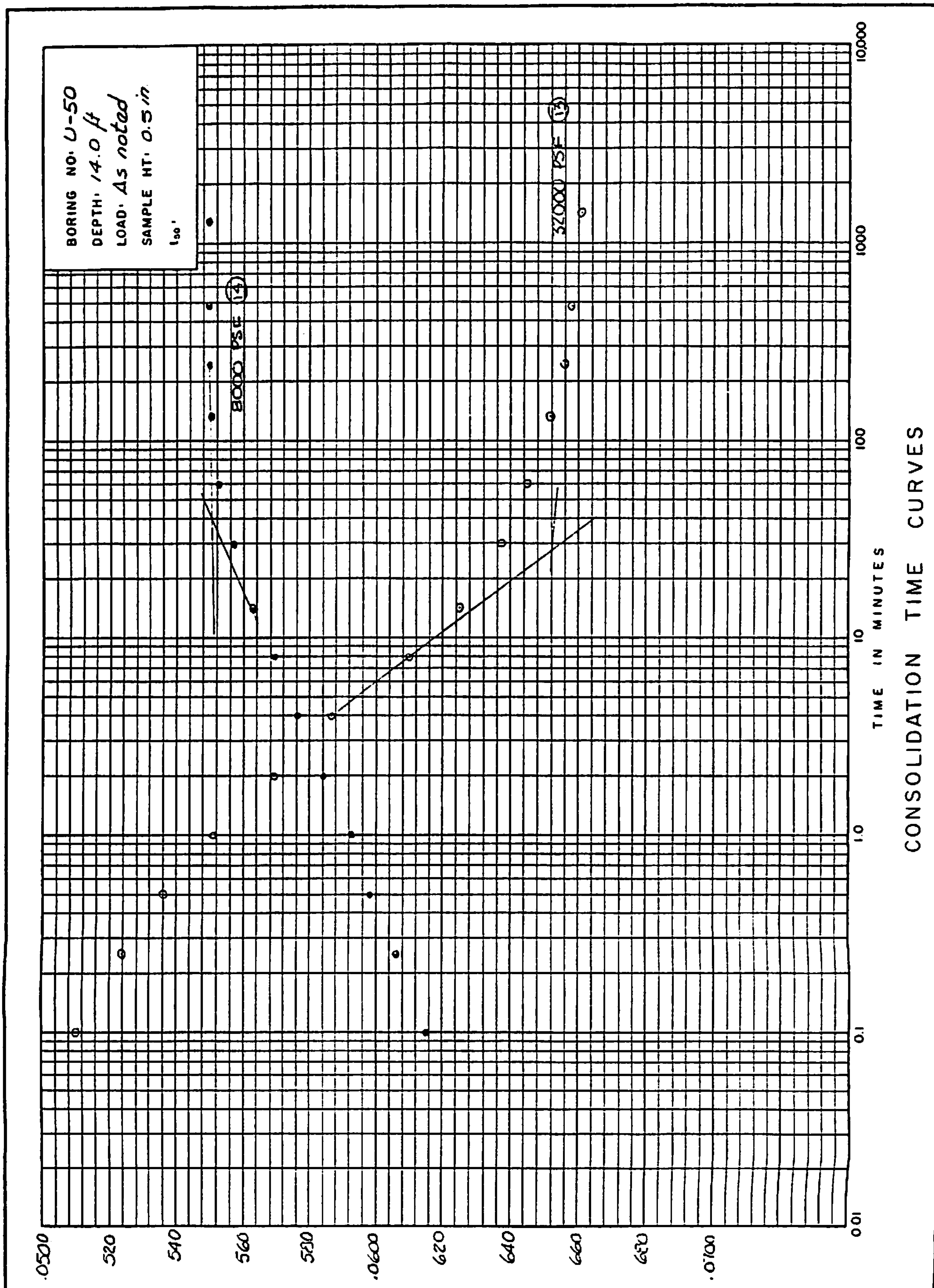


CONSOLIDATION TIME CURVES

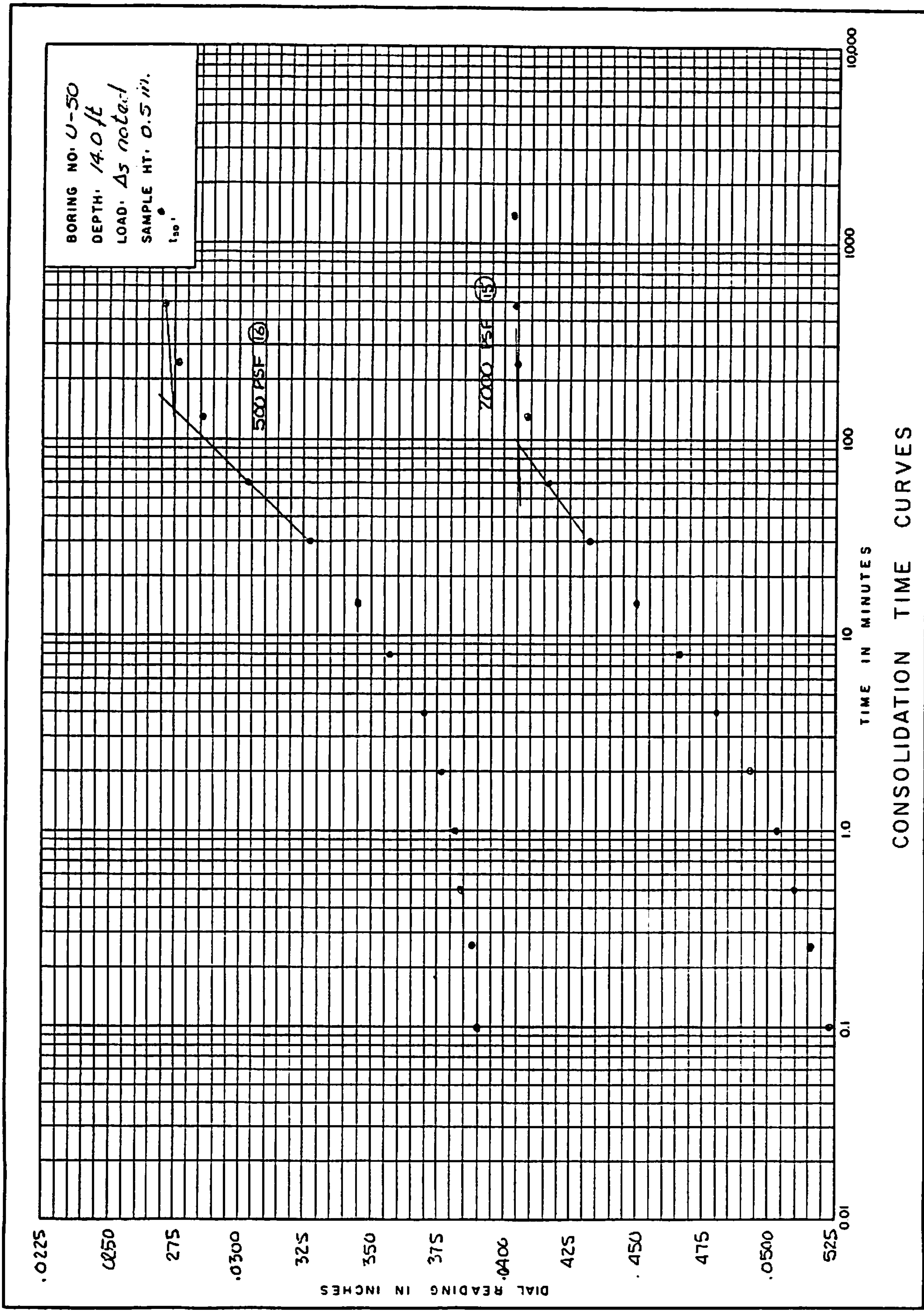


CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS



WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES

BORING NO.: U-50 DEPTH: 29 ft

MATERIAL : Yellow sandy clay

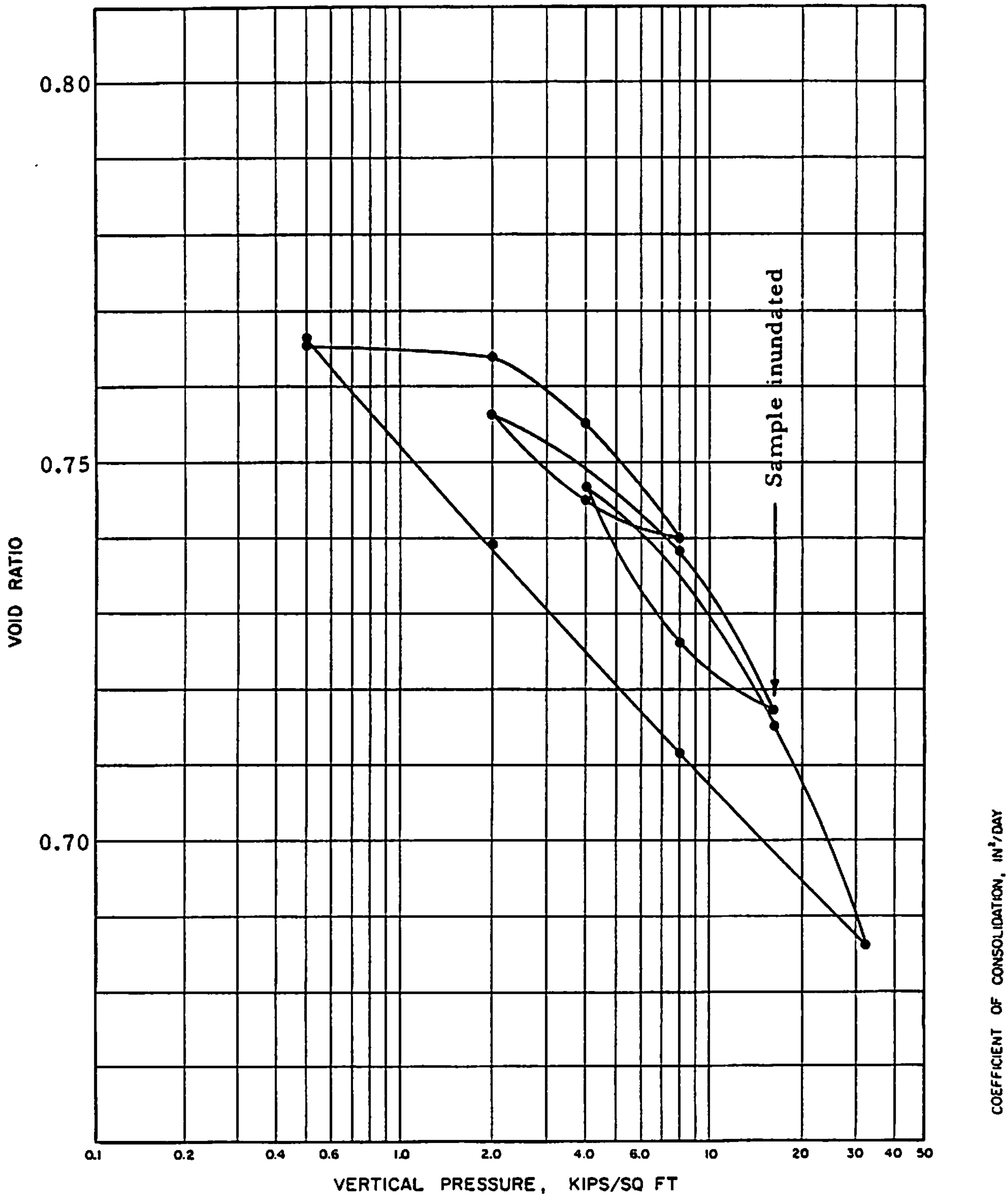
$e_o = 0.7788$

UNIT DRY WEIGHT : 116.6 LB/CU FT

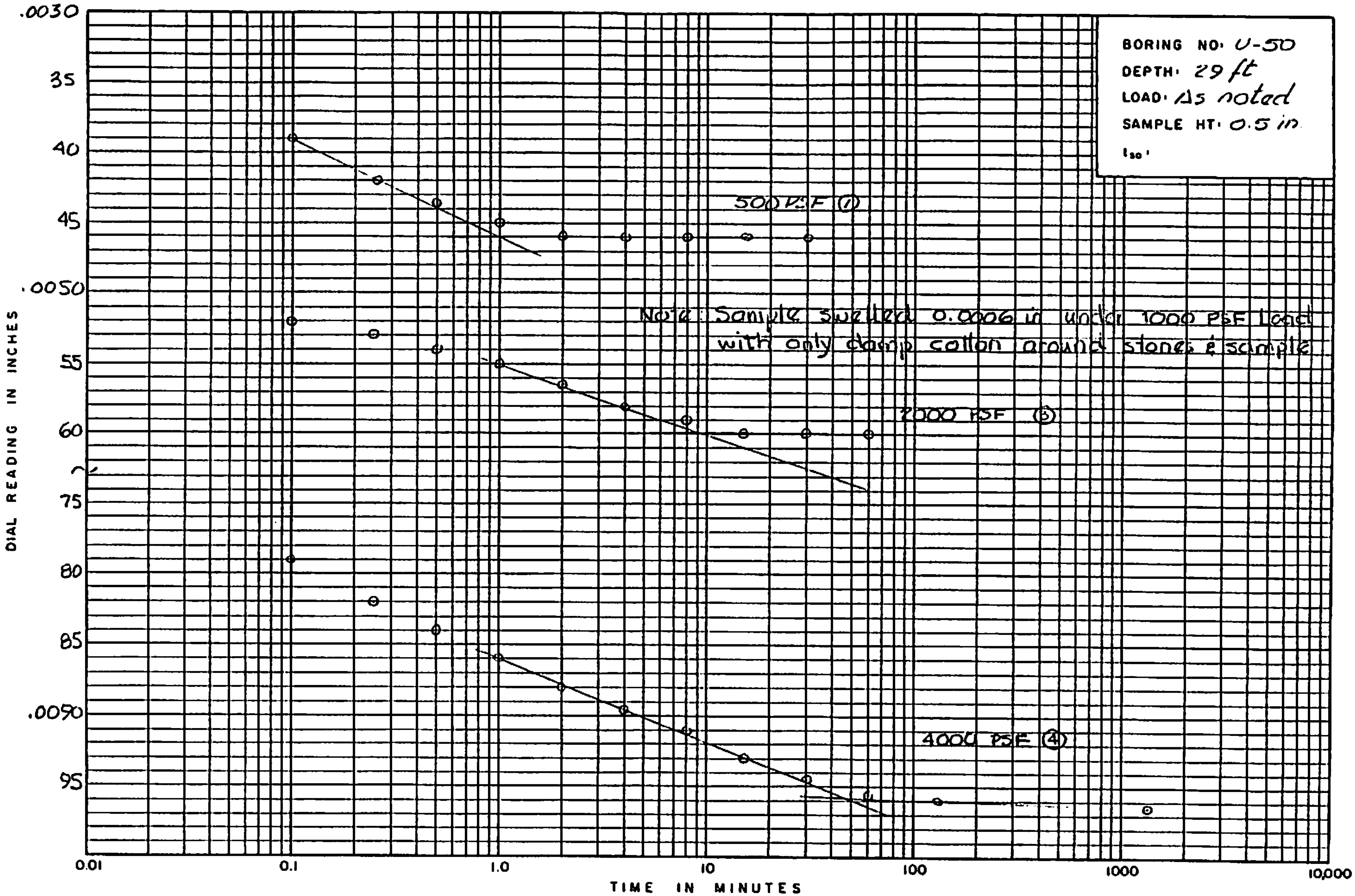
WATER CONTENT : 15.6 %

LIQUID LIMIT : 45

PLASTIC LIMIT : 19

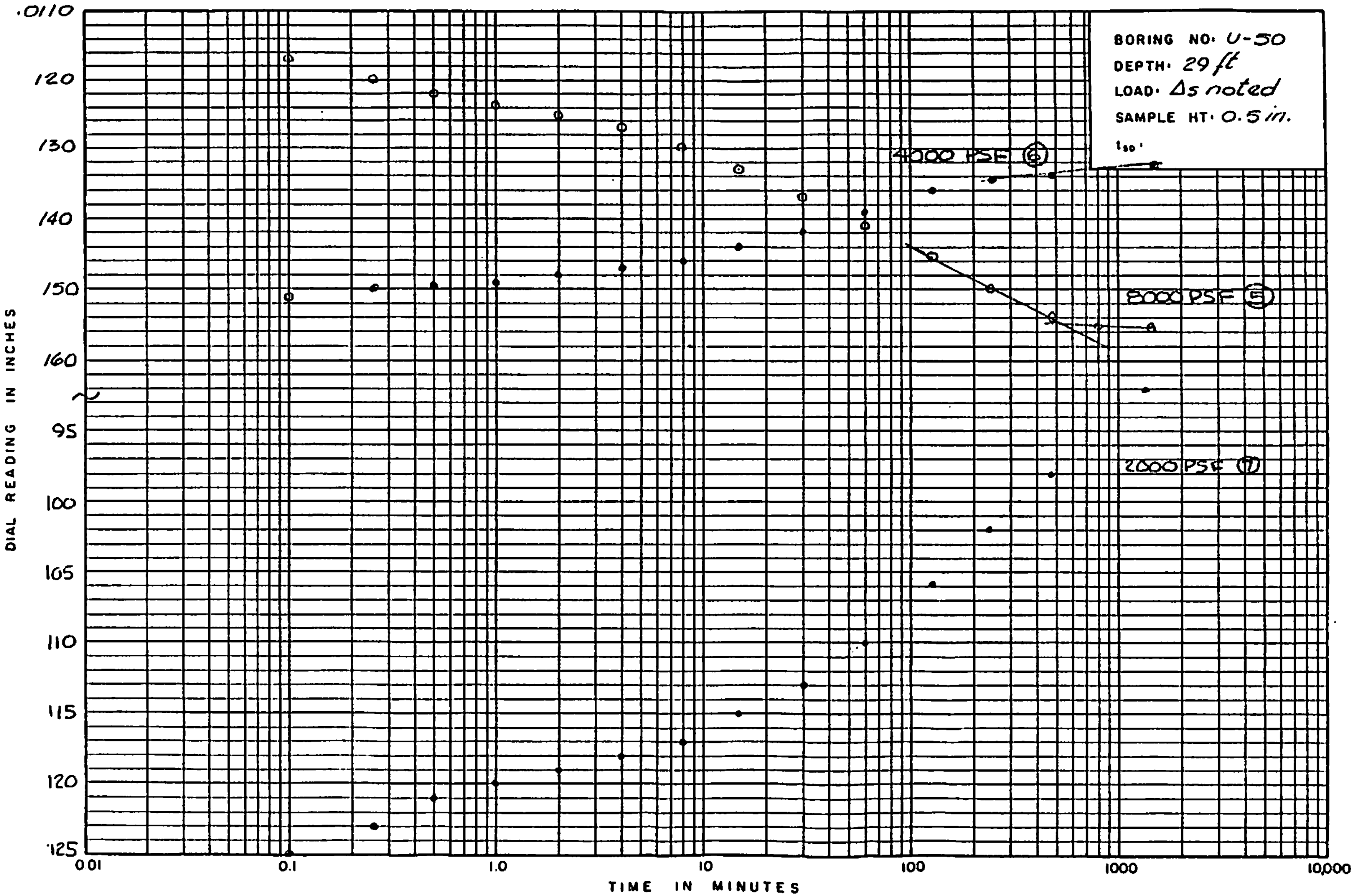


CONSOLIDATION TEST RESULTS



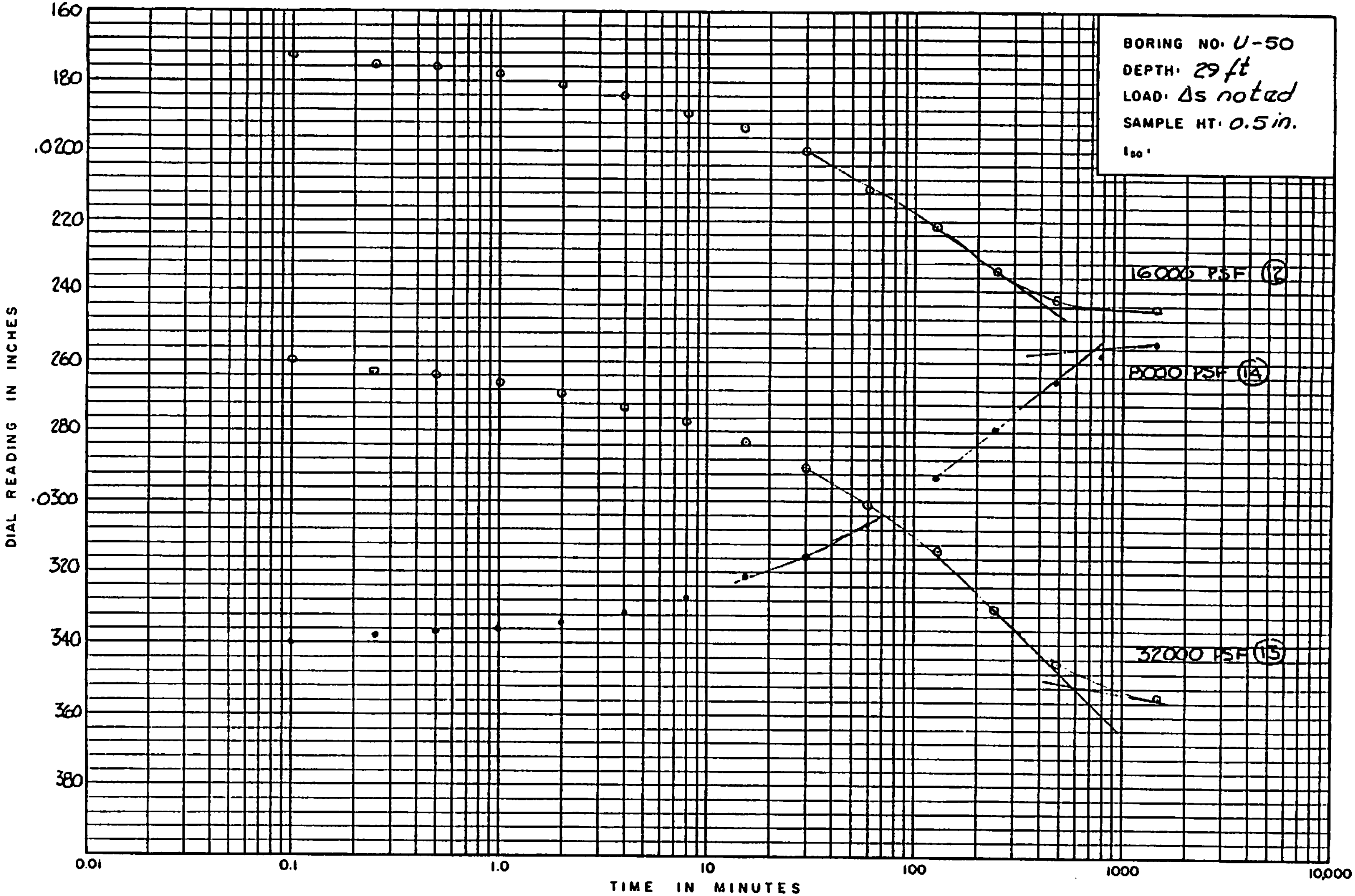
CONSOLIDATION TIME CURVES

PLATE 141

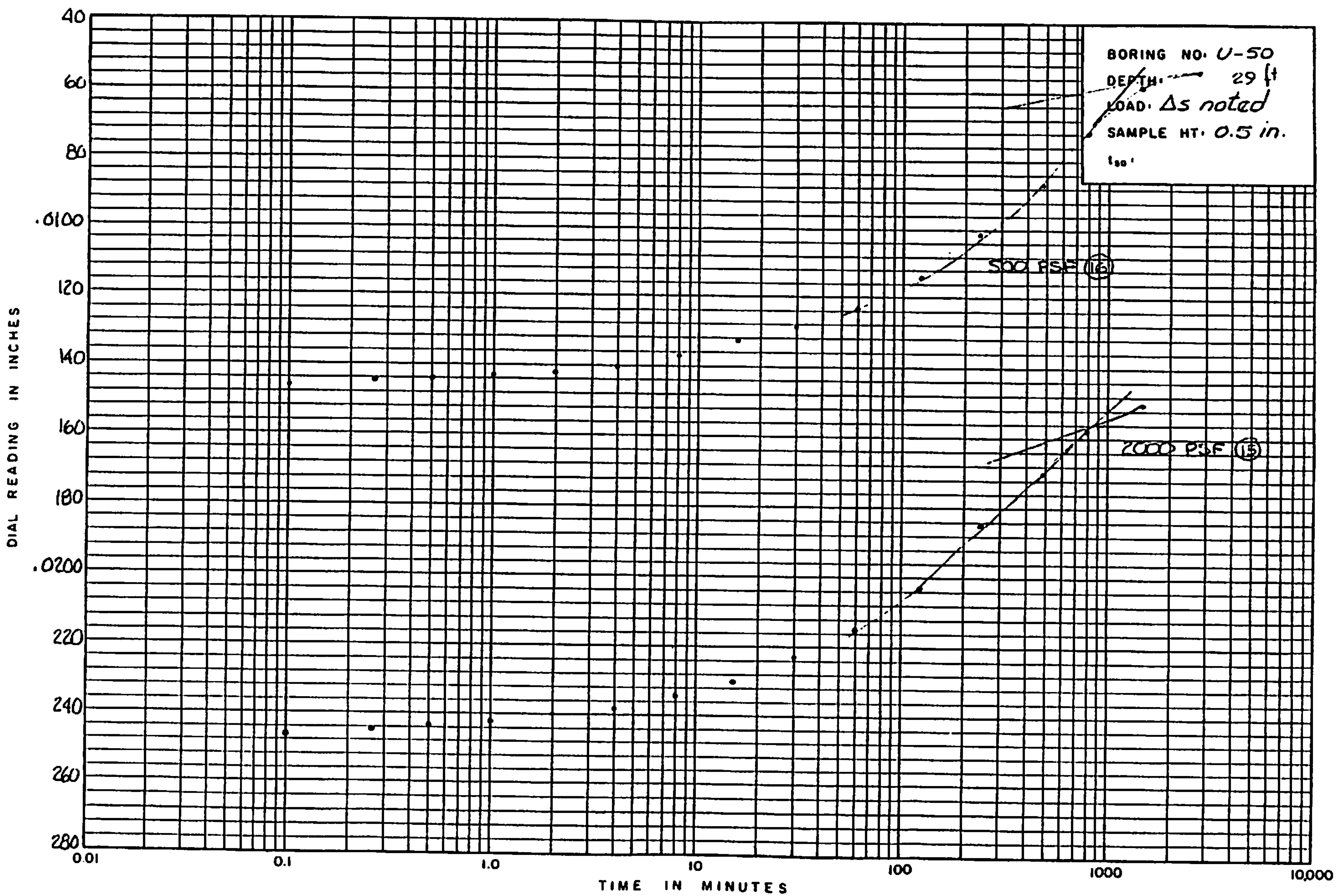


CONSOLIDATION TIME CURVES

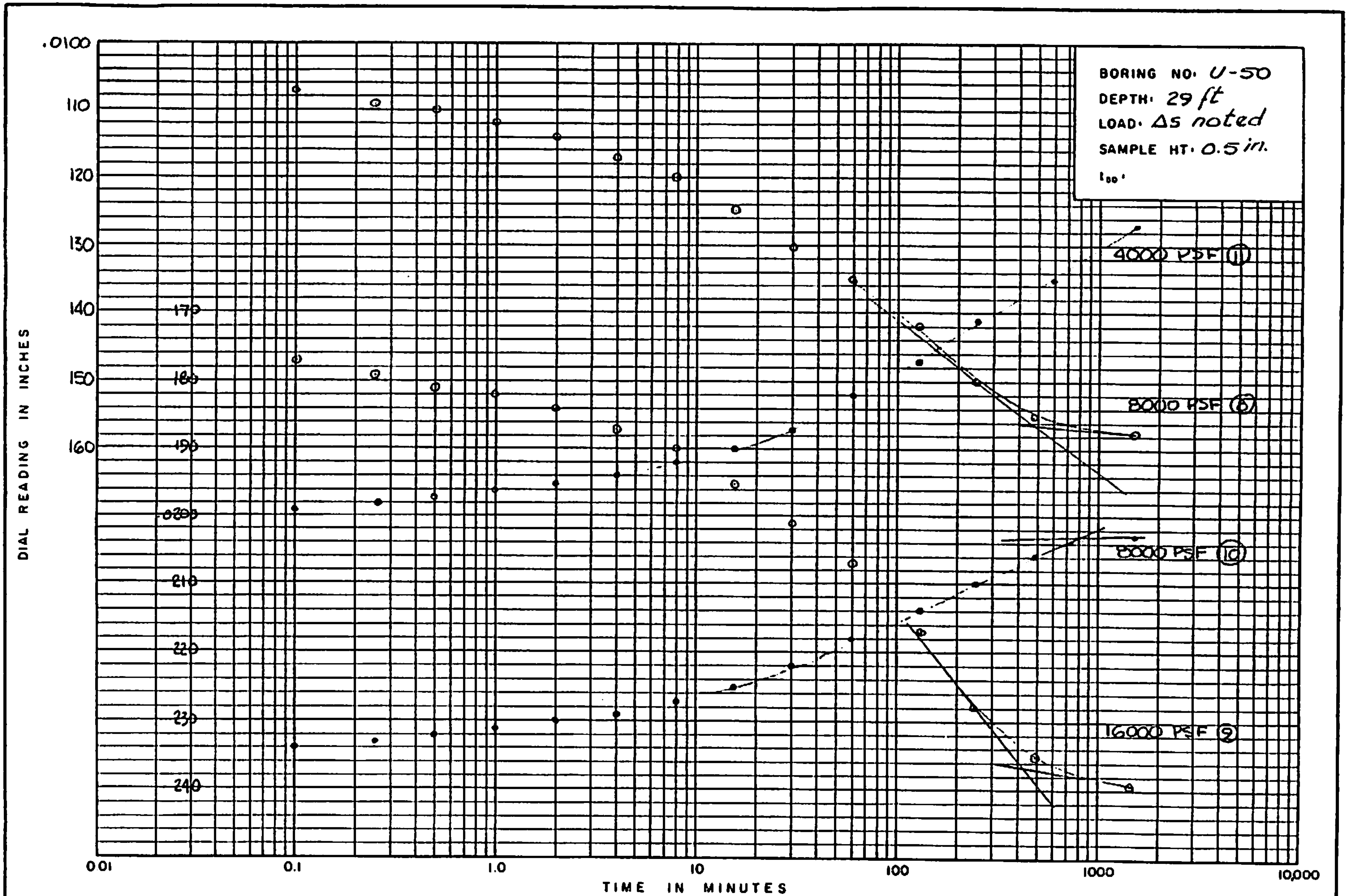
PLATE 14



CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES

BORING NO.: U-51 DEPTH: 14.5 ft

MATERIAL: Mostly calcareous material with clay and sand pockets

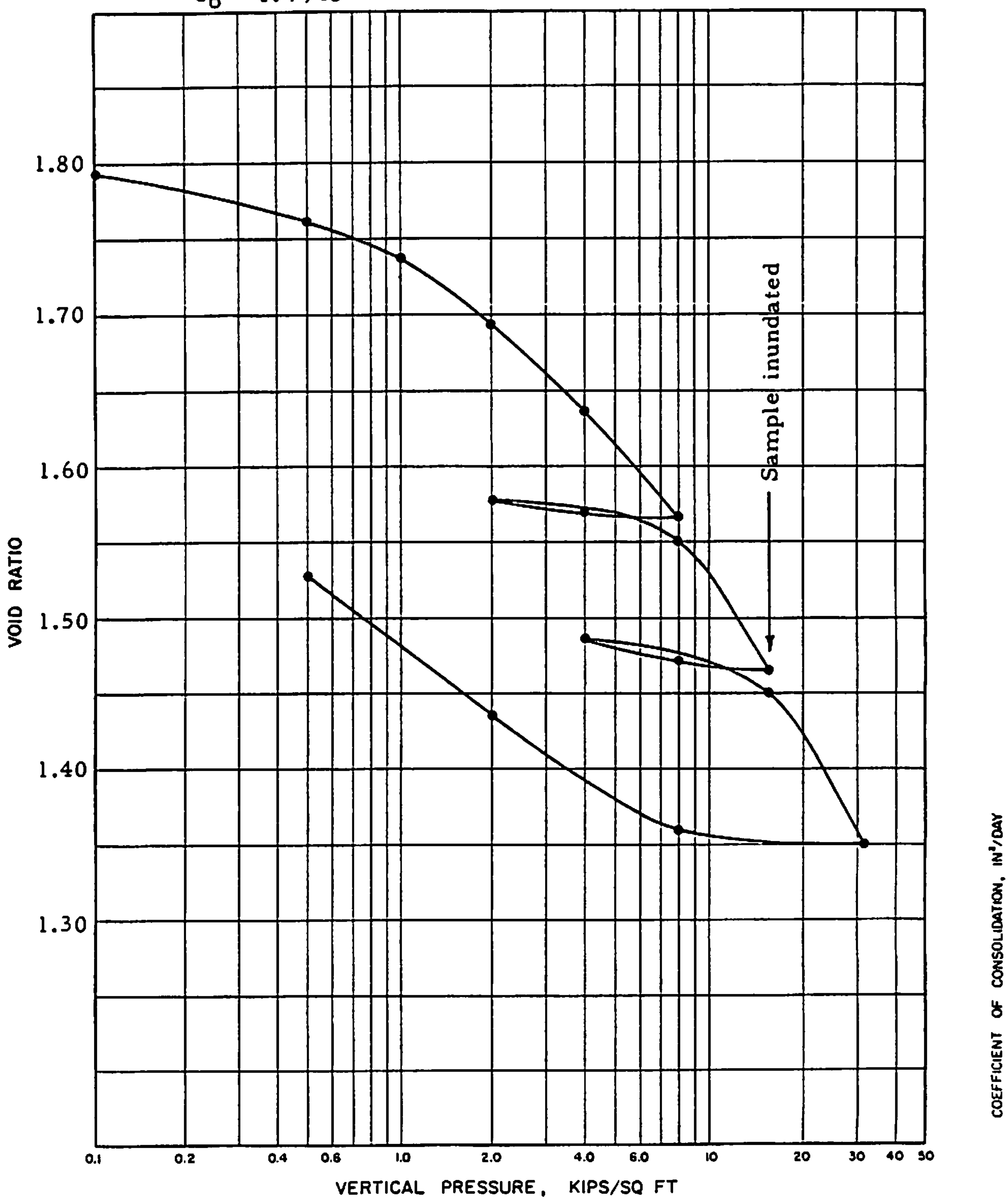
$e_o = 1.7948$

UNIT DRY WEIGHT: 65.2 LB/CU FT

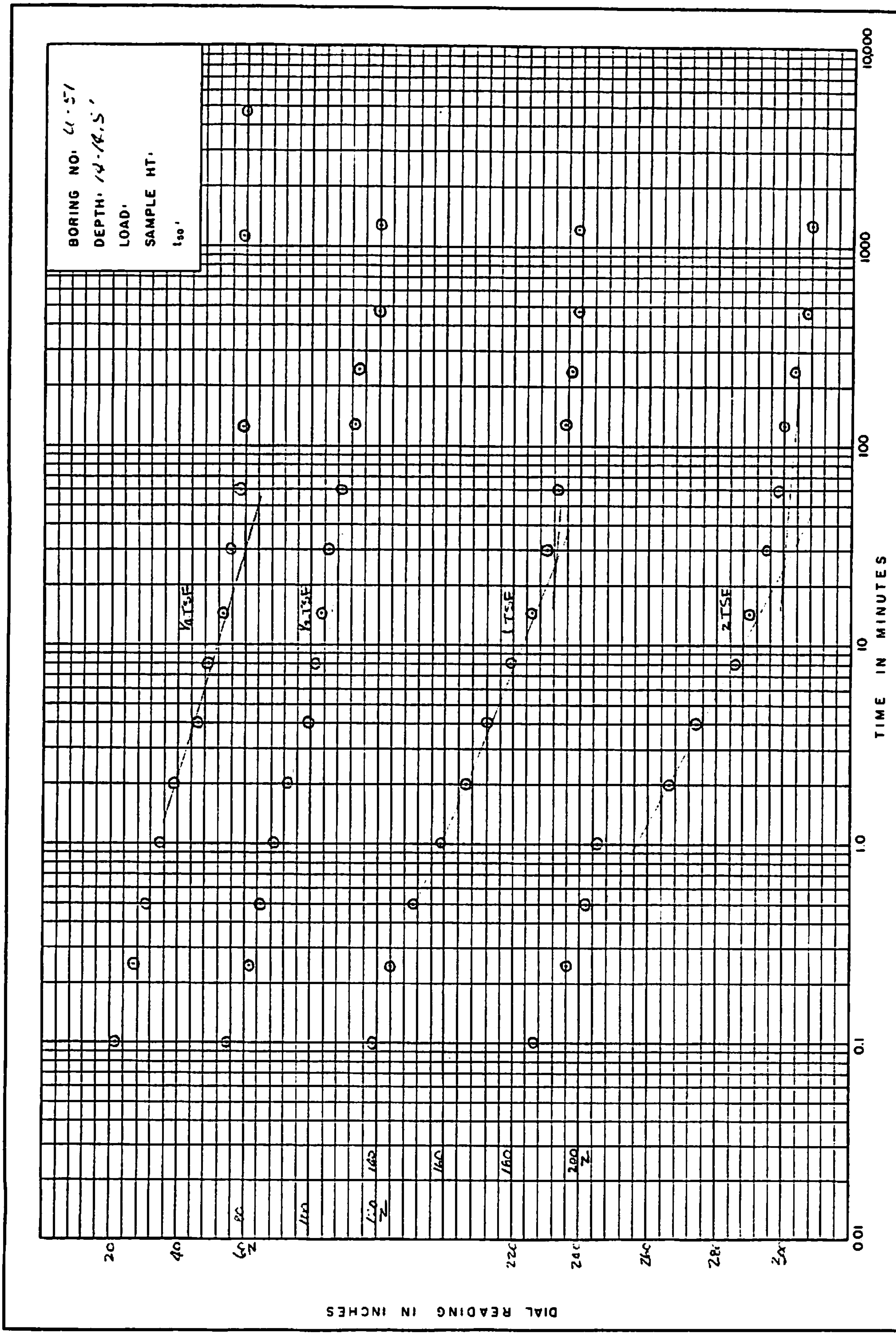
WATER CONTENT: 57.4 %

LIQUID LIMIT:

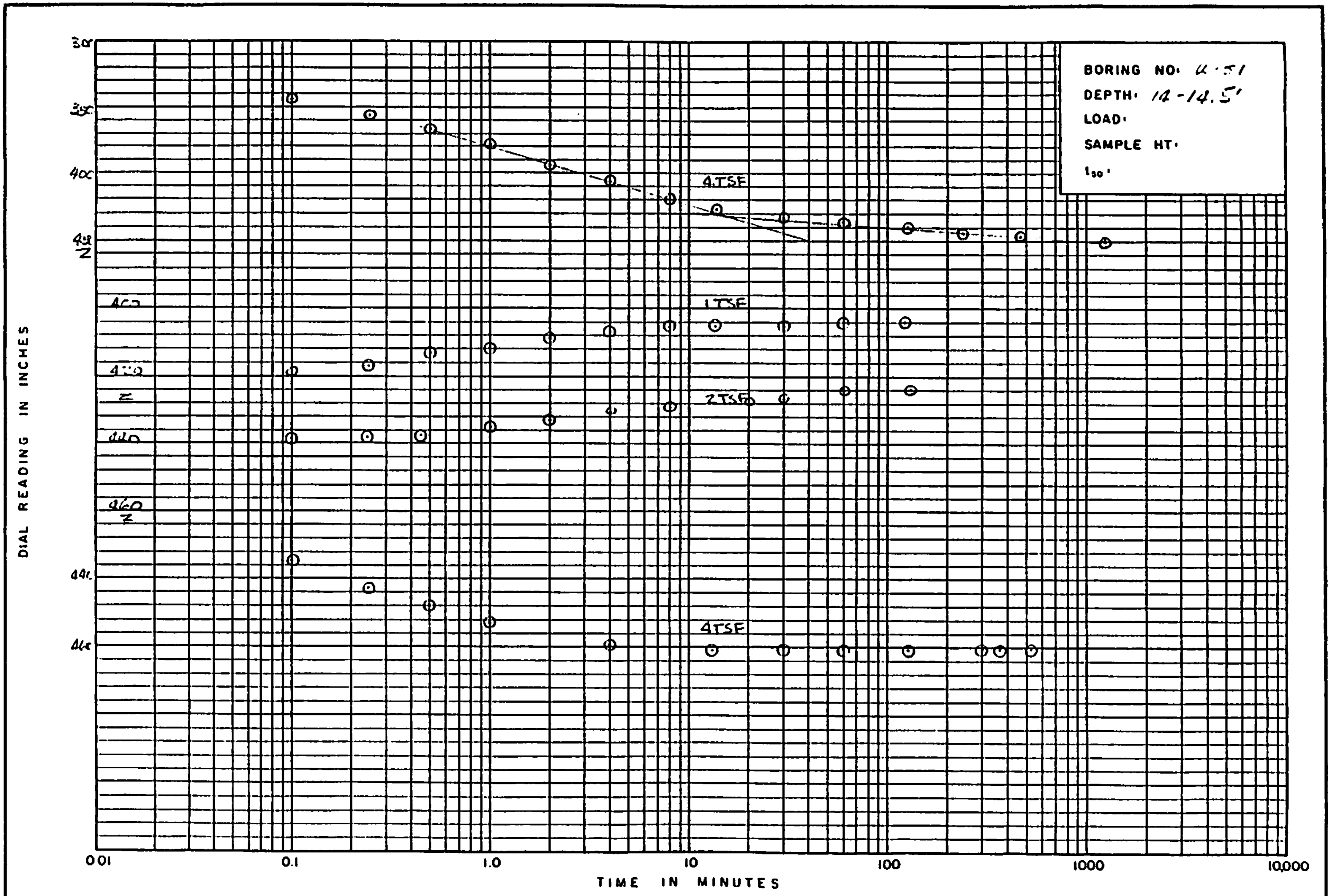
PLASTIC LIMIT:



CONSOLIDATION TEST RESULTS

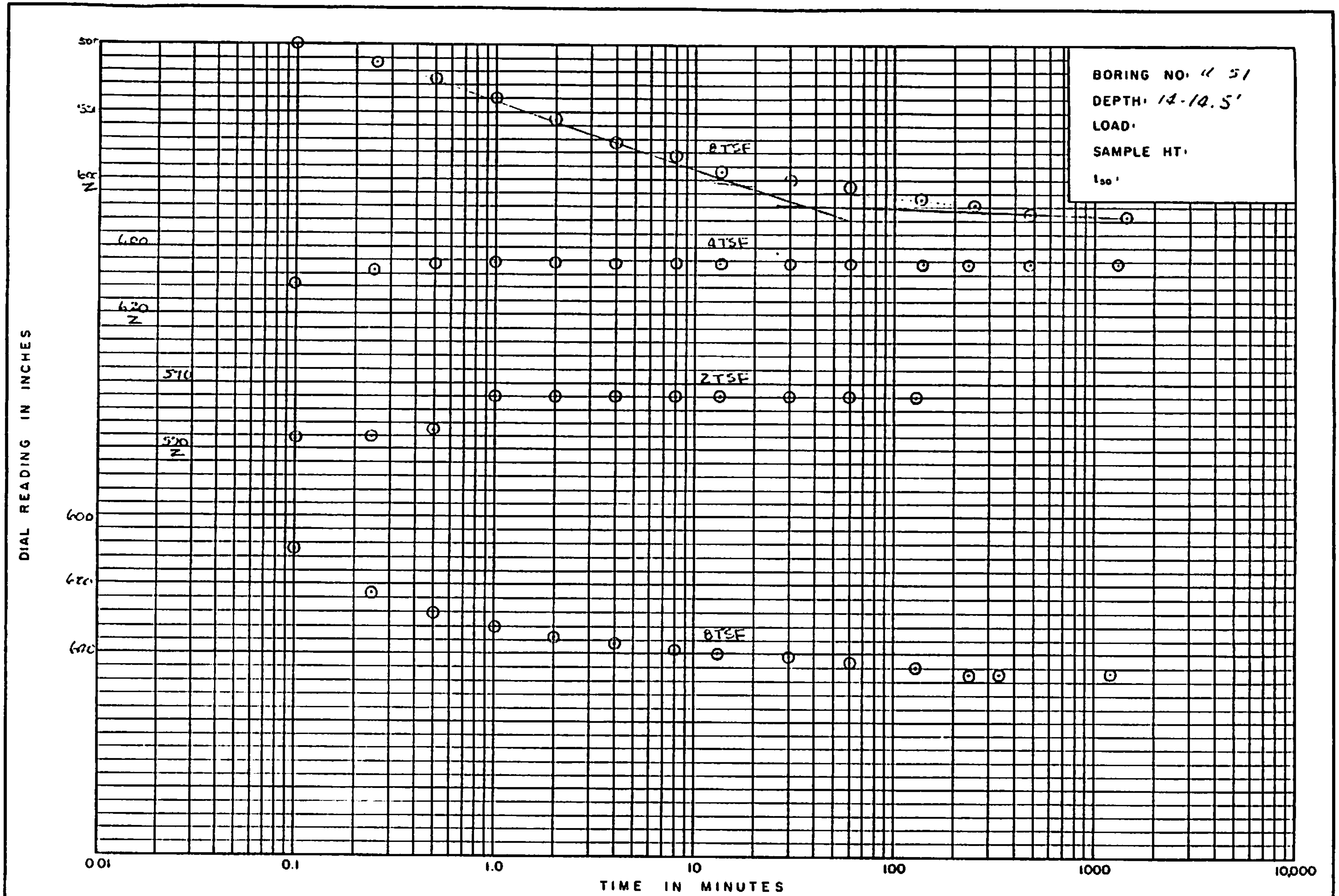


CONSOLIDATION TIME CURVES

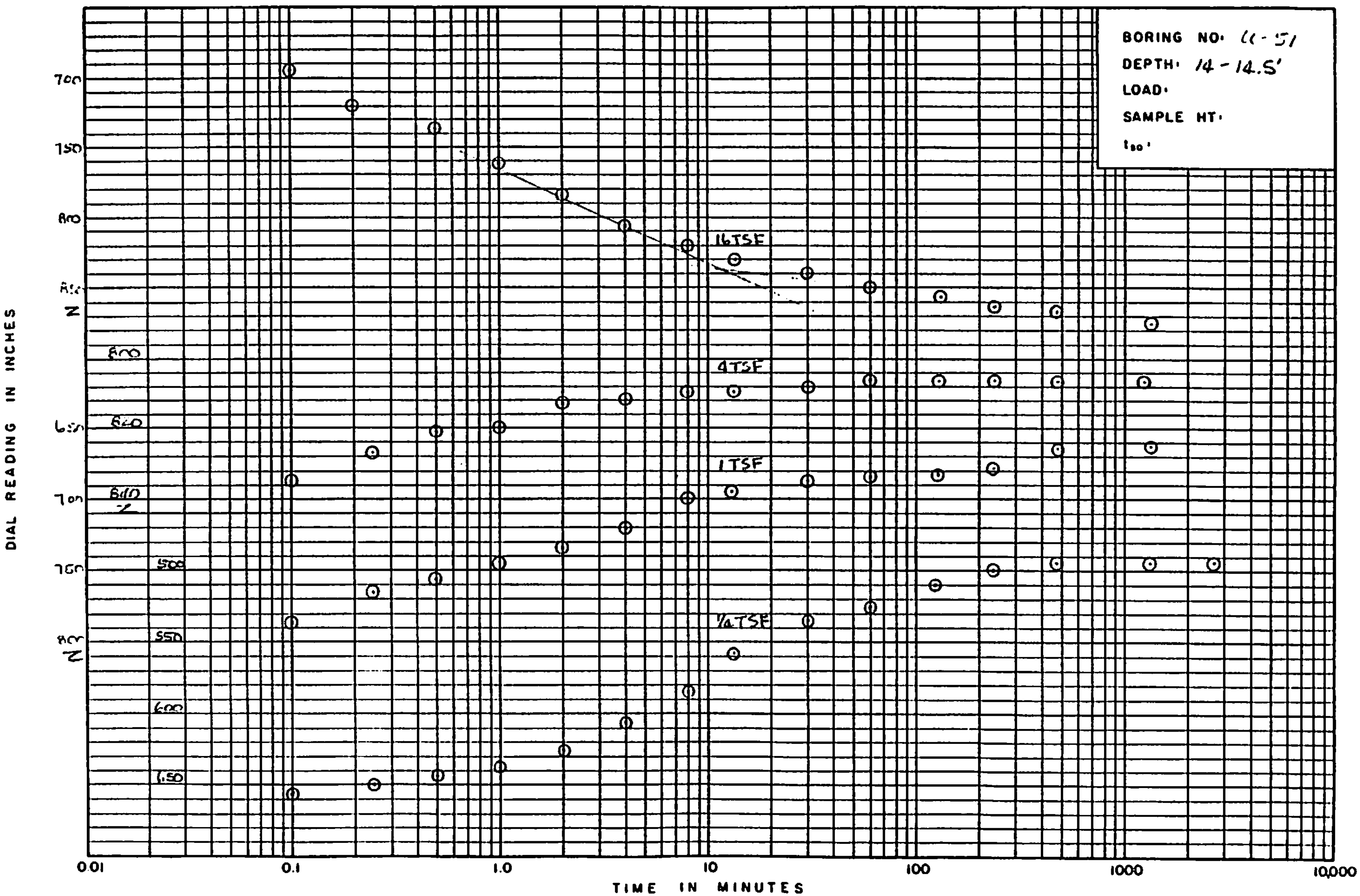


CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS



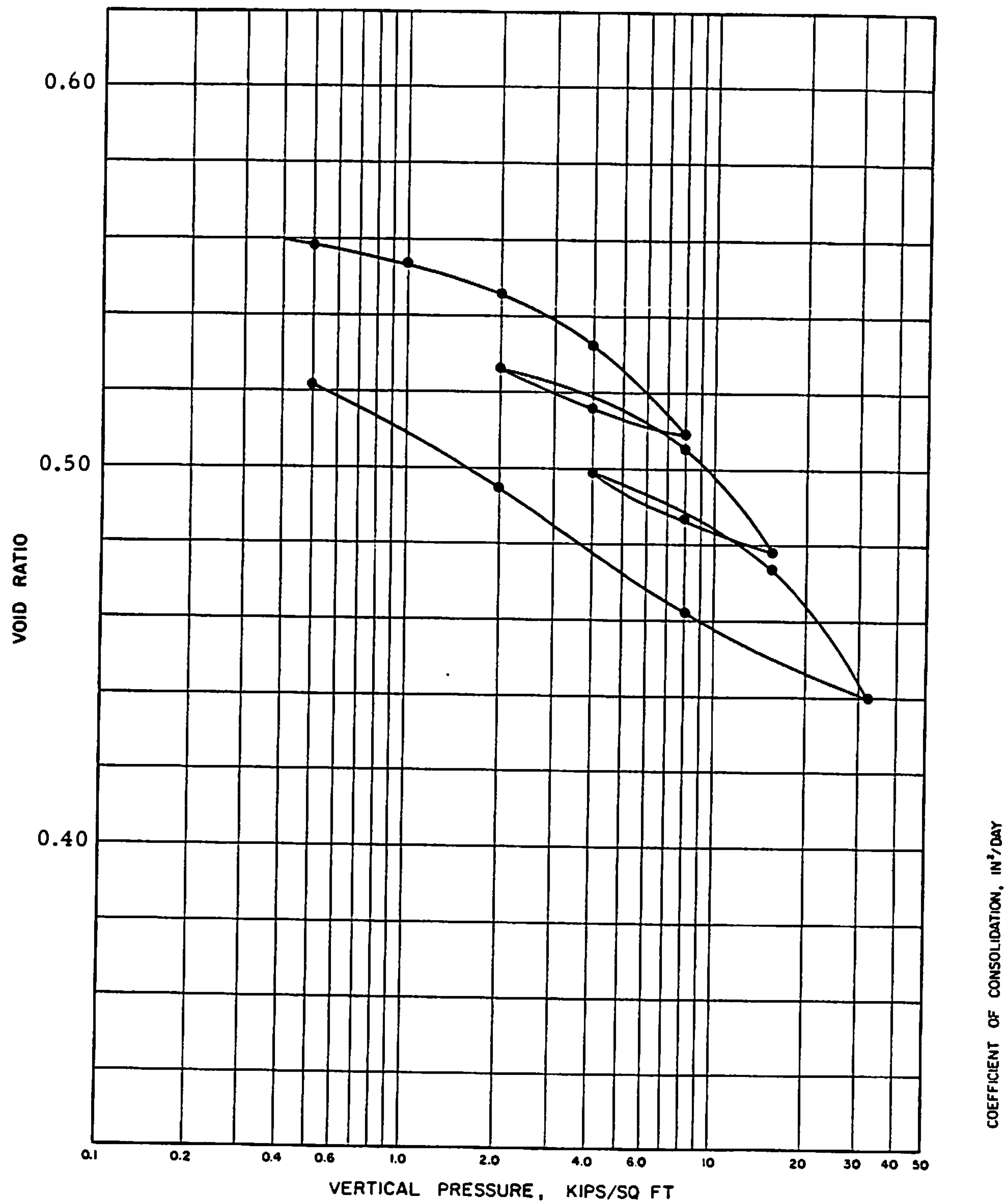
CONSOLIDATION TIME CURVES



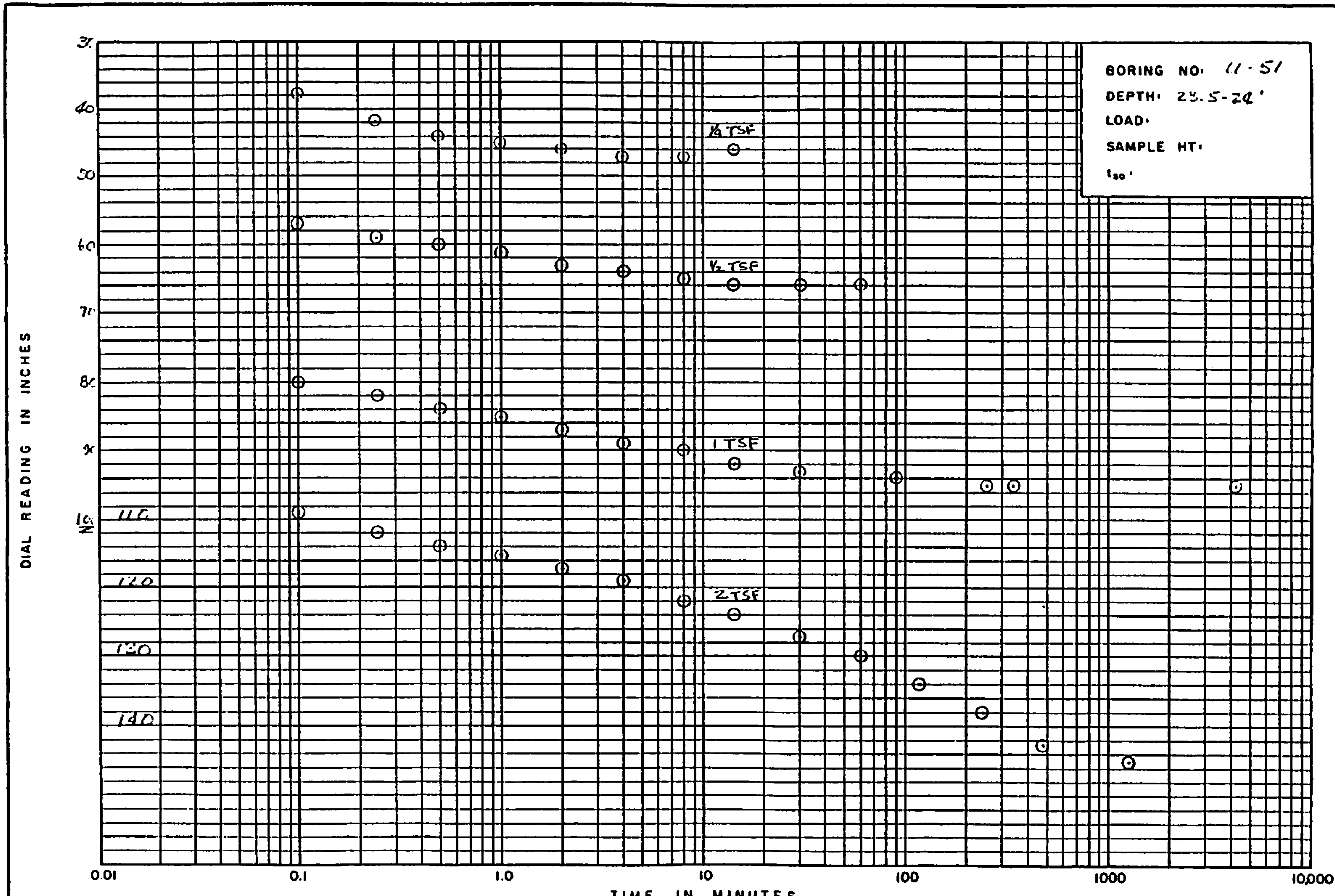
CONSOLIDATION TIME CURVES

BORING NO.: U-51 DEPTH: 23.5 ft
MATERIAL: Light gray and yellow sandy clay
$e_o = 0.5728$

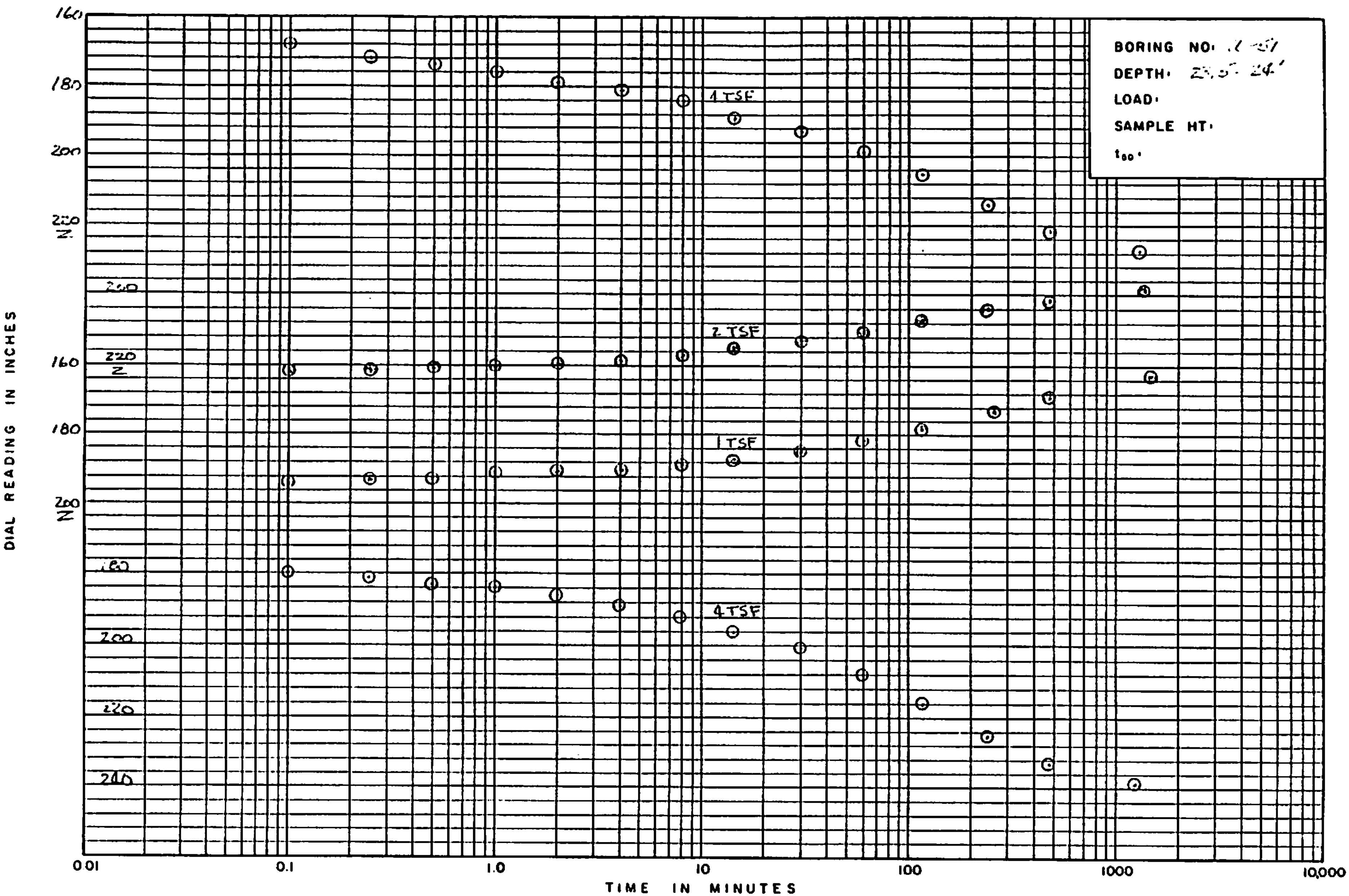
UNIT DRY WEIGHT: 91.8 LB/CU FT
WATER CONTENT: 18.4 %
LIQUID LIMIT:
PLASTIC LIMIT:



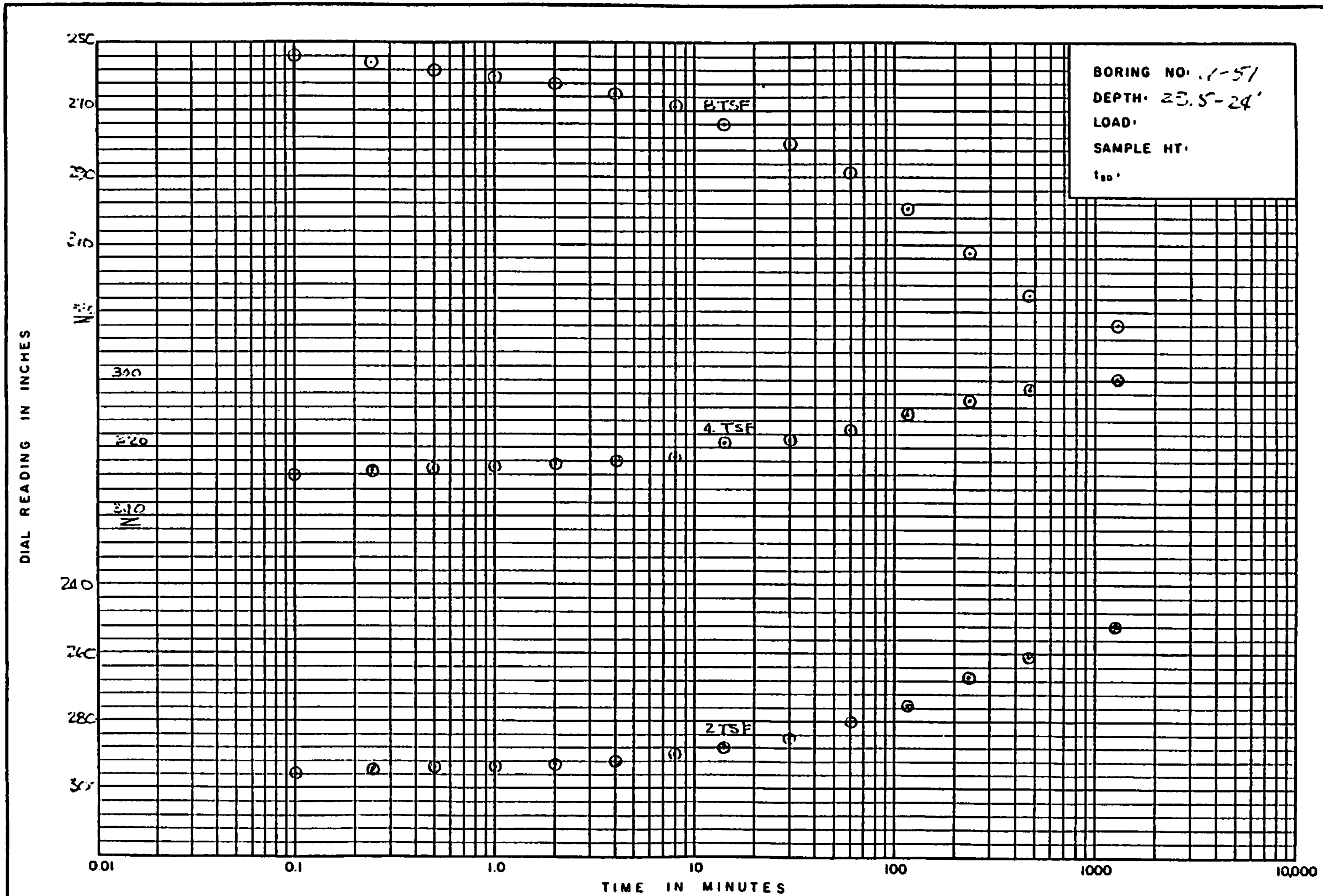
CONSOLIDATION TEST RESULTS



CONSOLIDATION TIME CURVES

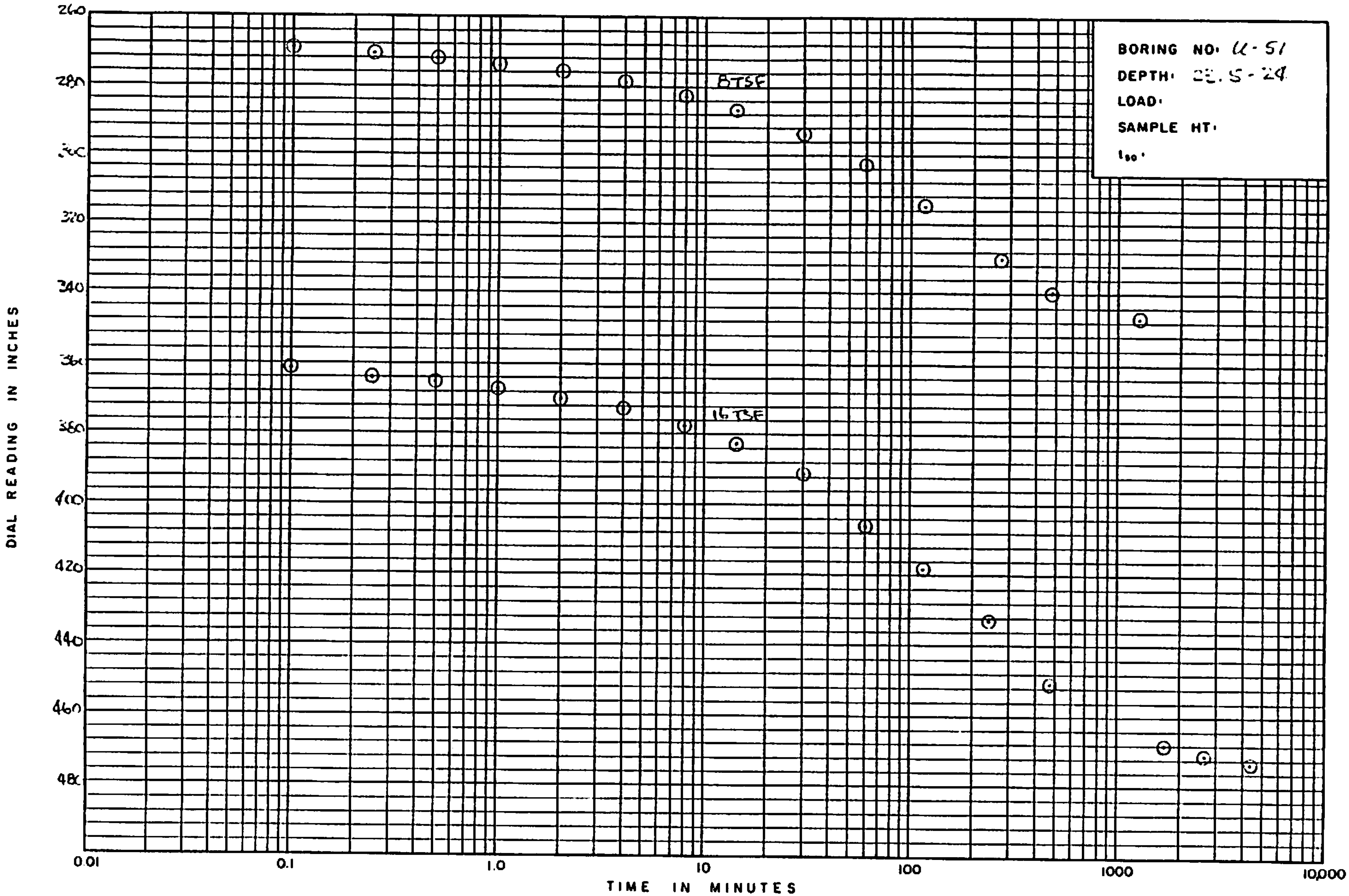


CONSOLIDATION TIME CURVES

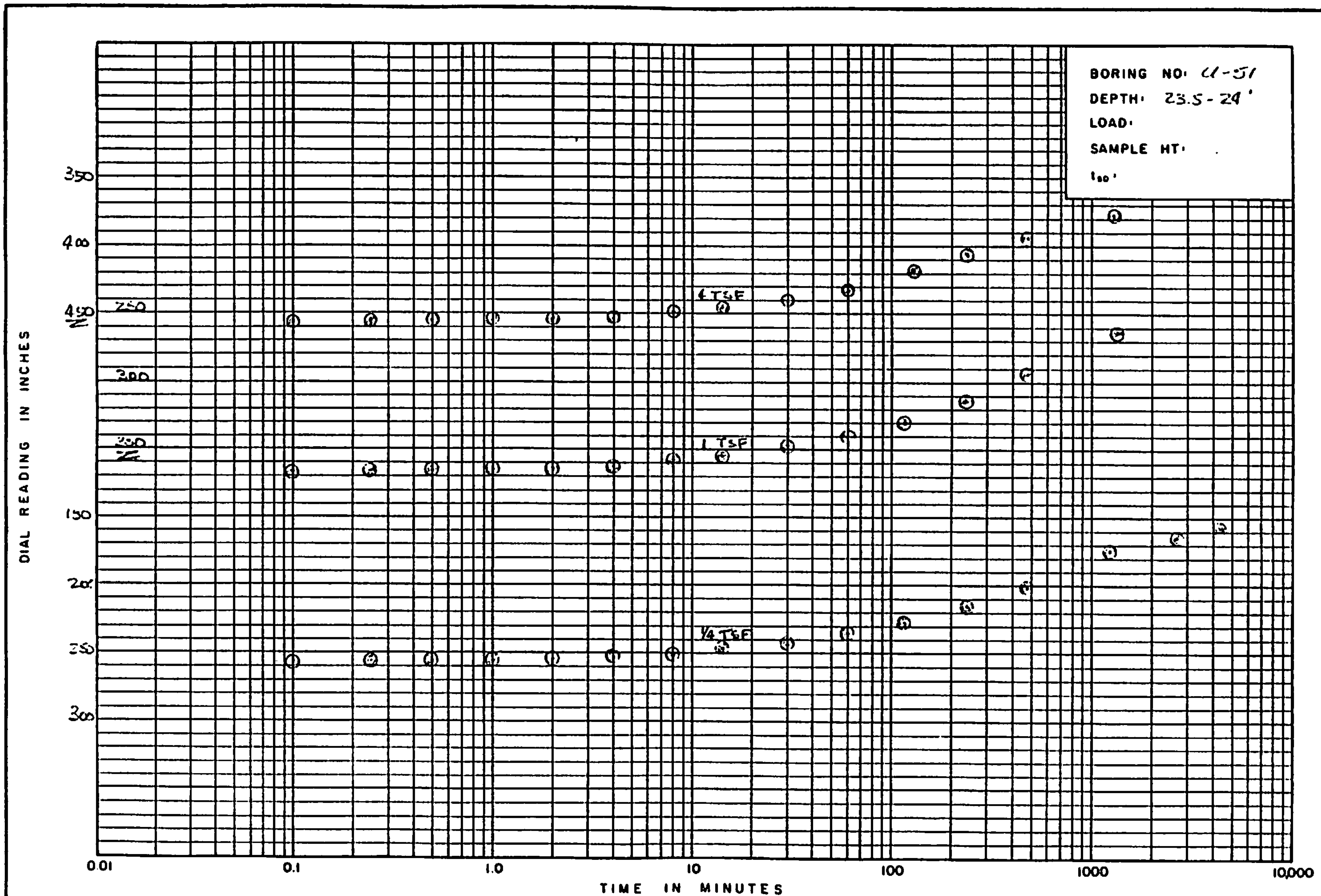


CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS



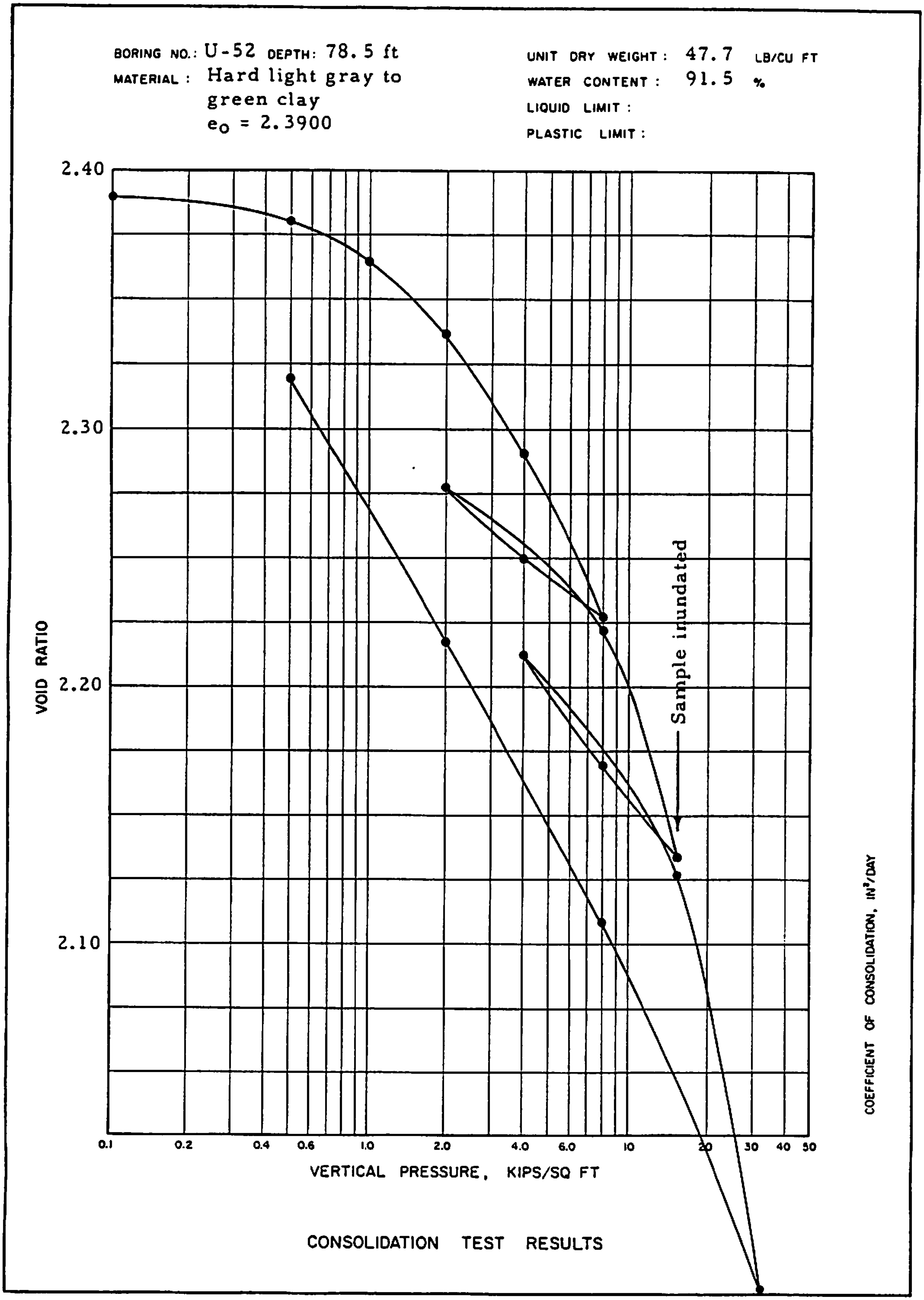
CONSOLIDATION TIME CURVES



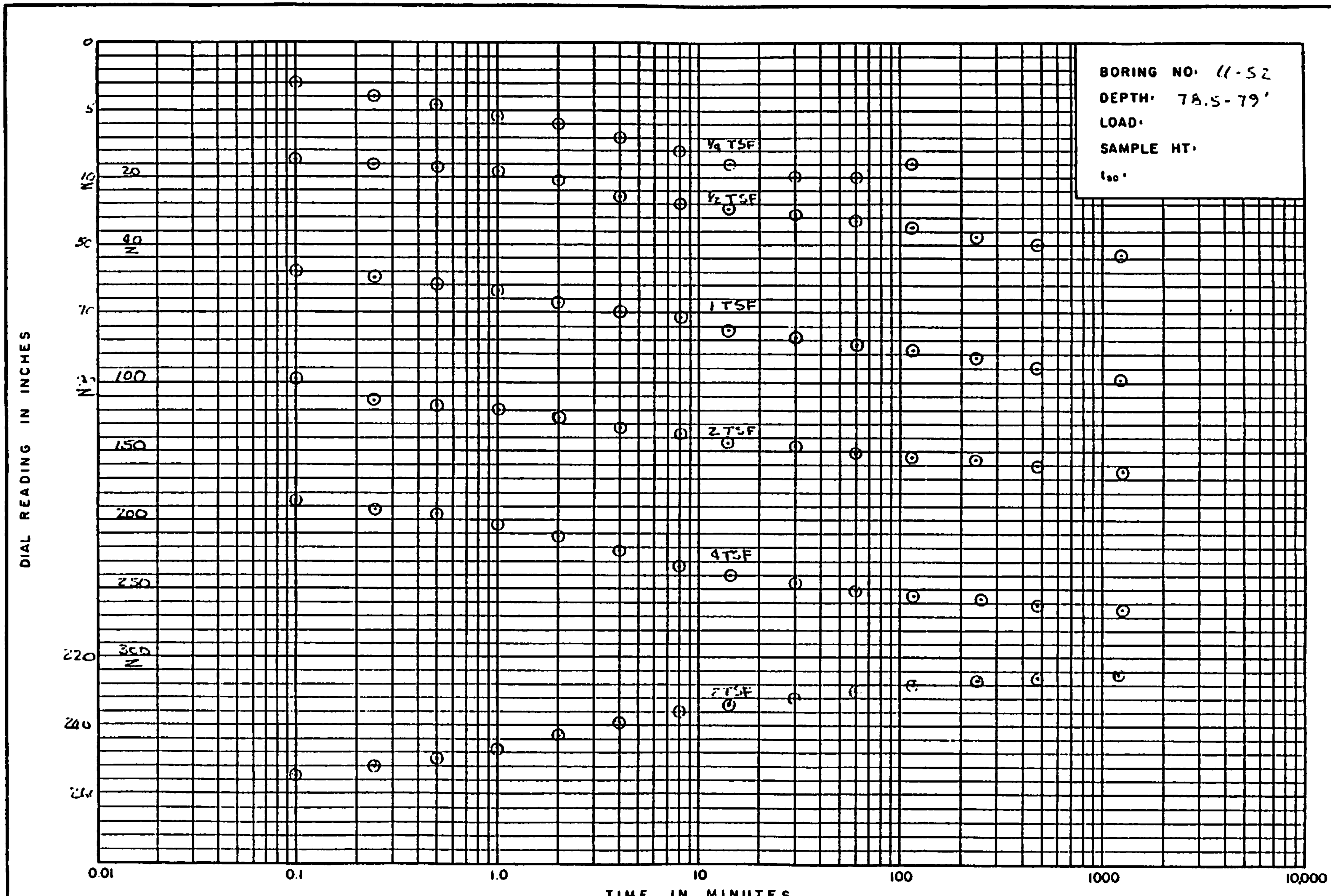
CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS

PLATE 15



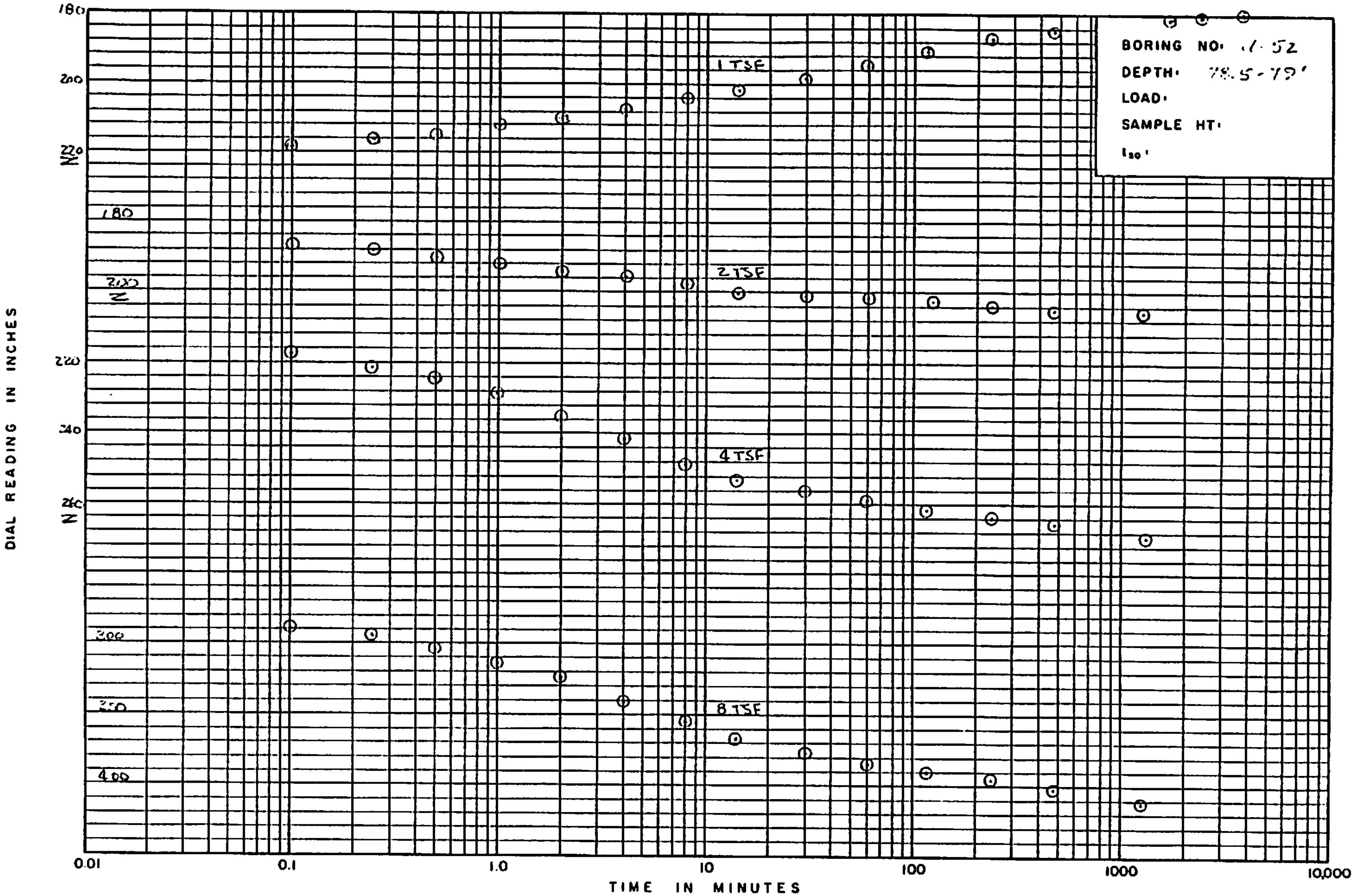
CONSOLIDATION TEST RESULTS



CONSOLIDATION TIME CURVES

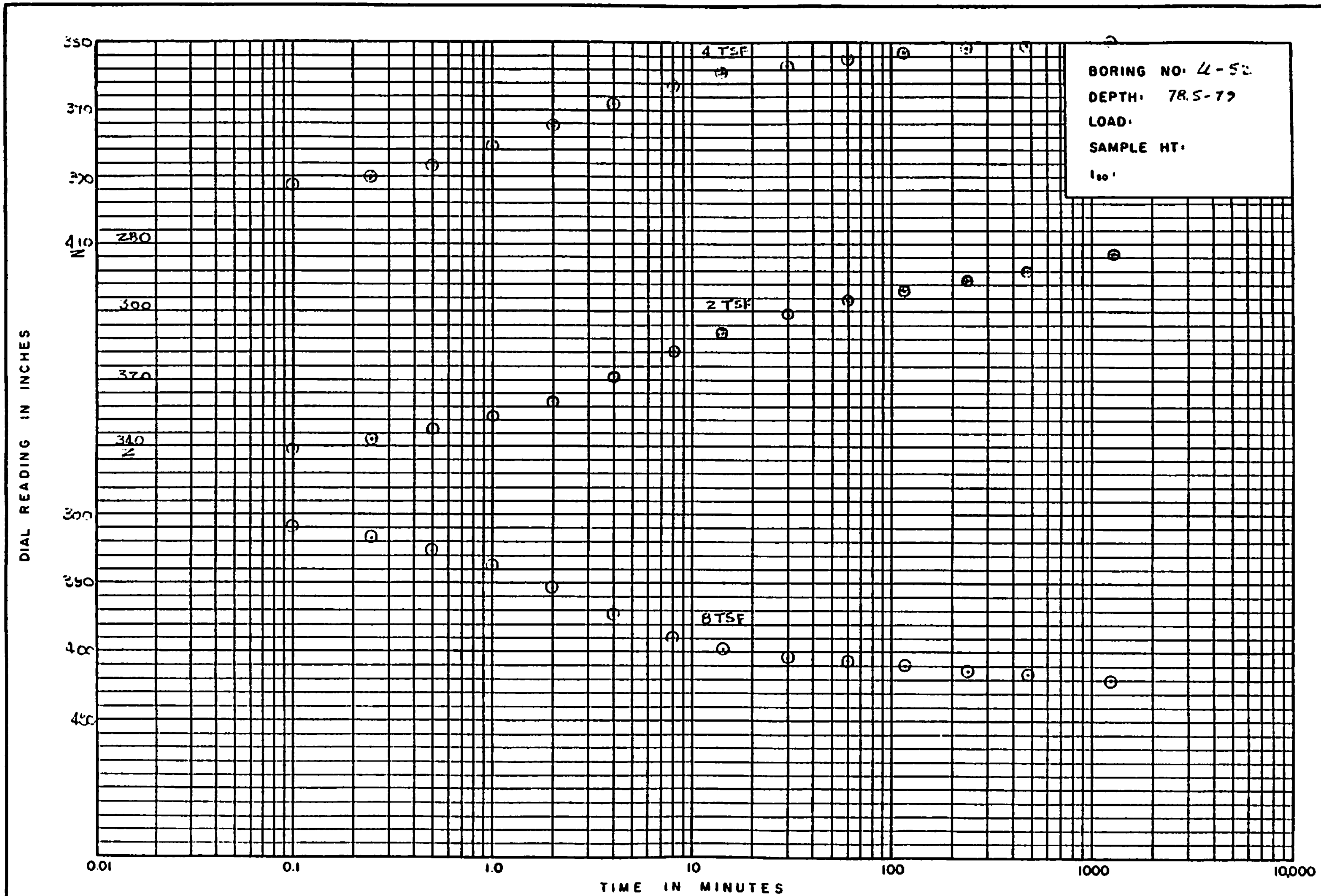
PLATE 156

WARE LIND ENGINEERS



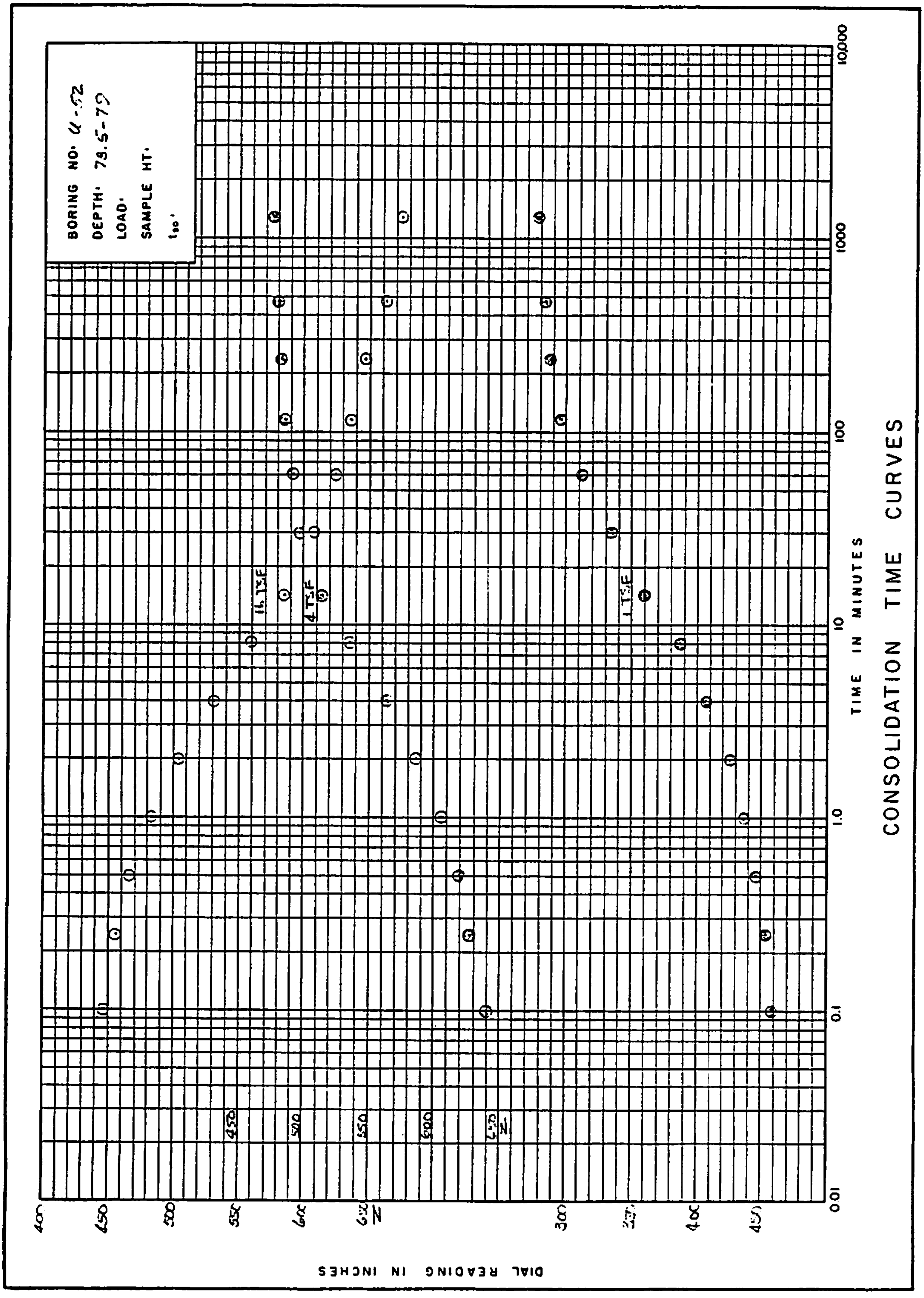
CONSOLIDATION TIME CURVES

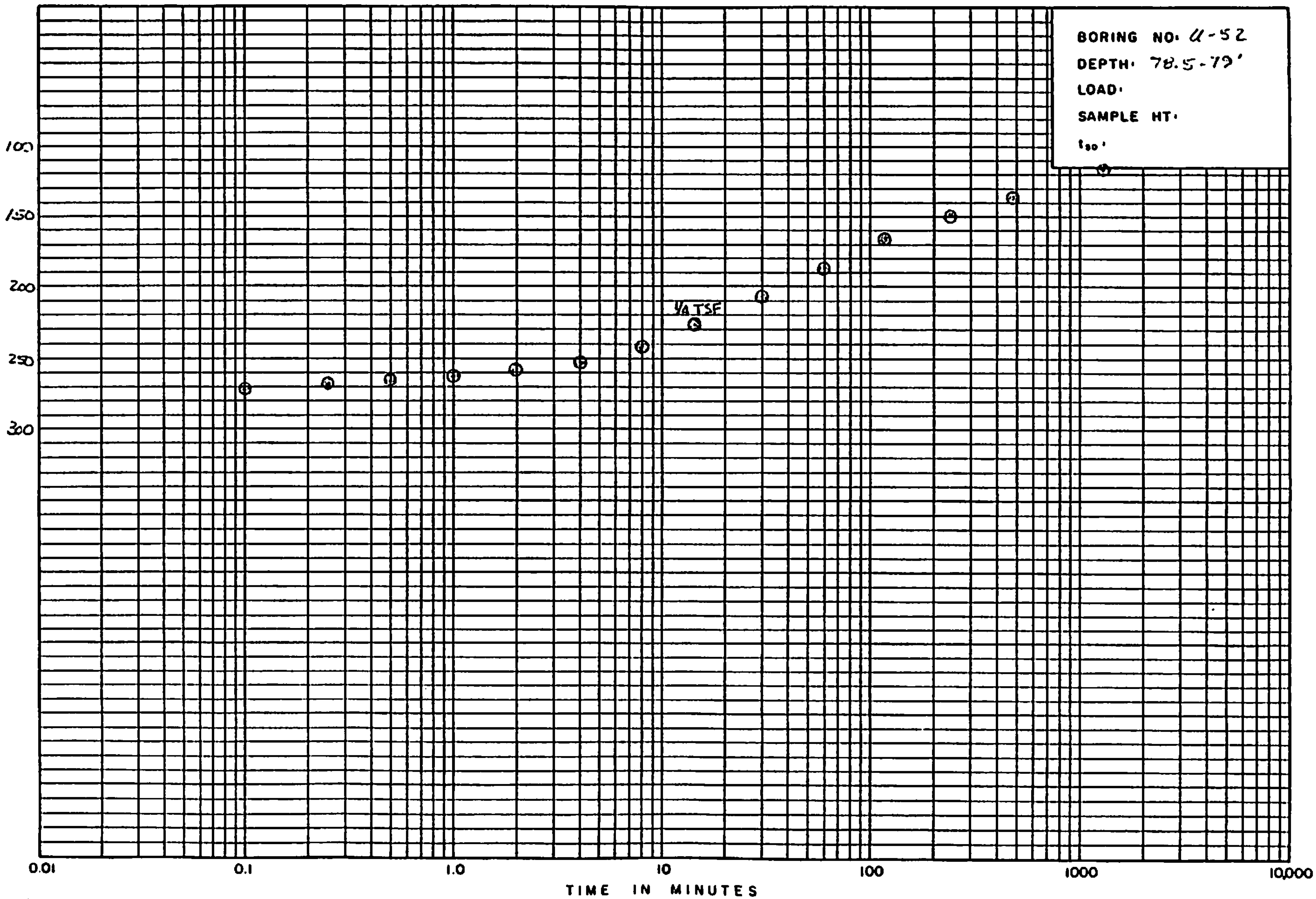
WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES

PLATE 16


BORING NO: U-52
DEPTH: 78.5-79
LOAD:
SAMPLE HT:
t_{50}:
16 TSF
4 TSF
1 TSF
0.01
0.1
1.0
10
100
1000
10,000
TIME IN MINUTES
DIAL READING IN INCHES
CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES

BORING NO.: U-53 DEPTH: 9.0 ft

MATERIAL: Very stiff tan clay, slightly sandy with small sand pockets

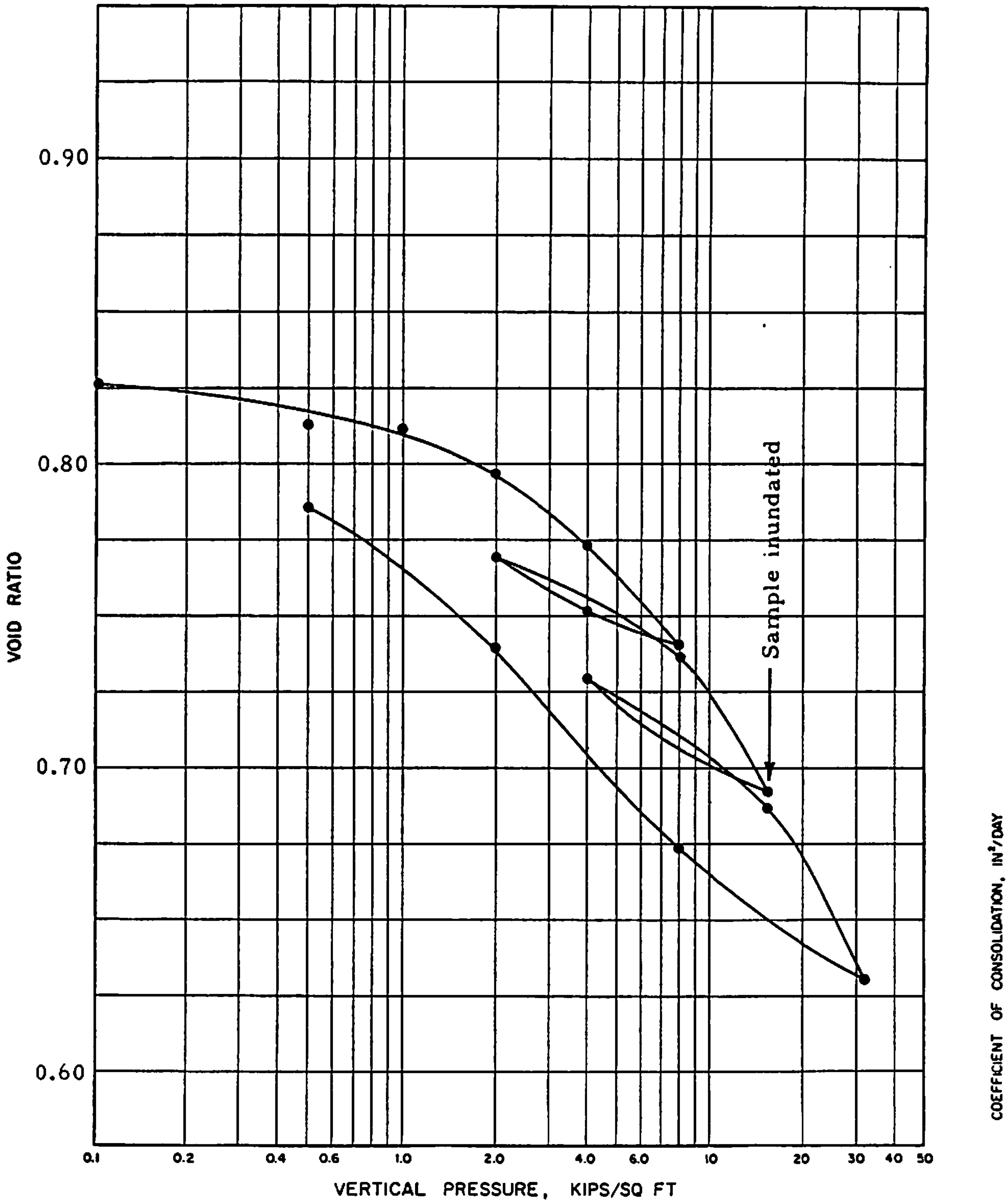
e_o = 0.826

UNIT DRY WEIGHT: 93.6 LB/CU FT

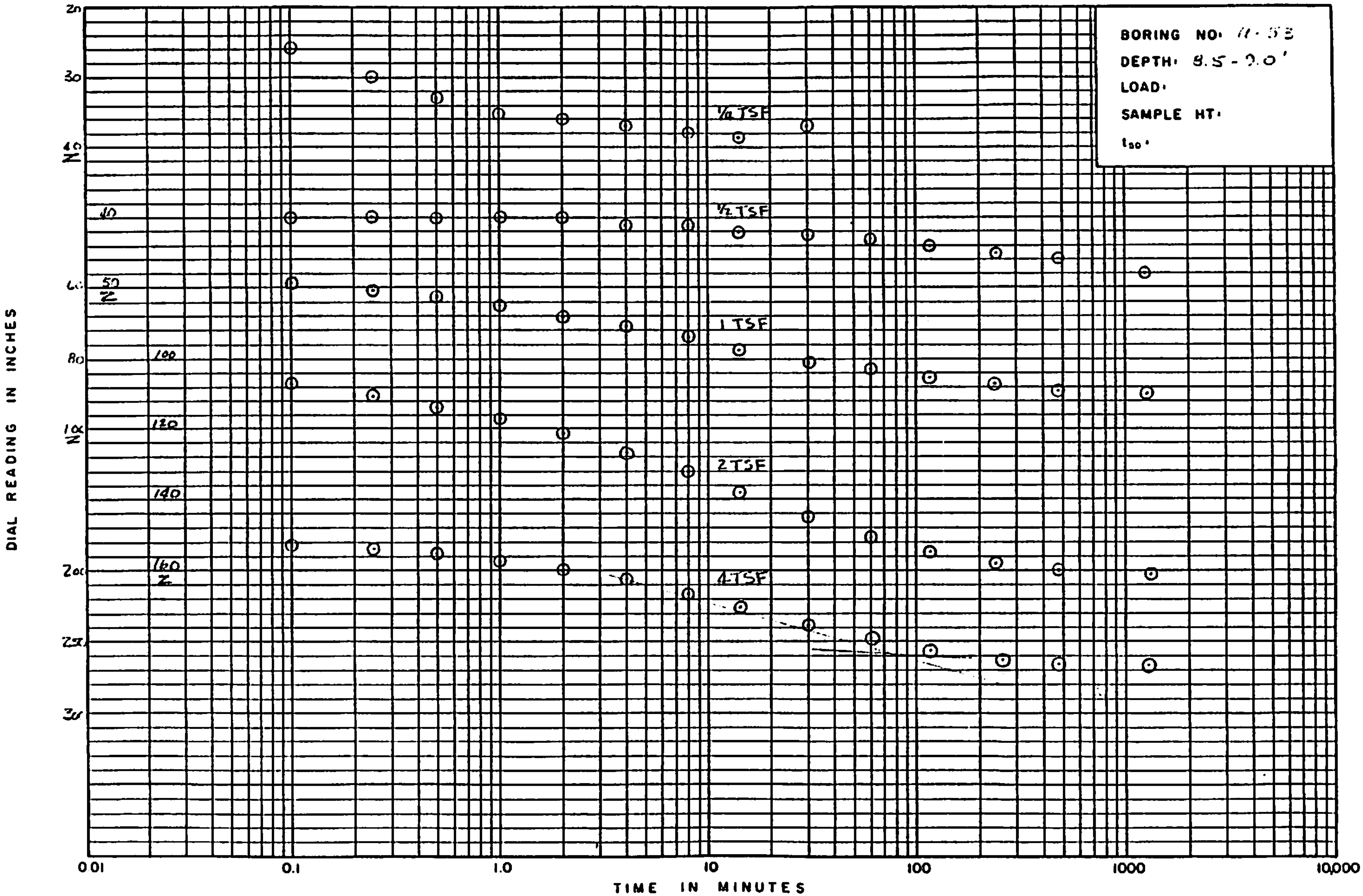
WATER CONTENT: 29.4 %

LIQUID LIMIT: 101

PLASTIC LIMIT: 26

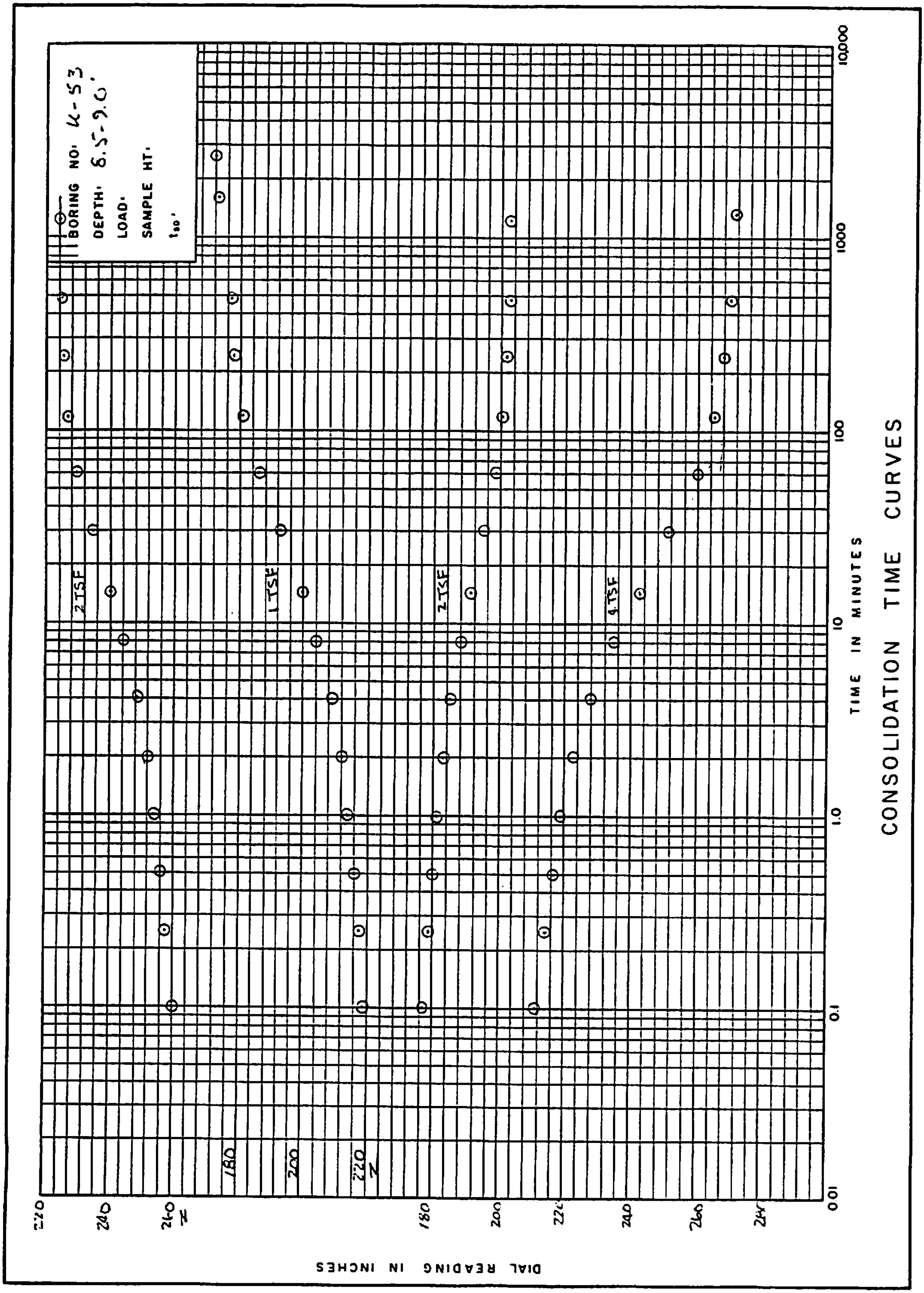


CONSOLIDATION TEST RESULTS

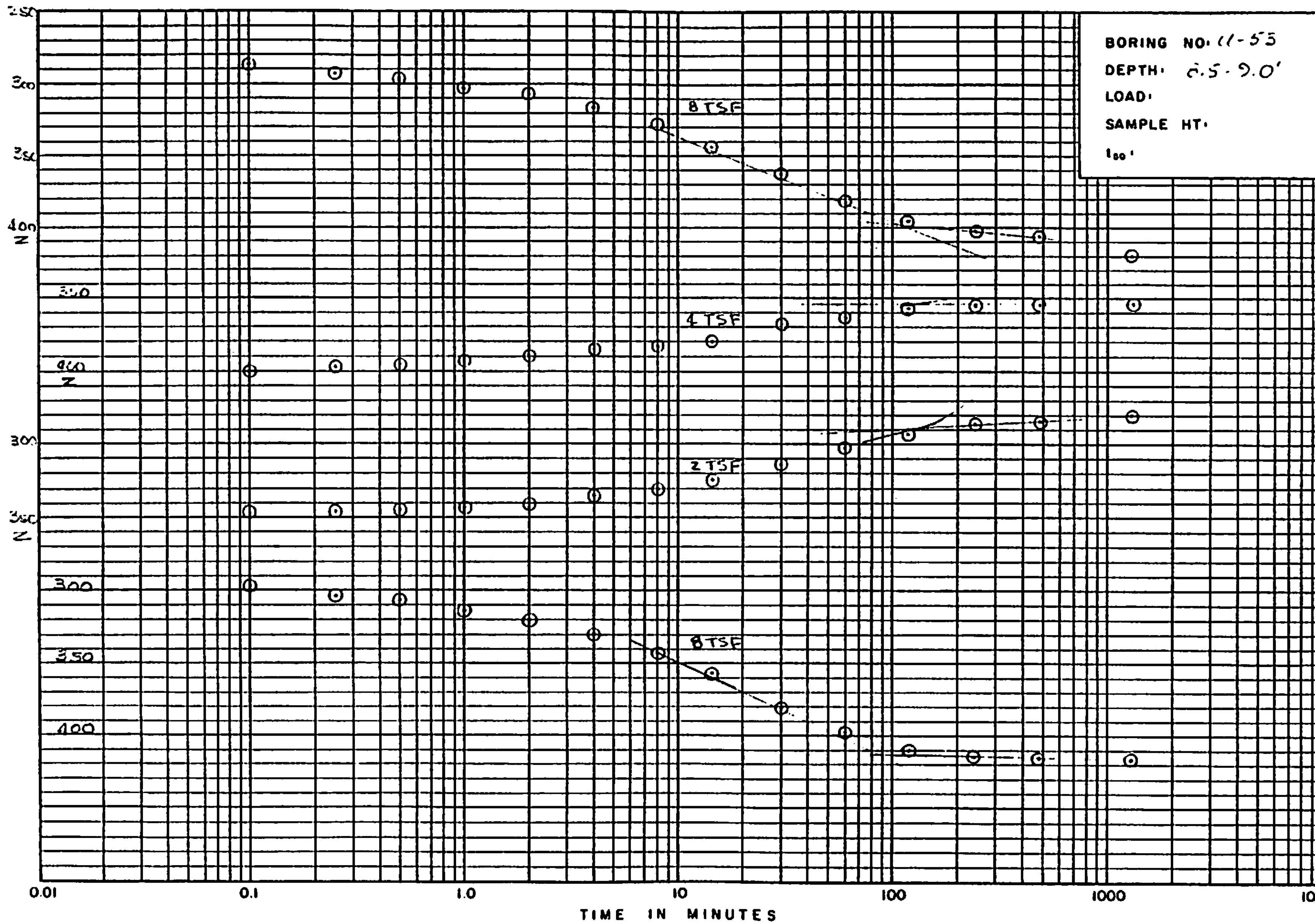


CONSOLIDATION TIME CURVES

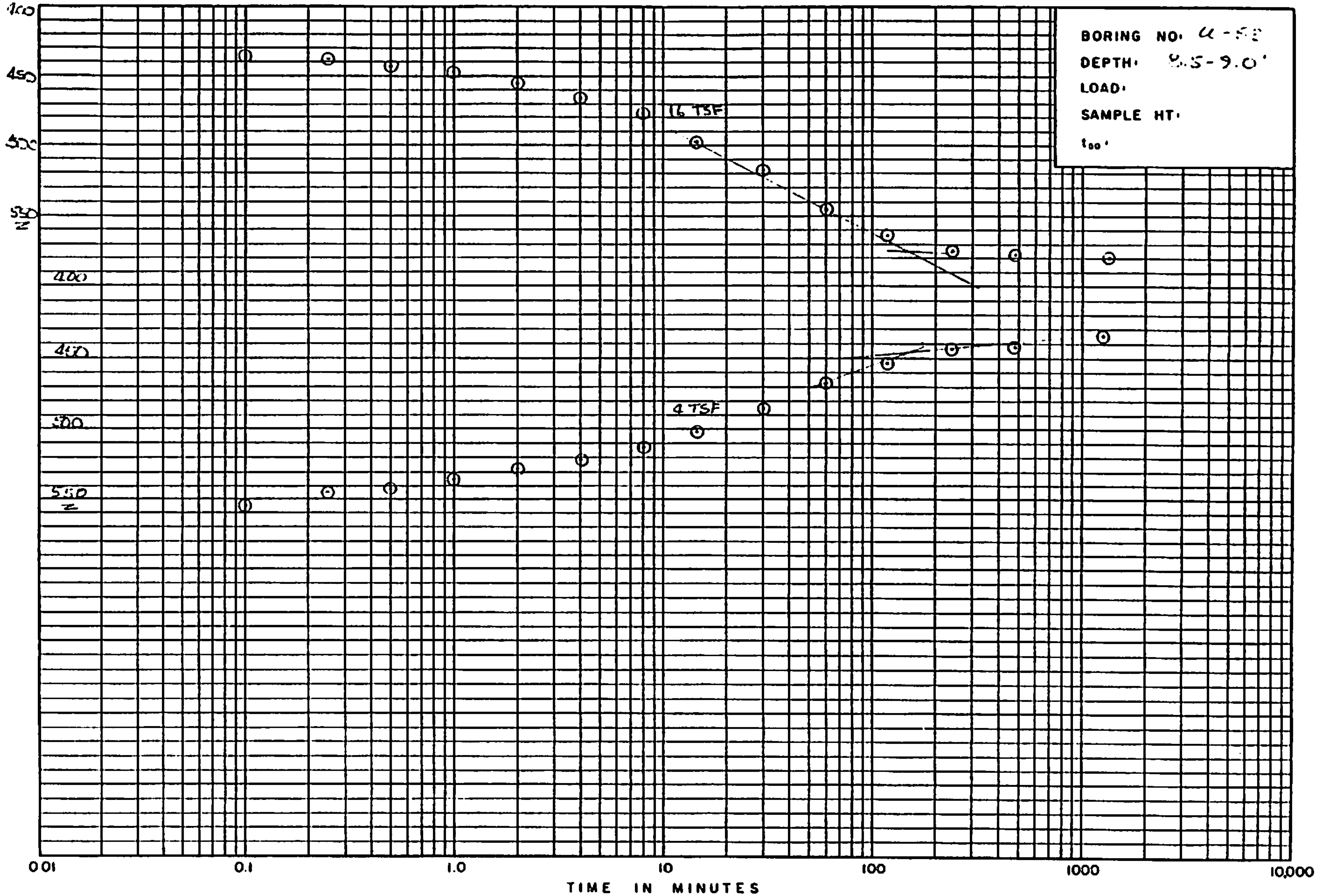
WARE LIND ENGINEERS



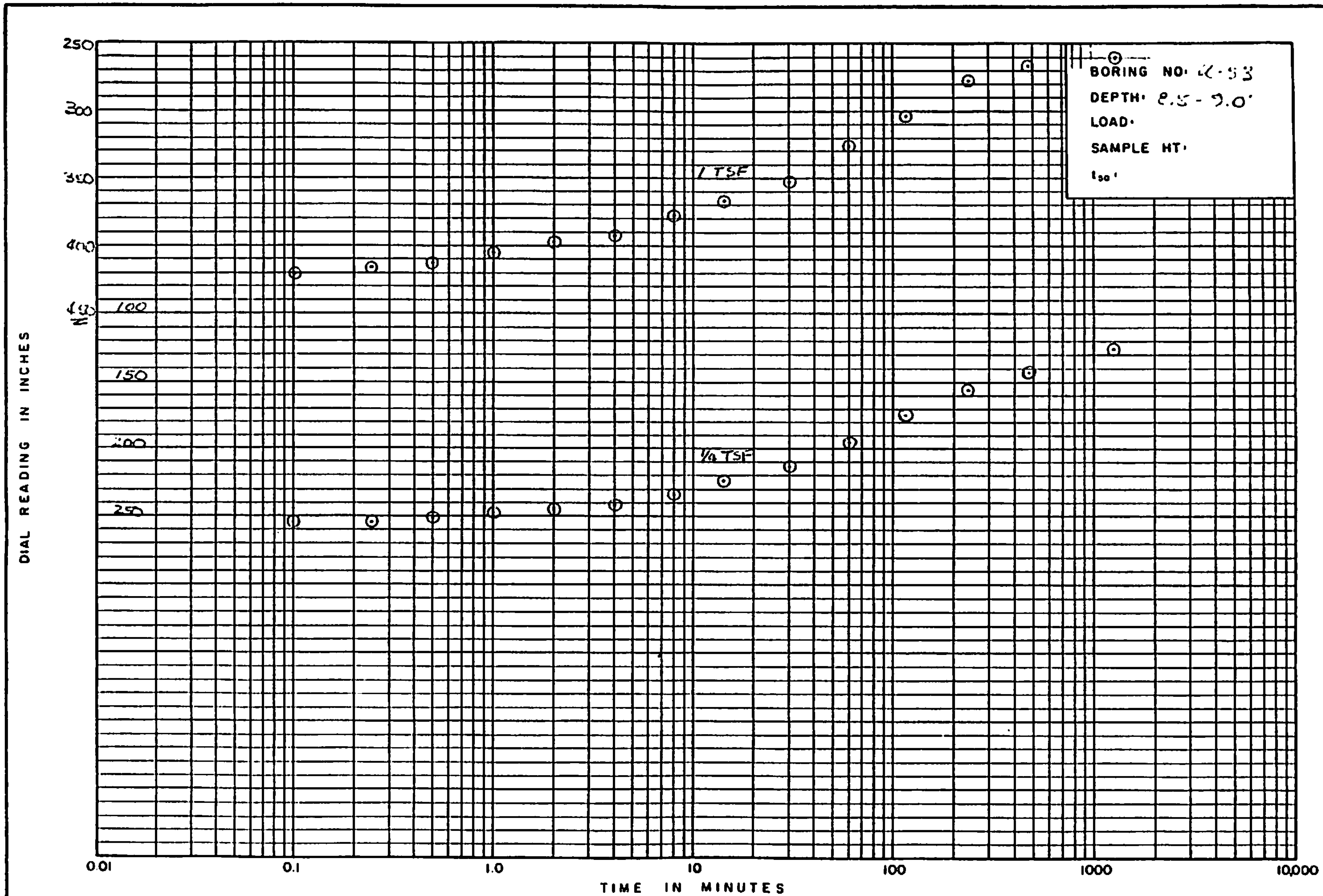
WARE LIND ENGINEERS



CONSOLIDATION TIME CURVES



CONSOLIDATION TIME CURVES

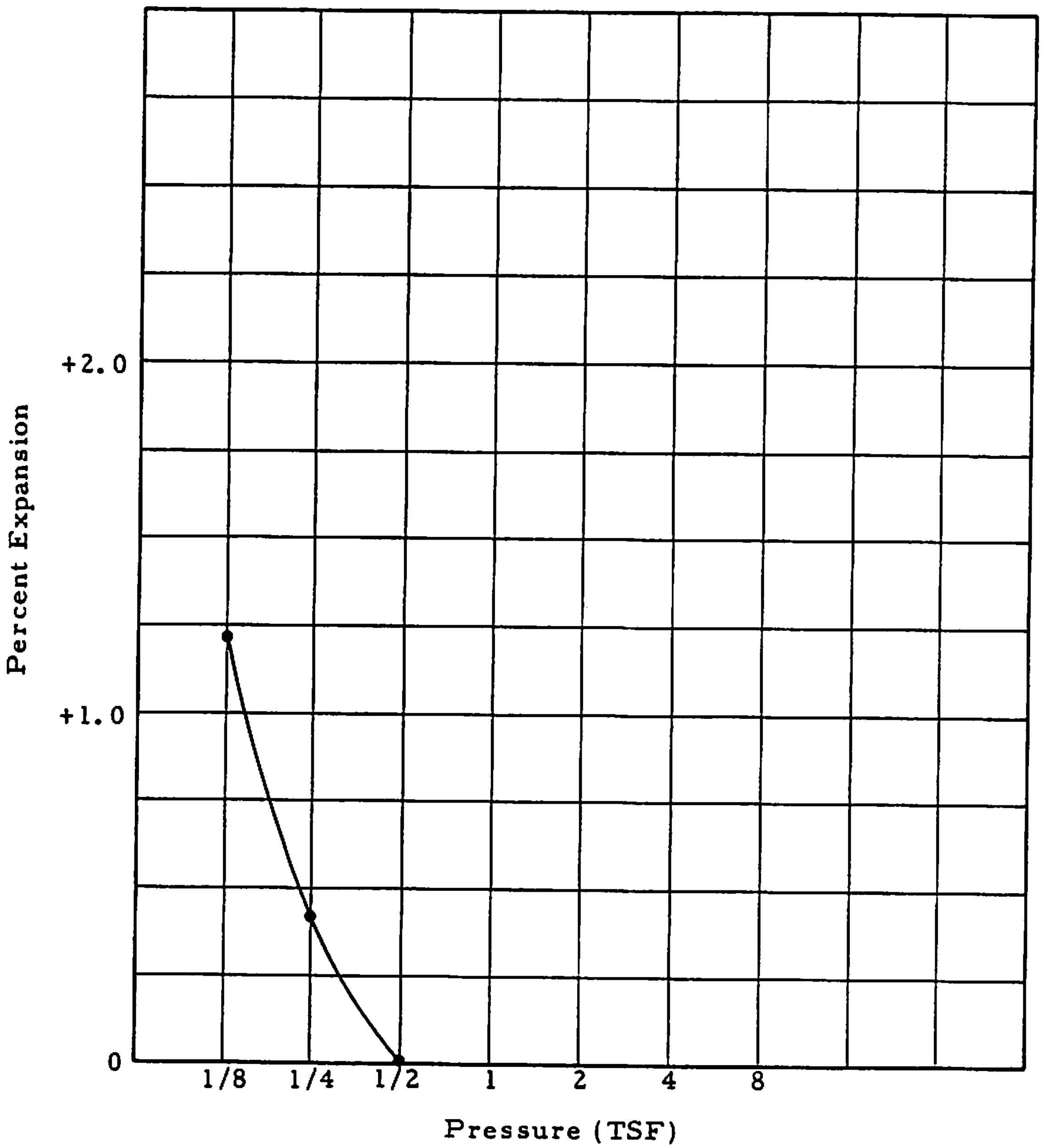


CONSOLIDATION TIME CURVES

WARE LIND ENGINEERS

Boring No.: TH-28
Sample No.: ST-13
Depth: 59-59.5 ft
Material: Hard green clay with calcareous seams

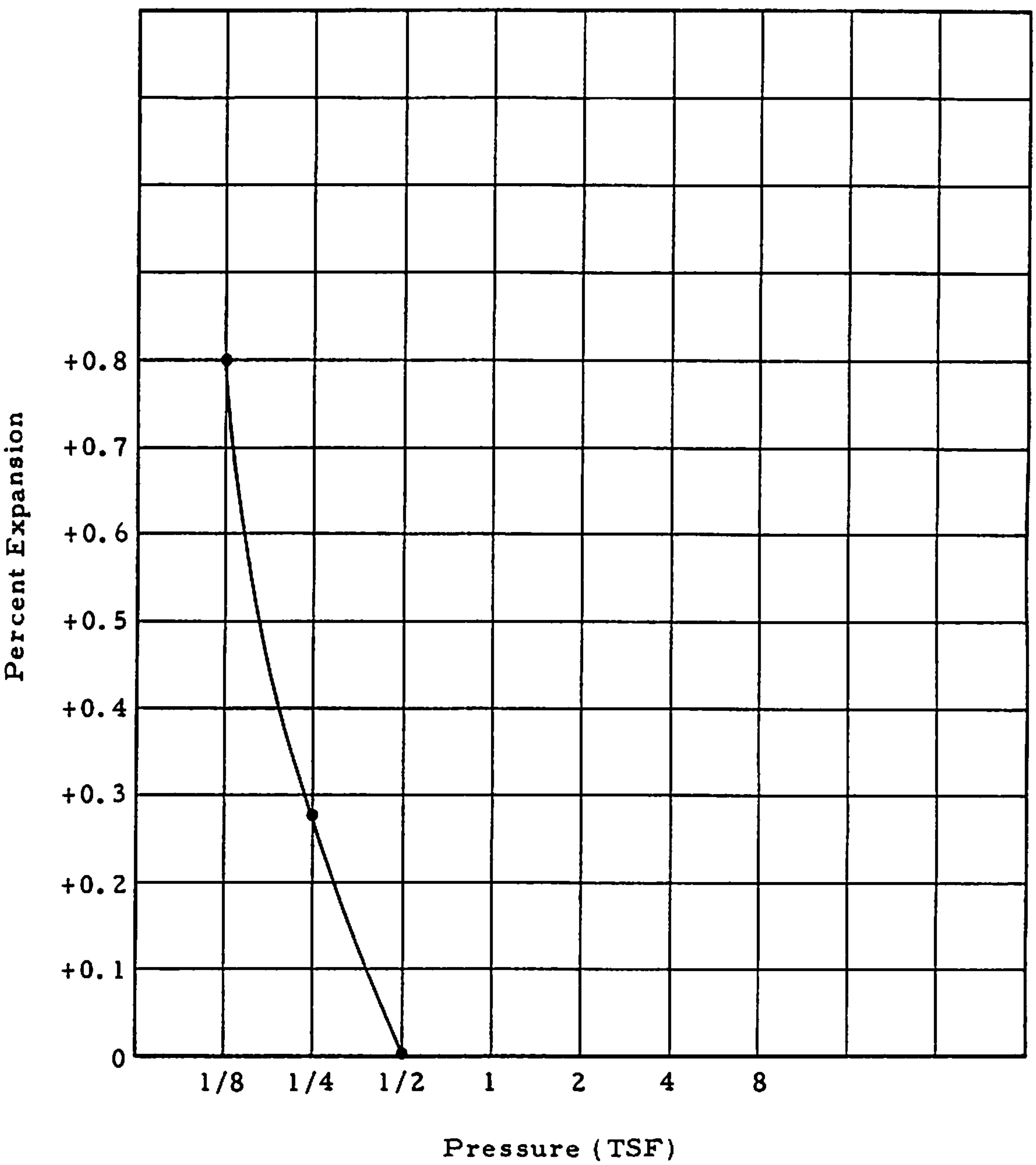
Initial Moisture Content: 41.6%
Unit Dry Weight: 79.8 pcf
Liquid Limit: 53
Plastic Limit: 22
Specific Gravity: 2.74



SWELL TEST

Boring No.: TH-29
Sample No.: ST-7
Depth: 29-29.5 ft
Material: Hard light gray and tan sandy clay

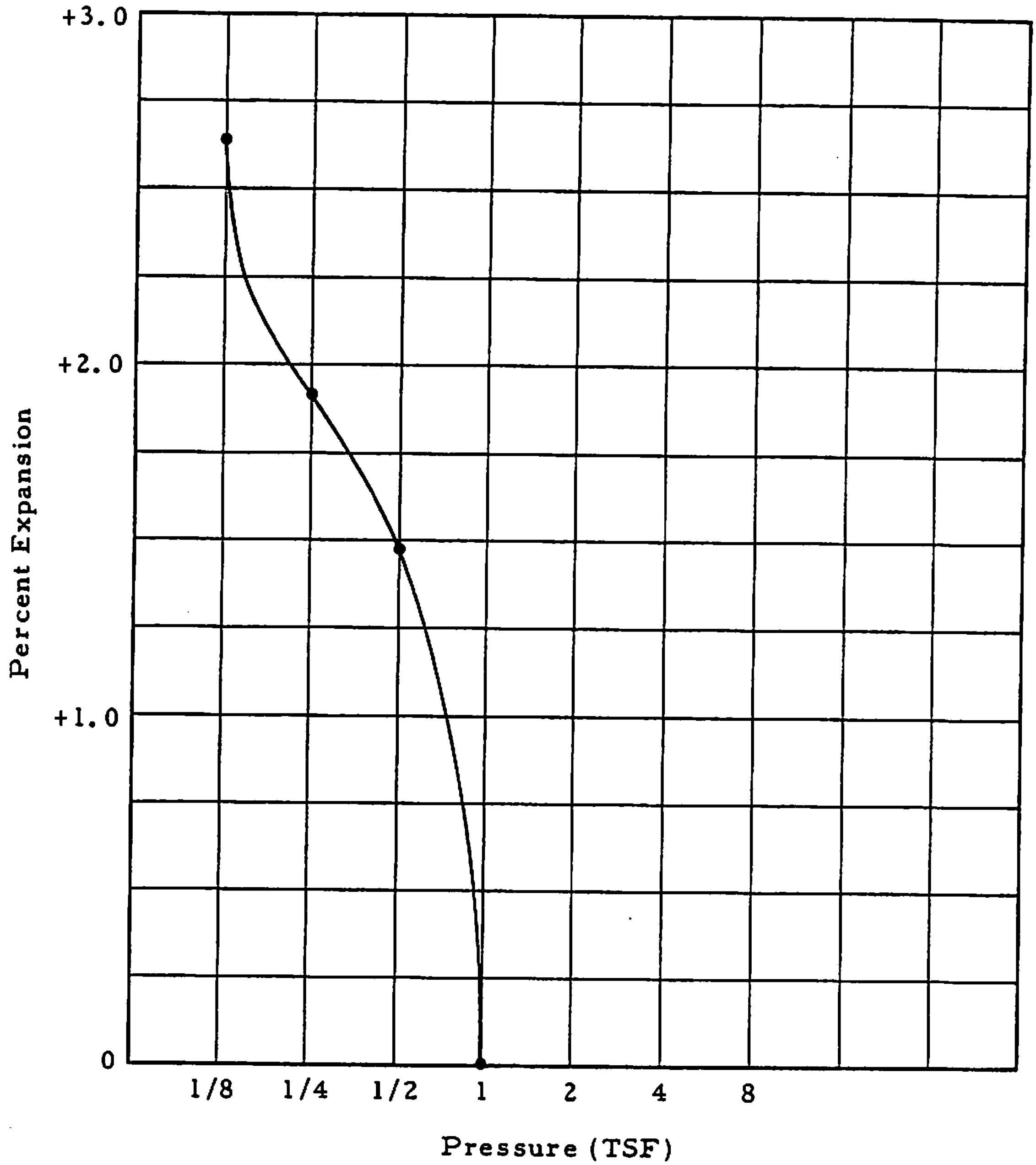
Initial Moisture Content: 12.8%
Unit Dry Weight: 116.6 pcf
Liquid Limit: 51
Plastic Limit: 18
Specific Gravity: 2.68



SWELL TEST

Boring No.: TH-29
Sample No.: ST-8
Depth: 34-34.5 ft
Material: Hard tan and light gray sandy clay

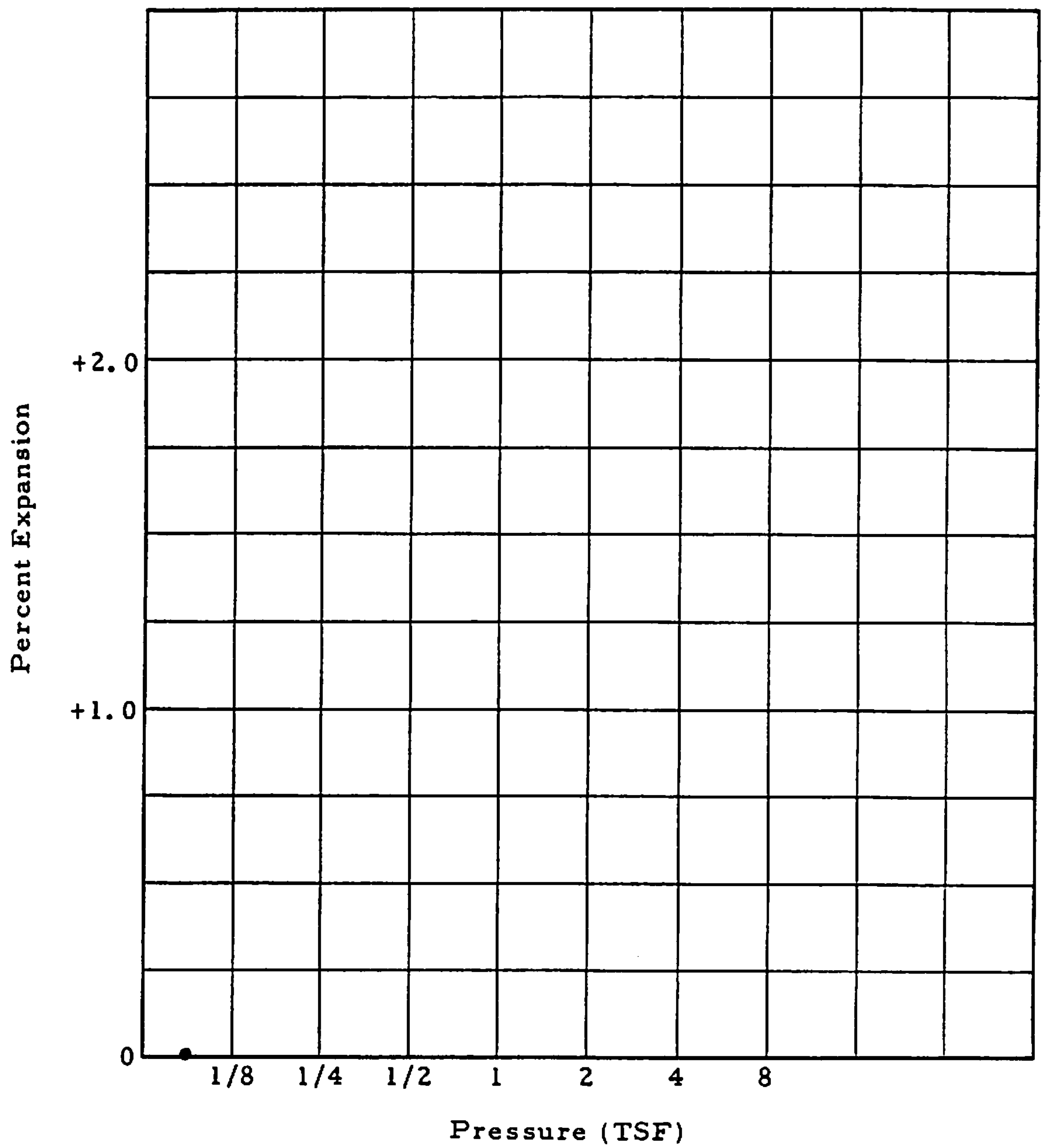
Initial Moisture Content: 14.3%
Unit Dry Weight: 115.6 pcf
Liquid Limit: 37
Plastic Limit: 17
Specific Gravity: 2.75



SWELL TEST

Boring No.: TH-29
Sample No.: ST-9
Depth: 39-39.5 ft
Material: Hard light gray sandy clay, calcareous with cementations

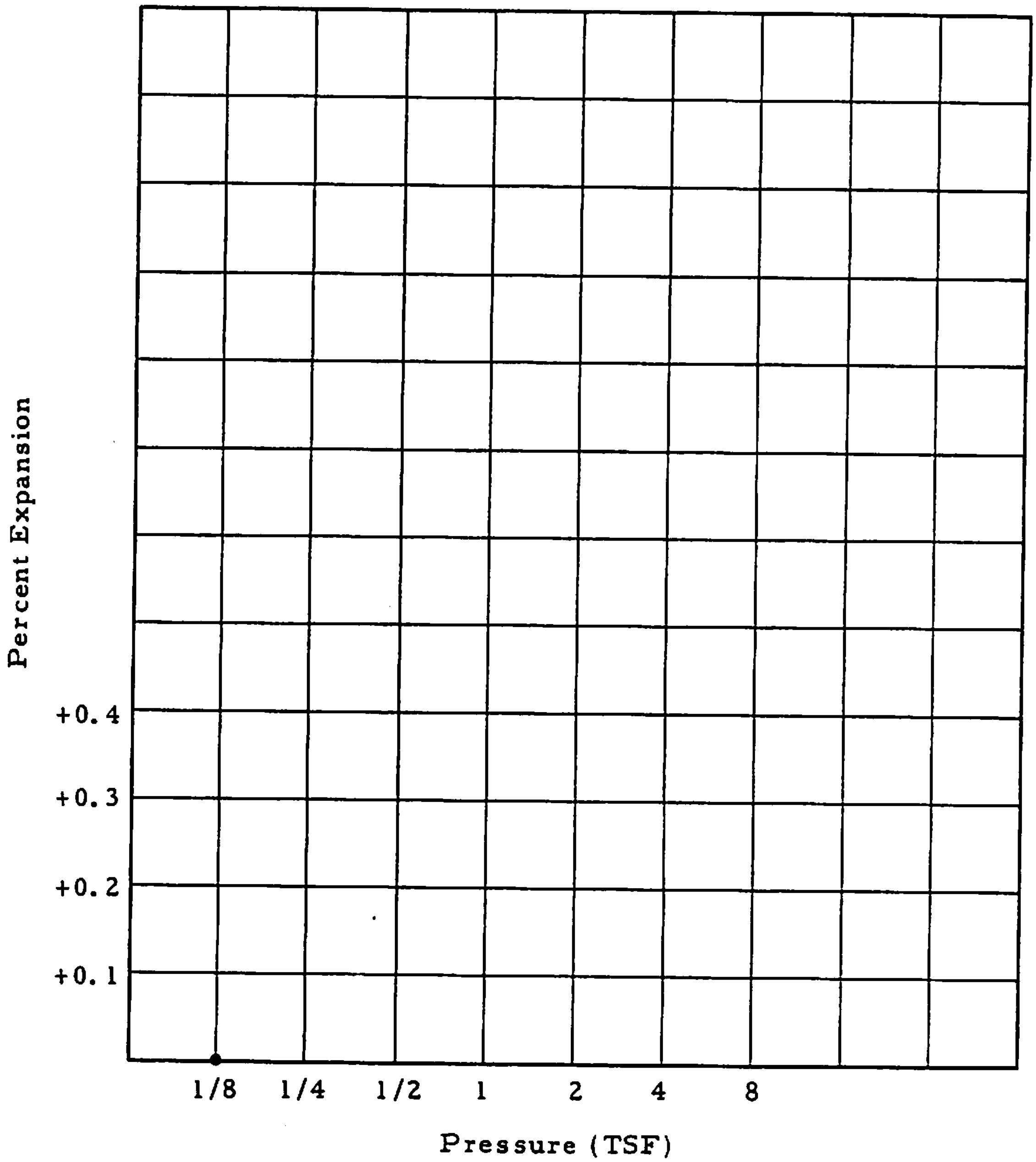
Initial Moisture Content: 18.7%
Unit Dry Weight: 106.5 pcf
Liquid Limit: 48
Plastic Limit: 23
Specific Gravity: 2.80



SWELL TEST

Boring No.: TH-29
Sample No.: ST-10
Depth: 44-44.5 ft
Material: Hard gray-green sandy clay, calcareous

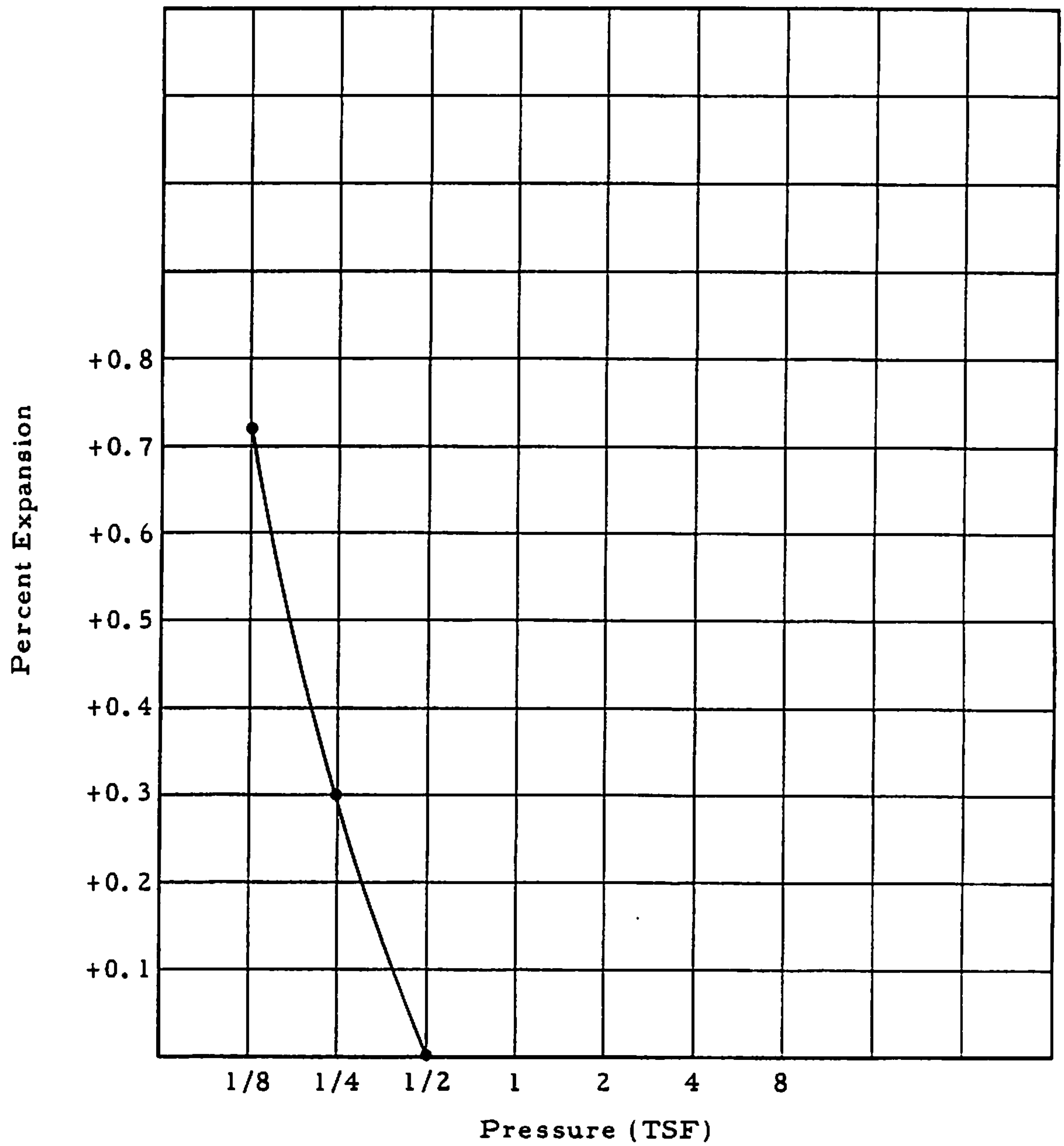
Initial Moisture Content: 13.4%
Unit Dry Weight: 121.3 pcf
Liquid Limit: 60
Plastic Limit: 20
Specific Gravity: 2.62



SWELL TEST

Boring No.: SH-30
Sample No.: ST-7
Depth: 29-29.5 ft
Material: Hard light gray and tan sandy clay

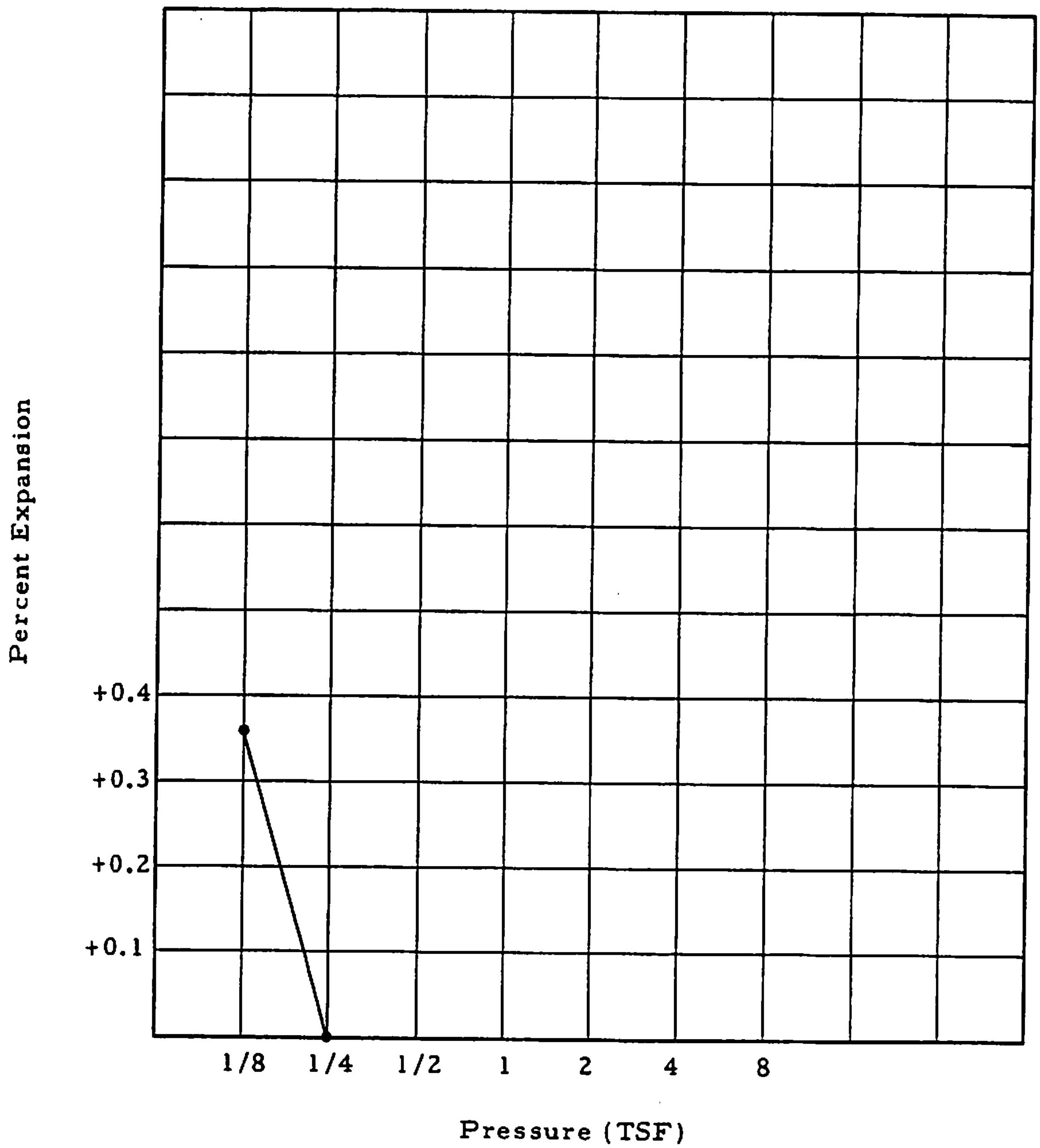
Initial Moisture Content: 12.8%
Unit Dry Weight: 118.0 pcf
Liquid Limit: 30
Plastic Limit: 19
Specific Gravity:



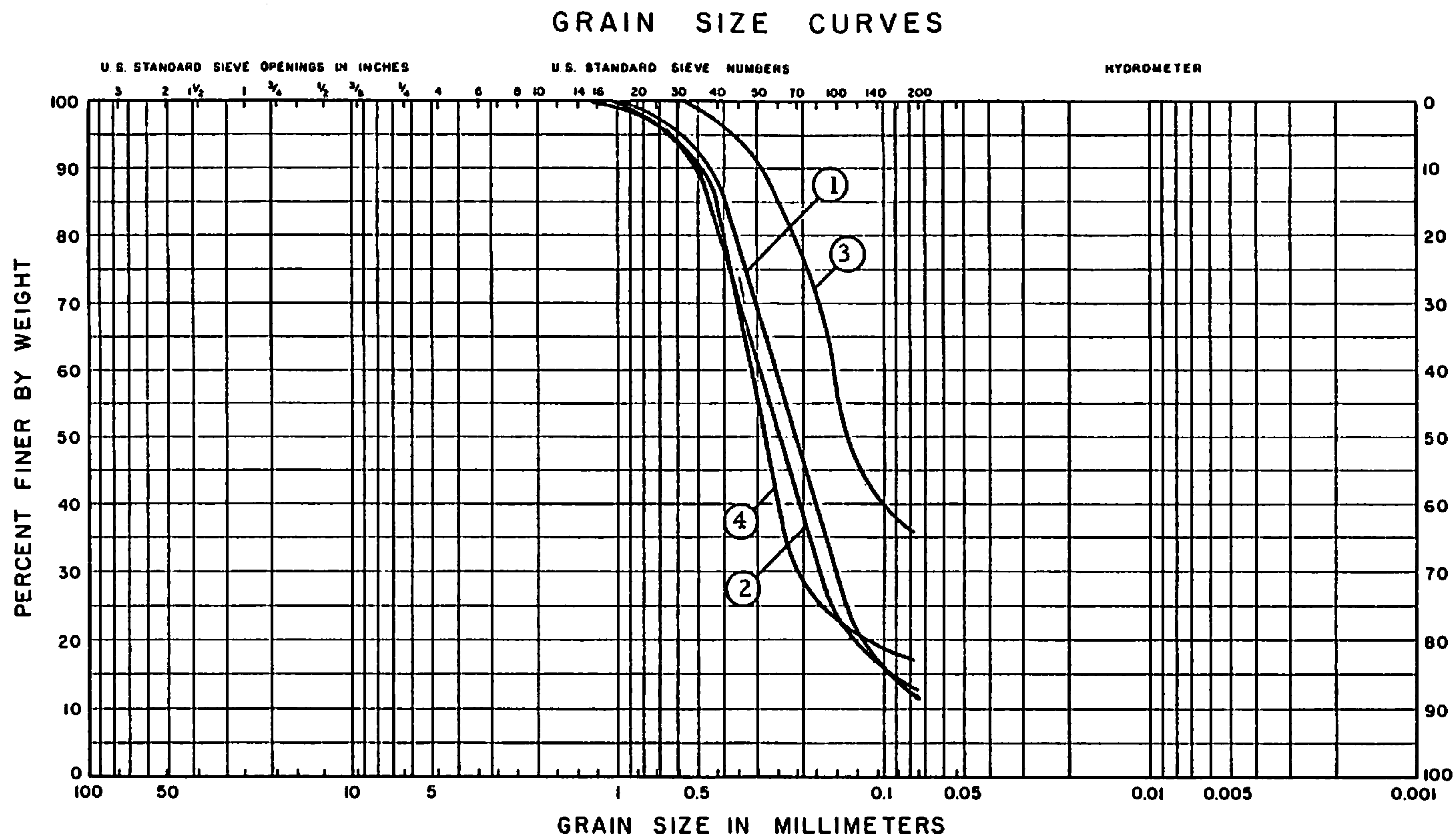
SWELL TEST

Boring No.: SH-30
Sample No.: ST-10
Depth: 43.5-44 ft
Material: Dense gray clayey sand, calcareous

Initial Moisture Content: 16.3%
Unit Dry Weight: 111.4 pcf



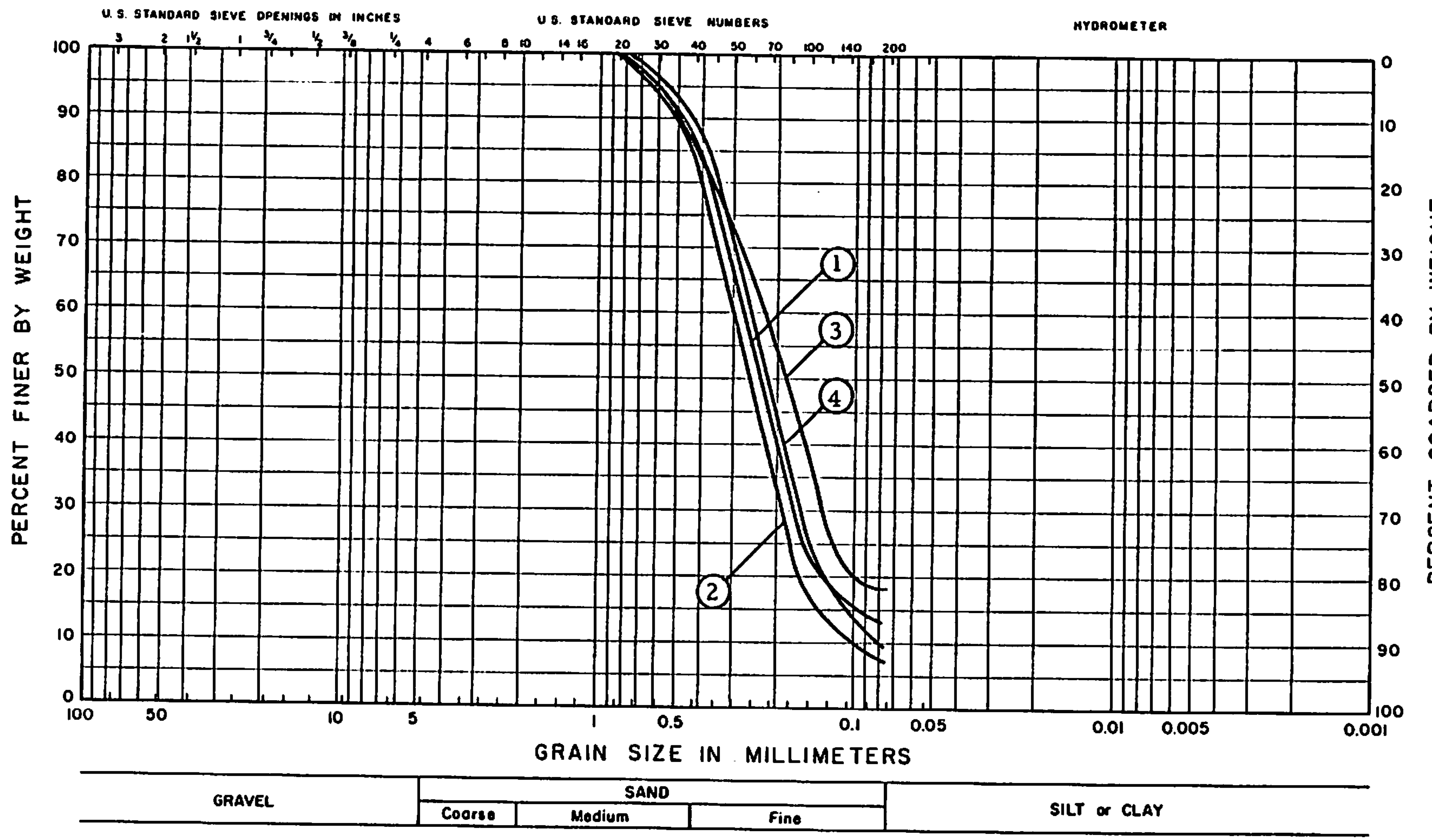
SWELL TEST



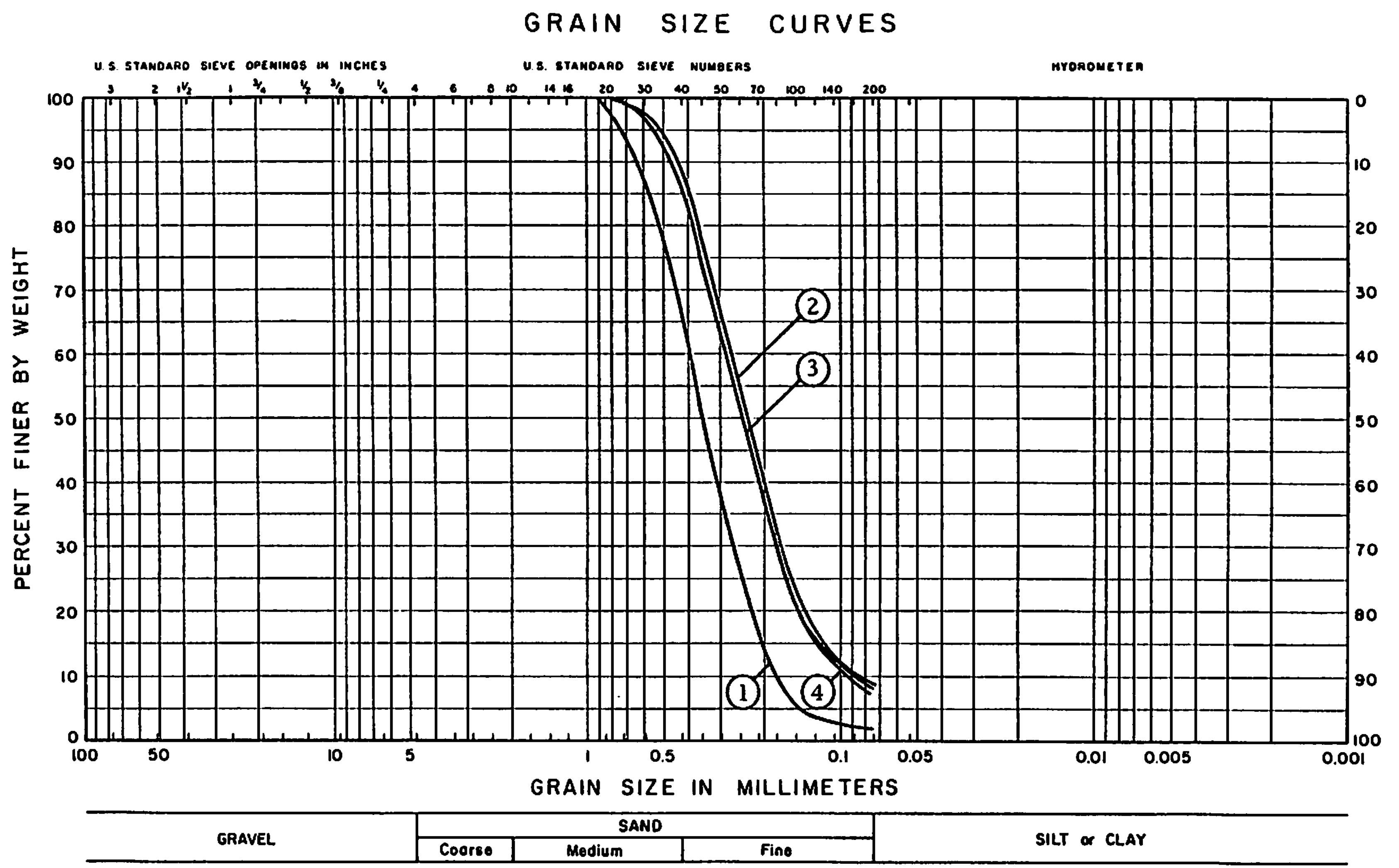
GRAVEL	SAND			SILT or CLAY
	Coarse	Medium	Fine	

Curve No.	Boring No.	Sample No.	Depth, ft
1	L-1	SS-1	3.0
2	L-1	SS-2	6.0
3	L-1	SS-4	15.0
4	L-1	ST-5	19.0

GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	L-2	SS-1	3.0
2	L-2	SS-2	6.0
3	L-2	SS-3	10.0
4	L-3	SS-1	3.0



Curve No.	Boring No.	Sample No.	Depth, ft
1	L-4	SS-3	10.0
2	L-5	SS-2	6.0
3	L-6	SS-2	6.0
4	L-6	SS-3	10.0

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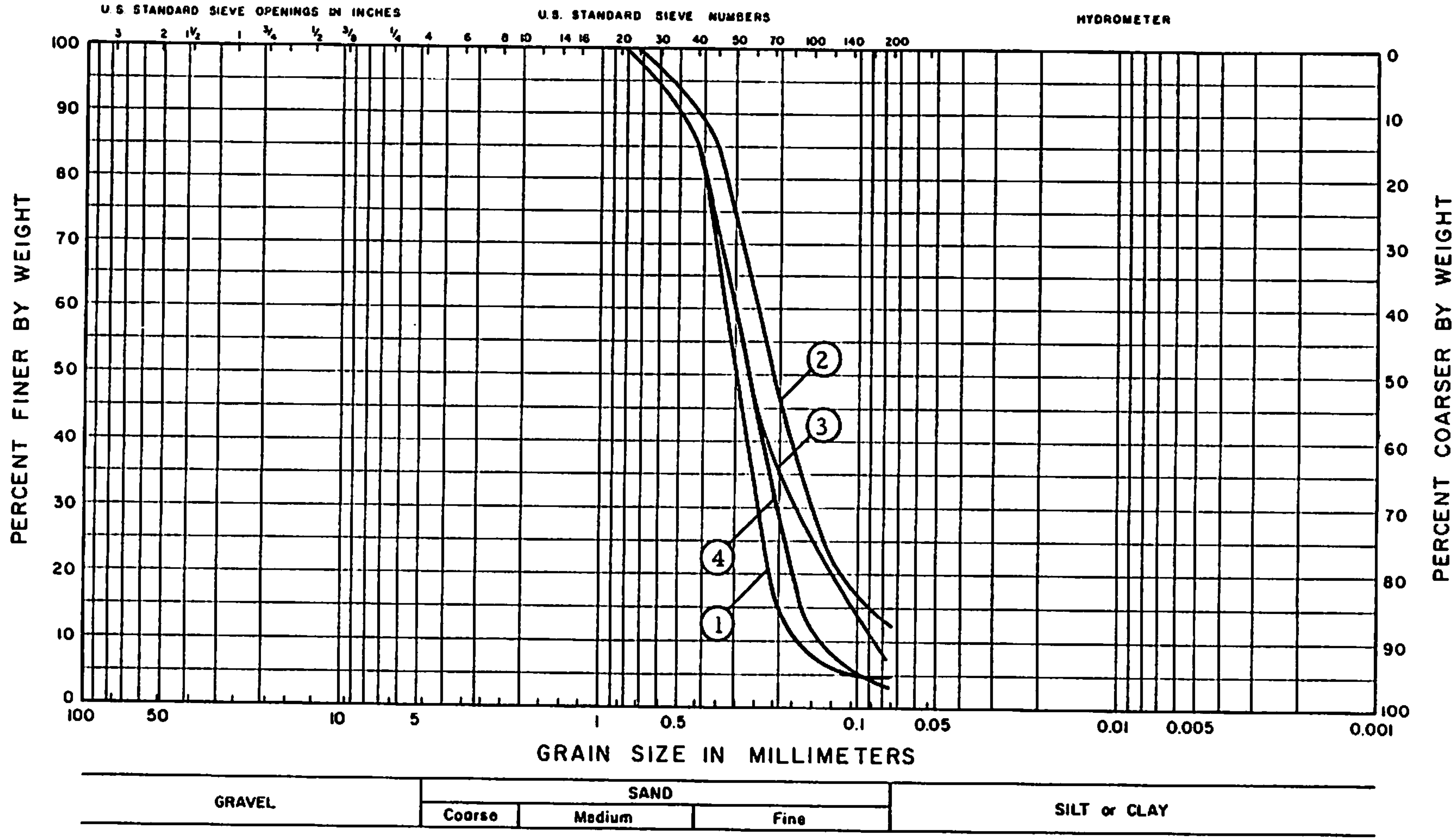
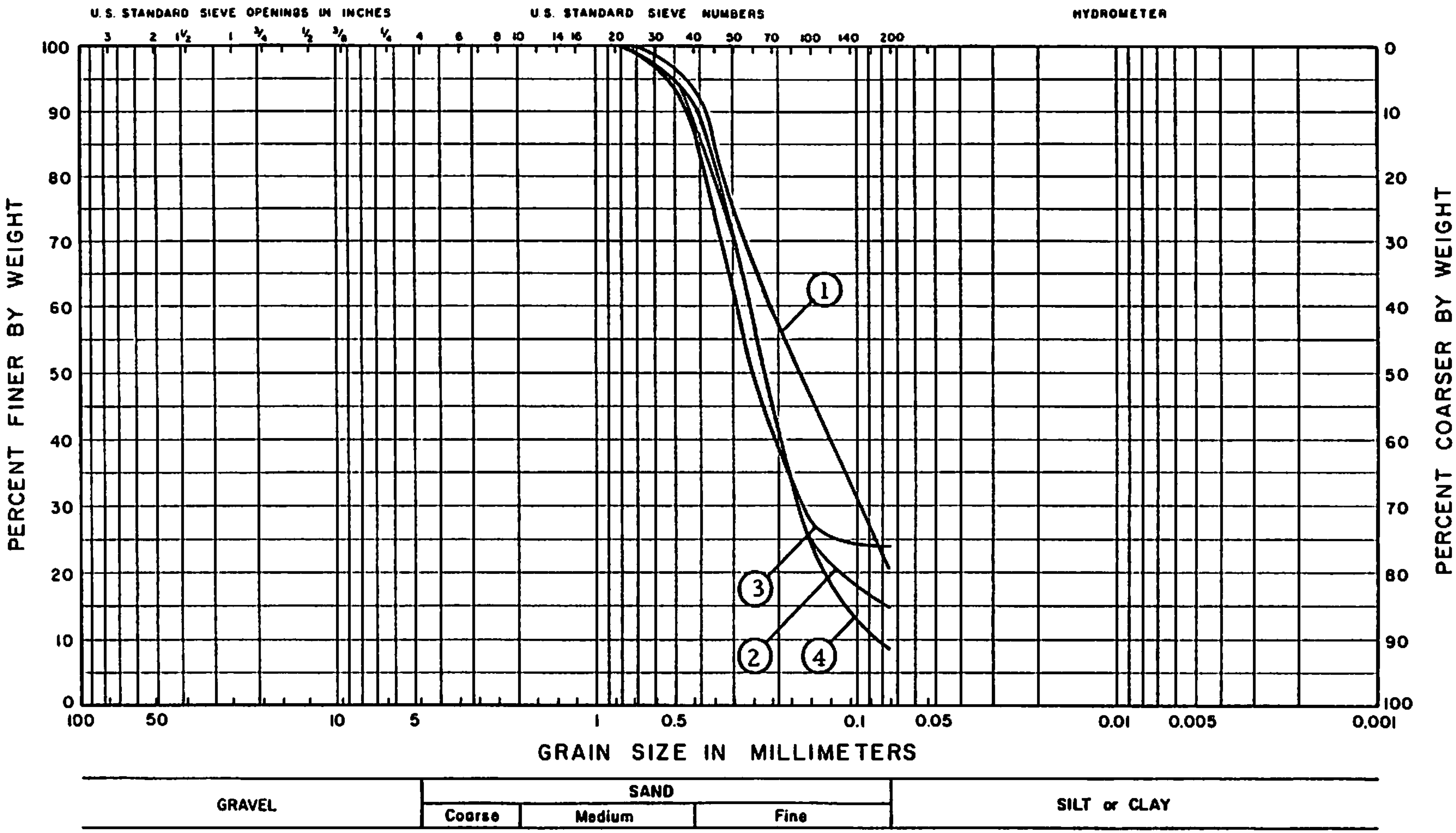
GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	L-7	SS-4	15.0
2	AP-9	SS-2	6.0
3	AP-9	SS-4	15.0
4	AP-10	SS-1	3.0

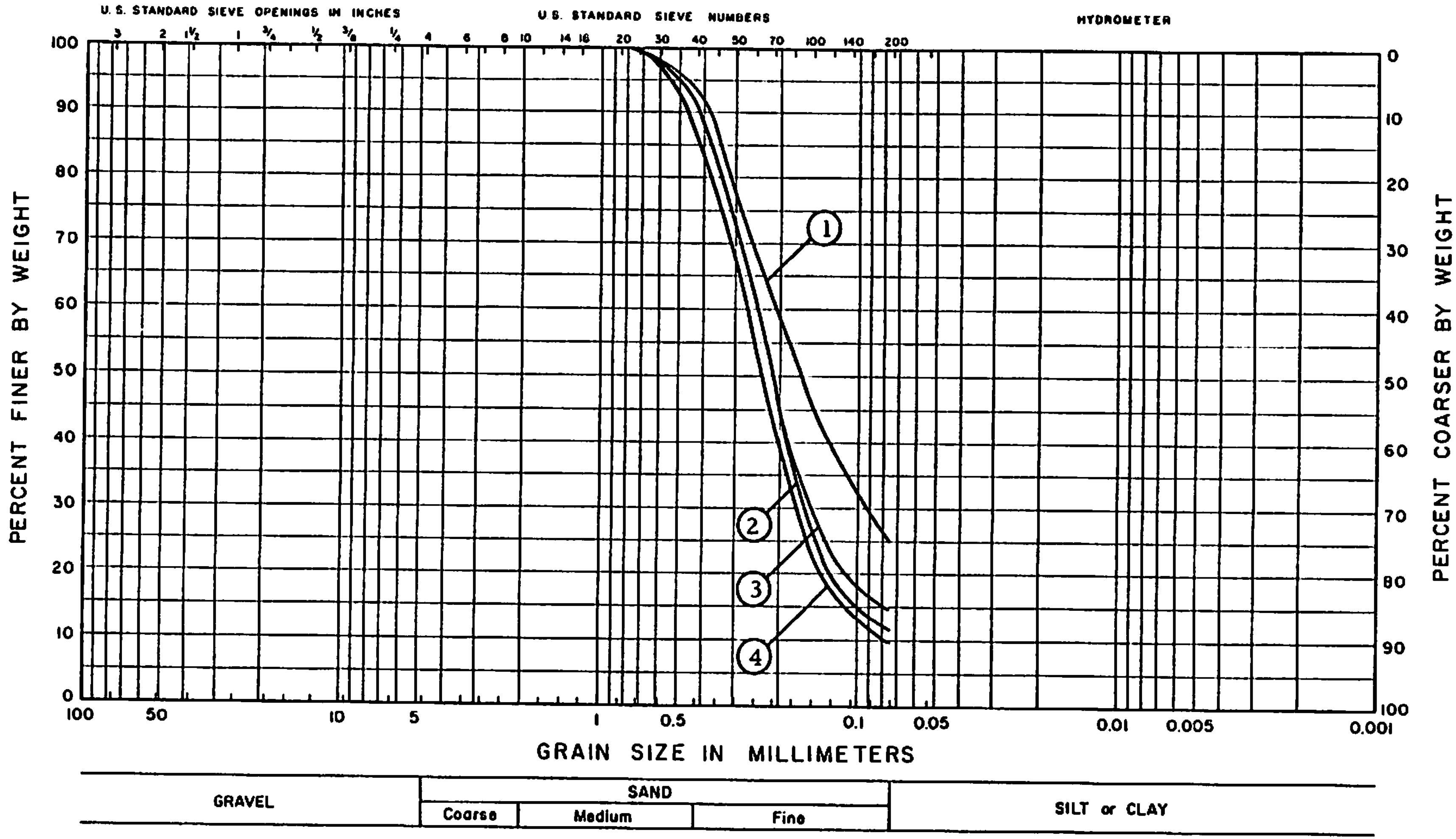
WARE LIND ENGINEERS

GRAIN SIZE CURVES



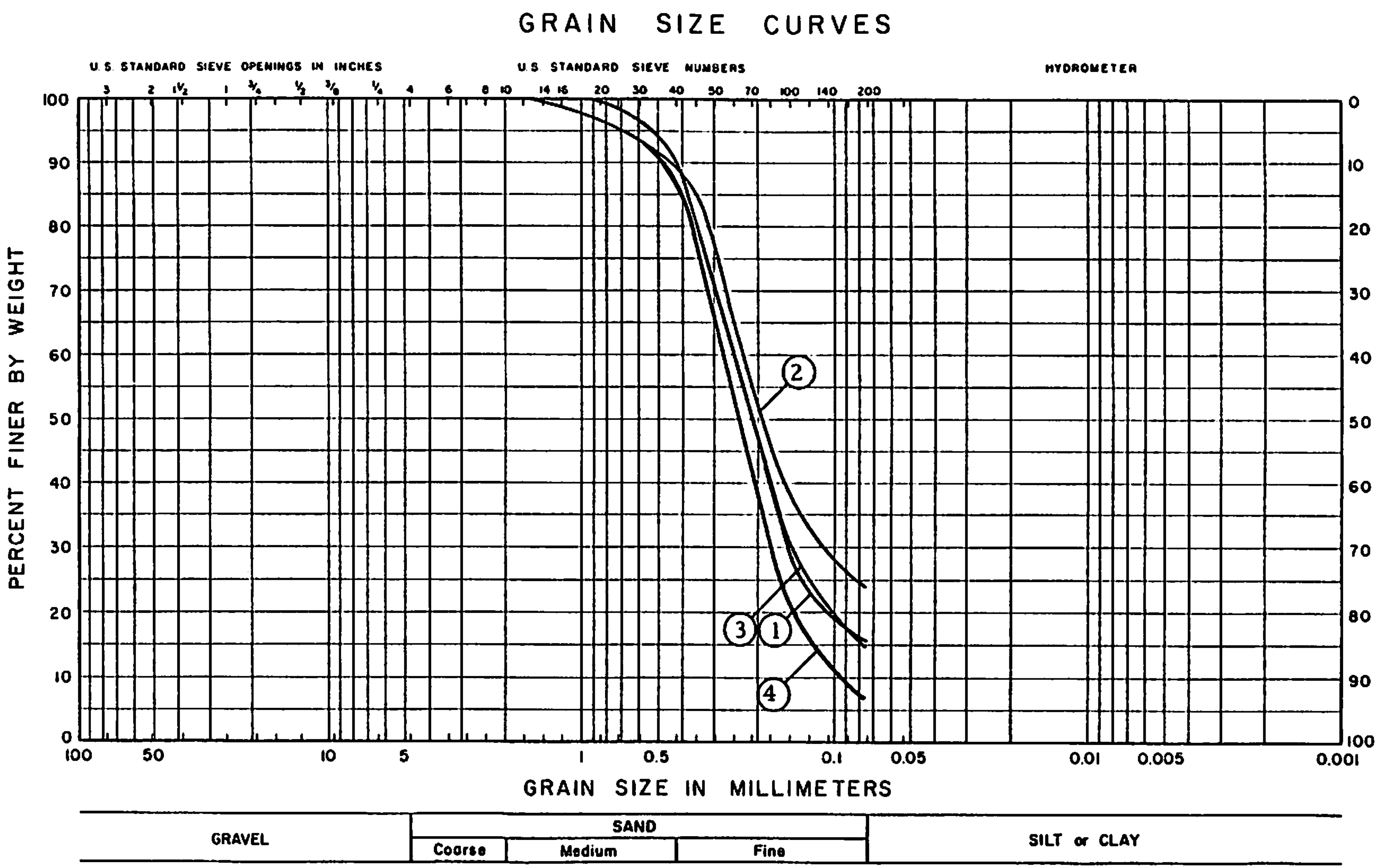
Curve No.	Boring No.	Sample No.	Depth, ft
1	AP-10	SS-3	10.0
2	AP-11	SS-2	6.0
3	AP-12	SS-3	10.0
4	AP-13	SS-1	3.0

GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	AP-13	SS-3	10.0
2	RR-14	SS-1	3.0
3	RR-15	SS-1	3.0
4	RR-16	SS-1	3.0

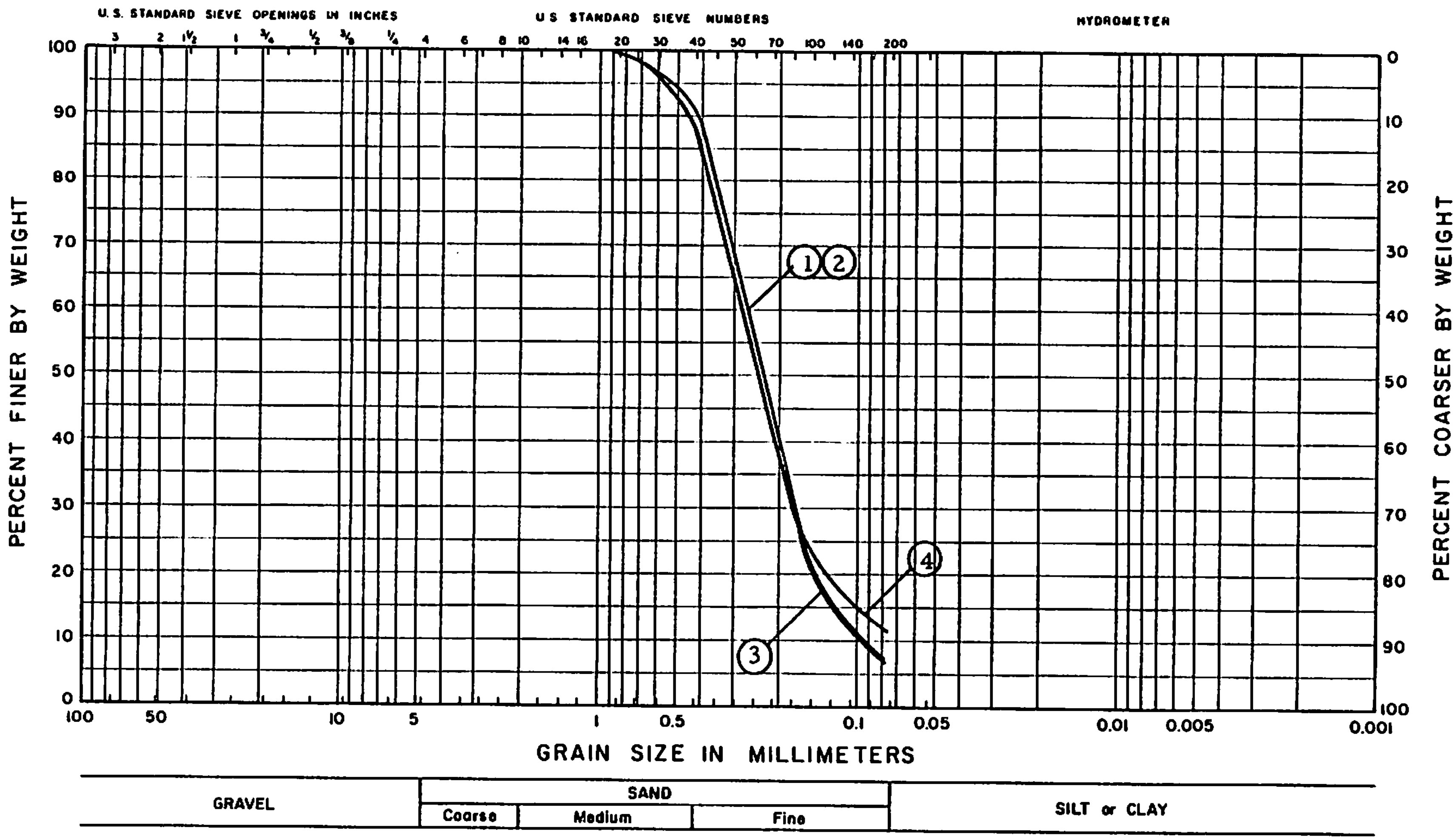
WARE LIND ENGINEERS



Curve No.	Boring No.	Sample No.	Depth, ft
1	RR-17	SS-1	3.0
2	RR-18	SS-1	3.0
3	RR-19	SS-1	3.0
4	RR-20	SS-1	3.0

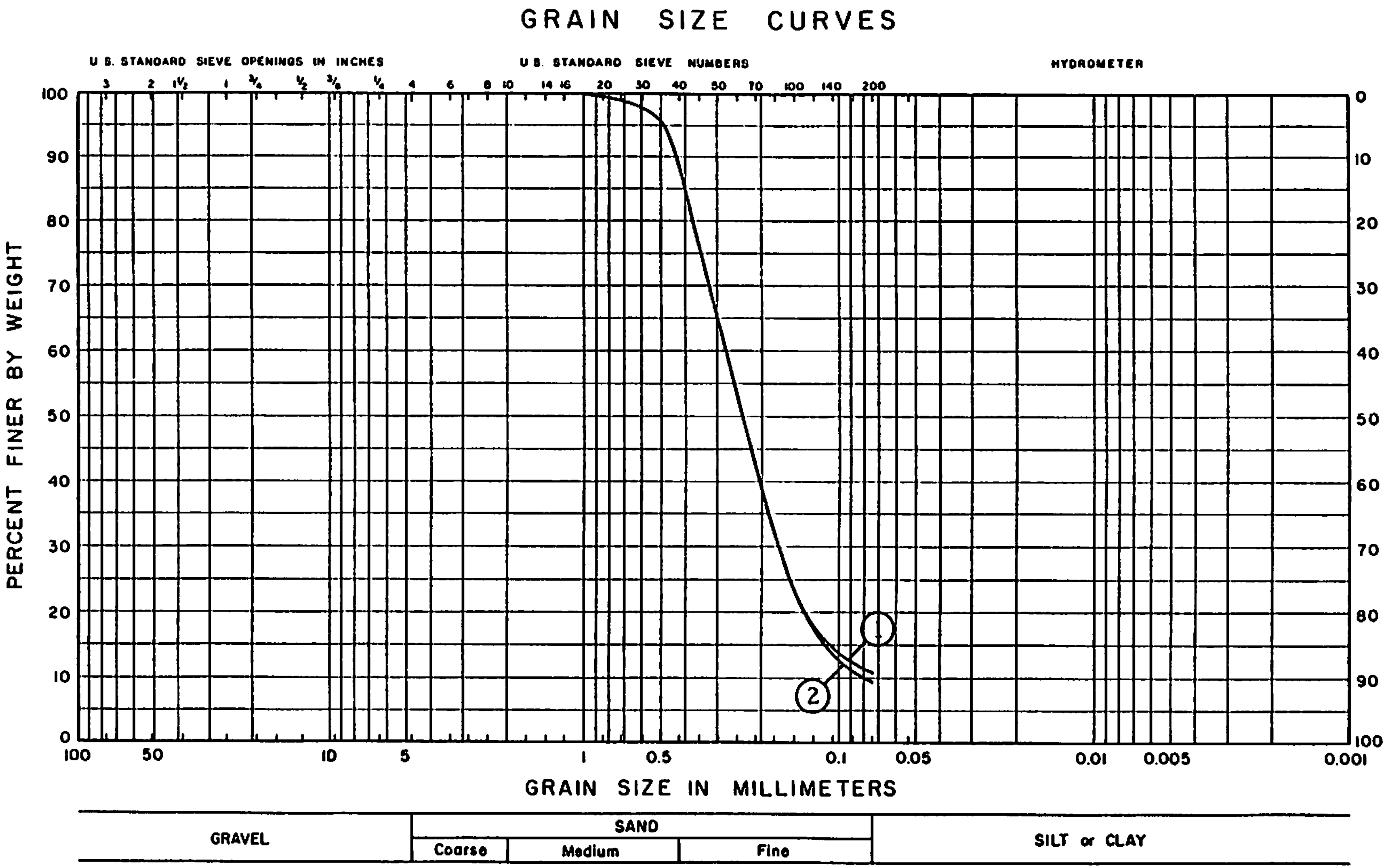
PLATE 18

GRAIN SIZE CURVES



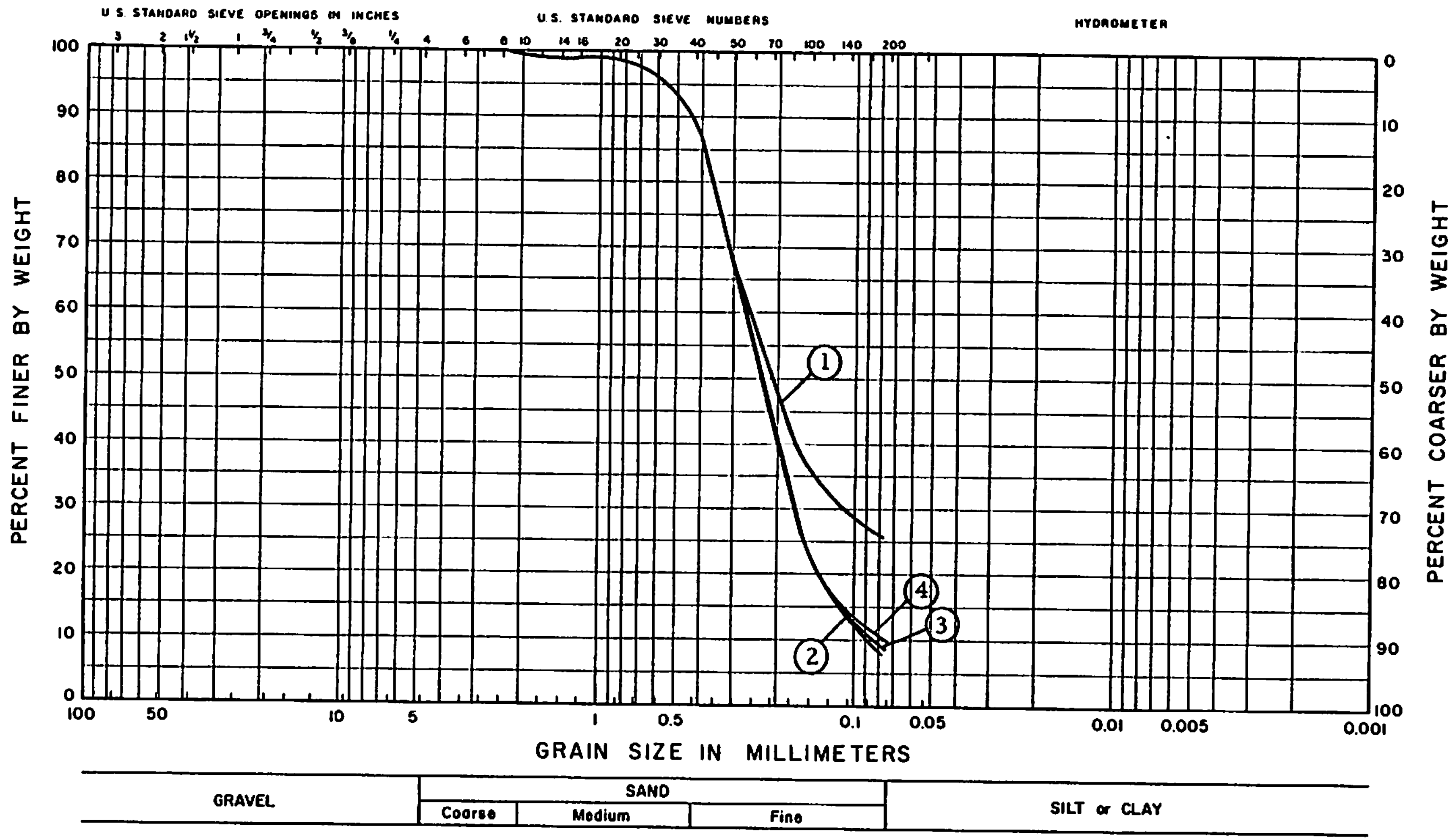
Curve No.	Boring No.	Sample No.	Depth, ft
1	RR-21	SS-1	3.0
2	RR-22	SS-1	3.0
3	RR-23	SS-1	3.0
4	RR-24	SS-1	3.0

WARE LIND ENGINEERS



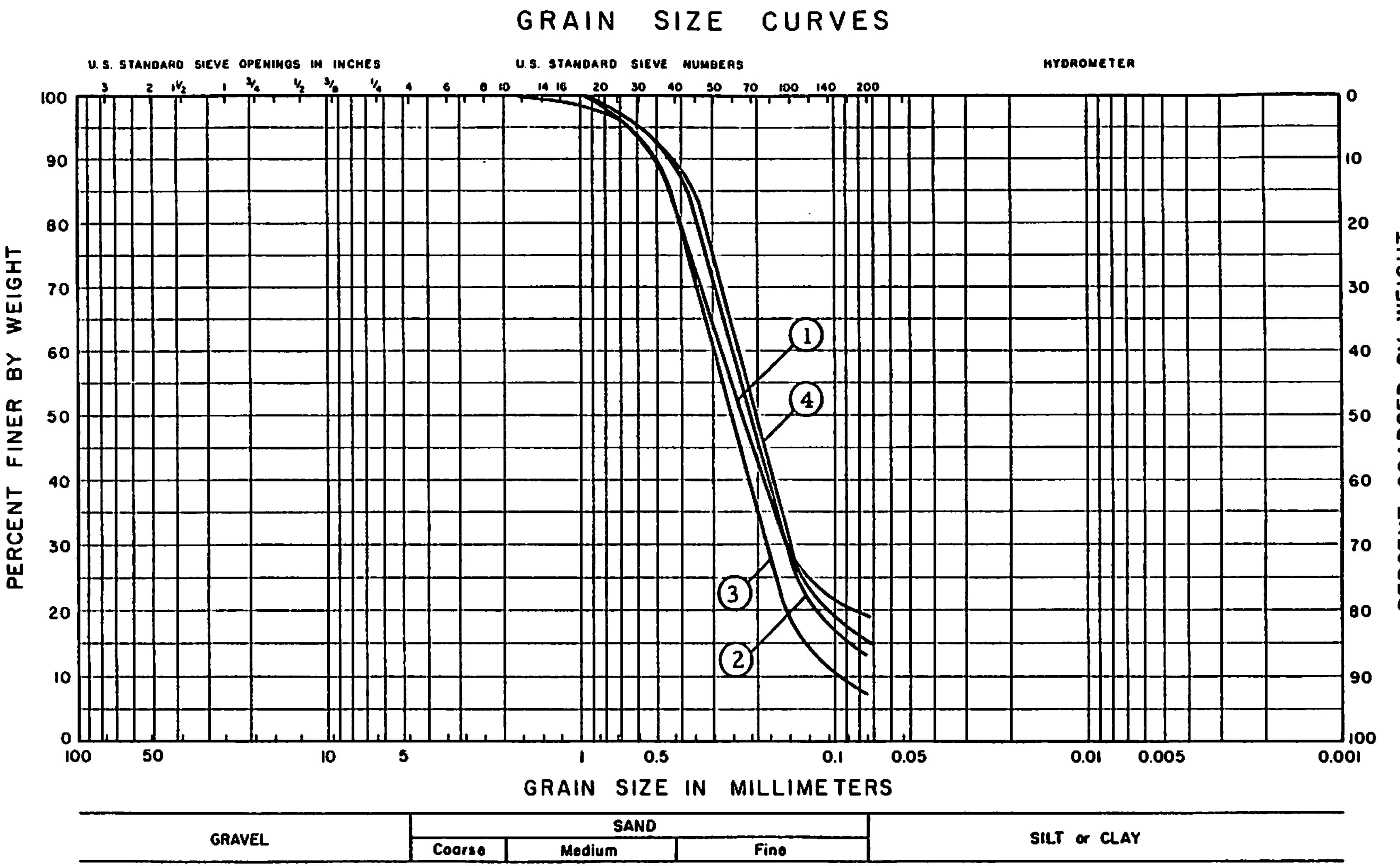
Curve No.	Boring No.	Sample No.	Depth, ft
1	TH-29	BAG 1	6.0-11.0
2	TH-29	BAG 2	6.0-11.0

GRAIN SIZE CURVES



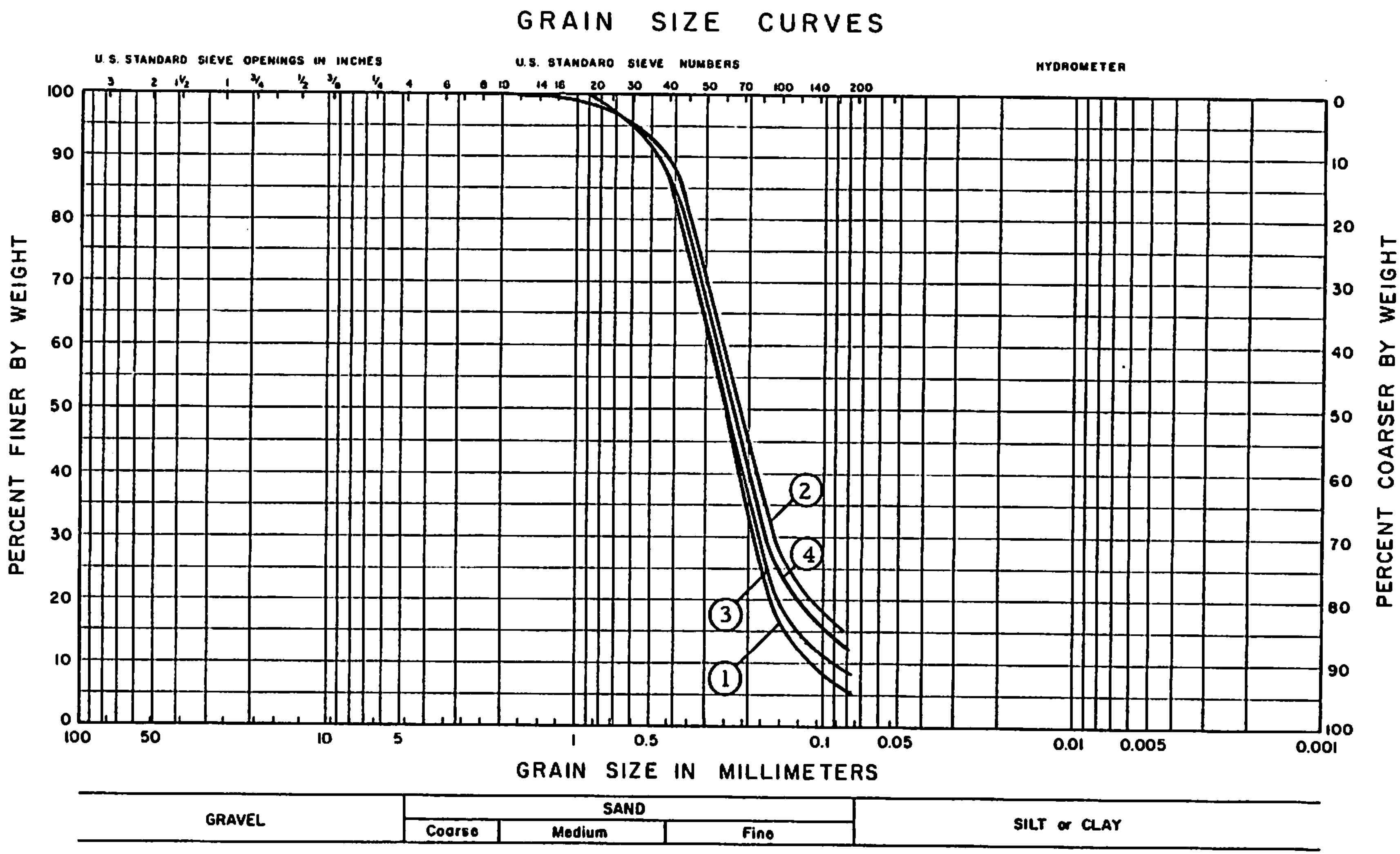
Curve No.	Boring No.	Sample No.	Depth, ft
1	RR-25	SS-1	3.0
2	TH-29	SS-1	3.0
3	TH-29	SS-2	6.0
4	TH-29	SS-3	10.0

WARE LIND ENGINEERS

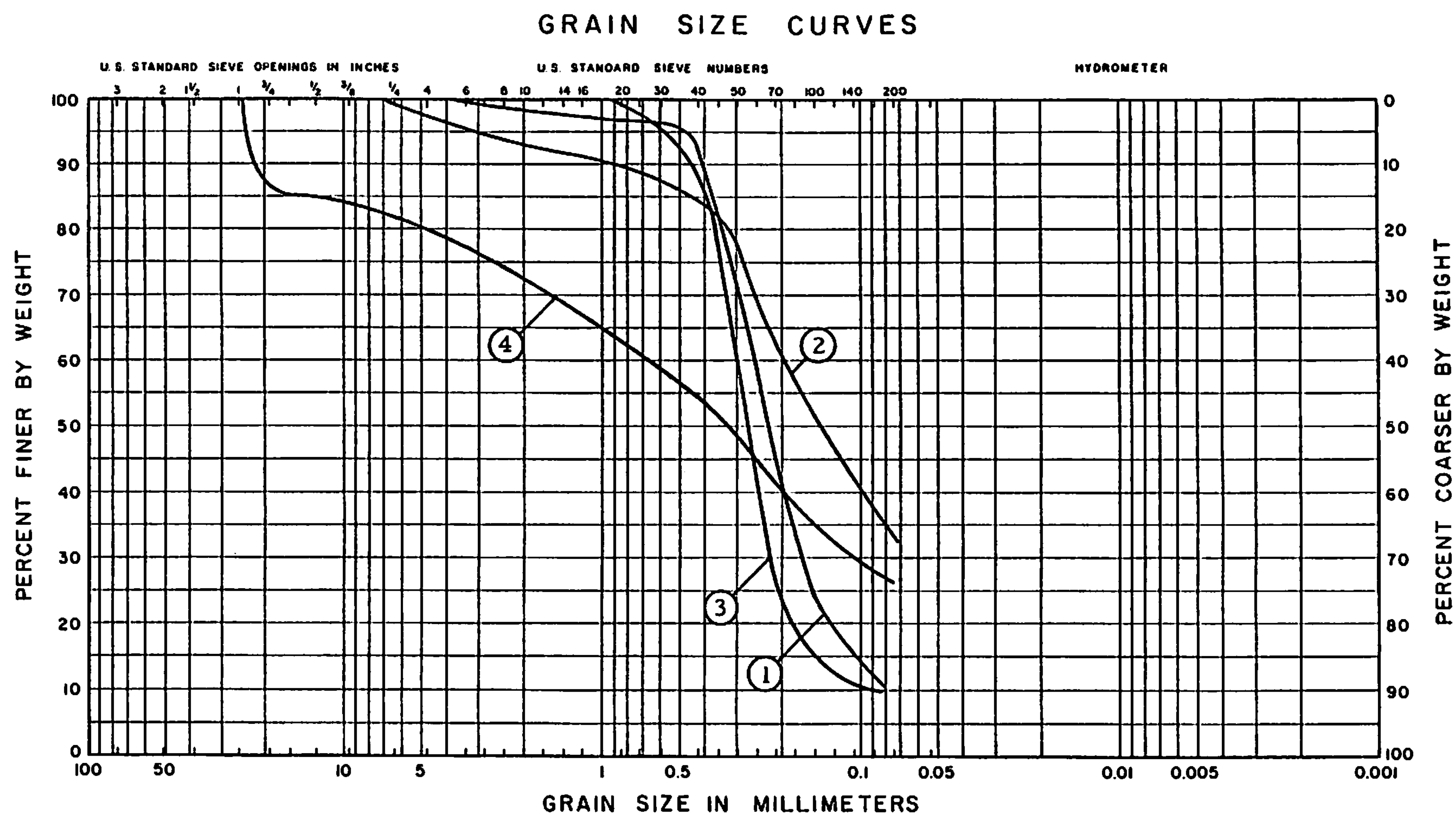


Curve No.	Boring No.	Sample No.	Depth, ft
1	CC-39	ST-3	8.5
2	CT-40	SS-1	3.0
3	CT-40	SS-2	6.0
4	CT-42	SS-1	3.0

PLATE 18



Curve No.	Boring No.	Sample No.	Depth, ft
1	CT-42	SS-2	6.0
2	CT-45	SS-1	3.0
3	CT-45	SS-2	6.0
4	AP-8	ST-1	2.5

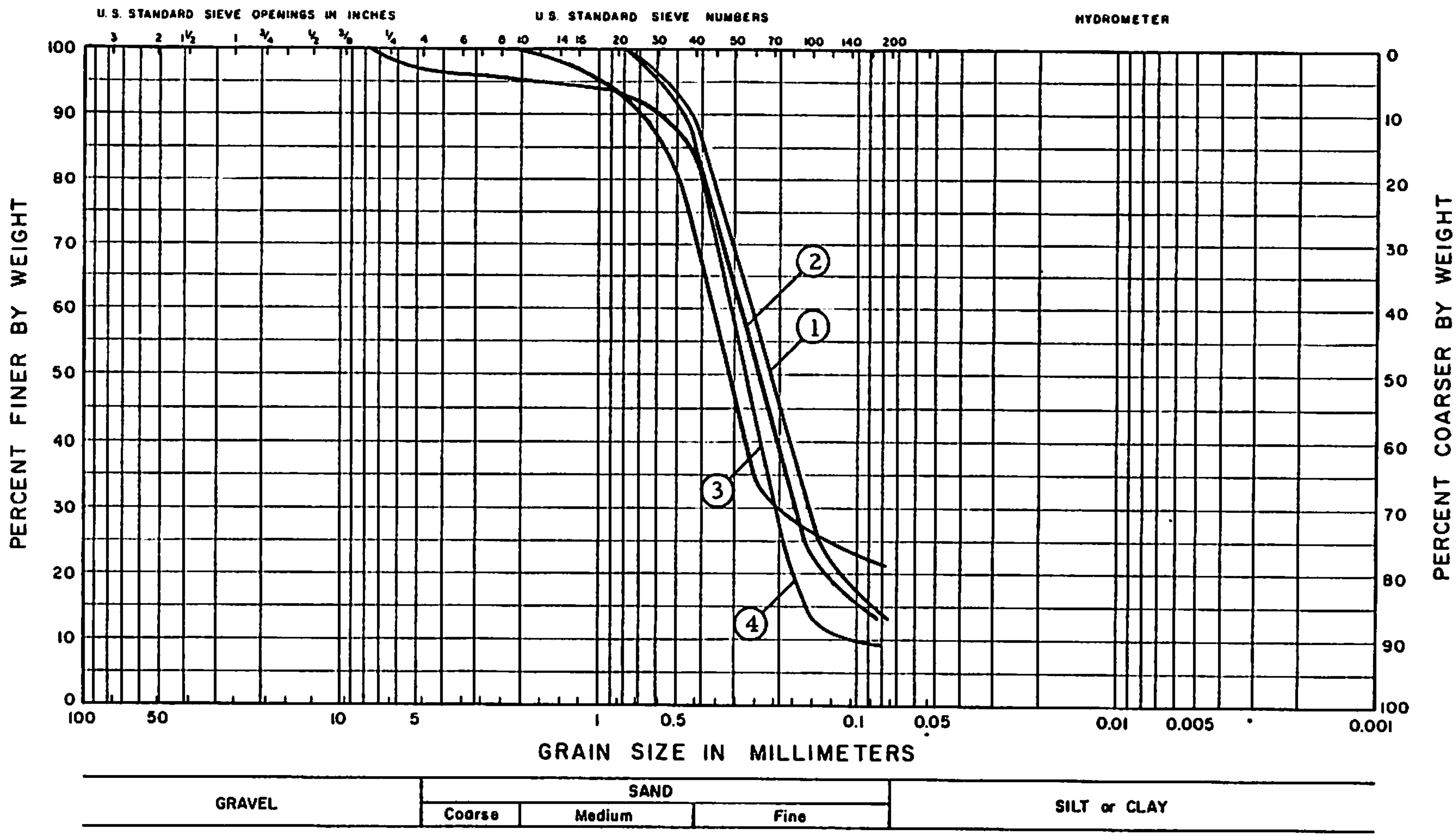


GRAVEL	SAND			SILT or CLAY
	Coarse	Medium	Fine	

Curve No.	Boring No.	Sample No.	Depth, ft
1	S-47	SS-1	3.0
2	S-47	SS-14	60.0
3	S-47	SS-16	69.0
4	S-47	SS-18	79.0

Note: All material coarser than the No. 40 sieve consists of calcareous, cemented particles for Curves 2, 3 and 4.

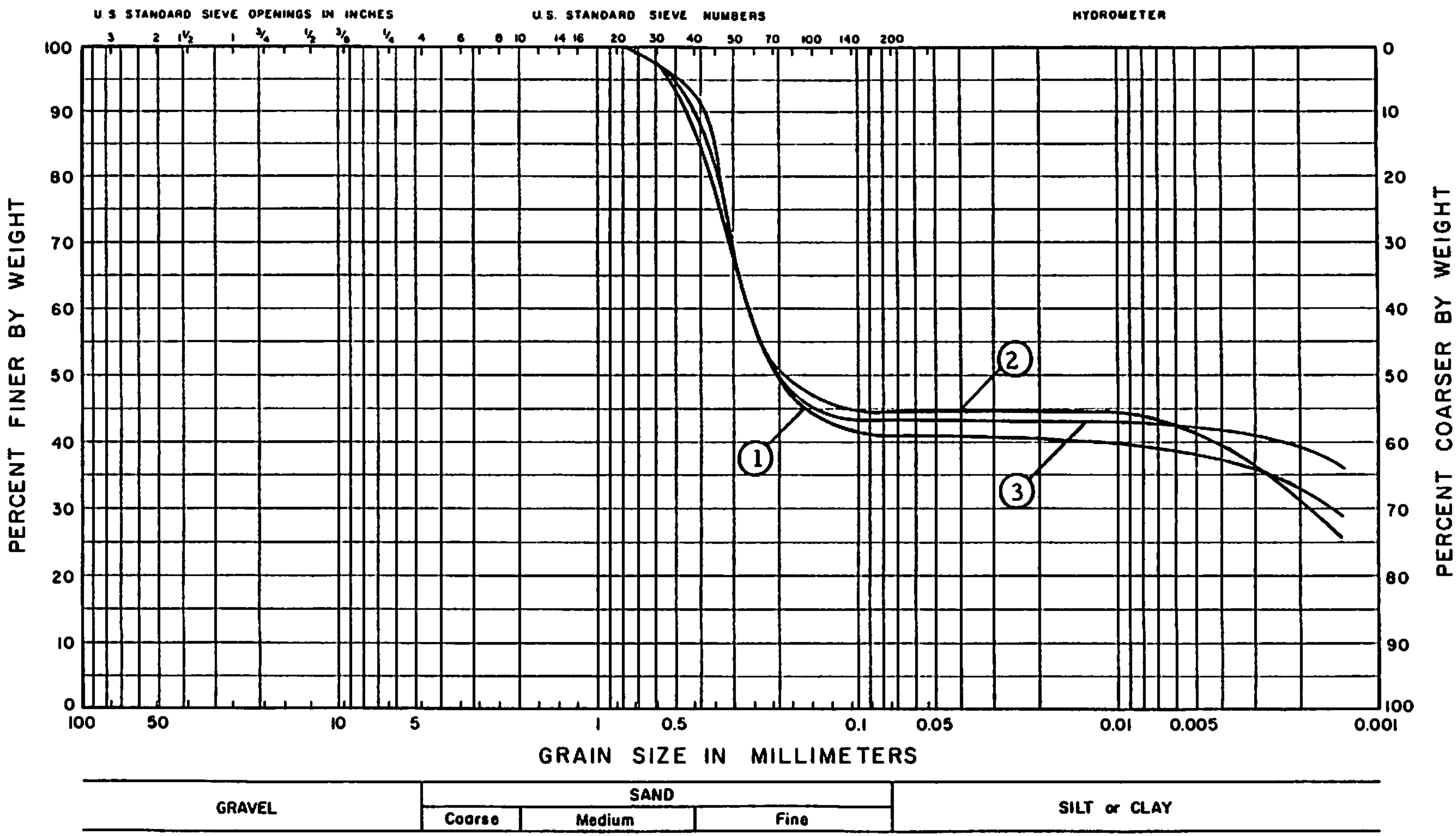
GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	U-48	SS-1	3.0
2	U-48	SS-2	6.0
3	U-48	SS-12	48.5
4	U-48	SS-16	70.0

Note: All particles coarser than the No. 60 sieve for Curve No. 4 consist of calcareous cementations.

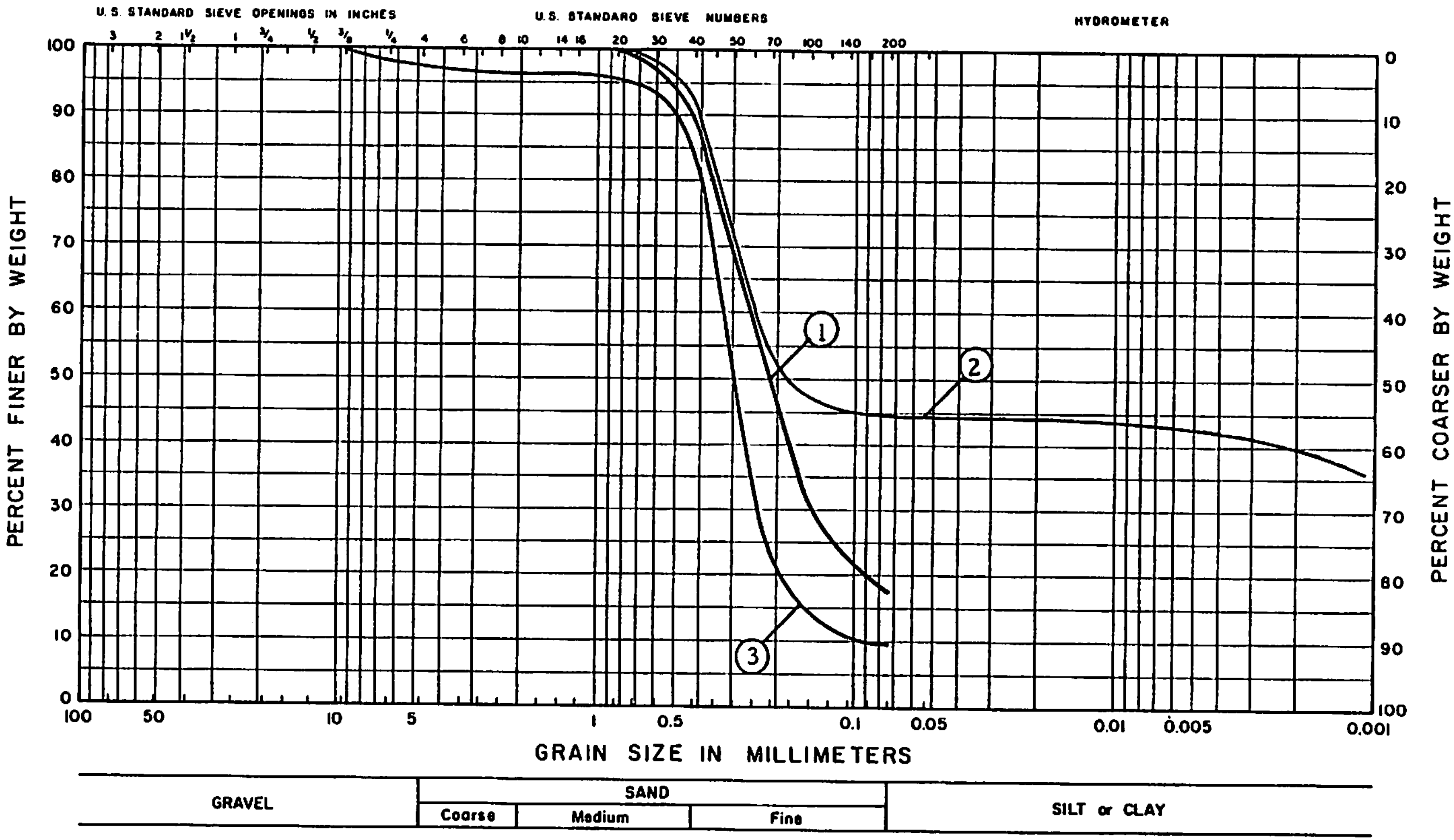
GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	U-48	ST-6	24.0
2	U-48	ST-8	34.0
3	U-49	ST-7	34.0

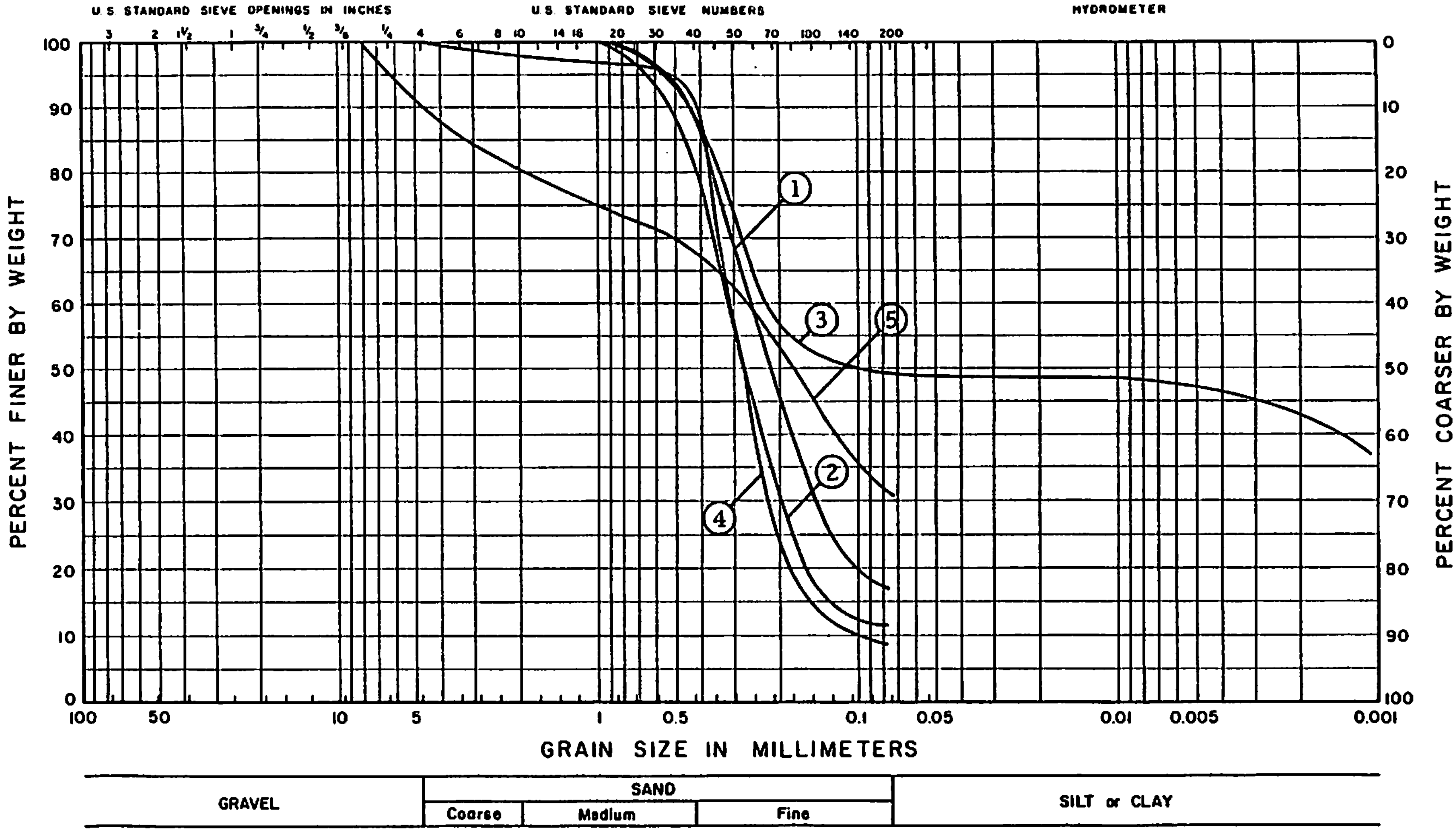
WARE LIND ENGINEERS

GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	U-49	SS-1	6.0
2	U-49	ST-7	34.0
3	U-49	SS-14	70.0

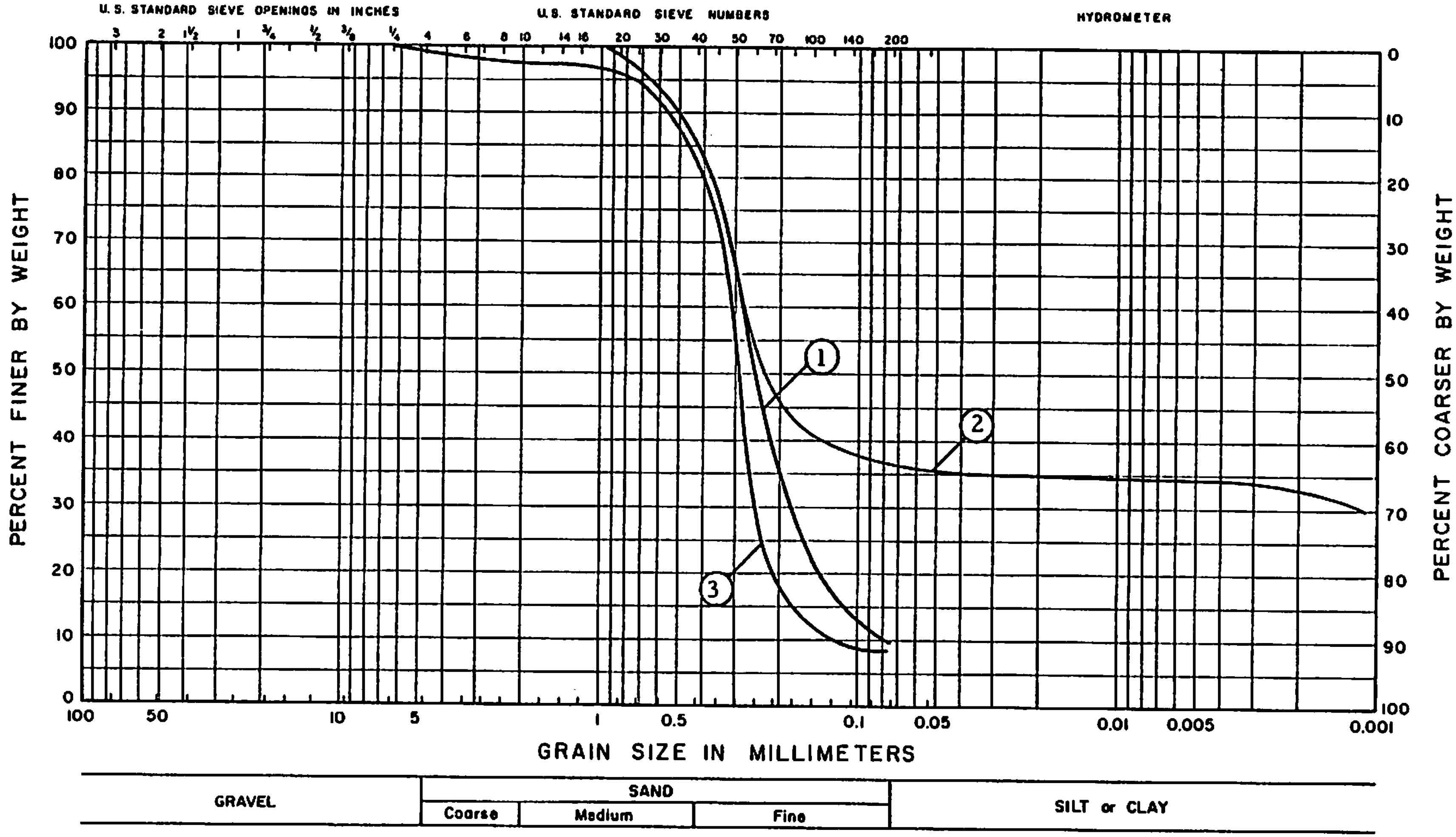
GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	U-50	SS-1	3.0
2	U-50	SS-2	6.0
3	U-50	ST-7	29.0
4	U-50	SS-16	69.5
5	U-50	SS-18	80.0

Note: Particles larger than No. 40 sieve for Curves 4 & 5 consist of calcareous cementations.

GRAIN SIZE CURVES

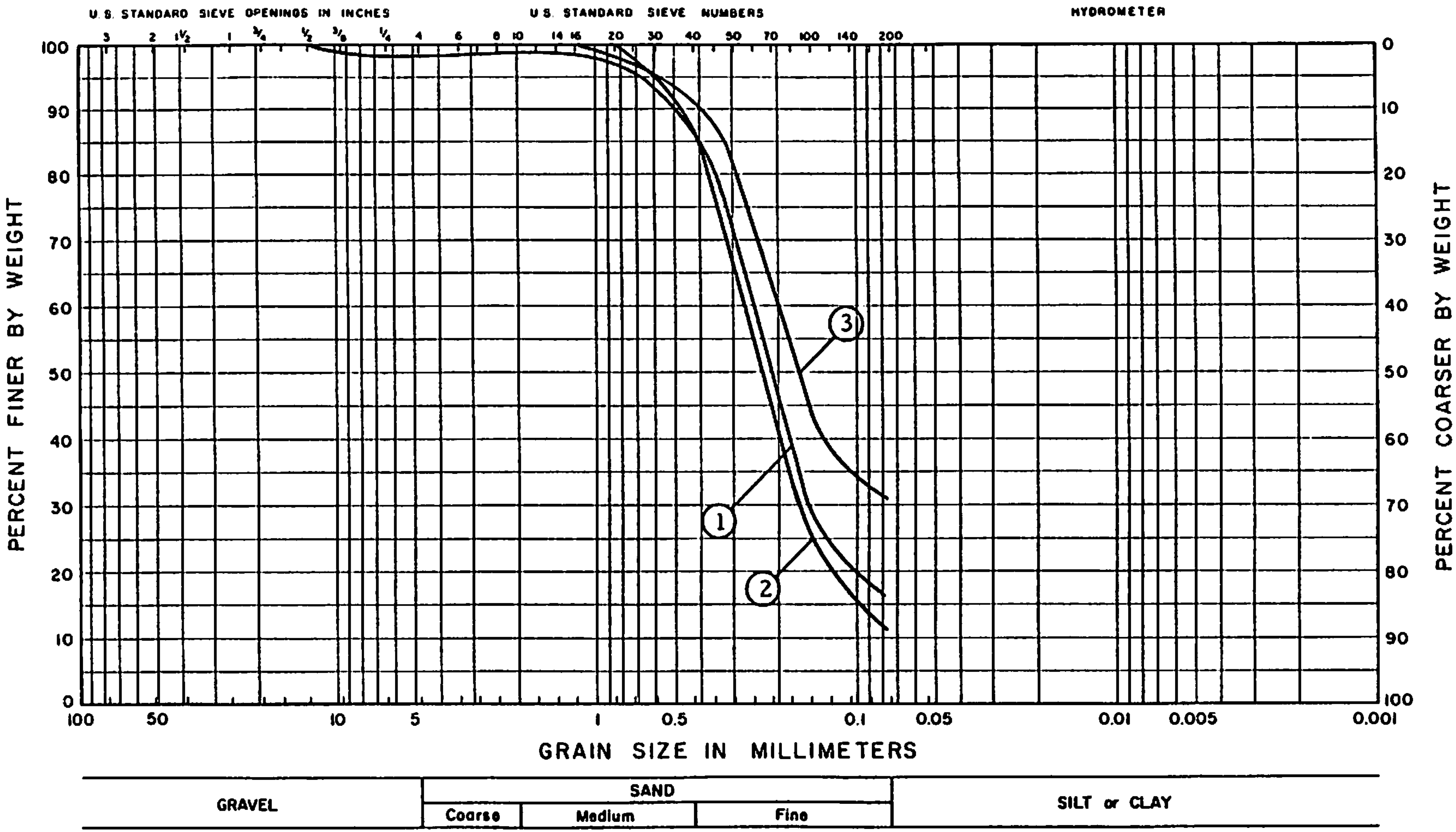


Curve No.	Boring No.	Sample No.	Depth, ft
1	U-51	SS-2	6.0
2	U-51	ST-6	25.0
3	U-51	SS-15	69.5

Note: Material coarser than the No. 20 sieve consists of cemented calcareous particles for Curve 3.

WARE LIND ENGINEERS

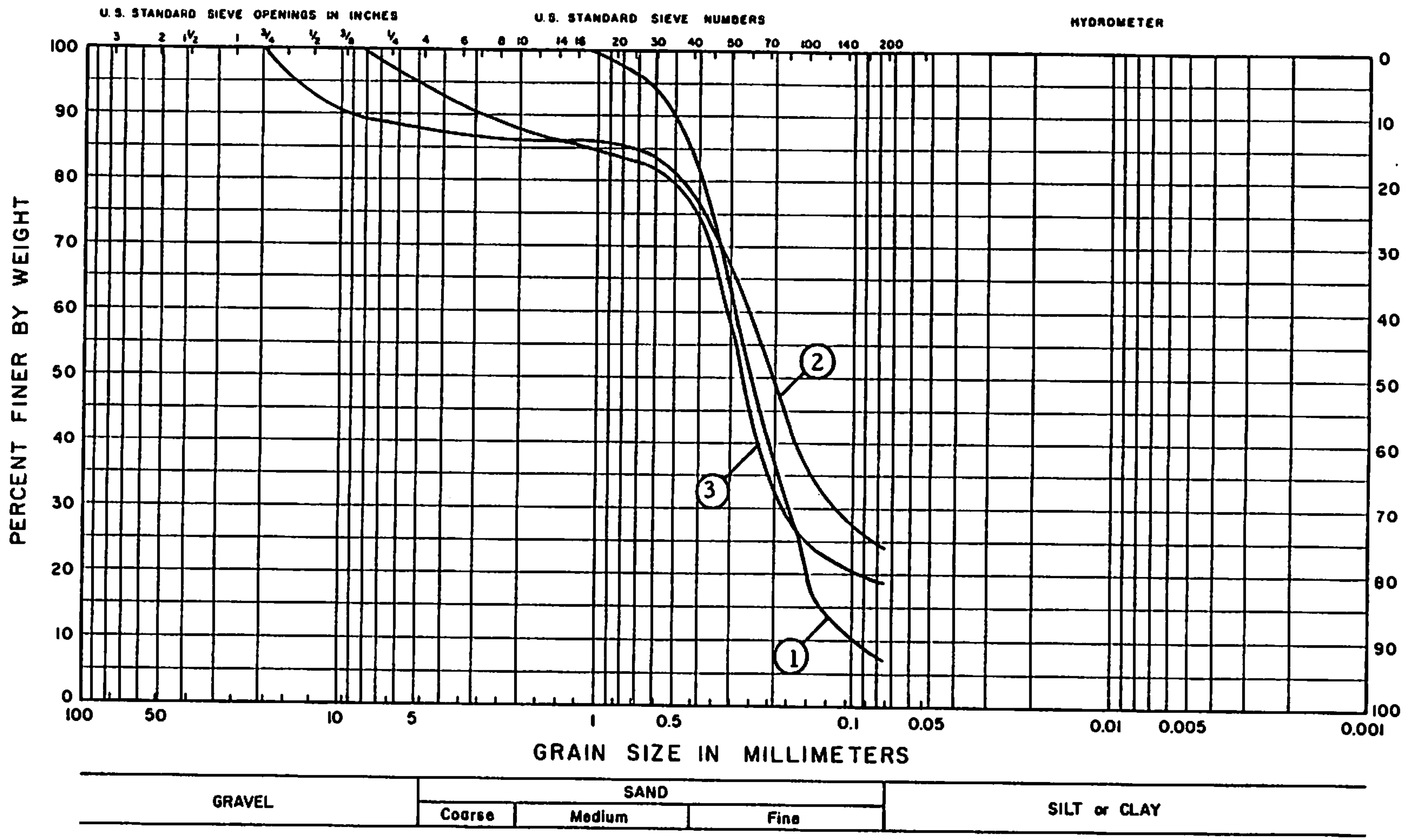
GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	U-52	SS-1	3.0
2	U-52	SS-2	6.0
3	U-52	SS 13	59.5

WARE LIND ENGINEERS

GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	U-53	SS-1	3.0
2	U-53	SS-13	59.0
3	U-53	SS-15	69.0

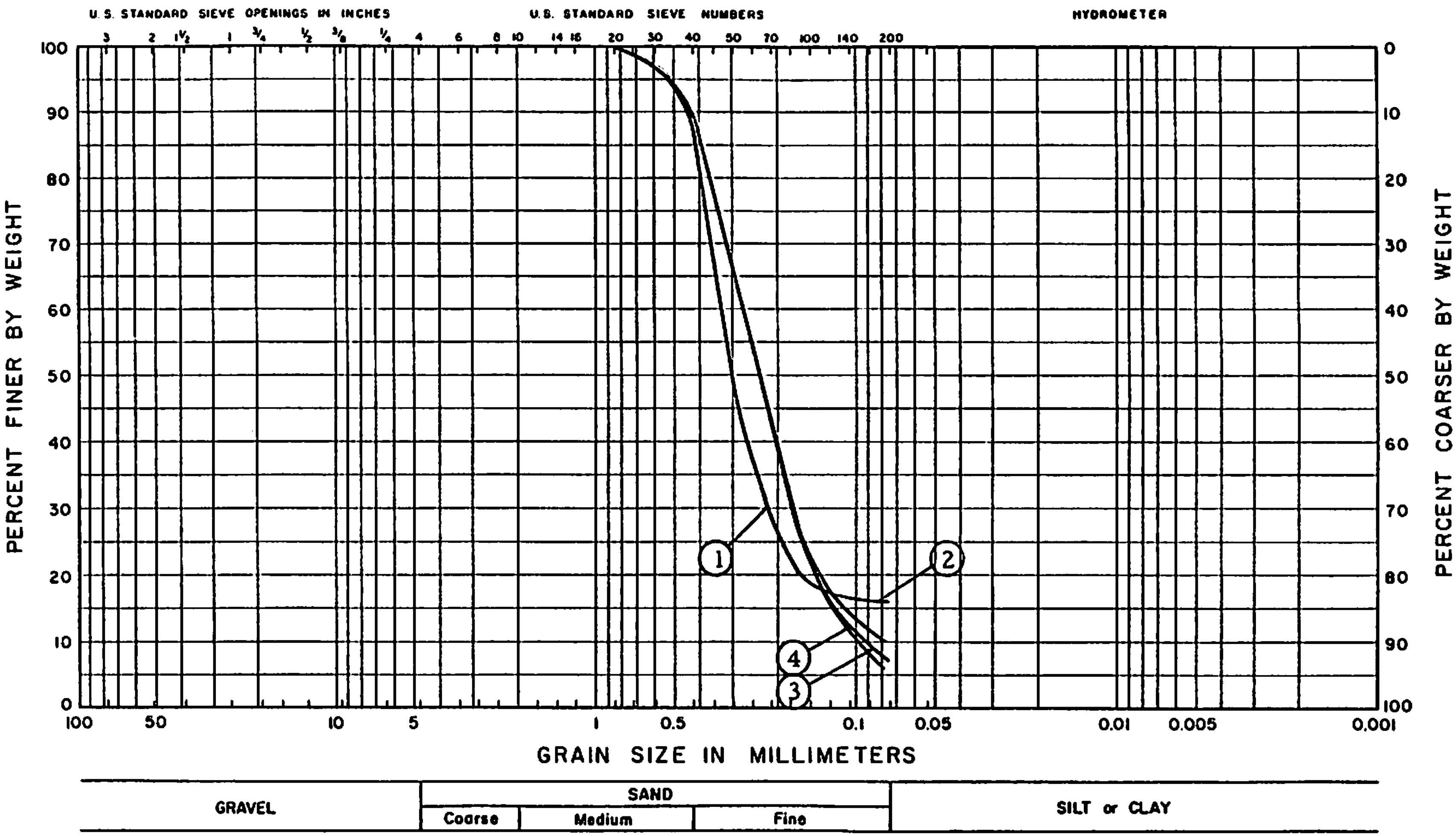
Note: Material coarser than the No. 20 sieve consists of cemented calcareous particles for Curve 2.

Material coarser than the No. 40 sieve consists of cemented calcareous particles for Curve 3.

PLATE 195

WARE LIND ENGINEERS

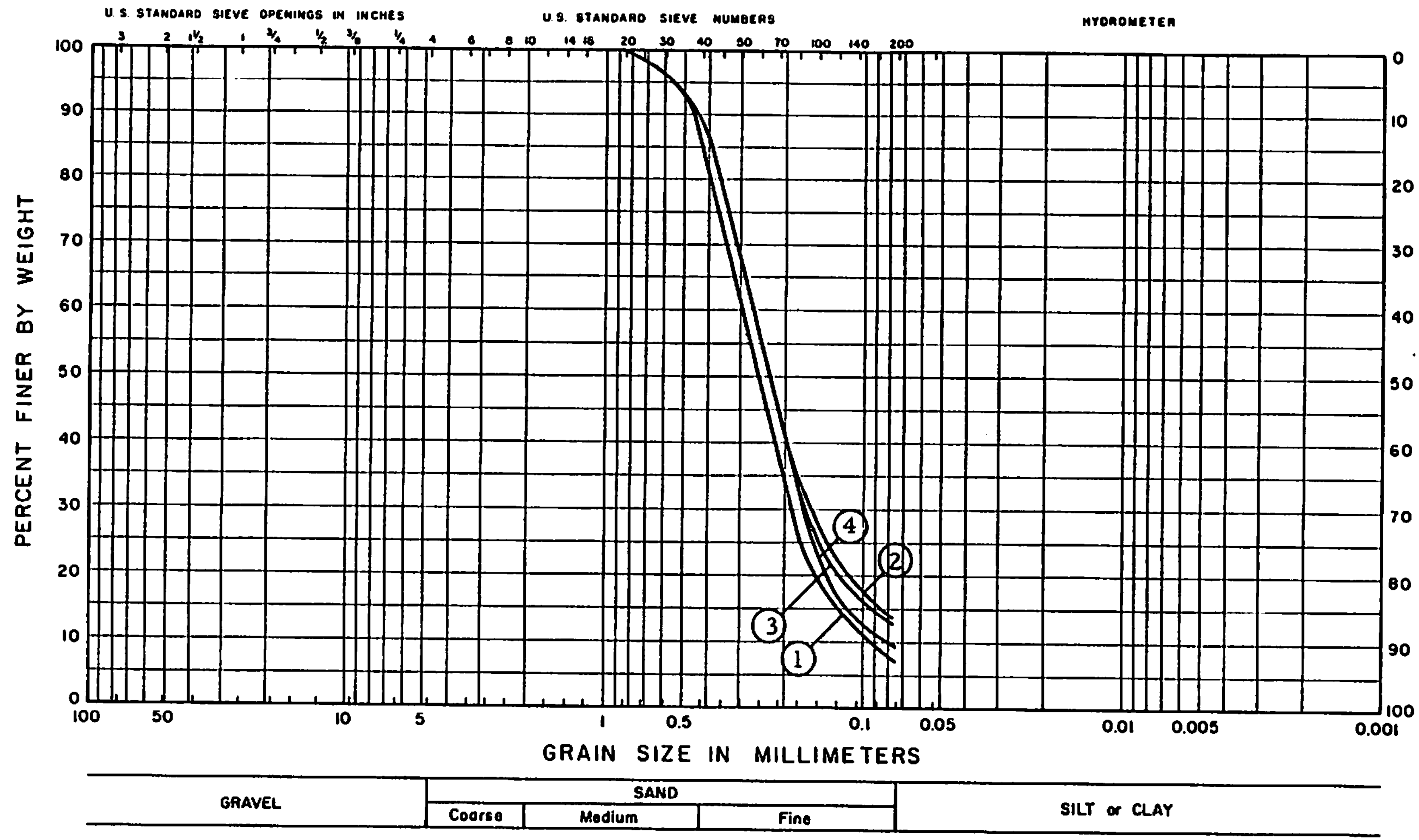
GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	AP-8	ST-3	9.0
2	CP-55	SS-1	3.0
3	CP-56	SS-2	6.0
4	CP-58	SS-2	6.0

PLATE 19c

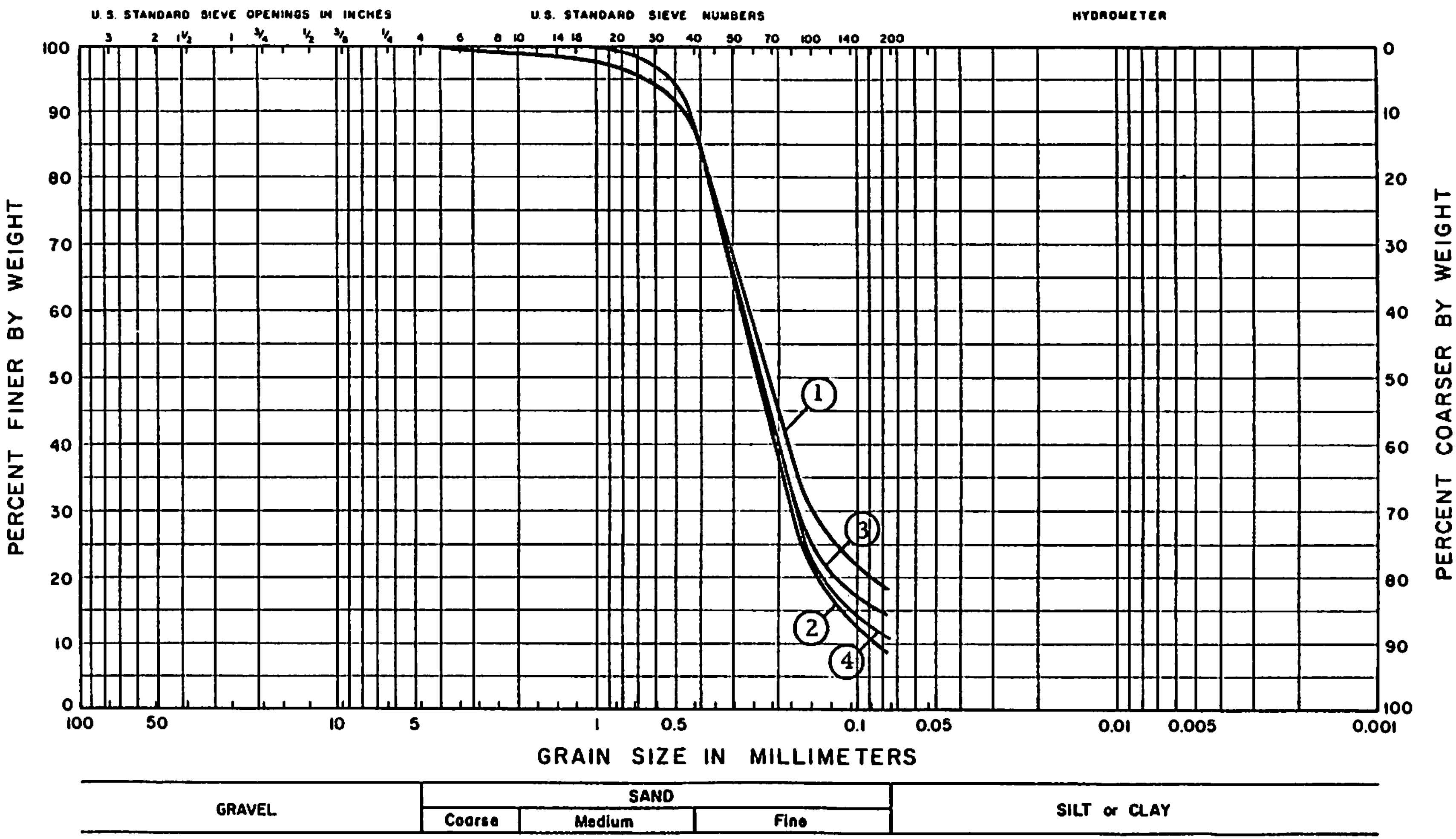
GRAIN SIZE CURVES



Curve No.	Boring No.	Sample No.	Depth, ft
1	CP-59	SS-2	6.0
2	CP-60	SS-1	3.0
3	CP-61	SS-1	3.0
4	RP-65	SS-1	3.0

77177

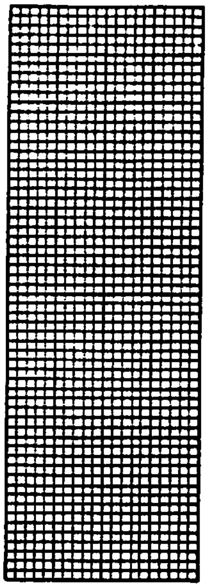
GRAIN SIZE CURVES

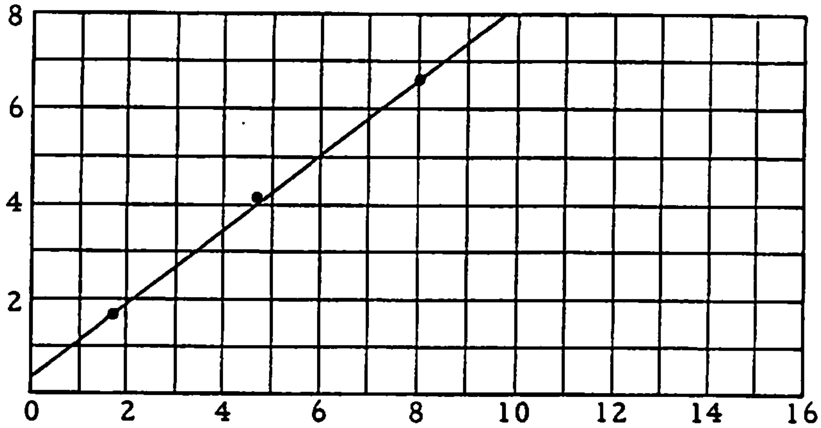


Curve No.	Boring No.	Sample No.	Depth, ft
1	RP-65	ST-3	9.5
2	FG-70	SS-1	3.0
3	FG-70	ST-2	5.5
4	FG-70	ST-3	8.5

WARE LIND Engineers

PLATE I.8





SHEAR STRENGTH PARAMETERS

ϕ = 38 Degrees

tan ϕ = 0.781

c = 0.35 Kips / sq ft

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	16.6	16.5	17.5	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb/cu ft	γ_d	97.4	98.5	99.9	
SAMPLE HEIGHT AFTER CONSOLIDATION, in.						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
NORMAL STRESS, Kips/sq ft		σ	1.71	4.68	8.02	
MAXIMUM SHEAR STRESS, Kips/sq ft		τ_{max}	1.95	4.16	6.60	
TIME TO FAILURE, min		t	15.0	22.0	33.5	
RATE OF STRAIN, in/min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips/sq ft		τ_{ult}				
DIAMETER, in.			2.50	2.50	2.50	
SIZE OF SQUARE SAMPLE, in.						
INITIAL HEIGHT, in.			0.50	0.50	0.50	

☐ CONTROLLED STRESS

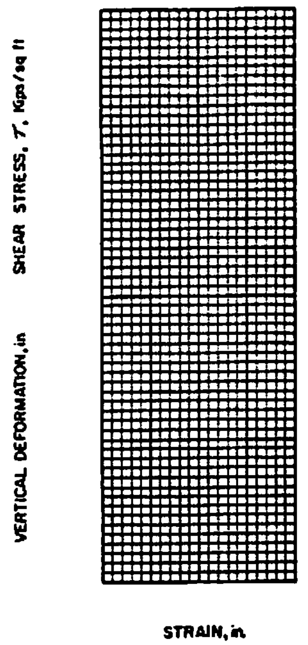
☒ CONTROLLED STRAIN

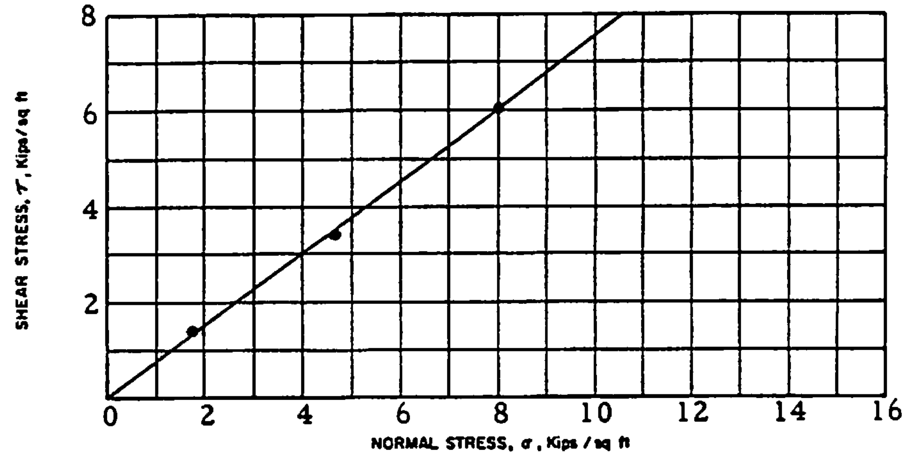
TYPE OF TEST Quick		TYPE OF SPECIMEN Undisturbed		
CLASSIFICATION Brown fine sand with organic material				
LL	PL	PI		G_s

REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. AP-8	SAMPLE NO. ST-1	DEPTH 2.5 ft	DATE 3/29/78

DIRECT SHEAR TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 37 Degrees

tan ϕ = 0.753

c = 0 Kips / sq ft

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	14.3	14.0	14.4	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb/cu ft	γ_d	116.7	117.0	110.6	
SAMPLE HEIGHT AFTER CONSOLIDATION, in						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
NORMAL STRESS, Kips/sq ft		σ	1.71	4.68	8.02	
MAXIMUM SHEAR STRESS, Kips/sq ft		τ_{max}	1.46	3.44	6.04	
TIME TO FAILURE, min		t	11.5	16.5	31.0	
RATE OF STRAIN, in/min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips/sq ft		τ_{ult}				
DIAMETER, in			2.50	2.50	2.50	
SIZE OF SQUARE SAMPLE, in						
INITIAL HEIGHT, in			0.50	0.50	0.50	

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

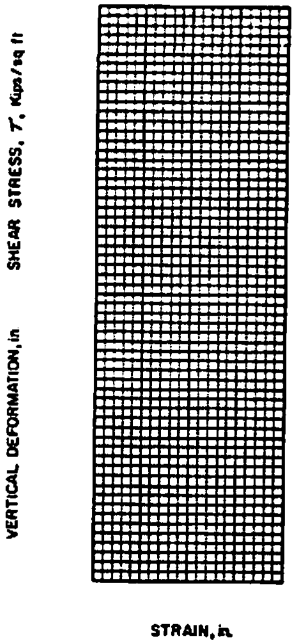
TYPE OF TEST Quick		TYPE OF SPECIMEN Undisturbed		
CLASSIFICATION Tan fine sand, slightly clayey				
LL	PL	PI		G_s

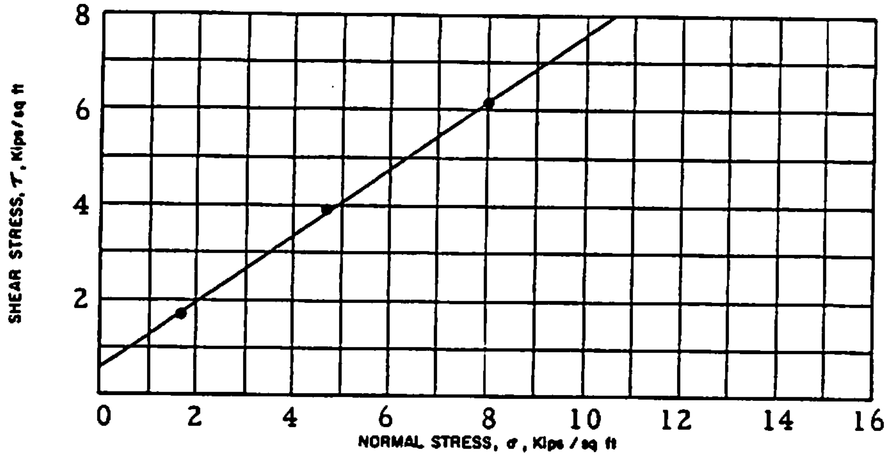
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. AP-8	SAMPLE NO. ST-3	DEPTH 9.5 ft	DATE 3/29/78

DIRECT SHEAR TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 35 Degrees

tan ϕ = 0.700

c = 0.6 Kips / sq ft

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

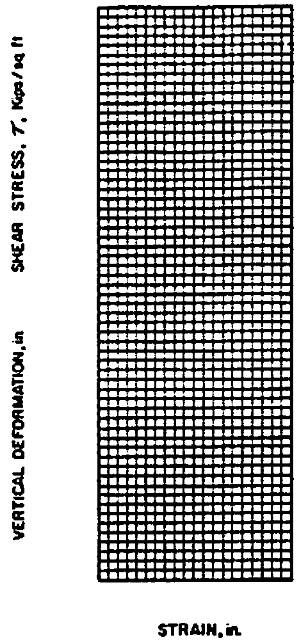
TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	10.2	13.0	13.2	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb/cu ft	γ_d	120.6	118.4	119.3	
SAMPLE HEIGHT AFTER CONSOLIDATION, in.						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
NORMAL STRESS, Kips/sq ft		σ	1.71	4.68	8.02	
MAXIMUM SHEAR STRESS, Kips/sq ft		τ_{max}	1.72	3.93	6.08	
TIME TO FAILURE, min		t	16.0	29.5	25.5	
RATE OF STRAIN, in/min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips/sq ft		τ_{ult}				
DIAMETER, in.			2.50	2.50	2.50	
SIZE OF SQUARE SAMPLE, in.						
INITIAL HEIGHT, in.			0.50	0.50	0.50	

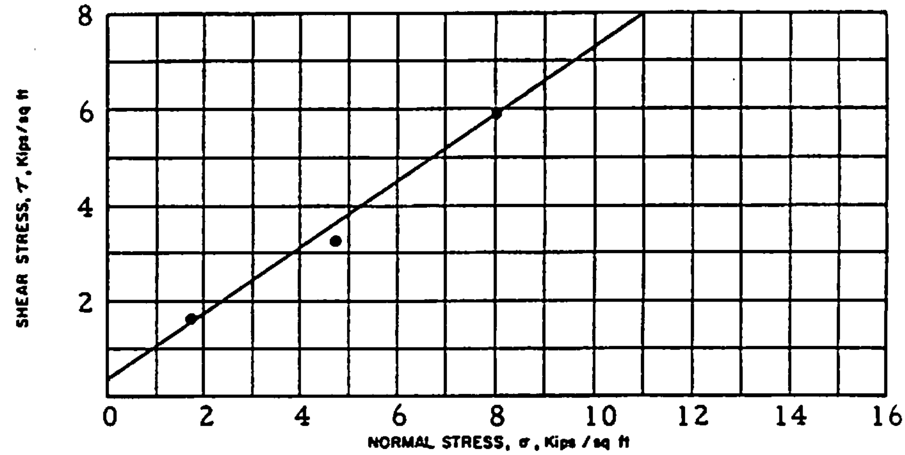
TYPE OF TEST: Quick		TYPE OF SPECIMEN: Undisturbed		
CLASSIFICATION: Light gray and tan clayey fine sand				
LL	PL	PI		G_s

REMARKS

PROJECT: DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. CC-38	SAMPLE NO. ST-3	DEPTH 9.5 ft	DATE 3/28/78

DIRECT SHEAR TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 35 Degrees

tan ϕ = 0.700

c = 0.35 Kips / sq ft

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	14.3	17.0	13.4	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb/cu ft	γ_d	113.0	111.6	119.4	
SAMPLE HEIGHT AFTER CONSOLIDATION, in.						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
NORMAL STRESS, Kips/sq ft		σ	1.71	4.68	8.02	
MAXIMUM SHEAR STRESS, Kips/sq ft		τ_{max}	1.68	3.24	7.57	
TIME TO FAILURE, min		t	14.5	26.0	42.0	
RATE OF STRAIN, in/min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips/sq ft		τ_{ult}				
DIAMETER, in.			2.50	2.50	2.50	
SIZE OF SQUARE SAMPLE, in.						
INITIAL HEIGHT, in.			0.50	0.50	0.50	

TYPE OF TEST	Quick	TYPE OF SPECIMEN	Undisturbed
CLASSIFICATION	Light gray and tan clayey fine sand with traces of organic material		

LL	PL	PI		G_s

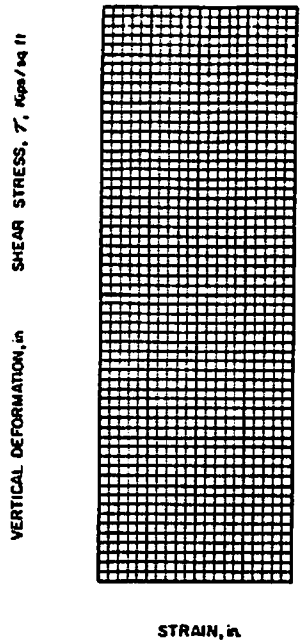
REMARKS

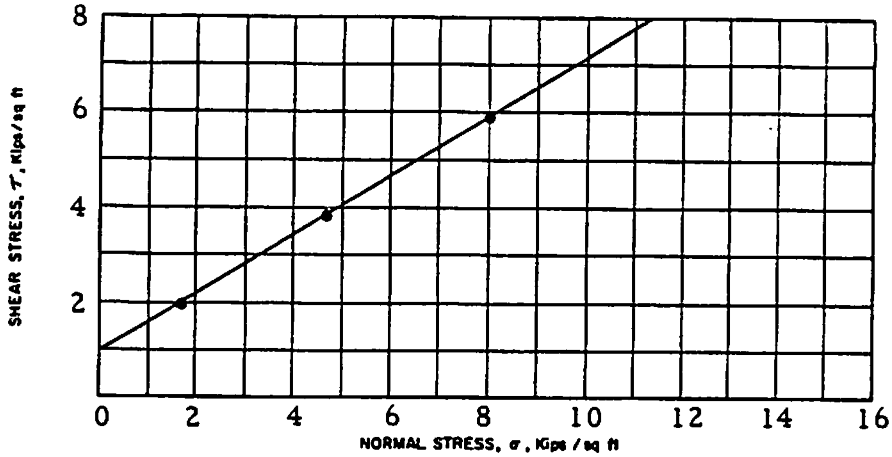
PROJECT	DEERHAVEN POWER PLANT
	GAINESVILLE, FLORIDA

BORING NO.	SAMPLE NO.	DEPTH	DATE
CC-39	ST-3	9.5 ft	3/29/78

DIRECT SHEAR TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 32 Degrees

tan ϕ = 0.625

c = 1.0 Kips / sq ft

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	16.4	16.0	16.5	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb/cu ft	γ_d	110.4	111.0	113.0	
SAMPLE HEIGHT AFTER CONSOLIDATION, in.						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
NORMAL STRESS, Kips/sq ft		σ	1.71	4.68	8.02	
MAXIMUM SHEAR STRESS, Kips/sq ft		τ_{max}	1.98	3.82	5.85	
TIME TO FAILURE, min		t	14.0	17.0	21.5	
RATE OF STRAIN, in/min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips/sq ft		τ_{ult}				
DIAMETER, in.			2.50	2.50	2.50	
SIZE OF SQUARE SAMPLE, in.						
INITIAL HEIGHT, in.			0.50	0.50	0.50	

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

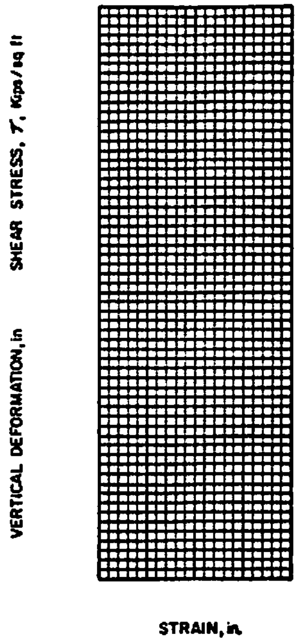
TYPE OF TEST Quick		TYPE OF SPECIMEN Undisturbed		
CLASSIFICATION Tan fine sand, slightly clayey				
LL	PL	PI		G_s

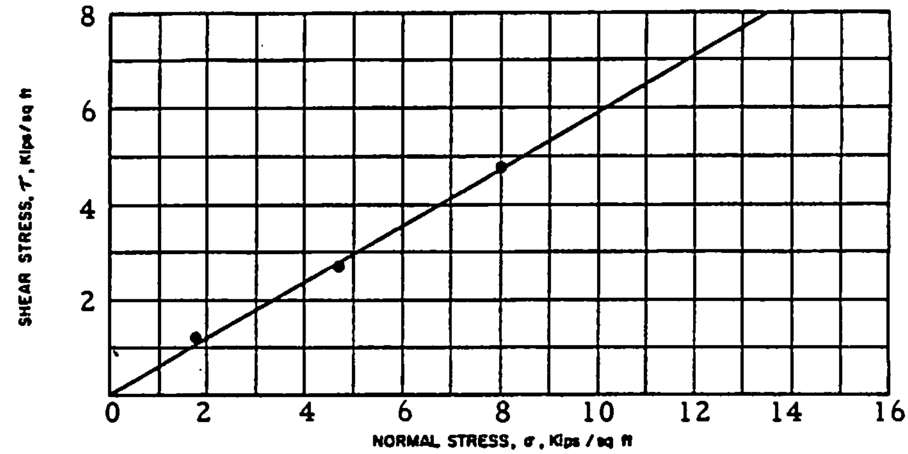
REMARKS

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO. FG-70	SAMPLE NO. ST-2	DEPTH 5.5 ft	DATE 3/31/78

DIRECT SHEAR TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 30.5 Degrees

tan ϕ = 0.589

c = 0 Kips / sq ft

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	0	0	0	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb/cu ft	γ_d	89.0	89.0	89.0	
SAMPLE HEIGHT AFTER CONSOLIDATION, in.						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
NORMAL STRESS, Kips/sq ft		σ	1.71	4.68	8.02	
MAXIMUM SHEAR STRESS, Kips/sq ft		τ_{max}	1.22	2.71	4.76	
TIME TO FAILURE, min		t	23.5	25.0	44.5	
RATE OF STRAIN, in/min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips/sq ft		τ_{ult}				
DIAMETER, in.			2.5	2.5	2.5	
SIZE OF SQUARE SAMPLE, in.						
INITIAL HEIGHT, in.			0.5	0.5	0.5	

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

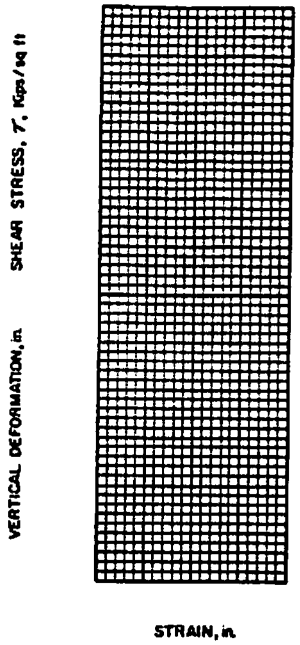
TYPE OF TEST Quick			TYPE OF SPECIMEN Remolded	
CLASSIFICATION Tan fine sand				
LL	PL	PI		G_s

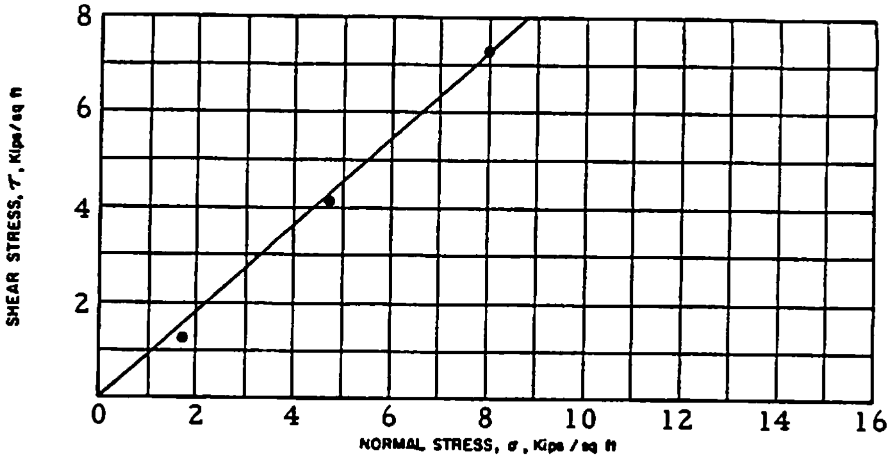
REMARKS These tests represent samples compacted to 0% relative density

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO.	SAMPLE NO. Bag 1	DEPTH 11.0 ft	DATE 3/22/78

DIRECT SHEAR TEST RESULTS

WARE LIND ENGINEERS





SHEAR STRENGTH PARAMETERS

ϕ = 42.5 Degrees

tan ϕ = 0.916

c = 0 Kips / sq ft

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	0	0	0	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	115.5	115.5	115.5	
SAMPLE HEIGHT AFTER CONSOLIDATION, in.						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
NORMAL STRESS, Kips / sq ft		σ	1.71	4.68	8.02	
MAXIMUM SHEAR STRESS, Kips/sq ft		τ_{max}	1.27	4.11	7.26	
TIME TO FAILURE, min		t	10.0	17.0	29.0	
RATE OF STRAIN, in / min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips / sq ft		τ_{ult}				
DIAMETER, in.			2.50	2.50	2.50	
SIZE OF SQUARE SAMPLE, in.						
INITIAL HEIGHT, in.			0.50	0.50	0.50	

☐ CONTROLLED STRESS

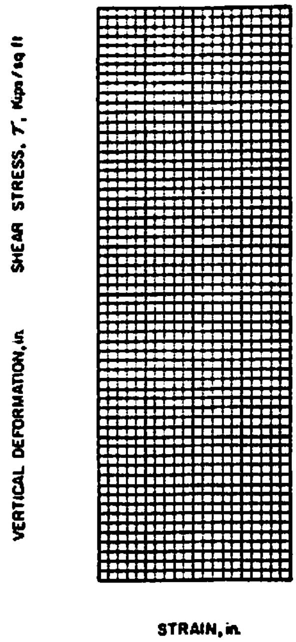
☒ CONTROLLED STRAIN

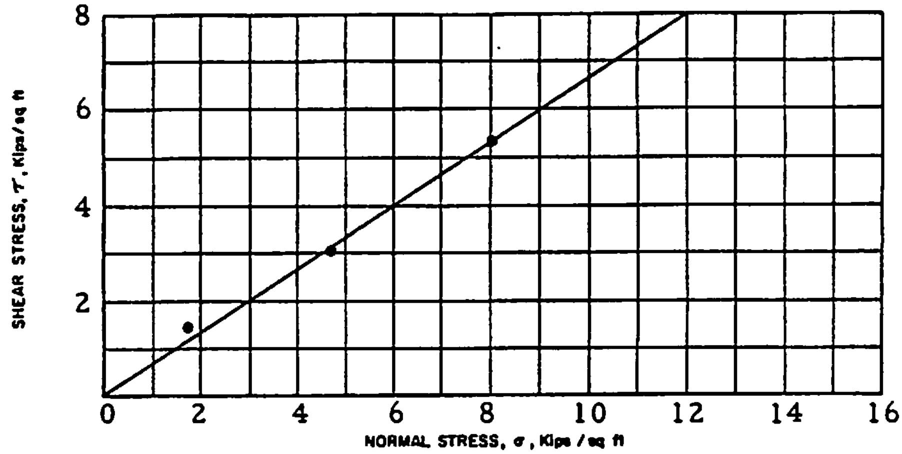
TYPE OF TEST Quick			TYPE OF SPECIMEN Remolded	
CLASSIFICATION Tan fine sand				
LL	PL	PI		G_s

REMARKS These tests represent samples compacted to 100% relative density

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO.	SAMPLE NO. Bag 1	DEPTH 11.0 ft	DATE 3/24/78

DIRECT SHEAR TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 33.5 Degrees

tan ϕ = 0.662

c = 0 Kips / sq ft

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	0	0	0	
	VOID RATIO	e_o				
	SATURATION, %	S_o				
	DRY DENSITY, lb / cu ft	γ_d	88.5	88.5	88.5	
SAMPLE HEIGHT AFTER CONSOLIDATION, in.						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
	VOID RATIO	e_f				
NORMAL STRESS, Kips / sq ft		σ	2.0	6.0	12.0	
MAXIMUM SHEAR STRESS, Kips / sq ft		τ_{max}	1.48	3.02	5.39	
TIME TO FAILURE, min		t	35.0	20.5	29.0	
RATE OF STRAIN, in / min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips / sq ft		τ_{ult}				
DIAMETER, in.			2.50	2.50	2.50	
SIZE OF SQUARE SAMPLE, in.						
INITIAL HEIGHT, in.			0.50	0.50	0.50	

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

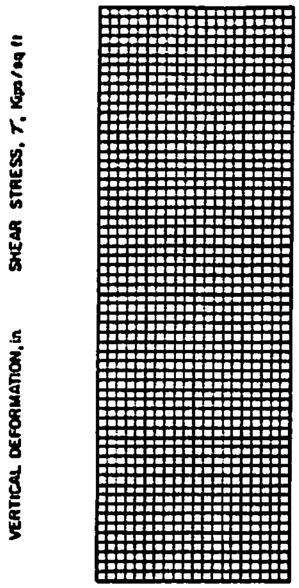
TYPE OF TEST	Quick	TYPE OF SPECIMEN	Remolded
CLASSIFICATION	Tan fine sand		
LL	PL	PI	G_s

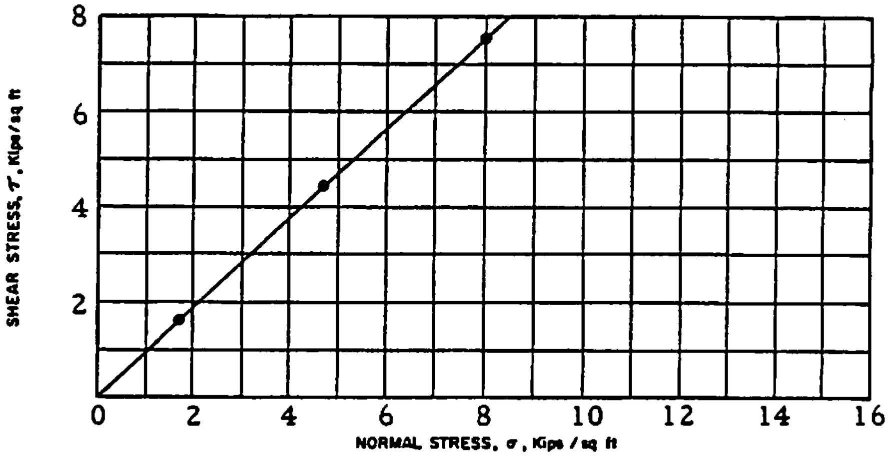
REMARKS

These tests represent samples compacted to 0% relative density

PROJECT	DEERHAVEN POWER PLANT		
	GAINESVILLE, FLORIDA		
BORING NO.	SAMPLE NO. Bag 2	DEPTH 11.0 ft	DATE 3/24/78

DIRECT SHEAR TEST RESULTS





SHEAR STRENGTH PARAMETERS

ϕ = 43.5 Degrees

tan ϕ = 0.949

c = 0 Kips / sq ft

TEST NO.			1	2	3	
INITIAL	WATER CONTENT, %	w_o	0	0	0	
INITIAL	VOID RATIO	e_o				
INITIAL	SATURATION, %	S_o				
INITIAL	DRY DENSITY, lb/cu ft	γ_d	114.0	114.0	114.0	
SAMPLE HEIGHT AFTER CONSOLIDATION, in.						
VOID RATIO AFTER CONSOLIDATION						
t_{50}, min						
FINAL	WATER CONTENT, %	w_f				
FINAL	VOID RATIO	e_f				
NORMAL STRESS, Kips/sq ft		σ	1.71	4.68	8.01	
MAXIMUM SHEAR STRESS, Kips/sq ft		τ_{max}	1.63	4.44	7.54	
TIME TO FAILURE, min		t	9.5	21.0	25.0	
RATE OF STRAIN, in/min			0.009	0.009	0.009	
ULTIMATE SHEAR STRESS, Kips/sq ft		τ_{ult}				
DIAMETER, in.			2.50	2.50	2.50	
SIZE OF SQUARE SAMPLE, in.						
INITIAL HEIGHT, in.			0.50	0.50	0.50	

☐ CONTROLLED STRESS

☒ CONTROLLED STRAIN

TYPE OF TEST Quick			TYPE OF SPECIMEN Remolded	
CLASSIFICATION Tan fine sand				
LL	PL	PI		G_s

REMARKS

These tests represent samples compacted to 100% relative density

PROJECT DEERHAVEN POWER PLANT			
GAINESVILLE, FLORIDA			
BORING NO.	SAMPLE NO. Bag 2	DEPTH 11.0 ft	DATE 3/24/78

DIRECT SHEAR TEST RESULTS

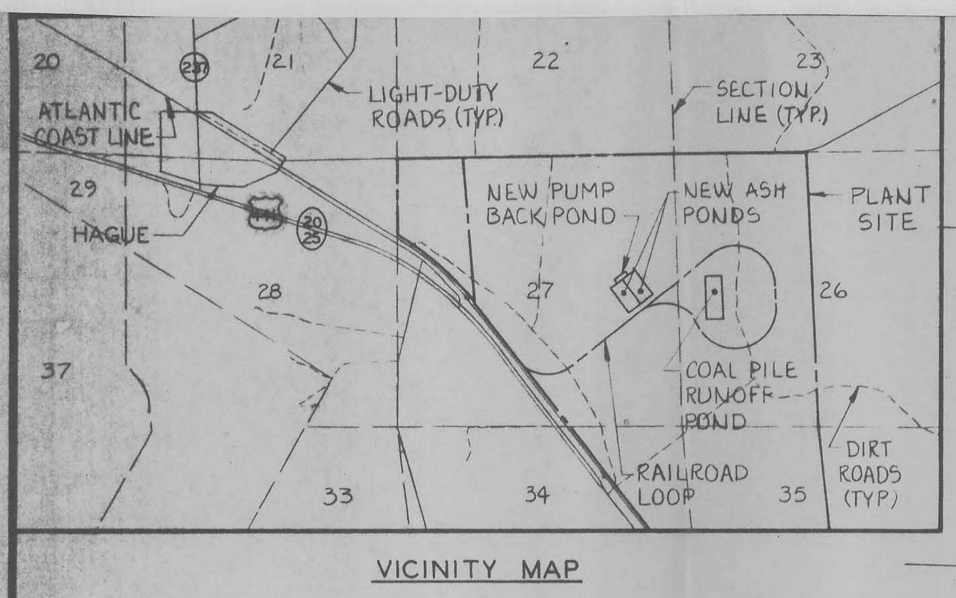
WARE LIND ENGINEERS

Ware Lind Engineers
Form No. 211 (73)

Project Deerhaven Power Plant Gainesville, Florida   Job No. 77177   Date

Test No.	1	2	3	4	5	6				
Depth (ft)	11	11	11	11	11	11				
Location	Bag 1 TH-29	Bag 1 TH-29	Bag 1 TH-29	Bag 2 TH-29	Bag 2 TH-29	Bag 2 TH-29				
Description	fine sand	fine sand	fine sand	fine sand	fine sand	fine sand				
Field Density, γ_f										
Wet Wt. Sple + Tare										
Tare										
Wet Wt. Sple										
Wet Density, pcf										
Wet Wt. Sple + Tare										
Dry Wt. Sple + Tare										
Tare										
Wt Dry Sple										
Water Content, %										
Dry Density, γ_f, pcf										
Minimum Density										
Wt. Dry Sple + Tare	315.31	312.99	314.75	313.10	312.09	312.78				
Tare	134.87	134.87	134.87	134.87	134.87	134.87				
Wt. Dry Sple	180.44	178.12	179.88	178.23	177.22	177.91				
γ min., pcf	90.22	89.06	89.94	89.12	88.61	89.0				
Maximum Density										
Wt. Dry Sple + Tare	349.16	361.93	366.15	362.82	361.21	358.39				
Tare	134.87	134.87	134.87	134.87	134.87	134.87				
Wt. Dry Sple	214.29	227.06	231.28	227.95	226.34	223.52				
γ max, pcf	107.15	113.50	115.60	113.98	113.17	111.76				

Remarks:



VICINITY MAP

LEGEND

EXISTING		THIS CONTRACT
180	CONTOURS	
	ROADS	
	STRUCTURES	
	FENCES	
	PROPERTY LINE	
	TRAIL	
	RAILROAD	
	SAMPLE BORING	
	SAMPLE BORING WITH PIEZOMETER	

DETAIL A

BORING COORDINATES			
BORING NO.	N. COORD.	E. COORD.	ELEV.
L-1	N14000	E6425	179
L-2	N13100	E6440	180
L-3	N12100	E6430	180
L-4	N14100	E7380	182
L-5	N13100	E7400	183
L-6	N14050	E8350	185
L-7	N13150	E8380	185
AP-8	N12725	E8400	183
AP-9	N12550	E8800	182
AP-10	N12300	E8830	181
AP-11	N12000	E8450	182
AP-12	N12350	E8200	182
AP-13	N12380	E8500	183
RR-14	N10550	E6900	177
RR-15	N10950	E7730	177
RR-16	N11320	E7800	178
RR-17	N11700	E8200	180
RR-18	N12060	E8700	181
RR-19	N12460	E9200	182
RR-20	N12900	E9750	182
RR-21	N13180	E10375	187
RR-22	N12770	E10980	188
RR-23	N11620	E10900	187
RR-24	N11340	E10420	186
RR-25	N12050	E9100	178
TH-26	N12160	E11040	189
TH-27	N12220	E11080	189
TH-28	N12340	E11080	189
TH-29	N12280	E11065	189
SH-30	N12000	E10700	187
CS-31	N12220	E10470	187
CS-32	N12000	E10500	187
CS-33	N11800	E10500	187
CS-34	N11600	E10500	187
CH-35	N11200	E10500	186
CC-36	N11000	E10500	184
CC-37	N10800	E10500	184
CC-38	N10600	E10500	184
CC-39	N10400	E10500	184
CT-40	N11080	E10590	185
CT-41	N11000	E10650	185
CT-42	N10920	E10590	185
CT-43	N10840	E10650	185
CT-44	N10760	E10590	185
CT-45	N10680	E10650	185
S-46	N10550	E10360	184
S-47	N10550	E10410	184
U-48	N10450	E10350	184
U-49	N10450	E10450	184
U-50	N10375	E10400	184
U-51	N10250	E10400	184
U-52	N10100	E10450	184
U-53	N10100	E10350	184
CP-54	NOT	DRILLED	
CP-55	N12600	E10100	188
CP-56	N12400	E10020	187
CP-57	N12400	E9800	185
CP-58	N12150	E10000	186

BORING NO.	N. COORD.	E. COORD.	ELEV.
CP-59	N12150	E9800	185
CP-60	N11900	E9850	185
CP-61	N11900	E10000	186
RP-62	NOT	DRILLED	
RP-63	NOT	DRILLED	
RP-64	N11680	E8930	176
RP-65	N11150	E9100	178
FS-66	N11350	E9670	186
LH-67	N11150	E9680	182
C-68	N11140	E10250	184
WW-69	N11140	E10400	184
FG-70	N10650	E10400	184
FG-71	N10800	E10400	184
FG-72	N10950	E10400	184
U-73	N10500	E10380	184

M-2-3-1 011874

NO.	DATE	BY	REVISION

DEERHAVEN GENERATING STATION UNIT 2

CITY OF GAINESVILLE/ GAINESVILLE-ALACHUA COUNTY REGIONAL UTILITIES BOARD

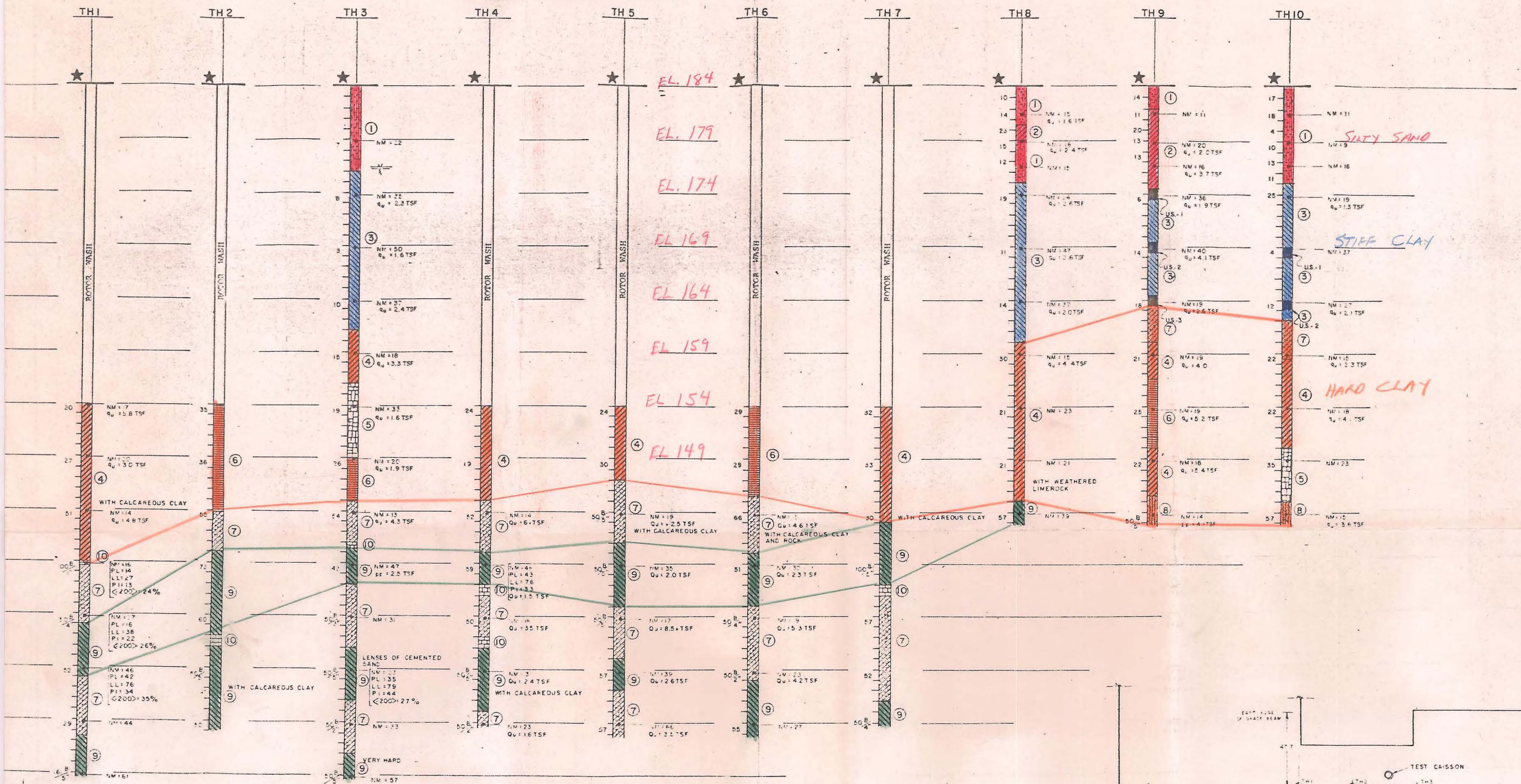
FLORIDA

BORING LOCATION PLAN

Burns & McDonnell
Engineers - Architects - Consultants
KANSAS CITY, MISSOURI

DATE	1-31-78	DRAWING NO.	1 —
DESIGNED	J.J.Z.		
DETAILED	S.M.K.	PROJECT	
CHECKED		SHEET OF SHEETS	

SOIL PROFILES



SOIL LEGEND

① GRAY TO TAN SLIGHTLY SILTY TO SLIGHTLY CLAYEY FINE TO MEDIUM SAND

② LIGHT GRAY TO BROWN CLAYEY FINE TO MEDIUM SAND

③ LIGHT ~~GREEN~~ BLUE GRAY TO LIGHT GRAY SLIGHTLY SANDY TO SANDY CLAY

④ LIGHT GRAY AND YELLOWISH BROWN TAN SANDY CLAY

⑤ SOFT TO MEDIUM WHITE TO TAN DECOMPOSED LIMEROCK AND CALCAREOUS CLAY

⑥ BLUISH-GREEN TO GRAY SANDY CLAY

⑦ HARD LIGHT GRAY TO LIGHT-GREENISH, GRAY CLAYEY FINE TO MEDIUM SANDS WITH COARSE SAND

⑧ TAN TO WHITE SANDY CLAY

⑨ HARD OLIVE GREEN TO LIGHT GRAY SLIGHTLY SANDY CLAY

ENGINEERING CLASSIFICATION

I COHESIONLESS SOILS (SANDS)

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	0 to 4
LOOSE	4 to 10
MEDIUM DENSE	10 to 30
DENSE	30 to 50
VERY DENSE	50 to 100
REFUSAL FOR STANDARD PENETRATION EQUIPMENT	100+

II–COHESIVE SOILS (CLAYS)

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, qu, tsf	BLOW COUNT "N"
VERY SOFT	< 1/4	0 to 2
SOFT	1/4 to 1/2	2 to 4
MEDIUM STIFF	1/2 to 1	4 to 8
STIFF	1 to 2	8 to 15
VERY STIFF	2 to 4	15 to 30
HARD	> 4	> 30

LABORATORY SYMBOLS

NM - NATURAL MOISTURE

PL - PLASTIC LIMIT

LL - LIQUID LIMIT

PI - PLASTIC INDEX

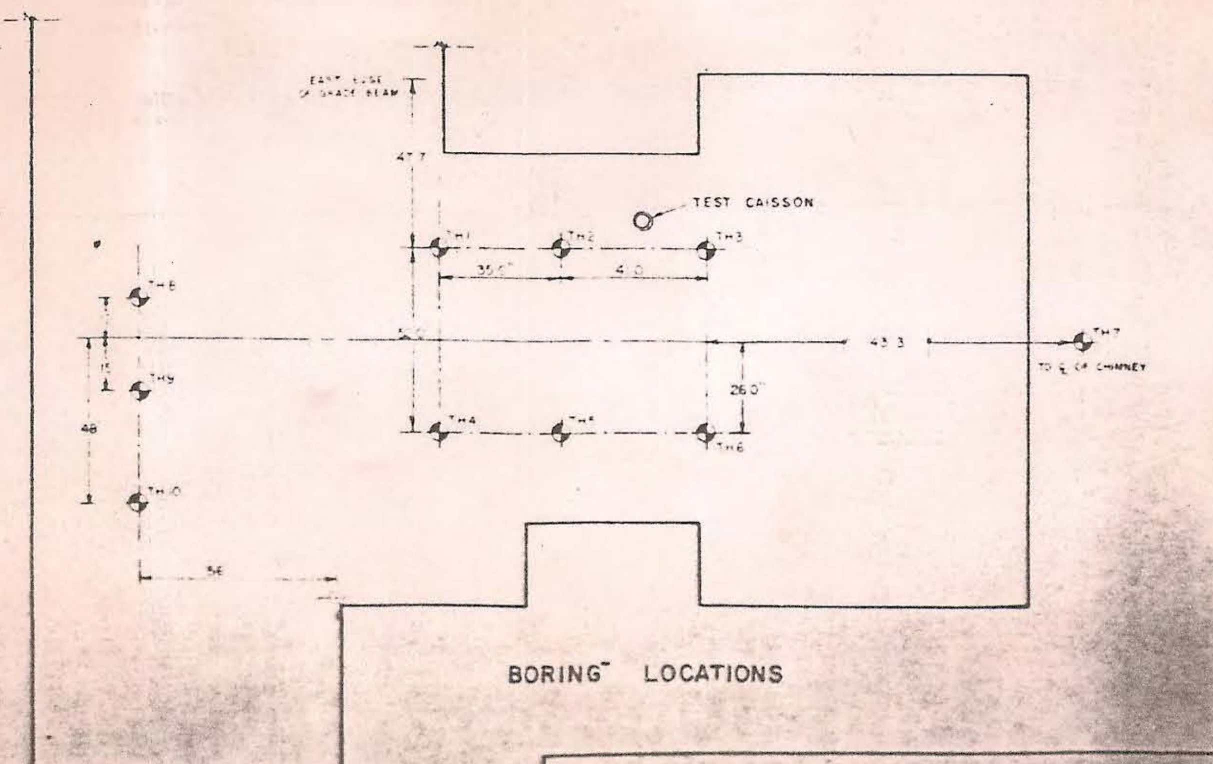
qu - UNCONFINED COMPRESSION STRENGTH T.S.F.

<200> - PERCENTAGE PASSING THE US. No. 200 SIEVE

US - UNDISTURBED SAMPLES 2.5 inches O.D. THIN WALL TUBE

GROUND WATER TABLE

Qu - UNCONSOLIDATED - UNDRAINED TRIAXIAL SHEAR T.S.F.



BORING LOCATIONS

ARDAMAN & ASSOCIATES
consulting engineers in soil sciences and materials testing

DEERHAVEN GENERATING STATION

GAINESVILLE, FLORIDA

Attachment E

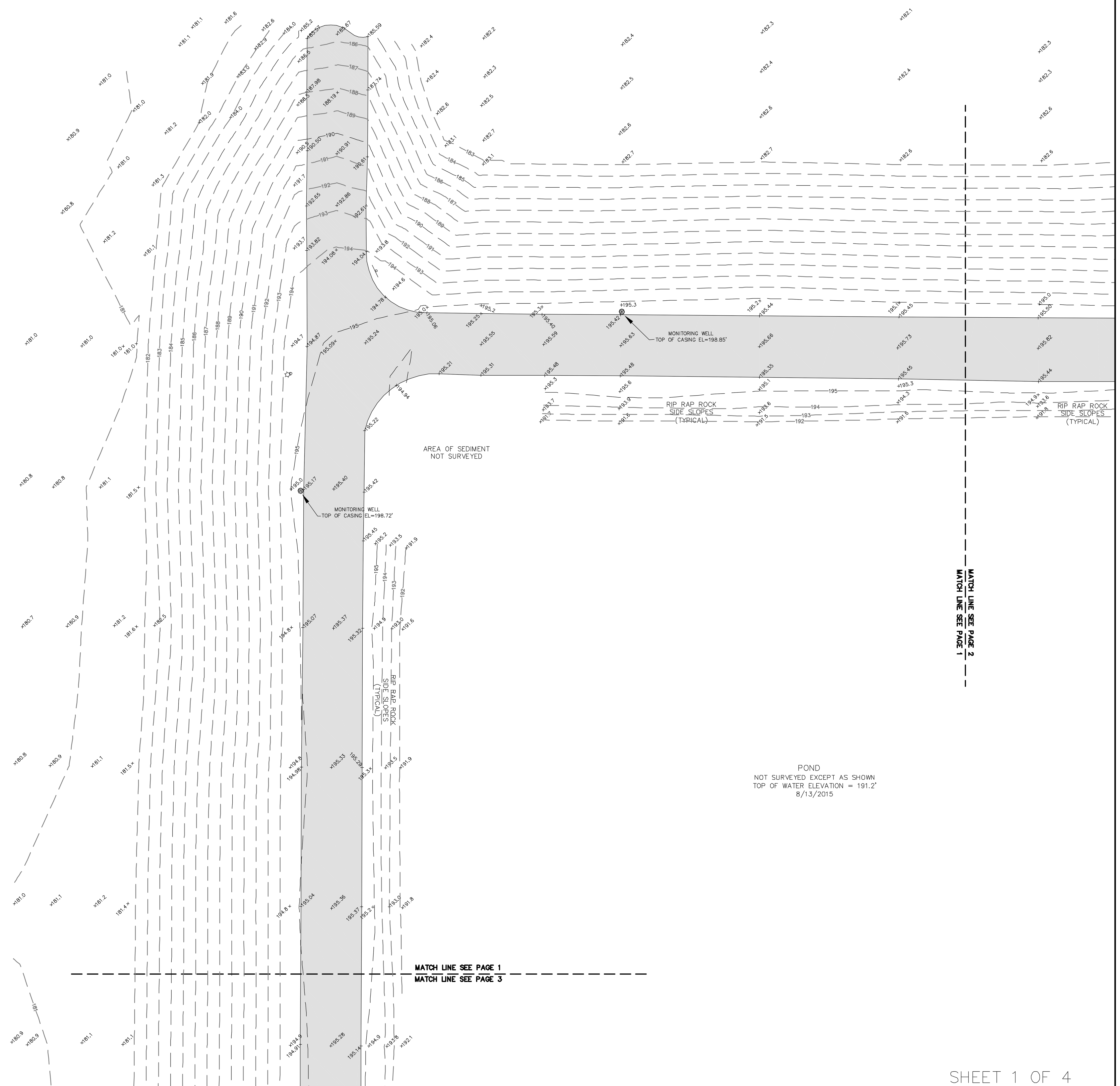
Degrove (2015) Topographic Map of the CCR Surface Impoundment System

MAP SHOWING TOPOGRAPHIC SURVEY OF

A Part of Sections 26 and 27, Township 8 South, Range 19 East
Alachua County, Florida

VICINITY MAP

(NOT TO SCALE)



SURVEYOR'S NOTES

1) THIS IS A TOPOGRAPHIC SURVEY, CERTIFIED TO INNOVATIVE WASTE CONSULTING SERVICES, LLC,. IT WAS PERFORMED IN COMPLIANCE WITH PROJECT–SPECIFIC SCOPES OF WORK AND IS LIMITED TO THE INFORMATIOM SHOWN HEREON.

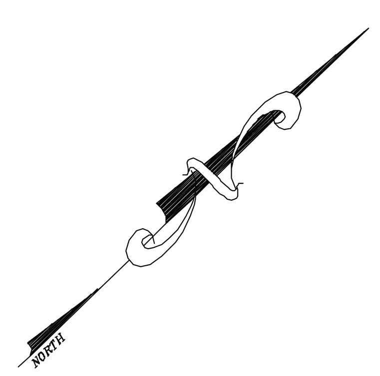
2) ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29) AND ARE BASED ON RTK/GPS CORRECTIONS FROM THE FLORIDA DEPARTMENT OF TRANSPORTATION'S FLORIDA PERMANENT REFERENCE NETWORK. GPS OBSERVATIONS AND RTK CORRECTIONS WERE VERIFIED TO NATIONAL GEODETIC BENCHMARK N 733 (PID#DL6491). NGVD 29 ELEVATION VALUES WERE OBTAINED USING THE VERTCON VERTICAL ADJUSTMENT UTILITY (CORPSCON VERSION 6.0.1). THE DATUM SHIFT CONVERSION APPLIED TO CONVERT NAVD 88 OBTAINED ELEVATIONS TO NGVD 29 WAS +0.78'.

3) SURVEY DATA WAS OBTAINED USING A COMBINATION METHODOLOGY OF RTK/GPS OBSERVATIONS, CONVENTIONAL GROUND SURVEYING PRACTICES AND DIFFERENTIAL LEVELING.

4) THIS SURVEY IN ITS DIGITAL FORMAT IS INTENDED TO BE DISPLAYED AT A SCALE OF 1"=20' OR SMALLER.

LEGEND & ABBREVIATIONS

	DENOTES PROJECT BENCHMARK
x131.3	DENOTES ELEVATION AT "X"
(133.59)	DENOTES ELEVATION AT END OF LEADER
	DENOTES WOOD LIGHT POLE
	DENOTES WOOD LIGHT POLE WITH ELECTRIC HAND HOLE
	DENOTES METAL SIGN
	DENOTES MONITORING WELL
	DENOTES ASPHALT
	DENOTES CONCRETE
	DENOTES METAL GRATING



GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

SHEET 1 OF 4

SURVEY DATE: APRIL 13, 2015	DRAWING DATE: SEPTEMBER 8, 2015	605 NORTHWEST 53RD AVENUE - SUITE A11A GAINESVILLE, FL 32609 352-338-9667 FAX 352-338-9677 LICENSED BUSINESS NUMBER L.B.4603	DEGROVE SURVEYORS, INC.	THIS SURVEY MEETS THE STANDARDS OF PRACTICE FOR PROFESSIONAL SURVEYORS AND MAPPERS IN THE STATE OF FLORIDA PURSUANT TO CHAPTER 5J–17.051 & 5J–17.052, F.A.C. THOMAS P. TRACZ, P.S.M., FLORIDA CERTIFICATION NO. 6039 NOTICE: NOT VALID WITHOUT THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER	CERTIFIED TO: iwcs innovative waste consulting services, llc
FIELD BOOK G–157, PAGE(S) 13–21	DRAWING SCALE: 1" = 20'				
DRAFTED BY: TPT	REVISION DATE:				
CHECKED BY: GRN					
COMPUTER FILE: 2015328_Deerhaven Topo.DWG					
JOB FILE No. 2015328					


MONITORING WELL
TOP OF CASING EL=198.85'
MONITORING WELL
TOP OF CASING EL=196.67'
RIP RAP ROCK
SIDE SLOPES
(TYPICAL)
AREA OF SEDIMENT
NOT SURVEYED
BENCHMARK #2
SET NAIL & DISK
(DSI BENCHMARK)
ELEVATION = 194.70' (NGVD 29)
18" METAL OUTFALL PIPE
MATCH LINE SEE PAGE 2
MATCH LINE SEE PAGE 1
POND
NOT SURVEYED EXCEPT AS SHOWN
TOP OF WATER ELEVATION = 191.2'
8/13/2015
POND
NOT SURVEYED EXCEPT AS SHOWN
TOP OF WATER ELEVATION = 192.9'
8/13/2015
TOP OF 8" PIPE
ELEVATION = 196.7'
TOP OF 8" PIPE
ELEVATION = 196.8'
CONCRETE PIPE SUPPORTS
(TYPICAL)
8" METAL PIPE
SECTION 27
SECTION 26
MATCH LINE SEE PAGE 2
MATCH LINE SEE PAGE 4
TOP ELEVATION = 195.20'
SHEET 2 OF 4


MATCH LINE SEE PAGE 1
MATCH LINE SEE PAGE 3
AREA OF SEDIMENT NOT SURVEYED
8" METAL PIPE
CONCRETE PIPE SUPPORTS (TYPICAL)
TOP ELEVATION = 195.30'
18" METAL OUTFALL PIPE
MONITORING WELL TOP OF CASING EL=197.95'
RIP RAP ROCK SIDE SLOPES (TYPICAL)
POND
NOT SURVEYED EXCEPT AS SHOWN
TOP OF WATER ELEVATION = 186.5'
8/13/2015
MATCH LINE SEE PAGE 4
MATCH LINE SEE PAGE 3
SECTION 27
SECTION 26
ABOVE GROUND PIPE SYSTEM NOT SURVEYED
CONCRETE BLOCK BUILDING
CONCRETE VAULT METAL COVER
MONITORING WELL TOP OF CASING EL=191.41'
ELECTRIC BOX
TOP OF 8" PIPE ELEVATION = 189.8'
INVERT ELEVATION = 179.40'
INVERT ELEVATION = 179.46'
24" CORRUGATED METAL PIPE
BENCHMARK #1
SET NAIL & DISK
(SIG BENCHMARK)
ELEVATION = 191.05' (NGVD 29)
TOP OF 8" PIPE ELEVATION = 180.5'
CONCRETE PIPE SUPPORT
TOP OF 8" PIPE ELEVATION = 186.9'
TOP OF 8" PIPE ELEVATION = 180.1'
5" METAL PIPE
6" METAL PIPE
GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft


MATCH LINE SEE PAGE 2
MATCH LINE SEE PAGE 4
MATCH LINE SEE PAGE 4
MATCH LINE SEE PAGE 3
AREA OF SEDIMENT NOT SURVEYED
8" METAL PIPE
CONCRETE PIPE SUPPORTS (TYPICAL)
18" METAL OUTFALL PIPE
TOP ELEVATION = 195.20'
RIP RAP ROCK SIDE SLOPES (TYPICAL)
CONCRETE VAULT METAL COVER
GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.
SECTION 27
SECTION 26
POND
NOT SURVEYED EXCEPT AS SHOWN
TOP OF WATER ELEVATION = 186.5'
8/13/2015
ABOVE GROUND PIPE SYSTEM NOT SURVEYED
CONCRETE BLOCK BUILDING
ELECTRIC BOX
BENCHMARK #1
SET NAIL & DISK
(ISG BENCHMARK)
ELEVATION = 191.05' (NGVD-29)
MONITORING WELL
TOP OF CASING EL.=190.70'
TOP OF 8" PIPE ELEVATION = 189.8'
TOP OF 8" PIPE ELEVATION = 189.5'
CONCRETE PIPE SUPPORT
TOP OF 8" PIPE ELEVATION = 186.9'
TOP OF PIPE ELEVATION = 184.52'
TOP OF PIPE ELEVATION = 184.69'
30" CORRUGATED METAL PIPE
TOP OF 5" PIPE ELEVATION = 183.7'
CONCRETE PIPE SUPPORT TOP ELEVATION 182.6'
CONCRETE PIPE SUPPORT TOP ELEVATION 182.3'
TOP OF 5" PIPE ELEVATION = 183.4'
5" METAL PIPE
TOP OF 5" PIPE ELEVATION = 183.1'
TOP OF 8" PIPE ELEVATION = 180.1'
6" METAL PIPE
5" METAL PIPE
8" METAL PIPE