Phone: (707) 441-8855 **Email:** info@shn-engr.com **Web:** shn-engr.com
812 W. Wabash Avenue, Eureka, CA 95501-2138

Reference: 022054.400

April 23, 2024

Rob Holmlund, Development Director
Humboldt Bay Harbor, Recreation, and Conservation District
601 Startare Drive
Eureka, CA 95501

Subject: Supplemental Geotechnical Data Report for 2023 On-land Investigation, Redwood Marine Multipurpose Terminal Replacement Project, Eureka, California

Introduction

This supplemental geotechnical data report provides the results of the second phase of subsurface investigations at the proposed Redwood Marine Multipurpose Terminal (RMMT) site in Eureka, California. The investigation was completed to supplement the data provided during the initial investigation phase (SHN, 2022) in order to inform the ongoing project planning.

The study area for the supplemental field investigation is focused on the onshore portion of the project area bordering Humboldt Bay (within about 500 feet of the bay shore), as was the initial phase of geotechnical evaluation. The additional sample points described herein fill previous data gaps such that the overall coverage of sample points is intended to provide adequate exploration coverage to inform the design of wharf and shoreline improvements. Additional exploration of upland areas to the west of the existing exploration coverage, as well as over-water borings on Humboldt Bay, are anticipated in future work phases.

Descriptions of site conditions, geologic setting, and the industrial history of the site are included in the initial project Preliminary Geotechnical Data Report (SHN, 2022), and are not repeated here.

Field Investigation

The supplementary geotechnical field investigation consisted of 12 cone penetration tests (CPTs) and four machine borings. The 2023 investigation sites are shown on Figure 1 and are included with the previous (2022) exploration program as well to show the compilation of exploration sites. The CPTs were completed first, between August 14 and 17, 2023, followed by the machine borings, which occurred between August 22 and 30, 2023. The 2023 exploration program was laid out to fill gaps between the previous exploration sites and to target specific areas adjacent to planned wharf structures. Exploration locations were developed collaboratively with the RMMT geotechnical team and staffed in the field by SHN geologists.

EXPLANATION

- 2022 CPT/ROTARY BORING
- 2023 CPT/ROTARY BORING
- A-A', GEOLOGIC CROSS SECTION: SEE FIGURE 2
- CPT/BORING SHOWN ON FIGURE 2

0 300

1" = 333'±

PHOTO SOURCE:
UAV, SHN, APRIL 2022

Humboldt Bay Harbor, Recreation, & Conservation District
Humboldt Bay Offshore Wind Heavy Lift Marine Terminal
Eureka, California

Boring/CPT Location Map

November 2023 - 022054.400

Figure
1

P:\Eureka\2022\022054-Humboldt-RMMT\GIS\GEO_Fig\X_CPTRotaryBoringLocations_20231121.mxd USER: atroia DATE: 11/21/23, 5:16PM

CPT Investigation

The CPT investigation was completed by Gregg Drilling (Gregg) and a full report of their methods and the results are included as Attachment 1. CPT sites are numbered 23-C101 through 23-C112. The individual probes were advanced to depths ranging from 77 feet below grade to as much as 110 feet. CPT provides a rapid characterization of the subsurface using a nominal 1.5-inch-diameter cone penetrometer that is hydraulically advanced into the subsurface to provide a near-continuous characterization of relative density, strength, and static and dynamic pore pressures. In addition to standard CPT assessment at each probe site (continuous profiles of equivalent soil behavior type, pore pressure, skin friction, penetration resistance, and so on), four sites were completed as "seismic CPTs."

Seismic cone penetration testing was completed in CPTs 23-C104, 23-C107, 23-C110 and 23-C112 (referred to on Figure 1 and in Gregg's data report as "23-CS104" and so on). Seismic cone penetration testing allows determination of soil shear wave velocities at specific depth intervals.

Machine Borings

Machine borings were completed by Taber Drilling of West Sacramento using mud rotary drilling methods. A truck-mounted CME-55 drill rig was utilized, equipped with an autohammer for standard penetration testing. The four borings are denoted as borings 23-B101 through 23-B104 and were advanced to depths between 140 feet (boring 23-B104) and 180 feet (borings 23-B101 and 23-B103). Elevations at the boring sites were between 9 and 10 feet; therefore, the elevations of specific depths on the boring logs can be determined by subtracting approximately 10 feet. Boring logs are included as Attachment 2.

Relatively undisturbed soil samples were obtained by driving a 2.5-inch interior diameter (ID), 3.0-inch outside diameter (OD), Modified California Sampler (MCS) containing steel liners and a 1.4-inch ID, 2.0-inch OD standard penetration test (SPT) sampler without liners in accordance ASTM-International (ASTM) D1586 standards. The samplers were advanced using a 140-pound CME auto-hammer falling 30 inches per blow. The number of blows required to drive the samplers the last 12 inches of an 18-inch drive is provided on the boring logs as penetration resistance (blows per foot [bpf]). The penetration resistance values (bpf) recorded for SPT sampler drives and provided on the boring logs are actual penetration resistance (N-values) that are uncorrected for depth and the energy transfer ratio of the automatic hammers used. The penetration resistance values provided on boring logs for the MCS sampler drives are field blow counts and should not be construed as SPT N-values. Equivalent SPT N-values for the MCS sampler should be considered lower by a factor of approximately 0.6. Intervals in soft materials with no, or very low, blow counts (at 25 feet in boring 23-B102) were sampled without hammer driving; rather, the sampler was advanced under the weight of the driving hammer and rods. Thin-walled shelby tubes were advanced locally, in soft fine-grained materials; the down-pressure and recovery are noted on the logs.

An SPT hammer efficiency report from Taber Drilling indicates an "average hammer efficiency" of 66%.

The earth materials encountered were logged and field classified in general accordance with the Manual-Visual Classification Method (ASTM D 2488). The final boring logs, presented in Attachment 2, were prepared based on the field logging, examination of samples in the laboratory, and the results of laboratory testing.

Water level observations were made during drilling by delaying the introduction of drilling fluid until wet conditions were encountered.

At the completion of each boring, the boreholes were backfilled with a cement slurry by tremie pipe and bentonite chips and completed to the surface to match existing conditions.

Results

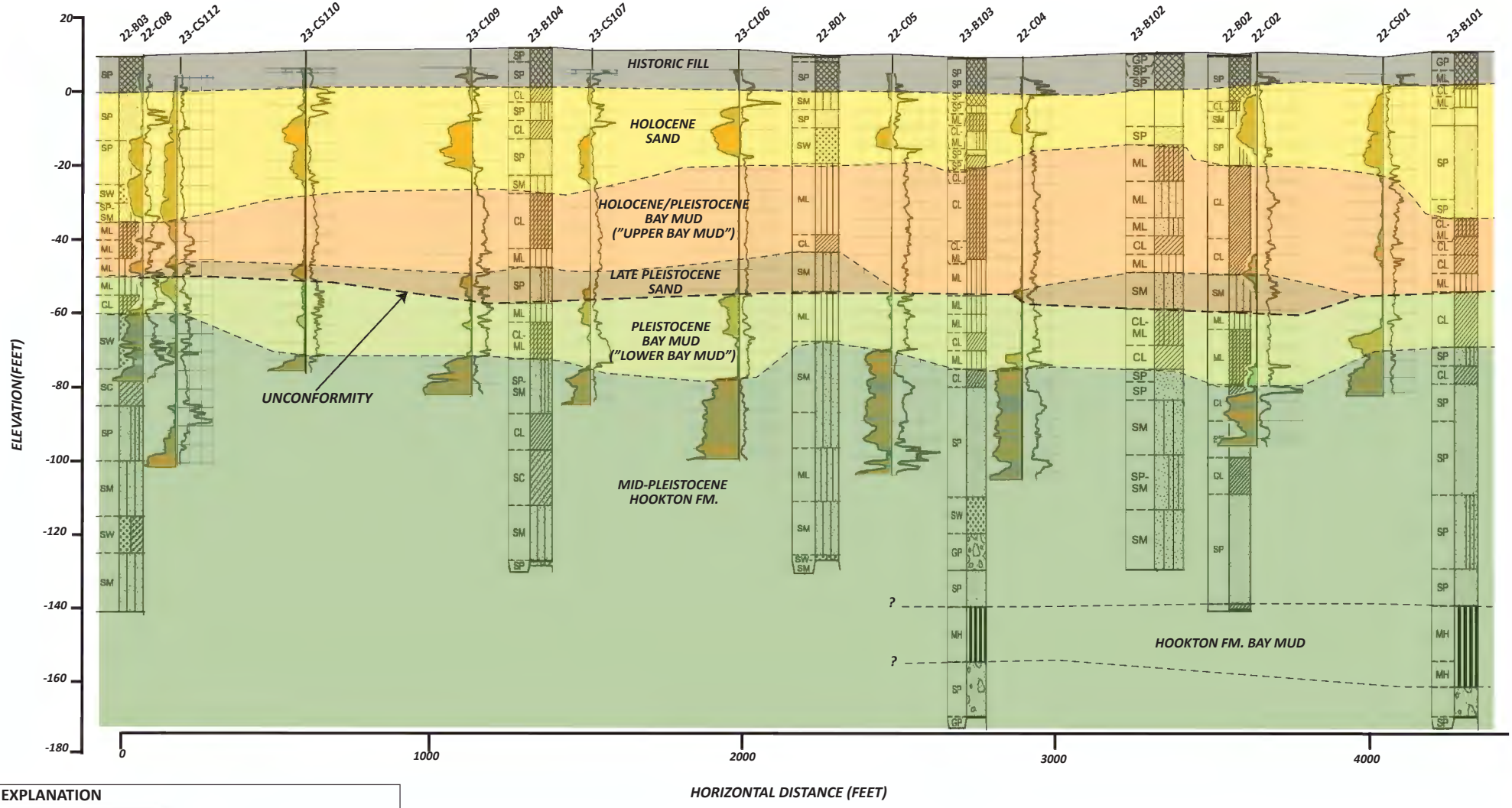
The results of the 2023 field investigation filled previous data gaps from the initial preliminary investigation and allow development of a refined interpretation of subsurface conditions along the bay shore through the project area. A geologic cross-section following line A-A' (the location of A-A' is shown on Figure 1) is included as Figure 2. The results of the recent field investigation are consistent with the initial preliminary findings and define a continuous stratigraphic profile along the length of the cross-section.

As described previously, the Samoa Peninsula is underlain by sedimentary materials that reflect late Pleistocene changes in sea level related to global glacial cycles. Specifically, the geologic cross-section (Figure 2) includes an "unconformity" (an erosional interval) that we interpret as reflecting the most recent (late Pleistocene) low sea level stand.

The deposits below the unconformity, the Hookton Formation (a regional unit) and overlying "lower bay mud," would have pre-dated the low stand, when sea level was considerably lower and the shoreline was well to the west of its current position. The deposits above the unconformity are interpreted to be latest Pleistocene to Holocene in age and reflect the transgression of sea level to its current levels (which were reached about 6,000 years ago) and the in-filling of Humboldt Bay. The upper (post-unconformity stratigraphy) includes a significant "bay mud" interval ("upper bay mud" on Figure 2) that suggests Humboldt Bay extended onto the site at one point, and a capping veneer of clean (wind-blown) sand. The buried "upper bay mud" is a localized deposit that does not extend to the south of the site (it has been observed to the northwest). The veneer of dune sand is ubiquitous across the Samoa Peninsula.

The geologic cross-section (Figure 2) includes borehole and CPT data that reflect the increasing age (and consistency) of the materials beneath the site. The upper dune sand ("Holocene sand") is generally loose; where saturated, these materials are typically associated with a high liquefaction potential. The "upper bay mud" is a very soft silty, clayey mud whose material properties are generally analogous to modern bay muds; these sediments are highly compressible and subject to high settlement potential. Hookton Formation sediments that underlie the site below an elevation of minus 60 to 70 feet are associated with a significant increase in material consistency, becoming dense to very dense. Hookton Formation sediments are present in geologic profiles across Humboldt Bay and occur beneath Eureka; we expect Hookton Formation sediments will be present below a similar elevation in proposed marine borings within the Samoa Channel offshore of the site.

GEOLOGIC CROSS-SECTION
A-A'



EXPLANATION

CONE RESISTANCE (qt) 0 1,000 FRICTION RATIO

PHOTO SOURCE: USDA NAIP, 2020

1 " = 1,000 '

Humboldt Bay Harbor, Recreation, & Conservation District
Humboldt Bay Offshore Wind Heavy Lift Marine Terminal
Eureka, California

Subsurface Section A-A'

November 2023 - 022054.400

Figure 2

P:\Eureka\2022\022054-Humboldt-RMMT\Figs\Geotech\GDR2 Supplemental\GEO_GDR2S1_Fig2_GeologicCrossSectionAA20231122.ai, USER: atroia, DATE: 11/22/23, 11:00AM

As the "upper bay mud" is a significant design consideration due to its high settlement potential, its distribution across the site is an important finding of the subsurface investigations completed thus far. Figure 3 shows the relative thickness of "upper bay mud" within the investigation area, which ranges from 12 feet at the south end of the area, to as much as 35 feet near the existing Redwood Marine terminal dock.

All four machine borings in the 2023 field investigation occurred within the area of historic infilling along the bay shore; the historic shoreline is shown on Figure 3. Fill soils consisted of a variety of sand, gravel, and localized wood waste. Some of the fill soils appears as reworked bay mud and contains shell fragments. The amount of wood waste is variable within the fill soils but appears relatively minor in the areas we have investigated.

Laboratory Testing

The results of laboratory testing are included in Attachment 3 and relevant results are included on the final boring logs in Attachment 2. Laboratory testing was completed by Cooper Testing Labs of Palo Alto, California and SHN in Eureka, California. Tests completed include unconsolidated-undrained triaxial shear, consolidated drained direct shear, consolidation, particle size distribution, % passing the No. 200 sieve, plasticity index, and corrosivity.

Next Steps

Additional subsurface investigation will occur in upland areas in the western portion of the site, once access is available, and offshore in the Samoa Channel, once permitting is completed. Primary unresolved issues related to the geotechnical conditions within the project area include the unknown extent of the "upper bay mud" in the western part of the site and the lack of knowledge regarding the nature of deposits, if any, within the Samoa Channel (beyond a narrow fringe of mudflats along the bay shore).

Respectfully,

SHN

REGISTERED GEOLOGIST
No. 2107
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

4/23/24

Gary D. Simpson, CEG 2107
Sr. Engineering Geologist

GDS:ame

Attachments:
1. CPT Report
2. Boring Logs
3. Laboratory Test Results

P:\Eureka\2022\022054-Humboldt-RMMT\GIS\GEO_GDR2s1_Fig3_UpperBayMudThickness.mxd USER: jsousa DATE: 11/21/23, 4:52PM

Humboldt Bay Harbor, Recreation, & Conservation District
Humboldt Bay Offshore Wind Heavy Lift Marine Terminal
Eureka, California

Upper Bay Mud Thickness
Supplemental GDR
November 2023 - 022054.400

Figure 3

Reference

SHN. (September 8, 2022). “Preliminary Geotechnical Data Report, Redwood Marine Multipurpose Terminal, Samoa, California.” Eureka, CA:SHN.

CPT Report 1

CONE PENETRATION TESTING (CPT) REPORT

Gregg Drilling LLC

Prepared for: SHN
Project D1235046
August 22, 2023

Prepared by: Eleni Pateras
epateras@greggdrilling.com

Table of Contents

August 22, 2023

SHN
Attn: Giovanni Vadurro

Subject: CPT Site Investigation
RMMT
Samoa, CA
GREGG Project Number: D1235046

Dear Giovanni:

The following report presents the results of Gregg Drilling's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	☒
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	☒
4	Groundwater Samples	(GWS)	☐
5	Soil Samples	(SS)	☐
6	Vapor Samples	(VS)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact me at 562-427-6899.

Sincerely,

CPT Reports Team
Gregg Drilling, LLC.

Cone Penetration Testing (CPT) Procedure

Gregg Drilling carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, Figure CPT.

The cone takes measurements of tip resistance (q_c), sleeve resistance (f_s), and penetration pore water pressure (u_2). Measurements are taken at either 2.5 or 5cm intervals during penetration to provide a nearly continuous profile. CPT data reduction and basic interpretation is performed in real time facilitating on-site decision making. The above-mentioned parameters are stored electronically for further analysis and reference. All CPT soundings are performed in accordance with revised ASTM standards (D 5778-12).

The 5mm thick porous plastic filter element is located directly behind the cone tip in the u_2 location. A new saturated filter element is used on each sounding to measure both penetration pore pressures as well as measurements during a dissipation test (PPDT). Prior to each test, the filter element is fully saturated with oil under vacuum pressure to improve accuracy.

When the sounding is completed, the test hole is backfilled according to client specifications. If grouting is used, the procedure generally consists of pushing a hollow tremie pipe with a "knock out" plug to the termination depth of the CPT hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

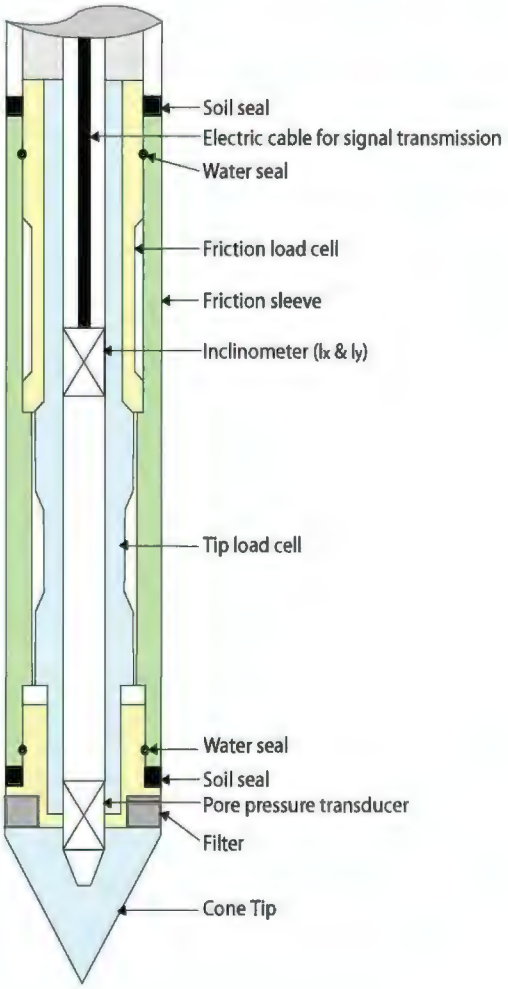


Figure CPT

15cm^2 Standard Cone Specifications

Dimensions	
Cone base area	15 cm^2
Sleeve surface area	225 cm^2
Cone net area ratio	0.85
Specifications	
Cone load cell	
Full scale range	180 kN (20 tons)
Overload capacity	150%
Full scale tip stress	120 MPa (1,200 tsf)
Repeatability	120 kPa (1.2 tsf)
Sleeve load cell	
Full scale range	31 kN (3.5 tons)
Overload capacity	150%
Full scale sleeve stress	1,400 kPa (15 tsf)
Repeatability	1.4 kPa (0.015 tsf)
Pore pressure transducer	
Full scale range	7,000 kPa (1,000 psi)
Overload capacity	150%
Repeatability	7 kPa (1 psi)

Note: The repeatability during field use will depend somewhat on ground conditions, abrasion, maintenance and zero load stability.

Cone Penetration Test Data & Interpretation

The Cone Penetration Test (CPT) data collected are presented in graphical and electronic form in the report. The plots include interpreted Soil Behavior Type (SBT) based on the charts described by Robertson (2010) (Figure SBT). Typical plots display SBT based on the non-normalized charts of Robertson (2010) or normalized data (2009 and 2016). For CPT soundings deeper than 30m, we recommend the use of the normalized charts of Robertson (2009 and 2016) which can be displayed as SBTn. The report also includes spreadsheet output of computer calculations of basic interpretation in terms of SBT and SBTn and various geotechnical parameters using current published correlations based on the comprehensive review by Lunne, Robertson and Powell (1997), as well as recent updates by Robertson and Cabal (Guide to Cone Penetration Testing 7th Edition, 2022). The interpretations are presented only as a guide for geotechnical use and should be carefully reviewed. Gregg Drilling LLC does not warranty the correctness or the applicability of any of the geotechnical parameters interpreted by the software and does not assume any liability for use of the results in any design or review. The user should be fully aware of the techniques and limitations of any method used in the software. Some interpretation methods require input of the groundwater level to calculate vertical effective stress. An estimate of the in-situ groundwater level has been made based on field observations and/or CPT results but should be verified by the user.

A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Note that it is not always possible to clearly identify a soil type based solely on q_t, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the correct soil behavior type.

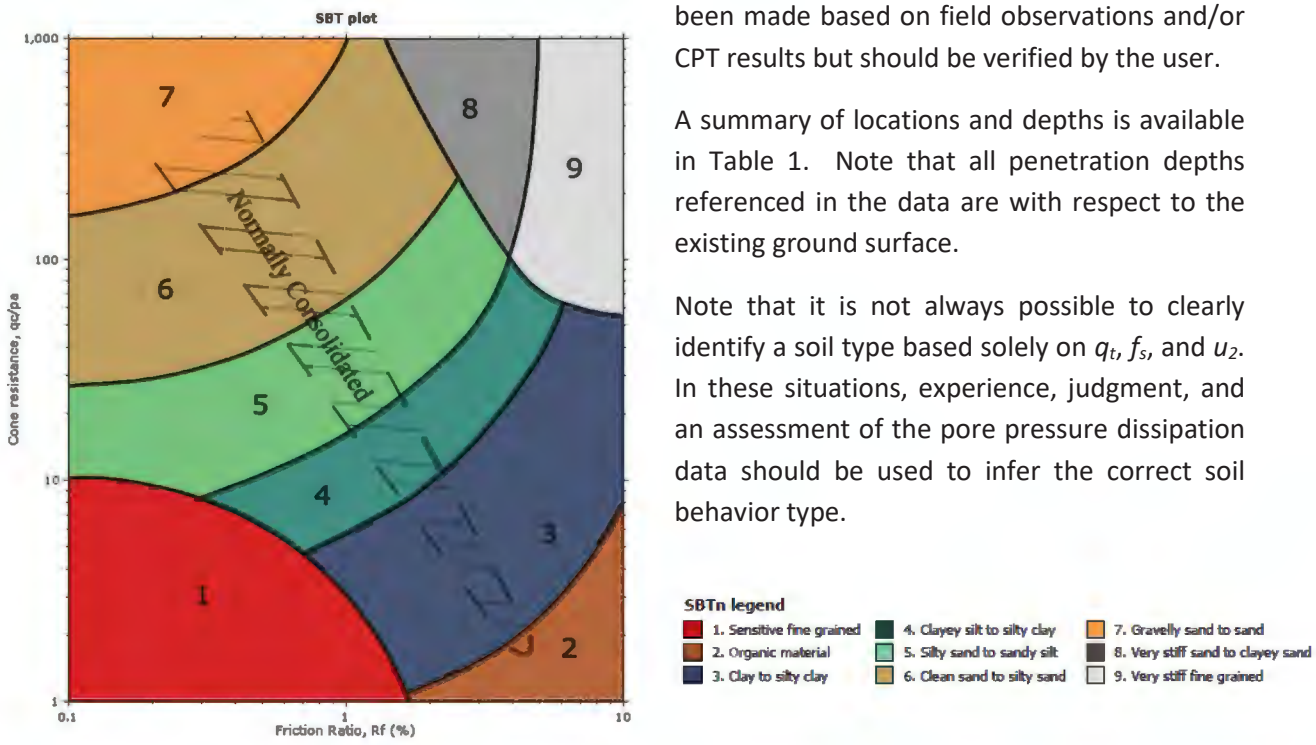


Figure SBT (After Robertson 2010) – Note: Colors may vary slightly compared to plots

Pore Pressure Dissipation Tests (PPDTs)

Pore Pressure Dissipation Tests (PPDT's) conducted at various intervals can be used to measure equilibrium water pressure (at the time of the CPT). If conditions are hydrostatic, the equilibrium water pressure can be used to determine the approximate depth of the ground water table. A PPDT is conducted when penetration is halted at specific intervals determined by the field representative. The variation of the penetration pore pressure (*u)* with time is measured behind the tip of the cone and recorded.

Pore pressure dissipation data can be interpreted to provide estimates of:

- Equilibrium piezometric pressure
- Phreatic Surface
- In situ horizontal coefficient of consolidation (c_h)
- In situ horizontal coefficient of permeability (k_h)

To correctly interpret the equilibrium piezometric pressure and/or the phreatic surface, the pore pressure must be monitored until it reaches equilibrium, *Figure PPDT*. This time is commonly referred to as t_{100}, the point at which 100% of the excess pore pressure has dissipated.

A complete reference on pore pressure dissipation tests is presented by Robertson et al. 1992 and Lunne et al. 1997.

A summary of the pore pressure dissipation tests completed for this project is included in Table 1.

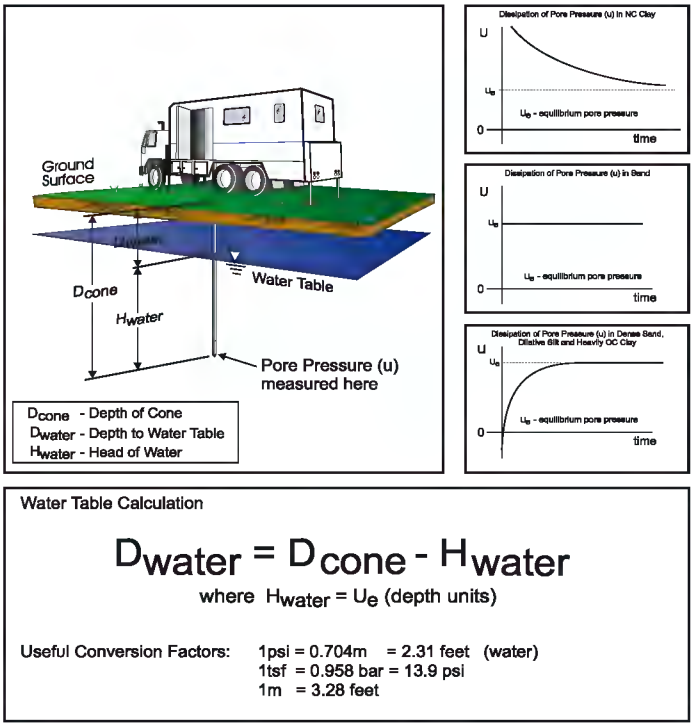


Figure PPDT

Seismic Cone Penetration Tests (SCPT)

Seismic Cone Penetration Testing (SCPT) can be conducted at various intervals during the Cone Penetration Test. Shear wave velocity (Vs) can then be calculated over a specified interval with depth. A small interval for seismic testing, such as 1-1.5m (3-5ft) allows for a detailed look at the shear wave profile with depth. Conversely, a larger interval such as 3-6m (10-20ft) allows for a more average shear wave velocity to be calculated. Gregg Drilling's cones have a horizontally active geophone located 0.2m (0.66ft) behind the tip.

To conduct the seismic shear wave test, the penetration of the cone is stopped and the rods are decoupled from the rig. An automatic hammer is triggered to send a shear wave into the soil. The distance from the source to the cone is calculated knowing the total depth of the cone and the horizontal offset distance between the source and the cone. To calculate an interval velocity, a minimum of two tests must be performed at two different depths. The arrival times between the two wave traces are compared to obtain the difference in time (Δt). The difference in depth is calculated (Δd) and velocity can be determined using the simple equation: $v = \Delta d/\Delta t$

Multiple wave traces can be recorded at the same depth to improve quality of the data.

A complete reference on seismic cone penetration tests is presented by Robertson et al. 1986 and Lunne et al. 1997.

A summary of the shear wave velocities, arrival times and wave traces are provided with the report.

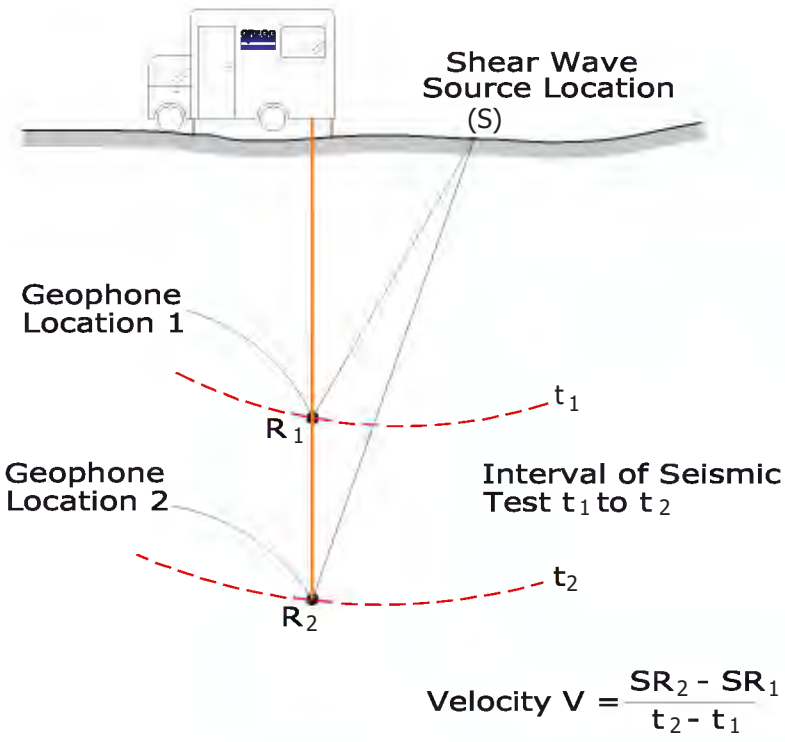


Figure SCPT

Soil Sampling

Gregg Drilling uses a piston-type push-in sampler to obtain small soil samples without generating any soil cuttings, *Figure SS*. Two different types of samplers (12 and 18 inch) are used depending on the soil type and density. The soil sampler is initially pushed in a "closed" position to the desired sampling interval using the CPT pushing equipment. Keeping the sampler closed minimizes the potential of cross contamination. The inner tip of the sampler is then retracted leaving a hollow soil sampler with inner 1¼" diameter sample tubes. The hollow sampler is then pushed in a locked "open" position to collect a soil sample. The filled sampler and push rods are then retrieved to the ground surface. Because the soil enters the sampler at a constant rate, the opportunity for 100% recovery is increased. For environmental analysis, the soil sample tube ends are sealed with Teflon and plastic caps. Often, a longer "split tube" can be used for geotechnical sampling.

For a detailed reference on direct push soil sampling, refer to Robertson et al, 1998.

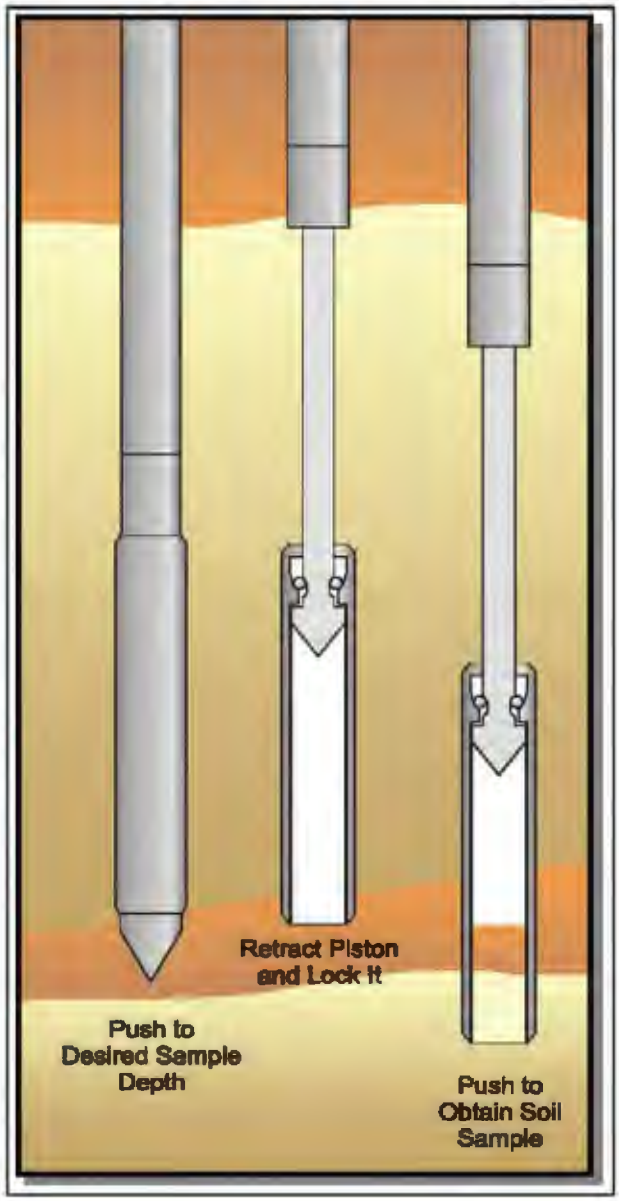


Figure SS

Ground Water Sampling

Gregg Drilling conducts groundwater sampling using a sampler as shown in *Figure GWS*. The groundwater sampler has a retrievable stainless steel or disposable PVC screen with steel drop off tip. This allows for samples to be taken at multiple depth intervals within the same sounding location. In areas of slower water recharge, provisions may be made to set temporary PVC well screens during sampling to allow the pushing equipment to advance to the next sample location while the groundwater is allowed to infiltrate.

The groundwater sampler operates by advancing 44.5mm (1¾ inch) hollow push rods with the filter tip in a closed configuration to the base of the desired sampling interval. Once at the desired sample depth, the push rods are retracted; exposing the encased filter screen and allowing groundwater to infiltrate hydrostatically from the formation into the inlet screen. A small diameter bailer (approximately ½ or ¾ inch) is lowered through the push rods into the screen section for sample collection. The number of downhole trips with the bailer and time necessary to complete the sample collection at each depth interval is a function of sampling protocols, volume requirements, and the yield characteristics and storage capacity of the formation. Upon completion of sample collection, the push rods and sampler, with the exception of the PVC screen and steel drop off tip are retrieved to the ground surface, decontaminated and prepared for the next sampling event.

For a detailed reference on direct push groundwater sampling, refer to Zemo et. al., 1992.

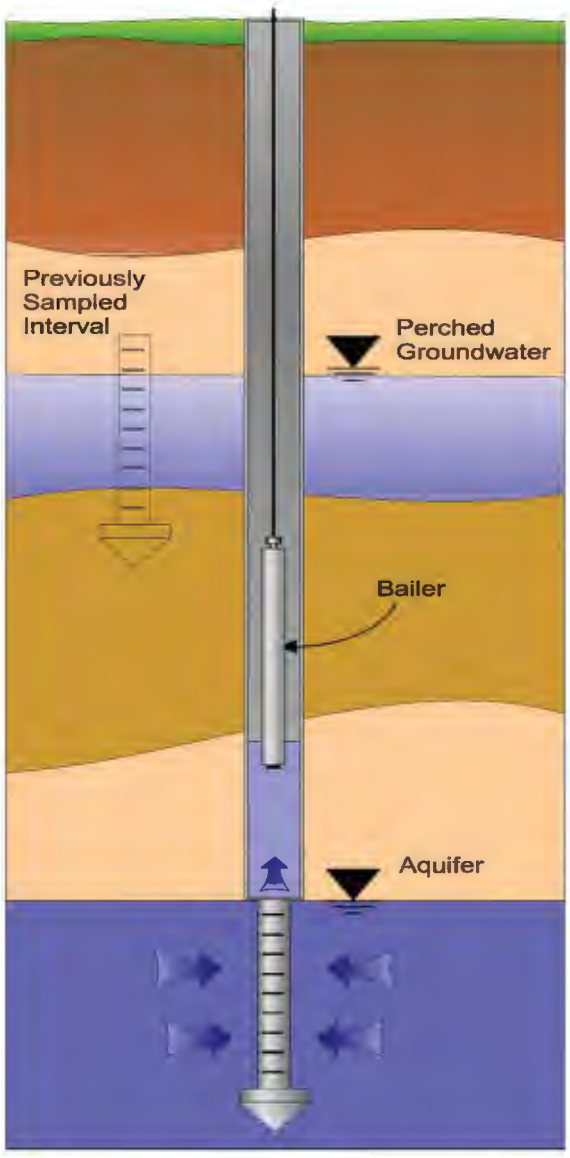


Figure GWS

References

Lunne, T., Robertson, P.K. and Powell, J.J.M., "Cone Penetration Testing in Geotechnical Practice" E & FN Spon. ISBN 0 419 23750, 1997

Roberston, P.K., "Soil Classification using the Cone Penetration Test", Canadian Geotechnical Journal, Vol. 27, 1990 pp. 151-158.

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Robertson, P.K. and Cabal, K.L., "Guide to Cone Penetration Testing for Geotechnical Engineering", 6th Edition, 2015, 145 p. Free online, http://www.greggdrilling.com/technical-guides.

Mayne, P.W., "NHI (2002) Manual on Subsurface Investigations: Geotechnical Site Characterization", available through www.ce.gatech.edu/~geosys/Faculty/Mayne/papers/index.html, Section 5.3, pp. 107-112.

Robertson, P.K., R.G. Campanella, D. Gillespie and A. Rice, "Seismic CPT to Measure In-Situ Shear Wave Velocity", Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8, 1986 pp. 791-803.

Robertson, P.K., Sully, J., Woeller, D.J., Lunne, T., Powell, J.J.M., and Gillespie, D.J., "Guidelines for Estimating Consolidation Parameters in Soils from Piezocone Tests", Canadian Geotechnical Journal, Vol. 29, No. 4, August 1992, pp. 539-550.

Robertson, P.K., T. Lunne and J.J.M. Powell, "Geo-Environmental Application of Penetration Testing", Geotechnical Site Characterization, Robertson & Mayne (editors), 1998 Balkema, Rotterdam, ISBN 90 5410 939 4 pp 35-47.

Copies of ASTM Standards are available through www.astm.org

Table 1: Cone Penetration Testing Summary

CPT Sounding Identification	Date	Termination Depth (ft)	Depth of Soil Samples (ft)	Depth of Groundwater Samples (ft)	Depth of Pore Pressure Dissipation Tests (ft)
23-C101	8/14/2023	94.49	-	-	-
23-C102	8/14/2023	94.65	-	-	-
23-C103	8/15/2023	105.64	-	-	-
23-CS104	8/16/2023	109.25	-	-	-
23-C105	8/14/2023	77.10	-	-	-
23-C106	8/15/2023	102.69	-	-	-
23-CS107	8/17/2023	90.55	-	-	-
23-C108	8/15/2023	97.77	-	-	-
23-C109	8/15/2023	92.68	-	-	-
23-CS110	8/17/2023	87.93	-	-	-
23-C111	8/16/2023	107.78	-	-	-
23-CS112	8/17/2023	110.07	-	-	-

APPENDIX A:

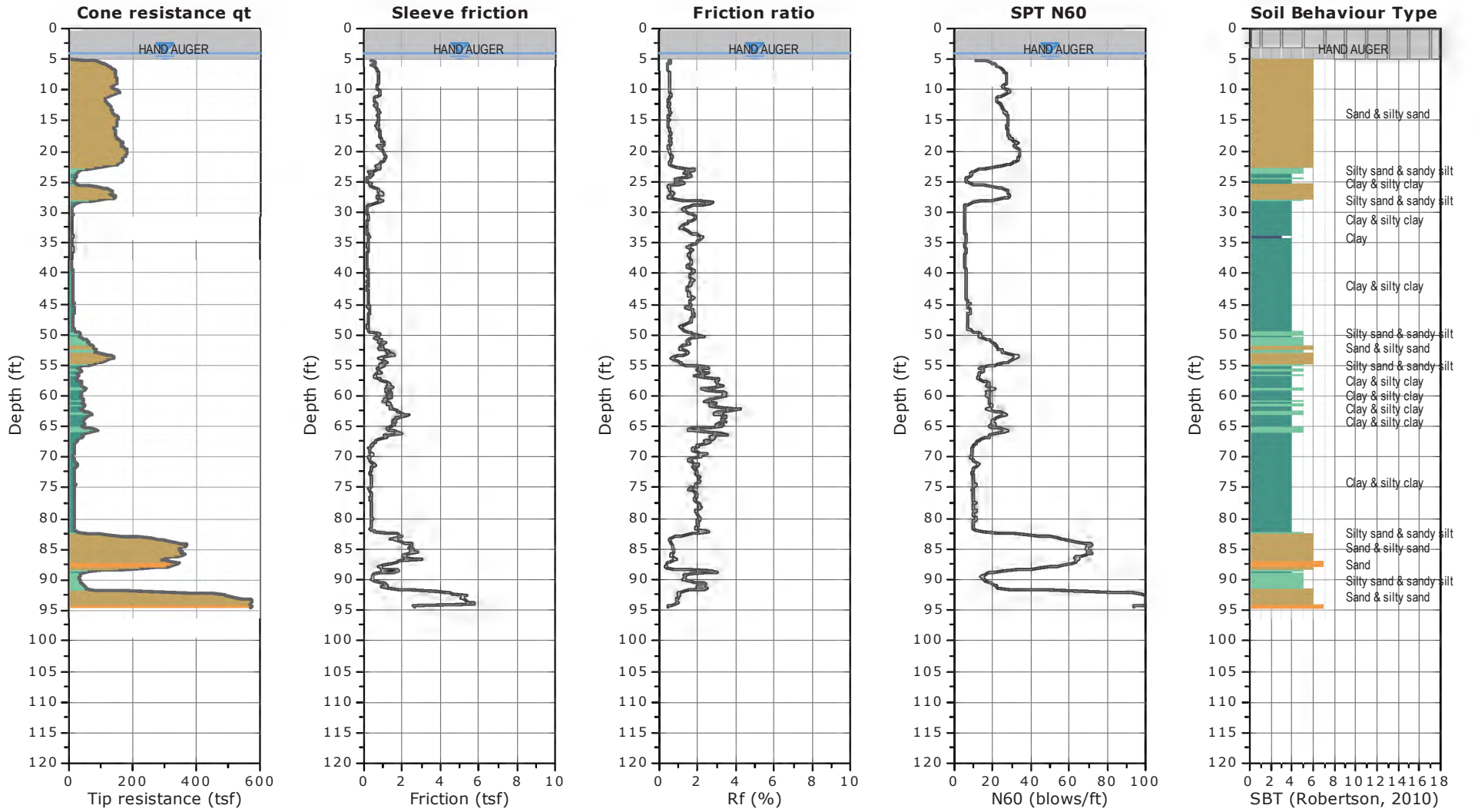
CPT PLOTS

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C101

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 94.49 ft, Date: 08/14/2023

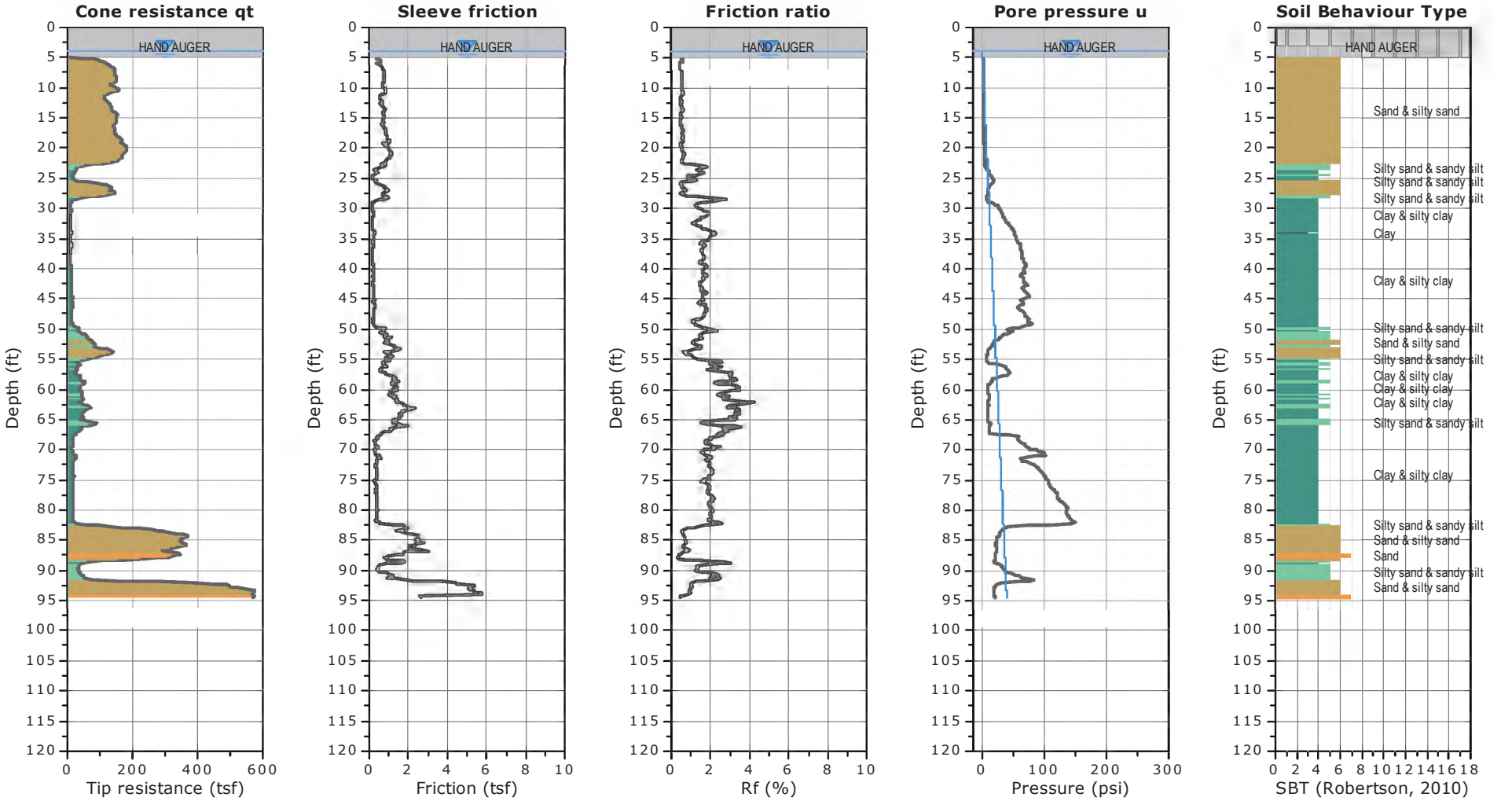


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C101

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 94.49 ft, Date: 08/14/2023



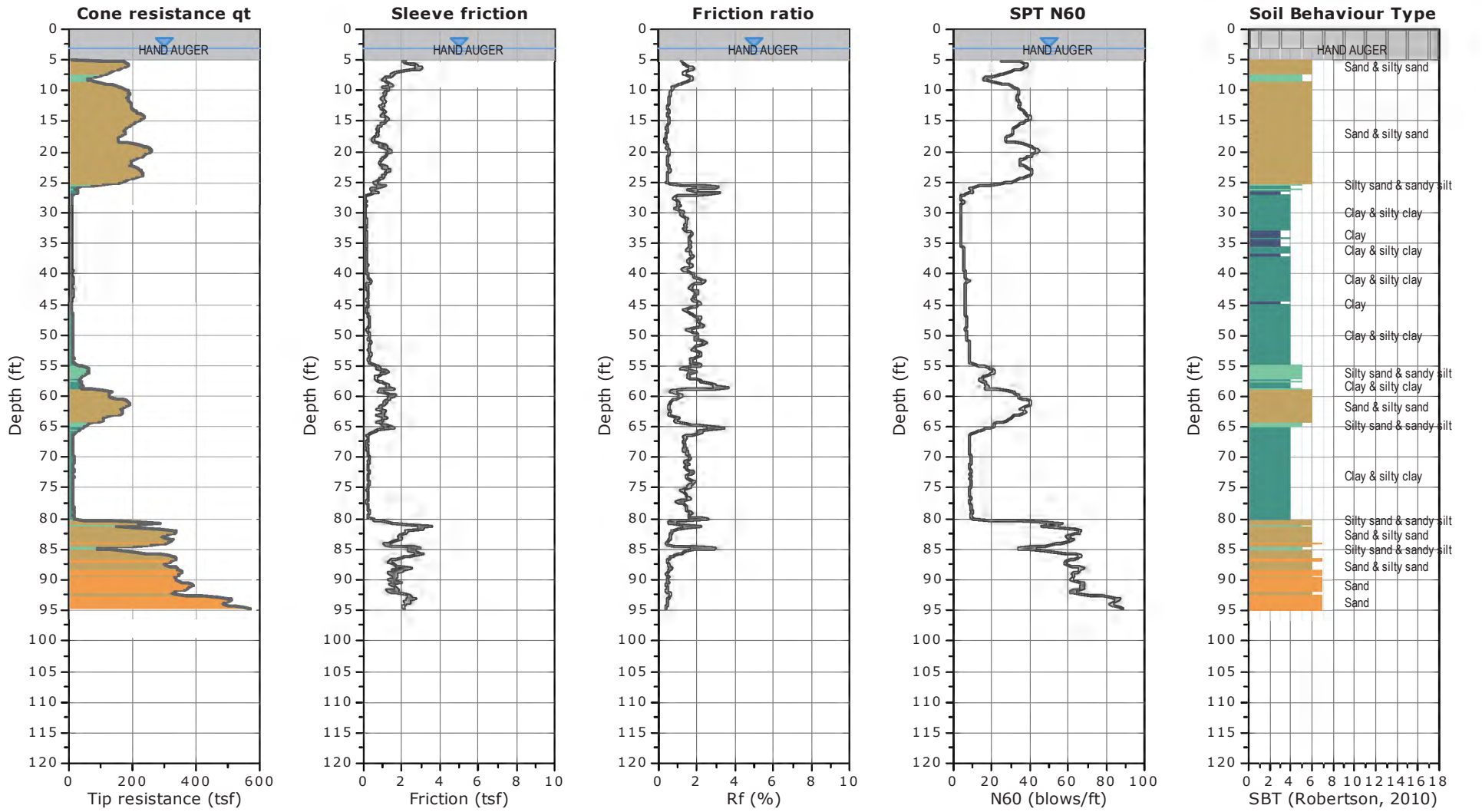
WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C102

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC109
Total depth: 94.65 ft, Date: 08/14/2023

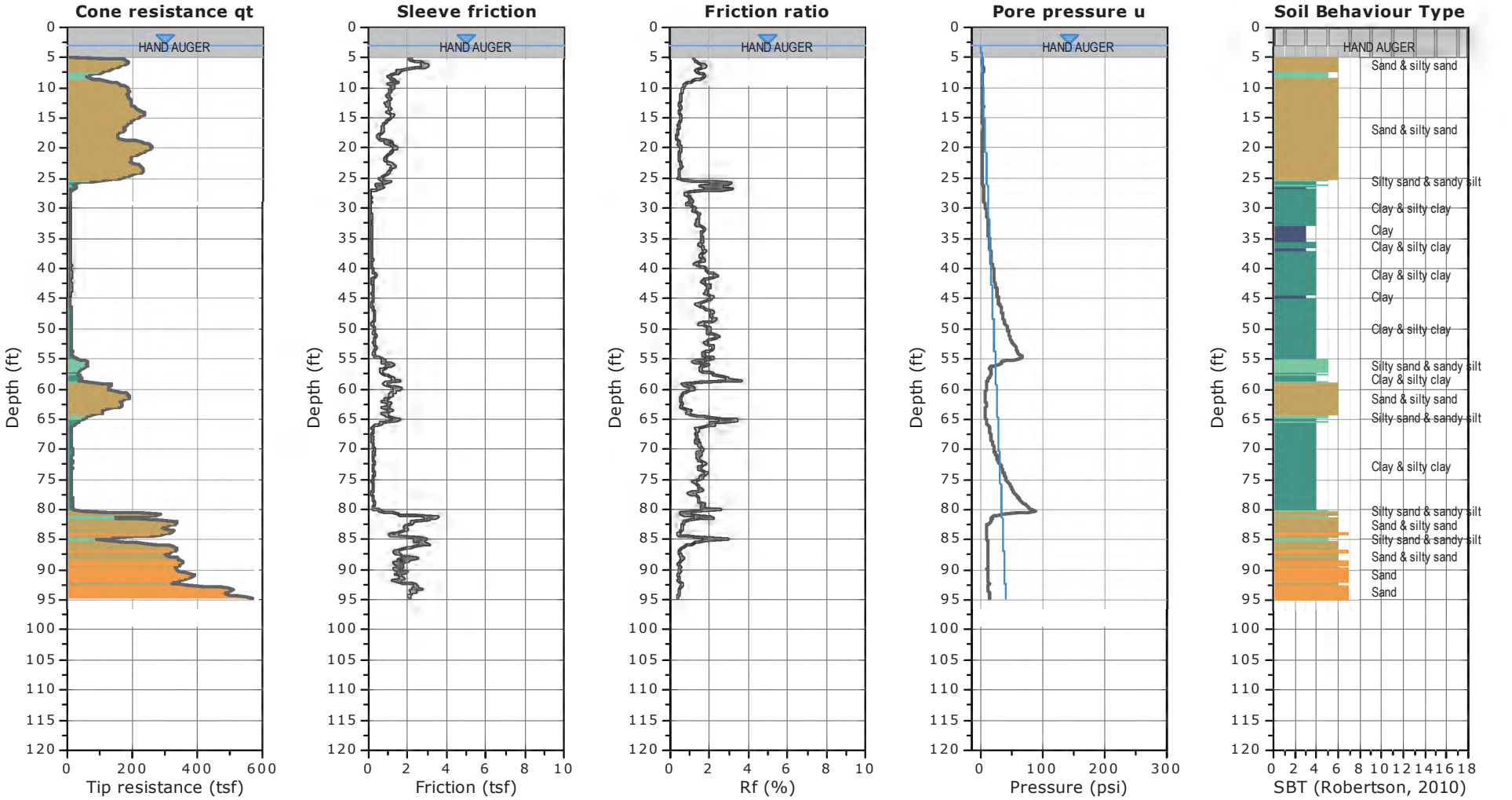


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C102

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC109
Total depth: 94.65 ft, Date: 08/14/2023



GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

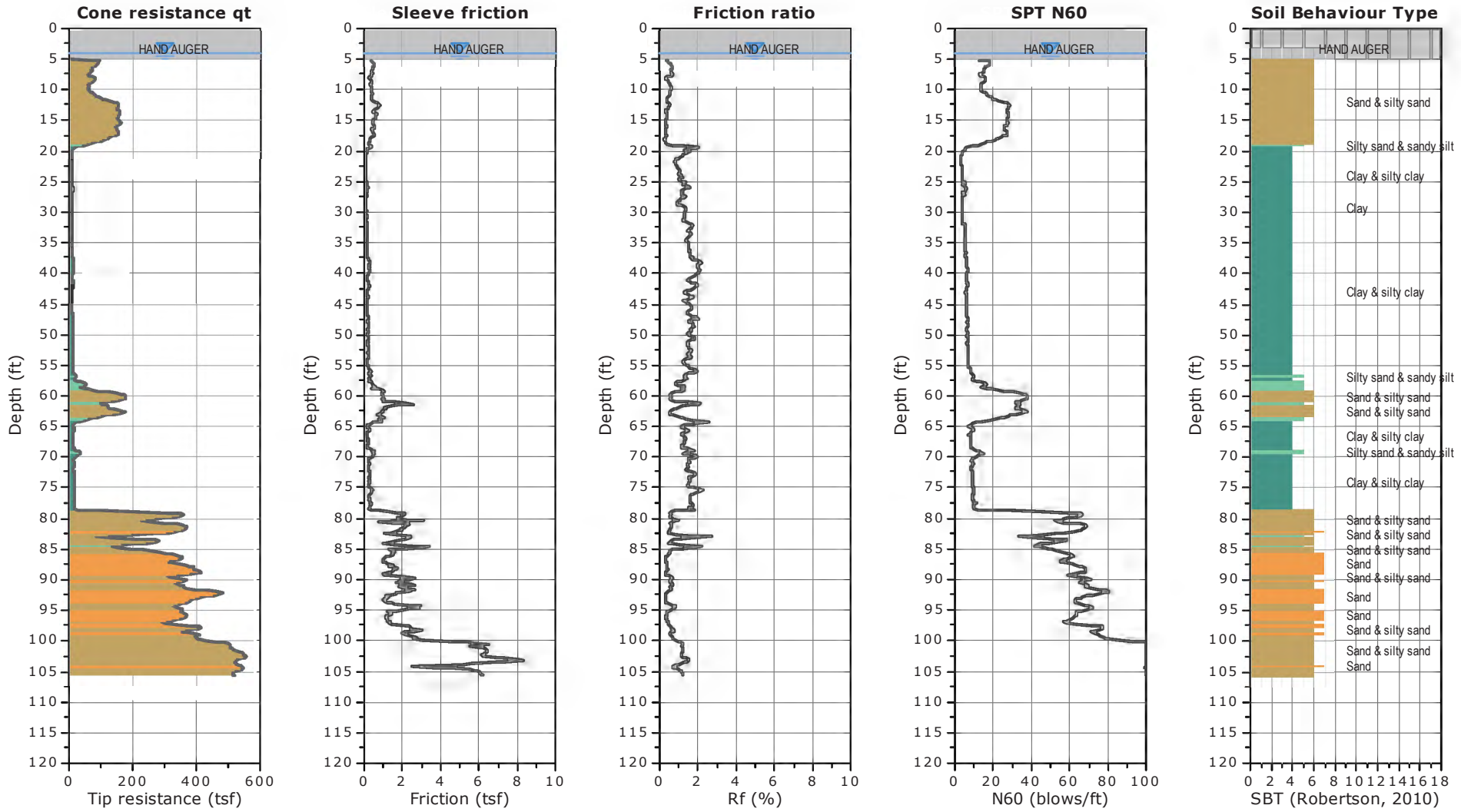
CPT: 23-C103

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94

Total depth: 105.64 ft, Date: 08/15/2023

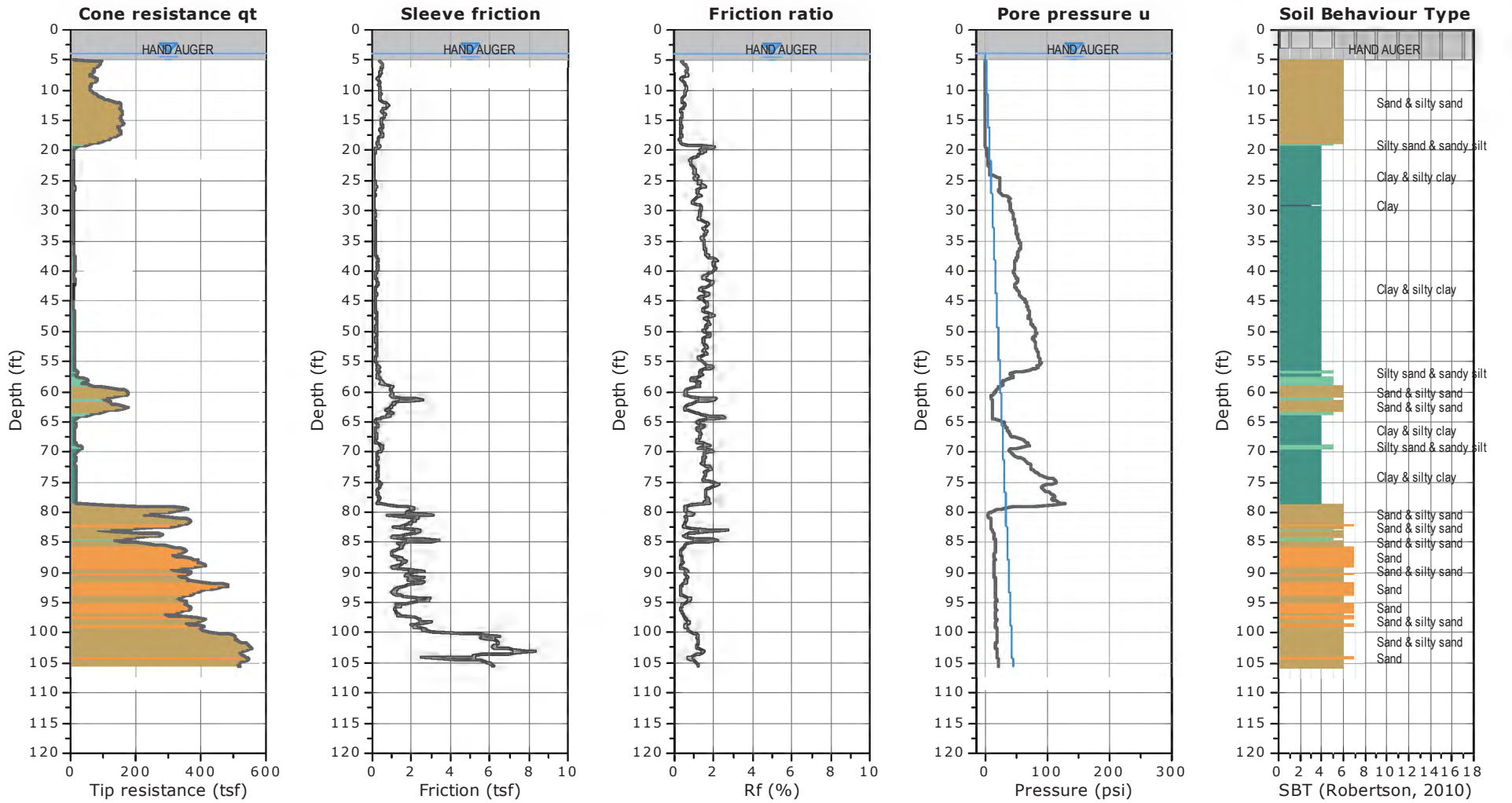


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C103

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 105.64 ft, Date: 08/15/2023



WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

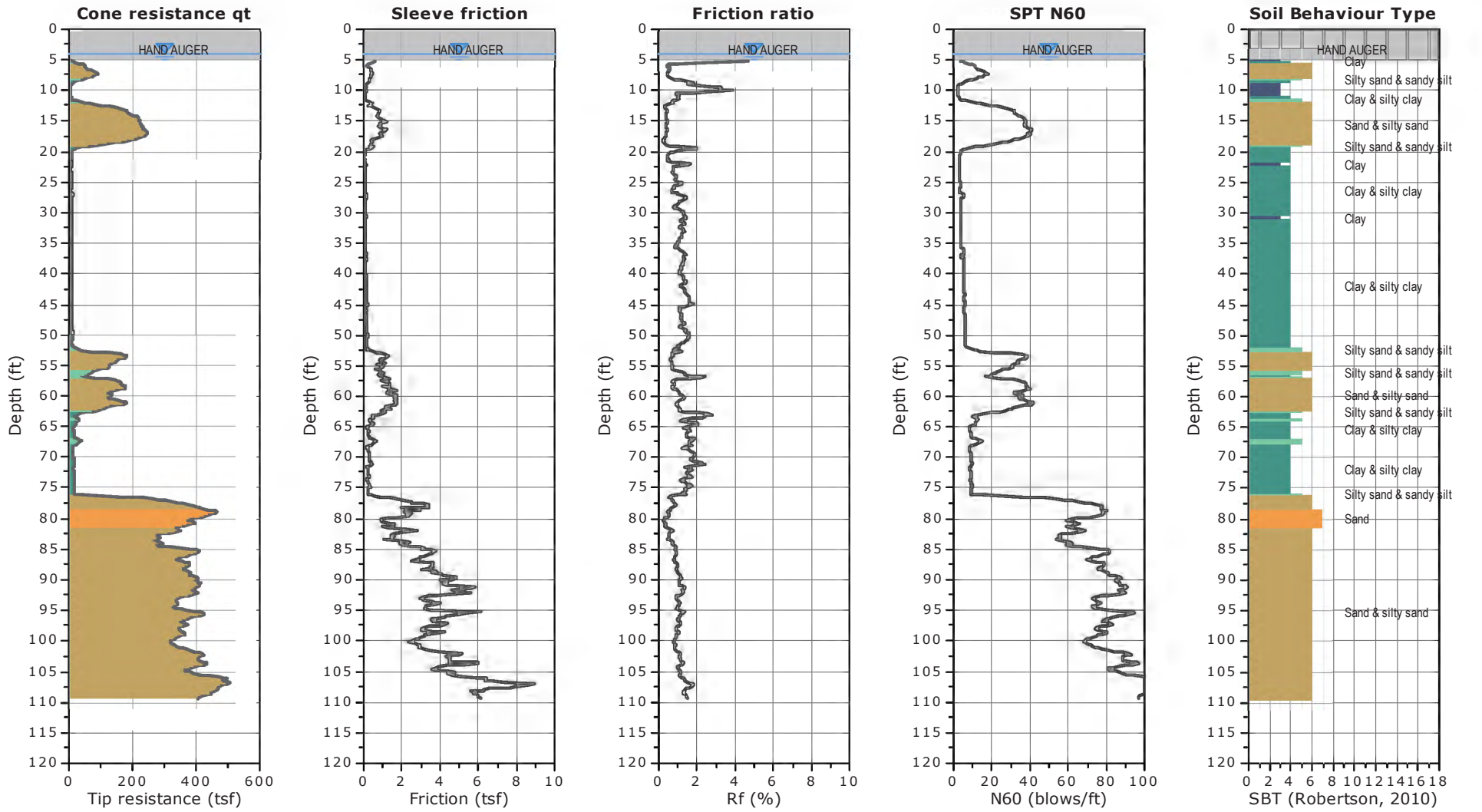
CPT: 23-CS104

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94

Total depth: 109.25 ft, Date: 08/16/2023

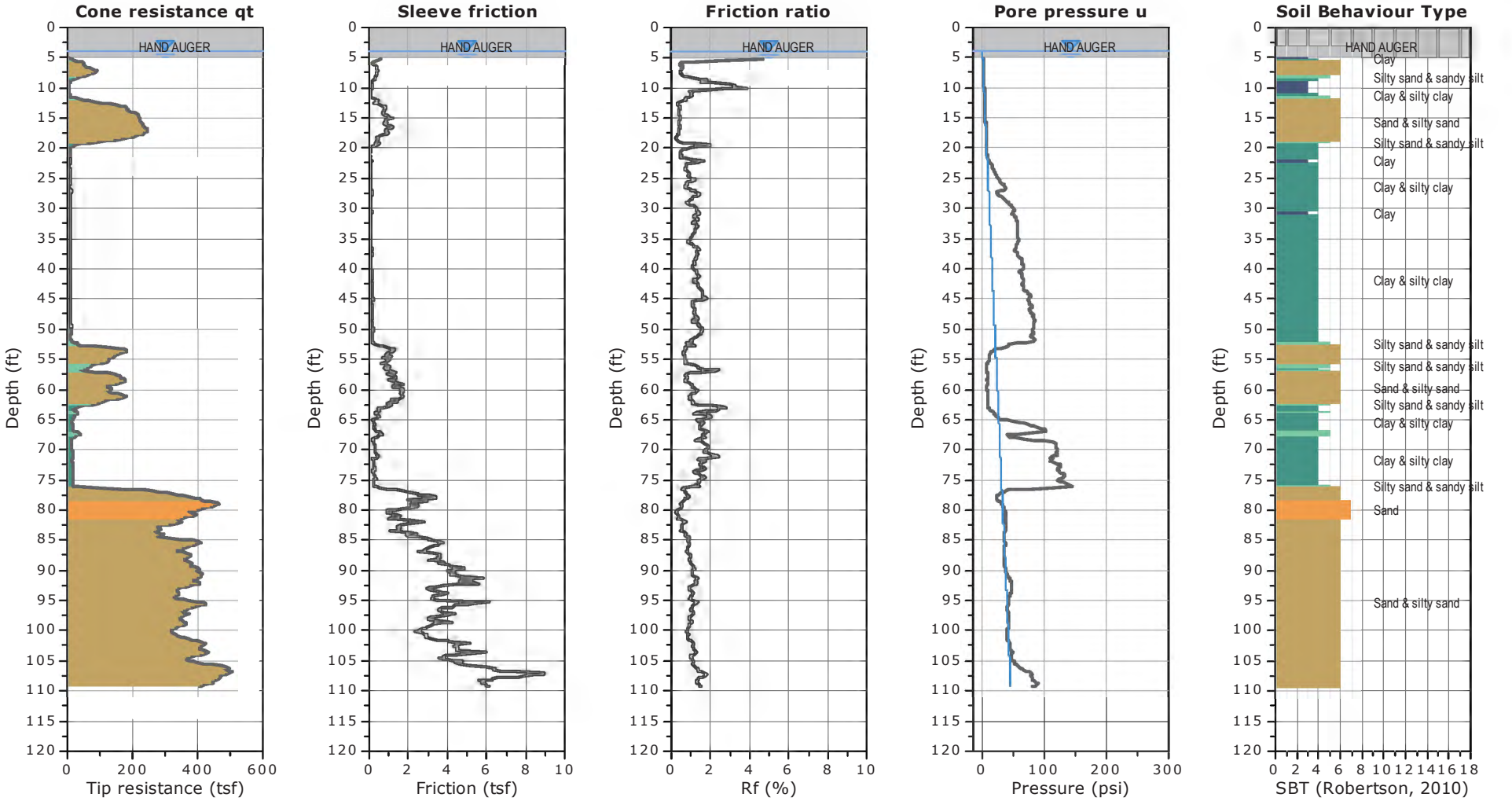


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-CS104

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 109.25 ft, Date: 08/16/2023



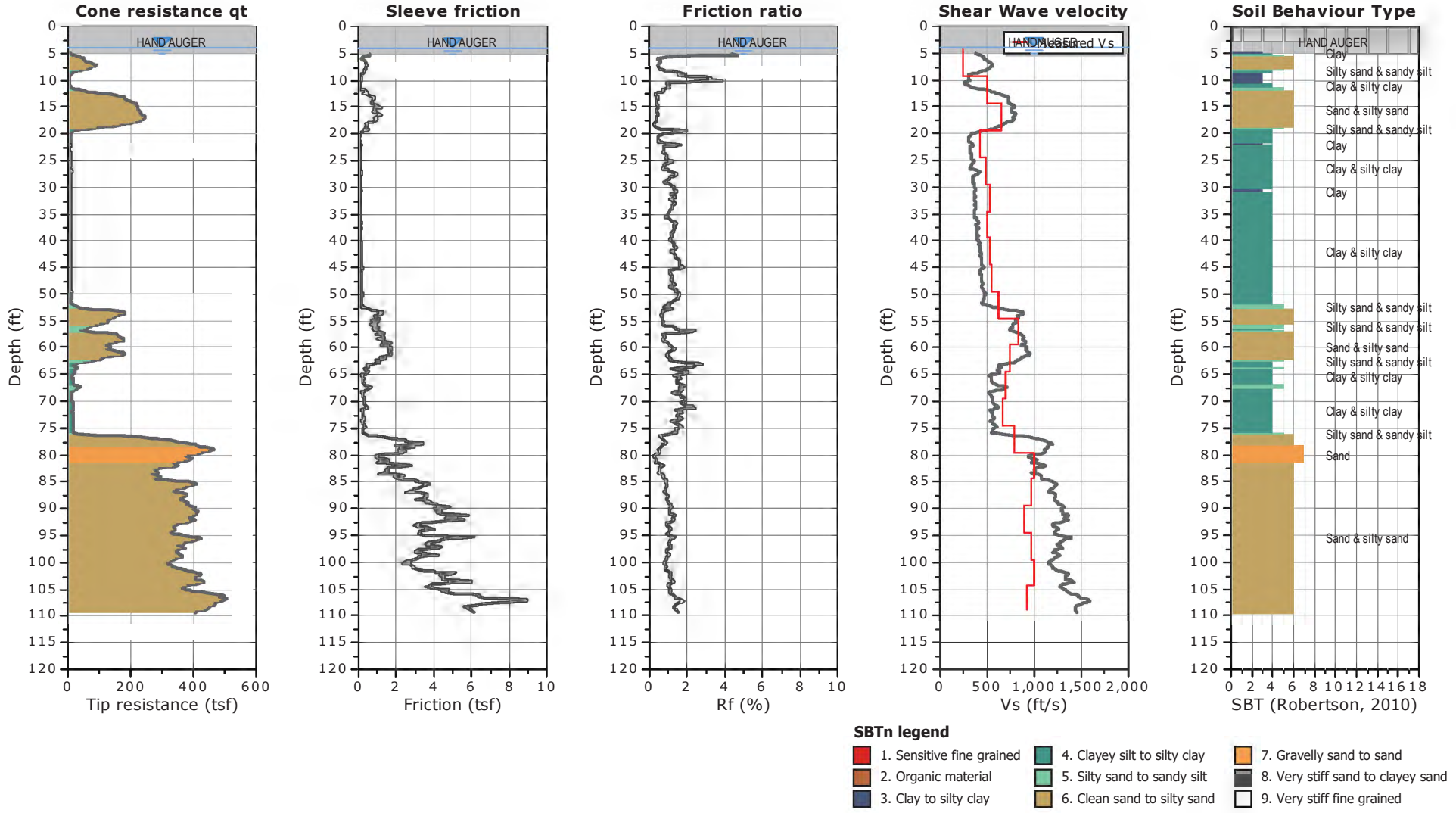
WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-CS104

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 109.25 ft, Date: 08/16/2023

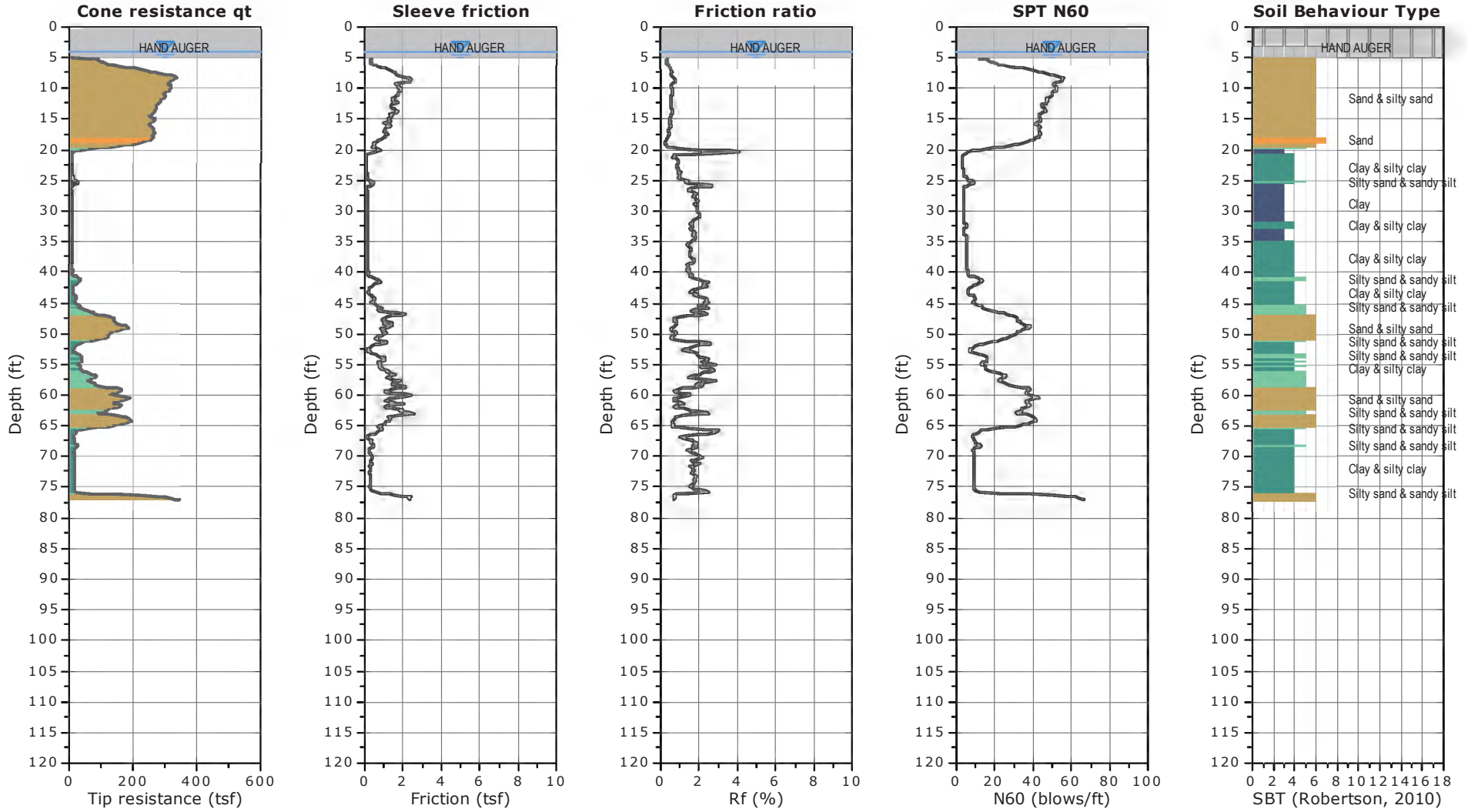


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C105

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC109
Total depth: 77.10 ft, Date: 08/14/2023

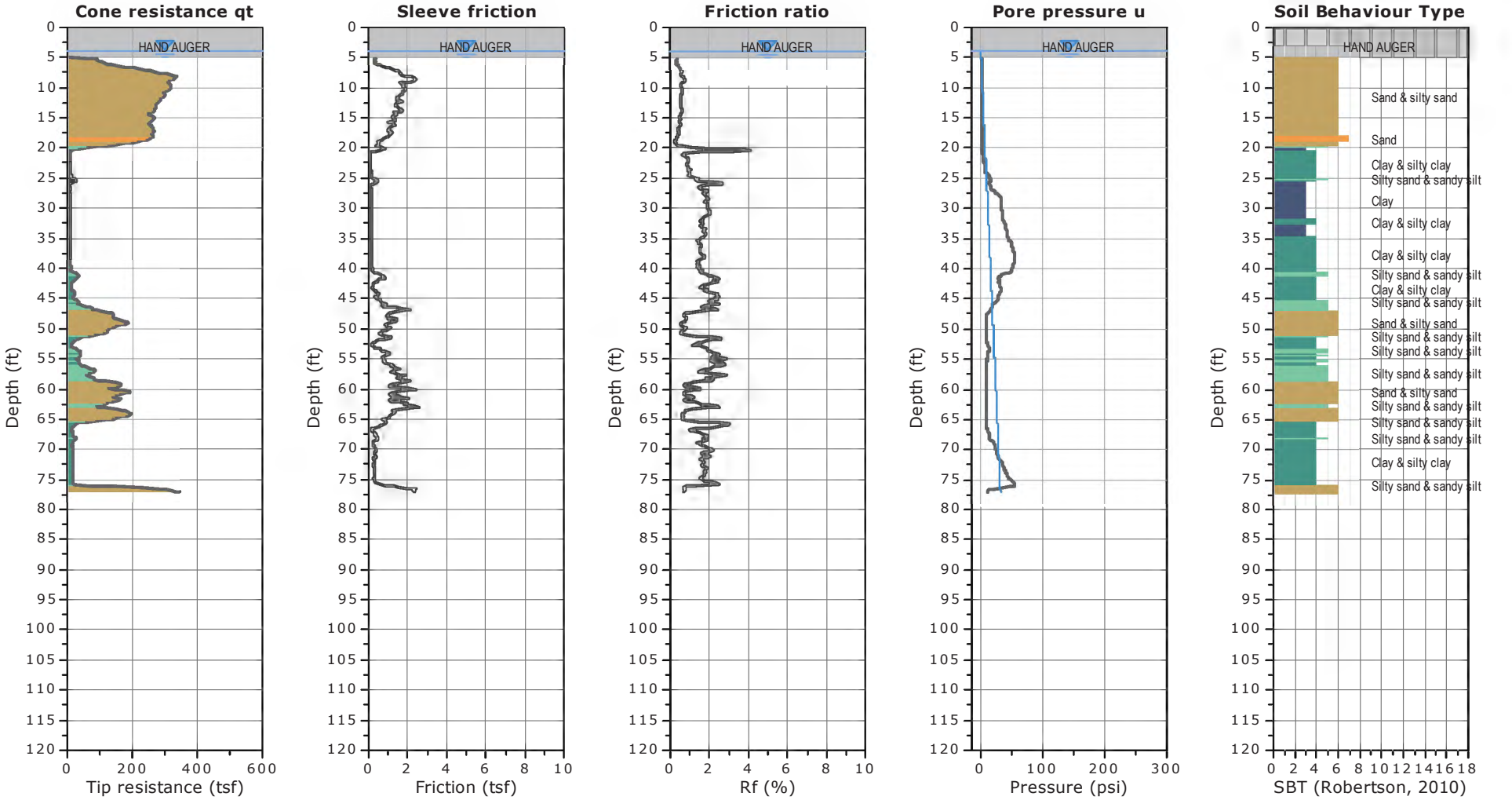


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C105

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC109
Total depth: 77.10 ft, Date: 08/14/2023



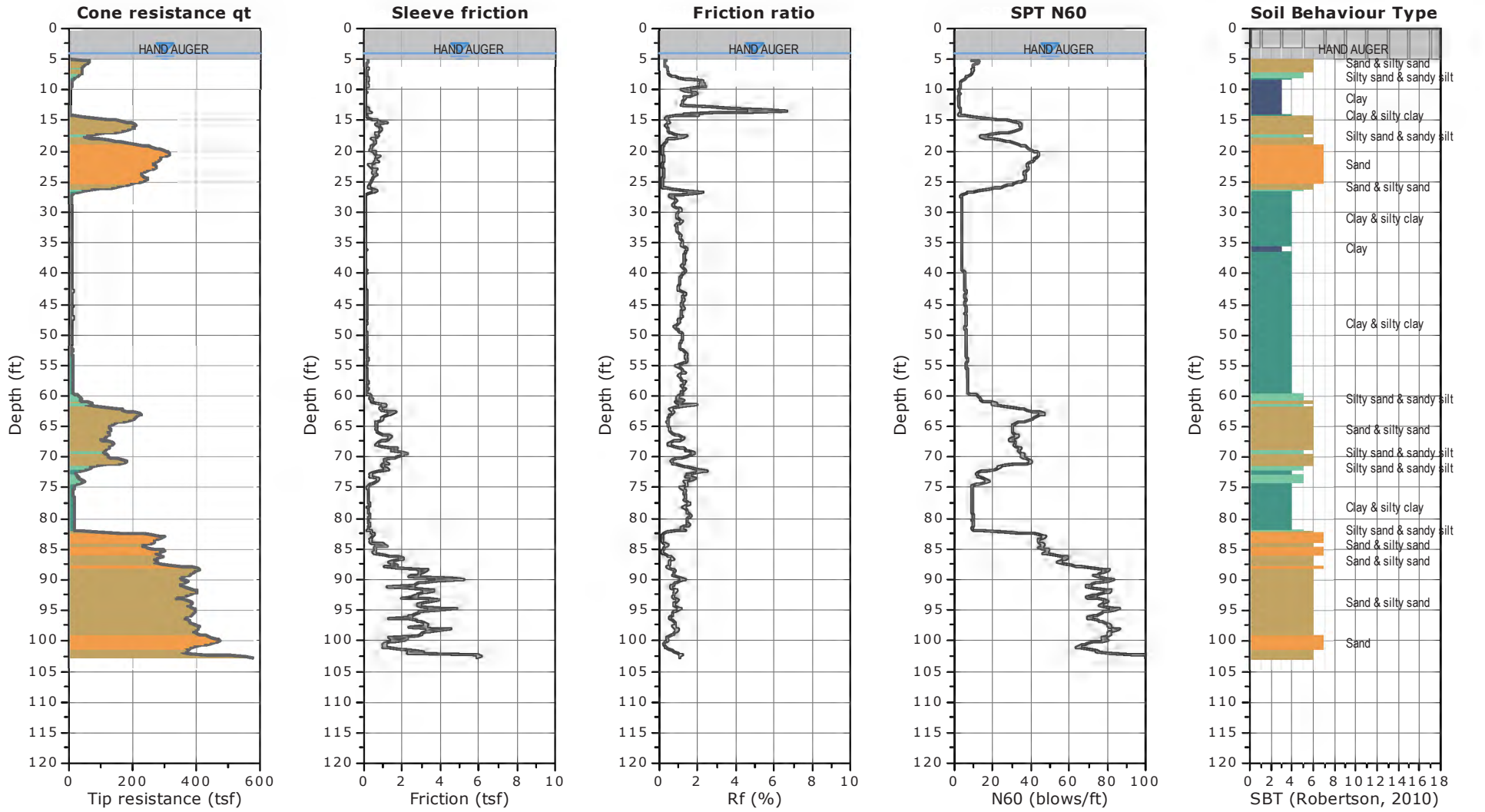
WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C106

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 102.69 ft, Date: 08/15/2023

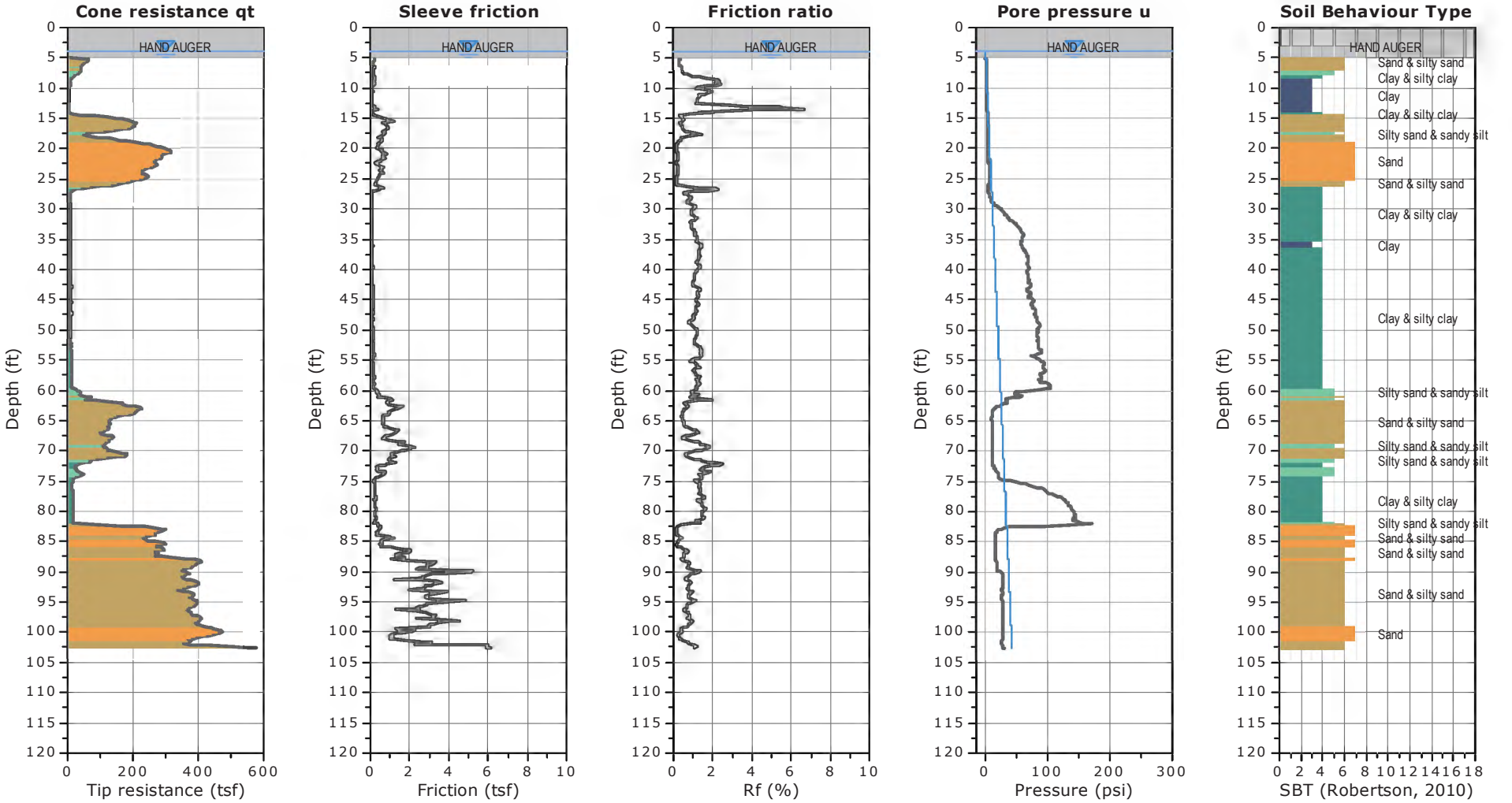


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C106

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 102.69 ft, Date: 08/15/2023



WATER TABLE FOR ESTIMATING PURPOSES ONLY

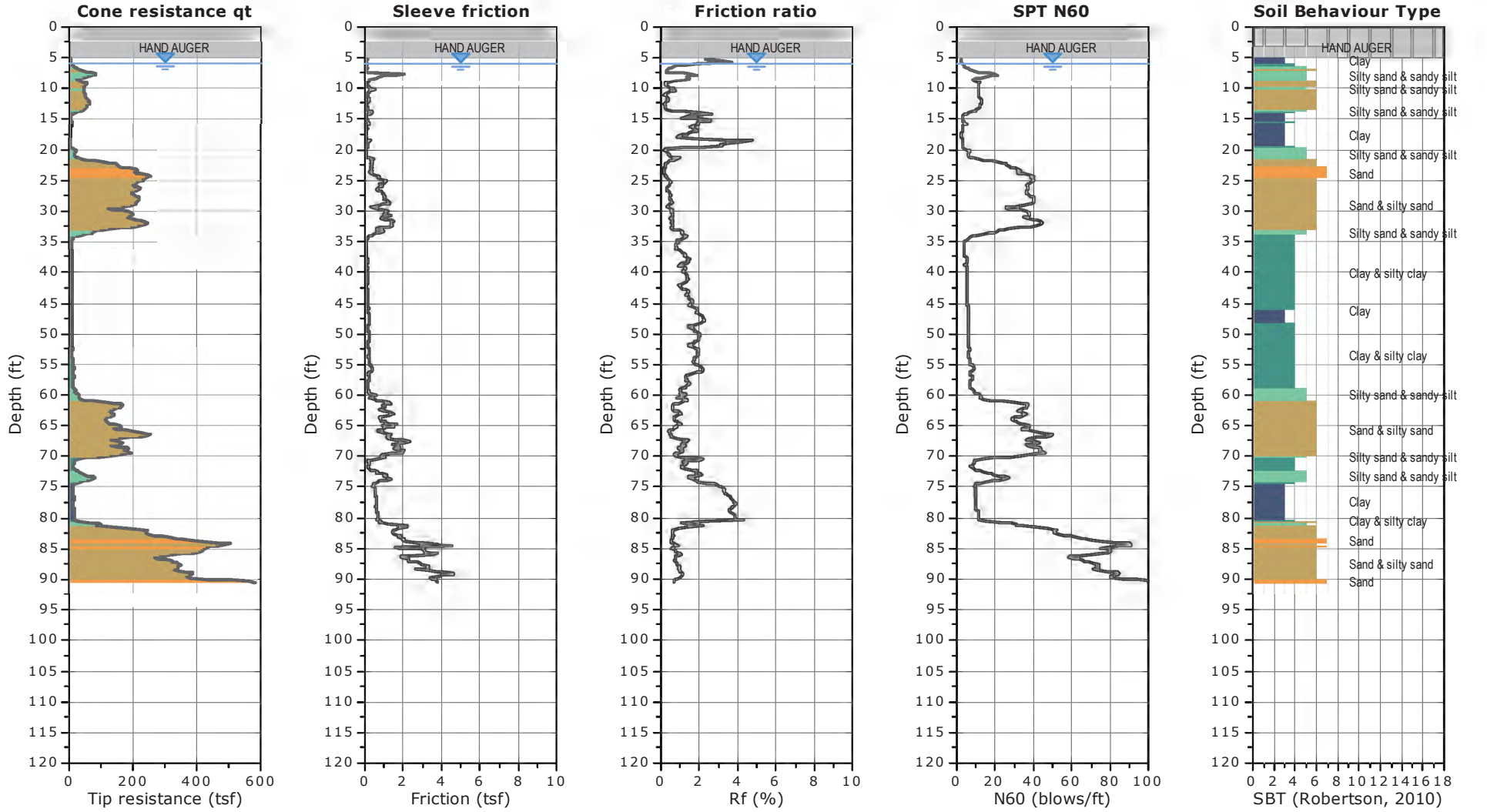
CPT: 23-CS107

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94

Total depth: 90.55 ft, Date: 08/17/2023



GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

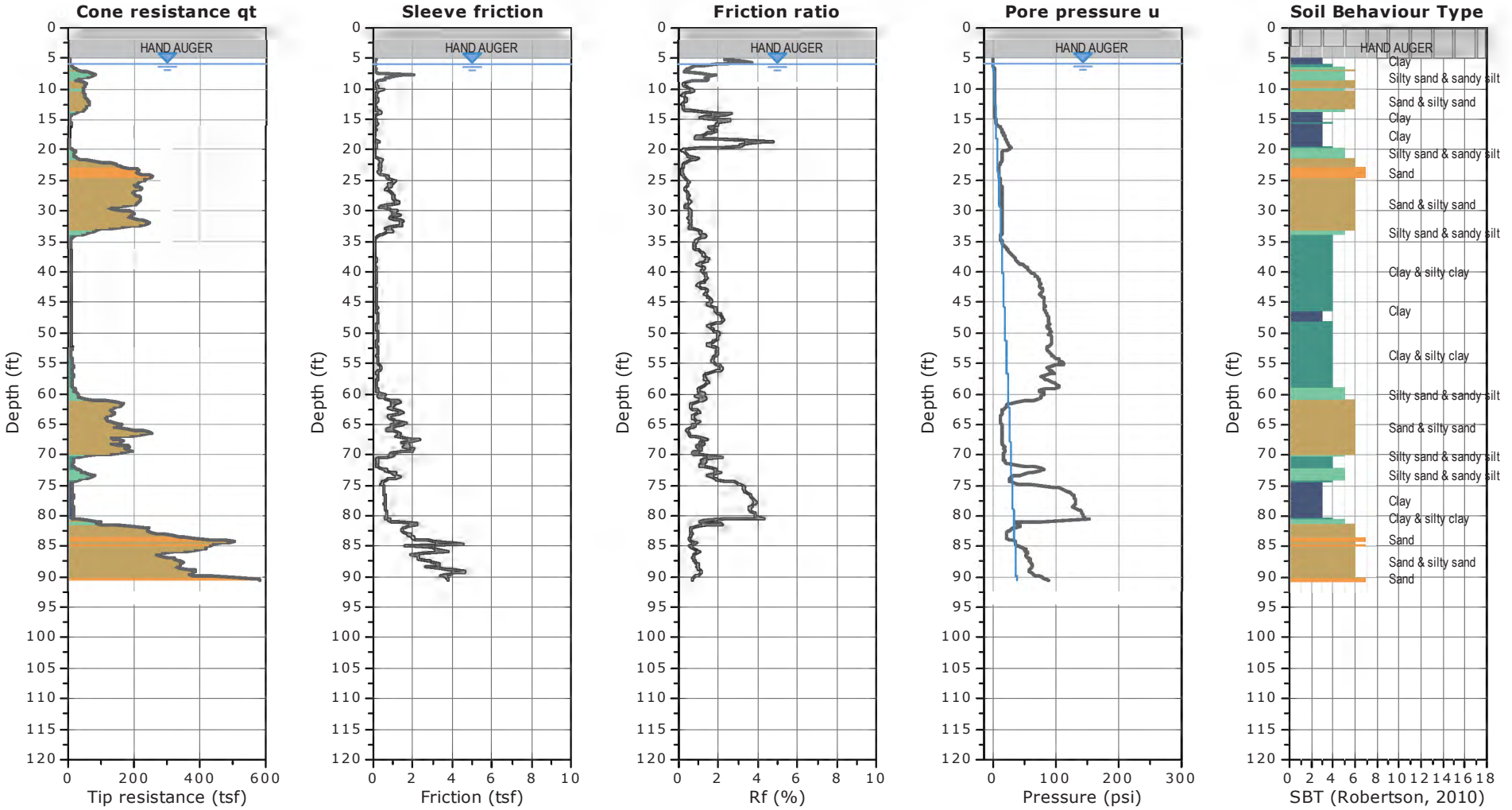
CPT: 23-CS107

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94

Total depth: 90.55 ft, Date: 08/17/2023



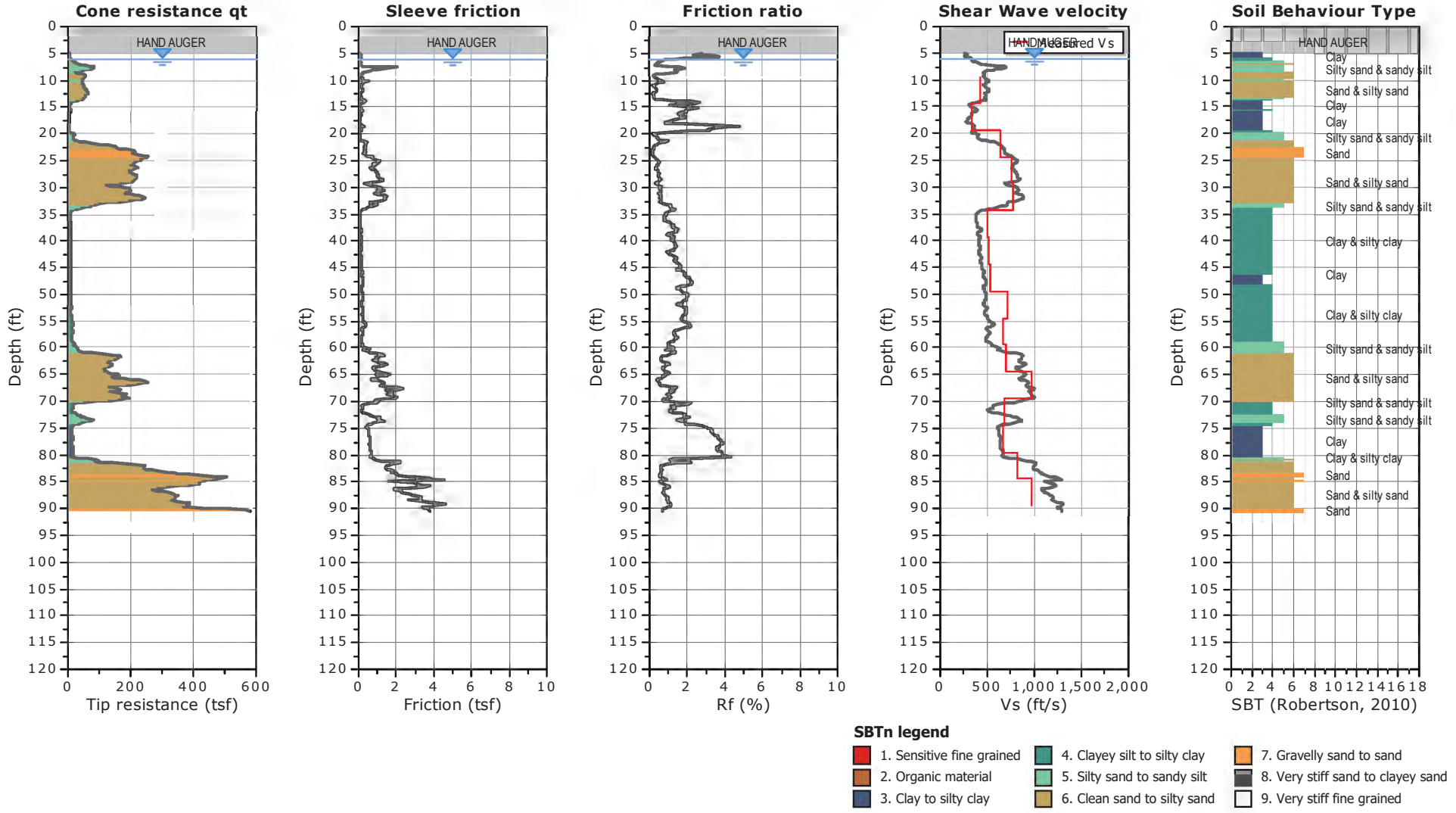
WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-CS107

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 90.55 ft, Date: 08/17/2023



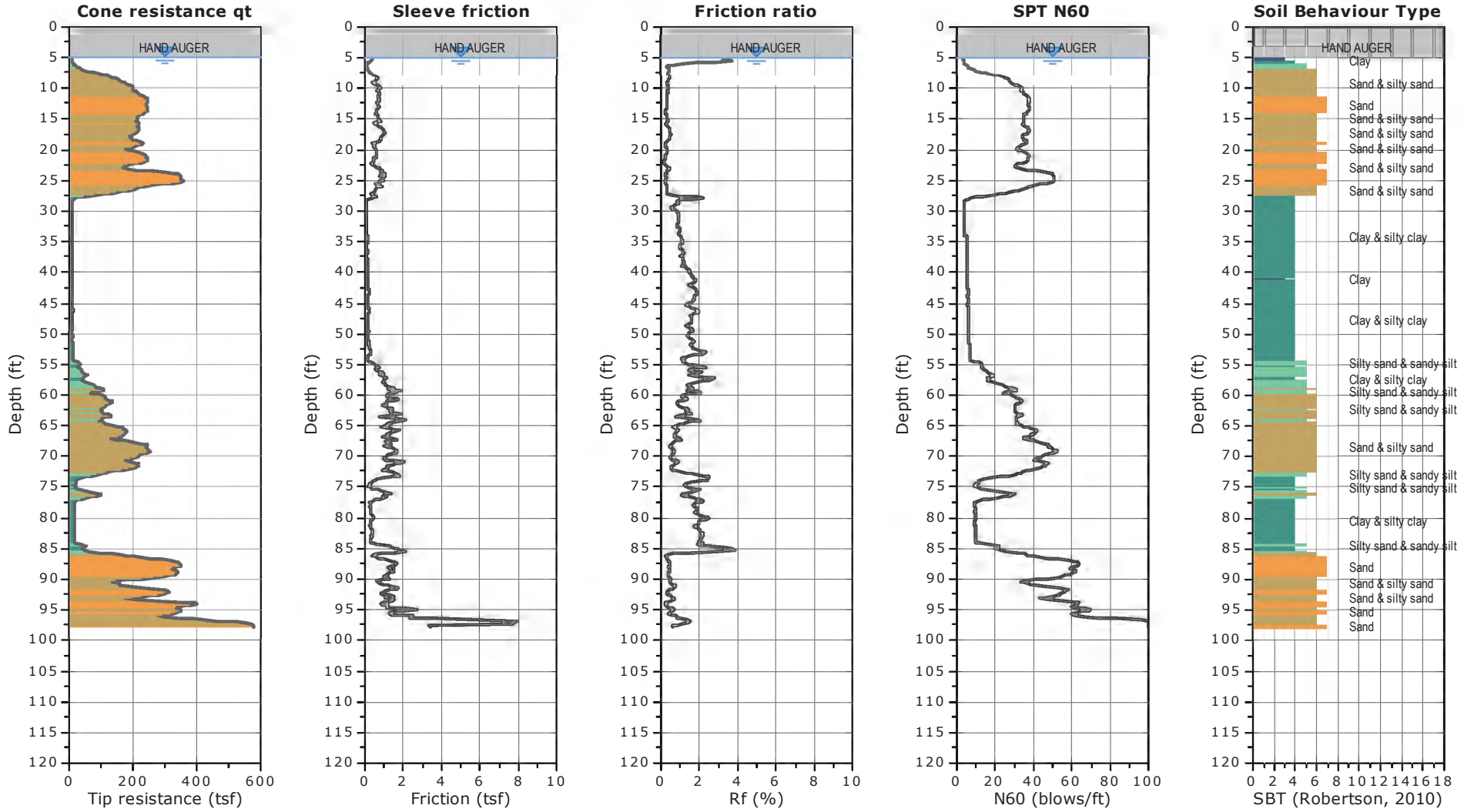
CPT: 23-C108

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94

Total depth: 97.77 ft, Date: 08/15/2023



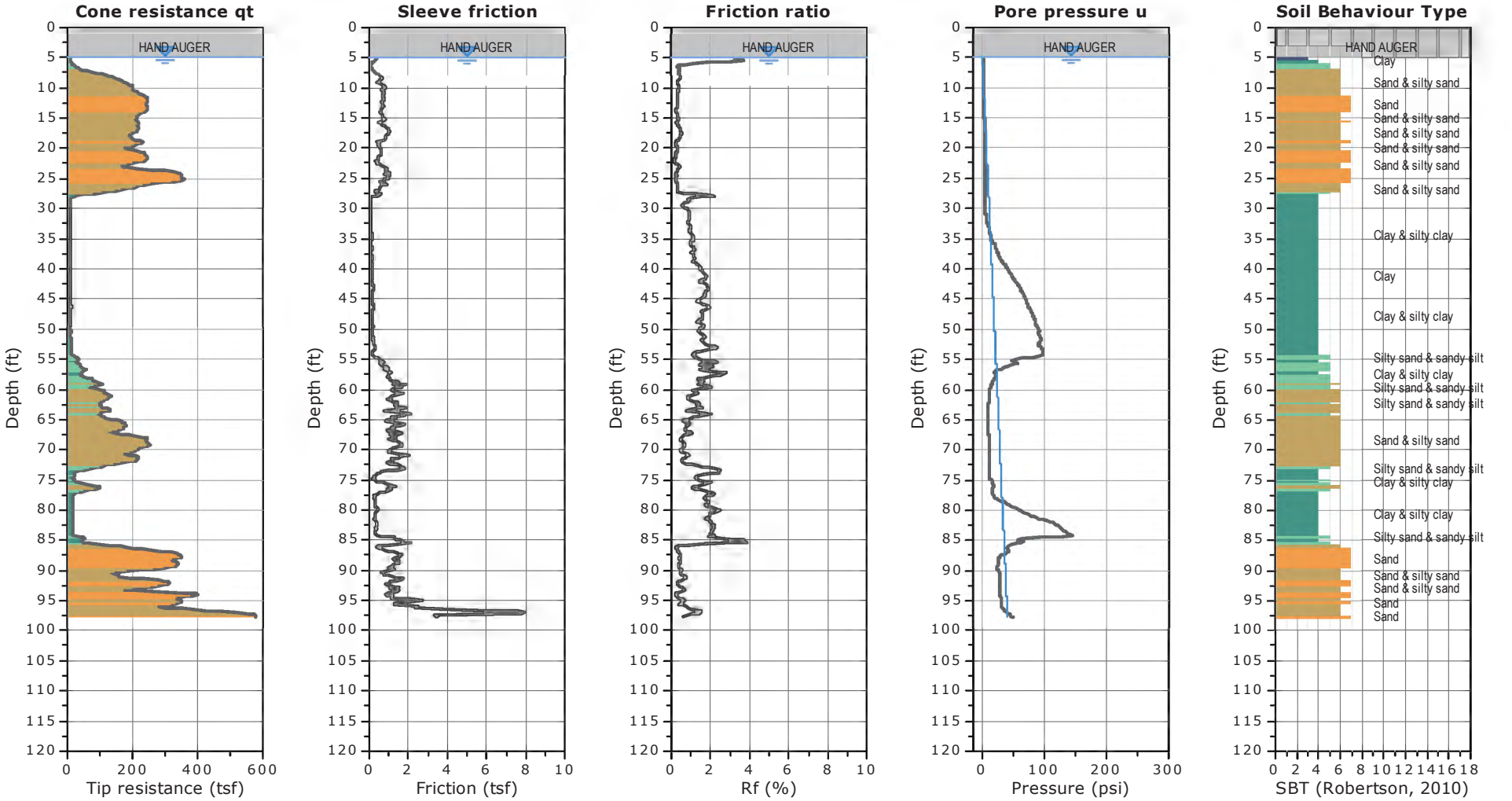
CPT: 23-C108

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94

Total depth: 97.77 ft, Date: 08/15/2023



WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

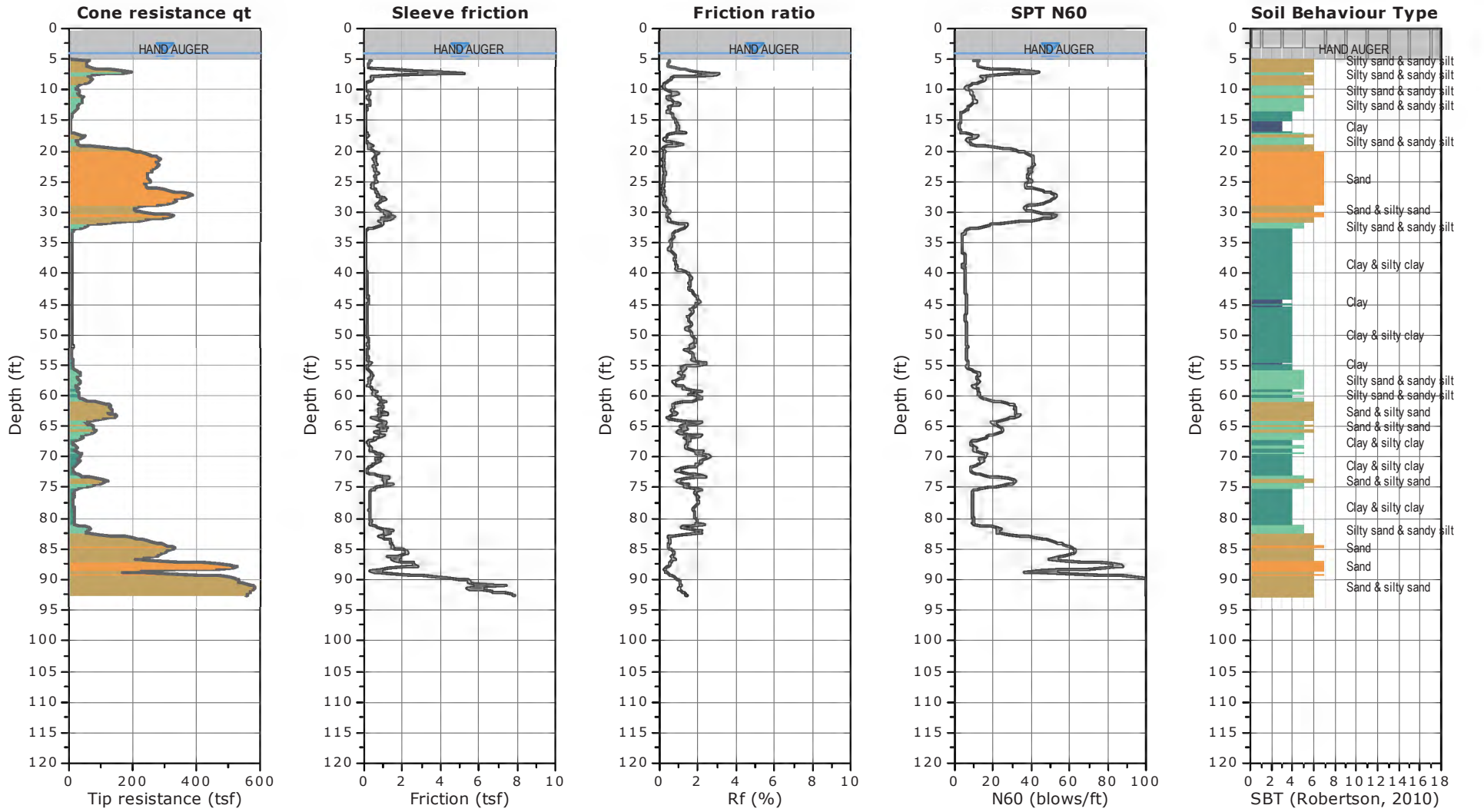
CPT: 23-C109

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94

Total depth: 92.68 ft, Date: 08/15/2023

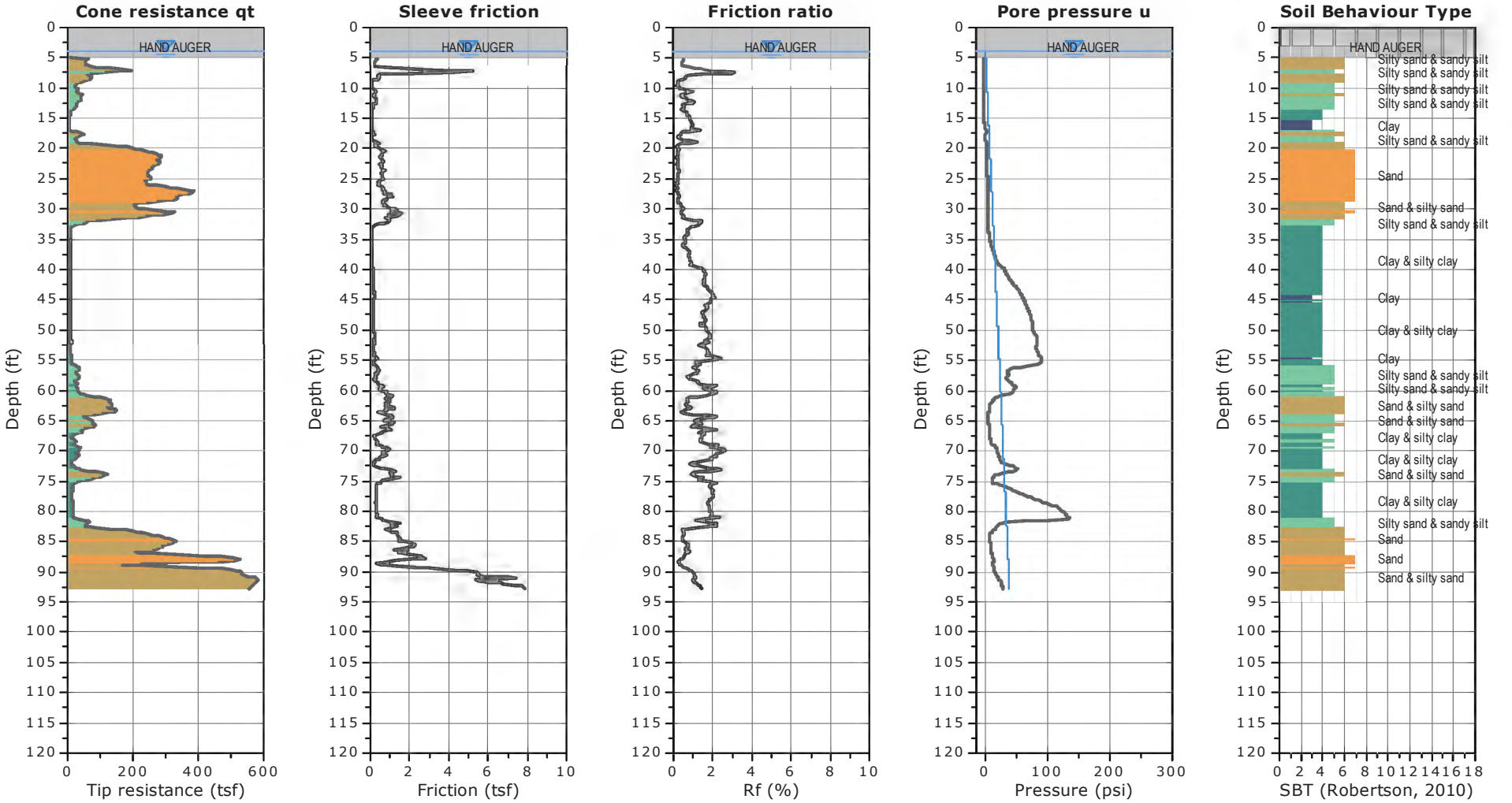


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C109

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 92.68 ft, Date: 08/15/2023



WATER TABLE FOR ESTIMATING PURPOSES ONLY

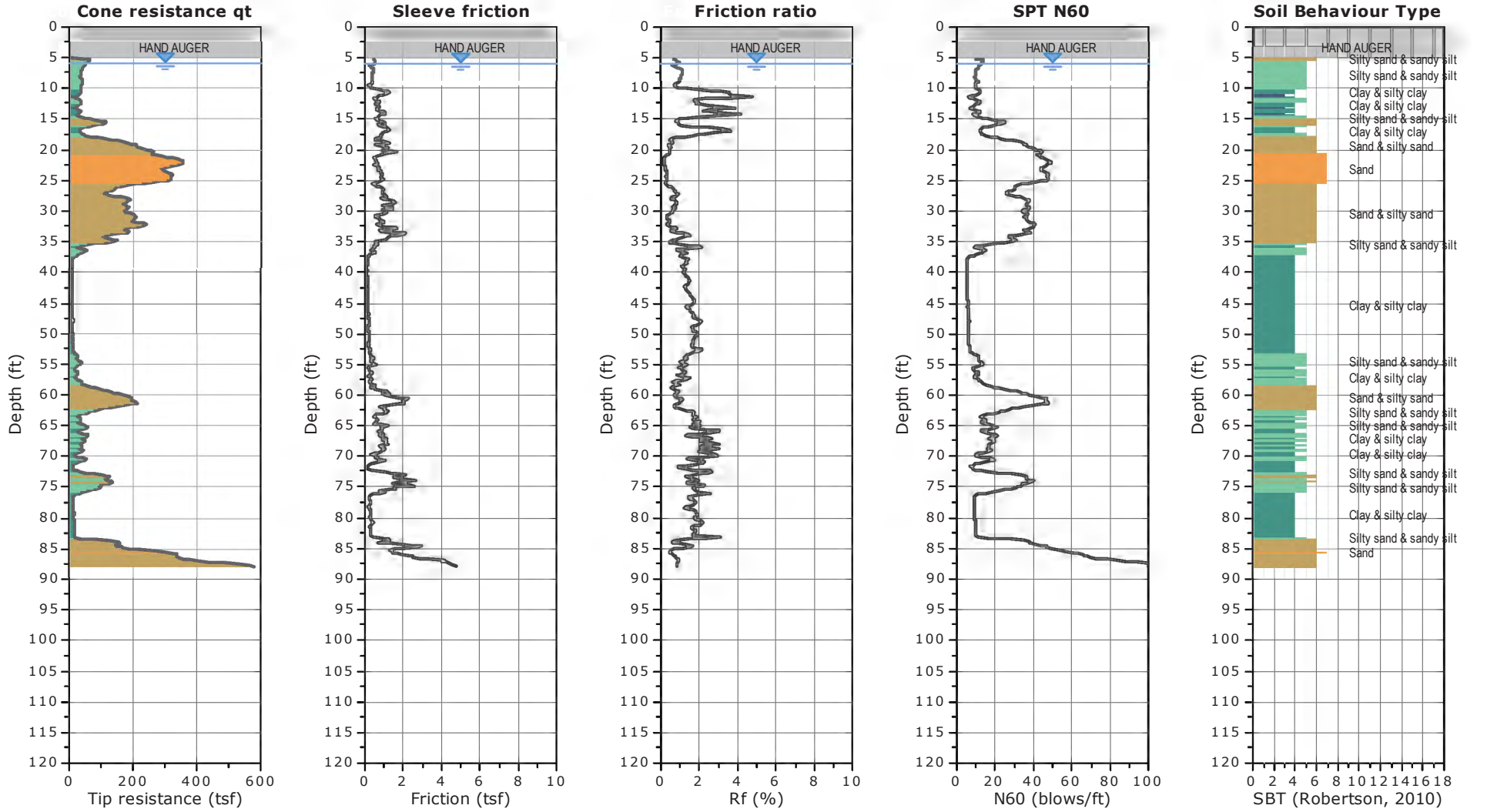
CPT: 23-CS110

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-82

Total depth: 87.93 ft, Date: 08/17/2023



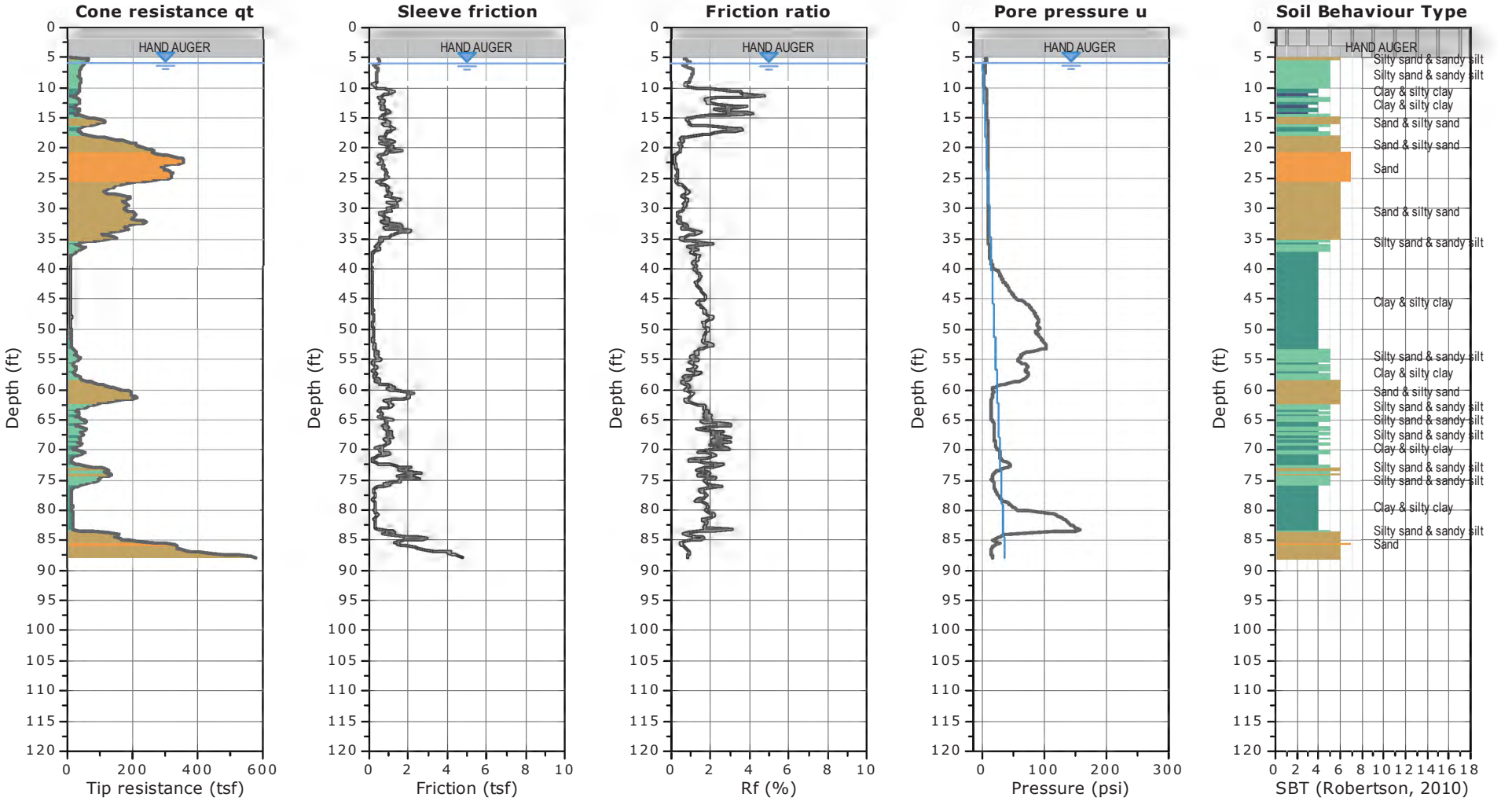
CPT: 23-CS110

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-82

Total depth: 87.93 ft, Date: 08/17/2023



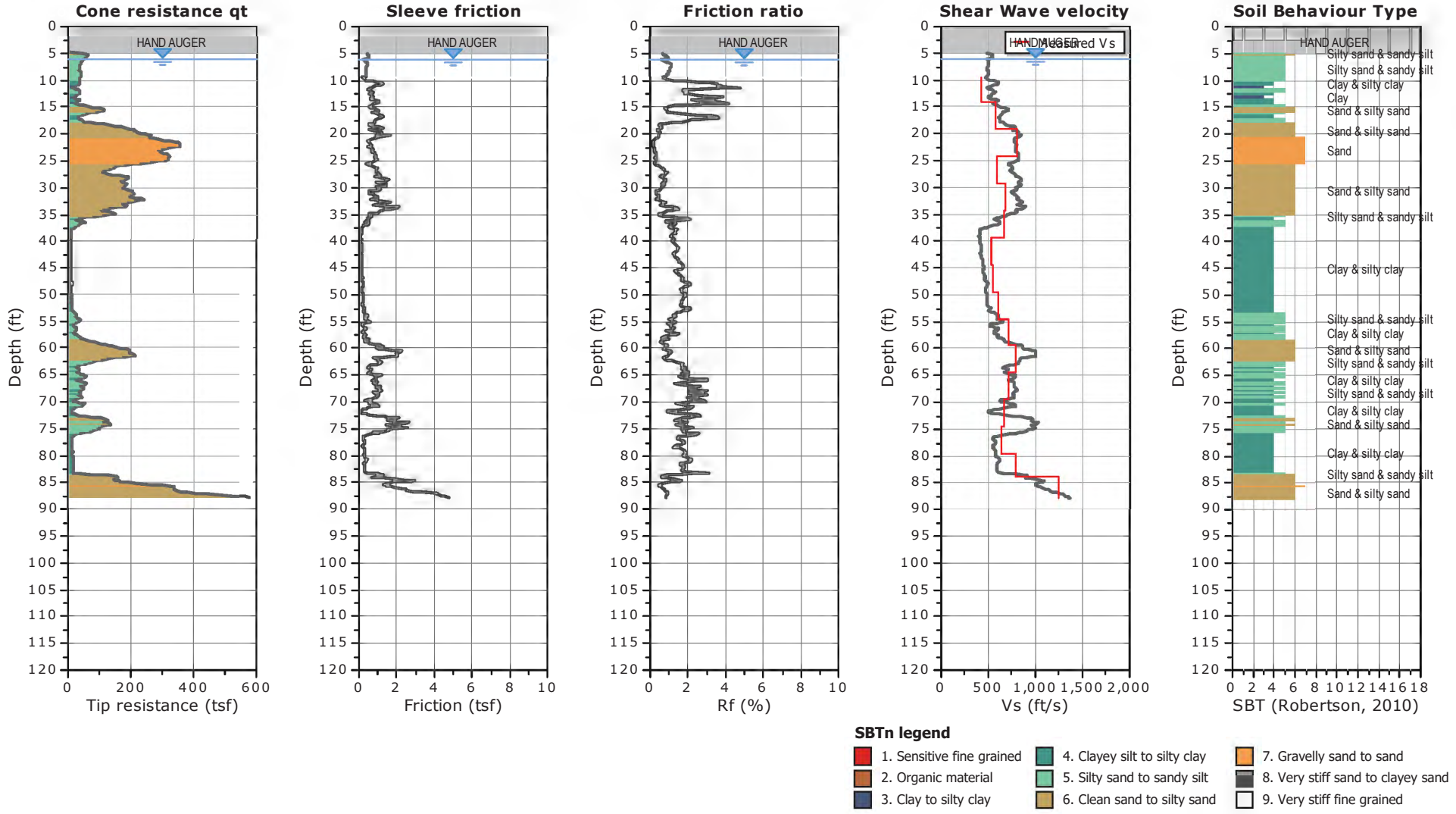
WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-CS110

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-82
Total depth: 87.93 ft, Date: 08/17/2023

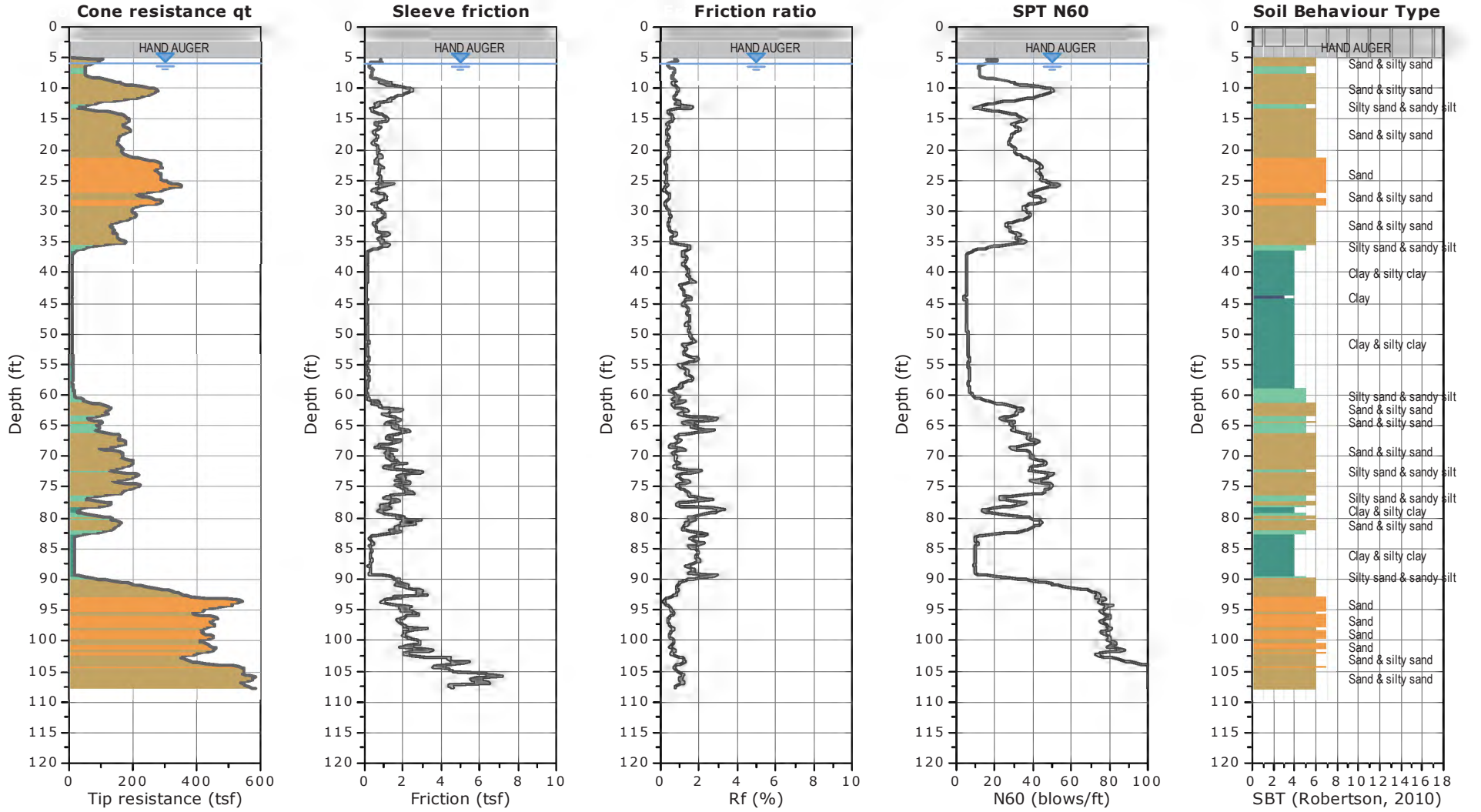


GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-C111

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94
Total depth: 107.78 ft, Date: 08/16/2023



GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

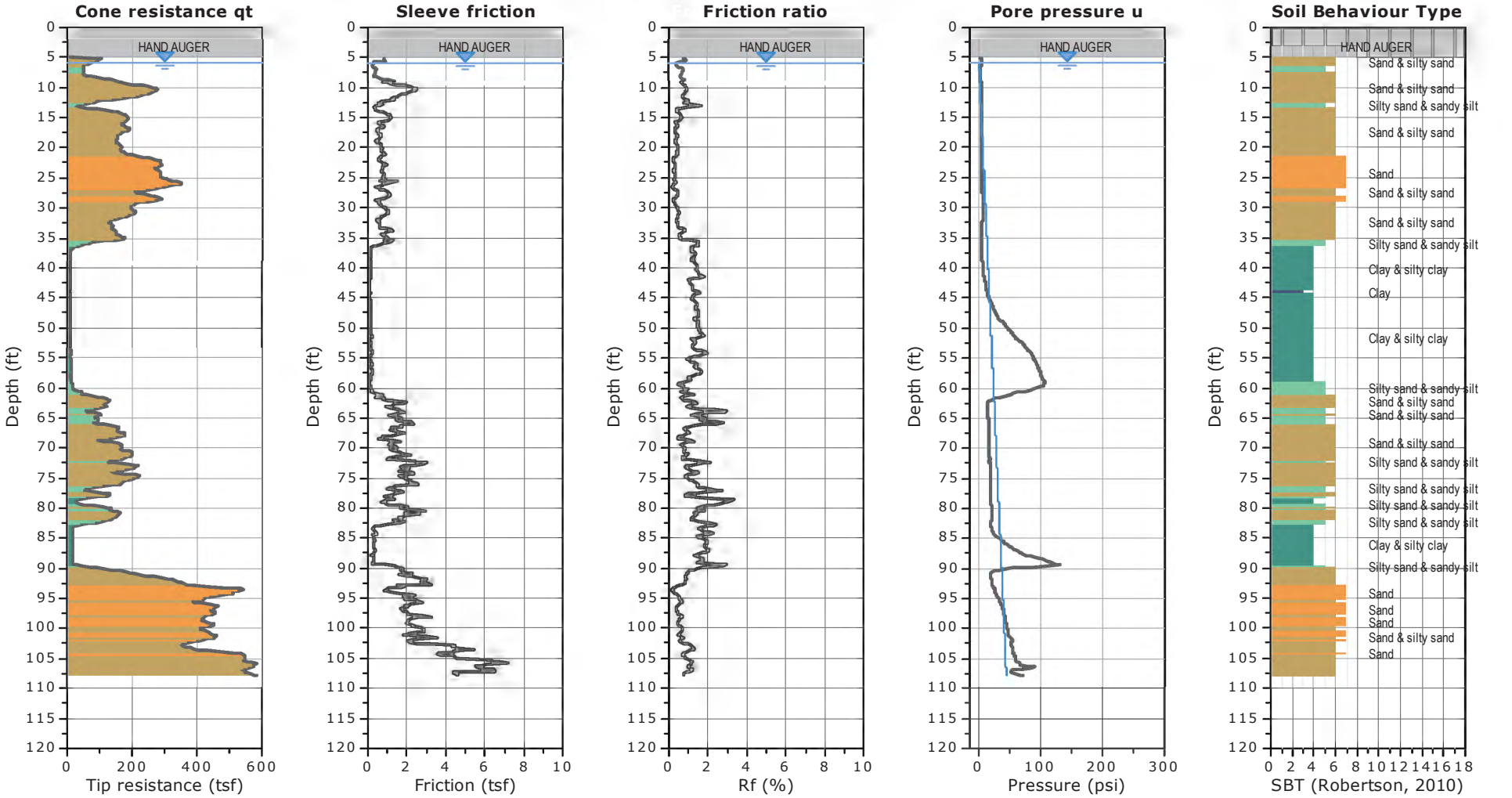
CPT: 23-C111

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-94

Total depth: 107.78 ft, Date: 08/16/2023



WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

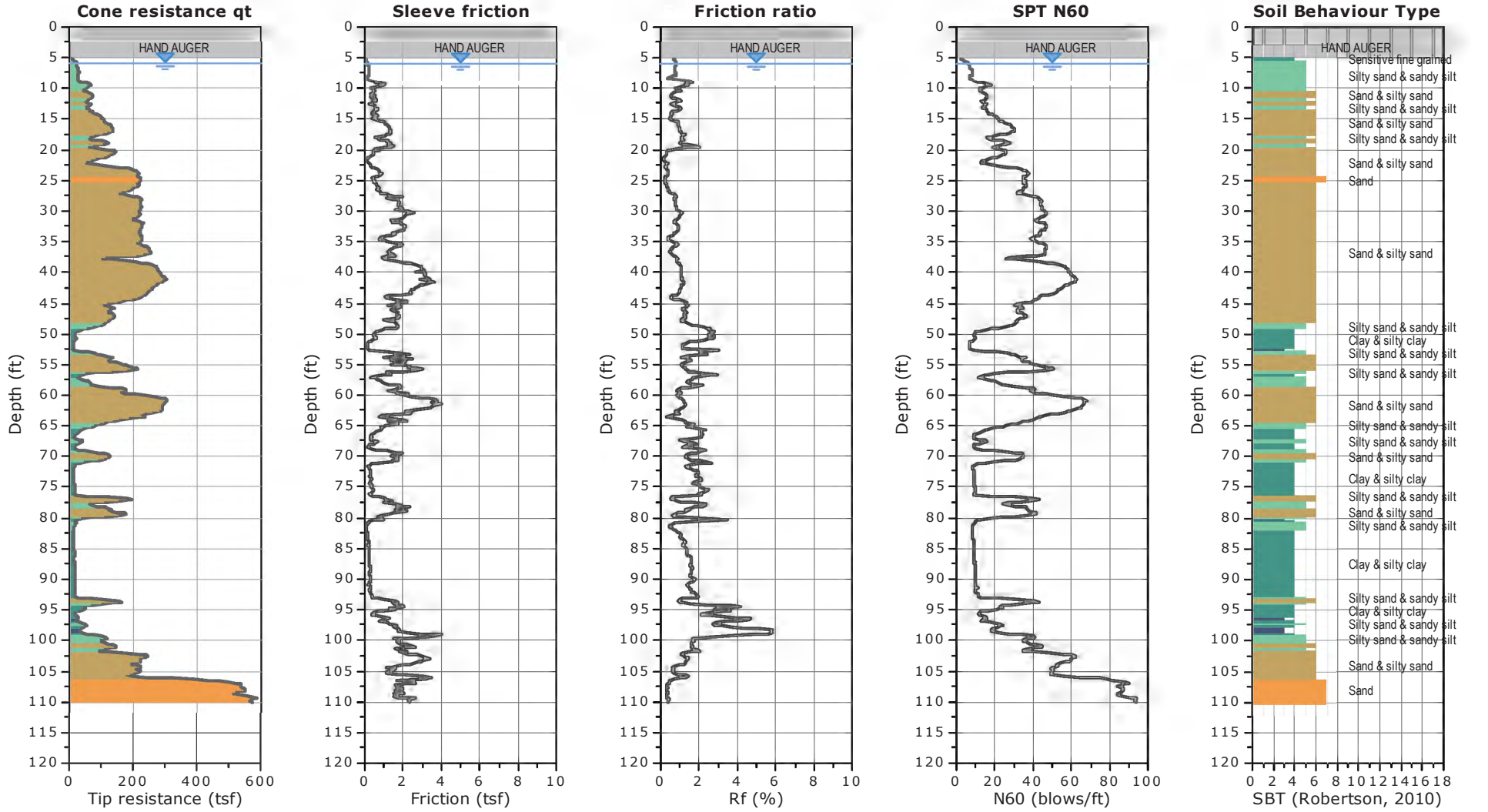
CPT: 23-CS112

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-82

Total depth: 110.07 ft, Date: 08/17/2023



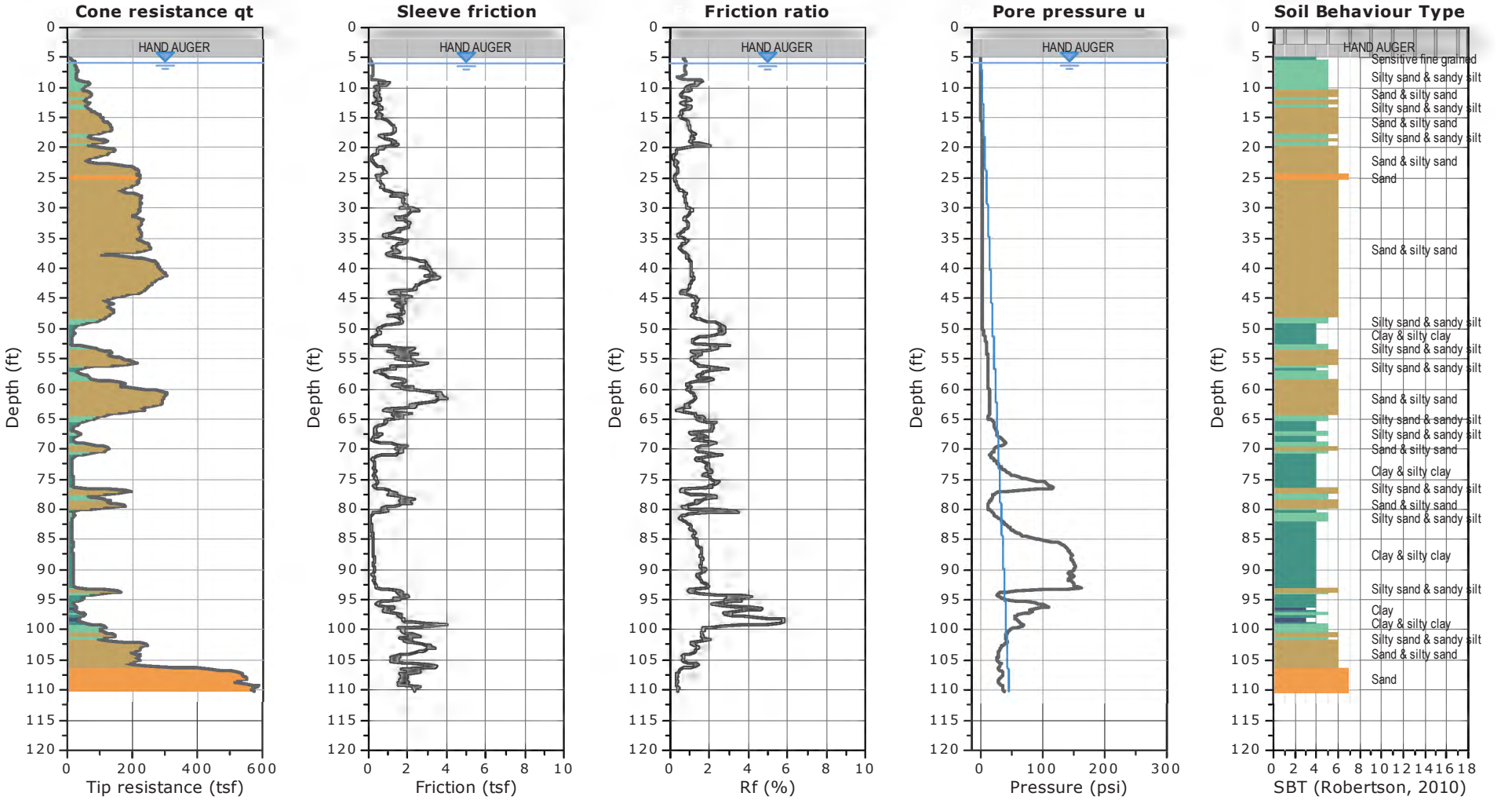
CPT: 23-CS112

CLIENT: SHN

SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-82

Total depth: 110.07 ft, Date: 08/17/2023



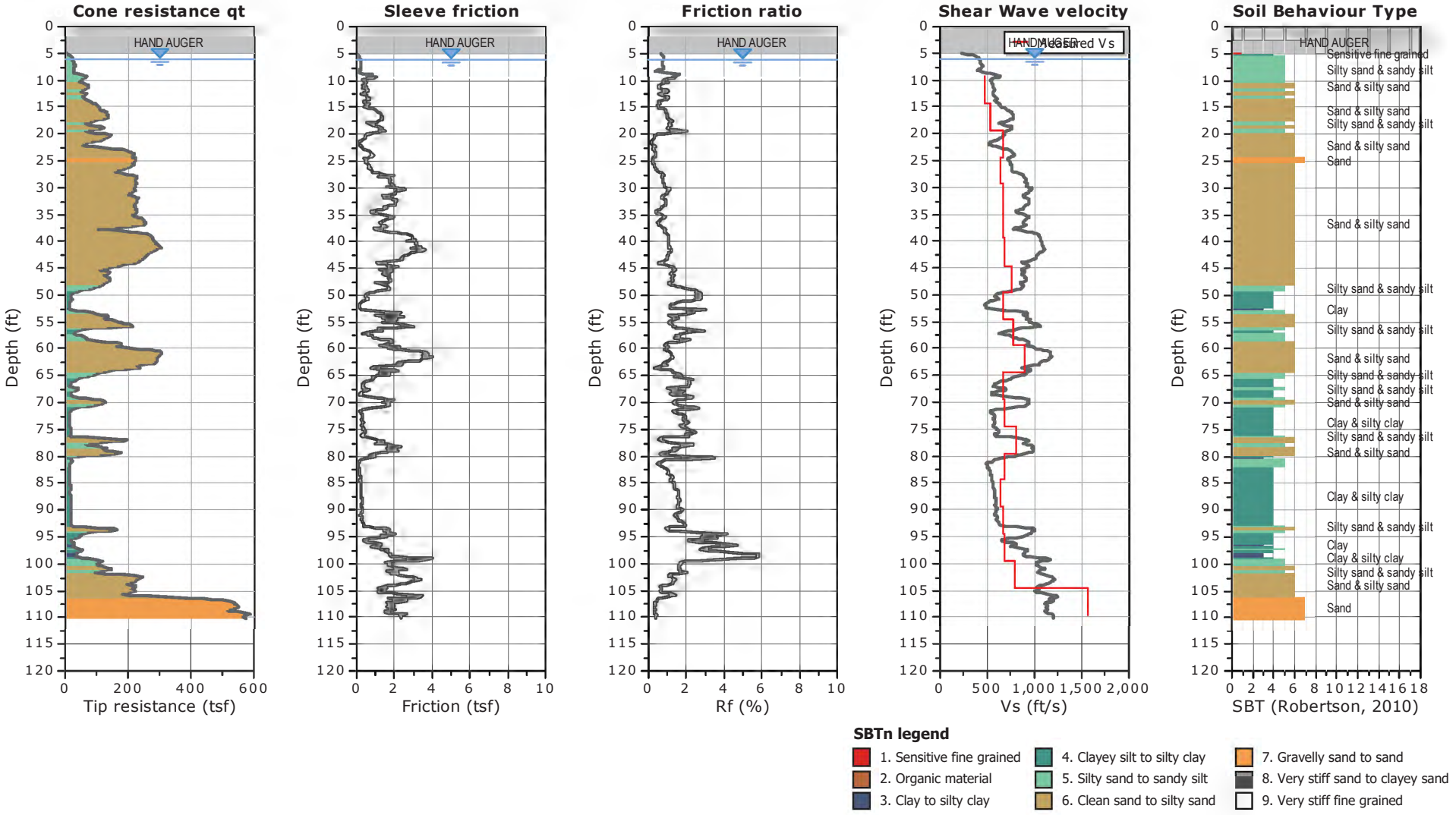
WATER TABLE FOR ESTIMATING PURPOSES ONLY

GREGG DRILLING, LLC
WWW.GREGGDRILLING.COM

CPT: 23-CS112

CLIENT: SHN
SITE: RMMT, SAMOA, CA

FIELD REP: GIOVANNI V.
Cone ID: GDC-82
Total depth: 110.07 ft, Date: 08/17/2023



APPENDIX B:

SEISMIC

PLOTS & TABLES

Shear Wave Velocity Calculations

RMMT

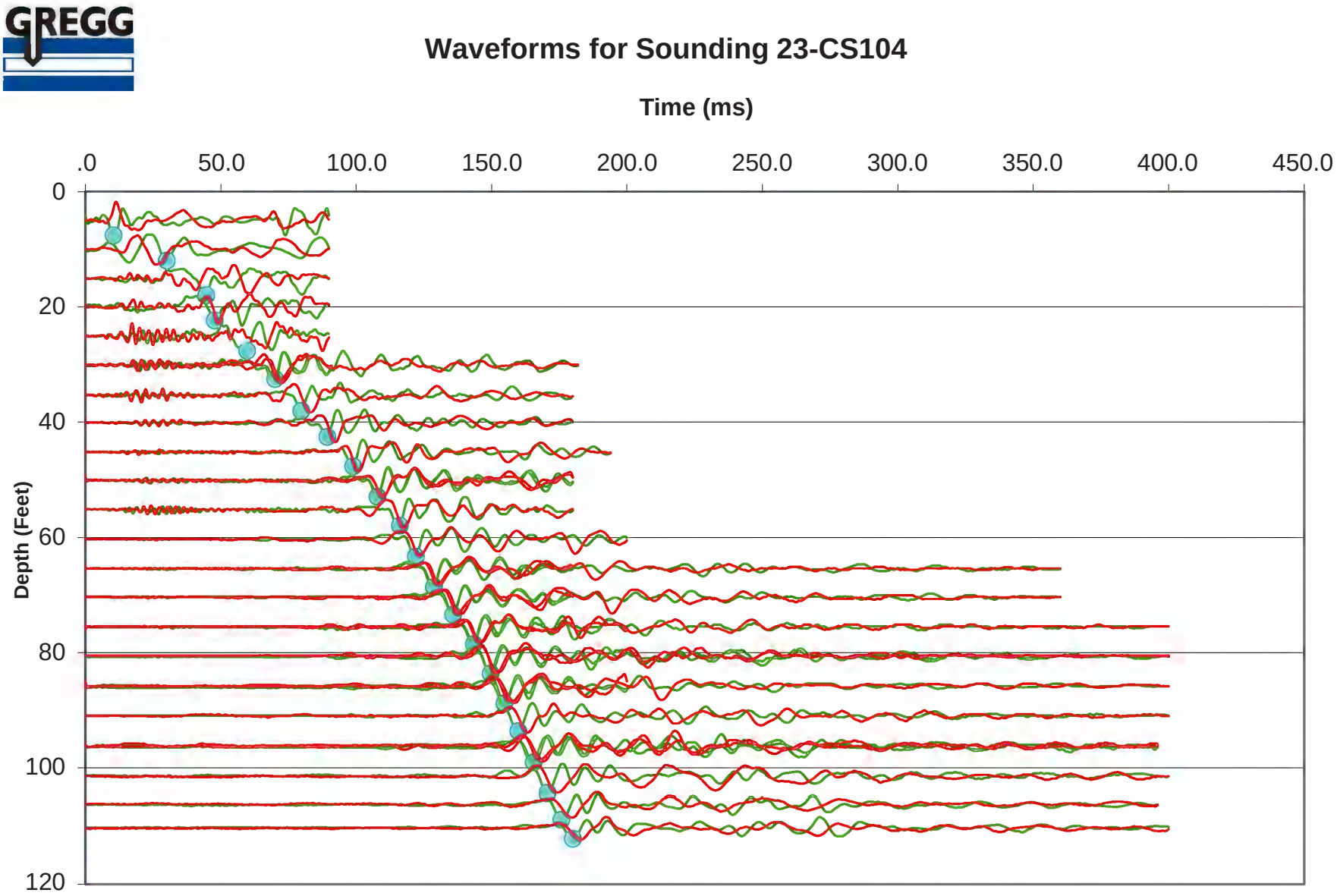
23-CS104

Geophone Offset: 0.66 Feet

Source Offset: 1.67 Feet

08/16/23

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
5.09	4.43	4.73	4.73	10.3500			
10.01	9.35	9.49	4.76	29.9000	19.5500	243.7	6.89
15.09	14.43	14.53	5.03	39.9000	10.0000	503.4	11.89
20.01	19.35	19.42	4.90	47.4500	7.5500	648.6	16.89
25.10	24.44	24.50	5.07	59.3500	11.9000	426.1	21.90
30.02	29.36	29.41	4.91	69.5500	10.2000	481.5	26.90
35.27	34.61	34.65	5.24	79.5000	9.9500	526.8	31.98
40.03	39.37	39.40	4.75	89.1000	9.6000	495.0	36.99
45.11	44.45	44.48	5.08	98.5500	9.4500	537.7	41.91
50.03	49.37	49.40	4.92	107.5000	8.9500	549.5	46.91
55.12	54.46	54.48	5.08	115.7500	8.2500	616.1	51.92
60.04	59.38	59.40	4.92	121.7000	5.9500	826.7	56.92
65.12	64.46	64.49	5.08	128.5000	6.8000	747.6	61.92
70.05	69.39	69.41	4.92	135.5500	7.0500	697.8	66.93
75.13	74.47	74.49	5.08	143.2000	7.6500	664.6	71.93
80.05	79.39	79.41	4.92	149.4500	6.2500	787.2	76.93
85.14	84.48	84.49	5.08	154.5500	5.1000	996.9	81.93
90.06	89.40	89.41	4.92	159.6500	5.1000	964.8	86.94
95.14	94.48	94.50	5.08	165.3000	5.6500	899.9	91.94
100.07	99.41	99.42	4.92	170.4000	5.1000	964.8	96.94
105.15	104.49	104.50	5.08	175.5000	5.1000	997.0	101.95
109.09	108.43	108.44	3.94	179.7500	4.2500	926.2	106.46


Waveforms for Sounding 23-CS104
Time (ms)
.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
Depth (Feet)
0
20
40
60
80
100
120

Shear Wave Velocity Calculations

RMMT

23-CS107

Geophone Offset: 0.66 Feet

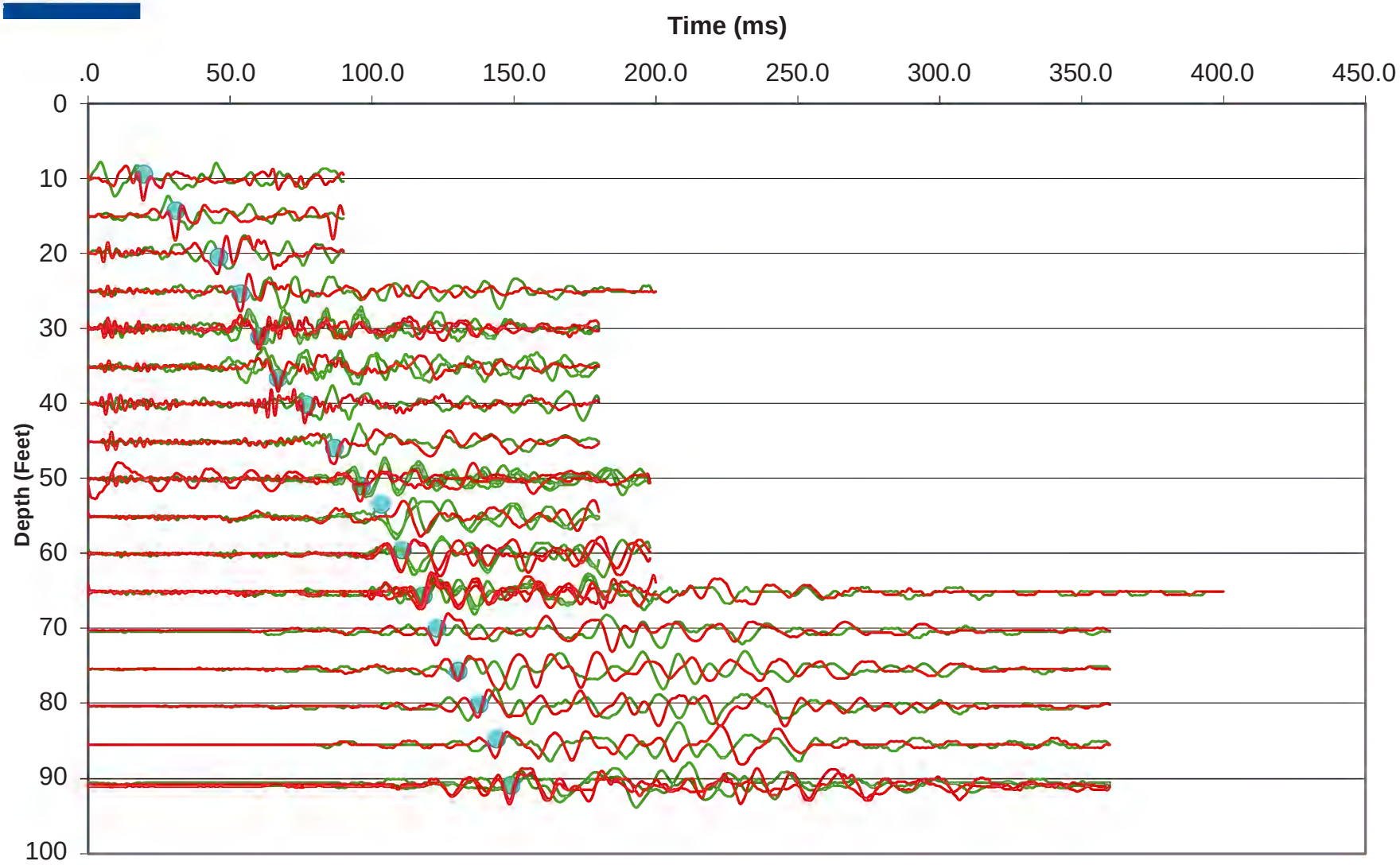
Source Offset: 1.67 Feet

08/17/23

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
10.17	9.51	9.66	9.66	19.4500			
15.09	14.43	14.53	4.87	30.7500	11.3000	431.2	11.97
20.01	19.35	19.42	4.90	45.7500	15.0000	326.5	16.89
25.10	24.44	24.50	5.07	53.7000	7.9500	637.8	21.90
30.02	29.36	29.41	4.91	60.2000	6.5000	755.6	26.90
35.10	34.44	34.49	5.08	66.7500	6.5500	775.3	31.90
40.03	39.37	39.40	4.92	76.6500	9.9000	496.6	36.91
45.11	44.45	44.48	5.08	86.5500	9.9000	513.3	41.91
50.03	49.37	49.40	4.92	95.9000	9.3500	526.0	46.91
55.12	54.46	54.48	5.08	103.0000	7.1000	715.9	51.92
60.04	59.38	59.40	4.92	110.3500	7.3500	669.3	56.92
65.12	64.46	64.49	5.08	117.7000	7.3500	691.6	61.92
70.05	69.39	69.41	4.92	122.8000	5.1000	964.6	66.93
75.13	74.47	74.49	5.08	130.2000	7.4000	687.0	71.93
80.05	79.39	79.41	4.92	137.5500	7.3500	669.4	76.93
85.14	84.48	84.49	5.08	143.7500	6.2000	820.0	81.93
90.06	89.40	89.41	4.92	148.8500	5.1000	964.8	86.94

GREGG

Waveforms for Sounding 23-CS10



Shear Wave Velocity Calculations

RMMT

23-CS110

Geophone Offset: 0.66 Feet

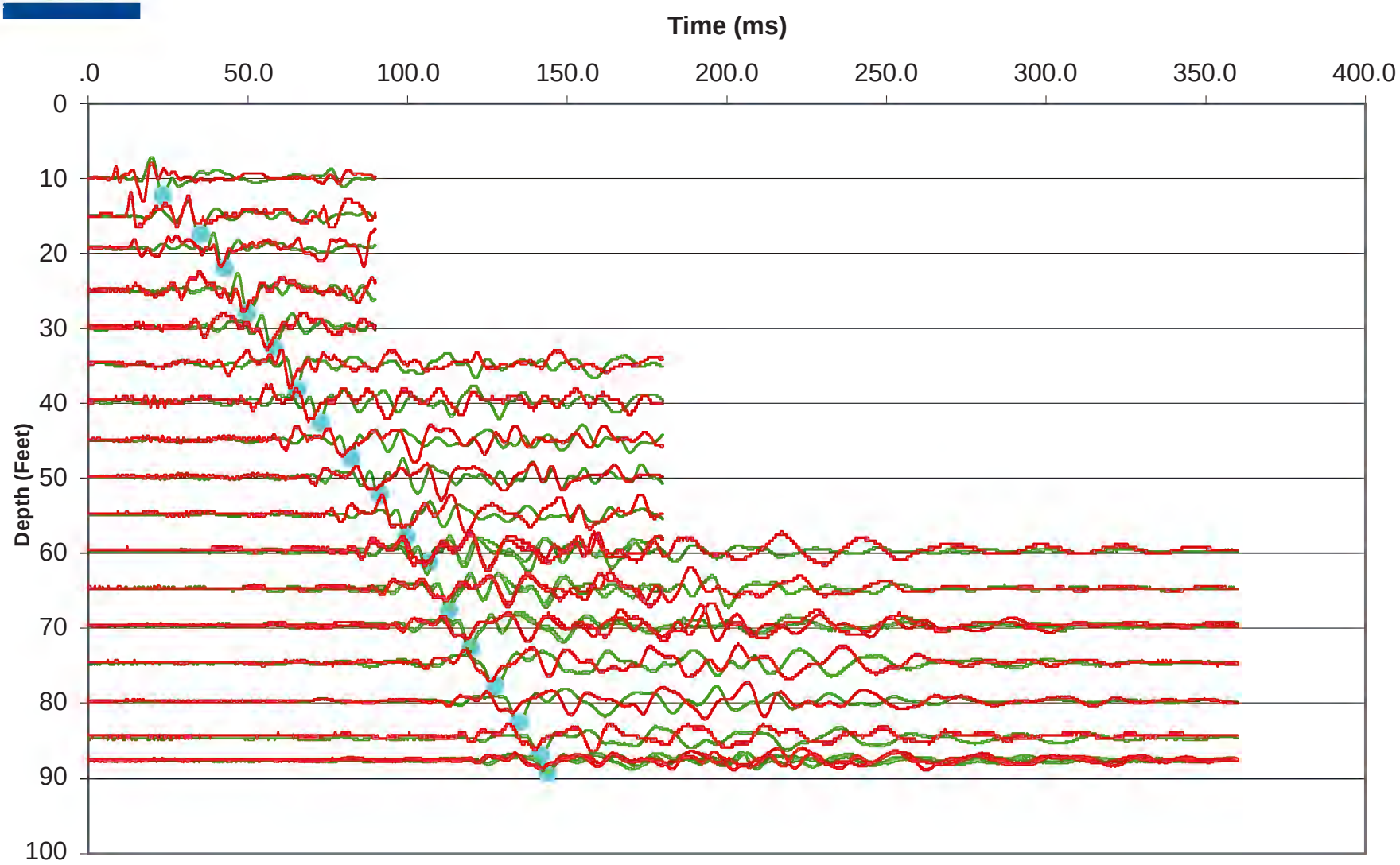
Source Offset: 1.67 Feet

08/17/23

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
10.01	9.35	9.49	9.49	23.3500			
15.09	14.43	14.53	5.03	35.1000	11.7500	428.4	11.89
19.36	18.70	18.77	4.24	42.4500	7.3500	577.3	16.56
25.10	24.44	24.50	5.72	49.6000	7.1500	800.6	21.57
30.02	29.36	29.41	4.91	57.9500	8.3500	588.2	26.90
35.10	34.44	34.49	5.08	65.4000	7.4500	681.6	31.90
40.03	39.37	39.40	4.92	72.8000	7.4000	664.4	36.91
45.11	44.45	44.48	5.08	82.2500	9.4500	537.7	41.91
50.03	49.37	49.40	4.92	91.1500	8.9000	552.6	46.91
55.12	54.46	54.48	5.08	99.5500	8.4000	605.1	51.92
60.04	59.38	59.40	4.92	106.4000	6.8500	718.1	56.92
65.12	64.46	64.49	5.08	112.8500	6.4500	788.1	61.92
70.05	69.39	69.41	4.92	119.7000	6.8500	718.2	66.93
75.13	74.47	74.49	5.08	127.3500	7.6500	664.6	71.93
80.05	79.39	79.41	4.92	135.0000	7.6500	643.1	76.93
85.14	84.48	84.49	5.08	141.4000	6.4000	794.4	81.93
87.93	87.27	87.28	2.79	143.6500	2.2500	1239.2	85.87

GREGG

Waveforms for Sounding 23-CS110



Shear Wave Velocity Calculations

RMMT

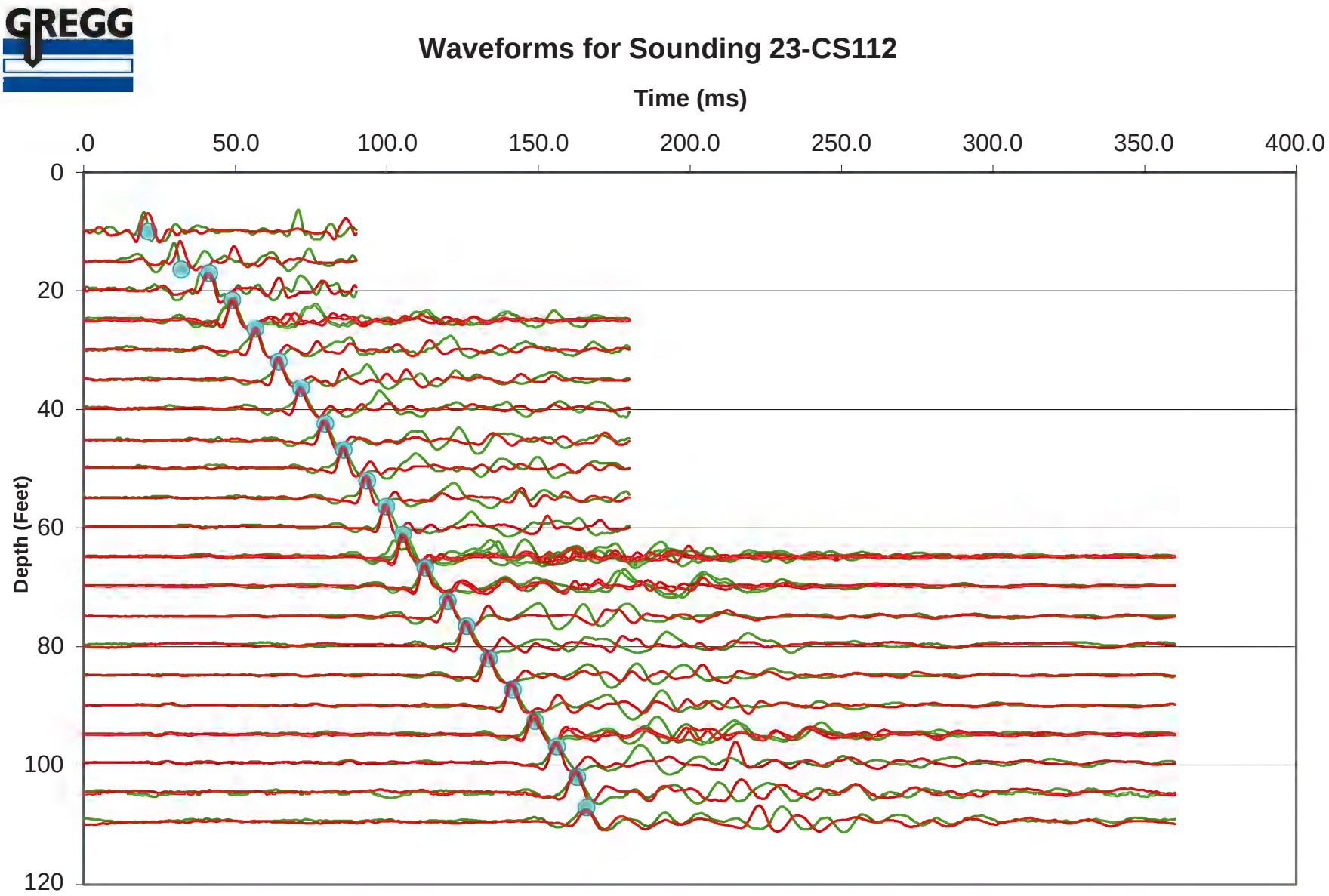
23-CS112

Geophone Offset: 0.66 Feet

Source Offset: 1.67 Feet

08/17/23

Test Depth (Feet)	Geophone Depth (Feet)	Waveform Ray Path (Feet)	Incremental Distance (Feet)	Characteristic Arrival Time (ms)	Incremental Time Interval (ms)	Interval Velocity (Ft/Sec)	Interval Depth (Feet)
10.01	9.35	9.49	9.49	21.3000			
15.09	14.43	14.53	5.03	32.0000	10.7000	470.4	11.89
20.01	19.35	19.42	4.90	41.2000	9.2000	532.3	16.89
25.10	24.44	24.50	5.07	48.8500	7.6500	662.8	21.90
30.02	29.36	29.41	4.91	56.5000	7.6500	642.1	26.90
35.10	34.44	34.49	5.08	64.1500	7.6500	663.8	31.90
40.03	39.37	39.40	4.92	71.5500	7.4000	664.4	36.91
45.44	44.78	44.81	5.41	79.4500	7.9000	684.7	42.07
50.03	49.37	49.40	4.59	85.5500	6.1000	752.5	47.08
55.12	54.46	54.48	5.08	93.2000	7.6500	664.4	51.92
60.04	59.38	59.40	4.92	99.5500	6.3500	774.7	56.92
65.12	64.46	64.49	5.08	105.2000	5.6500	899.7	61.92
70.05	69.39	69.41	4.92	112.5500	7.3500	669.3	66.93
75.13	74.47	74.49	5.08	119.9500	7.4000	687.0	71.93
80.05	79.39	79.41	4.92	126.1000	6.1500	800.0	76.93
85.14	84.48	84.49	5.08	133.5000	7.4000	687.1	81.93
90.22	89.56	89.58	5.08	141.4000	7.9000	643.6	87.02
95.14	94.48	94.50	4.92	148.7500	7.3500	669.4	92.02
100.07	99.41	99.42	4.92	155.9000	7.1500	688.2	96.94
105.31	104.65	104.67	5.25	162.5500	6.6500	789.3	102.03
110.07	109.41	109.42	4.76	165.6000	3.0500	1559.5	107.03


Waveforms for Sounding 23-CS112
Time (ms)
.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
Depth (Feet)
0
20
40
60
80
100
120

Boring Logs

2

BORING NUMBER 23-B101

CLIENT Humboldt Bay Harbor and Conservation District
PROJECT NAME Redwood Marine Multipurpose Terminal
PROJECT NUMBER 022054.400
PROJECT LOCATION 364 Vance Avenue, Samoa, Humboldt County, CA
DATE STARTED 8/22/23 **COMPLETED** 8/23/23
GROUND ELEVATION 11 ft (approx.) **HOLE SIZE** 4-1/2"
DRILLING CONTRACTOR Taber Drilling
GROUND WATER LEVELS:
DRILLING METHOD Mud rotary (CME-55 truck-rig w/auto-hammer)
▽ **AT TIME OF DRILLING** 6.00 ft / Elev 5.00 ft
LOGGED BY G. Vadurro **CHECKED BY**
AT END OF DRILLING ---
NOTES Backfilled borehole w/cement slurry.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Began drilling with solid flight augers. A/C paving, ~4" thick. (GP) GRAVEL with SAND to ~3'; SAND from 3'-4'; Dark gray to black SANDY SILT beginning at 4', wet (FILL).										
		▽ (ML) Mostly wood fragments with silt; very soft, moist; wood is highly decomposed (FILL).	MC 1/2		2-1-2 (3)	0.5						
			SPT 3		5-5-3 (8)							
10		(CL) SANDY LEAN CLAY in shoe at 9'; soft, wet, very dark gray (2.5Y3/1); no cementation; low plasticity, low toughness, slightly cohesive; contains fine sand (Native soil?)	MC	0	2-1-2 (3)							
		(ML) No recovery; mostly SILT and wood debris in cuttings. Reamed borehole; installed 6" steel casing to 4' bgs and switched to mud rotary using HWT rods and finger bit.										
		No recovery. Gravels in shoe; may have influenced blow counts.	SPT	0	12-11-12 (23)							
20		(SP) Poorly-graded SAND; dense, wet, very dark gray (Gley 1 3/N); no cementation; rapid dilatancy; mostly fine sand, quartz-rich, weakly stratified; trace shell fragments (Beach/Nearshore Marine Deposits).	SPT 4		7-14-16 (30)							7
		Grades slightly coarser, fine to medium sand with trace subrounded to rounded coarse sand.	SPT 5		13-18-18 (36)							
30		Grades finer to mostly fine sand.	SPT 6		13-19-20 (39)							5
		Silty Sand in shoe.	SPT 7		9-23-27 (50)							
40		(SP) Low to medium plasticity LEAN CLAY in upper portion of sample grading to dense Poorly-graded SAND with abundant shell fragments; mostly fine to medium sand with <10% fines and about 30-40% shell fragments.	MC 8/9		10-18-22 (40)	0.5 2.5						
		(CL-ML) Collected thin-walled Shelby Tube sample at 45'-47.5'. Pushed 12" at 100 psi; 12" at 125 psi; 6" at 200 psi; 30" recovery. Soft to medium stiff SILTY LEAN CLAY with abundant shell fragments in top of sample. Bottom of sample contains dark gray medium stiff SANDY SILT, none to weak cementation; non-plastic	ST 10			1.5	98	26				43
50												

(Continued Next Page)

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
50		to low plasticity with few plant fibers and no shell fragments. **TXUU Test**	MC 11/12		8-6-9 (15)	1.0 0.5 1.5						
		(CL) SANDY LEAN CLAY; stiff, wet, very dark gray; no cementation; low to medium plasticity with low toughness; very thinly laminated; fine sand with trace detrital organics; grades upward to sandy silt.										
		(CL) Collected thin-walled Shelby Tube sample at 55'-57.3'. Pushed 6" at 150 psi; 6" at 300 psi; 6" at 500 psi; 6" at 800 psi; 3" at 1000 psi; 27" recovery. Soft to medium stiff LEAN CLAY in top of sample. Bottom of sample contains medium dense SILTY SAND. **TXUU Test**	ST 13			1.5	98	27				60
60		(ML) SILT with SAND; stiff, wet, very dark gray (5Y 3/1); no cementation; slow dilantancy; non-plastic; thinly laminated with trace shell fragments.	SPT 14		5-6-8 (14)							
		(CL) LEAN CLAY; medium stiff, wet, dark gray (5Y 4/1); weak cementation; no dilatancy; low to medium plasticity with low toughness; trace fine sand.	MC 15/16		9-8-6 (14)	1.0 1.5 2.0						
70		Collected thin-walled Shelby Tube sample at 70-72.5'. Pushed 12" at 100 psi; 12" at 150 psi; 6" at 250 psi; 30" recovery. Becomes medium plastic with medium toughness. **Consolidation Test** **TXUU Test** Driller notes increase in drill resistance beginning at 72'.	ST 17				81 86	39 35	37	23	14	91
		Becomes stiff with slight color change to very dark gray to black; low plasticity with low toughness; increase in silt content; thinly laminated. Slow drilling from 75'-80'.	MC 18/19		7-11-11 (22)	1.0						
80		(SP) Transitions from hard SILTY LEAN CLAY to dense Poorly-graded SAND with SILT at 81'; mostly fine sand, dark gray, wet; no cementation; non-plastic silty fines.	MC 20/21		26-18-16 (34)	2.5 1.0						20
		(CL) LEAN CLAY; very stiff, moist, dark gray (5Y 4/1); weak cementation; no dilantancy; medium plasticity with medium toughness.	SPT 22		9-11-13 (24)							
90		(SP) Poorly-graded SAND; very dense, wet, gray (10YR 5/1); weak cementation; mostly fine sand with <10% fines (Pleistocene age HOOKTON FORMATION).	MC 23		44-58	2.0						
			SPT 24		19-28-29 (57)							
100		(SP) Poorly-graded SAND; very dense, wet, dark gray; weak cementation; fine to medium sand with <5% fines; few shell fragments.	MC 25/26		12-55-50/4"							

(Continued Next Page)

BORING NUMBER 23-B101

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
110		(SP) Poorly-graded SAND; very dense, wet, dark gray; weak cementation; fine to medium sand with <5% fines; few shell fragments. *(continued)*										
		Color change to dark greenish gray (Gley 1 4/5G); no cementation with rapid dilantancy; clean fine sand with <2% fines.	SPT 27		38-50/5"							
120		(SP) Poorly-graded SAND with SILT; very dense, wet, dark greenish gray to dark bluish gray (Gley 2 4/10BG-4/5B); weak cementation; slow dilatancy; fine sand with about 10-15% silt.	SPT 28		48-50/2"							
		Shell fragments in cuttings at 123'-125'.										
130		Sand grades slightly coarser with few rounded fine gravels, 1/2" max. size.	SPT 29		50/4"							
		Wood debris and shell fragments in cuttings at 133'-138'.										
		Coarse sand and fine gravel in cuttings at 138'-140'.										
140		(SP) Poorly-graded SAND; very dense, wet, dark bluish gray (Gley 2 4/10B); weak cementation; fine sand with about 5-10% silt; few thin coarse sand layers <5mm thick.	SPT 30		43-53-60 (113)							
150		(MH) ELASTIC SILT; very stiff, moist, very dark bluish gray (Gley 2 3/5PB); moderate cementation with medium dry strength; no dilantancy; medium to high plasticity with medium toughness.	SPT 31		13-15-17 (32)							
		Silt and clay in cuttings from 150'-165'.										
160												

(Continued Next Page)

BORING NUMBER 23-B101

CLIENT Humboldt Bay Harbor and Conservation District
PROJECT NAME Redwood Marine Multipurpose Terminal
PROJECT NUMBER 022054.400
PROJECT LOCATION 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
170		(CL) LEAN CLAY; becomes hard and dry with high dry strength; contains shell fragments and trace amounts of detrital organics.	MC 32/33		24-33-36 (69)	3.5 4			30	21	9	92
		Driller notes gravels at 172'.										
180		(SP) Sampler refusal with 50 blows for 3" and 10 blows with no advancement. Very dense Poorly-graded SAND in shoe; fine to medium sand with trace coarse sand and few gravels, 1/2" max. size.	SPT		60/3"							
		Refusal at 180.3 feet. Bottom of borehole at 180.3 feet.										

BORING NUMBER 23-B102

CLIENT Humboldt Bay Harbor and Conservation District
PROJECT NAME Redwood Marine Multipurpose Terminal
PROJECT NUMBER 022054.400
PROJECT LOCATION 364 Vance Avenue, Samoa, Humboldt County, CA
DATE STARTED 8/24/23 **COMPLETED** 8/25/23
GROUND ELEVATION 10 ft (approx.) **HOLE SIZE** 4-1/2"
DRILLING CONTRACTOR Taber Drilling
GROUND WATER LEVELS:
DRILLING METHOD Mud rotary (CME-55 truck-rig w/auto-hammer)
▽ **AT TIME OF DRILLING** 4.00 ft / Elev 6.00 ft
LOGGED BY A. Troia **CHECKED BY**
AT END OF DRILLING ---
NOTES Backfilled borehole w/cement slurry.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Began drilling with solid flight augers. A/C paving, ~4" thick. (GP) GRAVEL to ~2' (FILL). ▽ (SP) SAND from 2'-4' (FILL)										
		(SP) Poorly-graded SAND; loose, wet, dark gray (2.5Y 3/1); fine to medium sand with trace silt (FILL).	SPT 1		0-1-1 (2)							
			SPT 2		1-1-2 (3)							1
10		No recovery. Reamed borehole; installed 6" steel casing to 9' bgs and switched to mud rotary using HWT rods and finger bit.	MC	0	6-3-2 (5)							
		No recovery. Fine SAND in cuttings.	MC	0	3-2-3 (5)							
20		(SP) Poorly-graded SAND with SILT; medium dense, wet, very dark gray (Gley 1 3/N); mostly fine sand; slow dilantancy; shell layer at 20' with subrounded coarse sand (Beach/Nearshore Marine Deposits).	SPT 4		5-10-15 (25)							
		(CL) LEAN CLAY; very soft, wet, dark gray (2.5Y 4/1); no cementation; low plasticity with low toughness (Bay Mud).	MC 5		0-0-0 (0)							
30		Collected thin-walled Shelby Tube sample at 30'-32.5'. Pushed 24" at 100 psi; 6" at 125 psi; 30" recovery. Contains abundant shell fragments with trace very fine sand. **Consolidation Test** **TXUU Test** **Corrosivity Test**	ST 6				78 81	43 40	39	23	16	
		(ML) SILT to SANDY SILT; soft, moist to wet, dark gray (Gley 1 4/N); no cementation; non-plastic to low plasticity; low toughness; laminated; abundant shell fragments; increase in very fine sand at 36'.	MC 7/8		5-3-3 (6)	1.0 0.75						
40		Collected thin-walled Shelby Tube sample at 40'-42.5'. Pushed 12" at 100 psi; 6" at 115 psi; 6" at 200 psi; 6" at 250 psi; 30" recovery. Soft SILT with low plasticity and low toughness.	ST 9									
		(ML) SANDY SILT to SILTY SAND; medium stiff to very loose, moist, dark gray; weak cementation; non-plastic to low plasticity; low toughness; cohesive; very fine to fine sand; mostly sandy silt with silty sand interbeds, laminated; few fine organics; decreasing shell fragment content.	MC 10/11/12		3-3-5 (8)							
50												

(Continued Next Page)

BORING NUMBER 23-B102

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
50		(CL) Collected thin-walled Shelby Tube sample at 50'-52.5'. Pushed 30" at 100 psi; 2" at 150 psi. SILTY LEAN CLAY in top of sample, moist, dark gray, low plasticity, low toughness; shell fragments. **Consolidation Test** **TXUU Test**	ST 13				83	39	43	25	18	92
							83	39				
		(ML) SILT; medium stiff, moist, dark gray; weak cementation; non-plastic to low plasticity; low toughness; laminated with trace fibrous wood fragments and few shell fragments.	MC 14/15		4-4-5 (9)	0.75						
60		(SM) SILTY SAND; medium dense, wet, dark gray; weak cementation; fine sand with shells.	SPT 16		10-11-13 (24)							17
		Lost return circulation; added 5' of steel casing and advanced to 14'.	MC 17/18		17-17-18 (35)	0.75						
70		(CL-ML) Collected thin-walled Shelby Tube sample at 70-72.5'. Pushed 6" at 100 psi; 6" at 125 psi; 12" at 150 psi; 6" at 175 psi; 10" recovery. SILTY LEAN CLAY with SAND in bottom of sample, wet, gray; weak to moderate cementation; low plasticity, low toughness; very fine to fine sand.	ST 19									
		Medium stiff SILTY LEAN CLAY, becomes moist, low plasticity with medium toughness; fine shell fragments.	MC 20/21		2-3-6 (9)	1.0 0.75						
80		(CL) Collected thin-walled Shelby Tube sample at 80-82.5'. Pushed 6" at 100 psi; 12" at 150 psi; 6" at 250 psi; 6" at 350 psi. LEAN CLAY; moist, very dark gray to black (Gley 1 3/4-2.5/N); medium plasticity, low toughness. **Consolidation Test** **TXUU Test**	ST 22			0.25	84	36	42	24	18	97
							89	33				
			MC 23/24/25		6-9-18 (27)	0.75 1.5						
		(SP) Poorly-graded SAND; medium dense, wet, gray; mostly medium sand, quartz-rich with fine shell fragments. Driller notes that the bit stopped plugging up at 87.5'.										
90		(SP) Poorly-graded SAND; dense, wet, dark gray; stratified sand with shell fragments and clay layers; trace wood fragments (Pleistocene age HOOKTON FORMATION).	SPT 26		11-12-19 (31)							28
		(SM) SILTY SAND with interbedded Poorly-graded SAND with SILT; dense to very dense, wet, dark gray; low plasticity fines with low toughness; quartz-rich sand with abundant wood fragments.	MC 27/28/29		9-24-45 (69)	2.75 2.75						
100			SPT 30		22-31-13 (44)							

(Continued Next Page)

BORING NUMBER 23-B102

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
110		(SM) SILTY SAND with interbedded Poorly-graded SAND with SILT; dense to very dense, wet, dark gray; low plasticity fines with low toughness; quartz-rich sand with abundant wood fragments. *(continued)*										
		(SP-SM) Poorly-graded SAND to SILTY SAND; dense, wet, dark gray; moderate cementation; mostly fine sand with 2" interbeds of silty lean clay.	SPT 31		9-10-21 (31)							
		Gravel in cuttings at 115' and 120'.										
120												
		(SM) SILTY SAND; very dense, wet, dark gray; strong cementation, cohesive fines.	SPT 32		47-50/4"							
130												
140		Interbedded fine SAND and SILTY SAND	SPT 33		19-35-50 (85)							

Bottom of borehole at 141.5 feet.

BORING NUMBER 23-B103

CLIENT Humboldt Bay Harbor and Conservation District
PROJECT NAME Redwood Marine Multipurpose Terminal
PROJECT NUMBER 022054.400
PROJECT LOCATION 364 Vance Avenue, Samoa, Humboldt County, CA
DATE STARTED 8/25/23 **COMPLETED** 8/28/23
GROUND ELEVATION 10 ft (approx.) **HOLE SIZE** 4-1/2"
DRILLING CONTRACTOR Taber Drilling
GROUND WATER LEVELS:
DRILLING METHOD Mud rotary (CME-55 truck-rig w/auto-hammer)
▽ **AT TIME OF DRILLING** 4.00 ft / Elev 6.00 ft
LOGGED BY G. Vadurro **CHECKED BY**
AT END OF DRILLING ---
NOTES Backfilled borehole w/cement slurry.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		(SP) Poorly-graded SAND; loose, dry, grayish brown; gravel in upper 2' (FILL).										
		Becomes moist at 3'.										
		▽ (SP) Color change to very dark gray to black, wet; mostly fine quartz-rich sand with trace medium sand and silt (FILL).	SPT	0	3-2-2 (4)							
		(SP) No recovery; gravels and wood in shoe. Installed casing to 4' bgs and switched to mud rotary using HWT rods and finger bit.	SPT	0	2-2-2 (4)							
10		(SP) No recovery; wood and gravel fill in shoe likely influenced blow counts (FILL?). Installed additional 5' of casing and advanced to 9' bgs.	MC	0	3-11-12 (23)							
		(ML) Wood in cuttings to 13' transitioning to SILT with shell fragments (Bay Mud?).										
		(CL-ML) No recovery. Silt, clay, and shell fragments in cuttings from 15'-20' (Bay Mud).	SPT	0	1-1-1 (2)							
20		(SP) Poorly-graded SAND with SILT; medium dense, wet, dark gray; no cementation; non-plastic silty fines; mostly fine sand with few minor rounded coarse sand, quartz-rich; abundant shell fragments (Beach/Nearshore Marine Deposits). **Direct Shear Test**	MC 1		12-14-8 (22)		109	17				13
		(SP) Poorly-graded SAND; medium dense, wet, dark gray; no cementation; rapid dilatancy; fine to medium sand with trace coarse sand, rounded, quartz-rich.	SPT 2		8-9-6 (15)							
30		(CL) LEAN CLAY with SAND in shoe; contains trace wood fragments.										
		(CL) SILTY LEAN CLAY; very soft, wet, very dark gray (2.5Y 3/1); no cementation; medium plasticity with low toughness; few shell fragments; strong odor of decayed organics (Bay Mud).	MC 3/4		1-1-2 (3)	0.25 0.5						
		Collected thin-walled Shelby Tube sample at 35'-37.5'. Pushed 30" at 100 psi; 30" recovery. **Consolidation Test** **TXUU Test**	ST 5			0.25	80 82	41 39	35	23	12	95
40		Becomes soft; color change to dark bluish gray.	MC 6/7		0-3-2 (5)	0.25 0						
		Collected thin-walled Shelby Tube sample at 45'-47.5'. Pushed 24" at 100 psi; 6" at 150 psi; 30" recovery. Soft, dark gray LEAN CLAY; medium plasticity with low toughness; no cementation. **TXUU Test**	ST 8				83	38				
50												

(Continued Next Page)

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
50		(CL-ML) SILT to LEAN CLAY; medium stiff to stiff, wet, bluish black (Gley 2 3/10B); none to weak cementation; medium plasticity with low toughness.	MC 9/10		3-6-7 (13)	0.25 1.25						
		(CL) Collected thin-walled Shelby Tube sample at 55'-57.5'. Pushed 12" at 125 psi; 12" at 150 psi; 6" at 175 psi; 30" recovery. LEAN CLAY; soft to medium stiff, wet, very dark gray (2.5Y 3/1); weak cementation; low plasticity with low toughness. **Consolidation Test**	ST 11			0.75	89	32	30	20	10	97
60			MC 12/13		2-5-7 (12)	1.0 2.0						
		SILTY fine SAND in shoe at 61.5; few shell fragments in upper portion of sample.										
		(ML) SILT with fine SAND; very stiff, wet, very dark gray; weak cementation; no dilatancy; low plasticity with low toughness; few shell fragments.	SPT 14		6-8-9 (17)							
70		(ML) SILT; stiff, wet; weak cementation; slight increase in plasticity; <10% fine sand; fine shell fragments scattered throughout sample.	MC 15/16		8-8-10 (18)	0.5 0.75						
		(CL) Collected thin-walled Shelby Tube sample at 75'-77.5'. Pushed 12" at 100 psi; 6" at 125 psi; 12" at 150 psi; 30" recovery. LEAN CLAY to SILT; soft, wet, very dark gray; weak cementation; medium plasticity with medium toughness. **Consolidation Test** **TXUU Test**	ST 17			0.5	81 87	36 35				
80		(ML) Stiff, low plasticity SILT; moderate cementation; very thinly laminated with trace shell fragments.	MC 18/19		0-7-12 (19)	0.75 1.5						
		(CL) Very stiff LEAN CLAY with interbeddd Poorly-graded SAND; fine to medium sand, quartz-rich with few coarse sand grains composed of chert; abundant shell fragments.	SPT 20		17-14-13 (27)							
90		(SP) Poorly-graded SAND; very dense, wet, dark gray; no cementation; mostly fine to medium sand, quartz-rich, rounded with few coarse sand grains of chert; <3% fines (Pleistocene age HOOKTON FORMATION).	MC 22		4-47-50/5"							
		Mostly fine SAND with shell fragments; very dense, wet; <2% fines.	SPT 23		26-32-30 (62)							
100		Uniformly graded fine sand with no shell fragments.	MC 24		18-38-38 (76)							

(Continued Next Page)

BORING NUMBER 23-B103

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
110		(SP) Poorly-graded SAND; very dense, wet, dark gray; no cementation; mostly fine to medium sand, quartz-rich, rounded with few coarse sand grains of chert; <3% fines (Pleistocene age HOOKTON FORMATION). *(continued)* Trace shell fragments.	SPT 25		25-37-48 (85)							
120		(SW) Well-graded SAND; very dense, wet, dark gray; no cementation; quartz-rich with few rounded fine gravels, 1/2" max. size.	SPT 26		47-50/5"							
130		(GP) Poorly-graded GRAVEL with SAND; very dense, wet, dark gray; no cementation; rounded fine gravel and coarse sand comoposed of quartz, chert, and sandstone, 1/2" max. size, fresh, hard; fine sand in shoe. Coarse sand, fine gravel, shell and wood fragments in cuttings from 130'-140'.	SPT 27		35-50/4"							
140		(SP) Poorly-graded SAND; very dense, wet, dark gray; weak cementation; mostly fine sand with lesser amounts of medium sand; interbedded lense of fine gravel (3/8" max. size) at 140.8'.	SPT 28		32-43-41 (84)							
150		(MH) ELASTIC SILT; hard, moist, gray (Gley 1 5/4); moderate cementation with medium dry strength; high plasticity with medium to high toughness; laminated.	SPT 29		50-50/5"							
160												

(Continued Next Page)

BORING NUMBER 23-B103

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
		(SP) 2" recovery; SAND and GRAVEL in shoe.	SPT 30		50/4"							
170		Coarse sand and fine gravel in cuttings from 165'-180'; gravel content decreases at ~177'; color change in cuttings.										
180		(GP) 1.5" of recovery. Very dense Poorly-graded GRAVEL with SAND and CLAY; wet, dark yellowish brown to grayish brown; rounded to subrounded fine gravel (3/8" max. size) and coarse sand with slightly cohesive clayey fines.	SPT		50/3"							

Refusal at 180.3 feet.
Bottom of borehole at 180.3 feet.

BORING NUMBER 23-B104

CLIENT Humboldt Bay Harbor and Conservation District
PROJECT NAME Redwood Marine Multipurpose Terminal
PROJECT NUMBER 022054.400
PROJECT LOCATION 364 Vance Avenue, Samoa, Humboldt County, CA
DATE STARTED 8/29/23 **COMPLETED** 8/30/23
GROUND ELEVATION 9 ft (approx.) **HOLE SIZE** 4-1/2"
DRILLING CONTRACTOR Taber Drilling
GROUND WATER LEVELS:
DRILLING METHOD Mud rotary (CME-55 truck-rig w/auto-hammer)
▽ **AT TIME OF DRILLING** 5.00 ft / Elev 4.00 ft
LOGGED BY G. Vadurro **CHECKED BY**
AT END OF DRILLING ---
NOTES Backfilled borehole w/cement slurry.
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Began drilling with solid flight augers. A/C paving, ~4" thick. (SP) GRAVEL and SAND to ~3.5'; SAND with shell fragments from 3.5'-4' (FILL).										
		▽ (SP) Poorly-graded SAND; medium dense, moist becoming wet at 5', gray; no cementation; uniformly graded fine sand with shell fragments; <3% fines (FILL).	SPT 1		5-6-6 (12)							
		Becomes loose (FILL).	SPT 2		3-3-4 (7)							
10			SPT 3		3-4-6 (10)							
		(CL) SANDY LEAN CLAY; stiff, wet, dark gray (Gley 1 4/N); no cementation; low plasticity; shell fragments with odor of decayed organics (Bay Mud). Installed 6" steel casing to 4' bgs and switched to mud rotary using HWT rods and finger bit.										
		(SP) Poorly-graded SAND to SILT; loose with soft low plasticity SILT in lower 6" of sample.	SPT 4		6-4-1 (5)							
20		(CL-ML) SILTY LEAN CLAY; soft, wet, dark gray (Gley 1 4/N); no cementation; medium plasticity with low toughness; few shell fragments with trace organics; clayey sand with shell fragments in shoe (Bay Mud). **Consolidation Test** **TXUU Test** **Corrosivity Test**	MC 5/6		0-2-3 (5)	0 0	78	43	45	28	17	97
		Few fine gravels in cuttings at 20'-25'.	SPT 7		8-10-15 (25)							
30		(SP) Poorly-graded SAND; mediumu dense, wet, gray; no cementation; medium to coarse sand, quartz- and chert-rich with ~10-15% subround to rounded gravel, 1" max. size; some fractured from hammer blow (Beach/Nearshore Marine deposits). Becomes dense, very dark grayish brown (2.5Y 3/2); uniformly graded fine sand with trace medium to coarse sand; <2% fines.	SPT 8		13-21-19 (40)							
		(SM) SILTY SAND; medium dense, wet, very dark gray; no cementation; non-plastic silty fines; fine sand with abundant shell fragments; grades finer downward. Abundant coarse shell fragments in at 37'-40'; bit plugged at 38'.	SPT 9		13-10-11 (21)							22
40		(CH) FAT CLAY; soft to medium stiff, wet, dark gray; none to weak cementation; no dilatancy; medium plasticity with low toughness (Bay Mud).	MC 10/11		4-4-4 (8)	0.25 0.5						
		Collected thin-walled Shelby Tube sample at 45'-47.5'. Pushed 18" at 100 psi; 6" at 125 psi; 6' at 150 psi; 30" recovery. **Consolidation Test** **TXUU Test**	ST 12			0.5	81 80	39 40	51	25	26	99
50												

(Continued Next Page)

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
50		(CH) FAT CLAY; soft to medium stiff, wet, dark gray; none to weak cementation; no dilatancy; medium plasticity with low toughness (Bay Mud). *(continued)* Becomes medium stiff; grades silty with trace decomposed organics.	MC 13/14		5-5-5 (10)	0.25 0.5						
		(ML) Collected thin-walled Shelby Tube sample at 55'-57.5'. Pushed 6" at 100 psi; 6" at 115 psi; 6" at 125 psi; 6" at 150 psi; 6" at 275 psi; 30" recovery. SILT; medium stiff, wet, bluish gray; weak cementation; low plasticity with low toughness; trace shell fragments.	ST 15			1.75						
60		(SM) SILTY SAND; medium dense, wet, bluish black (Gley 2 2.5/10B); no cementation; rapid dilatancy; non-plastic silty fines; uniformly graded fine sand with shell fragments; clean fine SAND with <5% fines in shoe. **Direct Shear Test**	MC 16/17		7-14-22 (36)	1.0 1.25	107	22				15
		Becomes dense with slight increase in silt content; slightly cohesive with low plasticity interbeds.	SPT 18		8-17-20 (37)							
70		(ML) SILT with SAND; stiff, wet, dark bluish gray; weak cementation; no dilatancy; non-plastic; trace decomposed organics; thinly laminated with thin lenses of fine sand.	MC 19/20		6-11-17 (28)	1.0 1.25						
		(CL-ML) Collected thin-walled Shelby Tube sample at 75'-77.5'. Pushed 6" at 100 psi; 6" at 115 psi; 6" at 275 psi; 6" at 300 psi; 6" at 315 psi; 30" recovery. SILTY LEAN CLAY; stiff, moist, dark gray; weak cementation; medium plasticity with medium toughness. **Consolidation Test** **TXUU Test**	ST 21			1.25	84 86	38 35	35	24	11	96
80		Same; silt with sand and detrital wood fragments with scattered shell fragments in shoe. Bit is plugging at 80'-83'.	MC 22/23		10-12-22 (34)	1.0 1.25						
		(SP-SM) Poorly-graded SAND with SILT to SILTY SAND; very dense, wet, very dark gray; weak to moderate cementation; fine to medium sand with few fine gravels, 3/8" max. size, rounded; non-plastic silty fines (Pleistocene age HOOKTON FORMATION).	SPT 24		32-43-41 (84)							
90		Becomes mostly uniformly graded fine sand with silt.	SPT 25		48-50/5"							
		Grades to clean poorly-graded fine sand with <3% silt.	SPT 26		50-50/5"							
100		(CL) SANDY LEAN CLAY; hard, wet, dark gray; moderate cementation; no dilatancy; medium plasticity with low to medium toughness; trace decomposed organics; hard silty lean clay in bottom 4" of sample. Fine gravel and coarse sand in cuttings at 104'-110'.	SPT 27		15-21-19 (40)							

(Continued Next Page)

BORING NUMBER 23-B104

CLIENT Humboldt Bay Harbor and Conservation District **PROJECT NAME** Redwood Marine Multipurpose Terminal

PROJECT NUMBER 022054.400 **PROJECT LOCATION** 364 Vance Avenue, Samoa, Humboldt County, CA

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
110		(SC) CLAYEY SAND with GRAVEL; very dense, wet, olive brown (2.5Y 4/3); weak cementation; rapid dilatancy; low plasticity clayey fines; medium to coarse sand, rounded, quartz- and chert-rich with rounded fine gravel, 3/8" max. size, hard, fresh.	SPT 28		47-50/5"							
120		(SM) SILTY SAND; very dense, wet, dark bluish gray (Gley 2 4/5PB); weak to moderate cementation; slow dilatancy; non-plastic silty fines; mostly uniformly graded fine sand with trace medium quartz sand.	SPT 29		32-57-60 (117)							
130		Wood in cuttings at 129'-130'.										
140		(SP) Poorly-graded SAND with CLAY; very dense, wet, brown to strong brown (7.5YR 4/4-4/6); weak cementation; uniformly graded fine sand with low plasticity clayey fines.	SPT 30		47-50/2"							
		Refusal at 140.7 feet. Bottom of borehole at 140.7 feet.										

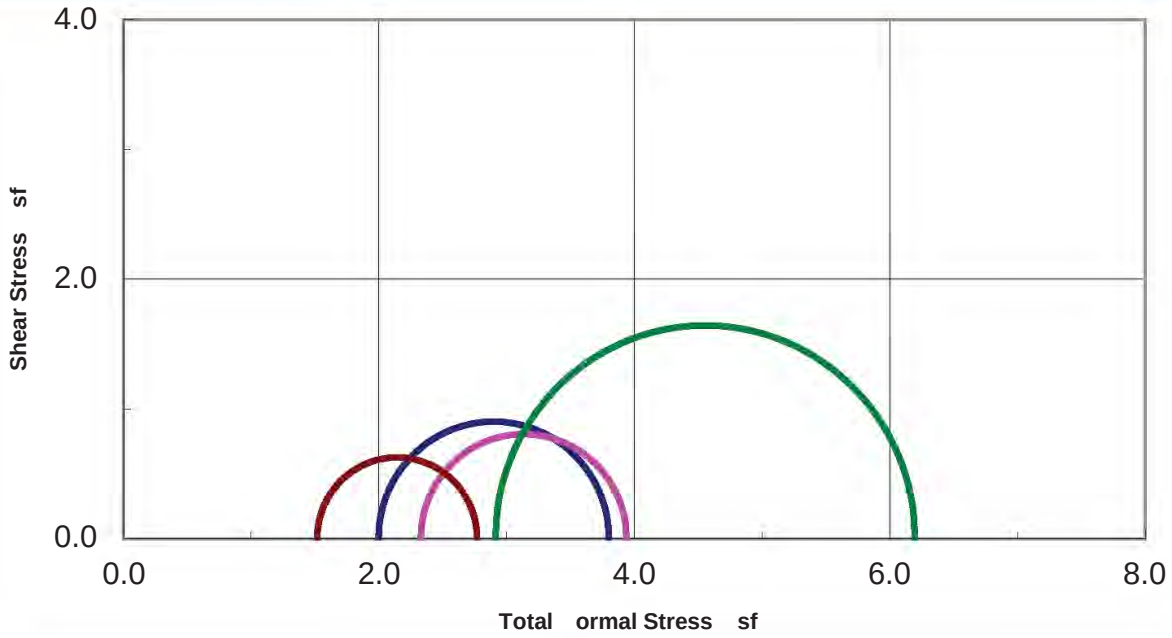
Laboratory Test Results

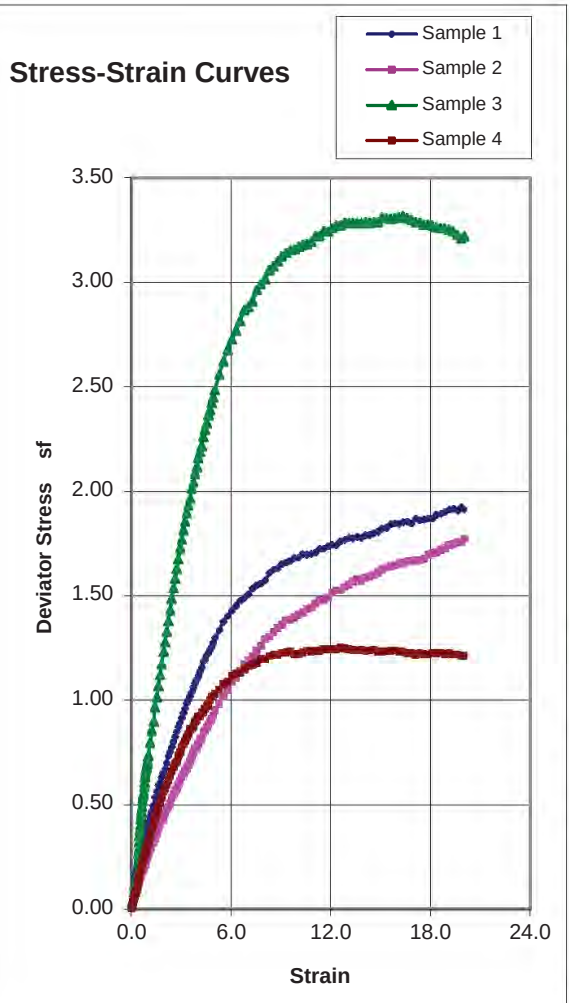
3

Cooper Testin a s Inc.
937 Commercial Street
Palo Alto CA 94303

COOPER TESTING LABORATORY

nconsoli ate - n raine Tria ial Test
ASTM D2850





Sample Data				
	1	2	3	4
oisture	26.1	26.6	35.1	39.9
Dry Den pcf	98.3	97.9	86.2	80.6
Void atio	0.715	0.722	0.955	1.091
Saturation	98.7	99.5	99.2	98.8
eight in	6.03	6.01	6.07	6.06
Diameter in	2.84	2.83	2.86	2.87
Cell psi	13.9	16.2	20.2	10.5
Strain	15.00	15.00	15.00	12.58
Deviator sf	1.806	1.611	3.286	1.253
ate min	1.00	1.00	1.00	1.00
in min	0.060	0.060	0.061	0.060
o o	0 4-1 4a			
Client	S ngineers eologists			
ro ect	220 4 400			
Boring	23- 101	23- 101	23- 101	23- 102
Sample	10	13	17	6
Depth ft	45-47.5	55-57.3(Tip-3)	70-72.59Tip-3)	30-32.5(Tip-3)

Visual Soil Description	
Sample	
1	luish Gray C A / San (shell fra ments)
2	Dar Gray C A / San poc ets
3	Dar Greenish Gray C A (ay Mu)
4	Da r Greenish Gray C A (ay Mu)

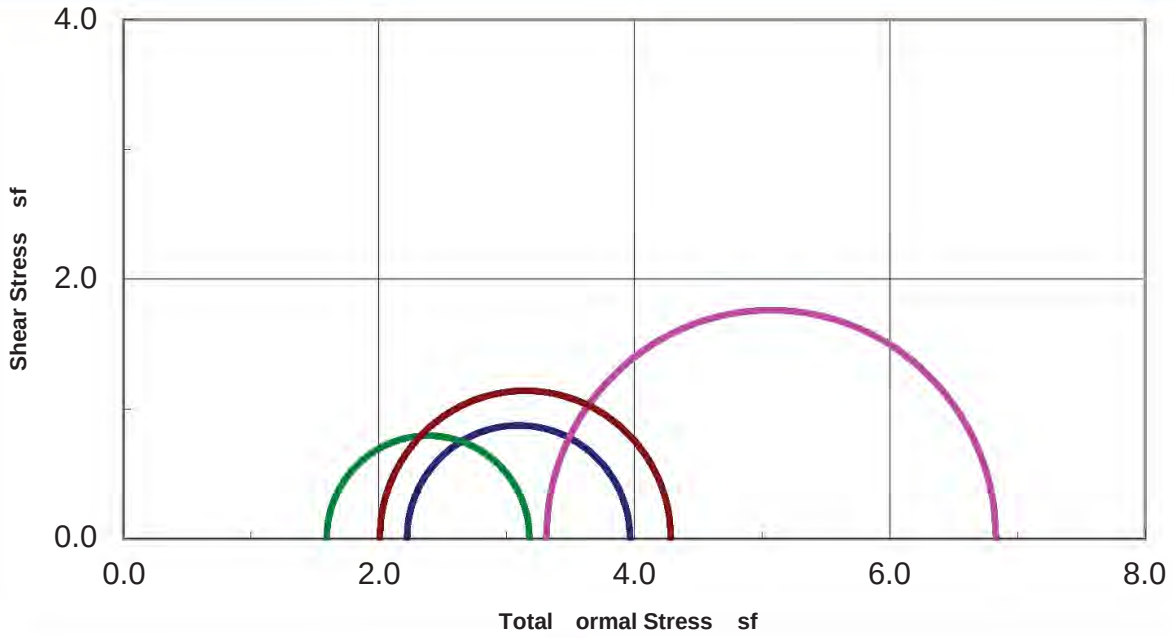
Remar s:

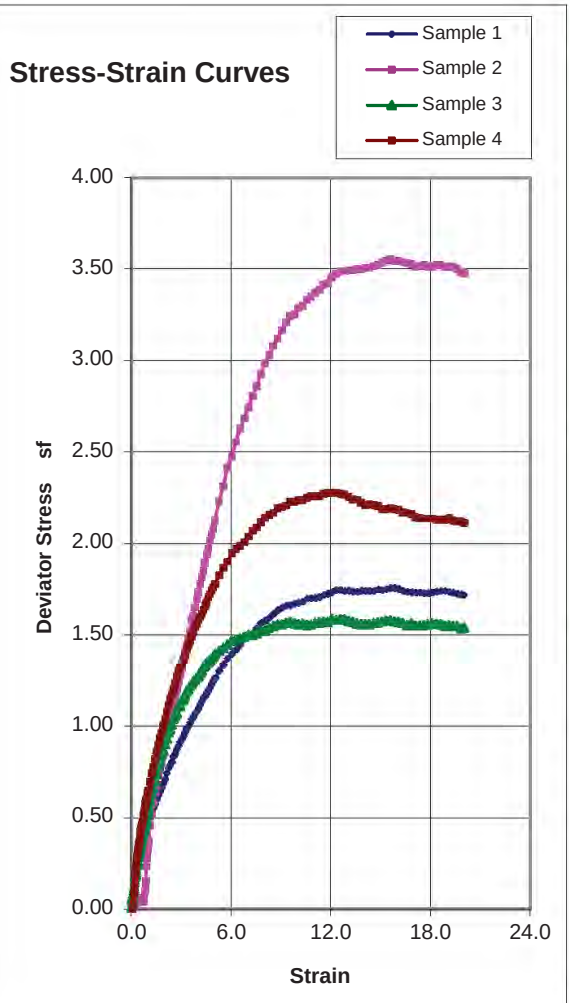
ote: Stren ths are pic e at the pea eviator stress or 15 strain hich ever occurs first per ASTM D2850.

Cooper Testin a s Inc.
937 Commercial Street
Palo Alto CA 94303

COOPER TESTING LABORATORY

nconsoli ate - n raine Tria ial Test
ASTM D2850





Sample Data				
	1	2	3	4
oisture	38.5	32.7	38.7	37.8
Dry Den pcf	82.5	89.1	82.3	82.5
Void atio	1.043	0.892	1.048	1.043
Saturation	99.6	99.1	99.6	97.7
eight in	6.08	6.05	6.06	6.08
Diameter in	2.84	2.87	2.87	2.83
Cell psi	15.4	23.0	11.0	13.9
Strain	15.00	15.00	12.07	12.33
Deviator sf	1.747	3.523	1.588	2.280
ate min	1.00	1.00	1.00	1.00
in min	0.061	0.060	0.061	0.061
o o	0 4-1 4			
Client	S ngineers eologists			
ro ect	220 4 400			
Boring	23 -102	23- 102	23- 103	23- 103
Sample	13	22	5	8
Depth ft	50-52.5(Tip-4)	80-82.5(Tip-3)	35-37.5(Tip-3)	45-47.5(Tip-3)

Visual Soil Description	
Sample	
1	Very Dar Greenish Gray C A (ay Mu)
2	Very Dar Greenish Gray C A (ay Mu)
3	Dar Greenish Gray C A (ay Mu)
4	Greenish Gray C A (ay Mu)

Remar s:

ote: Stren ths are pic e at the pea eviator stress or 15 strain hich ever occurs first per ASTM D2850.

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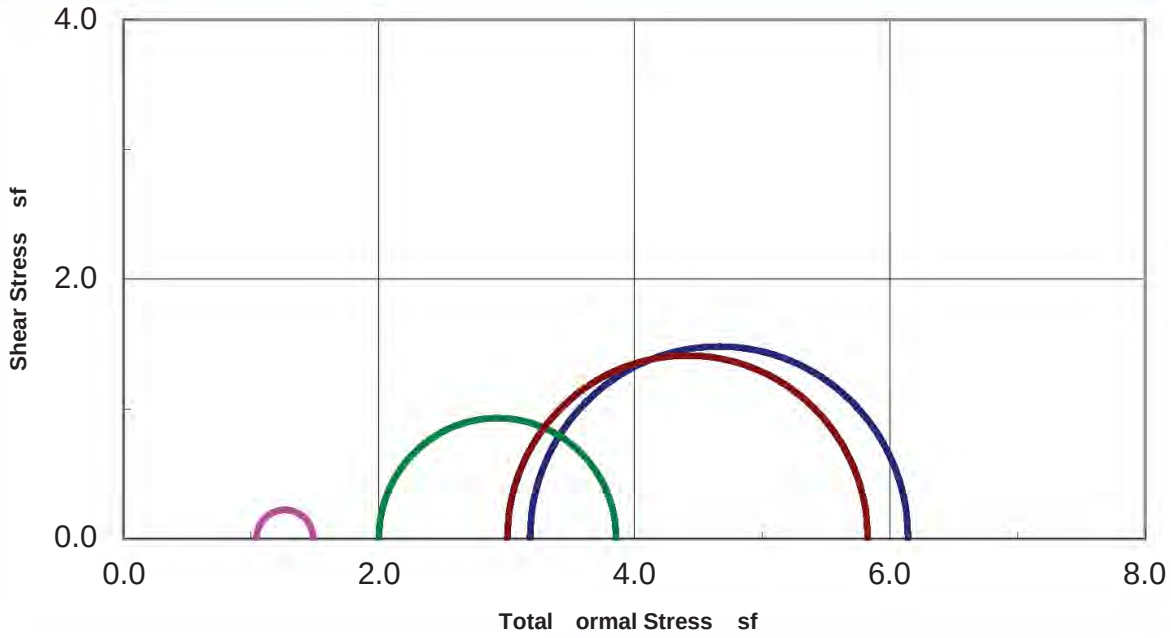
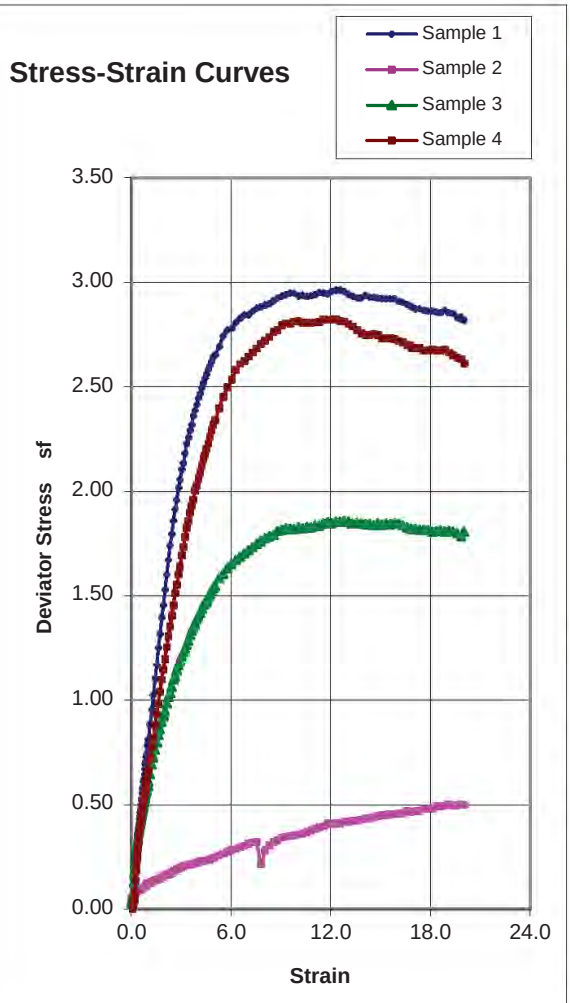
937 Commercial Street
Palo Alto CA 94303

COOPER TESTING LABORATORY

nconsoli ate - n raine Tria ial Test

ASTM D2850





Sample Data				
	1	2	3	4
oisture	34.9	40.4	40.0	35.1
Dry Den pcf	86.5	77.0	79.8	85.6
Void atio	0.949	1.190	1.113	0.970
Saturation	99.3	91.7	96.9	97.8
eight in	6.06	5.00	6.07	6.06
Diameter in	2.87	2.40	2.84	2.82
Cell psi	22.1	7.2	13.9	20.9
Strain	12.32	15.00	12.82	11.57
Deviator sf	2.962	0.445	1.859	2.824
ate min	1.00	1.00	1.00	1.00
in min	0.061	0.050	0.061	0.060
o o	0 4-1 4c			
Client	S ngineers eologists			
ro ect	220 4 400			
Boring	23- 103	23- 104	23- 104	23- 104
Sample	17	5	12	21
Depth ft	75-77.5(Tip-3)	20.5-21	45-47.5(Tip-3)	75-77.5(Tip-3)

Visual Soil Description	
Sample	
1	Dar Greenish Gray C A (ay Mu)
2	Greenish Gray SI T (ay Mu)
3	Greenish Gray C A (ay Mu)
4	Greenish Gray C A (ay Mu)

Remar s:

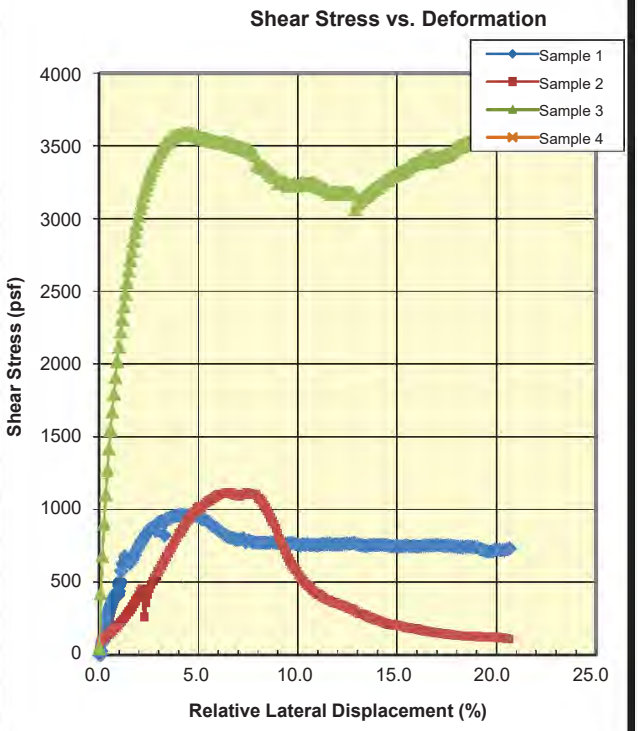
ote: Stren ths are pic e at the pea eviator stress or 15 strain hich ever occurs first per ASTM D2850.

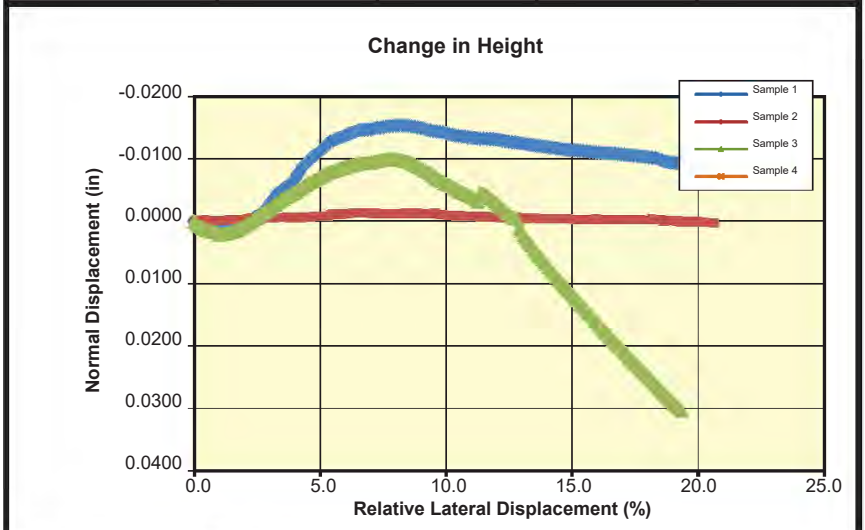
Consolidated Drained Direct Shear (ASTM D3080)

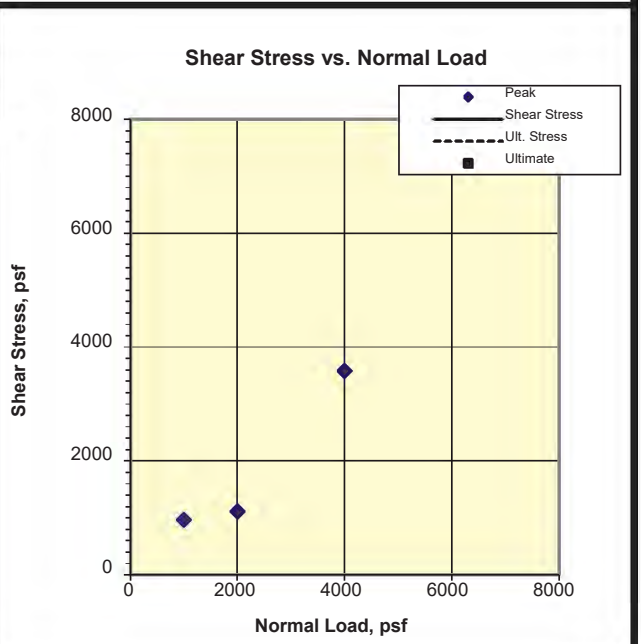
CTL Job #: 054-194 | Project #: 022054.400 | By: MD
Client: SHN Engineers & Geologists | Date: 10/31/2023 | Checked: PJ
Project Name: RMMT, Samoa Peninsula, Humboldt County | Remolding Info:

Specimen Data	1	2	3	4
Boring:	23-B103	23-B103	23-B103	
Sample:	1	1	1	
Depth (ft):	21-21.5	21-21.5	21-21.5	
Visual Description:	Dark Gray Silty SAND w/ Gravel & shells	Dark Gray Silty SAND w/ Gravel & shells	Dark Gray Silty SAND w/ Gravel & shells	
Normal Load (psf)	1000	2000	4000	
Dry Mass of Specimen (g)	132.0	132.8	134.3	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.42	2.42	2.42	
Initial Void Ratio	0.541	0.533	0.515	
Initial Moisture (%)	17.4	17.2	16.6	
Initial Wet Density (pcf)	128.4	128.9	129.7	
Initial Dry Density (pcf)	109.4	110.0	111.2	
Initial Saturation (%)	86.7	87.4	87.0	
ΔHeight Consol (in)	0.0056	0.0115	0.0216	
At Test Void Ratio	0.533	0.515	0.482	
At Test Moisture (%)	19.1	18.8	17.7	
At Test Wet Density (pcf)	130.9	132.1	133.8	
At Test Dry Density (pcf)	110.0	111.3	113.7	
At Test Saturation (%)	96.6	98.3	98.8	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	965	1117	3584	
ΔHeight (in) at Peak	-0.0086	-0.0012	-0.0057	
Ultimate Stress (psf)				

Phi (deg)		Ult. Phi (deg)	
Cohesion (psf)		Ult. Cohesion (psf)	







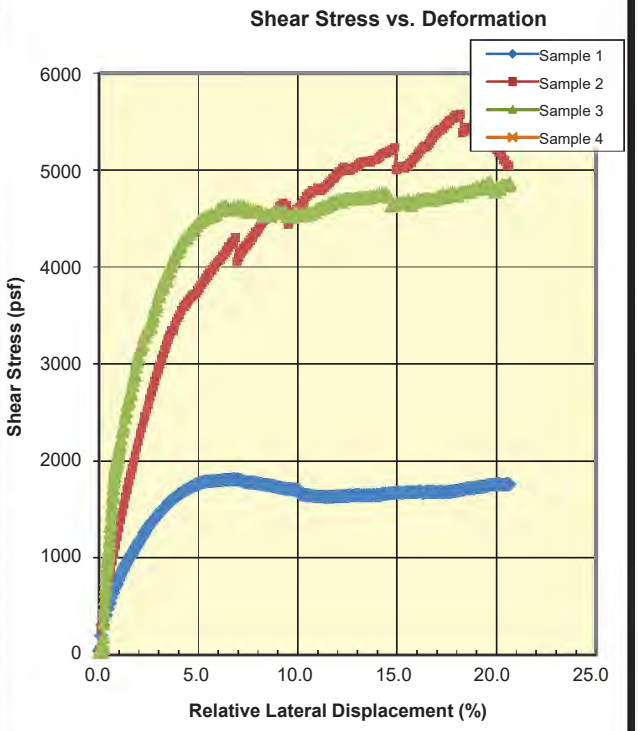
Remarks: Engineering judgement is required to determine phi and cohesion, no phi or cohesion is reported. To add phi and cohesion to the report go to the "phi" tab and in cells G30, G31, H30, and H31 enter end points for a line through the 3 data points. The points plotted can be changed on the "Eng Values" tab using cells L6, A2, C2, and E2.

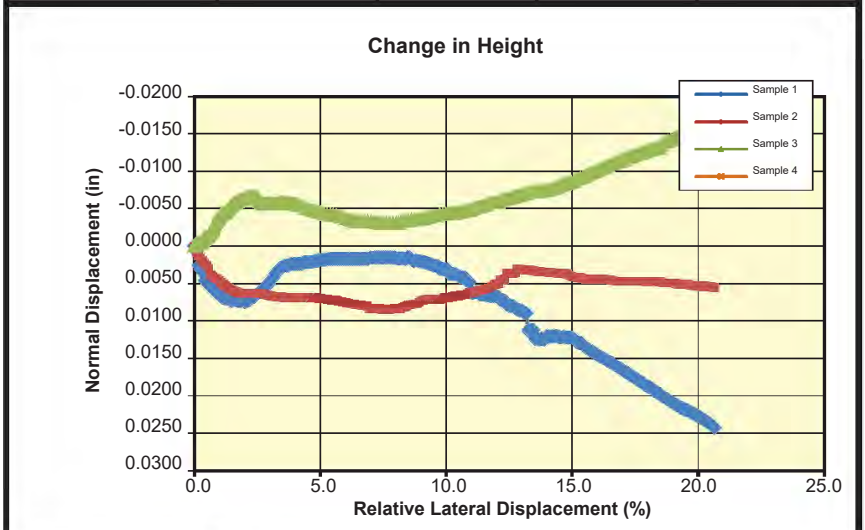
Consolidated Drained Direct Shear (ASTM D3080)

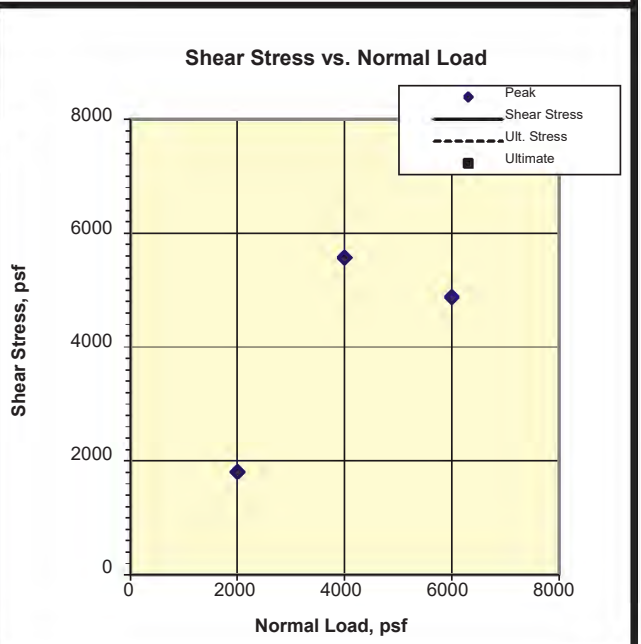
CTL Job #: 054-194 | Project #: 022054.400 | By: MD
Client: SHN Engineers & Geologists | Date: 11/2/2023 | Checked: PJ
Project Name: RMMT, Samoa Peninsula, Humboldt County | Remolding Info:

Specimen Data	1	2	3	4
Boring:	23-B104	23-B104	23-B104	
Sample:	17	17	17	
Depth (ft):	61-61.5	61-61.5	61-61.5	
Visual Description:	Dark Gray Silty SAND (shells)	Dark Gray Silty SAND (shells)	Dark Gray Silty SAND (shells)	
Normal Load (psf)	2000	4000	6000	
Dry Mass of Specimen (g)	131.0	134.5	135.6	
Initial Height (in)	1.01	1.01	1.01	
Initial Diameter (in)	2.42	2.42	2.42	
Initial Void Ratio	0.599	0.549	0.544	
Initial Moisture (%)	21.6	19.6	19.7	
Initial Wet Density (pcf)	130.5	132.6	133.1	
Initial Dry Density (pcf)	107.4	110.9	111.2	
Initial Saturation (%)	99.0	98.4	99.7	
ΔHeight Consol (in)	0.0329	0.0347	0.0563	
At Test Void Ratio	0.547	0.495	0.458	
At Test Moisture (%)	19.8	17.9	16.6	
At Test Wet Density (pcf)	133.0	135.4	137.4	
At Test Dry Density (pcf)	111.0	114.8	117.8	
At Test Saturation (%)	99.6	99.4	100.0	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	1813	5575	4876	
ΔHeight (in) at Peak	0.0017	0.0047	-0.0151	
Ultimate Stress (psf)				

Phi (deg)		Ult. Phi (deg)	
Cohesion (psf)		Ult. Cohesion (psf)	





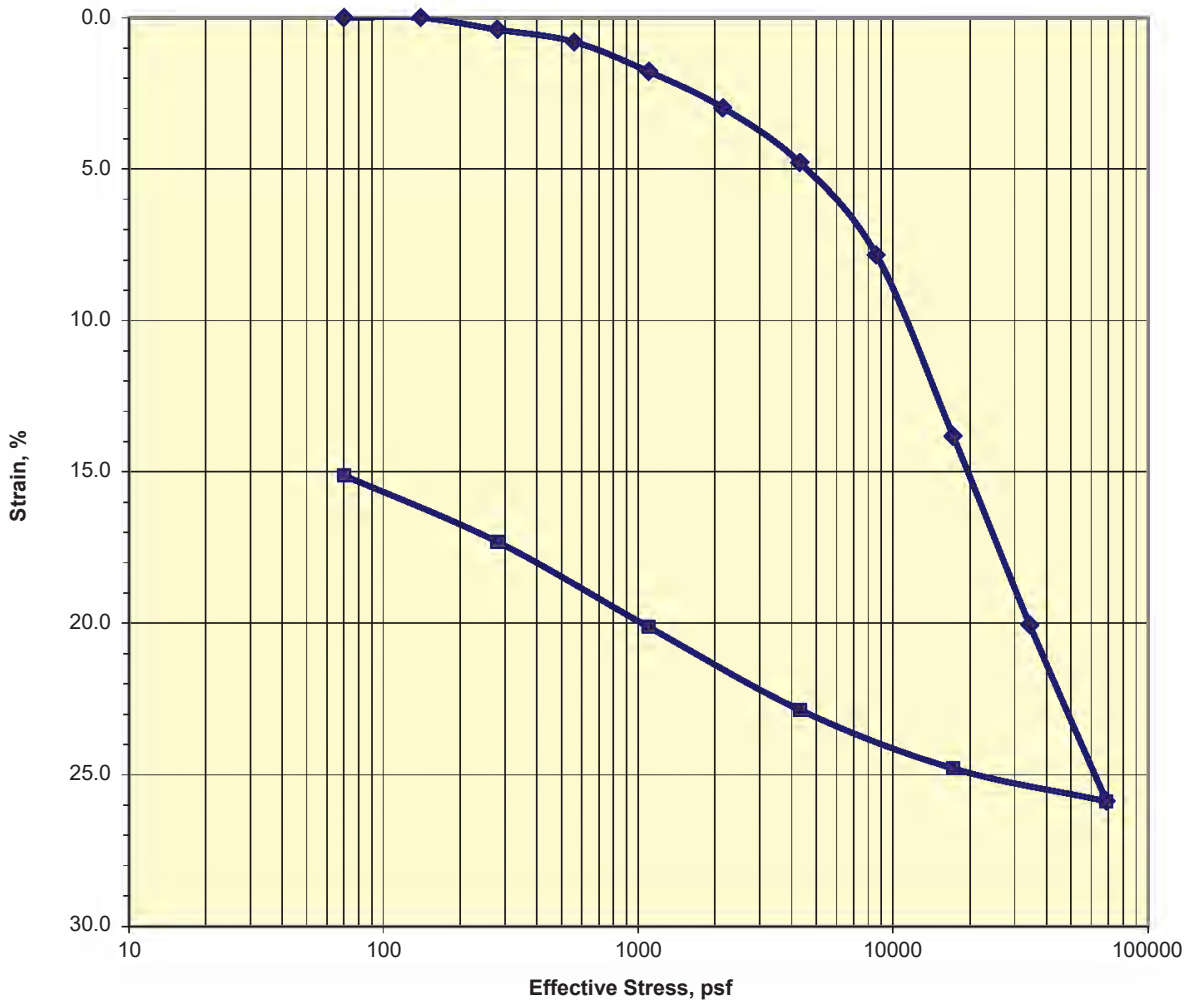


Remarks: Engineering judgement is required to determine phi and cohesion, no phi or cohesion is reported. To add phi and cohesion to the report go to the "phi" tab and in cells G30, G31, H30, and H31 enter end points for a line through the 3 data points. The points plotted can be changed on the "Eng Values" tab using cells L6, A2, C2, and E2.

Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23B101	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	17	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	70-72.5	**Checked:**	PJ
Soil Type:	Dark Greenish Gray CLAY (Bay Mud)			**Date:**	11/6/2023

Strain-Log-P Curve



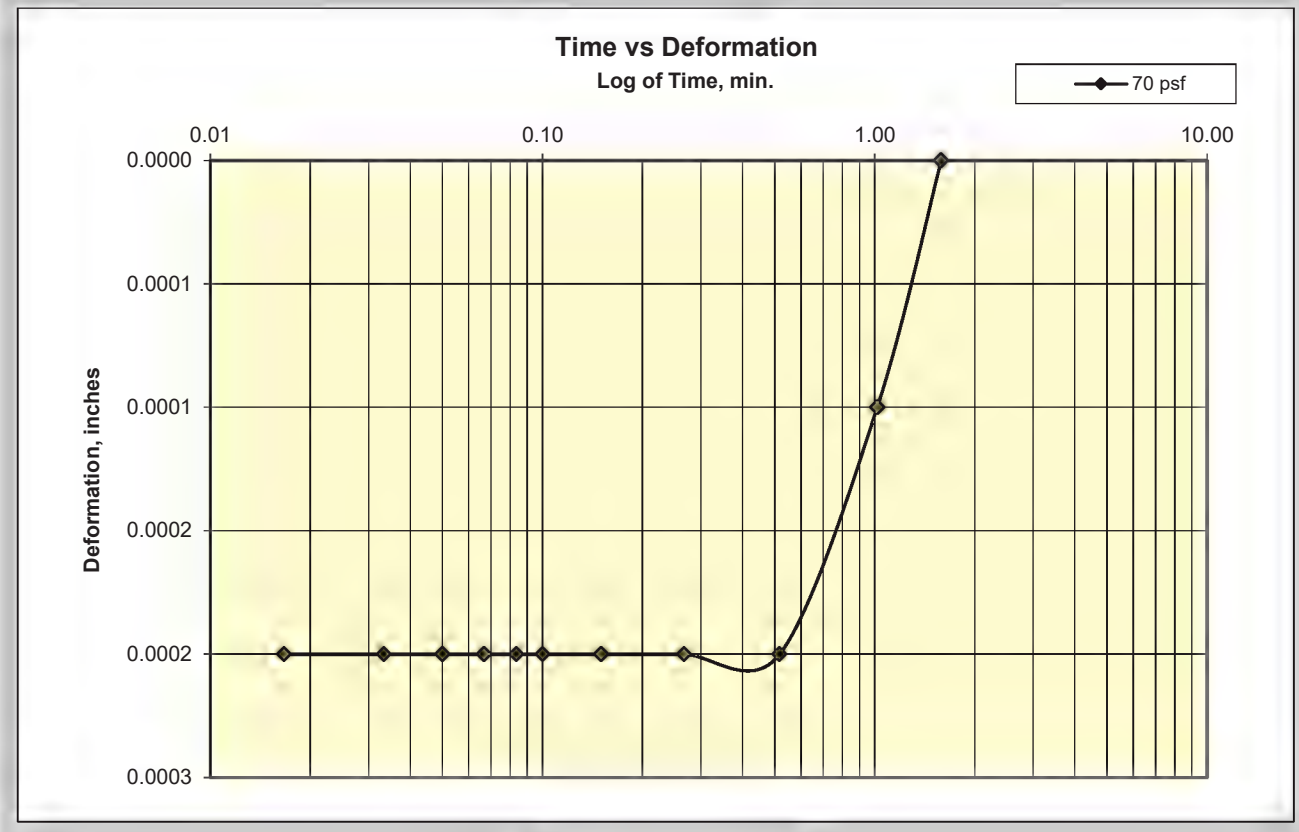
Assumed Gs 2.8	Initial	Final
Moisture %:	39.2	30.4
Dry Density, pcf:	80.5	94.4
Void Ratio:	1.172	0.851
% Saturation:	93.7	100.0

Remarks:

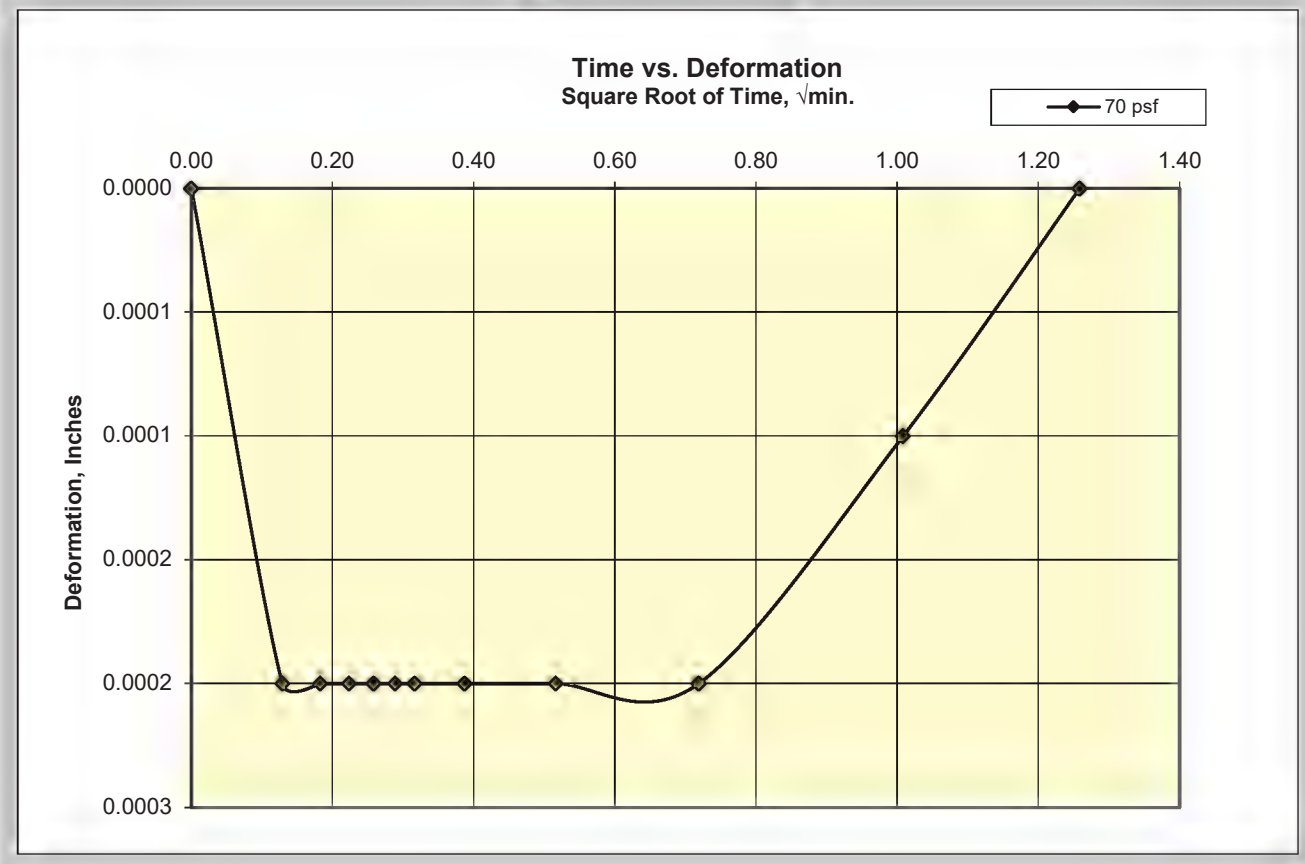
Cooper Testing Labs, Inc.

Load 1

70 psf



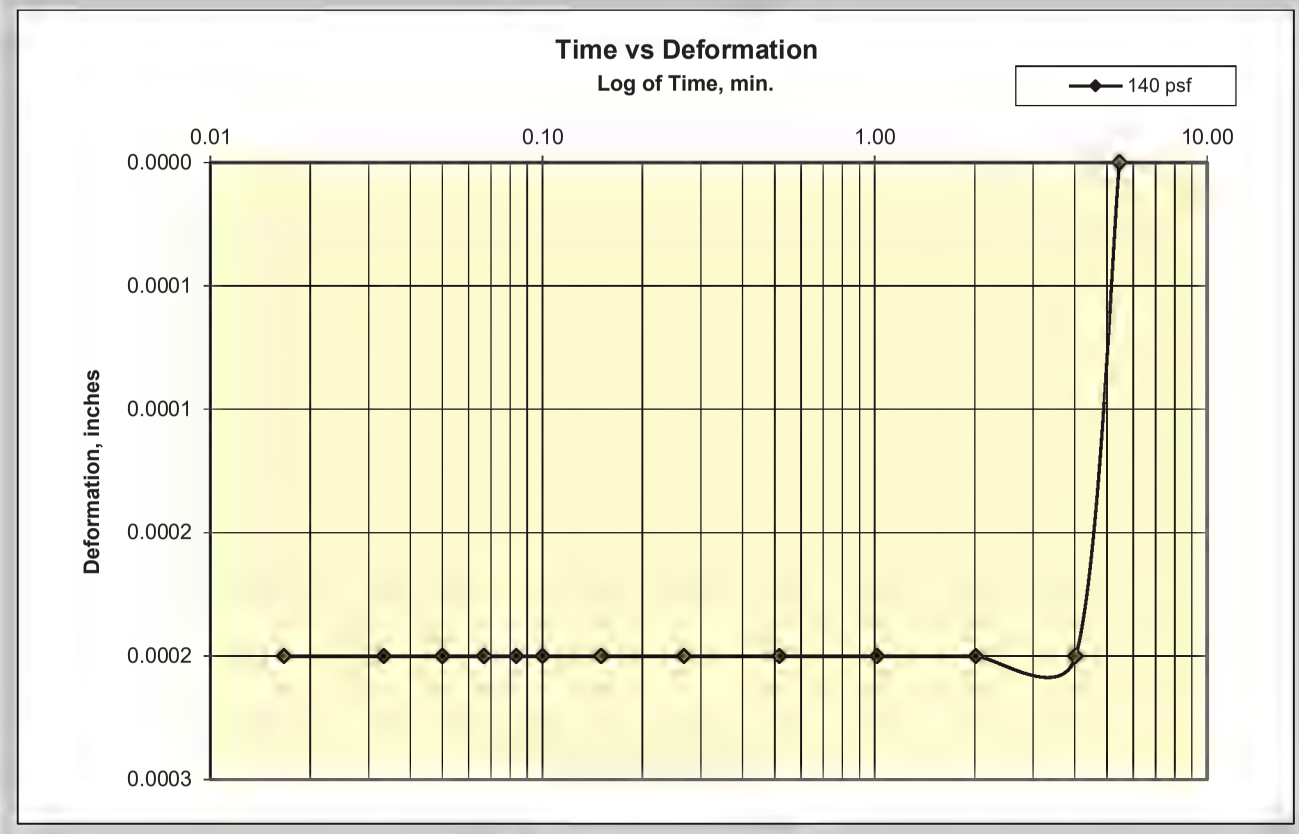
70 psf



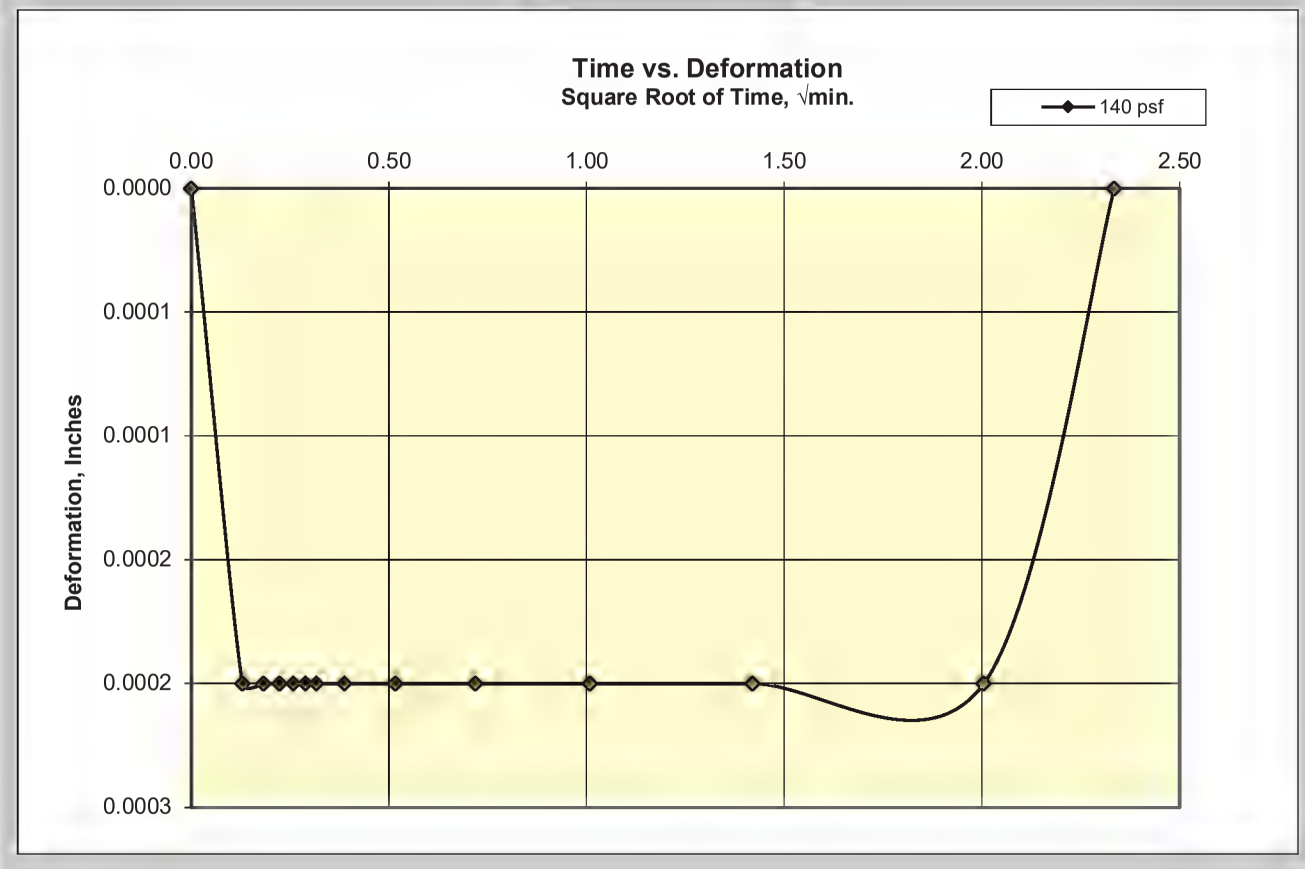
Cooper Testing Labs, Inc.

Load 2

140 psf



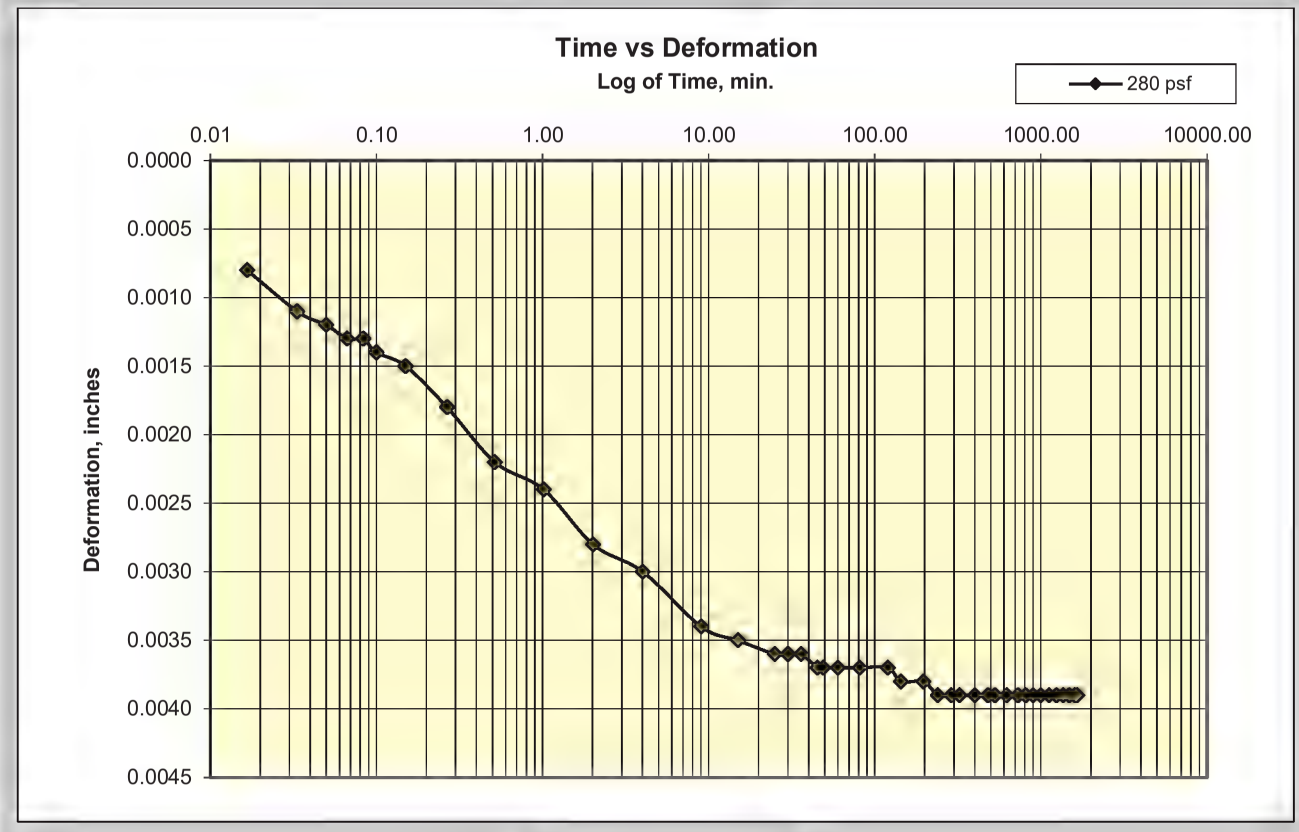
140 psf



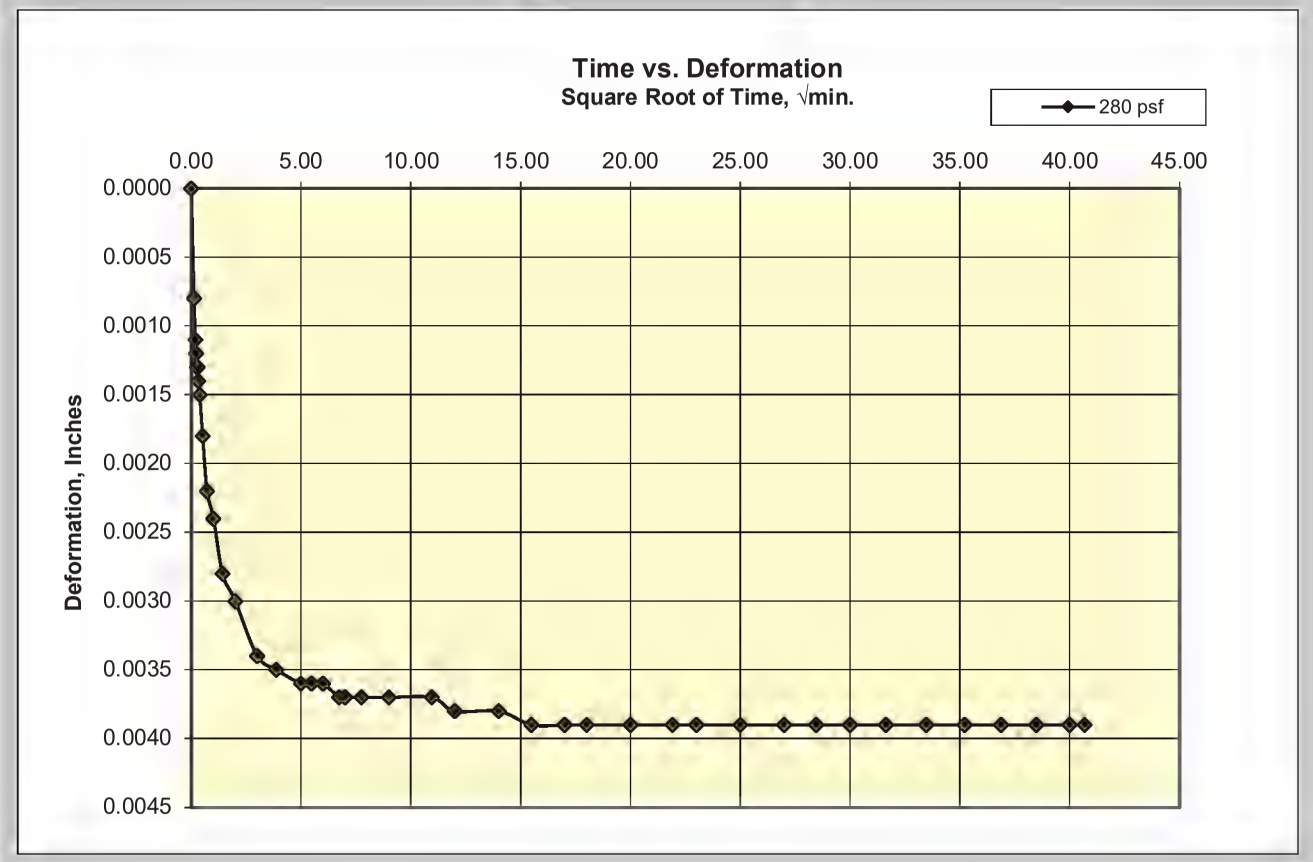
Cooper Testing Labs, Inc.

Load 3

280 psf



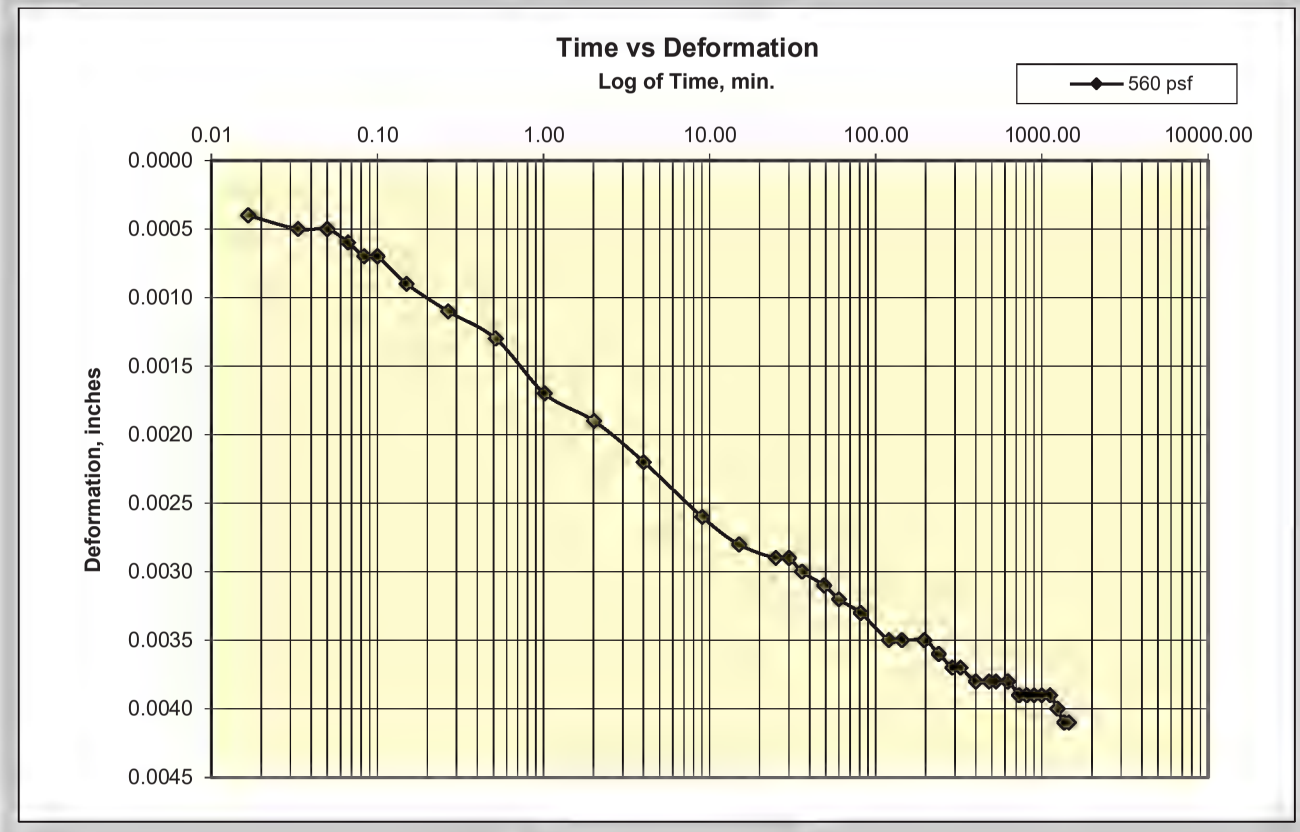
280 psf



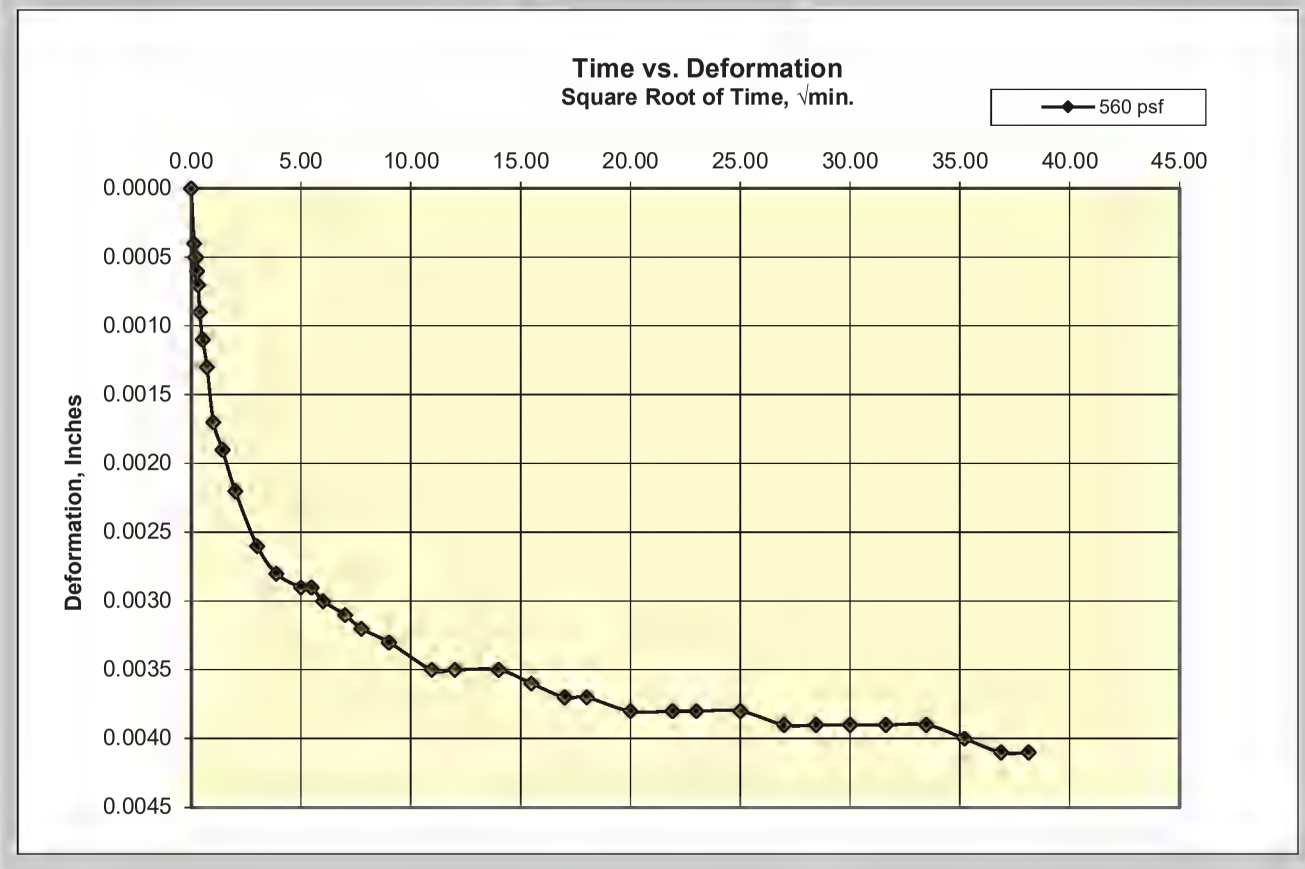
Cooper Testing Labs, Inc.

Load 4

560 psf



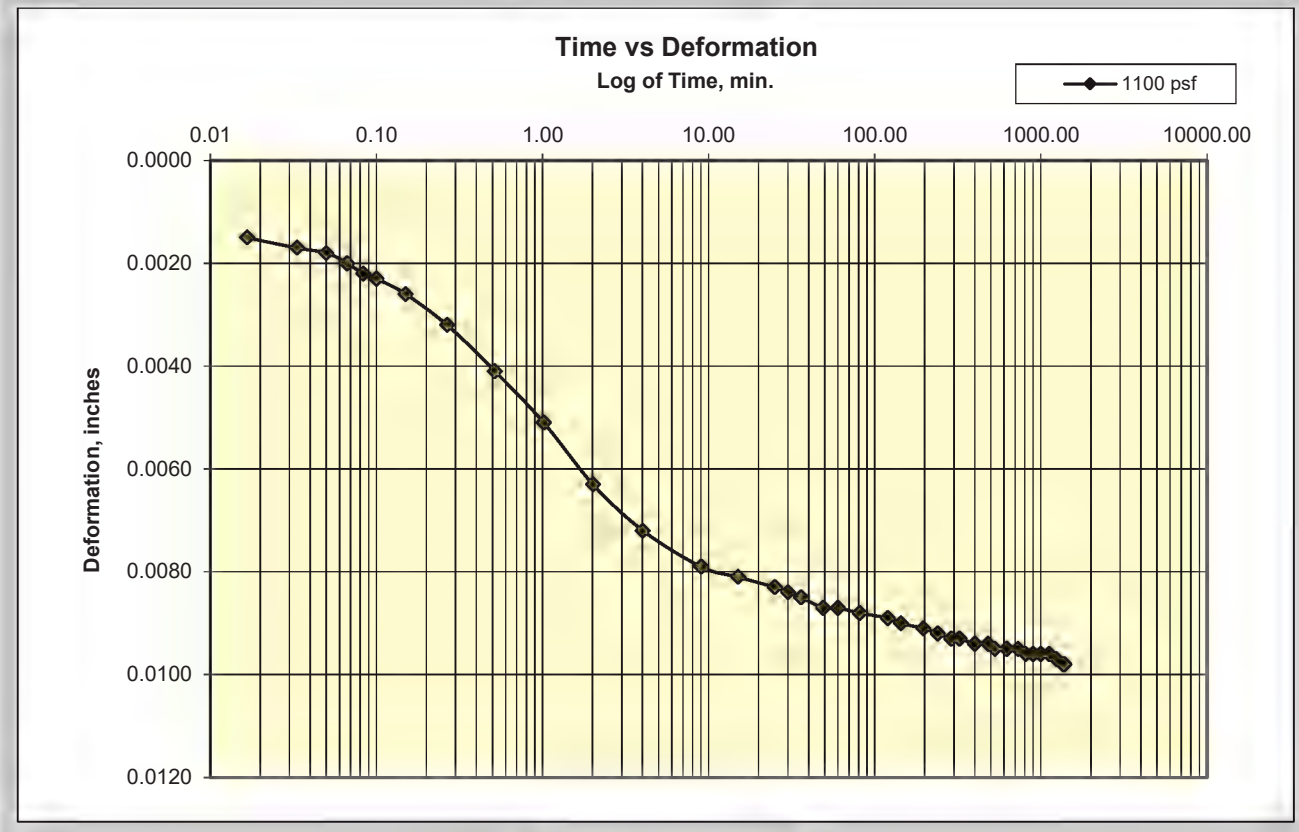
560 psf



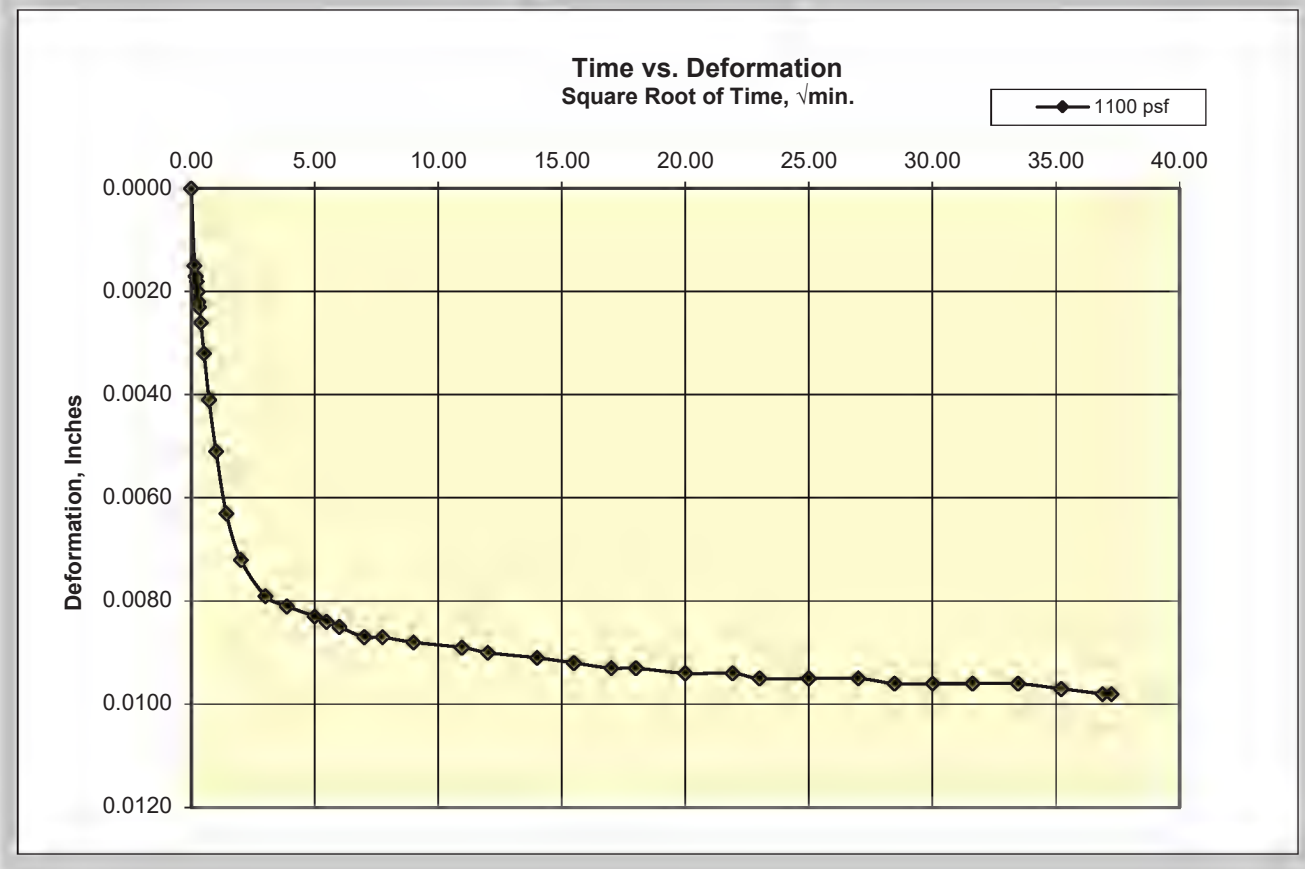
Cooper Testing Labs, Inc.

Load 5

1100 psf



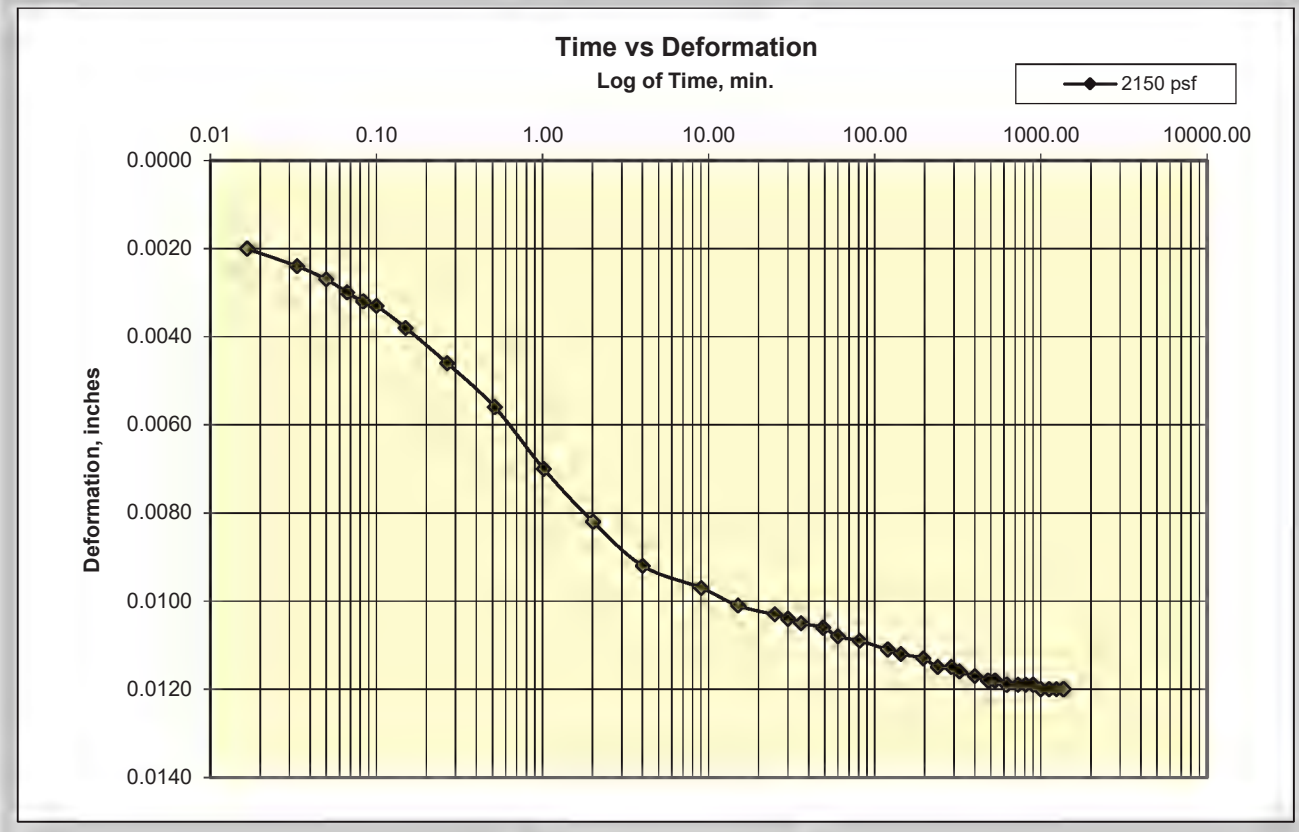
1100 psf



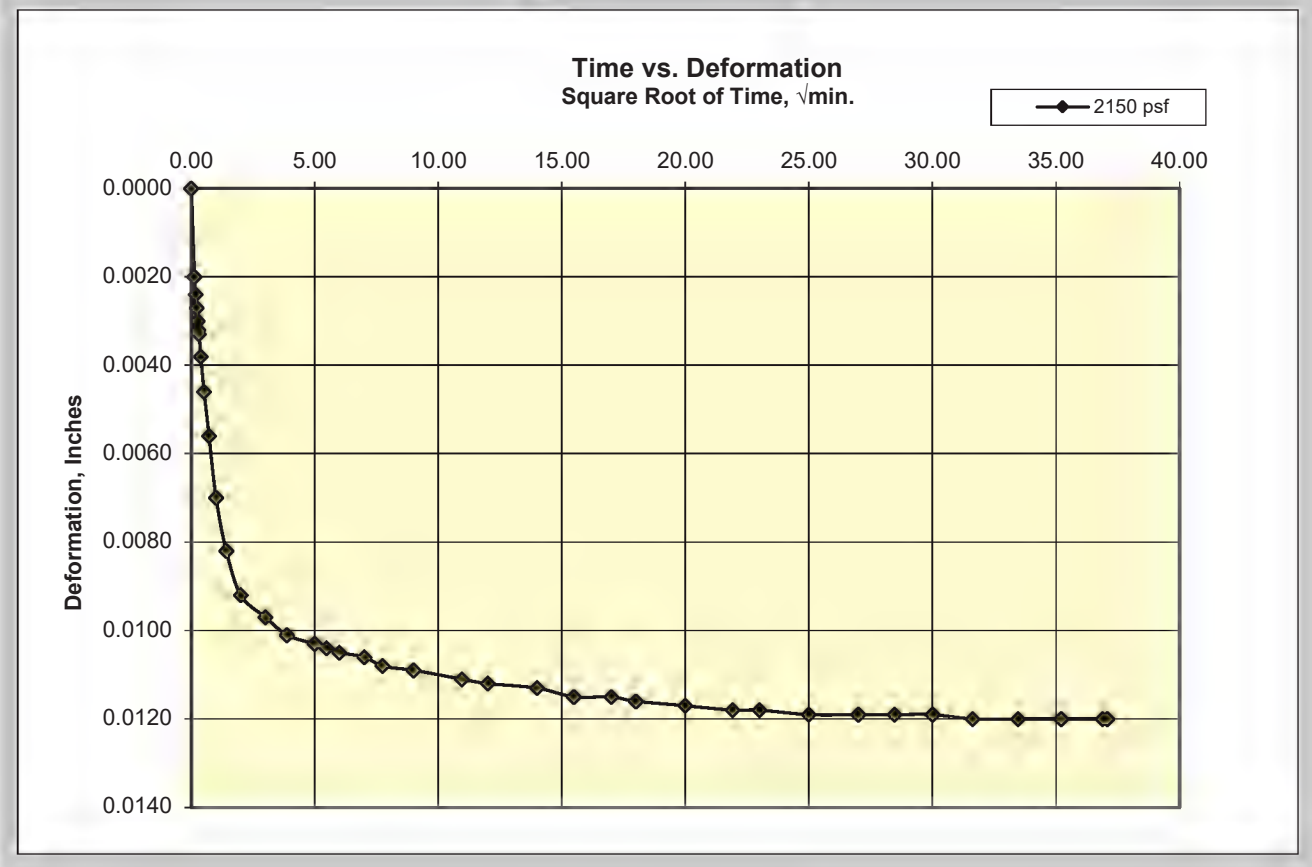
Cooper Testing Labs, Inc.

Load 6

2150 psf



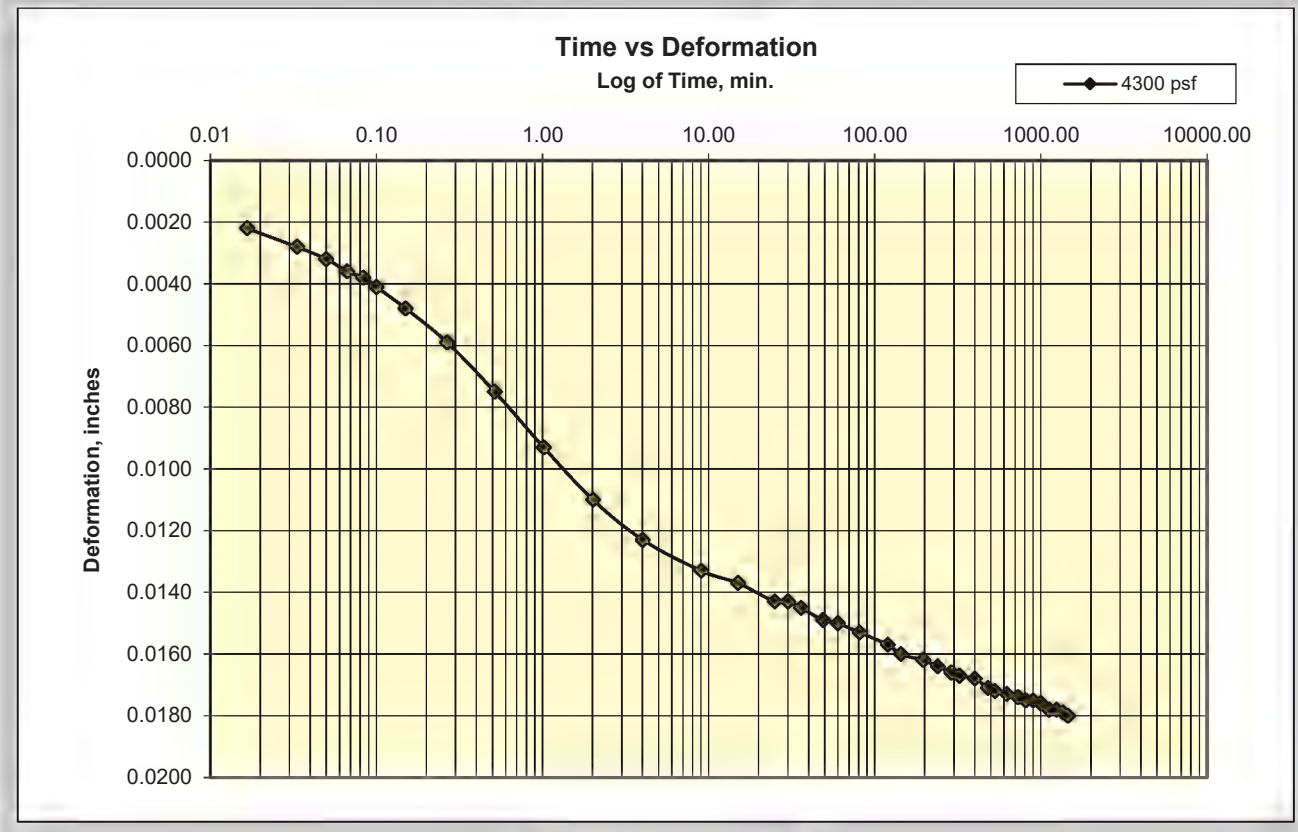
2150 psf



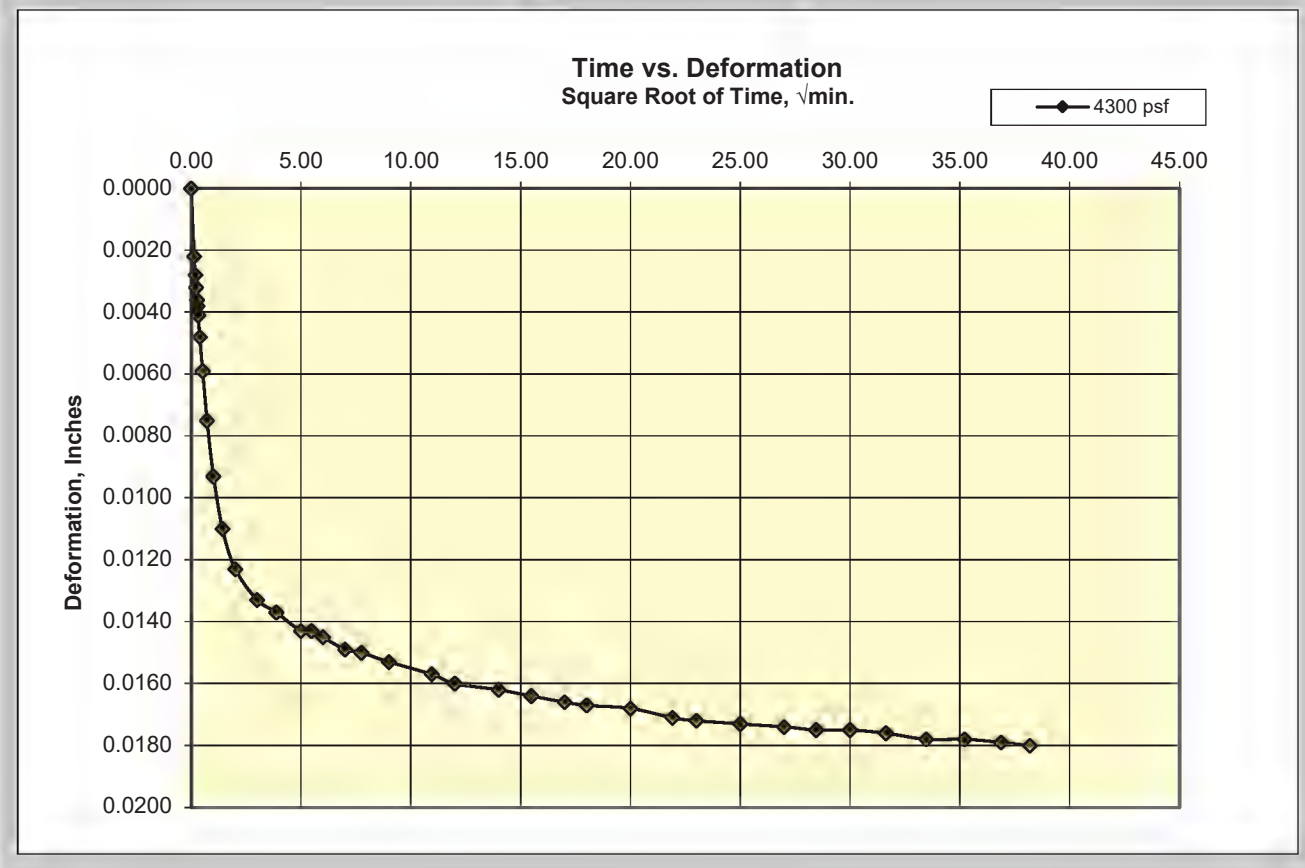
Cooper Testing Labs, Inc.

Load 7

4300 psf



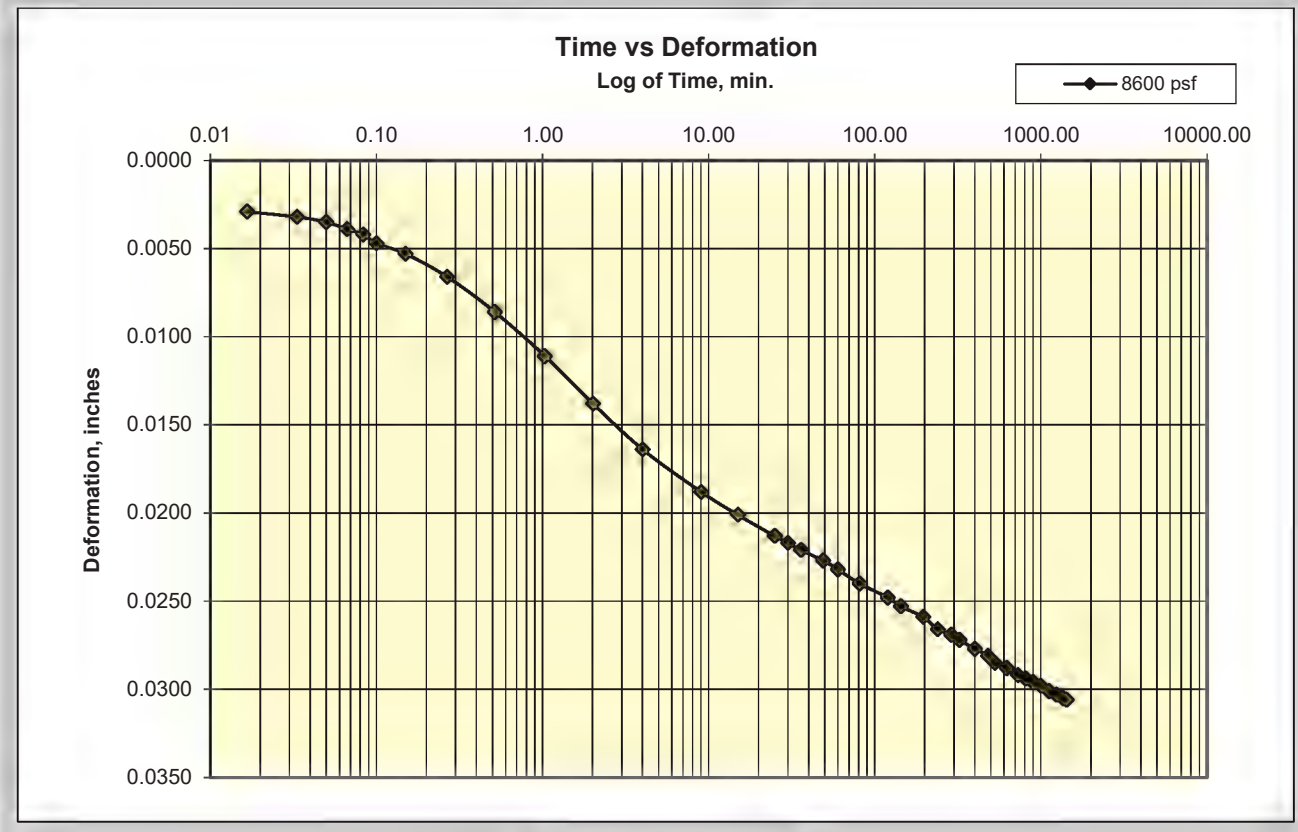
4300 psf



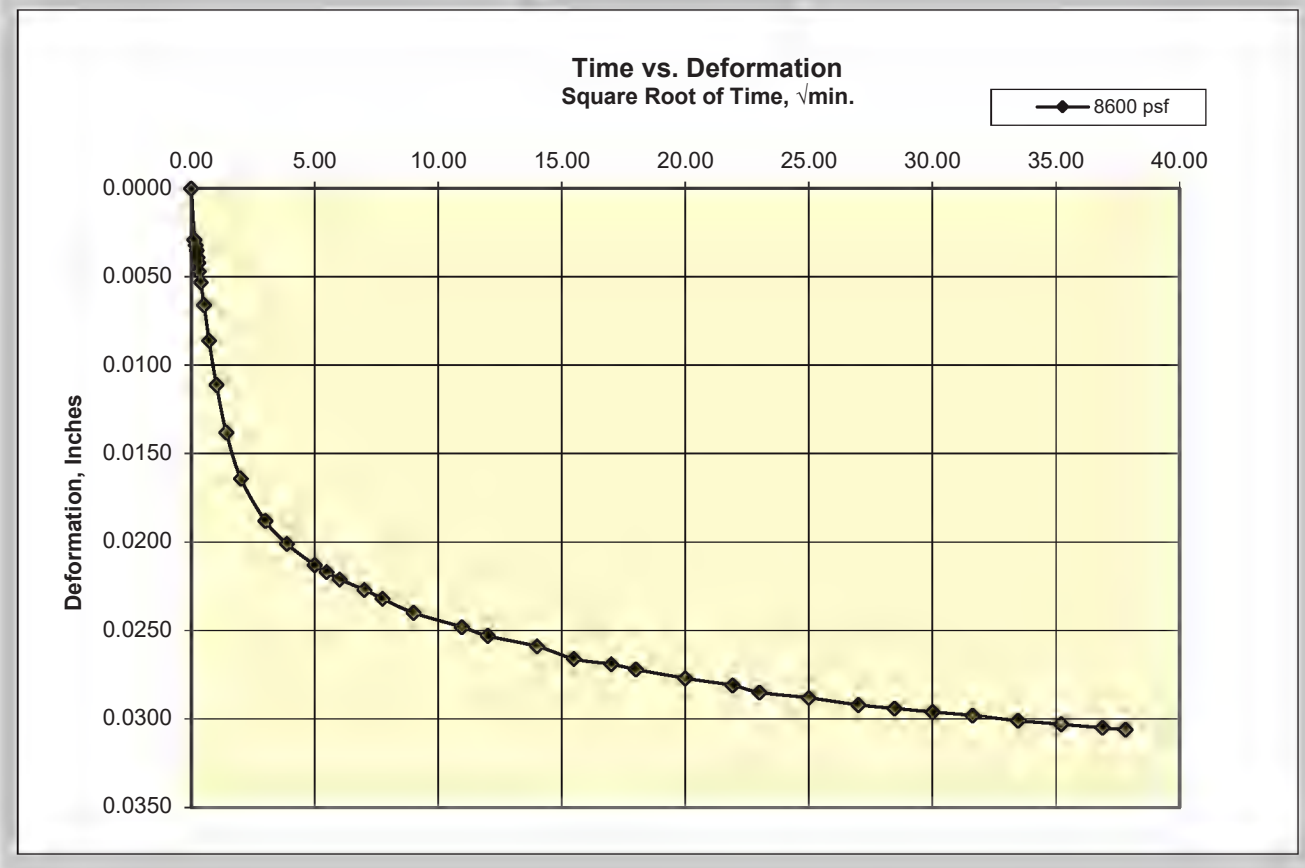
Cooper Testing Labs, Inc.

Load 8

8600 psf



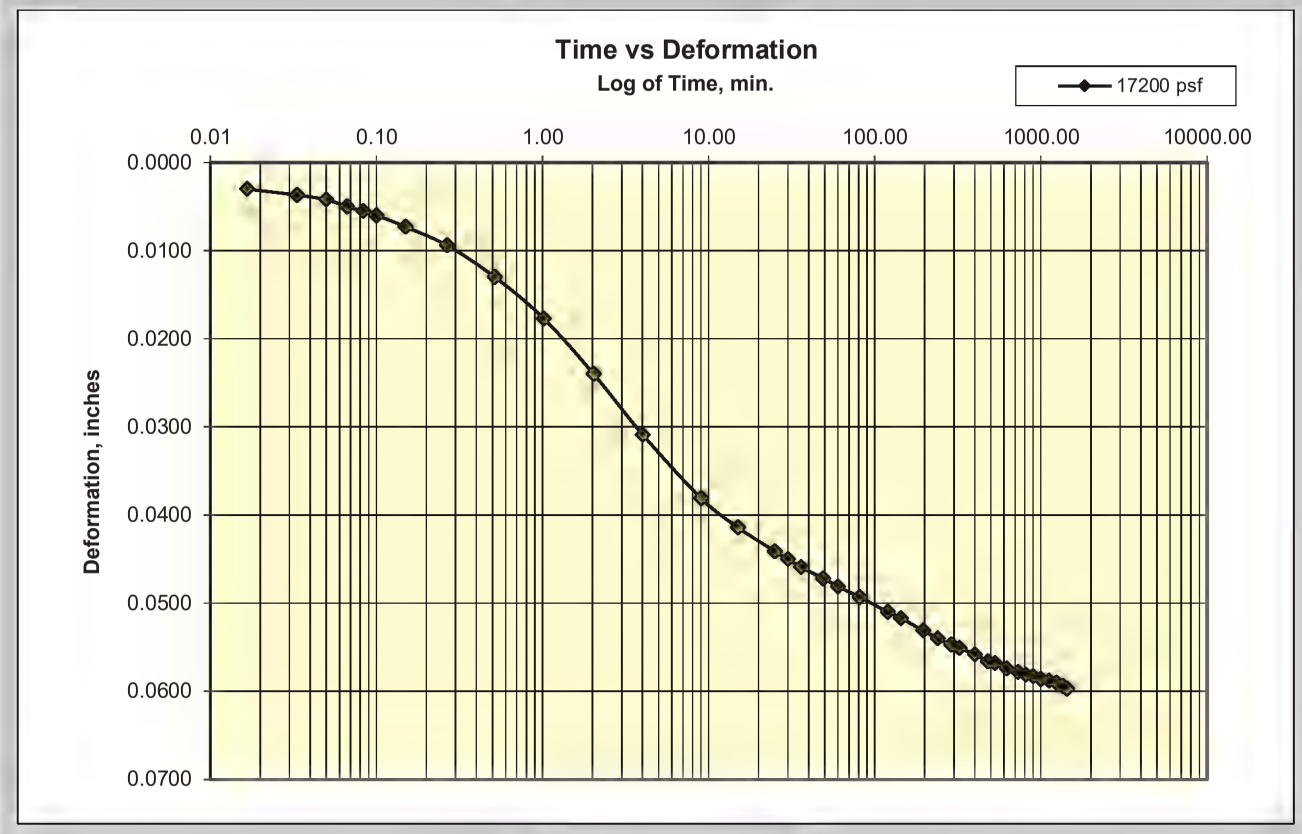
8600 psf



Cooper Testing Labs, Inc.

Load 9

17200 psf



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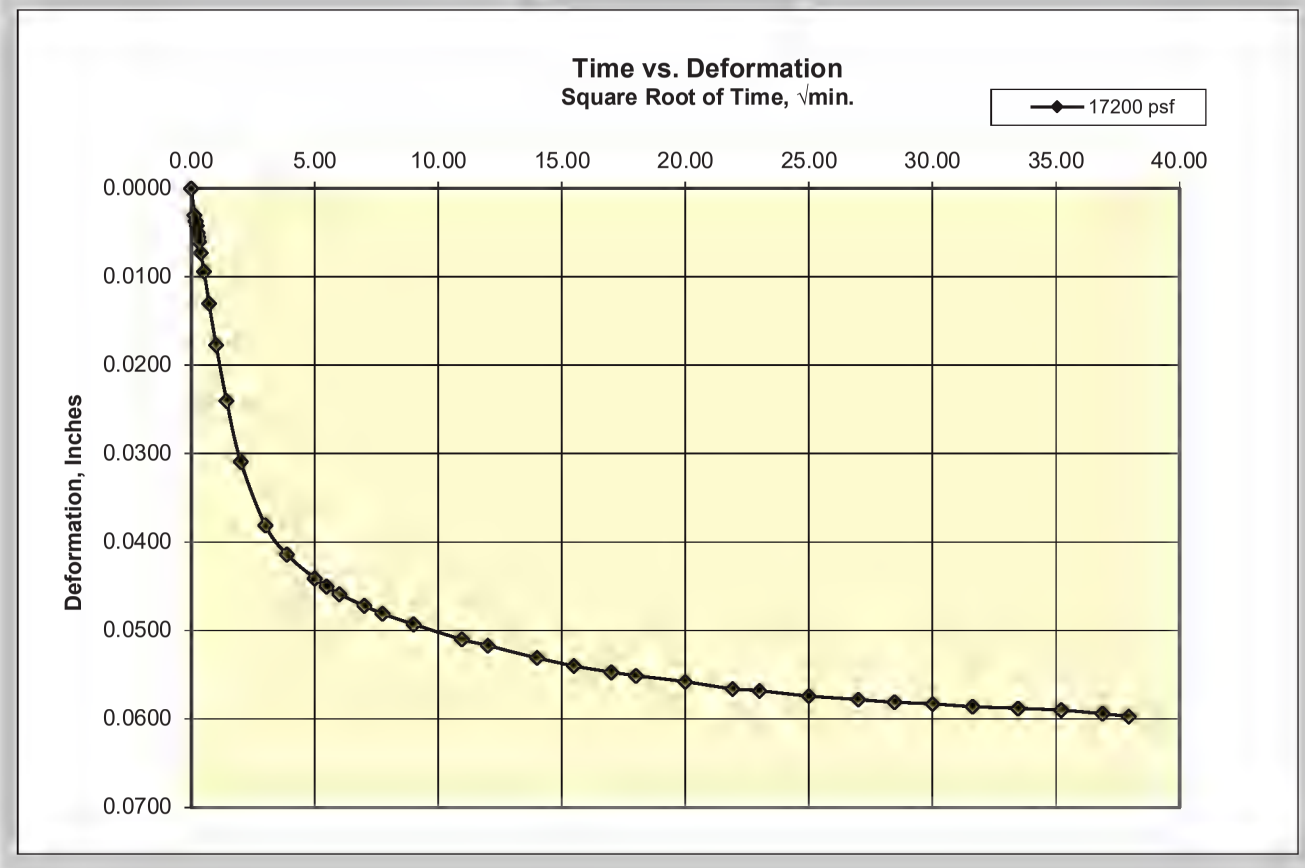
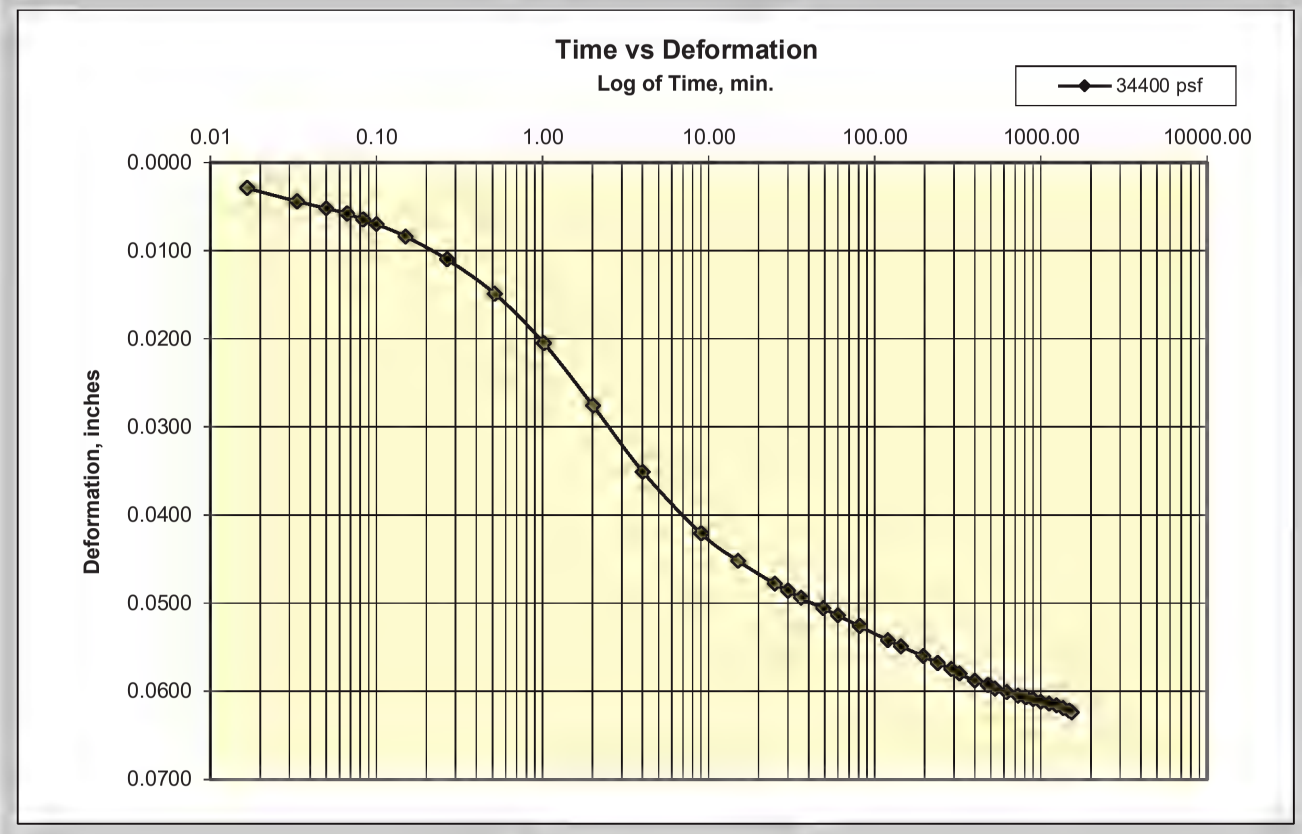


Cooper Testing Labs, Inc.

Load 10

34400 psf



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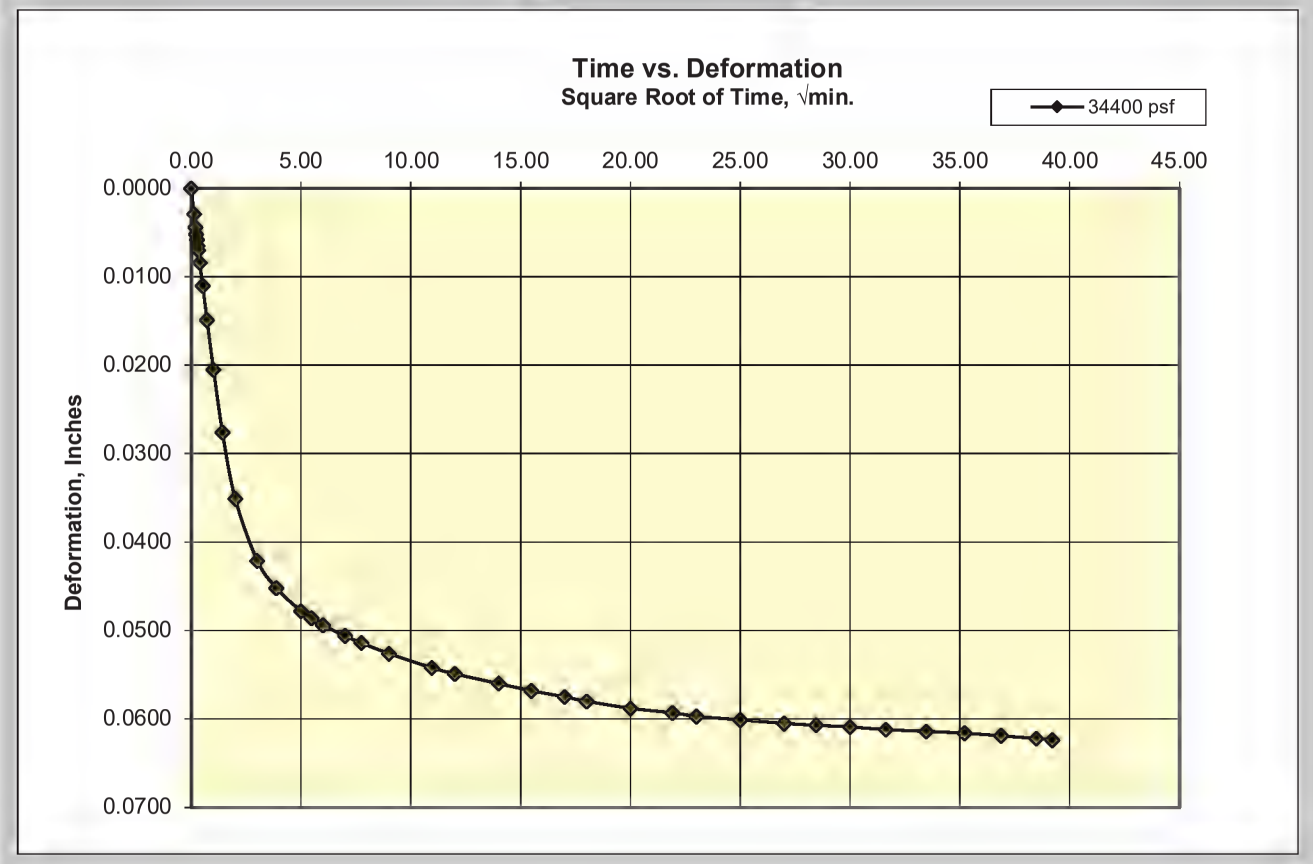
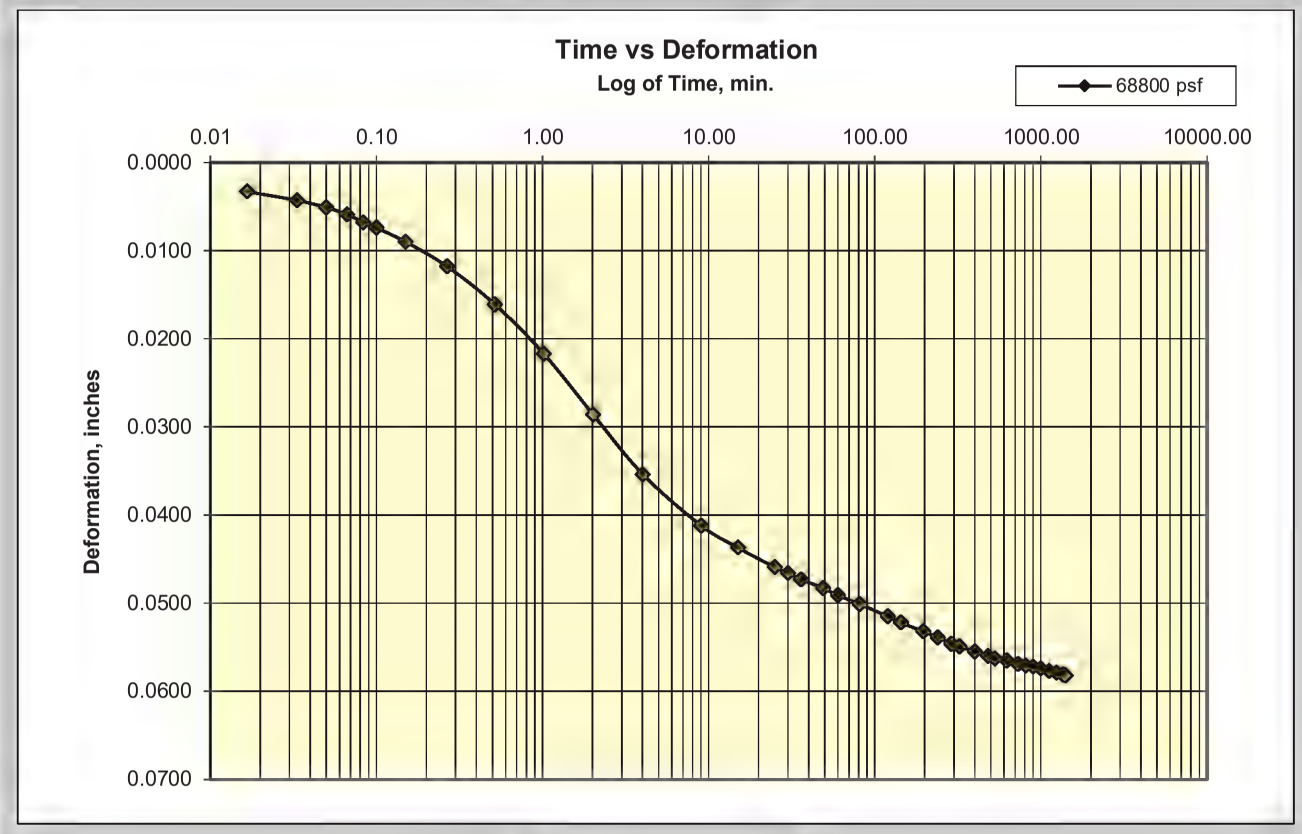
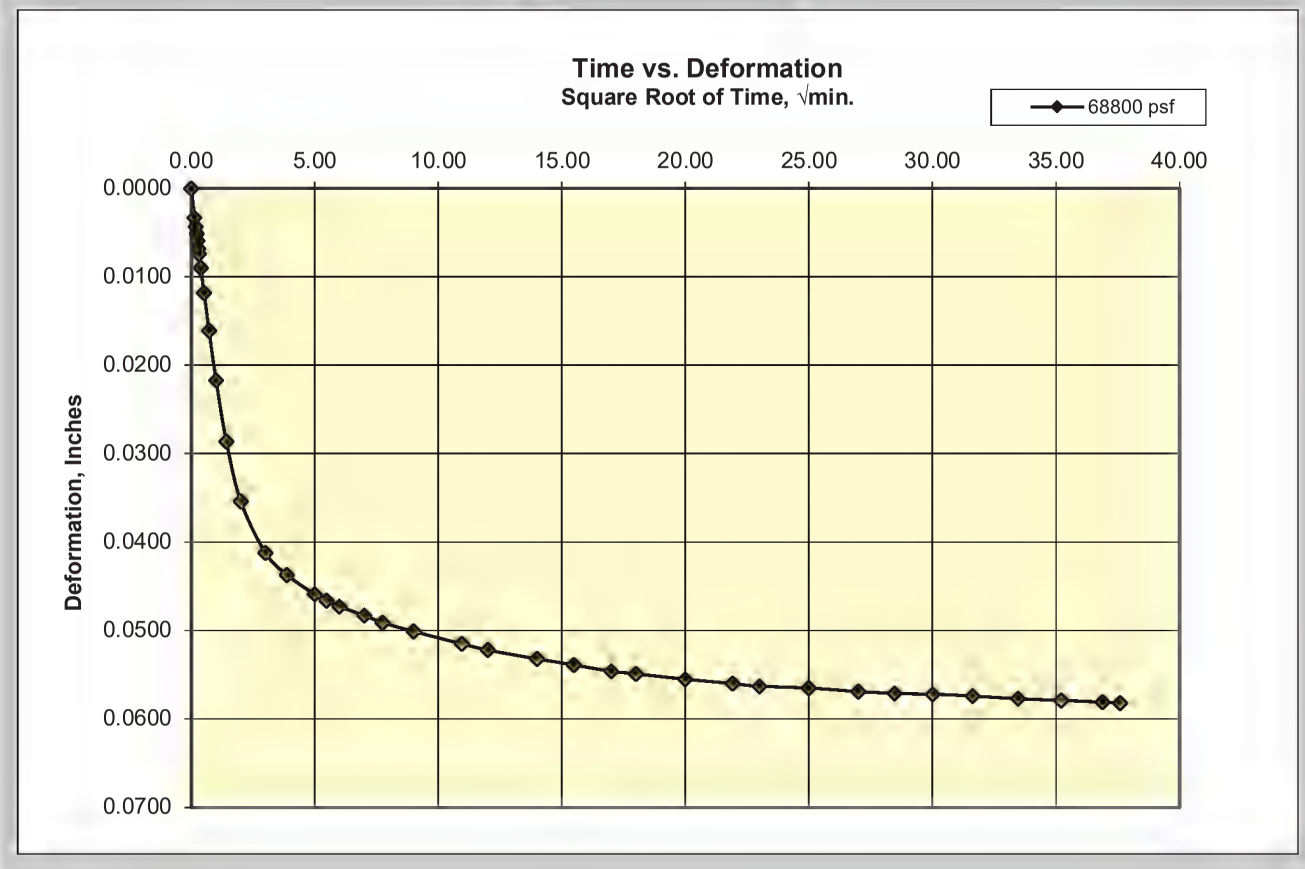


Cooper Testing Labs, Inc.

Load 11 68800 psf



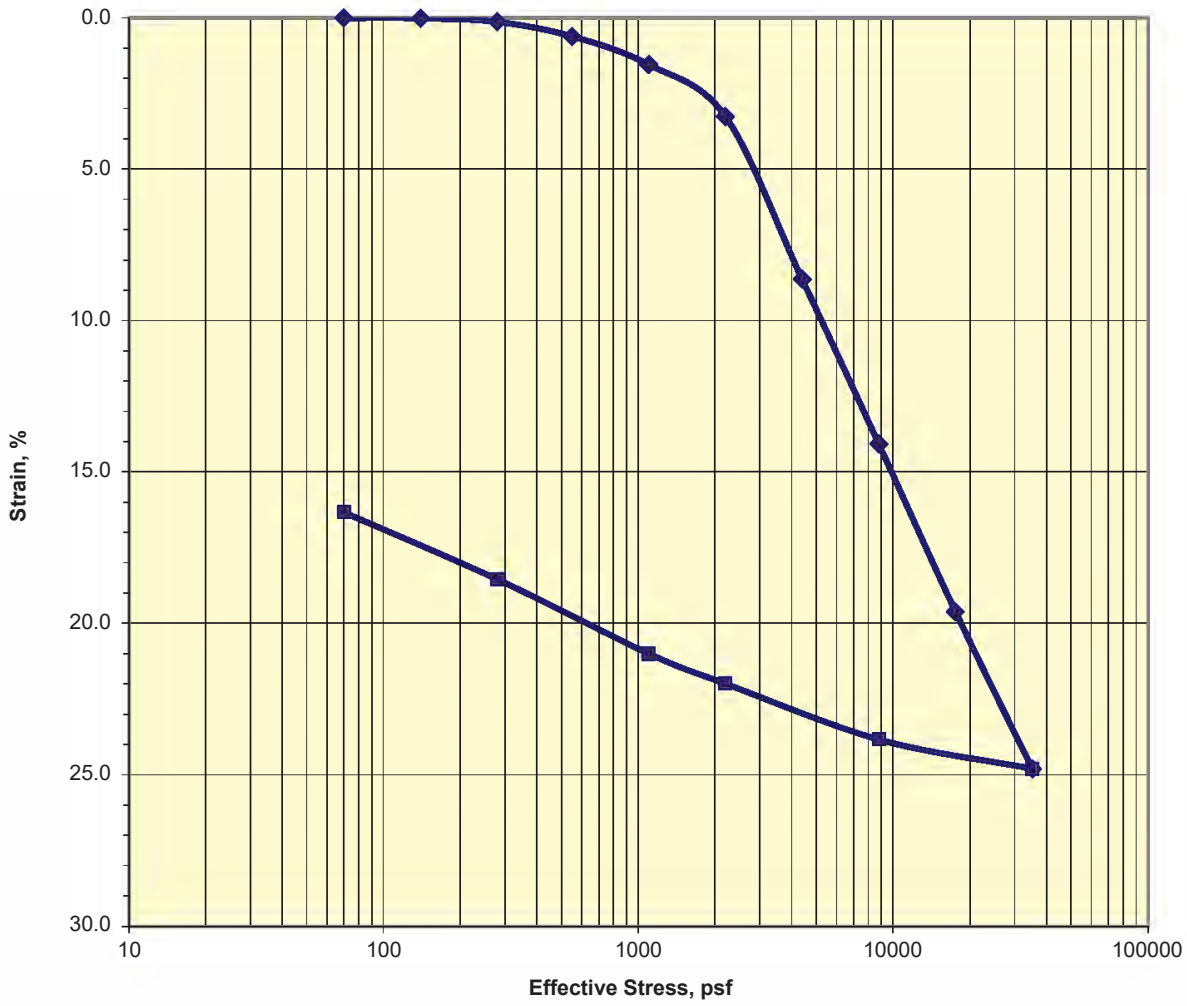
68800 psf



Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B102	**Run By:**	HM
Client:	SHN Engineers & Geologist	**Sample:**	6	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	30-32.5	**Checked:**	PJ
Soil Type:	Dark Greenish Gray CLAY (Bay Mud)			**Date:**	11/3/2023

Strain-Log-P Curve



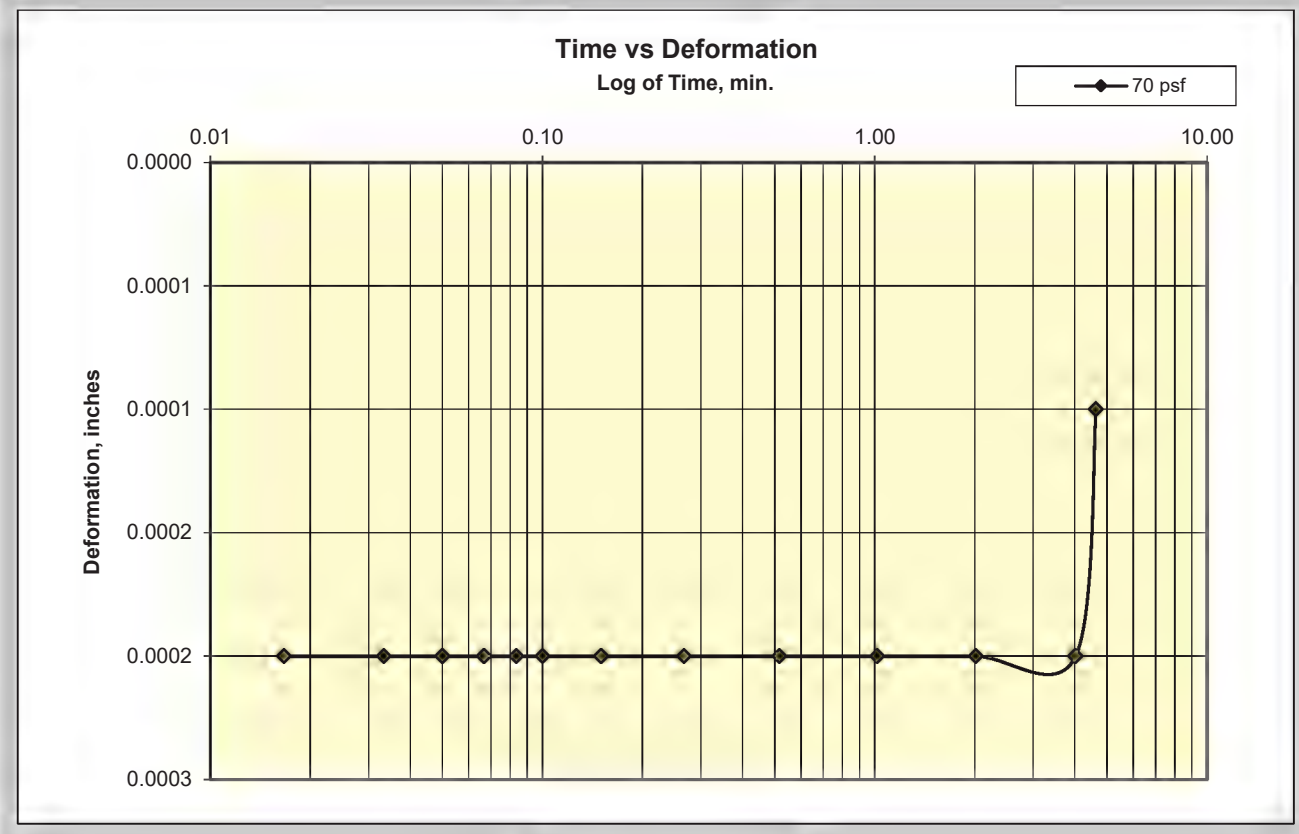
Assumed Gs 2.7	Initial	Final
Moisture %:	42.6	29.8
Dry Density, pcf:	78.2	93.4
Void Ratio:	1.155	0.805
% Saturation:	99.6	100.0

Remarks:

Cooper Testing Labs, Inc.

Load 1

70 psf



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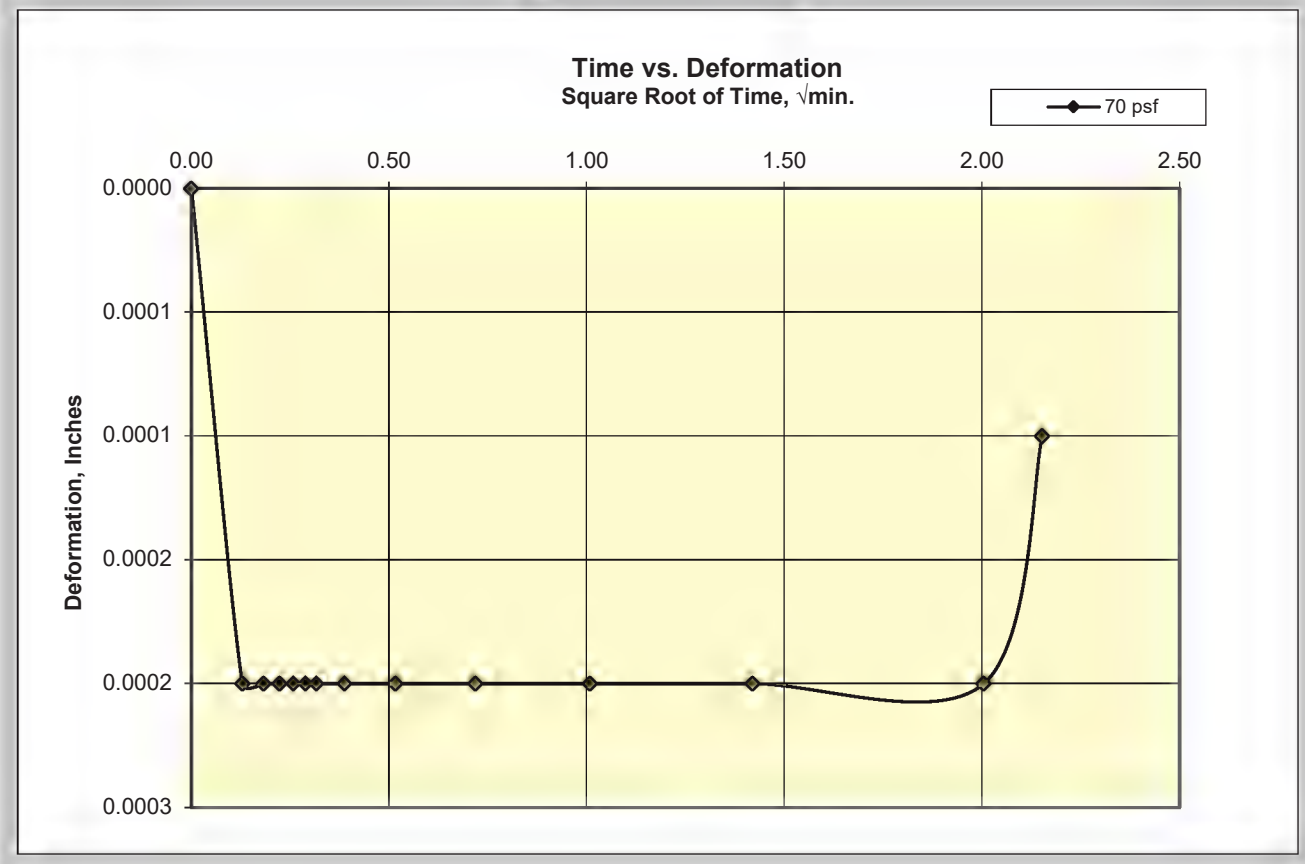

Cooper Testing Labs, Inc.

Load 2

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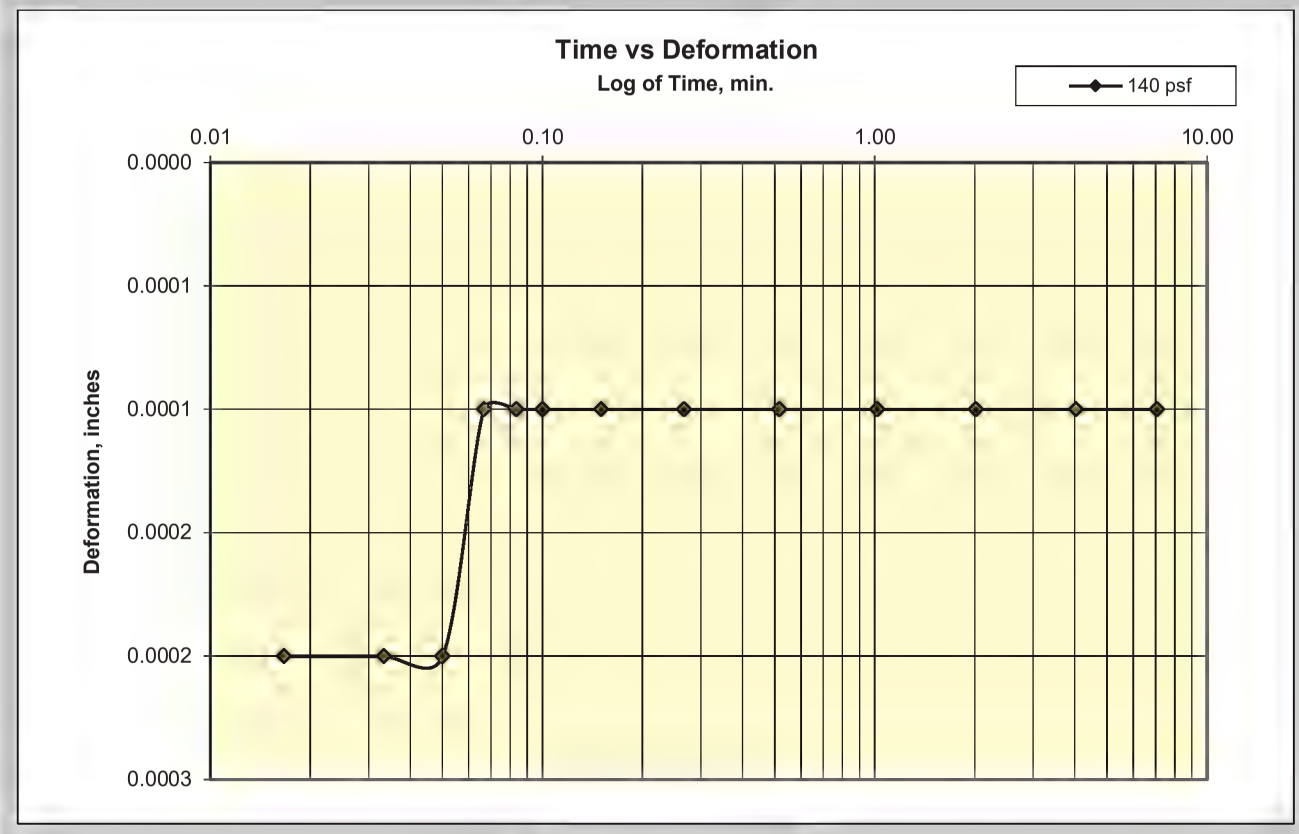

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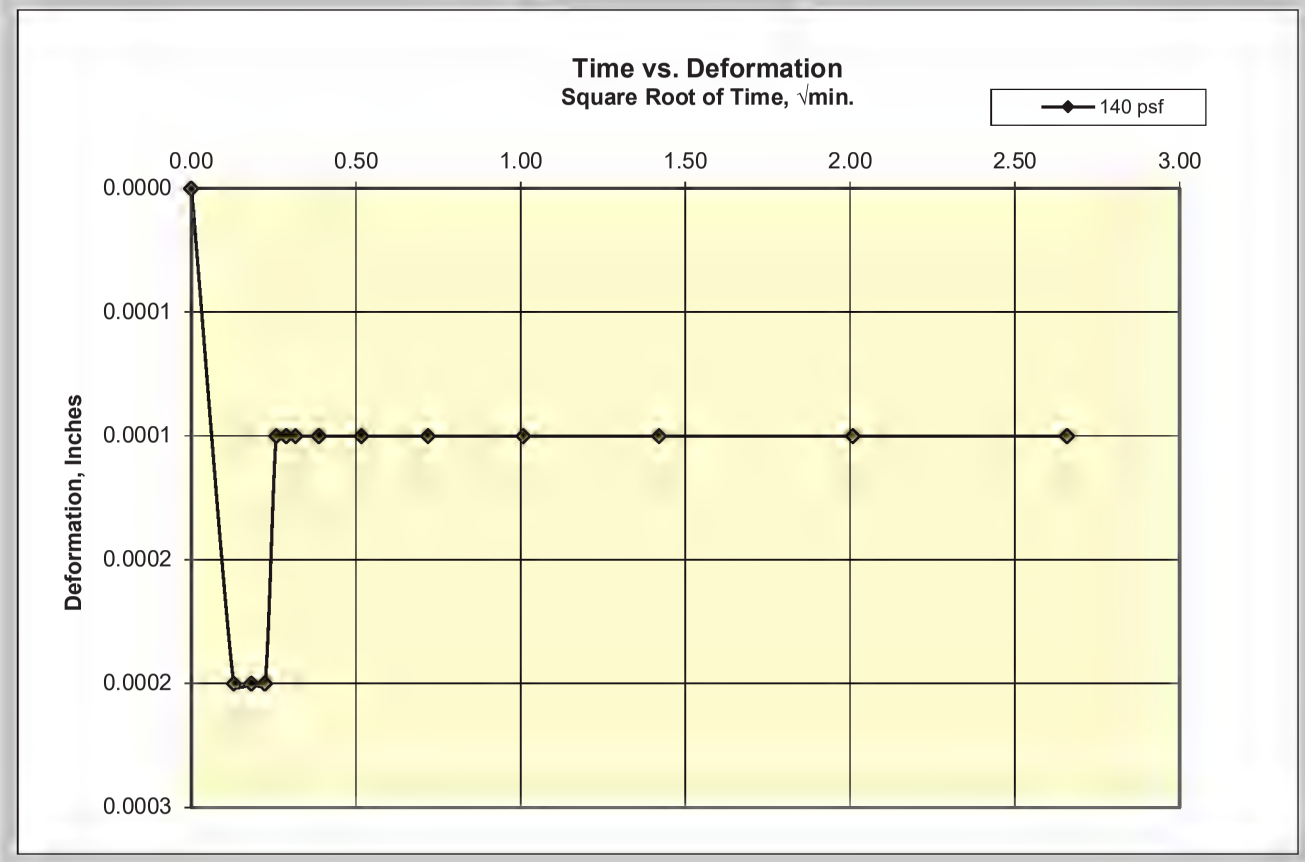
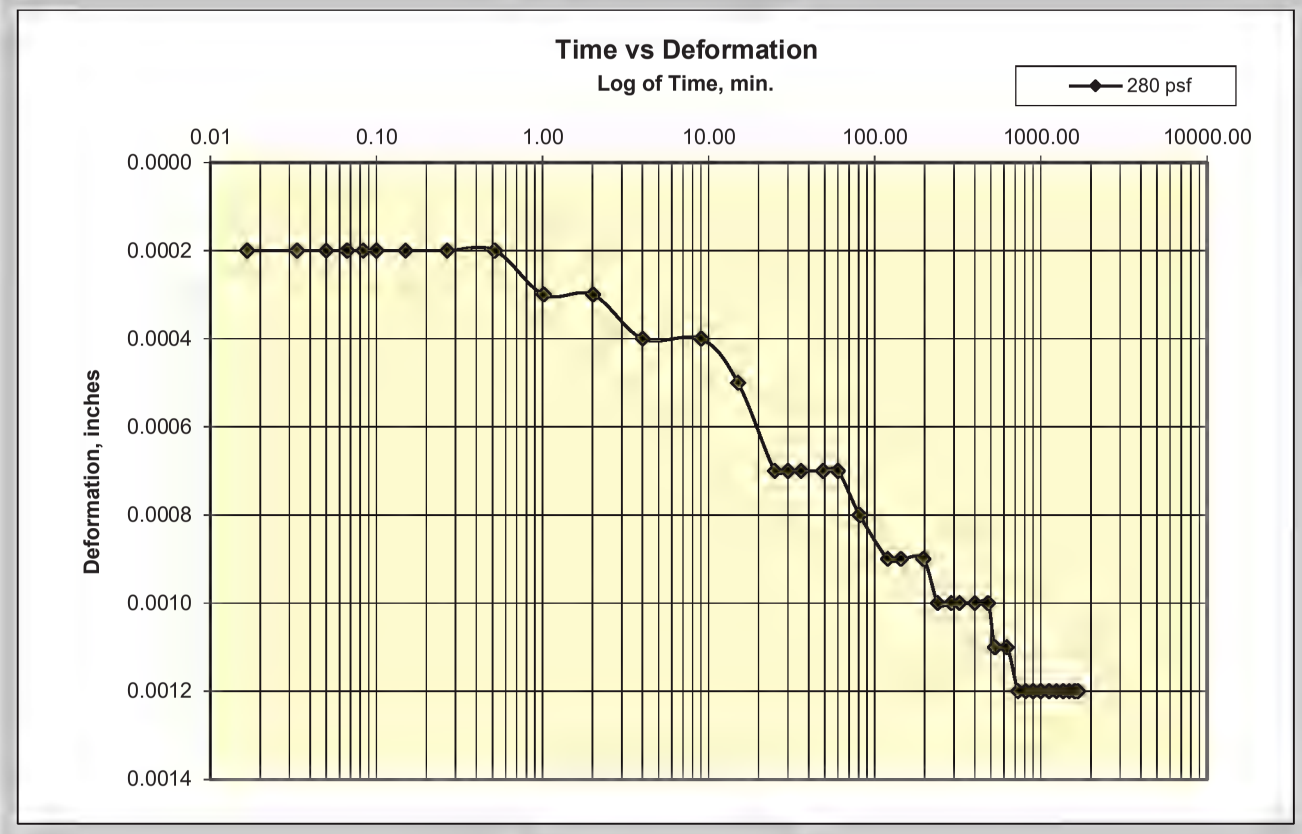


Cooper Testing Labs, Inc.

Load 3

280 psf



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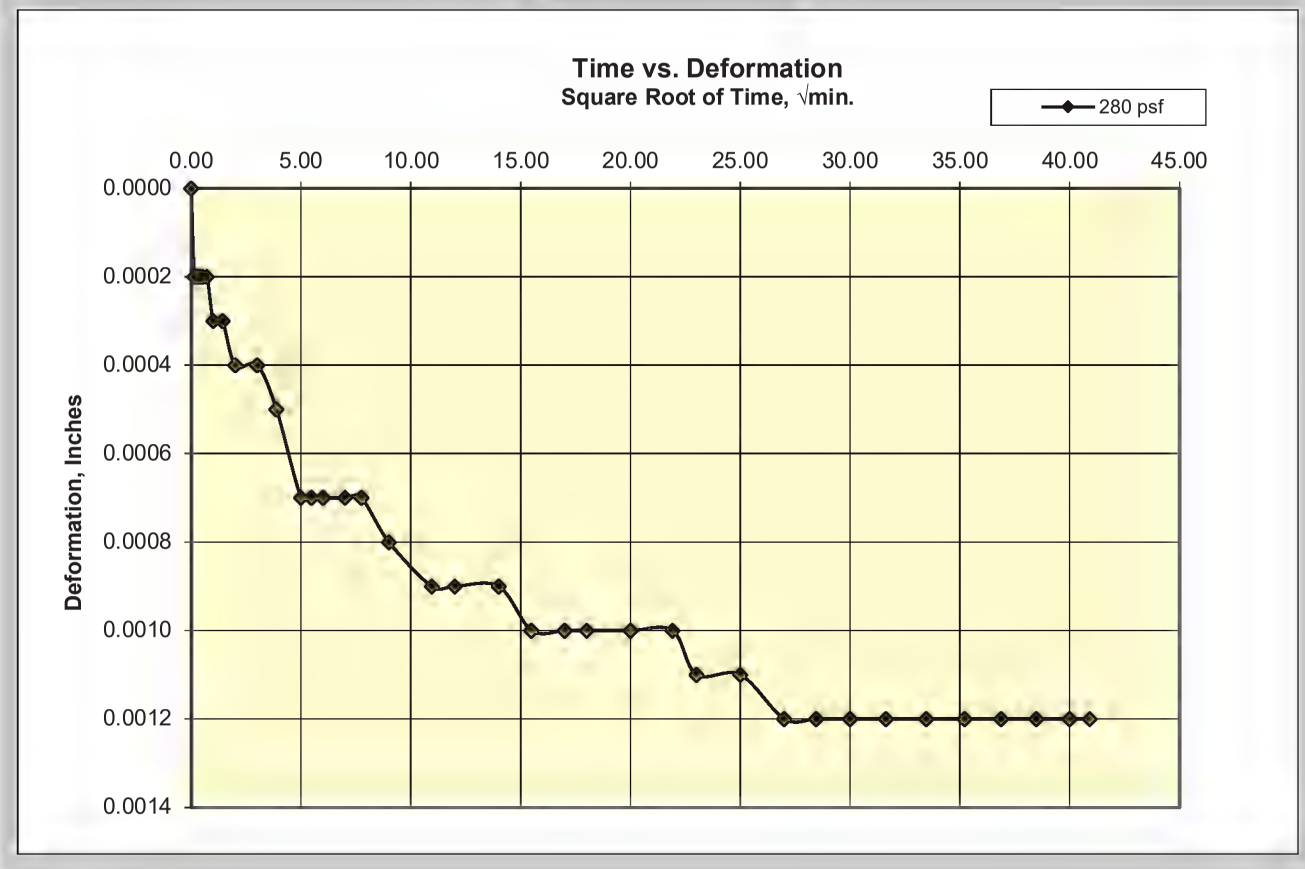
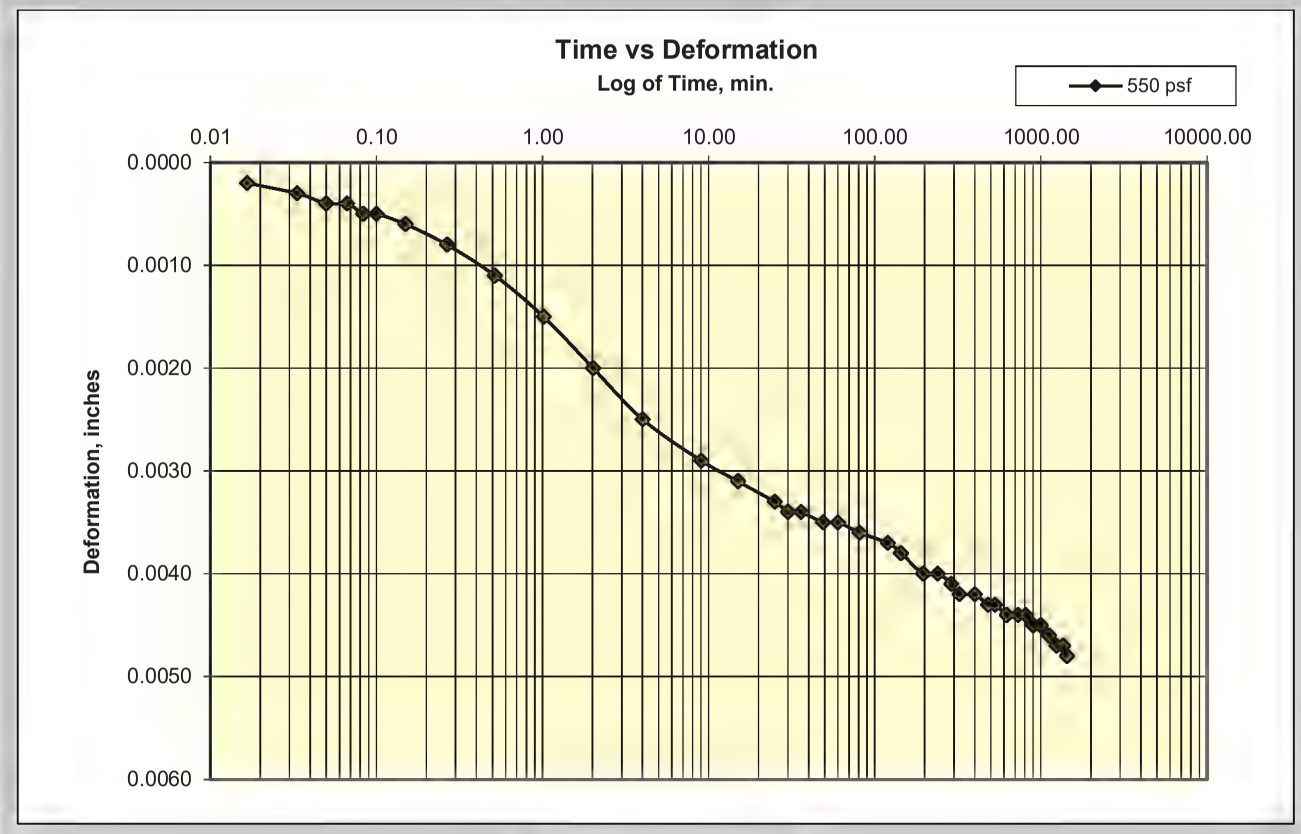


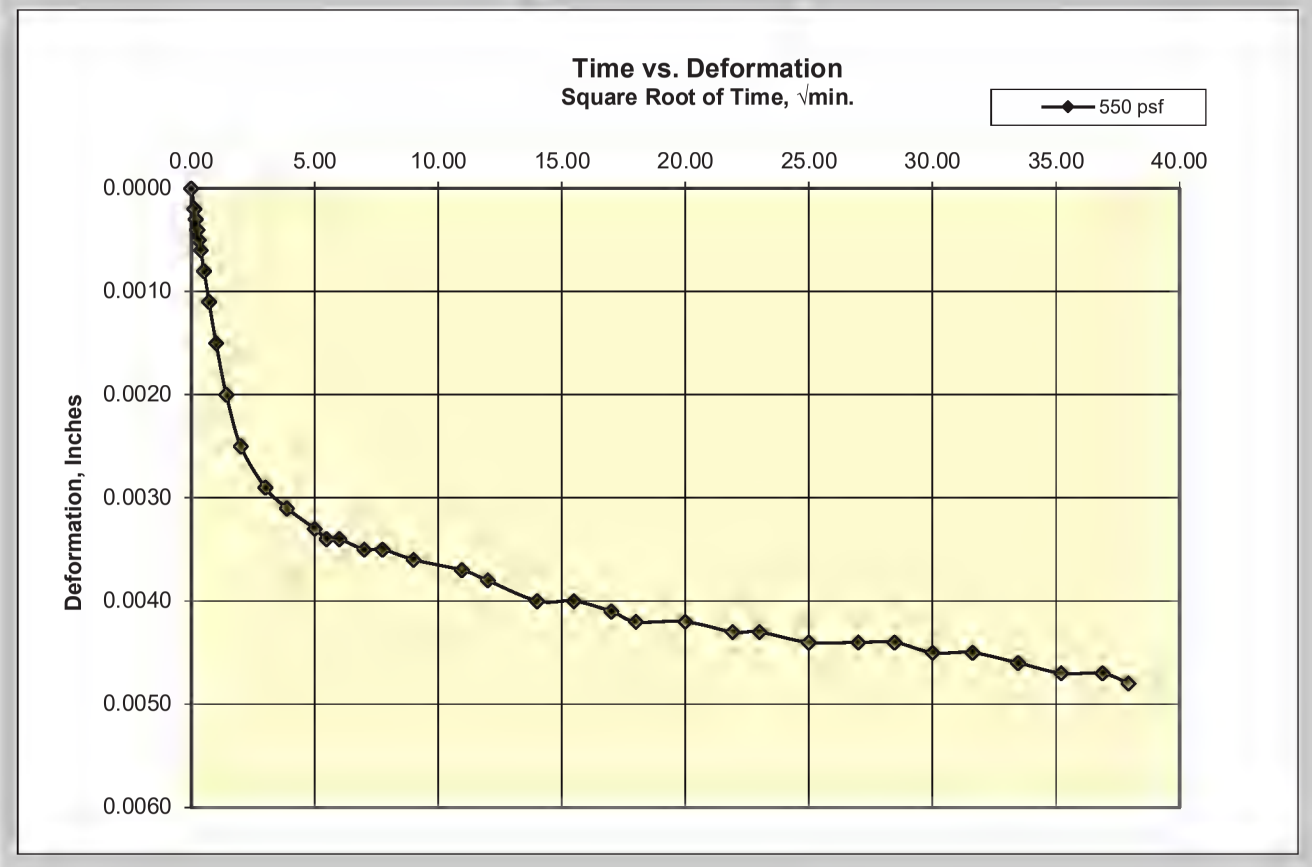
Cooper Testing Labs, Inc.

Load 4

550 psf



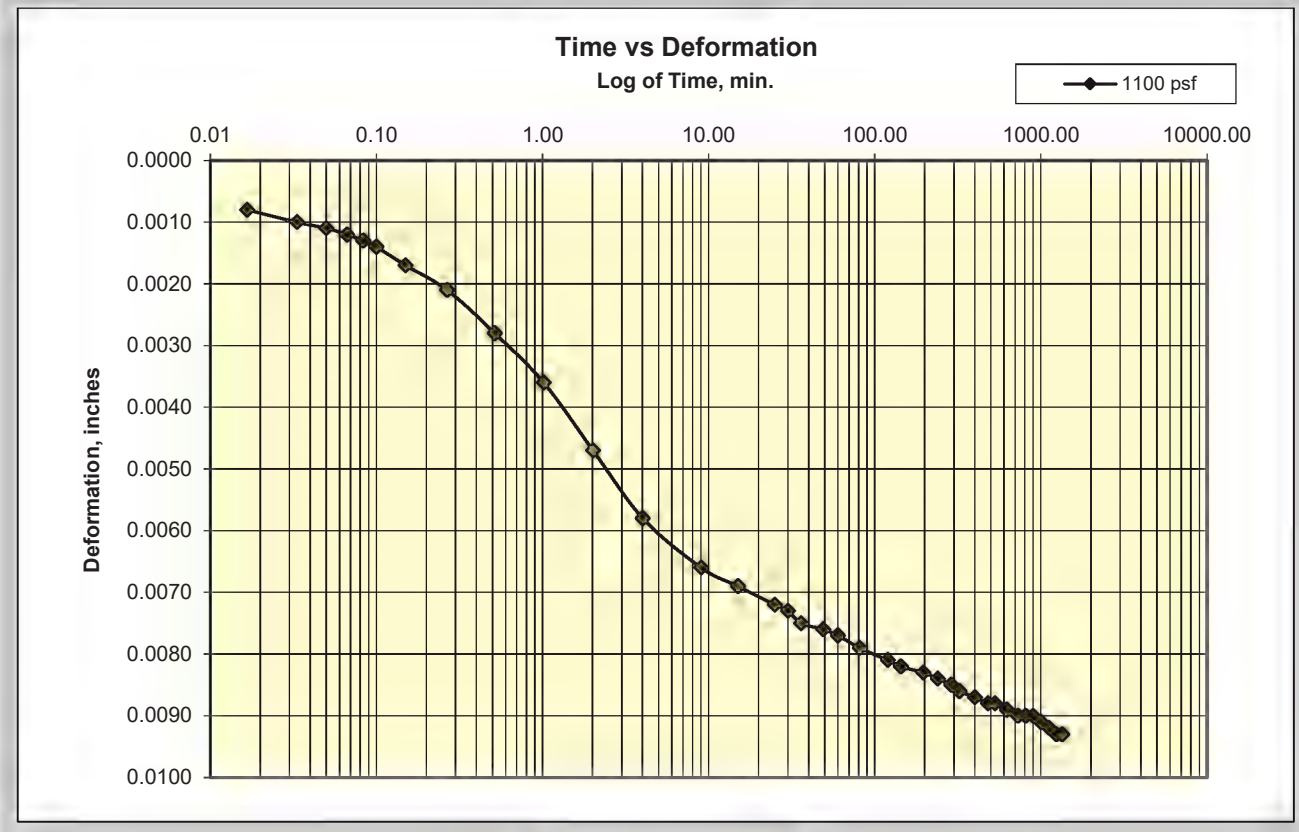
550 psf



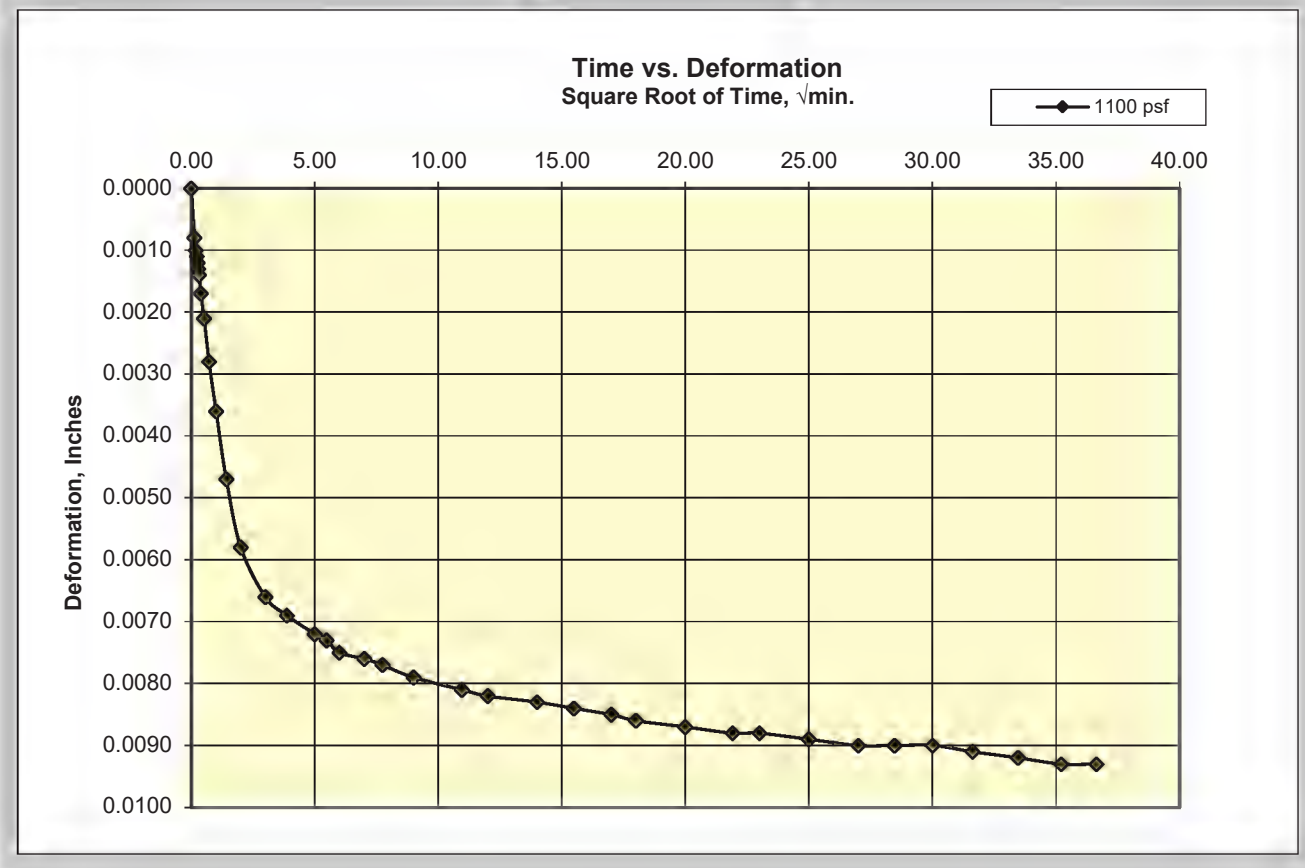
Cooper Testing Labs, Inc.

Load 5

1100 psf



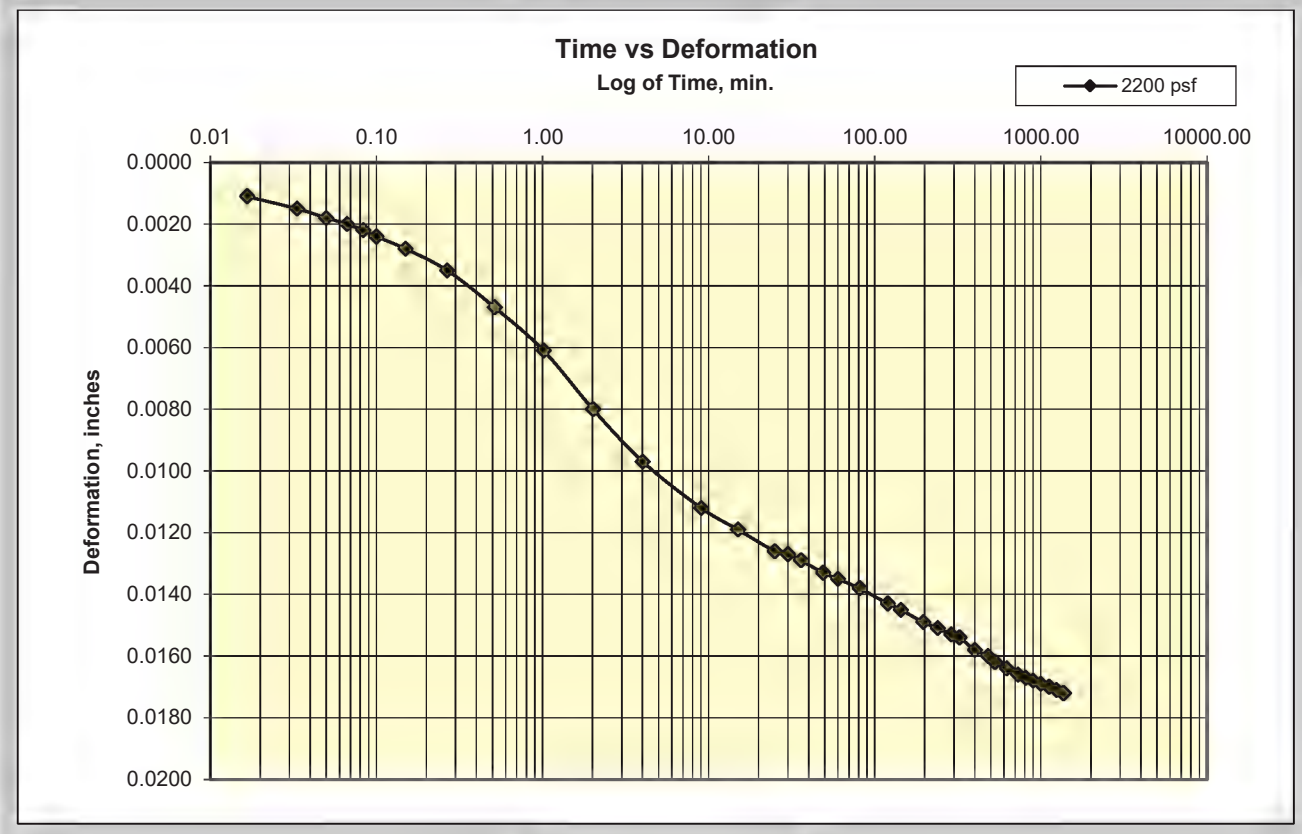
1100 psf



Cooper Testing Labs, Inc.

Load 6

2200 psf



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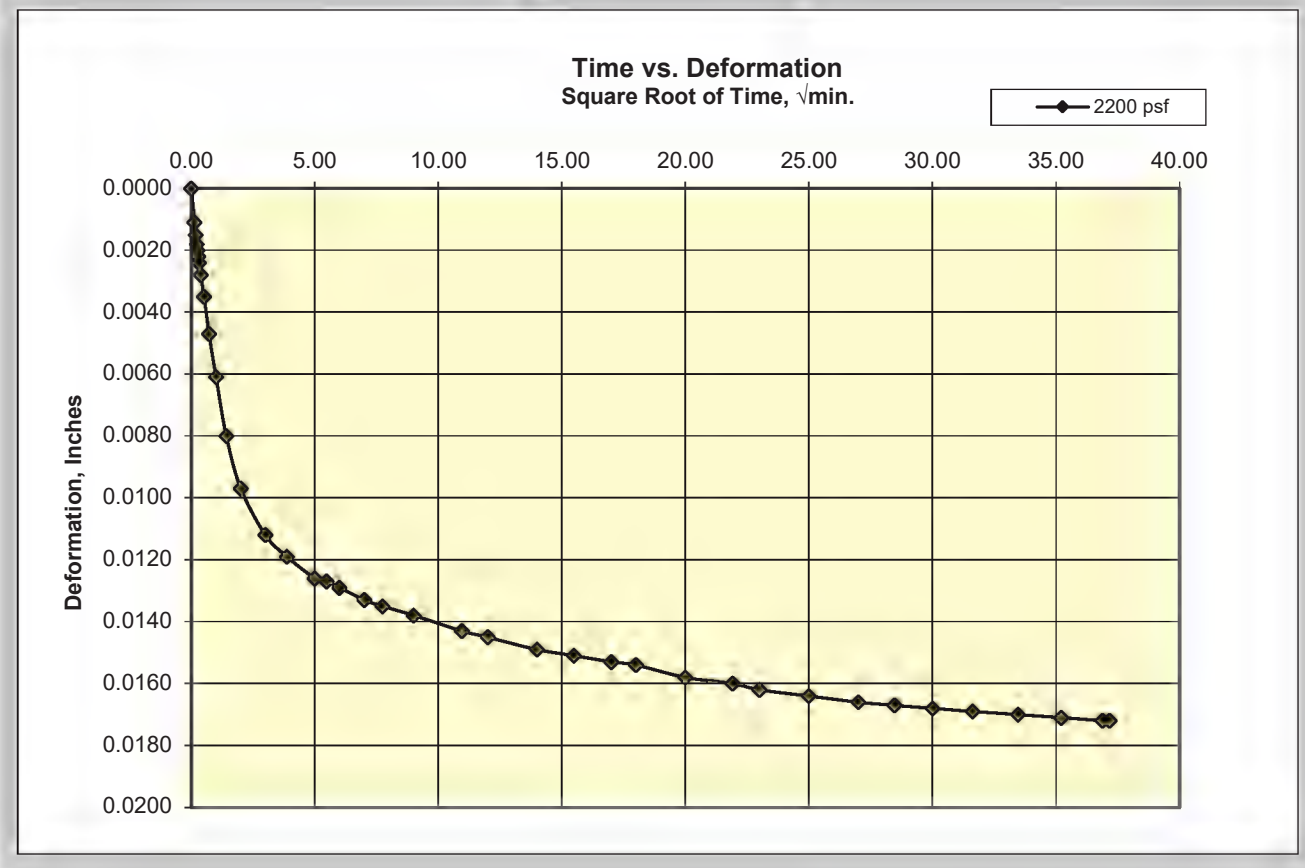
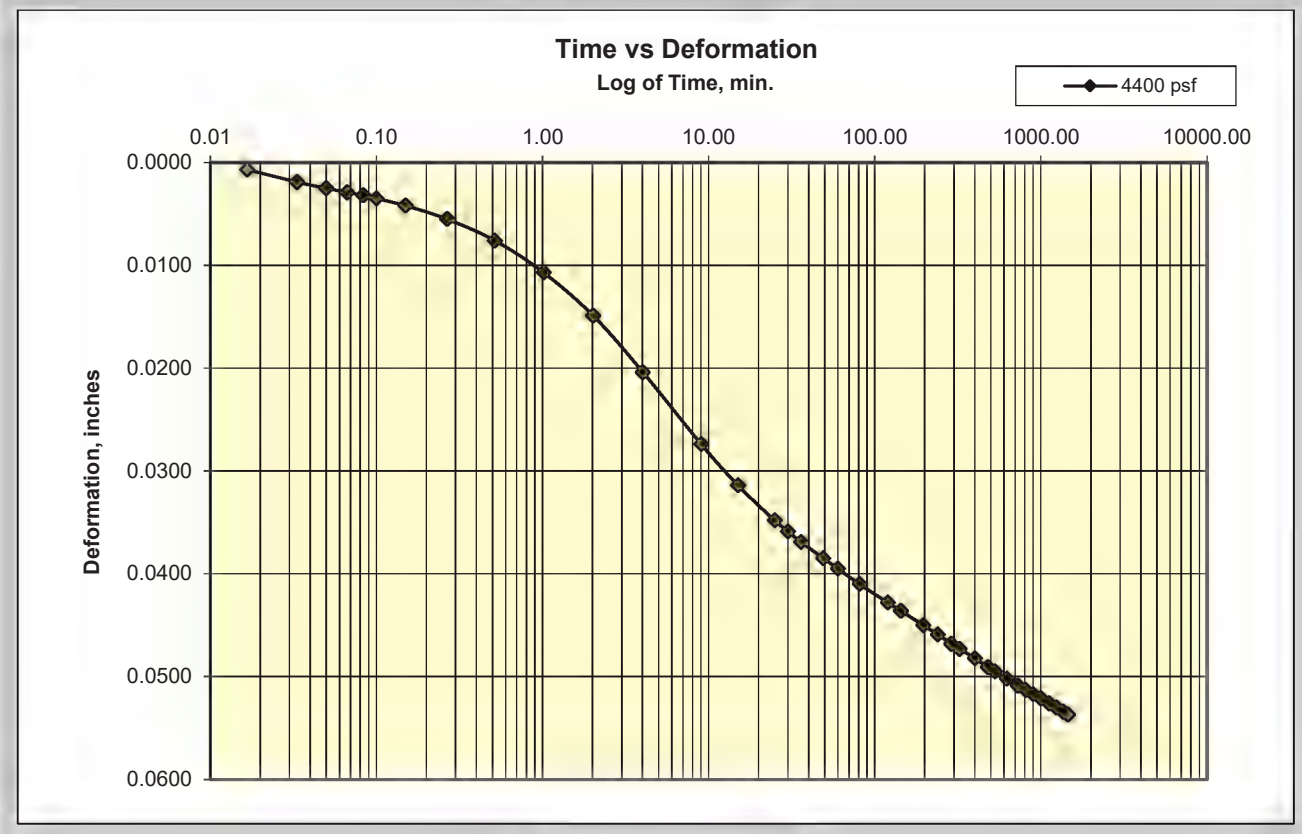


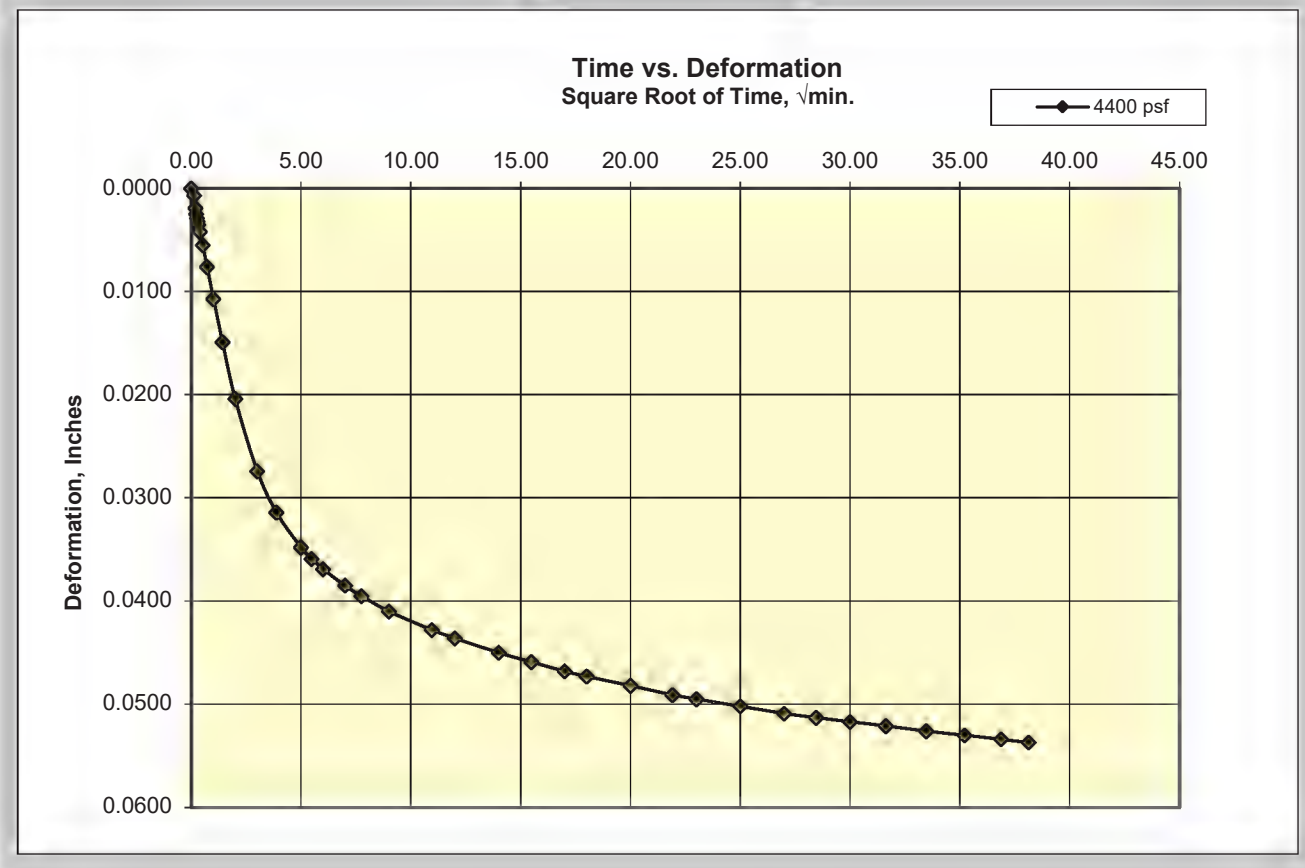
Cooper Testing Labs, Inc.

Load 7

4400 psf



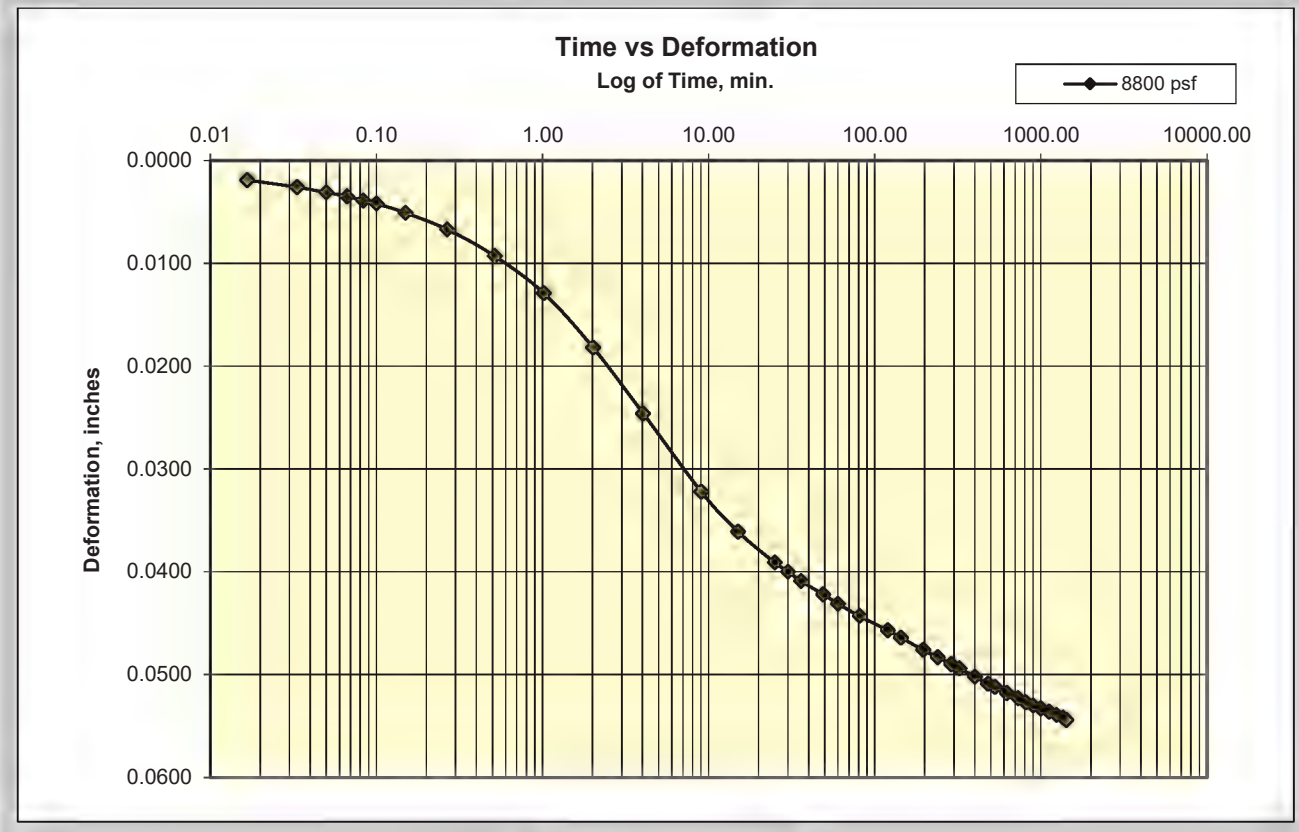
4400 psf



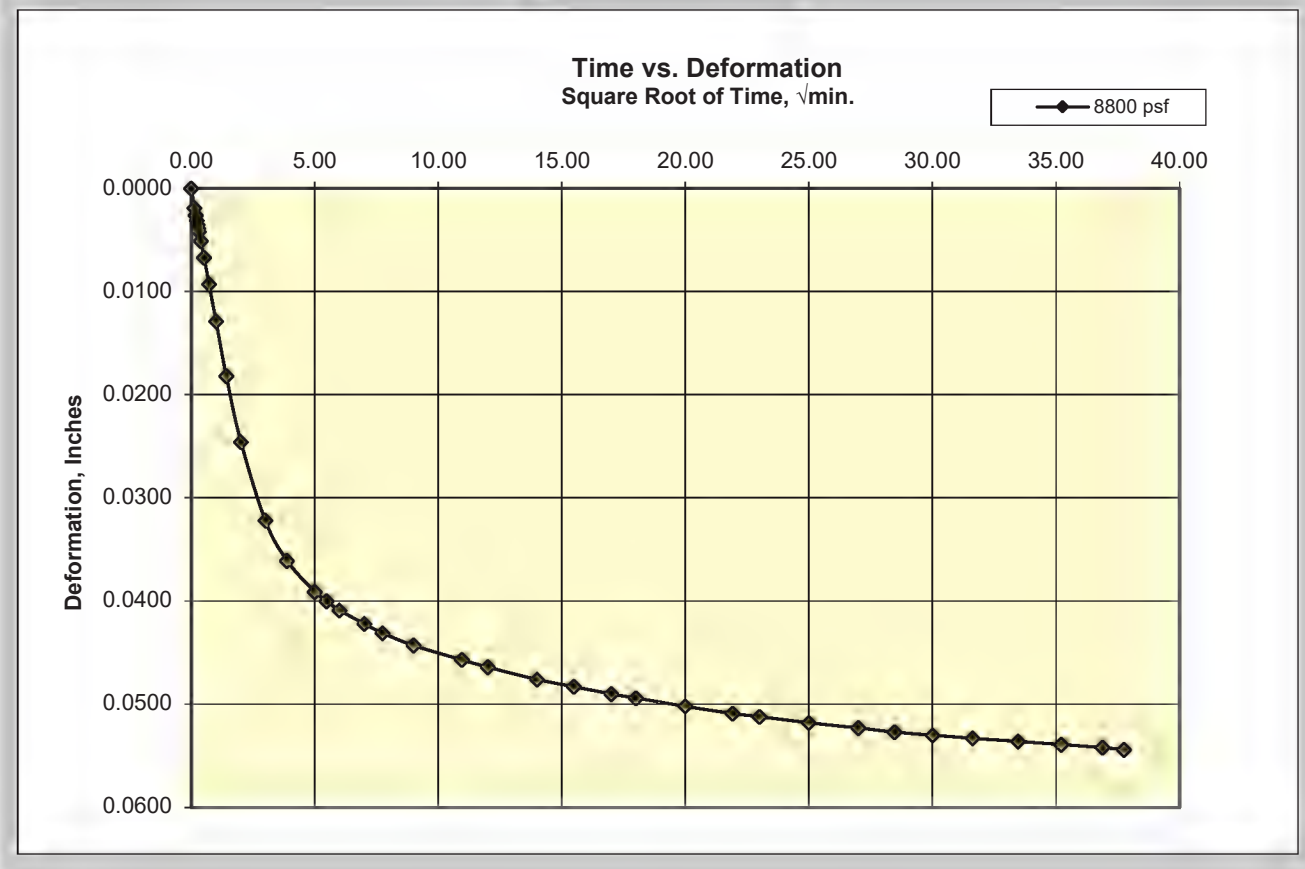
Cooper Testing Labs, Inc.

Load 8

8800 psf



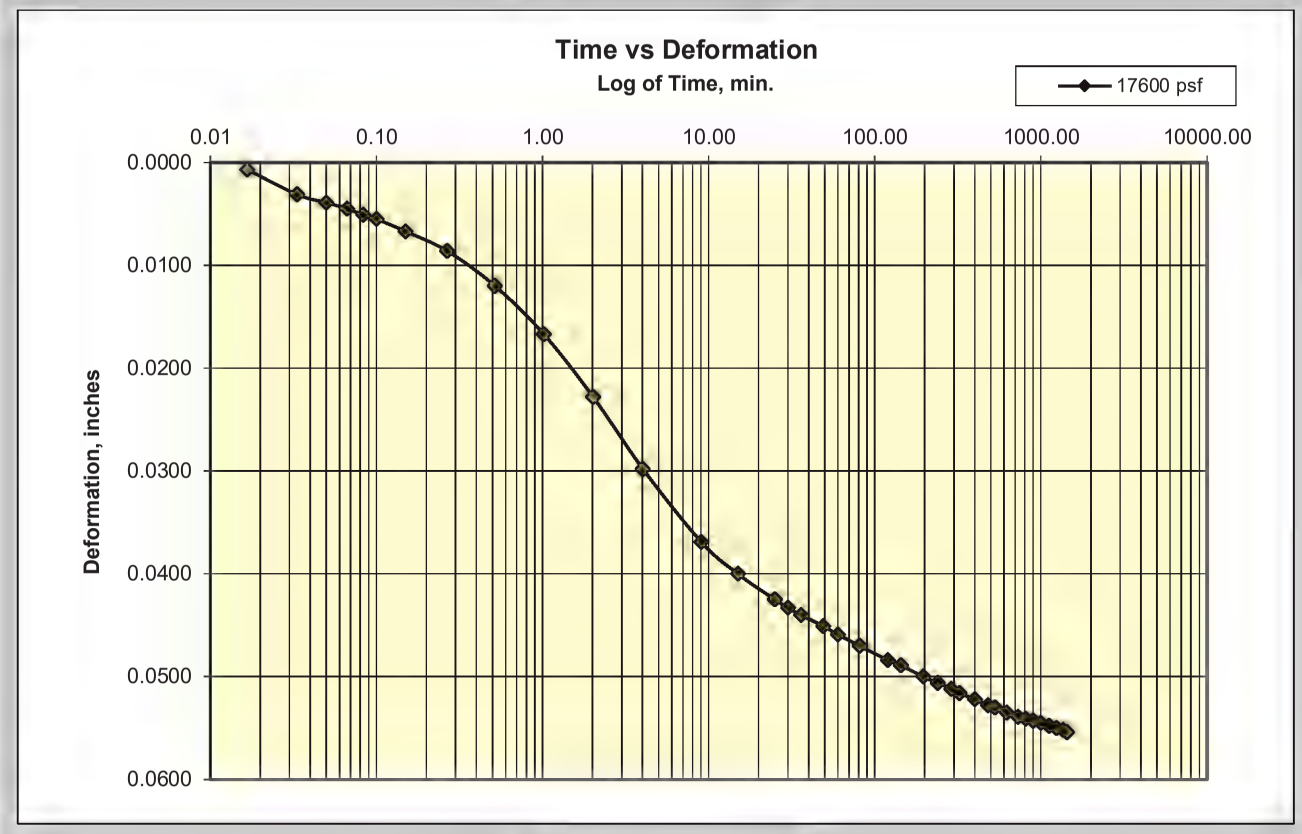
8800 psf



Cooper Testing Labs, Inc.

Load 9

17600 psf



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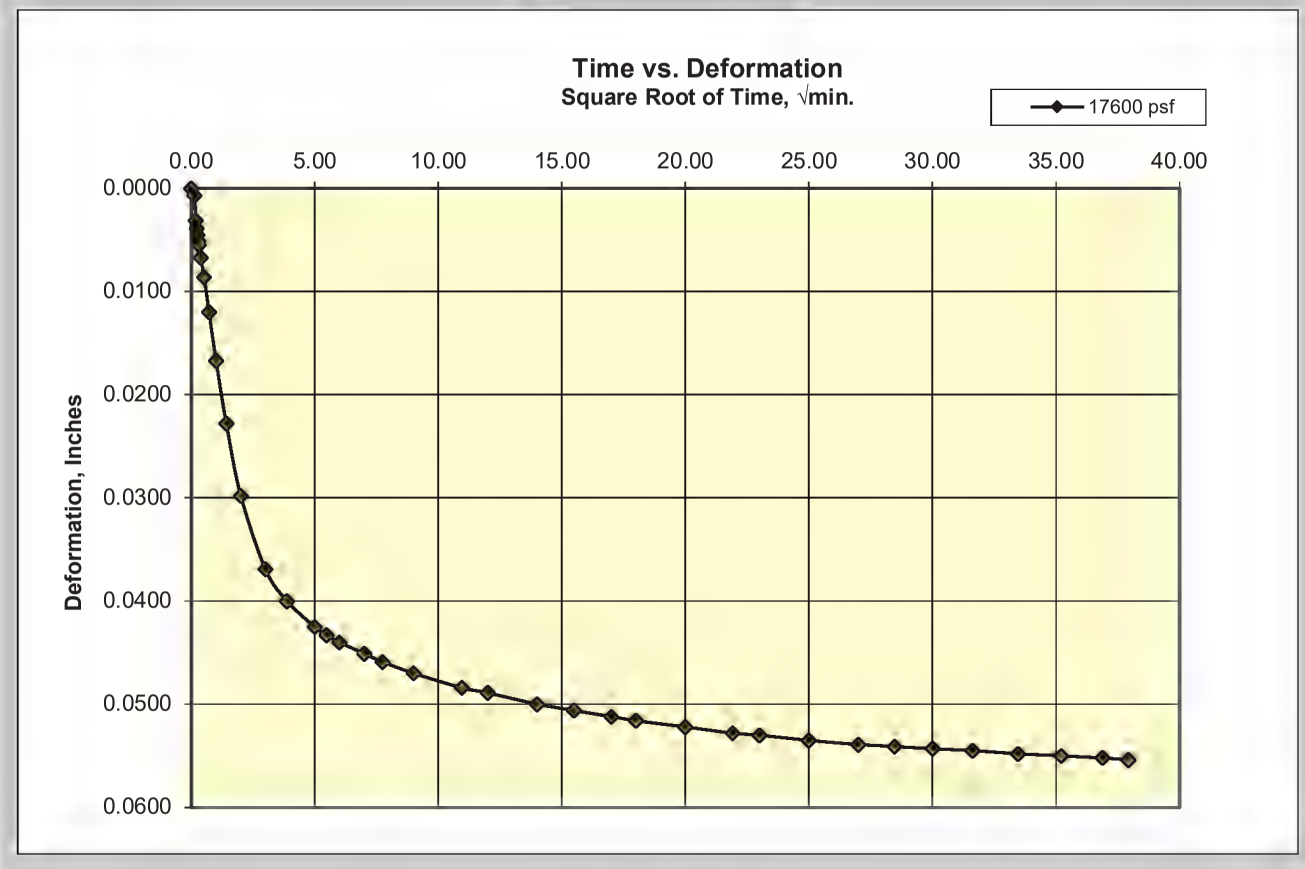
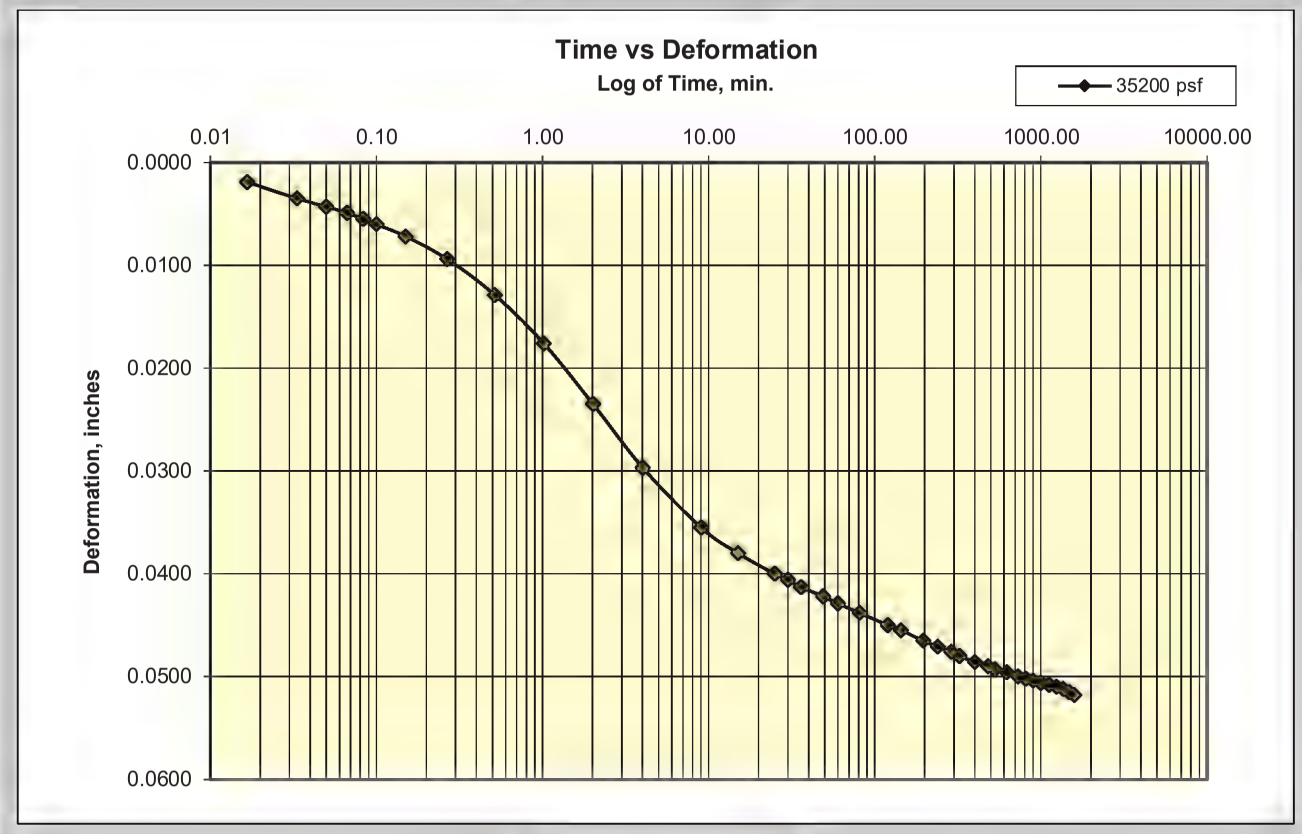


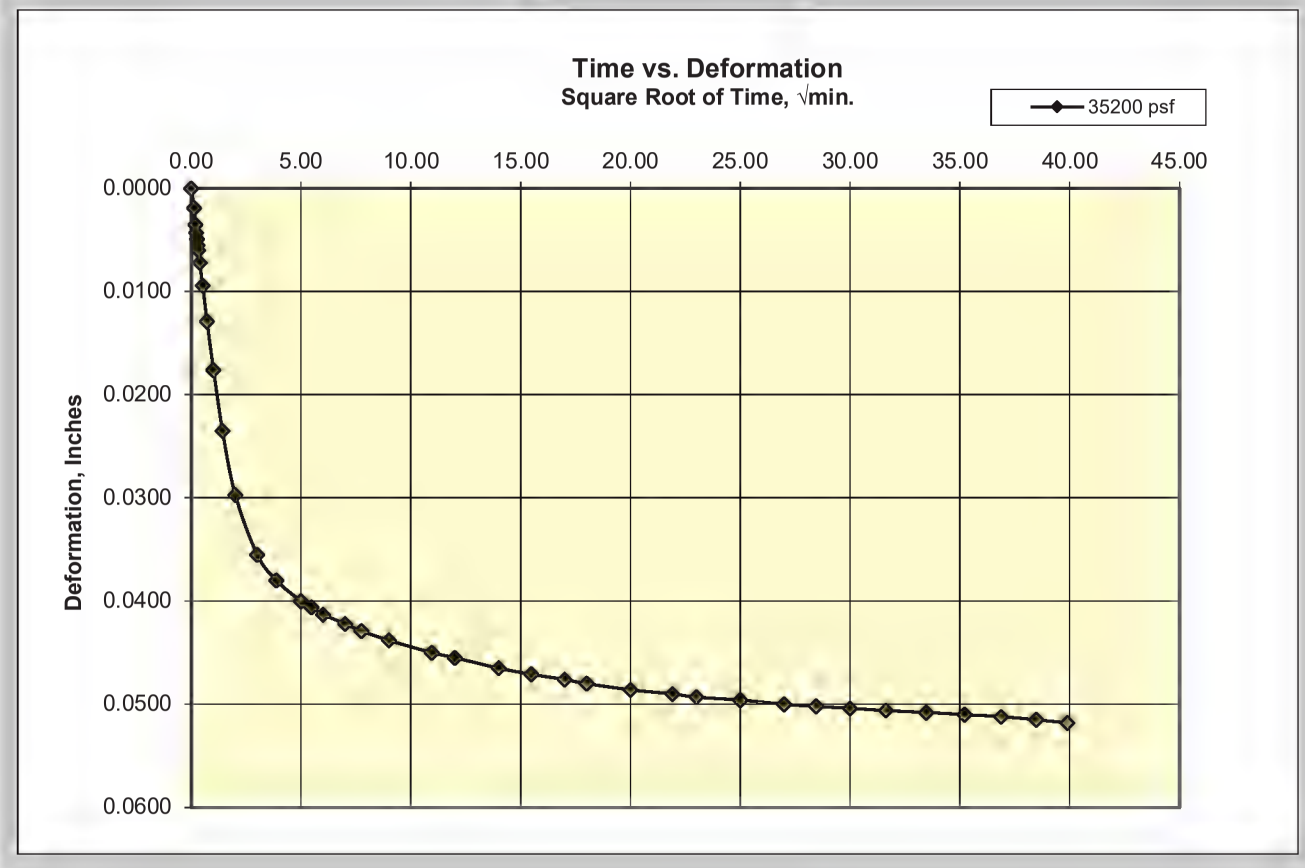
Cooper Testing Labs, Inc.

Load 10

35200 psf



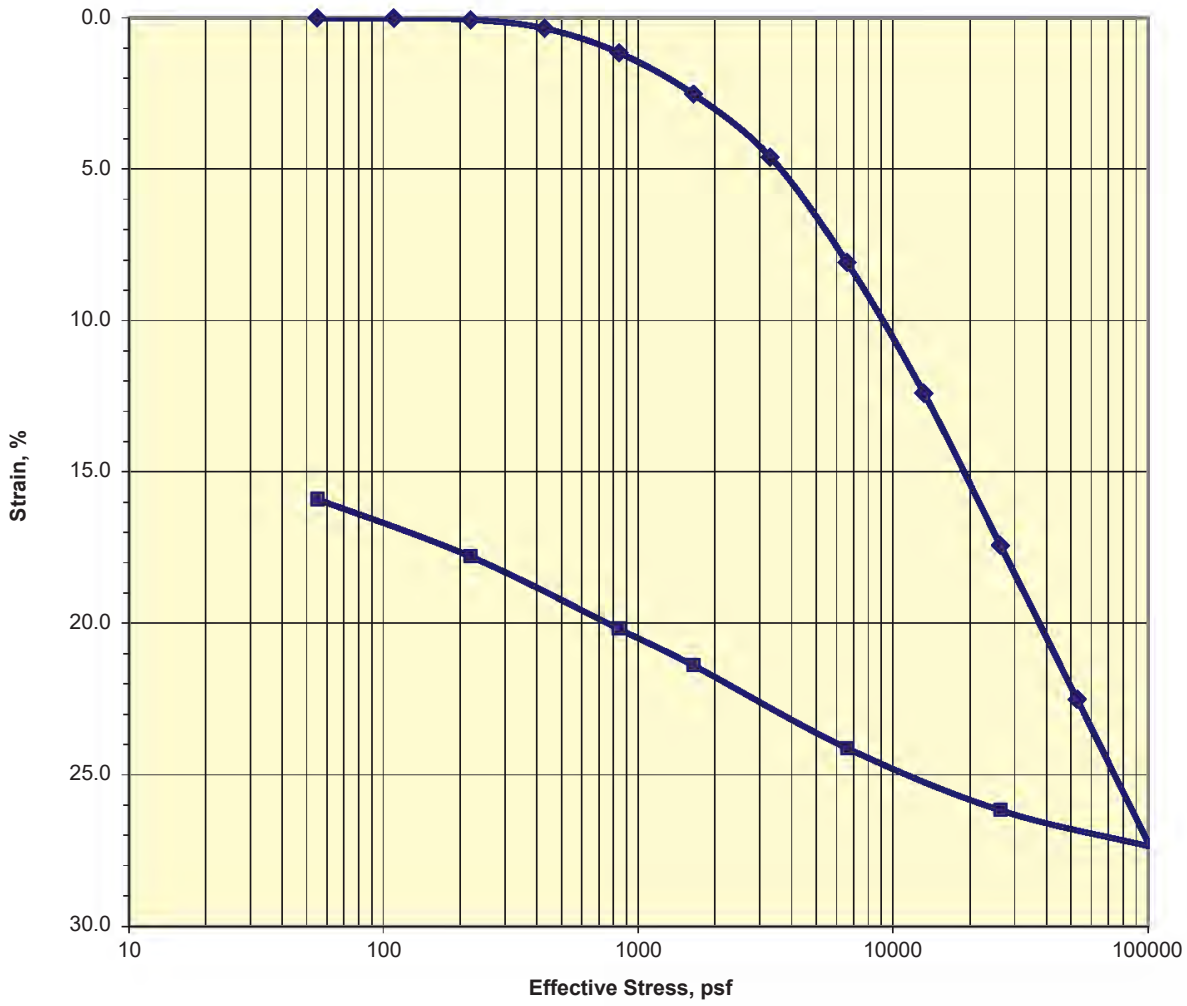
35200 psf



Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B102	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	13	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	50-52.5(Tip-1")	**Checked:**	PJ
Soil Type:	Very Dark Greenish Gray CLAY (Bay Mud)			**Date:**	11/7/2023

Strain-Log-P Curve

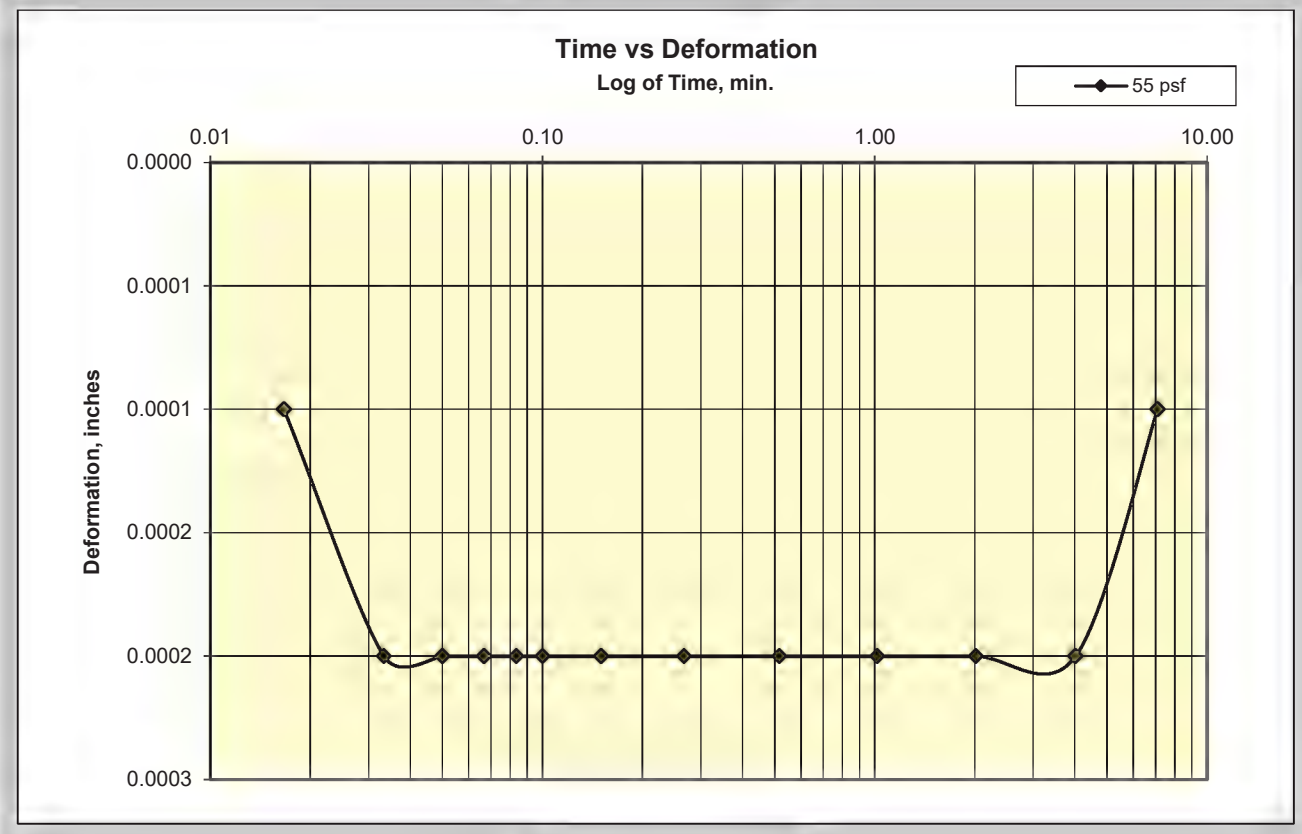


Assumed Gs 2.75	Initial	Final
Moisture %:	38.6	27.2
Dry Density, pcf:	82.7	98.3
Void Ratio:	1.076	0.747
% Saturation:	98.7	100.0

Remarks:

Cooper Testing Labs, Inc.

Load 1 — 55 psf



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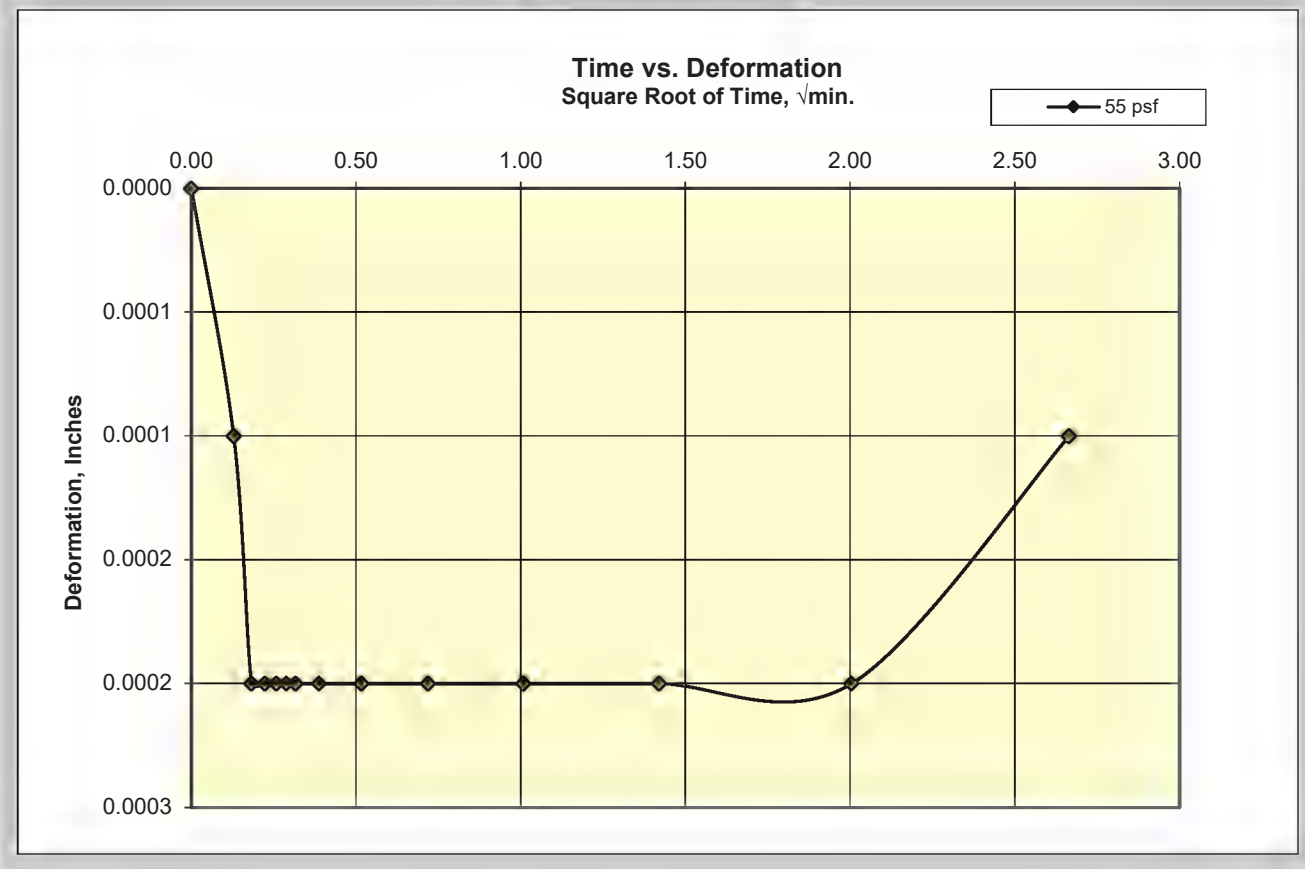
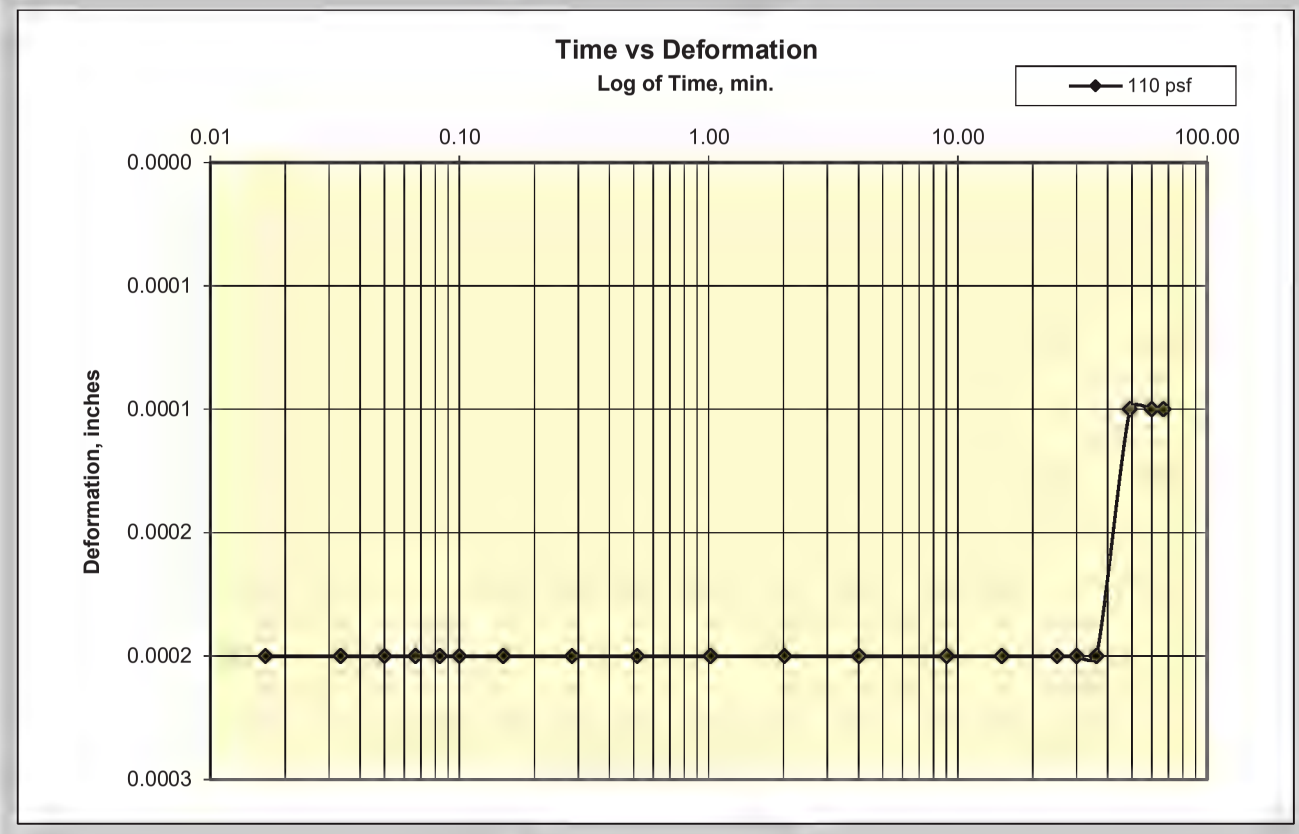


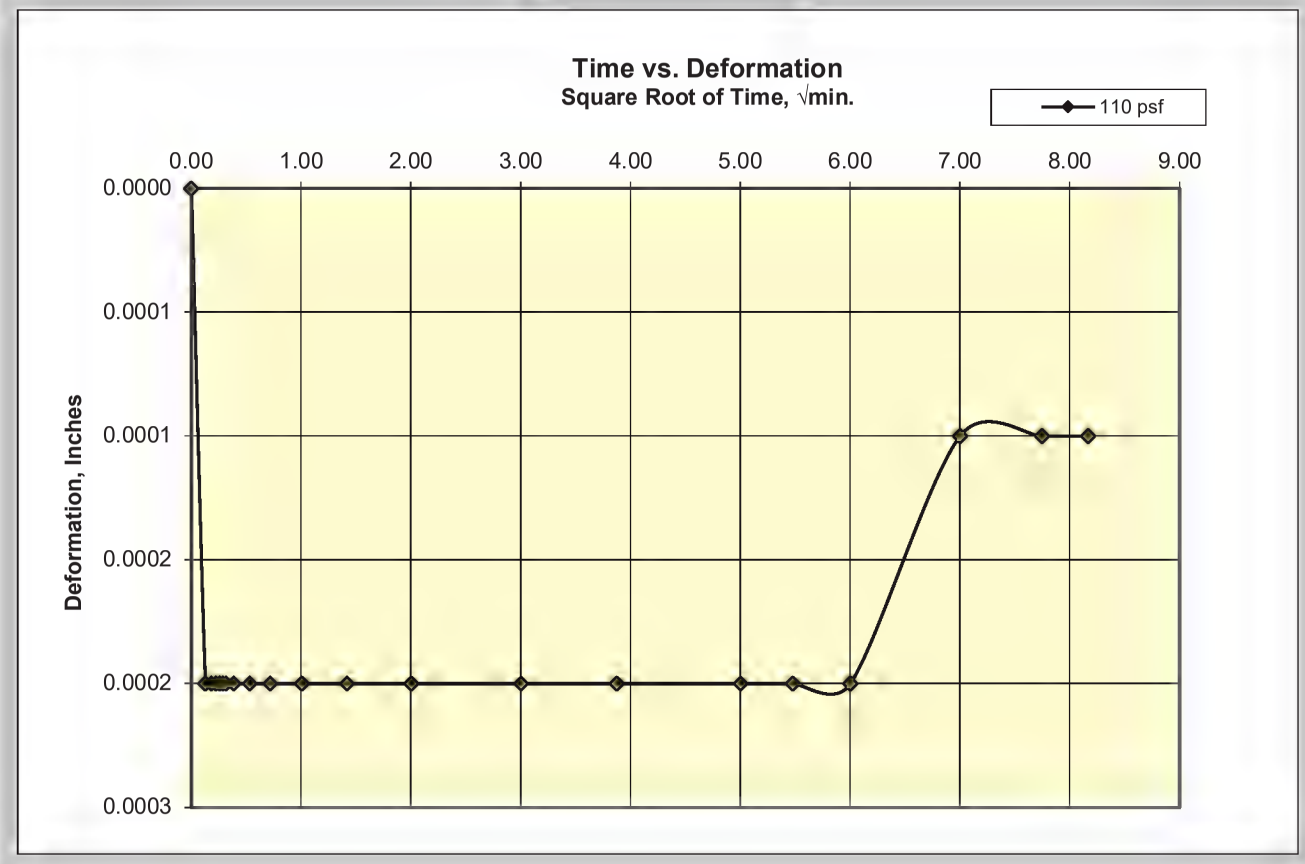
Cooper Testing Labs, Inc.

Load 2

110 psf



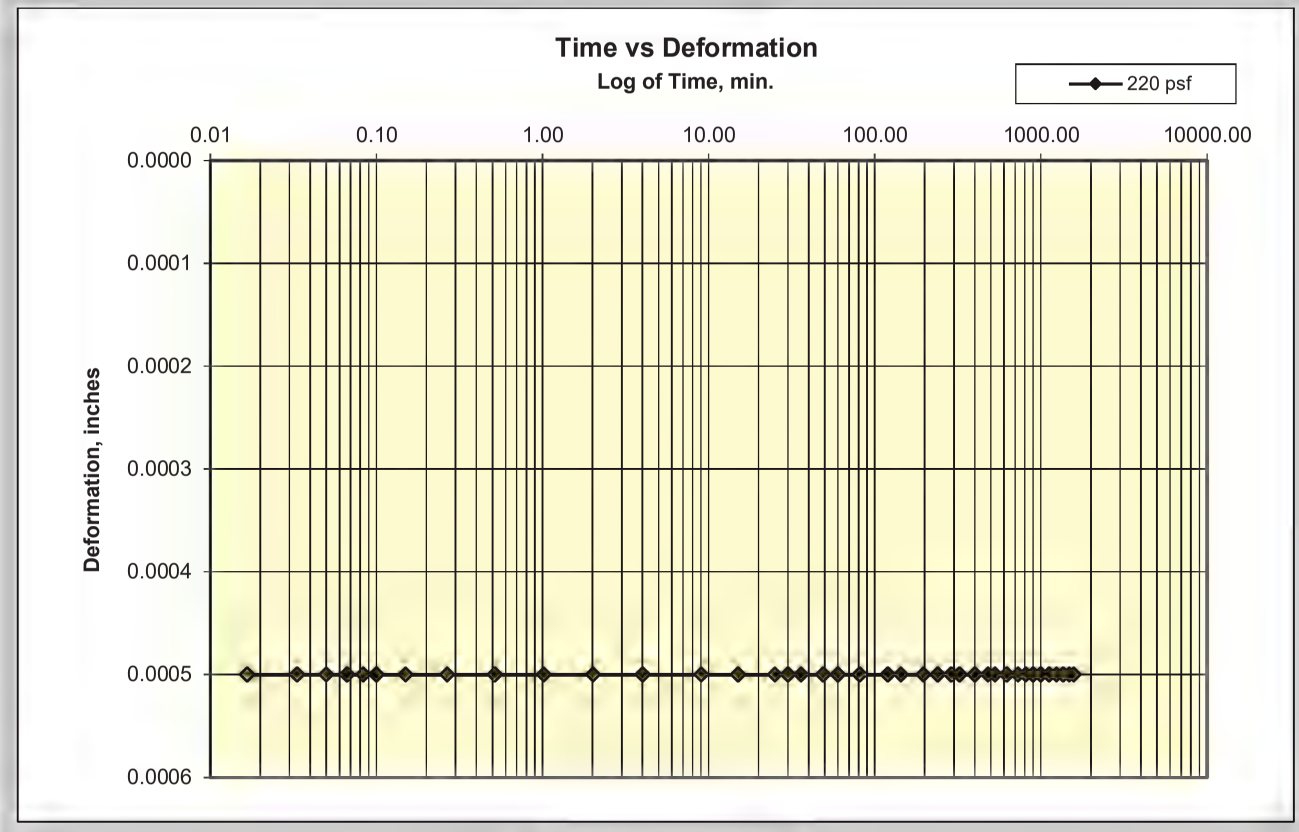
110 psf



Cooper Testing Labs, Inc.

Load 3

220 psf



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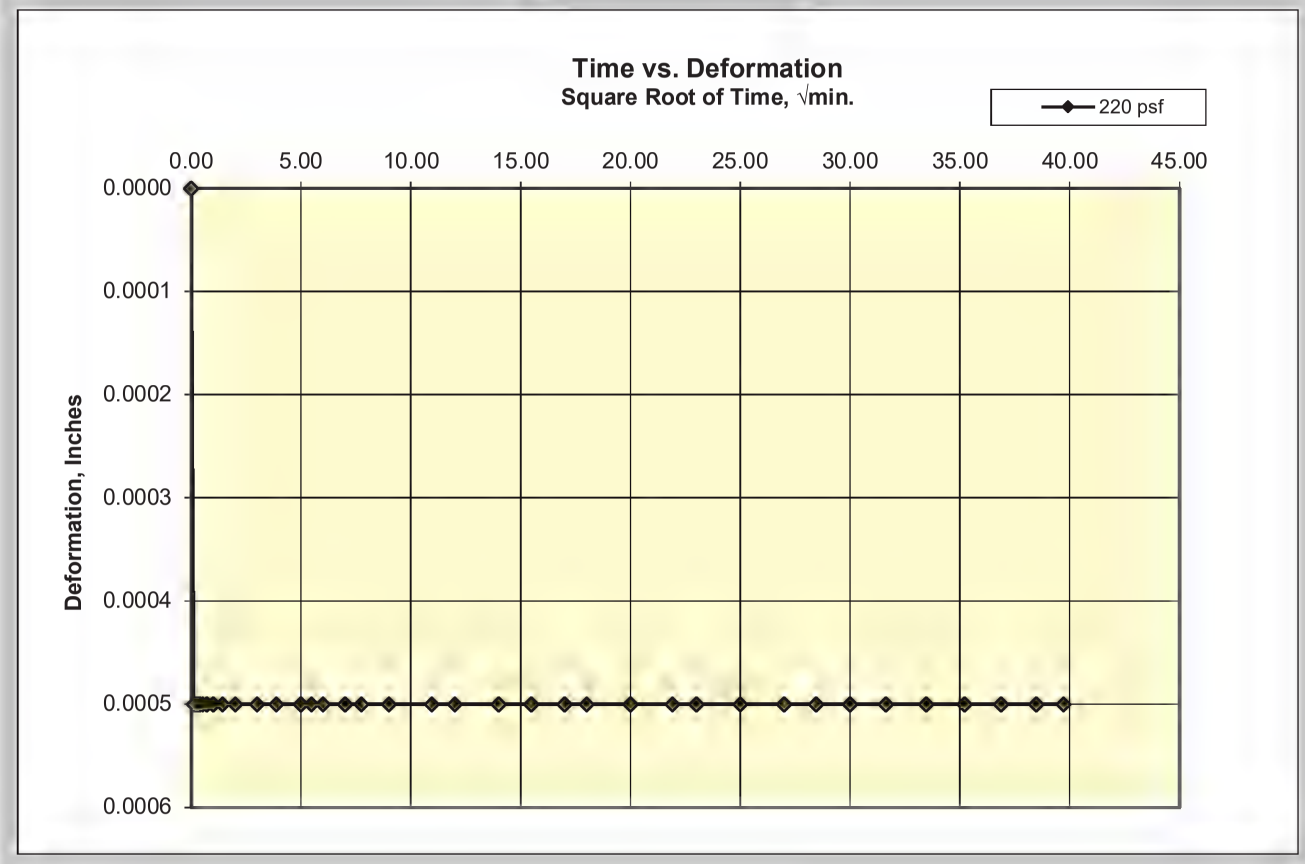
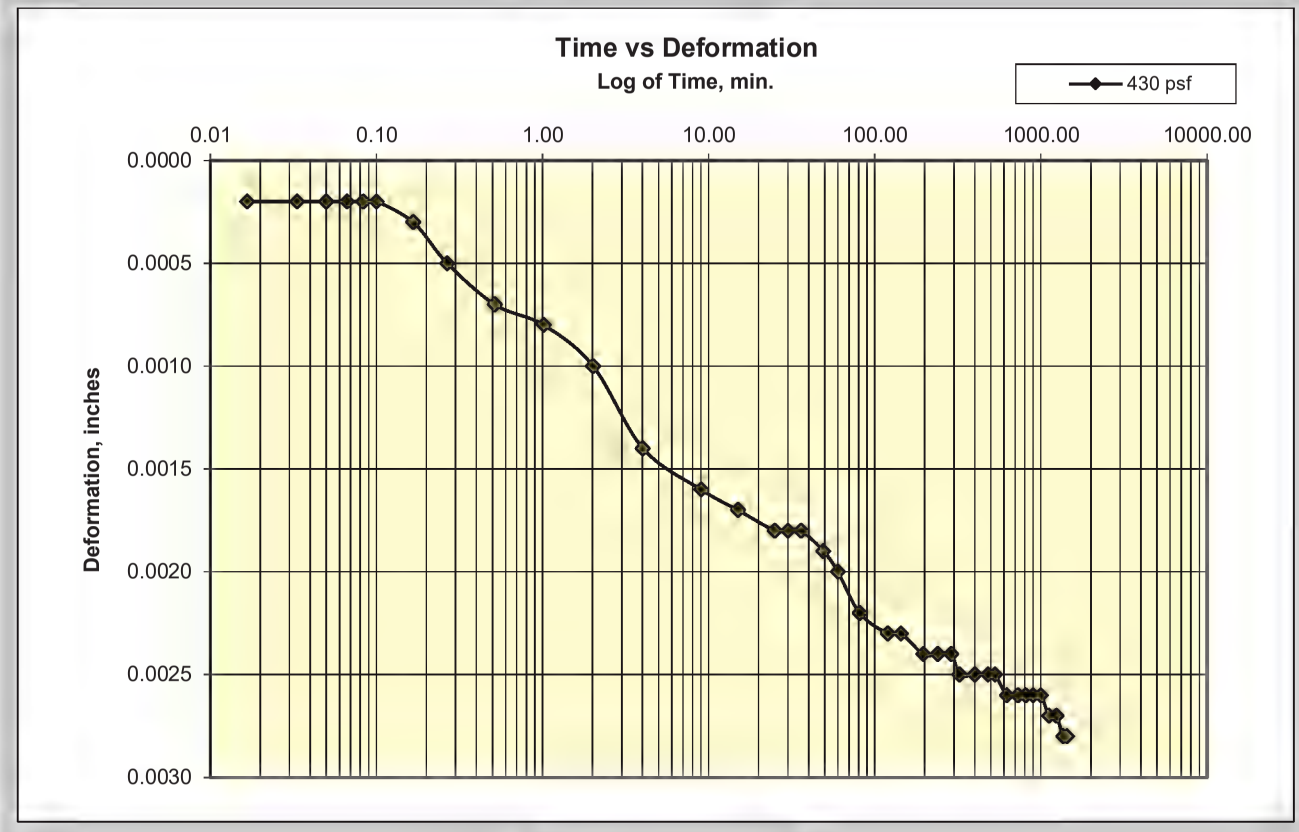


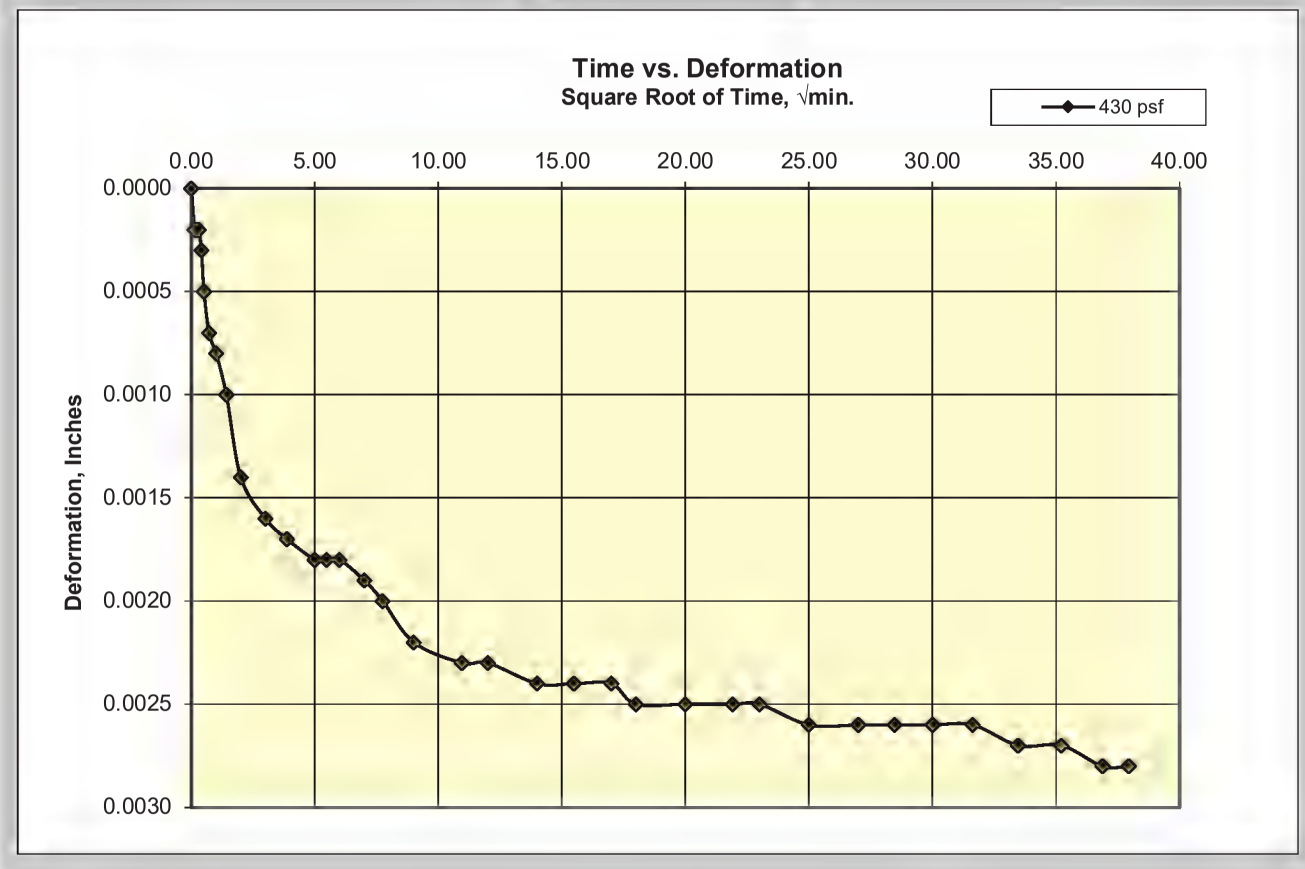
Cooper Testing Labs, Inc.

Load 4

430 psf



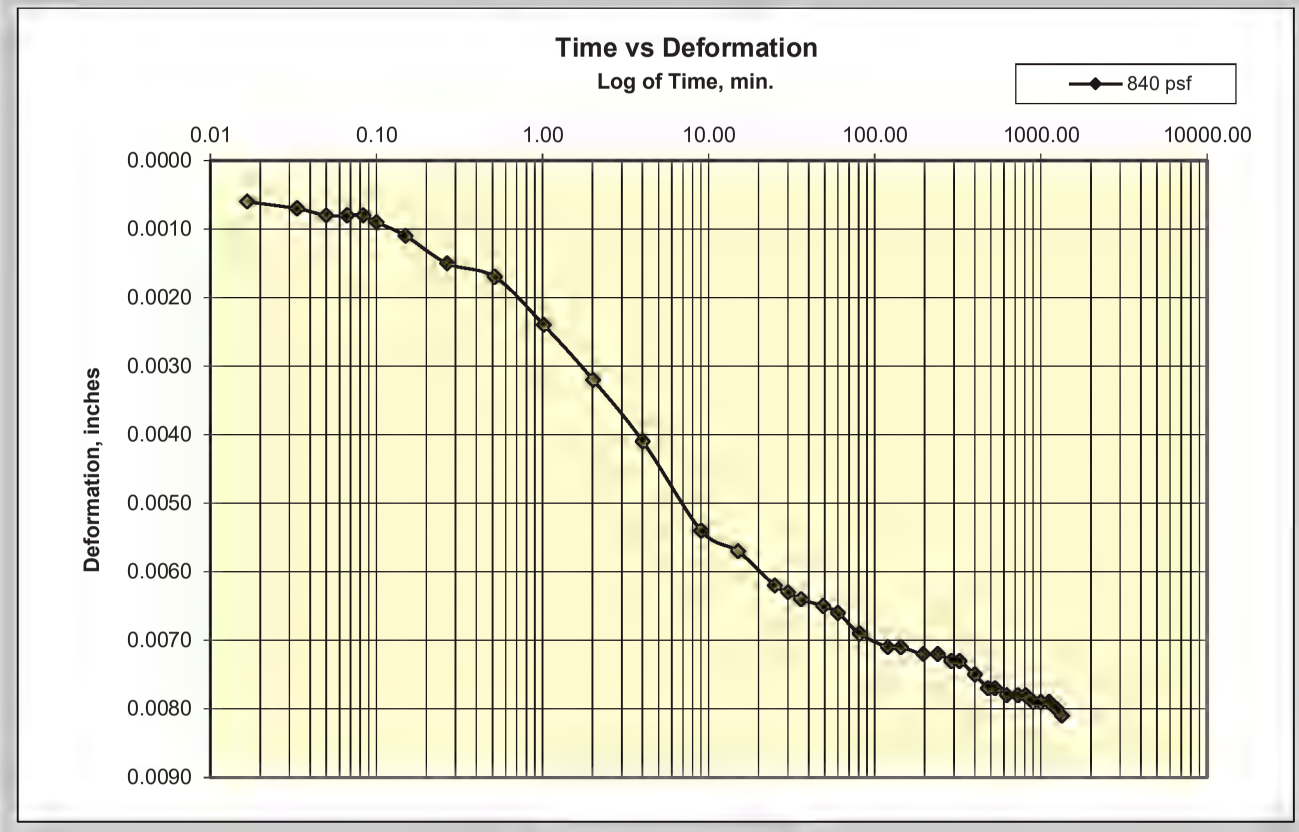
430 psf



Cooper Testing Labs, Inc.

Load 5

840 psf



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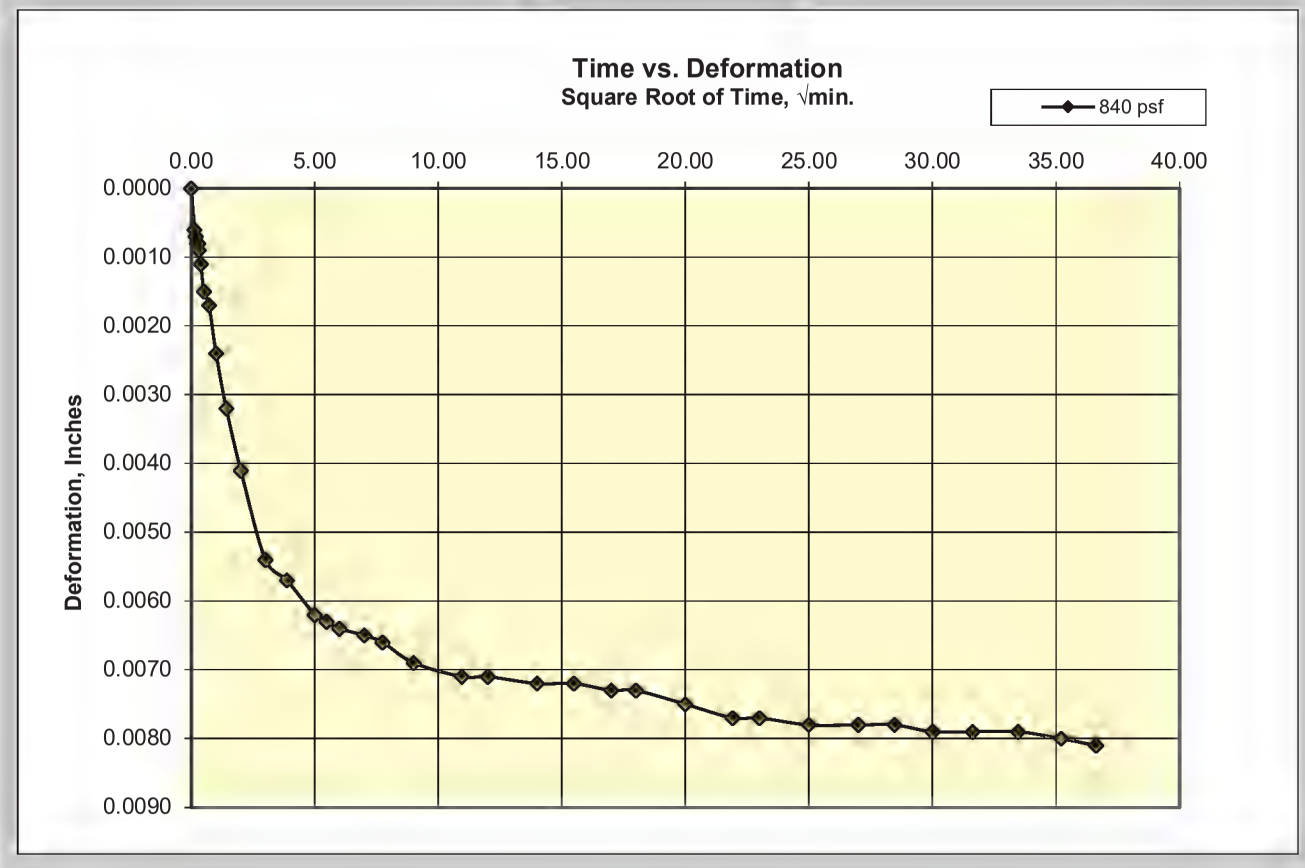
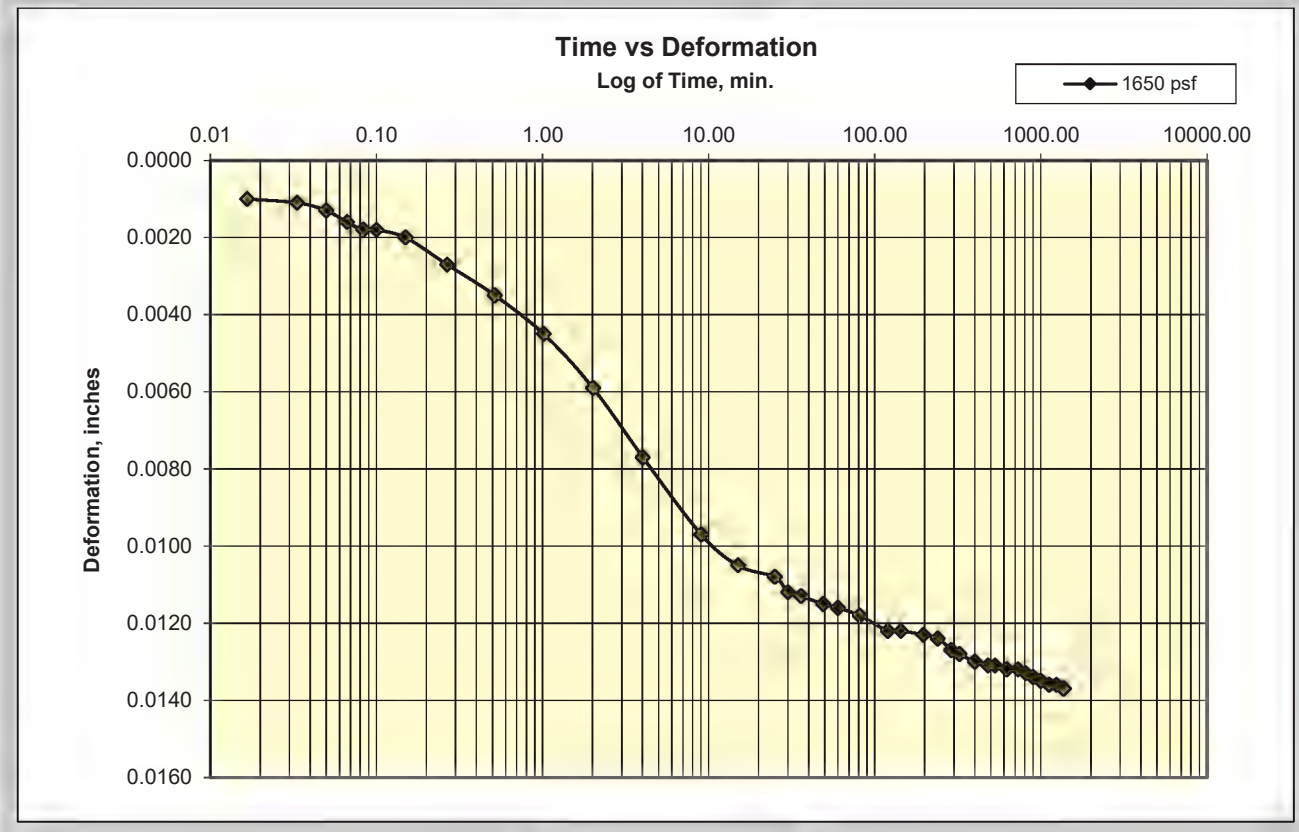


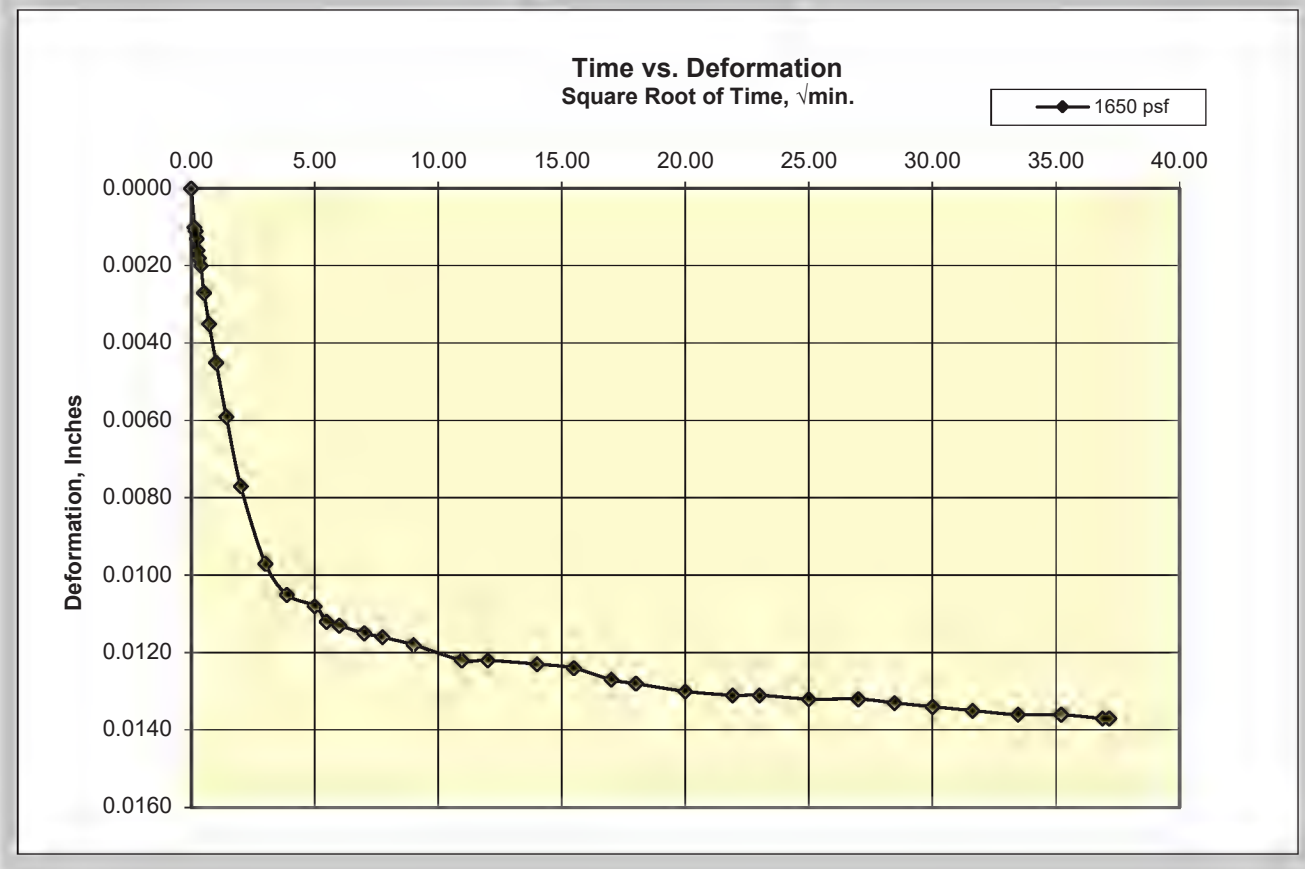
Cooper Testing Labs, Inc.

Load 6

1650 psf



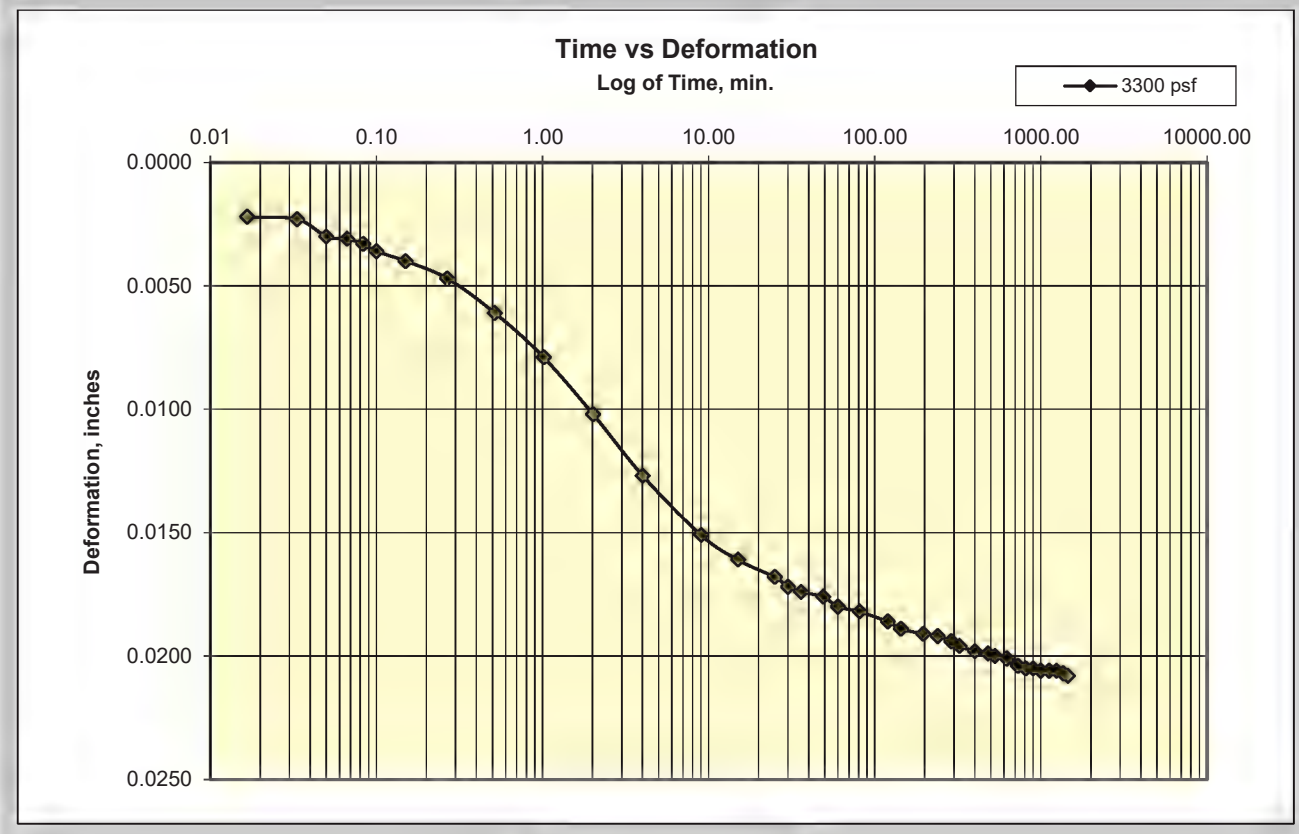
1650 psf



Cooper Testing Labs, Inc.

Load 7

3300 psf



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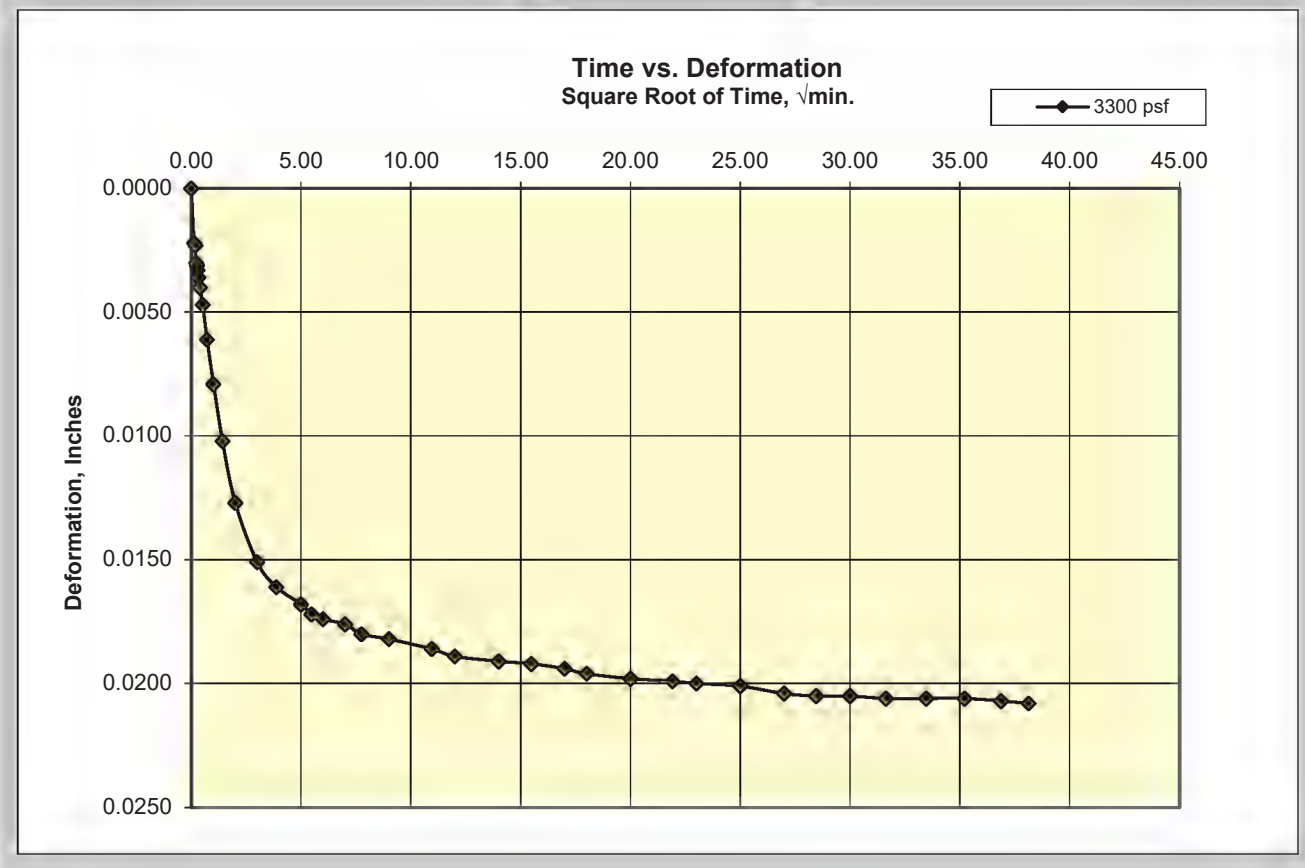

Cooper Testing Labs, Inc.

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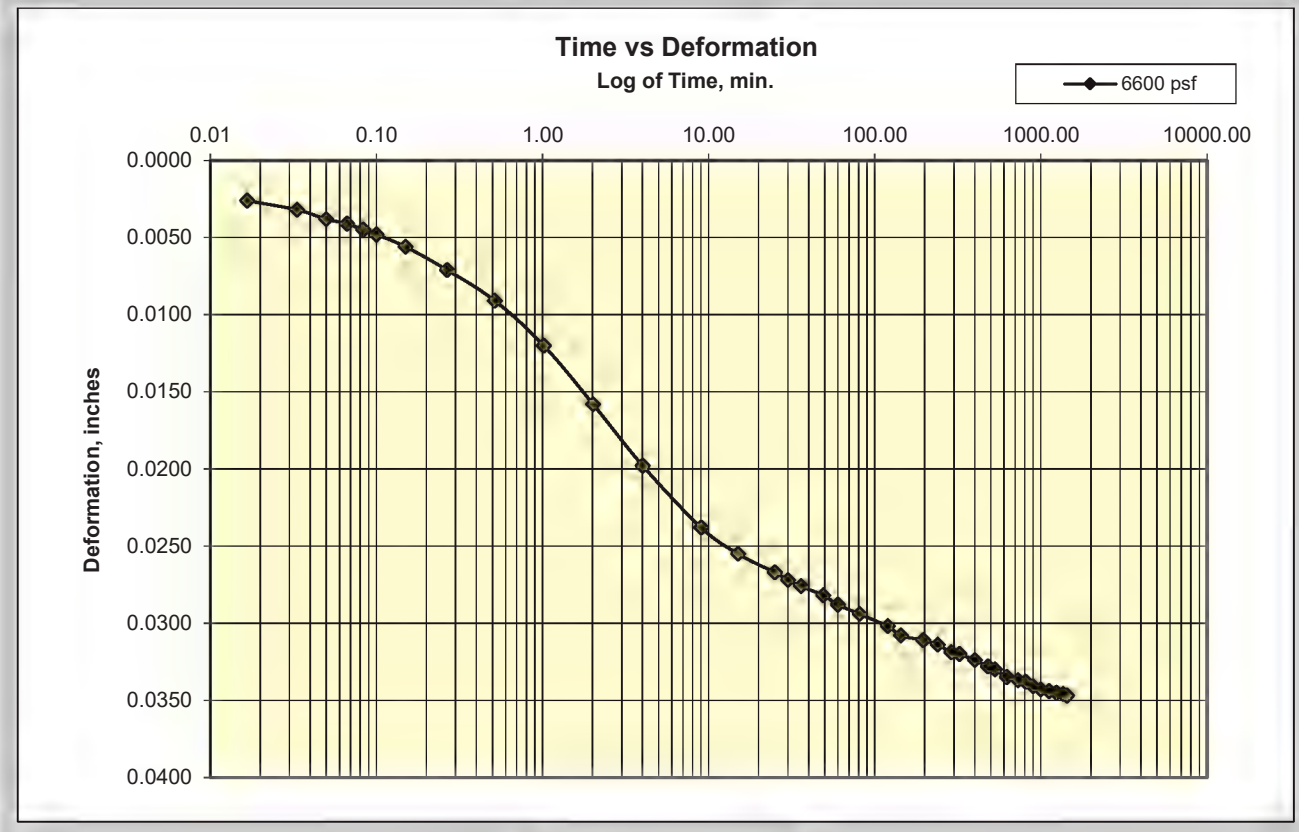
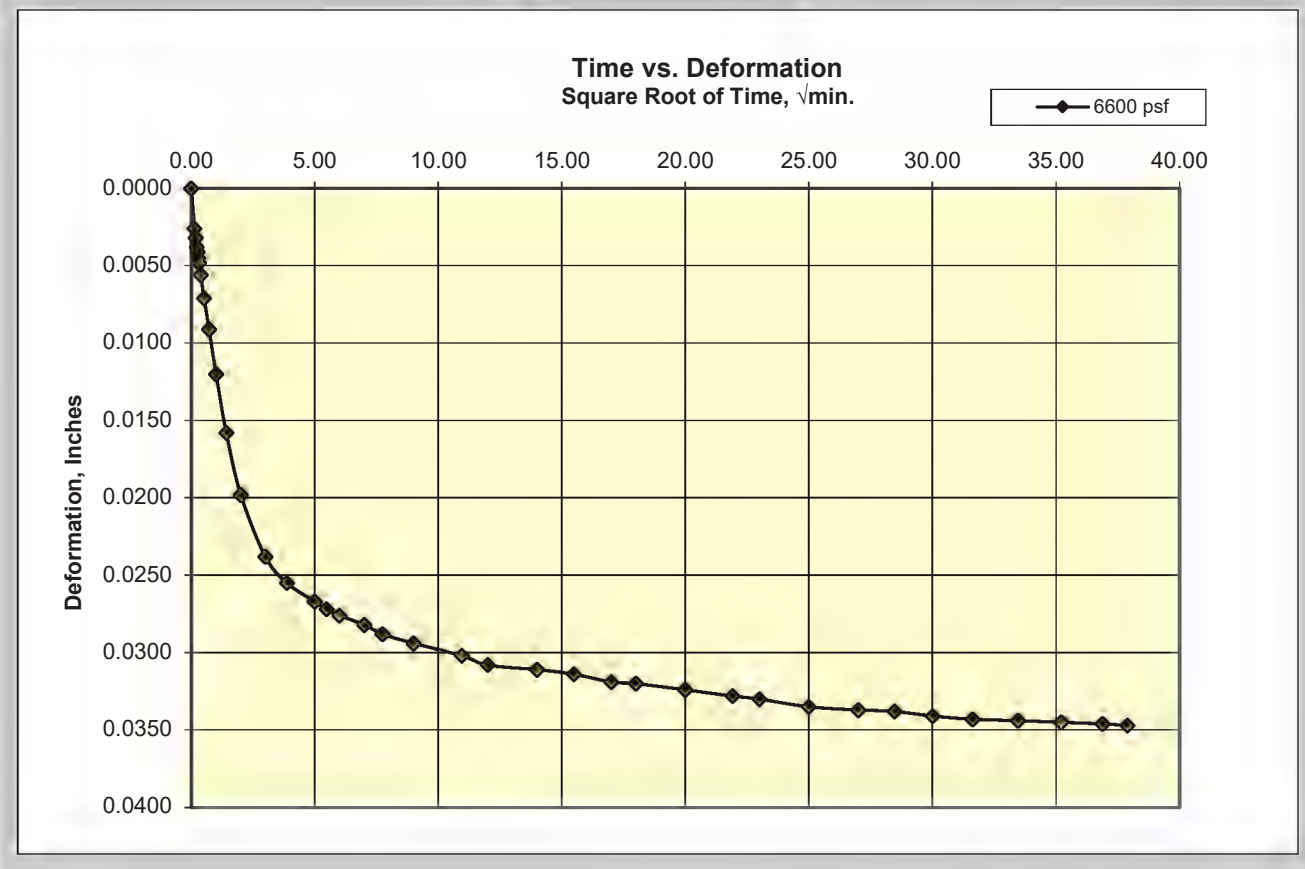


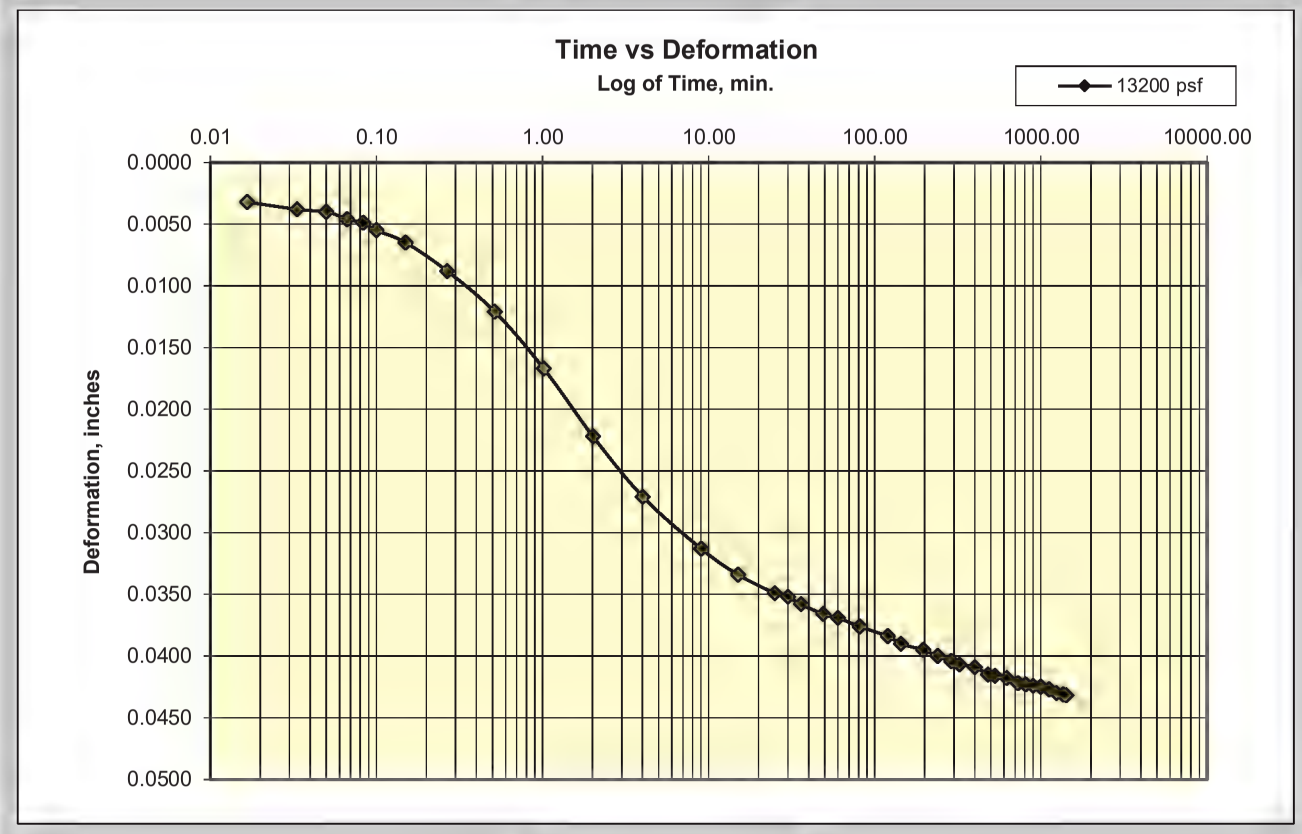
6600 psf



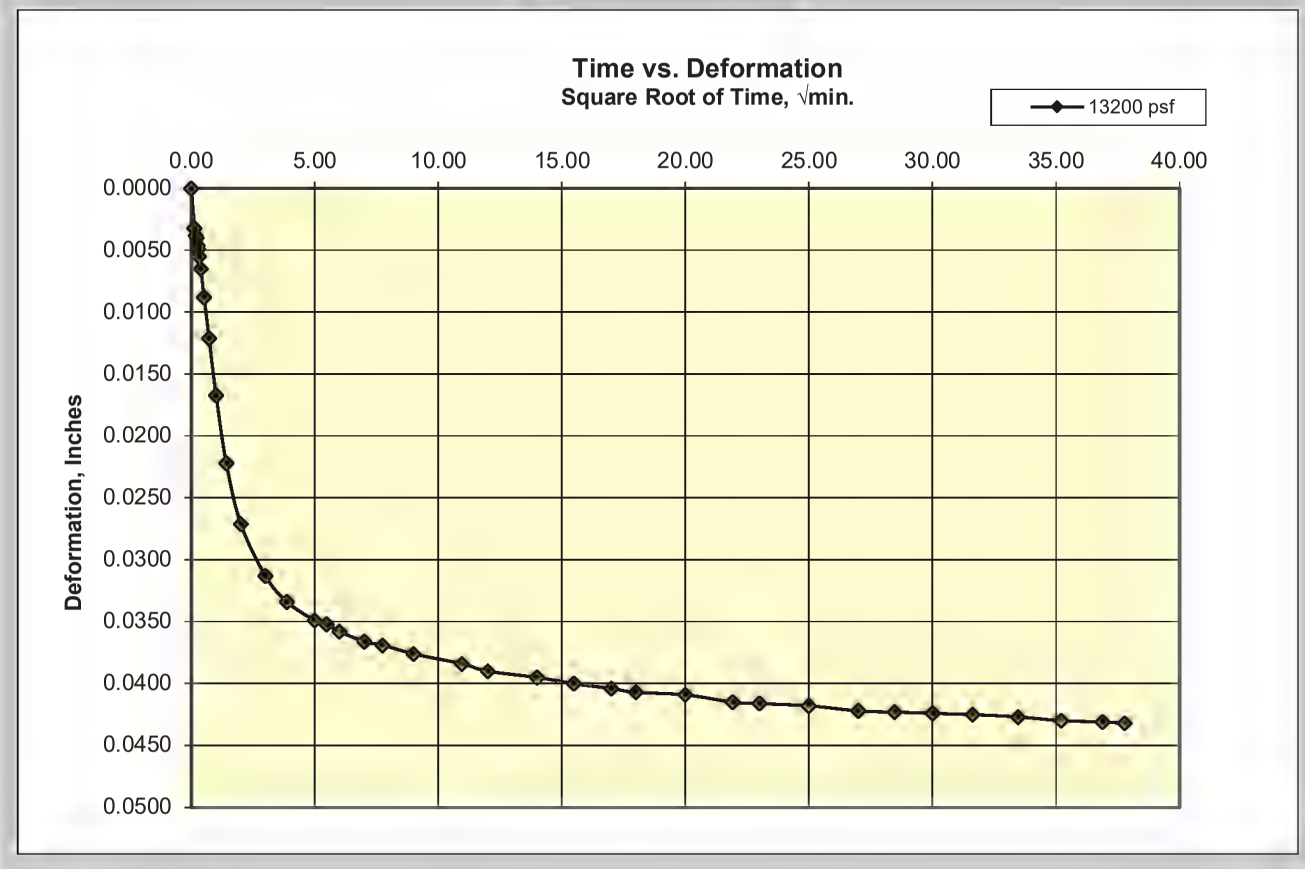
Cooper Testing Labs, Inc.

Load 9

13200 psf



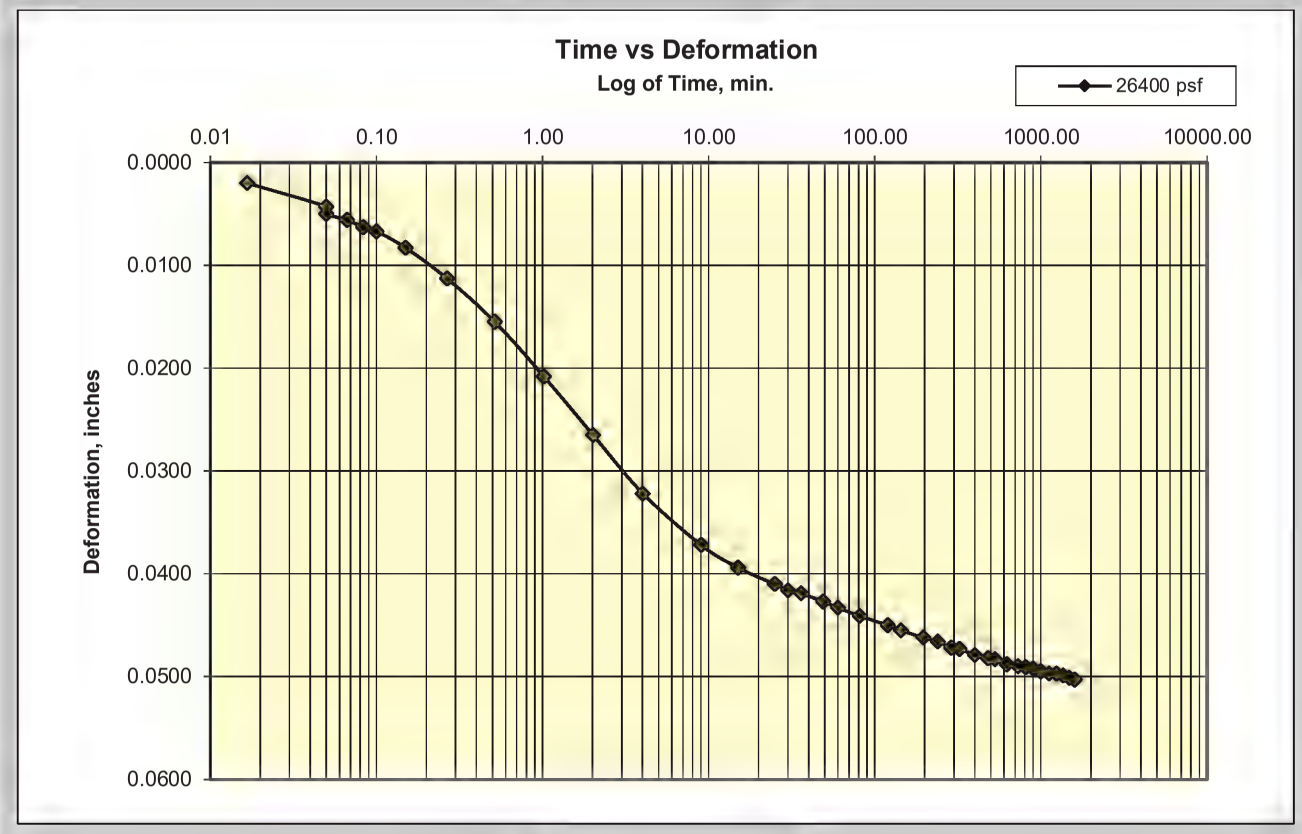
13200 psf



Cooper Testing Labs, Inc.

Load 10

26400 psf



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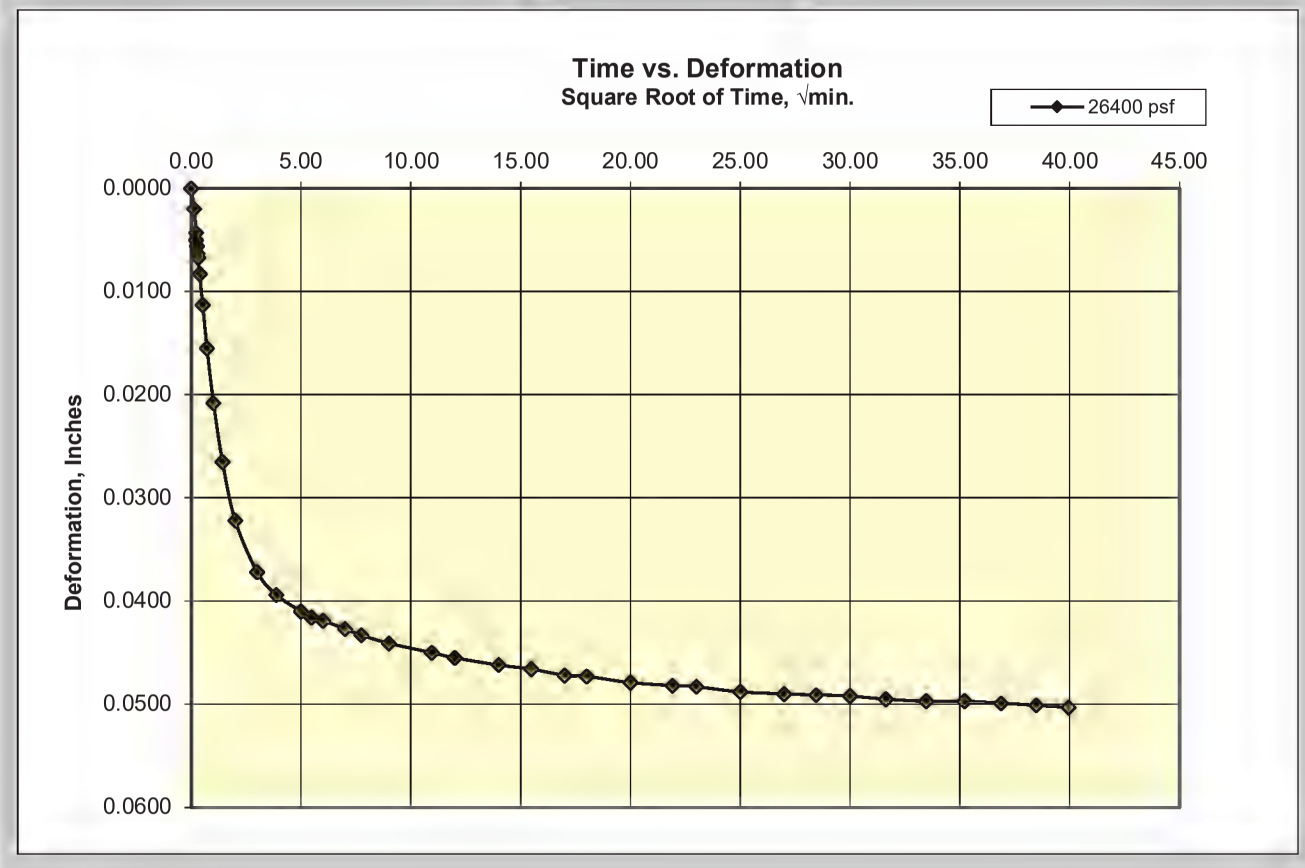
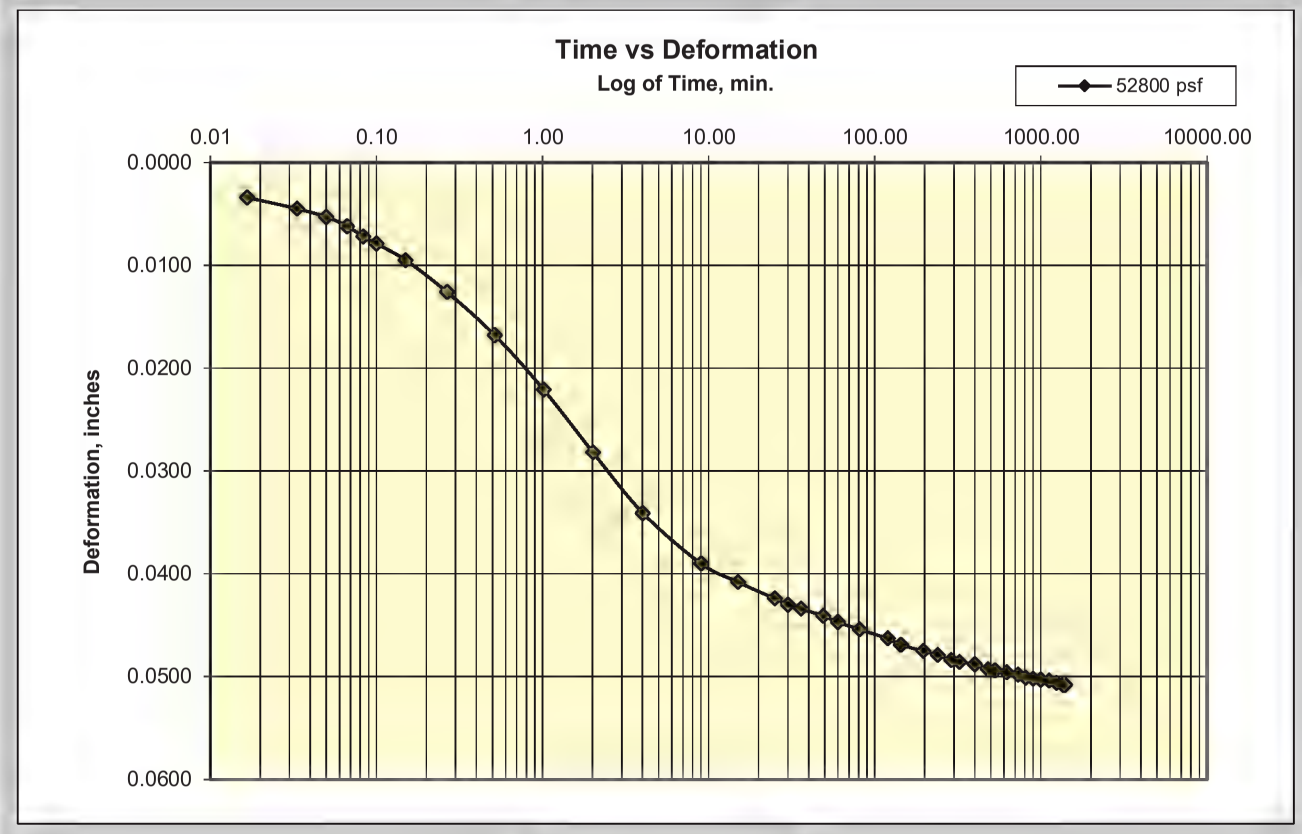
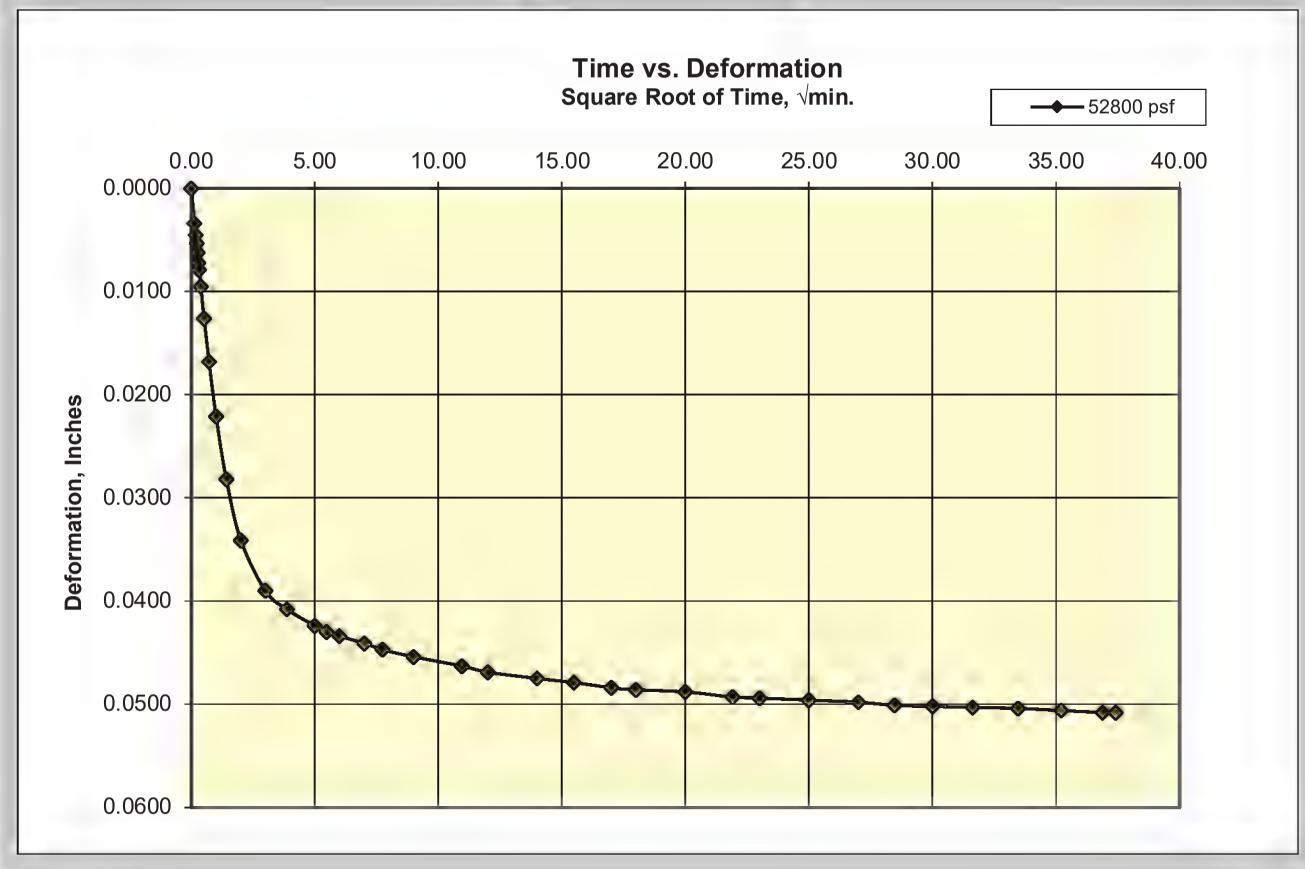


Cooper Testing Labs, Inc.

Load 11 52800 psf



52800 psf



Cooper Testing Labs, Inc.

Load 12

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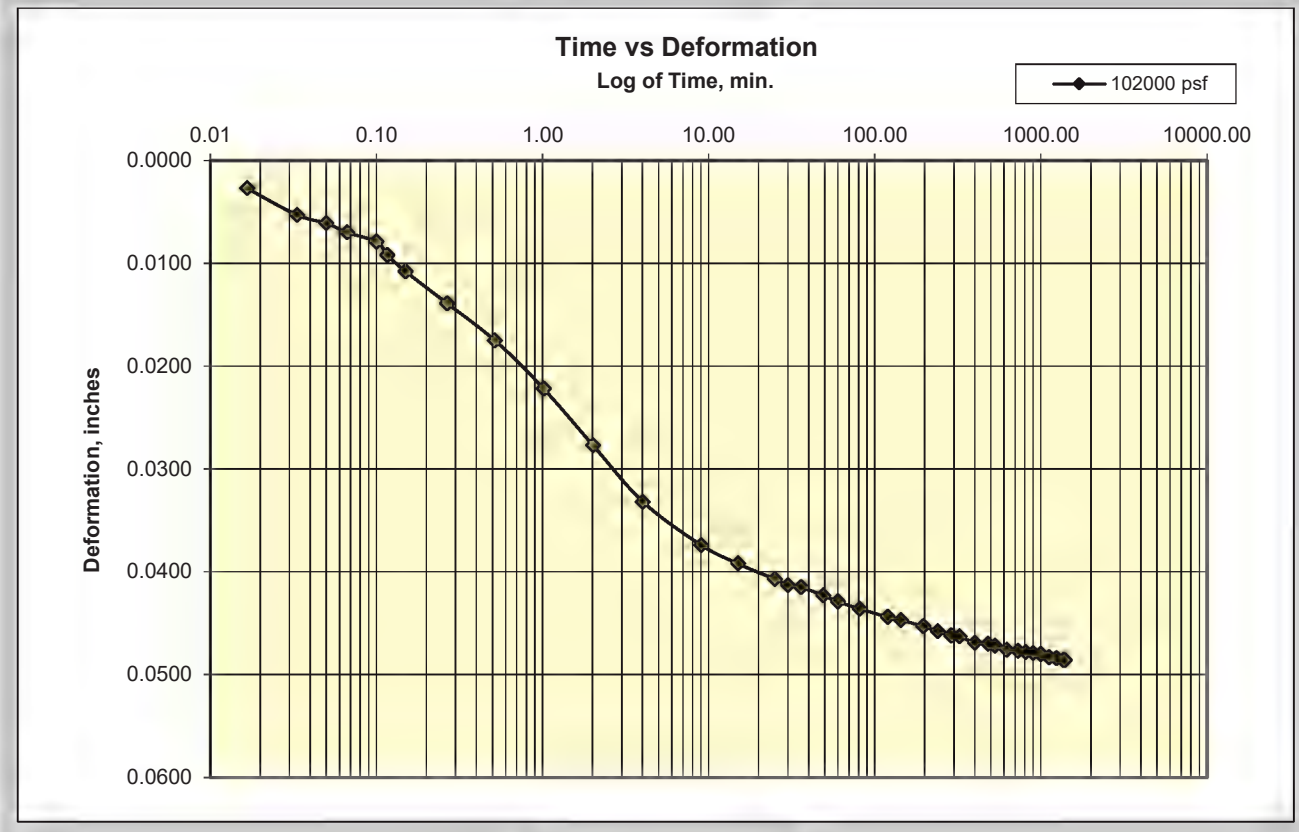

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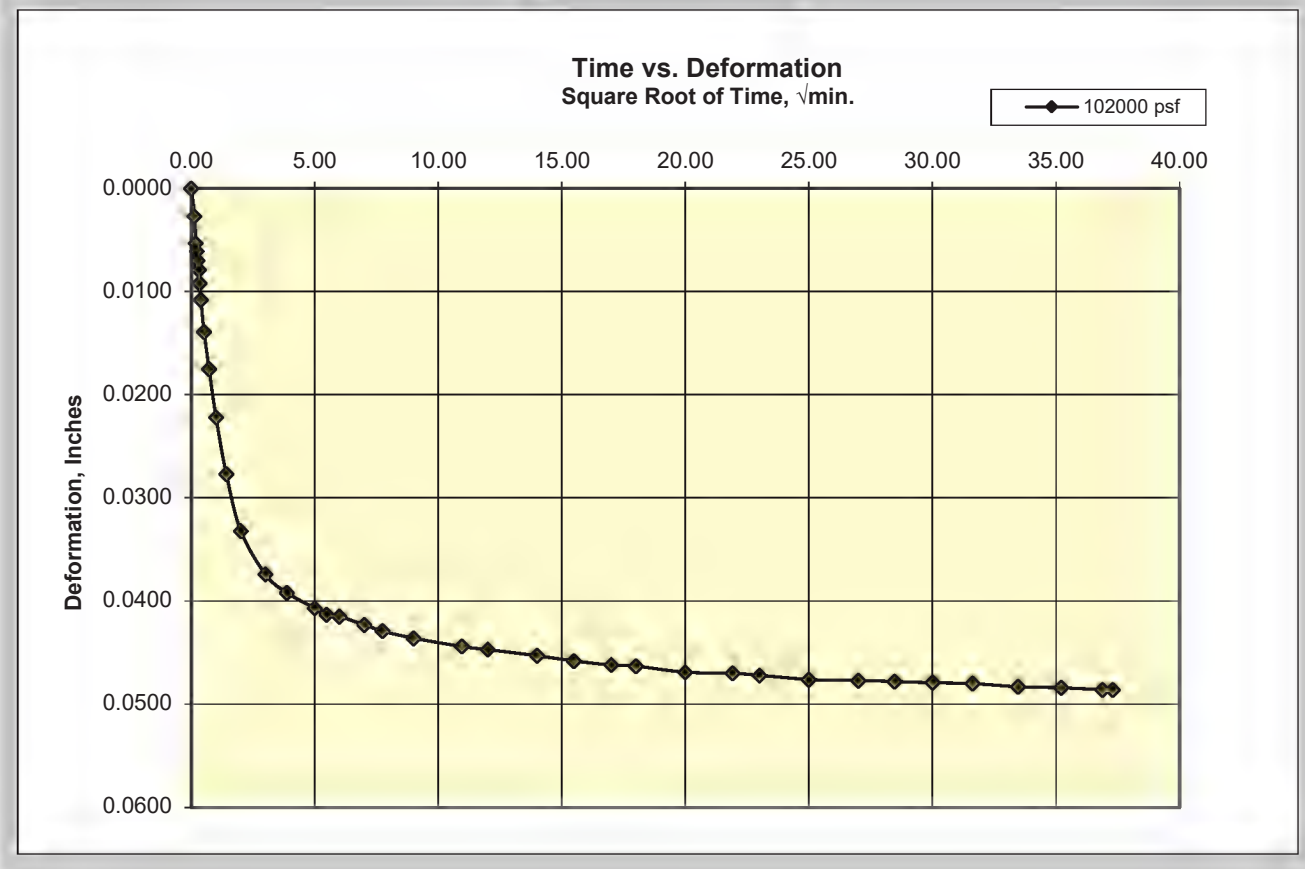
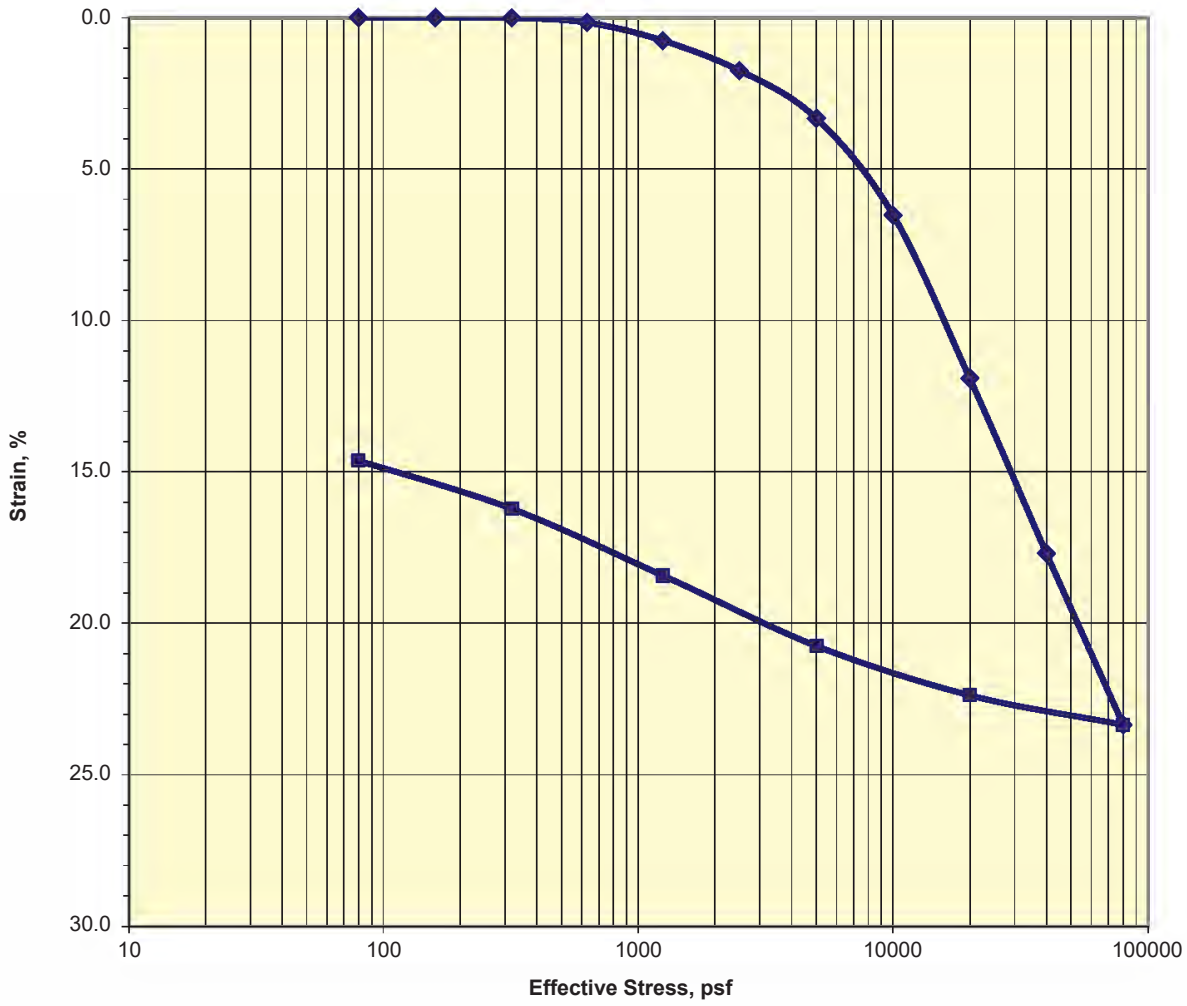


Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B102	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	22	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	80-82.5	**Checked:**	PJ
Soil Type:	Dark Gray Greenish Gray CLAY (Bay Mud)			**Date:**	11/3/2023

Strain-Log-P Curve



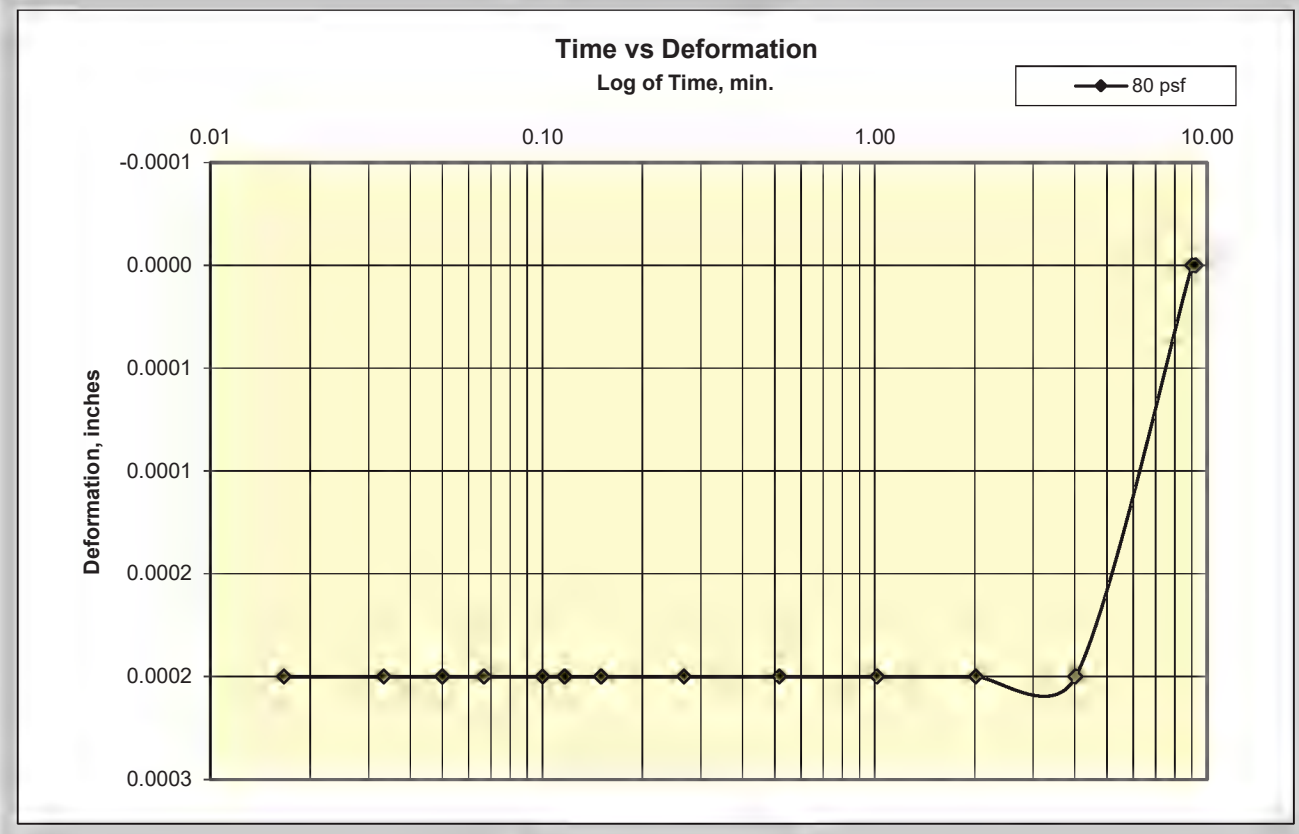
Assumed Gs 2.75	Initial	Final
Moisture %:	36.1	27.3
Dry Density, pcf:	84.2	98.1
Void Ratio:	1.039	0.751
% Saturation:	95.6	100.0

Remarks:

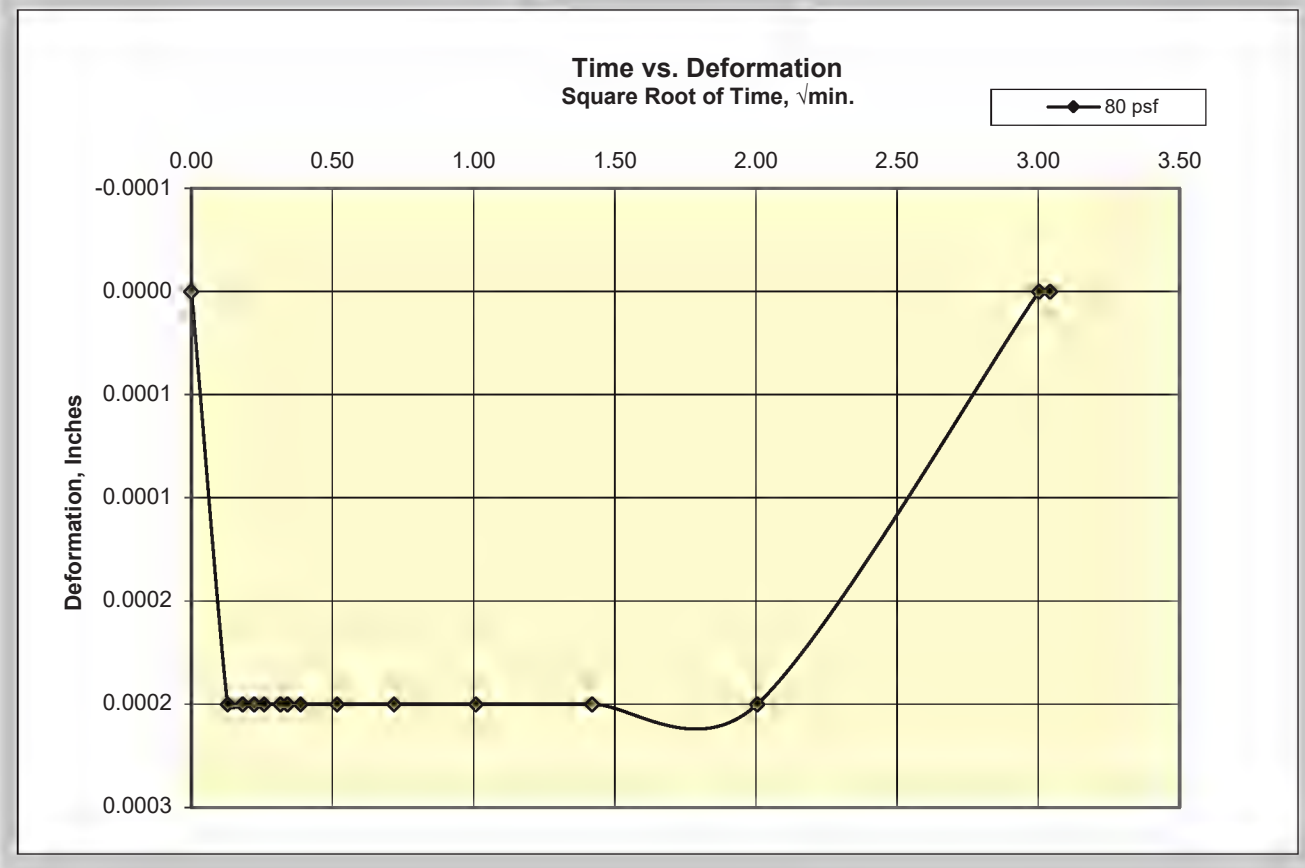
Cooper Testing Labs, Inc.

Load 1

80 psf



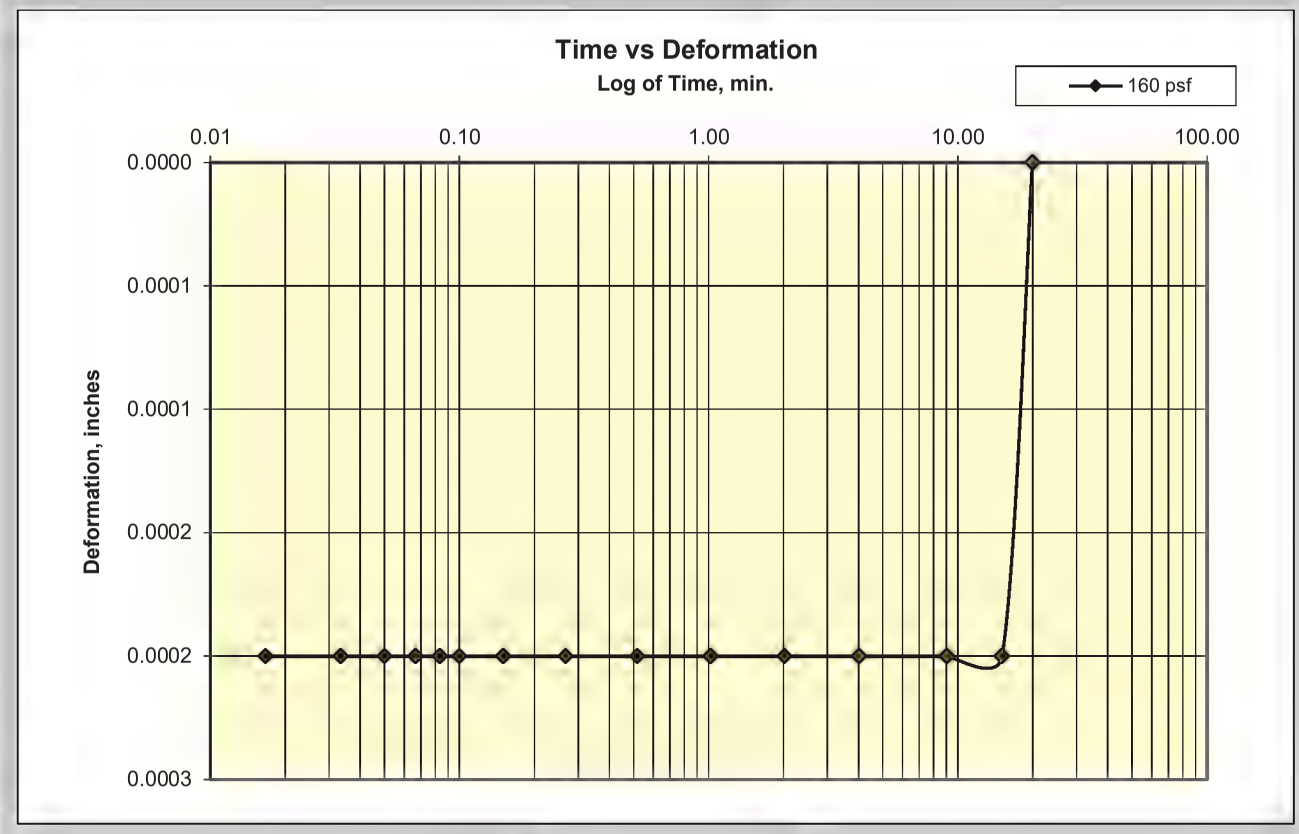
80 psf



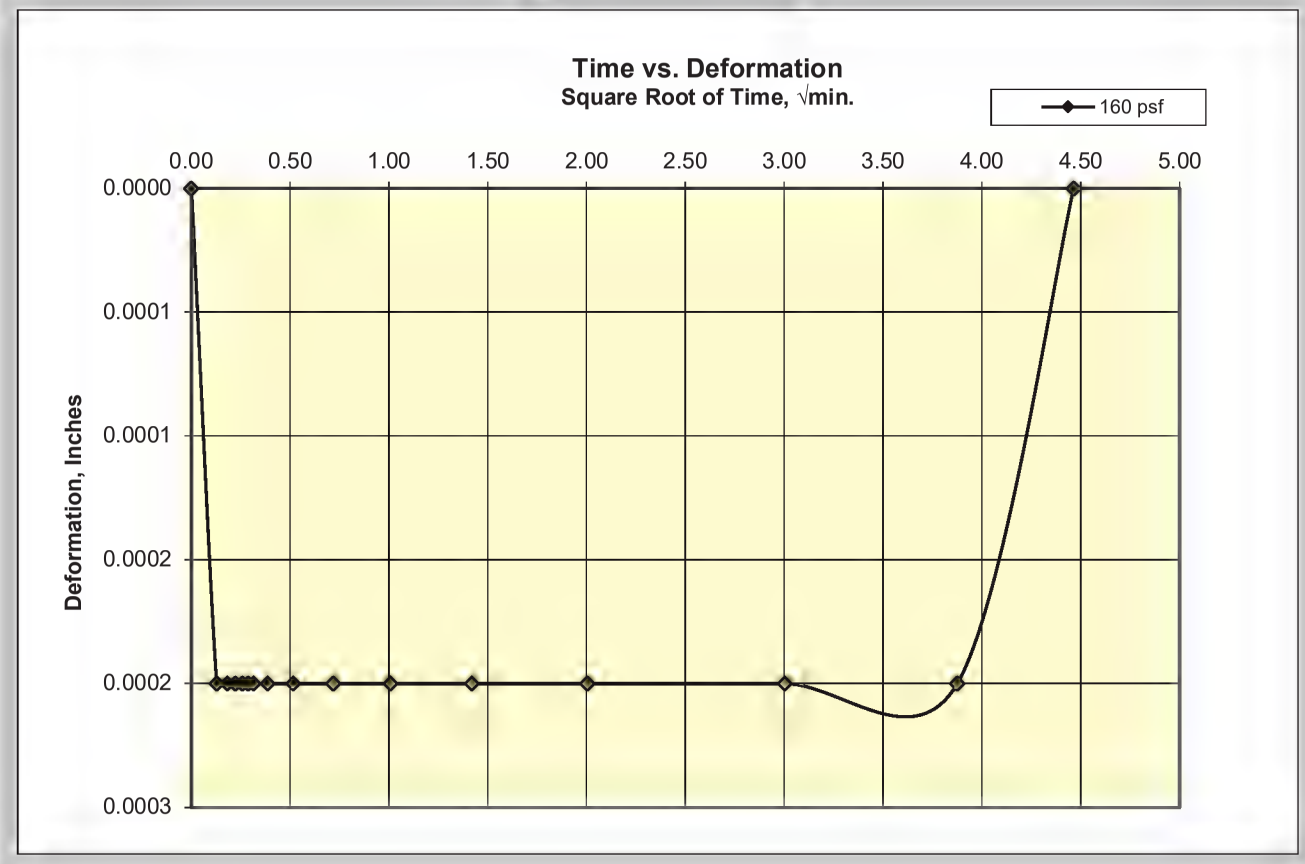
Cooper Testing Labs, Inc.

Load 2

160 psf



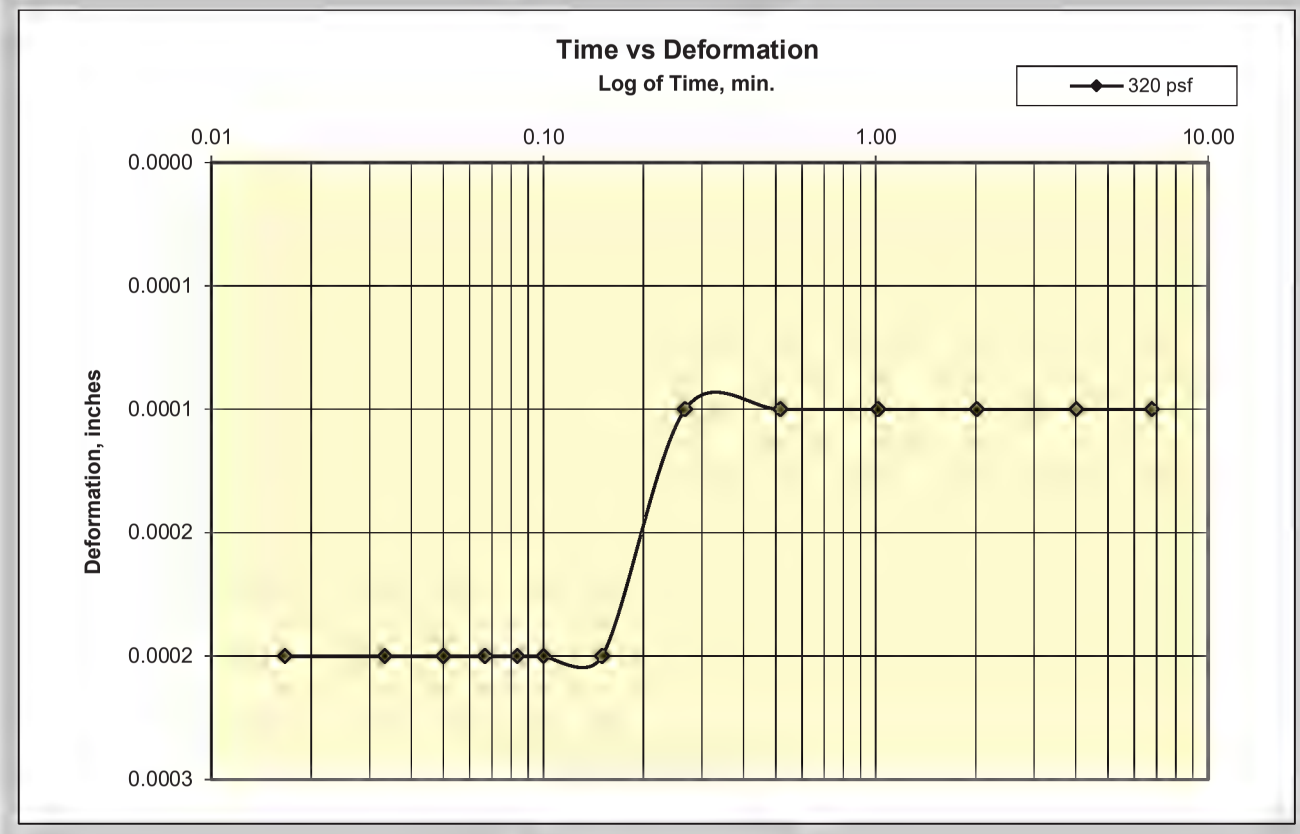
160 psf



Cooper Testing Labs, Inc.

Load 3

320 psf



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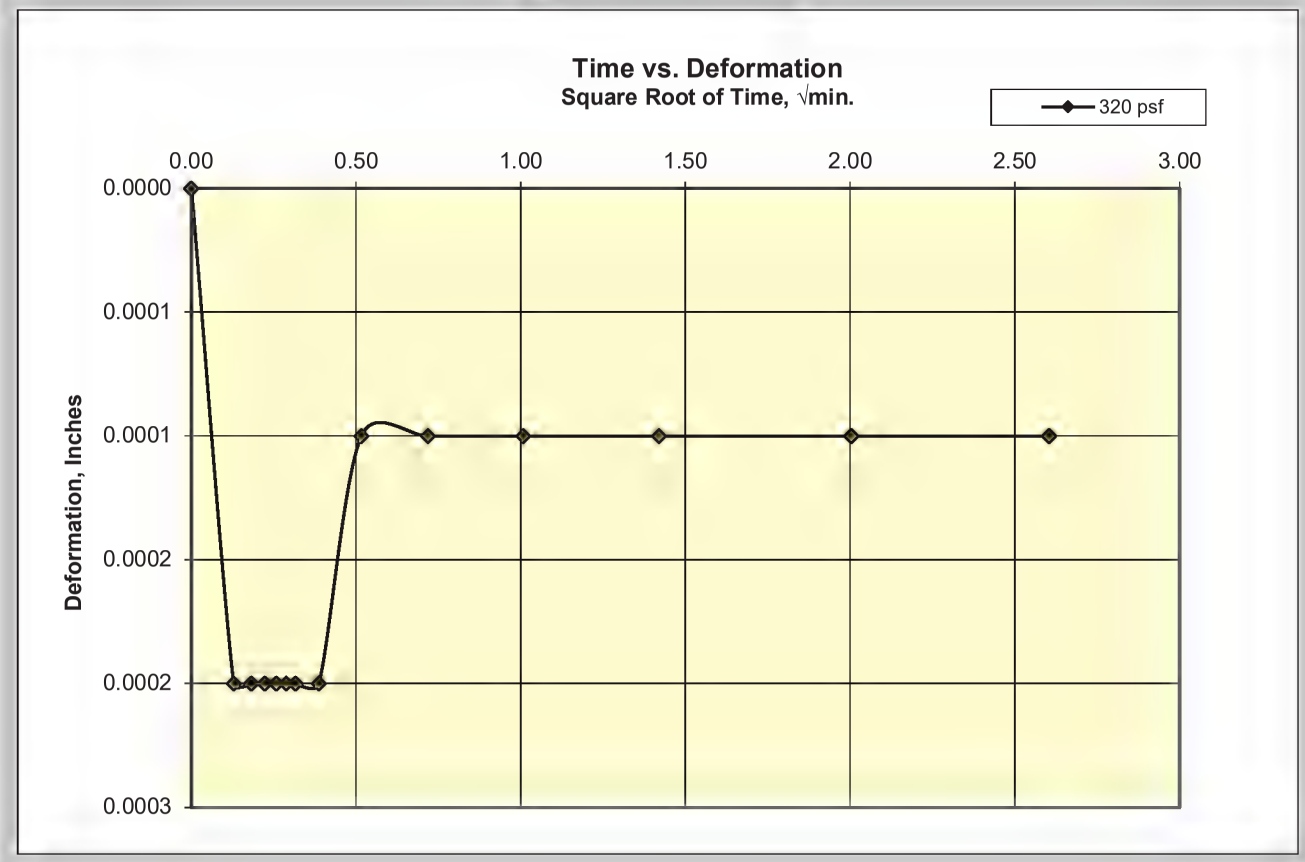
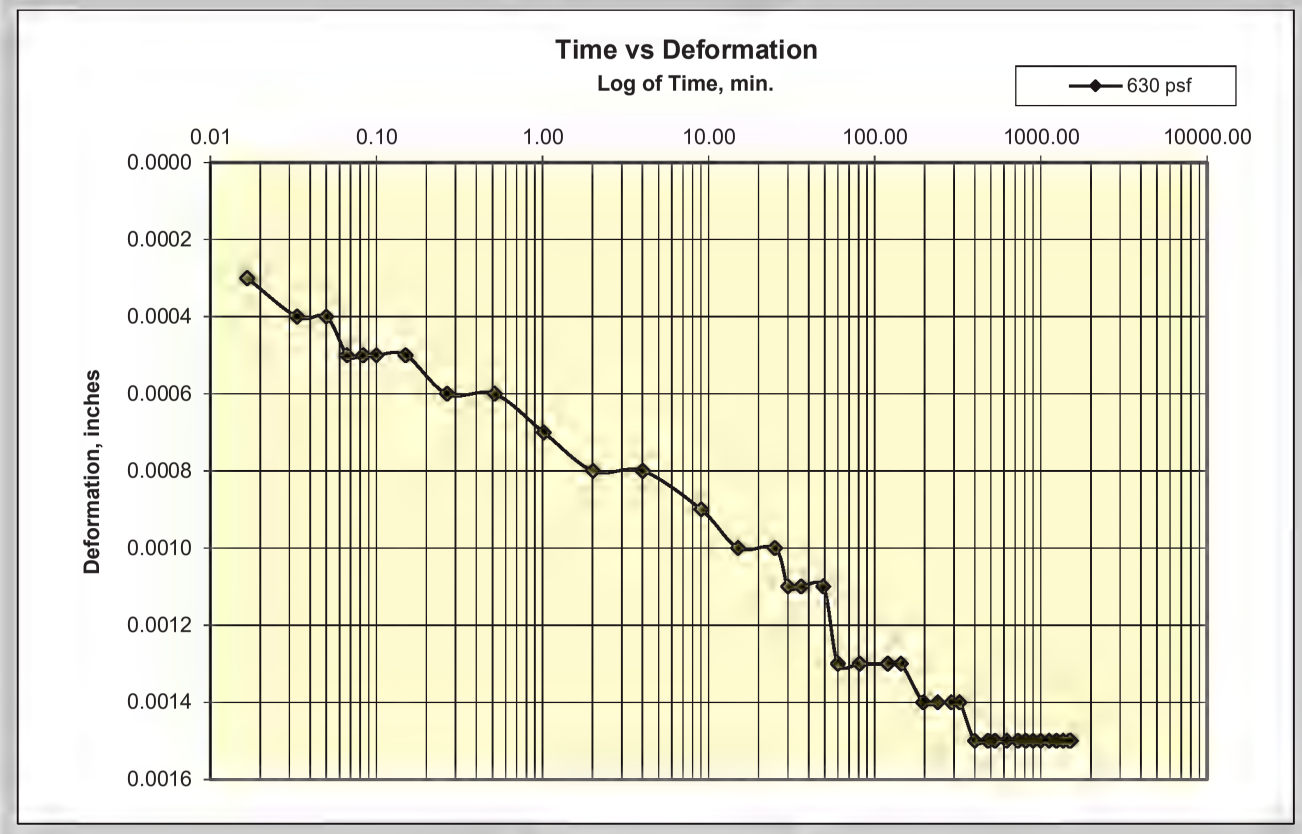


Cooper Testing Labs, Inc.

Load 4

630 psf



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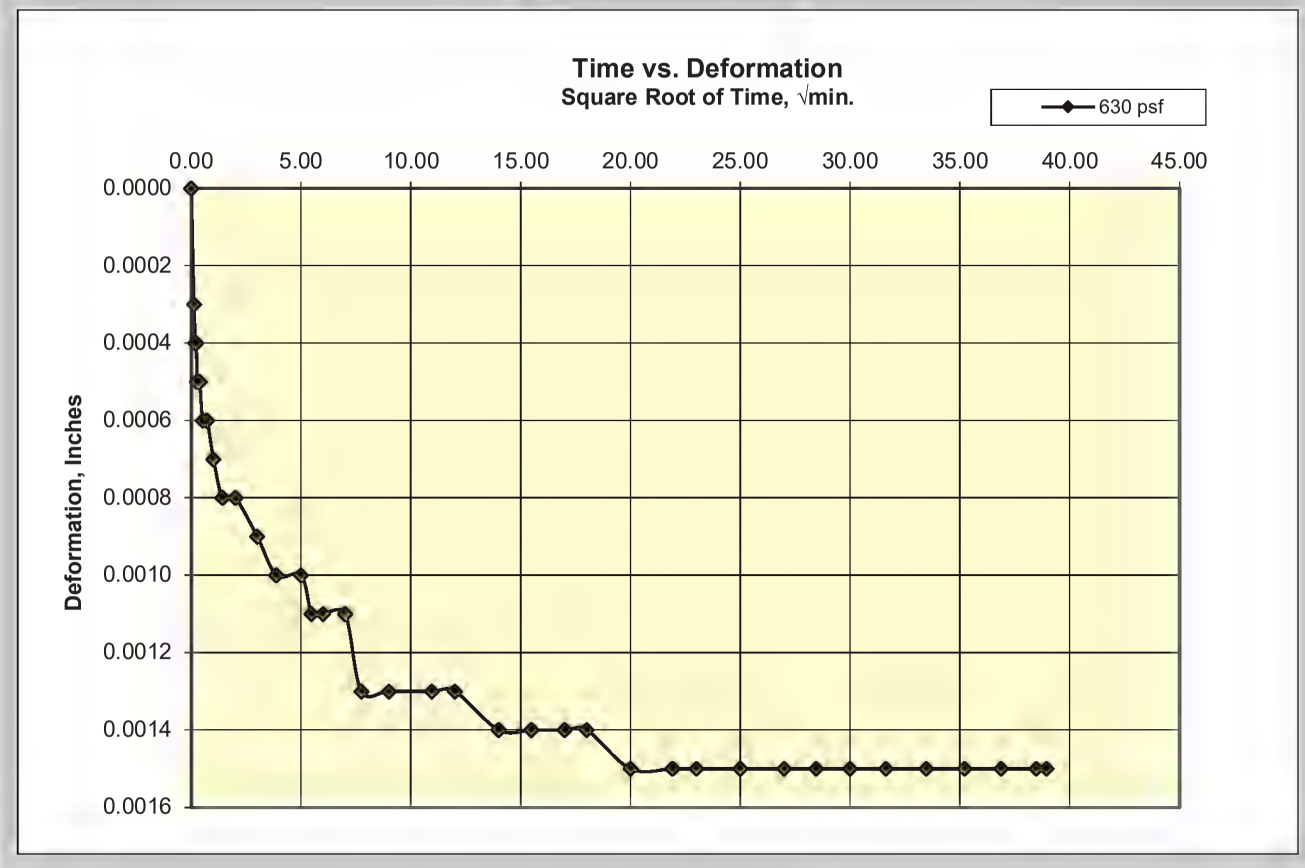
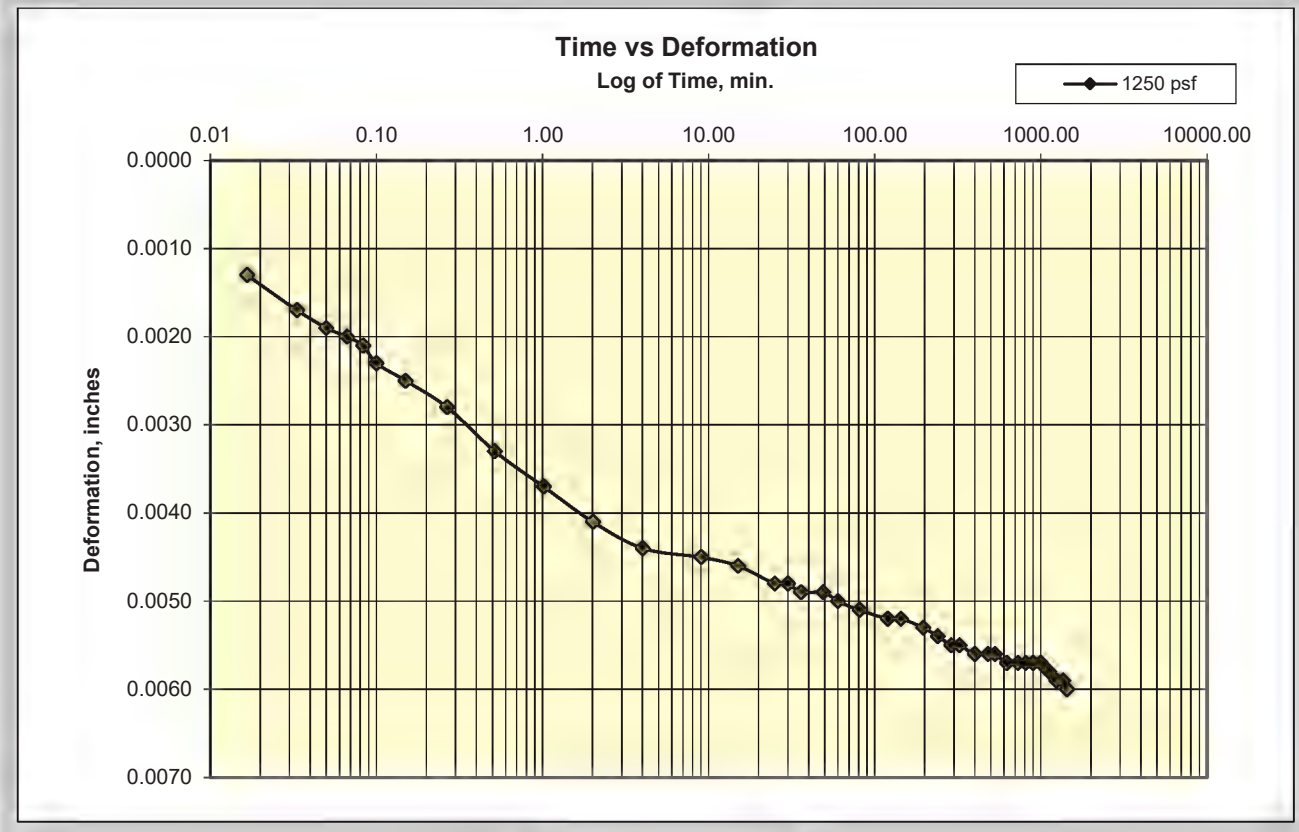


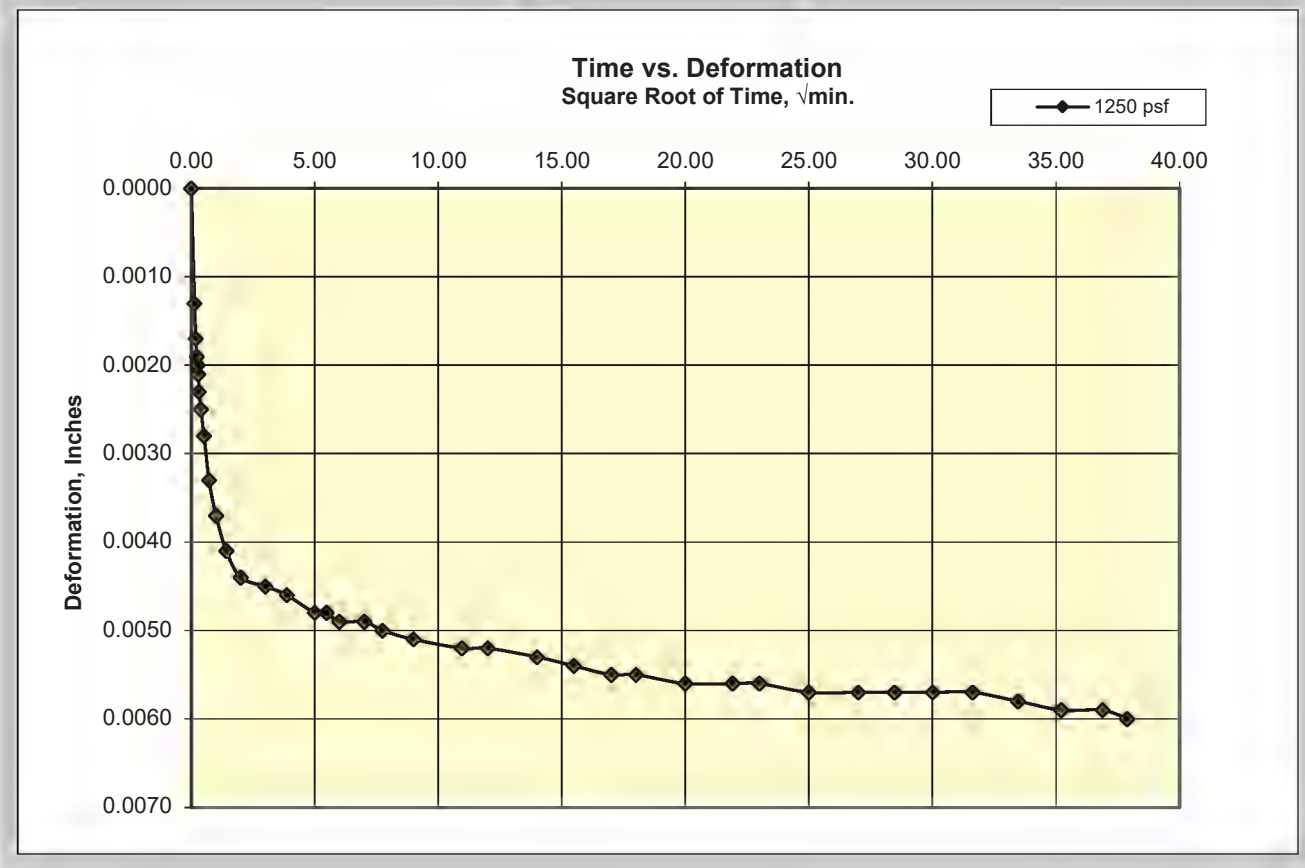
Cooper Testing Labs, Inc.

Load 5

1250 psf



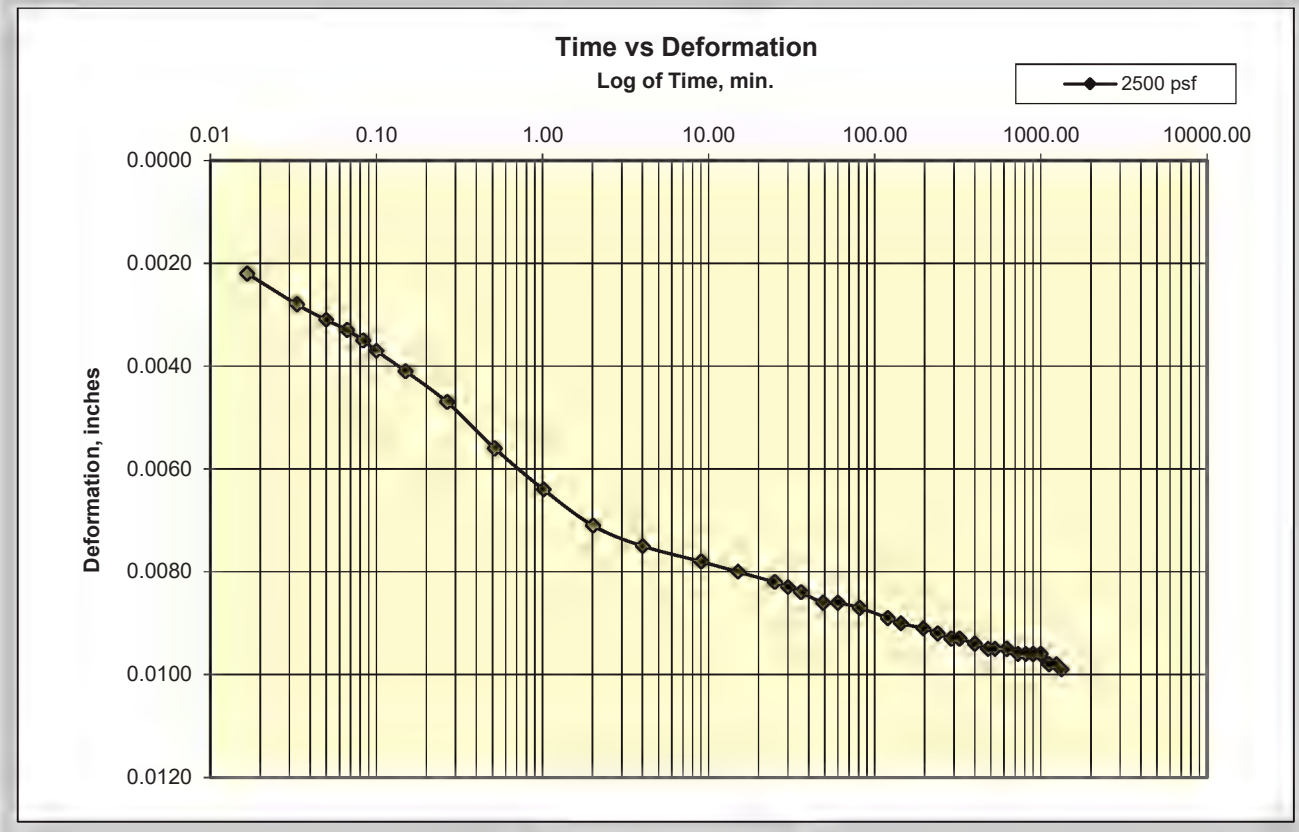
1250 psf



Cooper Testing Labs, Inc.

Load 6

2500 psf



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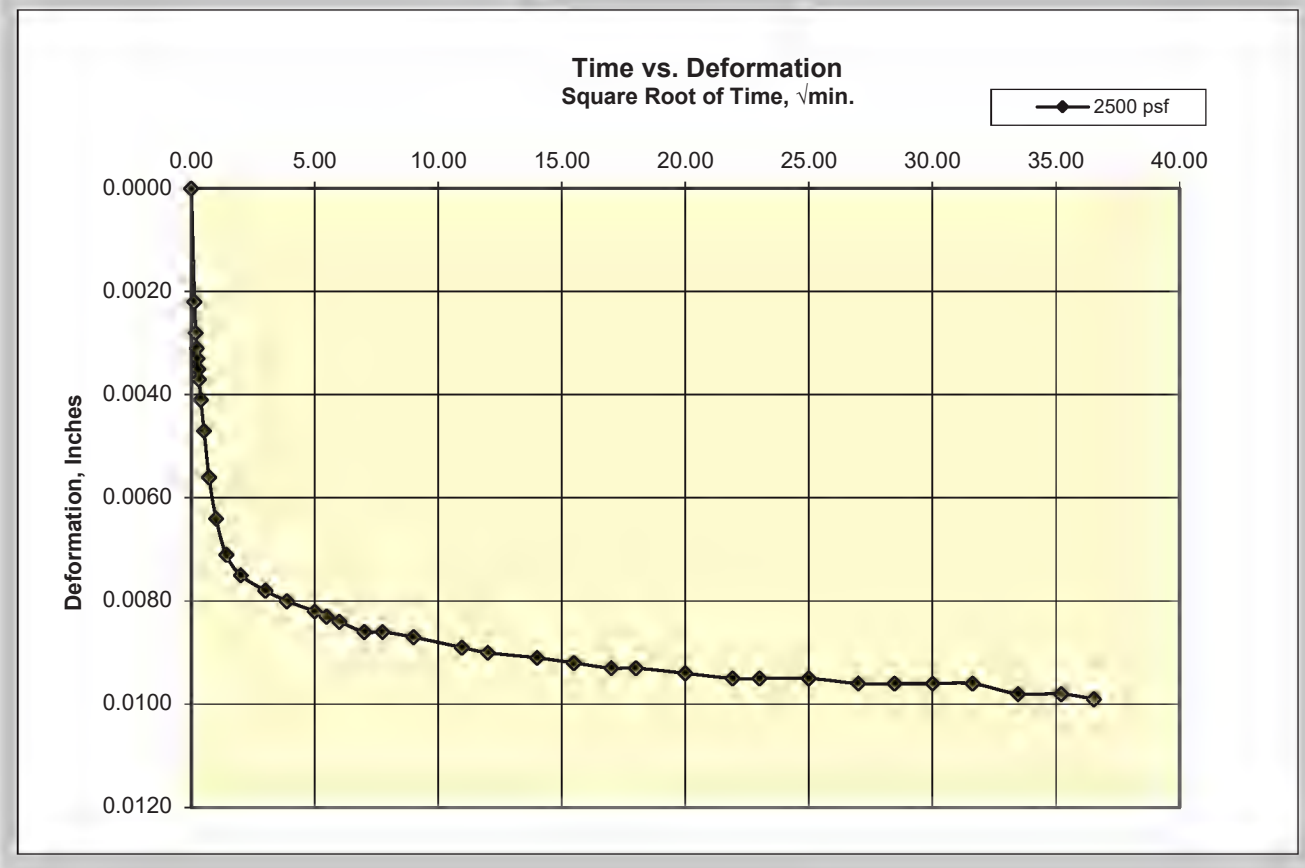
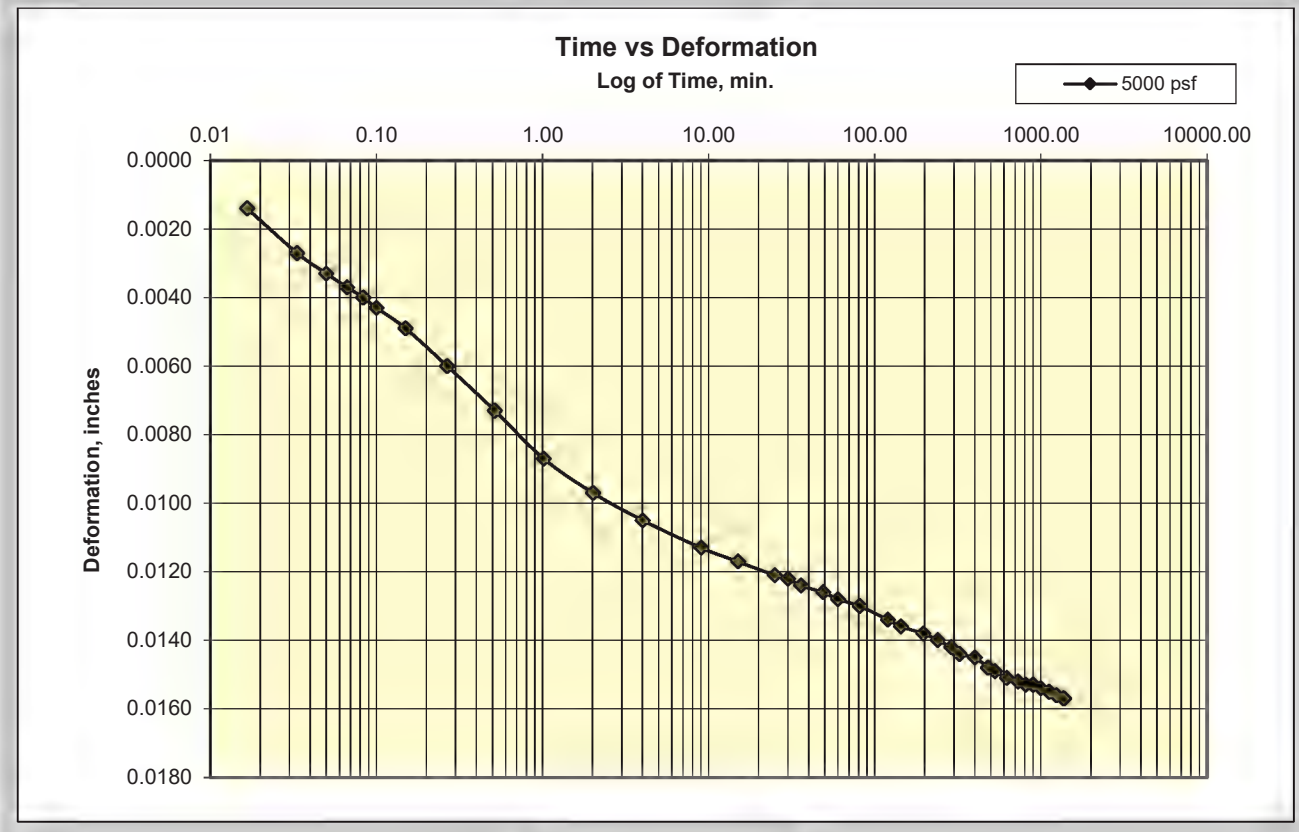


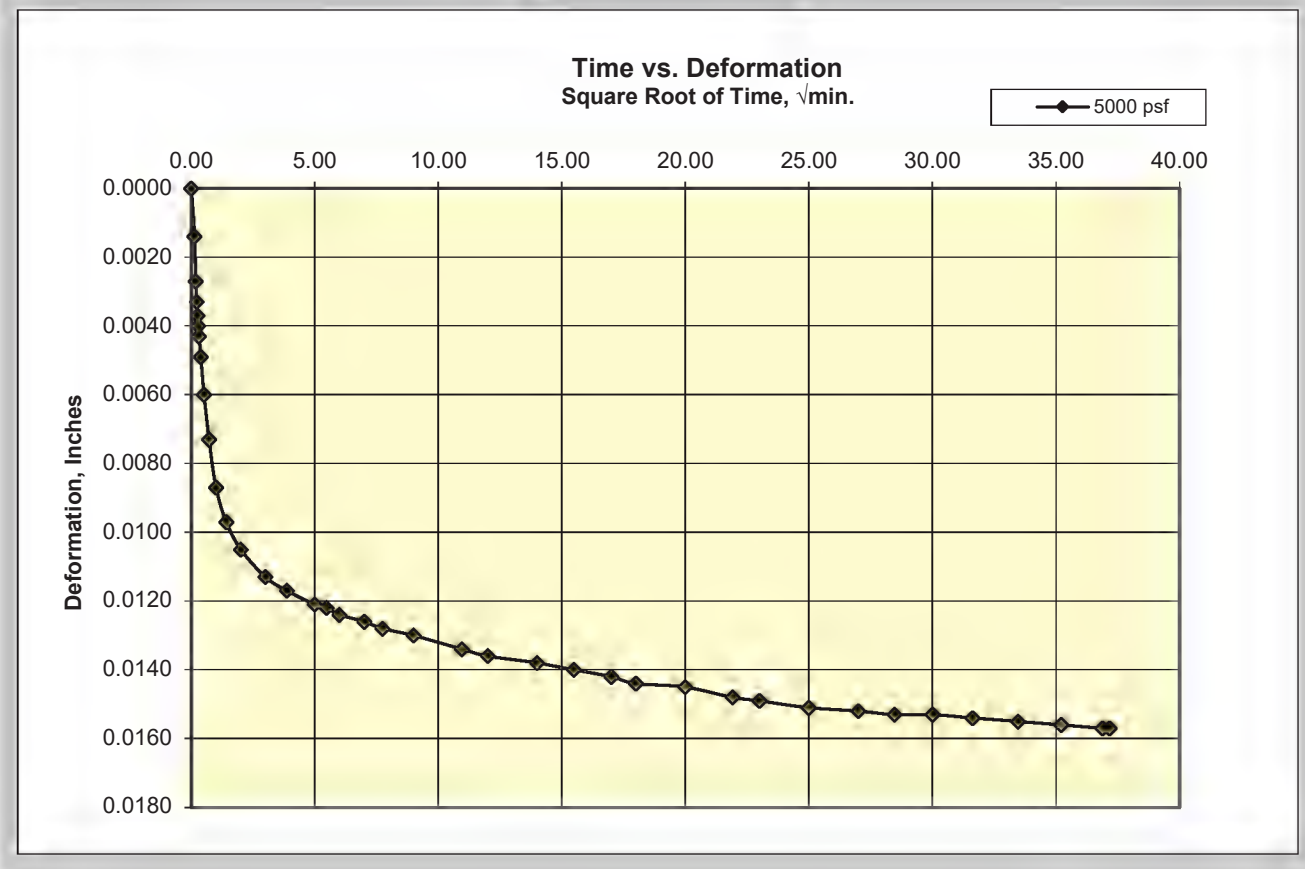
Cooper Testing Labs, Inc.

Load 7

5000 psf



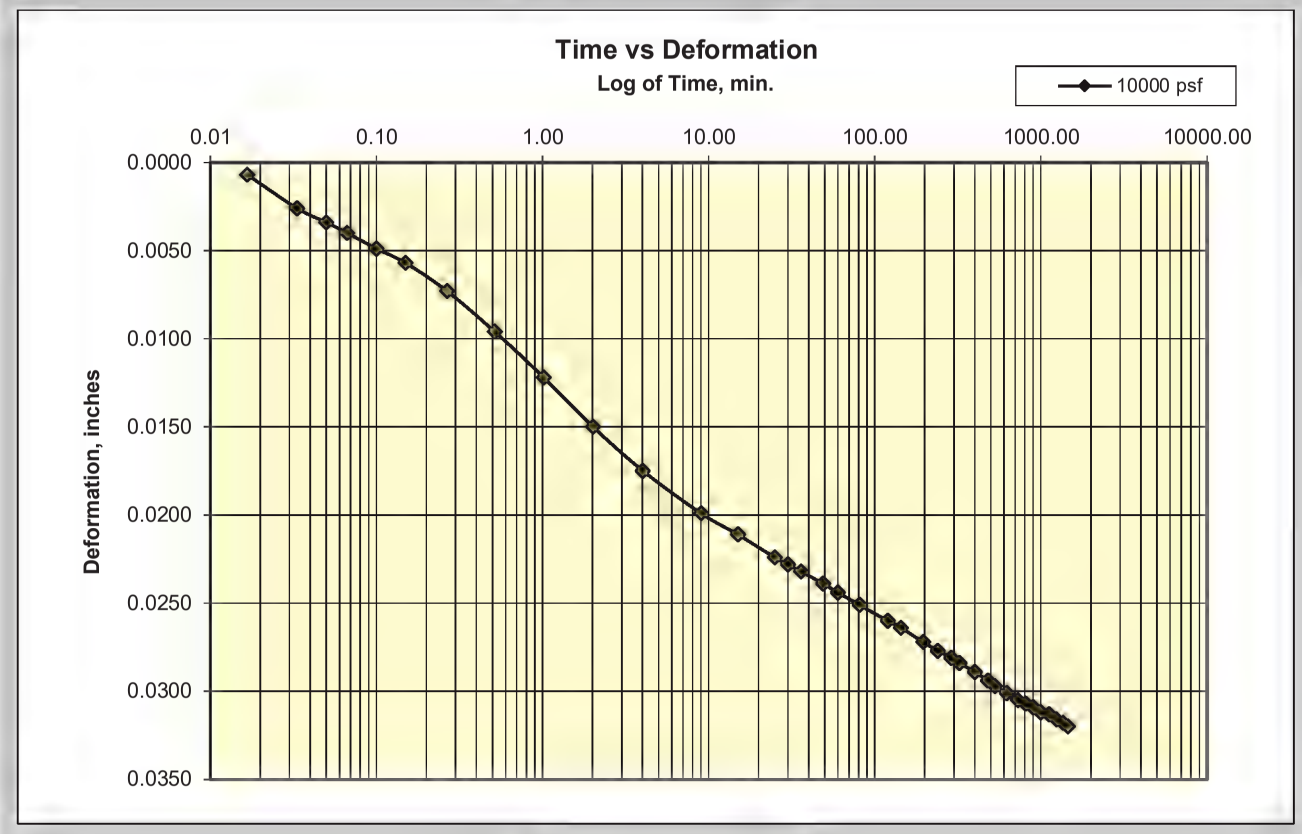
5000 psf



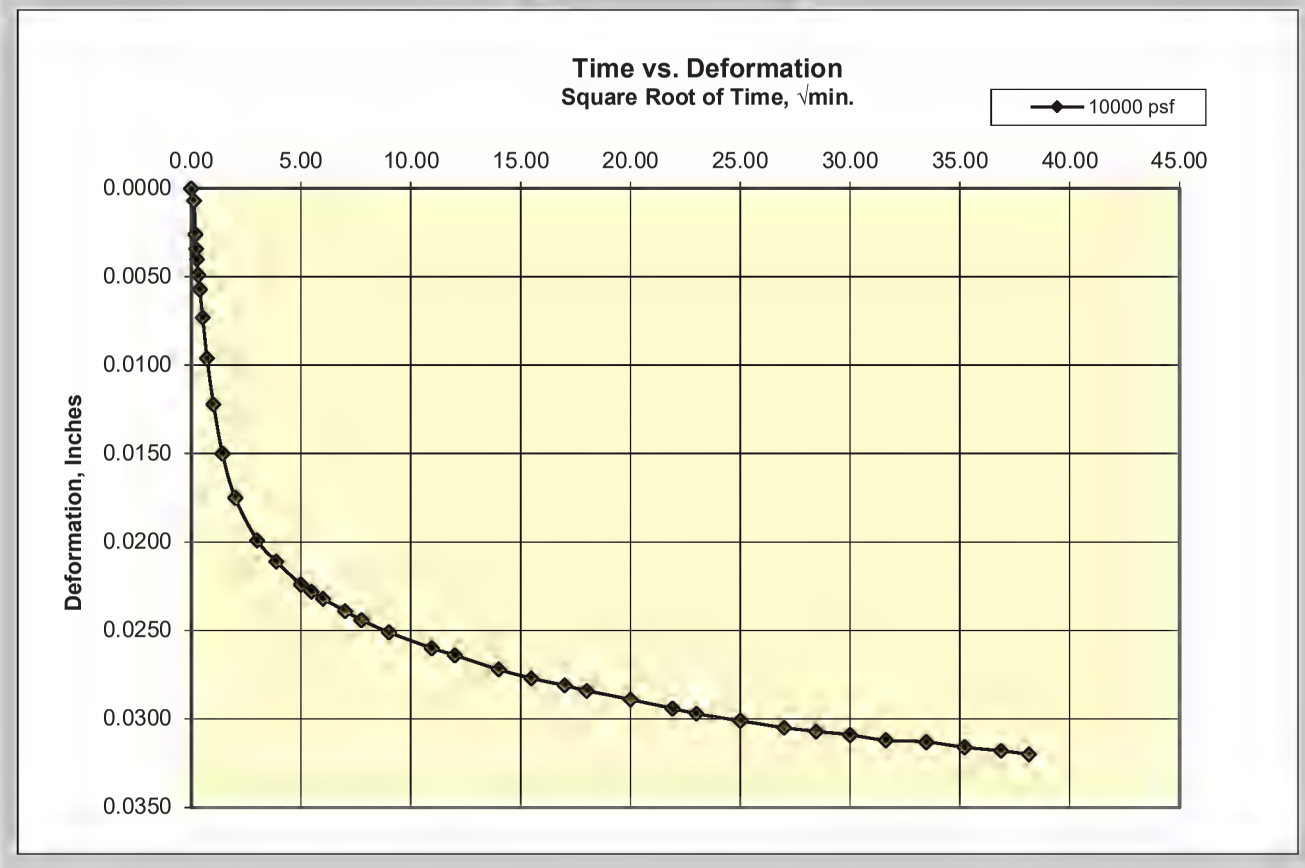
Cooper Testing Labs, Inc.

Load 8

10000 psf



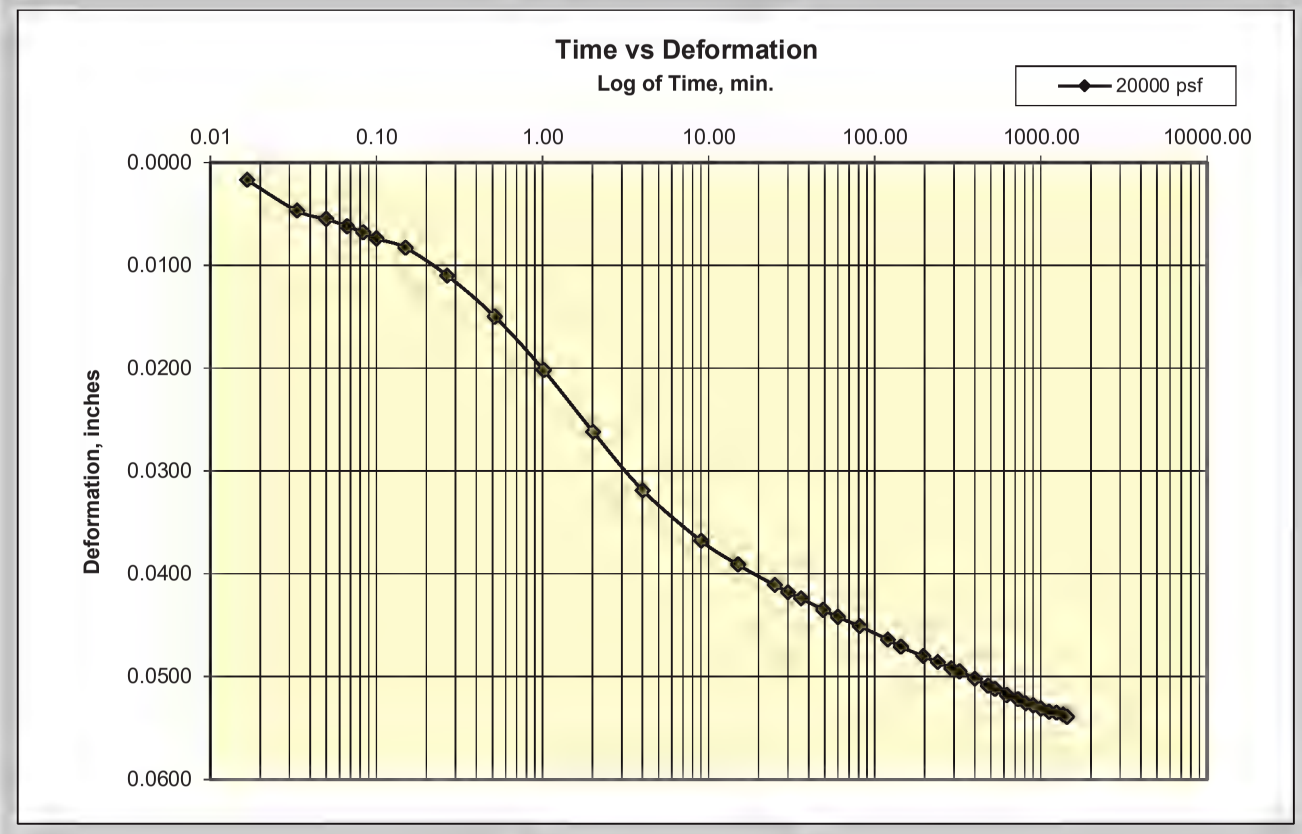
10000 psf



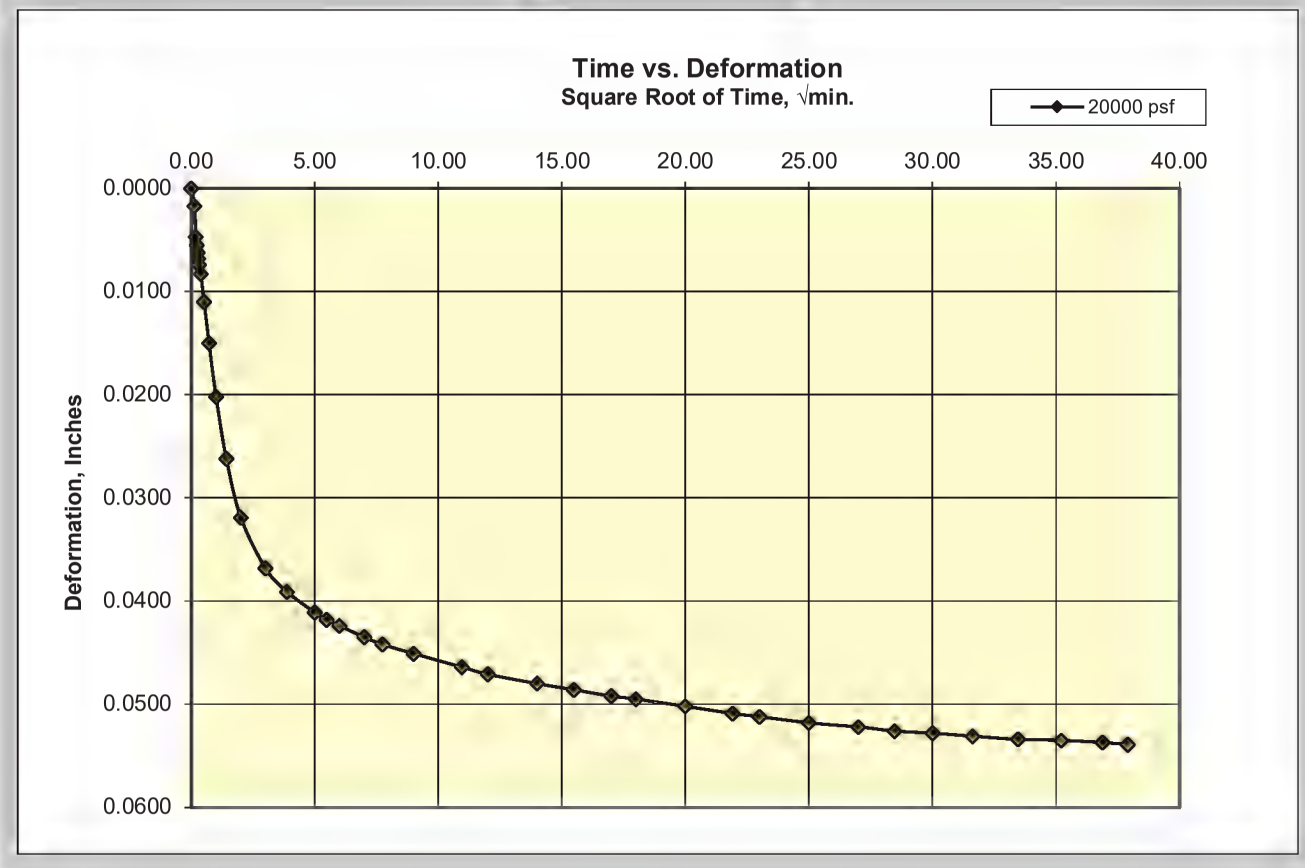
Cooper Testing Labs, Inc.

Load 9

20000 psf



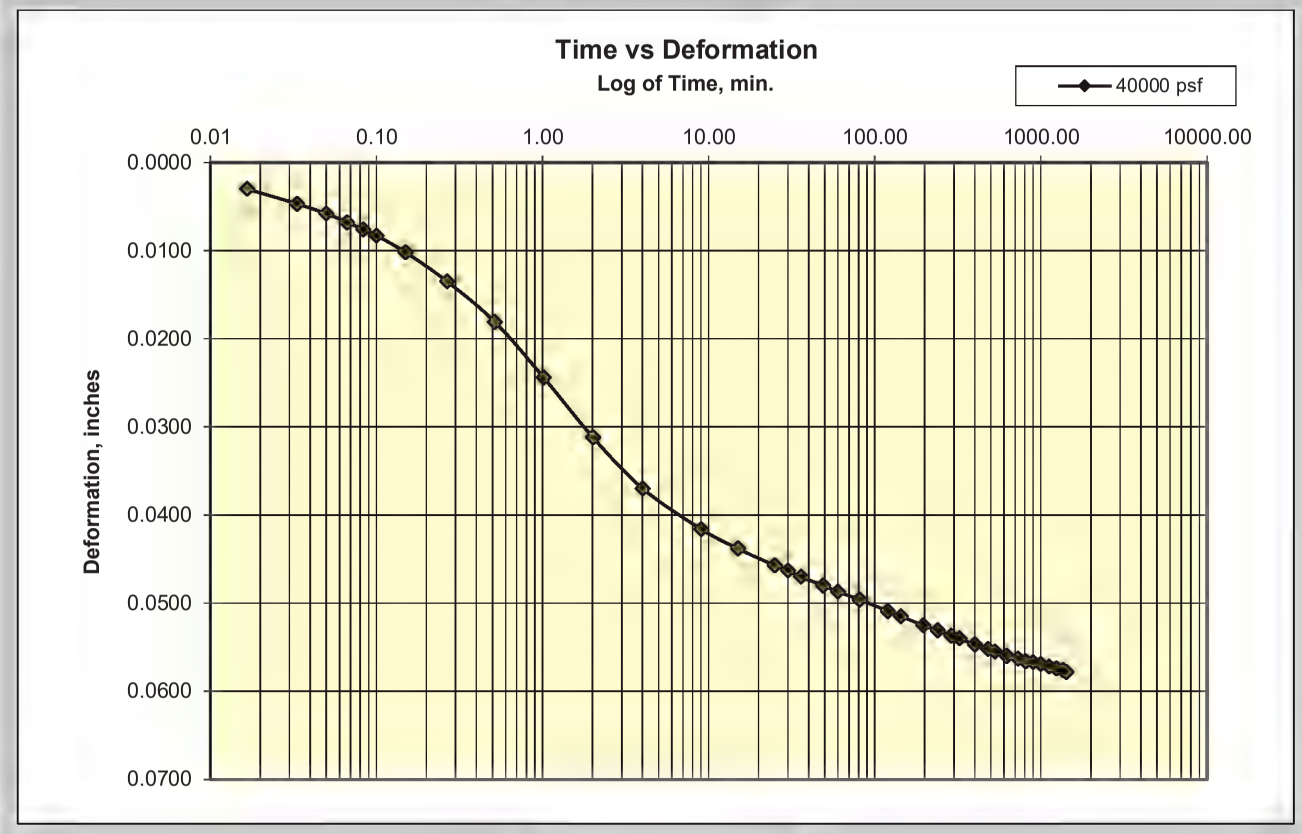
20000 psf



Cooper Testing Labs, Inc.

Load 10

40000 psf



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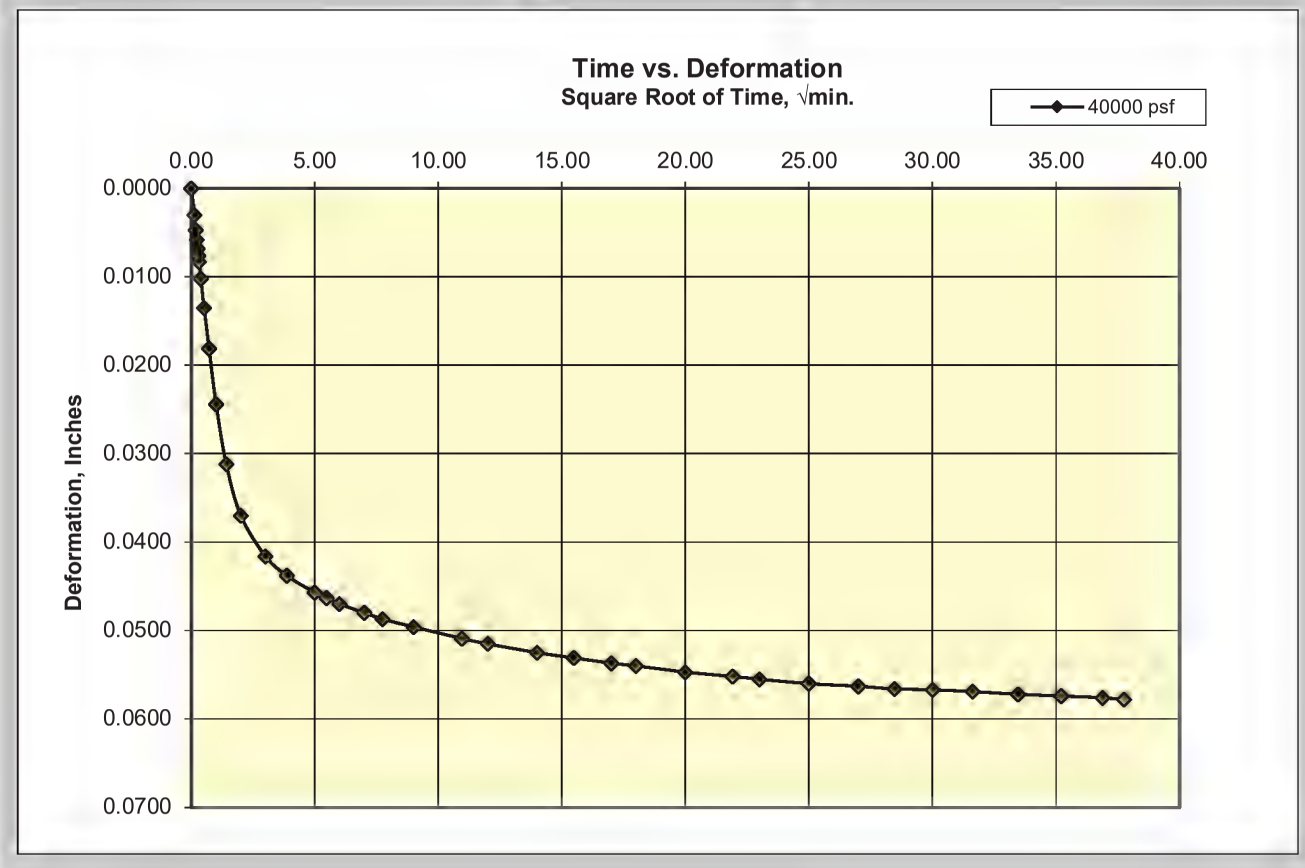
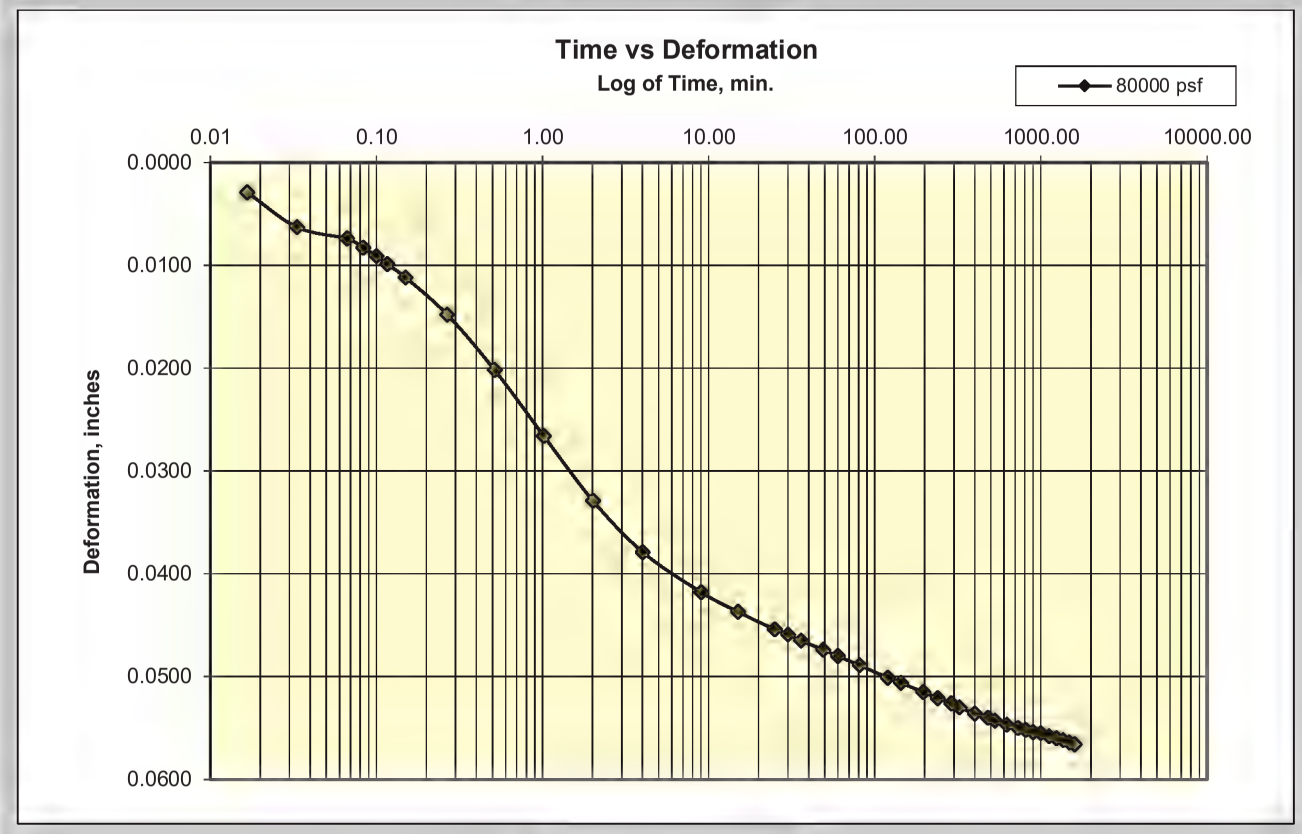


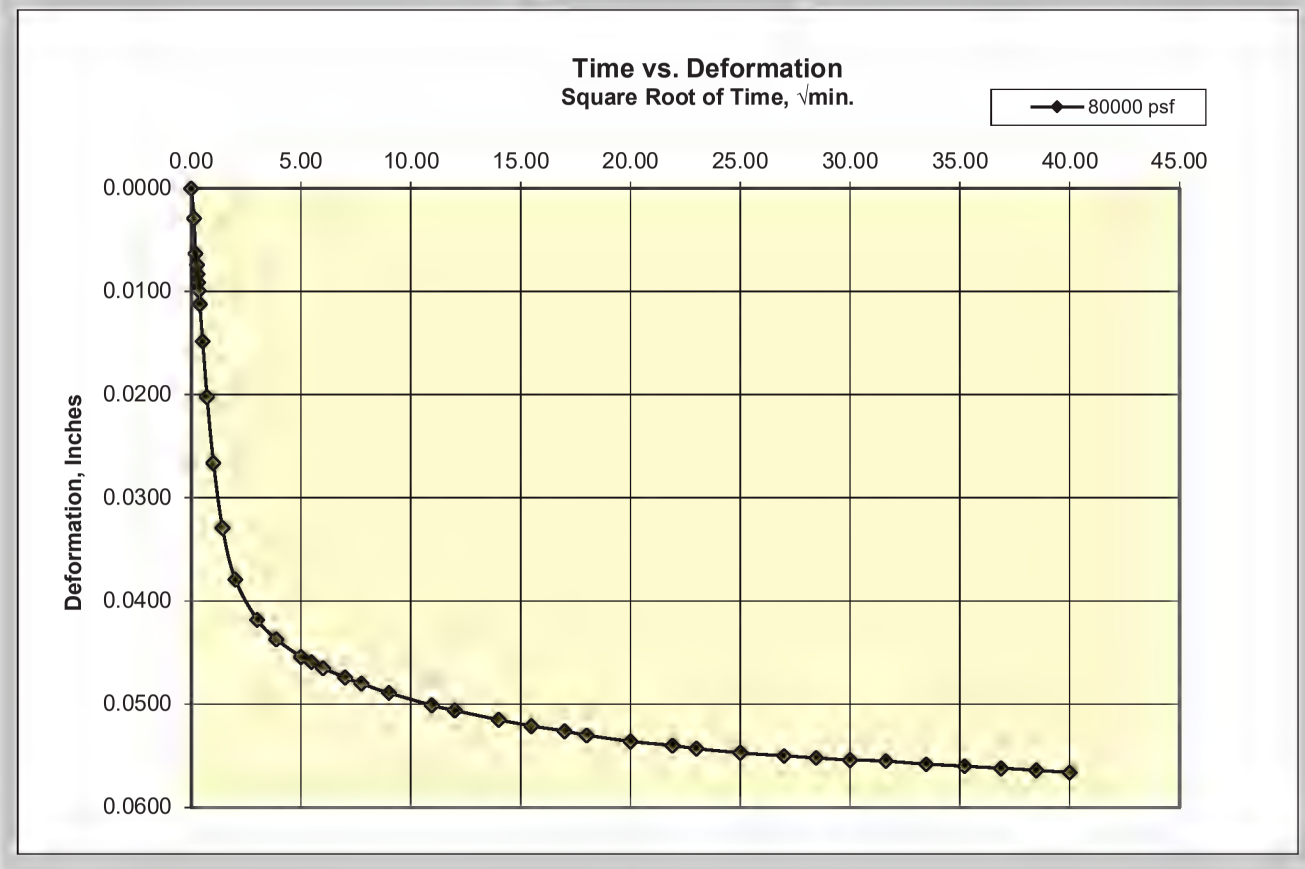
Cooper Testing Labs, Inc.

Load 11

80000 psf



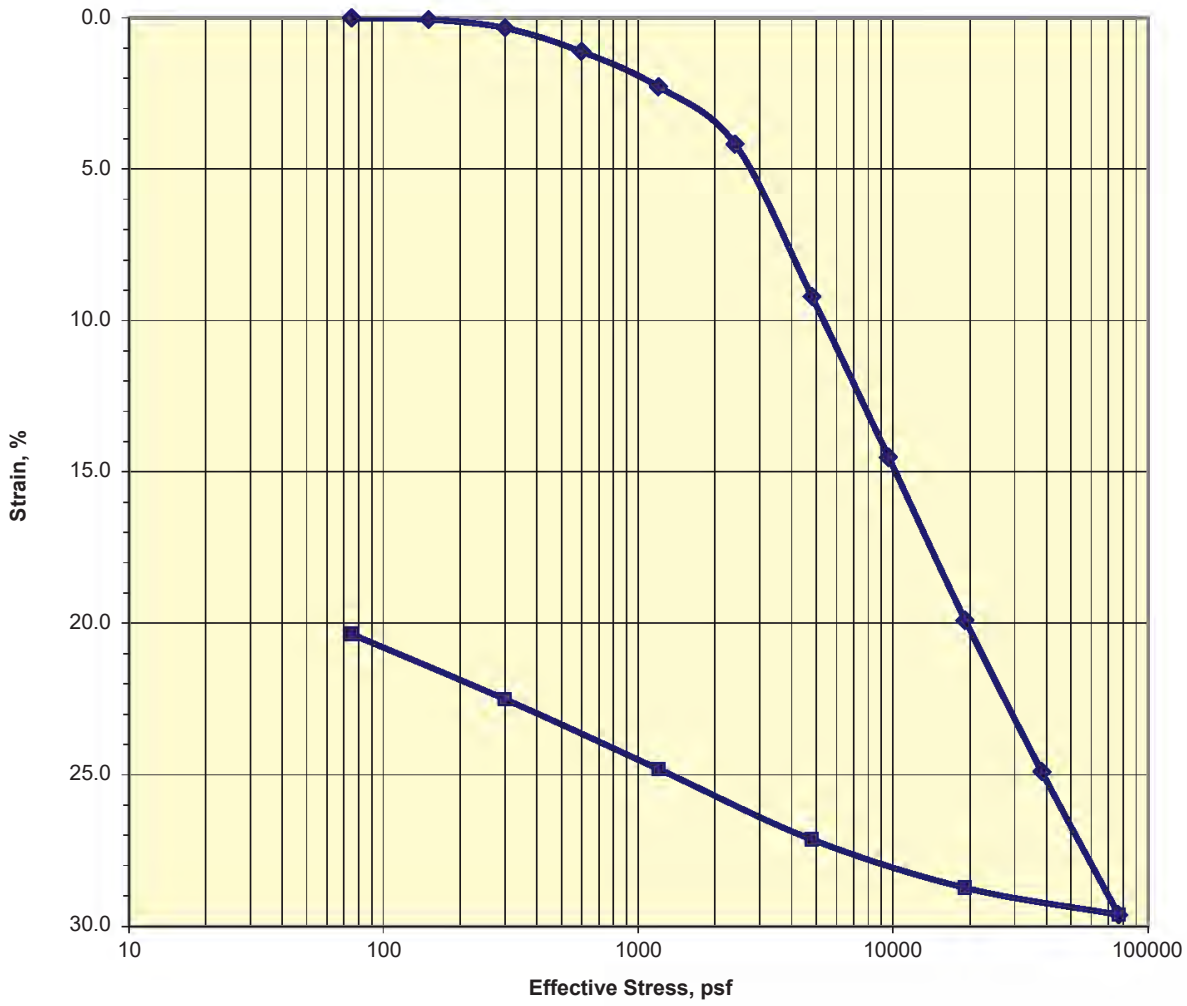
80000 psf



Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B103	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	5	**Reduced:**	RU
Project:	0220504.400	**Depth, ft.:**	35-37.5	**Checked:**	PJ
Soil Type:	Very Dark Gray CLAY (Bay Mud)			**Date:**	11/7/2023

Strain-Log-P Curve



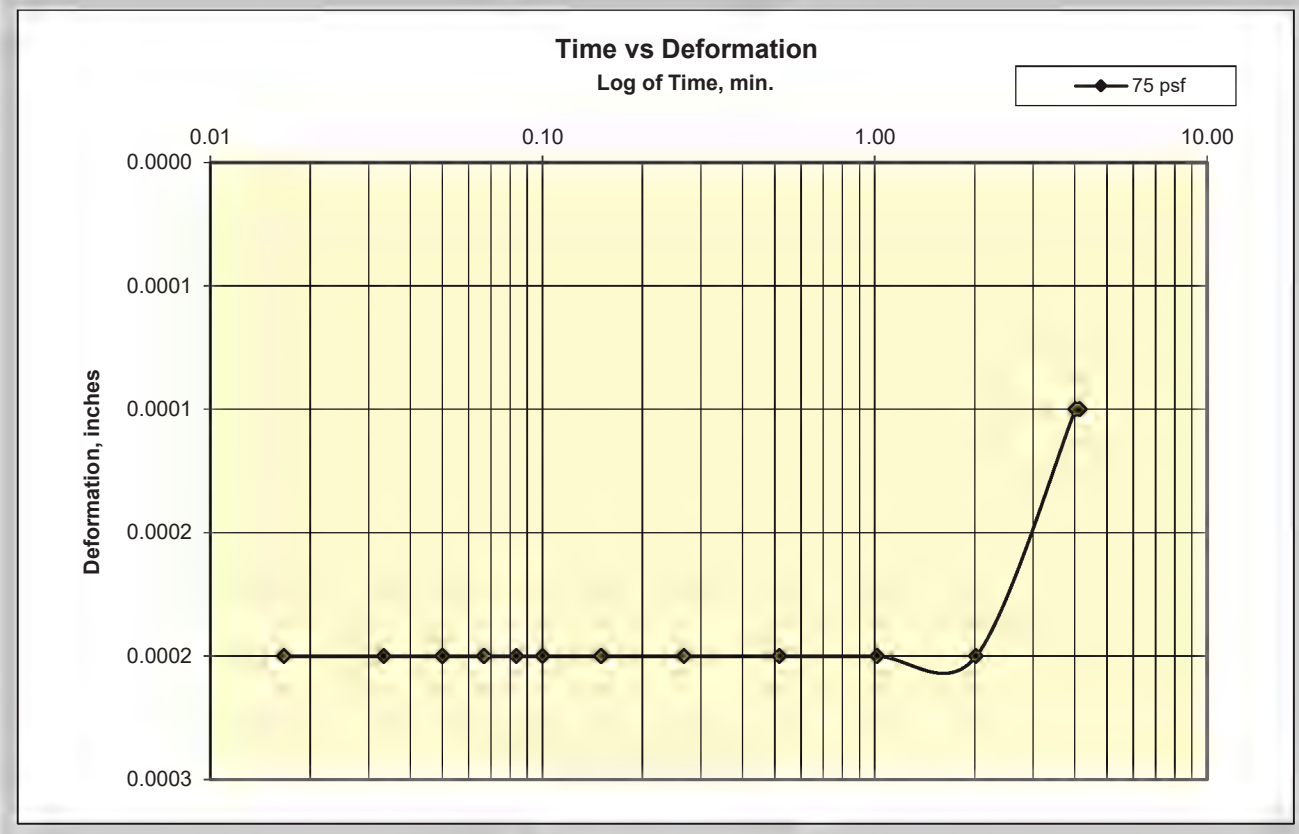
Assumed Gs 2.75	Initial	Final
Moisture %:	41.3	26.3
Dry Density, pcf:	79.5	99.6
Void Ratio:	1.158	0.724
% Saturation:	98.1	100.0

Remarks:

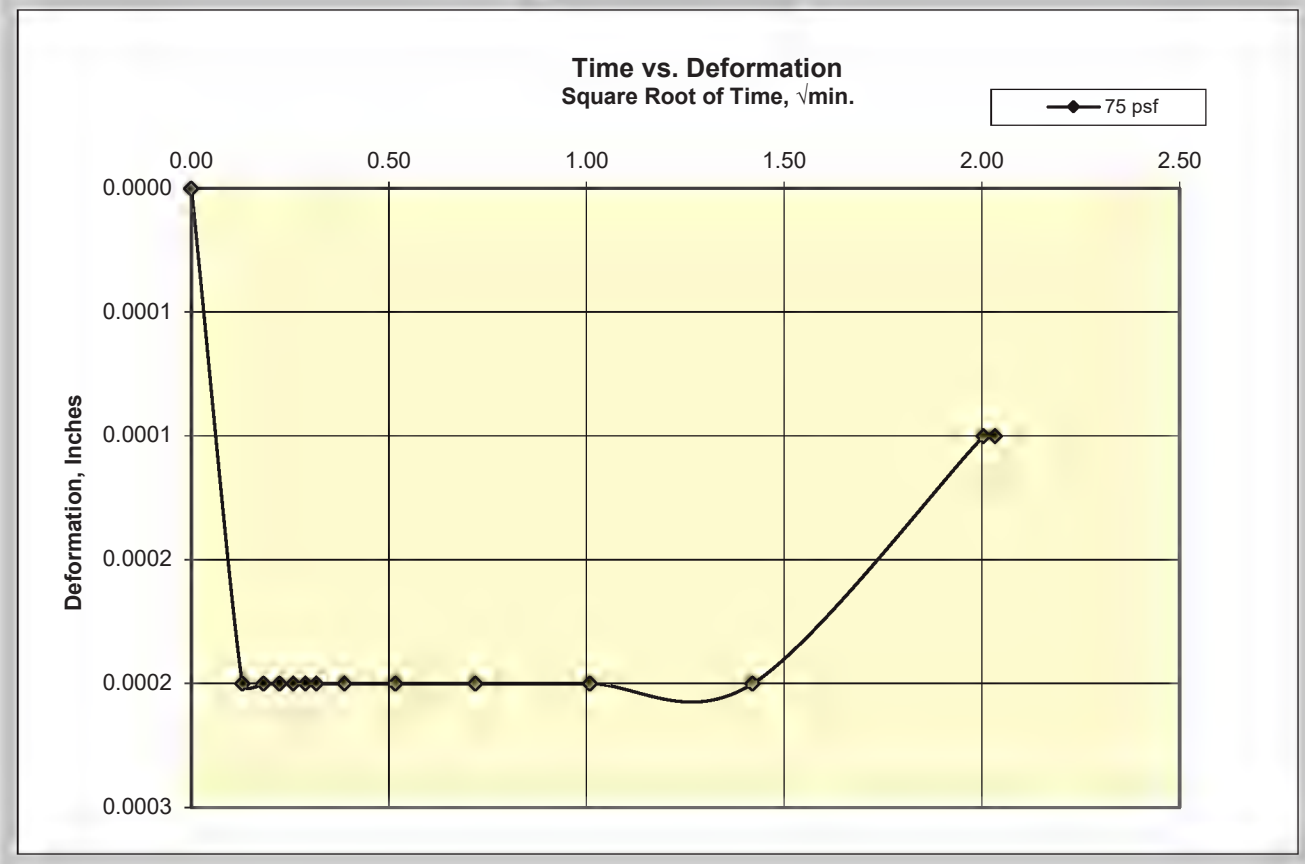
Cooper Testing Labs, Inc.

Load 1

75 psf



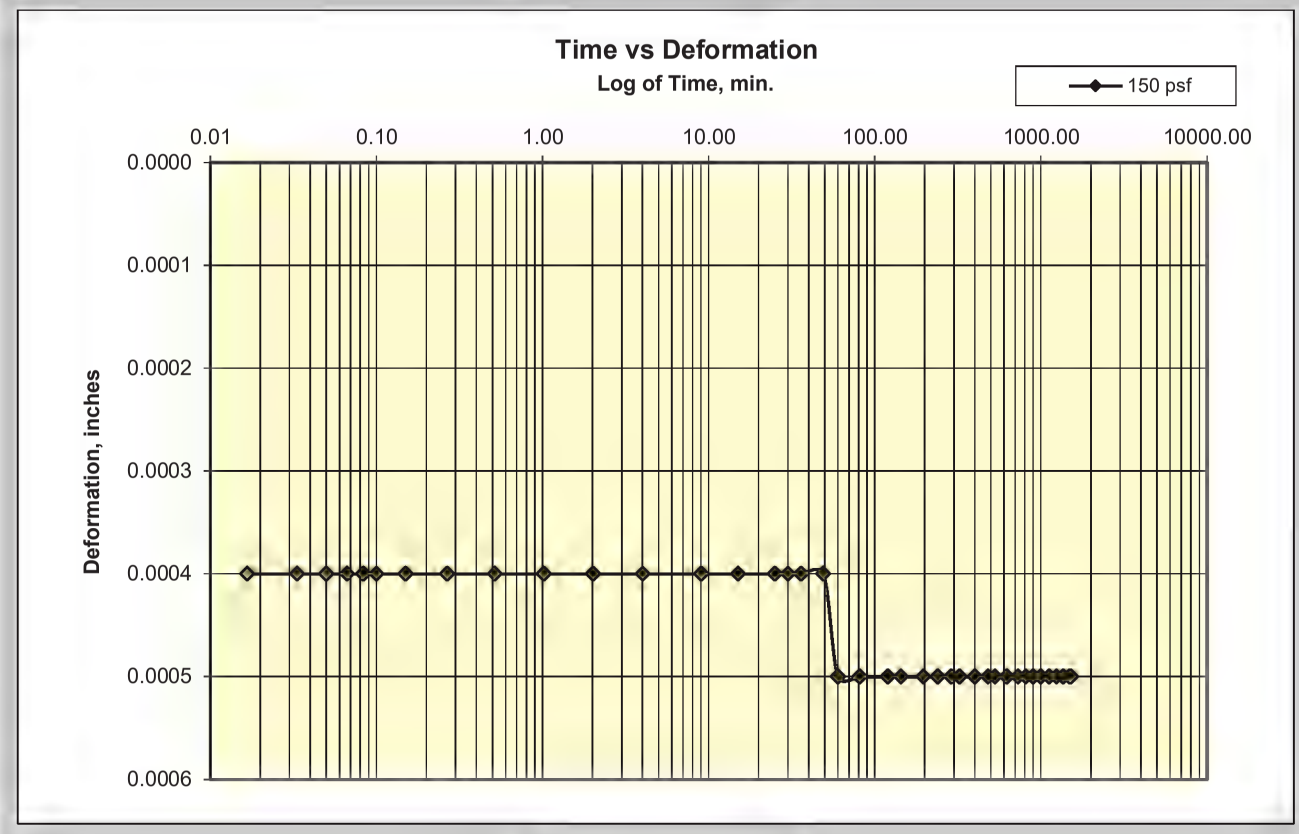
75 psf



Cooper Testing Labs, Inc.

Load 2

150 psf



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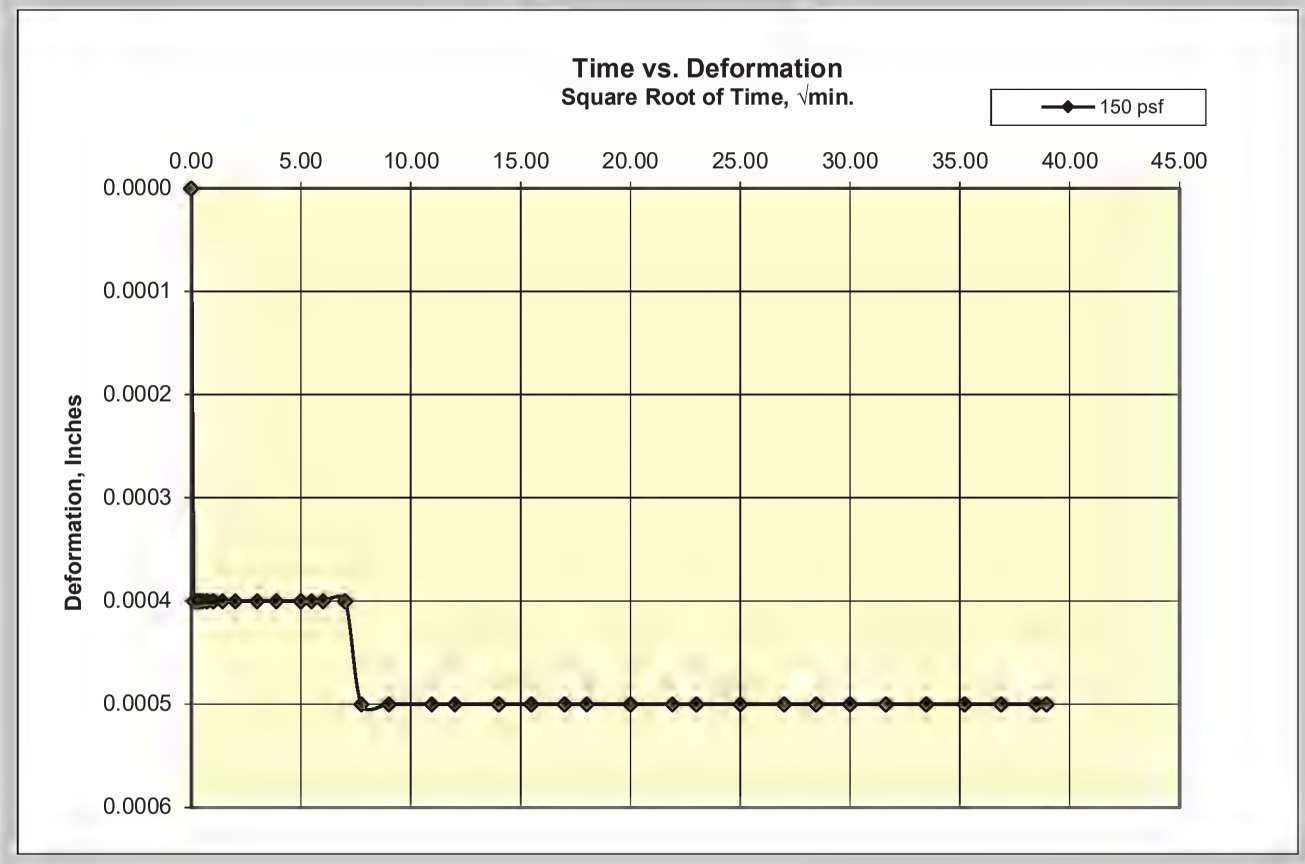
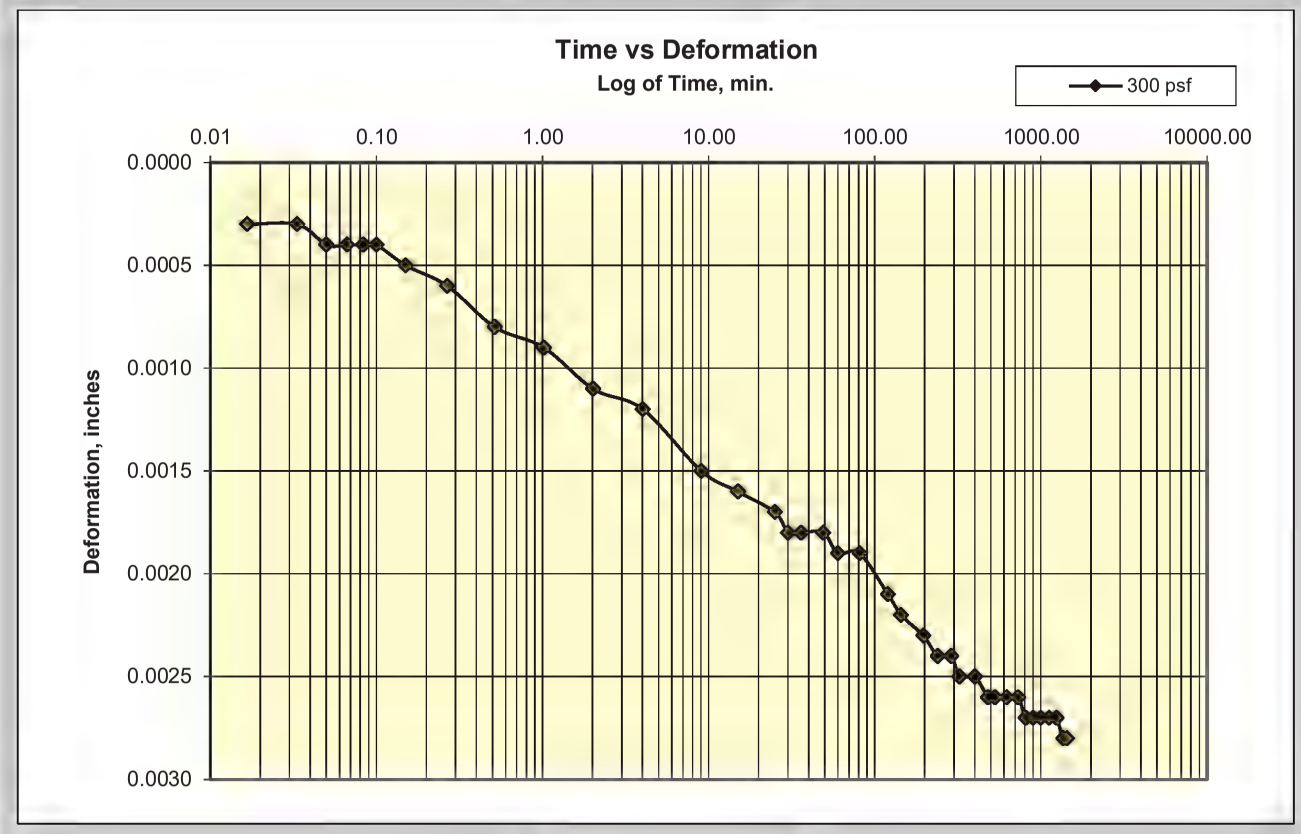


Cooper Testing Labs, Inc.

Load 3

300 psf



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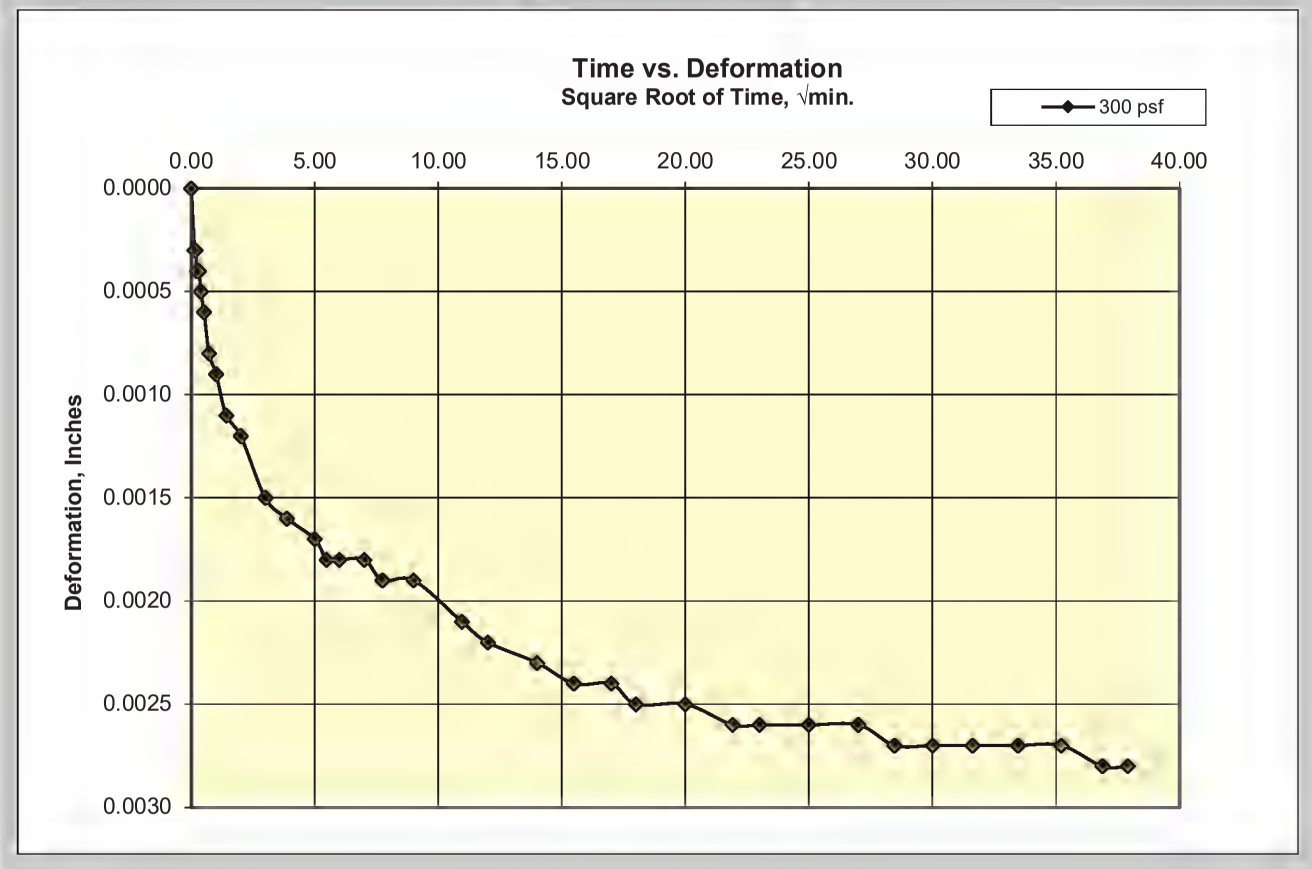
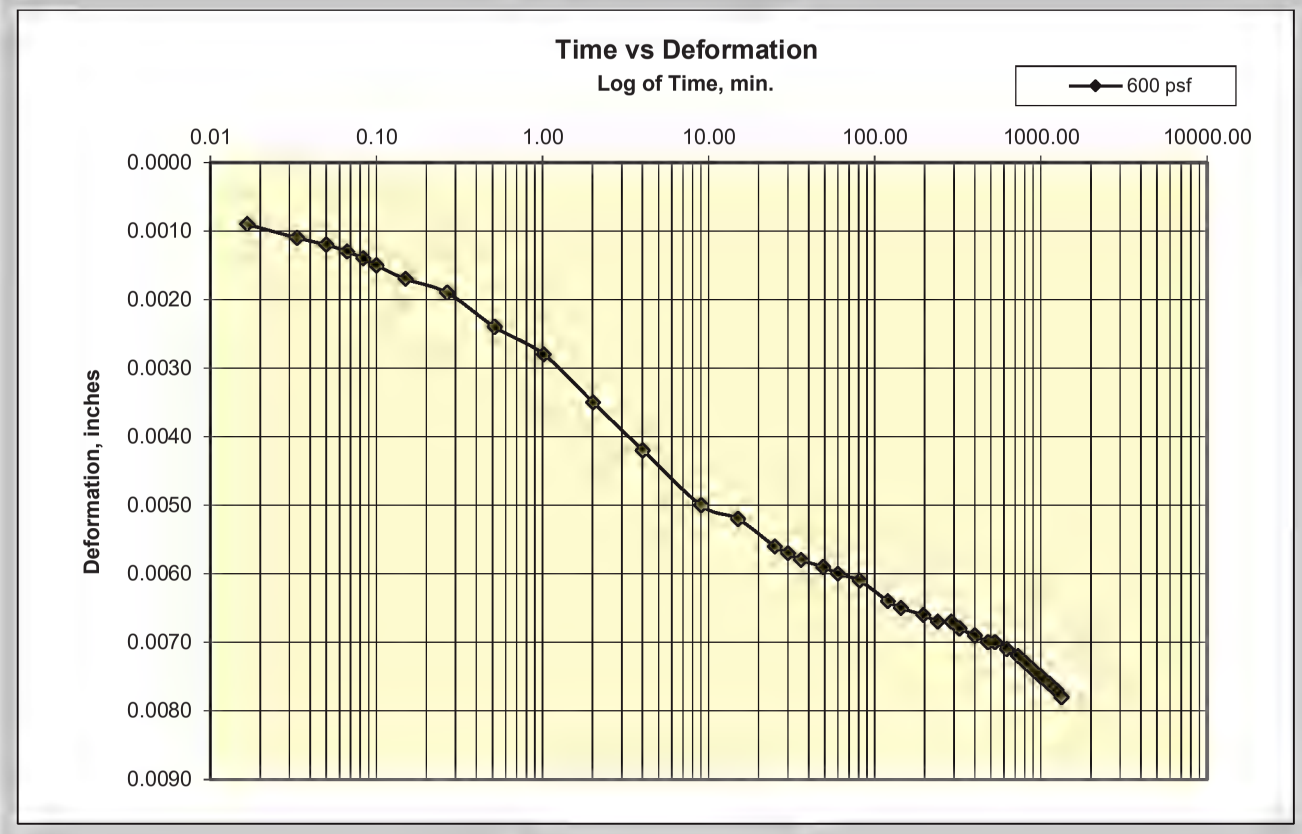


Cooper Testing Labs, Inc.

Load 4

600 psf



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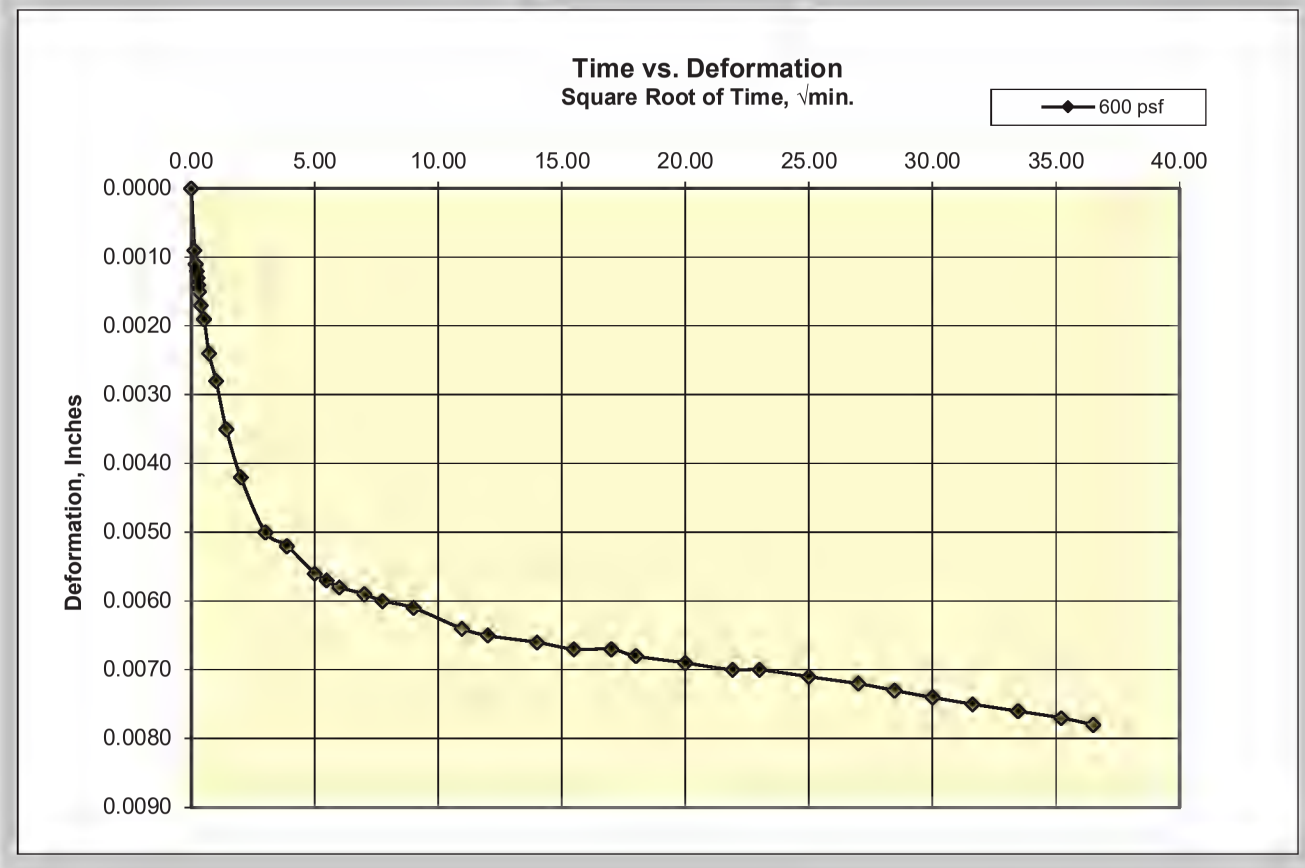
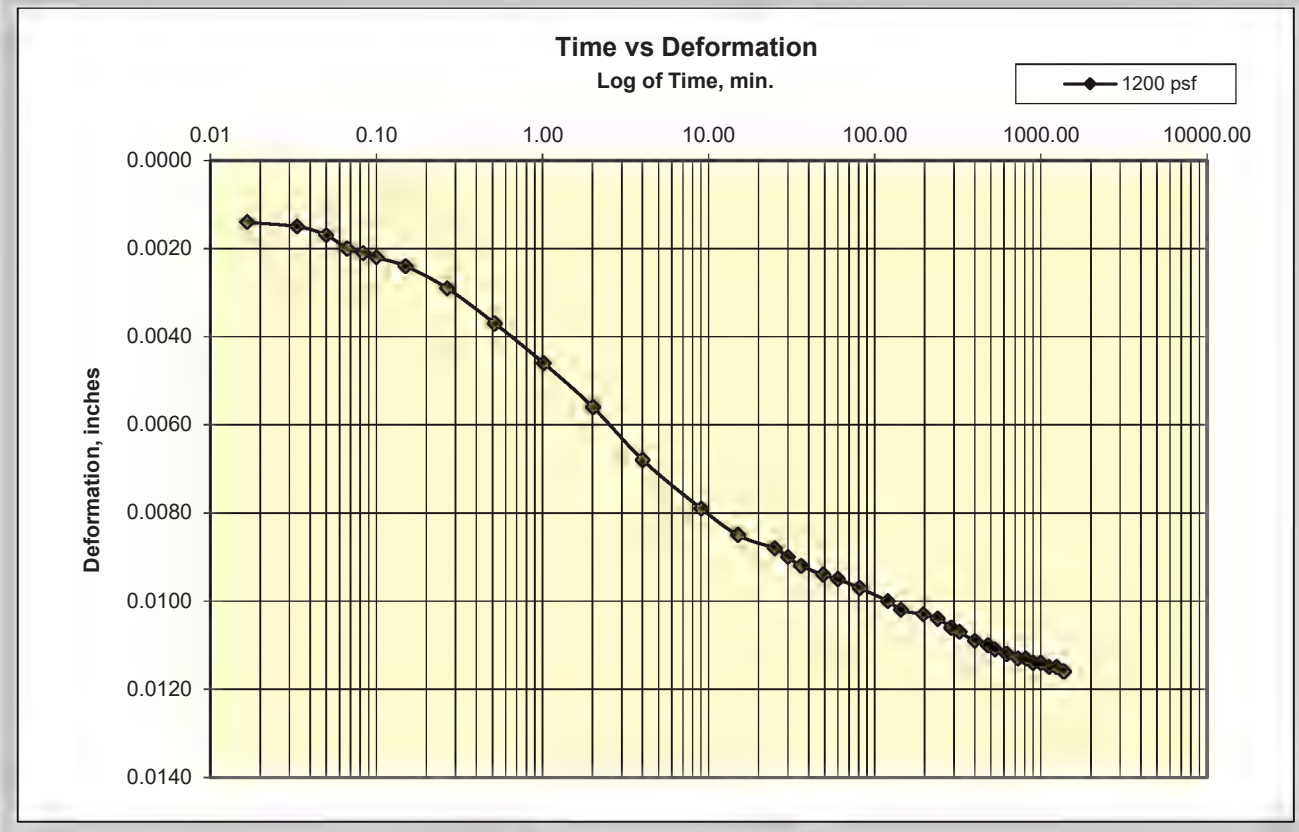


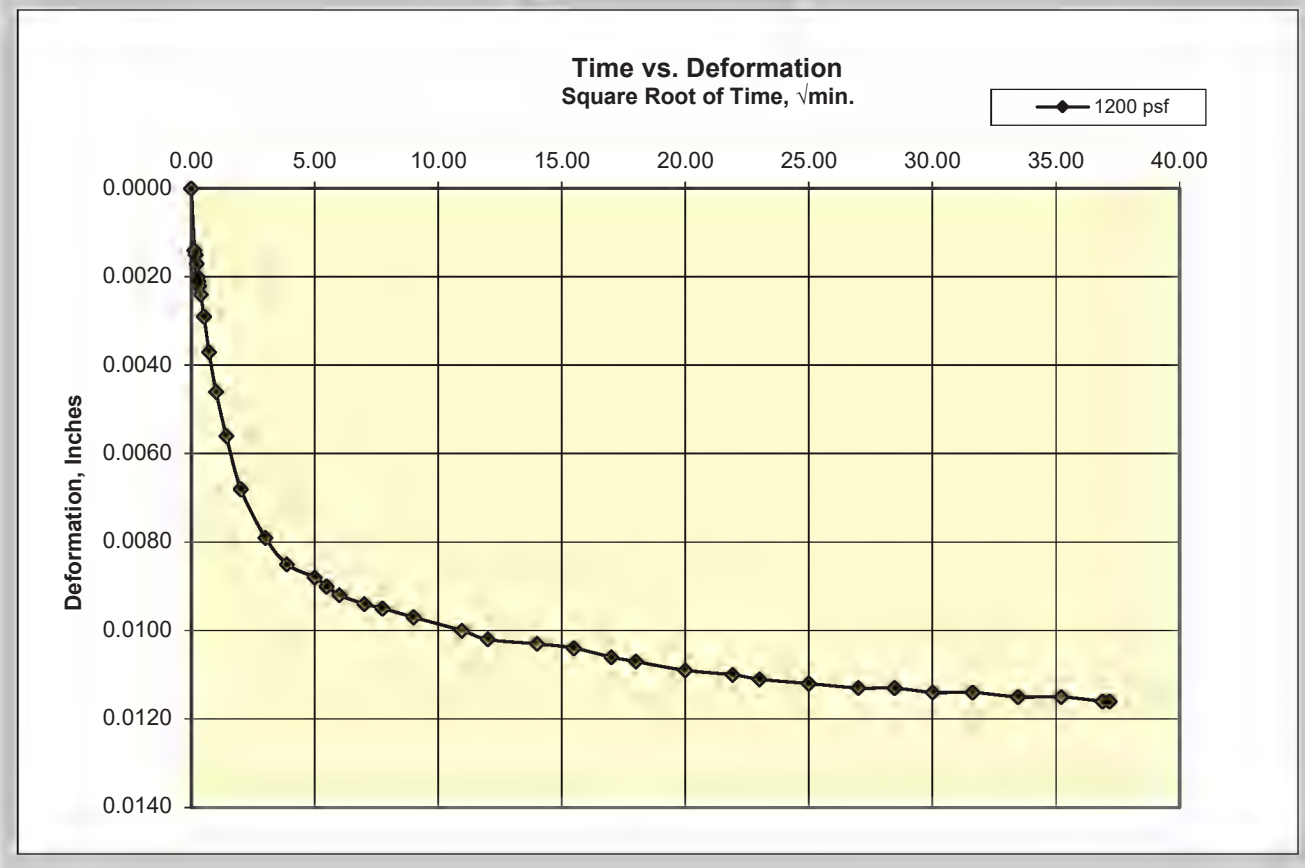
Cooper Testing Labs, Inc.

Load 5

1200 psf



1200 psf



Cooper Testing Labs, Inc.

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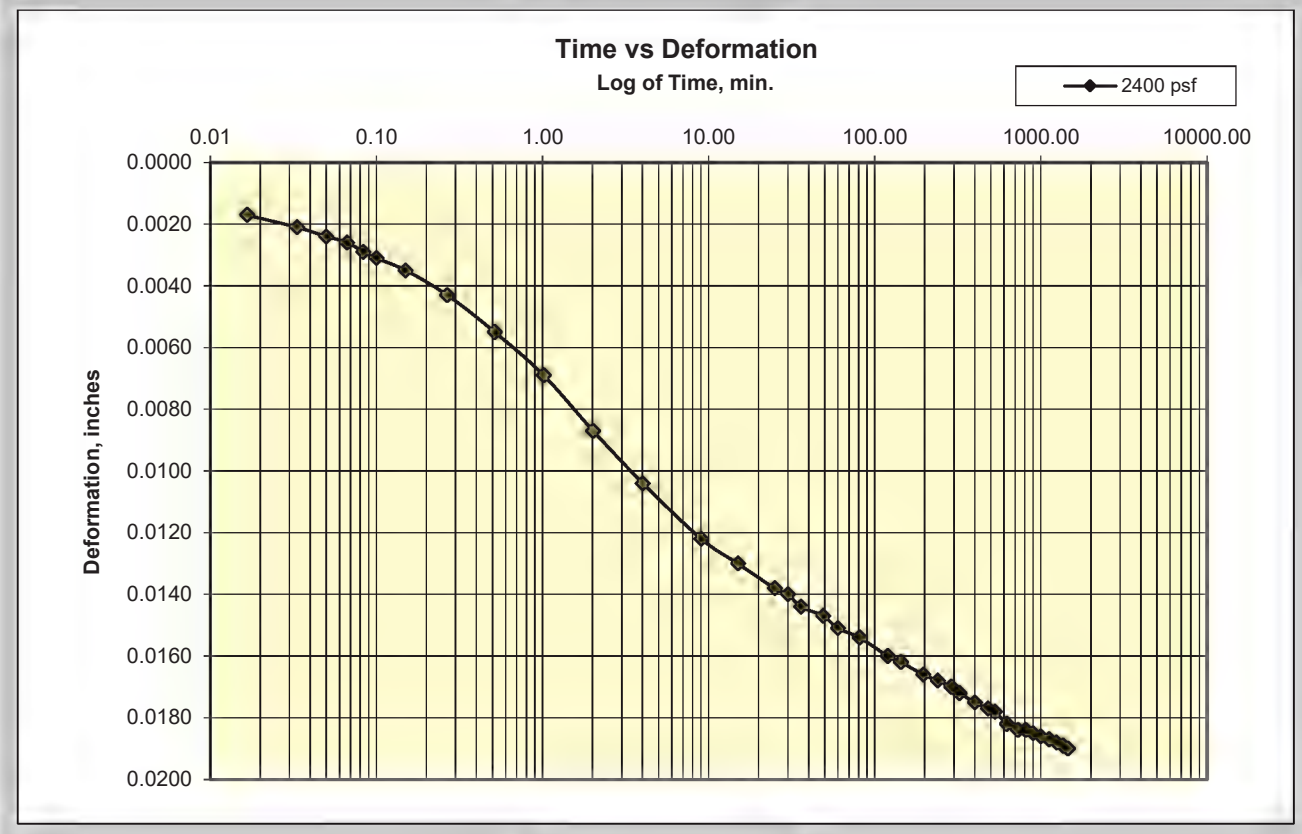
2400 psf



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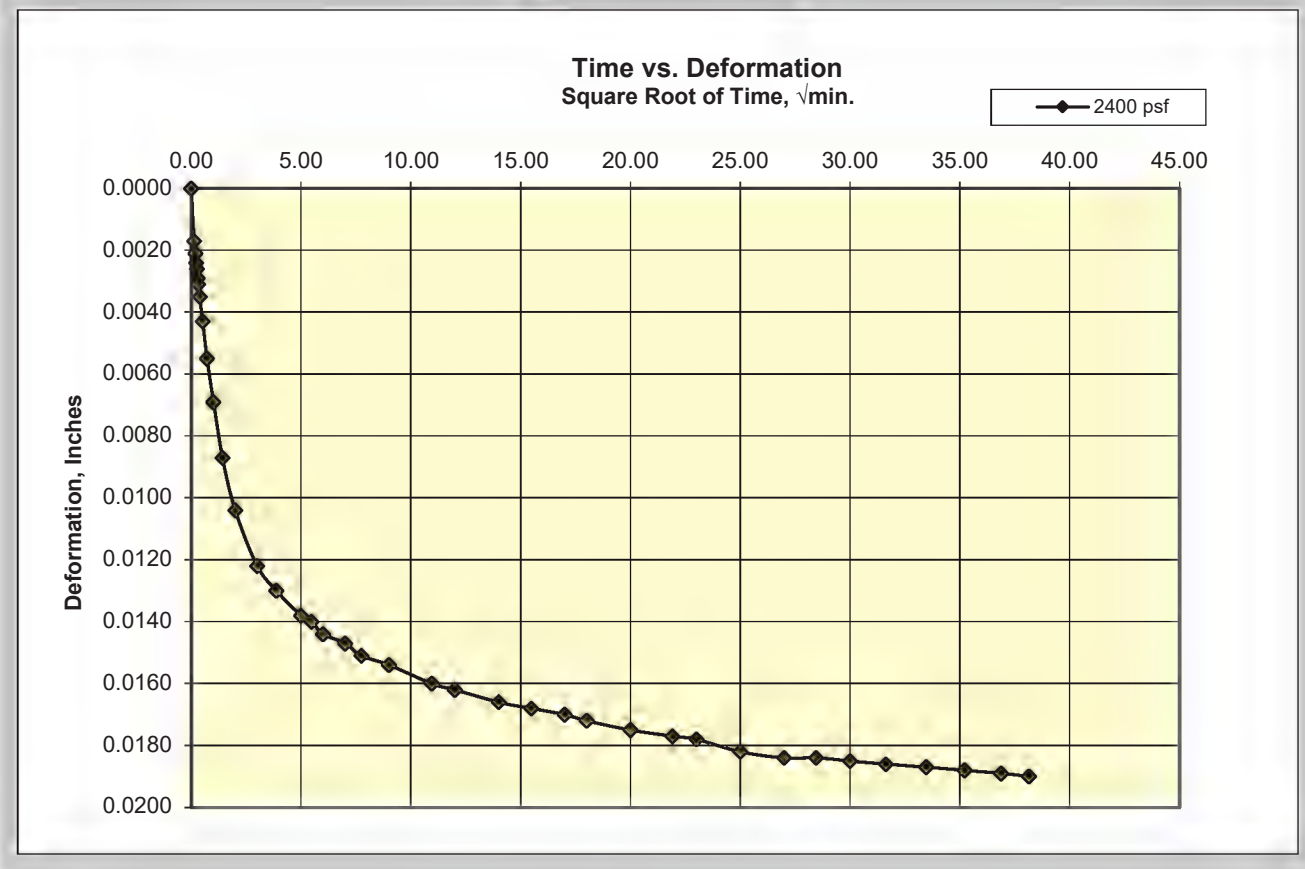

Cooper Testing Labs, Inc.

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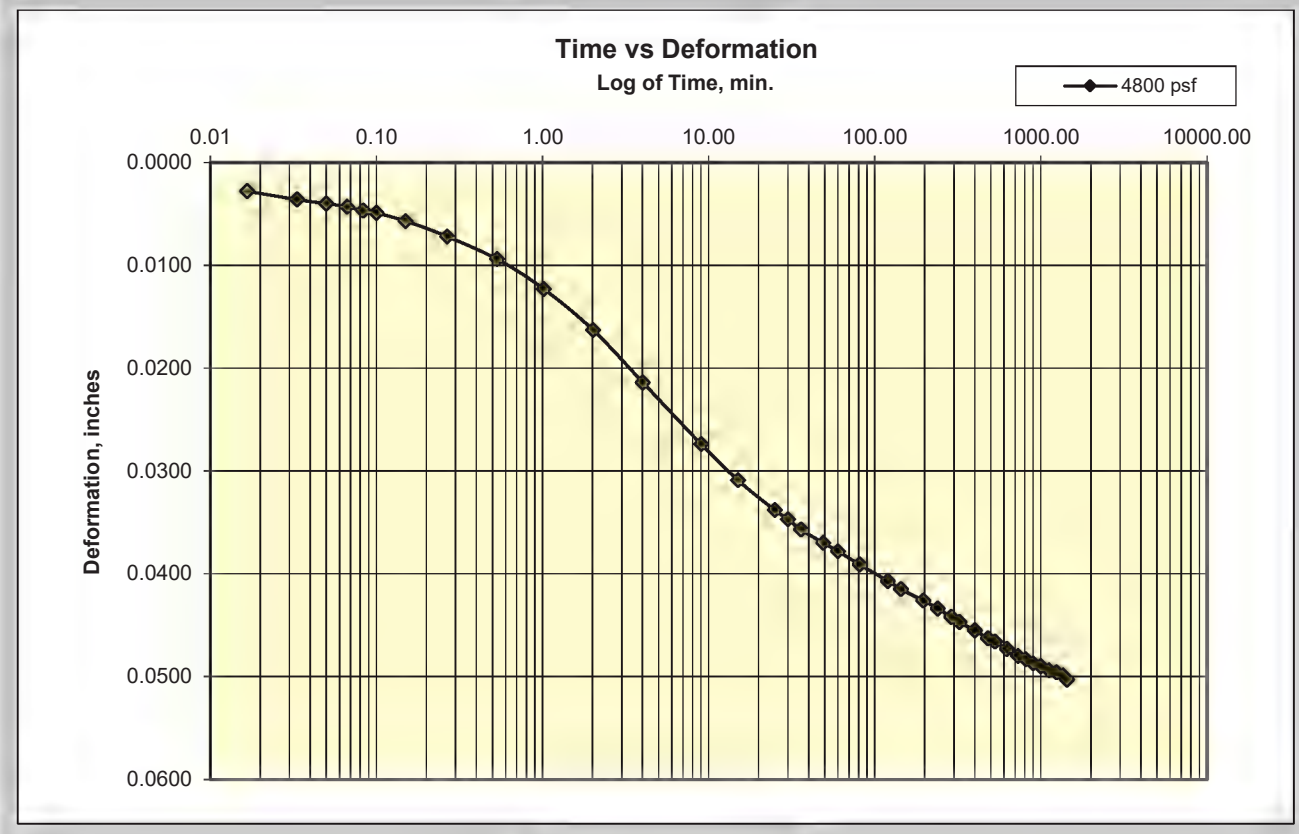

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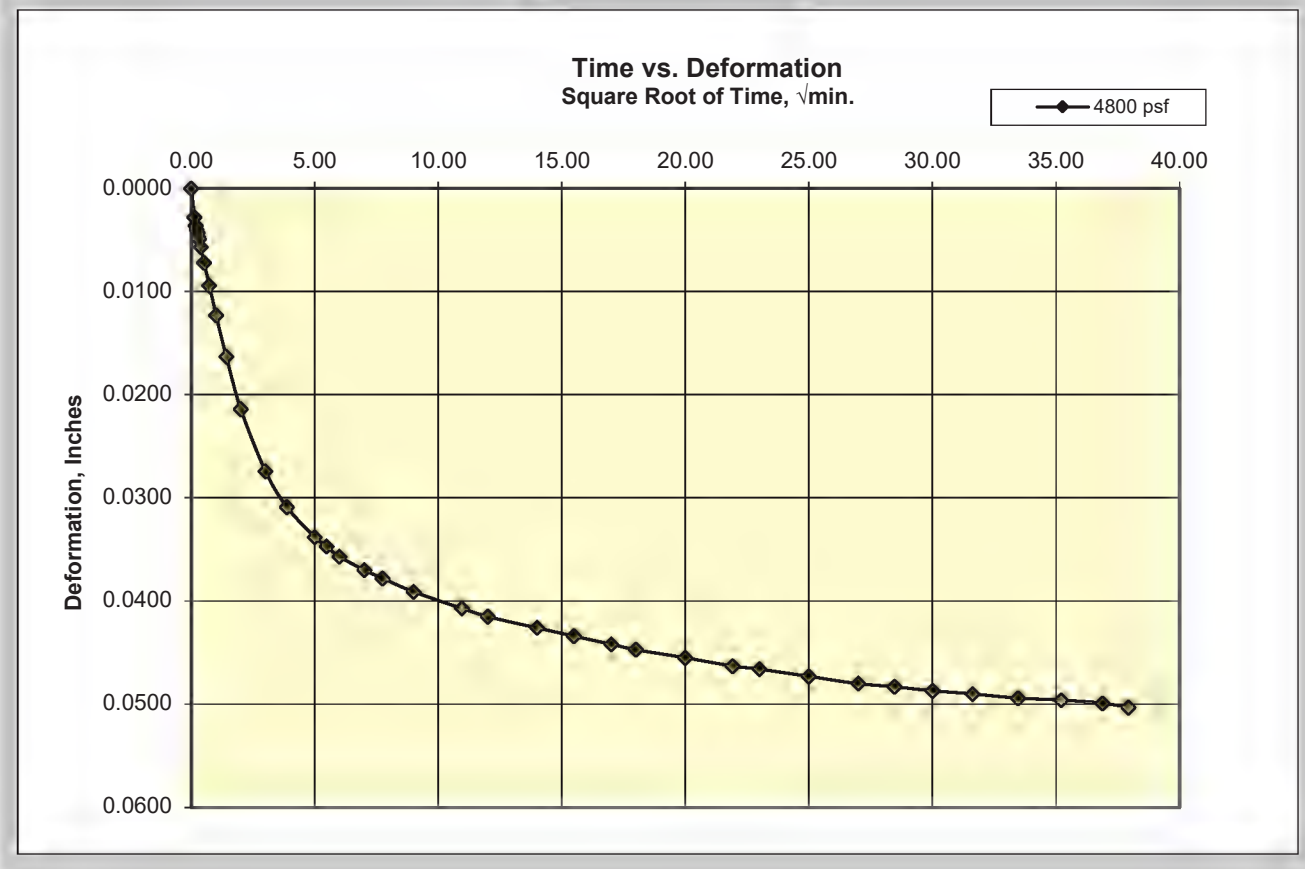

Cooper Testing Labs, Inc.

Load 8

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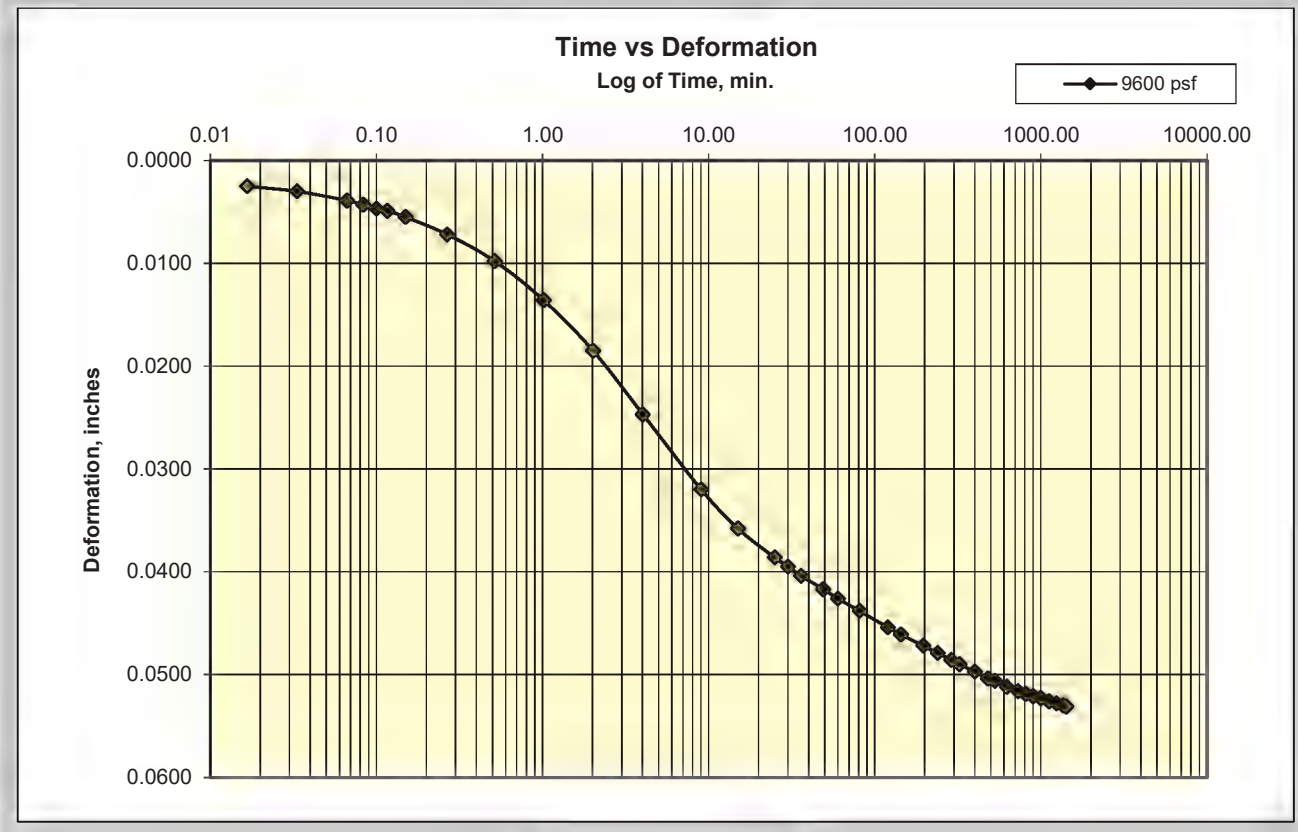

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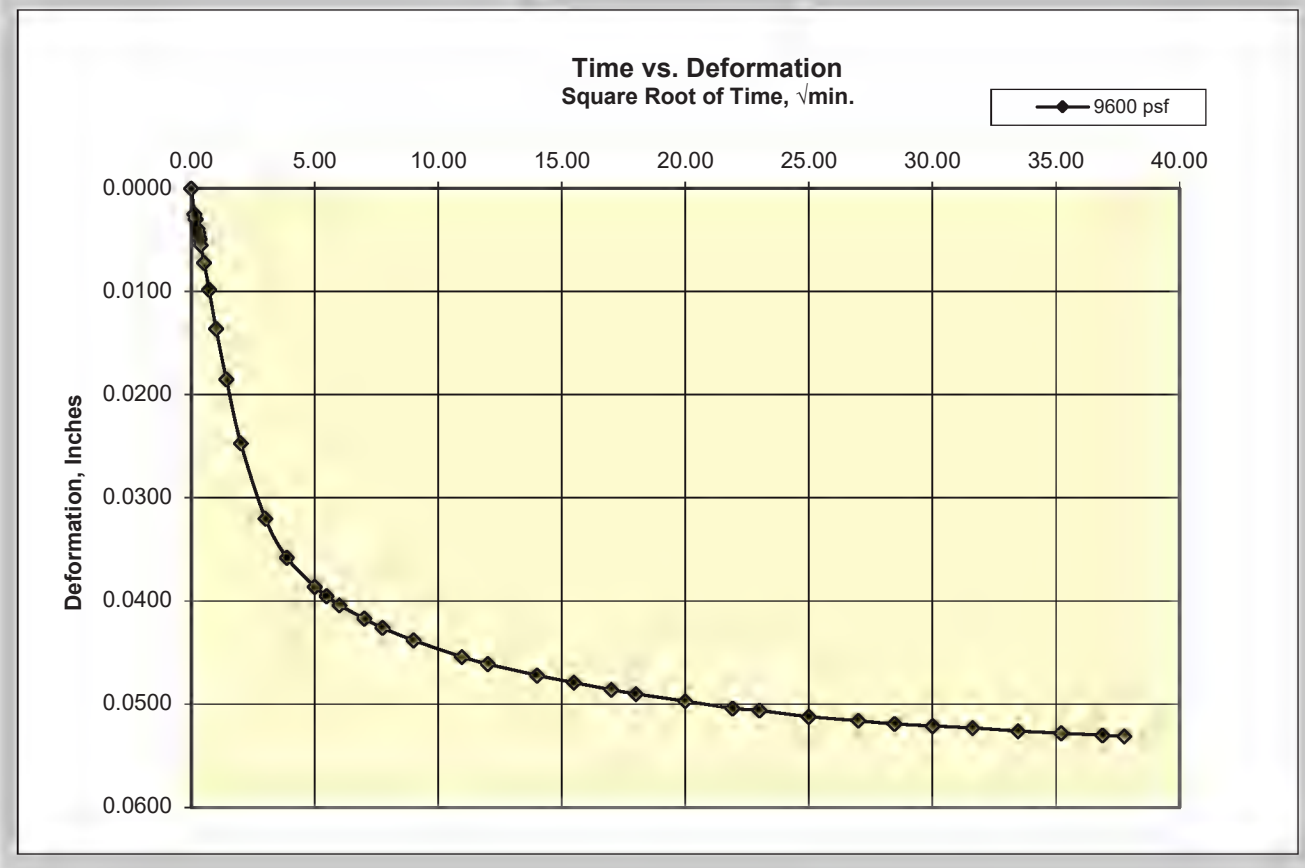
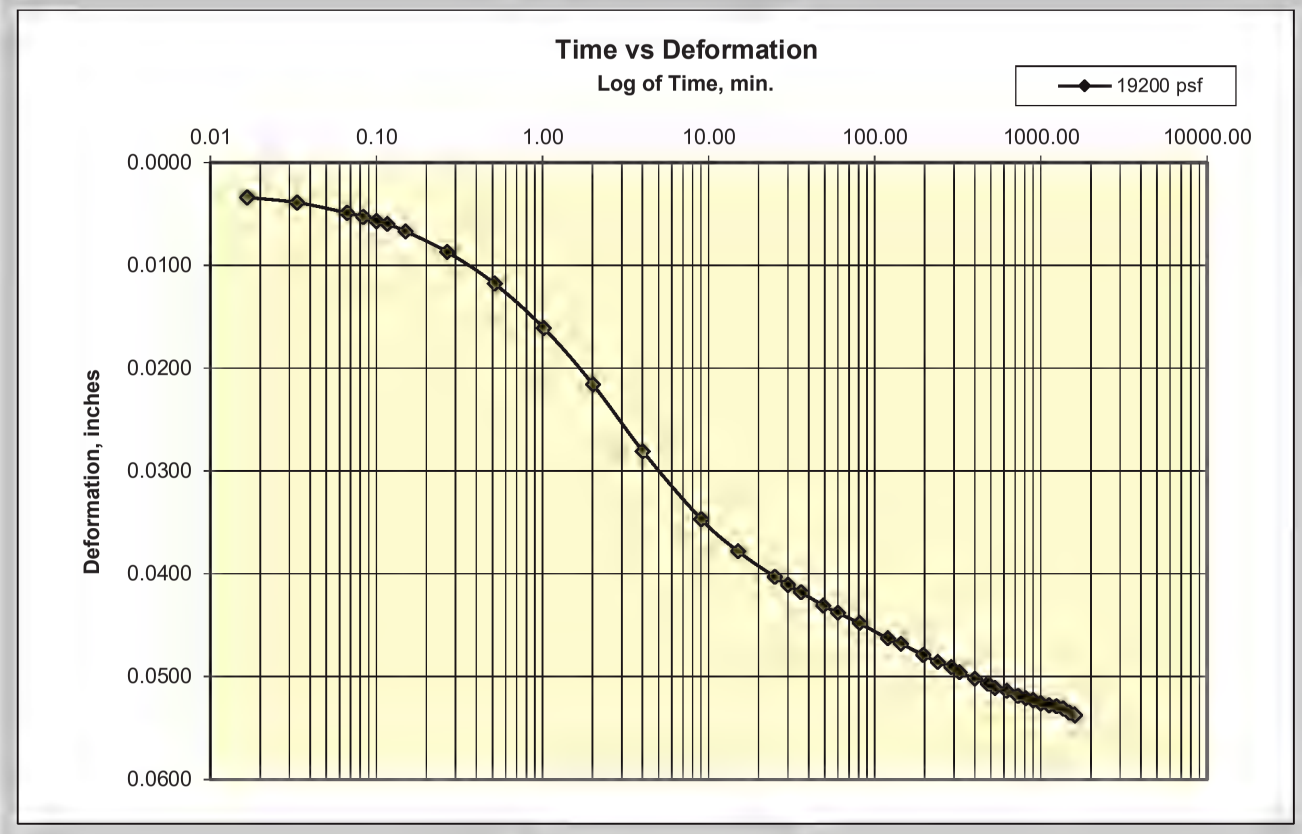


Cooper Testing Labs, Inc.

Load 9

19200 psf



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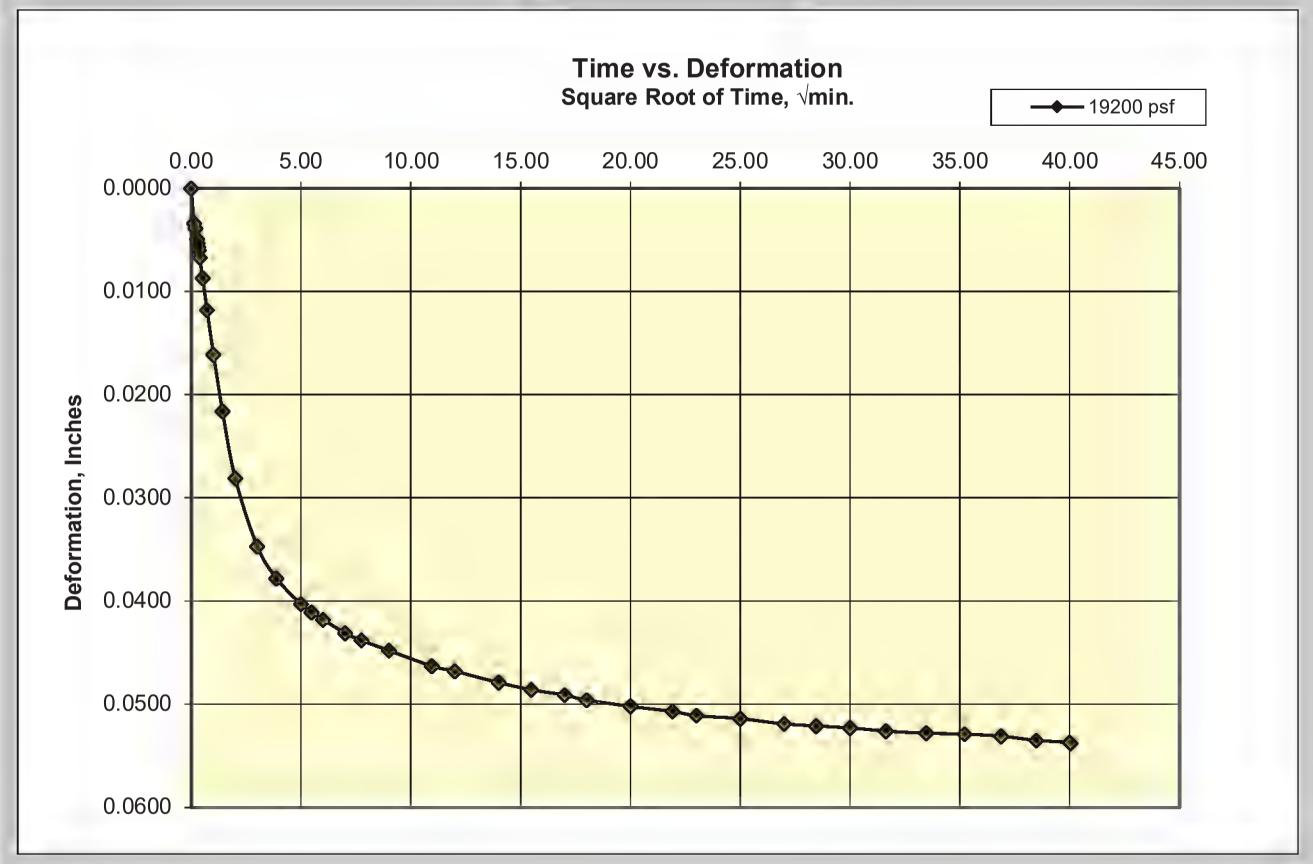
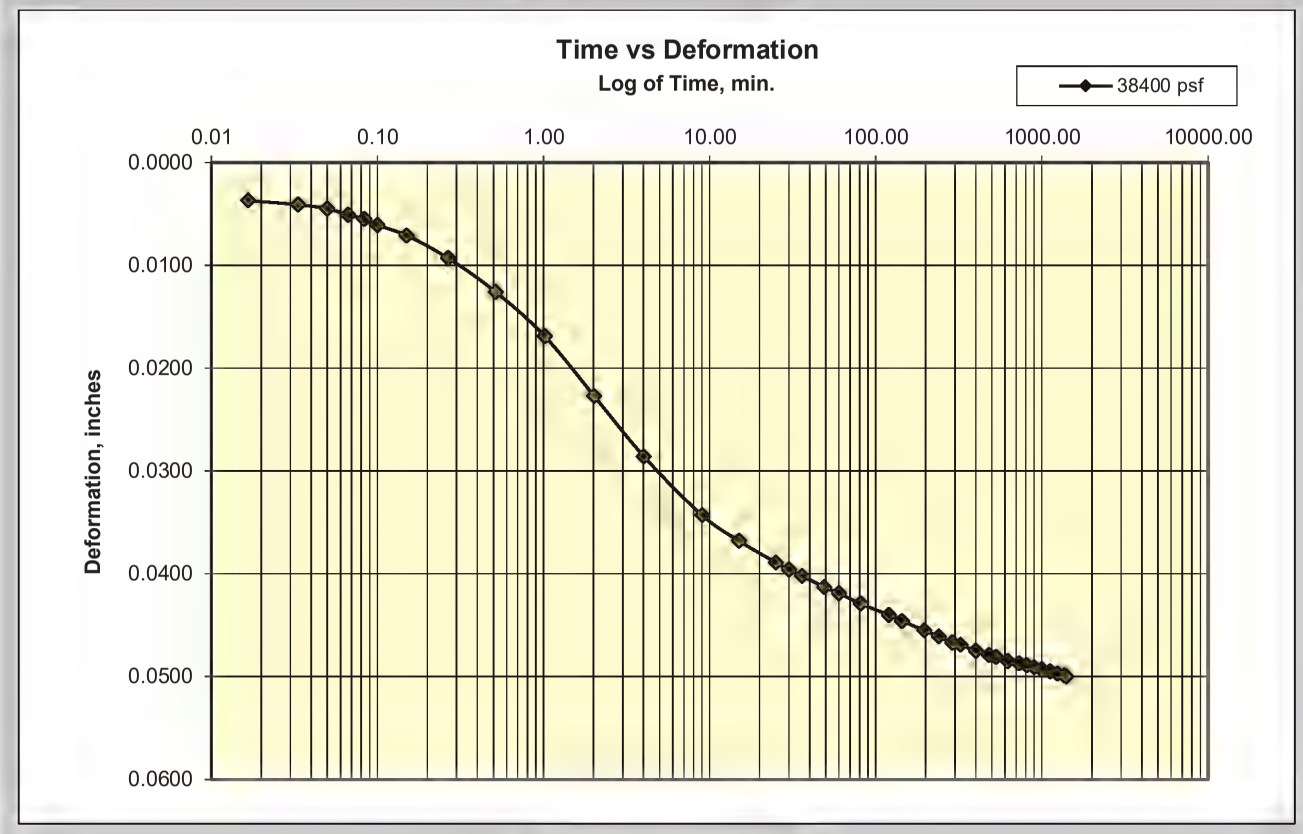


Cooper Testing Labs, Inc.

Load 10 38400 psf



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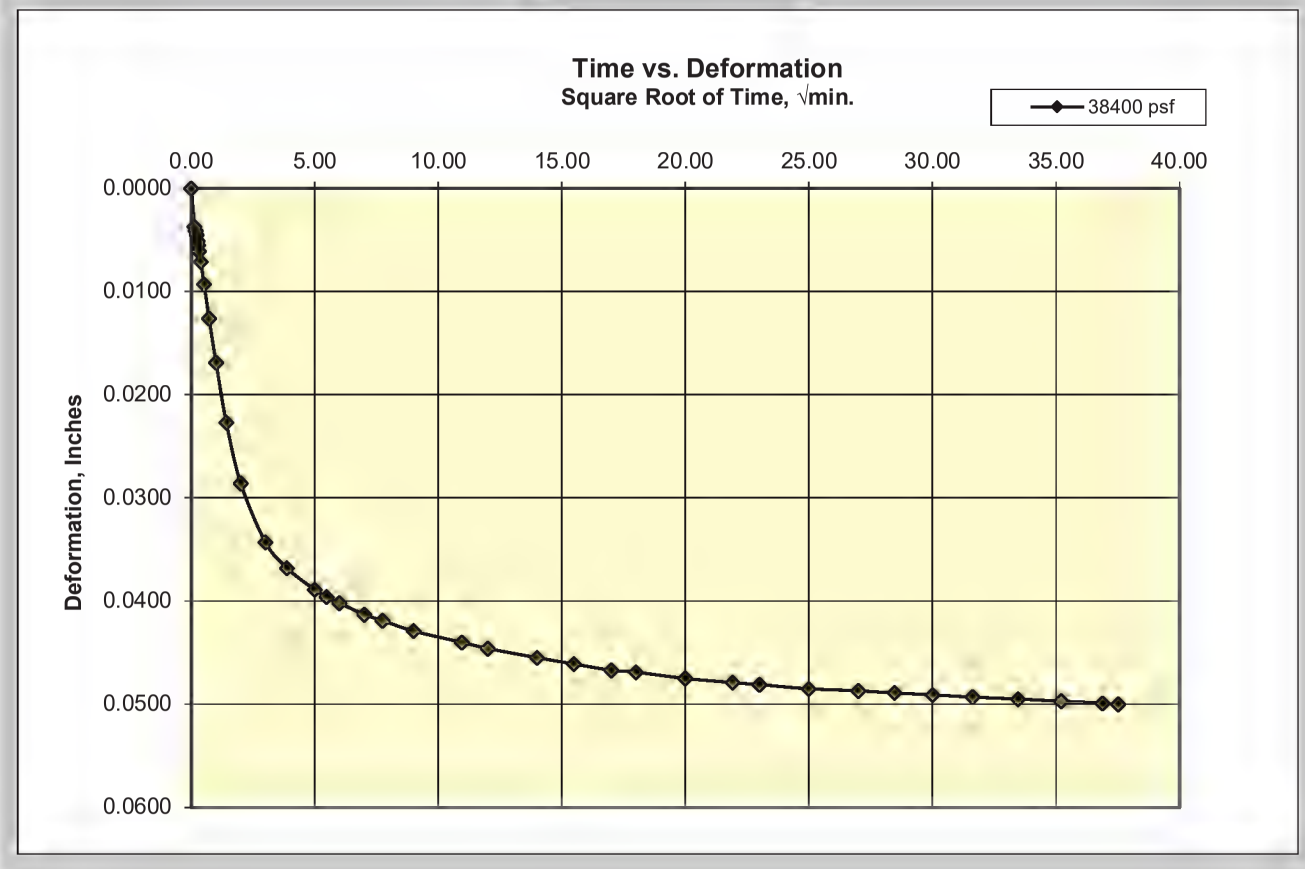
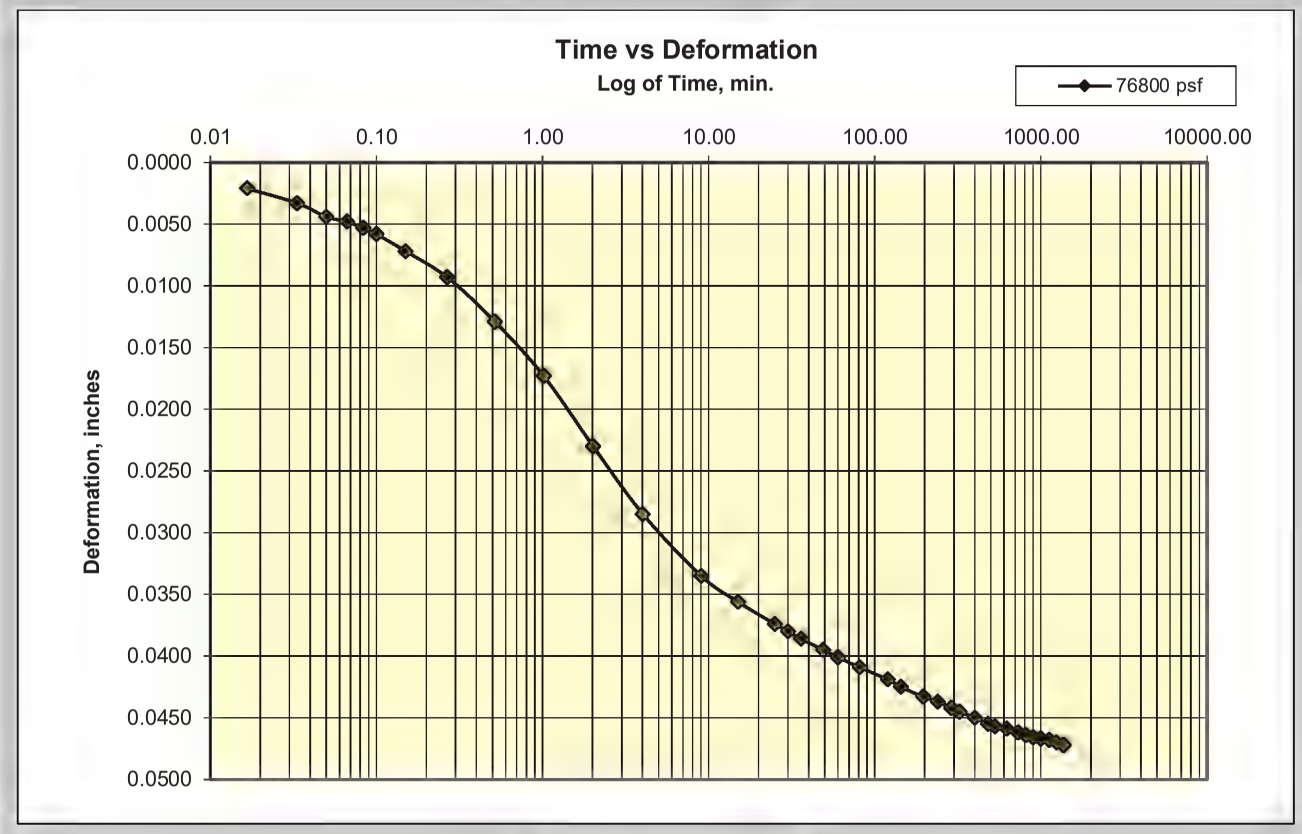


Cooper Testing Labs, Inc.

Load 11

76800 psf



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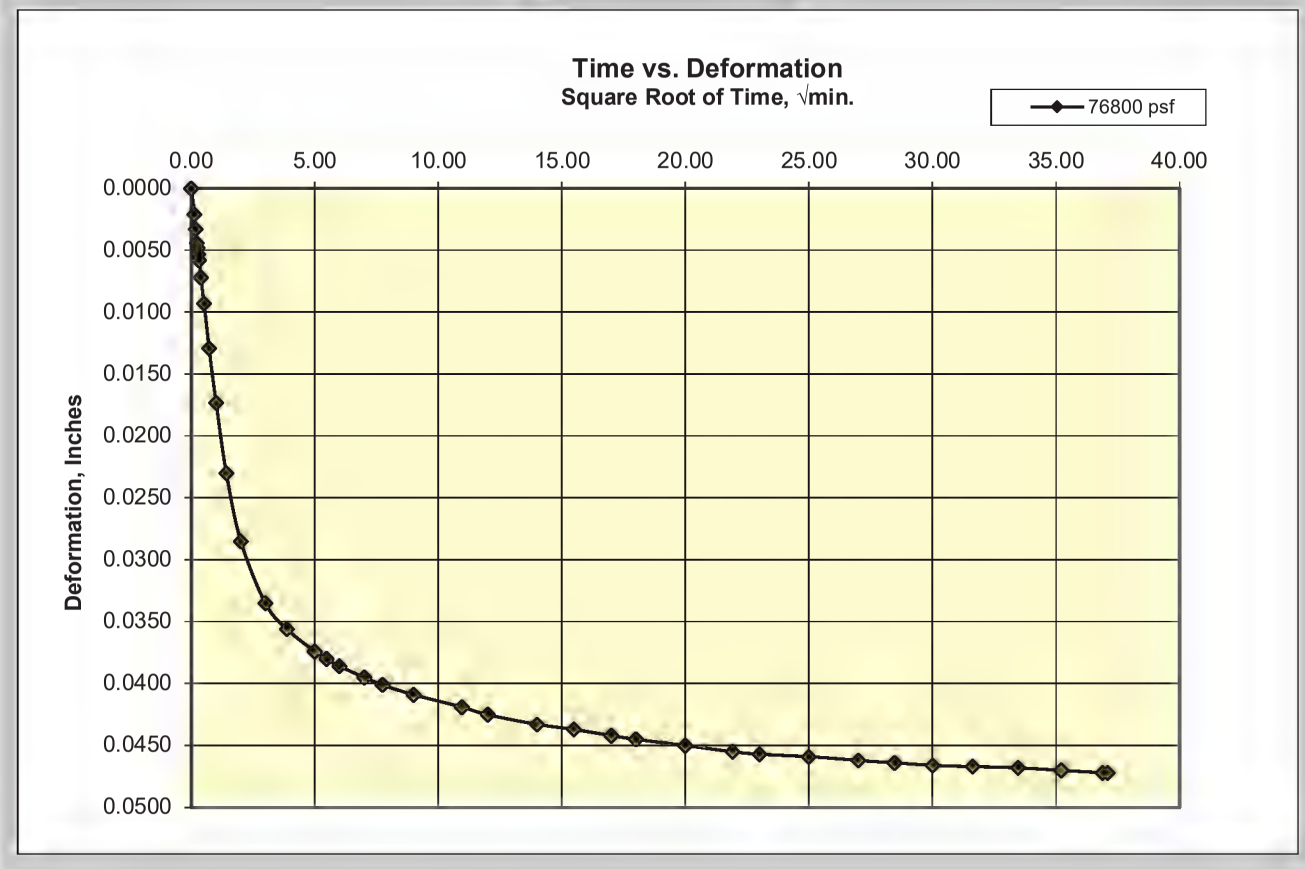
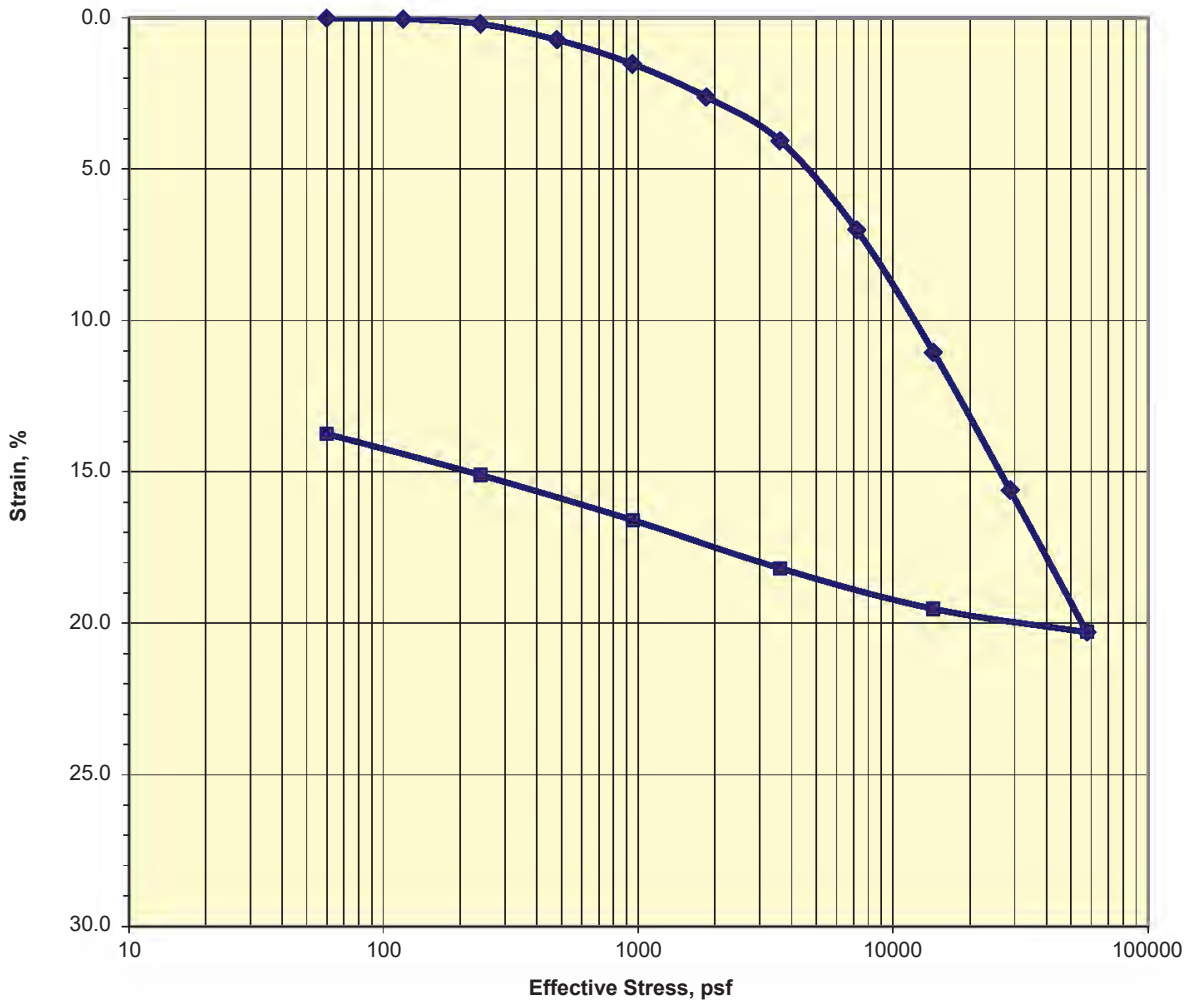


Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B103	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	11	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	55-57.5	**Checked:**	PJ
Soil Type:	Greenish Gray Sandy SILT			**Date:**	11/7/2023

Strain-Log-P Curve

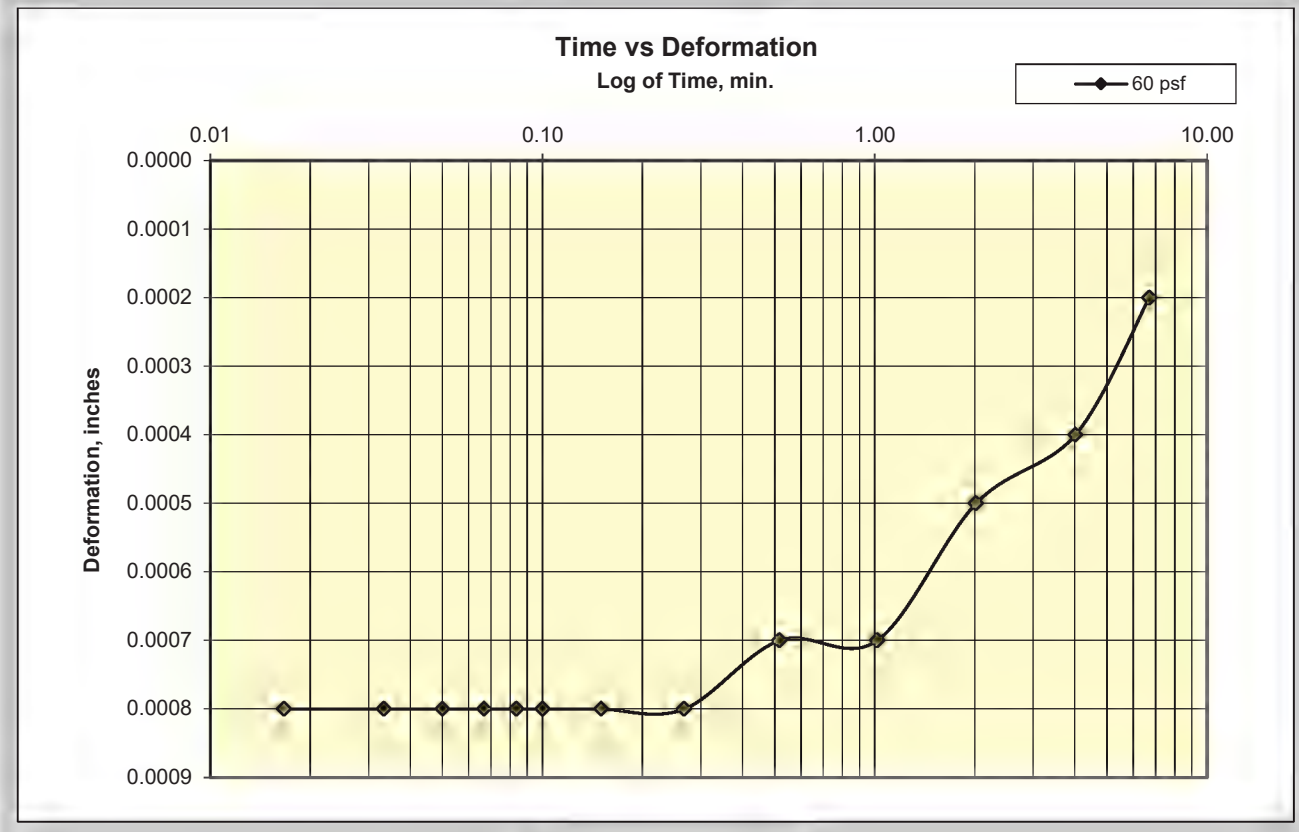


Assumed Gs 2.75	Initial	Final
Moisture %:	31.5	24.4
Dry Density, pcf:	89.0	102.7
Void Ratio:	0.930	0.671
% Saturation:	93.1	100.0

Remarks:

Cooper Testing Labs, Inc.

Load 1 — 60 psf



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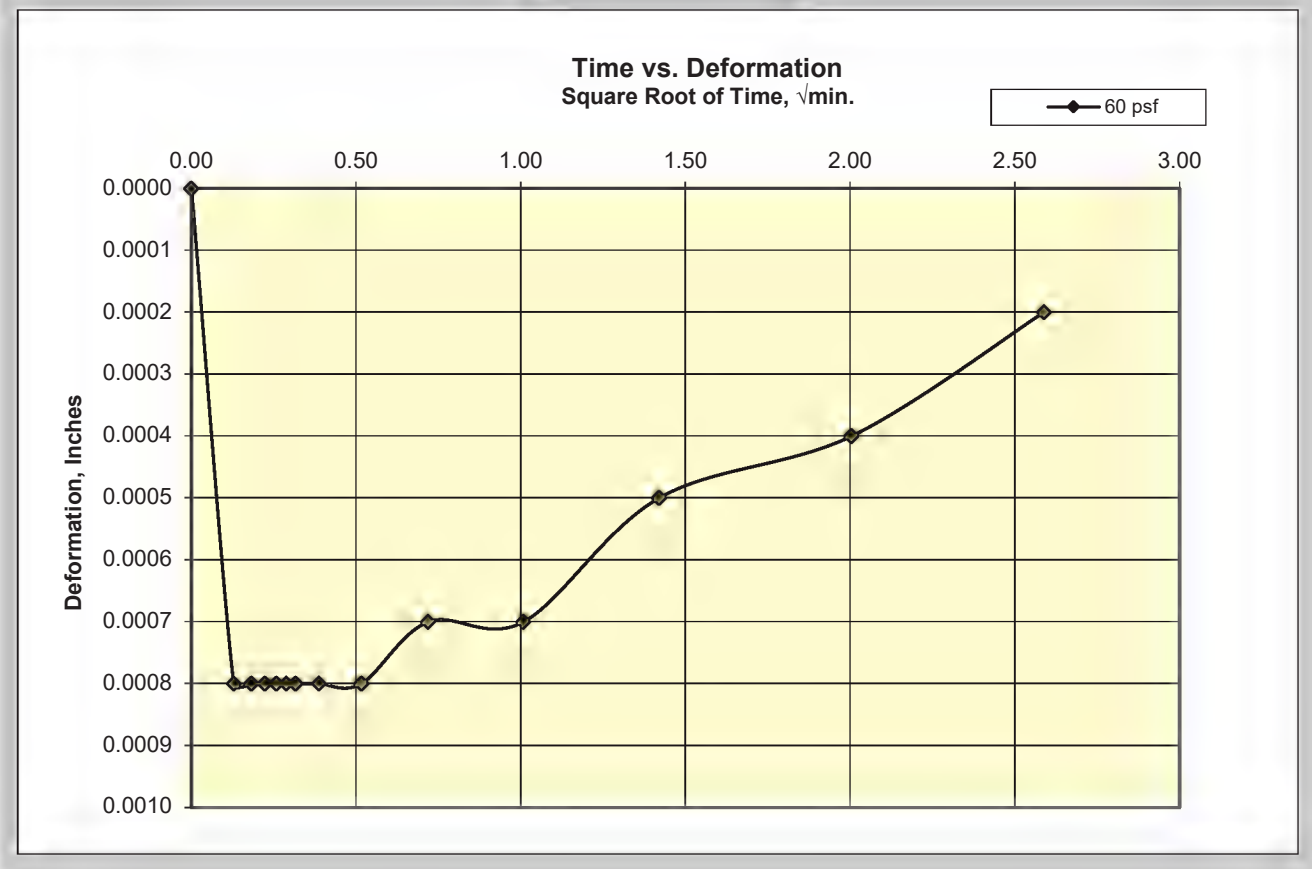

Cooper Testing Labs, Inc.

Load 2

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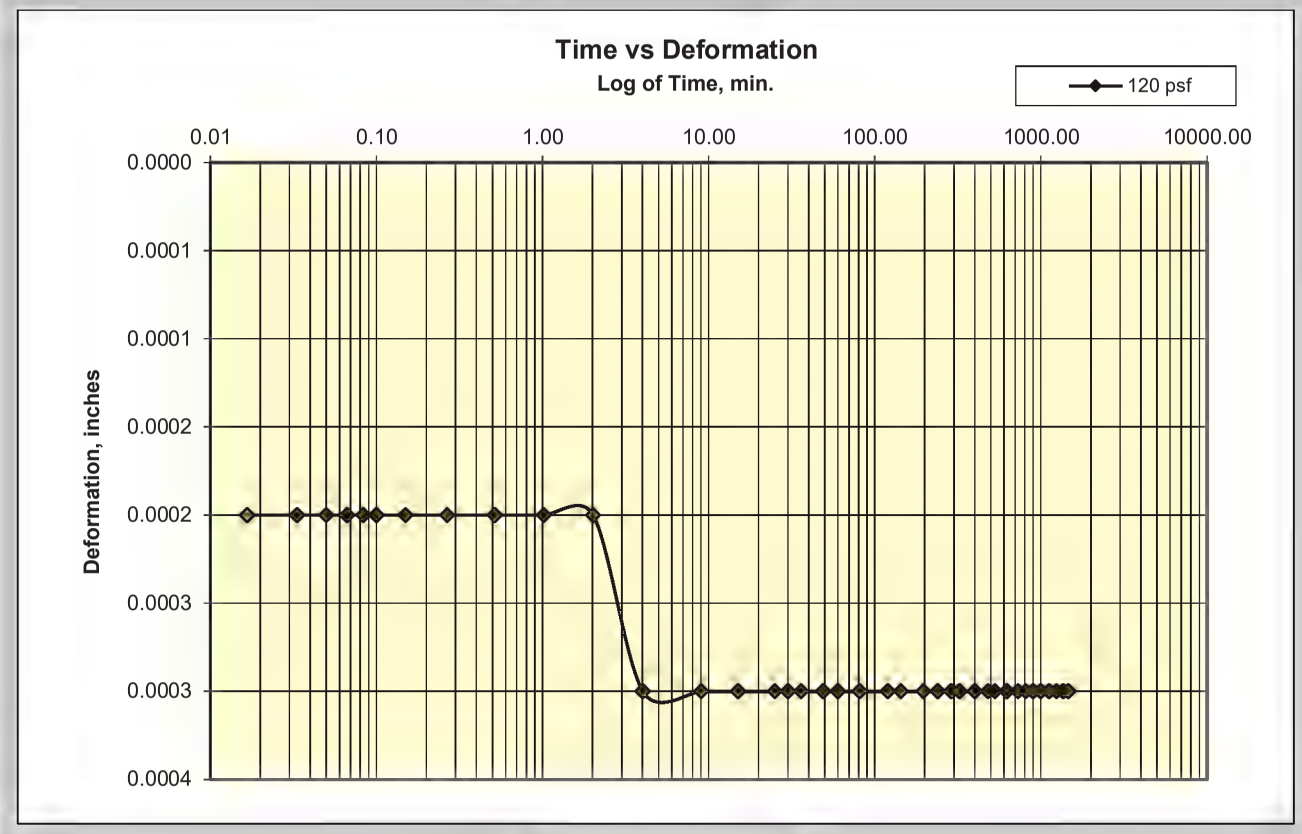

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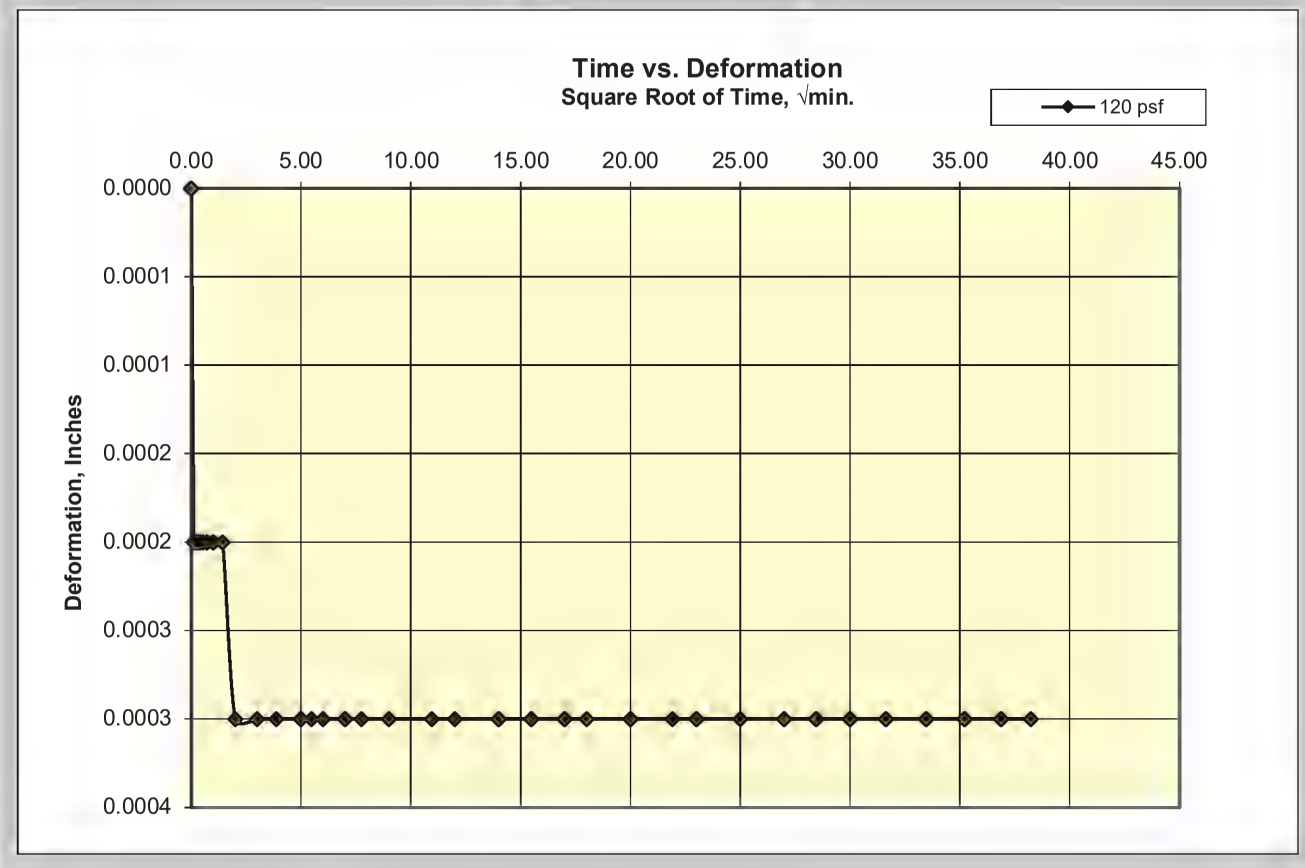

Cooper Testing Labs, Inc.

Load 3

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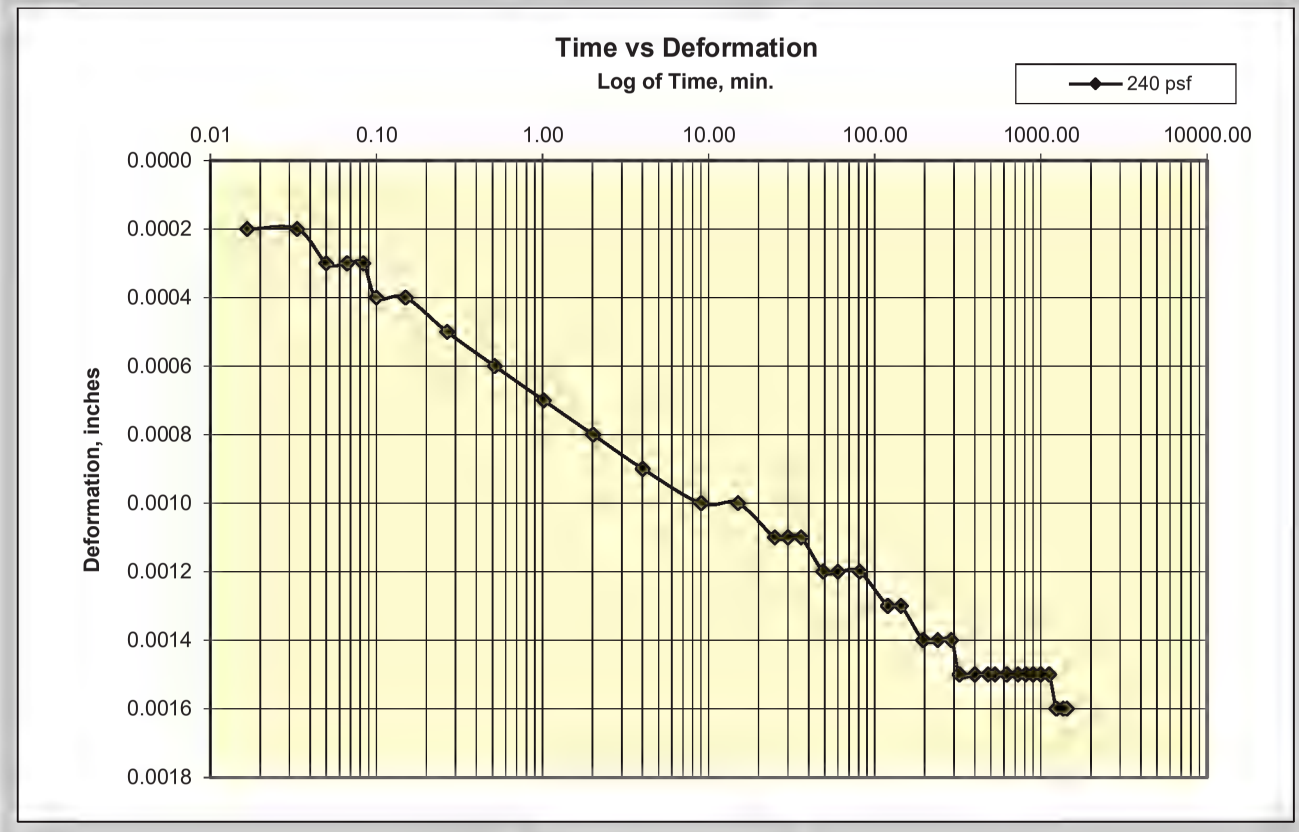

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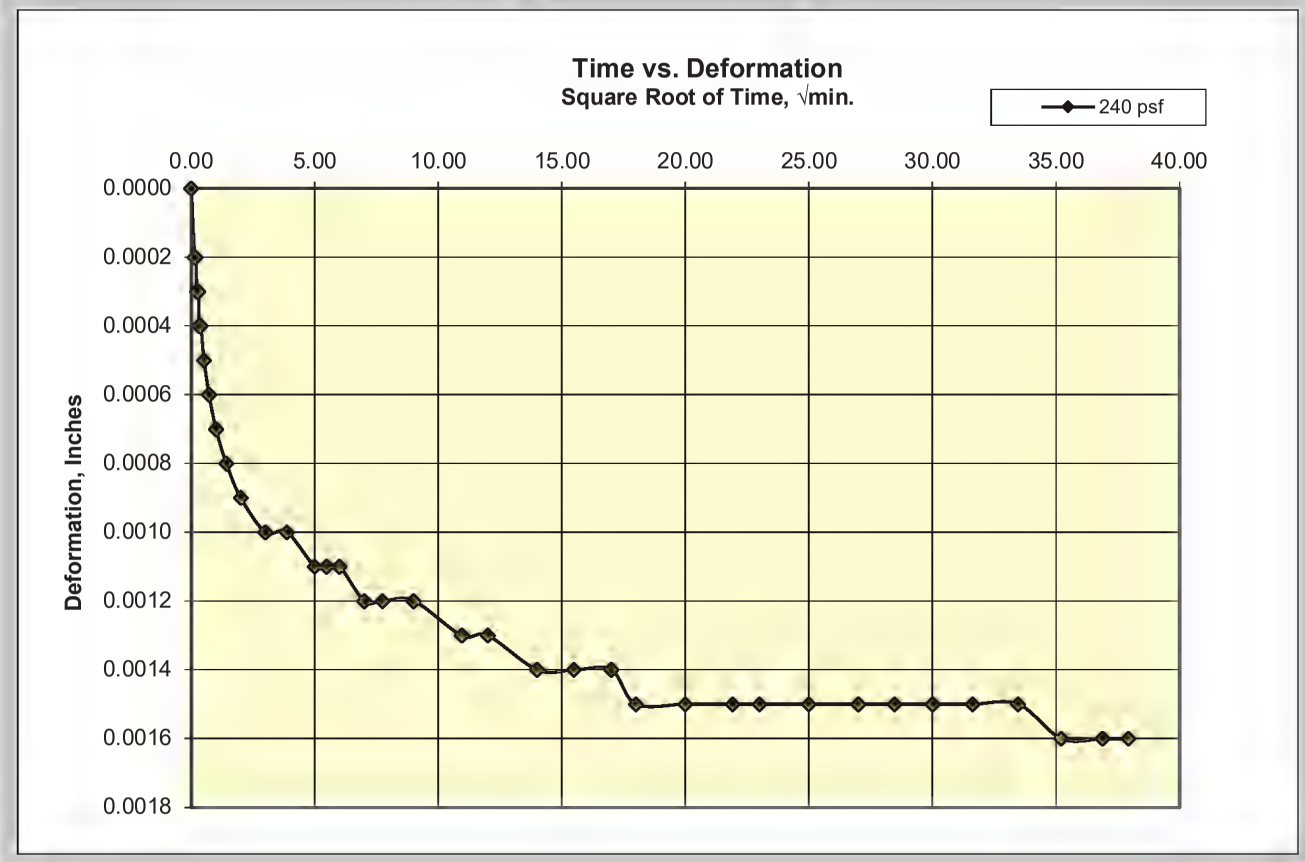

Cooper Testing Labs, Inc.

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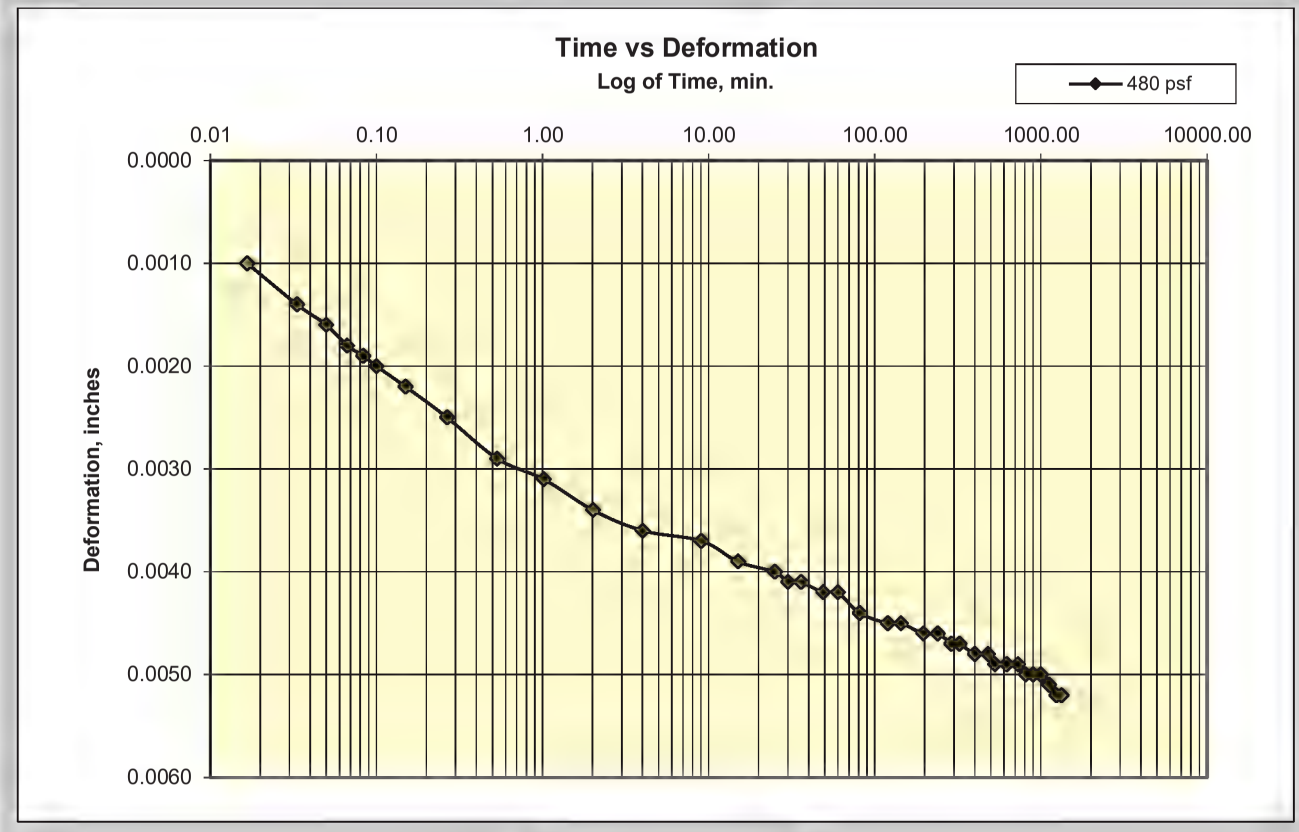

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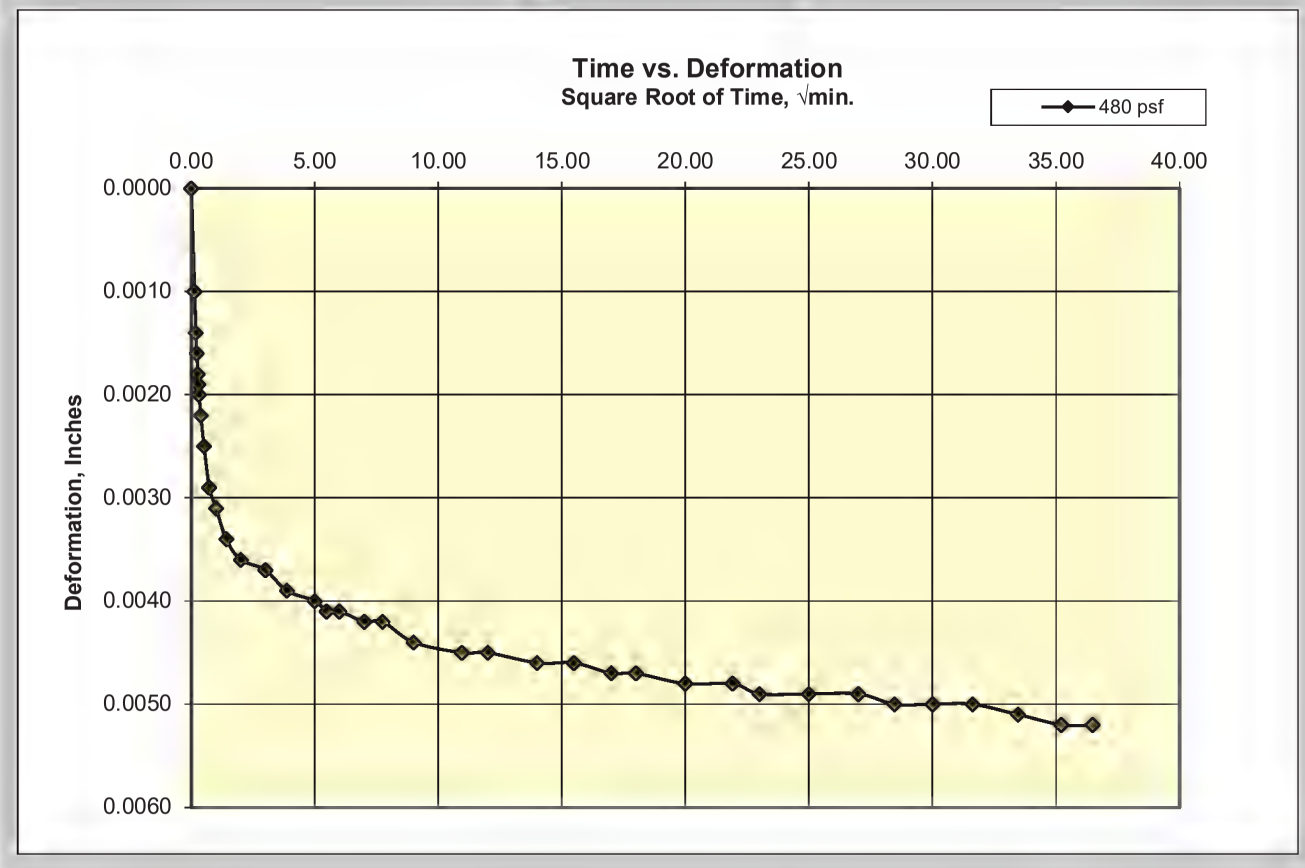
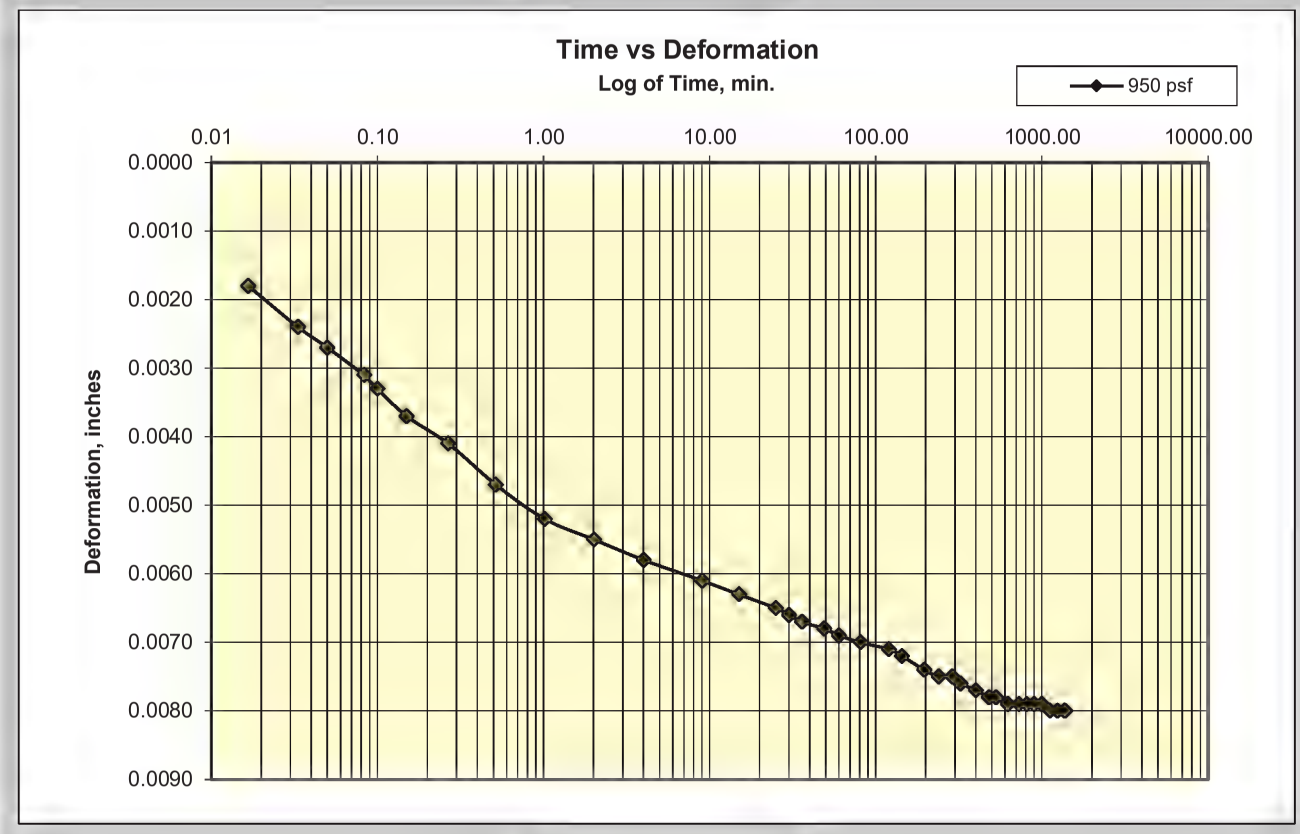


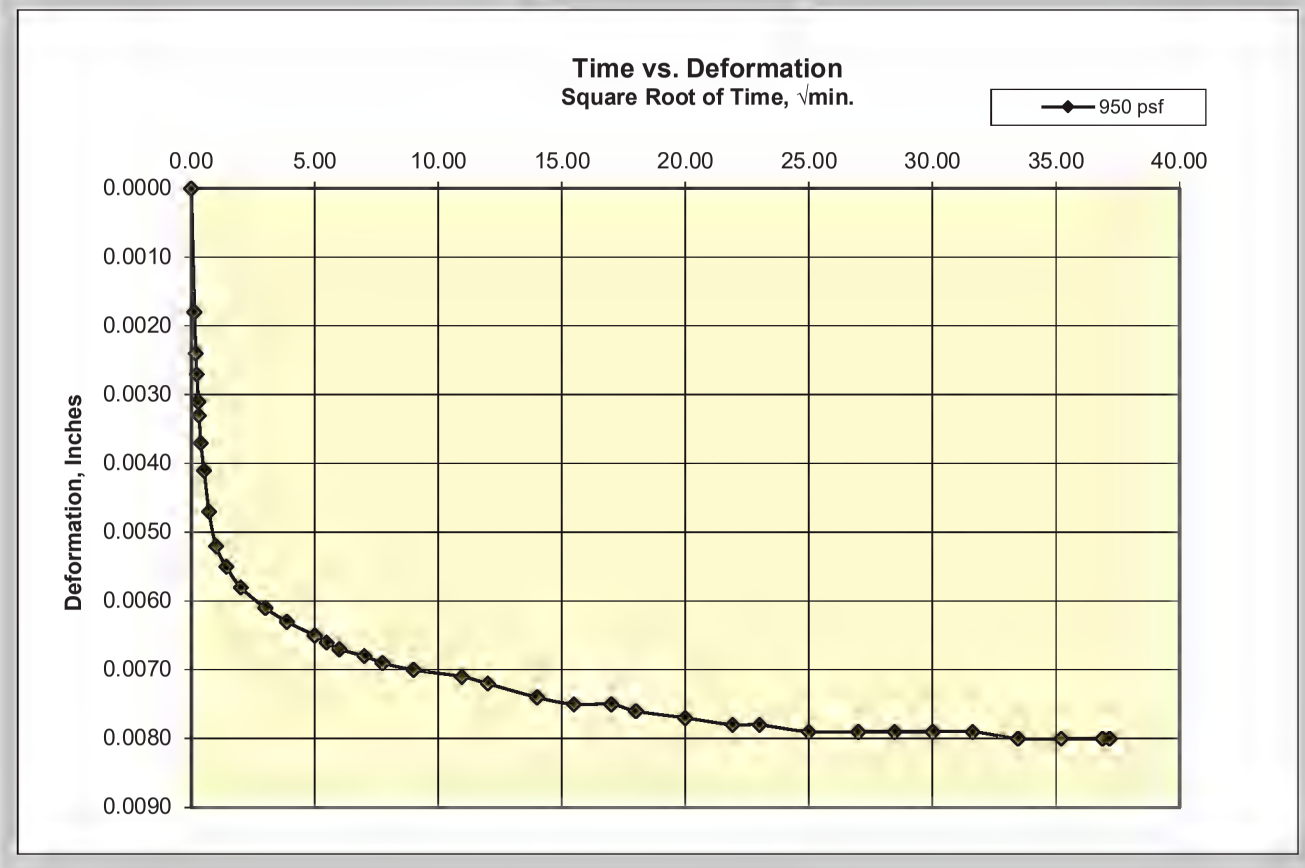
Cooper Testing Labs, Inc.

Load 5

950 psf



950 psf



Cooper Testing Labs, Inc.

Load 6

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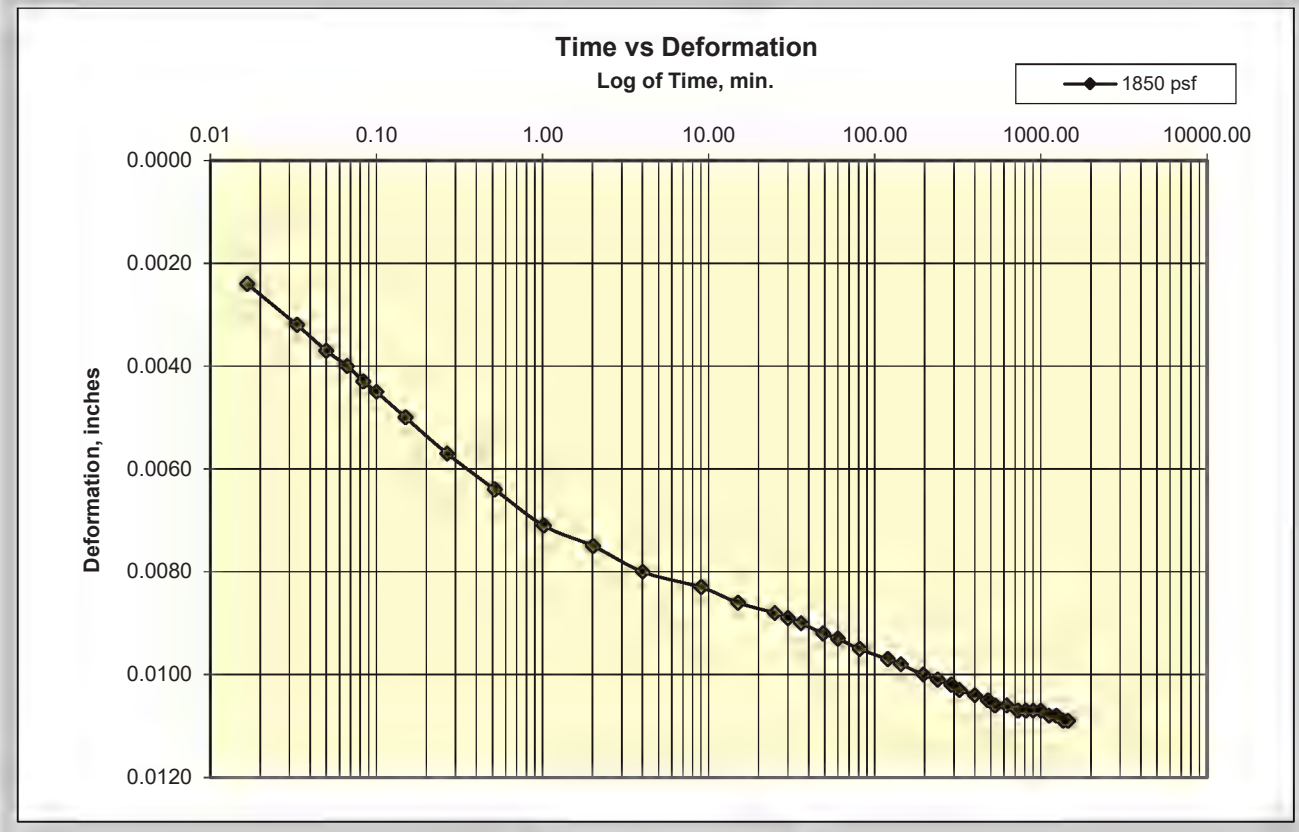

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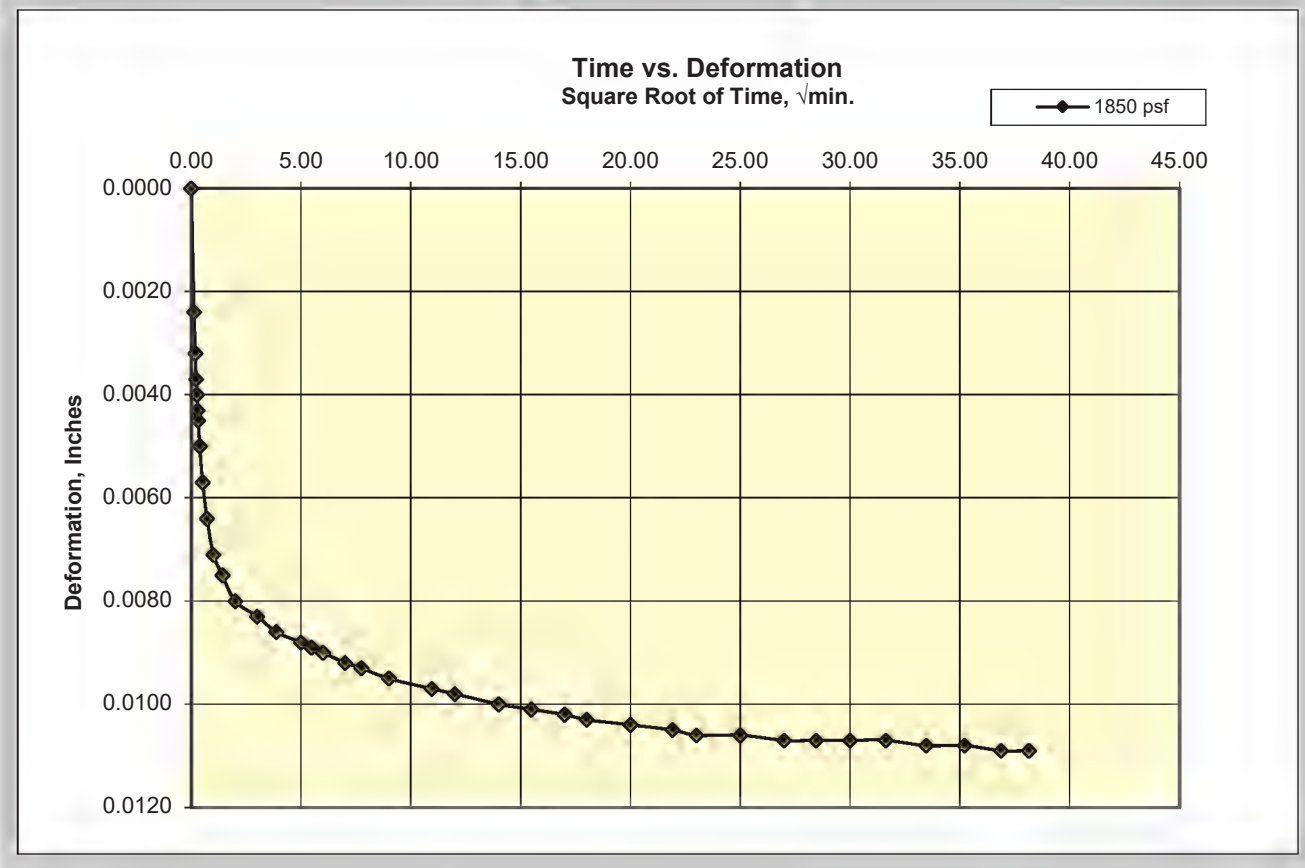

Cooper Testing Labs, Inc.

Load 7

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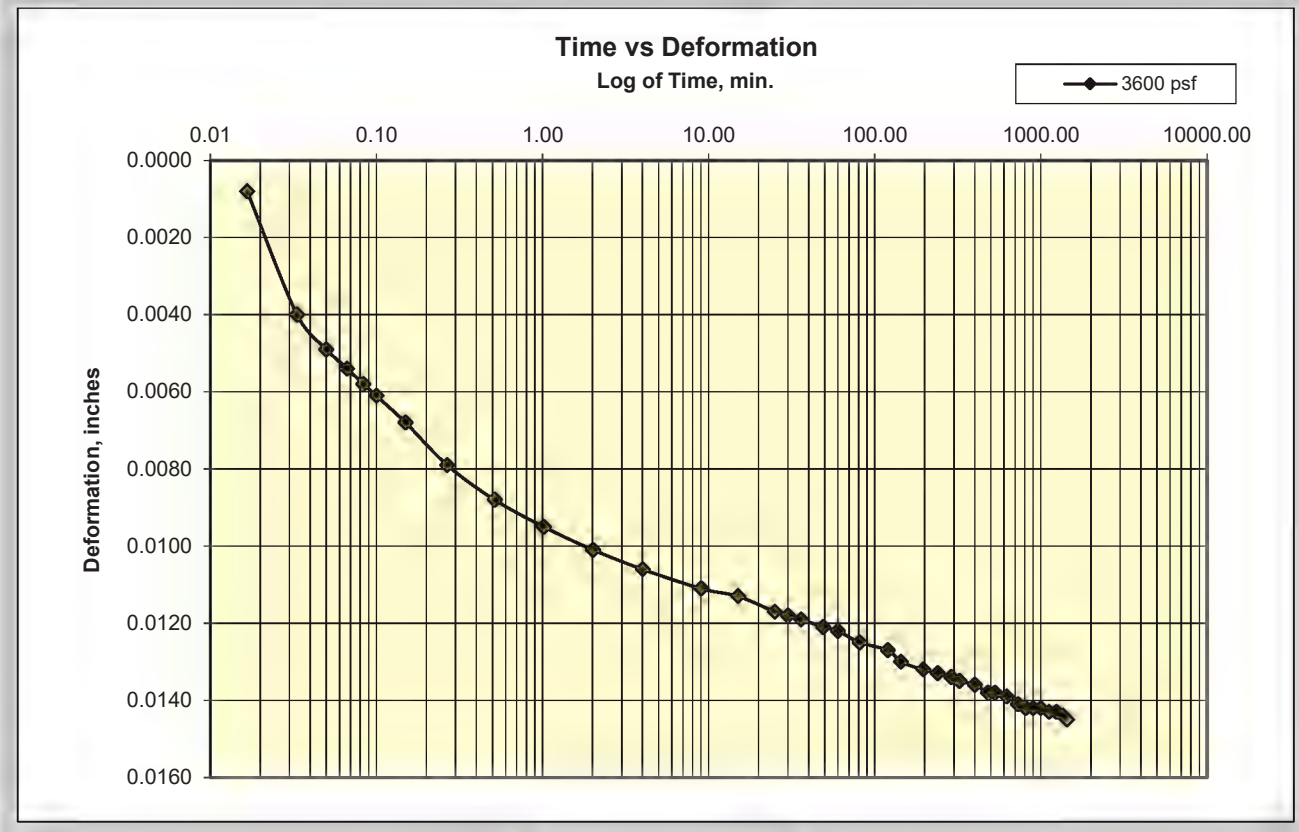

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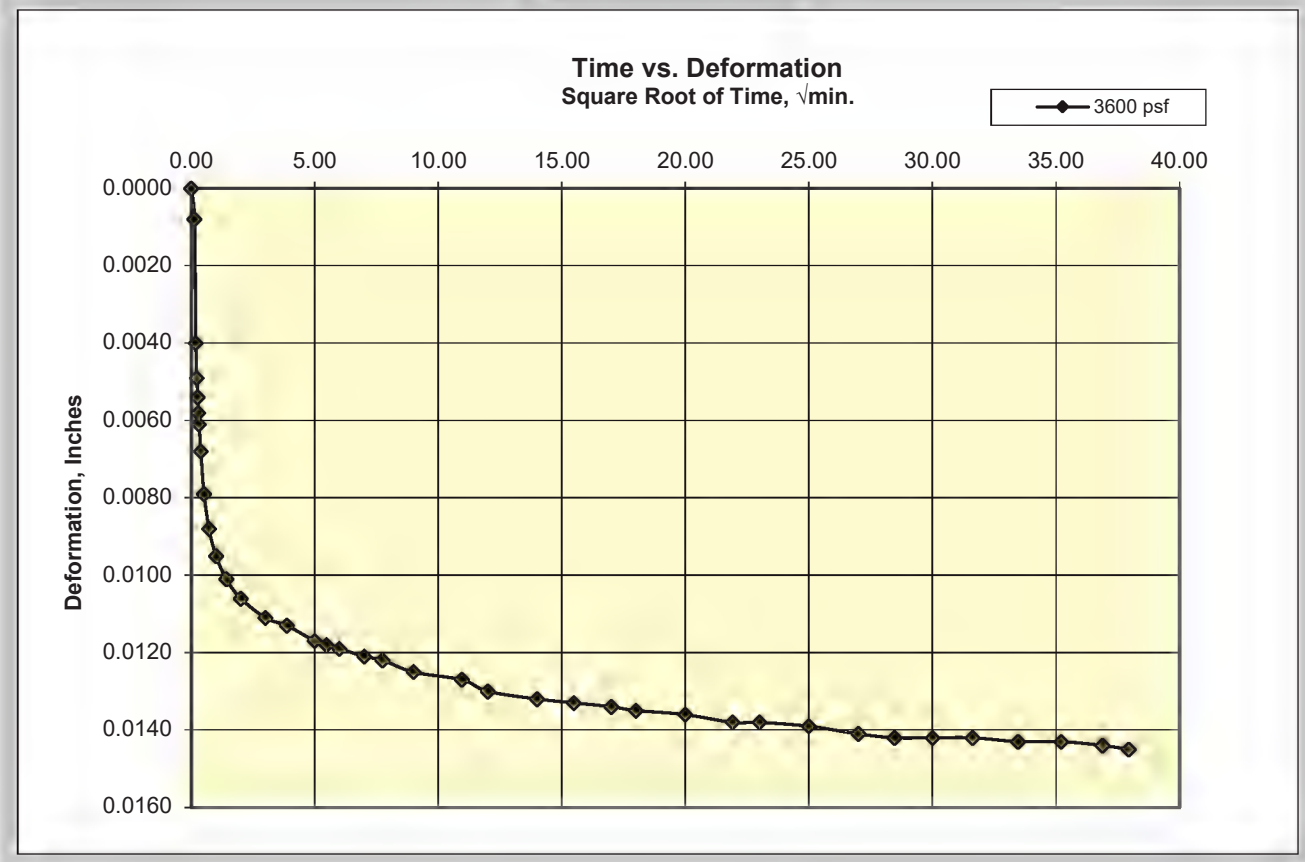
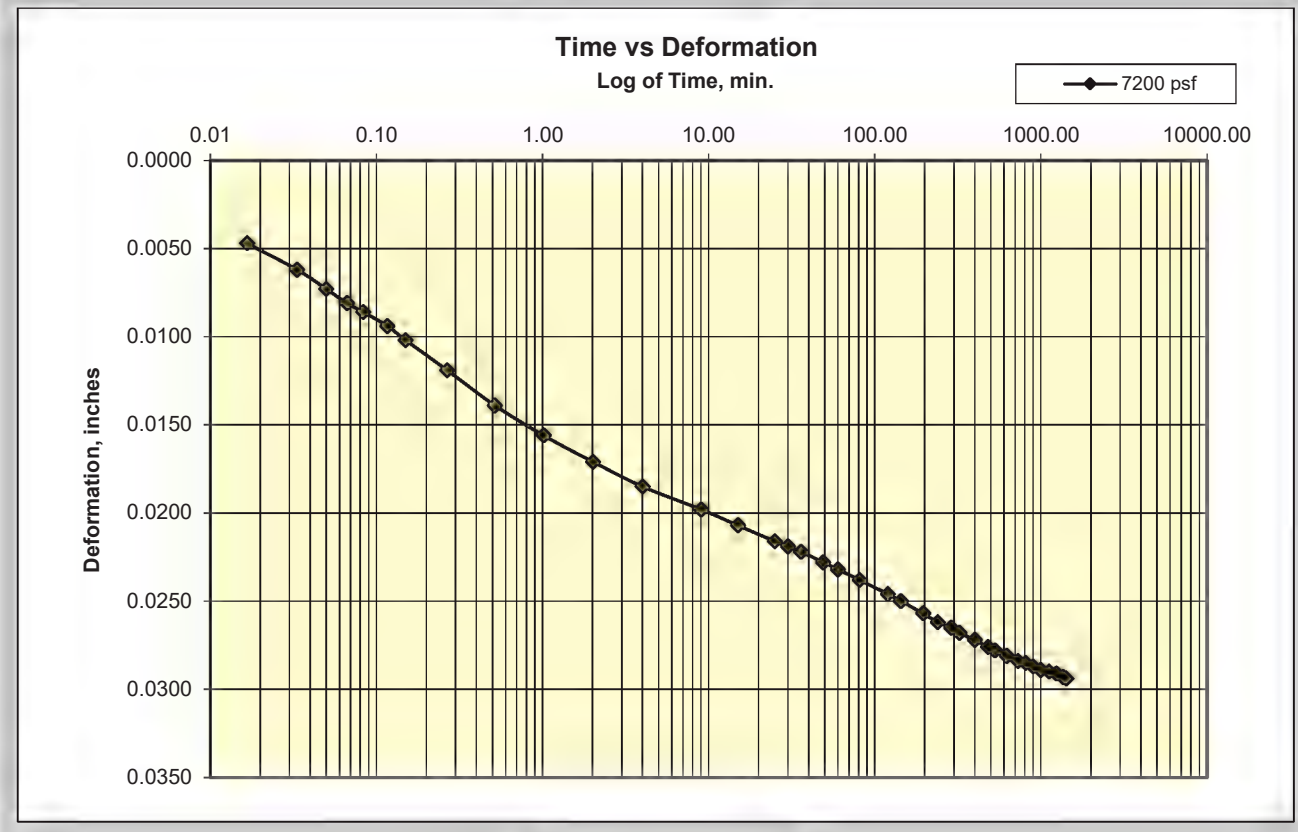


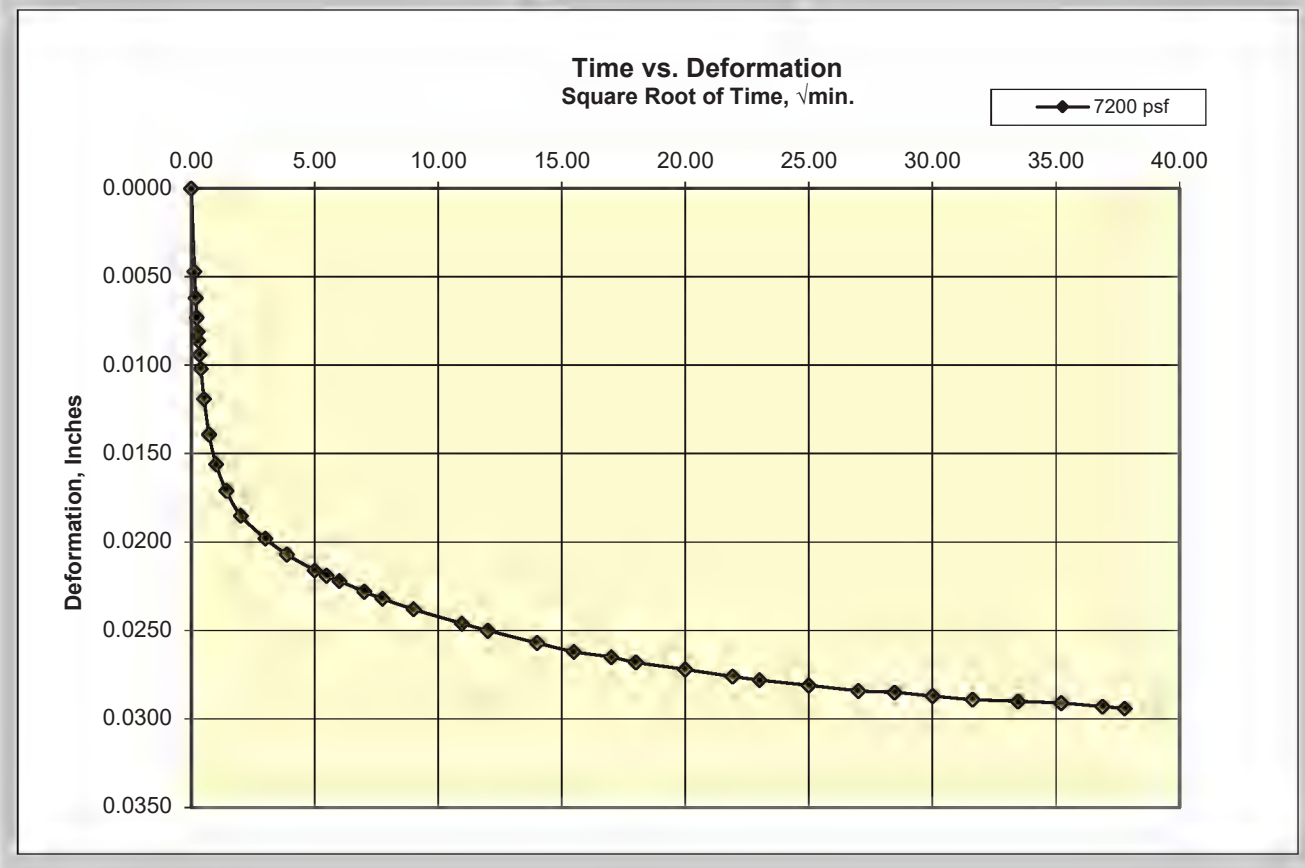
Cooper Testing Labs, Inc.

Load 8

7200 psf



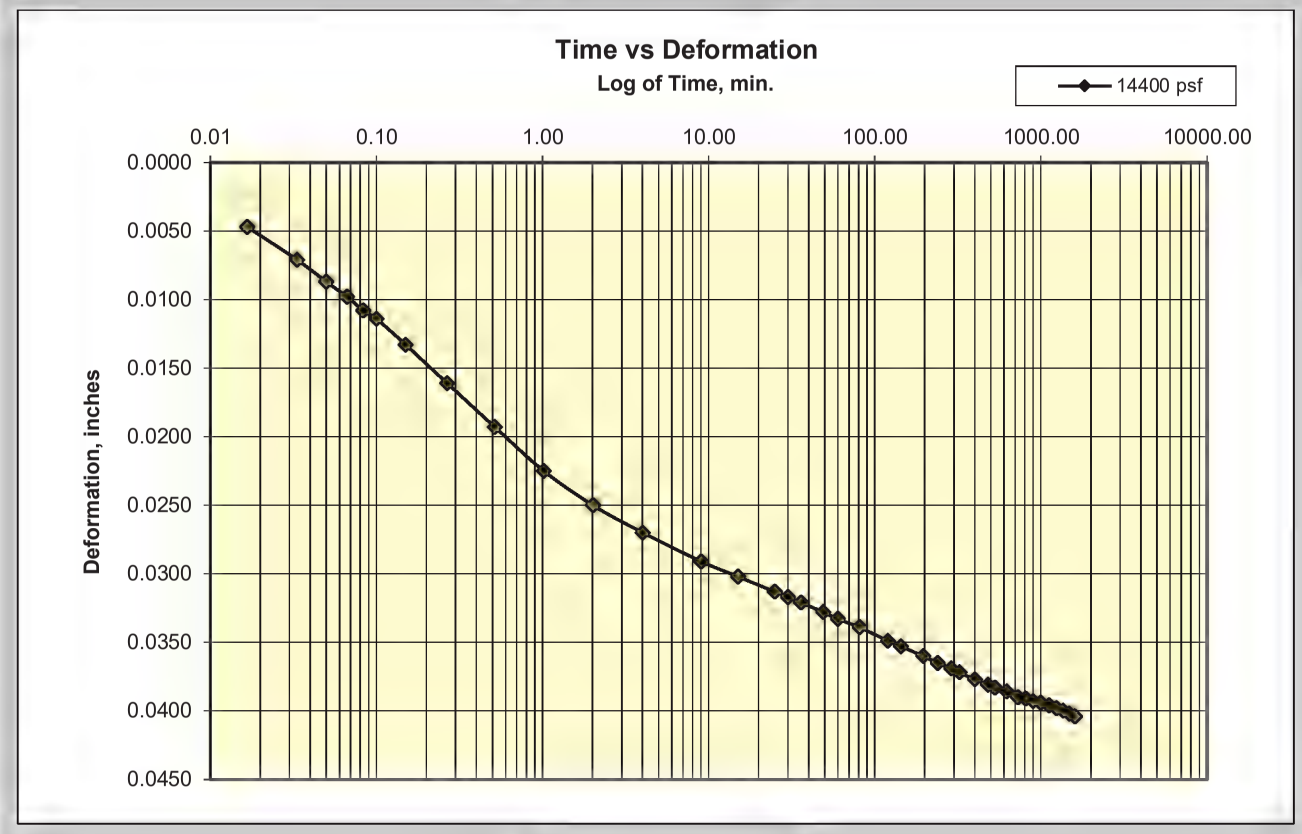
7200 psf



Cooper Testing Labs, Inc.

Load 9

14400 psf



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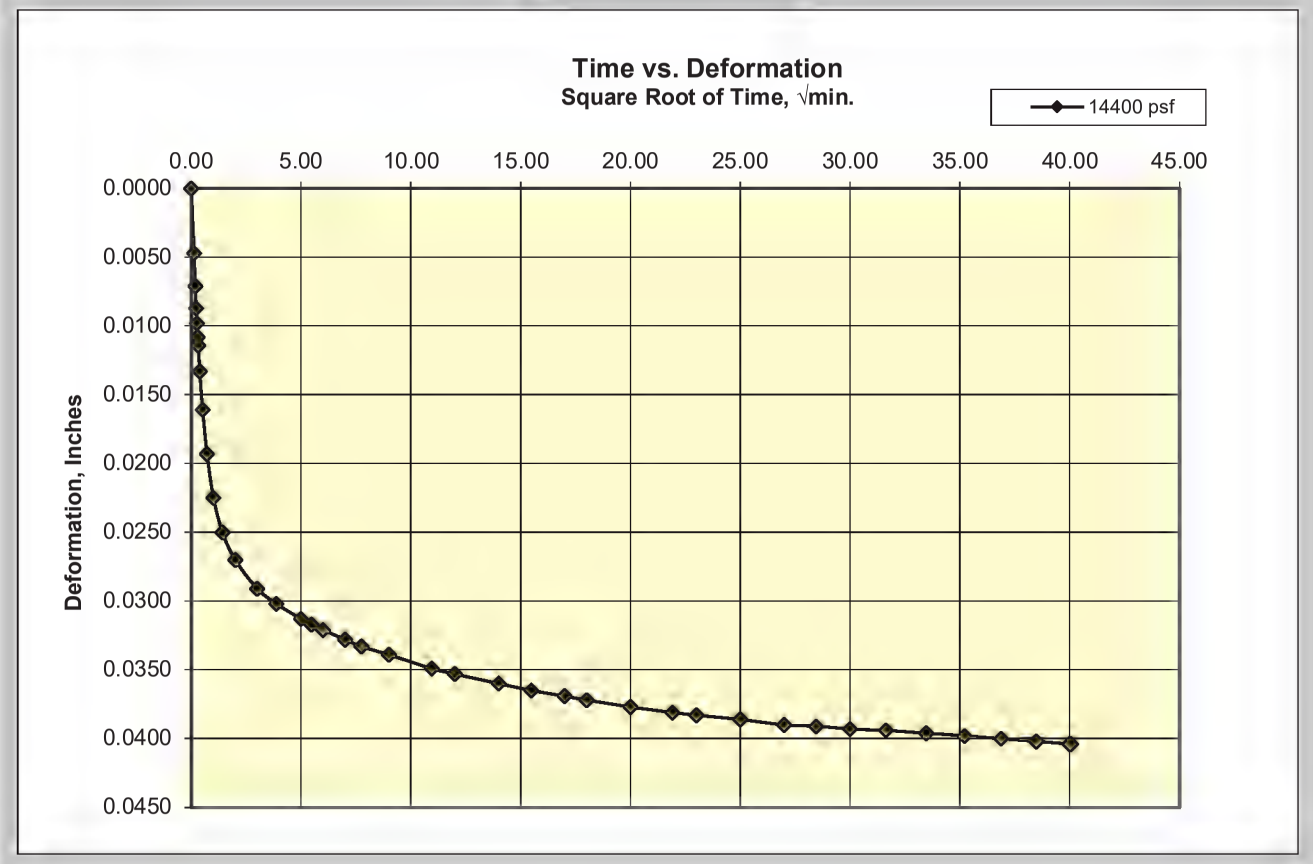
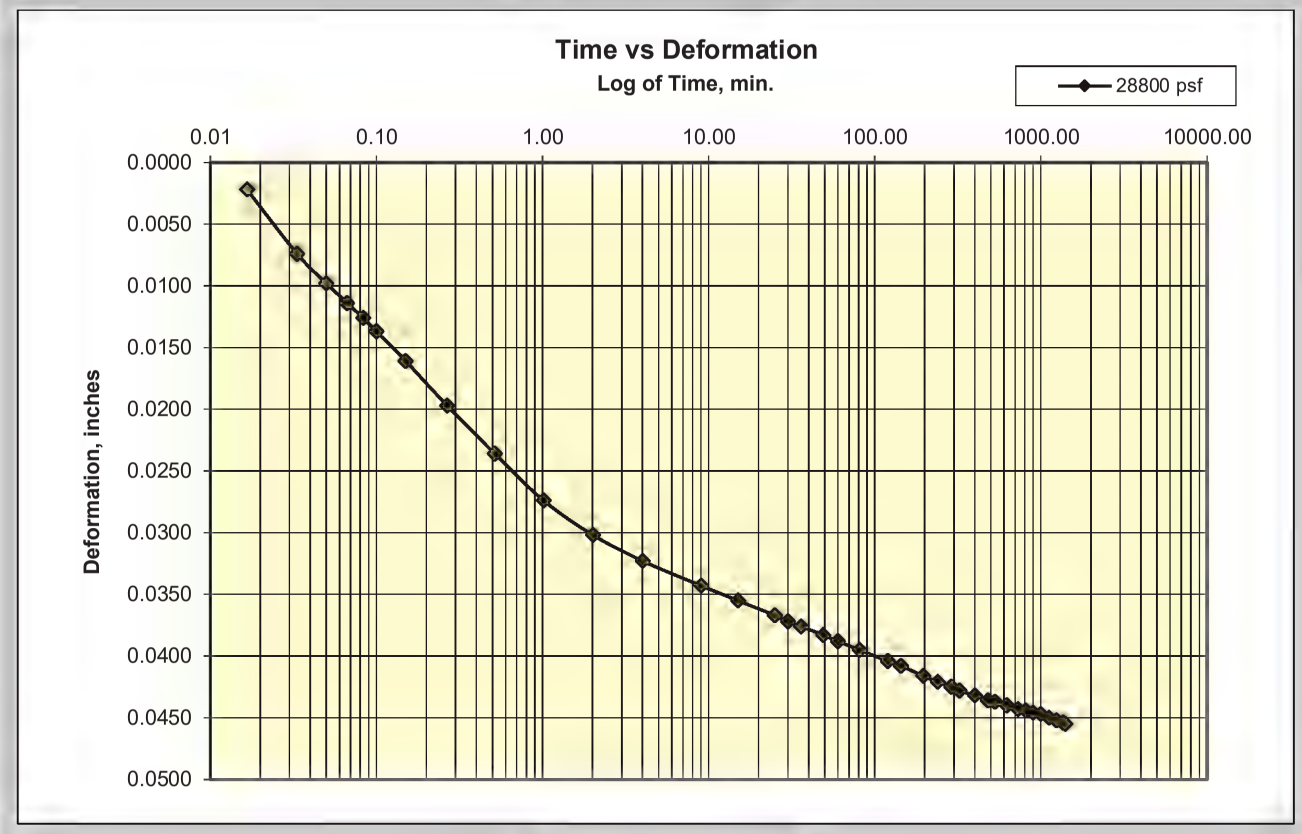


Cooper Testing Labs, Inc.

Load 10 28800 psf



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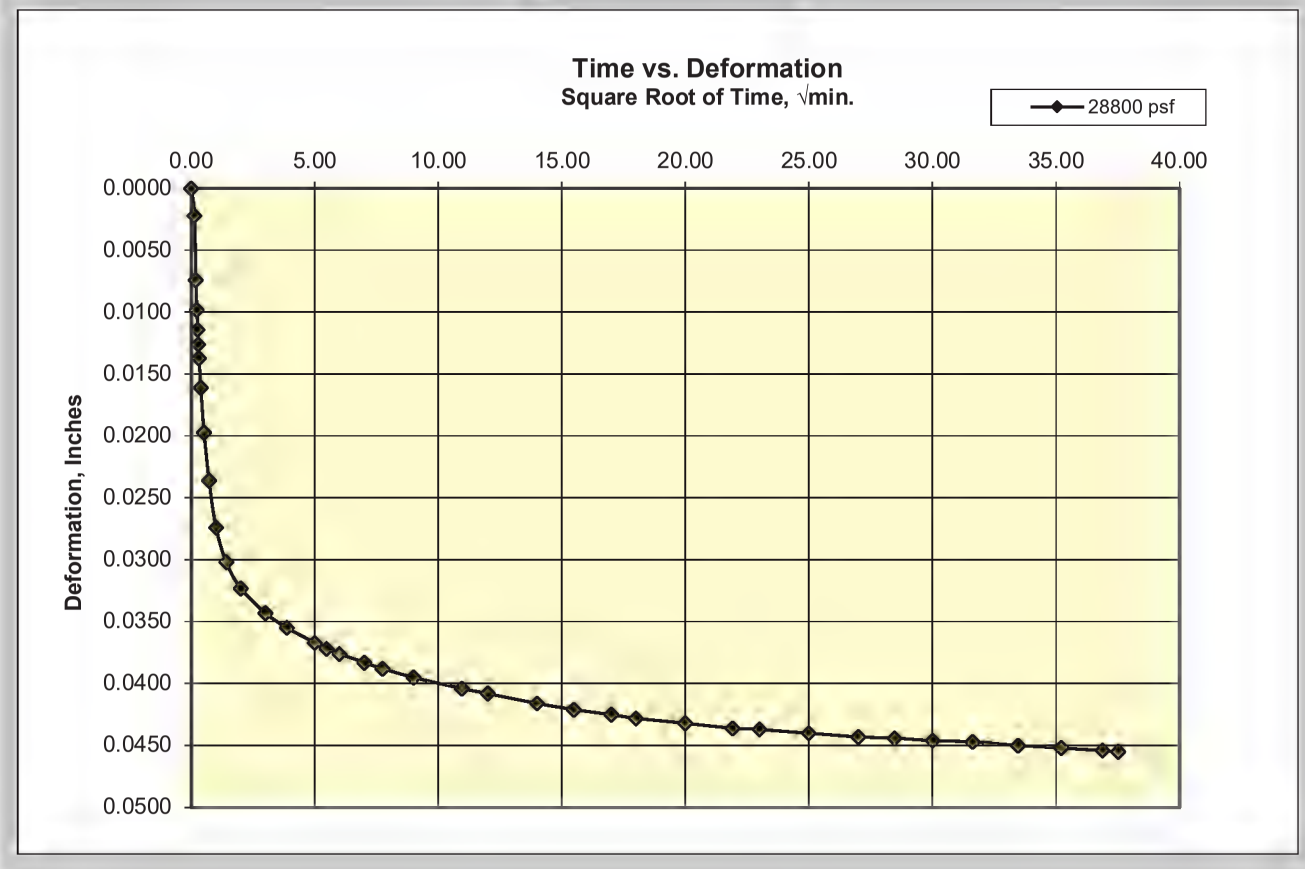

Cooper Testing Labs, Inc.

Load 11

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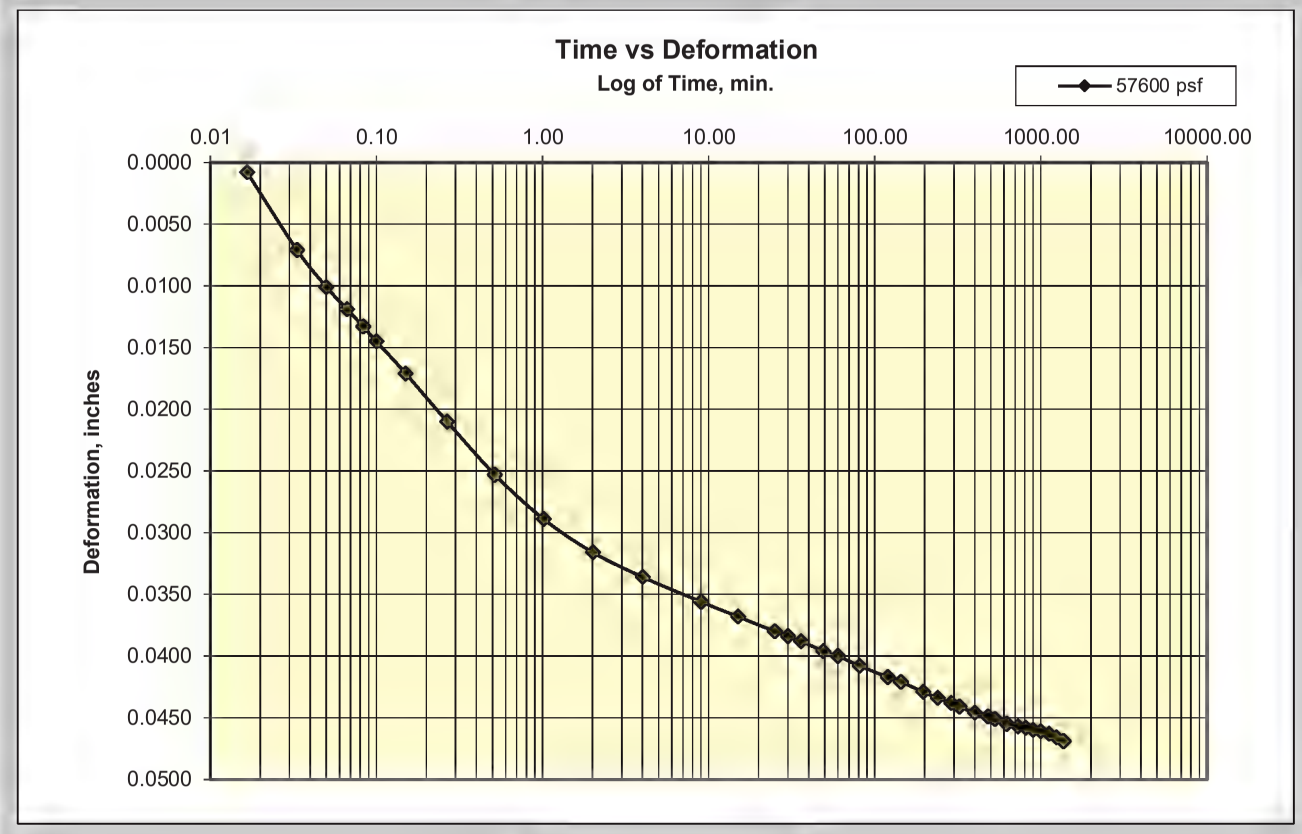

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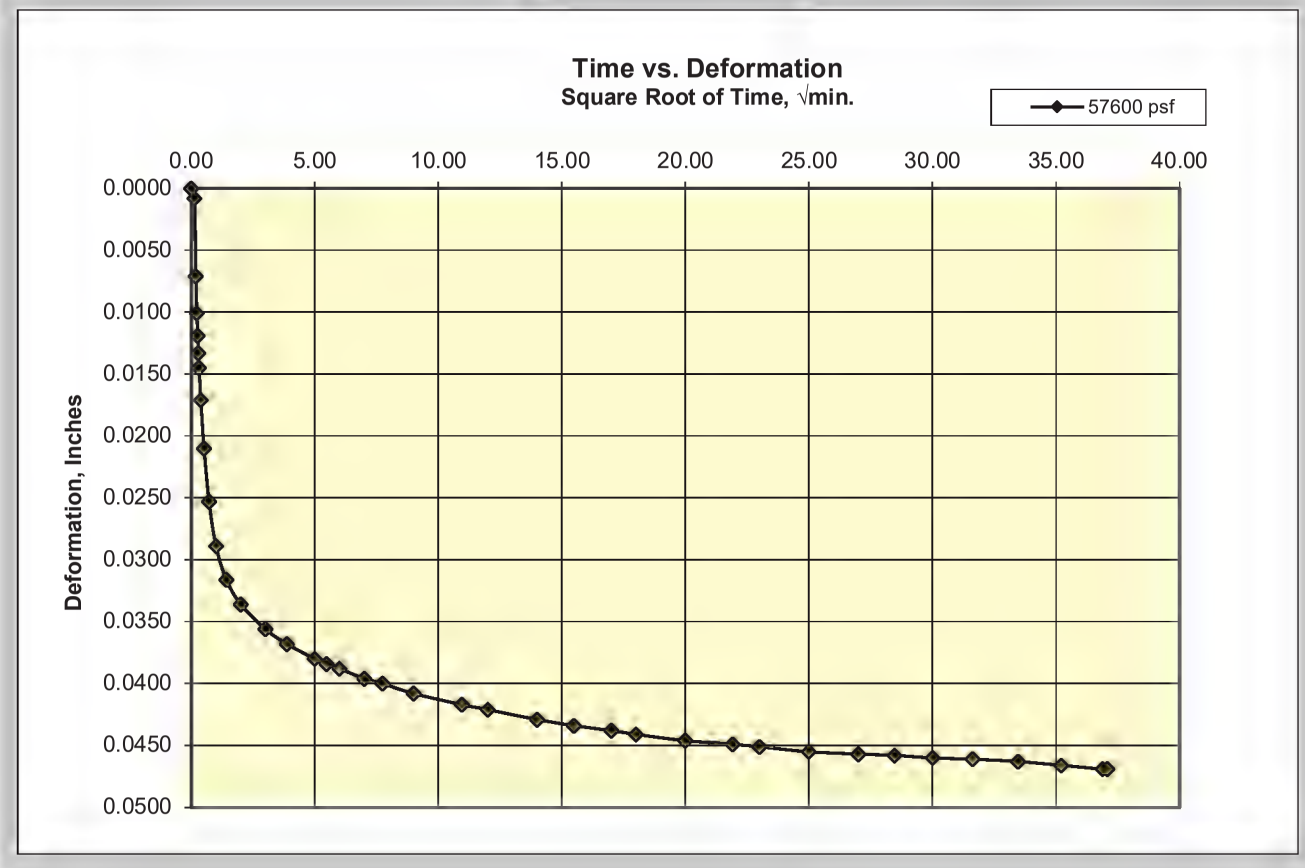
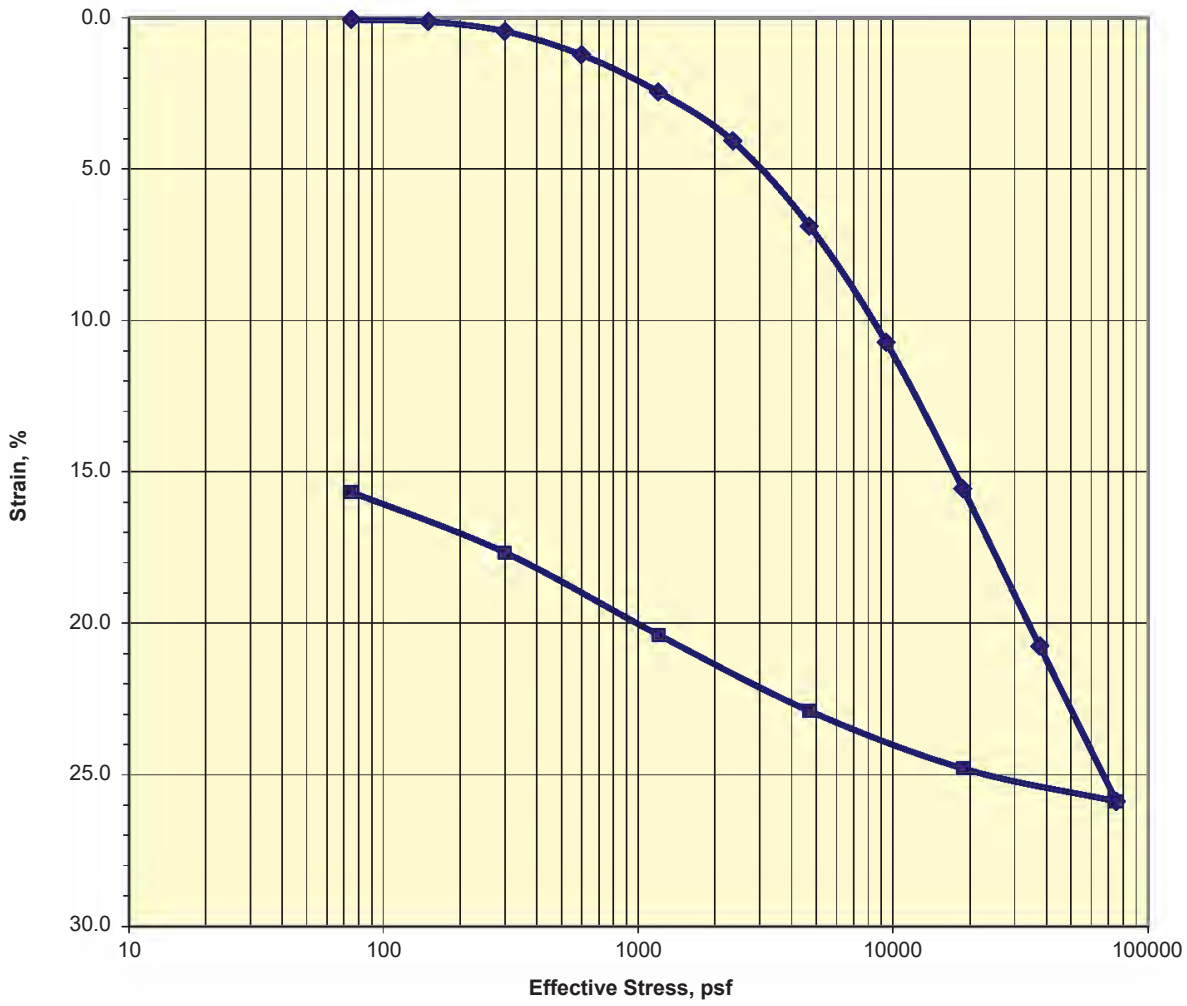


Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B103	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	17	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	75-77.5	**Checked:**	PJ
Soil Type:	Greenish Gray CLAY (Bay Mud)			**Date:**	11/8/2023

Strain-Log-P Curve



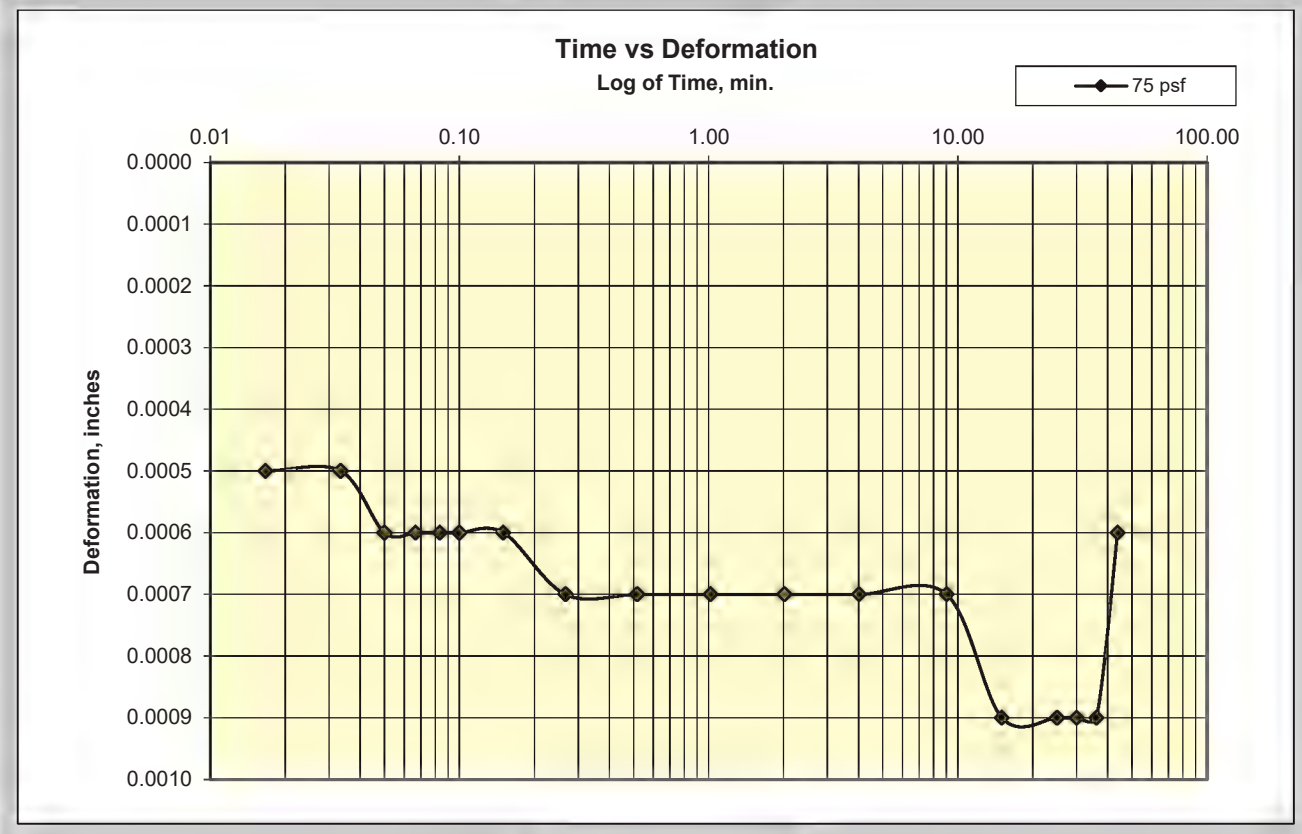
Assumed Gs 2.8	Initial	Final
Moisture %:	35.6	28.6
Dry Density, pcf:	81.4	97.1
Void Ratio:	1.148	0.800
% Saturation:	86.8	100.0

Remarks:

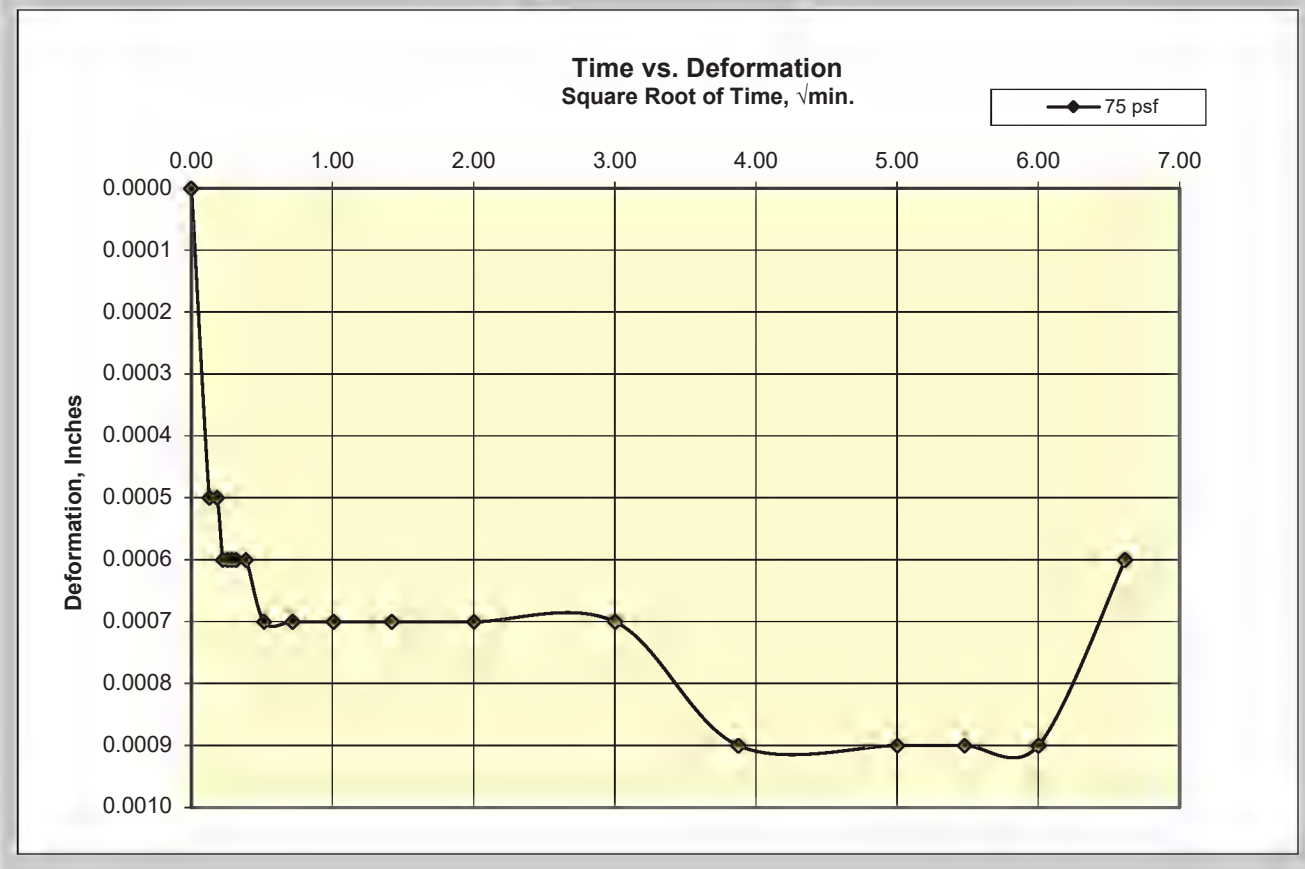
Cooper Testing Labs, Inc.

Load 1

75 psf



75 psf



Cooper Testing Labs, Inc.

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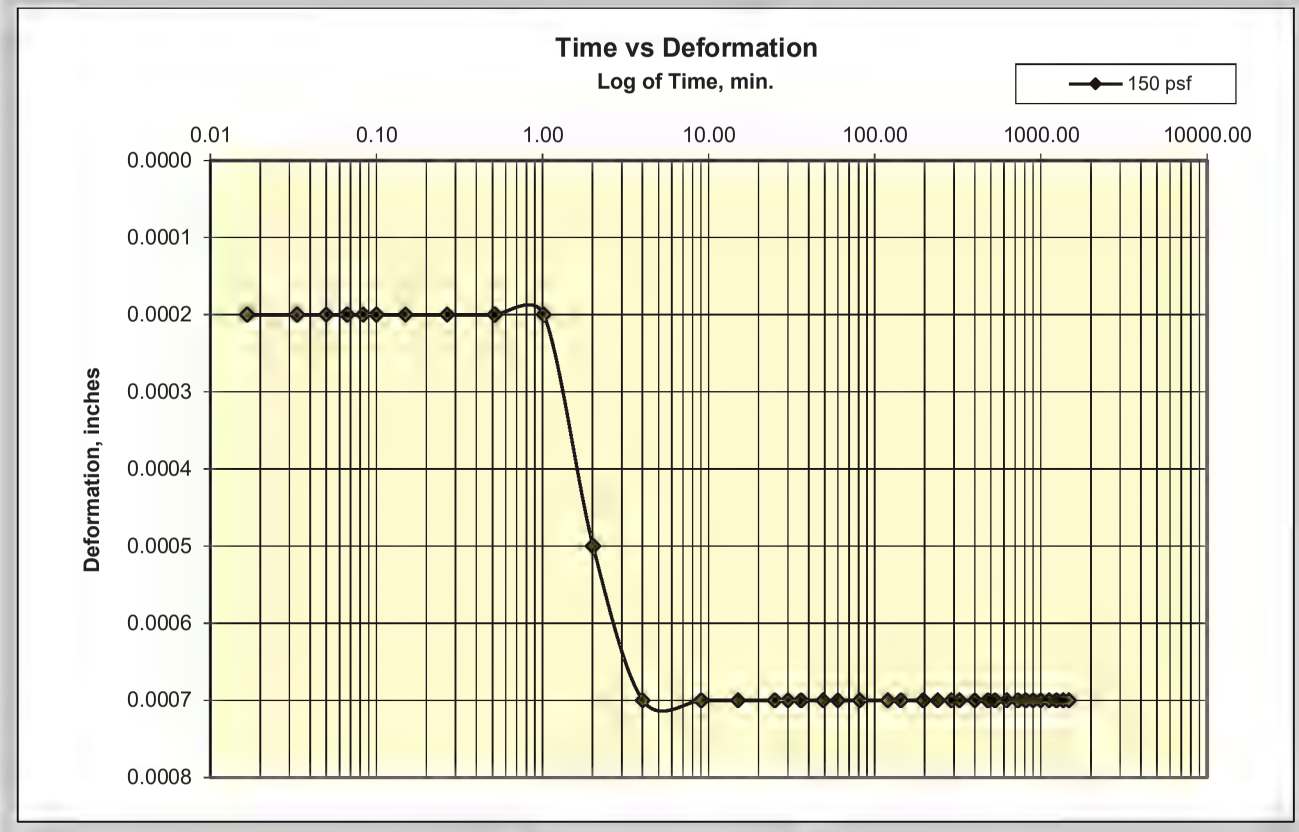

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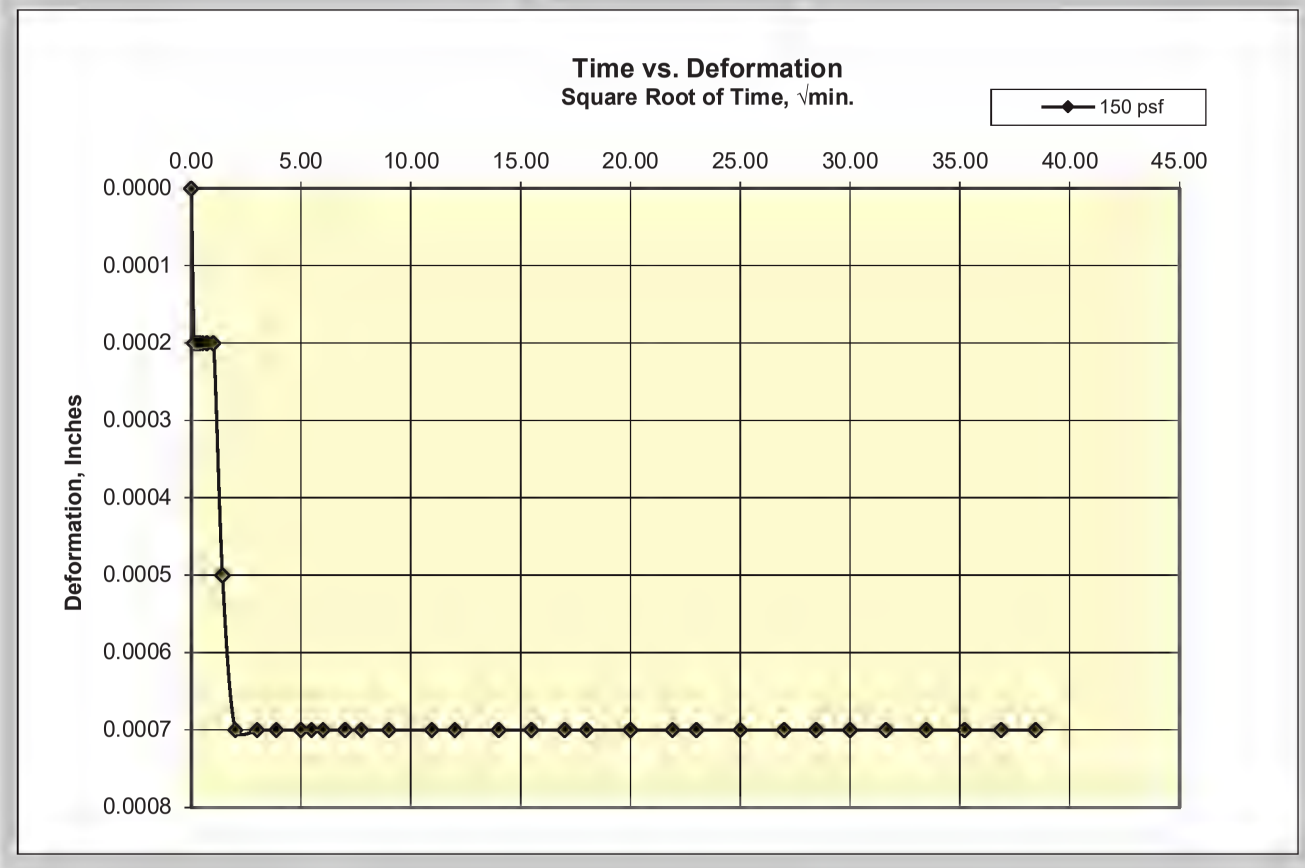

Cooper Testing Labs, Inc.

Load 3

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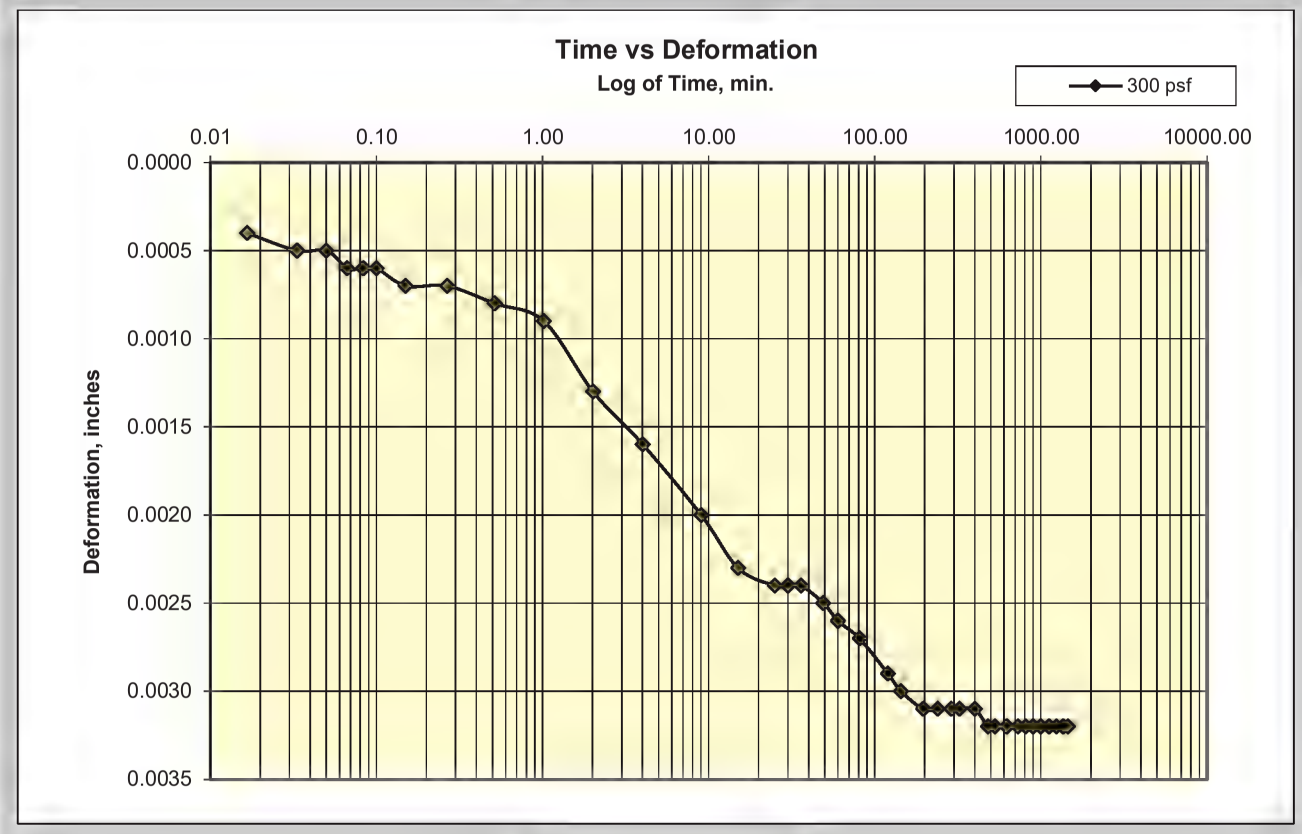

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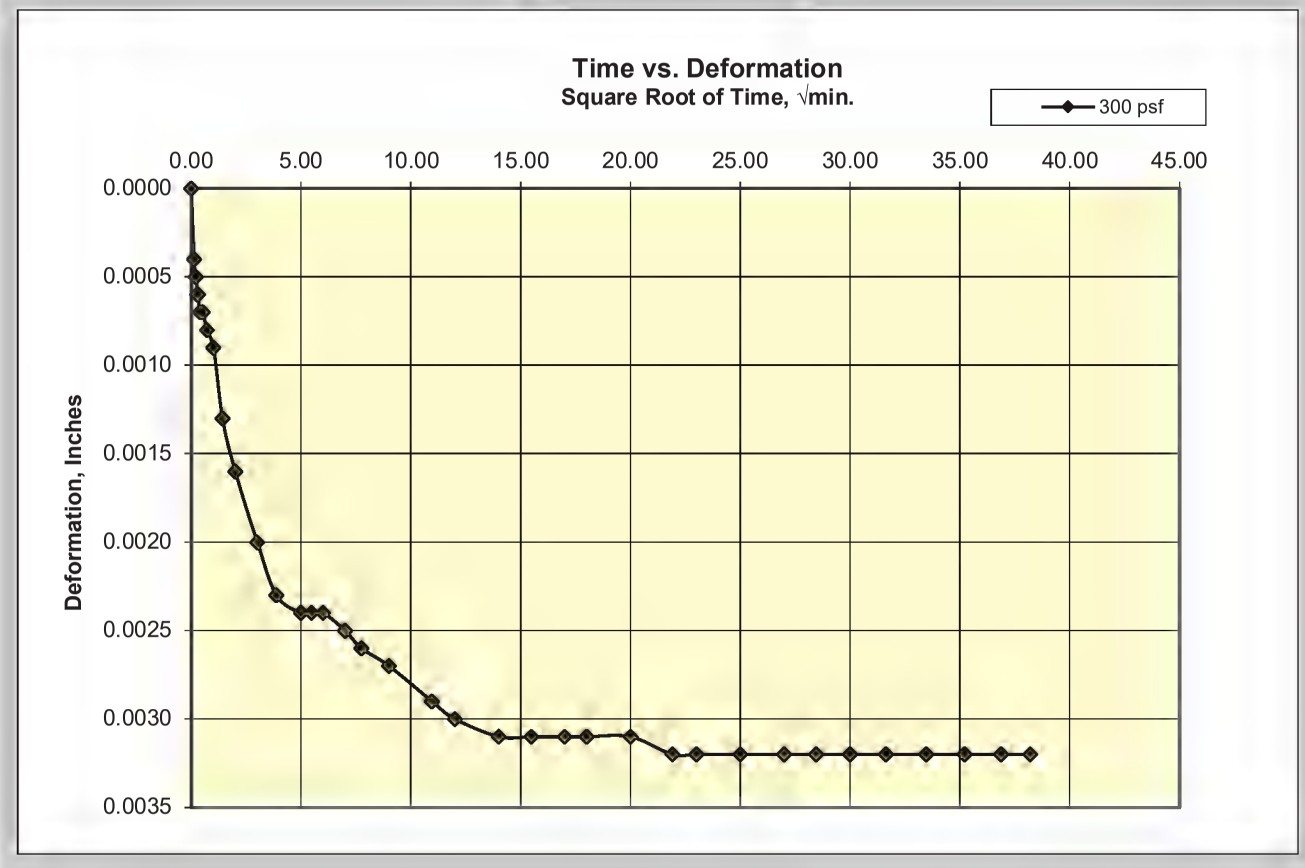

Cooper Testing Labs, Inc.

Load 4

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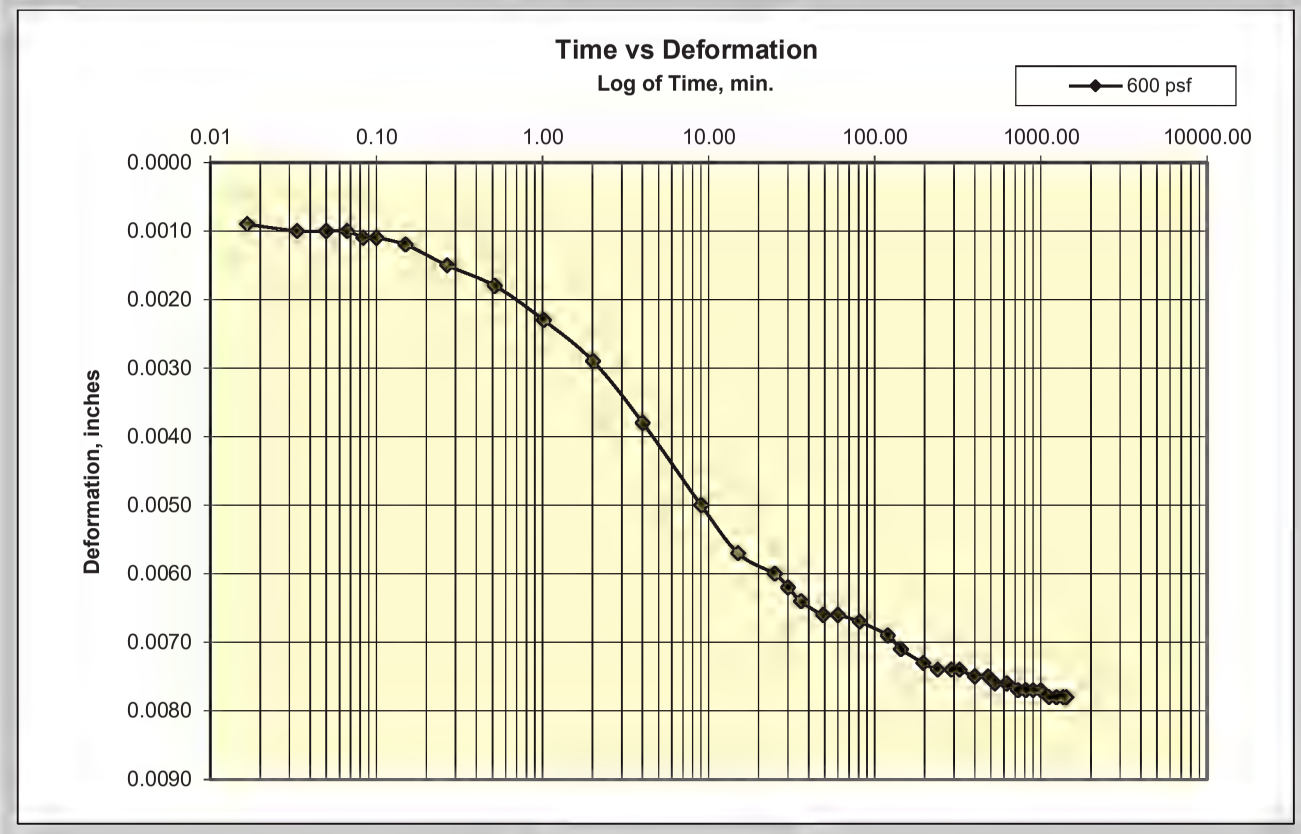

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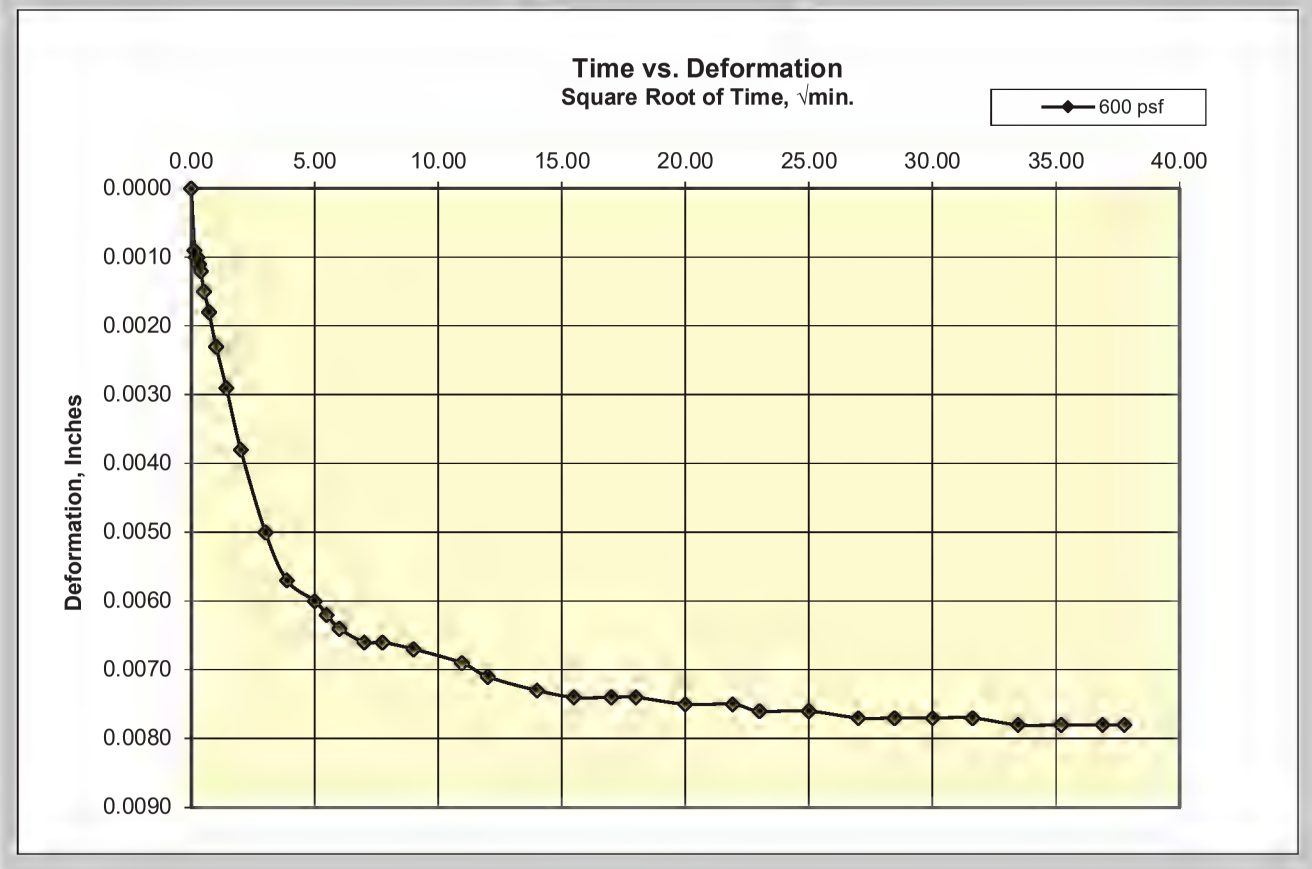

Cooper Testing Labs, Inc.

Load 5

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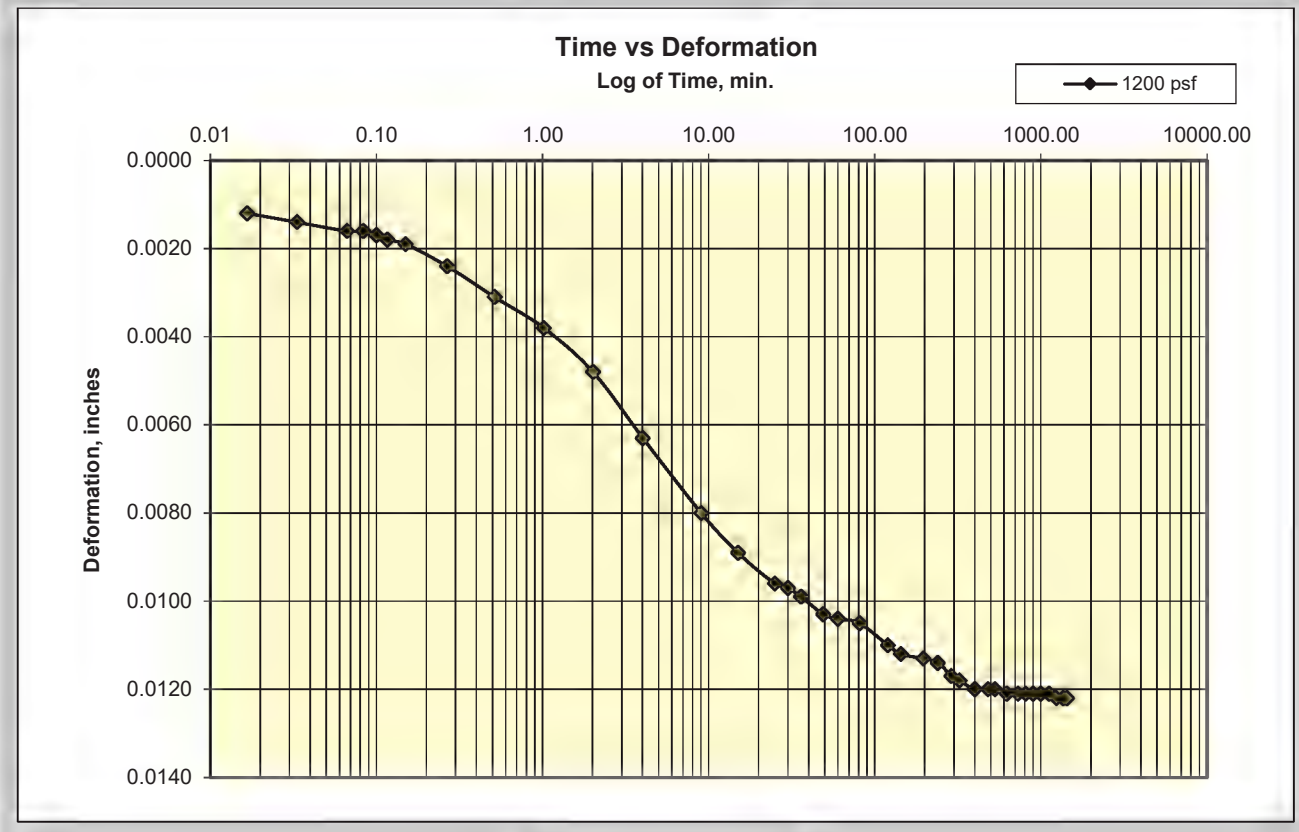

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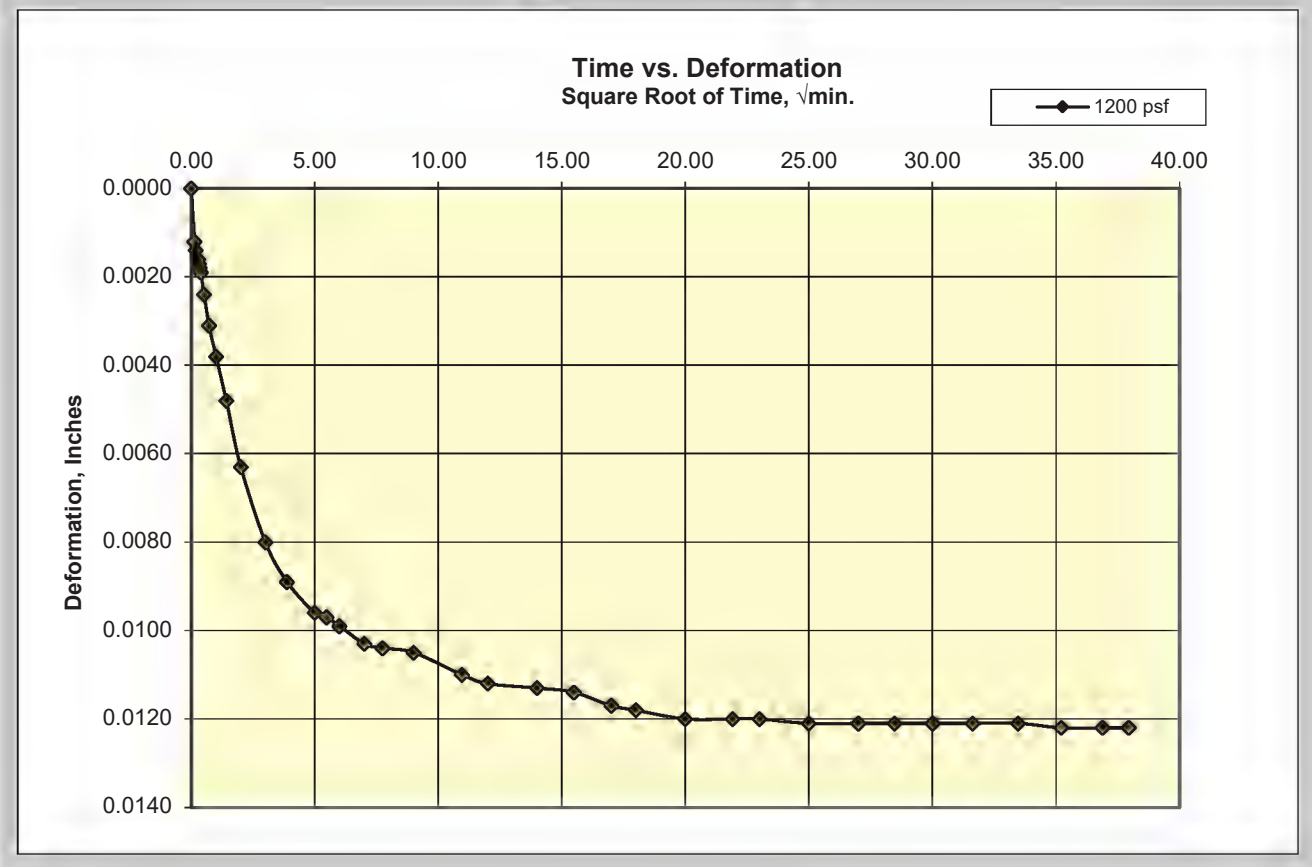
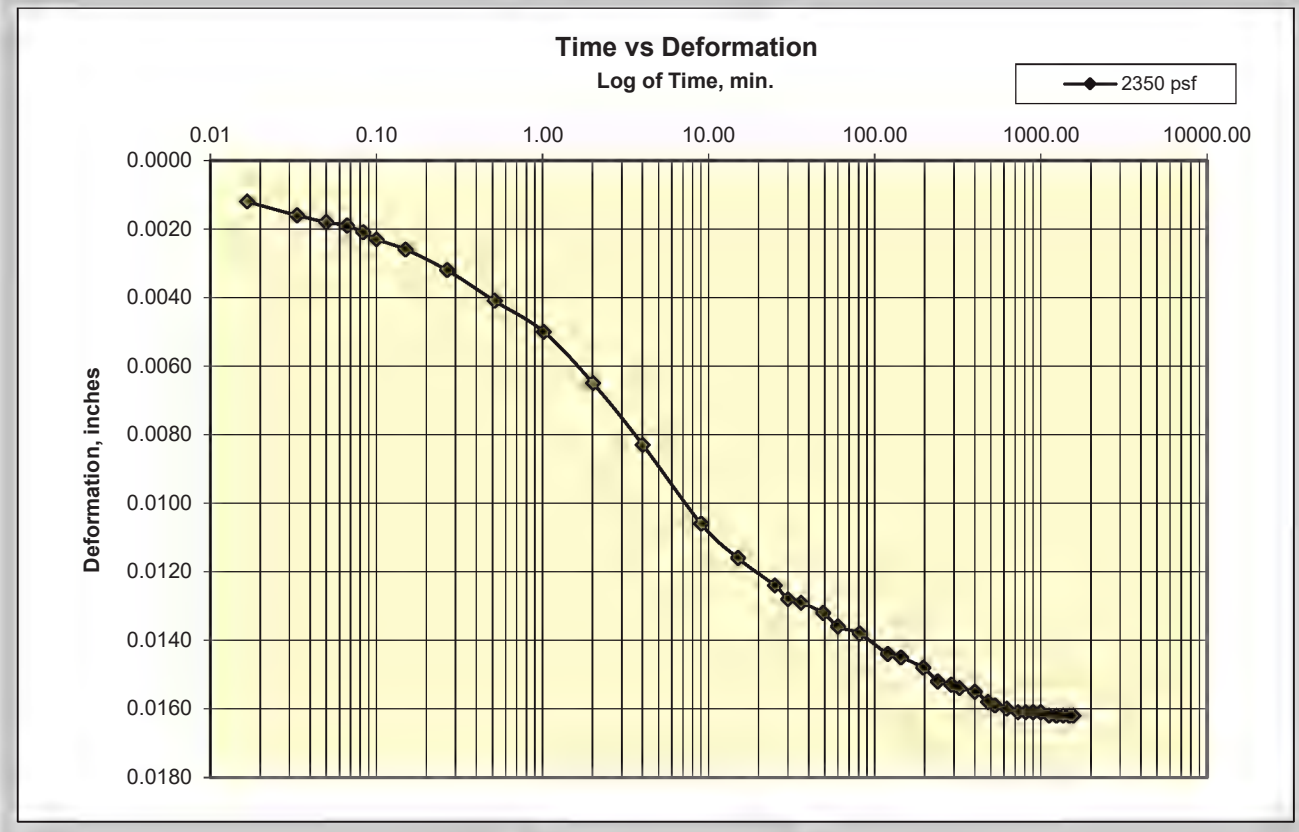


Cooper Testing Labs, Inc.

Load 6

2350 psf



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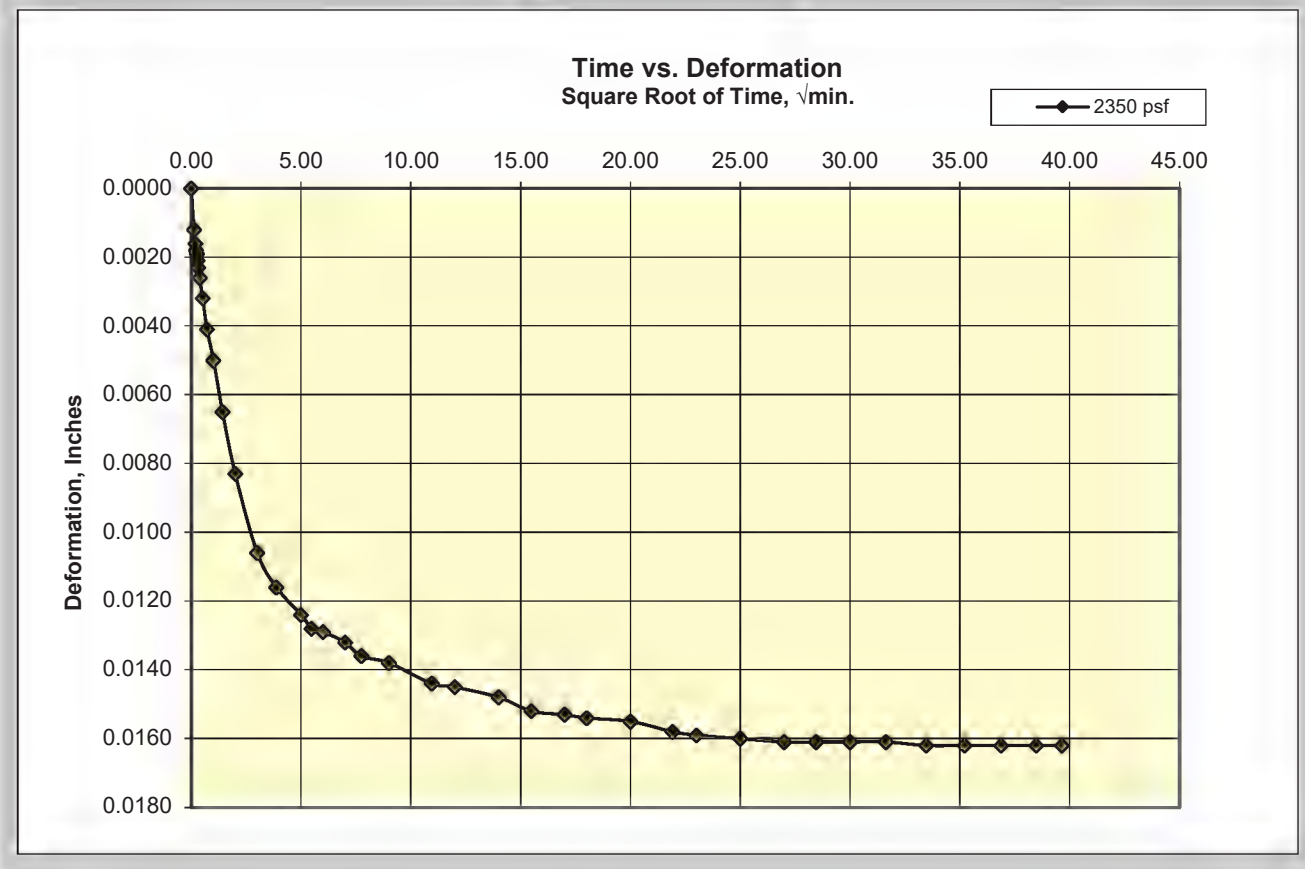

Cooper Testing Labs, Inc.

Load 7

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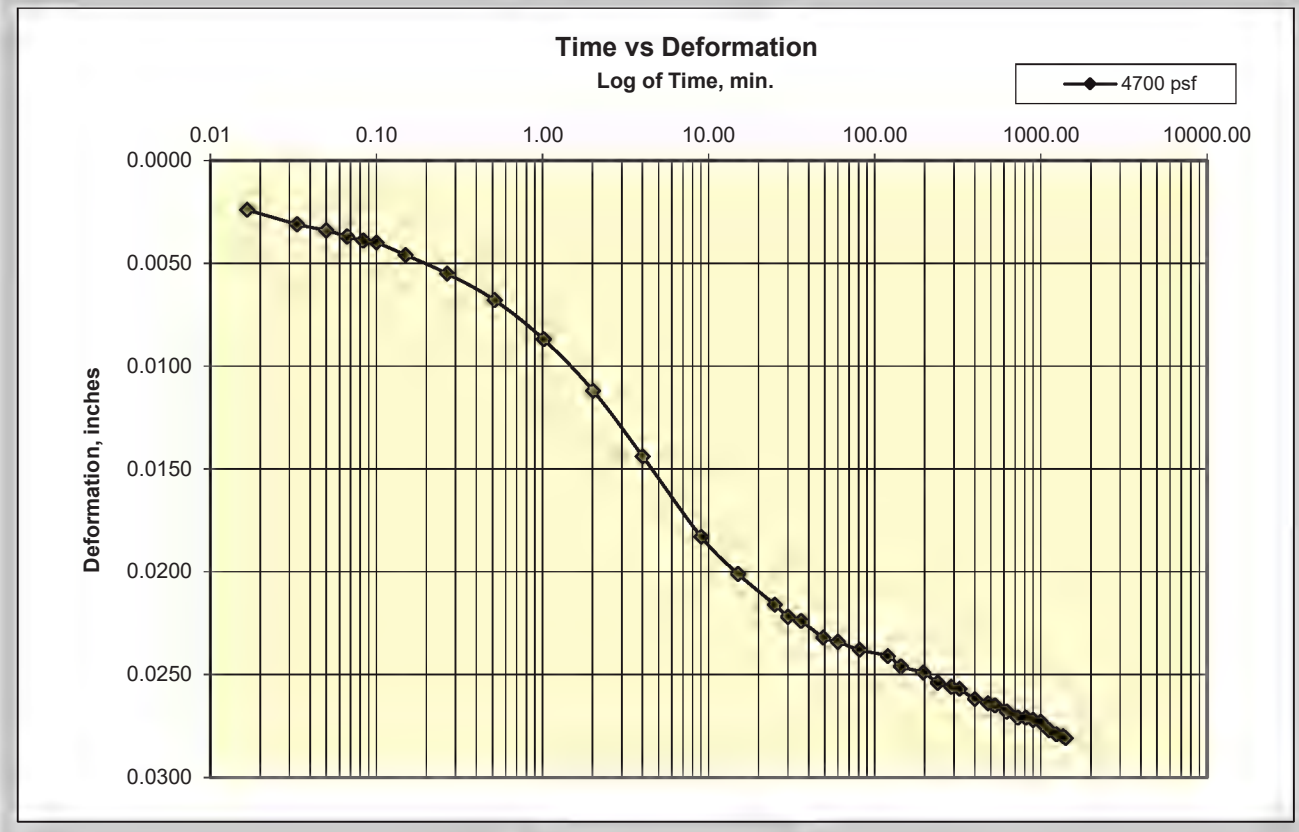

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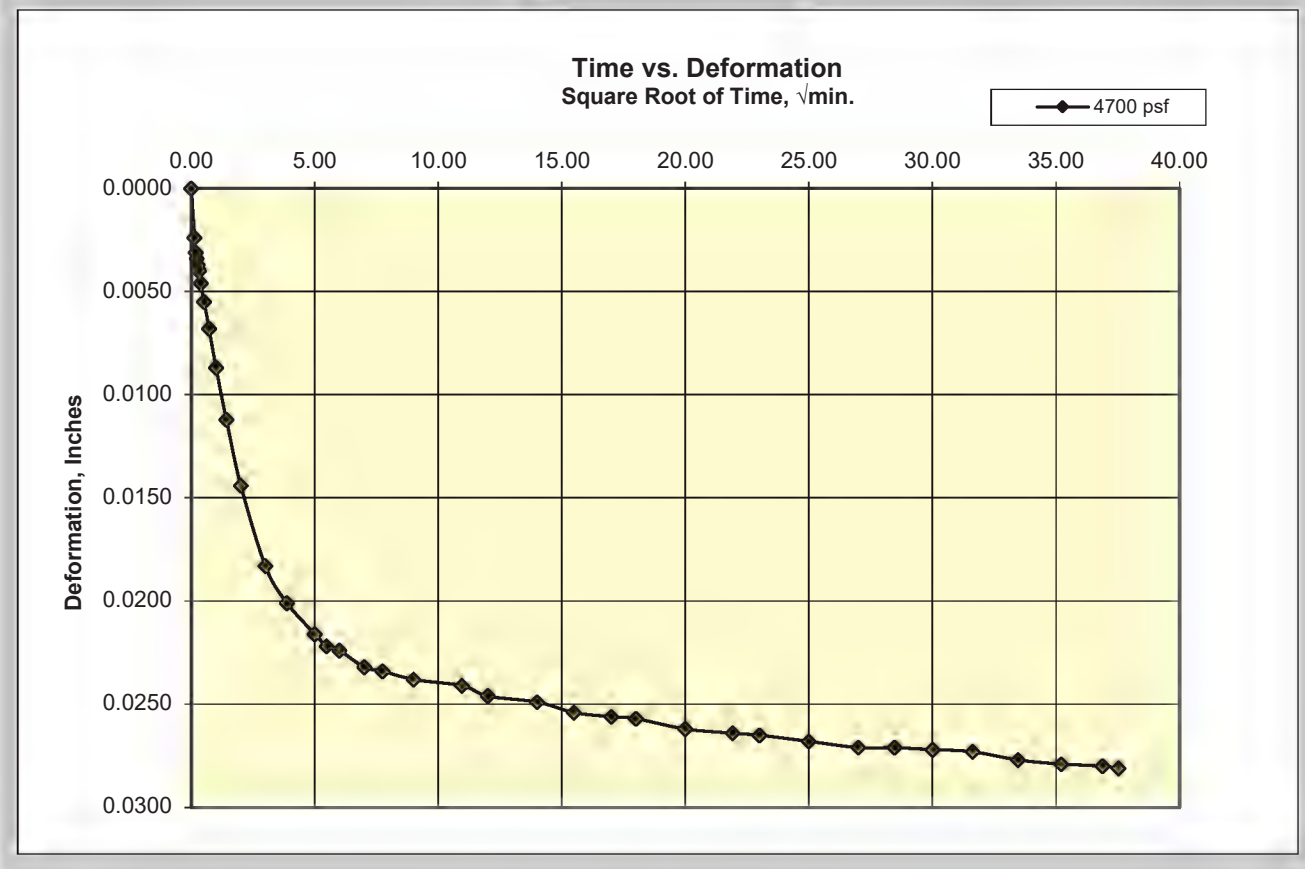

Cooper Testing Labs, Inc.

Load 8

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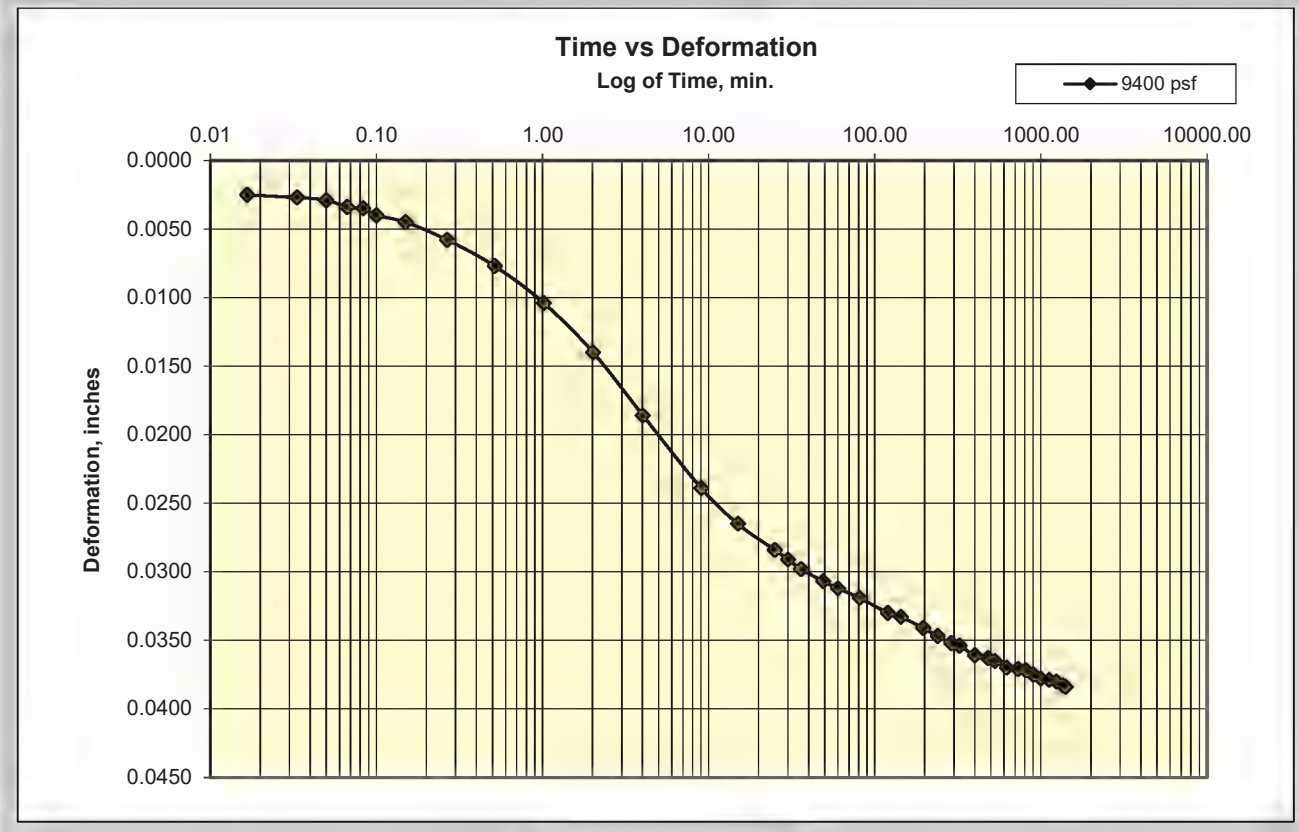
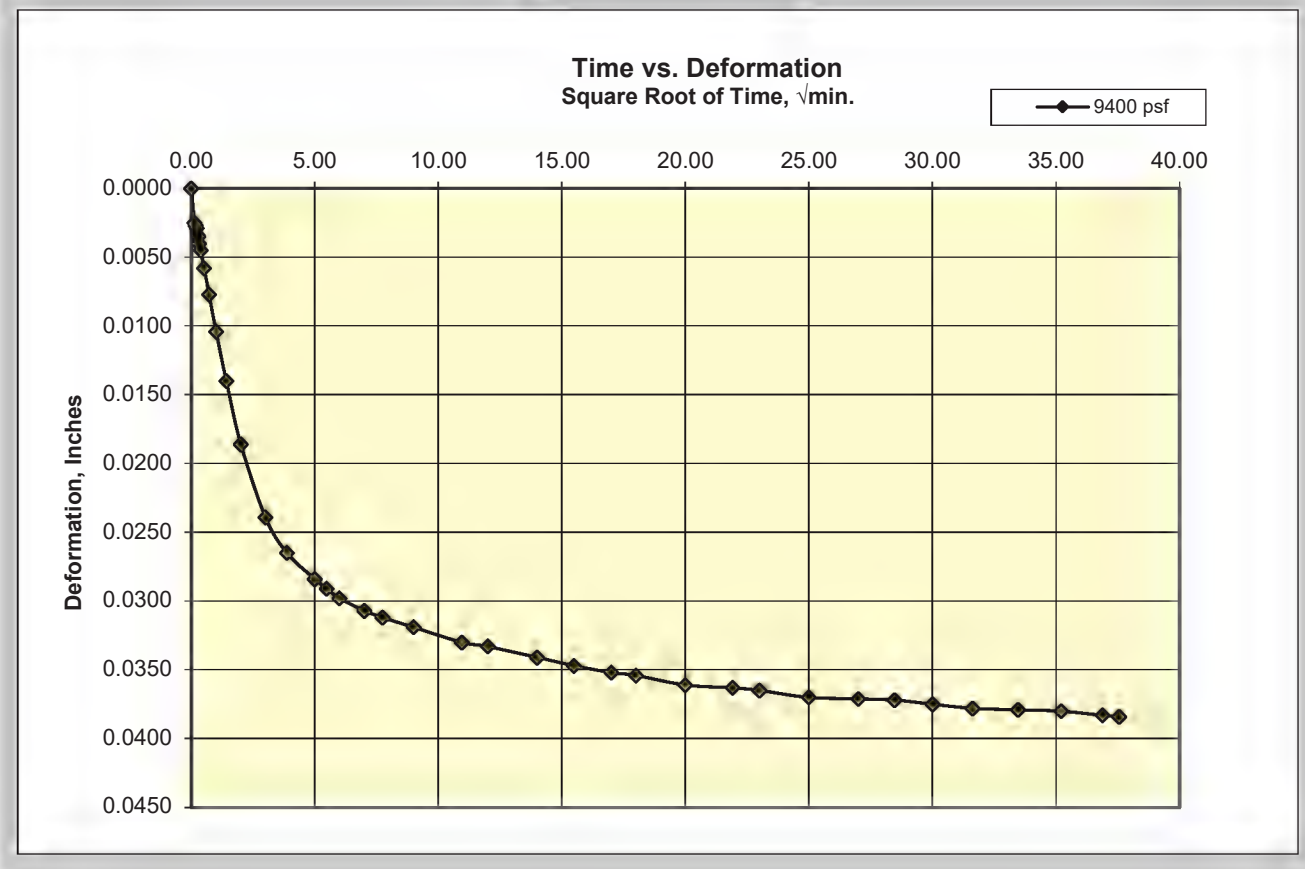


9400 psf



Cooper Testing Labs, Inc.

Load 9

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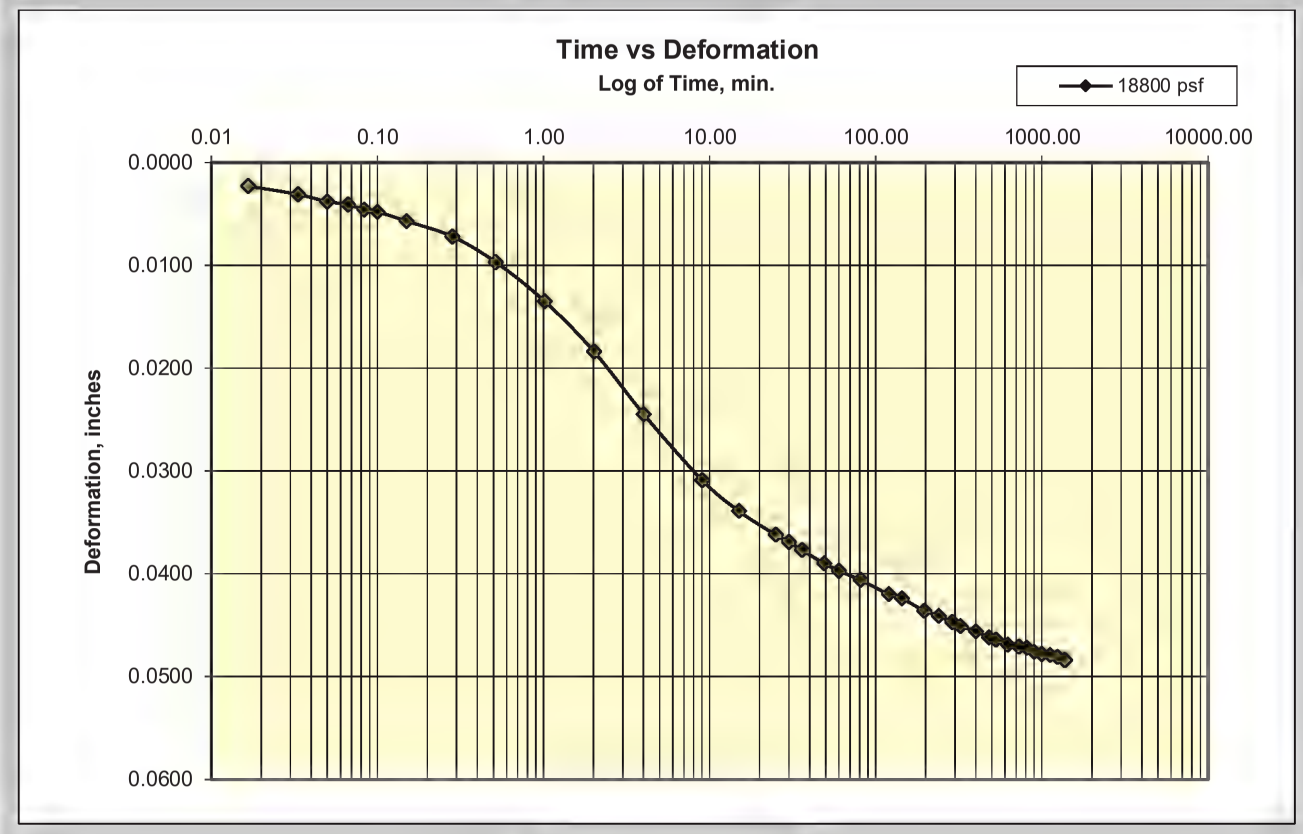
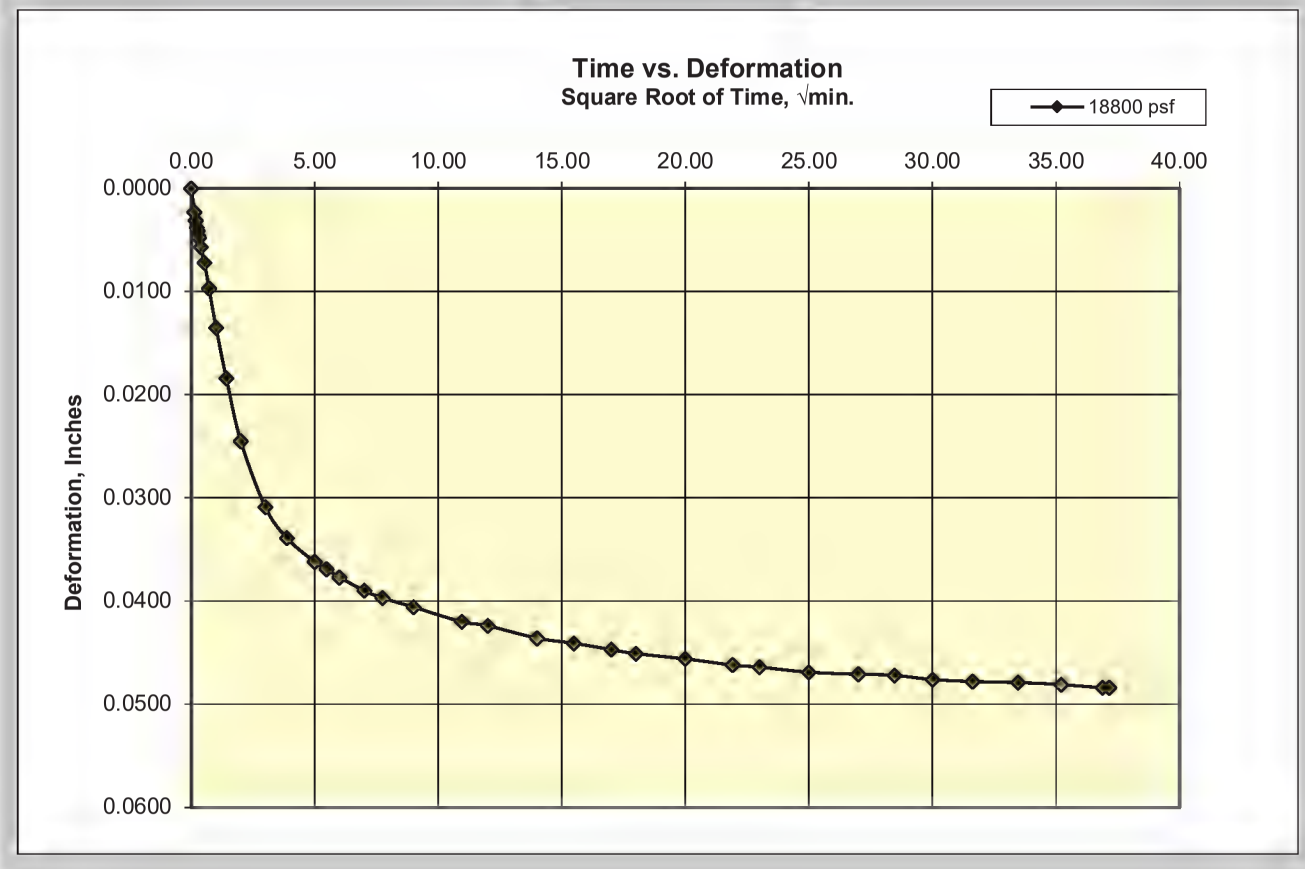


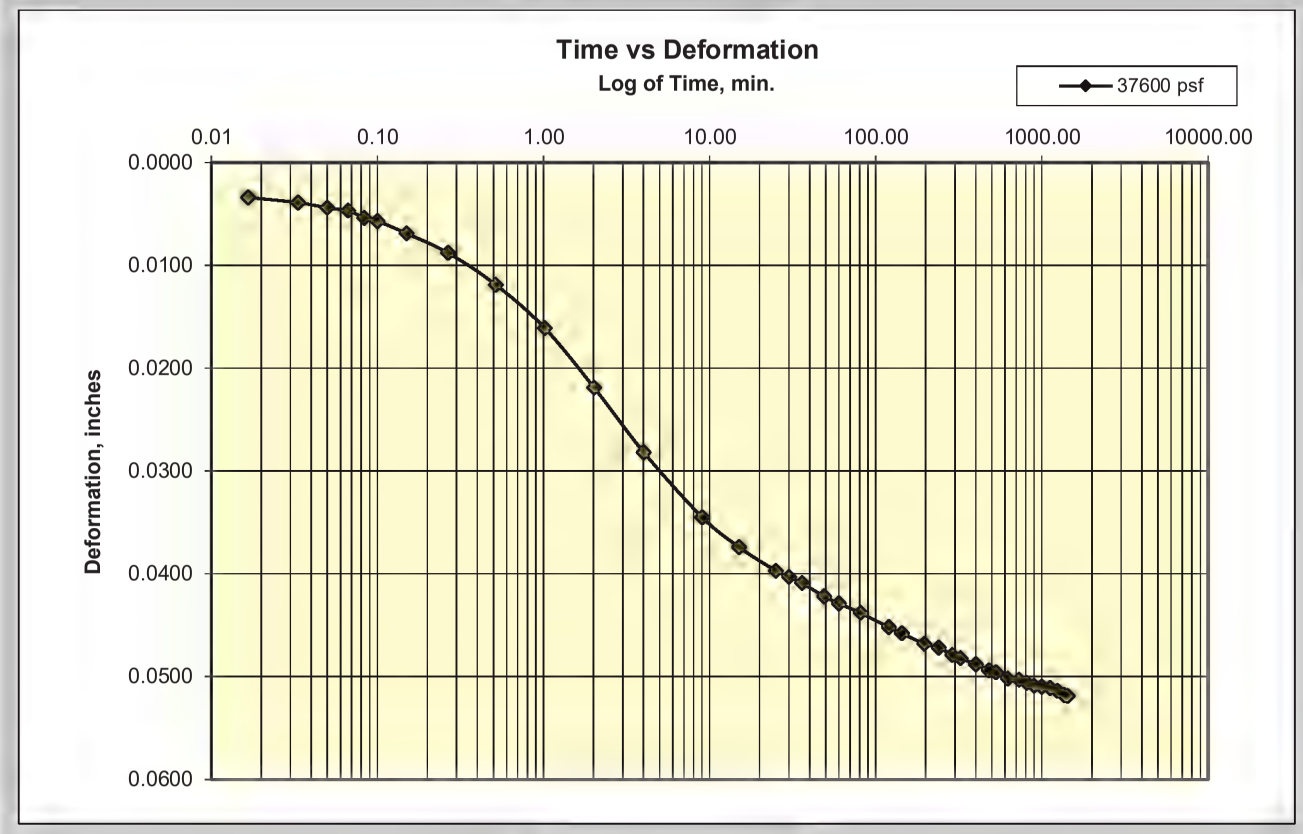
18800 psf



Cooper Testing Labs, Inc.

Load 10

37600 psf



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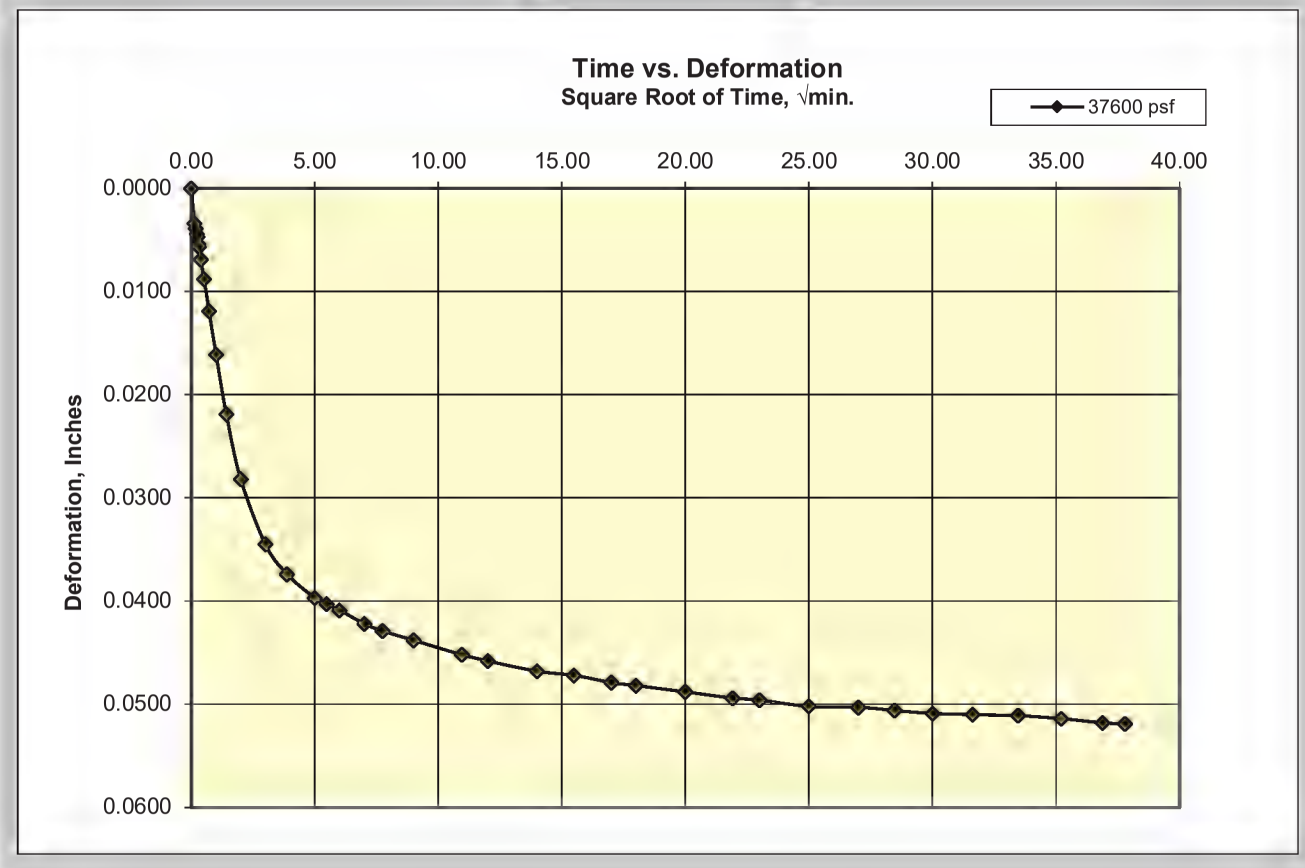
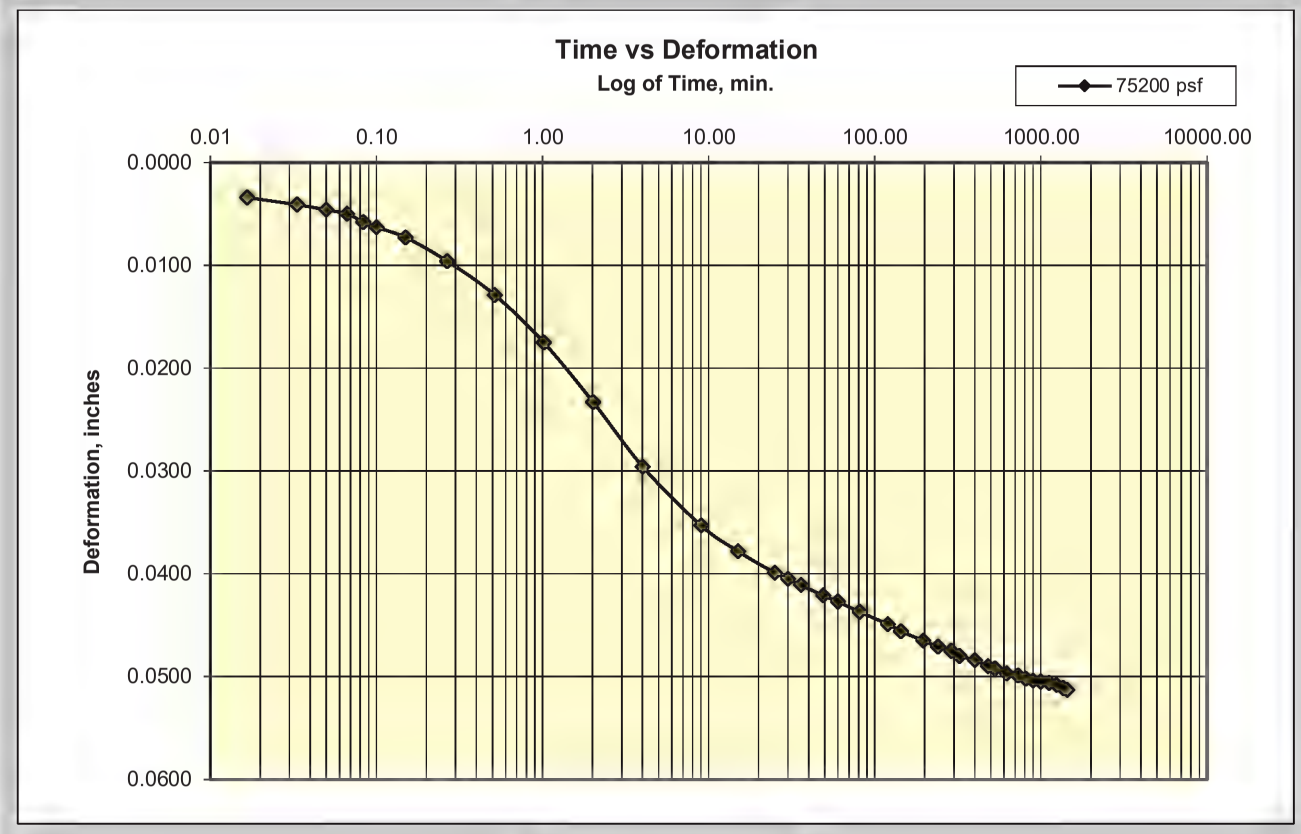


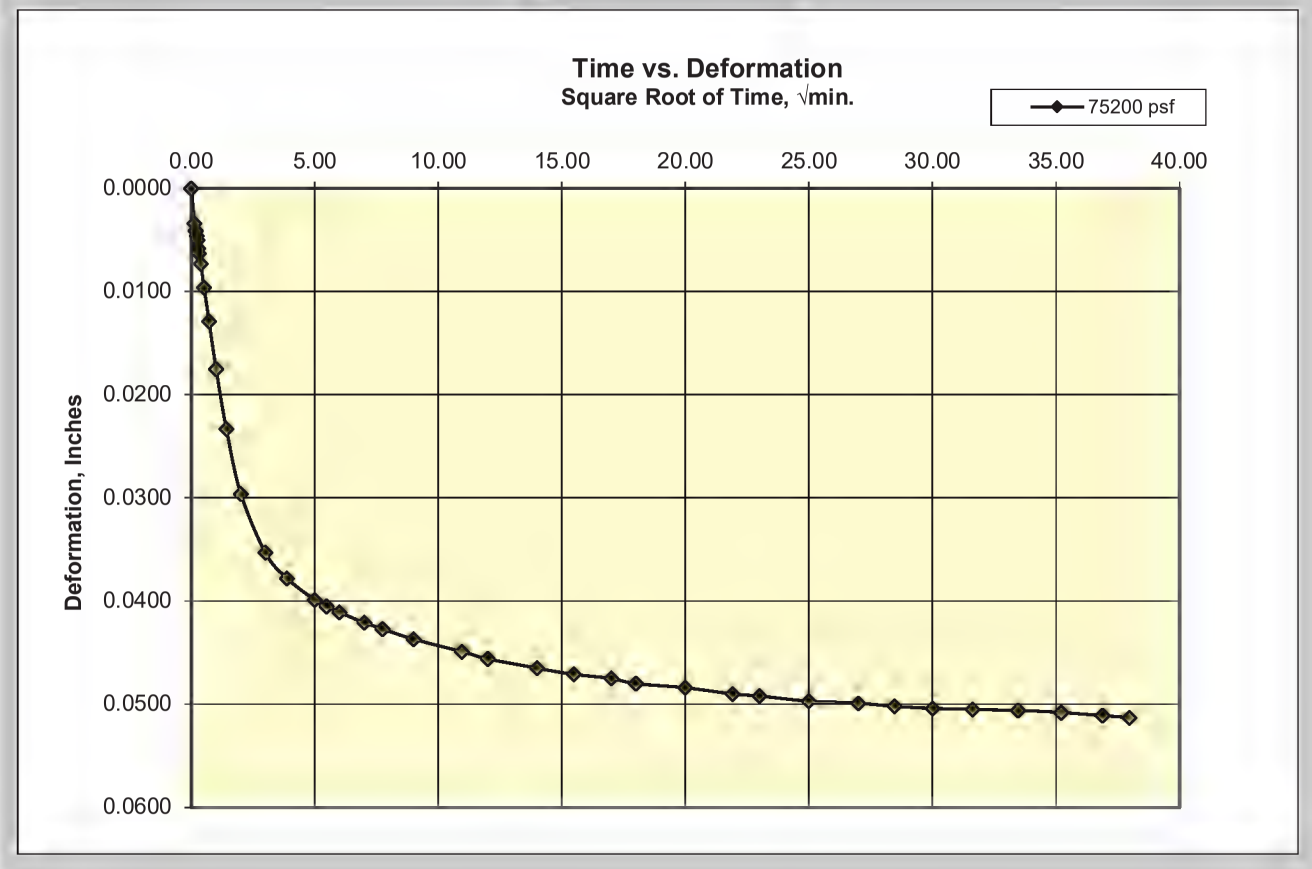
Cooper Testing Labs, Inc.

Load 11

75200 psf



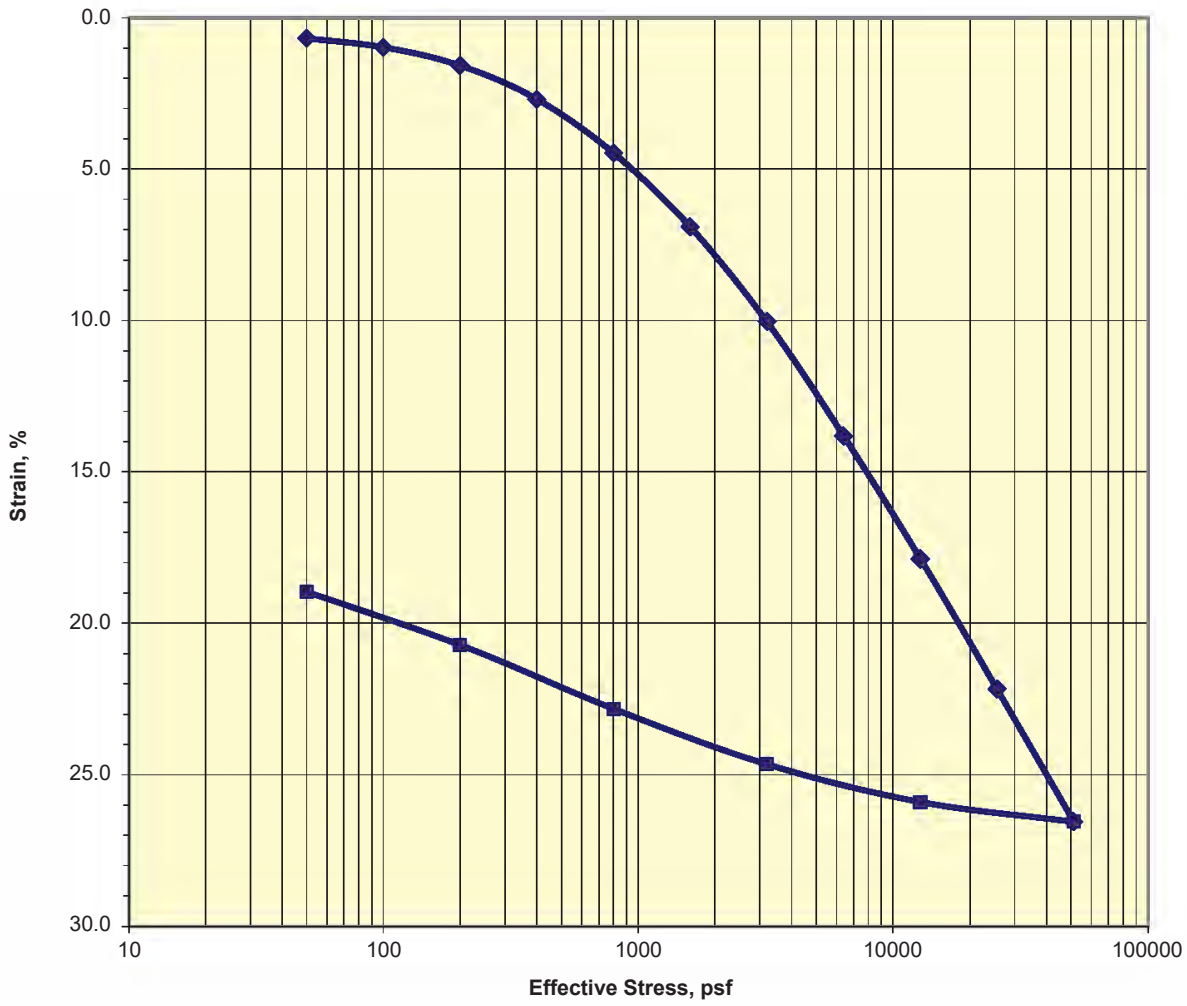
75200 psf



Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B104	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	6	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	21-21.5	**Checked:**	PJ
Soil Type:	Greenish Gray SILT (Bay Mud)			**Date:**	11/14/2023

Strain-Log-P Curve



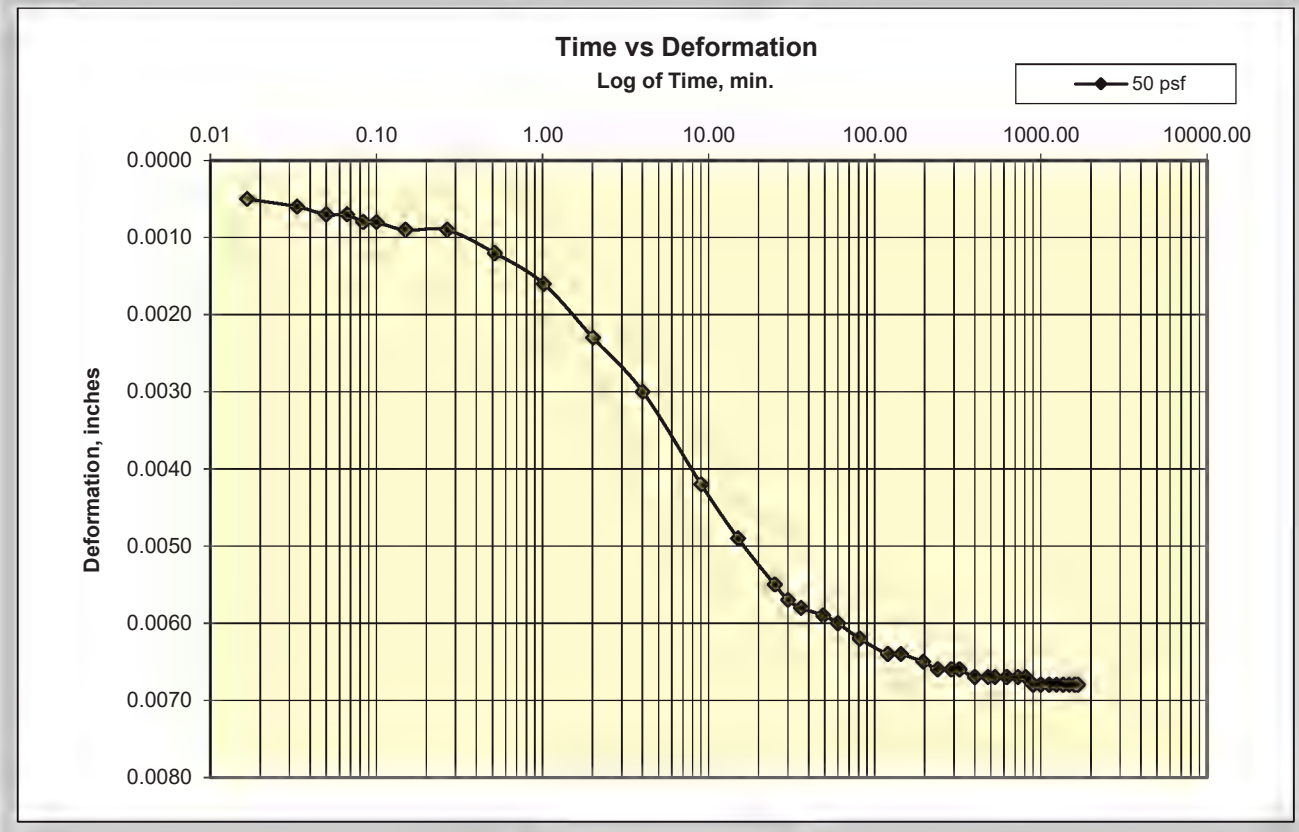
Assumed Gs 2.7	Initial	Final
Moisture %:	43.0	27.9
Dry Density, pcf:	77.6	96.1
Void Ratio:	1.173	0.753
% Saturation:	99.0	100.0

Remarks:

Cooper Testing Labs, Inc.

Load 1

50 psf



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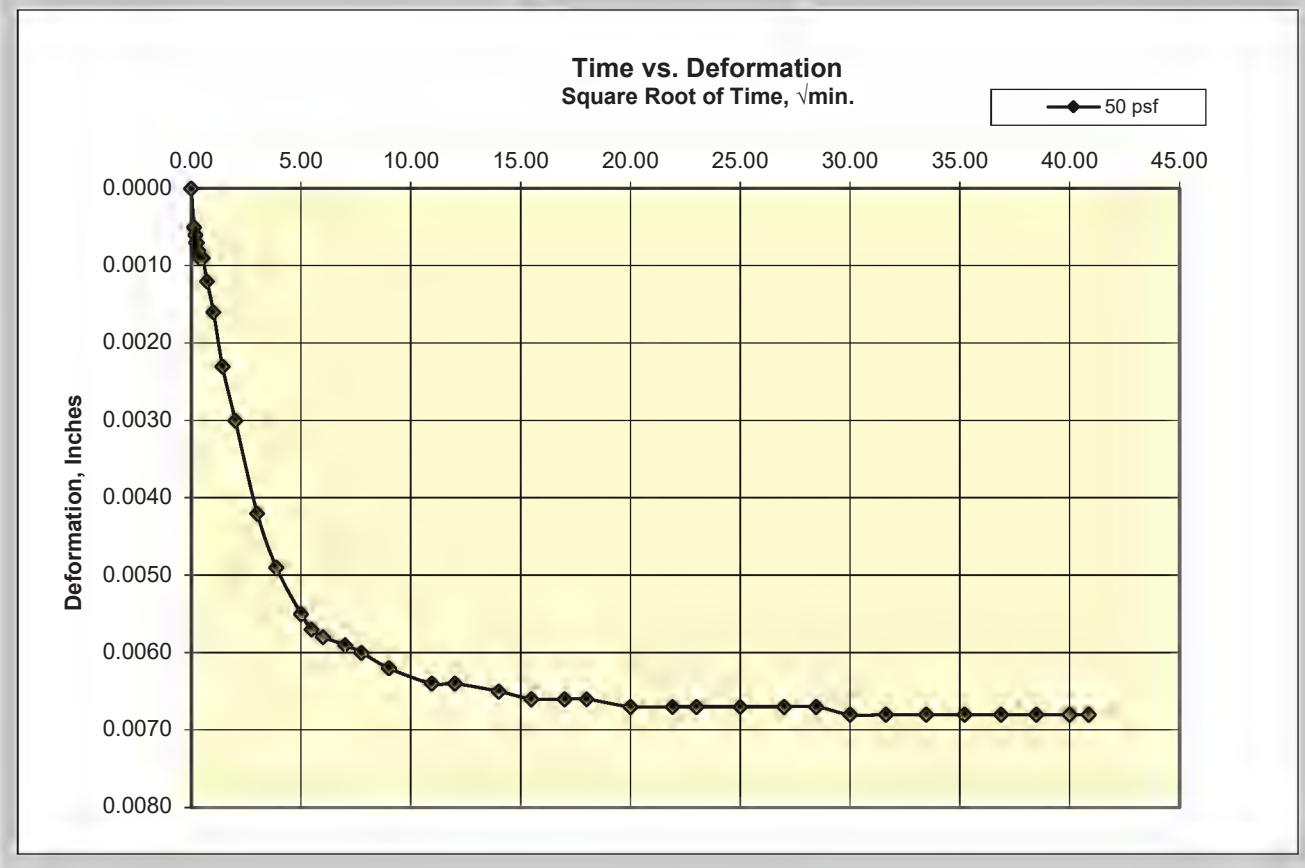

Cooper Testing Labs, Inc.

Load 2

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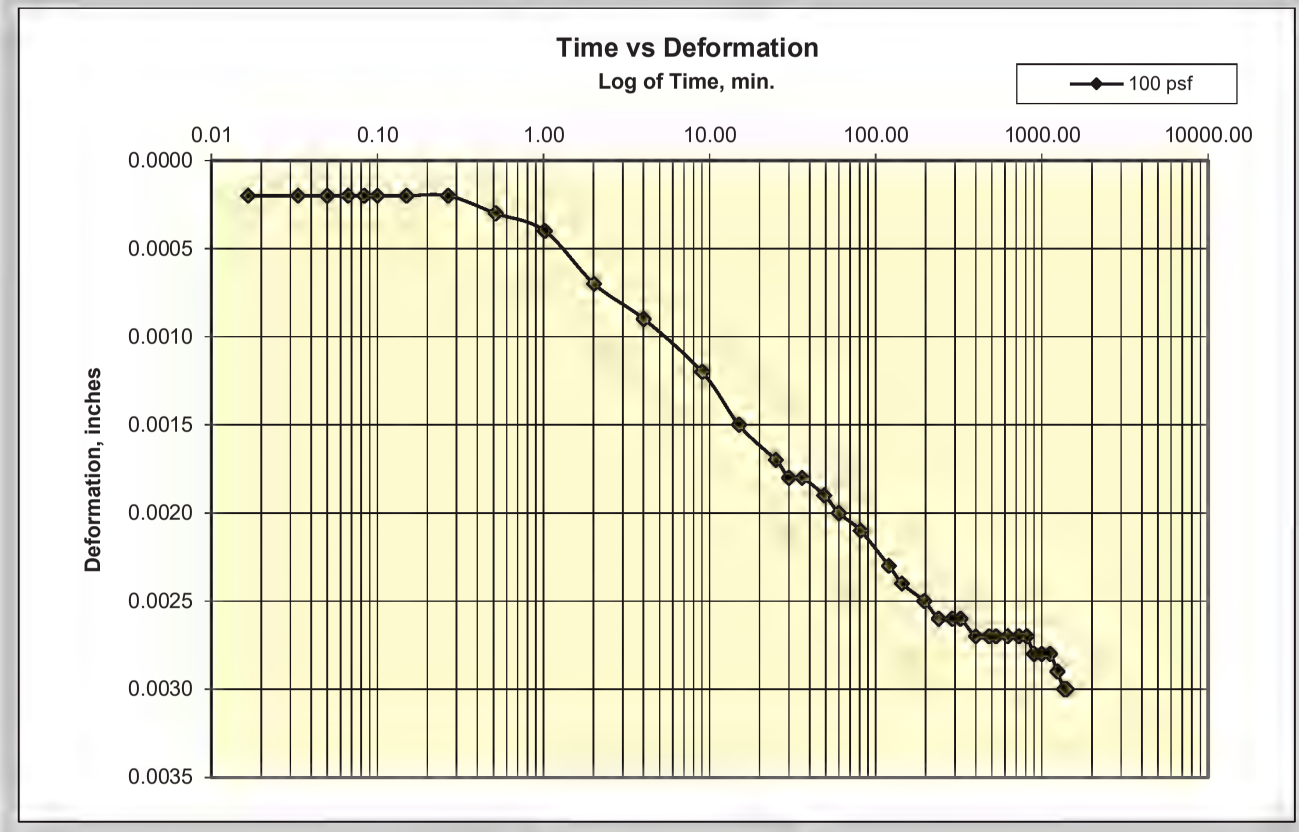

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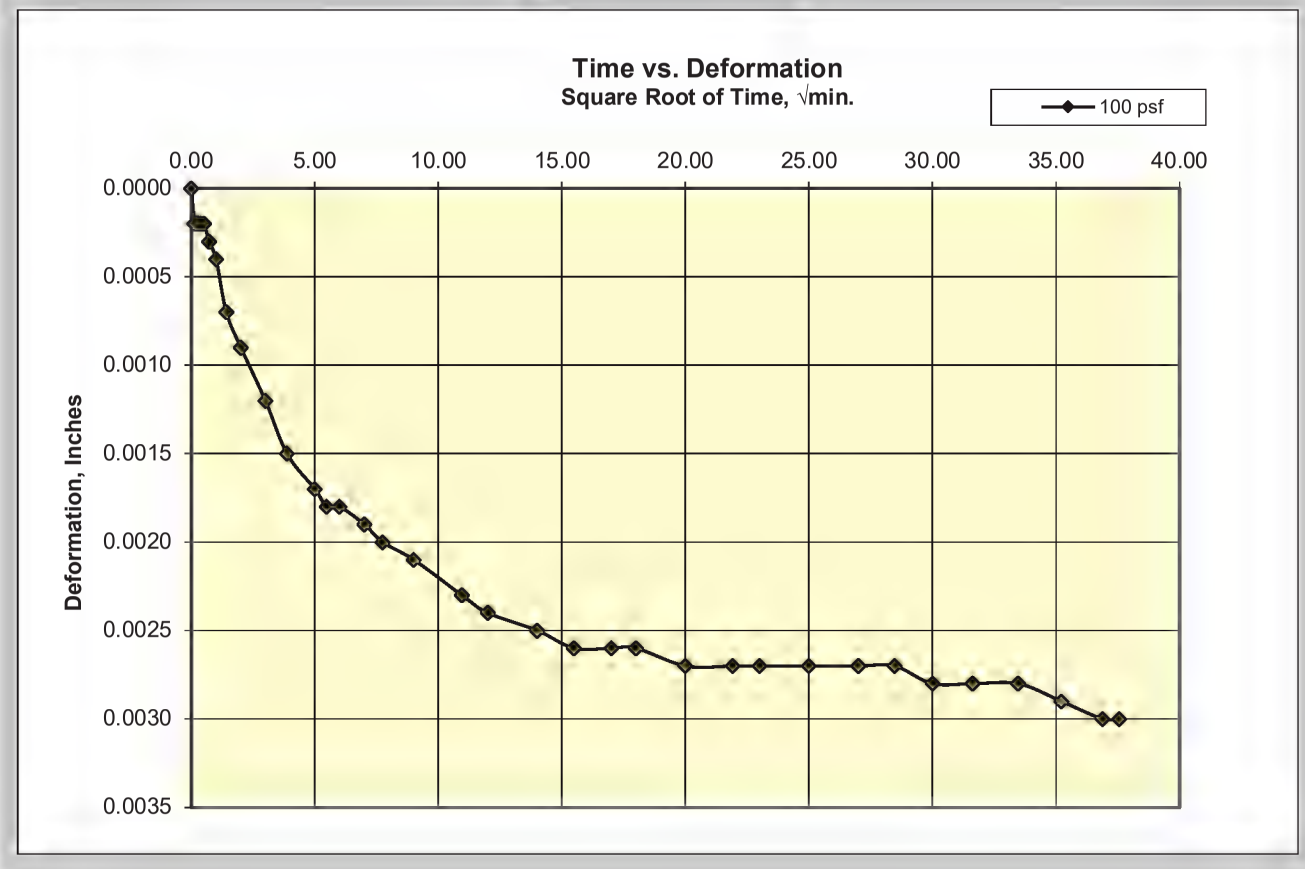

Cooper Testing Labs, Inc.

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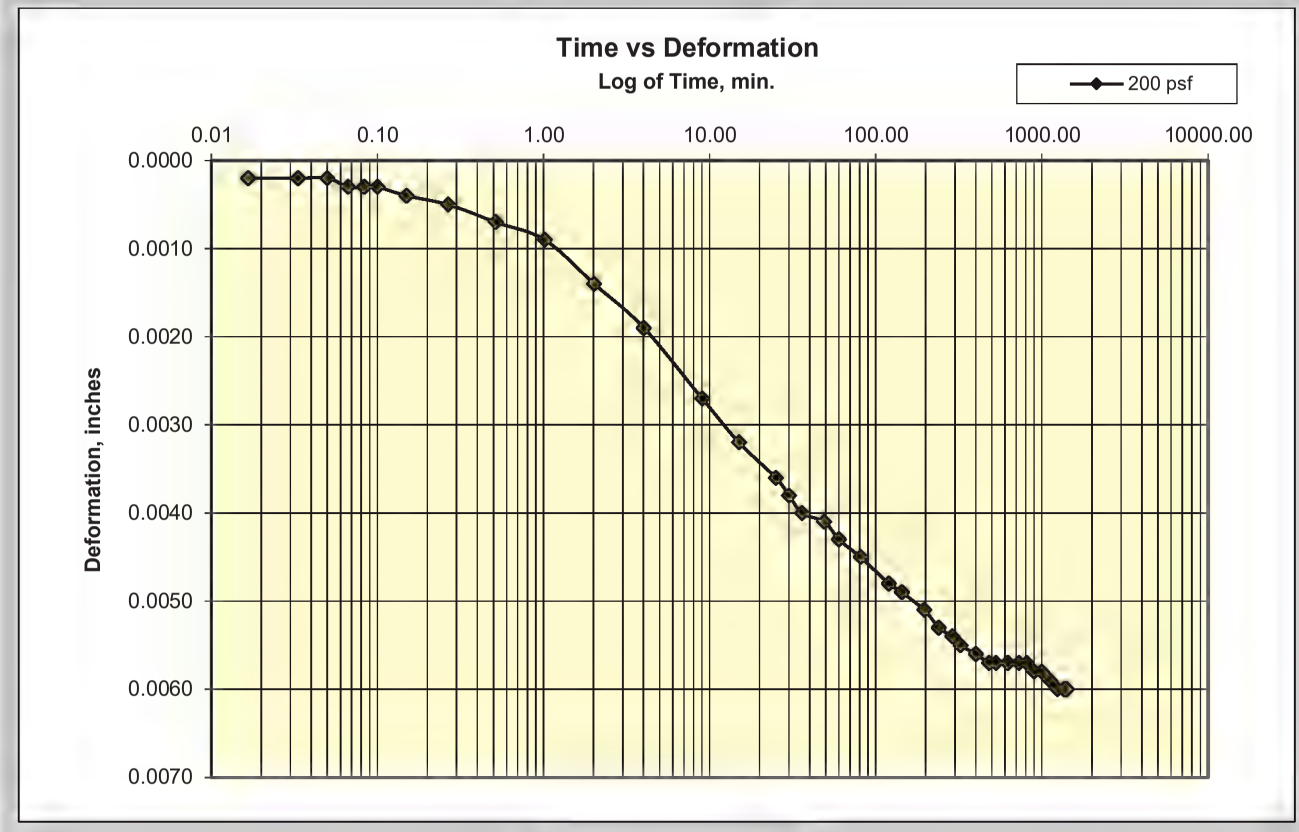

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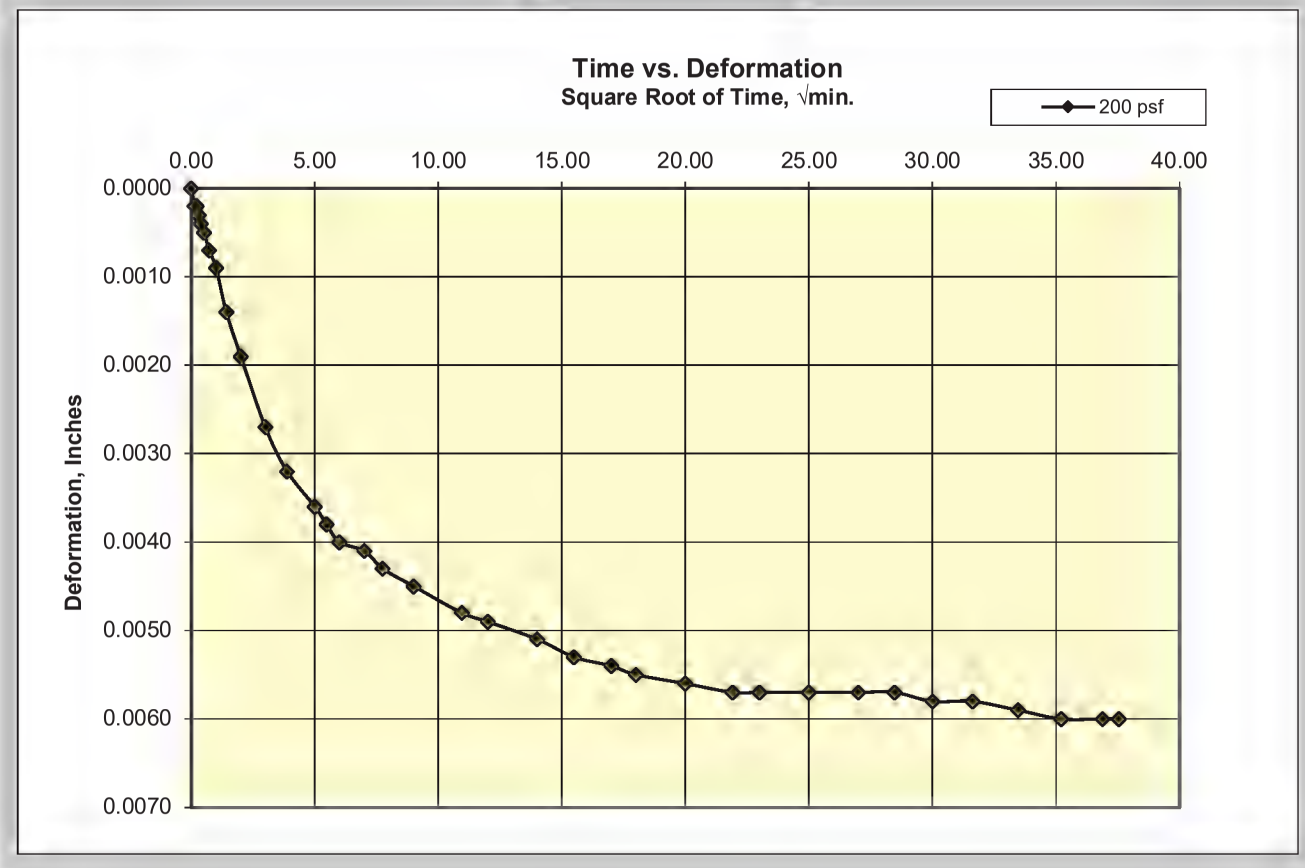

Cooper Testing Labs, Inc.

Load 4

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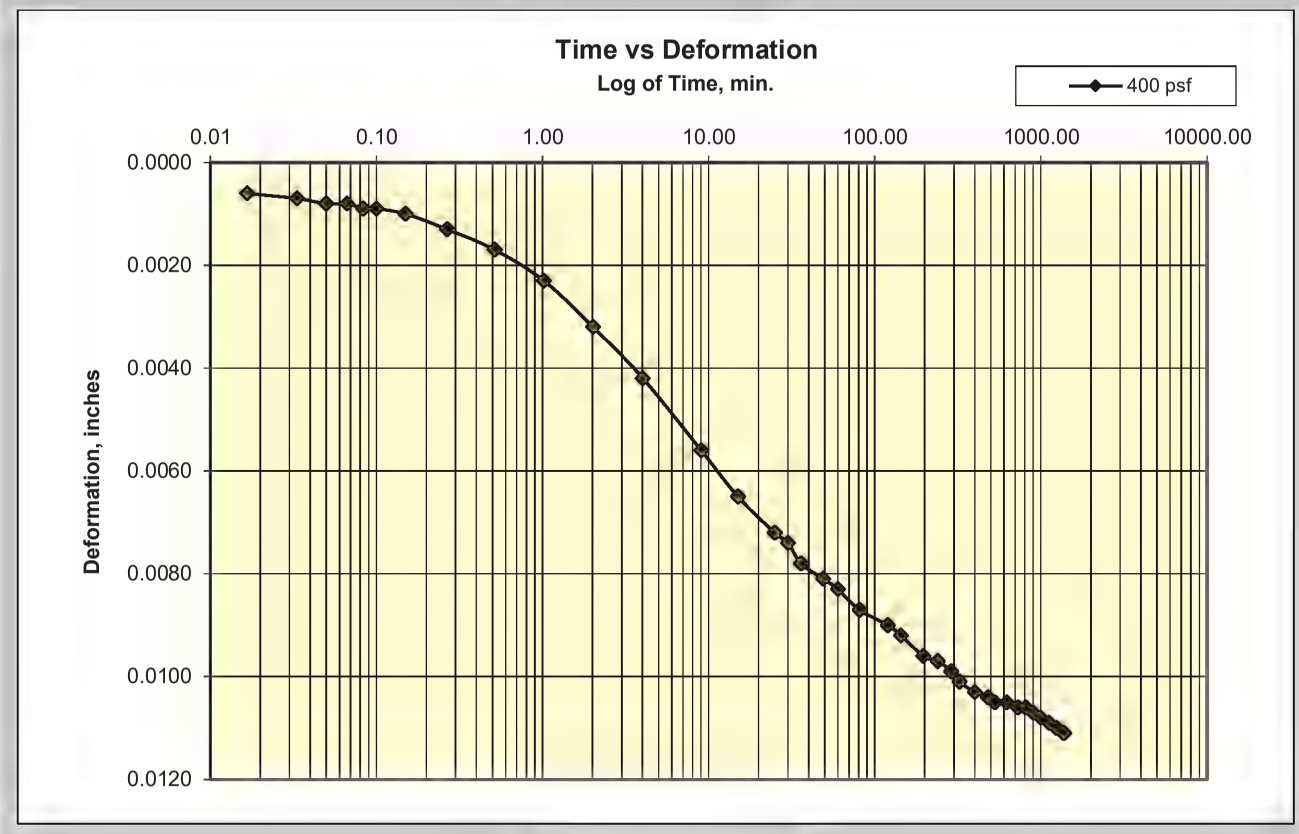

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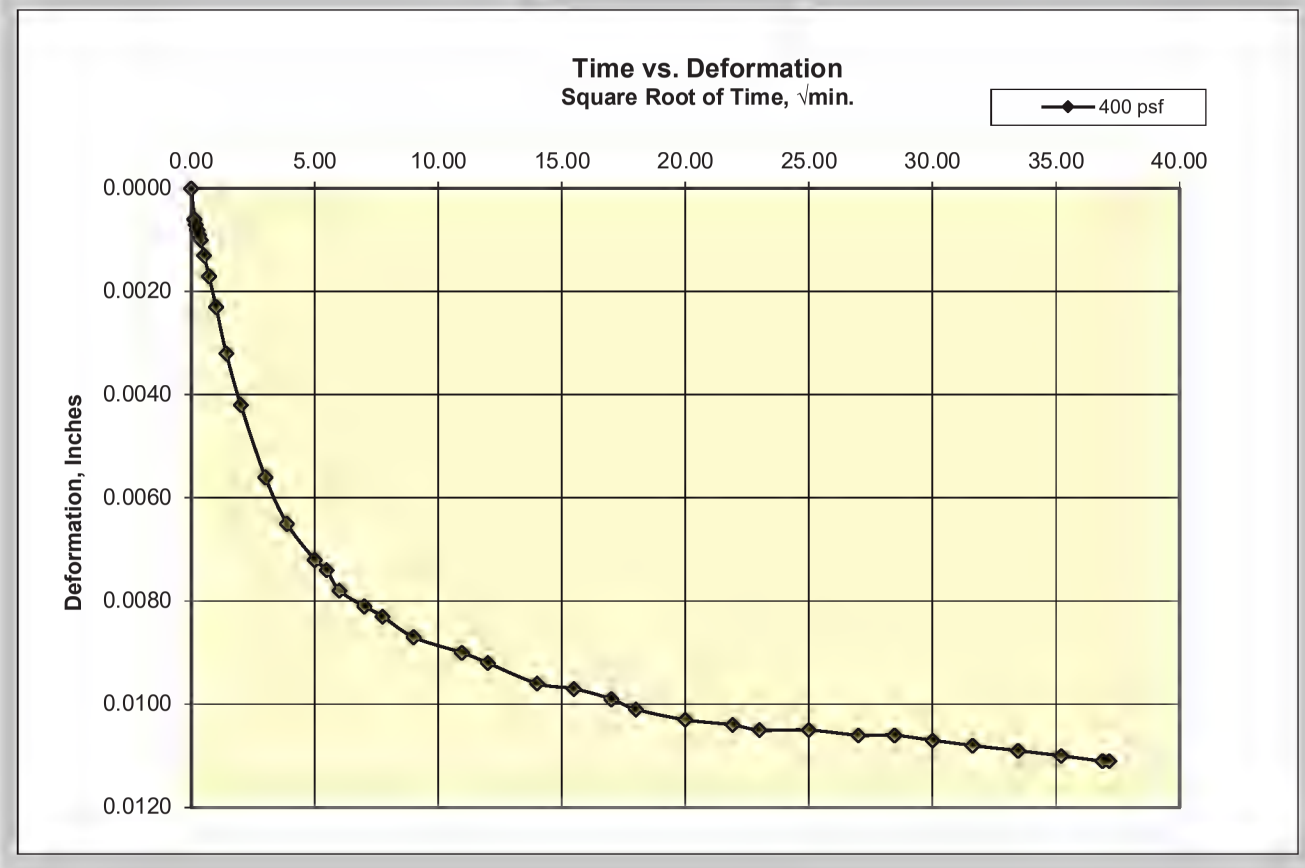
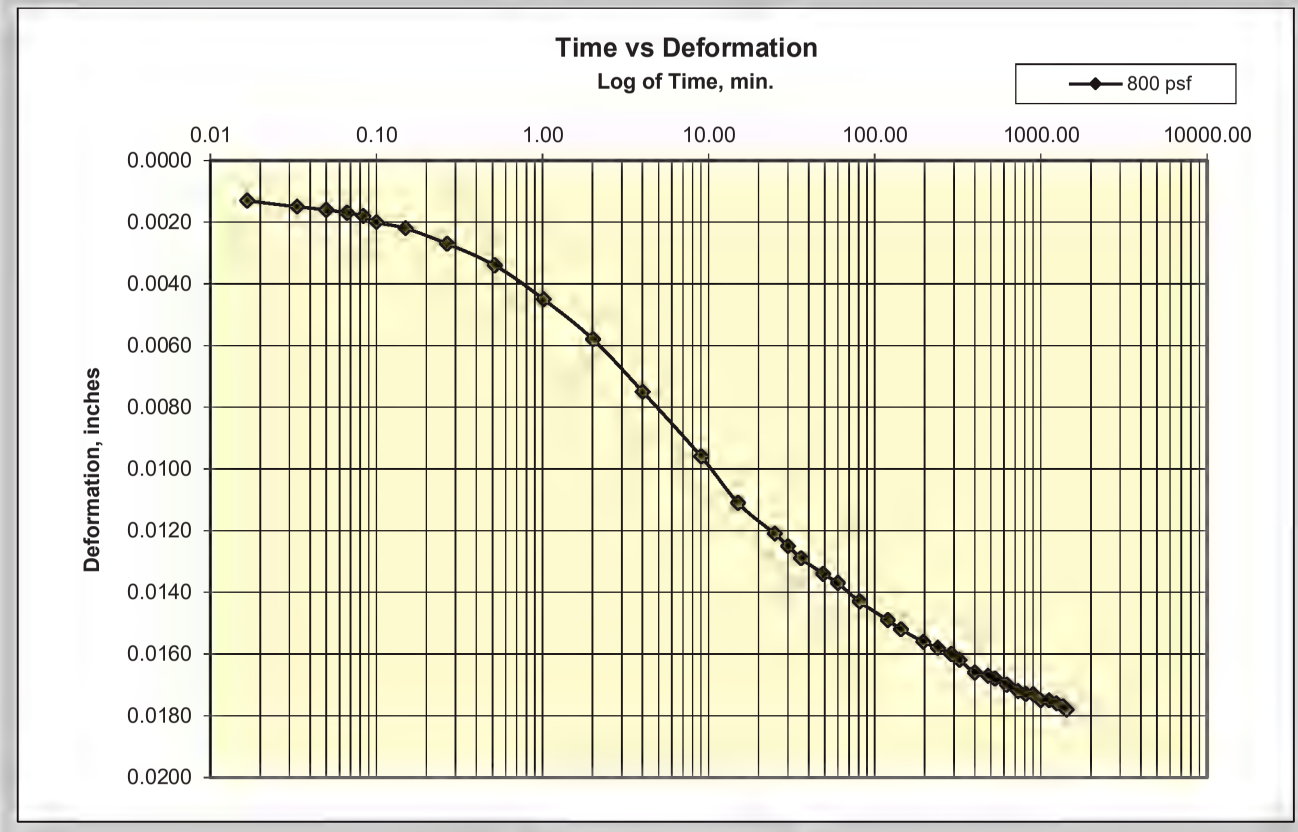


Cooper Testing Labs, Inc.

Load 5

800 psf



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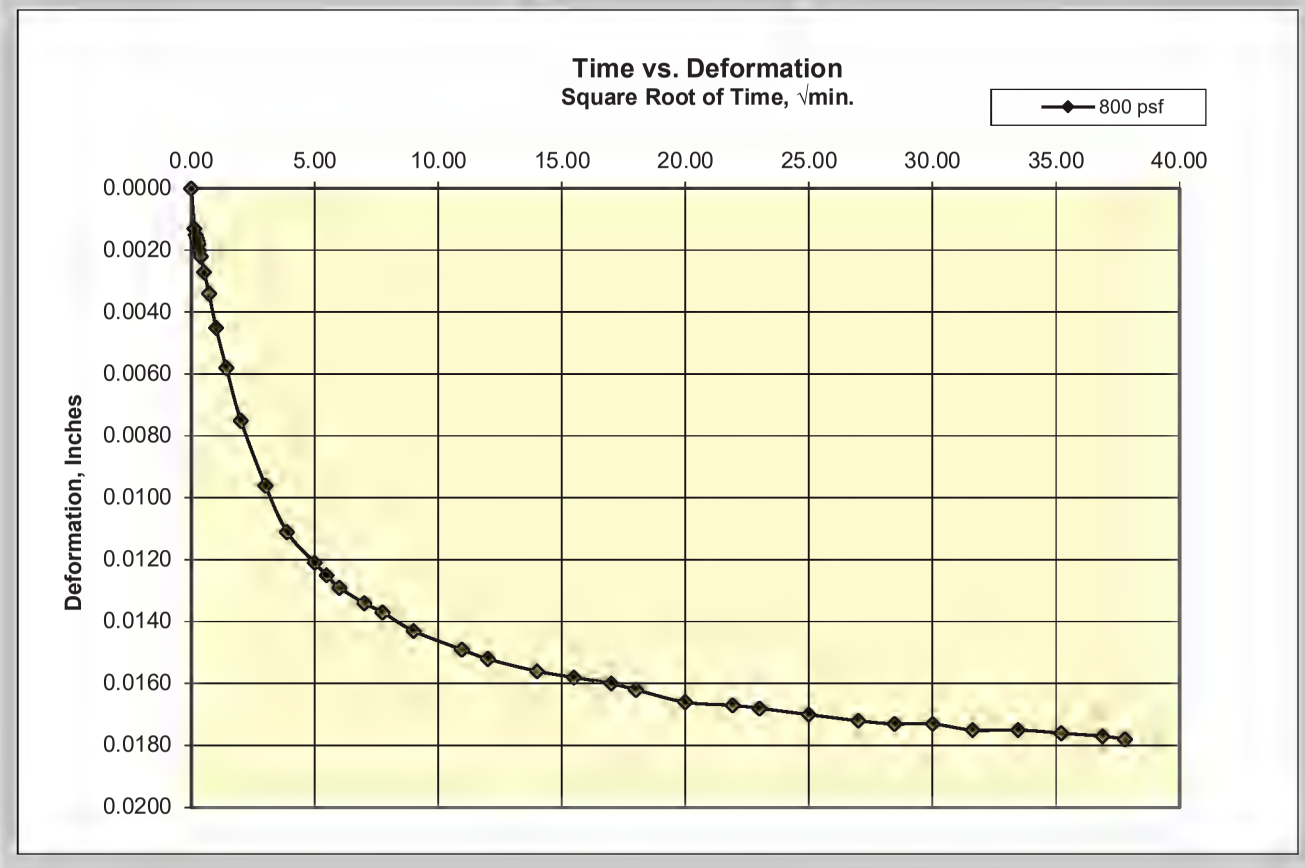
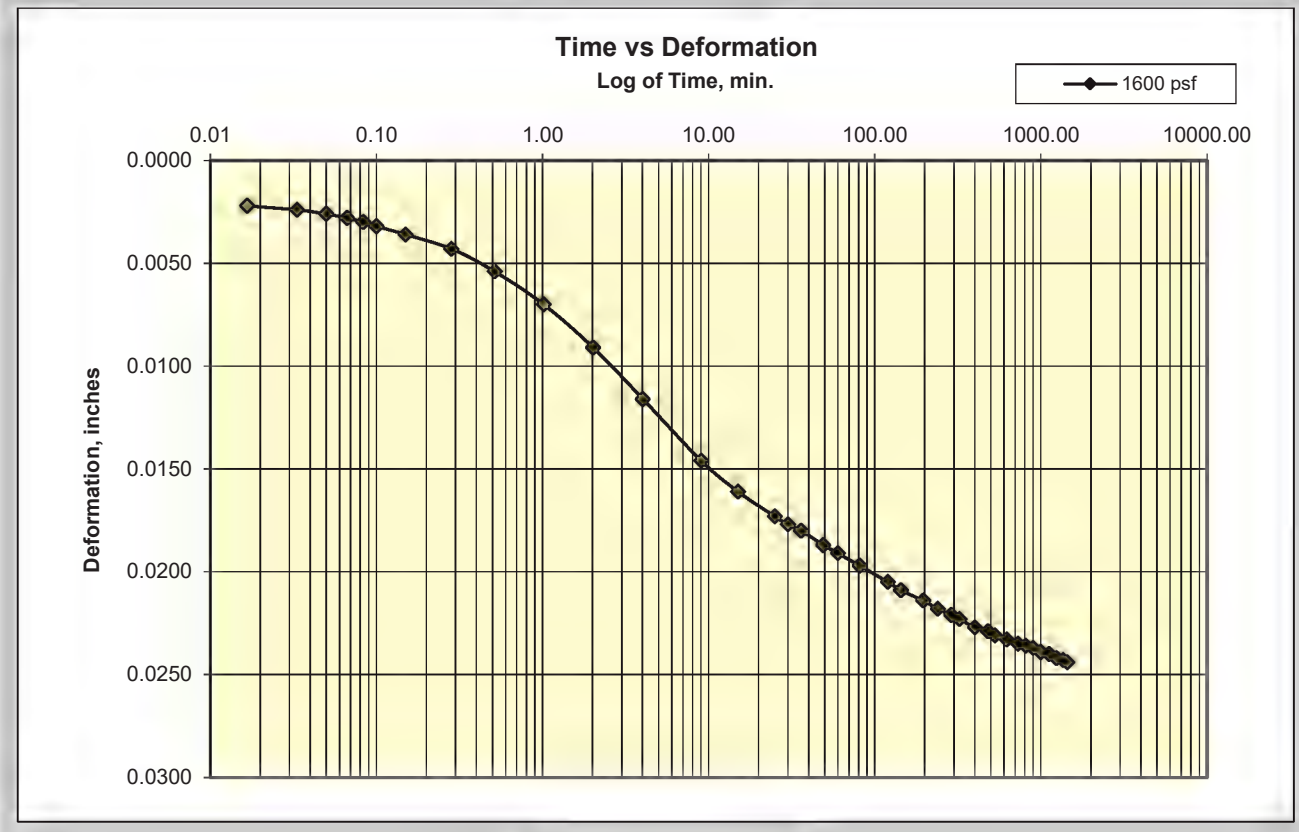


Cooper Testing Labs, Inc.

Load 6

1600 psf



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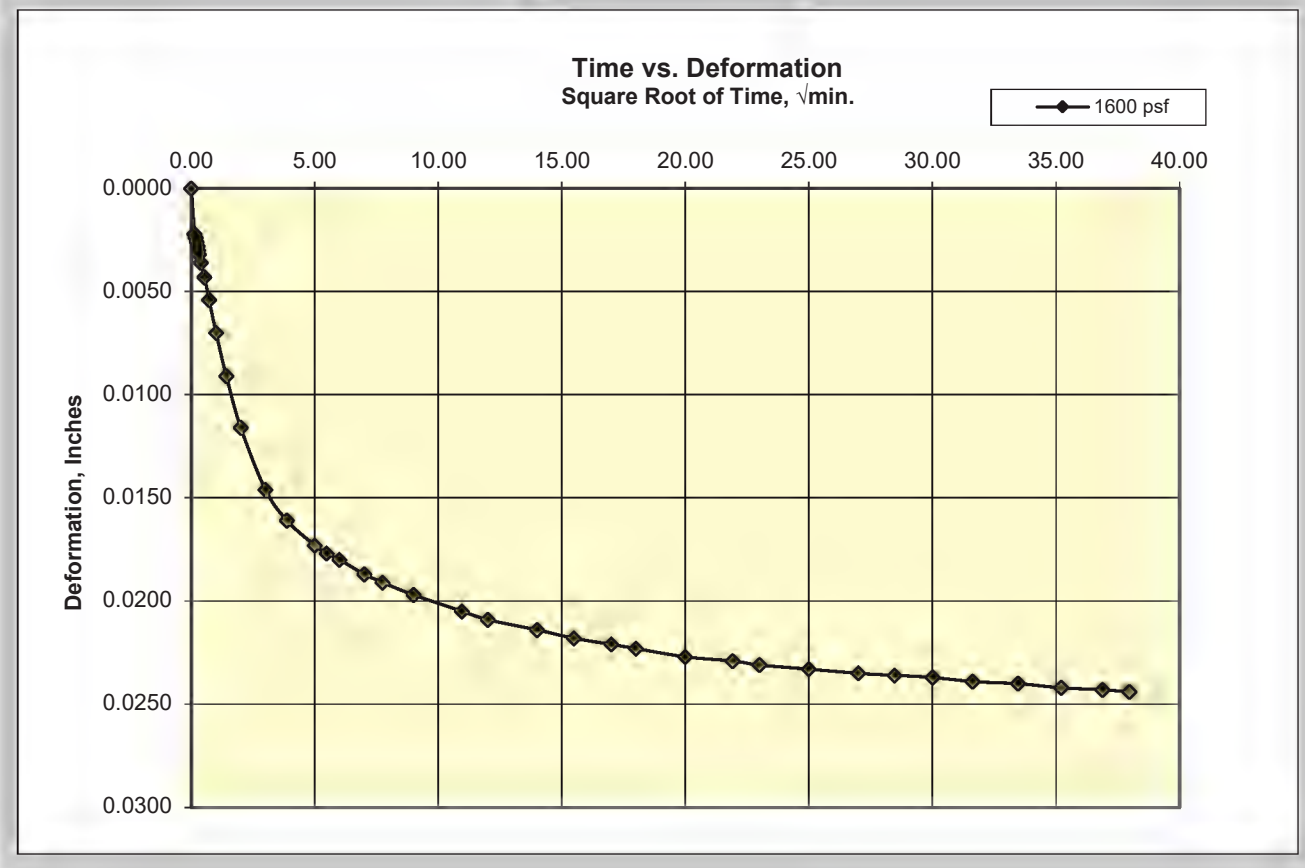
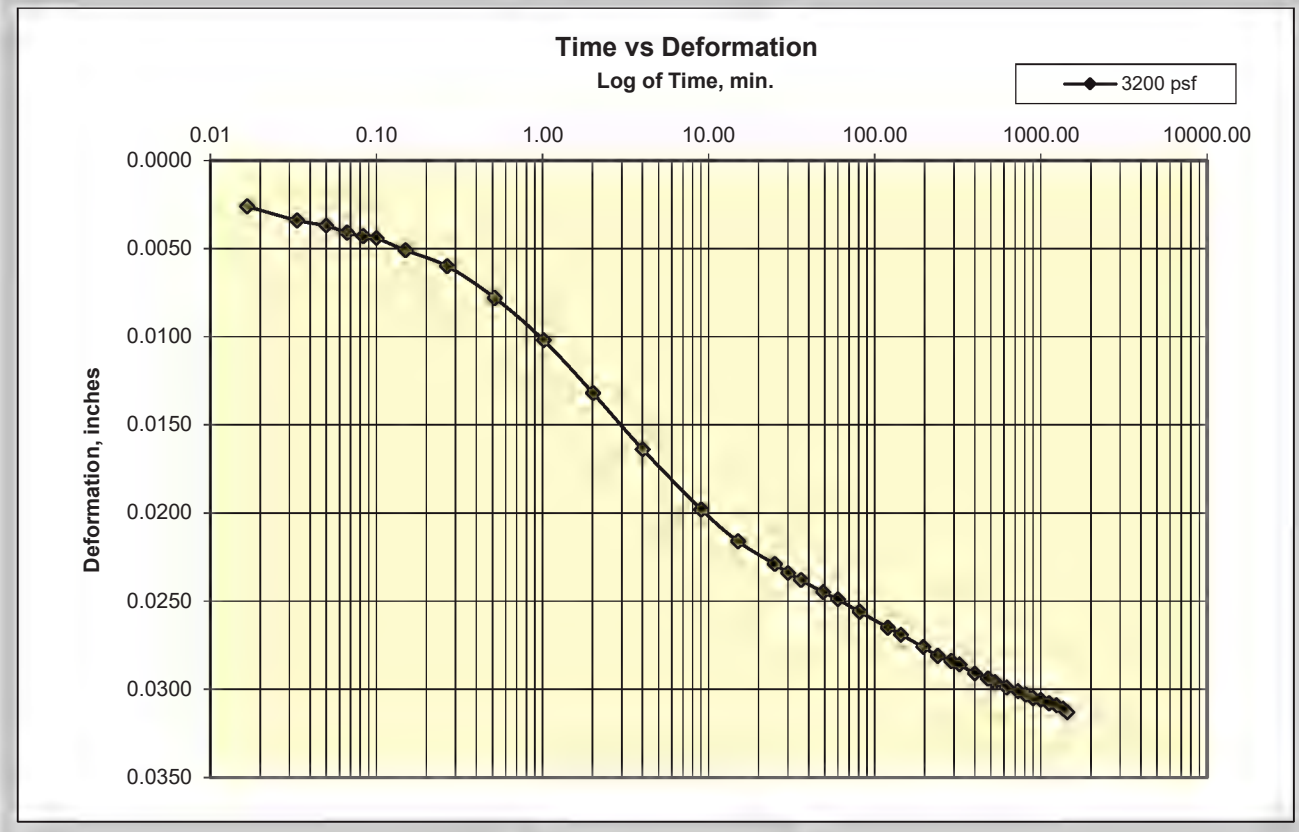


Cooper Testing Labs, Inc.

Load 7

3200 psf



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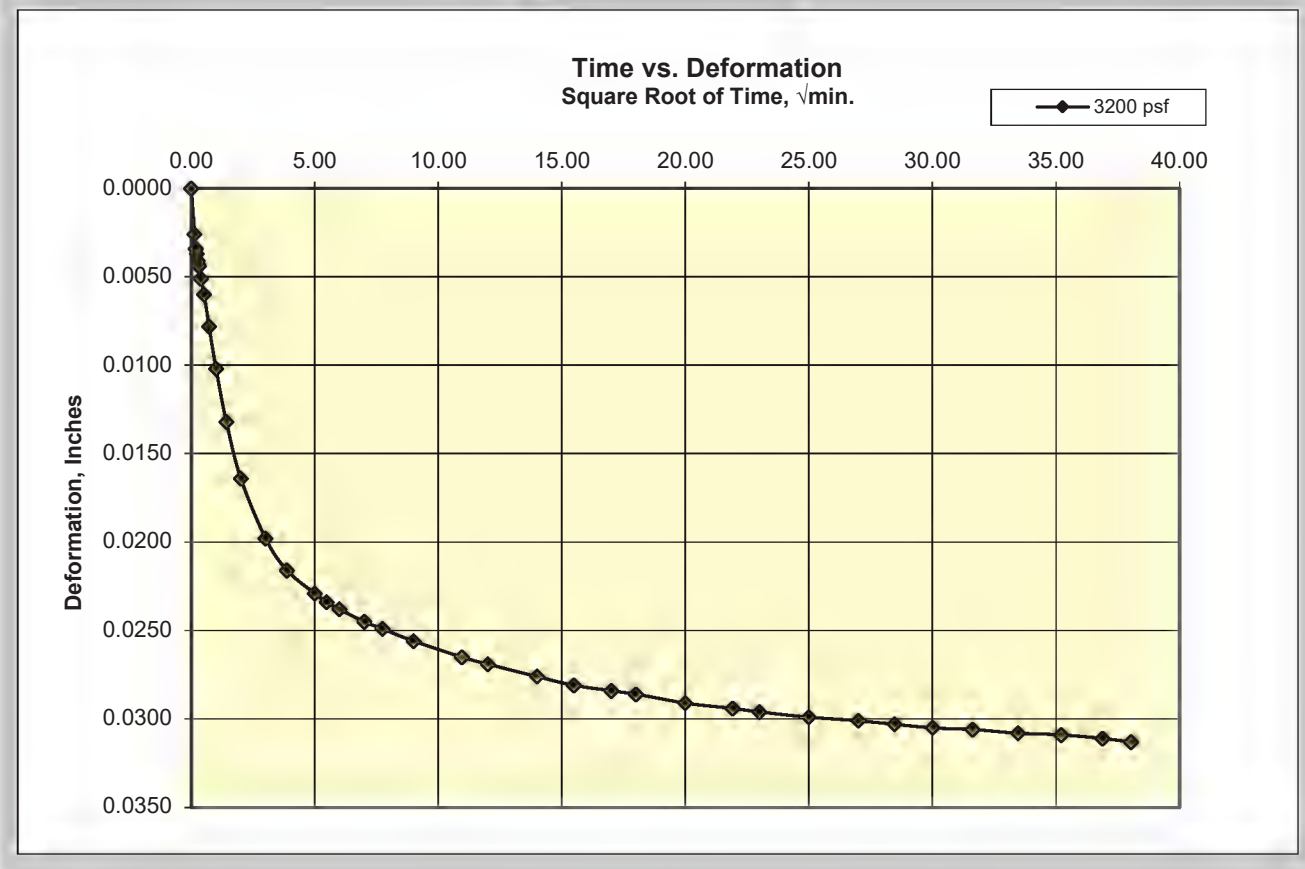
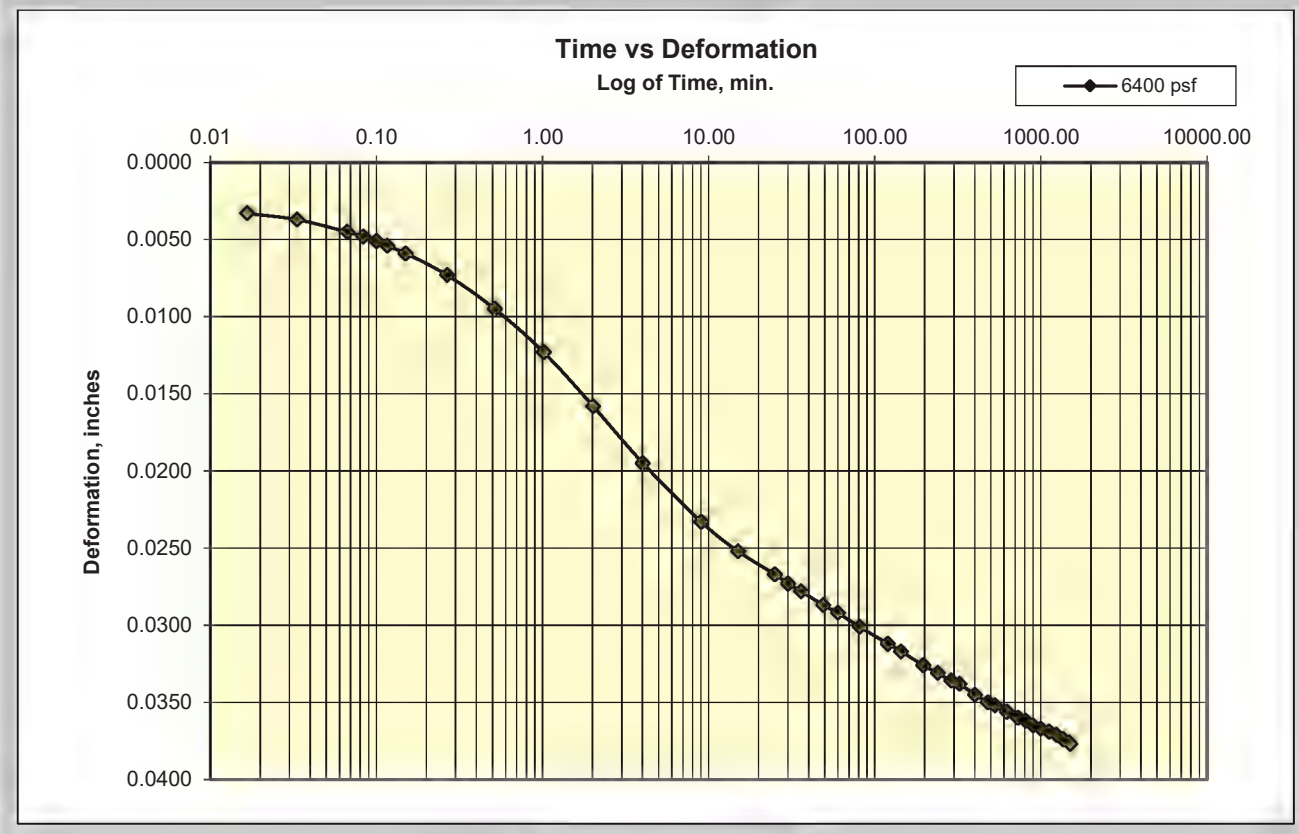


Cooper Testing Labs, Inc.

Load 8

6400 psf



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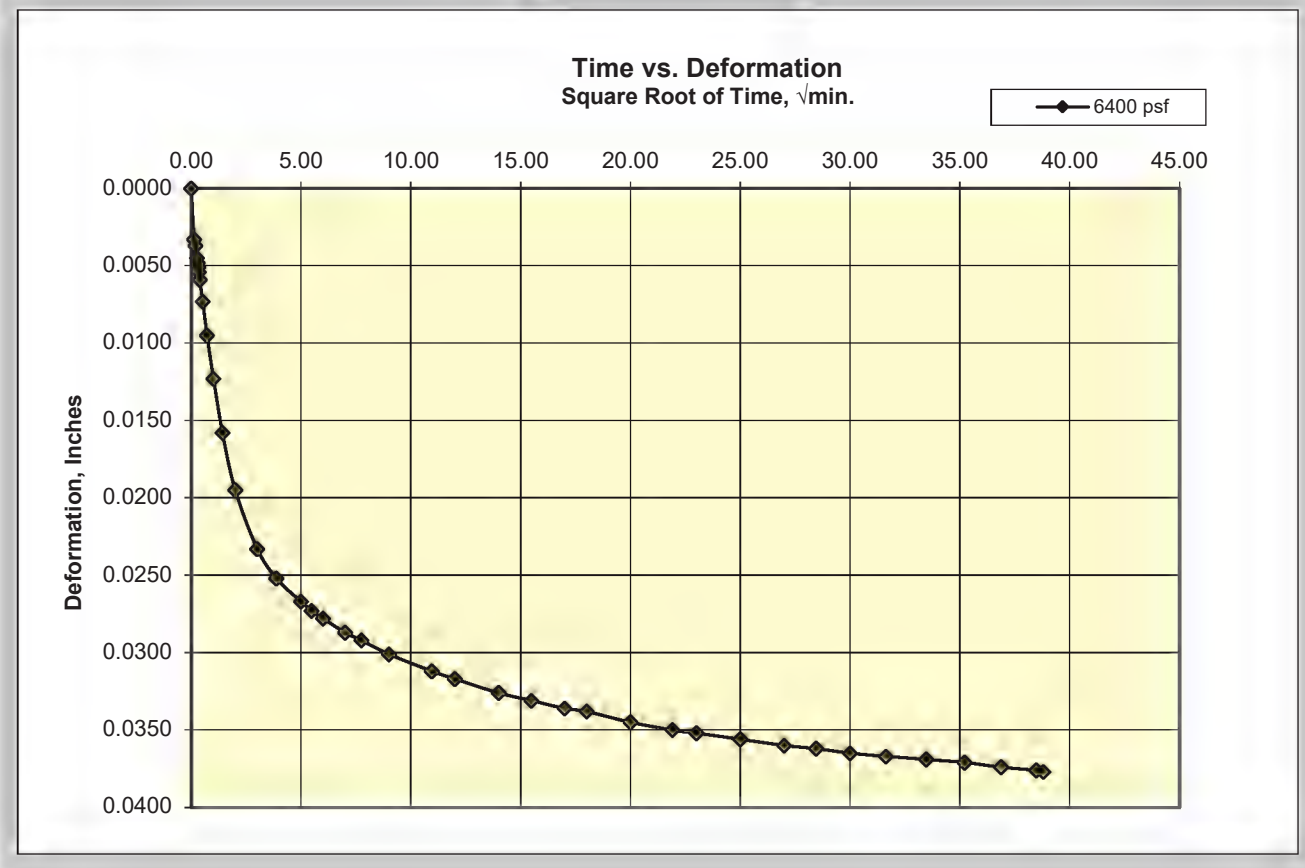
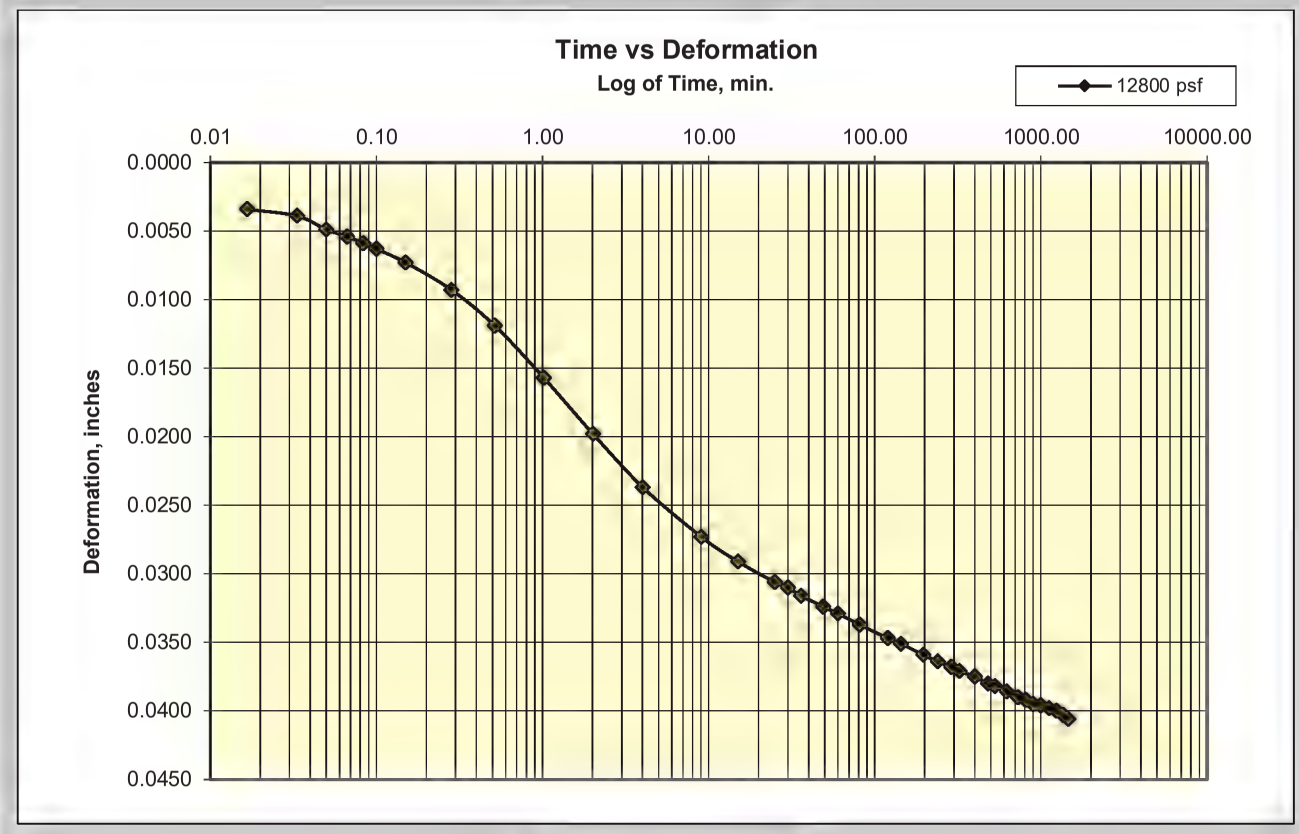


Cooper Testing Labs, Inc.

Load 9

12800 psf



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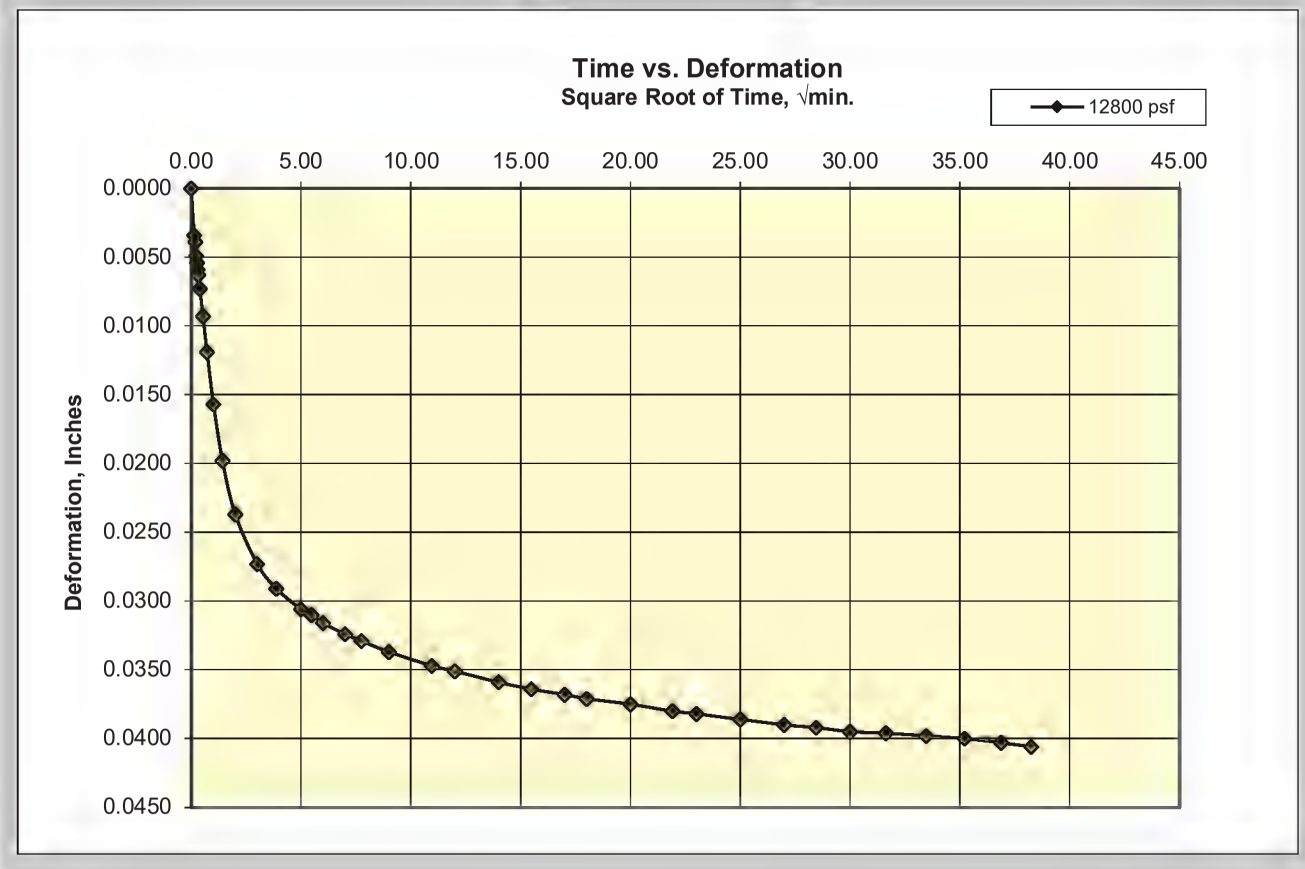
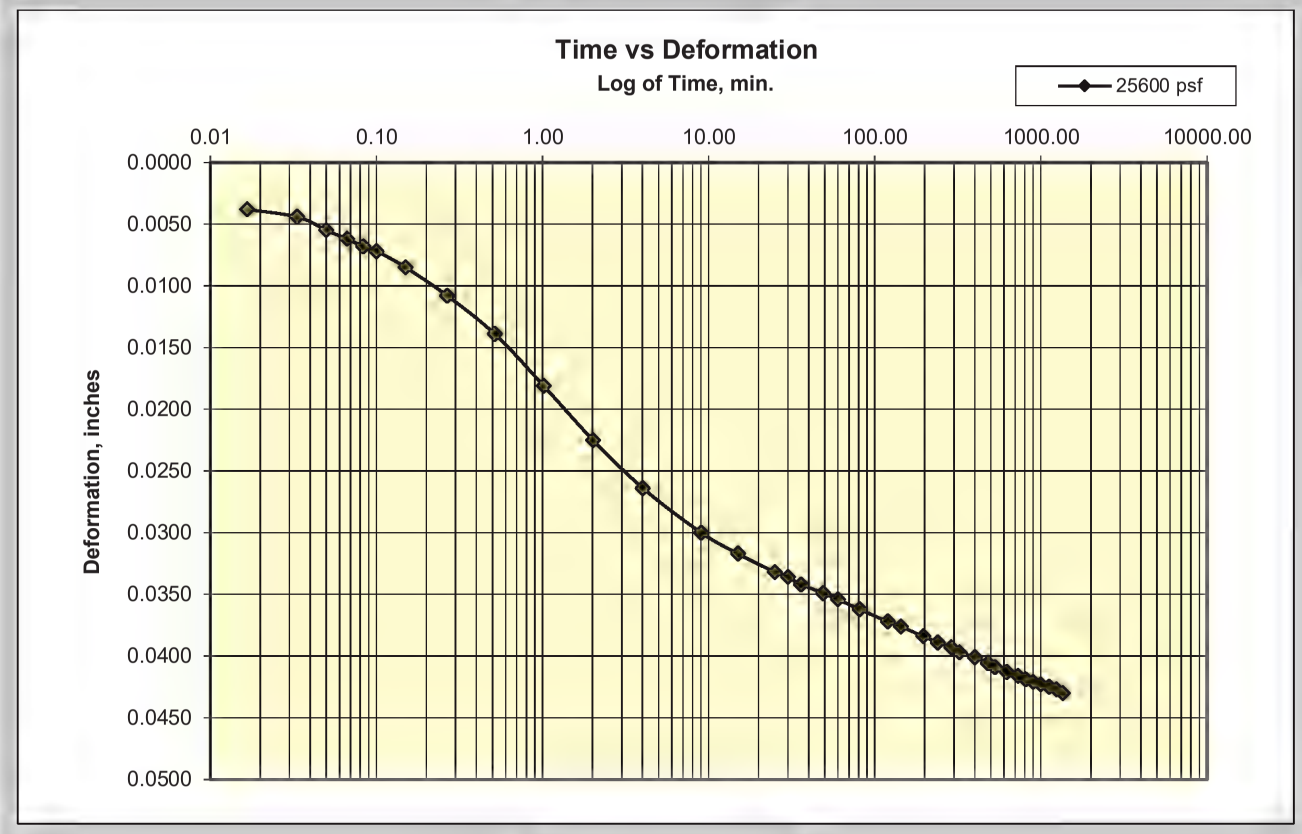


Cooper Testing Labs, Inc.

Load 10 25600 psf



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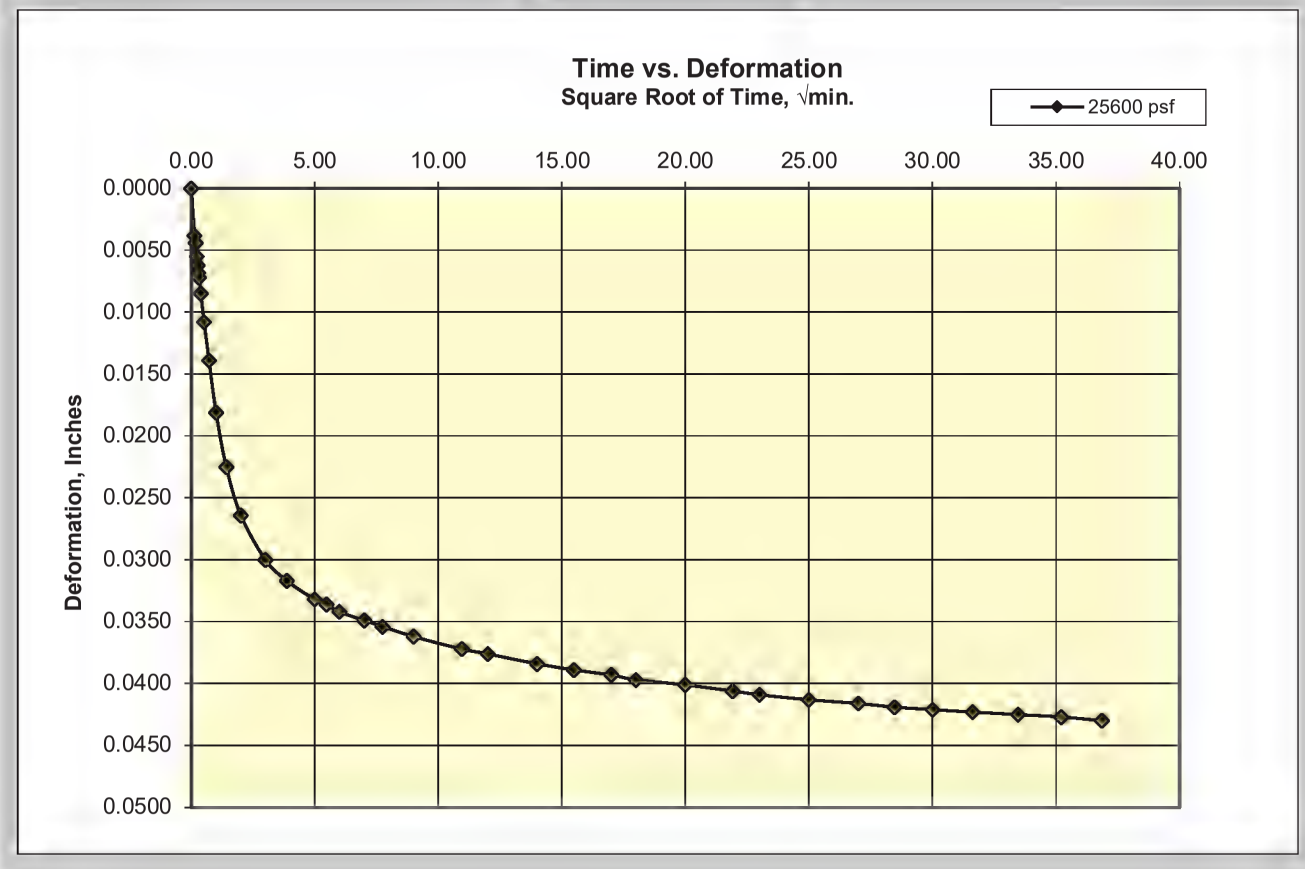
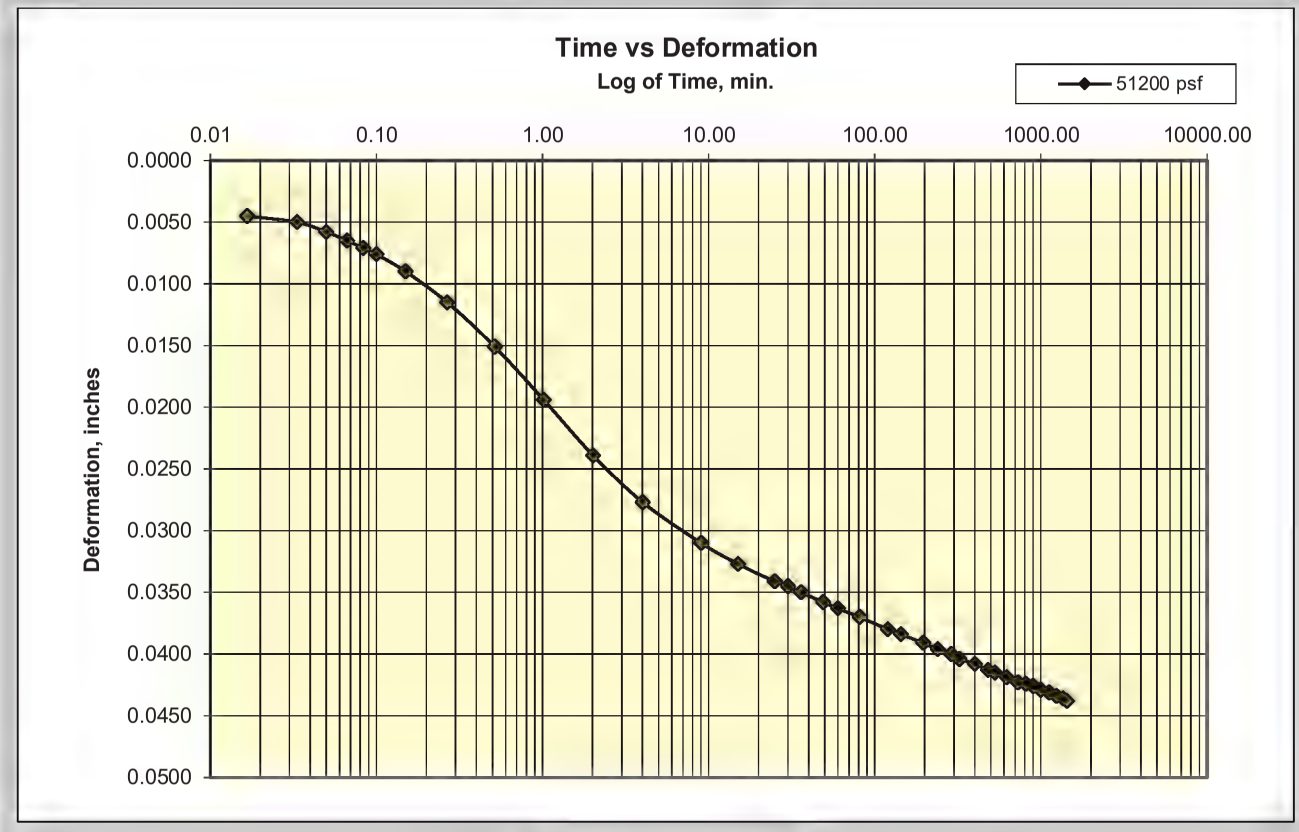


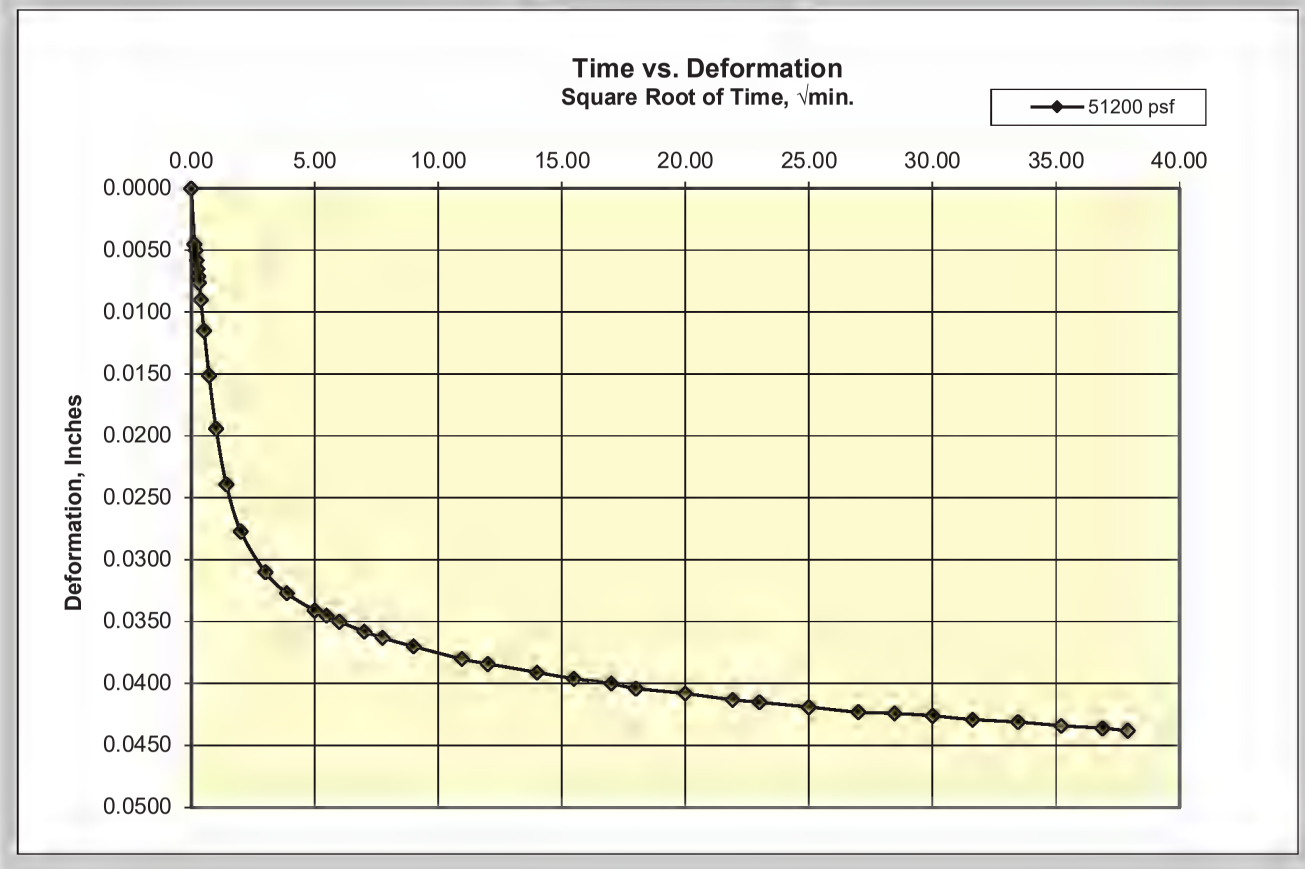
Cooper Testing Labs, Inc.

Load 11

51200 psf



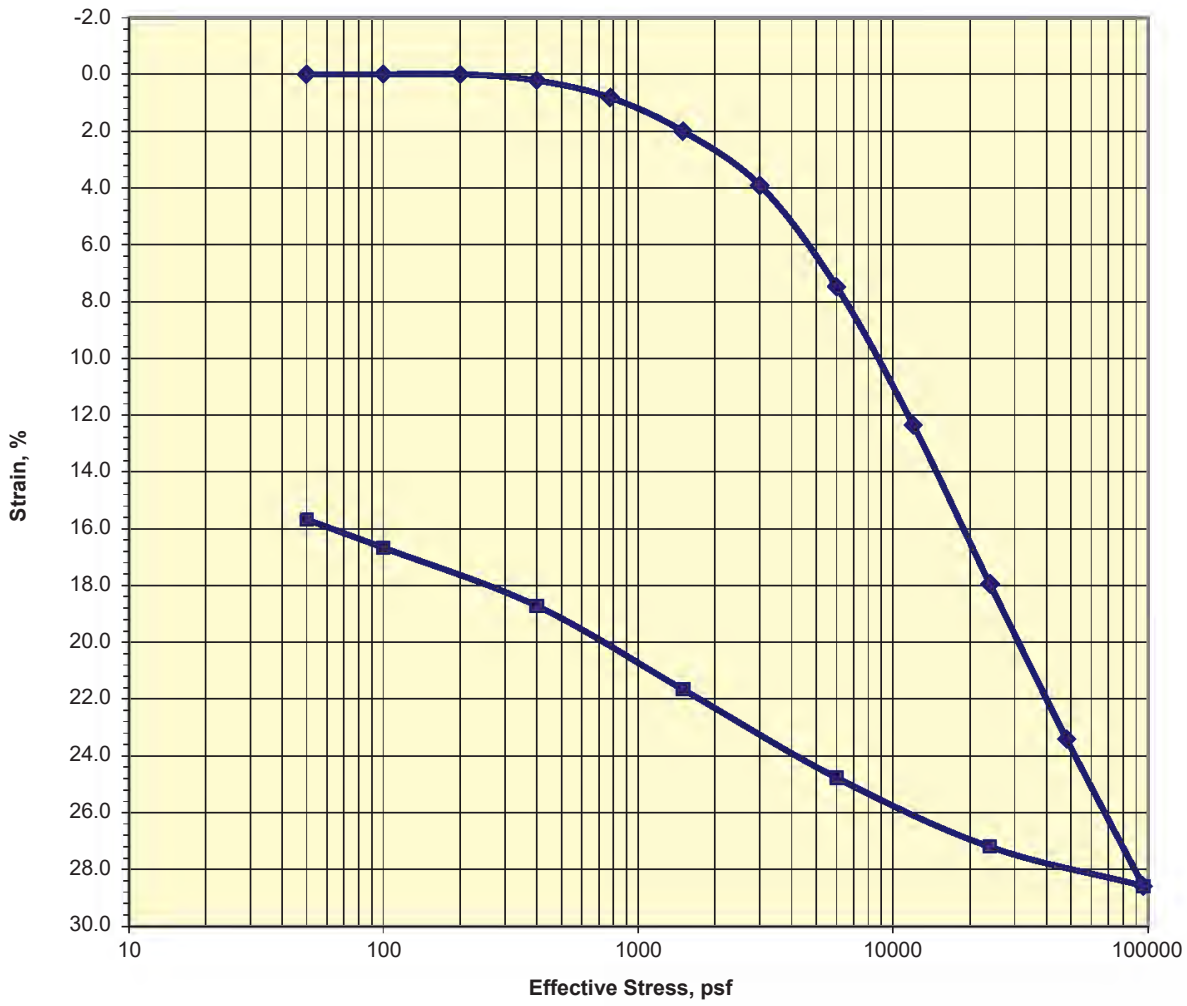
51200 psf



Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B104	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	12	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	45-47.5	**Checked:**	PJ
Soil Type:	Greenish Gray CLAY (Bay Mud)			**Date:**	11/8/2023

Strain-Log-P Curve



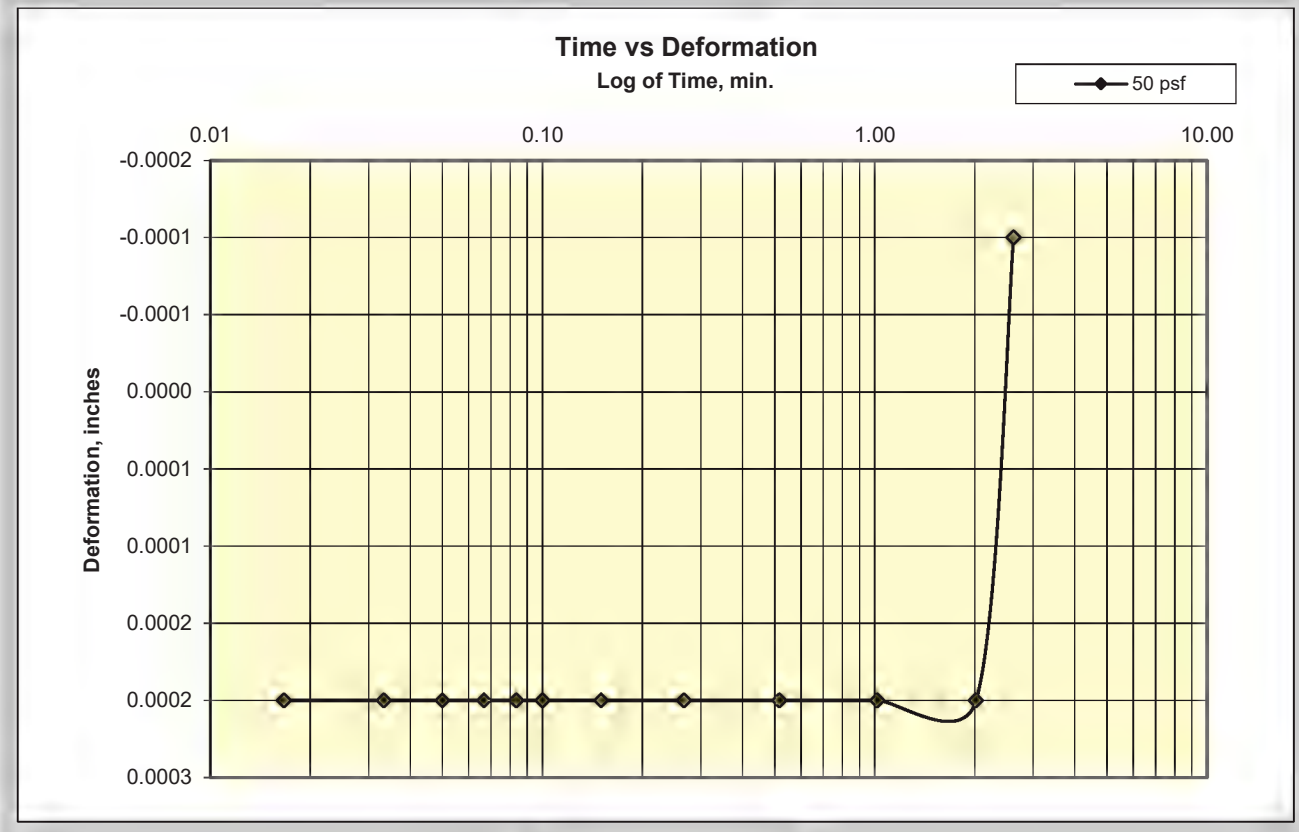
Assumed Gs 2.75	Initial	Final
Moisture %:	38.8	28.7
Dry Density, pcf:	81.2	95.9
Void Ratio:	1.113	0.791
% Saturation:	95.9	100.0

Remarks:

Cooper Testing Labs, Inc.

Load 1

50 psf



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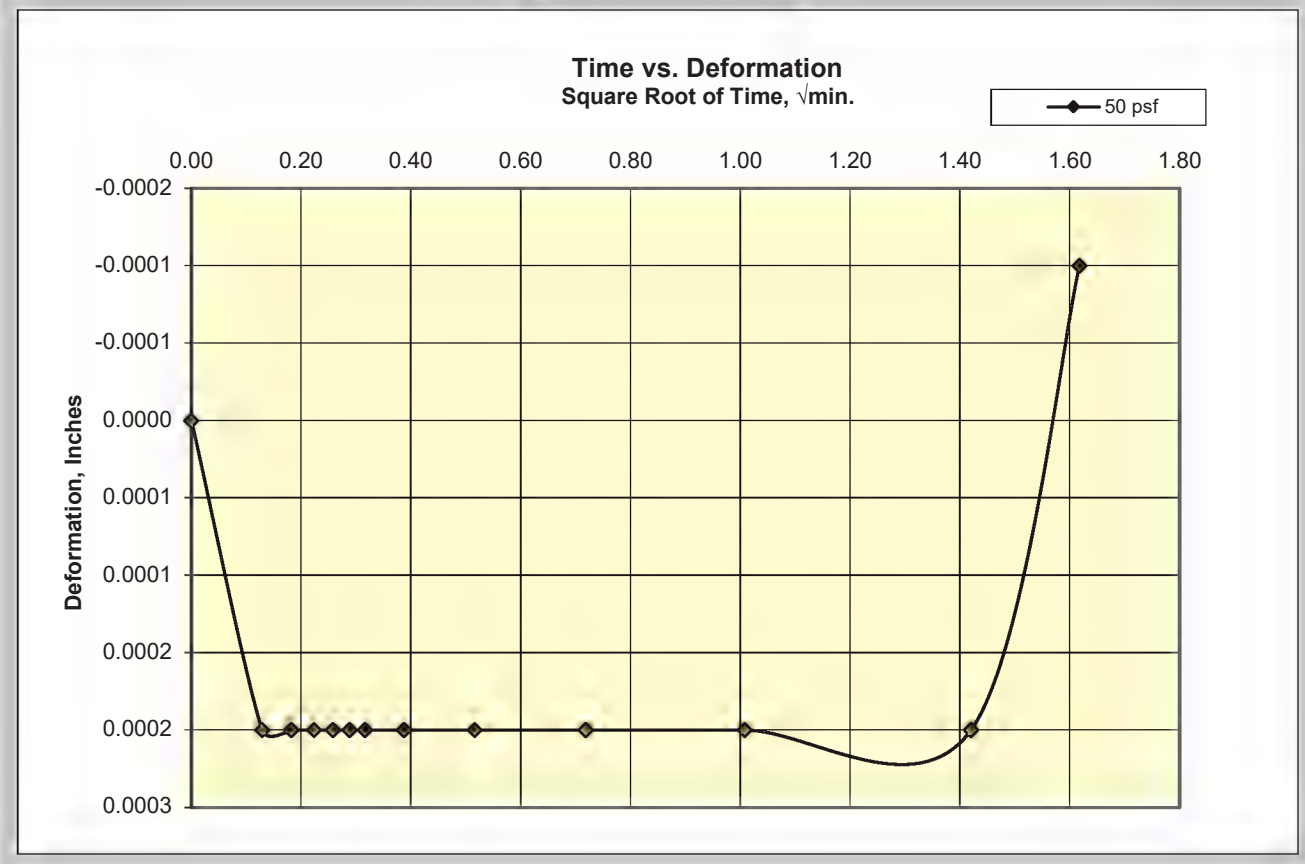

Cooper Testing Labs, Inc.

Load 2

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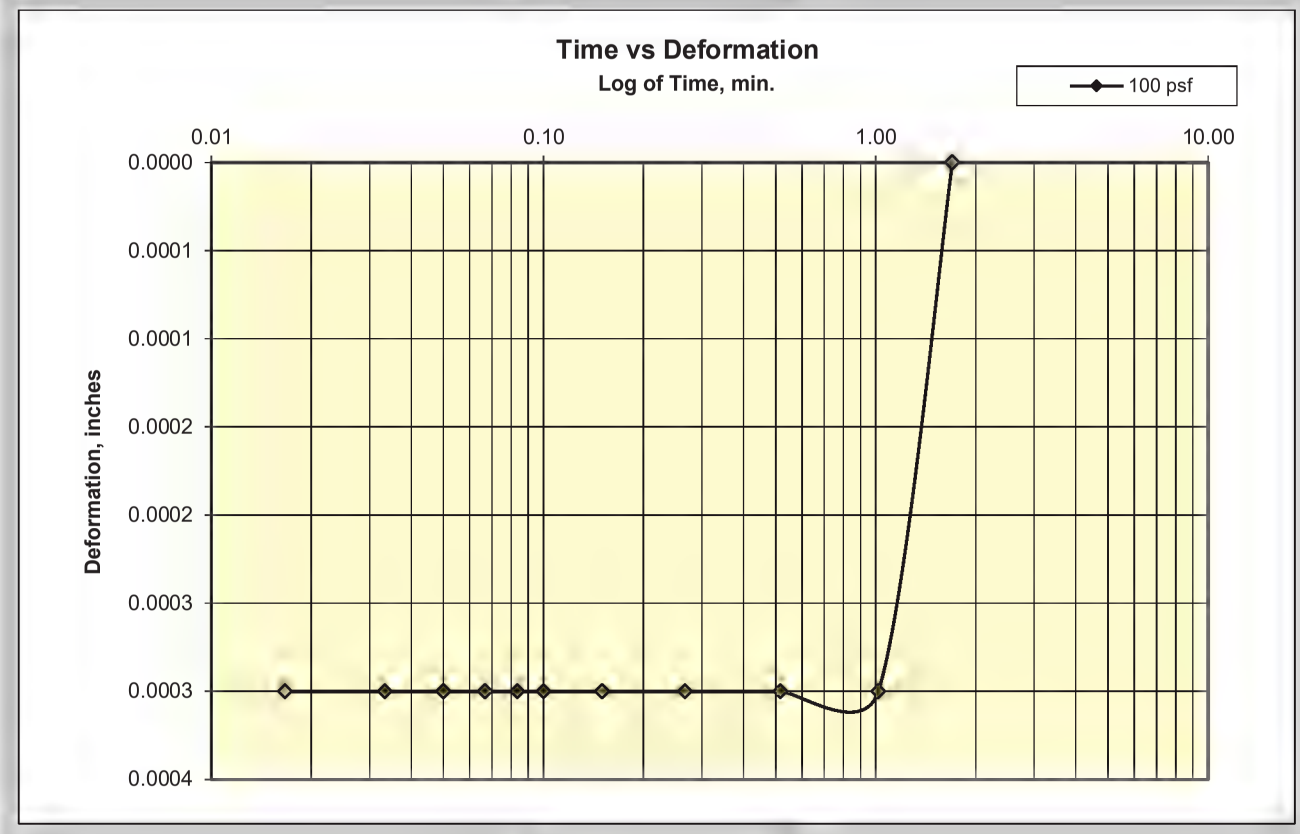

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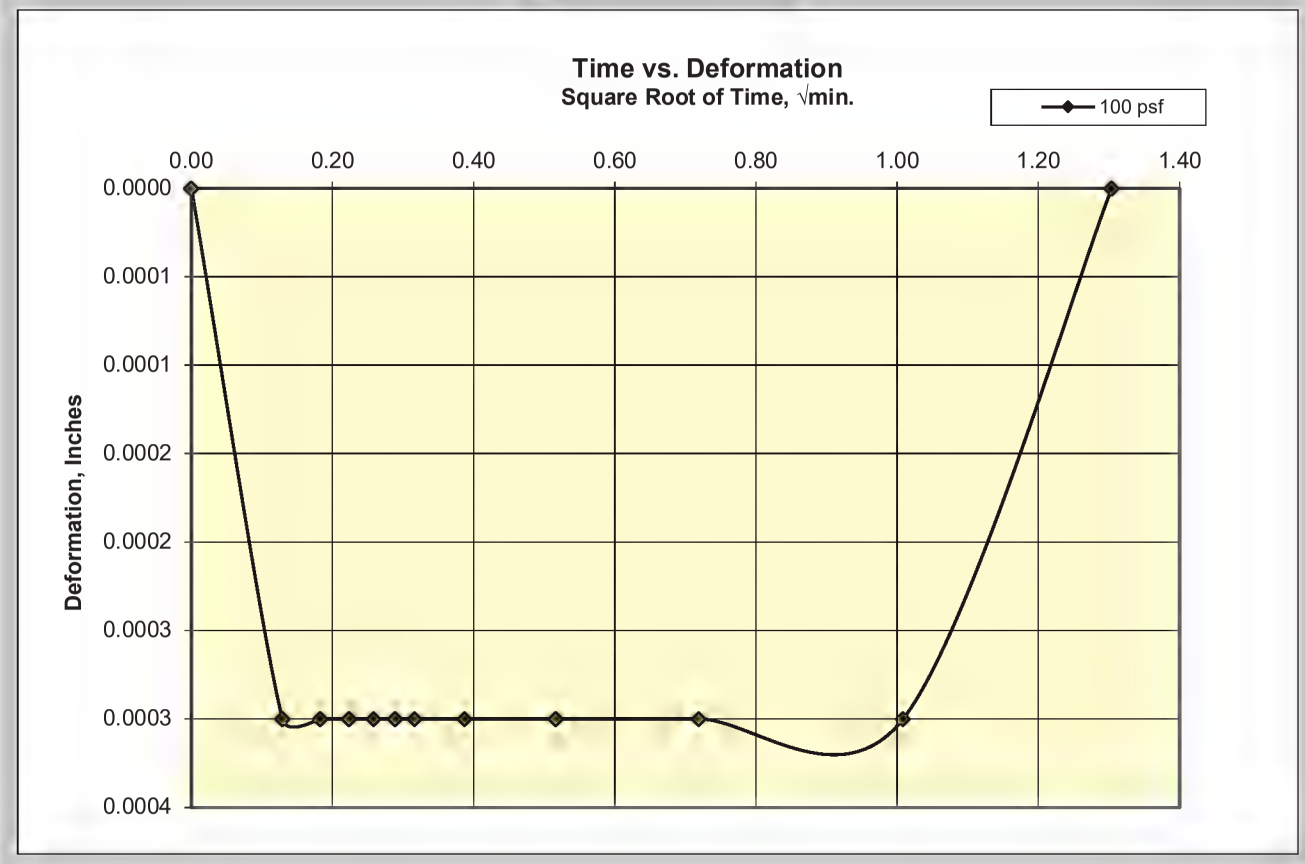

Cooper Testing Labs, Inc.

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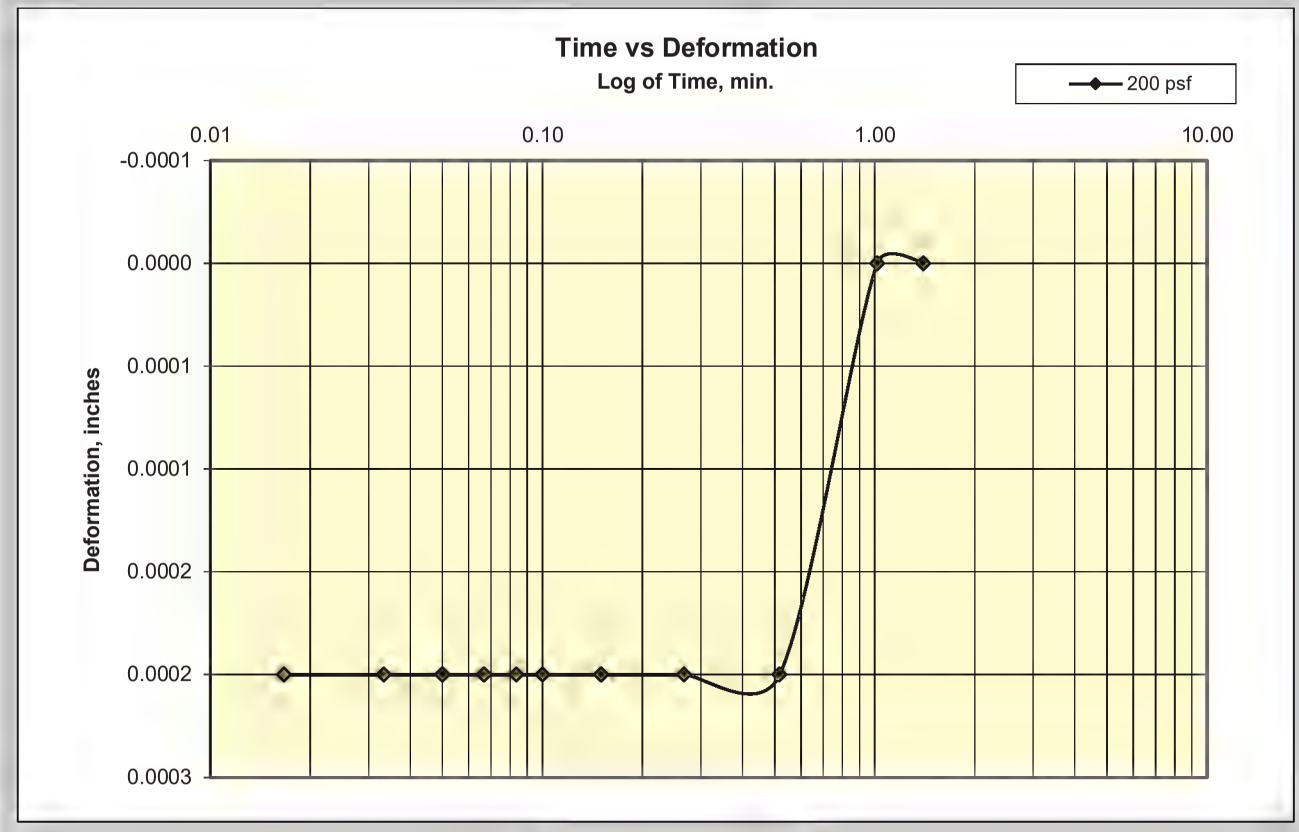

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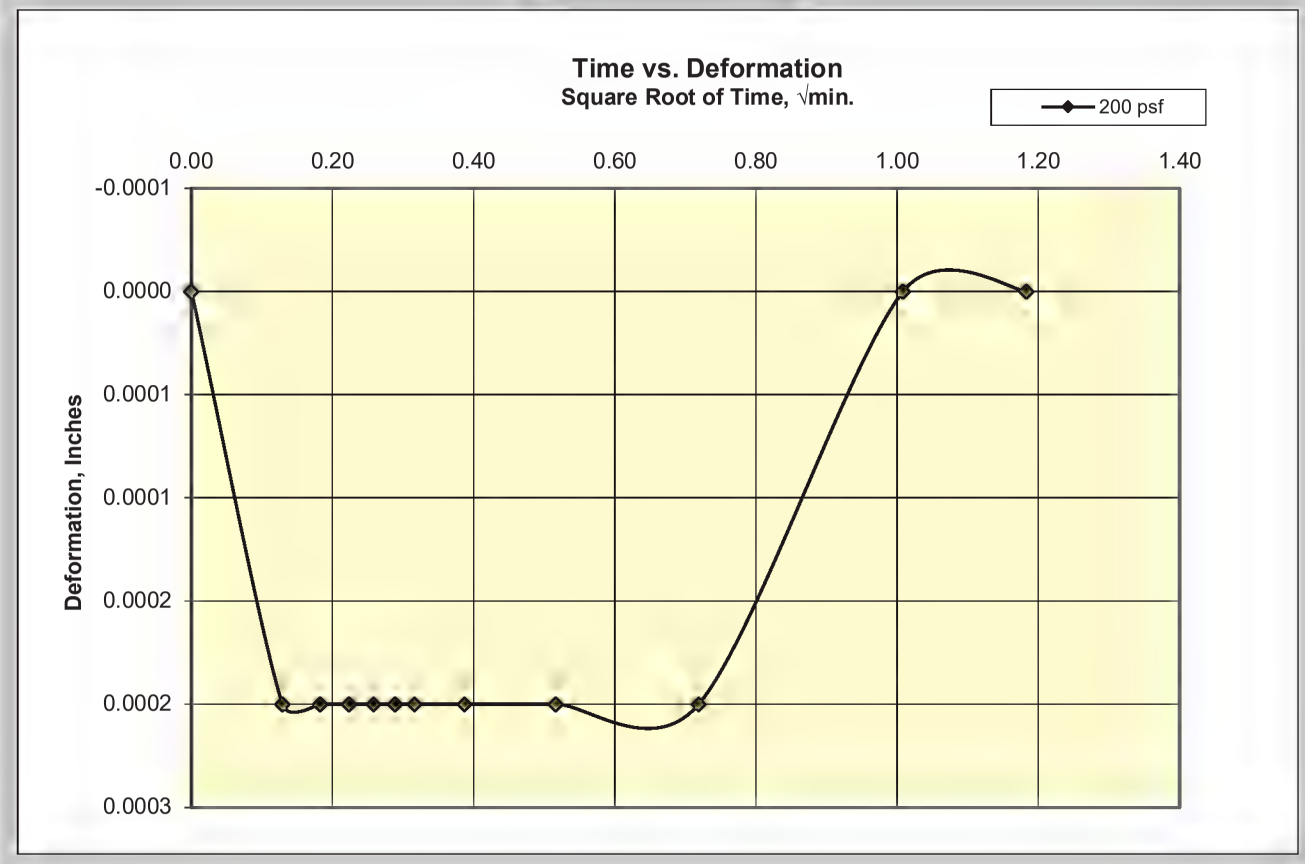

Cooper Testing Labs, Inc.

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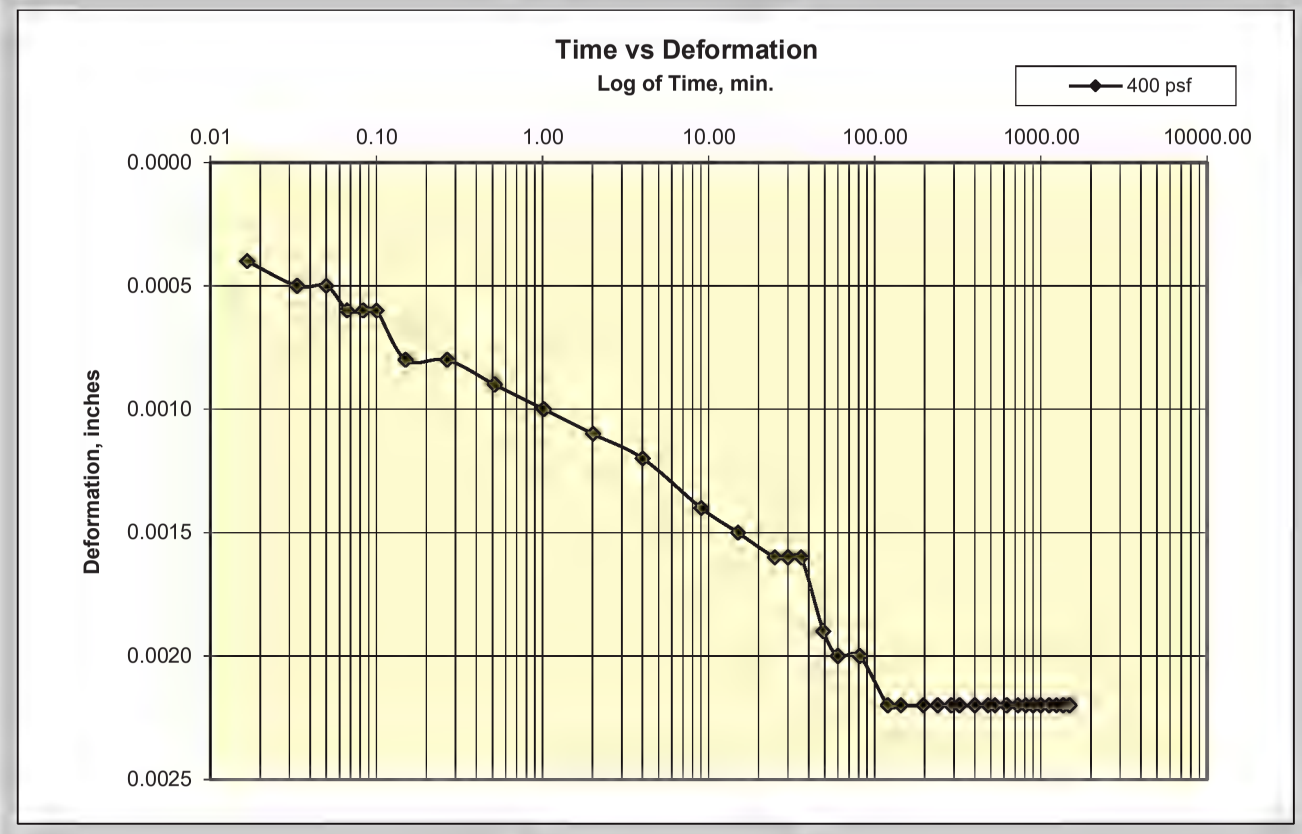

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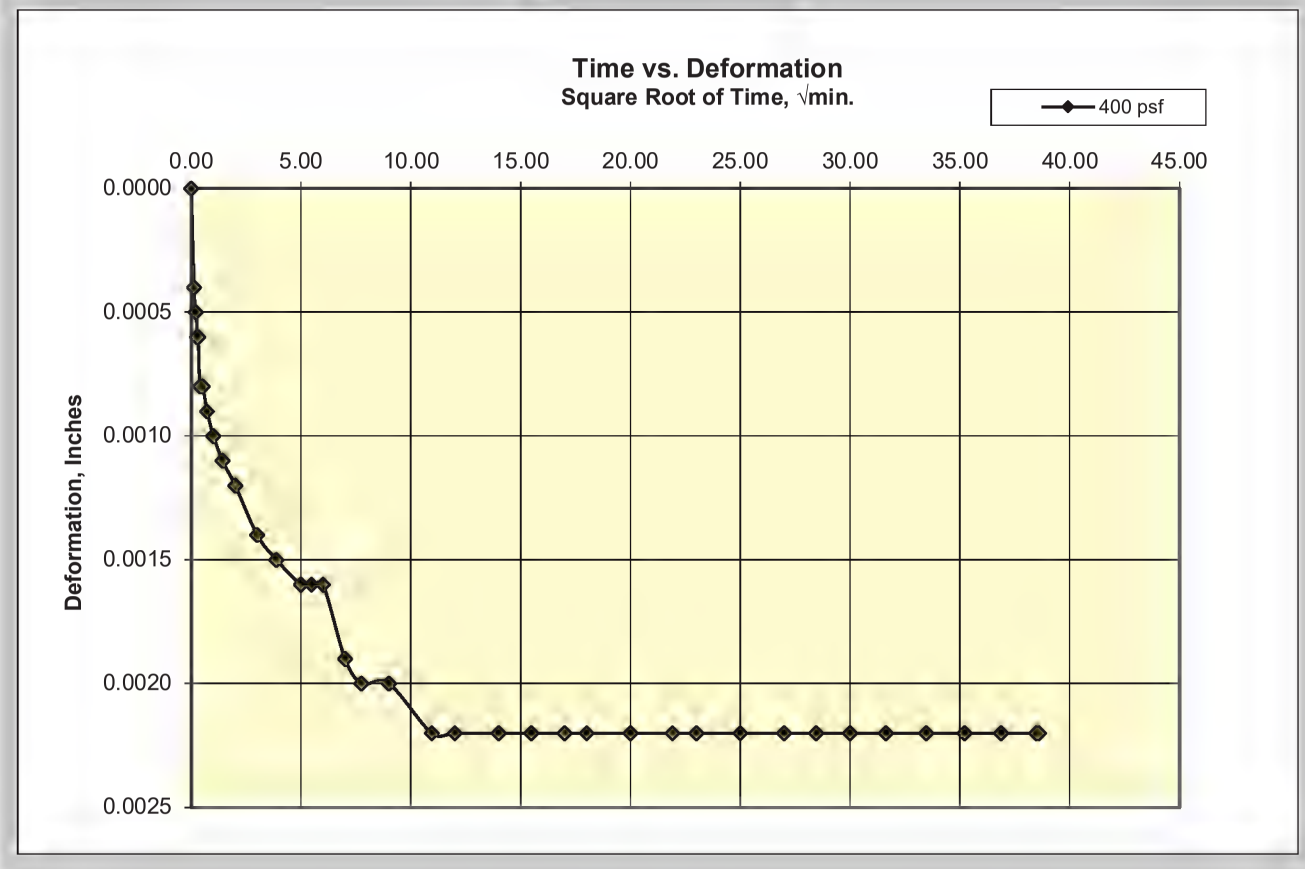
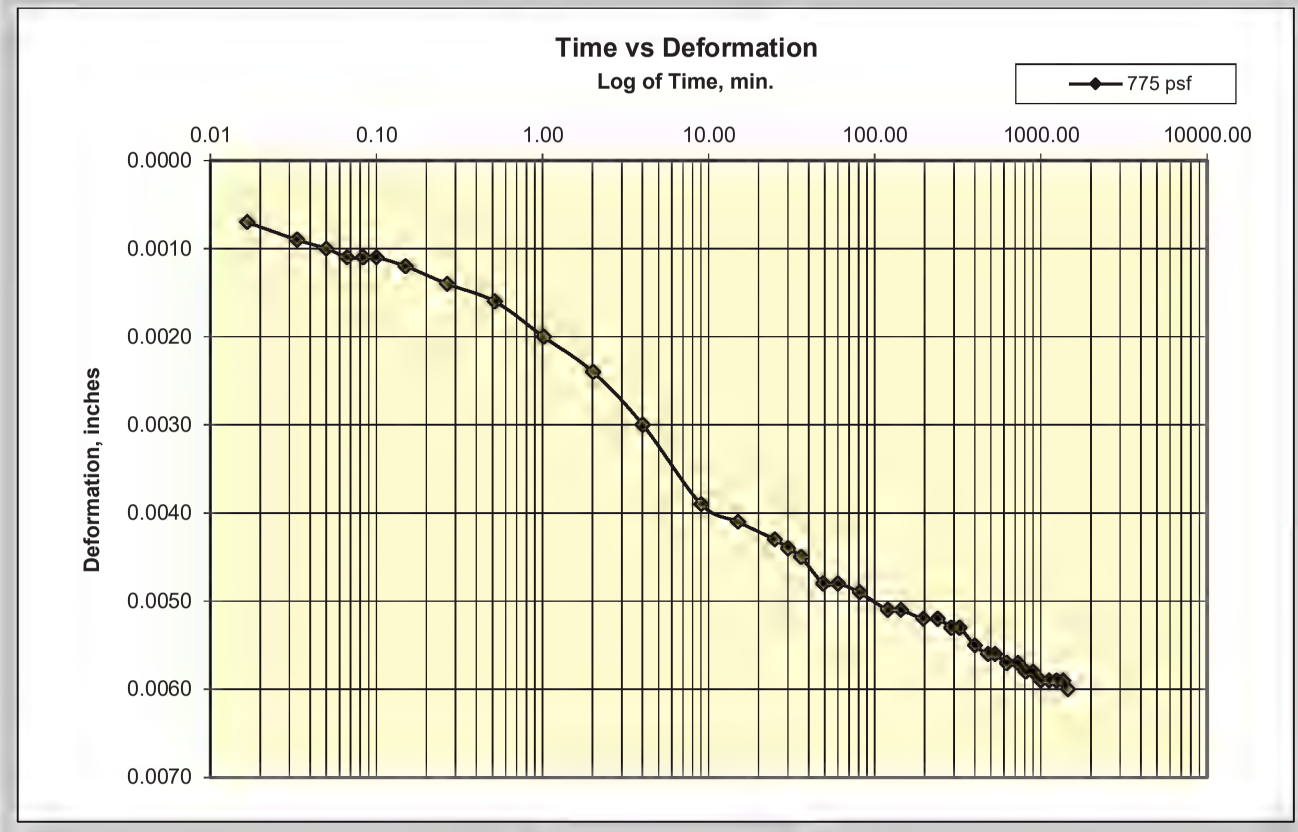


Cooper Testing Labs, Inc.

Load 5

775 psf



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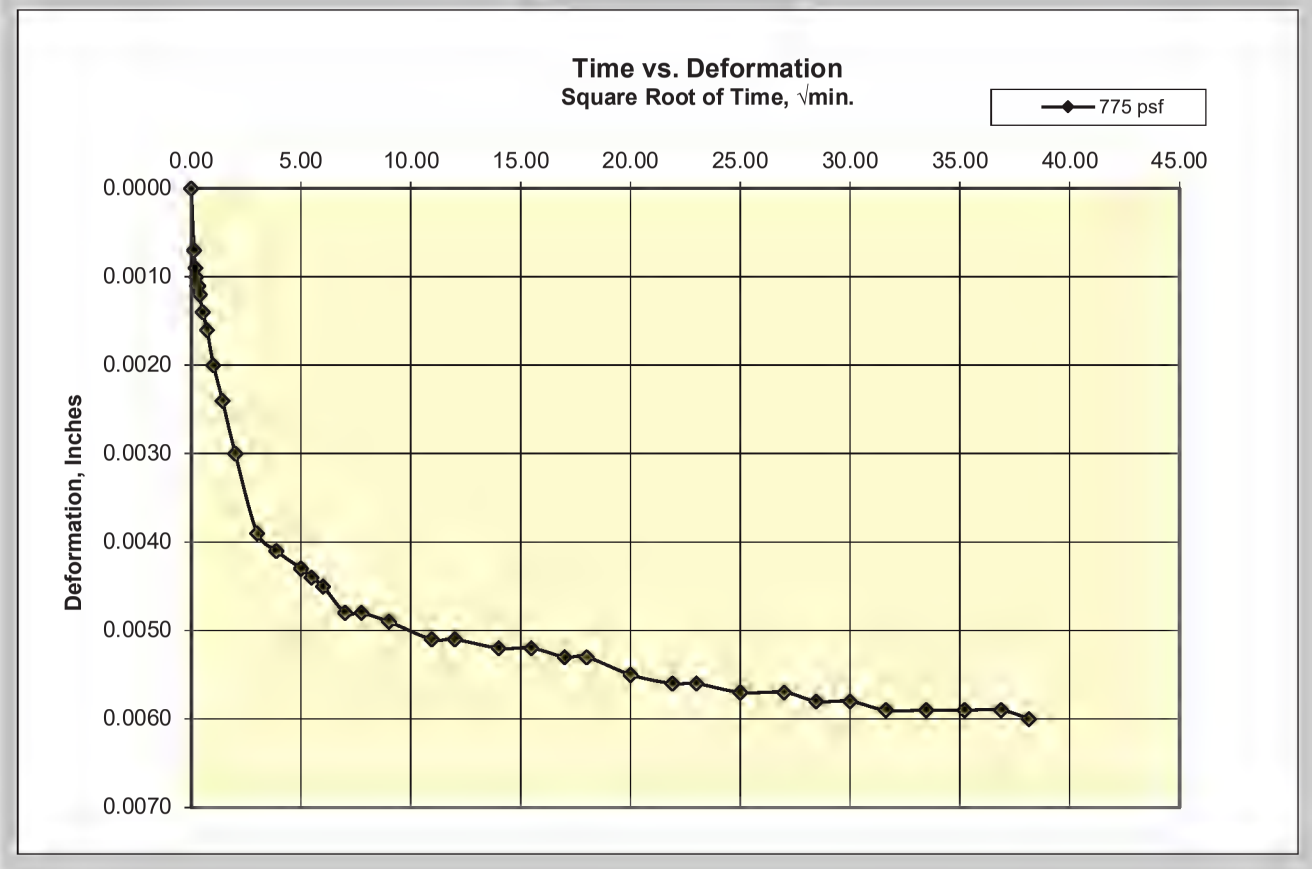

Cooper Testing Labs, Inc.

Load 6

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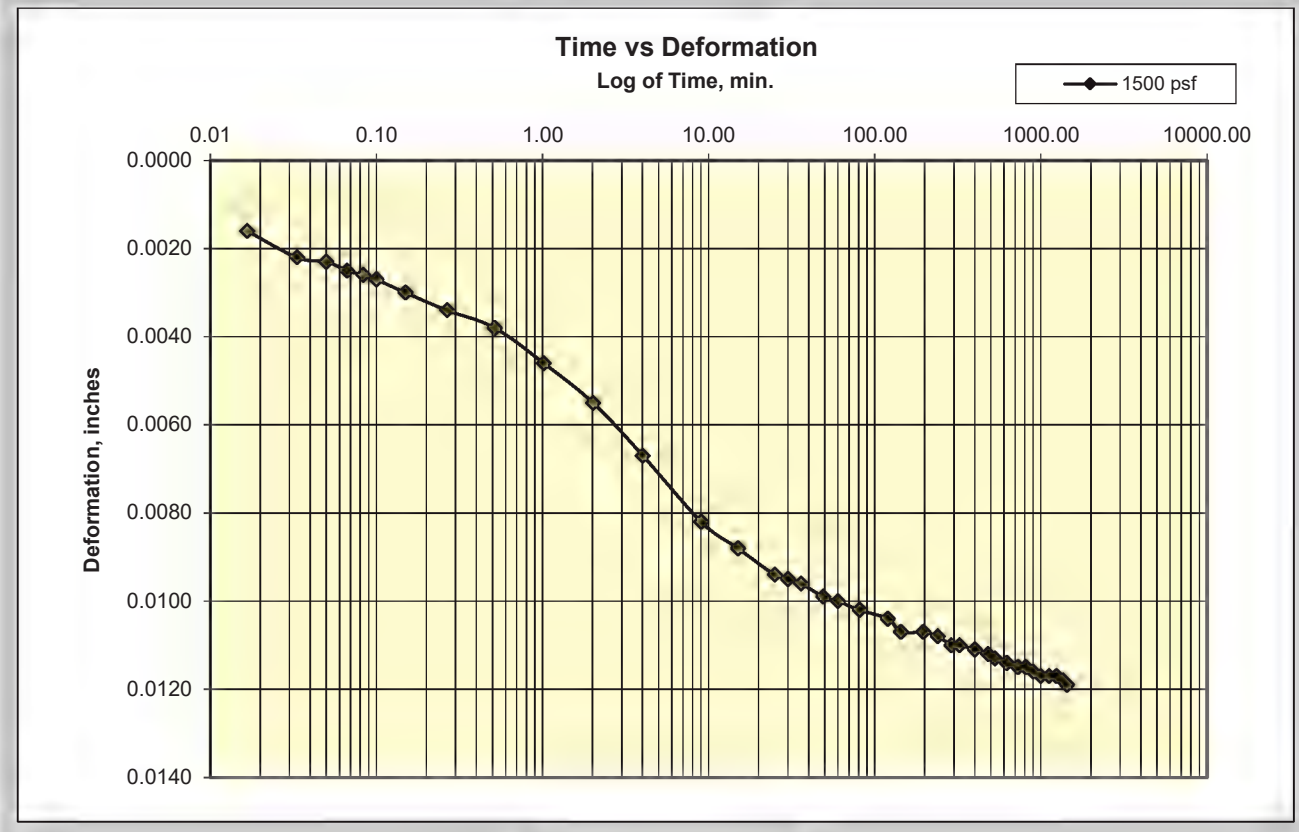

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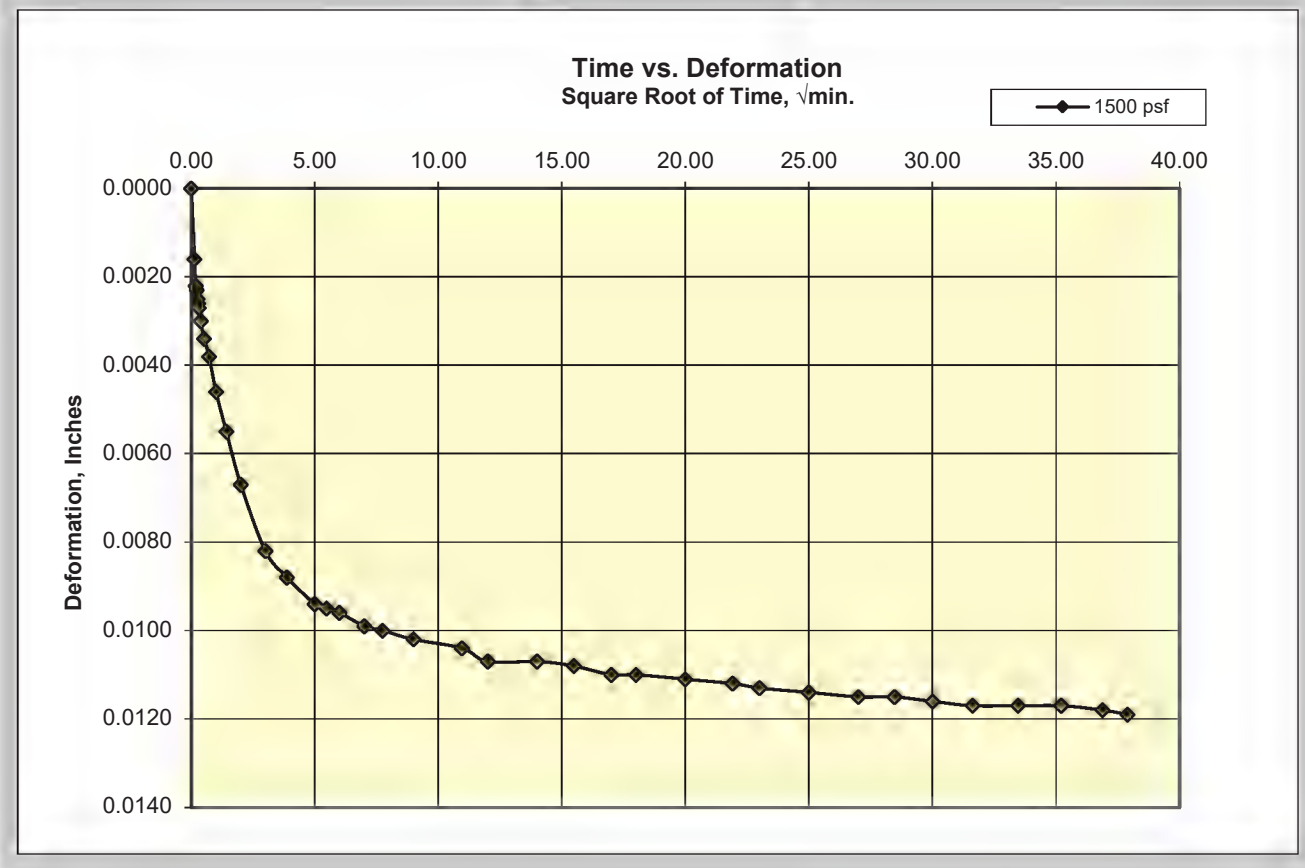

Cooper Testing Labs, Inc.

Load 7

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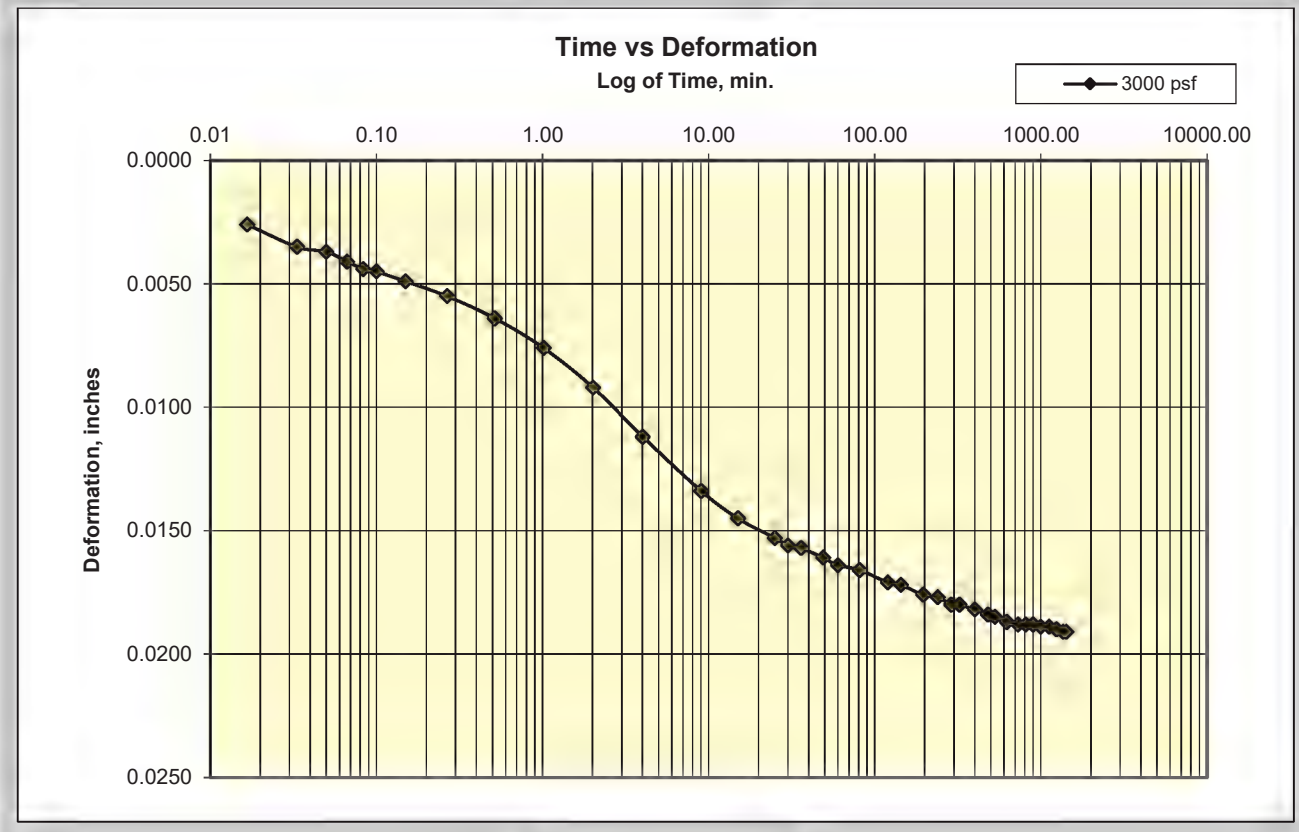

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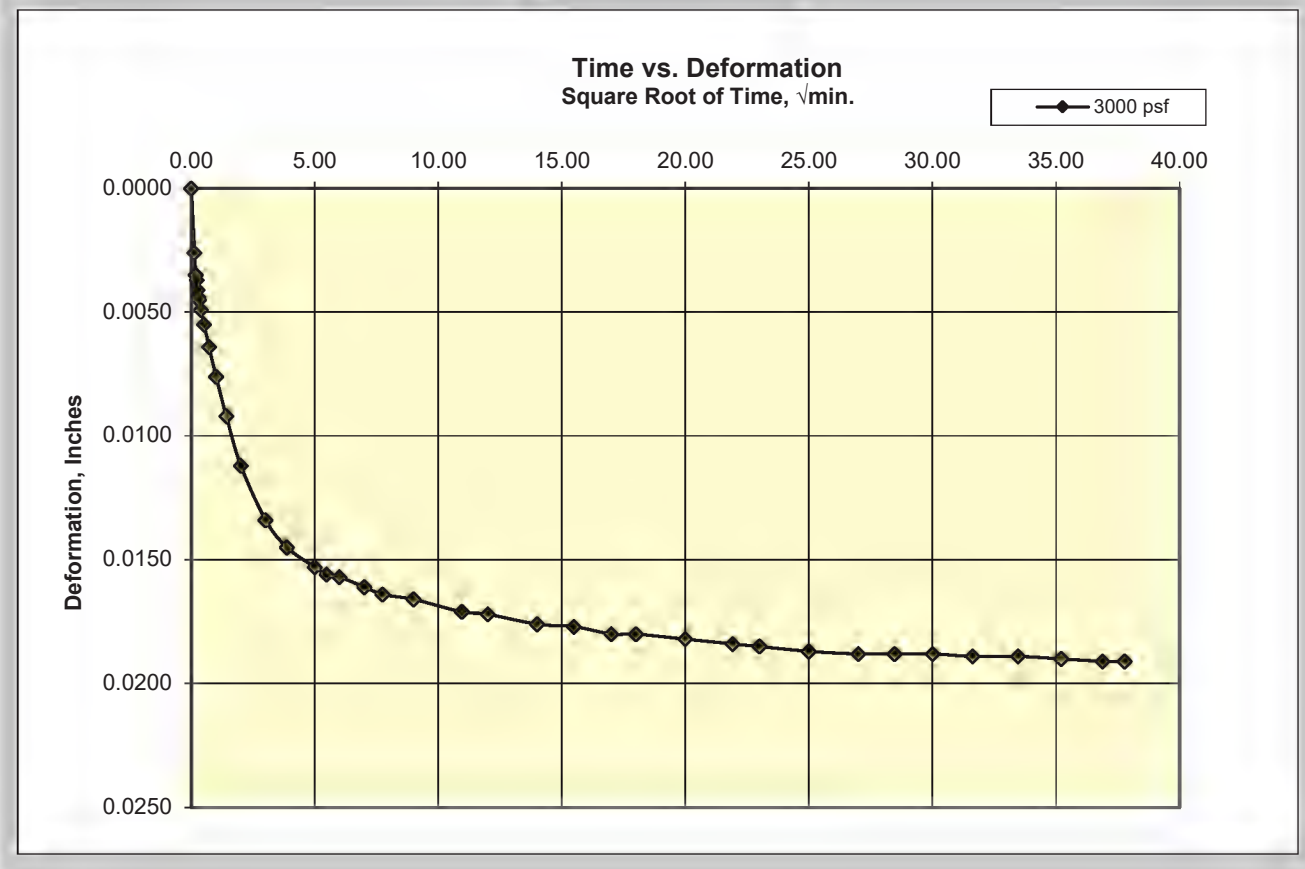
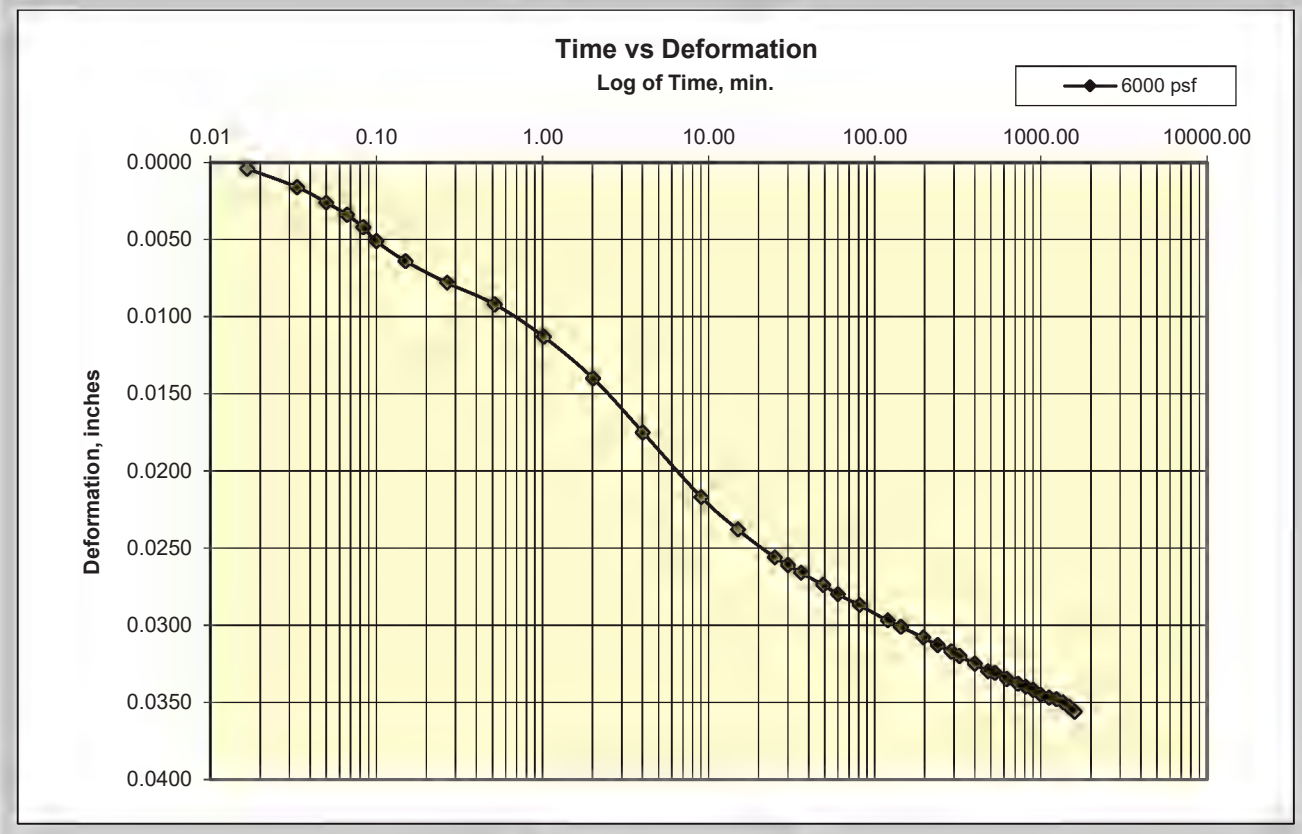


Cooper Testing Labs, Inc.

Load 8

6000 psf



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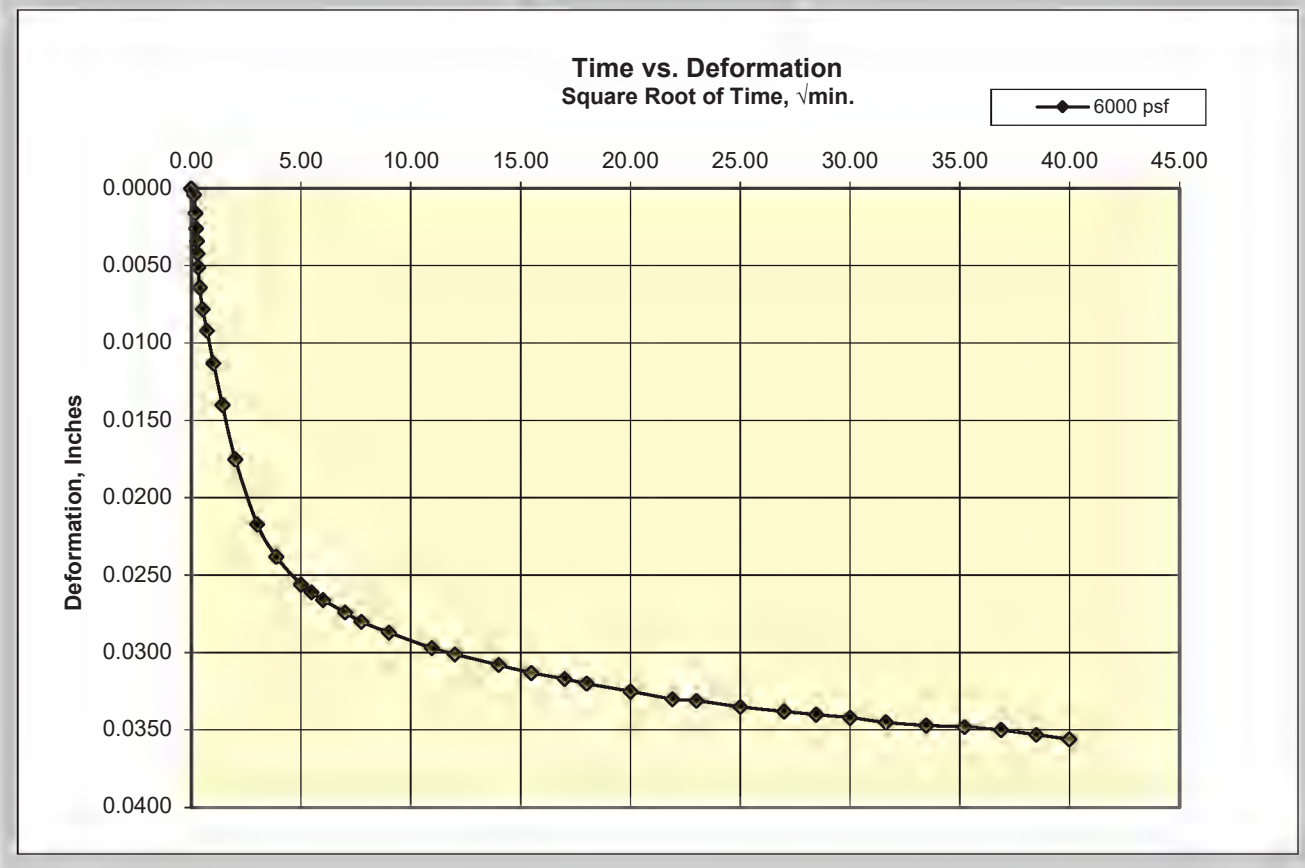
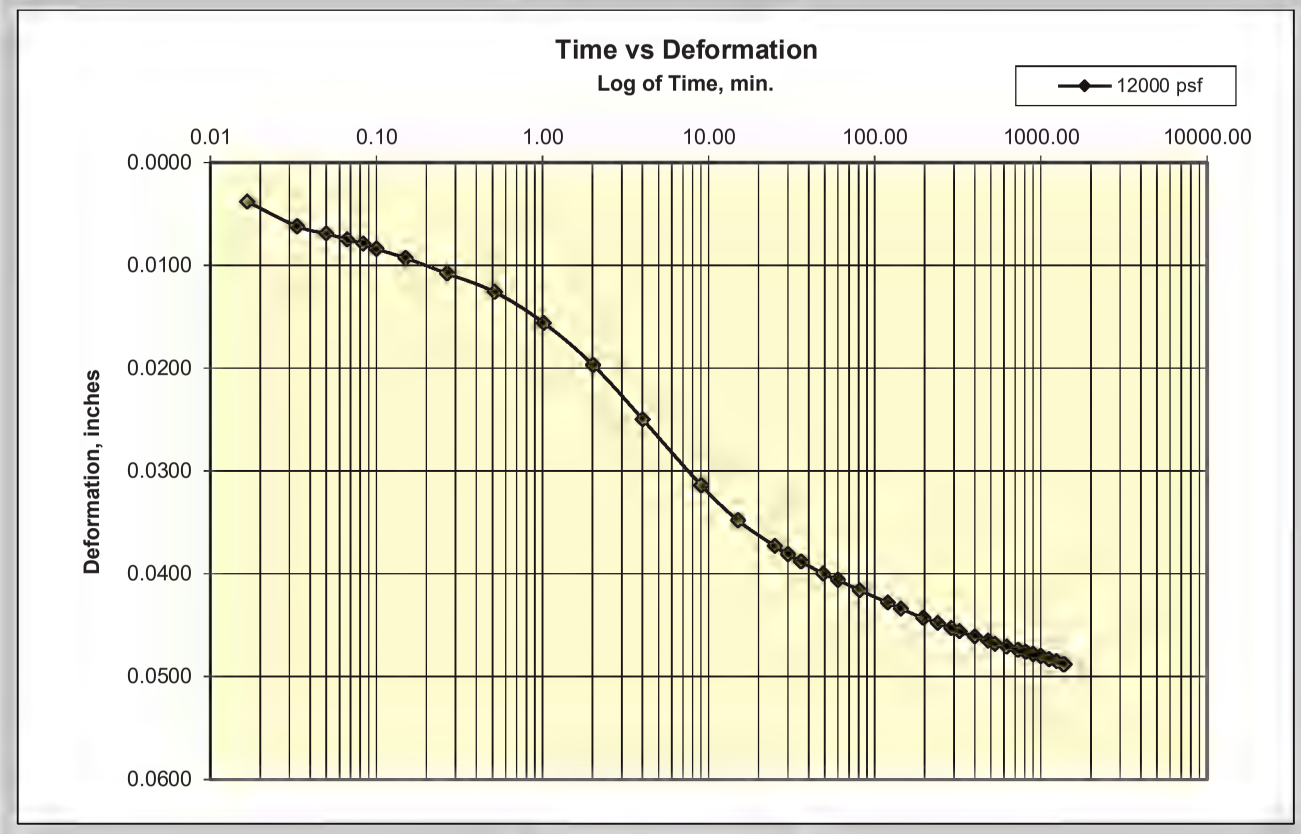


Cooper Testing Labs, Inc.

Load 9

12000 psf



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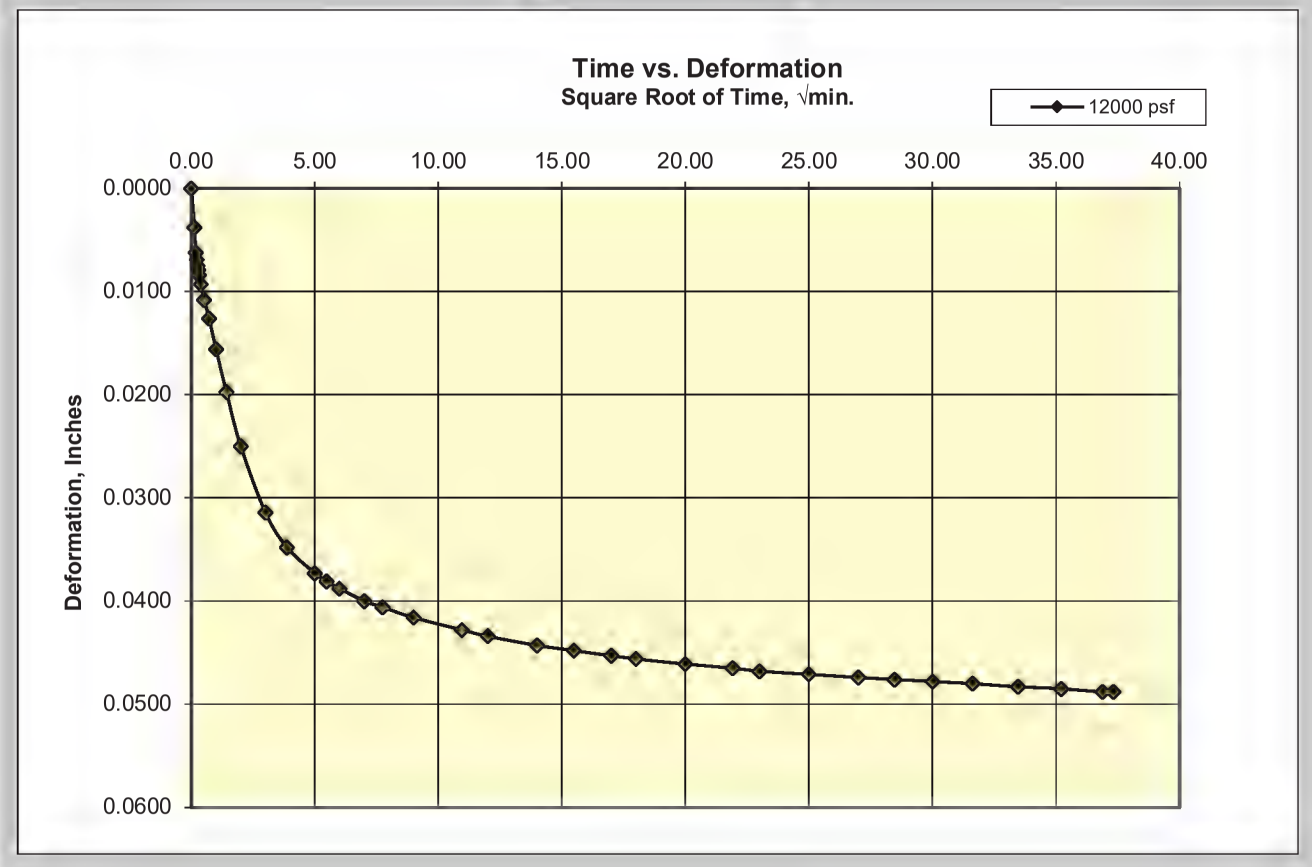

Cooper Testing Labs, Inc.

Load 10

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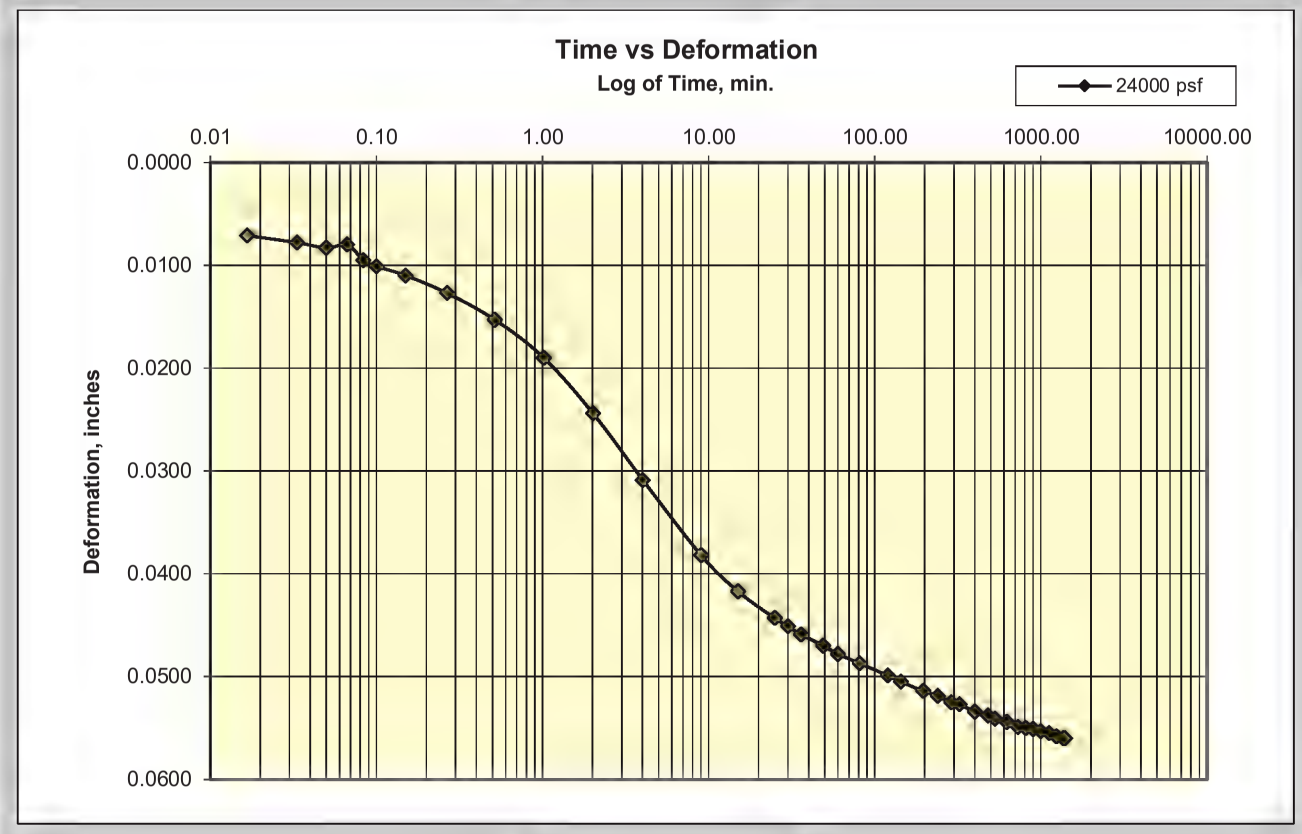

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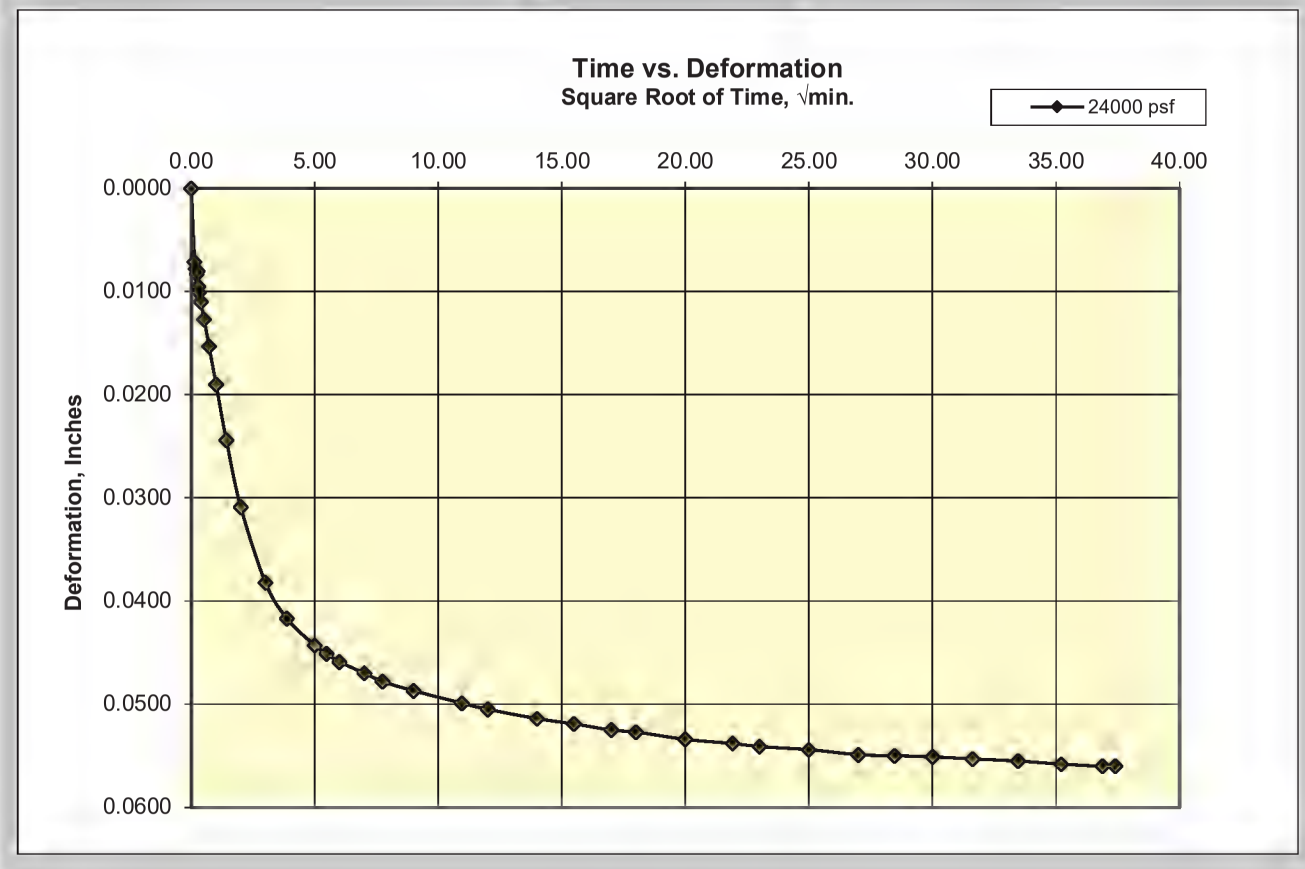
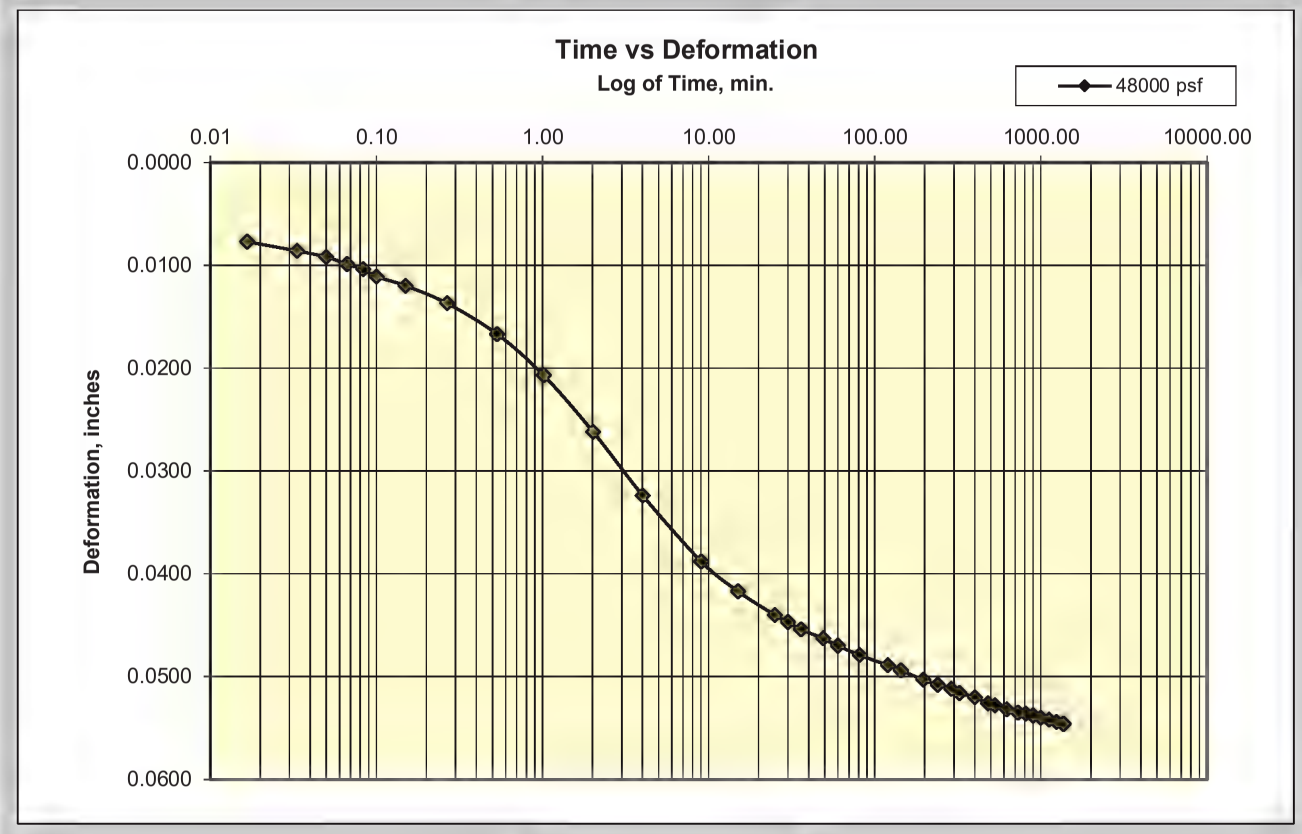


Cooper Testing Labs, Inc.

Load 11

48000 psf



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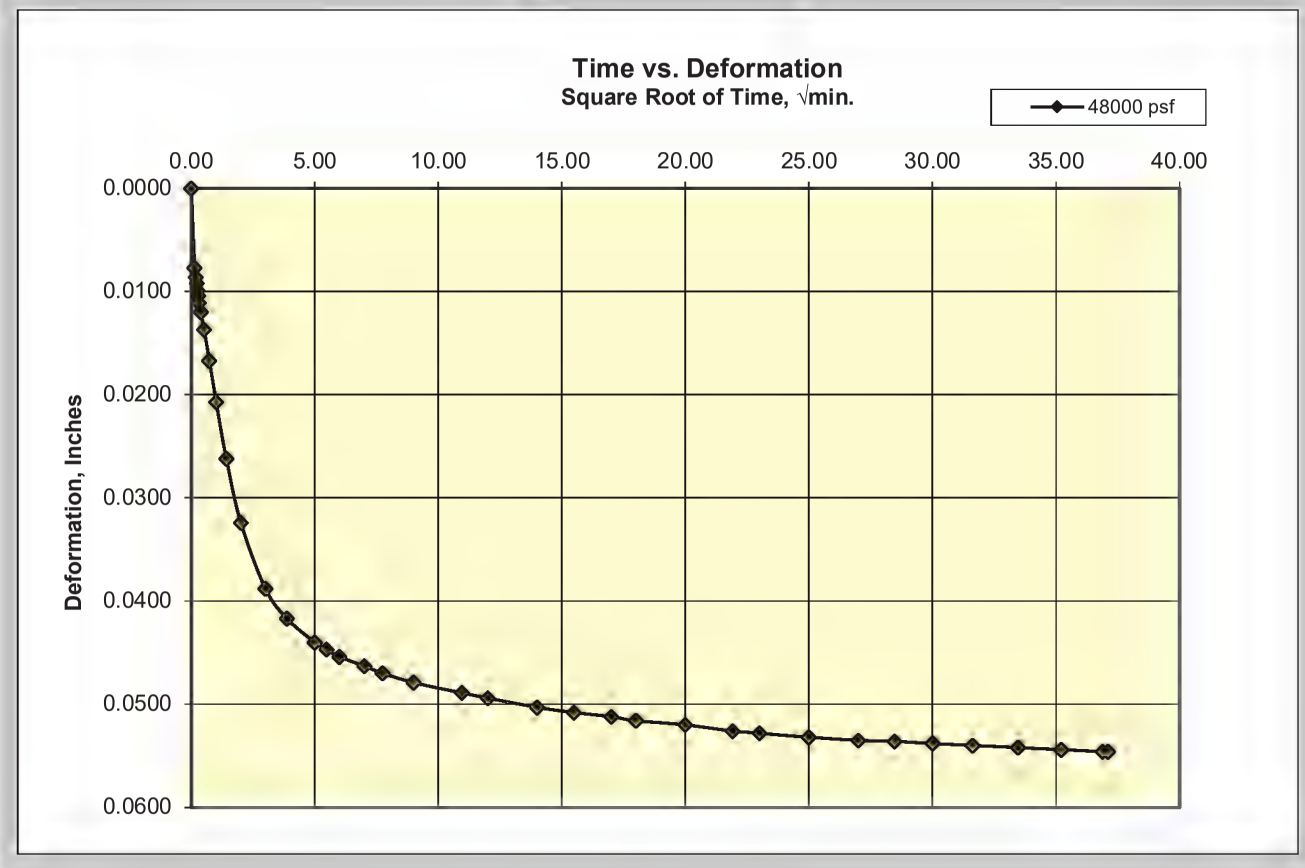

Cooper Testing Labs, Inc.

Load 12

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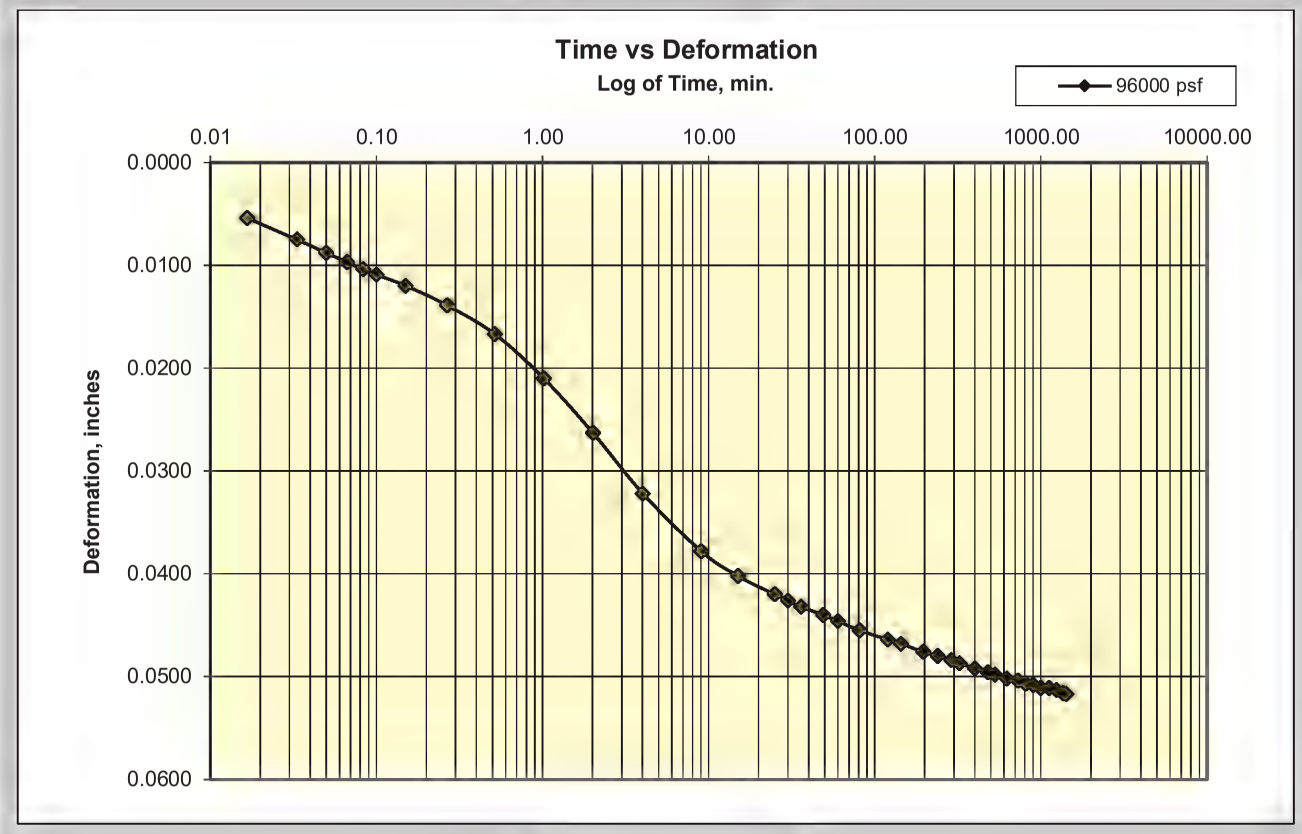

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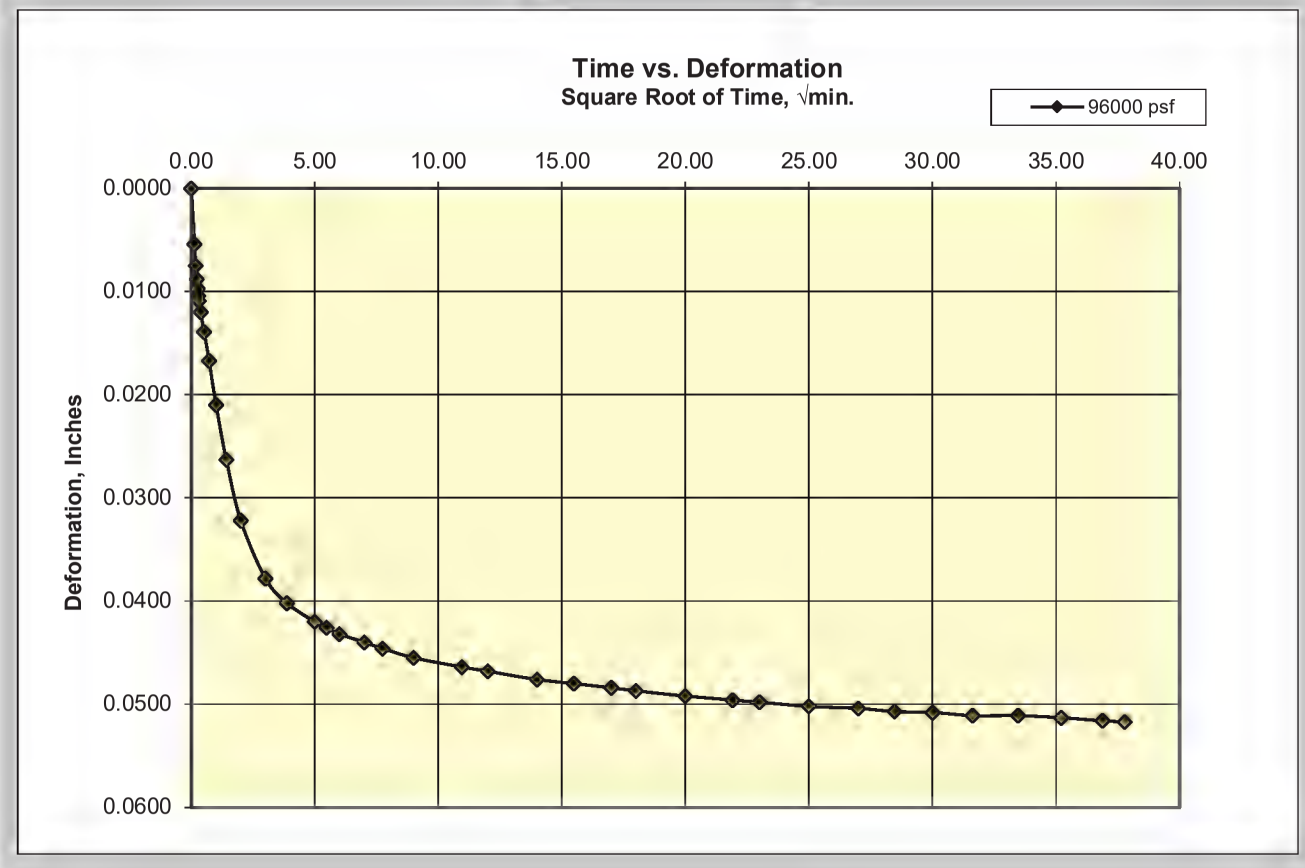
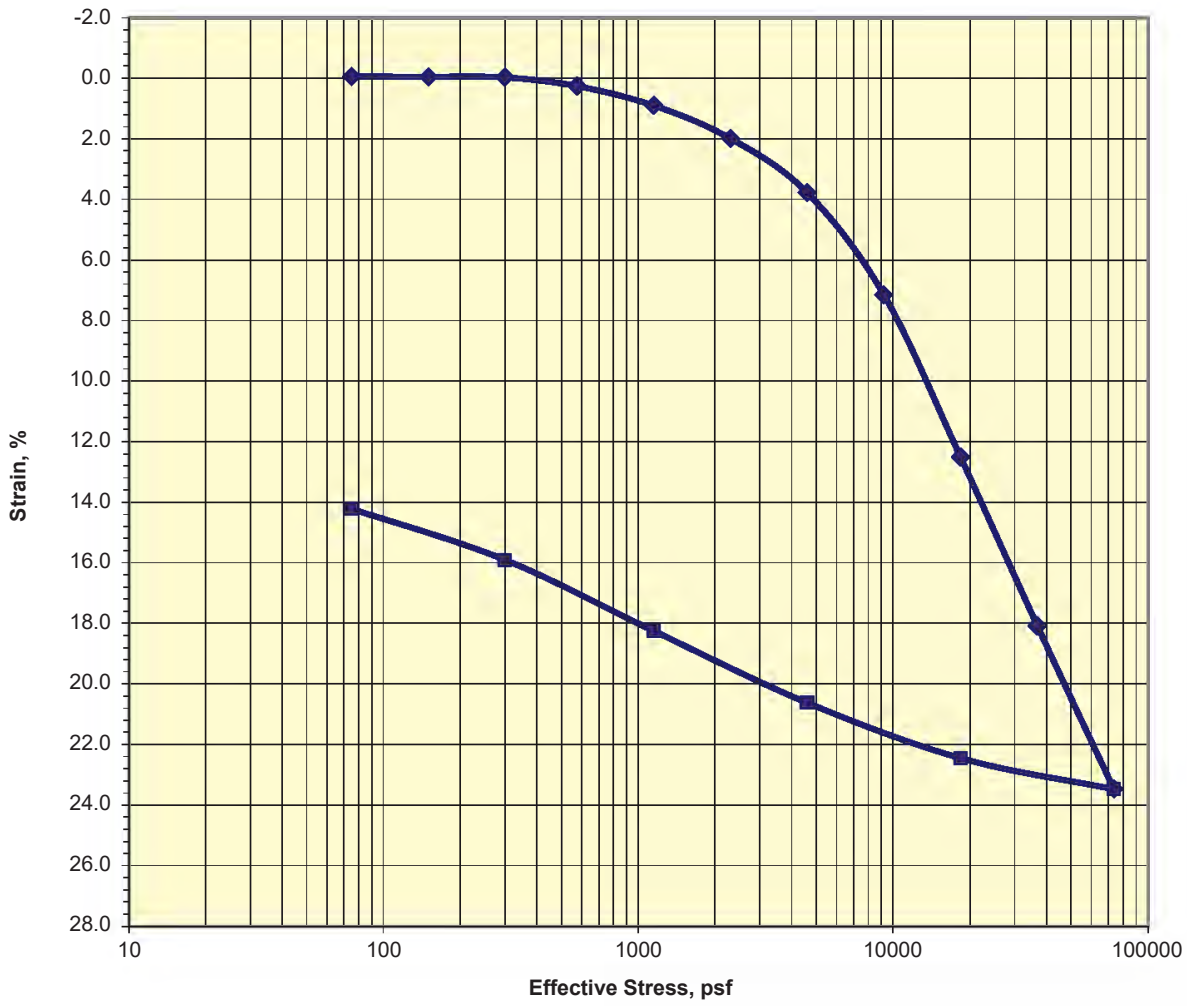


Consolidation Test
ASTM D2435

Job No.:	054-194	**Boring:**	23-B104	**Run By:**	HM
Client:	SHN Engineers & Geologists	**Sample:**	21	**Reduced:**	RU
Project:	022054.400	**Depth, ft.:**	75-77.5	**Checked:**	PJ
Soil Type:	Greenish Gray CLAY (Bay Mud)			**Date:**	11/7/2023

Strain-Log-P Curve



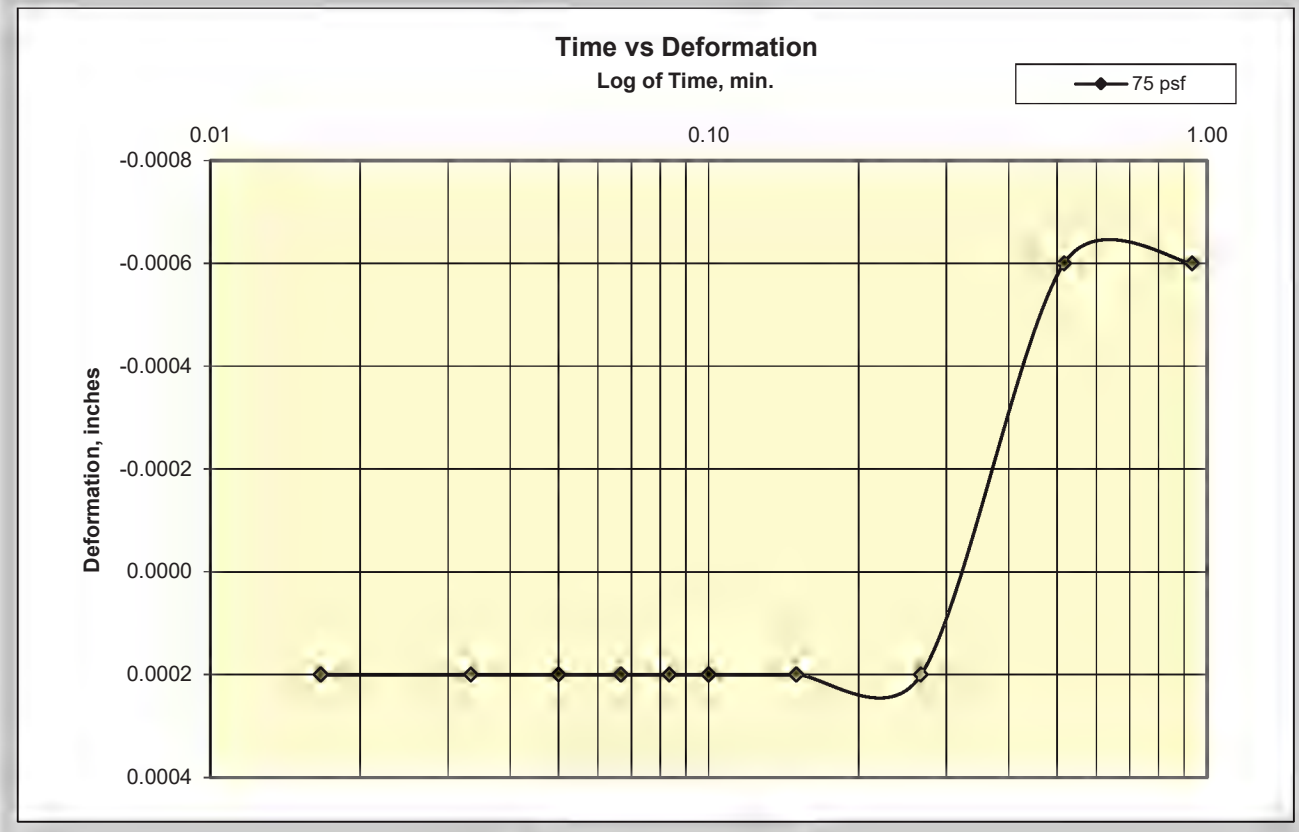
Assumed Gs 2.75	Initial	Final
Moisture %:	38.2	27.9
Dry Density, pcf:	83.6	97.1
Void Ratio:	1.053	0.767
% Saturation:	99.7	100.0

Remarks:

Cooper Testing Labs, Inc.

Load 1

75 psf



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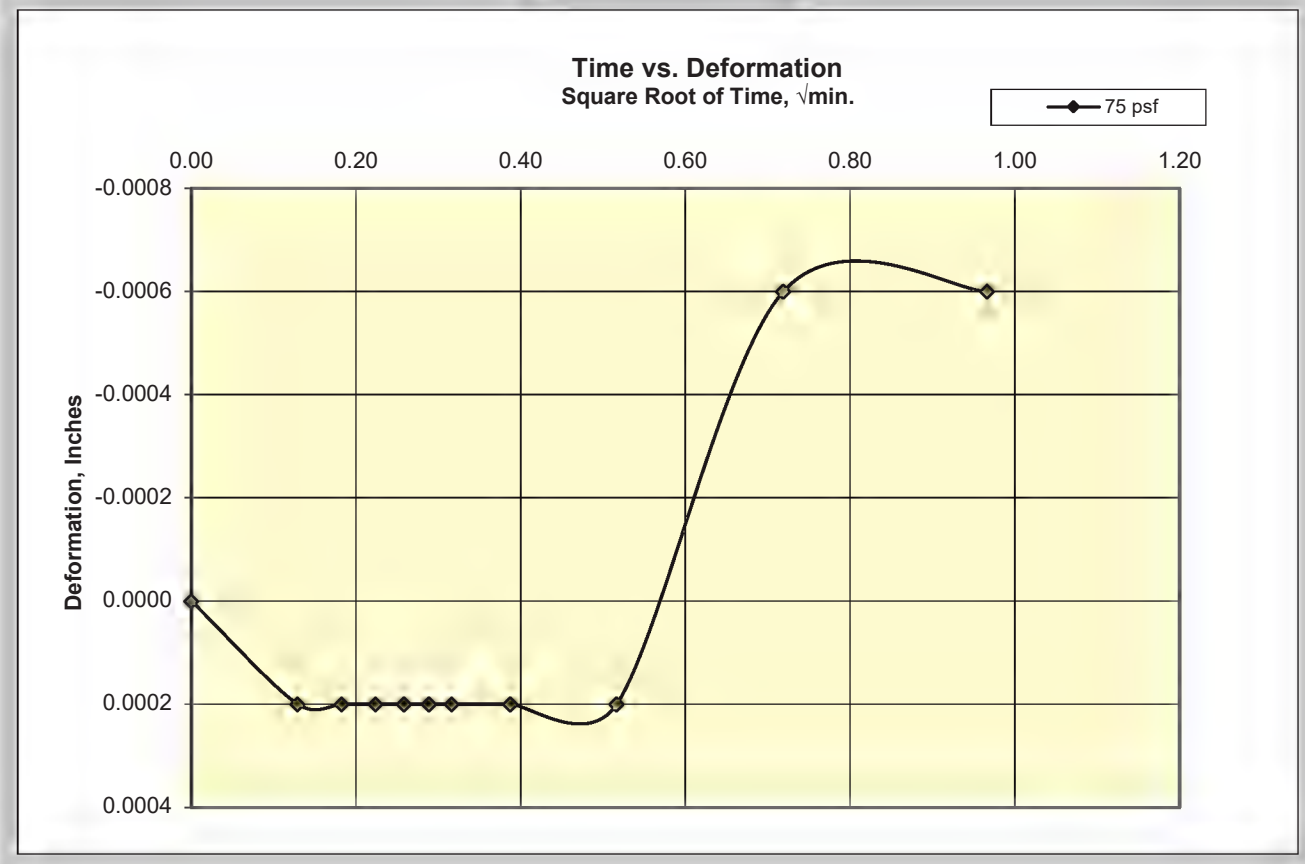

Cooper Testing Labs, Inc.

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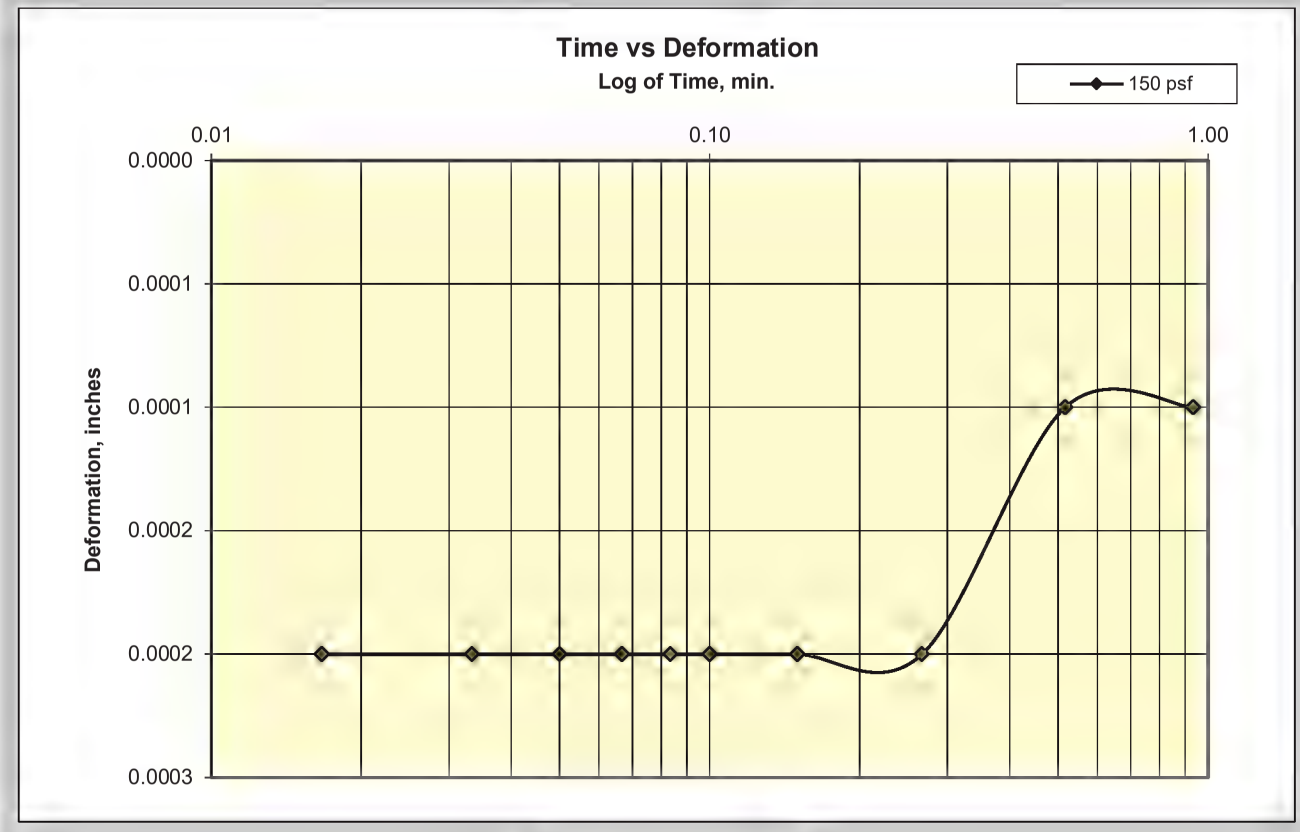

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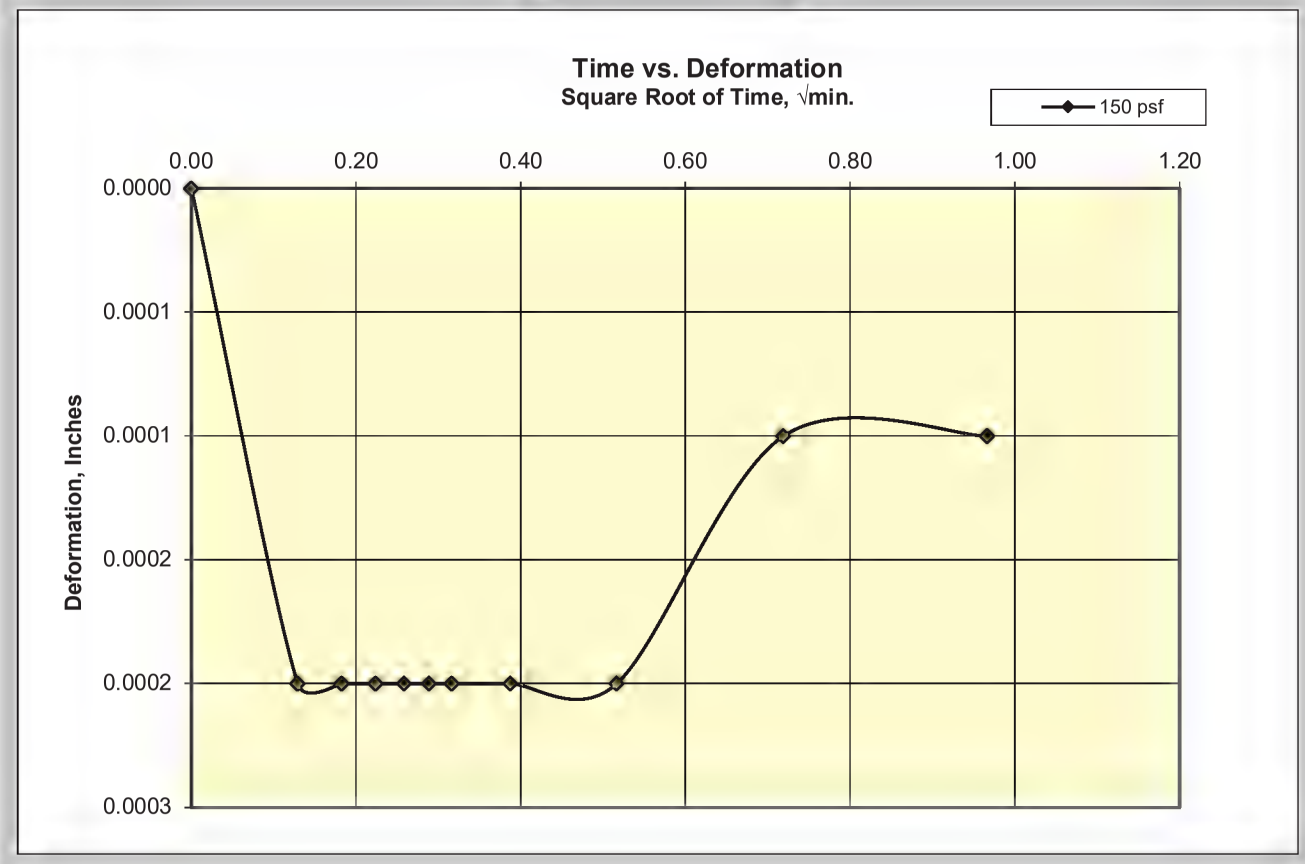

Cooper Testing Labs, Inc.

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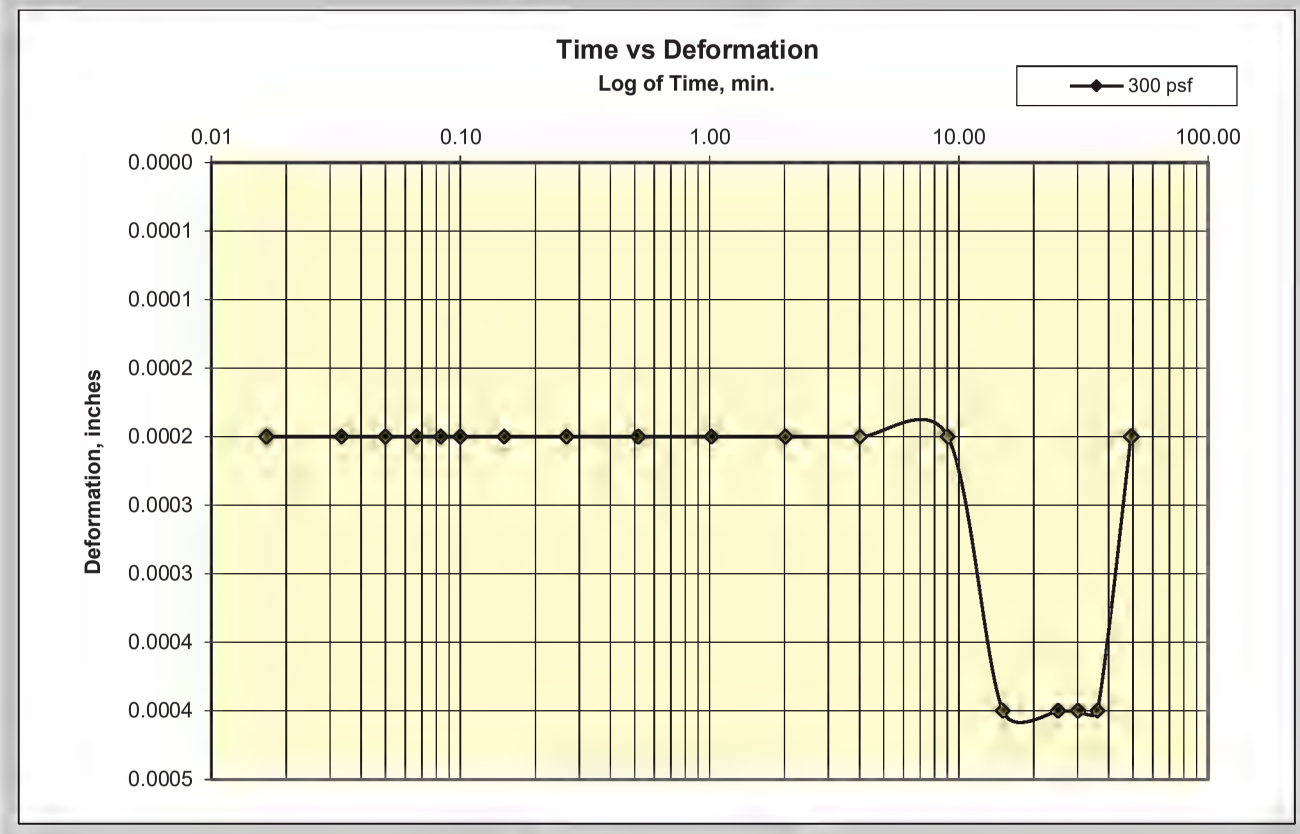

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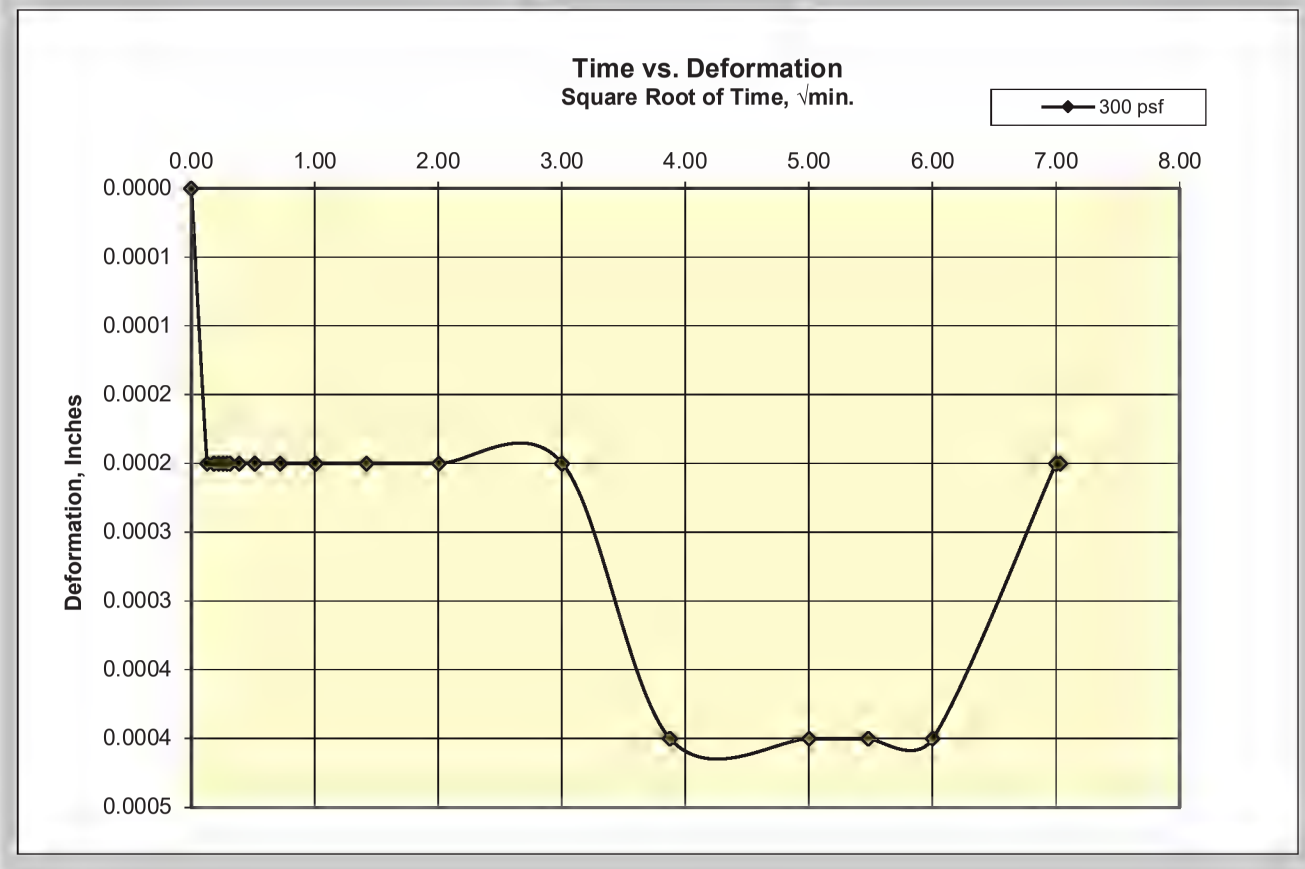
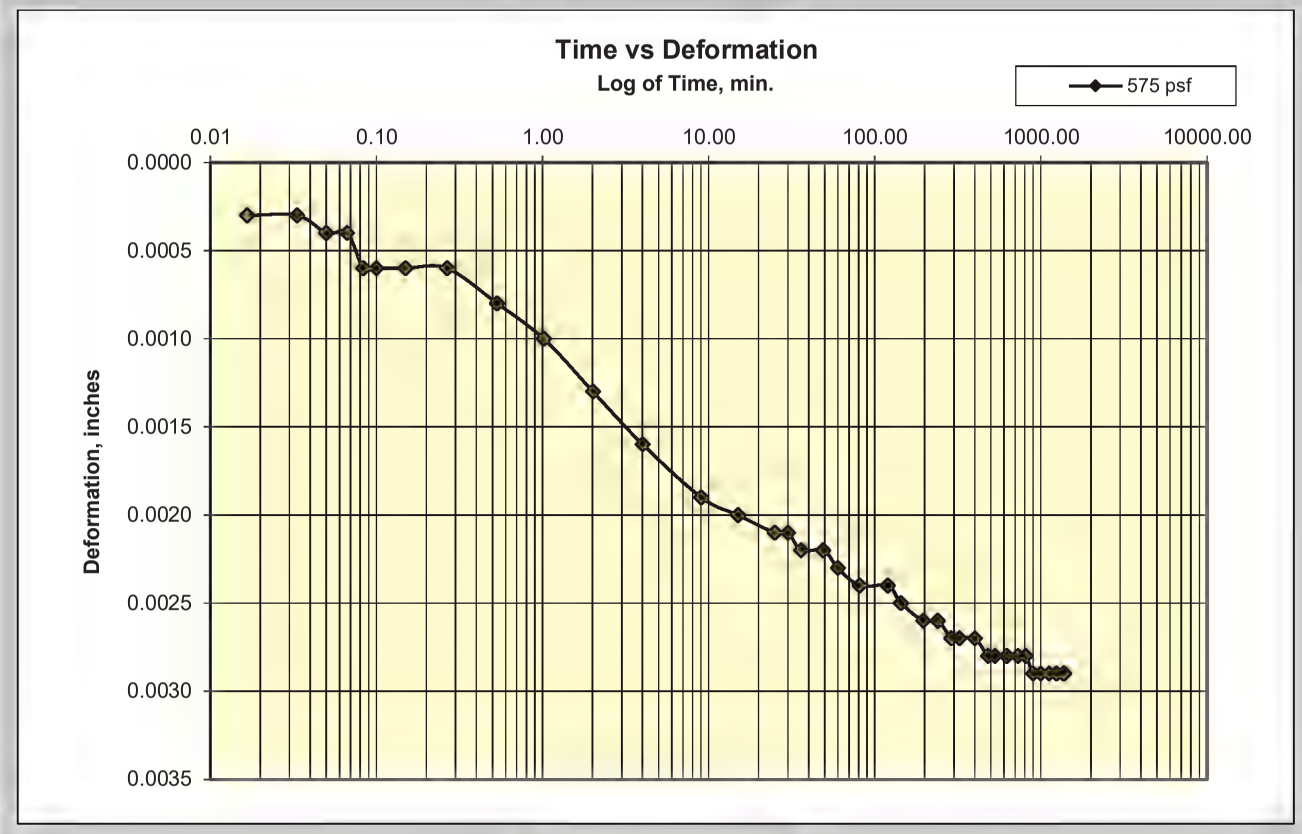


Cooper Testing Labs, Inc.

Load 4

575 psf



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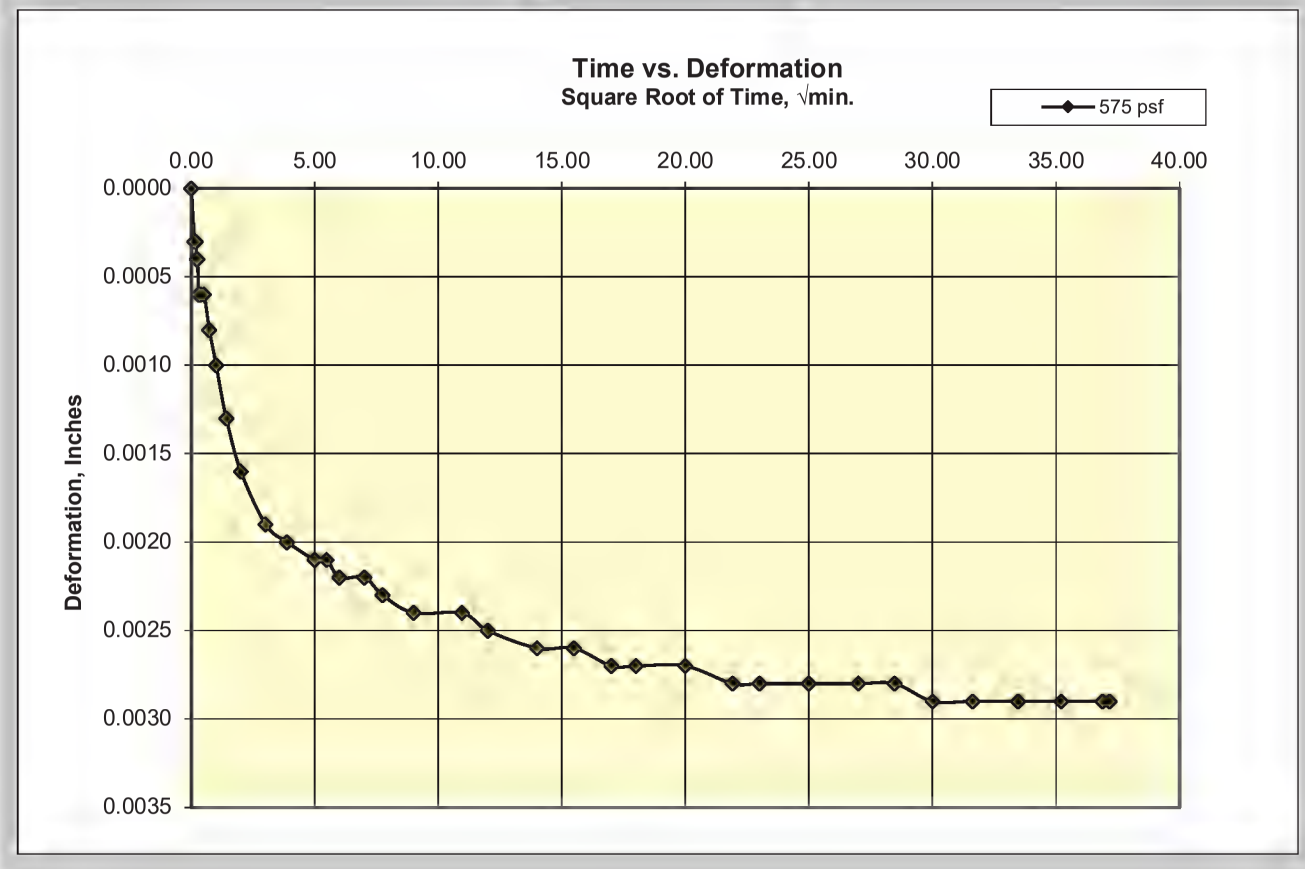
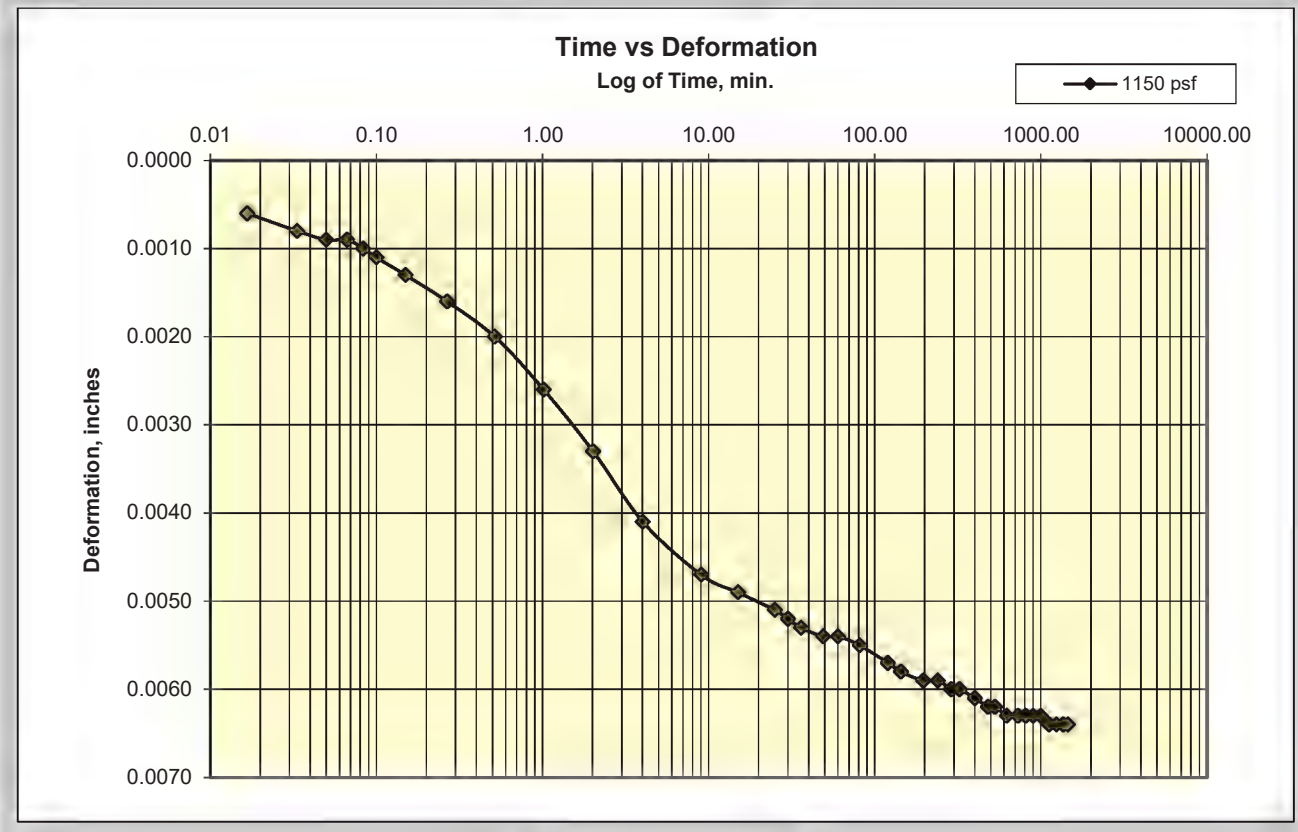


Cooper Testing Labs, Inc.

Load 5

1150 psf



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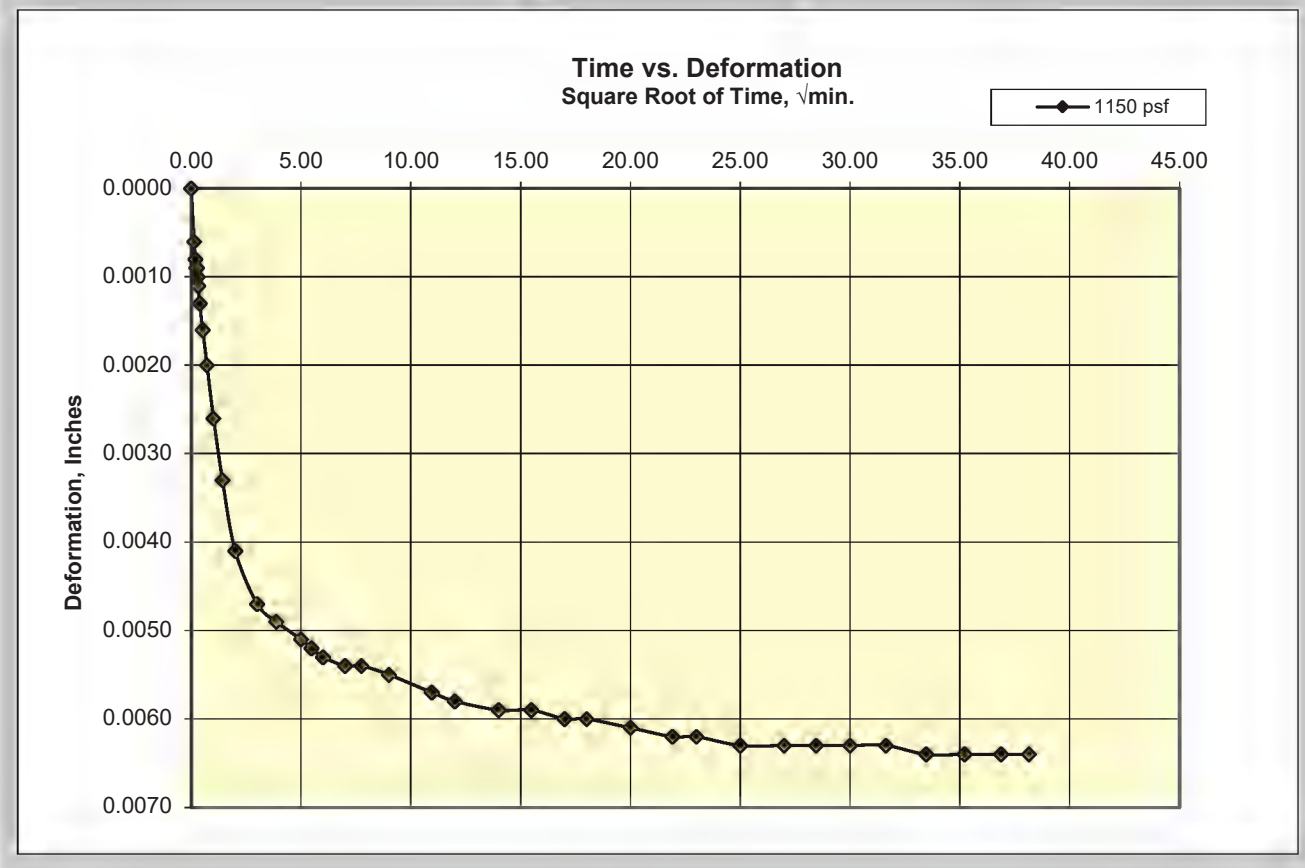

Cooper Testing Labs, Inc.

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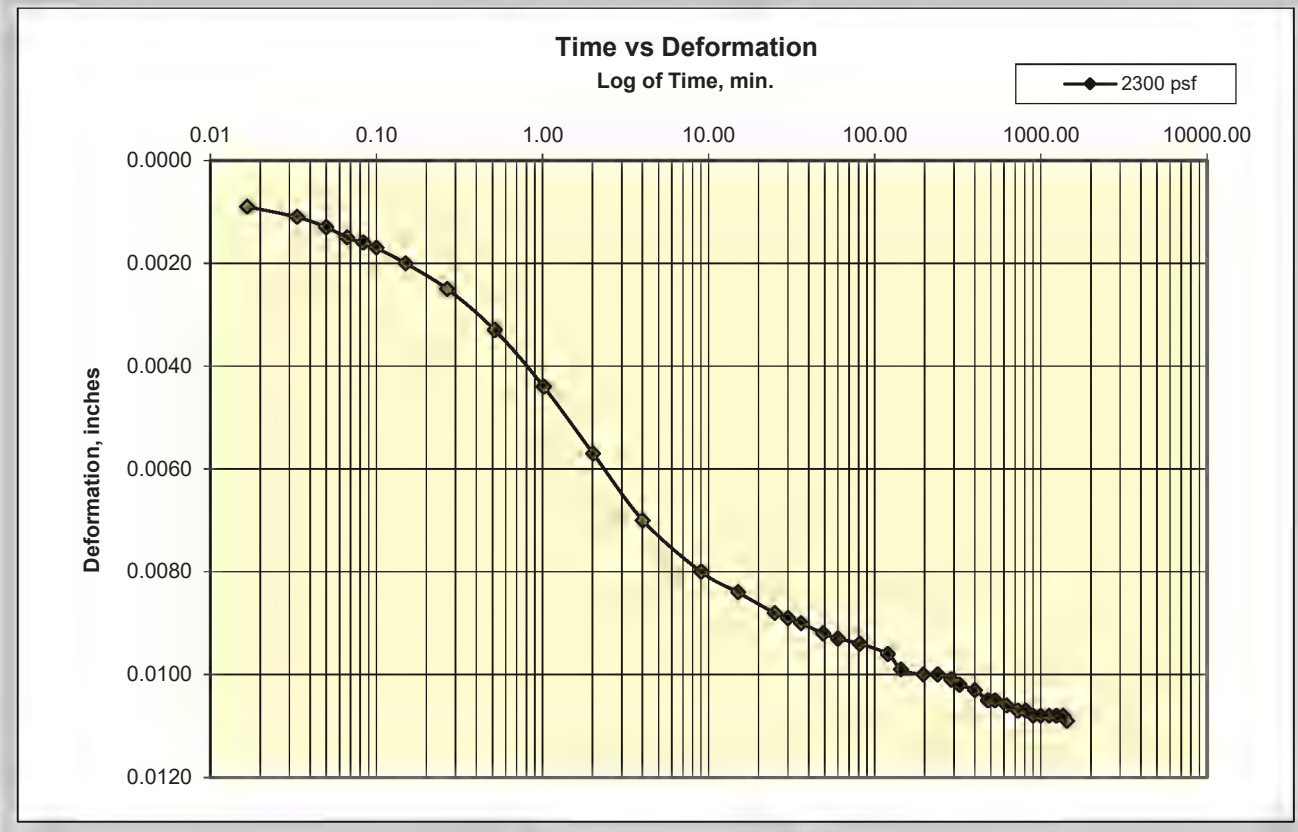

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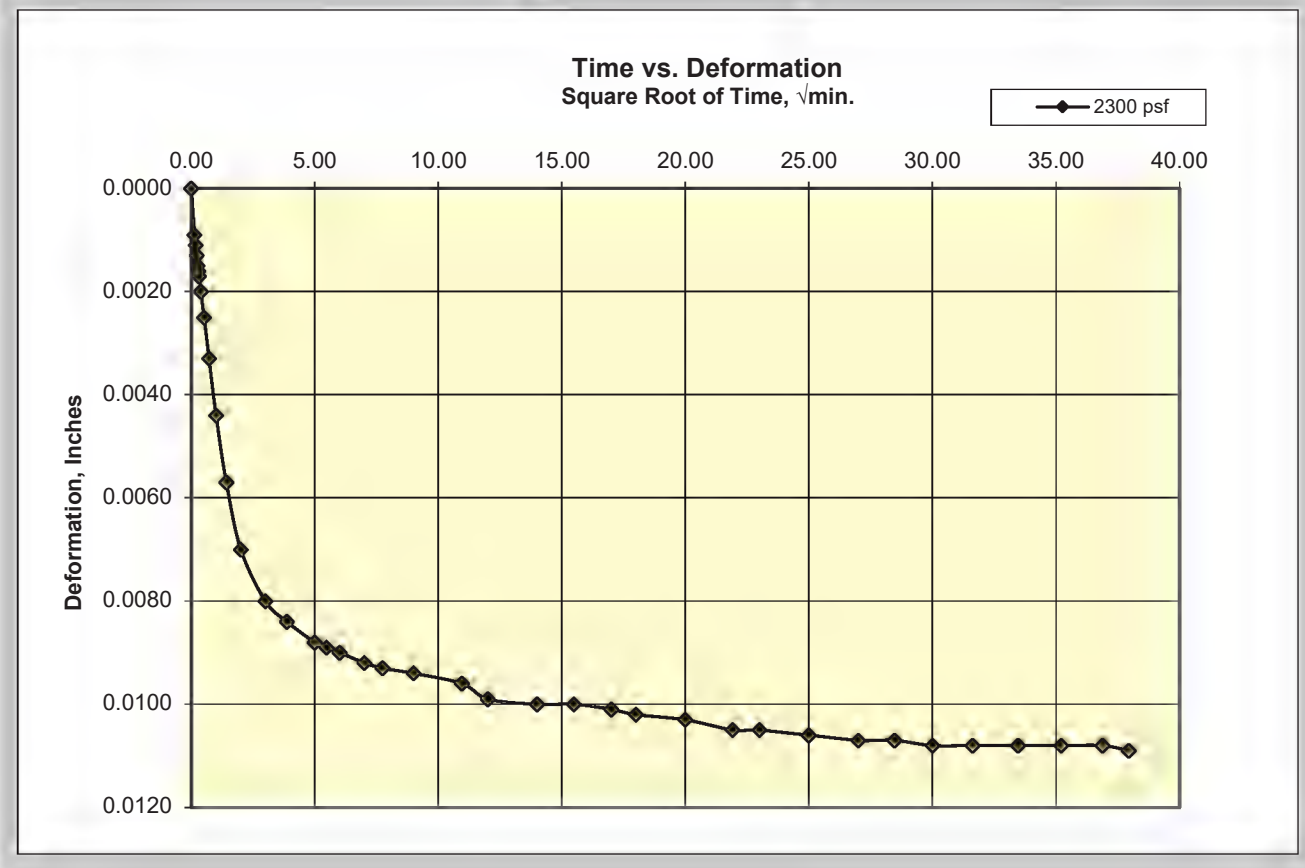

Cooper Testing Labs, Inc.

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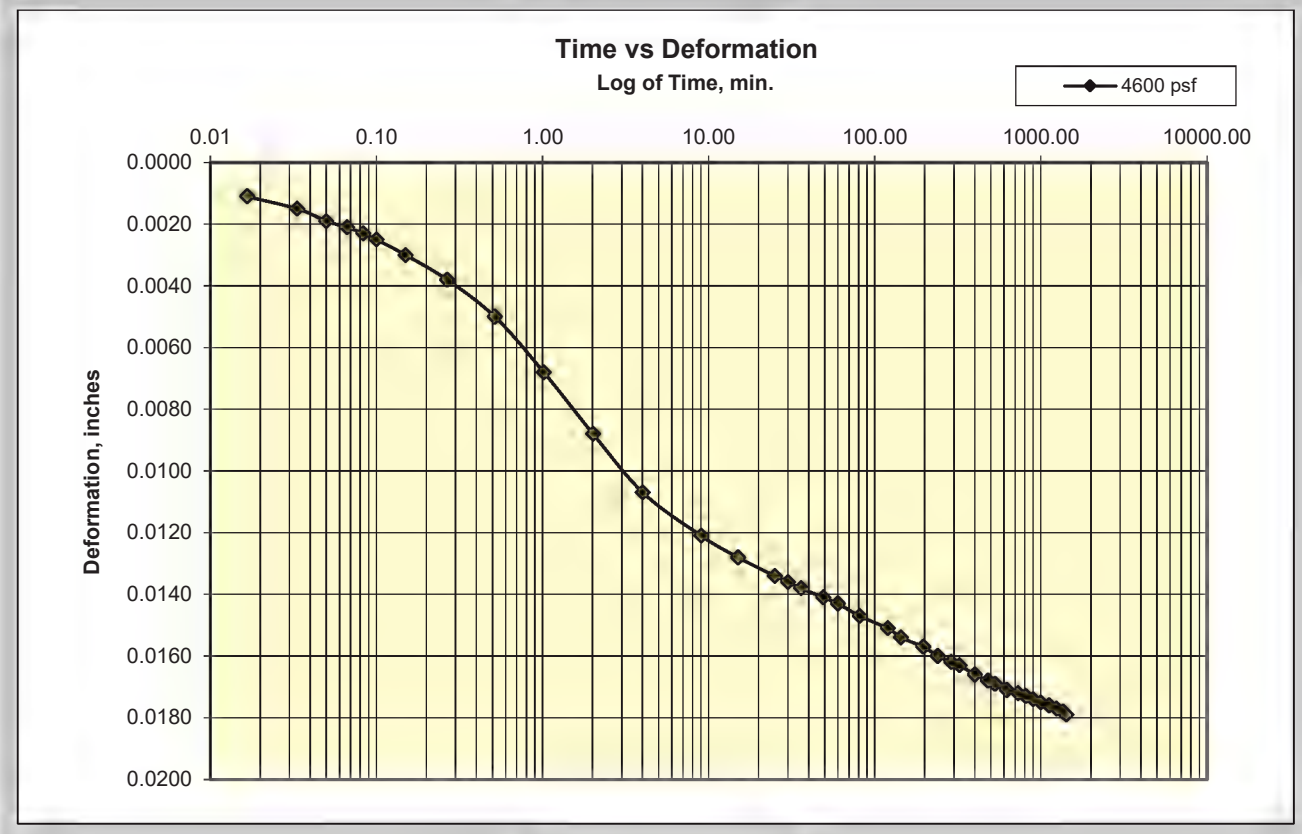

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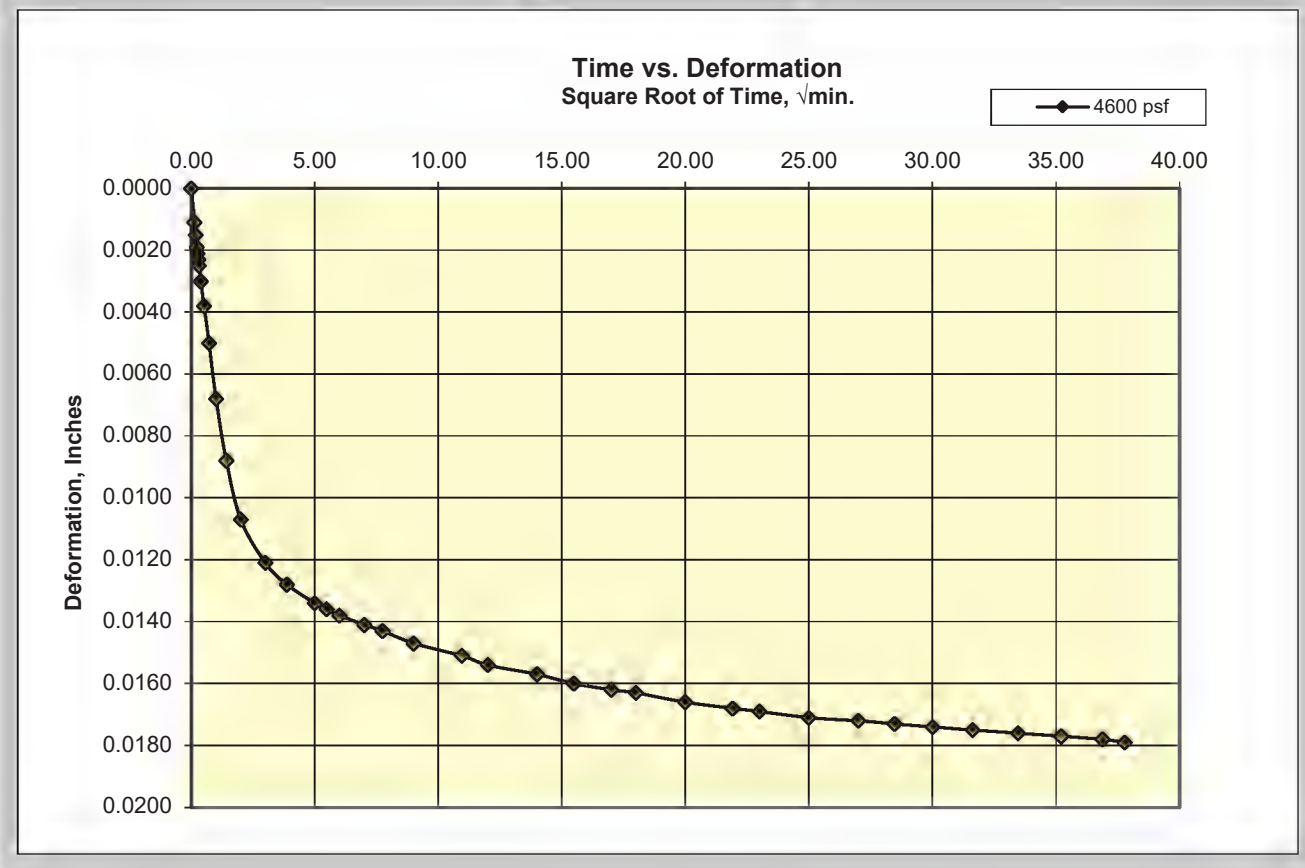

Cooper Testing Labs, Inc.

Load 8

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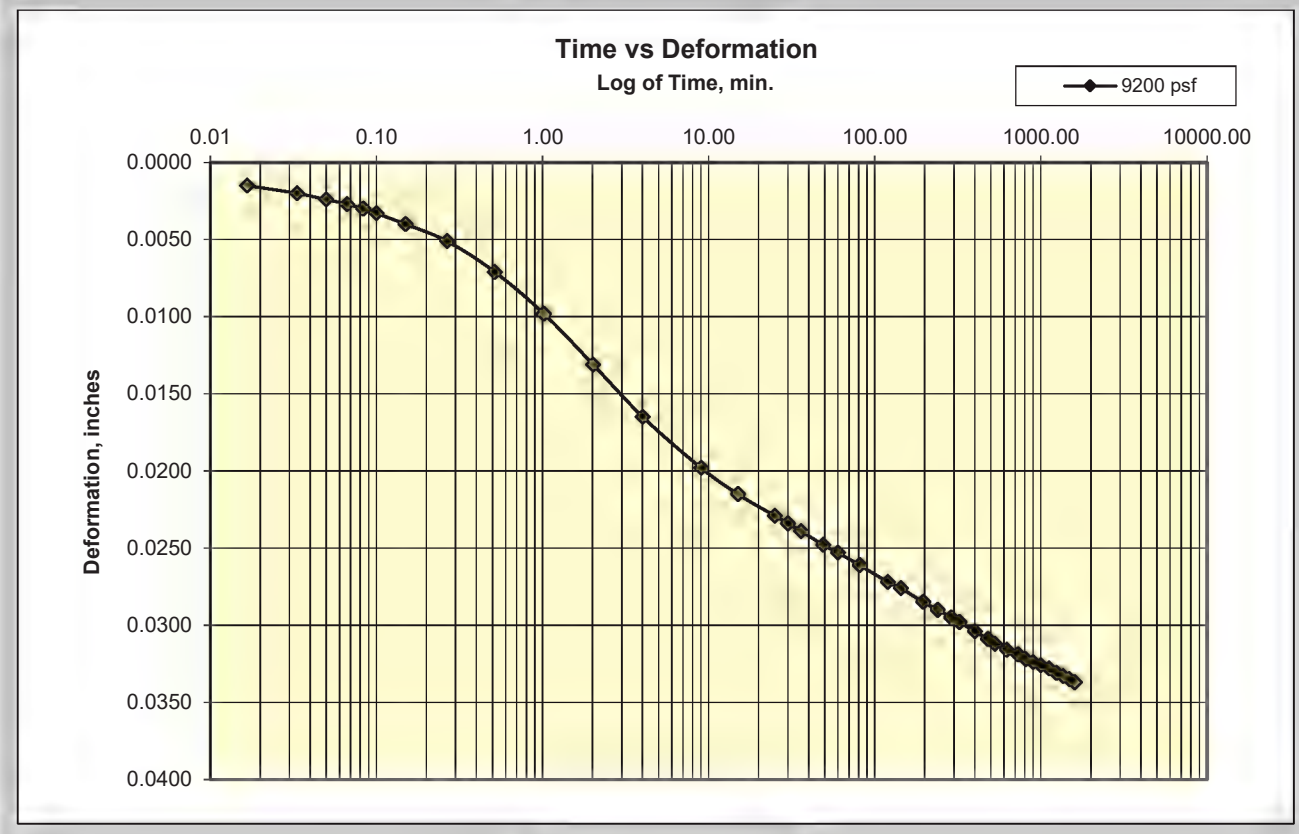
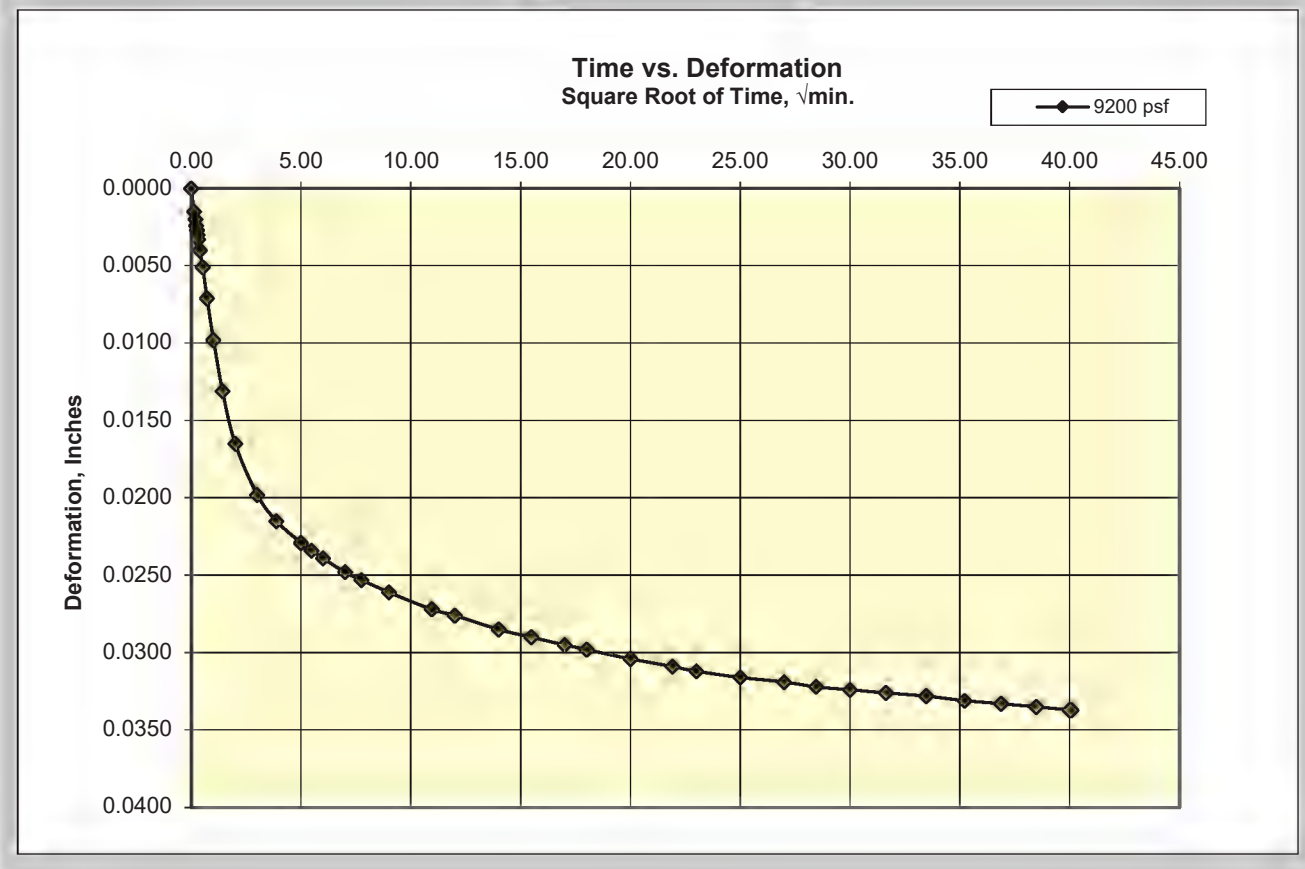


9200 psf



Cooper Testing Labs, Inc.

Load 9

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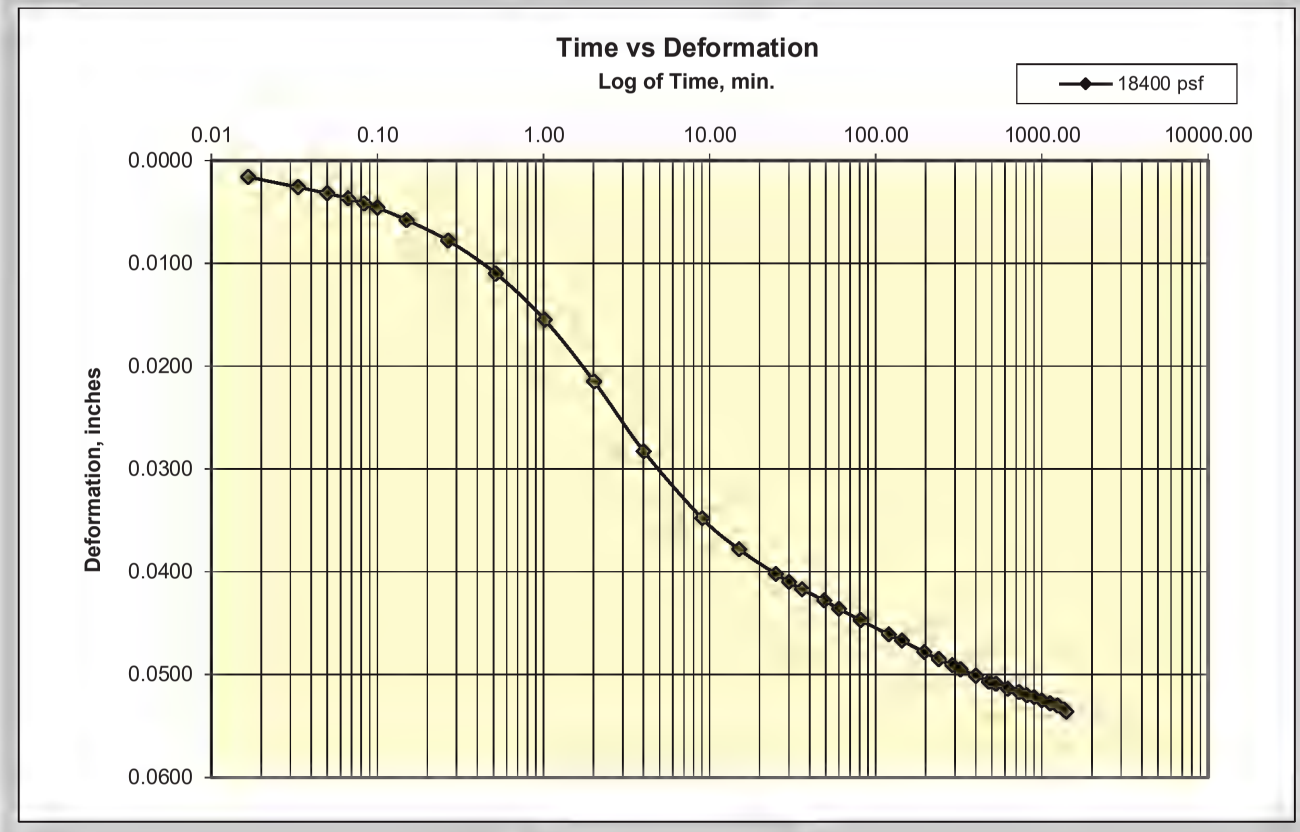

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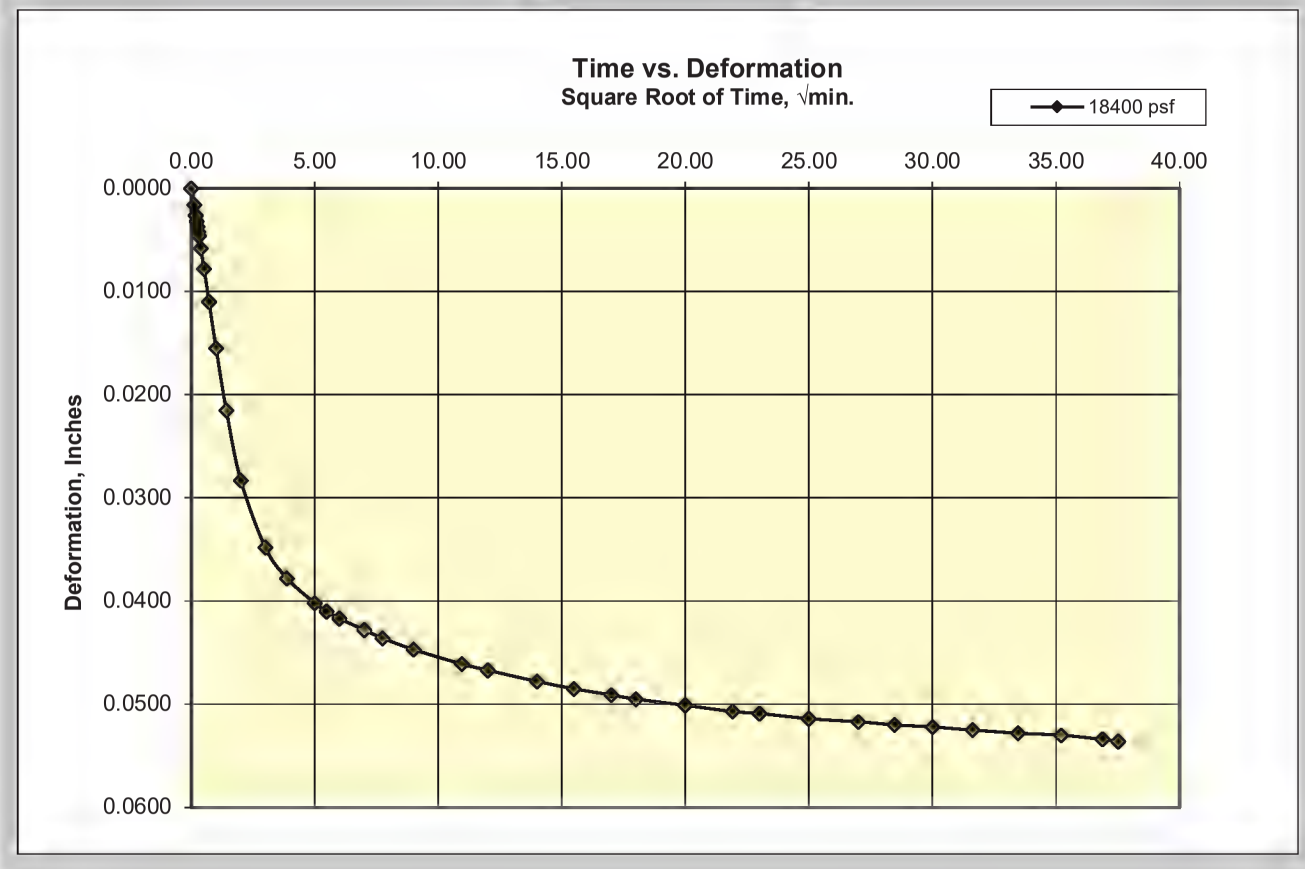
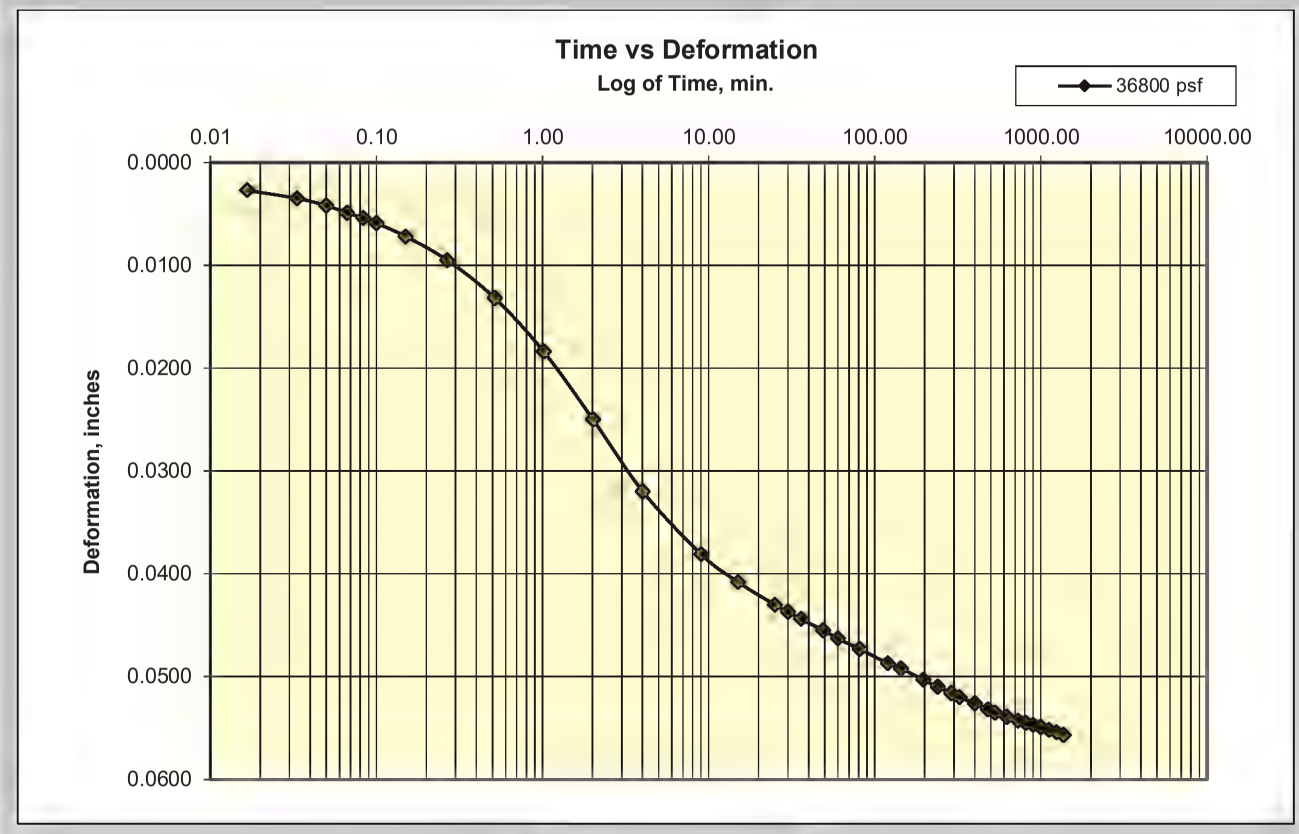


Cooper Testing Labs, Inc.

Load 10

36800 psf



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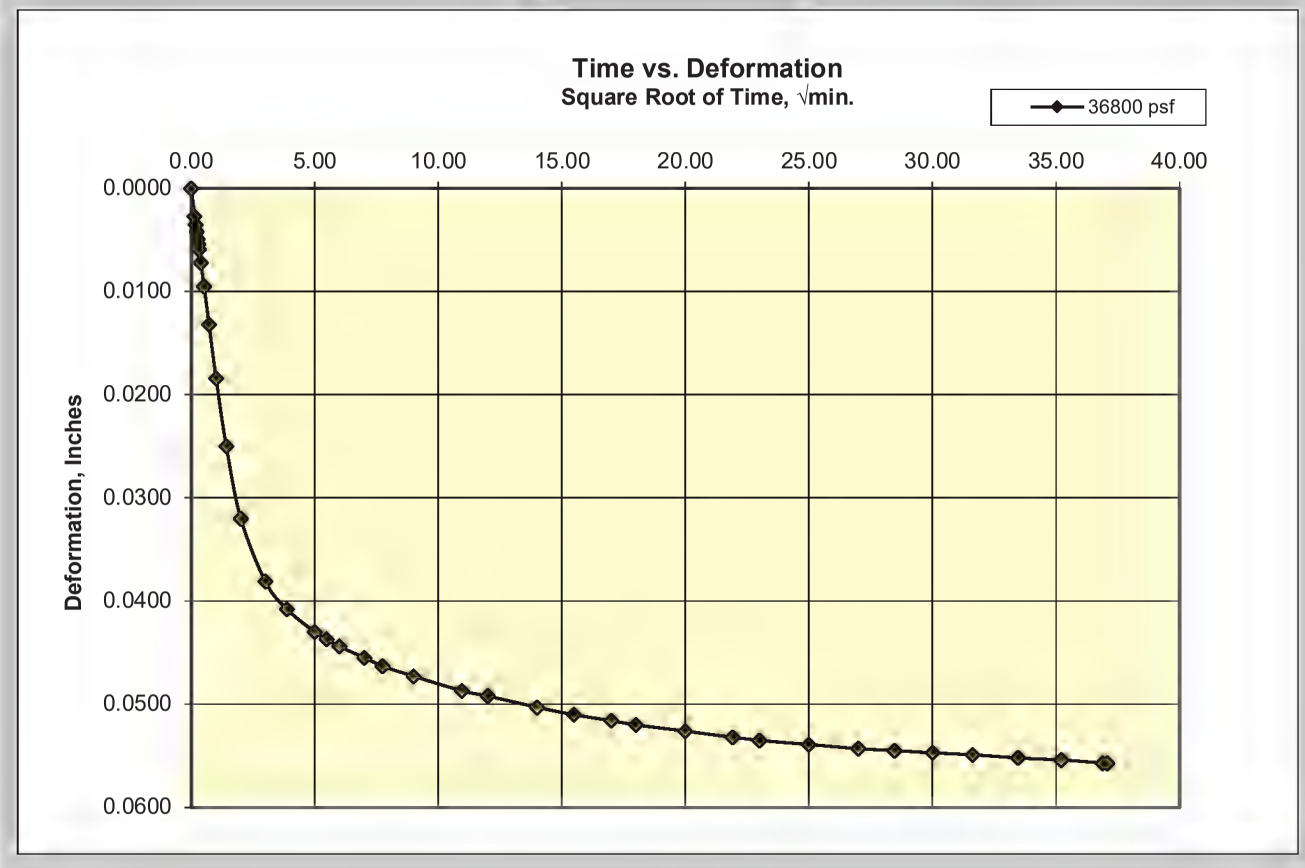
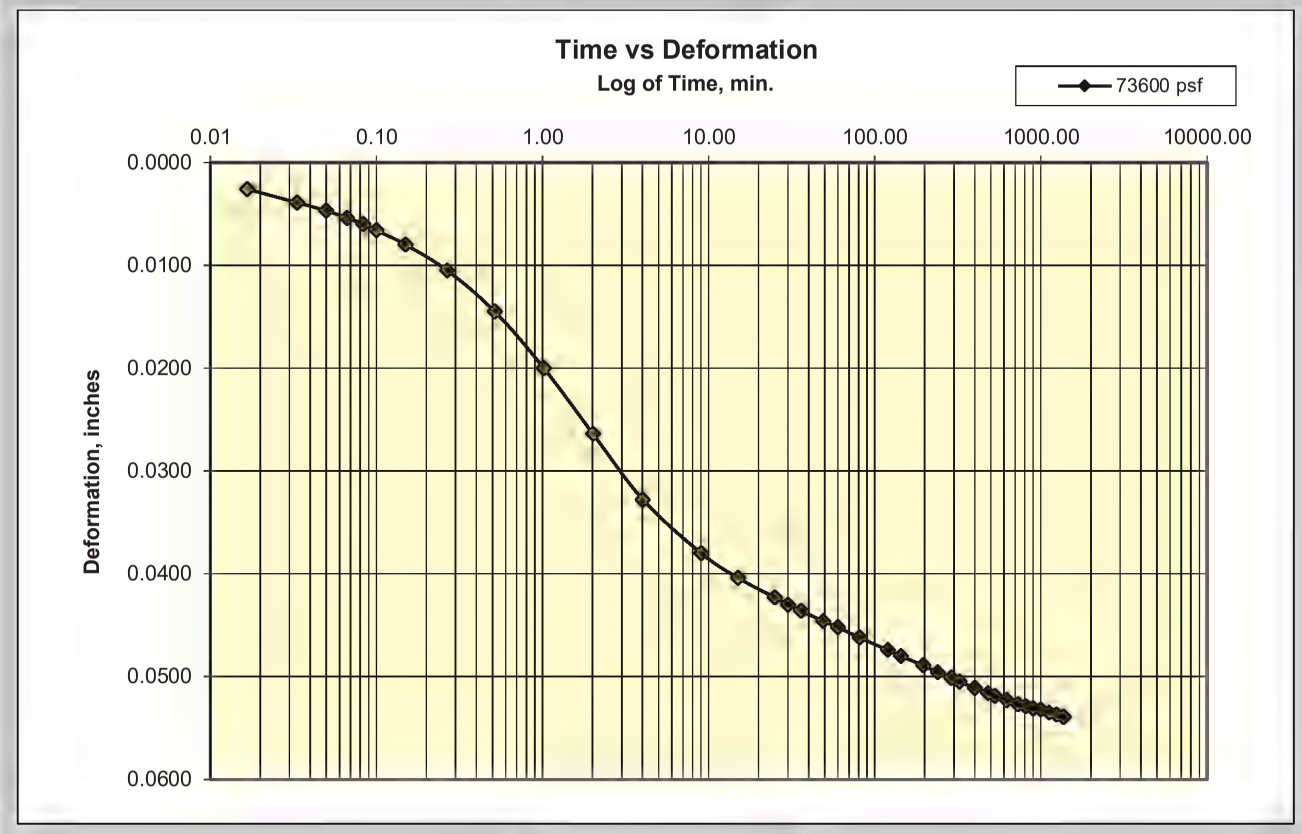
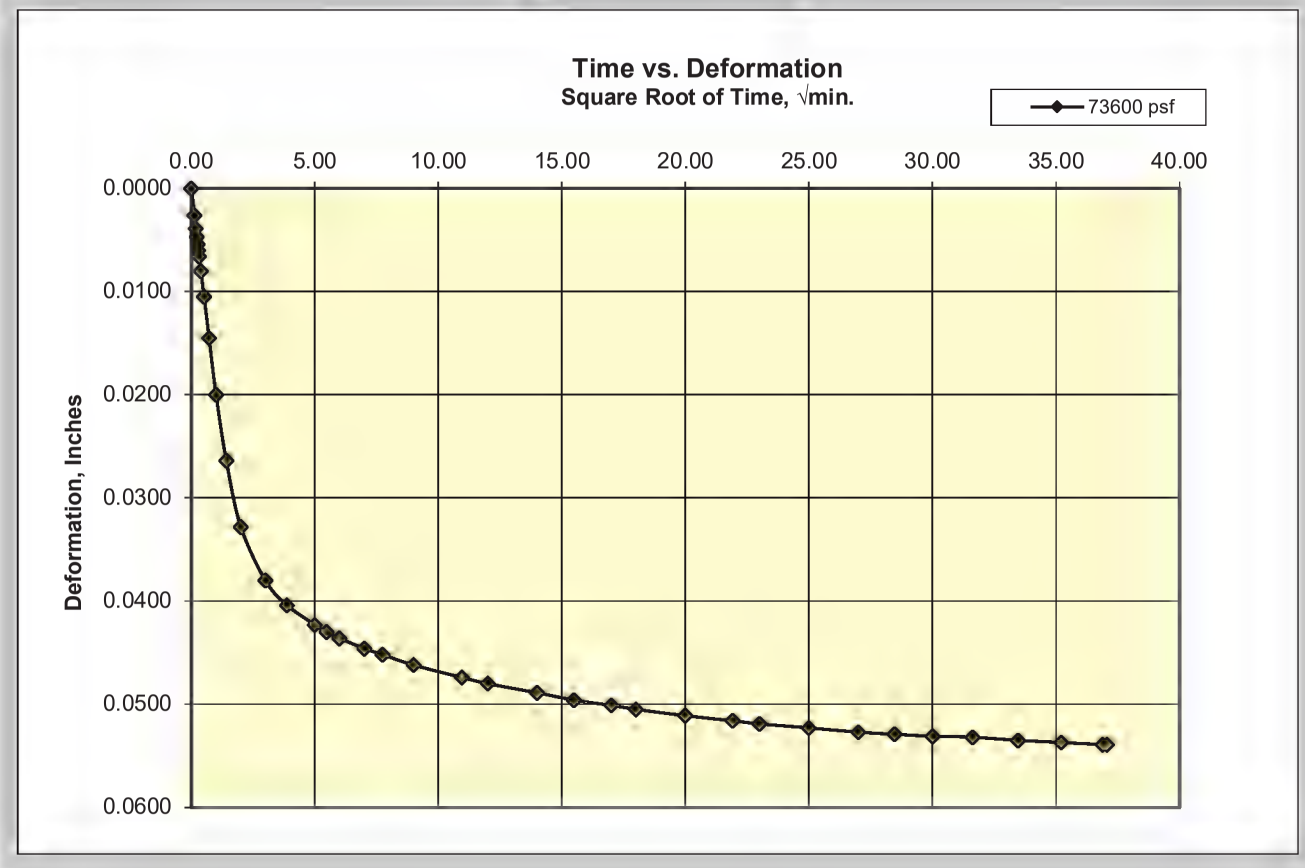


Cooper Testing Labs, Inc.

Load 11 73600 psf



73600 psf



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SIEVE ANALYSIS FOR PARTICLE SIZE DISTRIBUTION OF SOILS

ASTM D6913 - METHOD B

PROJECT NAME:	**RMMT Geotech**	LAB SAMPLE NO:	**23-958**
PROEJCT NUMBER:	**022054.400**	PERFORMED BY: **JMA**	DATE: **11/4/2023**
SAMPLE I.D.:	**23-B101 20-21.5'**	CHECKED BY: **KEW**	DATE: **11/10/2023**

TOTAL SAMPLE WEIGHT BEFORE WASH: 227.1 SAMPLE WEIGHT AFTER WASH: 210.7

PERCENT WASHED: **100.0**

	WEIGHT RETAINED			
SIEVE #	SCREEN	TOTAL	**% PASSED**	**% PASSED REQUIREMENT**
3" (75mm)		0	**100.000**	
2 1/2 (63mm)		0	**100.000**	
2" (50mm)		0	**100.000**	
1 1/2" (37.5mm)		0	**100.000**	
1" (25mm)		0	**100.000**	
3/4" (19mm)		0	**100.000**	
1/2" (12.5mm)		0	**100.000**	
3/8" (9.5mm)		0	**100.000**	
#4 (4.75mm)	0	0	**100.000**	
Pan	210.70	210.70		

FINE FRACTION GRADING WEIGHT 210.70

	WEIGHT RETAINED				
	REDUCED PORTION	SCREEN	TOTAL	**%PASSED**	**% PASSED REQUIREMENT**
#10 (2.00mm)	14.53	14.53	14.53	**93.6019**	
#20(.85mm)	12.87	12.87	27.40	**87.9348**	
#40 (.425mm)	37.23	37.23	64.63	**71.5412**	
#60 (.25mm)	81.96	81.96	146.59	**35.4513**	
#100 (.150mm)	55.30	55.30	201.89	**11.1008**	
#140 (.106mm)	5.32	5.32	207.21	**8.7583**	
#200 (.0075mm)	3.39	3.39	210.60	**7.2655**	
PAN		0.00	210.60		

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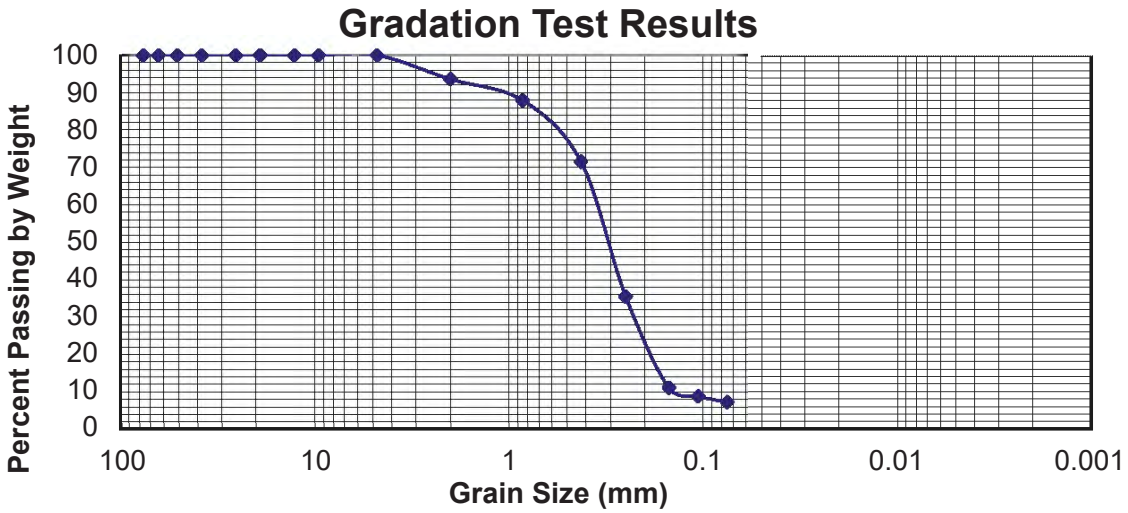
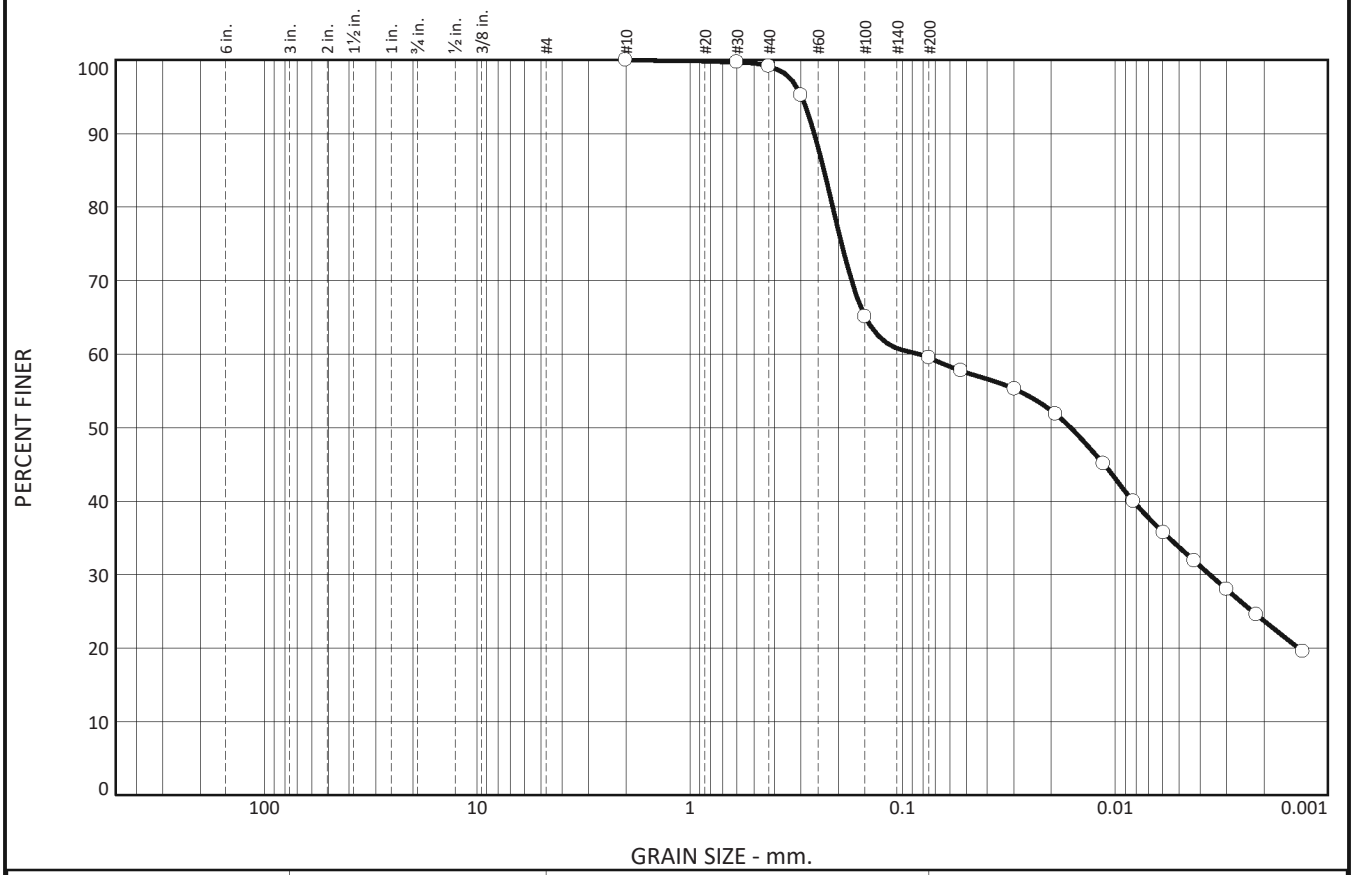
PROJECT NAME:	RMMT Geotech	PROJECT NUMBER:	022054.400
SAMPLE ID:	23-B101 20-21.5'	Lab Sample#:	23-958
DATE TESTED:	11/4/23		

SIEVE	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#140	#200
SIEVE SIZE (mm)	76.2	63.5	50.8	38.1	25.4	19.1	12.7	9.53	4.75	2.00	0.850	0.425	0.250	0.150	0.106	0.075
PERCENT PASSING	100	100	100	100	100	100	100	100	100	93.6	87.9	71.5	35.5	11.1	8.8	7.3
SPEC REQUIRED																



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.9	39.6	35.8	23.7

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	99.7		
#40	99.1		
#50	95.2		
#100	65.1		
#200	59.5		
#270	57.7		
0.0297 mm.	55.2		
0.0191 mm.	51.8		
0.0113 mm.	45.1		
0.0082 mm.	39.9		
0.0059 mm.	35.7		
0.0042 mm.	31.9		
0.0030 mm.	28.0		
0.0022 mm.	24.5		
0.0013 mm.	19.5		

* (no specification provided)

Soil Description

Dark Gray Sandy CLAY

Atterberg Limits

PL= 0 LL= 0 PI=

Coefficients

D_{90}= 0.2601 D_{85}= 0.2344 D_{60}= 0.0836
D_{50}= 0.0162 D_{30}= 0.0036 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Source of Sample: 23-B101 **Depth:** 55.0-57.3'
Sample Number: 13 **Date:**

COOPER TESTING LABORATORY

Client: SHN Engineers & Geologists
Project: RMT, Samoa Peninsula, Humboldt County - 022054.400

Project No: 054-194 **Figure**

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SIEVE ANALYSIS FOR PARTICLE SIZE DISTRIBUTION OF SOILS

ASTM D6913 - METHOD B

PROJECT NAME:	**RMMT Geotech**		LAB SAMPLE NO: **23-966**
PROEJCT NUMBER:	**022054.400**	PERFORMED BY: **JMA**	DATE: **11/4/2023**
SAMPLE I.D.:	**23-B102 20-21.5'**	CHECKED BY: **KEW**	DATE: **11/10/2023**

TOTAL SAMPLE WEIGHT BEFORE WASH: 250.7 SAMPLE WEIGHT AFTER WASH: 223.66

PERCENT WASHED: **100.0**

SIEVE #	WEIGHT RETAINED SCREEN	WEIGHT RETAINED TOTAL	% PASSED	% PASSED REQUIREMENT
3" (75mm)		0	**100.000**	
2 1/2 (63mm)		0	**100.000**	
2" (50mm)		0	**100.000**	
1 1/2" (37.5mm)		0	**100.000**	
1" (25mm)		0	**100.000**	
3/4" (19mm)		0	**100.000**	
1/2" (12.5mm)		0	**100.000**	
3/8" (9.5mm)		0	**100.000**	
#4 (4.75mm)	0	0	**100.000**	
Pan	223.66	223.66		

FINE FRACTION GRADING WEIGHT 223.66

	WEIGHT RETAINED REDUCED PORTION	WEIGHT RETAINED SCREEN	WEIGHT RETAINED TOTAL	%PASSED	% PASSED REQUIREMENT
#10 (2.00mm)	21.18	21.18	21.18	**91.5517**	
#20(.85mm)	5.09	5.09	26.27	**89.5213**	
#40 (.425mm)	7.09	7.09	33.36	**86.6933**	
#60 (.25mm)	77.01	77.01	110.37	**55.9753**	
#100 (.150mm)	100.94	100.94	211.31	**15.7120**	
#140 (.106mm)	7.19	7.19	218.50	**12.8440**	
#200 (.0075mm)	3.55	3.55	222.05	**11.4280**	
PAN		0.00	222.05		

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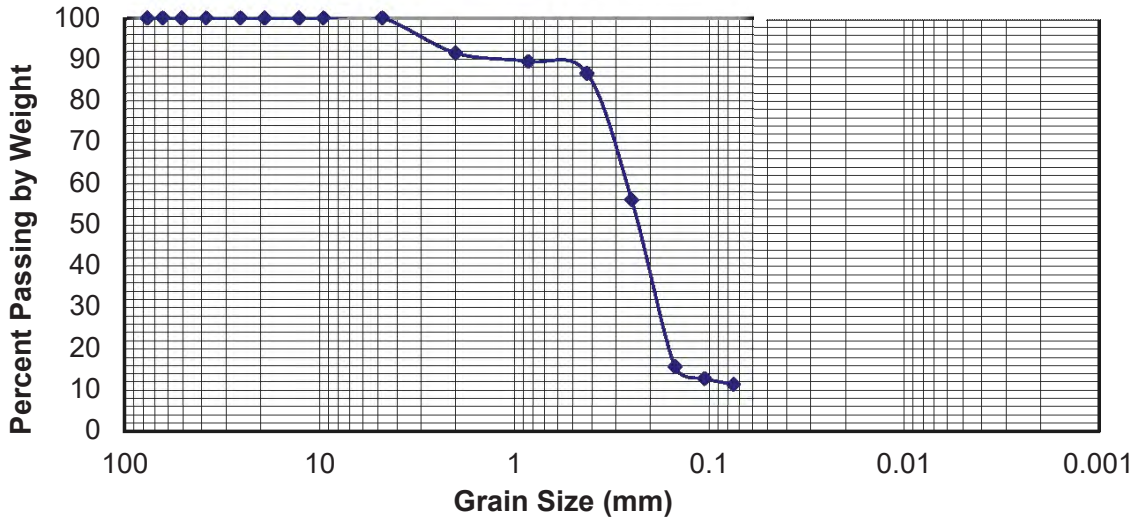
PROJECT NAME:	RMMT Geotech	PROJECT NUMBER:	022054.400
SAMPLE ID:	23-B102 20-21.5'	Lab Sample#:	23-966
DATE TESTED:	11/4/23		

SIEVE	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#140	#200
SIEVE SIZE (mm)	76.2	63.5	50.8	38.1	25.4	19.1	12.7	9.53	4.75	2.00	0.850	0.425	0.250	0.150	0.106	0.075
PERCENT PASSING	100	100	100	100	100	100	100	100	100	91.6	89.5	86.7	56.0	15.7	12.8	11.4
SPEC REQUIRED																

Gradation Test Results



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SIEVE ANALYSIS FOR PARTICLE SIZE DISTRIBUTION OF SOILS

ASTM D6913 - METHOD B

PROJECT NAME:	**RMMT Geotech**		LAB SAMPLE NO: **23-967**
PROEJCT NUMBER:	**022054.400**	PERFORMED BY: **JMA**	DATE: **11/4/2023**
SAMPLE I.D.:	**23-B102 30-32.5'**	CHECKED BY: **KEW**	DATE: **11/10/2023**

TOTAL SAMPLE WEIGHT BEFORE WASH: 219.0 SAMPLE WEIGHT AFTER WASH: 44.25

PERCENT WASHED: **100.0**

	WEIGHT RETAINED			
SIEVE #	SCREEN	TOTAL	% PASSED	% PASSED REQUIREMENT
3" (75mm)		0	**100.000**	
2 1/2 (63mm)		0	**100.000**	
2" (50mm)		0	**100.000**	
1 1/2" (37.5mm)		0	**100.000**	
1" (25mm)		0	**100.000**	
3/4" (19mm)		0	**100.000**	
1/2" (12.5mm)		0	**100.000**	
3/8" (9.5mm)		0	**100.000**	
#4 (4.75mm)	0	0	**100.000**	
Pan	44.25	44.25		

FINE FRACTION GRADING WEIGHT 44.25

	WEIGHT RETAINED				
	REDUCED PORTION	SCREEN	TOTAL	%PASSED	% PASSED REQUIREMENT
#10 (2.00mm)	6.04	6.04	6.04	**97.2420**	
#20(.85mm)	2.90	2.90	8.94	**95.9178**	
#40 (.425mm)	1.41	1.41	10.35	**95.2740**	
#60 (.25mm)	3.07	3.07	13.42	**93.8721**	
#100 (.150mm)	8.28	8.28	21.70	**90.0913**	
#140 (.106mm)	10.05	10.05	31.75	**85.5023**	
#200 (.0075mm)	10.89	10.89	42.64	**80.5297**	
PAN		0.00	42.64		

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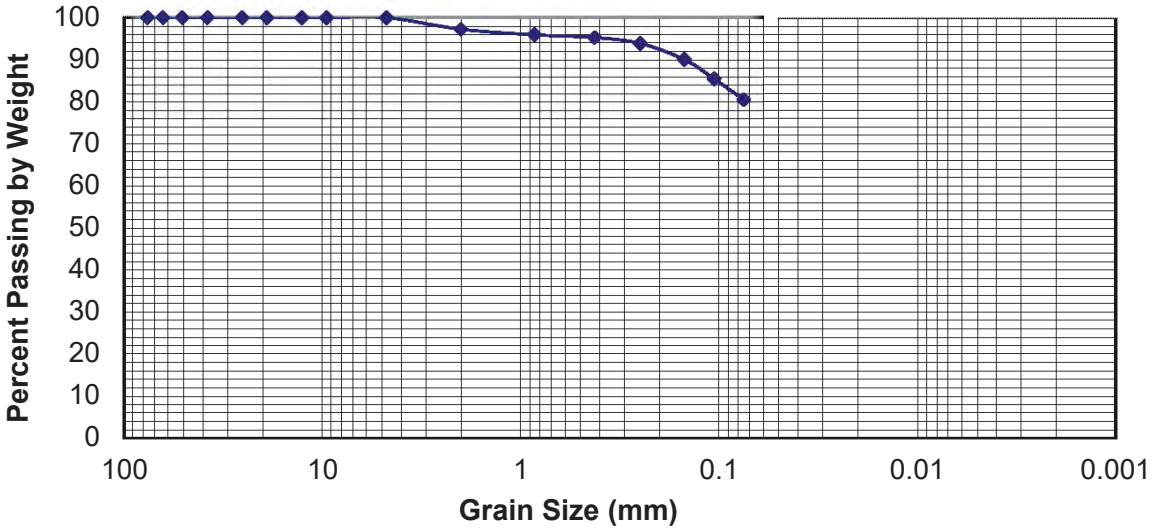
PROJECT NAME:	RMMT Geotech	PROJECT NUMBER:	022054.400
SAMPLE ID:	23-B102 30-32.5'	Lab Sample#:	23-967
DATE TESTED:	11/4/23		

SIEVE	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#140	#200
SIEVE SIZE (mm)	76.2	63.5	50.8	38.1	25.4	19.1	12.7	9.53	4.75	2.00	0.850	0.425	0.250	0.150	0.106	0.075
PERCENT PASSING	100	100	100	100	100	100	100	100	100	97.2	95.9	95.3	93.9	90.1	85.5	80.5
SPEC REQUIRED																

Gradation Test Results



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SIEVE ANALYSIS FOR PARTICLE SIZE DISTRIBUTION OF SOILS

ASTM D6913 - METHOD B

PROJECT NAME:	**RMMT Geotech**		LAB SAMPLE NO: **23-972**
PROEJCT NUMBER:	**022054.400**	PERFORMED BY: **JMA**	DATE: **11/4/2023**
SAMPLE I.D.:	**23-B103 20.5-21.0'**	CHECKED BY: **KEW**	DATE: **11/10/2023**

TOTAL SAMPLE WEIGHT BEFORE WASH: 259.1 SAMPLE WEIGHT AFTER WASH: 227.55

PERCENT WASHED: **100.0**

	WEIGHT RETAINED			
SIEVE #	SCREEN	TOTAL	**% PASSED**	**% PASSED REQUIREMENT**
3" (75mm)		0	**100.000**	
2 1/2 (63mm)		0	**100.000**	
2" (50mm)		0	**100.000**	
1 1/2" (37.5mm)		0	**100.000**	
1" (25mm)		0	**100.000**	
3/4" (19mm)		0	**100.000**	
1/2" (12.5mm)	0.00	0.00	**100.000**	
3/8" (9.5mm)	8.23	8.23	**96.824**	
#4 (4.75mm)	12.35	20.58	**92.057**	
Pan	206.97	227.55		

FINE FRACTION GRADING WEIGHT 206.97

	WEIGHT RETAINED				
	REDUCED PORTION	SCREEN	TOTAL	**%PASSED**	**% PASSED REQUIREMENT**
#10 (2.00mm)	19.88	19.88	40.46	**84.3844**	
#20(.85mm)	9.86	9.86	50.32	**80.5789**	
#40 (.425mm)	14.46	14.46	64.78	**74.9981**	
#60 (.25mm)	68.72	68.72	133.50	**48.4755**	
#100 (.150mm)	80.52	80.52	214.02	**17.3987**	
#140 (.106mm)	8.31	8.31	222.33	**14.1914**	
#200 (.0075mm)	3.87	3.87	226.20	**12.6978**	
PAN	0.89	0.89	227.09		

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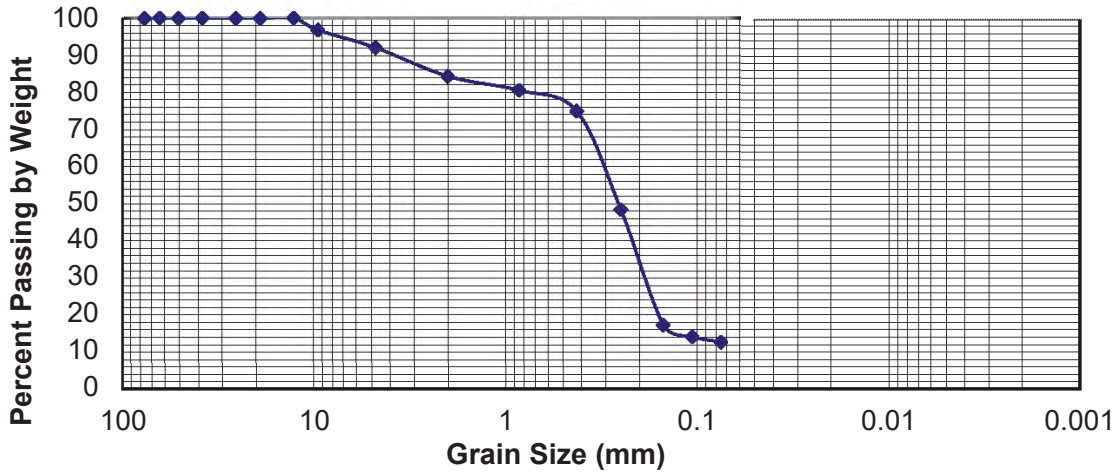
PROJECT NAME:	RMMT Geotech	PROJECT NUMBER:	022054.400
SAMPLE ID:	23-B103 20.5-21.0'	Lab Sample#:	23-972
DATE TESTED:	11/4/23		

SIEVE	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#140	#200
SIEVE SIZE (mm)	76.2	63.5	50.8	38.1	25.4	19.1	12.7	9.53	4.75	2.00	0.850	0.425	0.250	0.150	0.106	0.075
PERCENT PASSING	100	100	100	100	100	100	100	96.8	92.1	84.4	80.6	75.0	48.5	17.4	14.2	12.7
SPEC REQUIRED																

Gradation Test Results



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SIEVE ANALYSIS FOR PARTICLE SIZE DISTRIBUTION OF SOILS

ASTM D6913 - METHOD B

PROJECT NAME:	**RMMT Geotech**		LAB SAMPLE NO: **23-973**
PROEJCT NUMBER:	**022054.400**	PERFORMED BY: **JMA**	DATE: **11/4/2023**
SAMPLE I.D.:	**23-B103 35-37.5'**	CHECKED BY: **KEW**	DATE: **11/10/2023**

TOTAL SAMPLE WEIGHT BEFORE WASH: 181.6 SAMPLE WEIGHT AFTER WASH: 10.72

PERCENT WASHED: **100.0**

	WEIGHT RETAINED			
SIEVE #	SCREEN	TOTAL	**% PASSED**	**% PASSED REQUIREMENT**
3" (75mm)		0	**100.000**	
2 1/2 (63mm)		0	**100.000**	
2" (50mm)		0	**100.000**	
1 1/2" (37.5mm)		0	**100.000**	
1" (25mm)		0	**100.000**	
3/4" (19mm)		0	**100.000**	
1/2" (12.5mm)		0	**100.000**	
3/8" (9.5mm)		0	**100.000**	
#4 (4.75mm)	0	0	**100.000**	
Pan	10.72	10.72		

FINE FRACTION GRADING WEIGHT 10.72

	WEIGHT RETAINED				
	REDUCED PORTION	SCREEN	TOTAL	**%PASSED**	**% PASSED REQUIREMENT**
#10 (2.00mm)	0.43	0.43	0.43	**99.7632**	
#20(.85mm)	0.88	0.88	1.31	**99.2786**	
#40 (.425mm)	0.66	0.66	1.97	**98.9152**	
#60 (.25mm)	0.56	0.56	2.53	**98.6068**	
#100 (.150mm)	0.86	0.86	3.39	**98.1333**	
#140 (.106mm)	1.37	1.37	4.76	**97.3789**	
#200 (.0075mm)	4.11	4.11	8.87	**95.1156**	
PAN	1.85	1.85	10.72		

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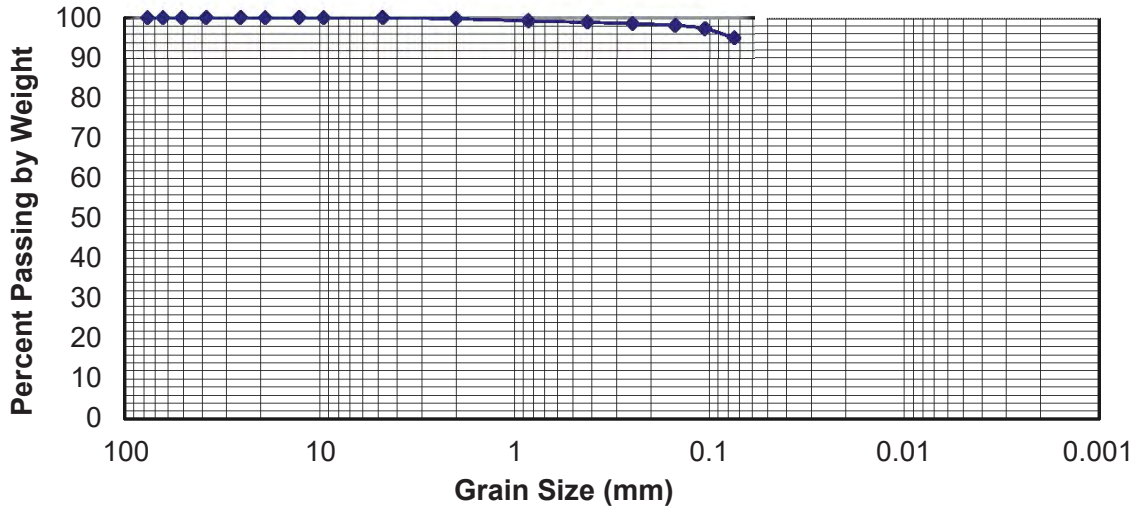
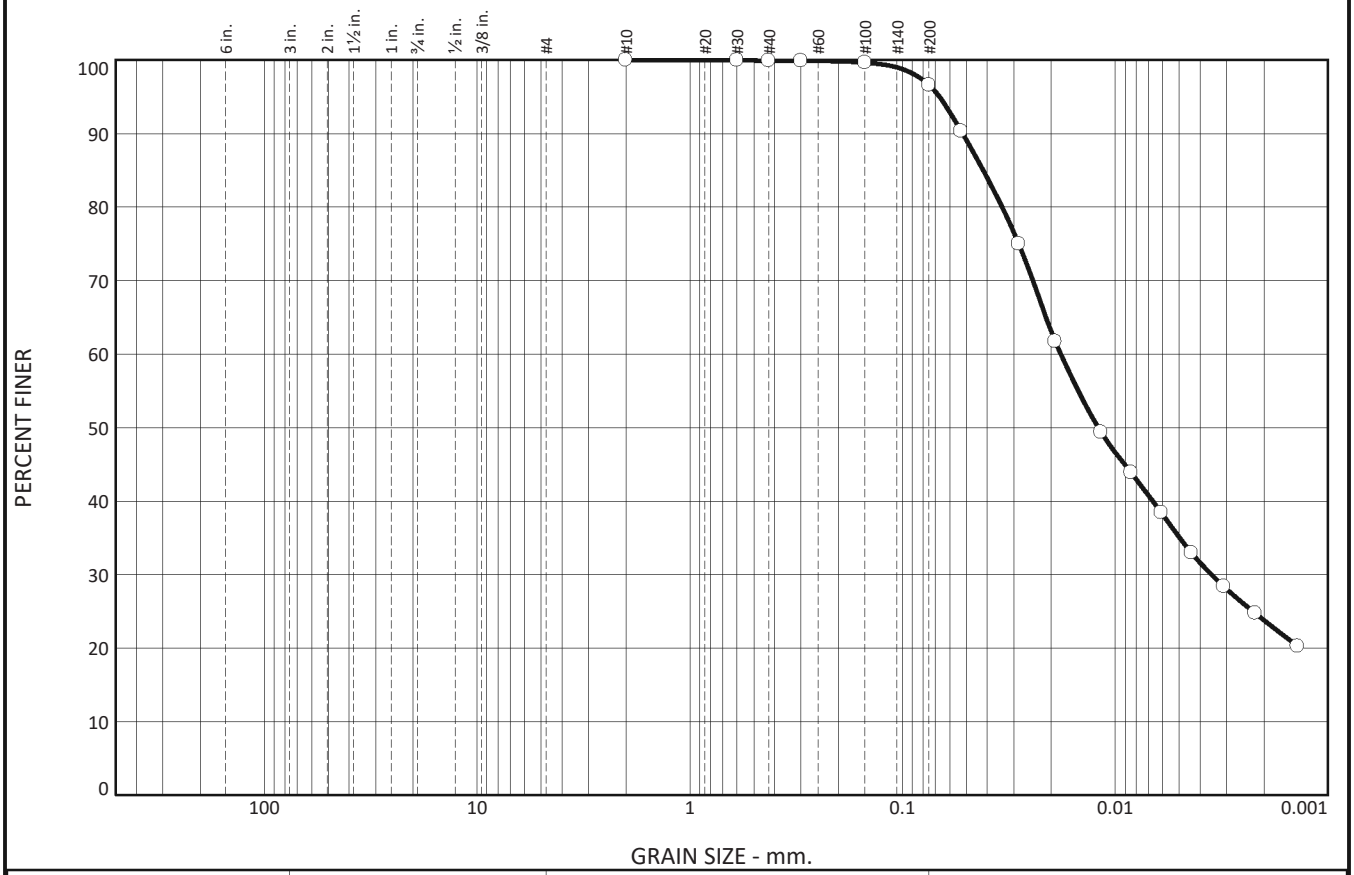
PROJECT NAME:	RMMT Geotech	PROJECT NUMBER:	022054.400
SAMPLE ID:	23-B103 35-37.5'	Lab Sample#:	23-973
DATE TESTED:	11/4/23		

SIEVE	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#140	#200
SIEVE SIZE (mm)	76.2	63.5	50.8	38.1	25.4	19.1	12.7	9.53	4.75	2.00	0.850	0.425	0.250	0.150	0.106	0.075
PERCENT PASSING	100	100	100	100	100	100	100	100	100	99.8	99.3	98.9	98.6	98.1	97.4	95.1
SPEC REQUIRED																

Gradation Test Results



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	3.3	72.8	23.8

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	100.0		
#40	99.9		
#50	99.9		
#100	99.6		
#200	96.6		
#270	90.3		
0.0284 mm.	75.0		
0.0191 mm.	61.7		
0.0117 mm.	49.4		
0.0084 mm.	43.9		
0.0061 mm.	38.4		
0.0044 mm.	33.0		
0.0031 mm.	28.4		
0.0022 mm.	24.8		
0.0014 mm.	20.3		

* (no specification provided)

Soil Description

Greenish Gray CLAY (Bay Mud)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0522 D_{85}= 0.0417 D_{60}= 0.0180
D_{50}= 0.0120 D_{30}= 0.0035 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: 23-B103 **Depth:** 75-77.5(Tip-3")
Sample Number: 17 **Date:**

COOPER TESTING LABORATORY

Client: SHN Engineers & Geologists
Project: RMT, Samoa Peninsula, Humboldt County - 022054.400

Project No: 054-194 **Figure**

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SIEVE ANALYSIS FOR PARTICLE SIZE DISTRIBUTION OF SOILS

ASTM D6913 - METHOD B

PROJECT NAME:	**RMMT Geotech**		LAB SAMPLE NO: **23-978**
PROEJCT NUMBER:	**022054.400**	PERFORMED BY: **JMA**	DATE: **11/4/2023**
SAMPLE I.D.:	**23-B104 60.5-61'**	CHECKED BY: **KEW**	DATE: **11/13/2023**

TOTAL SAMPLE WEIGHT BEFORE WASH: 308.4 SAMPLE WEIGHT AFTER WASH: 264.33

PERCENT WASHED: **100.0**

	WEIGHT RETAINED			
SIEVE #	SCREEN	TOTAL	**% PASSED**	**% PASSED REQUIREMENT**
3" (75mm)		0	**100.000**	
2 1/2 (63mm)		0	**100.000**	
2" (50mm)		0	**100.000**	
1 1/2" (37.5mm)		0	**100.000**	
1" (25mm)		0	**100.000**	
3/4" (19mm)		0	**100.000**	
1/2" (12.5mm)		0	**100.000**	
3/8" (9.5mm)		0	**100.000**	
#4 (4.75mm)	0	0	**100.000**	
Pan	264.33	264.33		

FINE FRACTION GRADING WEIGHT 264.33

	WEIGHT RETAINED				
	REDUCED PORTION	SCREEN	TOTAL	**%PASSED**	**% PASSED REQUIREMENT**
#10 (2.00mm)	0.20	0.20	0.20	**99.9351**	
#20(.85mm)	0.16	0.16	0.36	**99.8833**	
#40 (.425mm)	0.32	0.32	0.68	**99.7795**	
#60 (.25mm)	4.25	4.25	4.93	**98.4014**	
#100 (.150mm)	193.62	193.62	198.55	**35.6193**	
#140 (.106mm)	51.92	51.92	250.47	**18.7840**	
#200 (.0075mmum)	11.31	11.31	261.78	**15.1167**	
PAN	2.55	2.55	264.33		

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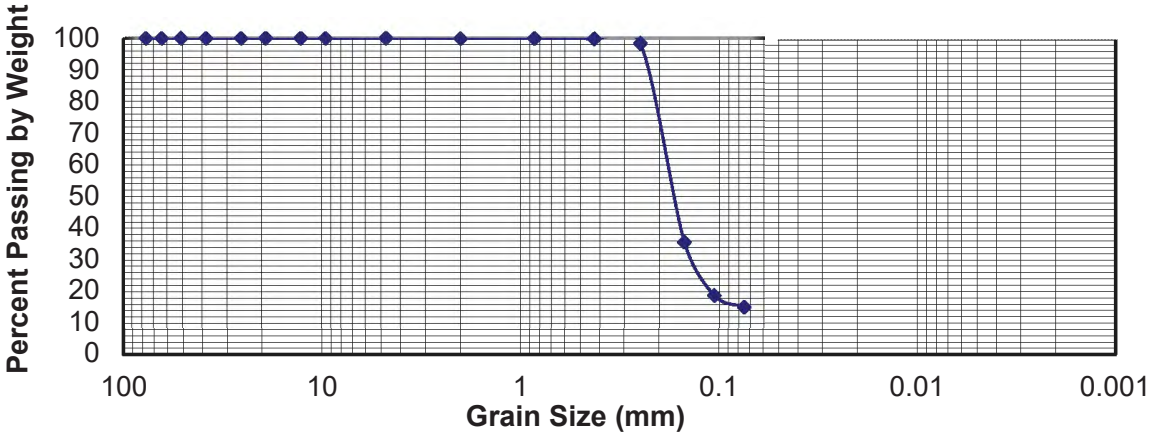
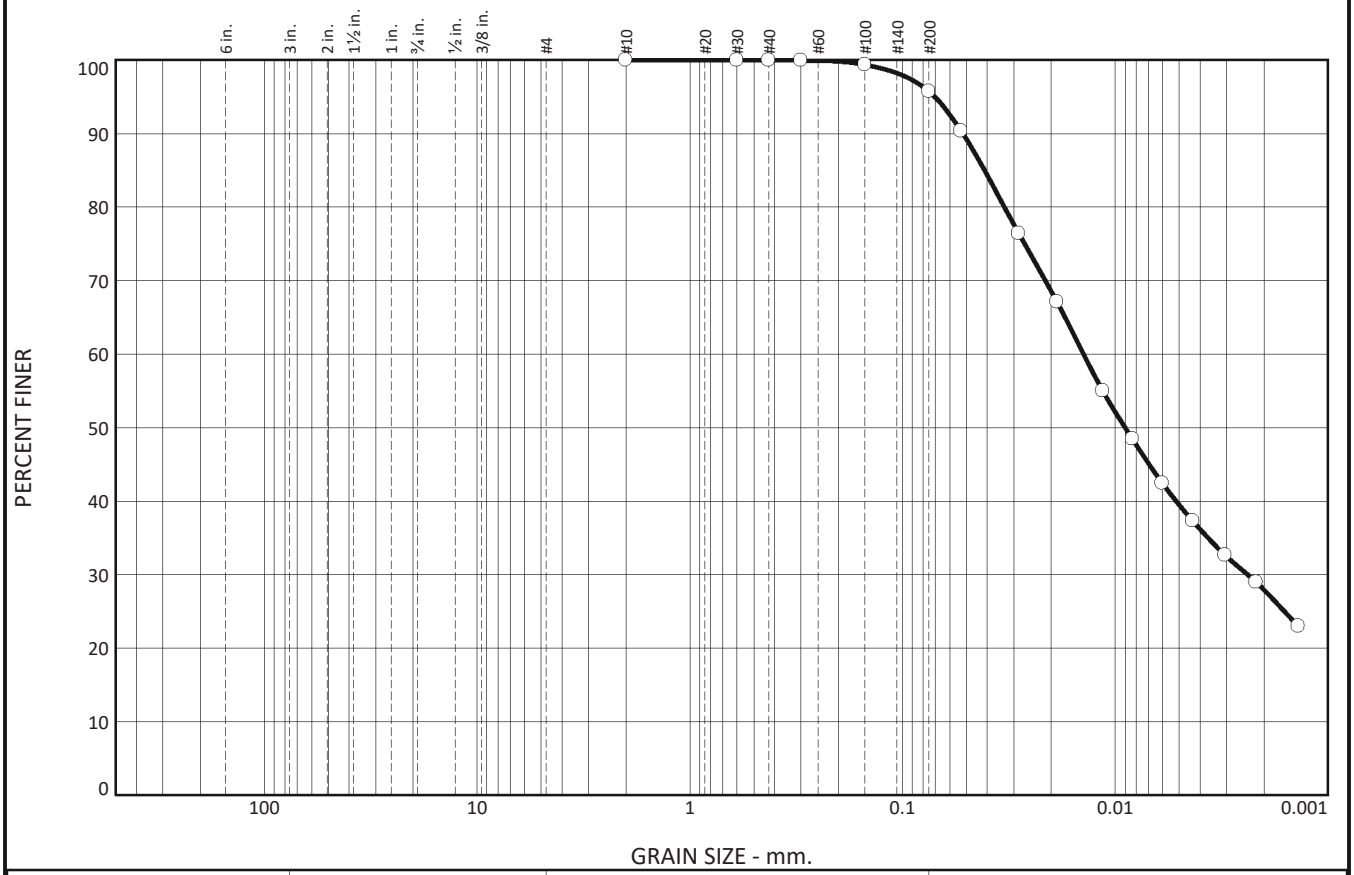
PROJECT NAME: RMMT Geotech
PROJECT NUMBER: 022054.400
SAMPLE ID:
Lab Sample#: 23-978
DATE TESTED: 11/4/23
23-B104 60.5-61'

SIEVE	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#140	#200
SIEVE SIZE (mm)	76.2	63.5	50.8	38.1	25.4	19.1	12.7	9.53	4.75	2.00	0.850	0.425	0.250	0.150	0.106	0.075
PERCENT PASSING	100	100	100	100	100	100	100	100	100	99.9	99.9	99.8	98.4	35.6	18.8	15.1
SPEC REQUIRED																

Gradation Test Results



Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	4.3	67.8	27.9

SIEVE SIZE OR DIAMETER	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#30	100.0		
#40	100.0		
#50	99.9		
#100	99.4		
#200	95.7		
#270	90.3		
0.0284 mm.	76.4		
0.0188 mm.	67.1		
0.0114 mm.	55.0		
0.0083 mm.	48.5		
0.0060 mm.	42.4		
0.0043 mm.	37.3		
0.0030 mm.	32.6		
0.0022 mm.	29.0		
0.0014 mm.	23.0		

* (no specification provided)

Soil Description

Greenish Gray CLAY (Bay Mud)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.0520 D_{85}= 0.0411 D_{60}= 0.0141
D_{50}= 0.0090 D_{30}= 0.0024 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Source of Sample: 23-B104 **Depth:** 75-77.5(Tip-4")
Sample Number: 21 **Date:**

COOPER TESTING LABORATORY

Client: SHN Engineers & Geologists
Project: RMT, Samoa Peninsula, Humboldt County - 022054.400

Project No: 054-194 **Figure**

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PERCENT PASSING # 200 SIEVE (ASTM - D1140)

Project Name:	**RMMT Geotech**	**Project Number:**	**022054.400**
Performed By:	**JMA**	**Date:**	**10/30/23**
Checked By:	**KEW**	**Date:**	**11/9/2023**
Project Manager:	**EJN**		

Lab Sample Number	23-959	23-960	23-962	23-963	23-964
Boring Label	23-B101	23-B101	23-B101	23-B101	23-B101
Sample Depth	30-31.5'	45-47.5'	70-72.5'	81-81.5'	166-166.5'
Pan Number	ss3	ss6	ss2	ss11	ss1
Dry Weight of Soil & Pan	359.7	356.3	343.4	365.3	353.4
Pan Weight	197.0	195.9	193.4	192.9	194.8
Weight of Dry Soil	162.7	160.4	150.0	172.4	158.6
Soil Weight Retained on #200&Pan	352.2	286.7	207.3	330.1	207.9
Soil Weight Passing #200	7.5	69.6	136.1	35.2	145.5
Percent Passing #200	**4.6**	**43**	**91**	**20**	**92**

Lab Sample Number	23-965	23-968	23-969	23-970	23-971
Boring Label	23-B102	23-B102	23-B102	23-B102	23-B102
Sample Depth	7-8.5'	50-52.5'	60-61.5'	80-82.5'	90-91.5'
Pan Number	ss14	ss20	ss15	ss10	a2
Dry Weight of Soil & Pan	354.8	407.2	355.3	346.2	246.8
Pan Weight	192.6	257.7	194.2	195.4	87.5
Weight of Dry Soil	162.2	149.5	161.1	150.8	159.3
Soil Weight Retained on #200&Pan	353.0	269.6	328.2	199.8	201.7
Soil Weight Passing #200	1.8	137.6	27.1	146.4	45.1
Percent Passing #200	**1.1**	**92**	**17**	**97**	**28**

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PERCENT PASSING # 200 SIEVE (ASTM - D1140)

Project Name:	**RMMT Geotech**	**Project Number:**	**022054.400**
Performed By:	**JMA**	**Date:**	**10/30/23**
Checked By:	**KEW**	**Date:**	**11/9/2023**
Project Manager:	**EJN**		

Lab Sample Number	23-974	23-976	23-977		
Boring Label	23-B103	23-B104	23-B104		
Sample Depth	55-57.5'	35-36.5'	45-47.5'		
Pan Number	a10	ss8	s31		
Dry Weight of Soil & Pan	241.6	355.5	221.5		
Pan Weight	87.1	193.0	76.8		
Weight of Dry Soil	154.5	162.5	144.7		
Soil Weight Retained on #200&Pan	97.2	320.5	78.4		
Soil Weight Passing #200	144.4	35.0	143.1		
Percent Passing #200	**93**	**22**	**99**		

Lab Sample Number					
Boring Label					
Sample Depth					
Pan Number					
Dry Weight of Soil & Pan					
Pan Weight					
Weight of Dry Soil					
Soil Weight Retained on #200&Pan					
Soil Weight Passing #200					
Percent Passing #200					

COOPER TESTING LABORATORY

200 Sieve Wash nalysis
ST D 1140

o o	054-194	ro ect o	02054.400
Client	S n ineers Geolo ists	Date	11/8/2023
ro ect	RMT Samoa Peninsula um ol t County		

un By MD
Chec ed By DC

Boring	23- 104							
Sample	5							
Depth ft	20.5-21							
Soil Type	Greenish Gray SI T (ay Mu)							
Wt of Dish Dry Soil gm	395.4							
Weight of Dish gm	173.7							
Weight of Dry Soil gm	221.7							
Wt et on 4 Sieve gm	0.0							
Wt et on 200 Sieve gm	7.5							
ravel	**0 0**							
Sand	**3 4**							
Silt Clay								

Remarks: As an added benefit to our clients, the gravel fraction may be included in this report. Whether or not it is included is dependent upon both the technician's time available and if there is a significant enough amount of gravel. The gravel is always included in the percent retained on the #200 sieve but may not be weighed separately to determine

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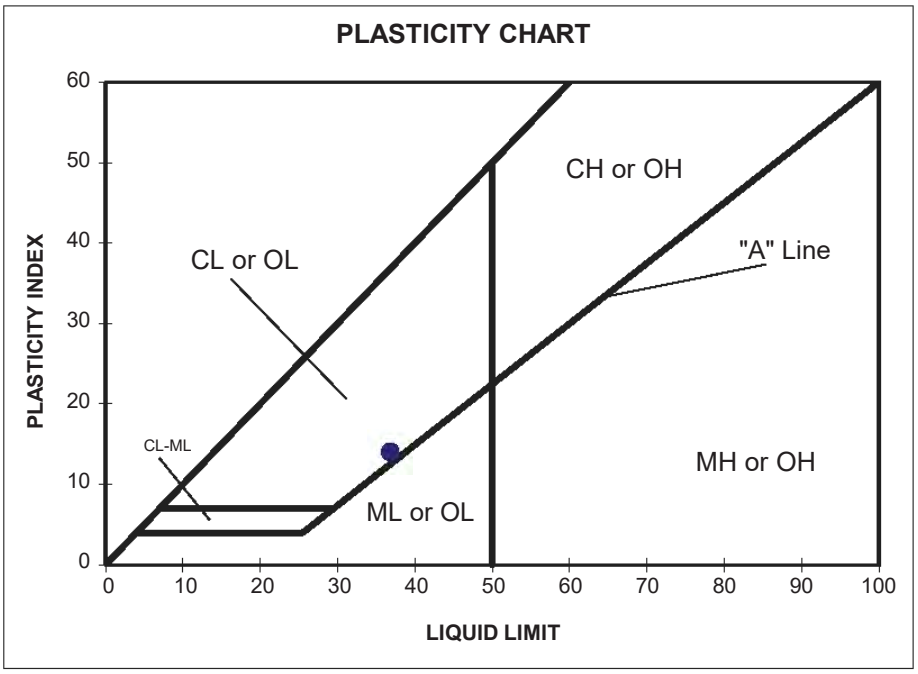
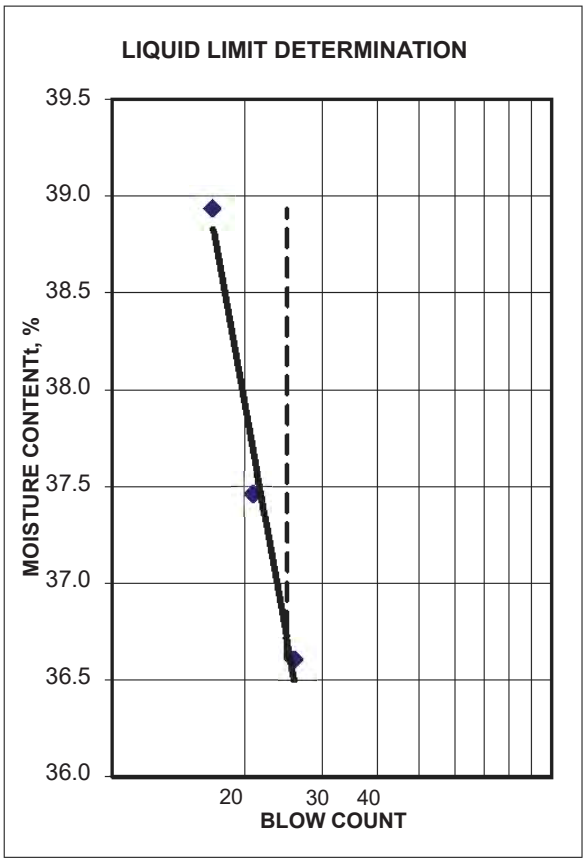
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT Geotech**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-962**
SAMPLE ID:	**23-B101 70-72.5'**	PERFORMED BY:	**JMA**	DATE:	**10/24/2023**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/9/2023**

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	15	16	4	5	6
B	PAN WT. (g)	21.100	20.320	29.160	28.740	29.520
C	WT. WET SOIL & PAN (g)	27.780	28.010	37.370	38.170	37.370
D	WT. DRY SOIL & PAN (g)	26.560	26.560	35.170	35.600	35.170
E	WT. WATER (C-D)	1.220	1.450	2.200	2.570	2.200
F	WT. DRY SOIL (D-B)	5.460	6.240	6.010	6.860	5.650
G	BLOW COUNT	--	--	26	21	17
H	MOISTURE CONTENT (E/F*100	22.3	23.2	36.6	37.5	38.9

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
37	**14**	23





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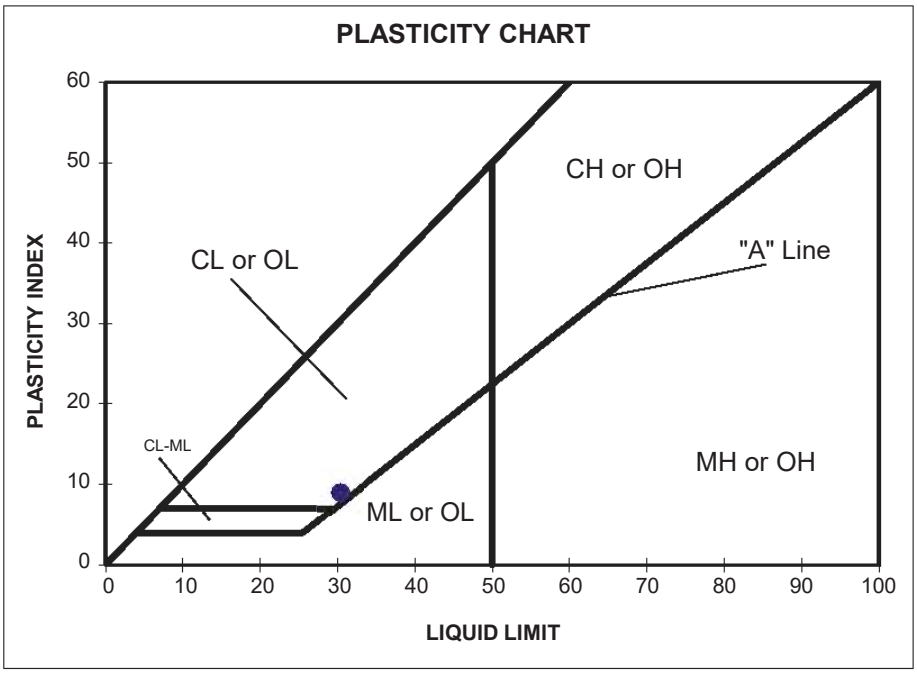
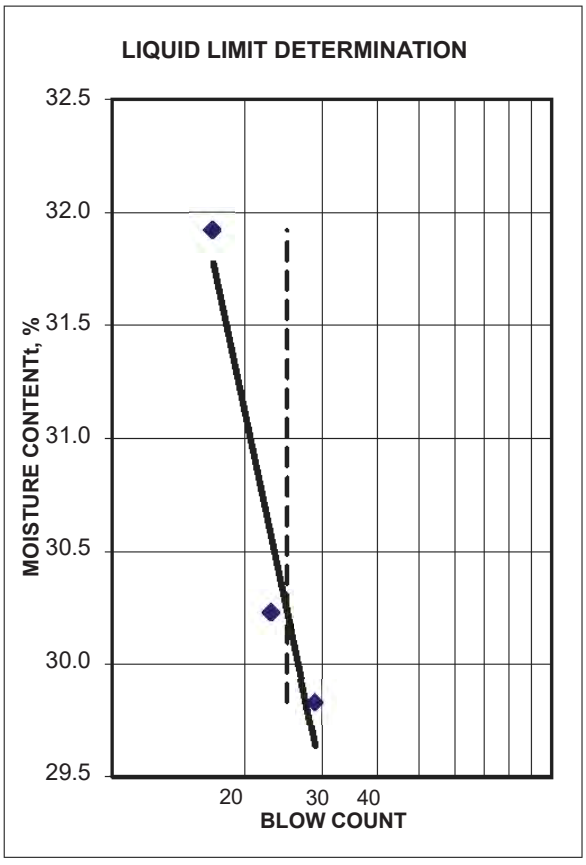
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT Geotech**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-964**
SAMPLE ID:	**23-B101 166-166.5'**	PERFORMED BY:	**SC**	DATE:	**11/3/2023**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/9/2023**

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	14	13	3	2	1
B	PAN WT. (g)	20.120	21.940	28.950	28.890	29.540
C	WT. WET SOIL & PAN (g)	26.090	27.880	38.960	36.860	37.640
D	WT. DRY SOIL & PAN (g)	25.040	26.840	36.660	35.010	35.680
E	WT. WATER (C-D)	1.050	1.040	2.300	1.850	1.960
F	WT. DRY SOIL (D-B)	4.920	4.900	7.710	6.120	6.140
G	BLOW COUNT	--	--	29	23	17
H	MOISTURE CONTENT (E/F*100	21.3	21.2	29.8	30.2	31.9

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
30	**9**	21





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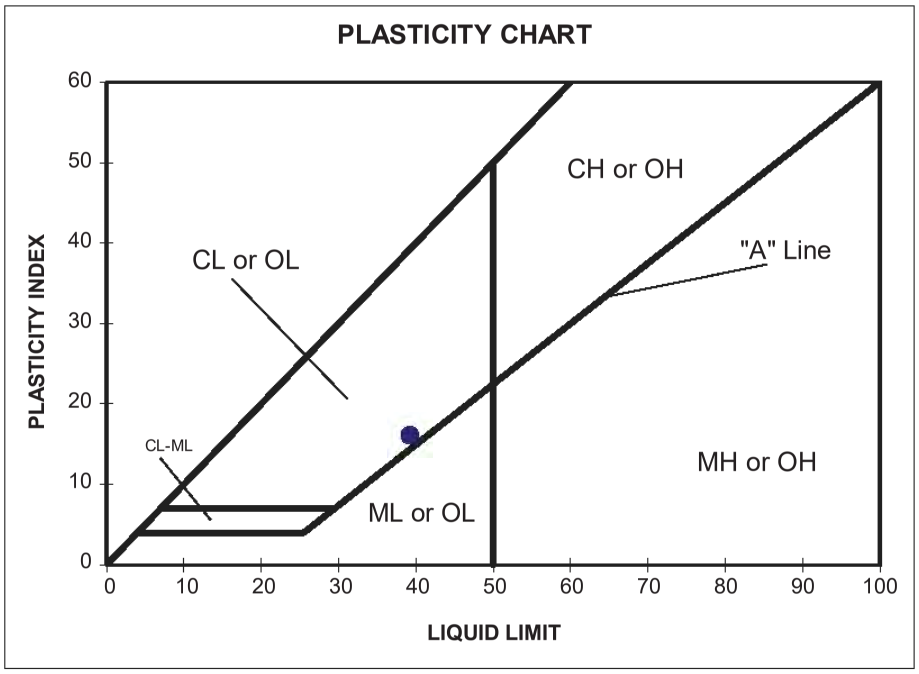
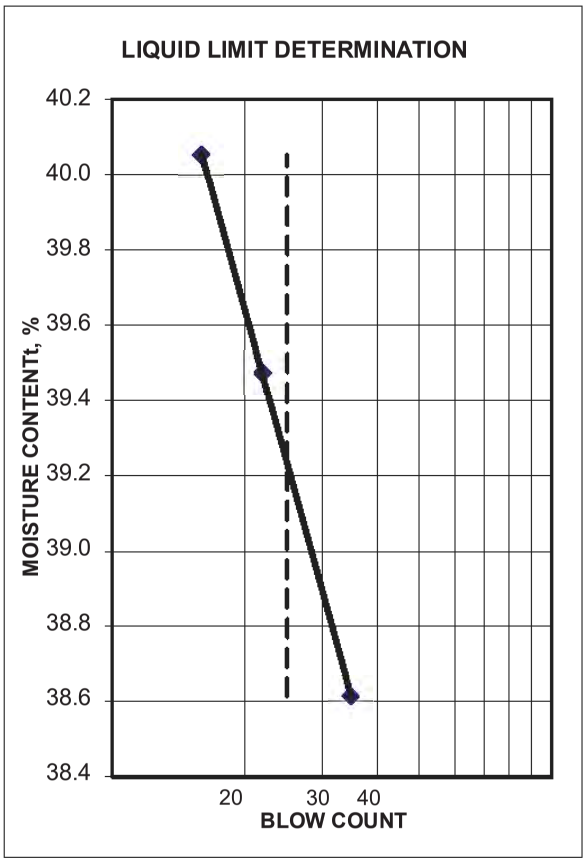
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-967**
SAMPLE ID:	**B102 30-32.5'**	PERFORMED BY:	**KW**	DATE:	**11/16/2023**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/17/2023**

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	15	16	4	5	6
B	PAN WT. (g)	21.110	20.300	29.180	28.750	29.500
C	WT. WET SOIL & PAN (g)	28.910	28.770	34.780	34.050	34.710
D	WT. DRY SOIL & PAN (g)	27.450	27.170	33.220	32.550	33.220
E	WT. WATER (C-D)	1.460	1.600	1.560	1.500	1.490
F	WT. DRY SOIL (D-B)	6.340	6.870	4.040	3.800	3.720
G	BLOW COUNT	--	--	35	22	16
H	MOISTURE CONTENT (E/F*100	23.0	23.3	38.6	39.5	40.1

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
39	**16**	23





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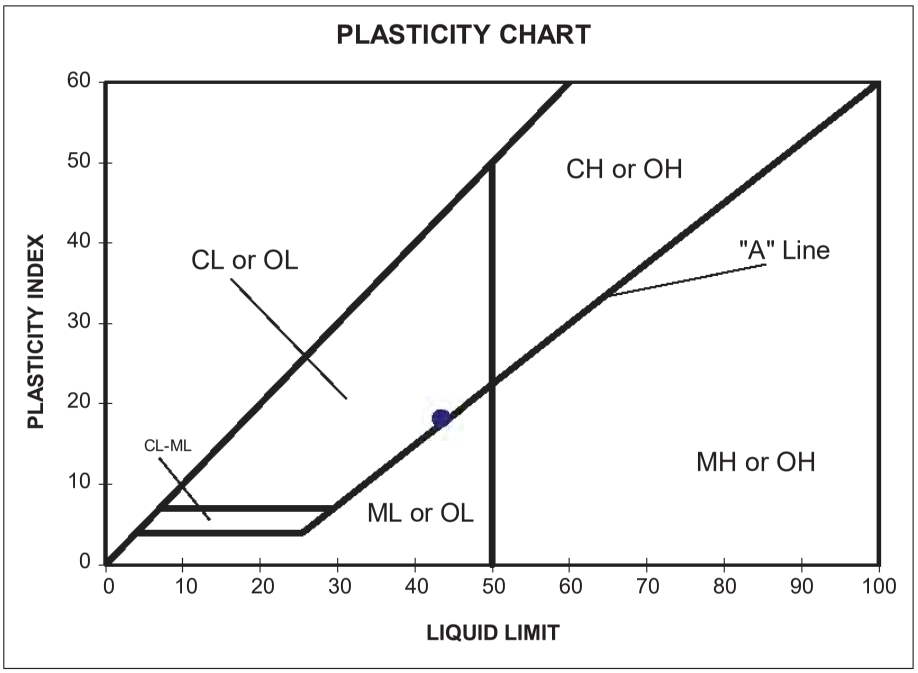
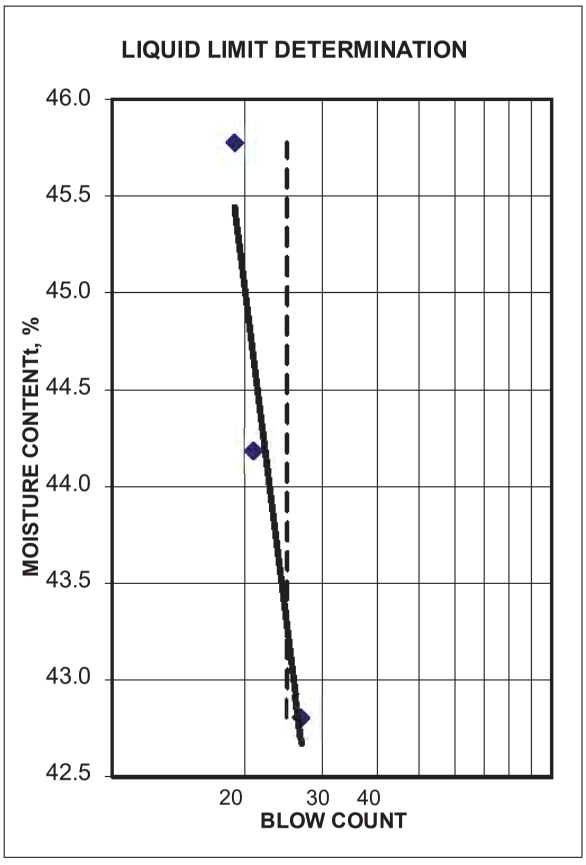
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT Geotech**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-968**
SAMPLE ID:	**23-B102 50-52.5'**	PERFORMED BY:	**JMA**	DATE:	**10/24/2023**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/9/2023**

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	13	14	1	2	3
B	PAN WT. (g)	21.920	20.110	29.540	28.900	28.900
C	WT. WET SOIL & PAN (g)	27.930	26.120	37.680	37.450	35.810
D	WT. DRY SOIL & PAN (g)	26.720	24.920	35.240	34.830	33.640
E	WT. WATER (C-D)	1.210	1.200	2.440	2.620	2.170
F	WT. DRY SOIL (D-B)	4.800	4.810	5.700	5.930	4.740
G	BLOW COUNT	--	--	27	21	19
H	MOISTURE CONTENT (E/F*100	25.2	24.9	42.8	44.2	45.8

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
43	**18**	25





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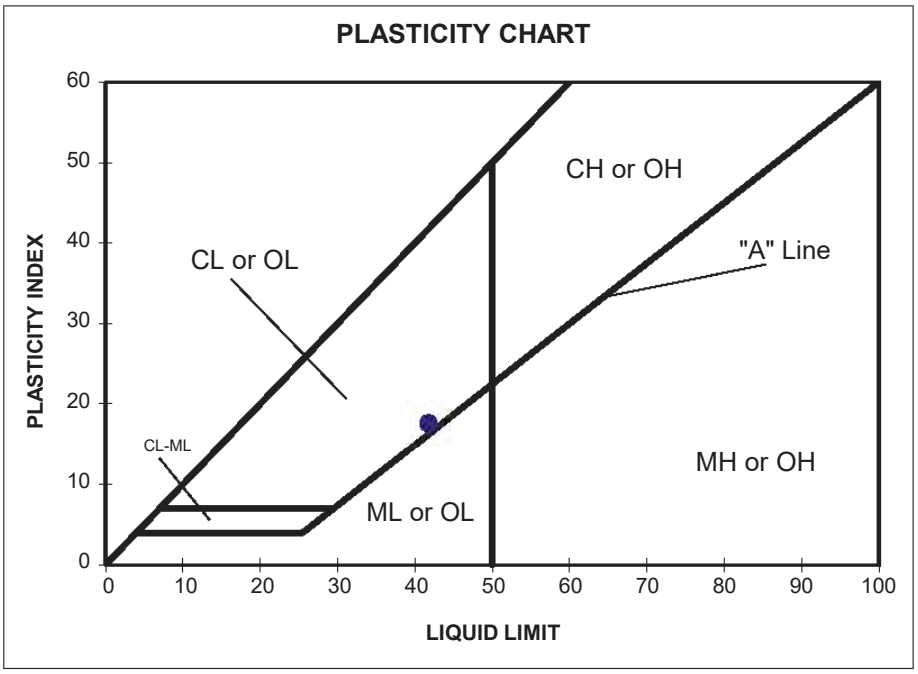
812 W. Wabash Eureka, CA 95501-2138 Tel: 707/441-8855 FAX: 707/441-8877 E-mail: shninfo@shn-engr.com

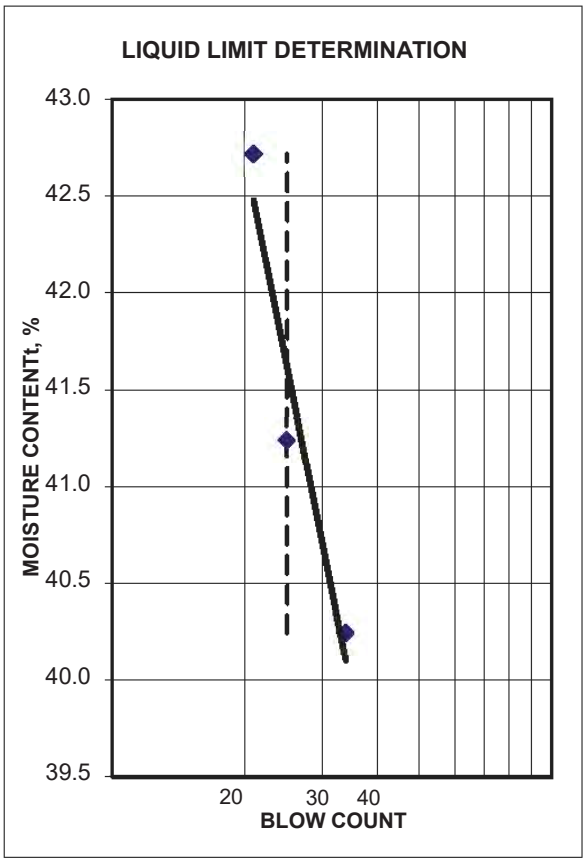
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT Geotech**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-970**
SAMPLE ID:	**23-B102 80-82.5'**	PERFORMED BY:	**SC**	DATE:	**10/25/2023**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/9/2023**

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	18	17	9	8	7
B	PAN WT. (g)	20.140	20.220	28.570	29.020	28.860
C	WT. WET SOIL & PAN (g)	26.120	26.220	37.840	35.630	34.840
D	WT. DRY SOIL & PAN (g)	24.960	25.050	35.180	33.700	33.050
E	WT. WATER (C-D)	1.160	1.170	2.660	1.930	1.790
F	WT. DRY SOIL (D-B)	4.820	4.830	6.610	4.680	4.190
G	BLOW COUNT	--	--	34	25	21
H	MOISTURE CONTENT (E/F*100	24.1	24.2	40.2	41.2	42.7

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
42	**18**	24





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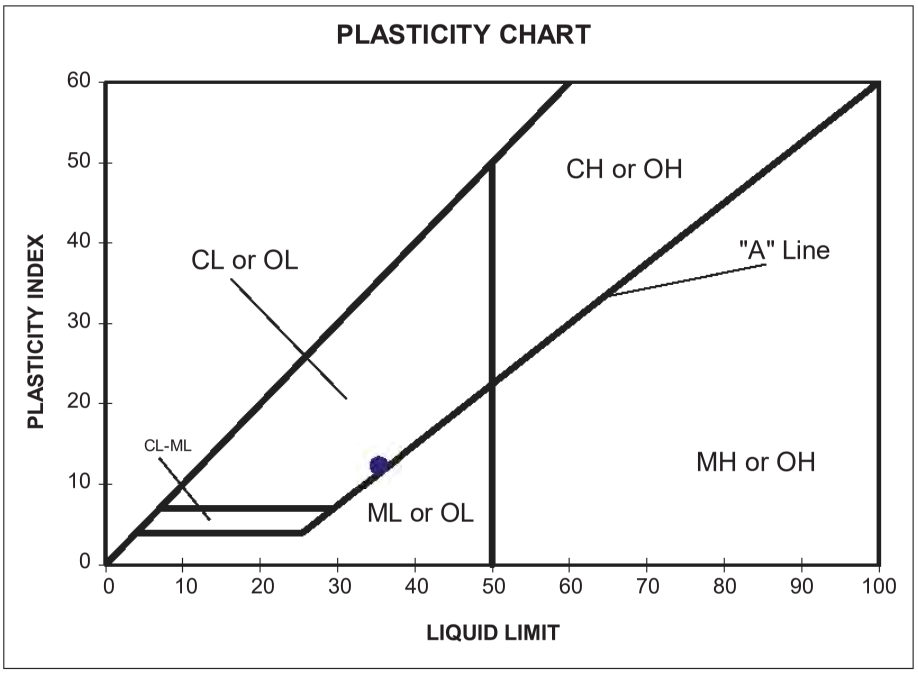
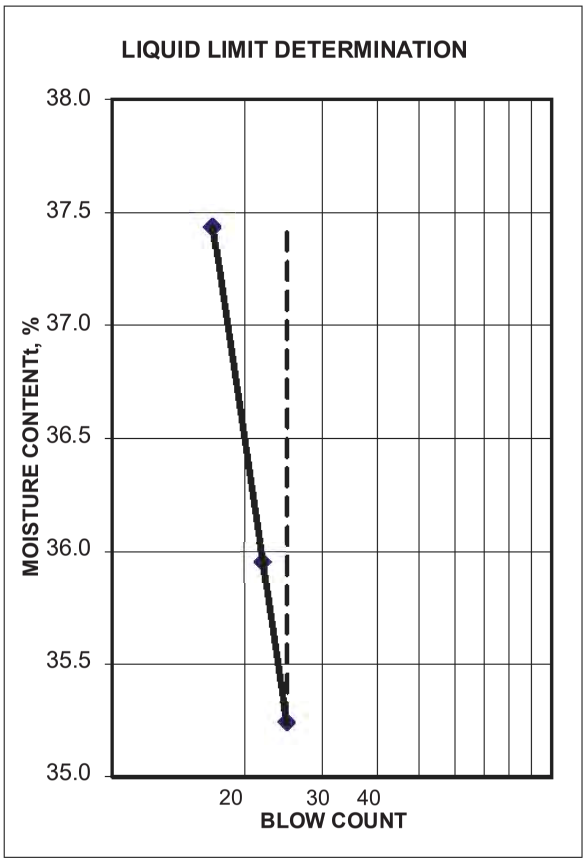
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT Geotech**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-975**
SAMPLE ID:	**23-B103 35-37.5'**	PERFORMED BY:	**SC**	DATE:	**10/27/23**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/9/2023**

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	18	17	9	8	7
B	PAN WT. (g)	20.130	20.200	28.570	28.980	28.840
C	WT. WET SOIL & PAN (g)	26.160	26.070	36.360	35.900	36.990
D	WT. DRY SOIL & PAN (g)	25.040	24.970	34.330	34.070	34.770
E	WT. WATER (C-D)	1.120	1.100	2.030	1.830	2.220
F	WT. DRY SOIL (D-B)	4.910	4.770	5.760	5.090	5.930
G	BLOW COUNT	--	--	25	22	17
H	MOISTURE CONTENT (E/F*100	22.8	23.1	35.2	36.0	37.4

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
35	**12**	23





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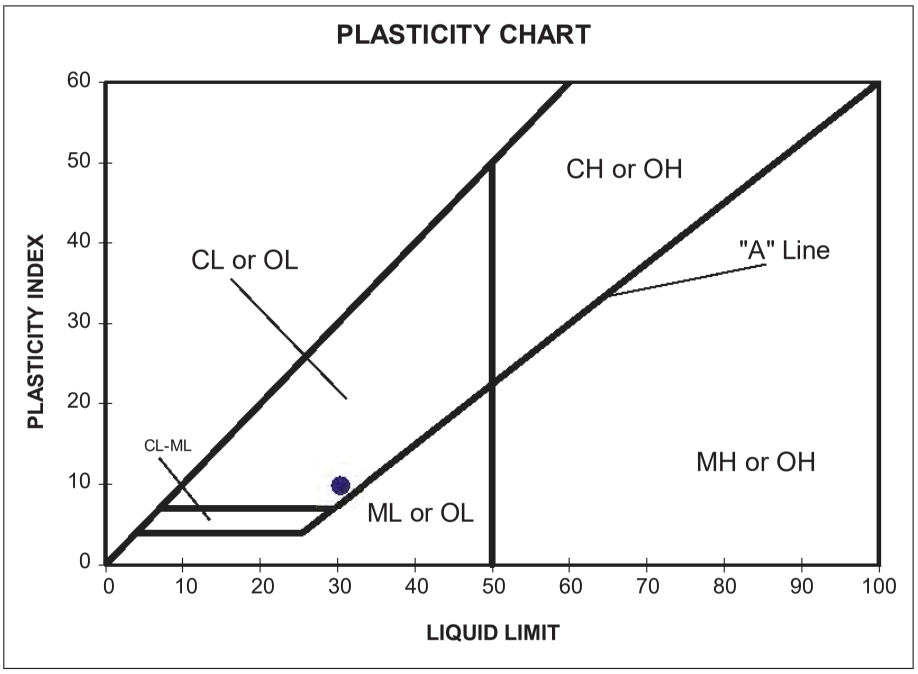
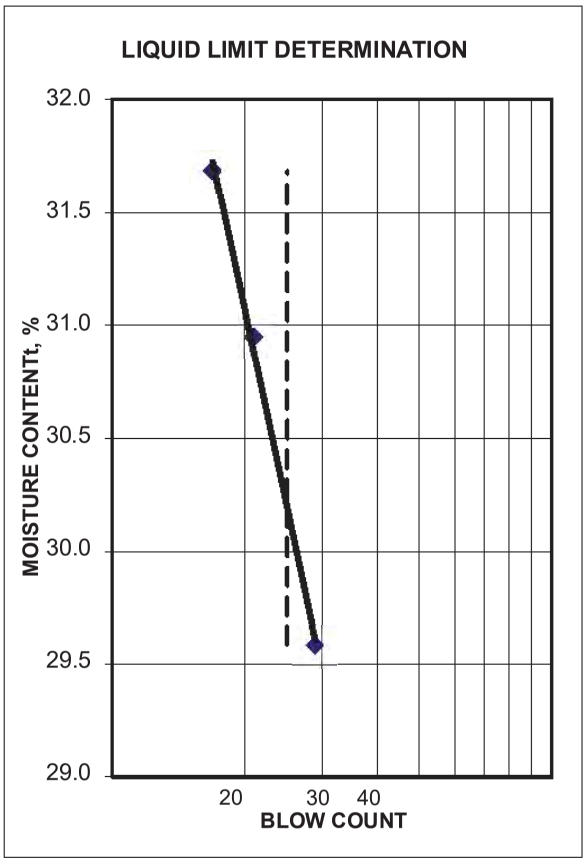
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT Geotech**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-974**
SAMPLE ID:	**23-B103 55-57.5'**	PERFORMED BY:	**SC**	DATE:	**10/25/2023**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/9/2023**

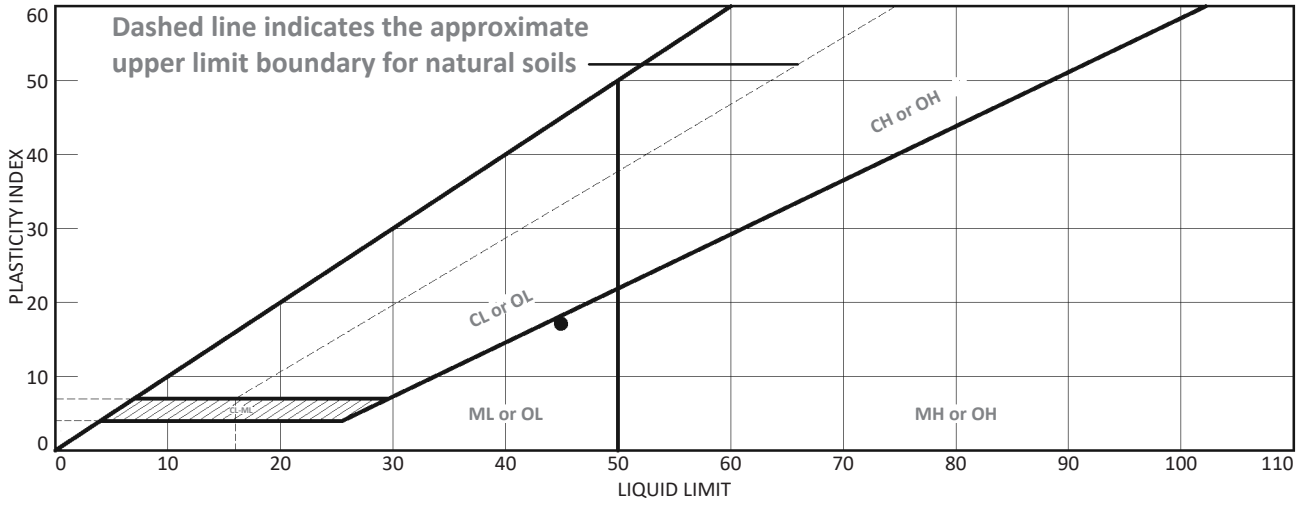
LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	20	19	12	11	10
B	PAN WT. (g)	16.920	17.030	29.330	28.680	29.550
C	WT. WET SOIL & PAN (g)	22.940	22.970	36.820	37.100	36.740
D	WT. DRY SOIL & PAN (g)	21.940	21.940	35.110	35.110	35.010
E	WT. WATER (C-D)	1.000	1.030	1.710	1.990	1.730
F	WT. DRY SOIL (D-B)	5.020	4.910	5.780	6.430	5.460
G	BLOW COUNT	--	--	29	21	17
H	MOISTURE CONTENT (E/F*100	19.9	21.0	29.6	30.9	31.7

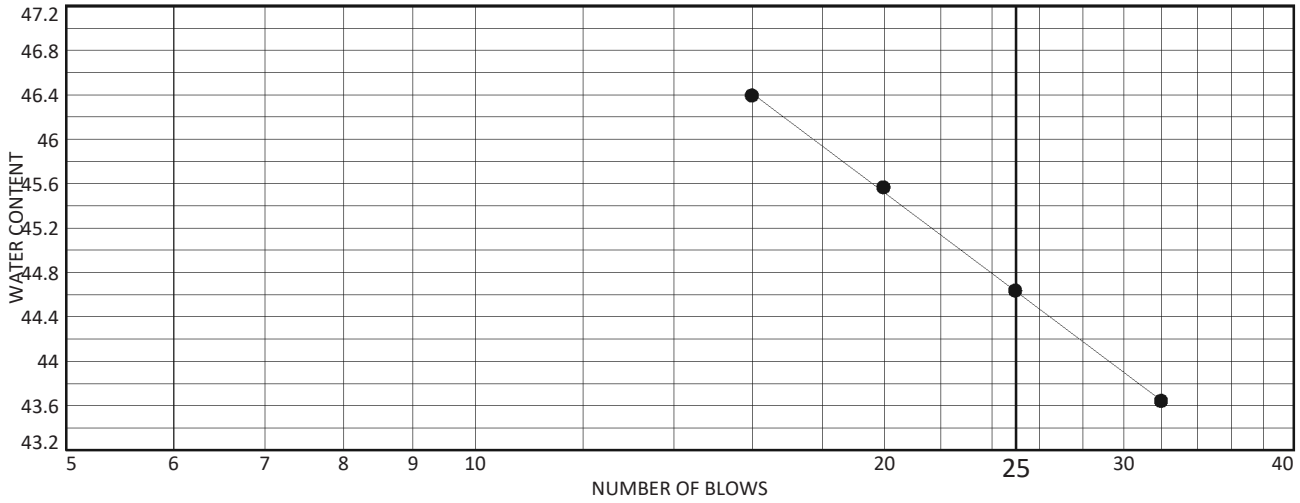
LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
30	**10**	20





LIQUID AND PLASTIC LIMITS TEST REPORT (ASTM D4318)





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Greenish Gray SILT (Bay Mud)	45	28	17			

Project No. 054-194 **Client:** SHN Engineers & Geologists

Project: RMT, Samoa Peninsula, Humboldt County - 022054.400

●**Source of Sample:** 23-B104 **Depth:** 21-21.5' **Sample Number:** 6

Remarks:

COOPER TESTING LABORATORY

Figure

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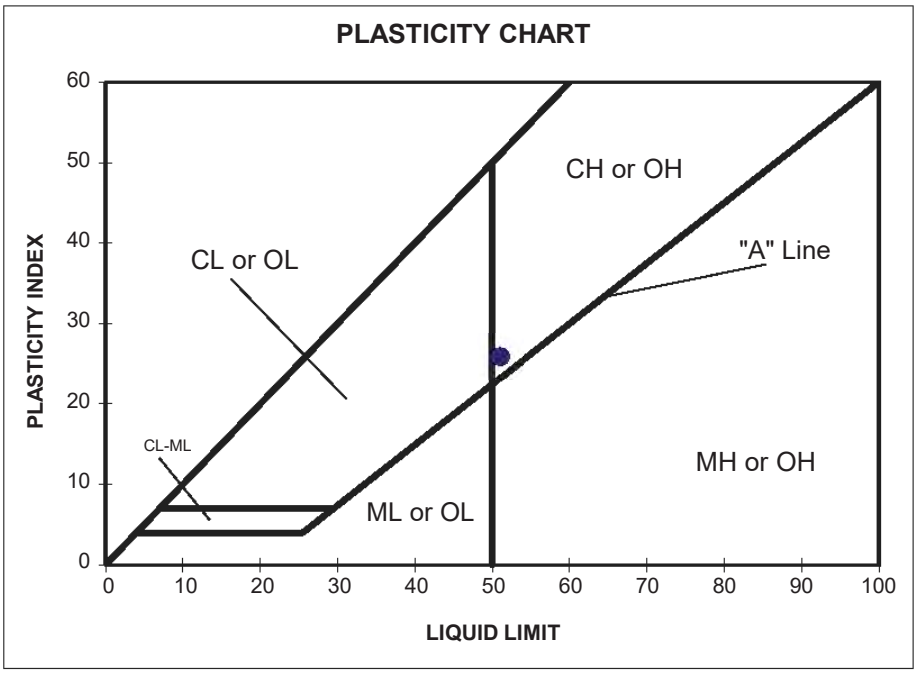
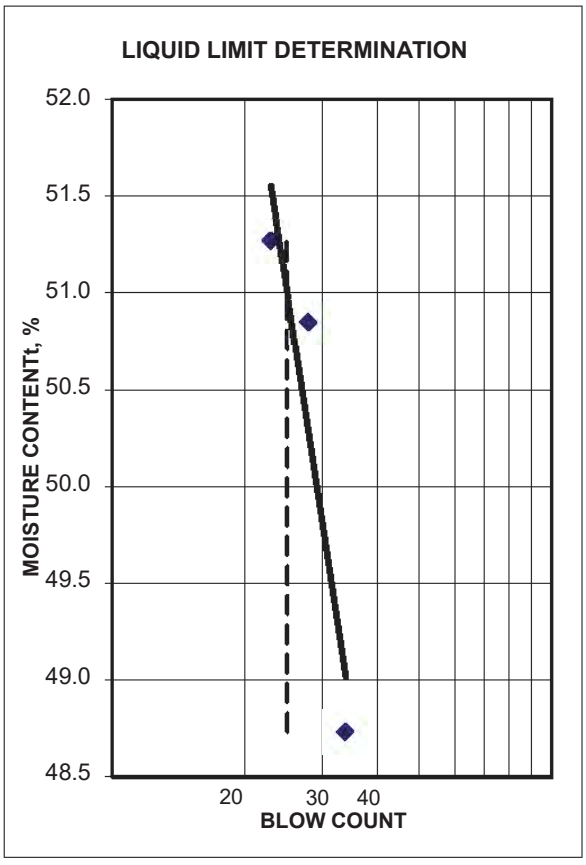
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT Geotech**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-977**
SAMPLE ID:	**23-B104 45-47.5'**	PERFORMED BY:	**SC**	DATE:	**10/27/2023**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/9/2023**

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	20	19	12	11	10
B	PAN WT. (g)	17.120	16.860	29.380	28.640	29.560
C	WT. WET SOIL & PAN (g)	23.100	23.200	37.010	35.760	35.520
D	WT. DRY SOIL & PAN (g)	21.910	21.910	34.510	33.360	33.500
E	WT. WATER (C-D)	1.190	1.290	2.500	2.400	2.020
F	WT. DRY SOIL (D-B)	4.790	5.050	5.130	4.720	3.940
G	BLOW COUNT	--	--	34	28	23
H	MOISTURE CONTENT (E/F*100	24.8	25.5	48.7	50.8	51.3

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
51	**26**	25





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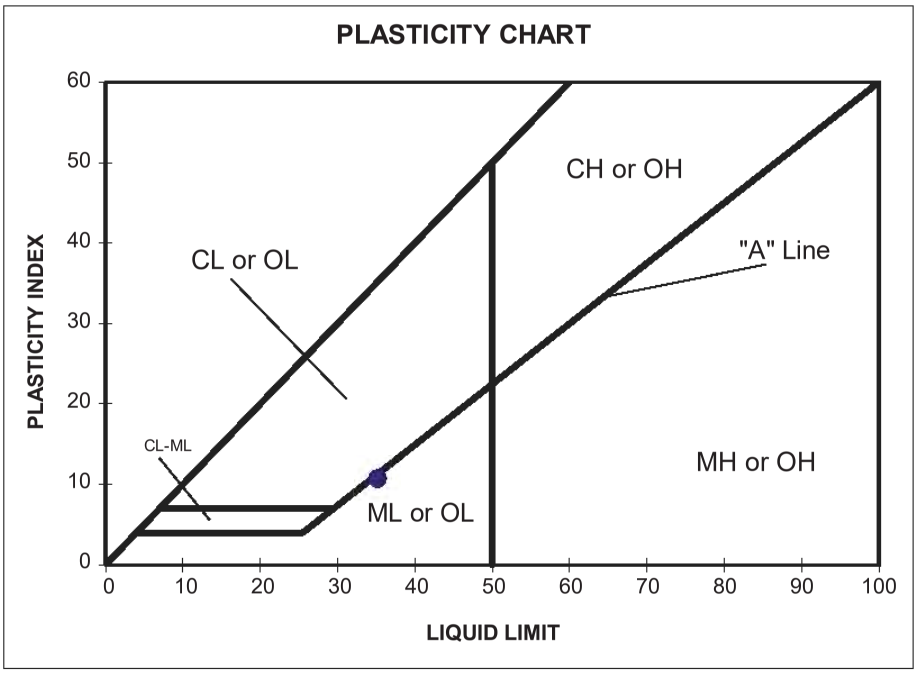
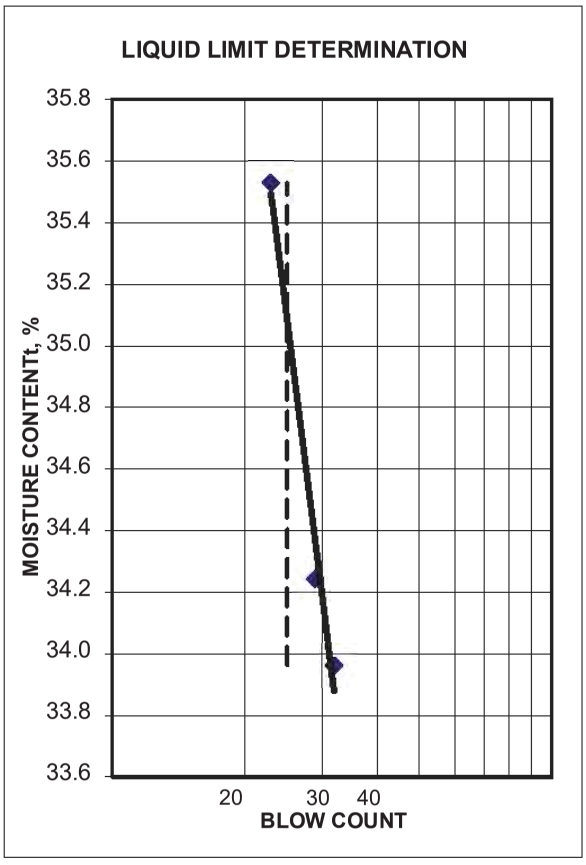
LIQUID LIMIT, PLASTIC LIMIT, and PLASTICITY INDEX (ASTM-D4318)

JOB NAME:	**RMMT**	JOB #:	**022054.400**	LAB SAMPLE #:	**23-975**
SAMPLE ID:	**B104 75-77.5'**	PERFORMED BY:	**JMA**	DATE:	**11/16/2023**
PROJECT MANAGER:	**EJN**	CHECKED BY:	**KEW**	DATE:	**11/17/2023**

LINE NO.		TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 1	TRIAL NO. 2	TRIAL NO. 3
A	PAN #	17	18	7	8	9
B	PAN WT. (g)	20.210	20.130	28.860	29.030	28.590
C	WT. WET SOIL & PAN (g)	28.660	28.960	33.830	34.440	34.350
D	WT. DRY SOIL & PAN (g)	26.990	27.240	32.570	33.060	32.840
E	WT. WATER (C-D)	1.670	1.720	1.260	1.380	1.510
F	WT. DRY SOIL (D-B)	6.780	7.110	3.710	4.030	4.250
G	BLOW COUNT	--	--	32	29	23
H	MOISTURE CONTENT (E/F*100	24.6	24.2	34.0	34.2	35.5

LIQUID LIMIT	**PLASTIC INDEX**	PLASTIC LIMIT
35	**11**	24





Corrosivity Tests Summary

CTL # 054-194 Date: 10/31/2023 Tested By: PJ Checked: PJ

Client: SNH Engineers & Geologists Project: RMMT, Samoa Peninsaula, Humboldt County Proj. No: 022054.400

Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP (Redox)		Sulfide	Moisture	Soil Visual Description
			As Rec.	Min	Sat.	mg/kg	mg/kg	%				Qualitative	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		E_H (mv)	At Test	by Lead	%	
Boring	Sample, No.	Depth, ft.	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
23-B102	6	30-32.5	-	-	290	2,691	128	0.0128	8.4	-	-	-	38.3	Greenish Gray CLAY (Bay Mud)
23-B104	5	20.5-21.0	-	-	527	796	25	0.0025	8.1	-	-	-	40.4	Greenish Gray SILT (Bay Mud)

SPT Hammer Energy Efficiency Report

4

Taber
EXPLORATION & TESTING

536 Galveston Street
West Sacramento, CA 95691-2116
Office **(916) 371-8234**
Fax (916) 371-8283

April 21, 2023

Taber Drilling
536 Galveston Street
West Sacramento, CA 95691

Subject: SPT – Hammer Energy Measurements
Old Truck 55 orange hammer
West Sacramento, CA

Greetings:

This letter transmits the Standard Penetration Test (SPT) hammer energy efficiency on April 14, 2023 using a Old Truck 55 orange hammer. Energy measurements for this hammer were obtained in a manner consistent with ASTM D4633-10 using an SPT Analyzer manufactured by Pile Dynamics, Inc. The purpose was to obtain hammer energy measurements and determine hammer efficiency (normalized for 60% efficiency) during sampling.

Dynamic strain and acceleration measurements were obtained through two strain bridge pairs and two accelerometers affixed on a 2-foot long section of AWJ rod. The AWJ rod was mounted on top of the string of rods and below the hammer. Strain and acceleration signals were conditioned and converted to force and velocity measurements using the SPT Analyzer.

The dynamic force and velocity data was converted to maximum transferred energy using the EFV method: $EFV = \int F(t) \bullet V(t) \bullet dt$. The integration is performed from when energy transfer begins to when the maximum energy occurs. This method is theoretically appropriate regardless of rod length, wave travel time, and the number of non-uniform rod connections. Energy transfer is then calculated as ETR = EFV/PE, where ETR is the energy transfer ratio, EVF is the energy transferred to the sampling rods, and PE is the theoretical potential energy.

The average hammer efficiency (ETR) on April 14, 2023 was **79%** (based on an EFV of 276 ft-lbs). Note, in accordance with the ASTM testing protocols employed, these results of energy measurement are specific to this hammer, on this date, at this location. A more general use and application of this data should only be made when based on specific professional engineering judgement.

We appreciate the opportunity to be of service.

Very Truly Yours,
Taber Drilling

Franklin Taber

Franklin Taber
GE 816

Attachments: Summary of Field Results, SPT Energy Measurements
SPT Analyzer Data, Per Drive Depth

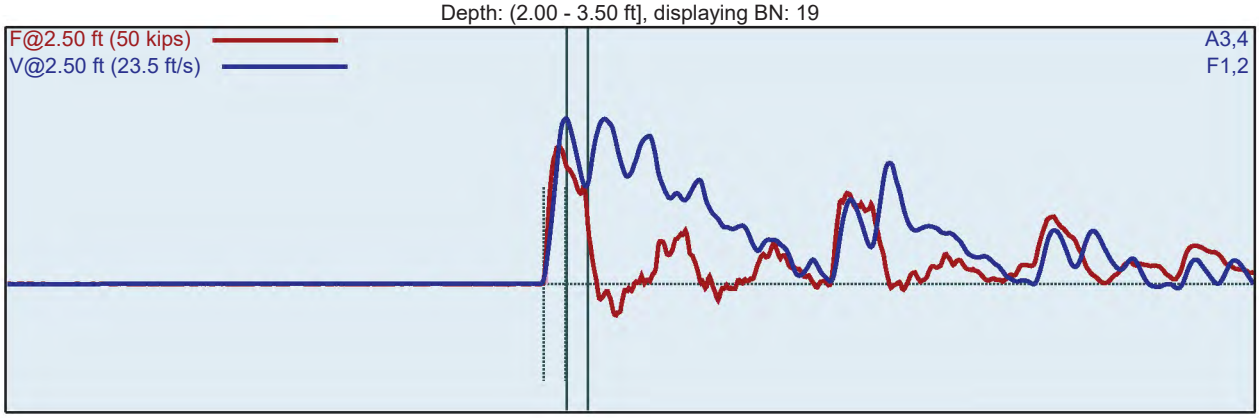
4-14-23 old 55truck
MJ

2.5
Test date: 4/14/2023

AR: 1.19 in^2
LE: 2.50 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (2.00 - 3.50 ft], displaying BN: 19



F1 : [202AWJ2] 222.96 PDICAL (1) FF1
F2 : [202AWJ1] 224.03 PDICAL (1) FF1

A3 (PR): [K12925] 354.726 mv/6.4v/5000g (1) VF1
A4 (PR): [K12930] 443.745 mv/6.4v/5000g (1) VF1

FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

BL#	BC /6"	FMX kips	VMX ft/s	BPM bpm	EFV ft-lb	ETR %
1	7	27	17.5	1.9	264	75.4
2	7	28	16.2	29.9	298	85.1
3	7	27	16.5	30.1	287	82.1
4	7	27	15.7	30.2	288	82.3
5	7	27	15.3	30.2	309	88.3
6	7	27	15.6	30.2	302	86.3
7	7	27	15.4	30.1	303	86.5
8	7	27	15.3	30.2	299	85.4
9	7	27	14.9	30.2	291	83.2
10	7	26	15.7	30.2	279	79.8
11	7	26	15.7	30.1	283	80.9
12	7	27	15.5	30.2	288	82.3
13	7	27	15.3	30.2	286	81.8
14	7	27	15.1	30.1	288	82.2
15	7	27	15.1	30.2	283	80.8
16	7	26	15.2	30.1	284	81.0
17	7	26	15.1	30.2	288	82.3
18	7	27	15.3	30.1	283	80.8
19	7	27	15.2	30.2	284	81.2
20	7	27	15.5	30.1	284	81.3
21	7	28	15.9	30.2	288	82.2
	Average	27	15.3	30.2	286	81.8
	Std Dev	0	0.3	0.0	5	1.3
	Maximum	28	15.9	30.2	299	85.4
	Minimum	26	14.9	30.1	279	79.8

N-value: 14

Sample Interval Time: 39.78 seconds.

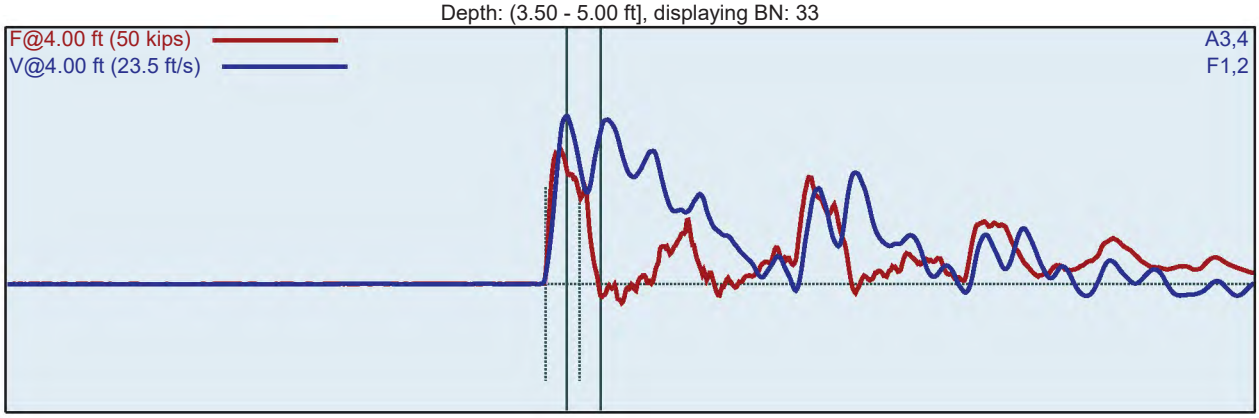
4-14-23 old 55truck
MJ

2.5
Test date: 4/14/2023

AR: 1.19 in^2
LE: 4.00 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (3.50 - 5.00 ft], displaying BN: 33



F1 : [202AWJ2] 222.96 PDICAL (1) FF1
F2 : [202AWJ1] 224.03 PDICAL (1) FF1

A3 (PR): [K12925] 354.726 mv/6.4v/5000g (1) VF1
A4 (PR): [K12930] 443.745 mv/6.4v/5000g (1) VF1

BL#	BC /6"	FMX kips	VMX ft/s	BPM bpm	EFV ft-lb	ETR %
22	7	27	15.2	1.9	290	82.9
23	7	27	15.4	30.0	289	82.4
24	7	27	15.1	30.1	286	81.6
25	7	27	15.0	30.2	283	80.8
26	7	27	15.3	30.2	288	82.2
27	7	28	15.8	30.1	287	81.9
28	7	27	15.4	30.2	283	80.8
29	7	26	15.2	30.1	289	82.5
30	7	26	15.4	30.2	286	81.7
31	7	26	15.0	30.2	280	80.0
32	7	26	15.6	30.2	282	80.5
33	7	26	15.4	30.2	285	81.4
34	7	25	15.6	30.1	284	81.0
35	7	26	15.4	30.2	282	80.5
	Average	26	15.3	28.1	285	81.5
	Std Dev	1	0.2	7.3	3	0.8
	Maximum	28	15.8	30.2	290	82.9
	Minimum	25	15.0	1.9	280	80.0

N-value: 14

Sample Interval Time: 25.86 seconds.

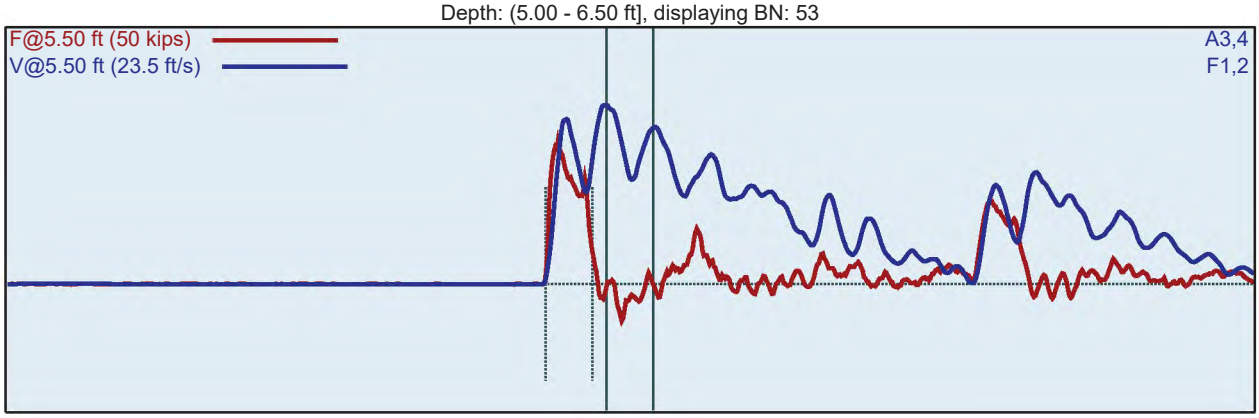
4-14-23 old 55truck
MJ

2.5
Test date: 4/14/2023

AR: 1.19 in^2
LE: 4.00 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (5.00 - 6.50 ft], displaying BN: 53



F1 : [202AWJ2] 222.96 PDICAL (1) FF1
F2 : [202AWJ1] 224.03 PDICAL (1) FF1

A3 (PR): [K12925] 354.726 mv/6.4v/5000g (1) VF1
A4 (PR): [K12930] 443.745 mv/6.4v/5000g (1) VF1

BL#	BC /6"	FMX kips	VMX ft/s	BPM bpm	EFV ft-lb	ETR %
36	7	26	14.9	30.1	275	78.7
37	7	27	15.1	30.2	278	79.5
38	7	27	15.2	30.1	288	82.4
39	7	27	15.3	30.2	276	78.8
40	7	27	16.3	30.2	283	81.0
41	7	27	16.0	30.1	286	81.7
42	7	27	16.0	30.1	282	80.5
43	6	26	14.7	1.9	274	78.3
44	6	27	16.0	29.9	282	80.7
45	6	27	15.9	30.0	286	81.8
46	6	27	15.5	30.2	293	83.8
47	6	27	15.3	30.1	280	80.1
48	6	28	15.6	30.2	285	81.3
49	7	27	15.7	30.1	281	80.3
50	7	27	15.4	30.2	272	77.8
51	7	28	16.1	30.2	280	80.0
52	7	28	15.7	30.2	278	79.4
53	7	28	16.4	30.1	280	80.0
54	7	28	16.1	30.2	271	77.4
55	7	28	16.0	30.1	273	78.0
Average		27	15.7	28.0	280	79.9
Std Dev		1	0.4	7.5	6	1.7
Maximum		28	16.4	30.2	293	83.8
Minimum		26	14.7	1.9	271	77.4

N-value: 13

Sample Interval Time: 111.76 seconds.

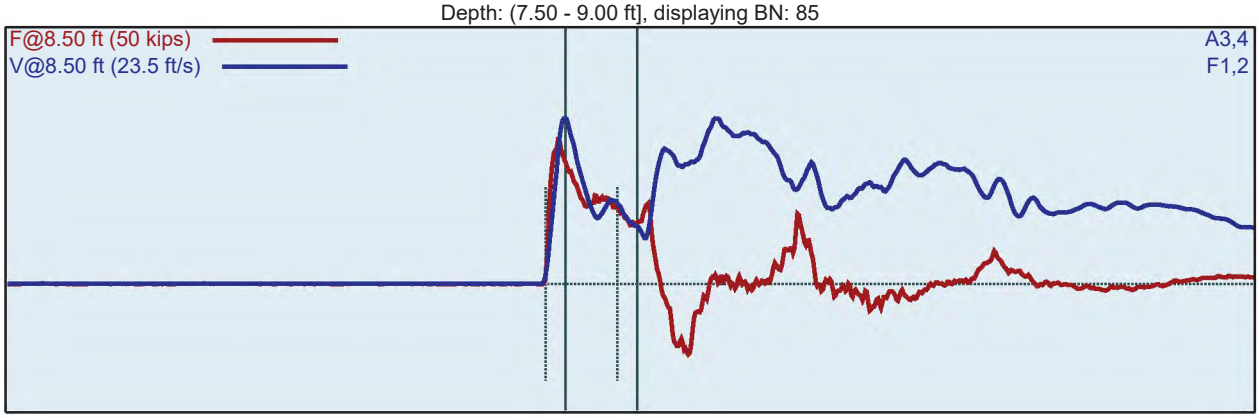
4-14-23 old 55truck
MJ

2.5
Test date: 4/14/2023

AR: 1.19 in^2
LE: 7.00 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (7.50 - 9.00 ft], displaying BN: 85



F1 : [202AWJ2] 222.96 PDICAL (1) FF1
F2 : [202AWJ1] 224.03 PDICAL (1) FF1

A3 (PR): [K12925] 354.726 mv/6.4v/5000g (1) VF1
A4 (PR): [K12930] 443.745 mv/6.4v/5000g (1) VF1

BL#	BC /6"	FMX kips	VMX ft/s	BPM bpm	EFV ft-lb	ETR %
68	6	29	18.0	30.1	241	68.9
69	6	29	17.6	30.2	251	71.8
70	6	29	17.1	30.1	258	73.6
71	6	29	16.0	30.1	262	74.7
72	6	29	15.9	30.1	259	74.1
73	6	29	15.6	30.1	258	73.6
74	6	29	15.3	30.1	252	72.0
75	6	28	15.6	30.1	247	70.4
76	6	28	15.7	30.2	244	69.8
77	6	29	15.3	30.1	242	69.1
78	6	29	16.5	30.1	243	69.4
79	6	29	16.6	30.1	232	66.3
80	8	28	17.1	1.9	246	70.3
81	8	28	16.5	29.9	257	73.5
82	8	28	16.1	30.0	252	72.1
83	8	28	15.7	30.0	268	76.7
84	8	28	15.6	30.1	263	75.2
85	8	28	15.2	30.1	272	77.6
86	8	28	15.2	30.2	272	77.6
87	8	28	15.2	30.0	270	77.2
	Average	28	15.8	28.1	254	72.7
	Std Dev	0	0.6	7.3	12	3.6
	Maximum	29	17.1	30.2	272	77.6
	Minimum	28	15.2	1.9	232	66.3

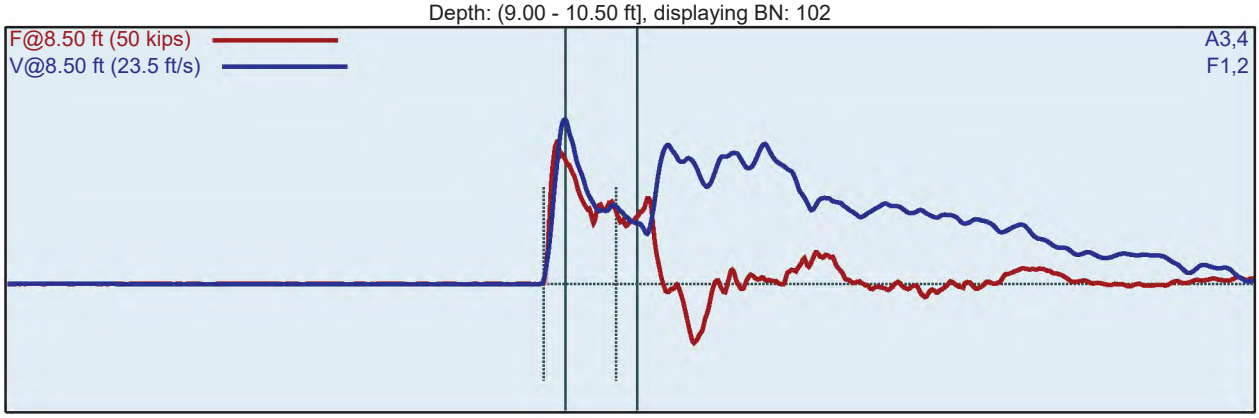
N-value: 14

Sample Interval Time: 231.60 seconds.

4-14-23 old 55truck
MJ
AR: 1.19 in^2
LE: 8.50 ft
WS: 16807.9 ft/s

2.5
Test date: 4/14/2023
SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (9.00 - 10.50 ft], displaying BN: 102



F1 : [202AWJ2] 222.96 PDICAL (1) FF1
F2 : [202AWJ1] 224.03 PDICAL (1) FF1

A3 (PR): [K12925] 354.726 mv/6.4v/5000g (1) VF1
A4 (PR): [K12930] 443.745 mv/6.4v/5000g (1) VF1

BL#	BC /6"	FMX kips	VMX ft/s	BPM bpm	EFV ft-lb	ETR %
88	8	28	15.2	30.1	268	76.7
89	8	28	15.4	30.1	272	77.7
90	8	28	15.4	30.1	274	78.4
91	8	28	15.2	30.1	271	77.4
92	8	27	15.4	30.1	270	77.0
93	8	27	15.3	30.2	278	79.4
94	8	28	14.6	30.1	269	76.9
95	8	28	15.4	30.1	270	77.0
96	9	28	14.6	30.1	273	78.1
97	9	27	14.9	30.1	276	79.0
98	9	28	15.3	30.0	276	78.8
99	9	27	15.1	30.1	274	78.2
100	9	27	15.0	30.1	269	76.9
101	9	28	14.9	30.2	269	76.8
102	9	27	15.1	30.0	271	77.4
103	9	28	14.8	30.1	270	77.2
104	9	27	14.8	30.0	268	76.6
Average		27	14.9	30.1	272	77.7
Std Dev		0	0.2	0.1	3	0.8
Maximum		28	15.3	30.2	276	79.0
Minimum		27	14.6	30.0	268	76.6

N-value: 9

Sample Interval Time: 31.95 seconds.

Summary of SPT Test Results

Project: 4-14-23 old 55truck, Test Date: 4/14/2023

FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EFV: Maximum Energy
ETR: Energy Transfer Ratio - Rated

Instr. Length ft	Blows Applied /6"	**N Value**	**N60 Value**	Average FMX kips	Average VMX ft/s	Average BPM bpm	Average EFV ft-lb	Average ETR %
2.50	**7-7-7**	**14**	**18**	27	15.3	30.2	286	81.8
4.00	**0-7-7**	**14**	**18**	26	15.3	28.1	285	81.5
4.00	**7-6-7**	**13**	**17**	27	15.7	28.0	280	79.9
7.00	**6-6-8**	**14**	**18**	28	15.8	28.1	254	72.7
8.50	**8-9-0**	**9**	**11**	27	14.9	30.1	272	77.7
		Overall Average Values:		27	15.5	28.8	276	78.8
		Standard Deviation:		1	0.5	6.0	14	4.0
		Overall Maximum Value:		29	17.1	30.2	299	85.4
		Overall Minimum Value:		25	14.6	1.9	232	66.3