APPENDIX NO. 1

PRELIMINARY GEOTECHNICAL REPORT

ATTACHMENT 1
GEOTECHNICAL REPORT (PRELIMINARY)

1.1 Introduction. Geotechnical requirements for this project include but are not limited to the preparation of the Foundation and Pavement Design Analysis, foundation design and pavement designs, and all specifications, sections, details, and all pertinent foundation and pavement design drawings for the Design/Build Replacement Family Housing at Dyess Air Force Base, Texas. The Contractor shall submit with the proposal the names, addresses and qualifications of the geotechnical firms, drilling firms, and testing laboratories that are registered in the State of Texas intended for subcontracting for approval to the Corps of Engineers, Fort Worth District. Approval of the aforementioned firms or laboratories does not release the Contractor from responsibility for an approved Foundation and Pavement Design Analysis (FDA/PDA) nor should it be construed as approval of the FDA/PDA. In addition, approval of the aforementioned firms or laboratories does not release the Contractor from responsibility for the adequacy of geotechnical specifications, sections, details, and all pertinent foundation and pavement design drawings, and related geotechnical portions of the project.

1.2 Foundation and Pavements. The foundation and pavement designs, FDA/PDA, Geotechnical specifications, sections, details, and pertinent foundation and pavement design drawings, and related geotechnical portions of the project shall comply with, but not be limited to, the following referenced material and criteria.

a. TM 5-822-7 Standard Practice for Concrete Pavements (http://www.usace.army.mil/inet/usace-docs/armytm/tm5-822-7/)

b. TM 5-822-8 Bituminous Pavements Standard Practice (http://www.usace.army.mil/inet/usace-docs/armytm/tm5-822-8/)

c. TM 5-822-5 Pavement Design for Roads, Streets, Walks, and Open Storage Areas (http://www.usace.army.mil/inet/usace-docs/armytm/tm5-822-5/)

d. TM 5-822-2 General Provisions and Geometric Design for Roads, Streets, Walks, and Open Storage Areas (http://www.usace.army.mil/inet/usace-docs/armytm/tm5-822-2/)

d. ETL1110-1-139 Engineering and Design – Selecting Asphalt Cements (http://www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/etl1110-1-139/toc.html)

e. ETL 1110-3-393 Design of Surfaced Areas (http://www.usace.army.mil/inet/usace- docs/eng-tech-ltrs/etl1110-3-393/toc.html)

g. SWDR 1110-34-1 Testing of Aggregates and Designing Mixtures for Asphaltic Concrete and Portland Cement Concrete Pavements

h. CESWD-ED-TS/G letter - Design Criteria for Ribbed Mat Foundations, dated 29 January 1988 (http://www.swf.usace.army.mil/EandC/ec-a/Ribmat1.pdf)

i. SWDED-G letter - Design Criteria for Developing Geotechnical Design Parameters for SWD Ribbed Mat Design Methodology, dated April 1987

j. EM 1110-2-1906, Engineering and Design, Laboratory Soils Testing (http://www.usace.army.mil/inet/usace-docs/eng-manuals/em1110-2-1906/toc.htm)

k. TM 5-818-1, Soils and Geology Procedures for Foundation and Design of Buildings and Other Structures (Except Hydraulic Structures) (http://www.usace.army.mil/inet/usace-docs/armytm/tm5-818-1/)

l. TI 809-04 Seismic Design for Buildings (http://www.hnd.usace.army.mil/techinfo/ti/809-04/ti80904.htm)

m. TM 5-809-12 Concrete Floor Slabs on Grade Subjected to Heavy Loads (http://www.usace.army.mil/inet/usace-docs/armytm/tm5-809-12/)

n. Index of Guide Specifications for Military Construction (http://www.ccb.org/ufgs/ufgs.htm)

o. Foundation and Pavement Design Analysis Format Example (Attachment 1A)

p. EM 1110-2-1907 Engineering and Design, Soil Sampling

q. TI 809-28 Design and Construction of Conventionally Reinforced Ribbed Mat Slabs (RRMS) (http://www.hnd.usace.army.mil/techinfo/ti.htm)

r. Southwestern Division AEIM (October 2000) (http://www.swf.usace.army.mil/EandC/ec-a/2000AEIM.html)

1.3 Subsurface Exploration. Sixteen (16) test holes were drilled adjacent to and southwest of the proposed project site in February 1994 by the U.S. Army Corps of Engineers, Fort Worth District. The borings were drilled in support of a Design/Build Replace Family Housing project. Representative samples of subsurface materials collected at that time were subjected to laboratory testing for visual classification, moisture content, Atterberg limits, dry density, strength, and controlled expansion-consolidation. Results of the field investigation and laboratory testing programs are presented in Attachments 1B and 1C, respectively.

For this project, additional soil borings and laboratory testing are required and therefore the Contractor shall submit his proposed exploration plan to the Contracting Officer for approval. It is the Contractor's responsibility to review, interpret, and evaluate the subsurface investigation and laboratory test data. The Contractor will be required to drill and sample the proposed borings in accordance Corps of Engineers (COE) criteria listed in EM 1110-2-1907. All soil samples collected during the subsurface investigation shall be tested at a Corps of Engineers approved laboratory. Laboratory tests shall be performed in accordance with "Laboratory Soils Testing" (EM 1110-2-1906). Geotechnical designs shall be based on soil data and technical criteria provided, and shall be in accordance with the Foundation and Pavement Design Analysis Format Example. The Contractor is responsible for all applicable clearances and permits from Dyess AFB, and for the protection of all underground utilities that

could be damaged during the field investigation. The site shall be returned to its original state after such drilling.

1.4 General Geology. Dyess Air Force Base is located in the southwestern section of the city of Abilene, Texas. Abilene lies near the southern end of the north-south trending Abilene-Haskell Plains physiographic subprovince. The area is characterized topographically by a moderately flat to gently sloping surface with some low hills and benches. Dyess Air Force Base is underlain by shale and limestone beds with occasional thin siltstone and sandstone beds belonging to the Clear Fork Group (undivided) and Permian in age. The depth to groundwater ranges from less than 3.0 meters in local creeks and drainage channels to 6.1 to 9.1 meters in high areas.

Based on results of the previously performed geotechnical investigation, the proposed project site is generally characterized by overburden features consisting of low to high plasticity clays (CL and CH), clayey sands (SC), and clayey gravels (GC), all underlain by a deeper formation of clay shale primary. Results of the field investigation are included in Attachment 1B at the end of this report.

1.5 Borrow Areas. There are no approved borrow sites on Dyess AFB. The Contractor shall be responsible for locating, testing, and providing required data to the Government for approval of all proposed off-base borrow sources. The borrow must meet all specification requirements and shall not be used prior to approval.

1.6 Foundation Design Analysis. The foundation design requirements for this project are provided in the Structural Design section of the RFP. A monolithic ribbed mat slab foundation system is required for bidding purposes. Site conditions may vary considerably (i.e., soil type, densities of materials, topographic relief, etc.); cut and fill requirements for site development are unknown; types, sizes and locations of housing units are not established (i.e., 2-story, single-story, single unit, multiple units, etc.), therefore, the monolithic ribbed mat slab foundation system is provided in order to address all family housing possibilities and provide a standard for bidding purposes. Foundations for the family housing facilities are to be reinforced concrete. Foundation designs and recommendations for features such as retaining walls, perimeter walls, etc., are the Contractor's responsibility and will be included as part of the FDA. Additional drilling, sampling, and testing is required by the successful proposer. The successful proposer shall submit a drilling and testing plan to the Contracting Officer for approval prior to soil sampling and testing. Therefore, design of any foundation system to support any structure(s) is also required. The design of any foundation system shall include, but not be limited to, identification of foundation structural design method used, presentation of allowable bearing capacity, soil parameters, settlement or consolidation, other applicable soil properties (i.e., permeability, shear strength, etc.) and all associated calculations. A Foundation Design Report shall be prepared describing, evaluating, and presenting boring locations, boring logs, a plasticity chart, gradation curves, moisture content/liquid limit/plastic limit versus depth chart, moisture content/dry density versus depth chart, unconfined compression test results, and consolidation/swell test results, as applicable. The Foundation Design Report narrative and data presentation shall be submitted to the Contracting Officer for review and approval. The narrative and all data shall be prepared and presented in the format shown in the Government-furnished Foundation and Pavement Design Analysis Format Example (Attachment 1A). Analysis for design shall be prepared separately from the design narrative and data presentation. Any unusual features shall also be addressed such as above ground and/or underground structures (i.e., pits, manholes, retaining walls, etc.) and associated

soil parameters. The Foundation Design Report shall also discuss deformation sensitive areas of ceramic tile, quarry tile, or similar floor materials, and the foundation design requirements for those areas. If the foundation system selected and its associated structural design requirements are approved by the Contracting Officer, and are different than the monolithic ribbed mat foundation system as provided for in this RFP, then a modification to this contract will be required.

1.6.1 Ribbed Mat Slab Foundation System Required for Bidding Purposes. The ribbed mat slab foundation system consists of reinforced concrete perimeter and interior ribs (beams) cast monolithically with the reinforced concrete floor slab. Potential differential settlement is spread over a large horizontal area by the ribs through soil-structure interaction. The ribbed mat foundation system is therefore, generally able to bridge low areas due to settlement and redistribute building loads to the subgrade, thereby minimizing any differential settlements that may occur. Design of the ribbed mat foundation should be in accordance with multiple letters *CESWD-ED-TS/G, Subject: Design Criteria for Ribbed Mat Foundations, dated 24 January 1988 and TI 809-28 Design and Construction of Conventionally Reinforced Ribbed Mat Slabs (RRMS)*. The net allowable bearing capacity should not be exceeded when sizing the width of the ribs (beams). This system requires exterior and interior beams along the perimeter and under all load-bearing walls. The interior beams should run parallel and perpendicular to the long axis of the building. A minimum of 25 millimeters of heave is anticipated (after required subgrade preparation) and the ribbed mat foundation should be designed accordingly. Any fill required to bring the subgrade beneath the foundation up to the bottom of the capillary water barrier shall consist of nonexpansive fill. Removal and replacement of unacceptable in situ material will be required.

1.6.2 Ribbed Mat Slab For Expansive Soil Conditions. A conventionally reinforced concrete ribbed mat slab is recommended as the foundation system for the Replacement Family Housing. This system involves minimal excavation depth and is "tied together" by its monolithic construction. The ribbed mat slab requires exterior and interior ribs. The minimum width of the ribs should be sized based on an allowable bearing capacity of 96 kPa (net) but not less than 250 millimeters wide according to the SWD-AEIM. Beam intersections at interior column locations should be widened, as detailed in the SWD-AEIM, such that the contact pressure does not exceed 96 kPa (net). Design of the ribbed mat slab should assume that (1) the structural load is supported solely on the beam and beam intersections, (2) the load transfer occurs over the effective beam width, and (3) the beam and soil remain in contact. The load used to size the beams should consist of full dead load plus that portion of the live load that acts more or less continuously, usually about 50 percent. Interior and exterior beams should be founded not less than 610 millimeters below outside finished grade and at a constant elevation. Minimum beam reinforcing percentage shall be as discussed in the SWD-AEIM, with a minimum of two bars both top and bottom, and number 13 (metric) stirrups spaced 610 millimeters on-center. The floor slabs shall be 125 millimeters thick and shall be reinforced with number 10 (metric) bars or larger. Floor slab reinforcement should be 0.2 percent of the gross area. Diagonal stiffener beams (ribs) shall be located at each corner of the mat slab, and shall be of the same size and reinforcement as the larger adjacent transverse rib. The maximum transverse and longitudinal rib spacing shall not exceed 4.5 meters on-center, and should run perpendicular and parallel to the long axis of the structure. A rib shall be provided under all significant wall loads and column loads.

The ribbed mat slab foundation should incorporate adequate stiffness such that the deformations do not exceed the structural tolerance of any elements in the foundation or

superstructure. The Contractor shall demonstrate using the referenced analytical approach that the ribbed mat slab foundations are designed for the following minimum conditions, or to that presented by the Contractor's Geotechnical consultant, whichever is more conservative. Design of the ribbed mat slab foundations should consider a vertical separation of the foundation slab and beams from the subgrade of 25 millimeters at the outside of all perimeter beams, with loss of support beneath the foundation over a horizontal distance of not less than 1.7 meters. This loss of support condition corresponds to the **center lift mode**. Additionally, **edge lift analyses** should consider an edge moisture variation distance equal to 1 meter, and an edge lift heave of 25 millimeters should be used in the design of the ribbed mat slabs. This edge lift heave corresponds to an applied structural pressure of 4.8 kPa. For edge lift considerations, two additional combinations of pressure and swell are required. For an allowable bearing capacity of 96 kPa, an edge lift heave of 20 millimeters can be expected to occur. At an ultimate bearing capacity of 287 kPa, 15 millimeters of heave should be anticipated.

A modulus of subgrade reaction equal to 54.3 kPa/mm can be used when analyzing the ribbed mat slabs to determine in-service deformations. This value, however, should be factored to account for width effects such that $K_{design}=K_1(.3048B_{eff})$, where B_{eff} is the effective beam width in meters. Design of the ribbed mat slabs may use the SWD-AEIM sections as a minimum stiffness "first approximation". The mat slabs will, by design, be supported on-grade. A polyethylene vapor barrier (6-mil) and a minimum 100-millimeter capillary water barrier should be placed beneath the mat slabs.

1.6.3 Subgrade Preparation. At a minimum, subgrade preparation should consist of removing all existing materials at the new structure site to a depth of 1 meter below existing grade and replacing with compacted nonexpansive backfill. Excavation to a constant elevation is necessary to avoid constructing part of the structure on cut and part on fill. Any additional fill needed to bring the subgrade under the capillary water barrier to the required finish floor elevation shall also be nonexpansive fill. The upper 150 millimeters of subgrade exposed after required excavation should be scarified and recompacted. Any fill materials encountered within the building footprint should be removed entirely. Existing foundations and utilities beneath and within 1.5 meters of the new structure should be removed entirely and should be backfilled with nonexpansive fill. The excavations should be backfilled to the bottom elevation of the required capillary water barrier layer using nonexpansive fill. Nonexpansive fill should be placed in control lifts not exceeding 205 millimeters in loose thickness and compacted to not less than 92 percent or 95 percent maximum laboratory density as determined in accordance with ASTM D 1557 or ASTM D 698, respectively. Prior to fill placement, the in situ subgrade should be compacted to not less than 90 percent or 95 percent maximum laboratory density as determined in accordance with ASTM D 1557 or ASTM D 698, respectively. All conduits embedded in concrete shall be connected to ground buried conduits using flexible connections. Any rigid piping for sewer, water, or other utilities in the foundation should also have flexible connections to accommodate the anticipated differential movement.

1.6.4 Moisture Control. All surface water flowing into the building site should be diverted around the structure so it will not infiltrate the subgrade. Rainfall should be prevented from entering the subgrade around the perimeter of the structure, by providing paving, drainage slopes, and diverting gutter downspouts away from the foundation, or combination thereof. When surface or subsurface water cannot be diverted away from the building, an interceptor or perimeter drains should be used and designed to prevent the drains

from introducing water to the foundation.

1.6.5 Foundation Material Definitions.

a. Satisfactory Materials. Satisfactory Materials include materials classified in ASTM D 2487 as GW, GM, GC, GP, SW, SM, SP, SC, CL, and CH and shall be free of trash, debris, roots, or other organic matter, or stones larger than 76 millimeters in any dimension.

b. Unsatisfactory Materials. Unsatisfactory Materials include materials classified in ASTM D 2487 as Pt, OH, OL, ML, MH and any other materials not defined as satisfactory. Man-made fills are considered unsatisfactory materials.

c. Nonexpansive Soils. Nonexpansive Soils for use under building floor slabs and foundations shall be satisfactory material having a plasticity index not less than 4 nor greater than 12 when tested in accordance with ASTM D 4318.

d. Cohesionless and Cohesive Materials. Cohesionless Materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive Materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

e. Capillary Water Barrier. Capillary Water Barrier shall consist of clean, crushed, nonporous rock, crushed gravel, or uncrushed gravel. The maximum particle size shall be 38 millimeters and no more than 2 percent by weight shall pass the 4.75-millimeter (No. 4) size sieve.

1.6.6 Foundation Material Testing Requirements. In-place densities of the subgrade, fills, and backfills shall be performed for every 90 square meters per lift in accordance with ASTM D 1556 or ASTM D 2922. Optimum Moisture and Laboratory Maximum Density of nonexpansive fill and backfill shall be performed for every 385 cubic meters or when any change in material occurs.

1.7 Pavement Design Analysis. Presented below are minimum pavement sections that are required for bidding purposes. The pavement structures were derived using pavement data reports from previous projects at Dyess AFB and the installations general satisfaction with the performance of these pavements. If it is determined after award of the RFP that these pavement structures are not adequate based on the soil conditions identified, the successful proposer shall submit a Pavement Design Report. The narrative and all data shall be prepared and presented in the format shown in the Government-furnished Foundation and Pavement Design Analysis. The FDA/PDA shall include but not be limited to, presentation and discussion of general project conditions, subsurface investigations and laboratory test data, subsurface conditions, design requirements, material definitions, and flexible and rigid pavement designs (including, but not limited to, pavement structure materials; construction thicknesses and compactive effort requirements in accordance with ASTM D 1557; CBR values for 90 percent, 95 percent, and 100 percent compaction; traffic classifications and categories; types and weights of vehicles; vehicle frequency of use; concrete flexural strength for designated time frame; and modulus of subgrade reaction utilized for design). The pavement materials description will address, as applicable, but not be limited to, requirements for hot-mix, prime coat, tack coat, aggregate base course, lime-

modified subgrade, Portland cement concrete, reinforcing steel, and subgrade preparation. Calculations shall address each type of pavement element affected by the additional pavement requirements.

1.7.1 Pavement Sections for Bidding Purposes. Pavement structures constructed in and/or constructed with materials classified as CH, CL, and GC, and having a plasticity index equal to or greater than 15 shall be lime-modified. Pavements constructed in and/or constructed with satisfactory materials having a plasticity index less than 15 shall require a subbase course, but that layer will not be lime-modified. Minimum requirements for the pavement structures for roads, streets, driveways, and parking areas are provided as follows.

a. Flexible Pavement Sections.

(1) Collector Streets, Residential Streets and Parking Areas constructed in and/or constructed with materials classifying as CH, CL, and GC, having a plasticity index equal to or greater than 15, will be provided with the following pavement structure.

50mm Hot-Mix Surface Course

200mm Aggregate Base Course compacted to at least 100 percent of laboratory maximum density as determined in accordance with ASTM D 1557

150mm Lime-Stabilized (6-percent) Subgrade compacted to at least 95 percent of laboratory maximum density as determined in accordance with ASTM D 1557

150mm Raw Subgrade compacted to at least 90 percent of laboratory maximum density as determined in accordance with ASTM D 1557

(2) Collector Streets, Residential Streets and Parking Areas constructed in and/or constructed with satisfactory materials not classifying as CH, CL, and GC, and not having a plasticity index equal to or greater than 15, will be provided with the following pavement structure.

50mm Hot-Mix Surface Course

200mm Aggregate Base Course compacted to at least 100 percent of laboratory maximum density as determined in accordance with ASTM D 1557

150mm Subbase Course compacted to at least 95 percent of laboratory maximum density as determined in accordance with ASTM D 1557

150mm Raw Subgrade compacted to at least 90 percent of laboratory maximum density as determined in accordance with ASTM D 1557

b. Rigid Pavement Sections.

(1) Driveways, Slabs, and Sidewalks where driveways cross sidewalks constructed in and/or constructed with materials classifying as CH, CL, and GC, having a plasticity index equal to or greater than 15, will be provided with the following pavement structure.

130mm Portland Cement Concrete reinforced with No. 13 bars (metric) spaced 406 millimeters o.c.e.w

150mm Aggregate Base Course compacted to at least 95 percent of laboratory maximum density as determined in accordance with ASTM D 1557

150mm Lime-Stabilized (6-percent) Subgrade compacted to at least 90 percent of laboratory maximum density as determined in accordance with ASTM D 1557

(2) Driveways, Slabs, and Sidewalks where driveways cross sidewalks constructed in and/or constructed with satisfactory materials not classifying as CH, CL, and GC, and not having a plasticity index equal to or greater than 15, will be provided with the following pavement structure.

130mm Portland Cement Concrete reinforced with No. 13 bars (metric) spaced 406 millimeters o.c.e.w.

150mm Aggregate Base Course compacted to at least 95 percent of laboratory maximum density as determined in accordance with ASTM D 1557

150mm Raw Subgrade compacted to at least 90 percent of laboratory maximum density as determined in accordance with ASTM D 1557

1.7.2 Pavement Material Definitions.

a. Hot-Mix Surface Course. Aggregates and asphaltic materials shall conform to the requirements of the Texas Department of Transportation, Standard Specifications for Construction of Highways, Streets and Bridges, (TXDOT, Std Spec), Items 300 and 340. The paving mixture shall conform to the requirements for Type "D" (fine-graded surface course) grading. Asphaltic material for the paving mixture should be asphaltic cement, viscosity grade AC-20, or performance grade PG64-22. Guide Specification *CEGS-02741 BITUMINOUS*

PAVING FOR ROADS, STREETS AND OPEN STORAGE AREAS should be edited to present the above requirements.

b. Prime Coat and Tack Coat. Asphaltic material for the prime coat shall be cut-back asphalt, grade MC-30, conforming to the requirements of TXDOT, Std Spec, Item 300, "Asphalts, Oils, Emulsions". Prime coat should be applied to the surface of the aggregate base course. Asphaltic material for the tack coat shall be cut-back asphalt, grade RC-250, or emulsified asphalt, grade SS-1, conforming to the requirements of TXDOT, Std Spec, Item 300, "Asphalts, Oils, Emulsions." Tack coat should be applied to all surfaces that contact new asphalt pavement. Guide Specification *CEGS-02748 BITUMINOUS TACK AND PRIME COATS* should be edited to present the above requirements.

c. Aggregate Base Course. Aggregates shall conform to the requirements of Guide Specification *CEGS-02722 AGGREGATE BASE COURSE.* The gradation should conform to the requirements of TXDOT, Std Spec, Item 247, for Type "A", Grade 1 material.

d. Subbase Course. Material shall conform to the requirements of Guide Specification *CEGS-02721 SUBBASE COURSES* and have a maximum CBR value of 20 percent.

e. Lime-Stabilized Subgrade. Material shall consist of a mixture of raw subgrade soil and hydrated lime. The application rate of lime should be 6 percent by dry weight of soil. Guide Specification *CEGS-02712 LIME-STABILIZED SUBGRADE* should be edited to include these requirements.

f. Raw Subgrade. The material shall conform to the requirements of Guide Specification *CEGS-02300 RAW SUBGRADE*. The specification should be edited to include the following subgrade preparation requirements. Prior to construction of the flexible and rigid pavements, a minimum of 150 millimeters of existing material should be removed from all pavement areas. After stripping, care should be taken not to disturb the remaining subgrade materials. Any fill material required to bring the pavement structures to the required elevations should be a satisfactory material. Cohesionless fill material should be compacted to not less than 95 percent of laboratory maximum density and cohesive fill material should be compacted to not less than 90 percent of laboratory maximum density, as determined in accordance with ASTM D 1557.

g. Portland Cement Concrete. The material shall conform to the requirements of Guide Specification *02754 CONCRETE PAVEMENT FOR SMALL PROJECTS (Tailoring Option).* The maximum nominal size aggregate shall be 38 millimeters and the mixture shall have a 28-day flexural strength of 4.48 MPa.

1.7.3 Pavement Material Testing Requirements. Testing shall be the responsibility of the contractor to ensure that the subgrade, aggregate base course, subbase course, lime-stabilized subgrade, hot-mix surface course, and Portland cement concrete are properly constructed. The following testing requirements shall be included in the contract specifications as a minimum:

a. In-place density testing of the subgrade, aggregate base course, subbase course, and lime-stabilized subgrade shall be performed, at a minimum, every 500 square

meters per lift in accordance with ASTM D 1556 and ASTM D 2922. ASTM D 1556 shall be used as a check at least once per lift for each 2500 square meters of completed subgrade, lime-stabilized subgrade, subbase course, and aggregate base course.

b. At least one sample of aggregate base course and subbase course material shall be tested in accordance with ASTM C 136. After the initial test, a minimum of one sieve analysis (ASTM C 136 and ASTM D 422) shall be performed for each 1000 metric tons of aggregate base and subbase course placed, with a minimum of one analysis performed for each day's run until the course is completed. One liquid limit and plasticity index shall be performed for each sieve analysis per ASTM D 4318

c. Wear tests shall be performed in accordance with ASTM C 131. A minimum of one test per aggregate base course material source shall be run.

d. Thickness of the aggregate base course, subbase course, and lime-stabilized subgrade shall be measured for each 500 square meters of material placed. Compacted thickness of the material shall be as shown on the contract drawings and the completed section shall be within 9 millimeters of the thickness shown.

e. Hot Bin gradations for the asphalt wearing course shall be tested in accordance with ASTM C 136 and ASTM C 117. A minimum of one test shall be conducted. Marshall specimens shall be taken in accordance with AI MS-2. At least two sets of specimens shall be taken. Asphalt extractions shall be performed in accordance with ASTM D 2172, Method A or B. At least one asphalt extraction shall be conducted. Field density tests shall be conducted in accordance with ASTM D 2950. One test shall be conducted for each 250 square meters of pavement placed. The mat density shall be 97.5 to 100.5 percent and the joint density shall be 95.5 to 100.5 percent of the density obtained from laboratory-compacted specimens. Thickness measurements shall be taken at a minimum of one measurement for each 836 square meters of pavement placed.

f. The Job Mix Formula for the bituminous mixture shall be furnished to the Contraction Officer for approval. The formula will indicate the percentage of each stockpile and mineral filler, the percentage of each size aggregate, the percentage of bitumen, and the temperature of the completed mixture when discharged from the mixer. The Contractor shall file with the Contracting Officer certified delivery tickets for all aggregates and bituminous materials actually used in construction. The finished mixture shall meet the requirements described below and when tested in accordance with AI MS-2. All samples will be compacted with 50 blows of specified hammer on each side of the sample.

Stability (minimum) – 2200 Newtons
Flow (maximum), 0.25mm – 20
Air Voids, percent – 3% to 5%
Percent Voids in mineral aggregate – 14
TSR, minimum percent - 75

g. The contractor shall be responsible for the development of the mixture proportion study for cementitious materials and chemical admixtures. The concrete mix design shall include a statement giving the maximum nominal coarse aggregate size and the proportions of all ingredients that will be used in the manufacture of concrete at least 60 days prior to commencing concrete operations. Trial design batches, mixture proportioning studies,

and testing requirements shall be the responsibility of the Contractor. Strength requirements shall be based on flexural strength. Trial mixtures having proportions, slumps, and air content suitable for the work shall be based on methodology described in ACI 211.1, modified as necessary to accommodate flexural strength. The maximum water-cementitious material ratio is 0.45. Coarse and fine aggregates shall have a satisfactory service record of at least 5 years successful service in three paving projects, or if a new source is used, shall meet the requirements when tested for resistance to freezing and thawing. Coarse and fine aggregates not having a satisfactory demonstrable service record shall have a durability factor of 50 when subjected to freezing and thawing in concrete in accordance with COE CRD-C 114 (Test Method for Soundness of Aggregates by Freezing and Thawing of Concrete Specimens).

h. Smoothness measurements shall be taken in successive positions parallel to the pavement (flexible and rigid) centerline with a 3.66-meter straightedge. Measurements shall be taken perpendicular to the pavement (flexible and rigid) centerline at 4.5-meter intervals. Surface smoothness shall not exceed 9.5 millimeters.

ATTACHMENT 1A

FOUNDATION AND PAVEMENT DESIGN ANALYSIS FORMAT EXAMPLE

ATTACHMENT 1A
FOUNDATION AND PAVEMENT DESIGN ANALYSIS FORMAT EXAMPLE

1. General. The successful proposer shall provide a Foundation and Pavement Design Analysis after contract award. The Foundation and Pavement Design Analysis (Report) shall include a description of the project, including a discussion of any unusual features of the project, a discussion for each structure that requires a foundation system (i.e., houses, retaining walls, etc.), and a discussion of each pavement type. The discussions should also include a project location description and site topographic features.

2. Subsurface Investigations. Provide a complete description of the subsurface exploration program, including descriptions of types of borings and samplers (for both disturbed and undisturbed samples, as applicable) utilized, number of each type of boring, dates of exploration, and the name of the soils testing laboratory to be used. Provide plans showing boring logs and locations.

3. Site Geology. Provide a complete general geologic description of the area and a more specific description of the geology for Dyess Air Force Base, Texas.

4. Subsurface Conditions. A discussion of subsurface conditions, as interpreted from the field boring logs and laboratory test results, shall be included in this paragraph. Discuss the depth to groundwater/water table and possible effects of the groundwater on the design of the foundations and pavements.

5. Seismic Design. The seismicity of the area and the seismic zone in which the project will be built shall be discussed. The seismic design of the foundation system(s) shall be in accordance with criteria contained in TI-809-04.

6. Testing.

a. Field Testing. Provide a discussion addressing the field testing program to include identification of the borings tested, intervals and total depth of testing, and testing method(s). Reference applicable enclosures.

b. Laboratory Testing. Provide a discussion addressing all laboratory tests performed on samples collected during the field investigation to include identification of the borings tested. Where applicable, discuss specific results of laboratory testing that are considered applicable to the foundation and pavement design recommendations. Provide an evaluation of sample adequacy, as applicable. Reference applicable enclosures.

7. Discussion. An in-depth discussion of all foundation systems and pavement structures considered applicable for the project shall be included in this paragraph. The paragraph shall include a description of the foundation system(s) and pavement structures considered with a discussion of the advantages and disadvantages of each. For foundations, address finish floor elevations, cut and fill requirements, structural loads, and the structure(s) dimensions/geometry for each type of structure and foundation system considered. For pavements, address types of vehicles and frequencies of use, corresponding design indexes, and pavement design parameters.

8. Recommendations. The recommended foundation system(s), pavement sections, and respective subgrade preparation and material testing requirements shall be discussed in this paragraph. The recommendations should be based on results of the field investigation, laboratory testing, and engineering studies.

a. Recommended Foundation System(s). If more than one foundation system is recommended, separate subparagraphs shall be used to discuss each foundation system. The subparagraphs shall provide a detailed description of the foundation system as well as specific design and construction requirements. The location and type of structure supported by that foundation system should also be discussed. Foundation design parameters and considerations should be provided and shall include as a minimum the following items: allowable bearing pressure(s); bearing elevations for each recommended foundation system; a minimum depth the foundation system shall bear below outside finished grade; foundation spacing requirements; foundation structural design methodology to be used; shrink-swell potential of the active subgrade; the design loads used to size the foundation elements; special considerations for deformation sensitive areas such as restrooms or other areas (i.e., tiled areas); a modulus of subgrade reaction; soil unit weights; at-rest and active earth pressure coefficients; anticipated settlement/differential settlement; and applicability (of each of the aforementioned items) to the design.

b. Recommended Pavement Sections. Provide separate subparagraphs for each rigid and flexible pavement structure included in the project. Each pavement design shall include as a minimum the following items: traffic types, road classifications and design indexes; subgrade strength values (CBR and modulus of subgrade reaction values for the specified compactive effort); pavement material thicknesses and compaction requirements; and concrete flexural strength for designated time frame.

c. Subgrade Preparation. This paragraph shall include a discussion on all requirements for excavation of existing subgrade materials, removal of existing unsuitable materials, replacement of excavated materials with nonexpansive and satisfactory materials, and minimum thickness of nonexpansive fill beneath building foundations. Provide compaction requirements for the raw subgrade, fill, and backfill materials. Foundation and pavement material definitions shall be presented.

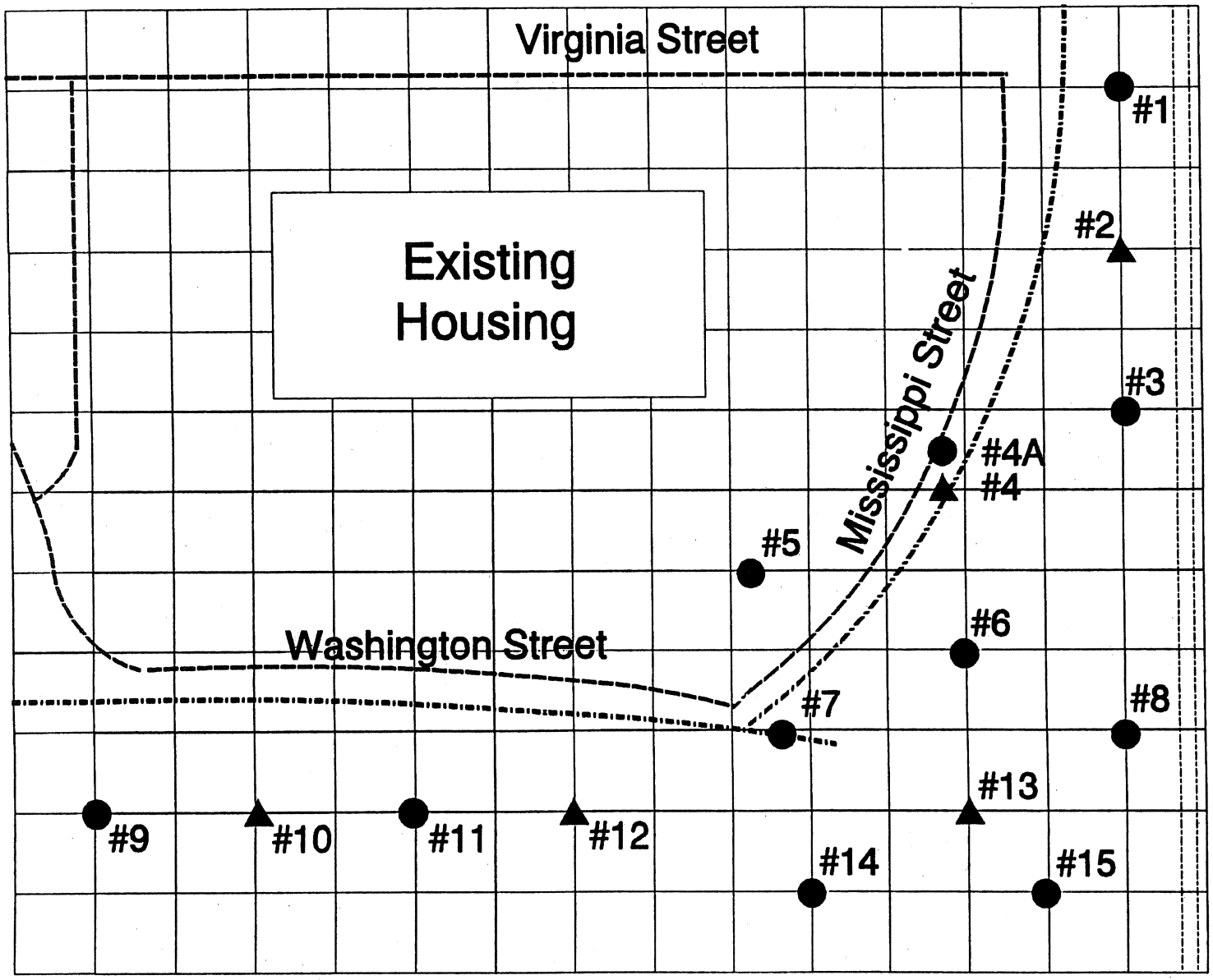
9. List of Exhibits to be Included in the Foundation Design Analysis (Report).

Exhibit 1	Site Plan with Boring Locations and Legend
Exhibit 2	Drill Logs
Exhibit 3	Plasticity Chart
Exhibit 4	Standard Penetration Tests versus Depth of Boring (if applicable)
Exhibit 5	Moisture Content versus Depth
Exhibit 6	Moisture Content-Liquid Limit-Plastic Limit versus Depth
Exhibit 7	Unconfined Compression Test Results (if applicable)
Exhibit 8	Consolidation-Expansion Tests/Swell Pressure Tests (if applicable)
Exhibit 9	Tabulation of Laboratory Test Results (to include Boring Number, Sample Number, Depth, %Gravel, %Sand, %Fines, LL, PL, PI, WC, Unit Weight, Laboratory Classification, and Visual Descriptions)

ATTACHMENT 1B

BORING LOGS AND LOCATIONS

Dyess AFB Family Housing/Boring Site Plan



Hole No. 8A2S-1

DRILLING LOG	DIVISION: S.W.D.	INSTALLATION: S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A2S-1		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 6 / UNDISTURBED 0	
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN: 9.8' +/-		16. DATE HOLE: STARTED 10 FEB 94 / COMPLETED 10 FEB 94	
8. DEPTH DRILLED INTO ROCK: 5.2' +/-		17. ELEVATION TOP OF HOLE:	
TOTAL DEPTH OF HOLE: 15.0'		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc. If significant) g
			(GRASS COVER) 0.0' TO 3.2' +/- CLAY: med-hi pl, drk. brn. down to brn. from 1.1' +/-; v. stiff down to hard from 1.1' +/-; damp-moist down to damp from 1.1'; mod. calc. down to calc. from 1.1' +/-	CL CH CL	A B C	1. WATER LEVEL: NOTE: Free water on auger at 8.5' +/- during drilling. NOTE: Level upon completion was 7.7'; level after 24 hrs. was 7.2'.
			3.2' TO 4.6' +/- CLAY: med. pl, lt. brn. w/ reddish brn; hard; damp; v. calc, with abundant lime matter	CL	D	2. JAR SAMPLES: A. 0.0' - 1.1' B. 1.1' - 3.2' C. 3.2' - 4.6' D. 4.6' - 6.9' E. 6.9' - 8.5' F. 8.5' - 9.8' G. 9.8' - 15.0'
			4.6' TO 6.9' +/- CLAY: l-med. pl, lt. pinkish red w/lt. gray; v. stiff; damp-moist; v. calc; mod. silty & sandy	GC SC	E F	
9.8	10		6.9' TO 8.5' +/- CLAY: med. pl, red-reddish brn; v. stiff; moist; calc; gravelly; mod. sandy	CLAY SHALE	G	3. DRILLING: 8" FLIGHT AUGER: 0.0' - 15.0' NOTE: Split Spoon samples taken every 2.5'.
	12 14 16 18 20 22 24 26 28 30 32 34 36 38		8.5' TO 9.8' +/- GRAVEL: predom. fn. w/small amount of med. gray; lt. brn. w/red-reddish brn. binder; med. density; wet-sat; calc; clayey & sandy 9.8' TO 15.0' T.D. CLAY SHALE: mod. weathered; dull red-reddish brn; v. soft; damp; sl. calc. T.D. 15.0'			4. STANDARD PENETRATION TESTS: DEPTH / NO. OF BLOWS: 1ST 6" / 2ND 6" / 3RD 6" 2.5' 14 21 20 5.0' 5 9 11 7.5' 14 14 16 10.0' 14 25 31 13.5' 10 20 31 5. BORING LOCATION: NOTE: Boring was drilled as shown on layout. Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

ENG FORM 1836 MAR 71 — PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT: DYESS AFB FAM. HOUSING — HOLE NO. 8A2S-1

Hole No. 6D-2

DRILLING LOG	DIVISION: S.W.D.	INSTALLATION: S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 6" Carboloy	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 6D-2		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2	UNDISTURBED 6
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN: 14.7' +/-		16. DATE HOLE: STARTED 14 FEB 94	COMPLETED 14 FEB 94
8. DEPTH DRILLED INTO ROCK: 0.3' +/-		17. ELEVATION TOP OF HOLE:	
TOTAL DEPTH OF HOLE: 15.0'		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			(GRASS COVER) 0.0' TO 1.4' +/- CLAY: med-hi pl, drk. brn; v. stiff; damp-moist; sl. calc. with trace of silt	CL	A	1. WATER LEVEL: NOTE: Boring was bailed to 13.5' +/- upon completion & left open.
				CL	B	
			1.4' TO 6.5' +/- CLAY: med. pl, lt. reddish brn; hard; damp; v. calc. w/ lime matter, w/trace of silt & sand	CL	DB 1 (4.5+)	NOTE: Level was 10.5' after 24 hrs.
				CL	DB 2 (4.5+)	2. JAR SAMPLES: A. 0.0' - 1.4' B. 1.4' - 2.5'
			6.5' TO 9.5' +/- CLAY: l-med. pl, red-reddish brn; hard; damp; calc; mod. silty; w/trace of fn. grav. & coarse sand	CL	DB 3 (4.5+)	3. DENISON SAMPLES: DB1: 2.5' - 4.5' DB2: 4.5' - 6.5' DB3: 6.5' - 8.5' DB4: 8.5' - 10.5' DB5: 11.5' - 12.5' DB6: 12.5' - 15.0'
				SC	DB 4	
			9.5' TO 14.7' +/- GRAVEL: fn-large; rounded to sub-rounded; lt. brn. w/ red-reddish brn. binder; med density; v. moist to wet; calc; mod. sandy; v. clayey from 9.5'-10.5' & 11.5'-13.5' (lost: 10.5'-11.5')	SC	LOST SAMPLE DB 5	NOTE: Pocket Penetrometer readings located in column 'F'
14.7				CLAY SHALE	DB 6 (4.5+)	4. DRILLING: 10" FLIGHT AUGER: 0.0' - 2.5' 6" DENSION BARREL: 2.5' - 15.0'
			14.7' TO 15.0' T.D. CLAY SHALE: mod. weathered; dull red-reddish brn; v. soft; damp; sl. calc.			5. BORING LOCATION: NOTE: Boring was drilled as shown on layout.
			T.D. 15.0'			Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

ENG FORM 1836 MAR 71 — PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT: DYESS AFB FAM. HOUSING — HOLE NO. 6D-2

Hole No. 8A2S-3

DRILLING LOG	DIVISION S.W.D.	INSTALLATION S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A2S-3		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7	UNDISTURBED 0
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN: 14.3' +/-		16. DATE HOLE: STARTED 10 FEB 94	COMPLETED 10 FEB 94
8. DEPTH DRILLED INTO ROCK: 0.7' +/-		17. ELEVATION TOP OF HOLE:	
TOTAL DEPTH OF HOLE: 15.0'		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	0		(GRASS COVER)			1. WATER LEVEL:
			0.0' TO 2.1' +/-	CH	A	NOTE: Free water on auger at 12.4' +/- during drilling.
	2		CLAY: med-hi. pl, drk. brn; v. stiff-hard; damp-moist; calc.	CL	B	NOTE: Level upon completion was 11.5'; level after 24 hrs. was 11.0'
			2.1' TO 5.8' +/-			
	4		CLAY: l-med. pl, lt. brn. down to lt. pinkish brn. from 3.1' +/-; hard; dry; v. calc, w/ abundant lime matter; silty	CL	C	2. JAR SAMPLES: A. 0.0' - 2.1', B. 2.1' - 3.1', C. 3.1' - 5.8', D. 5.8' - 7.0', E. 7.0' - 9.1', F. 9.1' - 12.4', G. 12.4' - 14.3', H. 14.3' - 15.0'
			5.8' TO 7.0' +/-			
	6		CLAY: med. pl, red-reddish brn; hard; damp; v. calc; w/ abundant lime matter; w/ trace of sand	CL	D	
			7.0' TO 12.4' +/-			
	8		CLAY: l-med. pl, red-reddish brn; hard; damp down to damp-moist from 9.1' +/-; calc; sl. sandy; w/an occasional grav.	CL	E	
	10			CL	F	3. DRILLING: 8" FLIGHT AUGER: 0.0' - 15.0'
	12					NOTE: Split Spoon samples taken every 2.5'.
14.3	14		12.4' TO 14.3' +/-	SC	G	
			GRAVEL: fn-med. w/abundant fn. grav; lt. brn. w/red-reddish brn. binder; med. density; rounded to sub-rounded; calc; clayey & sandy	CLAY SHALE	H	4. STANDARD PENETRATION TESTS:
	16		14.3' TO 15.0' T.D.			
			CLAY SHALE: mod. weathered, dull red-reddish brn; v. soft; damp; sl. calc.			
	18		T.D. 15.0'			
	20					
	22					
	24					
	26					
	28					
	30					
	32					
	34					
	36					
	38					

DEPTH	NO. OF BLOWS		
	1ST 6"	2ND 6"	3RD 6"
2.5'	16	19	24
5.0'	15	25	31
7.5'	13	19	22
10.0'	7	11	12
13.5'	8	20	26

5. BORING LOCATION: NOTE: Boring was drilled as shown on layout.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 6D-4

DRILLING LOG	DIVISION S.W.D.	INSTALLATION S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT 6" Carboloy	
2. LOCATION (Coordinates or Station) SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number) 6D-4		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 3	UNDISTURBED 3
5. NAME OF DRILLER G. WILLIAMS		14. TOTAL NUMBER CORE BOXES N/A	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER SEE REMARKS COLUMN	
		16. DATE HOLE STARTED 15 FEB 94	COMPLETED 15 FEB 94
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE	
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING N/A %	
TOTAL DEPTH OF HOLE 15.0'		19. NAME(S) OF INSPECTOR(S) Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	2		(GRASS COVER) 0.0' TO 0.6' +/- CLAY FILL: med. pl; brn; hard; damp; calc; w/trace of silt & sand & scattered surface lime grav.	CL	A B C	1. WATER LEVEL: NOTE: Boring was bailed to 13.5' +/- upon completion & left open.
	4		0.6' TO 1.0 +/- CLAY FILL: med. pl; lt. reddish brn-brn; hard; damp; v. calc. w/lime matter & trace of silt & sand	GC	DB 1 (4.5+)	NOTE: Level was 11.0' after 24 hrs. & closed in at 8.7'
	6			CL	DB 2 (4.5+)	2. JAR SAMPLES: A. 0.0' - 0.6' B. 0.6' - 1.0' C. 1.0' - 2.5'
	8		1.0' TO 2.8' +/- CLAY: med. pl, drk. brn; hard; dry-damp; calc; w/trace of silt & sand	SC	DB 3 (4.5+)	3. DENISON SAMPLES: DB1: 2.5' - 4.5' DB2: 4.5' - 6.5' DB3: 6.5' - 8.5'
	10		2.8' TO 5.5' +/- CLAY: l. pl; lt. pinkish brn; hard; dry; v. limy. w/some cementation			NOTE: Pocket Penetrometer readings located in column "F"
	12		5.5' TO 7.5' +/- CLAY: l. pl; red-reddish brn; v. stiff-hard; damp; v. calc. w/lime grav; silty		LOST SAMPLE	4. DRILLING: 10" FLIGHT AUGER: 0.0' - 2.5' 6" DENISON BARREL: 2.5' - 15.0' NOTE: Did not retain sample from 8.5'-15.0'. Drilled off set auger boring.
	14					
	16		7.5' TO 8.5' +/- CLAY: l-med. pl; red-reddish brn; v. stiff; moist; mod. silty & sandy; calc, w/ scattered lime grav.			5. BORING LOCATION: NOTE: Boring was drilled as shown on layout.
	18					
	20		8.5' TO 11.0' +/- GRAVEL: fn-med; rounded to sub-rounded; lt. brn. w/red-reddish brn. binder; calc; med. dense; v. sandy, moist			
	22					
	24		11.0' TO 15.0' T.D. GRAVEL: fn-large; rounded to sub-rounded; lt. brn. w/ red-reddish brn. binder; dense; wet-sat; calc; sl. silty & sandy; w/occasional cobble to 3 1/2"			
	26					
	28		T.D. 15.0'			
	30					
	32					
	34					
	36					
	38					Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 8A-4A

DRILLING LOG	DIVISION: S.W.D.	INSTALLATION: S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A-4A		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 2	UNDISTURBED 0
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
		16. DATE HOLE: STARTED 15 FEB 94	COMPLETED 15 FEB 94
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE	
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
TOTAL DEPTH OF HOLE: 15.0'		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	2		(NOTE: Refer to 6D-4 for classification of materials)		SAMPLES IN	1. WATER LEVEL: NOTE: Refer to 6D-4 for water level information
	4					2. JAR SAMPLES: A. 8.5' - 11.0' B. 11.0' - 15.0'
	6					3. DRILLING: 8" FLIGHT AUGER: 0.0' - 15.0'
	8					NOTE: Boring was drilled to obtain representative samples from 8.5' - 15.0'
	10			GP-GC	A	
	12			GP-GC	B	4. BORING LOCATION: NOTE: Boring was offset 3.0' east of 6D-4.
	14		T.D. 15.0'			
	16					
	18					
	20					
	22					
	24					
	26					
	28					
	30					
	32					
	34					
	36					
	38					Letter Classification based on laboratory classification. (MIL-STD-619B) ASTM D-2487)

ENG FORM 1836 MAR 71 — PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT: DYESS AFB FAM. HOUSING — HOLE NO. 8A-4A

Hole No. 8A2S-5

DRILLING LOG	DIVISION: S.W.D.	INSTALLATION: S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (GS or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A2S-5		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7 / UNDISTURBED 0	
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE: STARTED 17 FEB 94 / COMPLETED 17 FEB 94	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE	
TOTAL DEPTH OF HOLE: 15.0'		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f
	2		(GRASS COVER) 0.0' TO 3.5' +/- CLAY: med-hi. pl, drk. brn; hard; damp; calc; w/nods	CH	A
	4		3.5' TO 6.2' +/- CLAY: l. pl, lt. pinkish-brn; hard down to stiff from 4.8' +/-; dry; v. limy; w/ abundant lime matter; silty; w/trace of sand	CL	B
	6			CL	C
	8		6.2' TO 8.9' +/- CLAY: l-med. pl, red-reddish brn; v. stiff; damp; calc; mod. silty & sandy	CL	D
	10		8.9' TO 14.0' +/- SAND: fn. grained; red-reddish brn; med. dense; moist-v. moist down to wet from 12.0' +/-; calc; v. silty	SC	E
	12			SC	F
	14		14.0' TO 15.0' T.D. GRAVEL: predom. fn. w/ occasional med. gravel; lt. brn. w/red-reddish brn. binder; dense; calc; wet; v. silty & sandy	SC	G
	16				
	18		T.D. 15.0'		
	20				
	22				
	24				
	26				
	28				
	30				
	32				
	34				
	36				
	38				

REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g

1. WATER LEVEL:
NOTE: Free water on auger at 12.0' +/- during drilling.
NOTE: Free water level was 11.9' shortly after drilling & boring was backfilled.

2. JAR SAMPLES:
A. 0.0' - 3.5'
B. 3.5' - 4.8'
C. 4.8' - 6.2'
D. 6.2' - 8.9'
E. 8.9' - 12.0'
F. 12.0' - 14.0'
G. 14.0' - 15.0'

3. DRILLING:
8" FLIGHT AUGER:
0.0' - 15.0'
NOTE: Split Spoon samples taken every 2.5'.

4. STANDARD PENETRATION TESTS:

DEPTH	NO. OF BLOWS		
	1ST 6"	2ND 6"	3RD 6"
2.5'	11	15	22
5.0'	5	5	6
7.5'	9	12	14
10.0'	10	14	16
13.5'	14	23	25

5. BORING LOCATION:
NOTE: Boring was offset 50' west due to underground utilities.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 8A2S-6

DRILLING LOG	DIVISION S.W.D.	INSTALLATION S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A2S-6		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7	UNDISTURBED 0
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE: STARTED 10 FEB 94	COMPLETED 10 FEB 94
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE	
TOTAL DEPTH OF HOLE: 15.0'		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	2		(GRASS COVER) 0.0' TO 4.0' +/- CLAY: med-hi. pl, drk. brn; v. stiff-hard; damp-moist; mod. calc.	CL	A	1. WATER LEVEL: NOTE: Free water on auger at 12.0' +/- during drilling. NOTE: Level upon completion was 12.4'; level after 24 hrs. was 12.3'
	4		4.0' TO 5.1' +/- CLAY: med. pl, drk. reddish brn; hard; damp; v. calc, w/ lime matter	CL	B	
	6		5.1' TO 7.1' +/- CLAY: med. pl, reddish brn; hard; damp; v. calc, w/abundant lime matter; w/trace of sand	CL	C	2. JAR SAMPLES: A. 0.0' - 4.0' B. 4.0' - 5.1' C. 5.1' - 7.1' D. 7.1' - 9.9' E. 9.9' - 11.0' F. 11.0' - 11.9' G. 11.9' - 15.0'
	8			CH	D	
	10		7.1' TO 9.9' +/- CLAY: med. pl, drk. red-reddish brn; v. stiff-hard; calc, w/small amount of lime matter; w/trace of sand	SC	E	3. DRILLING: 8" FLIGHT AUGER: 0.0' - 15.0'
	12			SC	F	
	14		9.9' TO 11.0' +/- CLAY: l-med. pl; drk. red-reddish brn; stiff-v. stiff; moist; calc; sandy; w/ scattered fn. grav.	GC	G	NOTE: Split Spoon samples taken every 2.5'.
	16					4. STANDARD PENETRATION TESTS:
	18		11.0' TO 11.9' +/- CLAY: l. pl; red-reddish brn; med; v. moist; calc; sandy; gravelly w/fn. grav.			
	20					
	22		11.9' TO 15.0' T.D. GRAVEL: predom. fn. w/small amount of med. grav; lt. brn. w/red-reddish brn. binder; rounded to sub-rounded; med. density; wet; calc; clayey & sandy			
	24					
	26		T.D. 15.0'			
	28					
	30					
	32					
	34					
	36					
	38					

DEPTH	NO. OF BLOWS 1ST 6"	2ND 6"	3RD 6"
2.5'	6	8	12
5.0'	22	27	38
7.5'	5	12	15
10.0'	6	7	9
13.5'	17	18	21

5. BORING LOCATION:
NOTE: Boring was drilled as shown on layout.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 8A2S-7

DRILLING LOG	DIVISION: S.W.D.	INSTALLATION: S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A2S-7		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5	UNDISTURBED 0
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN: 14.5' +/-		16. DATE HOLE: STARTED 17 FEB 94	COMPLETED 17 FEB 94
8. DEPTH DRILLED INTO ROCK: 0.5' +/-		17. ELEVATION TOP OF HOLE:	
TOTAL DEPTH OF HOLE: 15.0'		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f
	0		(GRASS COVER)	CL	A
			0.0' TO 0.7' +/-		
	2		CLAY: med. pl, drk. brn; hard; damp; calc. w/lime nods; w/ trace of silt & sand	GC	B
			0.7' TO 4.5' +/-		
	4		CLAY: l. pl, lt. pinkish brn; hard; dry; v. limy; w/grav. size lime nods; w/trace of silt & sand	CL	C
	6		4.5' TO 7.0' +/-		
	8		CLAY: med. pl, red-reddish brn; hard; damp; v. calc; w/ lime matter; w/trace of silt & sand	SC	D
	10		7.0' TO 9.4' +/-		
	12		SAND: fn. grained; red-reddish brn; med; moist-v. moist; calc; silty	SC	E
	14		9.4' TO 14.5' +/-		F
			SAND: fn-med; red-reddish brn; dense; wet; calc; silty; gravelly, w/fn. grav.		
	16		14.5' TO 15.0' T.D.		
	18		CLAY SHALE: mod. weathered; dull red-reddish brn; soft-v. soft; damp; w/occasional blue-grn. spots; sl. calc.		
	20		T.D. 15.0'		
	22				
	24				
	26				
	28				
	30				
	32				
	34				
	36				
	38				

REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g

1. WATER LEVEL:
NOTE: Free water on auger at 9.0' +/- during drilling.
NOTE: Free water level was 9.4' shortly after completion & boring was backfilled.

2. JAR SAMPLES:
A. 0.0' - 0.7'
B. 0.7' - 4.5'
C. 4.5' - 7.0'
D. 7.0' - 9.4'
E. 9.4' - 14.5'
F. 14.5' - 15.0'

3. DRILLING:
8" FLIGHT AUGER:
0.0' - 15.0'
NOTE: Split Spoon samples taken every 2.5'.

4. STANDARD PENETRATION TESTS:

DEPTH	NO. OF BLOWS 1ST 6"	2ND 6"	3RD 6"
2.5'	38	47	55
5.0'	8	17	18
7.5'	9	9	9
10.0'	6	21	26
13.5'	16	17	20

5. BORING LOCATION:
NOTE: Boring was offset 20' south & drilled just west of drainage ditch.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 8A2S-8

DRILLING LOG	DIVISION: S.W.D.	INSTALLATION: S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (MSL or USE):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A2S-8		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 7; UNDISTURBED 0	
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN: 14.7' +/-		16. DATE HOLE: STARTED 11 FEB 94; COMPLETED 11 FEB 94	
8. DEPTH DRILLED INTO ROCK: 0.3' +/-		17. ELEVATION TOP OF HOLE:	
TOTAL DEPTH OF HOLE: 15.0'		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f
			(GRASS COVER) 0.0' TO 1.8' +/- CLAY: med-hi. pl; drk. brn; v. stiff-hard; damp-moist; mod. calc.	CL	A
			1.8' TO 3.1' +/- CLAY: med. pl; drk. reddish brn; hard; damp; v. calc; w/ abundant lime matter	CH	B
			3.1' TO 7.0' +/- CLAY: med. pl, lt. reddish brn. down to drk. reddish-brn. from 4.5' +/-; hard; dry-damp; v. calc. w/abund-ant lime matter	CL	C
			7.0' TO 12.5' +/- CLAY: med. pl; drk. red-reddish brn; v. stiff-hard down to v. stiff from 9.8' +/-; damp down to moist from 9.8' +/-; calc; w/some lime matter; w/trace of silt & sand	CL	D
14.7			12.5' TO 14.7' +/- GRAVEL: predom fn. w/small amount of med. gravel lt. brn w/red-reddish brn. binder; rounded to sub-rounded; med. density; sat; calc; clayey & sandy	CL	E
			14.7' TO 15.0' T.D. CLAY SHALE: mod. weathered, dull red-reddish brn; v. soft; damp; sl. calc.	SM	F
			T.D. 15.0'		G
					H

REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g

1. WATER LEVEL:
NOTE: Free water on auger at 12.5' +/- during drilling.
NOTE: Level upon completion was 12.0'. Level after 24 hrs. was 11.8'

2. JAR SAMPLES:
A. 0.0' - 1.8'
B. 1.8' - 3.1'
C. 3.1' - 4.5'
D. 4.5' - 7.0'
E. 7.0' - 9.8'
F. 9.8' - 12.5'
G. 12.5' - 14.7'
H. 14.7' - 15.0'

3. DRILLING:
8" FLIGHT AUGER:
0.0' - 15.0'
NOTE: Split Spoon samples taken every 2.5'.

4. STANDARD PENETRATION TESTS:

DEPTH	NO. OF BLOWS 1ST 6"	2ND 6"	3RD 6"
2.5'	15	21	27
5.0'	25	40	61
7.5'	8	14	18
10.0'	7	13	14
13.5'	11	10	10

5. BORING LOCATION:
NOTE: Boring was drilled as shown on layout.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 8A2S-9

DRILLING LOG	DIVISION S.W.D.	INSTALLATION S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT 8" Auger	
2. LOCATION (Coordinates or Station) SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number)	8A2S-9	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5	UNDISTURBED 0
5. NAME OF DRILLER G. WILLIAMS		14. TOTAL NUMBER CORE BOXES N/A	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN 8.9' +/-		16. DATE HOLE STARTED 16 FEB 94	COMPLETED 16 FEB 94
8. DEPTH DRILLED INTO ROCK 6.1' +/-		17. ELEVATION TOP OF HOLE	
TOTAL DEPTH OF HOLE 15.0'		18. TOTAL CORE RECOVERY FOR BORING N/A %	
		19. NAME(S) OF INSPECTOR(S) Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			(GRASS COVER) 0.0' TO 0.8' +/-	CL	A	1. WATER LEVEL: NOTE: Free water on auger at 6.0' +/- during drilling. NOTE: Level upon completion was 10.2'. NOTE: After 24 hrs, level was 6.1' with boring caved to 6.6'.
	2		CLAY: med. pl; reddish brn; v stiff-hard; damp; calc; w/ trace of silt & sand	CL	B	
	4		0.8' TO 3.4' +/- CLAY: l-med. pl; lt. reddish-brn; v. stiff; damp; calc; mod. silty & sandy	CL	C	
	6		3.4' TO 5.5' +/- CLAY: l. pl; lt. reddish-brn; hard; damp; calc; v. sandy	GP-GC	D E	2. JAR SAMPLES: A. 0.0' - 0.8' B. 0.8' - 3.4' C. 3.4' - 5.5' D. 5.5' - 6.0' E. 6.0' - 8.9' F. 8.9' - 13.9' G. 13.9' - 15.0'
8.9	8		5.5' TO 8.9' +/-			
	10		GRAVEL: fn. to large; angular to rounded; lt. grayish brn. w/reddish brn binder; med-dense; moist down to wet from 6.0' +/-; calc; mod. sandy & clayey	CL	F	3. DRILLING: 8" FLIGHT AUGER: 0.0' - 15.0' NOTE: Split Spoon samples taken every 2.5'.
	12					
	14		8.9' TO 15.0' T.D. CLAY SHALE: mod. weathered; dull red-reddish brn; soft-v. soft; damp; sl. calc; w/ trace of sand at contact	CL	G	
	16		T.D. 15.0'			
	18					
	20					
	22					
	24					
	26					
	28					
	30					
	32					
	34					
	36					
	38					

4. STANDARD PENETRATION TESTS:

DEPTH	NO. OF BLOWS 1ST 6"	2ND 6"	3RD 6"
2.5'	9	16	19
5.0'	21	25	32
7.5'	17	14	19
10.0'	15	31	36
13.5'	21	34	37

5. BORING LOCATION: NOTE: Boring was drilled as shown on layout.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

ENG FORM 1836 MAR 71 — PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT DYESS AFB FAM. HOUSING — HOLE NO. 8A2S-9

Hole No. 6D-10

DRILLING LOG	DIVISION S.W.D.	INSTALLATION S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT 6" Carboloy	
2. LOCATION (Coordinates or Station) SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number)	6D-10	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 4 / UNDISTURBED 3
5. NAME OF DRILLER G. WILLIAMS		14. TOTAL NUMBER CORE BOXES N/A	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER SEE REMARKS COLUMN	
		16. DATE HOLE	STARTED 16 FEB 94 / COMPLETED 16 FEB 94
7. THICKNESS OF OVERBURDEN 12.2' +/-		17. ELEVATION TOP OF HOLE	
8. DEPTH DRILLED INTO ROCK 2.8' +/-		18. TOTAL CORE RECOVERY FOR BORING N/A %	
TOTAL DEPTH OF HOLE 15.0'		19. NAME(S) OF INSPECTOR(S) Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
			(GRASS COVER) 0.0' TO 0.7' +/- CLAY FILL: l-med. pl; red-reddish brn. w/brn; stiff-v. stiff; moist; calc; silty & sandy	CH	A B	1. WATER LEVEL: NOTE: Boring was bailed to 12.5' with gravel caving in. Level after 24 hrs. was 10.0' w/boring closed in at 10.2'.
	2		0.7' TO 3.5' +/- CLAY: l-med. pl, drk. reddish brn; hard; dry-damp; calc; silty & sandy	CL SC	DB 1 (4.5+) DB 2 (4.5+)	2. JAR SAMPLES: A. 0.0' - 0.7' B. 0.7' - 3.4' C. 8.5' - 10.0' D. 10.0' - 12.2' E. 12.2' - 15.0'
	4					
	6					
	8		3.5' TO 5.5' +/- CLAY: l-med. pl, lt. reddish brn. w/white; hard; v. calc, w/lime matter & embedded fn. gravel w/some lime cementation	SC	DB 3 (4.5+)	
	10		5.5' TO 7.5' +/- CLAY: l. pl; red-reddish brn; hard; damp; v. calc; sandy; gravelly, w/fn. grav. from 6.2' +/-; w/some lime cementation	GP-GM	C	3. DENISON SAMPLES: DB1: 3.4' - 4.5' DB2: 4.5' - 6.5' DB3: 6.5' - 8.5'
12.2	12			GP-GM	D	NOTE: Samples from 2.5'-3.4' & 8.5'-10.5' (Jars B & C).
	14		7.5' TO 8.5' +/- CLAY: l. pl; red-reddish brn; hard; damp; calc; v. sandy	CL	E	NOTE: Pocket Penetrometer readings located in column F.
	16		8.5' TO 12.2' +/- GRAVEL: fn-large, w/cobbles to 3 1/2"; lt. brn. w/a red-reddish brn. binder; med; moist down to wet from 10.0' +/-; calc; mod. sandy			4. DRILLING: 10" FLIGHT AUGER: 0.0' - 2.5' 6" DENSION BARREL: 2.5' - 10.5' NOTE: Did not retain samples from 8.5'-10.5'; bailed water from boring & augered to 15.0'.
	18					
	20		12.2' TO 15.0' T.D. CLAY SHALE: mod. weathered; dull red-reddish brn; v. soft; damp; sl. calc.			5. BORING LOCATION: NOTE: Boring was drilled as shown on layout.
	22					
	24		T.D. 15.0'			
	26					
	28					
	30					
	32					
	34					
	36					
	38					

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 8A2S-11

DRILLING LOG	DIVISION: S.W.D.	INSTALLATION: S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A2S-11		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 6; UNDISTURBED 0	
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE: STARTED 17 FEB 94; COMPLETED 17 FEB 94	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE	
TOTAL DEPTH OF HOLE: 15.0'		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f
	2		(GRASS COVER) 0.0' TO 0.6' +/- CLAY: med. pl; brn; hard; dry; v. calc, w/lime nods; w/trace of silt & sand	CL	A B
	4		0.6' TO 7.2' +/- CLAY: l-med. pl; lt. reddish-brn-lt. pinkish brn; hard; dry down to damp from 5.0' +/-; v. limy, w/lime matter & occasional lime gravs w/ less lime from 5.0'; mod. silty & sandy	CL	C
	6				
	8		7.2' TO 11.0' +/- CLAY: l. pl; lt. red-reddish brn; v. stiff; damp; calc; silty & sandy	CL	D
	10				
	12		11.0' TO 12.8' +/- SAND: fn. grained; red-reddish brn; dense; v. moist; calc; v. silty	SC	E
	14		12.8' TO 15.0' T.D. SAND: fn-med; red-reddish brn; dense; wet; calc; silty; sl. gravelly, w/fn. grav.	SM	F
	16				
	18		T.D. 15.0'		
	20				
	22				
	24				
	26				
	28				
	30				
	32				
	34				
	36				
	38				

REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g

1. WATER LEVEL:
NOTE: Water on auger at 12.8' +/- during drilling.

NOTE: Free water level was 11.8' shortly after completion & boring was backfilled.

2. JAR SAMPLES:
A. 0.0' - 0.6'
B. 0.6' - 5.0'
C. 5.0' - 7.2'
D. 7.2' - 11.0'
E. 11.0' - 12.8'
F. 12.8' - 15.0'

3. DRILLING:
8" FLIGHT AUGER:
0.0' - 15.0'
NOTE: Split Spoon samples taken every 2.5'.

4. STANDARD PENETRATION TESTS:

DEPTH	NO. OF BLOWS		
	1ST 6"	2ND 6"	3RD 6"
2.5'	26	27	32
5.0'	11	16	21
7.5'	8	10	13
10.0'	10	15	33
13.5'	9	14	19

5. BORING LOCATION:
NOTE: Boring was offset 50' south due to large underground water line in area.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 6D-12

DRILLING LOG | DIVISION: S.W.D. | INSTALLATION: S.W.F. | SHEET 1 OF 1 SHEETS

1. PROJECT: DYESS A.F.B. FAMILY HOUSING
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN
3. DRILLING AGENCY: U.S.C.E.
4. HOLE NO. (As shown on drawing title and file number): 6D-12
5. NAME OF DRILLER: G. WILLIAMS
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
TOTAL DEPTH OF HOLE: 15.0'

10. SIZE AND TYPE OF BIT: 6" Carboloy
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 4 | UNDISTURBED 4
14. TOTAL NUMBER CORE BOXES: N/A
15. ELEVATION GROUND WATER: SEE REMARKS COLUMN
16. DATE HOLE: STARTED 15 FEB 94 | COMPLETED 15 FEB 94
17. ELEVATION TOP OF HOLE:
18. TOTAL CORE RECOVERY FOR BORING: N/A %
19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	2		(GRASS COVER) 0.0' TO 3.5' +/- CLAY: med. pl; drk. reddish brn; v. stiff-hard; damp; calc; w/trace of silt & sand	CL	A	1. WATER LEVEL: NOTE: Boring was bailed to 13.3' +/- completion & left open. NOTE: Level was 12.7' after 24 hrs.
	4		3.5' TO 5.5' +/- CLAY: l-med. pl; lt. reddish brn. w/white; hard; dry; v. limy, w/abundant lime matter; w/trace of silt & sand	CL	DB 1 (4.5+)	
	6			CL	DB 2 (4.5+)	2. JAR SAMPLES: A. 0.0' - 2.5' B. 10.5' - 12.5' C. 12.5' - 14.5' D. 14.5' - 15.0'
	8		5.5' TO 10.5' +/- CLAY: med. pl; red-reddish brn; hard; damp; calc; silty; w/trace of sand	CL	DB 3 (4.5+)	
	10			CL	DB 4 (4.5+)	3. DENISON SAMPLES: DB1: 2.5' - 4.5' DB2: 4.5' - 6.5' DB3: 6.5' - 8.5' DB4: 8.5' - 10.5'
	12		10.5' TO 14.5' +/- SAND: fn. grained; red-reddish brn; med; moist-v. moist down to wet from 12.5' +/-; calc; v. silty	SC	B	NOTE: Pocket Penetrometer readings located in column F.
	14			SC	C	
	16		14.5' TO 15.0' T.D. GRAVEL: fn-large; rounded to sub-rounded; lt. brn w/ red-reddish brn. binder; med density; wet; calc mod. sandy, w/trace of fines & occasional cobble to 3 1/2"		D	4. DRILLING: 10' FLIGHT AUGER: 0.0' - 2.5' 6' DENSION BARREL: 2.5' - 10.5'
	18		T.D. 15.0'			5. BORING LOCATION: NOTE: Boring was drilled as shown on layout.
	20					
	22					
	24					
	26					
	28					
	30					
	32					
	34					
	36					
	38					

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 6D-13

DRILLING LOG	DIVISION S.W.D.	INSTALLATION S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT 6" Carboloy	
2. LOCATION (Coordinates or Station) SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	
3. DRILLING AGENCY U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number)	6D-13	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED 3 / UNDISTURBED 5
5. NAME OF DRILLER G. WILLIAMS		14. TOTAL NUMBER CORE BOXES N/A	
6. DIRECTION OF HOLE ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER SEE REMARKS COLUMN	
7. THICKNESS OF OVERBURDEN 15.2' +/-		16. DATE HOLE STARTED 14 FEB 94 / COMPLETED 14 FEB 94	
8. DEPTH DRILLED INTO ROCK 0.3' +/-		17. ELEVATION TOP OF HOLE	
TOTAL DEPTH OF HOLE 15.5'		18. TOTAL CORE RECOVERY FOR BORING N/A %	
		19. NAME(S) OF INSPECTOR(S) Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	2		(GRASS COVER) 0.0' TO 3.5' +/- CLAY: med-hi. pl; drk. brn; stiff-v. stiff; damp-moist; sl. calc.	CL	A	1. WATER LEVEL: NOTE: Boring was bailed to 13.7' +/- completion & left open.
	4		3.5' TO 7.5' +/- CLAY: l-med. pl, reddish-brn; hard; damp; v. calc. w/lime matter; w/trace of sand	CH CL	DB 1 (4.5+) B	NOTE: Level was 12.4' after 24 hrs.
	6			CL	DB 2 (4.5+)	2. JAR SAMPLES: A. 0.0' - 2.5' B. 4.5' - 5.5' C. 11.5' - 13.5'
	8		7.5' TO 9.5' +/- CLAY: l. pl; red-reddish brn; hard; damp; calc; v. sandy	CL	DB 3 (4.5+)	3. DENISON SAMPLES: DB1: 2.5' - 4.5' DB2: 5.5' - 7.5' DB3: 7.5' - 9.5' DB4: 9.5' - 11.5' DB5: 13.5' - 15.5'
	10		9.5' TO 11.5' +/- CLAY: l. pl; red-reddish brn; stiff; moist; calc; silty; mod. sandy	SC	DB 4 (4.5+)	
	12		11.5' TO 13.5' +/- SILT: l. pl; red-reddish brn; med; v. moist; calc; sandy	CL	C	NOTE: Pocket Penetrometer readings located in column F.
	14			GC	DB 5 (4.5+)	4. DRILLING: 10" FLIGHT AUGER: 0.0' - 2.5' 6" DENSION BARREL: 2.5' - 15.5'
15.2	16		13.5' TO 15.2' +/- GRAVEL: fn-med; rounded to sub-rounded; lt. brn w/red-reddish brn. binder; med. density; wet-sat; calc; mod. clayey & sandy			NOTE: Samples were disturbed from 4.5'-5.5' & 11.5'-13.5' (Jar Samples B & C)
	18		15.2' TO 15.5' T.D. CLAY SHALE: mod. weathered; dull red-reddish brn; v. soft; damp; sl. calc.			5. BORING LOCATION: NOTE: Boring was drilled as shown on layout.
	20		T.D. 15.5'			
	22					
	24					
	26					
	28					
	30					
	32					
	34					
	36					
	38					Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

Hole No. 8A2S-14

DRILLING LOG | DIVISION: S.W.D. | INSTALLATION: S.W.F. | SHEET 1 OF 1 SHEETS

1. PROJECT: DYESS A.F.B. FAMILY HOUSING
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN
3. DRILLING AGENCY: U.S.C.E.
4. HOLE NO. (As shown on drawing title and file number): 8A2S-14
5. NAME OF DRILLER: G. WILLIAMS
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
TOTAL DEPTH OF HOLE: 15.0'

10. SIZE AND TYPE OF BIT: 8" Auger
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)
12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 6 | UNDISTURBED 0
14. TOTAL NUMBER CORE BOXES: N/A
15. ELEVATION GROUND WATER: SEE REMARKS COLUMN
16. DATE HOLE: STARTED 11 FEB 94 | COMPLETED 11 FEB 94
17. ELEVATION TOP OF HOLE
18. TOTAL CORE RECOVERY FOR BORING: N/A %
19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CLASS e	BOX OR SAMPLE NO. f
	0		(GRASS COVER)		
			0.0' TO 3.4' +/-	CL	A
	2		CLAY: med-hi. pl; drk. brn-drk-reddish brn; hard; damp, calc. w/nods; w/increase in lime matter from 1.9'	CH	B
	4		3.4' TO 7.2' +/-		
			CLAY: l-med. pl; lt. pinkish-brn-lt. reddish brn; hard; dry-damp; v. calc; mod. silty & sandy	CL	C
	6		7.2' TO 9.8' +/-		
	8		CLAY: l-med. pl; drk. red-reddish brn; hard; damp; calc; mod. sandy	CL	D
	10		9.8' TO 12.6' +/-		
			CLAY: l. pl; drk. red-reddish brn; v. stiff; damp-moist; calc; sandy	SC	E
	12		12.6' TO 15.0' T.D.		
	14		GRAVEL: fn-med; rounded to sub-rounded; lt. brn. w/red-reddish brn. binder; med. density; v. moist-wet; calc; mod. clayey & sandy	GP-GC	F
	16		T.D. 15.0'		
	18				
	20				
	22				
	24				
	26				
	28				
	30				
	32				
	34				
	36				
	38				

REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g

1. WATER LEVEL:
NOTE: No free water in boring during drilling or upon completion.

NOTE: Free water level was 14.7' on 14 FEB 94.

2. JAR SAMPLES:
A. 0.0' - 1.9'
B. 1.9' - 3.4'
C. 3.4' - 7.2'
D. 7.2' - 9.8'
E. 9.8' - 12.6'
F. 12.6' - 15.0'

3. DRILLING:
8" FLIGHT AUGER:
0.0' - 15.0'
NOTE: Split Spoon samples taken every 2.5'.

4. STANDARD PENETRATION TESTS:

DEPTH	NO. OF BLOWS 1ST 6"	2ND 6"	3RD 6"
2.5'	13	16	16
5.0'	19	23	33
7.5'	17	27	27
10.0'	9	11	16
13.5'	36	32	36

5. BORING LOCATION:
NOTE: Boring was drilled as shown on layout.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

ENG FORM 1836 MAR 71 — PREVIOUS EDITIONS ARE OBSOLETE. (TRANSLUCENT)

PROJECT: DYESS AFB FAM. HOUSING | HOLE NO. 8A2S-14

Hole No. 8A2S-15

DRILLING LOG	DIVISION: S.W.D.	INSTALLATION: S.W.F.	SHEET 1 OF 1 SHEETS
1. PROJECT: DYESS A.F.B. FAMILY HOUSING		10. SIZE AND TYPE OF BIT: 8" Auger	
2. LOCATION (Coordinates or Station): SEE REMARKS COLUMN		11. DATUM FOR ELEVATION SHOWN (TBM or MSL):	
3. DRILLING AGENCY: U.S.C.E.		12. MANUFACTURER'S DESIGNATION OF DRILL: FAILING 1500	
4. HOLE NO. (As shown on drawing title and file number): 8A2S-15		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 5 / UNDISTURBED 0	
5. NAME OF DRILLER: G. WILLIAMS		14. TOTAL NUMBER CORE BOXES: N/A	
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: SEE REMARKS COLUMN	
		16. DATE HOLE: STARTED 11 FEB 94 / COMPLETED 11 FEB 94	
7. THICKNESS OF OVERBURDEN		17. ELEVATION TOP OF HOLE	
8. DEPTH DRILLED INTO ROCK		18. TOTAL CORE RECOVERY FOR BORING: N/A %	
TOTAL DEPTH OF HOLE: 15.0'		19. NAME(S) OF INSPECTOR(S): Jackie R. Stokes	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	LAB CALSS e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
	2		(GRASS COVER) 0.0' TO 3.2' +/- CLAY: med-hi. pl; drk. brn; v. stiff-hard; damp-moist; mod. calc.	CH	A	1. WATER LEVEL: NOTE: Free water on auger at 12.5' +/- during drilling. NOTE: Level upon completion was 13.0'; Level on 14 FEB 94 was 12.5'.
	4		3.2' TO 9.9' +/- CLAY: med. pl; lt. reddish-brn; hard; dry-damp; v. calc. w/abundant lime matter; w/ trace of sand	CL	B	2. JAR SAMPLES: A. 0.0' - 3.2' B. 3.2' - 8.2' C. 8.2' - 9.9' D. 9.9' - 12.5' E. 12.5' - 15.0'
	8		9.9' TO 12.5' +/- CLAY: med. pl; red-reddish brn; v. stiff-hard; damp-moist; calc; sl. sandy	CL	C	
	10		12.5' TO 15.0' T.D.	CL	D	3. DRILLING: 8" FLIGHT AUGER: 0.0' - 15.0' NOTE: Split Spoon samples taken every 2.5'.
	12		GRAVEL: predom. fn. w/small amount of med. gravy lt. brn. w/red-reddish brn. binder; med. density; rounded to sub-rounded; wet; calc; clayey & sandy	SC	E	
	14					
	16		T.D. 15.0'			
	18					
	20					
	22					
	24					
	26					
	28					
	30					
	32					
	34					
	36					
	38					

4. STANDARD PENETRATION TESTS:

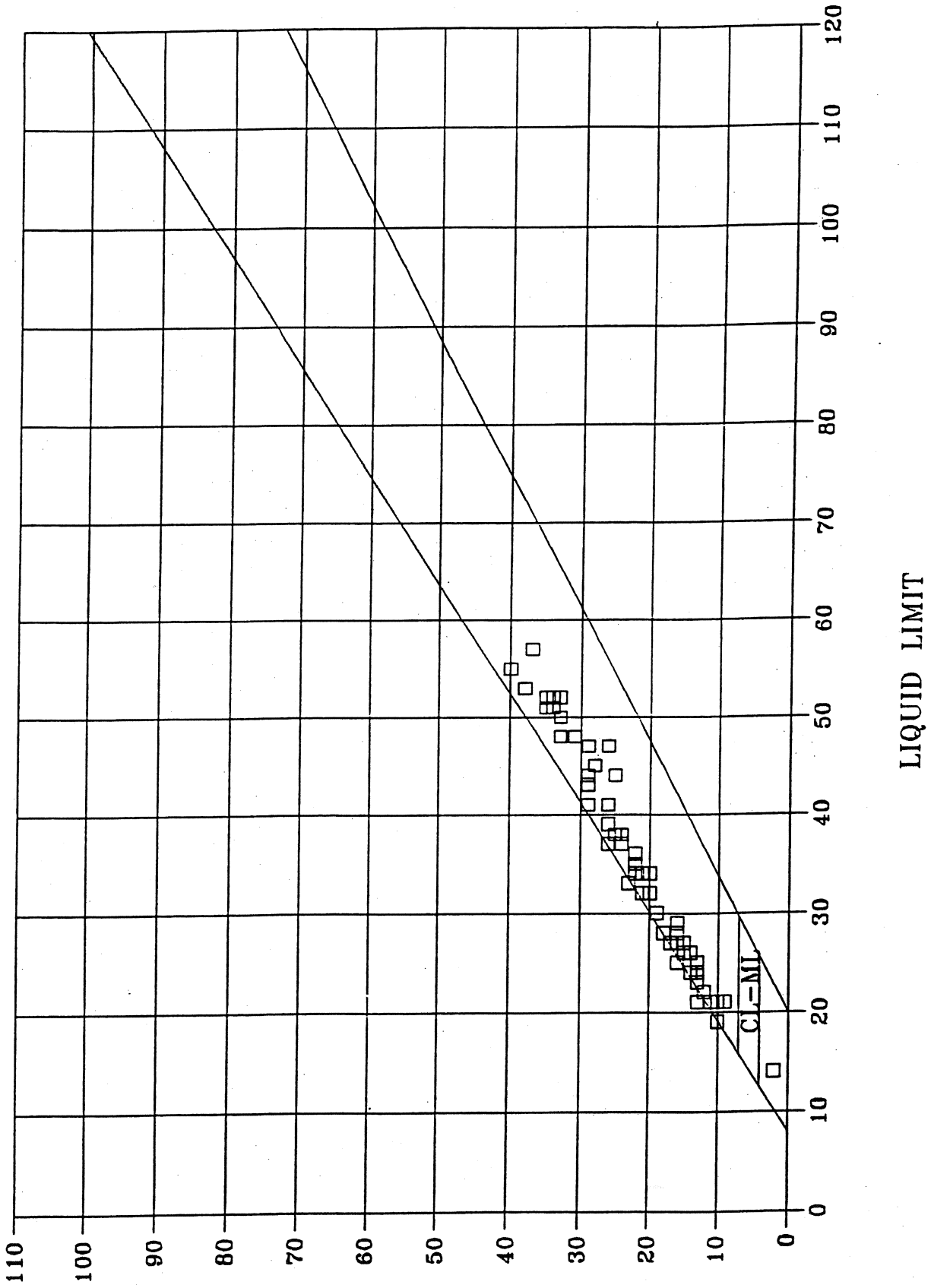
DEPTH	NO. OF BLOWS		
	1ST 6"	2ND 6"	3RD 6"
2.5'	10	23	27
5.0'	18	22	33
7.5'	21	32	36
10.0'	12	19	19
13.5'	18	21	26

5. BORING LOCATION:
NOTE: Boring was drilled as shown on layout.

Letter Classification based on laboratory classification. (MIL-STD-619B; ASTM D-2487)

ATTACHMENT 1C

LABORATORY TEST RESULTS

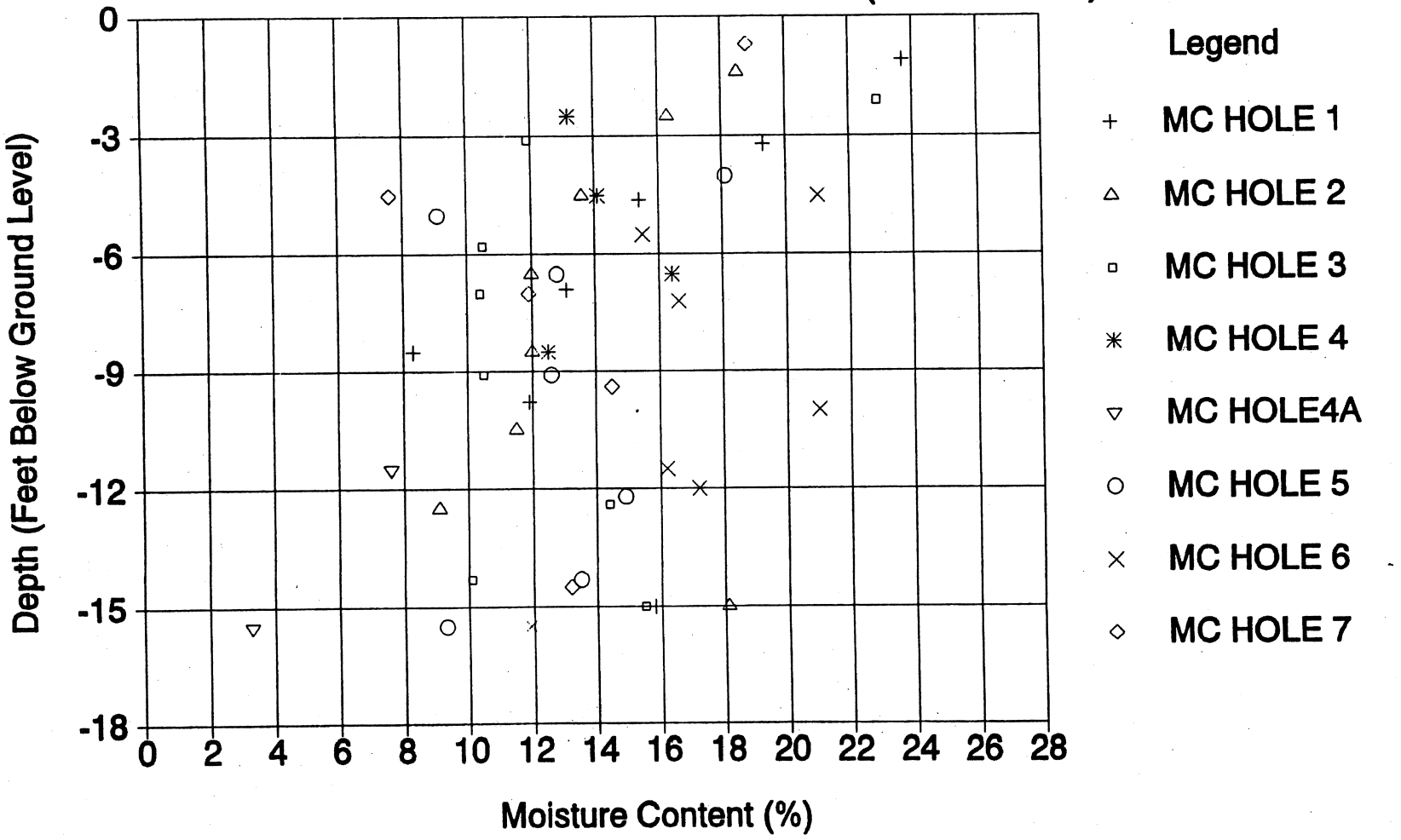


DYESS AFB
FAMILY HOUSING
PLASTICITY CHART
PLATE #

CESWD-ED-GL RPT NO. 16012

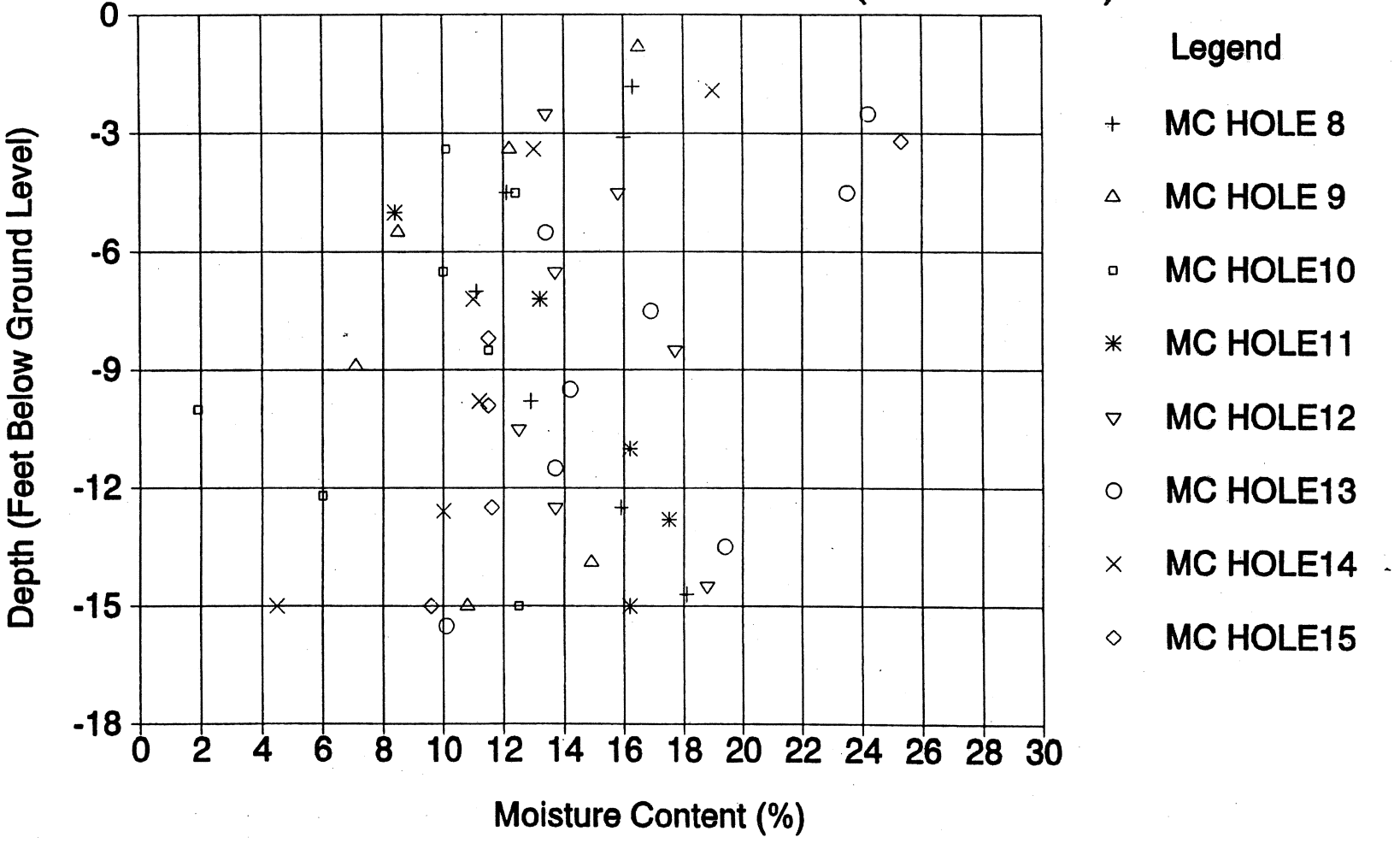
MOISTURE CONTENT VS. DEPTH

DYESS AFB FAMILY HOUSING (HOLES 1-7)



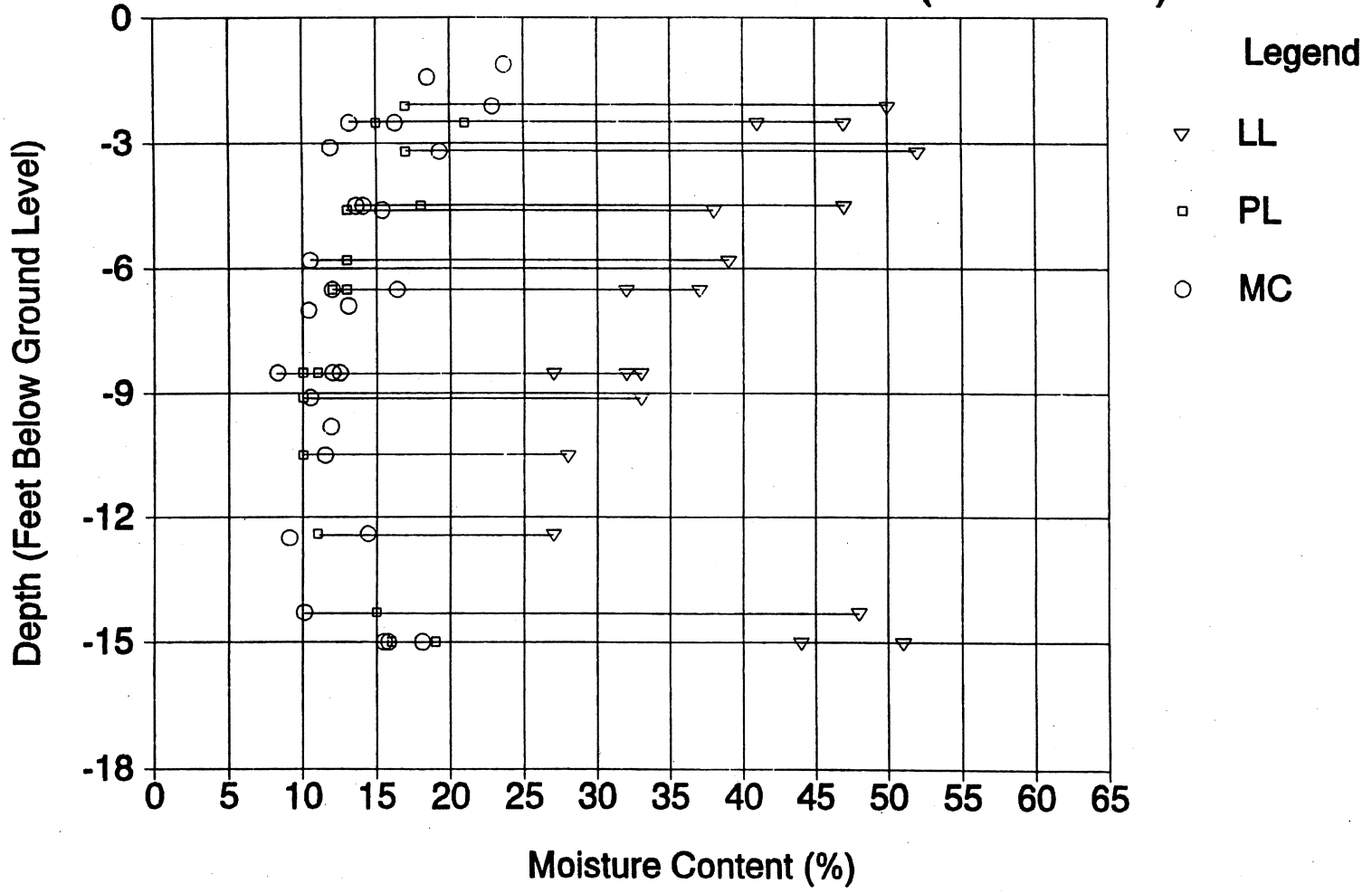
MOISTURE CONTENT VS. DEPTH

DYESS AFB FAMILY HOUSING (HOLES 8-15)



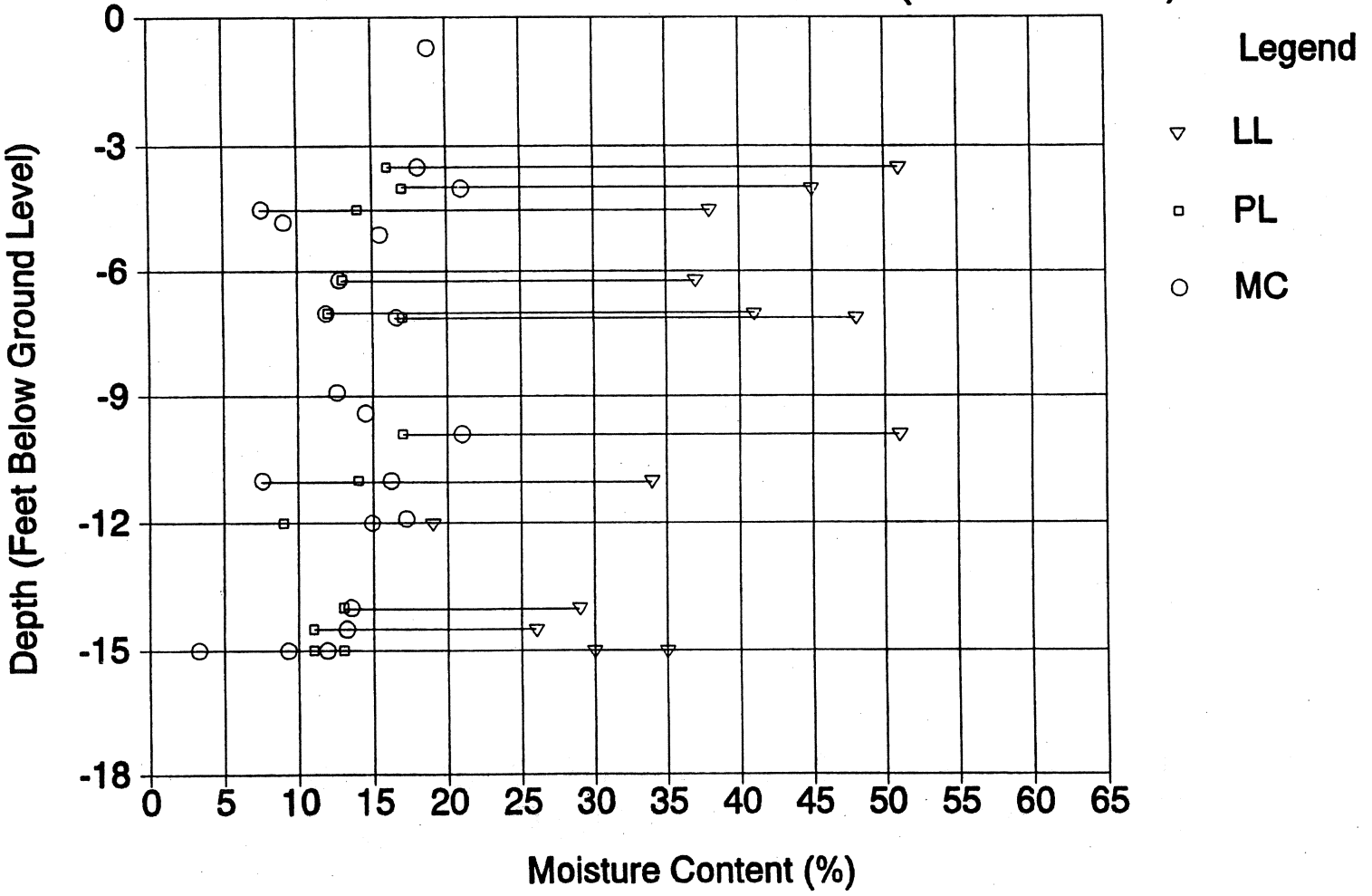
LIQUID LIMIT-PLASTIC LIMIT-MOISTURE CONTENT

DYESS AFB FAMILY HOUSING (HOLES 1-4)



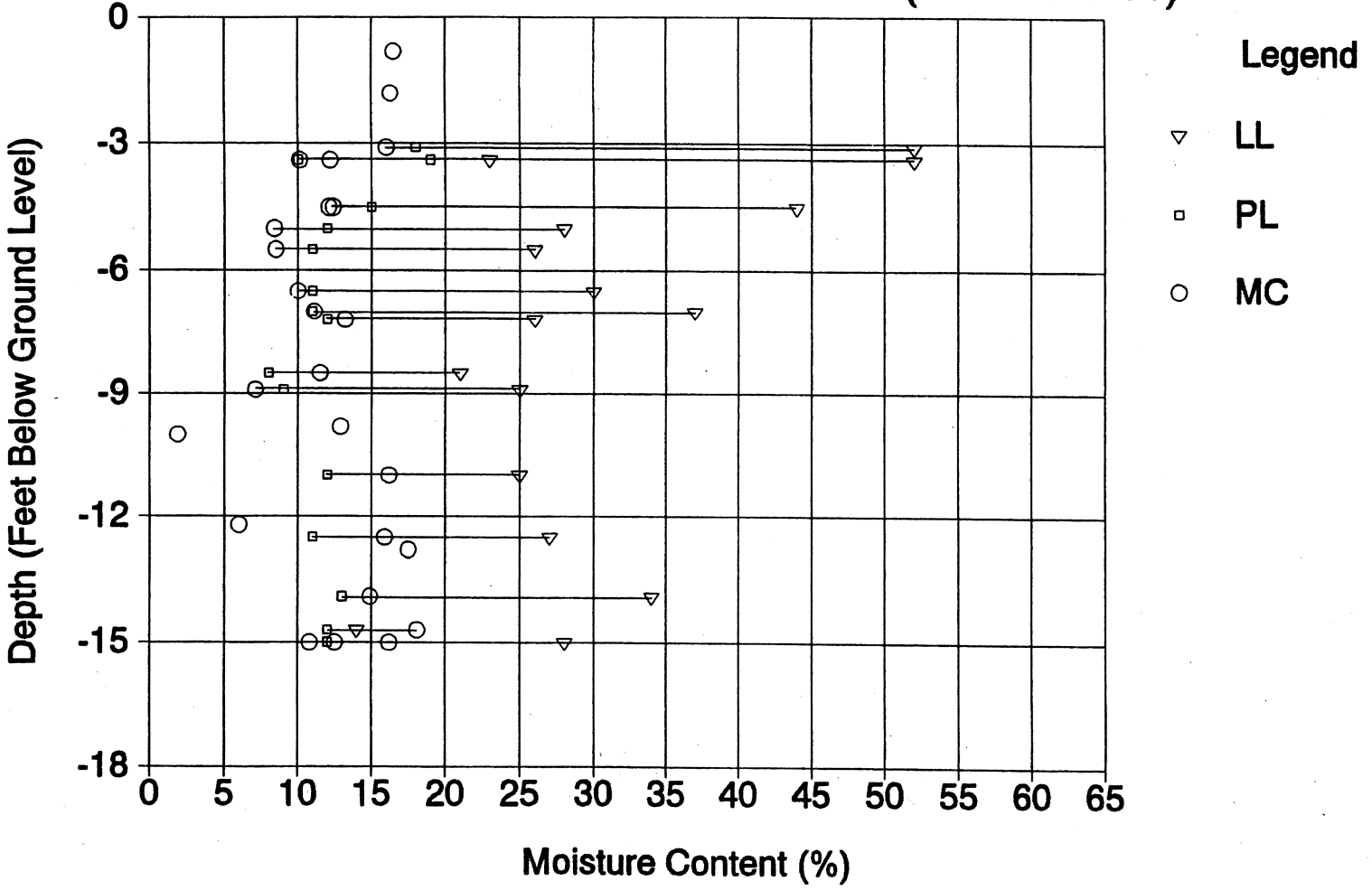
LIQUID LIMIT-PLASTIC LIMIT-MOISTURE CONTENT

DYESS AFB FAMILY HOUSING (HOLES 4A-7)



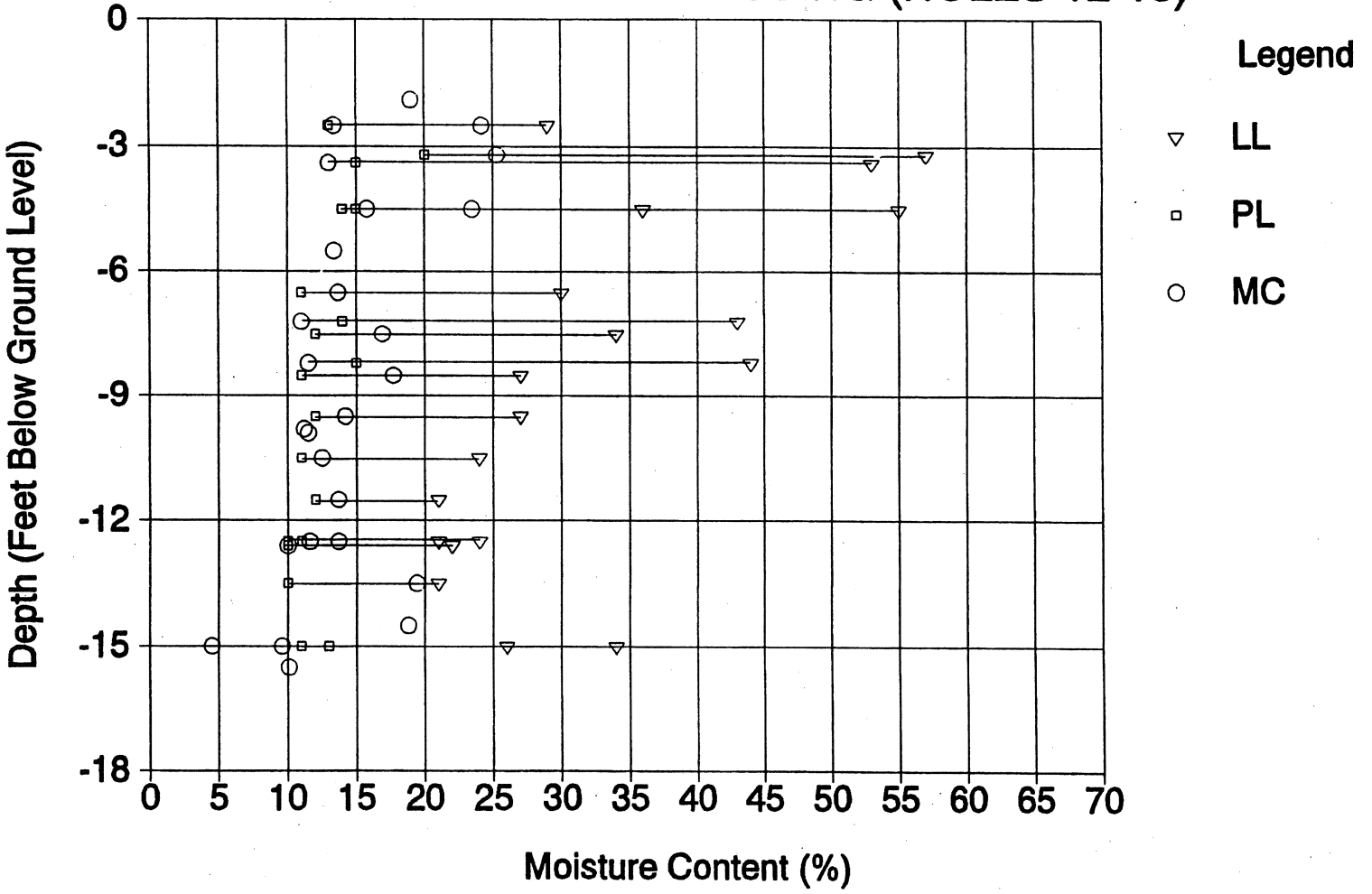
LIQUID LIMIT-PLASTIC LIMIT-MOISTURE CONTENT

DYESS AFB FAMILY HOUSING (HOLES 8-11)



LIQUID LIMIT-PLASTIC LIMIT-MOISTURE CONTENT

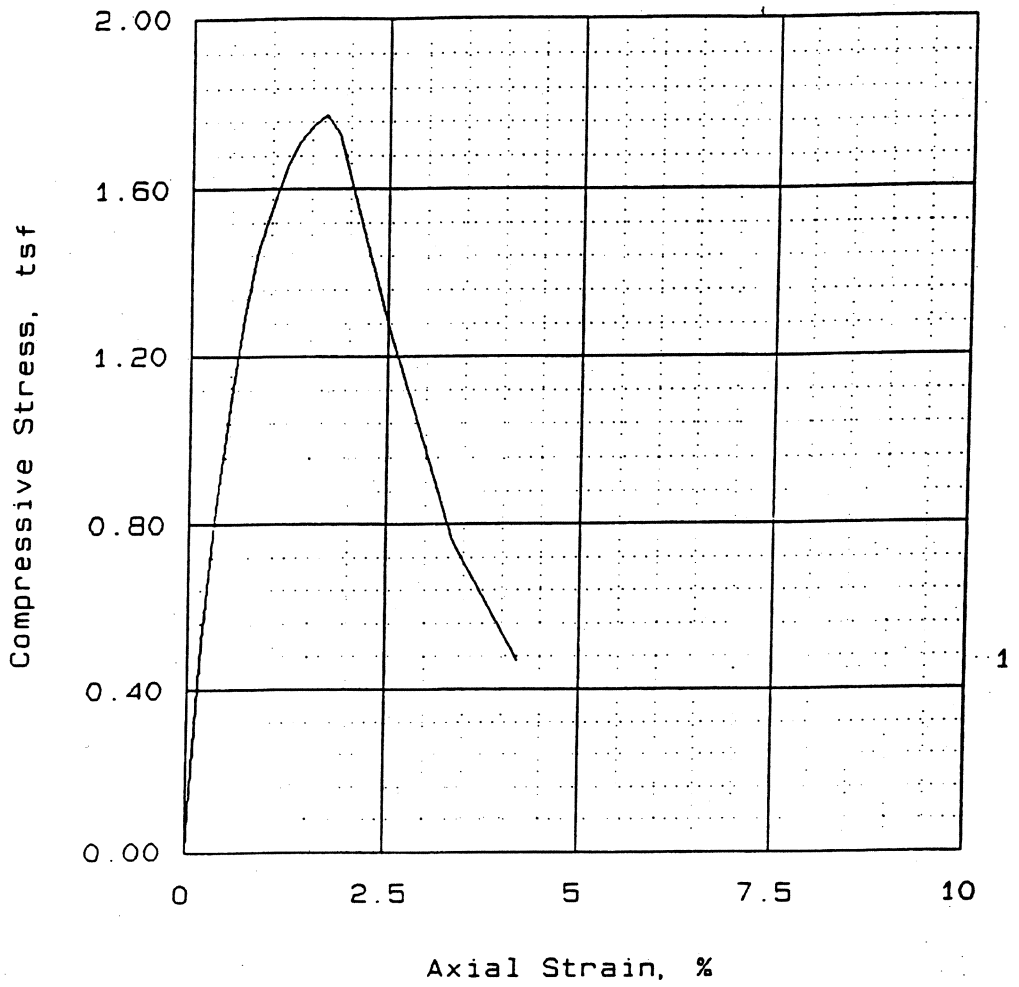
DYESS AFB FAMILY HOUSING (HOLES 12-15)



BLOW COUNT VS. DEPTH

DYESS AFB FAMILY HOUSING

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, tsf	1.78			
Undrained shear strength, tsf	0.89			
Rate of strain, %/min	0.100			
Water content, %	12.0			
Void ratio	0.4672			
Saturation, %	68.8			
Dry density, pcf	114.0			
Specimen diameter, in	5.81			
Specimen height, in	11.91			

Description: LEAN CLAY WITH SAND (CL)

LL = 37	PL = 13	PI = 24.0	GS = 2.68	Type: UNDISTURBED

Project No.: 16012

Date: MAY 1994

Remarks:
SPECIFIC GRAVITY
ESTIMATED.

Fig No.

Client: US ARMY CORPS OF ENGINEERS
ALBUQUERQUE DISTRICT

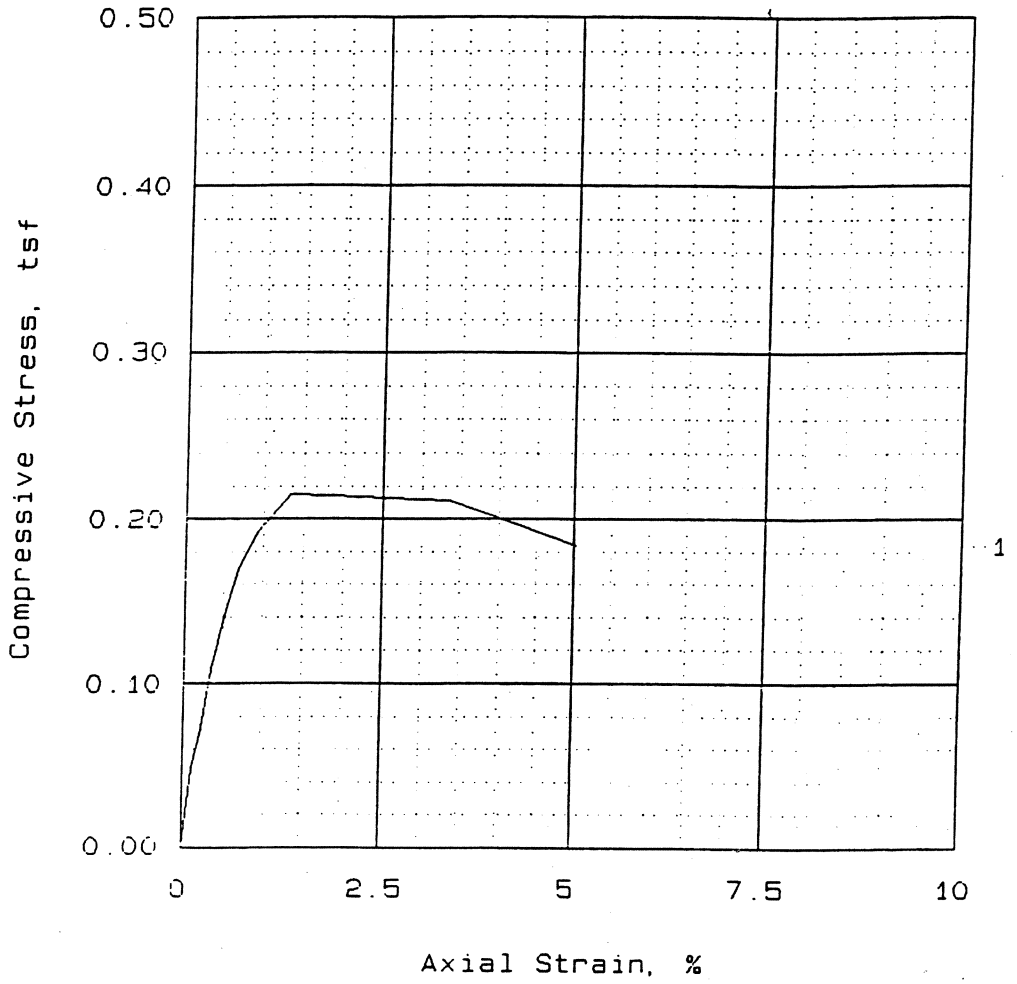
Project: DYESS AFB
FAMILY HOUSING

Location: BORING: 6D-2, DB-2,
4.7'-5.7', SWD LAB NO. 94/296

UNCONFINED COMPRESSION TEST

CORPS OF ENGINEERS - SOUTHWESTERN

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, tsf	0.22			
Undrained shear strength, tsf	0.11			
Rate of strain, %/min	0.200			
Water content, %	13.7			
Void ratio	0.3917			
Saturation, %	93.2			
Dry density, pcf	119.3			
Specimen diameter, in	5.59			
Specimen height, in	9.77			

Description: CLAYEY SAND WITH GRAVEL (SC)

LL = 27	PL = 10	PI = 17.0	GS = 2.66	Type: UNDISTURBED

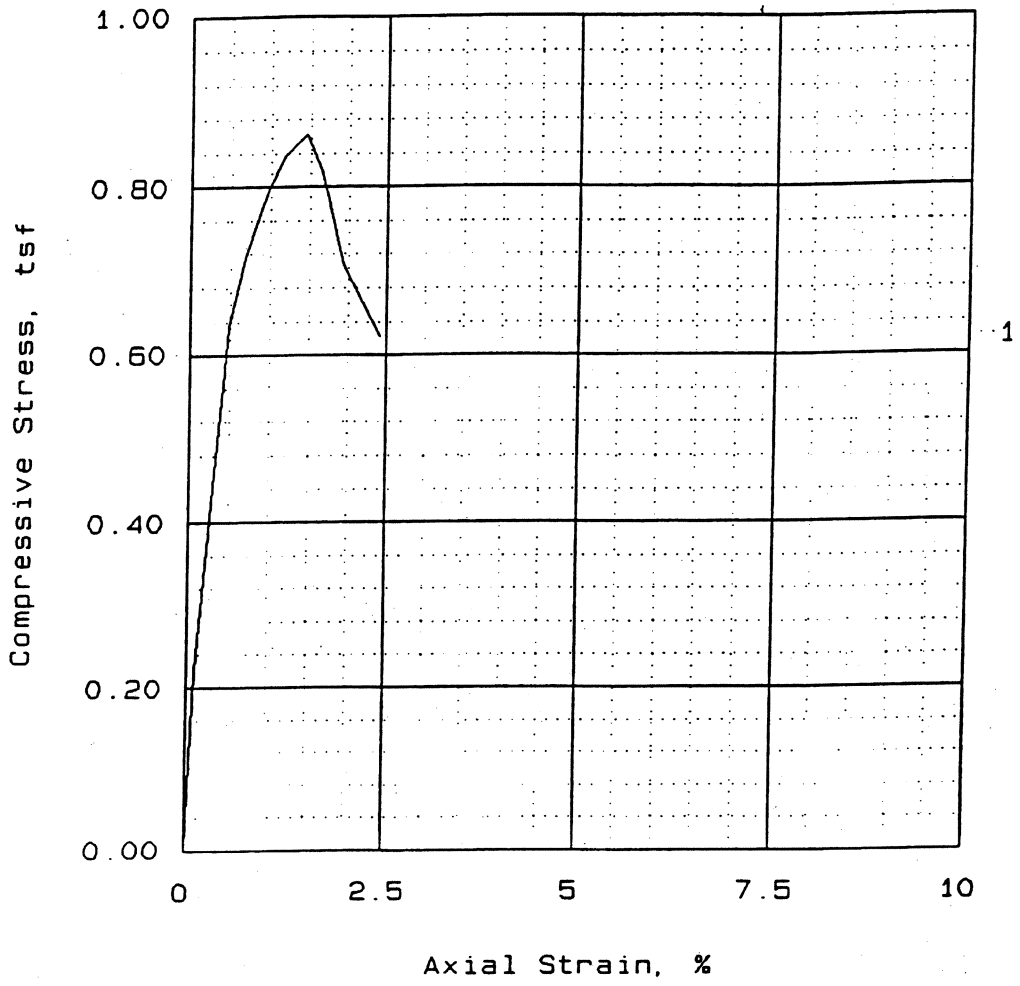
Project No.: 16012
Date: MAY 1994
Remarks:
SPECIFIC GRAVITY
ESTIMATED.

Fig No.

Client: US ARMY CORPS OF ENGINEERS
ALBUQUERQUE DISTRICT
Project: DYESS AFB
FAMILY HOUSING
Location: BORING: 6D-4, DB-3,
7.5'-8.3', SWD LAB NO. 94/306

UNCONFINED COMPRESSION TEST
CORPS OF ENGINEERS - SOUTHWESTERN

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, tsf	0.86			
Undrained shear strength, tsf	0.43			
Rate of strain, %/min	0.090			
Water content, %	8.7			
Void ratio	0.4806			
Saturation, %	48.3			
Dry density, pcf	113.0			
Specimen diameter, in	5.75			
Specimen height, in	10.34			

Description: CLAYEY SAND (SC) .

LL = 30	PL = 11	PI = 19.0	GS = 2.66	Type: UNDISTURBED

Project No.: 16012

Date: MAY 1994

Remarks:
SPECIFIC GRAVITY
ESTIMATED.

Fig No.

Client: US ARMY CORPS OF ENGINEERS
ALBUQUERQUE DISTRICT

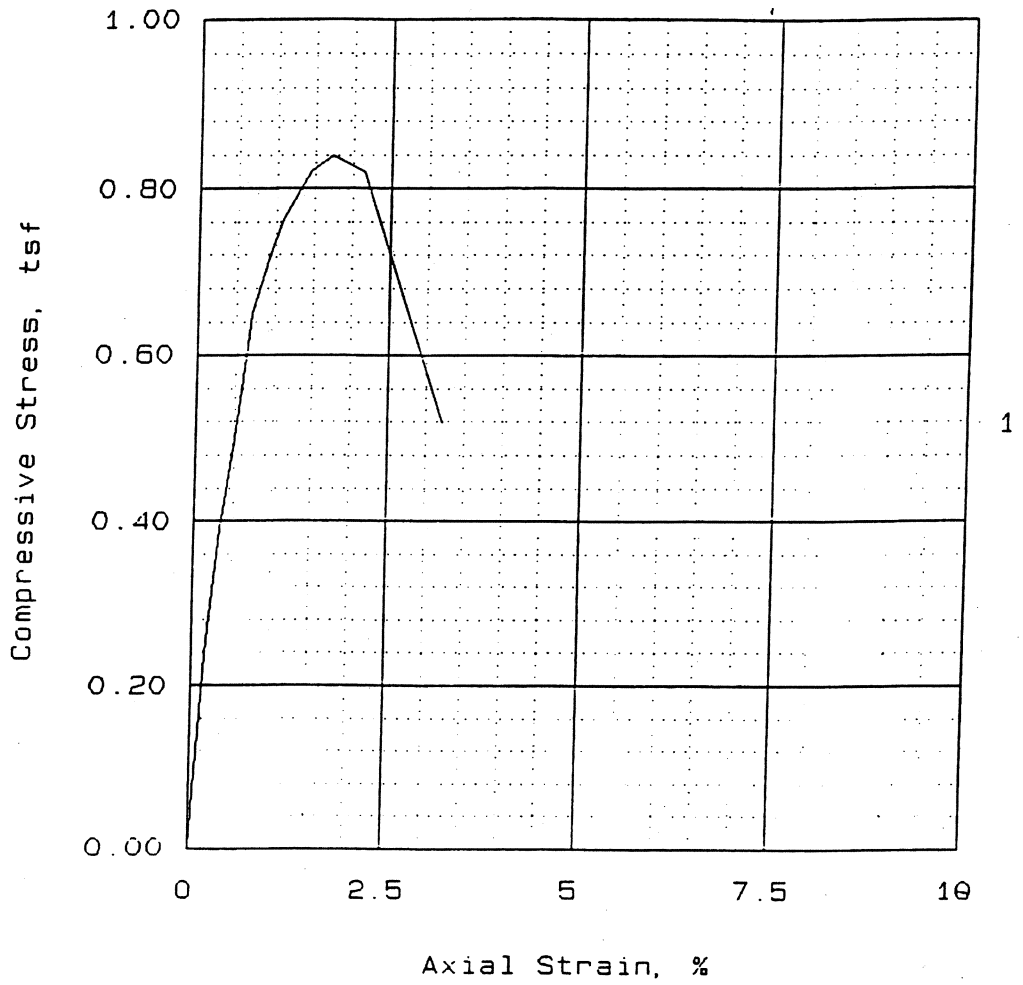
Project: DYESS AFB
FAMILY HOUSING

Location: BORING: 6D-10, DB-2,
5.5'-6.4', SWD LAB NO. 94/310

UNCONFINED COMPRESSION TEST

CORPS OF ENGINEERS - SOUTHWESTERN

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, tsf	0.84			
Undrained shear strength, tsf	0.42			
Rate of strain, %/min	0.350			
Water content, %	14.2			
Void ratio	0.4023			
Saturation, %	94.3			
Dry density, pcf	119.3			
Specimen diameter, in	5.56			
Specimen height, in	11.82			

Description: LEAN CLAY WITH SAND (CL)

LL = 30	PL = 11	PI = 19.0	GS = 2.68	Type: UNDISTURBED

Project No.: 16012

Date: MAY 1994

Remarks:
SPECIFIC GRAVITY
ESTIMATED.

Fig No.

Client: US ARMY CORPS OF ENGINEERS
ALBUQUERQUE DISTRICT

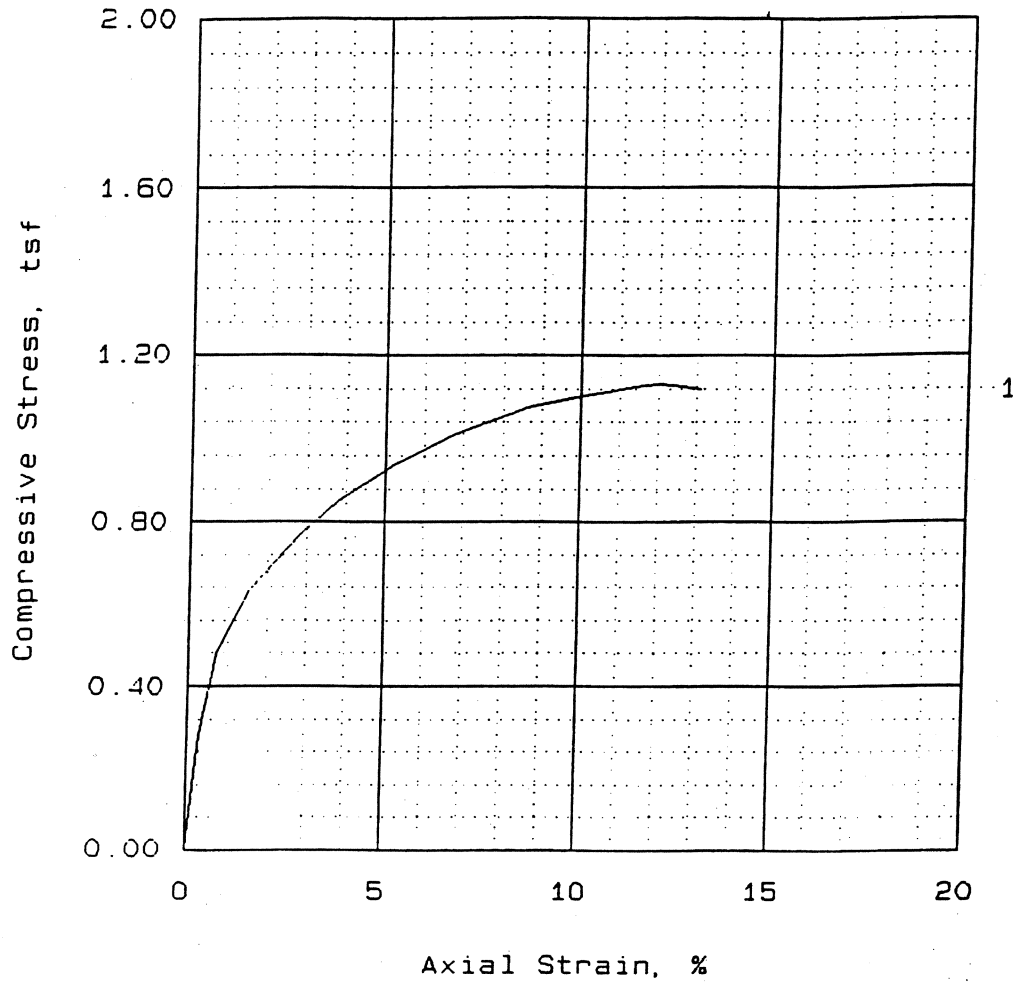
Project: DYESS AFB
FAMILY HOUSING

Location: BORING: 6D-12, DB-2,
5.4'-6.4', SWD LAB NO. 94/317

UNCONFINED COMPRESSION TEST

CORPS OF ENGINEERS - SOUTHWESTERN

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, tsf	1.13			
Undrained shear strength, tsf	0.57			
Rate of strain, %/min	0.300			
Water content, %	20.6			
Void ratio	0.6027			
Saturation, %	92.5			
Dry density, pcf	105.2			
Specimen diameter, in	5.79			
Specimen height, in	11.38			

Description: FAT CLAY WITH SAND (CH)

LL = 55	PL = 15	PI = 40.0	GS = 2.70	Type: UNDISTURBED

Project No.: 16012

Date: MAY 1994

Remarks:
SPECIFIC GRAVITY
ESTIMATED.

Fig No.

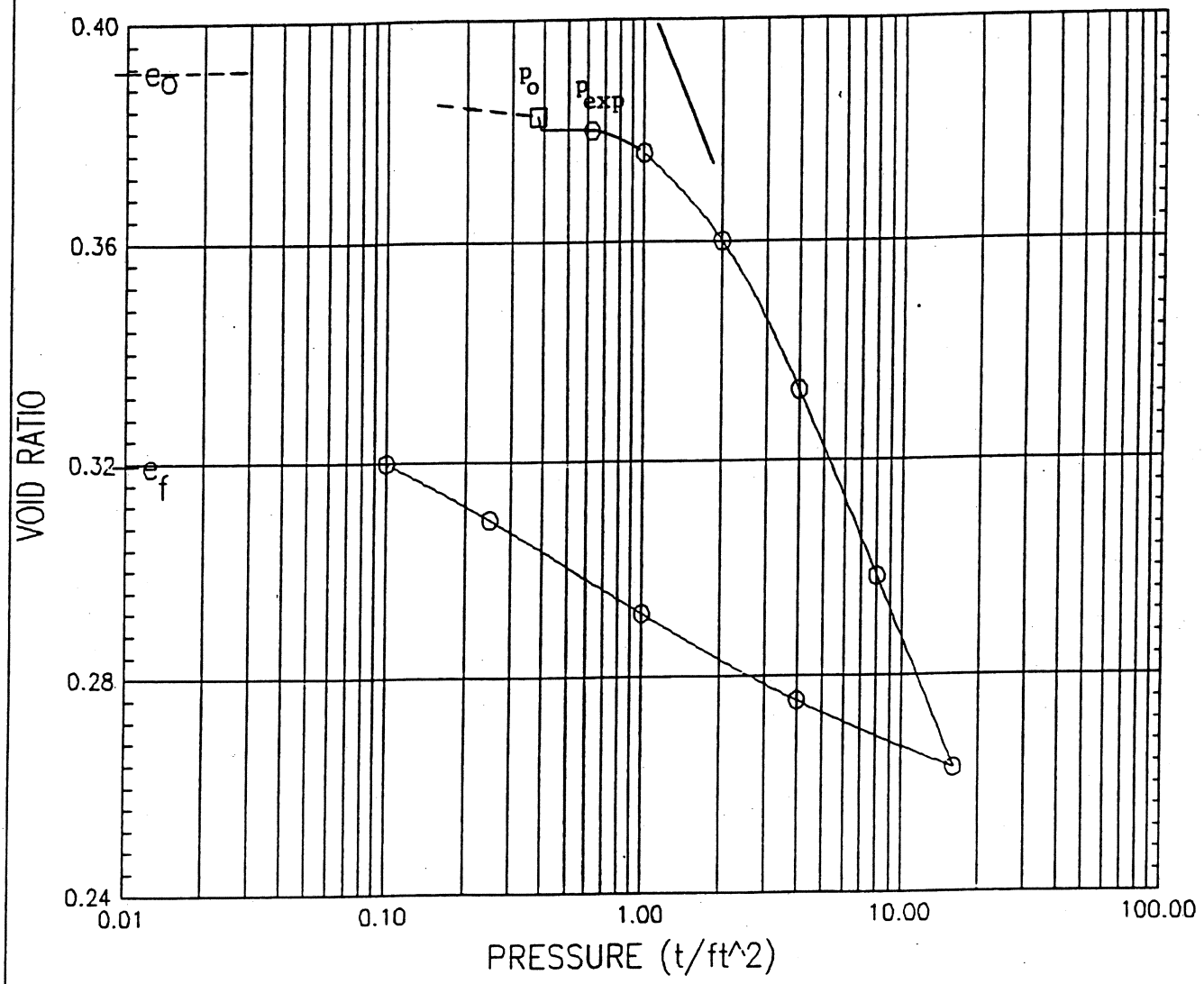
Client: US ARMY CORPS OF ENGINEERS
ALBUQUERQUE DISTRICT

Project: DYESS AFB
FAMILY HOUSING

Location: BORING: 6D-13, DB-1,
2.7'-3.7', SWD LAB NO. 94/324

UNCONFINED COMPRESSION TEST

CORPS OF ENGINEERS - SOUTHWESTERN

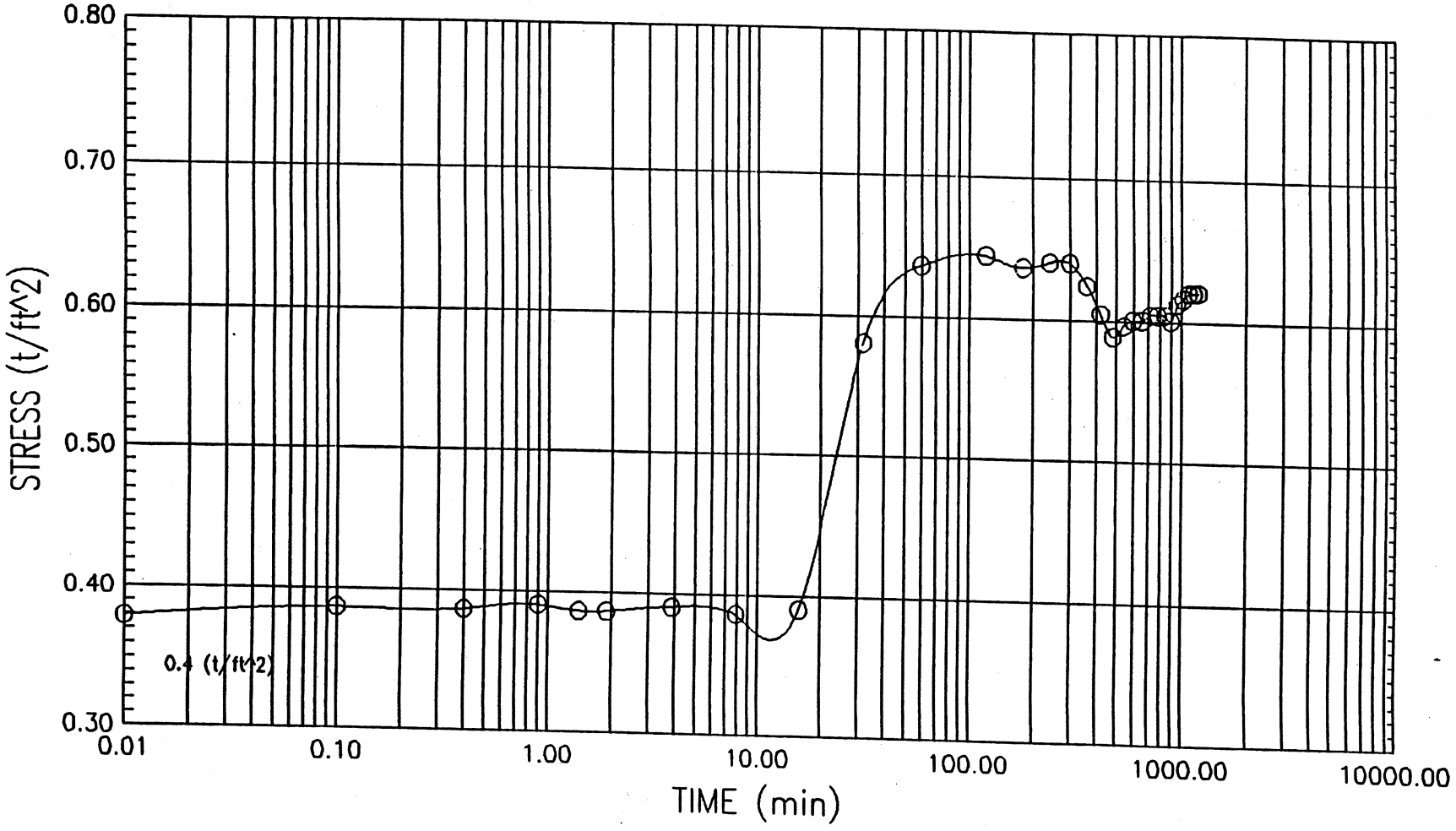


			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE (t/ft^2)	0.4	WATER CONTENT (%)	8.664	12.260
~~PRECONSOL~~. PRESSURE (t/ft^2) p_{exp}	0.6	DRY DENSITY (lb/ft^3)	120.231	126.763
COMPRESSION INDEX	0.12	SATURATION (%)	59.306	102.733
TYPE SPECIMEN	Undisturbed	VOID RATIO	0.392	0.320
DIA. (in) 4.452	HT. (in) 0.883	BACK PRESSURE (t/ft^2)		

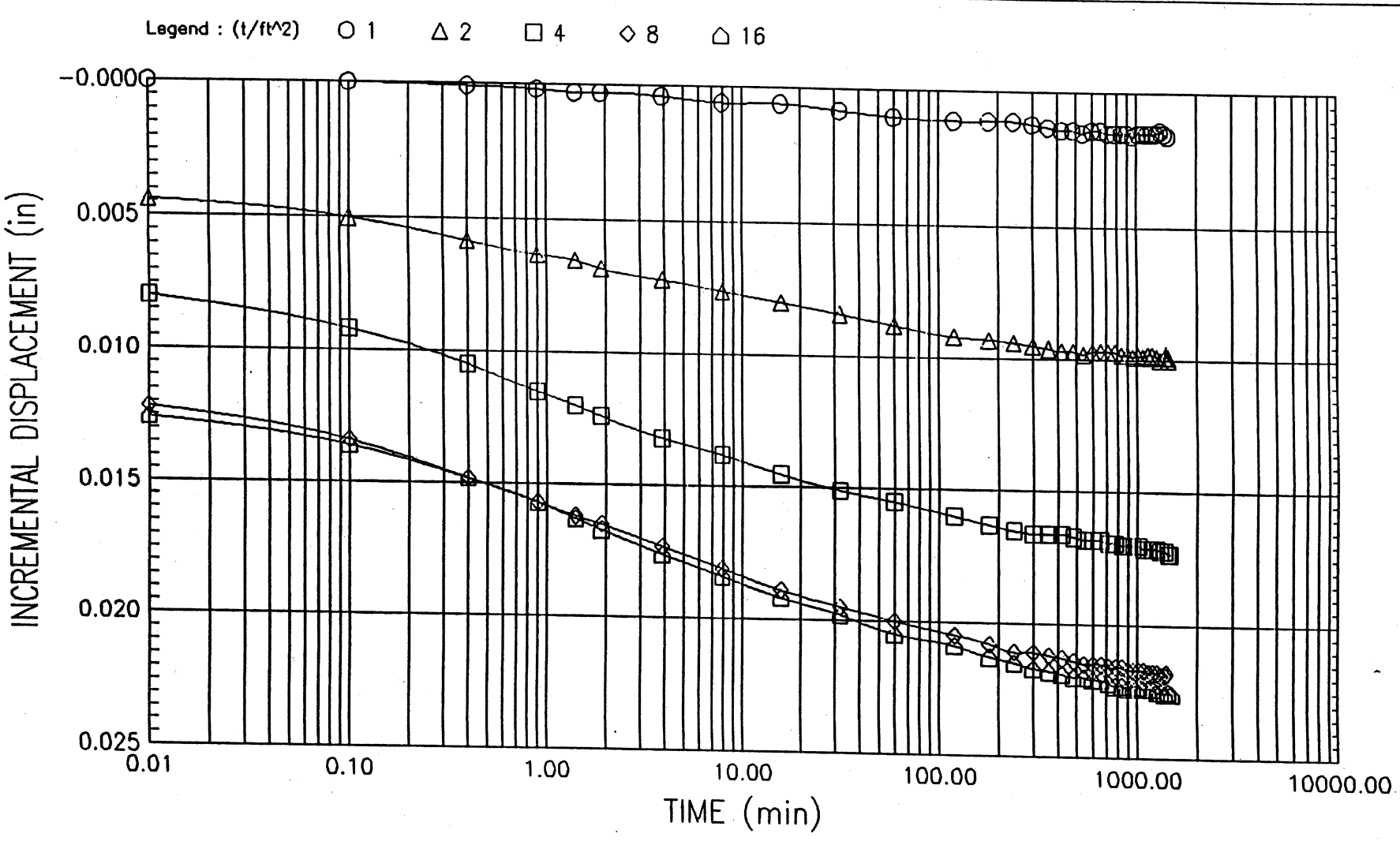
CLASSIFICATION LEAN CLAY WITH SAND (CL)

LL 37.0	PL 13.0	PI 24.0	PROJECT DYESS AFB
GS 2.680	D_{10}		Data File: B:296.CNV
REMARKS		BORING NO. 6D-2	SAMPLE NO. 94/296
□ Start-Swell O End-Swell		DEPTH 5.8-6.3	DATE APR 1994

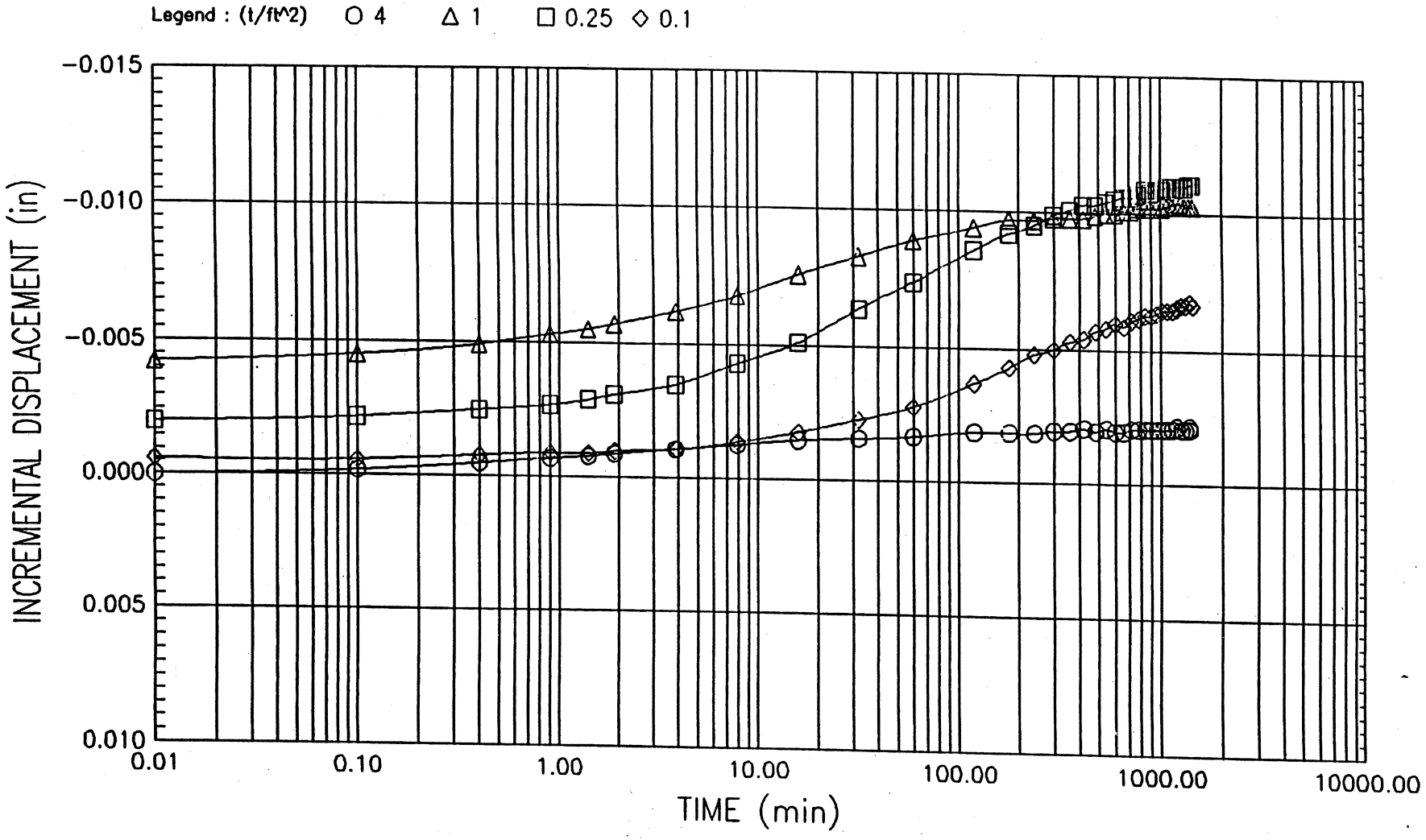
Army Corp of Engineers
CONSOLIDATION TEST REPORT



PROJECT	DYESS AFB		Army Corp of Engineers
	Data File: B:296.CNV		CONSOLIDATION TEST
BORING	6D-2	SAMPLE NO. 94/296	SWELL CURVES
DEPTH	5.8-6.3	DATE APR 1994	



PROJECT	DYESS AFB		Army Corp of Engineers
	Data File: B:296.CNV		CONSOLIDATION TEST
BORING	6D-2	SAMPLE NO. 94/296	TIME CURVES
DEPTH	5.8-6.3	DATE APR 1994	



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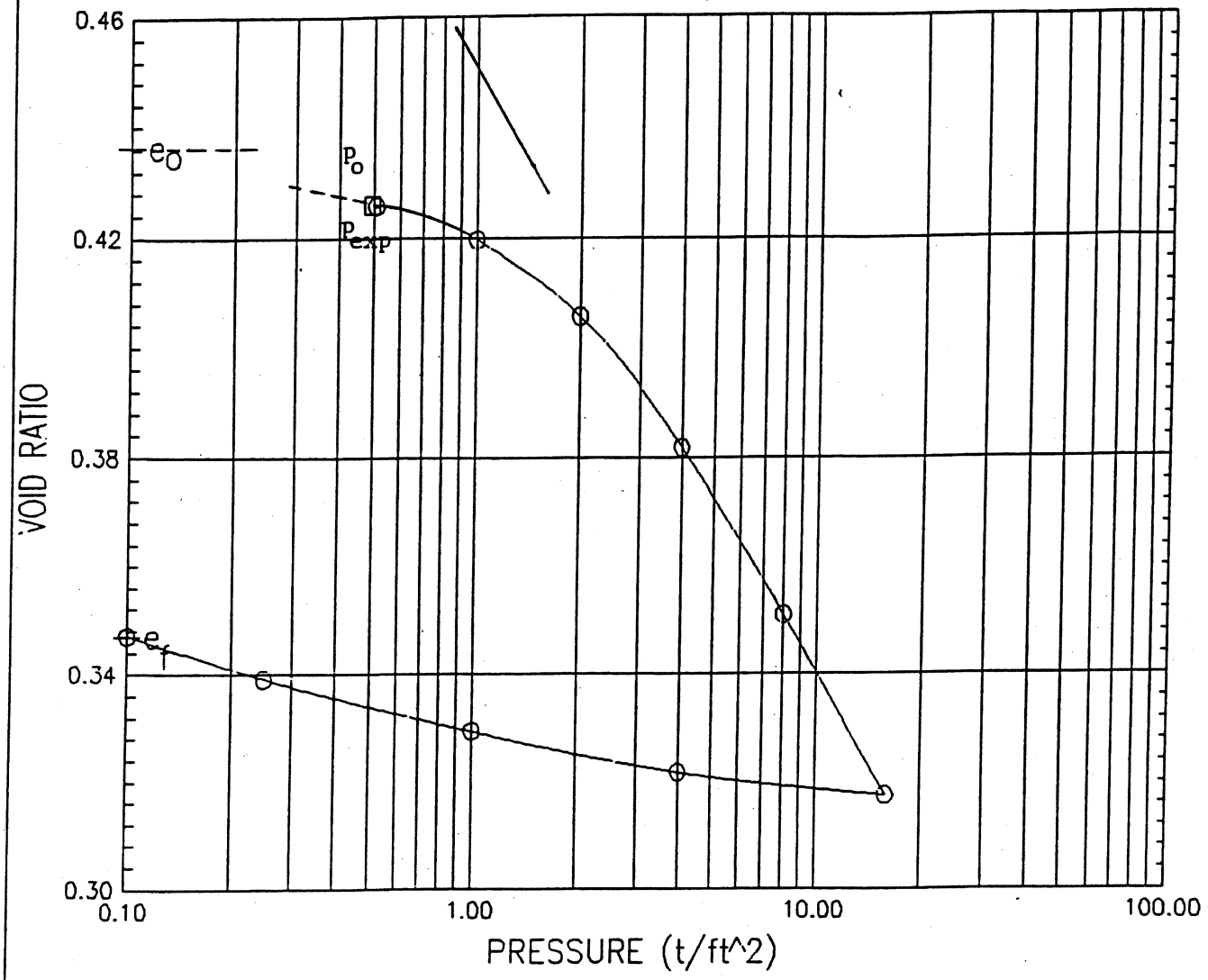
BORING	6D-2	SAMPLE NO. 94/296	TIME CURVES
DEPTH	5.8-6.3	DATE APR 1994	

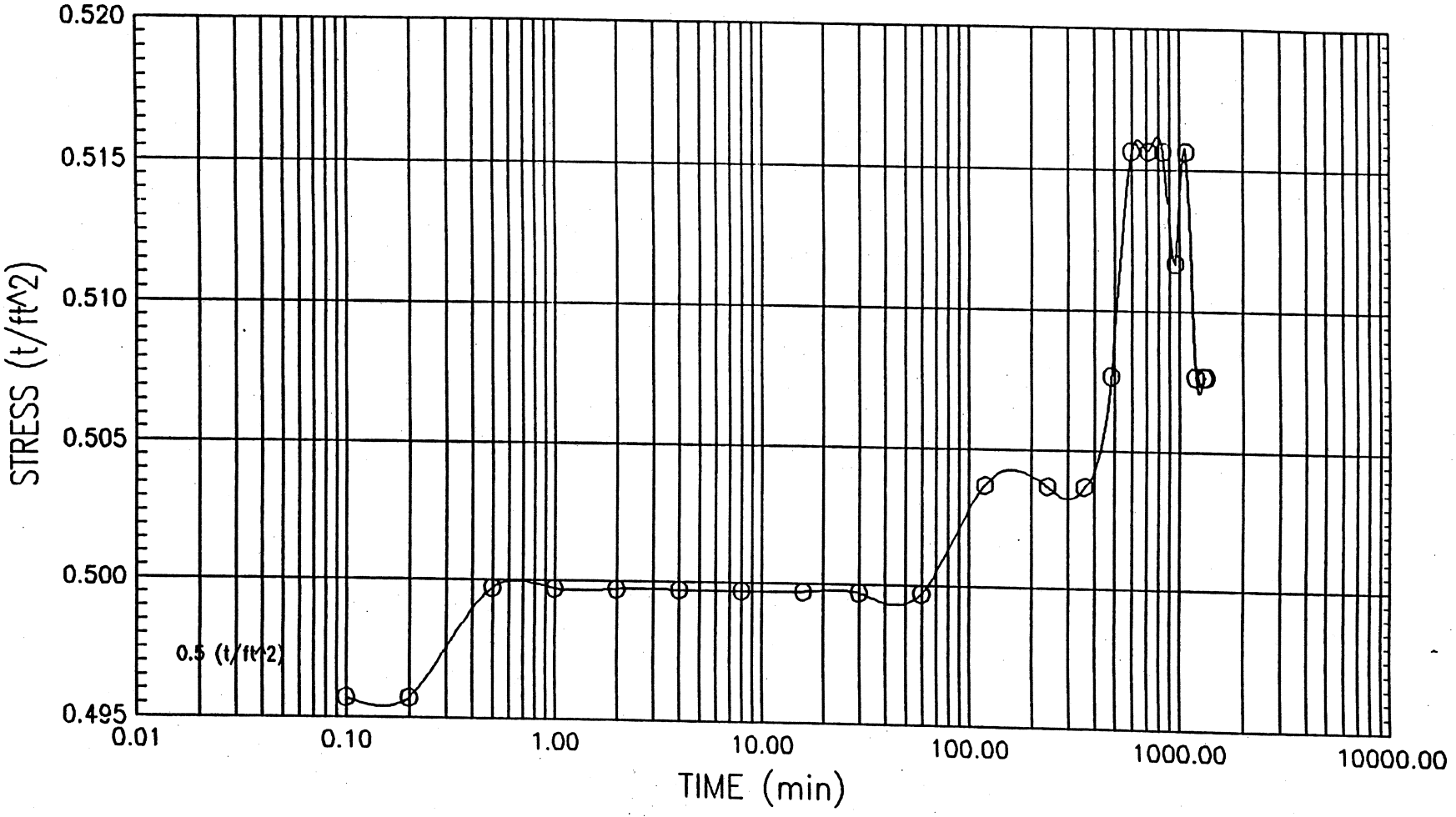


			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE (t/ft^2)	0.5	WATER CONTENT (%)	12.783	13.075
~~PRECONSOL~~. PRESSURE (t/ft^2) p_{exp}	0.5	DRY DENSITY (lb/ft^3)	115.581	123.263
COMPRESSION INDEX	0.11	SATURATION (%)	77.859	100.178
TYPE SPECIMEN	Undisturbed	VOID RATIO	0.437	0.347
DIA. (in) 4.454	HT. (in) 0.869	BACK PRESSURE (t/ft^2)		

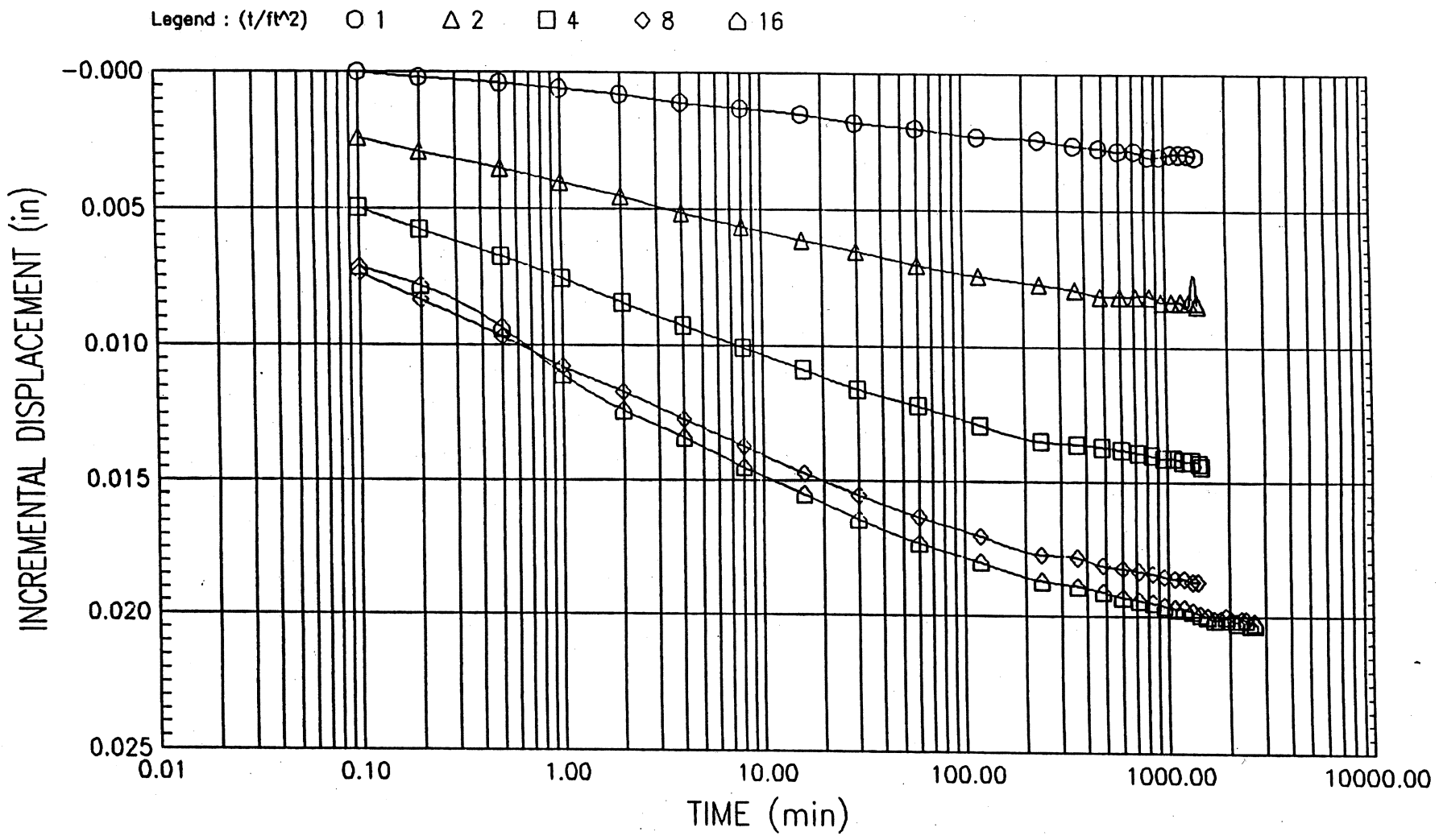
CLASSIFICATION CLAYEY SAND WITH GRAVEL (SC)

LL 27.0	PL 10.0	PI 17.0	PROJECT DYESS AFB
GS 2.660	D_{10}		Data File: B:306.CNV
REMARKS		BORING NO. 6D-4	SAMPLE NO. 94/306
☐ Start-Swell O End-Swell		DEPTH 7.3-7.5	DATE APR 1994

Army Corp of Engineers
CONSOLIDATION TEST REPORT



PROJECT	DYESS AFB		Army Corp of Engineers CONSOLIDATION TEST SWELL CURVES
	Data File: B:306.CNV		
BORING	6D-4	SAMPLE NO. 94/306	
DEPTH	7.3-7.5	DATE APR 1994	

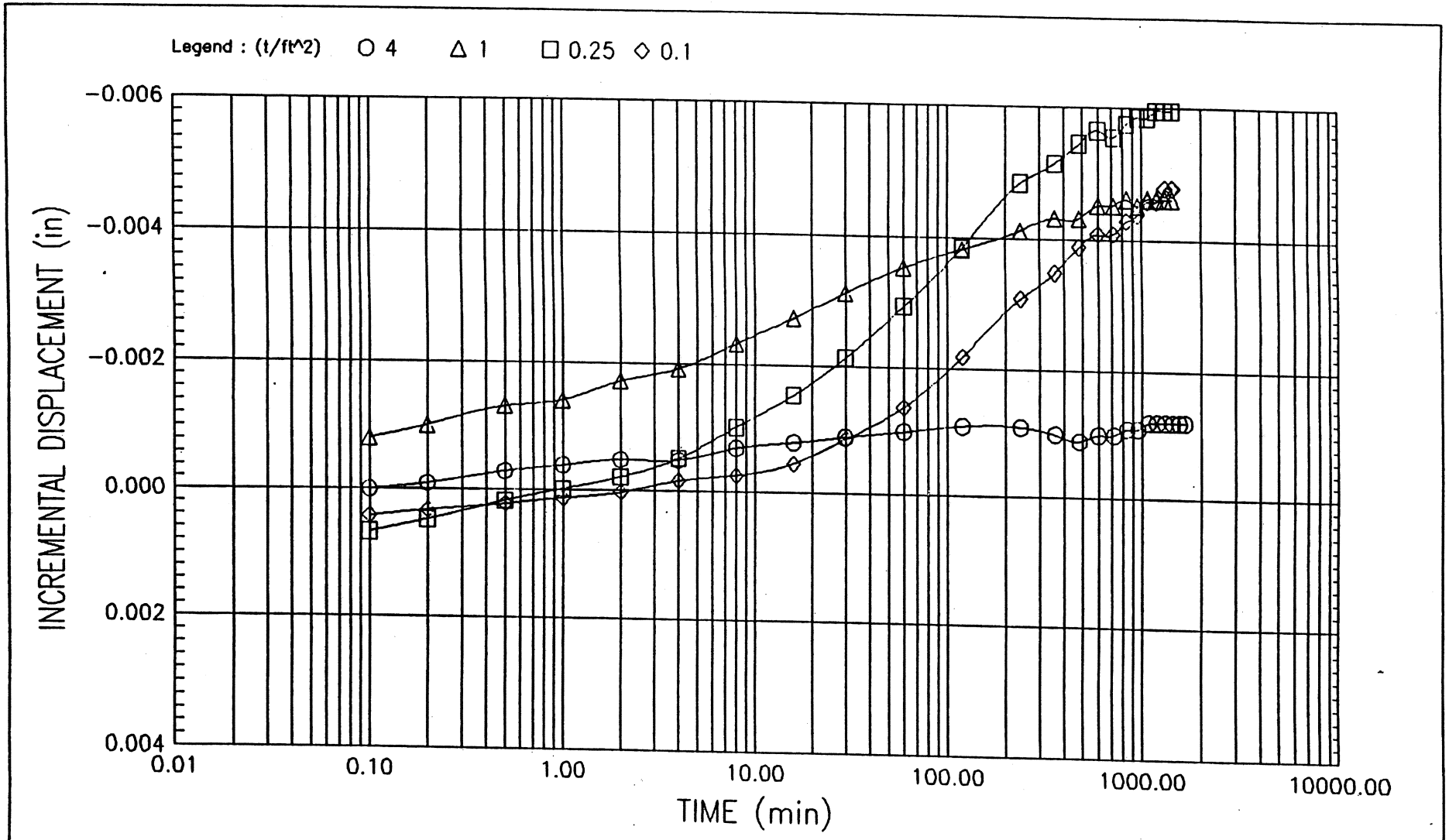


PROJECT	DYESS AFB		
	Data File: B:306.CNV		
BORING	6D-4	SAMPLE NO.	94/306
DEPTH	7.3-7.5	DATE	APR 1994

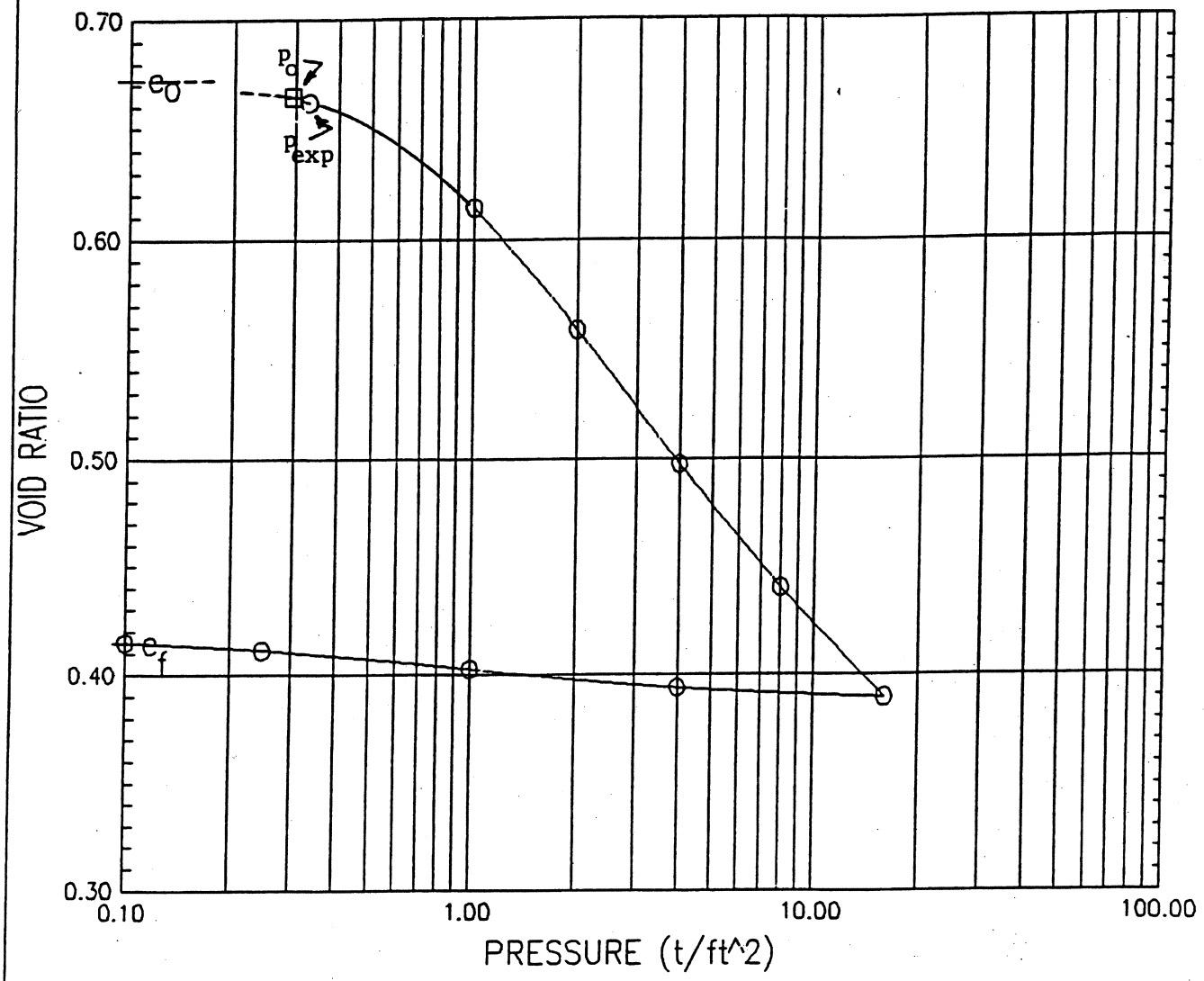
Army Corp of Engineers

CONSOLIDATION TEST

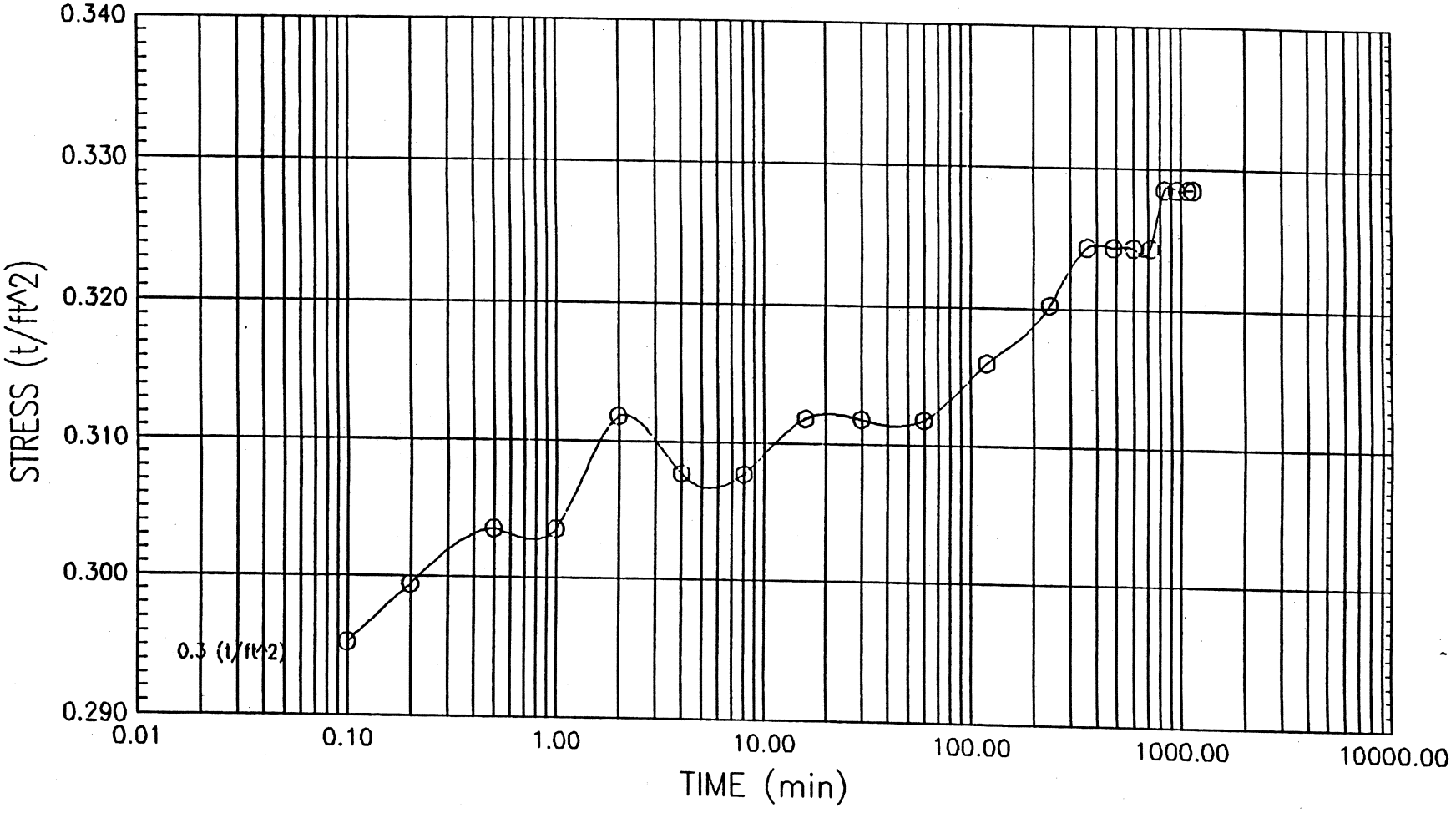
TIME CURVES



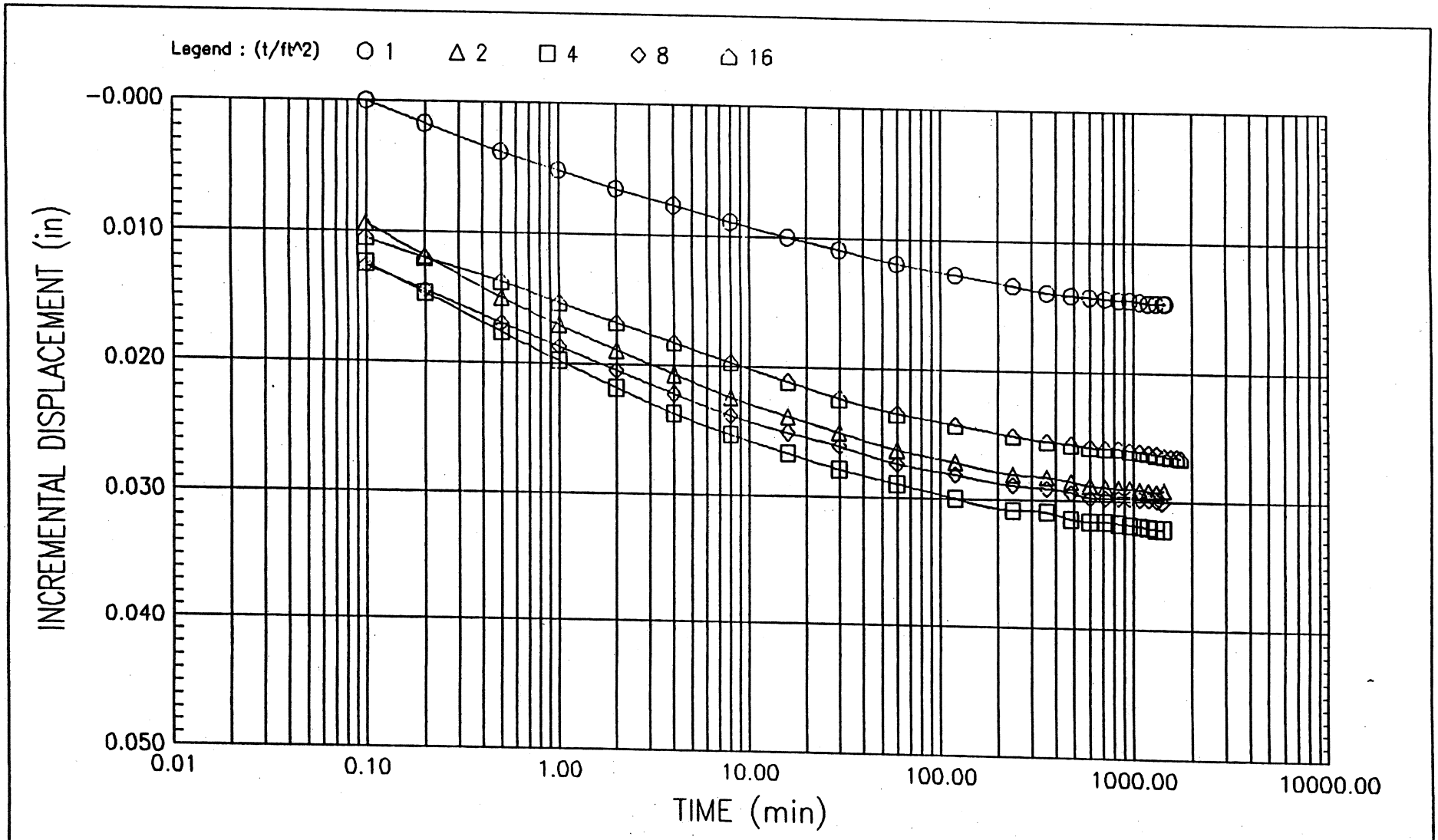
PROJECT	DYESS AFB		Army Corp of Engineers
	Data File: B:306.CNV		CONSOLIDATION TEST
BORING	6D-4	SAMPLE NO. 94/306	TIME CURVES
DEPTH	7.3-7.5	DATE APR 1994	



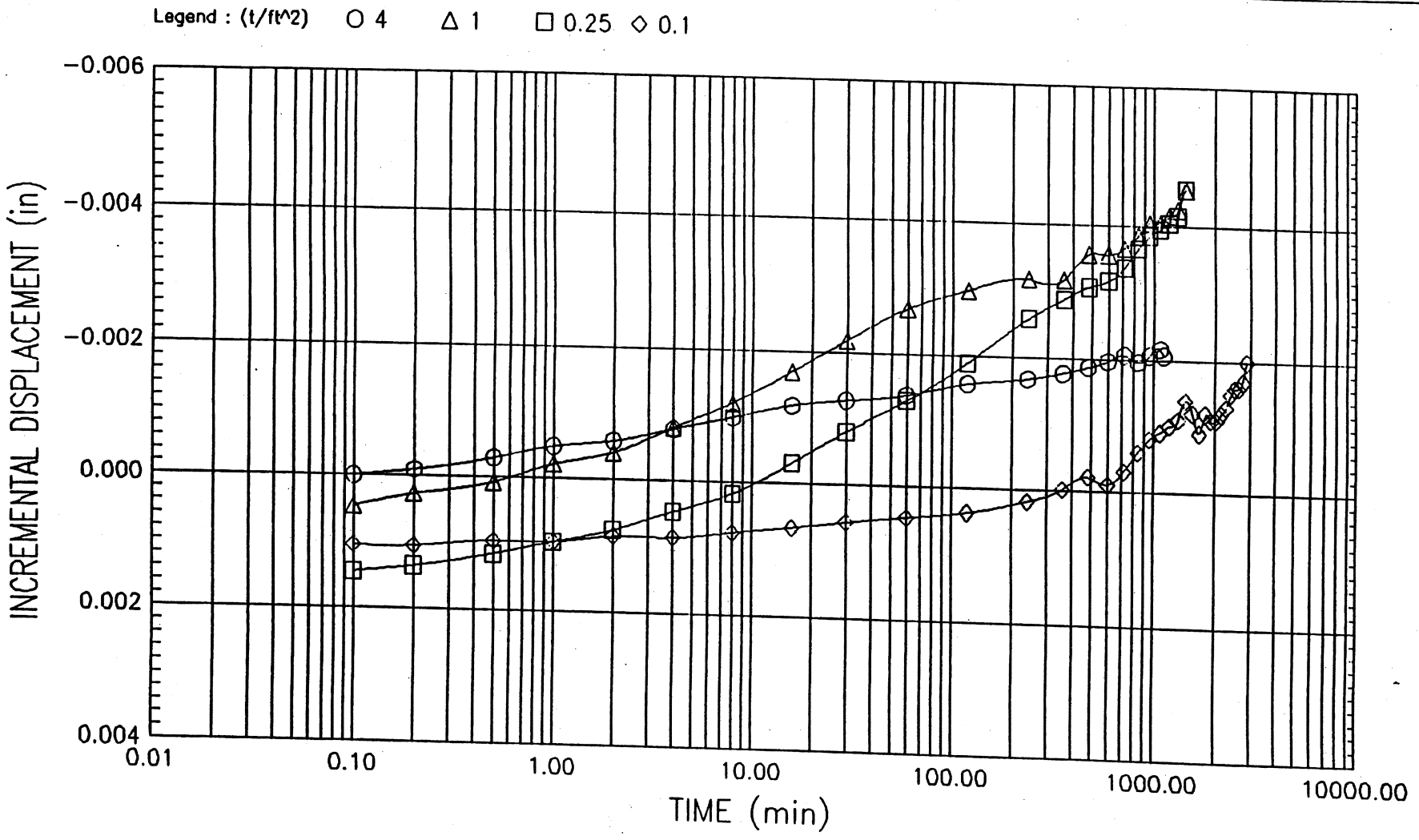
			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE (t/ft^2)	0.3	WATER CONTENT (%)	9.441	15.763
~~PRECONSOL~~. PRESSURE (t/ft^2) p_{exp}	0.3	DRY DENSITY (lb/ft^3)	99.248	117.344
COMPRESSION INDEX	—	SATURATION (%)	37.305	100.999
TYPE SPECIMEN	Undisturbed	VOID RATIO	0.673	0.415
DIA. (in) 4.456	HT. (in) 0.876	BACK PRESSURE (t/ft^2)		
CLASSIFICATION CLAYEY SAND (SC)				
LL 30.0	PL 11.0	PI 19.0	PROJECT DYESS AFB	
GS 2.660	D_{10}		Data File: B:310.CNV	
REMARKS			BORING NO. 6D-10	SAMPLE NO. 94/310
☐ Start-Swell ○ End-Swell			DEPTH 4.7-5.4	DATE APR 1994
			Army Corp of Engineers CONSOLIDATION TEST REPORT	



PROJECT	DYESS AFB		Army Corp of Engineers
	Data File: B:310.CNV		CONSOLIDATION TEST
BORING	6D-10	SAMPLE NO. 94/310	SWELL CURVES
DEPTH	4.7-5.4	DATE APR 1994	



PROJECT	DYESS AFB		Army Corp of Engineers
	Data File: B:310.CNV		CONSOLIDATION TEST
BORING	6D-10	SAMPLE NO. 94/310	TIME CURVES
DEPTH	4.7-5.4	DATE APR 1994	

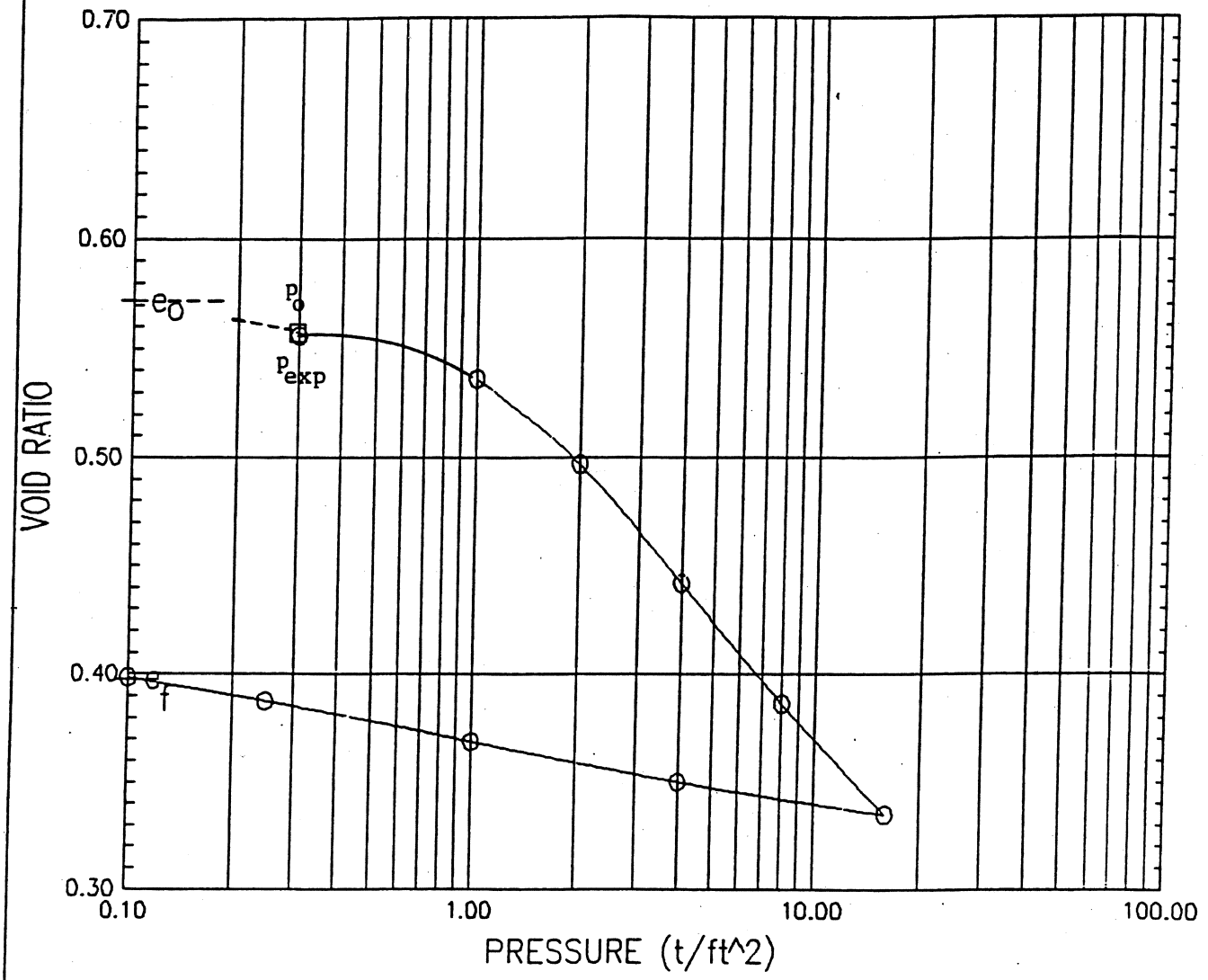


PROJECT	DYESS AFB		
	Data File: B:310.CNV		
BORING	6D-10	SAMPLE NO.	94/310
DEPTH	4.7-5.4	DATE	APR 1994

Army Corp of Engineers

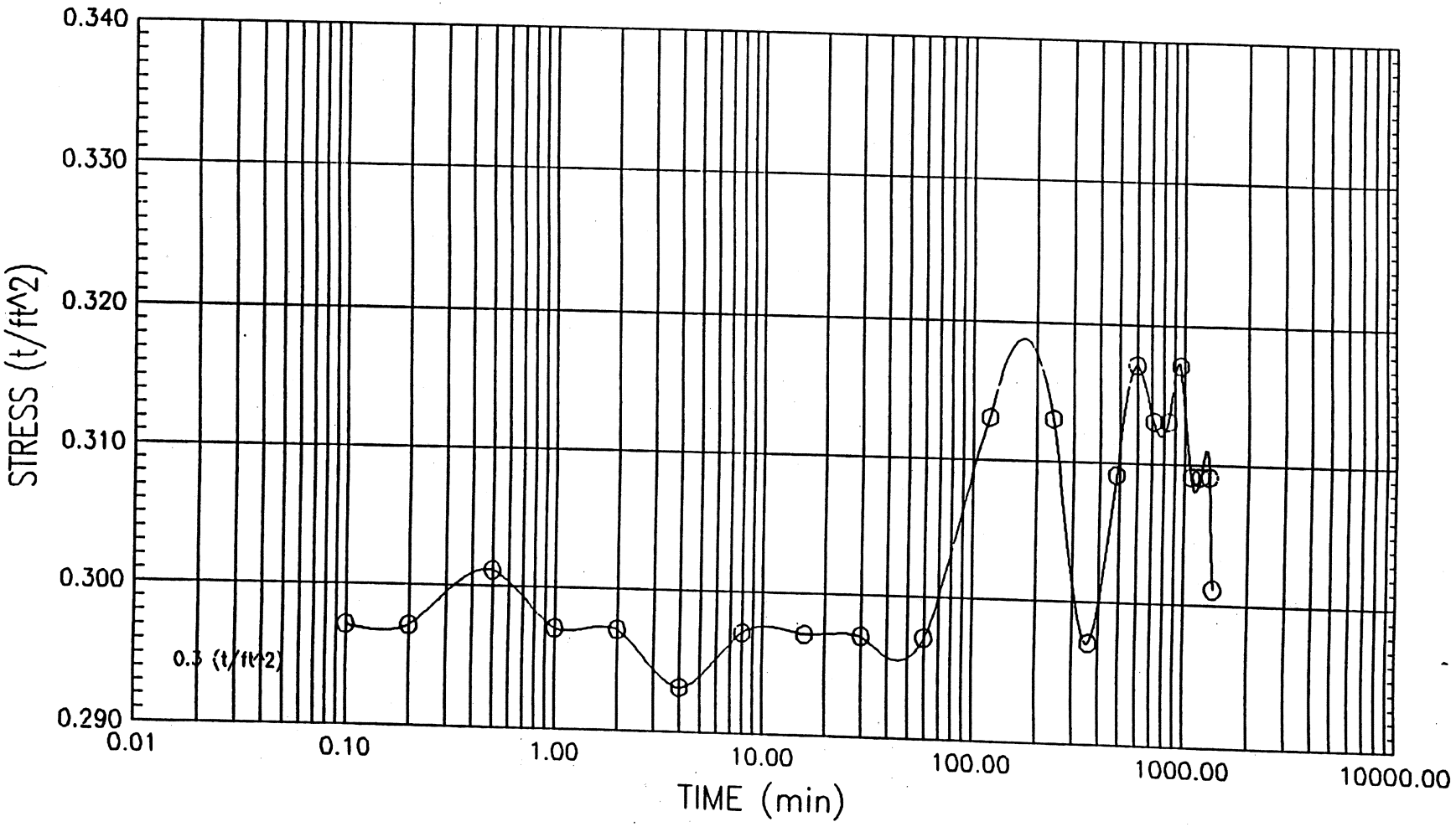
CONSOLIDATION TEST

TIME CURVES

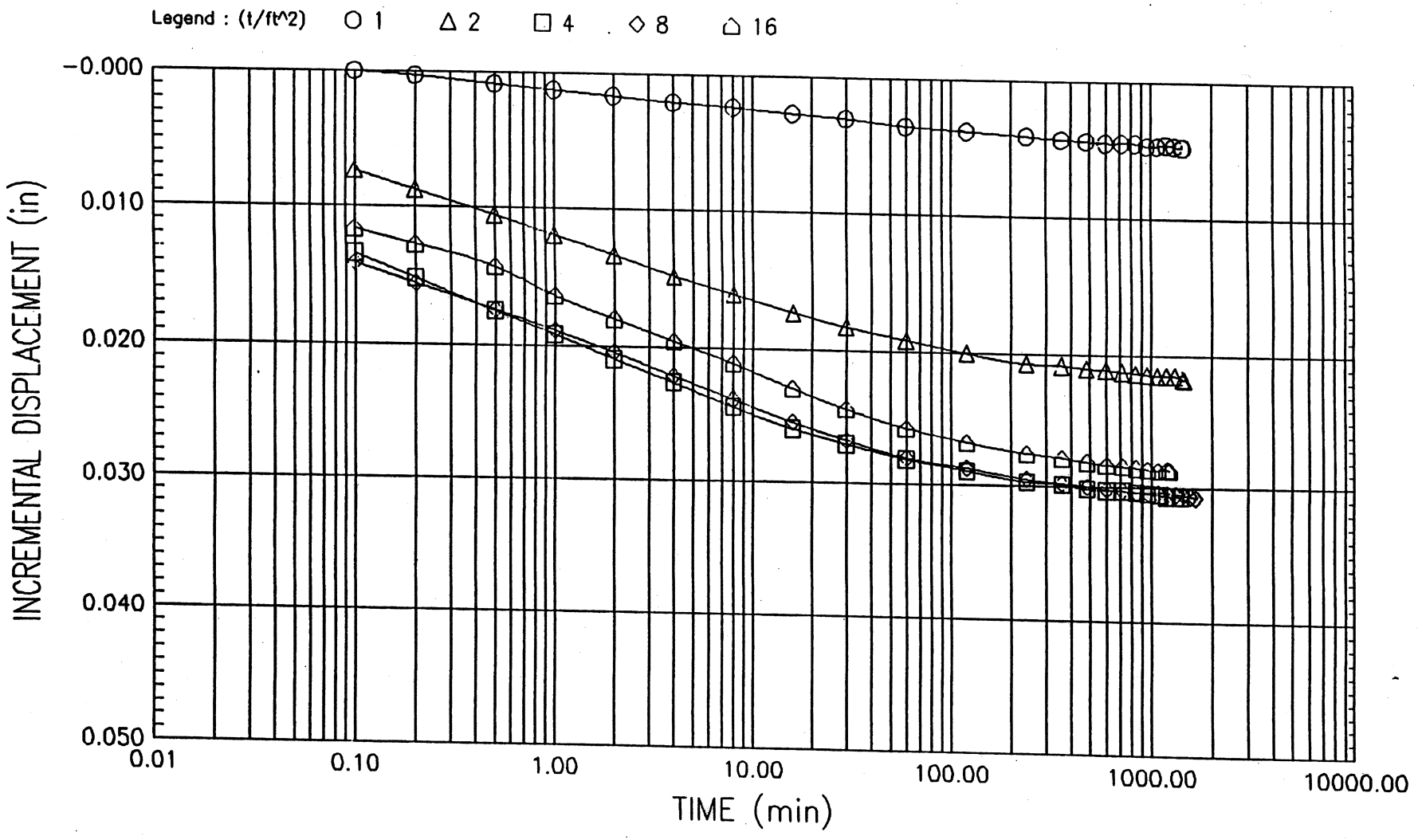


			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE (t/ft^2)	0.3	WATER CONTENT (%)	15.105	14.921
~~PRECONSOL~~. PRESSURE (t/ft^2) p_{exp}	0.3	DRY DENSITY (lb/ft^3)	106.406	119.642
COMPRESSION INDEX	—	SATURATION (%)	70.729	100.372
TYPE SPECIMEN	Undisturbed	VOID RATIO	0.572	0.398
DIA. (in) 4.456	HT. (in) 0.873	BACK PRESSURE (t/ft^2)		
CLASSIFICATION LEAN CLAY WITH SAND (CL)				
LL 30.0	PL 11.0	PI 19.0	PROJECT DYESS AFB	
GS 2.680	D_{10}		Data File: B:317.CNV	
REMARKS			BORING NO. 6D-12	SAMPLE NO. 94/317
☐ Start-Swell O End-Swell			DEPTH 5.0-5.3	DATE APR 1994

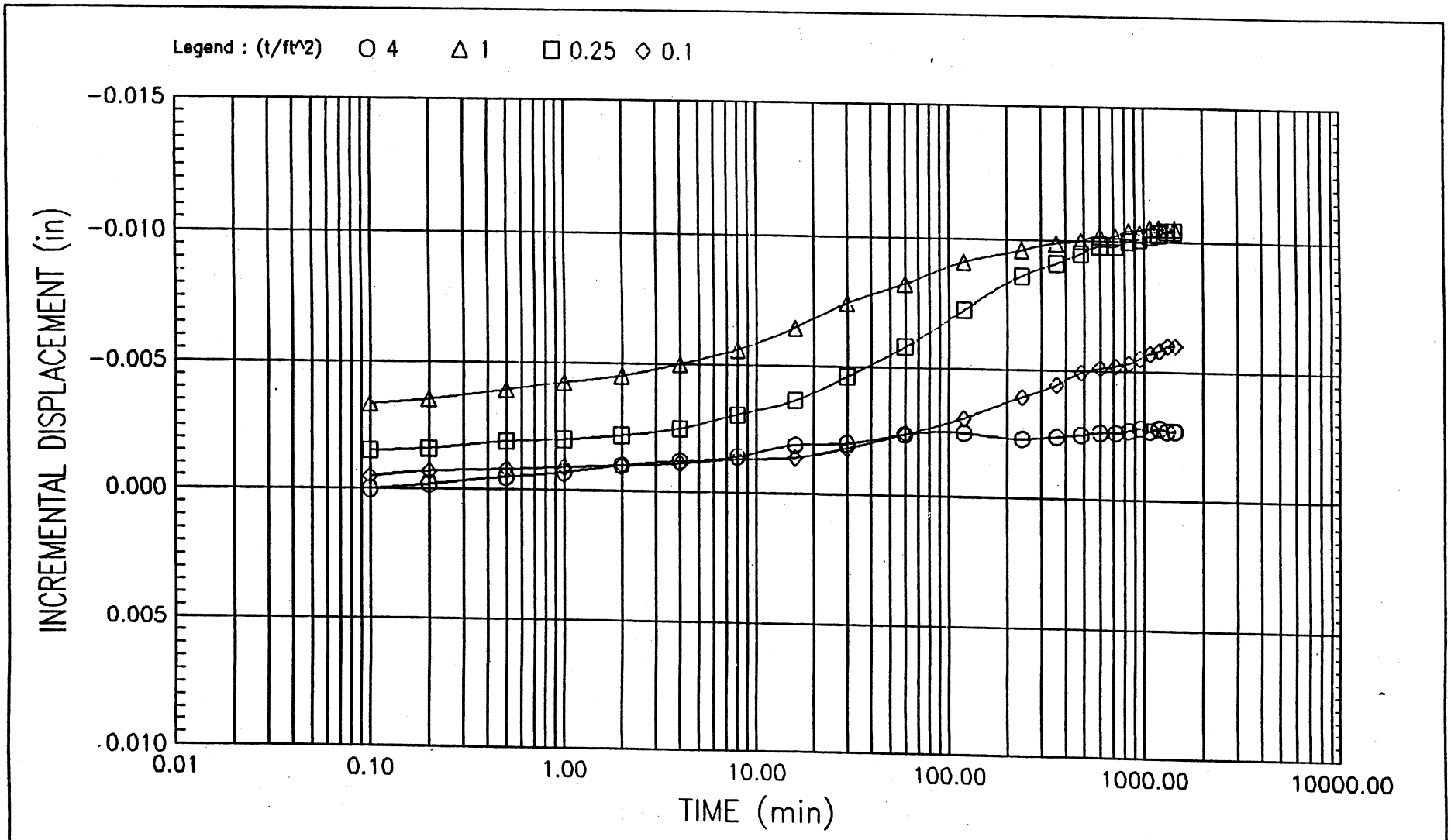
Army Corp of Engineers
CONSOLIDATION TEST REPORT



PROJECT	DYESS AFB		Army Corp of Engineers CONSOLIDATION TEST SWELL CURVES
	Data File: B:317.CNV		
BORING	6D-12	SAMPLE NO. 94/317	
DEPTH	5.0-5.3	DATE APR 1994	



PROJECT	DYESS AFB		Army Corp of Engineers
	Data File: B:317.CNV		CONSOLIDATION TEST
BORING	6D-12	SAMPLE NO. 94/317	TIME CURVES
DEPTH	5.0-5.3	DATE APR 1994	

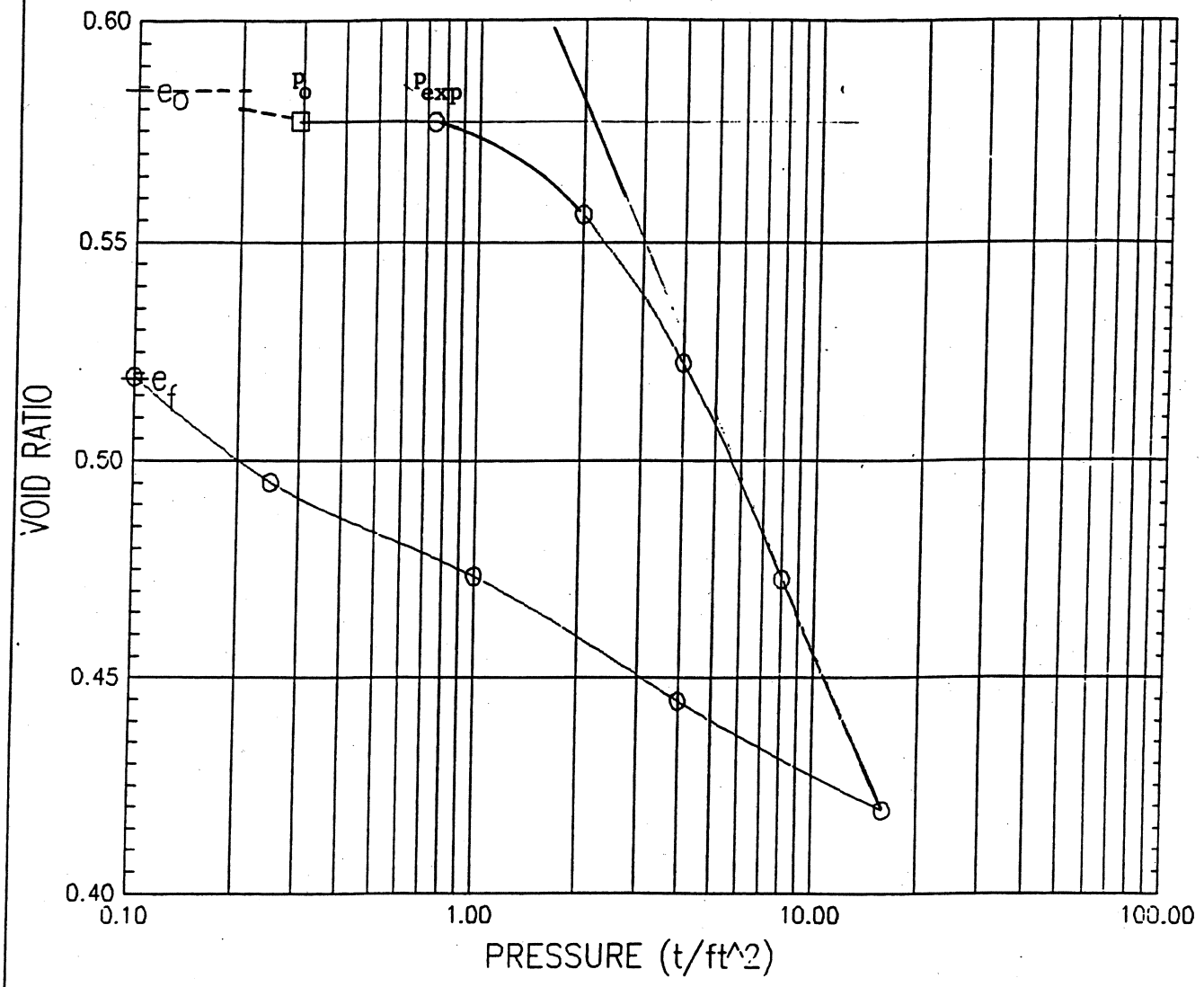


PROJECT	DYESS AFB		
	Data File: B:317.CNV		
BORING	6D-12	SAMPLE NO.	94/317
DEPTH	5.0-5.3	DATE	APR 1994

Army Corp of Engineers

CONSOLIDATION TEST

TIME CURVES

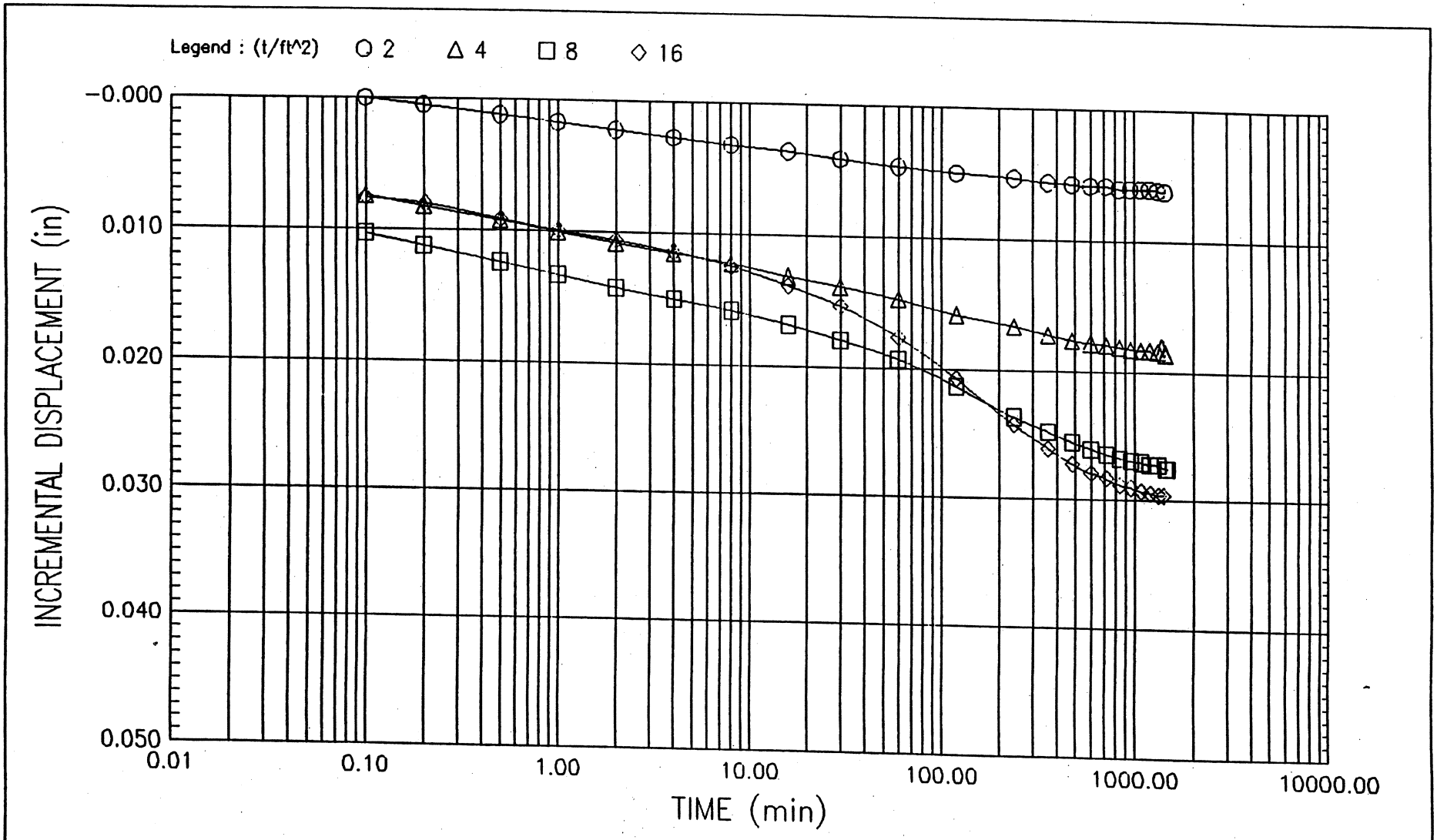


			BEFORE TEST	AFTER TEST
OVERBURDEN PRESSURE (t/ft^2)	0.3	WATER CONTENT (%)	17.679	19.381
~~PRECONSOL~~. PRESSURE (t/ft^2) p_{exp}	0.7	DRY DENSITY (lb/ft^3)	106.375	110.949
COMPRESSION INDEX	0.18	SATURATION (%)	81.661	100.785
TYPE SPECIMEN	Undisturbed	VOID RATIO	0.585	0.519
DIA. (in) 4.459	HT. (in) 0.876	BACK PRESSURE (t/ft^2)		

CLASSIFICATION FAT CLAY WITH SAND (CH)

LL 55.0	PL 15.0	PI 40.0	PROJECT DYESS AFB
GS 2.700	D_{10}		Data File: B:324.CNN
REMARKS		BORING NO. 6D-13	SAMPLE NO. 94/324
☐ Start-Swell O End-Swell		DEPTH 3.9-4.4	DATE APR 1994

Army Corp of Engineers
CONSOLIDATION TEST REPORT

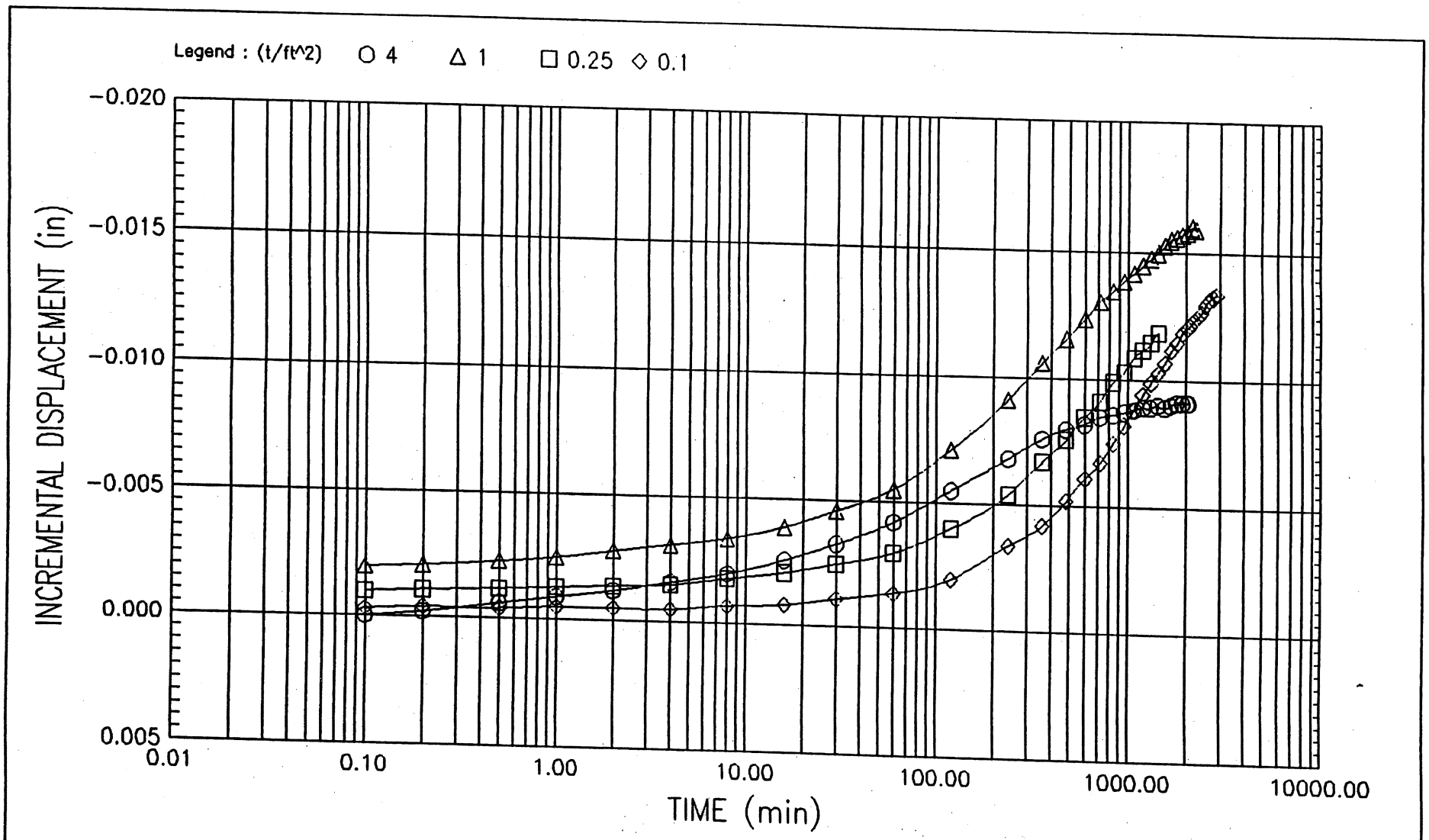


PROJECT	DYESS AFB		
	Data File: B:324.CNN		
BORING	6D-13	SAMPLE NO.	94/324
DEPTH	3.9-4.4	DATE	APR 1994

Army Corp of Engineers

CONSOLIDATION TEST

TIME CURVES

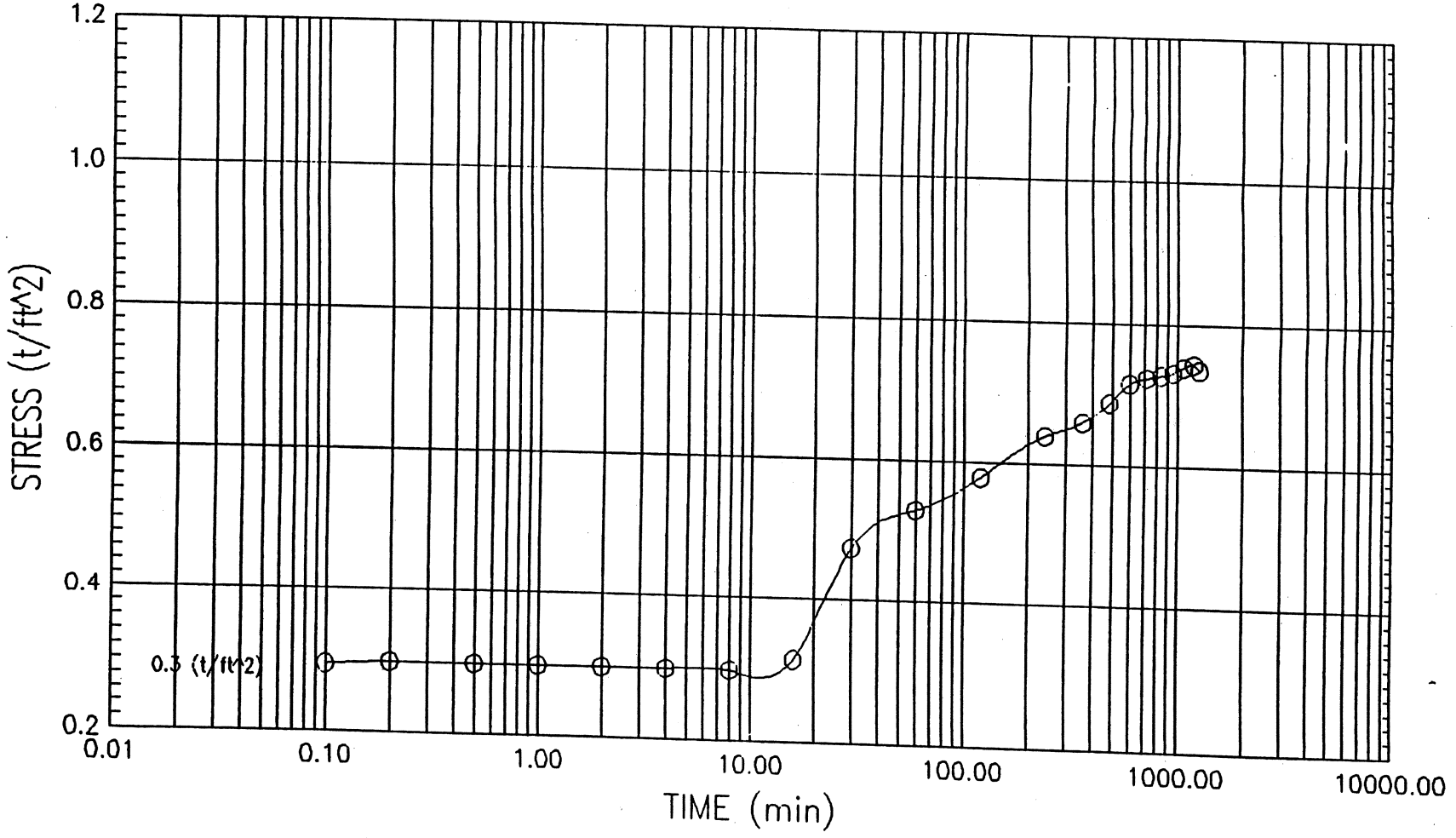


PROJECT	DYESS AFB		
	Data File: B:324.CNN		
BORING	6D-13	SAMPLE NO.	94/324
DEPTH	3.9-4.4	DATE	APR 1994

Army Corp of Engineers

CONSOLIDATION TEST

TIME CURVES



PROJECT	DYESS AFB		Army Corp of Engineers
	Data File: B:324.CNN		CONSOLIDATION TEST
BORING	6D-13	SAMPLE NO. 94/324	SWELL CURVES
DEPTH	3.9-4.4	DATE APR 1994	

ATTACHMENT 1D

REFERENCE DATA

RIBBED MAT SLAB FOUNDATIONS

1. References:

a. (BRAB) Building Research Advisory Board Report (Criteria for Selection and Design of Residential Slabs-on-Ground).

b. "Design and Construction of Post-Tensioned Slabs-on-Ground" by Post Tensioning Institute (PTI) 1980.

c. Criteria letter SWDED-TS/G "Design Criteria for Ribbed Mat Foundations" dated December 1986 (Revised).

d. "Development of Design Formulas for Ribbed Mat Foundations in Expansive Soils" dated December 1986.

e. "Criteria for Developing Geotechnical Design Parameters for SWD Ribbed Mat Design Methodology".

2. General.

a. The ribbed mat foundation is a monolithic slab on grade with stiffening ribs. The stiffened mat slab is particularly suited for structures on shallow foundations in expansive soils areas, where changing moisture content causes portions of the foundation soils to heave or shrink. Ribbed-mat foundations are simple and economical solutions to many foundation problems and have been used extensively for both military and civil works structures.

b. Soil properties for use in the design methods will be as furnished by the Corps of Engineers in a "Foundation Design Analysis".

c. Ribbed-mat slabs should be designed as conventionally reinforced.

3. Design Requirements.

a. The design procedure involves two parts, (1) satisfying minimum requirements, and (2) performing design analyses as necessary.

b. Minimum Requirements - The minimum requirements apply to ribbed mat foundations on expansive and nonexpansive soils and are as follows. Many of these requirements are illustrated on Plates 2 and 3.

Construction joint spacing should not exceed 50 feet in either direction for conventionally reinforced ribbed mats or 75 feet for prestressed mats. The construction joint detail is shown on Plate 7.

Ribs should be continuous across slab, usually spaced no more than 20 feet on centers on expansive soils. Rib depths should extend below the frost line, but normally are limited to 3 feet in order to minimize problems with maintaining the trench walls during construction. Minimum rib width should be 10 inches.

Optional horizontal construction joints are not desirable, but are sometimes required to facilitate construction. Use ribs on either side of large openings in the slab. In buildings with rigid frames such as pre-engineered metal buildings, transverse foundation ribs can be designed to take the rigid frame thrust. Minimum rib reinforcing percentage "p" for expansive soils should be 0.33 percent top and 0.33 percent bottom. The total reinforcing percentage may be reduced to 0.5% in ribs founded on nonexpansive soils. Use more when required by analysis.

Significant wall loads, column loads, etc., should be distributed to the soil by the ribs. An effective width of slab on each side of the rib, equal to the slab thickness, may be added to the rib width for bearing. The bearing pressure under the ribs shall not exceed the allowable soil bearing pressure. Ribs may be widened locally or thickened integral spot footings may be used to distribute column loads to the soil. See Plate 2.

Vapor barrier, capillary water barrier, and nonexpansive fill should be used under ribbed mat slabs. Where floors are subjected to vehicular loading, the floor slab must be designed in accordance with references stated above. Use a subgrade modulus, K, of 200 psi per inch due to gravel and nonexpansive compacted fill under the vehicular floor. Normally, 5 inches will be the minimum floor slab thickness except for small utilitarian buildings (2500 SF or less) where 4 inches will be sufficient. Minimum slab reinforcing ratio "p" should be 0.2 percent.

Expansion joints should be used to break up an irregularly shaped building (L- or U-shaped for example) into two or more rectangular shapes when normal structural analysis would result in unusually large rib beams.

c. Additional Requirements. - The additional requirements for ribbed mat slabs on expansive foundations are:

In expansive soil areas, the necessary depths of existing surface materials are removed and replaced with compacted nonexpansive fill. The depth of nonexpansive fill required is site dependent and is normally based on the expansive intensity which is usually higher near the surface. The depth shall be as required by the COE Foundation Design Analyses.

At corners of the building, diagonal ribs, as shown on Plate 2, should be used to keep the corners supported in case of loss of support for the perimeter ribs.

Center lift edge analyses predict moments due to soil displacements near the edge of the slab. However, soil displacements have also been observed at various interior locations. To account for possible interior soil displacement, interior ribs and reinforcement must be continuous.

d. Analytical Requirements. - All ribbed mats must be designed to distribute concentrated loads to the soil as spot footings, strip footings, or by beam-on-elastic foundation methods. Ribbed mats on expansive soils must also be designed for center lift and edge lift conditions. Design for these conditions should be as described in reference 1.c. and 1.d.

In expansive soils, perimeter ribs must be designed to span between transverse ribs while subjected to loads and soil pressures as calculated for the center lift and edge lift conditions.

Diagonal ribs should be of the same size and reinforcement as the larger adjacent transverse rib.

Design for expansive soil conditions represents an extreme condition, therefore, it is permissible to use a one-third increase in allowable stresses, or a one-third decrease in normal load factors.

4. Design Requirements for Family Housing.

a. All above design requirements also apply to ribbed mat foundations for family housing, except as follows.

b. Minimum rib width is 10 inches, minimum depth is 20 inches. Rib reinforcement shall be a minimum of 0.25% top and 0.25% bottom.

c. Minimum slab thickness is 4 inches, with a minimum of 0.2% reinforcement. Capillary water barrier may be reduced to 4 inches.

d. Analytical design may be by the SWD method, BRAB method, or PTI method. If post-tensioning is used, the criteria in paragraph 3.e. shall apply, except that minimum rib bottom steel may be 0.25%.

e. Foundation Notes. - The applicable notes from enclosed Plate 1 should be placed on the structural drawings (preferably, the foundation plan).

FOUNDATION NOTES (RIBBED MAT SLAB)

1. DESIGN FOUNDATION BEARING PRESSURE (NET) _____ KSF.

2. PLACE 6" CAPILLARY WATER BARRIER AND VAPOR BARRIER UNDER ALL SLABS, EXCEPT AS OTHERWISE NOTED.

3. CONSTRUCTION JOINTS (C.J.) SHALL BE PLACED AS SHOWN ON FOUNDATION PLANS THRU SLABS AND BEAMS (SEE DETAIL, SHEET ___ OF ___).

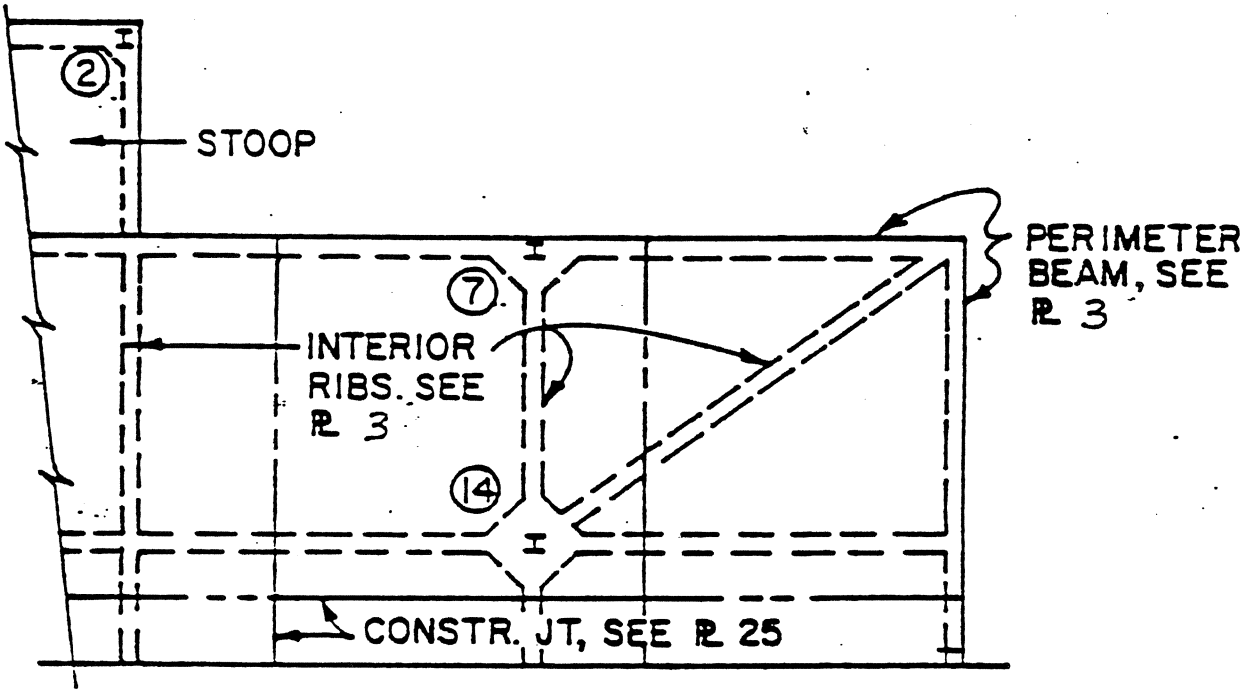
4. SLAB REINFORCEMENT SHALL BE PLACED AT MID-DEPTH OF SLAB UNLESS OTHERWISE NOTED.

5. FILL:

A. ALL FILL PLACED UNDER BUILDING SLABS SHALL BE NON-EXPANSIVE AND SHALL BE COMPACTED TO NOT LESS THAN 92% MAX. DENSITY ACCORDING TO ASTM D1557.

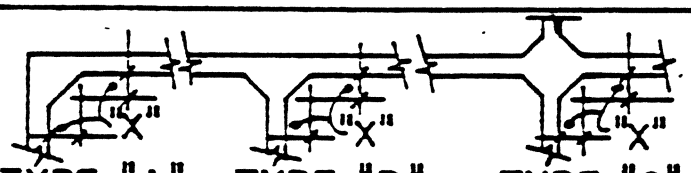
B. REMOVE ___' - ___" OF EXISTING MATERIAL AND REPLACE WITH NON-EXPANSIVE FILL UNDER THE 6" CAPILLARY WATER BARRIER.

RIBBED MAT FOUNDATION

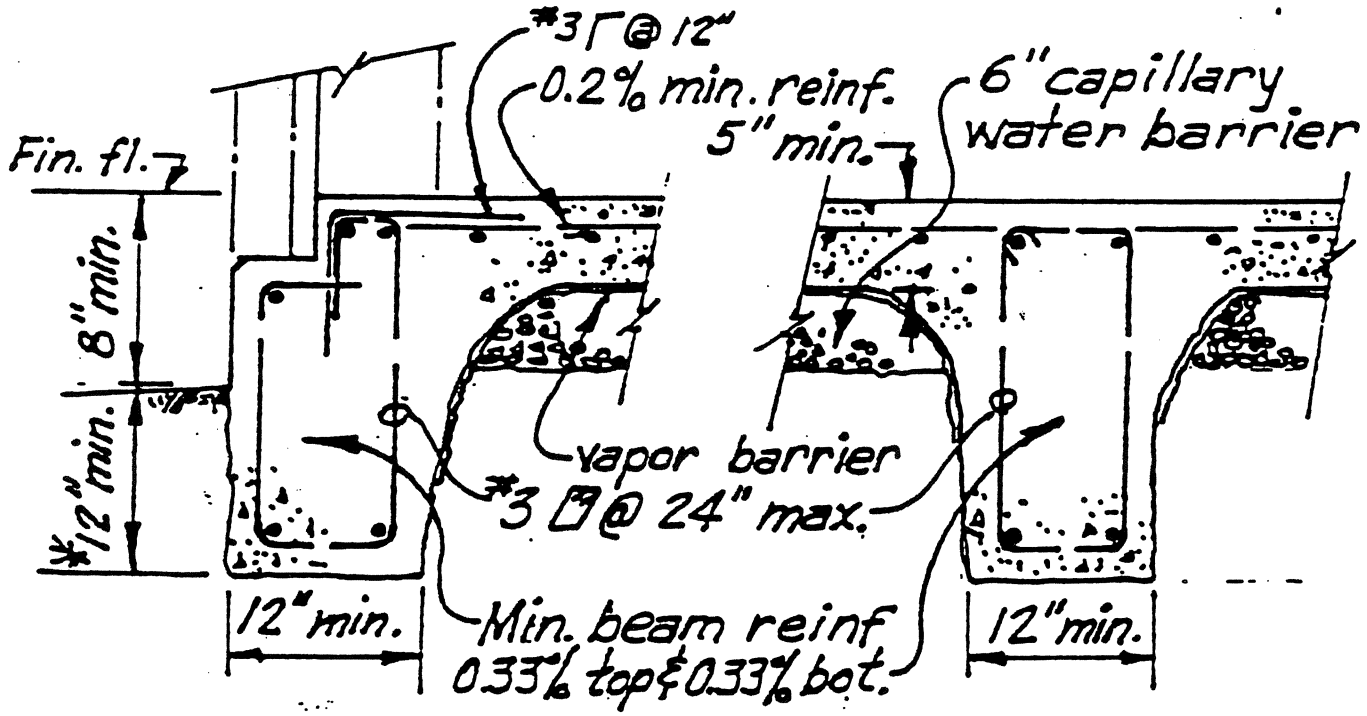


PARTIAL PLAN–FRAME CONSTRUCTION

(SHOWING ENLARGED BM. INTERSECTIONS FOR COLUMN FOOTINGS).

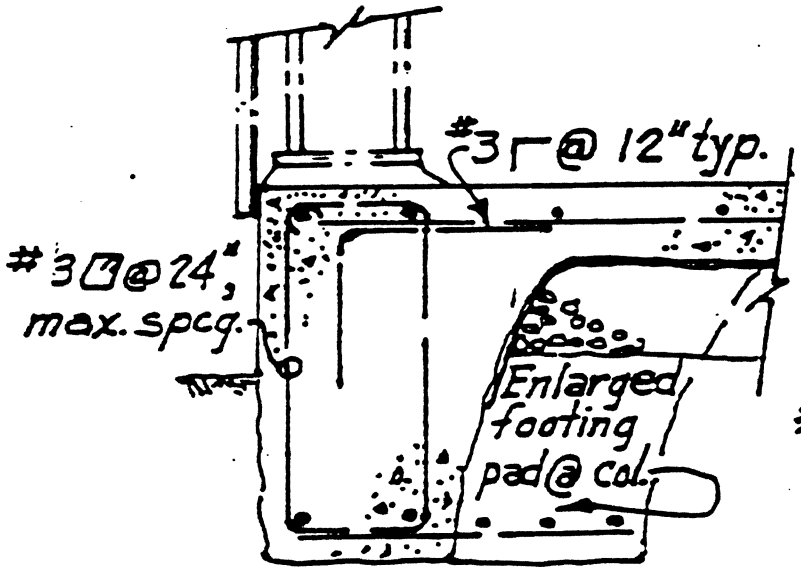
FOOTING SCHEDULE			
 TYPE "A" TYPE "B" TYPE "C"			
MARK	②	⑦	⑭
TYPE	"A"	"B"	"C"
* DIM. "X" (MIN.)	1'-0"	2'-0"	2'-0"

* DIMENSIONS SHOWN ARE MINIMUMS. USE LARGER DIMENSIONS IF REQUIRED FOR COLUMN LOADS.



PERIMETER RIB (BEARING WALL)

INTERIOR RIB



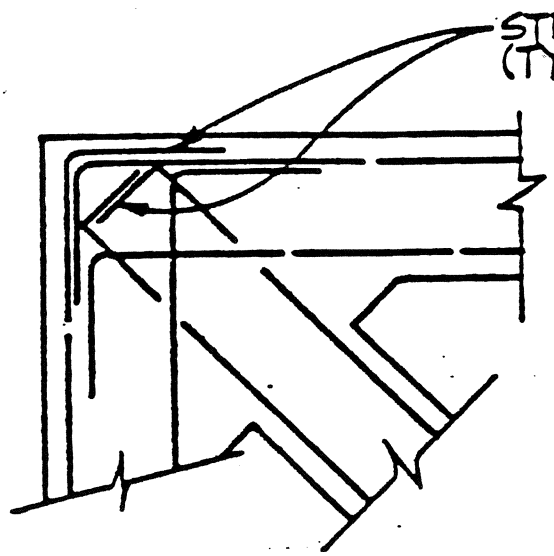
DESIGN NOTES:

Exceptions for family housing:
10" min rib width.
4" min slab thickness.
.5% total rib reinforcement.
MIN.
#3 ⌐ @ 24", slab to perim. beam.

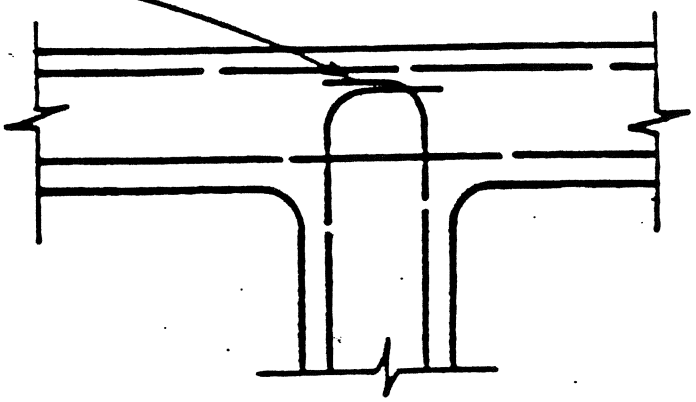
*See Foundation Design Analysis for beam depth, non-expansive fill, etc.

PERIMETER RIB (FRAME OR COLUMN)

RIBBED MAT FOUNDATION SECTIONS



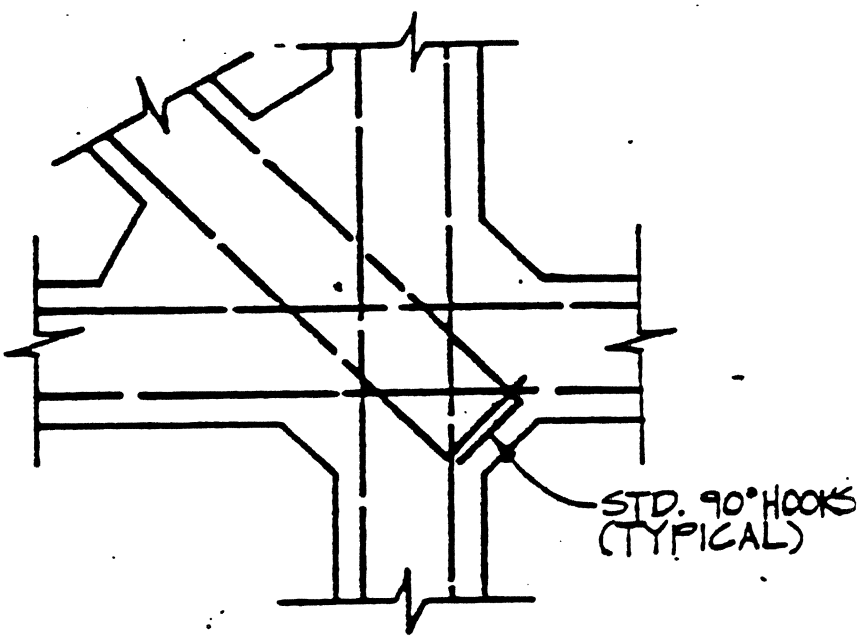
CORNER



INTERSECTION

NOTES:

1. REINFORCING SHOWN APPLIES TO TOP, BOTTOM AND INTERMEDIATE BARS.
2. SEE TABLE A (PL 5) AND B (PL 6) FOR SPLICE REQUIREMENTS.



INTERIOR INTERSECTION

RIBBED MAT FOUNDATIONS
RIB REINFORCEMENT

TABLE "A"					
f'_c = 3.0 KSI f_y = 60.0 KSI					
BAR SIZE	LAP LENGTH (IN)		EMBEDMENT LENGTH (IN)		
	TOP	OTHER	TOP	OTHER	HOOKS
3	13	12	12	12	9
4	18	13	14	12	11
5	22	16	17	12	14
6	28	20	22	16	17
7	39	28	30	21	20
8	50	36	39	28	22
9	64	46	49	36	25
10	81	58	62	45	28
11	99	71	77	55	31

1. Lap lengths shown are for Class B tension splices per ACI 318-83, 12.15.

2. For bars spaced laterally less than 6" o.c., or bars with less than 3" clear edge distance, multiply above lengths by 1.25.

3. Top bars are horizontal reinforcement placed so that more than 12" of concrete is cast below the reinforcement in that member.

4. For hooks with side cover (normal to plane of hook) not less than 2 ½", and for 90° hooks, cover on bar extension beyond hook not less than 2", multiply above lengths by 0.7.

Notes to engineer:

1. For Class A splices, multipy above lap lengths by 0.77, for Class C splices, multiply by 1.31.

2. Increase above lengths when using lightweight concrete.

3. Hook lengths are for tension only.

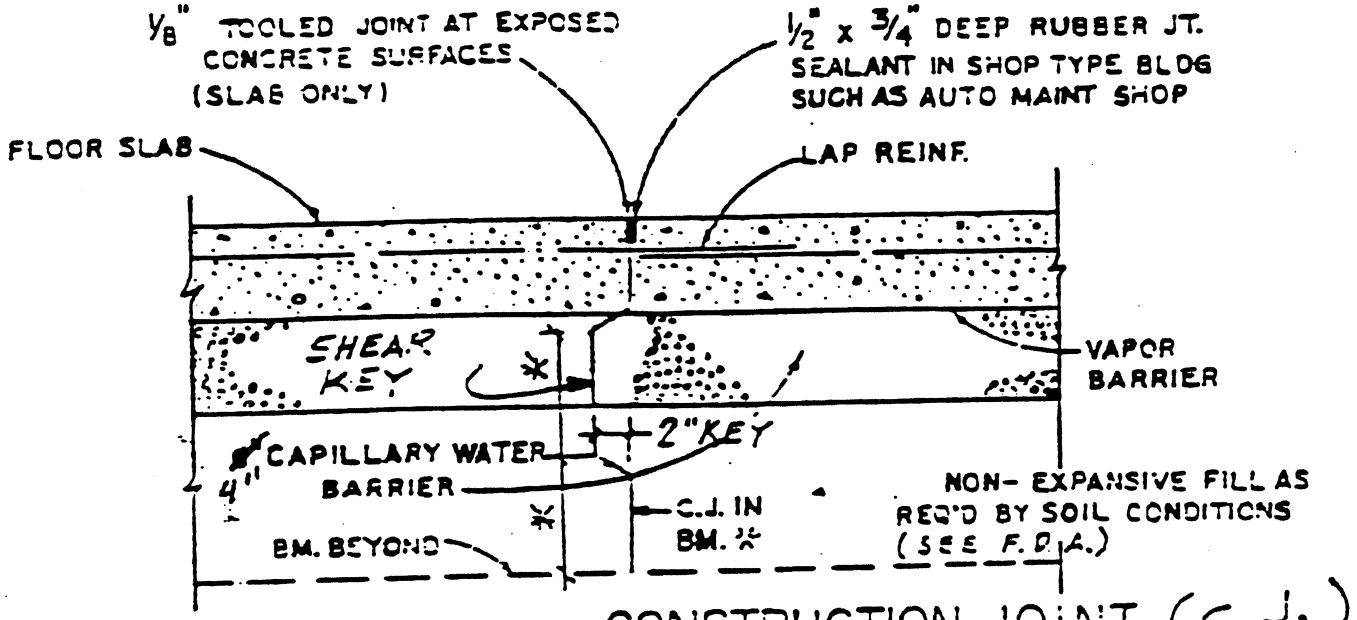
TABLE "B"

f'_c = 4.0KSI f_y = 60.0KSI

BAR SIZE	LAP LENGTH (IN)		EMBEDMENT LENGTH (IN)		
	TOP	OTHER	TOP	OTHER	HOOKS
3	13	12	12	12	8
4	18	13	14	12	10
5	22	16	17	12	12
6	27	19	20	15	15
7	33	24	26	19	17
8	44	32	34	24	19
9	56	40	43	31	22
10	71	51	55	39	25
11	87	62	67	48	27

NOTE:

NOTES UNDER TABLE "A" ALSO APPLY TO TABLE "B"



CONSTRUCTION JOINT (C.J.)

(RIBBED MAT CONSTRUCTION ONLY)

* 1/3 BEAM DEPTH

DESIGN NOTES

1. CONSTRUCTION JOINTS ARE TO BE PROVIDED IN RIBBED MAT THRU BEAMS AND SLAB AT ≤ 50' O.C. EA. WAY - THESE JOINTS SHOULD BE SHOWN ON FOUNDATION PLAN.

2. REINF CONTINUOUS ACROSS C.J. IN BEAM

CORPS OF ENGINEER GUIDE SPECIFICATIONS

The Corps of Engineer Guide Specifications referenced in the Preliminary Geotechnical Report have superseded guide numbers and titles. These guide specifications have been replaced by Unified Facilities Guide Specifications (UFGS). The corresponding UFGS guides are listed below:

OLD	NEW
CEGS-02300 Raw Subgrade	UFGS-02300a Earthwork
CEGS-02741 Bituminous Paving for Roads, Streets, and Open Storage Areas	UFGS-02741a Hot-Mix Asphalt (HMA) For Roads
CEGS-02748 Bituminous Tack and Prime Coats	UFGS-02748a Bituminous Tack And Prime Coats
CEGS-02722 Aggregate Base Course	UFGS-02722a Aggregate And/Or Graded-Crushed Aggregate Base Course
CEGS-02721 Subbase Courses	UFGS-02721a Subbase Courses
CEGS-02712 Lime-Stabilized Subgrade	UFGS-02712a Lime-Stabilized Base Course, Subbase, Or Subgrade
CEGS-02754 Concrete Pavement For Small Projects	UFGS-02754a Concrete Pavements For Small Projects