November 30, 2021

Sent via email

Mr. Michael Regan, EPA Administrator
United States Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Mail Code 50304-P
Washington DC, 20460

RE: Preliminary Alternate Liner Demonstration
DTE Electric Company Belle River Power Plant
Bottom Ash Basins Coal Combustion Residuals Unit
4505 King Road, China Township, Michigan

Dear Administrator Regan:

The DTE Electric Company (DTE Electric) is submitting the enclosed preliminary Alternate Liner Demonstration (ALD) to the U.S. Environmental Protection Agency (EPA) as a "place holder" and out of an abundance of caution to meet the November 30, 2021 date for submitting ALDs under the Part B rule.

As EPA has publicly acknowledged, the EPA has experienced unanticipated internal delays in reviewing and making decisions on the Part B applications that were submitted a year ago on November 30, 2020, and that this extended delay has practically eliminated the timeframe contemplated in the Part B rule for facilities to prepare their ALDs. Given this, EPA explains on their CCR Part B Implementation web page that they intend to "take actions to ensure that any facility approved to conduct a demonstration has the same amount of time anticipated by the current regulation to initiate and complete the demonstration after an approval."

DTE Electric appreciates EPA's commitment to take this corrective action and believes it is both necessary and appropriate. Regardless of the Agency's internal delays DTE Electric proceeded expeditiously with the hydrogeological site characterization and laboratory study as detailed in the September 1, 2021 extension request due to analytical limitations. The extension request detailed the compatibility laboratory testing program results as of late August 2021, and projected termination criteria to be met by March 23, 2022. EPA has not yet responded to the extension request.

The enclosed preliminary ALD prepared by Geosyntec using preliminary data, concludes that the low permeability natural clay soils underlying the Belle River Power Plant Bottom Ash Basins are consistently present across the basin and have sufficiently low hydraulic conductivity to prevent groundwater contamination at the solid waste boundary through the active life of the unit.

As allowed by the agency, electronic files were submitted to Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills via email. If you have any questions regarding this submittal, please contact me at 313.235.0153 or christopher.scieszka@dteenergy.com

Sincerely,

Christopher Scieszka
Project Manager, Environmental Management and Safety, DTE Energy

Enclosure

cc: Richard Huggins, Mary Jackson, Michelle Long, and Jason Mills

Prepared for

DTE Electric Company
One Energy Plaza
Detroit, Michigan 48226

PRELIMINARY ALTERNATE LINER DEMONSTRATION BOTTOM ASH BASINS

BELLE RIVER POWER PLANT

East China Township, Michigan

Prepared by

Geosyntec consultants

engineers | scientists | innovators

2100 Commonwealth Avenue, Suite 100
Ann Arbor, Michigan 48105

GLP8017

November 2021

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Appendix N – Fate and Transport Model Output Files

1. INTRODUCTION

This report has been prepared to provide the Preliminary Alternate Liner Demonstration (ALD) of Belle River Power Plant Bottom Ash Basins (BABs), one of two coal combustion residuals (CCR) units at the site, in accordance with 40 CFR Part 257 as amended on November 20, 2020 (CCR Rule). **Figure 1-1** provides a site location.

This report concludes that there is no reasonable probability that water from BABs will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.

1.1 Background

DTE Electric Company (DTE) submitted the Alternate Liner Demonstration Application for BABs to the United States Environmental Protection Agency (USEPA) on November 30, 2020 [1] in accordance with the CCR Rule. Soon after, DTE started the field and laboratory investigation studies to meet the requirements of the CCR Rule.

One of the requirements of the CCR rule is to conduct hydraulic conductivity testing using site-specific permeant liquid. The CCR Rule acknowledges that these tests may last long such that the operator of the CCR unit may need to submit an extension request for the laboratory testing program, and submit a preliminary ALD.

DTE submitted an extension request due to "analytical limitation" under a separate cover, dated September 1, 2021 [2]. The extension request detailed the compatibility testing program results as of late August 2021, and projected termination criteria to be met by March 23, 2022. The EPA has not yet responded to the extension request.

1.2 Purpose

The purpose of this report is to provide ALD approach, analysis details, and present results based on available data in accordance with the CCR Rule. Although the Part B Rule does not require the submittal of a preliminary ALD by November 30, 2021 if an extension request is submitted in accordance with §257.71(d)(2)(ii)(A), DTE is providing this preliminary ALD as a "place holder" and out of an abundance of caution and with confidence in the performance of the liner system to comply with the requirement to submit an ALD by November 30, 2021. A final ALD will be submitted in accordance with the schedule expected to be included in the forthcoming EPA decisions.

1.3 Report Organization

The remainder of this report is organized as follows:

- Section 2 – provides the field and laboratory investigation details, information on site geology/hydrogeology, and conceptual site model details.
- Section 3 – provides results of hydraulic conductivity testing, termination criteria details, chemistry testing of site-specific water, and discussion of results.
- Section 4 – provides analysis approach, details, groundwater protection standards, and evaluation of results as to whether BABs meet the ALD requirement of the CCR Rule.
- Section 5 – provides a summary of the report.
- Section 6 – provides certification.
- Section 7 – provides references.

1.4 Terms of Reference

This report was prepared by Mike Coram C.P.G., Omer Bozok P.E., Jesse Varsho P.E., and reviewed by John Seymour, P.E. of Geosyntec.

2. CHARACTERIZATION OF SITE HYDROGEOLOGY

The CCR Rule requires the following:

> *§257.71(d)(ii)(A) Characterization of site hydrogeology. A characterization of the variability of site-specific soil and hydrogeology surrounding the surface impoundment that will control the rate and direction of contaminant transport from the impoundment. The owner or operator must provide all of the following as part of this line of evidence:*
>
> *(1) Measurements of the hydraulic conductivity in the uppermost aquifer from all monitoring wells associated with the impoundment(s) and discussion of the methods used to obtain these measurements;*
>
> *(2) Measurements of the variability in subsurface soil characteristics collected from around the perimeter of the CCR surface impoundment to identify regions of substantially higher conductivity;*
>
> *(3) Documentation that all sampling methods used are in line with recognized and generally accepted practices that can provide data at a spatial resolution necessary to adequately characterize the variability of subsurface conditions that will control contaminant transport;*
>
> *(4) Explanation of how the specific number and location of samples collected are sufficient to capture subsurface variability if:*
>
> > *(i) Samples are advanced to a depth less than the top of the groundwater table or 20 ft beneath the bottom of the nearest water body, whichever is greater, and/or*
> >
> > *(ii) Samples are spaced further apart than 200 ft around the impoundment perimeter;*
>
> *(5) A narrative description of site geological history; and*
>
> *(6) Conceptual site models with cross-sectional depictions of the site environmental sequence stratigraphy that include, at a minimum:*
>
> > *(i) The relative location of the impoundment with depth of ponded water noted;*
> >
> > *(ii) Monitoring wells with screening depth noted;*
> >
> > *(iii) Depiction of the location of other samples used in the development of the model;*

(iv) The upper and lower limits of the uppermost aquifer across the site;

(v) The upper and lower limits of the depth to groundwater measured from monitoring wells if the uppermost aquifer is confined; and

(vi) Both the location and geometry of any nearby points of groundwater discharge or recharge (e.g., surface waterbodies) with potential to influence groundwater depth and flow measured around the unit.

2.1 Introduction

This section provides information on site geology and hydrogeology, data used in site characterization, a summary of ALD-specific field and laboratory study, and a conceptual site model built using the Environmental Visualization System (EVS).

2.2 Site Geology

The surficial topography of St. Clair County is characterized by a low-relief floodplain, stream terrace, and lakeshore deposits. The subsurface geology of the area is defined by glacial deposits, which range in thickness from 100 to 400 ft thick. These glacial sediments, including lacustrine, till, and sand and gravel outwash deposits, were deposited on the underlying bedrock. Throughout St. Clair County the underlying bedrock varies but is primarily fine-grained siliclastic rock, mostly shale with some sandstone [1].

The St. Clair River is the major surface water body in the county and runs along the eastern boundary of the county. Shallow regional groundwater flow would be expected to be to the east towards the St. Clair River. The BABs CCR Unit is located approximately one mile west of the St. Clair River.

2.2.1 Bottom Ash Basin Site-Specific Geology

The geology of St. Clair County consists of approximately 100 to 400 ft of glacial deposits, primarily lacustrine deposits, till, and, to a lesser extent, sand and gravel outwash, overlying a variety of bedrock surfaces. The glacial material underlying the BABs appears to be glaciolacustrine clays with local sand lenses. The uppermost aquifer unit (sandy rich interval) appears to be deposits from glaciofluvial outwash deposited directly above the bedrock surface.

The BABs CCR Unit is underlain by more than 100 ft of unconsolidated sediments, with the lower confining Bedford Shale generally encountered from 140 to 150 ft below ground surface (bgs). In general, the BABs CCR unit is initially underlain by approximately 90 ft in the western portion of the BABs and 130 ft in the eastern portion of the BABs of laterally extensive low hydraulic conductivity clay-rich deposits. During Geosyntec's ALD investigation in December 2020, cone

penetration test (CPT) dissipation tests were performed to determine hydraulic conductivity of the underlying clay-rich deposits, the results of the dissipation tests are summarized in Section 2.5.1. The CPT data confirm that the underlying deposits are consistently low hydraulic conductivity units.

The uppermost aquifer unit is a confined, sand-rich interval (within the footprint of the BABs) that directly overlies the Bedford Shale. It is thicker in the western portion of the BABs and decreases to the southeast. From west to east/southeast the uppermost aquifer increases in fines from a sandy unit to a silty unit. For the purposes of this report, the saturated unit directly overlaying the Bedford Shale (sandy and silty) is considered the "uppermost aquifer unit". It is further discussed in **Section 2.6.**

2.3 Uppermost Aquifer Field Testing and Hydrogeology

TRC calculated the hydraulic conductivities within the CCR monitoring wells set within the upper portion of the uppermost aquifer using single well hydraulic conductivity tests (e.g., slug tests) performed in 2016 and 2021 by TRC. Test results are provided in **Appendix A** and included in the EVS model. The monitoring well logs and construction details are presented in **Appendix B.** As calculated by TRC, the hydraulic conductivity of the uppermost aquifer using wells at the BABs CCR Unit area is approximately 1.2 ft/day (4E-4 cm/s).

2.4 Summary of Data Used for Site Characterization

A host of data from three separate investigations was used to characterize the subsurface stratigraphy and soil characteristics for the site. Historical investigations included a 1973-1974 investigation performed by Bechtel and a 2016 investigation performed by TRC, all of which are included in the initial ALD Application [1]. Data from the 2020 ALD Investigation performed by Geosyntec was used to augment the data set. In total, these three investigations included 56 investigative locations that included 22 soil borings, 13 monitoring wells and 16 CPTs. **Figure 2-1** provides investigation locations.

Boring logs for the 1970s, 2016, and 2020 field investigations are provided in **Appendices C** through **E**, respectively. These investigations extend across the site and include BABs and Diversion Basin (DB), which is another CCR unit connected to BABs (~ 400 ft southeast of BABs). Considering the proximity of both CCR units, field investigation data is used for both CCR units.

Field testing included pocket penetrometer tests on fine-grained soils, slug tests for the monitoring wells screened in the uppermost aquifer, and pore pressure dissipation tests (PPDs) at CPT locations. Lab testing included grain size distributions, Atterberg limits, water content, dry and/or total unit weight, specific gravity, and hydraulic conductivity testing. Type of tests, standards and

number of tests are summarized in **Table 2-1**. Laboratory test results are provided in **Appendices F** through **H** for the 1970s, 2016, and 2020 laboratory studies, respectively.

Considering the extent of existing field investigation data, it is Geosyntec's opinion that the data used in building this model is sufficient to capture the variability that may exist in soil conditions.

2.5 ALD-Specific Site Investigation Details

The scope of work for the ALD-Specific Site Investigation (SI) was completed in December 2020 and included drilling and sampling and advancing a CPT probe through the embankment and native soils. The purpose of the fieldwork was to obtain nominally undisturbed samples for hydraulic conductivity testing and to augment the existing data set to characterize the alternate liner materials in accordance with the CCR Rule. Investigations were conducted generally at 200-ft intervals but adjusted in the field as necessary to avoid underground utility lines, overhead power lines, and access issues, as needed. Investigations extended down to 100 ft bgs to an elevation approximately 490 ft, which is lower than groundwater level, and 20 ft below the nearest water body that is St. Clair River with a bottom elevation of approximately 525 ft.

The following sections provide a summary of the fieldwork completed during the SI.

2.5.1 Cone Penetrometer Tests

Eight CPTs were completed around the berms of the BABs in 200 ft intervals to characterize the BABs embankment and native soils. Similarly, seven CPTs were completed around DB. The CPT locations are provided in **Figure 2-1**. CPTs were advanced from the ground surface to refusal or to approximately 100 ft bgs. Pore pressure dissipation tests were conducted to estimate in-situ hydraulic conductivity at select depths; at a minimum, these tests were conducted near the sonic borings and at the elevation near where undisturbed samples were collected for laboratory hydraulic conductivity testing.

In total, 16 dissipation tests were completed at CPTs advanced around BABs, and 12 dissipation tests were completed at CPTs advanced around DB. Hydraulic conductivity values were estimated to range between 9.76E-9 cm/s and 2.81E-6 cm/s around BABs, and range between 7.97E-9 cm/s and 1.63E-6 cm/s around DB. Hydraulic conductivity values are similar between soils underlying BABs and DB. Results are summarized in **Table 2-2**. These values are consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1]. CPT logs are provided in **Appendix I1**, and PPD tests are provided in **Appendix I2**.

2.5.2 Sonic Drilling

In December 2020, six soil borings were advanced at the site to evaluate the subsurface geology, collect undisturbed samples for hydraulic conductivity testing, and collect additional soil samples

for characterization of native soils and the embankment. Soil samples were collected continuously in two to ten-foot sections from the ground surface to the termination of the soil boring. Geosyntec staff were present to log each boring and describe the soil samples in accordance with the Unified Soil Classification System (USCS). Shelby tubes were collected from the BABs embankment soils, and native soils at approximately 20 ft intervals from each of the sonic borings in accordance with ASTM D1587[1]. The soil borings were advanced to depths of approximately 100 ft-bgs to within the first encountered uppermost aquifer and/or into the top of the underlying shale bedrock. Sonic drilling locations are provided in **Figure 2-1.** Boring logs are provided in **Appendix E**. Soil stratigraphy is discussed in Section 2.6.

2.5.3 Laboratory Testing

A suite of index testing and hydraulic conductivity testing was conducted on select soil samples. Fourteen soil samples were collected from six borings for hydraulic conductivity testing from depths between five ft and 90 ft to capture soil conditions ranging from soft to very stiff soils. Details of hydraulic conductivity testing are provided in Section 3.

Index testing included:

- 24 Moisture Content tests (ASTM D2216)
- 4 Specific Gravity tests (ASTM D854)
- 22 Grain Size Mechanical Sieve tests (ASTM D6913)
- 21 Atterberg Limits tests (ASTM D4318)

Note that these tests quantities are included in **Table 2-1**. Test results are provided in **Appendix H**.

2.6 Conceptual Site Model

An EVS model was developed for the site based on data collected during the field investigations from the 1970s, 2016, and 2020. The EVS model centralized all the data to develop a comprehensive Conceptual Site Model (CMS). Based on the EVS model, the overall CMS of the Site lithology is relatively consistent with a low hydraulic conductivity clay-rich deposits with non-interconnected sand seams at deeper depths. Within the BABs CCR unit, the uppermost

[1] ASTM D1587 – Standard Practice for Thin-walled Tube Sampling for Fine-grained Soils.

aquifer unit sits directly above the bedrock and appears to thin and increase in silt from west to east/southeast across the BABs CCR unit.

Specific to the BABs CCR unit, Cross-sections (**Figures 2-2** through **2-7**) were created from the EVS model and analyzed to determine the various changes in lithology within the clay confining unit directly underlying the BABs and the characteristics of the upper aquifer unit which sits directly on the bedrock. Upon review of the transects, the lithology beneath the BABs consists of (from the ground surface down) (1) clay, (2) clay with sand, (3) uppermost aquifer unit, and (4) shale bedrock. These units are consistent with historical reports and TRC's November 2020, Initial Application for Alternate Liner Demonstration [1]. There were some discrepancies, in that the second clay unit was described as silty instead of sandy. Based on CPT and geotechnical index testing during Geosyntec's 2020 ALD investigation, the lower clay was re-interpreted as "clay with sand" mainly due to sand seams that were encountered. The clay within the "clay with sand" unit is relatively consistent stiff gray clay. Therefore, the lithology directly underlying the BABs consist of the following:

- (1) Clay – 50 to 60 ft thick directly beneath the BABs. This unit consists of mainly soft to medium stiff clay and minimal sand seams. None of the sand seams are interconnected or considered aquifer unit.

- (2) Clay with sand – This unit was encountered at approximately 50 to 60 ft bgs. Increasing thickness from west to east. At the west end of the BABs, this unit is approximately 40 ft thick and increases in thickness to 80 ft thick at the eastern edge of the BABs. This unit consists of stiffer gray clay with increasing sand seams. Although there are more frequent sand seams, most are less than 1 foot in thickness and have hydraulic conductivity values greater than 1 E-7 cm/s except for one location which is discussed in more detail below. The data supports that none of the sand seams are interconnected or considered an aquifer unit. Consequently, because the sands are isolated, the unit behaves like a low hydraulic conductivity clay unit.

- (3) Uppermost Aquifer Unit –This unit was encountered at approximately 90 ft bgs in the west and increases in depth to 140 ft bgs to the east. The thickness of the unit corresponds to the overlying unit and thins from west to east and directly sits atop the bedrock. The thickness changes from approximately 50 ft thick in the western edge of the BABs to ten ft thick in the eastern/southeastern edge of the BABs. This sandy unit is saturated and considered the uppermost aquifer unit within the BABs CCR unit. There is a transition from sandy aquifer beneath the BABs CCR unit to a thin saturated silty aquifer south/southeast of the BABs. Specifically, this silty aquifer extends beneath the DB and both are considered the "uppermost aquifer unit" on the cross sections and within the EVS model.

- (4) Shale bedrock – This unit was encountered at approximately 140-150 ft bgs.

During Geosyntec's 2020 investigation, CPT tests were conducted, and dissipation tests were completed at CPT-01B, CPT-03, and CPT-06 to estimate the hydraulic conductivity of the lithology. In addition, laboratory testing was conducted on individual grab samples from the three sonic borings around BABs for long-term breakthrough potential and is further discussed in Section 3. Based on the review of the CPT dissipation data (as discussed in Section 2.5.1 and Section 3), values ranged from 9.76E-9 cm/s to 2.81E-6 cm/s. The CPT-derived highest hydraulic conductivity value of 2.81E-6 cm/s was calculated at CPT-03 from a sand seam at 510 ft AMSL (approximately 80 ft bgs) within the (2) clay with sand unit. Dissipation tests at CPT-03 directly above and below the sand seam indicated hydraulic conductivities less than 1 E-7 cm/s. Therefore, the (1) clay and (2) clay with sand lithologies beneath the BABs have adequate hydraulic conductivity values to be considered a low hydraulic conductivity unit and is consistent with TRC's 2018 Natural Clay Liner Equivalency Evaluation Report [1].

Below the clay with sand is the uppermost aquifer unit that mainly consists of sand. This unit directly overlies the Bedford shale and decreases in thickness from west to south/southeast across the BABs. In the western portion of the BABs, the uppermost aquifer unit is approximately 50 ft thick (near MW-16-01) and thins to approximately 10 ft thick to the southeast. Beyond the BABs CCR unit, the EVS model predicts this unit extending to the DB CCR unit with increasing fines/silts. The hydraulic head in the (3) uppermost aquifer unit associated with the BABs is approximately 574 ft AMSL (TRC 2018a) with an almost flat horizontal gradient.

The bottom of the BABs is at an elevation of approximately 580 ft and the bottom of the clay underlying the BABs is at an elevation of approximately 500 ft (western portion), thus more than 80 ft of low hydraulic conductivity clay-rich deposits ((1) clay and (2) clay with sand) separate the bottom of the BABs CCR unit from the underlying (3) uppermost aquifer unit.

3. POTENTIAL FOR INFILTRATION

The CCR Rule requires:

§257.71(d)(ii)(B) Potential for infiltration. A characterization of the potential for infiltration through any soil-based liner components and/or naturally occurring soil that control release and transport of leachate. All samples collected in the field for measurement of saturated hydraulic conductivity must be sent to a certified laboratory for analysis under controlled conditions and analyzed using recognized and generally accepted methodology. Facilities must document how the selected method is designed to simulate on-site conditions. The owner or operator must also provide documentation of the following as part of this line of evidence:

> *(1) The location, number, depth, and spacing of samples relied upon is supported by the data collected in paragraph (d)(1)(ii)(A) of this section and is sufficient to capture the variability of saturated hydraulic conductivity for the soil-based liner components and/or naturally occurring soil;*
>
> *(2) The liquid used to pre-hydrate the samples and measure long-term hydraulic conductivity reflects the pH and major ion composition of the CCR surface impoundment porewater;*
>
> *(3) That samples intended to represent the hydraulic conductivity of naturally occurring soils (i.e., not mechanically compacted) are handled in a manner that will ensure the macrostructure of the soil is not disturbed during collection, transport, or analysis; and*
>
> *(4) Any test for hydraulic conductivity relied upon includes, in addition to other relevant termination criteria specified by the method, criteria that equilibrium has been achieved between the inflow and outflow, within acceptable tolerance limits, for both electrical conductivity and pH.*

3.1 Soil Sample and Site-Specific Water Details

3.1.1 Soil Samples for Hydraulic Conductivity Testing

Fourteen soil samples were collected for hydraulic conductivity testing. Considering the extent of existing field investigation data, including CPTs, earlier borings, Geosyntec believes that the collected samples are sufficient to capture the variability of hydraulic conductivity in natural soils.

3.1.2 Site-Specific Water Testing and Results

Site-specific CCR porewater samples were collected from both BABs and the DB for geochemical analyses to determine the representative composition of an "aggressive" solution for use in the

compatibility portion of the hydraulic conductivity testing. Due to the high turbidity of basin waters, samples were filtered through a 0.45-micron filter to evaluate dissolved concentrations. Site-specific water samples were tested for CCR Rule Appendix III and Appendix IV parameters as well as additional major cations (sodium, magnesium, potassium), anions (total alkalinity), iron, and manganese.

All water samples were found to be slightly basic, with pH concentrations ranging from 7.87 to 9.01 SU. TDS concentrations of all three samples are similar, ranging from 200 to 300 mg/L. All three samples have TDS concentrations < 1000 mg/L, which is defined by the United States Geological Survey (USGS) as "freshwater". BABs and DB samples have similar major ion compositions, as illustrated on the Piper diagram in **Figure 3-1**. The anion composition is very similar for all three samples and consists of predominantly sulfate with some alkalinity and very little chloride. The cation composition is predominantly calcium and monovalent cations (potassium/sodium), with a smaller proportion of magnesium. The DB sample has a slightly higher relative percentage of calcium and lower monovalent cations compared to the BABs samples.

The analytical results are provided in **Appendix J** and tabulated in **Table 3-1**. Results were used to calculate total ionic strength for each sample. Total ionic strength is a measure of the combined ion concentrations in a solution and can represent the salinity of a sample. Total ionic strength was calculated for each sample using geochemical modeling software Geochemist's Workbench (GWB) v12.0.4. The GWB thermodynamic dataset 'thermo.com.V8.R6_.tdat' was used for the calculations in order to incorporate all tested parameters. Analytical results for each parameter were input into GWB in units of milligrams per liter (mg/L) and the ionic strength of each sample was calculated in units of molality (m).

Both BABs samples contained similar ionic strength values (0.0088 and 0.0080 m) compared to the slightly higher ionic strength of the DB sample (0.0106 m). Thus, the DB sample is considered to be the more aggressive solution and was used for compatibility testing as described in Section 3.2.

3.2 Hydraulic Conductivity Testing Procedure and Termination Criteria

All 14 soil samples were tested for hydraulic conductivity, *k* using deionized water in accordance with ASTM D5084 [3] to establish a baseline *k* reading. Then, six of the samples exhibiting high and low *k* values were selected for compatibility testing in accordance with ASTM D7100 [4] using site-specific water. The use of ASTM D7100 is discussed in the preamble of the CCR Rule and deemed appropriate by USEPA.

ASTM D7100 termination criteria require the following conditions:

- The ratio of outflow to inflow is between 0.75 and 1.25. The hydraulic conductivity is considered steady if four or more consecutive hydraulic conductivity determinations fall within ±25 % or better of the mean value for hydraulic conductivity, $k \geq$ 3E-8 cm/s or within ±50 % or better for $k <$ 1E-8 cm/s, and a plot or tabulation of the hydraulic conductivity versus time shows no significant upward or downward trend;

- At least 2 pore volumes (PV) of flow have passed through the sample; and

- pH and electrical conductivity of effluent, is within 10% of that for the influent with no significant increasing or decreasing trends

3.3 Hydraulic Conductivity Test Results and Assessment

Preliminary results are provided in **Appendix K** as of August 20, 2021 and summarized in **Table 3-2**. The table provides sample ID, the start date for testing, amount of flow passed through a sample for a given duration of time, hydraulic conductivity values, and projected date for completing 2 PV of flow.

In addition, a set of figures created for each sample providing insight into the progression of:

- PV of flow with time.

- hydraulic conductivity with time.

- hydraulic conductivity with PV;

- pH of inflow and outflow with time; and

- Electrical conductivity (EC) with time.

Progression of different parameters is provided from **Figure 3-2** through **3-31**.

Overall, the hydraulic conductivity, *k* value of samples range between 8.2E-09 and 2.8E-08 (cm/s). The amount of PV of flow that has passed through the samples ranges from 0.8 to 2.3. As of August 20, 2021, two of the samples have reached the 2 PV criteria. The remaining samples are projected to reach 2 PV March 2022; this is based on linear extrapolation between PV at known dates and assumes *k* stays relatively constant. Overall, the PV of flow is progressing linearly towards the 2 PV criteria. Hydraulic conductivity values are generally flat and can be considered steady.

pH values are provided in **Table 3-3.** In general, the average pH of inflow ranges from 8.2 to 8.4, and the average pH of outflow ranges from 8.1 to 8.4. The pH of outflow is within 10 percent of inflow.

EC values are provided in **Table 3-4**. In general, the average EC of inflow ranges from 609 to 680, and the average EC of outflow ranges from 778 to 2146. The EC of outflow are not within the 10 percent of inflow; they are projected to meet the termination criterion by the end of December 2021. This date is based on the convergence of linear extrapolations of the data.

Table 3-5 summarizes if the sample has reached the termination criterion for PV, pH, EC, and the approximate projected date for reaching the termination criteria. As summarized in the table, samples have not reached all the termination criteria; pH has achieved termination criterion, and two of the samples have reached the PV criterion; none of the samples have reached the EC criterion. Based on available data, Geosyntec expects the last sample to reach termination criteria by the end of March 23, 2022.

The results do not include inflow vs outflow data. The main reason is that the project team had decided to keep the inflow constant, which provides more stable gradient across the sample, more accurate estimation of *k*, faster testing, and more control in the testing procedure. It is Geosyntec's opinion that the inflow/outflow criterion would be reached by the time other criteria is reached.

4. FATE AND TRANSPORT MODEL ANALYSES

The CCR Rule requires:

§257.71(d)(ii) (C) Mathematical model to estimate the potential for releases. Owners or operators must incorporate the data collected for paragraphs (d)(1)(ii)(A) and (d)(1)(ii)(B) of this section into a mathematical model to calculate the potential groundwater concentrations that may result in downgradient wells as a result of the impoundment. Facilities must also, where available, incorporate the national-scale data on constituent concentrations and behavior provided by the existing risk record. Application of the model must account for the full range of site current and potential future conditions at and around the site to ensure that high-end groundwater concentrations have been effectively characterized. All the data and assumptions incorporated into the model must be documented and justified.

> *(1) The models relied upon in this paragraph (d)(1)(ii)(C) must be well- established and validated, with documentation that can be made available for public review.*
>
> *(2) The owner or operator must use the models to demonstrate that, for each constituent in appendix IV of this part, there is no reasonable probability that the peak groundwater concentration that may result from releases to groundwater from the CCR surface impoundment throughout its active life will exceed the groundwater protection standard at the waste boundary.*
>
> *(3) The demonstration must include the peak groundwater concentrations modeled for all constituents in appendix IV of this part attributed both to the impoundment in isolation and in addition to background.*

4.1 Introduction

A fate and transport model analysis have been performed to evaluate whether the peak groundwater concentrations that may result from releases to the groundwater from the BABs exceeds the groundwater protection standards (GWPS) at the waste boundary throughout its active life.

The model considers flow of CCR pore water Constituents of Concern (COCs) migrating through the bottom of CCR unit down to the uppermost aquifer. The model does not consider additional migration of COCs horizontally to the waste management boundary. If considered, the horizontal groundwater flux would reduce the concentrations of the COCs; consequently, the model presents a conservative assessment. As discussed later in Section 4.6.1 the results of the model predicts COCs concentrations that are very low such that there is no reasonable probability that water from BABs will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.

4.2 Groundwater Protection Standards

Groundwater samples from TRC's 2016 and 2017 sampling events were tested for Appendix IV COC and represent eight rounds of background groundwater data. The data were used to calculate site-specific background levels (Background) for Appendix IV COC. **Appendix L** provides the memorandum describing the statistical calculations.

To develop GWPS for the ALD assessment, the federal Maximum Contaminant Level (MCL), Regional Screening Levels, and Background (whichever is higher) were evaluated and the highest value was selected as the GWPS in accordance with the CCR Rule. Where MCL are not available Regional Screening Levels were used. GWPS are provided in **Table 4-1.**

4.3 Consideration of Background Groundwater Concentrations

The background has been considered and is a factor when determining if GWPS has been exceeded. At the BABs, naturally occurring background concentrations are generally much lower than the GWPS. The predicted groundwater concentrations and peak groundwater background concentrations are further discussed in Section 4.6.1.

4.4 Leachate Quality Results

Porewater (i.e. leachate) quality samples from BABs and the DB were collected in December of 2020 and January of 2021; samples were analyzed for Appendix III and IV parameters by ALS Environmental in Holland, MI. Analytical results were compared for each parameter and the highest leachate concentration was used as the established concentration of the constituent (C_o) when calculating the predicted groundwater concentrations (PGC_t), as discussed further in this Section. The leachate quality data is summarized in **Table 4-2**.

In addition to the site-specific leachate concentrations, 90th percentile concentrations from the 2014 EPA study [5] were considered in the analysis. This data is summarized in **Table 4-2**.

4.5 Fate and Transport Model

4.5.1 Analysis Model

A one-dimensional fate and transport model was designed to further understand the potential for contaminant transport from the CCR units to the uppermost aquifer. The model was developed with a contaminant transport process through the clay and clay with sand layers under the BABs. Contaminant transport processes are discussed in Section 4.5.2.1 below.

The modeling program POLLUTE [6] was selected for the one-dimensional fate and transport evaluation. The data input for POLLUTE acquires all the input parameters, performs calculations

for individual transport processes, and then uses the semi-analytical solution for the various transportation process (see Section 4.5.2) to yield predicted concentrations at the various specified times and distances.

Model setup and inputs are discussed in detail in the following sections and are summarized via layers in **Figure 4-1**.

4.5.2 Proposed Mathematical and Associated Computer Model

4.5.2.1 *Mathematical Model*

The potential transport mechanisms that may occur at the BABs for the various modeled layers include advection, mechanical dispersion and diffusion. For porous media, these transport mechanisms can be represented by the following one-dimensional flow equation [7]:

Equation No. 1: $$n\frac{\delta c}{\delta t} = nD\frac{\delta^2 c}{\delta z^2} - V_\alpha \frac{\delta c}{\delta z} - \rho K_d \frac{\delta c}{\delta t} - n\lambda c$$

Where:

c = concentration at any point

D = Coefficient of hydrodynamic dispersion in the vertical direction

n = porosity of the geologic layer

K_d = distribution coefficient

V_α = Darcy Velocity in the vertical direction

ρ = dry density of soil

λ= decay constant of the contaminant species

t = time

POLLUTE utilizes the transport phenomena as governed by Equation No. 1

4.5.2.2 *Predicted Groundwater Concentrations*

This model uses an initial concentration value of one (1), which represents a unit concentration of any constituent in the leachate. The results from the model can thus be used as a prediction factor for estimating the future concentration of any constituent of concern in groundwater. Multiplying the output prediction factor by the initial leachate concentration provides the predicted

groundwater concentration at the end of the model run. The following equation (Equation No. 2) illustrates this concept:

Equation No. 2: $PGC_t = PF_t * C_o$

Where:

PGC_t = predicted groundwater concentration after t years.

PF_t = prediction factored after t years, which is the output of the model.

C_o = established leachate concentration of the constituent of concern.

4.5.3 Fate and Transport Model Inputs

4.5.3.1 *Initial Leachate or Source Concentration*

The initial leachate concentration input value used was one (1). This value is unitless because it represents unit leachate concentration of any given constituent. Therefore, the model results represent a fraction of the initial leachate concentration for any constituent.

4.5.3.2 *Number of Layers and Layer Thickness*

Two layers were modeled at the site: the clay layer and the clay with sand layer. At the BABs, the clay layer has an average thickness of 40 ft; the clay with sand layer has an average thickness of 63 ft. The average thickness of each layer was derived from an isopach map generated by subtracting the surface representing the bottom of the layer from the surface representing the top of the layer, and averaging the difference over the extent of the footprint of the BABs; model documentation for the average thickness of each layer can be found in **Appendix M**.

POLLUTE also allows layers to be subdivided into sublayers, which allows the predicted concentration distribution within a layer to be calculated. The clay layer was divided into 25 sublayers at the BABs. The clay with sand layer was divided into 40 sublayers at the BABs.

4.5.3.3 *Modeling Period*

The model was run for the operating period of 55 years. This modeling period captures the amount of time elapsed from the 1980s, when CCR unit(s) operations started, to 2034, which is the end of the projected active life of BABs.

4.5.3.4 *Talbot Parameters*

POLLUTE uses a Laplace transform to find the solution to the advection-dispersion equation. The numerical inversion of the Laplace transform depends on the Talbot parameters. The model provides default values for the parameters or they can be selected by the user. The default Talbot parameter were used in this demonstration [8].

4.5.3.5 *Boundary Conditions*

POLLUTE allows the user to select between multiple upper and lower boundary conditions. The top boundary condition typically represents the bottom of CCR unit as a potential source. The top boundary can be specified as either zero flux, constant concentration, or finite mass. A constant concentration was assumed as it provides conservative model results since it assumes that the leachate quality will remain constant at the maximum measured values over time.

The lower boundary can be specified as either zero flux, constant concentration, fixed outflow, or infinite thickness. For this model, an infinite thickness lower boundary was used; thus, the model output is a prediction factor of contaminant concentration in groundwater at the interface between the clay with sand layer and the underlying uppermost aquifer.

4.5.3.6 *Darcy Vertical Velocity*

POLLUTE requires a Darcy velocity to be input for the model as a whole. The Darcy velocity was calculated for each basin using a vertical gradient and the vertical hydraulic conductivity of the clay with sand layer. For the BABs, the vertical gradient was calculated using hydrogeologic data from the uppermost aquifer and the normal water elevation as controlled by the outflow structure within the CCR surface impoundment. These parameters were chosen to produce a conservative value for the Darcy velocity. Darcy velocity value of 1.02E-3 m/year was calculated for the BABs as provided in **Appendix M**. The hydraulic conductivity value used for the calculation of Darcy velocity is the average (geometric mean) of historical and current lab testing program vertical hydraulic conductivity data.

4.5.3.7 *Hydrodynamic Dispersion Coefficient*

The vertical coefficient of hydrodynamic dispersion is a required input for each layer within the POLLUTE model. The hydrodynamic dispersion coefficient is calculated using Equation No. 3:

Equation No. 3: $D = D^* + av$

Where:

D = the hydrodynamic dispersion coefficient (m^2/year);

D* = the effective diffusion coefficient (m^2/year).

a = the dispersivity (m);

v = the groundwater seepage velocity (m/year).

For this demonstration, the coefficient of hydrodynamic dispersion value (D) of 0.19 m^2/year was input into the model. This value was based on the effective diffusion coefficient (D*) for chloride (0.19 m2/yr), as calculated by Rowe et al. [9]. The coefficient of chloride was chosen as it is considered to have a high capacity for diffusion compared to other constituents of interest, this it is a conservative constituent to model among the constituents of concern.

The second part of Equation 3, (av) is related to dispersion. Rowe et al. [9]. Discusses when the seepage velocity (1.02E-3 m/year) is low (i.e., clay soils), diffusion will control the parameter hydrodynamic dispersion (D) and dispersion is negligible.

4.5.3.8 *Effective Porosity and Density Input*

The average porosity of each model layer was estimated using laboratory data as discussed in Section 2. The model shows good agreement between porosity values and geologic layers, with the overlying clay unit having lower porosities than the underlying clay with sand unit. An average of 46 percent porosity was used for the clay layer, while an average of 42 percent porosity was used for the clay with sand layer.

Based on empirical data provided by Sara (1994) [10], the laboratory porosity data was converted to effective porosities. An effective porosities values of 0.37 and 0.34 for the clay and clay with sand layers were utilized, respectively.

Density values from laboratory testing were also used to determine a suitable model input. The average dry density of 1,500 kg/m^3 (94.2 pcf) was assessed from the available data; this value was used in the POLLUTE model.

4.5.3.9 *Adsorption Coefficient and Degradation*

Adsorption and degradation of constituents can play a significant role in the impedance of contaminant migration in the subsurface. Within POLLUTE, the adsorption coefficient simulates the impedance of constituents or sorption of containments in the modeled layers, while degradation simulates the breakdown of contaminants over time. In this model, adsorption and degradation are assumed to be zero, which provides a more conservative model result.

4.6 Fate and Transport Analysis Results and Evaluation

4.6.1 Fate and Transport Baseline Model Results

The modeling was performed to evaluate predicted groundwater quality based on the hydrogeology of the site. At the BABs, the baseline model calculated a PF_t of 2.66E-33. With both the C_o and PF_t established, the PGC_t (i.e. predicted concentration) was calculated and compared to the established GWPS for the BABs. As provided in **Table 4-2**, the predicted groundwater quality results, and the 90th percentile concentrations from the 2014 EPA study [5] are below the GWPS levels. In addition, the predicted concentrations were added to the highest concentrations that were measured in 2016-2017 groundwater sampling event and compared to the GWPS. The combined results from predicted concentrations and the highest measured concentrations are below the GWPS (see **Tables 4-3**). Therefore, no impacts to groundwater above GWPS are predicted over the duration of BABs' active life.

The driving mechanism for the transport is chemical diffusion, because the advective flow would take more than a thousand years for a water molecule to travel from the bottom of BABs to upper most aquifer. **Appendix M** provides calculations for the time of travel.

The baseline model outputs for the BABs are included in **Appendix N**.

4.6.2 Sensitivity Analysis

Many of the model inputs are specific to the site. Given the potential for sampling bias, uncertainty, and natural variation, a sensitivity analysis was conducted to evaluate the impact on the variation of the model inputs. The analysis focused on changes to the model output, or PF_t, given a variation to a single model input as discussed in the following sections. A summary of the sensitivity analyses model input values is provided in **Table 4-4**. The resulting PF_t, from each sensitivity analysis was compared to a threshold prediction value, $PF_{threshold}$. The $PF_{threshold}$ value represents the PF_t at which impacts to groundwater are predicted for Appendix IV COCs at the top of the uppermost aquifer under the CCR unit; the threshold value is 0.2 for the northern BAB and 0.6 for the southern BAB. $PF_{threshold}$ is calculated using the Equation No. 4:

Equation No. 4: $$PF_{threshold} = \min\left\{\frac{GWPS_1}{C_1}, \frac{GWPS_2}{C_2}, \ldots, \frac{GWPS_i}{C_i}, \ldots, \frac{GWPS_n}{C_n}\right\}$$

Where:

$PF_{threshold}$ = Threshold Prediction Factor

$GWPS_i$ = Groundwater Protection Standard for Constituent 'i'

C_i = Maximum porewater concentration of the COC 'i'

4.6.2.1 *Darcy Velocity*

A sensitivity analysis was completed to evaluate the impact of Darcy velocity changes. A Darcy velocity of 2.03E-3 m/year was selected as the value to use for this analysis. This value is double the baseline value calculated during this demonstration and thus serves as a suitable value for input to the sensitivity analysis.

4.6.2.2 *Coefficient of Hydrodynamic Dispersion*

Model sensitivity to the coefficient of hydrodynamic dispersion was evaluated by increasing and decreasing the input value by 25%. The initial input value was derived from laboratory testing (Rowe et al., 2004) [9], and thus a 25% increase and decrease is considered a satisfactory variation for sensitivity analysis.

4.6.2.3 *Porosity and Effective Porosity*

Model sensitivity to the porosity and effective porosity was evaluated by increasing and decreasing the input value by the minimum and maximum range of values calculated from the laboratory results.

4.6.2.4 *Layer Thickness*

The isopach maps (**Appendix M**) were used to calculate the maximum and minimum thickness for the clay and clay with sand layers. Using those values as inputs, four additional models were run for each CCR unit to evaluate model sensitivities to layer thickness; in each model only one variable was changed.

4.6.2.5 *Modeling Period*

The modeling period used was 55 years (the "baseline"). To further evaluate the impact of modeling runtime on the resultant PFt, one model was run with a modeling period of 85 years, to capture the post-closure care time period, though DTE intends to close the BABs by removal.

4.6.2.6 *Sensitivity Results*

Additional fate and transport model runs were completed to evaluate model sensitivities to changing model inputs. As shown in **Table 4-5** using more conservative model input parameters resulted in PF_t values ranging from 6.23E-38 to 1.30E-26. This demonstrates that the BABs will not impact groundwater quality assuming conditions more conservative than the baseline scenario. The sensitivity modeling results are presented in **Table 4-5** whereas the model outputs are included in **Appendix N.**

4.6.3 Reliability of Computer Model

The computer-based transport model used for this analysis is based on rigorous and proven analytical solutions to the advection-dispersion equation for layered deposits. These equations were derived with the intent of modeling the physical and chemical transport of contaminants from waste impoundments. Widespread use, comprehensive documentation, and abundant publications (Talbot, 1979 [8]; Rowe, 1987 [11]; Rowe and Booker, 1987 [12]; Rowe, 1988 [7]; and Rowe and Booker, 1989 [13]) lend to the versatility of this modeling approach for assessing groundwater impacts. The outputs obtained from models conducted in POLLUTE can be compared to those obtained using other approaches to solving the advection-dispersion equation.

4.6.4 Degree of Conservativeness in Model Results

Input parameters for the baseline models were based on site-specific data whenever possible. When not possible, input values were derived from an understanding of the site and relevant peer-reviewed literature. If a high degree of uncertainty was present, conservative input values were selected. A summary of the various conservative assumptions is listed below:

- The maximum measured leachate (i.e., porewater) concentration for each constituent was used for the fate and transport model prediction table;
- Constant leachate concentration or a constant mass was used for the entire modeling period. A specific mass could have been assumed for modeling purposes which would have resulted in decrease leachate concentrations over time but to be conservative the model assumed constant leachate concentration over time;
- Adsorption can significantly reduce the concentrations of metal constituents as they move through soils, especially clays which would retard or slow down migration. To be conservative, the model assumed no adsorption would occur over time;
- Degradation of leachate (input values) through either biologic or chemical process was assumed not to occur during the modelling period. By assuming no degradation, the model overestimates the predicted groundwater quality over time; and
- The CCR Rule requires compliance at the waste boundary. The analysis only considers vertical flow from the bottom of FAB to the top of the uppermost aquifer; the analysis does not consider a 2-D flow towards the waste boundary, which would further lower the predicted concentration levels for COCs.

5. SUMMARY

This Preliminary ALD has been prepared to assess if the BABs CCR unit meets the ALD requirements per the CCR Rule. The data included comprehensive field and laboratory investigation data collected from the 1970s to 2020. The 2020 field and laboratory investigation studies were conducted specifically to augment data gaps and to address the CCR Rule requirements. The data were integrated into an EVS model to create a comprehensive CSM to understand the BABs lithology beneath the CCR unit and as a basis for the Fate and Transport analysis. The EVS model was relatively consistent with historic representations of the geology associated with the BABs CCR unit.

Site-specific water was collected from BABs and DB and tested to assess which one of the CCR units had the more aggressive water. Water from DB was deemed to be more aggressive and used for compatibility testing to estimate the impacts on the hydraulic conductivity of soil samples. The testing program is still underway. The most current results from the testing have been used in this ALD.

A comprehensive subsurface stratigraphy model was created using the augmented data set and processing it through the EVS. Following, Fate and Transport analysis was conducted to assess whether there is a reasonable probability that water from BABs may result from releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary.

The Fate and Transport analysis was conducted for the operating time period of 55 years ("baseline"), which captures the amount of time elapsed from the 1980s, when CCR unit operations started, to 2034, which is the end of the projected active life of BABs.

The analysis considered different contaminant transport mechanisms including, advection, dispersion, and diffusion. The analysis indicates that advective flow would take more than a thousand years for a water molecule to travel from the bottom of BABs to upper most aquifer. Therefore, the analysis results indicate that, due to the low permeability nature of the in-situ unconsolidated materials, chemical diffusion is the dominant transport mechanism as opposed to advection or seepage velocity. Consequently, the current hydraulic conductivity testing described in Section 3 is sufficient to characterize hydraulic conductivity and demonstrate the performance of the alternate liner system as it relates to advection or seepage flow. It is highly unlikely that running the samples until they achieve termination criteria would change the outcome of this study, and therefore, the tests do not need to extend until March 2022.

The Fate and Transport analysis was augmented with a sensitivity analysis to account for sampling bias, uncertainty, and natural variation in site-specific inputs. Predicted groundwater concentrations for both the baseline and sensitivity analyses are below GWPS. The analysis results

show that there is no reasonable probability that water from BABs will cause releases to groundwater throughout its active life that will exceed the groundwater protection standard at the waste boundary over the projected active life of the CCR unit.

6. CERTIFICATION

CCR Unit: DTE Electric Company; Belle River Power Plant, Bottom Ash Basins (BABs)

I, Omer Bozok, being a Registered Professional Engineer in good standing in the State of Michigan, do hereby certify in accordance with the CCR Rule, to the best of my knowledge, information, and belief, that the information contained in this plan has been prepared in accordance with the accepted practice of engineering and that the BABs meets the requirements of the Alternative Liner Demonstration per the CCR Rule.

Omer Bozok
Printed Name

November 30, 2021
Signature Date

6201062700 Michigan June 4, 2024
Registration Number State Expiration Date

Affix Seal

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TABLES

Table 2-1 – Field and Lab Testing Summary

Test	Current ASTM	Number Used in Characterization
Pocket Penetrometer	WK27337	194
Slug Test	D4044	4
Grain Size Distribution	D6913	43
Atterberg Limits	D4318	72
Water Content	D2216	96
Unit Weight	D7263	64
Specific Gravity	D854	10
Hydraulic Conductivity	D5084/D7100	12/6
Cone Penetration Test	D3441	16

Table 2-2 – Dissipation Tests Results

CPT ID	Lithology Unit	Hydraulic Conductivity (cm/s)
CPT-01B	Clay	1.80E-08
CPT-01B	Clay	3.61E-08
CPT-01B	Seam 2	8.54E-08
CPT-01B	Seam2	5.78E-07
CPT-01B	Seam 3	2.05E-08
CPT-01B	Seam 4	2.57E-08
CPT-03	Clay	9.76E-09
CPT-03	Clay	2.48E-08
CPT-03	Clay with Sand	3.14E-08
CPT-03	Clay with Sand	1.97E-08
CPT-03	Seam 3	2.81E-06
CPT-03	Seam 3	5.19E-07
CPT-03	Clay with Sand	2.96E-08
CPT-06B	Clay	3.33E-08
CPT-06B	Clay with Sand	1.96E-08
CPT-06B	Clay with Sand	2.34E-08
CPT-08B	Clay	1.91E-08
CPT-08B	Clay 2	3.35E-08
CPT-08C	Seam 2	2.97E-08
CPT-08C	Clay with Sand 2	8.03E-08
CPT-08C	Clay with Sand 2	2.97E-08
CPT-11	Clay	1.97E-08
CPT-11	Clay	2.64E-08
CPT-11	Clay with Sand 2	4.68E-08
CPT-11	Clay with Sand 4	3.86E-08
CPT-11	Clay with Sand 4	2.76E-08
CPT-12	Clay	7.97E-09
CPT-13B	Seam 3	1.63E-06

Table 3-1 – Ionic Strength of Filtered Porewater

Sample ID	Unit	Bottom Ash Basin - North	Bottom Ash Basin - South	Diversion Basin
Alkalinity, Total (as CaCO3)	mg/L	88	60	100
Antimony	mg/L	0.01 U	0.01 U	0.01 U
Arsenic	mg/L	0.0085	0.007	0.0093
Barium	mg/L	0.94	0.58	0.59
Beryllium	mg/L	0.004	0.00216	0.004
Boron	mg/L	0.38	0.83	1.29
Cadmium	mg/L	0.004 U	0.004 U	0.004 U
Calcium	mg/L	83	54	80
Chloride	mg/L	9.0	9.6	14
Chromium	mg/L	0.0087	0.0049	0.01
Cobalt	mg/L	0.01	0.00554	0.0052
Fluoride	mg/L	0.26	0.52	0.31
Iron	mg/L	0.16	1.05	0.34

Sample ID	Unit	Bottom Ash Basin - North	Bottom Ash Basin - South	Diversion Basin
Lead	mg/L	0.006	0.0061	0.01
Lithium	mg/L	0.034	0.0174	0.031
Magnesium	mg/L	15.9	13.8	17.5
Manganese	mg/L	0.01	0.0145	0.0137
Mercury	mg/L	0.0004 U	0.0004 U	0.0004 U
Molybdenum	mg/L	0.035	0.046	0.058
pH	SU	7.87	8.71	9.01
Potassium	mg/L	5.9	7.5	7.6
Selenium	mg/L	0.00582	0.0057	0.0061
Sodium	mg/L	55	86	115
Sulfate	mg/L	100	110	130
Thallium	mg/L	0.01	0.00117	0.00516
Total Dissolved Solids	mg/L	200	220	300
Ionic Strength	**molal (m)**	**0.0088**	**0.0080**	**0.0106**

Notes:U – Analyzed but not detected above the method detection limit. The method detection limit is shown.

Table 3-2 – Hydraulic Conductivity Test Results Summary

ID	Date	Days After Injection	Hydraulic Conductivity (cm/s)	Pore Volumes Passed After Injection	Days to Target Pore Volume	Date of Target PV Reached
B1-ST-1 (7-9')	March 22, 2021	7	9.3E-09	0.04340		
	August 20, 2021	151	8.2E-09	0.82670	216	March 23, 2022
B2-ST-1 (1-3')	March 15, 2021	0	1.8E-08	0.00000		
	August 20, 2021	151	1.2E-08	1.50420	50	October 8, 2021
B2-ST-4 (47-49')	March 15, 2021	0	2.4E-08	0.00000		
	August 20, 2021	151	2.2E-08	1.86780	11	August 30, 2021
B3-ST-5 (77-79')	March 15, 2021	0	2.2E-08	0.00000		
	August 20, 2021	151	1.9E-08	2.23830	Complete	August 6, 2021
B4-ST-3 (47-49')	March 15, 2021	0	2.7E-08	0.00000		
	August 20, 2021	151	2.8E-08	2.28070	Complete	August 3, 2021
B5-ST-5 (87-89')	March 15, 2021	0	1.7E-08	0.00000		
	August 20, 2021	151	1.5E-08	1.86670	11	August 30, 2021

Table 3-3 – Summary of pH Results

Sample ID	Parameter	pH Inflow	pH Outflow	Is pH of outflow within termination boundaries?
B1-ST-1 (7-9')	Min	8.2	8.1	Yes
	Max	8.6	8.6	
	Average	8.4	8.4	
B2-ST-1 (1-3')	Min	8.0	7.9	Yes
	Max	8.8	8.5	
	Average	8.4	8.2	
B2-ST-4 (47-49')	Min	8.0	8.0	Yes
	Max	8.6	8.4	
	Average	8.3	8.2	
B3-ST-5 (77-79')	Min	8.1	7.8	Yes
	Max	8.8	8.6	
	Average	8.3	8.1	
B4-ST-3 (47-49')	Min	7.7	7.8	Yes
	Max	8.7	8.7	
	Average	8.2	8.1	
B5-ST-5 (87-89')	Min	7.9	8.0	Yes
	Max	8.6	8.5	
	Average	8.4	8.2	

Table 3-4 – Summary of Electrical Conductivity Results

Sample ID	Parameter	EC Inflow (µs/cm)	EC Outflow (µs/cm)	Is EC of outflow within termination boundaries?	Approximate Projected Termination Date
B1-ST-1 (7-9')	Min	656	1230	No	November 12, 2021
	Max	660	1614		
	Average	657	1418		
B2-ST-1 (1-3')	Min	560	1764	No	December 23, 2021
	Max	782	3050		
	Average	645	2146		
B2-ST-4 (47-49')	Min	523	933	No	October 12, 2021
	Max	666	1313		
	Average	609	1087		
B3-ST-5 (77-79')	Min	611	816	No	September 12, 2021
	Max	735	1118		
	Average	680	946		
B4-ST-3 (47-49')	Min	518	597	No	September 1, 2021
	Max	730	930		
	Average	625	778		
B5-ST-5 (87-89')	Min	598	1040	No	September 5, 2021
	Max	760	2010		
	Average	678	1341		

Table 3-5 – Sample Condition as it Relates to Termination Criteria

	Termination Criterion Reached				
Sample ID	Pore Volumes Passed, PV	pH	Electrical Conductivity, EC	Approximate Projected Termination Date	Date Based On
B1-ST-1 (7-9')	No	Yes	No	March 23, 2022	PV
B2-ST-1 (1-3')	No	Yes	No	December 23, 2021	EC
B2-ST-4 (47-49')	No	Yes	No	October 12, 2021	EC
B3-ST-5 (77-79')	Yes	Yes	No	September 12, 2021	EC
B4-ST-3 (47-49')	Yes	Yes	No	September 1, 2021	EC
B5-ST-5 (87-89')	No	Yes	No	September 5, 2021	EC

Table 4-1 – Groundwater Protection Criteria

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	mg/L	MCL	6.0E-03	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**	2.0E-03	**6.0E-03**
Arsenic	mg/L	MCL	1.0E-02	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	5.0E-03	**1.0E-02**	7.0E-03	**1.0E-02**	7.2E-03	**1.0E-02**
Barium	mg/L	MCL	2.0E+00	3.0E-01	**2.0E+00**	3.3E-01	**2.0E+00**	3.1E-01	**2.0E+00**	4.4E-01	**2.0E+00**	3.3E-01	**2.0E+00**
Beryllium	mg/L	MCL	4.0E-03	2.8E-03	**4.0E-03**	2.8E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**	1.0E-03	**4.0E-03**
Cadmium	mg/L	MCL	5.0E-03	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**	1.0E-03	**5.0E-03**
Chromium	mg/L	MCL	1.0E-01	1.3E-02	**1.0E-01**	1.9E-02	**1.0E-01**	2.0E-03	**1.0E-01**	2.7E-02	**1.0E-01**	2.5E-02	**1.0E-01**
Cobalt	mg/L	Background or RSL	6.0E-03	3.6E-03	**6.0E-03**	3.9E-03	**6.0E-03**	1.0E-03	**6.0E-03**	1.3E-02	**1.3E-02**	7.7E-03	**7.7E-03**
Fluoride	mg/L	MCL	4.0E+00	1.8E+00	**4.0E+00**	1.8E+00	**4.0E+00**	1.7E+00	**4.0E+00**	1.1E+00	**4.0E+00**	1.7E+00	**4.0E+00**
Lead	mg/L	RSL	1.5E-02	3.5E-03	**1.5E-02**	2.9E-03	**1.5E-02**	1.0E-03	**1.5E-02**	1.2E-02	**1.5E-02**	6.9E-03	**1.5E-02**
Lithium	mg/L	Background or RSL	4.0E-02	4.2E-02	**4.2E-02**	1.9E-02	**4.0E-02**	2.4E-02	**4.0E-02**	3.7E-02	**4.0E-02**	6.5E-02	**6.5E-02**
Mercury	mg/L	MCL	2.0E-03	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**	2.0E-04	**2.0E-03**
Molybdenum	mg/L	Background or RSL	1.0E-01	9.6E-02	**1.0E-01**	6.5E-02	**1.0E-01**	1.1E-01	**1.1E-01**	1.2E-01	**1.2E-01**	6.9E-02	**1.0E-01**
Radium-226/228	pCi/L	MCL	5.0E+00	1.3E+00	**5.0E+00**	4.0E+00	**5.0E+00**	3.0E+00	**5.0E+00**	1.2E+00	**5.0E+00**	2.7E+00	**5.0E+00**
Selenium	mg/L	MCL	5.0E-02	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**	5.0E-03	**5.0E-02**
Thallium	mg/L	MCL	2.0E-03	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**	1.0E-03	**2.0E-03**

Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-2 – Baseline Fate and Transport Results

	Constituent	Units	Maximum Observed Concentration		90th Percentile Concentration	Prediction Factor	Predicted Groundwater Quality at Top of Uppermost Aquifer			Most Conservative GWPS	Outcome - Site (Pass/Fail)		Outcome - 90th Percentile
			BAB-North	BAB-South		BAB	BAB-North	BAB-South	90th Percentile		BAB-North	BAB-South	
Appendix IV	Antimony	mg/L	1.0E-02	1.0E-02	4.0E-02	2.66E-33	2.7E-35	2.7E-35	1.1E-34	6.0E-03	PASS	PASS	PASS
	Arsenic	mg/L	8.5E-03	7.0E-03	7.8E-01	2.66E-33	2.3E-35	1.9E-35	2.1E-33	1.0E-02	PASS	PASS	PASS
	Barium	mg/L	9.4E-01	5.8E-01	2.1E-01	2.66E-33	2.5E-33	1.5E-33	5.6E-34	2.0E+00	PASS	PASS	PASS
	Beryllium	mg/L	4.0E-03	2.2E-03	1.0E-03	2.66E-33	1.1E-35	5.7E-36	2.7E-36	4.0E-03	PASS	PASS	PASS
	Cadmium	mg/L	4.0E-03	4.0E-03	6.0E-02	2.66E-33	1.1E-35	1.1E-35	1.6E-34	5.0E-03	PASS	PASS	PASS
	Chromium	mg/L	8.7E-03	4.9E-03	2.0E-01	2.66E-33	2.3E-35	1.3E-35	5.3E-34	1.0E-01	PASS	PASS	PASS
	Cobalt	mg/L	1.0E-02	5.5E-03	5.0E-02	2.66E-33	2.7E-35	1.5E-35	1.3E-34	6.0E-03	PASS	PASS	PASS
	Fluoride	mg/L	2.6E-01	5.2E-01	2.1E+01	2.66E-33	6.9E-34	1.4E-33	5.7E-32	4.0E+00	PASS	PASS	PASS
	Lead	mg/L	6.0E-03	6.1E-03	1.0E-01	2.66E-33	1.6E-35	1.6E-35	2.7E-34	1.5E-02	PASS	PASS	PASS
	Lithium	mg/L	3.4E-02	1.7E-02	4.5E-01	2.66E-33	9.0E-35	4.6E-35	1.2E-33	4.0E-02	PASS	PASS	PASS
	Mercury	mg/L	4.0E-04	4.0E-04	7.0E-06	2.66E-33	1.1E-36	1.1E-36	1.9E-38	2.0E-03	PASS	PASS	PASS
	Molybdenum	mg/L	3.5E-02	4.6E-02	7.1E+00	2.66E-33	9.3E-35	1.2E-34	1.9E-32	1.0E-01	PASS	PASS	PASS
	Combined Radium	pCi/L	1.8E+00	6.7E-40	-	2.66E-33	4.7E-33	1.8E-72	-	5.0E+00	PASS	PASS	NA
	Selenium	mg/L	5.8E-03	5.7E-03	3.2E-01	2.66E-33	1.5E-35	1.5E-35	8.5E-34	5.0E-02	PASS	PASS	PASS
	Thallium	mg/L	1.0E-02	1.2E-03	3.0E-03	2.66E-33	2.7E-35	3.1E-36	8.0E-36	2.0E-03	PASS	PASS	PASS

Notes:

MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.

RSL - Regional Screening Level from 83 FR 36435.

UTL - Upper Tolerance Limit (95%) of the background data set.

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.

ug/L = micrograms per liter

mg/L = milligrams per liter

pCi/L = picocuries per liter

Table 4-3 - MW-16-01
Background and Maximum Predicted Concentrations Compared against GWPS

Constituent	Unit	GWPS Selection	MW-16-01				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	6.7E-42	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	6.2E-42	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	3.0E-01	3.9E-40	3.0E-01	2.0	**Pass**
Beryllium	mg/L	MCL	2.8E-03	2.7E-42	2.8E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	2.7E-42	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	1.0E-03	6.7E-42	1.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	3.6E-03	3.5E-42	3.6E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.80	2.9E-40	1.8	4.0	**Pass**
Lead	mg/L	RSL	3.5E-03	6.7E-42	3.5E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	2.3E-02	4.1E-41	2.3E-02	4.2E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	2.7E-43	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	8.9E-02	2.0E-40	8.9E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	1.8E-03	1.2E-39	1.8E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	5.8E-42	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.5E-42	1.0E-03	2.0E-03	**Pass**

Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-3 - MW-16-02
Background and Predicted Concentrations Compared against GWPS

Constituent	Unit	GWPS Selection	MW-16-02				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	3.3E-01	8.4E-04	3.3E-01	2.0	**Pass**
Beryllium	mg/L	MCL	2.8E-03	8.0E-07	2.8E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	1.9E-02	3.1E-06	1.9E-02	1.0E-01	**Pass**
Cobalt	mg/L	RSL	3.9E-03	1.0E-06	3.9E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.30	9.6E-03	1.3E+00	4.0	**Pass**
Lead	mg/L	RSL	2.9E-03	2.1E-06	2.9E-03	1.5E-02	**Pass**
Lithium	mg/L	RSL	1.9E-02	1.4E-04	1.9E-02	4.0E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	6.5E-02	3.8E-03	6.9E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	2.7E-03	7.6E-04	3.4E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-3 - MW-16-03
Background and Predicted Concentrations Compared against GWPS

Constituent	Unit	GWPS Selection	MW-16-03				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	5.0E-03	4.4E-05	5.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	3.0E-01	8.4E-04	3.0E-01	2.0	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.0E-03	3.1E-06	2.0E-03	1.0E-01	**Pass**
Cobalt	mg/L	RSL	1.0E-03	1.0E-06	1.0E-03	6.0E-03	**Pass**
Fluoride	mg/L	MCL	1.80	9.6E-03	1.8	4.0	**Pass**
Lead	mg/L	RSL	1.0E-03	2.1E-06	1.0E-03	1.5E-02	**Pass**
Lithium	mg/L	RSL	1.9E-02	1.4E-04	1.9E-02	4.0E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	Background	1.0E-01	3.8E-03	1.0E-01	1.1E-01	**Pass**
Radium-226/228	pCi/L	MCL	2.0E-03	7.6E-04	2.7E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-3 - MW-16-04
Background and Predicted Concentrations Compared against GWPS

Constituent	Unit	GWPS Selection	MW-16-04				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	7.0E-03	4.4E-05	7.0E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	4.4E-01	8.4E-04	4.4E-01	2.0	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	2.7E-02	3.1E-06	2.7E-02	1.0E-01	**Pass**
Cobalt	mg/L	Background	7.4E-03	1.0E-06	7.4E-03	1.3E-02	**Pass**
Fluoride	mg/L	MCL	1.80	9.6E-03	1.8	4.0	**Pass**
Lead	mg/L	RSL	7.1E-03	2.1E-06	7.1E-03	1.5E-02	**Pass**
Lithium	mg/L	RSL	3.7E-02	1.4E-04	3.7E-02	4.0E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	Background	1.1E-01	3.8E-03	1.1E-01	1.2E-01	**Pass**
Radium-226/228	pCi/L	MCL	2.7E-03	7.6E-04	3.5E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	2.0E-03	3.4E-05	2.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-3 - MW-16-09
Background and Predicted Concentrations Compared against GWPS

Constituent	Unit	GWPS Selection	MW-16-09				
			Data				
			Maximum Observed Concentration (A)	Maximum Predicted Concentration (B)	Combined Concentration (A+B)	GWPS	Pass/Fail
Antimony	mg/L	MCL	2.0E-03	2.0E-06	2.0E-03	6.0E-03	**Pass**
Arsenic	mg/L	MCL	7.2E-03	4.4E-05	7.2E-03	1.0E-02	**Pass**
Barium	mg/L	MCL	3.1E-01	8.4E-04	3.1E-01	2.0	**Pass**
Beryllium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	4.0E-03	**Pass**
Cadmium	mg/L	MCL	1.0E-03	8.0E-07	1.0E-03	5.0E-03	**Pass**
Chromium	mg/L	MCL	1.8E-02	3.1E-06	1.8E-02	1.0E-01	**Pass**
Cobalt	mg/L	Background	5.9E-03	1.0E-06	5.9E-03	7.7E-03	**Pass**
Fluoride	mg/L	MCL	1.60	9.6E-03	1.6	4.0	**Pass**
Lead	mg/L	RSL	5.4E-03	2.1E-06	5.4E-03	1.5E-02	**Pass**
Lithium	mg/L	Background	5.5E-02	1.4E-04	5.5E-02	6.5E-02	**Pass**
Mercury	mg/L	MCL	2.0E-04	8.0E-08	2.0E-04	2.0E-03	**Pass**
Molybdenum	mg/L	RSL	6.5E-02	3.8E-03	6.9E-02	1.0E-01	**Pass**
Radium-226/228	pCi/L	MCL	3.2E-03	7.6E-04	4.0E-03	5.0E-03	**Pass**
Selenium	mg/L	MCL	5.0E-03	3.4E-05	5.0E-03	5.0E-02	**Pass**
Thallium	mg/L	MCL	1.0E-03	3.0E-07	1.0E-03	2.0E-03	**Pass**

Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 4-4 – Sensitivity Analysis Model Inputs

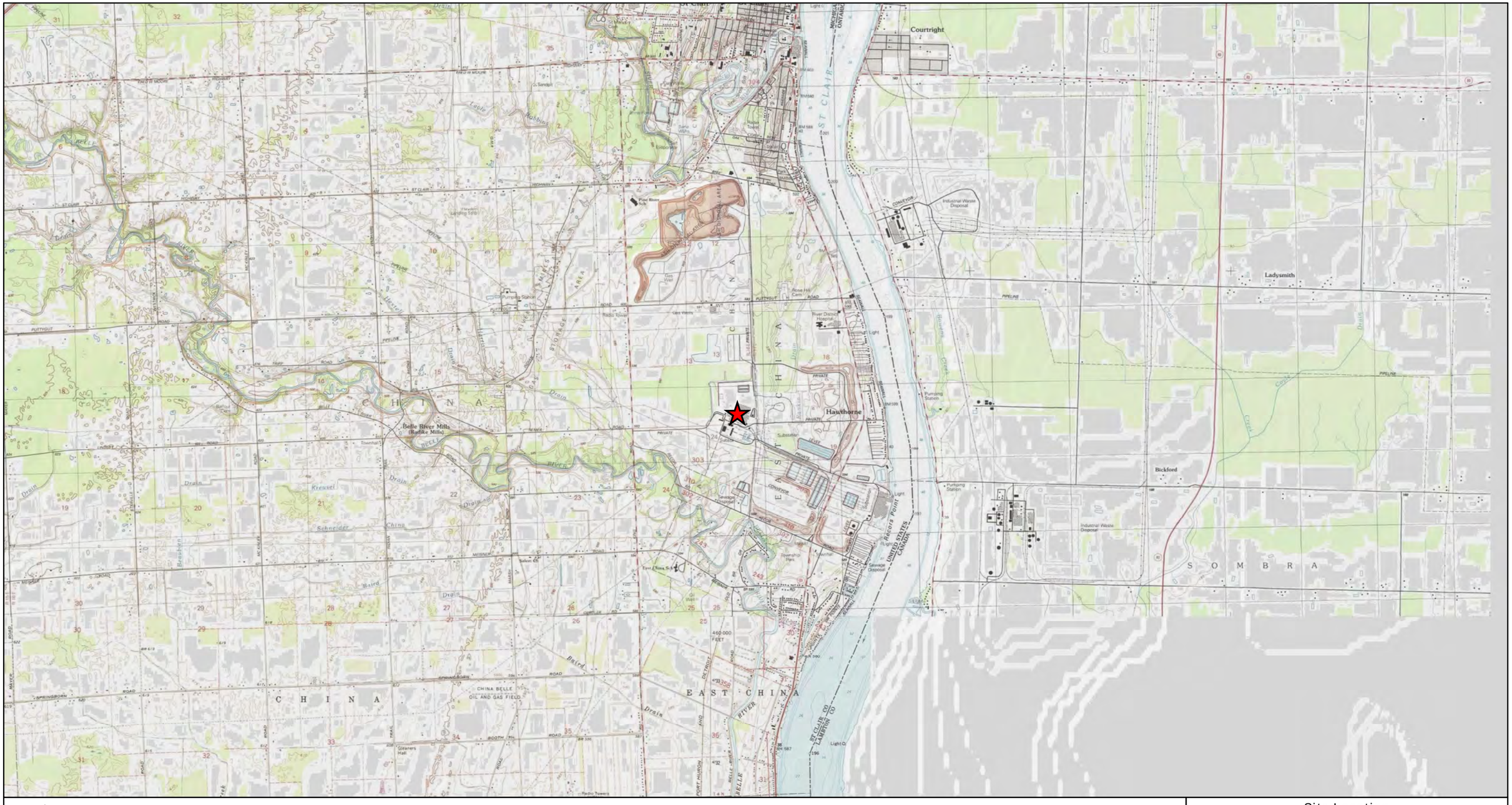
	Baseline	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**	**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**		**Baseline**	**Sensitivity Analysis**
Layer Properties	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Dv (m/yr)	Dv (m/yr)	CoHD	CoHD +25%	CoHD -25%	Total Porosity	Max Porosity	Min Porosity	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Modeling Period (years)	Modeling Period (years)
Clay	12.01	13.99	11.03	1.02E-03	2.03E-03	0.019	0.024	0.014	0.46	0.56	0.34	0.37	0.45	0.28	55	85
Clay with Sand	19.29	23.62	15.18	1.02E-03	2.03E-03	0.019	0.024	0.014	0.42	0.55	0.24	0.34	0.45	0.20	55	85

Dv = Vertical Darcy Velocity

CoHD = Coefficient of Hydrodynamic Dispersion

Table 4-5 – Sensitivity Analysis Results Prediction Factors

Bottom Ash Basins Sensitivity Analysis			
Model Name	**Description**	**Prediction Factor**	**Pass?***
BAB_Baseline	Baseline model for the Bottom Ash Basins.	2.66E-33	YES
BAB_ExtendedRun	Model runtime was extended from 55 years to 85 years.	1.30E-26	YES
BAB_Darcy	Darcy velocity was doubled.	2.52E-32	YES
BAB_CoHD_High	Coefficient of Hydrodynamic Dispersion was increased by 25%.	1.53E-30	YES
BAB_CoHD_Low	Coefficient of Hydrodynamic Dispersion was decreased by 25%.	6.23E-38	YES
BAB_ClayPoro_High	Used the highest effective porosity in clay interval; derived from laboratory data in project database.	2.50E-33	YES
BAB_ClayPoro_Low	Used the lowest effective porosity in clay interval; derived from laboratory data in project database.	3.08E-33	YES
BAB_SandPoro_High	Used the highest effective porosity in clay with sand interval; derived from laboratory data in project database.	1.67E-33	YES
BAB_SandPoro_Low	Used the lowest effective porosity in clay with sand interval; derived from laboratory data in project database.	1.06E-32	YES
BAB_ClayThick	Used thickest clay interval seen in boring/well; derived from project database.	3.60E-35	YES
BAB_ClayThin	Used thinnest clay interval seen in boring/well; derived from project database.	1.92E-32	YES
BAB_SandThick	Used thickest clay with sand interval seen in boring/well; derived from project database.	1.48E-37	YES
BAB_SandThin	Used thinnest clay with sand interval seen in boring/well; derived from project database.	1.36E-29	YES
* Indicates value less that $PF_{threshold}$, as discussed in Section 4.6.2.			



Legend

Site Location

1.5 0.75 0 1.5 Miles

Site Location

DTE Energy
Belle River Power Plant
4505 King Road
China Township, Michigan

Geosyntec consultants

Ann Arbor, Michigan | 2021/08/09

Figure 1-1

\\Chicago-01\prj1$\CWP\GLP8014 - Monroe Ash Basin Beneficial Reuse and Geotech Investigation\100 - Contracts\102 - Proposals\Part B Demonstration Support - BRPP\GIS\MXDs\BRPP Figure 1 - Site Layout.mxd. SKaroly. 11/6/2020. Project/Phase/Task.

Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

N

0 125 250 500 750 1,000 Feet

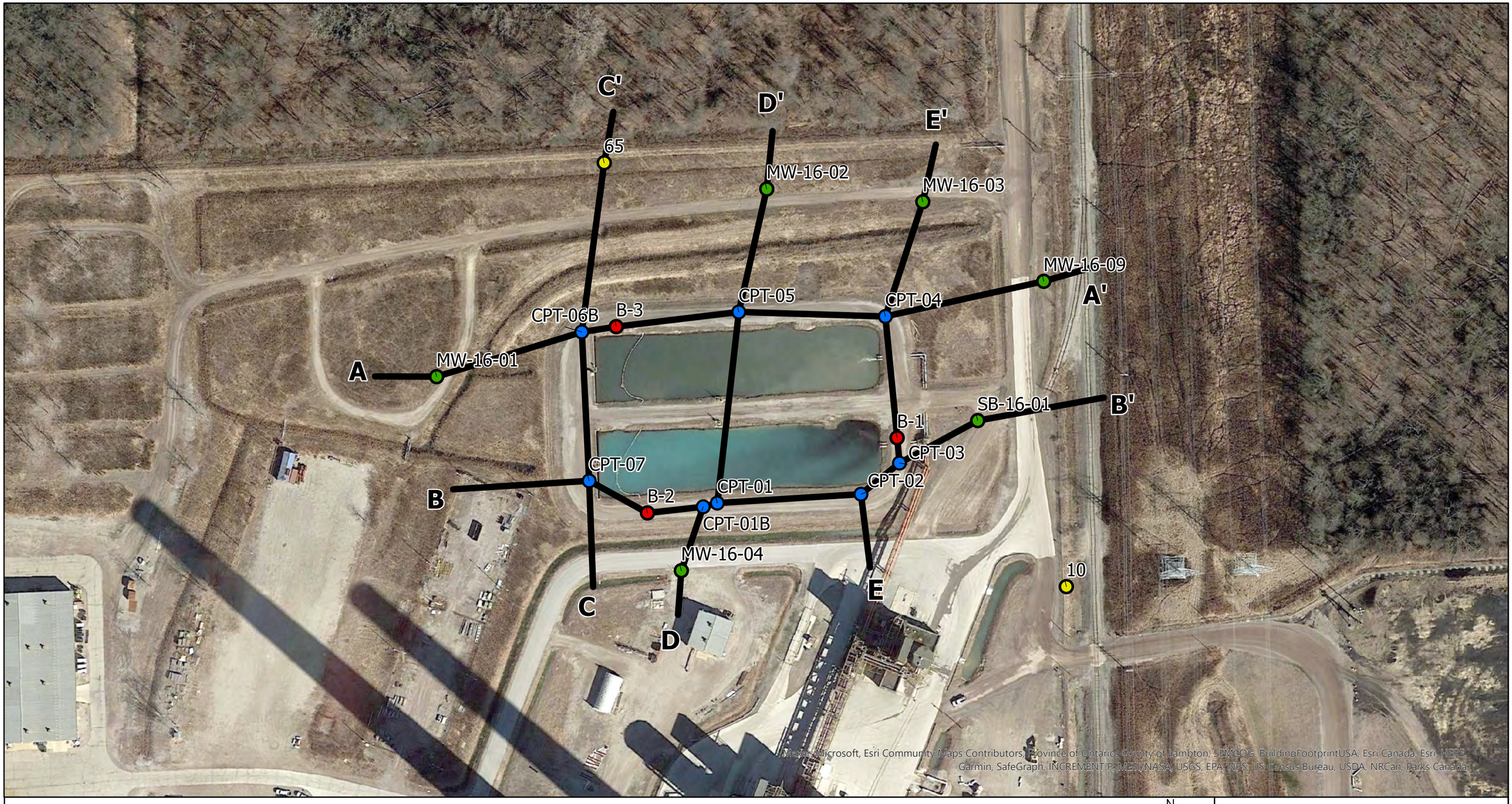
Field Investigation Locations
Bell River Power Plant
China Township, MI

Geosyntec consultants

GLP8017 | August 2021

Figure 2-1

\\chicago-01\data\prj1\USERS\Joel Conzelmann\Belle River\GIS\Belle River Sections\Belle River Sections.aprx 8/10/2021 4:27 PM



Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

N

0 62.5 125 250 375 500 Feet

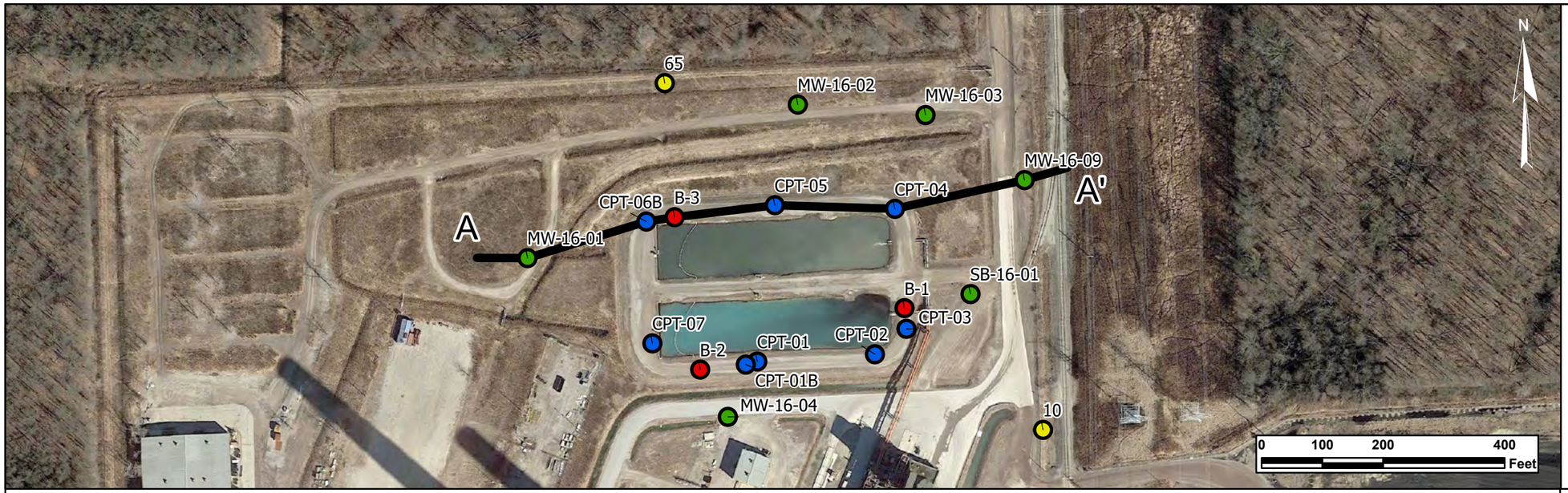
Cross Section Locations
Bell River Power Plant - Bottom Ash Basins
China Township, MI

Geosyntec consultants

Figure 2-2

GLP8017 | August 2021

\\chicago-01\data\prj1\USERS\Joel Conzelmann\Belle River\GIS\Belle River Sections\Belle River Sections.aprx 8/10/2021 4:27 PM

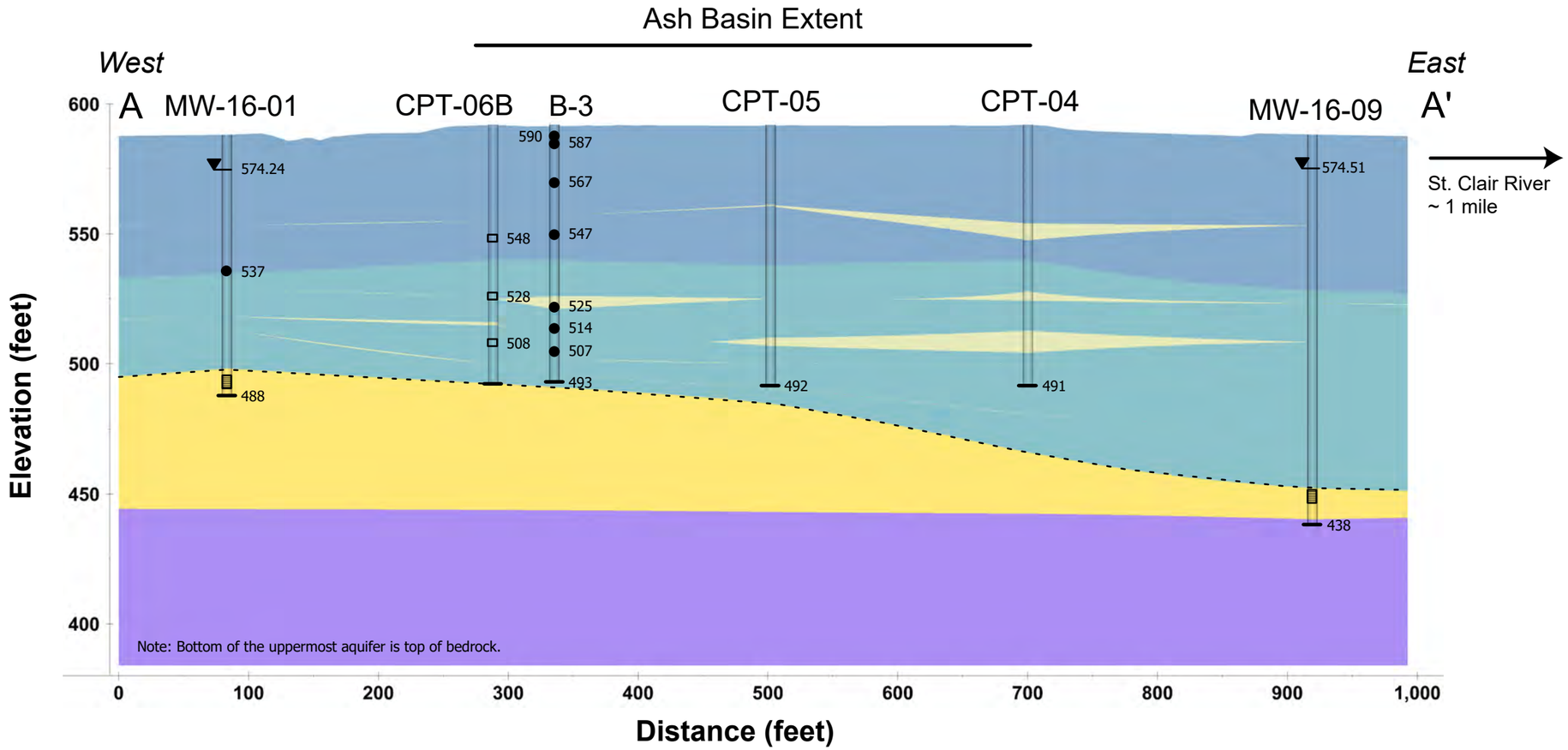


Legend

Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth
Imagery dated 03/24/2019



Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet
Horizontal Scale: 1-inch = 100-feet
Elevations are in Average Mean Sea Level
Unit interfaces are interpreted from limited data and are approximate.

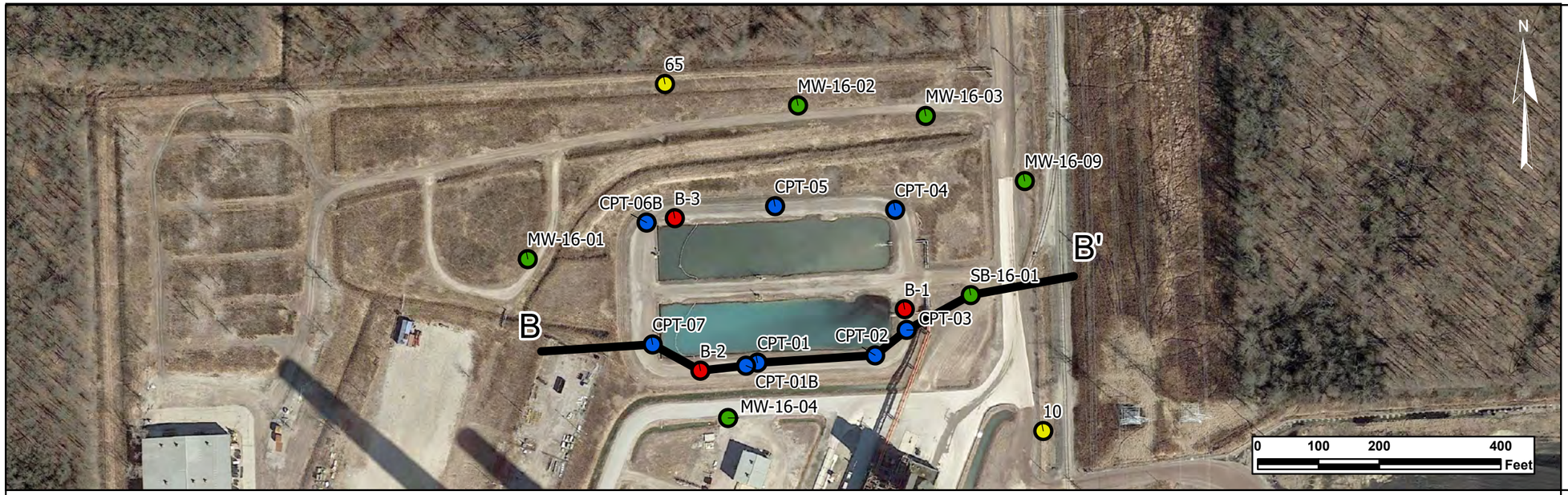
Cross Section A - A'
Belle River Power Plant - Bottom Ash Basins
China Township, MI

Geosyntec consultants

Figure 2-3

GLP8017 | August 2021

\\Chicago-01\prj1$\CWP\GLP8017 - Belle River ALD\500 - Technical\GIS\Belle River Sections\GIS\Belle River Sections\Belle River Sections.aprx 11/29/2021 1:35 PM

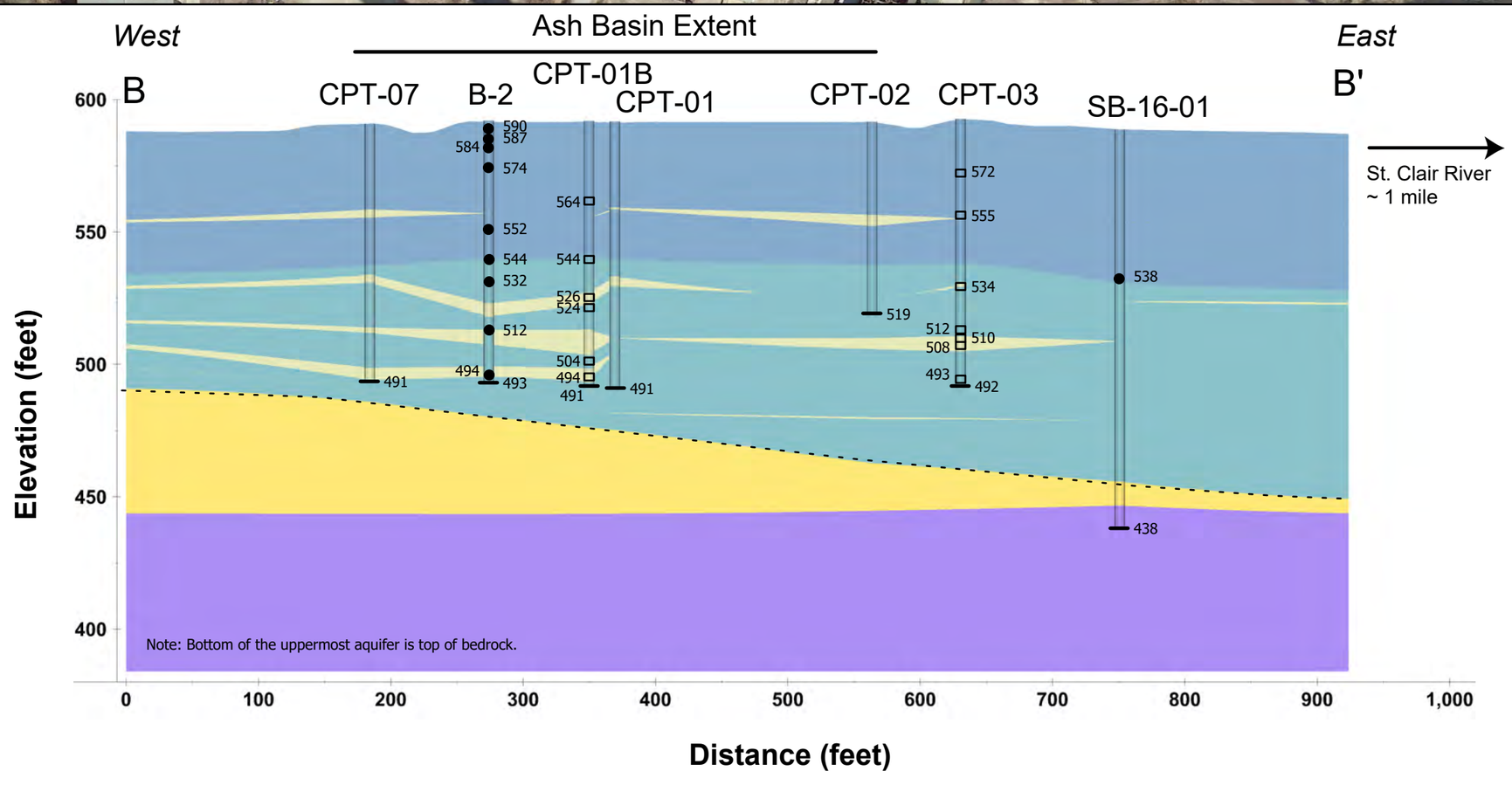


Legend

Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW- TRC
- Boring - Bechtel

Service Layer Credits: Google Earth
Imagery dated 03/24/2019



Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet
Horizontal Scale: 1-inch = 100-feet
Elevations are in Average Mean Sea Level
Unit interfaces are interpreted from limited data and are approximate.

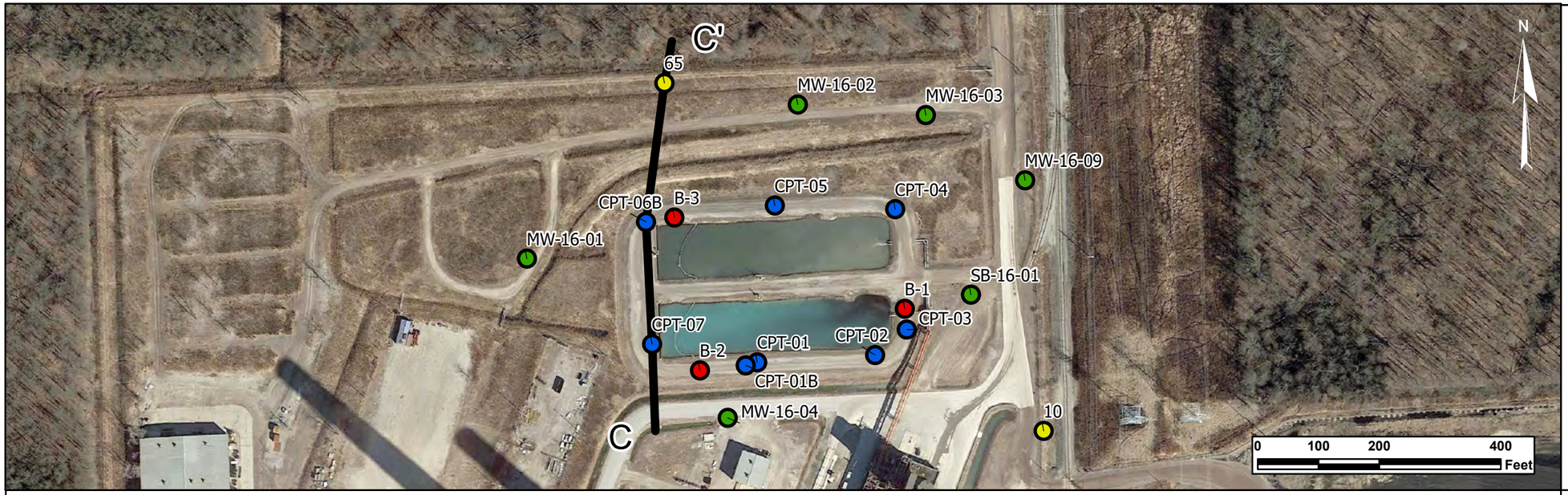
Cross Section B - B'
Belle River Power Plant - Bottom Ash Basins
China Township, MI

Geosyntec consultants

Figure 2-4

GLP8017 | August 2021

\\Chicago-01\prj1$\CWP\GLP8017 - Belle River ALD\500 - Technical\GIS\Belle River Sections\GIS\Belle River Sections\Belle River Sections.aprx 11/29/2021 1:43 PM

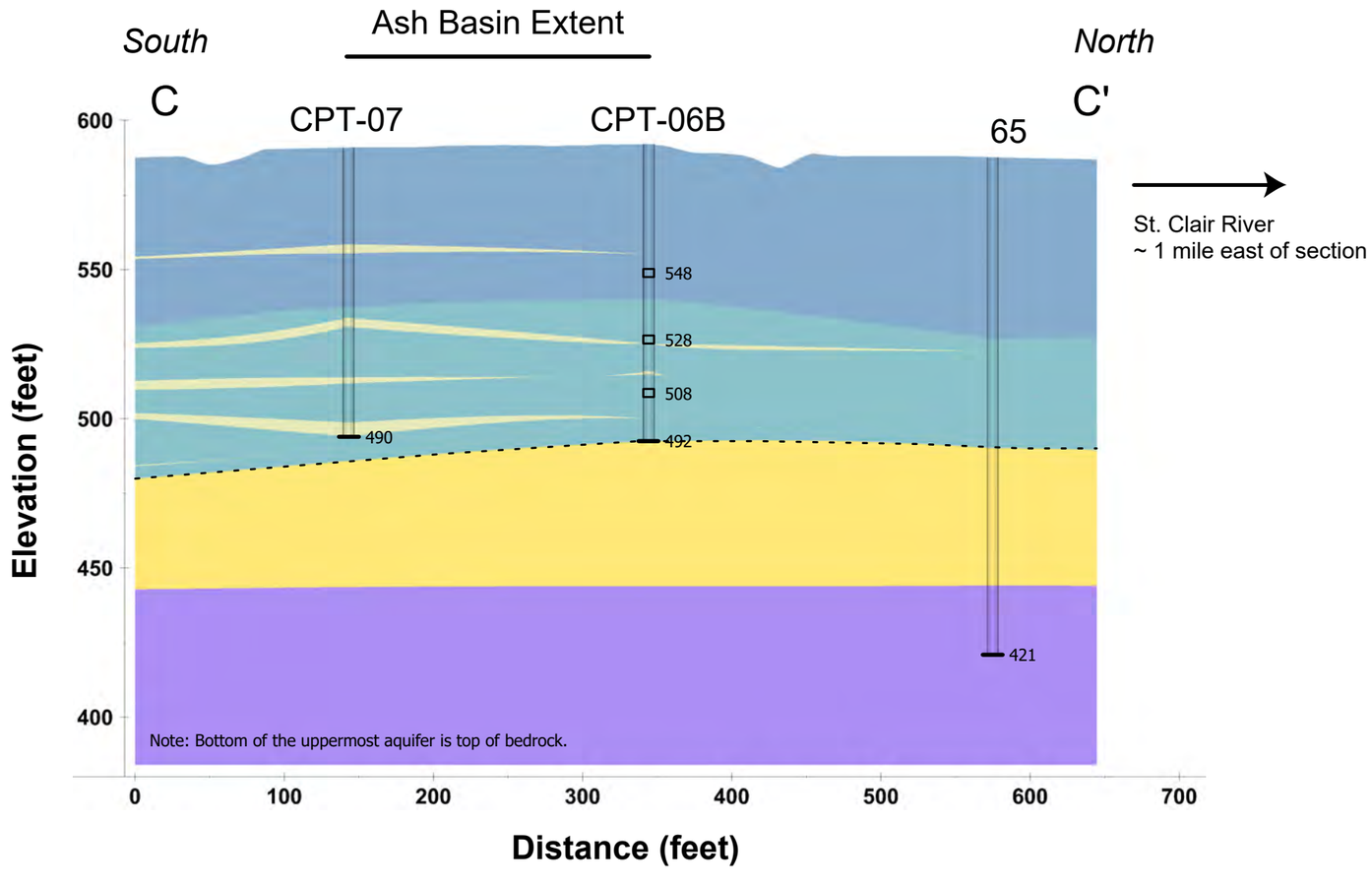


Legend

Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth
Imagery dated 03/24/2019



Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

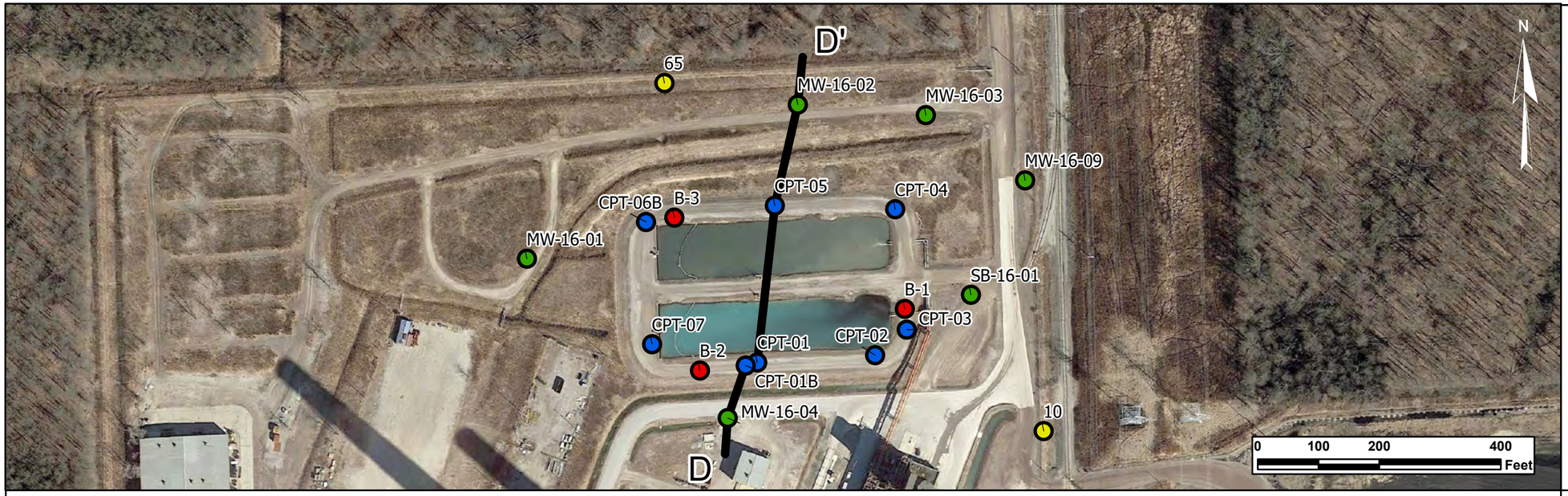
Vertical Scale: 1-inch = 50-feet
Horizontal Scale: 1-inch = 100-feet
Elevations are in Average Mean Sea Level
Unit interfaces are interpreted from limited data and are approximate.

Cross Section C - C'
Belle River Power Plant - Bottom Ash Basins
China Township, MI

Geosyntec consultants

Figure 2-5

GLP8017 | August 2021

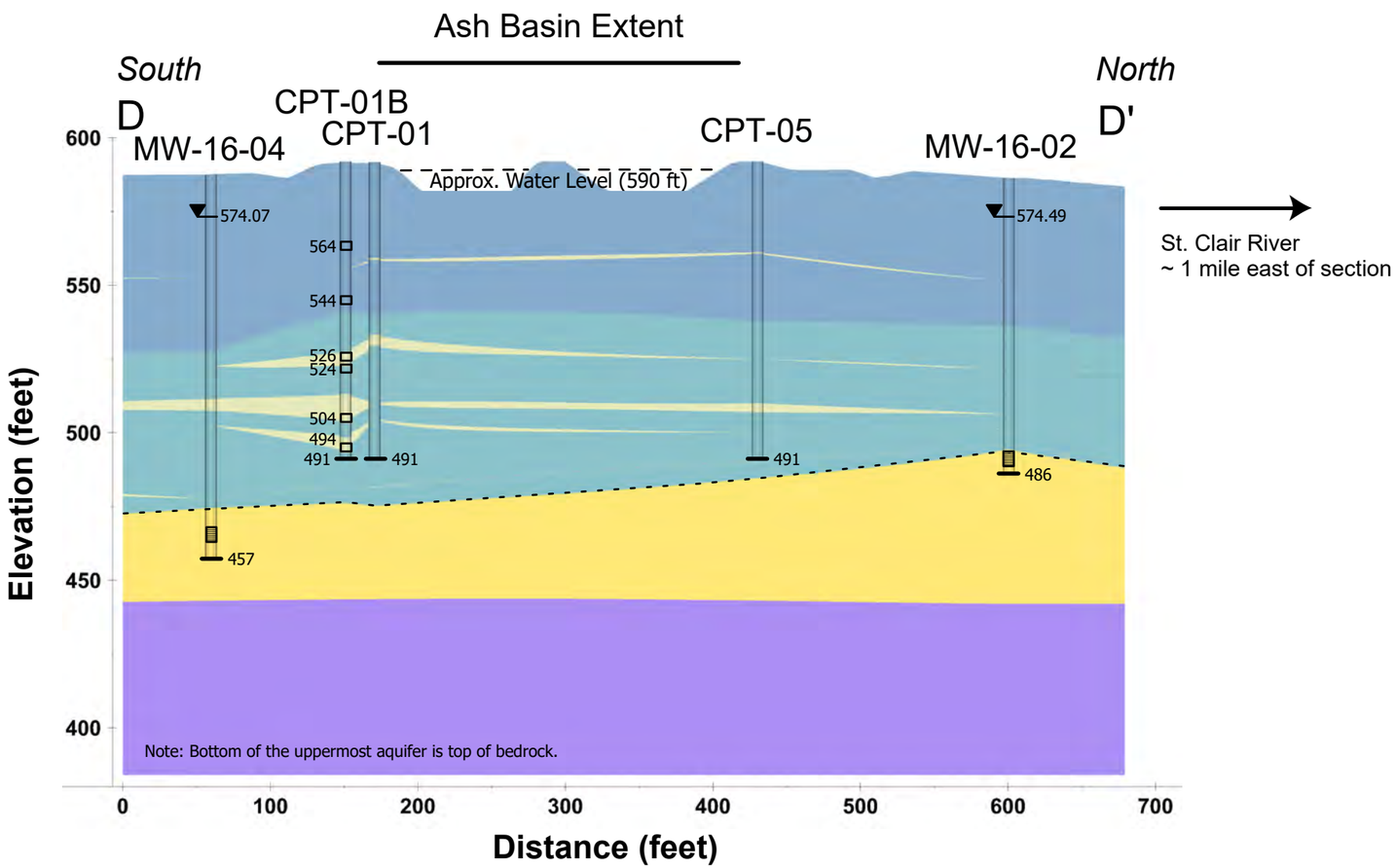


Legend

Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth
Imagery dated 03/24/2019



St. Clair River
~ 1 mile east of section

Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet
Horizontal Scale: 1-inch = 100-feet
Elevations are in Average Mean Sea Level
Unit interfaces are interpreted from limited data and are approximate.

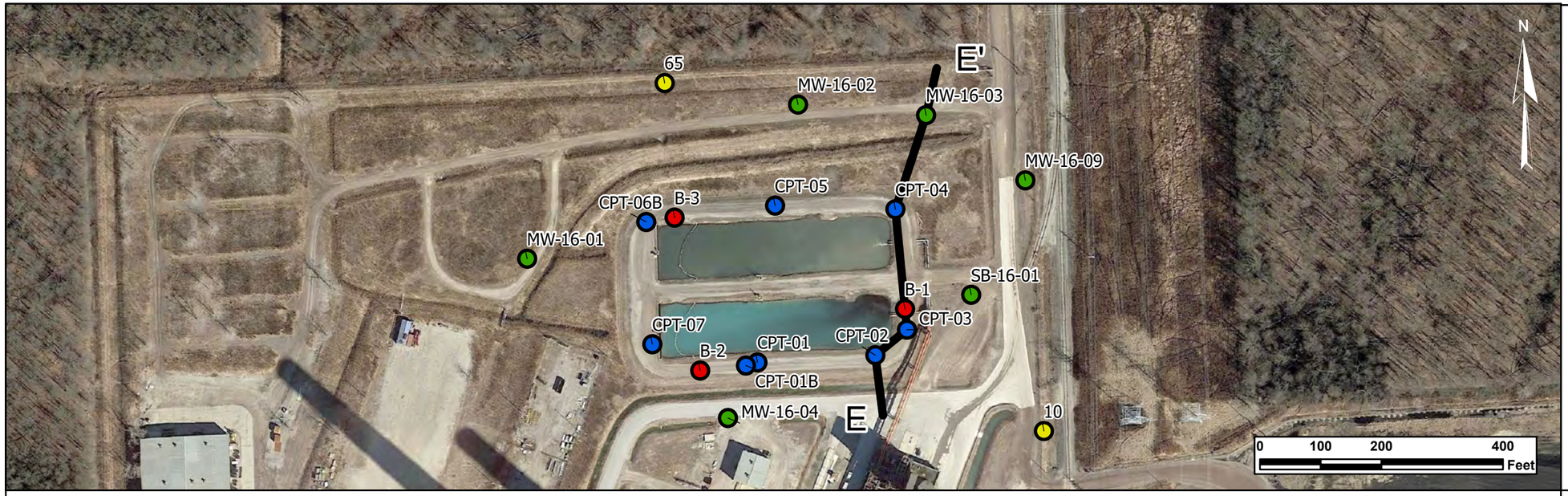
Cross Section D - D'
Belle River Power Plant - Bottom Ash Basins
China Township, MI

Geosyntec consultants

Figure 2-6

GLP8017 | August 2021

\\Chicago-01\prj1$\CWP\GLP8017 - Belle River ALD\500 - Technical\GIS\Belle River Sections\GIS\Belle River Sections\Belle River Sections.aprx 11/29/2021 1:43 PM

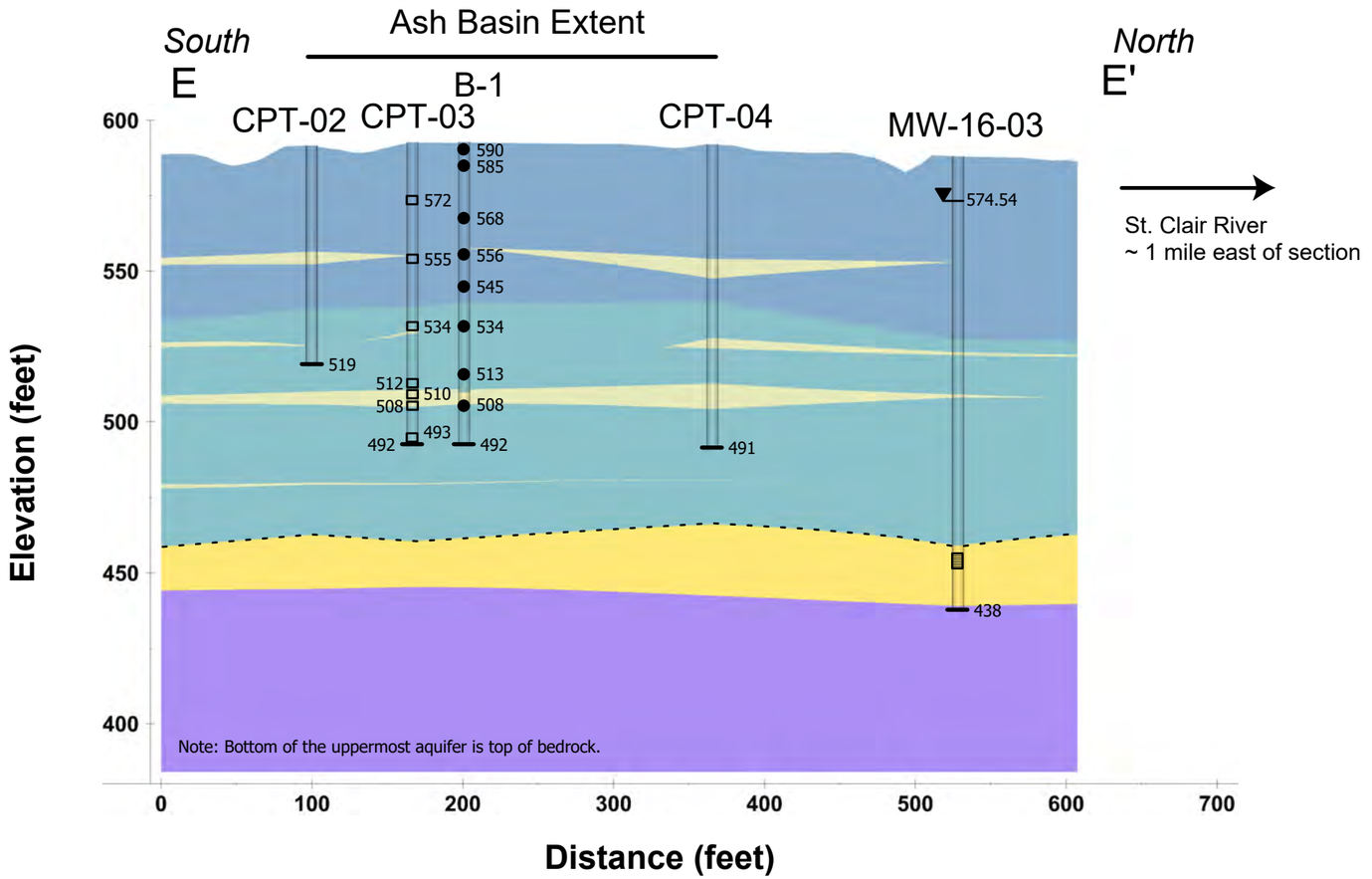


Legend

Boring Locations

- Boring - Geosyntec
- CPT - Geosyntec
- MW - TRC
- Boring - Bechtel

Service Layer Credits: Google Earth
Imagery dated 03/24/2019



Lithology

- Clay
- Clay with Sand
- Sandy Seams
- Uppermost Aquifer
- Shale Bedrock

- Water Level of Uppermost Aquifer
- End of Investigation
- Well Screen Interval
- Top of Uppermost Aquifer Unit
- CPT Pore Pressure Dissipation Test
- Geotechnical Sample Elevation

Vertical Scale: 1-inch = 50-feet
Horizontal Scale: 1-inch = 100-feet
Elevations are in Average Mean Sea Level
Unit interfaces are interpreted from limited data and are approximate.

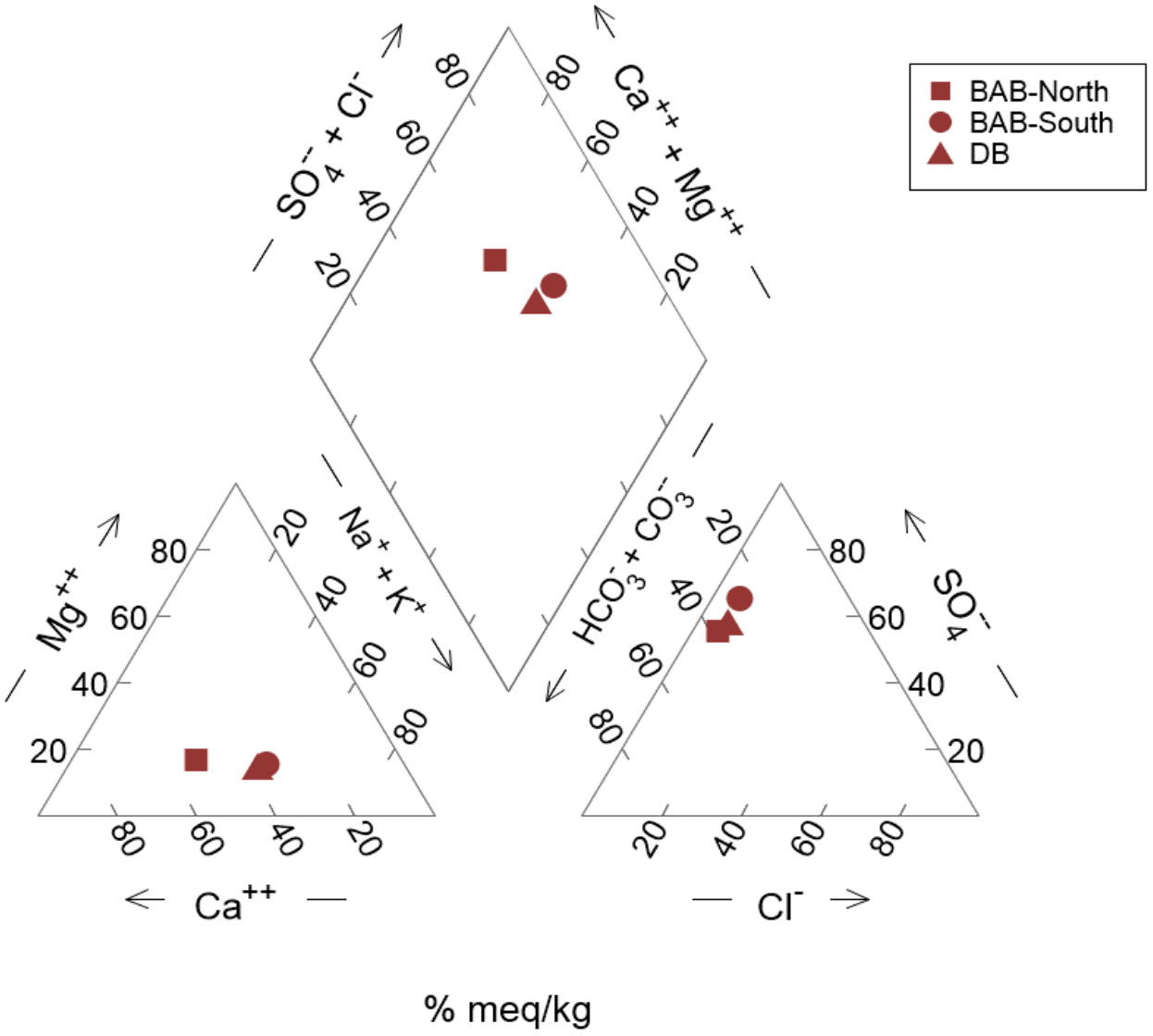
Cross Section E - E'
Belle River Power Plant - Bottom Ash Basins
China Township, MI

Geosyntec consultants

Figure 2-7

GLP8017 | August 2021

\\Chicago-01\prj1$\CWP\GLP8017 - Belle River ALD\500 - Technical\GIS\Belle River Sections\GIS\Belle River Sections\Belle River Sections.aprx 11/29/2021 1:43 PM



Note:
Results are shown in the relative percentage of milliequivalents per kilogram (meq/kg).

Filtered BAB and DB Porewater Sample

Piper Diagram

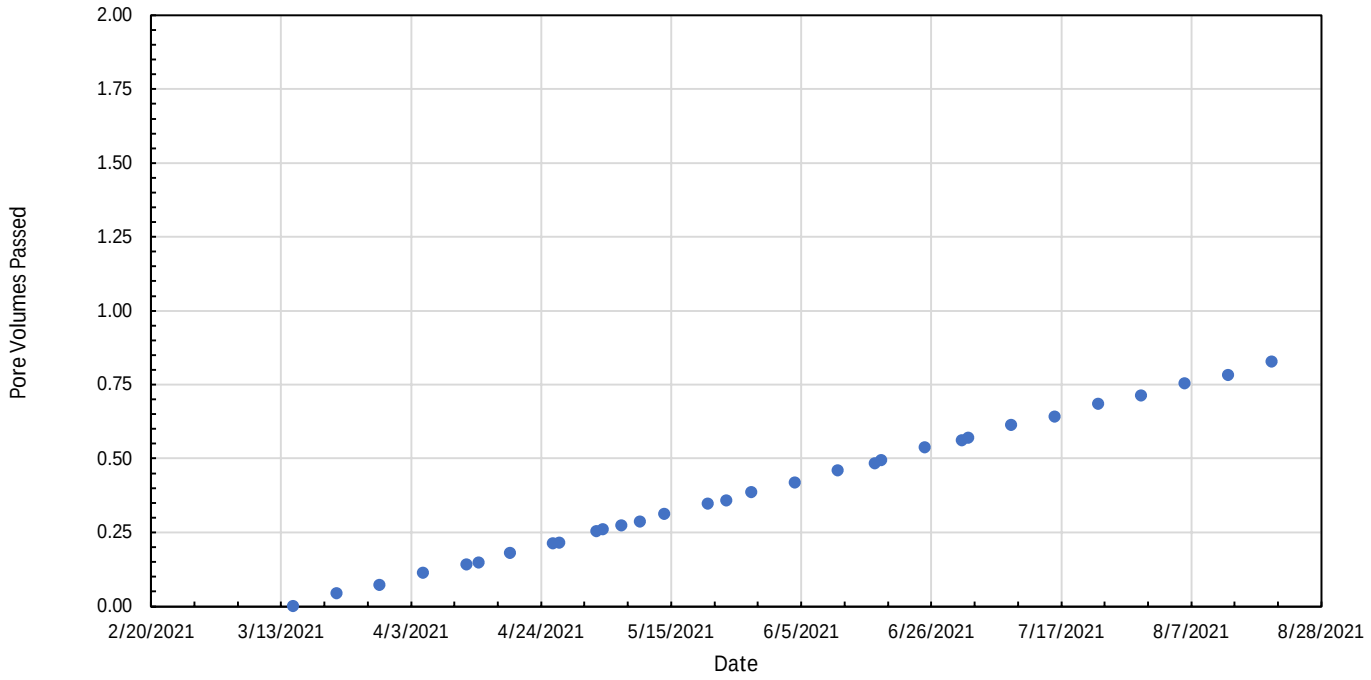
Belle River Power Plant
St. Clair County, MI

Geosyntec consultants

GLP8017	August 2021

Figure 3-1

C:\Users\BAres\Documents\DTE Belle River Report Stuff\[Figure X - Piper Diagram.xlsx]



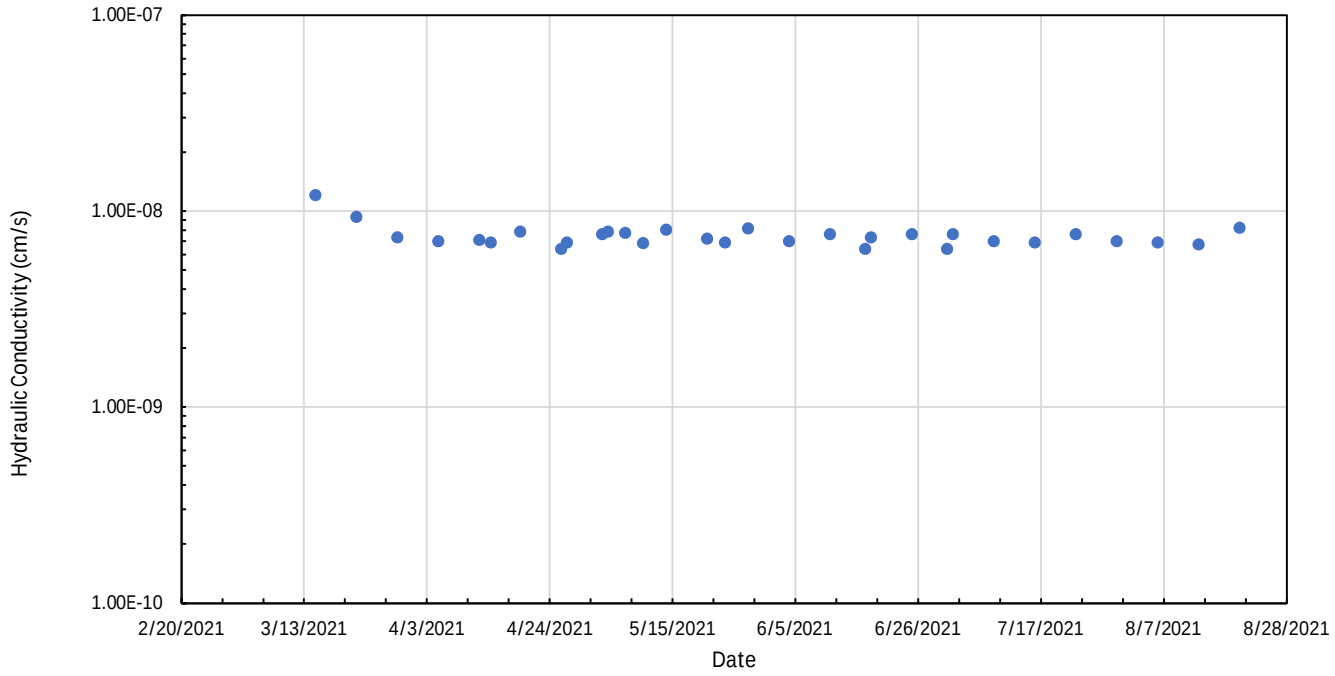
B1-ST-1 (7-9') PV of Flow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-2



B1-ST-1 (7-9') Hydraulic Conductivity with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

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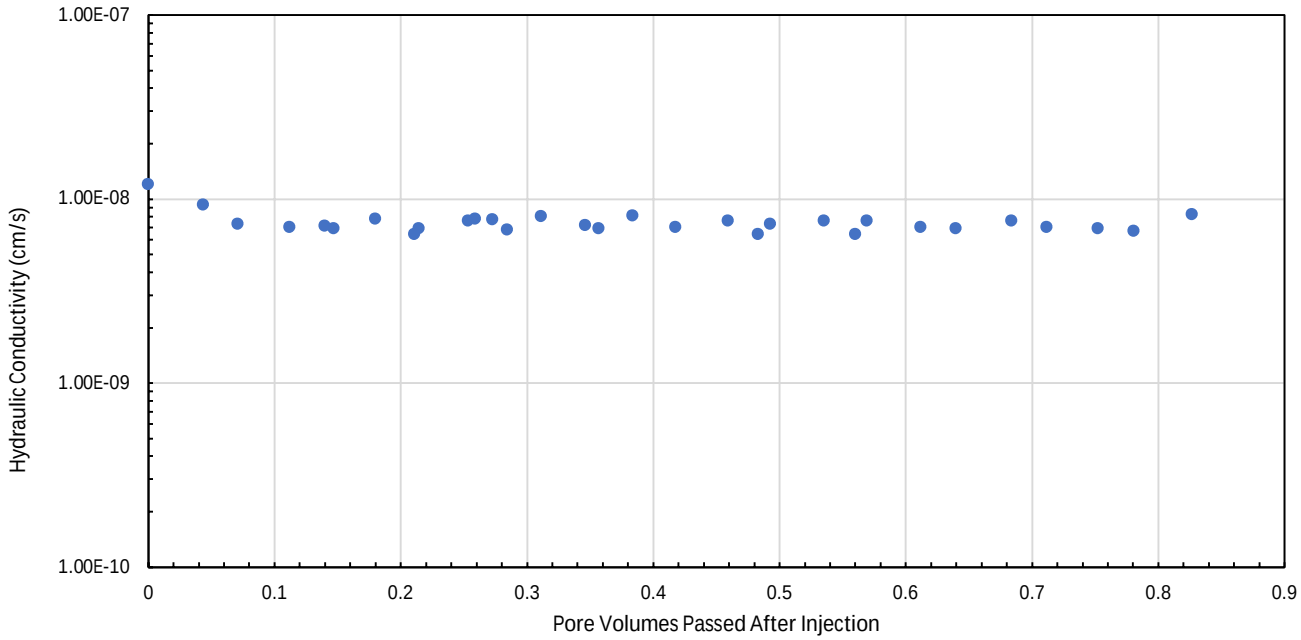
Figure 3-3



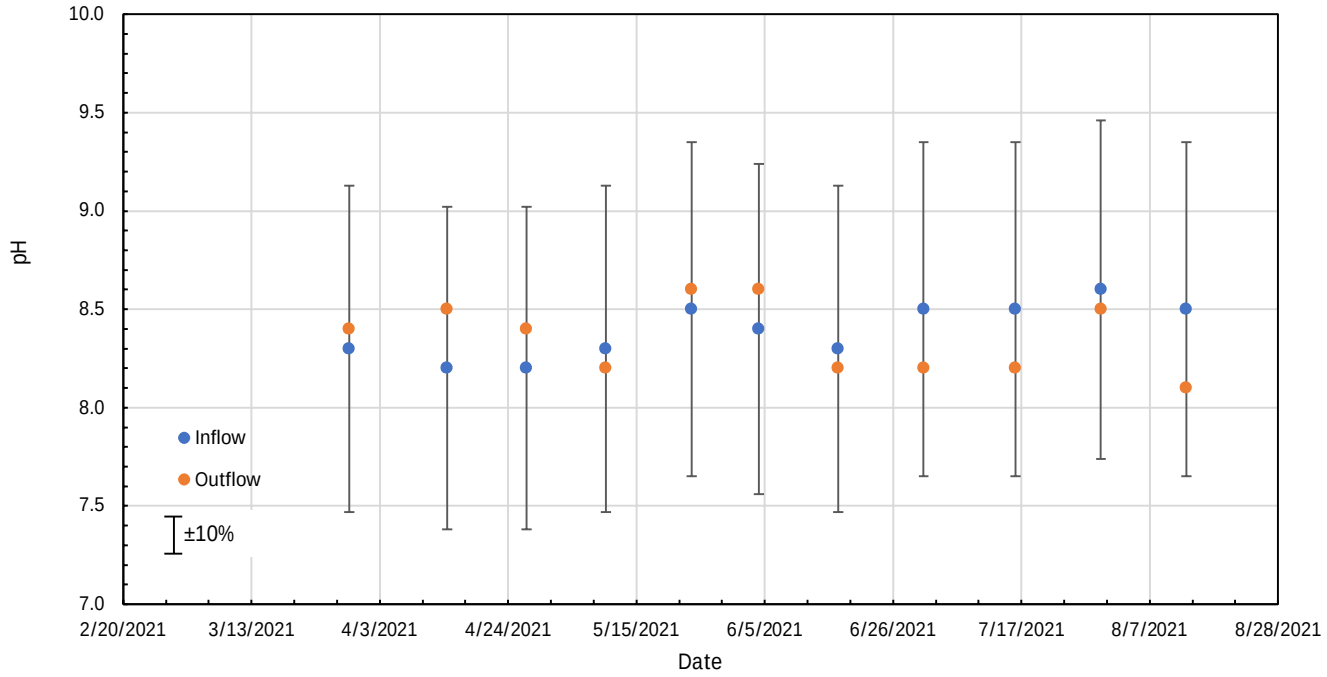
B1-ST-1 (7-9') Hydraulic Conductivity with PV

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-4



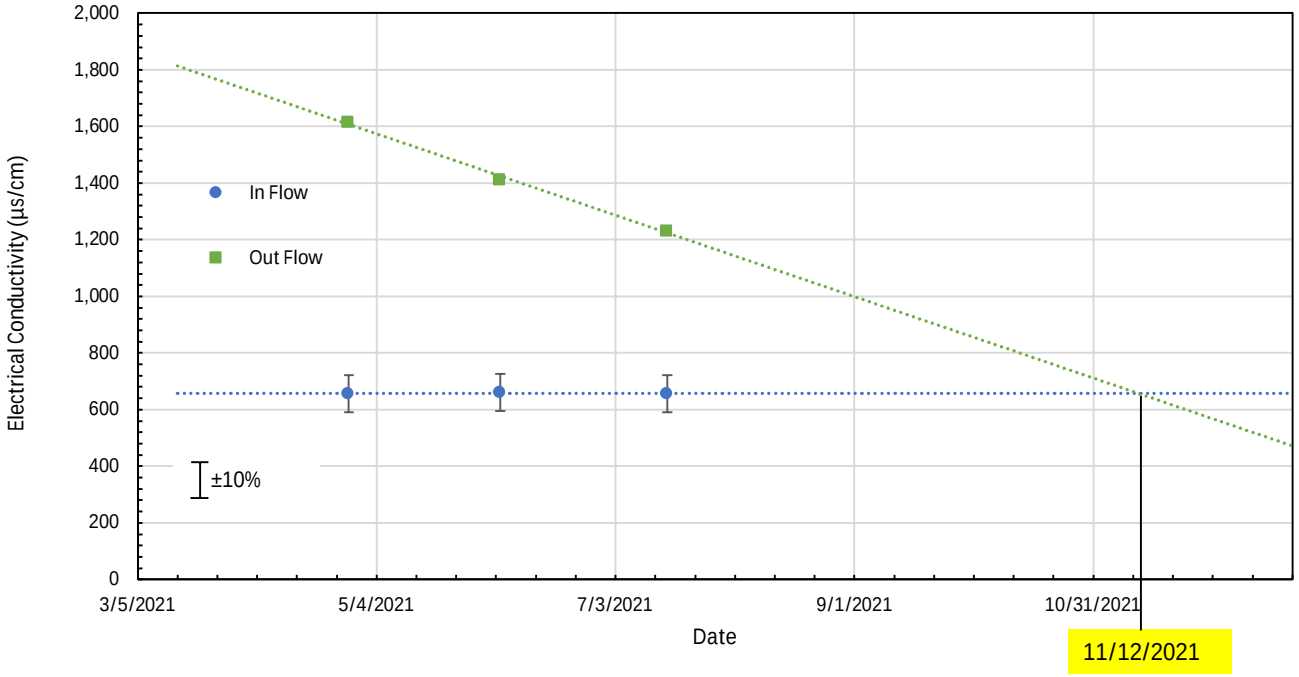
B1-ST-1 (7-9') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-5



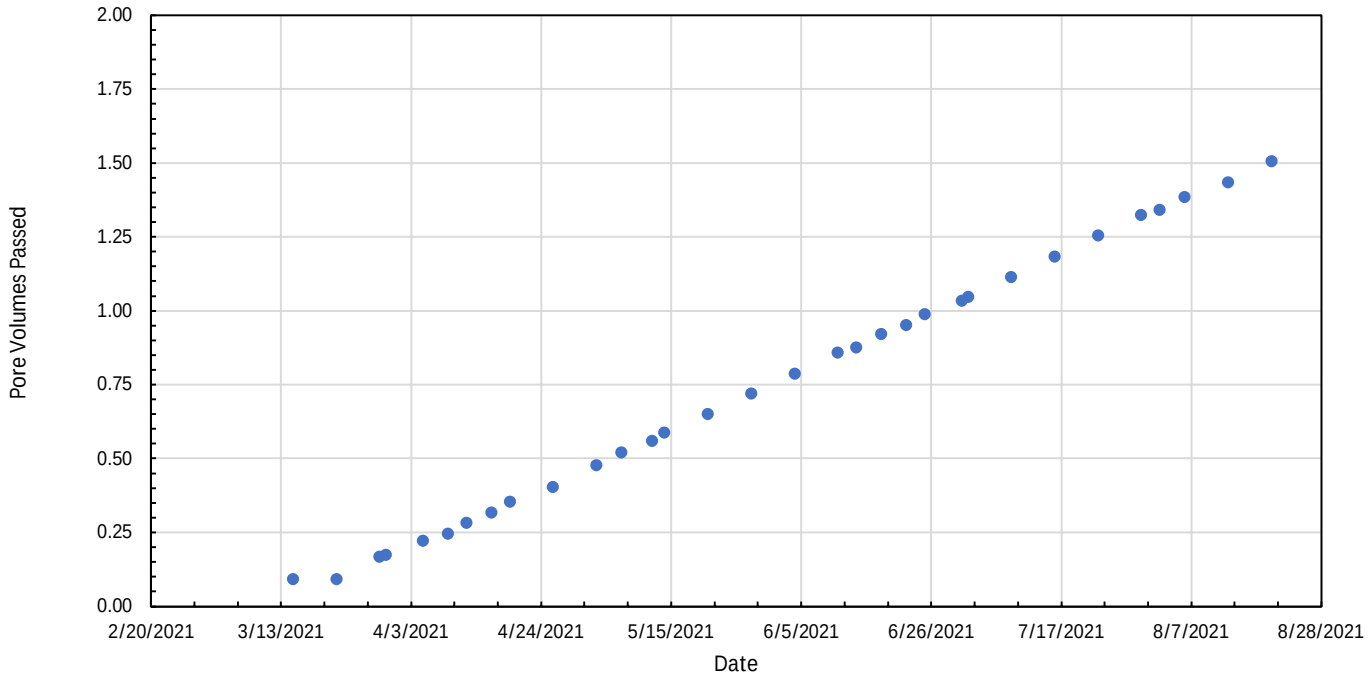
B1-ST-1 (7-9') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-6



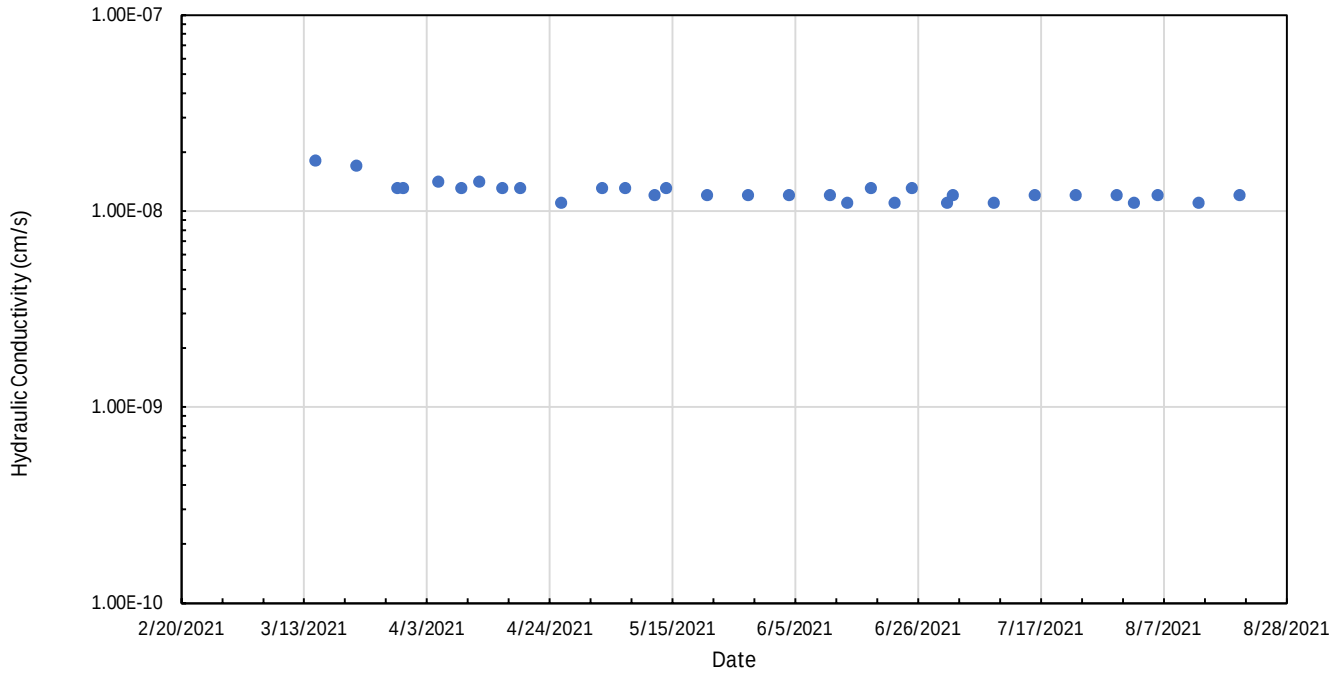
B2-ST-1 (1-3') PV of Flow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-7



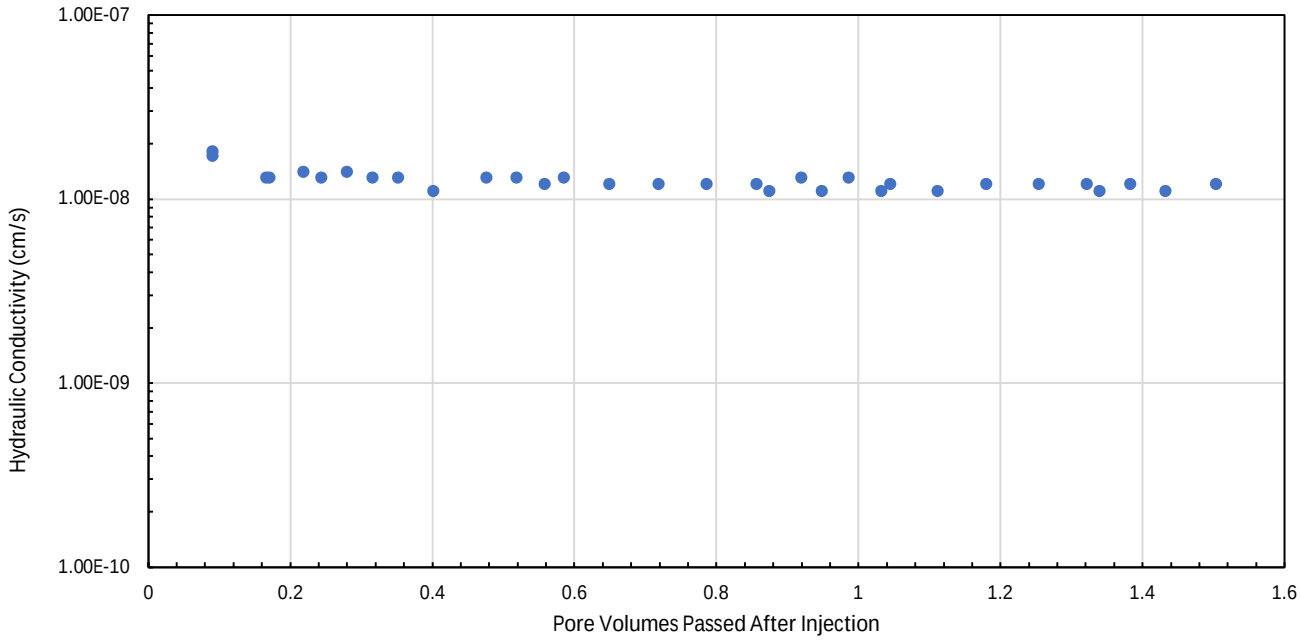
B2-ST-1 (1-3') Hydraulic Conductivity with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-8



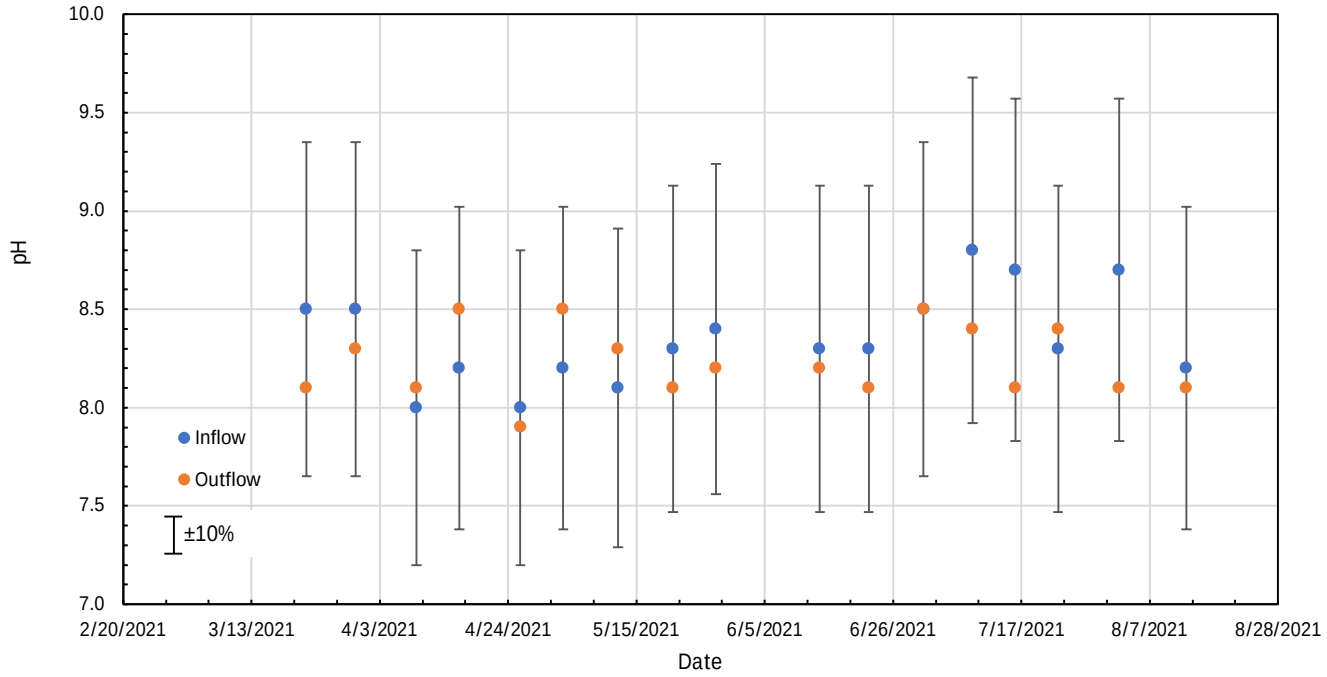
B2-ST-1 (1-3') Hydraulic Conductivity with PV

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-9



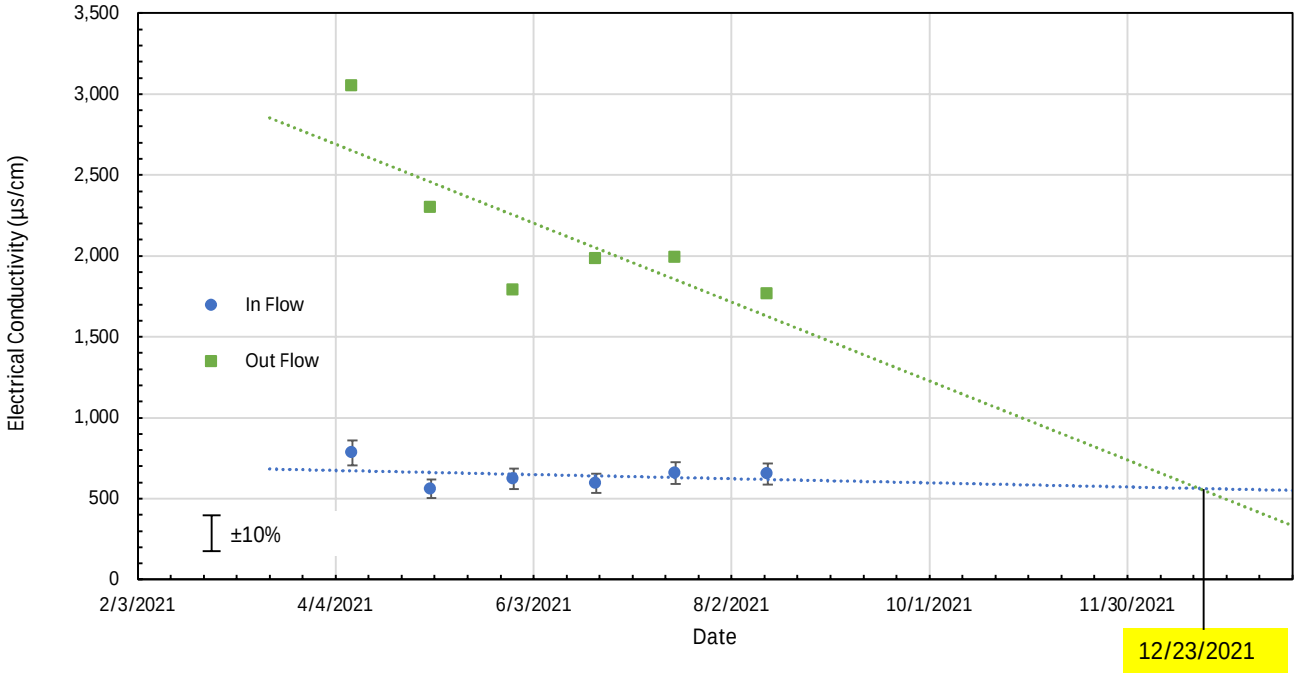
B2-ST-1 (1-3') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-10



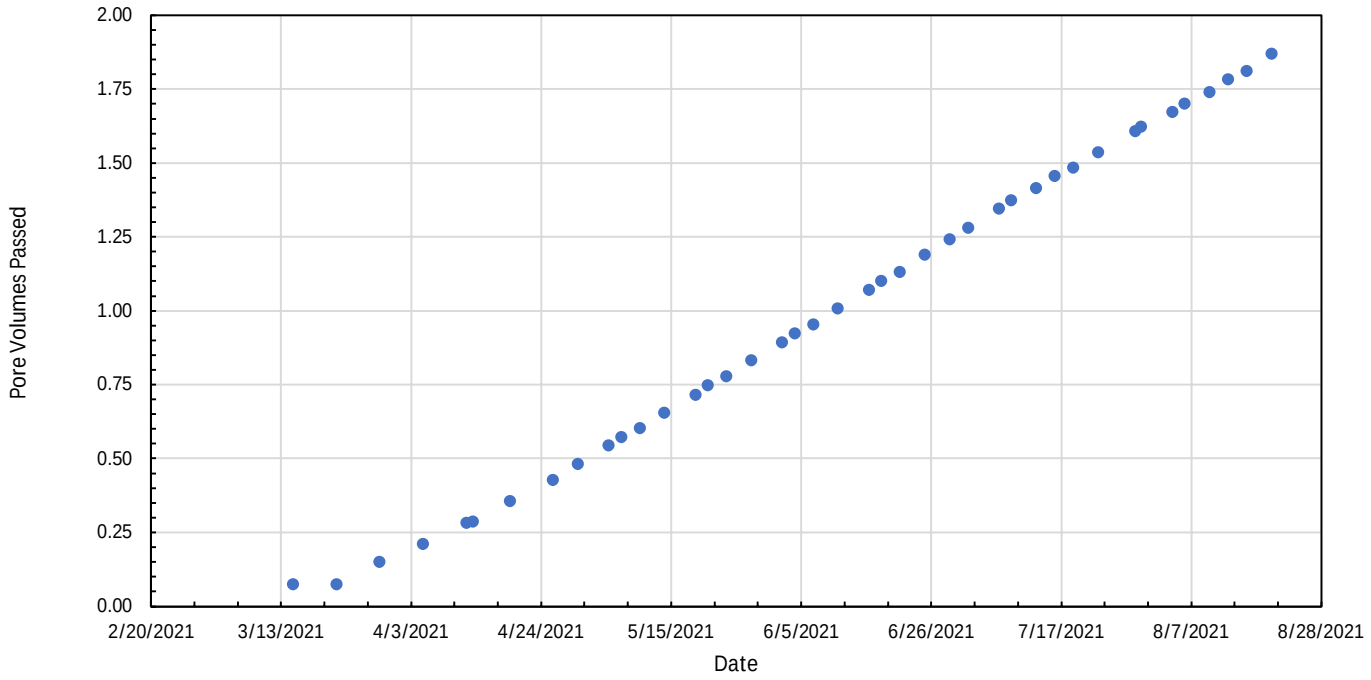
B2-ST-1 (1-3') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-11



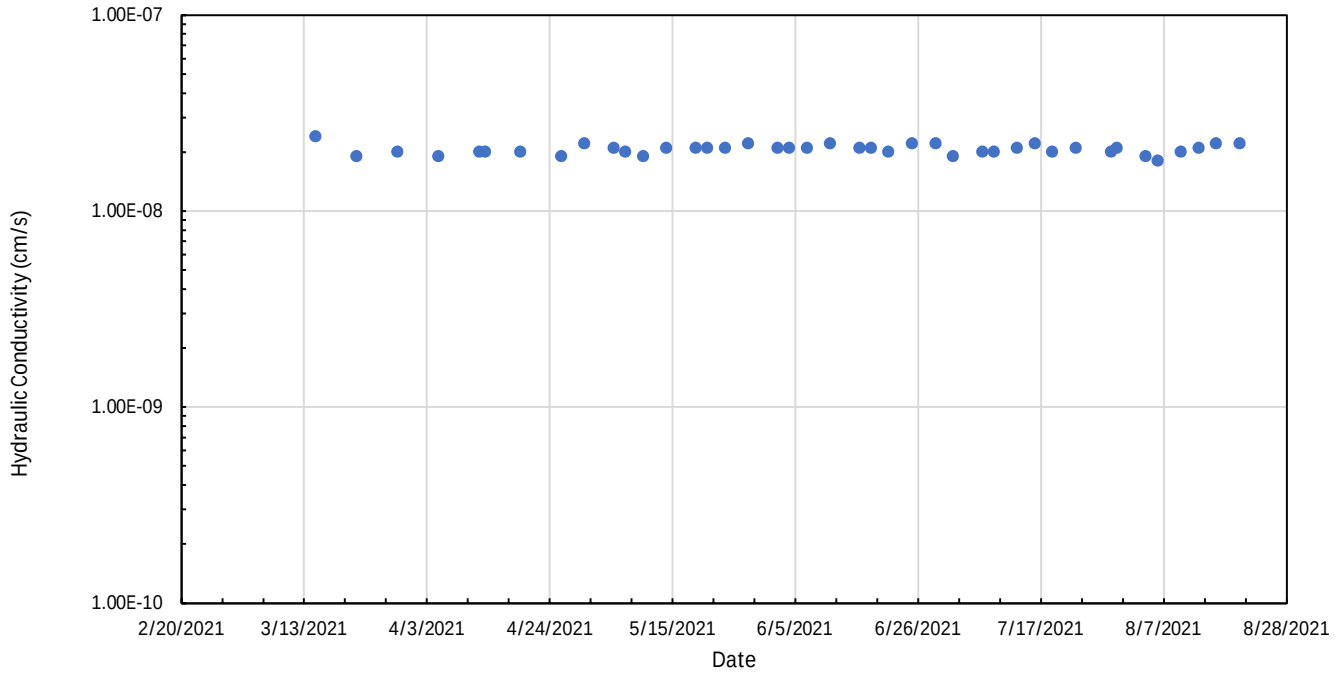
B2-ST-4 (47-49') PV of Flow With Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-12



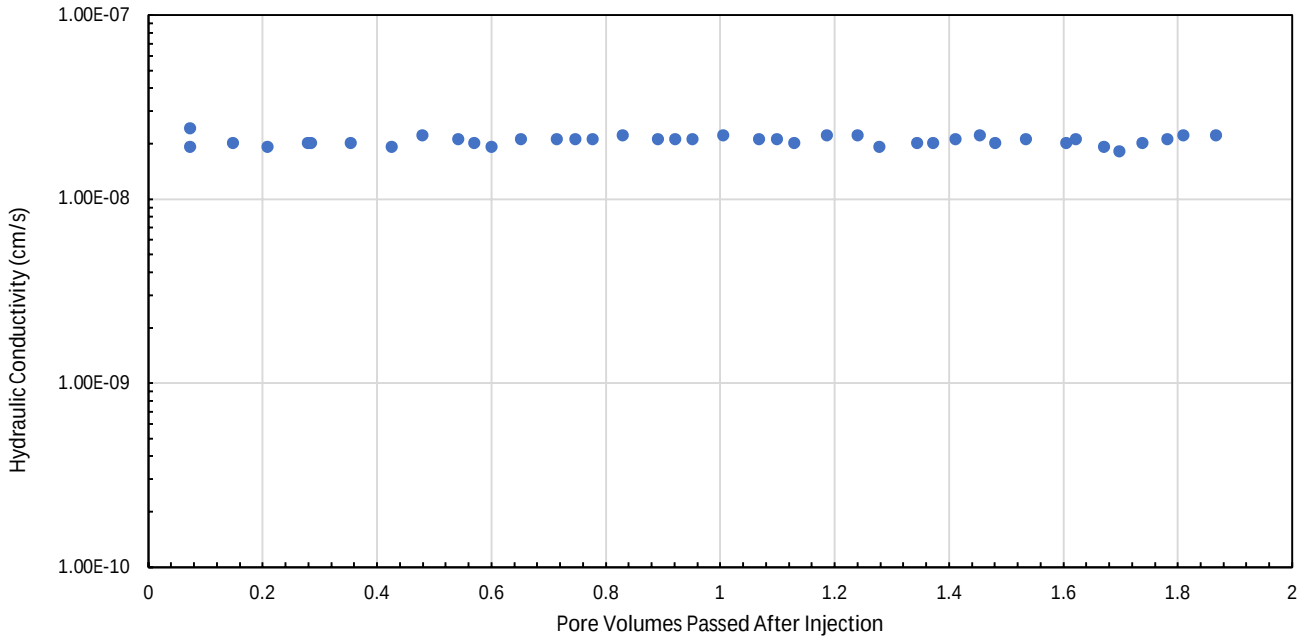
B2-ST-4 (47-49') Hydraulic Conductivity with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-13



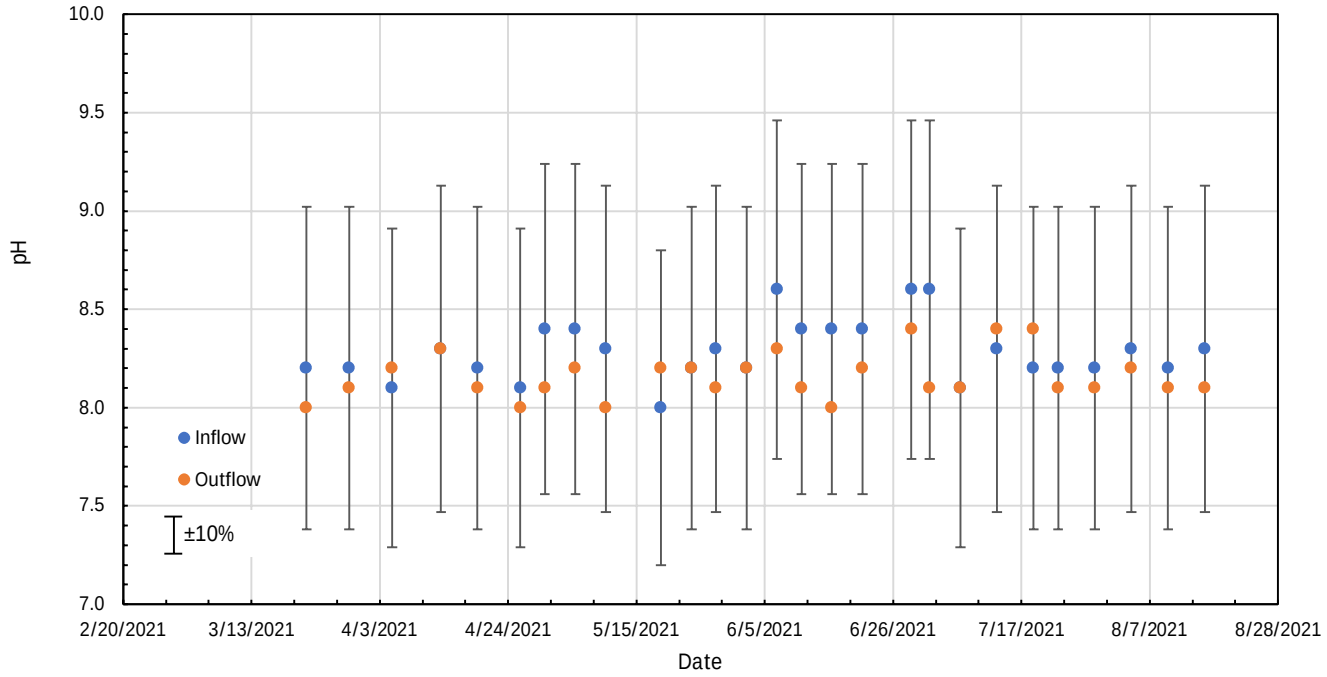
B2-ST-4 (47-49') Hydraulic Conductivity with PV

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-14



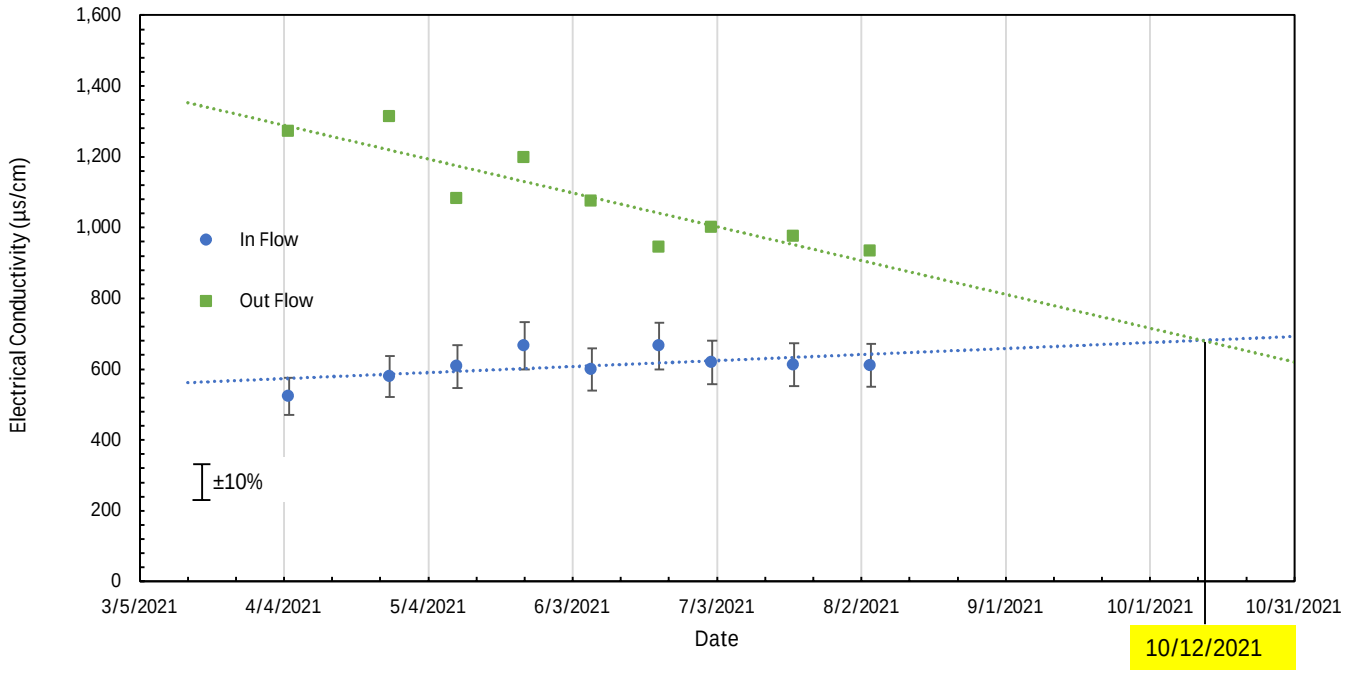
B2-ST-4 (47-49') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-15



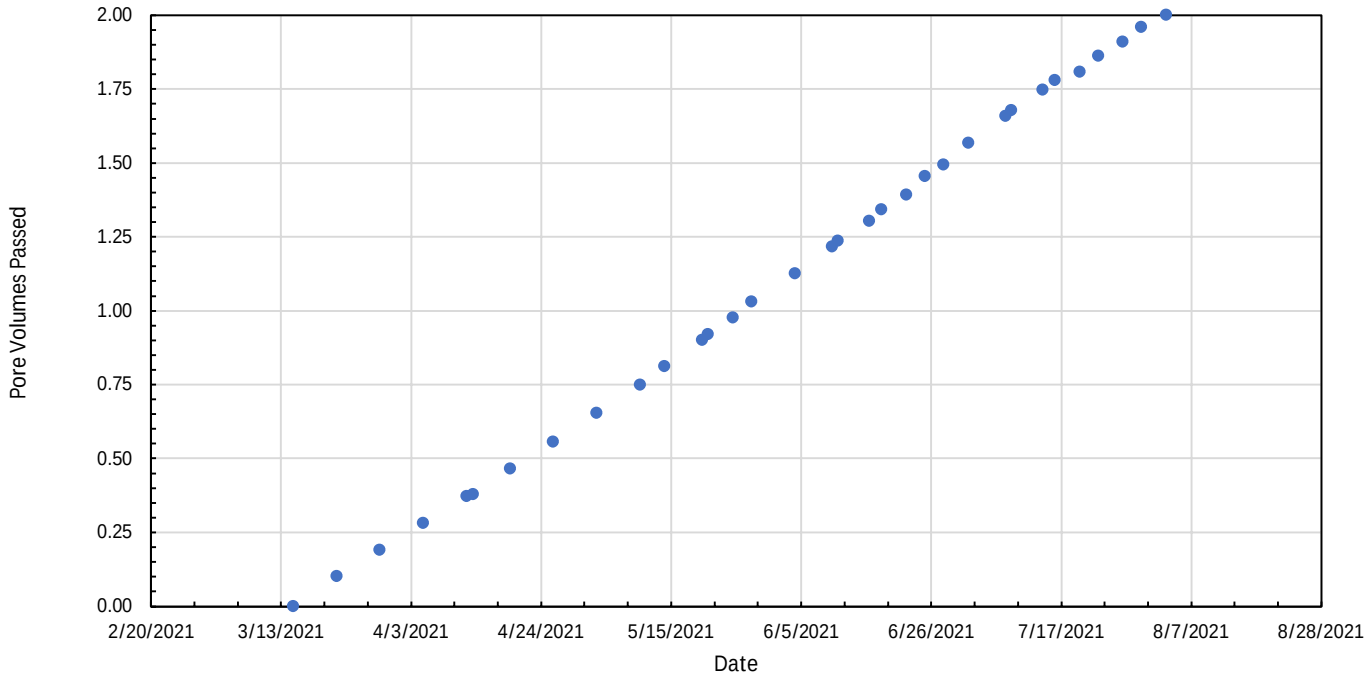
B2-ST-4 (47-49') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-16



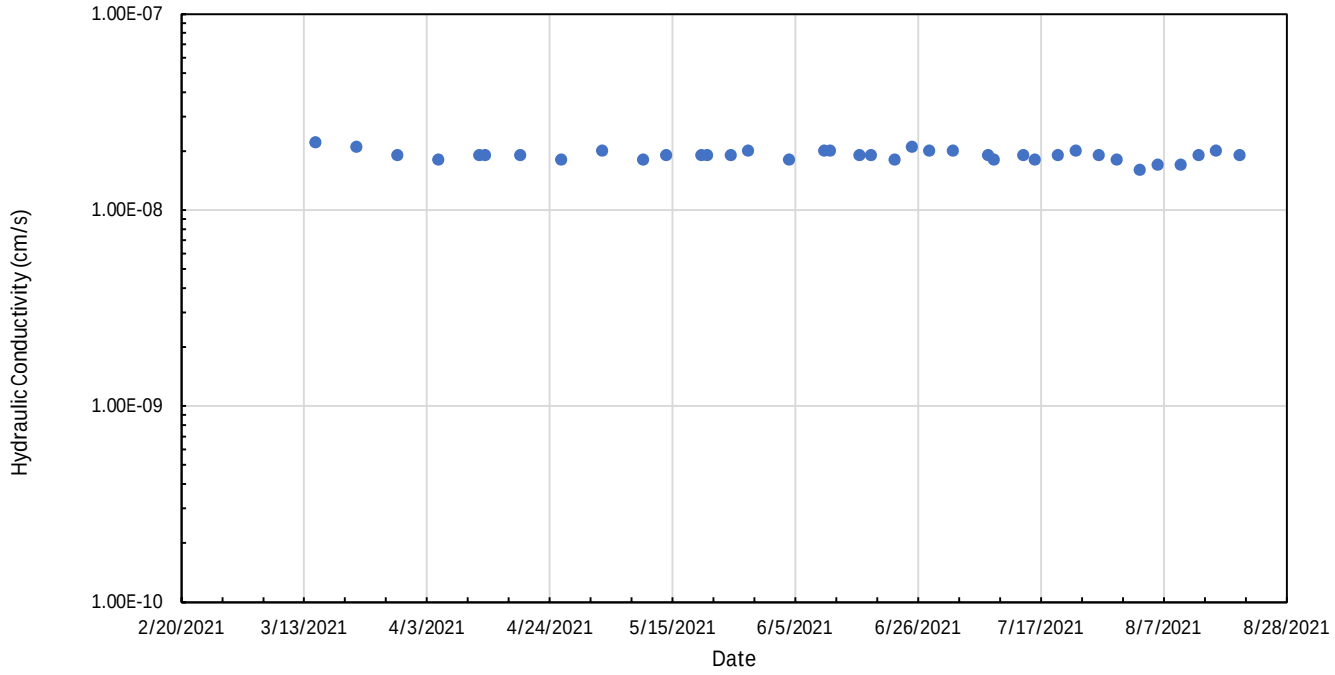
B3-ST-5 (77-79') PV of Flow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-17



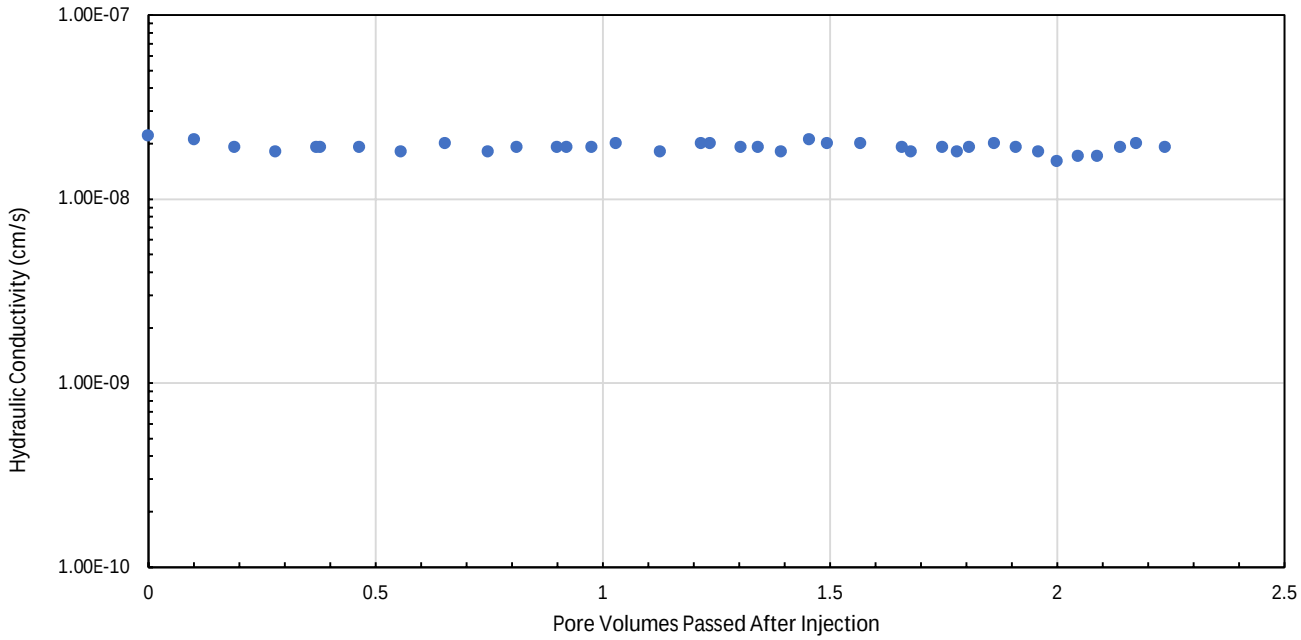
B3-ST-5 (77-79') Hydraulic Conductivity with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-18



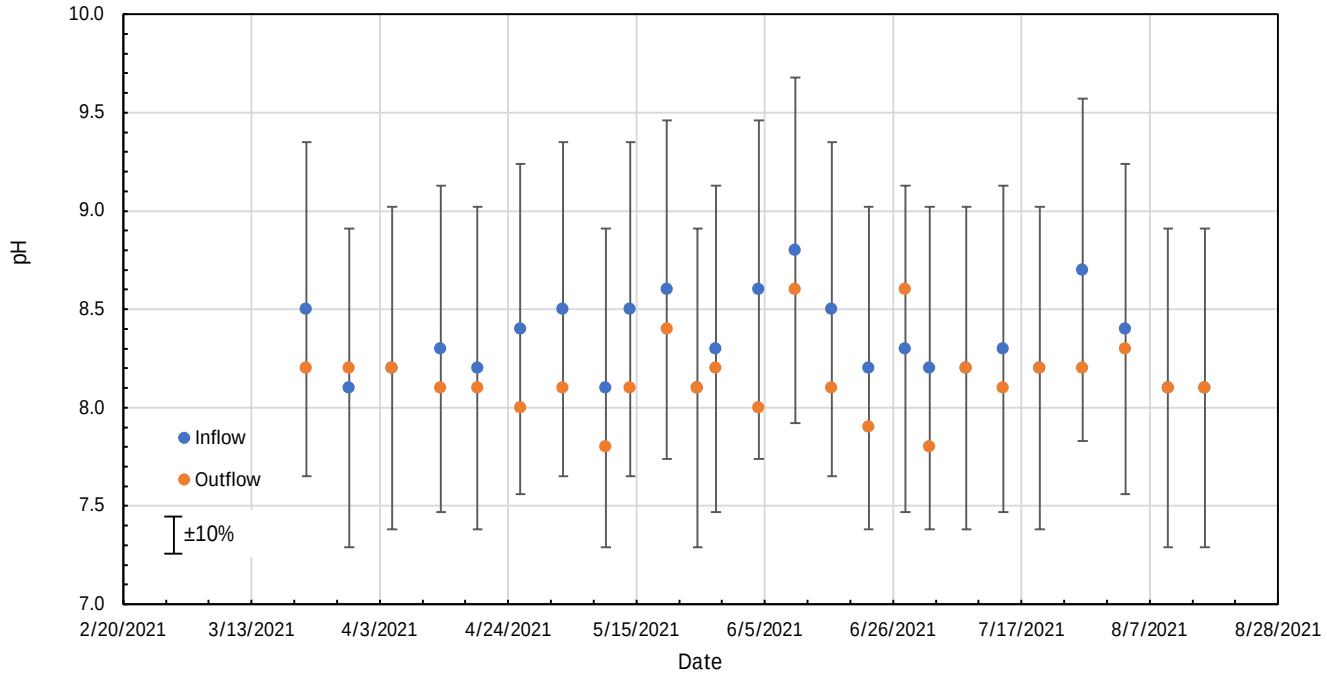
B3-ST-5 (77-79') Hydraulic Conductivity with PV

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-19



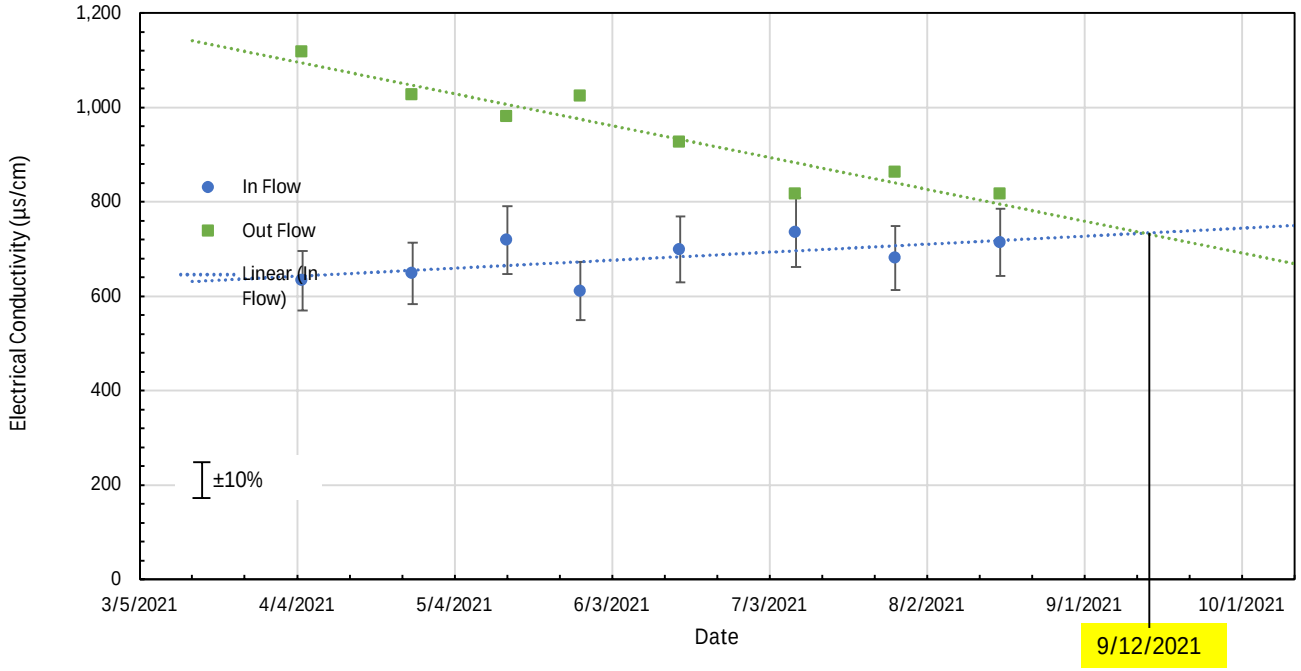
B3-ST-5 (77-79') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-20



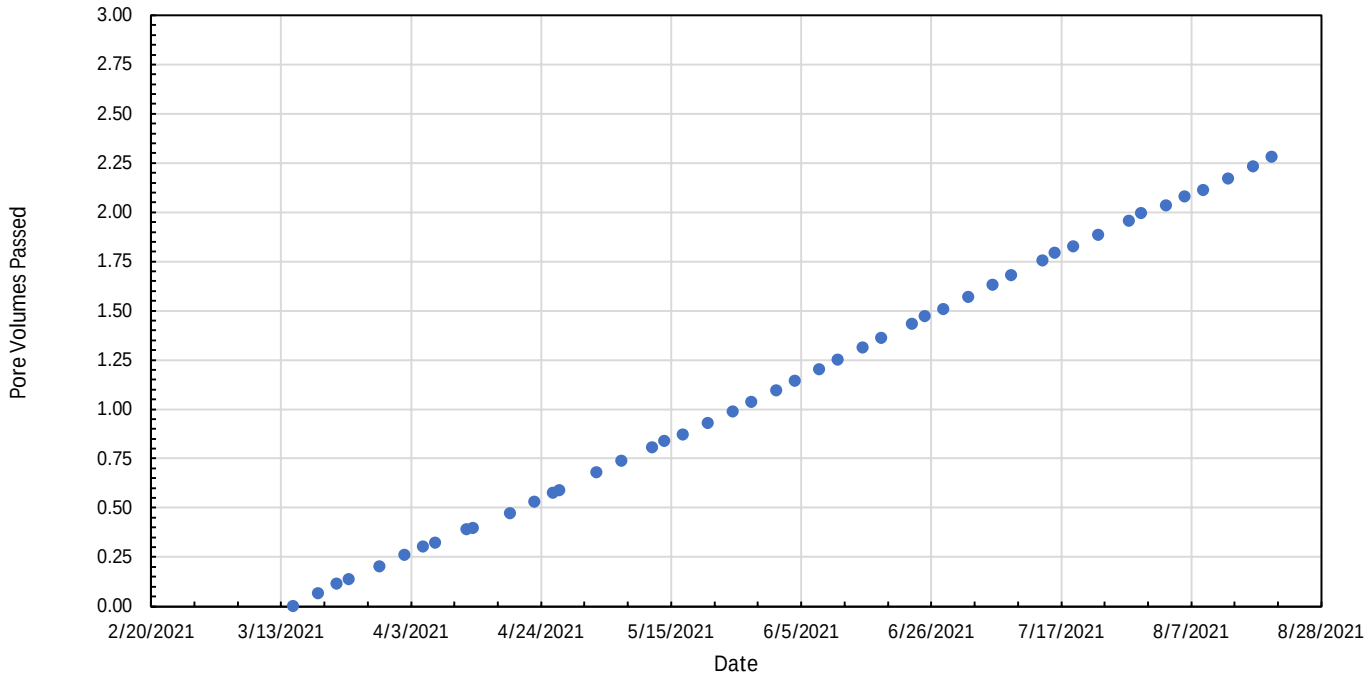
B3-ST-5 (77-79') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-21



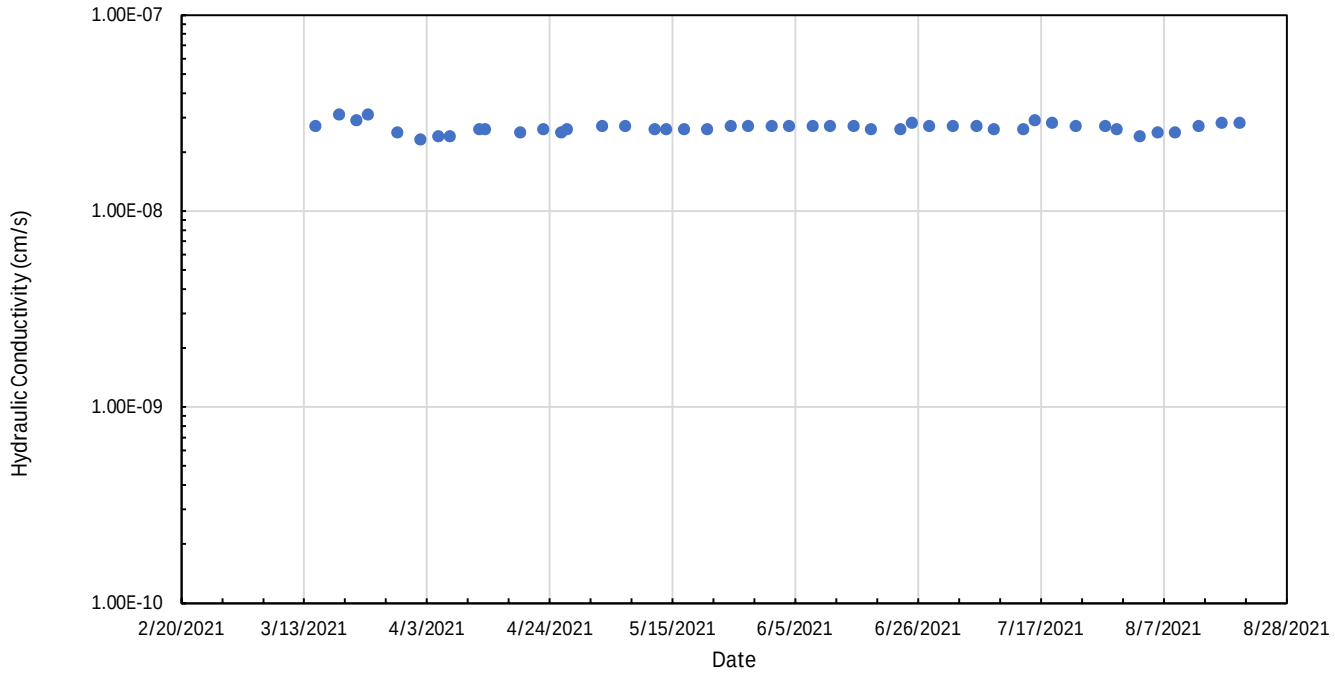
B4-ST-3 (47-49') PV of Flow With Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

Ann Arbor, MI | September 2021

Figure 3-22



B4-ST-3 (47-49') Hydraulic Conductivity with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

Geosyntec consultants

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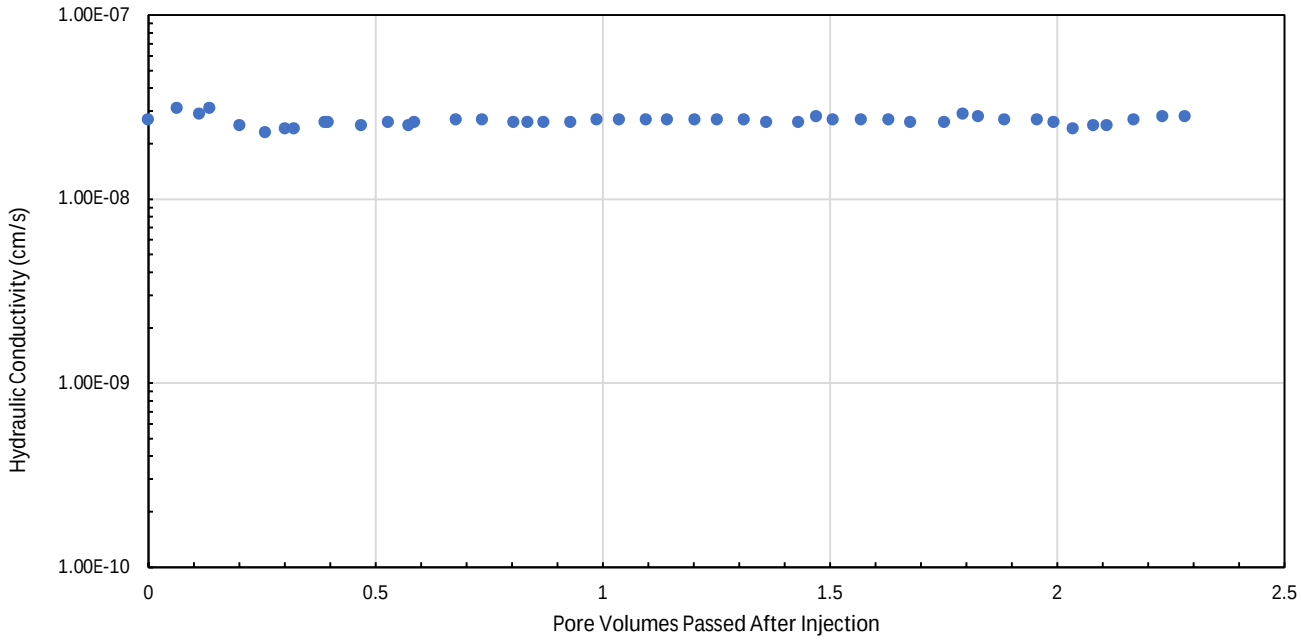
Figure 3-23



B4-ST-3 (47-49') Hydraulic Conductivity with PV

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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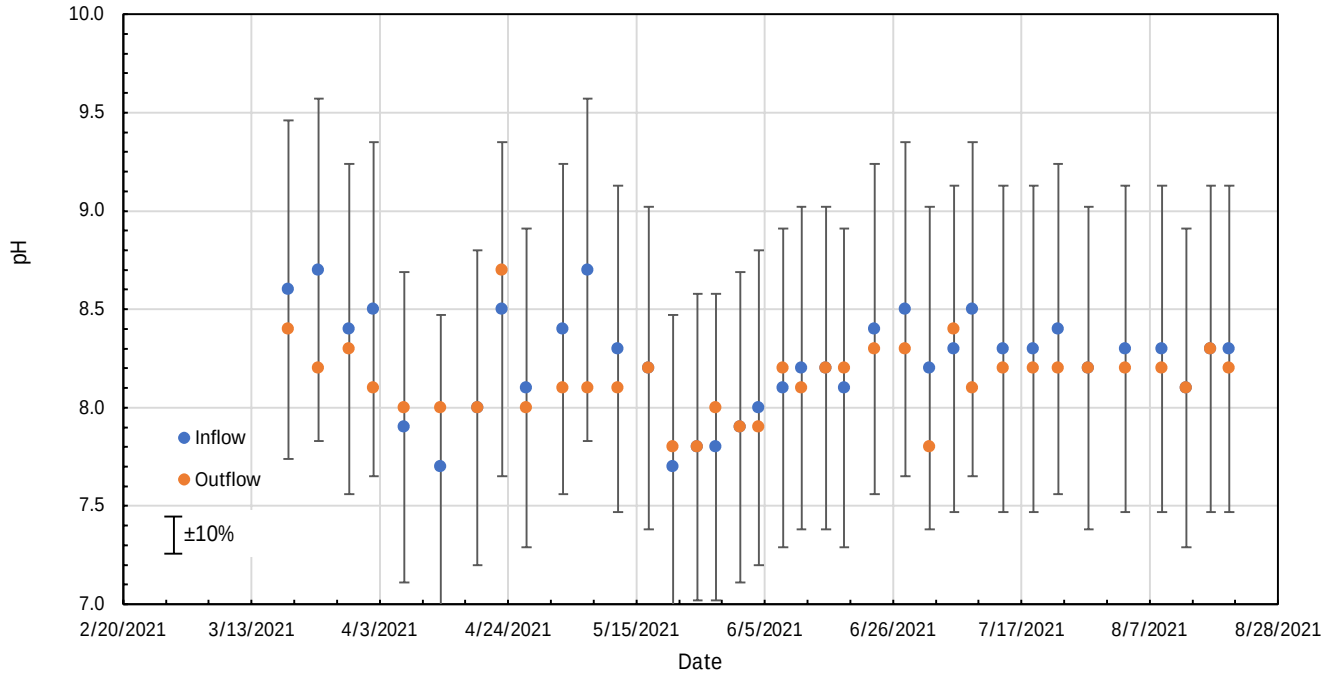
Figure 3-24



B4-ST-3 (47-49') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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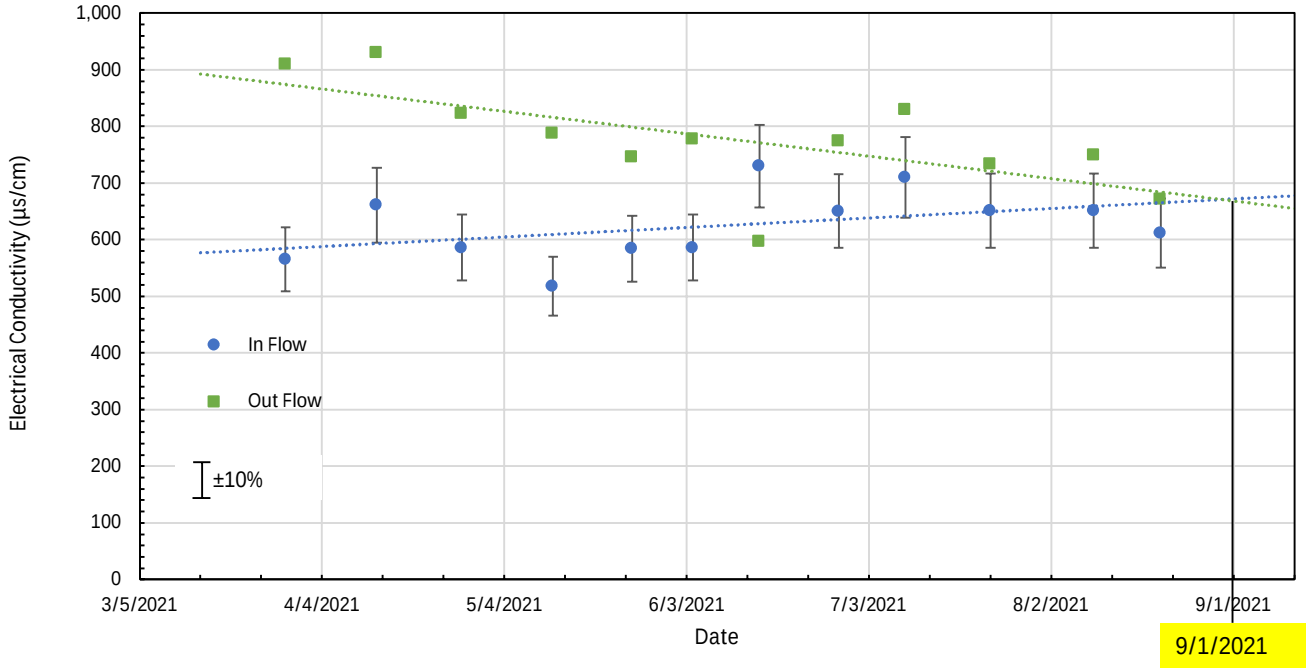
Figure 3-25



B4-ST-3 (47-49') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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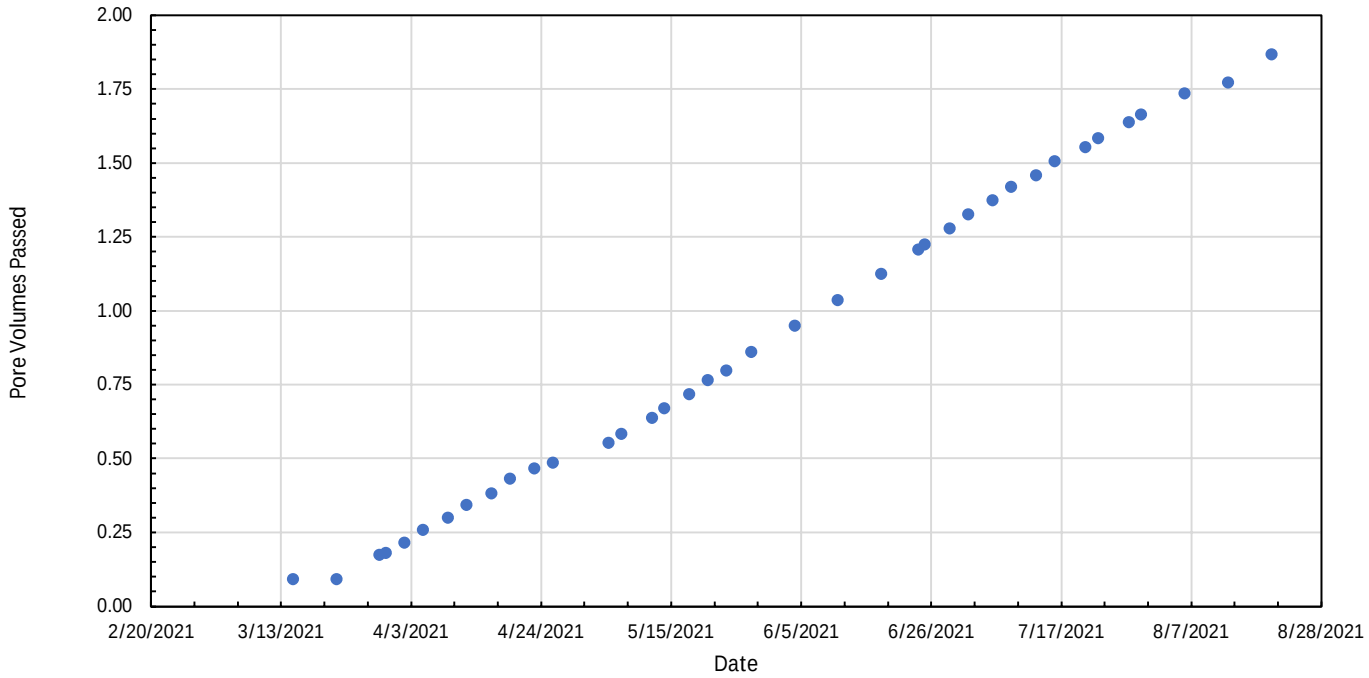
Figure 3-26



B5-ST-5 (87-89') PV of Flow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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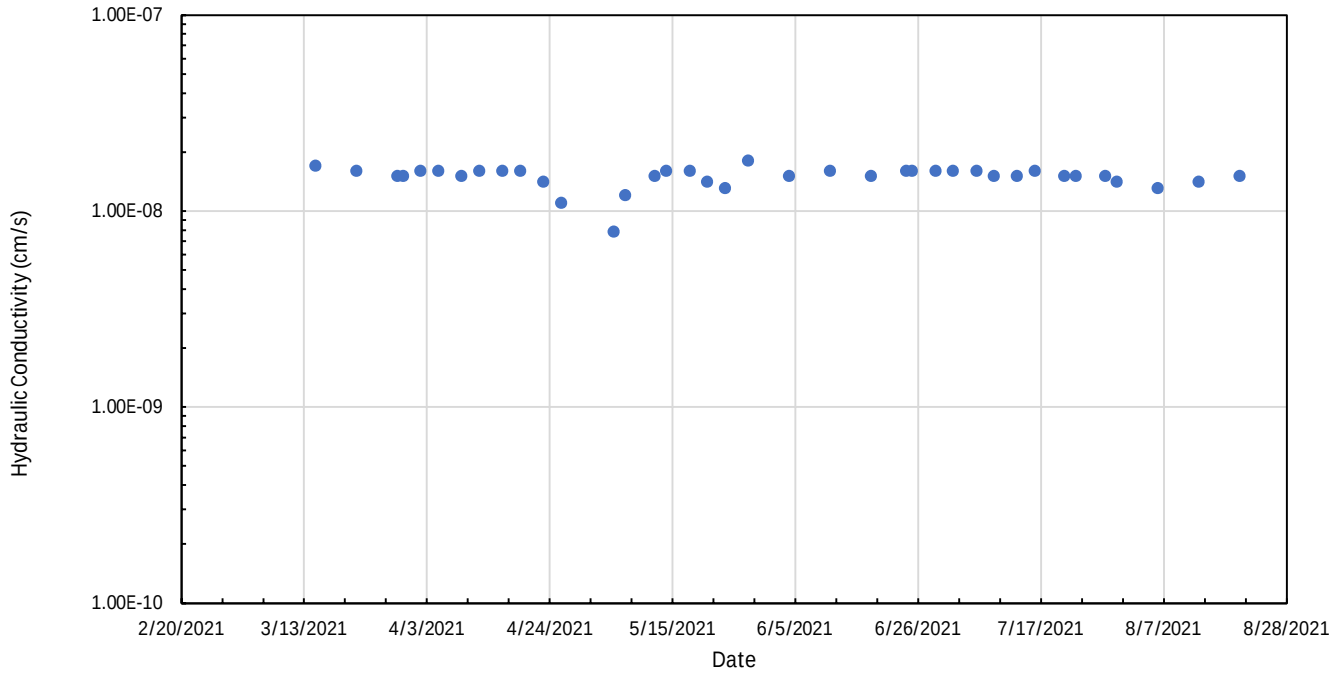
Figure 3-27



B5-ST-5 (87-89') Hydraulic Conductivity with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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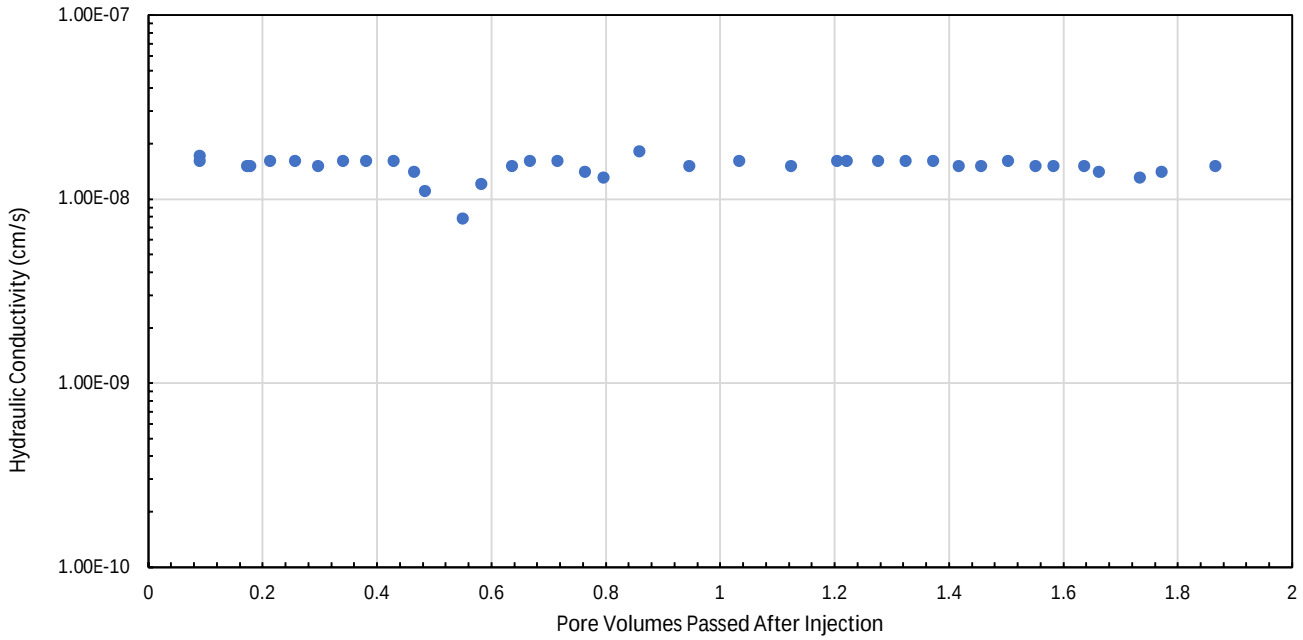
Figure 3-28



B5-ST-5 (87-89') Hydraulic Conductivity with PV

BELLE RIVER POWER PLANT
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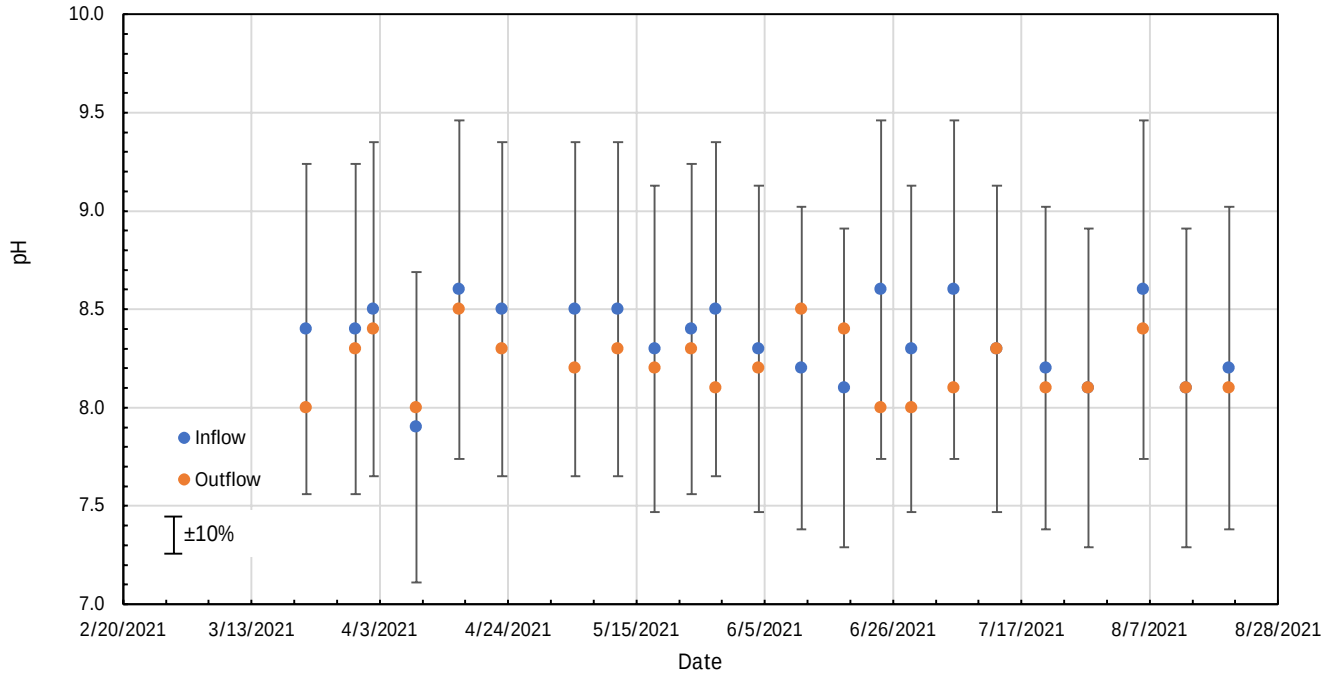
Figure 3-29



B5-ST-5 (87-89') pH of Inflow and Outflow with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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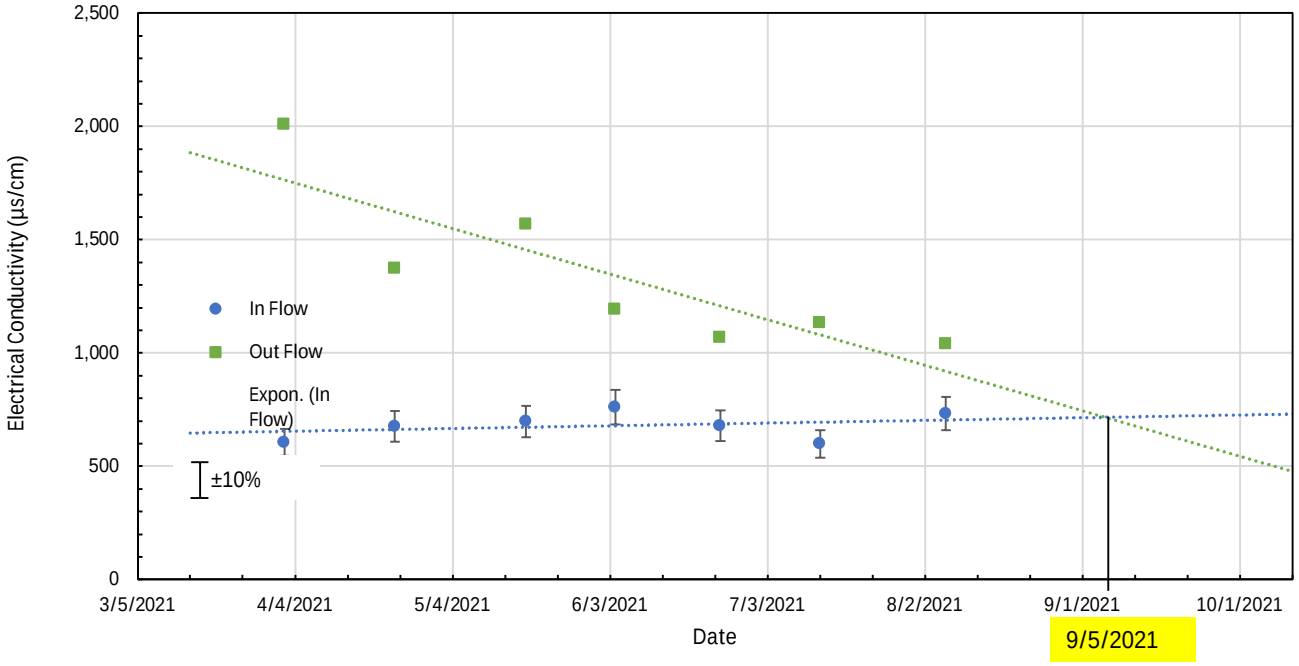
Figure 3-30



B5-ST-5 (87-89') Electrical Conductivity (EC) with Time

BELLE RIVER POWER PLANT
EAST CHINA TOWNSHIP, MICHIGAN

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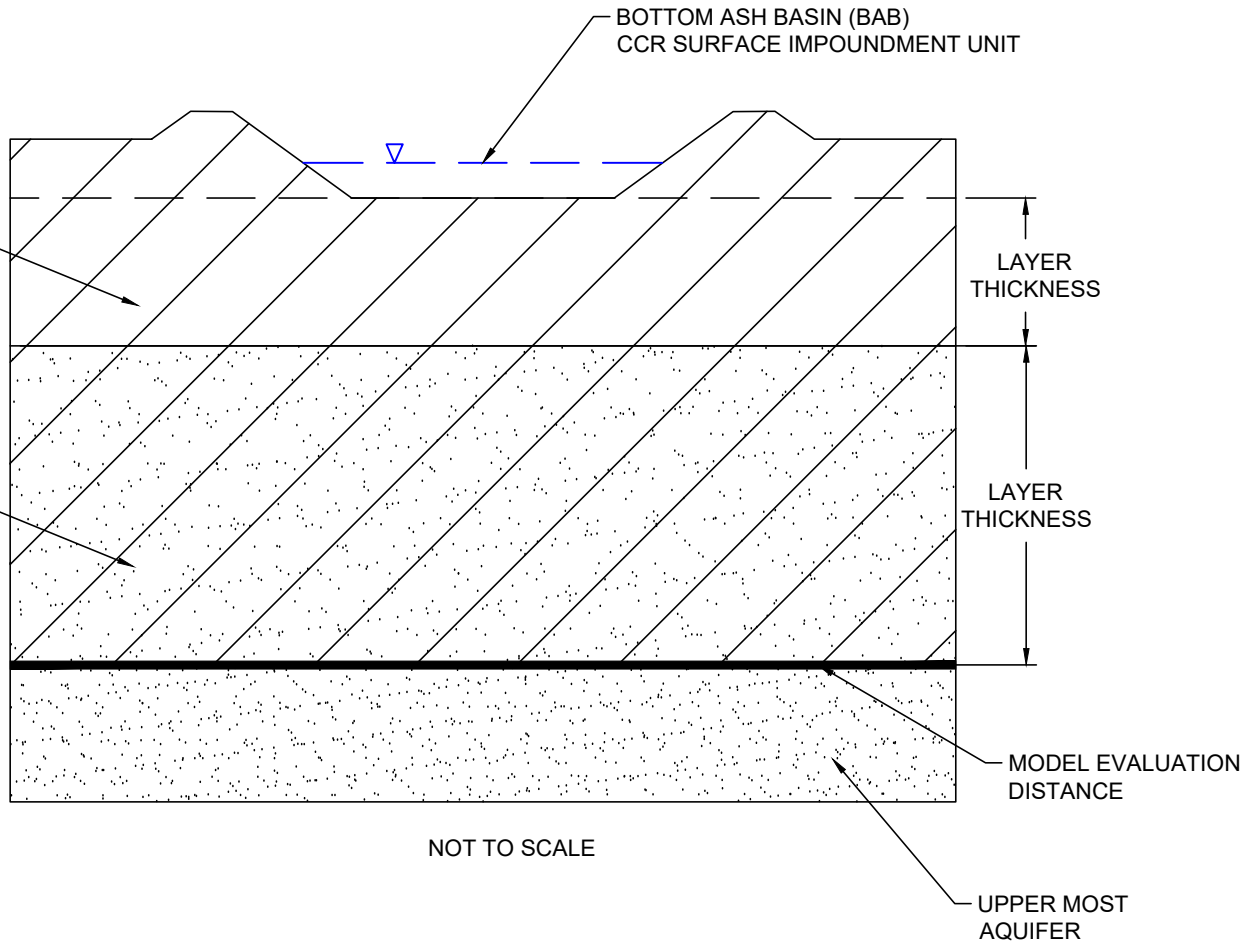
Figure 3-31

CLAY LAYER - LAYER 1		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	12.01
COEFFICIENT OF HYDODYNAMIC DISPERSION	M^2/a	0.019
EFFECTIVE POROSITY		0.42
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	M^3/KG	0
DEGRADATION		0

CLAY WITH SAND LAYER - LAYER 2		
INPUT PARAMETER	UNITS	VALUE
DARCY VELOCITY	M/YR	7.24E-03
TOTAL THICKNESS	METERS	19.29
COEFFICIENT OF HYDODYNAMIC DISPERSION	M^2/a	0.019
EFFECTIVE POROSITY		0.51
DENSITY	KG/M3	1509
DISTRIBUTION COEFFICIENT	M^3/KG	0
DEGRADATION		0



NOT TO SCALE

LEGEND

CLAY UNIT

CLAY WITH SAND UNIT

UPPER MOST AQUIFER

FIGURE 4-1
FATE AND TRANSPORT
CONCEPTUAL MODEL
BELLE RIVER ALD - BAB

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FIGURE 4-1

PROJECT NO: GLP8017 | AUGUST 2021

H:\DIDTE\BELLE RIVER ALD\FT MODEL - Last Saved by: JVarsho on 8/9/21

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Appendix A
Monitoring Well Slug Test Results

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2016 Slug Test Results

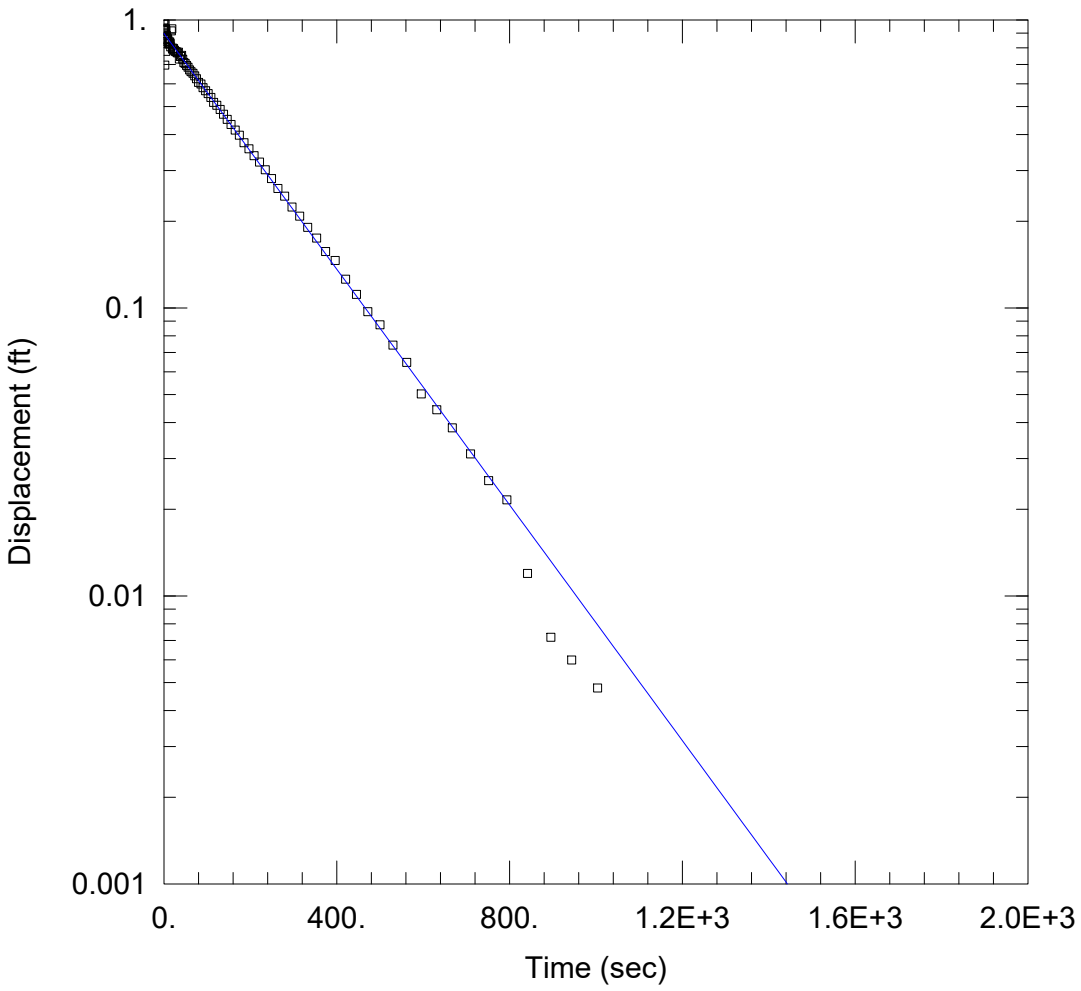
Hydraulic Conductivity Results
DTE Electric Company Belle River Power Plant
ChinaTownship, Michigan

Test Location ID	Date Performed	Test Type	Hydraulic Conductivity (K)	
			cm/sec	ft/day
MW-16-01b	3/1/2016	Falling Head	3.58E-04	1.015
		Rising Head	2.72E-04	0.770
		Average	**3.15E-04**	**0.892**
MW-16-04	3/1/2016	Falling Head	7.93E-05	0.225
		Rising Head	4.11E-05	0.116
		Average	**6.02E-05**	**0.171**
MW-16-05	3/1/2016	Falling Head	4.26E-05	0.121
		Rising Head	2.13E-05	0.060
		Average	**3.19E-05**	**0.090**
MW-16-07	3/1/2016	Falling Head	1.24E-04	0.350
		Rising Head	7.21E-05	0.204
		Average	**9.79E-05**	**0.277**
		Minimum	**3.19E-05**	**9.05E-02**
		Maximum	**3.15E-04**	**8.92E-01**
		Geometric Mean	**8.77E-05**	**0.249**

Conversion:

$$\frac{1\text{ cm}}{1\text{ sec}} \times \frac{86{,}400\text{ sec}}{1\text{ day}} \times \frac{1\text{ ft}}{30.48\text{ cm}} = 2.83\text{E+03}\ \frac{\text{ft}}{\text{day}}$$

Notes:
Slug test results calculated using the Bower-Rice (1976) Solution.



MW-16-01 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-01_IN.aqt
Date: 05/22/17 Time: 13:38:07

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE EC BRPP CCR
Project: 231828.0003.0000
Location: China Township, MI
Test Well: MW-16-01
Test Date: 4/13/16

AQUIFER DATA

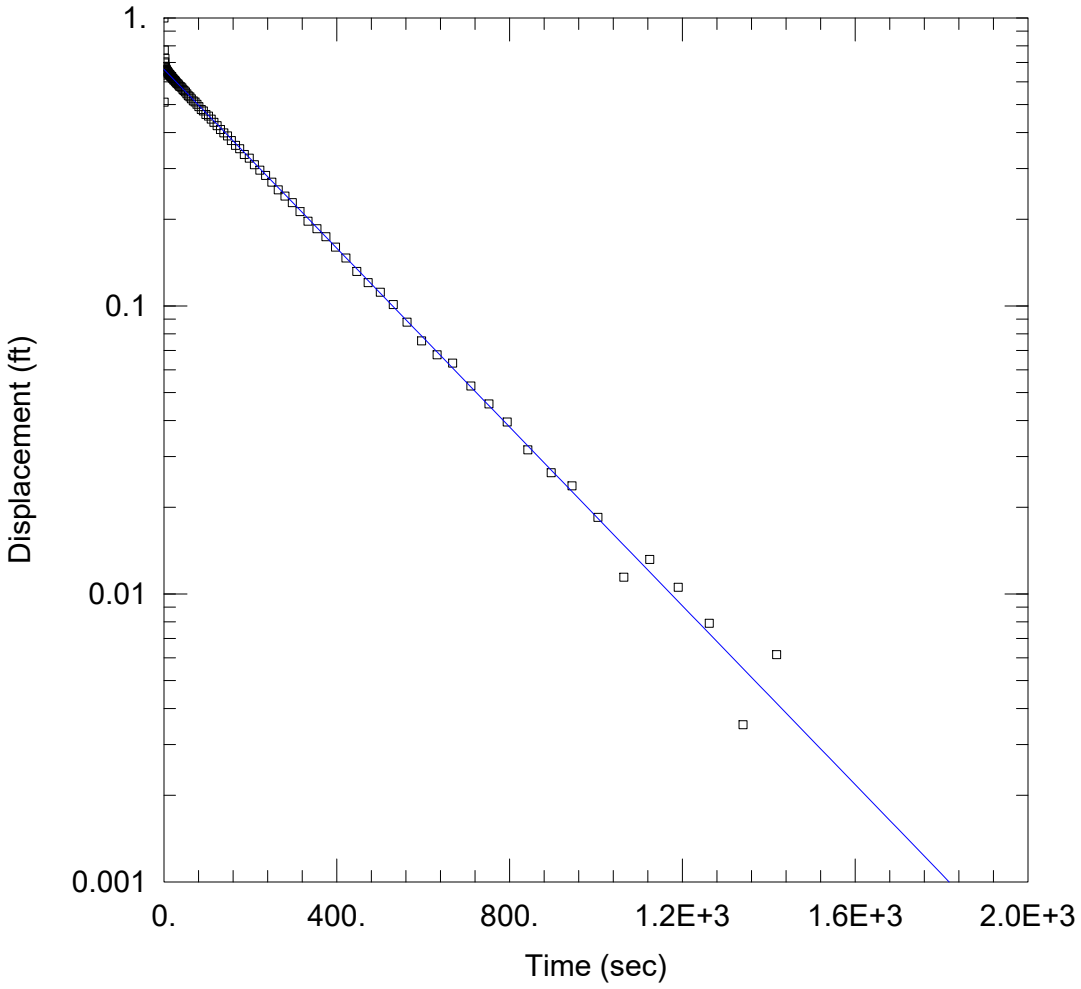
Saturated Thickness: 52. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-01)

Initial Displacement: 0.835 ft Static Water Column Height: 84.12 ft
Total Well Penetration Depth: 84.12 ft Screen Length: 5. ft
Casing Radius: 0.08333 ft Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice
K = 0.0003581 cm/sec y0 = 0.7491 ft



MW-16-01 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-01_OUT.aqt
Date: 05/22/17 Time: 13:40:08

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE EC BRPP CCR
Project: 231828.0003.0000
Location: China Township, MI
Test Well: MW-16-01
Test Date: 4/13/16

AQUIFER DATA

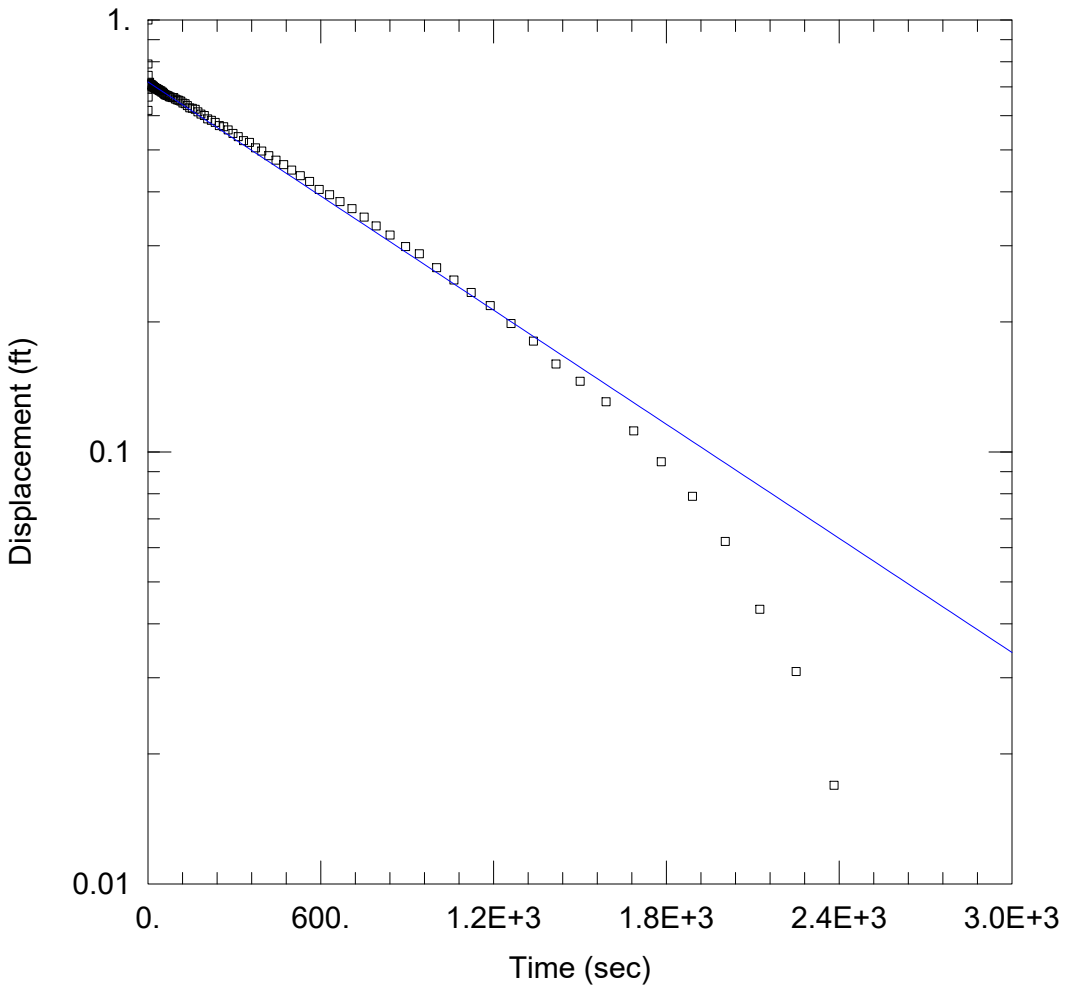
Saturated Thickness: 52. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-01)

Initial Displacement: 1.138 ft Static Water Column Height: 84.07 ft
Total Well Penetration Depth: 84.07 ft Screen Length: 5. ft
Casing Radius: 0.08333 ft Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice
K = 0.0002716 cm/sec y0 = 0.7541 ft



MW-16-04 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-04_IN.aqt
Date: 05/22/17 Time: 13:41:00

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE EC BRPP CCR
Project: 231828.0003.0000
Location: China Township, MI
Test Well: MW-16-04
Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft Anisotropy Ratio (Kz/Kr): 1.

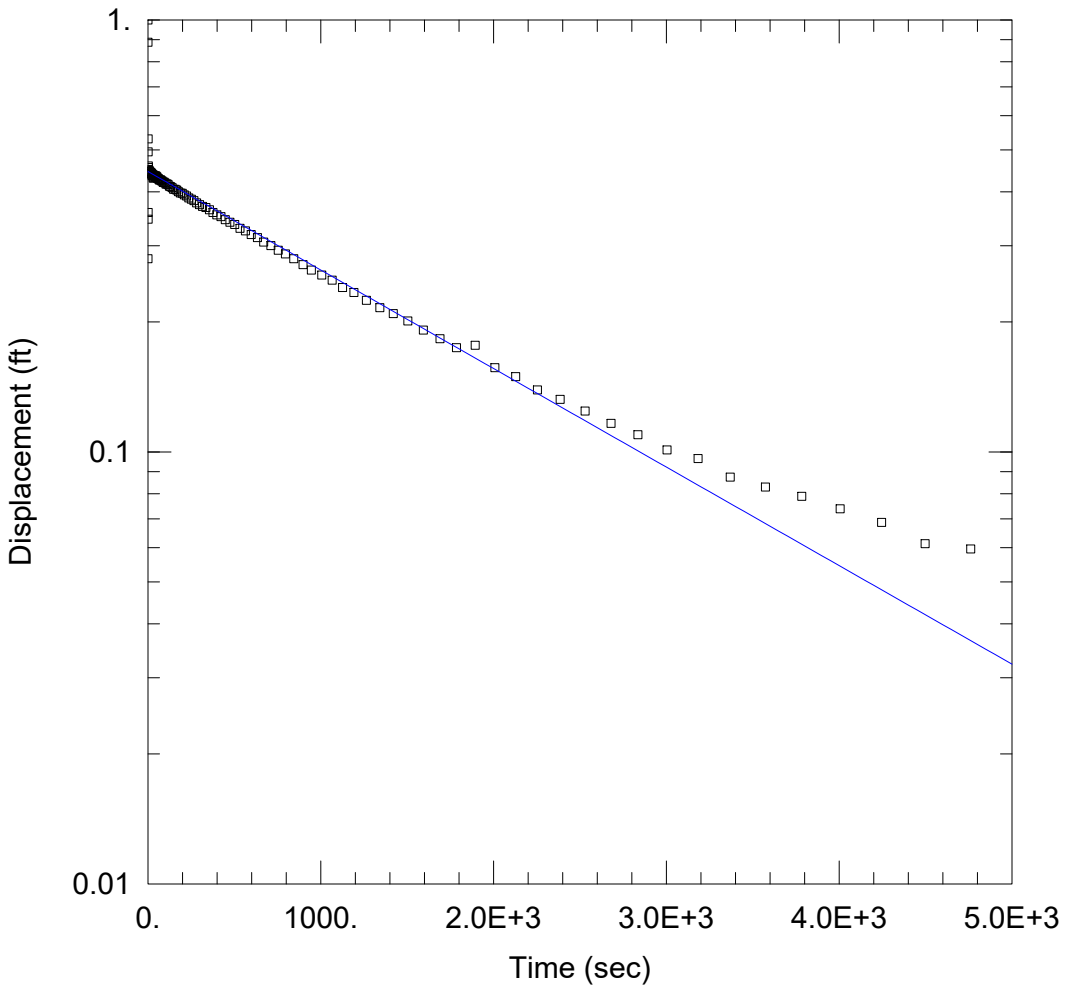
WELL DATA (MW-16-04)

Initial Displacement: 1.064 ft Static Water Column Height: 109.9 ft
Total Well Penetration Depth: 109.9 ft Screen Length: 5. ft
Casing Radius: 0.08333 ft Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 7.93E-5 cm/sec y0 = 0.7646 ft



MW-16-04 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-04_OUT.aqt
Date: 05/22/17 Time: 13:42:08

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE EC BRPP CCR
Project: 231828.0003.0000
Location: China Township, MI
Test Well: MW-16-04
Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 23.5 ft Anisotropy Ratio (Kz/Kr): 1.

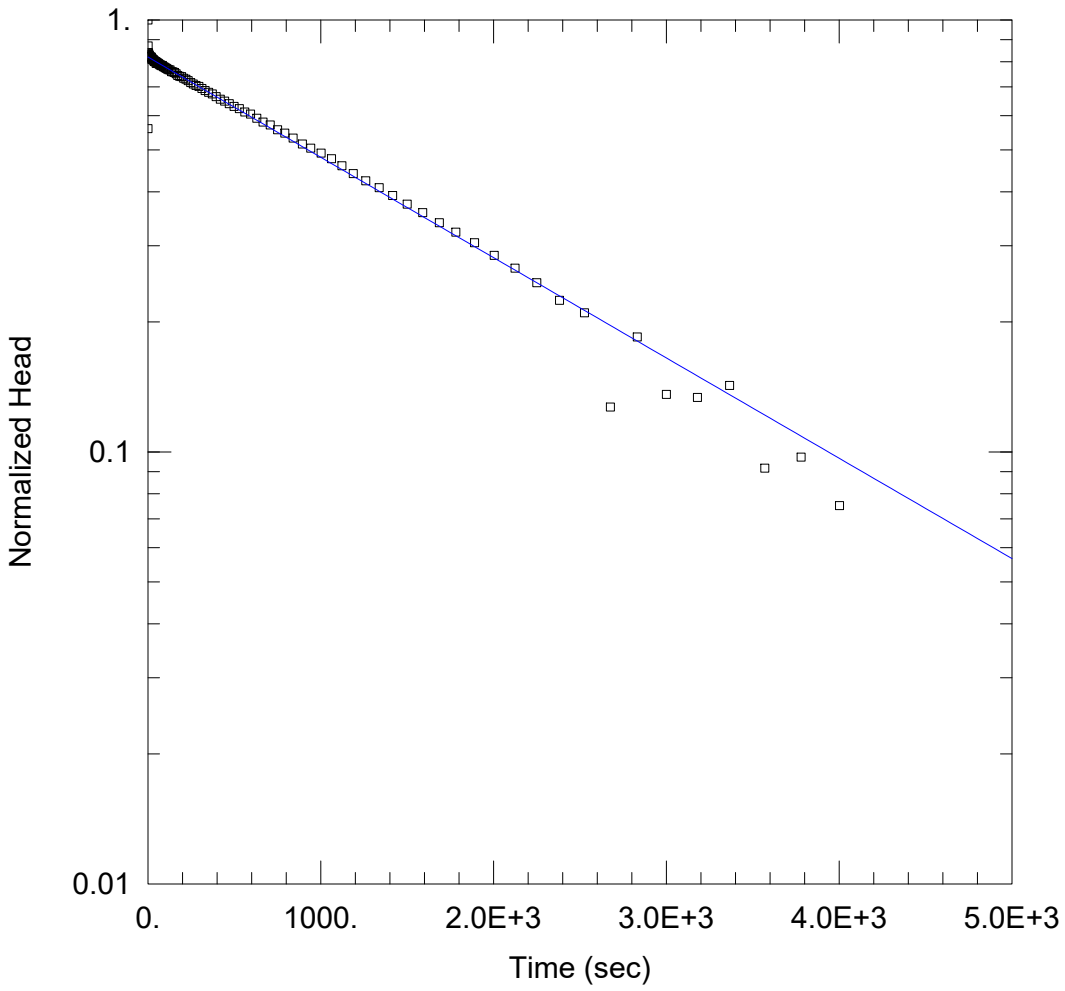
WELL DATA (MW-16-04)

Initial Displacement: 1.761 ft
Total Well Penetration Depth: 109.7 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 109.7 ft
Screen Length: 5. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 4.108E-5 cm/sec y0 = 0.7851 ft



MW-16-05 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-05_IN.aqt
Date: 05/22/17 Time: 13:42:57

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE EC BRPP CCR
Project: 231828.0003
Location: China Township, MI
Test Well: MW-16-05
Test Date: 4/13/16

AQUIFER DATA

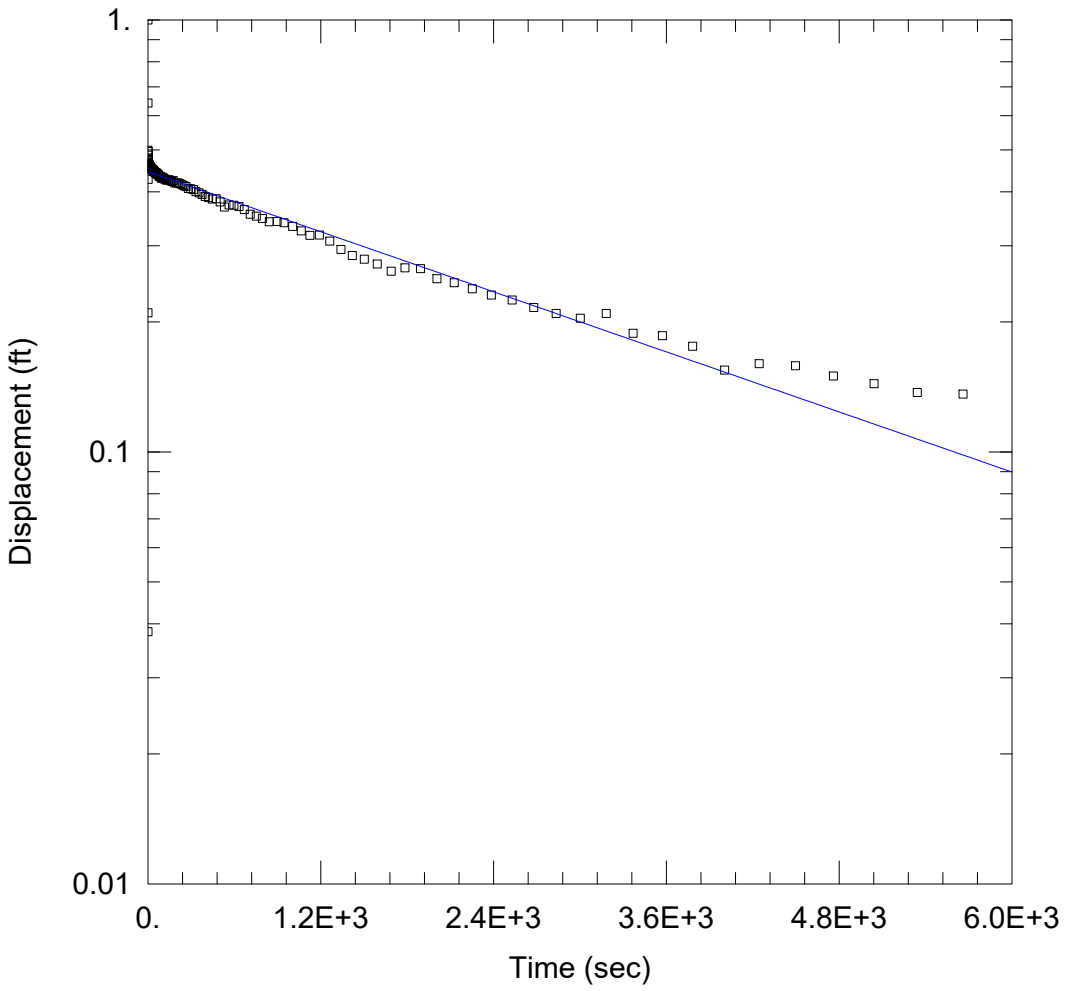
Saturated Thickness: 7. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-05)

Initial Displacement: 0.905 ft
Total Well Penetration Depth: 130.7 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 130.7 ft
Screen Length: 5. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 4.258E-5 cm/sec
y0 = 0.7426 ft



MW-16-05 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-05_OUT.aqt
Date: 05/22/17 Time: 13:43:26

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE EC BRPP CCR
Project: 231828.0003.0000
Location: China Township, MI
Test Well: MW-16-05
Test Date: 4/13/16

AQUIFER DATA

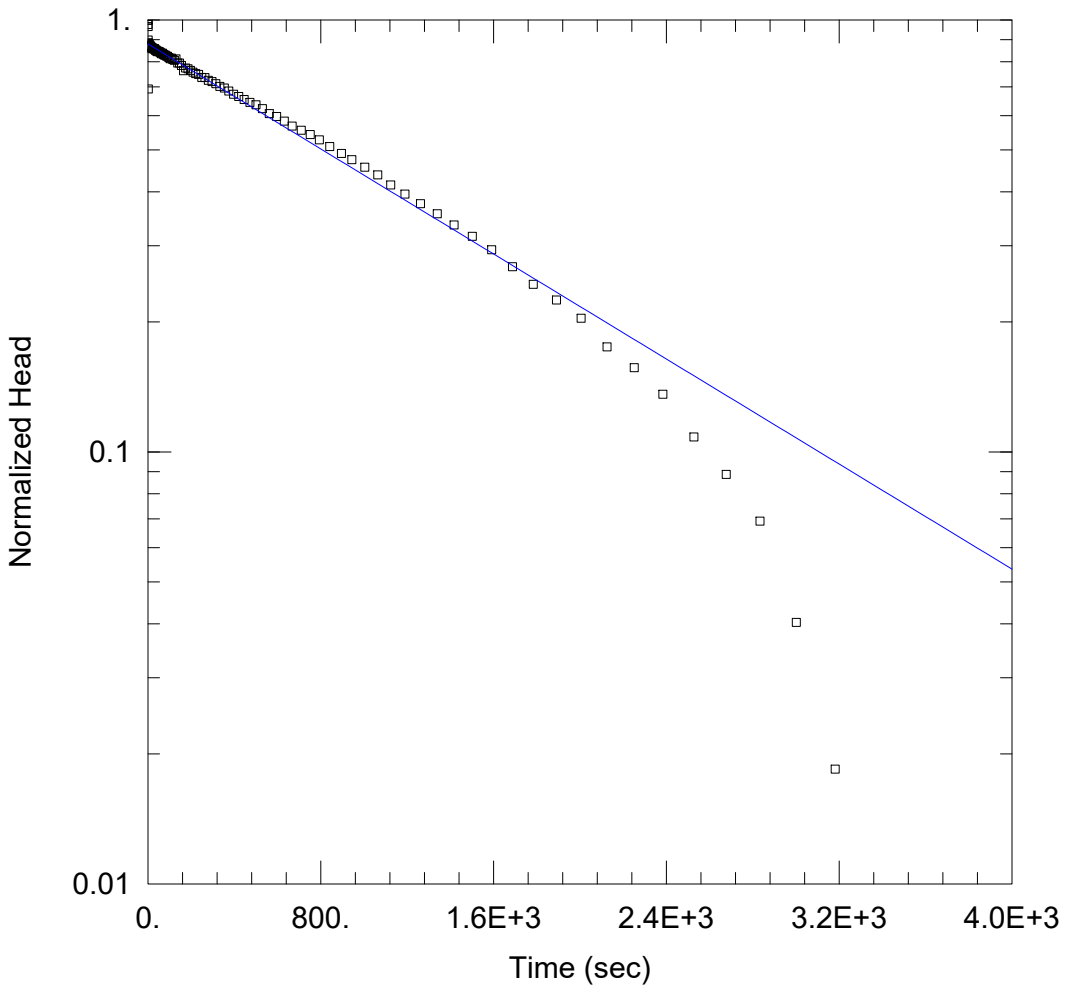
Saturated Thickness: 7. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-05)

Initial Displacement: 1.668 ft
Total Well Penetration Depth: 130.7 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 130.7 ft
Screen Length: 5. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 2.125E-5 cm/sec
y0 = 0.743 ft



MW-16-07 FALLING HEAD SLUG TEST

Data Set: P:\...\MW-16-07_IN.aqt
Date: 05/22/17 Time: 13:44:03

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE EC BRPP CCR
Project: 231828.0003
Location: China Township, MI
Test Well: MW-16-07
Test Date: 4/13/16

AQUIFER DATA

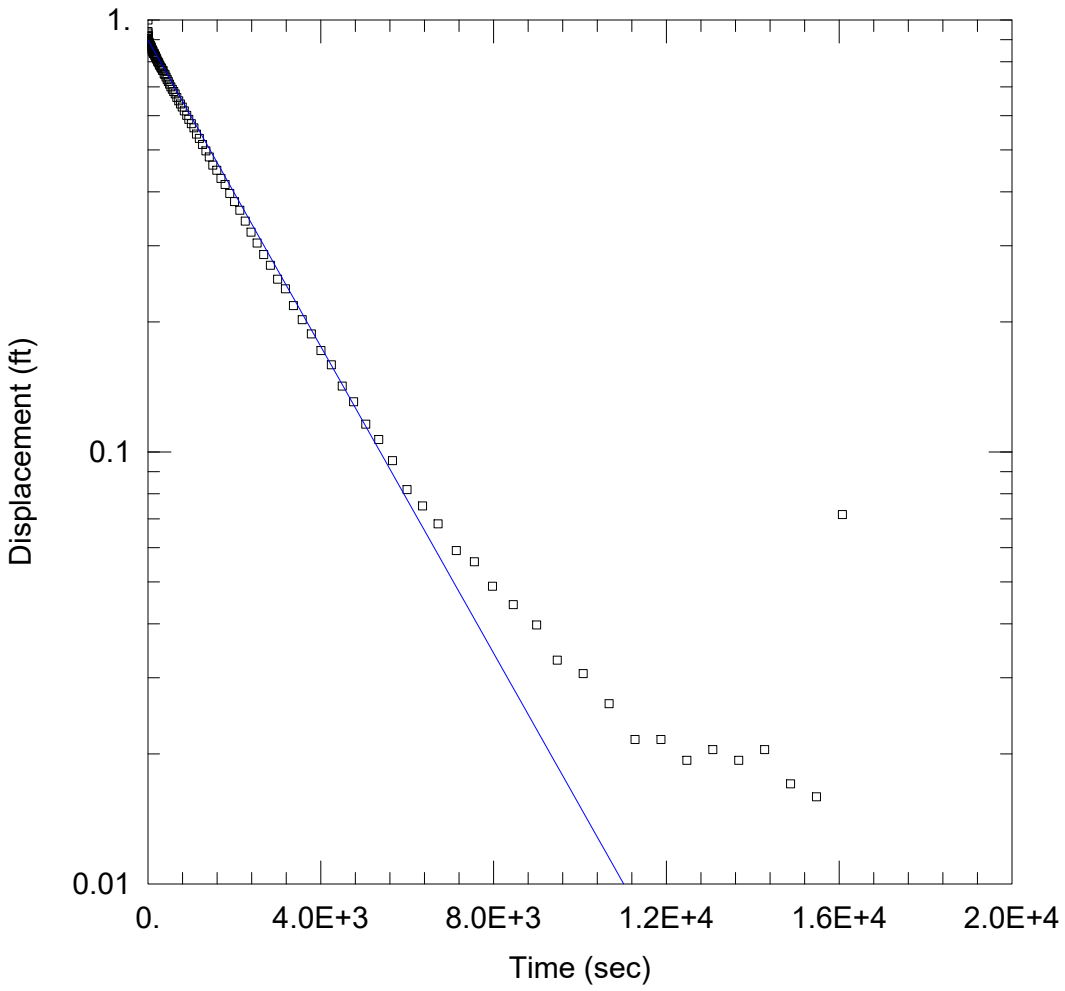
Saturated Thickness: 2. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-07)

Initial Displacement: 0.868 ft
Total Well Penetration Depth: 124.9 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 124.9 ft
Screen Length: 5. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.0001236 cm/sec
y0 = 0.7638 ft



MW-16-07 RISING HEAD SLUG TEST

Data Set: P:\...\MW-16-07_OUT.aqt
Date: 05/22/17 Time: 13:44:45

PROJECT INFORMATION

Company: TRC Environmental Corporation
Client: DTE EC BRPP CCR
Project: 231828.0003.0000
Location: China Township, MI
Test Well: MW-16-07
Test Date: 4/13/16

AQUIFER DATA

Saturated Thickness: 2. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-16-07)

Initial Displacement: 0.88 ft
Total Well Penetration Depth: 124.4 ft
Casing Radius: 0.08333 ft
Static Water Column Height: 124.4 ft
Screen Length: 5. ft
Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 7.212E-5 cm/sec
y0 = 0.7909 ft

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2021 Slug Test Results

2021 Hydrualic Conductivity Results Summary
DTE Electric Company Belle River Power Plant Bottom Ash Basins and Diversion Basin
4505 King Road, China Township, Michigan

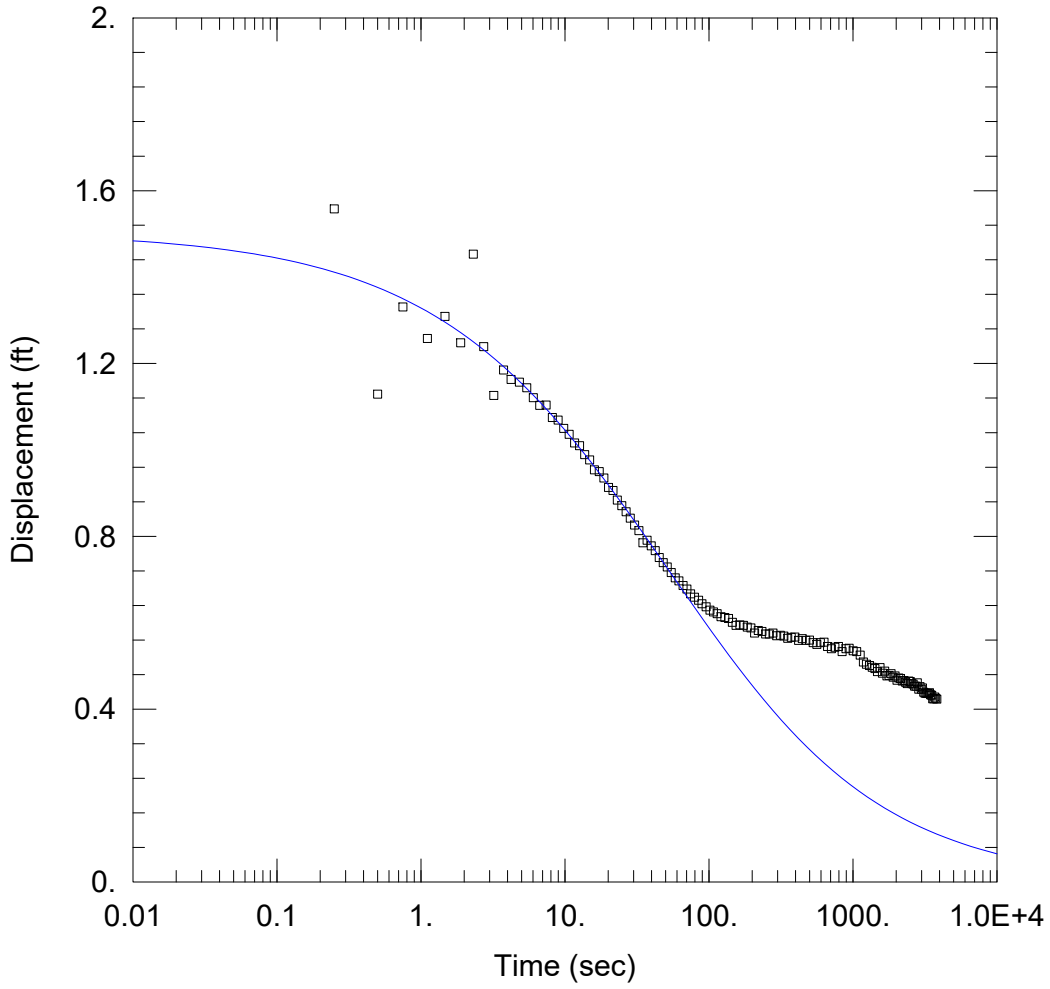
Test	WC (ft)	K (cm/s)	K (ft/day)	Comment/K Geometric mean (cm/s)	K Geometric mean (ft/day)
MW-16-02 Slug In	85.8	NA	NA	Not a good match, use slug out test	NA
MW-16-02 Slug Out	85.8	4.2E-04	1.2	4.2E-04	1.2
MW-16-03 Slug In	123.1	9.8E-03	27.8	9.6E-03	27.4
MW-16-03 Slug Out	123.1	9.5E-03	26.9		
MW-16-06 Slug In	125.6	1.0E-04	0.28	1.0E-04	0.30
MW-16-06 Slug Out	125.6	1.1E-04	0.31		
MW-16-08 Slug In	124.9	1.2E-05	0.03	1.1E-05	0.03
MW-16-08 Slug Out	124.9	1.1E-05	0.03		
MW-16-09 Slug In	126.9	1.5E-04	0.43	1.5E-04	0.43
MW-16-09 Slug Out	126.9	1.5E-04	0.43		
MW-16-10 Slug In	135.3	3.6E-05	0.10	3.6E-05	0.10
MW-16-10 Slug Out	135.3	3.7E-05	0.10		
MW-16-11A Slug In	127.3	6.1E-05	0.17	6.3E-05	0.18
MW-16-11A Slug Out	127.3	6.5E-05	0.18		

K = Hydraulic Conductivity

NA = Not applicable

WC = water column height in well

A 5' long by 1" diameter slug was utilized to complete slug tests in these wells in September 2021.



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 In.aqt
Date: 10/29/21 Time: 11:44:26

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-02
Test Date: 9/17/2021

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

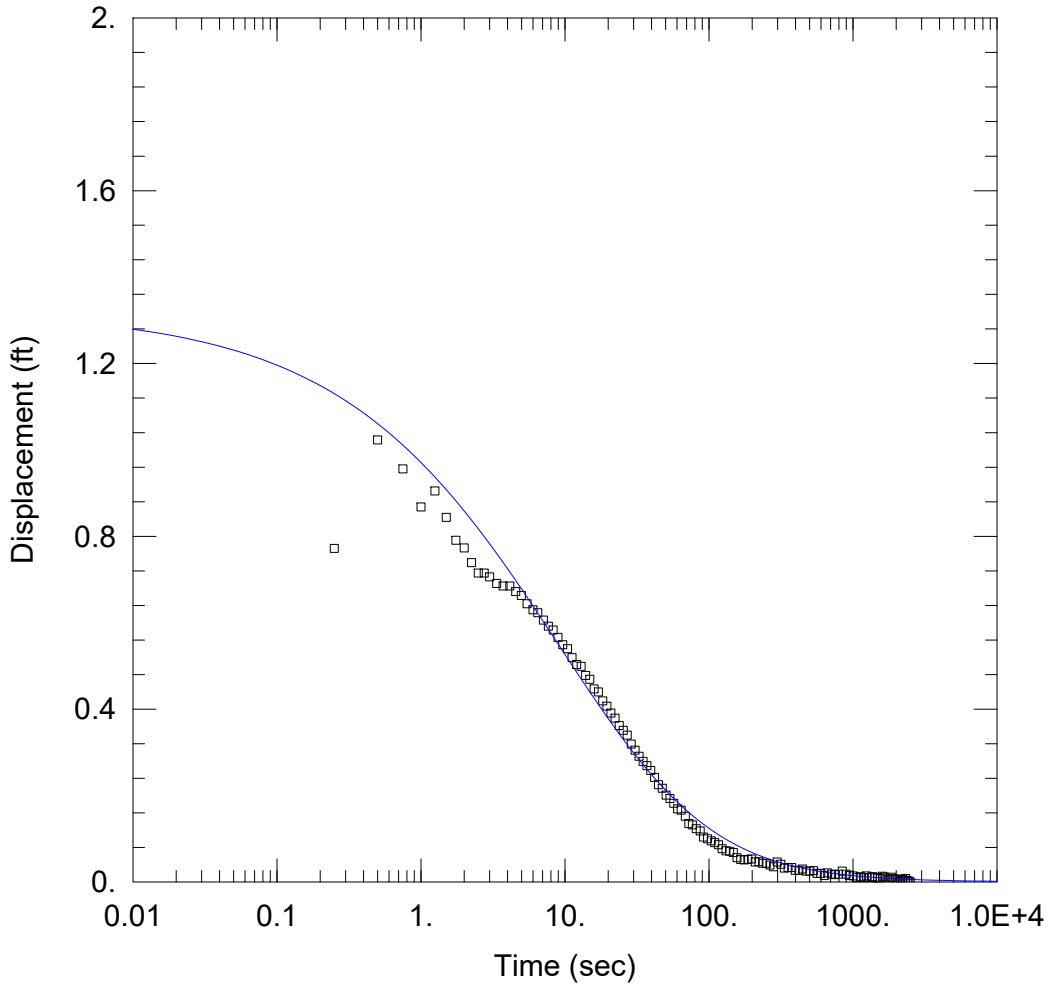
WELL DATA (MW-16-02)

Initial Displacement: 1.503 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 85.8 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.0006905 cm^2/sec
S = 3.692



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-02 Out.aqt
Date: 10/29/21 Time: 11:46:12

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-02
Test Date: 9/17/2021

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

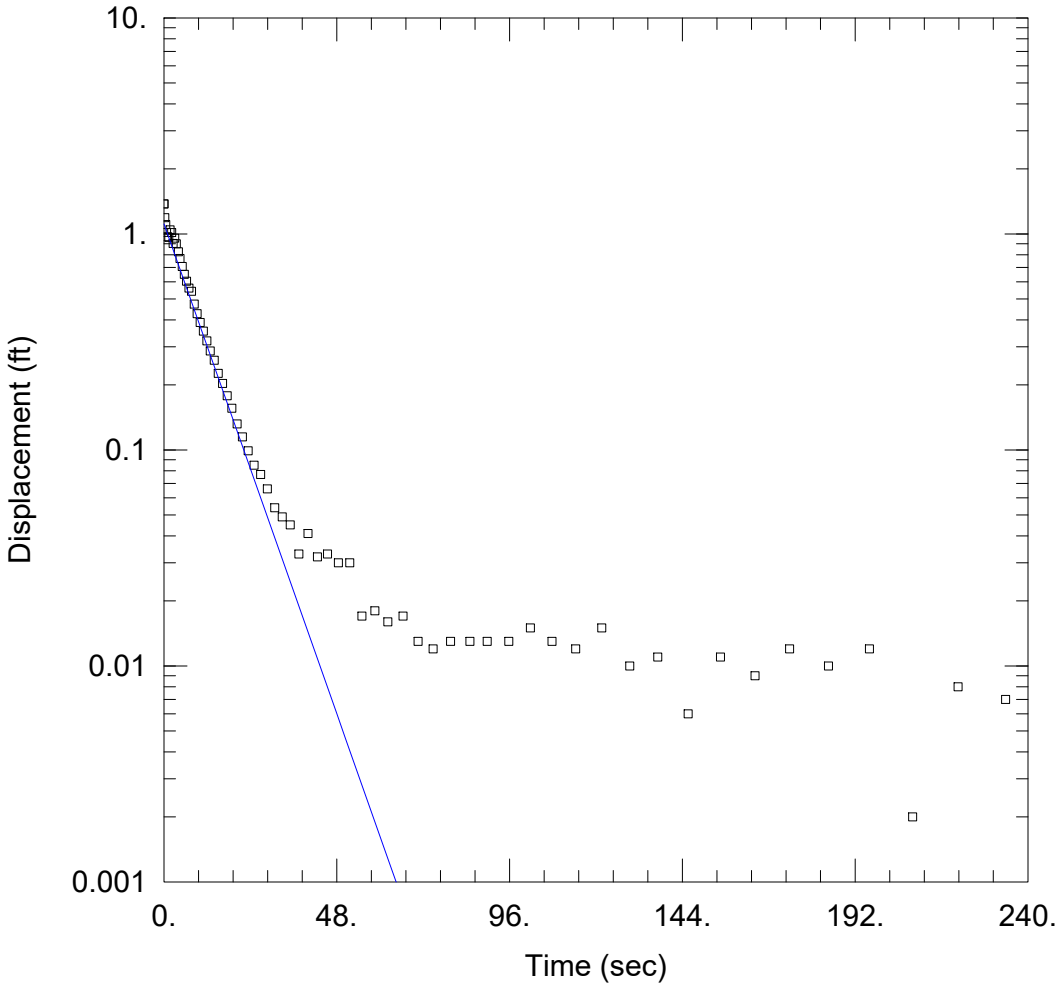
WELL DATA (MW-16-02)

Initial Displacement: 1.32 ft Static Water Column Height: 85.8 ft
Total Well Penetration Depth: 5. ft Screen Length: 5. ft
Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.1533 cm^2/sec S = 0.1



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 In.aqt
Date: 10/29/21 Time: 11:52:09

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-03
Test Date: 9/17/2021

AQUIFER DATA

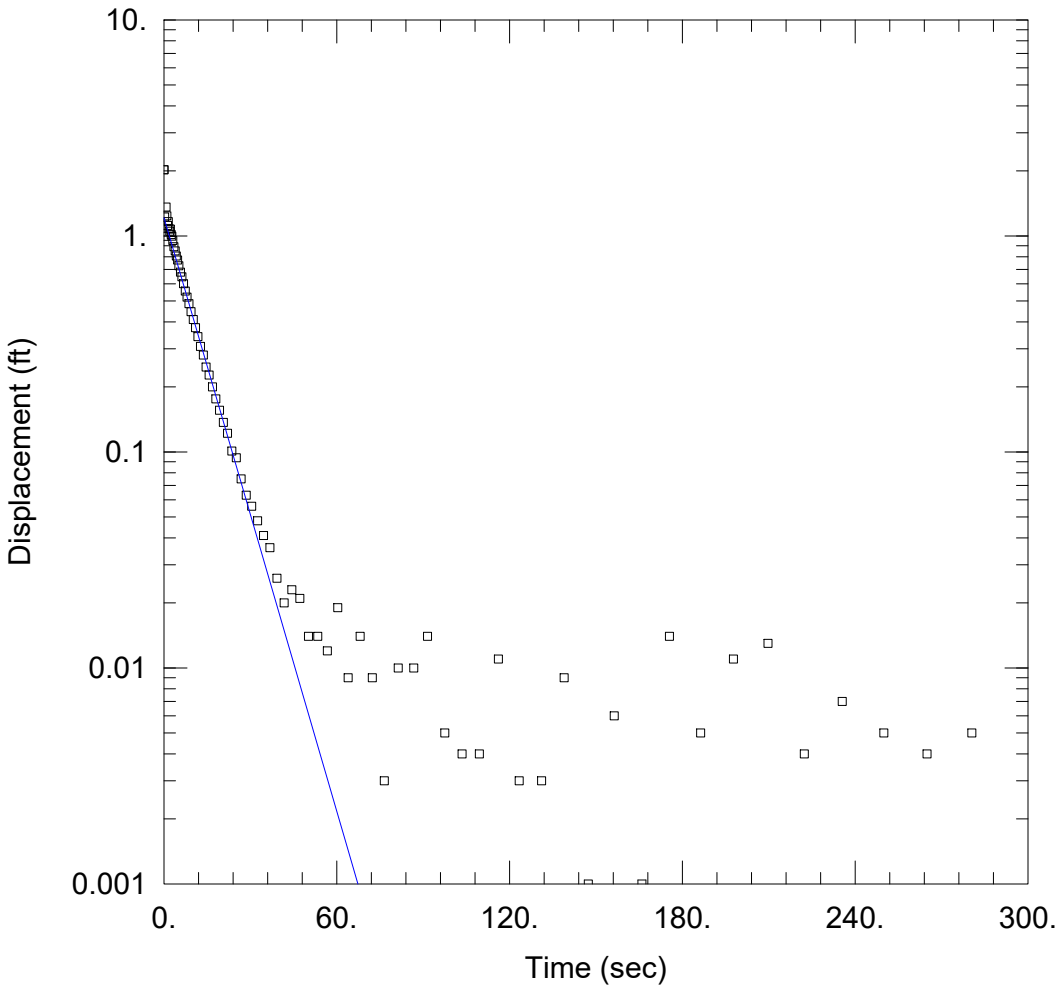
Saturated Thickness: 12. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 1.376 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 123.1 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.009782 cm/sec
y0 = 1.113 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-03 Out.aqt
Date: 10/29/21 Time: 11:53:59

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-03
Test Date: 9/17/2021

AQUIFER DATA

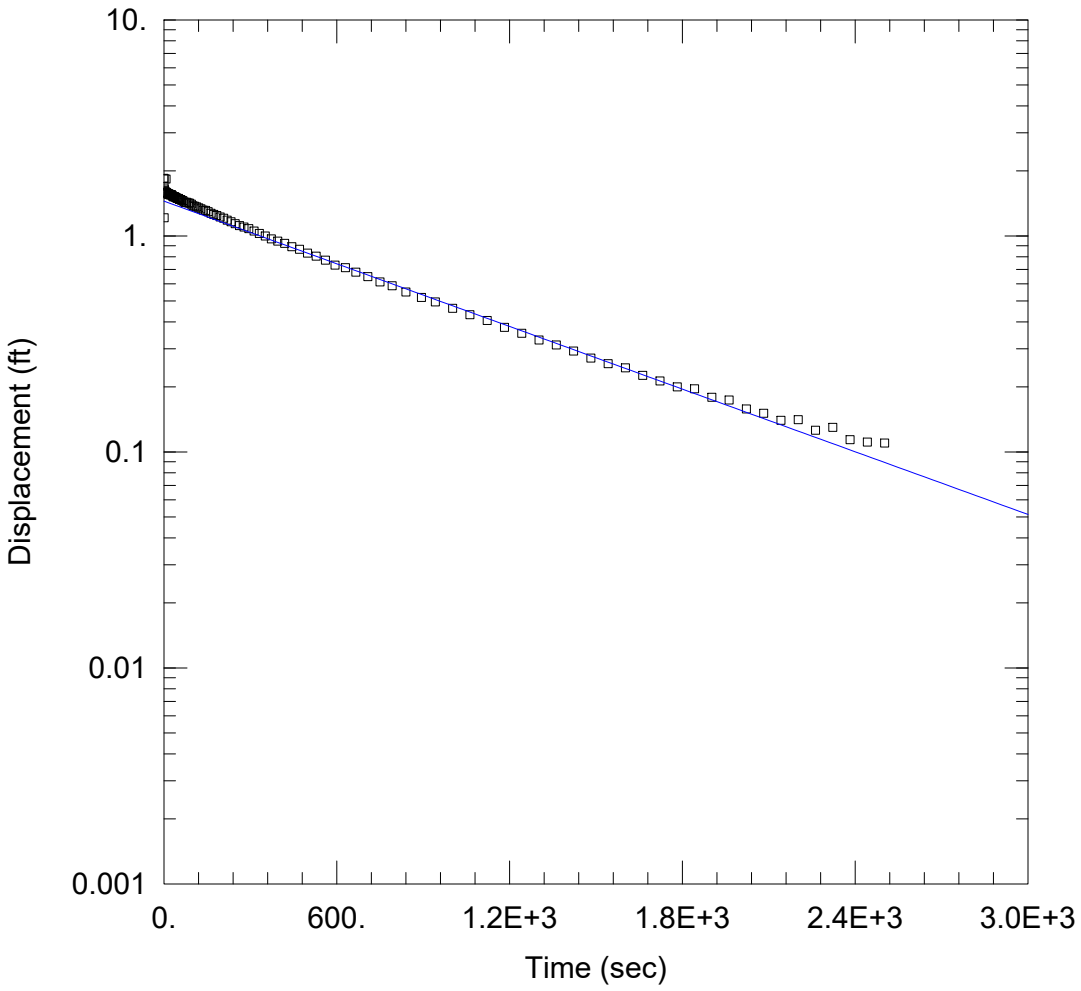
Saturated Thickness: 12. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-03)

Initial Displacement: 2.023 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 123.1 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.009488 cm/sec
y0 = 1.215 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 In.aqt
Date: 10/29/21 Time: 11:57:18

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-06
Test Date: 9/17/2021

AQUIFER DATA

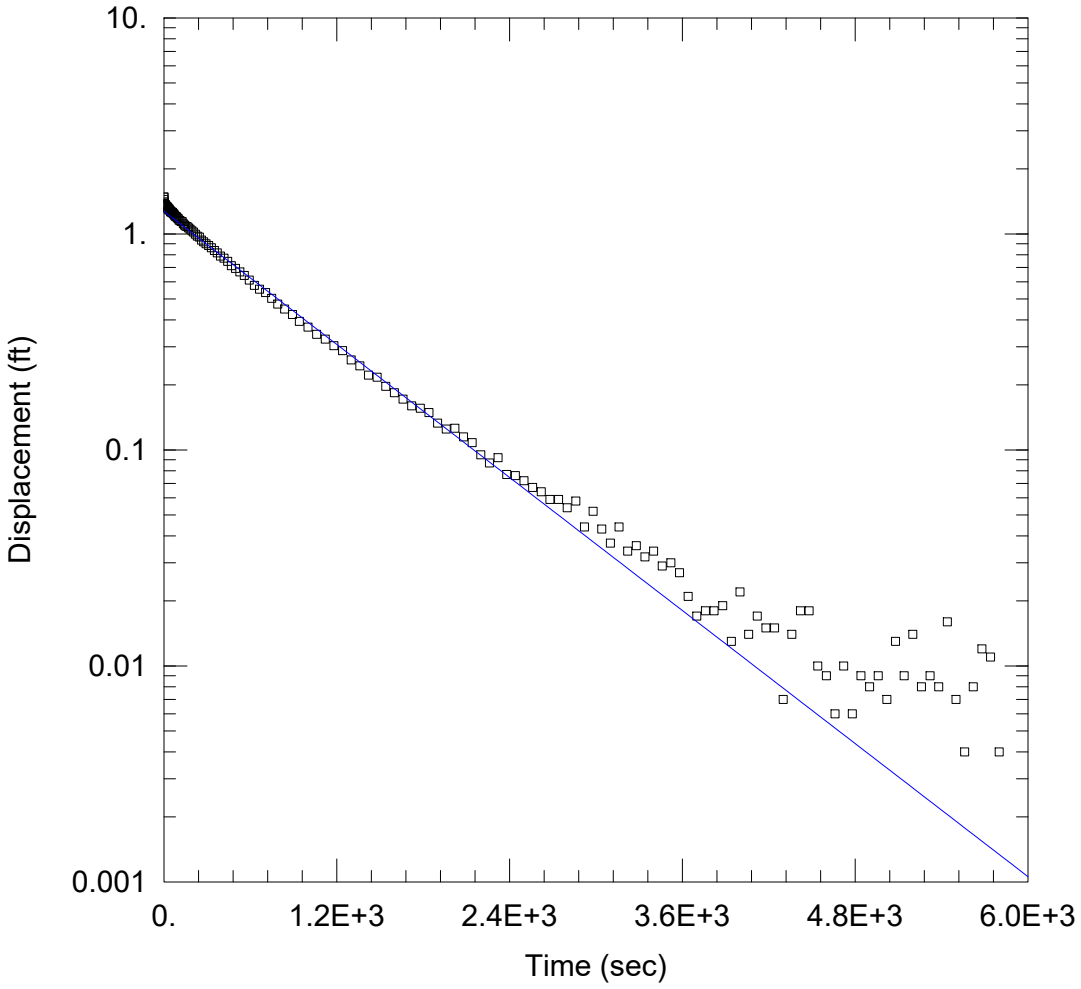
Saturated Thickness: 6. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.847 ft
Total Well Penetration Depth: 6. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 125.6 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.0001002 cm/sec
y0 = 1.449 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-06 Out.aqt
Date: 10/29/21 Time: 11:58:41

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-06
Test Date: 9/17/2021

AQUIFER DATA

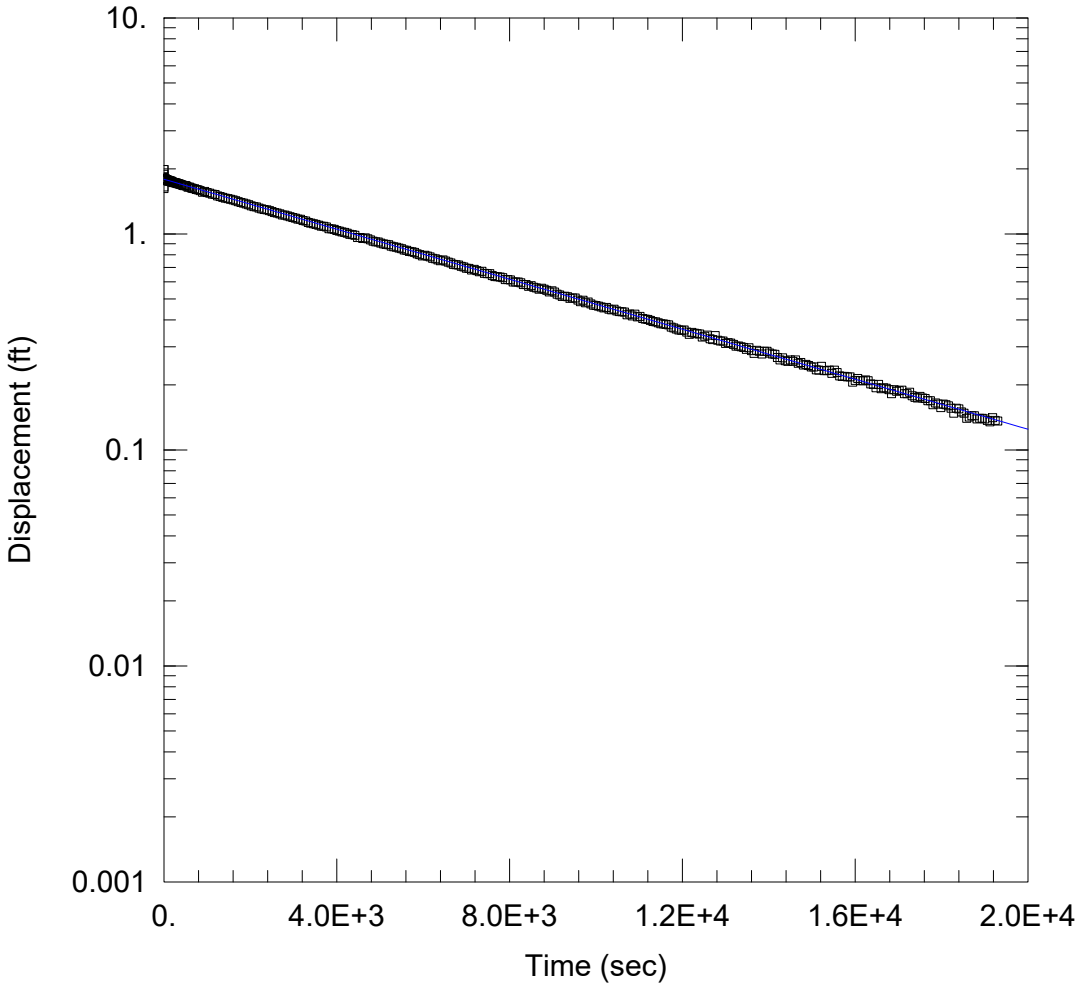
Saturated Thickness: 6. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-06)

Initial Displacement: 1.481 ft
Total Well Penetration Depth: 6. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 125.6 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.0001063 cm/sec
y0 = 1.271 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 In.aqt
Date: 10/29/21 Time: 12:36:01

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-08
Test Date: 9/16/2021

AQUIFER DATA

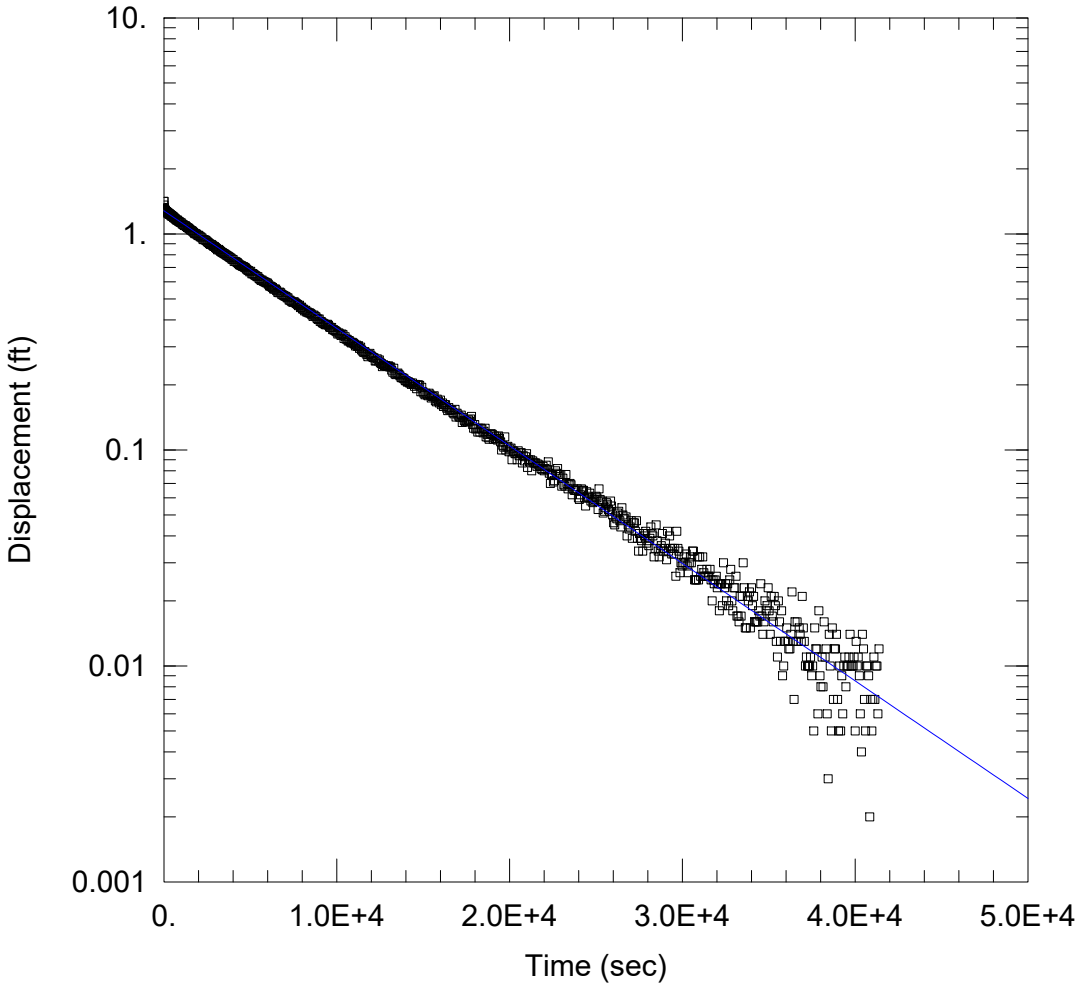
Saturated Thickness: 7. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-08)

Initial Displacement: 1.987 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 124.9 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 1.199E-5 cm/sec
y0 = 1.791 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-08 Out.aqt
Date: 10/29/21 Time: 12:38:13

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-08
Test Date: 9/16/2021

AQUIFER DATA

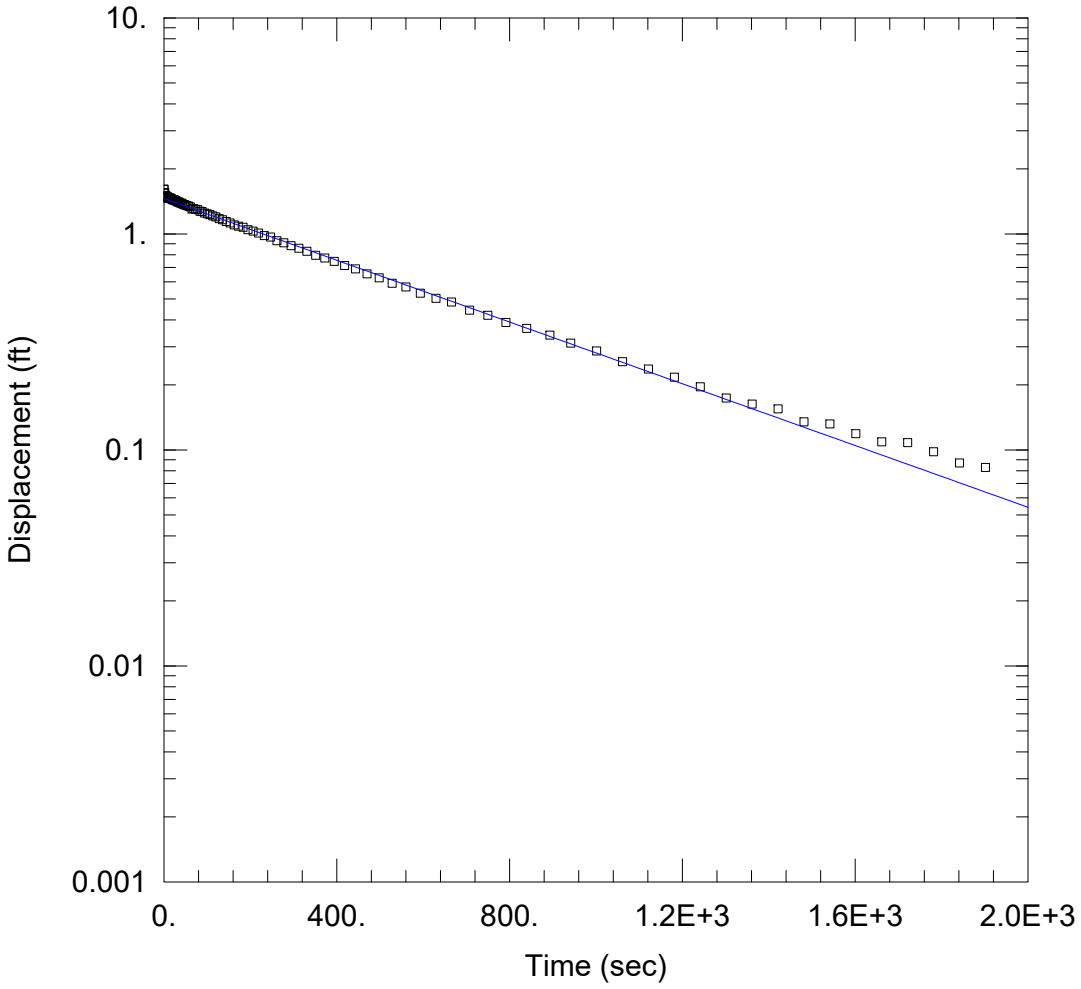
Saturated Thickness: 7. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-08)

Initial Displacement: 1.415 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 124.9 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 1.127E-5 cm/sec
y0 = 1.279 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 In.aqt
Date: 10/29/21 Time: 12:41:12

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-09
Test Date: 9/16/2021

AQUIFER DATA

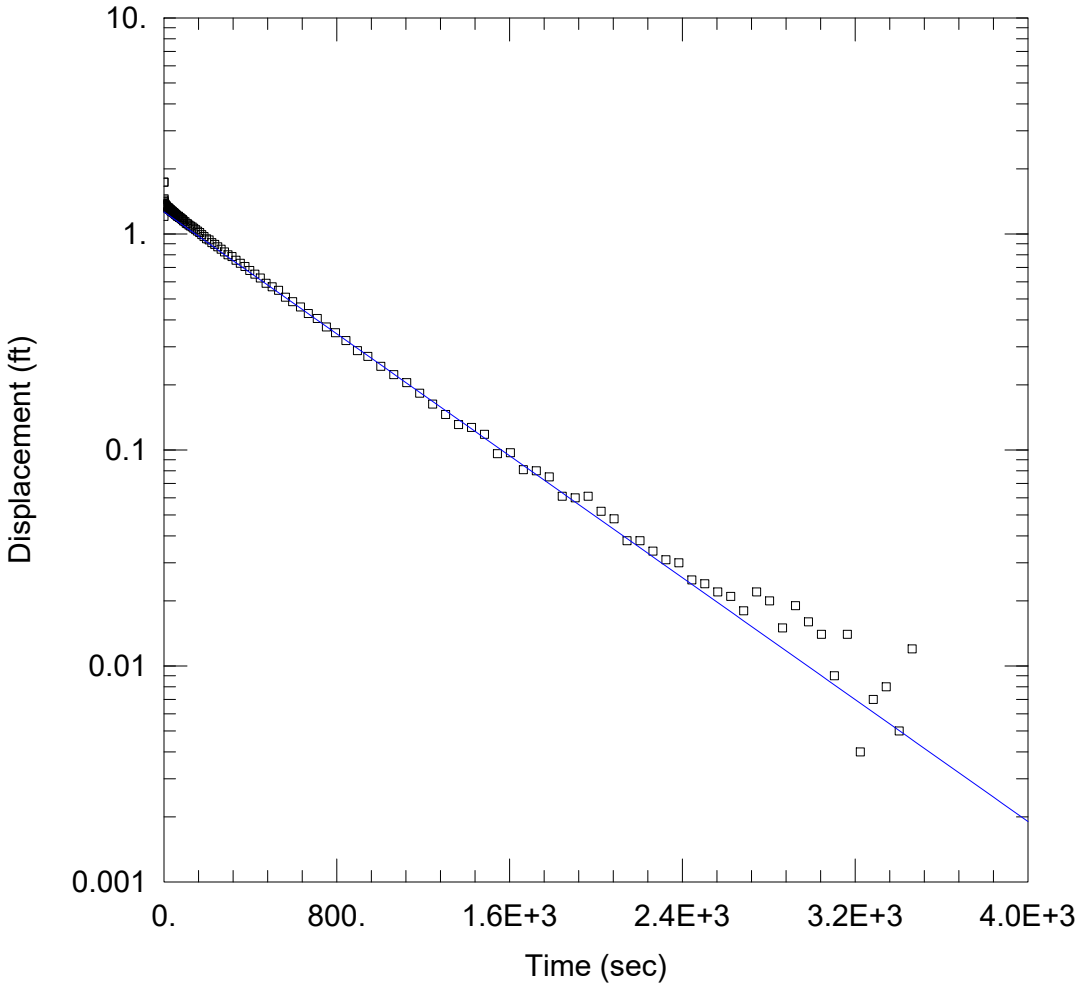
Saturated Thickness: 12. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-09)

Initial Displacement: 1.611 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 126.9 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 0.000148 cm/sec
y0 = 1.458 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-09 Out.aqt
Date: 10/29/21 Time: 12:43:28

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-09
Test Date: 9/16/2021

AQUIFER DATA

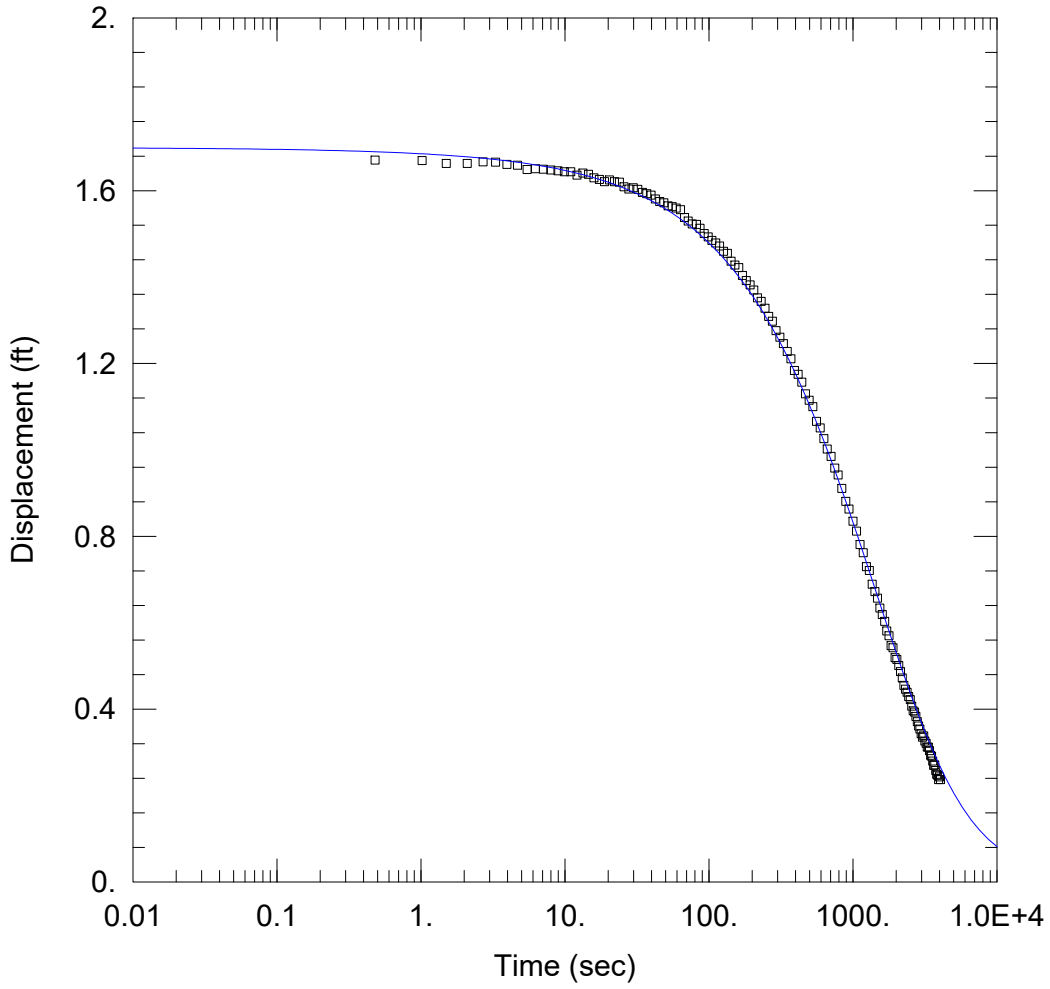
Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-09)

Initial Displacement: 1.736 ft Static Water Column Height: 126.9 ft
Total Well Penetration Depth: 5. ft Screen Length: 5. ft
Casing Radius: 0.0861 ft Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev
K = 0.0001461 cm/sec y0 = 1.265 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 In.aqt
Date: 10/29/21 Time: 12:52:23

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-10
Test Date: 9/16/2021

AQUIFER DATA

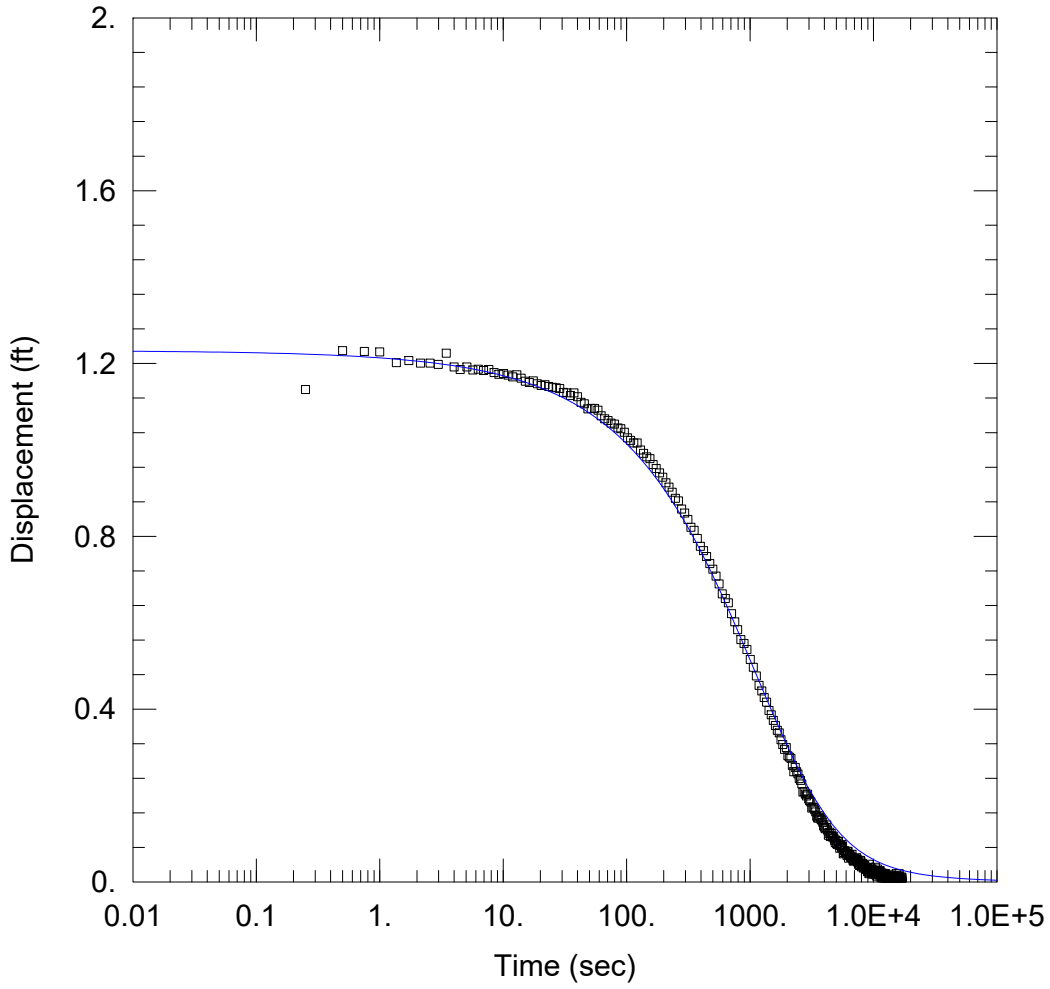
Saturated Thickness: 5. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.7 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 135.3 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos
T = 0.005538 cm^2/sec
S = 0.001701



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-10 Out.aqt
Date: 10/29/21 Time: 12:54:58

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-10
Test Date: 9/16/2021

AQUIFER DATA

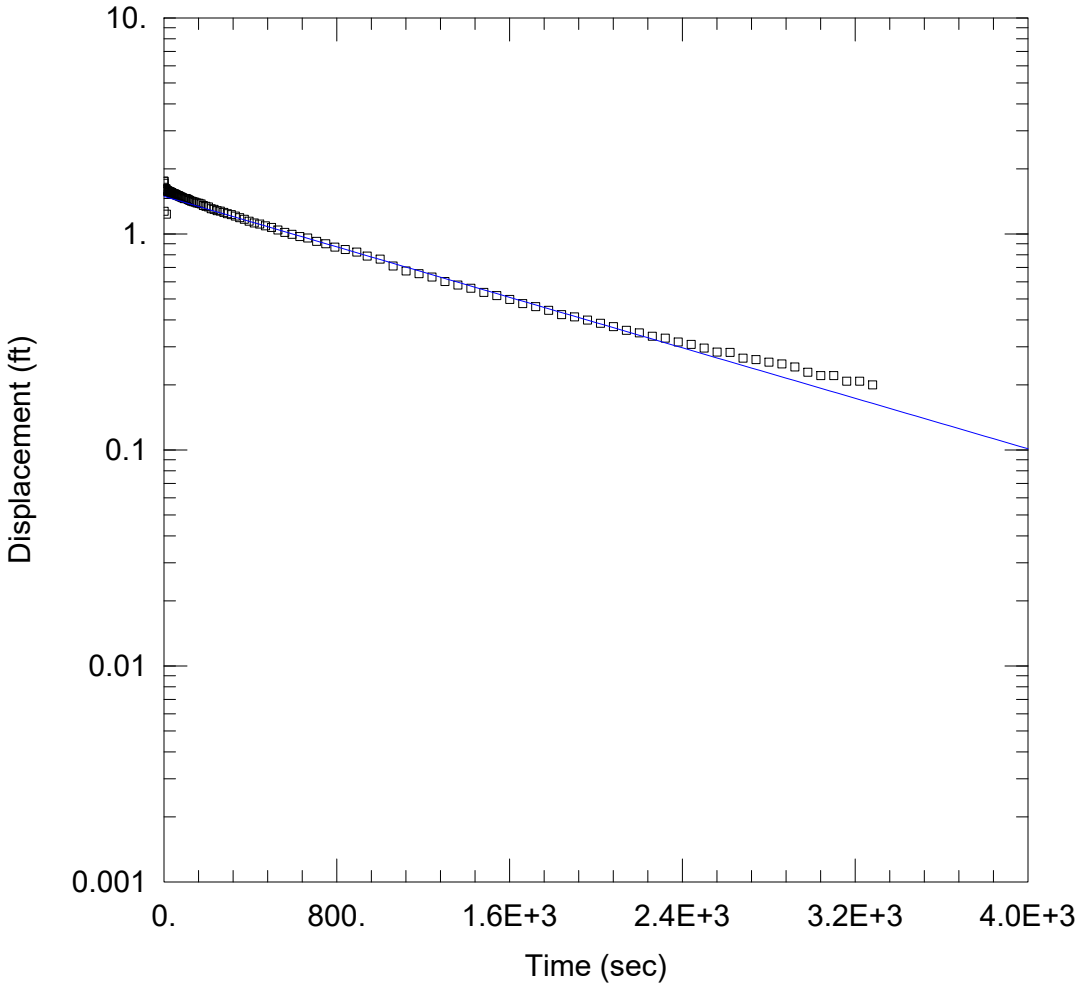
Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-10)

Initial Displacement: 1.23 ft
Total Well Penetration Depth: 5. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 135.3 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos
T = 0.005626 cm^2/sec
S = 0.004752



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A In.aqt
Date: 10/29/21 Time: 12:59:49

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-11A
Test Date: 9/16/2021

AQUIFER DATA

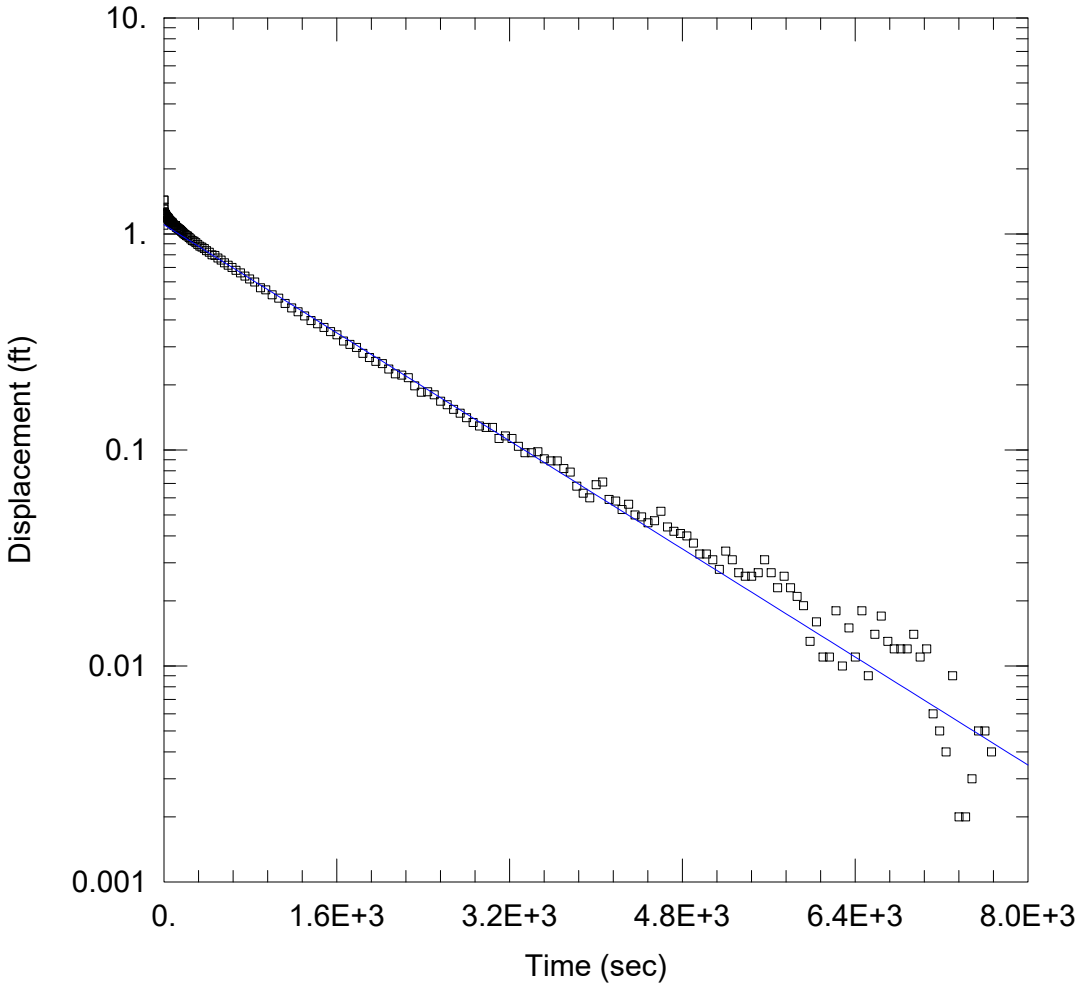
Saturated Thickness: 7. ft
Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.753 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 127.3 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 6.051E-5 cm/sec
y0 = 1.492 ft



WELL TEST ANALYSIS

Data Set: P:_Vision\DTE\2021 Slug Tests\Belle River PP\MW-16-11A Out.aqt
Date: 10/29/21 Time: 13:00:15

PROJECT INFORMATION

Company: TRC
Client: DTE
Location: Belle River PP
Test Well: MW-16-11A
Test Date: 9/16/2021

AQUIFER DATA

Saturated Thickness: 7. ft Anisotropy Ratio (Kz/Kr): 0.5

WELL DATA (MW-16-11A)

Initial Displacement: 1.434 ft
Total Well Penetration Depth: 7. ft
Casing Radius: 0.0861 ft
Static Water Column Height: 127.3 ft
Screen Length: 5. ft
Well Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev
K = 6.477E-5 cm/sec
y0 = 1.103 ft

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Appendix B
Monitoring Well Logs

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant			WELL ID: **MW-16-01**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/17/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.06	1.8	TOP OF CASING
588.26	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
93.8		RISER PIPE LENGTH
	84.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	89.0	BENTONITE SEAL
496.3	92.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
491.3	97.0	BOTTOM OF SCREEN
	97.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
488.3	100.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 97 FT.
4 IN. FROM 97 TO 100 FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 120 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	98.20	T/PVC	3/21/2016	--
DTB AFTER DEVELOPING:	100.32	T/PVC	4/13/2016	845
SWL BEFORE DEVELOPING:	12.92	T/PVC	3/21/2016	--
SWL AFTER DEVELOPING:	16.32	T/PVC	4/13/2016	845
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant		WELL ID:	**MW-16-02**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/15/2016 INSTALLED BY: A. Knutson		CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
588.94	2.7	TOP OF CASING
586.27	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
94.7		RISER PIPE LENGTH
	84.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	89.0	BENTONITE SEAL
494.2	92.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
489.2	97.0	BOTTOM OF SCREEN
	97.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
486.2	100.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 97 FT.
4 IN. FROM 97 TO 100 FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 460 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	97.07	T/PVC	3/15/2016	--
DTB AFTER DEVELOPING:	100.20	T/PVC	4/13/2016	9:24
SWL BEFORE DEVELOPING:	14.56	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	28.28	T/PVC	3/18/2016	--
OTHER SWL:	18.77	T/PVC	4/13/2016	9:24
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant		WELL ID:	**MW-16-03**
PROJ. NO: 231828.0003	DATE INSTALLED: 6/1/2016 INSTALLED BY: J. Reed	CHECKED BY:	M. Powers

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.66	2.6	TOP OF CASING
588.03	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
134.5		RISER PIPE LENGTH
	126.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	129.0	BENTONITE SEAL
456.2	132.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
451.2	137.0	BOTTOM OF SCREEN
	137.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
438.2	150.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 140 FT.
4 IN. FROM 140 TO 150 FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 60 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: TURBID

COLOR BEFORE: LIGHT GRAY

CLARITY AFTER: SLIGHTLY TURBID

COLOR AFTER: VERY LIGHT GRAY

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/8/2016	7:20
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	14:30
SWL BEFORE DEVELOPING:	16.06	T/PVC	6/8/2016	7:20
SWL AFTER DEVELOPING:	15.32	T/PVC	6/8/2016	14:30
OTHER DTB:	140.41	T/PVC	6/9/2016	10:00
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant			WELL ID: **MW-16-04**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/8/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.51	3.0	TOP OF CASING
587.50	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
122.0		RISER PIPE LENGTH
	111.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	116.0	BENTONITE SEAL
468.5	119.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
463.5	124.0	BOTTOM OF SCREEN
	124.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
457.5	130.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 124 FT.
4 IN. FROM 124 TO 130 FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 288 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	123.97	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	126.45	T/PVC	4/13/2016	9:31
SWL BEFORE DEVELOPING:	13.98	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	13.46	T/PVC	3/18/2016	7:30
OTHER SWL:	16.91	T/PVC	4/13/2016	9:31
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant			WELL ID: **MW-16-05**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/4/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.82	2.5	TOP OF CASING
588.32	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
141.5		RISER PIPE LENGTH
	128.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	133.0	BENTONITE SEAL
449.3	139.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
444.3	144.0	BOTTOM OF SCREEN
	150.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
444.3	150.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 150 FT.
____ IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 300 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	144.03	T/PVC	3/4/2016	--
DTB AFTER DEVELOPING:	147.16	T/PVC	4/13/2016	9:55
SWL BEFORE DEVELOPING:	13.71	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.13	T/PVC	3/18/2016	--
OTHER SWL:	16.87	T/PVC	4/13/2016	9:55
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant		WELL ID:	**MW-16-06**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/11/2016 INSTALLED BY: A. Knutson		CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
593.21	3.2	TOP OF CASING
589.98	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
138.2		RISER PIPE LENGTH
	127.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	132.0	BENTONITE SEAL
455.0	135.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
450.0	140.0	BOTTOM OF SCREEN
	140.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NA
450.0	140.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 140 FT.
____ IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 50 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NOT MEASURED

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	135.07	T/PVC	3/8/2016	--
DTB AFTER DEVELOPING:	142.85	T/PVC	4/13/2016	10:01
SWL BEFORE DEVELOPING:	19.62	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.90	T/PVC	3/18/2016	7:30
OTHER SWL:	17.65	T/PVC	4/13/2016	10:01
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant			WELL ID: **MW-16-07**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/9/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
592.58	2.7	TOP OF CASING
589.89	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
135.7		RISER PIPE LENGTH
	125.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	130.0	BENTONITE SEAL
456.9	133.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
451.9	138.0	BOTTOM OF SCREEN
	140.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
449.89	140.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 140 FT.
____ IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 120 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	138.02	T/PVC	3/9/2016	--
DTB AFTER DEVELOPING:	141.19	T/PVC	4/13/2016	11:56
SWL BEFORE DEVELOPING:	14.66	T/PVC	3/15/2016	--
SWL AFTER DEVELOPING:	14.25	T/PVC	3/18/2016	--
OTHER SWL:	16.83	T/PVC	4/13/2016	11:56
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

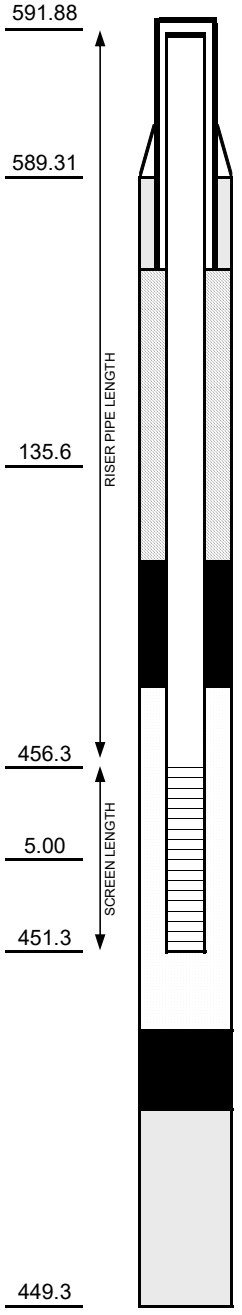
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant			WELL ID: **MW-16-08**
PROJ. NO: 231828.0003	DATE INSTALLED: 3/10/2016	INSTALLED BY: A. Knutson	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
591.88	2.6	TOP OF CASING
589.31	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
135.6		RISER PIPE LENGTH
	125.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	130.0	BENTONITE SEAL
456.3	133.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
451.3	138.0	BOTTOM OF SCREEN
	140.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
449.3	140.0	HOLE BOTTOM



NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 140 FT.
____ IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4 HOURS

WATER REMOVED: 125 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: BROWN /GREY

CLARITY AFTER: CLEAR

COLOR AFTER: NONE

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	137.94	T/PVC	3/11/2016	--
DTB AFTER DEVELOPING:	140.80	T/PVC	4/13/2016	12:00
SWL BEFORE DEVELOPING:	14.23	T/PVC	3/15/2016	14:30
SWL AFTER DEVELOPING:	14.23	T/PVC	3/18/2016	7:30
OTHER SWL:	15.79	T/PVC	4/13/2016	12:00
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

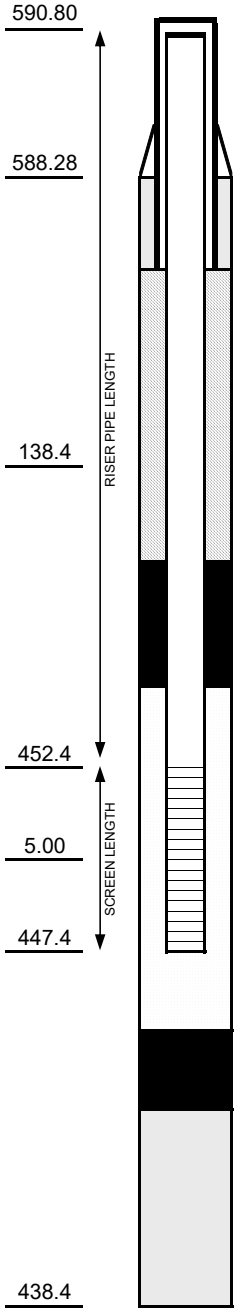
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant			WELL ID: **MW-16-09**
PROJ. NO: 231828.0003	DATE INSTALLED: 6/2/2016	INSTALLED BY: J. Reed	CHECKED BY: M. Powers

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
590.80	2.5	TOP OF CASING
588.28	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
138.4		RISER PIPE LENGTH
	130.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	133.0	BENTONITE SEAL
452.4	136.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
447.4	141.0	BOTTOM OF SCREEN
	141.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NATURAL COLLAPSE
438.4	150.0	HOLE BOTTOM



NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 150 FT.
____ IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 7 HOURS

WATER REMOVED: 30 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: TURBID

COLOR BEFORE: GRAY

CLARITY AFTER: VERY TURBID

COLOR AFTER: GRAY

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	140.00	T/PVC	6/7/2016	12:00
DTB AFTER DEVELOPING:	140.00	T/PVC	6/8/2016	10:25
SWL BEFORE DEVELOPING:	7.00	T/PVC	6/7/2016	12:00
SWL AFTER DEVELOPING:	117.42	T/PVC	6/8/2016	10:25
OTHER SWL:	16.76	T/PVC	6/9/2016	15:13
OTHER DTB:	144.30	T/PVC	6/9/2016	15:13

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant		WELL ID:	**MW-16-10**
PROJ. NO: 231828.0003	DATE INSTALLED: 6/6/2016 INSTALLED BY: J. Reed		CHECKED BY: M. Powers

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
592.26	3.0	TOP OF CASING
589.25	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
148.0		RISER PIPE LENGTH
	137.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	142.0	BENTONITE SEAL
444.3	145.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
439.3	150.0	BOTTOM OF SCREEN
	150.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: NA
439.3	150.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 150 FT.
_____ IN. FROM _____ TO _____ FT.

SURF. CASING DIAMETER: _____ IN. FROM _____ TO _____ FT.
_____ IN. FROM _____ TO _____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 4.5 HOURS

WATER REMOVED: 85 GALLONS

WATER ADDED: 60 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: DARK GRAY

CLARITY AFTER: VERY TURBID

COLOR AFTER: DARK GRAY

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	151.30	T/PVC	6/9/2016	7:45
DTB AFTER DEVELOPING:	152.28	T/PVC	6/9/2016	16:50
SWL BEFORE DEVELOPING:	17.80	T/PVC	6/9/2016	7:45
SWL AFTER DEVELOPING:	59.44	T/PVC	6/9/2016	16:50
OTHER SWL:		T/PVC		
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: DTE Electric Company Belle River Power Plant			WELL ID: **MW-16-11**
PROJ. NO: 231828.0003	DATE INSTALLED: 6/7/2016	INSTALLED BY: J. Reed	CHECKED BY: M. Powers

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)	
591.54	2.5	TOP OF CASING
589.03	0.0	GROUND SURFACE
	1.0	CEMENT SURFACE PLUG
		GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
		GROUT/BACKFILL METHOD: TREMIE
139.5		RISER PIPE LENGTH
	130.0	GROUT
		BENTONITE SEAL MATERIAL: TIME RELEASE PELLETS
	135.0	BENTONITE SEAL
452.0	137.0	TOP OF SCREEN
5.00		SCREEN LENGTH
		FILTER PACK MATERIAL: MEDIUM, WASHED SAND
447.0	142.0	BOTTOM OF SCREEN
	150.0	BOTTOM OF FILTER PACK
	NA	BENTONITE PLUG
		BACKFILL MATERIAL: WASHED SAND
447.0	150.0	HOLE BOTTOM

NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 150 FT.
____ IN. FROM ____ TO ____ FT.

SURF. CASING DIAMETER: ____ IN. FROM ____ TO ____ FT.
____ IN. FROM ____ TO ____ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 3 HOURS

WATER REMOVED: 84 GALLONS

WATER ADDED: 60 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: VERY TURBID

COLOR BEFORE: DARK GRAY

CLARITY AFTER: VERY TURBID

COLOR AFTER: GRAY

ODOR (IF PRESENT): NONE

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	141.36	T/PVC	6/9/2016	12:35
DTB AFTER DEVELOPING:	142.00	T/PVC	6/9/2016	15:45
SWL BEFORE DEVELOPING:	9.65	T/PVC	6/9/2016	12:35
SWL AFTER DEVELOPING:	116.00	T/PVC	6/9/2016	15:45
OTHER SWL:	16.67	T/PVC	6/21/2016	7:45
OTHER SWL:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

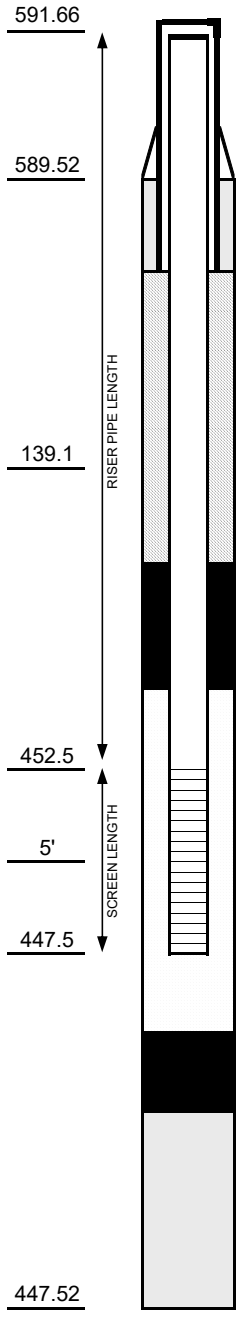
PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	DTE Electric Company Belle River Power Plant	WELL ID:	**MW-16-11A**
PROJ. NO:	265996.0003	DATE INSTALLED: 5/12/2017 INSTALLED BY: Jake Krenz	CHECKED BY: C. Scieszka

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)
591.66	2.1 TOP OF CASING
589.52	0.0 GROUND SURFACE
	1.5 CEMENT SURFACE PLUG
	GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
	GROUT/BACKFILL METHOD: TREMIE
139.1	131.5 GROUT
	BENTONITE SEAL MATERIAL: PELLETS
	134.0 BENTONITE SEAL
452.5	137.0 TOP OF SCREEN
5'	FILTER PACK MATERIAL: MEDIUM, WASHED SAND
447.5	142.0 BOTTOM OF SCREEN
	142.0 BOTTOM OF FILTER PACK
	NA BENTONITE PLUG
	BACKFILL MATERIAL: NA
447.52	142.0 HOLE BOTTOM



NOTES:

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SOLVENT USED? NO

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER:	6	IN. FROM	0	TO	142	FT.
	NA	IN. FROM	NA	TO	NA	FT.
SURF. CASING DIAMETER:	NA	IN. FROM	NA	TO	NA	FT.
	NA	IN. FROM	NA	TO	NA	FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: AIR LIFT

TIME DEVELOPING: 3 HOURS

WATER REMOVED: 110 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: Very Turbid

COLOR BEFORE: Dark Gray

CLARITY AFTER: Very Turbid

COLOR AFTER: Light Gray

ODOR (IF PRESENT): None

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	141.98	T/PVC	5/15/2017	0838
DTB AFTER DEVELOPING:	145.45	T/PVC	5/15/2017	1612
SWE BEFORE DEVELOPING:	17.79	T/PVC	5/15/2017	0838
SWE AFTER DEVELOPING:	90.12	T/PVC	5/15/2017	1612
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: 3120

Geosyntec
consultants

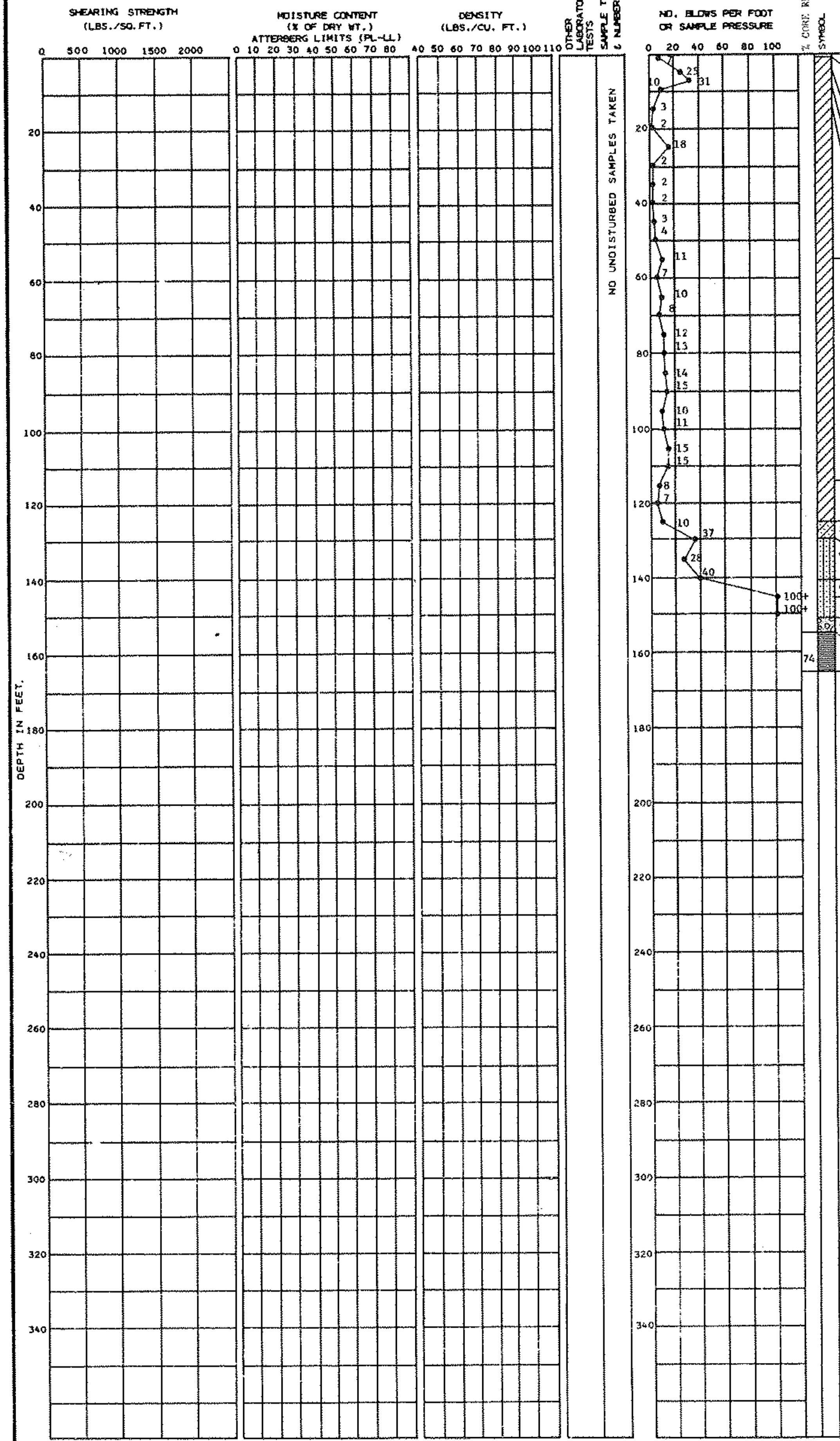
Appendix C
1970's Boring Logs

LOCATION: N 7,495 E 8,304

GROUND ELEVATION: 586.5

DATE DRILLED: 11-26-73 12-3-73

SHEET 1 OF 1



DESCRIPTION

- black clayey Topsoil (OH)
- med. mottled brown & gray, silty Clay (CL) trace of sand
- stiff to hard, gray, silty, some sand and gravel
- stiff, gray, silty, trace of sand, few pebbles
- very soft to soft, gray, silty, trace of fine sand
- med., gray, silty, some sand & pebbles
- soft, gray, silty, trace of sand & gravel

fine silty Sand (SC) & seams of med. gray silty clay

compact, gray, clayev siltv Sand (SM-SC)

compact, gray, silty fine Sand (SM)
— same, some gravel & clay
15 gallon water loss at 145.5 & 150.5ft

compact, gray, sandy Gravel (GC) some clay

154.0 - 165.1ft Shale, dark gray, soft

Bottom of Hole-Elevation-421.4
-Depth-165.1ft

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite slurry in soil and cement in rock.

SOIL BORING NO. 8

BECHTEL Belle River

LOCATION: N 8,600 E 9,965

GROUND ELEVATION 506.1

DATE DRILLED: 11-9-73

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

% CORE RECOVERY

SYMBOL

DESCRIPTION

NO UNDISTURBED SAMPLES TAKEN

DEPTH IN FEET

black, clayey Topsoil (OH) some roots

firm to stiff, mottled brown & gray, Clay (CL) streaks of sand & gravel

firm, silty brown

soft to plastic, gray silty Clay (CH)

very soft

soft, trace of fine sand

plastic

plastic to firm, trace of very fine sand

soft

soft to plastic, some silty & very fine sand parting

Dark gray, silty Clay (CL-ML) low plasticity

141.3-155.5ft Shale, black, slightly micaceous, abundent clay seams, 153.0-154.0ft contorted bedding.

Bottom of Hole-Elevation-430.6
-Depth-155.5ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite and natural soil in soil and cement in rock.

SOIL BORING NO. 10

BECHTEL

Belle River

LOCATION: N 7,884 E 9,005 GROUND ELEVATION 586.8

DATE DRILLED: 2-11-74 2-18-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER — SHELBY TUBES

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

DESCRIPTION
bottom ash, fill
clayey topsoil
soft, brown, silty Clay (CL), trace fine sand
stiff, some fine sand
very soft to soft, gray, silty Clay (CH)
plastic, gray, silty Clay (CL) some fine sand
fairly compact, gray, very fine sandy Silt (SM)
compact, gray, fine Sand (SP)
trace gas at 118.0ft
compact, fine to medium, gray Sand (SW)
trace coarse sand
compact, gray, gravelly, medium Sand(SW)
pinces broken Shale
146.0 - 174.2ft Shale, dark gray to gray, soft to moderately firm, fractured, horizontal bedding, scattered silty seams 154.2 - 154.9 light gray silty seam 154.9 - 155.5 gray, silty clay seam 160.5 - 162.2 local bedding dips 20°
Bottom of Hole-Elevation-412.6 -Depth-174.2ft
Water loss of 20 gallons in sand.
For Water Table information consult Section 4.1.3.
Hole backfilled with bentonite and natural soil in soil and cement grout in rock.

SOIL BORING NO. 12

BECHTEL Belle River

DUNN 10-72

LOCATION: N 8,306 E 9,627 GROUND ELEVATION 586.6

DATE DRILLED: 1-28-74 to 1-31-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER — OSTERBERGS | SHELBY TUBES

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

DESCRIPTION

- cinders, Topsoil
- plastic, brown & gray, silty Clay (CL) some topsoil firm, brown, some fine sand
- very soft to soft, gray, silty Clay (CH)
- plastic, gray, silty Clay (CL) some fine sand
- medium compact, gray, clayey Sand (SC)
- plastic, gray, silty Clay (CL), few sand lenses or pockets plastic to firm, some very fine sand
- soft, trace fine sand
- compact, gray, fine Sand (SP)
- firm, gray, clayey Silt (ML)
- 144.5 - 145.0ft Shale, gray, soft

Bottom of Hole-Elevation-441.6
-Depth-145.0ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Lentonite and natural soil.

SOIL BORING NO. 14

BECHTEL Belle River

LOCATION: N 7,996 E 8,712

GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74 2-14-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

DESCRIPTION

Cinders, bottom ash

Firm, brown & gray, silty clay (CL) some fine sand

Stiff, brown

Plastic, gray, trace fine sand

Very soft to soft, gray, silty clay (CH)

Plastic, gray, silty clay (CL) some fine sand

Medium compact, gray, clayey silt (ML)

Compact, gray, very fine sand (SP)

Compact, gray, silt (ML) some fine sand

Compact, gray, very fine to medium sand (SW)

142.0-143.75 ft. shale, gray, soft

Bottom of hole - Elevation - 442.25
- Depth - 143.75 ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite and natural soil.

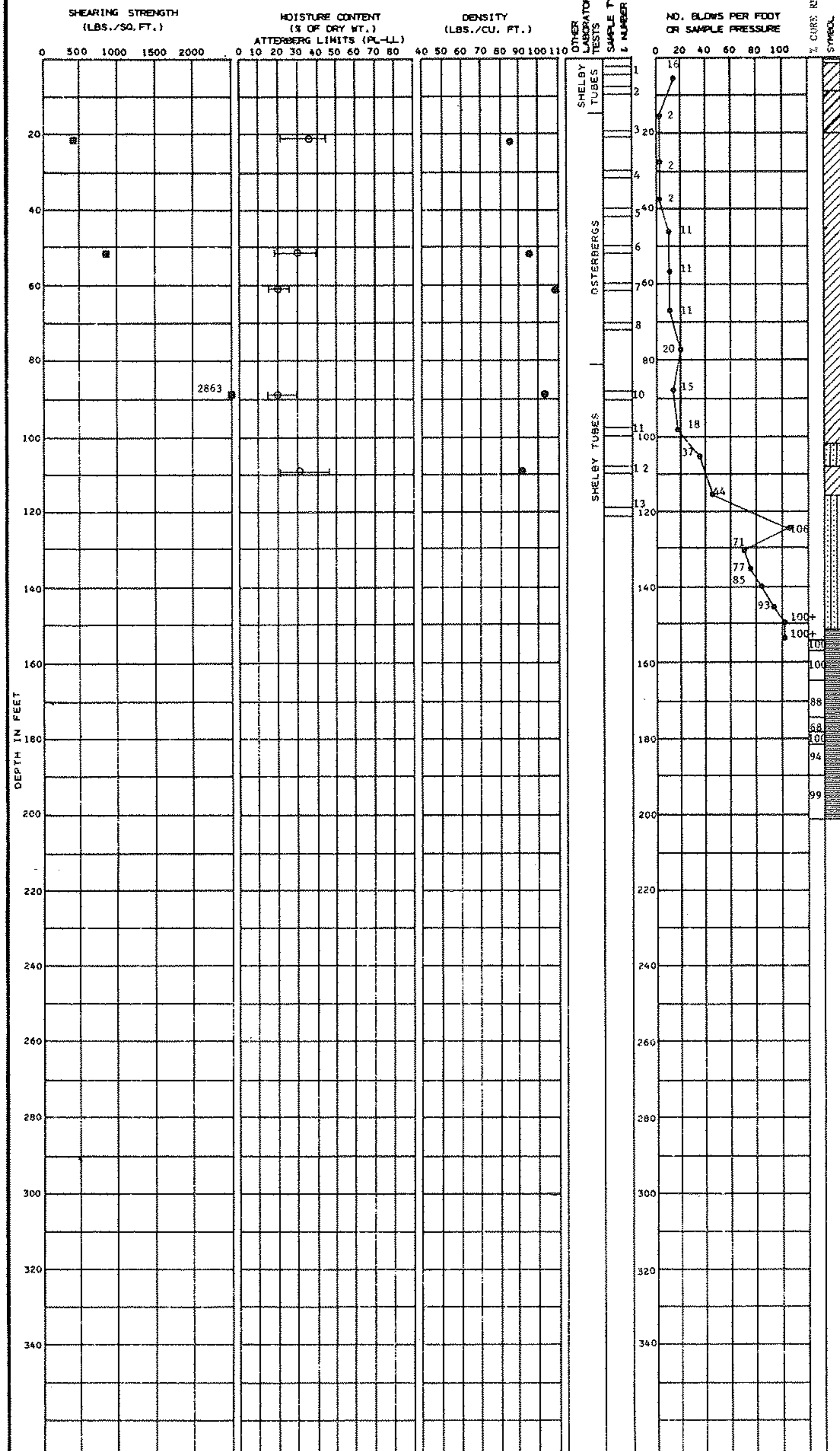
SOIL BORING NO. 16

BECHTEL Belle River

LOCATION: N 8,081 E 9,193 GROUND ELEVATION 586.0

DATE DRILLED: 1-16-74 1-29-74

SHEET 1 OF 1



DESCRIPTION

- fill, cinders
- peaty topsoil
- firm to stiff, brown, silty Clay (CL) trace fine sand
- very soft to soft, gray silty Clay (CH-CL)
- soft to firm, moderate to high plasticity, dark gray, silty Clay (CL) trace fine to coarse sand and gravel
- firm to stiff, moderately plastic, trace fine sand
- 30% fine to coarse sand
- plastic to firm, few pebbles
- very stiff, moderate plasticity, some fine to coarse sand and gravel few sand seams
- Silty Sand (SM-SW) fine to coarse sand grains with trace fines
- stiff, moderate to high plasticity, gray, silty Clay (CL) lenses of silty sand (30% of sample)
- 25 gallons water lost at 130ft
- silty Sand (SM) some fine to coarse sand and gravel, little fines
- 152.0 - 201.0ft Shale, gray, horizontal bedding, moist to dry
  - 152.0 - 156.0ft soft, interbedded shale and clay seams
  - 156.0 - 201.0ft firm to very firm, fractured to solid, silty seams
  - 156.0 - 159.8ft Quartz veins

Bottom of Hole-Elevation-385.0 -Depth-201.0ft

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite in soil and cement grout in rock.

▪ Unconsolidated Undrained

├─┤ Atterberg Limits

○ Moisture Content

SOIL BORING NO. 18

BECHTEL Belle River

LOCATION: N 8,011 E 9,337 GROUND ELEVATION 586.5

DATE DRILLED: 1-17-74 1-23-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DESCRIPTION

DEPTH IN FEET

SHELBY TUBES

bottom ash fill

Topsoil

plastic, brown, silty Clay (CL), trace sand

Firm, brown & gray

very soft to soft, gray, silty Clay(CH)

plastic to firm, gray, silty Clay (CL) some fine sand, trace pebbles

firm, few pebbles

plastic, trace fine sand

medium compact, fine sandy Silt (ML), trace clay

medium compact, very fine Sand (SP), trace silt, trace gas at 136.0ft

136.5 - 145.8ft Shale, gray, soft, disintegrated, moist, silty

145.8 - 147.9ft Sand gray, fine to medium grain, clayey

147.0 - 164.3ft Shale, gray, firm, fractured, horizontal bedding, dry
147.0 - 152.8ft soft, fractured to disintegrated

Bottom of Hole-Elevation-422.2
-Depth-164.3ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite and natural soil in soil and cement grout in rock.

SOIL BORING NO. 20

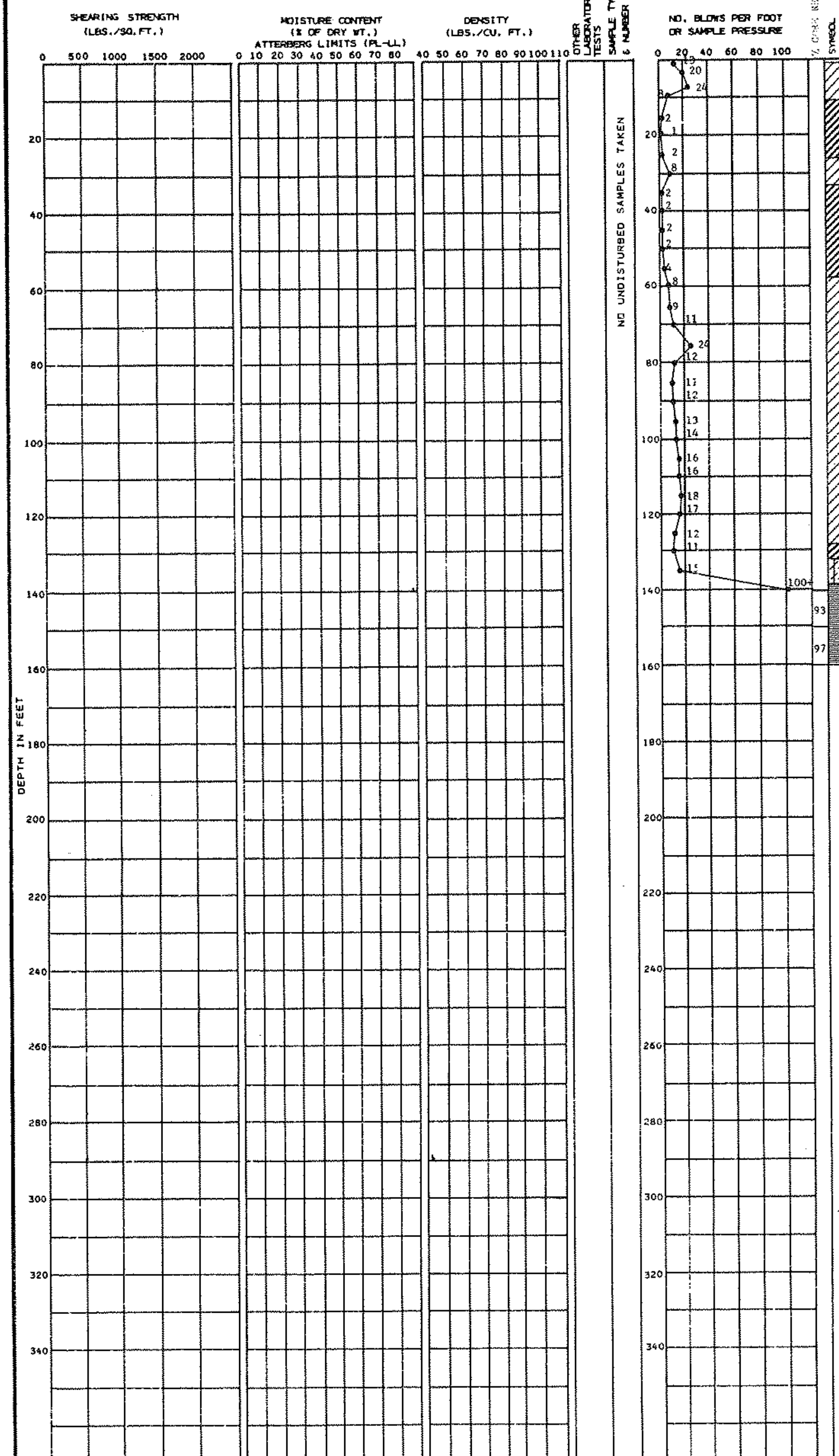
BECHTEL Belle River

LOCATION: N.8,002 E.9,943

GROUND ELEVATION 585.9

DATE DRILLED: 11-20-73

SHEET 1 OF 1



DESCRIPTION

black clayey Topsoil (OH)

firm to stiff, mottled brown, silty Clay (CL) trace of sand.

plastic, gray, silty, some fine sand

very soft gray silty Clay (CH)

plastic, dark gray sandy Clay (CL) some pebbles.

soft, gray silty Clay (CH)

soft to plastic gray silty Clay (CL) some fine sand

med., gray, silty some sand & gravel

med., gray, silty

trace of sand, a few pebbles

med. gray silty Clay (CH)

Slight to low plasticity, dark gray, clayey Silt (CL-ML)

138.5-160.5ft Shale, black, slightly micaceous, highly weathered to a depth of 140.75ft, crumbles easily.

Bottom of Hole-Elevation-425.4
-Depth-160.5ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite slurry in soil and cement grout in rock

SOIL BORING NO. 22

BECHTEL Belle River

LOCATION: N 7,904 E 9,436 GROUND ELEVATION 586.3

DATE DRILLED: 1-30-74 2-5-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

SHELBY TUBES

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

DESCRIPTION

cinders

sand, topsoil

soft, brown & gray, silty Clay (CL) trace very fine sand

stiff, brown, trace fine sand

very soft to soft, gray, silty Clay (CH)

▽ 4-25-74: Elevation of water-566.7
Depth of water-19.8 ft.

plastic, gray, silty Clay (CL) some fine sand

firm

soft to plastic

fairly compact, gray, clayey Silt (ML)

plastic, gray, silty Clay (CL) trace very fine sand

compact, gray Silt (ML) some very fine sand

142.0 - 164.0ft Shale, medium to dark gray, soft, disintegrated to fractured, horizontal bedding, with Quartz veins from 145.2 to 147.7, more firm below 154.0ft

Bottom of Hole-Elevation=422.3
-Depth-164.0ft

Piezometer Installation:
cement backfill from 164.0' to 139.0', 5.0' of sludge pipe with bentonite around sludge pipe from 139.0' to 134.0', 4.0' of #80 Screen from 134.0' to 130.0' with sand pack around screen, 134.41' of 2" PVC from 130.0' to 4.41' above surface, backfill with bentonite around casing from 130.0' to ground surface.

For Water Table information consult Section 4.1.3.

SOIL BORING NO. 24

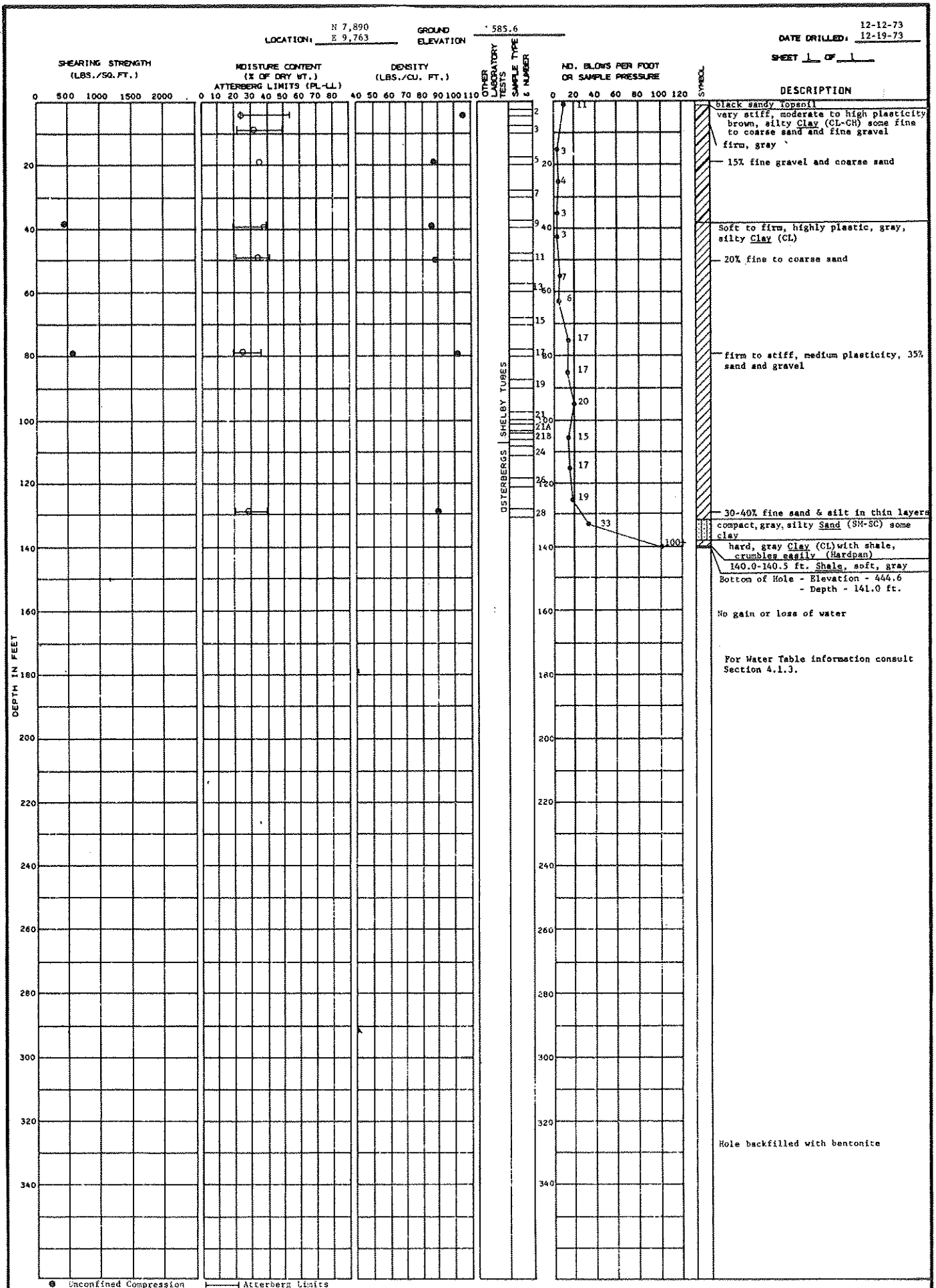
BECHTEL Belle River

LOCATION: N 7,890 E 9,763

GROUND ELEVATION 585.6

DATE DRILLED: 12-12-73, 12-19-73

SHEET 1 OF 1



● Unconfined Compression

O Moisture Content

Atterberg Limits

SOIL BORING NO. 26

BECHTEL Belle River

B-33

LOCATION: N 7,724 E 9,443 GROUND ELEVATION 585.8

DATE DRILLED: 1-15-74 1-22-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET

SHELBY TUBES

cinders fill

black sandy Topsoil

brown, silty, fine Sand (SM)

medium to stiff, brown & gray, silty Clay (CL) medium to high plasticity

stiff

soft, gray, silty Clay (CH)

soft, medium to high plasticity, gray silty Clay (CL)

medium to stiff, medium plasticity, 15% fine to coarse sand

very stiff, gray, silty fine sandy, with seams of fine sand, trace pebbles

plastic to firm, gray silty, trace of fine sand

stiff, 15% fine to coarse sand , medium to high plasticity

med. compact, clayey Silt (ML), trace of fine sand

hard, very sandy Clay (CL) some pebbles, some decomposed Shale (Hardpan)

143.8 - 193.5ft Shale, gray, soft to firm, disintegrated to fractured, moist to dry, horizontal bedding

Bottom of Hole-Elevation-392.3
-Depth-193.5ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and natural soil in soil and cement grout in rock.

● Unconfined Compression

⊢—⊣ Atterberg Limits

○ Moisture Content

SOIL BORING NO. 28

BECHTEL Belle River

LOCATION: N 7,673 E 9,015 GROUND ELEVATION 586.4

DATE DRILLED: 2-7-74 2-11-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

NO UNDISTURBED SAMPLES TAKEN

	DESCRIPTION
0	Cinders, fill
1	Sandy topsoil
2	Soft, brown & gray, silty Clay (CH) trace fine sand, high plasticity
3	Stiff, brown, some fine sand
20	Very soft to soft, gray, silty Clay (CH-CL)
40	Firm, gray, sandy clay layer
60	Gray, silty Clay (CL) medium plasticity, 20% fine to coarse sand
80	Stiff, dark, gray clayey sand (SC)
80	Firm to stiff, gray, silty clay (CL), silt lenses
80	Hard, some fine sand
80	Compact, gray, fine sand (SP)
100	silty fine sand (SM) 15% nonplastic fines
120	Compact, gray, very fine to coarse sand (SW)
120	Silty sand (SM) 15% nonplastic fines
135	Bottom of hole - Elevation - 451.4 - Depth - 135.0 ft

This hole stopped at 135.0 ft. due to gas.

With casing at 110.0' no gas. Casin pulled to 57.0'. No gas. Pulled to 50.0', gas bubbling in hole. Capped hole and left for 48 hours. After 48 hours no gas (pocket only)

2-8-74 No gas
2-11-74 Gas
2-11-74 Pulled to 50.0', capped
2-11-74 1400 hours removed cap (no gas)

82.5' - 107.0' used Gel to keep open

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel in soil

Atterberg Limits
O Moisture Content
* Sample Jar Unsealed

SOIL BORING NO. 30

BECHTEL Belle River

LOCATION: N 7,663 E 9,659 GROUND ELEVATION 586.6

DATE DRILLED: 2-6-74 2-12-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

NO UNDISTURBED SAMPLES TAKEN

DEPTH IN FEET

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

7 10 18 14 13 4 3 2 2 2 2 4 4 12 14 10 8 13 13 13 10 9 9 8 8 6 5 5 4 35 100

cinders, fill

medium stiff, brown & gray, silty Clay (CL-CH) highly plastic, trace fine sand

very stiff, brown

plastic, gray, some fine sand

same, sandy

very soft to soft, gray, medium to high plasticity

Gray, silty Clay (CL) medium to high plasticity

plastic, fine sand lenses

medium compact, gray, clayey Silt (ML)

plastic, gray, silty Clay (CL) some fine sand

10% fine to coarse sand

soft, trace fine sand

fairly compact, gray, clayey Silt (ML)

very stiff, gray, silty Clay (CL) sandy, few pebbles

142.0 - 144.5ft Shale, gray, soft

Bottom of Hole-Elevation-442.1
-Depth-144.5ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil.

⊢—⊣ Atterberg Limits
O Moisture Content
* Sample Jar Unsealed

SOIL BORING NO. 32

BECHTEL Belle River

LOCATION: N 7,398 E 9,963

GROUND ELEVATION: 586.0

DATE DRILLED: 11-8-73

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

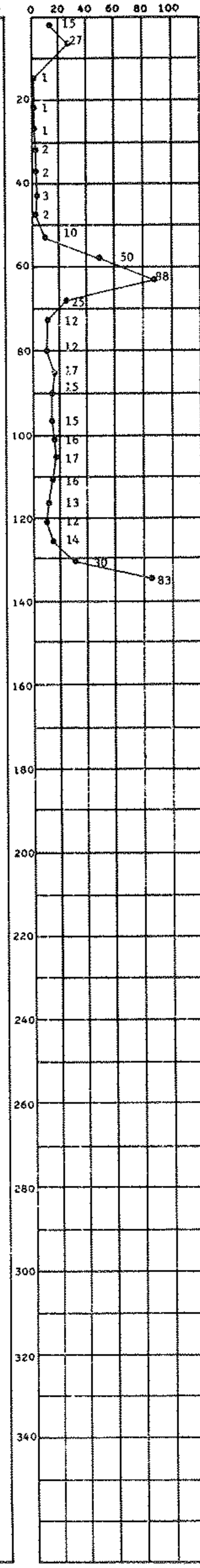
DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE



% CORE RECOVERY: 88, 87

SYMBOL

DEPTH IN FEET: 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340

DESCRIPTION

- black clayey Topsoil (OH) some sand
- firm, gray & brown, silty Clay (CL) trace of sand
- firm, gray, silty Clay (CH) very soft to soft
- firm to stiff, gray, fine sandy Clay (CL) silt seams
- compact, gray, medium silty Sand (SM-SC) some silt, trace of clay.
- plastic to firm, gray silty Clay (CL) a few sand & silt pockets
- soft to plastic, gray, silty Clay (CH) trace of fine sand
- medium compact, clayey Silt (ML) some fine sand, trace of pebbles
- hard, gray, sandy Clay (CH) trace of shale fragments
- 137.5-158.2ft Shale, black, slightly micaceous, highly weathered to a depth of 142.5ft, some clay seams.

Bottom of Hole-Elevation-427.83 -Depth-158.17ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel in soil and cement grout in rock.

SOIL BORING NO. 34

BECHTEL Belle River

LOCATION: N 9,007 E 13,035 GROUND ELEVATION 598.3

DATE DRILLED: 12-6-73 12-12-73

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DESCRIPTION

DEPTH IN FEET

St=1.91

St=1.1

St=1.13

SHELBY TUBES

black sandy Topsoil (OH)

silty Clay (CL-CH)

firm, brown, some sand

hard, highly plastic, dark grayish brown mottled, trace sand & fine gravel

medium to very stiff

soft, gray

dark gray, high plastic, (sample greatly disturbed)

(sample greatly disturbed)

medium, highly plastic

medium stiff, dark gray, silty Clay (CH) highly plastic

plastic, gray, silty Clay (CL-CH) trace sand, few pebbles

stiff, moderate plasticity, dark gray, silty Clay (CL) 10% medium to coarse sand, 15% gravel

firm, trace of sand & pebbles

soft to medium, moderately to highly plastic, gray, silty Clay (CL-CH) trace sand

compact, gray, fine sandy Silt (ML) some clay

compact, gray, silty fine Sand (SM) some pebbles, 30% nonplastic fines

143.0-153.0ft Shale, black, soft, micaceous, trace of pebbles, crumbles easily

Bottom of Hole-Elevation-445.3 -Depth-153.0ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel in soil and cement grout in rock.

⊕ Unconfined Compression
St = Sensitivity

Atterberg Limits
O Moisture Content

SOIL BORING NO. 38

BECHTEL Belle River

B-43

LOCATION: N 8,003 E 10,993

GROUND ELEVATION 589.1

DATE DRILLED: 12-14-73 / 12-18-73

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

DESCRIPTION

- black clayey Topsoil (OH)
- med., brown, silty Clay(CL) trace sand
- loose, brown, silty Sand (SM) trace pebbles
- stiff, brown & grey, silty Clay (CL) trace sand
- ▽ 4-25-74: Elevation of water-580.8 Depth of water-8.3 ft.
- stiff,gray, trace sand
- soft
- very soft, gray silty Clay (CH)
- plastic, gray, silty Clay (CL), trace sand & pebbles
- stiff, gray, sandy, silty, some pebbles
- med. gray, silty, some fine sand, few pebbles
- plastic to firm, gray, silty trace fine sand & pebbles
- gray sandy Silt (ML) some clay
- hard, grey, silty fine sandy Clay(CL) few pebbles trace shale
- 135.3-136.6ft Shale, gray, very hard, clayey

Bottom of Hole-Elevation-452.5 -Depth-136.6ft

No gain or loss of water

Piezometer Installation:
4' of 2" PVC Blank Casing from 84' to 80'; 5' #80 screen from 80' to 75', 78.48' of 2" PVC Blank Casing from 75' to 3.48' above ground surface. Sand pack around casing from bottom of hole to 70', bentonite seal around casing at top of sand pack, annulus backfilled with grout to ground surface.

For Water Table information consult Section 4.1.3.

SOIL BORING NO. 40

BECHTEL Belle River

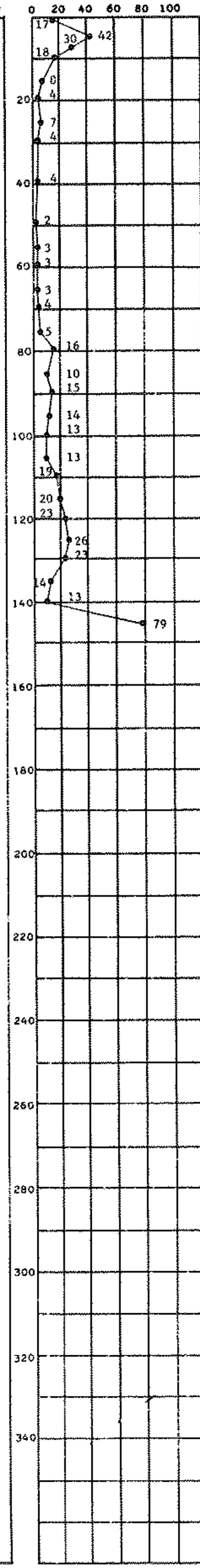
LOCATION: N 8,016 E 12,991 GROUND ELEVATION 600.2

DATE DRILLED: 11-19-73 11-21-73

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80	DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110	OTHER LABORATORY TESTS	SAMPLE TYPE & NUMBER	NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100	% CORE RECOVERY	SYMBOL	DESCRIPTION
				NO UNDISTURBED SAMPLES TAKEN				

DEPTH IN FEET: 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340



DESCRIPTION

- black sandy Topsoil
- stiff, brown, silty Clay (CL) trace of fine sand
- hard, some gray mottling
- plastic to firm, gray, trace of sand, few pebbles
- soft, gray, silty Clay (CL-CH)
- plastic, dark gray, fine sandy silty Clay (CL) some pebbles
- very soft, gray, silty Clay (CH)
- plastic, gray, silty Clay (CL) some fine sand
- —plastic, trace of sand, some pebbles
- —plastic to firm, some fine sand
- —soft to plastic
- med. compact, gray, fine sandy Silt (ML) trace of clay
- —stiff, gray, clayey Silt (ML) sand lenses, some pebbles
- 145.0-156.0ft Shale, black, soft, some thin laminae of sand

Bottom of Hole-Elevation-444.2
-Depth-156.0ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite slurry in soil and cement grout in rock.

SOIL BORING NO. 42

BECHTEL Belle River

LOCATION: N 7,004 E13,000 GROUND ELEVATION 600.5

DATE DRILLED: 11-20-73

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DESCRIPTION

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

clayey & sandy Fill

stiff, brown silty Clay (CL) trace of sand

med. brown & gray silty Clay (CL)

soft, gray silty Clay (CH)

med. compact, gray clayey Silt (ML)

compact, gray Silt (ML) some sand

med. to firm gray sandy Clay (CL)

compact, gray clayey Silt (ML)

med. gray silty Clay (CL) some sand

hard, gray sandy Clay (CL) trace of shale (hardpan)

140.0-164.5ft Shale, black, decomposed & weathered, slightly micaceous crumbles easily.

Bottom of Hole-Elevation-436.0
-Depth-164.5ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel in soil and cement grout in rock

SOIL BORING NO. 44

BECHTEL Belle River

LOCATION: N 5,344 E 12,319 GROUND ELEVATION 588.2

DATE DRILLED: 1-22-74 to 1-28-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER — NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

DESCRIPTION
Topsoil
firm, brown, silty Clay (CL), some gray mottling, trace fine sand
stiff
plastic, gray, some fine sand
very soft to soft, gray, silty Clay (CH)
plastic, gray, silty Clay (CL) some fine sand
firm, sandy, trace pebbles
plastic, some fine sand, few pebbles
firm, some pebbles
plastic, trace fine sand
hard, sandy, shaley, few pebbles
136.5-138.5ft Shale, gray, soft, 137.0-138.5ft brown, silty, fractured 138.5-147.0ft Mudstone, gray, soft, moist, fractured 147.0-165.0ft Shale, dark gray, firm, moist, highly fractured
Bottom of Hole-Elevation-423.2 -Depth-165.0ft
For Water Table information consult Section 4.1.3.
Water loss of 6-8 gal.
Hole backfilled with bentonite in soil and cement grout in rock

SOIL BORING NO. 46-A

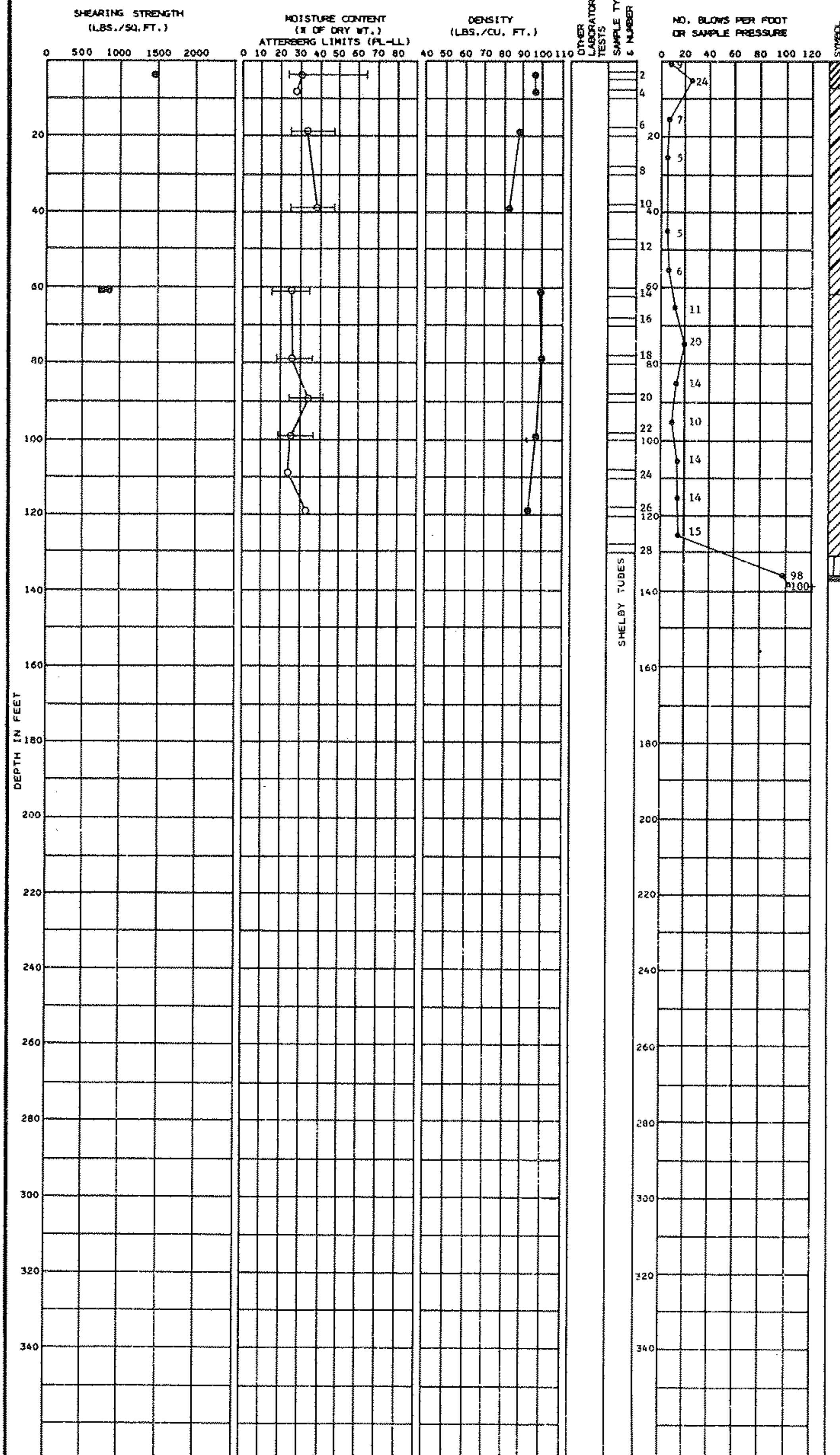
BECHTEL Belle River

LOCATION: N 3,950 E 12,584

GROUND ELEVATION 587.5

DATE DRILLED: 1-14-74 1-23-74

SHEET 1 OF 1



DESCRIPTION

Stiff to very stiff, brown & gray, silty Clay (CH) trace sand, highly plastic

very stiff, brown, medium to high plasticity, silty Clay (CL-CH)

medium, gray, trace sand

soft to medium

soft, dark to very dark gray

Medium stiff, gray, silty Clay (CL) 35% coarse sand and fine gravel

firm, some fine sand

stiff, dark gray, little coarse sand and fine gravel

little fine sand, few pebbles

medium to stiff, little fine sand

soft to medium, dark gray, 20% fine to coarse sand and gravel

medium to stiff, gray, trace fine to coarse sand

fairly compact, gray, clayey Silt (ML), some fine sand

136.5-137.6ft Shale, gray, soft, clayey

Bottom of Hole-Elevation-449.9
-Depth-137.6ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and natural soil.

● Unconfined Compression
■ Unconsolidated Undrained

|——| Atterberg Limits
O Moisture Content

SOIL BORING NO. 48

BECHTEL Belle River

LOCATION: N 2,951 E15,471

GROUND ELEVATION 581.8

DATE DRILLED: 12-19-73 to 1-8-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

St= 2.5

St=1.1

SHELBY TUBES

no recovery

69

100 +

100 +

100 +

98

90

DESCRIPTION

cinders, fly ash Fill

loose, gray, limestone Fill, some sand

very soft, gray, silty Clay (CL-CH) top 16-20' possibly disturbed

highly plastic

firm, highly plastic, gray, silty Clay (CH) some sand, trace pebbles

firm, moderately plastic, gray, sandy, silty Clay (CL) 20 to 25% fine to coarse sand and 10-15% fine gravel

fairly compact, fine sandy Silt (ML)

plastic, gray, silty Clay (CL) some fine sand, trace fine gravel

10-15% fine to coarse sand and fine gravel

20-25% fine to coarse sand and 10% fine gravel

firm, gray, some fine sand, trace pebbles

plastic, gray, trace fine sand

hard, gray, very sandy, few pebbles

compact, very fine Sand(SP) some silt

very hard, gray, clayey fine Sand(SC)

very hard, gray, sandy Clay (CL) (hardpan)

133.8-153.8ft Shale, gray, firm to soft, extremely fragmented and easily broken

Bottom of Hole-Elevation-428.05
-Depth-153.75ft

For Water Table information consult Section 4.1.3.

Water Level
At completion - 40.5'
Water Level
0800 33.5' 1-7-74

Bailed to 67.0'
1130 hours 67.91'
1400 " 66.33'
1600 " 66.08'
1800 " 65.25'
Water Level
0800 60.08' 1-8-74

Encountered gas at 98.0' while grouting casing at 98.0'. Extra precautions taken while grouting hole (slight pressure).

Hole backfilled with bentonite and natural soil in soil and cement grout in rock

● Unconfined
⊕ Unconsolidated Undrained
St = Sensitivity

○ Moisture Content
⊢⊣ Atterberg Limits

SOIL BORING NO. 50

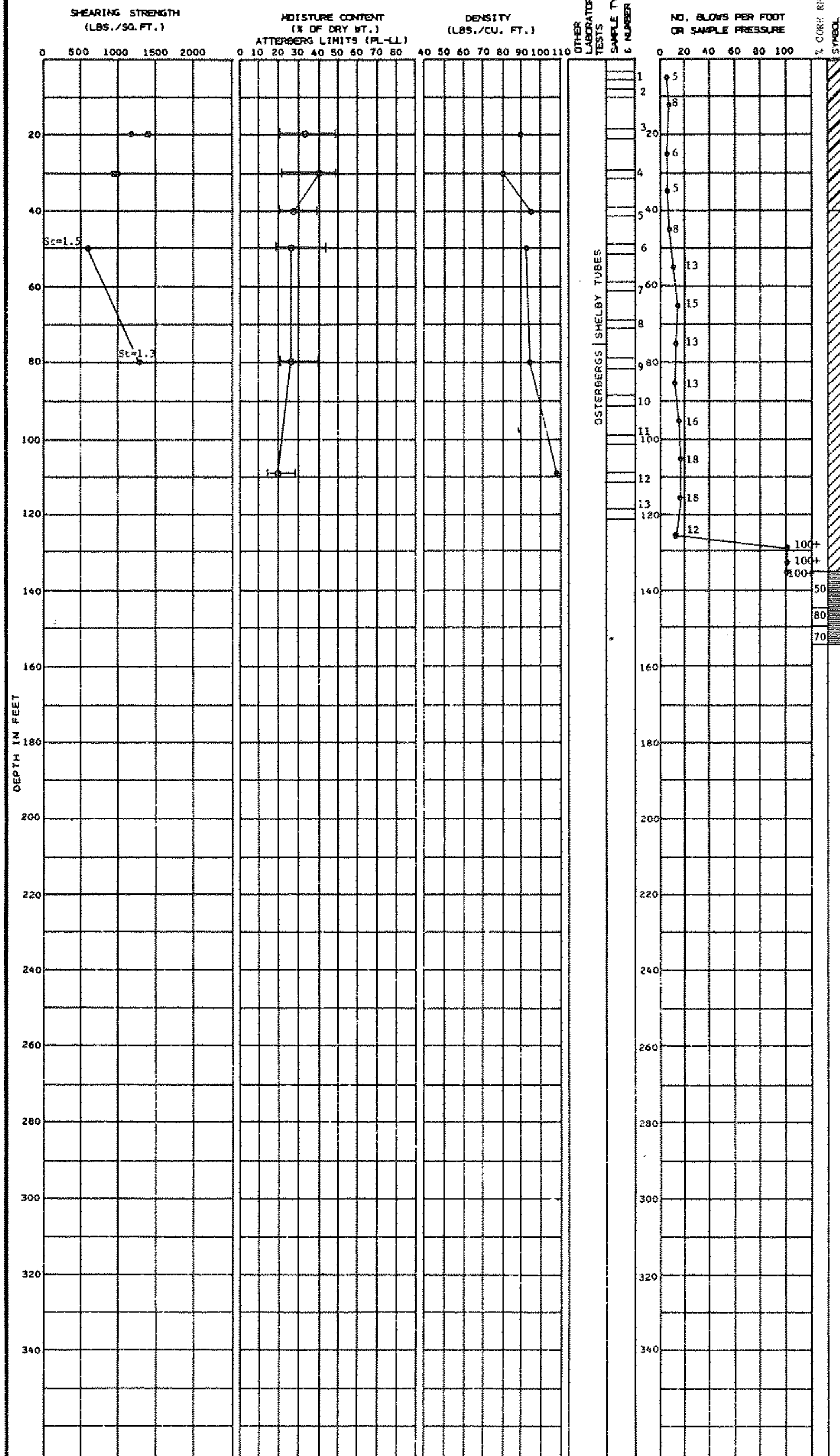
BECHTEL Belle River

LOCATION: N 2,052 E15,176

GROUND ELEVATION: 580.6

DATE DRILLED: 12-21-73 1-7-74

SHEET 1 OF 1



DESCRIPTION

- cinder coal (fill)
- medium, brown, silty Clay (CL-CH) (possible fill)
- soft, brown, some peaty structure (possible fill or river sediments)
- plastic, brown & gray
- trace sand
- plastic, gray, trace sand and pebbles

firm, moderately plastic, gray, silty Clay (CL) 20-30% fine to coarse sand and fine gravel
- 15-20% fine to coarse sand
- 15% fine to coarse sand and fine gravel
- firm, gray, some fine sand, few pebbles
- very hard, gray, some pebbles, seams of fine sand (Hardpan)

135.0-154.9 ft Shale, gray, silty, highly hackly fractured, breaks easily. 137.8-140.3 ft local dip approximatel 30°, firm. 146.5-150.0 ft local dip approximately 30°, firm

Bottom of Hole-Elevation-425.7
-Depth-154.9 ft

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and natural soil in soil and cement grout in rock.

● Unconfined
■ Unconsolidated Undrained
St = Sensitivity

○ Moisture content
├─┤ Atterberg limits

SOIL BORING NO. 53

BECHTEL Belle River

DUNN 10-73

LOCATION: N 2,645 E 15,506

GROUND ELEVATION 547.9

DATE DRILLED: 3-29-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

% CORE RECOVERY

SYMBOL

DESCRIPTION

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

medium compact, gray, medium to coarse Sand (SW) coal

firm, brownish gray, silty, sandy Clay (CL) coarse sand seams

very compact, gray Silty Sand (SM) fine

soft, gray, silty Clay (CH)

firm, gray, clayey Silt(ML)

medium, gray, silty Clay (CL) some sand and gravel

soft, trace sand and gravel

soft, reddish, silty, sandy clay some gravel

very compact, gray Silty Sand (SM) fine, trace shale

97.5-100.0ft Shale, gray, soft

Bottom of Hole-Elevation-447.9
-Depth-100.0ft

Note: Hole drilled from drilling platform in 30.9ft of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and soil

SOIL BORING NO. 55

BECHTEL Belle River

DUNN 10-78

LOCATION: N 1,907 E 15,269

GROUND ELEVATION 543.3

DATE DRILLED: 3-20-74 to 3-26-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL–LL)

DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

OSTERBERG

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

DESCRIPTION

loose, brown, fine to medium sand (SW) and gravel

soft, brownish gray, silty clay (CH) some sand and gravel

medium, gray, silty clay (CL) some sand and gravel

compact, gray, fine sand (SP)

medium, gray, silty clay (CL) little sand

compact, gray, layers of fine sand and clayey sand (SC)

very compact, gray, fine to coarse sand (SW) trace gravel

101.7-120.2 ft. shale, dark gray, soft disintegrated, horizontal bedding in part, moist; fine to coarse, very gravelly & cobbles; firm from 119.9 to 120.2 ft.

Bottom of hole - Elevation - 428.1
- Depth - 120.2 ft.

NOTE: Hole drilled from drilling Platform in 30.7 ft. of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite in soil and cement in rock

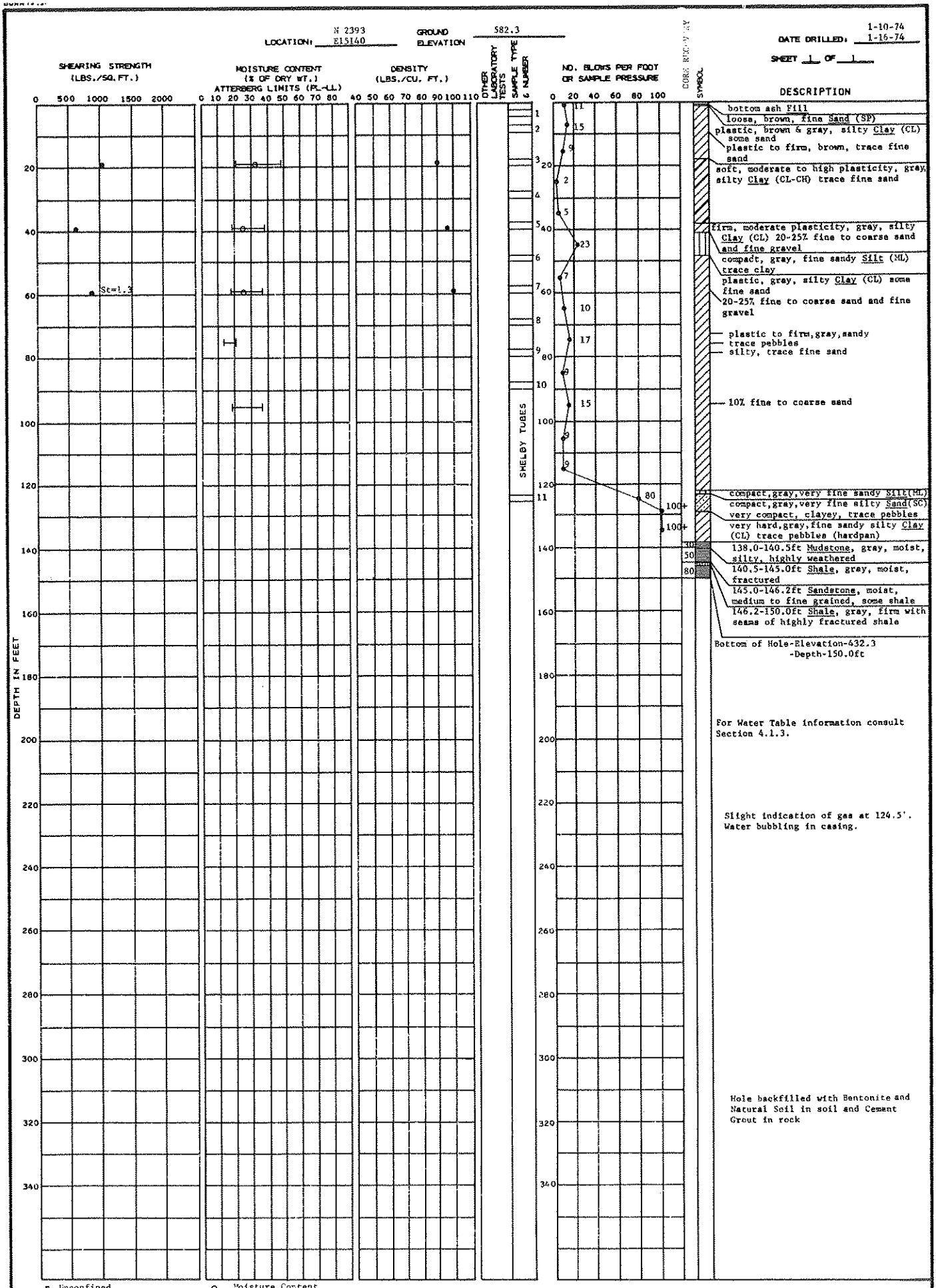
SOIL BORING NO. 57

BECHTEL Belle River

LOCATION: N 2393 E15140 GROUND ELEVATION 582.3

DATE DRILLED: 1-10-74 1-16-74

SHEET 1 OF 1



DESCRIPTION

bottom ash Fill

loose, brown, fine Sand (SP)

plastic, brown & gray, silty Clay (CL) some sand

plastic to firm, brown, trace fine sand

soft, moderate to high plasticity, gray, silty Clay (CL-CH) trace fine sand

firm, moderate plasticity, gray, silty Clay (CL) 20-25% fine to coarse sand and fine gravel

compact, gray, fine sandy Silt (ML) trace clay

plastic, gray, silty Clay (CL) some fine sand

20-25% fine to coarse sand and fine gravel

plastic to firm, gray, sandy

trace pebbles

silty, trace fine sand

10% fine to coarse sand

compact, gray, very fine sandy Silt (ML)

compact, gray, very fine silty Sand (SC)

very compact, clayey, trace pebbles

very hard, gray, fine sandy silty Clay (CL) trace pebbles (hardpan)

138.0-140.5ft Mudstone, gray, moist, silty, highly weathered

140.5-145.0ft Shale, gray, moist, fractured

145.0-146.2ft Sandstone, moist, medium to fine grained, some shale

146.2-150.0ft Shale, gray, firm with seams of highly fractured shale

Bottom of Hole-Elevation-432.3
-Depth-150.0ft

For Water Table information consult Section 4.1.3.

Slight indication of gas at 124.5'. Water bubbling in casing.

Hole backfilled with Bentonite and Natural Soil in soil and Cement Grout in rock

● Unconfined
St = Sensitivity

o Moisture Content
⊢⊣ Atterberg Limits

SOIL BORING NO. 59

BECHTEL Belle River

LOCATION: N 5,283 E 14,042 GROUND ELEVATION 593.1

DATE DRILLED: 1-23-74 1-29-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

NO UNDISTURBED SAMPLES TAKEN

DEPTH IN FEET

0 fill, cinders, clay, etc.

firm to stiff, brown, silty Clay (CL) trace fine sand

plastic, gray

soft, gray silty Clay (CH)

plastic, gray silty Clay (CL) trace fine sand, few pebbles

firm, sandy silty Clay (CL) few pebbles

stiff, fine sandy silty

plastic, silty Clay (CL), some fine sand

fairly compact, gray, clayey Silt (ML) trace Shale, pebbles

135.0-136.0ft Shale, gray, soft, weathered with sand seams

Bottom of Hole-Elevation-457.1
-Depth-136.0ft

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and natural soil.

SOIL BORING NO. 63

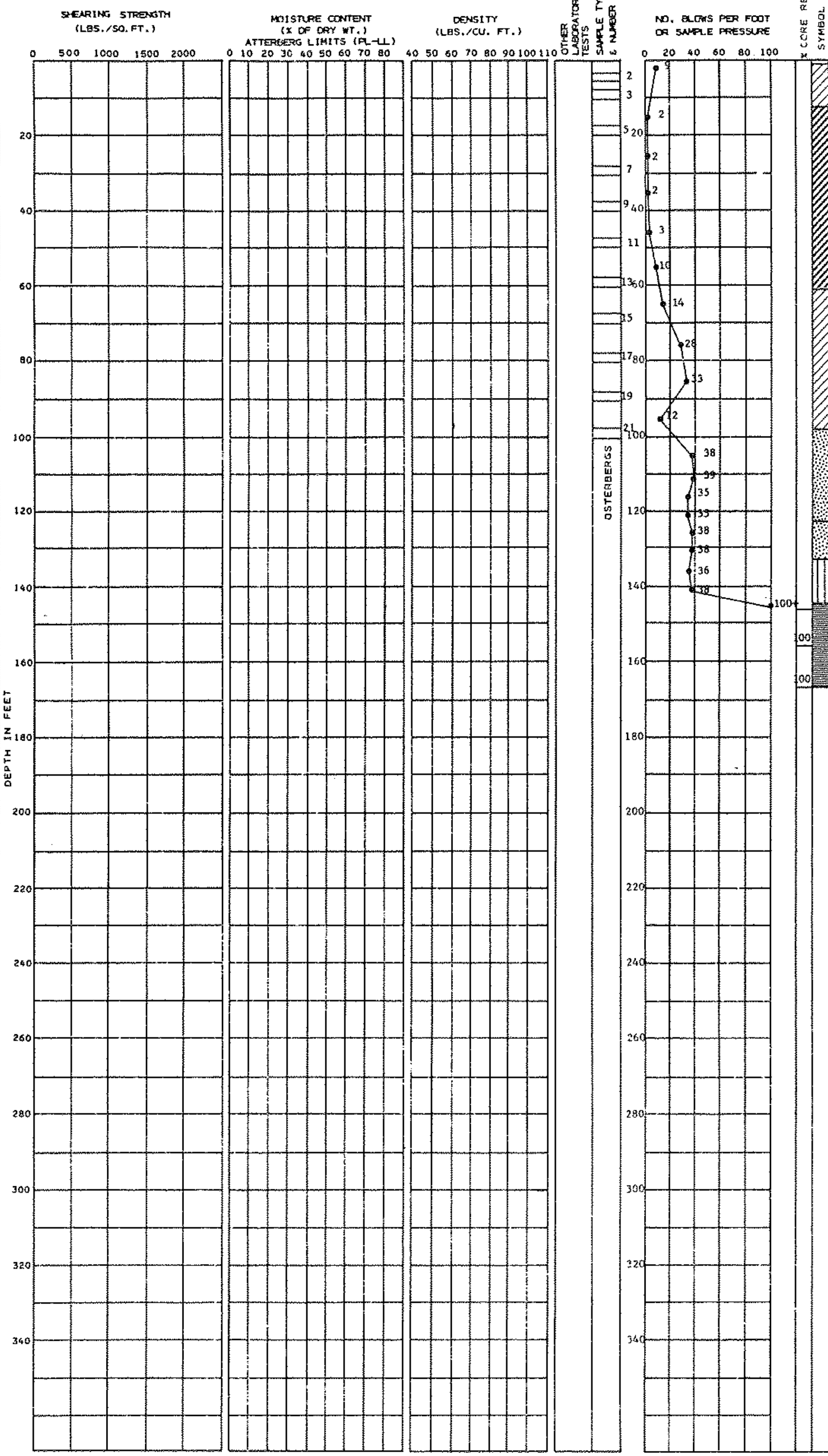
BECHTEL Belle River

GUNN 10-72

LOCATION:* N 9,208.32 E 9,376.12 GROUND ELEVATION 587.6

DATE DRILLED: 2-28-74 3-7-74

SHEET 1 OF 1



DESCRIPTION

sandy topsoil

plastic, brown, sandy clay (CL)

firm to stiff, silty clay, some fine sand

plastic, gray, trace fine sand

very soft to soft, gray, silty clay (CH)

Lost approximately 25 gallons of water between 55.0 - 70.5 ft.

plastic to firm, gray, silty clay (CL) some fine sand

stiff, same, few pebbles

soft to plastic

medium compact, gray sand (SP) fine

compact, gray sand (SW) very fine to medium, few pebbles

medium compact, gray silt (ML) some fine sand

143.5-166.5 ft. shale, gray

143.5-145.5 ft. soft, trace of clay and pebbles

145.5-156.5 ft. soft, highly fractured

155.5-166.5 ft. inc[illegible] bedded light and dark gray, firm, horizontal bedding, locally contorted, abundant quartz viens

Bottom of hole - Elevation - 421.2
- Depth - 166.5 ft.

* BENCH MARK ØBR - 3
16.5' of cement grout from 166.5' to 150.0'; 150.0' of 2" PVC blank casing from 150.0' to surface; casing cemented to surface and bench mark plate placed on top.
Benchmark Elev - 588.0

For Water Table information consult Section 4.1.3.

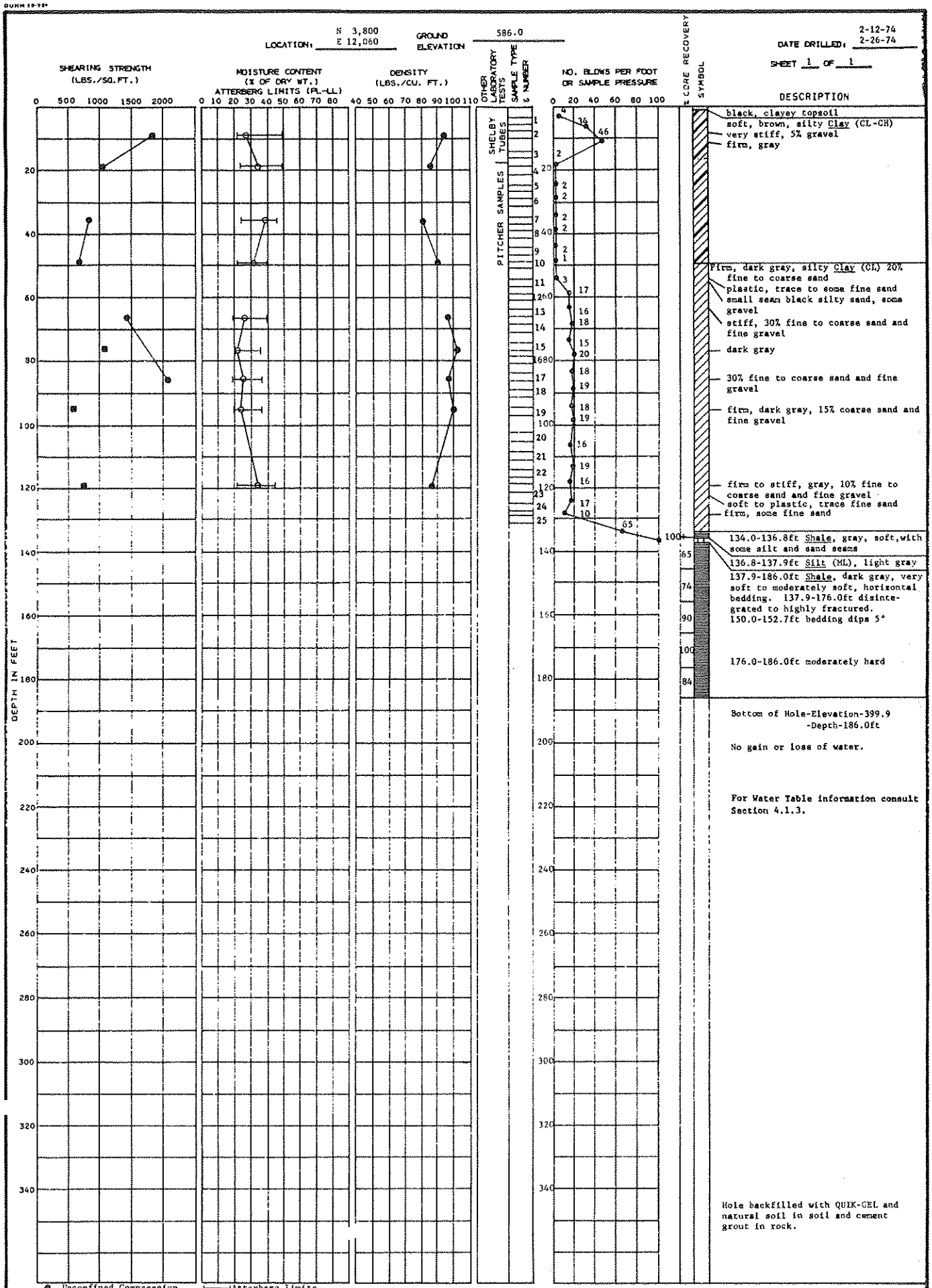
SOIL BORING NO. 65

BECHTEL Belle River

LOCATION: N 3,800 E 12,060 GROUND ELEVATION 586.0

DATE DRILLED: 2-12-74 2-26-74

SHEET 1 OF 1



DESCRIPTION

black, clayey topsoil

soft, brown, silty Clay (CL-CH)

very stiff, 5% gravel

firm, gray

Firm, dark gray, silty Clay (CL) 20% fine to coarse sand

plastic, trace to some fine sand

small seam black silty sand, some gravel

stiff, 30% fine to coarse sand and fine gravel

dark gray

30% fine to coarse sand and fine gravel

firm, dark gray, 15% coarse sand and fine gravel

firm to stiff, gray, 10% fine to coarse sand and fine gravel

soft to plastic, trace fine sand

firm, some fine sand

134.0-136.8ft Shale, gray, soft, with some silt and sand seams

136.8-137.9ft Silt (ML), light gray

137.9-186.0ft Shale, dark gray, very soft to moderately soft, horizontal bedding. 137.9-176.0ft disintegrated to highly fractured. 150.0-152.7ft bedding dips 5°

176.0-186.0ft moderately hard

Bottom of Hole-Elevation-399.9
-Depth-186.0ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with QUIK-GEL and natural soil in soil and cement grout in rock.

SOIL BORING NO. 101

BECHTEL Belle River

LOCATION: N 4,435 E 12,350 GROUND ELEVATION 589.7

DATE DRILLED: 2-5-74, 2-7-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

NO UNDISTURBED SAMPLES TAKEN

DEPTH IN FEET

20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

6 7 20 27

7 6

4 3

4 5

5 4

7 9

10 20

17 17

15 16

16 18

17 18

4 1

2 1

100+

clay, wood, cinders, fill

plastic to firm, brown, silty Clay (CL) some gray pockets, trace fine sand

firm

plastic, gray

very soft to soft, gray, silty Clay (CH)

plastic, gray, silty Clay (CL) trace fine sand, few pebbles

soft

compact, gray, silty Sand (SM) with some gravel

139.0-141.0ft Shale, gray, soft

Bottom of Hole-Elevation-448.7
-Depth-141.0ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil.

SOIL BORING NO. 103

BECHTEL Belle River

B-71

LOCATION: N 5,000 E 11,000

GROUND ELEVATION 588.3

DATE DRILLED: 2-26-74 3-5-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER — PITCHER SAMPLES | SHELBY TUBES | OSTERBERGS

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

DESCRIPTION

Black clayey topsoil

Plastic, brown, sandy, gravelly clay (CH) very stiff to hard, silty clay, some fine sand, 5% gravel

Very stiff, olive brown & grayish brown, silty Clay (CL) 5% gravel medium, gray, 5% fine to coarse sand

medium, gray brown, 5% fine to coarse sand

Medium, gray, silty Clay (CH) highly plastic

Medium, gray, clayey sand (SC), trace gravel

Stiff, gray, silty Clay (CL) 20% fine to coarse sand and fine gravel

soft, gray, 10% fine to coarse sand

15% fine to coarse sand

medium, dark gray, sandy, 35% fine to coarse sand

Compact, gray, fine silty sand (SM) trace pebbles

Hard, gray, silty clay (CL), some sand and shale chips

138.6-141.0 ft gravel (GP), dark gray shale and granitic cobbles

141.0-160.3 ft. shale, dark gray, soft to firm

141.0-150.3 ft. disintegrated to fractured

150.3-160.3 - fractured to intact

Bottom of hole - Elevation - 428.0
- Depth - 160.3 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with quik-gel and natural soil in soil and cement in rock

Atterberg Limits

Moisture Content

SOIL BORING NO. 105

BECHTEL Belle River

LOCATION: S 6,450 E 13,140 GROUND ELEVATION 600.7

DATE DRILLED: 2-26-74 3-6-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

8 37 43
36
11
5
20
5
4
4
4
40
3
4
3
4
60
4
4
5
9
80
10
13
15
13
100
13
23 possible stone
12
13
120
16
17
16 73
140 100+

sandy topsoil

medium compact, brown, very fine to medium Sand (SW)

firm, brown, sandy Clay (CL)

stiff, silty clay, some fine sand with gray mottling

plastic, gray, trace very fine sand

soft, gray, silty Clay (CH) slight trace very fine sand

plastic, gray, silty Clay (CL) some very fine sand

plastic to firm, some fine sand 1.5' boulder

compact, gray, very fine Sand and Silt (SM)

142.0 - 142.67ft Shale, soft, gray, broken

Bottom of Hole-Elevation-458.03 -Depth-142.67ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil.

SOIL BORING NO. 109

BECHTEL Belle River

B-75

LOCATION: N 6,600 / E 11,000 GROUND ELEVATION 588.5

DATE DRILLED: 2-21-74 / 2-26-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET

DESCRIPTION

Cinders, fill

Plastic, brown & gray, silty clay (CL)
Firm, some fine sand
Stiff

Very soft to soft, gray, silty clay (CH)

Plastic, gray, silty clay (CL), some fine sand

Firm, few pebbles

Plastic to firm

Soft to plastic

Compact, gray silt (ML), some clay & very fine sand

138.0-140.0 ft shale, gray, soft

Bottom of hole - Elevation - 438.5
Depth - 140.0 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil

SOIL BORING NO. 111

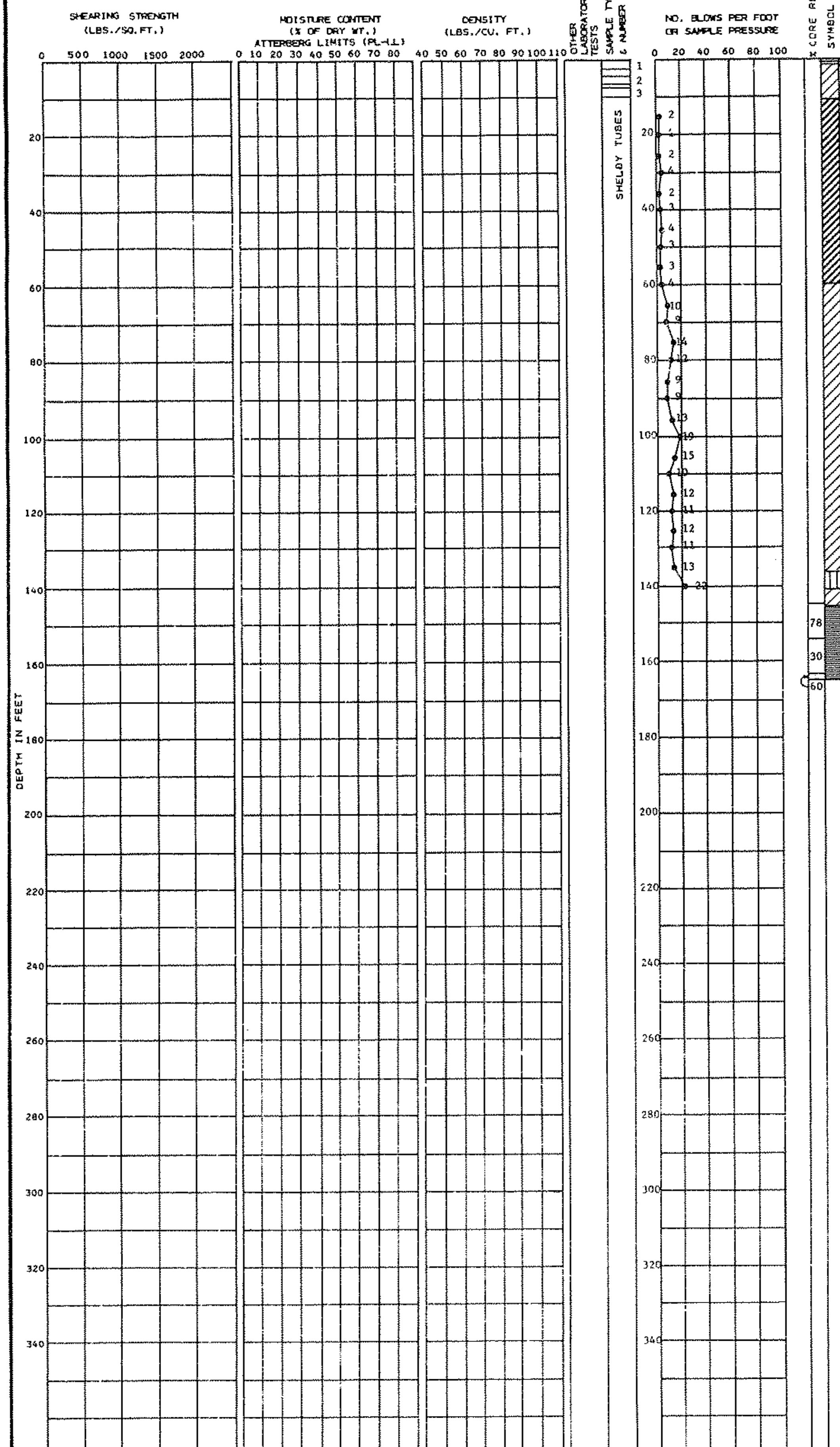
BECHTEL Belle River

LOCATION: N 6,800 E 9,360

GROUND ELEVATION: 587.4

DATE DRILLED: 2-27-74 3-5-74

SHEET 1 OF 1



DESCRIPTION

- cinders, fill
- peaty topsoil
- firm to stiff, brown and gray mottling, silty clay (CL) some fine sand
- firm, gray

very soft to soft, gray, silty clay (CH)

plastic, gray, silty clay (CL) some fine sand

- plastic to firm
- plastic, trace fine sand

medium compact, gray silt (ML) trace clay

stiff, gray, silty clay (CL) with sand and shale chips

145.0-164.3 ft. Shale, gray to dark gray, soft to moderately soft
145.0-149.3 ft. fragmented
149.3-153.0 ft. fractured
153.0-164.3 ft. fragmented to fractured

Bottom of hole - Elevation - 423.15
- Depth - 164.25 ft.

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil in soil and cement grout in rock

SOIL BORING NO. 113

BECHTEL Belle River

LOCATION: N 7,100 E13,060 GROUND ELEVATION 600.7

DATE DRILLED: 1-30-74 2-6-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL–LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

SHELBY TUBES

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

DESCRIPTION

sandy topsoil

stiff, brown, Clay (CL)

stiff, gray, silty sandy

soft, trace fine sand

very soft to soft, gray, silty Clay(CH)

plastic, gray, silty Clay (CL) some fine sand

compact, gray Silt (ML)

compact, gray, silty, very fine Sand (SM)

142.0-144.0ft Shale, gray, soft

Bottom of Hole-Elevation-456.7
-Depth-144.0ft

For Water Table information consult Section 4.1.3.

No Gain or Loss of Water

Hole Backfilled With Quick-Gel and Natural Soil

SOIL BORING NO. 115

BECHTEL Belle River

B-81

LOCATION: N 7,270 E 9,360

GROUND ELEVATION 585.5

DATE DRILLED: 2-5-74 2-12-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

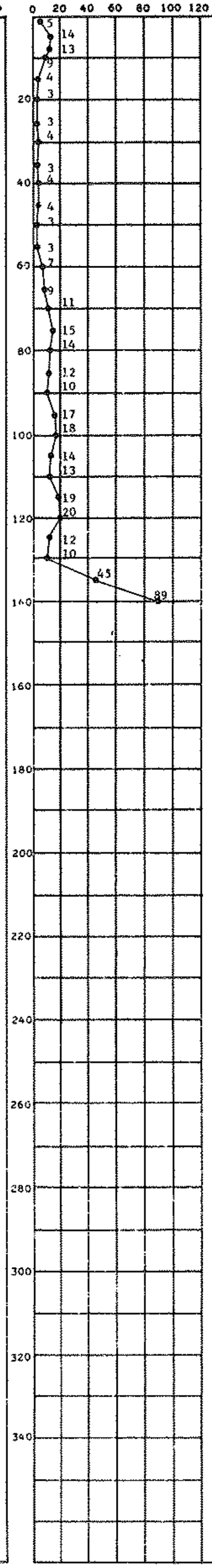
DENSITY (LBS./CU.FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120



SYMBOL

DEPTH IN FEET

DESCRIPTION

clay, ash, gravel fill

stiff, brown, silty Clay (CL) some fine sand

firm, brown & gray, trace fine sand

plastic, gray, trace very fine sand

very soft to soft, gray, silty Clay (CH)

plastic, gray, silty Clay (CL) some fine sand

— firm

— plastic, trace fine sand

Sand (SP)

137.0-140.0ft Shale, gray, soft, inter-bedded with hard gray clay

Bottom of Hole-Elevation-445.5
-Depth-140.0ft

For Water Table information consult Section 4.1.3.

No Gain or Loss of Water

Hole Backfilled With Quick-Gel and Natural Soil

SOIL BORING NO. 117

BECHTEL Belle River

LOCATION: N 7,510 E11,300 GROUND ELEVATION 588.8

DATE DRILLED: 1-29-74 2-5-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS | SAMPLE TYPE & NUMBER | OSTERBERGS | SHELBY TUBES

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

CORE RECOVERY | SYMBOL

DESCRIPTION

DEPTH IN FEET

Depth	Description
0	black, clayey, topsoil & cinder fill
2	stiff to very stiff, dark grayish brown mottled light olive brown, silty Clay (CL) trace sand
3	very stiff, 10% coarse sand and fine gravel
4	firm, dark gray, silty Clay (CL-CH) 5-10% coarse sand
5	soft to firm, very dark grayish brown, silty Clay (CL) 5% coarse sand and gravel
6	soft to firm, dark grayish brown, highly plastic, silty Clay (CH-CL)
7	plastic to firm, gray, silty Clay (CL) some fine sand
9	stiff, grayish brown, sandy, 25% fine to coarse sand and gravel
12	slight trace of sand
13	compact, gray, very fine sandy Silt(ML)
14	stiff, gray, silty Clay (CL) some very fine sand
136.5	136.5-154.0ft Shale, dark gray. 136.5-139.0ft light gray, horizontal and contorted bedding

Bottom of Hole-Elevation-434.8
-Depth-154.0ft

No Gain or Loss of Water

For Water Table information consult Section 4.1.3.

Hole Backfilled With Bentonite and Natural Soil in Soil and Cement Grout in Rock

● Unconfined Compression

Atterberg Limits

○ Moisture Content

SOIL BORING NO. 119

BECHTEL Belle River

B-85

LOCATION: N 7,660 E 10,630 GROUND ELEVATION 587.9

DATE DRILLED: 2-14-74 2-19-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

NO UNDISTURBED SAMPLES TAKEN

7 5 15 15 7 3 2 4 3 3 2 2 3 4 5 9 10 13 12 10 9 14 12 12 9 9 8 30 75 100+

sandy topsoil

medium compact, brown, fine Sand (SP)

plastic, gray, silty Clay (CL) some fine sand

very soft to soft, gray, silty Clay (CH)

plastic, gray, silty Clay (CL) trace fine sand

medium compact, gray, clayey Silt (ML) trace fine sand

hard, gray, sandy Clay (CL) some pebbles

135.0-135.5ft Shale, gray, soft

Bottom of Hole-Elevation-452.4
-Depth-135.5ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with quik-gel and natural soil

SOIL BORING NO. 121

BECHTEL Belle River

DUNN 1-73

LOCATION: N 8,017 E 4,999

GROUND ELEVATION 588.9

DATE DRILLED: 3-25-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

Blow counts (top to bottom): 12, 11, 15, 20, 7, 7, 6, 5, 4, 4, 4, 5, 5, 6, 7, 7

Gray, silty topsoil

Medium, mottled brown & gray, silty sandy clay (CL), trace of pebbles

Soft, gray, silty clay (CH), trace of sand

Bottom of hole - Elevation - 518.9
- Depth - 70.0 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil

SOIL BORING NO. 123

BECHTEL Belle River

LOCATION: N 7,950 E 11,140

GROUND ELEVATION 588.8

DATE DRILLED: 2-1-74 2-6-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER — SHELBY TUBES | PITCHER SAMPLES

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET

Depth	Sample	Blows	Description
0	2	11	sandy topsoil
	3		Very stiff, olive brown, silty Clay (CL-CH) some fine sand, trace gravel
			stiff
20	5	9	very soft to soft, grayish brown
	7	5	soft, grayish brown
40	9	4	soft, dark grayish brown, 5% fine to coarse sand
	11	4	
60	13	4	Firm, gray, silty Clay (CH) 10% fine gravel and coarse sand
	15	19	Firm, gray, silty Clay (CL) 10% fine to coarse sand, few layers / lenses silty clay, 40% fine to medium sand
80	17	13	firm to stiff, dark gray, 15% fine to coarse sand and fine gravel
	19	19	
100	21	32	compact, gray Sand (SP) trace gravel
	23	27	plastic to firm, gray, silty Clay (CL) trace fine sand
120	25	14	firm to stiff, dark gray, 20% fine to coarse sand and fine gravel
	27	19	
140		100+	loose, gray, clayey Silt (ML) trace fine sand
			hard, gray, sandy Clay (CL) few pebbles (hardpan)
			137.0-140.0ft Shale, gray, soft
			Bottom of Hole-Elevation-448.8ft -Depth-140.0ft
160			For Water Table information consult Section 4.1.3.
180			
200			
220			No Gain or Loss of Water
240			
260			
280			
300			
320			Hole Backfilled With Quick-Gel and Natural Soil
340			

● Unconfined Compression
■ Unconsolidated Undrained

⊢—⊣ Atterberg Limits
○ Moisture Content

SOIL BORING NO. 126

BECHTEL Belle River

LOCATION: N 3,000 E 11,000

GROUND ELEVATION 589.5

DATE DRILLED: 2-7-74 2-13-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET

DESCRIPTION

Sandy topsoil

Firm, brown, silty, clay fill, bricks cinders

Stiff, brown silty clay (CL) with some organic pockets

Very stiff, some fine sand

Firm, some gray mottling

Soft, gray, silty clay (CH)

Plastic, gray, silty clay (CL), some fine sand

Soft, trace of fine sand

Compact, gray silt (ML) with fine sand, trace of clay

Hard, gray, sandy clay (CL), few pebbles (hardpan)

141.0-141.5 ft. shale, gray, soft

Bottom of hole - Elevation -448.0
- Depth-141.5 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil

SOIL BORING NO. 128

BECHTEL Belle River

LOCATION: N 9,014 E 4,993 GROUND ELEVATION 595.3

DATE DRILLED: 3-26-74 3-28-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET

gray, clayey topsoil

medium to stiff, brown, silty Clay (CL-CH) some sand and gravel

grayish brown, highly plastic

medium, gray, no sand or gravel

medium, moderate to high plasticity, grayish brown, silty Clay (CL)

low plasticity, dark gray, 25% fine to medium sand

15% fine to medium sand, low to medium plasticity

very compact, gray, fine to coarse Sand (SW) some gravel

very compact, gray, sands and fine to medium Gravel (GW) fragments of shale

Bottom of Hole-Elevation-450.3
-Depth-145.0ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and soil

o Water Content

|—| Atterburg Limits

* Water content taken from unsealed jar sample.

SOIL BORING NO. 130

BECHTEL Bella River

B-95

LOCATION: N 10,050 E 4,995

GROUND ELEVATION 594.6

DATE DRILLED: 3-5-74 3-7-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

14 18 16 44 6 2 4 3 2 3 2 2 3 4 4 21 46 100+ 100+ 100+ 100+ 100+ 100+ 100+ 100+ 100+ 100+ 100+

Clay topsoil

Stiff, brown and gray, silty clay(CL-CH) some fine sand

Hard

Stiff, brown

Plastic, gray, trace fine sand

Very soft to soft, gray, silty clay (CH)

Soft, moderate to high plasticity, gray, silty Clay (CL)

Soft to firm, highly plastic, dark gray, silty Clay (CH) 5% fine sand

Firm, gray, silty clay (CL), some fine sand

Hard, very sandy

Very compact, gray, clayey very fine sand (SC)

Compact, gray, very fine sand (SP)

Blowcount refusal possible boulder

Bottom of hole - Elevation - 456.1
- Depth - 128.5 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and Natural Soil

o Water Content

⊢⊣ Atterburg Limits

* Water content taken from unsealed jar sample.

SOIL BORING NO. 134

BECHTEL Belle River

LOCATION: N 10,050 E 7,000

GROUND ELEVATION 590.2

DATE DRILLED: 3-8-74 3-13-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

SYMBOL

DESCRIPTION

DEPTH IN FEET

Plastic, brown, silty clay (CL-CH) some fine sand

Stiff, brown and gray

Hard, mottled gray, 15% fine to coarse sand

Very soft to soft, moderately plastic, gray, silty Clay (CL)

10% fine to coarse sand

plastic, gray, some fine sand

low to moderate plasticity, 25% fine to coarse sand

very stiff, fine sandy

Firm, some fine sand

15% fine to coarse sand

Plastic, trace fine sand

Compact, gray, fine sand (SP)

124.0-130.0 ft shale, black, laminated, medium hard

Bottom of hole - Elevation - 460.2
- Depth - 130.0 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and soil

● Unconfined Compression

○ Moisture Content

⊢⊣ Atterburg Limits

* Water content taken from unsealed jar sample.

SOIL BORING NO. 136

BECHTEL Belle River

R-99

LOCATION: 10,030 / 8,977

GROUND ELEVATION 588.7

DATE DRILLED: 3-11-74 / 3-14-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

DESCRIPTION

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

peaty, sandy topsoil

firm, brown, silty Clay (CL-CH) some fine sand

stiff, sandy

plastic, gray, trace fine sand

very soft to soft, gray, silty Clay (CH)

soft to medium, moderate to high plasticity, gray, silty Clay (CL)

firm, some fine sand

medium compact, gray, clayey silt (ML)

firm, gray, silty Clay (CL) some fine sand

stiff

plastic

highly plastic

compact, gray, very fine Sand (SP) trace silt

compact, gray, very fine to medium Sand (SW) trace gravel

hard, gray, sandy, silty Clay (CL) few pebbles (Hardpan)

144.0-145.0ft Shale, gray, medium hard

Bottom of Hole-Elevation-443.7
-Depth-145.0ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and soil

o Water Content
Atterburg Limits
Water content taken from unsealed jar sample.

SOIL BORING NO. 138

BECHTEL Belle River

B-101

LOCATION: 10,850 E 3,003 N

GROUND ELEVATION 592.0

DATE DRILLED: 3-19-74 to 3-20-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

plastic, brown, silty Clay (CL) trace sand

stiff, some fine sand

soft, gray

very soft to soft, gray, silty Clay (CH)

Bottom of Hole-Elevation 521.5
-Depth-70.5ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

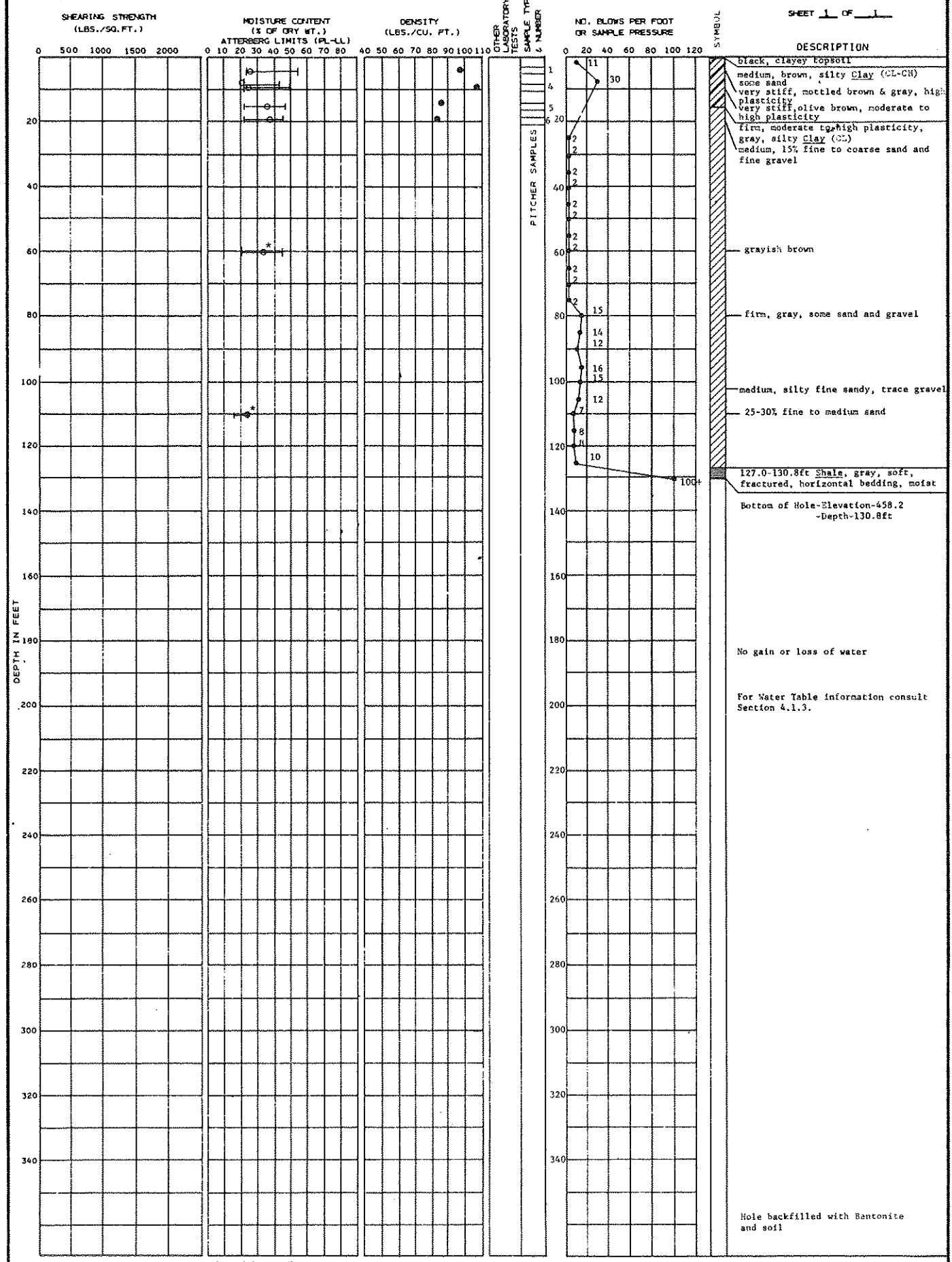
Hole backfilled with Quik-Gel and soil

SOIL BORING NO. 140

BECHTEL Belle River

B-103

LOCATION: N 11,146 E 7,995 | GROUND ELEVATION 589.0 | DATE DRILLED: 3-25-74 to 3-27-74 | SHEET 1 OF 1



Bottom of Hole-Elevation-458.2
-Depth-130.8ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Bantonite and soil

○ Moisture Content
⊢⊣ Atterburg Limits
* Water content taken from unsealed jar sample.

SOIL BORING NO. 142

BECHTEL Belle River

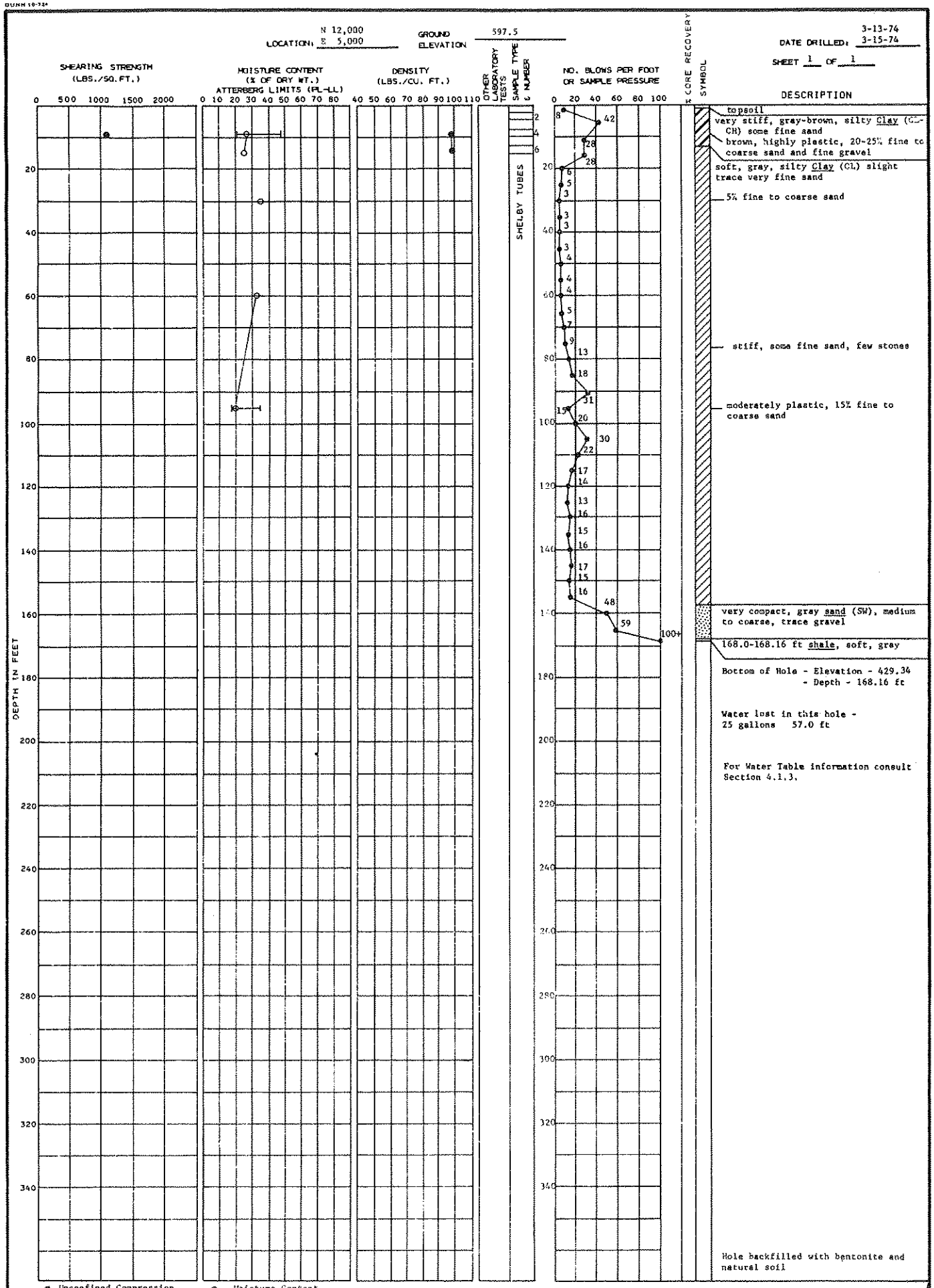
B-105

DUNN 10-74

LOCATION: N 12,000 E 5,000 GROUND ELEVATION 597.5

DATE DRILLED: 3-13-74 3-15-74

SHEET 1 OF 1



DESCRIPTION

topsoil

very stiff, gray-brown, silty Clay (CL-CH) some fine sand

brown, highly plastic, 20-25% fine to coarse sand and fine gravel

soft, gray, silty Clay (CL) slight trace very fine sand

5% fine to coarse sand

stiff, some fine sand, few stones

moderately plastic, 15% fine to coarse sand

very compact, gray sand (SW), medium to coarse, trace gravel

168.0-168.16 ft shale, soft, gray

Bottom of Hole - Elevation - 429.34
- Depth - 168.16 ft

Water lost in this hole - 25 gallons 57.0 ft

For Water Table information consult Section 4.1.3.

Hole backfilled with bentonite and natural soil

● Unconfined Compression ○ Moisture Content ⊢⊣ Atterburg Limits

SOIL BORING NO. 144

BECHTEL Belle River

LOCATION: N 12,000 E 7,000 GROUND ELEVATION 589.7

DATE DRILLED: 3-18-74 3-19-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

SHELBY TUBES

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

(topsoil)
stiff, brown & gray, silty Clay (CL)
some fine sand
gray & brown, moderate plasticity, trace sand
40% fine to coarse sand & fine gravel
very soft to soft, brown, moderate to high plasticity, 5% fine to coarse sand

grayish brown

compact, gray Clayey fine Sand (SL) trace pebbles

stiff, gray, fine sandy, silty Clay (CL)

plastic, trace fine sand
boulder

compact, gray, sandy Silty Gravel (GM)

compact, gray, clayey Silt (ML)

very compact, gray, very fine Sand (SP)

gravelly Sand (SW)
boulder

Bottom of Hole - Elevation - 455.7
- Depth - 134.0 ft.

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and soil

DEPTH IN FEET

Moisture Content
Atterburg Limits
* Water content taken from unsealed jar sample.

SOIL BORING NO. 146

BECHTEL elle ier

B-109

LOCATION: N 13,061 E 5,006 GROUND ELEVATION 598.6

DATE DRILLED: 3-28-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.)	MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)	DENSITY (LBS./CU. FT.)	OTHER LABORATORY TESTS	SAMPLE TYPE & NUMBER	NO. BLOWS PER FOOT OR SAMPLE PRESSURE	SYMBOL	DESCRIPTION
0 500 1000 1500 2000	0 10 20 30 40 50 60 70 80	40 50 60 70 80 90 100 110		NO UNDISTURBED SAMPLES TAKEN	0 20 40 60 80 100 120		

DEPTH IN FEET: 20, 40, 60, 80, 100, 120, 140, 160, 180, 200, 220, 240, 260, 280, 300, 320, 340

No. blows per foot: 11, 13, 12, 15, 4, 4, 4, 4, 2, 3, 3, 3, 2, 2, 2, 2

DESCRIPTION

Black, clayey topsoil

Firm, brown & gray, silty, sandy clay (CL), trace of pebbles

Soft, gray, silty clay (CH), trace of sand

Bottom of hole - Elevation - 528.6
- Depth - 70.0 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and natural soil

SOIL BORING NO. 148

BECHTEL Belle River

LOCATION: N 7455, E 9535 — GROUND ELEVATION 585.2 — DATE DRILLED: 9/28/77, 9/30/77 — SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

DESCRIPTION
0-0.7' Topsoil, dark brown, clayey
0.7-12.0' Silty Clay, dark brown, very stiff, med. plasticity, moist, trace wood fragments, trace sand, trace fine gravel (CL)
12.0-58.0' Clay, med. gray, very soft, high plasticity, moist to wet, trace silt, trace sand, trace fine gravel (CH)
38.5'-58.0' Soft
58.0-129.8' Silty Clay, med. gray, med. stiff, med. plasticity, moist, little sand, trace fine to coarse gravel (CL)
98.5-108.5' Very stiff
108.5-118.5' Stiff
118.5-129.8' Trace sand
129.8-136.0' Clayey Silt, med. gray, med. stiff to stiff, wet, with occasional fine-grained sand seams (ML)
136.0-140.5' Clayey Sand, med. gray, med. dense, wet, fine-grained, scattered silt layers, trace fine to med. gravel (SC)
140.5' Top of Rock
140.5-162.0' Shale, med. gray, soft, weathered
144.0-158.7' Firm, scattered soft clay layers
156.0' Irregular bedding
158.7-162.0' Hard, dark gray, occasional soft clay layers
Bottom of Hole: Depth 162.0' Elevation 423.2
Hole grouted from 162.0' to ground surface.

SOIL BORING NO. B-8

BECHTEL Belle River

LOCATION: N 7675, E 9100

GROUND ELEVATION: 585.6

DATE DRILLED: 8/8/77 – 8/11/77

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

DESCRIPTION

0-0.3' Topsoil, clayey silt, med. brown, dry

0.3-8.5' Clayey Silt, green brown and med. gray, mottled, slight plasticity, dry, trace wood fragments, trace fine gravel (ML)

8.5-11.5' Silty Clay, med. gray and brown, mottled, high plasticity, wet, trace silt, trace fine gravel (CL)

11.5-46.5' Clay, med. gray, very soft, very high plasticity, wet, trace silt, trace fine gravel (CH)

46.5-101.5' Silty Clay, med. gray, soft to med. stiff, med. plasticity, moist, little sand, trace fine to coarse gravel, occasional cobble(CL)

48.5-50.0' Seams of clayey sand and silt

68.5-78.5' Very stiff

78.5-88.5' Stiff

83.0-83.5' Cobble

88.5-101.5' Med. stiff

101.5-111.0' Silty Sand, med. gray and brown, med. dense, fine-to med.-grained, wet, with silt seams (SM)

111.0-150.5' Sand, med. gray and brown, med. dense, fine-to coarse-grained, wet, trace silt, trace fine to coarse gravel, very clean, occasional cobbles (SW-SP)

121.0-133.5' Fine-to med.-grained

128.5-133.5' Silty

133.5-148.5' Med.-to coarse-grained

143.0-148.5' Some fine to coarse gravel

148.5-150.5' Fine-to med.-grained

150.5' Top of Rock

150.5-171.0' Shale, med. gray to dark gray, soft to moderately hard

150.5-158.9' Soft, weathered, mechanically fractured

158.9-171.0' Moderately hard, occasional mechanical fractures at 45° angle, occasional soft shale seams

163.5-164.0' Fissile, core broken every 1/4"

Bottom of Hole: Depth 171.0'
Elevation 414.6

Hole caved in from 171.0' to 145.0'.

Hole grouted from 145.0' to ground surface.

SOIL BORING NO. B-9

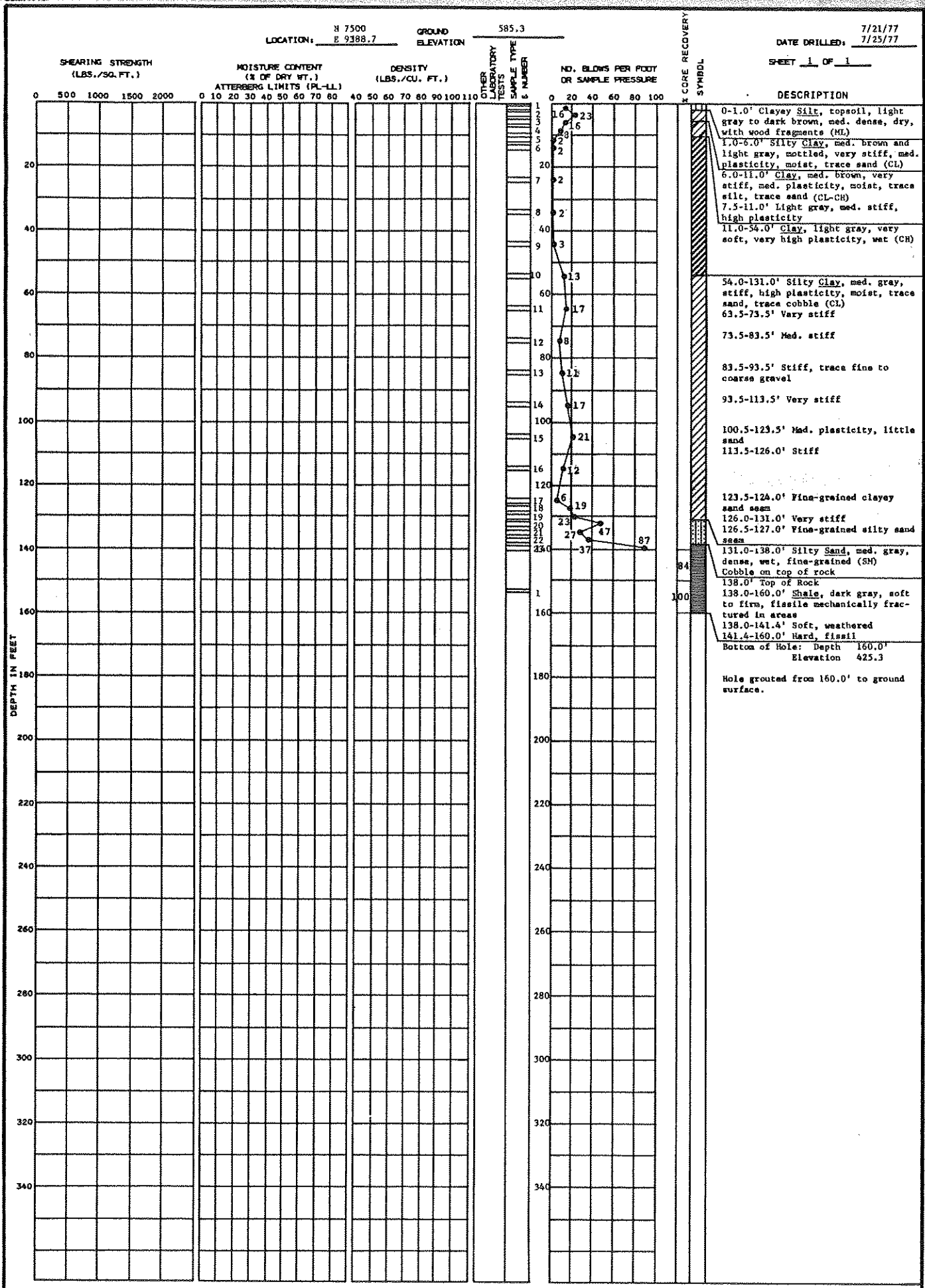
BECHTEL Belle River

LOCATION: N 7500 E 9388.7

GROUND ELEVATION 585.3

DATE DRILLED: 7/21/77 7/25/77

SHEET 1 OF 1



DESCRIPTION

0-1.0' Clayey Silt, topsoil, light gray to dark brown, med. dense, dry, with wood fragments (ML)

1.0-6.0' Silty Clay, med. brown and light gray, mottled, very stiff, med. plasticity, moist, trace sand (CL)

6.0-11.0' Clay, med. brown, very stiff, med. plasticity, moist, trace silt, trace sand (CL-CH)

7.5-11.0' Light gray, med. stiff, high plasticity

11.0-54.0' Clay, light gray, very soft, very high plasticity, wet (CH)

54.0-131.0' Silty Clay, med. gray, stiff, high plasticity, moist, trace sand, trace cobble (CL)

63.5-73.5' Very stiff

73.5-83.5' Med. stiff

83.5-93.5' Stiff, trace fine to coarse gravel

93.5-113.5' Very stiff

100.5-123.5' Med. plasticity, little sand

113.5-126.0' Stiff

123.5-124.0' Fine-grained clayey sand seam

126.0-131.0' Very stiff

126.5-127.0' Fine-grained silty sand seam

131.0-138.0' Silty Sand, med. gray, dense, wet, fine-grained (SM)

Cobble on top of rock

138.0' Top of Rock

138.0-160.0' Shale, dark gray, soft to firm, fissile mechanically fractured in areas

138.0-141.4' Soft, weathered

141.4-160.0' Hard, fissil

Bottom of Hole: Depth 160.0'
Elevation 425.3

Hole grouted from 160.0' to ground surface.

SOIL BORING NO. B-12

BECHTEL Belle River

LOCATION: N 13,000 E 7,000

GROUND ELEVATION 590.6

DATE DRILLED: 3-27-74 3-28-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

DESCRIPTION

black, clayey topsoil

medium, brown, silty Clay (CL) trace of sand and gravel

gray, silty

soft, gray, sandy, silty Clay (CH)

no sand

Bottom of Hole-Elevation-520.1
-Depth-70.5ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and soil

SOIL BORING NO. 150

BECHTEL Belle River

LOCATION: N 13,785 E 5,006 GROUND ELEVATION 599.0

DATE DRILLED: 3-7-74 3-14-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER — NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET

firm, brown, leached Clay (CL-CH)trace fibers and topsoil

stiff, brown and gray, silty clay, trace fine sand, few pebbles

soft to plastic, gray, some fine sand

very soft to soft, gray, silty Clay (CH)

soft, moderately plastic, grayish brown, silty Clay (CL) 10% fine to coarse sand

5% fine to coarse sand

soft to plastic, gray, some fine sand highly plastic

25% fine to coarse sand

very stiff, very sandy clay, few pebbles

low plasticity, clayey silt (CL-ML)

lense, 15% fine to medium sand

firm to stiff, silty, some fine sand

10% fine sand, low plasticity

medium compact, gray, Clayey Sand (SC) fine to medium

plastic to firm, gray, silty Clay(CL) some fine sand

Clayey Silt (ML)

164.0-165.0ft Shale; gray, soft

Bottom of Hole-Elevation-434.0
-Depth-165.0ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and soil

O Moisture Content

Atterburg Limits

* Water content taken from unsealed jar sample.

SOIL BORING NO. 154

BECHTEL Belle River

B-115

LOCATION: N 14,000 E 8,000

GROUND ELEVATION 591.5

DATE DRILLED: 4-5-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

topsoil

firm to stiff, brown, silty clay (CL)

very stiff, trace gravel

plastic to firm, gray

soft, gray, silty clay (CH)

8 14 30 22 8 7 4 4 4 3 2 2 2 2 2 3

Bottom of Hole - Elevation - 521.5
- Depth - 70.0 ft.

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and soil

SOIL BORING NO. 157

BECHTEL Belle River

B-117

LOCATION: N 14,000 E 9,950

GROUND ELEVATION 591.3

DATE DRILLED: 4-3-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

NO UNDISTURBED SAMPLES TAKEN

DEPTH IN FEET

0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

20 9 17 13 15 7 4 5 2 2 2 3 4 4 5

gray silt (ML)

loose to medium compact, brown to gray, silty sand (SM) fine to medium

firm, gray, silty clay (CL)

soft, gray, silty clay (CH)

Bottom of Hole - Elevation - 521.3
- Depth - 70.0 ft.

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel in soil

SOIL BORING NO. 159

BECHTEL Belle River

DUNN 10-72P

LOCATION: N 15,000 E 8,000

GROUND ELEVATION 591.4

DATE DRILLED: 4-8-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

% CORE RECOVERY

SYMBOL

DESCRIPTION

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN

plastic, gray, silty Clay (CL-CH)
firm, gray and brown, trace fine sand

plastic, gray, some fine sand
medium, grayish brown, moderately to highly plastic, silty Clay (CL)
very soft to soft, gray

moderately plastic

5% fine to medium sand

soft to plastic, trace fine sand

highly plastic

plastic, some fine sand

10% fine to coarse sand

firm, few sand seams

very stiff, sandy, few pebbles

medium compact, gravelly Sand (SW)
seams of fine sand

Bottom of Hole-Elevation-453.4
-Depth-138.0ft

Unable to keep this boring open below 138.0' due to gravel.

No gain or loss of water.

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and Natural Soil.

O Moisture Content

⟷ Atterburg Limits

* Water content taken from unsealed jar sample

SOIL BORING NO. 163

BECHTEL Belle River

LOCATION: N 14,830 E 9,938 GROUND ELEVATION 594.3

DATE DRILLED: 3-26-74 3-27-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER — NO UNDISTURBED SAMPLES TAKEN

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

DESCRIPTION

Loose to medium compact, brown, fine to medium sand (SW) trace fine gravel

Stiff, gray, silty clay (CL) medium, some sand

soft, gray, silty clay (CH)

Medium, gray, sandy, silty clay (CL) some gravel

firm, trace of sand and gravel

medium, silty

medium compact, gray, silty sand (SM) fine

compact, gray, fine to medium gravel (GW) with fine to coarse sand

156.0 - 156.5 ft. shale

Bottom of Hole - Elevation - 437.8
- Depth - 156.5 ft.

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Bentonite and soil

SOIL BORING NO. 165

BECHTEL Belle River

B-123

LOCATION: N 3,525 E 12,533 GROUND ELEVATION 590.8

DATE DRILLED: 3-5-74 3-7-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

SHELBY TUBES

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DEPTH IN FEET

DESCRIPTION

cinders, fill

stiff, brown and gray, silty Clay (CL) some fine sand

firm, gray, trace fine sand

▽ 4-25-74 Elevation of water-578.3
Depth of water-10.0 ft.

Very soft to soft, gray, silty clay (CH)

plastic, gray, silty Clay (CL) some fine sand

compact, dark gray, Clayey Sand (SC) few pebbles

plastic to firm, gray, silty Clay (CL) some fine sand

compact, gray, very fine Sand (SP)

plastic, grey, silty Clay (CL) trace fine sand

compact, gray, clayey Silt (ML)

143.5 - 144.0ft Shale, soft, gray

Bottom of Hole-Elevation-446.8
-Depth-144.0ft

No gain or loss of water

Piezometer Installation:
3 feet of 2 inch pvc blank casing from 144.0 to 141.0 feet, 4 feet of #80 screen from 141.0 to 137.0 feet, 141.3 feet of 2 inch pvc casing from 137.0 to 4.3 feet above ground surface, backfilled with sand around screen, annulus backfilled with bentonite and soil to ground surface.

For Water Table information consult Section 4.1.3.

SOIL BORING NO. 181

BECHTEL Belle River

B-125

LOCATION: N 3,536 E 9,564 GROUND ELEVATION 586.1

DATE DRILLED: 3-15-74 3-19-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100 120

SYMBOL

DESCRIPTION

DEPTH IN FEET

Topsoil

Stiff, brown, silty clay (CL), trace fine sand, some gray mottling

Very soft to soft gray, silty clay (CH)

Plastic, gray, silty clay (CL), some fine sand

Plastic to firm, some fine sand, few pebbles

138.5-139.92 ft shale, gray, soft

Bottom of hole - Elevation - 446.18
" - Depth - 139.92 ft

No gain or loss of water

For Water Table information consult Section 4.1.3.

Hole backfilled with Quik-Gel and soil

NO UNDISTURBED SAMPLES TAKEN

SOIL BORING NO. 184

BECHTEL Belle River

B-127

LOCATION: N 5,500 E 9,797

GROUND ELEVATION 586.8

DATE DRILLED: 2-26-74, 2-27-74

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DESCRIPTION

DEPTH IN FEET

0 Very soft, brown & gray, silty, sandy Clay (CL-CH)

stiff, brown, silty, some fine sand

gray mottling

plastic, gray, some fine sand

20 Very soft to soft, gray, silty Clay (CH)

Soft, moderate to high plasticity, gray, silty Clay (CL)

40

60 soft to firm, 20% fine to coarse sand

stiff, sandy, with silt & sand lenses

80

firm to stiff, few pebbles

100

moderate plasticity, 20% fine to coarse sand

Compact, gray Silt (ML) trace of clay & 20% fine sand, nonplastic

120 Hard, gray, sandy Clay (CL) some pebbles

plastic to firm, silty, some fine sand

Compact, gray, very fine Silty Sand (SM)

140 Very hard, gray, sandy Clay (CL) some pebbles

139.0-139.3 Shale, gray, soft

Bottom of Hole - Elevation - 447.5

- Depth - 139.3 ft

No gain or loss of water.

For Water Table information consult Section 4.1.3.

160

180

200

220

240

260

280

300

320

340

Hole backfilled with Quik-Gel and natural soil.

O Moisture Content

Atterburg Limits

* Water content taken from unsealed jar sample.

SOIL BORING NO. 186

BECHTEL Belle River

LOCATION: N 3500 E 11741

GROUND ELEVATION 585.2

DATE DRILLED: 8/6/75 8/8/75

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DRY DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

NO UNDISTURBED SAMPLES TAKEN.

DESCRIPTION

Medium stiff, mottled brown & gray, slightly moist, silty Clay (CL) trace shale fragments

brown

very soft, gray, moist

trace very fine sand and pebbles

very slight trace sand

trace sand

medium stiff

stiff, trace sand and very fine gravel

hard, trace to little sand and very fine gravel

stiff

less very fine gravel

medium stiff

Very soft, moist, gray Silt (ML)

Medium stiff, gray, moist, silty Clay (CL) trace sand

very hard, slightly moist, trace to little sand

138-140.5 ft. Shale, gray, highly weathered

Bottom of Hole - Elevation - 444.7
- Depth - 140.5 ft.

Boring grouted with cement at completion.

* Possibly caused by unbalanced hydrostatic head.

For Water Table information consult Section 4.1.3.

SOIL BORING NO. 191

BECHTEL BELLE RIVER

LOCATION: N 3558 E 11701

GROUND ELEVATION 585.2

DATE DRILLED: 8/11/75 - 8/14/75

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DRY DENSITY (LBS./CU. FT.)

SHELBY TUBES | OTHER LABORATORY TESTS | OSTERBERG | SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

CORE RECOVERY

SYMBOL

DEPTH IN FEET

DESCRIPTION

Topsoil

Stiff, mottled brown & gray, slightly moist, silty Clay (CL) trace sand

gray, trace sand

medium stiff

soft

slightly stiffer, trace sand

medium stiff, moist, trace to little sand and fine gravel

trace sand and very fine gravel, possible sand or silt seams

more fine gravel

Medium dense, gray, fine to medium Silty Sand (SM)

Very dense, gray, medium coarse Clayey Sand (SC) trace gravel

139.5-140 ft. Shale, gray, very hard, weathered

Bottom of Hole - Elevation - 445.2
- Depth - 140.0 ft.

Boring grouted with cement at completion.

For Water Table information consult Section 4.1.3.

● Unconfined Compression
* Sample contained sand seams.

○ Moisture Content
Atterberg Limits

SOIL BORING NO. 193

BECHTEL BELLE RIVER

LOCATION: N 7800, E 9400 | GROUND ELEVATION 585.1 | DATE DRILLED: 8/17/77 – 8/22/77 | SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) | MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) | DENSITY (LBS./CU. FT.) | OTHER LABORATORY TESTS | SAMPLE TYPE & NUMBER | NO. BLOWS PER FOOT OR SAMPLE PRESSURE | % CORE RECOVERY | SYMBOL | DESCRIPTION

DEPTH IN FEET

0-0.5' Topsoil, silty, dark brown, roots

0.5-5.5' Clayey Silt, brown and med. gray, mottled, med. dense, slight plasticity, dry, trace fine to med. gravel (ML)

5.5-8.0' Silty Clay, med. gray, stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)

8.0-58.5' Clay, med. gray, very soft, high plasticity, wet, trace silt, trace fine sand (CH)

58.5-125.5' Silty Clay, med. gray, soft, med. plasticity, moist, trace to little sand, trace fine gravel(CL)
58.5-88.5' Little sand
68.5-88.5' Med. Stiff

88.5-98.5' Stiff
88.5-118.5' Trace sand

98.5-125.5' Med. stiff

105.5-106.0' Small cobbles

118.5-125.5' Occasional fine-grained sand seams

125.5-138.8' Clayey Silt, med. gray, med. dense to dense, moist, with fine-grained sand seams (ML)
127.5-128.3' Fine gravel
134.5-136.3' Boulder
138.1-138.8' Boulder

138.8' Top of Rock
138.8-157.5' Shale, dark gray, soft, friable, slightly fissile, occasional mechanically fractured
149.8-157.5' Harder, scattered, thin black shale stringers

Bottom of Hole: Depth 157.5'
Elevation 427.6

Hole grouted from 157.5' to ground surface.

SOIL BORING NO. B-1

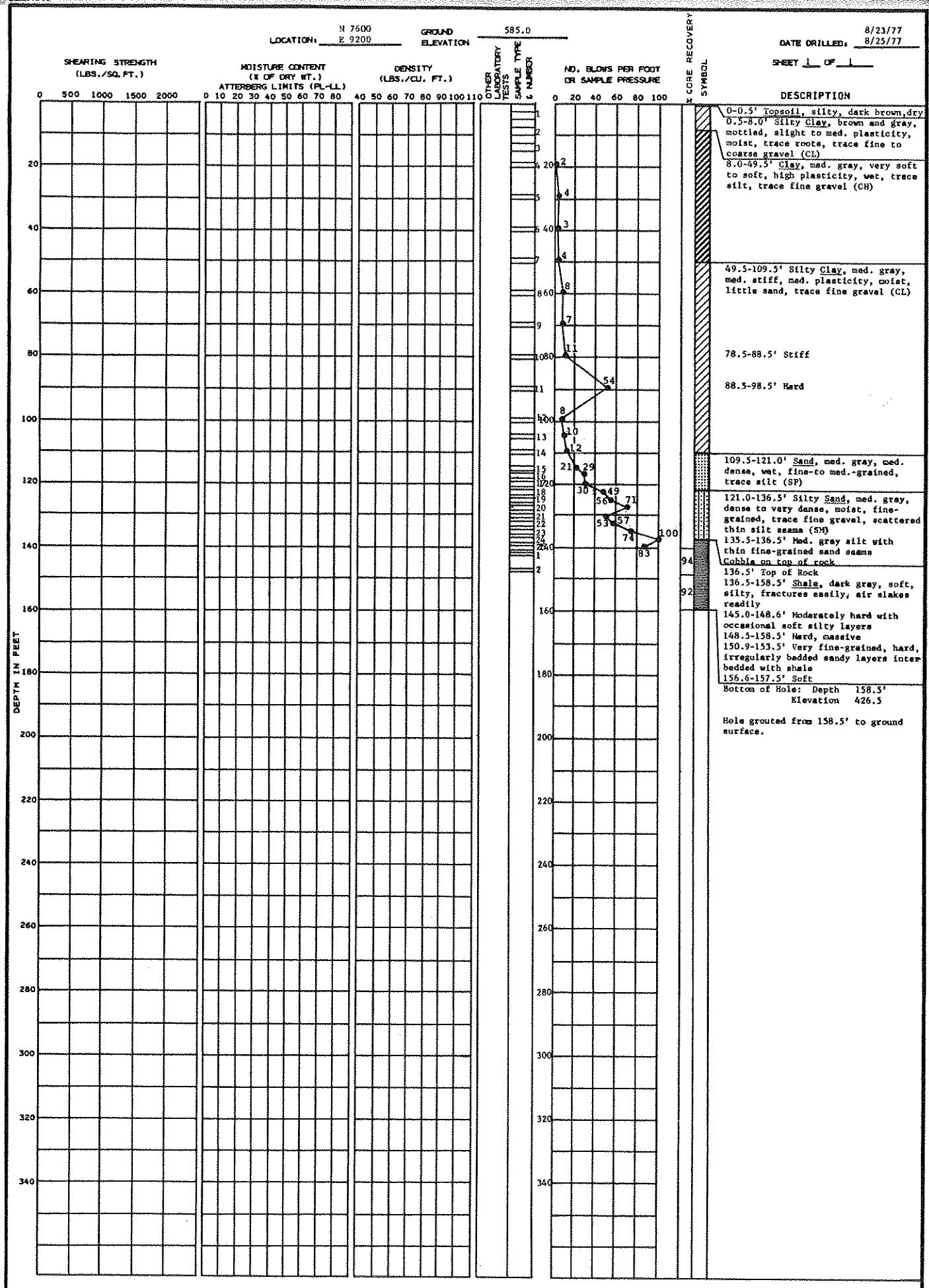
BECHTEL Belle River

LOCATION: N 7600, E 9200

GROUND ELEVATION: 585.0

DATE DRILLED: 8/23/77, 8/25/77

SHEET 1 OF 1



DESCRIPTION

0-0.5' Topsoil, silty, dark brown, dry

0.5-8.0' Silty Clay, brown and gray, mottled, slight to med. plasticity, moist, trace roots, trace fine to coarse gravel (CL)

8.0-49.5' Clay, med. gray, very soft to soft, high plasticity, wet, trace silt, trace fine gravel (CH)

49.5-109.5' Silty Clay, med. gray, med. stiff, med. plasticity, moist, little sand, trace fine gravel (CL)

78.5-88.5' Stiff

88.5-98.5' Hard

109.5-121.0' Sand, med. gray, med. dense, wet, fine-to med.-grained, trace silt (SP)

121.0-136.5' Silty Sand, med. gray, dense to very dense, moist, fine-grained, trace fine gravel, scattered thin silt seams (SM)

135.5-136.5' Med. gray silt with thin fine-grained sand seams

Cobble on top of rock

136.5' Top of Rock

136.5-158.5' Shale, dark gray, soft, silty, fractures easily, air slakes readily

145.0-148.6' Moderately hard with occasional soft silty layers

148.5-158.5' Hard, massive

150.9-153.5' Very fine-grained, hard, irregularly bedded sandy layers interbedded with shale

156.6-157.5' Soft

Bottom of Hole: Depth 158.5'
Elevation 426.5

Hole grouted from 158.5' to ground surface.

SOIL BORING NO. B-2

BECHTEL Belle River

LOCATION: N 7850, E 9200 | GROUND ELEVATION 585.5 | DATE DRILLED: 8/2/77, 8/4/77 | SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

DESCRIPTION

0-1.0' Topsoil, clayey silt, dark brown to light brown, dry, wood fragments and roots (ML)

1.0-8.5' (?) Silty Clay, med. brown, med. plasticity, moist, trace fine to coarse gravel (CL)

8.5-58.5' Clay, med. gray, very soft, very high plasticity, wet, trace silt, trace fine angular gravel (CH)

46.5-58.5' Soft

58.5-114.5' Silty Clay, med. gray, soft to med. stiff, high plasticity, moist to wet, trace to little fine sand, trace fine to coarse gravel(CL)

78.5-88.5' Stiff

88.5-98.5' Very stiff

98.5-114.5' Stiff to med. stiff
103.5 Less sand, occasional 1/4" pits of red clay
104.0' 1/2" light gray, fine-grained, sand pit
113.5' Trace silt, trace sand

114.5-128.5' Silty Sand, med. gray, med. dense, moist to wet, fine-grained with thin seams of silt and clay(SM)
123.5-125.0' Loose

128.5-133.3' Clay, med. gray, stiff, high plasticity, wet, trace silt, trace fine gravel, occasional pits of red clay (CH)

133.3-142.0' Silty Sand, med. gray, med. dense to dense, moist to wet, fine-grained, occasional silt and clay seams (SM)
141.7-142.0' Coarse sand seam

142.0' Top of Rock

142.0-162.5' Shale, dark gray, soft, massive, friable
155.0-162.5' Hard
159.0-160.5' Core mechanically fractured

Bottom of Hole: Depth 162.5'
Elevation 423.0

Hole grouted from 162.5' to ground surface.

SOIL BORING NO. B-4

BECHTEL Bells River

LOCATION: N 7600, E 9400

GROUND ELEVATION: 584.8

DATE DRILLED: 7/26/77, 8/1/77

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.)

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)

DENSITY (LBS./CU. FT.)

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

DESCRIPTION

0-1.0' Silty Clay, topsoil, dark brown to green brown, stiff, slight plasticity, moist, trace sand, with roots and wood fragments (CL)

1.0-6.0' Clayey Silt, light brown to gray, med. dense, dry, trace sand, trace fine gravel (ML)

6.0-8.5' Clay, dark brown, stiff, med. plasticity, moist, trace silt (CL)

8.5-54.0' Clay, med. gray, soft to very soft, very high plasticity, wet, trace fine angular gravel (CH)

54.0-127.5' Silty Clay, med. gray, stiff, med. plasticity, moist, trace sand, trace fine to coarse gravel (CL)

73.5-75.0' Med. stiff

93.5-103.5' Very stiff

103.5-113.5 Stiff

113.5-126.0' Med. stiff

123.5-124.4' Clay seam, high plasticity

124.4-125.0' Silty sand seam, fine-grained, wet

126.0-127.5' Stiff, some sand

127.5-137.8' Silt and Sand, med. gray, med. dense to dense, wet, sand fine-grained (ML and SM)

137.8' Top of Rock

137.8-160.0' Shale, dark blue gray to black, soft, fissile, dry

142.6-144.2' and 154.5-160.0' Core completely fractured into 1/4" or less pieces

150.5-153.0' Core fractured into 1/4" to 4" pieces

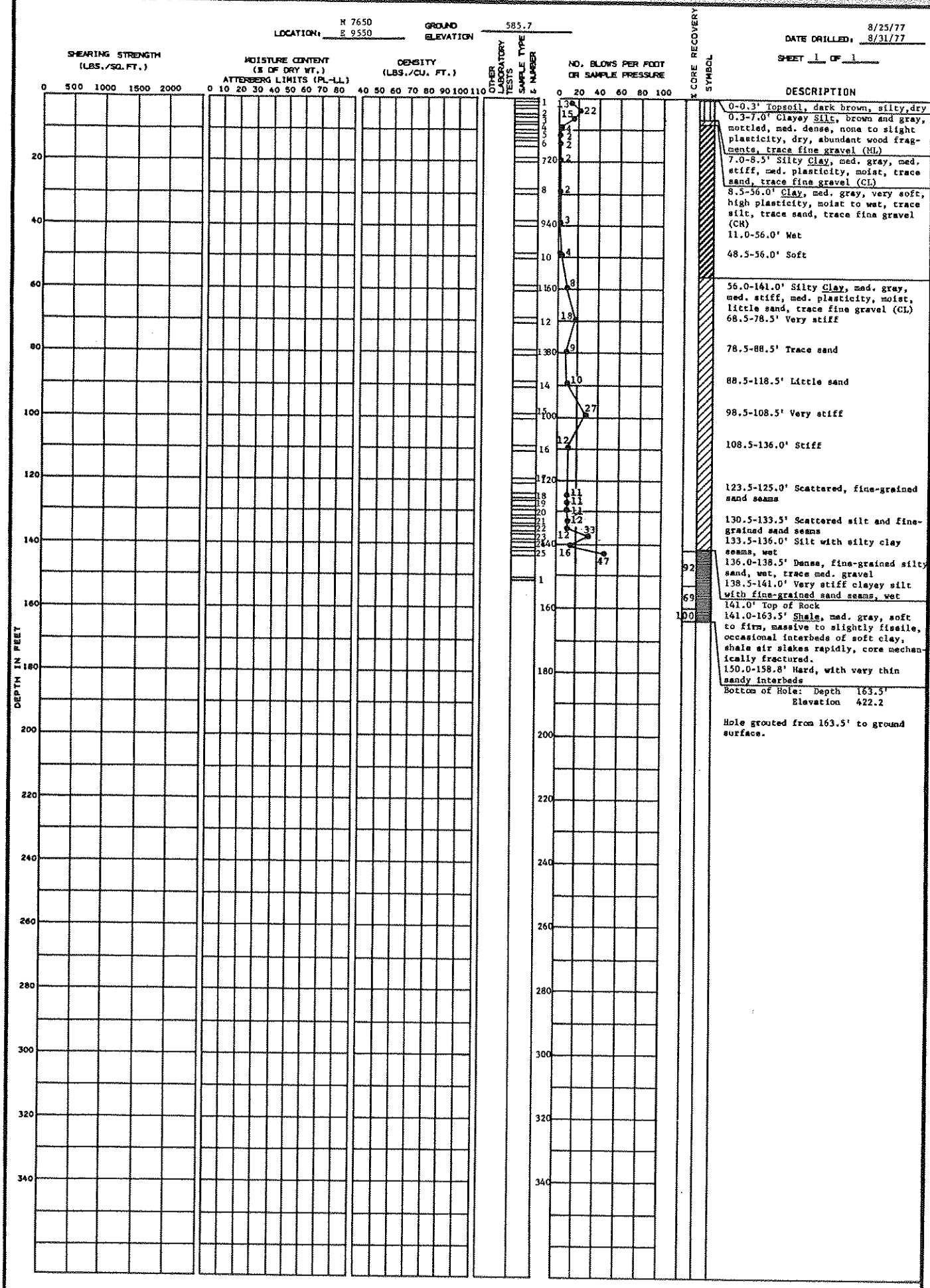
Bottom of Hole: Depth 160.0'
Elevation 424.8

Hole grouted from 160.0' to ground surface.

SOIL BORING NO. B-5

BECHTEL Belle River

LOCATION: N 7650, E 9550 | GROUND ELEVATION 585.7 | DATE DRILLED: 8/25/77, 8/31/77 | SHEET 1 OF 1



DESCRIPTION

0-0.3' Topsoil, dark brown, silty, dry

0.3-7.0' Clayey Silt, brown and gray, mottled, med. dense, none to slight plasticity, dry, abundant wood fragments, trace fine gravel (ML)

7.0-8.5' Silty Clay, med. gray, med. stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)

8.5-56.0' Clay, med. gray, very soft, high plasticity, moist to wet, trace silt, trace sand, trace fine gravel (CH)

11.0-56.0' Wet

48.5-56.0' Soft

56.0-141.0' Silty Clay, med. gray, med. stiff, med. plasticity, moist, little sand, trace fine gravel (CL)

68.5-78.5' Very stiff

78.5-88.5' Trace sand

88.5-118.5' Little sand

98.5-108.5' Very stiff

108.5-136.0' Stiff

123.5-125.0' Scattered, fine-grained sand seams

130.5-133.5' Scattered silt and fine-grained sand seams

133.5-136.0' Silt with silty clay seams, wet

136.0-138.5' Dense, fine-grained silty sand, wet, trace med. gravel

138.5-141.0' Very stiff clayey silt with fine-grained sand seams, wet

141.0' Top of Rock

141.0-163.5' Shale, med. gray, soft to firm, massive to slightly fissile, occasional interbeds of soft clay, shale air slakes rapidly, core mechanically fractured.

150.0-158.8' Hard, with very thin sandy interbeds

Bottom of Hole: Depth 163.5'
Elevation 422.2

Hole grouted from 163.5' to ground surface.

SOIL BORING NO. B-6

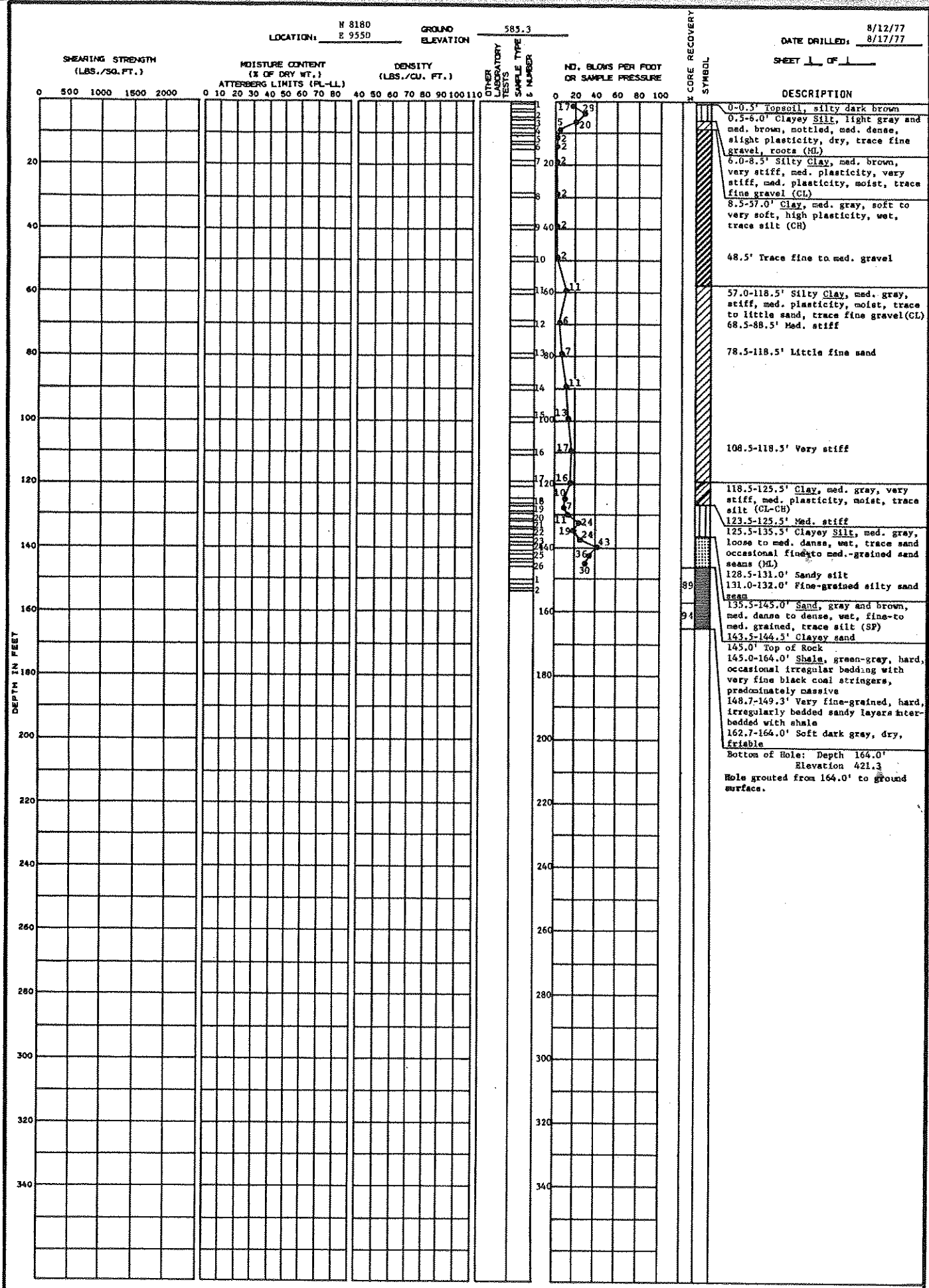
BECHTEL Belle River

LOCATION: N 8180, E 9550

GROUND ELEVATION 585.3

DATE DRILLED: 8/12/77, 8/17/77

SHEET 1 OF 1



DESCRIPTION

0-0.5' Topsoil, silty dark brown

0.5-6.0' Clayey Silt, light gray and med. brown, mottled, med. dense, slight plasticity, dry, trace fine gravel, roots (ML)

6.0-8.5' Silty Clay, med. brown, very stiff, med. plasticity, very stiff, med. plasticity, moist, trace fine gravel (CL)

8.5-57.0' Clay, med. gray, soft to very soft, high plasticity, wet, trace silt (CH)

48.5' Trace fine to med. gravel

57.0-118.5' Silty Clay, med. gray, stiff, med. plasticity, moist, trace to little sand, trace fine gravel(CL)

68.5-88.5' Med. stiff

78.5-118.5' Little fine sand

108.5-118.5' Very stiff

118.5-125.5' Clay, med. gray, very stiff, med. plasticity, moist, trace silt (CL-CH)

123.5-125.5' Med. stiff

125.5-135.5' Clayey Silt, med. gray, loose to med. dense, wet, trace sand occasional fine to med.-grained sand seams (ML)

128.5-131.0' Sandy silt

131.0-132.0' Fine-grained silty sand seam

135.5-145.0' Sand, gray and brown, med. dense to dense, wet, fine-to med. grained, trace silt (SP)

143.5-144.5' Clayey sand

145.0' Top of Rock

145.0-164.0' Shale, green-gray, hard, occasional irregular bedding with very fine black coal stringers, predominately massive

148.7-149.3' Very fine-grained, hard, irregularly bedded sandy layers inter-bedded with shale

162.7-164.0' Soft dark gray, dry, friable

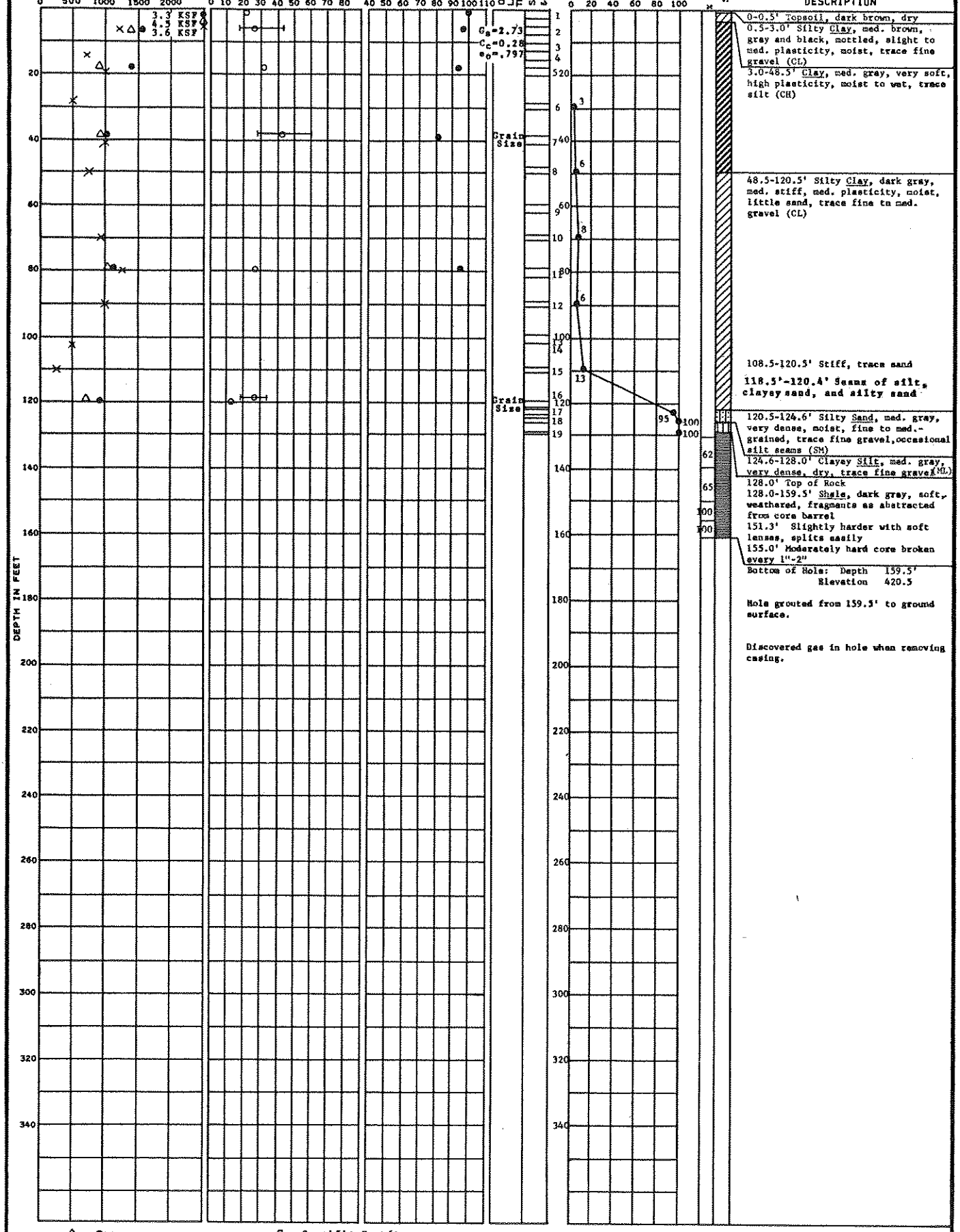
Bottom of Hole: Depth 164.0'
Elevation 421.3

Hole grouted from 164.0' to ground surface.

SOIL BORING NO. B-13

BECHTEL Belle River

LOCATION: N 5270, E 15660 | GROUND ELEVATION 580.0 | DATE DRILLED: 9/7/77, 9/14/77 | SHEET 1 OF 1



DESCRIPTION

0-0.5' Topsoil, dark brown, dry

0.5-3.0' Silty Clay, med. brown, gray and black, mottled, slight to med. plasticity, moist, trace fine gravel (CL)

3.0-48.5' Clay, med. gray, very soft, high plasticity, moist to wet, trace silt (CH)

48.5-120.5' Silty Clay, dark gray, med. stiff, med. plasticity, moist, little sand, trace fine to med. gravel (CL)

108.5-120.5' Stiff, trace sand

118.5'-120.4' Seams of silt, clayey sand, and silty sand

120.5-124.6' Silty Sand, med. gray, very dense, moist, fine to med.-grained, trace fine gravel, occasional silt seams (SM)

124.6-128.0' Clayey Silt, med. gray, very dense, dry, trace fine gravel (ML)

128.0' Top of Rock

128.0-159.5' Shale, dark gray, soft, weathered, fragments as abstracted from core barrel

151.3' Slightly harder with soft lenses, splits easily

155.0' Moderately hard core broken every 1"-2"

Bottom of Hole: Depth 159.5'
Elevation 420.5

Hole grouted from 159.5' to ground surface.

Discovered gas in hole when removing casing.

△ Torvane
○ Unconsolidated Undrained
⊙ Unconfined Compression
⊢⊣ Atterberg Limits
G_s Specific Gravity
C_c Compression Index
e_o Initial Void Ratio
× Pocket Penetrometer

SOIL BORING NO. B-17

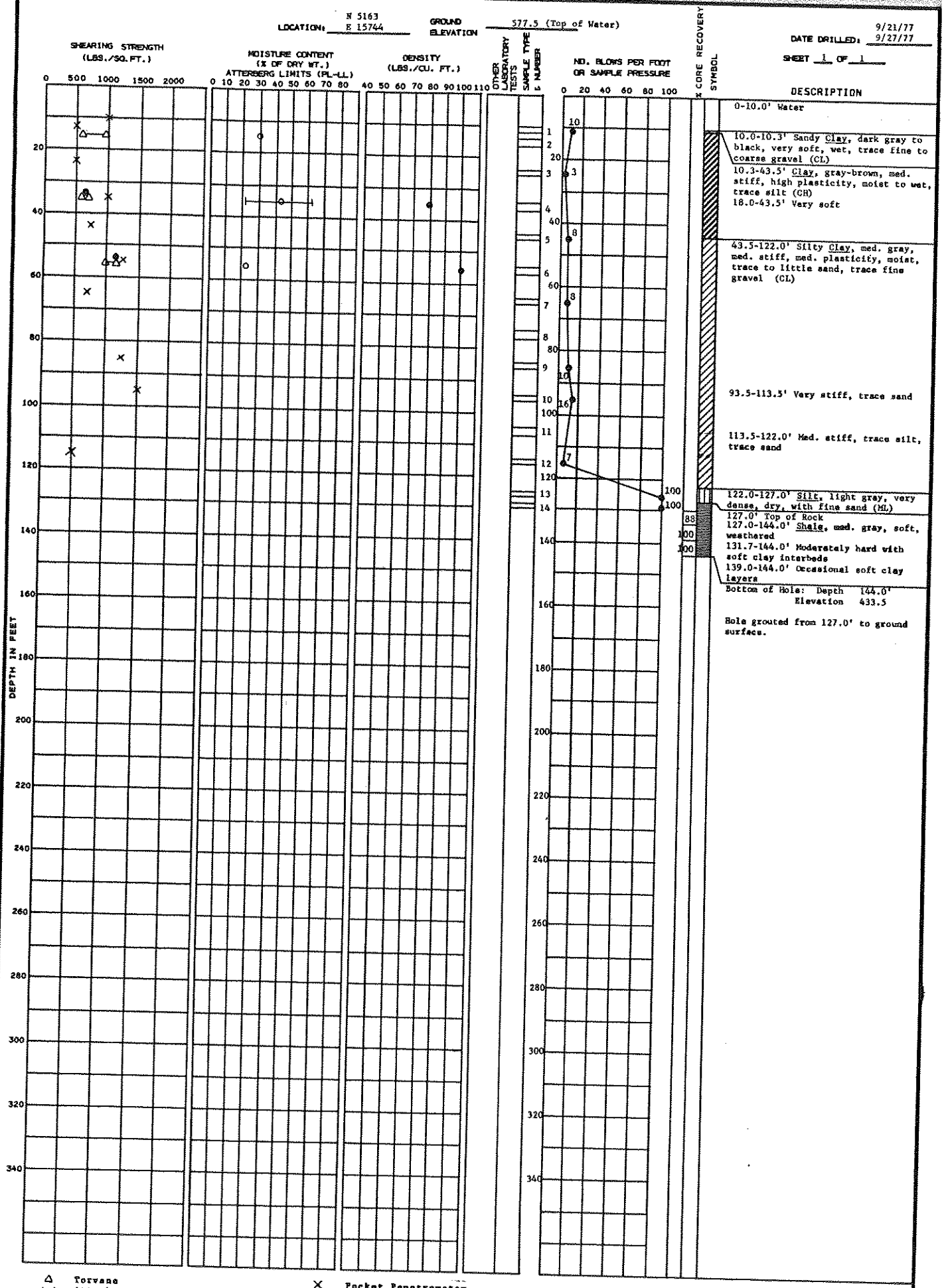
BECHTEL Belle River

LOCATION: N 5163, E 15744

GROUND ELEVATION: 577.5 (Top of Water)

DATE DRILLED: 9/21/77, 9/27/77

SHEET 1 OF 1



DESCRIPTION

0-10.0' Water

10.0-10.3' Sandy Clay, dark gray to black, very soft, wet, trace fine to coarse gravel (CL)

10.3-43.5' Clay, gray-brown, med. stiff, high plasticity, moist to wet, trace silt (CH)

18.0-43.5' Very soft

43.5-122.0' Silty Clay, med. gray, med. stiff, med. plasticity, moist, trace to little sand, trace fine gravel (CL)

93.5-113.5' Very stiff, trace sand

113.5-122.0' Med. stiff, trace silt, trace sand

122.0-127.0' Silt, light gray, very dense, dry, with fine sand (ML)

127.0' Top of Rock

127.0-144.0' Shale, med. gray, soft, weathered

131.7-144.0' Moderately hard with soft clay interbeds

139.0-144.0' Occasional soft clay layers

Bottom of Hole: Depth 144.0'
Elevation 433.5

Hole grouted from 127.0' to ground surface.

△ Torvane
⊢ Atterberg Limits
● Unconfined Compression
○ Unconsolidated Undrained
× Pocket Penetrometer

SOIL BORING NO. B-22

BECHTEL Belle River

LOCATION: N 5364, E 15750 | GROUND ELEVATION: 577.5 (Top of Water) | DATE DRILLED: 9/15/77, 9/21/77 | SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS | SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET

4.5 KSF

Grain Size

DESCRIPTION

0-14.0' Water

14.0-47.5' Clay, light gray-brown, very soft, high plasticity, wet, trace silt (CH)

47.5-123.0' Silty Clay, med. gray, med. stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)

68.5-108.5' Stiff

100.3' Gray, sandy

108.5-123.0' Soft

118.5'-121.2' Layers of clay, silt, clayey sand, and silty sand

123.0-126.5' Silt with fine-grained sand seams, med. gray, very dense, trace fine gravel (ML)

126.5' Top of Rock

126.5-146.4' Shale, dark gray, very soft, weathered

128.8-132.5' Soft

132.5-146.4' Moderately hard with interbeds of soft clay, core breaks easily

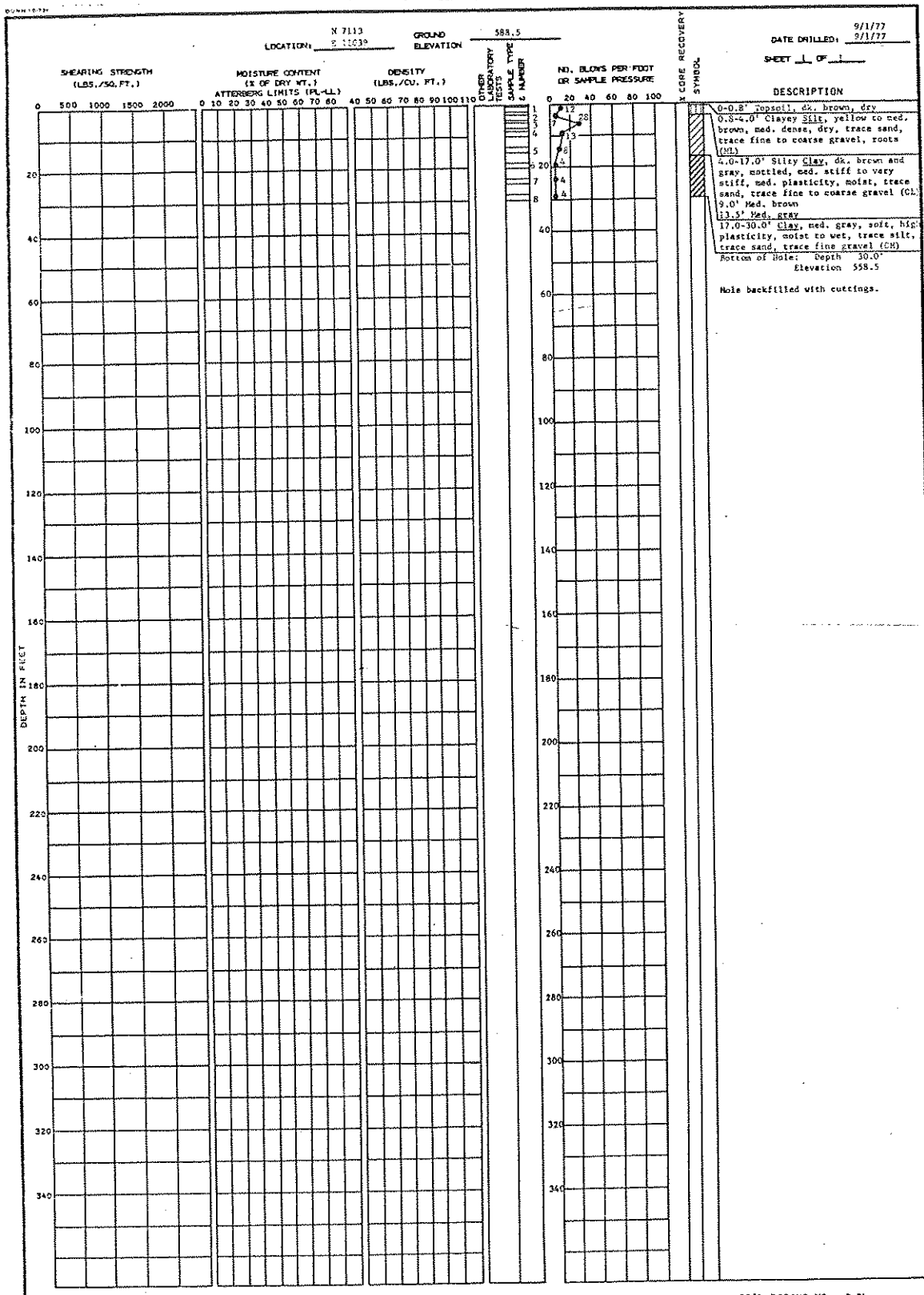
Bottom of Hole: Depth 146.4'
Elevation 431.1

Hole grouted from 146.4' to ground surface.

Δ Torvane
○ Unconsolidated Undrained
● Unconfined Compression
⊢ Atterberg Limits
✕ Pocket Penetrometer

SOIL BORING NO. B-23

BECHTEL Belle River



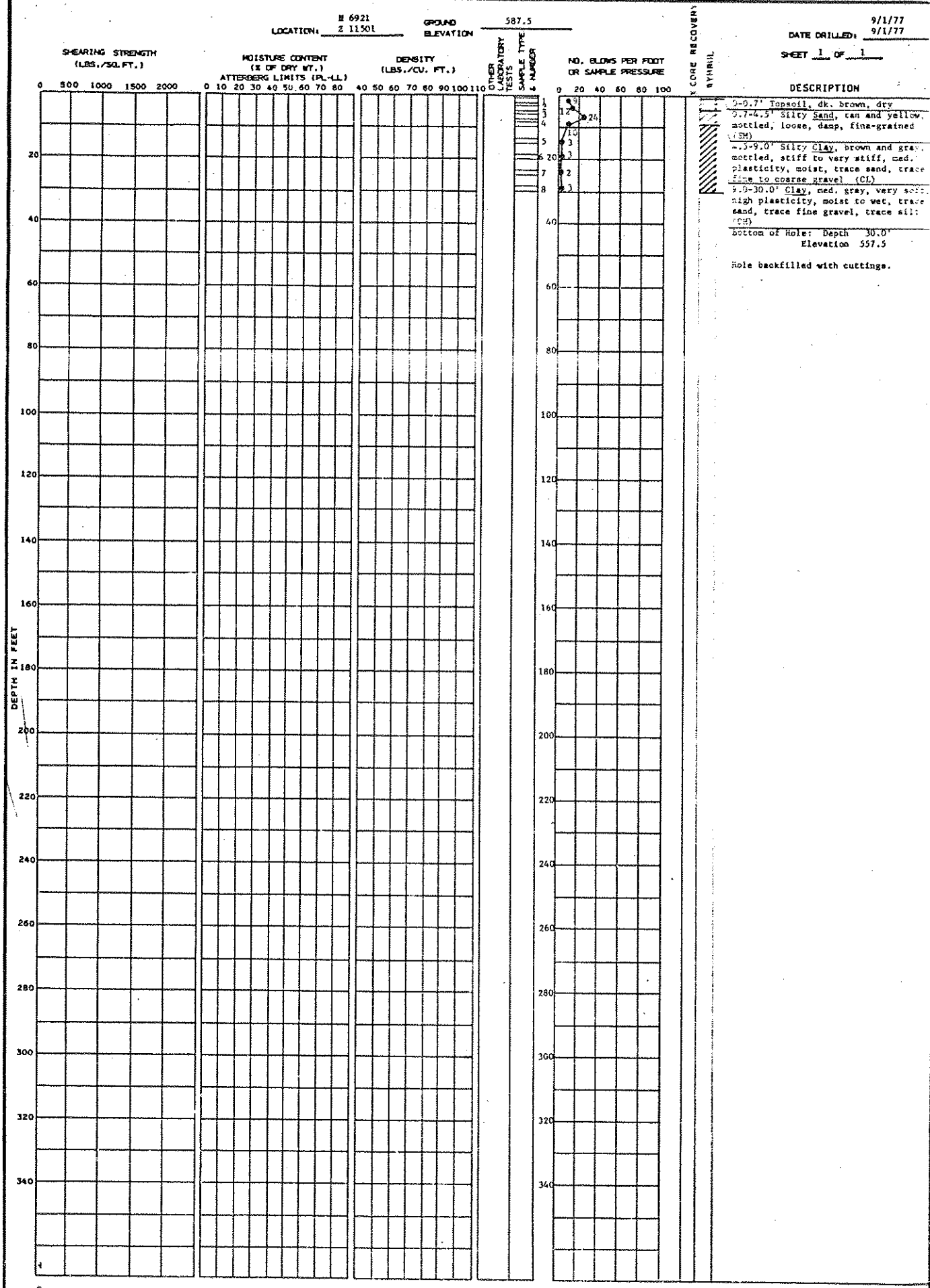
SOIL BORING NO. B-24

BECHTEL Belle River

LOCATION: N 6921, E 11501 — GROUND ELEVATION 587.5

DATE DRILLED: 9/1/77, 9/1/77

SHEET 1 OF 1



DESCRIPTION

0-0.7' Topsoil, dk. brown, dry

0.7-4.5' Silty Sand, tan and yellow mottled, loose, damp, fine-grained (SM)

4.5-9.0' Silty Clay, brown and gray mottled, stiff to very stiff, med. plasticity, moist, trace sand, trace fine to coarse gravel (CL)

9.0-30.0' Clay, med. gray, very soft high plasticity, moist to wet, trace sand, trace fine gravel, trace silt (CH)

Bottom of Hole: Depth 30.0'
Elevation 557.5

Hole backfilled with cuttings.

SOIL BORING NO. B-26

BECHTEL Belle River

LOCATION: N 6730 E 11963

GROUND ELEVATION 588.1

DATE DRILLED: 9/1/77 9/1/77

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ.FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

DESCRIPTION

0-0.7' Topsoil, dr. brown, dry

0.7-4.0' Silty Sand, tan and gold, mottled, mod. dense, dry, fine-grained, roots (SM)

4.0-13.5' Silty Clay, gray and brown, mottled, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)

6.0' Green brown

13.5-30.0' Clay, med. gray, soft, high plasticity, moist to wet, trace silt, trace fine gravel (CH)

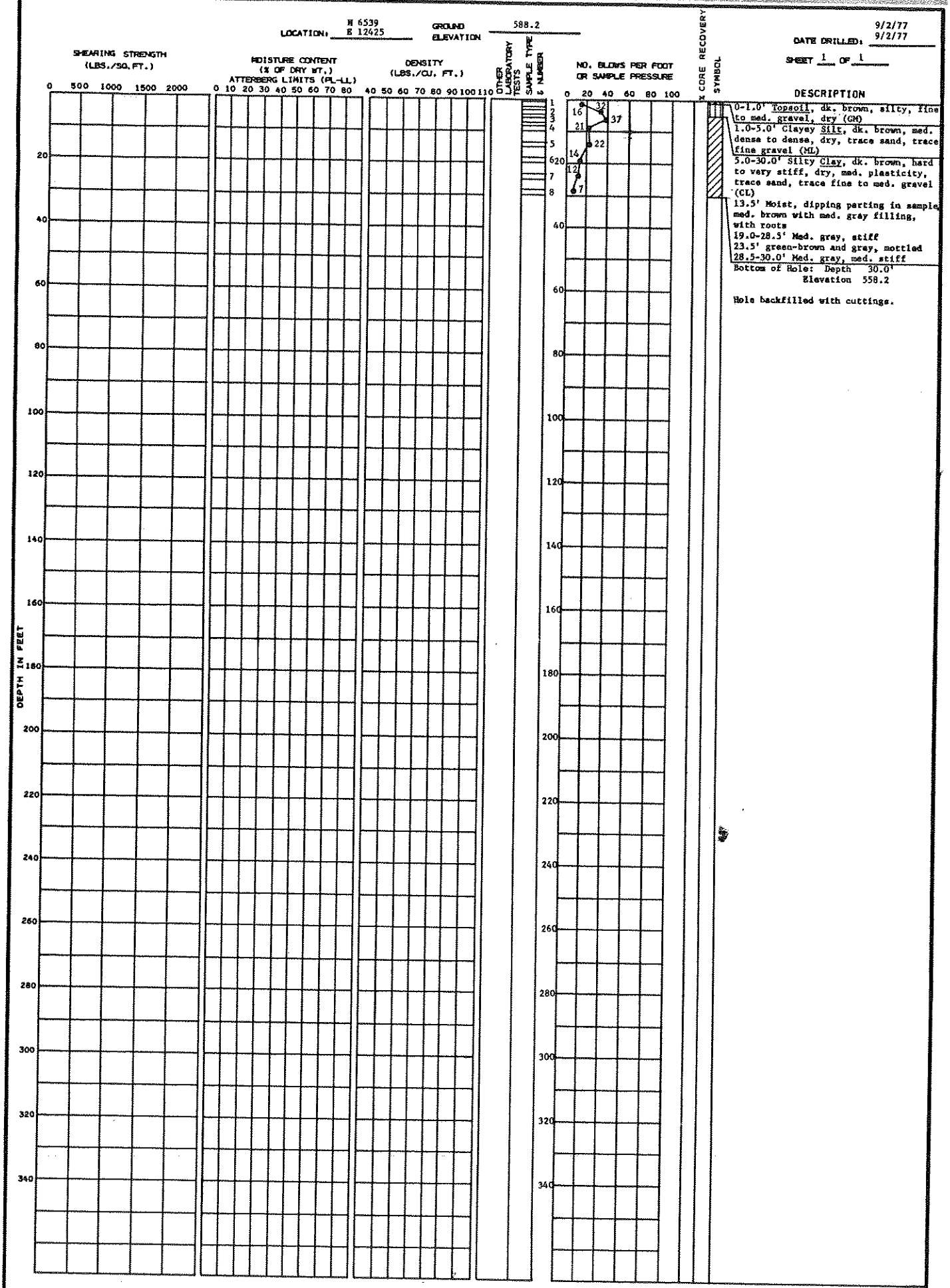
Bottom of Hole: Depth 30.0'
Elevation 558.1

Hole backfilled with cuttings.

SOIL BORING NO. B-28

BECHTEL Belle River

LOCATION: N 6539, E 12425 | GROUND ELEVATION 588.2 | DATE DRILLED: 9/2/77, 9/2/77 | SHEET 1 OF 1



DESCRIPTION

0-1.0' Topsoil, dk. brown, silty, fine to med. gravel, dry (GM)

1.0-5.0' Clayey Silt, dk. brown, med. dense to dense, dry, trace sand, trace fine gravel (ML)

5.0-30.0' Silty Clay, dk. brown, hard to very stiff, dry, med. plasticity, trace sand, trace fine to med. gravel (CL)

13.5' Moist, dipping parting in sample, med. brown with med. gray filling, with roots

19.0-28.5' Med. gray, stiff

23.5' green-brown and gray, mottled

28.5-30.0' Med. gray, med. stiff

Bottom of Hole: Depth 30.0'
Elevation 558.2

Hole backfilled with cuttings.

SOIL BORING NO. B-30

BECHTEL Belle River

LOCATION: N 6348, E 12890

GROUND ELEVATION: 600.0

DATE DRILLED: 9/1/77, 9/1/77

SHEET 1 OF 1

SHEARING STRENGTH (LBS./SQ. FT.) 0 500 1000 1500 2000

MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL) 0 10 20 30 40 50 60 70 80

DENSITY (LBS./CU. FT.) 40 50 60 70 80 90 100 110

OTHER LABORATORY TESTS

SAMPLE TYPE & NUMBER

NO. BLOWS PER FOOT OR SAMPLE PRESSURE 0 20 40 60 80 100

% CORE RECOVERY

SYMBOL

DEPTH IN FEET 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340

SAMPLE	BLOWS
1	23
2	28
3	24
4	17
5	11
6	20
7	10
8	9
	7

DESCRIPTION

0-1.0' Topsoil, dk. brown, silty, dry, sandy fill with coarse gravel

1.0-6.0' Clayey Silt, green brown, med. dense, dry, trace sand (ML)

6.0-30.0' Silty Clay, green brown, very stiff, slight plasticity, moist, trace sand, trace fine gravel (CL)

13.5' Med. gray, stiff to med. stiff, med. plasticity

28.5-30.0' Med. to high plasticity

Bottom of Hole: Depth 30.0'
Elevation 570.0

Hole backfilled with cuttings.

SOIL BORING NO. B-32

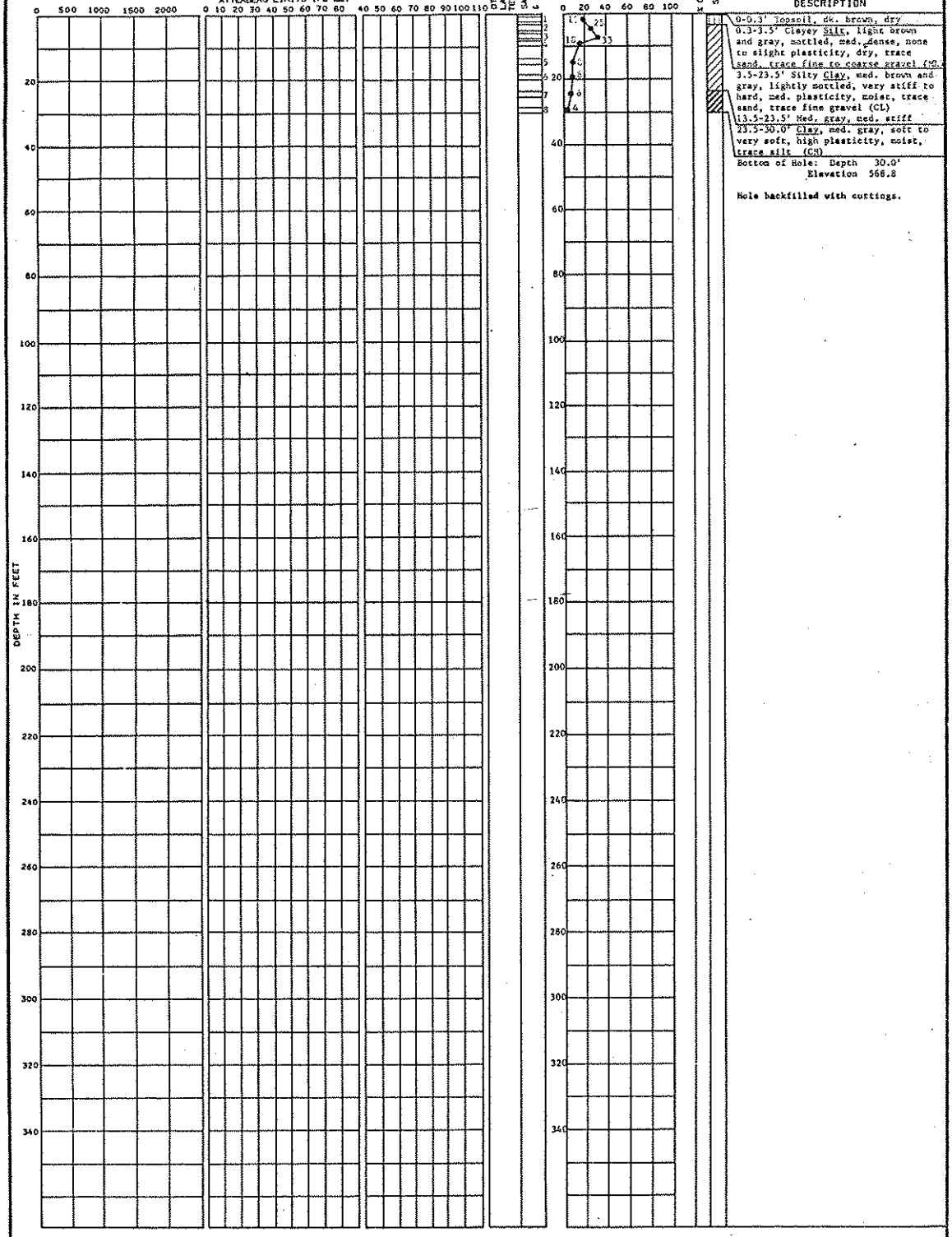
BECHTEL Belle River

LOCATION: N 6156 E 13349

GROUND ELEVATION 598.8

DATE DRILLED: 9/2/77 9/2/77

SHEET 1 OF 1



DESCRIPTION

0-0.3' Topsoil, dk. brown, dry

0.3-3.5' Clayey Silt, light brown and gray, mottled, med. dense, none to slight plasticity, dry, trace sand, trace fine to coarse gravel (ML)

3.5-23.5' Silty Clay, med. brown and gray, lightly mottled, very stiff to hard, med. plasticity, moist, trace sand, trace fine gravel (CL)

13.5-23.5' Med. gray, med. stiff

23.5-30.0' Clay, med. gray, soft to very soft, high plasticity, moist, trace silt (CH)

Bottom of Hole: Depth 30.0'
Elevation 568.8

Hole backfilled with cuttings.

SOIL BORING NO. B-34

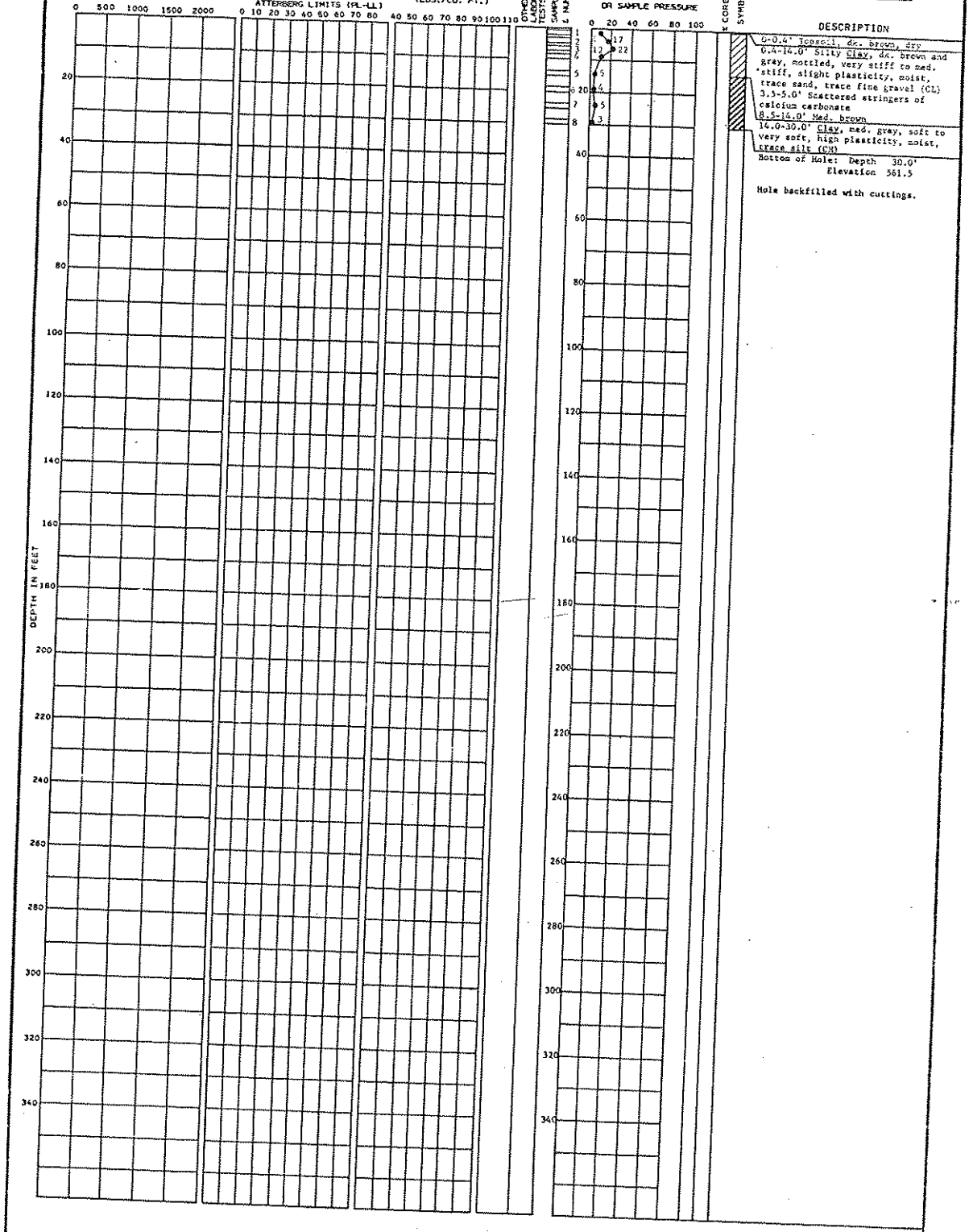
BECHTEL Bells River

LOCATION: N 59+85 E 23+11

GROUND ELEVATION 591.5

DATE DRILLED: 9/2/77

SHEET 1 OF 1



DESCRIPTION

0-0.4' Topsoil, dk. brown, dry

0.4-14.0' Silty Clay, dk. brown and gray, mottled, very stiff to med. stiff, slight plasticity, moist, trace sand, trace fine gravel (CL)

3.5-5.0' Scattered stringers of calcium carbonate

8.5-14.0' Med. brown

14.0-30.0' Clay, med. grey, soft to very soft, high plasticity, moist, trace silt (CH)

Bottom of Hole: Depth 30.0'
Elevation 561.5

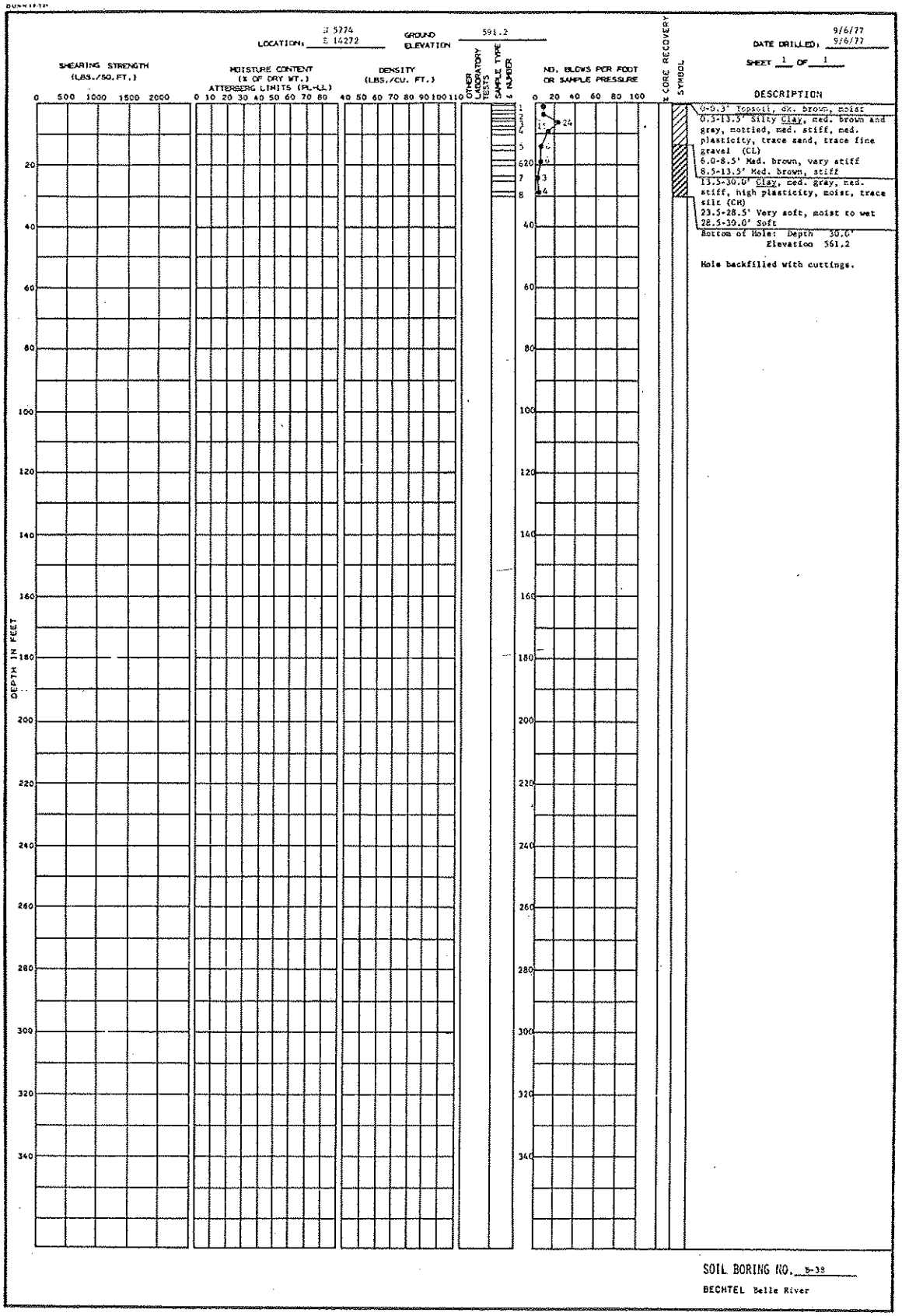
Hole backfilled with cuttings.

SOIL BORING NO. B-36

BECHTEL Belle River

LOCATION: N 5774, E 14272 — GROUND ELEVATION 591.2 — DATE DRILLED: 9/6/77

SHEET 1 OF 1



DESCRIPTION

0-0.5' Topsoil, dk. brown, moist
0.5-13.5' Silty Clay, med. brown and grey, mottled, med. stiff, med. plasticity, trace sand, trace fine gravel (CL)
6.0-8.5' Med. brown, very stiff
8.5-13.5' Med. brown, stiff
13.5-30.0' Clay, med. gray, med. stiff, high plasticity, moist, trace silt (CH)
23.5-28.5' Very soft, moist to wet
28.5-30.0' Soft

Bottom of Hole: Depth 30.0'
Elevation 561.2

Hole backfilled with cuttings.

SOIL BORING NO. B-38

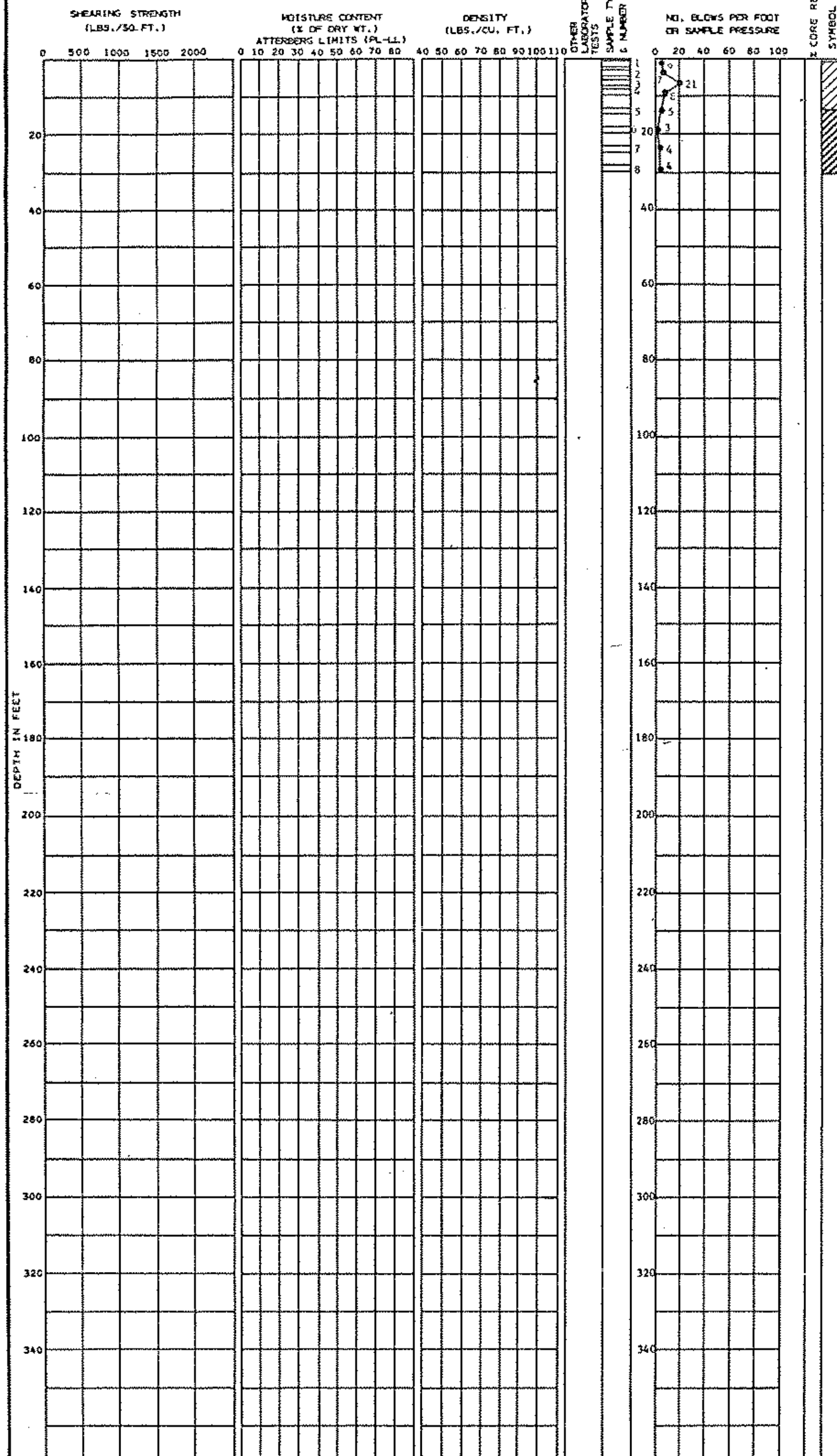
BECHTEL Bells River

LOCATION: N 5582 E 14735

GROUND ELEVATION 590.2

DATE DRILLED: 9/6/77 9/6/77

SHEET 1 OF 1



DESCRIPTION

0-0.4' Topsoil, dk. brown, dry

0.4-13.5' Silty Clay, med. brown, med. stiff to very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)

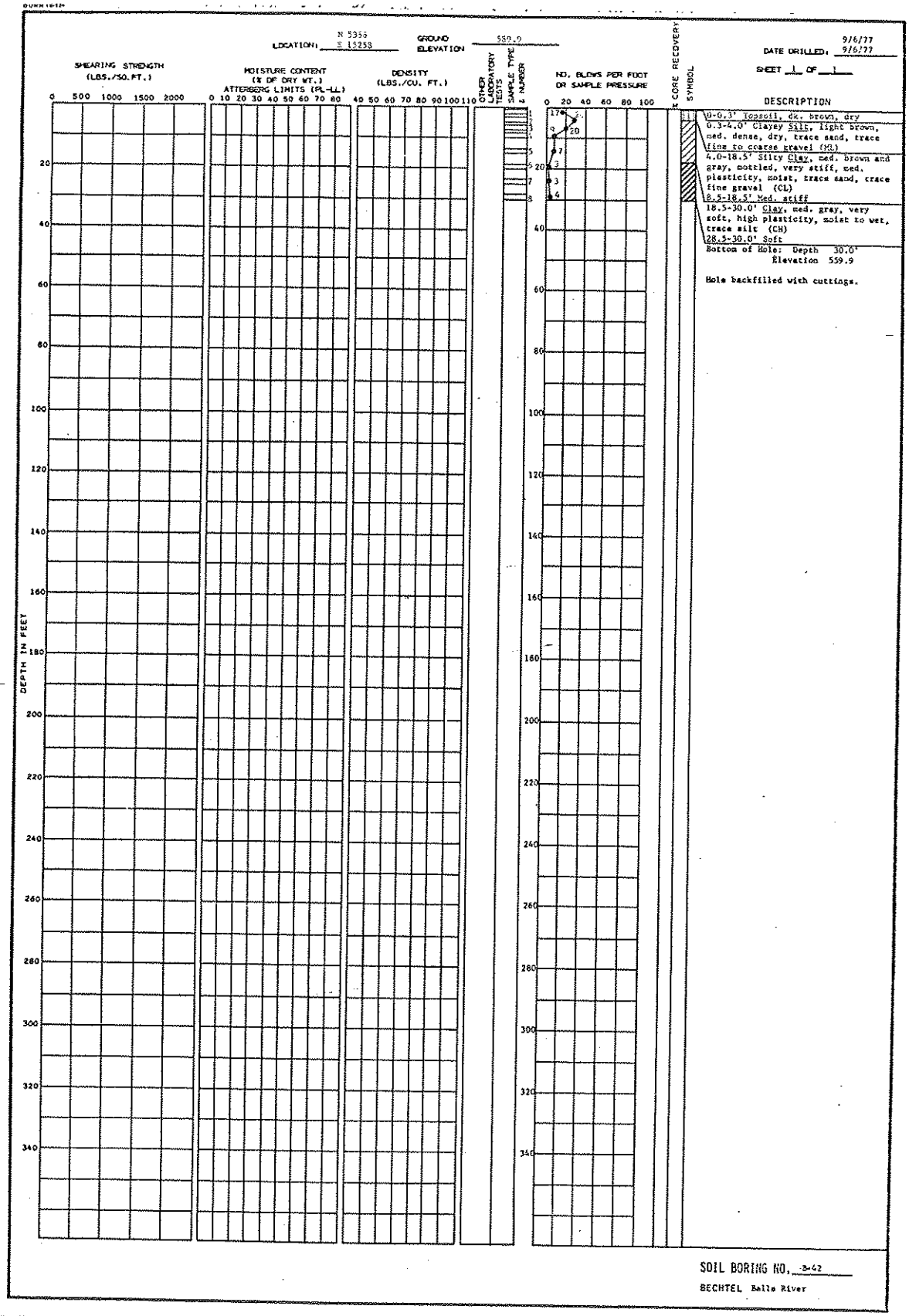
13.5-30.0' Clay, med. gray, soft to very soft, high plasticity, moist to wet, trace silt (CH)

Bottom of Hole: Depth 30.0'
Elevation 560.2

Hole backfilled with cuttings.

SOIL BORING NO. B-40

BECHTEL Belle River


LOCATION: N 5359 E 15253
GROUND ELEVATION 559.9
DATE DRILLED: 9/6/77 9/6/77
SHEET 1 OF 1
SHEARING STRENGTH (LBS./SQ.FT.)
0 500 1000 1500 2000
MOISTURE CONTENT (% OF DRY WT.) ATTERBERG LIMITS (PL-LL)
0 10 20 30 40 50 60 70 80
DENSITY (LBS./CU. FT.)
40 50 60 70 80 90 100 110
OTHER LABORATORY TESTS
SAMPLE TYPE & NUMBER
NO. BLOWS PER FOOT OR SAMPLE PRESSURE
0 20 40 60 80 100
% CORE RECOVERY
SYMBOL
DESCRIPTION
0-0.3' Topsoil, dk. brown, dry
0.3-4.0' Clayey Silt, light brown, med. dense, dry, trace sand, trace fine to coarse gravel (ML)
4.0-18.5' Silty Clay, med. brown and gray, mottled, very stiff, med. plasticity, moist, trace sand, trace fine gravel (CL)
8.5-18.5' Med. stiff
18.5-30.0' Clay, med. gray, very soft, high plasticity, moist to wet, trace silt (CH)
28.5-30.0' Soft
Bottom of Hole: Depth 30.0'
Elevation 559.9
Hole backfilled with cuttings.
DEPTH IN FEET
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340
17 20 2 7 3 3 4
SOIL BORING NO. B-42
BECHTEL Bells River

Geosyntec
consultants

Appendix D

2016 Boring Logs

WELL CONSTRUCTION LOG

TRC

WELL NO. MW-16-01

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	2/29/16	2/29/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.17	591.30	120.0	6/4

Boring Location: Approximately 188 feet off road to the S, W of bottom ash basins.
N: 471155.70 E: 13625546.02

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time 4/13/16 08:45 ▼ Depth (ft bgs) 14.52

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	**SILTY CLAY WITH GRAVEL** mostly clay, little to some silt, little fine to coarse gravel, few fine sand, low plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				CLAY mostly clay, trace fine to coarse gravel, high plasticity, brown (10YR 5/3), moist, stiff.				Original boring abandoned due to compromised screen. Redrilled and installed at survey location noted above within 10 feet of original location.
				Change to dark gray (10YR 4/1), very stiff at 5.0 feet.				
				Change to soft at 8.0 feet.				
2 CS	50		10	Change to no gravel, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very soft at 10.0 feet.				
			15 ▼					
3 CS	100		20	Change to dark gray (10YR 4/1) at 20.0 feet.	CL			
			25					
4 CS	100		30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: Chris Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

Checked By: C. Scieszka

WELL CONSTRUCTION LOG

WELL NO. MW-16-01

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, soft.				
6 ST	100		50					
7 CS	100		55					
8 CS	80		60					
9 CS	100		65		CL			
10 CS	100		70					
11 CS	100		75					
			80					
			85					
			90	**SAND** mostly fine sand, dark gray (10YR 4/1), saturated.	SP			
			95					
			100	End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

TRC

WELL NO. MW-16-02

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/14/16	3/15/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	586.27	588.94	100.0	6/4

Boring Location: 325 feet W of haul road, 5 feet N of road, N of bottom ash basins.

N: 471409.06 E: 13625991.78

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time 4/13/16 09:24 Depth (ft bgs) 16.07

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	**CLAY** mostly clay, few silt, few coarse gravel, medium plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				Change to no gravel at 7.0 feet.				
2 CS	80		10	Change to high plasticity, dark gray (10YR 4/1), moist, very soft at 10.0 feet.				
			15 ▼					
3 CS	100		20		CL			
			25					
4 CS	90		30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature:

Checked By: C. Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-02

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		50	**SILTY CLAY** mostly clay, little to some silt, few fine sand, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1), very soft.	CL-ML			
7 CS	50		55					
			60					
8 CS	100		65					
			70					
9 CS	100		75					
			80					
10 CS	100		85					
			90	**CLAYEY SILT** mostly silt, some clay, few fine sand, few coarse gravel, low plasticity, dark gray (10YR 4/1), moist, very soft.	ML-CL			
			95	**SAND** mostly fine to coarse sand, dark gray (10YR 4/1), saturated. Change to fine sand at 96.0 feet.	SW			
			100	End of boring at 100.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-03

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	5/25/16	5/31/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.03	590.66	150.0	6/4

Boring Location: Approximately 100 feet W of haul road, N of bottom ash basins.	Personnel	Drilling Equipment:
N: 471391.78 E: 13626202.49	Logged By - J. Reed Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:		
China Township	St. Clair	MI	While Drilling:	Date/Time	Depth (ft bgs)
			After Drilling:	Date/Time 6/8/16 14:30	Depth (ft bgs) 12.82

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
			0	**TOPSOIL**				
1 CS	100		5	**SILTY CLAY** mostly clay, some silt, few fine to medium sand, trace gravel, low to medium plasticity, dark gray (10YR 4/1) with trace orange mottling, moist, medium stiff to stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		10	Change to gray (10YR 5/1) at 10.5 feet.				
			15	**CLAY** mostly clay, few silt, trace to few fine to medium sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
3 CS	100		20					
			25	Change to trace to few fine to coarse sand at 25.0 feet.	CL			
4 CS	100		30					
			35					
			40	Change to trace fine to coarse sand at 41.5 feet.				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Checked By: M. Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-03

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few silt, trace fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
			50					
6 CS	90		55		CL			
			60	Change to stiff at 60.5 feet. Change to medium stiff at 62.0 feet.				
7 CS	100		65	**SANDY CLAY** mostly clay, little to some sand, few silt, gray (10YR 5/1), moist, soft to medium stiff.	CL			
				CLAY mostly clay, few silt, few fine to coarse sand, gray (10YR 5/1), moist, stiff. Change to coal fragments present at 67.5 feet. Change to no coal fragments present at 68.0 feet.				
			70		CL			
8 CS	90		75	1-inch thick interval of silty fine to coarse sand at 75.0 feet.				
			80	**SANDY SILT** mostly silt, little to some fine to medium sand, gray (10YR 5/1), moist, medium dense.	ML			
				CLAY mostly clay, few silt, few fine to coarse sand, low to medium plasticity, gray (10YR 5/1), moist, stiff.				
9 CS	100		85					
			90	Change to medium soft at 90.0 feet.	CL			
10 CS	100		95	Change to few fine gravel from 94.0 to 95.0 feet. Change to trace fine gravel, medium stiff to stiff at 95.0 feet.				
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-03

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**CLAY** mostly clay, few silt, few fine to coarse sand, trace fine gravel, medium plasticity, gray (10YR 5/1), medium stiff to stiff.				
			110	Change to low plasticity, soft to medium stiff at 111.0 feet.				
12 CS	100		115		CL			
			120					
13 CS	100		125					
				SANDY CLAY mostly clay, little to some fine to medium sand, few silt, trace to few fine gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff.	CL			
			130	**SILTY SAND** mostly fine to medium sand, little silt, gray (10YR 5/1), moist, loose.	SM			
14 CS	90		135	**SAND** mostly fine to medium sand, trace silt, gray (10YR 5/1), moist, loose.	SP			
				SILTY SAND mostly fine to medium sand, little silt, few clay, gray (10YR 5/1), moist, loose.	SM			
			140	**SAND** mostly fine to coarse sand, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.				
15 CS	100		145		SW			
				SILT mostly silt, few clay, trace coarse sand to fine gravel, gray (10YR 5/1), dry to moist, dense to very dense.	ML			
			150	**SHALE** weathered shale bedrock, dark gray.				
				End of boring at 150 feet below ground surface.				
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

TRC

WELL NO. MW-16-04

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/7/16	3/8/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	587.50	590.51	130.0	6/4

Boring Location: 200 feet from W corner of road, S of bottom ash basins.

N: 470893.74 E: 13625876.34

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time — Depth (ft bgs)
After Drilling: Date/Time 4/13/16 09:31 — Depth (ft bgs) 13.91

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), very stiff. Change to no gravel at 1.0 feet.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			10	Change to stiff at 10.5 feet.				
2 CS	100		15	Change to dark gray (10YR 4/1), very soft at 12.0 feet. ▼				
3 CS	100		25		CL			
4 CS	100		35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: Chris Scieszka

Checked By: C. Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-04

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			
6 CS	100		55					
7 CS	100		60	Change to few coarse gravel at 60.0 feet.				
8 CS	100		65					
9 CS	100		70					
10 CS	100		75	**SILTY CLAY** mostly clay, little to some silt, trace fine sand, medium plasticity, dark gray (10YR 4/1), very stiff.	CL-ML			
				SILT mostly silt, trace to few fine sand, non plastic, dark gray (10YR 4/1), saturated, stiff.	ML			
			80	**SAND** mostly fine sand, few medium to coarse sand, dark gray (10YR 4/1), moist.	SP			
				SANDY CLAY mostly clay, some fine sand, high plasticity, dark gray (10YR 4/1), moist.	CL			
			85	**SILTY CLAY** mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.	CL-ML			
				CLAYEY SILT mostly silt, some clay, low plasticity, dark gray (10YR 4/1), stiff.	ML-CL			
			90	**SILTY CLAY** mostly clay, some silt, high plasticity, dark gray (10YR 4/1), stiff.	CL-ML			
			95					
			100	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-04

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), very soft.	CL			
			110					
12 CS	100		115	**SILT** mostly silt, few fine sand, nonplastic, dark gray (10YR 4/1), saturated, stiff.	ML			
			120	**SAND** mostly fine sand, dark gray (10YR 4/1), saturated.				
13 CS	100		125		SP			
			130	End of boring at 130.0 feet below ground surface.				
			135					
			140					
			145					
			150					
			155					

WELL CONSTRUCTION LOG

WELL NO. MW-16-05

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/3/16	3/4/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.32	590.82	150.0	6

Boring Location: S end of haul road, W of diversion basin.	Personnel	Drilling Equipment:
N: 470378.15 E: 13626342.79	Logged By - A. Knutson Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time After Drilling: Date/Time 4/13/16 09:55 ▼ Depth (ft bgs) 14.37

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	80		5	**CLAY WITH GRAVEL** mostly clay, few to some coarse gravel, high plasticity, dark grayish brown (10YR 4/2), moist, very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				CLAY mostly clay, few fine to coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, hard.				
				Change to no gravel, very stiff at 4.0 feet.				
2 CS	100		10	Change to dark gray (10YR 4/1), very soft at 10.0 feet.				
			15	▼				
3 CS	100		20		CL			
			25	Change to medium stiff at 26.0 feet.				
				Change to very soft at 28.0 feet.				
4 CS	100		30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Firm: TRC Environmental Corporation 734.971.7080
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: C. Scieszka

WELL CONSTRUCTION LOG

WELL NO. MW-16-05

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
				SILTY CLAY mostly clay, little to some silt, medium plasticity, dark gray (10YR 4/1), very soft.	CL-ML			
6 ST	100		50	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
7 CS	100		55					
			60	Change to few fine to coarse gravel at 60.0 feet.	CL			
8 CS	100		65	Change to medium stiff at 65.0 feet.				
				Change to stiff at 67.5 feet.				
			70	**SILTY CLAY** mostly clay, some silt, few fine to coarse gravel, high plasticity, very dark gray (10YR 3/1), very stiff.				
9 CS	100		75					
				Change to low plasticity, black (10YR 2/1), hard at 77.0 feet.	CL-ML			
10 CS	60		80					
			85	Change to few to little fine sand at 85.5 feet.				
			90	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
11 CS	100			Change to medium stiff at 93.5 feet.				
			95		CL			
				Change to soft at 97.5 feet.				
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-05

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
12 CS	100		105	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL			
13 CS	100		110					
14 CS	100		115					
15 CS	100		120					
16 CS	90		125					
			130					
			135	**CLAYEY SILT** mostly silt, some clay, medium plasticity, dark gray (10YR 4/1), wet, medium stiff.	ML-CL			
			140	**SHALE** dark gray (10YR 4/1), dry.				
			145					
			150	End of boring at 150.0 feet below ground surface.				
			155					

WELL CONSTRUCTION LOG

WELL NO. MW-16-06

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/10/16	3/11/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.98	593.21	140.0	6

Boring Location: 123 feet S of road connecting to haul road, E of diversion basin.

N: 470439.03 E: 13626796.04

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time 4/13/16 10:01 ▼ Depth (ft bgs) 14.45

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		5	**GRAVEL WITH SAND** mostly gravel, some fine to coarse sand, brown (10YR 5/3), moist, dense. **CLAY** mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	100		10	Change to few coarse gravel at 10.0 feet. Change to dark gray (10YR 4/1), stiff at 12.0 feet. Change to very soft at 13.0 feet. ▼				
3 CS	100		15					
4 CS	100		20		CL			
			25					
			30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature:

Checked By: C. Scieszka

Firm: TRC Environmental Corporation 734.971.7080
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-06

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.				
			50					
6 CS	100		55		CL			
			60					
7 CS	100		65					
			70	**SILTY CLAY** mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
				SAND mostly fine sand, few coarse sand, dark gray (10YR 4/1), moist.	SP			
8 CS	100		75	**SILTY CLAY** mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.				
			80		CL-ML			
9 CS	80		85					
			90	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
10 CS	70		95		CL			
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-06

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.				
12 CS	100		110		CL			
13 CS	100		115					
14 CS	100		120					
			125	**SILTY CLAY** mostly clay, some silt, medium plasticity, dark gray (10YR 4/1), moist, medium stiff.	CL-ML			
			130					
			135	**SILT** mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
				SHALE dark gray (10YR 4/1), hard, brittle.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-07

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/8/16	3/9/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.89	592.58	140.0	6

Boring Location: 326 feet S of road connecting to haul road, E of diversion basin.

N: 470233.47 E: 13626858.79

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time 4/13/16 11:56 ▼ Depth (ft bgs) 14.13

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	60		5	**CLAY** mostly clay, few coarse gravel, high plasticity, brown (10YR 5/3) mottled with dark gray (10YR 4/1), very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				Change to dark gray (10YR 4/1) mottled with brown (10YR 5/3) at 5.0 feet.				
2 CS	100		10	Change to dark gray (10YR 4/1) at 11.0 feet.				
			15	▼ Change to moist, very soft at 13.0 feet.				
3 CS	100		20					
			25					
4 CS	100		30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature:

Checked By: C. Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-07

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 ST	100		50					
7 CS	100		55	**SILTY CLAY** mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
8 CS	100		60					
			65	**CLAYEY SILT** mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
				SAND mostly fine to coarse sand, dark gray (10YR 4/1), moist, loose.	SW			
				CLAYEY SILT mostly silt, little to some clay, few fine to coarse sand, low plasticity, dark gray (10YR 4/1), moist.	ML-CL			
9 CS	100		70	**SILTY CLAY** mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft. Change to few coarse gravel at 70.0 feet.				
			75					
10 CS	100		80					
			85		CL-ML			
11 CS	100		90					
			95					
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-07

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
12 CS	100		105	**SILTY CLAY** mostly clay, little silt, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
13 CS	80		110					
14 CS	100		115					
15 CS	100		120					
			125					
			130	**SILT** mostly silt, no plasticity, dark gray (10YR 4/1), saturated, loose.	ML			
			135	**SHALE** dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-08

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/9/16	3/10/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.31	591.88	140.0	6

Boring Location: 566.6 feet S of road connecting to haul road, E of diversion basin.

N: 470002.90 E: 13626846.85

Personnel
Logged By - A. Knutson
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time 4/13/16 12:00 ▼ Depth (ft bgs) 13.19

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	50		0	**CLAY WITH GRAVEL** mostly clay, little coarse gravel, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1) mottled with brown (10YR 5/3), moist, very stiff.				
2 CS	100		10	Change to dark gray (10YR 4/1), very soft at 10.0 feet. ▼				
3 CS	100		15					
			20					
4 CS	100		25		CL			
			30					
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Checked By: C. Scieszka

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

WELL NO. MW-16-08

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL			
6 CS	100		50					
7 CS	80		55					
8 CS	100		60					
9 CS	100		65					
10 CS	60		70	**SILTY CLAY** mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.	CL-ML			
			75					
			80					
			85					
			90					
			95					
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-08

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**SILTY CLAY** mostly clay, some silt, few coarse gravel, high plasticity, dark gray (10YR 4/1), moist, soft.				
				Change to few fine sand at 105.5 feet.				
			110	Change to no sand at 110.0 feet.				
12 CS	100		115		CL-ML			
13 CS	100		120					
			125					
			130					
14 CS	100		135	**SILT** mostly silt, dark gray (10YR 4/1), saturated, very soft.	ML			
				SHALE dark gray (10YR 4/1), brittle, hard.				
			140	End of boring at 140.0 feet below ground surface.				
			145					
			150					
			155					

WELL CONSTRUCTION LOG

WELL NO. MW-16-09

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	6/1/16	6/1/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.28	590.80	150.0	6

Boring Location: E of bottom ash basins, E of haul road. N: 471284.45 E: 13626365.84	Personnel: Logged By - J. Reed; Driller - A. Goldsmith	Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations: While Drilling: Date/Time; After Drilling: Date/Time 6/9/16 15:13
China Township	St. Clair	MI	Depth (ft bgs); Depth (ft bgs) 14.36

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	75		0	**TOPSOIL**				
				SILTY CLAY mostly clay, little to some silt, few fine to coarse sand, trace to few fine gravel, low plasticity, dark grayish brown (10YR 4/2), moist, stiff.	CL-ML			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
			5	**CLAY** mostly clay, few silt, trace to few fine to coarse sand, medium plasticity, gray (10YR 5/1), moist, soft.				
2 CS	85		10					
			15	▼				
3 CS	100		20		CL			
			25					
4 CS	100		30	Change to trace to few fine gravel at 30.0 feet.				
			35					
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Firm: TRC Environmental Corporation, 1540 Eisenhower Place Ann Arbor, Michigan 734.971.7080 Fax 734.971.9022

Checked By: M. Powers

WELL CONSTRUCTION LOG

WELL NO. MW-16-09

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
			45	**CLAY** mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, soft.				
5 CS	100		50	Change to soft to medium stiff at 50.0 feet.				
			55					
			60					
			65					
6 CS	100		70	Change to soft at 70.0 feet.	CL			
			75					
			80	Change to medium stiff to stiff at 80.0 feet.				
			85	Change to stiff at 85.0 feet.				
7 CS	100		90					
			95					
			100					

WELL CONSTRUCTION LOG

WELL NO. MW-16-09

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
8 CS	75		105	**CLAY** mostly clay, few silt, trace to few fine to coarse sand, trace to few fine gravel, medium plasticity, gray (10YR 5/1), moist, stiff. Change to medium stiff at 105.0 feet.	CL			
9 CS	80		115					
10 CS	100		130					
			135	**SAND** mostly fine sand, trace silt, dark gray (10YR 4/1), moist, loose.	SP			
11 CS	80		145	**SAND WITH GRAVEL** mostly fine to coarse sand, little to some fine to medium gravel, trace to few silt, trace to few clay, dark gray (10YR 4/1), moist to wet, loose.	SW			
				SHALE weathered, gray (10YR 5/1), brittle.				
			150	End of boring at 150.0 feet below ground surface.				
			155					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-10

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	6/2/16	6/3/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.25	592.26	150.0	6

Boring Location: S end of haul road, W/NW of diversion basin. N: 470532.54 E: 13626417.00	Personnel: Logged By - J. Reed; Driller - A. Goldsmith	Drilling Equipment: TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time 6/9/16 07:45 ▼ Depth (ft bgs) 15.30

Sample Number and Type	Recovery (%)	Blow Counts	Depth in Feet	Lithologic Description	USCS	Graphic Log	Well Diagram	Comments
			0	**TOPSOIL**				
				CLAY mostly clay, few silt, trace to few fine to coarse sand, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
1 CS	50		5					
			10					
				Change to gray (10YR 5/1) at 11.0 feet. Change to soft to medium stiff at 12.0 feet.				
2 CS	90		15 ▼					
			20		CL			
3 CS	95		25	Change to soft at 25.0 feet.				
			30	Change to few fine to coarse sand, medium stiff at 30.0 feet.				
				Change to dark gray (10YR 4/1) at 32.0 feet.				
4 CS	100		35	Change to soft at 35.0 feet.				
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Firm: TRC Environmental Corporation 734.971.7080
1540 Eisenhower Place Ann Arbor, Michigan Fax 734.971.9022

Checked By: M. Powers

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	100		45	**CLAY** mostly clay, few silt, trace to few fine to coarse sand, dark gray (10YR 4/1), moist, soft.				
			50					
6 CS	100		55		CL			
			60					
7 CS	100		65					
			70	**CLAY WITH SAND** mostly clay, little fine to coarse sand, few silt, trace gravel, dark gray (10YR 4/1), moist, very stiff.				
8 CS	100		75	Change to few to little medium to coarse sand, low to medium plasticity, stiff at 75.0 feet.	CL			
			80	**CLAYEY SAND** mostly fine to coarse sand, some clay, dark grayish brown (10YR 4/2), moist, medium dense.	SC			
9 CS	100		85	**SAND** mostly fine to medium sand, dark grayish brown (10YR 4/2), moist, loose.	SP			
			90	**SANDY CLAY** mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.				
10 CS	100		95		CL			
			100	**CLAY WITH SAND** mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			

WELL CONSTRUCTION LOG

WELL NO. MW-16-10

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	100		105	**CLAY WITH SAND** mostly clay, little fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff to stiff.	CL			
			110	**SANDY CLAY** mostly clay, little to some fine to coarse sand, few silt, medium plasticity, dark grayish brown (10YR 4/2), moist, medium stiff.	CL			
12 CS	100			**SAND** mostly medium to coarse sand, dark gray (10YR 4/1), moist, loose.	SP			
			115	**CLAY** mostly clay, little sand, few to little silt, dark gray (10YR 4/1), moist, stiff.				
13 CS	95		120					
			125					
14 CS	95		130		CL			
			135					
15 CS	50		140					
			145	**GRAVELLY SILT** mostly silt, some fine to coarse gravel, few clay, few sand, low to medium plasticity, dark gray (10YR 4/1), moist, soft.	ML			
				SILTY CLAY hard, dark gray (10YR 4/1), hardpan, brittle.	CL-ML			
			150	**SHALE** dark gray.				
				End of boring at 150.0 feet below ground surface.				
			155					
			160					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-11

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	6/3/16	6/6/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.03	591.54	150.0	6

Boring Location: S of haul road, W of diversion basin.	Personnel	Drilling Equipment:
N: 470251.34 E: 13626438.92	Logged By - J. Reed Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time After Drilling: Date/Time 6/21/16 07:45 ▼ Depth (ft bgs) 14.47

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
			0	**TOPSOIL**				
1 CS	50		5	**CLAY** mostly clay, few silt, trace to few sand, few gravel, low to medium plasticity, dark grayish brown (10YR 4/2), moist, stiff.				Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
				Change to trace gravel at 8.0 feet.				
2 CS	70		10	Change to gray (10YR 5/1) at 12.0 feet.				
			15	Change to no gravel at 13.0 feet. ▼				
3 CS	90		20	Change to medium stiff at 21.0 feet.	CL			
			25					
4 CS	90		30					
			35	Change to soft to medium stiff at 34.5 feet.				
			40					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature: [signature]

Checked By: M. Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

WELL CONSTRUCTION LOG

TRC

WELL NO. MW-16-11

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
5 CS	90		45	**CLAY** mostly clay, few silt, trace to few sand, medium plasticity, gray (10YR 5/1), moist, soft to medium stiff.				
			50	Change to medium stiff at 49.0 feet.				
6 CS	100		55					
			60	Change to soft at 60.0 feet.				
7 CS	100		65					
			70	Change to trace gravel, soft to medium stiff at 70.0 feet.	CL			
8 CS	100		75	Change to medium stiff at 75.0 feet.				
			80					
9 CS	90		85					
			90					
10 CS	90		95	Change to medium stiff to stiff at 95.0 feet.				
			100					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

WELL CONSTRUCTION LOG

WELL NO. MW-16-11

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
11 CS	85		105	**CLAY** mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff to stiff.				
			110	Change to medium stiff at 110.0 feet.				
12 CS	80		115					
			120		CL			
13 CS	85		125					
			130					
14 CS	90		135					
			140	**SANDY CLAY** mostly clay, some fine sand, few silt, dark gray (10YR 4/1), moist.	CL			
				CLAY mostly clay, few silt, trace to few sand, trace gravel, low to medium plasticity, gray (10YR 5/1), moist, medium stiff.	CL			
15 CS	90		145	**SHALE** dark gray.				
			150	End of boring 150.0 feet below ground surface.				
			155					

WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

Facility/Project Name	Date Drilling Started	Date Drilling Completed	Project Number
DTE Electric Company Belle River Power Plant	5/11/17	5/12/17	231828.0003

Drilling Firm	Drilling Method	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	589.5	591.66	142.0	6

Boring Location: North of fuel oil tank number 2, between berm and fence.

Personnel
Logged By - J. Krenz
Driller - A. Goldsmith

Drilling Equipment: TSi 150cc

Civil Town/City/or Village	County	State
China Township	St. Clair	MI

Water Level Observations:
While Drilling: Date/Time
After Drilling: Date/Time 5/15/17 08:38 ▼ Depth (ft bgs) 17.79

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 CS	90		0	**CLAY** mostly clay, trace gravel, medium plasticity, dark grayish brown (10YR 4/2), mottled with dark yellowish brown (10YR 4/6), medium stiff, moist, plant roots to 0.5 feet.	CL			Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to install monitoring well.
2 CS	60		10					
3 CS	70		20	▼ Change to high plasticity, gray (10YR 5/1), soft at 19.0 feet.				
4 CS	70		30					
5 CS	100		40					
6 CS	100		50					
7			60					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 8/21/17

Signature: Jarl Krenz Firm: TRC Environmental Fax

Checked By: C. Scieszka

WELL CONSTRUCTION LOG

WELL NO. MW-16-11A

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
CS	100		70	**CLAY** mostly clay, trace fine to medium gravel, high plasticity, gray (10YR 5/1), medium stiff, moist.				
				Change to few fine to coarse gravel at 70.0 feet.				
8 CS	100		80	Change to trace fine sand at 80.0 feet.				
9 CS	90							
10 CS	70		90					
11 CS	100		100		CL			
12 CS	100		110					
13 CS	100		120	Change to trace medium to coarse gravel at 126.0 feet.				
14 CS	60		130	**SILT** mostly silt, trace clay, dark gray (10YR 4/1), dense, saturated.	ML			
15 CS	100		140	**SILTY CLAY** mostly clay, some silt, few to little fine to coarse gravel, medium to low plasticity, dark gray (10YR 4/1), moist, medium stiff, inclusions of shale bedrock.	CL-ML			
				BEDROCK shale, weathered, gray (10YR 4/1).				
				End of boring at 142.0 feet below ground surface.				
			150					

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 8/21/17

SOIL BORING LOG

BORING NO. SB-16-01

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
DTE Electric Company Belle River Power Plant	3/1/16	3/1/16	231828.0003

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stock Drilling	Sonic	588.69	---	150.0	6

Boring Location: Corner of E connecting road off haul road, E of bottom ash basins.	Personnel	Drilling Equipment:
N: 471096.38 E: 13626276.67	Logged By - A. Knutson Driller - A. Goldsmith	TSi 150cc

Civil Town/City/or Village:	County:	State:	Water Level Observations:
China Township	St. Clair	MI	While Drilling: Date/Time Depth (ft bgs) After Drilling: Date/Time Depth (ft bgs)

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
1 CS	50		5	**CLAY WITH GRAVEL** mostly clay, little fine to coarse gravel, few fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.	CL		Continuous sampling with 4-inch diameter casing from ground surface to terminus of soil boring, over-drilled with 6-inch diameter casing to total depth.
				CLAY mostly clay, trace fine sand, high plasticity, dark gray (10YR 4/1), mottled with brown (10YR 5/3), moist, very stiff.			
2 CS	100		10	Change to stiff at 10.0 feet.			
			15	Change to no sand, dark gray (10YR 4/1), very soft at 13.0 feet.			
3 CS	100		20		CL		
			25				
4 CS	100		30				
			35				
			40				

SOIL BORING WELL CONSTRUCTION LOG 231828.0003.0000.GPJ TRC_CORP.GDT 7/14/16

Signature:

Checked By: M. Powers

Firm: TRC Environmental Corporation
1540 Eisenhower Place Ann Arbor, Michigan
734.971.7080
Fax 734.971.9022

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
5 CS	100		45	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.			
6 ST	100		50		CL		
7 CS	100		55				
				CLAY WITH SAND mostly clay, little fine to coarse sand, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
8 CS	100		60	**CLAY** mostly clay, high plasticity, dark gray (10YR 4/1), moist, very soft.	CL		
9 CS	100		65	**SANDY SILT** mostly silt, little to some fine to coarse sand, few clay, low plasticity, dark gray (10YR 4/1), moist, stiff.	ML		
10 CS	100		70	**CLAY** mostly clay, few fine to coarse gravel, dark gray (10YR 4/1), moist, medium stiff.			
			75	Change to no gravel, soft at 72.5 feet.			
			80	Change to few coarse gravel at 80.0 feet.			
11 CS	100		85		CL		
			90				
			95				
			100				

SOIL BORING LOG

BORING NO. SB-16-01

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	COMMENTS
12 CS	100		105	**CLAY** mostly clay, few coarse gravel, dark gray (10YR 4/1), moist, soft.	CL		
13 CS	100		110				
14 CS	100		115				
15 CS	100		120				
16 CS	100		125				
			130				
			135	**SILT** mostly silt, few fine sand, non plastic, dark gray (10YR 4/1), moist.	ML		
			140				
			145	**SHALE** dark gray (10YR 4/1), dry.			
			150	End of boring at 150.0 feet below ground surface.			
			155				

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Appendix E

2020 Boring Logs

Boring B-1					
Drilling Start Date:	12/8/2020	**Boring Depth (ft):**	100		
Drilling End Date:	12/9/2020	**Boring Diameter (in.)**	4.25		
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-		
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-		
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.8		
Logged By:	Brian Ares	**Northing, Easting (MI State Plane):**	471073.109	13626167.862	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.8	6'/7'	B-1-1 (3')	Lean CLAY - brown, hard, dry	4.5	Gravel road at surface
5	587.8		B-1-2 (6')	Gravely SAND - brown, poorly graded, fine gravel, coarse sand, silt, dry Lean CLAY - brown, hard, dry		
		100%	B-1-ST-1			
10	582.8	3'/3'	B-1-3 (10')	Same as above	4.5	
15	577.8	6'/7'	B-1-4 (15')	Very stiff from 14 to 16 ft.	2.5	
				Lean CLAY - Gray, soft - medium stiff, moist	0.5	
20	572.8	100%	B-1-ST-2			
25	567.8	6'/6'	B-1-5 (22') B-1-6 (25')	Same as above	0.5	

Boring B-1					
Drilling Start Date:	12/8/2020	**Boring Depth (ft):**	100		
Drilling End Date:	12/9/2020	**Boring Diameter (in.)**	4.25		
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-		
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-		
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.8		
Logged By:	Brian Ares	**Northing, Easting (MI State Plane):**	471073.109	13626167.862	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
30	562.8	4'/9'				
			B-1-7 (34')			
35	557.8				< 0.5	
		75%	B-1-ST-3			
				Same as above		
40	552.8	4'/8'	B-1-8 (40')			
45	547.8					
				Same as above	< 0.5	
		2'/4'	B-1-9 (48')			

Boring B-1					
Drilling Start Date:	12/8/2020	**Boring Depth (ft):**	100		
Drilling End Date:	12/9/2020	**Boring Diameter (in.)**	4.25		
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-		
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-		
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.8		
Logged By:	Brian Ares	**Northing, Easting (MI State Plane):**	471073.109	13626167.862	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	542.8	4'/7'	B-1-10 (52')	Lean CLAY - Gray, soft - medium stiff, moist	< 0.5	
55	537.8	50%	B-1-ST-4			
60	532.8	6'/6'	B-1-11 (59')	Same as above	0.5	
			B-1-12 (63')		0.5	
65	527.8	2'/10'		Same as above	0.5	
70	522.8		B-1-13 (74')	Consistency increases to stiff	1.0	
75	517.8	1'/5'	B-1-14 (80')	Lean CLAYwith Sand - Gray, medium stiff - stiff, moist	0.5 1.5	

Boring B-1					
Drilling Start Date:	12/8/2020	**Boring Depth (ft):**	100		
Drilling End Date:	12/9/2020	**Boring Diameter (in.)**	4.25		
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-		
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-		
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.8		
Logged By:	Brian Ares	**Northing, Easting (MI State Plane):**	471073.109	13626167.862	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.8	25%	B-1-ST-5	Lean CLAY with Sand - Gray, medium stiff - stiff, moist		
			B-1-15 (82')	Becomes very stiff, trace coarse-fine gravel	2.0	
85	507.8	3'/6'	B-1-16 (85')			
			B-1-17 (87')	Becomes stiff, no gravel	1.5	
90	502.8	2'/8'			1	
95	497.8		B-1-18 (94')		1	
		0%				Shelby tube sample attempted, near zero recovery
100	492.8	100%	B-1-ST-6	Boring Terminated @ 100'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-2				
Drilling Start Date:	12/9/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/10/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane)**	470971.736	13625830.745

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1'/1'	B-2-1 (1')	Fat CLAY - brown, hard, some fine gravel and coarse sand, dry	4.5+	Gravel road at surface
		100%	B-2-ST-1			
				Becomes lean	4.5	
5	587.0	4'/4'	B-2-2 (5')		4.5	
		100%	B-2-ST-2			
				Same as above		
10	582.0	3'/3'	B-2-3 (10')			
			B-2-4 (12')	Lean CLAY - gray, very stiff, dry	2.0	
15	577.0	8'/8'				
			B-2-5 (18')			
20	572.0			Becomes soft - medium stiff, moist	0.5	
		7'/7'			0.5	
			B-2-6 (24')			
25	567.0				0.5	
		100%	B-2-ST-3			

Boring B-2				
Drilling Start Date:	12/9/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/10/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane)**	470971.736	13625830.745

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY - gray, soft, wet	< 0.5	
30	562.0	8'/8'	B-2-7 (32')			
35	557.0				< 0.5	
				Becomes moist		
					< 0.5	
40	552.0	10'/10'	B-2-8 (40')		< 0.5	
45	547.0			Becomes soft-stiff	1.0	
			B-2-9 (46')		< 0.5	
		100%	B-2-ST-4			
					1.0	
50	542.0	4'/4'	B-2-10 (50')		0.5	

Boring B-2				
Drilling Start Date:	12/9/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/10/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane)**	470971.736	13625830.745

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Sandy Lean CLAY - gray, stiff, moist		
			B-2-11 (54')		1.0	
55	537.0					
		8'/8'				
					1.0	
60	532.0		B-2-12 (60')			
				Same as above		
					1.0	
		6'/6'	B-2-13 (64')			
65	527.0					
					1.5	
		100%	B-2-ST-5			
				Some coarse gravel (69' - 74')	1.0	
70	522.0		B-2-14 (70')		1.5	
		6'/6'				
					1.0	
75	517.0		B-2-15 (75')	Lean CLAY with Sand - gray, stiff, moist	1.0	
					1.0	
		8'/8'				
80	512.0		B-2-16 (80')		1.0	

Boring B-2				
Drilling Start Date:	12/9/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/10/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane)**	470971.736	13625830.745

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY with Sand - gray, stiff, moist	1.0	
85	507.0	4'/4'	B-2-17 (86')		1.0	
		100%	B-2-ST-6			
90	502.0	5'/5'	B-2-18 (91')	Becomes very stiff	2 2	
				Same as above	2.5	
95	497.0	3'/3'	B-2-19 (96')		2.5	
		100%	B-2-ST-7			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
99	493.0			Boring Terminated @ 99'		

Boring B-3				
Drilling Start Date:	12/10/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/11/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane**	471223.201	13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	592.0	1'/1'	B-3-1 (1')	GRAVELY SAND - tan, well graded, mostly coarse to fine gravel and coarse sand		Gravel road at surface
		100%	B-3-ST-1			
		4'/4'	B-3-2 (5')	Lean CLAY - brown, trace fine gravel, hard, dry	4.5 4.5	
5	587.0					
		100%	B-3-ST-2			
10	582.0	7'/7'	B-3-3 (10')	Becomes very stiff Becomes medium stiff	2.5 2.5 0.5 0.5	
15	577.0		B-3-4 (15')			
20	572.0	6'/6'	B-3-5 (20')	Transition to moist	0.5 0.5	
25	567.0	5'/5'	B-3-6 (25')		0.5 0.5 0.5	

Boring B-3				
Drilling Start Date:	12/10/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/11/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane**	471223.201	13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-3-ST-3	Lean CLAY - gray, medium stiff, moist		
30	562.0	4'/4'	B-3-7 (30')		0.5 0.5	
35	557.0	8'/8'	B-3-8 (35')	Same as above	0.5 0.5	
40	552.0		B-3-9 (40')		0.5	
45	547.0	6'/6'	B-3-10 (45')	Same as above	0.5 0.5 0.5	
		100%	B-3-ST-4			
50	542.0	7'/7'	B-3-11 (50')	Same as above	0.5 0.5	
55	537.0		B-3-12 (55')		0.5 0.5	

Boring B-3				
Drilling Start Date:	12/10/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/11/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane**	471223.201	13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				CLAY - gray, medium stiff, moist		
					0.5	
60	532.0	8'/8'	B-3-13 (60')			
					0.5	
					0.5	
65	527.0	4'/4'	B-3-14 (67')	Sandy Lean CLAY - gray, very fine - fine sand and silt, some fine gravel, moderate grading, moist		
		0%				Shelby tube sample attempted - no recovery
70	522.0	3'/3'	B-3-15 (70')	Lean CLAY with Sand - gray, stiff - very stiff, moist	2.0	
					1.5	
				Same as above		
75	517.0	4'/4'	B-3-16 (75')		1.5	
		100%	B-3-ST-5			

Boring B-3				
Drilling Start Date:	12/10/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/11/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	592.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane**	471223.201	13625788.558

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
80	512.0	9'/9'	B-3-17 (80')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5 1.5 2.0	
85	507.0		B-3-18 (85')		1.5	
90	502.0	5'/5'	B-3-19 (90')	Same as above	2.0 2.0	
95	497.0	4'/4'	B-3-20 (95')	Same as above	2.0 1.5	
99	493.0	100%	B-3-ST-6	Boring Terminated @ 99'		Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite

Boring B-4				
Drilling Start Date:	12/11/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/14/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	586.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane)**	470431.940	13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	586.0	0'/1'		Lean CLAY - brown, very stiff, dry		
		0%				Shelby tube sample attempted from 1-3', no recovery
		0.5'/4'		Same as above	2.5	Very little recovery. This assessment comes from verbal description from drilling crew
5	581.0	100%	B-4-ST-1			
		6'/6'	B-4-1 (10')	Becomes hard	4.5	
10	576.0			Lean CLAY - gray, stiff, dry	1	
			B-4-2 (12')		1	
15	571.0	6'/6'	B-4-3 (15')	Becomes medium stiff, moist	0.5	
					0.5	
20	566.0		B-4-4 (20')		0.5	
		6'/6'		Same as above	0.5	
25	561.0		B-4-5 (25')		0.5	

Boring B-4				
Drilling Start Date:	12/11/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/14/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	586.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane)**	470431.940	13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-4-ST-2	Lean CLAY - gray, medium stiff, moist		
				Same as above	0.5	
30	556.0		B-4-6 (30')			
		6'/6'			0.5	
			B-4-7 (34')		0.5	
35	551.0		B-4-8 (36')	SILTY SAND - gray, mostly very fine - fine sand and silt, some fine gravel, well graded, moist		
		6'/6'		Lean CLAY - gray, medium stiff, moist	0.5	
40	546.0		B-4-9 (40')			
				Same as above	0.5	
		6'/6'			0.5	
45	541.0		B-4-10 (45')			
		100%	B-4-ST-3			
				Same as above		
50	536.0		B-4-11 (50')		0.5	
		7'/7'			0.5	
					0.5	
55	531.0		B-4-12 (55')			

Boring B-4				
Drilling Start Date:	12/11/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/14/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	586.0	
Logged By:	Brian Ares	**Northing, Easting (MI State Plane)**	470431.940	13626386.593

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY - gray, medium stiff, moist	0.5	
		6'/6'				
60	526.0		B-4-13 (60')		0.5	
				Same as above	0.5	
		5'/5'				
65	521.0		B-4-14 (65')		0.5	
		100%	B-4-ST-4			
				Same as above		
70	516.0		B-4-15 (70')			
		8'/8'				
75	511.0		B-4-16 (75')	Lean CLAY with Sand - gray, stiff - very stiff, moist	1.5	
					1.5	
					2.0	
		5'/5'				
80	506.0		B-4-17 (80')		2.0	

Boring B-4					
Drilling Start Date:	12/11/2020	**Boring Depth (ft):**	99		
Drilling End Date:	12/14/2020	**Boring Diameter (in.)**	4.25		
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample		
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-		
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-		
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	586.0		
Logged By:	Brian Ares	**Northing, Easting (MI State Plane)**	470431.940	13626386.593	

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY with Sand - gray, stiff - very stiff, dry	1.5	
		5'/5'			2.0	
85	501.0		B-4-18 (85')			
		100%	B-4-ST-5		1.0	
				Same as above	1.0	
90	496.0		B-4-19 (90')			
		5'/5'			1.5	
				Same as above		
95	491.0	3'/3'	B-4-20 (95')		1.5	
		100%	B-4-ST-6			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
99	487.0			Boring Terminated @ 99'		

Boring B-5				
Drilling Start Date:	12/14/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/14/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	591.3	
Logged By:	Sean Karoly	**Northing, Easting (MI State Plane)**	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	591.3	0.75'/1'		Lean CLAY - light brown, little gravel, little sand, hard, moist	4.0	
		50%	B-5-ST-1			
				Lean CLAY - gray, very stiff - hard, moist	2.0	
		4'/4'			3.5	
5	586.3				> 4.5	
			B-5-1 (7')			
				Fat CLAY - gray to brown, some fine gravel, medium stiff - very stiff	2.5	
10	581.3	7'/7'			0.5	
					0.5	
					1.0	
			B-5-2 (14')			
15	576.3			Lean CLAY - gray, medium stiff, moist	0.5	
		7'/7'				
					0.5	
20	571.3				0.5	
			B-5-3 (21')	Same as above		
					0.5	
		5'/6'				
25	566.3				0.5	
		100%	B-5-ST-2		0.5	

Boring B-5				
Drilling Start Date:	12/14/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/14/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	591.3	
Logged By:	Sean Karoly	**Northing, Easting (MI State Plane)**	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
			B-5-4 (29')	Lean CLAY - gray, medium stiff - stiff, moist		
30	561.3				1.0	
		7'/7'	B-5-5 (32')		1.0	
					1.0	
35	556.3					
				Same as above	1.0	
			B-5-6 (37')			
		5'/5'				
					0.5	
40	551.3					
				Same as above		
			B-5-7 (42')		1.0	
		6'/6'				
45	546.3				1.0	
			B-5-8 (46')			
		100%	B-5-ST-3		1.0	
				color transition to darker gray		
50	541.3				0.5	
		4'/4'				1 cm sand seam observed
			B-5-9 (52')	Becomes stiff	1.5	

Boring B-5				
Drilling Start Date:	12/14/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/14/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	591.3	
Logged By:	Sean Karoly	**Northing, Easting (MI State Plane)**	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY - dark gray, medium stiff - stiff, moist		
55	536.3	8'/8'	B-5-10 (57')		1.0	
					0.5	
60	531.3			Lean CLAY with Sand - dark gray, trace fine and coarse gravel, medium stiff - stiff, moist	1.0	Some fine black gravel observed
		6'/6'	B-5-11 (62')		0.5	
					1.0	
65	526.3				1.5	
			B-5-12 (66')		1.5	
		100%	B-5-ST-4		1.0	
				Same as above		
70	521.3				1.5	
		9'/9'	B-5-13 (72')		1.0	
75	516.3				1.0	
			B-5-14 (77')		1.5	

Boring B-5				
Drilling Start Date:	12/14/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/14/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	591.3	
Logged By:	Sean Karoly	**Northing, Easting (MI State Plane)**	470218.324	13626779.118

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY with Sand - dark gray, trace fine and coarse gravel, stiff - very stiff, moist	1.0	
80	511.3					
					2.0	
		9'/9'	B-5-15 (82')			
					1.0	
85	506.3					
			B-5-16 (86')		1.5	
		100%	B-5-ST-5			
90	501.3			Same as above	2.5	
			B-5-17 (92')		2.5	
		8'/8'				
					2.0	
95	496.3					
			B-5-18 (96')		2.0	
		100%	B-5-ST-6 B-5-19 (99')			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
99	492.3			Boring Terminated @ 99'		

Boring B-6				
Drilling Start Date:	12/15/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/15/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	589.3	
Logged By:	Sean Karoly	**Northing, Easting (MI State Plane):**	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
0	589.3	1'/1'		GRAVEL - light gray to gray, mostly coarse and fine gravel and sand		
		50%	B-6-ST-1	Lean CLAY - gray to brown, trace gravel, very stiff - hard, moist		
		3.5'/4'	B-6-1 (5')		3.0 4.5 3.5 3.0	
5	584.3					
		100%	B-6-ST-2	Lean CLAY - gray, very stiff, moist	3.0	
10	579.3		B-6-2 (10')		3.0	
		7'/7'		Becomes medium stiff - stiff	1.0 0.5	
15	574.3		B-6-3 (15')		0.5	
		4'/4'		Same as above	0.5 0.5	
20	569.3		B-6-4 (20')	Same as above	0.5	
		7'/7'			1.0 0.5	
25	564.3		B-6-5 (25')		1.0	

Boring B-6				
Drilling Start Date:	12/15/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/15/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	589.3	
Logged By:	Sean Karoly	**Northing, Easting (MI State Plane):**	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
		100%	B-6-ST-3	Lean CLAY - gray, medium stiff - stiff, moist		
				Same as above	0.5	
30	559.3		B-6-6 (30')		0.5	
		9'/9'			1.0	
35	554.3		B-6-7 (35')		0.5	
					0.5	
				Same as above		
					0.5	
40	549.3		B-6-8 (40')			
		9'/9'			0.5	
45	544.3		B-6-9 (45')		0.5	
					1.0	
		100%	B-6-ST-4			

Boring B-6				
Drilling Start Date:	12/15/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/15/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	589.3	
Logged By:	Sean Karoly	**Northing, Easting (MI State Plane):**	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
50	539.3	9'/9'	B-6-10 (50')	Lean CLAY - gray, medium stiff - stiff, moist Color transition to darker gray	1.0 1.0	
55	534.3		B-6-11 (55')		1.0	
60	529.3	9'/9'	B-6-12 (60')	Lean CLAY with Sand - gray, stiff, moist Same as above	1.0 1.5	
65	524.3		B-6-13 (65')		1.5 1.5	
		100%	B-6-ST-5			
70	519.3	9'/9'	B-6-14 (70')	Same as above	1.0 1.5	
75	514.3		B-6-15 (75')		1.5 1.5	

Boring B-6				
Drilling Start Date:	12/15/2020	**Boring Depth (ft):**	99	
Drilling End Date:	12/15/2020	**Boring Diameter (in.)**	4.25	
Drilling Company:	Cascade Drilling	**Sampling Method(s):**	Shelby Tube, Grab Sample	
Drilling Method:	Sonic	**GW During Drilling (ft bgs):**	-	
Drilling Equipment:	600T	**GW After Drilling (ft bgs):**	-	
Driller Name:	Joe Lary III	**Ground Surface Elev. (ft):**	589.3	
Logged By:	Sean Karoly	**Northing, Easting (MI State Plane):**	470018.376	13626852.319

DEPTH (ft)	ELEVATION (ft)	RECOVERY (ft.)	SAMPLE	MATERIAL DESCRIPTION	PENETROMETER	REMARKS
				Lean CLAY with Sand - gray, stiff, moist		
80	509.3		B-6-16 (80')		1.5	
		9'/9'			1.5	
85	504.3		B-6-17 (85')	Becomes very stiff	2.0	
		100%	B-6-ST-6			
				Becomes stiff	1.5	
90	499.3		B-6-18 (90')			
		8'/8'			1.5	
95	494.3		B-6-19 (95')	Some gravel observed	1.5	
		100%	B-6-ST-7 B-6-20 (99')			Borehole grouted with grout mixture - Grout 20% solids Pumpable Bentonite
99	490.3			Boring Terminated @ 99'		

Geosyntec
consultants

Appendix F

1970's Lab Test Results

4-6-5-2

SUBSURFACE INVESTIGATION AND FOUNDATION REPORT

THE DETROIT EDISON COMPANY

BELLE RIVER
UNITS 1 & 2
JOB 10539
VOLUME 2 OF 2

GEOLOGY AND SOIL PROPERTIES

AUGUST 1976

BECHTEL
ANN ARBOR, MICHIGAN

TABLE OF CONTENTS

VOLUME 2 OF 2

Appendix C

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B7/28	Jar Sample Clayey SILT; dark gray, low plasticity (CL-ML)	129.5 to 131.0	64								
			H64.1								See plot
B7/30	Jar Sample Silty CLAY; sandy, dark gray, low plasticity (CL-ML)	138.88 to 140.33	65								
			S/H 65.1								See plot

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PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B10/30	Jar Sample	141.3	66								
	Silty CLAY; sandy, dark gray, low plasticity (CL-ML)		SH 66.1								See plot

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
15/2	1.6' Recovery; say 3.0' to 4.6' depth	3.0-5.0	119								
		3.3-3.6	Saved								
	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL)	3.6-3.7	W119.1	25.5		97					
		3.7	TV								TV=1.00tsf
		3.7-4.1	T119.01	25.4		101	UU	8.0 2386			$\bar{\sigma}_c$=475 psf
		3.7-4.1	L119.1	23.6	45 21						
		4.1-4.2	W119.2	25.3		97					
		4.2	TV								TV=1.20tsf
		4.2-4.5	Saved								

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SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
15/4	1.3' Recovery; say 8.0' to 9.3' depth	8.0-10.0	120									
		8.1-8.4	saved									
	Silty CLAY, dark gray, stiff consistency, moderate to highly plastic (CL)	8.4	TV									TV=0.70 tsf
		8.4-8.6	W120.1	31.2			90					
		8.6-8.9	U120.1	31.1			93	U	6.0 1257			
		8.6-8.9	L120.1	31.5	44	19						
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)	8.9	TV									TV=0.61 tsf
		9.0-9.4	saved									

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SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
15/6	1.2' Recovery; say 18.0' to 19.2' depth	18.0-20.0	121									
	Silty CLAY, dark grey, soft to firm consistency, moderate to highly plastic (CL)	18.1-18.4	L121.1	35.0	42	20						
		18.1-18.4	U121.1	34.1			87	U	15.0 508			@20% strain s= 546 psf
		18.4-18.5	W121.1	36.1			83					
		18.5	TV									TV=0.28tsf
		18.8-18.9	W121.2	36.3			83					
		18.9	TV									TV=0.22tsf

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SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
15/14	2.5' Recovery; say 58.0' to 60.5' depth	58.0-60.5	125									
		58.3-58.7	Saved									
	Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)	58.7-58.9	W125.1	23.4								
		58.9	TV									TV = 0.46tsf
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)	58.9-59.2	Saved									
		59.2-59.6	U125.1	22.5			104	U	15.2 1067			@ 20% strain s =1260 psf
		59.2-59.6	L125.1	22.6	34	18						
	Note: Void occurs along outside edge of upper 1.3' of sample	59.6-59.7	W125.2	22.4			103					
		59.7	TV									TV = 0.61tsf
		60.0-60.4	Saved									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
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SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
18/3	2.4' Recovery; say 20.0' to 22.4' depth	20.0-22.5	176										
		20.1-20.4	Saved										
	Silty CLAY, dark grey, soft to firm consistency, moderate to high plasticity (CL)	20.4-20.6	W176.1	39.1			82						
		20.6	TV										TV=0.26tsf
	Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	20.6-20.9	T176.0-1	39.9			83	UU	9.0	411			$\bar{\sigma}_c$-2448psf
		20.6-20.9	L176.1	38.3	44	21							
		20.9-21.2	Saved										
		21.2-21.4	W176.2	32.1			88						
		21.4	TV										TV=0.26tsf
		21.7-22.0	Saved										
		22.0-22.4	Saved										

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
18/6	Sitly CLAY; gray, firm to stiff consistency, moderately plastic (CL)	50.0 to 52.5	345									
		50.3 to 50.5	W345.1	35.8								
		50.5	TV									TV=0.38tsf
	Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	50.5 to 50.8	save 345.1									
		51.2 to 51.4	W345.2	24.6			98					
		51.4	TV									TV=0.50tsf
		51.4 to 51.7	T345.0.1	31.0			92	UU	3.0 827			
		51.4 to 51.7	L345.1	29.6	39	18						

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PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
18/7	2.4' Recovery; say 60.0' to 62.4' depth	60.0 62.5	346									
		60.6	TV									TV=0.46 tsf
	Silty CLAY, Sandy, dark gray, firm to stiff consistency, moderate plasticity (CL)	60.6-61.0	saved									
		61.0 61.3	L346.1	20.2	26	16						
	Sample includes about 30% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	61.4-61.6	W346.2	19.9			109					
		61.6	TV									TV=0.65 tsf
		61.6-62.0	saved									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
18/10	1.3' Recovery; say 88.0' to 89.3' depth	88.0-90.0	179									
		88.4	TV									TV=1.3 tsf
	Silty CLAY, sandy, gray, very stiff consistency, moderate plasticity (CL)	88.4-88.4	W179.1	22.9			99					
		88.7-88.8	W179.2	21.9			98					
	Sample includes about 25% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)	88.8	TV									TV=1.1 tsf
		88.8-90.1	L179.1	17.3	29	15						
		88.8-90.1	T179.01	17.3			110	UU	15.0 2863			σ_c=6336 psf

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BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
18/11	Jar Sample	103.5-105.0	430								
			S430.1								See plot
	Silty SAND, subrounded to subangular fine to coarse Sand grains with about 10% non-plastic fines (SM-SW)										

C-11

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
18/12	1.7' Recovery; say 108.0' to 109.7' depth	108.0-110.0	181										
		108.2-108.5	L181.1	34.2	46	22							
	Silty CLAY, grey, stiff consistency, moderate to highly plastic (CL)	108.2-108.5	T181.1.1	34.5			87	CU	5.9	1952			$\bar{\sigma}_c$=3744psf
		108.5-108.6	W181.1	32.3			90						
		108.6	TV										TV=0.71tsf
	Sample includes lenses/layers below 108.9' depth consisting of Silty Sand, subrounded to subangular fine to medium Sand grains with about 40% non-plastic fines (SM)	108.6-108.9	T181.1.2	31.0			92	CU	6.2	2601			$\bar{\sigma}_c$=7488psf
		108.6-108.9	T181.1.3	30.7			92	CU	6.8	4088			$\bar{\sigma}_c$=15120psf
		108.9-109.3	Saved										
		109.3-109.4	W181.2	26.8			94						
	Layers/lenses comprise ±30% of total sample below 108.9' depth	109.4	TV										TV=0.51tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

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IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
18/16	Jar Sample	139.5-141.0	431								
	Silty SAND, gravelly; about 25% hard subrounded to subangular gravel size particles (3/4" max. size), subrounded to subangular fine to coarse Sand grains, about 15% non-plastic fines (SM)		S431.1								See plot

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BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
19/1	Silty CLAY, dark greyish brown, very stiff consistency moderate to high plasticity (CL-CH) Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	3.0-5.0	290									
		3.4-3.6	W290.1	25.7			95					
		3.6	TV									TV=1.15tsf
		3.6-3.9	Saved									
		3.9-4.2	Saved									
		4.2-4.3	W290.2	31.4			87					
		4.3	TV									TV=1.13tsf

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IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
19/3	1.8' Recovery; say 18.0' to 19.8' depth	18.0-20.0	292								
		18.1-18.5	L292.1	40.2	49 24						
	Silty CLAY, gray, soft to firm consistency moderate to high plasticity (CL-CH)	18.5-18.6	W292.1	39.1		85					
		18.6	TV								TV=0.27 tsf
		18.6-19.0	saved								
		19.1-19.3	W292.2	35.3		83					
		19.3	St								TV=0.23 tsf
		19.4-19.7	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

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BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
19/8	Silty CLAY, grey, stiff consistency, moderate plasticity (CL) Sample includes about 15% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	68.0-70.0	297									
		68.4-68.5	W297.1	23.1			103					
		68.5	TV									TV=0.80tsf
		68.5-68.8	Saved									
		69.2-69.3	W297.2	22.2			103					
		69.3	TV									TV=0.73tsf
		69.3-69.7	Saved									

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BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
19/9	1.9' Recovery; say 78.0' to 79.9' depth	78.0-80.0	298									
		78.2-78.6	saved									
	Silty CLAY, gray, stiff consistency, moderate plasticity (CL)	78.6-78.7	W298.1	21.4			106					
		78.7	TV									TV=0.63 tsf
		78.7-79.0	L298.1	24.4	33	17						
		79.0-79.5	saved									
	Sample includes about 15% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	79.6-79.7	W298.2	24.9			101					
		79.7	TV									TV=0.67 tsf

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IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
19/11	1.8' Recovery; say 100.0' to 101.8' depth	100.0-102.0	300									
		100.5	TV									TV-0.43tsf
	Silty CLAY, grey, firm consistency, moderate plasticity (CL)	100.5-100.6	W300.1	22.7			100					
		100.6-100.9	Saved									
	Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	101.3-101.4	W300.2	27.3			94					
		101.4	TV									TV=0.42 tsf
		101.4-101.7	Saved									

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IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
19/12	1.9' Recovery; say 118.0' to 119.9' depth	118.0-120.0	301									
	Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL)	118.4-118.5	W301.1	35.1		86						
		118.5	TV									TV=0.55tsf
		118.5-118.9	Saved									
	Sample includes few thin lenses/layers of SILT, sandy (ML) comprising ±5% of total	119.2-119.3	W301.2	41.4		80						
		119.3	TV									TV=0.68tsf
		119.3-119.6	Saved									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B22/29	Jar Sample	133.5 to B5.5	67								
	Clayey SILT: dark gray, slight to low plasticity (CL-ML)		S/H 67.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
25/1	Silty CLAY, grayish brown, very stiff consistency, highly plastic (CH)	3.0 to 5.0	266								
		4.0	TV								TV=0.41tsf
		4.0 to 4.3	save 266.1								
	Sample includes about 5% hard subrounded gravel size particles	4.3 to 4.5	W266.1	24.1		100					
		4.5 to 4.8	U266.1	22.4		108	U	5.0 3456			
	Note: upper 1.0' of sample disturbed (Wash?)	4.5 to 4.8	I266.1	24.5	59 23						
		4.8	TV								TV=1.8tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
25/3	1.9' Recovery; say 18.0' to 19.9' depth, upper 0.8' disturbed (WASH??)	18.0-20.0	268								
		18.8-19.2	Saved								
	Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)	19.2-19.3	W268.1	39.1		80					
		19.3	TV								TV=0.30tsf
		19.3-19.6	Saved								
		19.6-19.7	W268.2	38.1		81					
		19.7	TV								TV=0.27tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
25/4	Silty CLAY, Sandy, dark grey, soft to firm consistency, moderately plastic (CL)	28.0-30.0	269								
		28.1-28.5	Saved								
		28.5-28.7	W269.1	18.1		111					
	Sample includes about 30% fine to coarse SAND and fine Gravel size particles (sub-rounded to subangular in shape)	28.7	TV								TV=0.27tsf
		28.7-29.1	Saved								
		29.1-29.3	W269.2	22.6		102					
		29.3	TV								TV=0.25 tsf
	few thin lenses/layers of Silty CLAY (CL-CH) throughout comprising ±10% of total	29.3-29.7	I269.1	31.0	25 16						
	Note: Entire sample slightly disturbed										

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
25/6		48.0-50.0	271									
		48.3-48.7	saved									
	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)	48.7-48.8	W271.1	37.9			80					
		48.8	TV									TV=0.37 tsf
		48.8-49.2	saved									
	Sample includes about 15% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	49.2-49.4	W271.2	34.6			82					
		49.4	TV									TV=0.30 tsf
		49.4-49.8	L271.1	38.0	39	19						

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
25/7	Silty CLAY, grey, firm to stiff consistency, moderate plastiticy (CL) Sample includes about 15% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	58.0-60.0	272								
		58.4-58.5	W272.1	24.1		98					
		58.5	TV								TV=0.45 tsf
		58.5-58.8	Saved								
		59.2-59.3	W272.1	24.4		99					
		59.3	TV								TV=0.58tsf
		59.3-59.6	Saved								

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE April 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
25/10	1.8' Recovery; Say 88.0' to 89.8' depth	88.0 to 90.0	275									
		88.1 to 88.4	save 275.1									
		88.4 to 88.6	WZ75.1	19.7			106					
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	88.6	TV									TV=0.74tsf
		88.6 to 88.9	save Z75.2									
	Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	88.9 to 89.2	T275.0.1	22.5			104	UU	11.0 2213			
		88.9 to 89.2	L275.1	21.4	36	19						
		89.2 to 89.4	WZ75.2	22.3			103					
		89.4	TV									TV=0.80tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
25/12	2.4' Recovery; say 118.0' to 120.4' depth	118.0-120.5	277									
	Silty CLAY, grey, stiff consistency, moderate to high plasticity (CL-CH)	118.6-118.7	W277.1	42.8			77					
		118.7	TV									TV=0.70tsf
	Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)	118.7-119.0	Saved									
		119.0-119.4	Saved									
		119.4-119.5	W277.2	36.4			82					
		119.8	TV									TV=0.68tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE Jan. 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B26/2	Recovery 1.6', say 3.5' to 5.1' depth	3.5 to 5.5	1									
		3.7	TV	25.4								TV=0.88 tsf
	Silty CLAY, grayish brown, moderate to high plasticity, very stiff consistency (CL-CH) Includes about 15% subangular to subrounded fine gravel and coarse sand particles	3.7	W1.1	25.4								
		3.7 to 4.0	save 1.1									
		4.0	TV	23.9								TV=1.4 tsf
		4.0	W1.2	23.9								
		4.0 to 4.3	T1.1.1	23.0			104	CU	15.0 1100			
		4.0 to 4.3	L1.1.	23.0	53	24						
		4.3	TV									TV=1.13 tsf
		4.3 to 4.7	T1.1.2	23.9			103	CU	15.0 1725			
		4.7	TV	21.9								TV= 1.3 tsf
		4.7	W1.3	21.9								
		4.7 to 5.0	T1.1.3	22.3			108	CU	15.0 2400			

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B26/3	1.5' Recovery; say 8.0' to 9.5' depth	8.0 to 10.0	2										
		8.2	TV	31.5									TV=0.9 tsf
	Silty CLAY; dark gray, moderately to highly plastic, firm consistency (CL-CH).	8.2	W2.1	31.5									
		8.3 to 8.7	save 2.1										
	Includes about 10% subangular to subrounded fine gravel size particles and ±5% fine to coarse sand size particles.	8.7	TV	33.0									TV=0.6 tsf
		8.7	W2.2	33.0									
		8.8 to 8.9	L2.1	32.0	50	22							
		8.9 to 9.2	save 2.2										
		9.2	TV	32.7									TV=0.4 tsf
		9.2	W2.3	32.7									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B26/5	1.2' Recovery; say 18.0' to 19.2' depth	18.0 to 20.0	3								
		18.0 to 18.3	T3.13	35.7		86	CU	15.2 2175			
	Silty CLAY, gray, soft consistency, highly plastic (CL-CH)	18.3	TV	35.9							TV=0.17 tsf
		18.3	W3.1	35.9							
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	18.3 to 18.7	T3.12	35.3		86	CU	10.7 839			
		18.7 to 19.0	T3.11	35.4		89	CU	15.1 676			
		19.0	TV	35.6							TV=0.24 tsf
		19.0	W3.2	35.6							

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B26/9	1.9' Recovery; say 38.0' to 39.9' depth	38.0 to 40.0	5								
	Silty CLAY; gray, soft to firm consistency, highly plastic (CL)	38.4	TV	40.6							TV=0.20 tsf
		38.4 to 38.5	W5.1	40.6							
		38.5 to 38.8	save 5.1								
		38.8	TV	39.5							TV=0.23 tsf
		38.8 to 38.9	W5.2	39.5							
		38.9 to 39.3	save 5.2								
		39.3	TV	36.0							TV=0.34 tsf
		39.3 to 39.4	W5.3	36.0							
		39.4 to 39.8	U5.1	36.6		86	U	1.6 443			
		39.4 to 39.8	L.5.1	36.6	38 20						

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
FILE NO. 1255
DATE Jan. 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B26/11	Silty CLAY: dark gray, firm consistency, highly plastic (CL)	48.0 to 50.0	6										
		48.0 to 48.3	save 6.1										
	Sample includes about 20% coarse to fine sand grains (subangular to subrounded in shape)	48.3	TV	31.0									TV=0.28 tsf
		48.3 to 48.4	W6.1	31.0									
		48.4 to 48.7	save 6.2										
		48.7	TV										TV=0.32 tsf
		48.7 to 49.0	T6.1.3	30.0			93	CU	4.6	2206			
		49.0	TV	36.3									TV=0.29 tsf
		49.0 to 49.1	W6.2	36.3									
		49.1 to 49.4	T6.1.2	36.5			86	CU	3.9	1222			
		49.4	TV	34.5									TV-0.33 tsf
		49.4 to 49.5	W6.3	34.5									
		49.5 to 49.8	T6.1.1	36.1			88	CU	3.8	896			
		49.5 to 49.8	L6.1	36.1	41	21							

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B26/17	1.0' Recovery; say 78.0' to 79.0' depth	78.0 to 80.0	9								
		78.2	TV	25.1							TV=0.46
	Silty CLAY, dark gray, firm to stiff consistency, highly plastic (CL)	78.2	W9.1	25.1							
		78.2 to 78.5	U9.1	24.8		101	U	12.0 580			
	Includes about 35% subangular to subrounded fine Gravel and coarse Sand particles	78.2 to 78.5	L9.1	24.8	36 20						
		78.5	TV	25.8							TV=0.52 tsf
		78.5 to 78.6	W9.2	25.8							
		78.6 to 78.9	save 9.1								
		78.9	TV	25.0							TV=0.38 tsf
		78.9 to 79.0	W9.3	25.0							

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
26/28	Recovery 2.4'; say 128.0' to 130.4' depth	128.0-131.0	13										
	Silty CLAY, dark grey firm to stiff consistency, moderate to highly plastic (CL)	128.0-128.3	T13.1.3	34.0			90	CU	3.4	4652			$\bar{\sigma}_c$=16,704psf
		128.4-128.8	T13.1.2	35.6			86	CU	4.5	2442			$\bar{\sigma}_c$=8352 psf
		128.4-128.8	L13.1	35.4	39	21							
	Bottom third of sample includes 30 to 40% fine Sand and non-plastic Silt particles occurring in thin layers (1/16" to 1/4" thick)	128.8-128.9	W13.2	32.1									
		128.8-128.9	TV	32.1									TV=0.60tsf
		129.7	TV	27.5									TV=0.50tsf
		129.7-129.8	W13.3	27.5									
		129.8-130.2	T13.1.1	22.9			96	CU	15.0	4500			$\bar{\sigma}_c$=4176psf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
27/2	1.4' Recovery; say 3.5' to 4.9' depth	3.5-5.5	302								
		3.6-4.0	Saved								
	Silty CLAY; greyish brown, stiff consistency, moderate to high plasticity (CL-CH)	4.0-4.2	W302.1	24.2		99					
		4.2	TV								TV=0.87 tsf
	Sample includes about 5% coarse Sand and fine gravel sized particles (subrounded to subangular in shape)	4.2-4.5	Saved								
		4.5-4.8	T302.2	24.9		103	UU	8.0 2099			
		4.5-4.8	L302.1	23.1	48 24						

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
27/4	1.7' Recovery; Say 8.0' to 9.7' depth	8.0 to 10.0	303								
		8.1 to 8.4	save 303.1								
	Silty CLAY, grayish brown, firm to stiff consistency, highly plastic (CL-CH)	8.4 to 8.6	W303.1	31.5		88					
		8.6	TV								TV=0.66tsf
	Sample includes about 10% coarse sand and fine gravel size particles (subrounded to subangular in shape)	8.6 to 8.9	U303.1	30.6		94	U	20.0 1772			@15.0% strain s=1722psf
		8.6 to 8.9	L303.1	30.4	51 23						
		8.9 to 9.2	save 303.2								
		9.2 to 9.4	W303.2	33.5		87					
		9.4	TV								TV=0.47tsf

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SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
27/10	2.4' Recovery; Say 33.0' to 35.4' depth	33.0 to 35.5	306									
		33.1 to 33.4	save 306.1									
	Silty CLAY, gray, firm consistency, moderately plastic (CL)	33.4 to 33.6	W306.1	37.9			84					
		33.6	st									TV=0.31tsf TV_R=0.09tsf
		34.0 to 34.3	C306.1	38.6						1.016	.44	
		34.0 to 34.3	L306.1	37.4	41	22						
		34.0 to 34.3	SG306.1									specific gravity=2.73
		34.3 to 34.6	save 306.2									
		34.6 to 34.8	W306.2	36.3			86					
		34.8 to 35.2	save 306.3									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
27/14	1.9' Recovery; say 53.0' to 54.9' depth	53.0-55.5	308									
		53.1-53.5	saved									
	Silty CLAY, Sandy, very dark gray, stiff consistency, low to moderate plasticity (CL)	53.6-53.7	W308.1	13.0			120					
		53.7	TV									TV=0.78 tsf
	Sample includes about 40% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	54.0-54.4	saved									
		54.4-54.5	W308.2	25.9			98					
		54.5-54.7	L308.1	24.2	32	17						
		54.7	TV									TV=0.34 tsf
	At 53.9' change to Silty CLAY, gray, firm consistency, moderate plasticity (CL)											
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)											

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
27/17	Jar Sample	68.5-70.0	432								
	Clayey SILT, Sandy, dark gray, low plasticity (CL-ML)		S/H 432.1								See plot
	Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)										

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
27/24	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)	103.0 to 105.5	313									
		103.2 to 103.5	save 313.1									
		103.5	TV									TV=0.61tsf
	Sample includes about 25% coarse to fine sand grains and fine gravel sized particles (subrounded to subangular in shape)	103.5 to 103.7	W313.1	27.4			98					
		103.7 to 104.1	save 313.2									
		104.2 to 104.5	C313.1	33.9						0.910	.30	
		104.2 to 104.5	L313.1	31.1	43	25						
		104.2 to 104.5	SG313.1									specific gravity=2.74

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
27/26	1.5' Recovery; say 113.0' to 114.5' depth	113.0-115.0	314								
		113.1	TV								TV=0.16 tsf
	Silty CLAY, gray, soft consistency, moderate plasticity (CL)	113.1-113.5	W314.1	34.6		89					
	Sample includes few thin lenses/layers of Silty SAND (± 1/8" thick) comprising ± 10% of total	113.6-114.4	S314.1	21.4							See plot
	At 113.6' change to - Silty fine SAND, uniform fine Sand grains with about 10% non-plastic fines (SM-SP)										

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
27/30	2.4' Recovery; say 129.0' to 131.4' depth; upper 0.8' possibly disturbed	129.0-131.5	315								
		129.1-129.4	Saved								
	Silty CLAY, grey, stiff consistency, moderate plasticity (CL)	129.5-129.6	W315.1	34.0		84					Clay portion
		129.9-130.1	L315.1	34.3	40 21						
	Sample includes Silty fine Sand lenses/layers throughout comprising about 10% of total sample	130.2	TV								TV=0.75tsf
		130.2-130.6	Saved								
		130.6-131.1	Saved								
		131.1-131.3	W315.2	24.1		99					Silty Sand and Clay portion

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
28/3	1.2' Recovery; say 5.0' to 6.2' depth	5.0-7.0	183								
		5.0-5.3	saved								
	Silty CLAY, dark gray, very stiff consistency, moderate to high plasticity (CL)	5.3-5.5	W183.1	33.3		95					
		5.5	TV								TV=1.30 tsf
		5.5-5.8	saved								
		5.8-6.1	U183.1	25.3		100	U	4.0 1981			
		5.8-6.1	L183.1	25.5	47 23						

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
28/9	Silty CLAY, dark gray, soft consistency, moderate to highly plastic (CL)	28.0-30.0	186										
		28.1-28.4	saved										
		28.4-28.5	W186.1	40.0			80						
		28.5	TV										TV=0.20 tsf
		28.5-28.8	saved										
		28.8-29.1	U186.1	38.0			84	U	7.0	425			
		28.8-29.1	L186.1	39.2	42	20							
		29.1-29.3	W186.2	41.4			78						
		29.3	TV										TV=0.20 tsf
		29.3-29.6	saved										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
28/15	2.1' Recovery; say 58.0' to 60.1' depth	58.0-60.0	189								
		58.2-58.5	saved								
	Silty CLAY, dark gray, firm consistency, moderate plasticity (CL)	58.5-58.6	W189.1	25.5		98					
		58.6	TV								TV=0.38 tsf
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	59.0-59.3	saved								
		59.3-59.4	W189.2	25.1		99					
		59.4-59.7	saved								
		59.7	TV								TV=0.43 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
28/23	2.1' Recovery, say 98.0' to 100.1' depth	98.0-100.0	193								
		98.1-98.4	saved								
	Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL) Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	98.4-98.5	W193.1	23.0		104					
		98.5	TV								TV=0.71 tsf
		98.5-98.9	saved								
		99.2-99.3	W193.2	23.8		98					
		99.3	TV								TV=0.93 tsf
		99.3-99.6	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
30/3	Jar Sample	6.0-7.5	433										
	Silty CLAY, dark grayish brown, high plasticity (CH)		L433.1	22.4*	55	25							
	*Note: Water content taken from unsealed jar sample												

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1972

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
30/6	Jar Sample	18.5-20.0	434								
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)		W434.1	37.7*							
	*Note: Water content taken from unsealed jar sample										

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PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
30/12	Jar Sample	53.5-55.0	435								
	Silty CLAY, grey, moderate plasticity (CL)		W435.1	* 24.7							
	Sample includes about 20% fine to coarse Sand grains (subangular to subrounded in shape)										
	*Note: Water content taken from unsealed jar sample										

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PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
30/15	Jar Sample	68.5-70.0	436								
	Silty CLAY, Sandy, gray moderate plasticity (CL) Sample includes about 25% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)		S/H 436.1								See plot

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
30/21	Jar Sample	98.5-100.0	437								
	Silty fine SAND, uniform fine Sand grains with about 15% non plastic fines (SM)		S437.1								See plot

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DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
30/25	Jar Sample	118.5-120.0	438								
			S438.1								See plot
	Silty SAND, subrounded to subangular fine to medium Sand grains, about 15% non-plastic fines (SM)										

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
32/3	Jar Sample	6.0-7.5	439								
	Silty CLAY, dark grayish brown, moderate to highly plastic (CL-CH)		W439.1	20.3*							
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
32/7	Jar Sample	23.5-25.0	440								
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-CH)		W440.1	37.9*							
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
32/10	Jar Sample	38.5-40.0	441								
	Silty CLAY, gray, moderate to high plasticity (CL)		L441.1		44 19						

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
32/20	Jar Sample	88.5-90.0	442									
	Silty CLAY, gray, moderate plasticity (CL)		L442.1		36	17						
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)											

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
33/3 *	1.4' Recovery; say 8.0' to 9.4' depth	8.0-10.5	280										
	Silty CLAY, dark grey, firm to stiff consistency, moderate to high plasticity (CL-CH)	8.1-8.4	Saved										
		8.4-8.5	W280.1	30.6			92						
		8.5	TV										TV = 0.78tsf
	Sample includes about 5% fine to medium Sand grains (sub-rounded to subangular in shape)	8.5-8.8	Saved										
		8.8	TV										TV = 0.68tsf
		8.8-9.2	L280.1	31.6	48	25							
	*Note: This sample labeled B33/2, 8'-10'6"	9.2-9.3	W280.2	33.3			89						

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
33/5	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)	18.0-18.5	282									
		18.2-18.5	Saved									
		18.5-18.6	W282.1	34.7			86					
	Sample includes about 5% fine to coarse Sand grains (sub-rounded to subangular in shape)	18.6	TV									TV=0.29 tsf
		18.6-19.0	282.1	37.6	43	23						
		19.7-19.8	W282.1	36.2			84					
		19.8	TV									TV=0.32 tsf
	Note: This sample and 33/9 labeled B33/5, 38-40'6"	19.8-20.3	Saved									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
33/7*	2.1' Recovery, say 28.0' to 30.1' depth	28.0-30.5	281								
		28.1-28.4	save								
	Silty CLAY, gray, soft to firm consistency, moderate to high plasticity (CL)	28.4-28.6	W281.1	40.3		81					
		28.6	TV								TV=0.20 tsf
		28.6-28.9	T281.1.1	39.0		82	CU	13.4 739			$\bar{\sigma}_c$=1440 psf
		28.9-29.3	T281.1.2	39.7		82	CU	4.6 966			$\bar{\sigma}_c$=2880 psf
	Sample includes about 5% fine to medium Sand grains (subrounded to subangular in shape)	29.3-29.4	W281.1	37.7		83					
		29.4	TV								TV=0.26 tsf
		29.4-29.7	T281.13	38.3		84	CU	6.3 1521			$\bar{\sigma}_c$=5760 psf
	* Note: This sample labeled B33/4, 28'-30'6"	29.4-29.7	L281.1	38.7	46 22						

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B33/9*	2.1' Recovery; say 38.0' to 40.1' depth	38.0-40.5	283									
		38.3-38.6	Saved									
	Silty CLAY, grey, soft to firm consistency, moderate to high plasticity (CL)	38.6-38.7	W283.1	36.8			85					
		38.7	TV									TV = 0.27tsf
		38.7-39.1	T283.1.1	37.4			83	CU	6.9 798			$\bar{\sigma}_c$=1728psf
		38.7-39.1	T283.1.2	37.1			85	CU	5.5 1081			$\bar{\sigma}_c$=3456psf
	* Note: This sample labeled B33/5, 38'-40'6"	39.1-39.5	T283.1.3	36.2			86	CU	5.2 1662			$\bar{\sigma}_c$=6912psf
		39.1-39.5	L283.1	37.2	43	23						
		39.5-39.6	W283.2	37.3			85					
		39.6	TV									TV = 0.28tsf
		39.6-39.9	Saved									
		39.9	St									TV=0.35tsf TVr=0.09tsf

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
33'11"*	1.9' Recovery; say 48.0' to 49.9' depth	48.0-50.5	284								
		48.1-48.4	saved								
	Silty CLAY, dark gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	48.4-48.5	W284.1	45.1		76					
		48.5	TV								TV = 0.30 tsf
	Sample contains about 10% fine to coarse SAND grains (subrounded to subangular in shape)	48.5-48.8	saved								
		48.8-49.0	L284.1	41.8	48 25						
		49.0-49.3	saved								
		49.3-49.4	W284.2	34.5		81					
	* Note: This sample labeled B33/6 48'-50'6"										

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PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/3	Silty CLAY; dark grayish brown mottled with blue gray, highly plastic; hard consistency with a blocky structure. Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape) (CL-CH)	8.0 to 10.0	17								
		8.5	W17.1	25.3							
		8.5	TV	25.3							TV=2.4 tsf
		8.6 to 8.9	L17.1	24.9	49 24						
		8.6 to 8.9	U17.1	24.3		102	U	3.0 2123			
		8.6 to 8.9	U_R17.1	24.2		103	U_R	7.0 761			
		8.6 to 8.9	H17.1								see plot
		9.0	W17.2	26.3							
		9.0	ST	26.3							TV=2.1 tsf TV_R=1.1
		9.1 to 9.5	save 17.1								
		9.6	W17.3	27.3							
		9.9	TV	27.3							TV-2.1 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE Jan. 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/4	1.8' Recovery; say 13.5' to 15.3' depth; upper 0.2' disturbed	13.5 to 15.5	18								
		13.8 to 14.2	save 18.1								
	Silty CLAY; dark grayish brown, highly plastic, stiff to very stiff consistency.	14.2	W18.1	28.6							
		14.2	TV	28.6							TV=1.1 tsf
		14.3 to 14.6	U18.1	28.5		96	U	4.0 1506			
	Soil includes 5 to 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	14.3 to 14.6	L18.1	28.5	46 22						
		14.3 to 14.6	H18.1								see plot
		14.6	C18.1	29.0					.770	.19	
	(CL-CH)	14.6	SG18.1								specific gravity=2.71
		14.7	W18.2	28.8							
		14.7	TV	28.8							TV=0.9 t sf
		14.8 to 15.2	save 18.2								

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PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/6	Recovery 0.7'; ay 23.5' to 24.2' depth	23.5 to 25.5	19									
		23.7 to 24.1	U19.1	37.6	48	19						
	Silty CLAY, dark gray, highly plastic (CL-CH)	24.1	W19.1	37.6								
	Note: Entire sample greatly disturbed											

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/8	0.8' Recovery; say 33.5' to to 34.3' depth	33.5 to 35.5	20								
		34.1	W20.1	35.7							
	Silty CLAY, dark gray, highly plastic (CL-CH)	34.1 to 34.3	L20.1	36.3	48 20						
	Note: Entire sample greatly disturbed										

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PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/12	1.8' Recovery; say 53.5' to 55.3'	53.5 to 55.5	22								
		53.6	W22.1	33.7							
		53.6	TV	33.7							TV=0.36 tsf
	Silty CLAY, dark grayish brown, highly plastic, firm consistency throughout	53.6 to 54.0	save 22.1								
		54.0	W22.2	33.1							
	(CL-CH)	54.0	TV	33.1							TV=0.41tsf
		54.1 to 54.4	U22.1	33.4		90	U	5.0 985			
		54.1 to 54.4		32.9	44 21						
		54.1 to 54.4	H22.1								See plot
		54.5	W22.3	33.5							
		54.5	TV	33.5							TV=0.44 tsf
		5.45 to 54.9	save 22.2								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/16	0.6' Recovery; say 73.5' to 74.1' depth	73.5 to 75.5	24								
		73.6	TV	43.5							TV=0.27 tsf
	Silty CLAY, dark gray, highly plastic, soft to firm consistency (CH)	73.6	W24.1	43.5							
		73.7 to 74.0	U24.1	41.3		79	U	4.8 704			
		73.7 to 74.0	L24.1	41.3	55 24						
		73.7 to 74.0	H24.1								See plot
		74.0 to 74.1	C24.1	36.0					.935	.33	
		74.0 to 74.1	SG24.1								specific gravity=2.72
		74.0 to 74.1	W24.2	40.7							

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PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/18	1.5' Recovery; say 83.5' to 85.0' depth	83.5 to 85.5	25										
		83.7	TV	14.4									TV=0.78 tsf
	Silty CLAY; gravelly dark gray, moderate plasticity, stiff consistency (CL)	83.7	W25.1	14.4									
		83.7 to 84.1	save 25.1										
		84.1	TV	17.8									TV=0.82 tsf
	Includes ±10 % medium to coarse Sand and ±15% sub-angular to subrounded Gravel size particles (1/4" to 1" size)	84.1	W25.2	17.8									
		84.2 to 84.6	save 25.2										
		84.6	St	22.8									TV=0.62 tsf TV_R=0.55 tsf
		84.6	W25.3	22.8									
		84.6 to 85.0	U25.1	22.2			104	U	14.0	603			
		84.6 to 85.0	U_R25.1	22.2			105	U_R	17.4	548			
		84.6 to 85.0	L25.1	22.2	33	19							
		84.6 to 85.0	H25.1										See plot

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE Jan. 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/24	1.9' Recovery; say 113.0' to 114.9' depth	113.0 to 115.0	26								
		113.3	TV	34.5							TV=0.32 tsf
	Silty CLAY; gray, moderately to highly plastic, soft to firm consistency (CL-CH)	113.3	W26.1	34.5							
	Includes about 5% fine Sand size particles	113.3 to 113.7	save 26.1								
		113.7	TV	32.2							TV=0.48 tsf
		113.7	W26.2	32.2							
		113.7 to 114.1	save 26.2								
		114.1	TV	33.1							TV=0.44 tsf
		114.1	W26.3	33.1							
		114.1 to 114.6	U26.1	31.9		92	U	6.0 500			
		114.1 to 114.6	L26.1	31.9	45 25						
		114.1 to 114.6	H26.1								See plot
		114.6	TV								TV=0.52 tsf

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C-70 GOLDBERG-ZOINO AND ASSOCIATES, INC.

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLI-DATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B38/30	Jar Sample	138.5 to 140.0	69								
	Silty SAND; subrounded to subangular fine to coarse Sand grains, about 30% non-plastic fines (SM)		S/H 69.1								See plot

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/2	1.1' Recovery; say 4.0' to 5.1' depth	4.0 to 6.0	28								
		4.1	W28.1	33.6							
	Silty CLAY; olive gray mottled with yellowish brown, highly plastic, very stiff consistency throughout	4.1	TV	33.6							TV=1.0 tsf
		4.1 to 4.4	save 28.1								
		4.4	W28.2	31.1							
	Soil includes 2 to 5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	4.4	TV	31.1							TV=1.1 tsf
		4.5 to 4.8	U28.1	29.4		94	U	5.0 1024			
		4.5 to 4.8	U_R28.1	29.4		95	U_R	9.0 974			
	(CH)	4.5 to 4.8	L28.1	29.4	63 28						
		4.5 to 4.8	H28.1								See plot
		4.8	W28.3	39.5							
		4.8	ST	39.5							TV=1.4 tsf TV_R=1.0 tsf
		4.9 to 5.1	save 28.2								

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/5	1.2' Recovery: say 10.0' to 11.2' depth	10.0 to 12.0	29									
		10.3	TV	29.0								TV=1.25 tsf
	Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)	10.3	W29.1	29.0								
		10.3 to 10.7	save 29.1									
	Includes about 15% subangular to subrounded fine Gravel and coarse Sand particles	10.7	TV	27.5								TV=1.43 tsf
		10.7 to 10.8	W29.2	27.5								
		10.8 to 11.0	C29.1	29.5						.799	.23	
		10.8 to 11.0	I29.1	29.5	46	23						
		11.1 to 11.2	W29.3	28.9								

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	c_c	
B 41/7	Silty CLAY, dark gray, highly plastic; soft to firm consistency throughout (CL-CH)	20.0 to 22.0	30									
		20.5	W30.1	39.7								
		20.5	TV	39.7								TV=0.28 tsf
		20.6 to 20.9	U30.1	39.2			83	U	3.0 338			
		20.6 to 20.9	L30.1	39.2	47	24						
		20.6 to 20.9	H30.1									See plot
		21.0 to 21.1	C30.1	38.1						1.055	.34	
		21.0 to 21.1	SG30.1									Specific gravity=2.70
		21.1	W30.2	39.4								
		21.1	TV	39.4								TV=0.30 tsf
		21.1 to 21.5	save 30.1									
		21.5	W30.3	38.2								
		21.5	TV	38.2								TV=0.30 tsf

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/9	1.7' Recovery; say 30.0' to 31.7' depth	30.0 to 32.0	31								
		30.4	TV	36.6							TV=0.30 tsf
		30.4 to 30.5	W31.1	36.6							
	Silty CLAY, gray, firm consistency, highly plastic (CL-CH)	30.5 to 30.8	save 31.1								
		30.8	TV	35.6							TV=0.28 tsf
	Includes about 5% subangular to subrounded coarse Sand particles	30.8 to 30.9	W31.2	35.6							
		30.9 to 31.2	U31.1	36.9		86	U	15.0 69%			
	Note: Upper 0.4' of sample disturbed	30.9 to 31.2	L31.1	36.9	45 21						
		31.2	TV	36.1							TV=0.32 tsf
		31.2 to 31.3	W31.3	36.1							
		31.3 to 31.6	save 31.2								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/11	1.1' Recovery; say 40.0' to 41.1' depth	40.0 to 42.0	32										
		40.2	TV	16.8									TV=0.30 tsf
	Silty CLAY, sandy, very dark gray, about 35% fine to coarse Sand, ±10% sub-angular to subrounded fine Gravel size particles, fines of low plasticity	40.2	W32.1	16.8									
		40.2 to 40.6	save 32.1										
		40.6	ST	16.5									TV=0.34 tsf TV=0.28 tsf
		40.6	W32.2	16.5									
	(CL-SC)	40.6 to 41.0	U32.1	16.0			118	U	20.0	884			@15.0% strain s = 648 psf
		40.6 to 41.0	L32.1	16.0	20	12							
		40.6 to 41.0	S/H 32.1										See plot

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

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DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/13		52.0 to 54.0	33								
	1.5' Recovery; say 52.0' to 53.5' depth; upper 0.3' disturbed	52.3	TV	47.5							TV=0.21 tsf
		52.3 to 52.4	W33.1	47.5							
	Silty CLAY, gray, soft to firm consistency, highly plastic (CL-CH)	52.4 to 52.7	save 33.1			76					
		52.7	TV	45.5							TV=0.23 tsf
		52.7 to 52.8	W33.2	45.5							
		53.0 to 53.2	C33.1	46.5					1.235	.35	
		53.0 to 53.2	L33.1	46.5	52 25						
		53.2	ST	44.1							TV=0.27 tsf TV_R=0.19 tsf
		53.2 to 53.3	W33.3	44.1							

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE March 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLI-DATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/17	1.0' Recovery; say 72.5' to 73.5' depth; upper 0.1' is 'wash' disturbed sample (?)	72.5 to 74.5	35								
		72.8	W35.1	17.1							
	Silty CLAY, sandy, dark gray, soft to firm consistency; sand occurs primarily as pockets of Silty fine Sand (±30% of sample) (CL-SC) Also 5% to 10% Gravel size particles throughout	72.8	TV								TV=0.15 tsf
		72.9 to 73.2	T35.0.1	19.6		105	UU	14.0 454			
		72.9 to 73.2	L35.1	19.6	25 15						
		72.9 to 73.2	S/H 35.1								See plot
		73.3	C35.1	26.7					.697	.21	
		73.3	SG35.1								Specific Gravity=2.68

C-7810

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/23	Silty CLAY, dark gray, moderate plasticity, firm consistency (CL); includes 10% to 15% fine to coarse Sand and fine Gravel size particles	101.0to 103.0	37										
		101.3	TV	23.2									TV=0.46 tsf
		101.3	W37.1	23.2									
		101.3to 101.8	save 37.1										
		101.8	TV	25.4									TV=0.62 tsf
		101.8	W37.2	25.4									
		101.9to 102.3	U37.1	26.4			99	U	10.0	534			
		101.9 to 102.3	L37.1	26.4	34	20							
		101.9 to 102.3	H37.1										See plot

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE Jan. 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/25	1.7Recovery; say 112.0' to 113.7' depth	112.0 to 114.0	38								
		112.3	TV	20.9							TV=0.65 tsf
	Silty CLAY, dark gray, stiff consistency, moderately plastic (CL)	112.3 to 112.4	W38.1	20.9							
		112.4 to 112.7	save 38.1								
	Includes about 35% subrounded to subangular fine Gravel and coarse Sand particles	112.7	TV	24.0							TV=0.60 tsf
		112.7 to 112.8	W38.2	24.0							
		113.0 to 113.2	C38.1	24.2					.642	.18	
		113.0 to 113.2	L38.1	24.2	29 19	104					
		113.2	TV	19.4							TV=1.0 tsf
		113.2 to 113.3	W38.3	19.4							
		113.3 to 113.7	save 38.2								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B41/29	1.1' Recovery; say 130.0' to 131.1' depth	130.0 to 132.0	40									
		130.2	TV	14.7								TV=0.50 tsf
	Clayey SAND, gravelly, dark gray; about 35% fine to coarse Sand particles and ±10% sub-rounded Gravel size particles; fines of low plasticity (GC-SC)	130.2	W40.1	14.7								
		130.2 to 130.6	save 40.1									
		130.6	W40.2	10.9								
		130.6 to 130.9	U40.1	13.8		124	U	8.0	1749			
		130.6 to 130.9	L40.1	13.8	25 17							
		130.6 to 130.9	S/H 40.1									See plot
		130.9 to 131.1	C40.1	11.3						.370	.09	
		130.9 to 131.1	SG40.1									Specific Gravity = 2.69

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B48/2	0.9' Recovery; say 3.0' to 3.9' depth	3.0 to 5.0	198										
		3.1	TV	32.4									TV=0.68 tsf
	Silty CLAY, dark grayish brown mottled light gray, stiff to very stiff consistency, highly plastic (CH)	3.1 to 3.2	W198.1	32.4									
		3.2 to 3.5	L198.1	27.3	63	24							
		3.2 to 3.5	U198.1	27.3			97	U	3.2	1466			
		3.5	TV										TV=1.18 tsf
	Sample includes 5-10% medium to coarse Sand grains (subrounded to sub-angular in shape)	3.5 to 3.9	save 198.1										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B48/4	Silty CLAY; dark grayish brown, very stiff consistency, moderately to highly plastic (CL-CH) Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	8.0 to 10.0	199									
		8.5 to 8.7	H199.1									See plot
		8.7	TV	27.5								TV=1.23 tsf
		8.7 to 8.8	W199.1	27.5								
		8.8 to 9.1	save 199.1				97					
		9.1	TV	28.9								TV=1.23 tsf
		9.1 to 9.2	W199.2	28.9								
		9.2 to 9.5	save 199.2									
		9.5	TV									TV=1.43 tsf
		9.5 to 9.9	save 199.3									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B48/6	Recovery 2.3'; say 18.0' to 20.3' depth; upper 0.4' disturbed	18.0 to 20.0	200								
		18.3	TV	34.4							TV=0.26 tsf
	Silty CLAY; dark gray, firm consistency, highly plastic (CL-CH)	18.3 to 18.4	W200.1	34.4							
		18.4 to 18.7	save 200.1								
		18.7	TV								TV=0.49 tsf
	Sample includes about 5% coarse Sand grains (sub-rounded to subangular in shape)	18.7 to 19.1	T200.1.1	32.8		90	CU	6.5 928			
		18.7 to 19.1	L200.1	34.3	47 25						
		19.1	TV	32.7							TV=0.42 tsf
		19.1 to 19.2	W200.2	32.7							
		19.2 to 19.5	T200.1.2	34.2		89	CU	4.5 1304			
		19.5	TV	34.1							TV=0.38 tsf
		19.5 to 19.6	W200.3	34.1							
		19.6 to 19.9	T200.1.3	35.6		88	CU	10.6 1579			

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B48/10	1.5' Recovery; say 38.0' to 39.5' depth; Upper 1.0' disturbed	38.0 to 40.0	202									
		38.4	TV	40.4								TV = 0.10 tsf
		38.4 to 38.5	W202.1	40.4								
	Silty CLAY, dark gray to very dark gray, soft consistency, highly plastic (CL-CH)	39.0	TV									TV = 0.15 tsf
		39.0 to 39.2	save 202.1									
		39.2 to 39.4	C202.1	38.8						1.027	.33	
		39.2 to 39.4	L202.1	38.8	47	24						
		39.2 to 39.4	SG202.1									Specific Gravity=2.73
		39.2 to 39.4	γ 202.1	38.8			82					
		39.4	TV	40.0								TV = 0.25 tsf
		39.4 to 39.5	W202.2	40.0								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B48/14	2.0' Recovery; say 60.0' to 62.6' depth. Upper 0.4' depth disturbed	60.0 to 62.6	204										
		60.4 to 60.7	save 204.1										
	— — — — — — — — — —	60.7	TV	26.0									TV = 0.34 tsf
	Silty CLAY, Sandy; dark gray, firm consistency, moderately plastic (CL)	60.7 to 60.8	W204.1	26.0									
		60.8 to 61.1	L204.1	26.3	34	16							
	Sample includes ±35% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	60.8 to 61.1	UU 204.1	26.3			99	UU	15.0	746			
		61.1	TV	25.8									TV = 0.42 tsf
		61.1 to 61.2	W204.2	25.8									
		61.2 to 61.5	U204.1	25.2			100	U	15.0	745			
		61.5	TV	25.3									TV = 0.38 tsf
		61.5 to 61.6	W204.3	25.3									
		61.6 to 61.9	save 204.2										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B48/18	1.5' Recovery; say 78.0' to 79.5' depth	78.0 to 80.0	206									
		78.1	TV	25.6								TV=0.56 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)	78.1 to 78.2	W206.1	25.6								
		78.2 to 78.5	save 206.1									
		78.5 to 78.6	L206.1	25.6	36	18						
	Sample includes about 15% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	78.6	TV	25.6								TV=0.70 tsf
		78.6 to 78.7	W206.2	25.6								
		78.7 to 79.0	save 206.2				100					
		79.0	TV	26.0								TV=0.73 tsf
		79.0 to 79.1	W206.3	26.0								
		79.1 to 79.4	save 206.3									
		79.4	TV									TV=0.63 tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
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DATE Jan. 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B48/20	1.3' Recovery; say 88.0' to 89.3' depth	88.0 to 90.0	207								
		88.2 to 88.3	W207.1	44.51							
	Silty CLAY, dark gray, very soft consistency, highly plastic (CL-CH)	88.9 to 89.0	W207.2	30.2							
		89.0 to 89.2	I207.1	28.2	41 25						
	Sample includes ±10% coarse Sand or fine Gravel size particles (subrounded to subangular)										
	Note: Entire sample much disturbed										

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PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE Jan. 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	c_c	
B48/22	2.0' Recovery; say 98.0' to 100.0' depth, upper 0.4' disturbed	98.0 to 100.0	208										
		98.4	TV	27.5									TV=0.45 tsf
		98.4 to 98.5	W208.1	27.5									
	Silty CLAY; dark gray, firm to stiff consistency, moderately to highly plastic (CL)	98.5 to 98.9	T208.1.3	27.6			97	CU	11.4	4410			
		98.9	TV										TV=0.54 tsf
		98.9 to 99.2	T208.1.1	26.8			99	CU	11.5	2017			
	Sample includes 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	98.9 to 99.2	L208.1.1	26.8	36	19							
		99.2	TV	26.1									TV=0.56 tsf
		99.2 to 99.3	W208.2	26.1									
		99.3 to 99.6	T208.1.2	26.0			96	CU	11.8	2880			
		99.6	TV	24.0									TV=0.52 tsf
		99.6 to 99.7	W208.3	24.0									
		99.7 to 100.0	save 208.1										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L / w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
48/24	Silty CLAY; dark gray, soft to medium consistency, moderately plastic (CL) Sample contains ±20% coarse to fine Sand and fine Gravel particles (subrounded to subangular in shape) Note: Entire sample thoroughly disturbed	108.0 to 110.0	209								
		108.6	TV	25.6							TV=0.26 tsf
		108.6 to 108.7	W209.1	25.6							
		108.7 to 109.1	save 209.1								
		109.1	TV	23.0							TV=0.31 tsf
		109.1 to 109.2	W209.2	23.0							
		109.6 to 110.0	save 209.2								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B48/26	2.1' Recovery; say 118.0' to 120.1' depth	118.0 to 120.5	210									
		118.1	TV	33.2								TV = 0.43 tsf
	Silty CLAY, gray, medium to stiff consistency, moderate to highly plastic (CL)	118.1 to 118.2	W210.1	33.2								
		118.2 to 118.5	save 210.1									
	Sample includes about 5% fine to coarse Sand sized particles (subrounded to subangular in shape)	118.5 to 118.9	save 210.2									
		118.9	TV	32.8								TV = 0.51 tsf
		118.9 to 119.0	W210.2	32.8								
		119.0 to 119.4	Y210.1	32.9			91					
		119.0 to 119.4	S/H 210.1									See Plot
		119.4	TV	33.0								TV = 0.60 tsf
		119.4 to 119.5	W210.3	33.0								
		119.5 to 119.9	save 210.3									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE March 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B49/2	2.1' Recovery; say 6.0' to 8.1' depth	6.0 to 8.0	132									
		6.5	TV	29.3								TV=1.6 tsf
		6.5 to 6.6	W132.1	29.3								
	Silty CLAY, grayish brown, very stiff consistency, highly plastic (CL-CH)	7.1	TV	28.8								TV=1.4 tsf
		7.1 to 7.2	W132.2	28.8								
		7.2 to 7.6	γ132.1	28.0			95					
		7.6	TV									TV=1.85 tsf
	Sample includes about 15-20% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	7.6 to 7.8	L132.1	26.2	50	17						
		6.0 to 8.1	MC132.1	28.1								γ_{dry} Max=116 W_{opt}=16.5

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B49/3	Silty CLAY; dark grayish brown, firm to stiff consistency, highly plastic (CL-CH)	13.0 to 15.0	133								
		13.2	TV	29.0							TV=0.73tsf
		13.2 to 13.3	W133.1	29.0							
		13.3 to 13.7	save 133.1			92					
		13.7	TV								TV=0.53tsf
		13.7 to 14.0	C133.1	33.3					.823	.26	
		13.7 to 14.0	L133.1	31.8	47 23						
		13.7 to 14.0	SG133.1								
		14.0	TV	31.3							TV=0.42tsf
		14.0 to 14.1	W133.2	31.3							
		14.1 to 14.4	save 133.2								
		14.4	TV	30.4							TV=0.45tsf
		14.4 to 14.5	W133.3	30.4							
		14.5to 14.9	save 133.3								

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B49/4	1.9' Recovery; say 23.0 to 24.9' depth	23.0 to 25.0	134								
		23.1	TV	32.2							TV=0.34 tsf
	Silty CLAY; grayish brown, firm consistency, moderately to highly plastic (CL)	23.1 to 23.2	W134.1	32.2							
		23.2 to 23.5	save 134.1								
		23.5	TV								TV=0.37 tsf
		23.5 to 23.9	save 134.2								
		23.9	TV	34.0							TV=0.41 tsf
		23.9 to 24.0	W134.2	34.0							
		24.0 to 24.3	U134.1	34.0		90	U	6.0 1028			
		24.0 to 24.3	L134.1	32.8	42 22						
		24.4	TV								TV=0.42 tsf
		24.4 to 24.8	save 134.3								
		24.8	TV	34.0							TV=0.37 tsf
		24.8 to 24.9	W134.3	34.0							

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE July 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
49/6	1.9' Recovery; say 43.0' to 44.9' depth	43.0-45.0	136										
	Silty CLAY; dark greyish brown, firm consistency, highly plastic (CH-CL)	43.1-43.2	W136.1	39.9									
		43.5	TV										TV=0.42tsf
		43.8-43.9	W136.2	35.2									
	Sample includes ±5% coarse Sand grains (subrounded to subangular in shape)	43.9-44.2	T136.12	46.3			75	CU	2.9	1356			$\bar{\sigma}_c$=3744psf
		43.9-44.2	L136.1	45.5	53	22							
	Lower portions of sample appear to be "sensitive", i.e. became soft and sticky on remolding	44.2	TV	45.7									TV=0.37tsf
		44.2-44.3	W136.3	45.7									
		44.3-44.7	T136.11	43.5			78	CU	5.8	921			$\bar{\sigma}_c$=1872psf
		44.3-44.7	T136.13	44.9			77	CU	4.7	1928			$\bar{\sigma}_c$=7488psf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B49/7	1.9' Recovery; say 53.0' to 54.6' depth	53.0 to 55.0	137								
		53.2	TV	25.9							TV = 0.34 tsf
	Silty CLAY, dark gray, medium to stiff consistency, moderately plastic (CL)	53.2 to 53.3	W 137.1	25.7							
		53.3 to 53.7	save 137.1								
	Sample includes about 15% fine to coarse Sand particles (subrounded to subangular in shape)	53.7 to 54.1	γ 137.1	25.0		97					
		54.1 to 54.4	S/H 137.1								See Plot
		54.4	TV	25.9							TV = 0.65 tsf
		54.4 to 54.6	W 137.2	25.9							
		54.5 to 54.9	save 137.1								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B49/9	1.5' Recovery; say 73.0' to 74.5' depth	73.0 to 75.0	139									
		73.1	TV	25.7								TV=0.68 tsf
	Silty CLAY, sandy; dark gray, stiff consistency, moderately plastic (CL)	73.1 to 73.2	W139.1	25.7								
		73.2 to 73.5	save 139.1				99					
	Sample includes ±30% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	73.5	TV	24.1								TV=0.75 tsf
		73.5 to 73.6	W139.2	24.1								
		73.6 to 73.9	save 139.2									
		73.9	TV									TV=0.80 tsf
		73.9 to 74.3	U139.1	25.6			100	U	20.0 2513			@ 15% strain s=2254 psf
		73.9 to 74.3	L139.1	18.2	33	22						
		74.3	TV	22.8								TV=0.76 tsf
		74.3 to 74.4	W139.3	22.8								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B49/11	1.5' Recovery; say 93.0' to 94.5' depth	93.0 to 95.0	141									
		93.1	TV	26.6								TV = 0.62 tsf
	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)	93.1 to 93.2	W141.1	26.6								
		93.2 to 93.5	save 141.1				98					
	Sample includes ±20% coarse Sand and fine Gravel size particles (subangular to subrounded in shape)	93.5	TV	26.2								TV = 0.70 tsf
		93.5 to 93.6	W141.2	26.2								
		93.8 to 94.0	C141.1	28.6						0.701	0.20	
		93.8 to 94.0	L141.1	24.3	37	22						
		93.8 to 94.0	SG141.1									Specific Gravity=2.68
		94.0	TV	27.0								TV = 0.68 tsf
		94.0 to 94.1	W141.3	27.0								
		94.1 to 94.5	save 141.2									

C-98 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B49/13	1.6' Recovery; say 113.0' to 114.6' depth	113.0 to 115.0										
		113.1	TV	29.3								TV=0.55 tsf
	Silty CLAY: sandy, dark gray, stiff consistency, moderately plastic (CL)	113.1 to 113.2	W143.1	29.3								
		113.2 to 113.5	T143.1.3	29.2			93	CU	11.1 4132			
		113.5	TV									TV=0.62 tsf
	Sample includes about 25% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	113.5 to 113.8	T143.1.2	28.7			95	CU	11.8 2426			
		113.8	TV	28.1								TV=0.64 tsf
		113.8 to 113.9	W143.2	28.1								
		113.9 to 114.2	T143.1.1	24.0			100	CU	12.7 1787			
		113.9 to 114.2	L143.1	24.0	33	22						
		114.2	TV	28.7								TV=0.64 tsf
		114.2 to 114.3	W143.3	28.7								
		114.3 to 114.6	save 143.1									

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/4	1.5' Recovery; say 18.0' to 19.5' depth - disturbed	18.0 to 20.0	84									
		18.7 to 19.0	saved									
	Silty CLAY, gray, moderate to high plasticity (CL)	19.0 to 19.1	W84.1	34.6			84					
		19.1	TV									TV = 0.13tsf
	Note: Entire sample disturbed	19.1 to 19.4	L84.1	34.6	45	20						

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % / MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/5	Jar Sample	23.5-25.0	453									
	Silty CLAY, gray, high plasticity (CH-CL)		L453.1	39.8*	52	22						
	*Note: Water content taken from unsealed jar sample											

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: GREENWOOD ENERGY CENTER UNITS 2 & 3 FILE NO. 1323

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS DATE ____

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/6	1.9' Recovery; say 28.0' to 29.9' depth	28.0 to 30.0	85										
		28.1 to 28.3	V85.1	35.2				VS rVS		443 208			St = 2.1
	Silty CLAY, gray, firm consistency, moderate plasticity (CL)	28.3 to 28.5	k85.1	37.2			84				1.002		hydrometer - see plot
		28.5 to 28.6	W85.1	35.2									
		28.6 to 28.9	T85.11	33.0			88	CU	13.1	842			$\bar{\sigma}_c$ = 1440 psf
		28.6 to 28.9	T85.12	33.1			90	CU	14.5	1050			$\bar{\sigma}_c$ = 2880 psf
		29.0	W85.2	34.3									TV = 0.28 tsf
		29.1 to 29.4	L85.2	34.3	39	18							
	Note: Below 29.4' depth sample becomes softer, more sensitive on remolding	29.1 to 29.4	T85.13	34.3			86	CU	14.0	1718			$\bar{\sigma}_c$ = 5760 psf
		29.4 to 29.7	U85.1	45.8			75	U	2.4	197			
		29.4 to 29.7	L85.1	45.7	51	18							

C-102 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/8	2.0' Recovery	38.0 to 40.0	86									
	Silty CLAY, gray, firm consistency, highly plastic (CH)	38.1 to 38.4	T86.01	46.2		74	UU	4.0	643			$\bar{\sigma}_c$ = 3456 psf
		38.4 to 38.5	W86.1	47.6		71						
		38.5	TV									TV = 0.39 tsf
		38.5 to 38.9	C86.1	51.6						1.383	0.55	
		38.5 to 38.9	SG86.1									Specific Gravity = 2.75
		38.9 to 39.2	U86.1	51.3		70	U	2.0	550			
		38.9 to 39.2	L86.1	51.2	55 23							
		39.2 to 39.3	W86.2	48.6		71						
		39.3 to 39.6	saved									

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/10	1.8' Recovery; say 48.0' to 49.8' depth	48.0 to 50.0	87								
		48.1 to 48.4	V87.1	25.9			VS rVS	518 484			St = 1.1
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)	48.5	W87.1	25.9		96					
		48.6 to 48.8	k87.1	26.9		97			.730		sieve/hydrometer see plot
		48.9	W87.2	24.2		97					
	Sample includes 20 to 25% fine to coarse Sand particles and 10 to 15% subrounded to subangular Gravel size particles to 1/2 inch maximum	48.9	TV	24.2							TV = 0.41 tsf
		49.0 to 49.3	U87.1	23.6		99	U	15.0 527			
		49.0 to 49.3	L87.1	23.4	36 16						
		49.3 to 49.6	T87.0.1	23.2		100	UU	15.0 721			σ_c = 4320

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/12	1.9' Recovery; say 58.0' to 59.9' depth	58.0 to 60.0	88								
		58.1 to 58.5	saved								
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	58.5	W88.1	23.8		99					
		58.5	TV	23.8							TV = 0.53 tsf
		58.6 to 58.9	U88.1	25.8		99	U	9.0 1008			
	Sample includes about 20% fine to coarse Sand particles and about 10% subrounded to subangular Gravel particles to 1/2 inch maximum size	58.6 to 58.9	L88.1	24.2	39 18						
		59.0	W88.2	24.8		97					
		59.0	TV	24.8							TV = 0.54 tsf
		59.1 to 59.4	T88.0.1	24.3		101	UU	10.0 1132			σ_c = 4608 psf
		59.4 to 59.8	saved								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/14	1.9' Recovery; say 68.0' to 69.9' depth	68.0 to 70.0	89									
		68.0 to 68.4	saved									
	Silty CLAY, sandy; gray, firm to stiff consistency, moderately plastic (CL)	68.4	W89.1	27.3			93					
		68.4	TV	27.3								TV = 0.48 tsf
	Sample includes 20 to 25% fine to coarse Sand particles and subrounded to subangular Gravel size particles	68.5 to 68.9	saved									
		69.0 to 69.2	L89.1	27.9	43	18						
		69.2	W89.2	29.5			94					
		69.2	TV	29.5								TV = 0.54 tsf
		69.3 to 69.7	saved									

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C-106 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/16	1.9' Recovery; say 78.0' to 79.9' depth	78.0 to 80.0	90								
		78.2 to 78.5	saved								
	Silty CLAY, gray, firm to stiff consistency, moderate plasticity (CL)	78.5	W90.1	27.7		95					
		78.5	TV	27.7							TV = 0.56 tsf
		78.6 to 78.9	U90.1	27.9		95	U	10.0 1271			
	Sample includes 10 to 15% fine to coarse Sand particles and subrounded to subangular Gravel particles to 1/2 inch maximum size	78.6 to 78.9	L90.1	27.9	39 20						
		79.0	W90.2	27.8		92					
		79.0	TV	27.8							TV = 0.63 tsf
		79.1 to 79.7	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
50/18	1.9' Recovery, say 88.0' to 89.9' depth; upper 0.3' disturbed	88.0 to 90.0	91								
		88.3 to 88.6	T91.1.1	28.0		97	CU	14.6 1923			$\bar{\sigma}_c$ = 3456 psf
		88.6	W91.1	27.6		95					
		88.6	TV	27.6							TV = 0.59 tsf
	Silty CLAY, sandy, gray, firm to stiff consistency, moderate plasticity (CL)	88.7 to 89.0	T91.1.2	27.6		97	CU	11.7 2590			$\bar{\sigma}_c$ = 6912 psf
		88.7 to 89.0	L91.1	29.5	39 23						
	Sample includes 20 to 25% fine to coarse Sand size particles and about 10% subrounded to subangular Gravel size particles	89.0	W91.2	27.0		95					
		89.0	TV	27.0							TV = 0.69 tsf
		89.1 to 89.4	T91.1.3	27.6		96	CU	11.8 3989			$\bar{\sigma}_c$ = 13,824 psf
		89.5 to 89.8	saved								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/3	2.3' Recovery; say 20.0' to 22.3' depth	20.0 to 22.3'	108										
		20.1 to 20.5	saved										
	Silty CLAY; gray, very stiff consistency, moderate to high plasticity (CL - CH)	20.5	W108.1	31.1			92						
		20.5	TV										TV = 1.2 tsf
		20.5 to 20.9	U108.1	30.3			92	U	4.0	2737			
	NOTE: Consistency of soil decreases within lower half of sample with no visible signs of disturbance	20.5 to 20.9	L108.1	30.9	49	20							
		20.9 to 21.0	W108.2	30.4			92						
		21.2 to 21.5	T 108.0.1	31.1			92	UU	8.0	1591			σ_c = 2016 psf
		21.5 to 21.6	W108.3	31.4			91						
		21.6	TV										TV = 0.7 tsf
		21.6 to 21.9	saved										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/4	2.5' Recovery; say 28.0' to 30.5' depth	28.0 to 30.5	109										
		28.2 to 28.5	saved										
	Silty CLAY, gray, firm consistency, of moderate plasticity (CL)	28.5	W 109.1	32.5			89						
		28.6 to 28.9	U 109.1	31.8			94	U	9.0	489			
	Sample includes lenses or layers of non-plastic sandy Silt (about 15% of total sample)	28.6 to 28.9	L 109.1	29.4	35	18							
		28.9 to 29.2	V 109.1	30.5				VS rVS		568 277			St = 2.1
		29.3	W 109.2	30.5			89						
	Note change in physical properties of soil below 29.5' depth - is Silty CLAY (CL-CH)	29.4 to 29.7	saved										
		29.8	W 109.3	41.3			79						
		29.9 to 30.2	C 109.1	40.5							1.013	0.45	
		29.9 to 30.2	SG 109.1										Specific Gravity = 2.70
		29.9 to 30.2	L 109.2	40.5	49	20							

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C-110 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ___ SUMMARY OF LABORATORY TEST RESULTS — DATE ___ SHEET ___ OF ___

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/6	2.4' Recovery; say 48.0' to 50.4' depth	48.0 to 50.5	111								
		48.1 to 48.4	T111.11	22.1		101	CU	10.2 15159			$\bar{\sigma}_c$ = 2160psf
	SILT, dark gray, firm consistency, non-plastic to slightly plastic (ML)	48.4	W111.1	22.9		99					
		48.4	TV	22.9							TV = 0.27 tsf
		48.5 to 48.8	T111.12	22.7		99	CU	15.0 17508			$\bar{\sigma}_c$ = 4320psf
		48.8 to 49.1	T1111.3	22.1		104	CU	13.3 27777			$\bar{\sigma}_c$ = 8640psf
	Becomes more plastic with depth,	49.1	W111.2	21.5		103					
	At ±49.5' depth change to Silty CLAY, sandy; dark gray, stiff consistency; moderately plastic (CL)	49.1	TV	21.5							TV = 0.35 tsf
		49.2 to 49.5	U111.1	25.2		100	U	2.5 317			
		49.2 to 49.5	L111.1	25.2	22 18						
	Includes 15 to 20% fine to coarse Sand size particles with less than 5% fine Gravel size pieces to 1/4 inch maximum size	49.5	W111.3	23.6		101					
		49.5	TV	23.6							TV = 0.73 tsf
		49.6 to 49.8	V111.1	23.6			VS rVS	2160 1950			St = 1.1

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/7	2.4' Recovery; say 58.0' to 60.4' depth	58.0 - 60.4	112										
		58.2 - 58.5	saved										
	Silty CLAY; sandy, very dark gray, very stiff consistency, moderate plasticity (CL)	58.5 - 58.6	W112.1	16.0			112						
		58.6'	TV										TV = 1.10 tsf
		58.6 - 58.9	kd12.1	15.1							0.411		sieve/hydrometer see plot
	Sample includes about 30 - 35% fine to coarse subrounded to rounded Sand grains; also about 10 - 15% Gravel pieces (subrounded to subangular, 1-1/2" max. size)	59.0 - 59.3	U112.1	13.0			116	U	6.0	1799			
		59.0 - 59.3	L112.1	12.9	23	14							
		59.3 - 59.7	saved										
		59.7	W112.2	14.6			115						
		59.7	TV										TV = 1.20 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/8	1.5' Recovery; say 68.0' to 69.5' depth	68.0 to 69.5'	113								
		68.2	W113.1	14.5		111					
		68.2	TV								TV = 1.0 tsf
	Silty CLAY, sandy, very dark gray, stiff to very stiff consistency, moderate plasticity (CL)	68.2 to 68.5	U113.1	14.2		115	U	13.0 1677			
		68.2 to 68.5	L113.1	13.8	24 14						
	Includes about 30% fine to coarse rounded to subrounded Sand grains, and about ±10% subrounded to subangular Gravel pieces (3/4" max. size)	68.6	W113.2	14.3							
		68.6	TV								TV = 1.2 tsf
		69.0 to 69.4	T 113.0.1	16.2		111	UU	15.0 1891			$\bar{\sigma}_c$ = 5184 psf
		69.4	W113.3	19.4							
		69.4	TV								TV = 0.8 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/9	2.5' Recovery; say 78.0' to 80.5' depth	78.0 to 80.5'	114									
		78.2 to 78.5	saved									
	Silty CLAY; gray, stiff consistency, moderately plastic (CL)	78.5 to 78.6	W114.1	23.3			105					
		78.6'	TV									TV = 0.5 tsf
	Sample includes about 20% fine to coarse Sand and fine Gravel particles (subangular to subrounded)	78.6 to 78.9	T 114.0.1	21.8			105	UU	14.0 1157			σ_c = 3760 psf
		78.6 to 78.9	L114.1	23.5	35	18						
		78.9 to 79.0	W114.2	22.1			106					
		79.0	TV									TV = 0.8 tsf
		79.0 to 79.3	saved									
		79.3 to 79.7	saved									
		79.7 to 79.8	W114.3	21.9			103					
		79.8	TV									TV = 0.95 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/10	2.5' Recovery; say 88.0' to 90.5' depth	88.0 to 90.5	115								
		88.2 to 88.5	saved								
	Silty CLAY; sandy, gray, stiff consistency, moderate plasticity (CL)	88.5	W115.1	26.7		97					
		88.6 to 88.9	U115.1	27.2		97	U	8.0 2435			
		88.6 to 88.9	L115.1	26.4	39 18						
	Sample includes 25 to 30% fine to coarse Sand size particles and subrounded to subangular Gravel particles	89.0	W115.2	26.4		96					
		89.1 to 89.4	V115.1	26.4			VS rVS	1662 1529			St = 1.1
		89.5 to 89.8	saved								
		89.8	W115.3	27.0		95					
		89.9 to 90.3	saved								

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/12	2.5' Recovery; say 108.0' to 110.5' depth	108.0 - 110.5	117								
		108.1 - 108.5	saved								
	Silty CLAY; gray, medium to stiff consistency, moderate to high plasticity (CL)	108.5	W117.1	29.7		83					
		108.5	TV								TV = 0.55 tsf
	Sample includes about 10% fine to coarse subrounded to rounded Sand grains	108.5 - 108.8	saved								
		108.8 - 109.1	saved								
		109.1	W117.2	35.1							
		109.1	TV								TV = 0.35 tsf
		109.3 - 109.6'	T 117.0.1	35.8		87	UU	3.0 1596			$\bar{\sigma}_c$ = 7632 psf
		109.3 - 109.6	L117.1	36.2	46 22						
		109.6 - 109.9	saved								
		110.0	W117.3	35.5		87					
		110.0	TV								TV = 0.51 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
52/12	Jar Sample	115.5	567									
	Silty CLAY, grey, moderate plasticity (CL)		L567.1		34	18						
	Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)											

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
53/3	1.7' Recovery; say 19.0' to 20.7' depth	19.0 to 21.0	96									
		19.2 to 19.5	saved									
	Silty CLAY, gray, stiff consistency, moderate to high plasticity (CL-CH)	19.5	W96.1	32.0			87					
		19.5	TV									TV = 0.58 tsf
		19.6 to 19.9	U96.1	31.8			88	U	5.0 1156			
		19.6 to 19.9	L96.1	31.7	49	20						
		20.0	W96.2	32.1			87					
		20.0	TV									TV = 0.65 tsf
		20.1 to 20.4	T96.0.1	32.2			91	UU	8.9 1425			$\bar{T}_c$ = 2405 psf

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
53/4	1.8' Recovery; say 29.0' to 30.8' depth	29.0 to 31.0	97									
		29.1 to 29.4	saved									
	Silty CLAY, gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	29.5	W97.1	42.5			77					
		29.5	TV	42.5								TV = 0.53 tsf
		29.6 to 29.9	U97.1	40.7			80	U	5.0 1006			
		29.6 to 29.9	L97.1	41.1	49	22						
		30.0	W97.2	38.8			91					
		30.0	TV	38.8								TV = 0.47 tsf
		30.1 to 30.4	T97.0.1	34.2			88	UU	2.4 973			σ_c = 3024 psf
		30.4 to 30.7	saved									

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
53/5	1.7' Recovery; say 39.0' to 40.7' depth	39.0 to 41.0	98								
		39.1 to 39.4	saved								
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	39.4 to 39.5	W98.1	26.3		97					
		39.5	TV	26.3							TV = 0.49 tsf
	Sample includes 20 to 30% coarse to fine Sand and fine Gravel size particles (subrounded to subangular in shape)	39.5 to 39.8	C98.1	30.9					0.872	0.35	
		39.5 to 39.8	SG98.1								Specific Gravity = 2.72
		39.5 to 39.8	L98.1	30.5	39 20						
		39.5 to 39.8	k98.1	30.2					0.732		Sieve Hydrometer see plot
		39.8 to 40.1	saved								
		40.1 to 40.2	W98.2	29.6		92					
		40.2	TV	29.6							TV = 0.34 tsf
		40.2 to 40.6	saved								

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
53/6	1.5' Recovery; say 49.0' to 50.5' depth	49.0-51.0	99								
	Silty CLAY, grey, soft to firm consistency, moderately plastic (CL)	49.1	W99.1	36.2		89					
		49.2-49.5	U99.1	27.9		94	U	14.9 561			
		49.2-49.5	L99.1	27.8	43 18						
	Sample includes 15 to 20% fine to coarse Sand size particles and subrounded to subangular gravel size pieces	49.6	W99.2	27.3		94					
		49.7-50.0	V99.1	27.3			VS rVS		540 340		
	Sample slightly disturbed throughout	50.0-50.3	Saved								

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PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
FILE NO. 1255
DATE ____
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
53/9	2.5' Recovery; say 79.0' to 81.5' depth	79.0 to 81.5	101									
		79.4	W1011	27.6			97					
	Silty CLAY; mottled gray, firm to stiff consistency, moderately plastic (CL)	79.5 to 79.8	V1011	27.9			95	VS rVS	1371 1025			St = 1.3
		80.1 to 80.4	U101.1	27.9			95	U	6.0 1275			
	Sample includes about 15% fine to coarse Sand and fine Gravel size particles	80.1 to 80.4	L1011	28.0	39	21						
		80.5 to 80.8	saved									
		80.9 to 81.2	saved									

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
53/12	2.5' Recovery; say 109.0' to 111.5' depth	109.0 - 111.5'	104								
		109.2 - 109.5	saved								
	Silty CLAY; dark gray, stiff consistency, moderate plasticity (CL)	109.5 - 109.7	W1041	20.0		108					
		109.7	TV								TV = 0.68 tsf
		109.7 - 110.0	I1041	20.5	29 15						
	Sample includes about 15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	110.0 - 110.4	saved								
		110.4 - 110.5	W1042	20.1		107					
		110.5	TV								TV = 0.85 tsf
		110.5' - 110.8	saved								

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PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
53/12	Jar Sample	116.0	568								
	Silty CLAY, grey, moderate plasticity (CL)		L568.1		36 19						
	Sample includes about 15% fine to coarse SAND and fine Gravel size particles (subrounded to subangular in shape)										

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
54/4	1.8' Recovery, say 53.0' to 54.8' depth	53.0 to 55.0	397									
		53.2 to 53.5	T397.11	23.6			102	CU	10.7 4838			$\bar{\sigma}c$ = 2160 psf
	Clayey SILT, dark gray, firm consistency, slightly plastic to non-plastic (CL - ML)	53.2 to 53.5	T397.01	24.4			99	UU	15.0 533			σc = 4320 psf
		53.2 to 53.5	L397.1	22.8	21	17						
		53.5 to 53.6	W397.1	25.7								
	@± 53.5' depth, change to Silty CLAY sandy very dark gray, firm to stiff consistency, moderately plastic (CL)	53.6	TV									TV=0.36 tsf
		53.6 to 53.9	T397.14	22.6			101	CU	14.9 1430			$\bar{\sigma}c$ = 2160 psf
		53.9 to 54.2	T397.12	23.2			102	CU	14.8 2022			$\bar{\sigma}c$ = 4320 psf
	Sample includes few lenses/ layers of clayey SILT; also about 15% fine to coarse sand size particles and subrounded to subangular gravel size pieces	53.9 to 54.2	T397.13	23.2			102	CU	13.8 3867			$\bar{\sigma}c$ = 8640 psf
		54.2 to 54.3	W397.2	23.3								
		54.3 to 54.6	T397.19	24.0			100	CU	10.6 2805			$\bar{\sigma}c$ = 6480 psf
		54.3 to 54.6	L397.2	24.0	31	18						
		54.6	TV									TV = 0.47 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
54/5	2.0' Recovery	58.5 to 60.5	398									
		58.6 to 58.9	saved									
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	58.9	W398.1	25.2			93					
		58.9	TV	25.2								TV = 0.44 tsf
	Sample includes about 20% fine to coarse Sand size particles and about 10% subangular to subrounded Gravel particles to 2 inch maximum size	59.0 to 59.3	T398.0.1	25.4			99	UU	15.0 768			σ_c = 4464 psf
		59.3 to 59.6	U398.1	25.8			99	U	11.0 557			
		59.3 to 59.6	L398.1	26.2	38	17						
		59.6	W398.2	27.5			92					
		59.6	TV	27.5								TV = 0.55 tsf
		59.7 to 60.0	V398.1	27.5			92	VS	1100			
		60.0 to 60.3	saved									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
54/6	2.0' Recovery	63.0 to 65.0	399									
	Silty CLAY, sandy, gray, firm to stiff consistency, moderately plastic (CL)	63.1 to 63.4	T399.0.1	26.1			98	UU	13.0 796			$\bar{\sigma}_c$ = 5040 psf
		63.4 to 63.5	W399.1	24.3			92					
		63.5	TV	24.3								TV = 0.46 tsf
	Sample includes about 25% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	63.5 to 63.8	C399.1	26.0						0.696	0.24	
		63.5 to 63.8	SG399.1									Specific Gravity = 2.71
		63.5 to 63.8	k399.1	27.2			98			.724		Sieve/hydrometer See plot
		63.5 to 63.8	L399.1	26.0	36	18						
		63.8 to 64.1	T399.1.1	26.4			98	CU	12.0 1362			$\bar{\sigma}_c$ = 2448 psf
		64.1 to 64.2	W399.2	25.0			98					
		64.2	TV	25.0								TV = 0.52 tsf
		64.2 to 64.5	T399.1.2	25.2			98	CU	12.1 2008			$\bar{\sigma}_c$ = 4896 psf
		64.5 to 64.8	T399.1.3	25.8			98	CU	11.6 2929			$\bar{\sigma}_c$ = 9792 psf
		64.8	TV									TV = 0.48 tsf

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
54/7	2.0' Recovery	68.0 to 70.0	400										
	Silty CLAY, sandy, gray, stiff consistency, moderately plastic (CL)	68.1 to 68.4	V400.1	26.3				VS rVS		1300 840			St = 1.5
		68.4 to 68.5	W400.1	26.3			96						
		68.5	TV	26.3									TV = 0.58 tsf
	Sample includes 30 to 40% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	68.5 to 68.8	U400.1	25.9			98	U	8.9	788			
		68.5 to 68.8	L400.1	26.2	37	18							
		68.8 to 69.1	T400.0.1	25.9			98	UU	12.0	1148			σ_c = 5112 psf
		69.1 to 69.2	W400.2	22.5			102						
		69.2	TV	22.5									TV = 0.54 tsf
		69.2 to 69.8	saved										
		69.8	TV										TV = 0.56 tsf

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS % (PSF)	e_o	C_c	
54/8	2.0' Recovery	73.0 to 75.0	401									
		73.0 to 73.3	saved									
	Silty CLAY, gray, stiff consistency, moderately plastic (CL)	73.3 to 73.4	W401.1	38.9			81					
		73.4	TV	38.9								TV = 0.54 tsf
	Sample includes about 10% fine to coarse Sand grains and silty fine Sand lenses	73.4 to 73.7	saved									
		73.7 to 74.0	C401.1	38.3						0.982	0.41	
		73.7 to 74.0	SG401.1									Specific Gravity=2.73
		73.7 to 74.0	L401.1	31.6	45	21						
		73.7 to 74.0	k401.1	31.6			90			0.851		sieve/hydrometer see plot
		74.0 to 74.1	W401.2	30.0			89					
		74.1	TV	30.0								TV = 0.50 tsf
		74.1 to 74.7	saved									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
58/2	Jar Sample Silty CLAY, dark greyish brown, moderate to high plasticity (CL)	6.0'	562								
			L562.1		42 19						

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
58/6	Jar Sample	25.0'	563								
	Silty CLAY, grey, moderate to high plasticity (CL-CH)		L563.1		48 20						

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
58/10	Jar Sample	45.0'	564									
	Silty CLAY, Sandy, low to moderate plasticity (CL) Sample includes about 35% fine Sand grains		L564.1		27	19						

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
58/13	Jar Sample	60.0'	565									
	Silty CLAY, Sandy, gray, moderately plastic (CL) Sample includes about 45% fine to coarse Sand grains (Subrounded to subangular in shape)		L565.1		34	17						

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
58/17	Jar Sample	80.0'	566								
	Silty CLAY, dark gray, moderate to high plasticity (CL)		L566.1		43 20						

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % / MAX. SHEAR STRESS (PSF)	e_o	C_c	
B59/3	1.8' Recovery; say 18.0' to 19.8' depth	18.0 to 20.0	76									
		18.1 to 18.4	saved									
	Silty CLAY, gray, firm to stiff consistency, moderate to high plasticity (CL-CH)	18.4 to 18.5	W76.1	32.1			83					
		18.5	TV	32.1								TV = 0.58 tsf
		18.5 to 18.8	V76.1	32.8				VS	1260			
		18.8 to 19.1	U76.1	32.8			90	U	6.9 1056			
		18.8 to 19.1	L76.1	32.7	48	20						
		19.1 to 19.3	W76.1	31.6			90					
		19.3	TV	31.6								TV = 0.56 tsf
		19.3 to 19.7	saved									

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
59/5	1.9' Recovery; say 38.0' to 39.9' depth; upper 0.5' disturbed	38.0 to 40.0	78								
		38.6 to 38.7	W78.1	26.7		94					
		38.7	TV	26.7							TV - 0.46 tsf
	Silty CLAY, sandy, gray, firm consistency, moderately plastic (CL)	38.7 to 39.0	U78.1	26.2		99	U	14.9 626			
		38.7 to 39.0	L78.1	26.2	38 18						
	Sample includes 20 to 25% fine to coarse Sand and fine Gravel size particles, subrounded to subangular in shape	39.0 to 39.3	saved								
		39.3 to 39.4	W78.2	25.6		96					
		39.4	TV	25.6							TV = 0.47 tsf
		39.4 to 39.7	V78.1	25.6			VS	637			

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c *	
59/7	1.5' Recovery; say 58.0' to 59.5' depth	58.0 to 60.0	80										
		58.1 to 58.4	saved										
	Silty CLAY, sandy, dark gray, firm to stiff consistency, moderately plastic (CL)	58.4 to 58.6	W80.1	25.0			100						
		58.6	TV	25.0									TV = 0.49 tsf
		58.6 to 58.9	U80.1	26.3			98	U	8.0	835			
	Sample includes 20 to 25% coarse to fine Sand and fine Gravel size particles (subrounded to subangular in shape)	58.6 to 58.9	L80.1	24.5	36	18							
		58.9 to 59.0	W80.2	24.1			102						
		59.0	TV	24.1									TV = 0.51 tsf
		59.0 to 59.3	V80.1	24.1				VS rVS		734 (969)			

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
59/9	Jar Sample	75.0	569									
	Clayey SAND, subrounded to subangular fine to coarse Sand and fine Gravel size particles with 35 to 40% low to moderately plastic fines (SC)		L569.1		22	14						

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C-138 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
59/11	Jar Sample	95.0	570									
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand size particles (subrounded to sub-angular in shape)		L570.1		37	19						

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/1	Jar Sample	5.0 to 6.5	70										
	Silty CLAY; dark gray, highly plastic (CL-CH)		L70.1	27.3	50	20							
			H70.1										See plot
B60/2	Jar Sample	10.0 to 12.5	71										
	Silty CLAY; dark gray, moderately to highly plastic (CL)		L71.1	28.0	44	19							
			H71.1										See plot
B60/3	Jar Sample	19.0 to 20.5	72										
	Silty CLAY; dark gray, moderately to highly plastic (CL)		L72.1	30.3	43	19							
			H72.1										See plot
B60/5	Jar Sample	27.0 to 28.5	73										
	Silty CLAY; dark gray, highly plastic (CL-CH)		L73.1	34.3	48	20							
			H73.1										See plot

C-140 GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/2	Silty CLAY; grayish brown, stiff to very stiff consistency, highly plastic (CL-CH)	8.0 to 10.0	42									
		8.0 to 8.3	save 42.1									
		8.3	TV	28.3								TV=1.1tsf
	Includes about 10% subangular to subrounded fine Gravel and coarse Sand grains	8.3 to 8.4	W42.1	28.3								
		8.4 to 8.7	save 42.2									
		8.7 to 9.0	T42.1.3	28.9			96	CU	5.3 1336			
		8.7 to 9.0	T42.1.3R	28.9			98	CU_R	11.6 1751			Remolded sample
		9.0	TV	29.0								TV=0.88tsf
		9.0 to 9.1	W42.2	29.0								
		9.1 to 9.4	T42.1.2	29.3			95	CU	5.2 882			
		9.1 to 9.4	T42.1.2R	29.3			99	CU_R	10.8 1244			Remolded sample
		9.4 to 9.7	T42.1.1	29.8			94	CU	3.6 530			
		9.4 to 9.7	T42.1.1R	29.8			96	CU_R	15.0 875			Remolded sample
		9.7	TV	29.7								TV=1.1tsf
		9.7 to 9.8	W42.3	29.7								
		9.8 to 10.0	C42.1	30.0						.787	.23	Specific Gravity=2.71
		9.8 to 10.0	L42.1	29.7	53	26						

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE March 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/3	2.0 Recovery; say 17.0' to 19.0' depth. Upper 0.5' disturbed	17.0 to 19.0	43								
		17.5	TV	29.9							TV=0.27 tsf
	Silty CLAY, dark gray, medium to stiff consistency, moderately plastic (CL)	17.5 to 17.6	W43.1	29.9							
		17.6 to 18.0	U43.1	24.3		105	U	20.0 1143			@15.0%strain s=1029 psf
		17.6 to 18.0	U_r43.1	24.3		103	U_r	20.0 1053			@15.0%strain s=879 psf
	Sample includes about 10% fine to coarse Sand grains (sub-rounded to subangular in shape)	17.6to 18.0	L43.1	24.3	39 21						
		18.0	TV	19.2							TV=0.87 tsf
		18.0 to 18.1	W43.2	19.2							
		18.1 to 18.3	k43.1	26.1							
		18.1 to 18.3	H43.1								See plot
		18.6	TV	19.5							TV=0.46 tsf
		18.6 to 18.7	W43.3	19.5							
		18.7 to 19.0	save 43.1								

C-142 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/4	1.8' Recovery; say 21.0' to to 22.8' depth	21.0 to 23.0	44										
		21.1	TV	31.8									TV=0.52 tsf
		21.1 to 21.2	W44.1	31.8									
	Silty CLAY, grayish brown, stiff consistency, highly plastic (CL-CH)	21.2 to 21.5	T44.13	31.0			94	CU	3.8	2658			
		21.8	TV	30.9									TV=0.71 tsf
	Includes about 5% coarse Sand and fine Gravel particles	21.8 to 21.9	W44.2	30.9									
		21.9 to 22.3	T44.11	30.4			94	CU	6.7	1389			
		21.9 to 22.3	I44.1	30.4	43	17							
		22.3	TV	29.9									TV=0.68 tsf
		22.3 to 22.4	W44.3	29.9									
		22.4 to 22.8	T44.14	30.6			95	CU	7.6	1588			

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Jan. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/5	1.9' Recovery; say 25.0' to 26.9' depth	25.0 to 27.0	45										
		25.1	TV	34.8									TV=0.53 tsf
	Silty CLAY; gray, moderate to high plasticity, firm to stiff consistency (CH-CL)	25.1	W45.1	34.8									
		25.2 to 25.6	save 45.1										
		25.6	TV	35.5									TV=0.55 tsf
		25.6	W45.2	35.5									
		25.7 to 26.1	U45.1	36.8			86	U	4.0	1002			
		25.7 to 26.1	L45.1	36.8	51	22							
		26.2	TV	36.3									
		26.2	W45.3	36.3									
		26.2 to 26.5	save 45.2										
		26.5	TV										TV=0.50 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
60/6	Silty CLAY, gray, firm to stiff consistency, high plasticity (CL-CH)	30.0-32.0	46										
		30.1-30.4	Saved										
		30.4	W46.1	40.4			81						
		30.4	TV										TV=0.47tsf
		30.5-30.8	U46.1	35.0			88	U	3.7	1577			
		30.5-30.8	L46.1	34.7	48	25							
		31.0	V46.1	34.0				VS		1000			
								rVS		550			
		31.3	TV										TV=0.40tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/8	1.7' Recovery; say 40.0' to 41.7' depth	40.0 to 42.0	48								
	Silty CLAY; dark gray, moderate to high plasticity, firm consistency (CL-CH)	40.1	TV	23.6							TV=0.46 tsf
		40.1 to 40.2	W48.1	23.6							
		40.2 to 40.6	save 48.1								
	Includes about 10% Silty fine Sand occurring as pockets or lenses 1/8" to 3/8" long	40.6	TV	33.7							TV=0.40 tsf
		40.6	W48.2	33.7							
		40.7 to 41.1	U48.1	39.7		83	U	3.0 338			
		40.7 to 41.1	L48.1	39.7	47 25						
		41.1	TV	41.4							TV=0.40 tsf
		41.1	W48.3	41.4							
		41.1 to 41.5	save 48.2								
		41.5	TV								TV=0.33 tsf

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/9	1.9' Recovery; say 45.0' to 46.9' depth	45.0 to 47.0	49								
		45.1	TV	25.9							TV=0.45tsf
	Silty CLAY, sandy, dark gray, firm to stiff consistency, highly plastic (CL) Includes about 30% subangular to subrounded fine Gravel to coarse Sand size particles	45.1 to 45.2	W49.1	25.9							
		45.2 to 45.5	T49.1.3	26.0		102	CU	8.5 2510			
		45.5 to 45.8	T49.1.2	27.0		98	CU	8.2 1499			
		45.8	TV	25.4							TV=0.50tsf
		45.8 to 45.9	W49.2	25.4							
		45.9 to 46.3	T49.1.1	26.6		99	CU	12.9 1267			
		45.9 to 46.3	L49.1	24.8	38 16						
		46.3	TV	25.3							TV=0.52tsf
		46.3 to 46.4	W49.3	25.3							
		46.4 to 46.7	save 49.1								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
60/10	1.7' Recovery; say 50.0' to 51.7' depth; upper 0.5' disturbed	50.0-52.0	50										
		50.3-50.4	W50.1	29.3									
		50.5-50.9	saved										
	Silty CLAY, dark gray, firm consistency, moderate plasticity (CL)	50.9	TV										TV=0.36 tsf
		50.9-51.2	U50.1	25.5			100	U	15.2	1255			@20% strain s=1367 psf
		50.9-51.2	L50.1	25.7	34	16							
	Sample includes about 10% fine to coarse SAND and fine gravel size particles (subrounded to subangular in shape)	51.2-51.3	W50.2	25.9			97						
		51.3	TV										TV=0.42 tsf
		51.3-51.6	V50.1					VS rVS		1950 1050			
	Few thin (± 1/16" thick) lenses/ layers of SILT, grey, non-plastic (ML) appear throughout comprising 5% of total sample												

C-148 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE March 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/11	1.8' Recovery; say 55.0' to 56.8' depth	55.0 to 57.0	51									
		55.1	TV	25.9								TV=0.33 tsf
	Silty CLAY, dark gray, moderate plasticity, firm to stiff consistency (CL)	55.1 to 55.2	W51.1	25.9								
		55.2 to 55.5	save 51.1									
	Includes about 20% medium to coarse SAND and ±10% subangular to subrounded gravel size particles (1/4" to 1" size)	55.5	TV	24.8								TV=0.63 tsf
		55.5 to 55.9	U51.1	24.8			103	U	24.0 1407			@15.0% strain s=1299 psf
		55.5 to 55.9	U_r51.1	24.8			103	U_r	20.0 1002			@15.0% strain s= 817 psf
		55.5 to 55.9	L51.1	24.8	33	18						
		56.0	TV	25.9								TV=0.50 tsf
		56.0	W51.2	25.9								
		56.1 to 56.4	k51.1	25.5								
		56.1 to 56.4	S/H 51.1									See plot
		56.4	TV	25.9								TV=0.46 tsf
		56.4	W51.3	25.9								
		56.4 to 56.7	save 51.3									

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/12	0.5' Recovery; say 60.0' to 60.5' depth	60.0 to 62.0	52								
		60.0 to 60.2	W52.2	28.9							
		60.2	W52.1	27.9							
	Silty CLAY, dark gray, moderate plasticity (CL)	60.2 to 60.4	I52.1	27.9	36 18						
	Entire sample disturbed										

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C-150 SOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/13	1.9' Recovery; say 67.0' to 68.9' depth	67.0 to 69.0	53										
		67.1	TV	24.7									TV=0.63 tsf
	Silty CLAY; dark gray, stiff consistency, moderately to highly plastic (CL)	67.1 to 67.2	W53.1	24.7									
	Sample includes zones of Silty CLAY, gravelly, stiff to very stiff consistency, moderately plastic (CL) and Clayey GRAVEL, sandy, slightly plastic (GC)	67.2 to 67.5	T53.1.4	15.5			114	CU	12.9	4613			
		67.2 to 67.5	T53.1.5	21.0			104	CU	11.9	3178			
		67.5	TV	16.4									TV=0.95 tsf
		67.5 to 67.6	W53.2	16.4									
	Silty CLAY, gravelly, and Clayey GRAVEL, sandy, zones comprise 40 to 50% of total	67.6 to 67.9	T53.1.3	19.7			104	CU	15.0	4060			
		67.9	TV										TV=0.48tsf
		67.9 to 68.3	L53.1	29.4	40	19							
		68.3 to 68.6	T53.1.1	23.6			104	CU	15.0	1945			
		68.3 to 68.6	T53.1.2	31.9			91	CU	6.2	1723			
		68.6	TV										TV=0.50 tsf
		68.6 to 68.7	W53.3	33.2									

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/14	2.2' Recovery; say 74.0' to 76.2' depth	74.0 to 76.5	54								
		74.4	TV	25.9							TV=0.54tsf
	Silty CLAY, dark gray, moderately to highly plastic, medium consistency (CL) Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	74.4	W54.1	25.9							
		74.5 to 75.0	save 54.1								
		75.0	TV	26.8							TV=0.70tsf
		75.0	W54.2	26.8							
		75.1 to 75.6	U54.1	26.9		97	U	5.0 652			
		75.1 to 75.6	L54.1	26.9	40 20						
		75.6	TV	26.0							TV=0.70tsf
		75.6	W54.3	26.0							
		75.6 to 76.0	save 54.2								
		76.0	TV								TV=0.63tsf

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE March 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/16	2.4' Recovery; say 84.0' to 86.4' depth	84.0 to 86.5	56.0									
		84.2	TV	27.4								TV=0.62 tsf
	Silty CLAY, dark gray, moderate to high plasticity, firm consistency (CL)	84.2	W56.1	27.4								
		84.2 to 84.6	save 56.1									
		84.6	TV	26.7								TV=0.73 tsf
	Includes about 20% fine to coarse Sand particles and ±15% subangular to subrounded Gravel particles	84.6	W56.2	26.7								
		84.7 to 85.1	save 56.2									
		85.2 to 85.4	C56.1	27.9						.744	.27	
		85.2 to 85.4	L56.1	26.9	40	19						
		85.2 to 85.4	SG56.1									Specific Gravity=2.73
		85.6	TV	26.1								TV=0.65 tsf
		85.6	W56.3	26.1								
		85.6 to 86.1	k56.1	29.1								
		85.6 to 86.1	S/H 56.1									See plot
		86.1	TV									TV=0.65 tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/19	2.5' Recovery; say 99.0' to 101.5' depth	99.0 to 101.5	59								
		99.5	TV	27.6							TV=0.61 tsf
	Silty CLAY; dark gray, highly plastic, firm to stiff consistency (CL)	99.5	W59.1	27.6							
		99.5 to 99.9	save 59.1								
	Includes ±15% coarse Sand and subrounded to subangular Gravel size particles	99.9	TV	26.9							TV=0.80 tsf
		99.9	W59.2	26.9							
		100.0 to 100.4	U59.1	27.1		101	U	7.0 1132			
		100.0 to 100.4	L59.1	27.1	38 20						
		100.4	TV	26.8							TV=0.80 tsf
		100.4	W59.3	26.8							
		100.5 to 100.9	save 59.2								
		100.9	TV								TV=0.66 tsf
		100.9 to 101.4	save 59.3								

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % / MAX. SHEAR STRESS (PSF)	e_o	C_c	
B60/23	2.3' Recovery; say 119.0' to 121.3' depth	119.0 to 121.5	63									
		119.6	TV	32.9								TV-0.35 tsf
	Silty CLAY, gray mottled reddish brown, low plasticity, soft consistency; includes about 40% fine to coarse Sand grains (subrounded to subangular) (CL-ML)	119.6	W63.1	32.9								
		119.6 to 120.0	U63.1	15.4			115	U	6.0 / 335			
		119.6 to 120.0	L63.1	15.4	17	11						
	At 120.0' change to Clayey SAND about 10% hard, subrounded to subangular Gravel particles, about 15% plastic and non-plastic fines (SC)	120.0	TV	12.9								TV=0.10
		120.0	W63.2	12.9								test performed on sand lens
		120.1 to 120.5	save 63.1									
		120.5	TV	17.2								TV=0.21 tsf
		120.5	W63.3	17.2								
		120.5 to 121.0	save 63.2									

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PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
DATE April 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/2	Silty CLAY, olive brown very stiff consistency, moderately to highly plastic (CL-CH) Sample includes about 5% hard, subrounded to rounded gravel size particles	8.0 to 10.0	349										
		8.1 to 8.7	save 349.1										sample used for T466.1, 2, 3
		8.7 to 8.9	W349.1	27.7			94						
		8.9 to 9.2	U349.1	27.8			96	U	2.4	1828			
		8.9 to 9.2	L349.1	27.8	50	22							
		9.2	TV										TV=1.8tsf
		9.2 to 10.0	save 349.2										sample used for T466.1, 2, 3

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/4	2.3' Recovery; Say 19.0' to 21.3' depth	19.0 to 21.5	351								
		19.0 to 19.3	save 351.1								
	Silty CLAY, gray, firm consistency, highly plastic (CL-CH)	19.3 to 19.5	W35L1	33.3		89					
		19.5	TV								TV=0.48tsf
		19.5 to 19.9	save 351.2								
		19.9 to 20.2	U35L1	35.8		86	U	6.0 1014			
		19.9 to 20.2	L35L1	35.8	49 24						
		20.2 to 20.4	W35L2	35.0		88					
		20.4	TV								TV=0.38tsf
		20.4 to 20.8	save 351.3								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/7	2.1' Recovery; Say 34.0' to 36.1' depth	34.0to 36.5	354									
		34.1 to 34.4	save 354.1									
	Silty CLAY, gray, firm consistency, moderately to highly plastic (CL-CH)	34.4 to 34.6	W354.1	39.9		81						
		34.6	TV									TV=0.27tsf
		34.6 to 34.9	save 354.2									
		34.9to 35.2	U354.1	40.0		81	U	2.4	796			
		34.9to 35.2	L354.1	37.8	46 24							
		35.2to 35.4	W354.2	38.6		83						
		35.4	TV									TV=0.34tsf
		35.4to 35.7	save 354.3									

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/10	2.4' Recovery; Say 49.0' to 51.4' depth	49.0 to 51.6	357									
		49.1 to 49.4	save 357.1									
	Silty CLAY; dark gray, firm consistency, moderately plastic (CL)	49.4 to 49.6	W357.1	33.0			88					
		49.6	TV									TV=0.32tsf
		46.6 to 49.9	save 357.2									
	Sample includes about 20% coarse to fine sand grains (subrounded to subangular in shape)	50.1 to 50.4	U357.1	32.8			90	U	5.0 722			
		50.1 to 50.4	L357.1	31.0	40	22						
		50.4	TV									TV=0.44tsf
		50.6 to 50.8	W357.2	28.8			93					
		50.8	TV									TV=0.30tsf
		50.8 to 51.2	save 357.3									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/13	2.4' Recovery; say 64.0' to 66.4' depth	64.0 to 66.5	360									
		64.6 to 64.9	save 360.1									
	Silty CLAY; sandy, gray, stiff consistency, moderately plastic (CL)	64.9	TV									TV=0.49tsf
		64.9 to 65.1	W360.1	26.3			97					
		65.2 to 65.6	U360.1	26.6			97	U	20.0 1430			@15.0%strain s=1337 psf
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)	65.2 to 65.6	L360.1	26.6	39	19						
		65.6 to 65.8	W360.2	26.2			96					
		65.8	TV									TV=0.52tsf
		65.8 to 66.1	save 360.2									

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE April 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/15	1.0' Recovery; Say 74.0' to 75.0' depth	74.0 to 76.5	362										
		74.1 to 74.4	save 362.1										
		74.4 to 74.6	W362.1	24.5			99						
	Silty CLAY; sandy, dark gray, stiff consistency, moderately plastic (CL)	74.6	TV										TV=0.69tsf
		74.6 to 74.9	U362.01	22.8			105	UU	17.0	1098			@15.0% strain s=1054 psf
	Sample includes about 30% coarse sand and fine gravel size particles (subrounded to subangular in shape)	74.6 to 74.9	L362.1	22.8	36	21							

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/17	2.3' Recovery; Say 84.0' to 86.3' depth	84.0 to 86.5	364								
		84.1 to 84.4	save 364.1								
		84.4 to 84.6	W364.1	23.9		98					
	Silty CLAY; sandy, dark gray, stiff consistency. moderately plastic (CL)	84.6	TV								TV=0.60tsf
		84.6 to 84.9	save 364.2								
	Sample includes about 30% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	85.2 to 85.5	U364.1	25.2		97	U	20.0 207			@15.0%strain s=1923 psf
		85.2 to 85.5	L364.1	25.2	37 19						
		85.5 to 85.7	W364.2	26.2		99					
		85.7	TV								TV=0.57tsf
		85.7 to 86.1	save 364.3								

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE April 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/19	1.3' Recovery; say 94.0' to 95.3' depth; upper 0.9' disturbed (Wash?)	94.0 to 96.5	366										
		94.9	TV										TV=0.36tsf
		94.9 to 95.3	T366.0.1	24.5			100	UU	20.0	572			@15.0%strain s=548 psf
	Silty CLAY, dark gray, firm consistency, moderately plastic (CL)	94.9 to 95.3	L366.1	24.5	36	20							
	Sample includes about 15% coarse sand and fine gravel size particles (subrounded to subangular in shape)												

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
101/23	Silty CLAY; gray, firm to stiff consistency, moderately plastic (CL)	119.0 to 121.5	370								
		119.1 to 119.4	save 370.1								
		119.4 to 119.5	W370.1	31.8		91					
	Sample includes about 10% coarse to fine sand and fine gravel size particles (subrounded to subangular in shape)	119.5	TV								TV=0.42 tsf
		119.5 to 119.8	save 370.2								
		119.8 to 120.2	T370.0.1	37.2		85	UU	8.0 721			
		119.8 to 120.2	L370.1	37.2	44 22						
		120.2to 120.4	W370.2	32.6		88					
		120.4	TV								TV=0.55tsf
		120.4 to 120.7	save 370.3								
		120.7to 121.1	save 370.4								

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE April 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/1	Silty CLAY; olive brown and grayish brown, very stiff to hard consistency, highly plastic (CH) Sample includes about 5% hard, rounded gravel sized particles	4.0 to 6.0	373									
		4.2 to 4.5	save 373.1									
		4.5 to 4.7	W373.1	23.4			100					
		4.7 to 5.0	save 373.2									
		5.0	TV									TV=2.00tsf
		5.1 to 5.4	C373.1	23.6						.642	.10	
		5.1 to 5.4	L373.1	23.6	53	24						
		5.1 to 5.4	SG373.1									specific gravity=2.72
		5.4 to 5.6	W373.2	24.2			101					
		5.6 to 5.9	save 373.3									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/2	Silty CLAY, olive brown and greyish brown, very stiff consistency, moderate to highly plastic (CL) Sample includes about 5% hard subrounded gravel particles to 3/4" max. size Note: Saved material used as part of MC466.1 and T466.1.1, 2, 3 test series	9.0-11.0	374										
		9.1-9.4	T374.14	27.7			98	CU	5.8	1189			$\bar{\sigma}_c$=864psf
		9.4-9.7	L374.1	27.6	46	24							
		9.7-9.9	W374.1	26.1			100						
		9.9-10.2	T374.1.1	26.3			97	CU	3.0	1273			$\bar{\sigma}_c$=576psf
		10.2	TV										TV-1.1tsf
		10.2-10.6	T374.12	26.4			99	CU	4.4	1227			$\bar{\sigma}_c$=1152psf
		10.6-10.9	T374.13	26.9			96	CU	10.5	2191			$\bar{\sigma}_c$=2304psf

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July, 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/3	Silty CLAY, grey, medium consistency, moderately plastic (CL) Sample includes about 5% fine to coarse Sand grain (subrounded to subangular in shape)	20.0-22.0	375									
		20.1-20.4	Saved									
		20.4-20.6	W375.1	36.0			85					
		20.6	TV									TV-0.39tsf
		20.6-20.9	Saved									
		20.9-21.2	L375.1	33.4	42	20						
		21.2-21.4	W375.2	33.3			86					
		21.4	TV									TV=0.41tsf
		21.4-21.7	Saved									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/4	1.1' Recovery; say 30.0' to 31.1' depth	30.0-32.0	376								
		30.7-31.0	Saved								
	Silty CLAY, grey, moderately plastic (CL)										
	Note: Entire Sample much disturbed.										

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ___ SUMMARY OF LABORATORY TEST RESULTS — DATE ___ SHEET ___ OF ___

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/5	2.2' Recovery; say 40.0' to 42.2' depth	40.0-42.5	377									
		40.1-40.4	T377.14	39.2			84	CU	7.6 1902			$\bar{\sigma}_c$=7200 psf
	Silty CLAY, grayish brown, medium consistency, moderately plastic (CL) Sample includes about 5% fine to coarse SAND grains (subrounded to subangular in shape)	40.4	TV									TV=0.35 tsf
		40.4-40.6	W377.1	35.7								
		40.6-41.0	T377.11	35.9			84	CU	5.9 1068			$\bar{\sigma}_c$=1800 psf
		40.6-41.0	L377.1	35.9	44	21						
		41.0-41.3	T377.12	35.9			85	CU	3.1 1376			$\bar{\sigma}_c$=3600 psf
		41.3-41.5	W377.2	34.9			86					
		41.5	TV									TV=0.37 tsf
		41.5-41.8	T377.13	35.1			85	CU	3.8 1830			$\bar{\sigma}_c$=7200 psf

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/6	1.7' Recovery; say 50.0' to 51.7' depth	50.0-52.5	378								
		50.0-50.3	Saved								
	Silty CLAY, grey, medium consistency, highly plastic (CH)	50.3-50.5	W378.1	42.8		76					
		50.5	TV								TV=0.35tsf
		50.5-50.8	Saved								
		50.8-51.1	L378.2	46.2	57 25						
		51.1-51.3	W378.2	41.2		78					
		51.3	TV								TV=0.33tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE July 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/8	2.3' Recovery; say 70.0' to 72.3' depth	70.0-72.5	380									
		70.1-70.4	Saved									
	Silty CLAY, dark grey, stiff consistency, moderate plasticity (CL)	70.4-70.6	W380.1	23.9			100					
		70.6	TV									TV=0.65tsf
	Sample includes about 20% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	70.6-70.9	Saved									
		70.9-71.2	C380.1	23.7						0.625	.21	
		70.9-71.2	L380.1	23.8	37	19						
		70.9-71.2	SG 380.1									Specific Gravity-2.70
		71.3-71.5	W380.2	23.5			100					
		71.5	TV									TV=0.70tsf
		71.5-71.8	Saved									
		71.8-72.2	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/10	1.6' Recovery; say 90.0' to 91.6' depth	90.0-92.0	382									
	Silty CLAY, grey, soft consistency, moderate plasticity (CL)	90.5-90.6	W382.1	31.0			84					
		90.6	TV									TV=0.17tsf
		90.6-90.9	L382.1	29.4	34	19						
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	90.9-91.2	Saved									
		91.2-91.3	W382.2	30.3			88					
		91.3	TV									TV=0.18tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

C-172 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L / ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/11	1.7' Recovery; say 110.0' to 111.7' depth; upper 0.7' disturbed, WASH??	110.0-111.5	383								
		110.7-110.9	W383.1	31.7		86					
	Silty CLAY, grey, soft consistency, moderately plastic (CL)	110.9	TV								TV-0.25tsf
		110.9-111.3	Saved								
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)										
	Note: Entire Sample disturbed.										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
105/12	0.7' Recovery; say 120.0' to 120.7' depth	120.0-122.5	384								
	Silty CLAY, Sandy, dark gray, medium consistency, moderate plasticity (CL)	120.2-120.3	W384.1	22.1		102					
		120.3-120.6	saved								
		120.6-120.7	L384.1	20.4	29 17						
	Sample includes about 35% fine to coarse SAND grains (subrounded to subangular in shape)										
	Note: Entire sample slightly disturbed										

C-174 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
118/1	2.1' Recovery; say 3.0' to 5.1' depth; upper 1.0' disturbed (WASH??)	3.0-5.0	252									
		4.0-4.3	L252.1	21.4	49	26						
	Silty CLAY, greyish brown, hard consistency, moderate to highly plastic (CL-CH)	4.4-4.5	W252.1	22.3			101					
		4.5	TV									TV=>2.5tsf
		4.6-5.0	Saved									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
118/2	1.5' Recovery; say 8.0' to 9.5' depth	8.0 - 10.0'	253										
		8.1'	W253.1	23.8									
	Silty CLAY, dark grayish brown, very stiff to hard consistency, highly plastic (CL - CH)	8.2 - 8.5'	T253.2.1	23.0			107	CD	4.3	754			$\bar{\sigma}_c$ = 576 psf
		8.2 - 8.5'	L253.1	23.3	49	23							
		8.5'	W253.2	21.5									
	Sample includes ±5% coarse Sand and fine Gravel size particles	8.6 - 8.9'	T253.2.2	23.3			105	CD	3.6	1248			$\bar{\sigma}_c$ = 1152 psf
		8.9 - 9.2'	T253.2.3	24.2			103	CD	2.2	2156			$\bar{\sigma}_c$ = 2304 psf
		9.2 - 9.5'	Saved										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
118/3	2.1' Recovery; say 18.0' to 20.1' depth; upper 0.5' disturbed	18.0-20.0	254									
		18.7-18.9	W254.1	35.5			84					
	Silty CLAY, grey, firm consistency, moderate to high plasticity (CL)	18.9	TV									TV=0.37tsf
		18.9-19.3	Saved									
		19.3-19.5	W254.2	31.6			89					
		19.5	TV									TV=0.40tsf
		19.5-19.9	L254.1	35.3	45	23						

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
118/4	21.4' Recovery; say 28.0' to 30.1' depth	28.0-30.0	255								
		28.5-28.6	W255.1	25.3		94					
	Silty CLAY, gray, mottled very dark gray, firm to stiff consistency, moderate plasticity (CL)	28.6	TV								TV= 0.28 tsf
		28.6-28.9	saved								
		28.9-29.3	saved								
	Sample includes about 15% fine to coarse SAND grains (subrounded to subangular in shape)	29.3-29.4	W255.2	20.6		103					
		29.4	TV								TV=0.64 tsf
		29.4-29.8	saved								
	Note: Upper 1.3' of sample slightly disturbed										

C-178 OLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
118/5	Silty CLAY, greyish brown, firm consistency, moderately plastic (CL)	38.0-40.0	256								
		38.1-38.4	Saved								
		38.4	TV								TV=0.34tsf
		38.4-38.6	W256.1	36.9		85					
		38.6-38.9	Saved								
		38.9-39.3	C256.1	36.9					0.969	0.39	
		38.9-39.3	I256.1	36.9	41 22						
		38.9-39.3	SG 256.1								Specific Gravity-2.70
		39.3	TV								TV-0.35tsf
		39.3-39.5	W256.2	36.6		86					
		39.5-39.8	Saved								

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
118/6	2.1' Recovery; say 48.0' to 50.1' depth	48.0-50.0	257									
	Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)	48.4-48.5	W257.1	42.6		76						
		48.5	TV									TV=0.30tsf
		48.5-48.8	Saved									
	Sample includes few thin lenses/layers of SILT, Sandy (ML) comprising ±5% of total	48.8-49.2	Saved									
		49.2-49.3	W257.2	43.9		76						
		49.3	TV									TV=0.43tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
118/9	1.9' Recovery; say 78.0' to 79.9' depth; upper 0.3' disturbed	78.0-80.0	260									
		78.1-78.4	Saved									
	Silty CLAY; dark grey, stiff consistency, moderately plastic (CL)	78.4-78.7	W260.1	22.1			103					
		78.7	TV									TV=0.68tsf
	Sample includes about 20% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)	78.7-79.0	C260.1	27.8						0.741	.24	
		78.7-79.0	L260.1	25.3	42	23						
		78.7-79.0	SG 260.1									Specific Gravity-2.70
	Note: Proportions of Sand and fine Gravel increase with depth approaching 40% near bottom of sample.	79.0-79.4	Saved									
		79.4-79.7	W260.2	13.1			123					

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B119/1	0.8' Recovery; say 3.0' to 3.8' depth	3.0 to 5.0	331								
		3.1	TV	32.4							TV=1.0 tsf
	Silty CLAY; dark grayish brown mottled light olive brown, stiff to very stiff consistency, moderately to highly plastic (CL)	3.1	W331.1	32.4							
		3.1 to 3.4	save 331.1								
		3.4	TV	25.4							TV=1.34 tsf
		3.4 to 3.8	v331.1	25.4		98					

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE Jan. 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B119/2	Recovery 2.2'; say 8.0' to 10.2' depth	8.0 to 10.0	332									
		8.2	TV									TV=1.25 tsf
	Silty CLAY, dark, grayish brown, very stiff consistency, moderately to highly plastic (CL)	8.2 to 8.3	W332.1	28.4								
		8.3 to 8.6	T332.13	27.9			98	CU	2.2 2012			
		8.6	TV									TV=1.43 tsf
	Sample includes about 10% coarse Sand and fine Gravel size particles (subrounded to subangular in shape)	8.6 to 9.0	T332.14	29.2			94	CU	1.5 1240			
		9.0	TV									TV=1.43 tsf
		9.0 to 9.1	W332.2	27.5								
		9.1 to 9.4	T332.11	28.3			95	CU	2.2 887			
		9.4	TV									TV=1.50 tsf
		9.4 to 9.5	W332.3	29.2								
		9.5 to 9.7	L332.1	30.8	53	26						
		9.7 to 10.1	save 332.1									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B119/3	1.9' Recovery; say 20.0' to 21.9' depth; upper 0.3' disturbed	20.0 to 22.0	333								
		20.3	St	37.3							TV=0.31 tsf TV_R=0.17 tsf
	Silty CLAY: dark gray, firm consistency, highly plastic (CL-CH)	20.3 to 20.4	W333.1	37.3							
		20.4 to 20.7	save 333.1								
		20.7	TV								TV=0.32 tsf
	Sample includes about 5 to 10% coarse Sand grains (subrounded to subangular in shape)	20.7 to 21.1	save 333.2								
		21.1	TV	37.2							TV=0.31 tsf
		21.1 to 21.2	W333.2	37.2							
		21.2 to 21.5	save 333.3								
		21.5	TV								TV=0.29 tsf
		21.5 to 21.9	W333.1	36.3		83					

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B119/4	Silty CLAY: very dark grayish brown, soft to firm consistency, highly plastic (CL) Sample includes ±5% coarse Sand and fine Gravel size particles (subrounded to sub-angular in shape)	30.0 to 32.0	334										
		30.1	TV	35.4									TV=0.24 tsf
		30.1 to 30.2	W334.1	35.4									
		30.2 to 30.5	save 334.1										
		30.5	TV										TV=0.26 tsf
		30.5 to 30.8	T334.13	35.3			87	CU	5.6	1655			
		30.8	St	37.8									TV=0.29 tsf TV_R=0.11 tsf
		30.8 to 30.9	W334.2	37.8									
		30.9 to 31.2	T334.12	38.5			85	CU	1.5	1229			
		31.2	TV										TV=0.30 tsf
		31.2 to 31.6	T334.11	36.9			86	CU	1.5	985			
		31.2 to 31.6	I334.1	36.4	41	22							
		31.6 to 31.9	save 334.2										

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Jan. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B119/5	Silty CLAY: dark grayish brown, soft to firm consistency, highly plastic (CL-CH)	40.0 to 42.5	335								
		40.2	TV								TV=0.26 tsf
		40.2 to 40.5	V335.1	35.4		88					
		40.5	TV	35.6							TV=0.27 tsf
		40.5 to 40.6	W335.1	35.6							
		40.6 to 40.9	save 335.1								
		40.9	TV								TV=0.29 tsf
		40.9 to 41.3	save 335.2								
		41.3	St	36.0							TV=0.27 tsf TV_R=0.14 tsf
		41.3 to 41.4	W335.2	36.0							
		41.4 to 41.7	save 335.3								
		41.7	TV								TV=0.31 tsf
		41.7 to 42.1	save 335.4								
		42.1	TV								TV=0.30 tsf

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B119/9	2.1' Recovery; say 80.0' to 82.1' depth	80.0 to 82.5	339									
		80.1	TV	22.4								TV = 0.90 tsf
	Silty CLAY, Sandy, grayish brown, stiff consistency, moderately plastic (CL)	80.1 to 80.2	W339.1	22.4								
		80.2 to 80.5	save 339.1									
		80.5 to 80.8	339.1	21.6			107					
	Sample includes about 25% coarse to fine Sand and fine Gravel size particles (subrounded to subangular in shape)	80.5 to 80.8	save 339.2									
		80.8	TV	21.0								TV = 1.0 tsf
		80.8 to 80.9	W339.2	21.0								
		80.9 to 81.2	save 339.3									
		81.2 to 81.5	save 339.4									
		81.5	TV	22.1								TV = 0.73 tsf
		81.5 to 81.6	W339.1	22.1								
		81.6 to 81.9	U339.1	20.7			107	U	20.0 3428			@15% Strain s = 3072 psf
		81.6 to 81.9	L339.1	20.7	33	20						

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
126/3	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH) Sample includes about 5% hard subrounded to subangular gravel particles	8.0 to 10.0	241								
		8.2 to 8.6	U241.1	26.2		99	U	2.4 1735			
		8.2 to 8.6	L241.1	26.6	47 24						
		8.6 to 8.8	W241.1	27.1		97					
		9.1	TV								TV=1.12tsf
		9.4 to 9.6	W241.2	27.0		96					
		9.6 to 9.9	save 241.2								

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
126/5	1.9' Recovery: Say 18.0' to 19.9' depth	18.0 to 20.0	242								
		18.4 to 18.5	W242.1	49.3							
	Silty CLAY, grayish brown soft consistency, moderately to highly plastic (CL-CH)	19.2 to 19.3	W242.2	34.7							
		19.6 to 19.8	L242.1	35.6	47 23						
	Note: Entire sample disturbed										

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L / ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
126/7	Silty CLAY, dark grayish brown, soft consistency, moderately to highly plastic (CL-CH) Sample includes about 5% coarse to fine sand grains (subrounded to subangular in shape) Note:Entire sample disturbed	28.0 to 30.0	243									
		28.5	TV									TV=0.18tsf
		28.5 to 28.7	W2431	35.4		86						
		29.0 to 29.3	save 243.1									
		29.3 to 29.5	W243.2	34.9		86						
		29.5	TV									TV=0.19tsf
		29.5 to 29.9	save 243.2									

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
126/11	2.3' Recovery; Say 48.0' to 50.3' depth	48.0 to 50.5	245									
		48.2 to 48.5	save 245.1									
		48.5 to 48.7	W245.1	46.3			76					
	Silty CLAY, gray, firm consistency, highly plastic (CH)	48.7	TV									TV=0.35tsf
		48.7 to 49.1	save 245.2									
	Sample includes about 10% fine gravel and coarse sand size particles (subrounded to subangular in shape)	49.1 to 49.4	T245.01	41.1			81	UU	4.0 498			
		49.1 to 49.4	L245.1	41.2	59	25						
		49.4 to 49.6	W245.2	41.4			80					
		49.6	TV									TV=0.40tsf
		49.6 to 49.9	save 245.3									

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
126/13	Silty CLAY, dark grey, firm consistency, moderately plastic (CL)	58.0-60.5	246								
		58.2-58.5	Saved								
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)	58.5-58.7	W246.1	38.8		79					Silty Clay Portion
		58.7	TV								TV=0.32tsf
		59.0-59.3	L246.1	32.9	40 23						
	few layers/lenses ±1" thick of Silty CLAY, Sandy, very stiff consistency, low to moderate plasticity (CL)	59.9-60.0	W246.2	22.1		104					Silty clay, Sandy layer
		60.0	TV								TV=0.46tsf
		60.0-60.3	Saved								
	Sample includes about 40% fine to medium Sand grains (subrounded to subangular in shape)										

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
126/15	2.4' Recovery; say 68.0' to 70.4' depth	68.0-70.5	247									
	Silty CLAY, dark grey, firm to stiff consistency, moderately plastic (CL)	68.3-68.7	Saved									
		68.7-68.8	W247.1	24.1			99					
		68.8	TV									TV=0.50tsf
	Sample includes about 15% fine to coarse Sand and fine Gravel sized particles (sub-rounded to subangular in shape)	68.8-69.3	L247.1	23.2	34	18						
		69.6-69.9	Saved									
		70.1-70.2	W247.2	24.0			100					
		70.2	TV									TV=0.47tsf

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE April 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
126/23	Silty CLAY; dark gray, firm to stiff consistency, moderately plastic (CL)	108.0 to 110.0	251								
		108.1 to 108.4	save 251.1								
		108.4 to 108.6	W251.1	25.1		97					
	Sample includes about 20% coarse to fine sand and fine gravel sized particles (subrounded to subangular in shape)	108.6	TV								TV=0.48tsf
		108.6 to 108.9	T251.0.1	25.3		96	UU	20.0 1369			@15.0%strain s=1339 psf
		108.6 to 108.9	L251.1	23.6	36 20						
		109.2 to 109.4	W251.2	24.2		97					
		109.4	TV								TV=0.48 tsf
		109.4 to 109.8	save 251.3								

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/2	1.4' Recovery; Say 3.5' to 4.9' depth	3.5 to 5.5	302									
		3.6 to 4.0	save 302.1									
	Silty CLAY; grayish brown, stiff consistency, moderately to highly plastic	4.0 to 4.2	W302.1	24.2			99					
		4.2	TV									TV=0.87tsf
	(CL-CH)	4.2 to 4.5	save 302.2									
	Sample includes about 5% coarse sand and fine gravel size particles (subrounded to subangular in shape)	4.5 to 4.8	T302.0.1	24.9			103	UU	8.0 2099			
		4.5 to 4.8	L302.1	23.1	48	24						

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

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DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/3	Silty CLAY, greyish brown, very stiff consistency, moderate to high plasticity (CL-CH)	5.0-7.0	416										
		5.1	TV										TV=1.20tsf
		5.4-5.5	W416.1	29.3			77						
	@ 5.2' change to -	5.0-5.2 5.6-7.0	MC 416.1										See plot
	Clayey SAND, dark grey, fine to coarse Sand grains with about 40% moderately plastic fines (SC) roots and fibers evident	5.9	TV										TV=0.68tsf
		6.2-6.3	W416.2	27.0			94						
		6.6	TV										TV=1.1tsf
	@5.6' change to-	6.6-7.0	L416.1	25.8	49	22							
	Silty CLAY, olive grey, firm to stiff consistency, moderate to high plasticity (CL-CH)	6.6-7.0	U416.1	13.5			113	rU	3.2	9403			Test at 95% of MC 416.1
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)												

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PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ___ SUMMARY OF LABORATORY TEST RESULTS

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DATE April 1974
SHEET ___ OF ___

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/4	1.6' Recovery; Say 8.0' to 9.6' depth	8.0 to 10.0	417								
		8.1 to 8.7	save 417.1								sample used for T466.1,2,3
	Silty CLAY, olive brown mottled grayish brown, very stiff to hard consistency, moderately to highly plastic (CL-CH)	8.7 to 8.9	W417.1	21.9		107					
		8.9 to 9.6	save 417.2								sample used for T466.1,2,3
	Sample includes about 20% coarse to fine sand and fine gravel size particles (sub-rounded to subangular in shape)	9.1	TV								TV=2.0 tsf

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

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DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L / ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c *	
127/8	2.1' Recovery; say 16.0' to 18.1' depth	16.0-18.0	421								
		16.2-16.5	Saved								
	Silty CLAY, grey, firm consistency, moderate to high plasticity (CL-CH)	16.6-16.7	W421.1	28.0		91					
		16.7	TV								TV=0.77tsf
	Sample includes lenses/layers which contain about 20% fine to coarse Sand grains (sub-rounded to subangular in shape)	16.7-17.0	Saved								
		17.0-17.3	Saved								
		17.3-17.4	W421.2	30.7		93					
		17.4	TV								TV=0.40tsf
		17.4-17.7	Saved								

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/11	Jar Sample	28.5-30.0	456										
	Silty CLAY, grey, moderate plasticity (CL)		W456.1	22.8*									
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)												
	*Note: Water content taken from unsealed jar sample												

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/13	Jar Sample	38.0-40.0	457								
			W457.1	21.4*							
	Silty CLAY, grey, moderate plasticity (CL)										
	Sample includes about 5% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/14	Jar Sample	43.5-45.0	458									
			L458.1		32	18						
	Silty CLAY, dark grey, moderate plasticity (CL)											
	Sample includes < 5% fine to coarse Sand grains (subrounded to subangular in shape)											

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SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/15	Jar Sample	48.5-50.0	459								
			W459.1	20.6*							
	Silty CLAY, dark grey, moderate plasticity (CL)										
	Sample includes 10 to 15% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. * WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/18	Jar Sample	63.5-65.0	460								
			W460.1	20.3 *							
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10 to 15% fine to coarse Sand and fine Gravel size particles (sub-rounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/19	Jar Sample	68.5-70.0	461									
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)		L461.1		33	16						

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS w_L w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/24	Jar Sample	93.5-95.0	462								
	SILT, grey, non-plastic (ML)		W462.1	24.9*							
	Sample includes about 25% fine Sand grains										
	*Note: Water content taken from unsealed jar sample										

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SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
127/29	Jar Sample	113.5-115.0	463									
	Silty CLAY, dark gray, moderate plasticity (CL)		L463.1		41	21						
	Sample includes 5 to 10% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)											

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SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c *	
127/32	Jar Sample	128.5-130.0	464										
	Silty CLAY, dark gray, moderate plasticity (CL)		W464.1	30.9*									
	*Note: Water content taken from unsealed jar sample.												

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DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/3	1.1' Recovery; Say 8.0' to 9.1' depth; upper 0.3' disturbed (Wash?)	8.0 to 10.5	386								
		8.3 to 8.6	save 386.1								
		8.6	TV								TV=1.5tsf
	Silty CLAY, olive brown, very stiff consistency, moderately to highly plastic (CL-CH)	8.6 to 8.7	W386.1	22.9		108					
		8.7 to 9.0	T386.01	22.3		108	UU	6.0 3381			
		8.7 to 9.0	L386.1	22.9	48 23						

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/5	2.1' Recovery; say 18.0' to 20.1' depth	18.0-21.0	387										
		18.1-18.4	Saved										
	Silty CLAY, greyish brown, stiff consistency, moderate to highly plastic (CL-CH)	18.4-18.7	T387.1.1	33.5			90	CU	6.8	1102			$\bar{\sigma}_c$=1152psf
		18.4-18.7	L387.1	30.8	48	21							
		18.7-18.8	W387.1	31.7									
		18.8	TV										TV=0.63tsf
		18.8-19.1	T387.1.4	33.1			90	CU	9.7	1276			$\bar{\sigma}_c$=2304psf
		19.1-19.4	T387.1.3	31.9			90	CU	3.6	2087			$\bar{\sigma}_c$=4608psf
		19.4-19.6	W387.2	33.1			89						
		19.6	TV										TV=0.53tsf
		19.6-20.0	Saved										

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/7	2.0' Recovery; Say 28.0' to 30.0' depth	28.0 to 30.5	388									
		28.3 to 28.4	W388.1	35.8			88					
		28.4 to 28.6	L388.1	35.6	45	20						
	Silty CLAY, gray, moderately to highly plastic (CL-CH)											
	Note: Entire samply highly disturbed											

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PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE April 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/9	Silty CLAY, gray, firm consistency, moderately to highly plastic (CL)	38.0 to 40.5	389								
		38.1 to 38.4	save 389.1								
		38.4 to 38.6	W389.1	34.9		87					
		38.6	TV								TV=0.29tsf
		38.6 to 38.9	save 389.2								
		39.1 to 39.3	L389.1	36.4	41 22						
		39.1 to 39.3	C389.1	40.2					1.083	.39	
		39.1 to 39.3	SG389.1								specific gravity=2.73
		39.3 to 39.6	save 389.3								
		39.6	TV								TV=0.31tsf
		39.6 to 39.8	W389.2	34.3		88					
		39.8 to 40.0	save 389.4								

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/11	1.8' Recovery; say 48.0' to 49.8' depth	48.0-50.5	390									
		48.2-48.5	Saved									
	Silty CLAY, grey, soft consistency, moderate to highly plastic (CL)	48.5	TV									TV=0.28tsf
		48.5-48.6	W390.1	45.2			77					
	Note: Sample much disturbed below 48.8' depth											

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PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/13	0.6' Recovery; say 58.5' to 59.1' depth	58.5-60.5	391								
		58.6-58.7	W391.1	25.7		97					
	Silty CLAY, grey, soft consistency, moderate plasticity (CL)	58.7-58.9	L391.1	31.7	35 18						
		58.9-59.1	Saved								
	Sample includes about 15% fine to coarse Sand grains (subrounded to subangular in shape)										
	Note: Entire sample slightly disturbed										

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/15	Silty CLAY; dark gray, stiff consistency, moderately plastic (CL)	73.0 to 75.5	392										
		73.8 to 74.0	W392.1	24.6			99						
		74.0 to 74.3	L392.1	22.8	36	21							
	Sample includes about 15% fine to coarse sand and fine gravel sized particles (subrounded to subangular in shape)	74.0 to 74.3	T392.01	24.8			101	UU	7.0	954			
		74.3 to 74.7	save 392.1										
		74.7 to 74.9	W392.2	23.2			102						
	Note: Upper 0.8' of sample disturbed (Wash?)	74.9	TV										TV=0.68tsf
		74.9 to 75.2	save 392.2										

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/19	1.8' Recovery; say 93.0' to 94.8' depth	93.0-95.5	394									
		93.1-93.4	T394.1.1	23.7			99	CU	15.0 1518			$\bar{\sigma}_c$= 3240psf
		93.1-93.4	L394.1	23.7	41	21						
	Silty CLAY, grey, firm to stiff consistency, moderate to high plasticity (CL)	93.4	TV									TV= 0.50tsf
		93.4-93.5	W394.1	25.8								
	Sample includes about 10% fine to coarse Sand and fine gravel size particles (sub-rounded to subangular in shape)	93.5-93.8	T394.1.2	25.9			99	CU	15.0 3047			$\bar{\sigma}_c$=6480psf
		93.8-94.1	T394.1.3	27.0			99	CU	13.2 4450			$\bar{\sigma}_c$=12960psf
		94.1-94.3	W394.2	26.8			98					
		94.3	TV									TV=0.44tsf
		94.3-94.6	Saved									

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/21	2.2' Recovery; Say 103.0' to 105.2' depth	103.0 to 105.5	395									
		103.2 to 103.5	save 395.1									
	Silty CLAY, sandy; gray, stiff consistency, moderately plastic (CL)	103.5 to 103.7	W395.1	27.3			97					
		103.7	TV									TV=0.68tsf
		103.7 to 104.0	C395.1	28.0						.703	.23	
	Sample includes about 30% fine to coarse sand and fine gravel size particles (sub-rounded to subangular in shape)	103.7 to 104.0	SG395.1									specific gravity=2.71
		103.7 to 104.0	L395.1	26.1	39	21						
		104.1 to 104.4	save 395.2									
		104.4 to 104.6	W395.2	25.1			102					
		104.6	TV									TV=0.51tsf
		104.6 to 104.9	save 395.3									

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PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE July 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/22	Jar Sample	108.5-110.0	465									
			W465.1	26.6*								
	Silty CLAY, grey, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (sub-angular to subrounded in shape)		L465.1		39	19						

*Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE April 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
129/24	1.8' Recovery; Say 123.0' to 124.8' depth; upper 0.5' disturbed (Wash?)	123.0 to 125.5	396								
		123.5	TV								TV=0,36tsf
		123.5 to 123.9	save 396.1								
	Silty CLAY, gray, stiff consistency, moderately to highly plastic (CL-CH)	123.9 to 124.1	W396.1	32.4		90					
		124.1 to 124.4	T396.01	30.6		95	UU	8.0 679			
		124.1 to 124.4	396.1	30.2	46 22						
	Sample includes about 10% hard subrounded gravel size particles	124.4	TV								TV=0.34tsf

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ___ SUMMARY OF LABORATORY TEST RESULTS — DATE ___ SHEET ___ OF ___

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
130/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)	7.5'	571									
			L571.1	24.9*	49	21						
130/SS6	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	20.0'	572									
			L572.1	30.1*	44	22						
130/SS10	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	40.0'	573									
			L573.1	30.7*	44	23						
130/SS13	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	55.0'	574									
			L574.1	34.3*	46	23						

*Not: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE 12/74

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
130/SS14	Jar Sample Silty CLAY, dark gray, low plasticity (CL) Sample includes ±25% fine to medium Sand size particles	60	575										
			L575.1	13.5	26	17							
130/SS16	Jar Sample Silty CLAY, dark gray, low to moderate plasticity (CL) Sample includes about 15% fine to medium Sand size particles	70	576										
			L576.1	20.8	34	21							

*Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
134/SS4	Jar Sample Silty CLAY, grayish brown, highly plastic (CL-CH)	8.5-10.0'	578									
			L578.1	24.2*	49	24						
134/SS9	Jar Sample Silty CLAY, grayish brown, moderate to high plasticity (CL)	33.5-35.0'	579									
			L579.1	34.5*	45	22						
134/SS14	Jar Sample Silty CLAY, dark gray, highly plastic (CH) Sample includes ±5% fine Sand	58.5-60.0'	580									
			L580.1	44.1*	52	33						

*Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Nov., 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B136/2	1.9' Recovery; say 3.0' to 4.9' depth	3.0-5.0'	525									
		3.1-3.4'	MC									Used for proctor. See plot
	Silty CLAY, mottled gray-brown and yellow-brown, very stiff consistency, high plasticity (CH)	3.4-3.5'	W525.1	36.2								
		3.5'	TV									TV = 1.28 tsf
		3.5-4.2'	MC									Used for proctor. See plot
	Includes about ±5% fine to coarse subangular to sub-rounded Sand grains	4.2-4.3'	W525.2	29.8			92					
		4.3'	TV									TV = 1.62 tsf
		4.3-4.9'	MC									Used for proctor. See plot
		3.0-4.9'	L525.1		62	25						

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Nov. 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B136/4	1.8' Recovery; say 8.0' to 9.8' depth	8.0'-10.0'	526								
		8.5'-8.8'	saved								
	Silty CLAY, mottled gray, gray-brown and yellow brown, hard consistency, moderate to high plasticity (CL-CH)	8.8'-9.2'	U526.1	24.3		102	U	3.0 5446			
		8.8'-9.2'	L526.1	25.1	48 22						
		9.2'-9.3'	W526.2	25.7		98					
	Upper 0.5' of sample includes about ±15% fine to coarse Sand size particles (subrounded to subangular in shape)	9.3'	TV								TV>2.5 tsf
		9.3'-9.6'	saved								

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
136/6	1.6' Recovery; say 13.0' to 14.6' depth	13.0-15.0'	527								
		13.1-13.5'	rC/rU								used for compacted C/U
	Silty CLAY, grayish-brown, stiff consistency, moderately plastic (CL)	13.5'	W527.1	31.5		90					
		13.5'	TV								TV = 0.62 tsf
		13.6-14.1'	rC/rU								used for compacted C/U
	Sample includes 10-20% fine to coarse Sand particles	14.1'	TV								TV = 0.67 tsf
		14.1-14.6'	rC/rU								used for compacted C/U
		13.0-14.6'	L527.1		43 22						
		13.0-14.6'	C527.1	17.3		101			0.675	.15	
		13.0-14.6'	Ur527.1	17.5		100	rU	2.0 2763			
		13.0-14.6'	SG527.1								Specific Gravity=2.74

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE
TABLE — SUMMARY OF LABORATORY TEST RESULTS
SHEET OF

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
136/SS9	Jar Sample	23.5 - 25.0'	581									
	Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±10% fine to coarse Sand size particles (CL)		W581.1	31.1*			93*					
136/SS11	Jar Sample	33.5 - 35.0'	582									
	Silty CLAY, grayish brown, moderate to high plasticity (CL)		L582.1	31.9*	43	19						
136/SS15	Jar Sample	53.5 - 55.0'	583									
	Silty CLAY, gray-brown, moderate plasticity (CL)		W583.1	38.5*			85*					
136/SS19	Jar Sample	73.5 - 75.0'	584									
	Silty CLAY dark gray, of low to moderate plasticity. Sample includes about 25% fine to coarse Sand size particles (CL)		L584.1	17.0*	34	21						

* Water content taken from unsealed jar samples

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE ____

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
136/SS24	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±15% fine to coarse Sand size particles	98.5-100.0'	585									
			L585.1	21.0*	40	21						

*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. * WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
137/SS1	Jar Sample Silty CLAY, yellow-brown, moderately to highly plastic (CL-CH) Sample includes ±15% fine to coarse Sand size particles	1.5 to 3.0	586 S/H 586.1								See plot
137/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH)	9.5 to 11.0	587 I587.1	24.8*	53 24						

Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
138/SS4	Jar Sample Silty CLAY, dark gray, moderate to high plasticity. Sample includes about 10% fine to coarse Sand size particles occurring as pockets (CL-CH)	8.5 - 10.0'	588									
138/SS9	Jar Sample Silty CLAY, light gray-brown, moderate to high plasticity (CL)	33.5 - 35.0'	589									
			W589.1	32.0*			90					
138/SS14	Jar Sample Silty CLAY, dark gray-brown, high plasticity (CL-CH)	58.5 - 60.0'	590									
			W590.1	31.9*								
138/SS23	Jar Sample Silty CLAY, dark gray, high plasticity (CL-CH)	103.5 - 105.0'	591									
			I591.1	26.7*	49	25						

* Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % / MAX. SHEAR STRESS (PSF)	e_o	C_c	
139/SS3	Jar Sample Silty CLAY, grayish brown, highly plastic (CH-CL) Sample includes ±5% fine to medium Sand size particles	6.5-8.0'	593									
			L593.1	23.5*	50	24						
139/SS8	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	29.5-31.0'	594									
			L594.1	25.2*	42	22						
139/SS12	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	49.5-51.0'	595									
			L595.1	31.4*	43	20						
139/SS22	Jar Sample GRAVEL, subangular to sub-rounded Gravel particles, 1/2" to 1-1/2" in size with about 15% fine to coarse Sand, less than 10% non-plastic fines (GP)	99.5-101.0'	596									
			S596.1									See plot

*Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B141/1	1.9' Recovery; say 3.0' to 4.9' depth	3.0-5.0'	528									
		3.1-3.4'	MC									Used for proctor. See plot
	Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH)	3.4-3.5'	W528.1	28.9			90					
		3.5'	TV									TV=1.50 tsf
	Includes ±5% Gravel size pieces (subrounded to subangular in shape)	3.5-4.1'	MC									Used for proctor. See plot
		4.1-4.2'	W528.2	25.7			88					
		4.2-4.5'	MC									Used for proctor. See plot
	Breaks verticall and laterally in a blocky manner	4.5'	TV									TV -1.00 tsf
		4.5-4.9'	MC									Used for proctor. See plot
		3.0-4.9'	L528.1		56	23						

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
141/2	Silty CLAY, mottled gray and brown, very stiff consistency, high plasticity (CH-CL) Sample includes ±20% fine to coarse Sand size particles	8.0-10.0'	529										
		8.1-8.7'	rU										Used for compacted U
		8.7'	W529.1	26.3			95						
		8.7'	TV										TV - 1.77 tsf
		8.8-9.2'	rU										Used for compacted U
		9.2'	W529.2	25.0			95						
		9.2'	TV										TV = 1.02 tsf
		9.3-10.0'	rU										Used for compacted U
		8.0-10.0'	L529.1		49	23							
		8.0-10.0'	U529.1	17.5			103	rU	2.0	5558			

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Nov. 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B141/4	1.9' Recovery, say 18.0 to 19.9' depth	18'-20'	531									
		18.0-18.3	Saved									
	Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)	18.3-18.4	W531.1	35.3			86					
		18.4	TV									TV=0.37tsf.
	Sample includes ±5% fine to coarse Sand grains and fine subangular to subrounded Gravel pieces (1/4" max. size)	18.4-18.7	T531.12	35.5			87	CU	3.2 1393			$\bar{\sigma}_c$ = 2304psf
		18.4-18.7	L531.1	35.2	45	21						
		18.7-19.1	T531.11	36.3			86	CU	3.0 1040			$\bar{\sigma}_c$ = 1152psf
		19.1-19.2	W531.2	36.6			85					
		19.2	TV									TV=0.32 tsf
		19.2-19.5	T531.1.3 b	37.3			84	CU	9.6 1626			$\bar{\sigma}_c$ = 4637psf
		19.5-19.9	T531.1.3 a	35.1			85	CU	4.2 1625			$\bar{\sigma}_c$ = 4608psf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % / MAX. SHEAR STRESS (PSF)	e_o	C_c	
141/SS4	Jar Sample Silty CLAY, brown, moderate to high plasticity (CL)	29.5-31.0'	597									
			L597.1	33.8*	47	21						
141/SS10	Jar Sample Silty CLAY, grayish brown, moderately plastic (CL)	59.5-61.0'	598									
			L598.1	30.2*	41	19						
141/SS21	Jar Sample Sandy GRAVEL, hard sub-angular to subrounded Gravel size particles to 3/4" maximum about 30% fine to coarse Sand and 20% non-plastic fines (GM)	114.5-116.0'	599									
			S599.1									See plot
141/SS27	Jar Sample Sandy CLAY, gray, low plasticity; about 45% fine to coarse Sand and fine Gravel size particles to 1/4" max. size (SM-SC)	144.5-146.0'	600									
			S600.1									See plot

*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B142/1	0.9' Recovery; say 3.0' to 3.9' depth	3.0-5.5'	532									
		3.0-3.4'	MC									Used for proctor. See plot
	Silty CLAY, mottled brown and gray, very stiff consistency high plasticity (CH)	3.4-3.5'	W532.1	28.9			98					
		3.5'	TV									TV=1.53 tsf
		3.5-3 7'	MC									Used for proctor. See plot
	Includes ±10% subrounded to subangular fine to coarse Sand grains	3.7-3.8'	W532.2	25.1			97					
		3.8'	TV									TV=1.58 tsf
		3.8-3.9'	MC									Used for proctor. See plot
		3.0-3.9'	L532.1		54	23						

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PROJECT: BELLE RIVER PLANT UNITS I & II
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255
DATE Nov. 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B142/4	0.7' Recovery; say 8.0' to 8.6' depth	8.0'-10.5'	533	22.8			106					
		8.0'-8.3'	L533.2	21.4	42	22						
		8.3'-8.4'	W533.1	24.8								
	Silty CLAY, olive brown to dark brown with layers of Sandy CLAY; very stiff consistency, moderate to high plasticity (CL)	8.4'	TV									
		8.4'-8.6'	L533.1	24.5	49	22						
	at 8.3': CHANGE TO: Olive-gray/brown Silty CLAY, very stiff consistency, highly plastic (CL-CH)											
	Sample includes ±10% fine to coarse Sand and Gravel size particles (subrounded to subangular in shape; 1/2 inch maximum size)											

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
142/5	2.1' Recovery; say 14.0' to 16.1' depth	14.0 - 16.5'	534										
	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL)	14.1 - 14.4	r CU										Used for compacted CU
		14.4'	W534.1	36.5			82						
		14.4'	TV										TV = 0.35 tsf
		14.5' - 15.1'	r CU										Used for compacted CU
		15.1'	W534.2	34.0			86						
		15.1'	TV										TV = 0.40 tsf
		15.2 - 15.6'	r CU										Used for compacted CU
		15.6'	W534.3	35.1			88						
		15.6'	TV										TV = 0.41 tsf
		15.7 - 16.1'	r CU										Used for compacted CU
		14.0 - 16.1'	L534.1		47	22							
		14.0 - 16.1'	T534.1.2	15.3			105	CU	15.0	1475			$\bar{\sigma}_c$ = 1872 psf
		14.0 - 16.1'	T534.1.3	15.1			105	CU	15.0	2625			$\bar{\sigma}_c$ = 3600 psf

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Nov. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B142/6	2.3' Recovery; say 19.0' to 21.4' depth	19.0'-21.5'	535									
		19.2'	TV									TV = 0.30 tsf
		19.2'-19.5'	saved									
	Silty CLAY, gray-brown, medium consistency, moderate to high plasticity (CL)	19.5'-19.6'	W535.1	38.5								
		19.6	TV									TV=0.32 tsf
	Sample includes ±15% fine to coarse Sand and fine Gravel size pieces (1/2 inch maximum size)	19.6'-19.9'	saved									
		20.1'-20.5	C535.1	38.2						1.019	.41	
		20.1'-20.5'	SG535.1									Specific gravity = 2.69
		20.1'-20.5'	L535.1	37.9	45	22						
		20.5'-20.6'	W535.2	37.7			83					
		20.6'	TV									TV =0.36 tsf
		20.6'-20.9'	saved									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
142/SS14	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	61.0'	601									
			L601.1	34.3*	44	20						
142/SS24	Jar Sample Silty CLAY, sandy, gray, of low plasticity (CL-ML) Sample includes 25-30% fine to medium Sand size particles	111.0'	602									
			L602.1	22.0*	23	16						

*Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ___ SUMMARY OF LABORATORY TEST RESULTS — DATE ___ SHEET ___ OF ___

IDENTIFICATION			TEST NO.	PROPERTIES				STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
143/SS2	Jar Sample Silty CLAY, yellow-brown, of moderate to high plasticity (CL)	6.0'	603										
			L603.1	23.1*	45	20							
143/SS4	Jar Sample Silty CLAY, gray, moderately plastic (CL)	16.0'	604										
			L604.1	26.7*	43	22							
143/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	36.0'	605										
			L605.1	36.1*	46	23							
143/SS11	Jar Sample Silty CLAY, grayish-brown, of moderate plasticity (CL)	51.0'	606										
			L606.1	31.6	43	22							

*Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
143/SS15	Jar Sample Silty CLAY, grayish-brown, highly plastic (CL-CH)	71.0'	607								
			L607.1	29.9*	48 21						
143/SS20	Jar Sample Silty CLAY, gray, moderately plastic (CL) Sample includes 20-25% fine to coarse Sand size particles	96.0'	608								
			L608.1	19.3*	38 20						
143/SS27	Jar Sample Sandy CLAY, gray, of low plasticity (SC) Sample includes ±35% fine to coarse Sand and ±5% fine Gravel size particles to 1/4" maximum	131.0'	609								
			L609.1	14.7*	27 17						

*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Nov., 1974 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B144/4	2' Recovery; say 8.0' to 10.0' depth	8.0-10.0'	537										
		8.2'	TV										TV = 1.80 tsf
		8.2-8.5'	saved										
	Silty CLAY, brown, hard consistency, highly plastic (CL-CH)	8.5-8.8'	U537.1	26.3			97	U	1.7	861			
		8.5-8.8'	U537.1	24.1			99	U	15.0	1482			
	Includes about 20 - 25% fine to coarse Sand and fine Gravel size pieces (sub-rounded to subangular in shape; 1/2 inch max. size)	8.5-8.8'	L537.1	27.3	48	21							
		8.8-8.9'	W537.1	28.1									
		8.9'	TV										TV = 1.70 tsf
	Entire sample slightly disturbed?	8.9-9.2'	U537.2	24.1			100	U	3.0	1002			
		9.2-9.3'	W537.2	27.1									

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B144/6	1.7' Recovery; say 13.0' to 14.7' depth	13.0-15.0'	538	25.7			99					
		13.3-13.7'	saved									
		13.7-13.8'	W538.1	25.7								
	Silty CLAY, brown and grayish brown, very stiff consistency, moderate to high plasticity (CL)	13.8'	TV									TV = 1.53 tsf
		13.8-14.1'	S/H538.1									sieve/hydrometer. See plot
		14.1-14.2'	W538.2	25.7								
	Sample includes 15 to 20% fine to coarse Sand size particles	14.2'	TV									TV = 1.88 tsf
		14.2-14.5'	saved									

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
144/SS10	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity. Sample includes ±5% fine to coarse sand size particles (CL)	28.5 to 30	610								
			W610.1	35.5							
144/SS16	Jar Sample Silty CLAY, gray-brown, moderate to high plasticity (CL)	58.5 to 60	611								
			W611.1	32.4							
144/SS23	Jar Sample Silty CLAY, gray, moderate plasticity (CL) Sample includes 15% fine to coarse sand size particles	93.5 to 95	612								
			I612.1	19.8	35 18						

GOLDBERG-ZOINO AND ASSOCIATES, INC.
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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B146/3	1.8' Recovery; say 6.0' to 7.8' depth	6.0 - 8.0'	540										
		6.1 - 6.4'	r CU										Used for compacted CU
	Silty CLAY, brown & gray mottled, very stiff to hard consistency, moderate plasticity (CL)	6.4 - 6.5'	W540.1	36.2			84						
		6.5'	TV										TV = 2.03 tsf
		6.5' - 6.9'	r CU										Used for compacted CU
	Sample includes ±5% fine to medium Sand size particles (subangular to subrounded in shape)	6.9 - 7.0'	W540.2	37.8			83						
		7.0'	TV										TV = 2.03 tsf
		7.0 - 7.3'	r CU										Used for compacted CU
		7.4 - 7.5'	L540.1	37.2	44	21							
		7.5 - 7.8'	r CU										Used for compacted CU
		6.0 - 7.8'	T540.1.2	14.4			108	CU	15.0	2163			$\bar{\sigma}_c$ = 1872 psf
		6.0 - 7.8'	T540.1.3	14.2			108	CU	10.9	3173			$\bar{\sigma}_c$ = 3888 psf

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TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B146/5	1.6' Recovery; say 10.0' to 11.6' depth	10.0-12.0'	541								
		10.1-10.4'	MC								Used for proctor. See plot
	Silty CLAY, mottled brown and gray, firm consistency, moderate plasticity (CL)	10.4'	W541.1	33.9		90					
		10.4'	TV								TV = 0.67 tsf
	includes ±10% fine to coarse Sand size particles	10.5-11.0'	MC								Used for proctor. See plot
		11.0'	W541.1	27.5		92					
	@ ±11.1' depth changes to	11.0'	TV								TV = 0.73 tsf
	Silty CLAY, Sandy, firm consistency, moderately plastic (CL)	11.1-11.6'	MC								Used for proctor. See plot
	Includes ±40% fine to coarse Sand and Gravel size pieces	10.0-11.6'	L541.1		38 19						

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
146/7	2.1' Recovery; say 14.0' to 16.1' depth	14.0-16.0'	542										
		14.1-14.5'	rC/rU										used for compacted C/U
	Silty CLAY, brown, firm to stiff consistency, moderate to high plasticity (CL)	14.5'	W542.1	32.2			88						
		14.5'	TV										TV = 0.48 tsf
		14.6-15.1'	rC/rU										used for compacted C/U
	Sample includes ±5% fine to coarse Sand size particles	15.1'	W542.2	33.3			90						
		15.1'	TV										TV = 0.50 tsf
		15.2-15.6'	rC/rU										used for compacted C/U
		15.6'	W542.3	34.0			85						
		15.6'	TV										TV = 0.49 tsf
		15.7-16.1'	rC/rU										used for compacted C/U
		14.0-16.1'	L542.1		46	22							
		14.0-16.1'	C542.1	15.9			103				(.679)	.15	
		14.0-16.1'	Ur542.1	16.6			104	rU	2.0	3282			
		14.0-16.1'	SG542.1										Specific Gravity = 2.75

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
146/SS16	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	53.5-55.0'	614								
			1614.1	28.7*	43 20						

*Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
147/SS3	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH) Sample includes ±10% fine to coarse Sand size particles	6.0'-7.5'	624									
			L624.1		58	24						
147/SS7	Jar Sample Silty CLAY, gray, of moderate to high plasticity (CL) Sample includes ±5% fine to coarse Sand size particles	23.5-25.0'	616									
			L616.1	31.9*	46	23						

*Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Nov. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
B151A/2	1.2' Recovery; say 7.5' to 8.7' depth	7.5'-10.0'	544									See plot
		7.7'-8.0'	S/H 544.1									
	Silty CLAY, mottled yellow-brown and gray, very stiff consistency, moderate to high plasticity	8.0'	W544.1	25.0		94						
		8.0'	TV									TV = 1.40 tsf
		8.1'-8.4'	saved									
	Sample includes 5-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape-to 1/2 inch maximum size)	8.5'	W544.2	24.8		98						
		8.5'	TV									TV = 1.40 tsf

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE Nov. 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B151A/3	1.2' Recovery; say 12.5' to 13.7' depth	12.5'-15.0'	545									
		12.6'-12.9'	saved									
	Silty CLAY, gray, very stiff consistency, highly plastic (CL-CH)	12.9'	W345.1	27.5			94					
		12.9'	TV									TV = 1.13 tsf
	Sample includes 10-15% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape-to 1/4 inch maximum size)	13.0'-13.3'	T 545.0.1	28.3			95	UU	10.0 2325			$\bar{\sigma}_c$ - 1555 psf
		13.0'-13.3'	L545.1	27.7	48	20						
		13.3'-13.6'	saved									
		13.7'	W345.2	31.5			93					
		13.7'	TV									TV = 0.55 tsf

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % / MAX. SHEAR STRESS (PSF)	e_o	C_c	
154/SS3	Jar Sample	6.0'-7.5'	617									
	Silty CLAY, yellow brown, highly plastic (CH-CL)		L617.1	23.2*	51	23						
	Sample includes ±10% fine to coarse Sand size particles		W617.1				100					
154/SS8	Jar Sample	28.5-30.0'	618									
	Silty CLAY, grayish-brown, moderately plastic (CL)	L618.1	L618.1	33.3*	44	21						
	Sample includes ±10% fine to coarse Sand size particles											
154/SS13	Jar Sample	53.5-55.0'	619									
	Silty CLAY, grayish-brown, moderately plastic (CL)		L619.1	33.4*	40	19						
	Sample includes ±5% fine to coarse Sand size particles											
154/SS17	Jar Sample	73.5'-75.0'	620									
	Silty CLAY, gray, highly plastic (CH)		L620.1	33.1*	54	25						

Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
154/SS19	Jar Sample Silty CLAY, Sandy, dark gray, of low to moderate plasticity (CL) Sample includes ±25% fine to coarse Sand size particles	83.5-85.0'	621									
			L621.1	25.7*	31	16						
154/SS22	Jar Sample Clayey SILT, gray, of low plasticity (CL-ML) Sample includes ±15% fine to medium Sand size particles	98.5-100.0'	622									
			L622.1	9.6*	20	13						
154/SS25	Jar Sample Silty CLAY, gray, of low plasticity, (CL) Sample includes ±10% fine Sand size particles	113.5-115.0'	623									
			L623.1	18.4*	30	19						

Note: Water content taken from unsealed jar sample

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
158/2	2.2' Recovery; say 7.5' to 9.7' depth; upper 1.5' disturbed	7.5-10.0'	548									
		7.6-8.1'	rU									used for compacted U
		8.1'	W548.1	29.0			94					
	Silty CLAY, mottled gray-brown and grayish brown, stiff to very stiff consistency, moderately to highly plastic (CL-CH)	8.2-8.5'	rU									used for compacted U
		8.5'	W548.2	28.2			95					
		8.6-8.9'	rU									used for compacted U
	Sample includes fine to medium Sand size particles; 30% or more near top of sample, ±10% near bottom	9.0'	W548.3	24.3								
		9.0'	TV									
		9.1-9.4'	rU									used for compacted U
		9.4'	W548.4	21.6			101					
		9.4'	TV									
		9.5-9.7'	rU									used for compacted U
		7.5-9.7'	L548.1		50	21						
		7.5-9.7'	Ur548.1	16.8			104	rU	2.0 347			

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PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE 11/74 — SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B158/4	Silty CLAY, gray, firm consistency, moderate to high plasticity (CL) Sample includes 5-10% fine to coarse Sand size particles	17.5-20.0'	550								
		17.5-17.8'	saved								
		17.9'	W550.1	36.2		84					
		17.9'	TV								TV = 0.34 tsf
		18.0-18.5'	saved								
		18.5'	W550.2	37.8		83					
		18.5'	TV								TV = 0.37 tsf
		18.6-18.9'	T550.1.1	37.5		83	CU	3.2 885			$\bar{\sigma}_c$ = 1080 psf
		18.6-18.9'	L550.1		46 19						
		19.0-19.3'	T550.1.2	33.5		87	CU	5.1 971			$\bar{\sigma}_c$ = 2160 psf
		19.3-19.6'	T550.1.3	37.1		83	CU	5.7 1297			$\bar{\sigma}_c$ = 4320 psf
		19.8	W550.3	37.2							

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
163/SS2	Jar Sample Silty CLAY, yellow-brown, highly plastic (CH-CL) Sample includes ±5% fine to coarse Sand size particles	3.5-5.0'	615									
			L615.1		51	24						
163/SS4	Jar Sample Silty CLAY, grayish-brown, moderately to highly plastic (CL)	8.5-10.0'	625									
			L625.1	28.4*	47	23						
163/SS8	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL)	28.5-30.0'	626									
			L626.1	23.9*	42	20						
163/SS11	Jar Sample Silty CLAY, grayish-brown, moderately plastic (CL) Sample includes ±5% fine to medium Sand size particles	43.5-45.0'	627									
			L627.1	33.5	45	21						

*Note: Water content taken from unsealed jar sample

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
163/SS16	Jar Sample Silty CLAY, grayish-brown, highly plastic (CH)	68.5-70.0'	628										
			L628.1	36.9*	52	24							
163/SS21	Jar Sample Silty CLAY, gray, moderately plastic (CL) Sample includes ±10% fine to coarse Sand size particles	93.5-95.0'	629										
			L629.1	22.3*	39	20							

*Note: Water content taken from unsealed jar sample

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE Nov. 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B185/3	2.7' Recovery; say 6.0' to 8.7' depth	6.0-9.0'	552								
		6.5-6.8'	saved								
	Silty CLAY, mottled gray-brown and brown, very stiff to hard consistency, highly plastic (CL-CH)	6.8'	W552.1	25.2		99					
		6.9-7.2'	saved								
		7.5-7.8'	U552.1	23.9		104	U	4.0 2948			
	Sample includes <5% fine to coarse Sand and Gravel particles (subrounded to subangular in shape- to 1" maximum size)	7.5-7.8'	I552.1	24.7	50 23						
		7.8'	W552.2	26.9		99					
		7.8'	TV								TV = 1.75 tsf
		7.9-8.1'	C552.1	29.1					.757	0.18	
		7.9-8.1'	SG552.1								Specific Gravity ≐2.72
		8.2-8.5'	saved								

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE ____ SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B185/7	2.7' Recovery; say 18.0' to 20.7' depth	18.0-21.0'	554									
		18.2-18.5'	saved									
	Silty CLAY, gray, medium consistency, highly plastic (CL-CH)	18.5-18.8'	U554.1	39.3			81	U	2.4 416			
		18.5-18.8'	L554.1	39.0	49	22						
	Sample includes less than 5% fine Sand size particles	18.9'	W554.1	38.8			81					
		18.9'	TV									TV = 0.35 tsf
		19.2-19.8'	saved									
		19.9'	W554.2	35.4			82					
		19.9'	TV									TV = 0.32 tsf

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ___ SUMMARY OF LABORATORY TEST RESULTS — DATE ___ SHEET ___ OF ___

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
B185/13	2.8' Recovery; say 48.0' to 50.8' depth	48.0-51.0'	556									
		48.2-48.5'	saved									
	Silty CLAY, gray, medium consistency, moderate to high plasticity (CL)	48.5'	W556.1	34.7			85					
		48.5'	TV									TV = 0.44 tsf
	Sample includes varying amounts of fine to medium Sand, ±10% at top of sample to ±40% near bottom; less than 5% subangular to subrounded Gravel particles to 1/4" size occur throughout	48.6-48.9'	L556.1	37.1	47	22						
		49.4'	W556.2	31.5			87					
		49.5-49.9'	L556.2	25.9	28	17						

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε %	MAX. SHEAR STRESS (PSF)	e_o	C_c	
186/3	Jar Sample	6.0 7.5	443										
	Silty CLAY, dark greyish brown, high plasticity (CH-CL)		L443.1		52	18							
			W443.1	21.5*			99						
	*Note: Water content taken from unsealed jar sample												

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GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

DATE July 1974

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
186/7	0.8' Recovery; say 23.0' to 23.8' depth	23.0-25.0	423									
		23.0-23.3	I423.1	40.5	42	21						
	Silty CLAY, grey, soft consistency, moderate to high plasticity (CL)	23.3-23.5	W423.1	39.0			80					
		23.5-23.8	Saved									
	Note: Entire sample much disturbed											

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH			CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS w_L	ATTERBERG LIMITS w_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
186/13	1.5' Recovery; say 53.0' to 54.5' depth	53.0-55.0	426									
		53.2-53.5	Saved									
	Silty CLAY, grey, soft to firm consistency, moderate plasticity (CL)	53.5-53.6	W426.1	40.7			80					
		53.6	TV									TV = 0.28tsf
	below 53.8' depth, sample includes about 20% fine to coarse Sand and fine gravel size particles (subrounded to subangular in shape)	53.6-54.0	Saved									
		54.0-54.3	L426.1	27.0	33	17						
		54.3-54.4	W426.2	28.6			92					
		54.4	TV									TV =0.21tsf

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CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE July 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
186/20	Jar Sample	88.5-90.0	444									
	Silty CLAY, grey, moderate plasticity (CL)		W444.1	20.2*			107					
			L444.1		32	17						
	Sample includes about 20% fine to coarse Sand grains (subrounded to subangular in shape)											
	*Note: Water content taken from unsealed jar sample											

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
186/23	Jar Sample	103.5-105.0	445									
	SILT, grey, non-plastic (ML)		W445.1	12.0*								
	Sample includes about 20% fine Sand grains		I445.1		18	18						
	*Note: Water content taken from unsealed jar sample											

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. * WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
187/6	Jar Sample	18.5-20.0	446								
	Silty CLAY, dark grayish brown, moderate to high plasticity (CL-CH)		W446.1	35.9*							
	*Note: Water content taken from unsealed jar sample										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
187/7	Jar Sample	23.5-25.0	447									
	Silty CLAY, gray, moderate to high plasticity (CL-CH)		L447.1	37.9*	47	20						
	*Note: Water content taken from unsealed jar sample											

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
187/13	Jar Sample	53.5-55.0	448								
	Silty CLAY, grey, moderate to high plasticity (CL)		W448.1	39.5*							
	*Note: Water content taken from unsealed jar sample										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II — FILE NO. 1255

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS — DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT. WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
187/14	Jar Sample	58.5-60.0	449								
	Clayey SILT, Sandy, gray, low to moderate plasticity (CL-ML) Sample includes about 45% fine to coarse Sand and fine Gravel size particles (subrounded to subangular in shape)		S/H 449.1								See plot

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C-268 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
DATE July 1974
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
187/17	Jar Sample	73.5-75.0	450								
			W450.1	25.6*							
	Silty CLAY, dark grey, moderate plasticity (CL)										
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

PROJECT: BELLE RIVER PLANT UNITS I & II

TABLE ____ SUMMARY OF LABORATORY TEST RESULTS

FILE NO. 1255

DATE July 1974

SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ε % MAX. SHEAR STRESS (PSF)	e_o	C_c	
187/22	Jar Sample	98.5-100.0	451								
			W451.1	24.1*							
	Silty CLAY, dark grey, moderate plasticity (CL)										
	Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)										
	*Note: Water content taken from unsealed jar sample										

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

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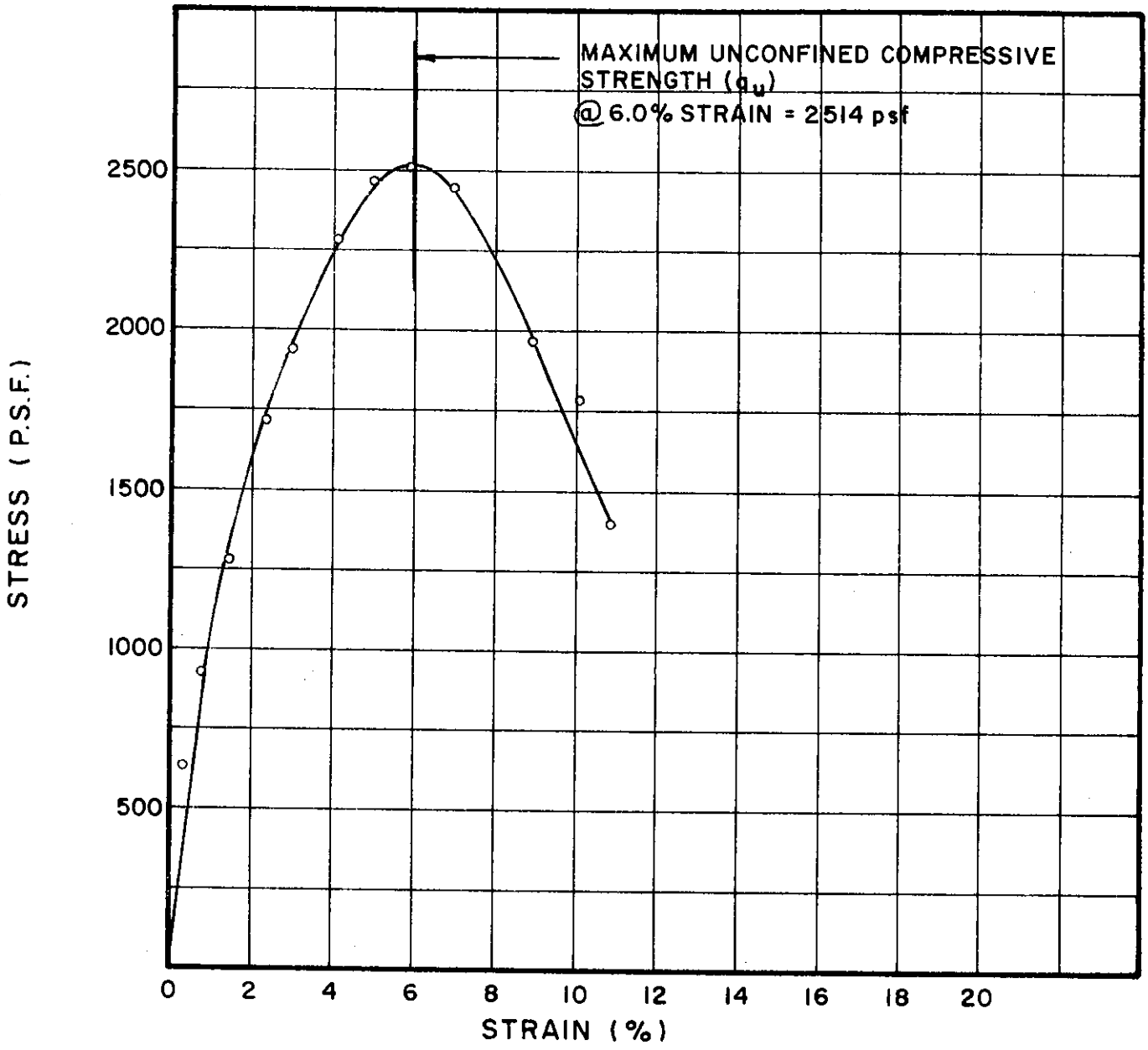
C-270 GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

PROJECT: BELLE RIVER PLANT UNITS I & II
FILE NO. 1255
DATE July 1974
TABLE ____ SUMMARY OF LABORATORY TEST RESULTS
SHEET ____ OF ____

IDENTIFICATION			TEST NO.	PROPERTIES			STRENGTH		CONSOLIDATION		OTHER TESTS AND REMARKS
BORING SAMPLE	SOIL DESCRIPTION	DEPTH (FEET)	—	NAT.* WATER CONTENT (%)	ATTERBERG LIMITS ω_L	ω_P	DRY UNIT WEIGHT (PCF)	TEST TYPE	ϵ % MAX. SHEAR STRESS (PSF)	e_o	C_c	
187/23	Jar Sample	103.5 105.0	452									
	Silty CLAY, gray, moderate plasticity (CL) Sample includes about 10% fine to coarse Sand grains (subrounded to subangular in shape)		L452.1	28.8*	34	19						
	*Note: Water content taken from unsealed jar sample											



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U120.2	1.40	3.50	0.26	31.6	93	44	19	SILTY CLAY (CL)

BORING NO. 15

SAMPLE NO. 4

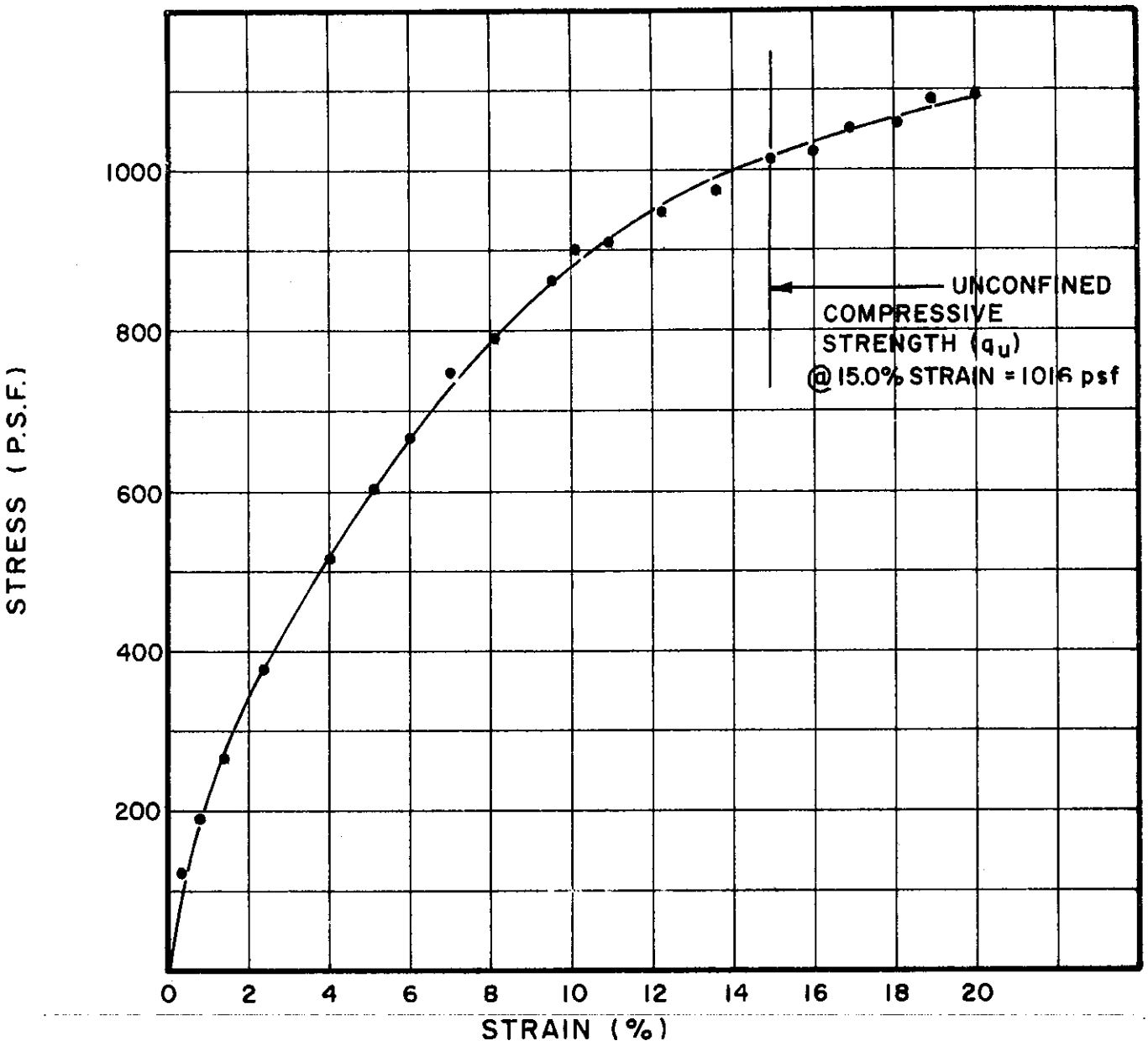
DEPTH 8.6' TO 8.9'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U121.1	1.40	3.50	0.26	34.1	87	42	20	SILTY CLAY (CL)

BORING NO. 15

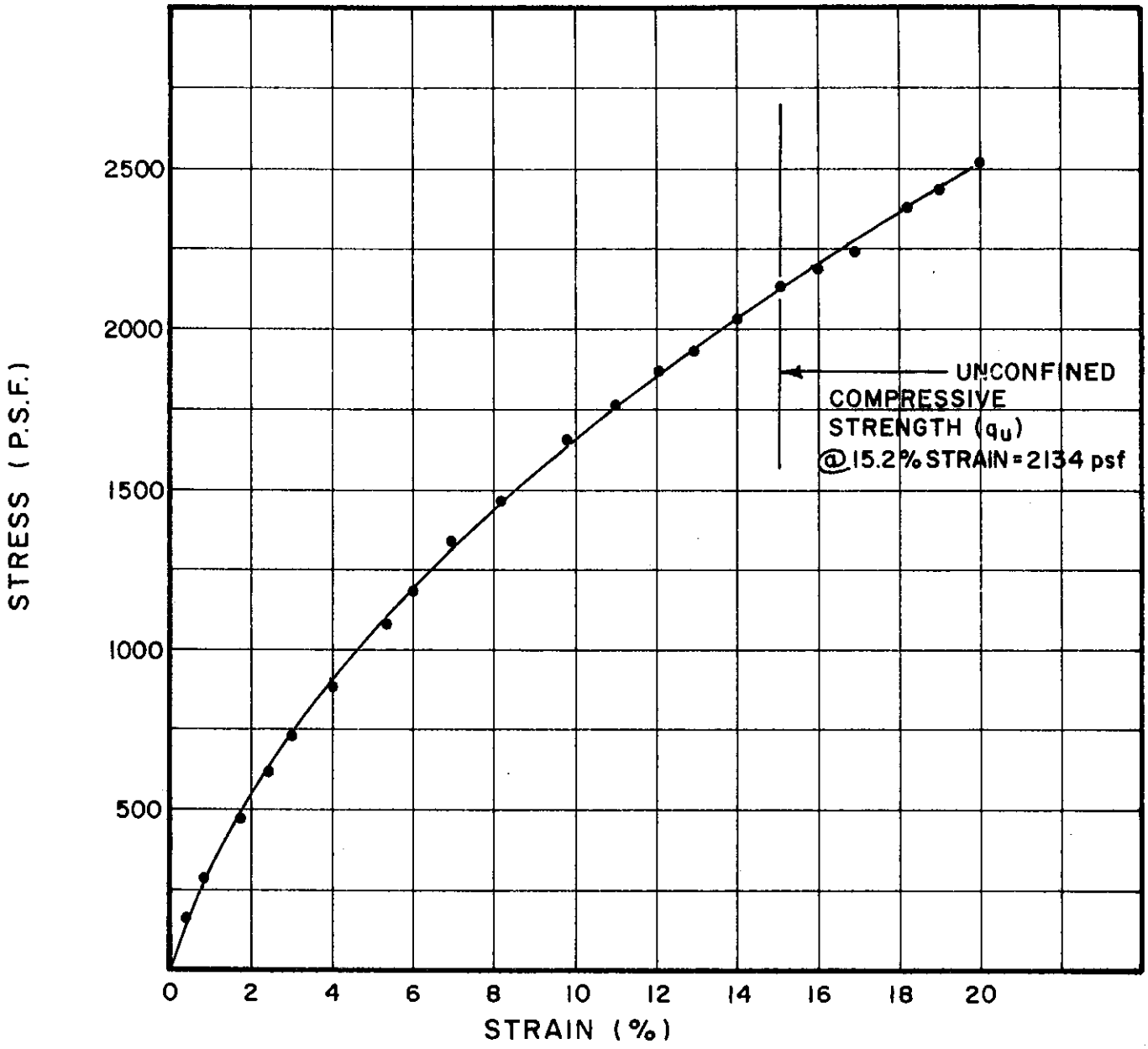
SAMPLE NO. 6

DEPTH 18.1' TO 18.4'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U125.1	1.40	3.50	0.26	22.5	104	34	18	SILTY CLAY (CL)

BORING NO. 15

SAMPLE NO. 14

DEPTH 59.2' TO 59.6'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
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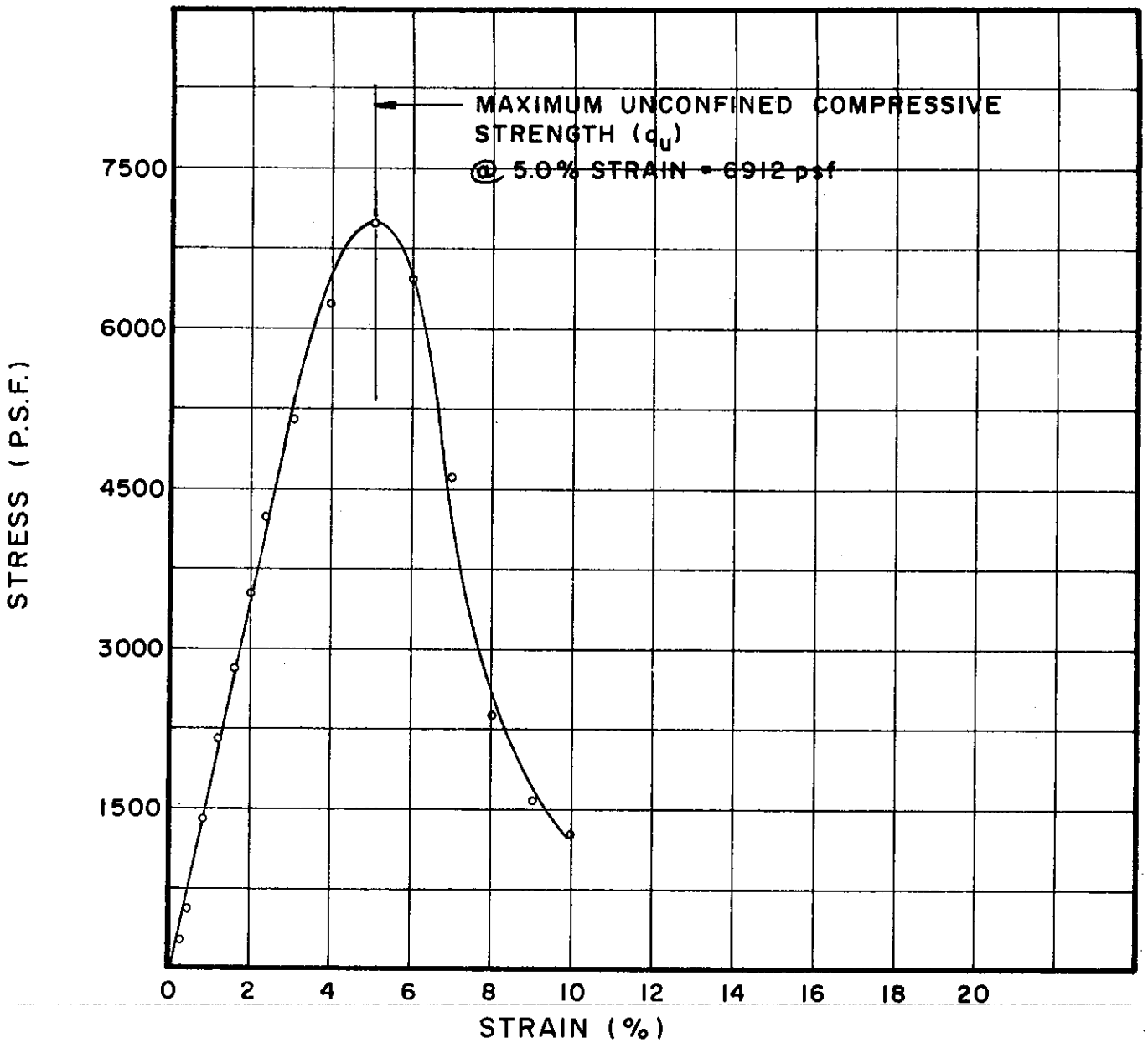
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U266.1	1.44	3.46	.260	22.4	108	59	23	SILTY CLAY (CH)

BORING NO. 25

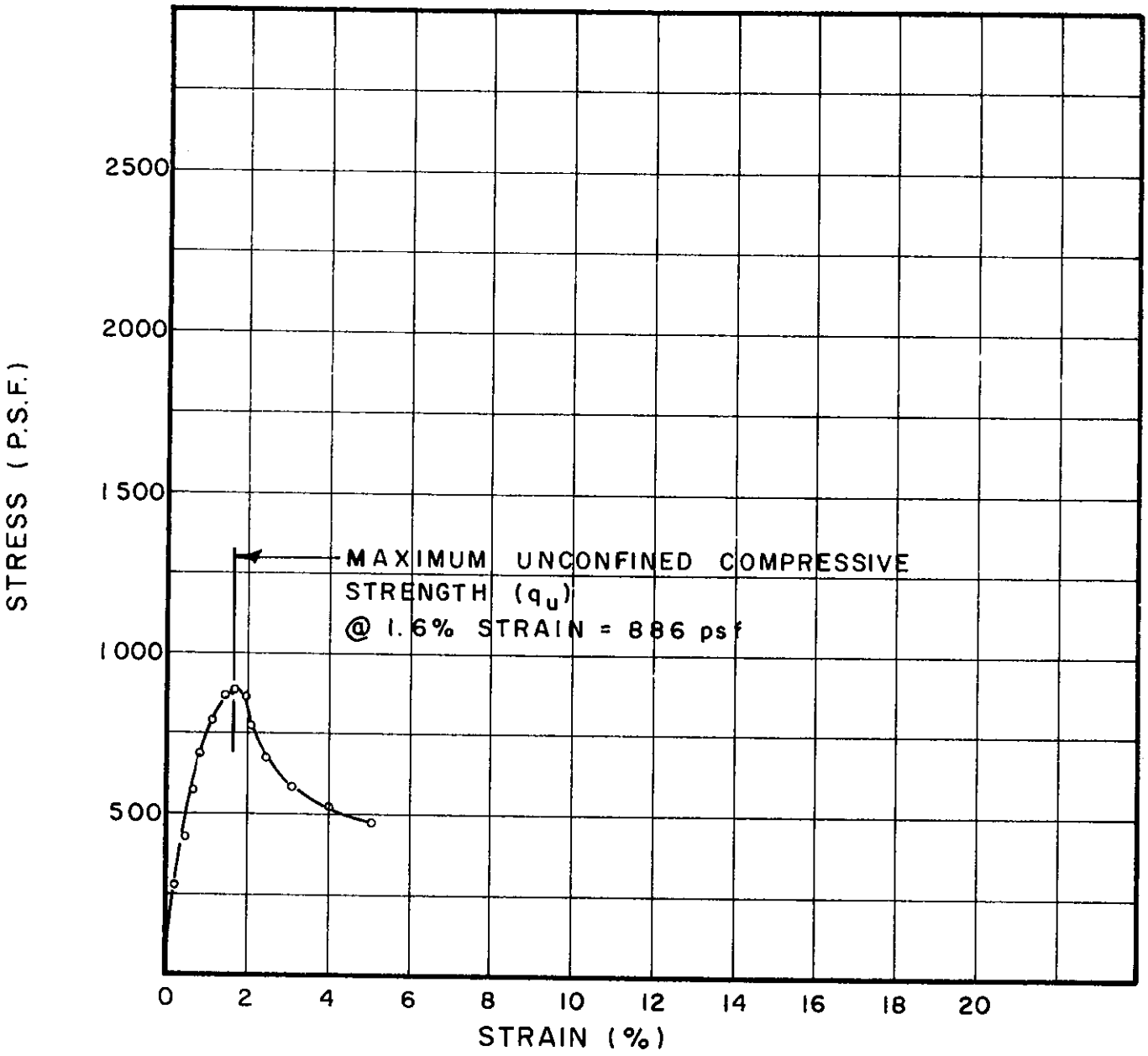
SAMPLE NO. 1

DEPTH 4.5' TO 4.8'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U5.1	1.41	3.50	.257	36.6	86	38	20	SILTY CLAY (CL)

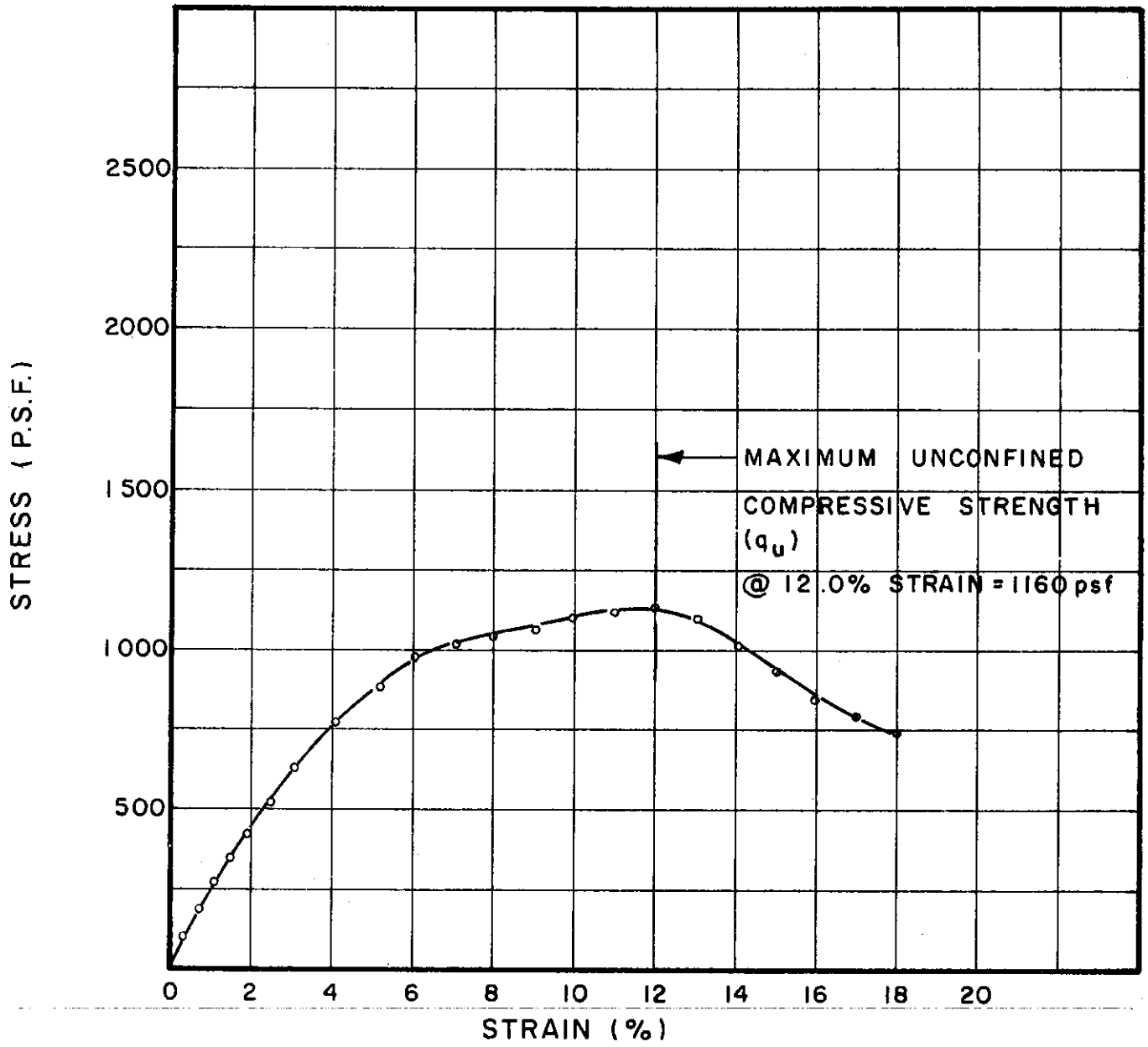
BORING NO. 26

SAMPLE NO. 9

DEPTH 39.4' TO 39.7'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U9.1	1.41	3.45	.261	24.8	101	36	20	SILTY CLAY, SANDY (CL)

BORING NO. 26

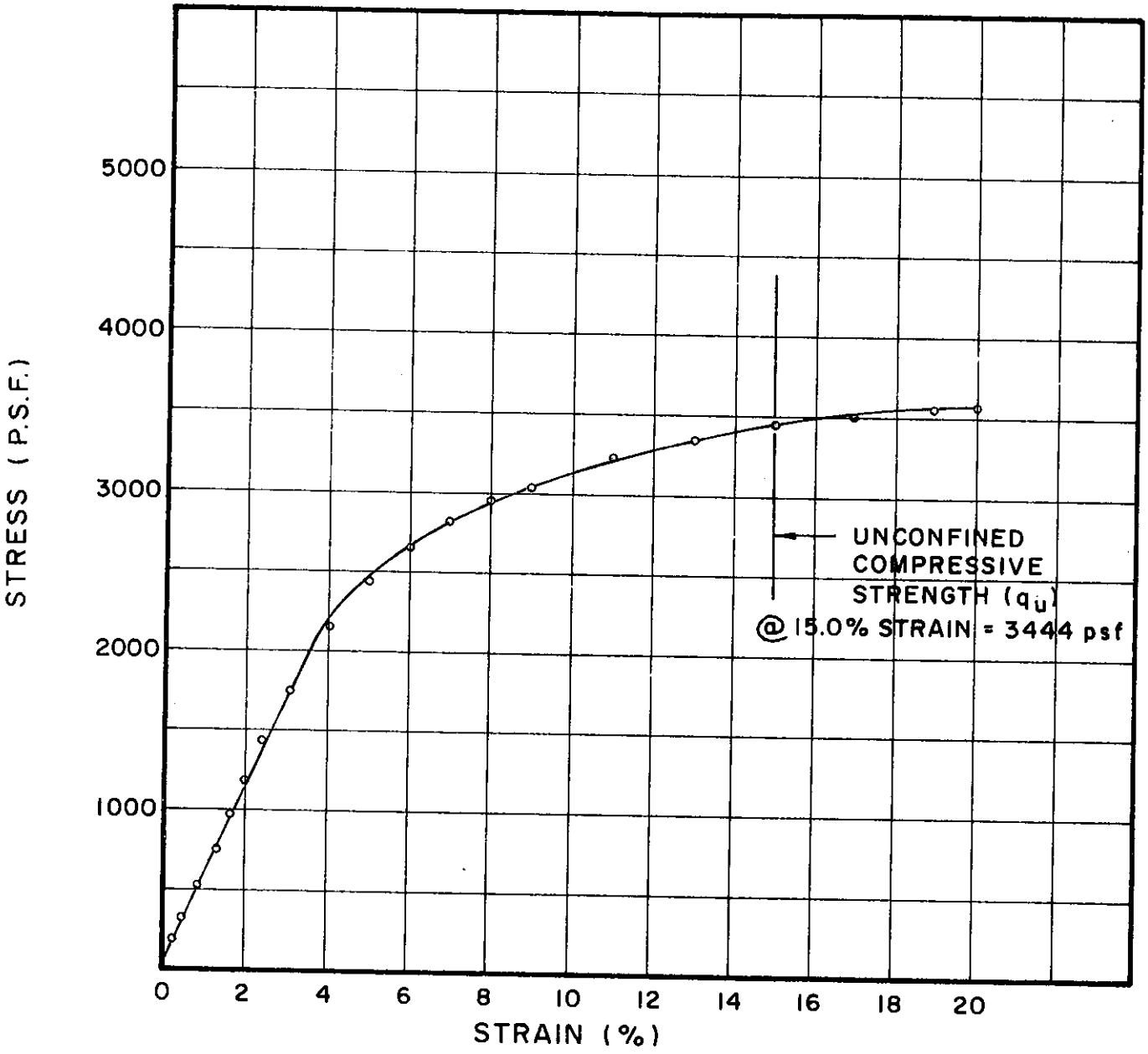
SAMPLE NO. 17

DEPTH 78.2' TO 78.5'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U303.1	1.41	3.45	.261	30.6	94	51	23	SILTY CLAY (CL-CH)

BORING NO. 27

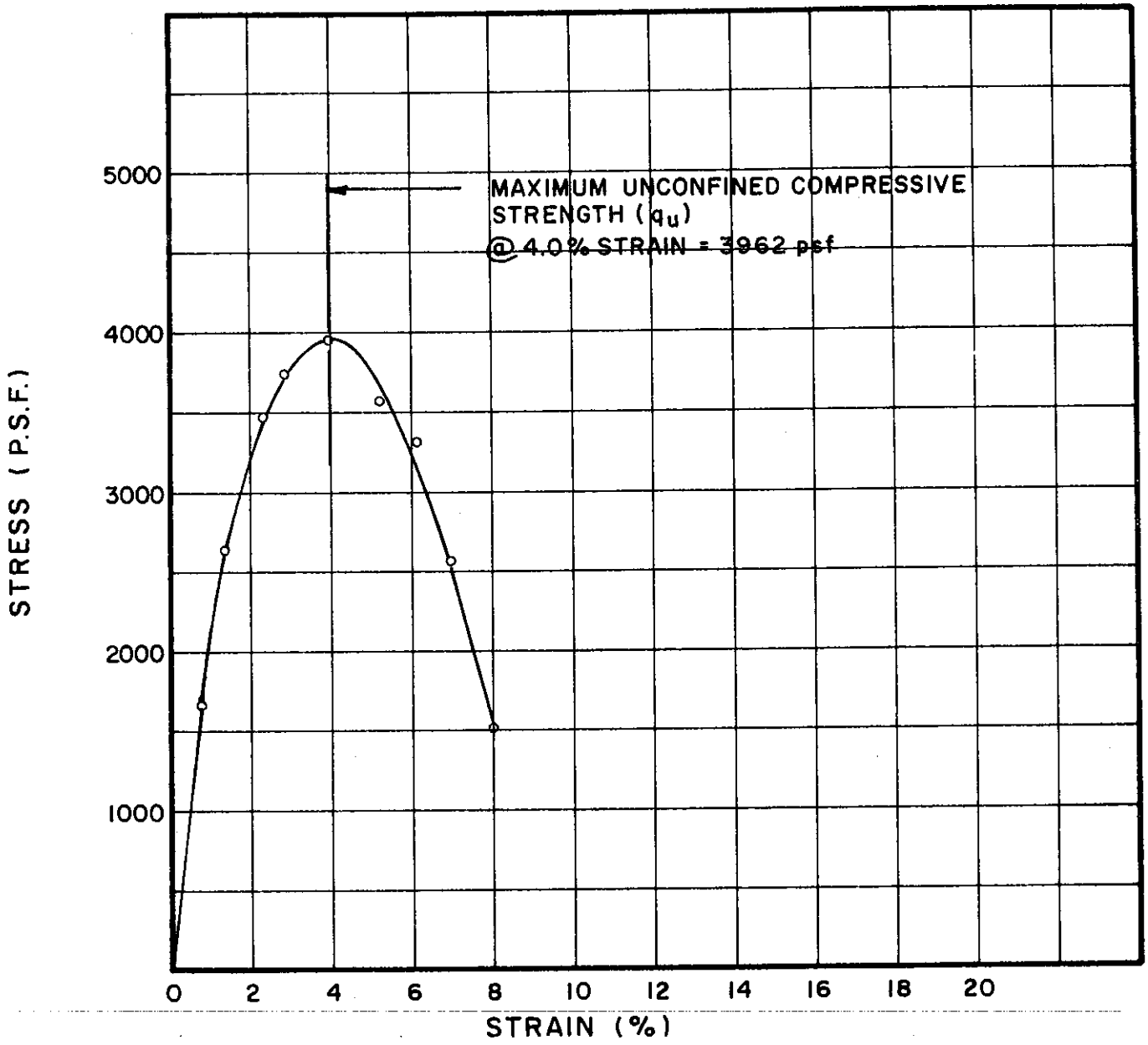
SAMPLE NO. 4

DEPTH 8.6' TO 8.9'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U183.1	1.39	3.49	0.26	25.3	100	47	23	SILTY CLAY (CL)

BORING NO. 28

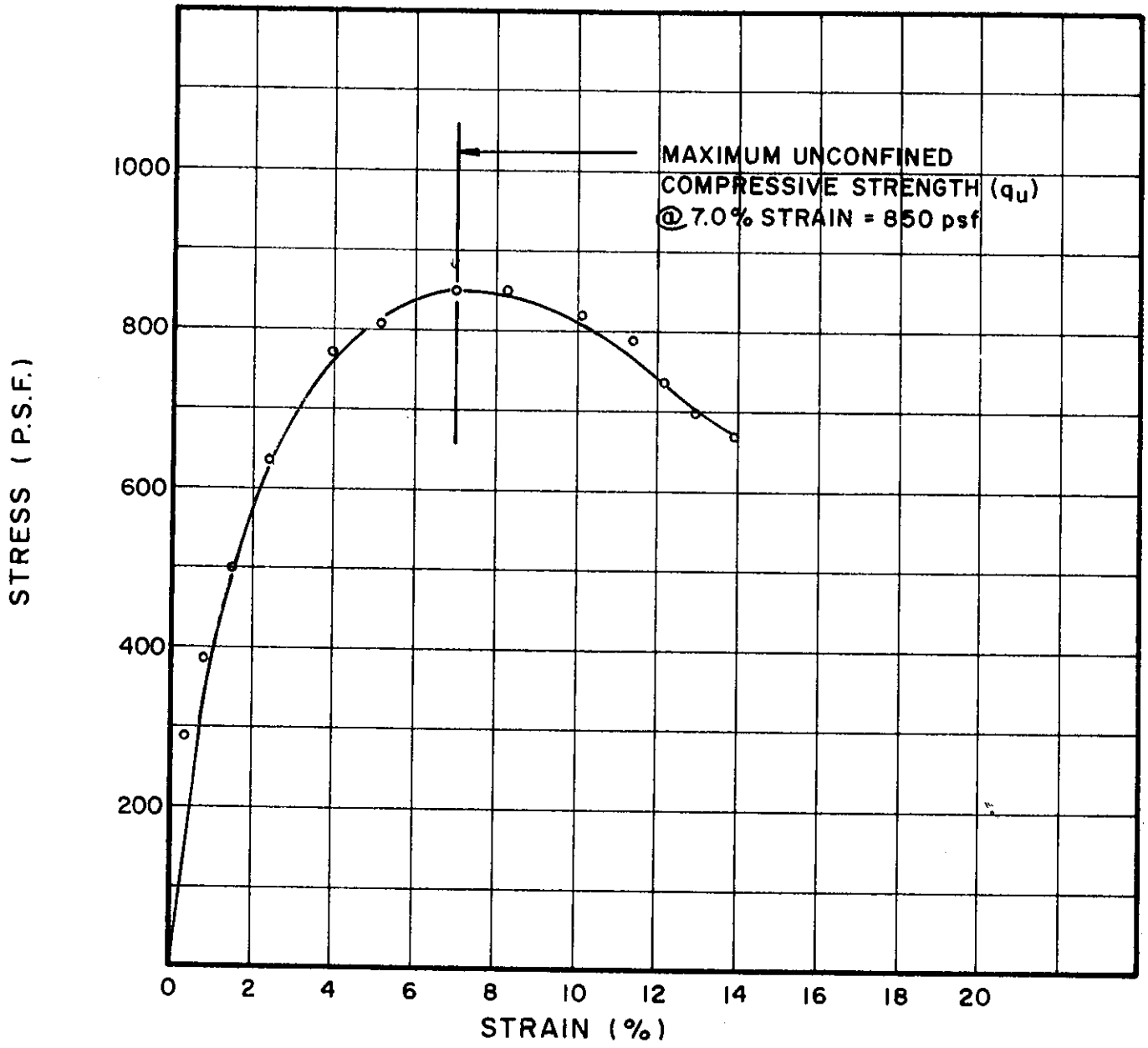
SAMPLE NO. 3

DEPTH 5.8' TO 6.1'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U186.2	1.40	3.50	0.26	38.0	84	42	20	SILTY CLAY (CL)

BORING NO. 28

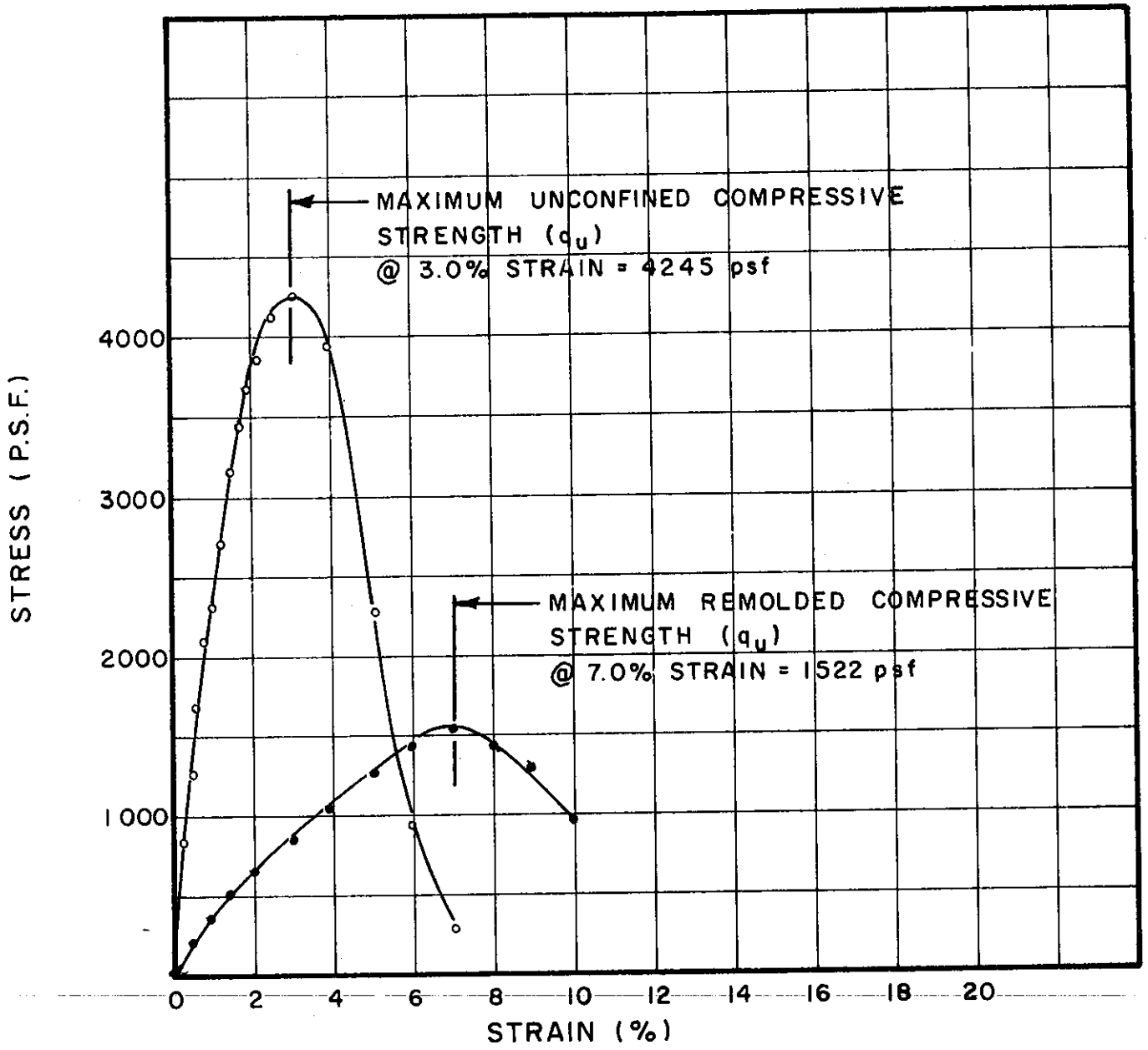
SAMPLE NO. 9

DEPTH 28.8' TO 29.1'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U17.1	1.44	3.54	.254	24.3	102	49	24	SILTY CLAY (CL-CH)
U17.1	1.40	3.50	.257	24.3	103	49	24	SILTY CLAY (CL-CH)

BORING NO. 38

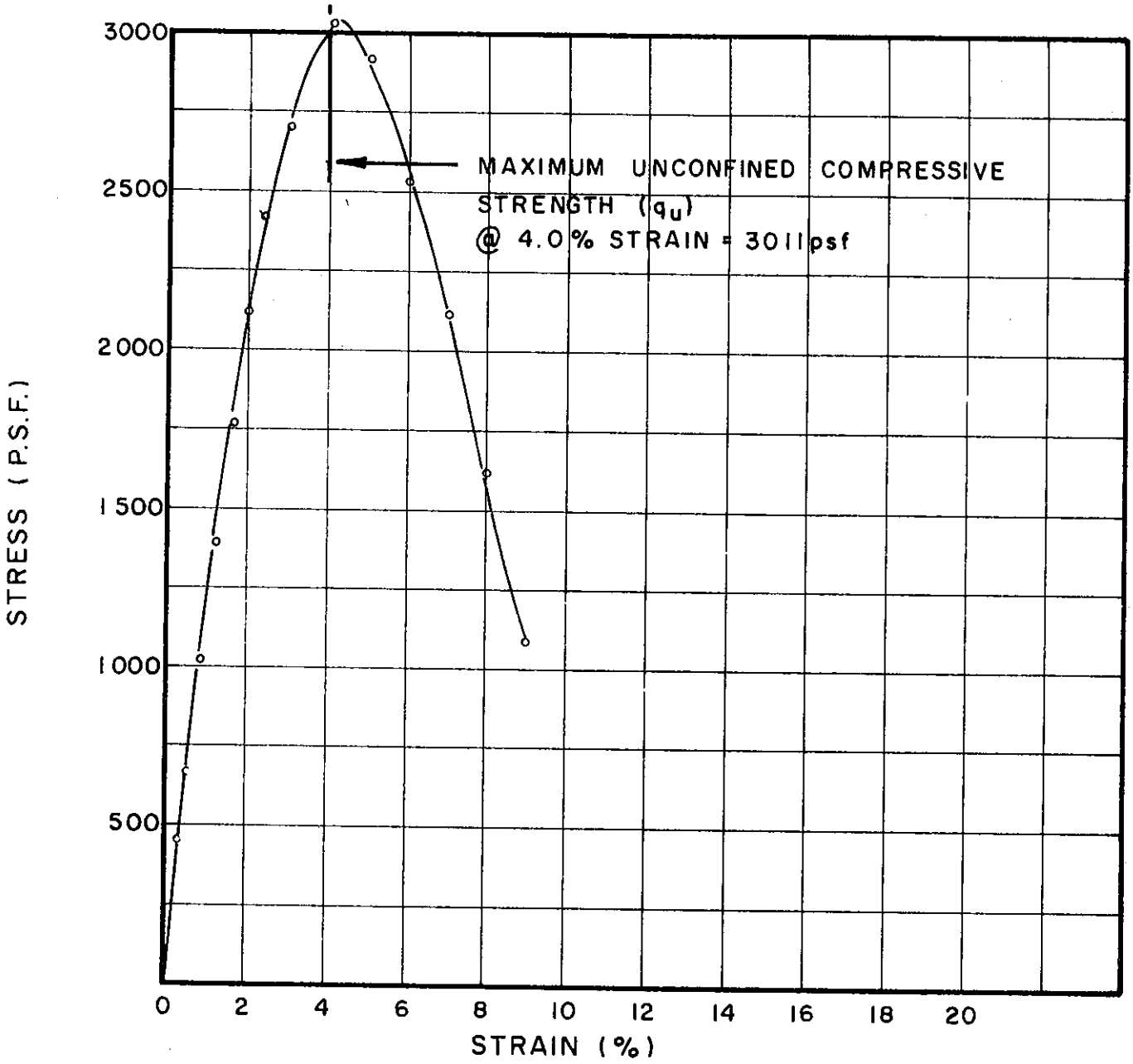
SAMPLE NO. 3

DEPTH 8.7' TO 9.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U18.1	1.42	3.50	.257	28.5	96	46	22	SILTY CLAY (CL-CH)

BORING NO. 38

SAMPLE NO. 4

DEPTH 14.3' TO 14.6'

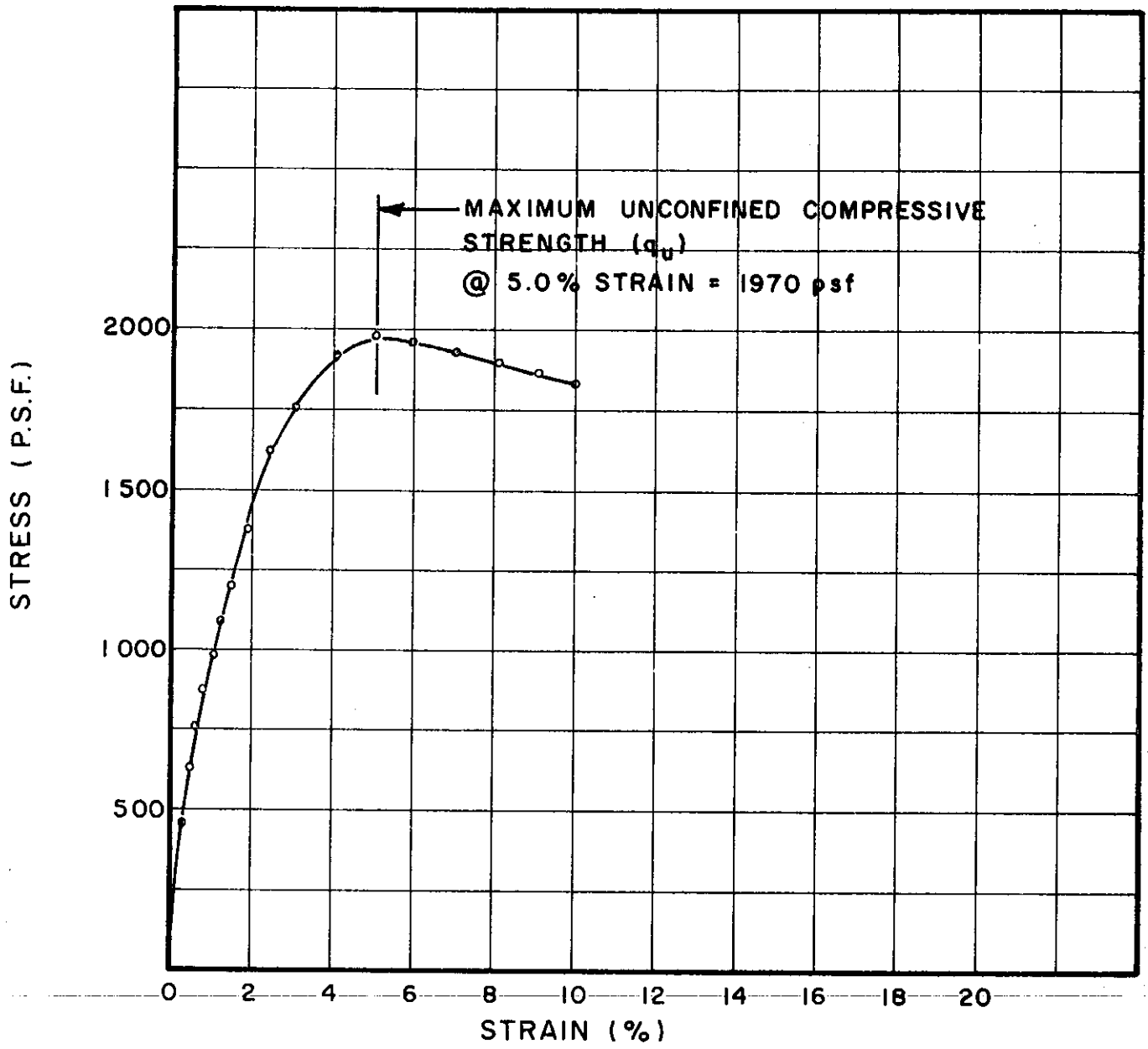
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-281

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U22.1	1.41	3.50	.257	33.4	90	44	21	SILTY CLAY (CL-CH)

BORING NO. 38

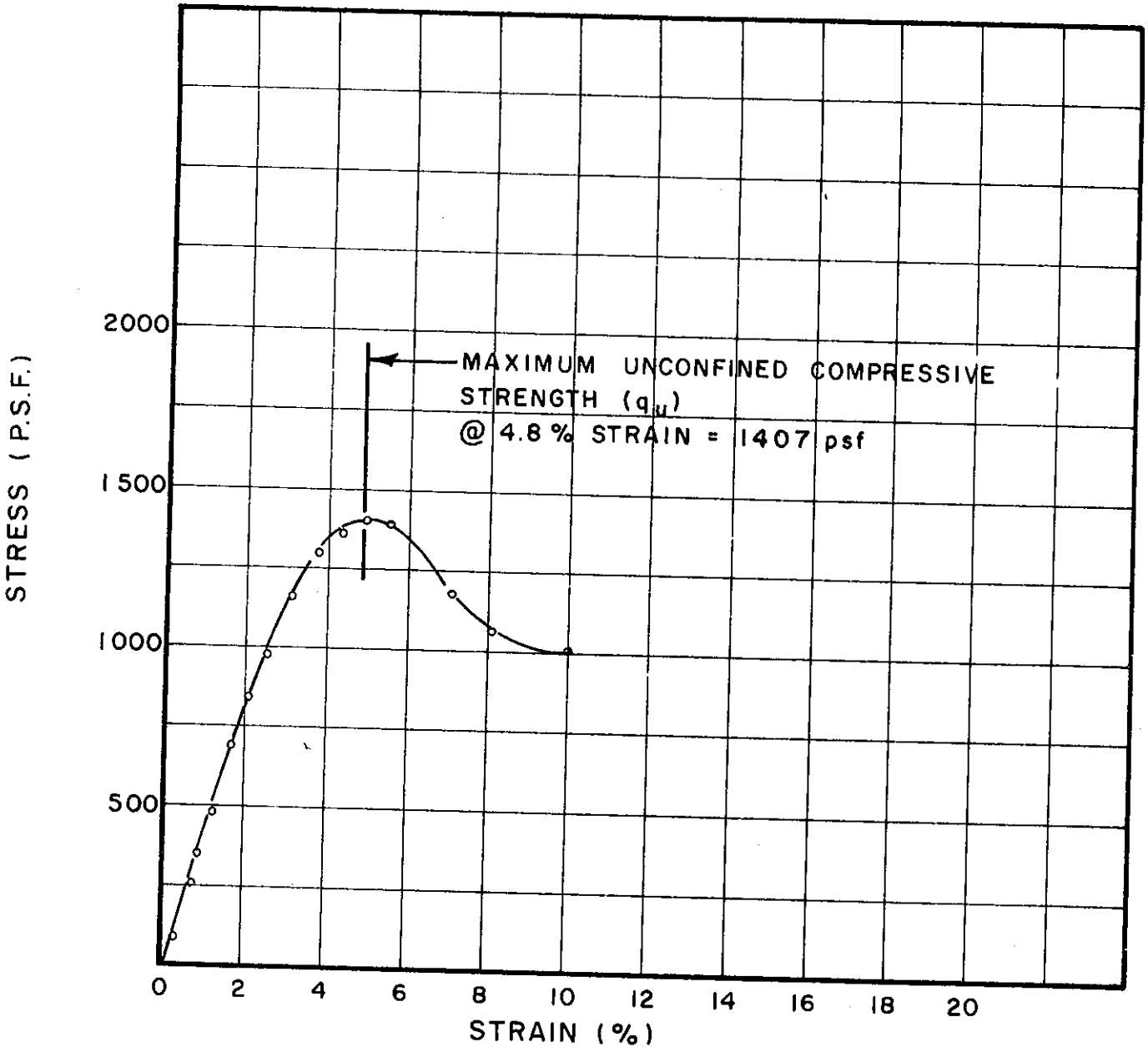
SAMPLE NO. 12

DEPTH 54.2' TO 54.5'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U24.1	1.40	3.50	.257	41.3	79	55	24	SILTY CLAY (CL-CH)

BORING NO. 38

SAMPLE NO. 16

DEPTH 73.7' TO 74.0'

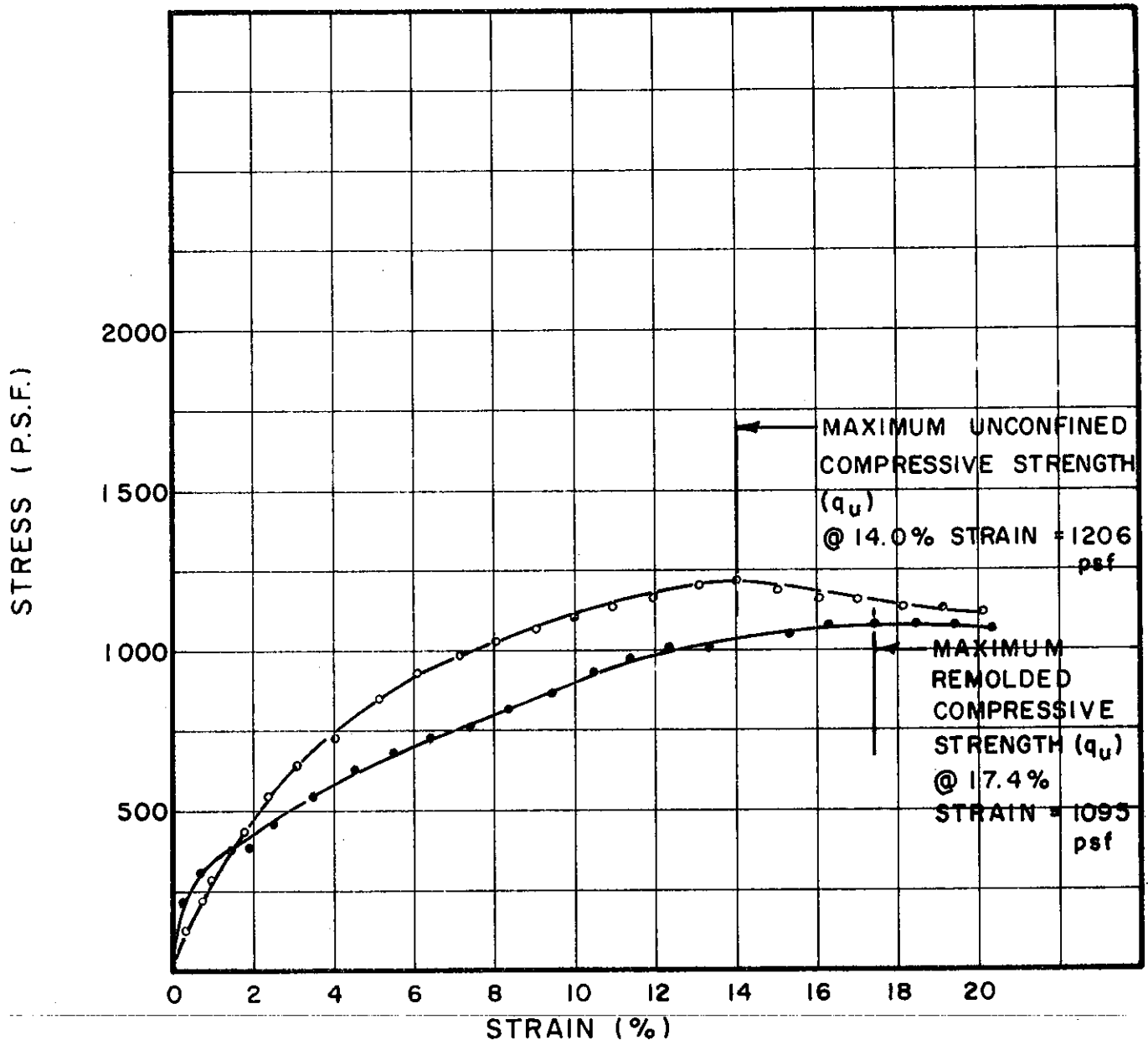
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-283

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U25.1 ○	1.41	3.50	.257	22.2	104	33	19	SILTY CLAY GRAVELLY (CL)
U_r25.1 ●	1.40	3.52	.256	22.2	105	33	19	SILTY CLAY GRAVELLY (CL)

BORING NO. 38

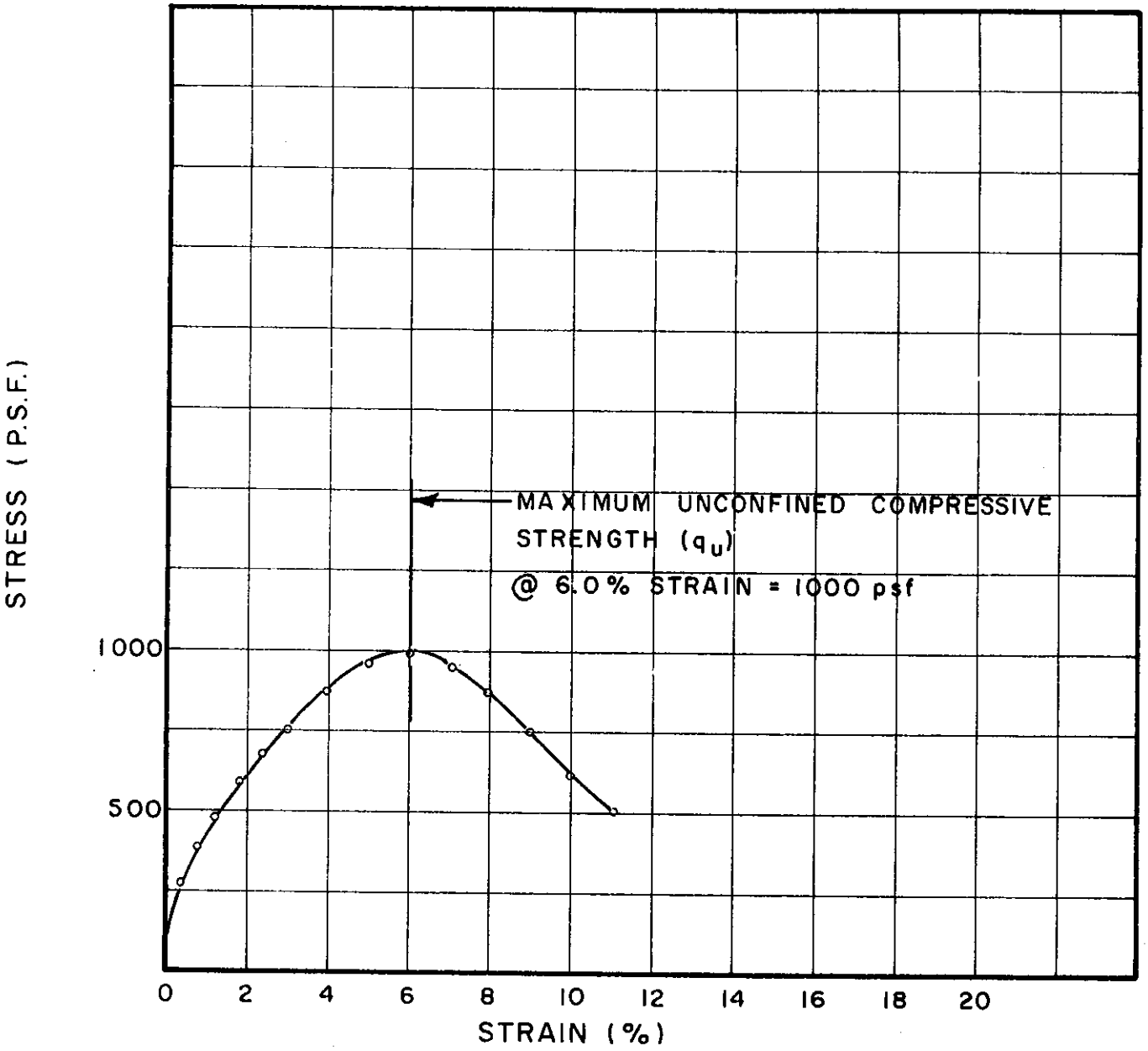
SAMPLE NO. 18

DEPTH 84.6' TO 84.9'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U26.1	1.42	3.50	.257	31.9	92	45	25	SILTY CLAY (CL)

BORING NO. 38

SAMPLE NO. 24

DEPTH 114.2' TO 114.5'

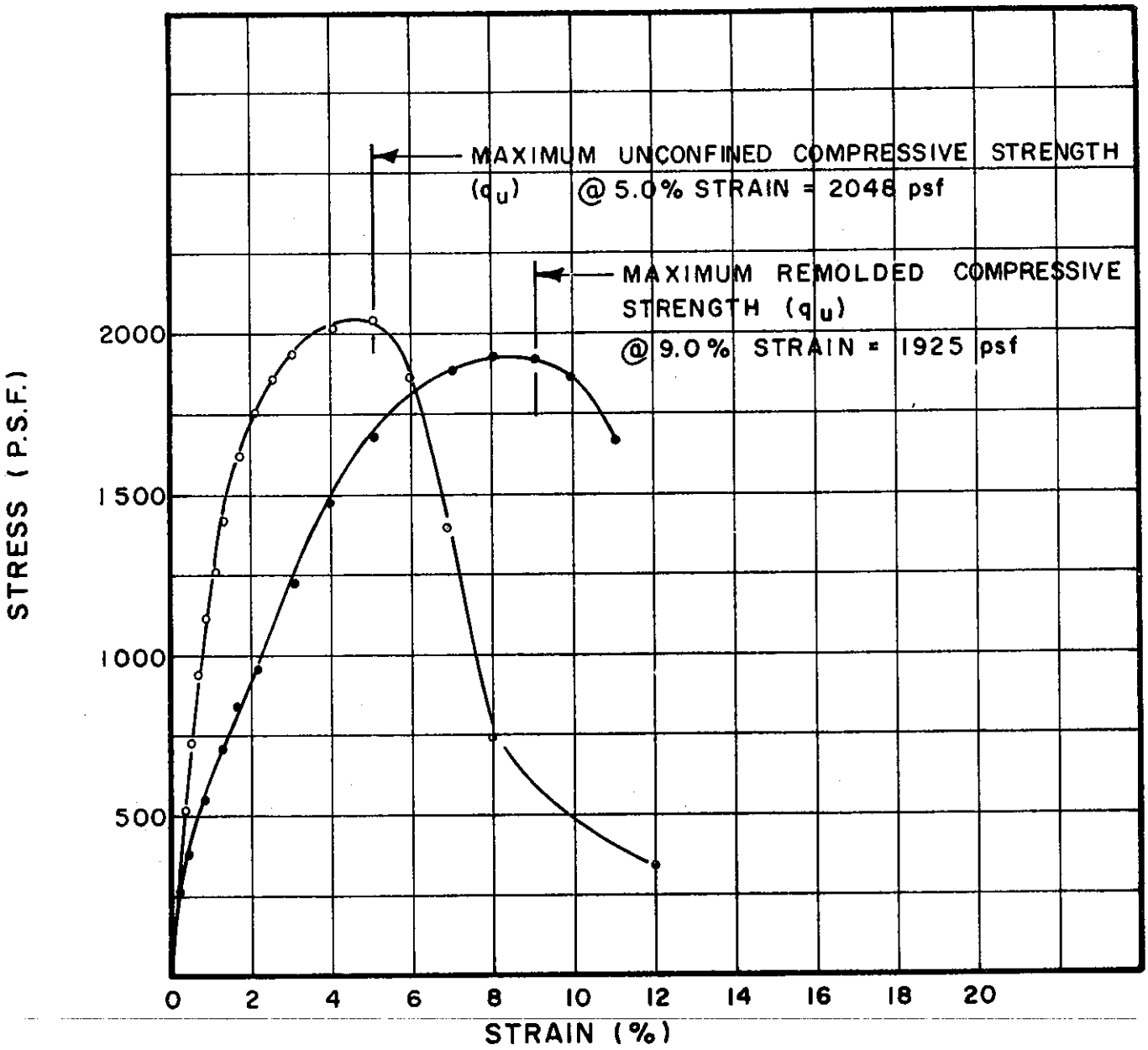
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-285

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	SOIL PROPERTIES WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U28.1 ○	1.43	3.50	.257	29.4	94	63	28	SILTY CLAY (CH)
U_r28.1 ●	1.40	3.38	.266	29.4	95	63	28	SILTY CLAY (CH)

BORING NO. 41

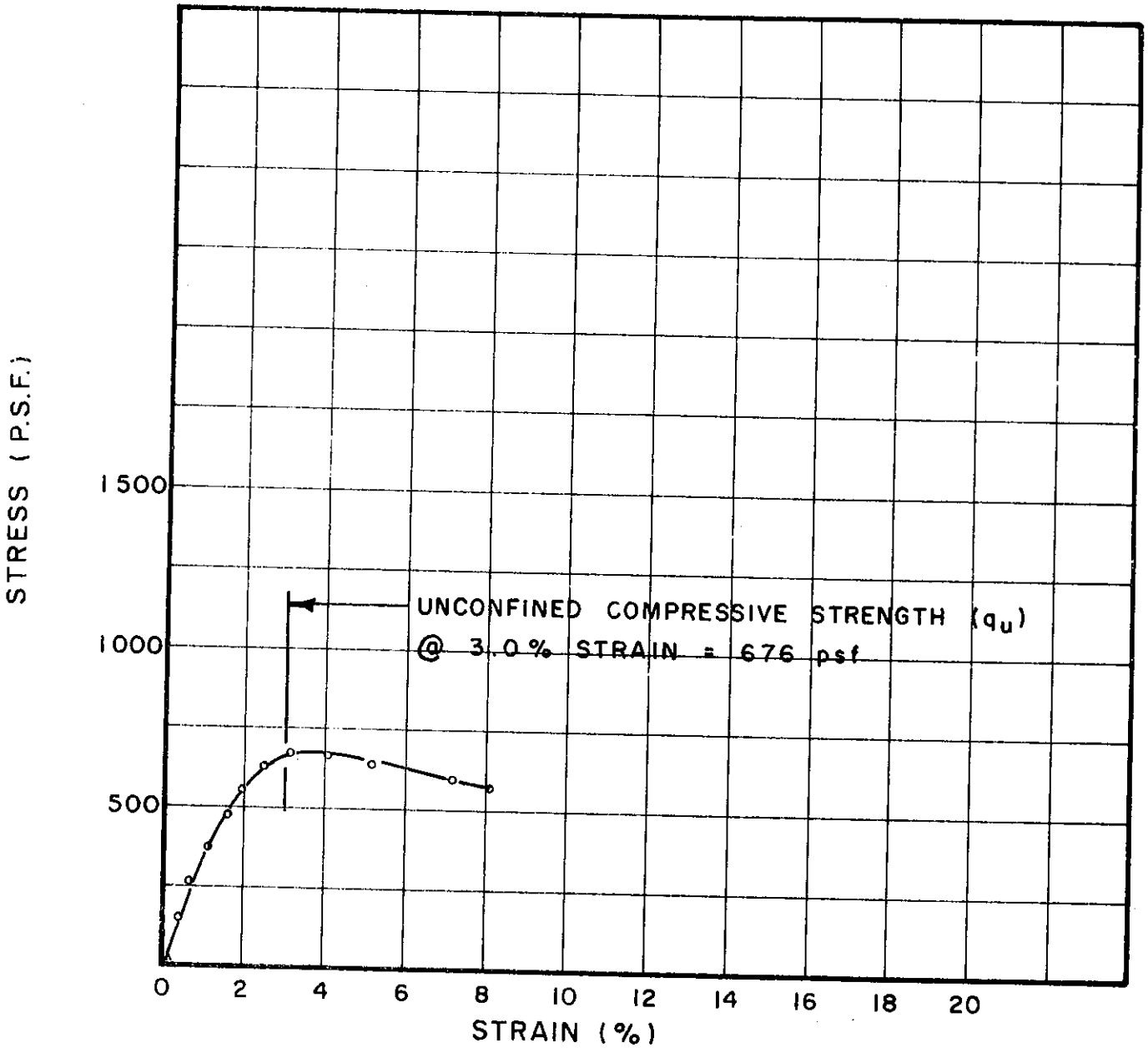
SAMPLE NO. 2

DEPTH 4.5' TO 4.8'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U30.1	1.42	3.50	.257	39.2	83	47	24	SILTY CLAY (CL-CH)

BORING NO. 41

SAMPLE NO. 7

DEPTH 20.6' TO 20.9'

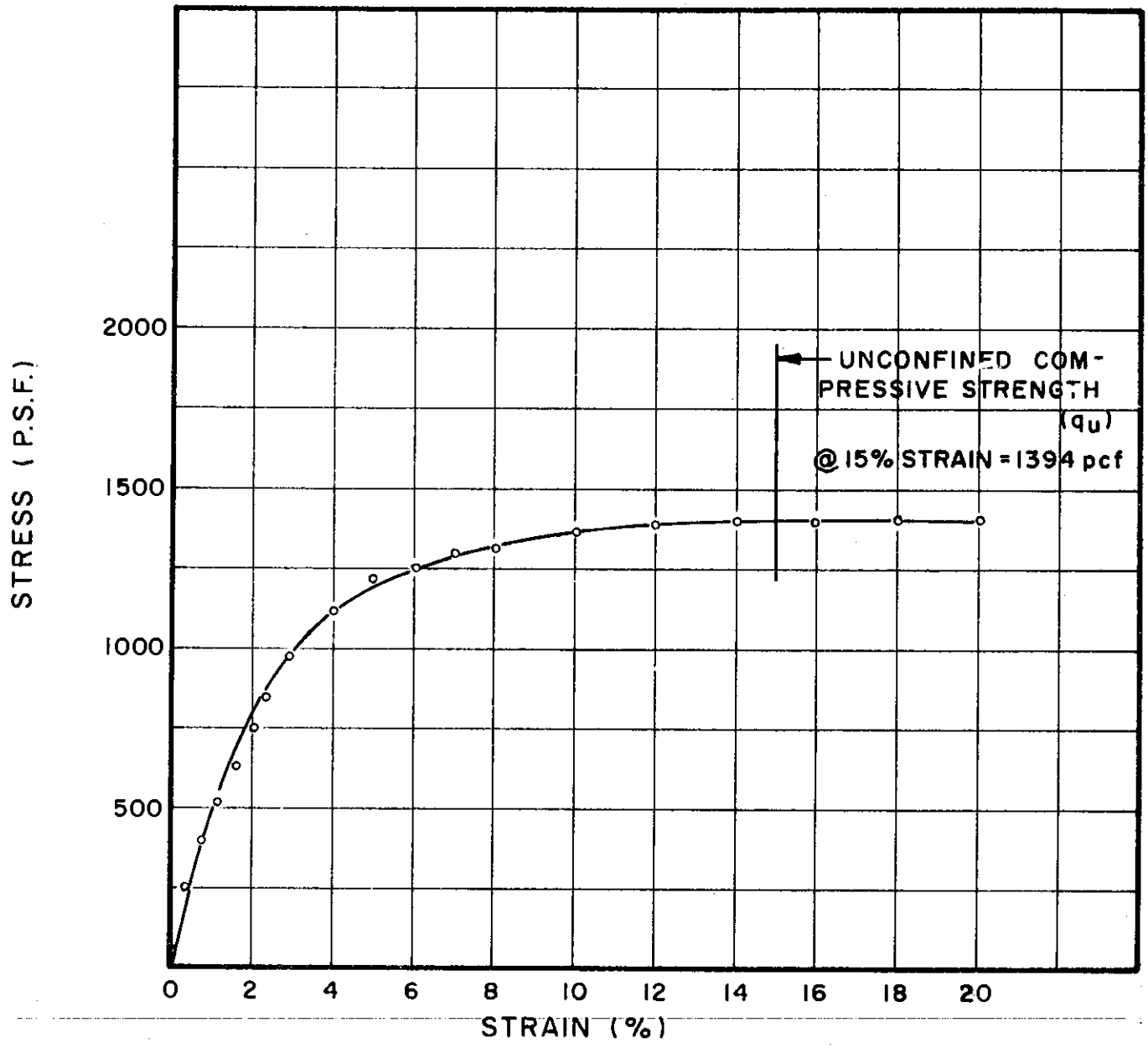
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-287

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U31.1	1.40	3.50	.257	36.9	86	45	21	SILTY CLAY, (CL-CH)

BORING NO. 41

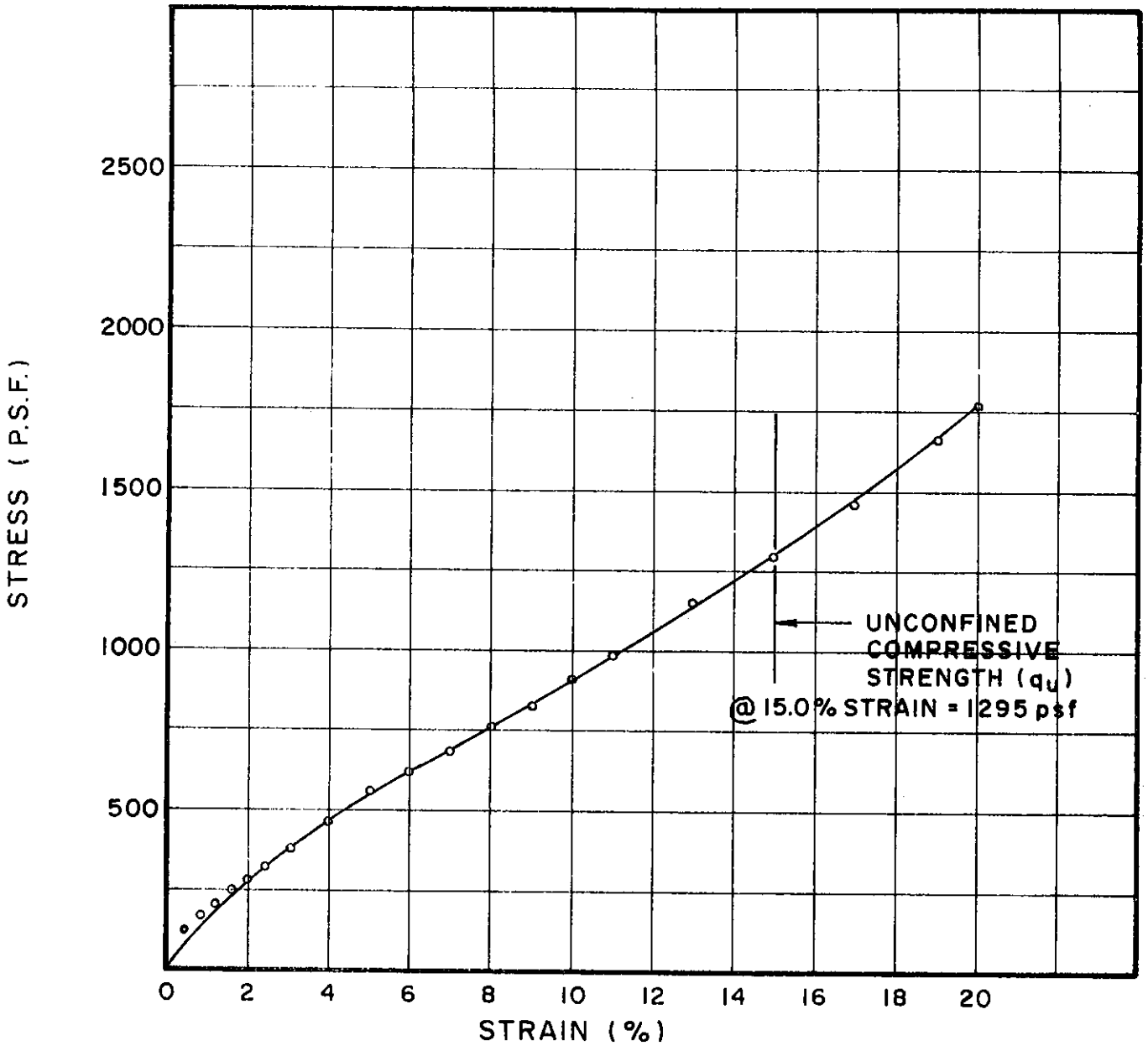
SAMPLE NO. 9

DEPTH 30.9' TO 31.2'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U32.1	1.37	3.45	.260	16.0	118	20	12	SILTY CLAY, SANDY (CL-SC)
								(SAMPLE SLIGHTLY DISTURBED)

BORING NO. 41

SAMPLE NO. 11

DEPTH 40.6' TO 41.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

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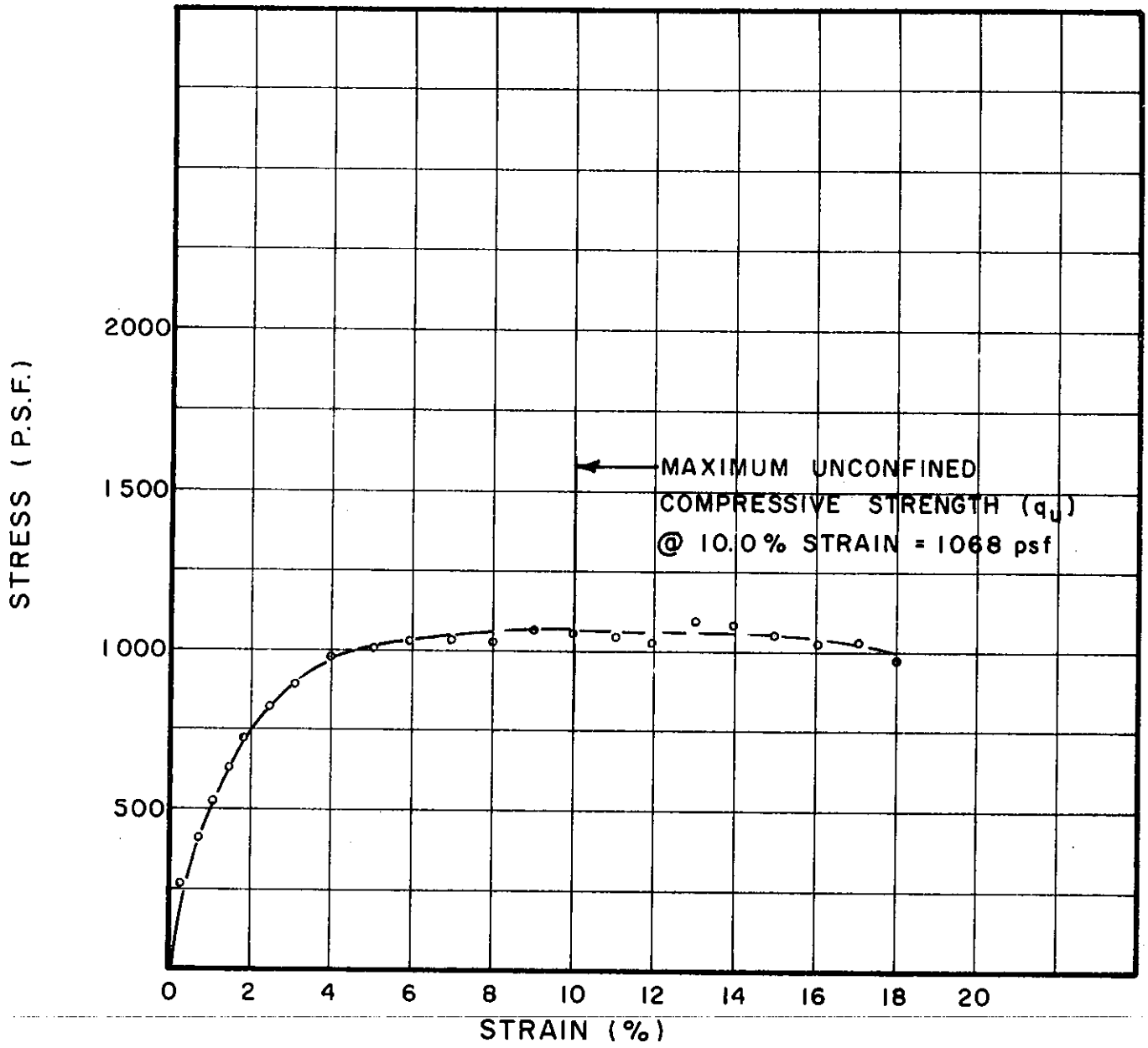
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U37.1	1.41	3.47	.259	26.4	99	34	20	SILTY CLAY, SANDY (CL)

BORING NO. 41

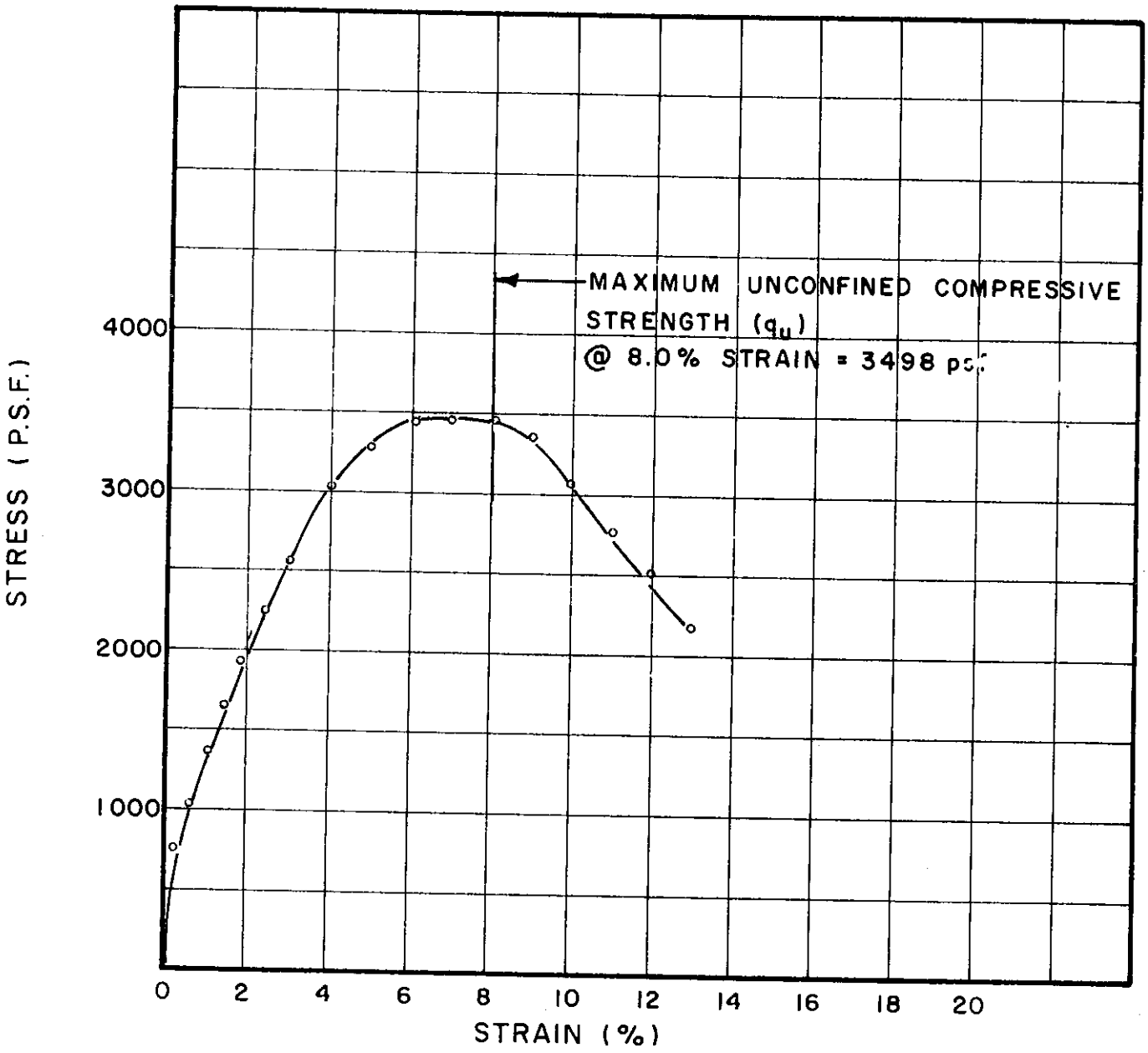
SAMPLE NO. 23

DEPTH 101.8' TO 102.1'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U40.1	1.44	3.13	.29	13.8	124	25	17	CLAYEY SAND (GC-SC)

BORING NO. 41

SAMPLE NO. 29

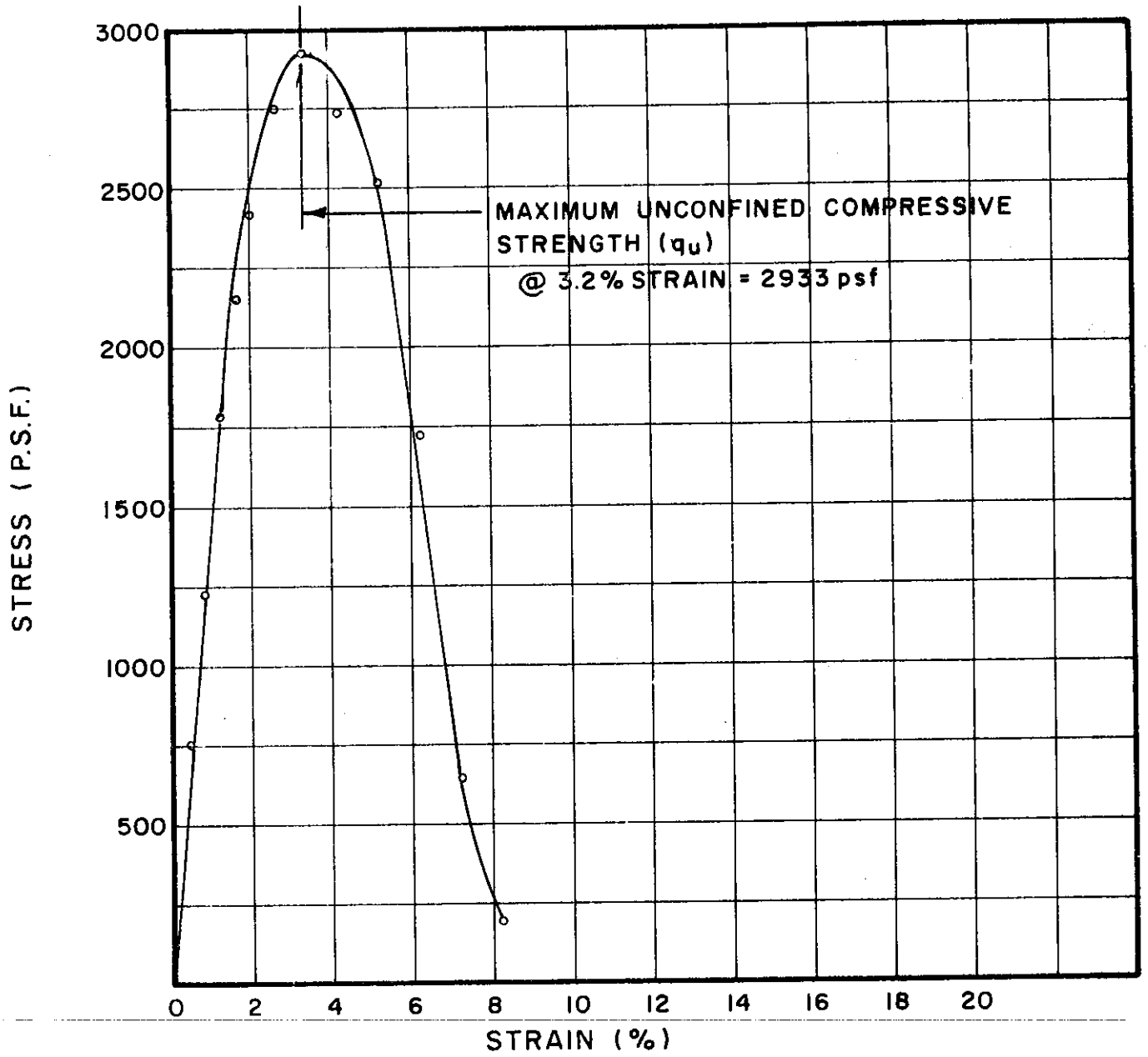
DEPTH 130.7' TO 131.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U198.1	1.43	3.50	.257	27.3	97	63	24	SILTY CLAY (CH)

BORING NO. 48

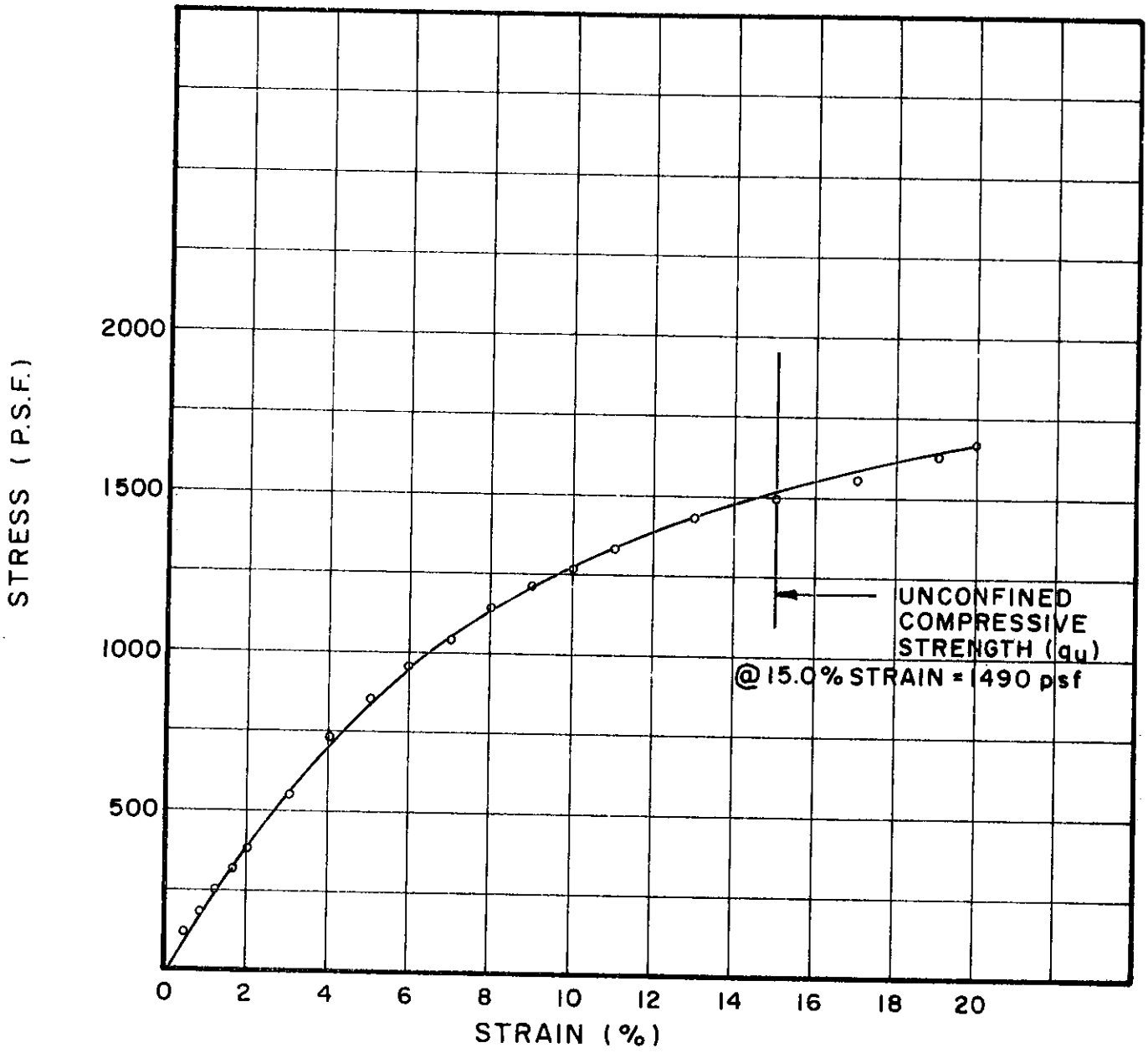
SAMPLE NO. 2

DEPTH 3.2' TO 3.5'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U204.1	1.41	3.41	.264	25.2	100	34	16	SILTY CLAY, SANDY (CL)

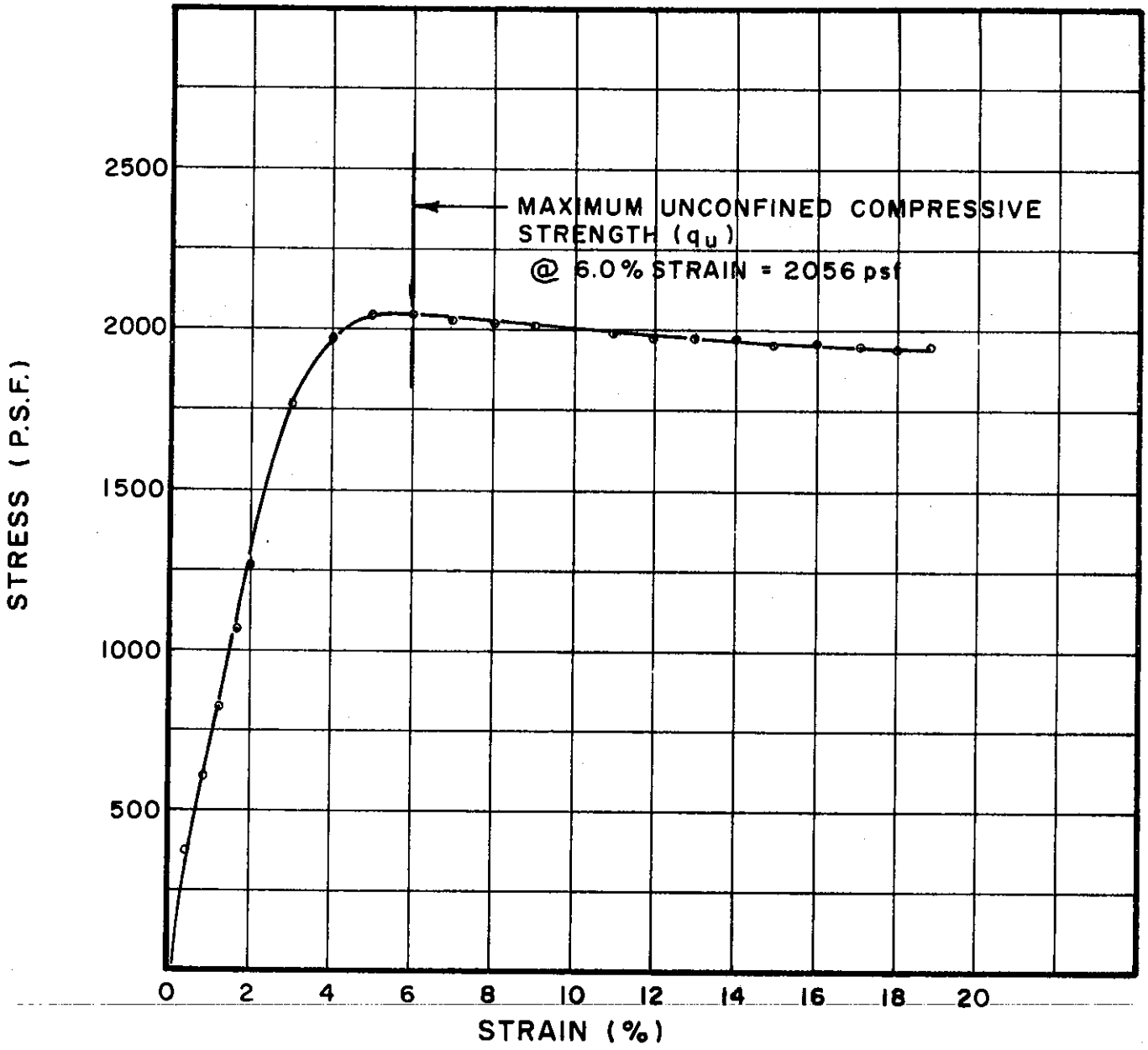
BORING NO. 48

SAMPLE NO. 14

DEPTH 61.2' TO 61.5'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U134.1	1.41	3.51	.256	34.0	90	42	22	SILTY CLAY (CL)

BORING NO. 49

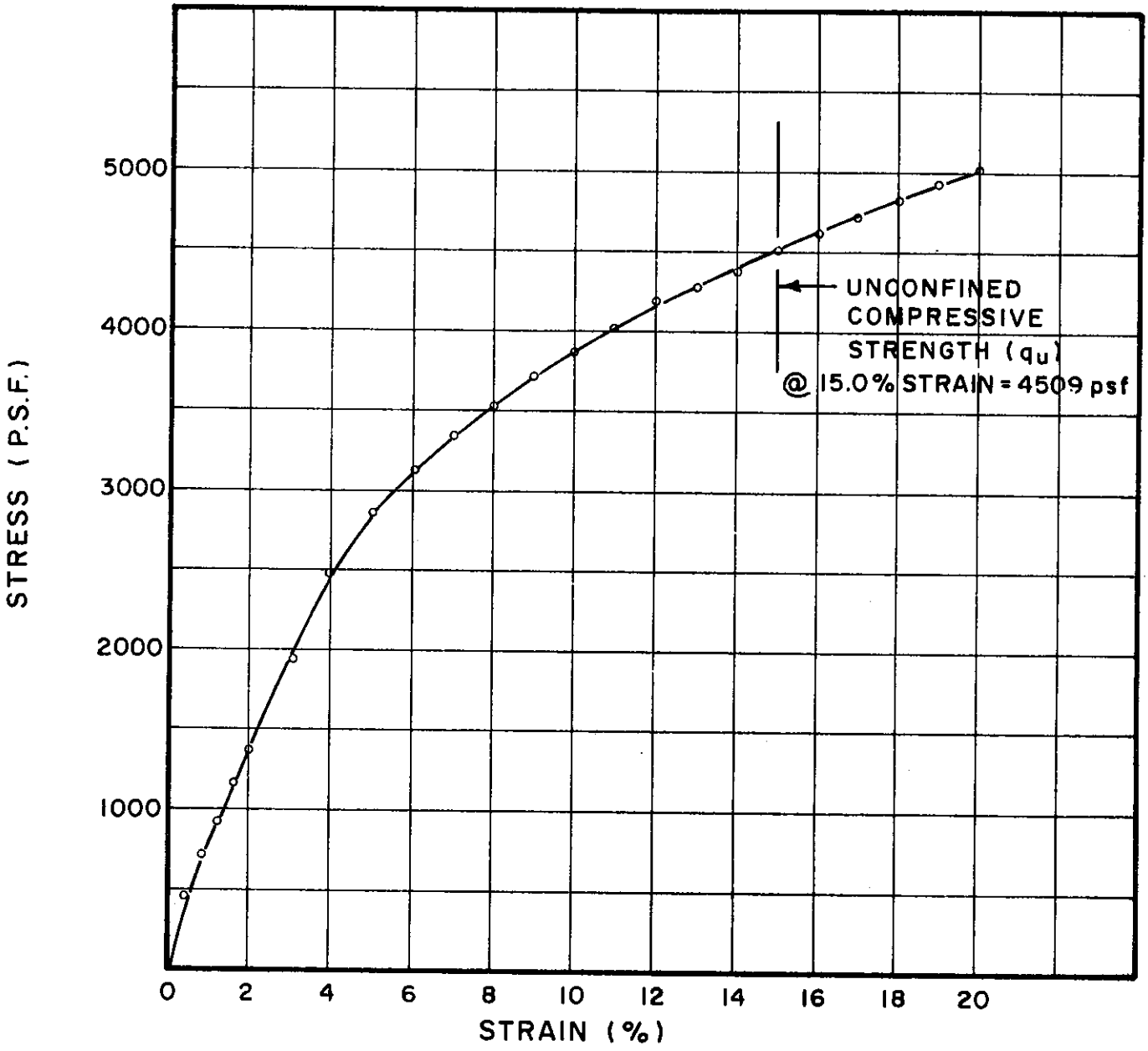
SAMPLE NO. 4

DEPTH 24.0' TO 24.3'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U139.1	1.41	3.36	.268	25.6	100	33	22	SILTY CLAY; SANDY
								(CL)

BORING NO. 49

SAMPLE NO. 9

DEPTH 73.9' TO 74.3'

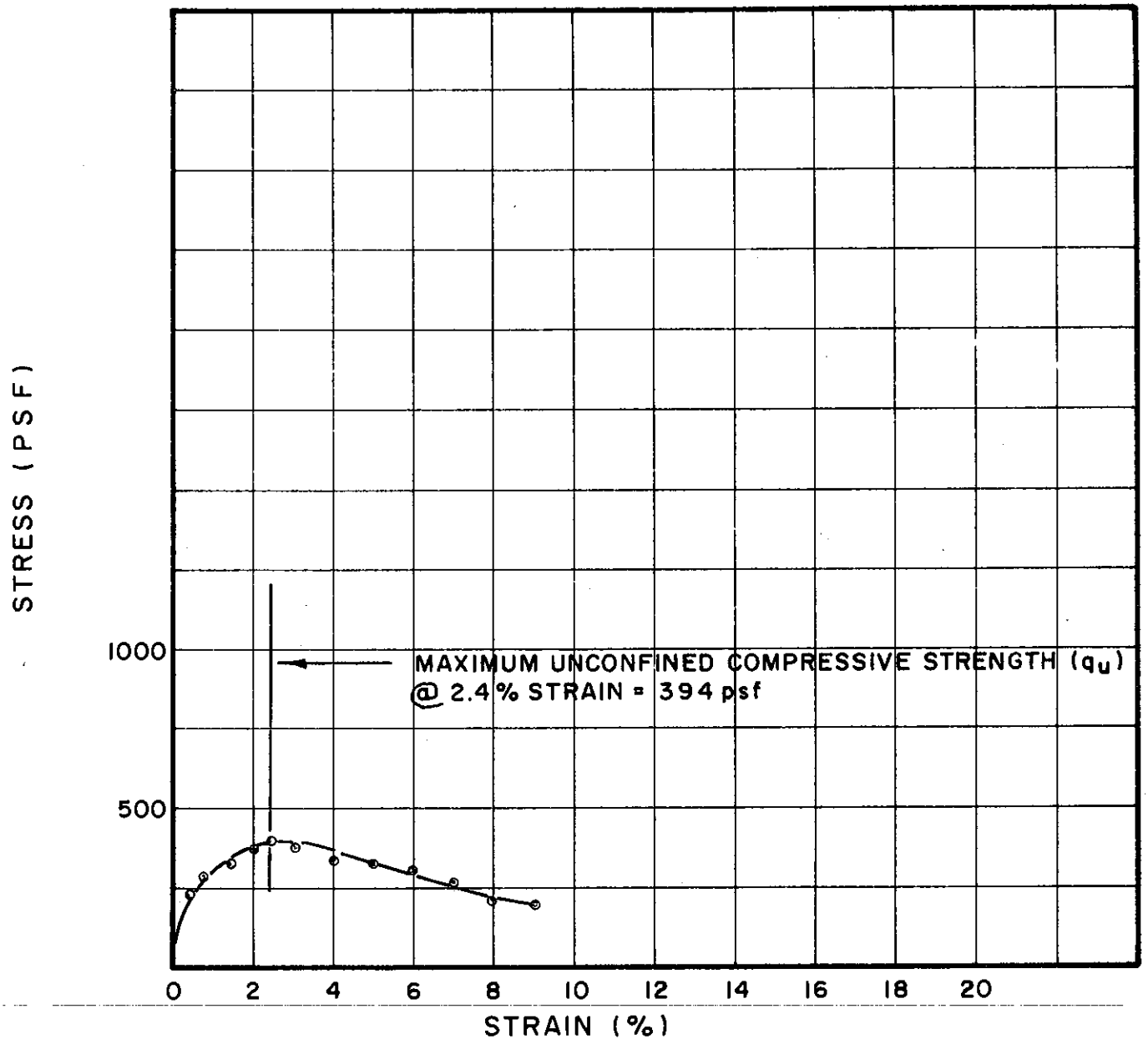
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-295

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U85.1	1.39	3.21	.25	45.8	75	51	18	SILTY CLAY (CH-CL)

BORING NO. 50

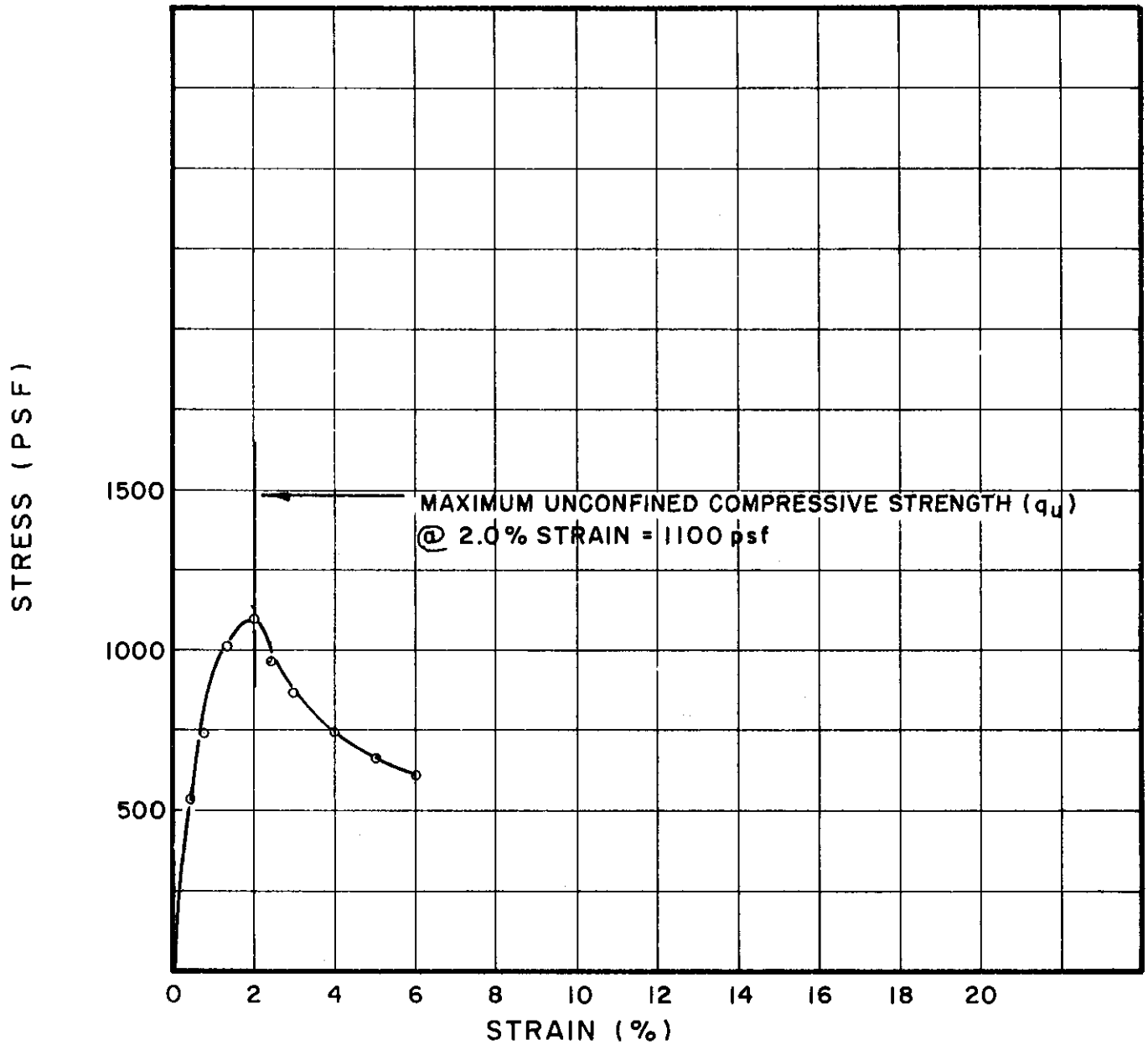
SAMPLE NO. 6

DEPTH 29.3' TO 29.7'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U86.1	1.40	3.27	0.25	51.3	70	55	23	SILTY CLAY (CH)

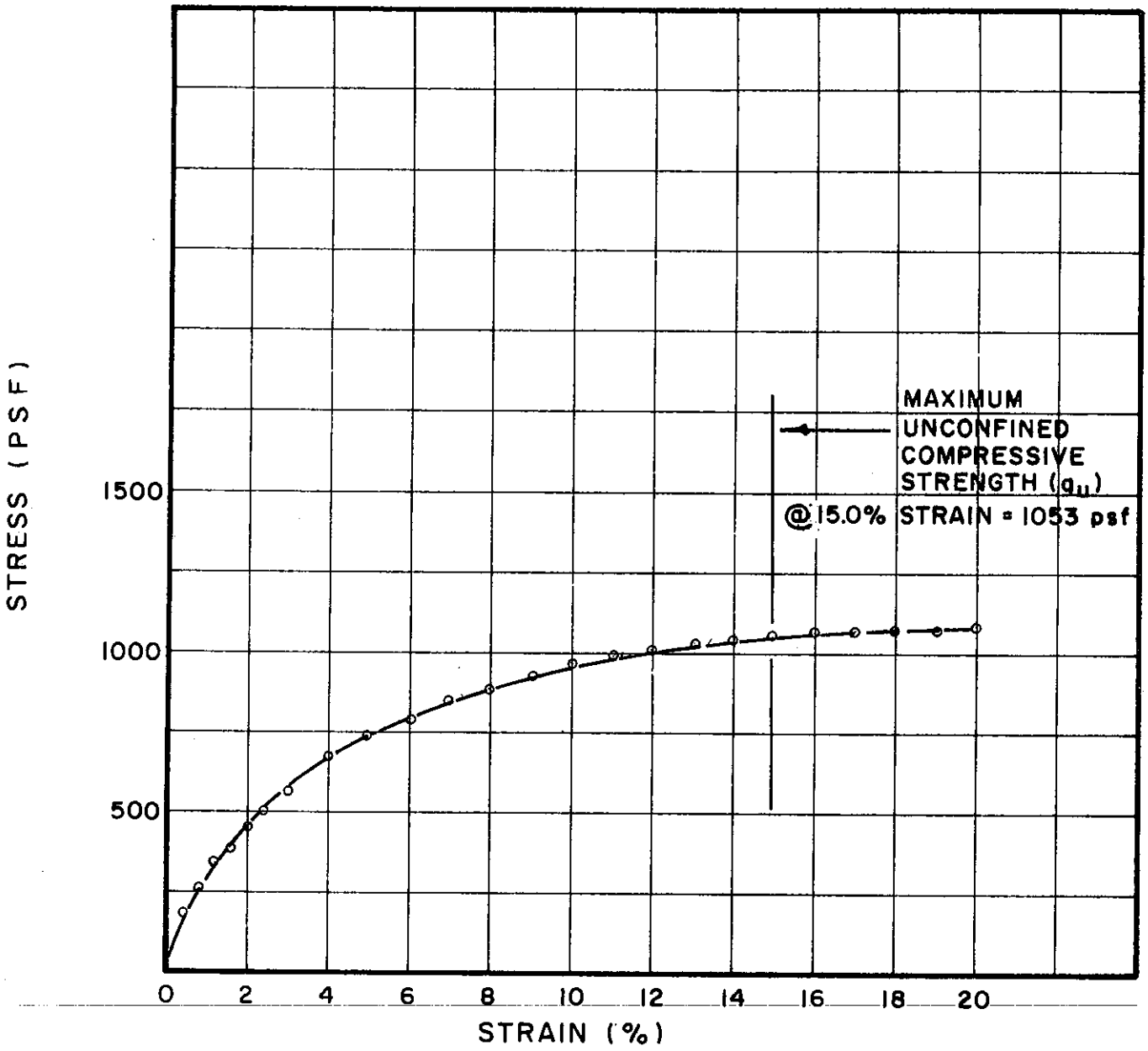
BORING NO. 50

SAMPLE NO. 8

DEPTH 38.9' TO 39.2'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U87.1	1.40	3.25	.25	23.6	99	36	16	SILTY CLAY, SANDY (CL)

BORING NO. 50

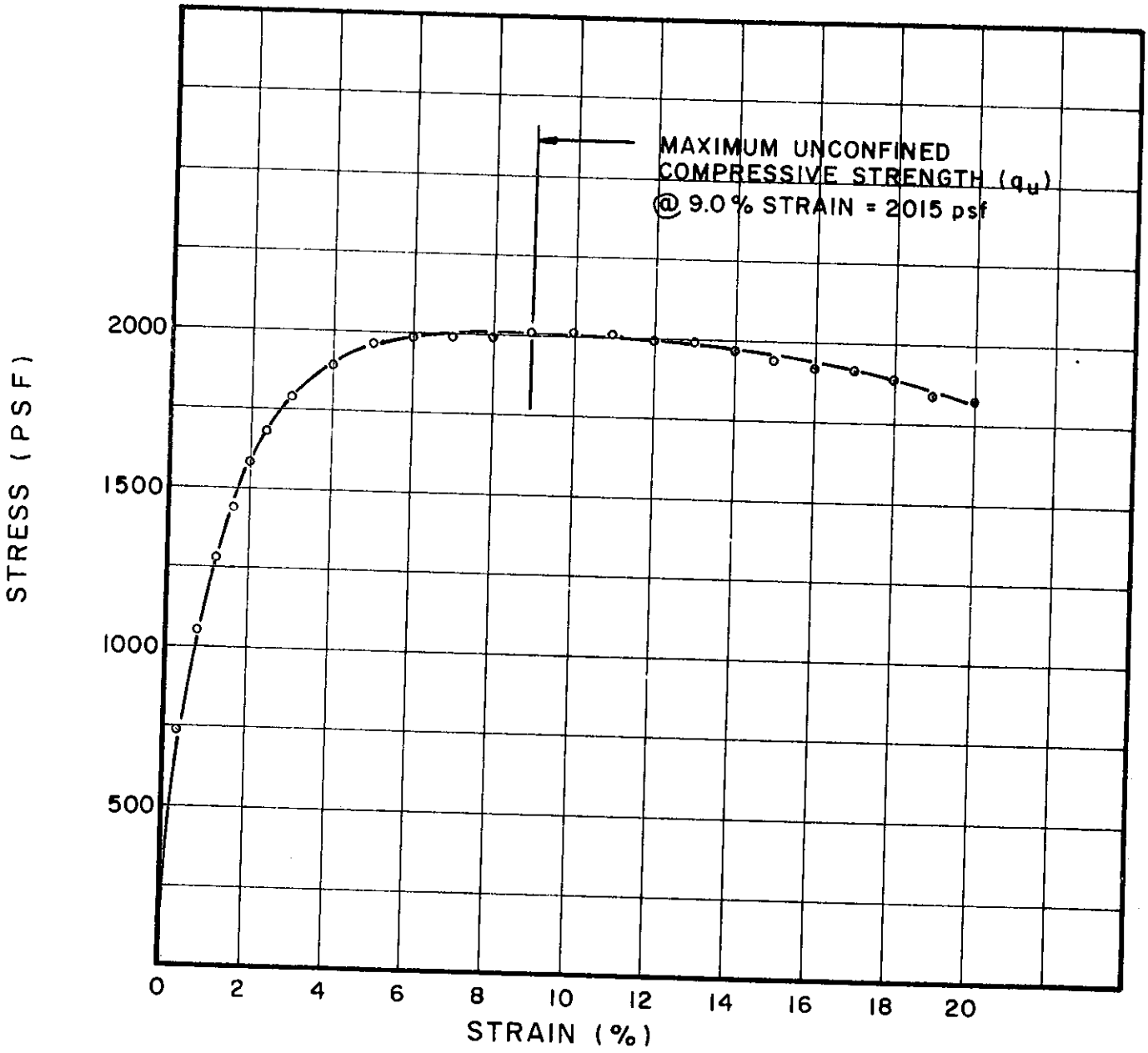
SAMPLE NO. 10

DEPTH 49.0' TO 49.3'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U88.1	1.38	3.20	.25	25.8	99	39	18	SILTY CLAY (CL)

BORING NO. 50

SAMPLE NO. 12

DEPTH 58.6' - 58.9'

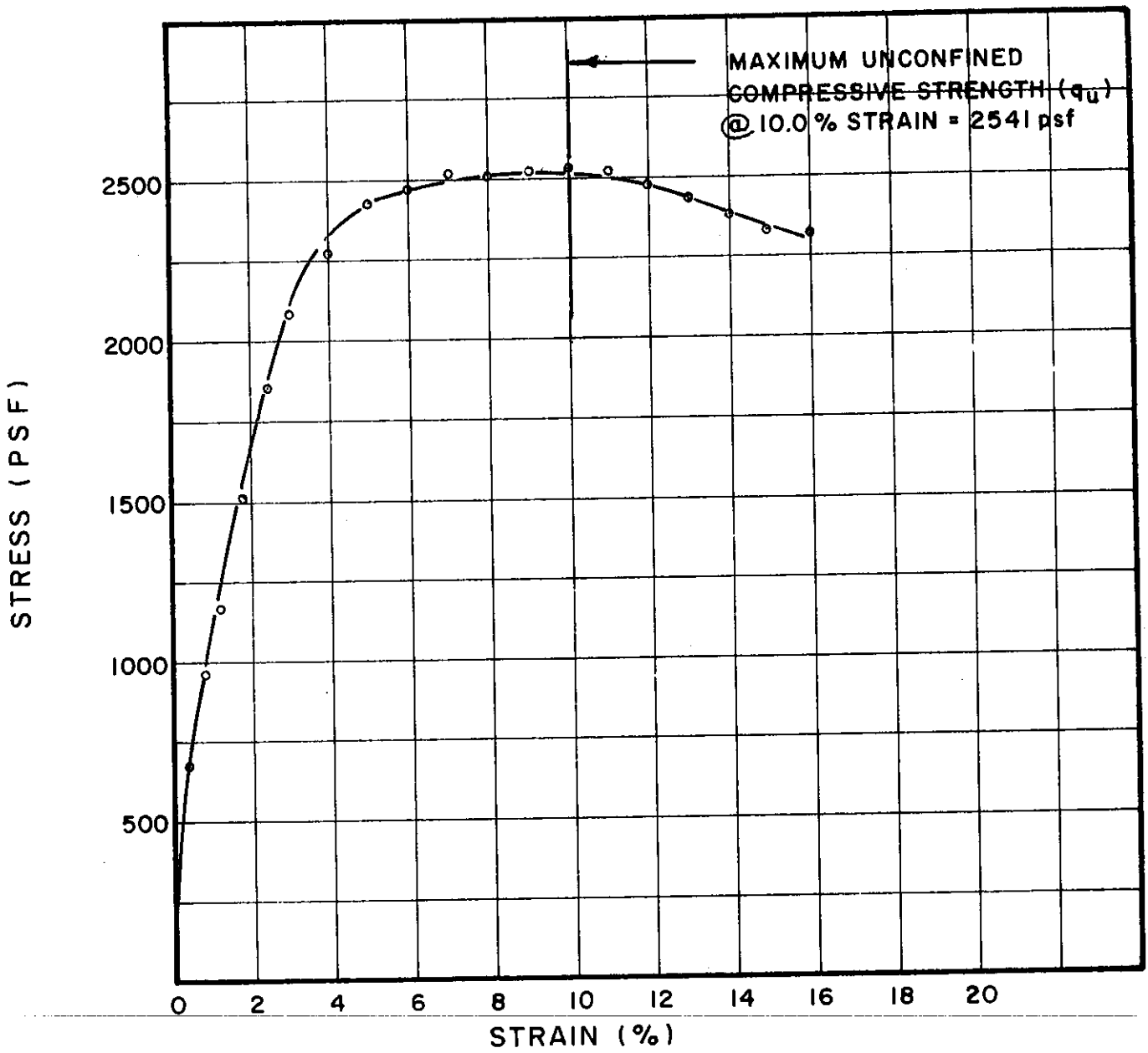
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-299

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U90.1	1.39	3.20	.25	27.9	95	39	20	SILTY CLAY (CL)

BORING NO. 50

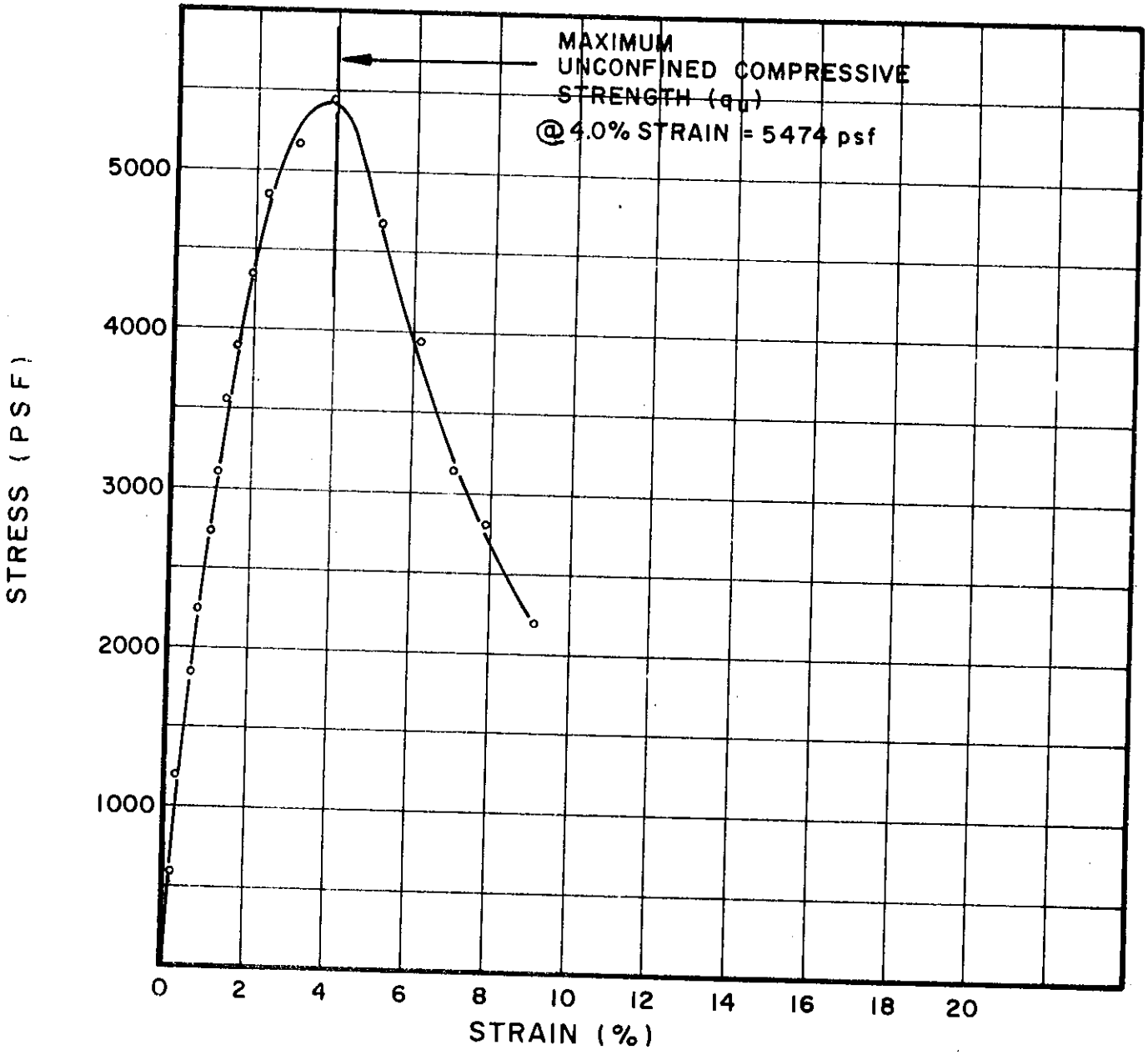
SAMPLE NO. 16

DEPTH 78.6' - 78.9'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U108.1	1.37	3.48	.25	30.3	92	49	20	SILTY CLAY (CL-CH)

BORING NO. 52

SAMPLE NO. 3

DEPTH 20.5' - 20.9'

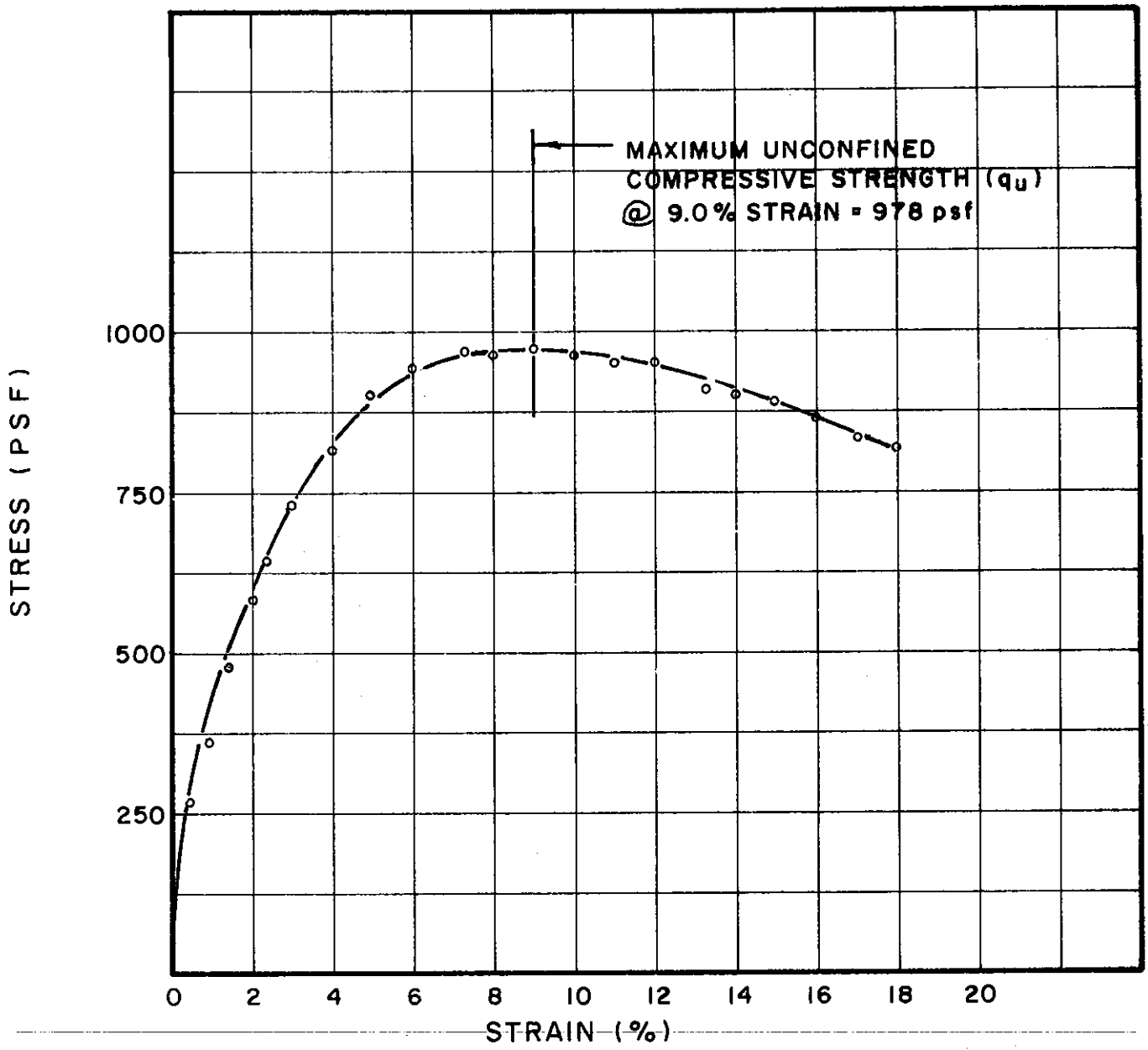
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-301

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U109.1	1.37	3.25	.25	31.8	94	35	18	SILTY CLAY (CL)

BORING NO. 52

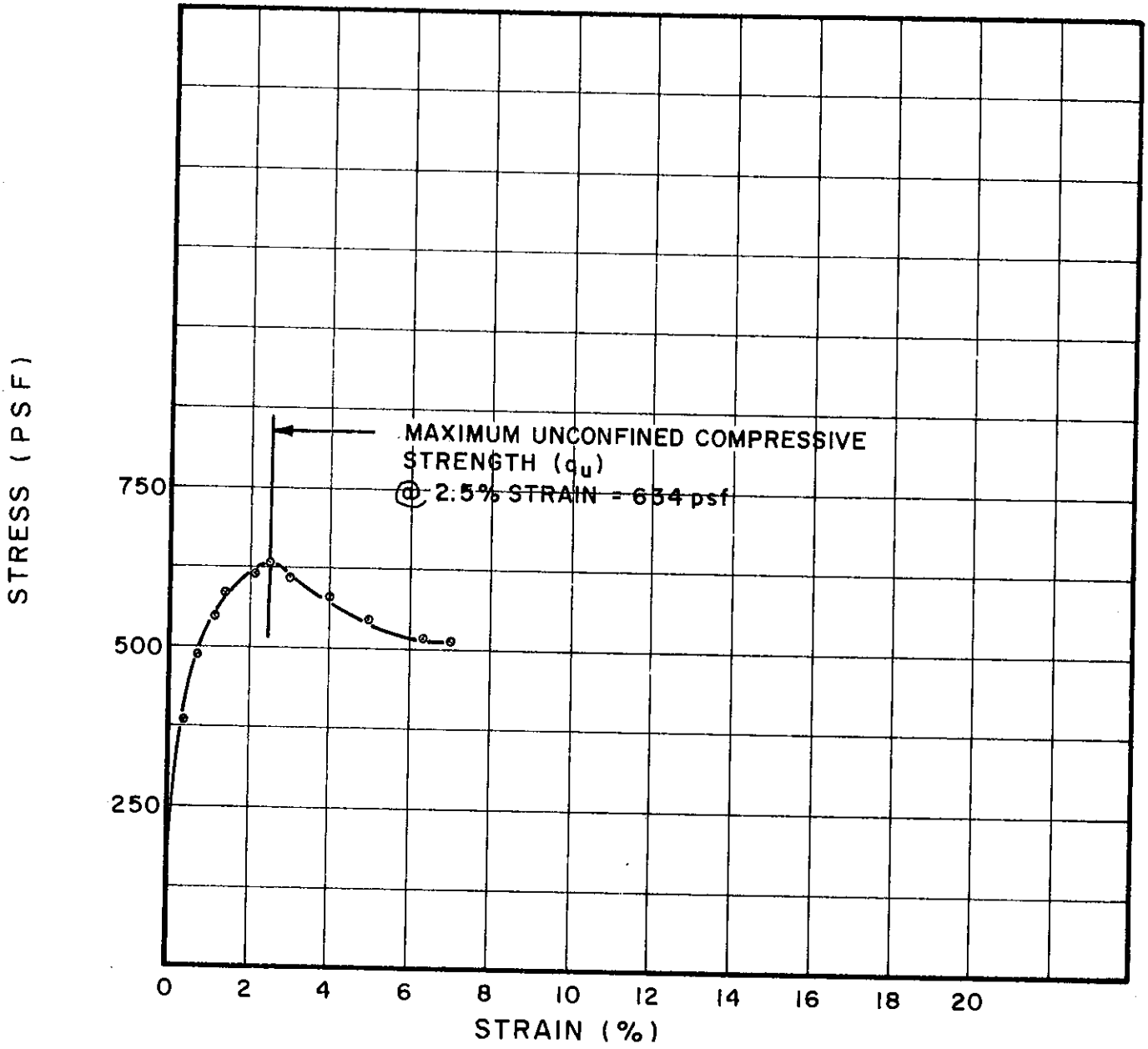
SAMPLE NO. 4

DEPTH 28.6' TO 28.9'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U111.1	1.38	3.02	.29	25.2	100	22	18	SILTY CLAY (CL-ML)

BORING NO. 52

SAMPLE NO. 6

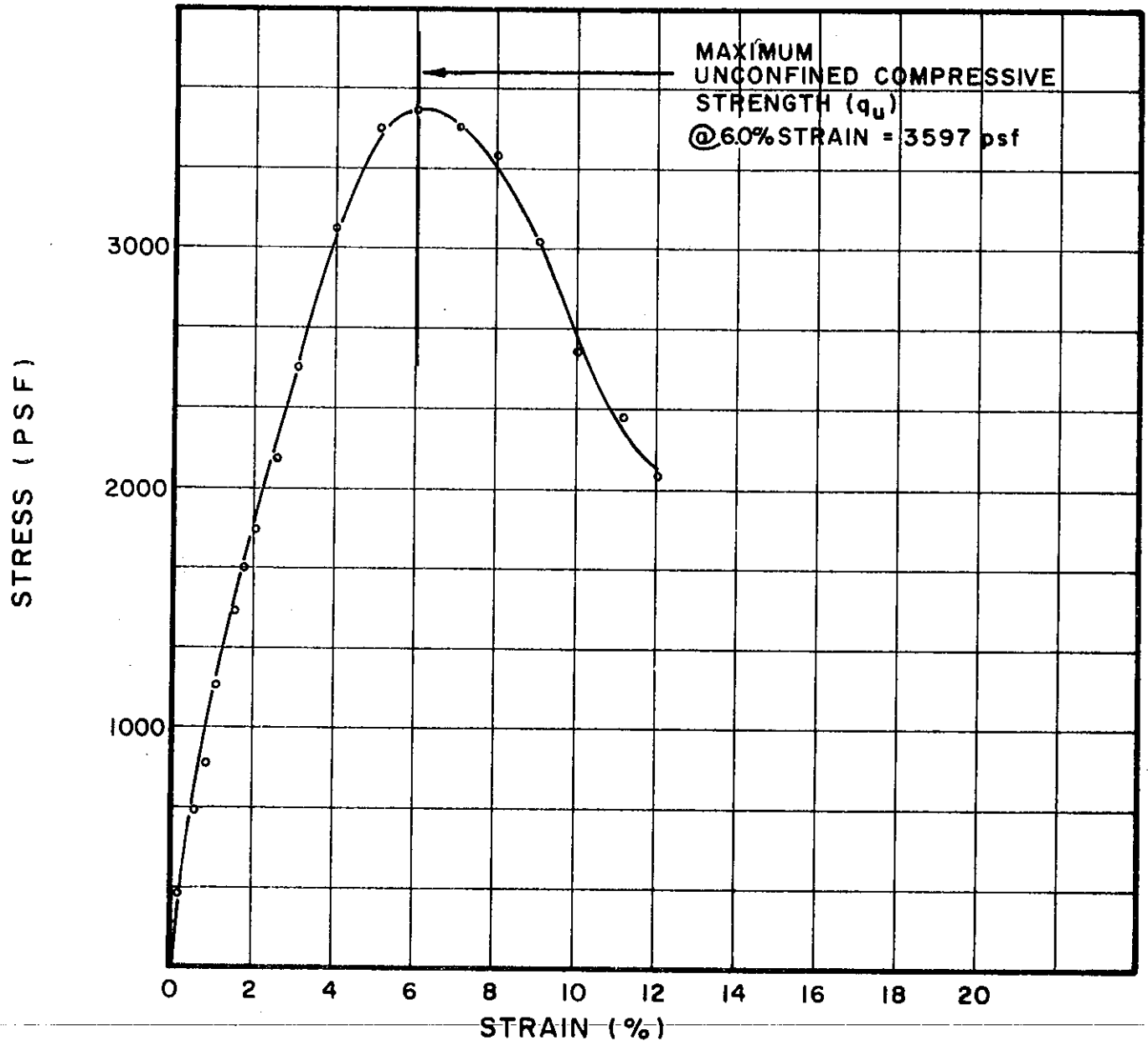
DEPTH 49.2' - 49.5'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-303

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U112.1	1.36	3.37	.25	13.0	116	23	14	SILTY CLAY, SANDY
								(CL)

BORING NO. 52

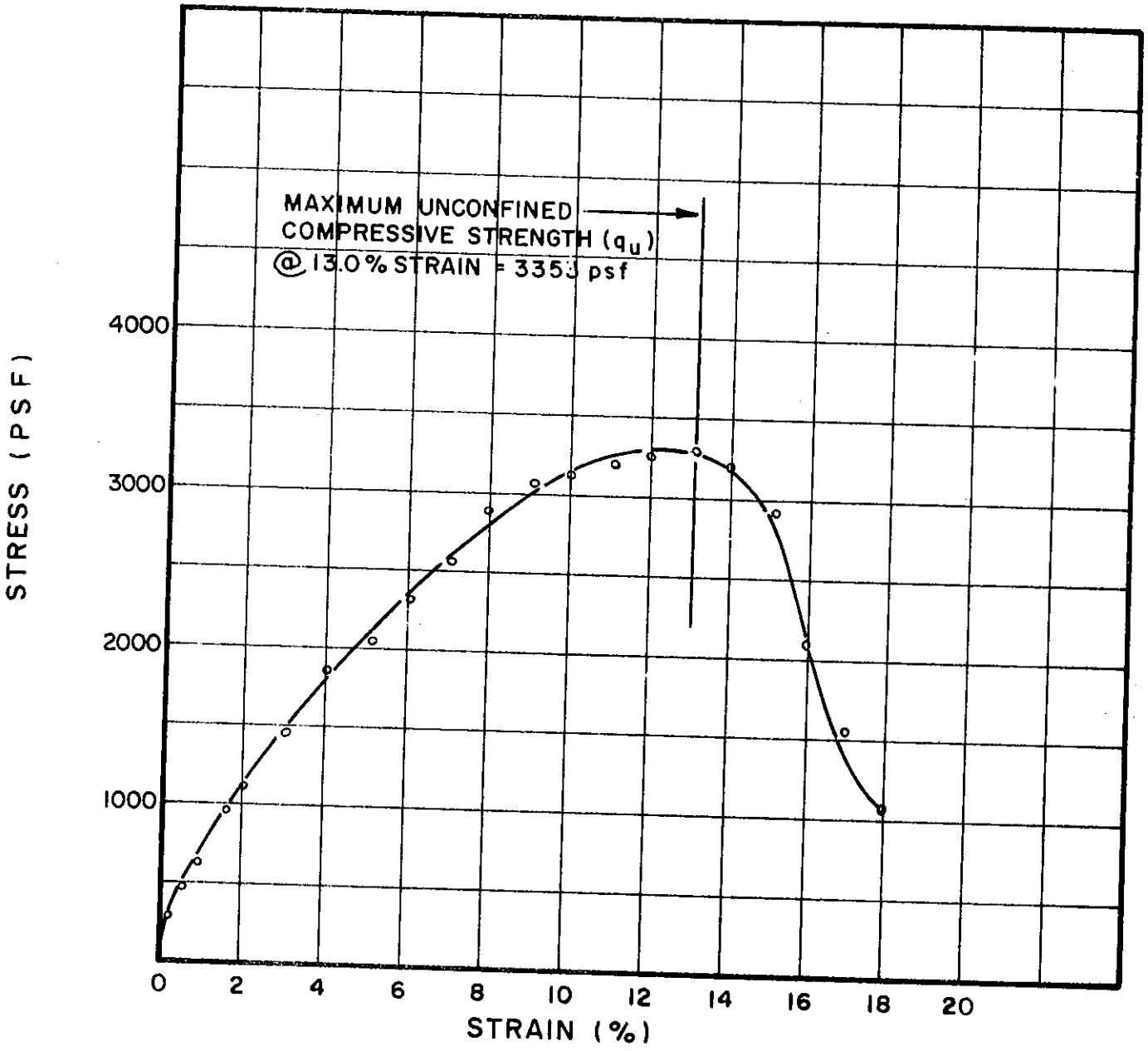
SAMPLE NO. 7

DEPTH 59.0' - 59.3'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U113.1	1.34	3.50	.25	14.2	115	24	14	SILTY CLAY, SANDY
								(CL)

BORING NO. 52

SAMPLE NO. 8

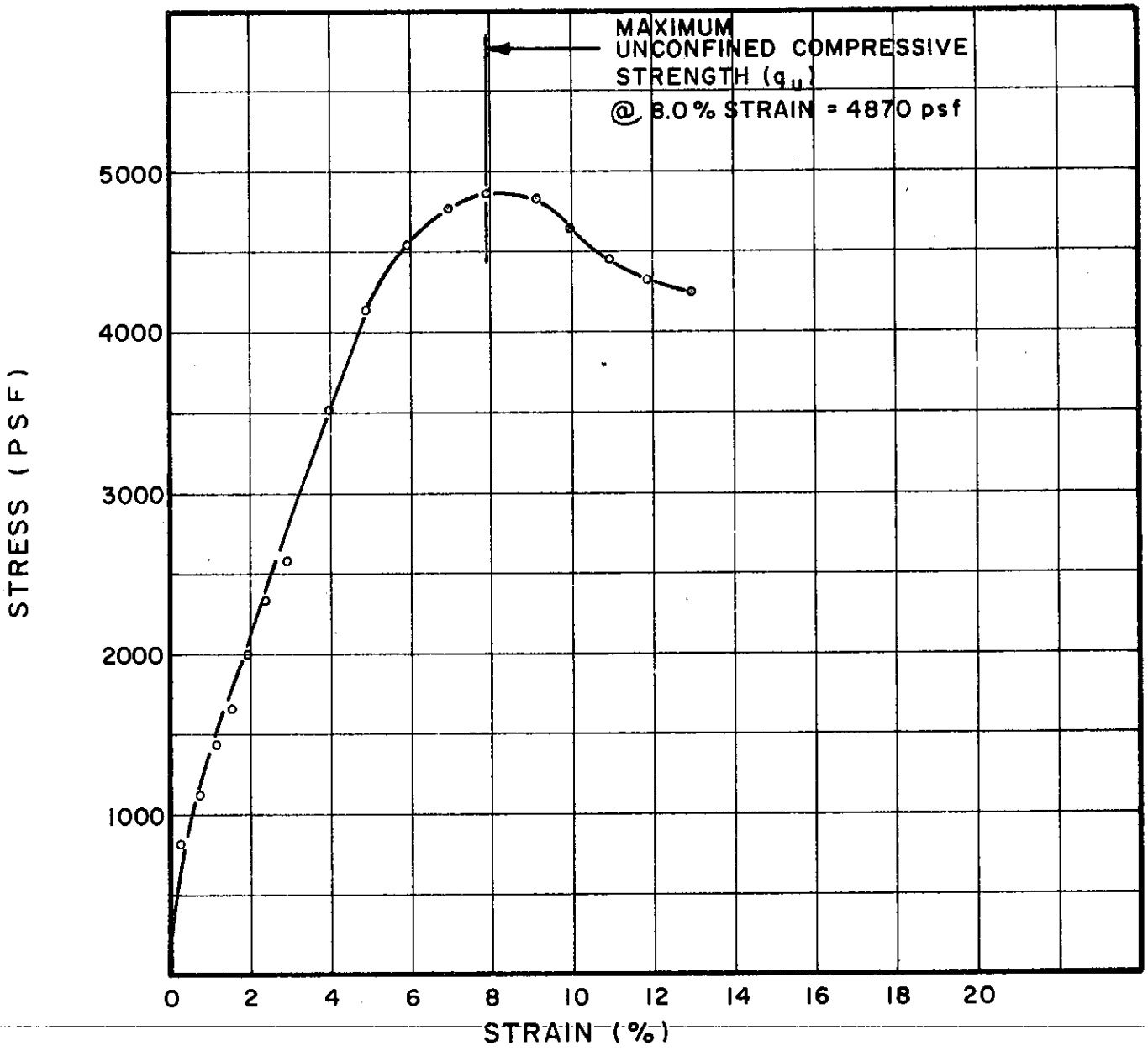
DEPTH 68.2' TO 68.5'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U115.1	1.39	3.27	.28	27.2	97	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52

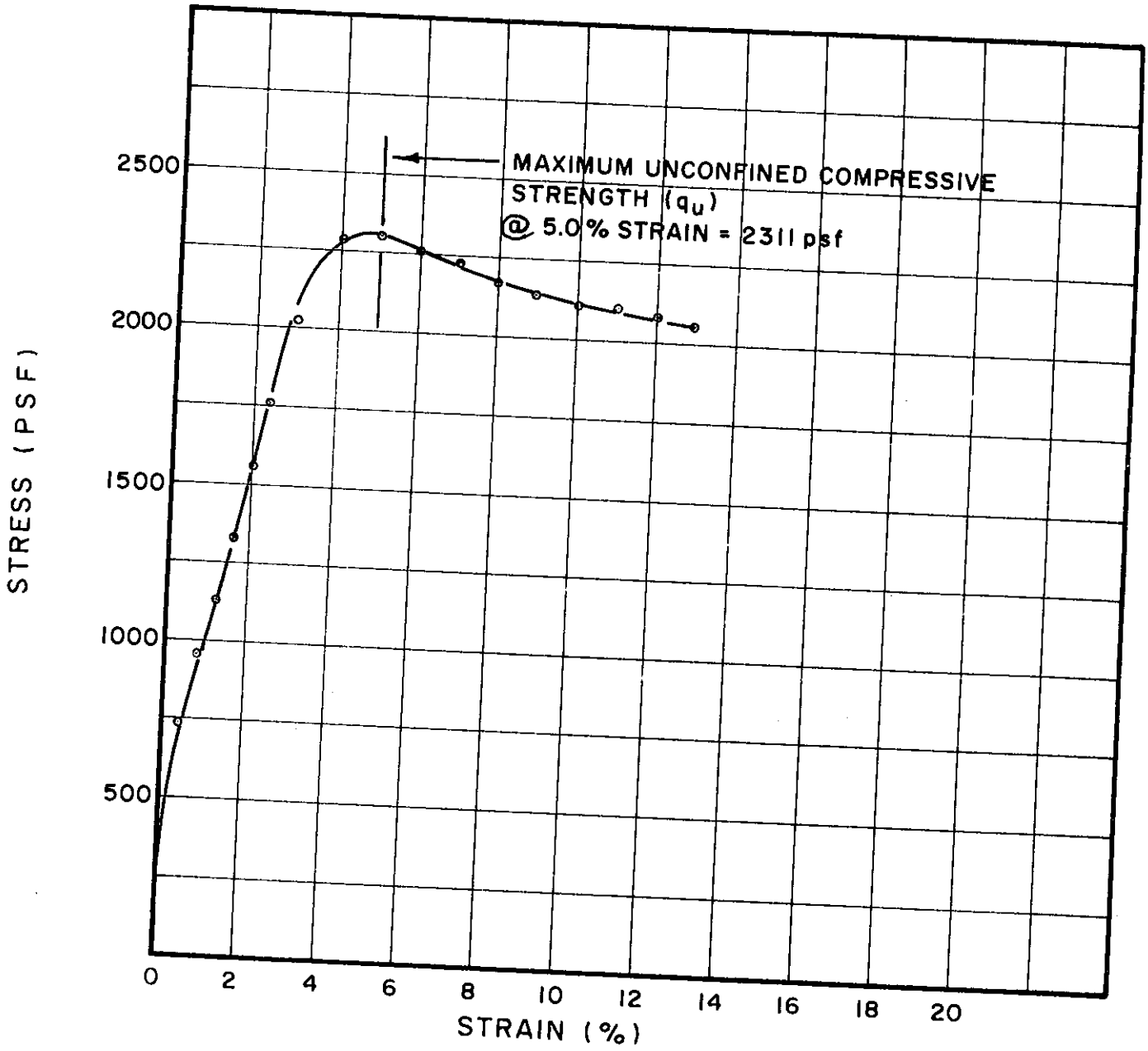
SAMPLE NO. 10

DEPTH 88.6' - 88.9'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U96.1	1.40	3.20	.25	31.8	88	49	20	SILTY CLAY (CL-CH)

BORING NO. 53

SAMPLE NO. 3

DEPTH 19.6' TO 19.9'

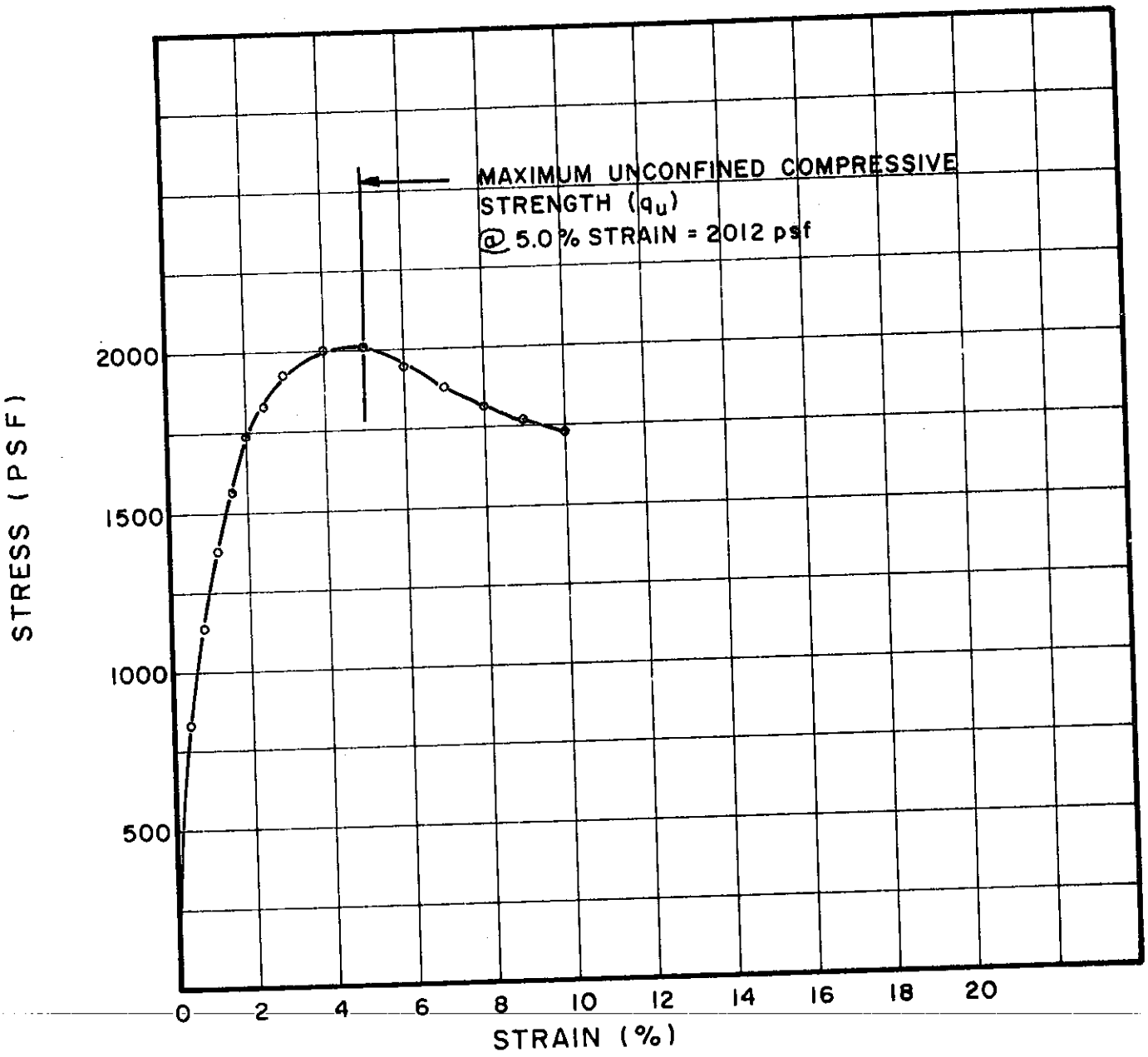
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-307

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	
U97.1	1.38	3.24	.25	40.7	80	49	22	SILTY CLAY (CL-CH)

BORING NO. 53

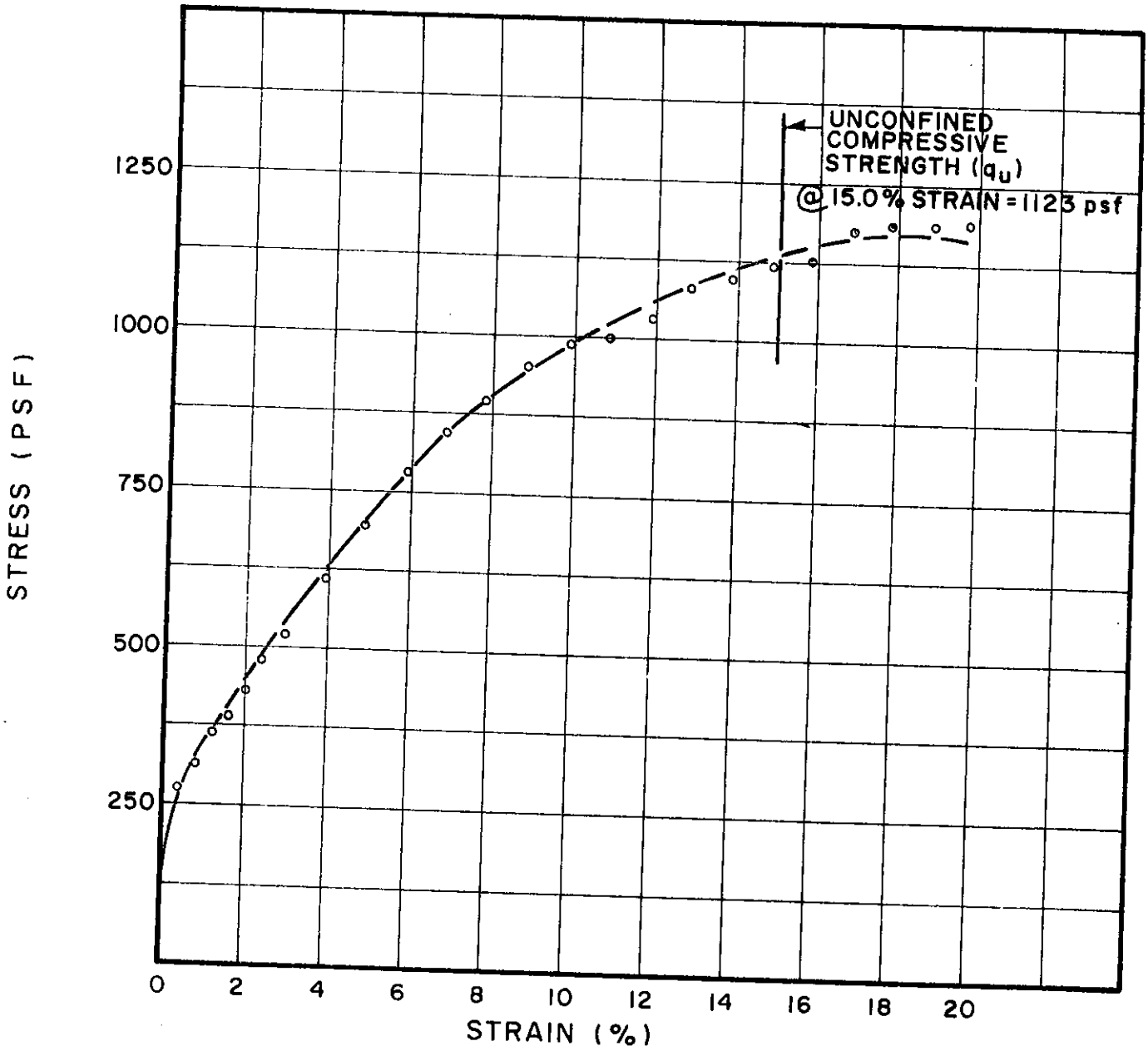
SAMPLE NO. 4

DEPTH 29.6' - 29.9'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U99.1	1.37	3.17	.25	27.9	94	43	18	SILTY CLAY (CL)

BORING NO. 53

SAMPLE NO. 6

DEPTH 49.2' TO 49.5'

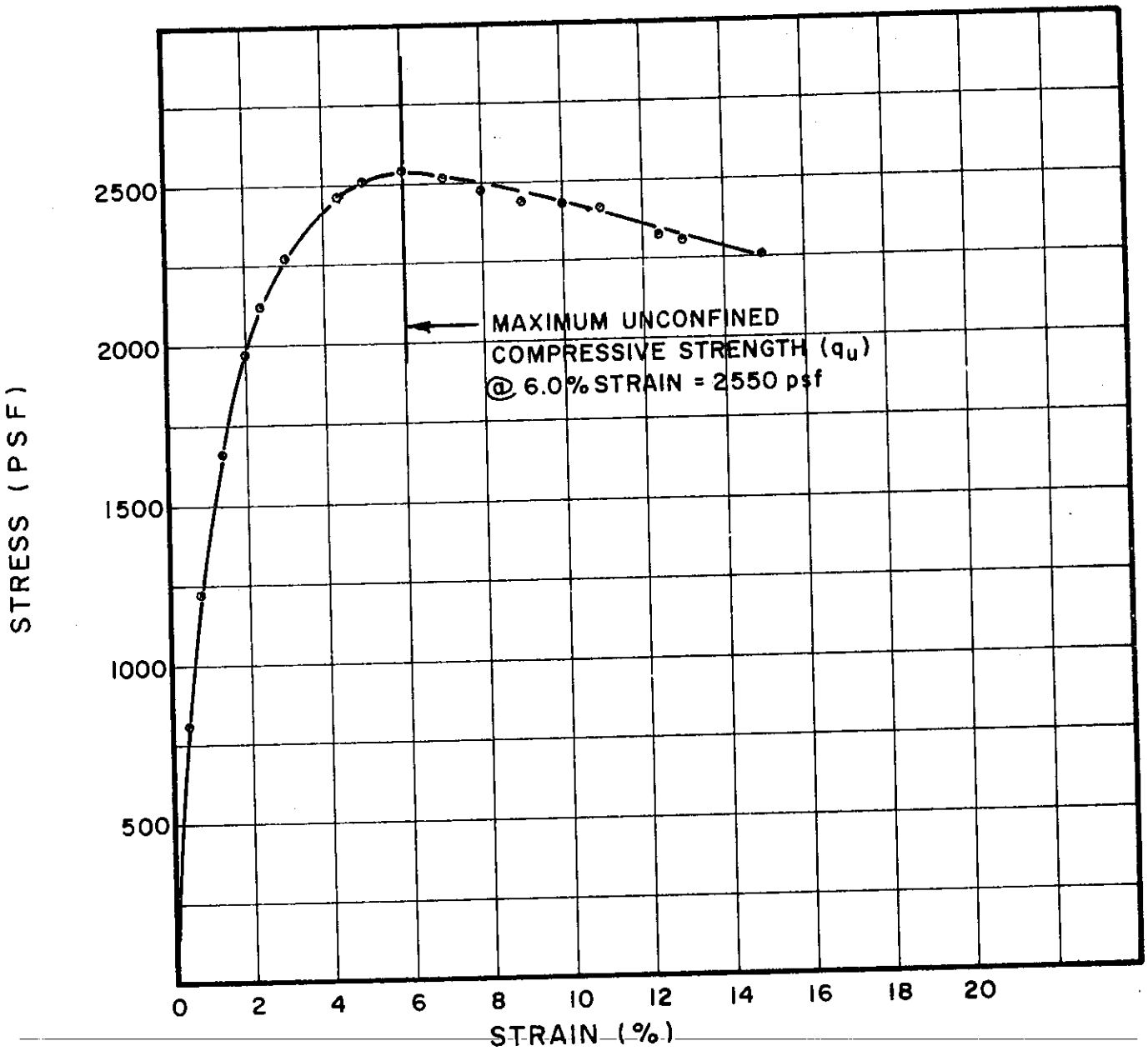
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-309

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	
U101.1	1.40	3.20	.25	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53

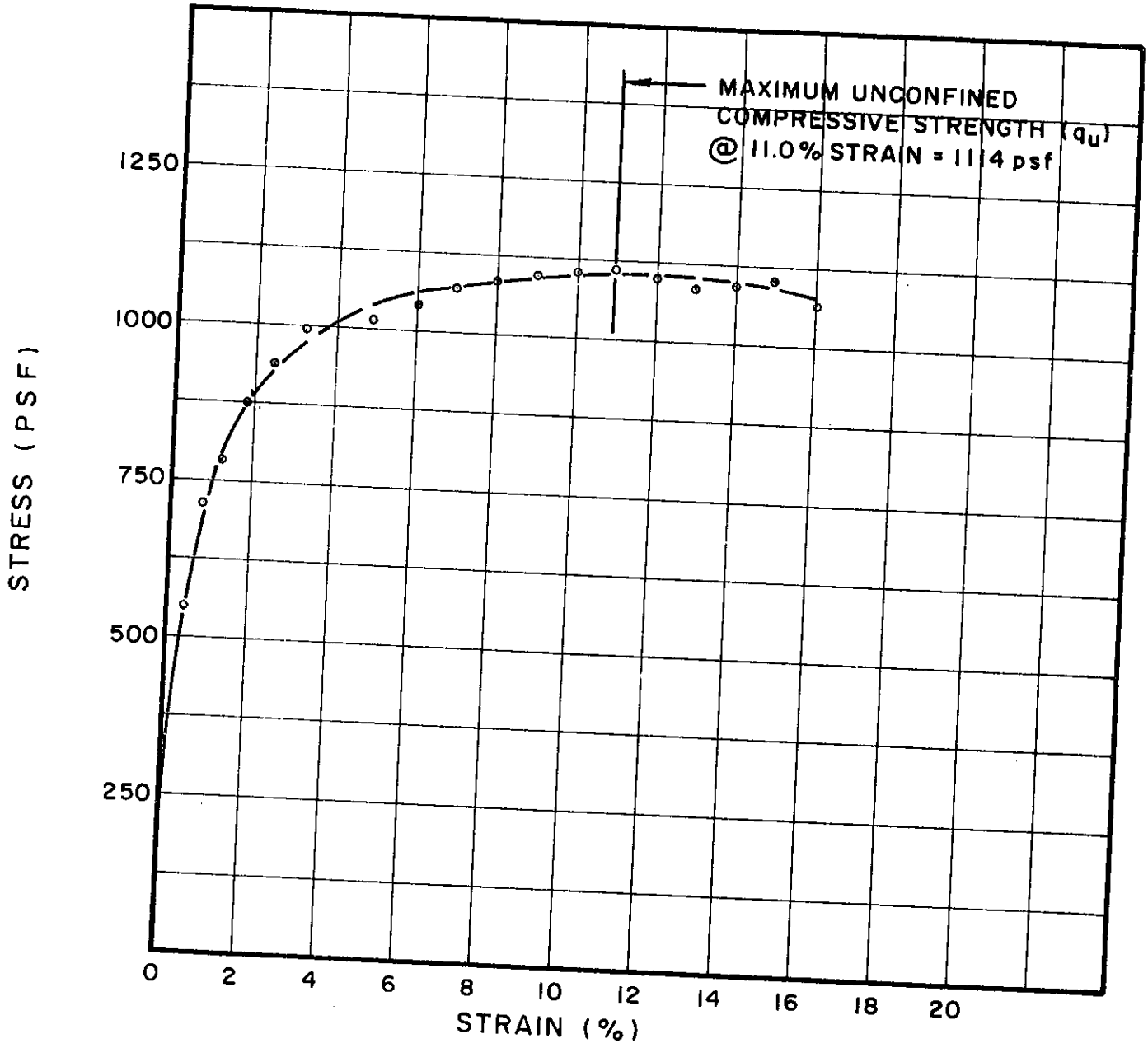
SAMPLE NO. 9

DEPTH 80.1' - 80.4'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U398.1	1.38	3.25	.25	25.8	99	38	17	SILTY CLAY, SANDY (CL)

BORING NO. 54

SAMPLE NO. 5

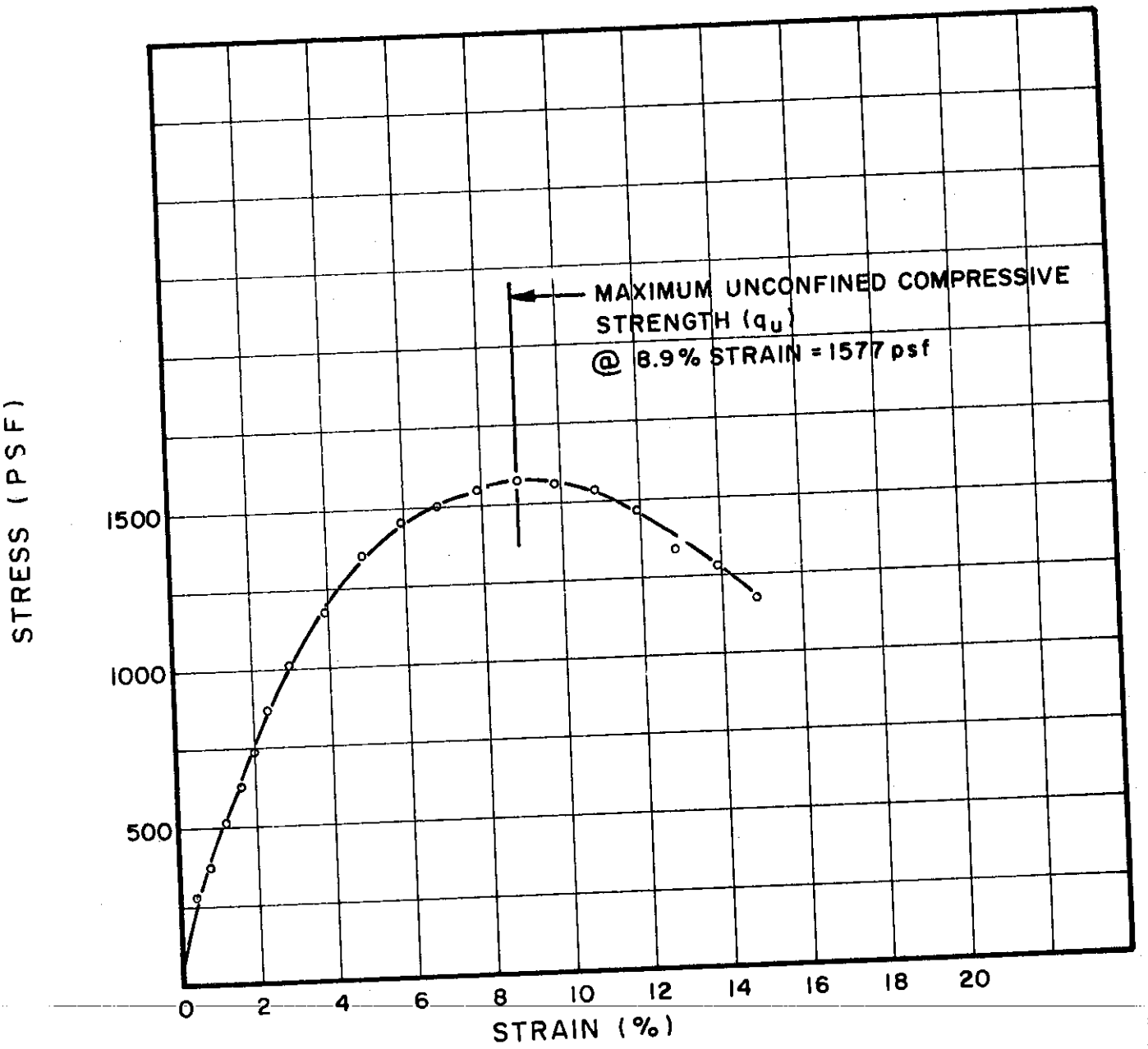
DEPTH 59.3' TO 59.6'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				SOIL DESCRIPTION
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	
U400.1	1.39	3.17	.25	25.9	98	37	18	SILTY CLAY, SANDY (CL)

BORING NO. 54

SAMPLE NO. 7

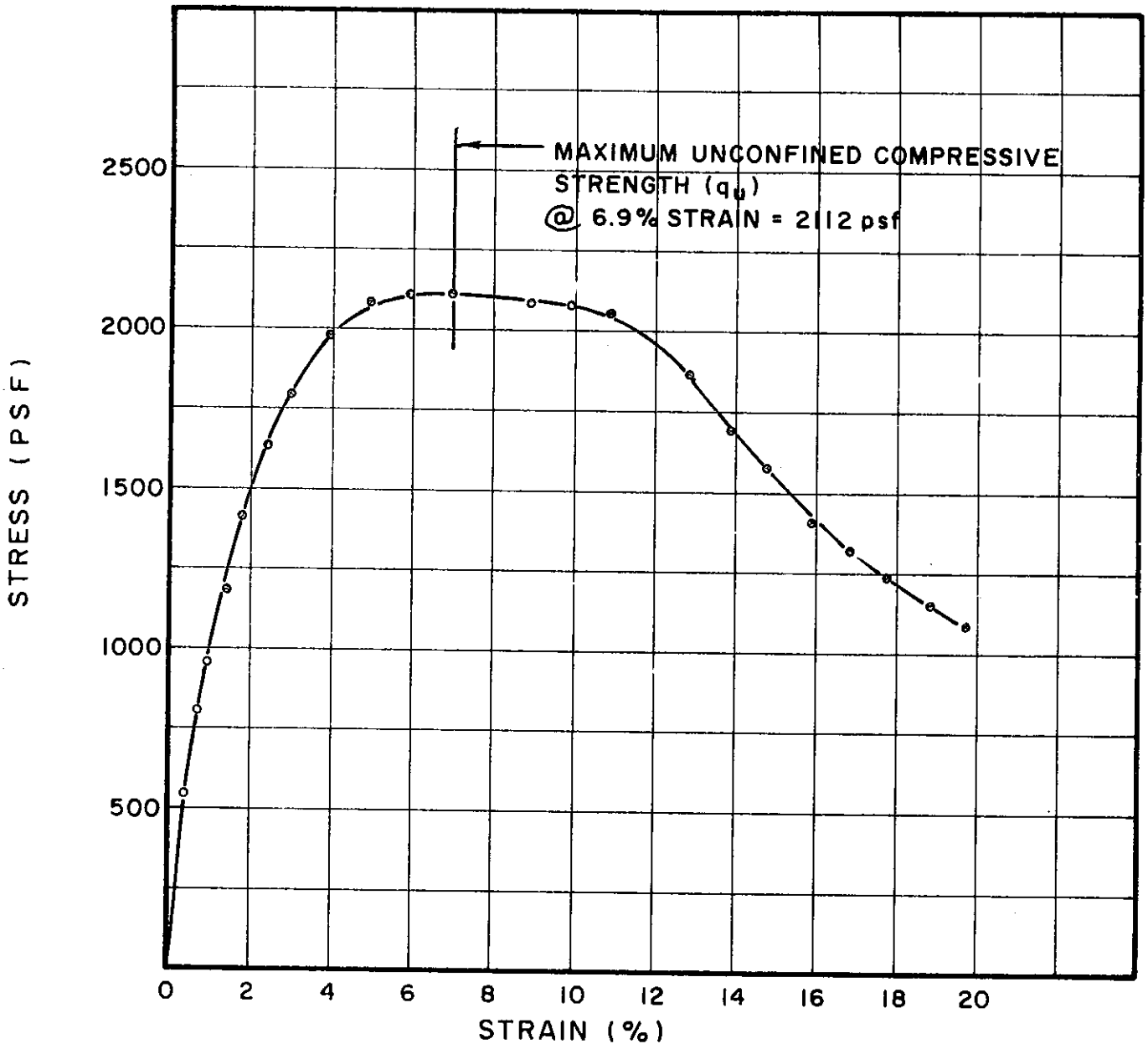
DEPTH 68.5' TO 68.8'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U76.1	1.38	3.22	.25	32.8	90	48	20	SILTY CLAY (CL-CH)

BORING NO. 59

SAMPLE NO. 3

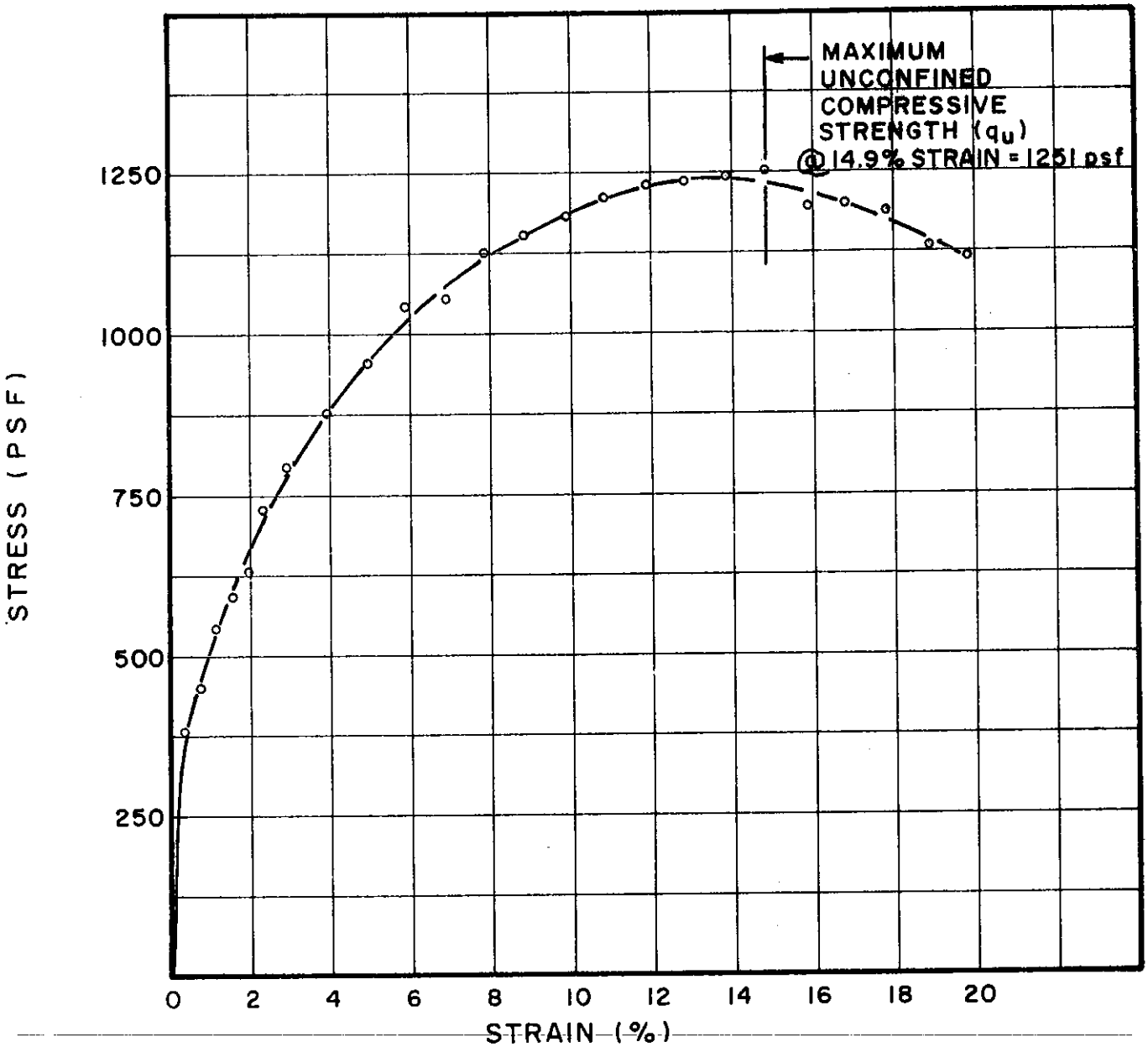
DEPTH 18.8' TO 19.1'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U78.1	1.38	3.27	.25	26.2	99	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

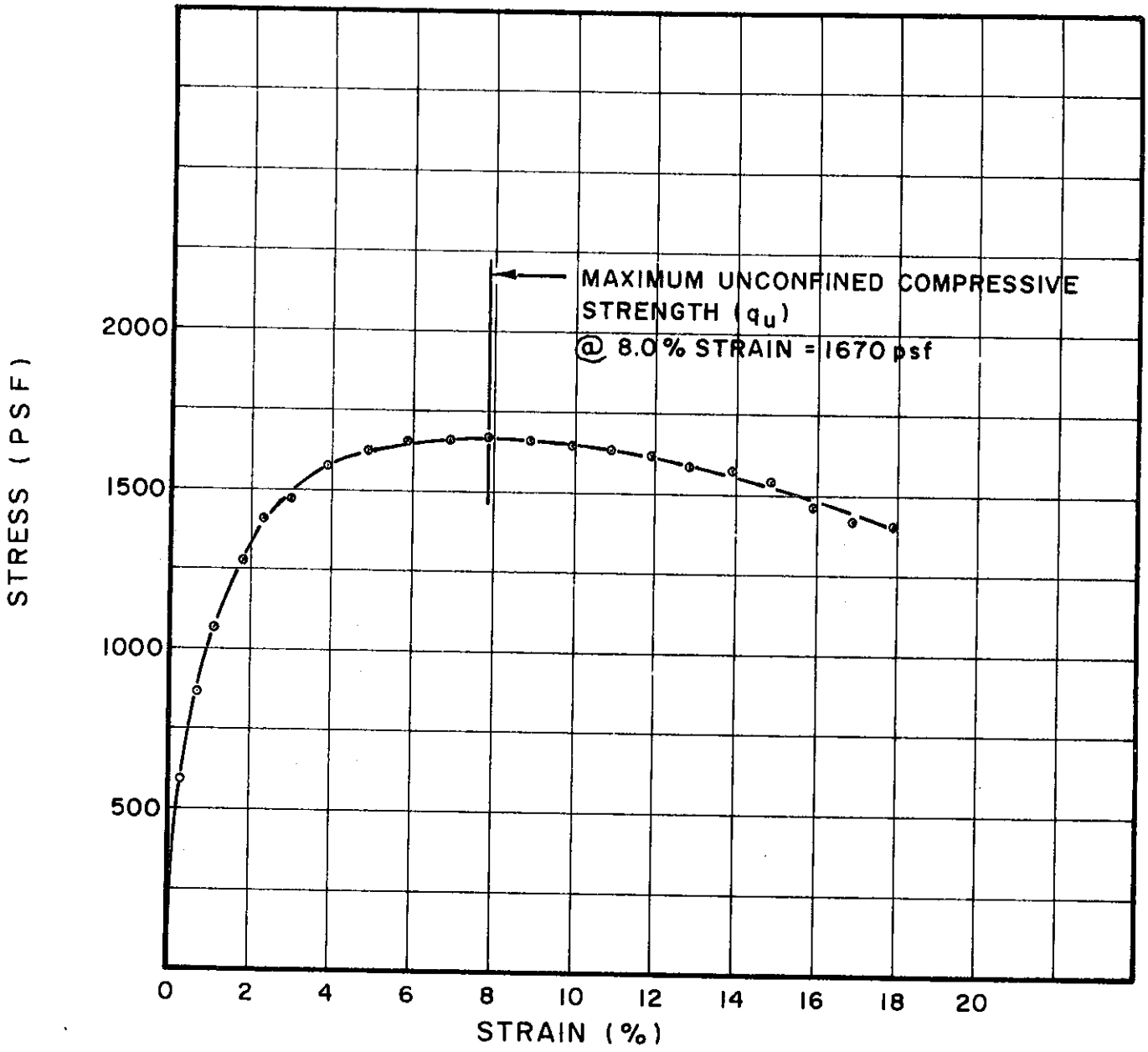
SAMPLE NO. 5

DEPTH 38.7' TO 39.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U80.1	1.38	3.26	.25	26.3	98	36	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

SAMPLE NO. 7

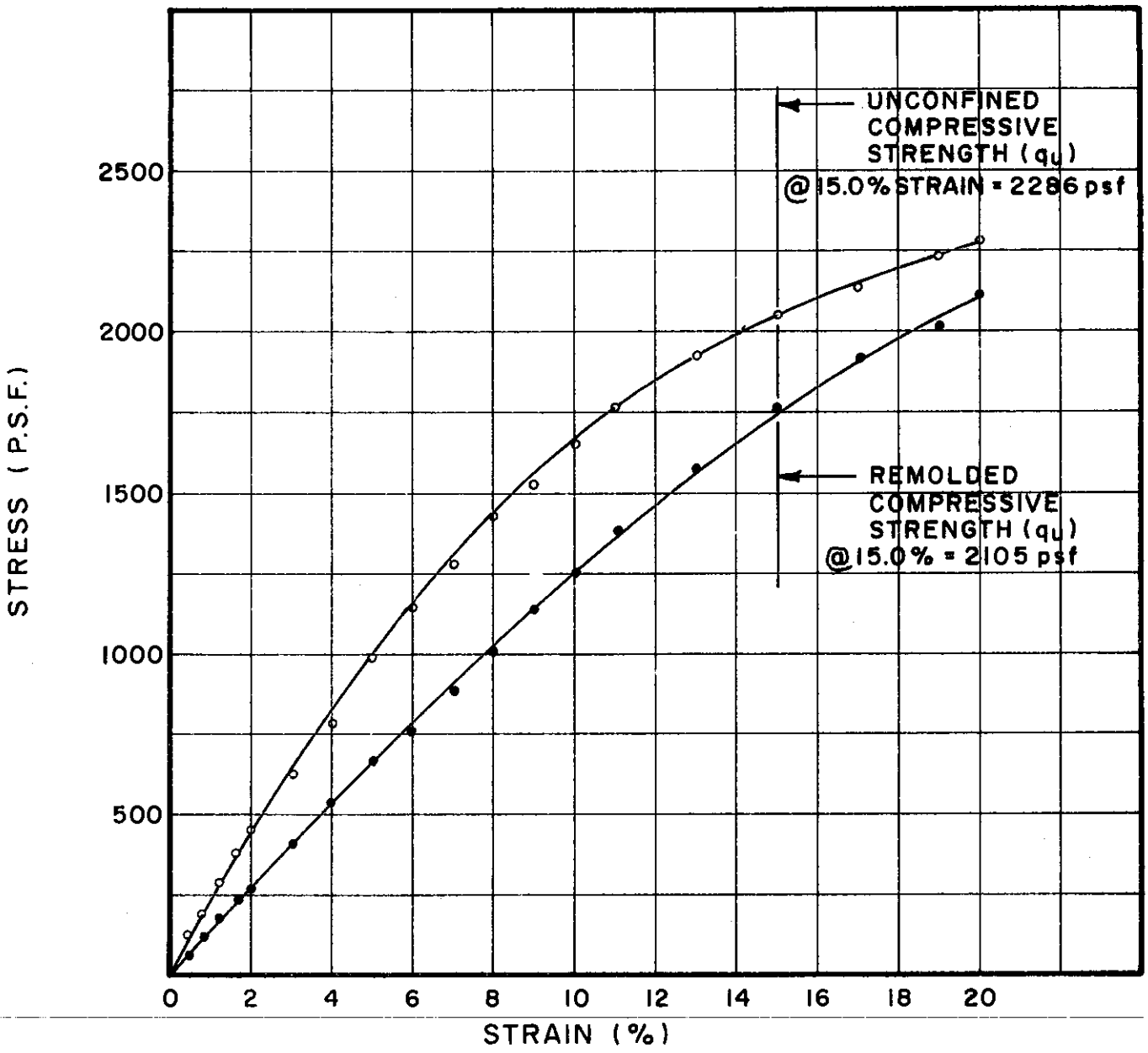
DEPTH 58.6' TO 58.9'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLOBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U43.1	1.40	2.85	.316	24.3	105	39	21	SILTY CLAY (CL)
U_R43.1	1.44	2.70	.333	24.3	103	39	21	SILTY CLAY (CL)

BORING NO. 60

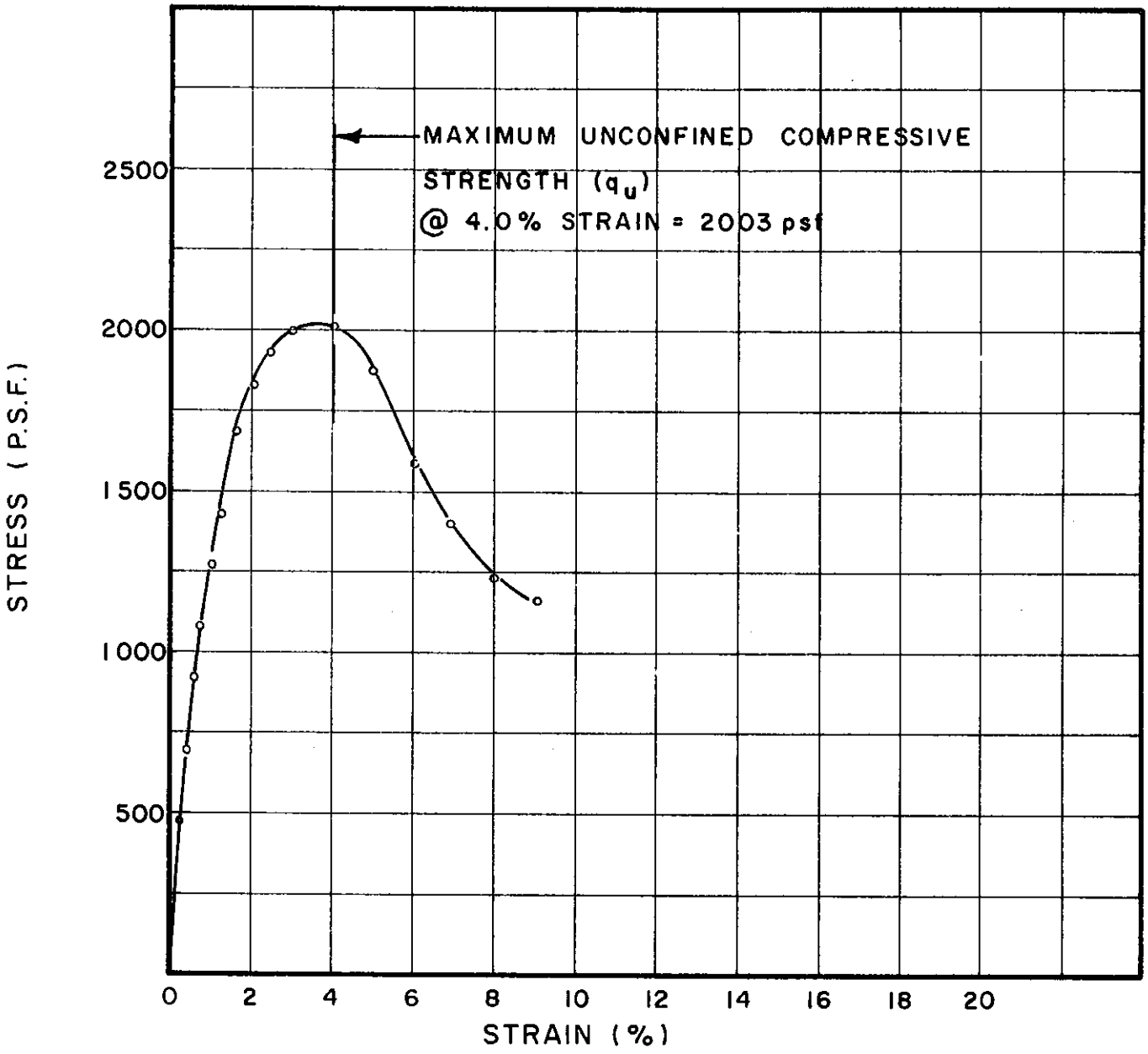
SAMPLE NO. 3

DEPTH 17.6' TO 18.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U45.1	1.43	3.50	.257	36.8	86	51	22	SILTY CLAY (CH)

BORING NO. 60

SAMPLE NO. 5

DEPTH 25.6' TO 25.9'

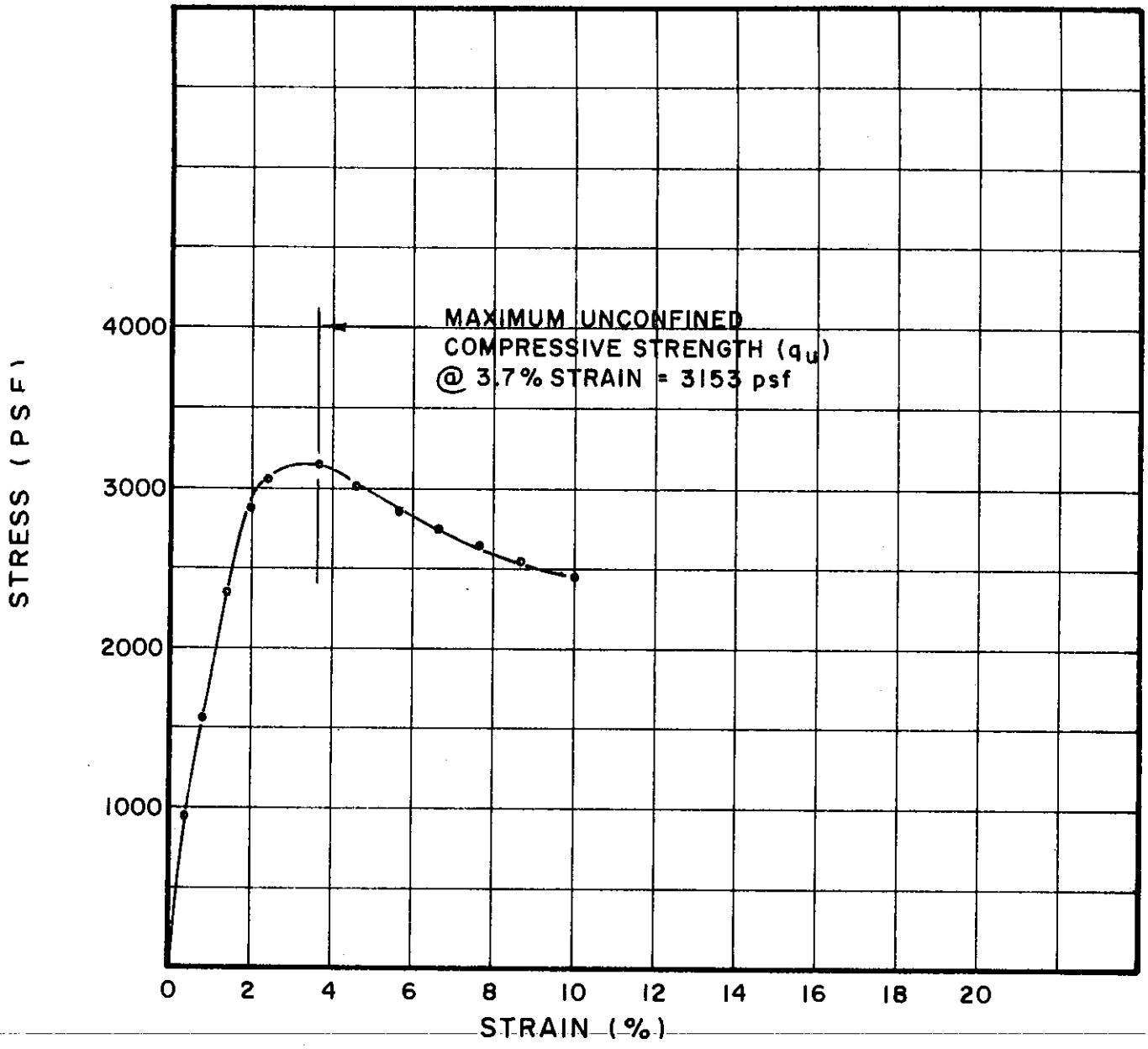
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-317

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U46.1	1.41	3.06	.26	35.0	88	48	25	SILTY CLAY (CL-CH)

BORING NO. 60

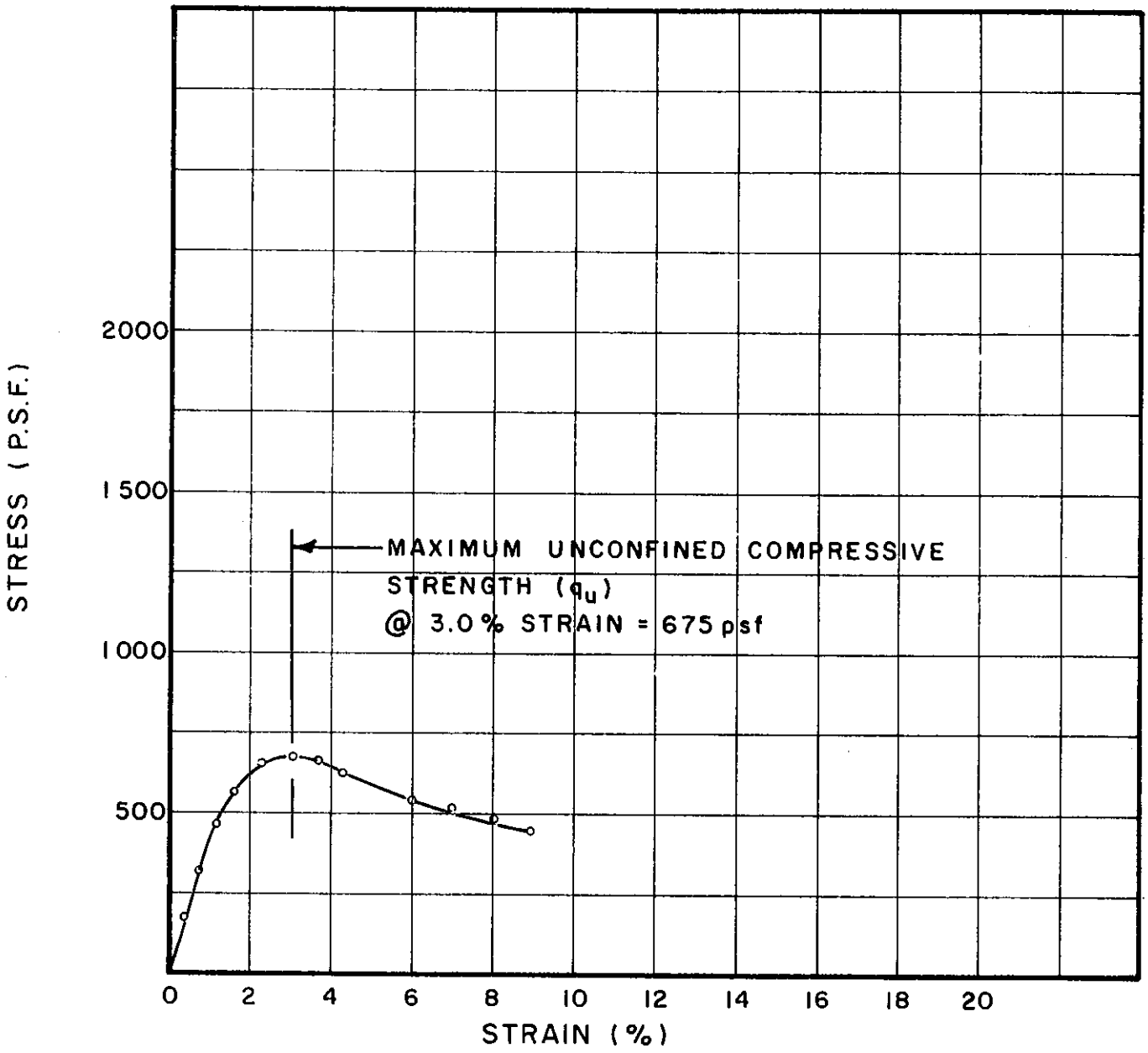
SAMPLE NO. 6

DEPTH 30.5' TO 30.8'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U48.1	1.41	3.50	.257	39.7	83	47	25	SILTY CLAY (CL)

BORING NO. 60

SAMPLE NO. 8

DEPTH 40.6' TO 41.0'

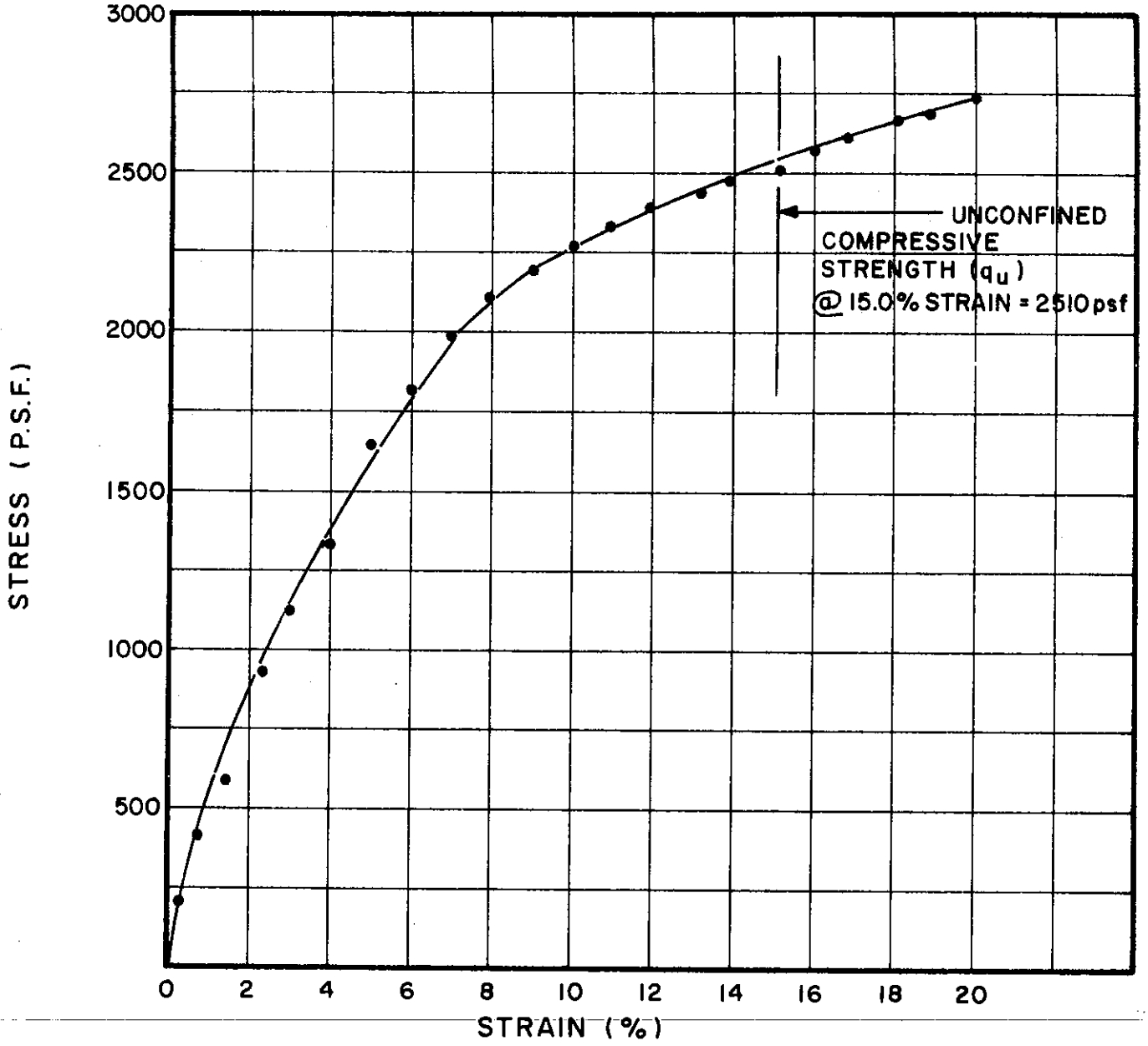
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-319

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U50.1	1.40	3.50	0.26	25.5	100	34	16	SILTY CLAY (CL)

BORING NO. 60

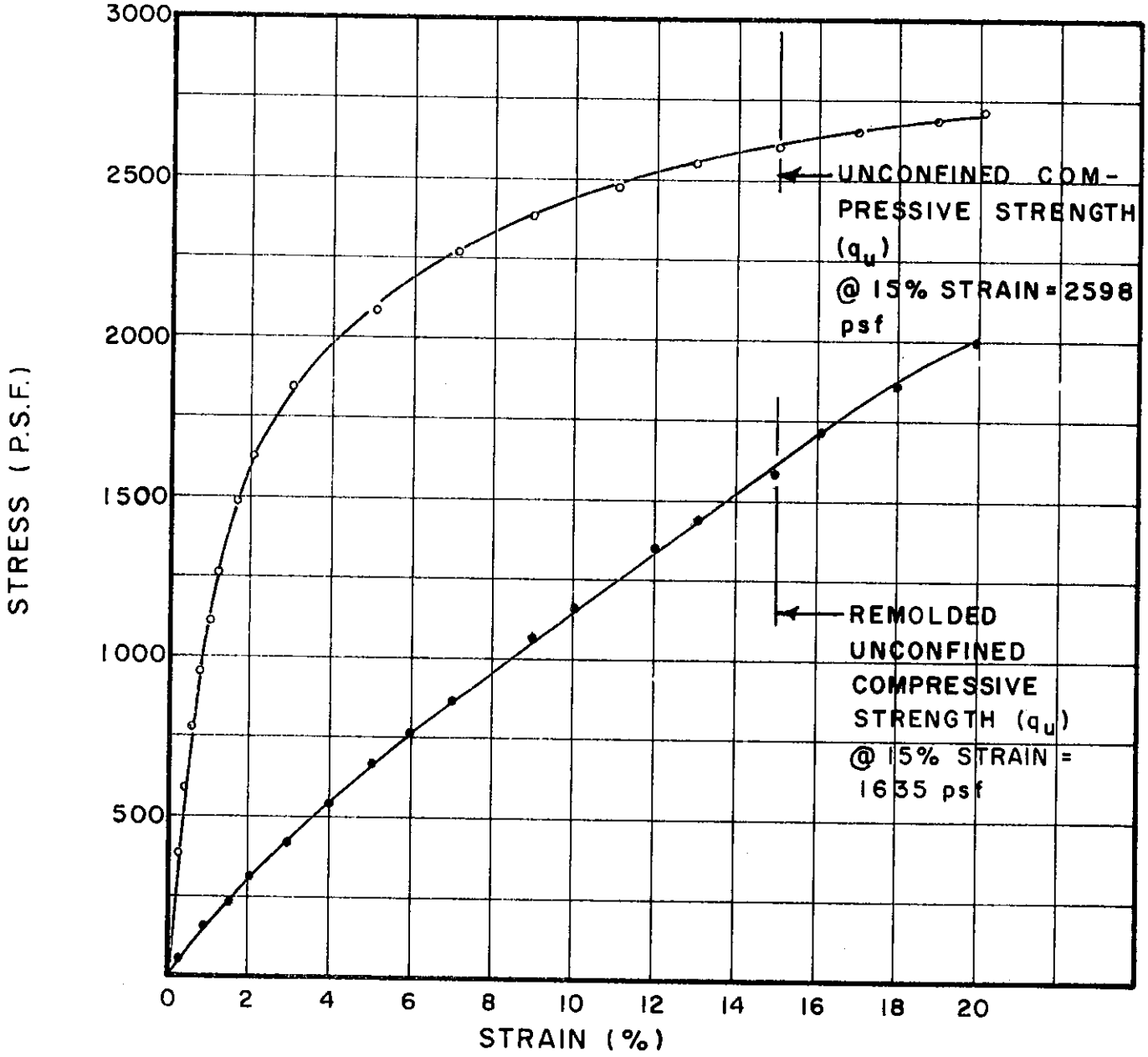
SAMPLE NO. 10

DEPTH 50.9' TO 51.2'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U51.1	1.41	3.49	.258	24.8	103	33	18	SILTY CLAY, SANDY (CL)
U51.1	1.41	3.30	.273	24.8	103	33	18	SILTY CLAY, SANDY (CL)

BORING NO. 60

SAMPLE NO. 11

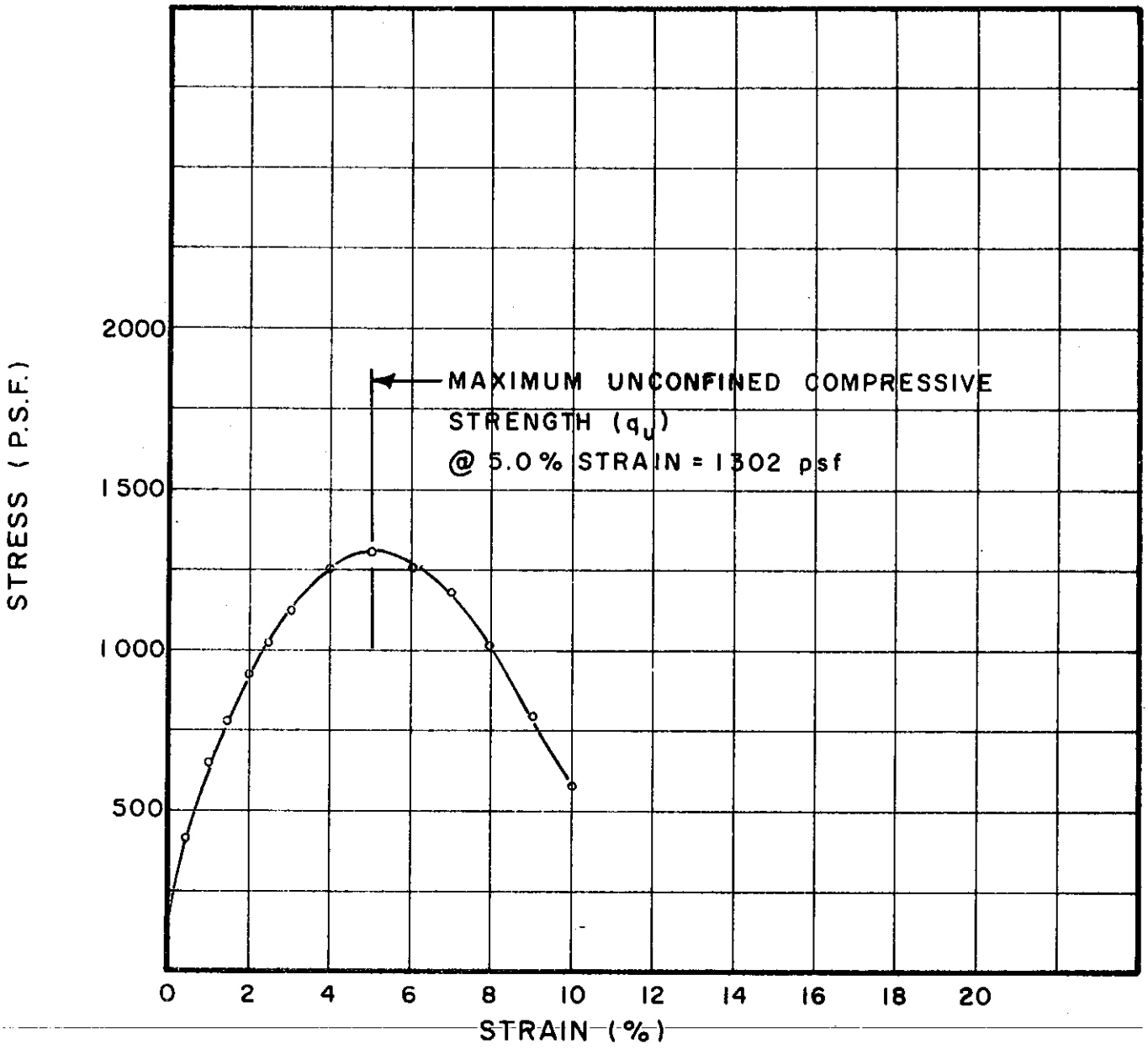
DEPTH 55.6' TO 56.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-321

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U54.1	1.42	3.50	.257	26.9	97	40	20	SILTY CLAY (CL)

BORING NO. 60

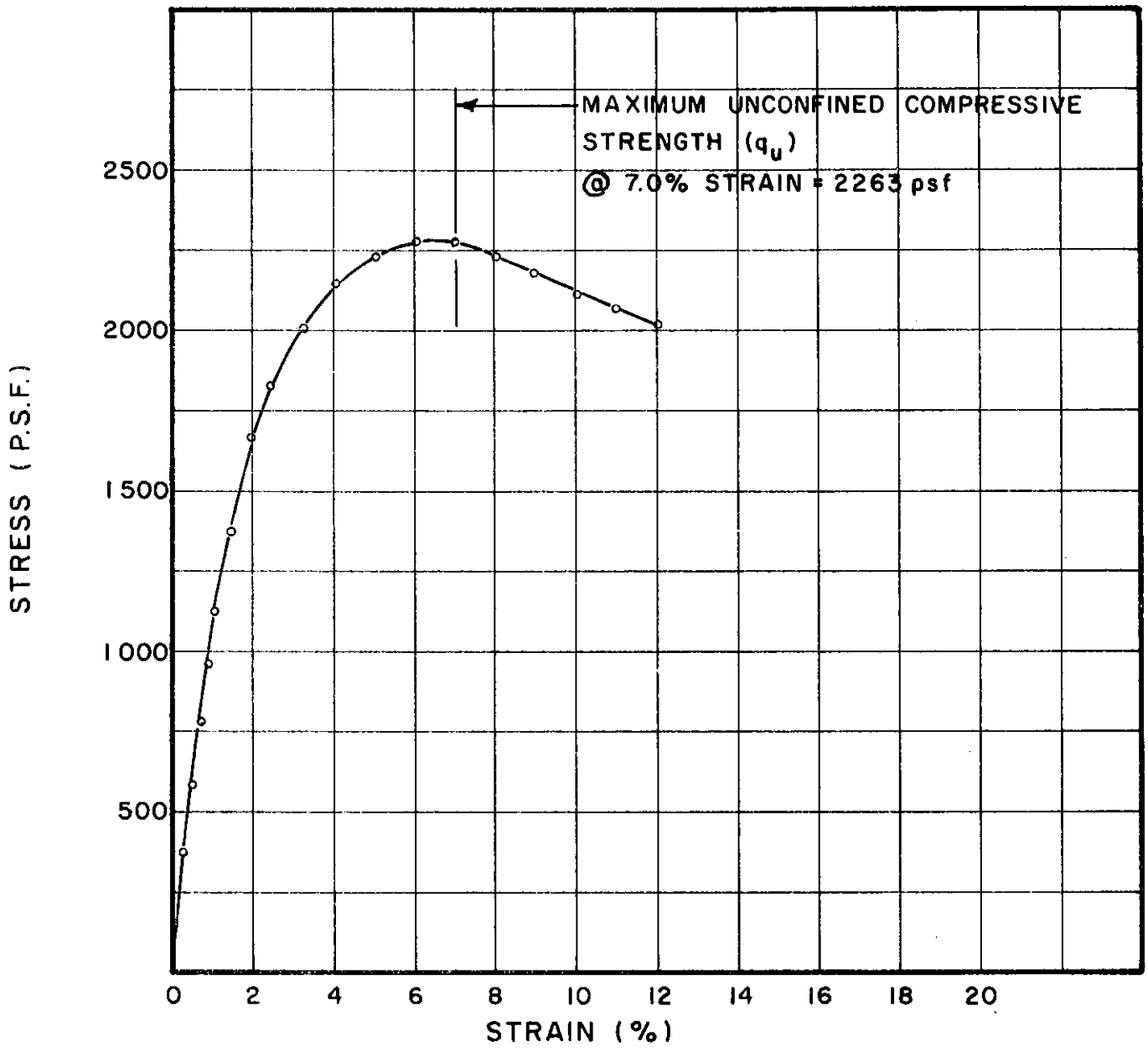
SAMPLE NO. 14

DEPTH 75.1' TO 75.4'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U59.1	1.41	3.50	.257	27.1	101	38	20	SILTY CLAY SANDY (CL)

BORING NO. 60

SAMPLE NO. 19

DEPTH 100.1' TO 100.4'

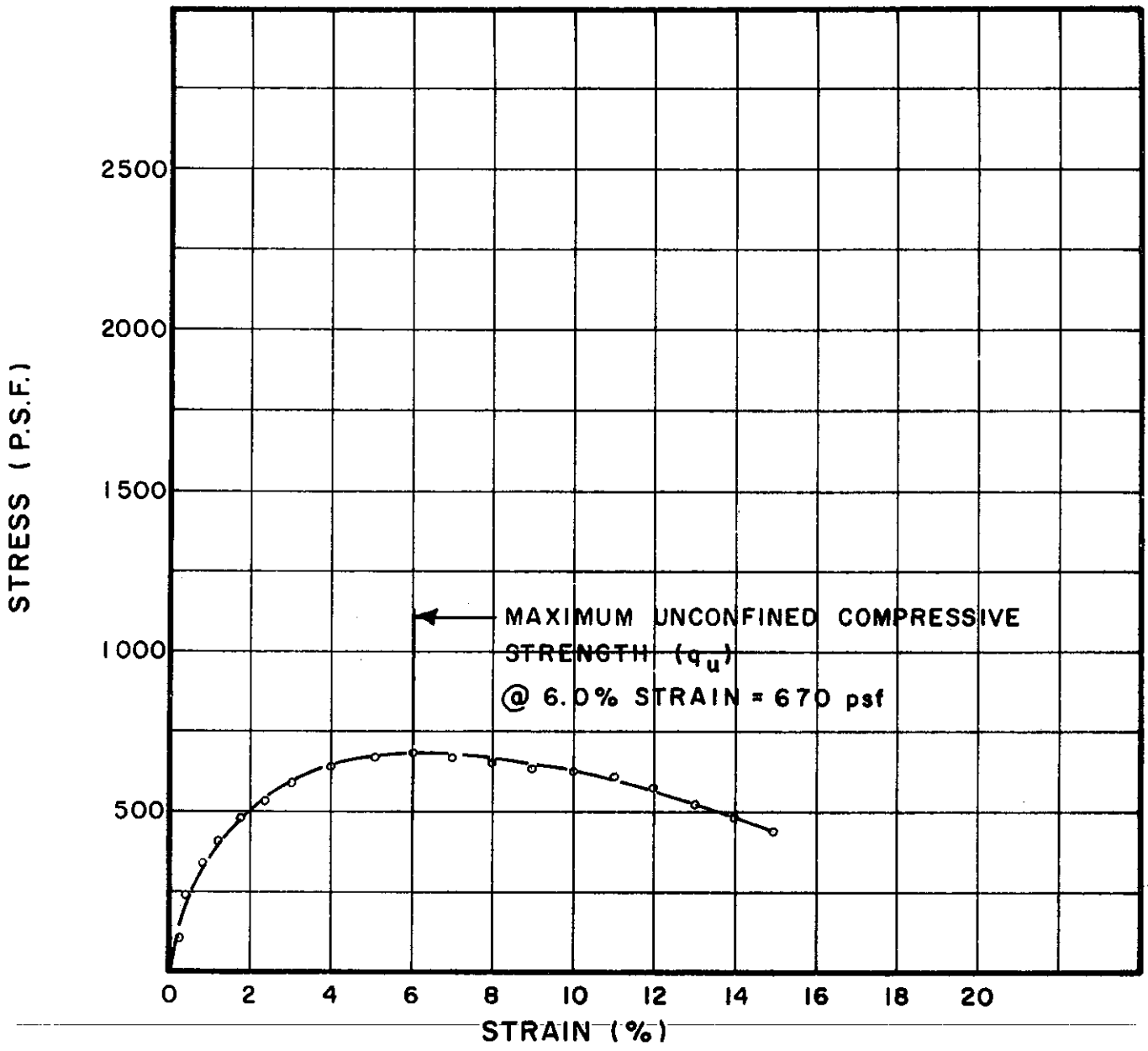
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-323

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U63.1	1.44	3.50	.257	15.4	115	17	11	SILTY CLAY, SANDY (CL-ML)

BORING NO. 60

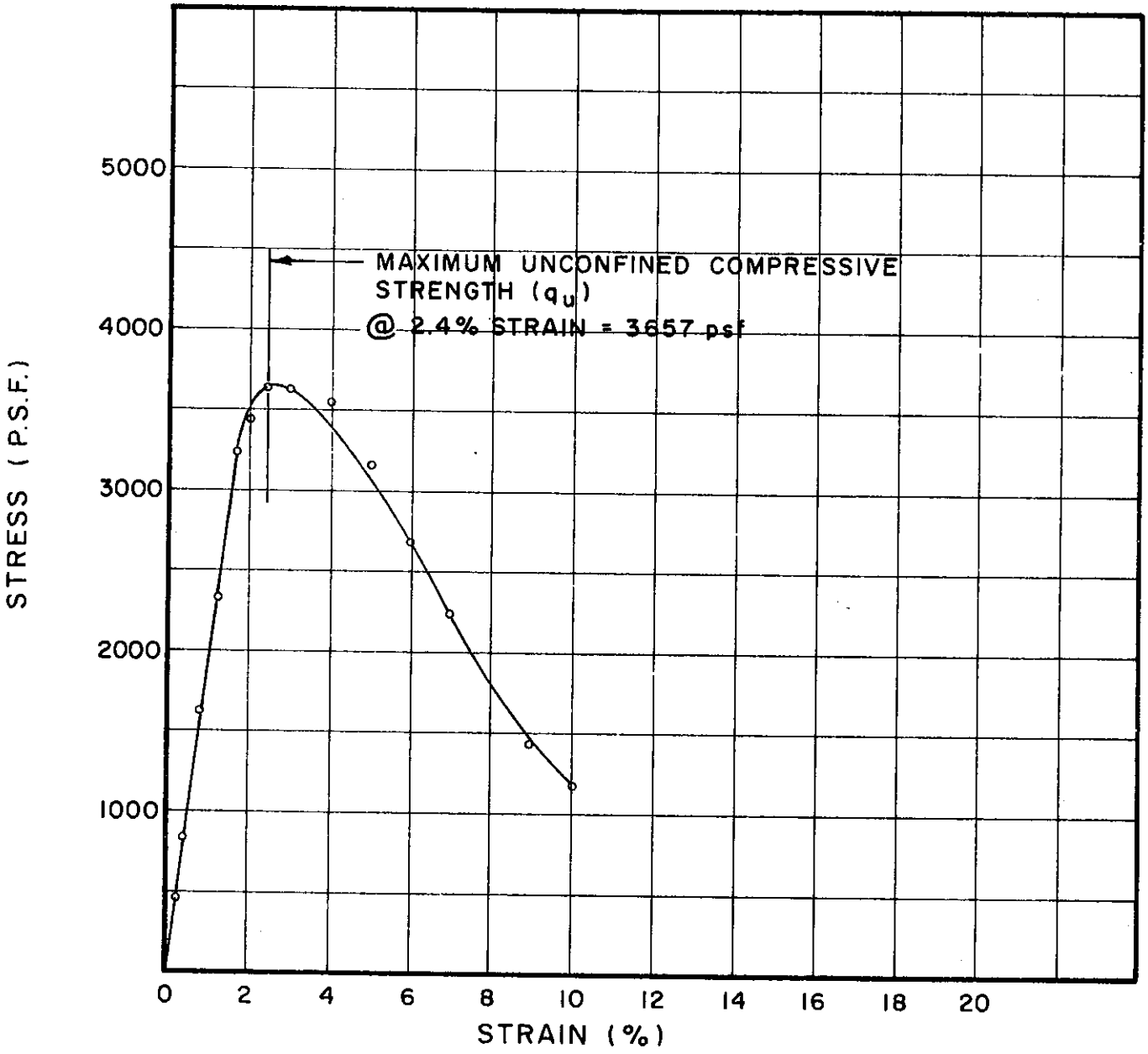
SAMPLE NO. 23

DEPTH 119.6' TO 120.0

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U349.1	1.44	3.15	.286	27.8	96	50	22	SILTY CLAY (CL-CH)

BORING NO. 101

SAMPLE NO. 2

DEPTH 8.9' TO 9.2'

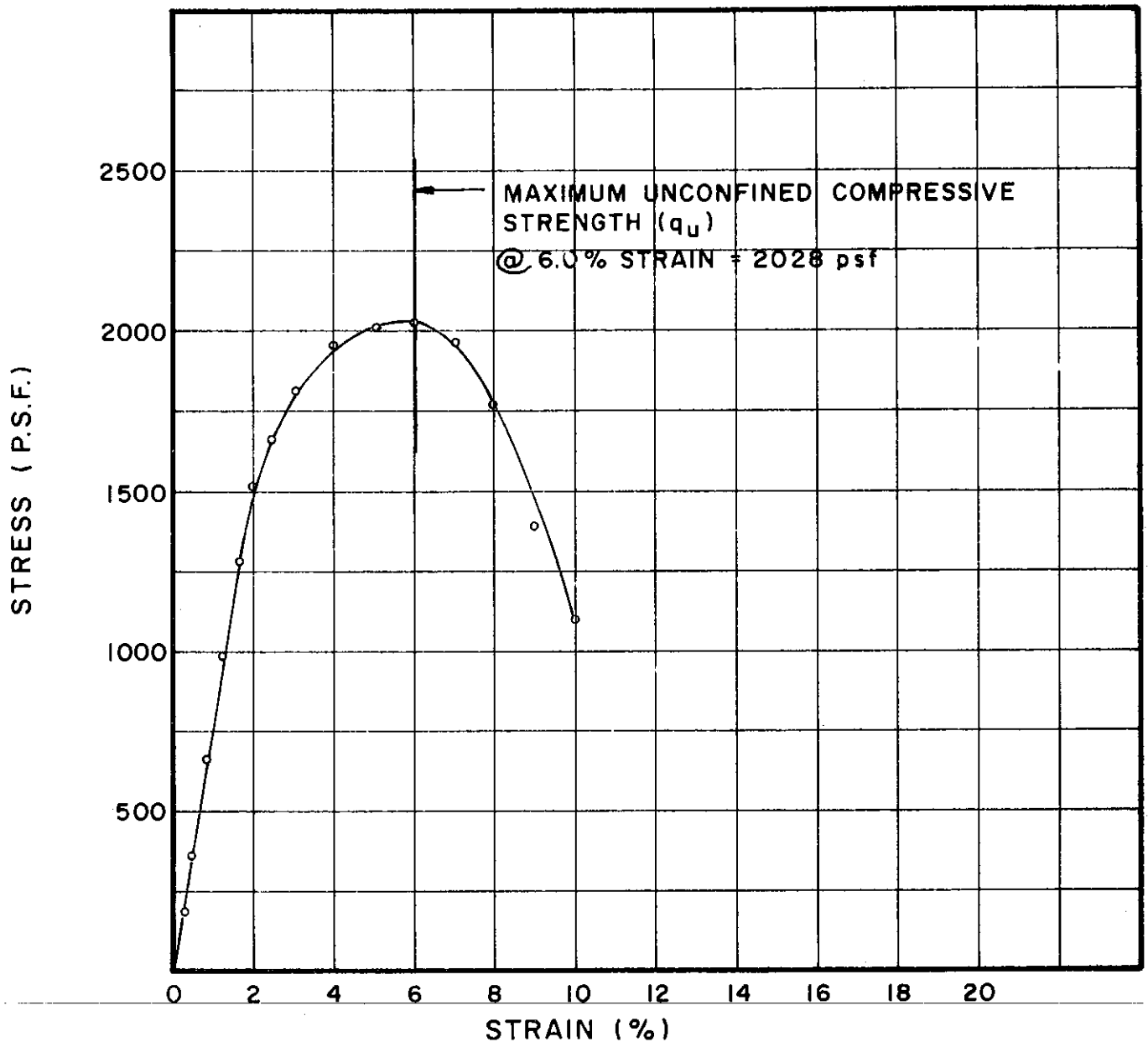
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-325

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U351.1	1.41	3.29	.274	35.8	86	49	24	SILTY CLAY (CL-CH)

BORING NO. 101

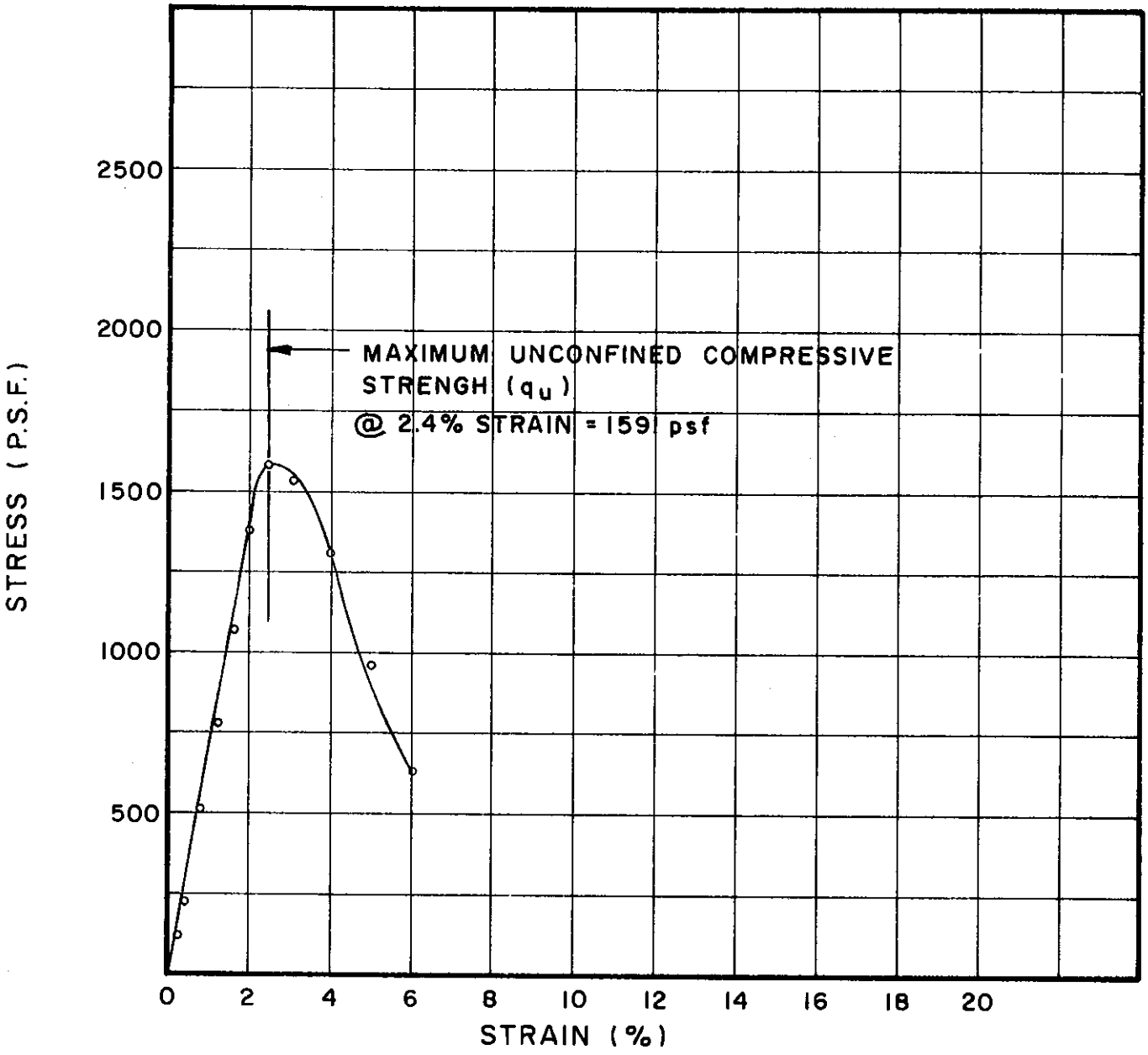
SAMPLE NO. 4

DEPTH 19.9' TO 20.2'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U354.1	1.41	3.37	.267	40.0	81	46	24	SILTY CLAY (CL-CH)

BORING NO. 101

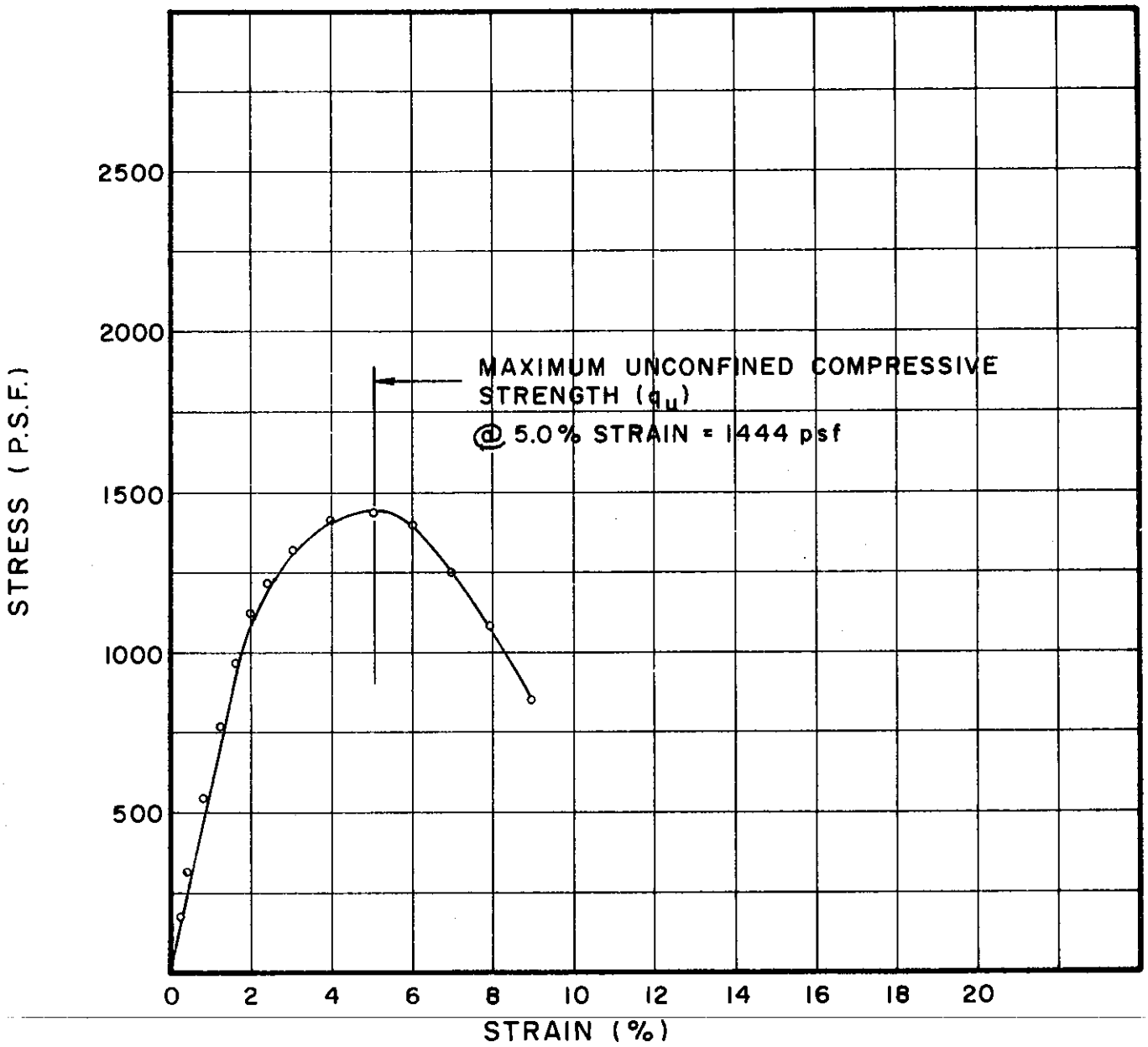
SAMPLE NO. 7

DEPTH 34.9' TO 35.2'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U357.1	1.40	3.30	.273	32.8	90	40	22	SILTY CLAY (CL-CH)

BORING NO. 101

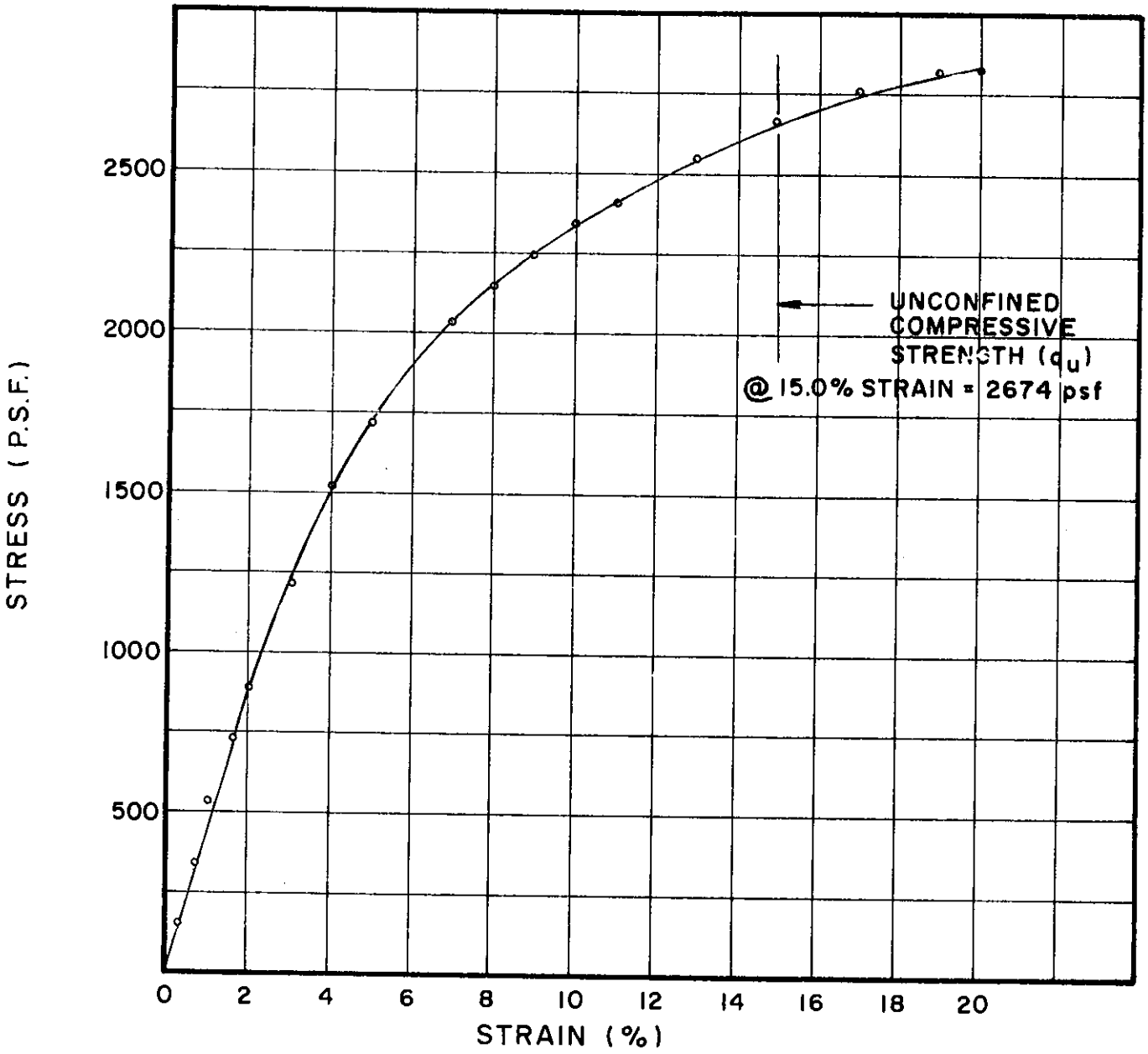
SAMPLE NO. 10

DEPTH 50.1' TO 50.4'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U360.1	1.39	3.28	.274	26.6	97	36	19	SILTY CLAY, SANDY (CL)

BORING NO. 101

SAMPLE NO. 13

DEPTH 65.2' TO 65.6'

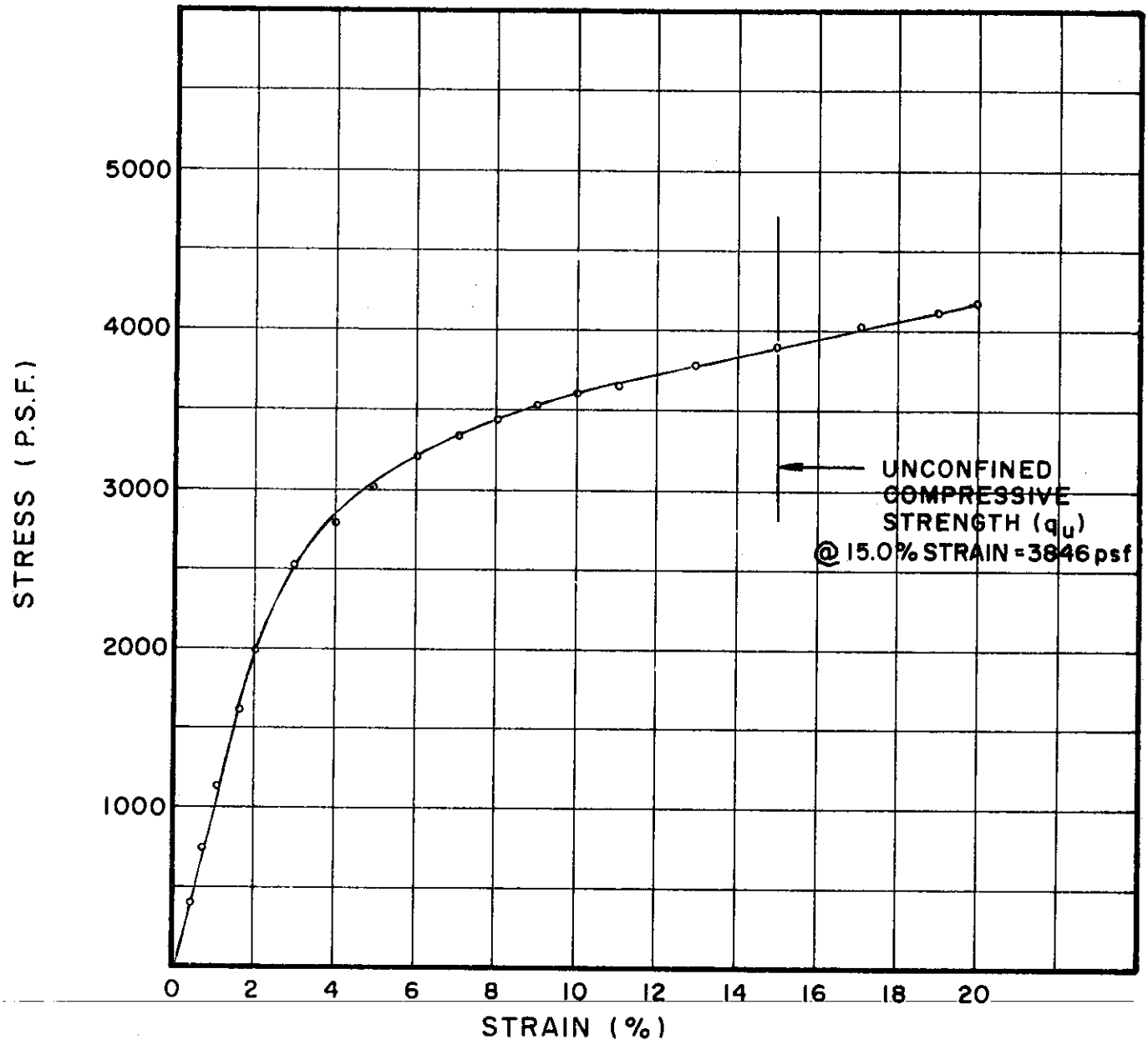
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-329

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U364.1	1.41	3.35	.269	25.2	97	37	19	SILTY CLAY, SANDY (CL)

BORING NO. 101

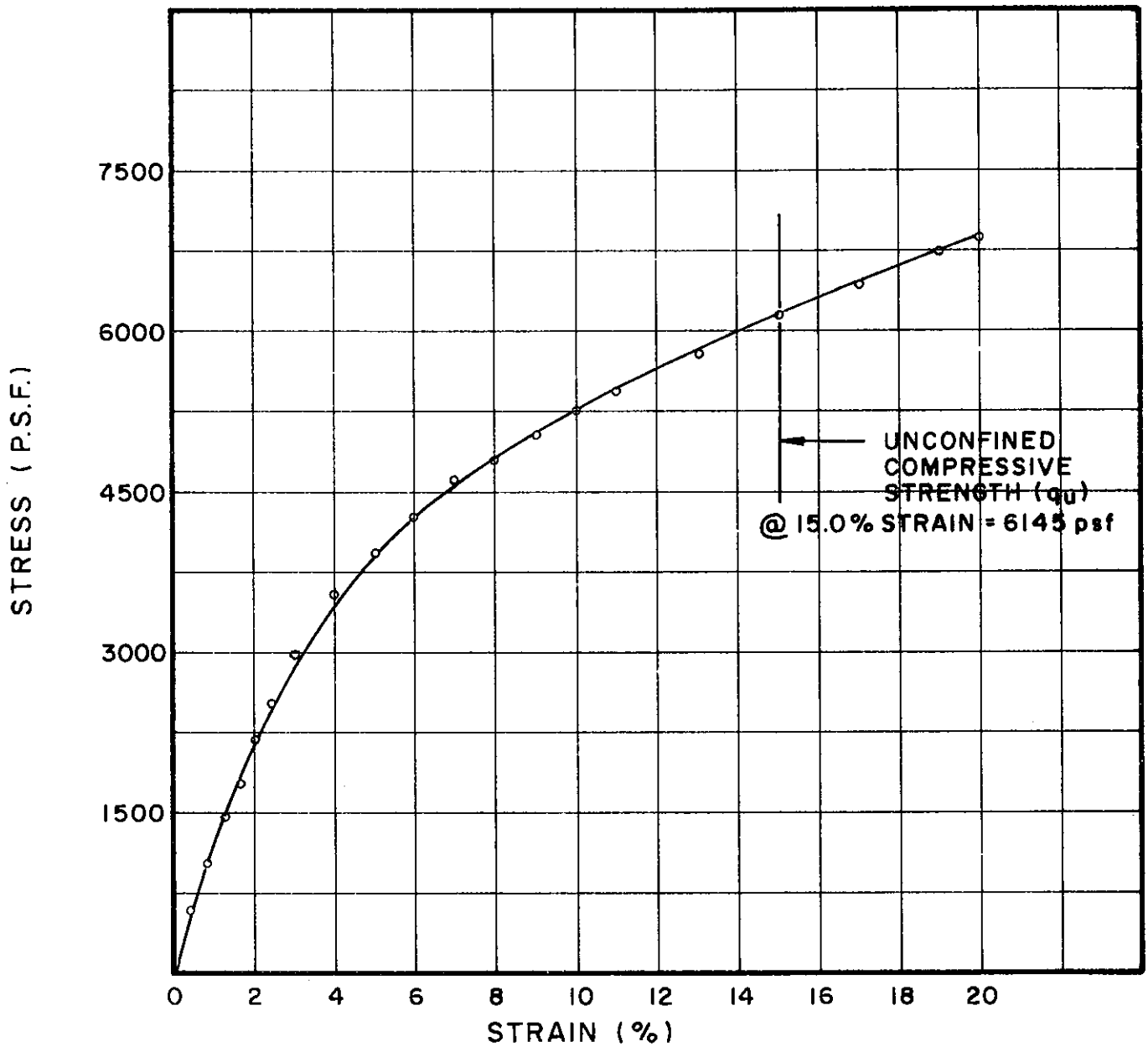
SAMPLE NO. 17

DEPTH 85.2' TO 85.5'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U339.1	1.41	3.35	.268	20.7	107	33	20	SILTY CLAY, SANDY (CL)

BORING NO. 119

SAMPLE NO. 9

DEPTH 81.6' TO 81.9'

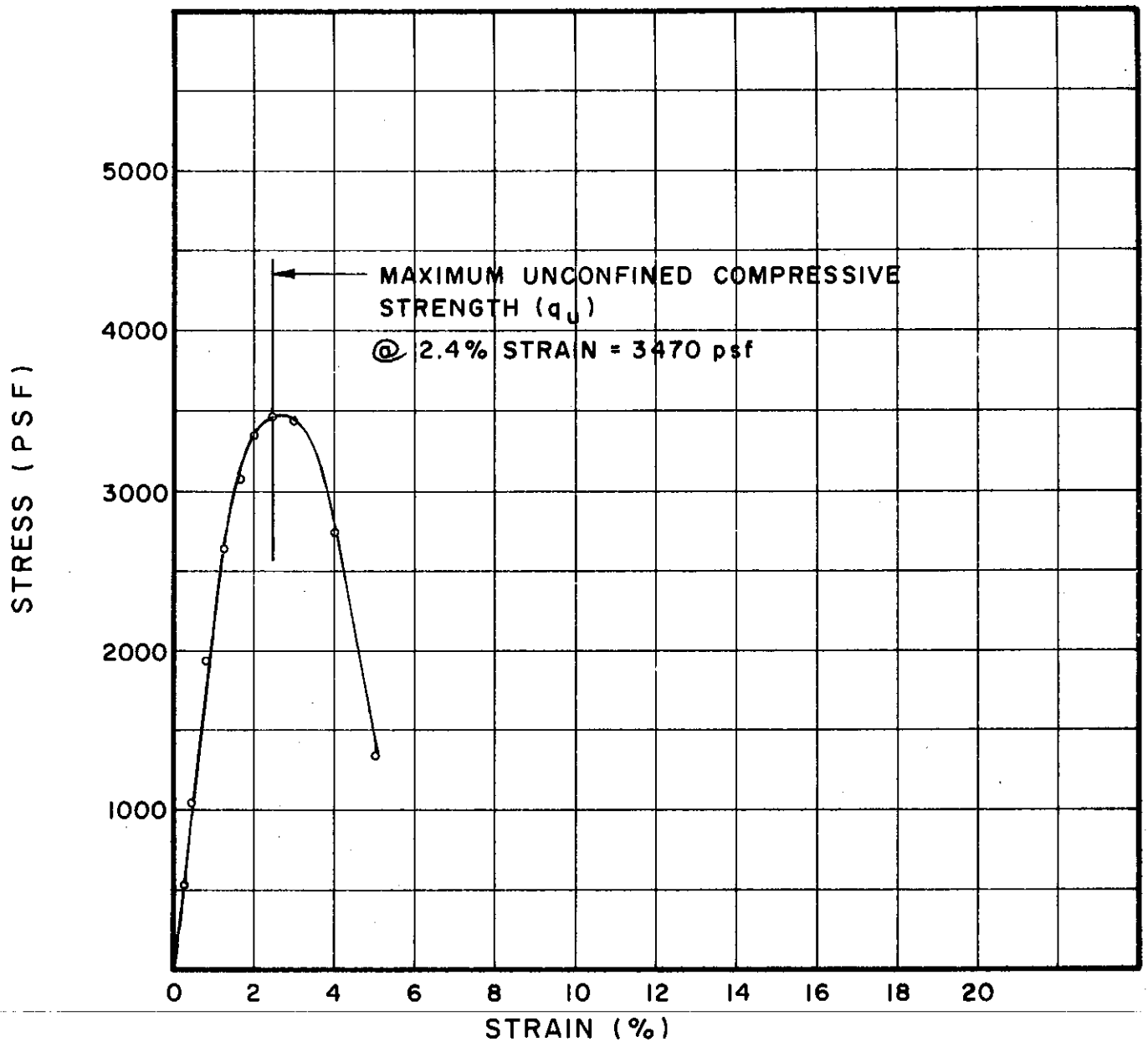
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-331

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U241.1	1.46	3.50	.257	26.2	99	47	24	SILTY CLAY (CL-CH)

BORING NO. 126

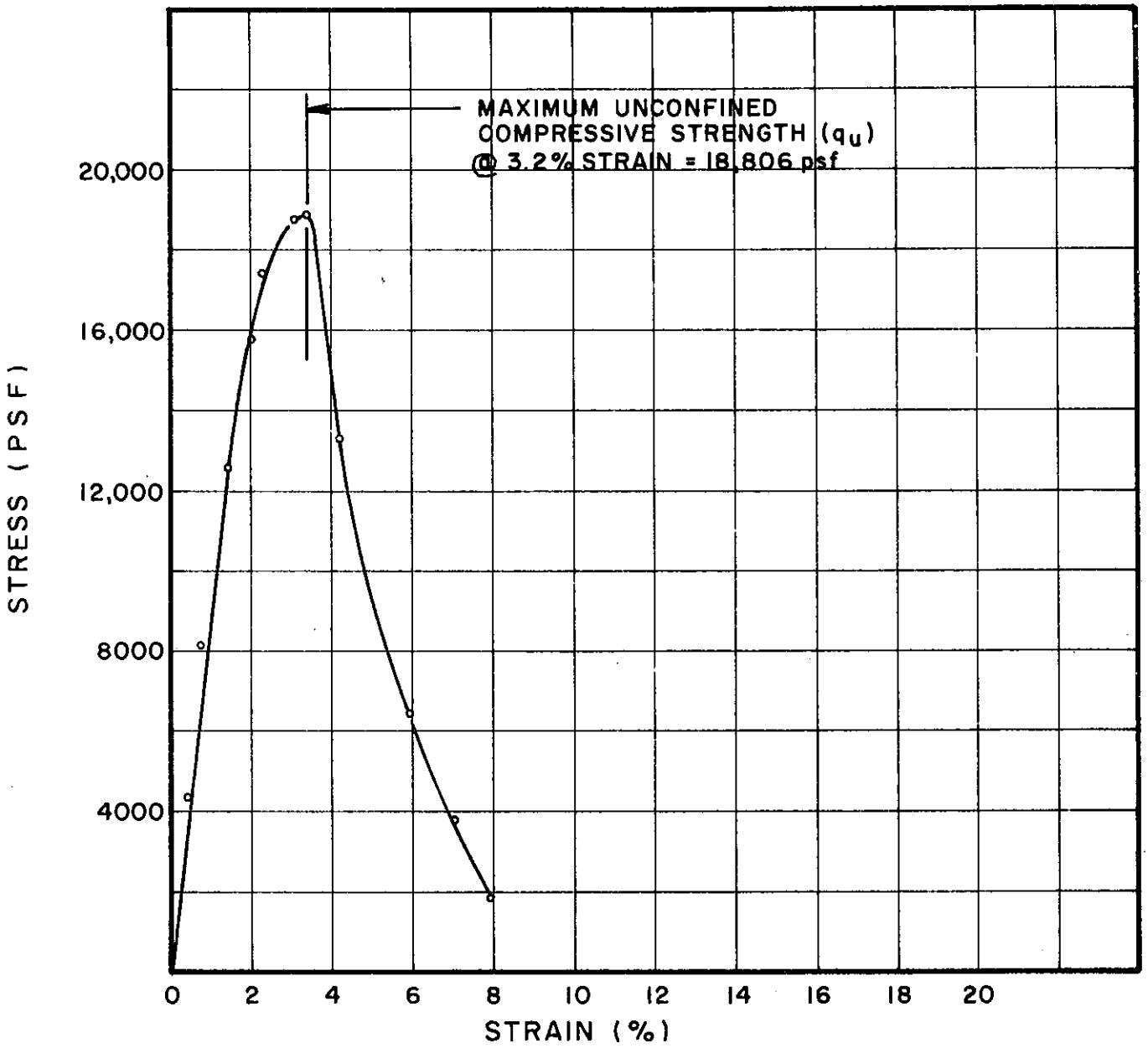
SAMPLE NO. 3

DEPTH 8.2' TO 8.6'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U416.2	1.42	3.55	0.26	13.5	113	49	22	SILTY CLAY (CL-CH)
								"COMPACTED SAMPLE"

BORING NO. 127

SAMPLE NO. 3

DEPTH 5.6' TO 7.0'

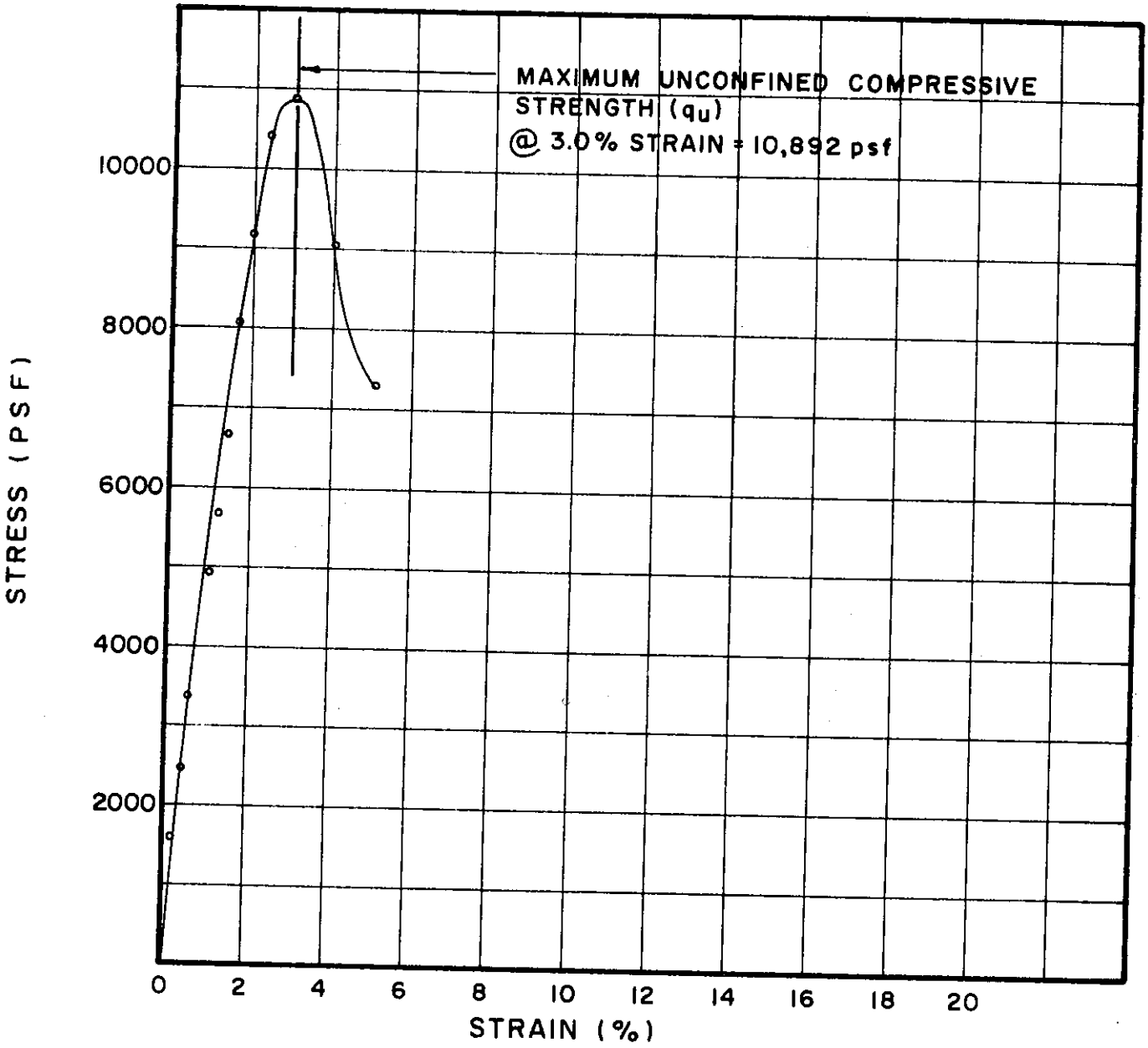
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-333

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U526.1	1.42	3.46	0.25	24.3	102	48	22	SILTY CLAY (CL-CH)

BORING NO. 136

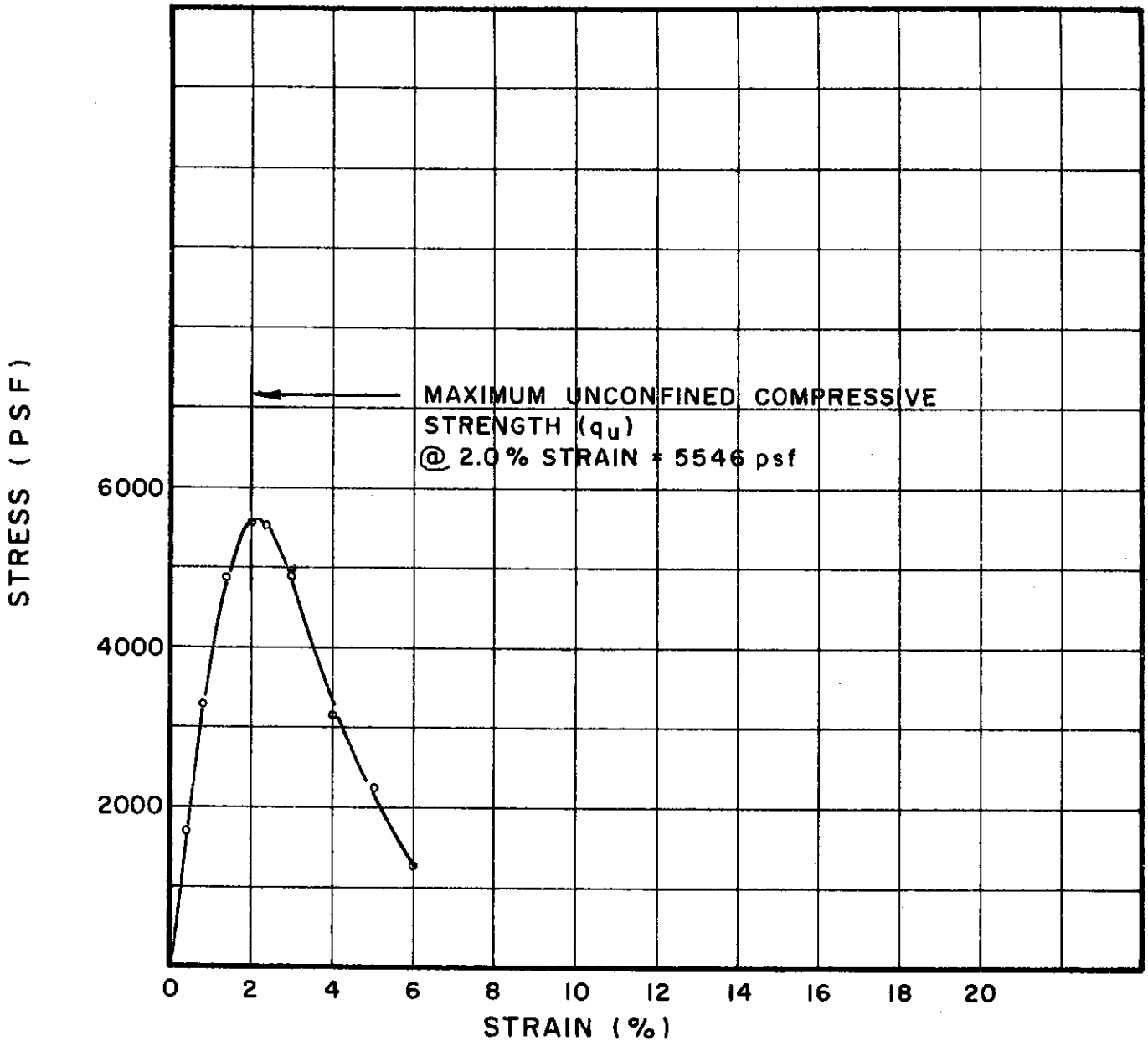
SAMPLE NO. 4

DEPTH 8.8' TO 9.2'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U_r527.1	1.40	3.28	.274	17.5	100	43	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 136

SAMPLE NO. ST 6

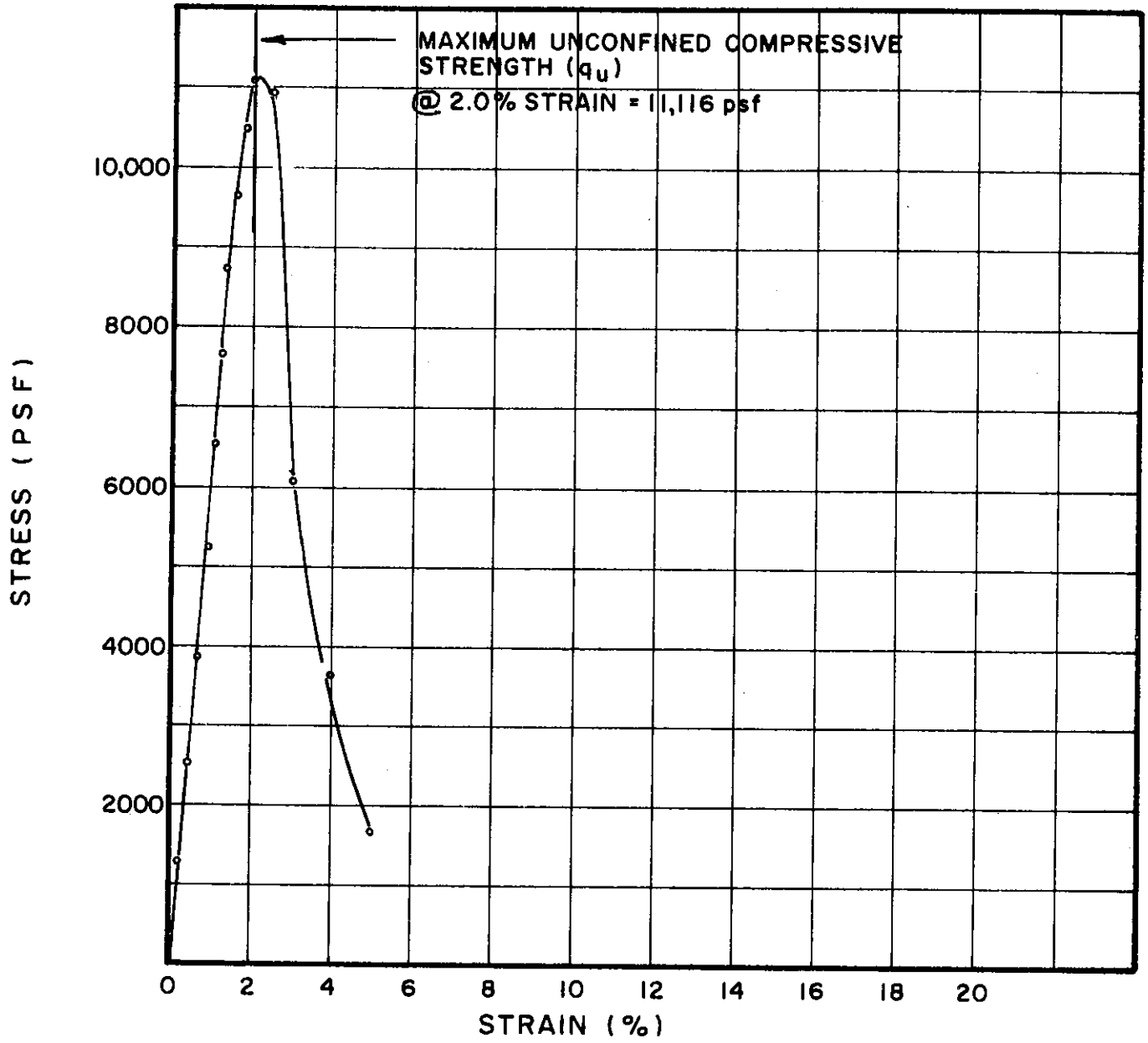
DEPTH 13.0' TO 14.6'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LL (%)	LIMITS PL (%)	SOIL DESCRIPTION
U529.1	1.41	3.05	.28	17.5	103	49	23	SILTY CLAY (CL-CH)

BORING NO. 141

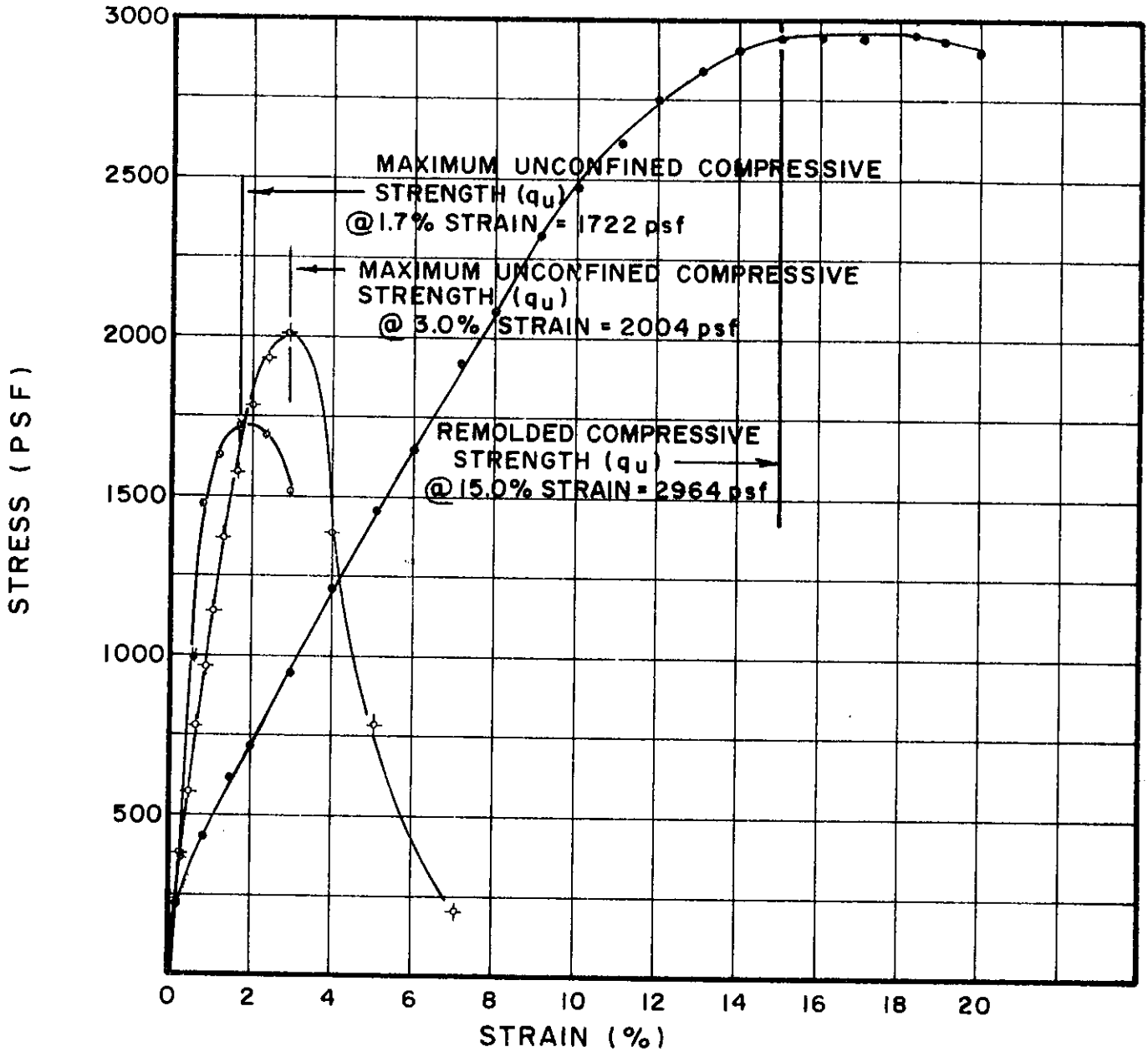
SAMPLE NO. 2

DEPTH 8.0' TO 10.0'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U537.1 ✧ / ○ U537.2	1.41 / 1.39	3.24 / 3.23	.28 / .28	26.3 / 24.1	97 / 99	48	21	SILTY CLAY (CL-CH)
● U537.1	1.42	3.15	.28	24.1	100			

BORING NO. 144

SAMPLE NO. 4

DEPTH 8.0' TO 10.0'

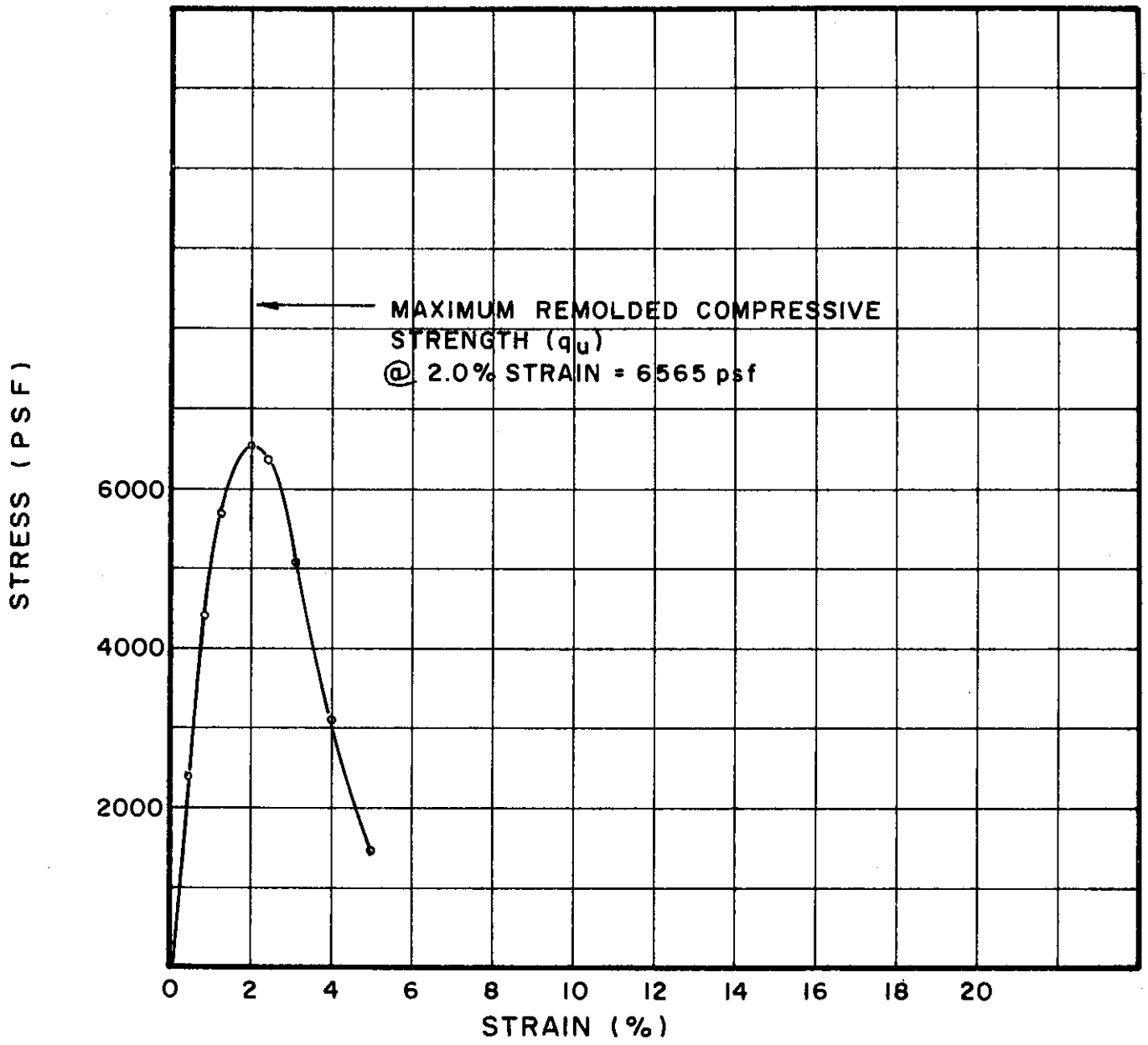
UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-337

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
U_r542.1	1.40	3.18	.283	16.6	104	46	22	SILTY CLAY (CL)
								COMPACTED SAMPLE

BORING NO. 146

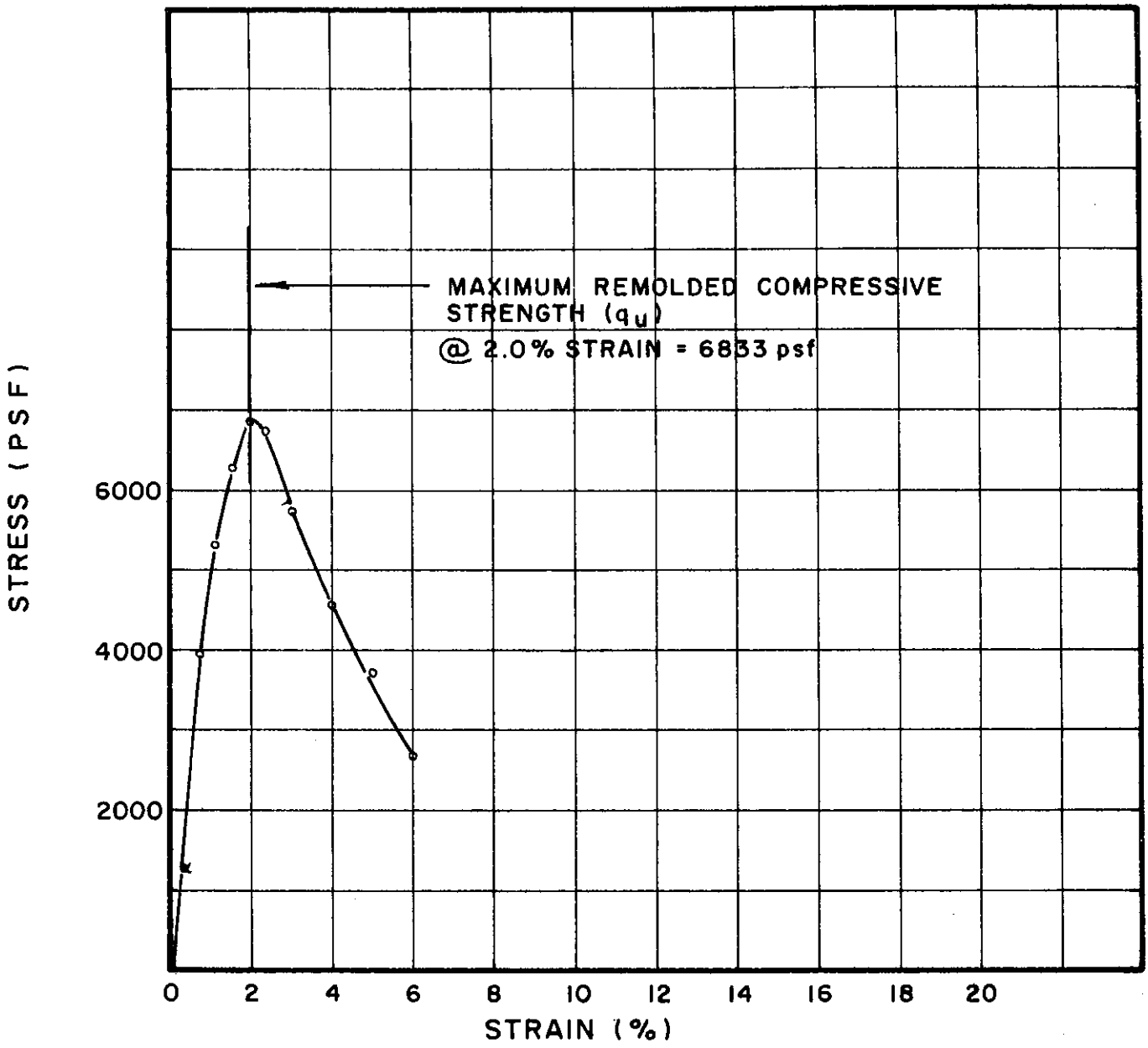
SAMPLE NO. ST 7

DEPTH 14.0' TO 16.1'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U_r548.1	1.37	3.20	.281	16.8	104	50	21	SILTY CLAY (CL-CH)
								COMPACTED SAMPLE

BORING NO. 158

SAMPLE NO. ST 2

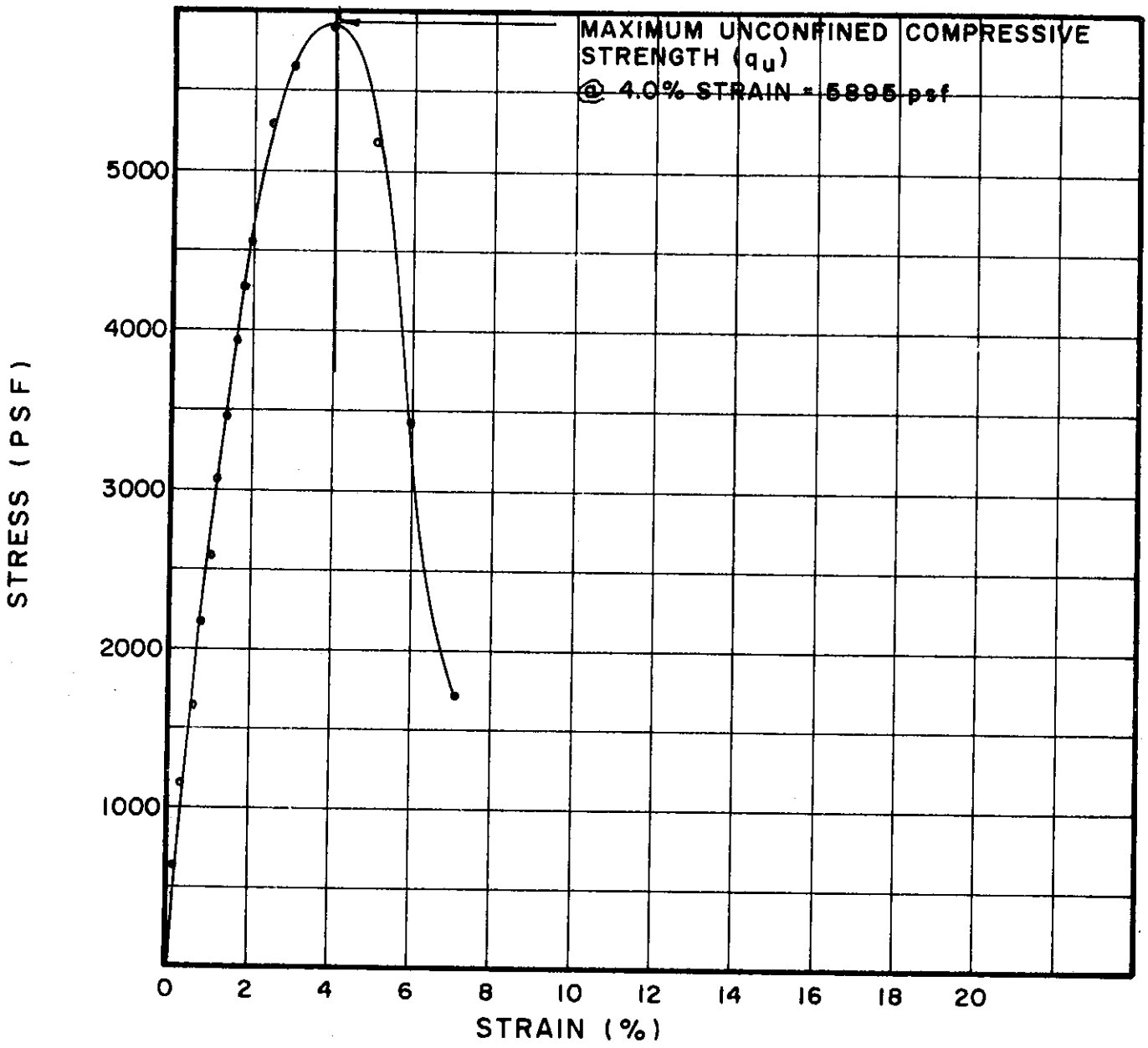
DEPTH 7.5' TO 9.7'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-339

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U552.1	1.40	3.43	0.25	23.9	104	50	23	SILTY CLAY (CL-CH)

BORING NO. 185

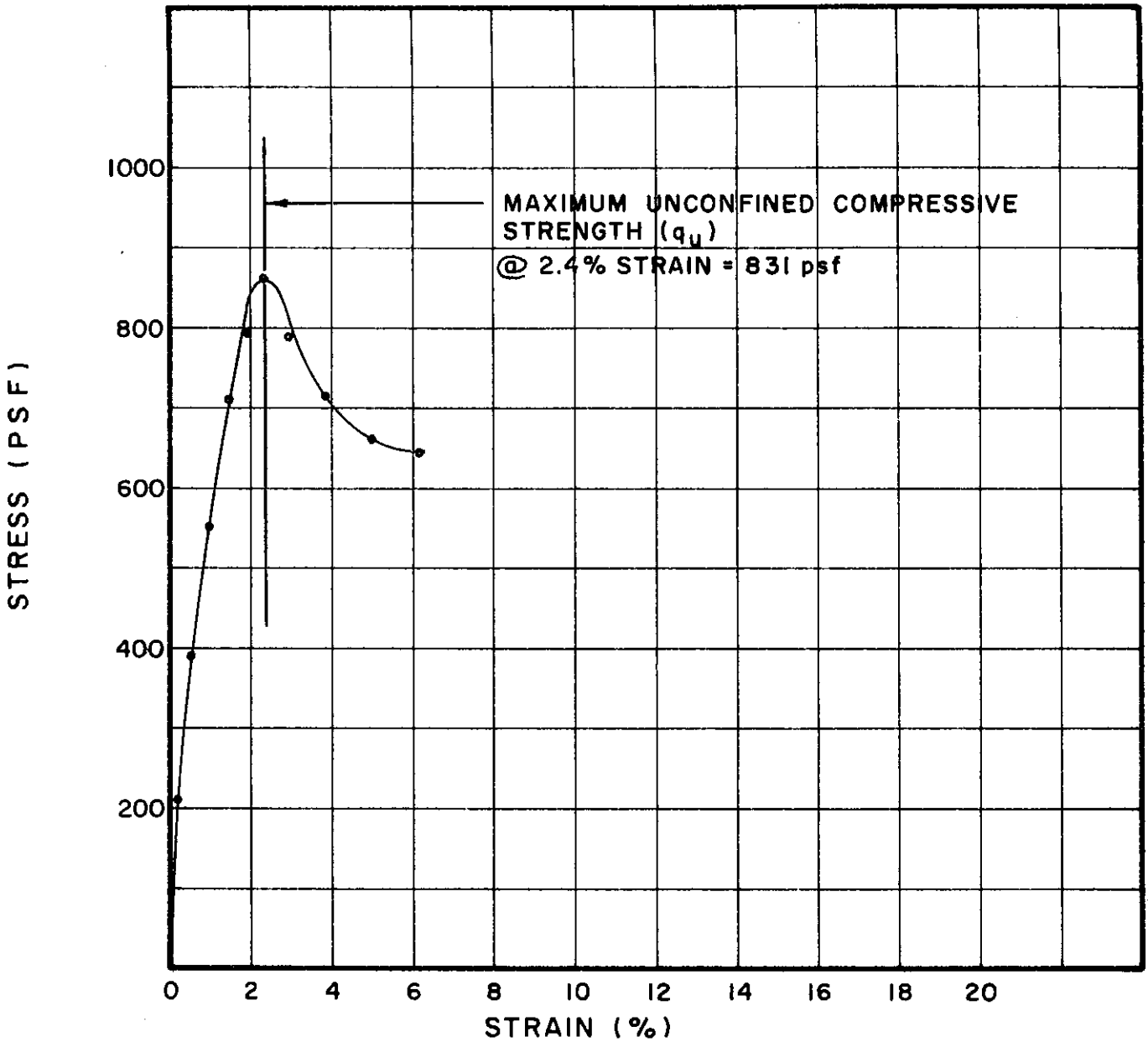
SAMPLE NO. 3

DEPTH 7.5' TO 7.8'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER (INCHES)	HEIGHT (INCHES)	STRAIN RATE (%/MIN)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
U554.1	1.41	3.33	0.25	39.3	81	49	22	SILTY CLAY (CL-CH)

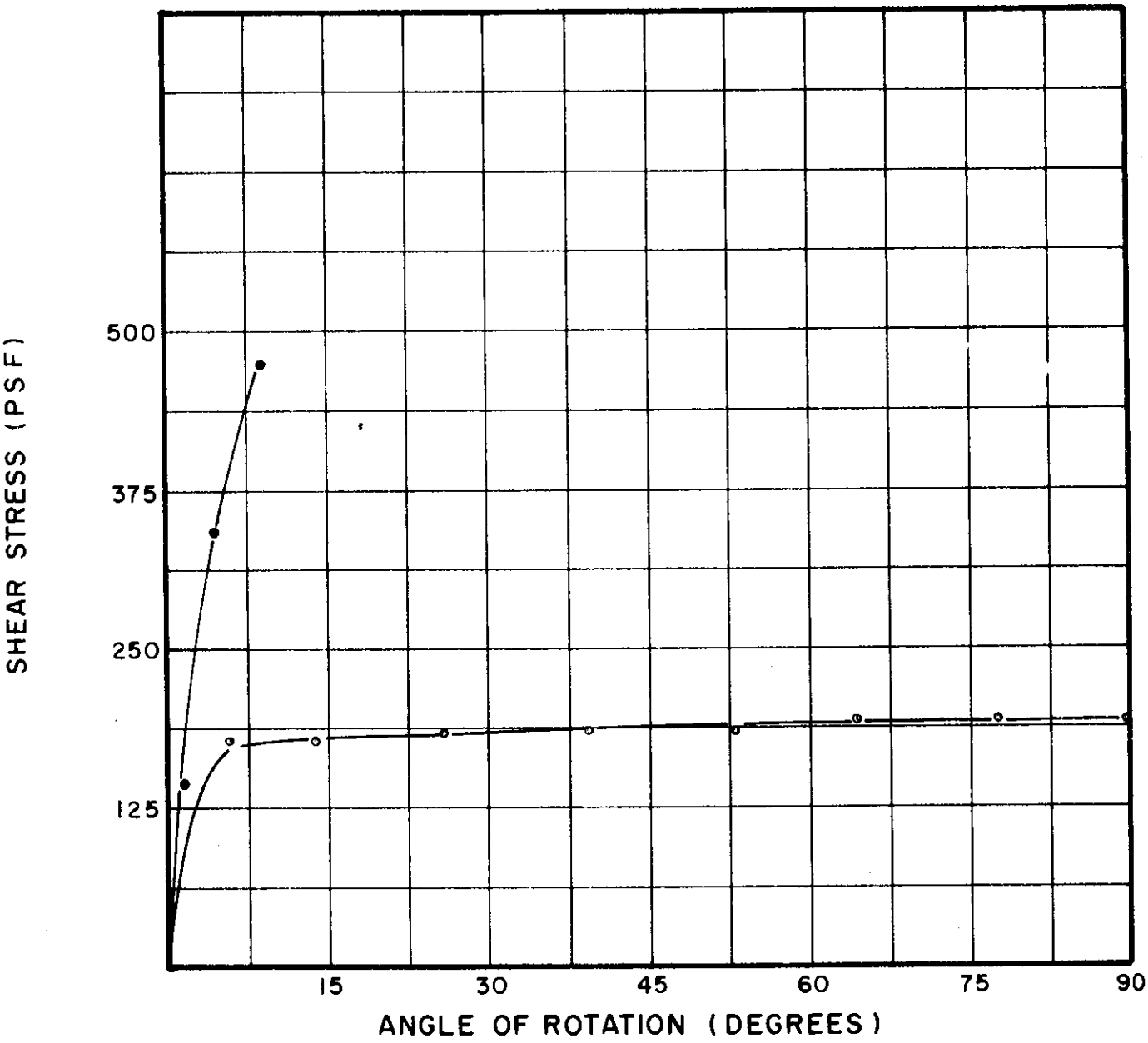
BORING NO. 185

SAMPLE NO. 7

DEPTH 18.5' TO 18.8'

UNCONFINED COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
VS85.1 ●	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)
rVS85.1 ○	.50	.25	6.0	35.2	82	39	18	SILTY CLAY (CL)

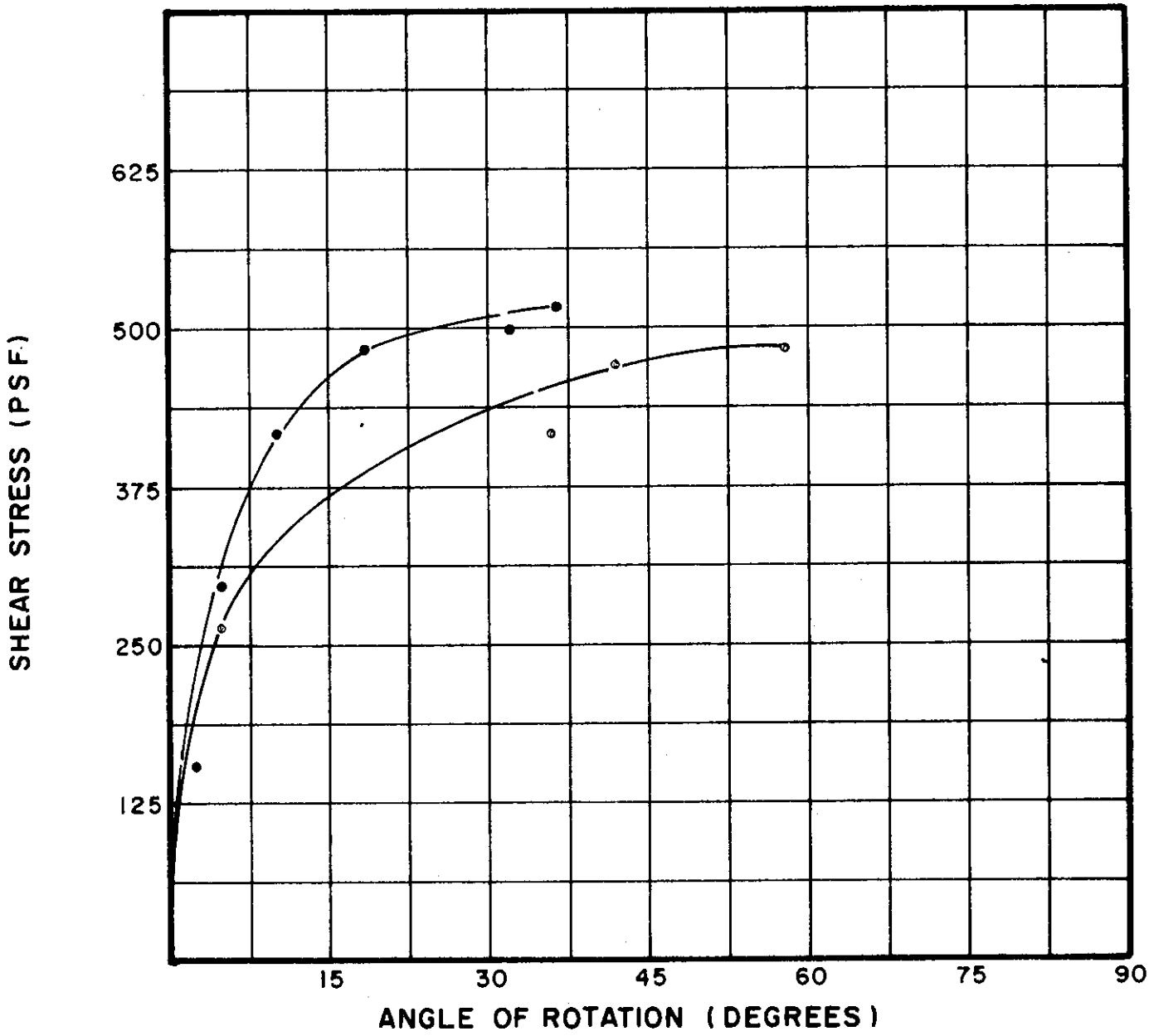
BORING NO. 50

SAMPLE NO. 6

DEPTH 28.1' - 28.3'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
VS87.1 ●	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)
VS87.1 ○	.50	.25	6.0	25.9	96	36	16	SILTY CLAY, SANDY (CL)

BORING NO. 50

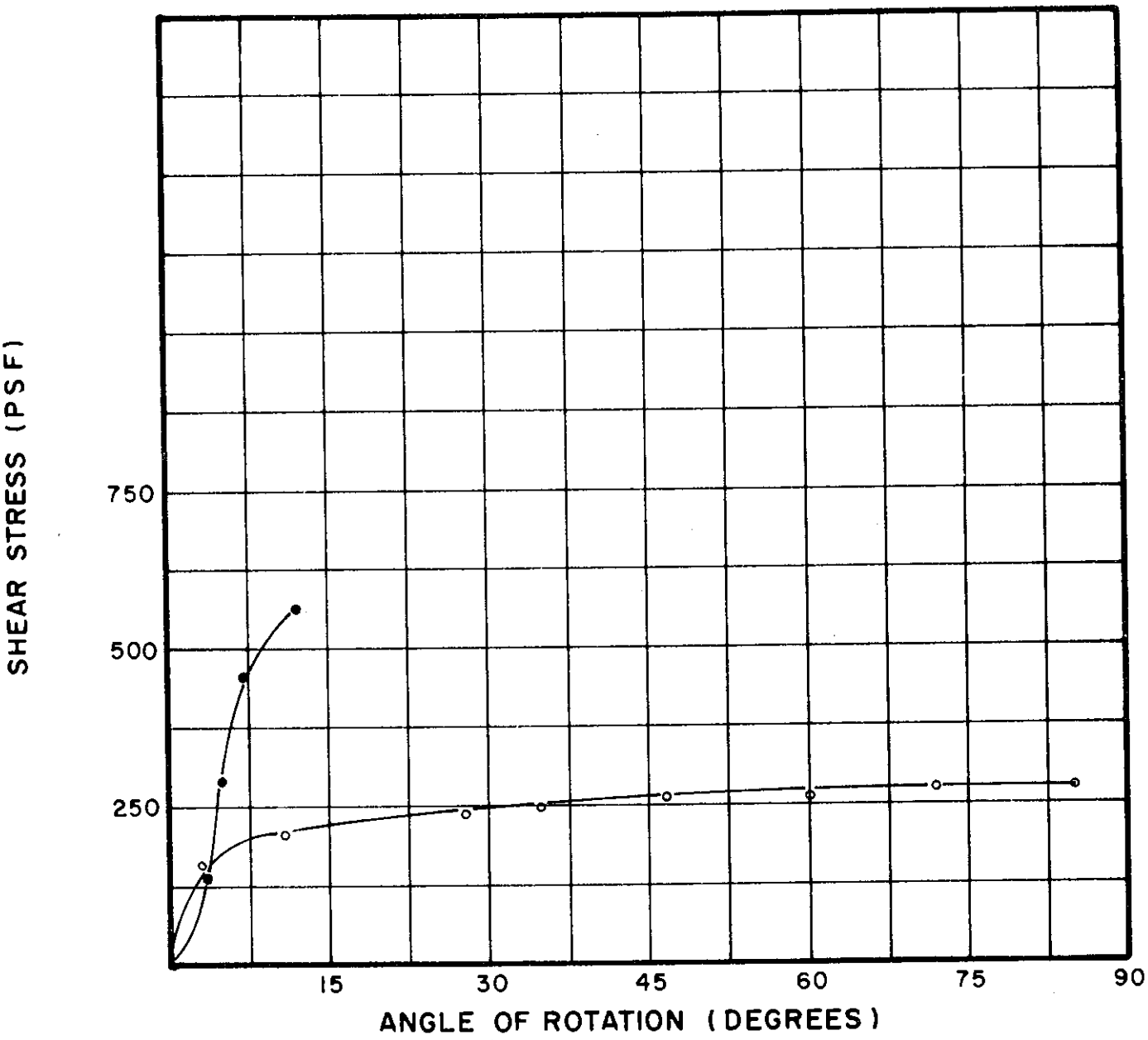
SAMPLE NO. 10

DEPTH 48.1' - 48.4'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
VS109.1 ●	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)
VS109.1 ○	.50	.25	6.0	30.5	89	35	18	SILTY CLAY (CL)

BORING NO. 52

SAMPLE NO. 4

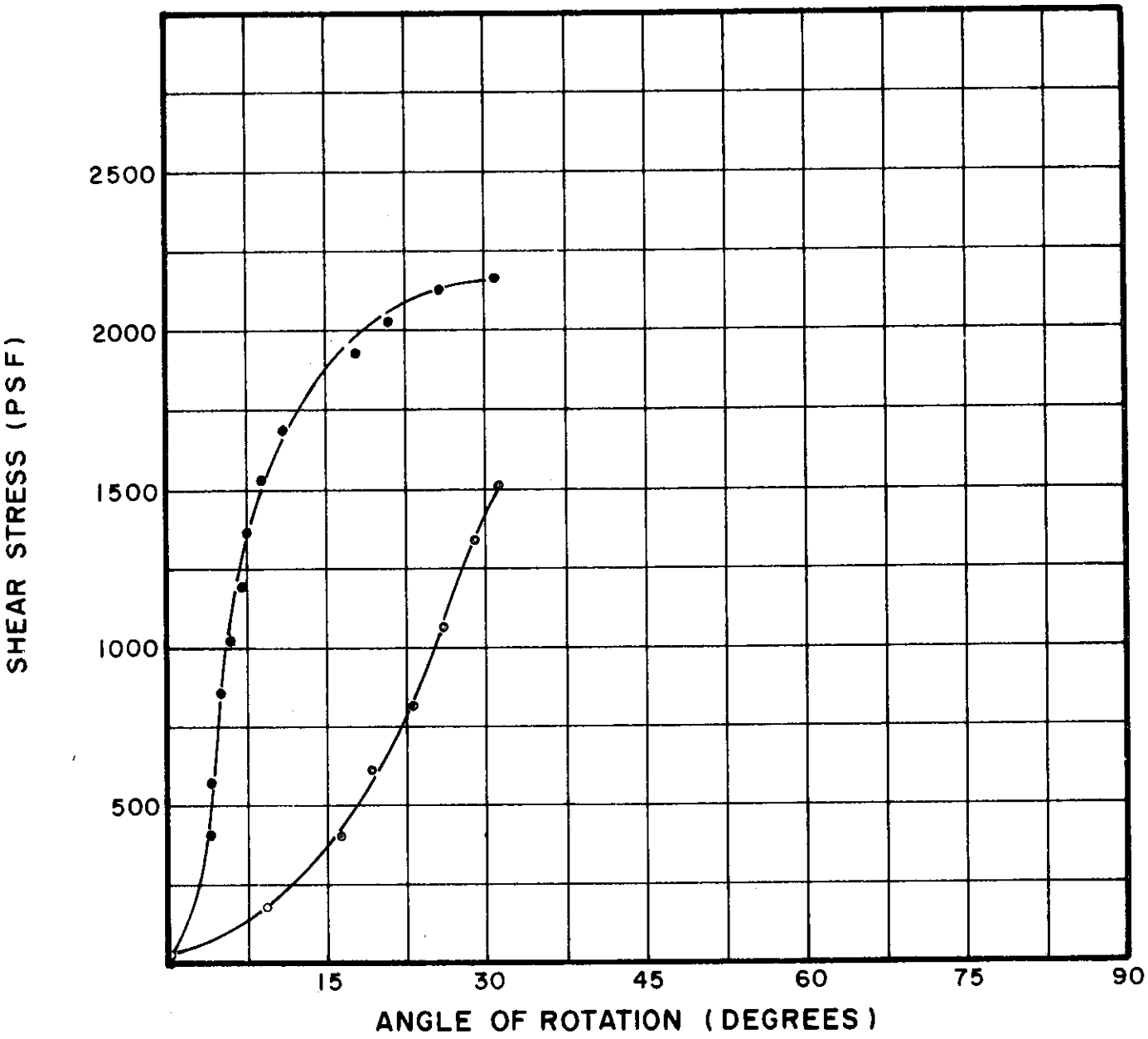
DEPTH 28.9' - 29.2'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-345

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES			
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%) PL(%)	SOIL DESCRIPTION
VSIII.1 ●	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY(CL)
rVSIII.1 ○	.50	.25	6.0	23.6	101		SILTY CLAY, SANDY(CL)

BORING NO. 52

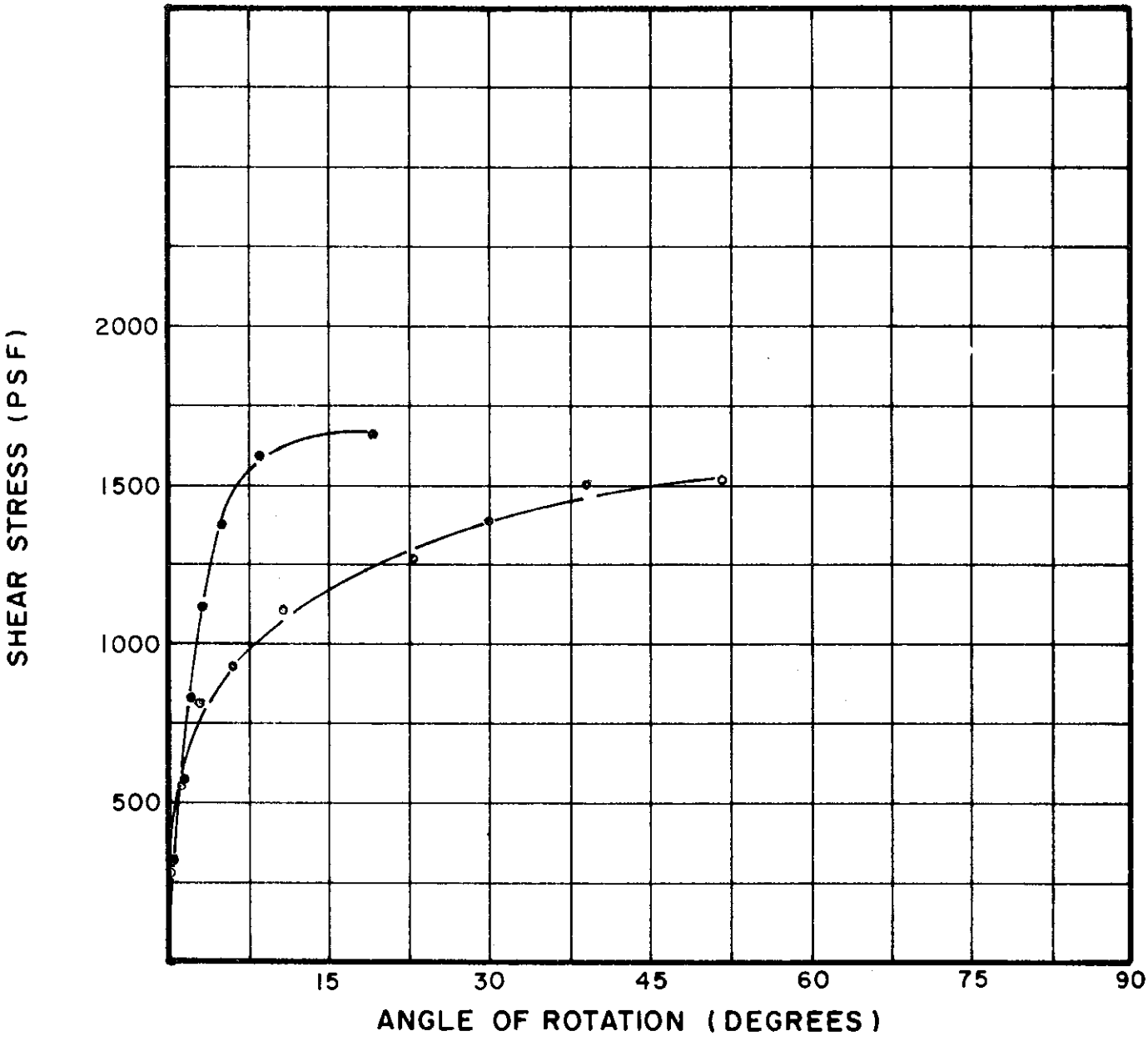
SAMPLE NO. 6

DEPTH 49.6' - 49.8'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
VSI15.1 ●	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)
VSI15.1 ○	.50	.25	6.0	26.4	96	39	18	SILTY CLAY, SANDY (CL)

BORING NO. 52

SAMPLE NO. 10

DEPTH 89.1' - 89.4'

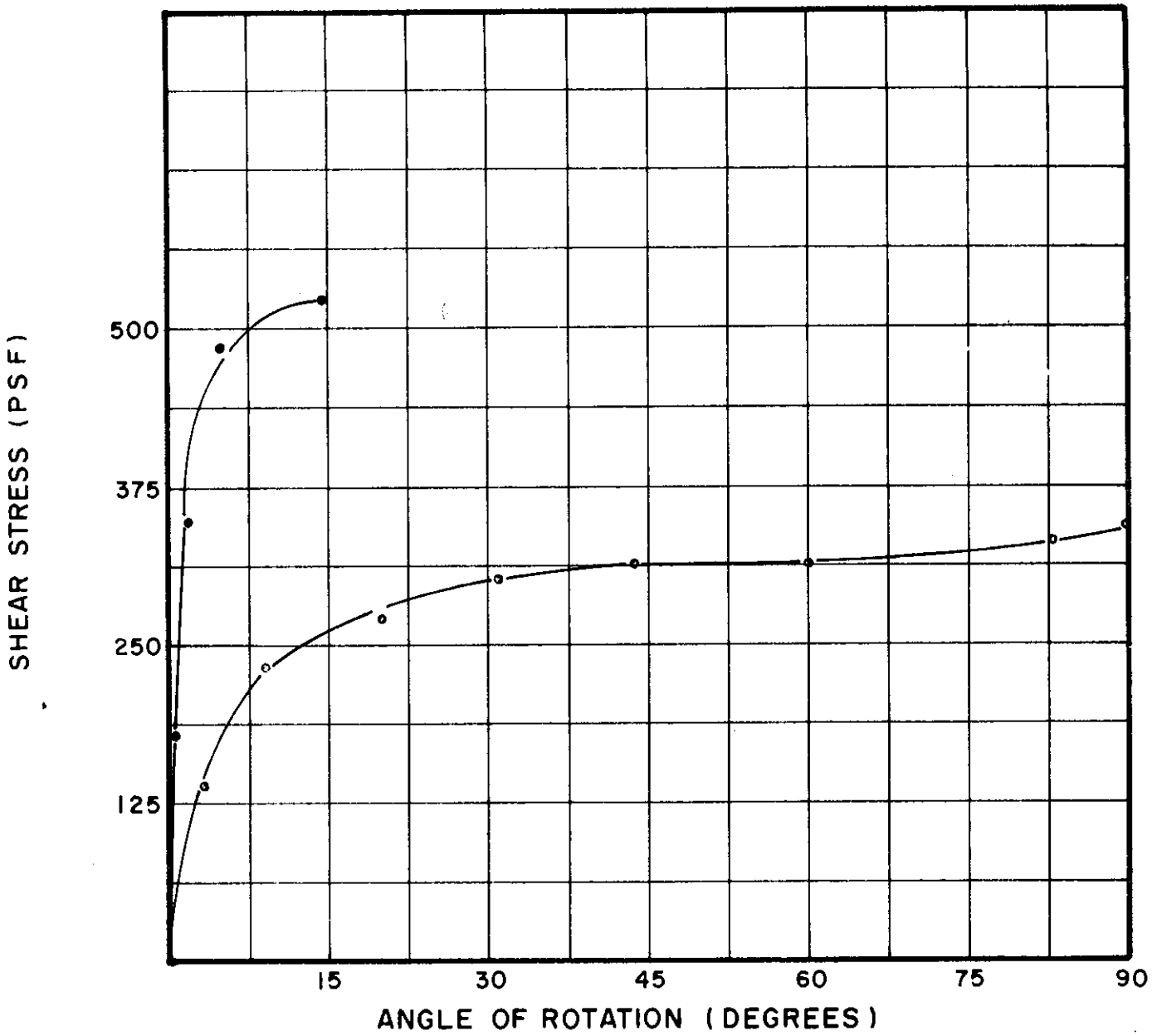
LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-347

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
VS99.2 ●	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)
VS99.2 ○	.50	.25	6.0	27.3	94	43	18	SILTY CLAY (CL)

BORING NO. 53

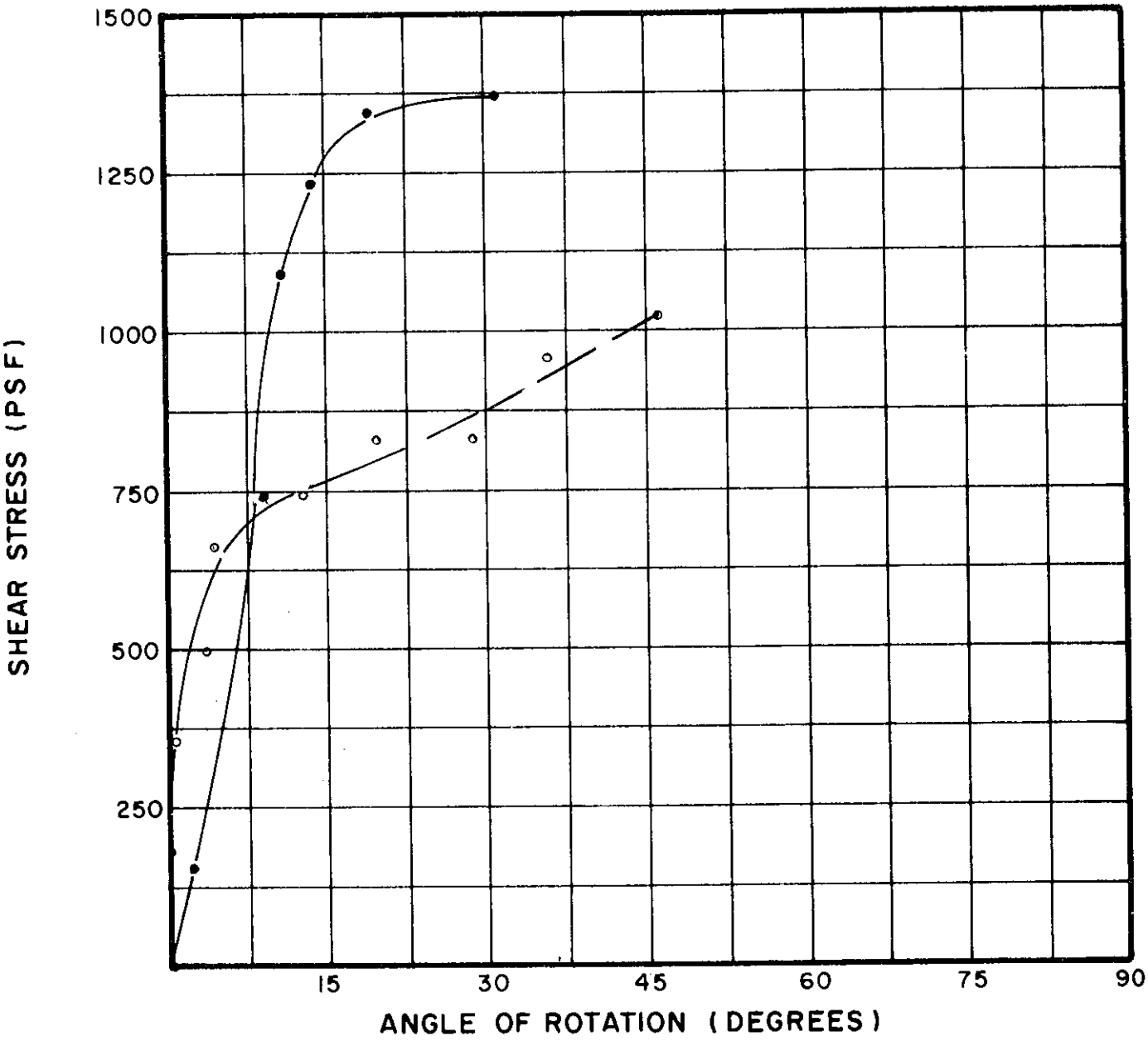
SAMPLE NO. 6

DEPTH 49.7' - 50.0'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
VSI01.1 ●	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)
VSI01.1 ○	.50	.25	6.0	27.9	95	39	21	SILTY CLAY (CL)

BORING NO. 53

SAMPLE NO. 9

DEPTH 79.5' - 79.8'

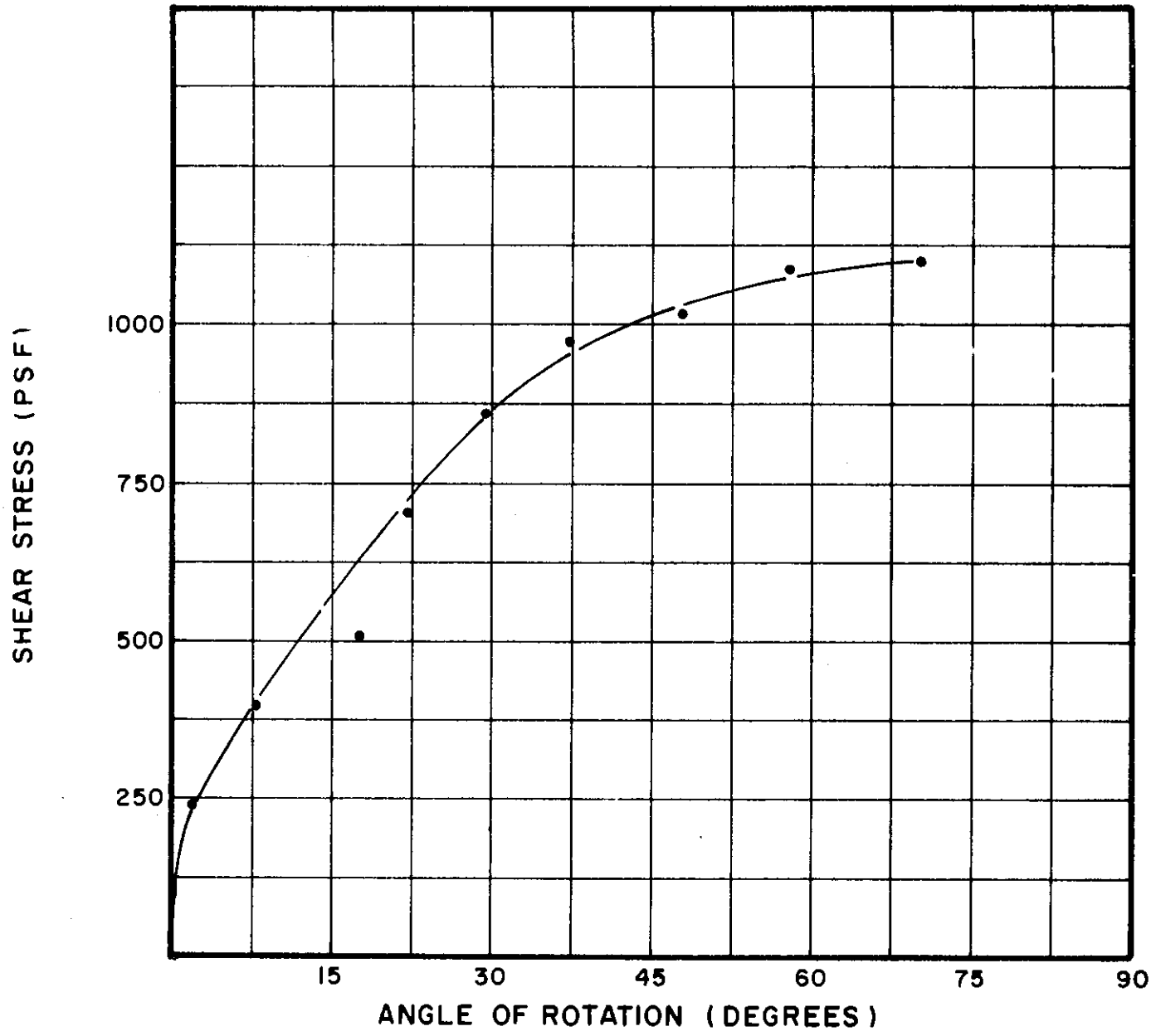
LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-349

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL(%)	SOIL DESCRIPTION
VS398.1 •	.50	.25	6.0	27.5	92	38	17	SILTY CLAY, SANDY (CL)

BORING NO. 54

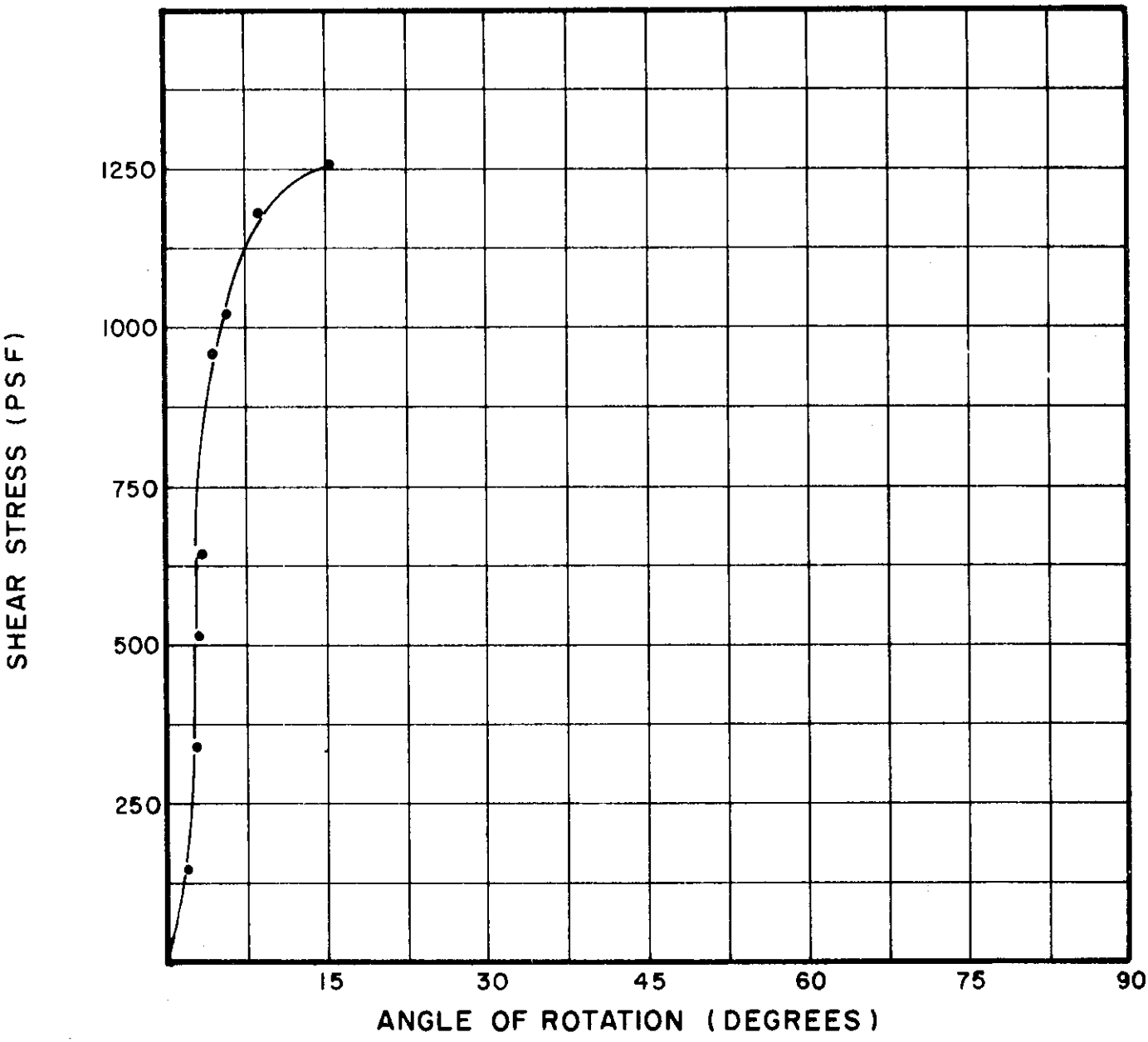
SAMPLE NO. 5

DEPTH 59.7' - 60.0'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
VS76.1 •	.50	.25	6.0	32.8	90	48	20	SILTY CLAY (CL-CH)

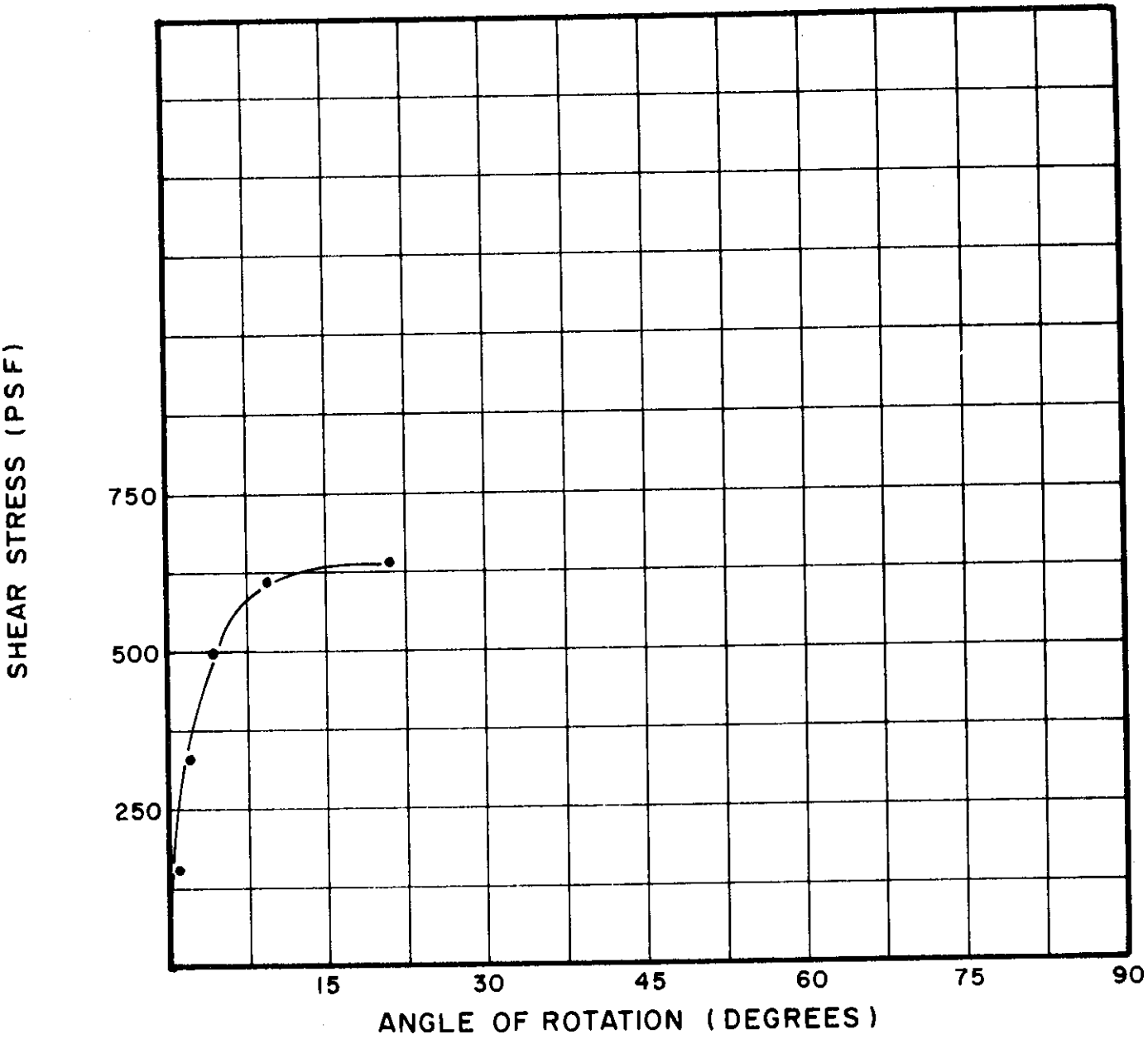
BORING NO. 59

SAMPLE NO. 3

DEPTH 18.5' - 18.8'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL(%)	PL(%)	SOIL DESCRIPTION
VS78.1 •	.50	.25	6.0	25.6	96	38	18	SILTY CLAY, SANDY (CL)

BORING NO. 59

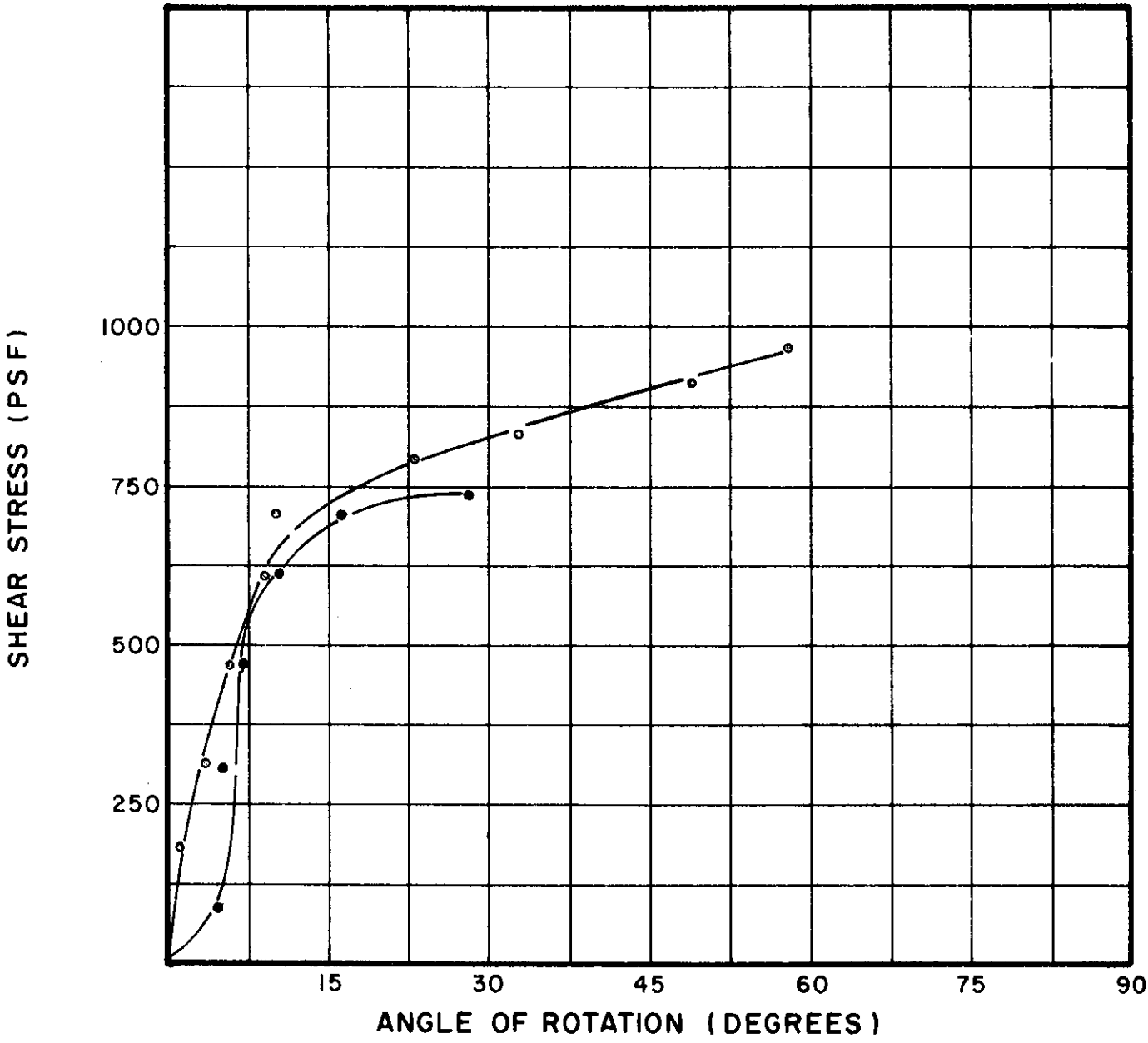
SAMPLE NO. 5

DEPTH 39.4' - 39.7'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255



TEST NO.	TEST DATA			SOIL PROPERTIES				
	DIAMETER OF VANE (INCHES)	HEIGHT OF VANE (INCHES)	RATE OF ROTATION (°/MIN)	WATER CONTENT (%)	UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL (%)	PL (%)	SOIL DESCRIPTION
VS80.1 ●	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)
rVS80.1 ○	.50	.25	6.0	24.1	102	36	18	SILTY CLAY, SANDY (CL)

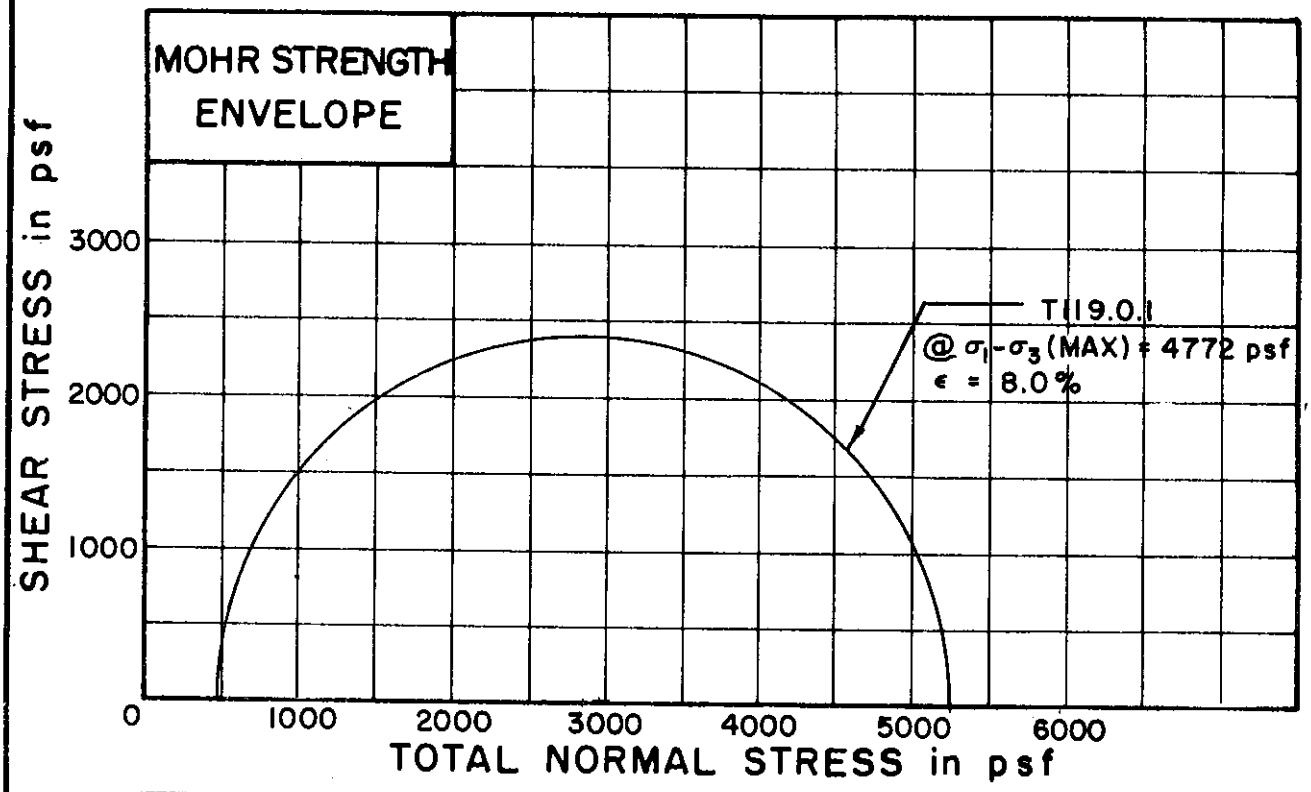
BORING NO. 59

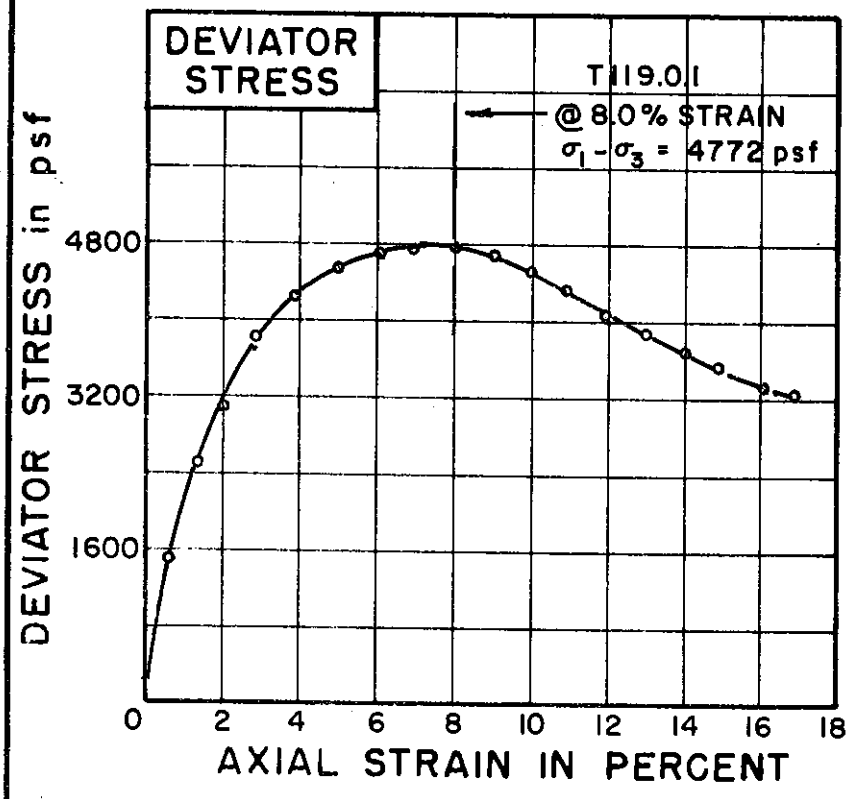
SAMPLE NO. 7

DEPTH 59.0' - 59.3'

LABORATORY VANE SHEAR TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II





TEST NO./ SYMBOL		T119.0.1		
INITIAL WATER CONTENT	w_o	25.4%		
DRY DENSITY pcf	γ_d	101		
SAMPLE DIAMETER in.	D_o	1.40		
SAMPLE HEIGHT in.	H_o	3.41		
CONFINING PRESSURE psf	σ_3	475		
RATE OF STRAIN PERCENT/MINUTE		0.26		
FINAL WATER CONTENT	w_f	25.1%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 15

SAMPLE NO. 2

DEPTH 3.7' TO 4.1'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 45 PLASTIC LIMIT 21

UNCONSOLIDATED UNDRAINED

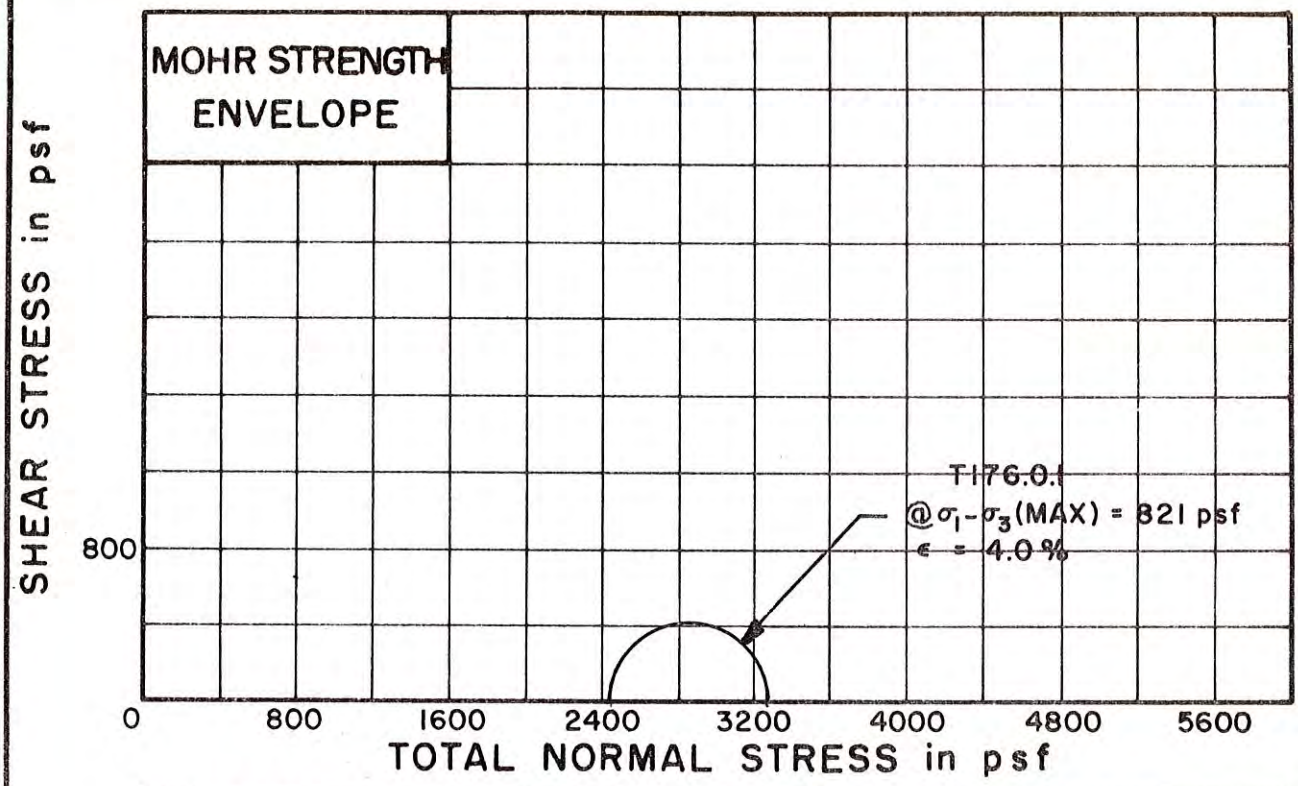
TRIAXIAL COMPRESSION TESTS

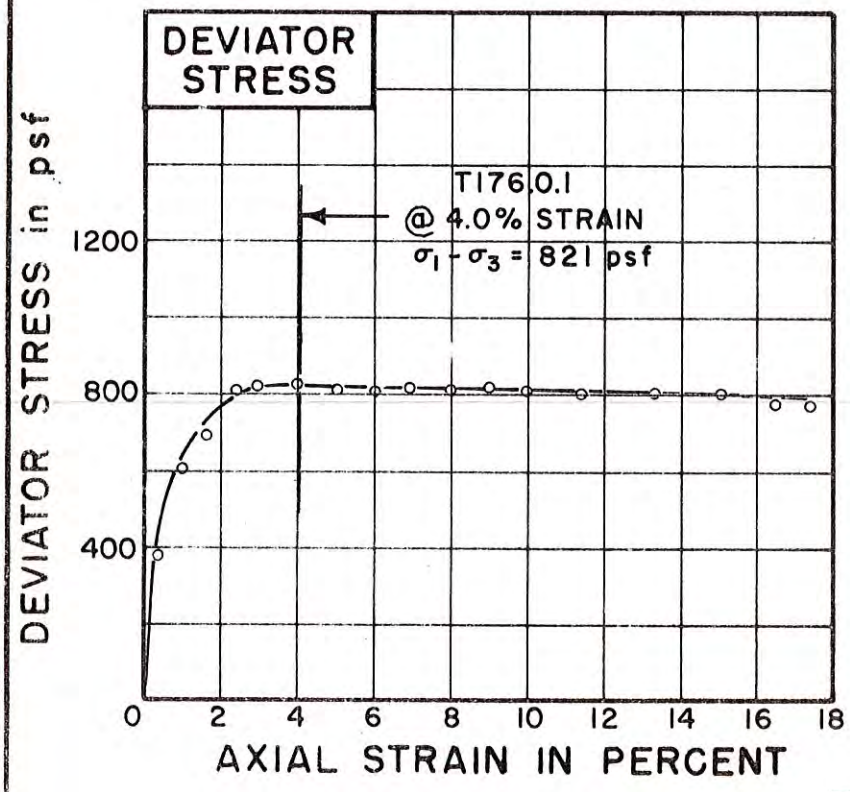
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-355





TEST NO./ SYMBOL		T176.0.1		
INITIAL WATER CONTENT	w_o	39.9%		
DRY DENSITY pcf	γ_d	83		
SAMPLE DIAMETER in.	D_o	1.37		
SAMPLE HEIGHT in.	H_o	3.29		
CONFINING PRESSURE psf	σ_3	2448		
RATE OF STRAIN PERCENT/MINUTE		0.26		
FINAL WATER CONTENT	w_f	39.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 18

SAMPLE NO. 3

DEPTH 20.6' TO 20.9'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 44 PLASTIC LIMIT 21

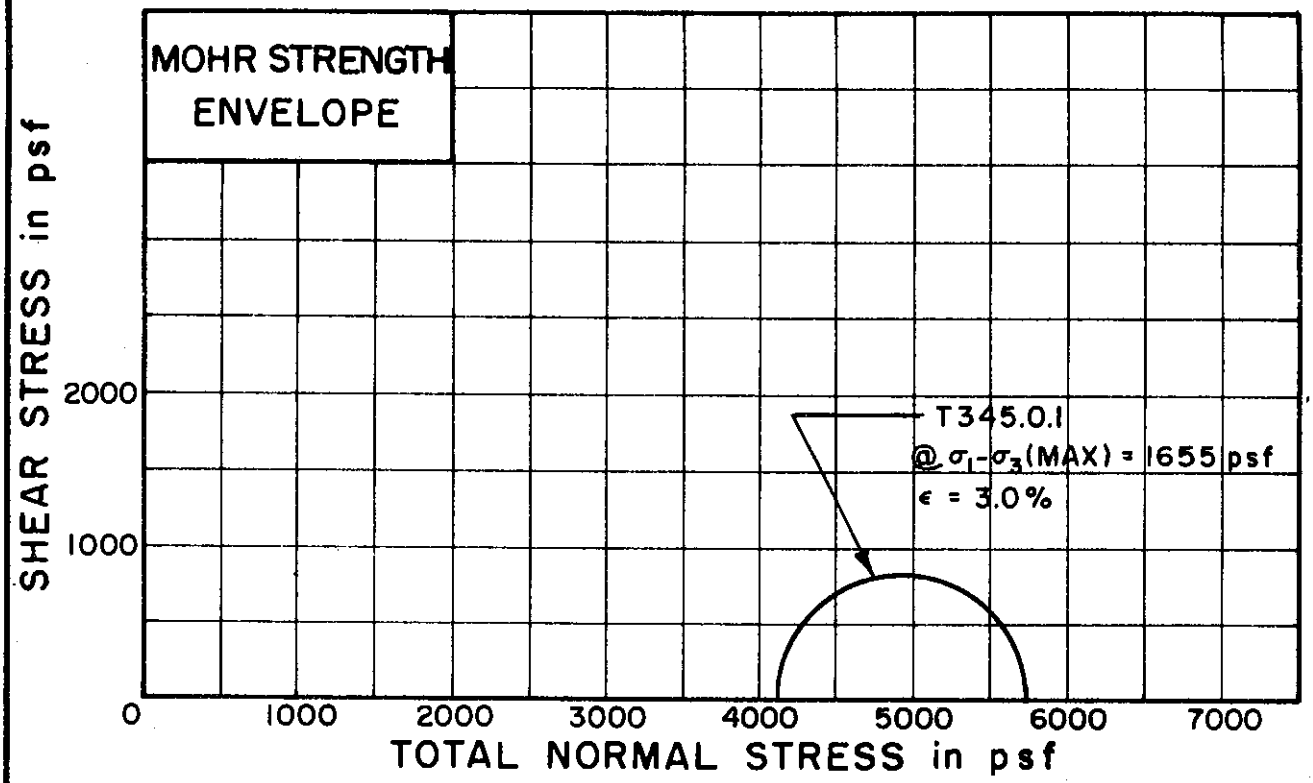
UNCONSOLIDATED UNDRAINED

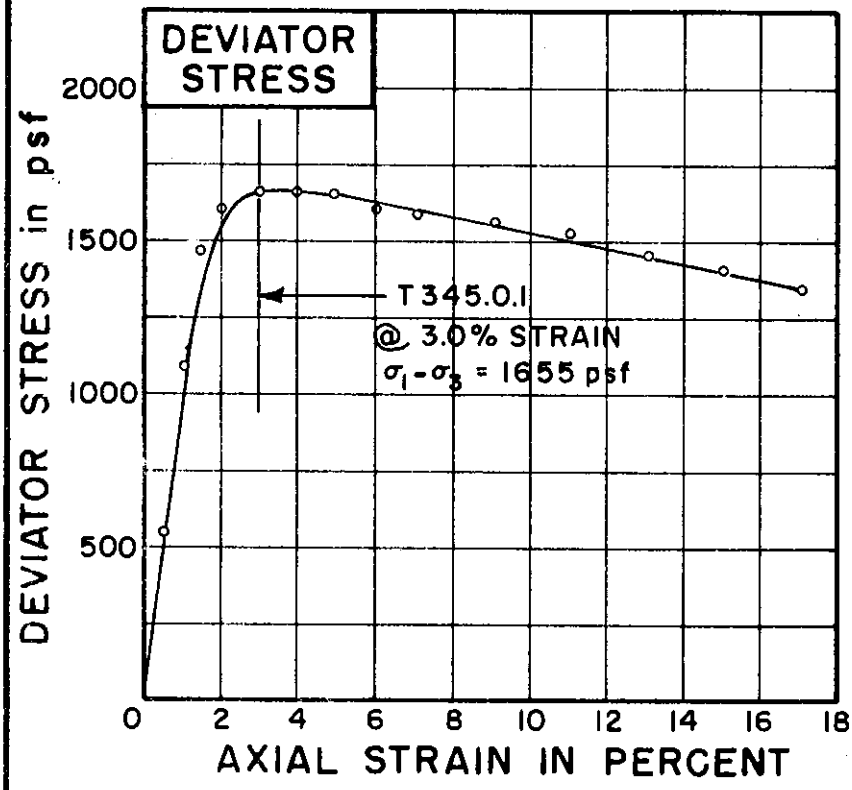
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255





TEST NO./ SYMBOL		T345.0.1		
INITIAL WATER CONTENT	w_o	31.0%		
DRY DENSITY pcf	γ_d	92		
SAMPLE DIAMETER in.	D_o	1.41		
SAMPLE HEIGHT in.	H_o	3.34		
CONFINING PRESSURE psf	σ_3	4104		
RATE OF STRAIN PERCENT/MINUTE		0.27		
FINAL WATER CONTENT	w_f	30.8%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 18

SAMPLE NO. 6

DEPTH 51.4' TO 51.7'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

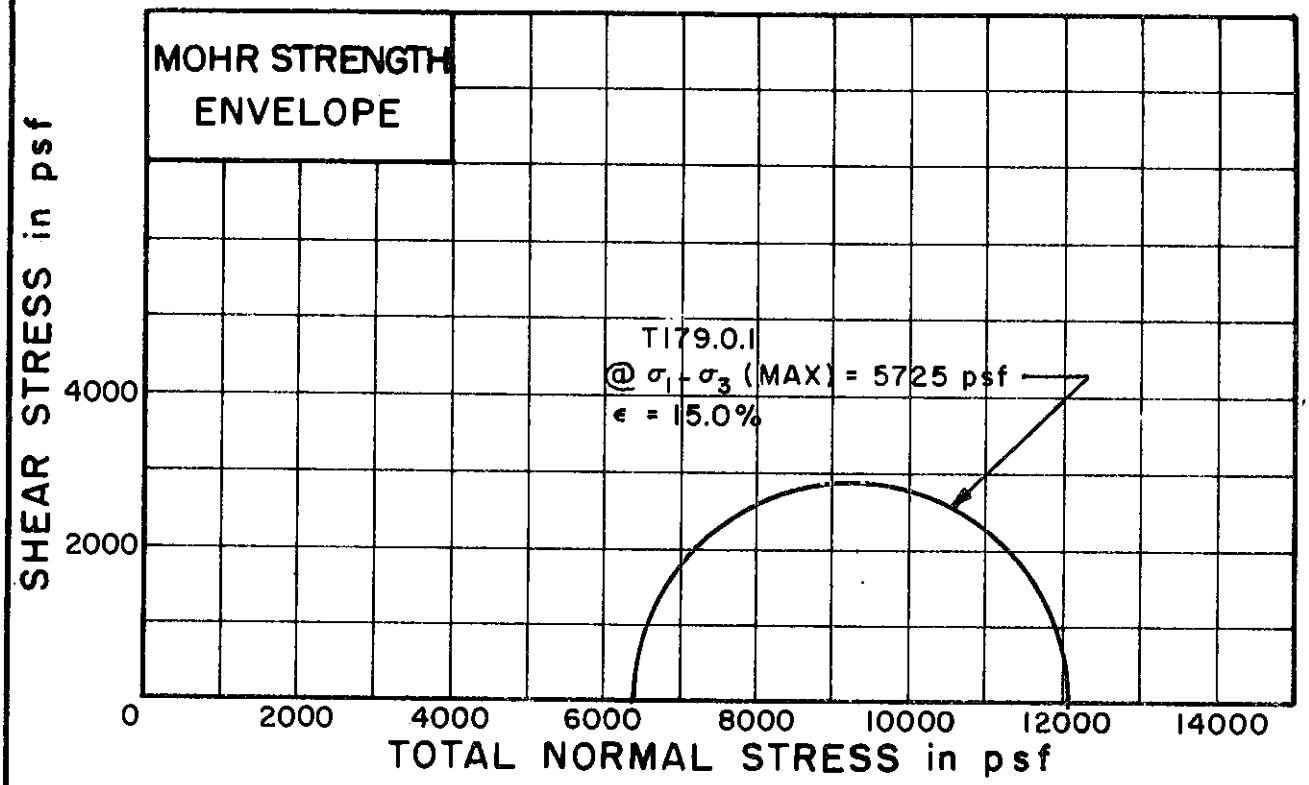
THE DETROIT EDISON COMPANY

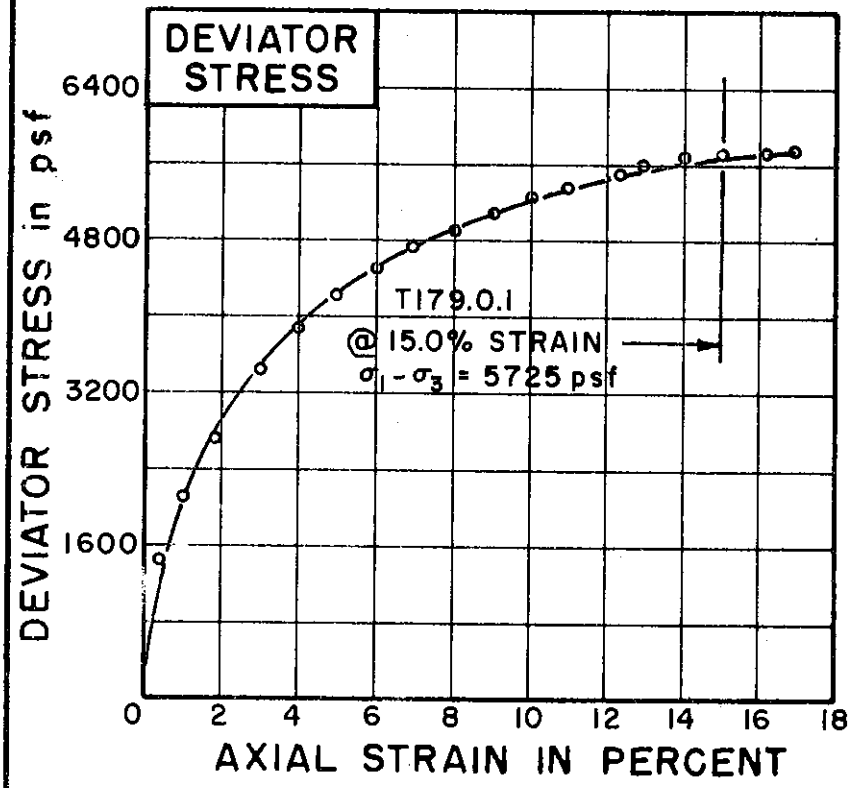
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-357





TEST NO./ SYMBOL		T179.0.1		
INITIAL WATER CONTENT	w_o	17.3%		
DRY DENSITY pcf	γ_d	111		
SAMPLE DIAMETER in.	D_o	1.36		
SAMPLE HEIGHT in.	H_o	3.22		
CONFINING PRESSURE psf	σ_3	6336		
RATE OF STRAIN PERCENT/MINUTE		0.26		
FINAL WATER CONTENT	w_f	17.2%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 18

SAMPLE NO. 10

DEPTH 88.8' TO 90.1'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 29 PLASTIC LIMIT 15

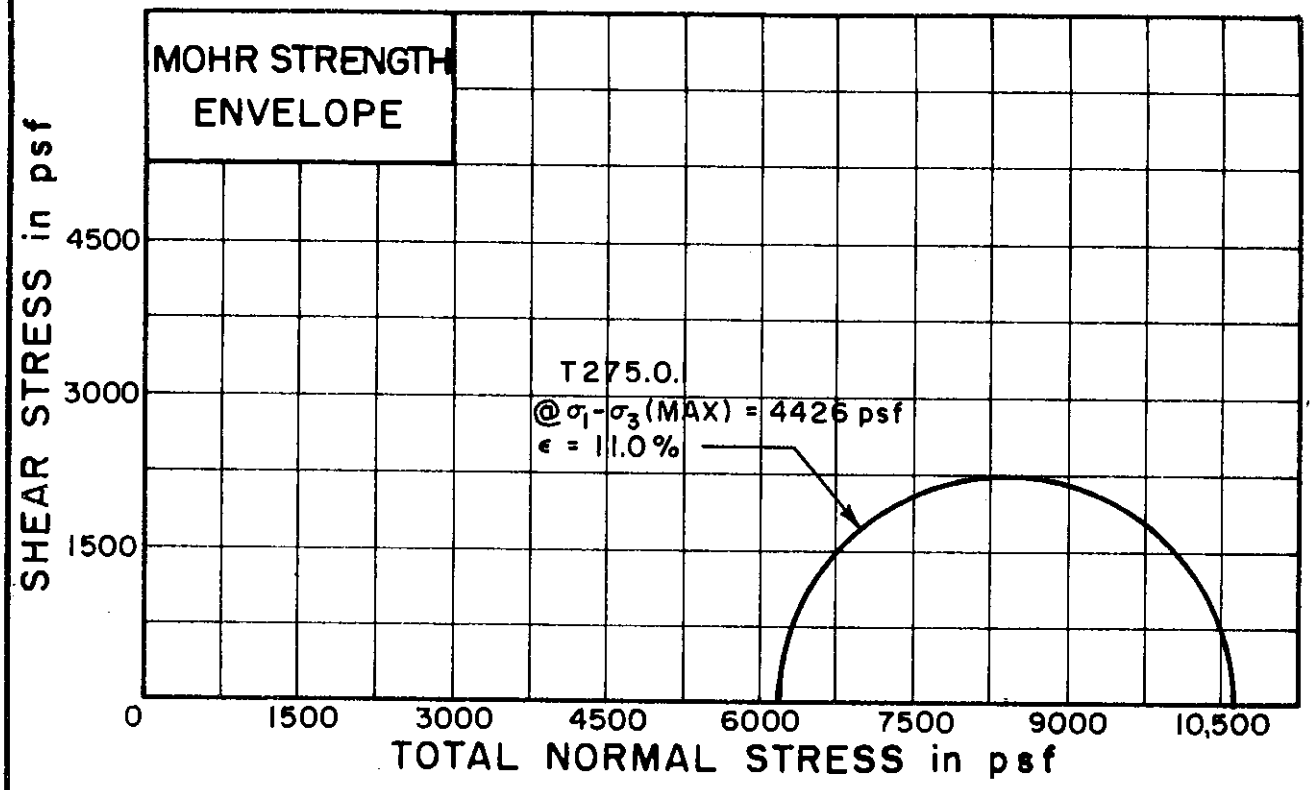
UNCONSOLIDATED UNDRAINED

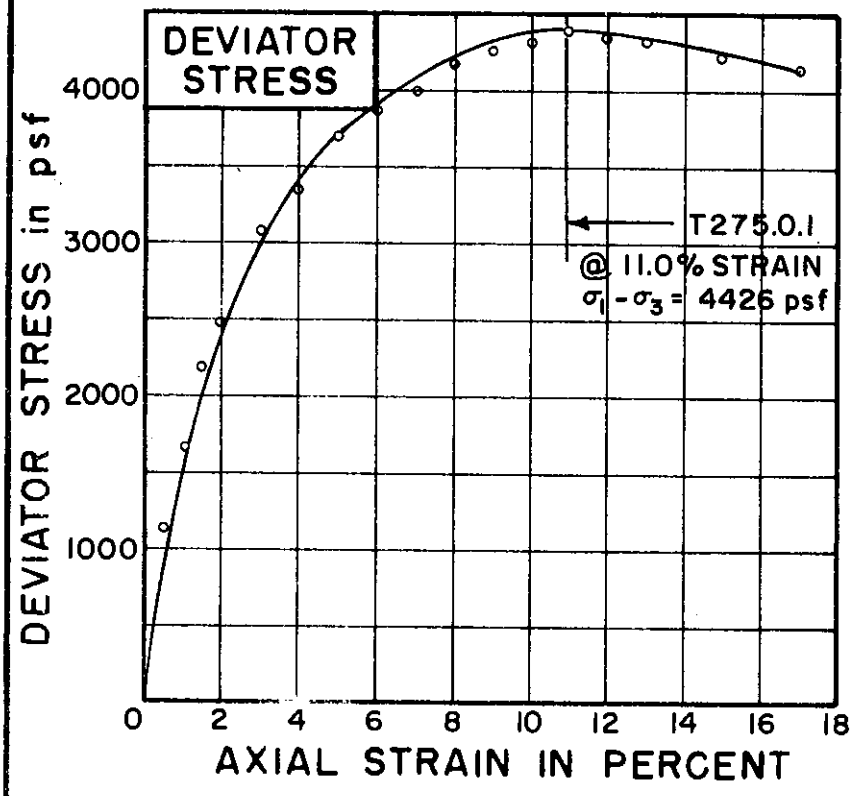
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





TEST NO./ SYMBOL		T275.0.1		
INITIAL WATER CONTENT	w_o	22.5%		
DRY DENSITY pcf	γ_d	104		
SAMPLE DIAMETER in.	D_o	1.39		
SAMPLE HEIGHT in.	H_o	3.35		
CONFINING PRESSURE psf	σ_3	6192		
RATE OF STRAIN PERCENT/MINUTE		0.27		
FINAL WATER CONTENT	w_f	22.4%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 25

SAMPLE NO. 10

DEPTH 88.9' TO 89.2'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 19

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

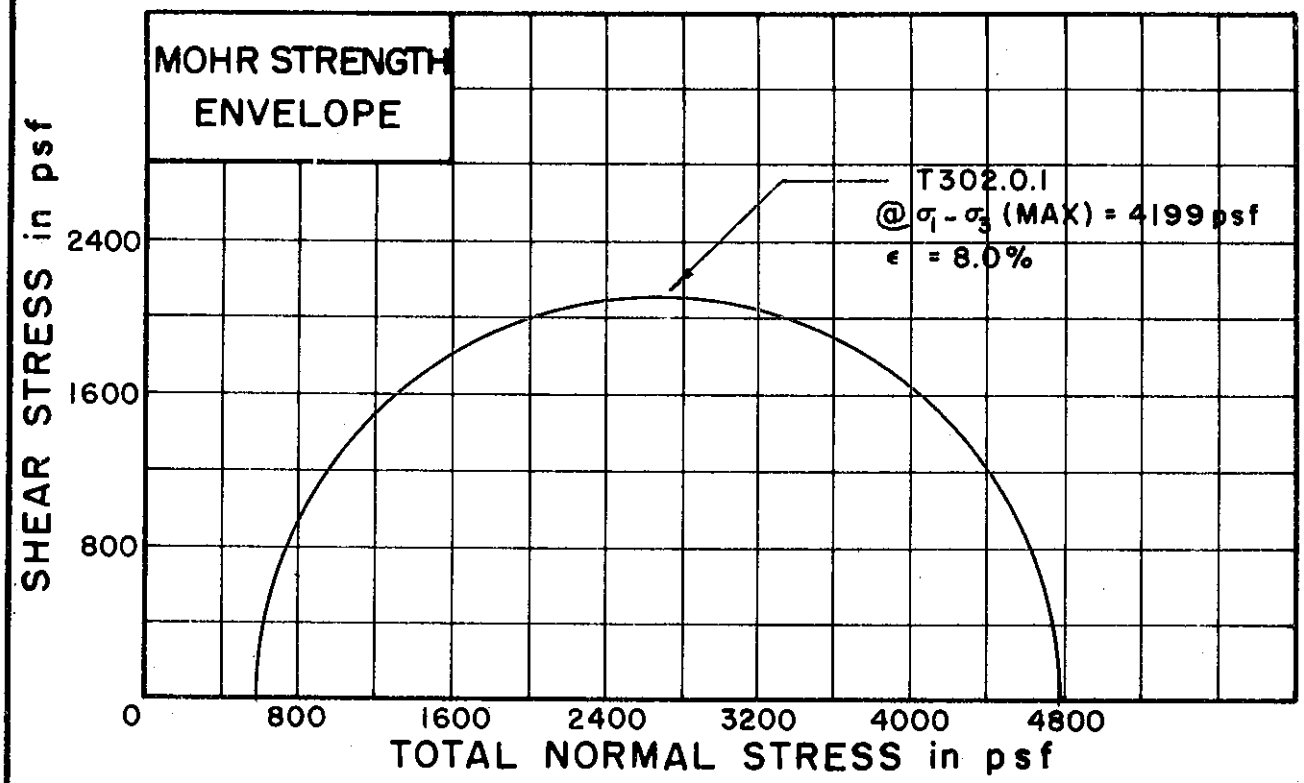
THE DETROIT EDISON COMPANY

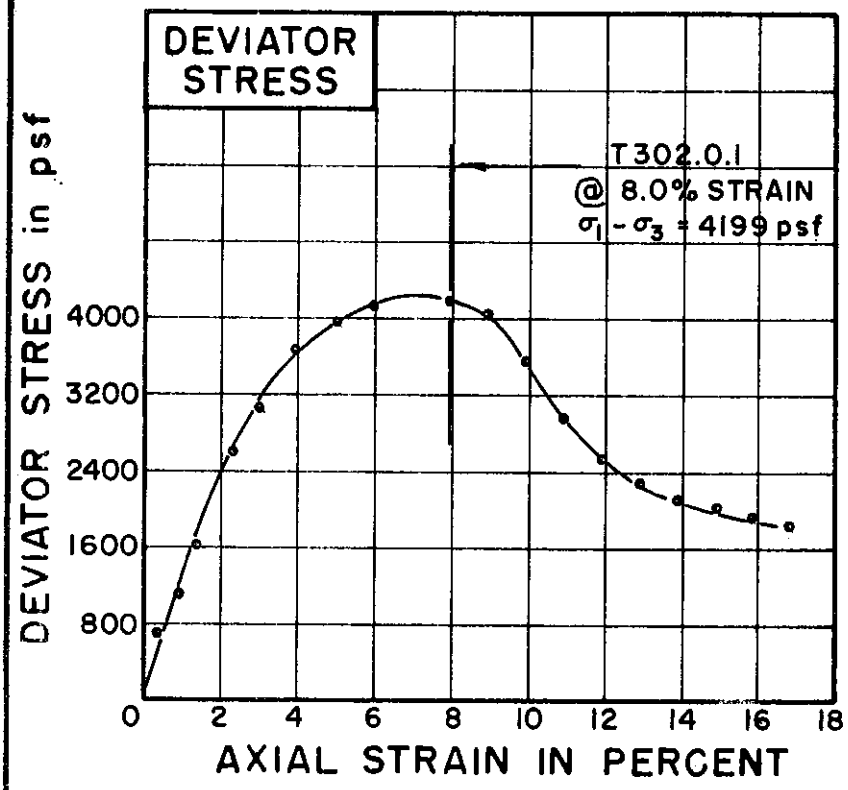
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-359





TEST NO./ SYMBOL		T302.0.		
INITIAL WATER CONTENT	w_o	24.9%		
DRY DENSITY pcf	γ_d	103		
SAMPLE DIAMETER in.	D_o	1.40		
SAMPLE HEIGHT in.	H_o	3.33		
CONFINING PRESSURE psf	σ_3	576		
RATE OF STRAIN PERCENT/MINUTE		.25		
FINAL WATER CONTENT	w_f	24.7%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 27

SAMPLE NO. 2

DEPTH 4.5' TO 4.8'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 24

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

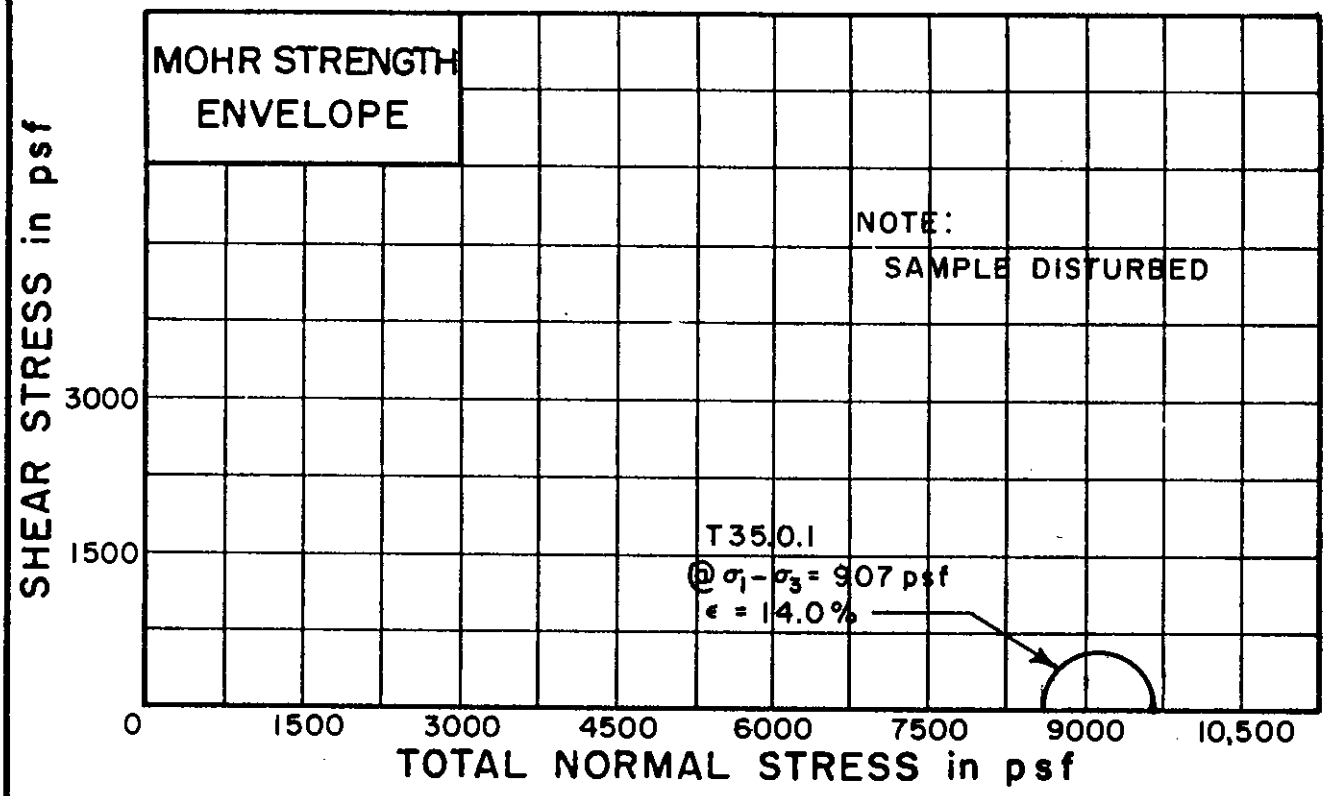
THE DETROIT EDISON COMPANY

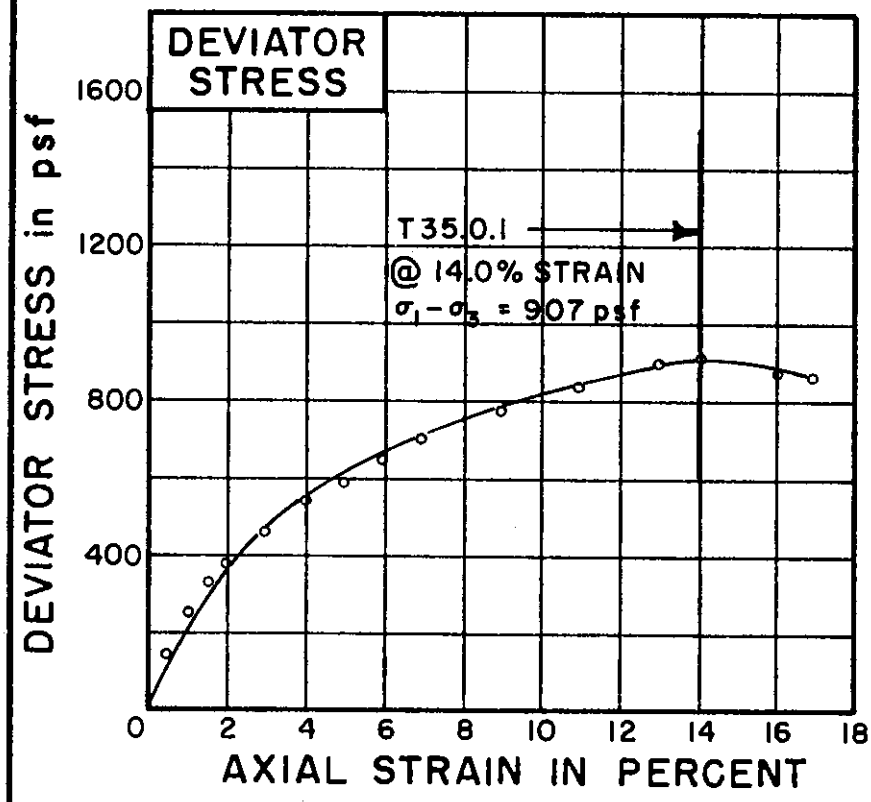
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

C-360





TEST NO./ SYMBOL		T35.0.1		
INITIAL WATER CONTENT	w_o	19.6%		
DRY DENSITY pcf	γ_d	105		
SAMPLE DIAMETER in.	D_o	1.41		
SAMPLE HEIGHT in.	H_o	3.50		
CONFINING PRESSURE psf	σ_3	8654		
RATE OF STRAIN PERCENT/MINUTE		0.26		
FINAL WATER CONTENT	w_f	19.6%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 41

SAMPLE NO. 17

DEPTH 72.9' TO 73.2'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 25% PLASTIC LIMIT 15%

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

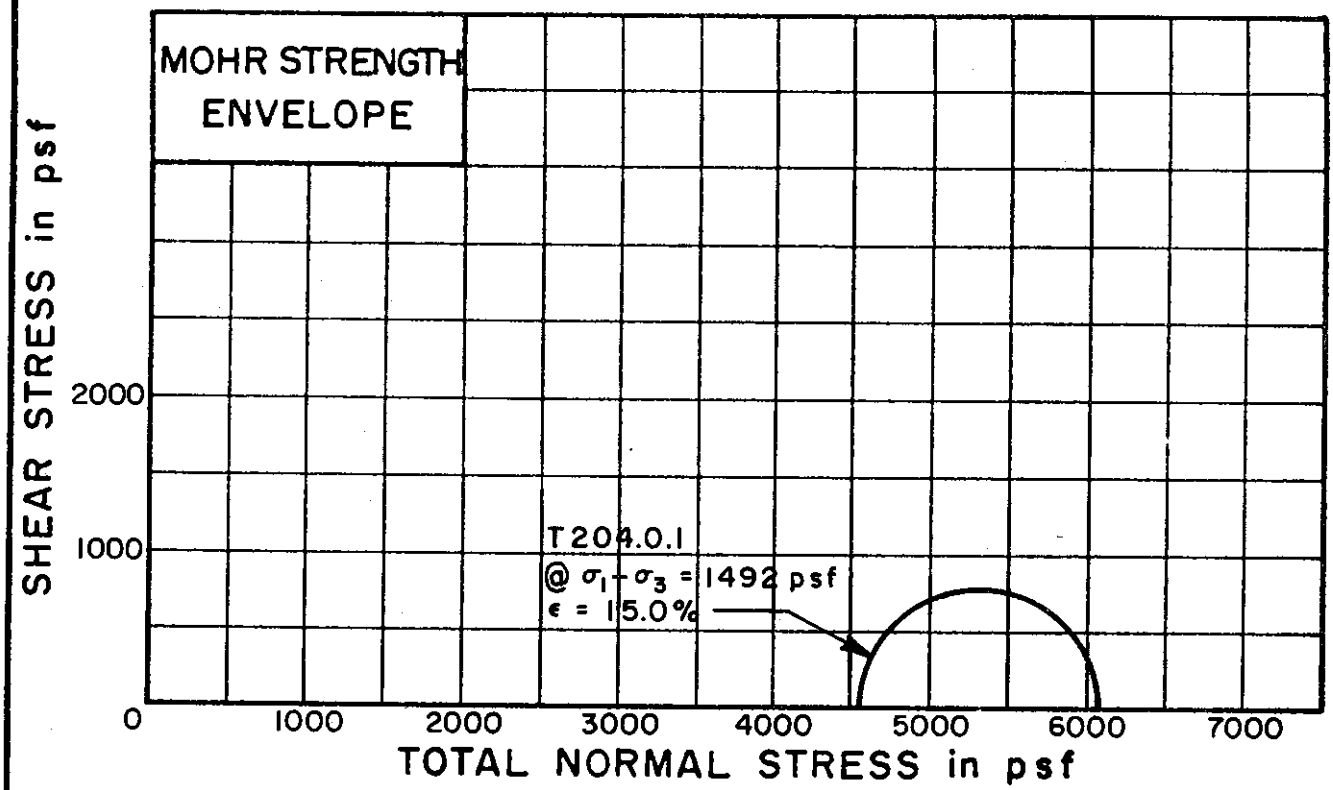
THE DETROIT EDISON COMPANY

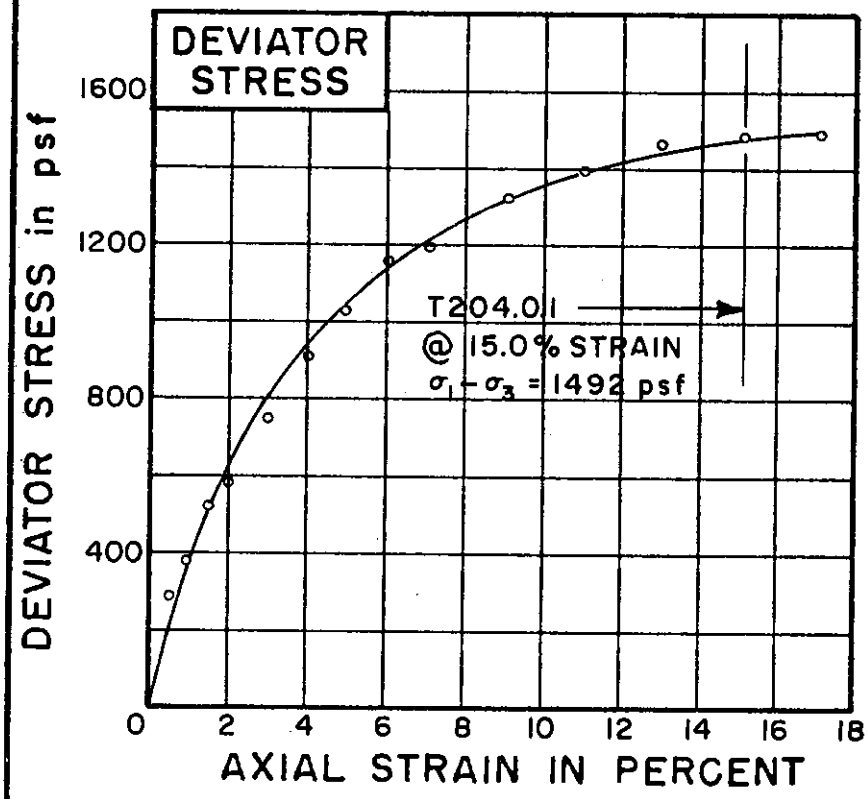
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-361





TEST NO./ SYMBOL	T204.0.1		
INITIAL WATER CONTENT	w_o	26.3%	
DRY DENSITY pcf	γ_d	99	
SAMPLE DIAMETER in.	D_o	1.40	
SAMPLE HEIGHT in.	H_o	3.43	
CONFINING PRESSURE psf	σ_3	4608	
RATE OF STRAIN PERCENT/MINUTE		0.26	
FINAL WATER CONTENT	w_f	25.8%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 48

SAMPLE NO. 14

DEPTH 60.8' TO 61.1'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 34% PLASTIC LIMIT 16%

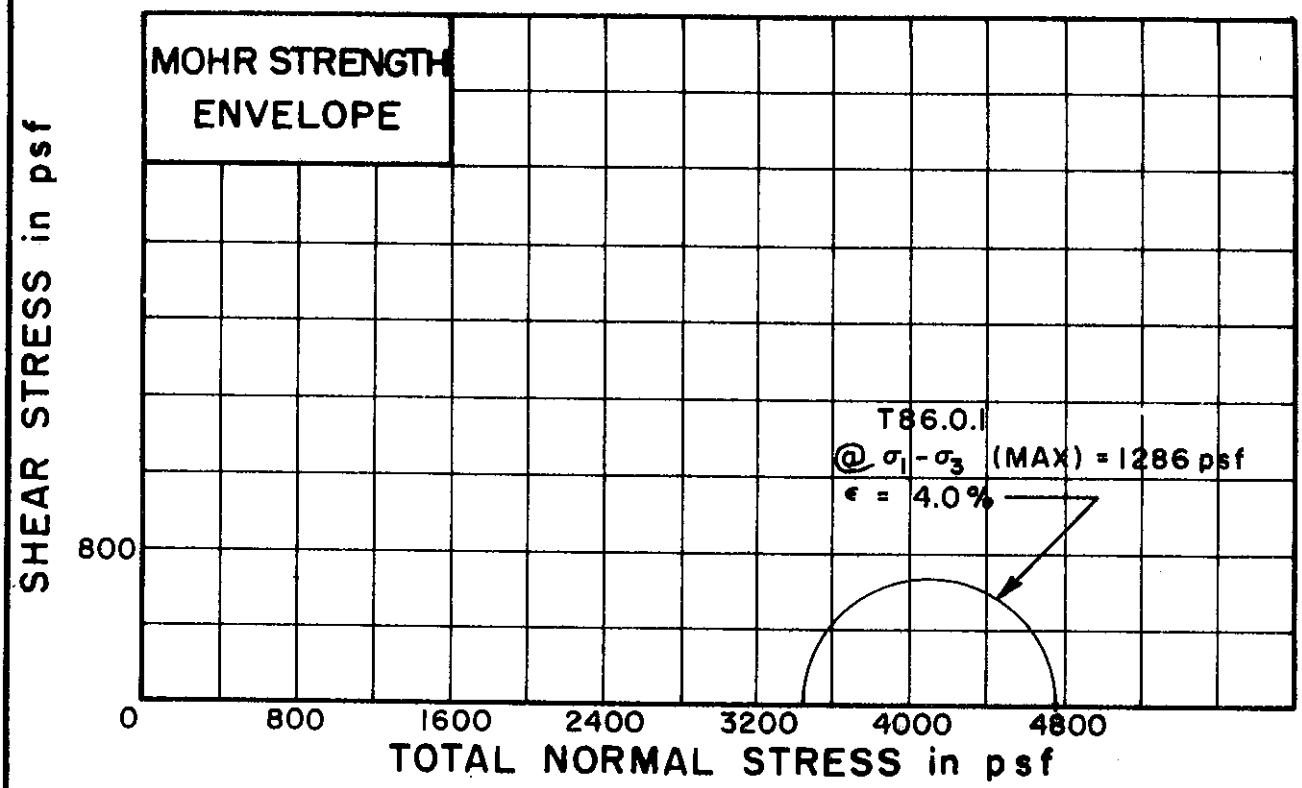
UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

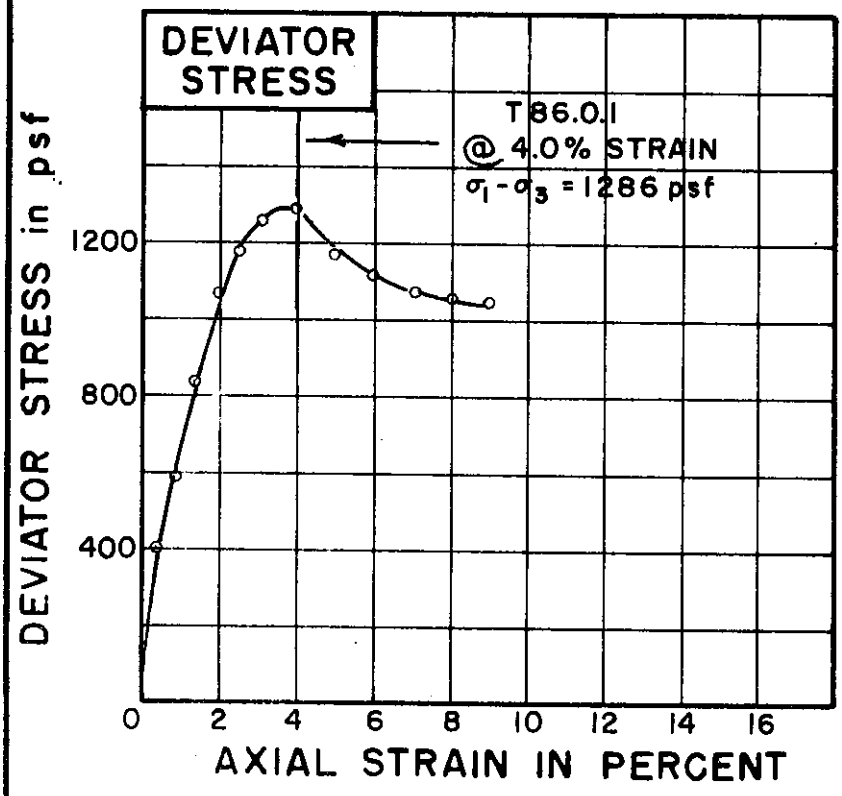
THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING
C-362





TEST NO./ SYMBOL	T86.0.1		
INITIAL WATER CONTENT	w_o	46.2%	
DRY DENSITY pcf	γ_d	74	
SAMPLE DIAMETER in.	D_o	1.40	
SAMPLE HEIGHT in.	H_o	3.27	
CONFINING PRESSURE psf	σ_3	3456	
RATE OF STRAIN PERCENT/MINUTE		.25	
FINAL WATER CONTENT	w_f	46.3%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 8

DEPTH 38.1' TO 38.4'

SOIL DESCRIPTION: SILTY CLAY (CH)

LIQUID LIMIT 55 PLASTIC LIMIT 23

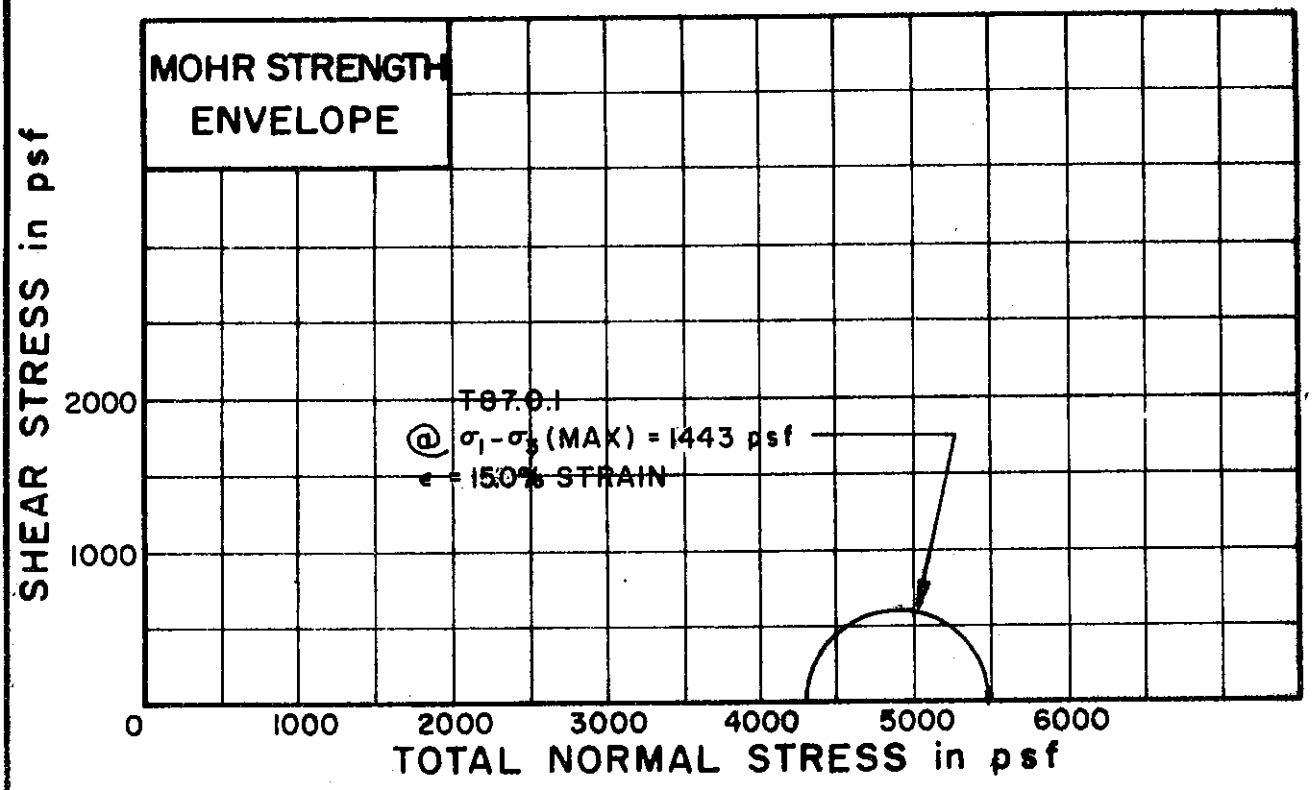
UNCONSOLIDATED UNDRAINED

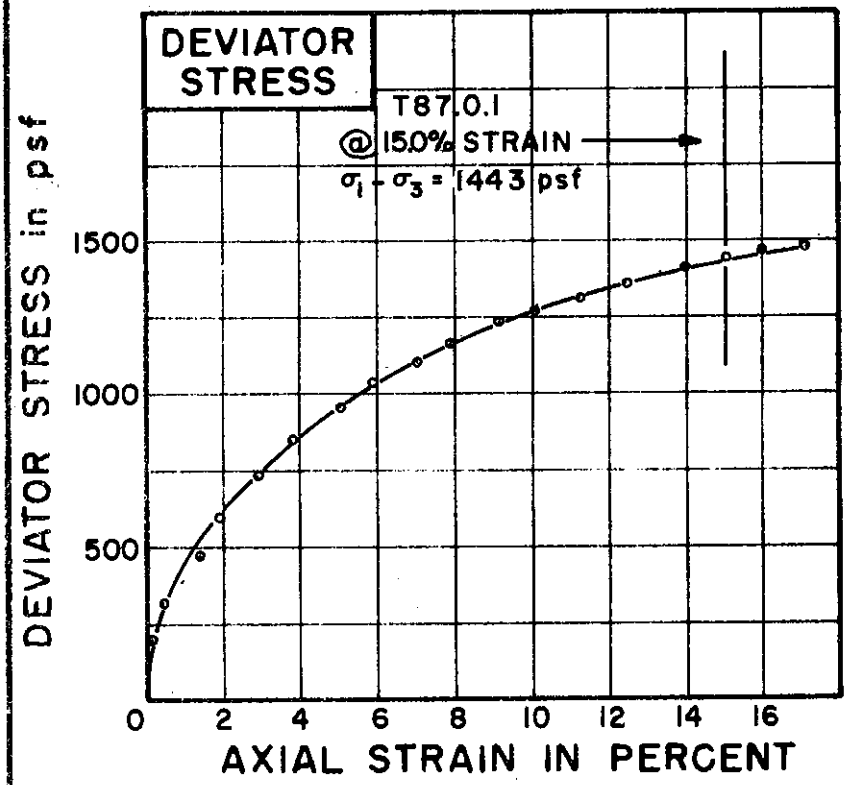
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255
C-363





TEST NO./ SYMBOL		T87.0.1		
INITIAL WATER CONTENT	w_o	23.2		
DRY DENSITY pcf	γ_d	100		
SAMPLE DIAMETER in.	D_o	1.40		
SAMPLE HEIGHT in.	H_o	3.12		
CONFINING PRESSURE psf	σ_3	4320		
RATE OF STRAIN PERCENT/MINUTE		.25		
FINAL WATER CONTENT	w_f	23.0		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 50

SAMPLE NO. 10

DEPTH 49.3' TO 49.6'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 16

UNCONSOLIDATED UNDRAINED

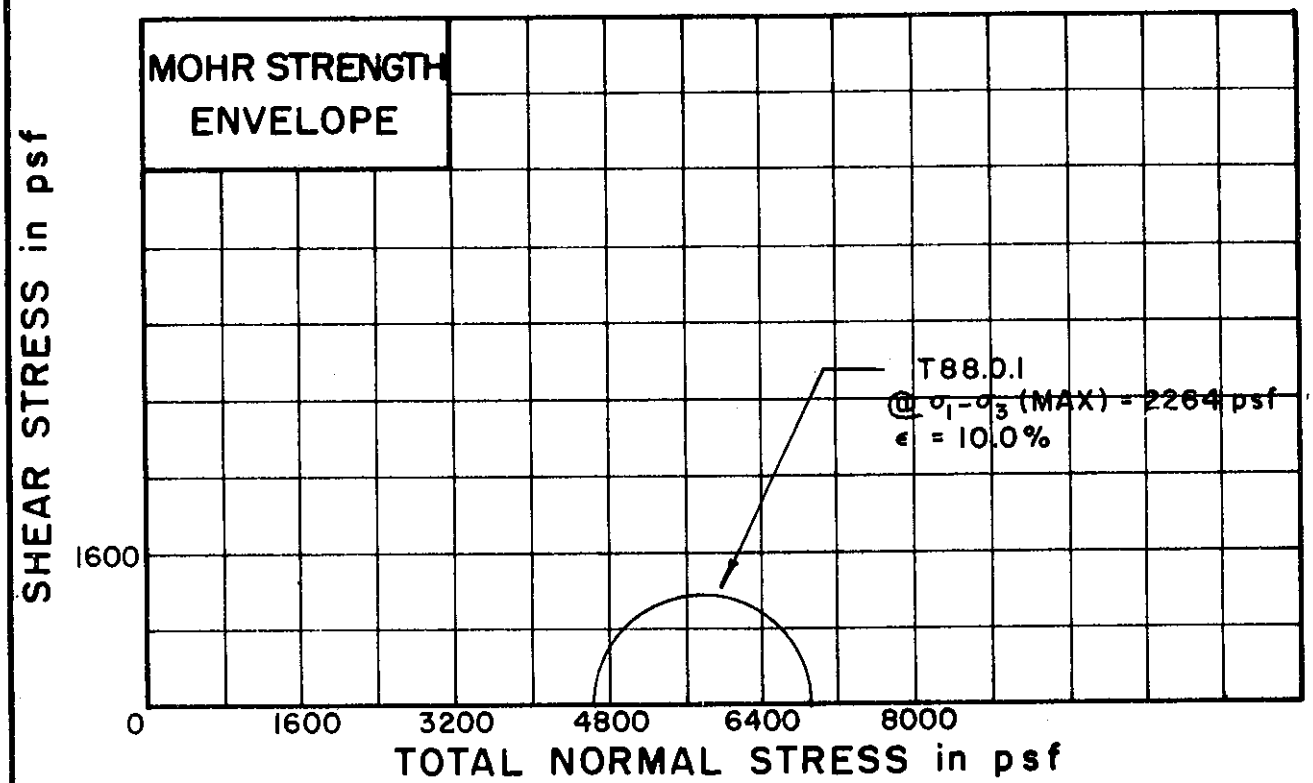
TRIAXIAL COMPRESSION TESTS

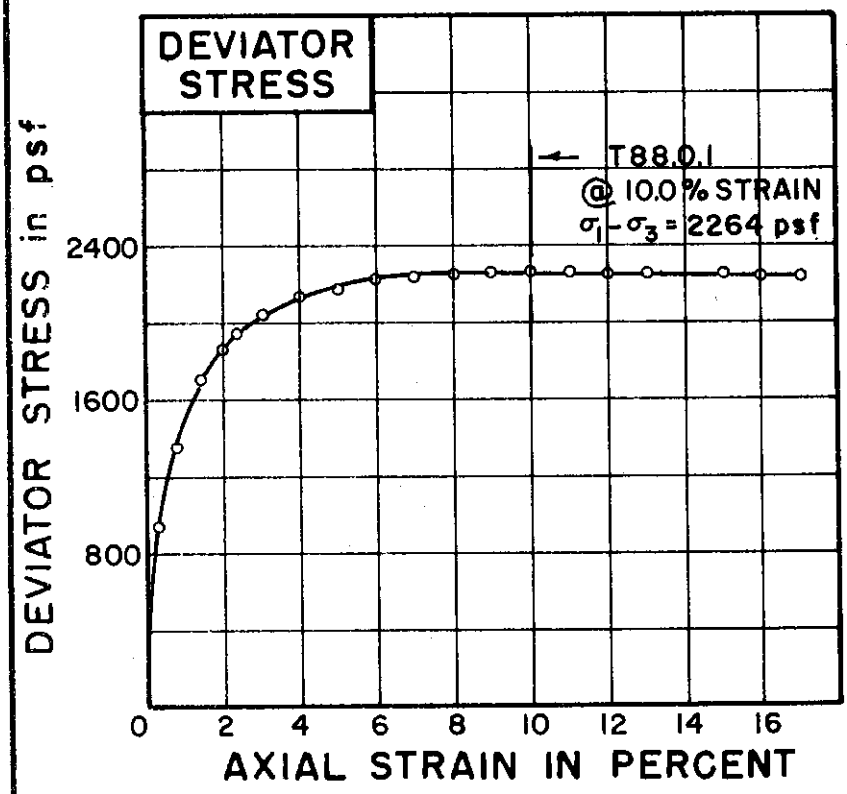
THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





TEST NO./ SYMBOL	T88.0.1		
INITIAL WATER CONTENT	w_o	24.3	
DRY DENSITY pcf	γ_d	101	
SAMPLE DIAMETER in.	D_o	1.38	
SAMPLE HEIGHT in.	H_o	3.11	
CONFINING PRESSURE psf	σ_3	4608	
RATE OF STRAIN PERCENT/MINUTE		.26	
FINAL WATER CONTENT	w_f	23.5	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 50

SAMPLE NO. 12

DEPTH 59.1' TO 59.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED

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THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

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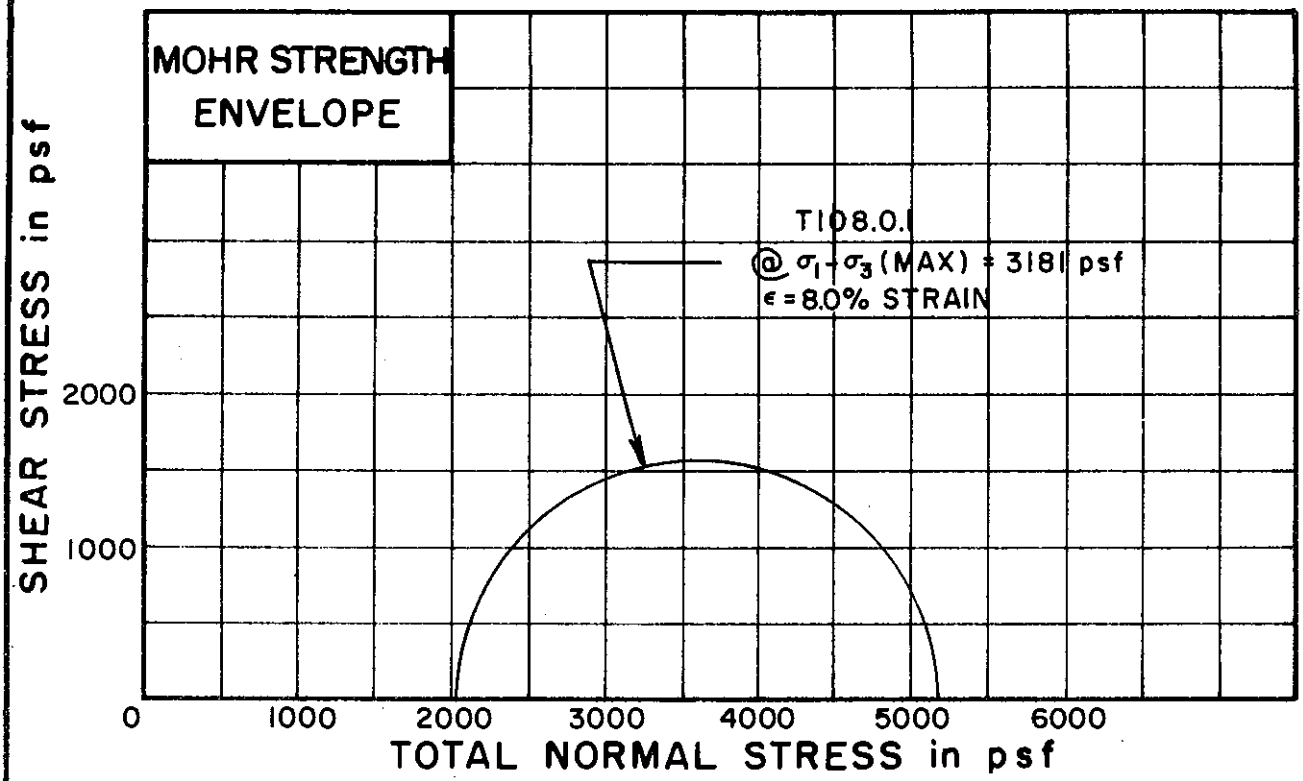
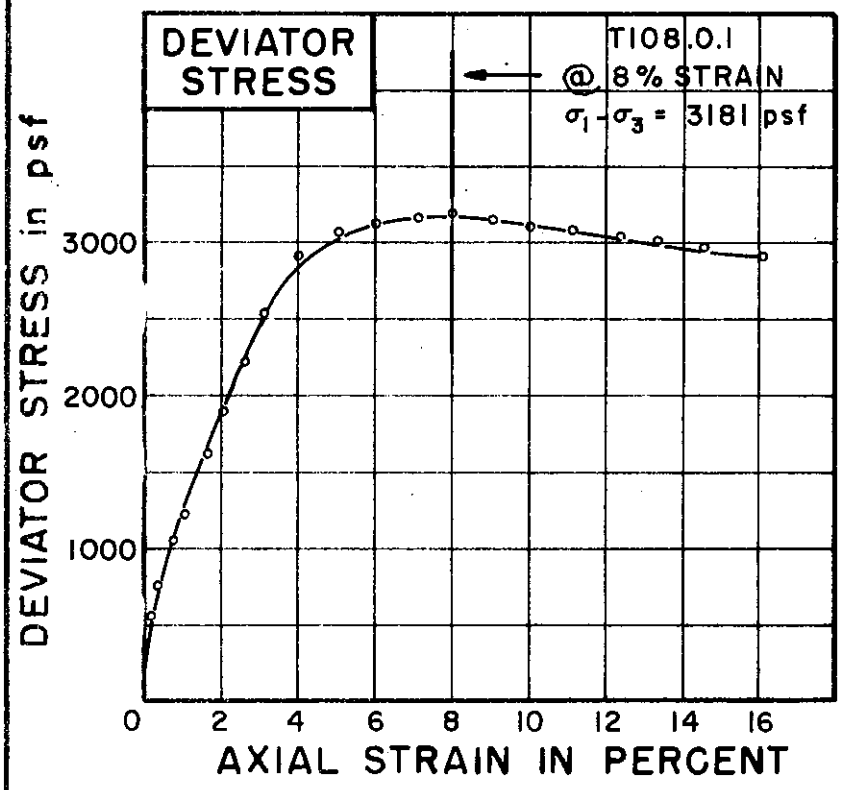
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





TEST NO./ SYMBOL		T108.0.1		
INITIAL WATER CONTENT	w_o	31.1		
DRY DENSITY pcf	γ_d	92		
SAMPLE DIAMETER in.	D_o	1.41		
SAMPLE HEIGHT in.	H_o	3.25		
CONFINING PRESSURE psf	σ_3	2016		
RATE OF STRAIN PERCENT/MINUTE		.25		
FINAL WATER CONTENT	w_f	30.9		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52

SAMPLE NO. 3

DEPTH 21.2' TO 21.5'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 49 PLASTIC LIMIT 20

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THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

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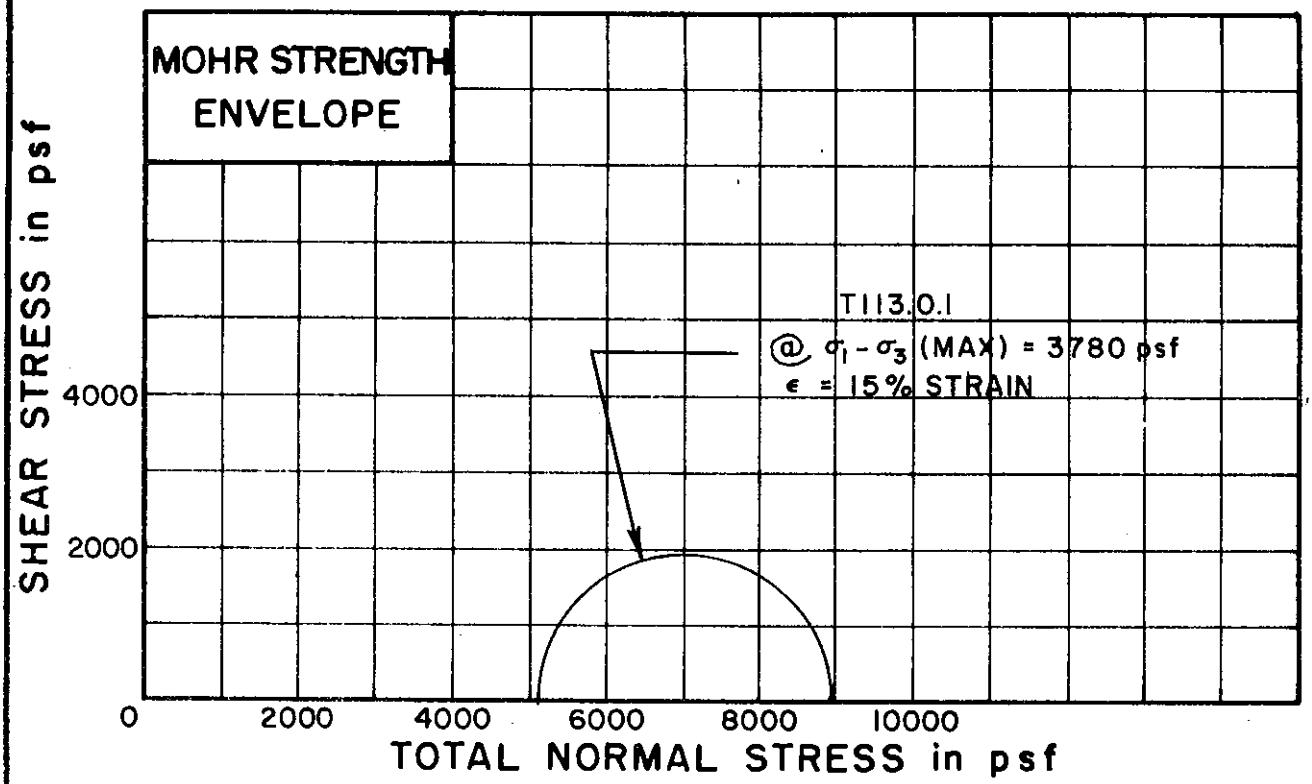

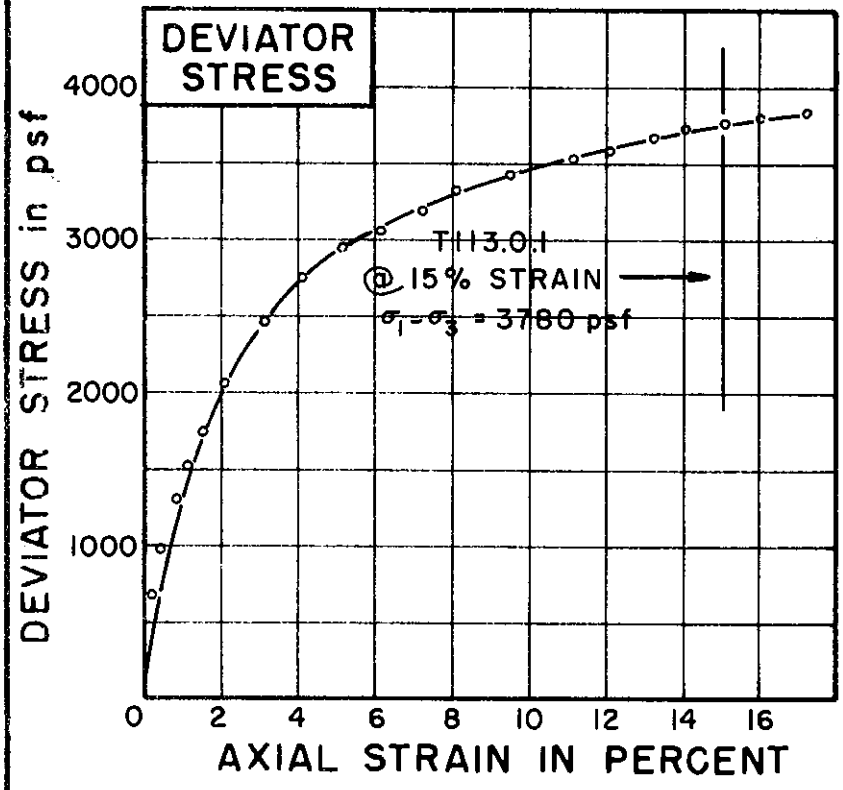

TEST NO./ SYMBOL		T113.0.1		
INITIAL WATER CONTENT	w_o	16.2		
DRY DENSITY pcf	γ_d	111		
SAMPLE DIAMETER in.	D_o	1.38		
SAMPLE HEIGHT in.	H_o	3.18		
CONFINING PRESSURE psf	σ_3	5184		
RATE OF STRAIN PERCENT/MINUTE		.25		
FINAL WATER CONTENT	w_f	16.1		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52

SAMPLE NO. 8

DEPTH 69.0 TO 69.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY

LIQUID LIMIT 24 PLASTIC LIMIT 14 (CL)

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

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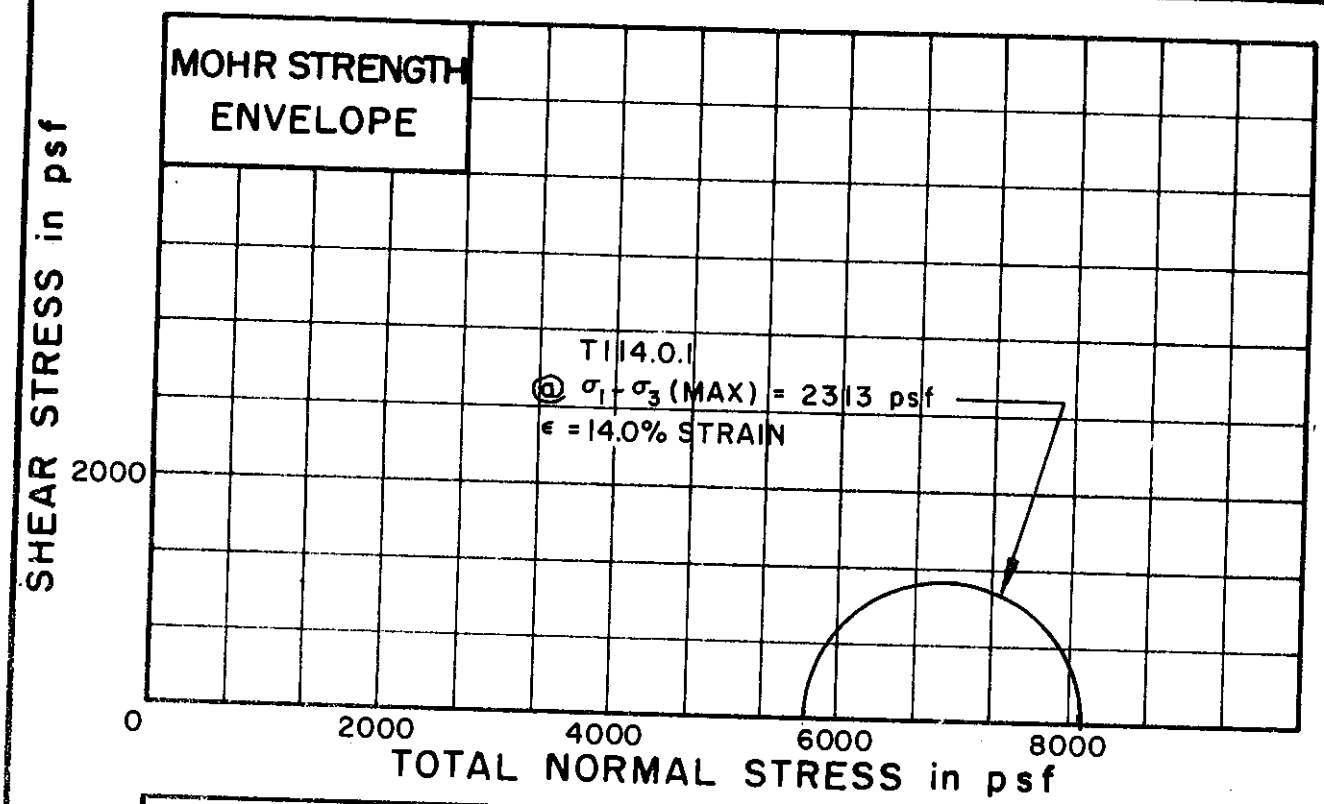

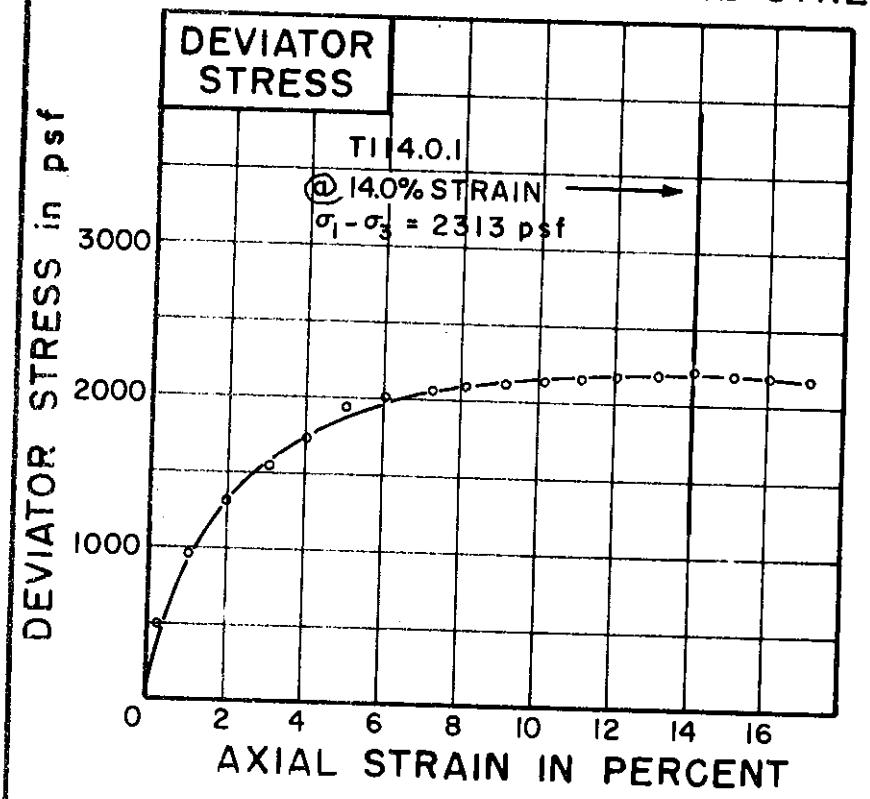

TEST NO./ SYMBOL		T114.0.1		
INITIAL WATER CONTENT	w_o	21.8		
DRY DENSITY pcf	γ_d	105		
SAMPLE DIAMETER in.	D_o	1.38		
SAMPLE HEIGHT in.	H_o	3.31		
CONFINING PRESSURE psf	σ_3	5760		
RATE OF STRAIN PERCENT/MINUTE		.25		
FINAL WATER CONTENT	w_f	21.7		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 52

SAMPLE NO. 9

DEPTH 78.6' TO 78.9'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 35 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING
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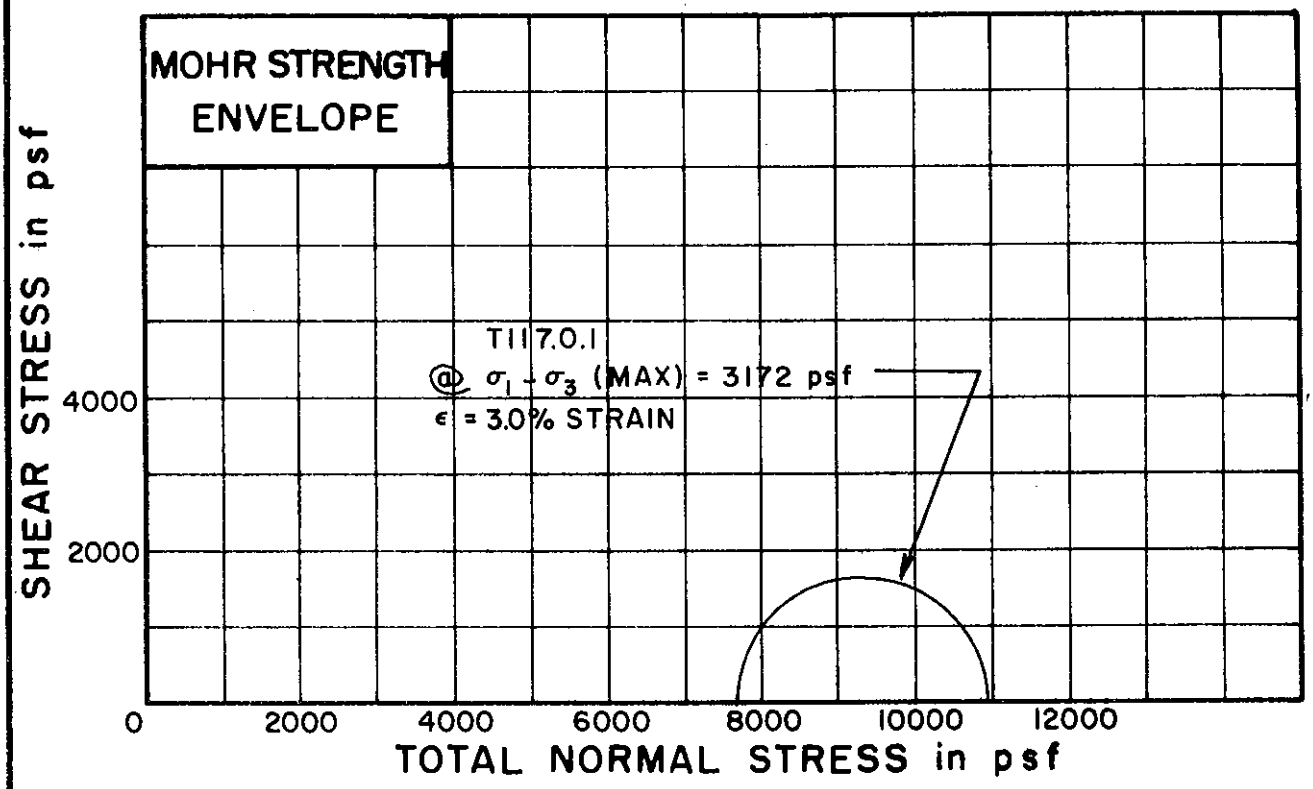
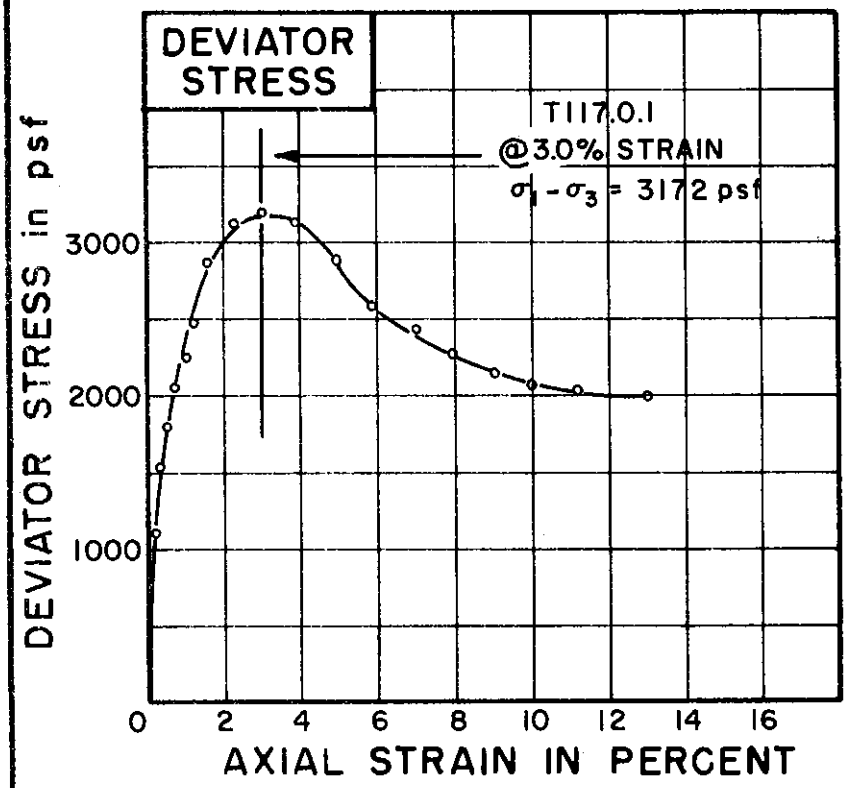




TEST NO./ SYMBOL	T117.0.1		
INITIAL WATER CONTENT	w_o	35.8	
DRY DENSITY pcf	γ_d	87	
SAMPLE DIAMETER in.	D_o	1.38	
SAMPLE HEIGHT in.	H_o	3.45	
CONFINING PRESSURE psf	σ_3	7632	
RATE OF STRAIN PERCENT/MINUTE		.25	
FINAL WATER CONTENT	w_f	35.7	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 52

SAMPLE NO. 12

DEPTH 109.3' TO 109.6'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 46 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED

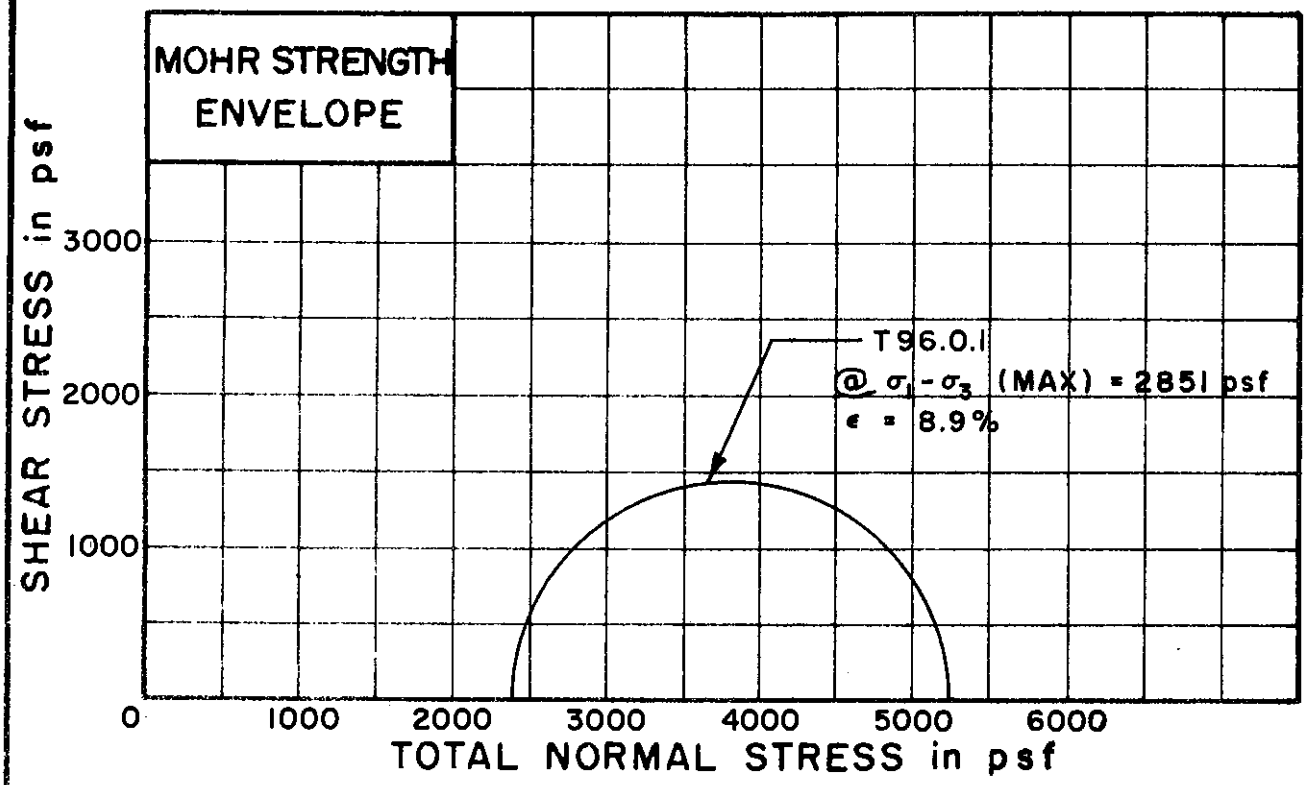
TRIAXIAL COMPRESSION TESTS

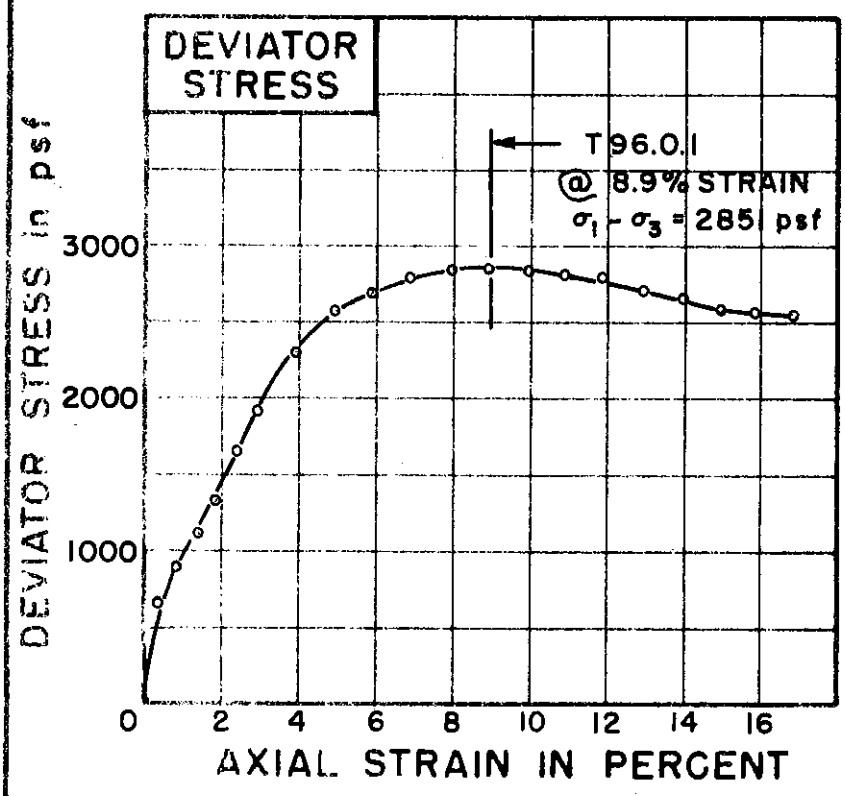
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-369





TEST NO./ SYMBOL	T96.0.1		
INITIAL WATER CONTENT	w_o	32.2%	
DRY DENSITY pcf	γ_d	91	
SAMPLE DIAMETER in.	D_o	1.39	
SAMPLE HEIGHT in.	H_o	3.26	
CONFINING PRESSURE psf	σ_3	2405	
RATE OF STRAIN PERCENT/MINUTE		.25	
FINAL WATER CONTENT	w_f	31.8%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 53

SAMPLE NO. 3

DEPTH 20.1' TO 20.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 49 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED

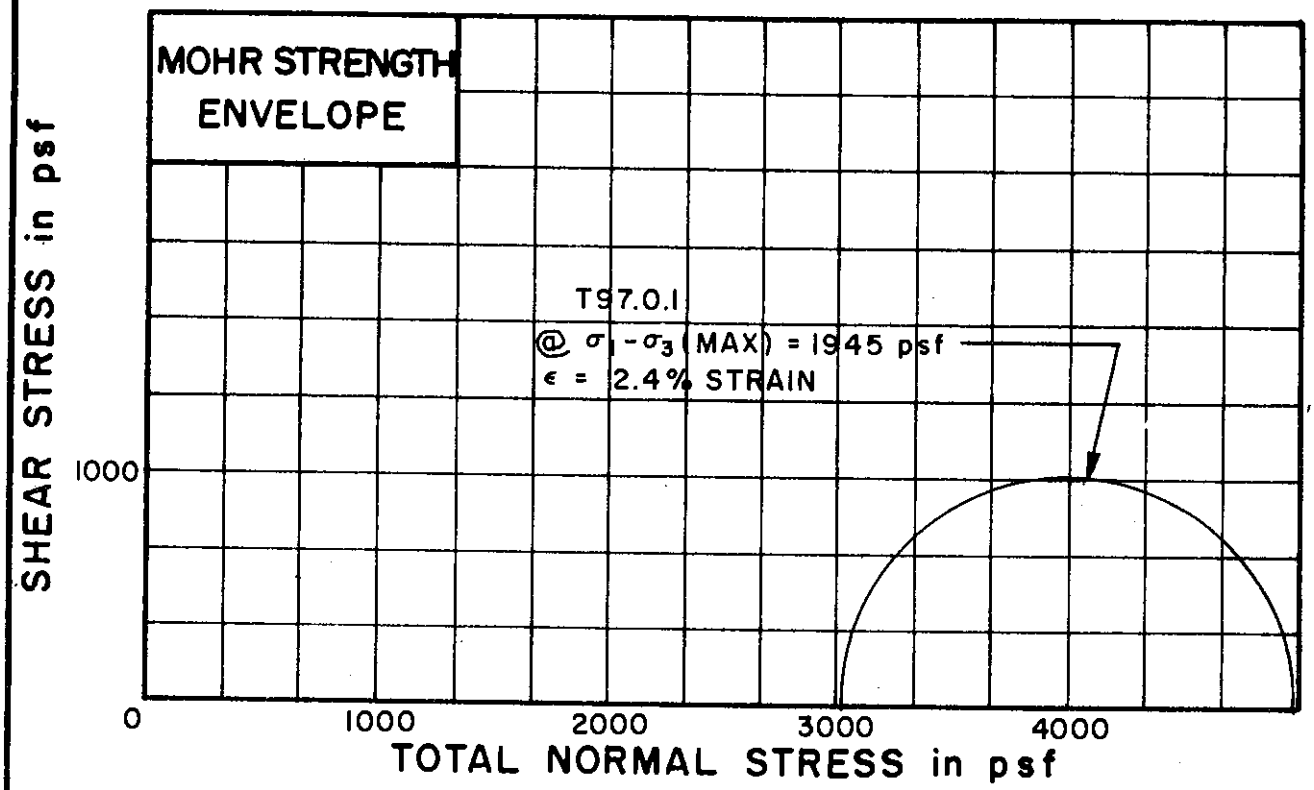
TRIAXIAL COMPRESSION TESTS

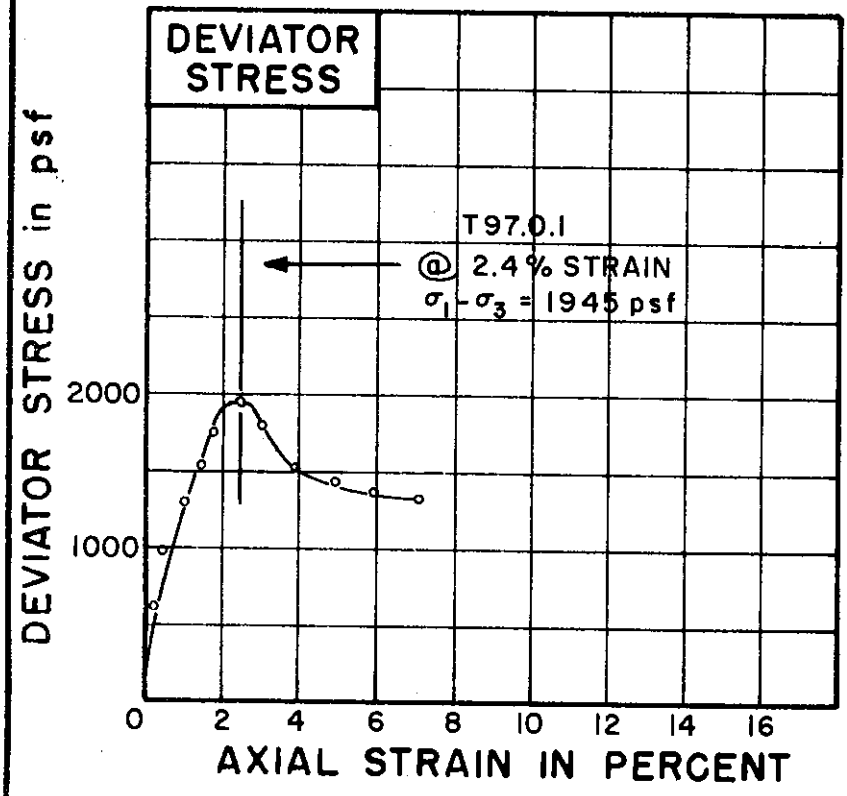
THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING
C-370





TEST NO./ SYMBOL		T97.0.1		
INITIAL WATER CONTENT	w_o	34.0		
DRY DENSITY pcf	γ_d	88		
SAMPLE DIAMETER in.	D_o	1.39		
SAMPLE HEIGHT in.	H_o	3.21		
CONFINING PRESSURE psf	σ_3	3024		
RATE OF STRAIN PERCENT/MINUTE		.25		
FINAL WATER CONTENT	w_f	3.42		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 53

SAMPLE NO. 4

DEPTH 30.1' TO 30.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 49 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED

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THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

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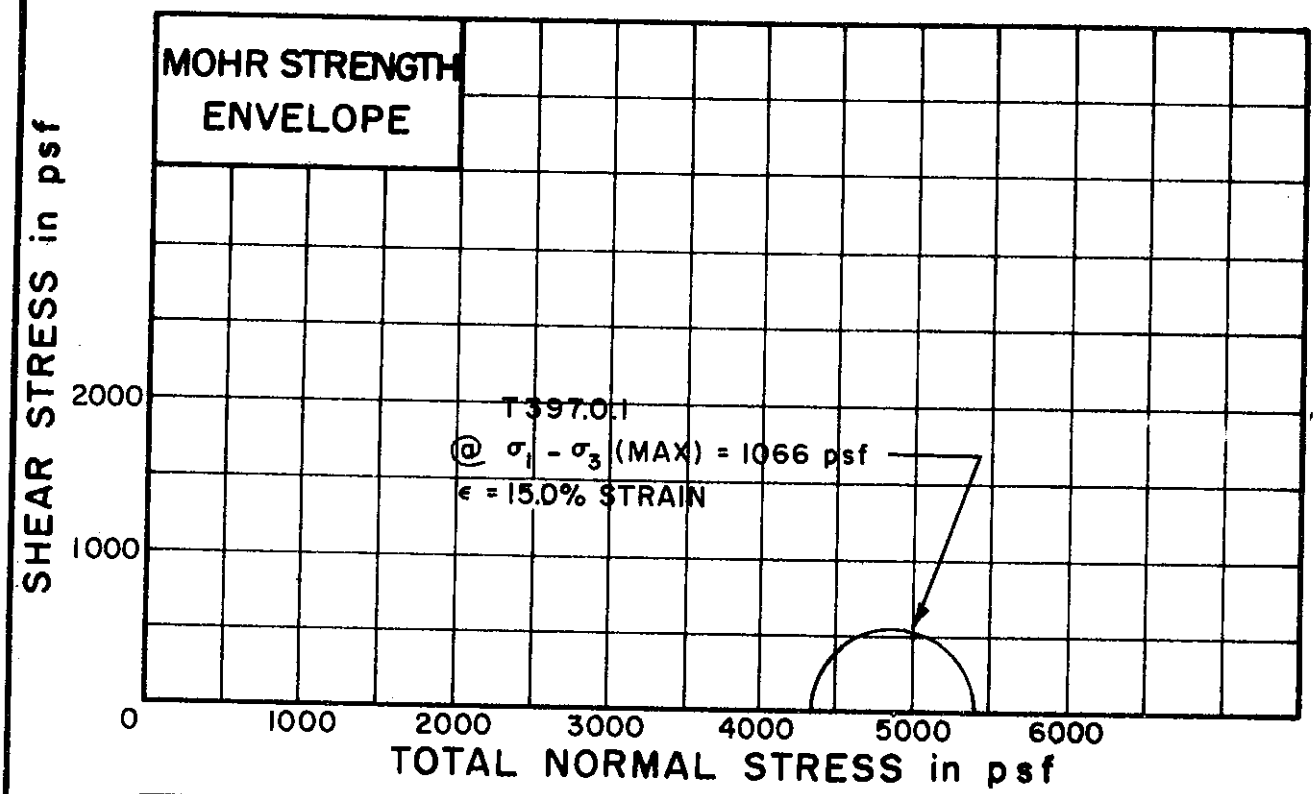

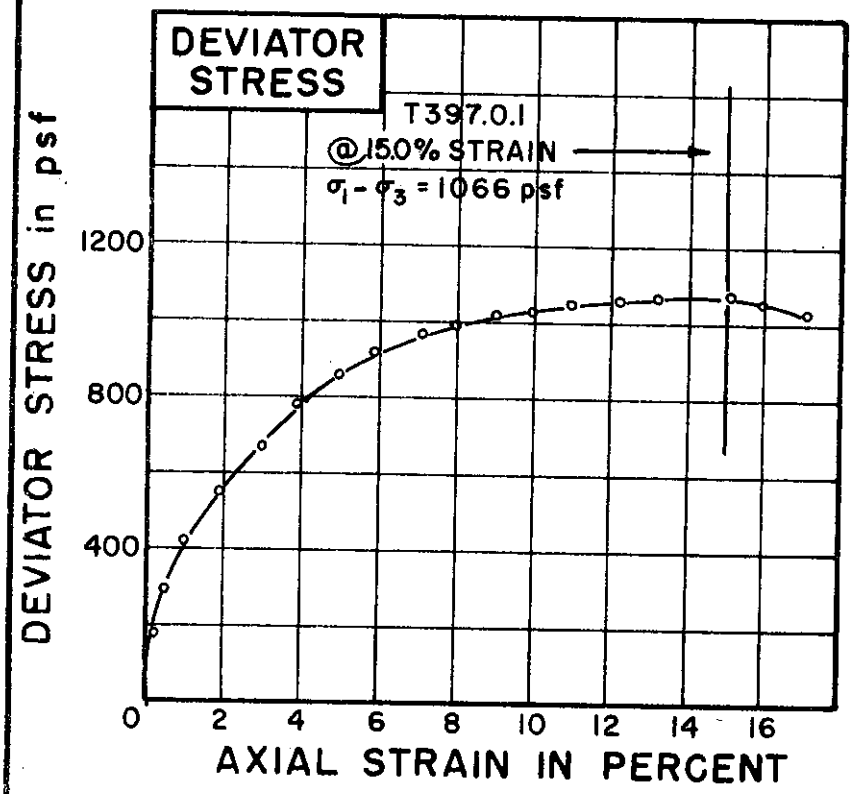

TEST NO./ SYMBOL	T397.0.1		
INITIAL WATER CONTENT	w_o	24.4	
DRY DENSITY pcf	γ_d	99	
SAMPLE DIAMETER in.	D_o	1.39	
SAMPLE HEIGHT in.	H_o	3.24	
CONFINING PRESSURE psf	σ_3	4320	
RATE OF STRAIN PERCENT/MINUTE		.25	
FINAL WATER CONTENT	w_f	23.9	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54

SAMPLE NO. 4

DEPTH 53.2' TO 53.5'

SOIL DESCRIPTION: CLAYEY SILT (ML-CL)

LIQUID LIMIT 21 PLASTIC LIMIT 17

UNCONSOLIDATED UNDRAINED

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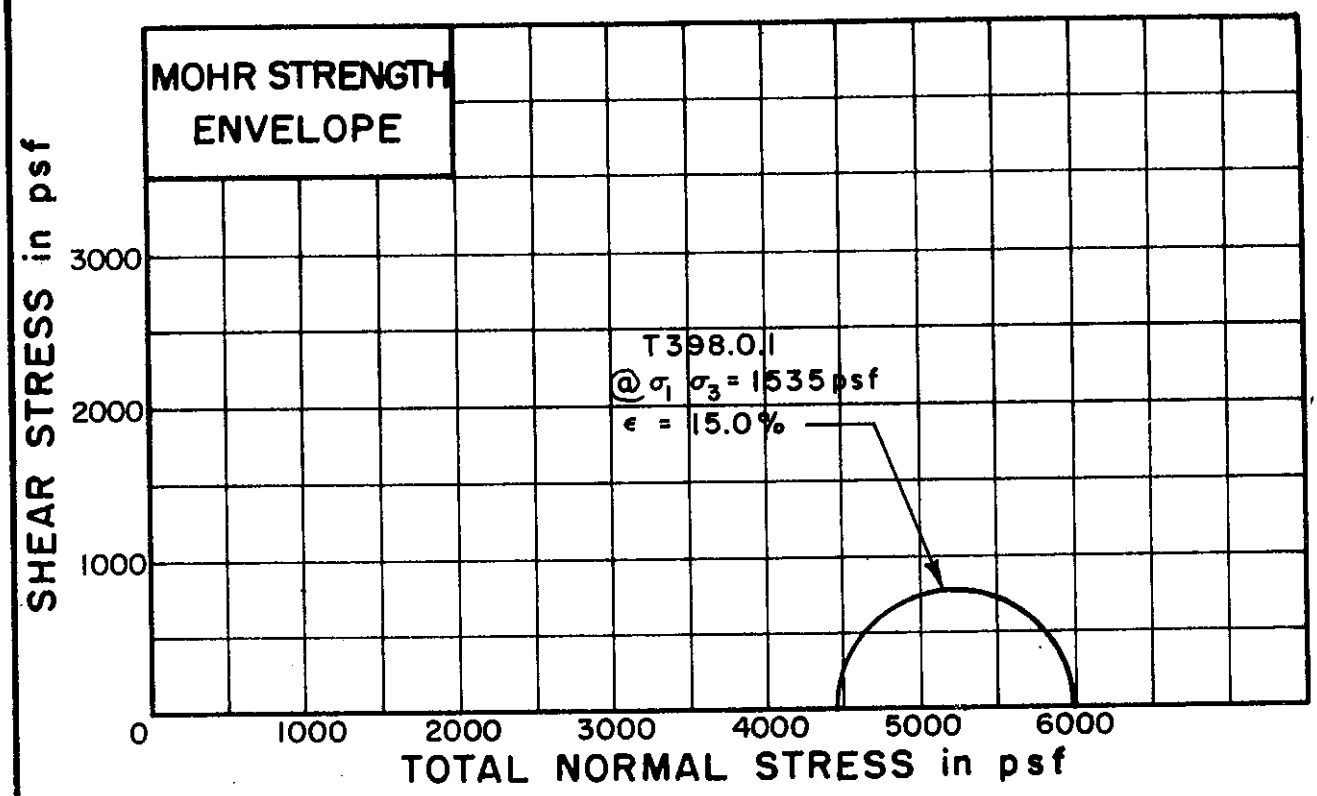
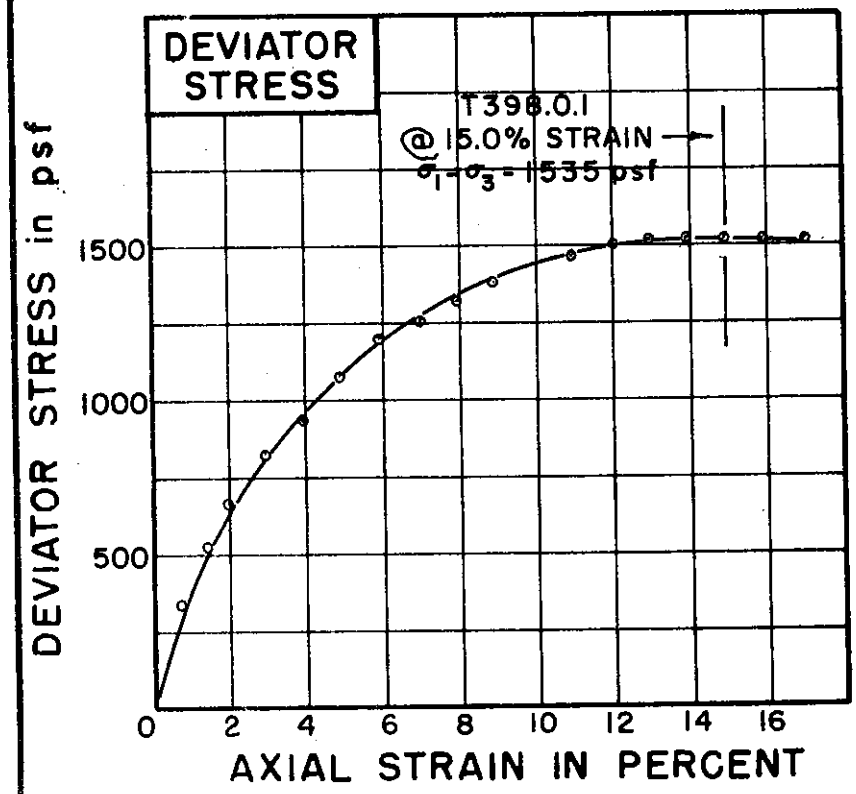
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

C-372





TEST NO./ SYMBOL	T398.0.1		
INITIAL WATER CONTENT	w_o	25.4%	
DRY DENSITY pcf	γ_d	99	
SAMPLE DIAMETER in.	D_o	1.38	
SAMPLE HEIGHT in.	H_o	3.26	
CONFINING PRESSURE psf	σ_3	4464	
RATE OF STRAIN PERCENT/MINUTE		.25	
FINAL WATER CONTENT	w_f	25.5%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 54

SAMPLE NO. 5

DEPTH 59.0' TO 59.3'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 38 PLASTIC LIMIT 17

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

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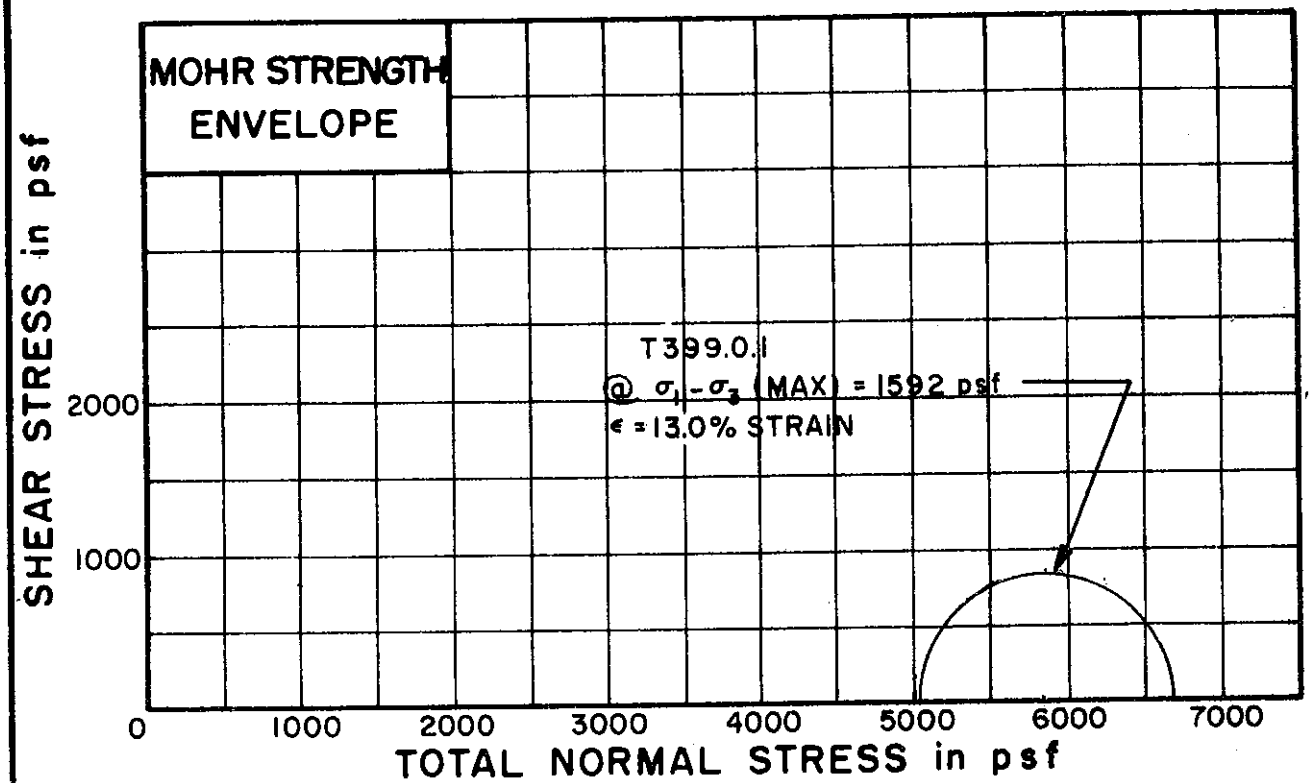
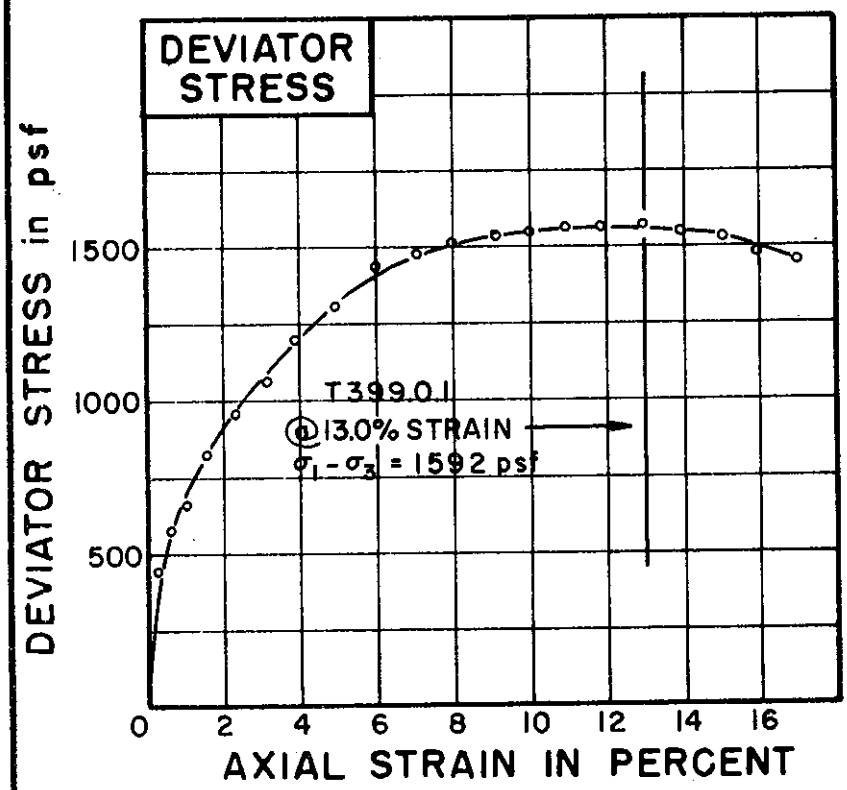
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





TEST NO./ SYMBOL		T399.0.1		
INITIAL WATER CONTENT	w_o	26.1		
DRY DENSITY pcf	γ_d	98		
SAMPLE DIAMETER in.	D_o	1.38		
SAMPLE HEIGHT in.	H_o	3.33		
CONFINING PRESSURE psf	σ_3	5040		
RATE OF STRAIN PERCENT/MINUTE		.25		
FINAL WATER CONTENT	w_f	25.8		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 54

SAMPLE NO. 6

DEPTH 63.1' TO 63.4'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED

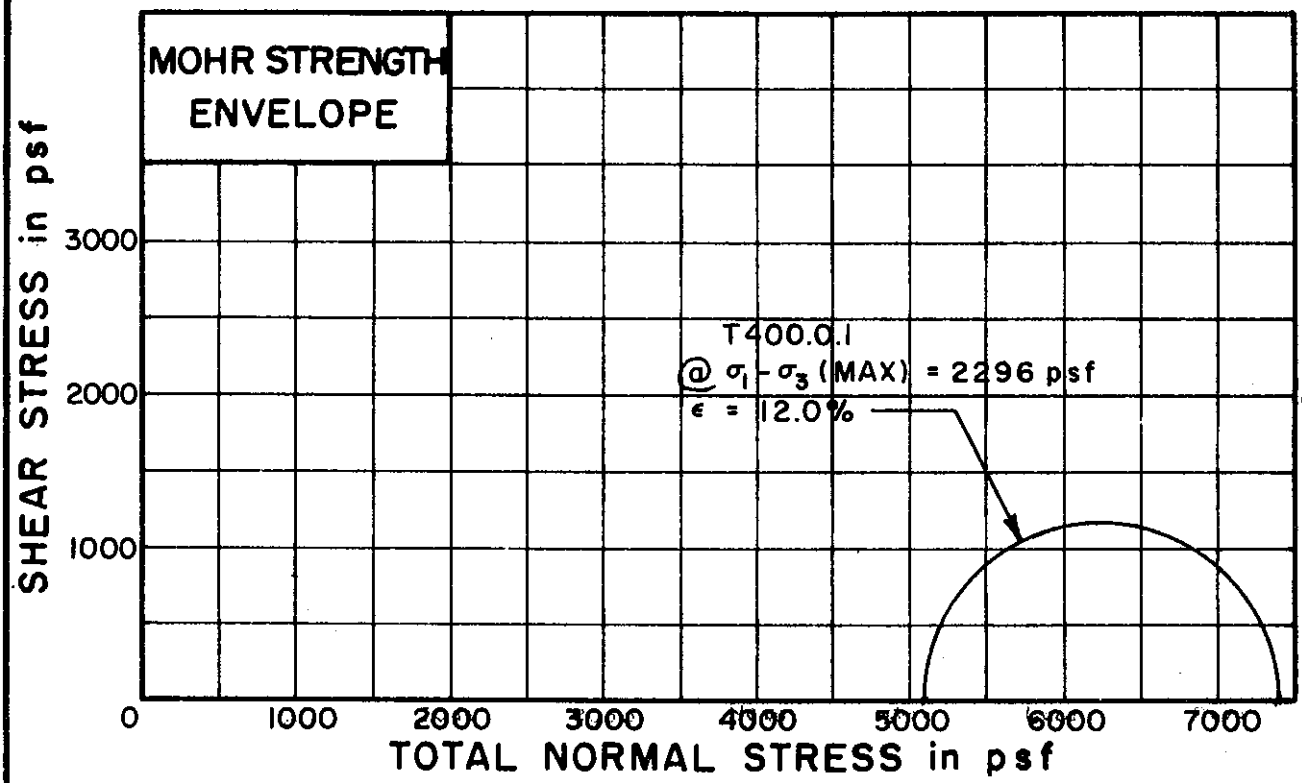
TRIAXIAL COMPRESSION TESTS

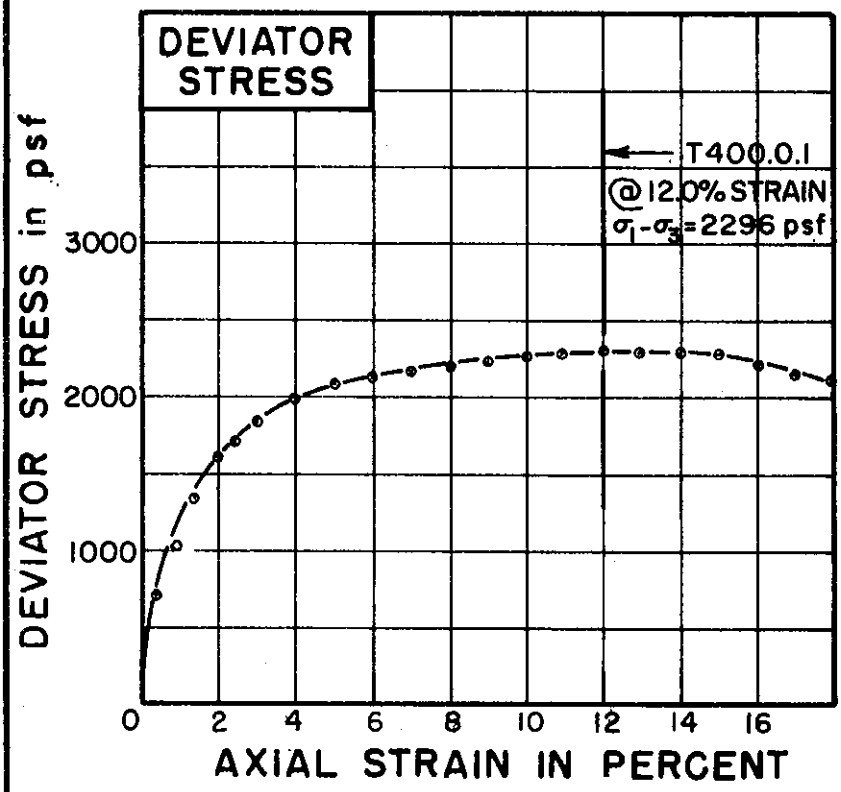
THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





TEST NO./ SYMBOL		T400.0.1		
INITIAL WATER CONTENT	w_o	25.9%		
DRY DENSITY pcf	γ_d	98		
SAMPLE DIAMETER in.	D_o	1.39		
SAMPLE HEIGHT in.	H_o	3.25		
CONFINING PRESSURE psf	σ_3	5112		
RATE OF STRAIN PERCENT/MINUTE		.25		
FINAL WATER CONTENT	w_f	25.5%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 54

SAMPLE NO. 7

DEPTH 68.8' TO 69.1'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 37 PLASTIC LIMIT 18

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

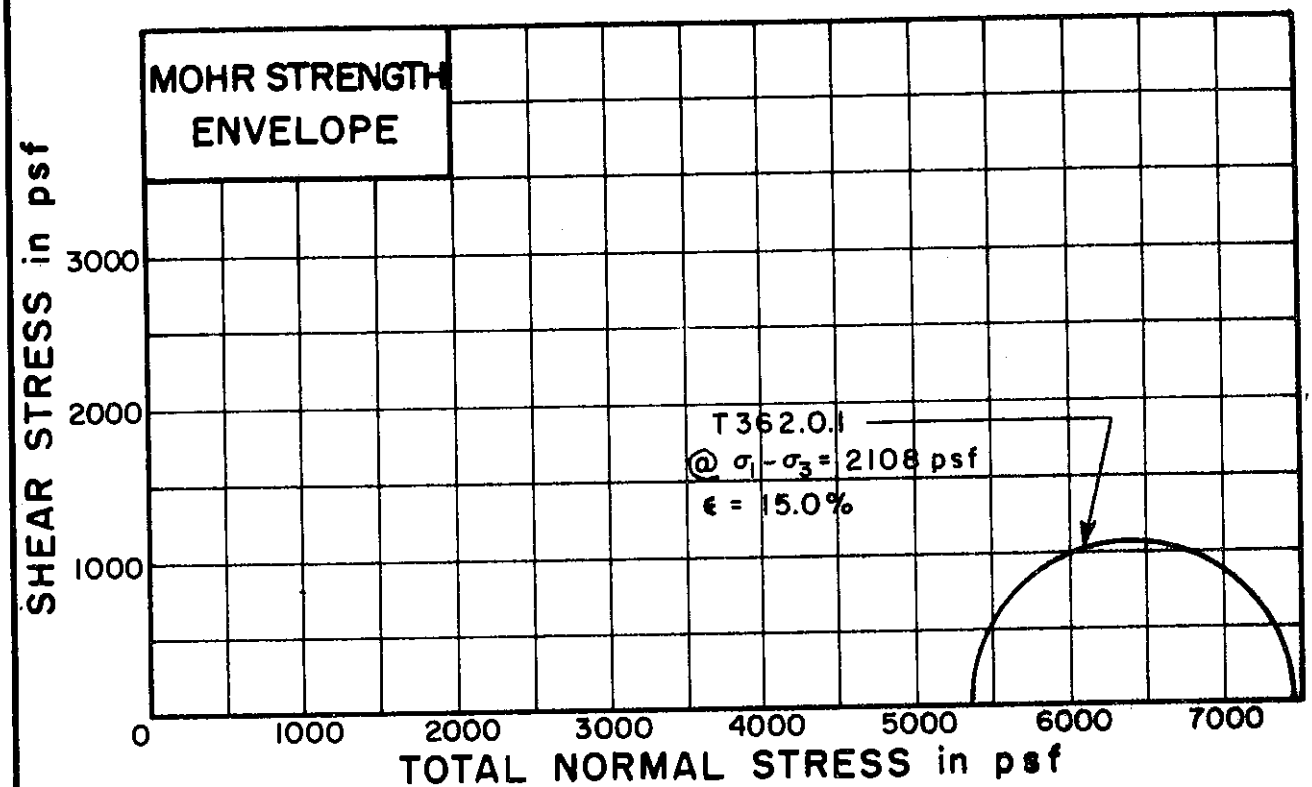
THE DETROIT EDISON COMPANY

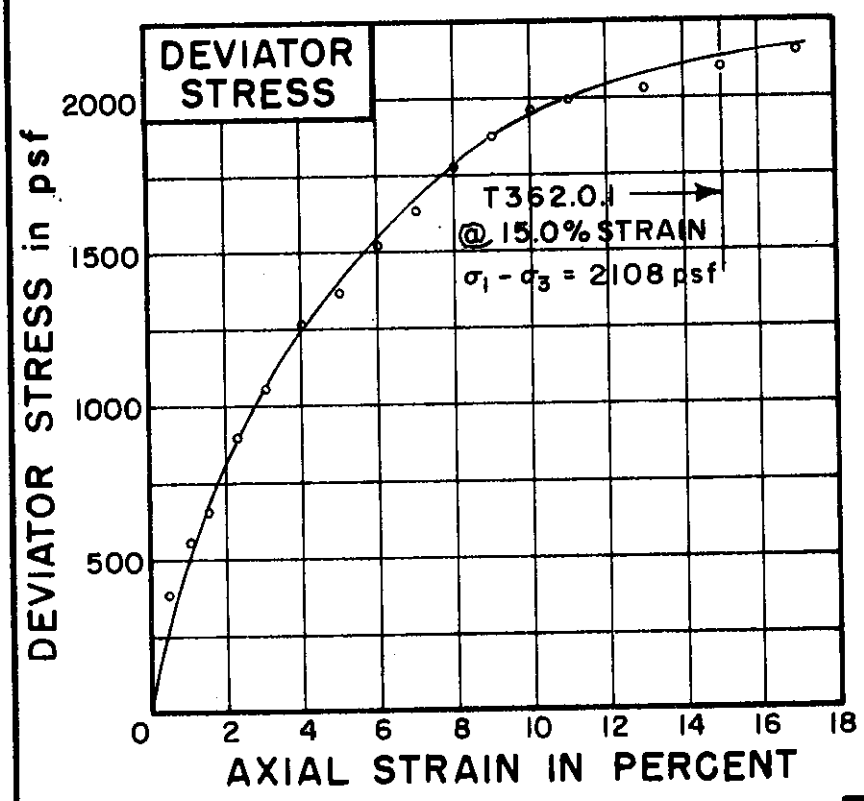
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-375





TEST NO./ SYMBOL		T362.0.1		
INITIAL WATER CONTENT	w_o	22.8%		
DRY DENSITY pcf	γ_d	105		
SAMPLE DIAMETER in.	D_o	1.40		
SAMPLE HEIGHT in.	H_o	3.31		
CONFINING PRESSURE psf	σ_3	5328		
RATE OF STRAIN PERCENT/MINUTE		0.27		
FINAL WATER CONTENT	w_f	22.6%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 101

SAMPLE NO. 15

DEPTH 74.6' TO 74.9'

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 21

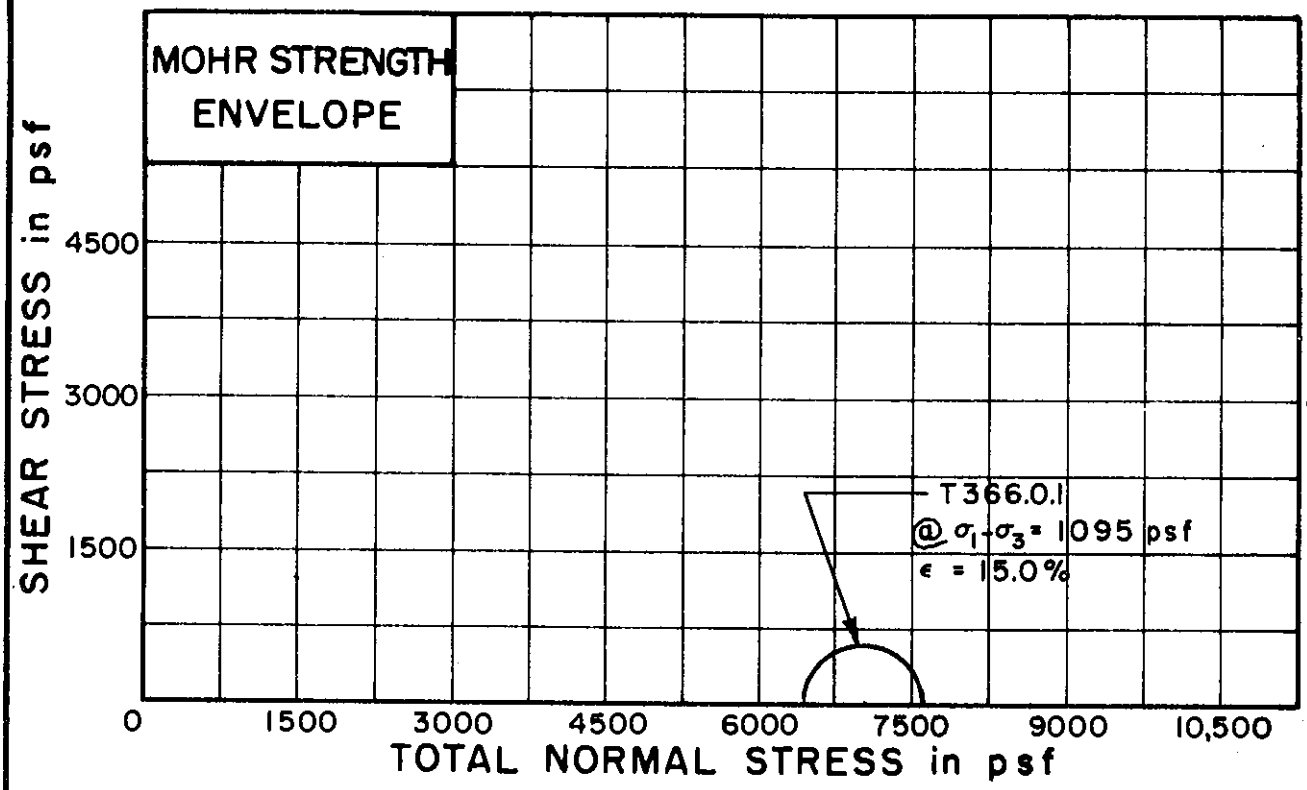
UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

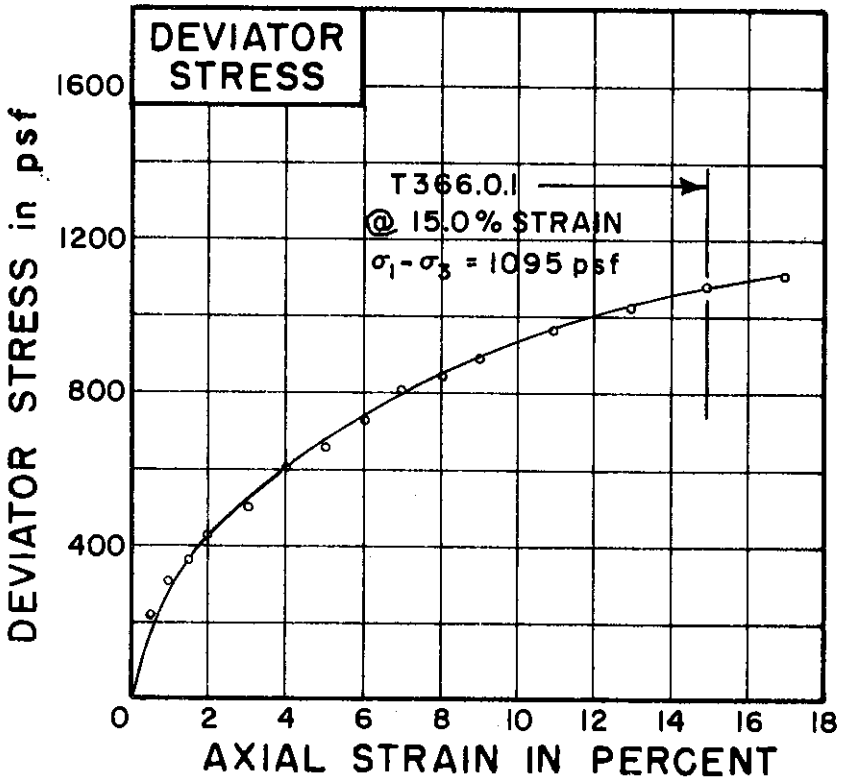
THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





TEST NO./ SYMBOL	T366.0.1		
INITIAL WATER CONTENT	w_o	24.5%	
DRY DENSITY pcf	γ_d	100	
SAMPLE DIAMETER in.	D_o	1.40	
SAMPLE HEIGHT in.	H_o	3.27	
CONFINING PRESSURE psf	σ_3	6480	
RATE OF STRAIN PERCENT/MINUTE		0.27	
FINAL WATER CONTENT	w_f	24.3%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 101

SAMPLE NO. 19

DEPTH 94.9' TO 95.3'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

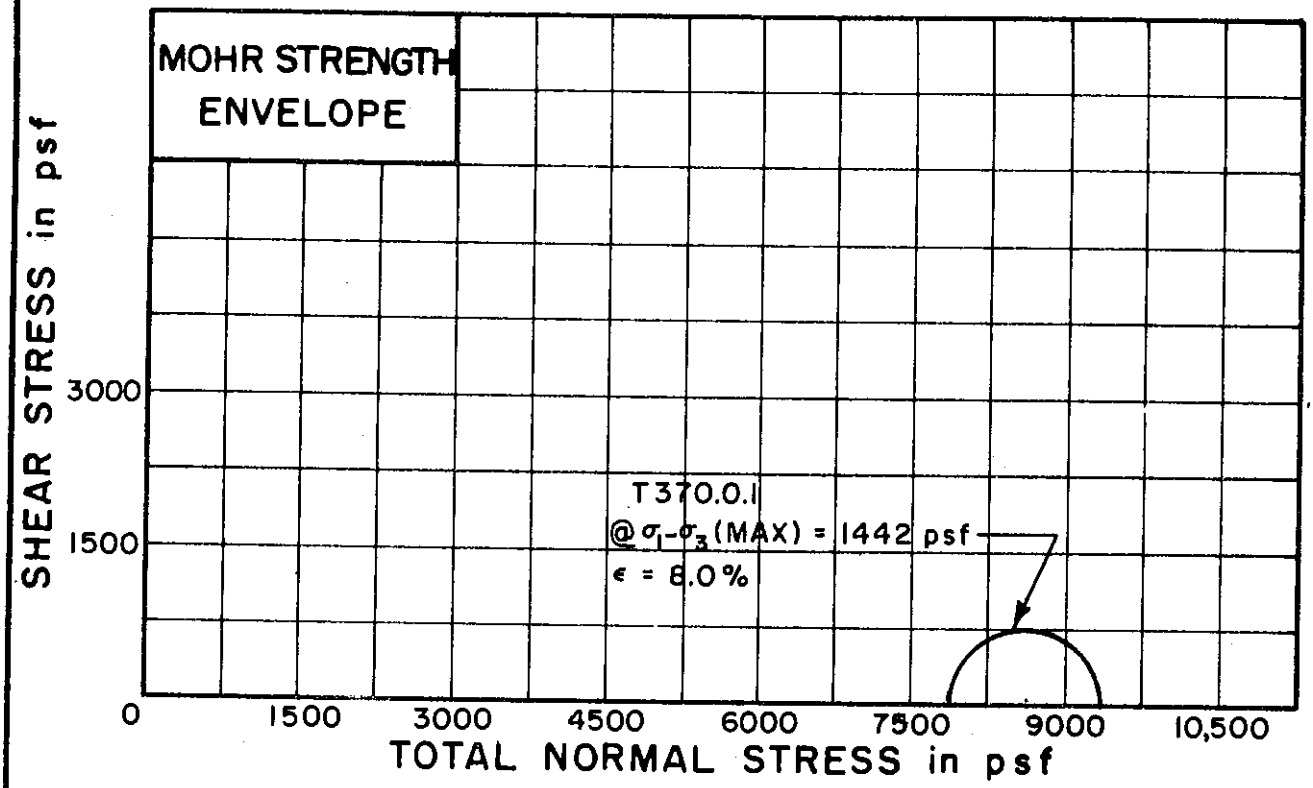
THE DETROIT EDISON COMPANY

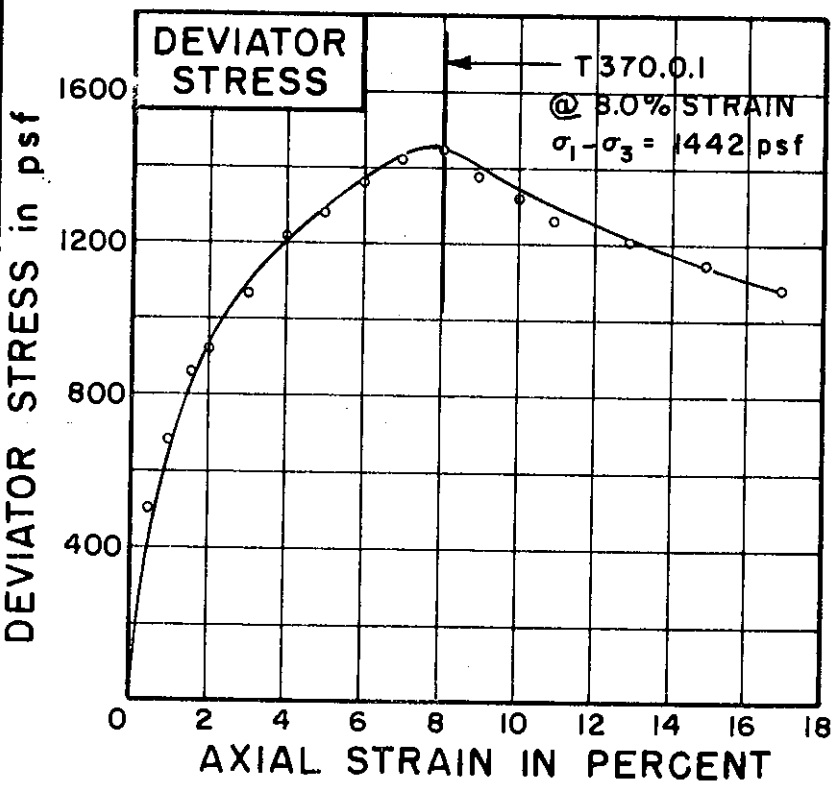
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-377





TEST NO./ SYMBOL		T370.0.1		
INITIAL WATER CONTENT	w_o	37.2%		
DRY DENSITY pcf	γ_d	85		
SAMPLE DIAMETER in.	D_o	1.40		
SAMPLE HEIGHT in.	H_o	3.23		
CONFINING PRESSURE psf	σ_3	7920		
RATE OF STRAIN PERCENT/MINUTE		0.27		
FINAL WATER CONTENT	w_f	36.9%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 101

SAMPLE NO. 23

DEPTH 119.8' TO 120.2'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 44 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED

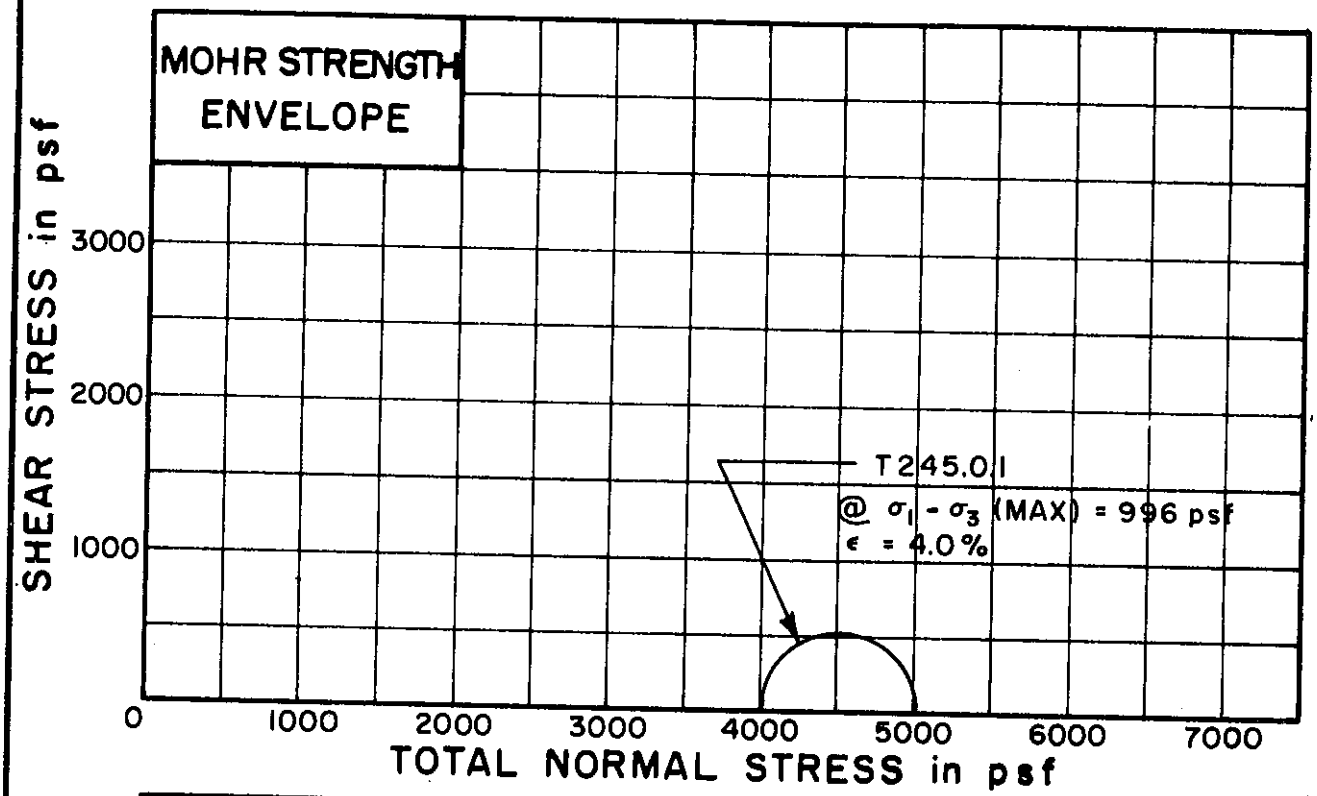
TRIAXIAL COMPRESSION TESTS

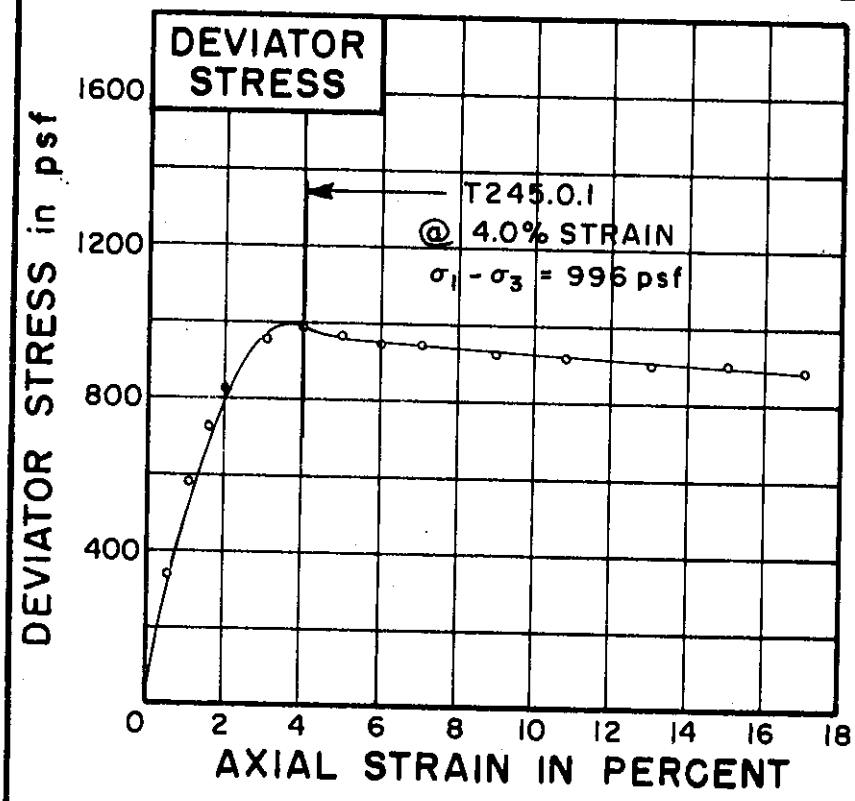
THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





TEST NO./ SYMBOL		T245.0.1		
INITIAL WATER CONTENT	w_o	41.1%		
DRY DENSITY pcf	γ_d	81		
SAMPLE DIAMETER in.	D_o	1.41		
SAMPLE HEIGHT in.	H_o	3.25		
CONFINING PRESSURE psf	σ_3	4032		
RATE OF STRAIN PERCENT/MINUTE		0.27		
FINAL WATER CONTENT	w_f	40.9%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 126

SAMPLE NO. 11

DEPTH 49.1' TO 49.4'

SOIL DESCRIPTION: SILTY CLAY (CH)

LIQUID LIMIT 59 PLASTIC LIMIT 25

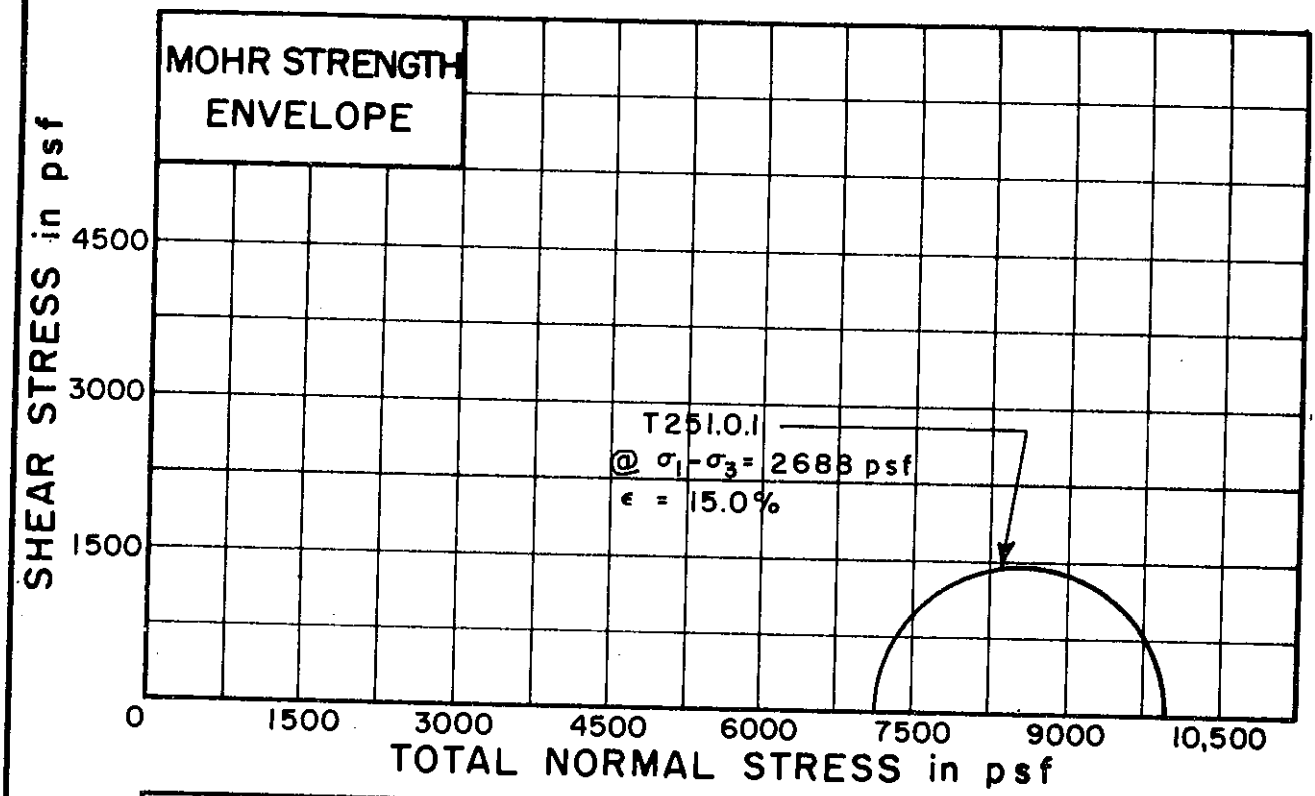
UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

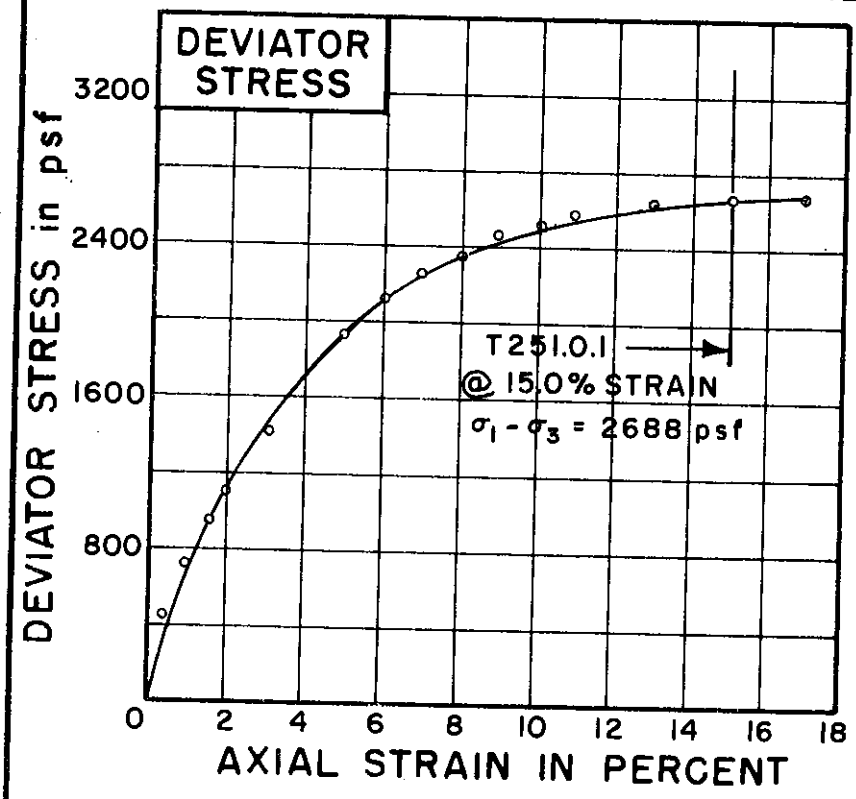
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-379





TEST NO./ SYMBOL	T251.0.1		
INITIAL WATER CONTENT	w_o	25.3%	
DRY DENSITY pcf	γ_d	96	
SAMPLE DIAMETER in.	D_o	1.40	
SAMPLE HEIGHT in.	H_o	3.33	
CONFINING PRESSURE psf	σ_3	7200	
RATE OF STRAIN PERCENT/MINUTE		0.27	
FINAL WATER CONTENT	w_f	25.2%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 126

SAMPLE NO. 23

DEPTH 108.6' TO 108.9'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 20

UNCONSOLIDATED UNDRAINED

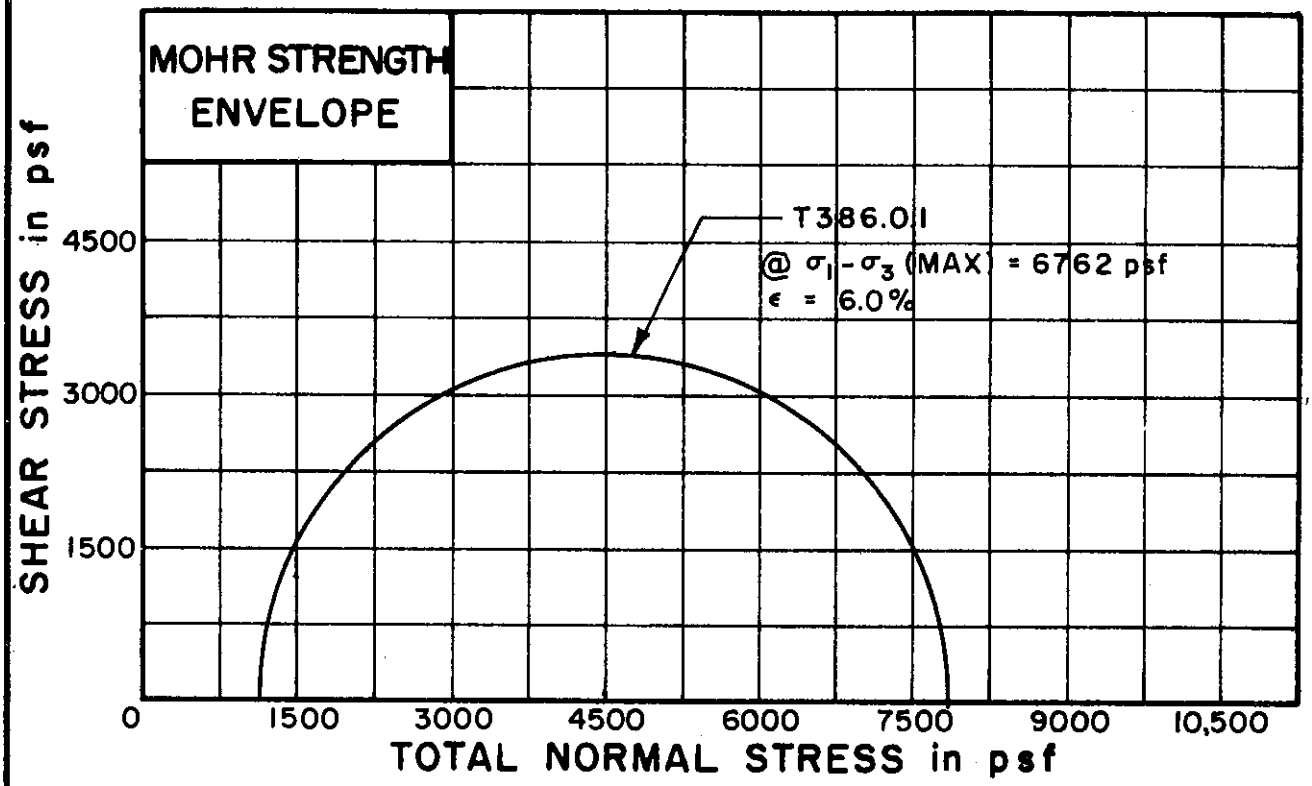
TRIAXIAL COMPRESSION TESTS

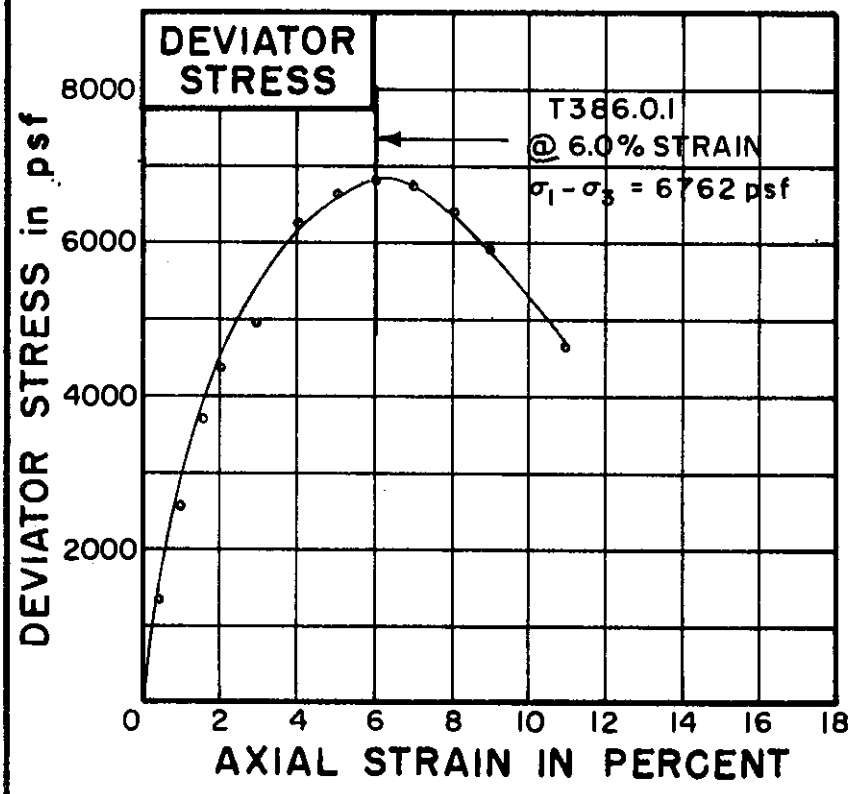
THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING
C-380





TEST NO./ SYMBOL		T386.0.1		
INITIAL WATER CONTENT	w_o	22.3%		
DRY DENSITY pcf	γ_d	108		
SAMPLE DIAMETER in.	D_o	1.45		
SAMPLE HEIGHT in.	H_o	3.50		
CONFINING PRESSURE psf	σ_3	1080		
RATE OF STRAIN PERCENT/MINUTE		0.26		
FINAL WATER CONTENT	w_f	22.2%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 129

SAMPLE NO. 3

DEPTH 8.7' TO 9.0'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 23

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

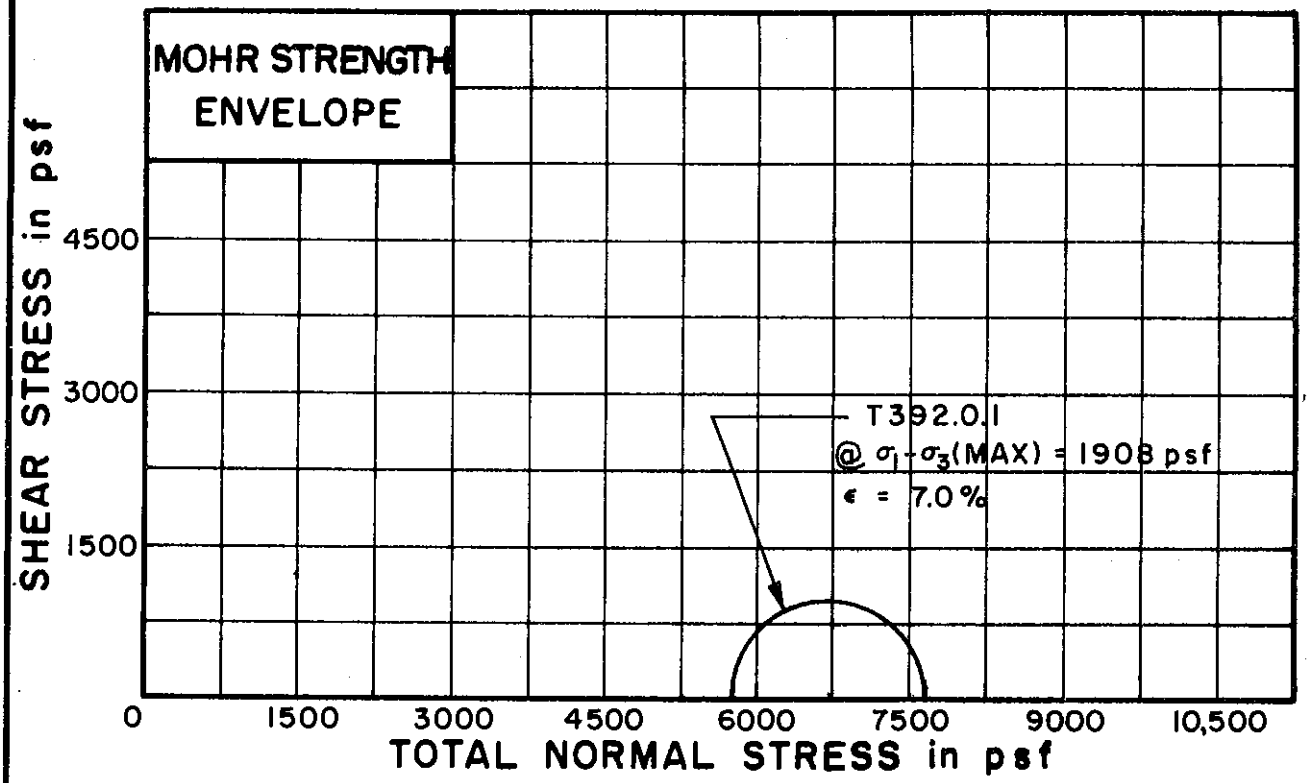
THE DETROIT EDISON COMPANY

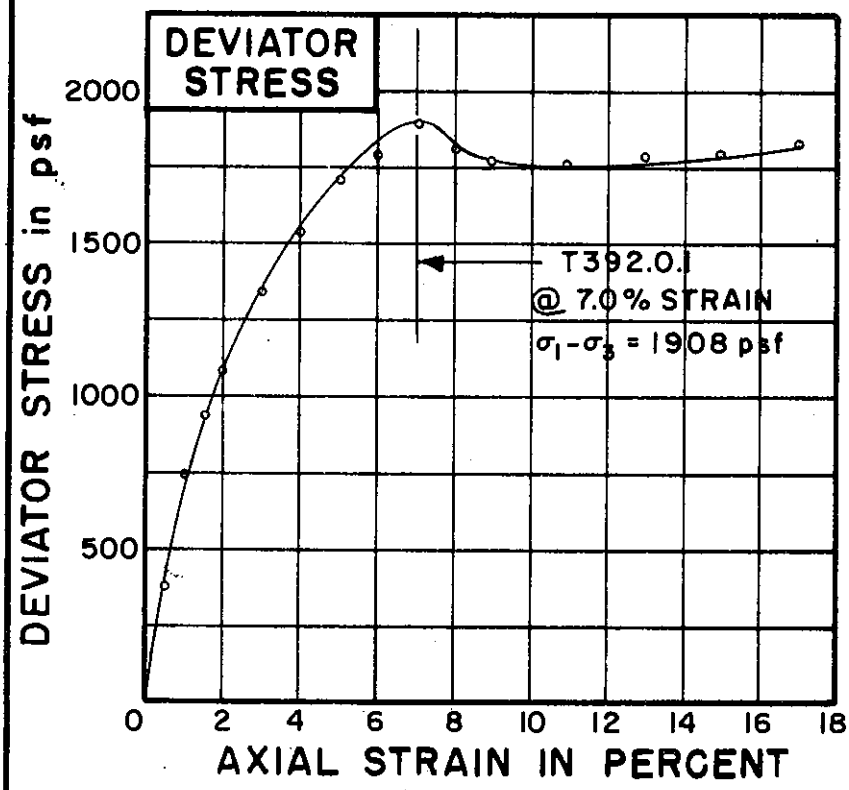
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-381





TEST NO./ SYMBOL		T392.0.1		
INITIAL WATER CONTENT	w_o	24.8%		
DRY DENSITY pcf	γ_d	101		
SAMPLE DIAMETER in.	D_o	1.41		
SAMPLE HEIGHT in.	H_o	3.35		
CONFINING PRESSURE psf	σ_3	5760		
RATE OF STRAIN PERCENT/MINUTE		0.27		
FINAL WATER CONTENT	w_f	24.6%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 129

SAMPLE NO. 15

DEPTH 74.0' TO 74.3'

SOIL DESCRIPTION: SILTY CLAY (CL)

LIQUID LIMIT 36 PLASTIC LIMIT 21

UNCONSOLIDATED UNDRAINED

TRIAXIAL COMPRESSION TESTS

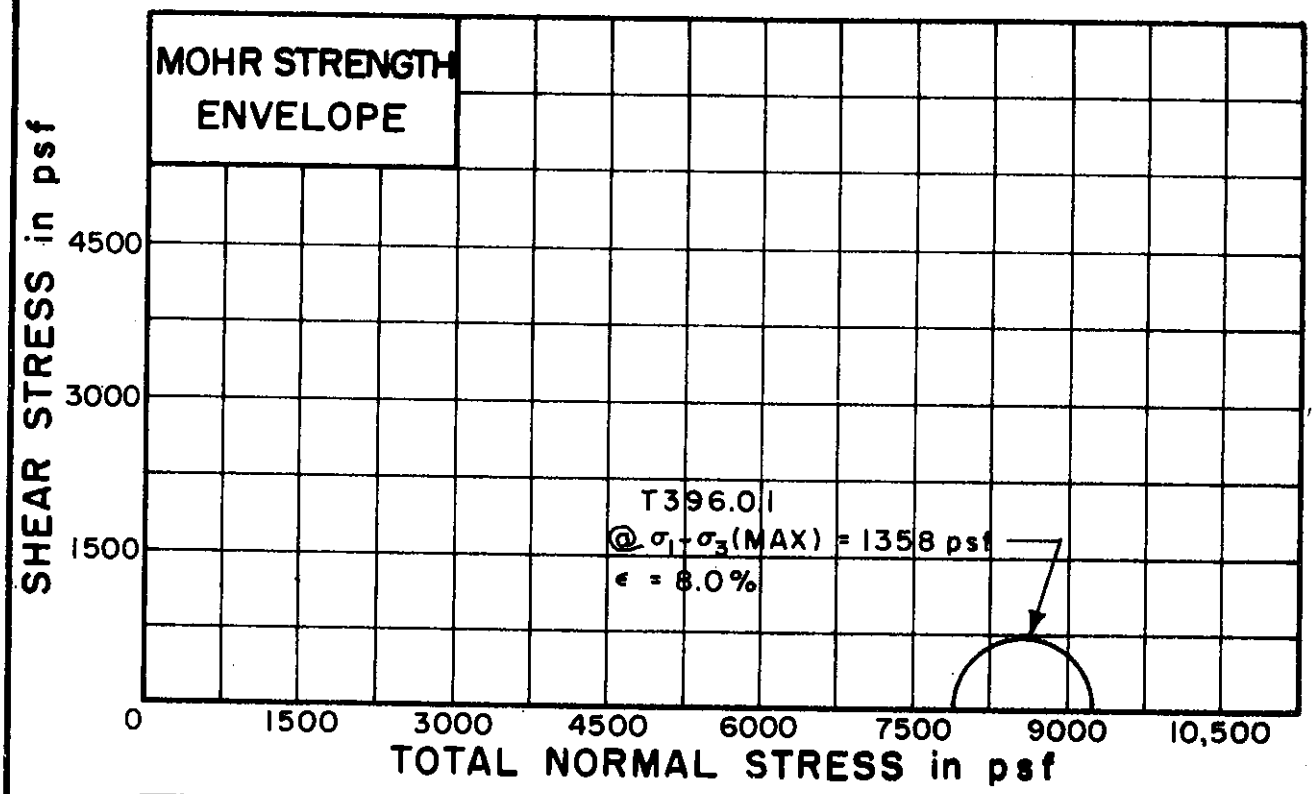
THE DETROIT EDISON COMPANY

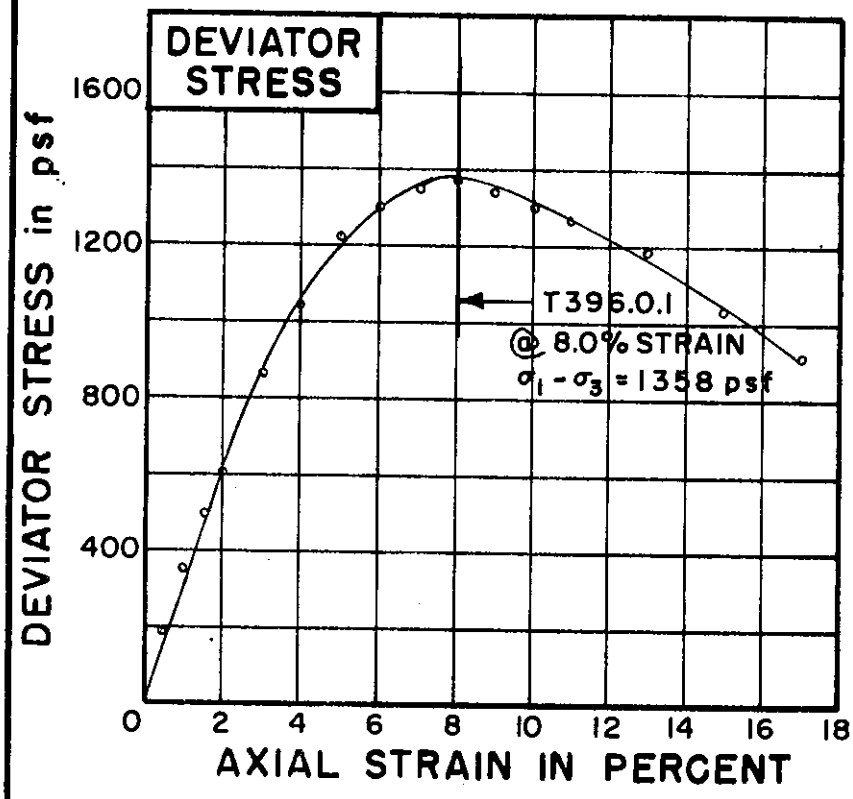
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

C-382





TEST NO./ SYMBOL		T396.0.1		
INITIAL WATER CONTENT	w_o	30.6%		
DRY DENSITY pcf	γ_d	95		
SAMPLE DIAMETER in.	D_o	1.41		
SAMPLE HEIGHT in.	H_o	3.20		
CONFINING PRESSURE psf	σ_3	7920		
RATE OF STRAIN PERCENT/MINUTE		0.28		
FINAL WATER CONTENT	w_f	30.3%		
SKETCH OF SAMPLE AT END OF TEST				

BORING NO. 129

SAMPLE NO. 24

DEPTH 124.1' TO 124.4'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 46 PLASTIC LIMIT 22

UNCONSOLIDATED UNDRAINED

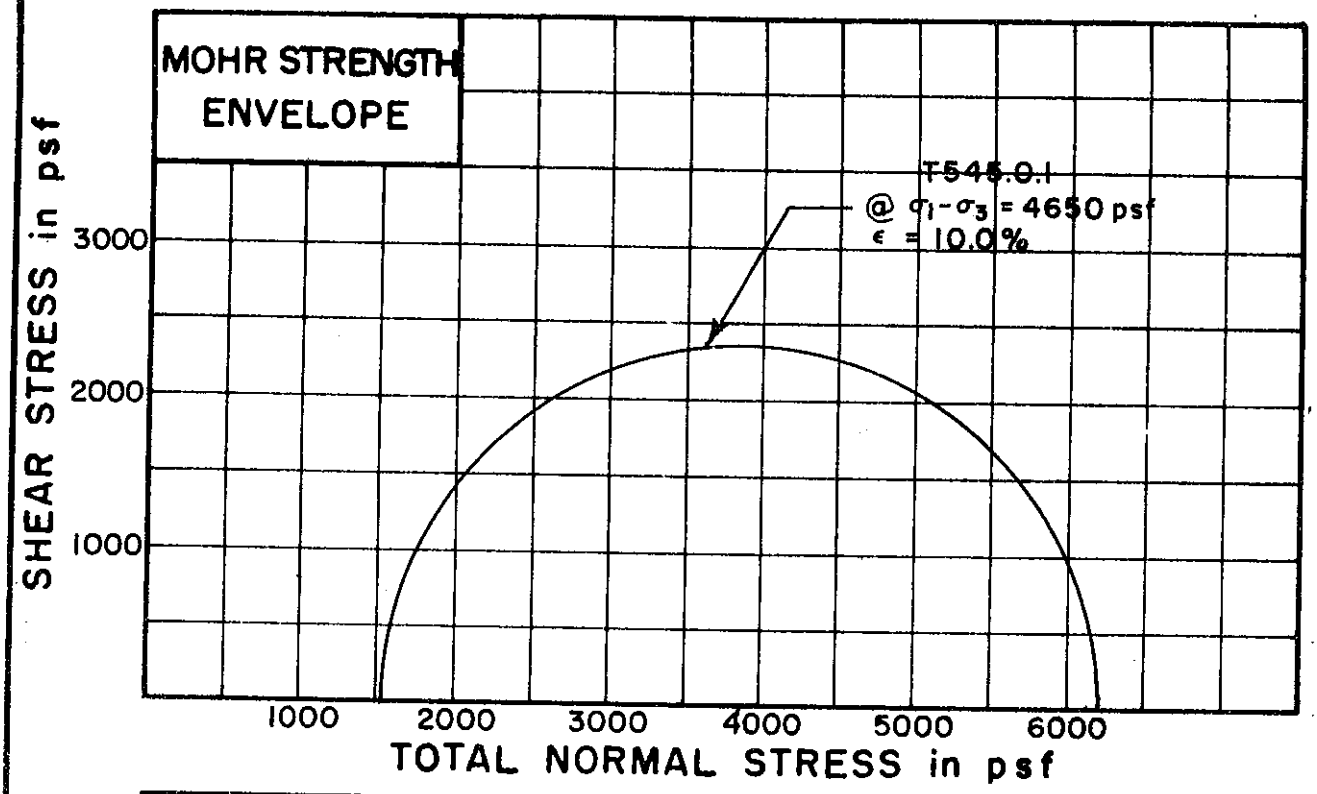
TRIAXIAL COMPRESSION TESTS

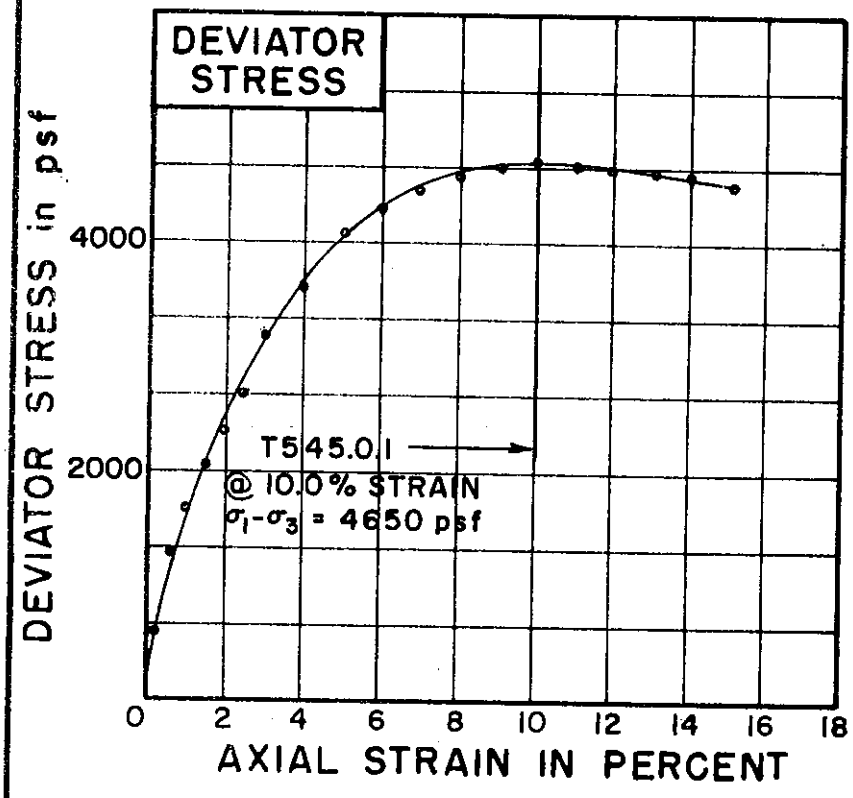
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE 1255

C-383





TEST NO./ SYMBOL	T545.0.1		
INITIAL WATER CONTENT	w_o	28.3%	
DRY DENSITY pcf	γ_d	95	
SAMPLE DIAMETER in.	D_o	1.41	
SAMPLE HEIGHT in.	H_o	3.32	
CONFINING PRESSURE psf	σ_3	1555	
RATE OF STRAIN PERCENT/MINUTE		0.27	
FINAL WATER CONTENT	w_f	28.1%	
SKETCH OF SAMPLE AT END OF TEST			

BORING NO. 151A

SAMPLE NO. 3

DEPTH 13.0' TO 13.3'

SOIL DESCRIPTION: SILTY CLAY (CL-CH)

LIQUID LIMIT 48 PLASTIC LIMIT 20

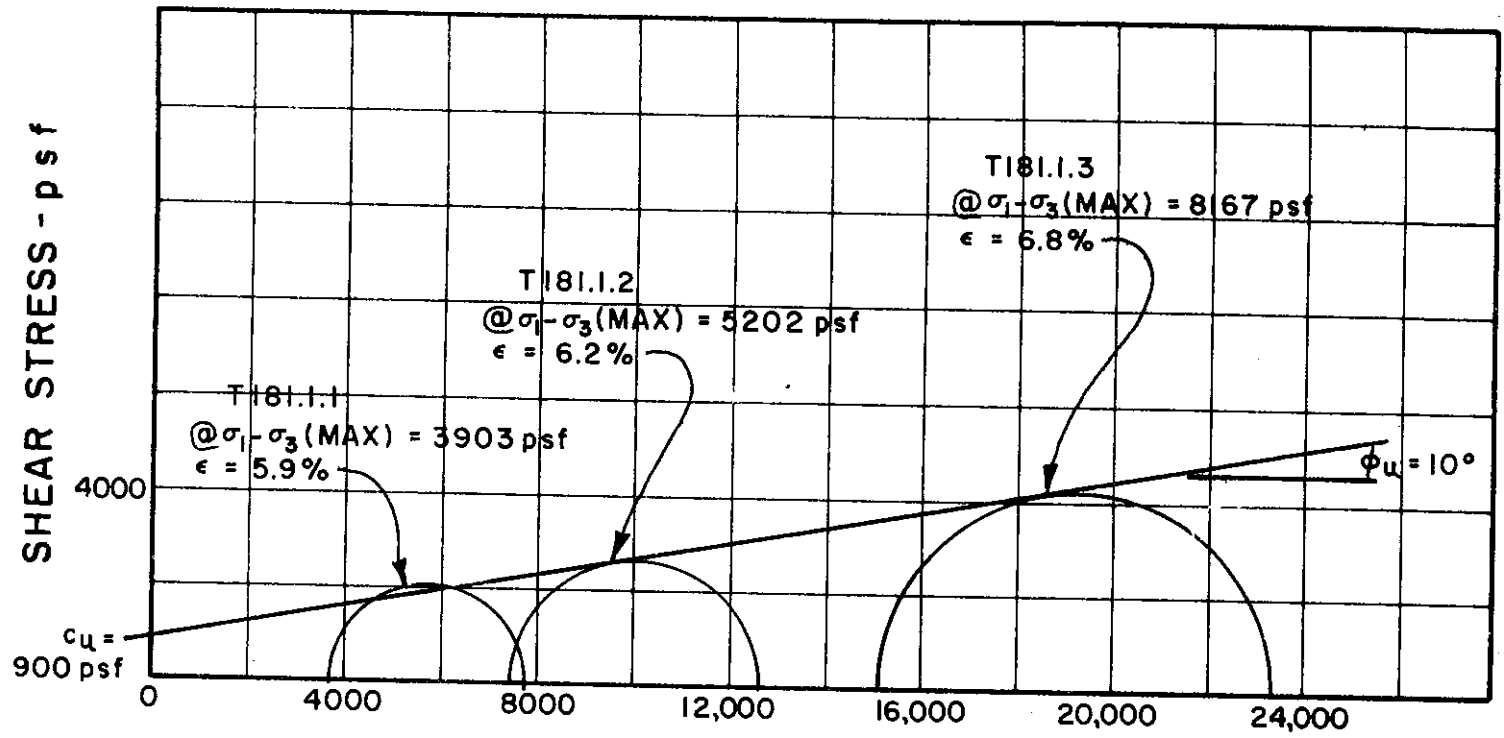
UNCONSOLIDATED UNDRAINED

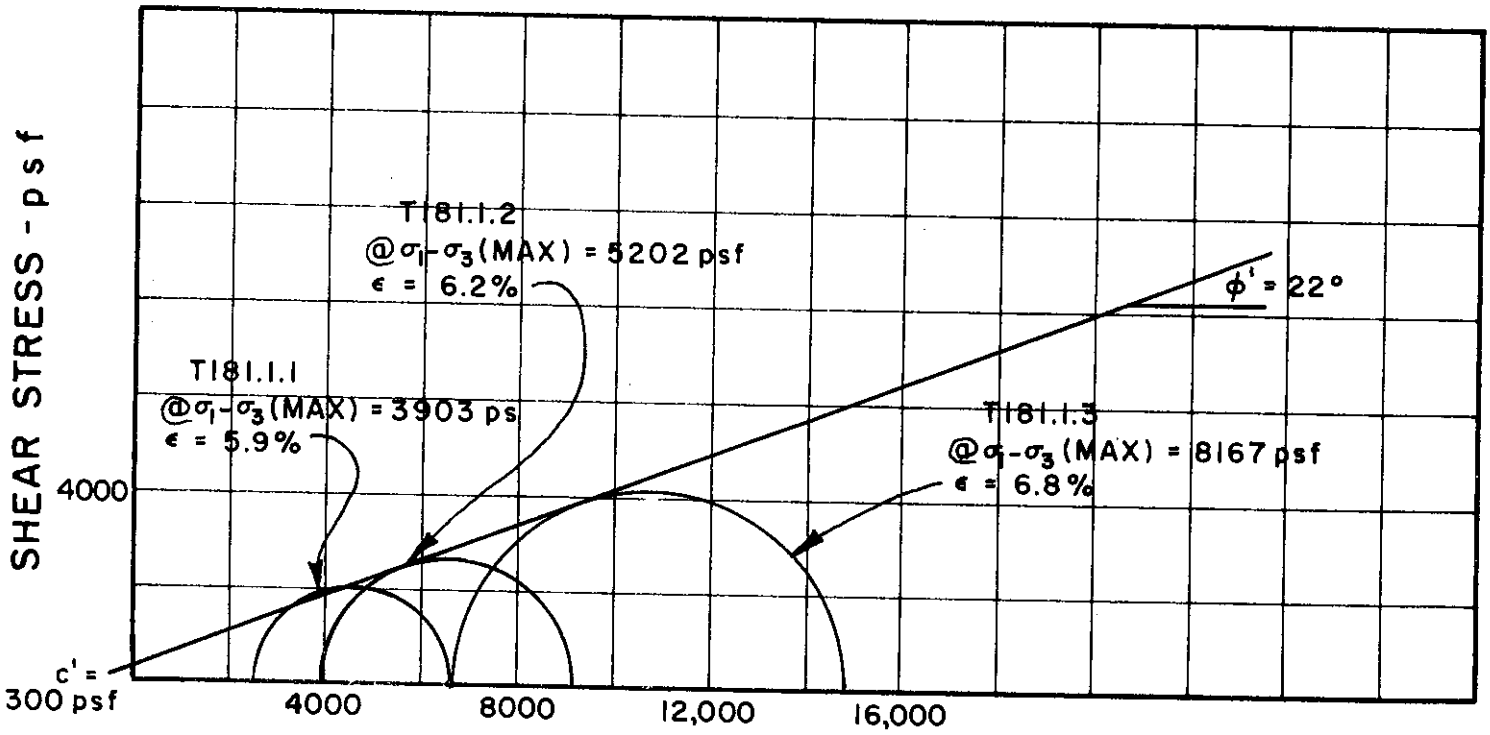
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

FILE 1255





BORING NO. 18

SAMPLE NO. 12

DEPTH 108.0' TO 110.0'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255

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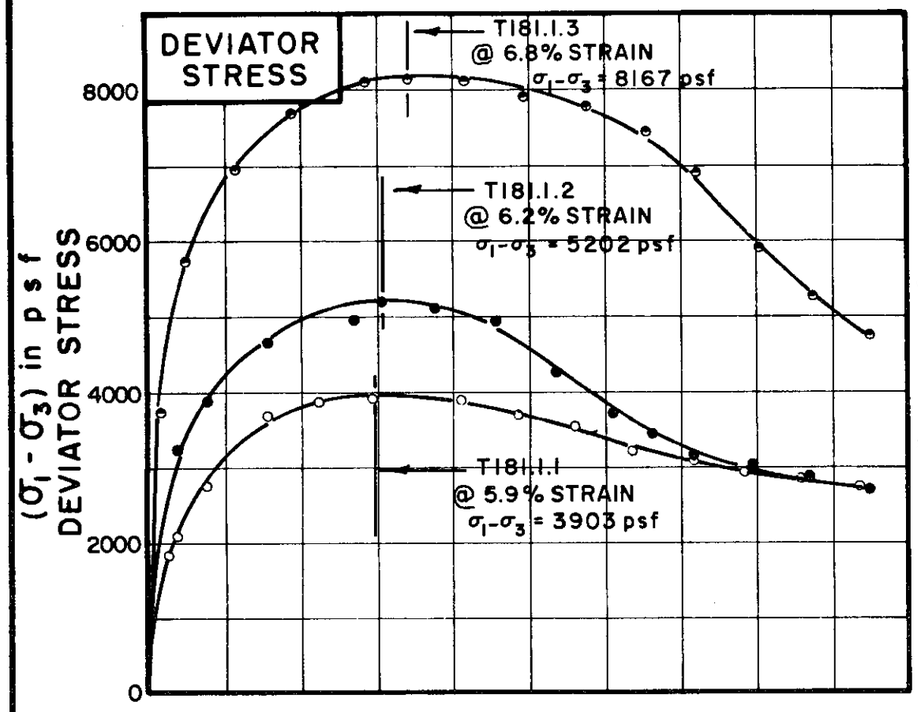
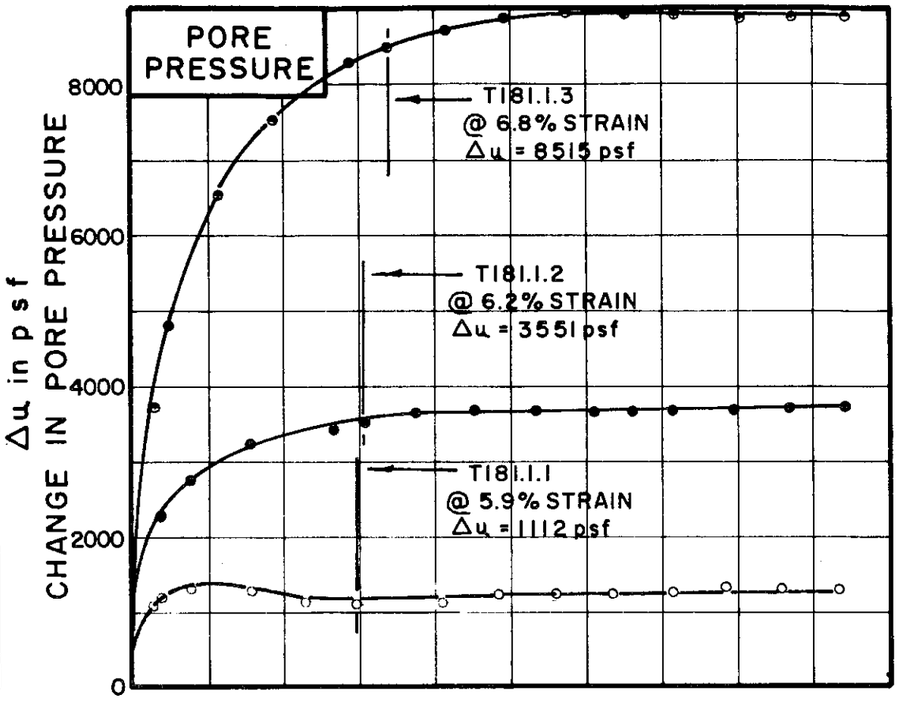
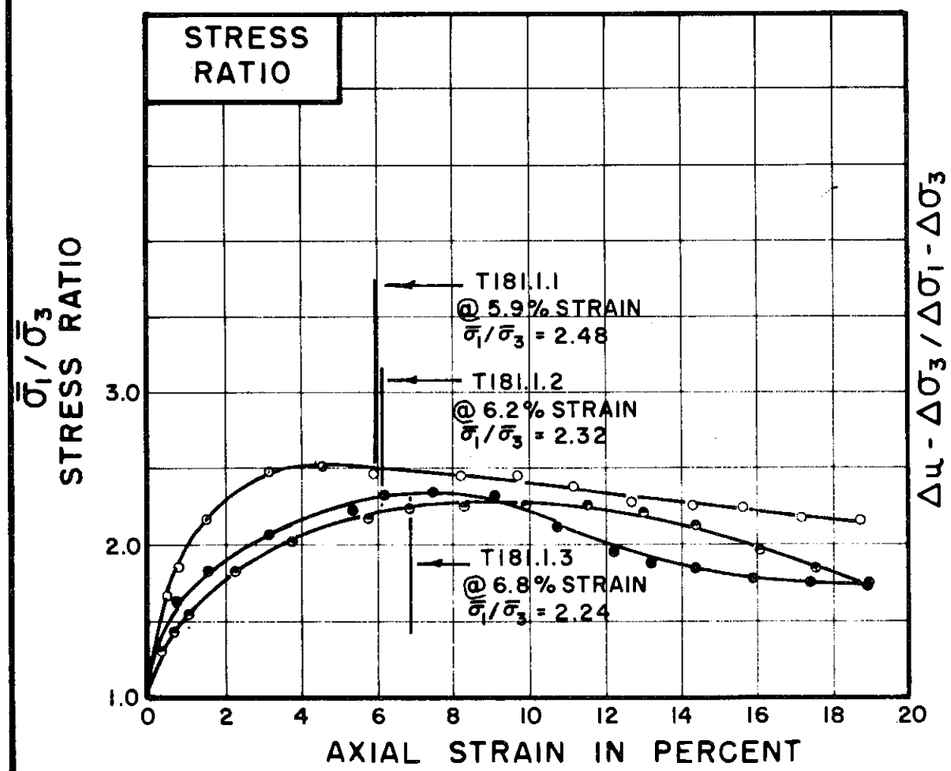
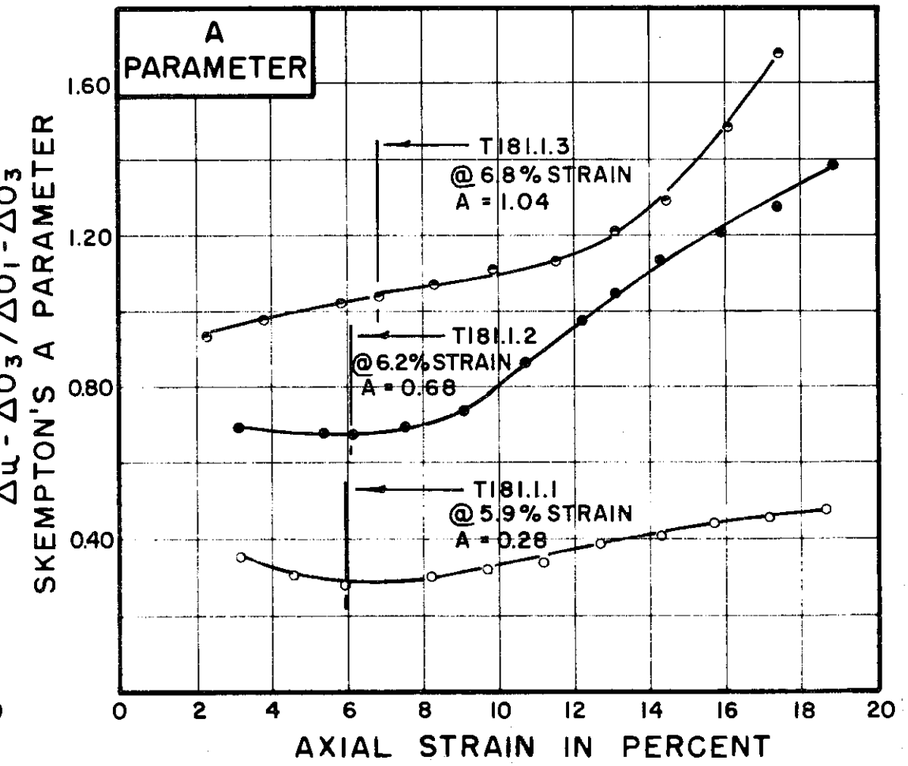
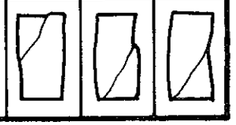








TEST NO. / SYMBOL		T181.1.1 ○	T181.1.2 ●	T181.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	34.5%	31.0%	30.7%
	DRY DENSITY lb/cu ft	γ_d	87	92	92
	SAMPLE DIAMETER in.	D_o	1.40	1.39	1.37
	SAMPLE HEIGHT in	H_o	3.37	3.35	3.37
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	10080	7200	6480
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	3744	7488	15120
	VOLUMETRIC STRAIN	ϵ_{vol}	2.32%	4.19%	6.61%
	PORE PRESSURE RESPONSE		95%	97%	93%
FINAL CONDITIONS	WATER CONTENT	w_f	33.7%	29.3%	27.7%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT/MINUTE			.024	.024	.024

BORING NO. 18
SAMPLE NO. 12
DEPTH 108.0' TO 110.0'

SOIL DESCRIPTION SILTY CLAY (CL)

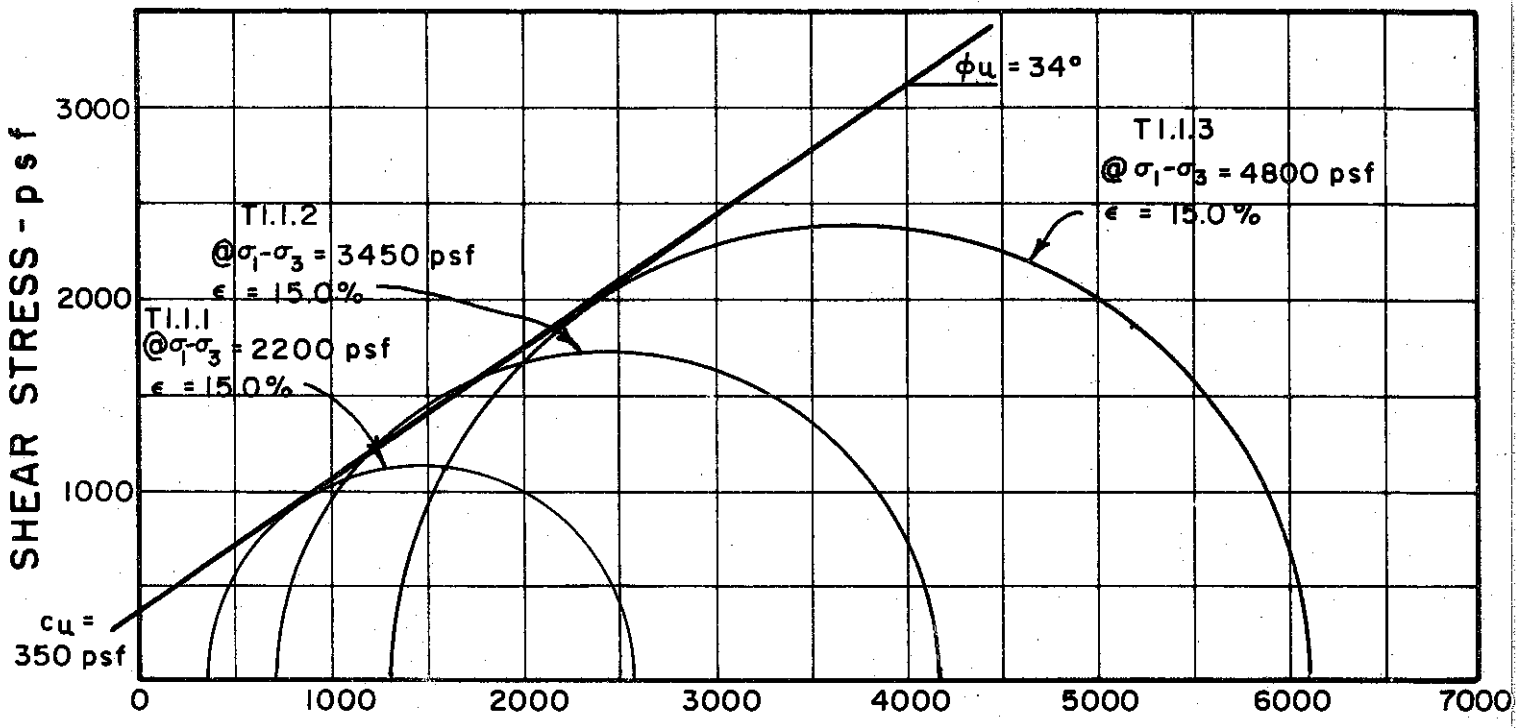
LIQUID LIMIT 46 PLASTIC LIMIT 22

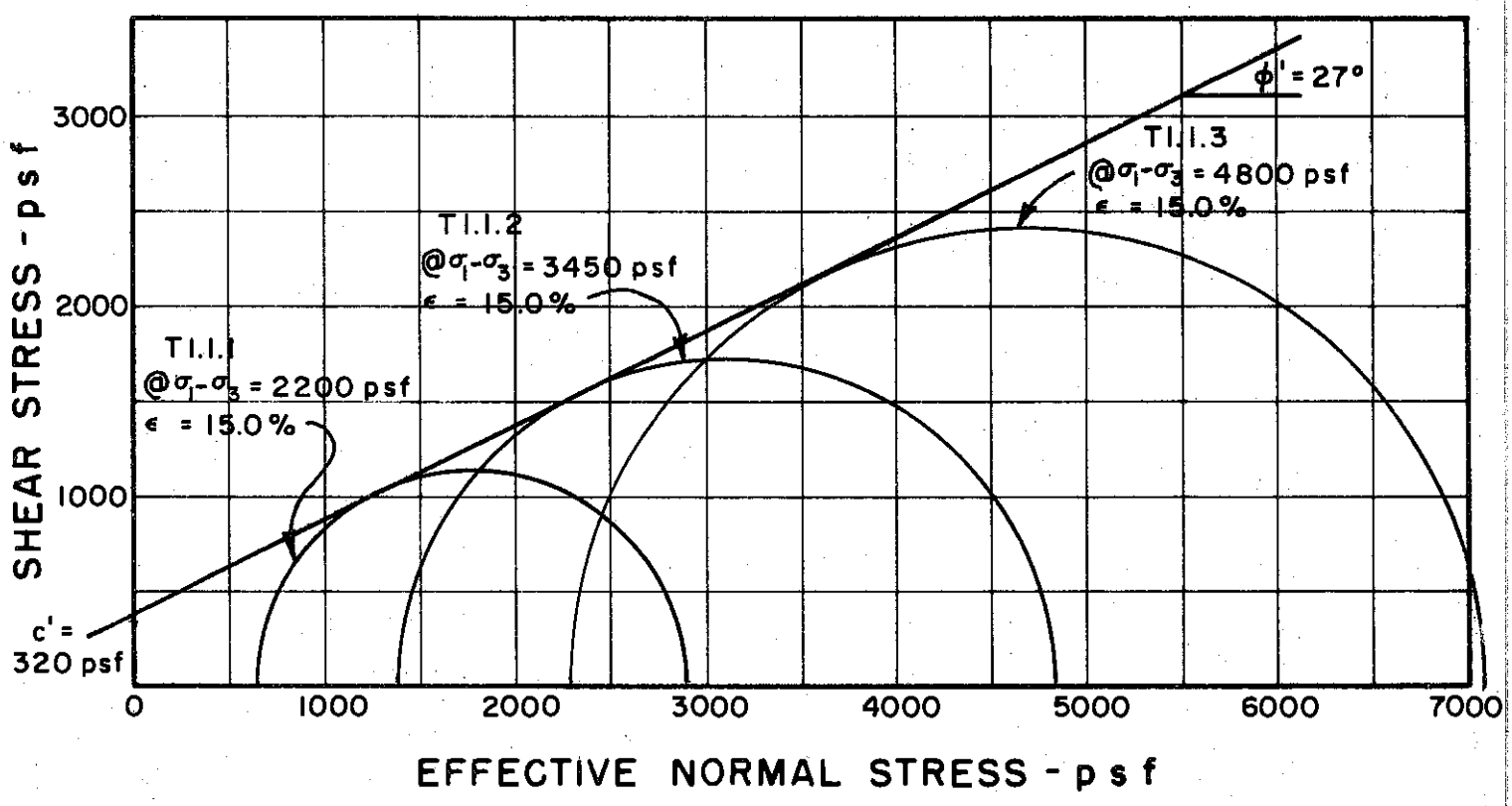
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-386

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 26

SAMPLE NO. 2

DEPTH 3.5 TO 5.5

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

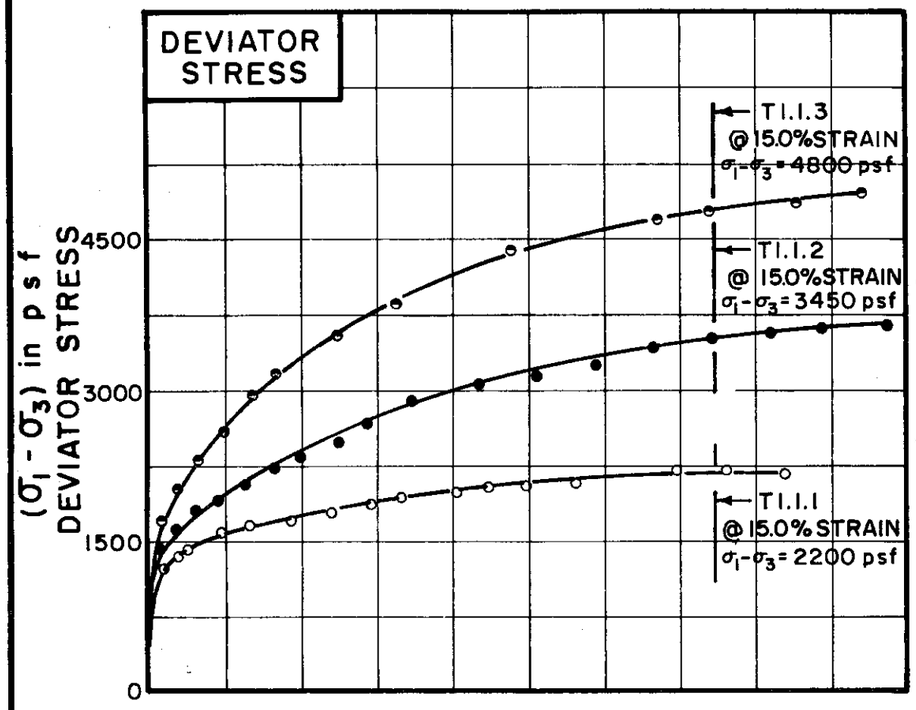
MOHR STRENGTH ENVELOPE

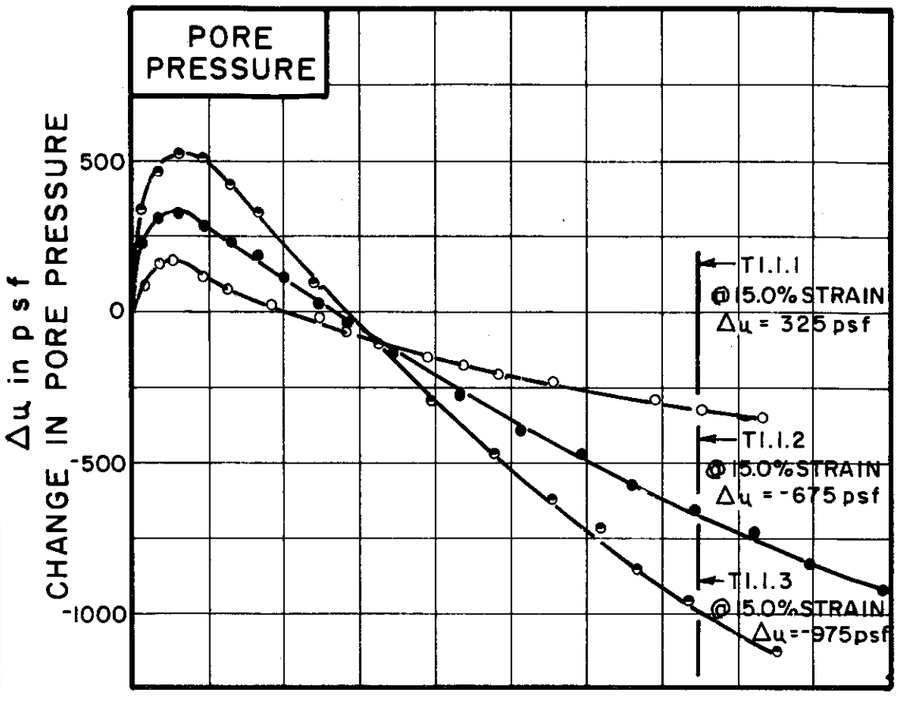
TRIAXIAL COMPRESSION TESTS

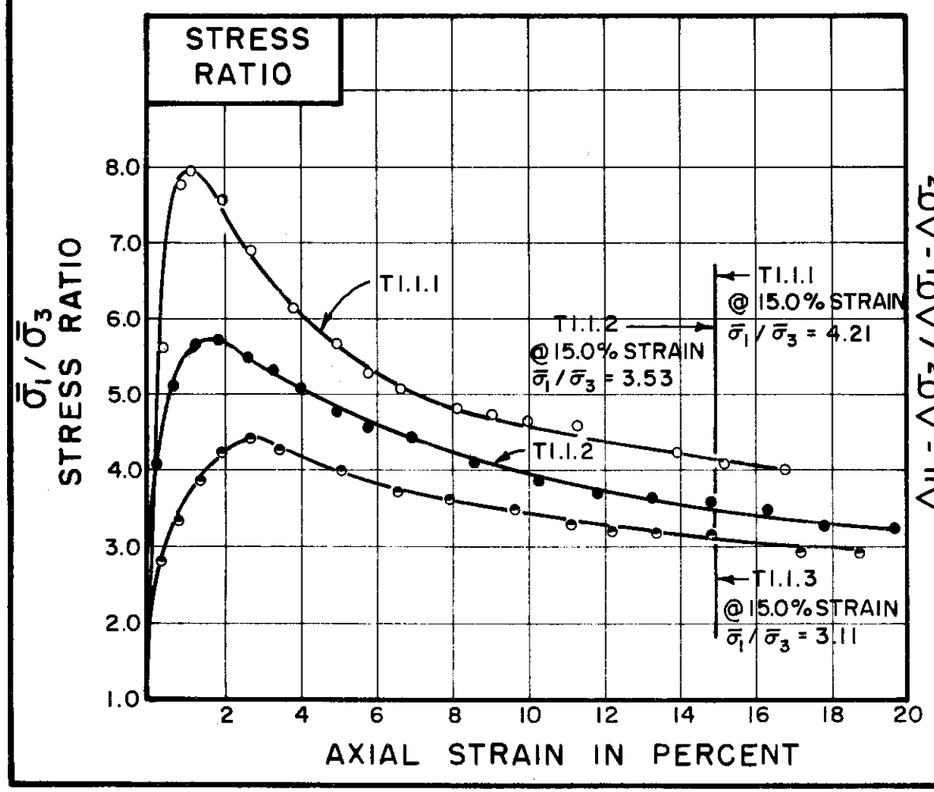
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

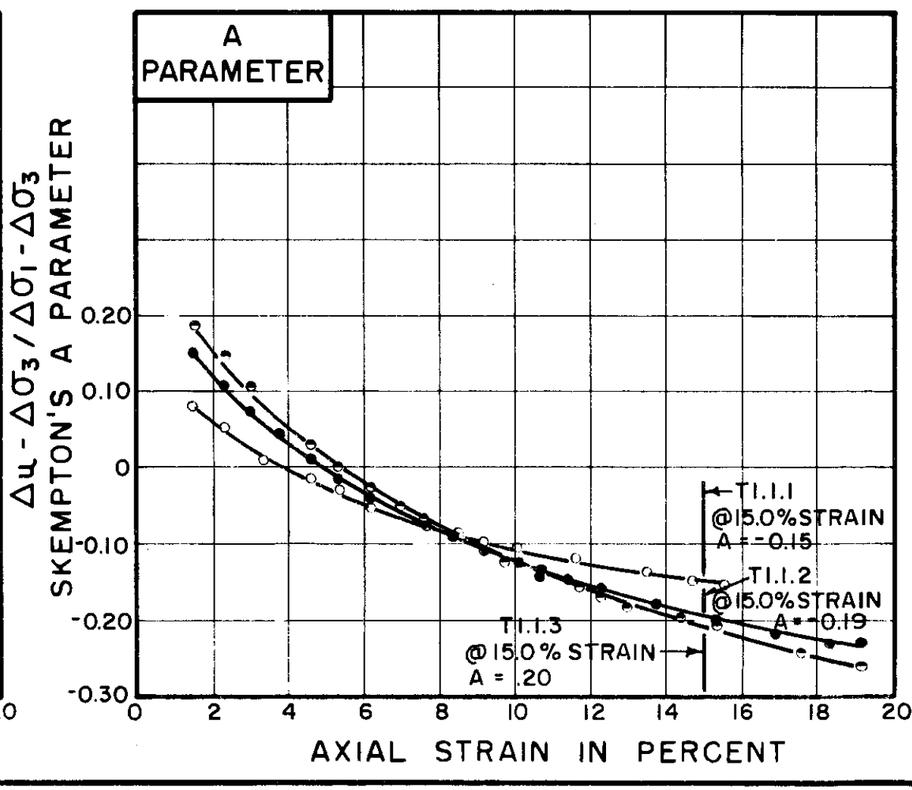
FILE 1255

C-387









TEST NO. / SYMBOL		T1.1.1 ○	T1.1.2 ●	T1.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	23.0%	23.9%	22.3%
	DRY DENSITY pcf	γ_d	104	103	108
	SAMPLE DIAMETER in.	D_o	1.39	1.39	1.47
	SAMPLE HEIGHT in	H_o	3.22	3.25	3.26
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	8740	8352	8410
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	360	691	1296
	VOLUMETRIC STRAIN	ϵ_{vol}	.4%	1.0%	1.4%
	PORE PRESSURE RESPONSE		100%	98%	94%
FINAL CONDITIONS	WATER CONTENT	w_f	26.7%	26.7%	25.3%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.025	.025	.025

BORING NO. 26
SAMPLE NO. 2
DEPTH 3.5 TO 5.5

SOIL DESCRIPTION SILTY CLAY (CL-CH)

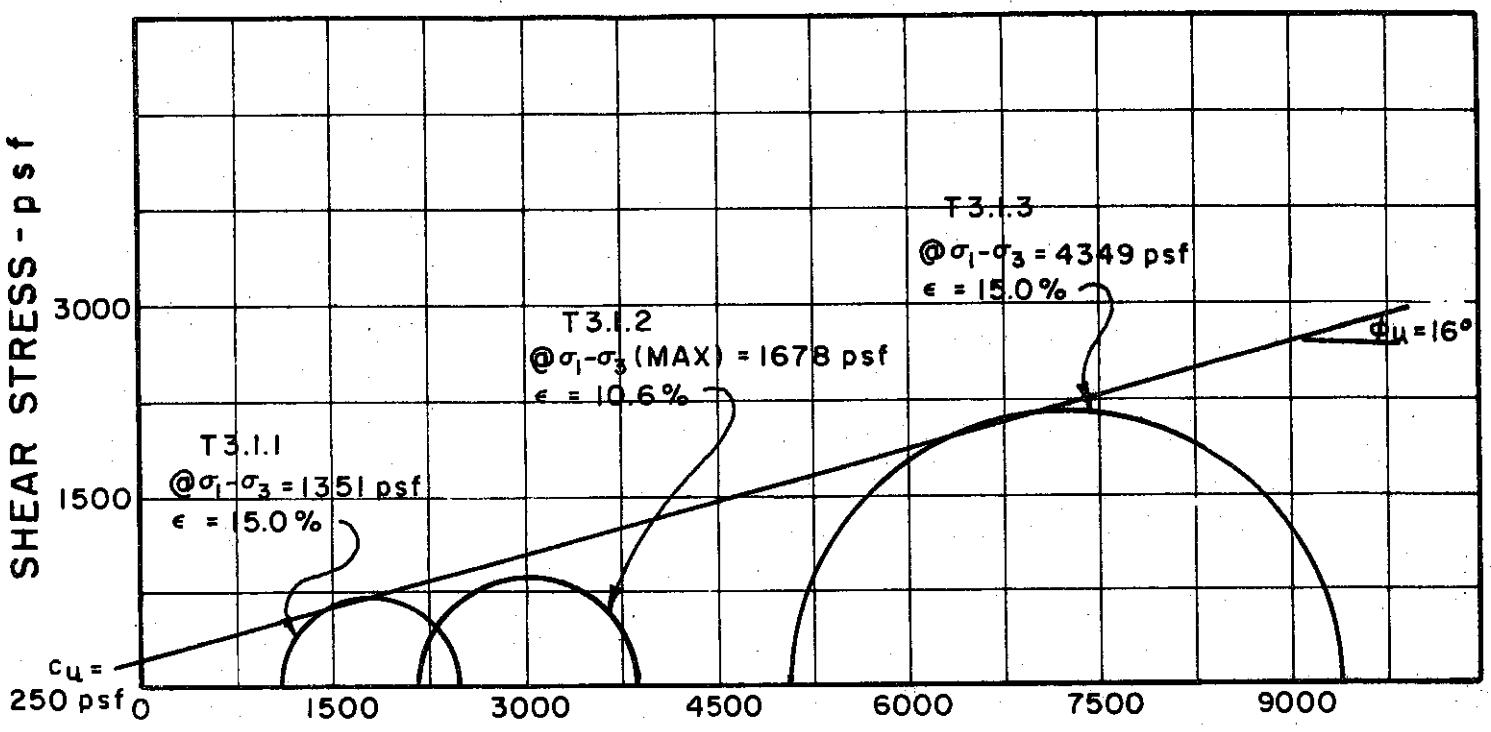
LIQUID LIMIT 53 PLASTIC LIMIT 24

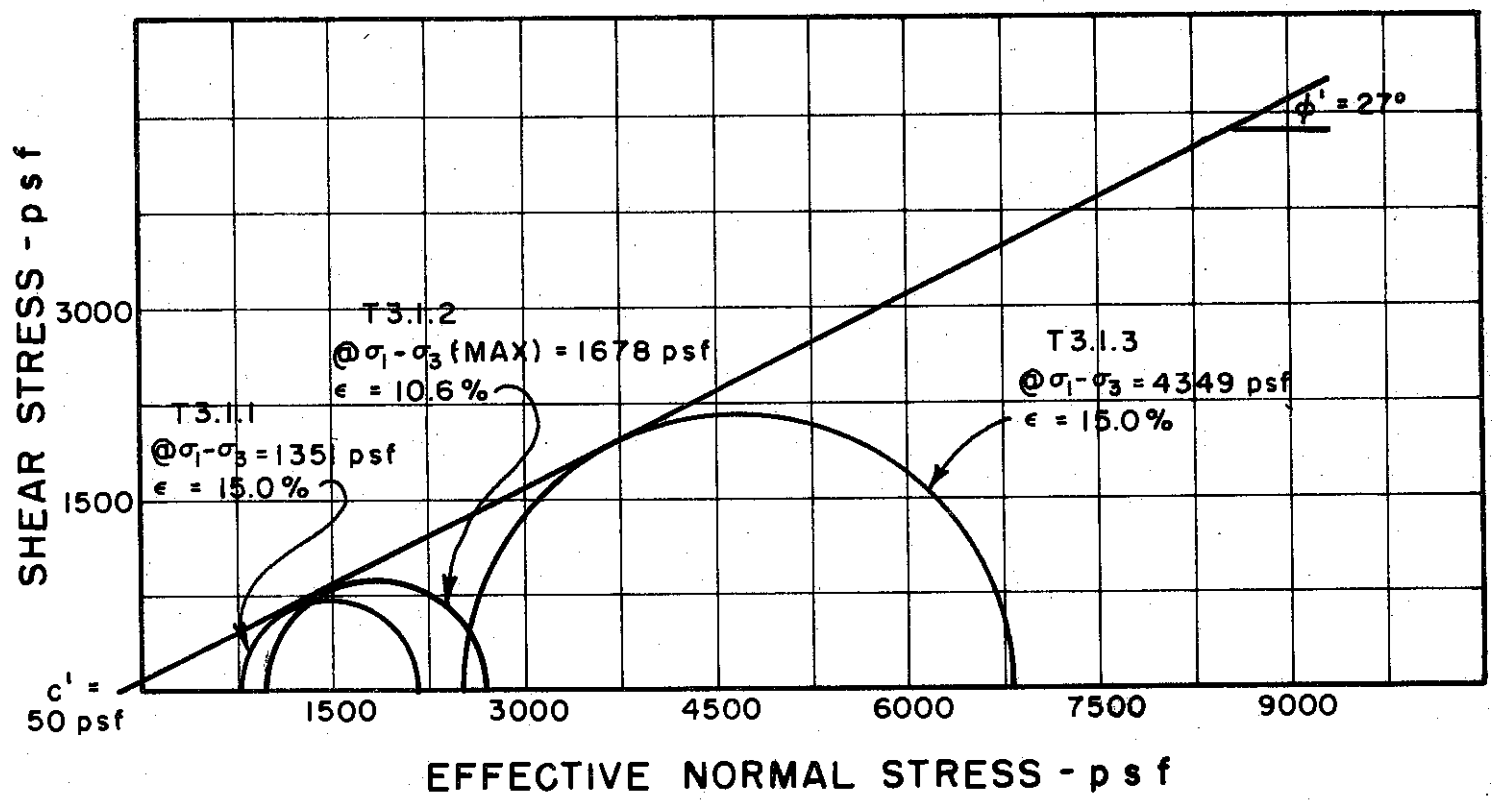
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-388

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 26

SAMPLE NO. 5

DEPTH 18.0 TO 20.0

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

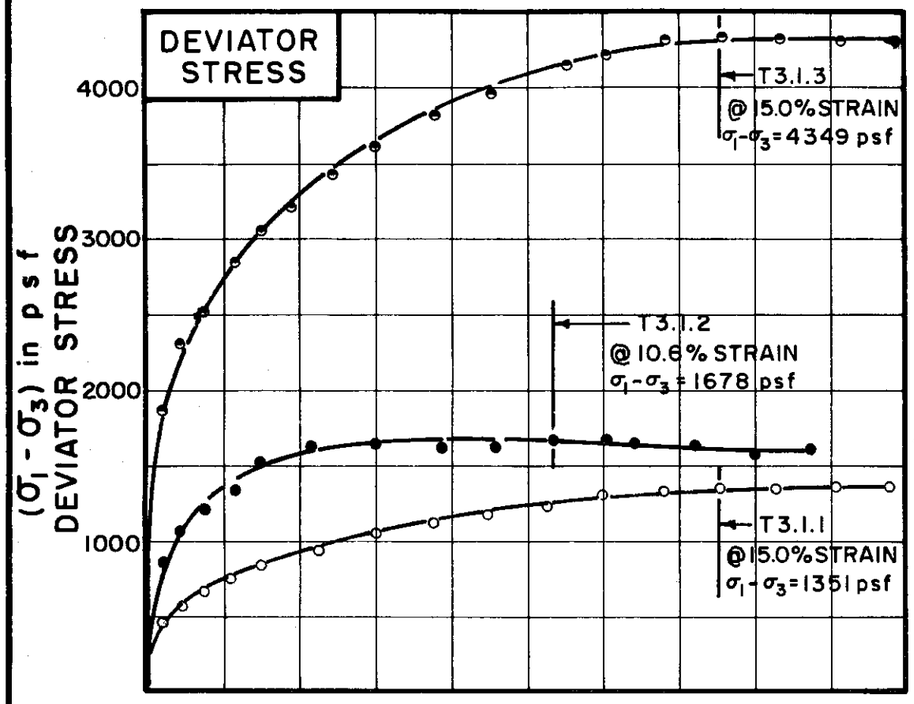
MOHR STRENGTH ENVELOPE

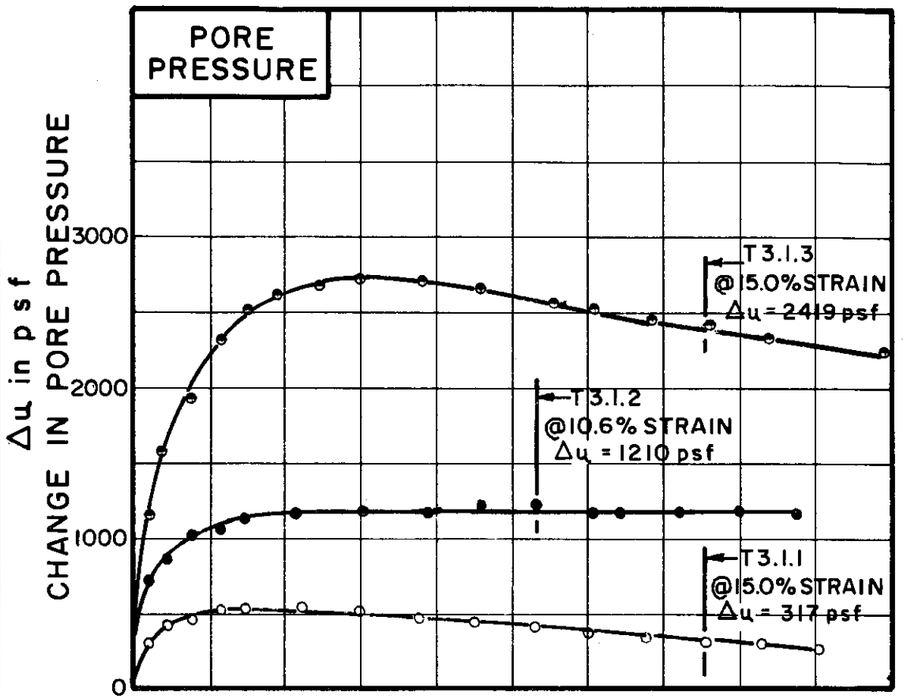
TRIAXIAL COMPRESSION TESTS

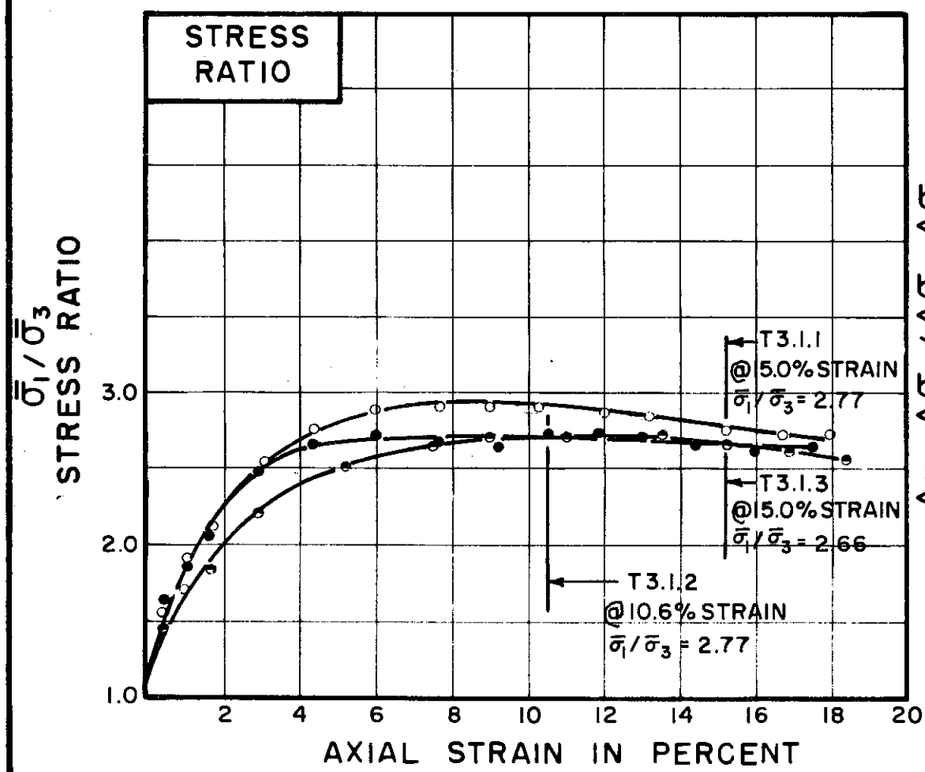
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

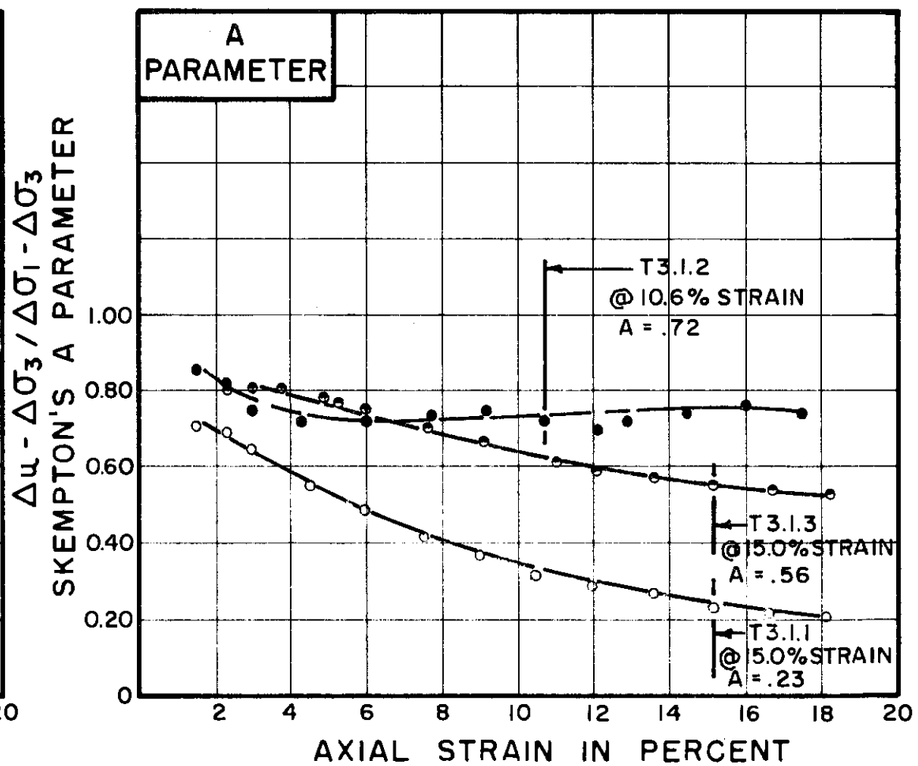
FILE 1255

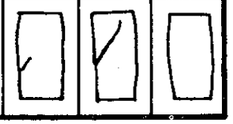
C-389









TEST NO. / SYMBOL		T3.1.1 ○	T3.1.2 ●	T3.1.3 ◒
INITIAL CONDITIONS: WATER CONTENT	w_o	35.4%	35.3%	35.7%
INITIAL CONDITIONS: DRY DENSITY pcf	γ_d	89	86	86
INITIAL CONDITIONS: SAMPLE DIAMETER in.	D_o	1.40	1.40	1.41
INITIAL CONDITIONS: SAMPLE HEIGHT in	H_o	3.36	3.35	3.35
CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE psf	u_o	7200	7200	10800
CONDITIONS BEFORE SHEAR: INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1080	2160	5040
CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN	ϵ_{vol}	5.3 %	6.2%	8.7 %
CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE		100%	98%	95%
FINAL CONDITIONS: WATER CONTENT	w_f	31.1%	30.8%	28.4%
FINAL CONDITIONS: SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE		.024	.024	.024

BORING NO. 26
SAMPLE NO. 5
DEPTH 18.0 TO 20.0

SOIL DESCRIPTION SILTY CLAY (CL-CH)

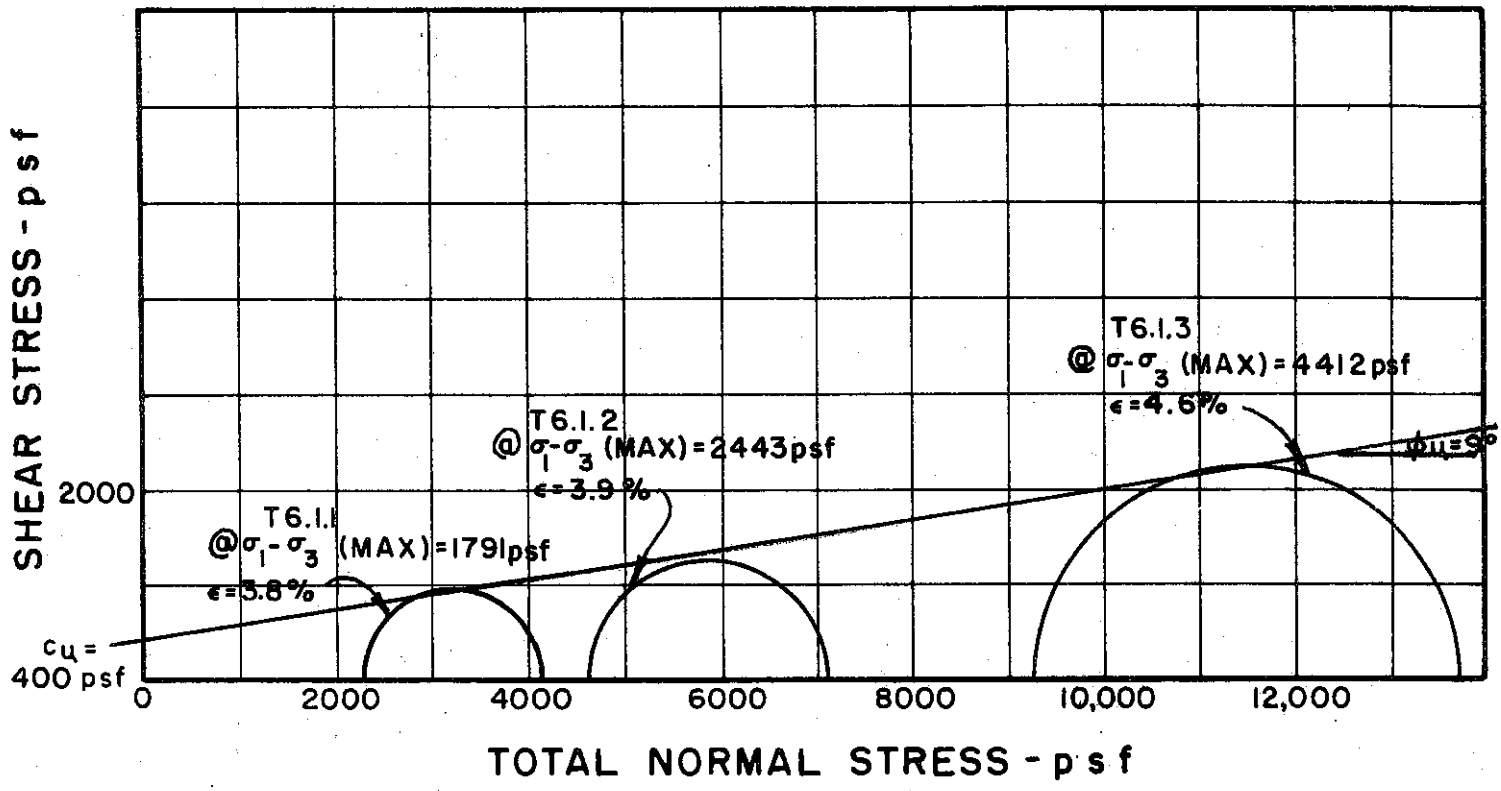
LIQUID LIMIT ____ PLASTIC LIMIT ____

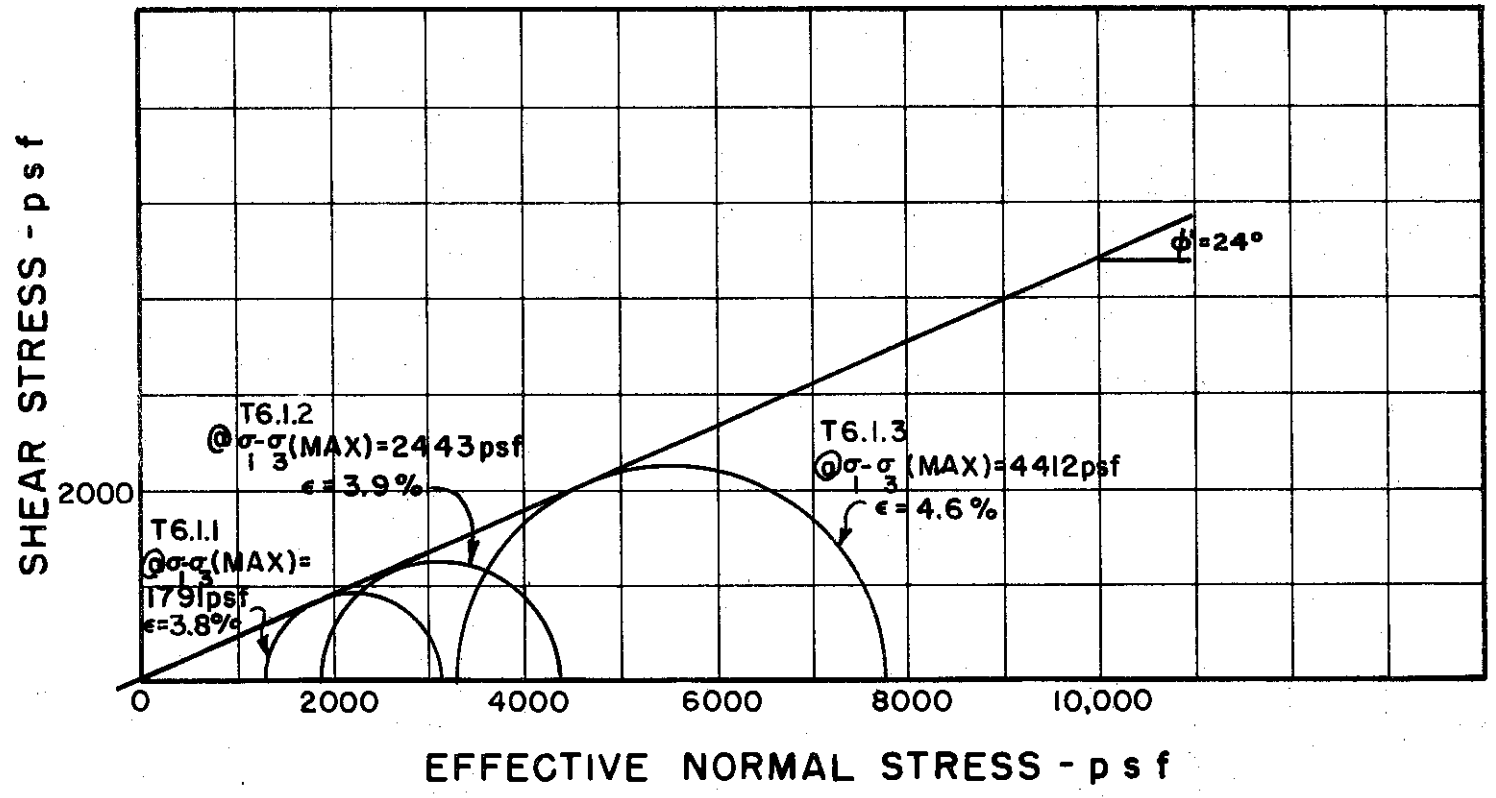
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-390

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 26

SAMPLE NO. 11

DEPTH 48.0 TO 50.0

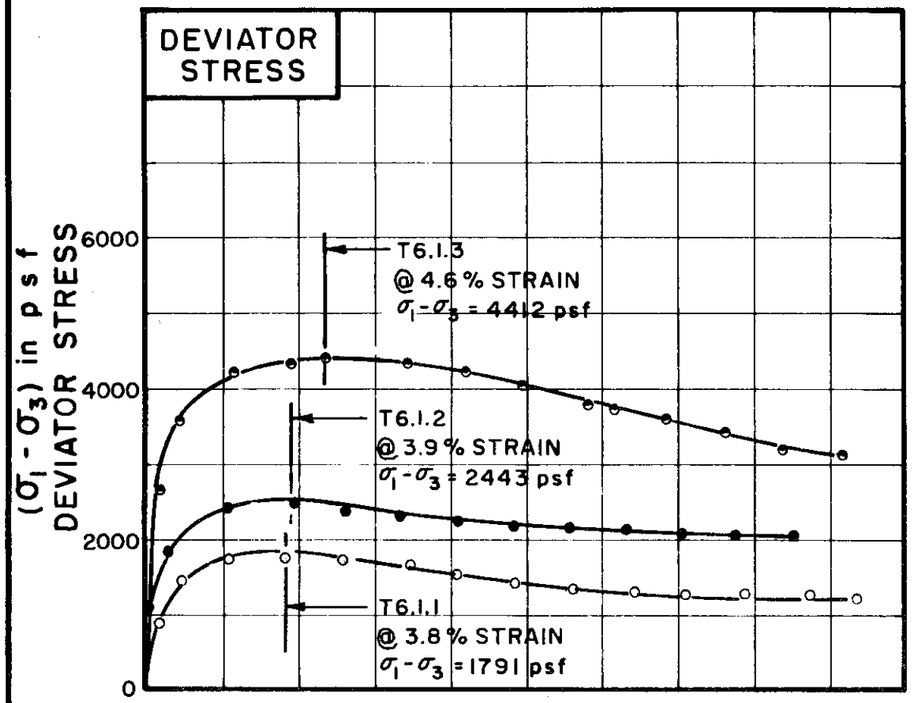
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

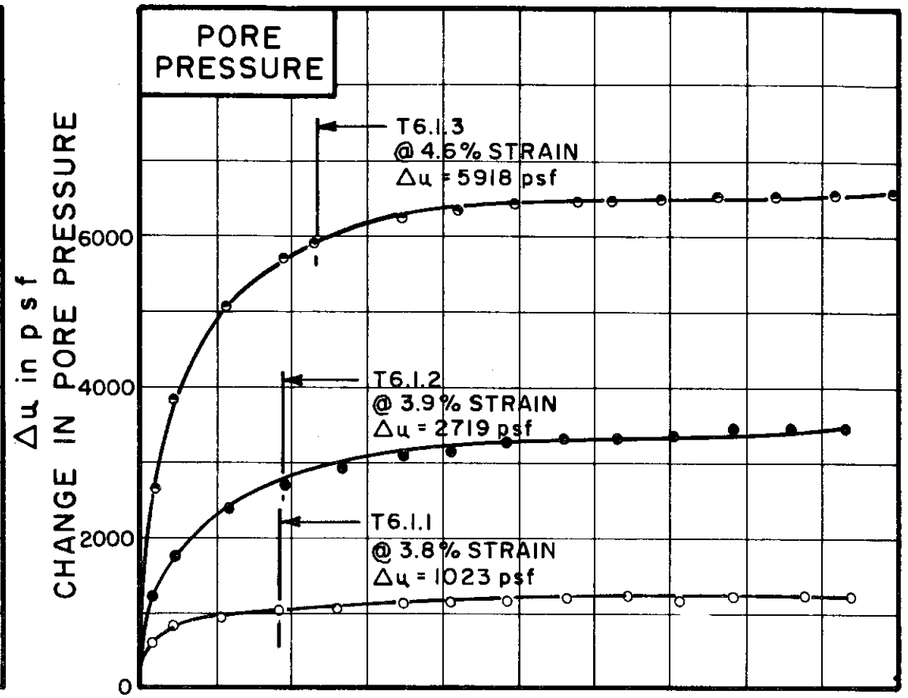
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

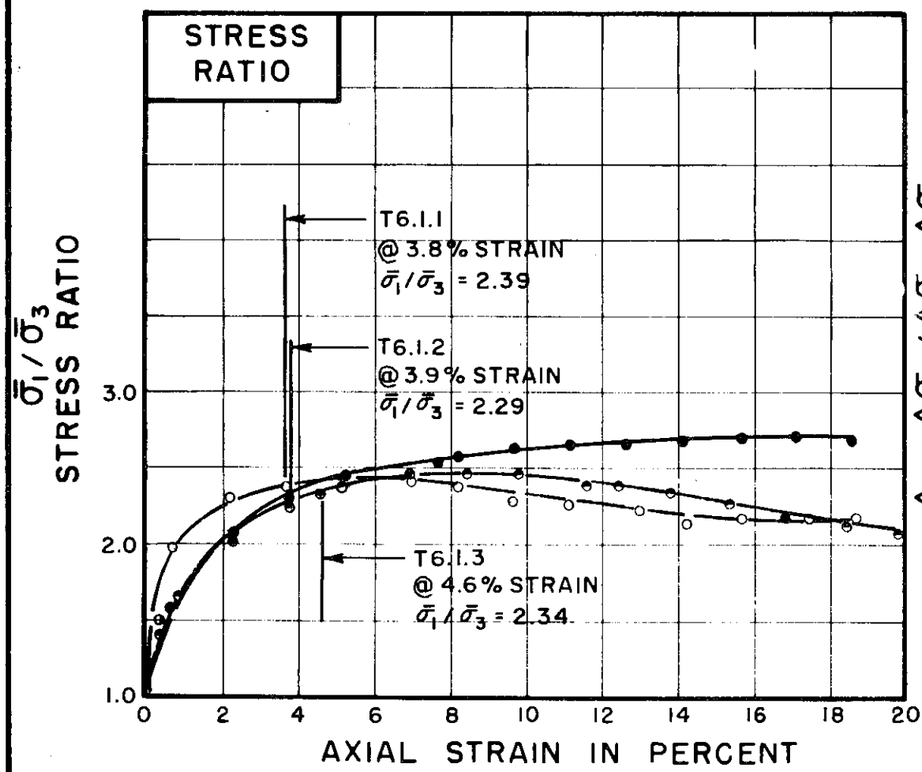
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

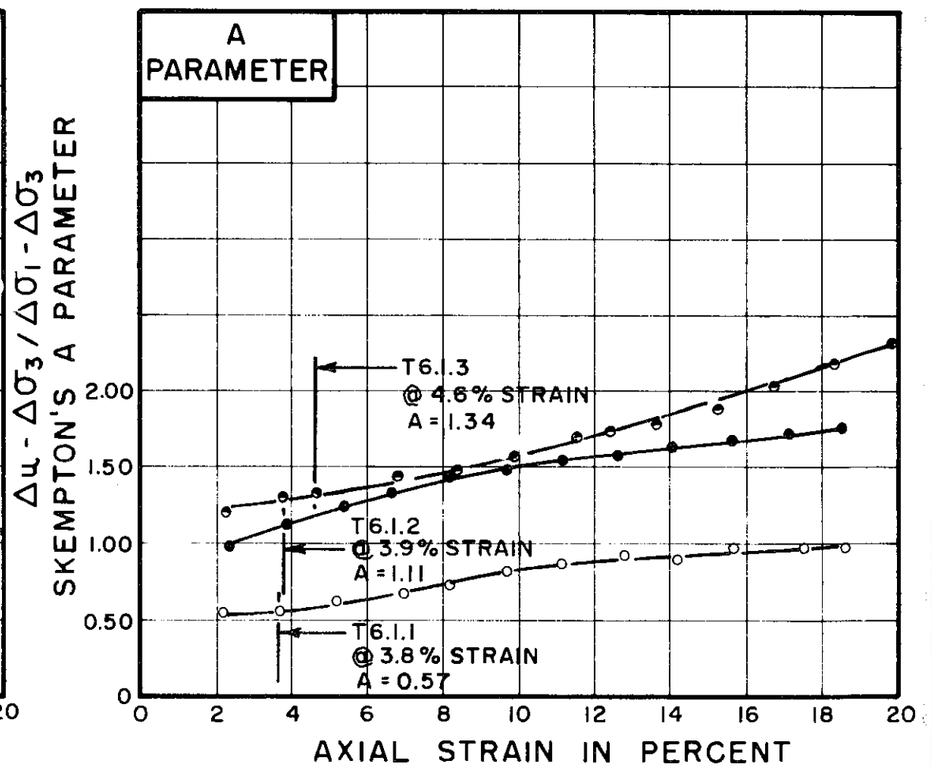
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255

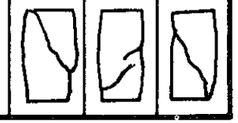
C-391









TEST NO. / SYMBOL		T6.1.1 ○	T6.1.2 ●	T6.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	36.1%	36.5%	30.0%
	DRY DENSITY pcf	γ_d	88	86	93
	SAMPLE DIAMETER in.	D_o	1.40	1.40	1.40
	SAMPLE HEIGHT in	H_o	3.35	3.40	3.36
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p s f	u_o	5760	7200	7200
	INITIAL EFFECTIVE STRESS p s f	$\bar{\sigma}_1 = \bar{\sigma}_3$	2304	4608	9216
	VOLUMETRIC STRAIN	ϵ_{vol}	2.0%	4.8 %	8.5 %
	PORE PRESSURE RESPONSE		99%	95%	100%
FINAL CONDITIONS	WATER CONTENT	w_f	34.3%	32.9%	23.8%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.025

BORING NO. 26
SAMPLE NO. 11
DEPTH 48.0 TO 50.0

SOIL DESCRIPTION SILTY CLAY (CL)

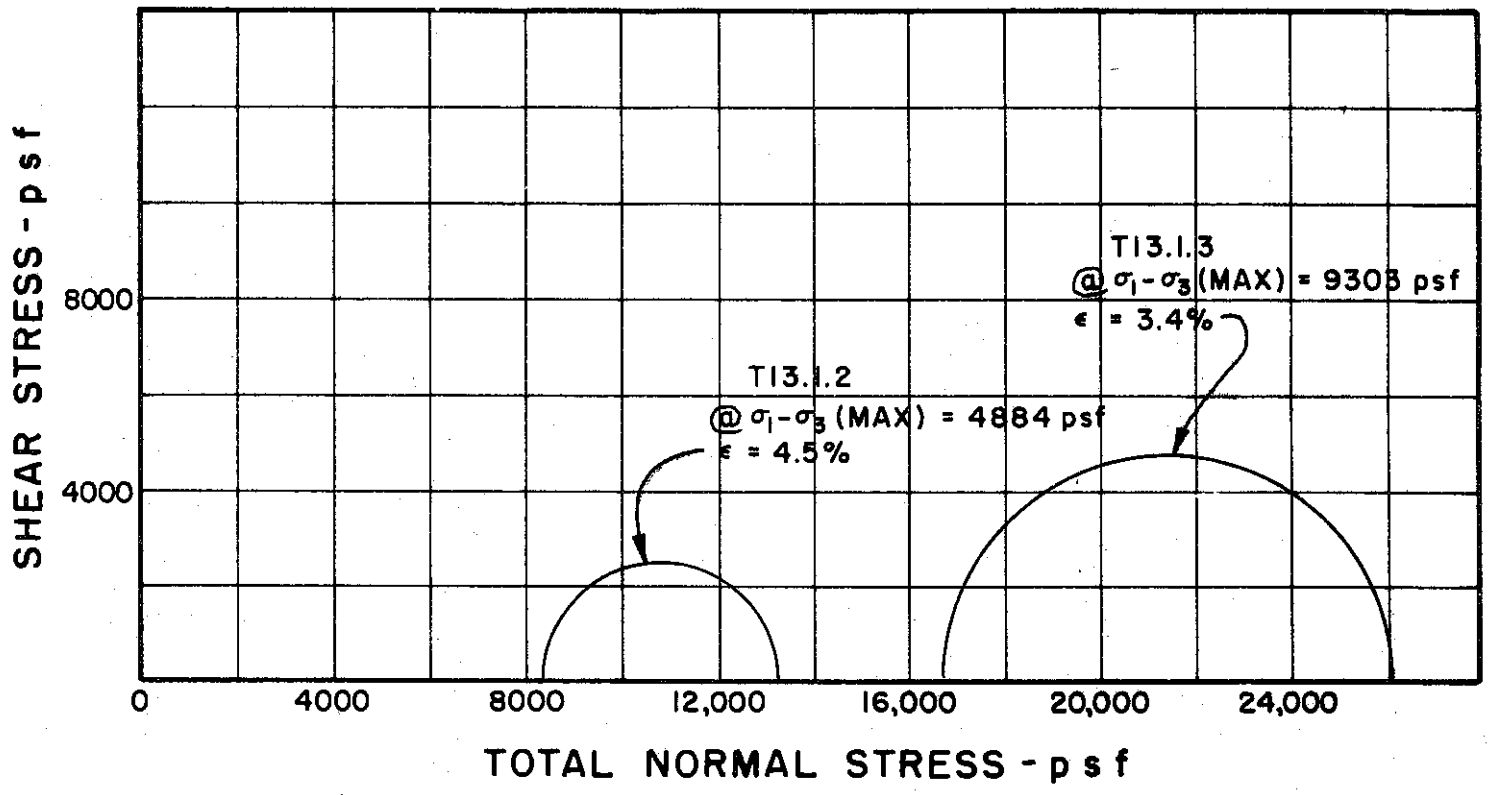
LIQUID LIMIT 41 PLASTIC LIMIT 21

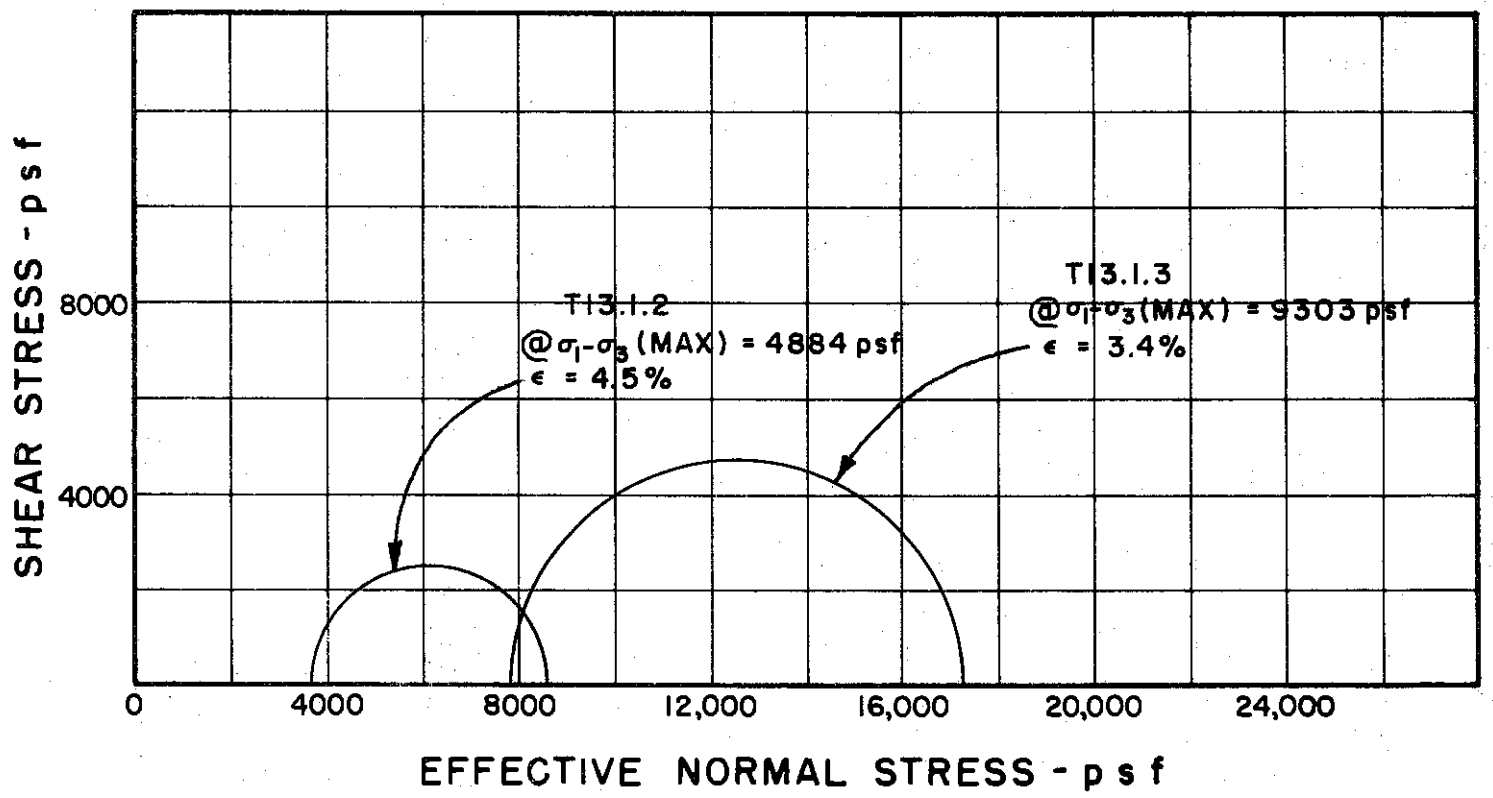
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-392

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 26

SAMPLE NO. 28

DEPTH 128.0' TO 130.0'

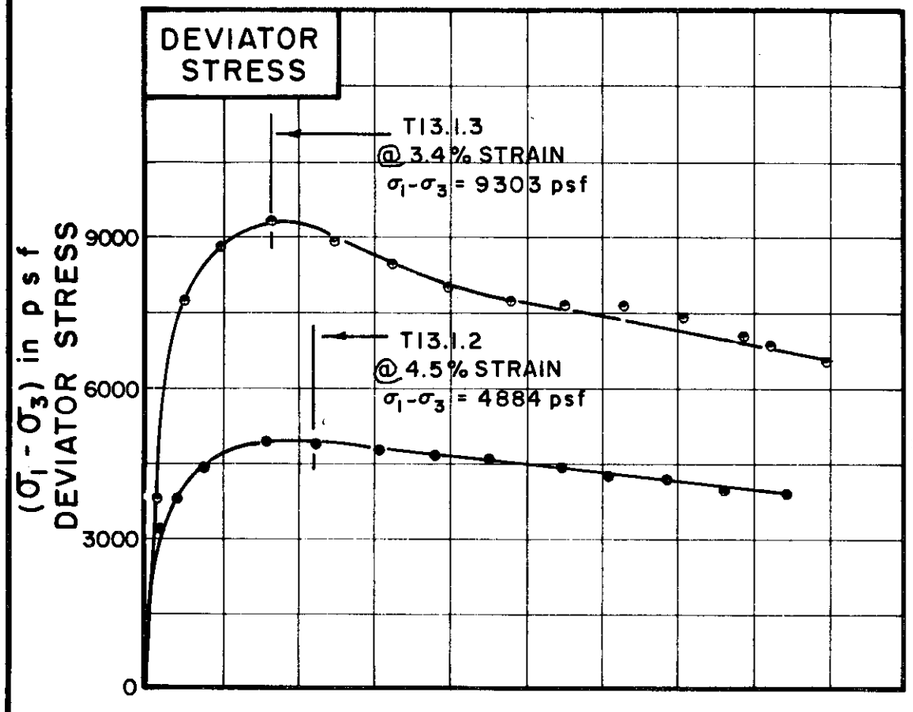
REMARKS SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.1

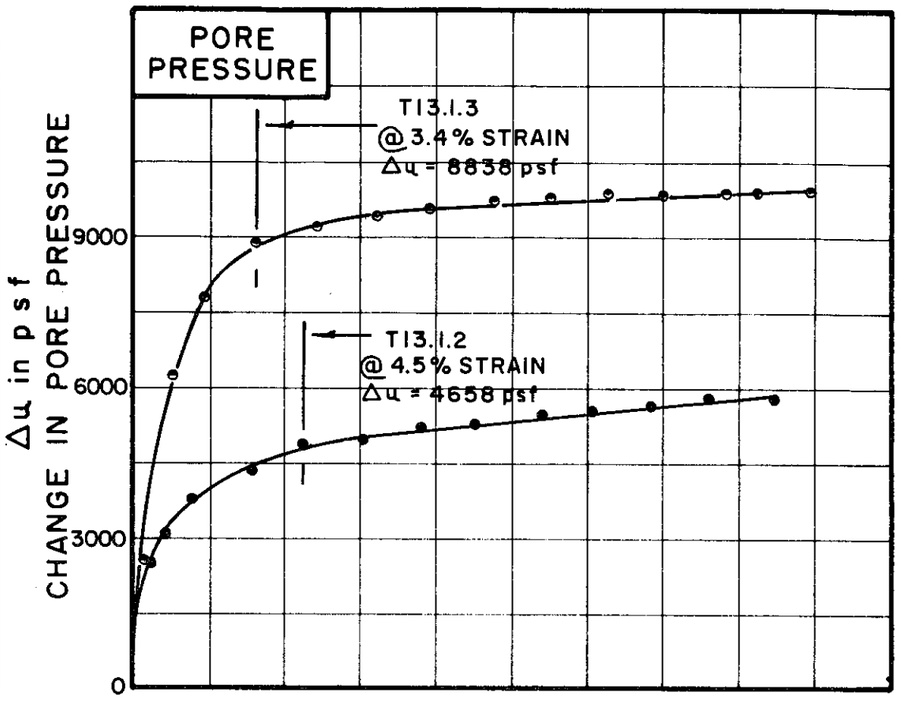
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

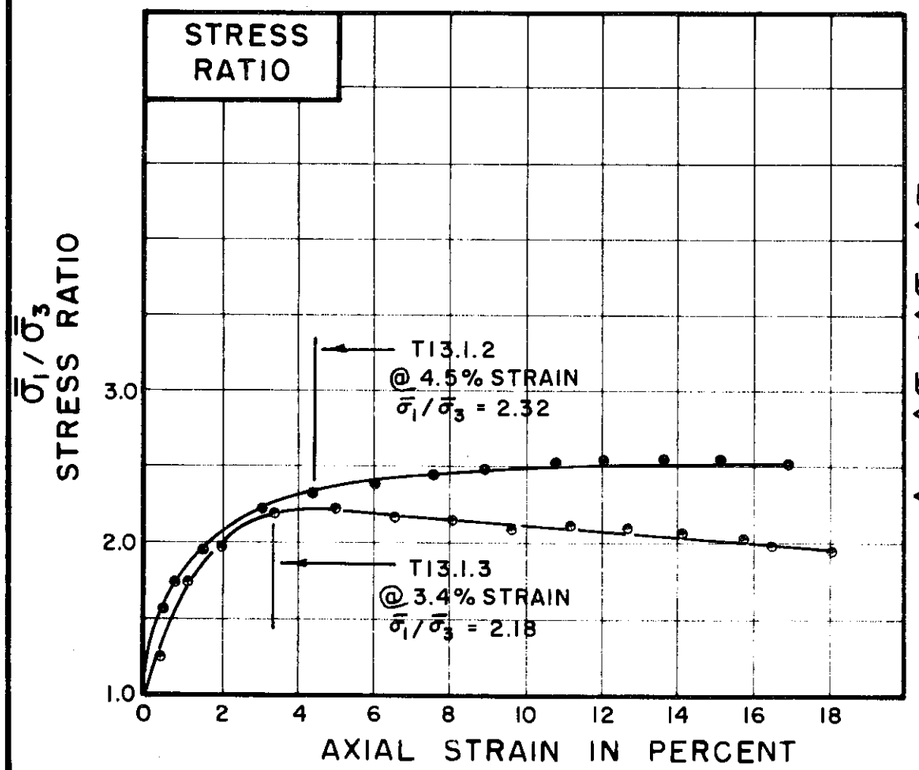
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

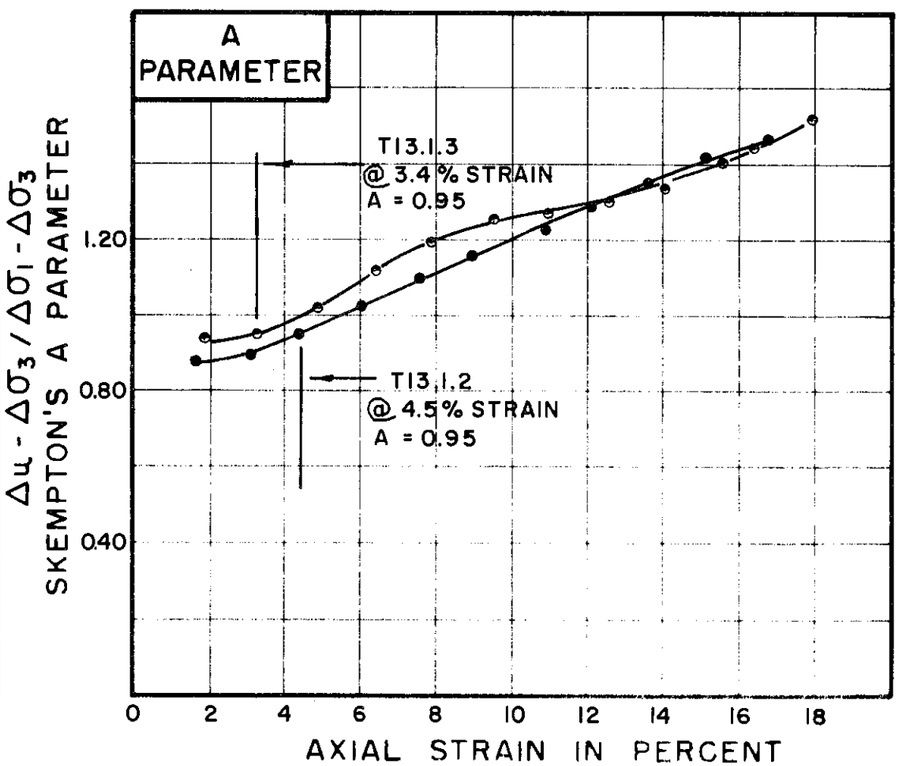
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255

C-393









TEST NO. / SYMBOL		T13.1.2 ●	T13.1.3 ○	
INITIAL CONDITIONS	WATER CONTENT	w_o	35.6%	34.0%	%
	DRY DENSITY lb/cu ft	γ_d	86	90	
	SAMPLE DIAMETER in.	D_o	1.40	1.40	
	SAMPLE HEIGHT in	H_o	3.35	3.38	
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	6480	8640	
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	8352	16704	
	VOLUMETRIC STRAIN	ϵ_{vol}	6.09%	10.9%	%
	PORE PRESSURE RESPONSE		98%	98%	
FINAL CONDITIONS	WATER CONTENT	w_f	31.4%	27.6%	%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.024	.025	

BORING NO. 26
SAMPLE NO. 28
DEPTH 128.0' TO 130.0'

SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 39 PLASTIC LIMIT 21

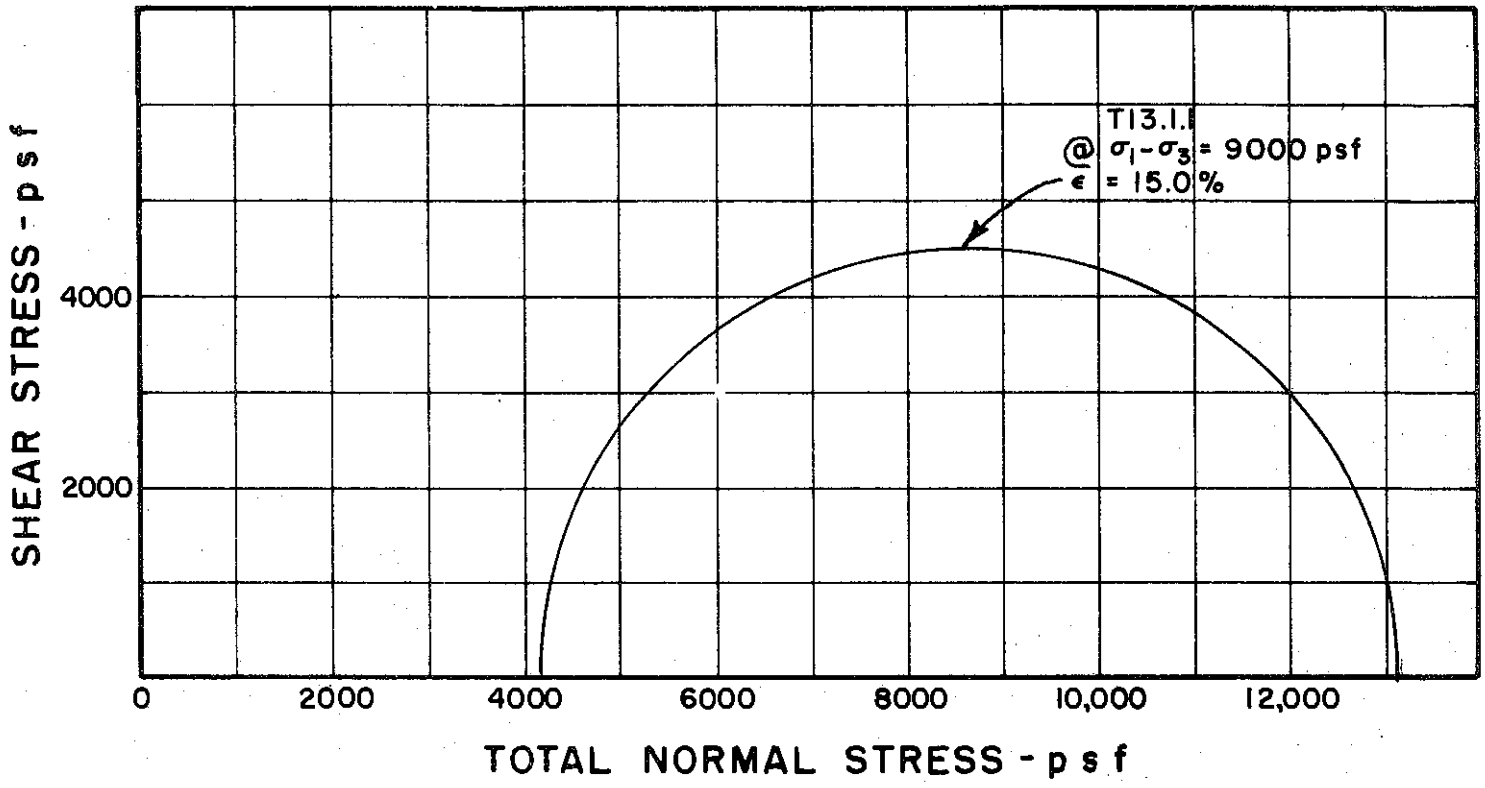
NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.1

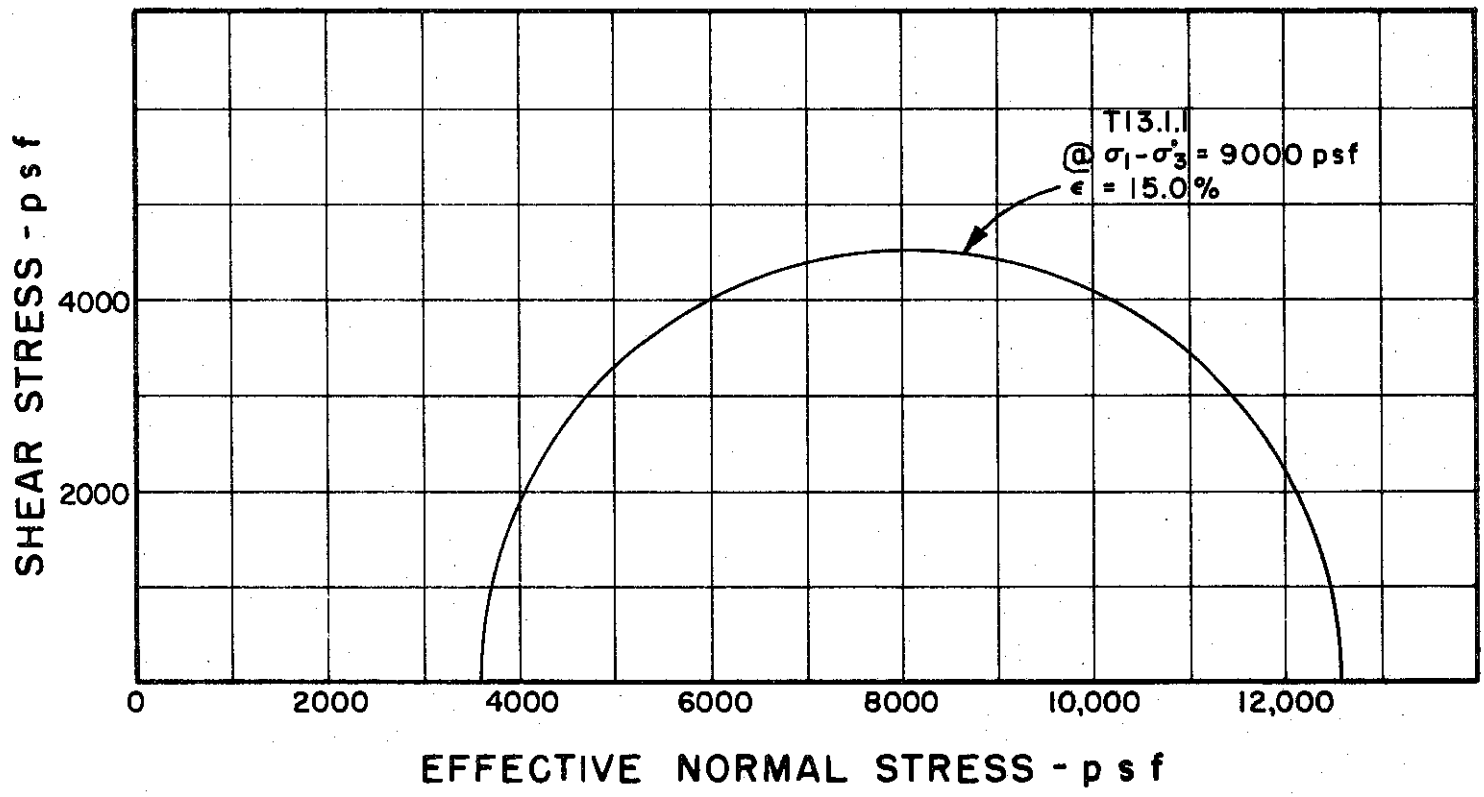
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-394





BORING NO. 26

SAMPLE NO. 28

DEPTH 128.0' TO 130.0'

REMARKS SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.2 & T13.1.3

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

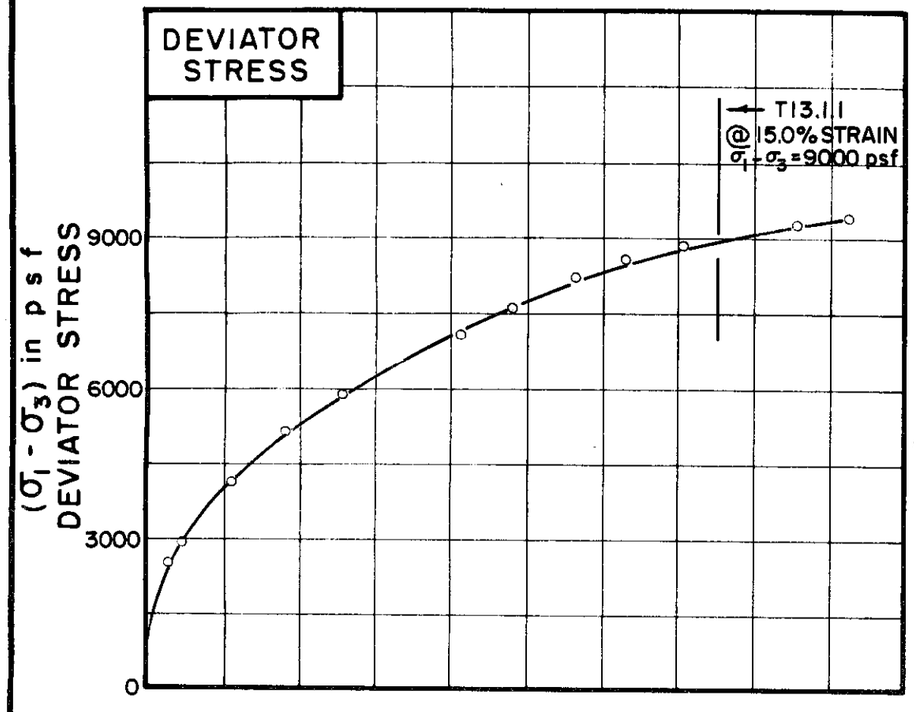
MOHR STRENGTH ENVELOPE

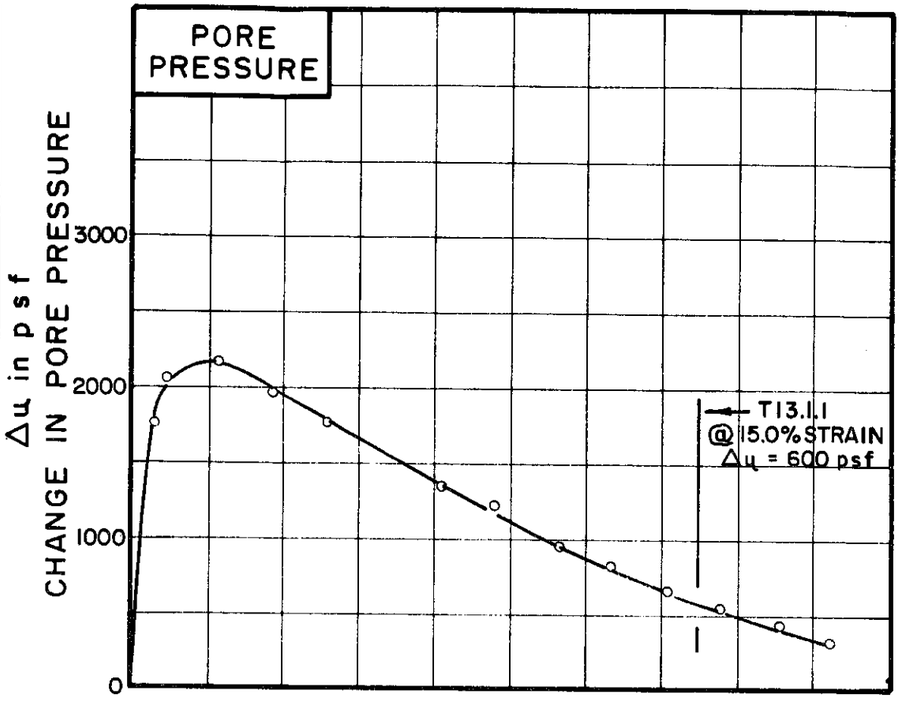
TRIAXIAL COMPRESSION TESTS

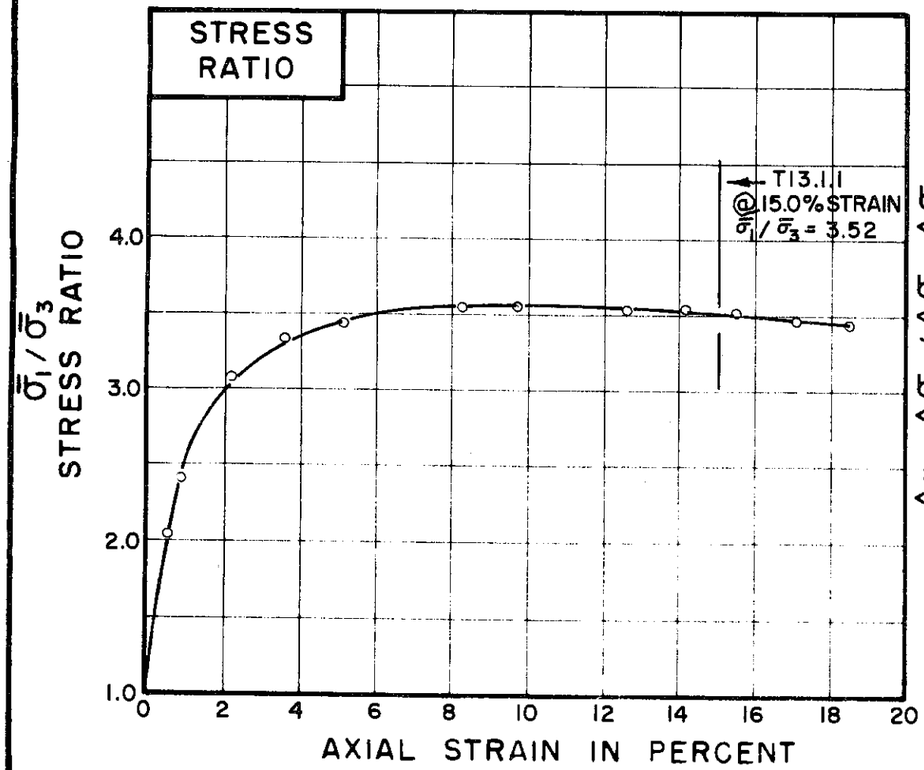
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

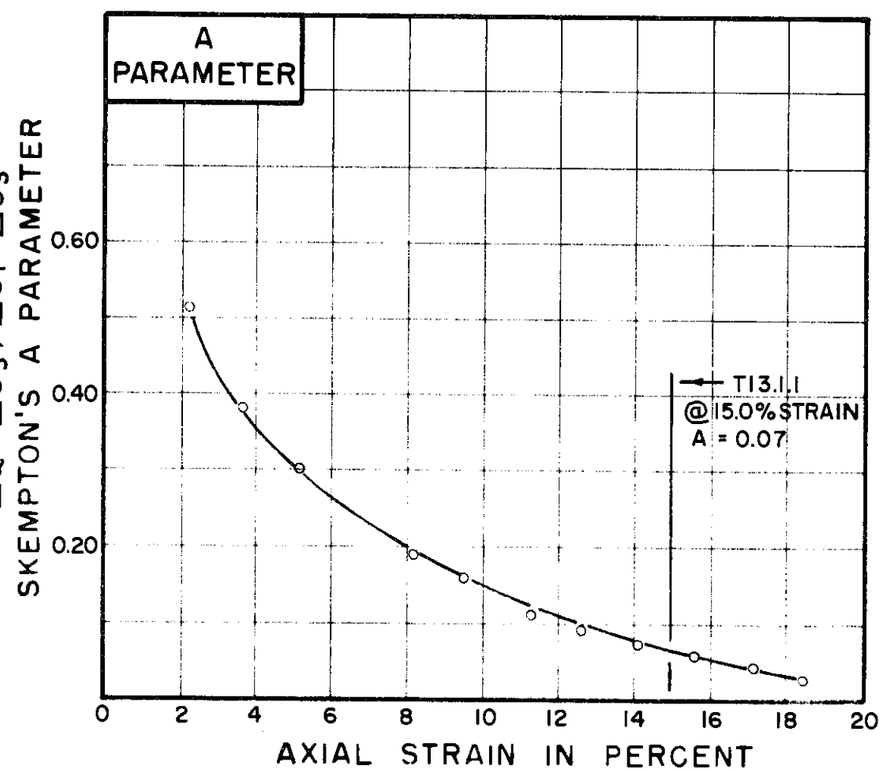
FILE 1255

C-395









TEST NO. / SYMBOL	T13.1.1 o		

INITIAL CONDITIONS	WATER CONTENT	w_o	22.9%	%	%
	DRY DENSITY lb/cu ft	γ_d	96		
	SAMPLE DIAMETER in.	D_o	1.40		
	SAMPLE HEIGHT in	H_o	3.38		
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	6480		
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	4176		
	VOLUMETRIC STRAIN	ϵ_{vol}	1.77%	%	%
	PORE PRESSURE RESPONSE		96%		
FINAL CONDITIONS	WATER CONTENT	w_f	22.9%	%	%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024		

BORING NO. 26
SAMPLE NO. 28
DEPTH 128.0' TO 130.0'
SOIL DESCRIPTION SILTY CLAY WITH LAYERS OF FINE SAND & SILT

LIQUID LIMIT — PLASTIC LIMIT —

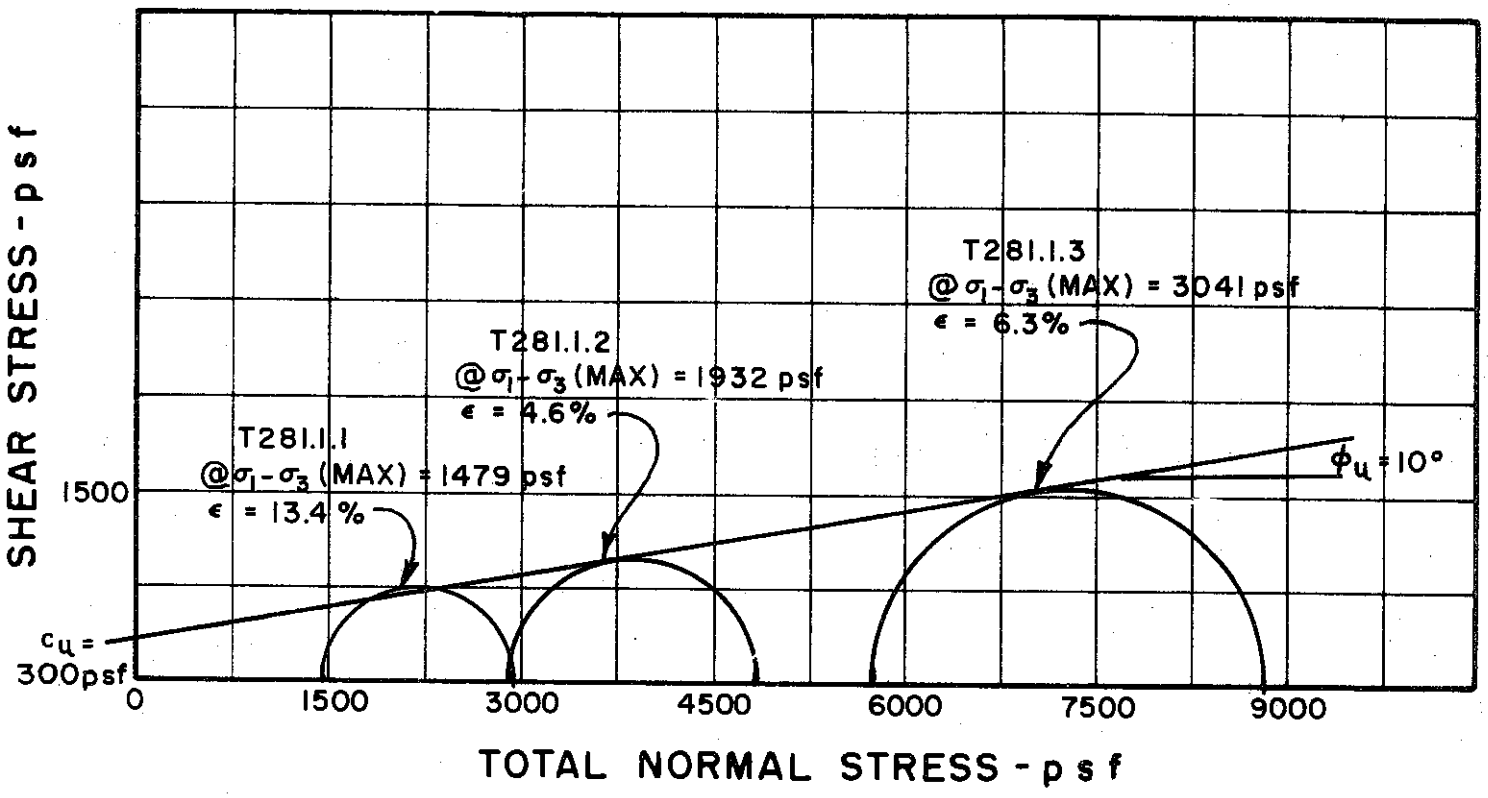
NOTE: SOILS WITHIN THIS SAMPLE ARE VARIABLE - SEE TEST RESULTS FOR T13.1.2 & T13.1.3

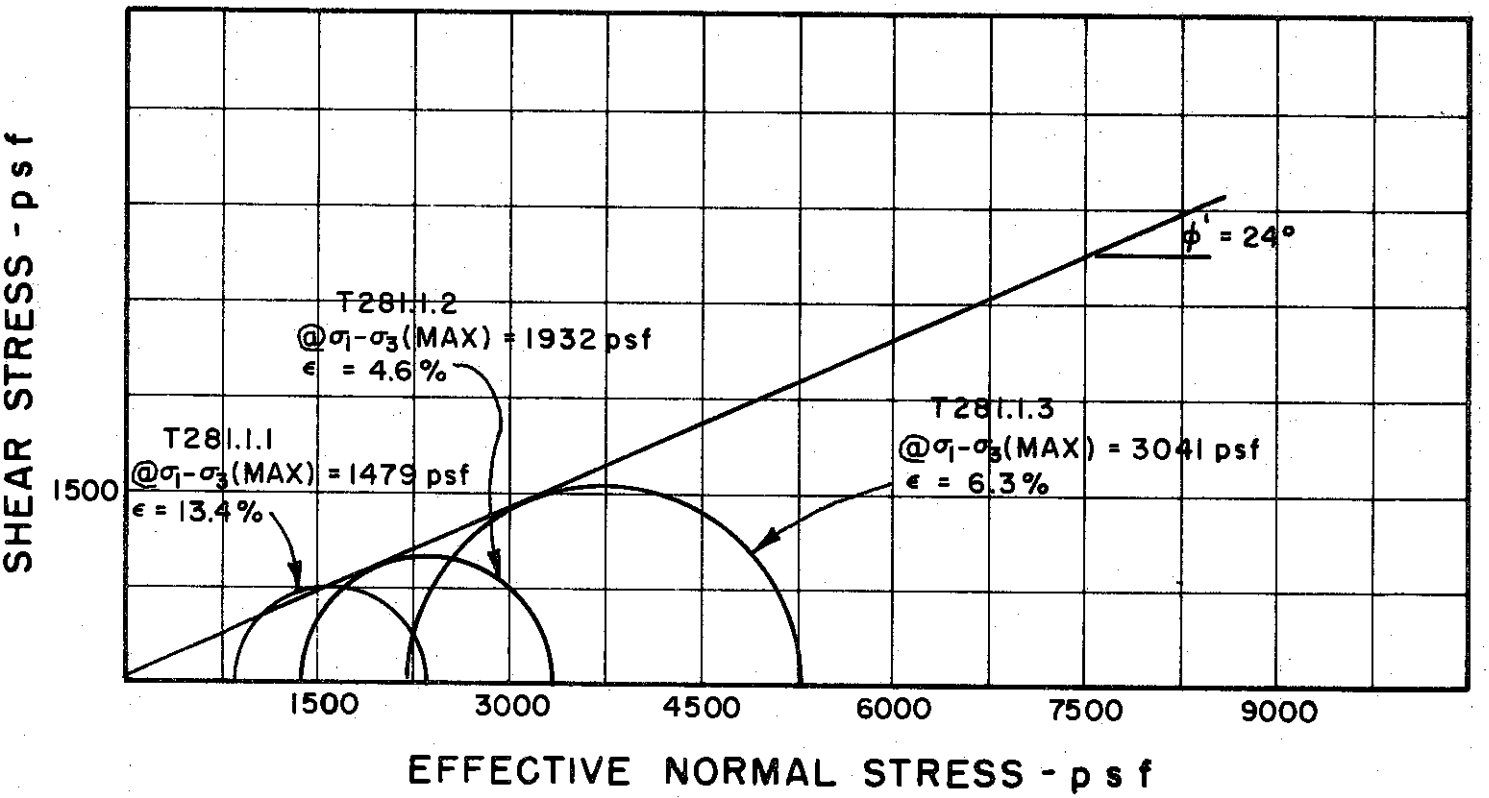
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-396

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 33

SAMPLE NO. 7

DEPTH 28.0' TO 30.5'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE

TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

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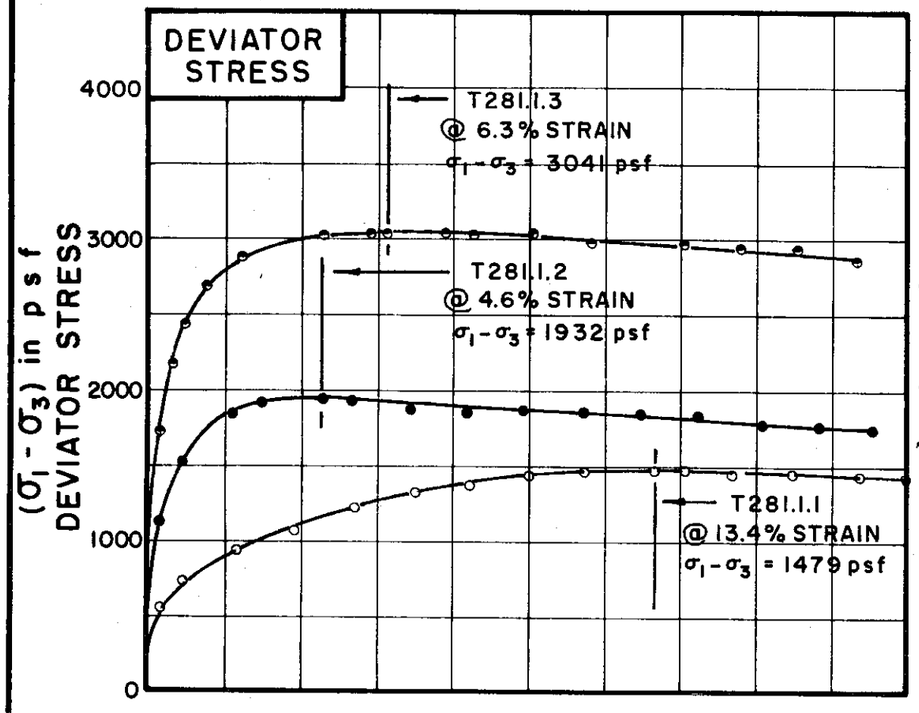
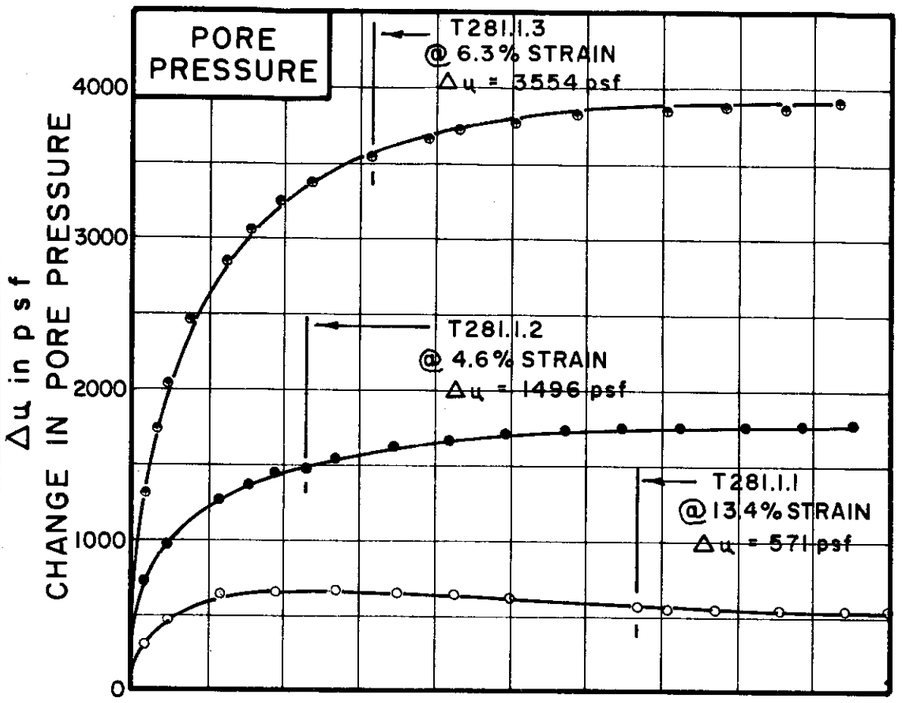
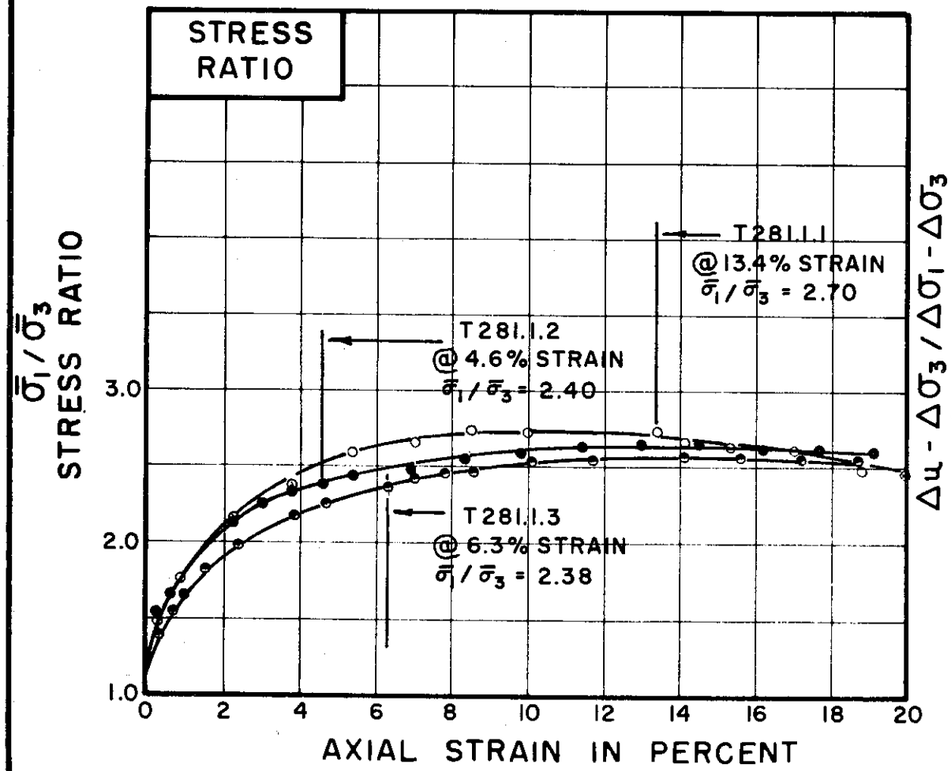
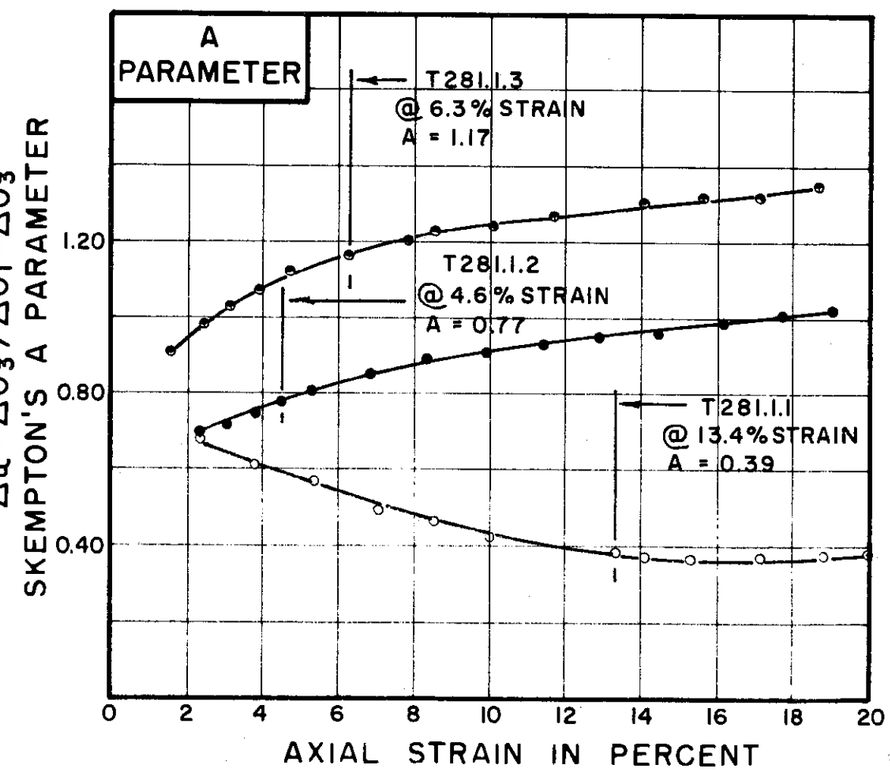








TEST NO. / SYMBOL		T281.1.1 ○	T281.1.2 ●	T281.1.3 ⊖
INITIAL CONDITIONS: WATER CONTENT	w_o	39.0%	39.7%	38.3%
INITIAL CONDITIONS: DRY DENSITY lb/cu ft	γ_d	82	82	84
INITIAL CONDITIONS: SAMPLE DIAMETER in.	D_o	1.38	1.38	1.38
INITIAL CONDITIONS: SAMPLE HEIGHT in	H_o	3.28	3.27	3.28
CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE psf	u_o	7200	7200	11520
CONDITIONS BEFORE SHEAR: INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1440	2880	5760
CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN	ϵ_{vol}	2.96%	4.10%	7.21%
CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE		98%	98%	96%
FINAL CONDITIONS: WATER CONTENT	w_f	37.3%	36.6%	31.7%
FINAL CONDITIONS: SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE		.025	.025	.025

BORING NO. 33
SAMPLE NO. 7
DEPTH 28.0' TO 30.5'

SOIL DESCRIPTION SILTY CLAY (CL)

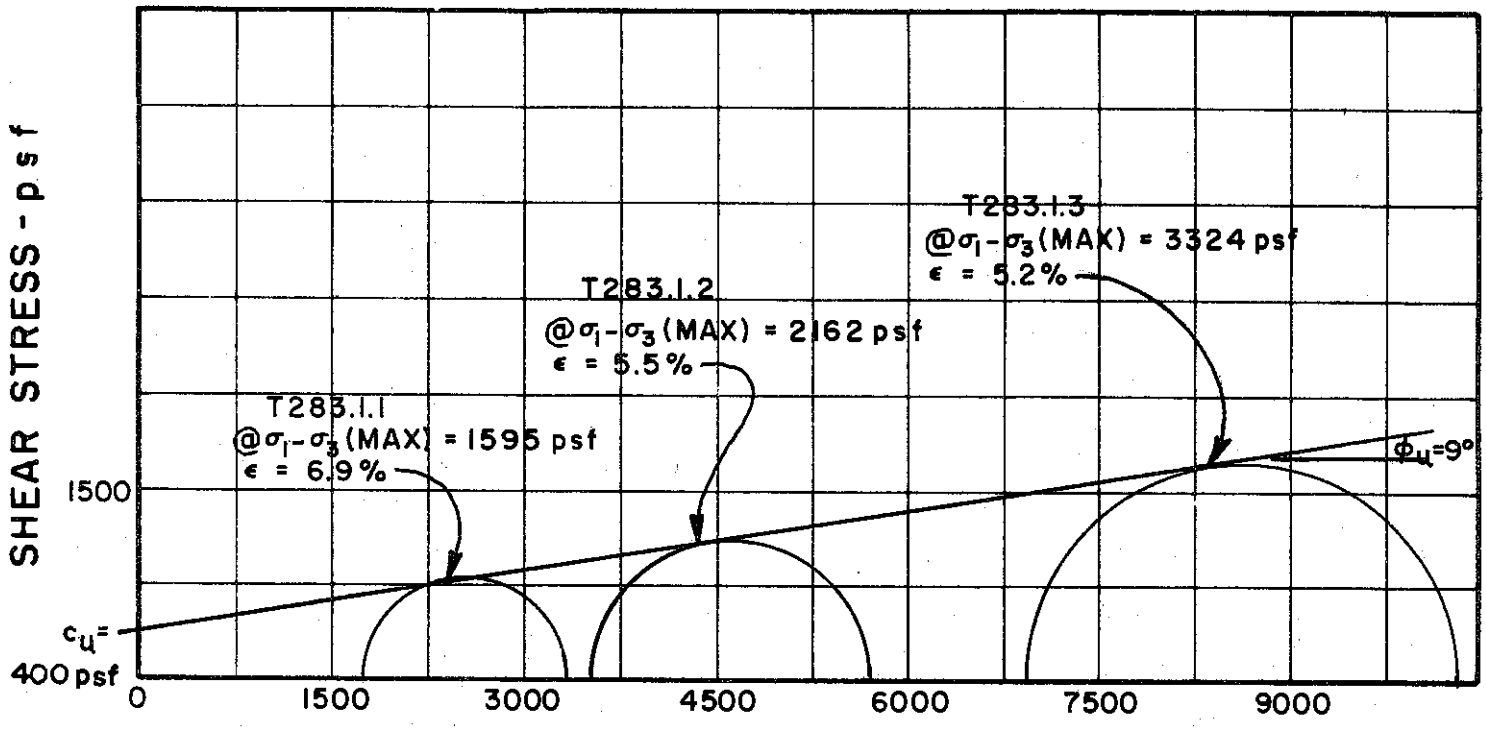
LIQUID LIMIT 46 PLASTIC LIMIT 22

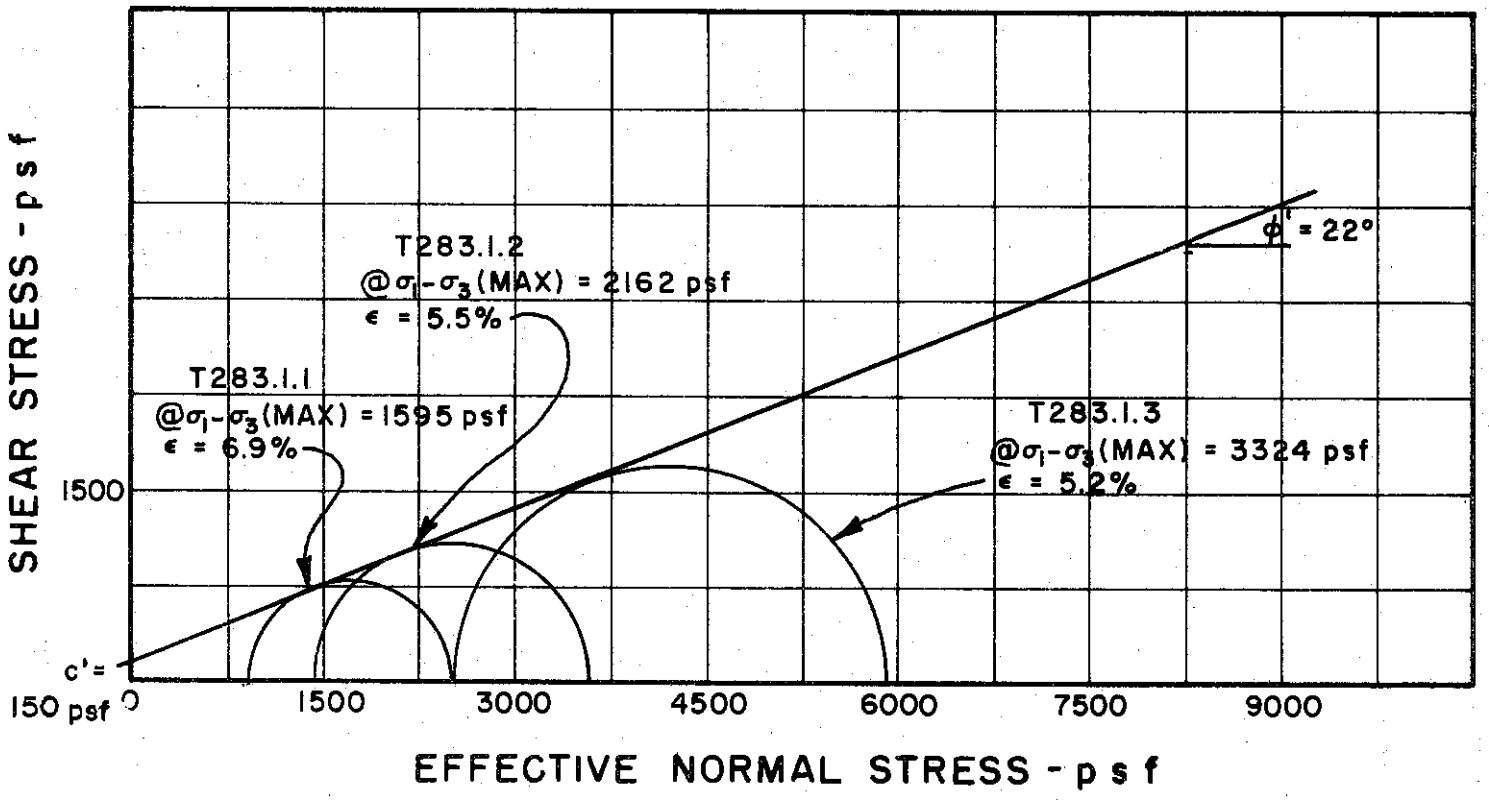
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-398

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 33

SAMPLE NO. 9

DEPTH 38.0' TO 40.5'

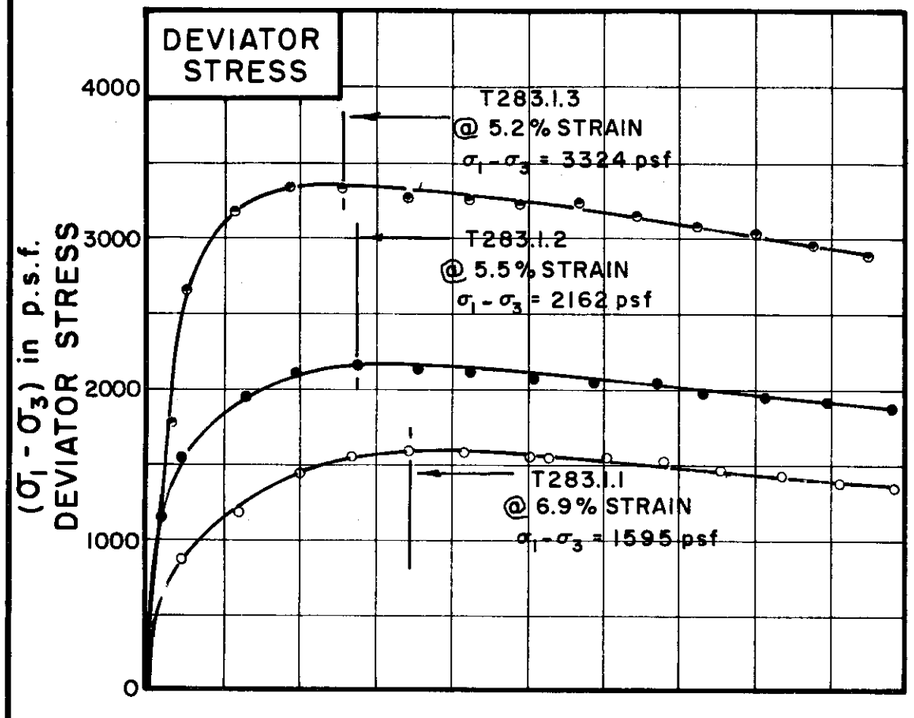
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

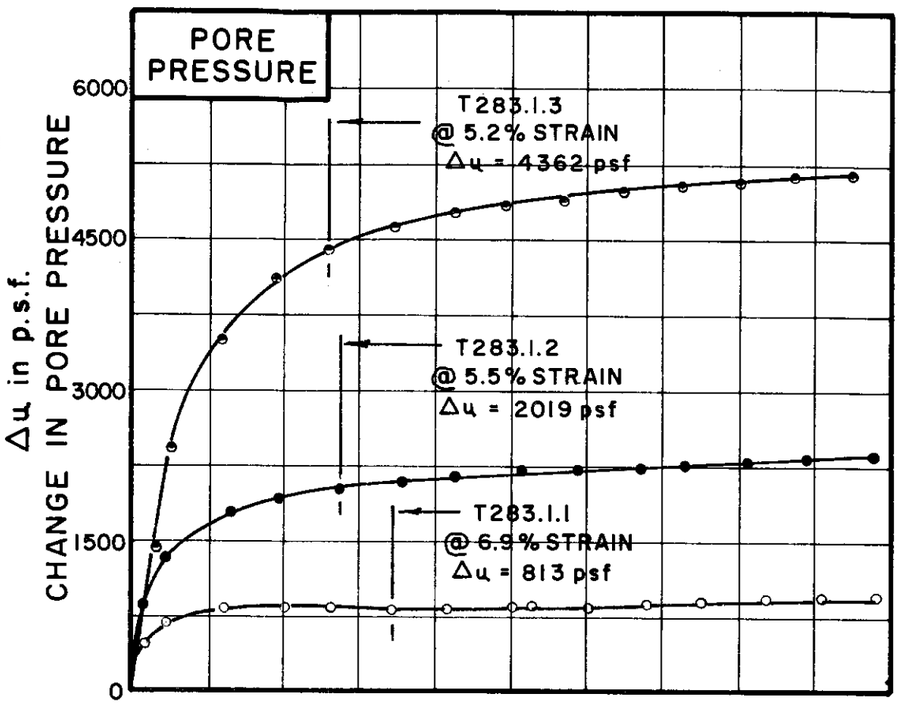
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

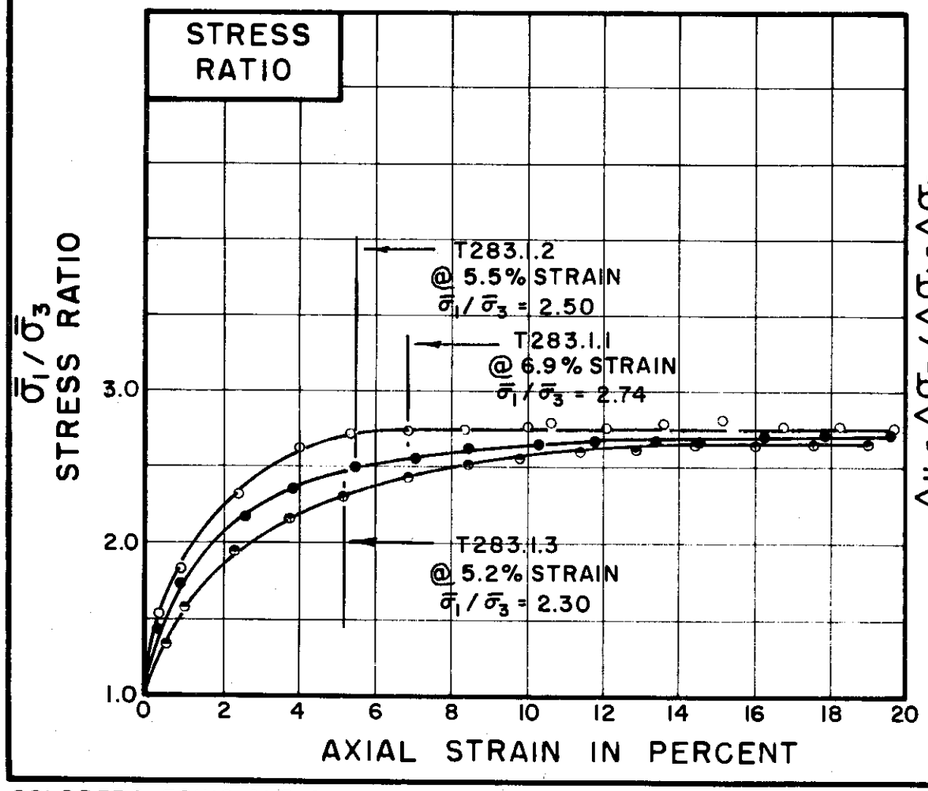
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

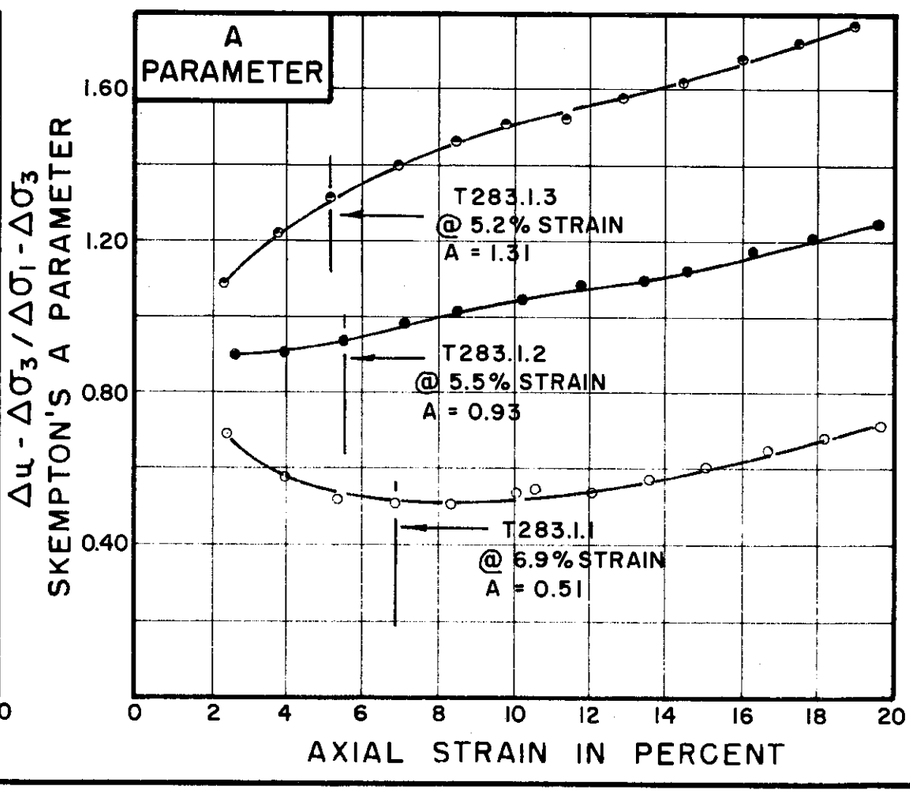
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-399









TEST NO. / SYMBOL		T283.1.1 ○	T283.1.2 ●	T283.1.3 ◎
INITIAL CONDITIONS	WATER CONTENT	w_o	37.4%	37.1%	36.2%
	DRY DENSITY lb/cu ft	γ_d	83	85	86
	SAMPLE DIAMETER in.	D_o	1.40	1.39	1.39
	SAMPLE HEIGHT in	H_o	3.31	3.25	3.32
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	u_o	7200	7200	12960
	INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$	1728	3456	6912
	VOLUMETRIC STRAIN	ϵ_{vol}	1.77%	3.35%	5.16%
	PORE PRESSURE RESPONSE		96%	98%	95%
FINAL CONDITIONS	WATER CONTENT	w_f	35.5%	33.6%	30.8%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT/MINUTE			.024	.025	.024

BORING NO. 33
SAMPLE NO. 9
DEPTH 38.0' TO 40.5'

SOIL DESCRIPTION SILTY CLAY (CL)

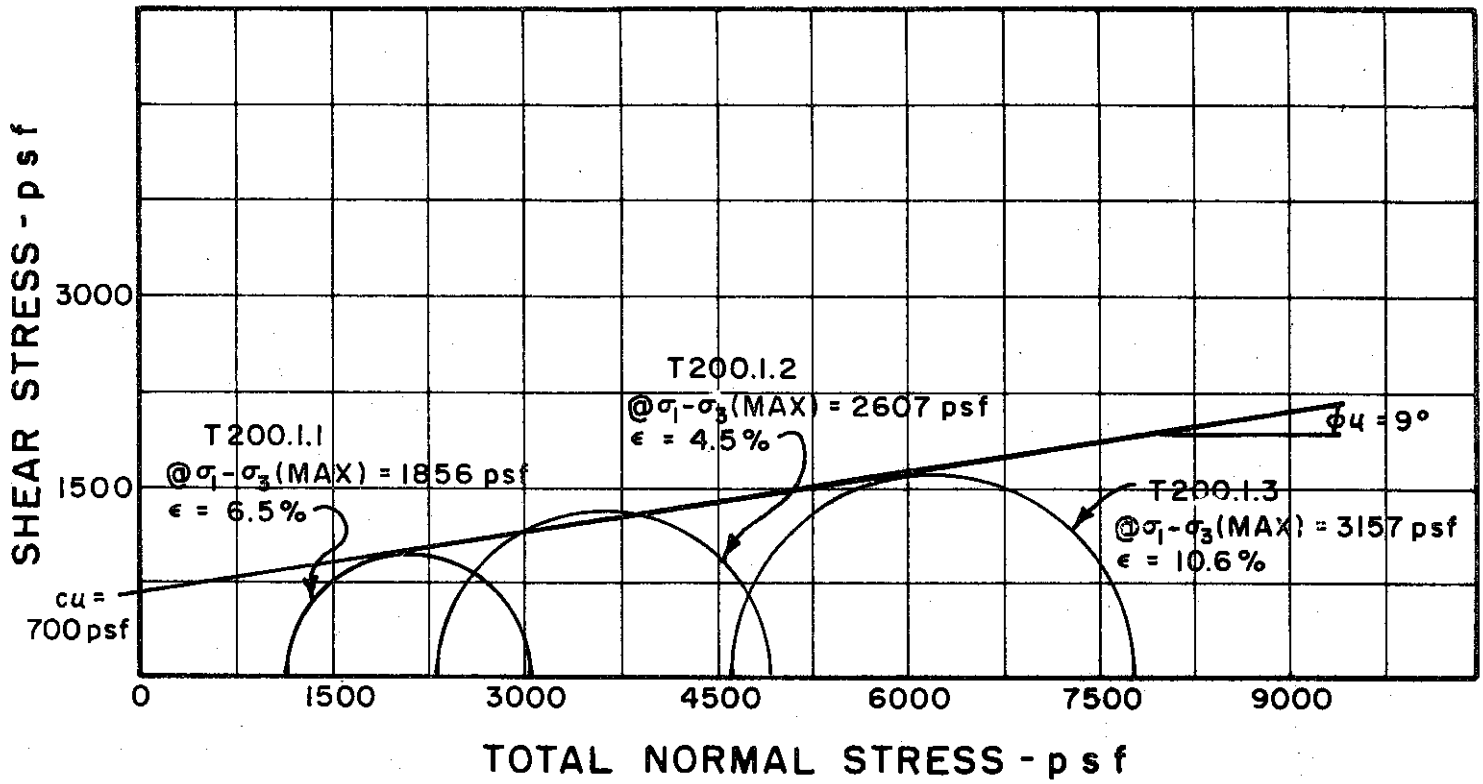
LIQUID LIMIT 43 PLASTIC LIMIT 23

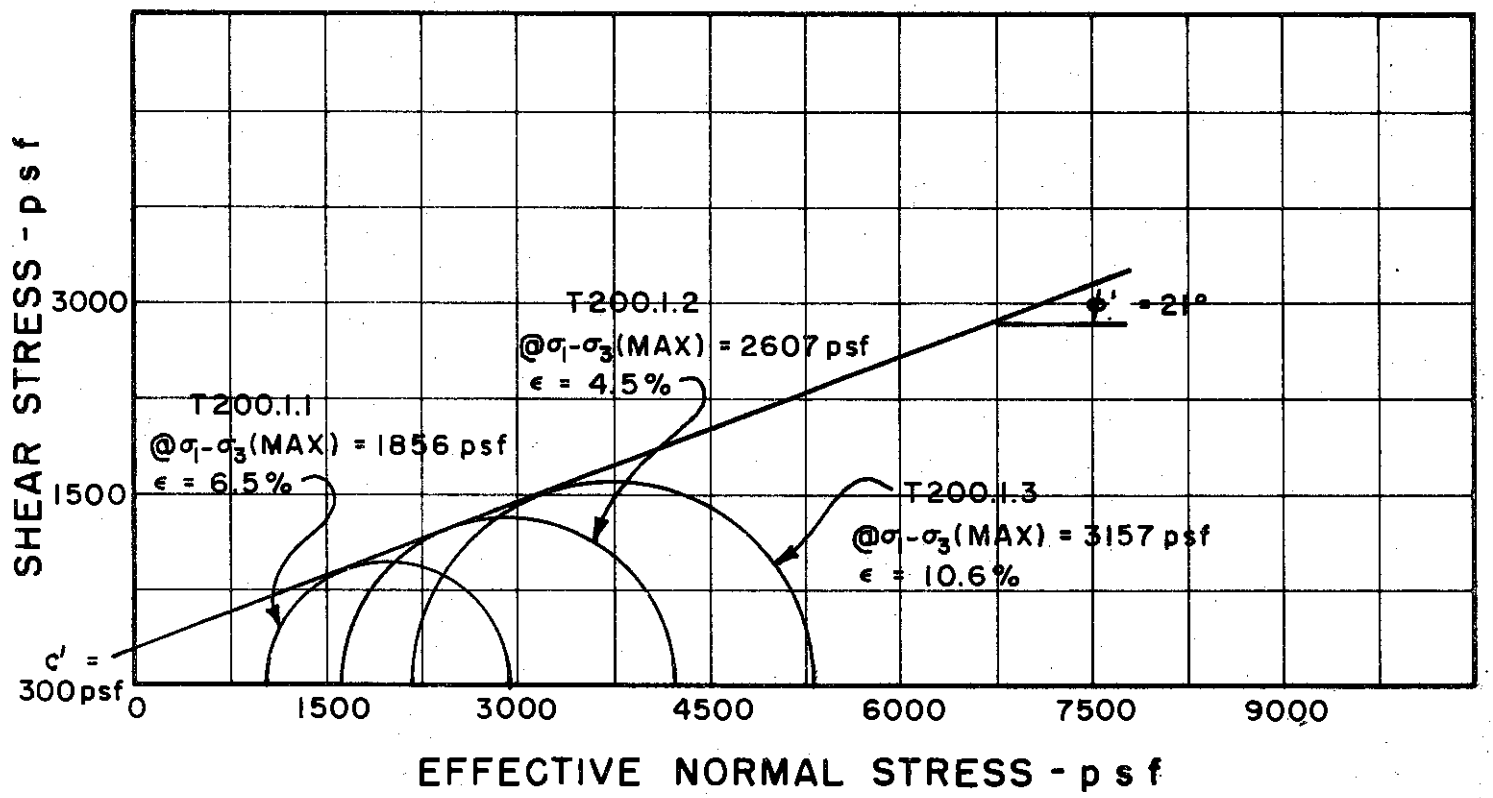
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-400

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 48

SAMPLE NO. 6

DEPTH 18.0 TO 20.0

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

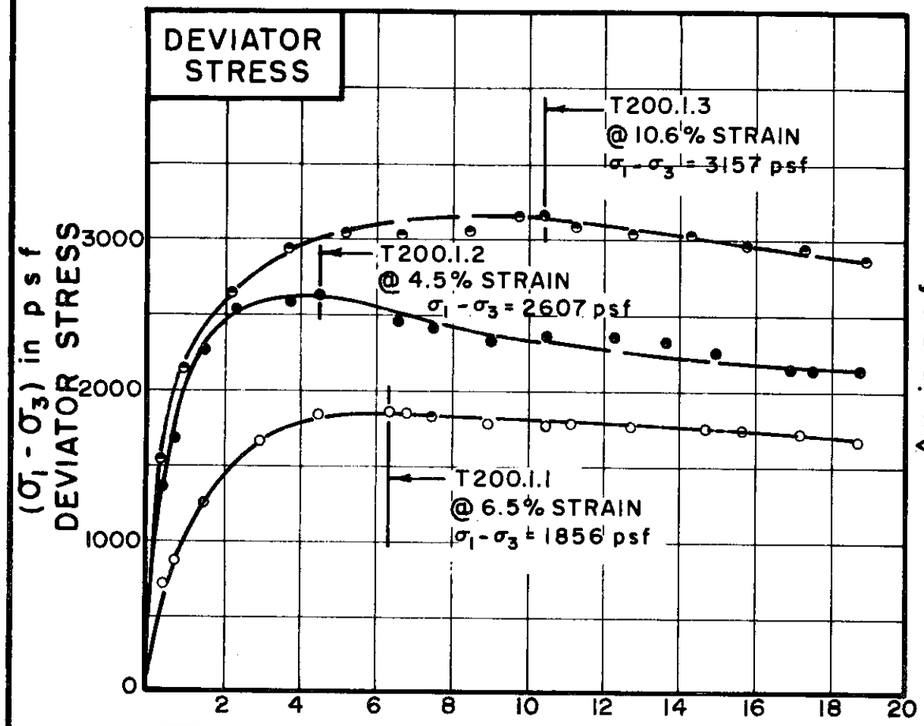
MOHR STRENGTH ENVELOPE

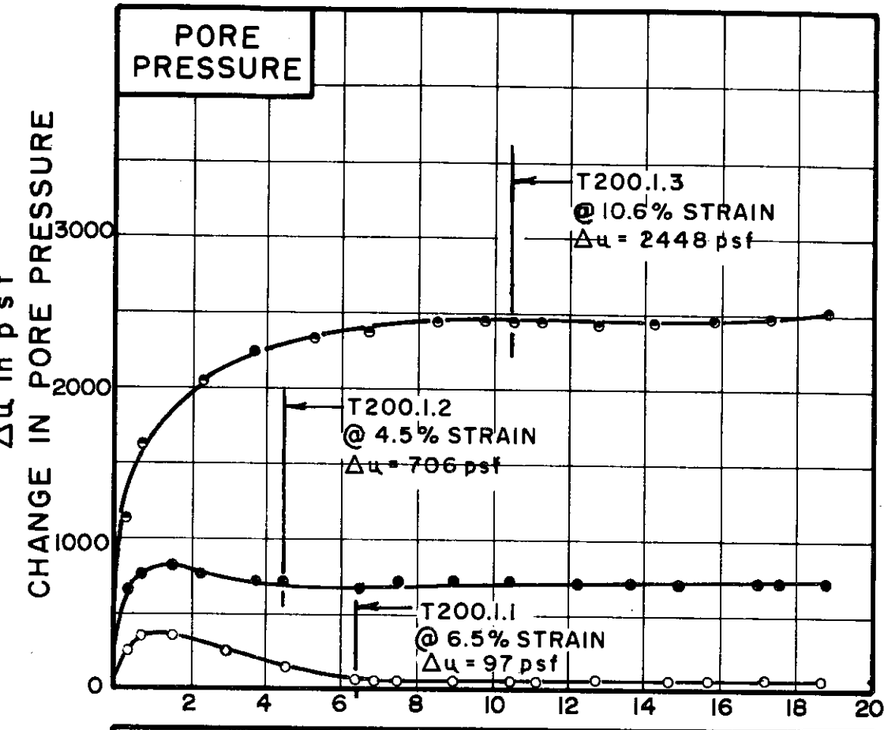
TRIAXIAL COMPRESSION TESTS

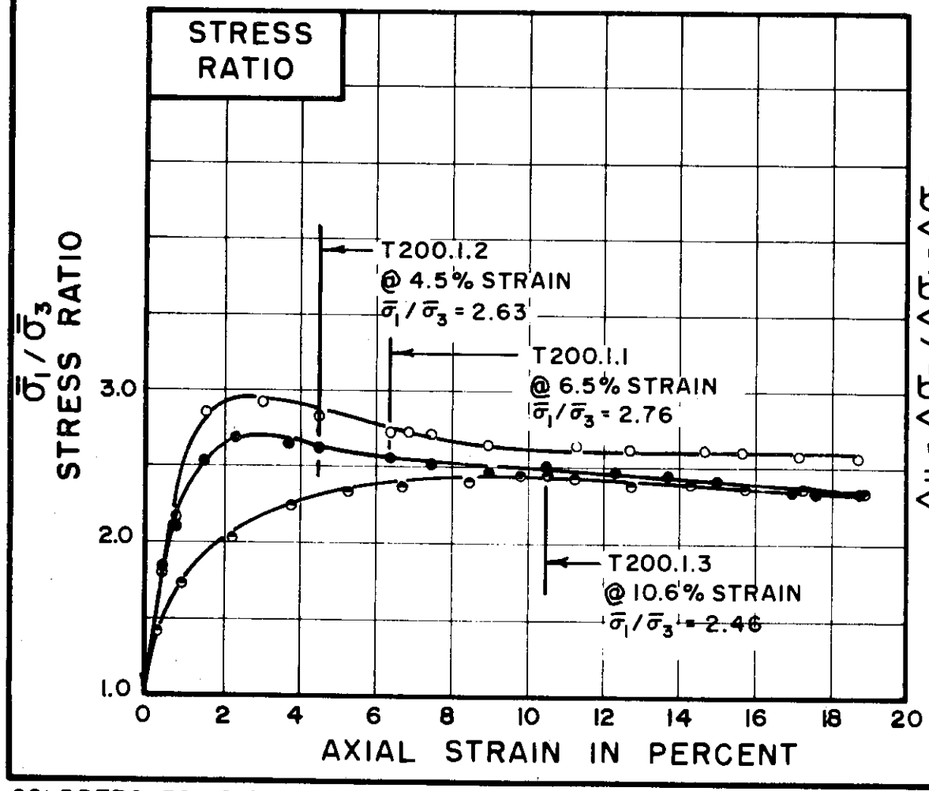
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

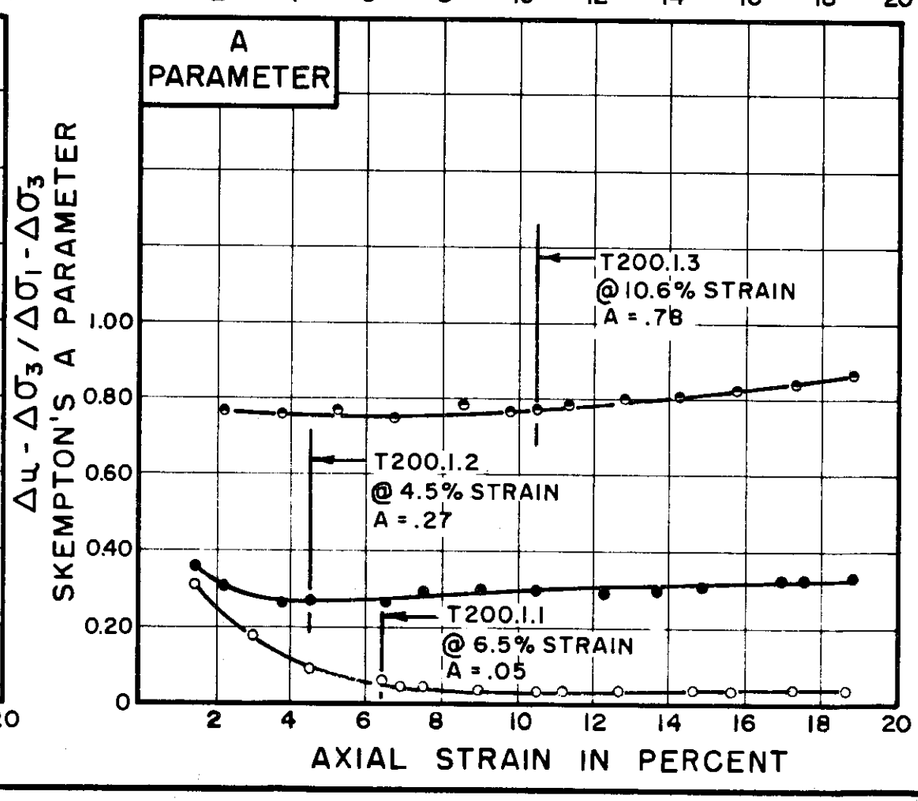
FILE 1255

C-401









TEST NO. / SYMBOL		T200.1.1 ○	T200.1.2 ●	T200.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	32.8%	34.2%	35.6%
	DRY DENSITY pcf	γ_d	90	89	88
	SAMPLE DIAMETER in.	D_o	1.41	1.41	1.41
	SAMPLE HEIGHT in	H_o	3.35	3.35	3.38
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	8640	8640	8640
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1152	2304	4608
	VOLUMETRIC STRAIN	ϵ_{vol}	1.6 %	2.7 %	5.9 %
	PORE PRESSURE RESPONSE		96%	99%	100%
FINAL CONDITIONS	WATER CONTENT	w_f	32.1 %	33.4%	31.0%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.024	.024	.024

BORING NO. 48
SAMPLE NO. 6
DEPTH 18.0 TO 20.0

SOIL DESCRIPTION SILTY CLAY, (CL-CH)

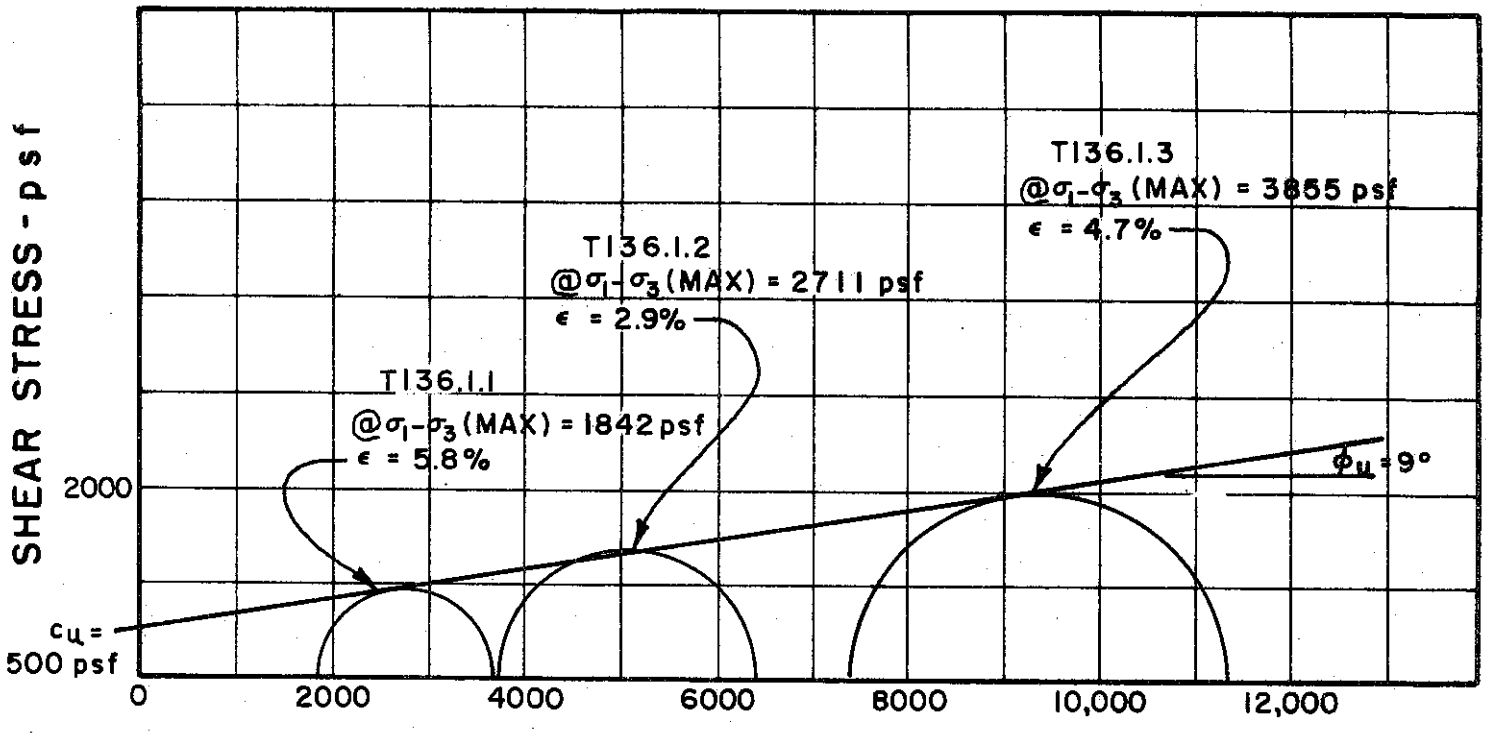
LIQUID LIMIT 47 PLASTIC LIMIT 25

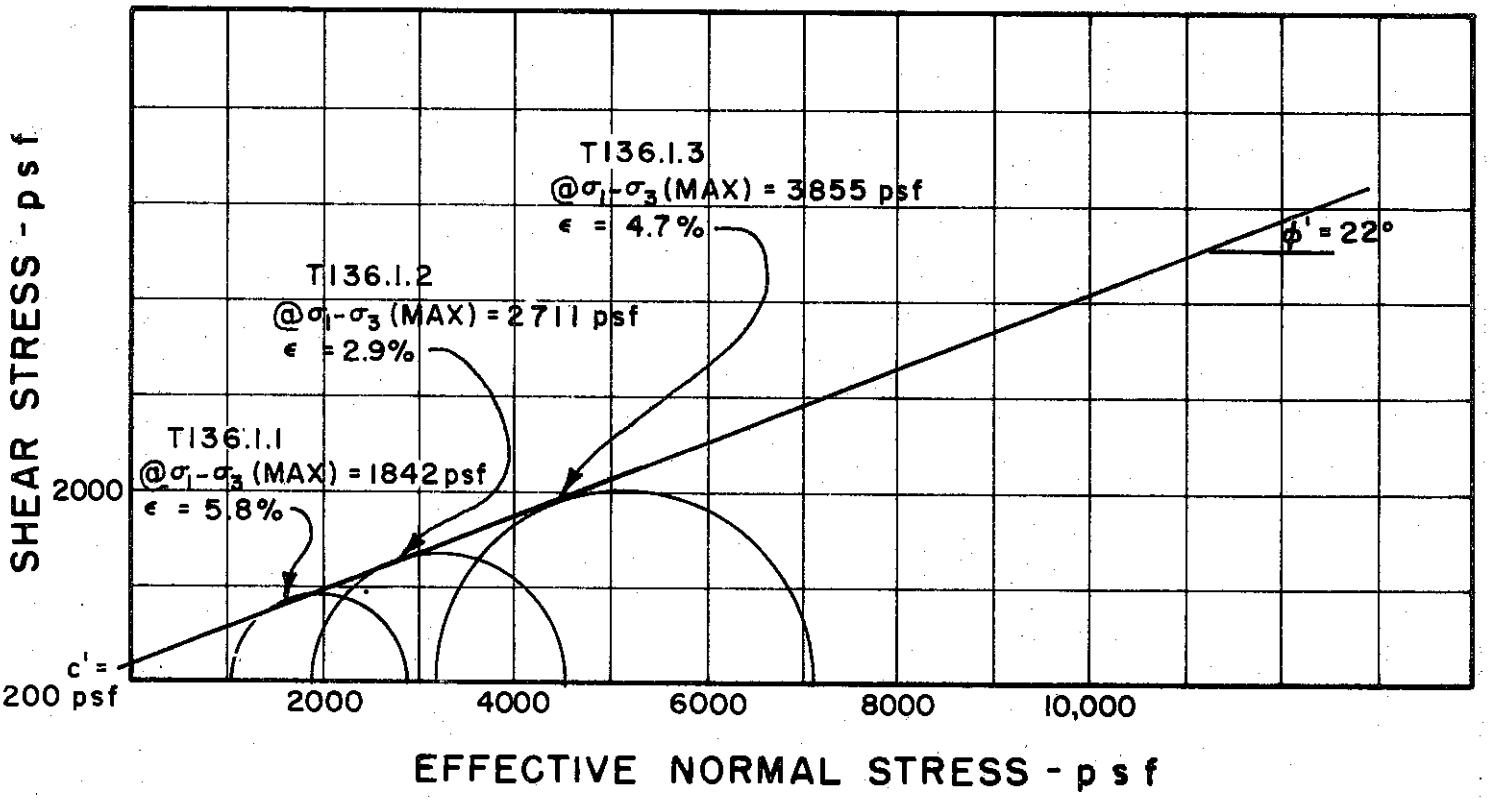
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-402

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 49

SAMPLE NO. 6

DEPTH 43.0' TO 45.0'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

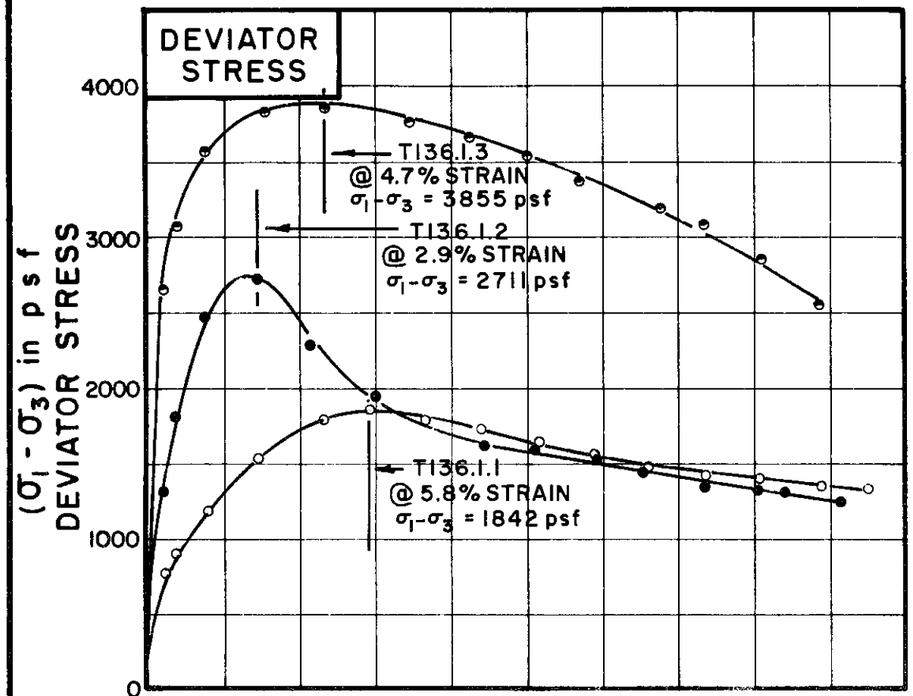
MOHR STRENGTH ENVELOPE

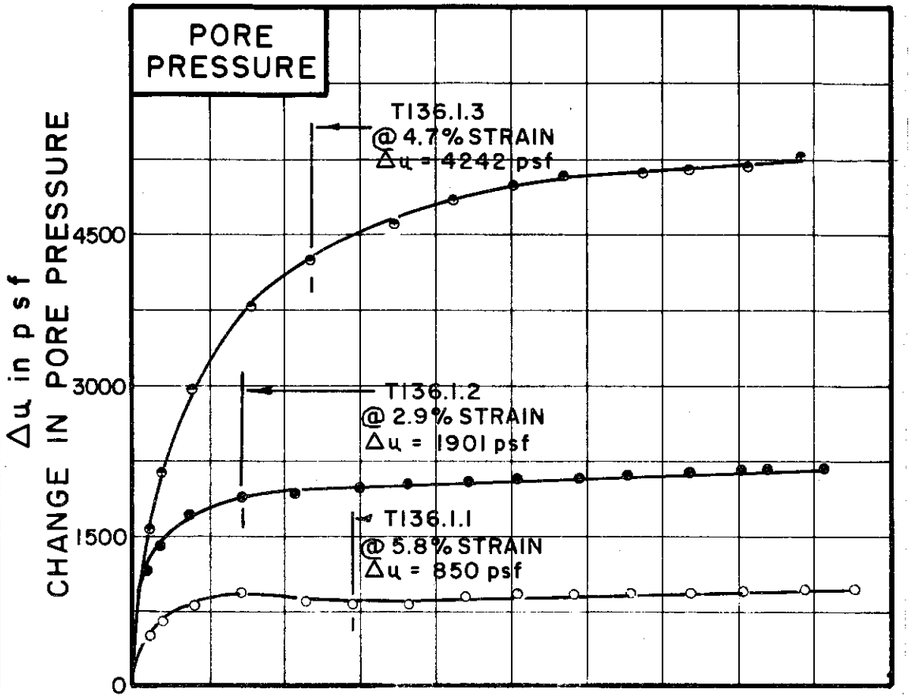
TRIAXIAL COMPRESSION TESTS

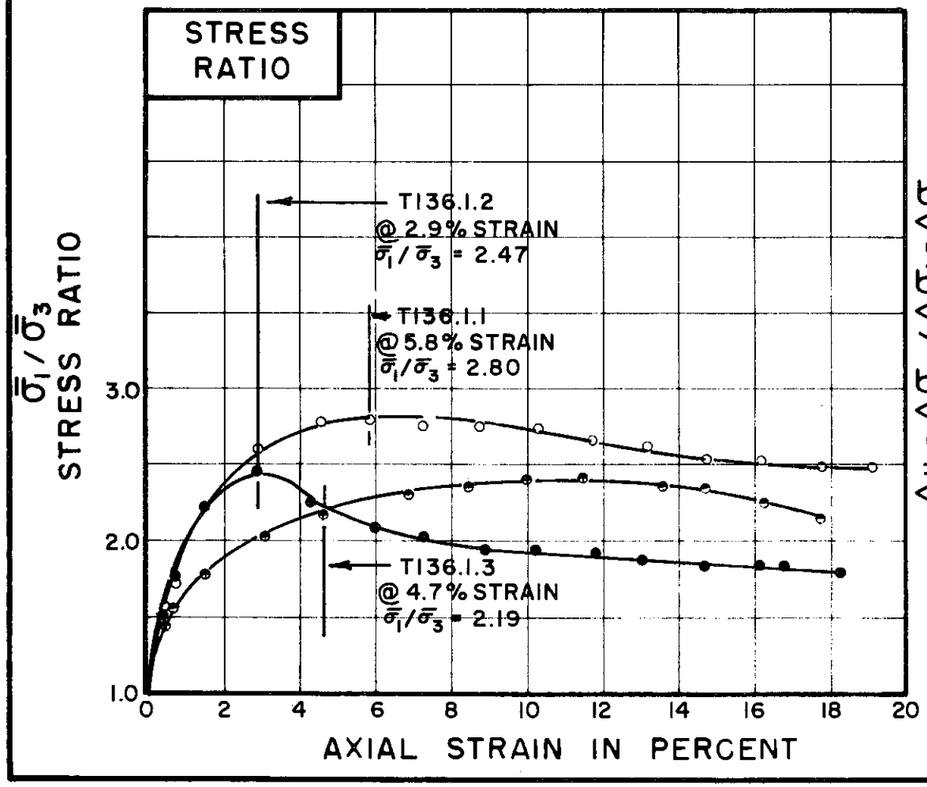
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

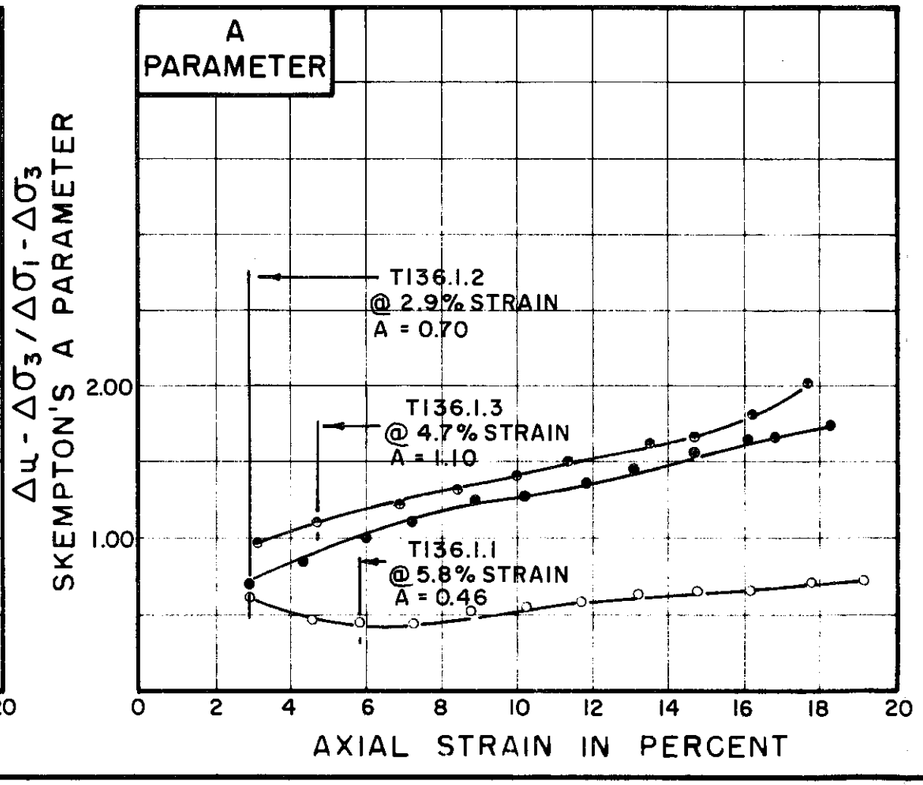
FILE 1255

C-403









TEST NO. / SYMBOL		T136.1.1 ○	T136.1.2 ●	T136.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	43.5%	46.3%	44.9%
	DRY DENSITY lb/cu ft	γ_d	78	75	77
	SAMPLE DIAMETER in.	D_o	1.40	1.40	1.41
	SAMPLE HEIGHT in	H_o	3.43	3.45	3.34
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	11520	8640	7200
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1872	3744	7488
	VOLUMETRIC STRAIN	ϵ_{vol}	2.55%	2.88%	8.59%
	PORE PRESSURE RESPONSE		98%	100%	96%
FINAL CONDITIONS	WATER CONTENT	w_f	41.5%	44.7%	38.5%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.023	.025

BORING NO. 49
SAMPLE NO. 6
DEPTH 43.0' TO 45.0'

SOIL DESCRIPTION SILTY CLAY (CH-CL)

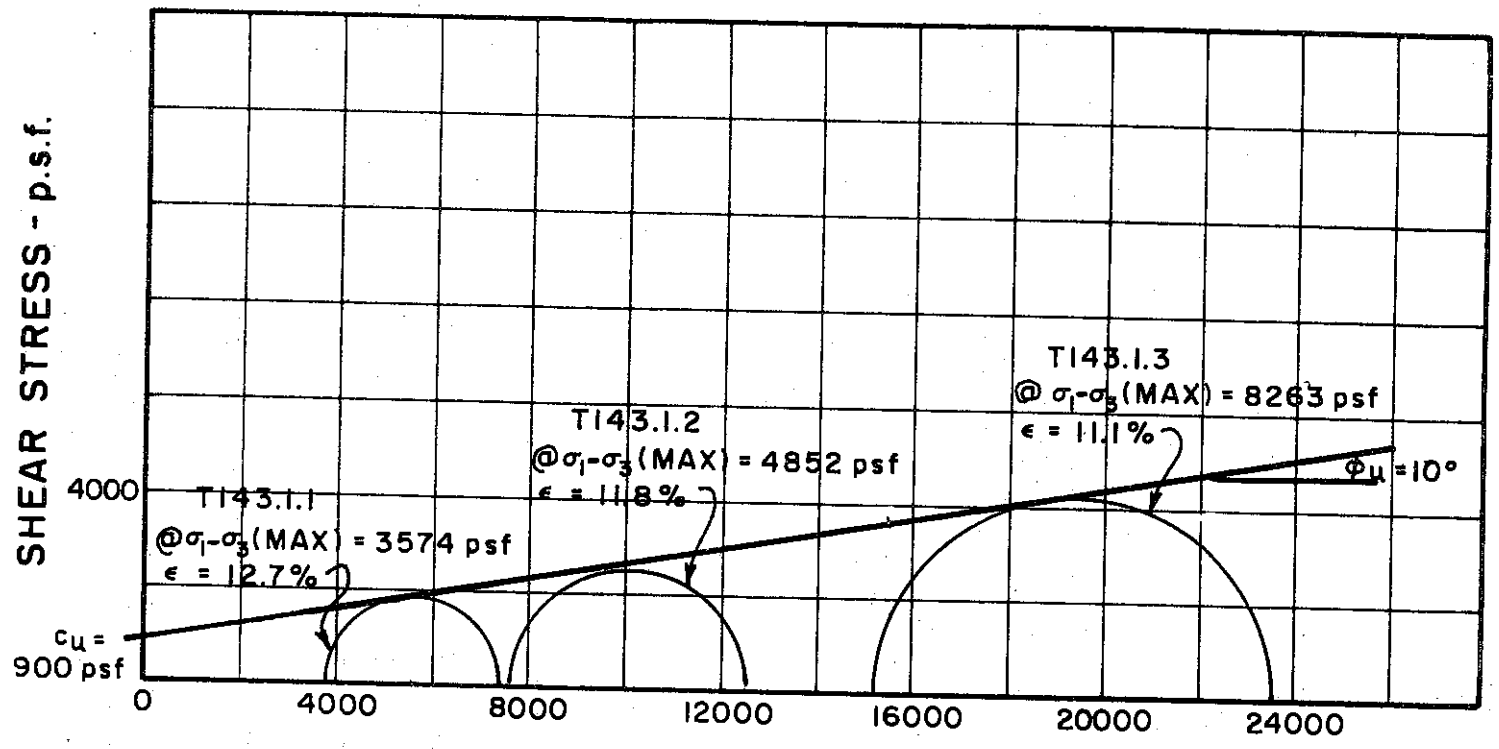
LIQUID LIMIT 53 PLASTIC LIMIT 22

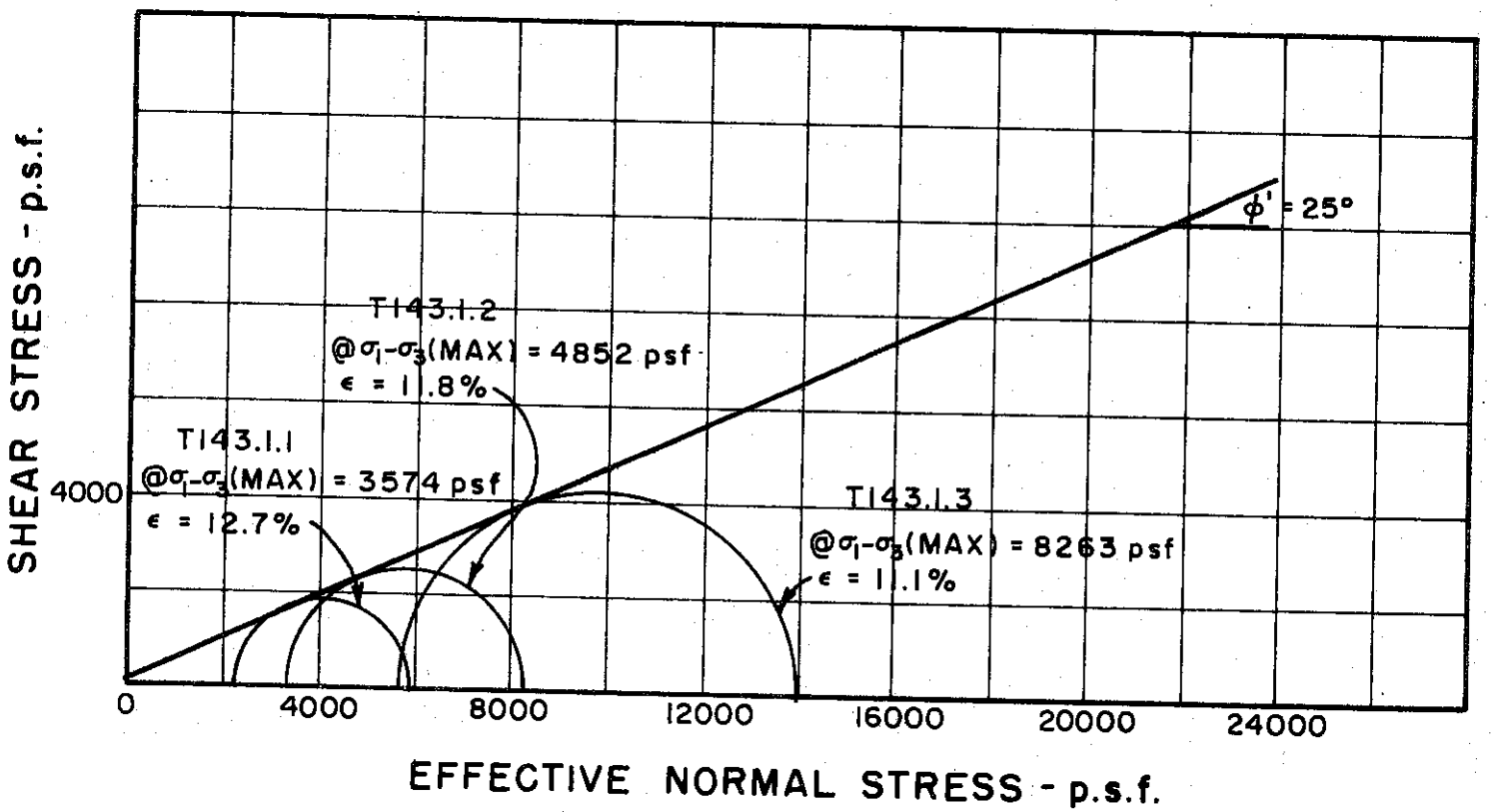
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-404

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 49

SAMPLE NO. 13

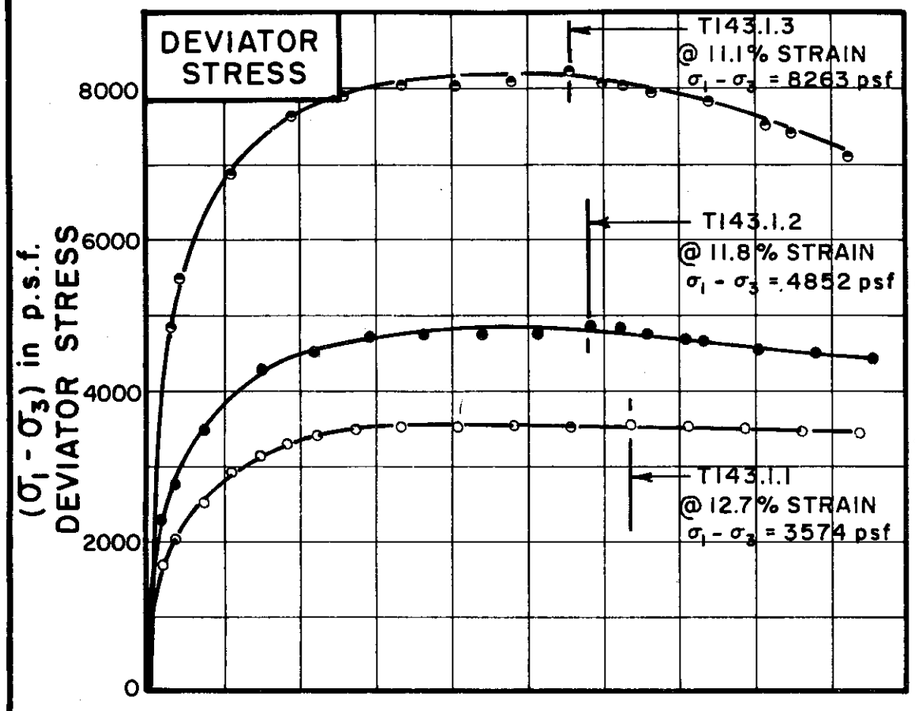
DEPTH 113.0' TO 115.0'

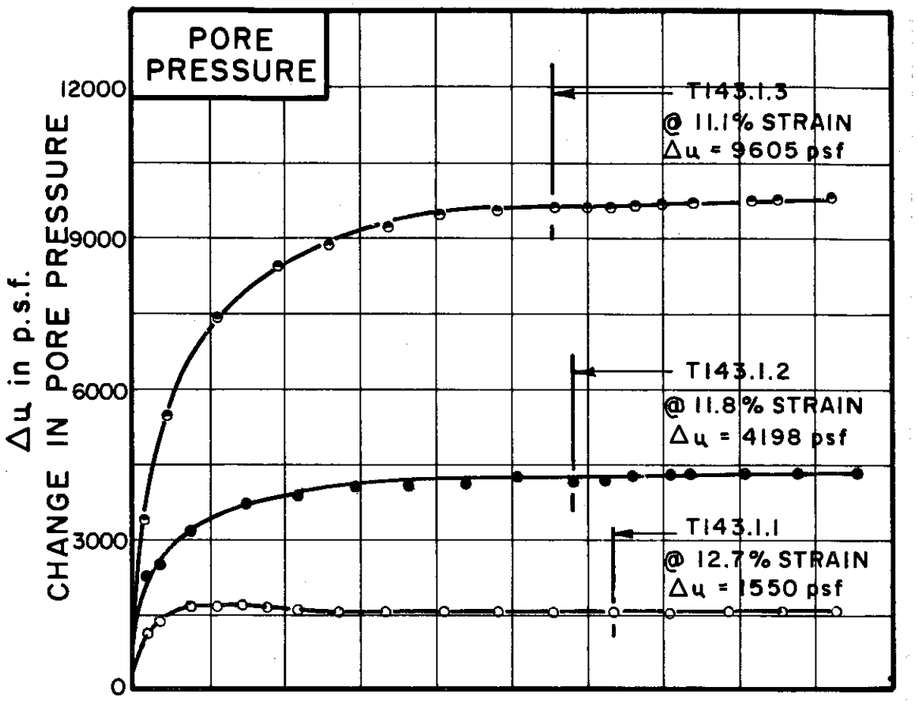
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

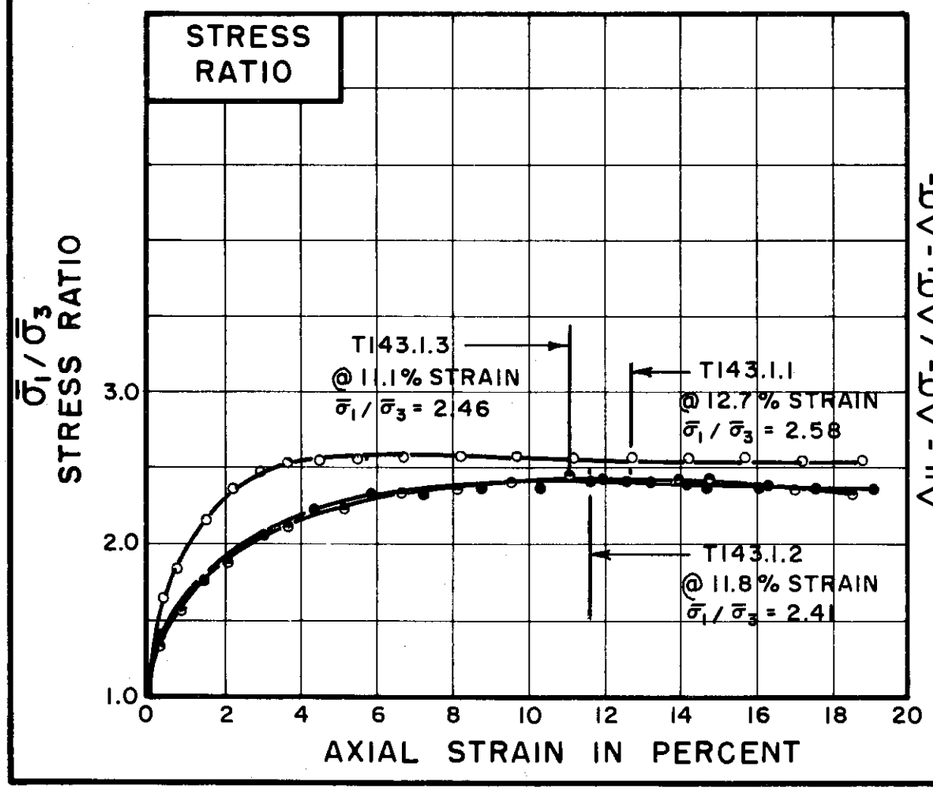
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

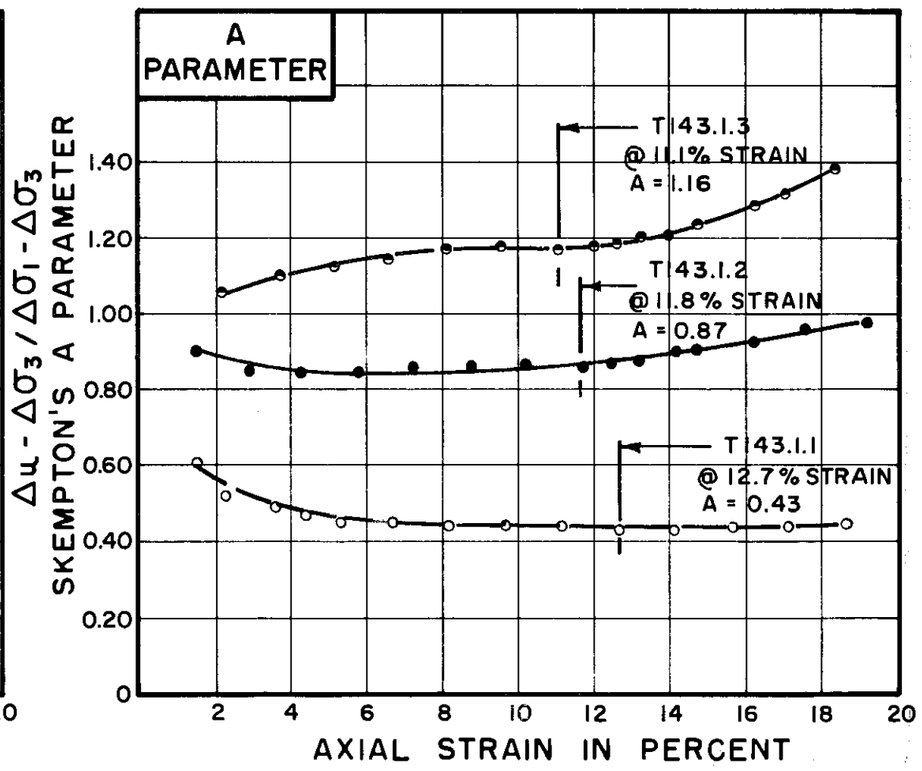
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-405









TEST NO. / SYMBOL		T143.1.1 ○	T143.1.2 ●	T143.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	24.0%	28.7%	29.2%
	DRY DENSITY pcf	γ_d	100	95	93
	SAMPLE DIAMETER in.	D_o	1.40	1.40	1.41
	SAMPLE HEIGHT in	H_o	3.37	3.46	3.44
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	u_o	11520	7200	7200
	INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$	3816	7632	15264
	VOLUMETRIC STRAIN	ϵ_{vol}	2.6%	5.1%	6.3%
	PORE PRESSURE RESPONSE		95	100	100
FINAL CONDITIONS	WATER CONTENT	w_f	23.1%	26.5%	24.4%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.024	.023	.024

BORING NO. 49
SAMPLE NO. 13
DEPTH 113.0' TO 115.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

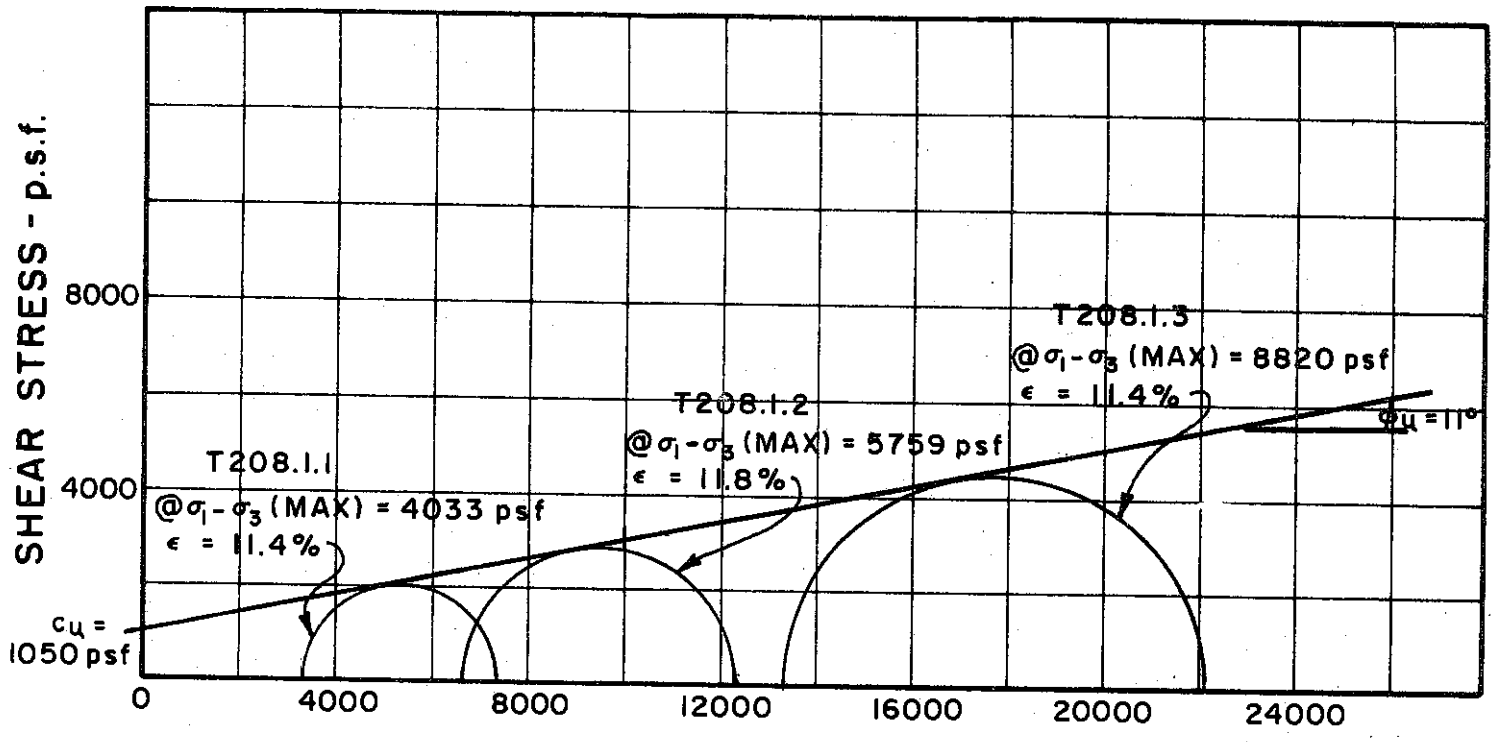
LIQUID LIMIT 33 PLASTIC LIMIT 22

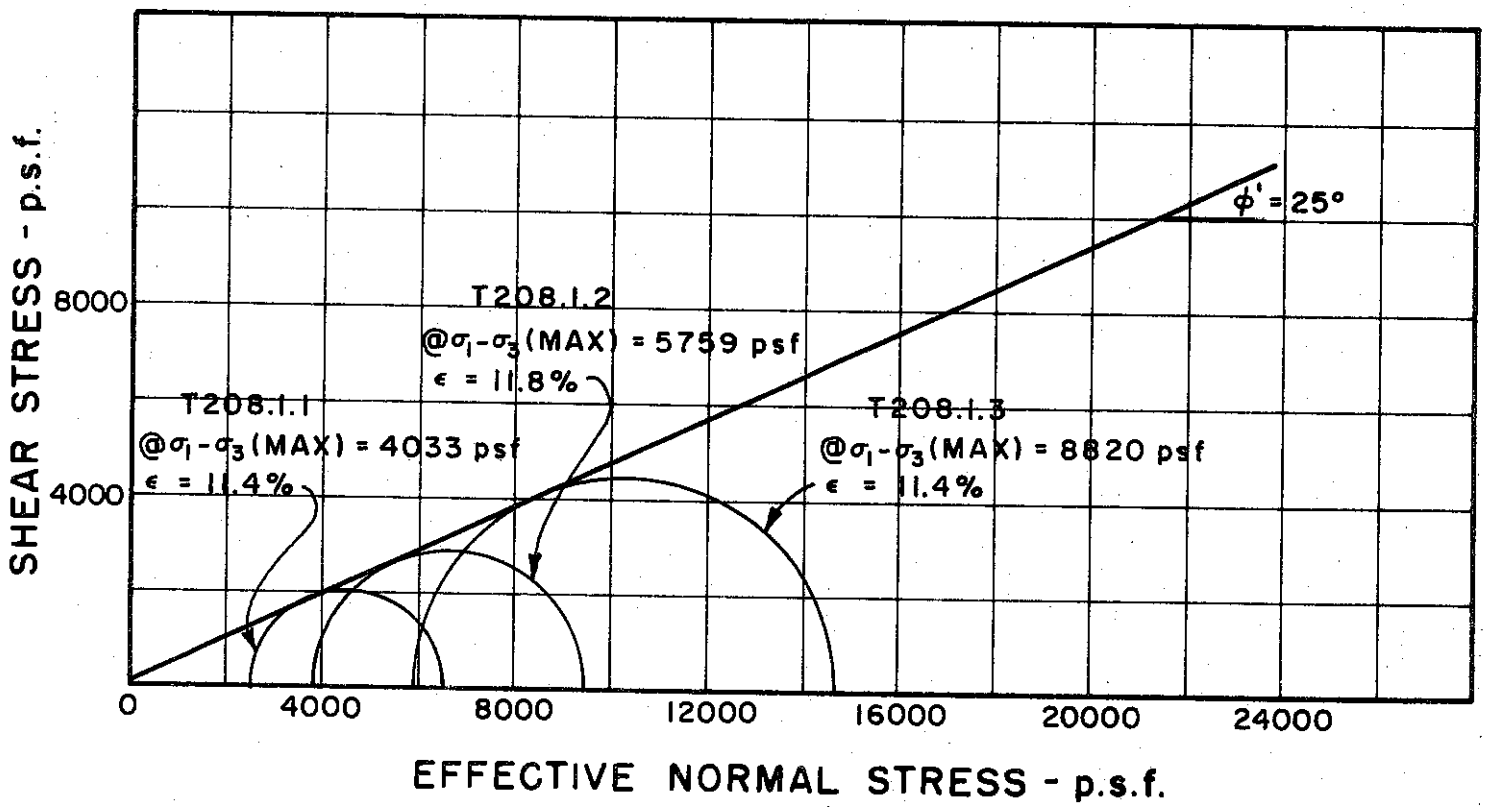
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-406

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 48

SAMPLE NO. 22

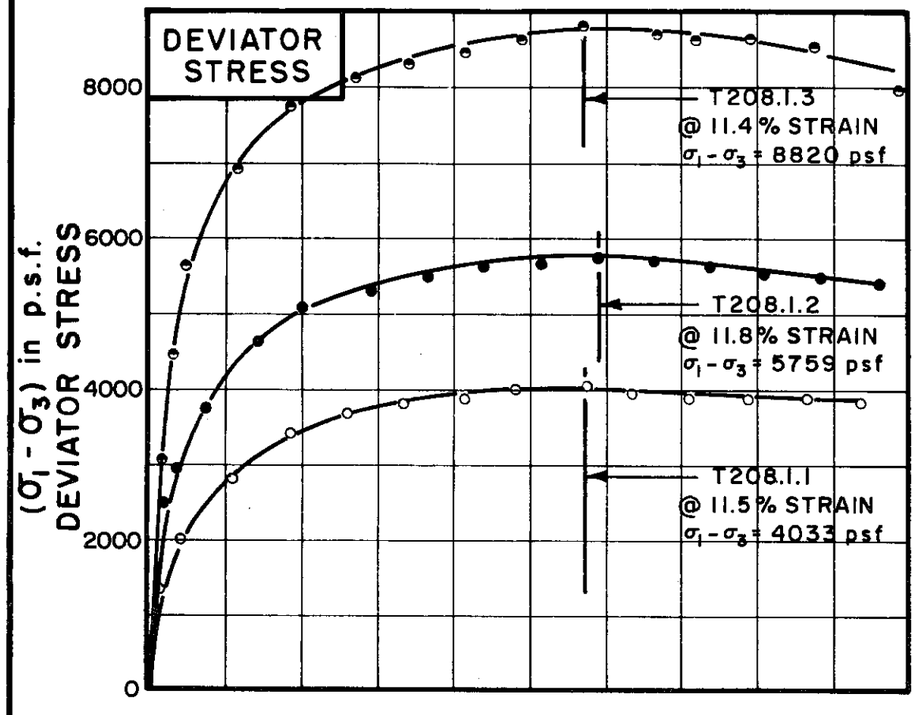
DEPTH 98.0' TO 100.0'

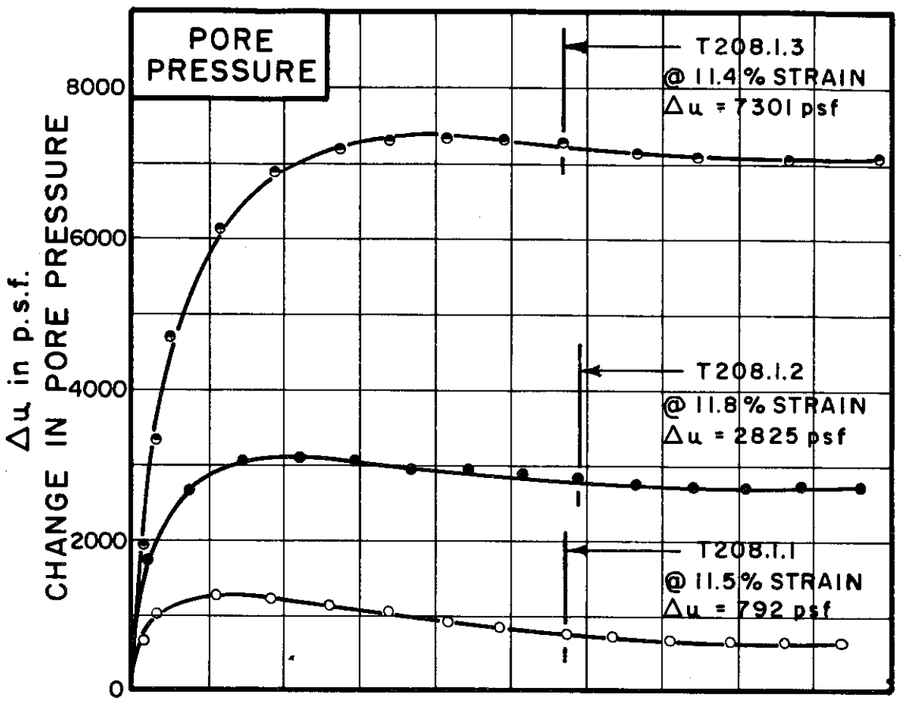
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

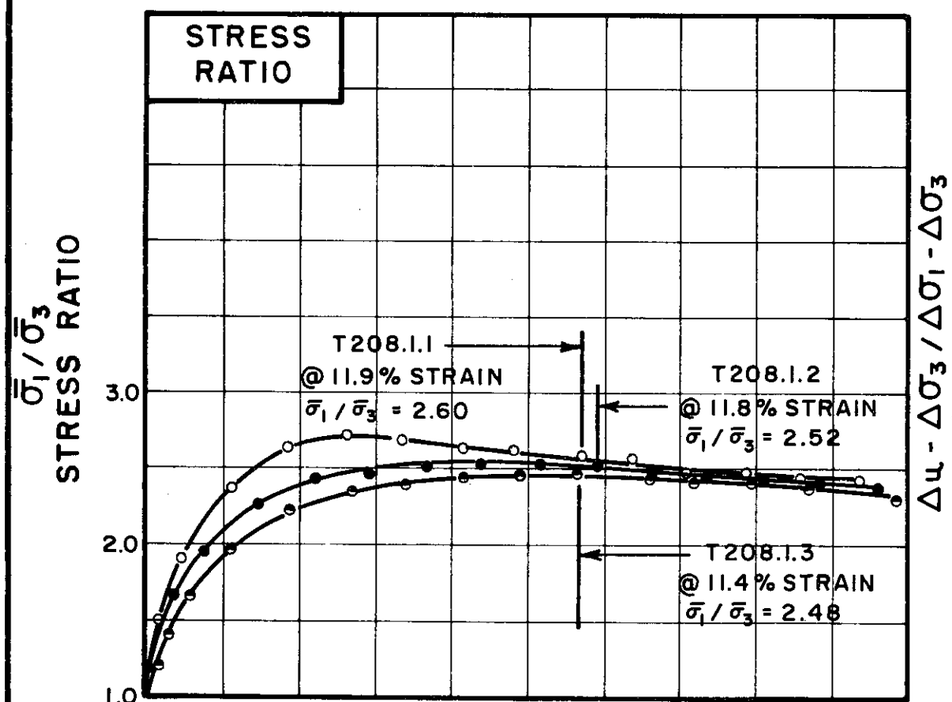
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

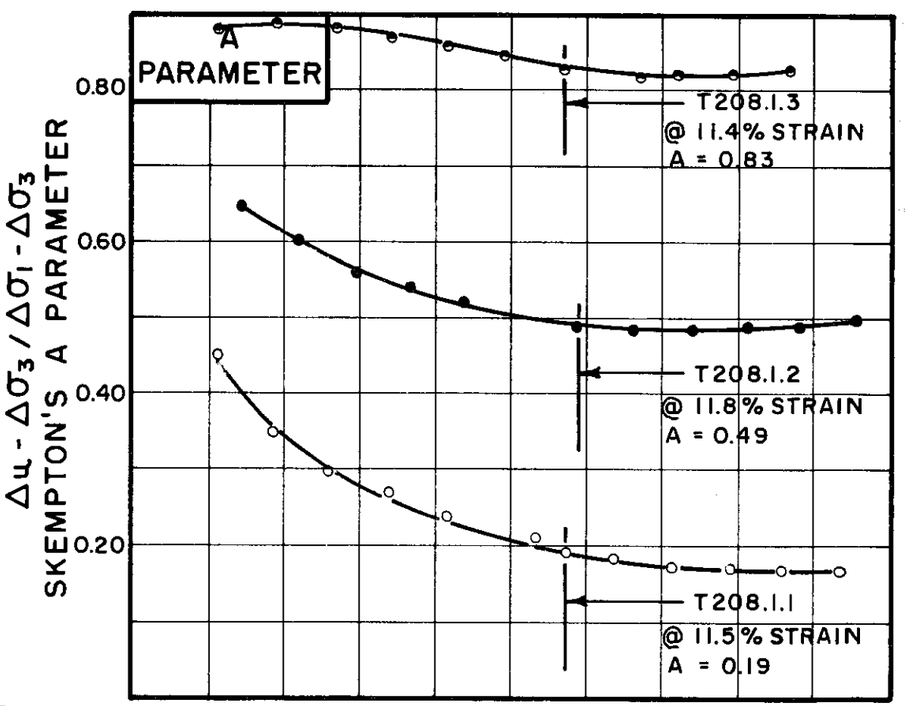
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

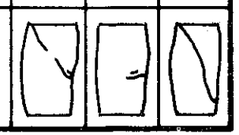
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-407









TEST NO. / SYMBOL		T208.1.1 ○	T208.1.2 ●	T208.1.3 ⊖
INITIAL CONDITIONS: WATER CONTENT	w_o	26.8%	26.0%	27.6%
INITIAL CONDITIONS: DRY DENSITY pcf	γ_d	99	96	97
INITIAL CONDITIONS: SAMPLE DIAMETER in.	D_o	1.40	1.40	1.40
INITIAL CONDITIONS: SAMPLE HEIGHT in	H_o	3.36	3.44	3.32
CONDITIONS BEFORE SHEAR: FINAL BACK PRESSURE p.s.f.	u_o	8640	11520	7200
CONDITIONS BEFORE SHEAR: INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$	3312	6624	13248
CONDITIONS BEFORE SHEAR: VOLUMETRIC STRAIN	ϵ_{vol}	3.0%	5.2%	7.8%
CONDITIONS BEFORE SHEAR: PORE PRESSURE RESPONSE		95%	94%	98%
FINAL CONDITIONS: WATER CONTENT	w_f	25.3%	23.7%	22.8%
FINAL CONDITIONS: SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT/MINUTE		.024	.023	.024

BORING NO. 48
SAMPLE NO. 22
DEPTH 98.0' TO 100.0'

SOIL DESCRIPTION SILTY CLAY (CL)

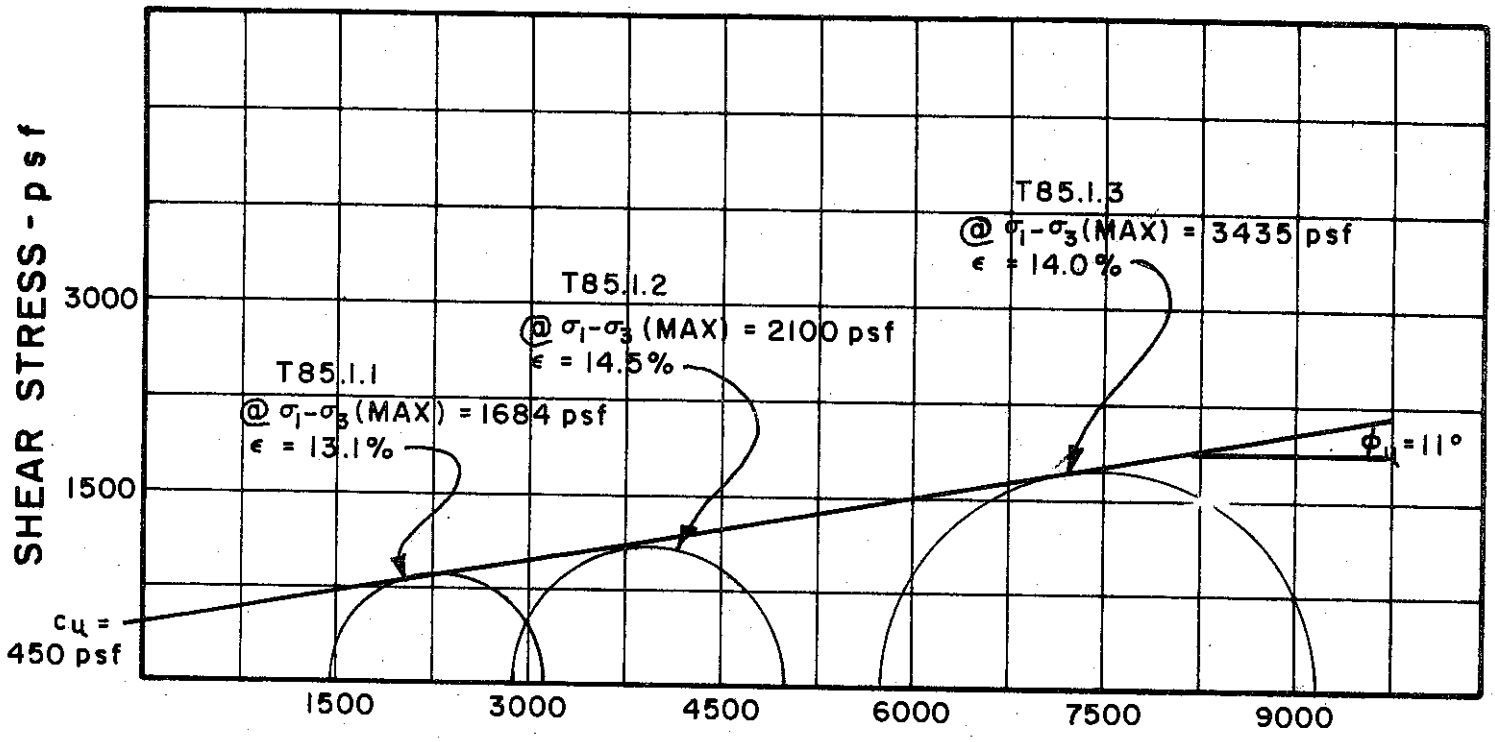
LIQUID LIMIT 36 PLASTIC LIMIT 19

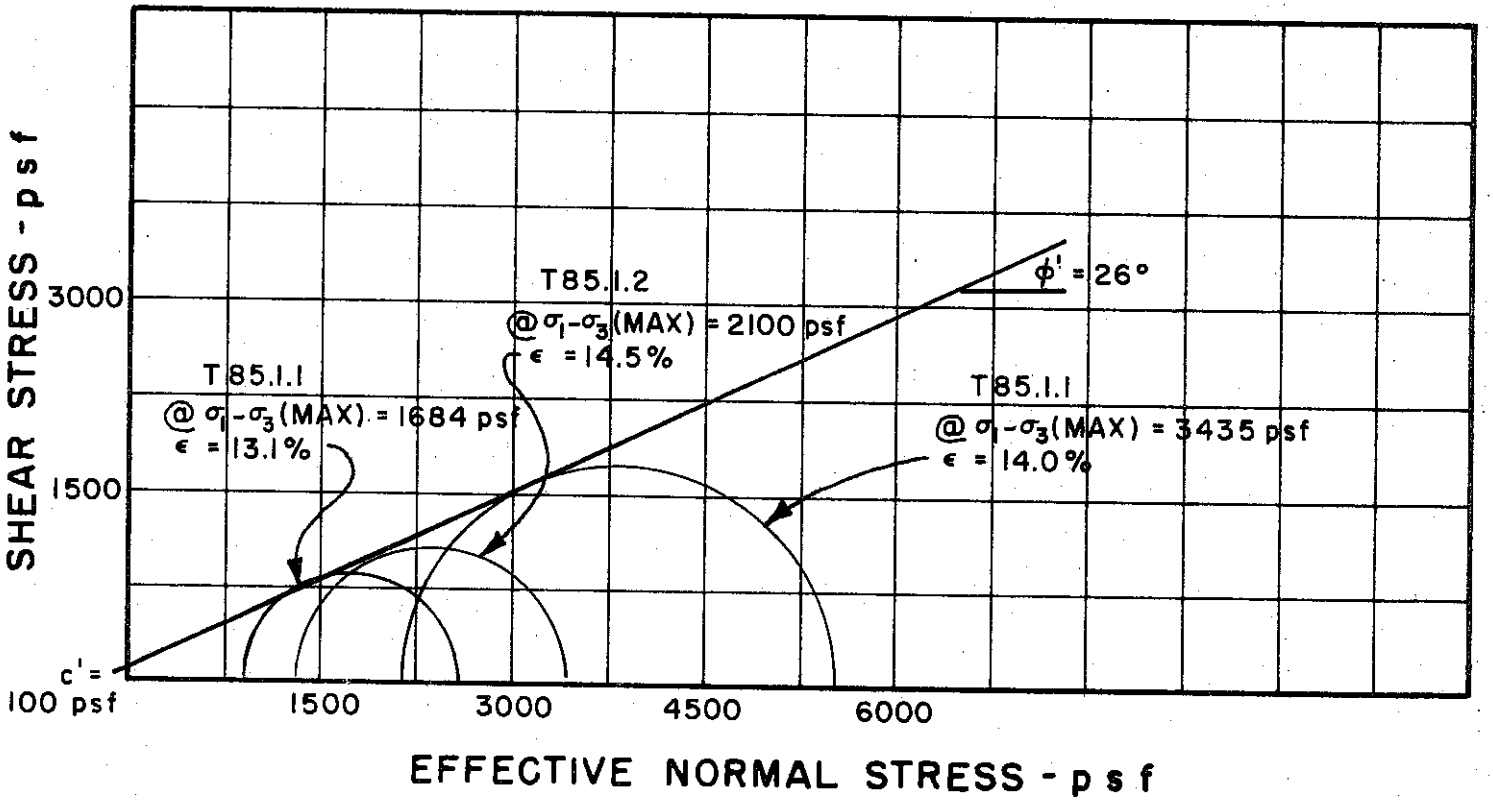
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-408

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 50

SAMPLE NO. 6

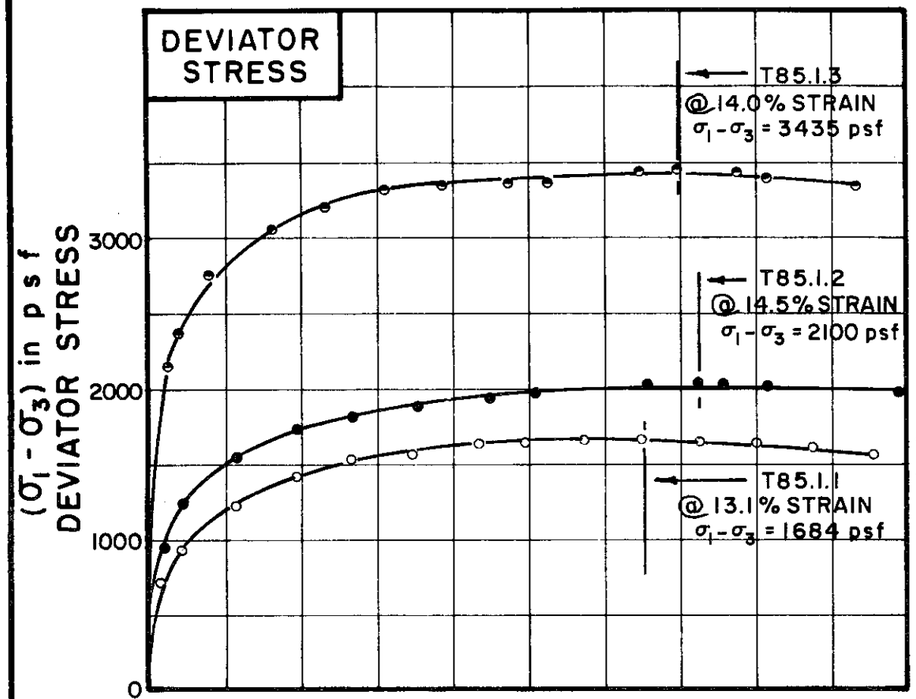
DEPTH 28.0' TO 30.0'

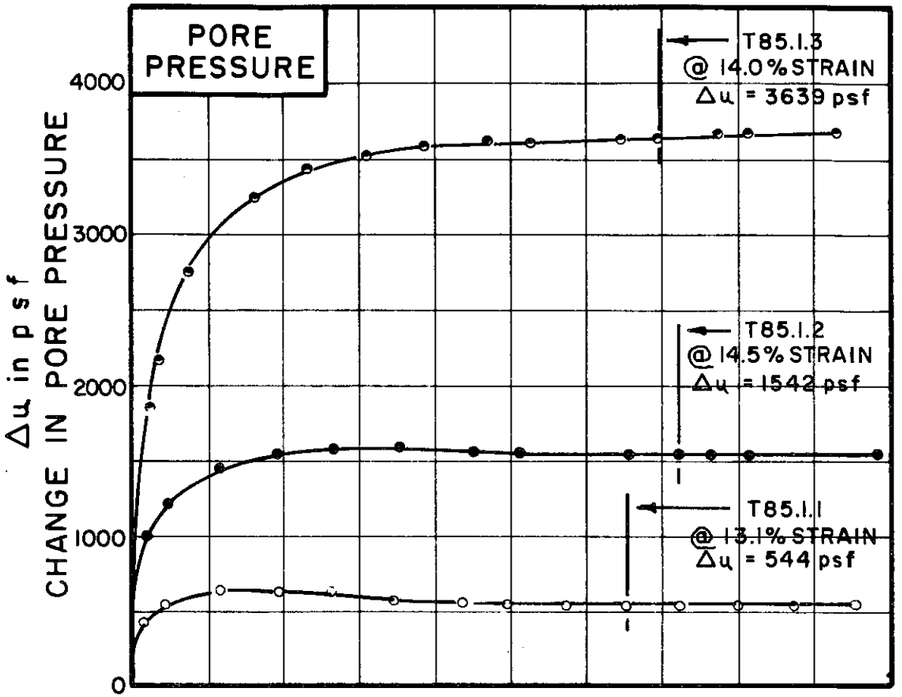
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

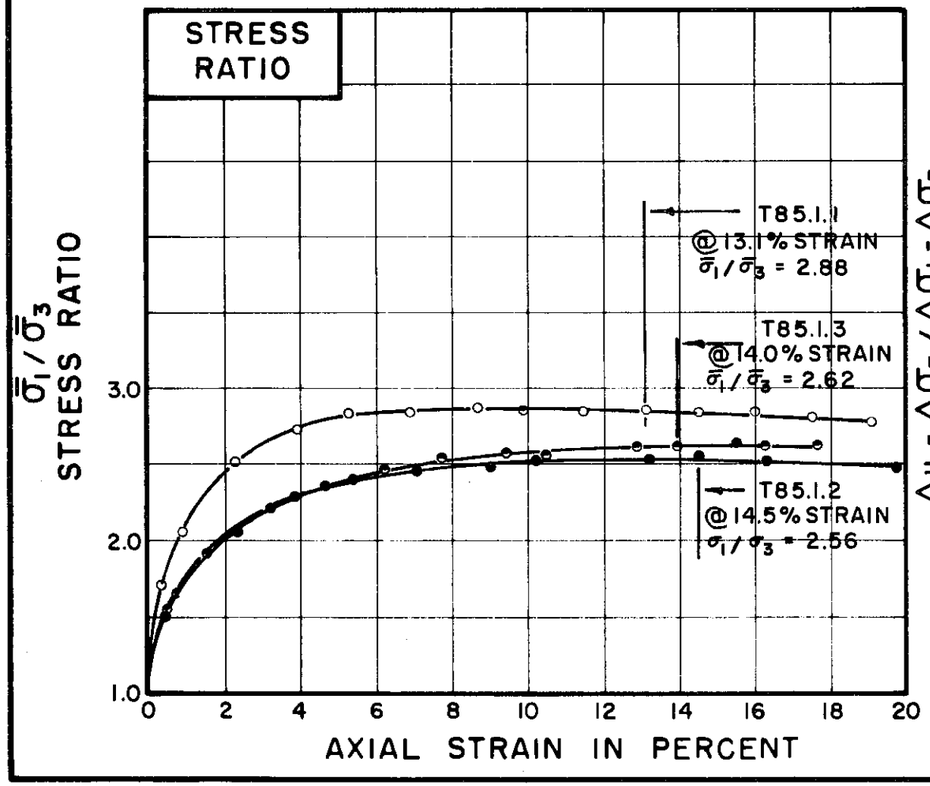
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

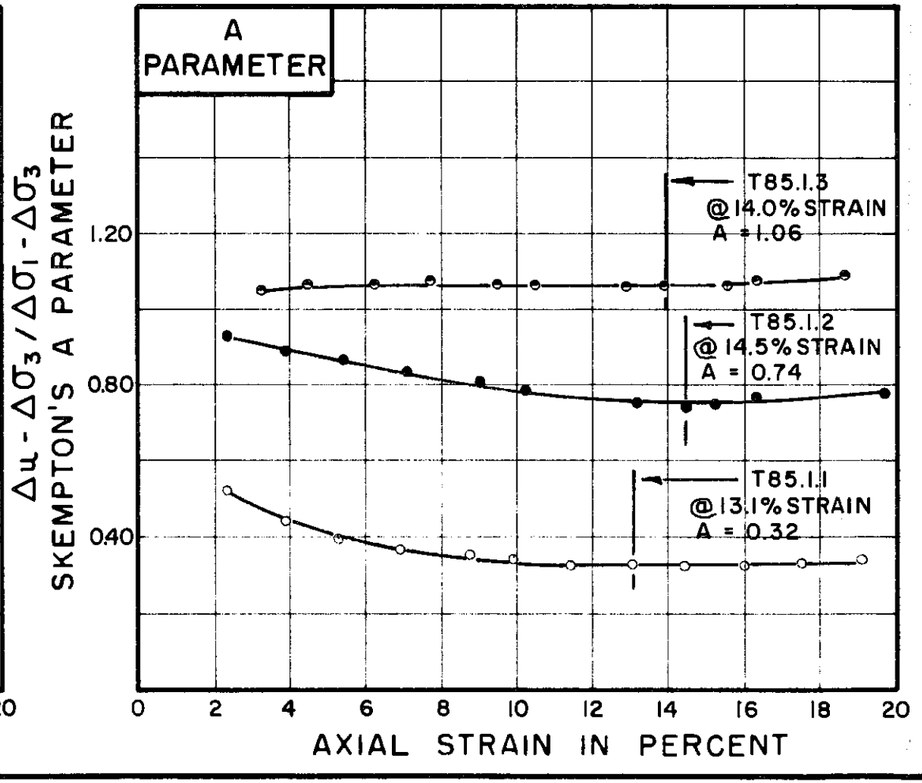
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-409









TEST NO. / SYMBOL		T85.1.1 ○	T85.1.2 ●	T85.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	33.0%	33.1%	34.3%
	DRY DENSITY lb/cu ft	γ_d	88	90	86
	SAMPLE DIAMETER in.	D_o	1.38	1.39	1.39
	SAMPLE HEIGHT in	H_o	3.30	3.25	3.27
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p s f	u_o	10,080	10,080	10,080
	INITIAL EFFECTIVE STRESS p s f	$\bar{\sigma}_1 = \bar{\sigma}_3$	1440	2880	5760
	VOLUMETRIC STRAIN	ϵ_{vol}	2.58%	3.18%	4.86%
	PORE PRESSURE RESPONSE		96%	95%	100%
FINAL CONDITIONS	WATER CONTENT	w_f	31.5%	27.3%	28.5%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.025	.025	.024

BORING NO. 50
SAMPLE NO. 6
DEPTH 28.0' TO 30.0'

SOIL DESCRIPTION SILTY CLAY (CL)

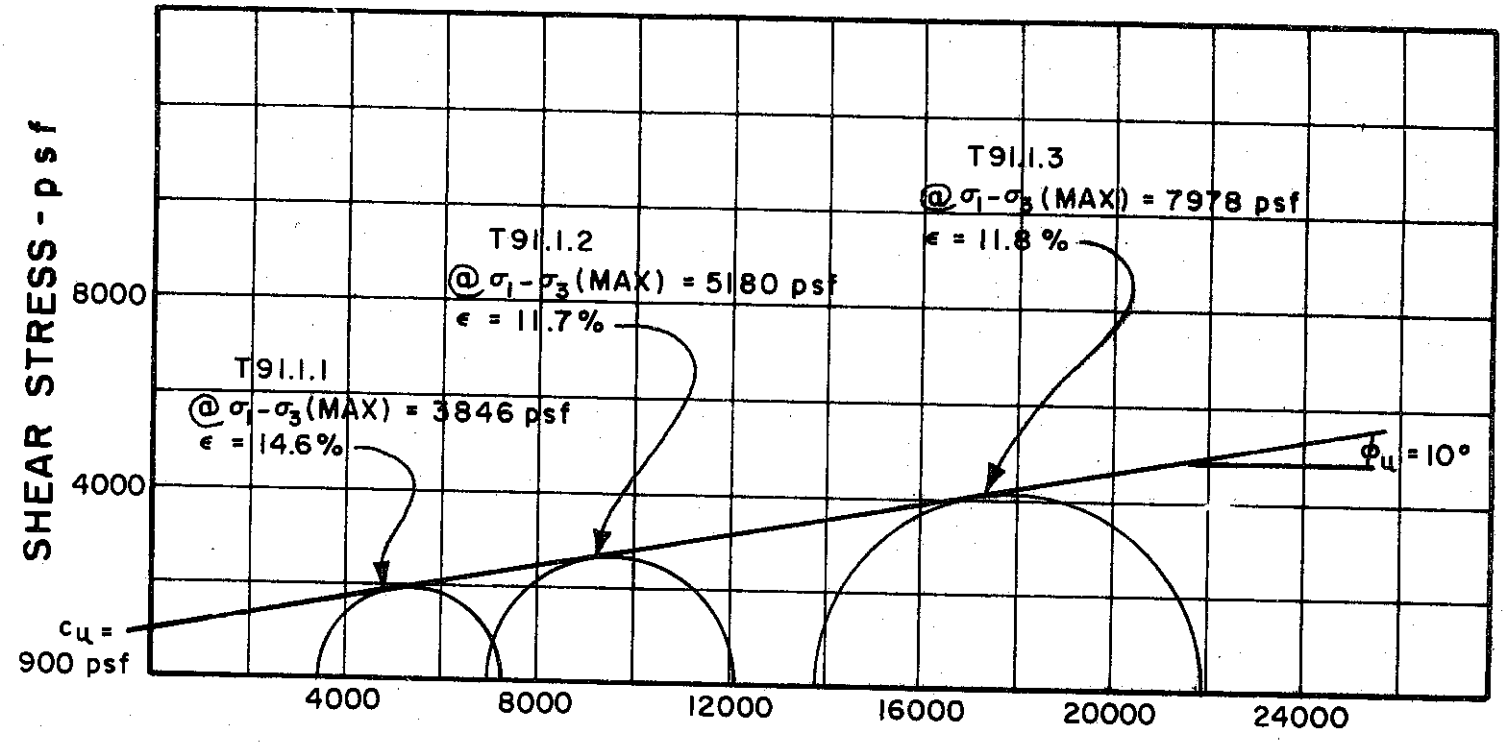
LIQUID LIMIT 39 PLASTIC LIMIT 18

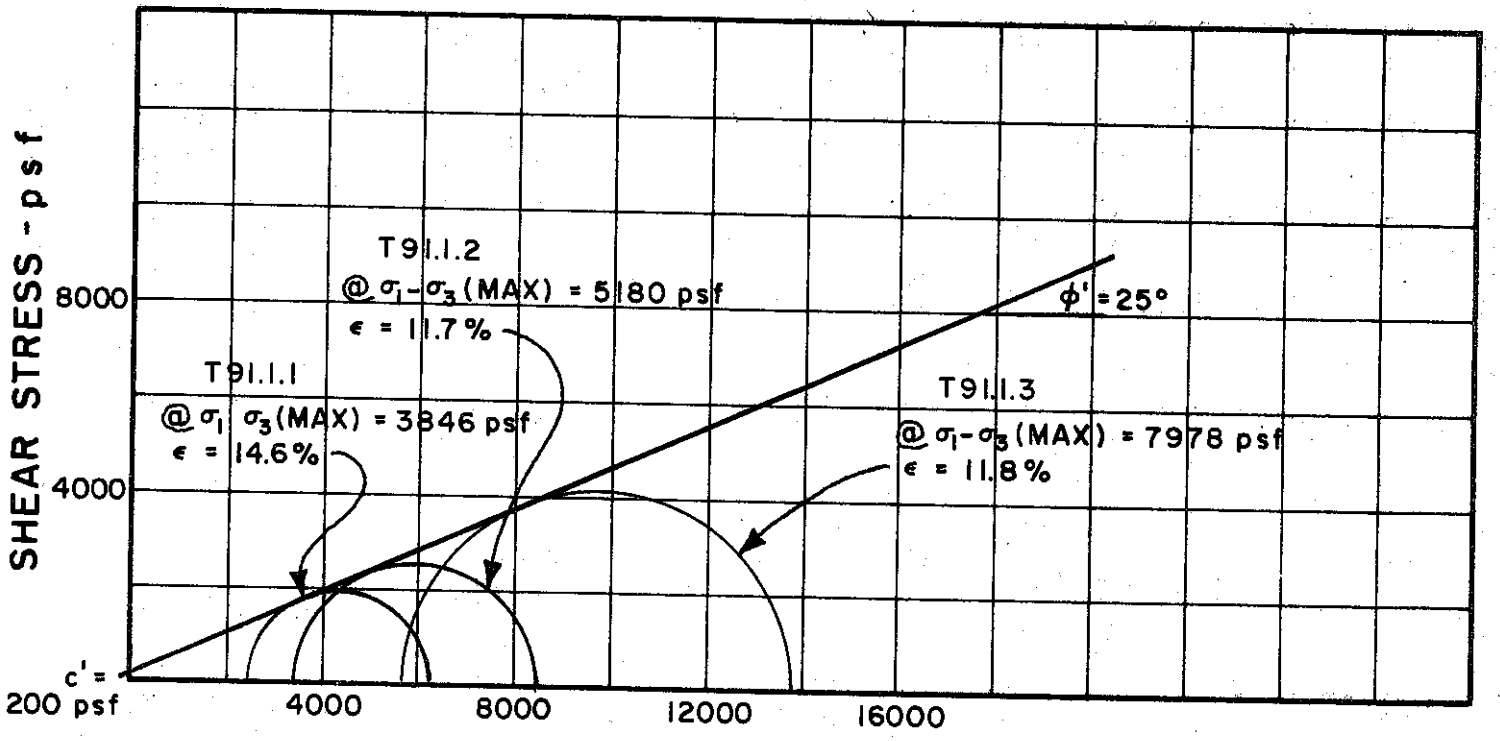
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-410

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 50

SAMPLE NO. 18

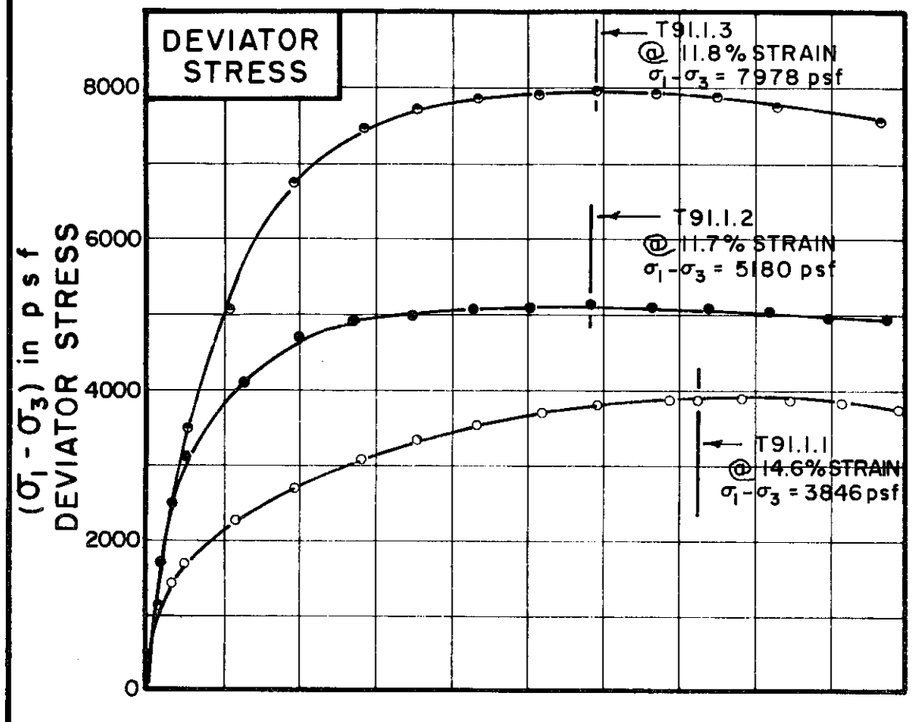
DEPTH 88.0' TO 90.0'

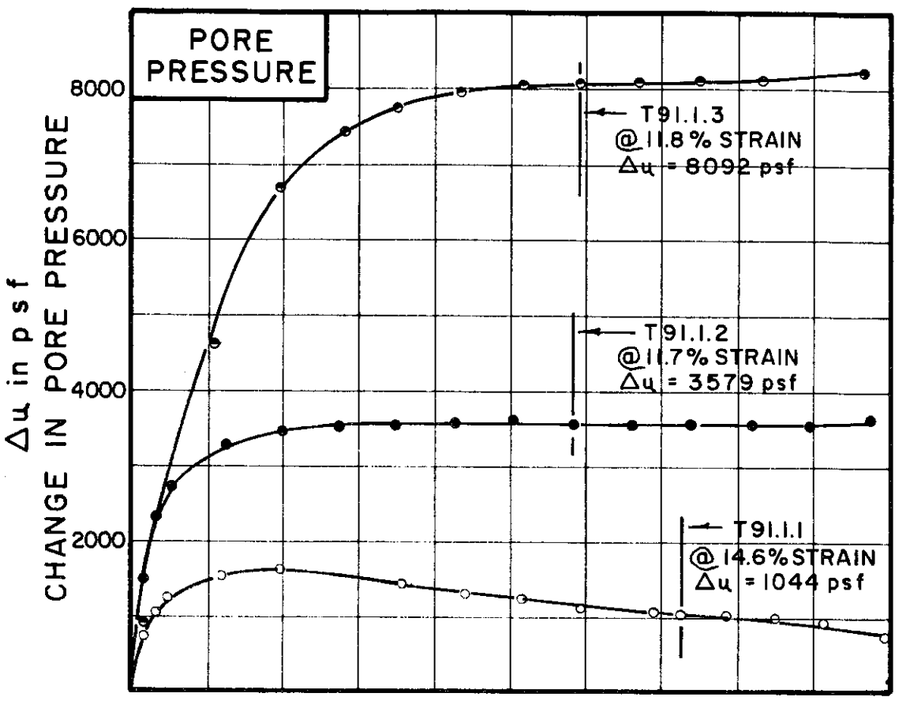
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

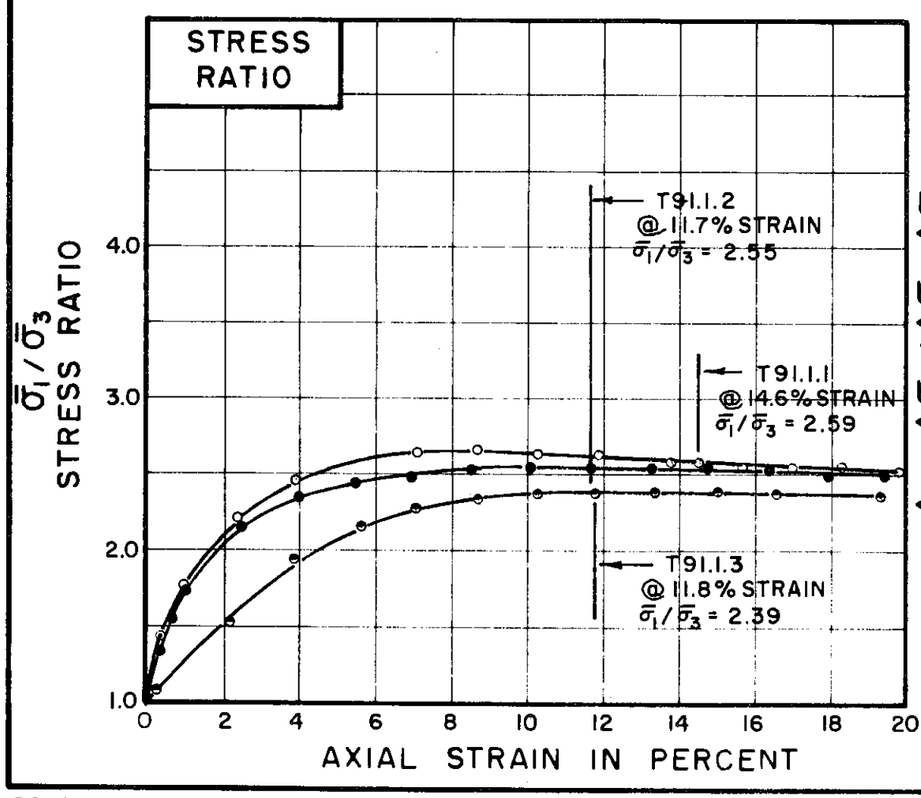
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

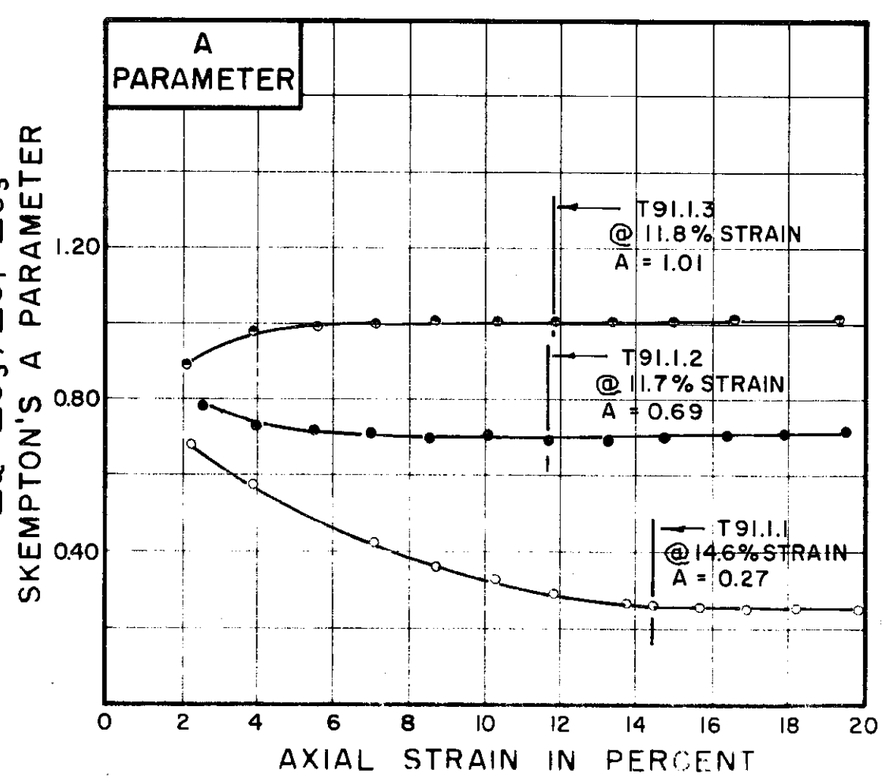
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

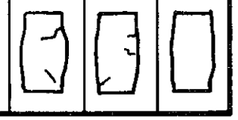
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-411









TEST NO. / SYMBOL		T91.1.1 ○	T91.1.2 ●	T91.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	28.0%	27.6%	27.6%
	DRY DENSITY lb/cu ft	γ_d	97	97	96
	SAMPLE DIAMETER in.	D_o	1.37	1.38	1.41
	SAMPLE HEIGHT in	H_o	3.18	3.25	3.25
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	8640	8640	12,960
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1$ = $\bar{\sigma}_3$	3456	6912	13,824
	VOLUMETRIC STRAIN	ϵ_{vol}	3.54%	4.24%	6.87%
	PORE PRESSURE RESPONSE		96%	95%	96%
FINAL CONDITIONS	WATER CONTENT	w_f	25.5%	26.0%	22.7%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT/MINUTE	.025	.025	.025

BORING NO. 50
SAMPLE NO. 18
DEPTH 88.0' TO 90.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

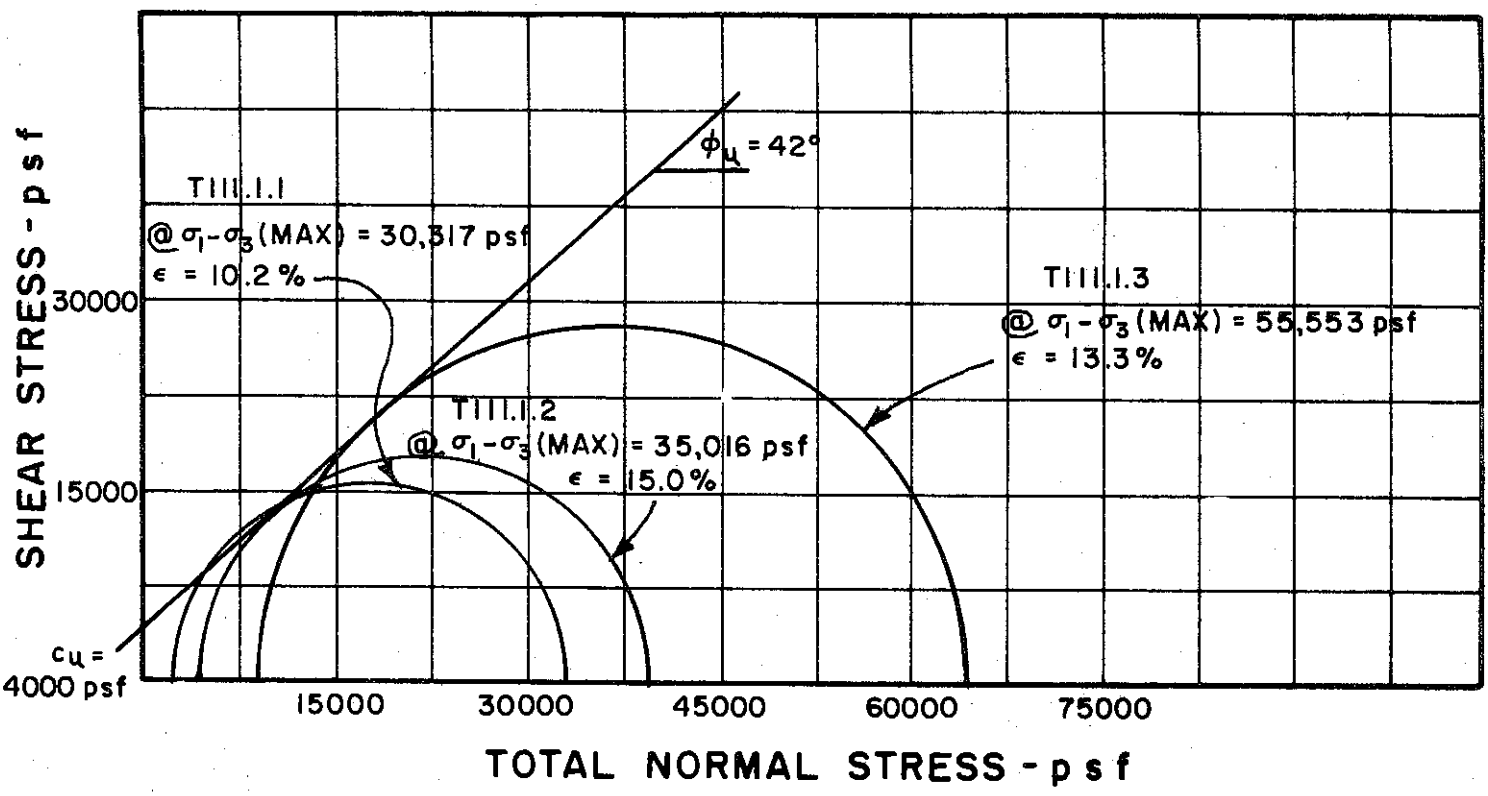
LIQUID LIMIT 39 PLASTIC LIMIT 23

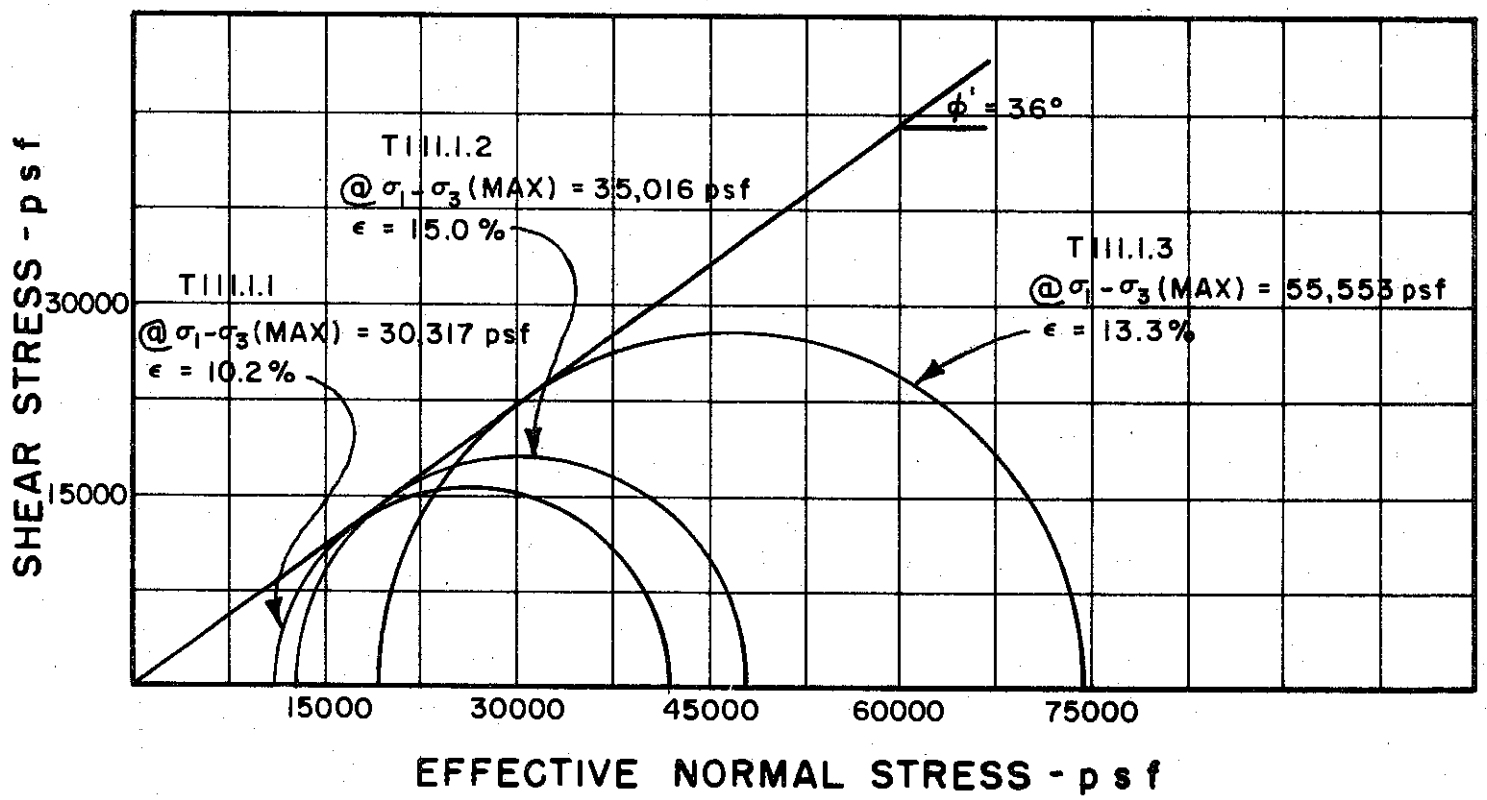
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-412

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 52

SAMPLE NO. 6

DEPTH 48.0' TO 50.5'

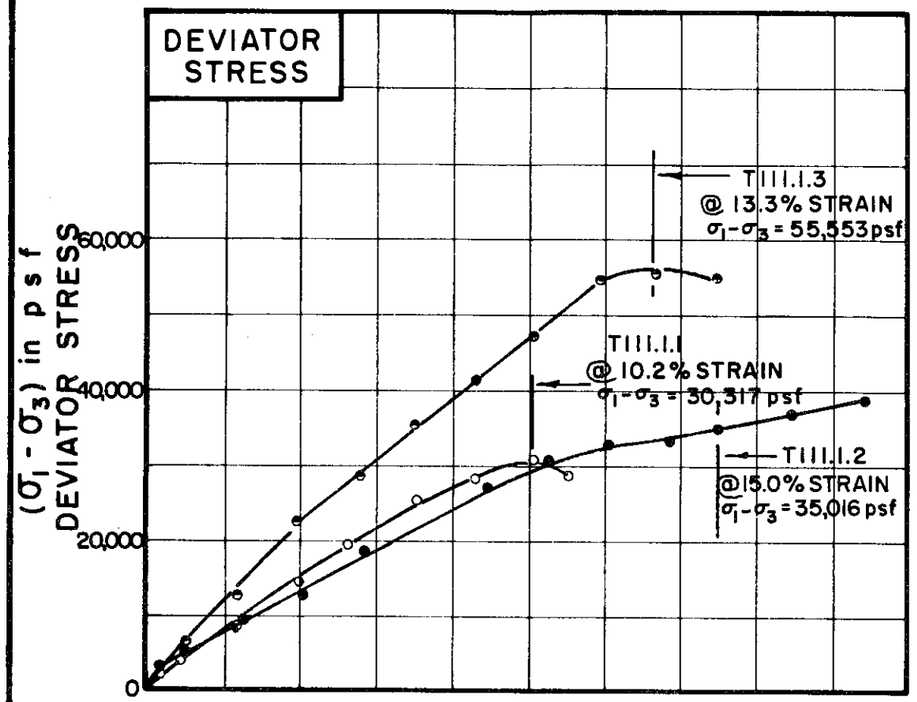
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

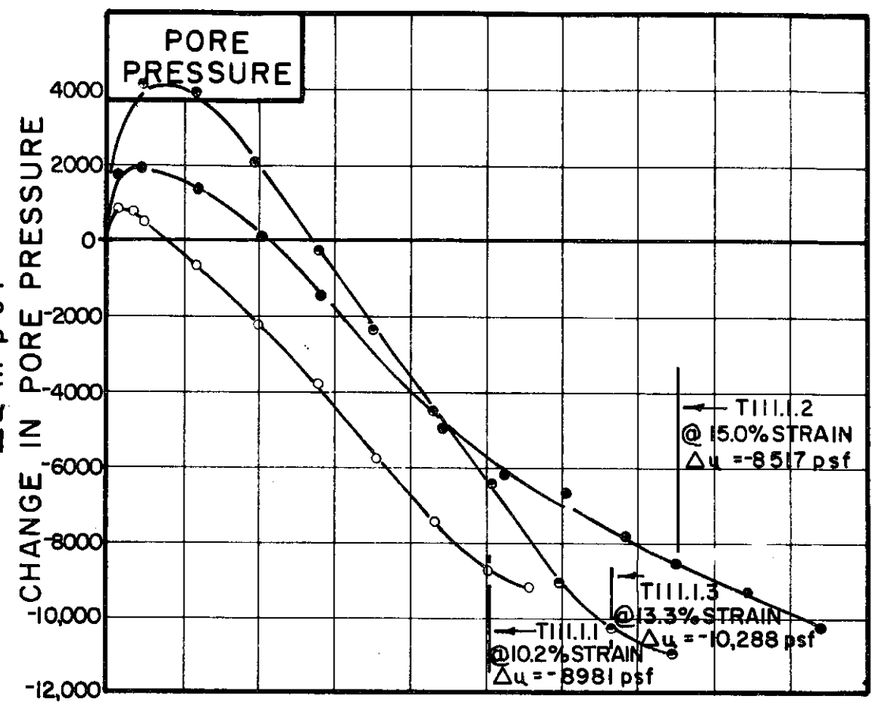
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

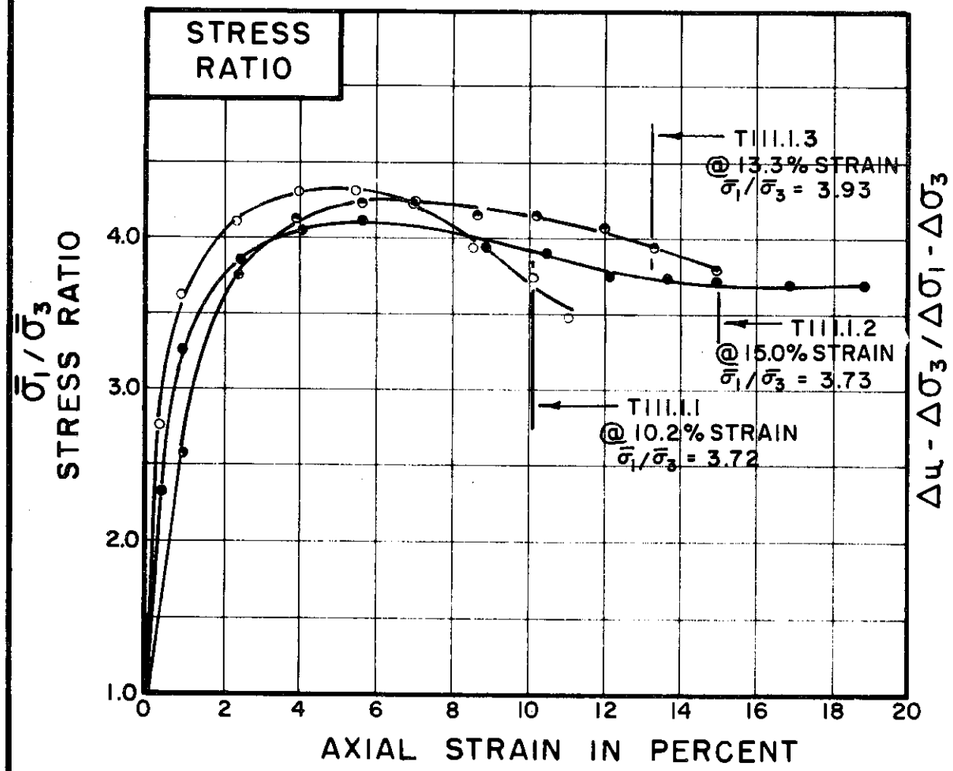
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

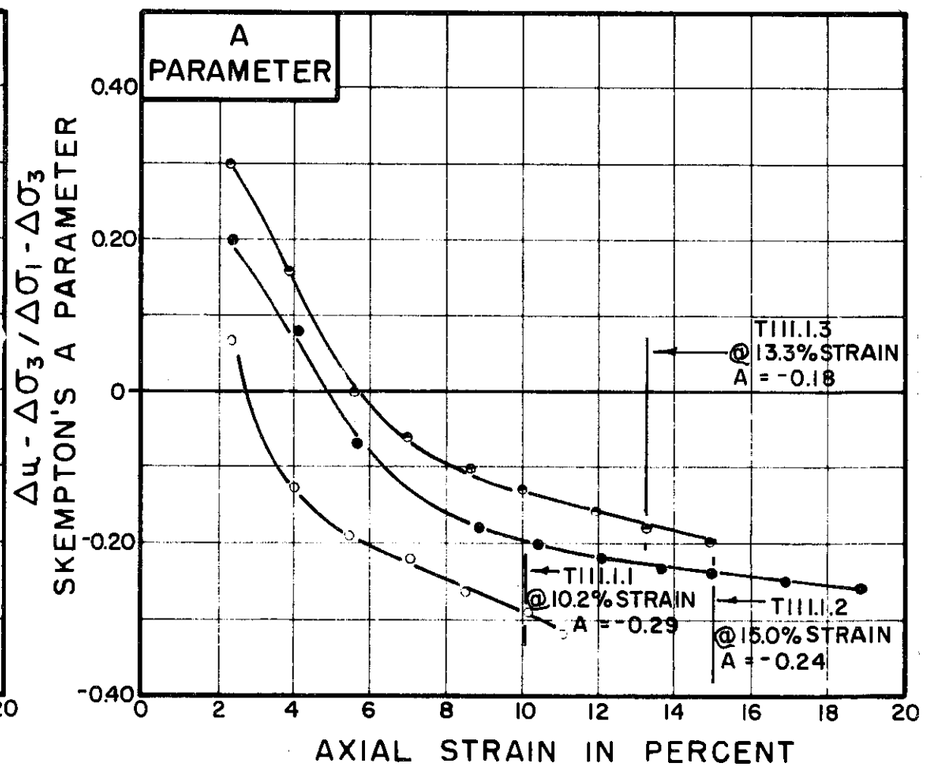
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-413









TEST NO. / SYMBOL		T111.1.1 ○	T111.1.2 ●	T111.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	22.1%	22.7%	22.1%
	DRY DENSITY lb/cu ft	γ_d	101	99	104
	SAMPLE DIAMETER in.	D_o	1.39	1.38	1.38
	SAMPLE HEIGHT in	H_o	3.20	3.10	3.21
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	9360	11,520	11,520
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	2160	4320	8640
	VOLUMETRIC STRAIN	ϵ_{vol}	0.62%	1.22%	1.78%
	PORE PRESSURE RESPONSE		99%	97%	97%
FINAL CONDITIONS	WATER CONTENT	w_f	21.8%	21.8%	21.8%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.025	.026	.025

BORING NO. 52
SAMPLE NO. 6
DEPTH 48.0' TO 50.5'

SOIL DESCRIPTION SILT (ML)

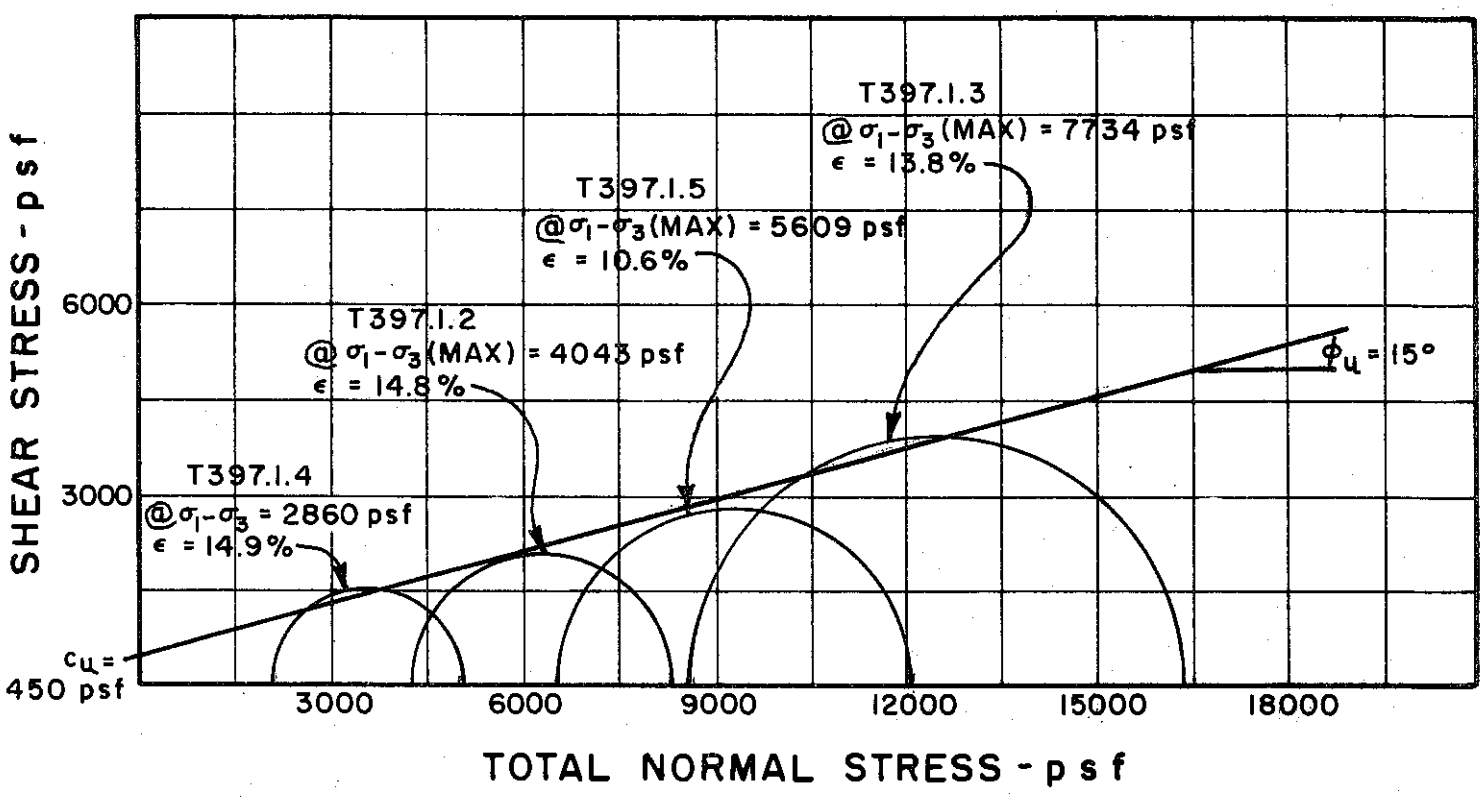
LIQUID LIMIT NON-PLASTIC PLASTIC LIMIT

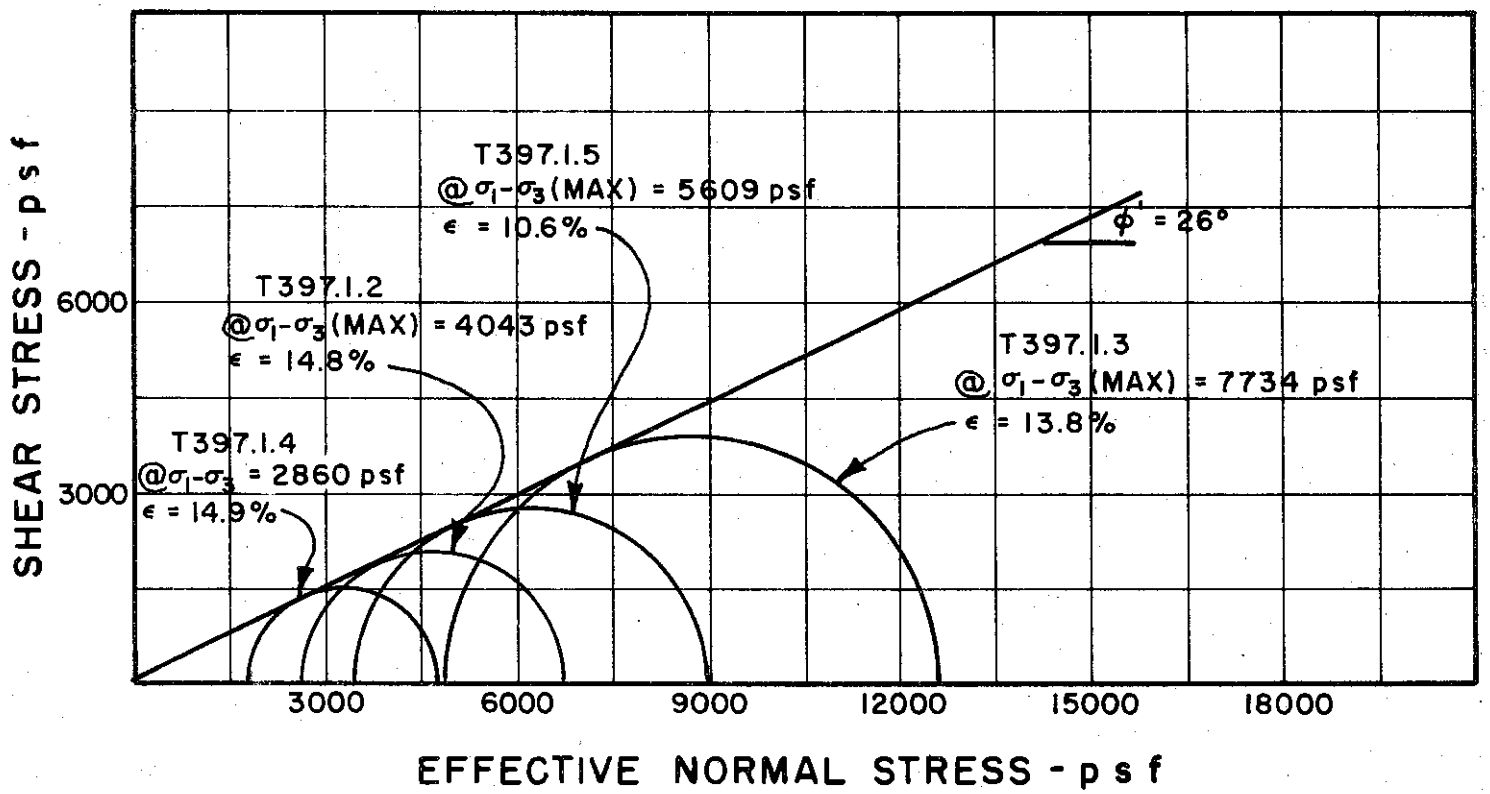
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-414

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 54

SAMPLE NO. 4

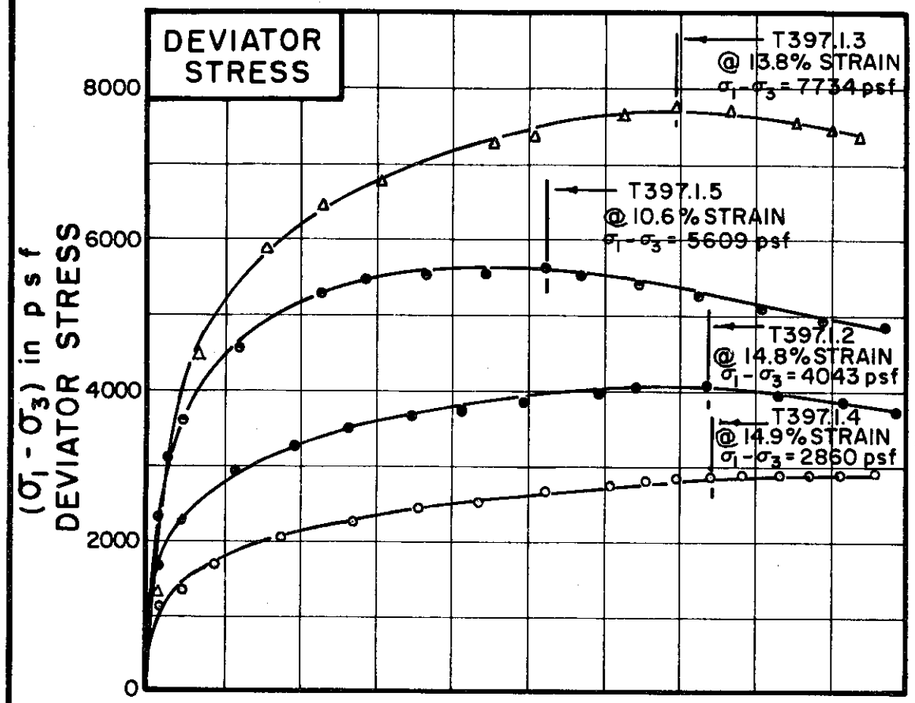
DEPTH 53.0' TO 55.0'

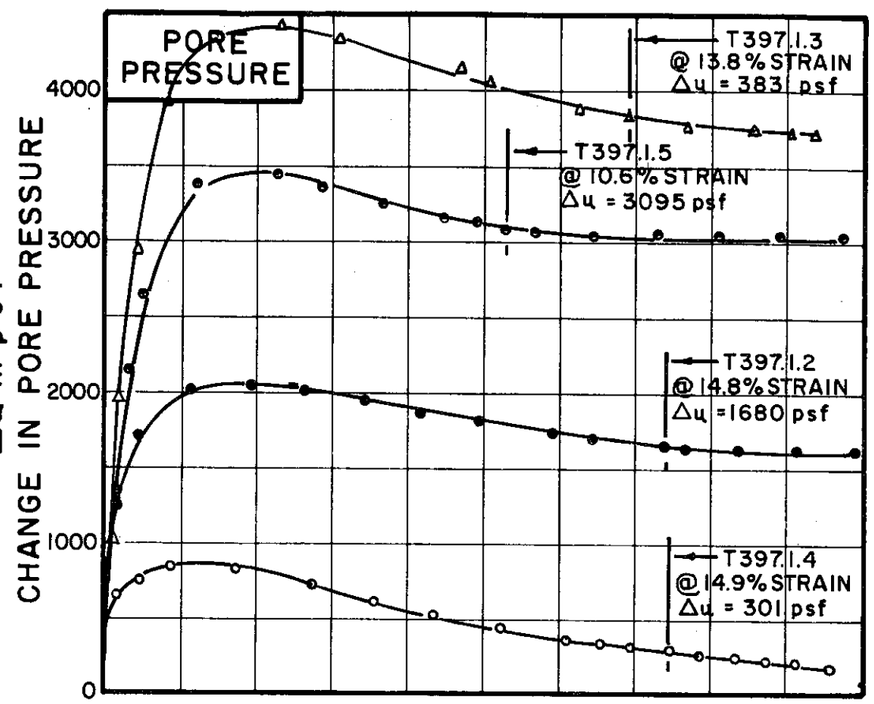
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

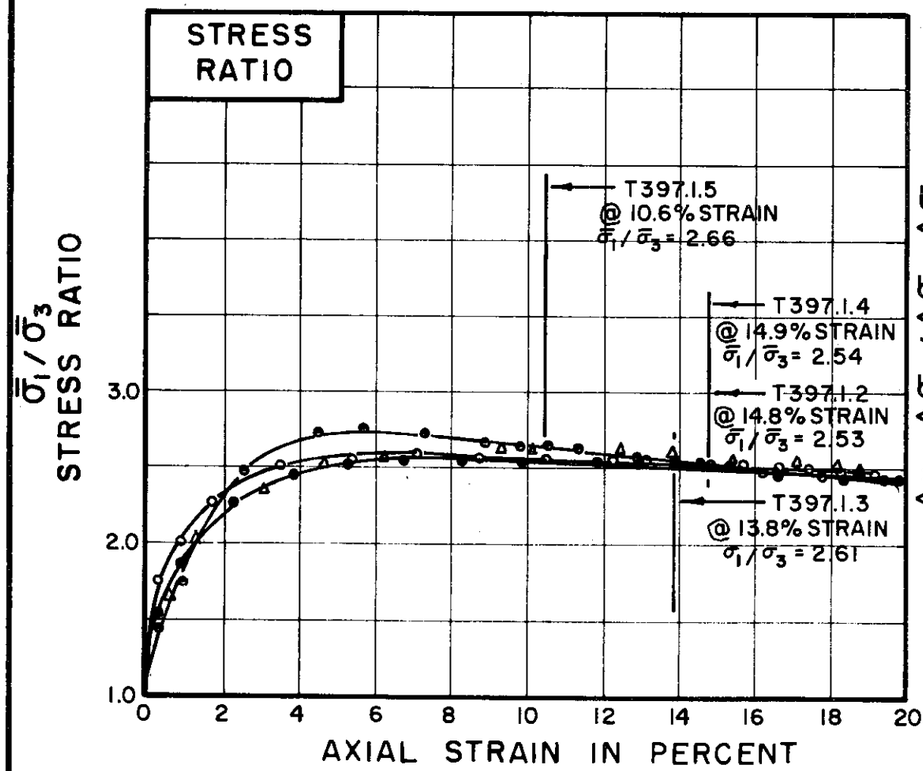
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

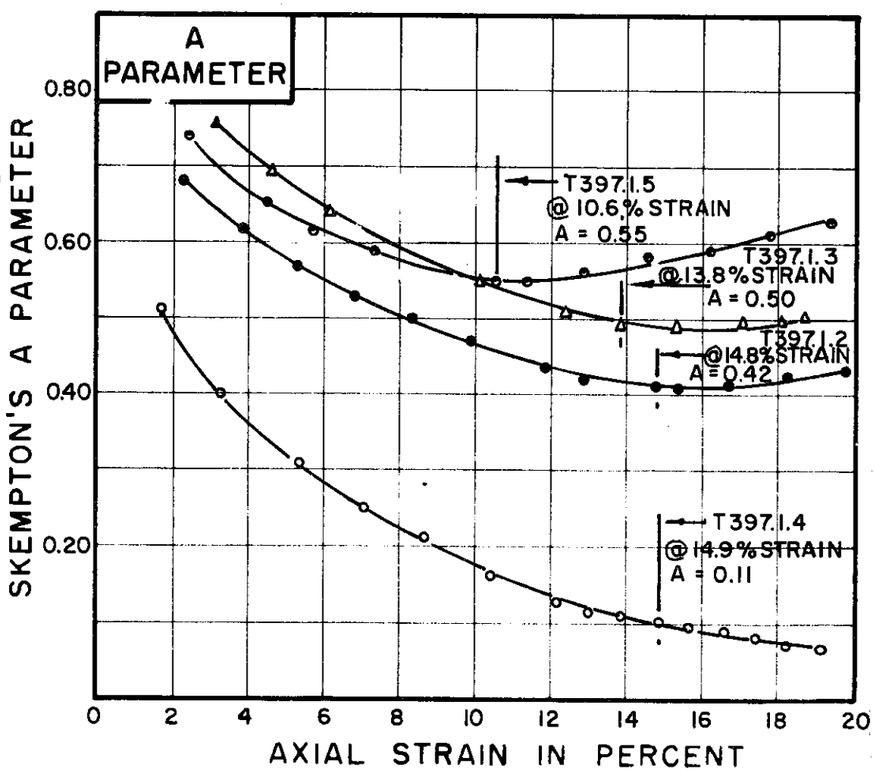
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-415









TEST NO. / SYMBOL		T397.1.4 ○	T397.1.2 ●	T397.1.5 ◆	T397.1.3 △
INITIAL CONDITIONS	WATER CONTENT	w_o	22.6%	23.2%	24.0%	23.2%
	DRY DENSITY lb/cu ft	γ_d	101	102	100	102
	SAMPLE DIAMETER in.	D_o	1.37	1.37	1.37	1.38
	SAMPLE HEIGHT in	H_o	2.88	3.30	3.12	3.30
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	7200	10080	8640	7200
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	2160	4320	6480	8640
	VOLUMETRIC STRAIN	ϵ_{vol}	1.68%	1.94%	3.33%	4.95%
	PORE PRESSURE RESPONSE		95 %	96 %	98 %	95 %
FINAL CONDITIONS	WATER CONTENT	w_f	21.5%	21.3%	19.9%	19.8%
	SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.028	.024	.026	.025

BORING NO. 54
SAMPLE NO. 4
DEPTH 53.0' TO 55.0'

SOIL DESCRIPTION SILTY CLAY (CL)

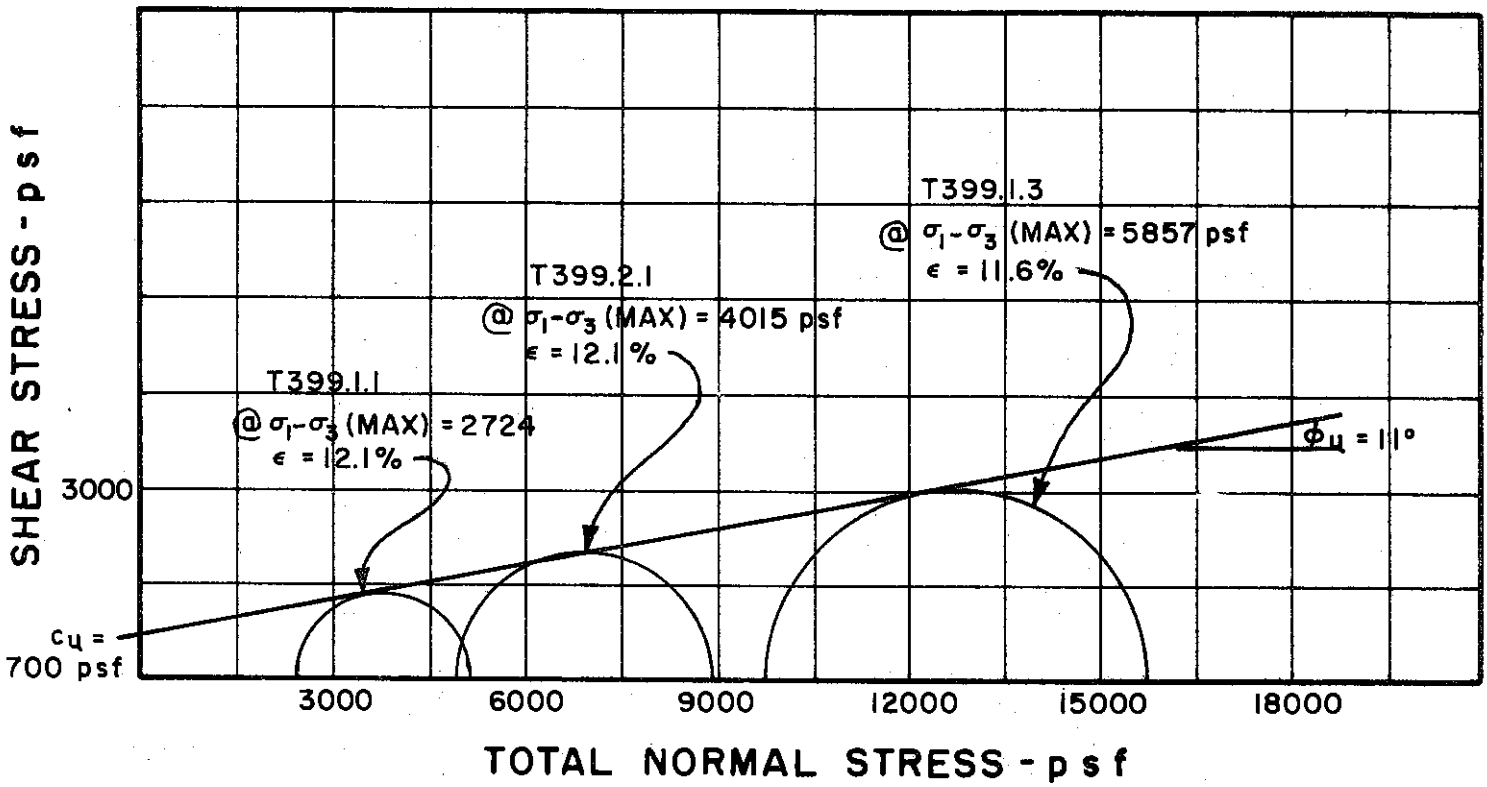
LIQUID LIMIT 31 PLASTIC LIMIT 18

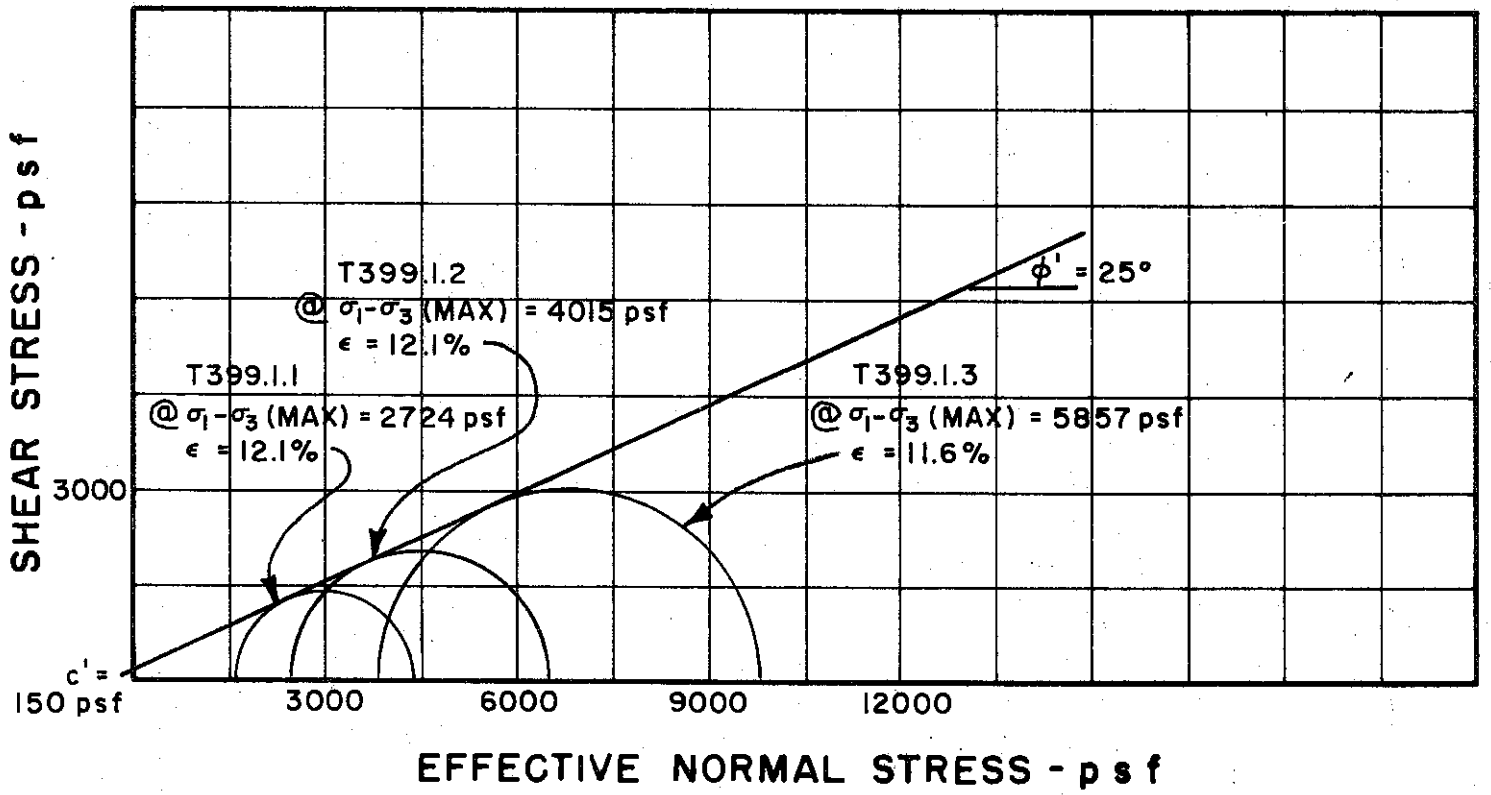
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-416

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 54

SAMPLE NO. 6

DEPTH 63.0' TO 65.0'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

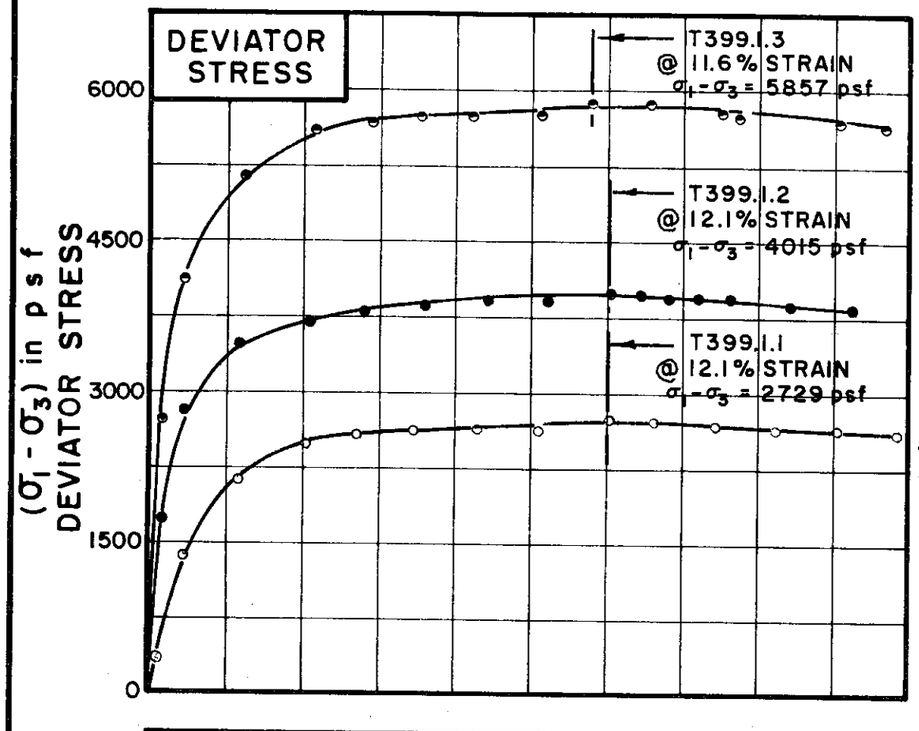
MOHR STRENGTH ENVELOPE

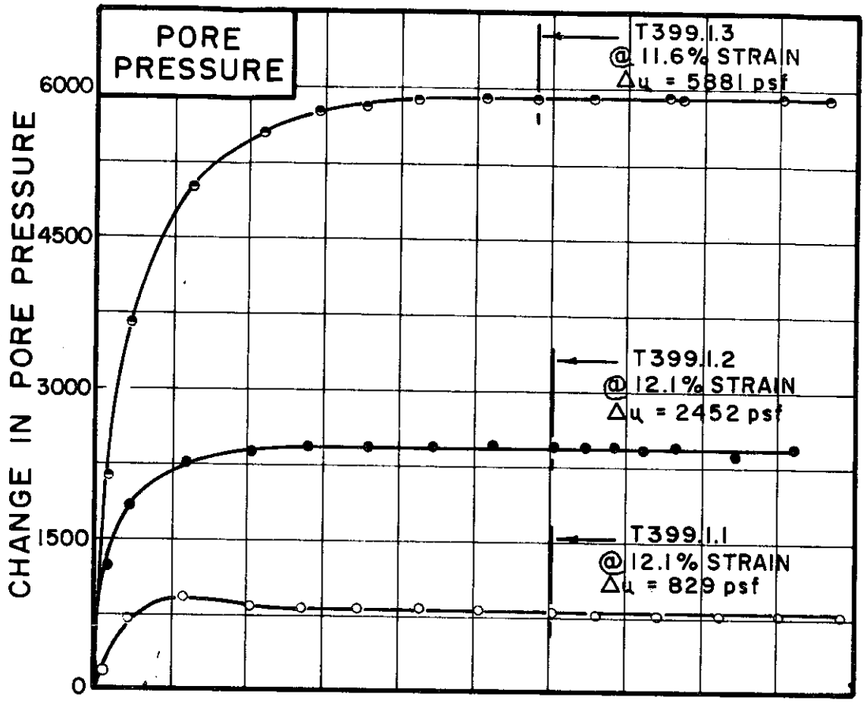
TRIAXIAL COMPRESSION TESTS

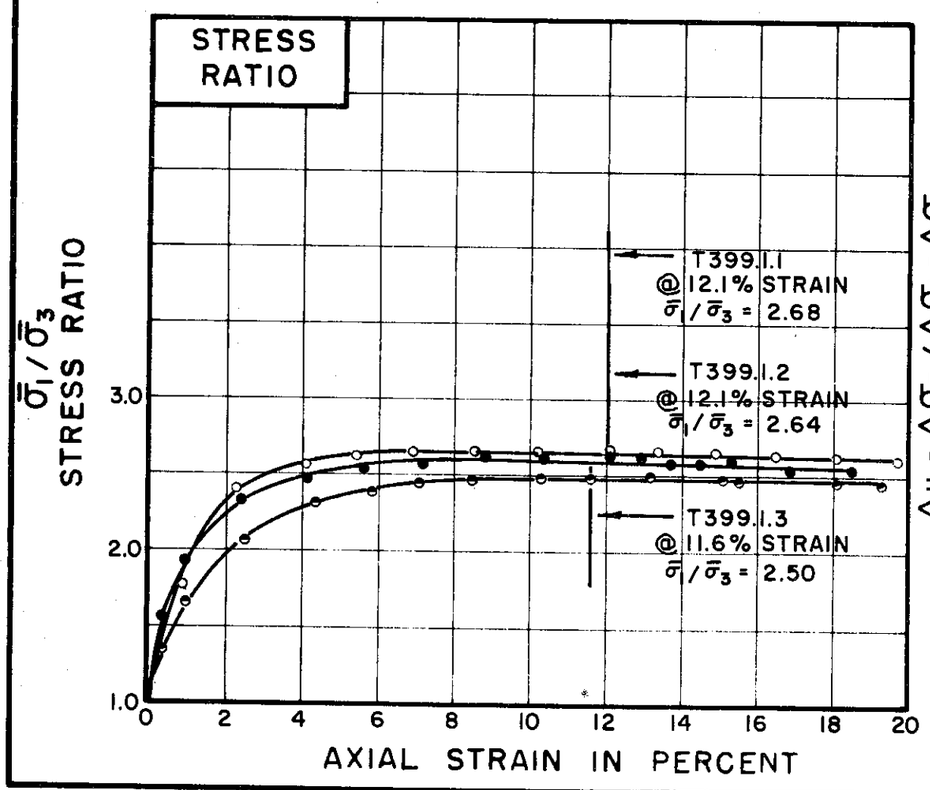
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

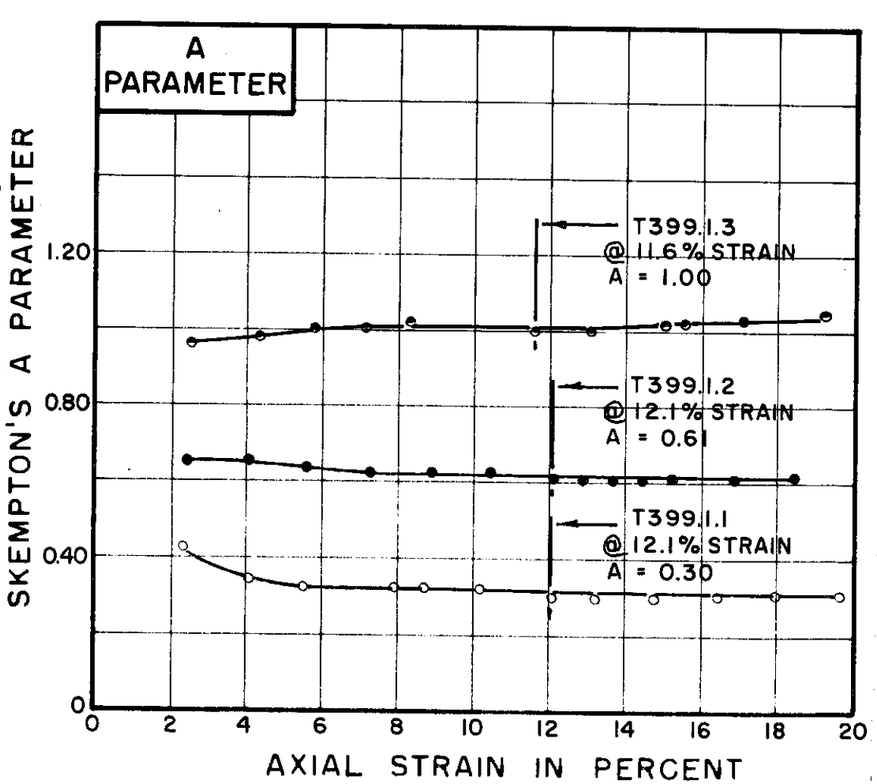
FILE 1255

C-417









TEST NO. / SYMBOL		T399.1.1 ○	T399.1.2 ●	T399.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	26.4%	25.2%	25.8%
	DRY DENSITY lb/cu ft	γ_d	98	98	98
	SAMPLE DIAMETER in.	D_o	1.39	1.38	1.39
	SAMPLE HEIGHT in	H_o	3.20	3.14	3.29
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	10,080	10,080	10,080
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	2448	4896	9792
	VOLUMETRIC STRAIN	ϵ_{vol}	1.77%	3.48%	5.79%
	PORE PRESSURE RESPONSE		96%	95%	98%
FINAL CONDITIONS	WATER CONTENT	w_f	25.5%	22.8%	22.2%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.025	.026	.025

BORING NO. 54
SAMPLE NO. 6
DEPTH 63.0' TO 65.0'

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

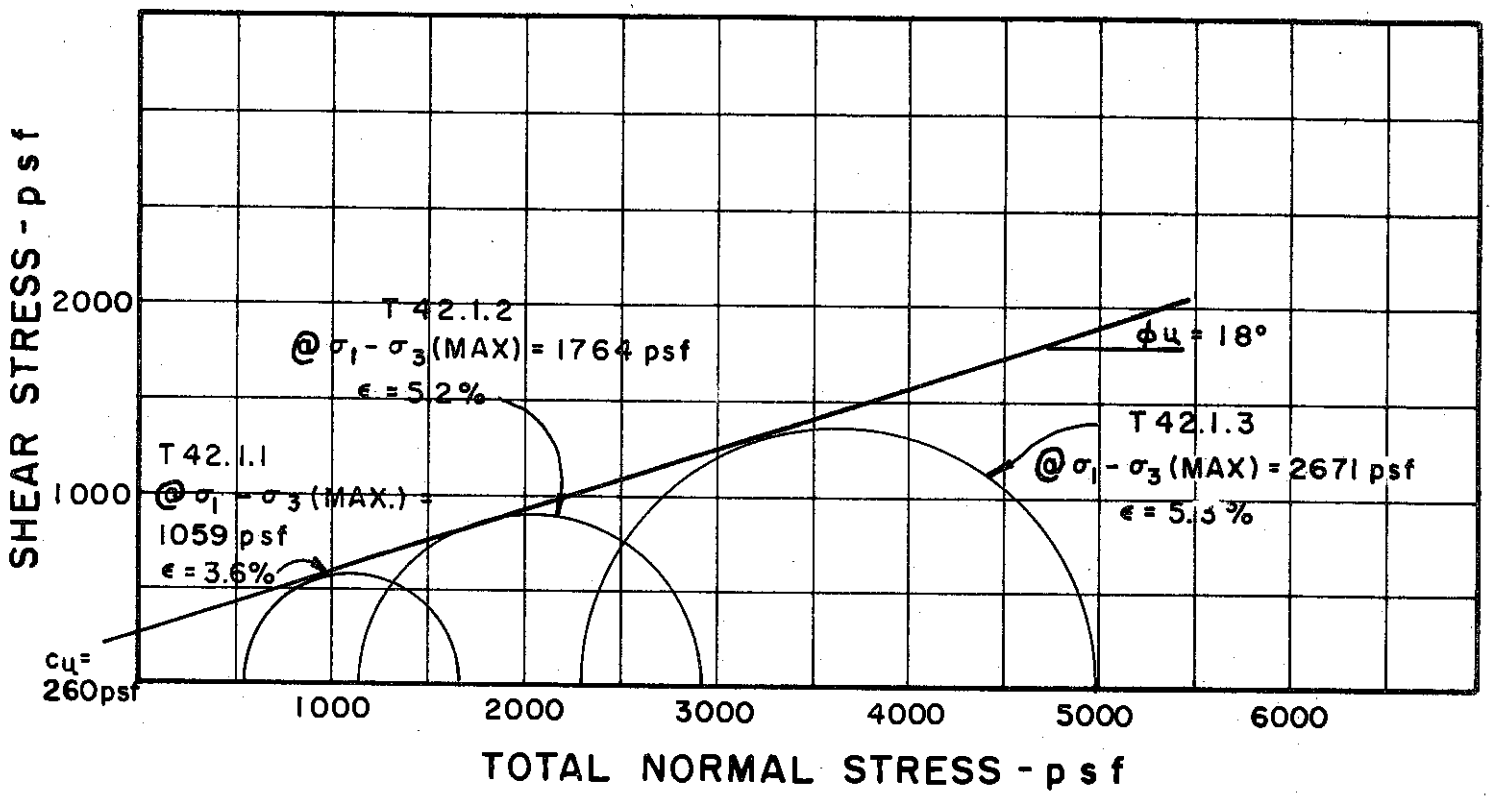
LIQUID LIMIT 36 PLASTIC LIMIT 18

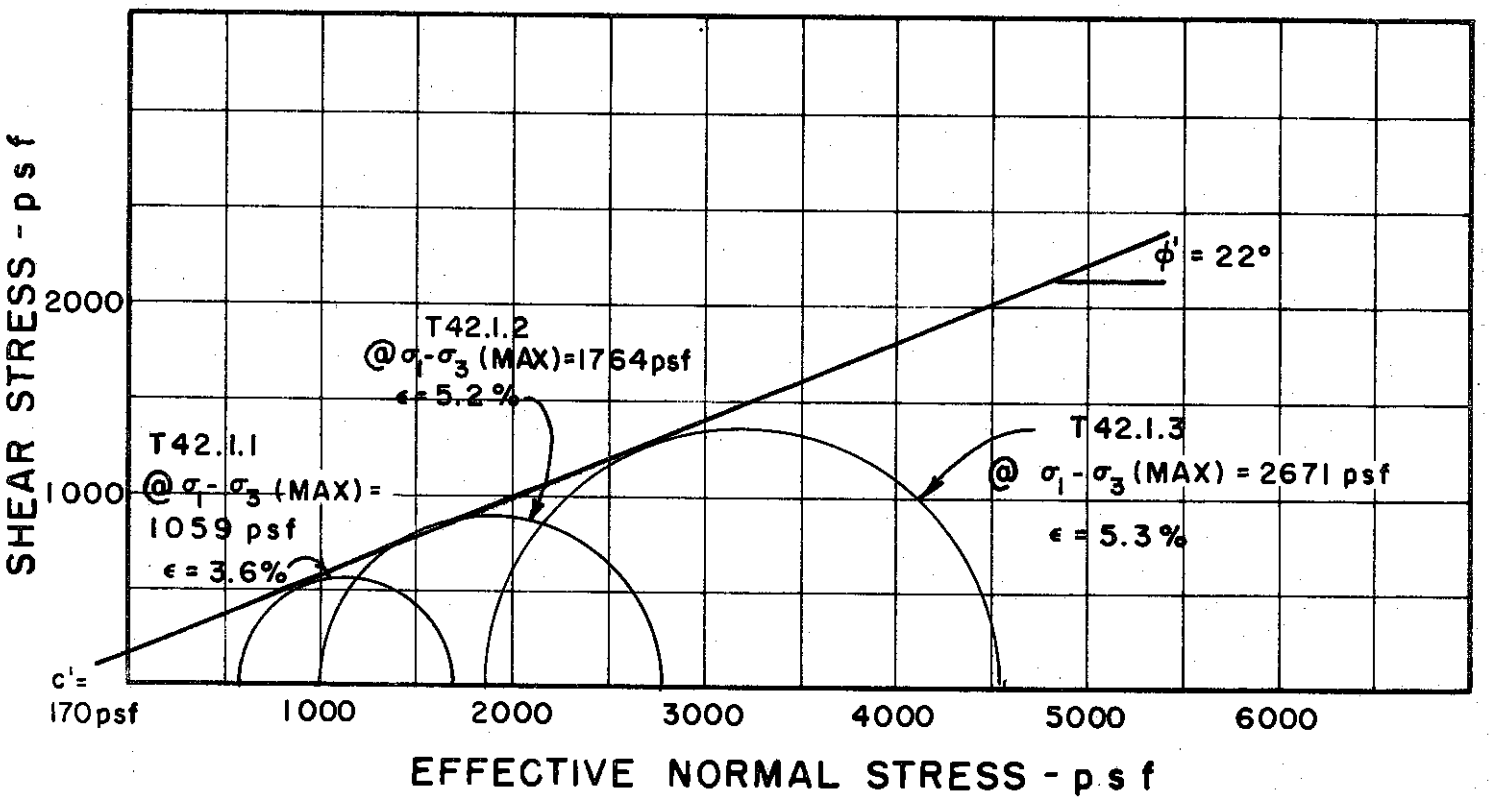
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-418

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

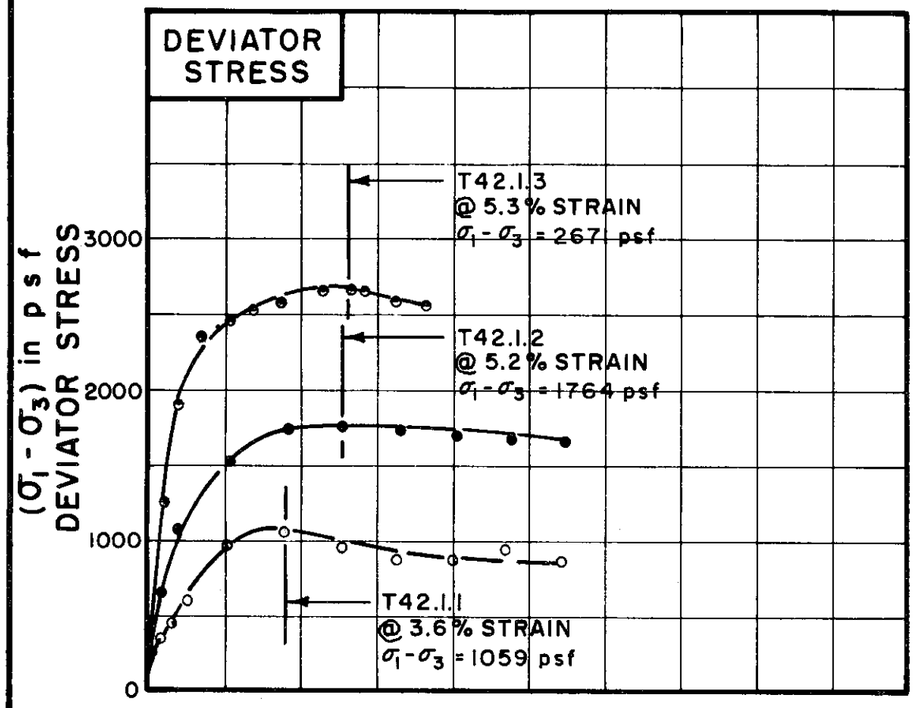
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

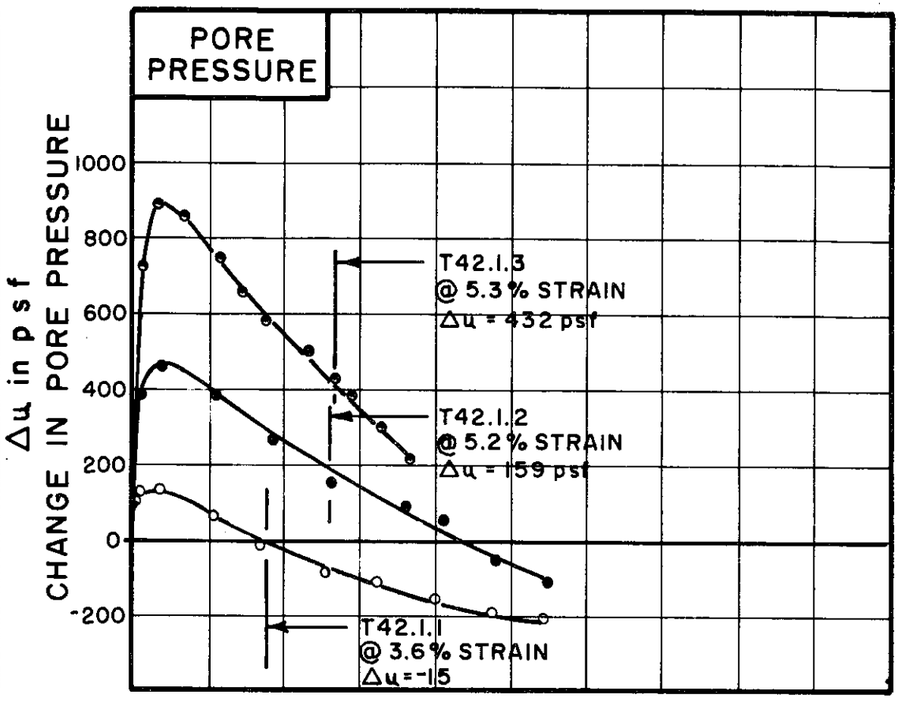
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

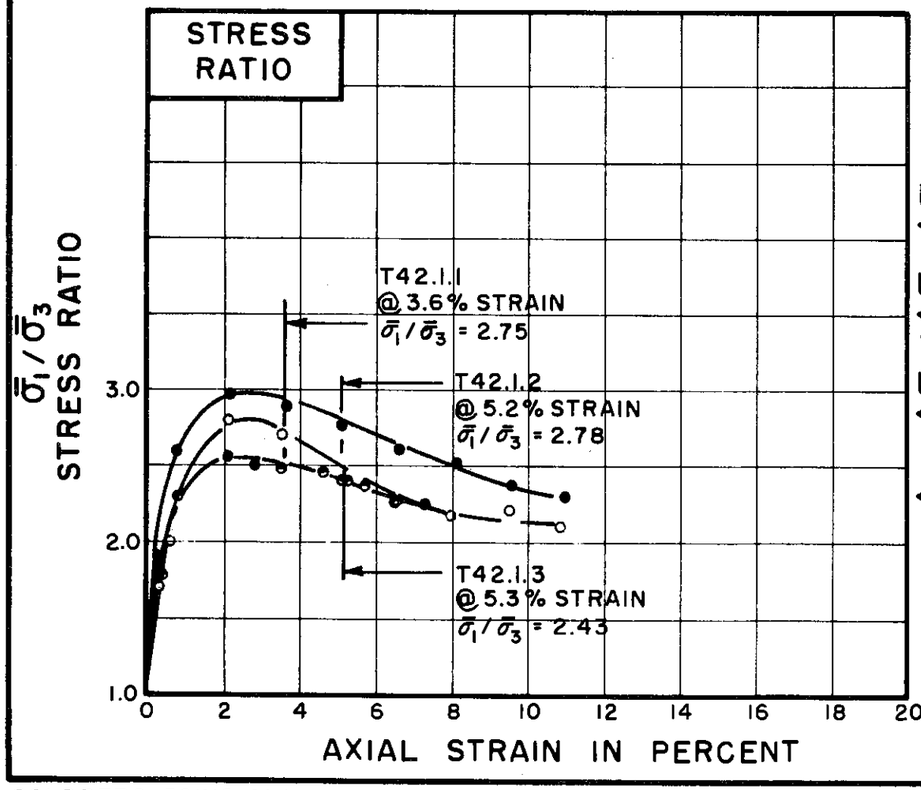
MOHR STRENGTH ENVELOPE

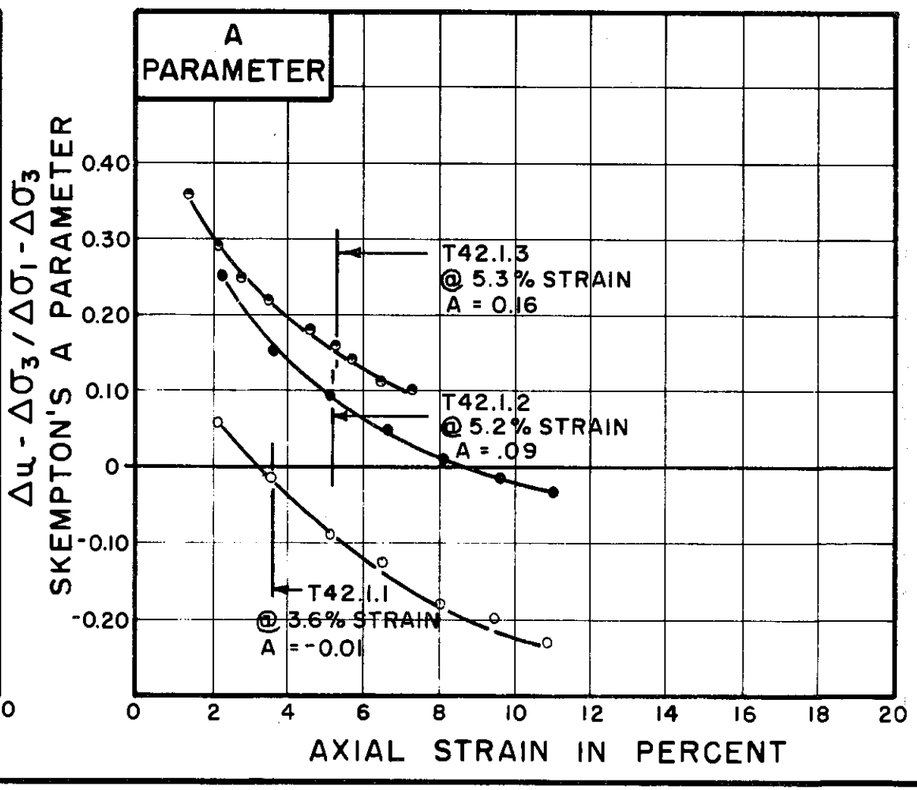
TRIAXIAL COMPRESSION TESTS

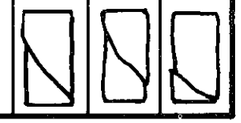
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-419









TEST NO. / SYMBOL		T42.1.1 ○	T42.1.2 ●	T42.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	29.8%	29.3%	28.9%
	DRY DENSITY pcf	γ_d	94	95	96
	SAMPLE DIAMETER in.	D_o	1.40	1.40	1.40
	SAMPLE HEIGHT in	H_o	3.43	3.40	3.42
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	7200	7200	8784
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_3$	590	1152	2304
	VOLUMETRIC STRAIN	ϵ_{vol}	0.2%	1.6%	1.4%
	PORE PRESSURE RESPONSE		98%	99%	98%
FINAL CONDITIONS	WATER CONTENT	w_f	32.3%	30.9%	29.6%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT/MINUTE			.023	.024	.023

BORING NO. 60
SAMPLE NO. 2
DEPTH 8.0 TO 10.0

SOIL DESCRIPTION SILTY CLAY (CH)

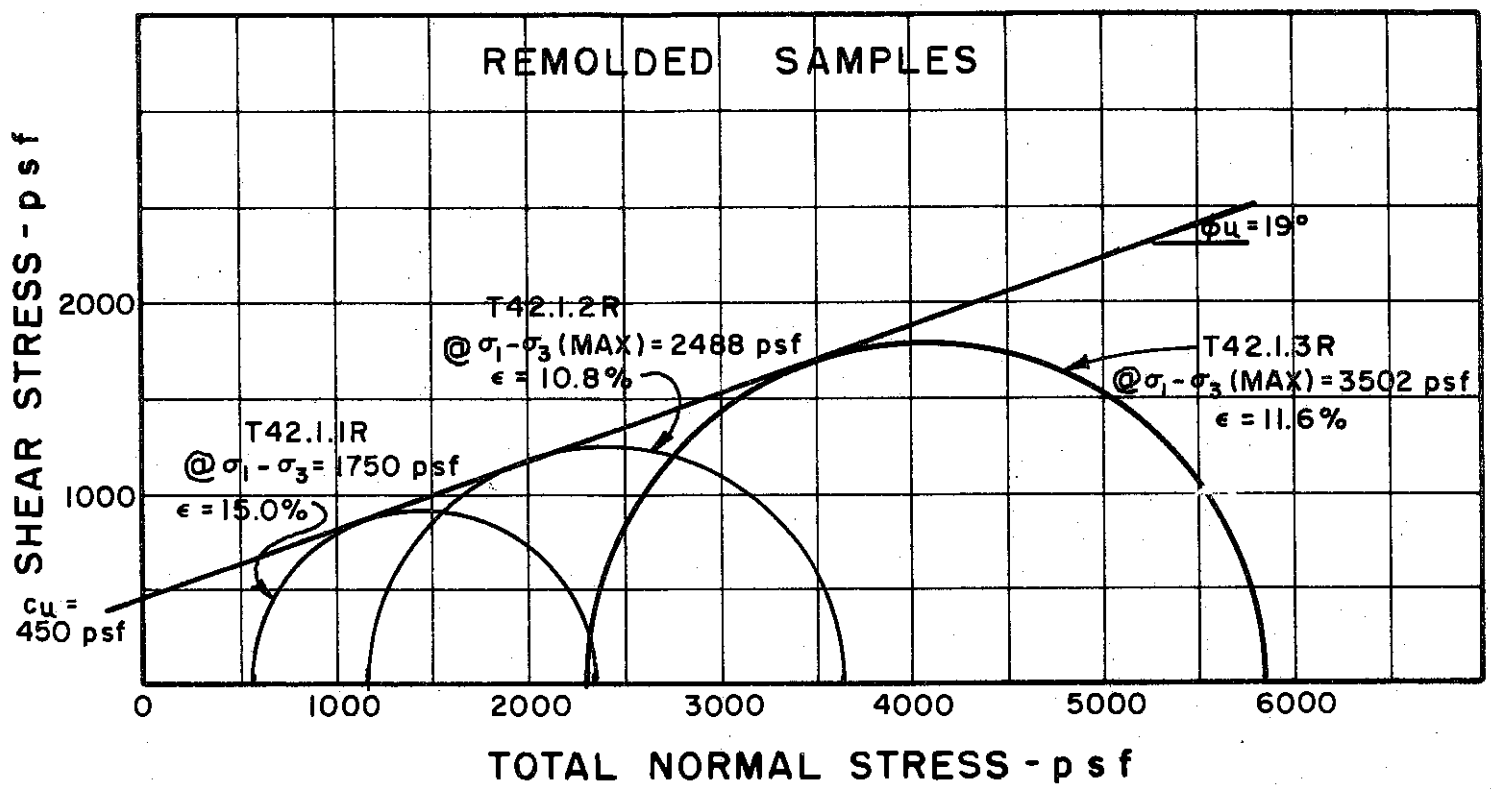
LIQUID LIMIT 53 PLASTIC LIMIT 26

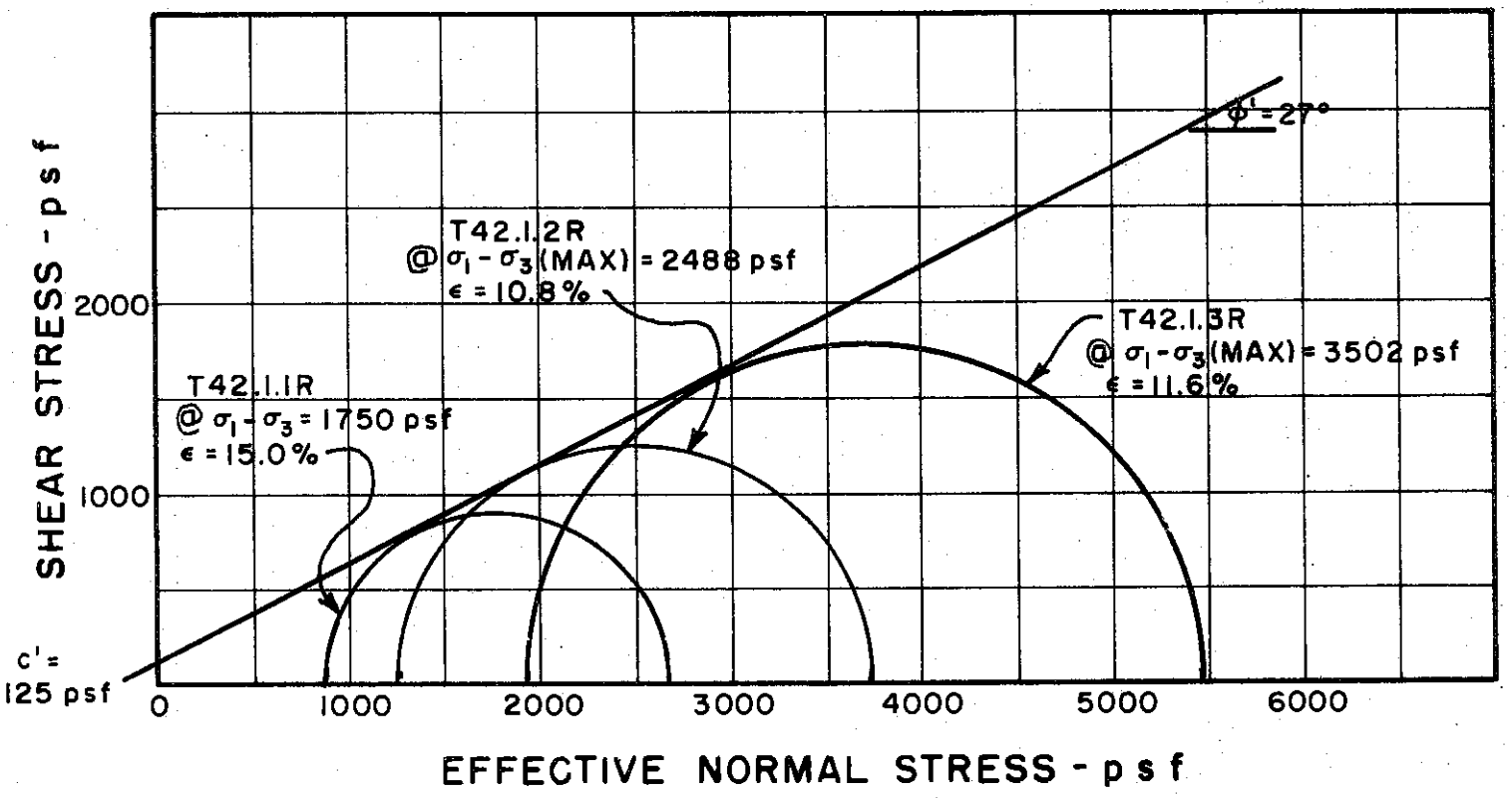
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-420

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 60

SAMPLE NO. 2

DEPTH 8.0 TO 10.0

REMARKS ENVELOPE IS INTERPRETIVE BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

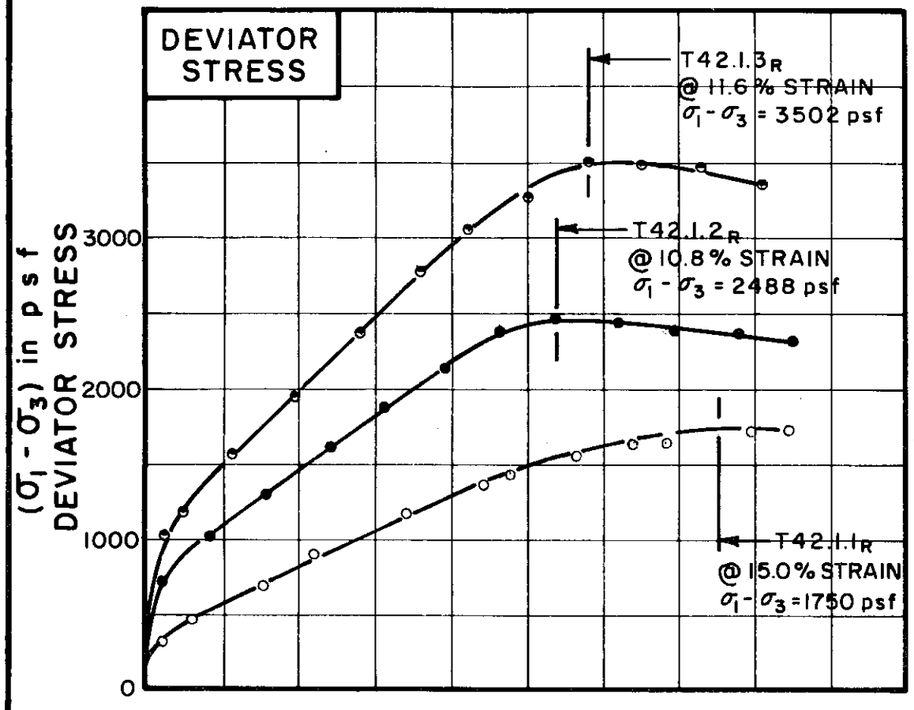
MOHR STRENGTH ENVELOPE

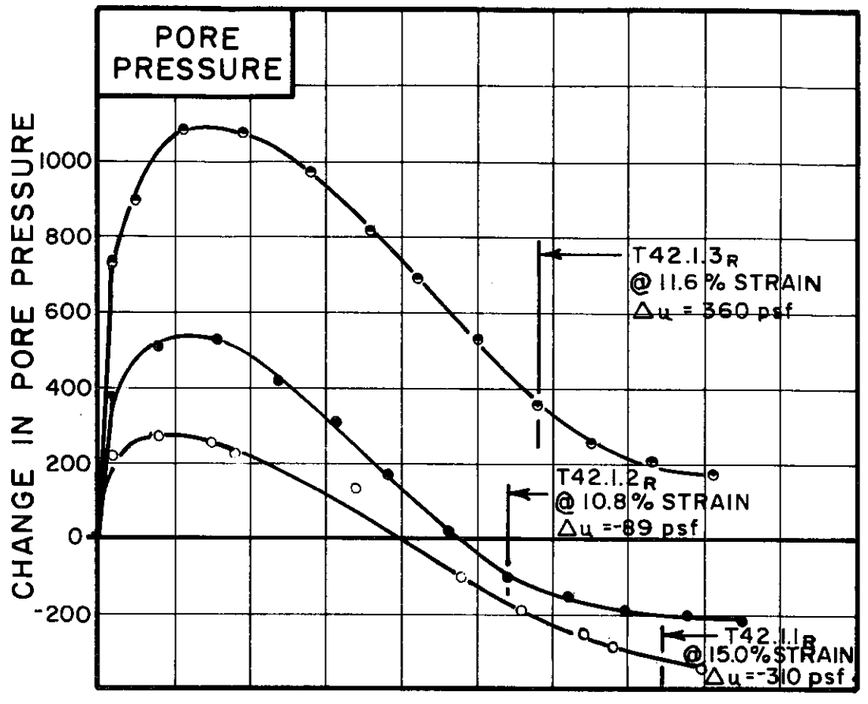
TRIAXIAL COMPRESSION TESTS

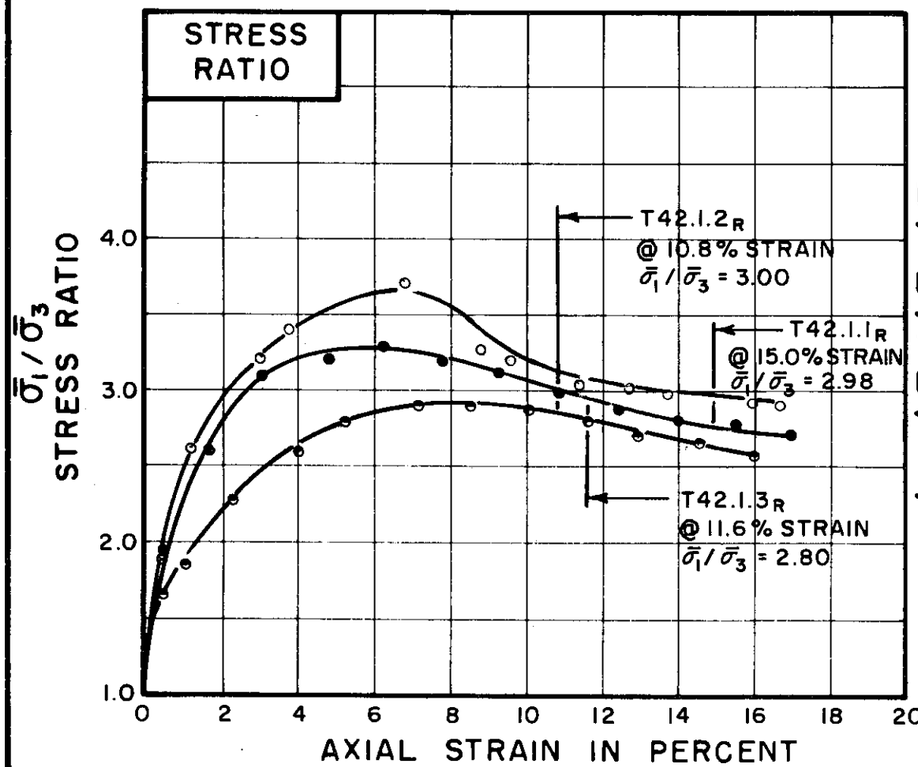
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

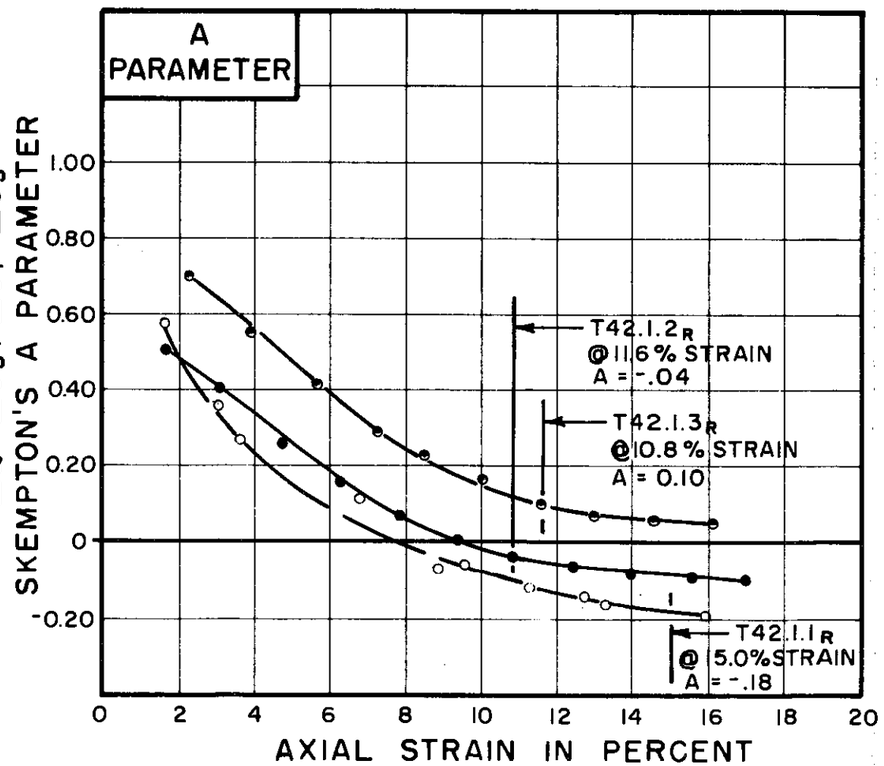
FILE 1255

C-421









TEST NO. / SYMBOL		T42.1.1R ○	T42.1.2R ●	T42.1.3R ⊙
INITIAL CONDITIONS	WATER CONTENT	w_o	29.3%	29.3%	29.3%
	DRY DENSITY pcf	γ_d	96	99	98
	SAMPLE DIAMETER in.	D_o	1.40	1.40	1.40
	SAMPLE HEIGHT in	H_o	3.30	3.25	3.29
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	8640	8640	8640
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	576	1152	2304
	VOLUMETRIC STRAIN	ϵ_{vol}	0.7%	2.4%	3.3%
	PORE PRESSURE RESPONSE		97%	97%	97%
FINAL CONDITIONS	WATER CONTENT	w_f	29.0%	26.1%	25.8%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT/MINUTE			.024	.025	.025

BORING NO. 60
SAMPLE NO. 2
DEPTH 8.0 TO 10.0

SOIL DESCRIPTION SILTY CLAY (CL)

LIQUID LIMIT 53 PLASTIC LIMIT 26

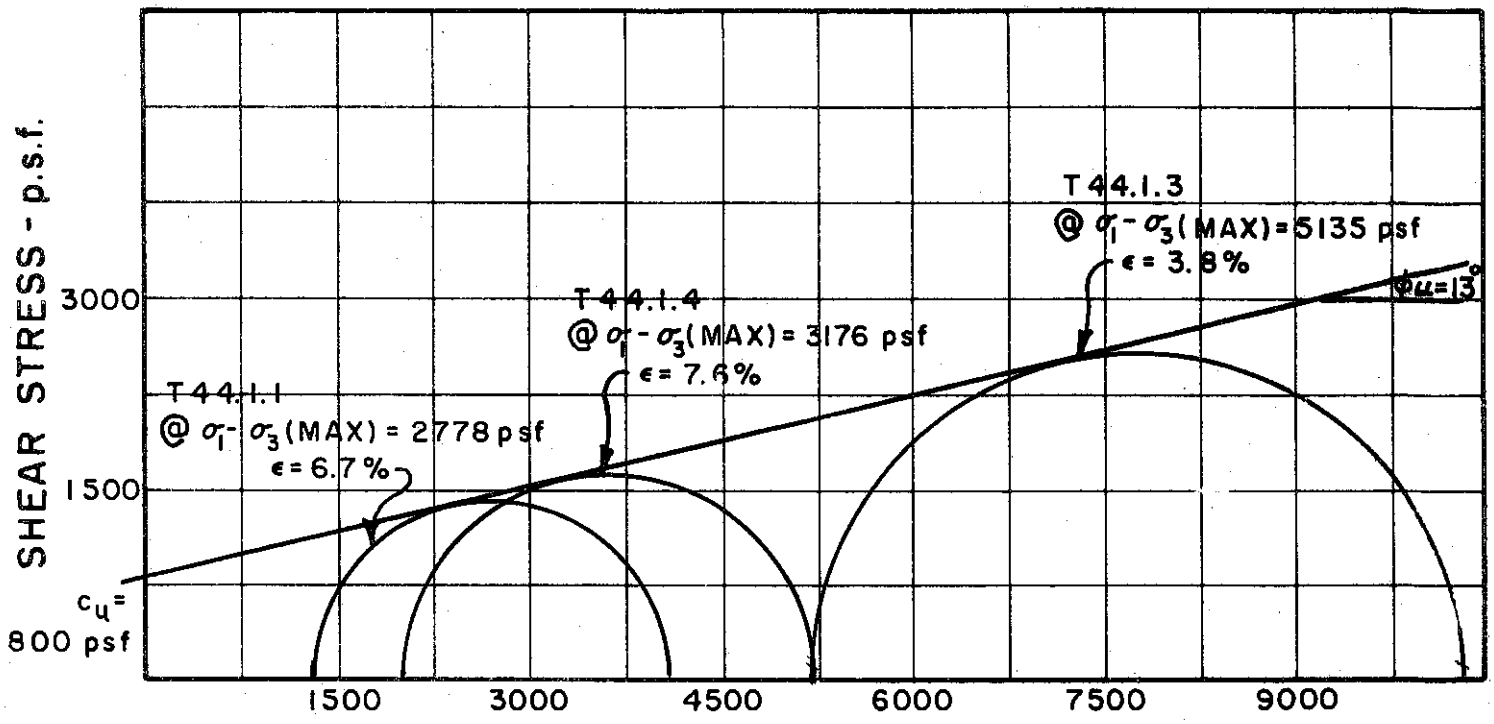
REMOLDED SAMPLES

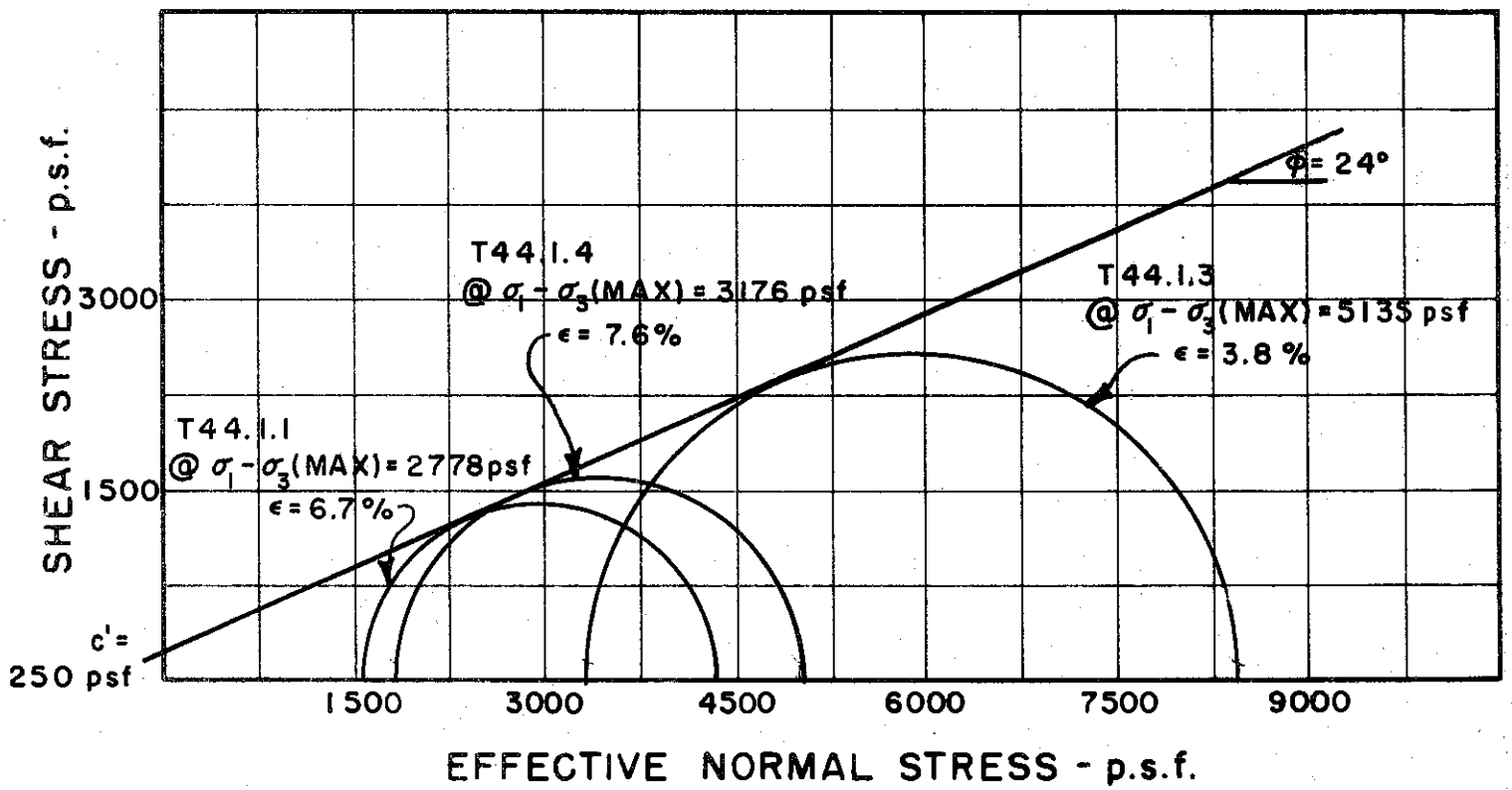
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-422

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 60

SAMPLE NO. 4

DEPTH 21.0 TO 23.0

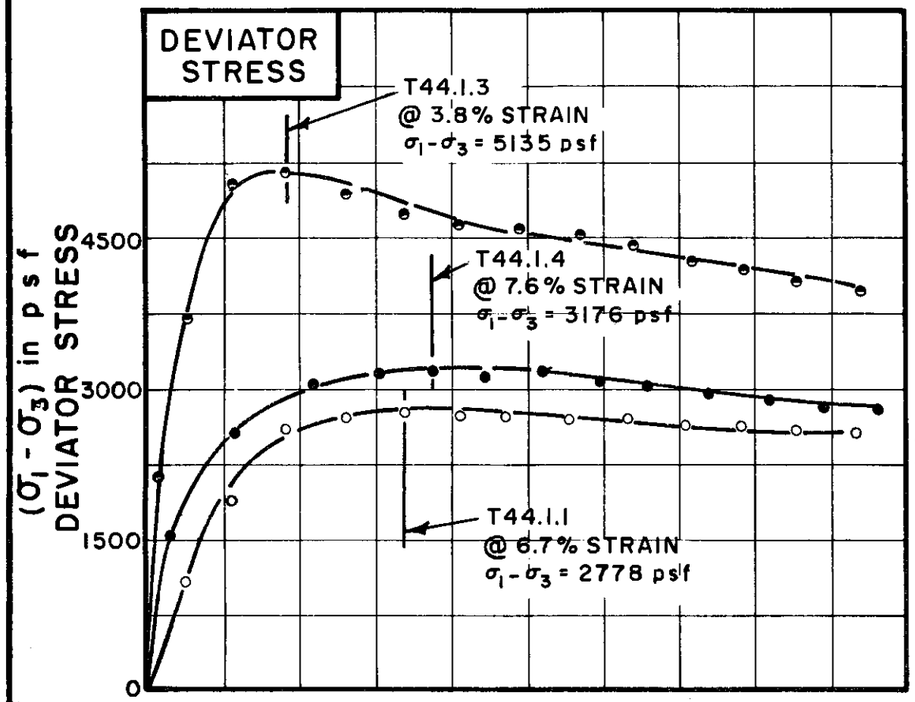
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

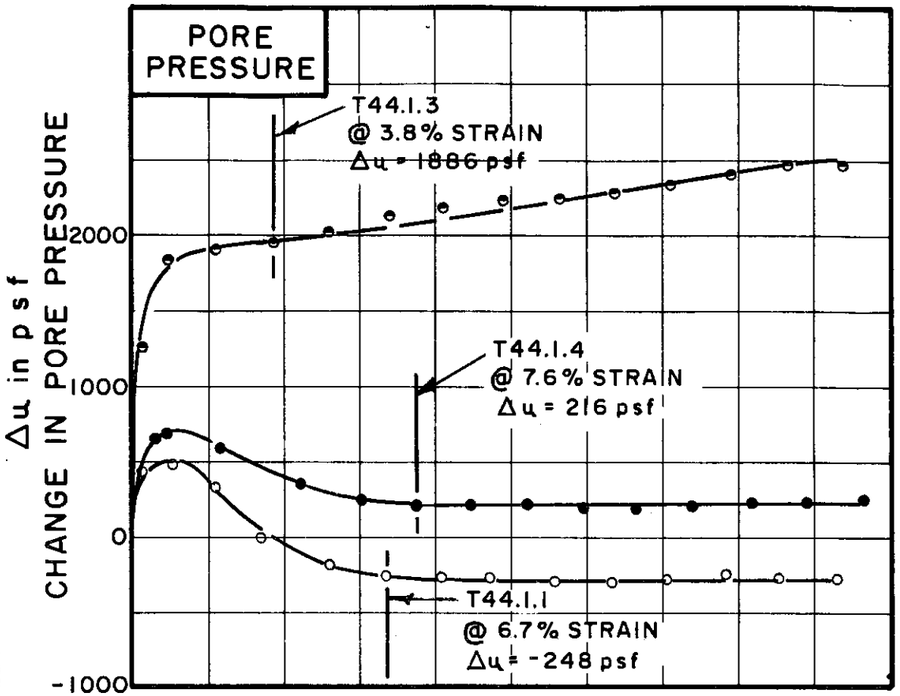
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

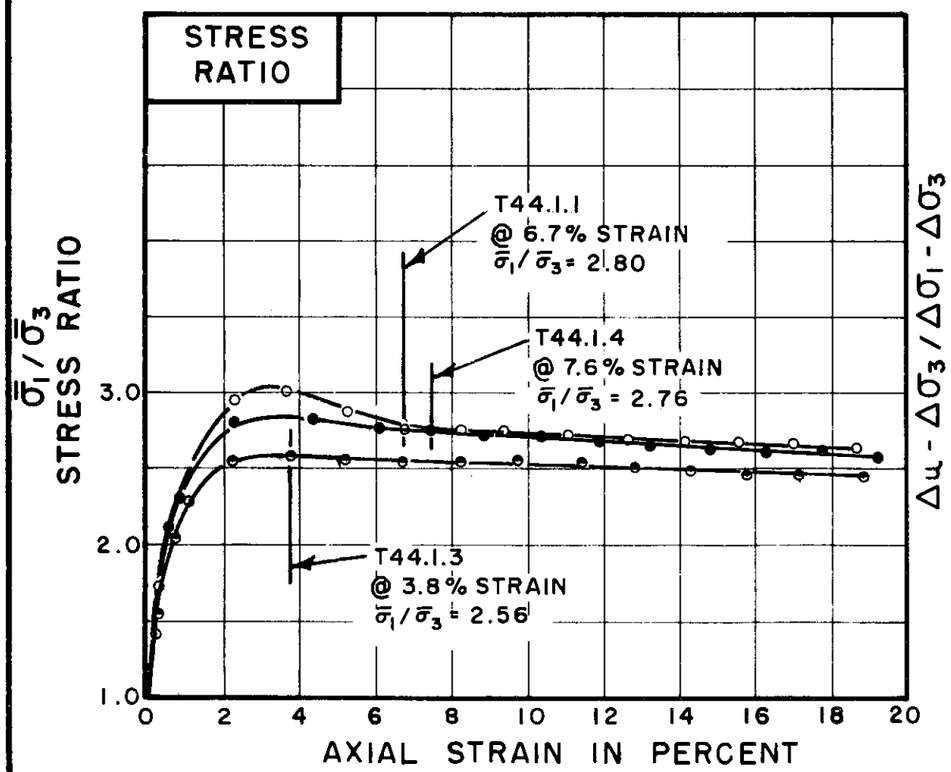
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

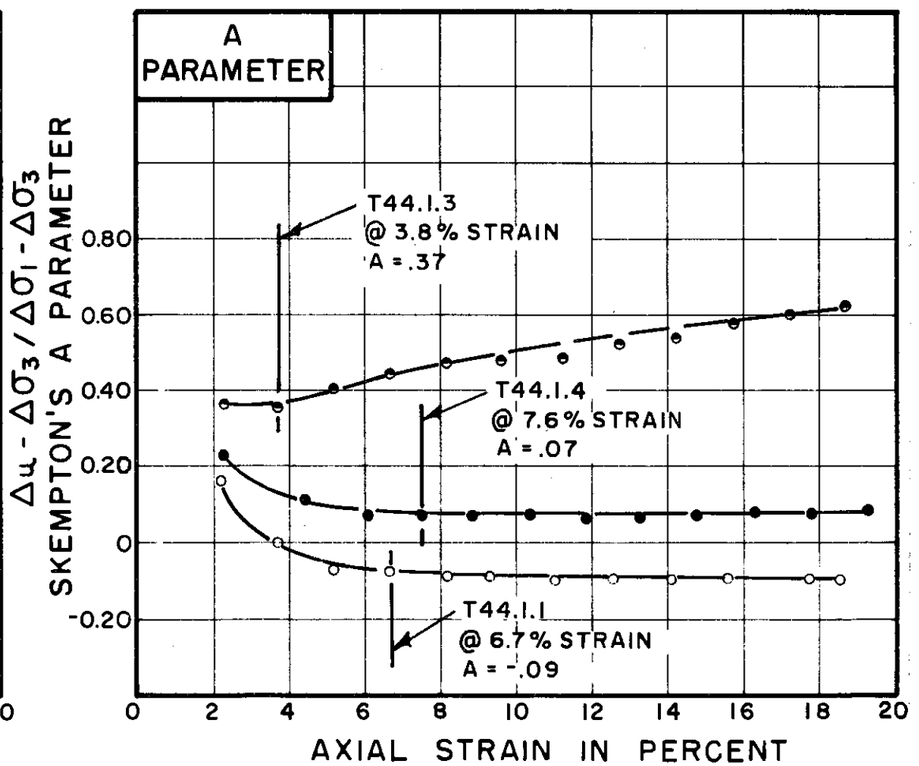
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255

C-423









TEST NO. / SYMBOL		T44.1.1 ○	T44.1.4 ●	T44.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	30.4%	30.6%	31.0%
	DRY DENSITY pcf	γ_d	94	95	94
	SAMPLE DIAMETER in.	D_o	1.43	1.42	1.43
	SAMPLE HEIGHT in	H_o	3.37	3.40	3.36
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p s f	u_o	10080	8640	10080
	INITIAL EFFECTIVE STRESS p s f	$\bar{\sigma}_1$ = $\bar{\sigma}_3$	12 96	20 16	5184
	VOLUMETRIC STRAIN	ϵ_{vol}	1.5%	3.6%	3.8%
	PORE PRESSURE RESPONSE		98%	97%	96%
FINAL CONDITIONS	WATER CONTENT	w_f	31.2%	30.1%	29.5%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.024	.024	.024

BORING NO. 60
SAMPLE NO. 4
DEPTH 21.0 TO 23.0

SOIL DESCRIPTION SILTY CLAY, (CL)

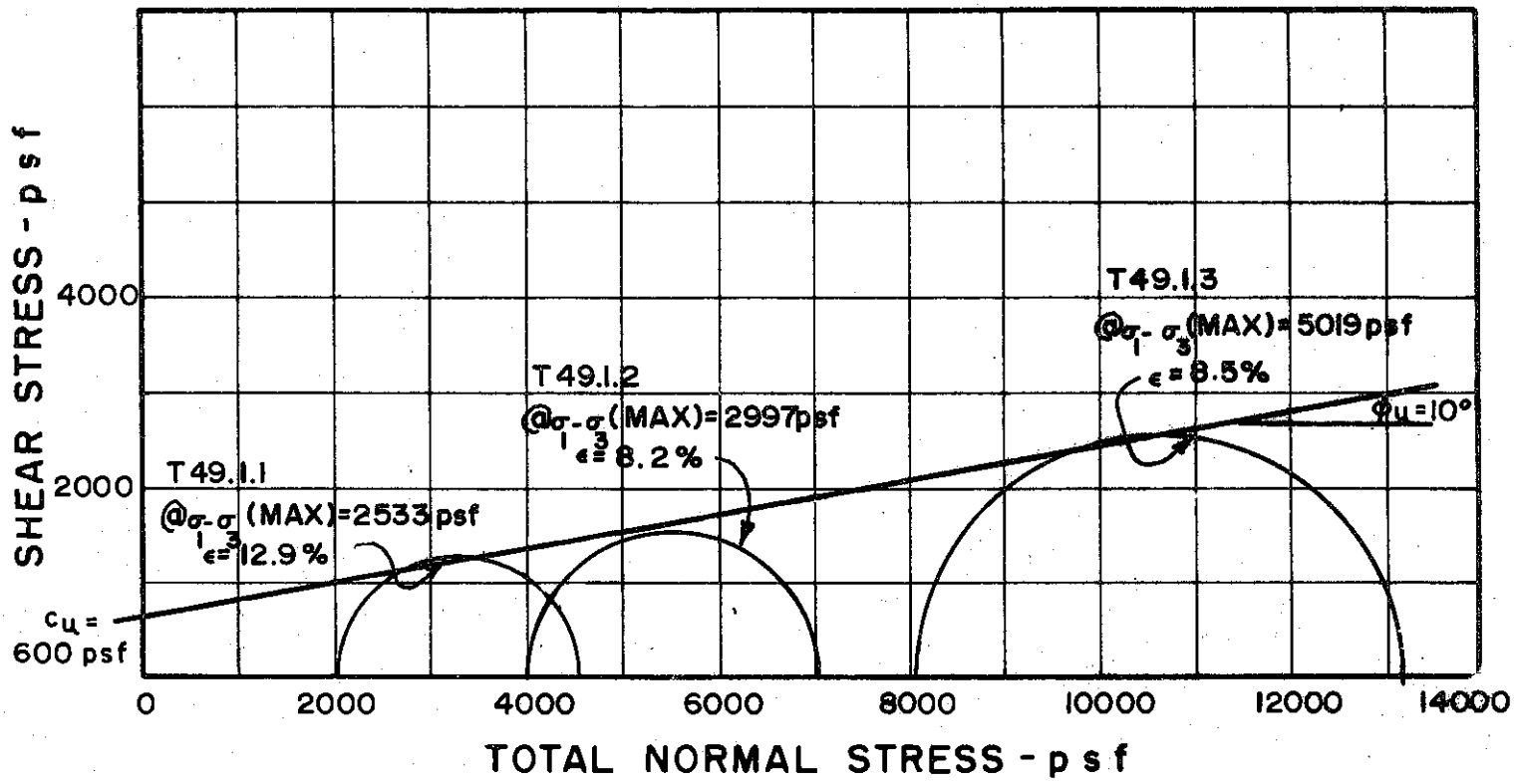
LIQUID LIMIT 43 PLASTIC LIMIT 17

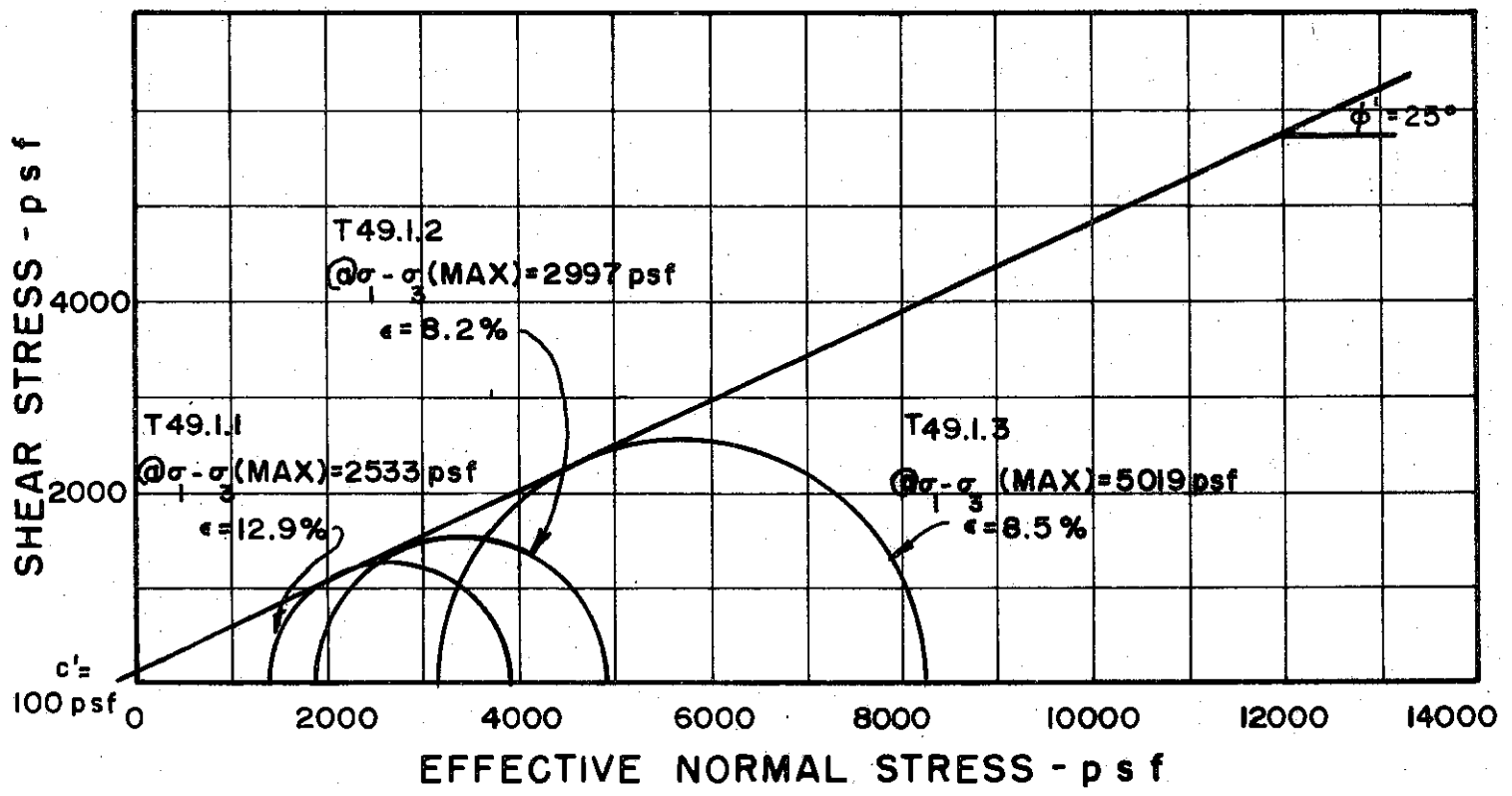
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-424

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 60

SAMPLE NO. 9

DEPTH 45.0 TO 47.0

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

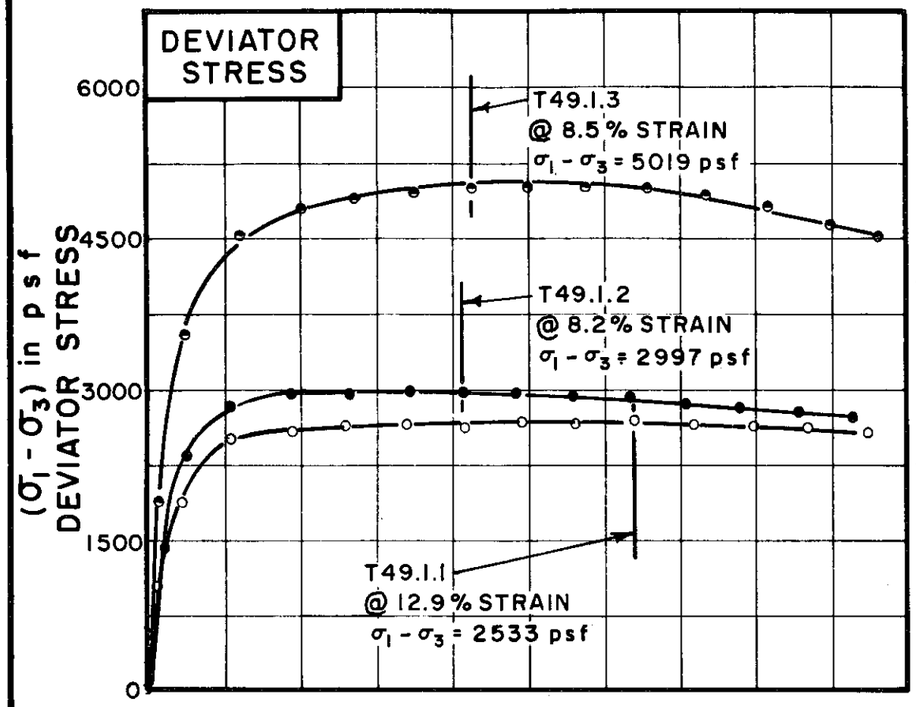
MOHR STRENGTH ENVELOPE

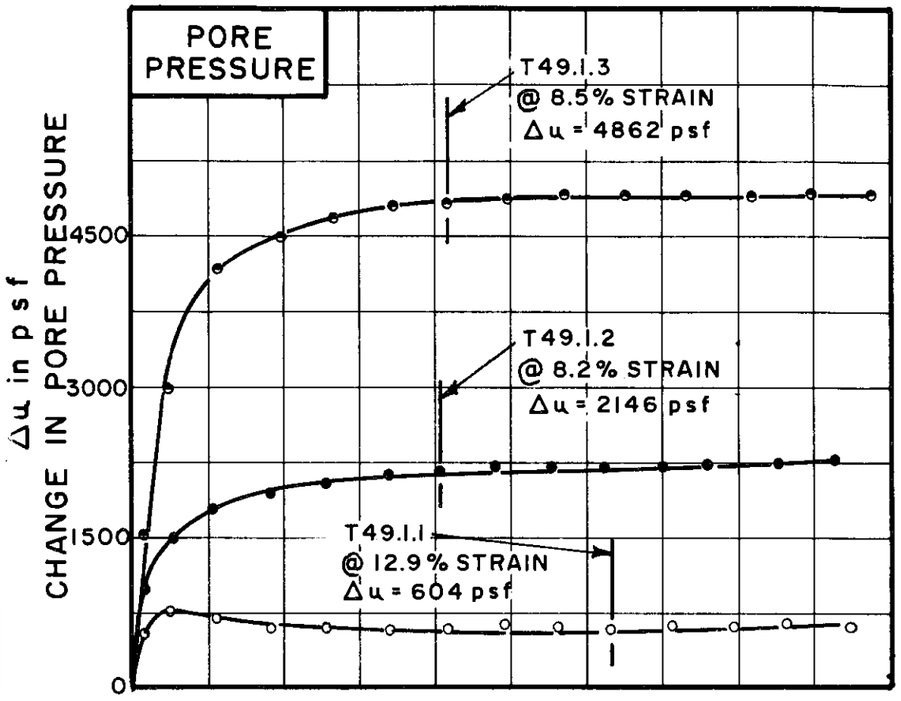
TRIAXIAL COMPRESSION TESTS

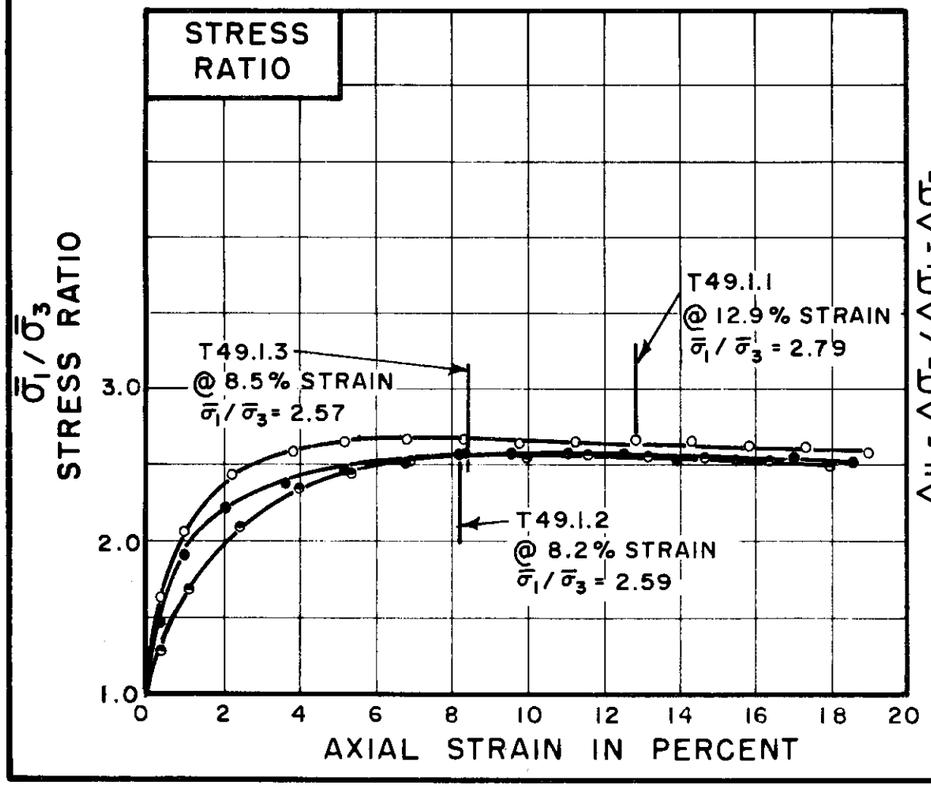
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

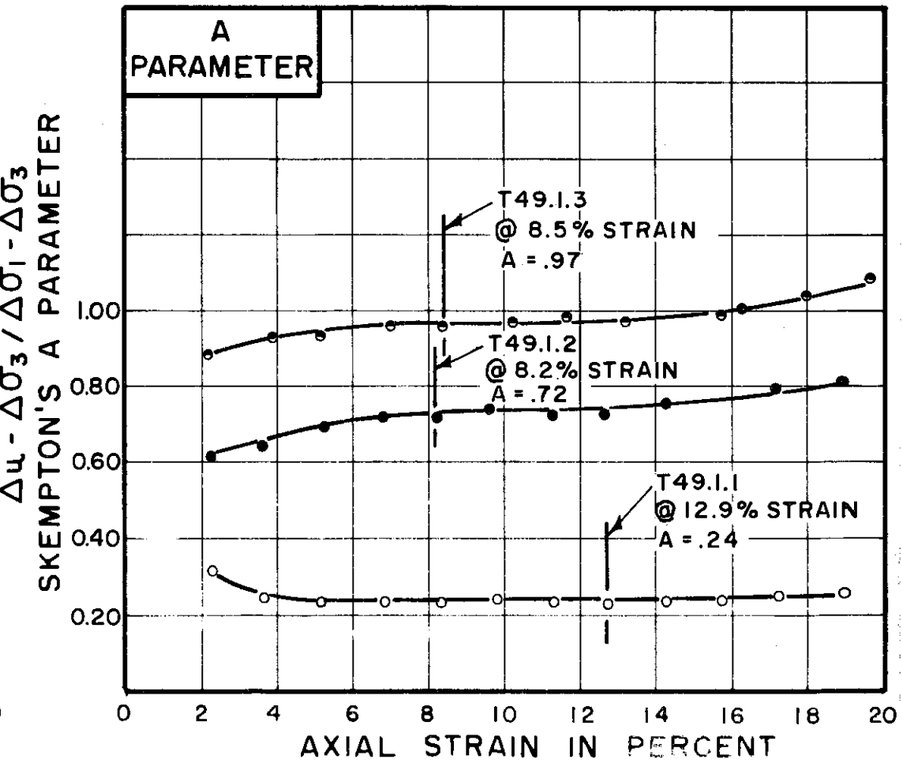
FILE 1255

C-425









TEST NO. / SYMBOL		T49.1.1 ○	T49.1.2 ●	T49.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	26.6%	27.0%	26.0%
	DRY DENSITY pcf	γ_d	99	98	102
	SAMPLE DIAMETER in.	D_o	1.42	1.40	1.39
	SAMPLE HEIGHT in	H_o	3.32	3.40	3.26
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	10080	10080	11520
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	2016	4032	8064
	VOLUMETRIC STRAIN	ϵ_{vol}	1.9 %	3.5%	5.7%
	PORE PRESSURE RESPONSE		97%	96%	91%
FINAL CONDITIONS	WATER CONTENT	w_f	26.0%	25.5%	22.6%
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.025

BORING NO. 60
SAMPLE NO. 9
DEPTH 45.0 TO 47.0

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

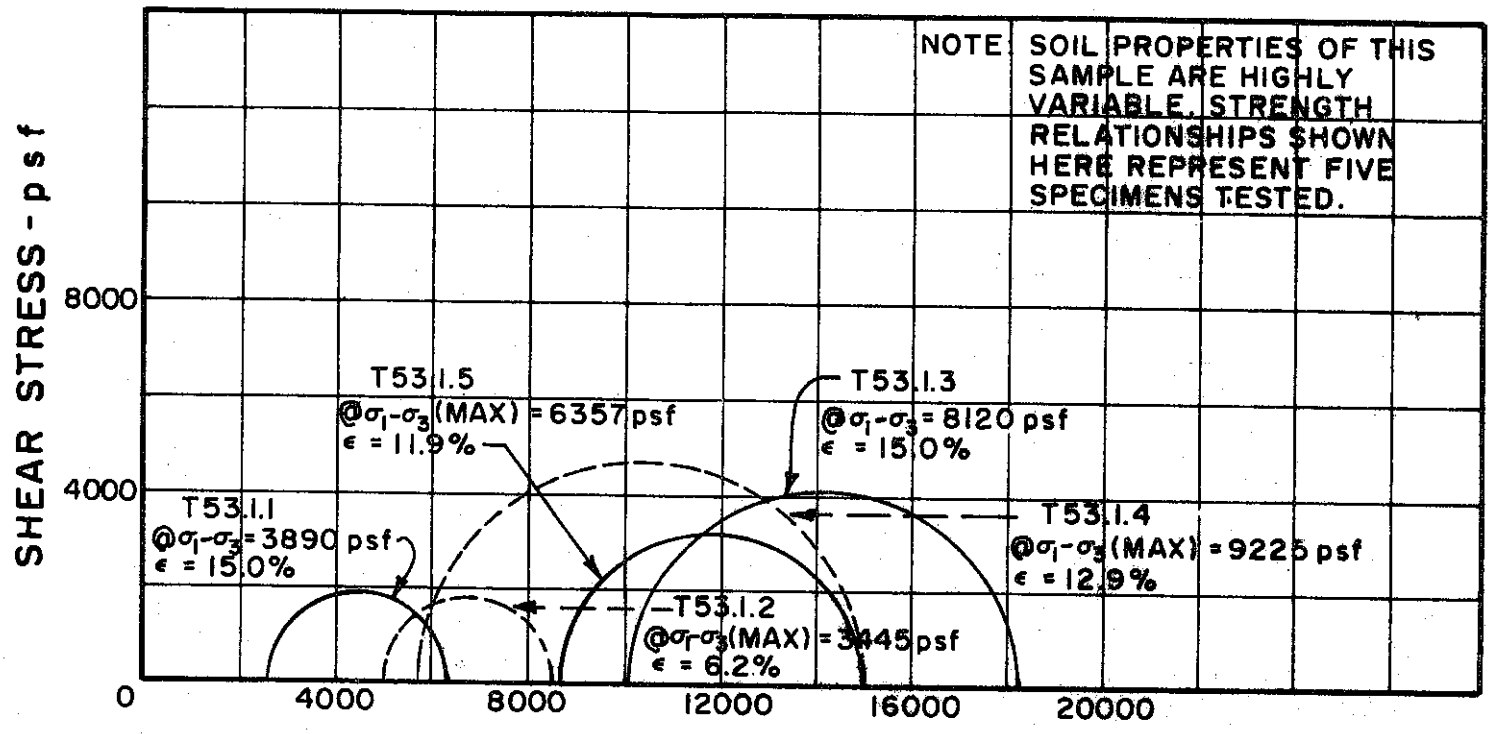
LIQUID LIMIT 38 PLASTIC LIMIT 16

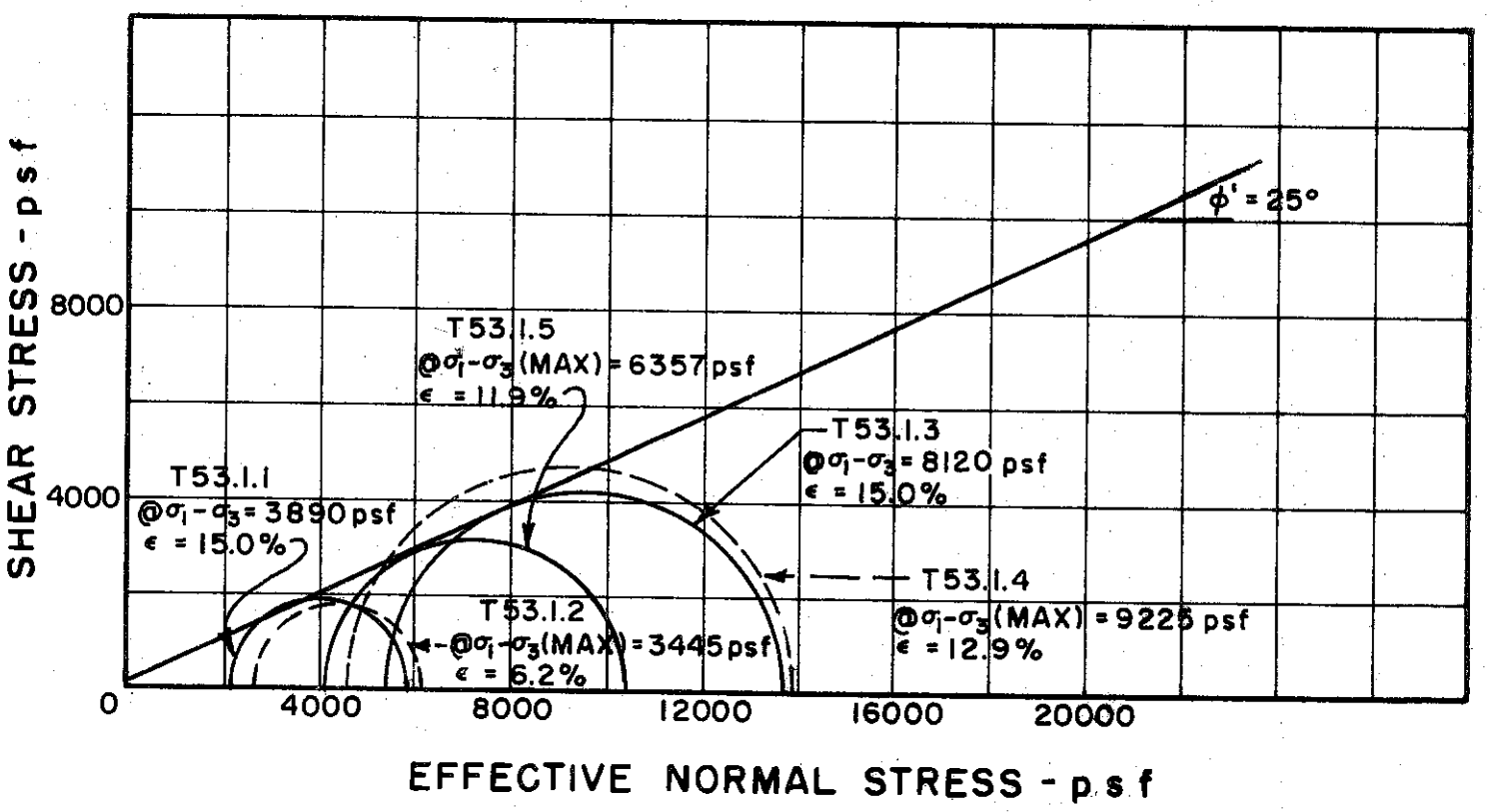
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-426

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 60

SAMPLE NO. 13

DEPTH 67.0' TO 69.0'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

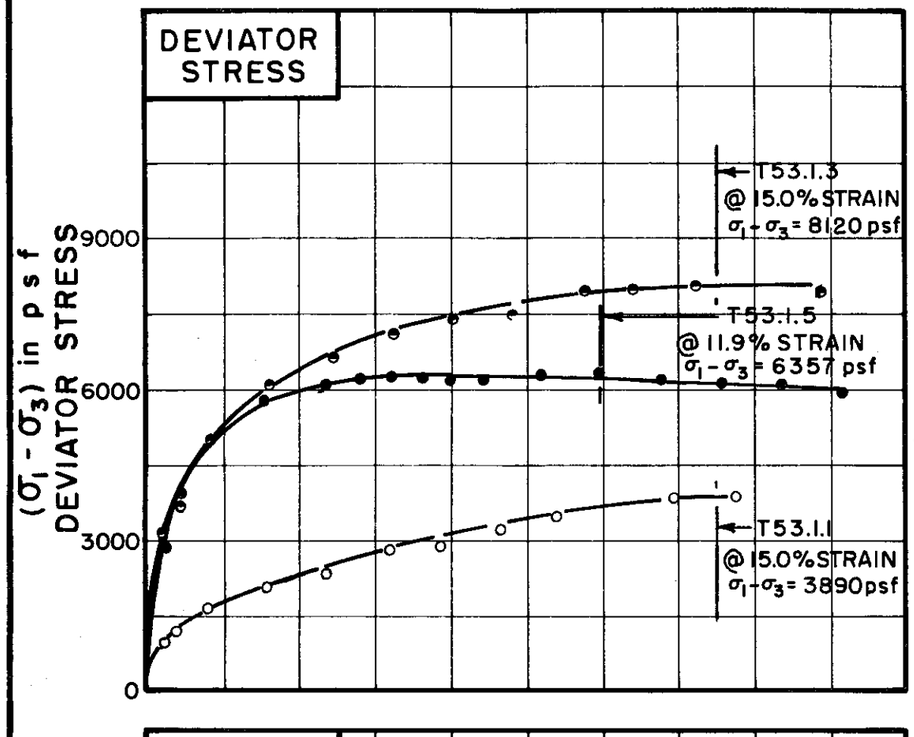
MOHR STRENGTH ENVELOPE

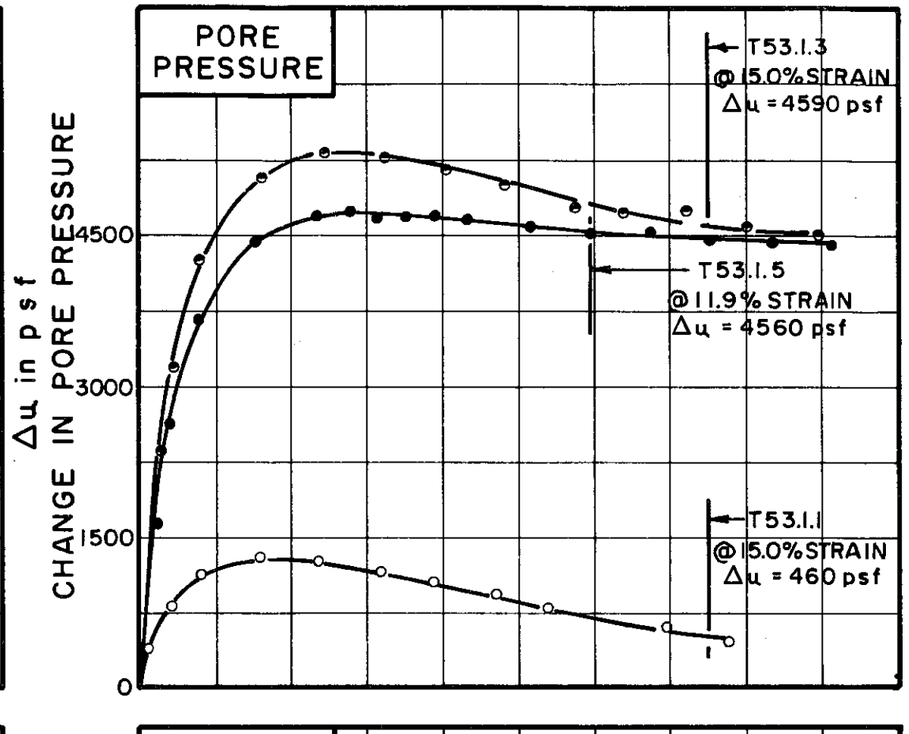
TRIAXIAL COMPRESSION TESTS

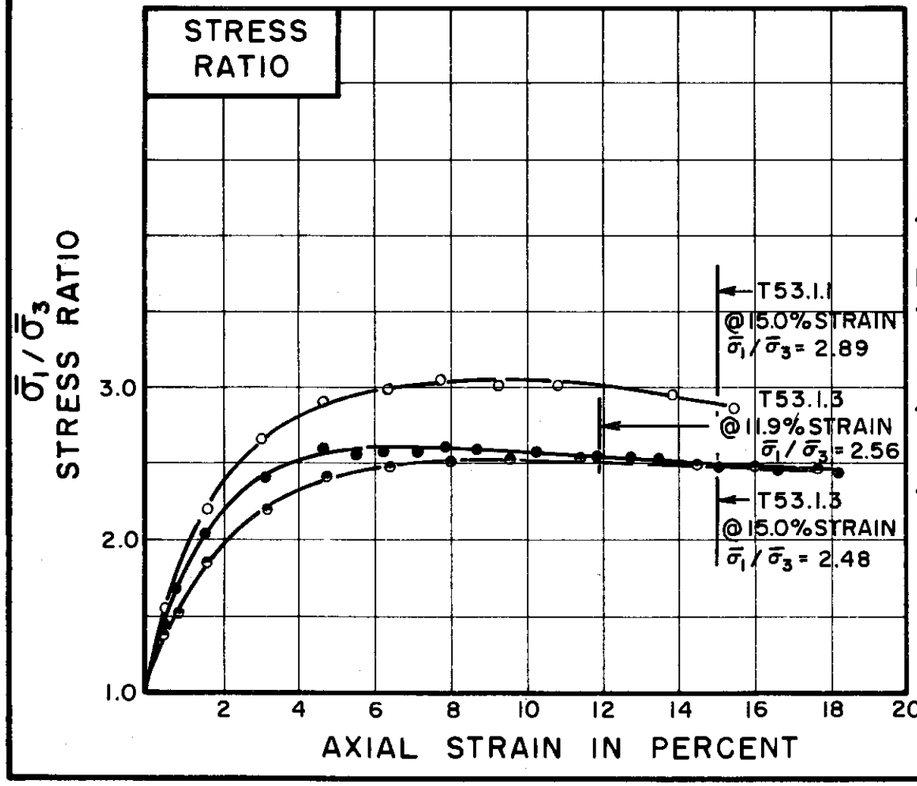
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

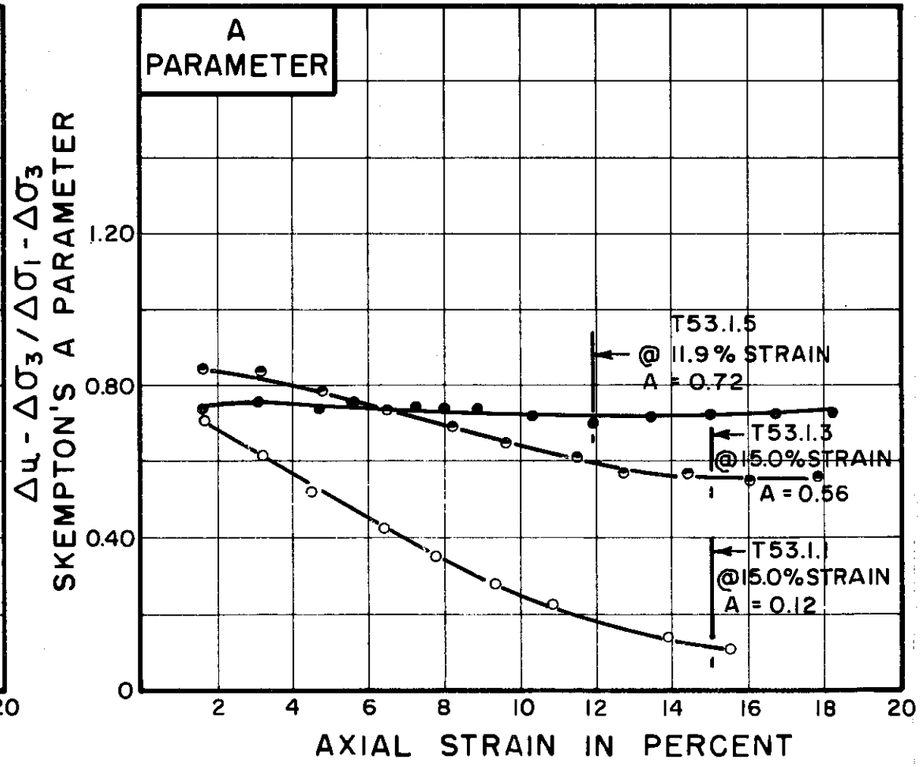
FILE 1255

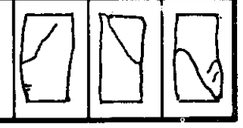
C-427









TEST NO.* / SYMBOL		T53.1.1 ○	T53.1.5 ●	T53.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	23.6%	21.0%	19.7%
	DRY DENSITY pcf	γ_d	103	104	104
	SAMPLE DIAMETER in.	D_o	1.42	1.42	1.41
	SAMPLE HEIGHT in	H_o	3.25	3.19	3.20
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	u_o	7200	8640	7200
	INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$	2520	8640	10080
	VOLUMETRIC STRAIN	ϵ_{vol}	3.0%	5.0%	6.1%
	PORE PRESSURE RESPONSE		97%	100%	100%
FINAL CONDITIONS	WATER CONTENT	w_f	21.7%	18.9%	17.6%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.025	.025	.025

BORING NO. 60
SAMPLE NO. 13
DEPTH 67.0' TO 69.0'

SOIL DESCRIPTION SILTY CLAY, GRAVELLY (CL-ML)

LIQUID LIMIT ____ PLASTIC LIMIT ____

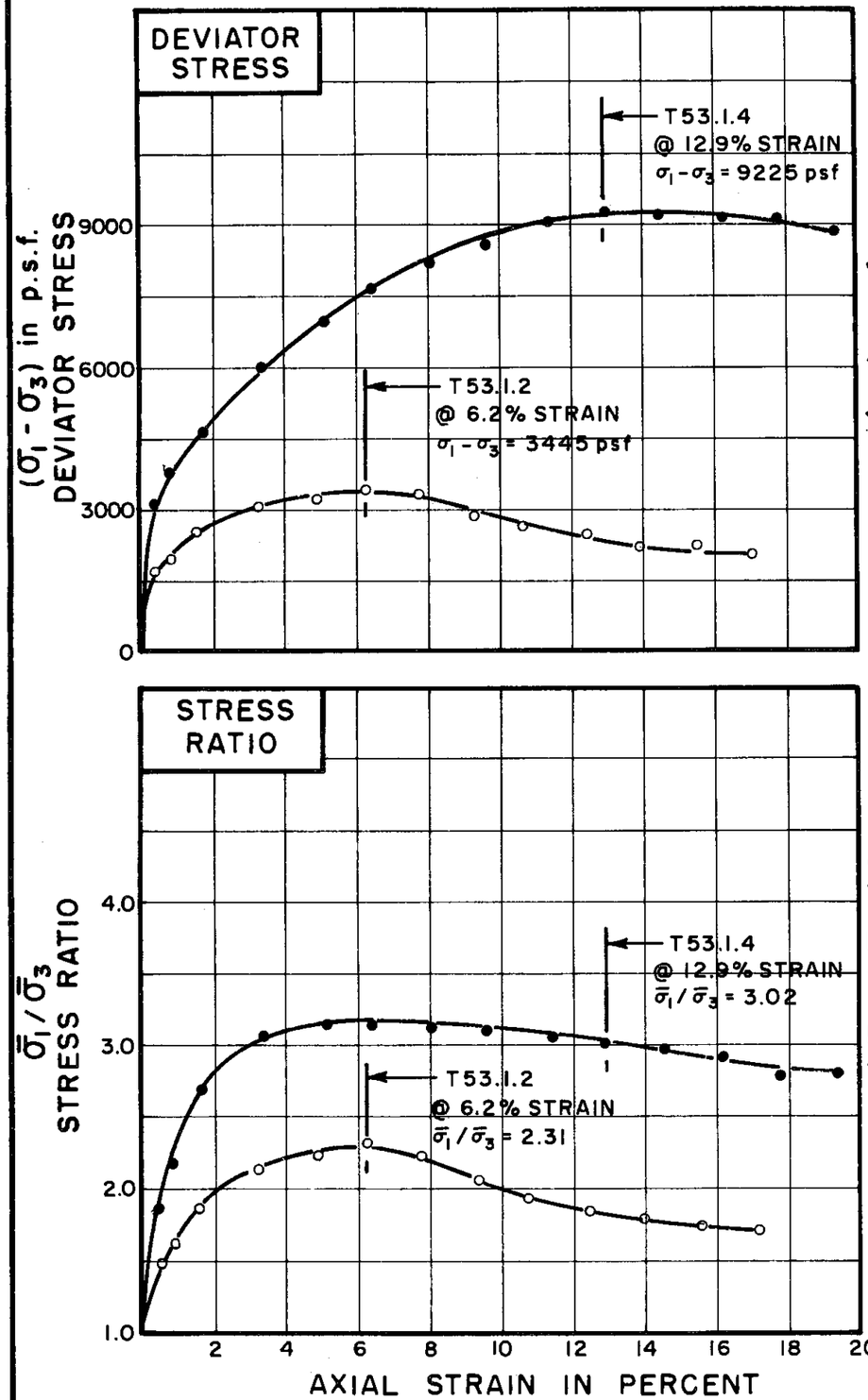
* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE - SEE DATA FOR TESTS T53.1.2 AND T53.1.4

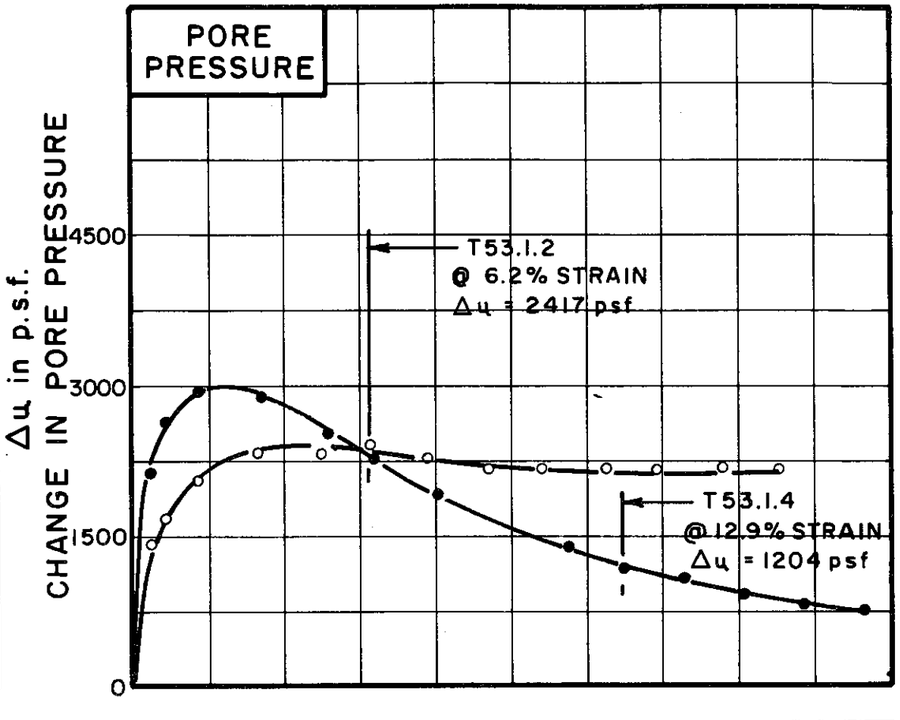
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

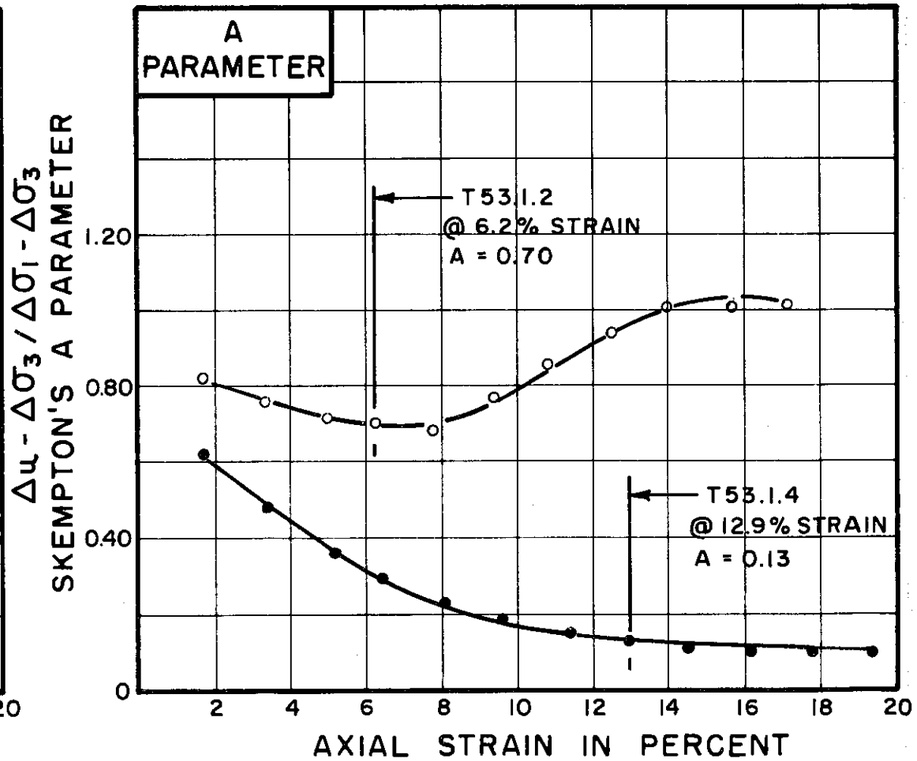
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-428

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING







TEST NO.* / SYMBOL		T53.1.2 ○		T53.1.4 ●
INITIAL CONDITIONS	WATER CONTENT	w_o 31.9%	%	15.5%
	DRY DENSITY pcf	γ_d 91		114
	SAMPLE DIAMETER in.	D_o 1.41		1.40
	SAMPLE HEIGHT in	H_o 3.28		3.15
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	u_o 8640		11,520
	INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$ 5040		5760
	VOLUMETRIC STRAIN	ϵ_{vol} 5.3%	%	2.4%
	PORE PRESSURE RESPONSE	97%		93%
FINAL CONDITIONS	WATER CONTENT	w_f 28.4%	%	14.9%
	SKETCH OF SAMPLE AT END OF TEST			
RATE OF STRAIN PERCENT/MINUTE		.025		.026

BORING NO. 60
SAMPLE NO. 13
DEPTH 67.0' TO 69.0'
SOIL DESCRIPTION T53.1.2-CLAYEY GRAVEL(GC)
T53.1.4-SILTY CLAY(CL)

LIQUID LIMIT (40) PLASTIC LIMIT (19)

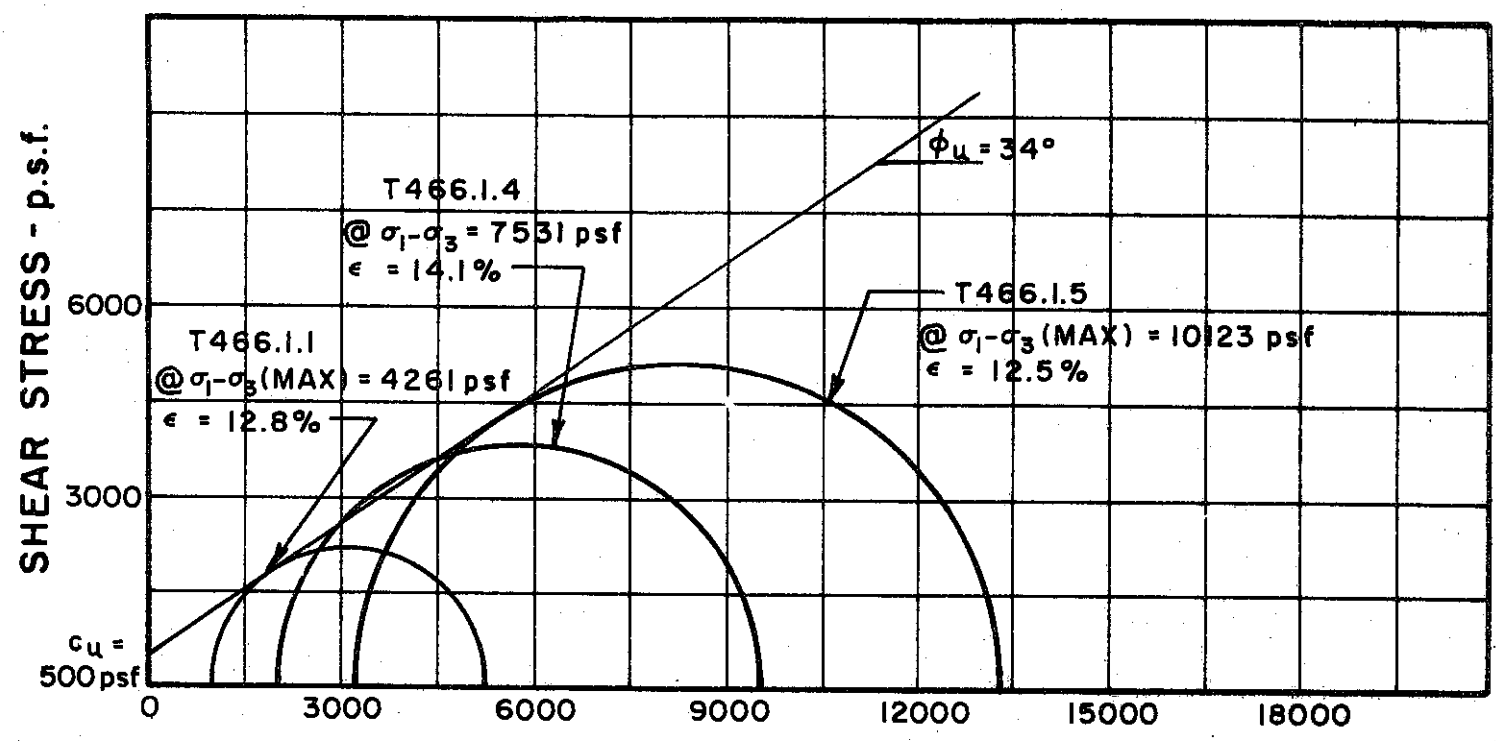
* NOTE: SOIL PROPERTIES OF THIS SAMPLE ARE HIGHLY VARIABLE - SEE DATA FOR T53.1.1, T53.1.3 AND T53.1.5

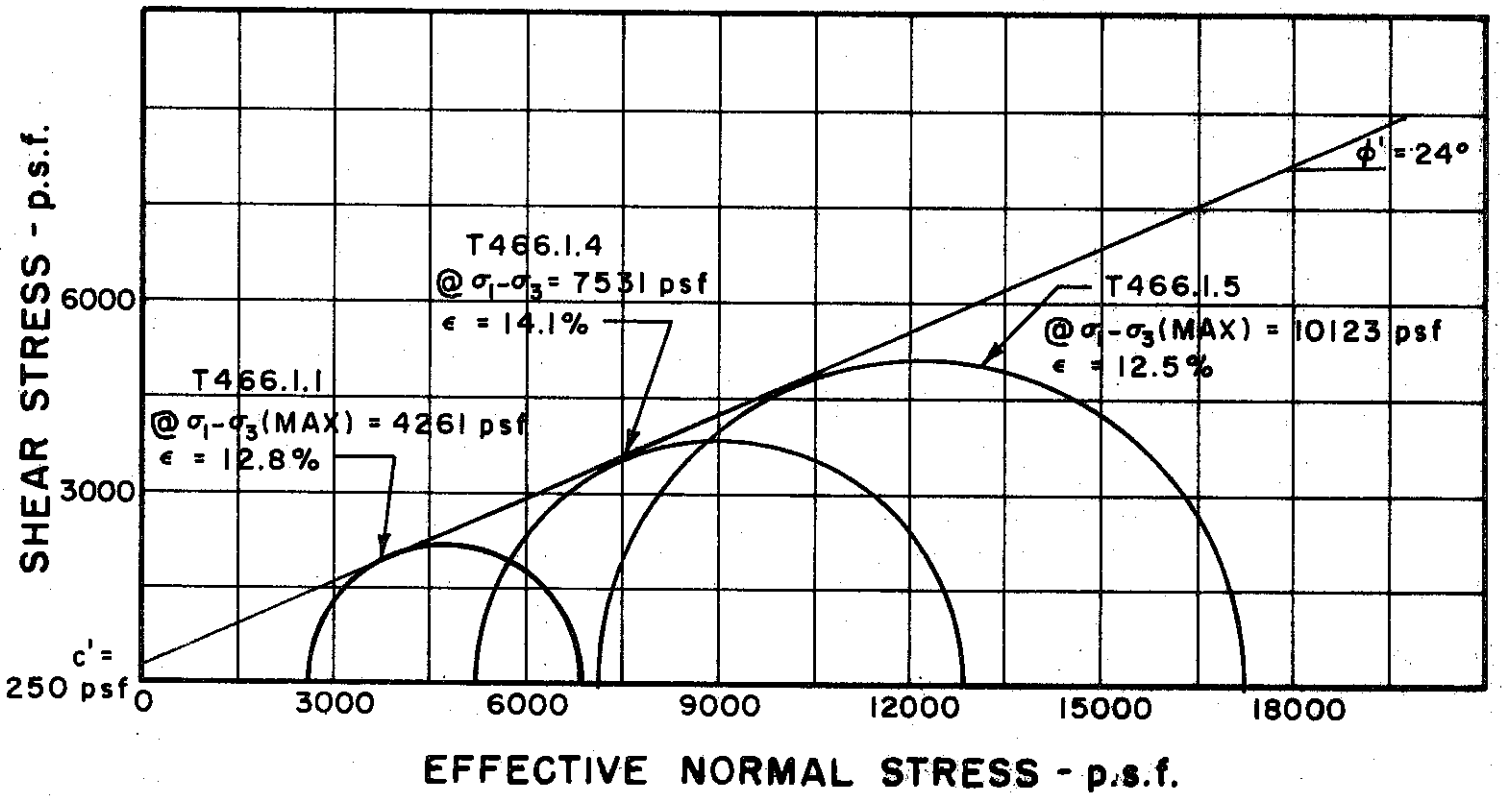
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-429

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 101, 105, 127, 128, 180 & 183

SAMPLE NO. COMBINED SAMPLES

DEPTH 2.0' TO 10.0'

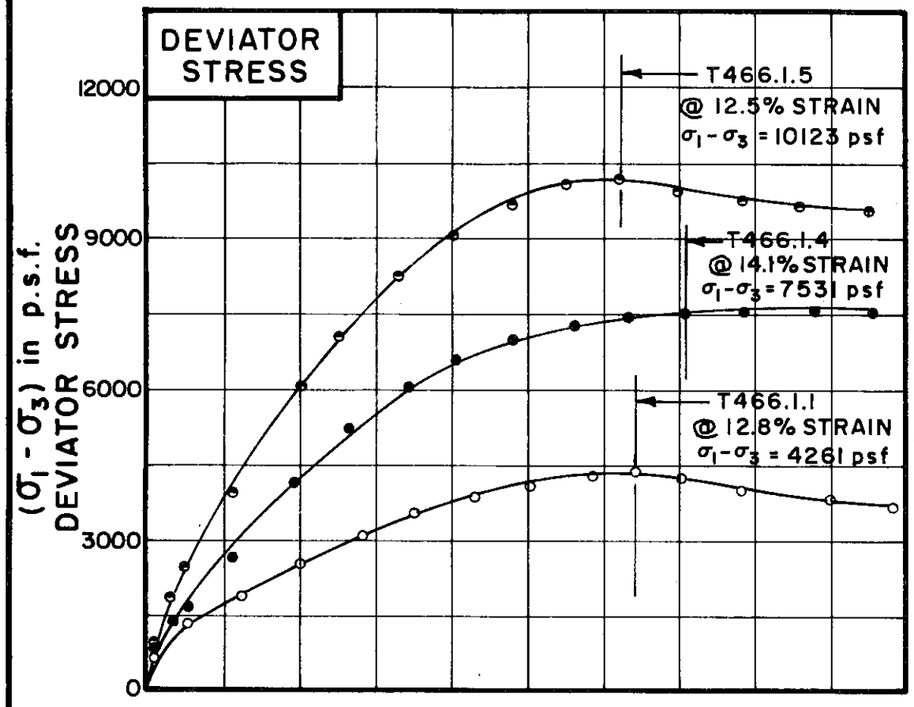
REMARKS ENVELOPE IS INTERPRETIVE BASED ON LIMITED DATA POINTS AVAILABLE

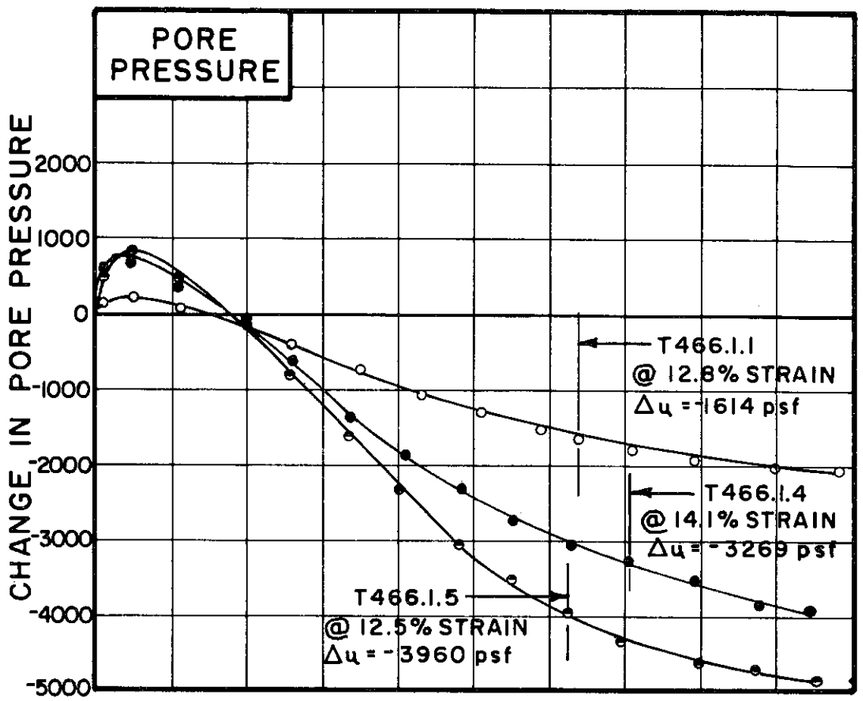
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

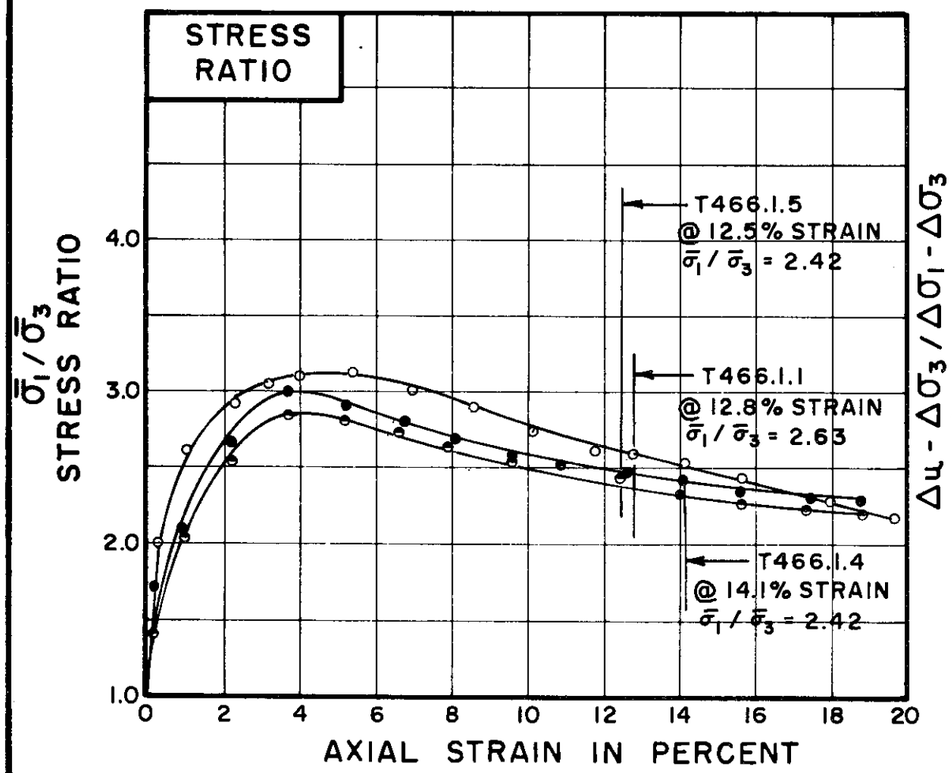
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

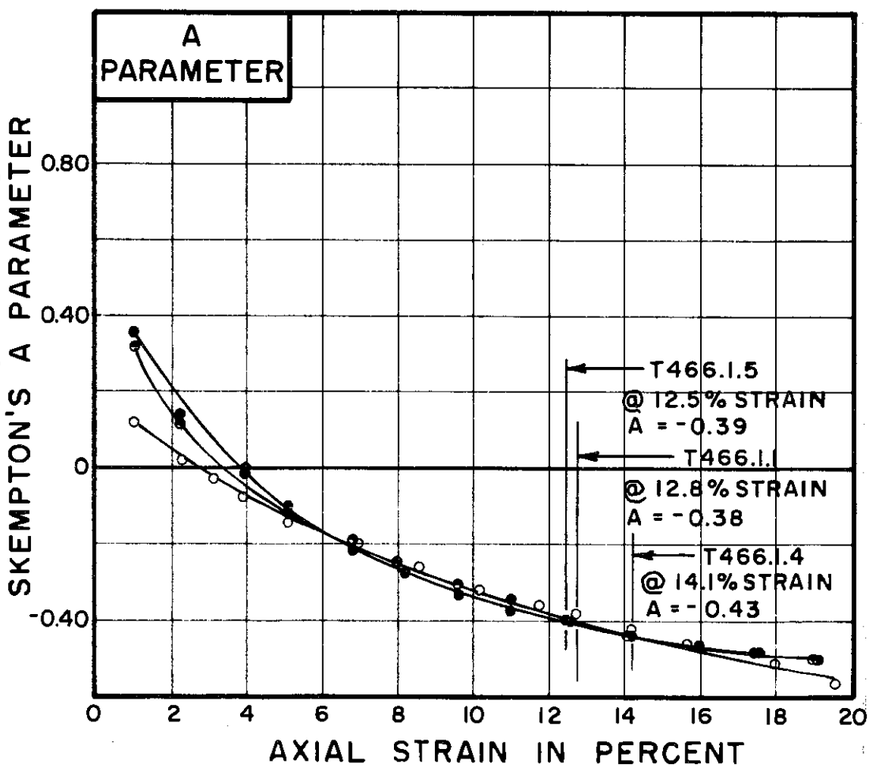
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

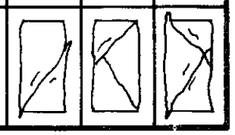
FILE 1255
C-430









TEST NO. / SYMBOL		T466.1.1 ○	T466.1.4 ●	T466.1.5 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	15.3%	15.5%	15.9%
	DRY DENSITY pcf	γ_d	113	114	114
	SAMPLE DIAMETER in.	D_o	1.38	1.39	1.40
	SAMPLE HEIGHT in	H_o	3.19	3.36	3.44
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	u_o	7200	7200	7200
	INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$	1008	2016	3168
	VOLUMETRIC STRAIN	ϵ_{vol}	— %	.14 %	.14%
	PORE PRESSURE RESPONSE		98%	99%	98%
FINAL CONDITIONS	WATER CONTENT	w_f	21.3%	19.1%	18.4%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT/MINUTE			.025	.024	.023

BORING NO. 101,105,127,128,180 & 183
SAMPLE NO. COMBINED SAMPLES
DEPTH 2.0' TO 10.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

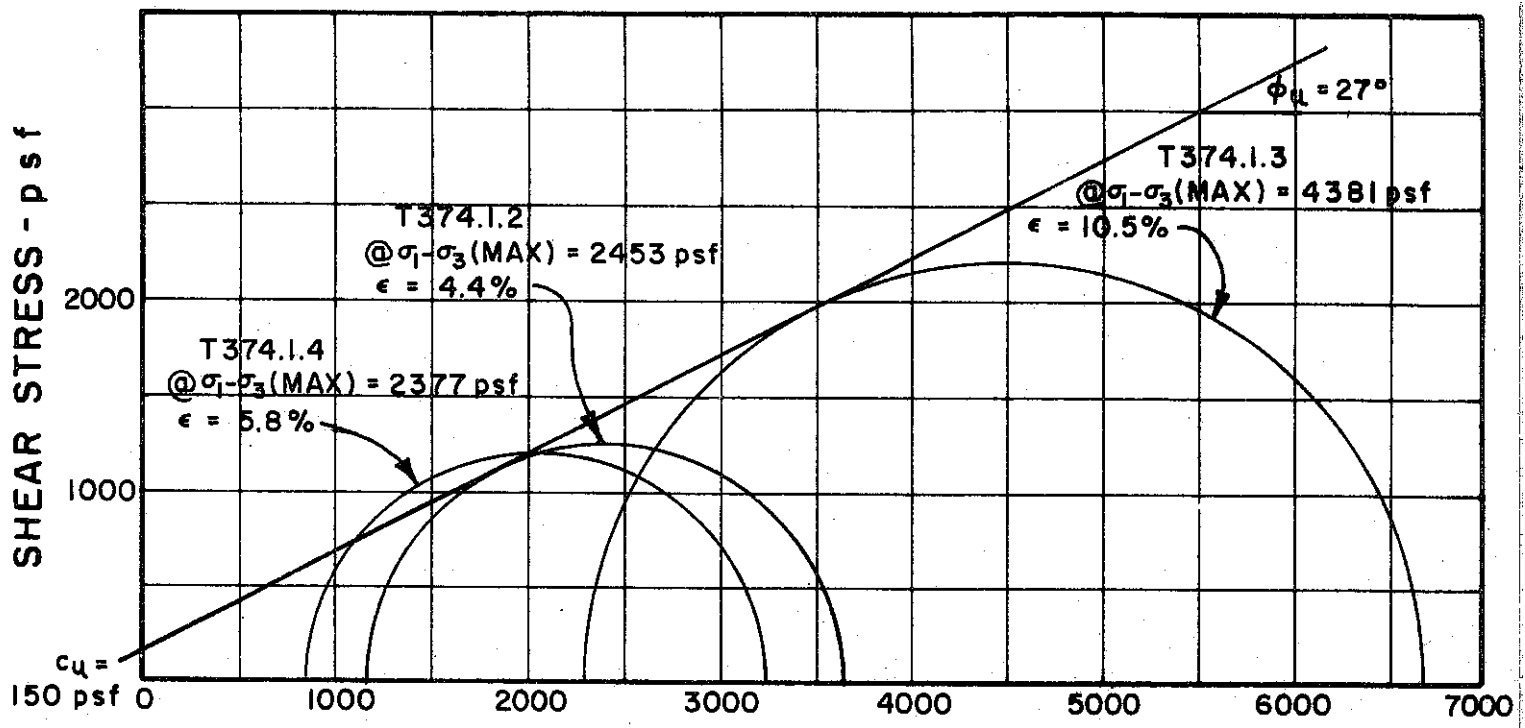
LIQUID LIMIT ____ PLASTIC LIMIT ____
SEE DATA FOR INDIVIDUAL SAMPLES

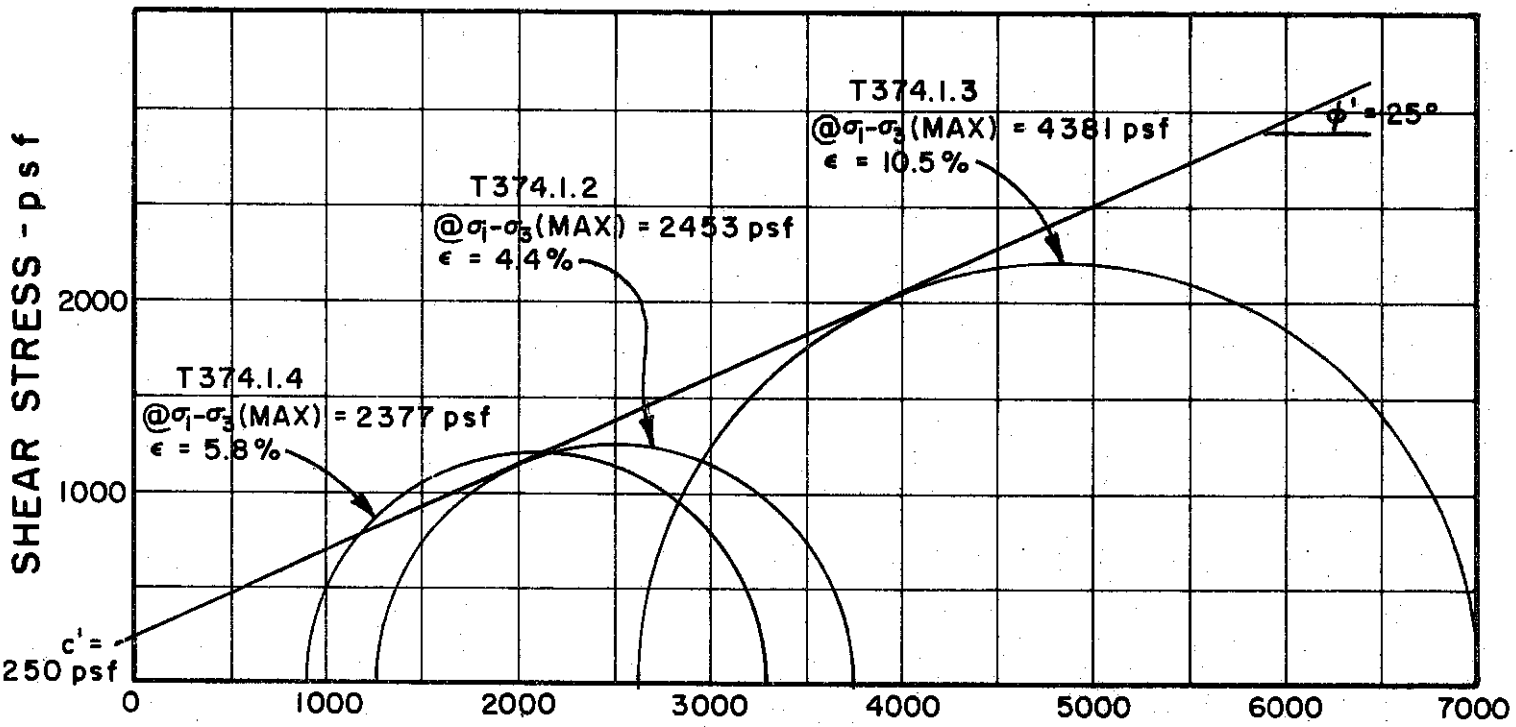
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-431

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 105

SAMPLE NO. 2

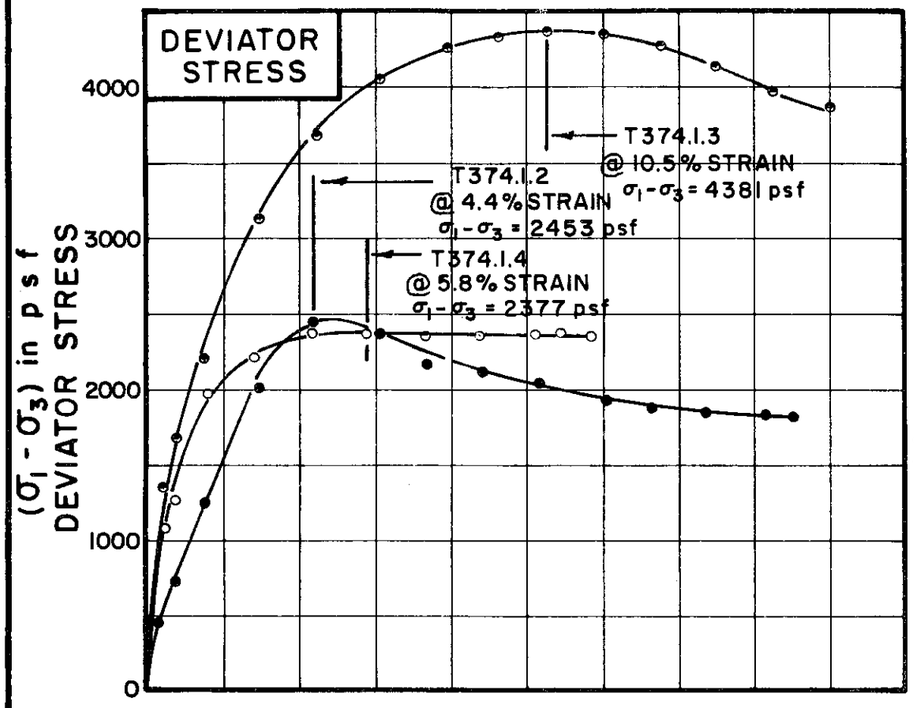
DEPTH 9.0' TO 11.0'

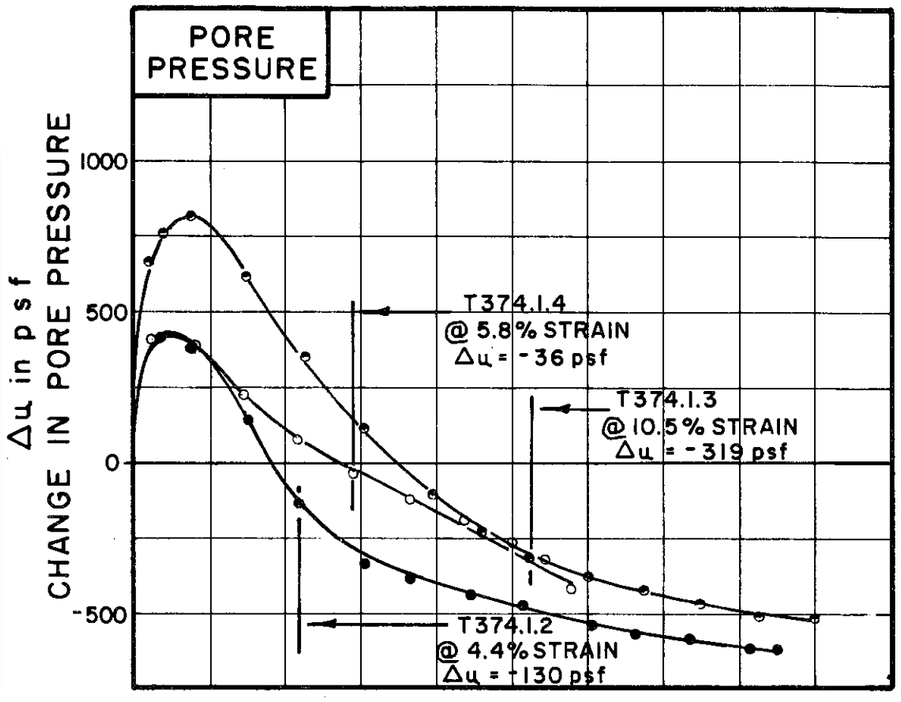
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

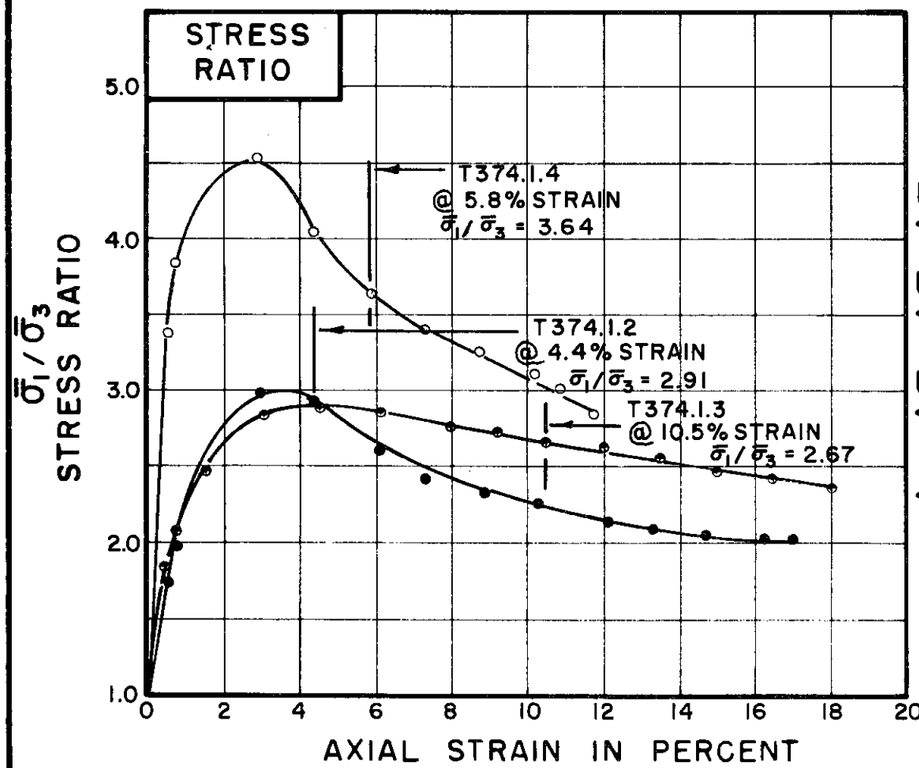
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

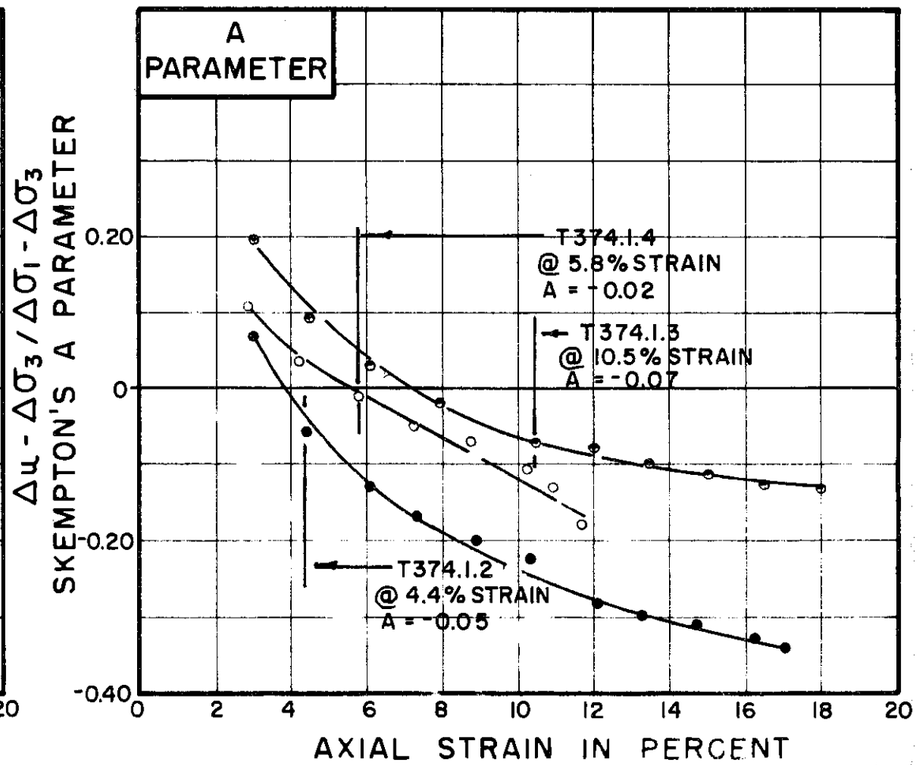
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-432









TEST NO. / SYMBOL		T374.1.4 ○	T374.1.2 ●	T374.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	27.7%	26.4%	26.9%
	DRY DENSITY lb/cu ft	γ_d	98	99	96
	SAMPLE DIAMETER in.	D_o	1.42	1.40	1.38
	SAMPLE HEIGHT in	H_o	3.44	3.39	3.35
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	5760	6480	7200
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	864	1152	2304
	VOLUMETRIC STRAIN	ϵ_{vol}	0.60%	0.50%	1.35%
	PORE PRESSURE RESPONSE		98%	95%	95%
FINAL CONDITIONS	WATER CONTENT	w_f	28.5%	27.7%	27.6%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.023	.024	.024

BORING NO. 105
SAMPLE NO. 2
DEPTH 9.0' TO 11.0'

SOIL DESCRIPTION SILTY CLAY (CL)

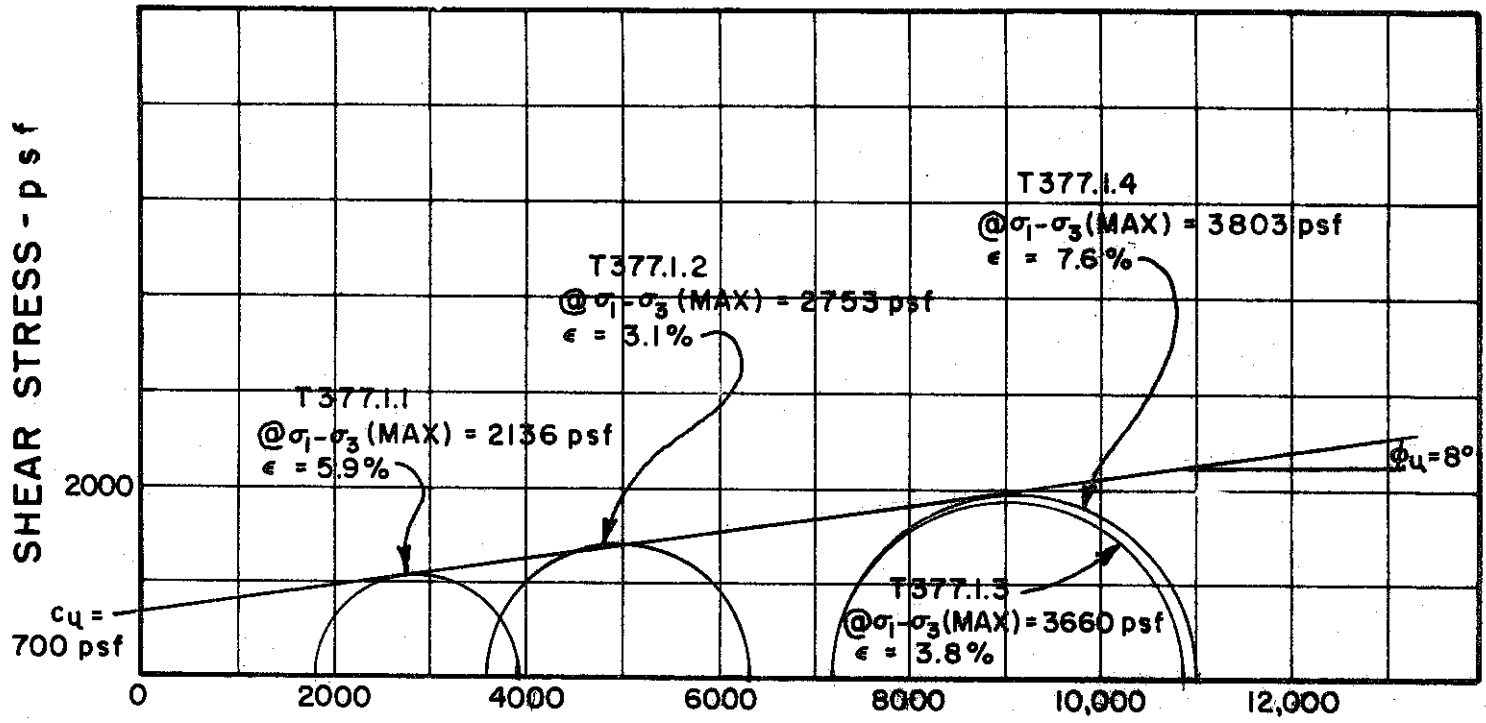
LIQUID LIMIT 46 PLASTIC LIMIT 24

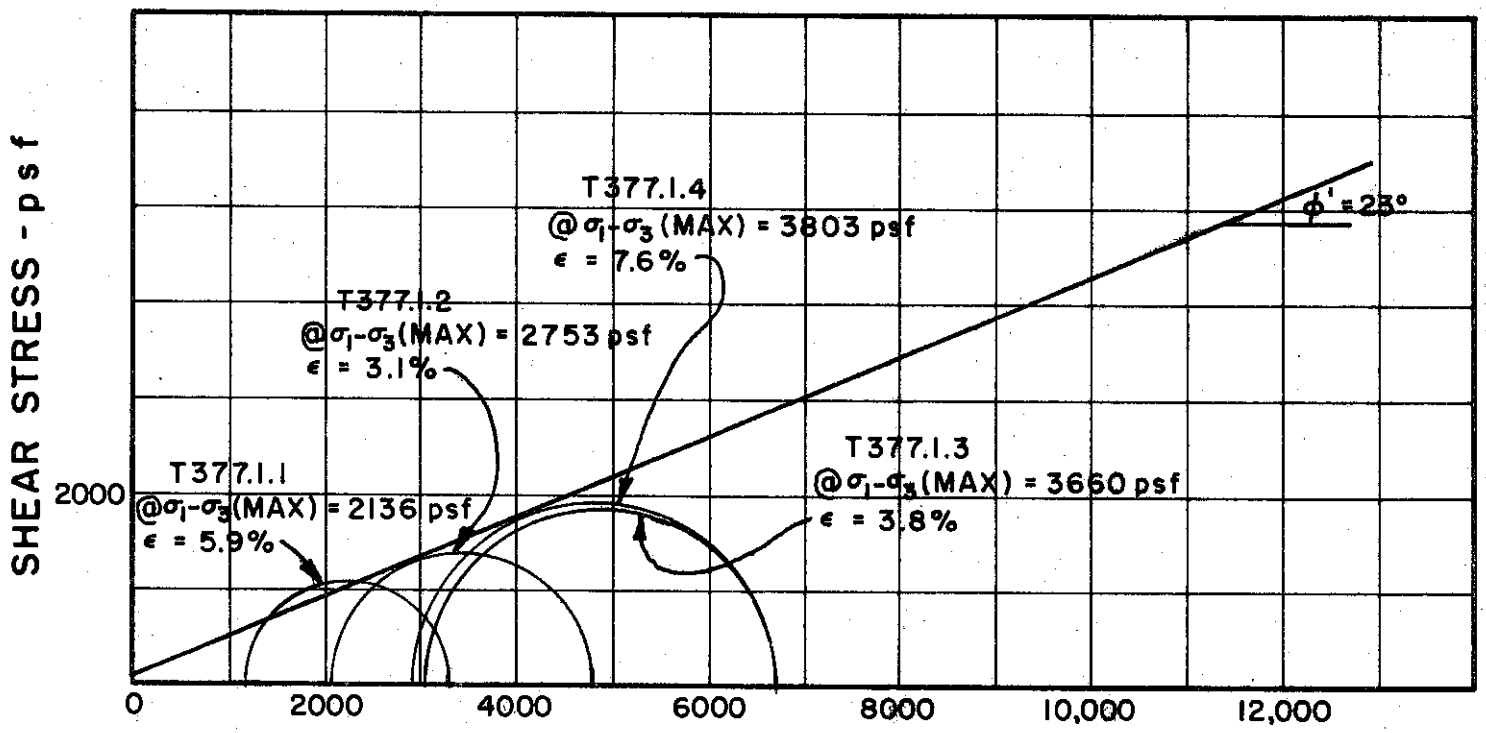
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-433

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 105

SAMPLE NO. 5

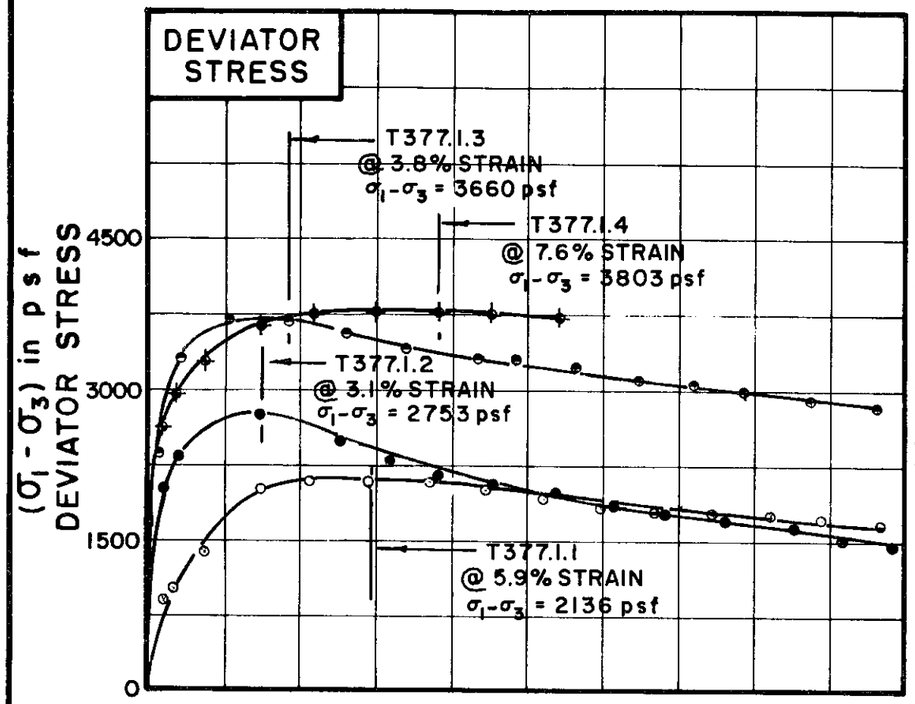
DEPTH 40.0' TO 42.5'

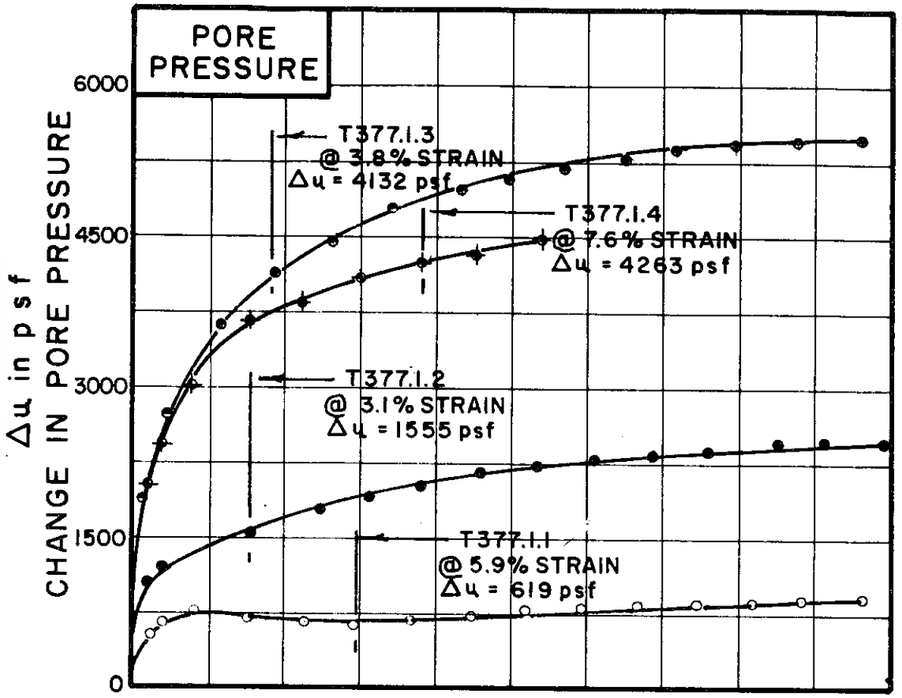
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

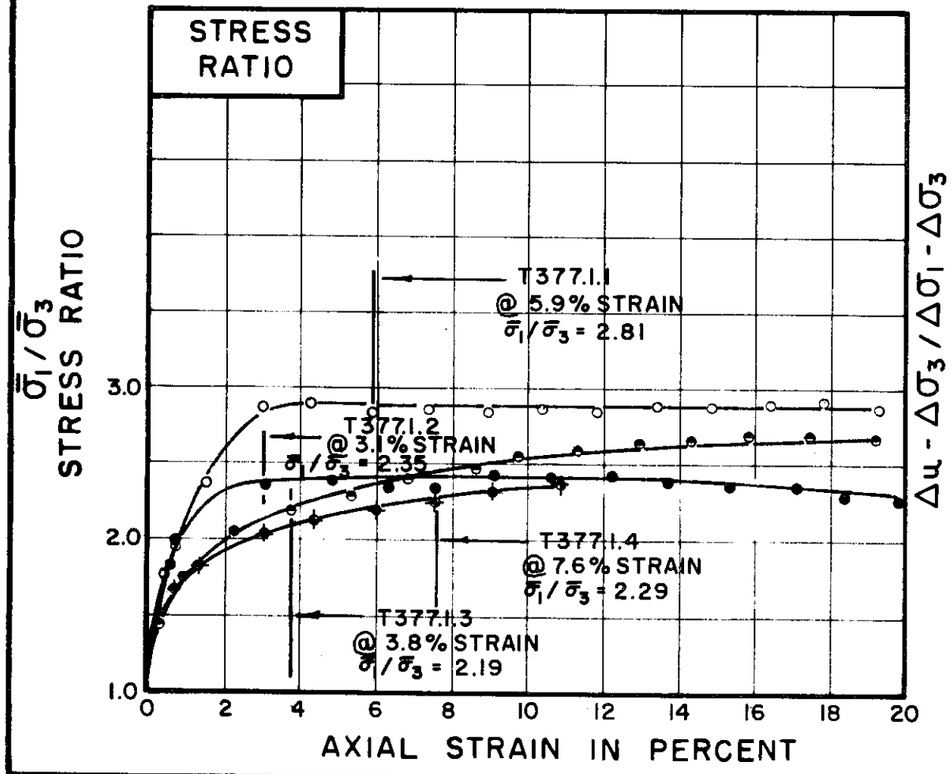
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

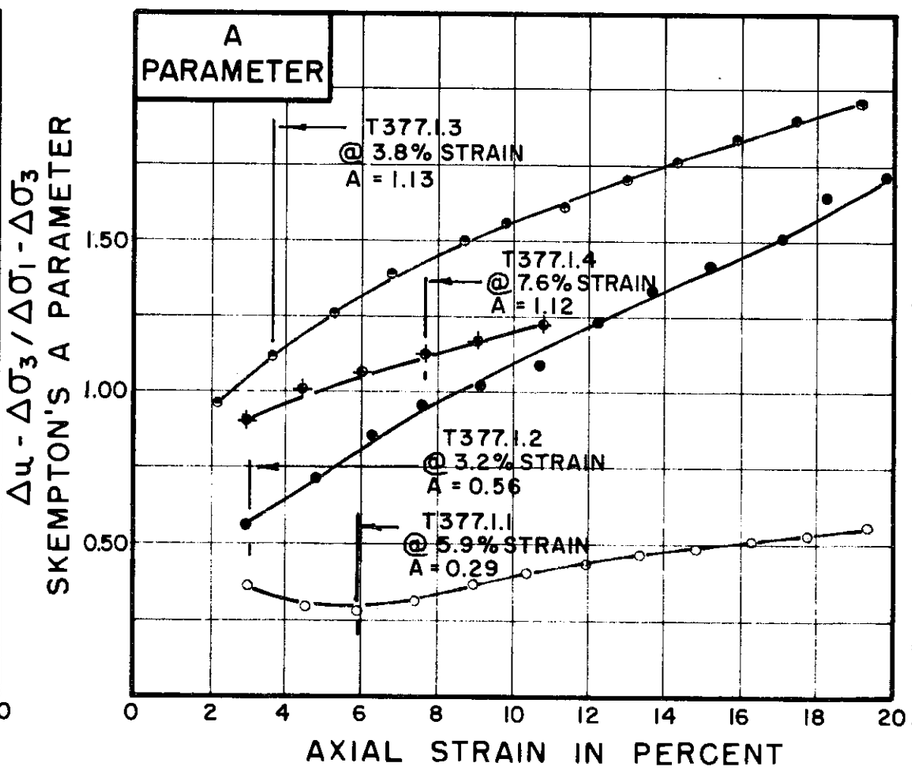
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-434









TEST NO. / SYMBOL		T377.1.1 ○	T377.1.2 ●	T377.1.3 ◎	T377.1.4 ◉
INITIAL CONDITIONS	WATER CONTENT	w_o	35.9%	35.9%	35.1%	39.2%
	DRY DENSITY lb/cu ft	γ_d	84	85	85	84
	SAMPLE DIAMETER in.	D_o	1.39	1.42	1.38	1.41
	SAMPLE HEIGHT in	H_o	3.38	3.30	3.34	3.37
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	7200	7200	7200	7200
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1800	3600	7200	7200
	VOLUMETRIC STRAIN	ϵ_{vol}	1.49%	2.38%	4.36%	7.47%
	PORE PRESSURE RESPONSE		97%	96%	96%	96%
FINAL CONDITIONS	WATER CONTENT	w_f	35.3%	34.1%	30.9%	33.4%
	SKETCH OF SAMPLE AT END OF TEST					

RATE OF STRAIN PERCENT / MINUTE	.024	.024	.024	.024

BORING NO. 105
SAMPLE NO. 5
DEPTH 40.0' TO 42.5'

SOIL DESCRIPTION SILTY CLAY (CL)

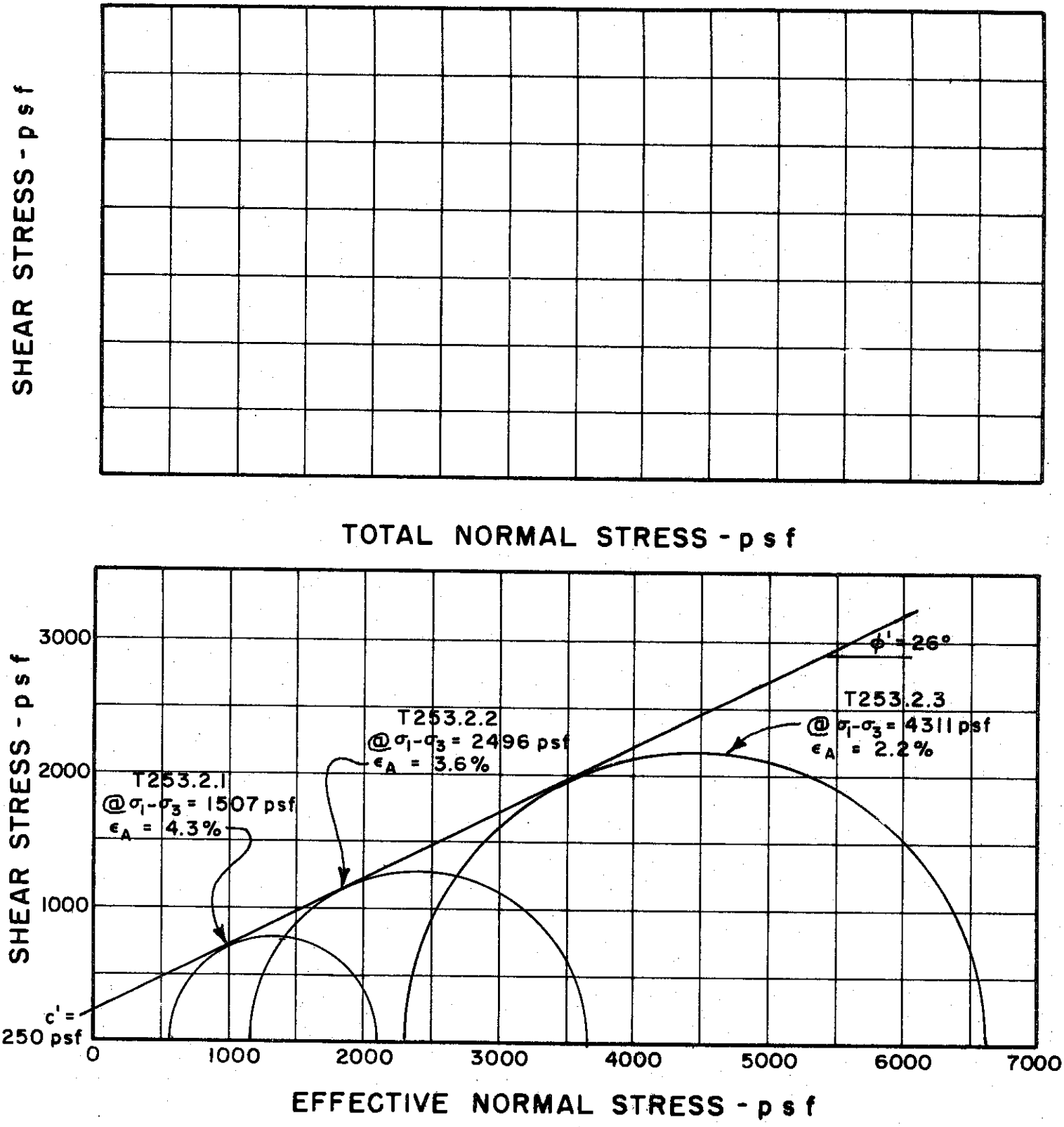
LIQUID LIMIT 44 PLASTIC LIMIT 21

CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-435

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING



BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

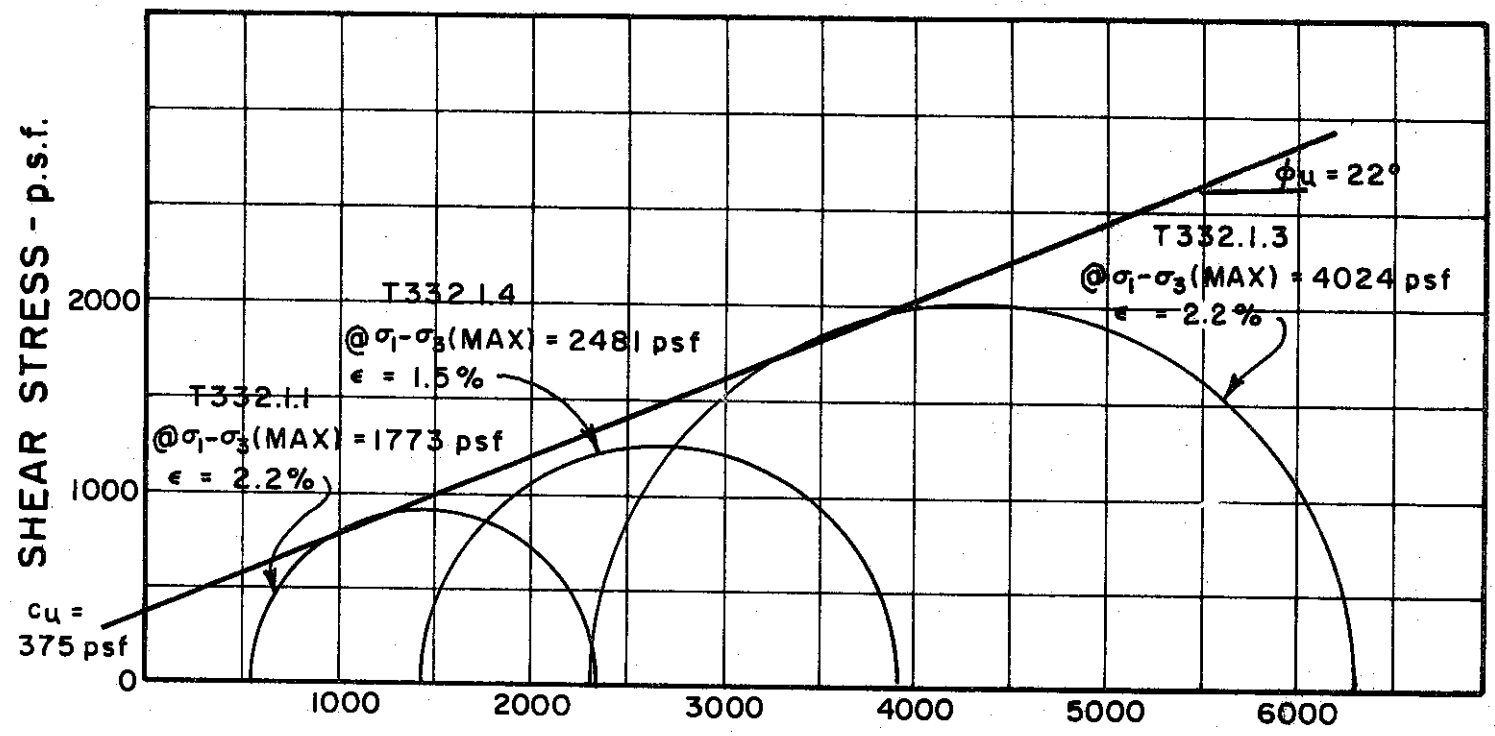
REMARKS

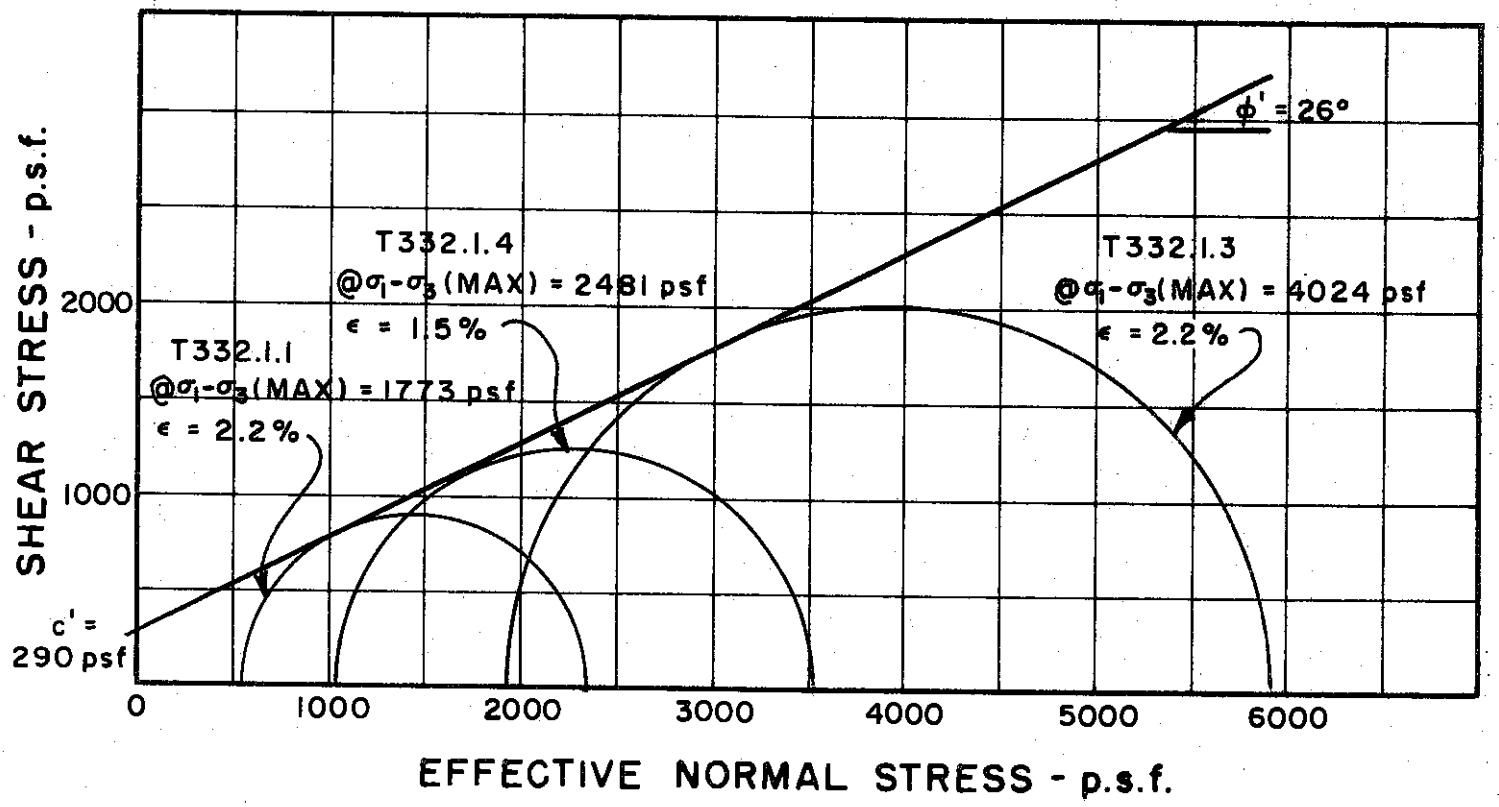
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-436





BORING NO. 119

SAMPLE NO. 2

DEPTH 8.0' TO 10.0'

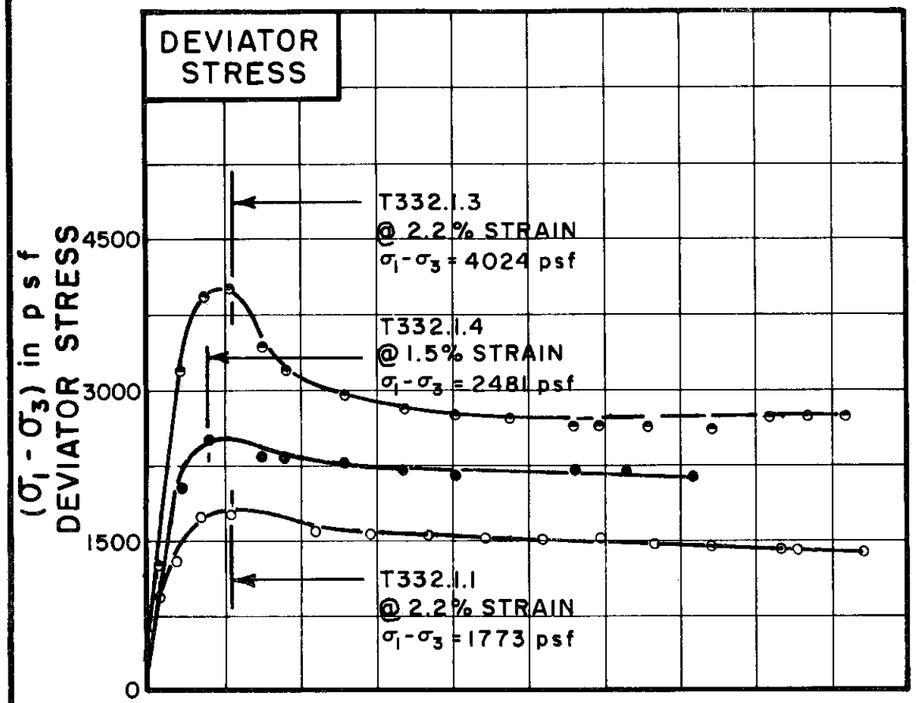
REMARKS ENVELOPE IS INTERPRETIVE BASED ON LIMITED DATA POINTS AVAILABLE

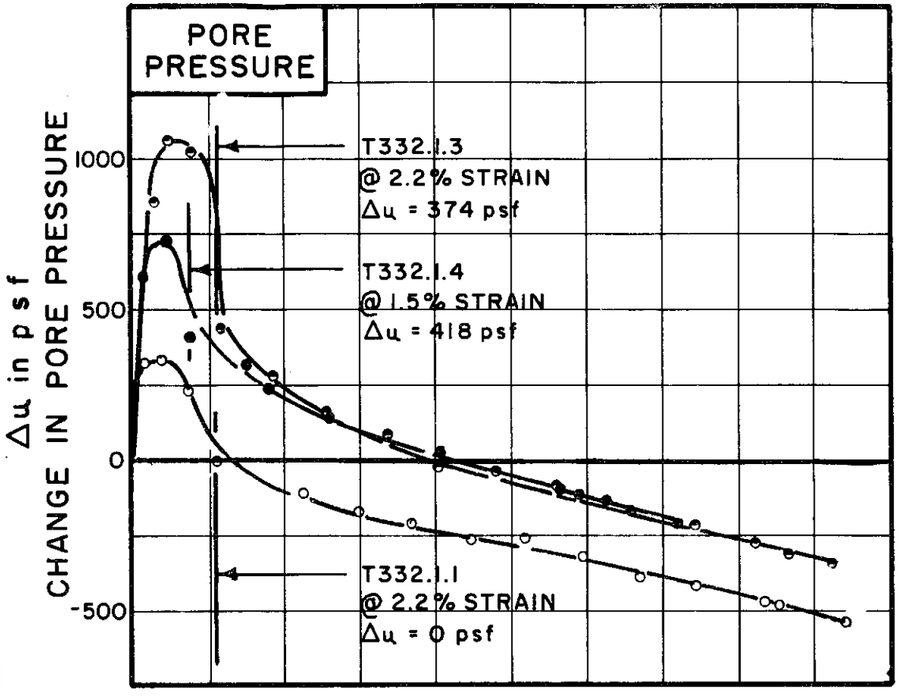
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

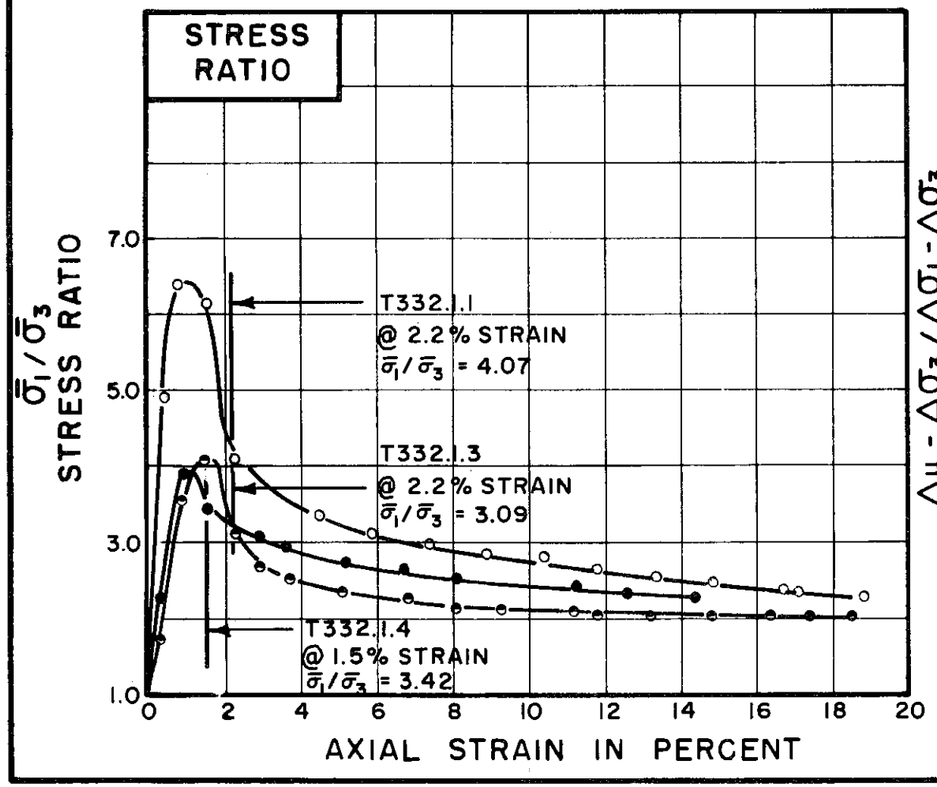
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

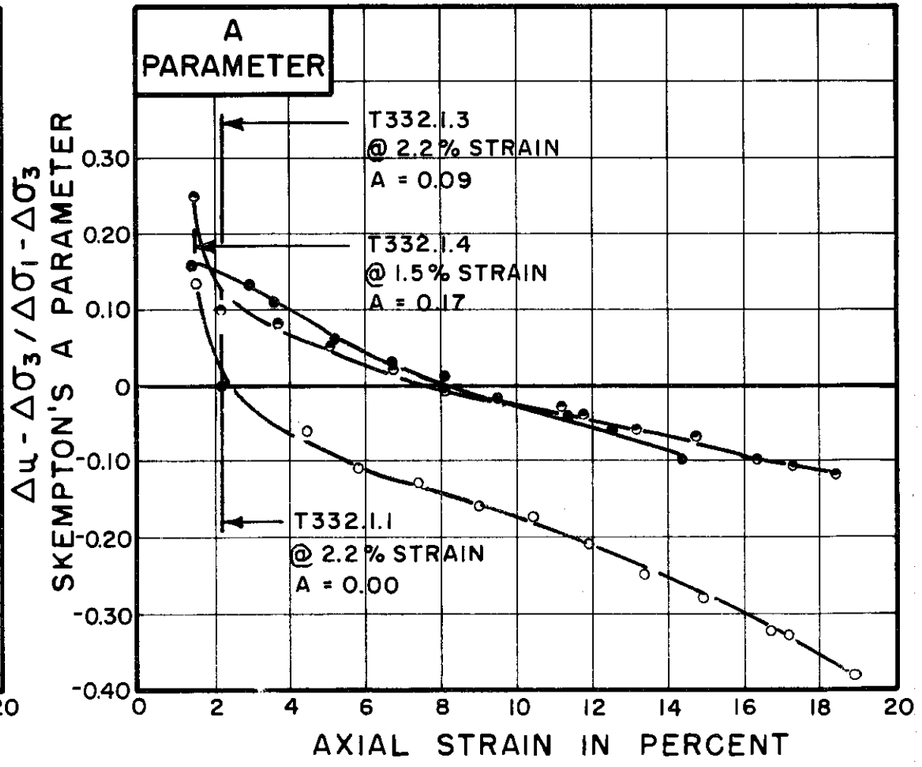
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-437









TEST NO. / SYMBOL		T332.1.1 ○	T332.1.4 ●	T332.1.3 ●
INITIAL CONDITIONS	WATER CONTENT	w_o	28.3%	29.2%	27.9%
	DRY DENSITY pcf	γ_d	95	94	99
	SAMPLE DIAMETER in.	D_o	1.42	1.41	1.41
	SAMPLE HEIGHT in	H_o	3.36	3.38	3.40
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	8640	7200	8640
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	576	1440	2304
	VOLUMETRIC STRAIN	ϵ_{vol}	0.4%	1.7%	1.9%
	PORE PRESSURE RESPONSE		98%	98%	99%
FINAL CONDITIONS	WATER CONTENT	w_f	29.4%	29.5%	27.6%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.024	.024	.024

BORING NO. 119
SAMPLE NO. 2
DEPTH 8.0' TO 10.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

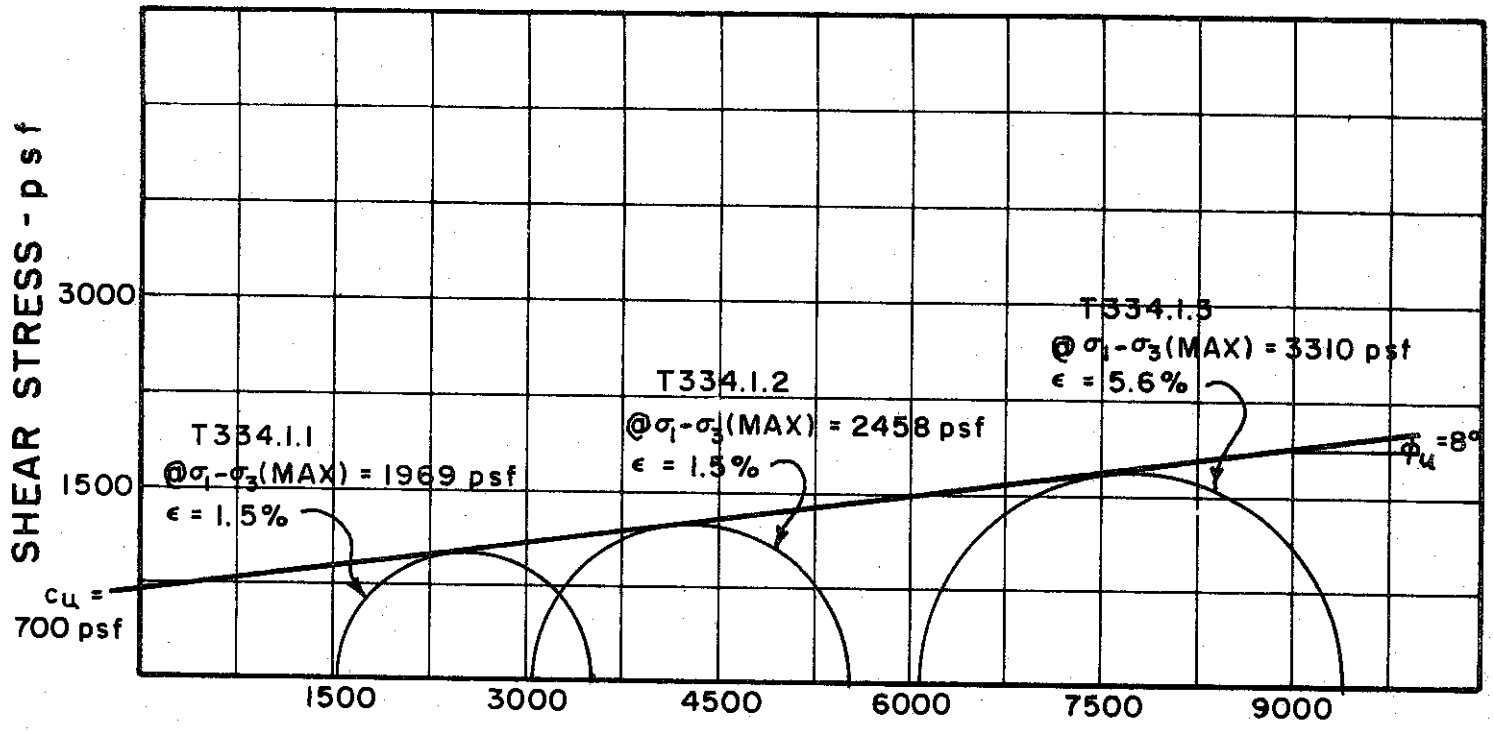
LIQUID LIMIT 53 PLASTIC LIMIT 26

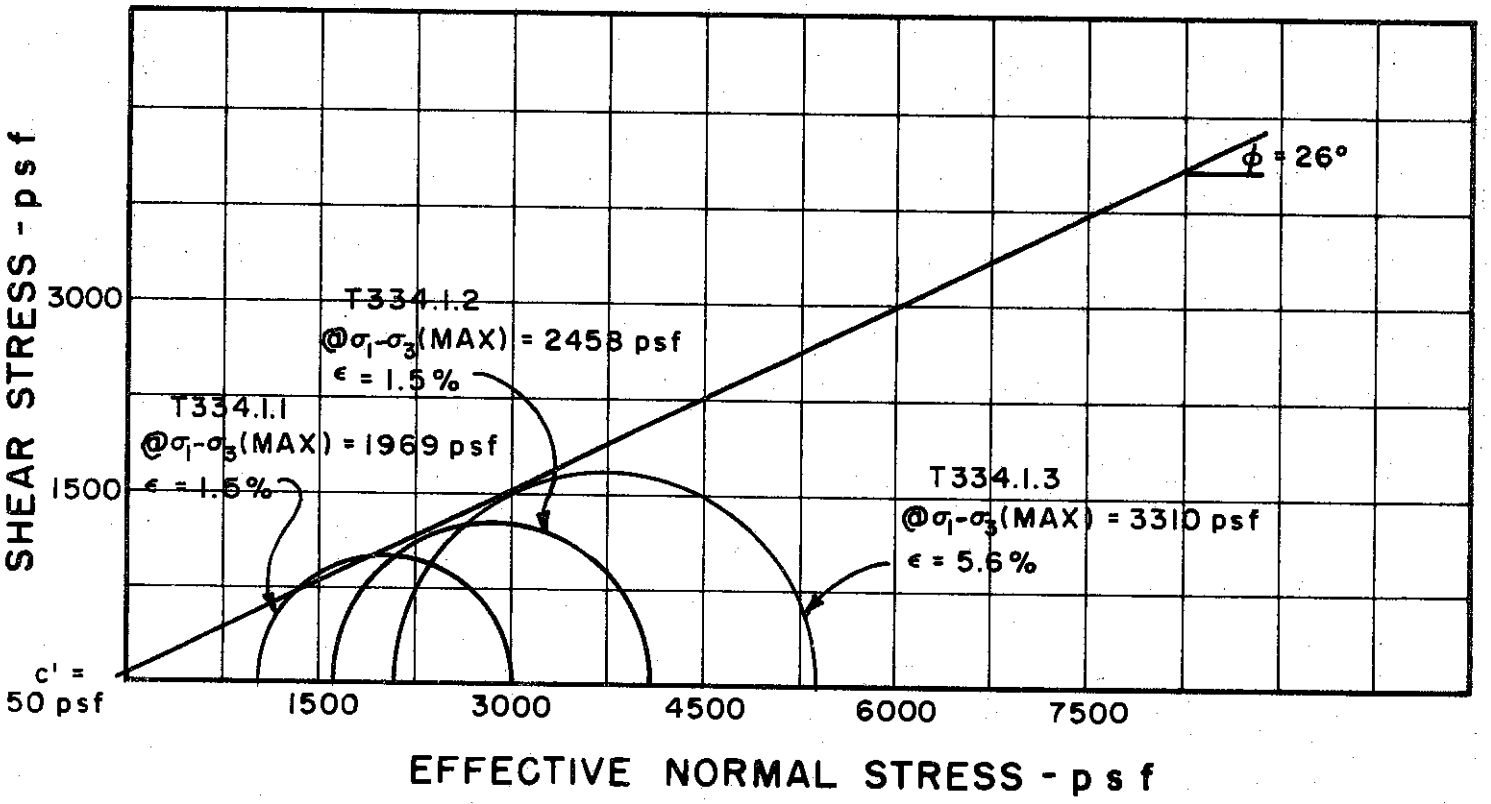
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-438

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 119

SAMPLE NO. 4

DEPTH 30.0 TO 32.0

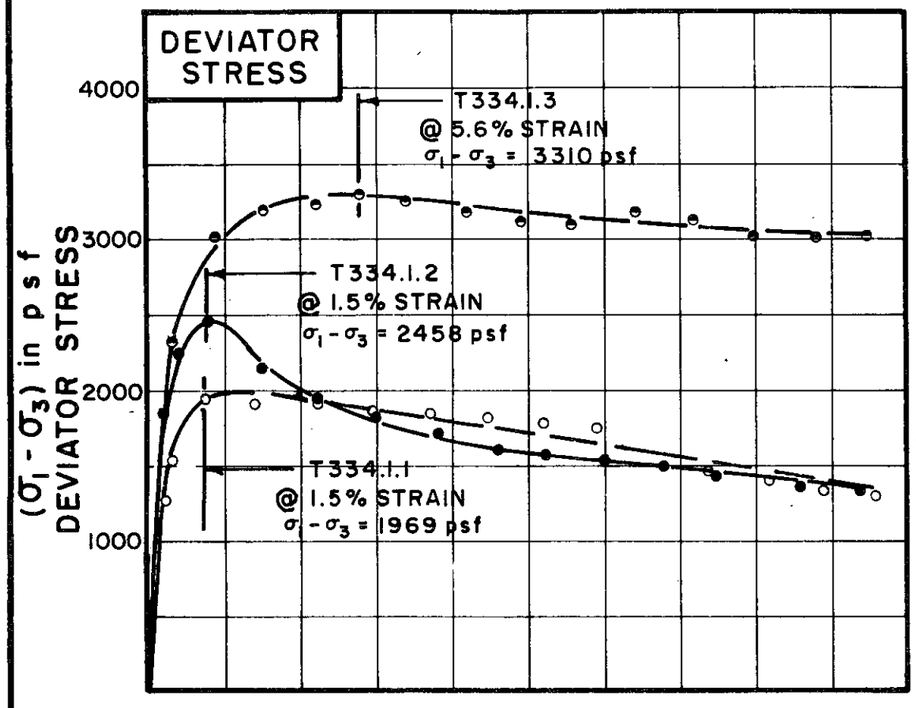
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

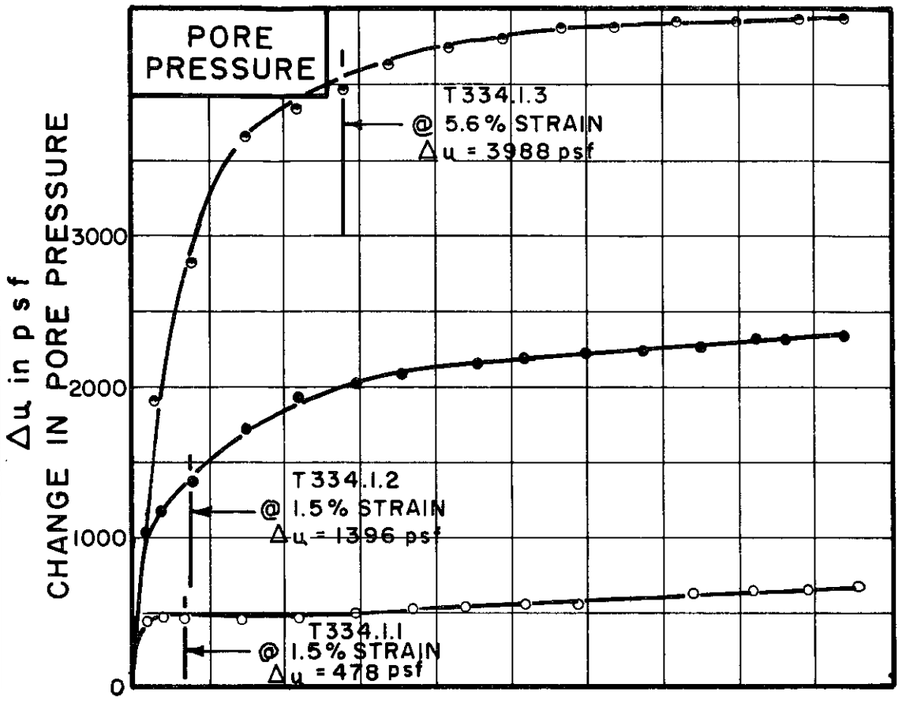
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

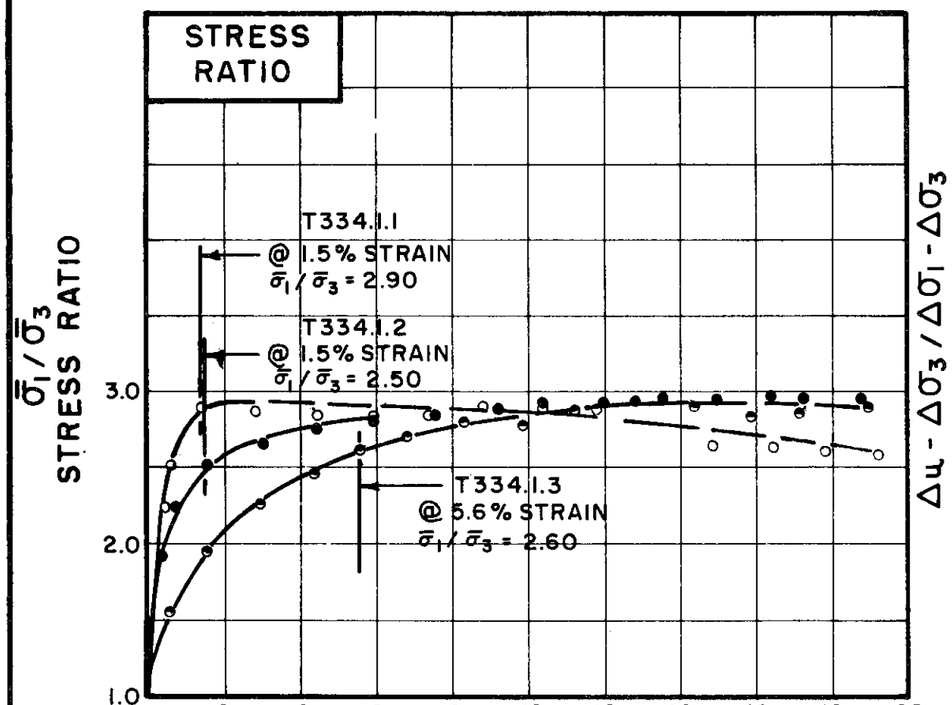
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

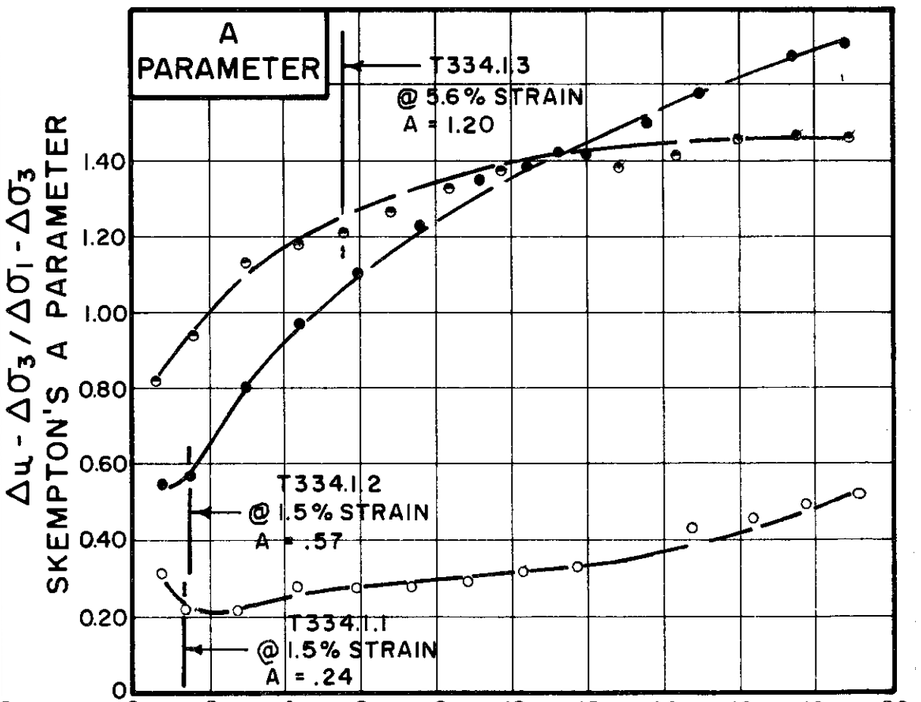
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-439









TEST NO. / SYMBOL		T334.1.1 ○	T334.1.2 ●	T334.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	36.9%	38.5%	35.3%
	DRY DENSITY pcf	γ_d	86	85	87
	SAMPLE DIAMETER in.	D_o	1.41	1.41	1.41
	SAMPLE HEIGHT in	H_o	3.39	3.35	3.36
BEFORE SHEAR CONDITIONS	FINAL BACK PRESSURE psf	u_o	11520	7200	11520
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1512	3024	6048
	VOLUMETRIC STRAIN	ϵ_{vol}	1.4%	2.7%	6.4%
	PORE PRESSURE RESPONSE		95%	99%	100%
FINAL CONDITIONS	WATER CONTENT	w_f	35.2%	36.1%	29.8%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.024	.024	.024

BORING NO. 119
SAMPLE NO. 4
DEPTH 30.0 TO 32.0

SOIL DESCRIPTION SILTY CLAY (CL)

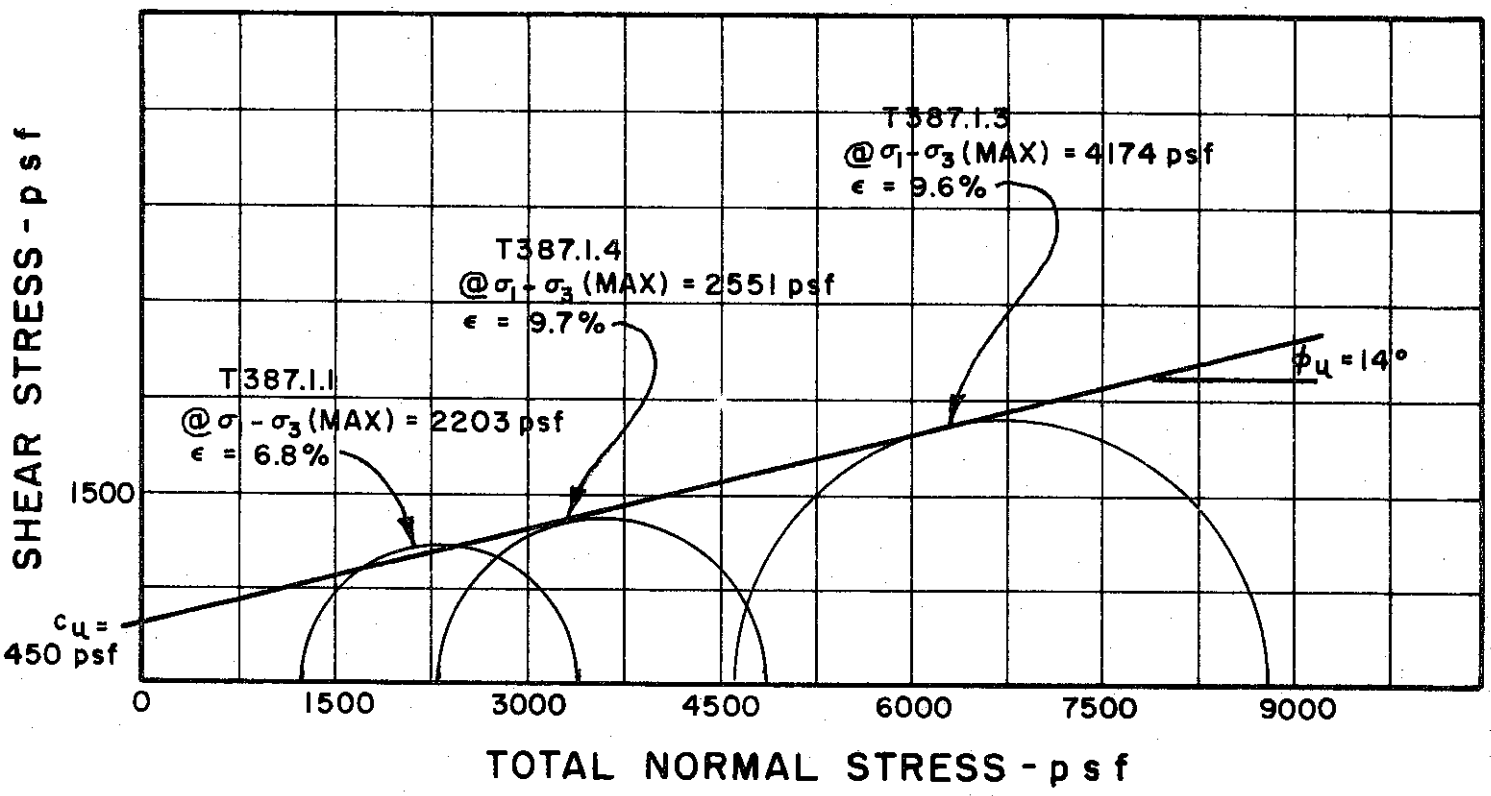
LIQUID LIMIT 41 PLASTIC LIMIT 22

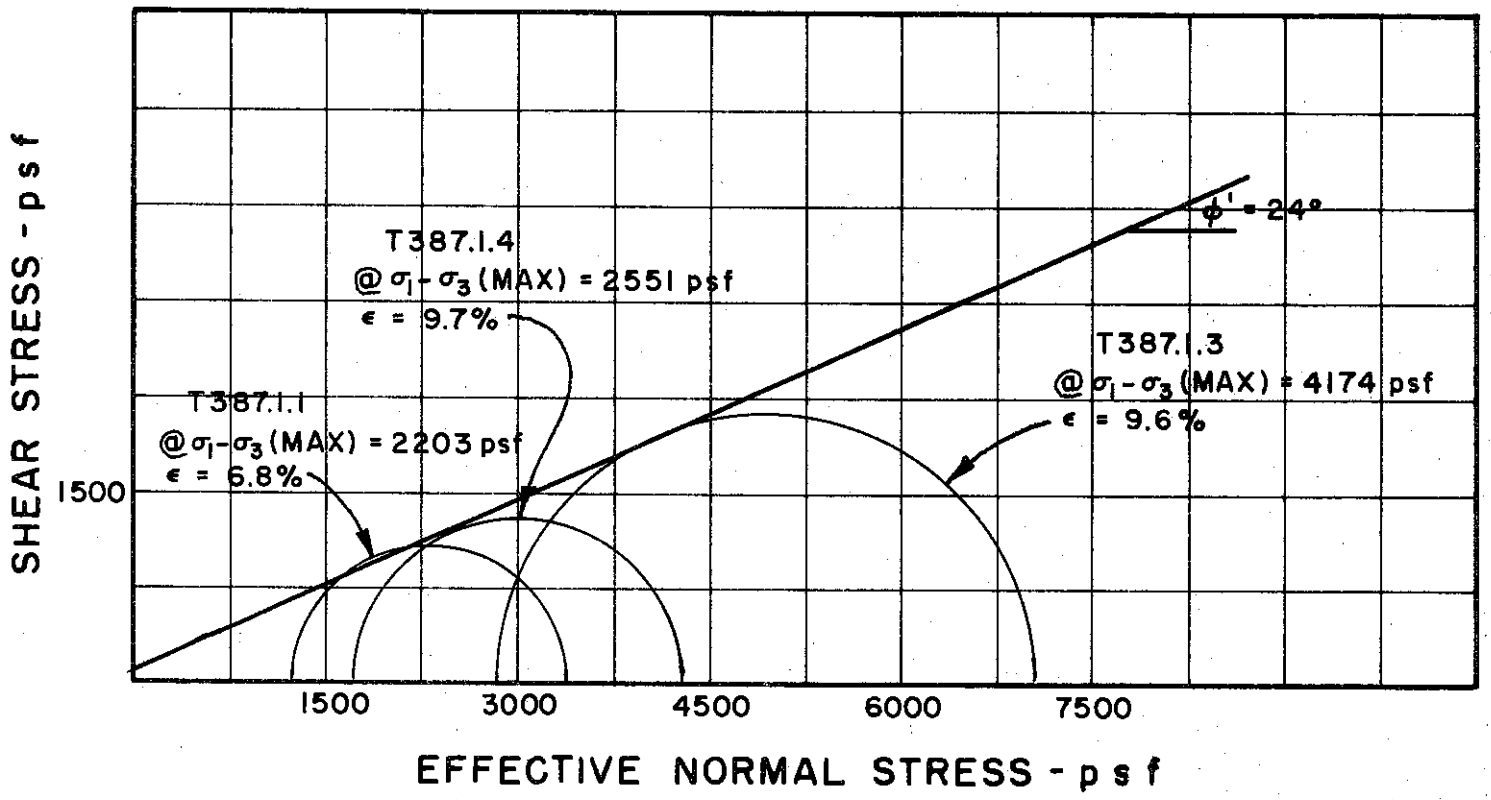
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-440

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 129

SAMPLE NO. 5

DEPTH 18.0' TO 21.0'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

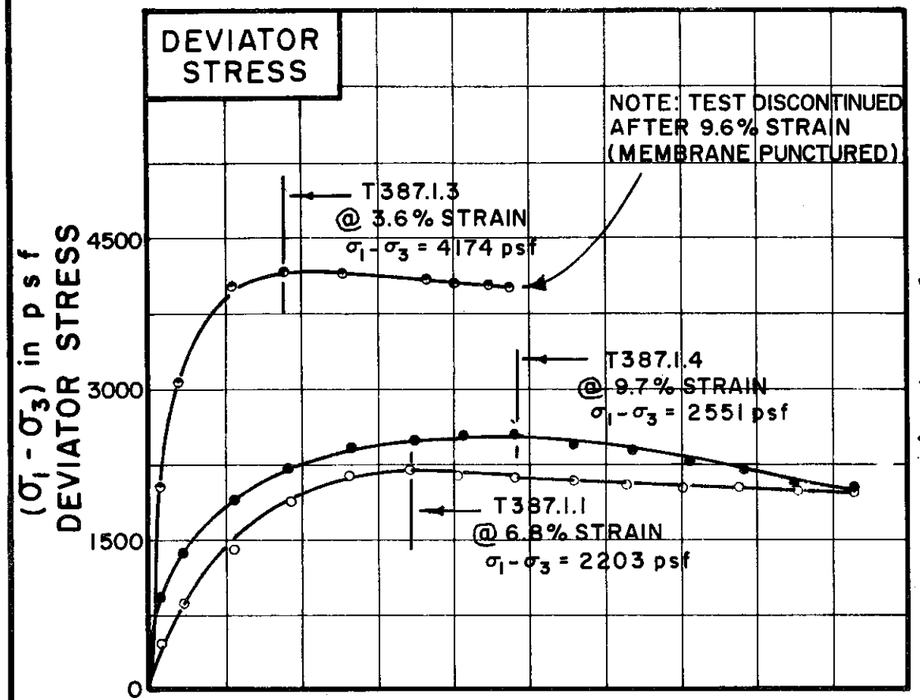
MOHR STRENGTH ENVELOPE

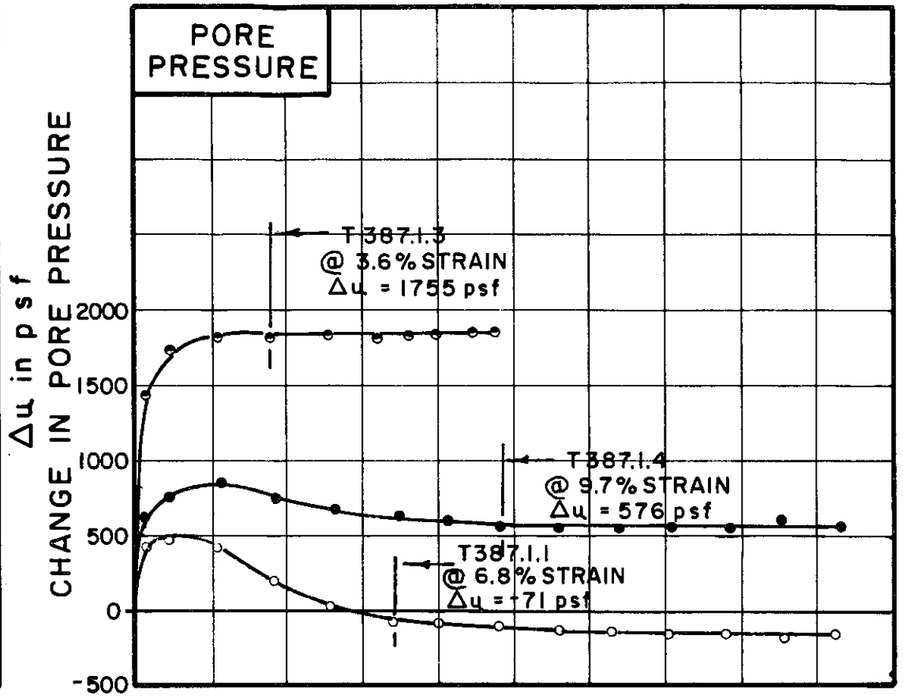
TRIAXIAL COMPRESSION TESTS

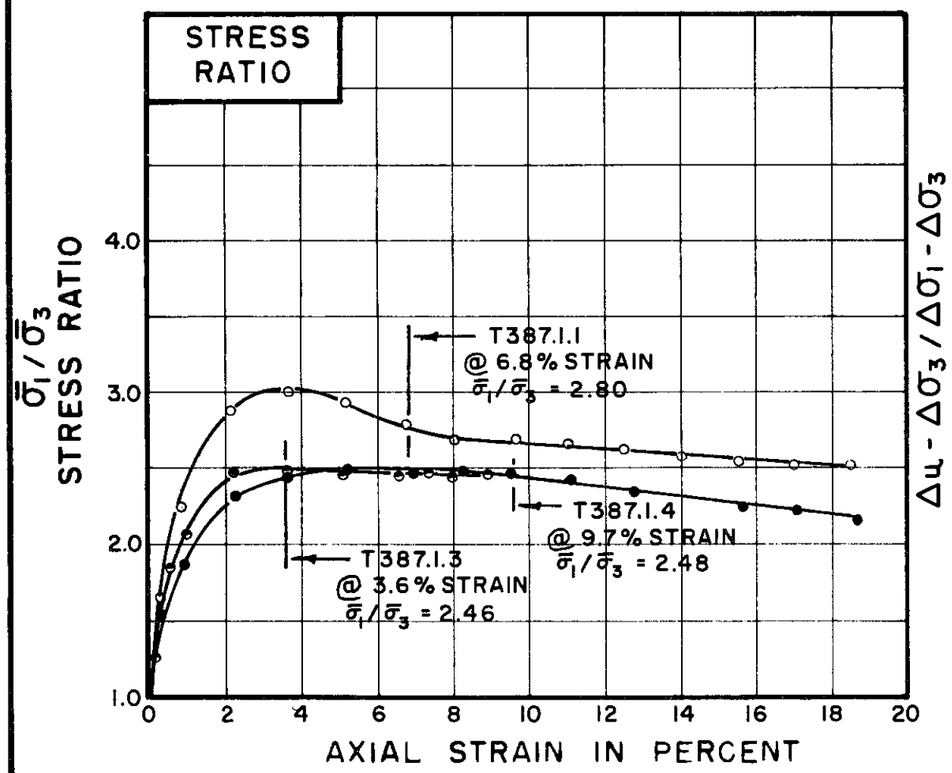
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

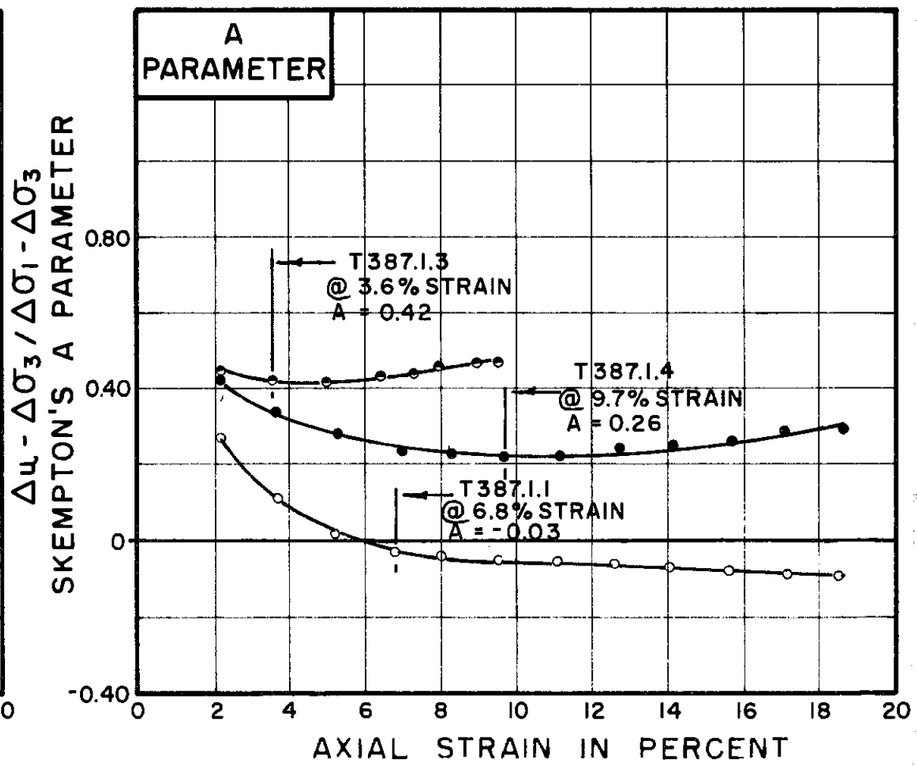
FILE 1255

C-441









TEST NO. / SYMBOL		T387.1.1 ○	T387.1.4 ●	T387.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	33.5%	33.1%	31.9%
	DRY DENSITY lb/cu ft	γ_d	90	90	90
	SAMPLE DIAMETER in.	D_o	1.41	1.41	1.41
	SAMPLE HEIGHT in	H_o	3.39	3.38	3.45
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	u_o	6480	5760	6480
	INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$	1152	2304	4608
	VOLUMETRIC STRAIN	ϵ_{vol}	1.31%	2.94%	3.20%
	PORE PRESSURE RESPONSE		98%	99%	97%
FINAL CONDITIONS	WATER CONTENT	w_f	33.4%	31.9%	— %
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT/MINUTE			.024	.024	.023

BORING NO. 129
SAMPLE NO. 5
DEPTH 18.0' TO 21.0'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

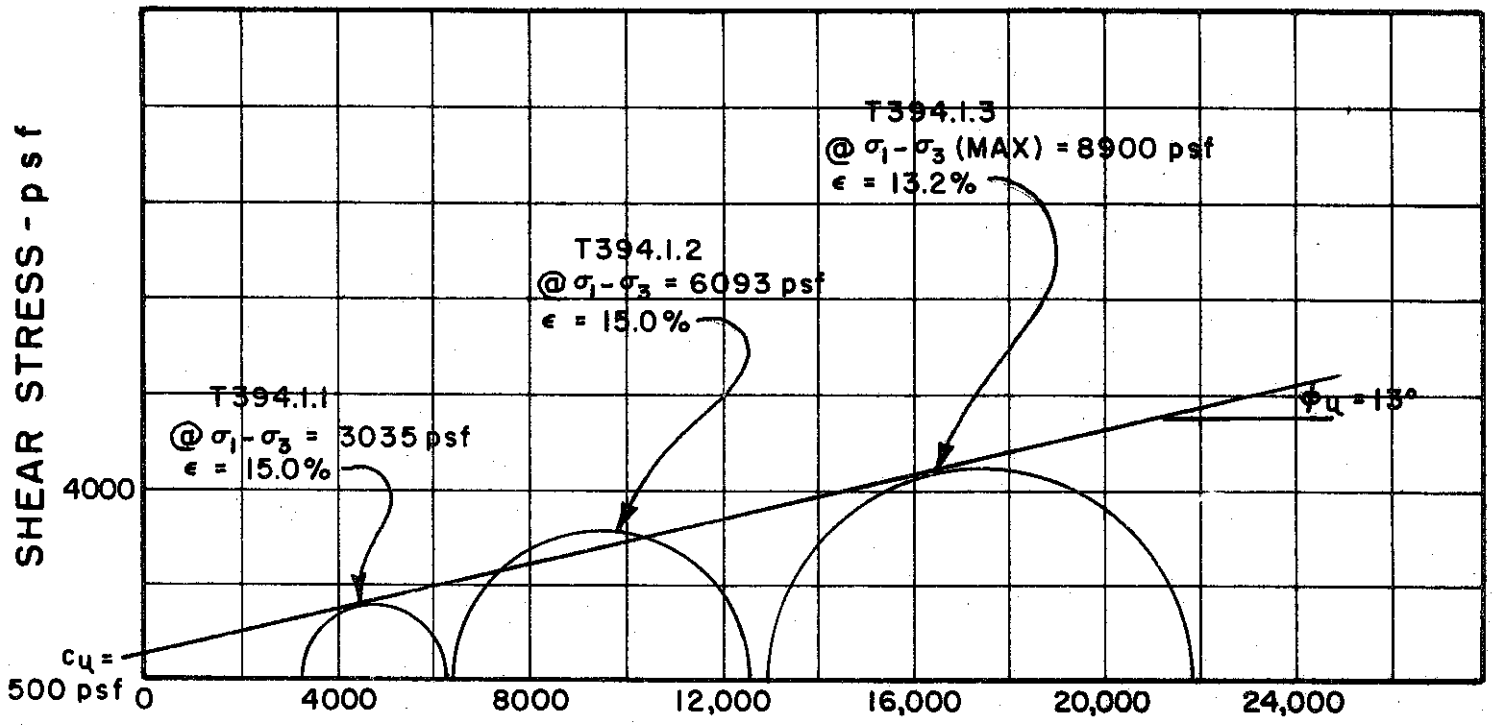
LIQUID LIMIT 48 PLASTIC LIMIT 21

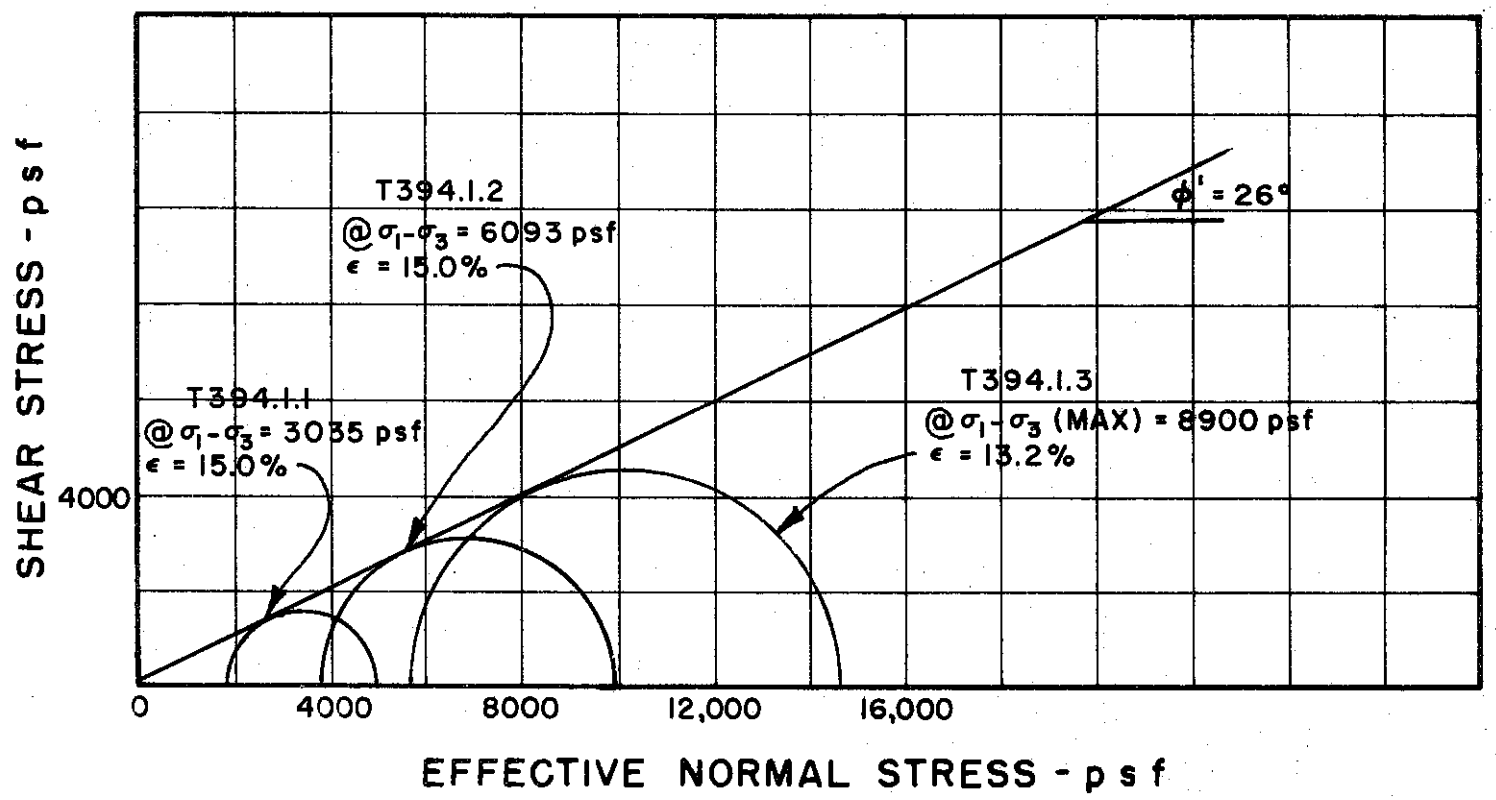
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-442

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 129

SAMPLE NO. 19

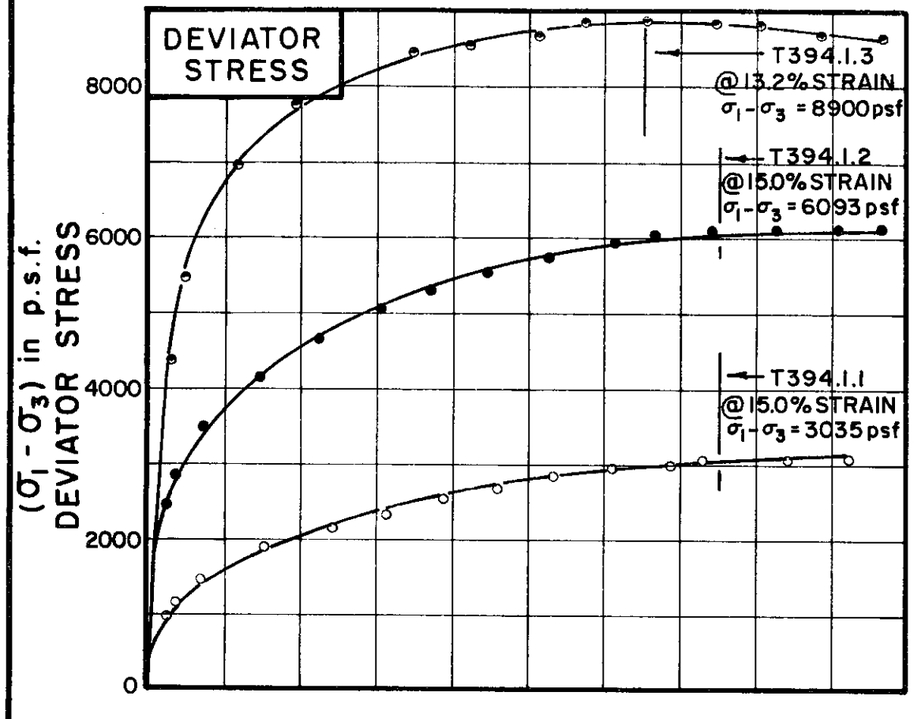
DEPTH 93.0' TO 95.5'

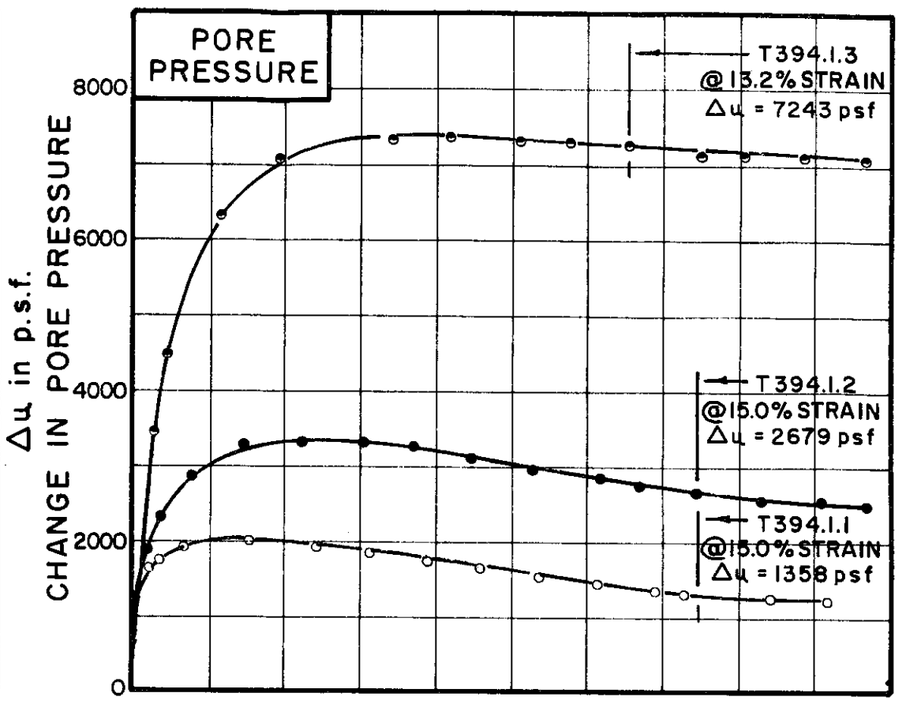
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

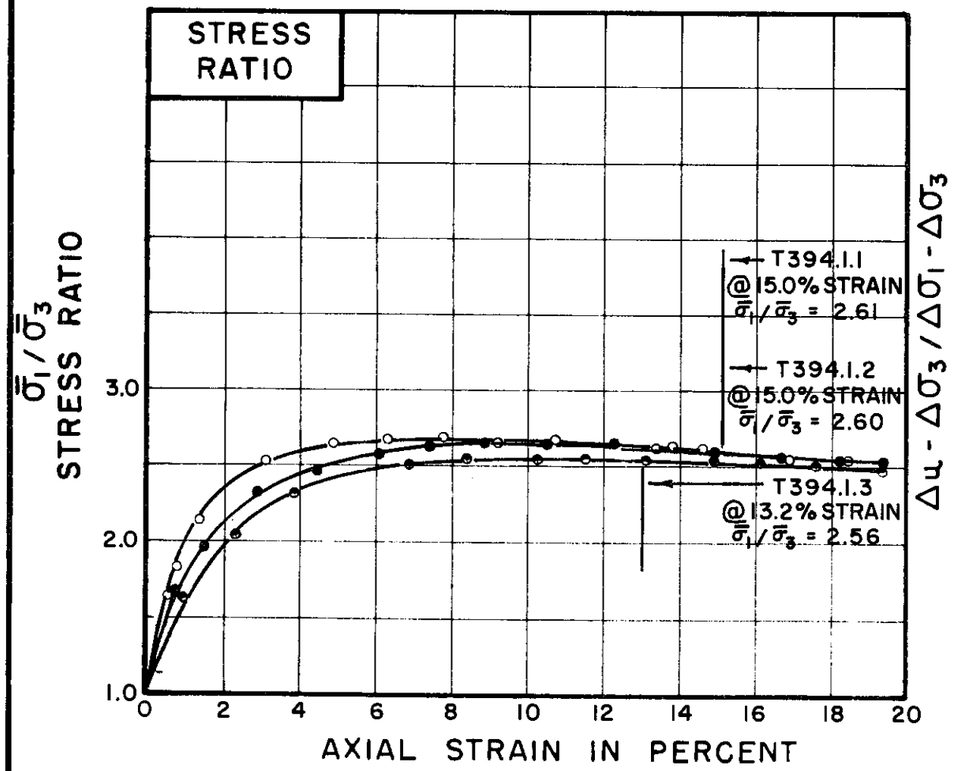
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

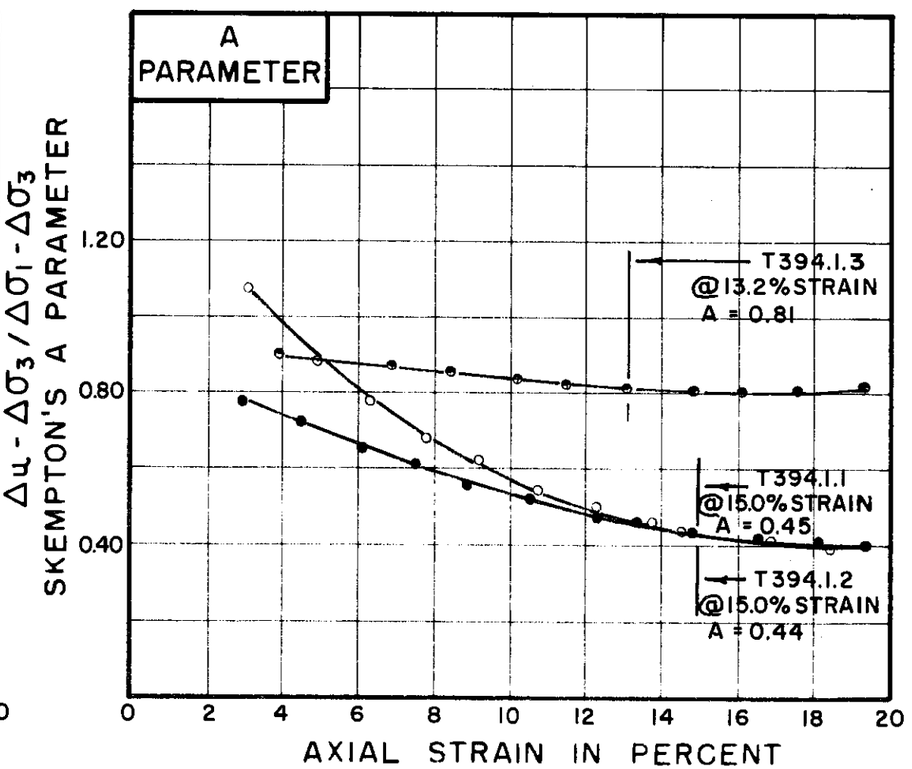
MOHR STRENGTH ENVELOPE
TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-443









TEST NO. / SYMBOL		T394.1.1 ○	T394.1.2 ●	T394.1.3 ●
INITIAL CONDITIONS	WATER CONTENT	w_o	23.7%	25.9%	27.0%
	DRY DENSITY lb/cu ft	γ_d	99	99	99
	SAMPLE DIAMETER in.	D_o	1.39	1.40	1.40
	SAMPLE HEIGHT in	H_o	3.27	3.38	3.32
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	u_o	7200	7200	7200
	INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$	3240	6480	12960
	VOLUMETRIC STRAIN	ϵ_{vol}	1.73%	2.61%	5.03%
	PORE PRESSURE RESPONSE		99%	98%	98%
FINAL CONDITIONS	WATER CONTENT	w_f	22.2%	22.7%	21.5%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.025	.024	.025

BORING NO. 129
SAMPLE NO. 19
DEPTH 93.0' TO 95.5'

SOIL DESCRIPTION SILTY CLAY (CL)

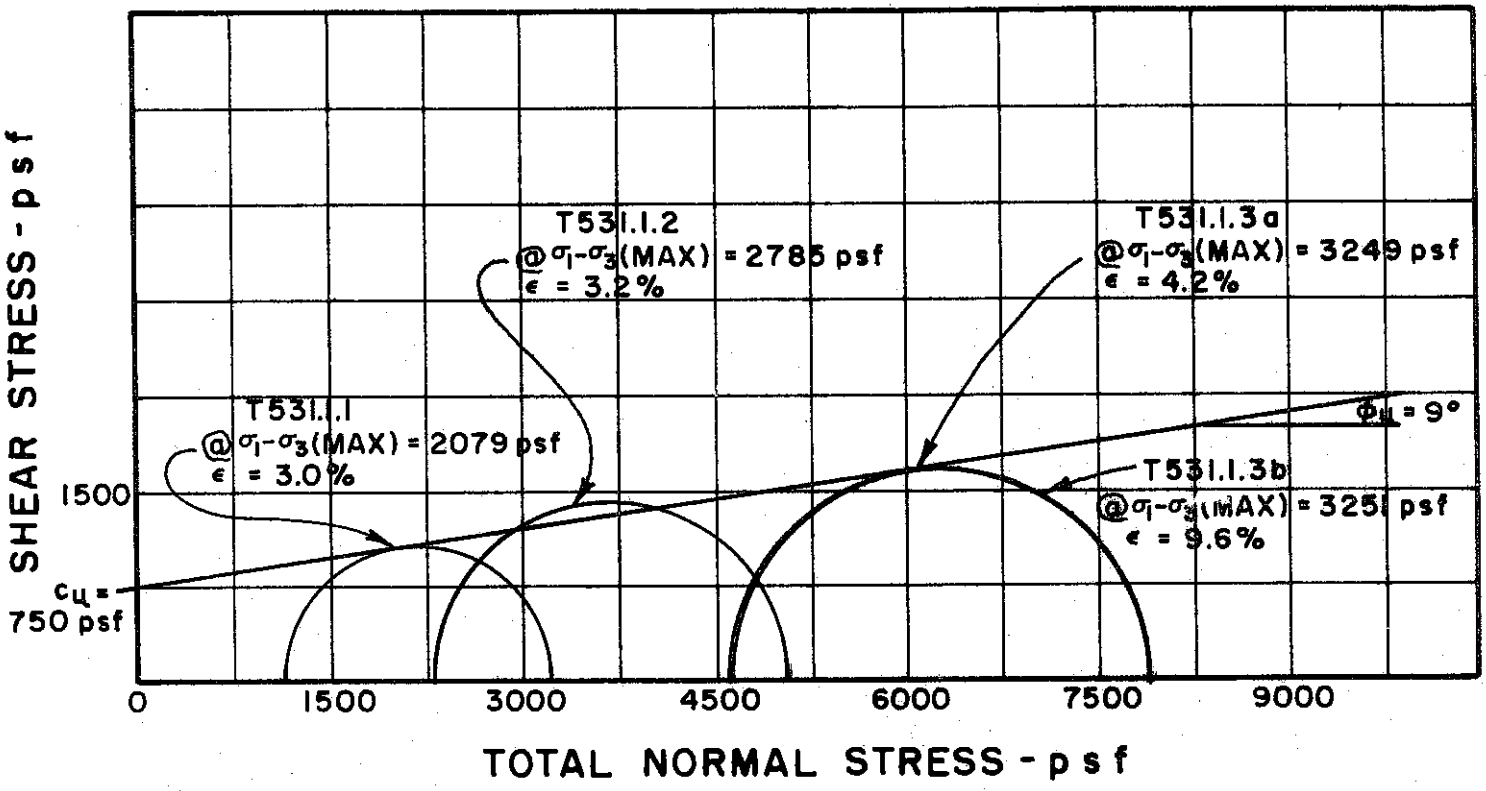
LIQUID LIMIT 41 PLASTIC LIMIT 21

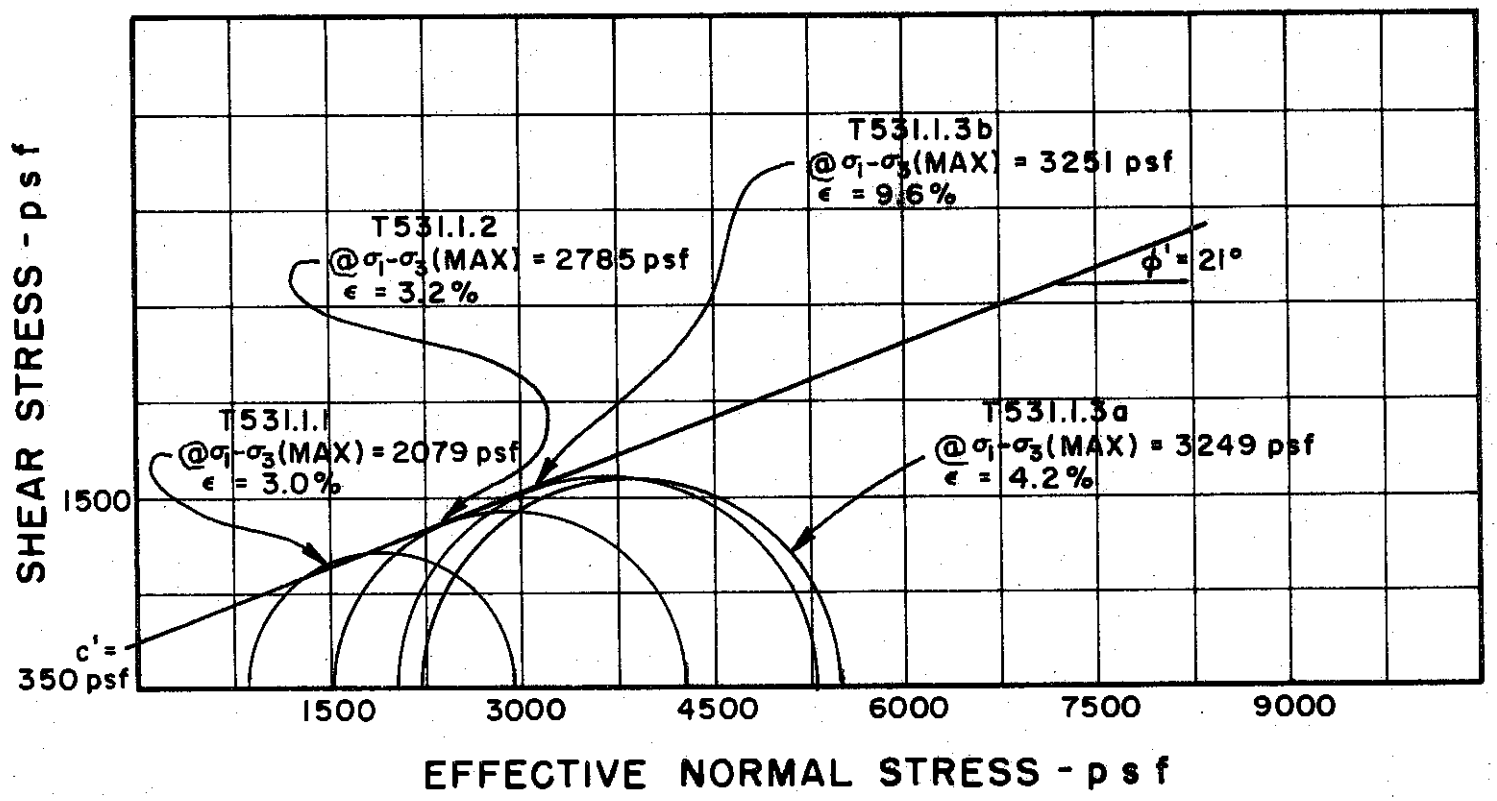
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-444

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 141

SAMPLE NO. 4

DEPTH 18.0' TO 20.0'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

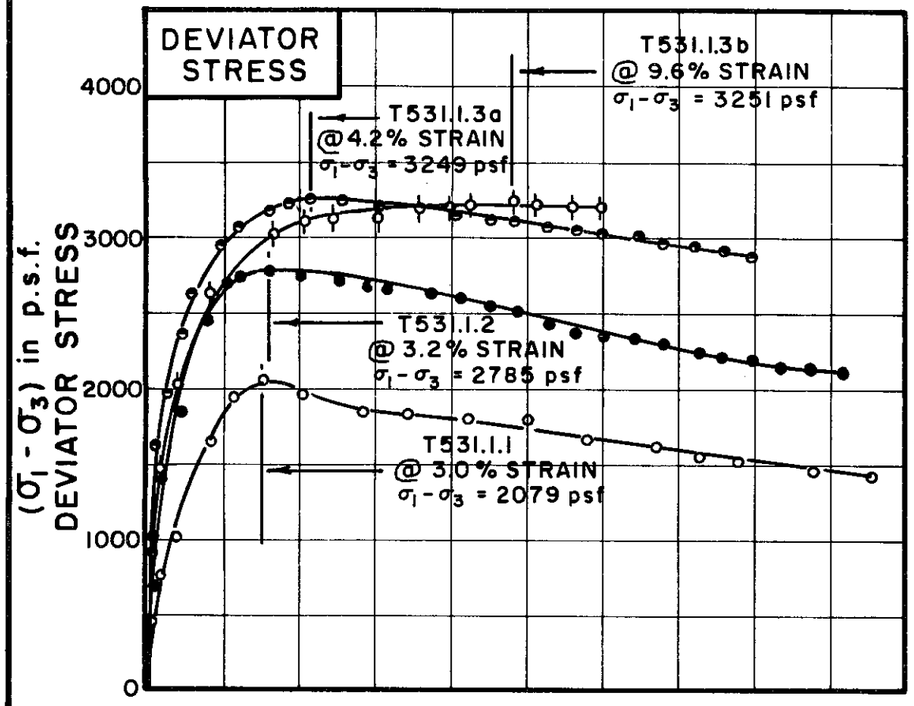
MOHR STRENGTH ENVELOPE

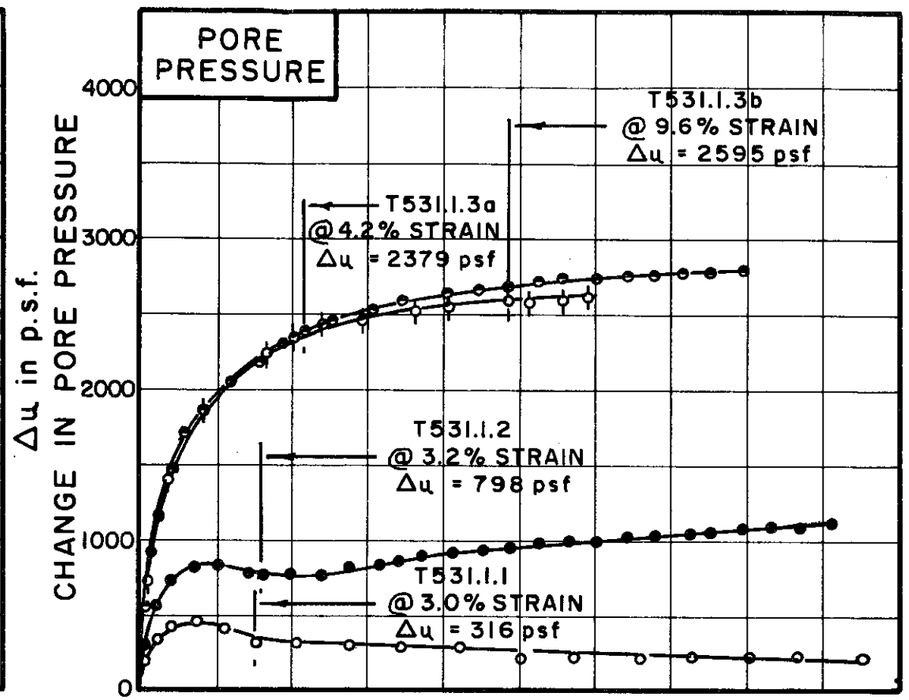
TRIAXIAL COMPRESSION TESTS

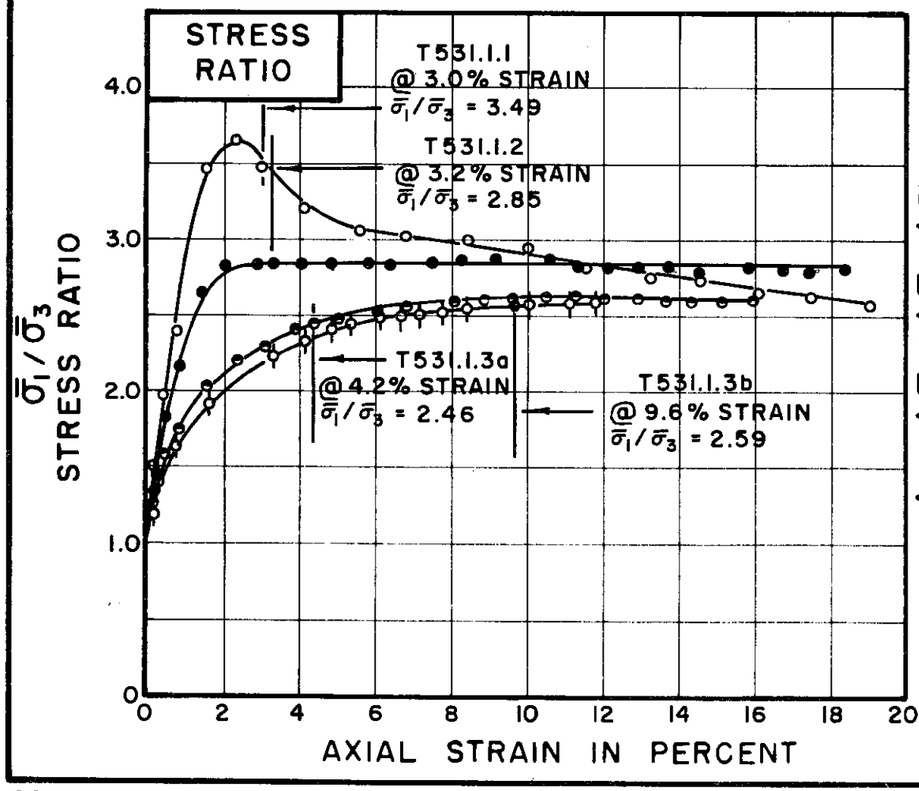
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

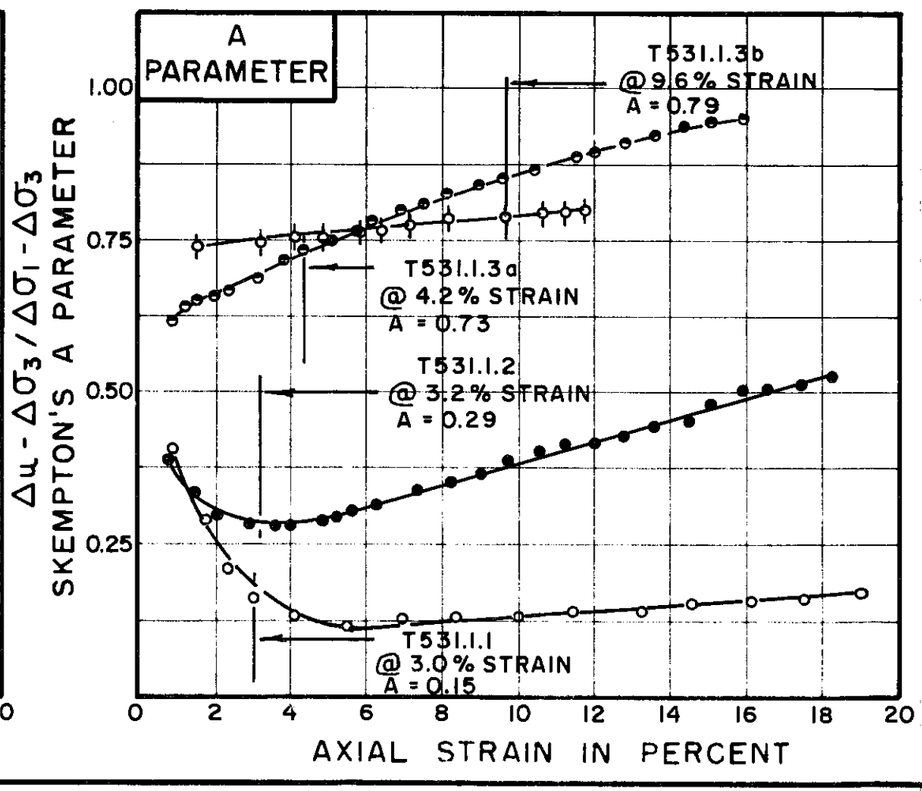
FILE 1255

C-445









TEST NO. / SYMBOL		T531.1.1 ○	T531.1.2 ●	T531.1.3a / T531.1.3b ◐
INITIAL CONDITIONS	WATER CONTENT	w_o	36.3%	35.5%	35.1 % / 37.3
	DRY DENSITY lb/cu ft	γ_d	86	87	85 / 84
	SAMPLE DIAMETER in.	D_o	1.39	1.40	1.41 / 1.39
	SAMPLE HEIGHT in	H_o	3.30	3.20	3.33 / 3.28
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p.s.f.	u_o	10080	8640	11520 / 14400
	INITIAL EFFECTIVE STRESS p.s.f.	$\bar{\sigma}_1 = \bar{\sigma}_3$	1152	2304	4608 / 4637
	VOLUMETRIC STRAIN	ϵ_{vol}	0.9 %	1.2 %	4.3 % / 5.1
	PORE PRESSURE RESPONSE		96%	95%	96% / 91%
FINAL CONDITIONS	WATER CONTENT	w_f	35.5%	34.5%	30.9 % / 34.4
	SKETCH OF SAMPLE AT END OF TEST				

RATE OF STRAIN PERCENT / MINUTE	0.24	.010	.010 / .007

BORING NO. 141
SAMPLE NO. 4
DEPTH 18.0' TO 20.0'

SOIL DESCRIPTION SILTY CLAY (CL)

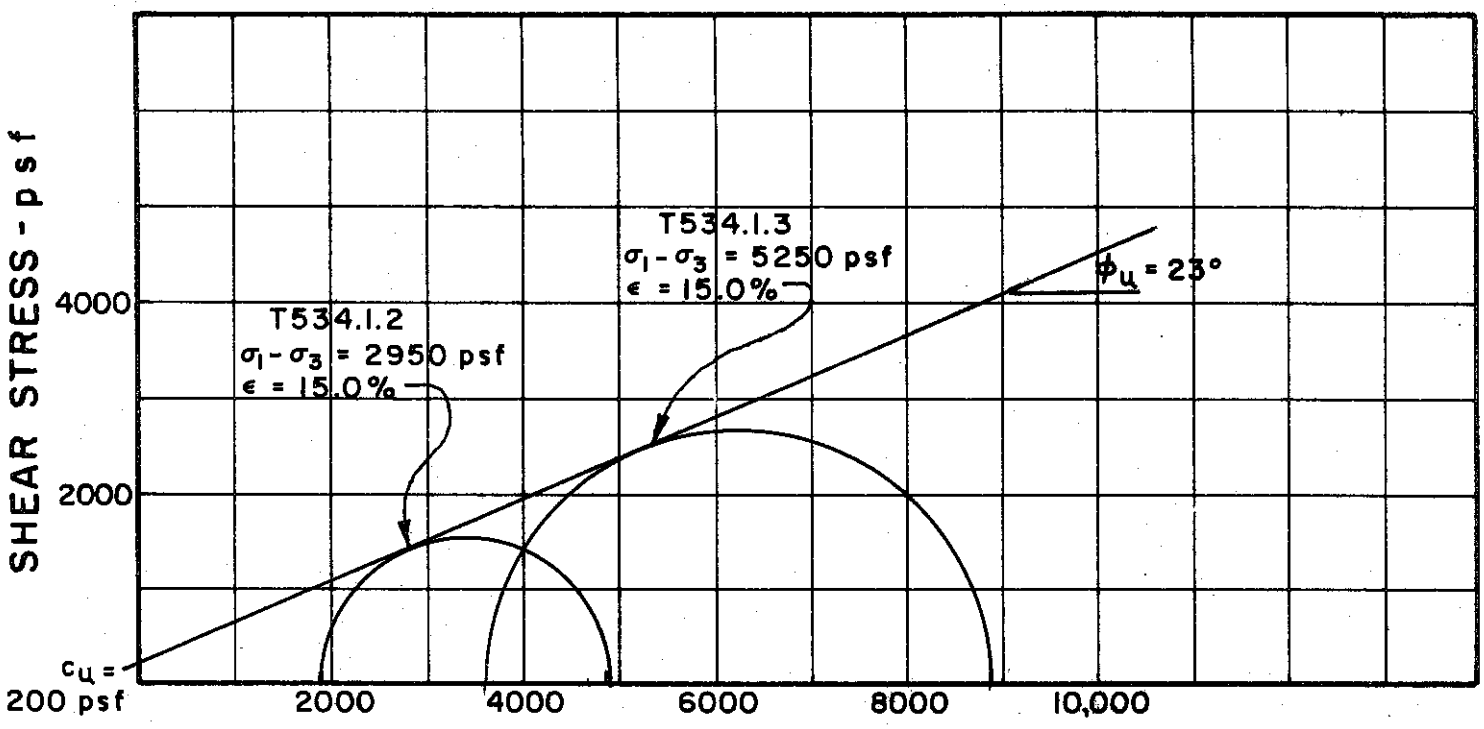
LIQUID LIMIT 45 PLASTIC LIMIT 21

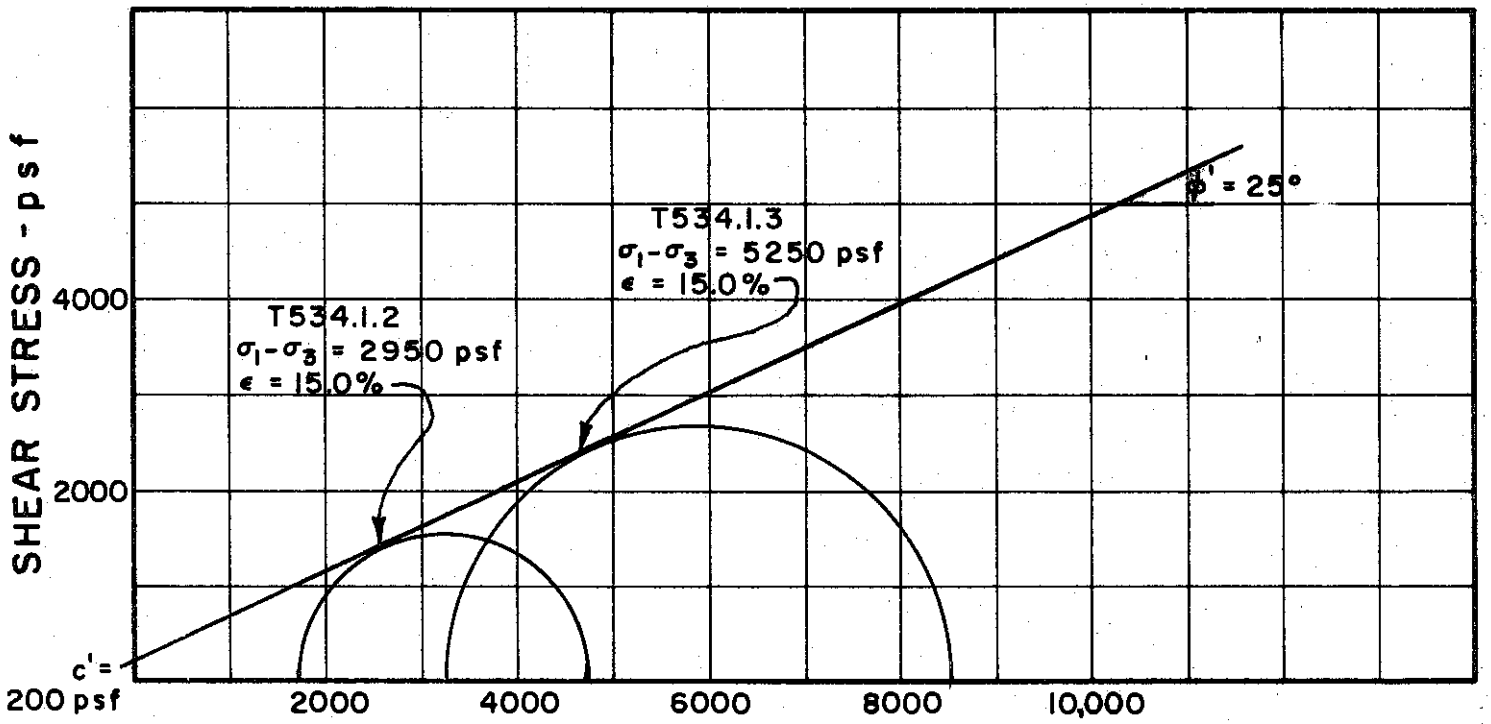
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-446

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 142

SAMPLE NO. 3

DEPTH 14.0' TO 16.1'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

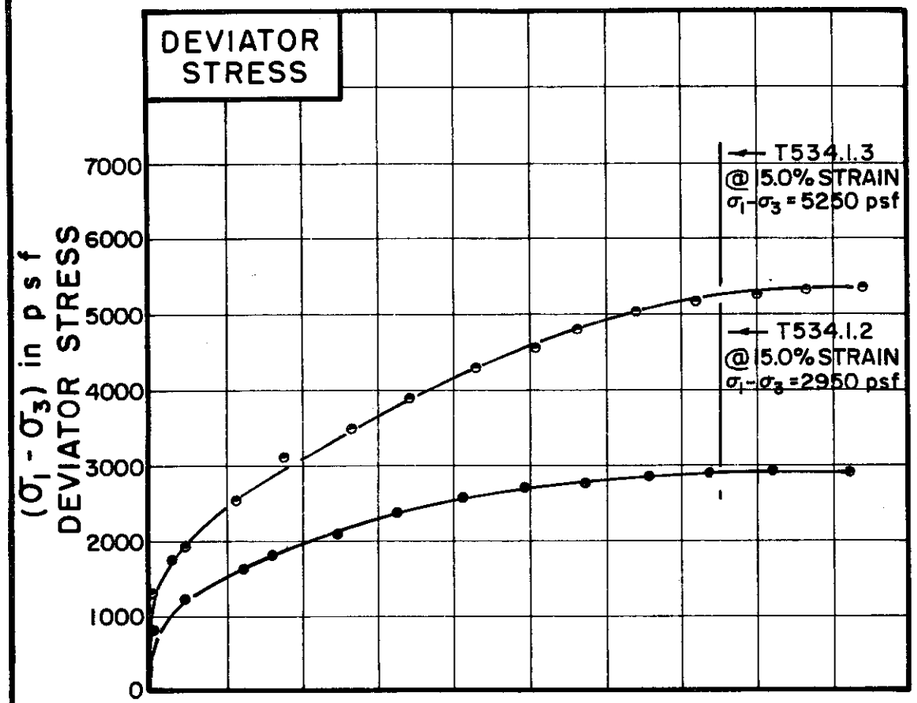
MOHR STRENGTH ENVELOPE

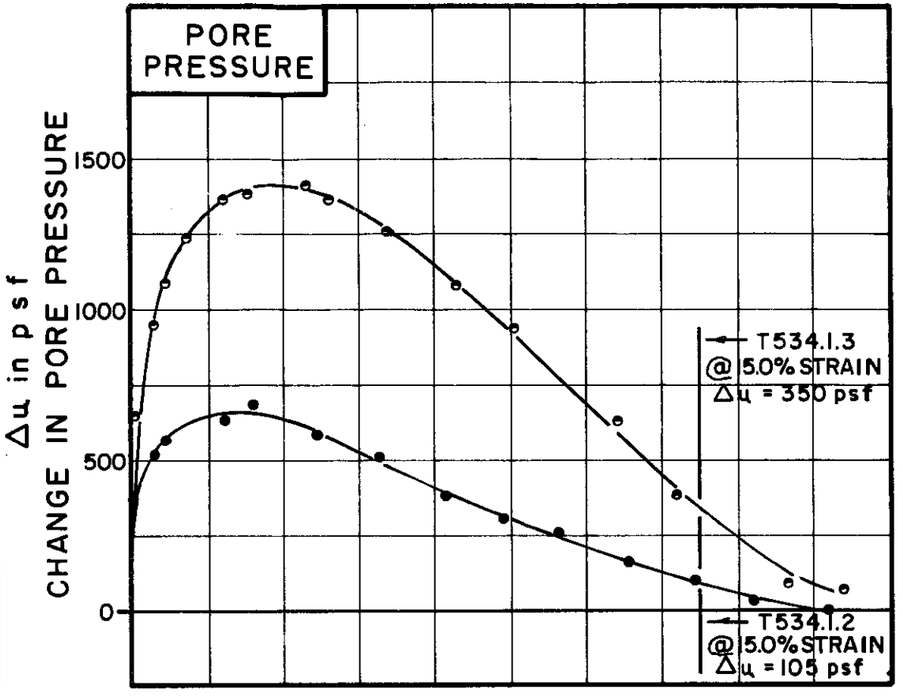
TRIAXIAL COMPRESSION TESTS

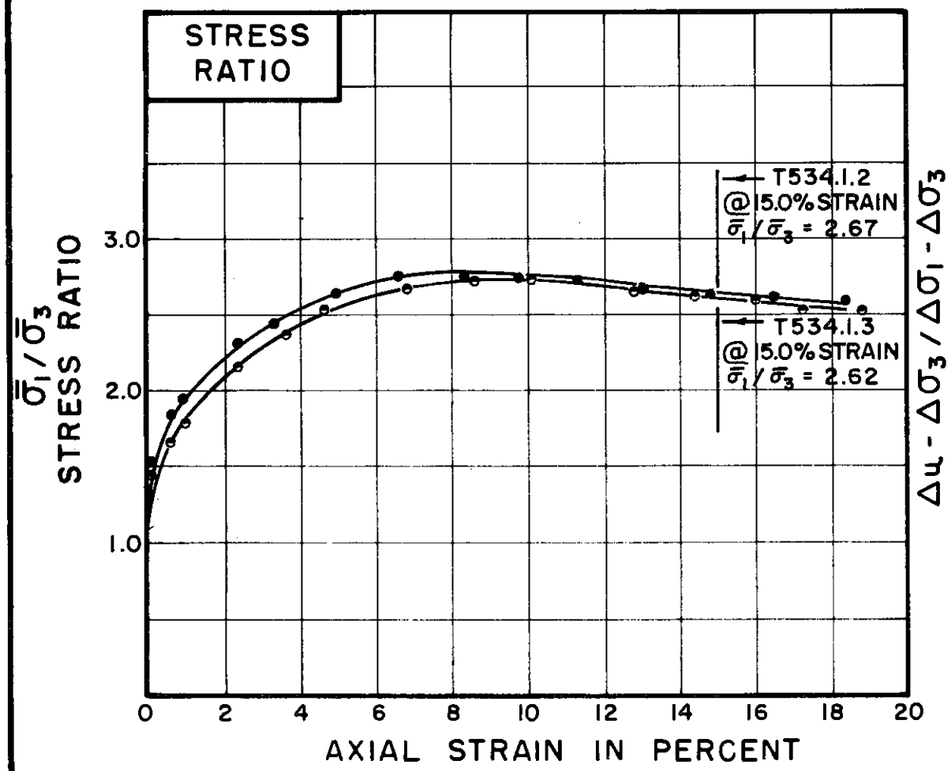
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

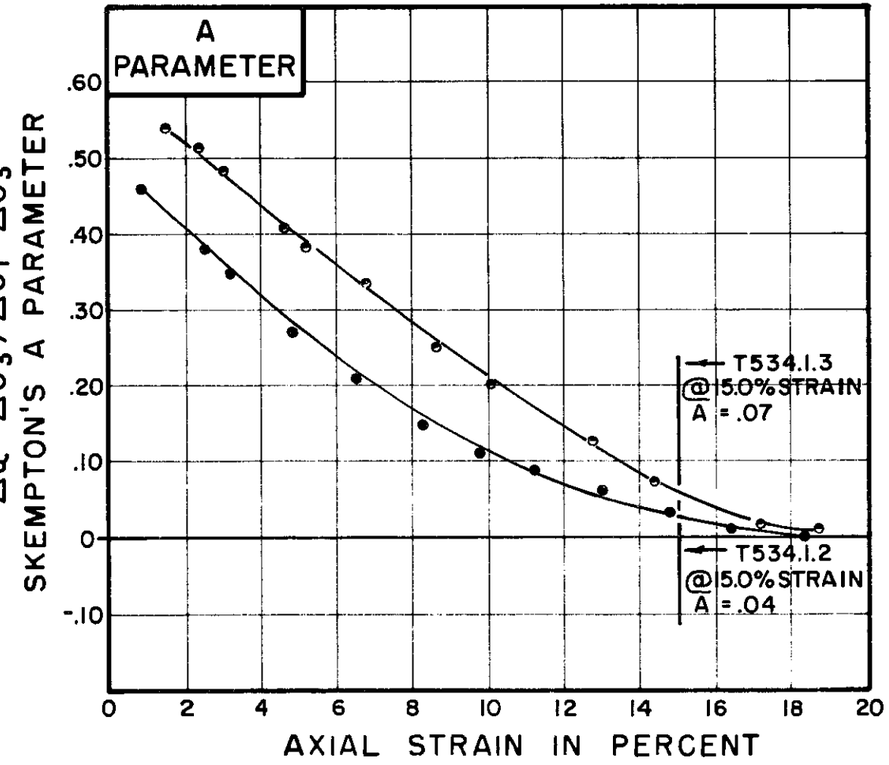
FILE 1255

C-447









TEST NO. / SYMBOL		T534.1.2 ●	T534.1.3 ○	
INITIAL CONDITIONS	WATER CONTENT	w_o	15.3%	15.1%	%
	DRY DENSITY lb/cu ft	γ_d	105	105	
	SAMPLE DIAMETER in.	D_o	1.385	1.37	
	SAMPLE HEIGHT in	H_o	3.05	3.31	
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE psf	u_o	20160	23155	
	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1872	3600	
	VOLUMETRIC STRAIN	ϵ_{vol}	0.13%	0.13%	%
	PORE PRESSURE RESPONSE		97%	94%	
FINAL CONDITIONS	WATER CONTENT	w_f	29.0%	24.1%	%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.0078	.0072	

BORING NO. 142
SAMPLE NO. 3
DEPTH 14.0' TO 16.1'

SOIL DESCRIPTION SILTY CLAY (CL)

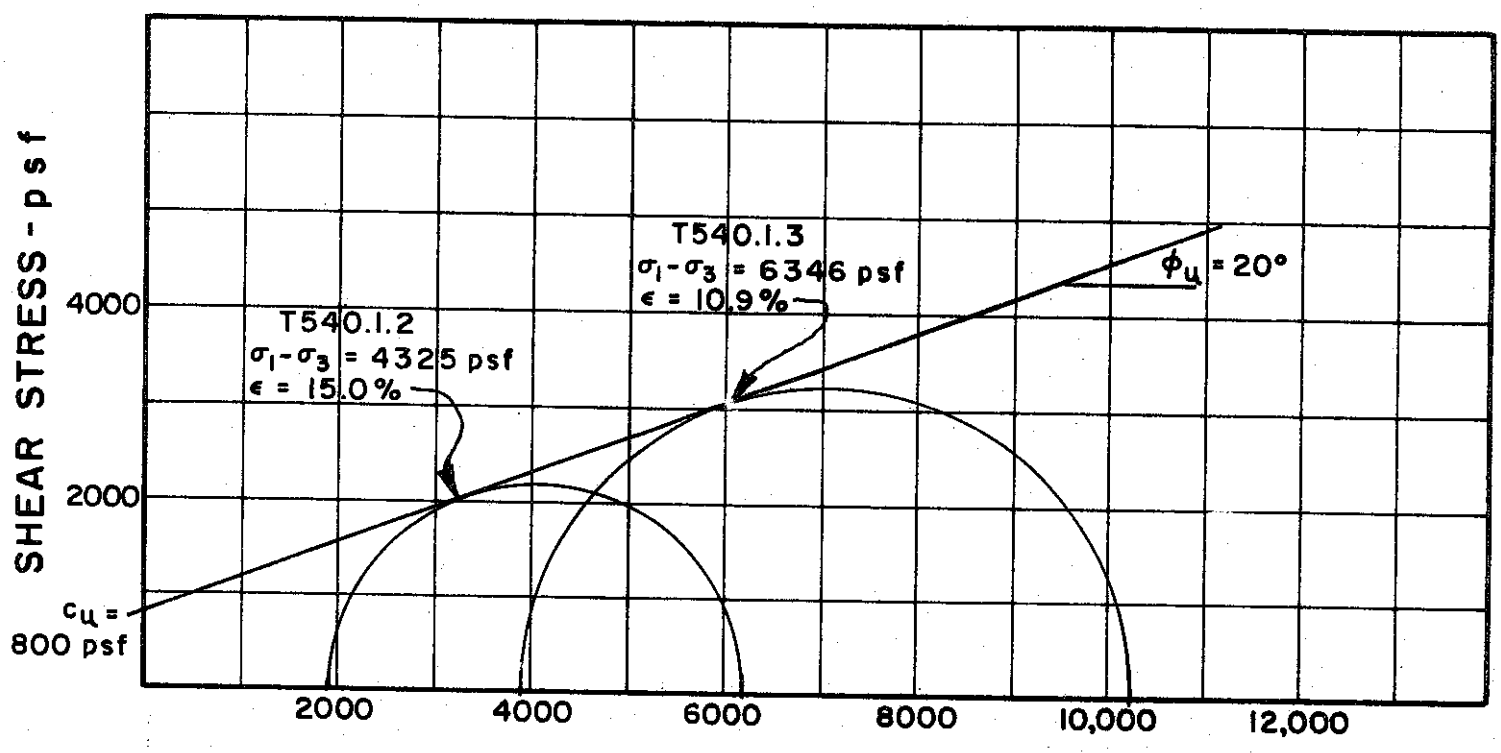
LIQUID LIMIT 47 PLASTIC LIMIT 22

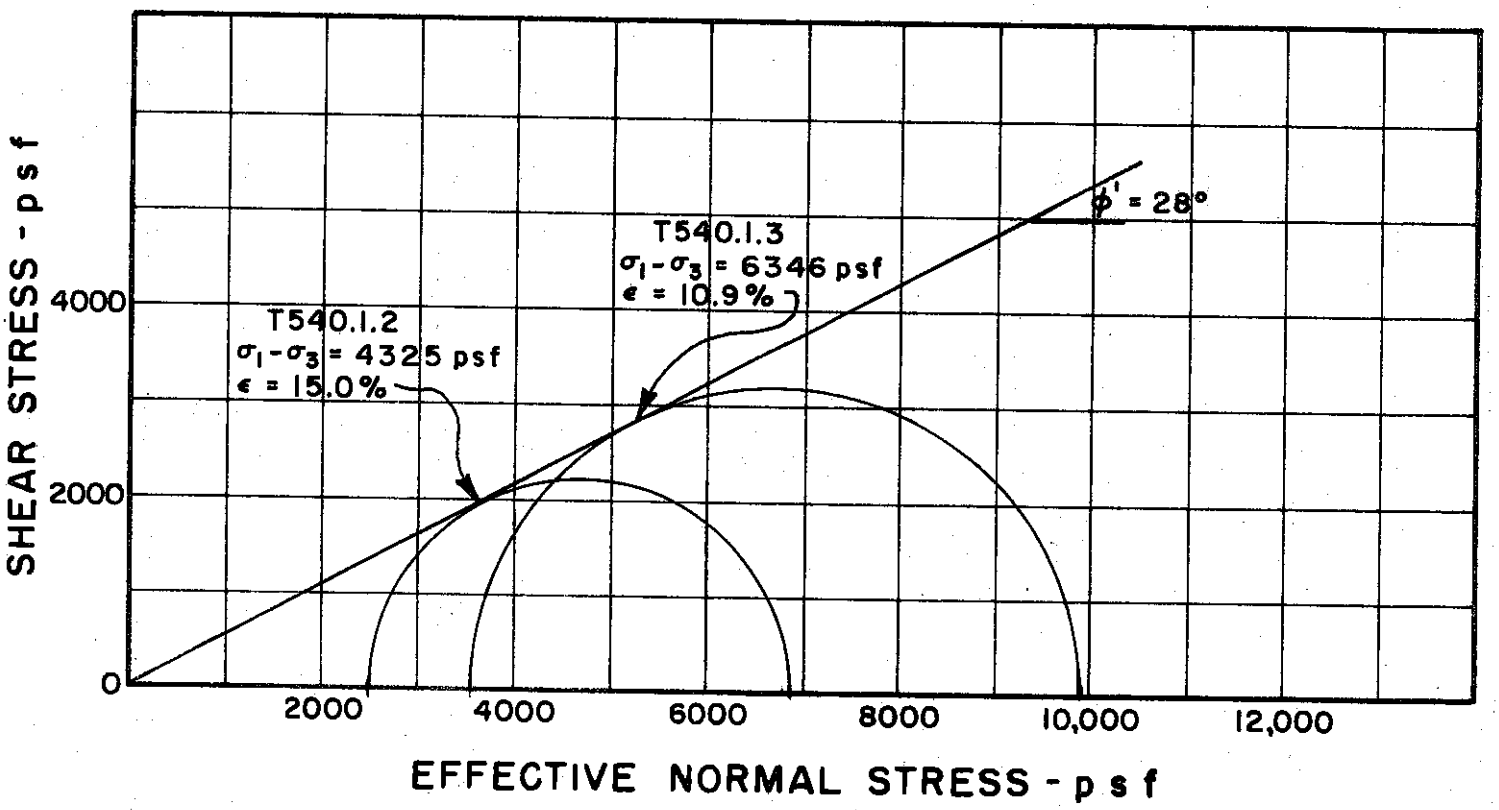
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-448

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 146

SAMPLE NO. ST 3

DEPTH 6.0' TO 7.8'

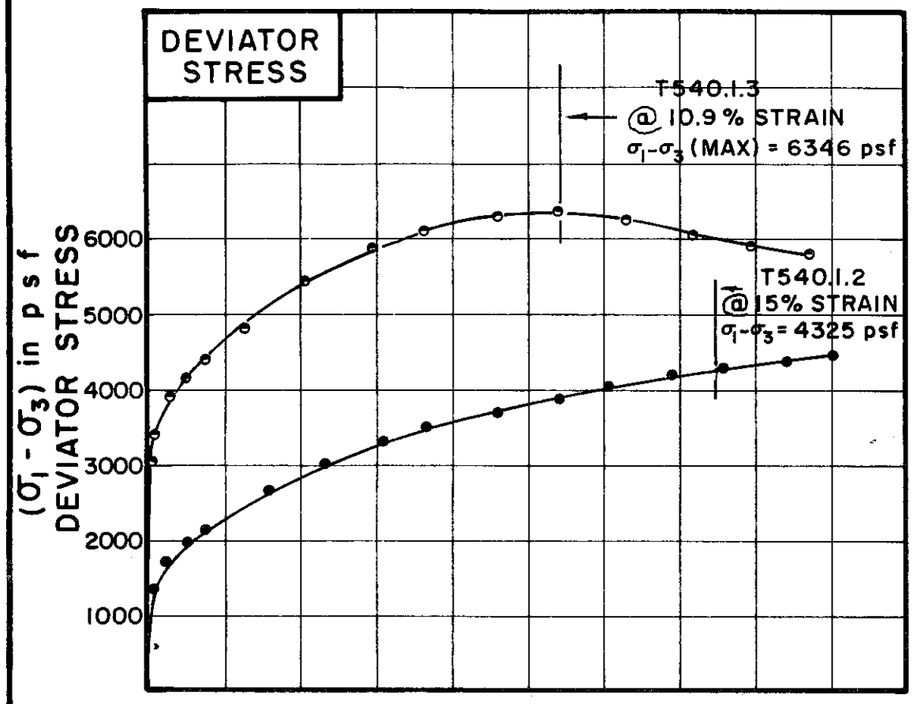
REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

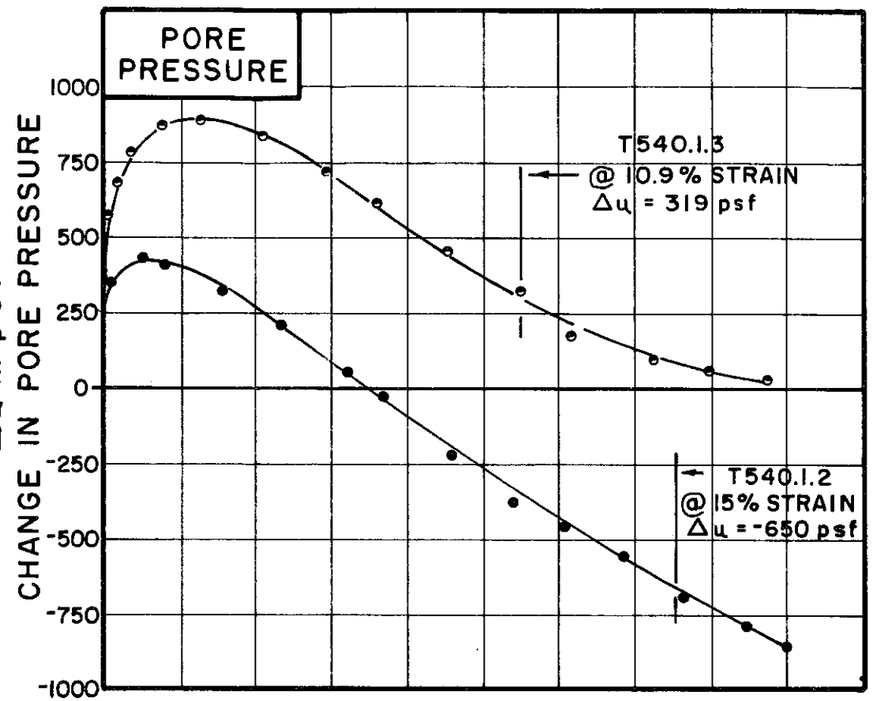
GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

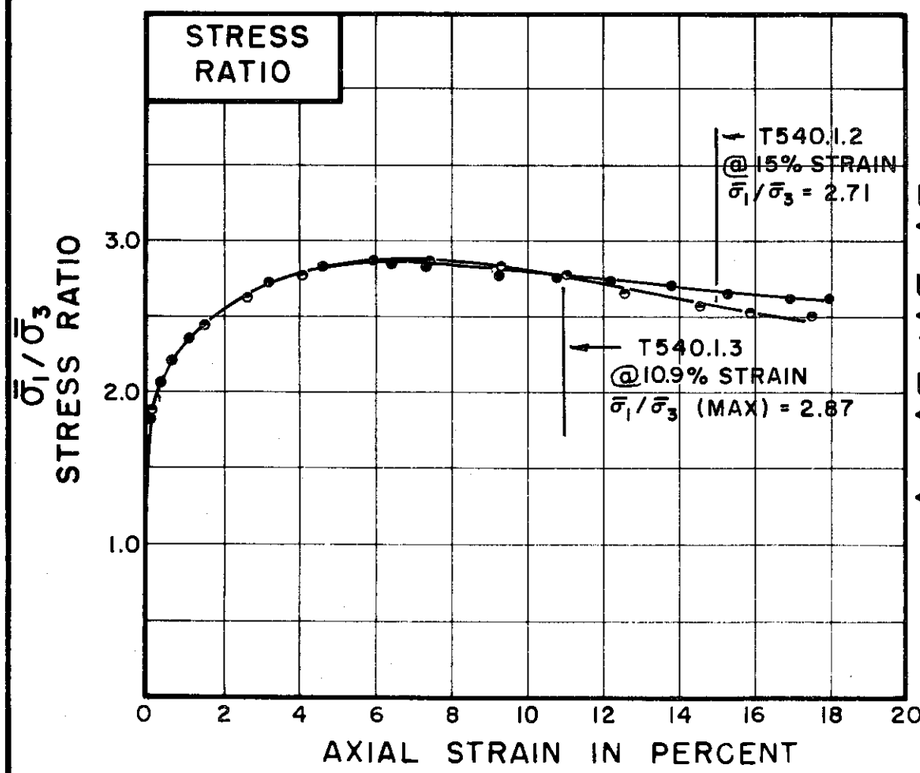
MOHR STRENGTH ENVELOPE

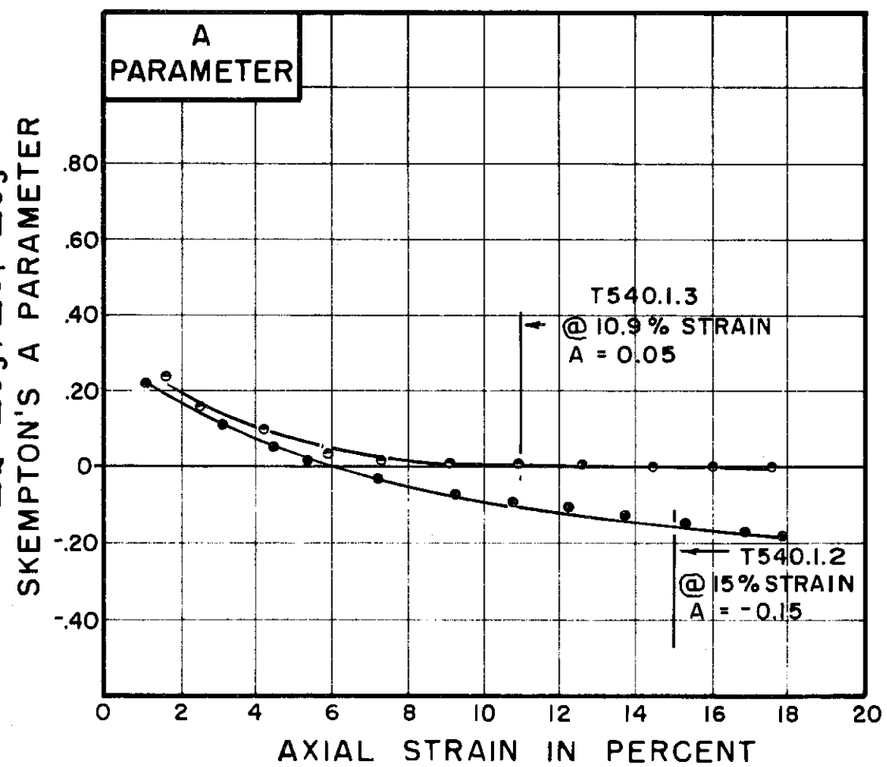
TRIAXIAL COMPRESSION TESTS

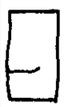
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
FILE 1255
C-449









TEST NO. / SYMBOL	T540.1.2 ●	T540.1.3 ○	
INITIAL CONDITIONS — WATER CONTENT	w_o	14.4%	14.2%	%
INITIAL CONDITIONS — DRY DENSITY lb/cu ft	γ_d	108	108	
INITIAL CONDITIONS — SAMPLE DIAMETER in.	D_o	1.35	1.37	
INITIAL CONDITIONS — SAMPLE HEIGHT in	H_o	3.27	3.02	
CONDITIONS BEFORE SHEAR — FINAL BACK PRESSURE psf	u_o	25344	25344	
CONDITIONS BEFORE SHEAR — INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	1872	3888	
CONDITIONS BEFORE SHEAR — VOLUMETRIC STRAIN	ϵ_{vol}	1.82%	4.12%	%
CONDITIONS BEFORE SHEAR — PORE PRESSURE RESPONSE		97%	96%	
FINAL CONDITIONS — WATER CONTENT	w_f	24.4%	23.2%	%
FINAL CONDITIONS — SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT/MINUTE		.0073	.0079	

BORING NO. 146
SAMPLE NO. ST 3
DEPTH 6.0' TO 7.8'

SOIL DESCRIPTION SILTY CLAY (CL)

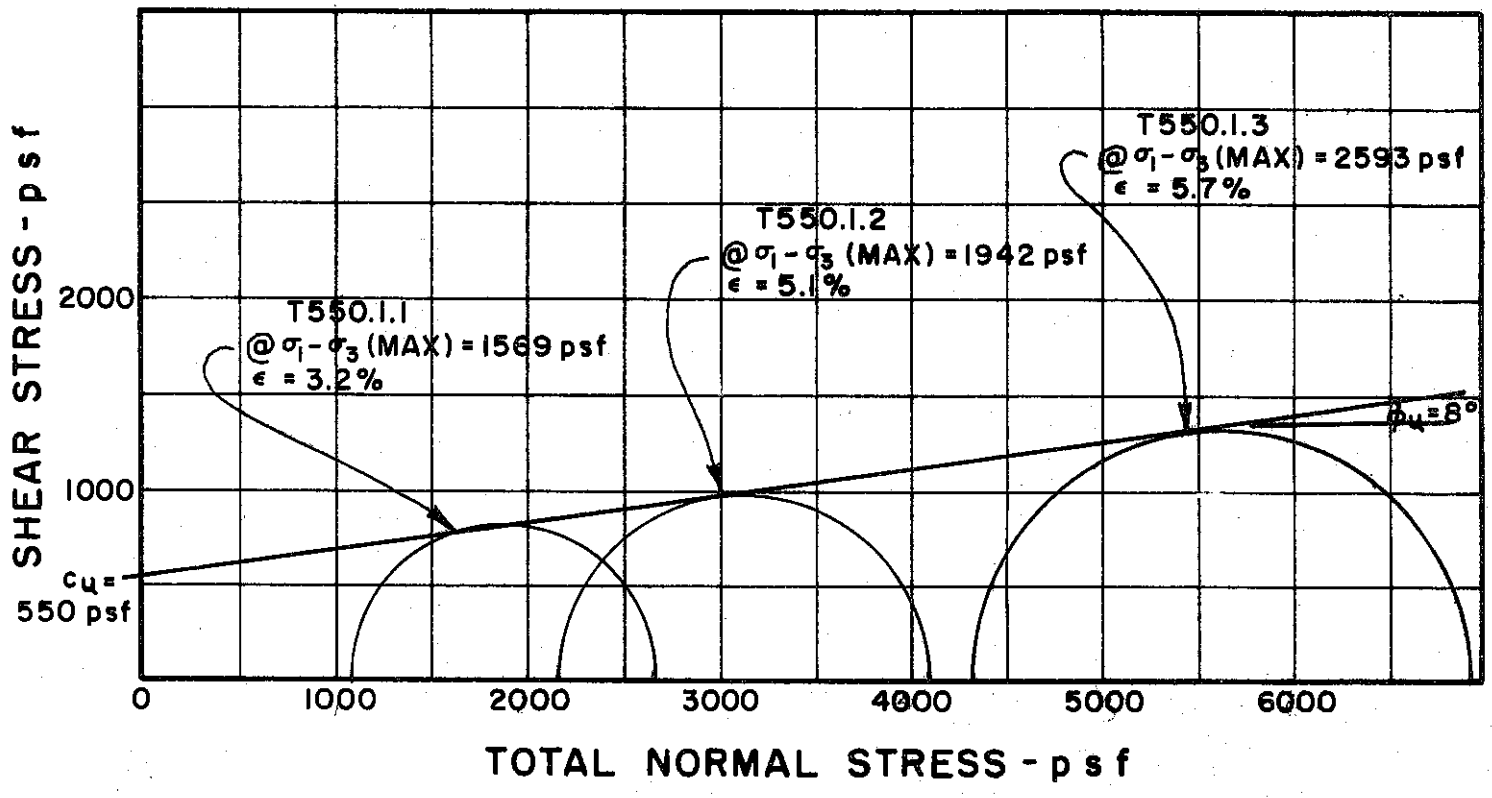
LIQUID LIMIT 44 PLASTIC LIMIT 21

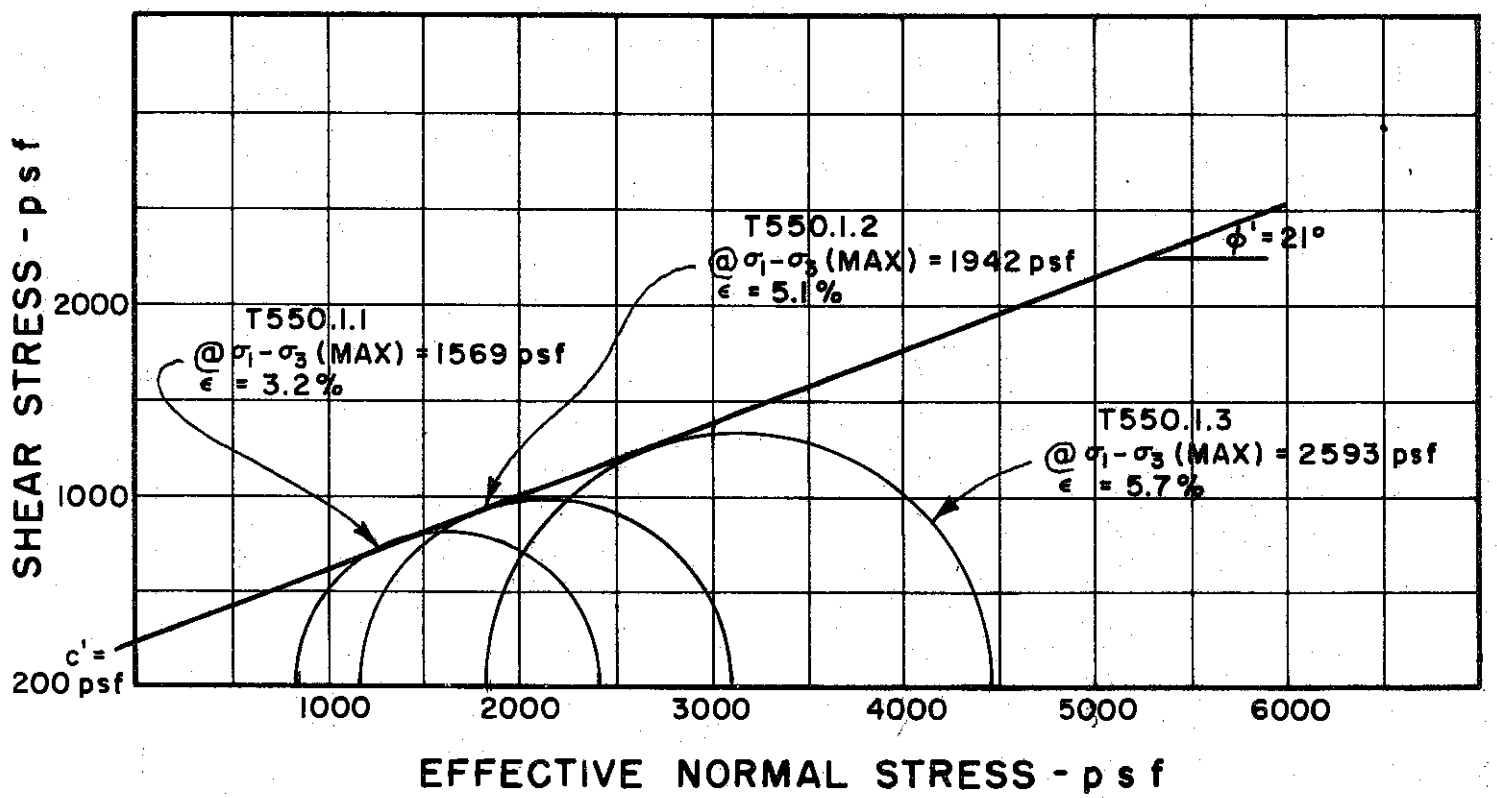
CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-450

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING





BORING NO. 158

SAMPLE NO. 4

DEPTH 17.5' TO 20.0'

REMARKS ENVELOPE IS INTERPRETIVE, BASED ON LIMITED DATA POINTS AVAILABLE

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

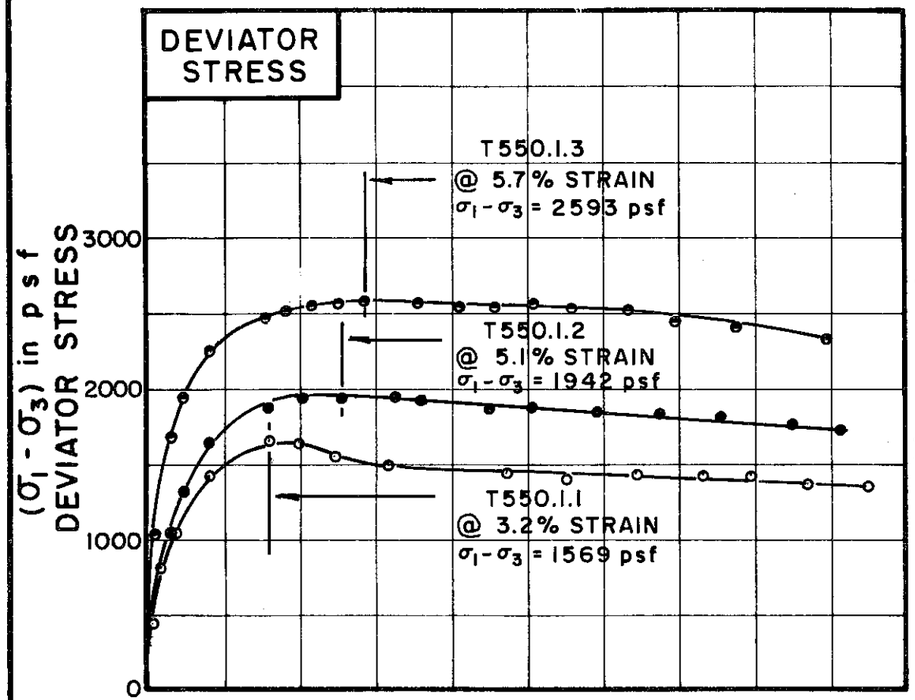
MOHR STRENGTH ENVELOPE

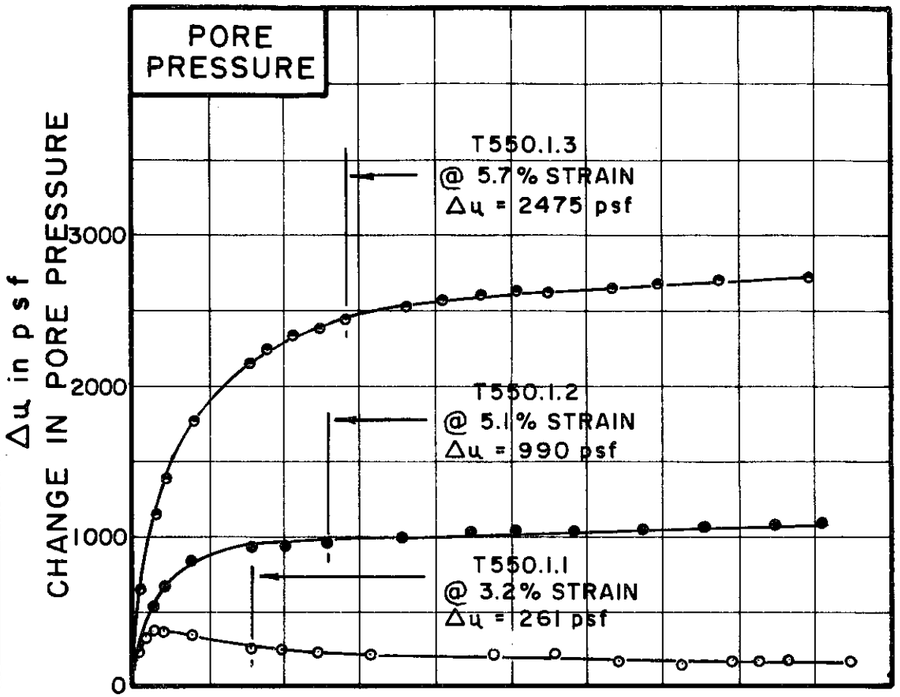
TRIAXIAL COMPRESSION TESTS

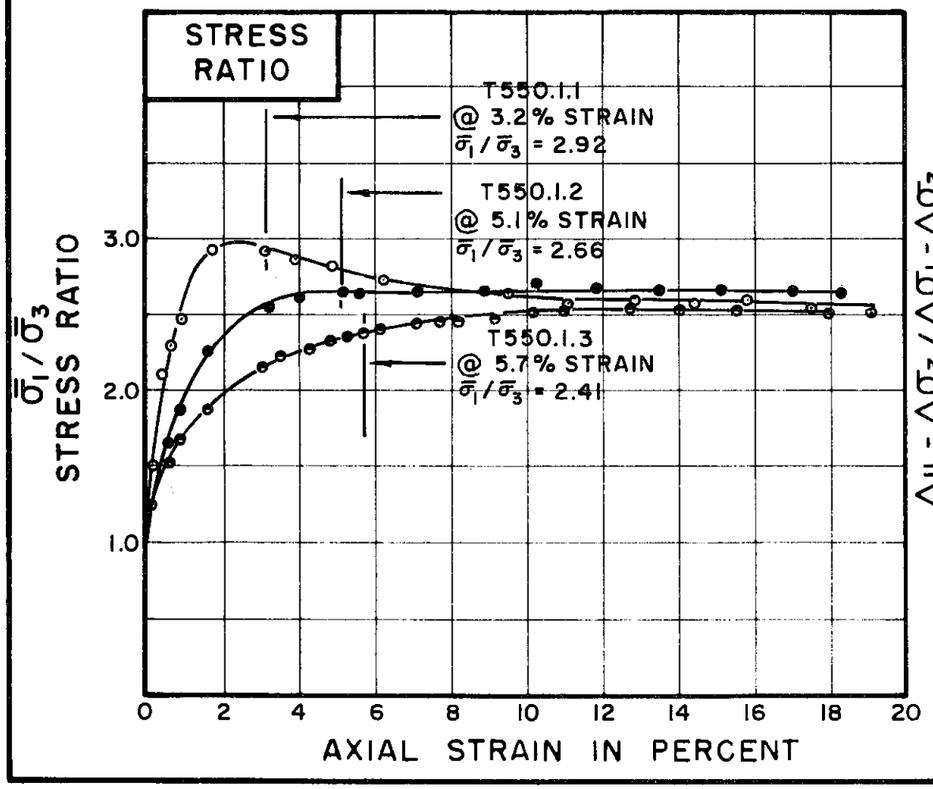
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

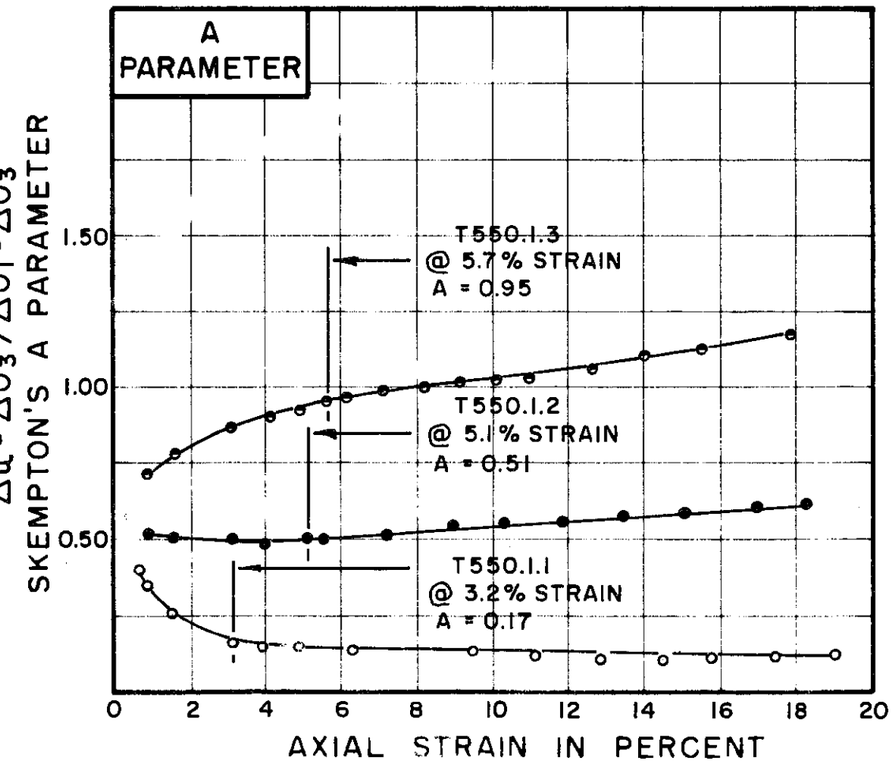
FILE 1255

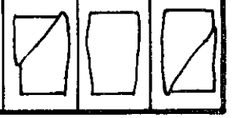
C-451









TEST NO. / SYMBOL		T550.1.1 ○	T550.1.2 ●	T550.1.3 ⊖
INITIAL CONDITIONS	WATER CONTENT	w_o	37.5%	33.5%	37.1%
	DRY DENSITY lb/cu ft	γ_d	83	87	83
	SAMPLE DIAMETER in.	D_o	1.40	1.40	1.40
	SAMPLE HEIGHT in	H_o	3.16	3.18	3.19
CONDITIONS BEFORE SHEAR	FINAL BACK PRESSURE p s f	u_o	8640	10080	15840
	INITIAL EFFECTIVE STRESS p s f	$\bar{\sigma}_1 = \bar{\sigma}_3$	1080	2160	4320
	VOLUMETRIC STRAIN	ϵ_{vol}	1.4 %	2.4 %	4.2 %
	PORE PRESSURE RESPONSE		95%	95%	96%
FINAL CONDITIONS	WATER CONTENT	w_f	37.4%	32.2%	33.4%
	SKETCH OF SAMPLE AT END OF TEST				
RATE OF STRAIN PERCENT / MINUTE			.025	.025	.008

BORING NO. 158
SAMPLE NO. 4
DEPTH 17.5' TO 20.0'

SOIL DESCRIPTION SILTY CLAY (CL)

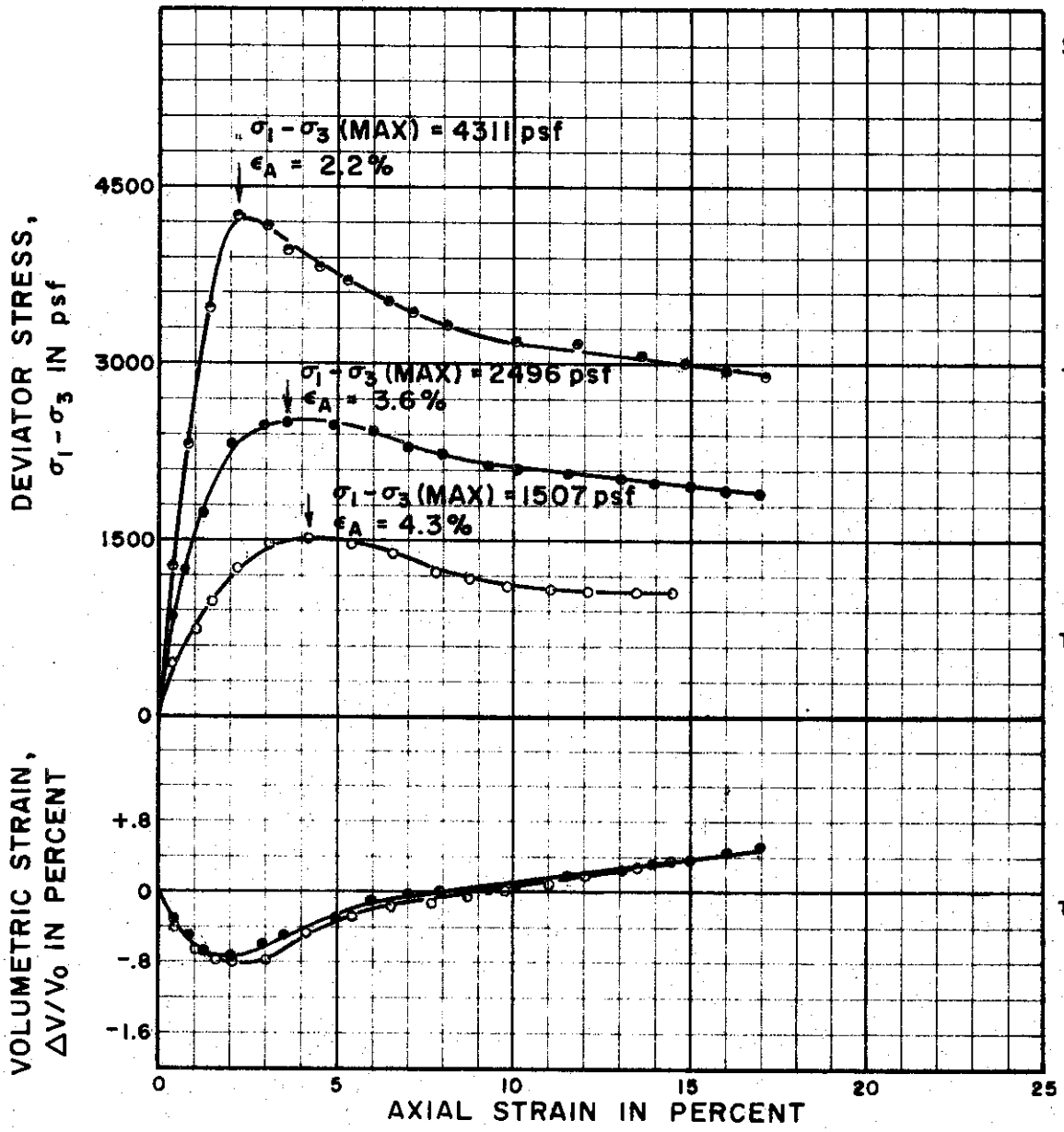
LIQUID LIMIT 46 PLASTIC LIMIT 19

CONSOLIDATED UNDRAINED
TRIAXIAL COMPRESSION
TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255
C-452

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING



SKETCHES AT FAILURE

TEST NO. 253.2.3

TEST NO. 253.2.2

TEST NO. 253.2.1

TEST NO./SYMBOL			253.2.1 ○	253.2.2 ●	253.2.3 ●
INITIAL CONDITIONS	INITIAL WATER CONTENT %	w_o	23.0	23.3	24.2
	INITIAL UNIT WEIGHT pcf	γ_d	107	105	103
	SAMPLE HEIGHT & DIAMETER in	D_o / H_o	1.39 / 3.51	1.39 / 3.46	1.41 / 3.43
CONDITIONS BEFORE SHEAR	INITIAL EFFECTIVE STRESS psf	$\bar{\sigma}_1 = \bar{\sigma}_3$	576	1152	2304
	FINAL BACK PRESSURE psf	u_o	7776	8352	7776
	VOLUMETRIC STRAIN %	ϵ_{vol}	.94	1.28	2.74
	PORE PRESSURE RESPONSE %		99	97	96
FINAL CONDITIONS	FINAL WATER CONTENT %	w_f	26.8	26.1	25.8
	FINAL UNIT WEIGHT pcf	γ_d	107	106	—
RATE OF STRAIN PERCENT PER MINUTE			.002	.002	.002

BORING NO. 118

SAMPLE NO. 2

DEPTH 8.2' TO 9.2'

SOIL DESCRIPTION SILTY CLAY (CL-CH)

LIQUID LIMIT 49 PLASTIC LIMIT 23

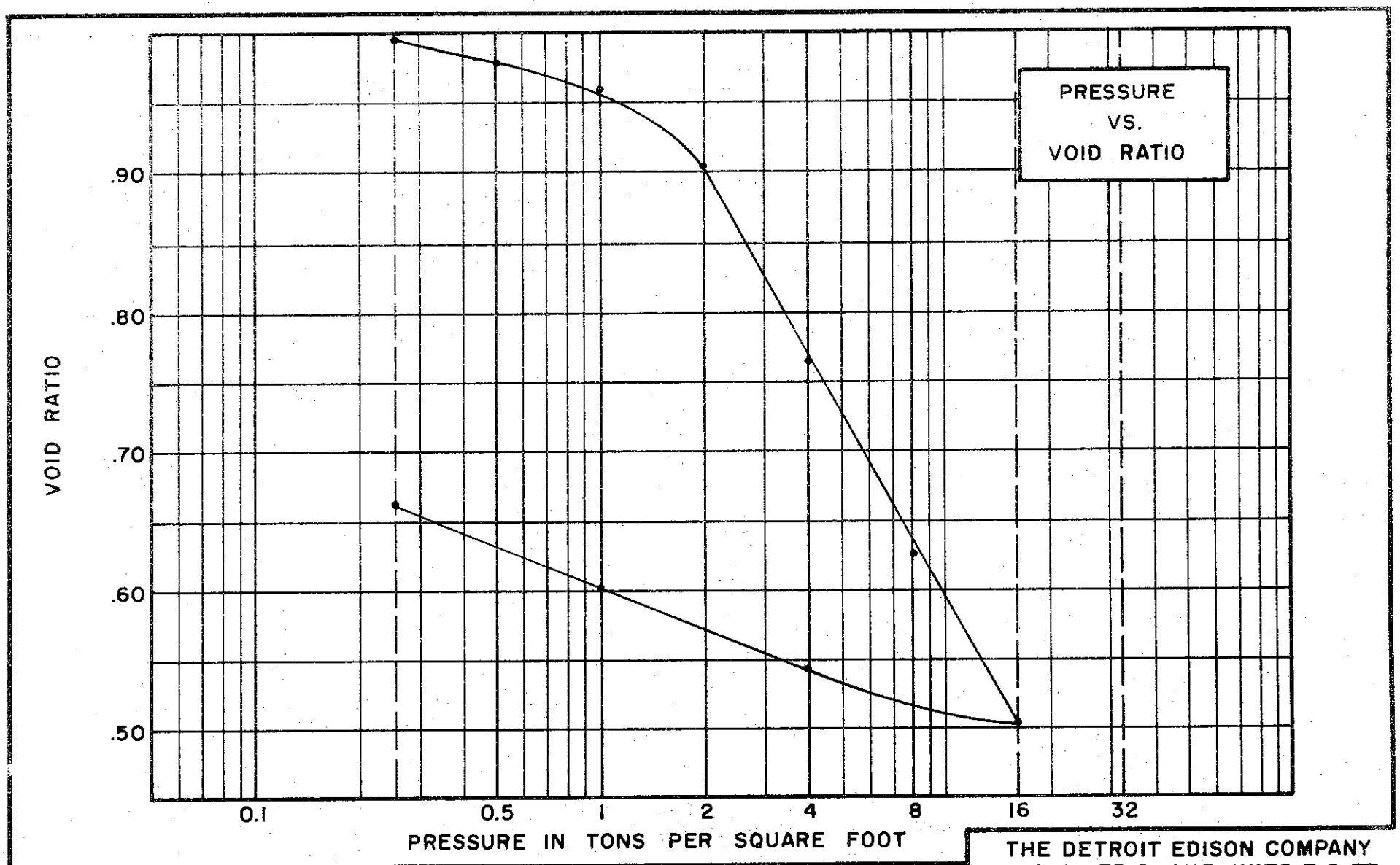
CONSOLIDATED DRAINED TRIAXIAL COMPRESSION TESTS

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-453

GOLDBERG-ZOINO AND ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.73

WATER CONTENT, INITIAL 38.6% FINAL 27.9%

ATTERBERG LIMITS:
LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.016

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

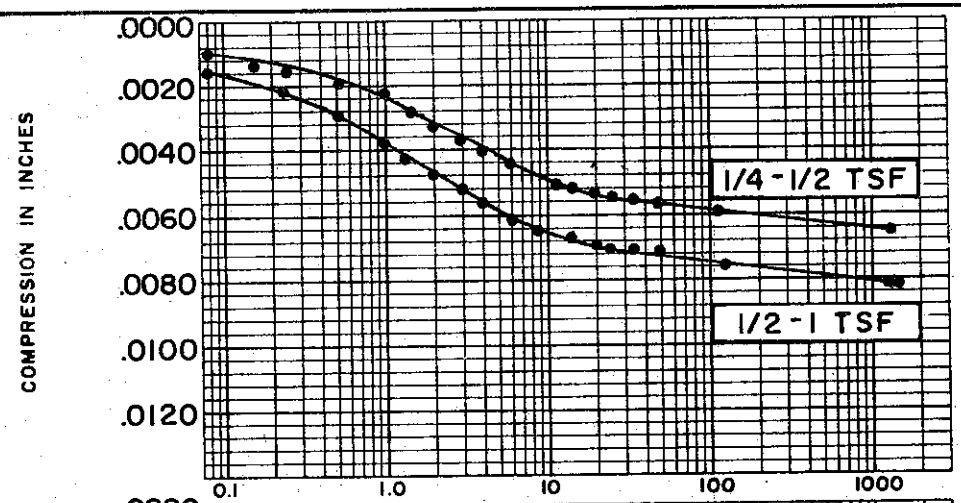
BORING NO. 27 TEST NO. C306.1

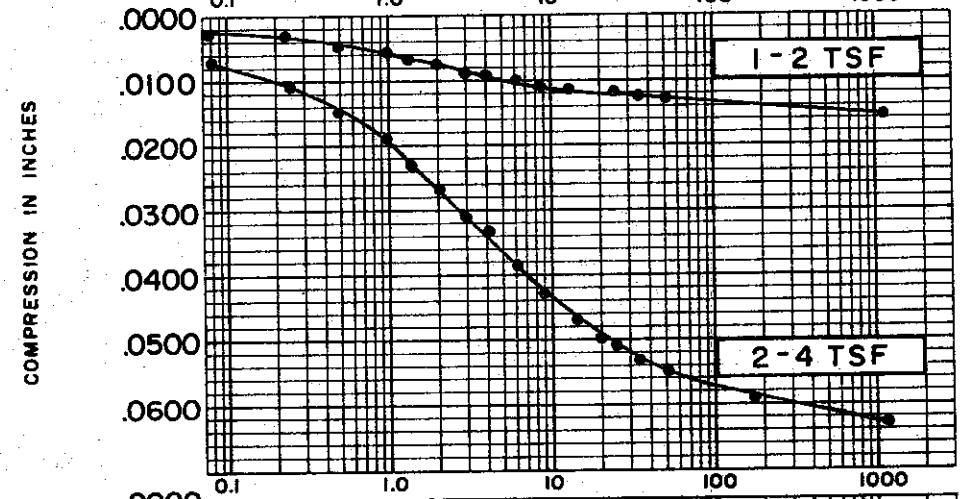
SAMPLE NO. 10 DATE APRIL 74

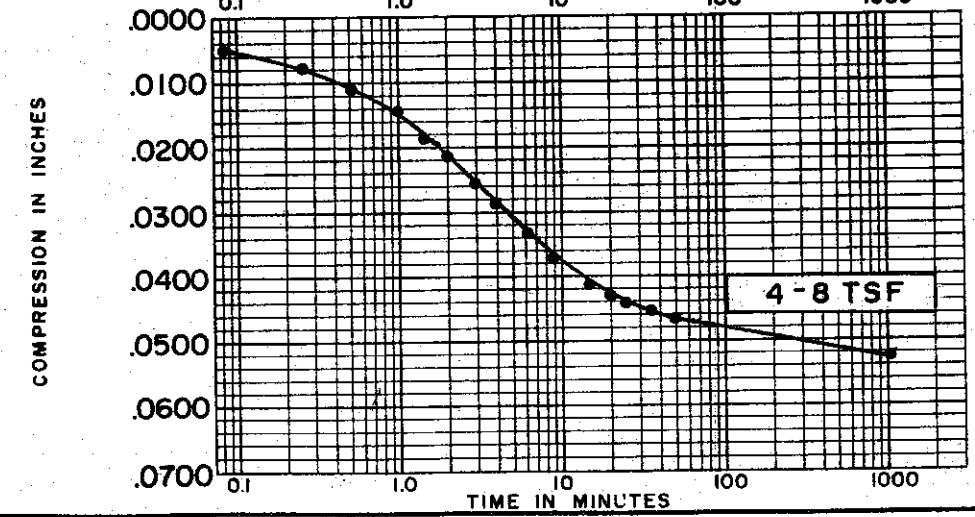
DEPTH 34.0' TO 34.3'

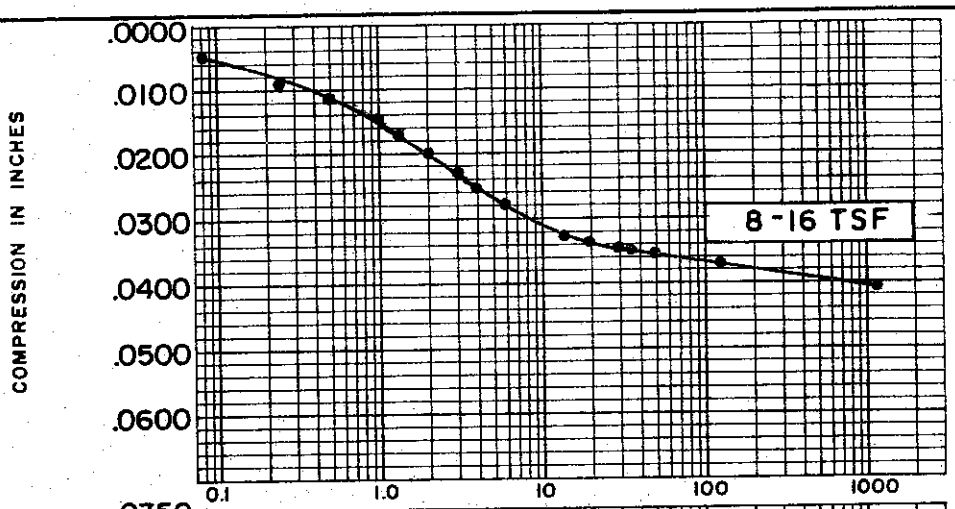
C-455

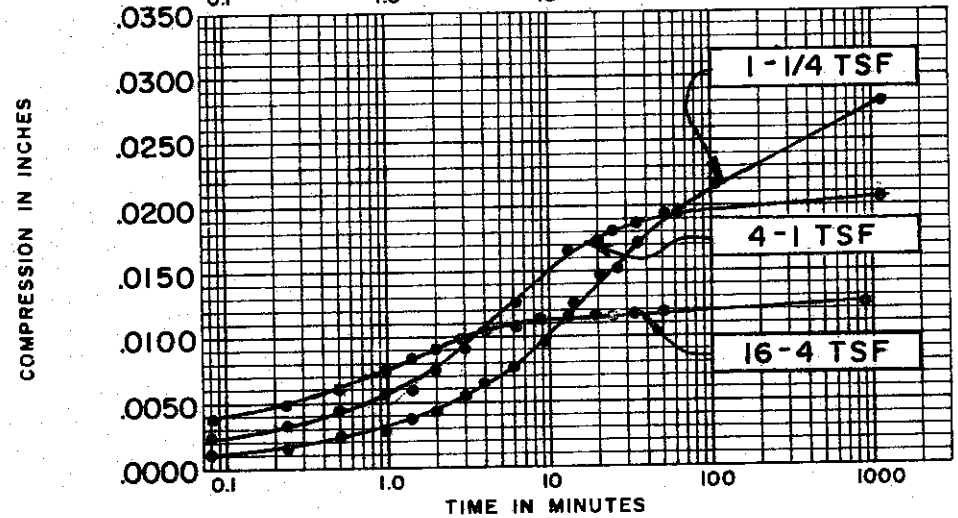
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 38.6%
FINAL WATER CONTENT 27.9%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.016

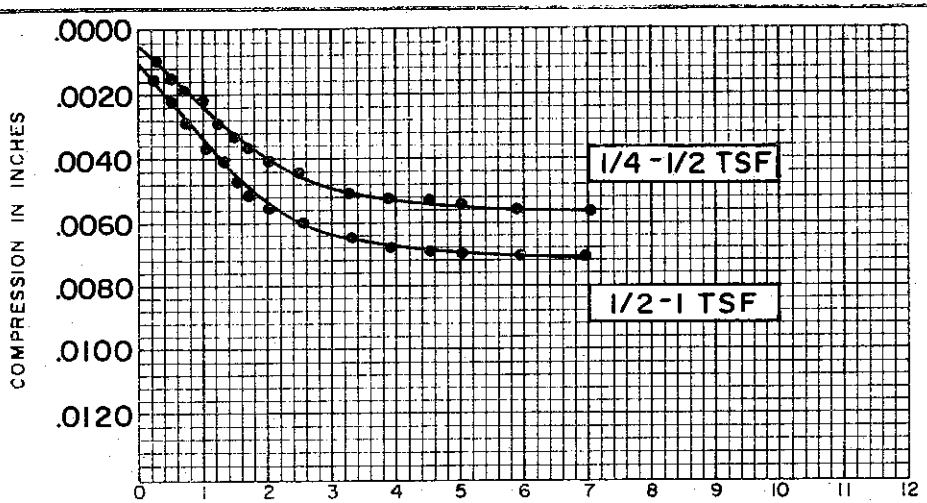
BORING NO. 27
SAMPLE NO. 10
DEPTH 34.0' TO 34.3'

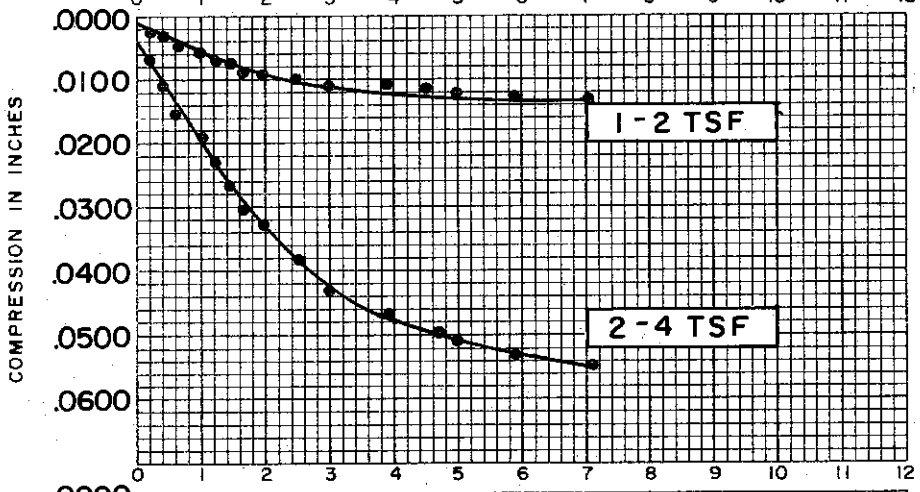
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

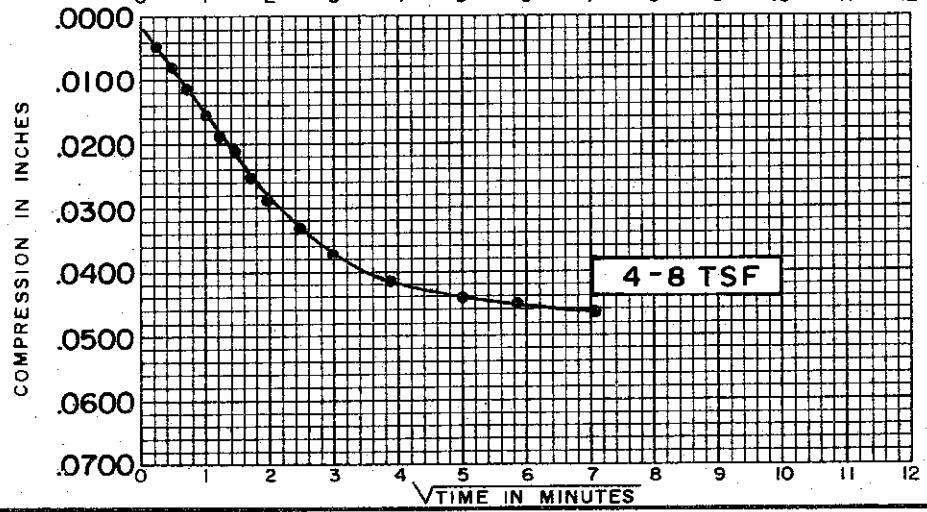
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

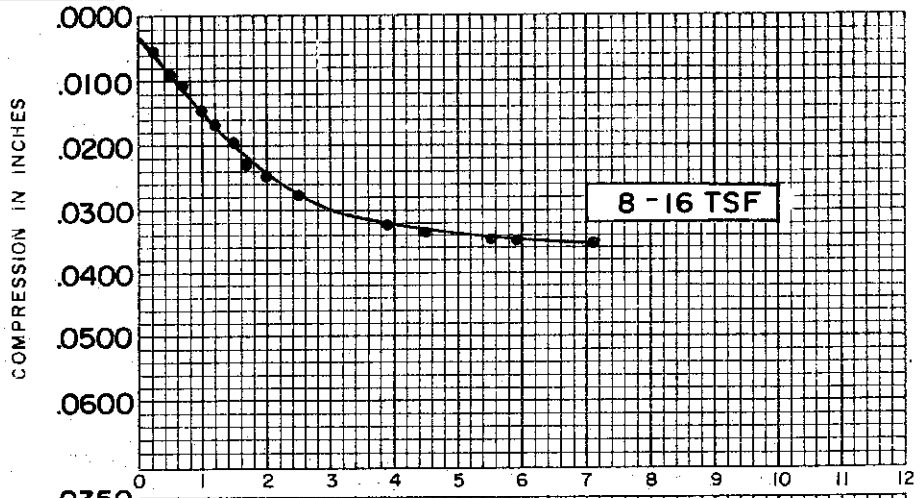
FILE 1255

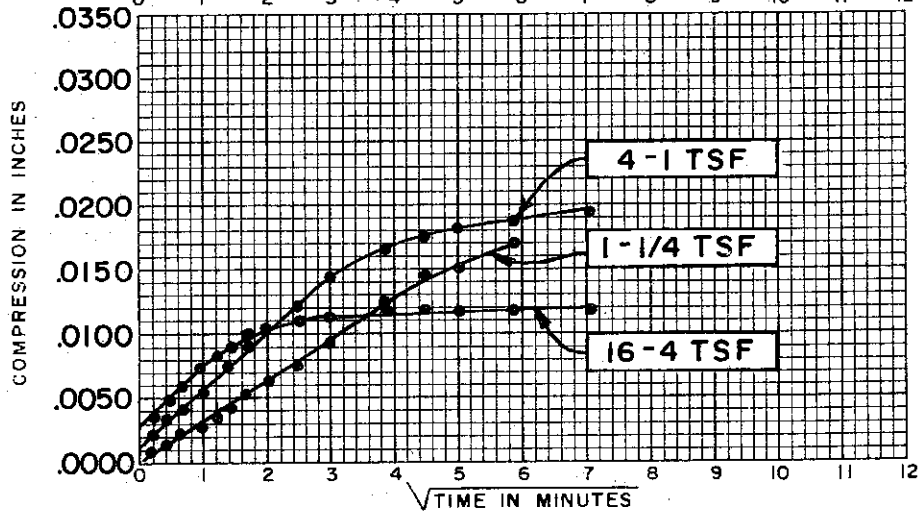
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 38.6%
FINAL WATER CONTENT 27.9%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.016

BORING NO. 27
SAMPLE NO. 10
DEPTH 34.0' TO 34.3'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

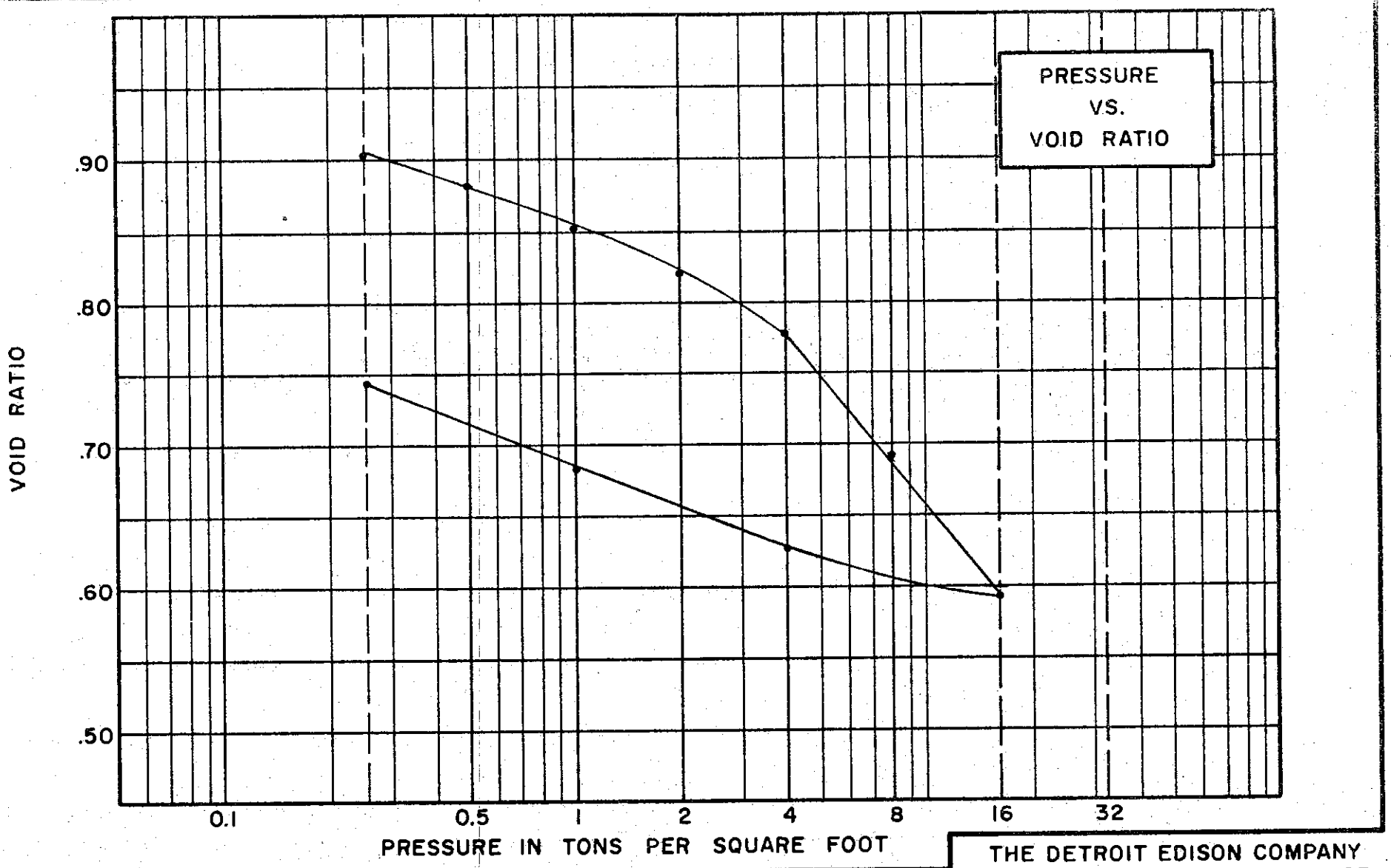
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-457

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-458



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY; SANDY (CL)

SPECIFIC GRAVITY 2.74

WATER CONTENT, INITIAL 33% FINAL 30%

ATTERBERG LIMITS:

LIQUID LIMIT 43 % PLASTIC LIMIT 25 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.910

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

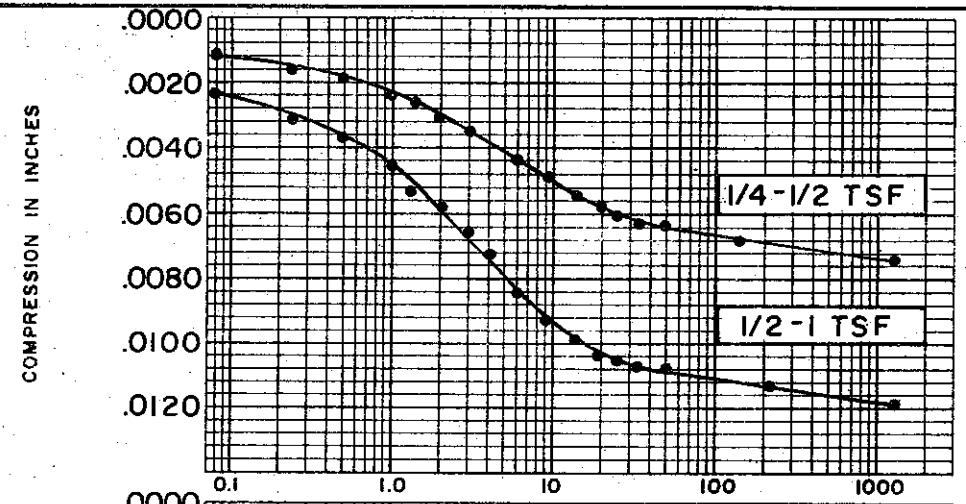
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

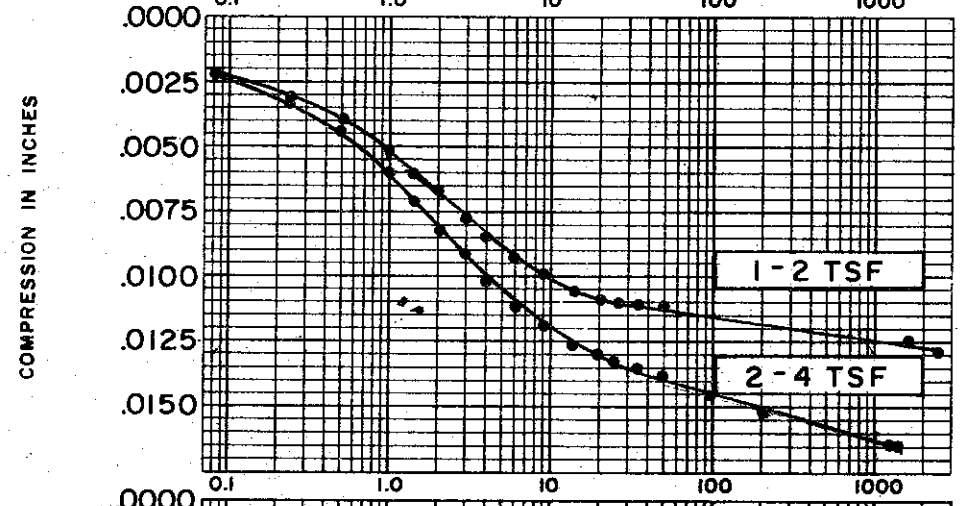
BORING NO. 27 TEST NO. C313.1

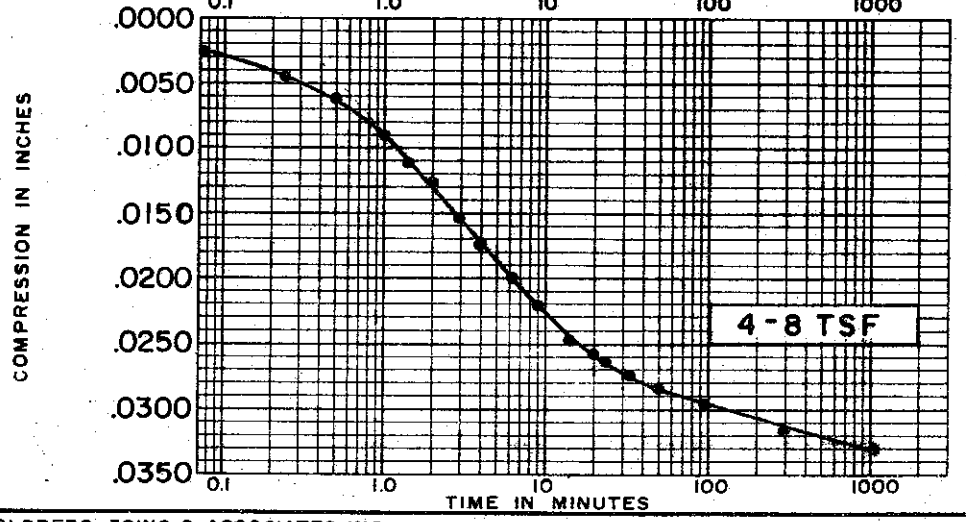
SAMPLE NO. 24 DATE APRIL 74

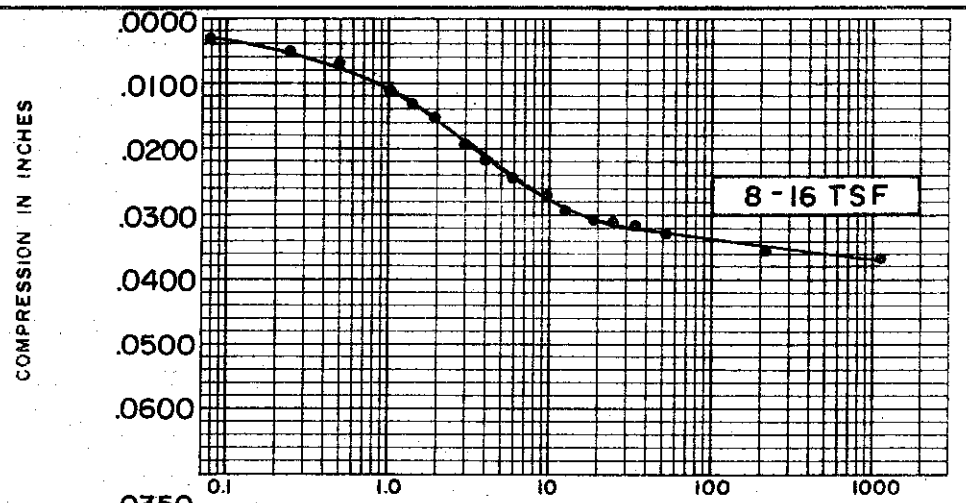
DEPTH 104.2' TO 104.5'

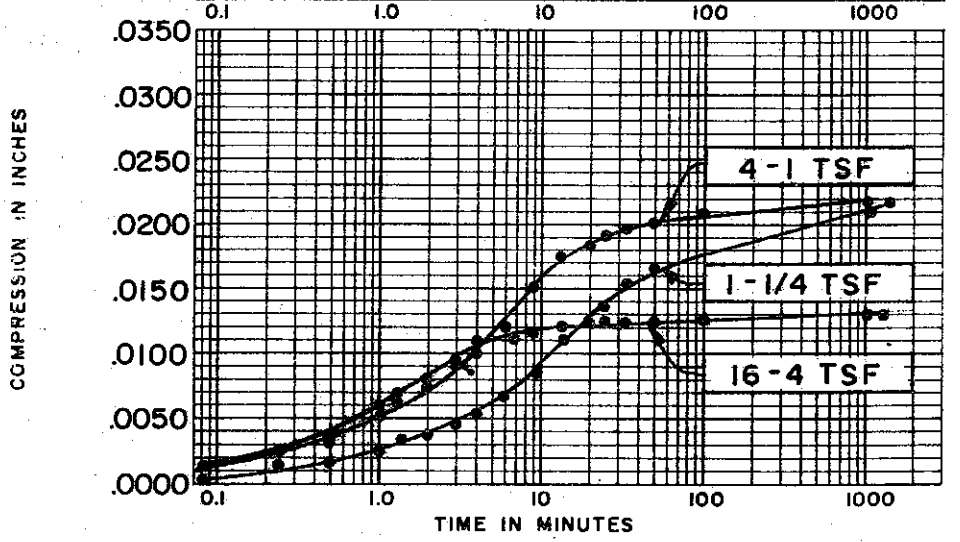
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY; SANDY (CL)
SPECIFIC GRAVITY 2.74
INITIAL WATER CONTENT 33.9%
FINAL WATER CONTENT 30.0%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.910

BORING NO. 27
SAMPLE NO. 24
DEPTH 104.2' TO 104.5'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

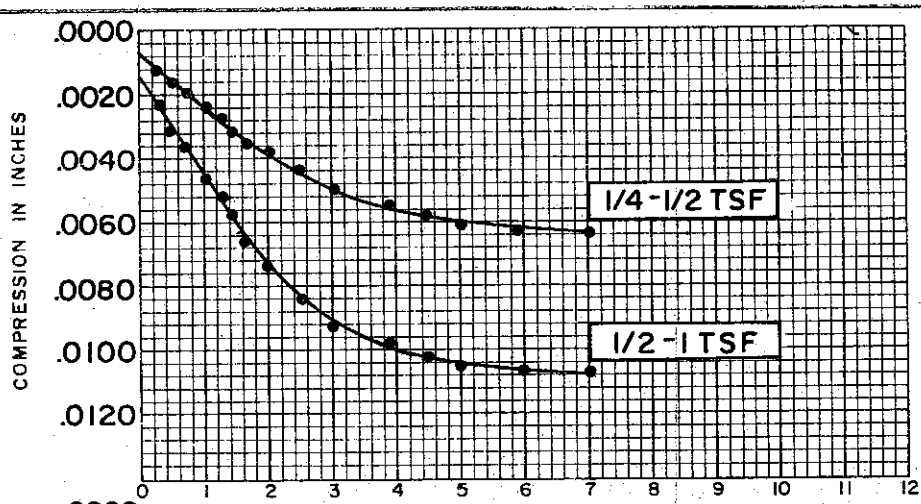
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

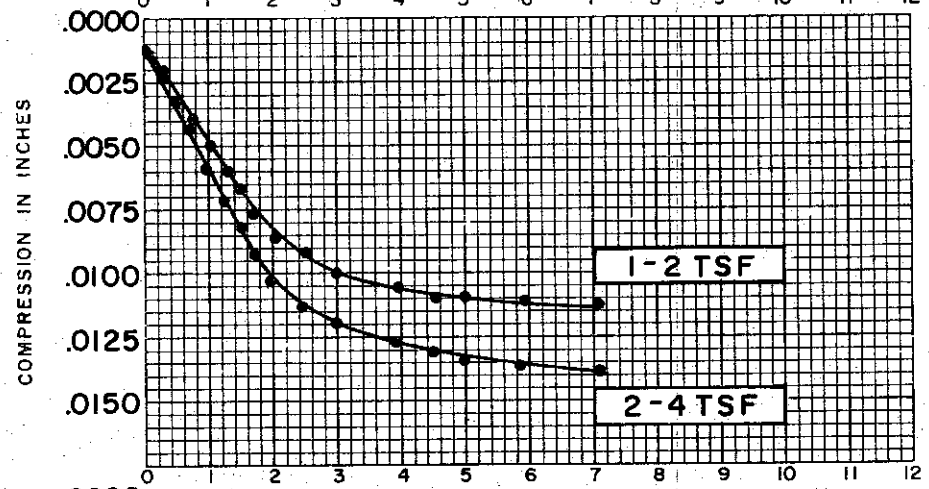
FILE 1255

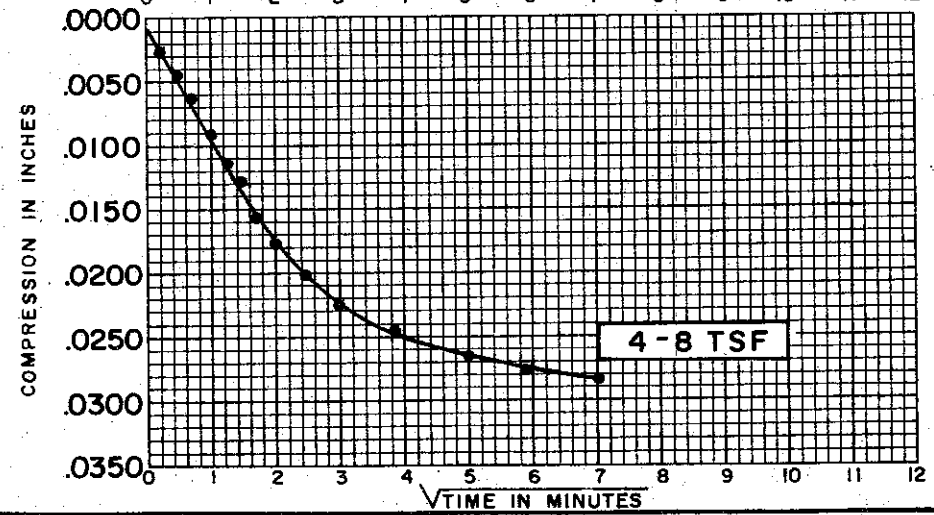
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

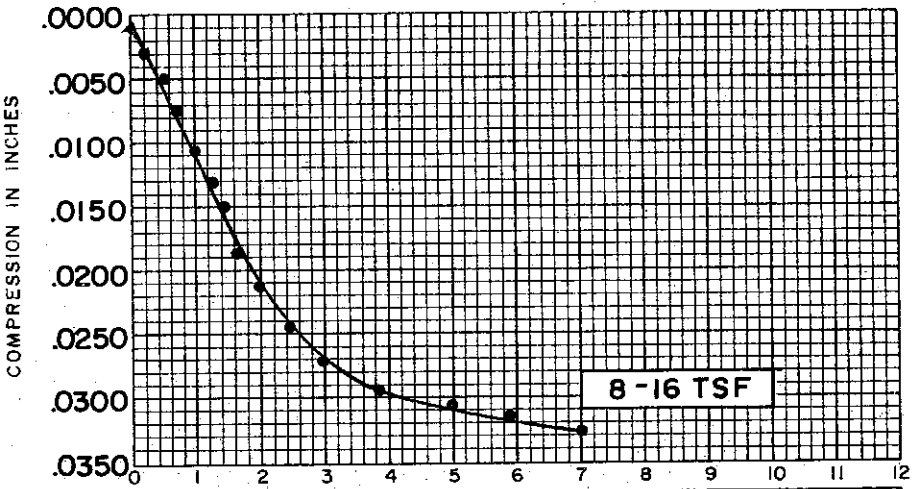
C-459

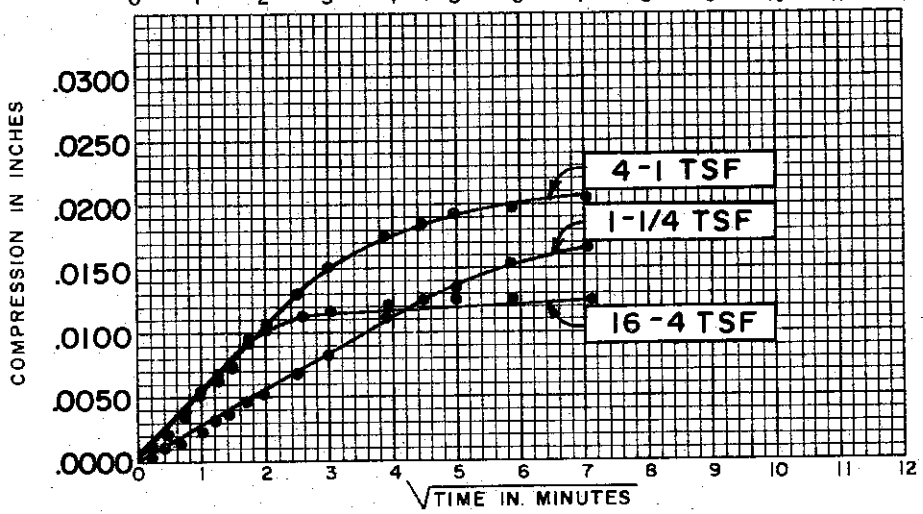
C-460











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY; SANDY (CL)
SPECIFIC GRAVITY 2.74
INITIAL WATER CONTENT 33.9%
FINAL WATER CONTENT 30.0%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.910

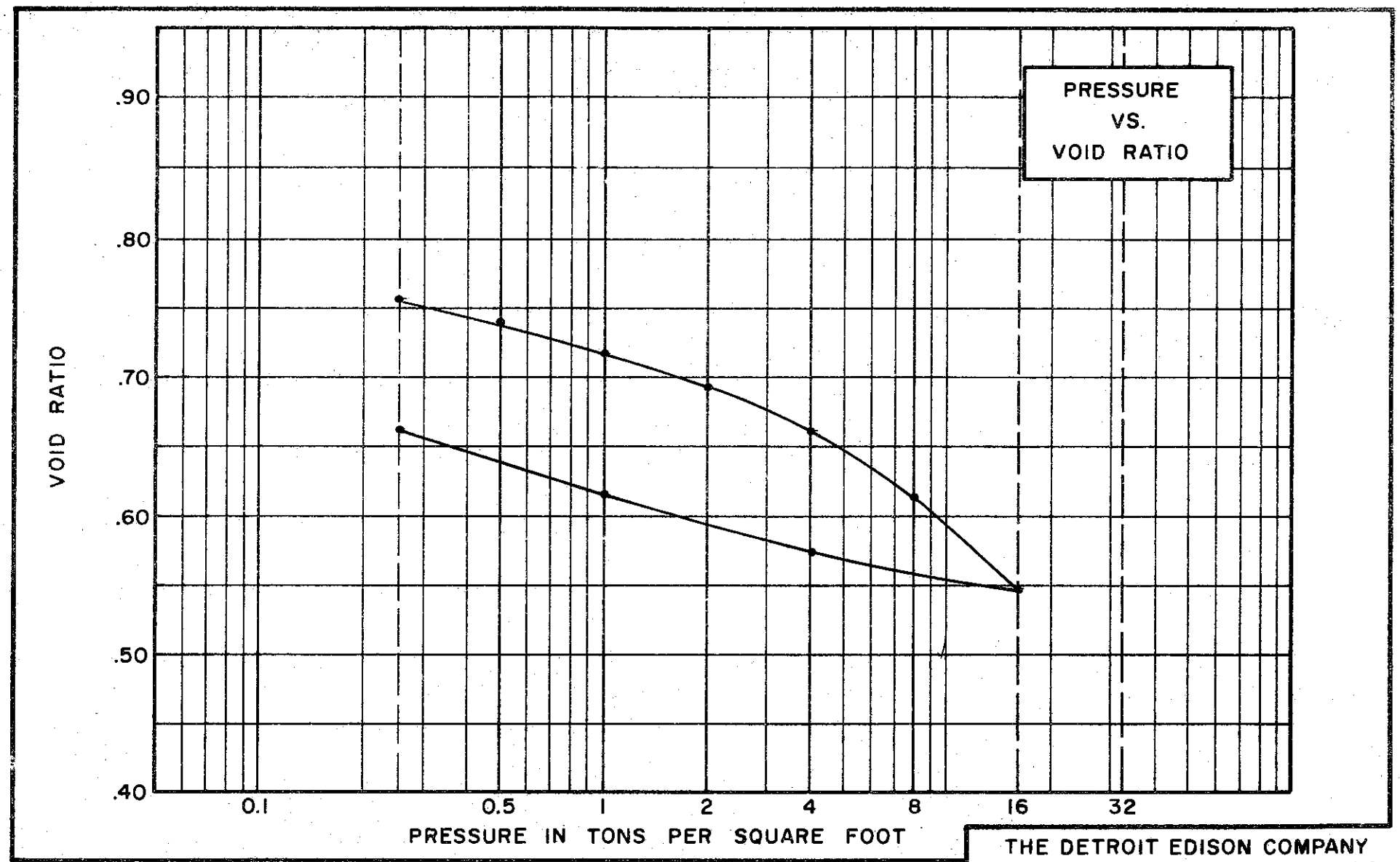
BORING NO. 27
SAMPLE NO. 24
DEPTH 104.2' TO 104.5'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.71

WATER CONTENT, INITIAL 29.0% FINAL 28.0%

ATTERBERG LIMITS:
LIQUID LIMIT 46% PLASTIC LIMIT 22%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.770

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

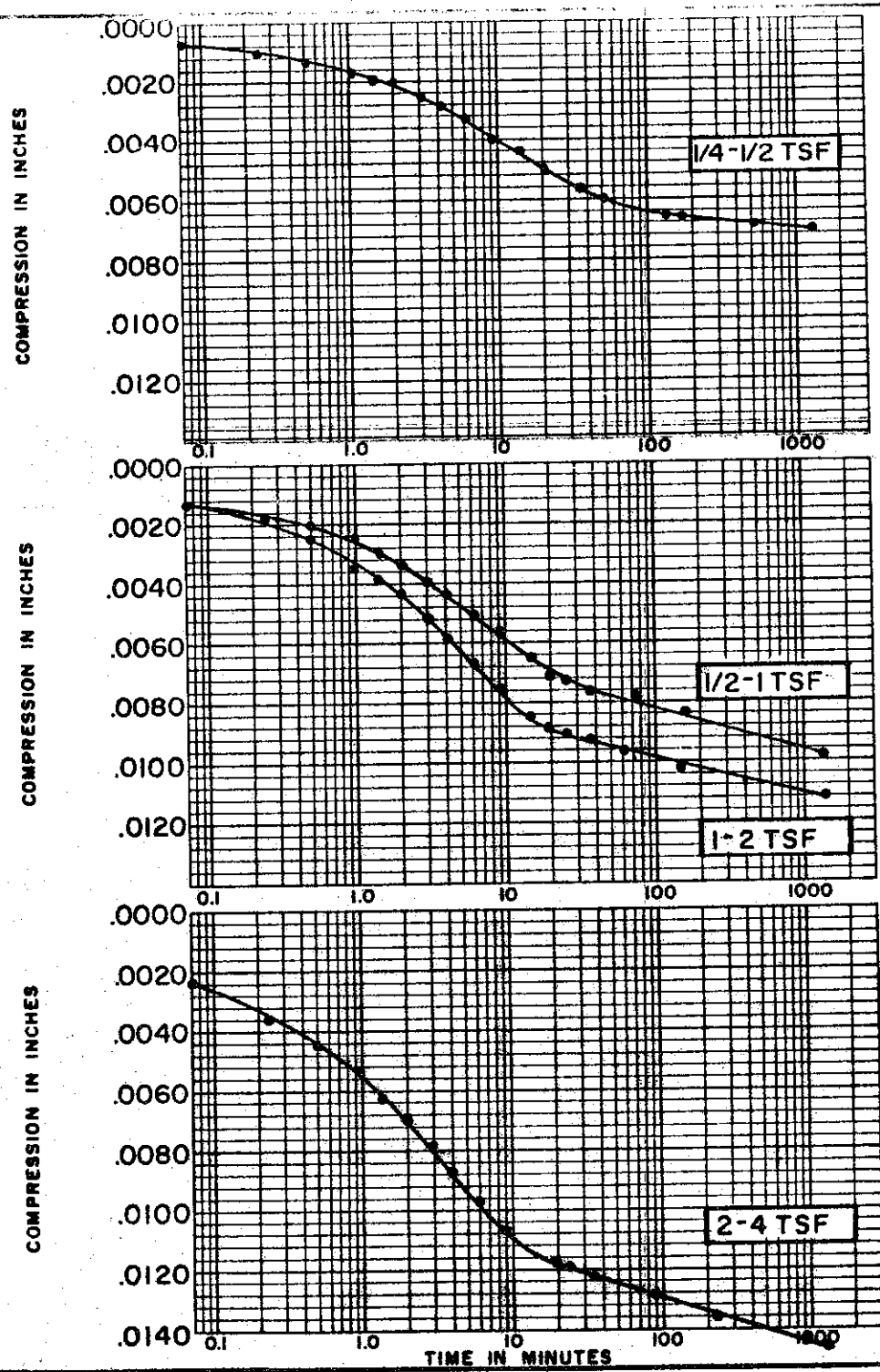
BORING NO. 38 TEST NO. C18.1

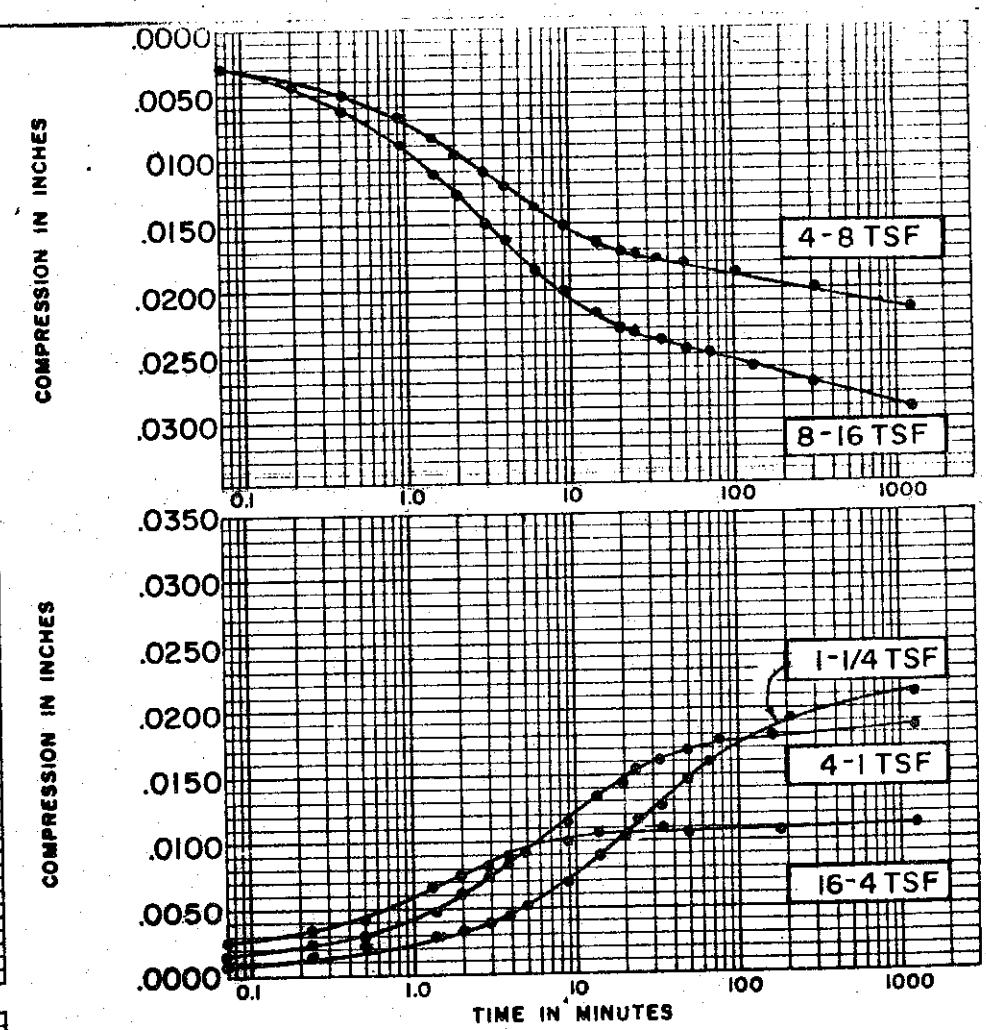
SAMPLE NO. 4 DATE JAN. 1974

DEPTH 14.6' TO 14.7'

C-461

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 29.0%
FINAL WATER CONTENT 28.0%

TEST DATA

INITIAL SAMPLE HEIGHT 0.800"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.77±

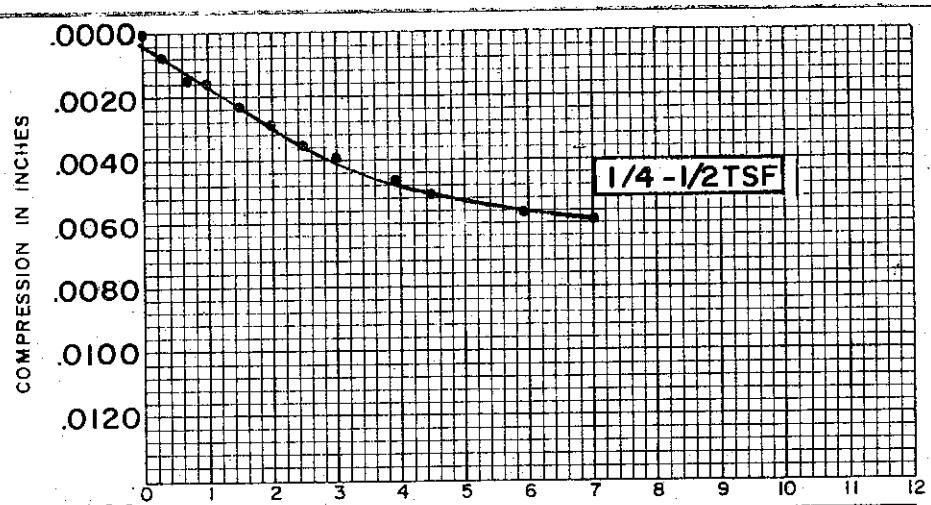
BORING NO. 38
SAMPLE NO. 4
DEPTH 14.6' TO 14.7'

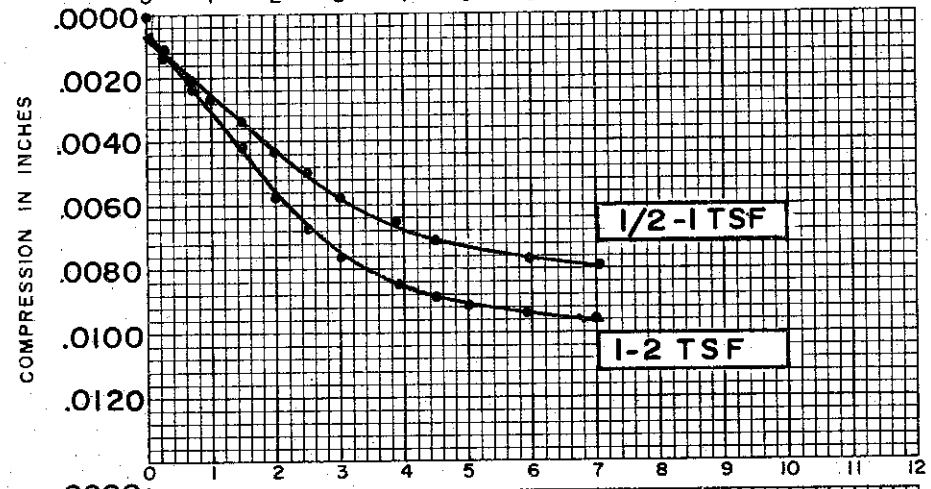
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

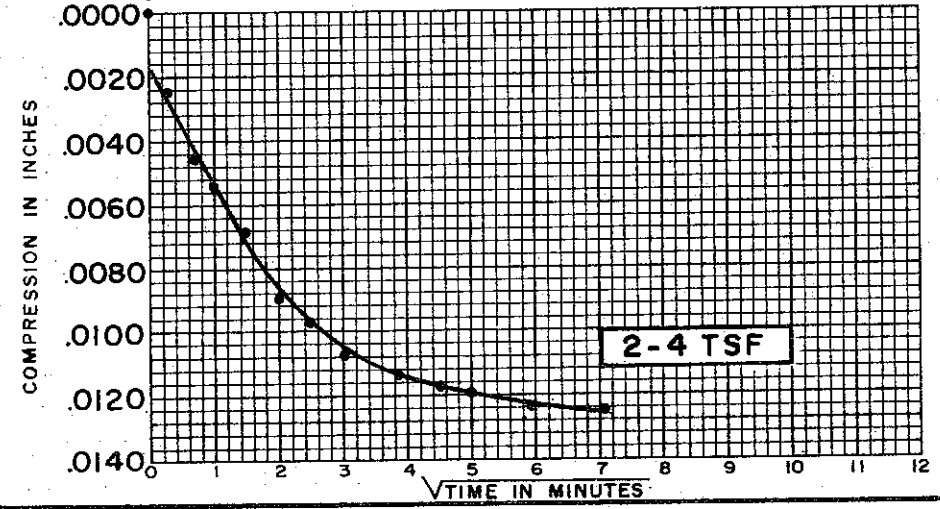
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

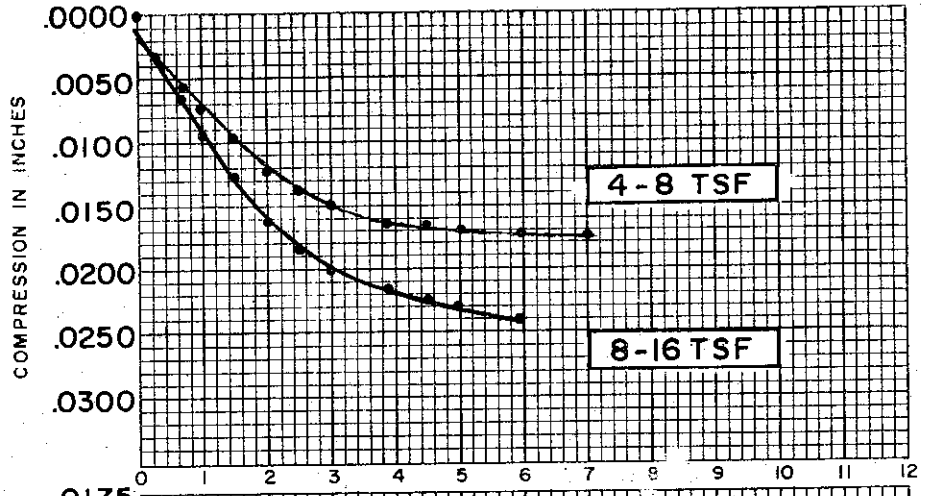
FILE 1255

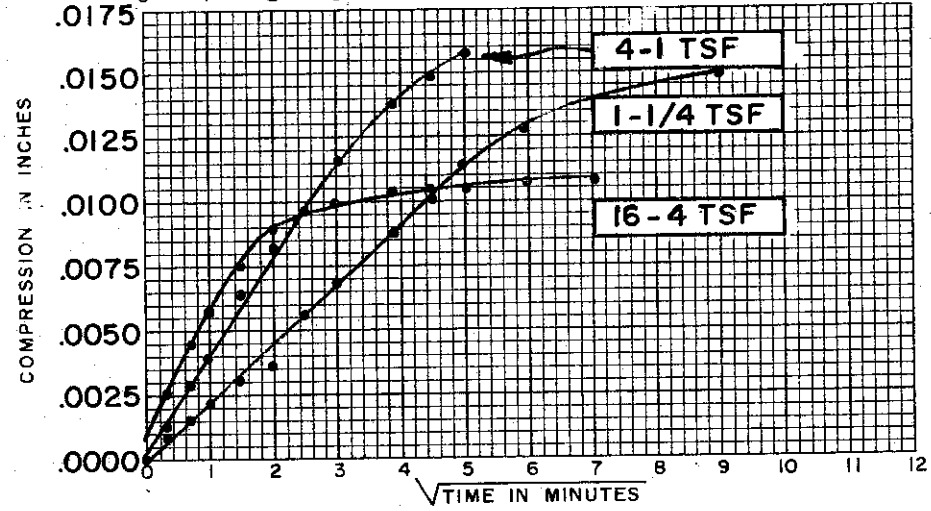
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 29.0 %
FINAL WATER CONTENT 28.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.770

BORING NO. 38
SAMPLE NO. 4
DEPTH 14.6' TO 14.7'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

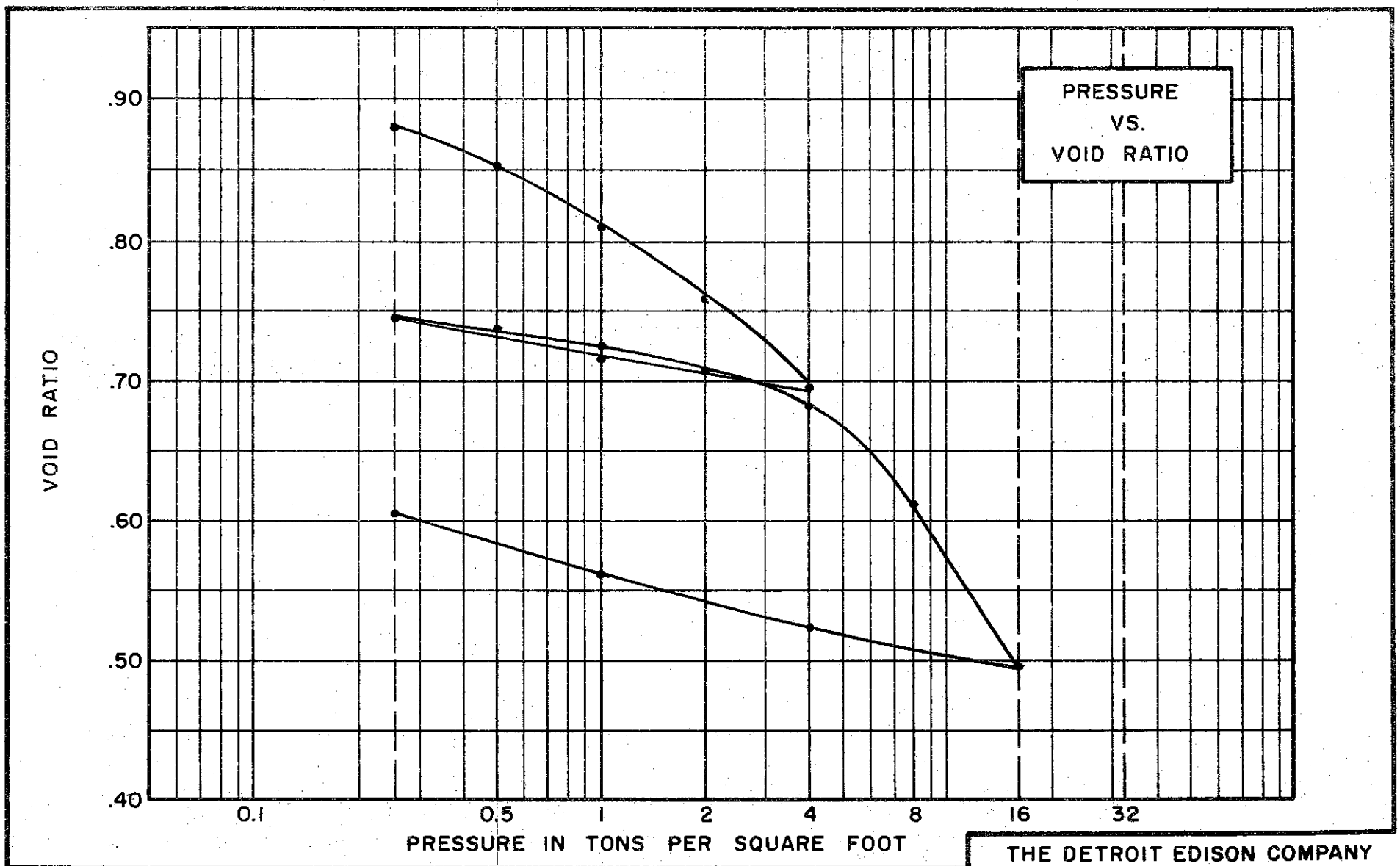
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-463

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-464



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CH)

SPECIFIC GRAVITY 2.72

WATER CONTENT, INITIAL 36.0% FINAL 27.7%

ATTERBERG LIMITS:

LIQUID LIMIT 55 % PLASTIC LIMIT 24 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.935

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

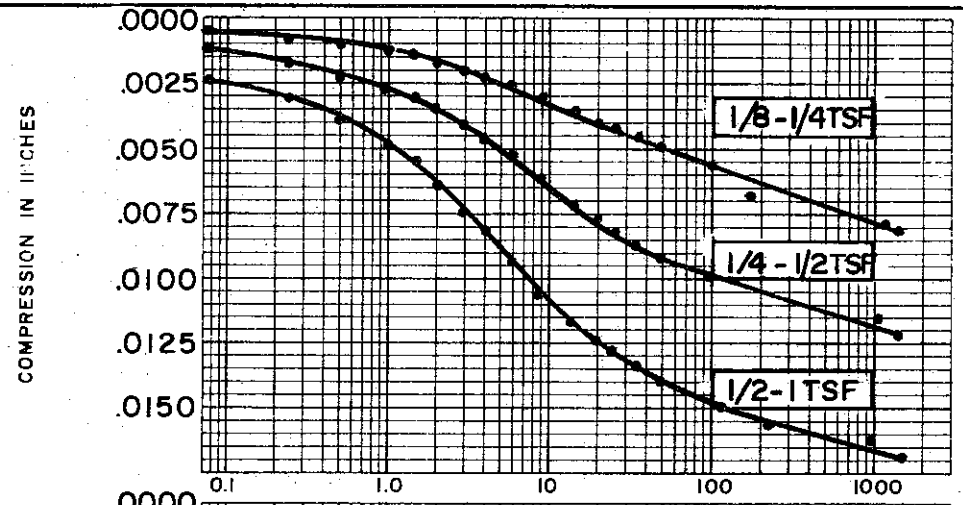
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

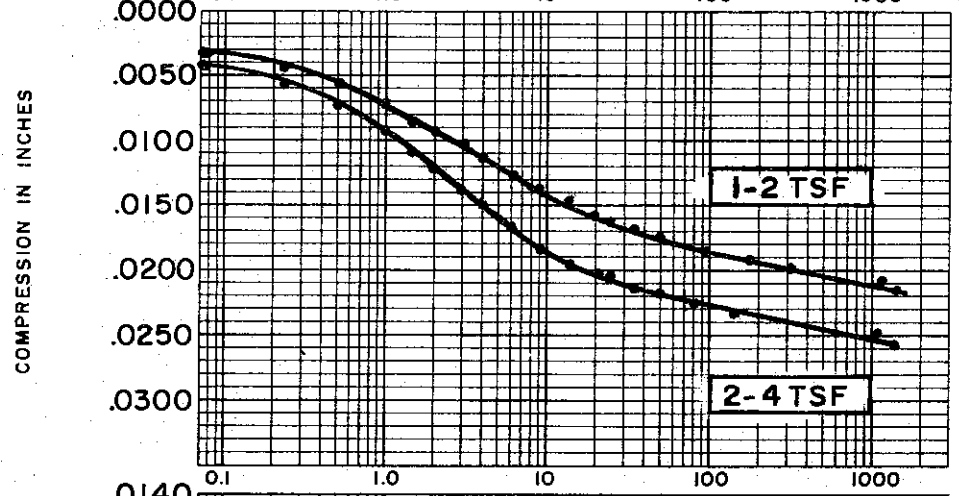
BORING NO. 38 TEST NO. C24.1

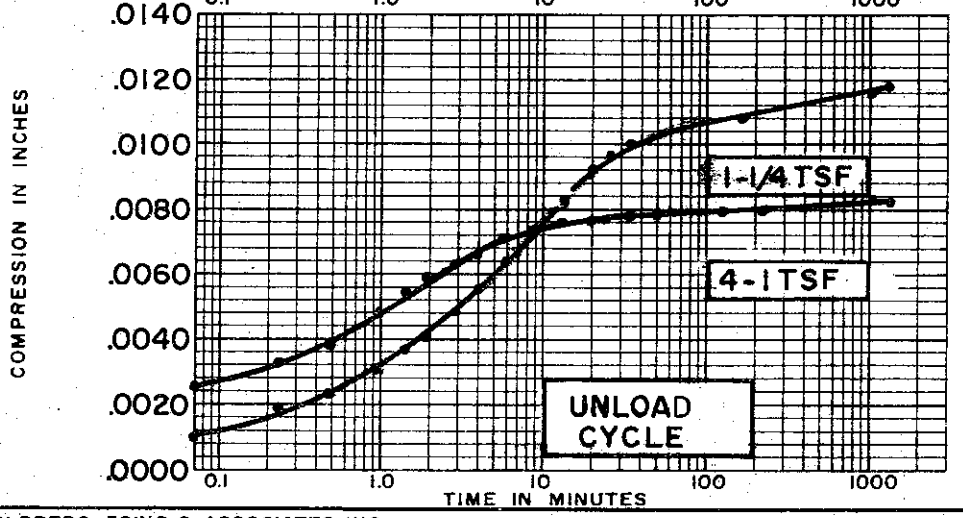
SAMPLE NO. 16 DATE JAN. 1974

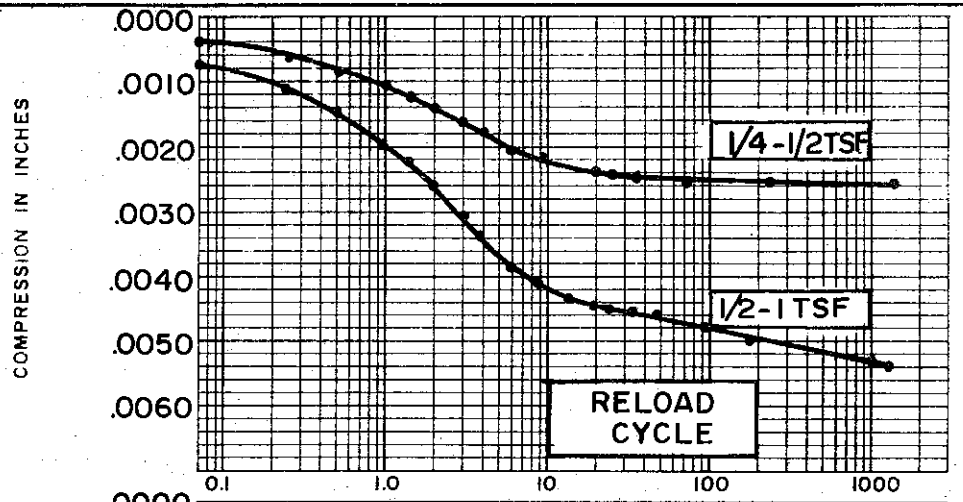
DEPTH 74.0' TO 74.1'

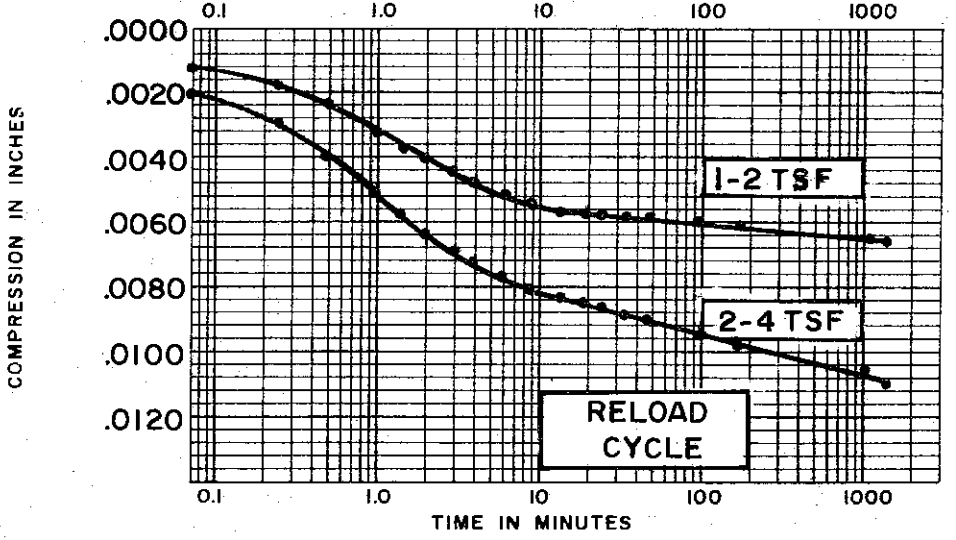
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 36.0 %
FINAL WATER CONTENT 27.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.935

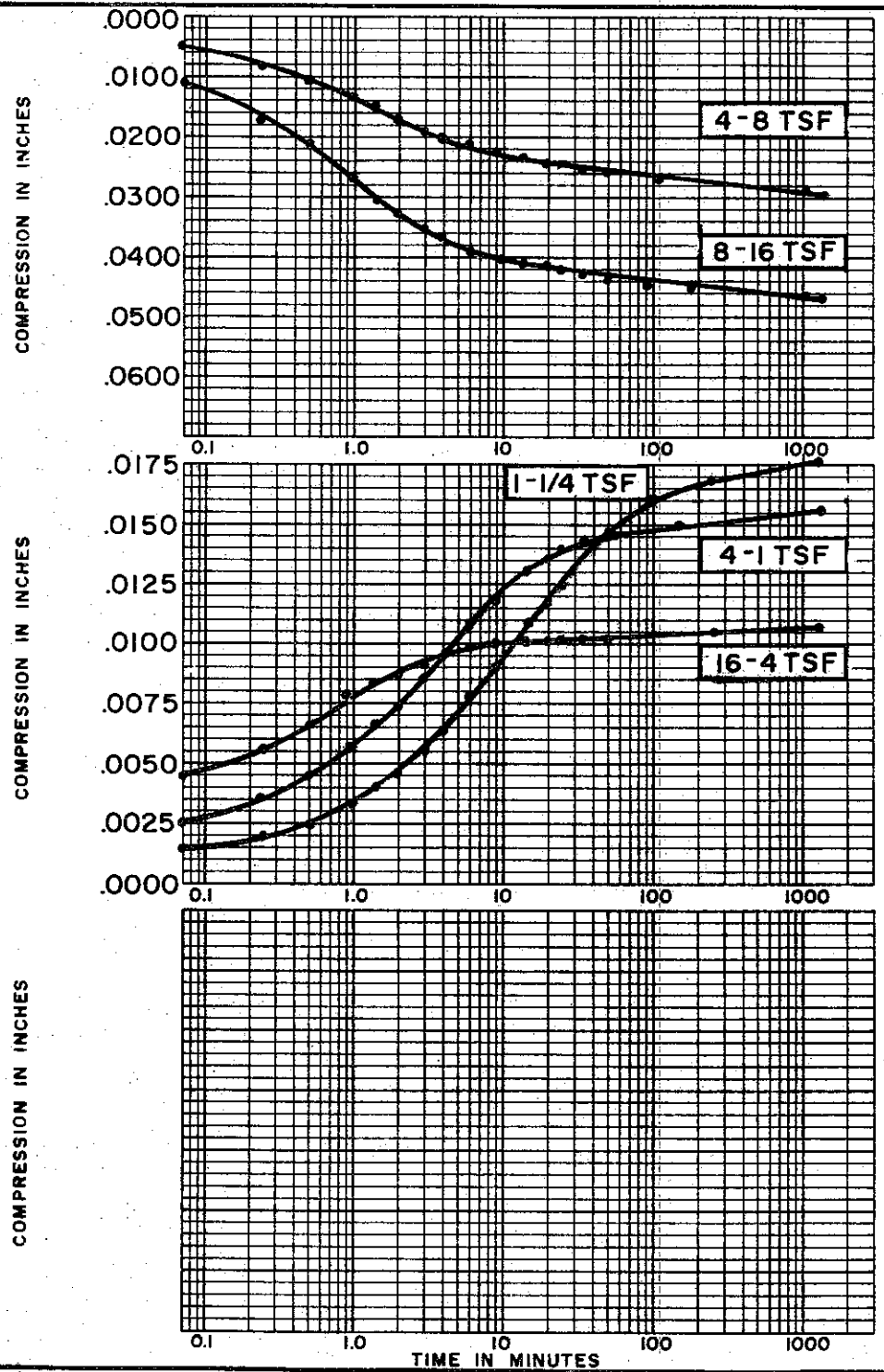
BORING NO. 38
SAMPLE NO. 16
DEPTH 74.0' TO 74.1'

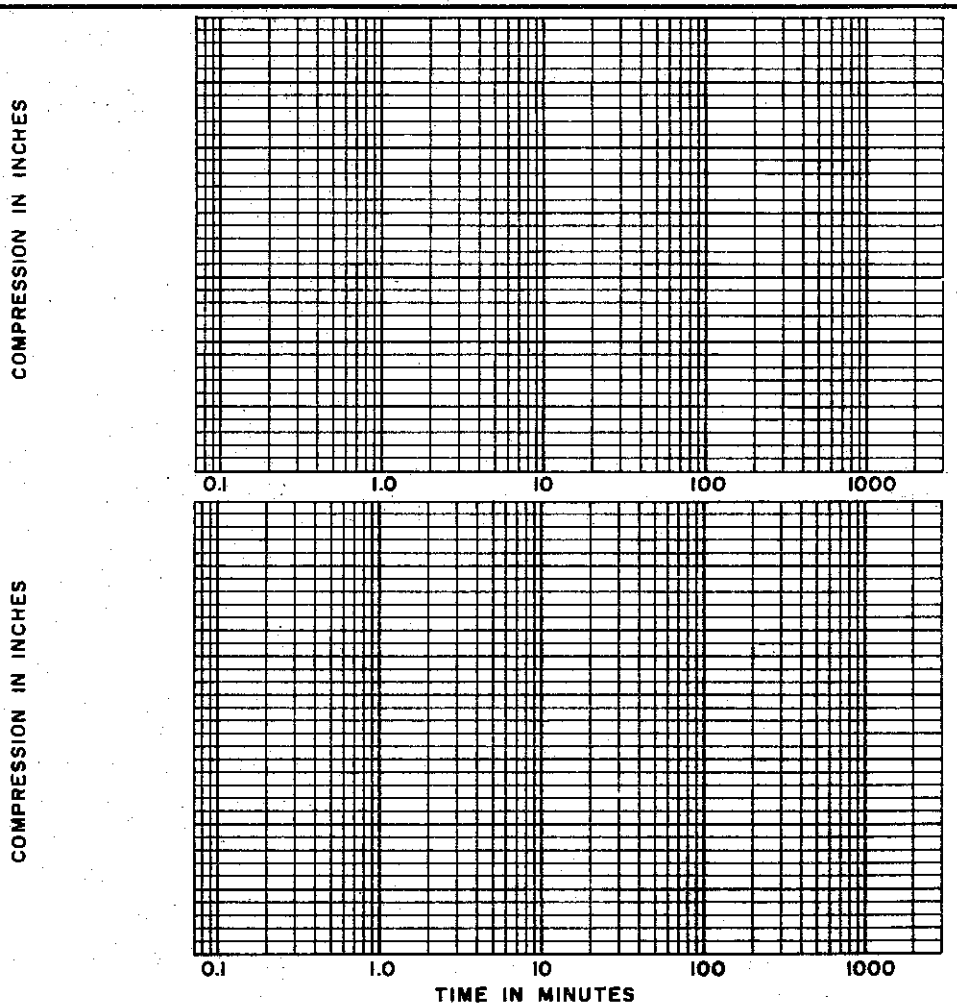
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 36.0%
FINAL WATER CONTENT 27.7%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.935

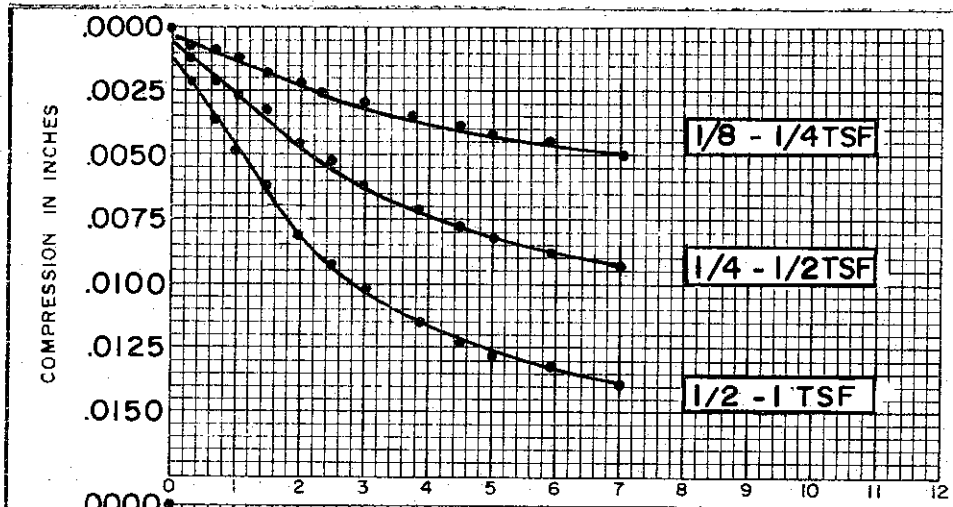
BORING NO. 38
SAMPLE NO. 16
DEPTH 74.0 TO 74.1

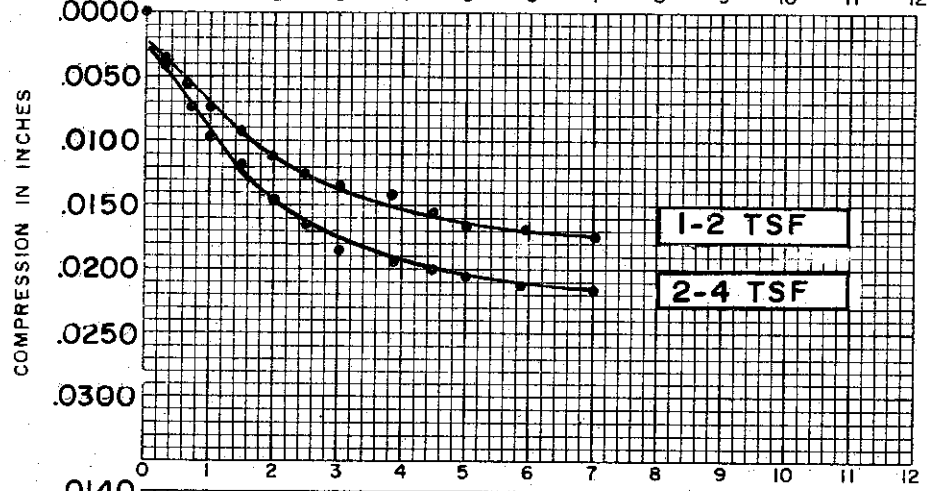
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

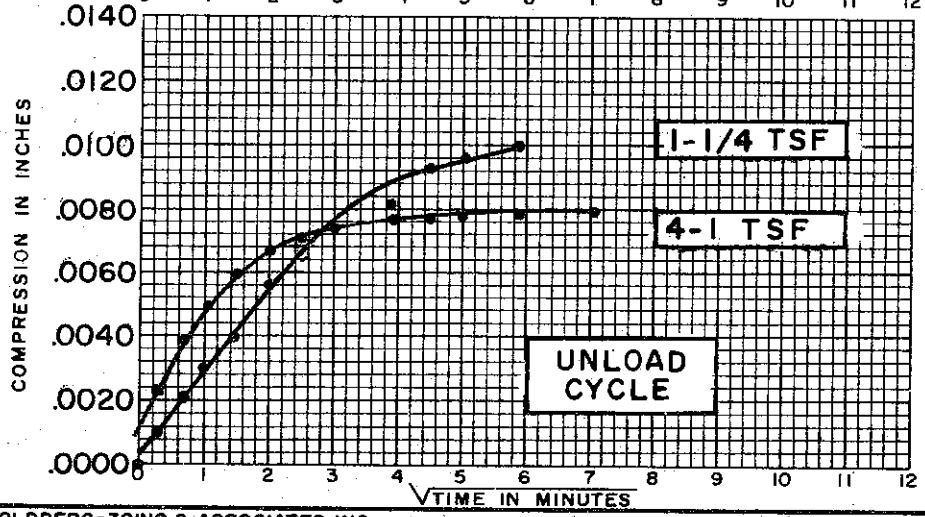
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

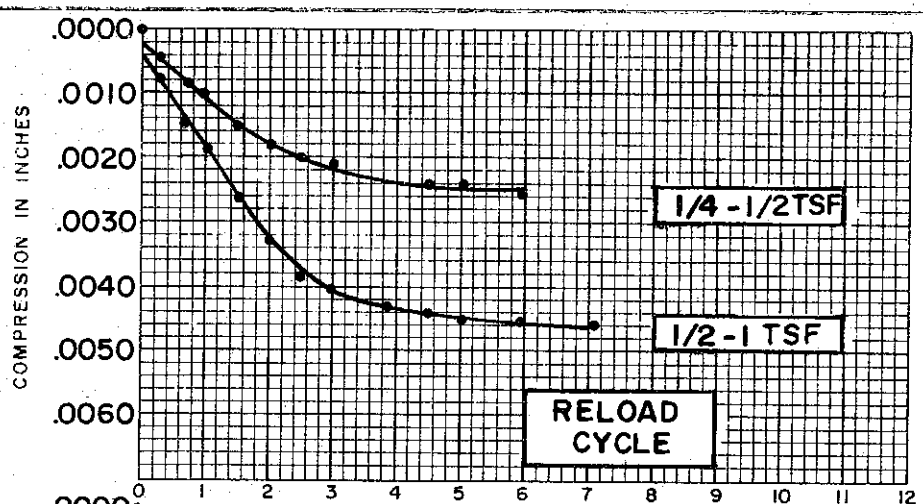
FILE 1255

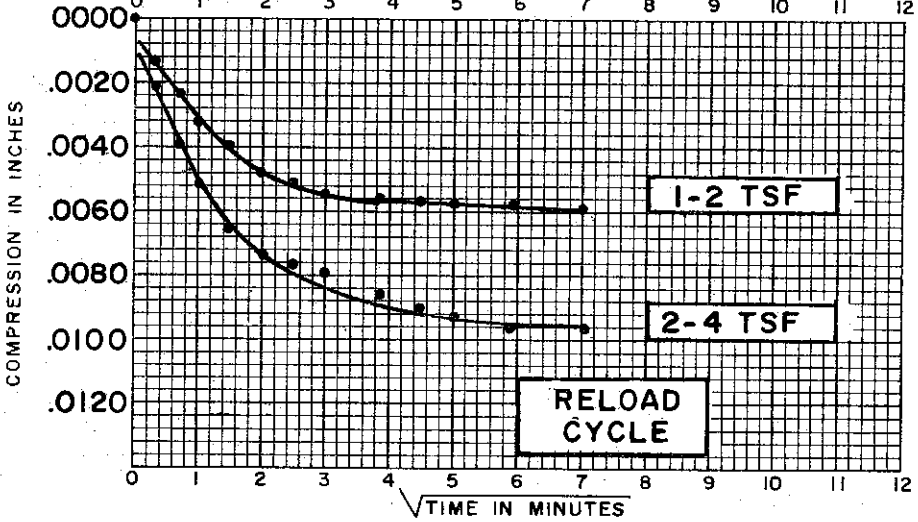
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 36.0%
FINAL WATER CONTENT 27.7%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.935

BORING NO. 38
SAMPLE NO. 16
DEPTH 74.0' TO 74.1'

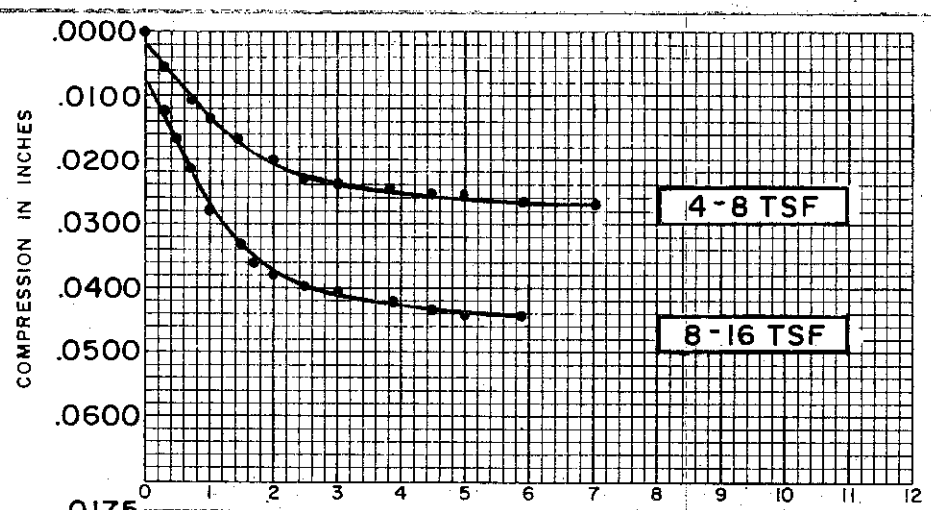
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

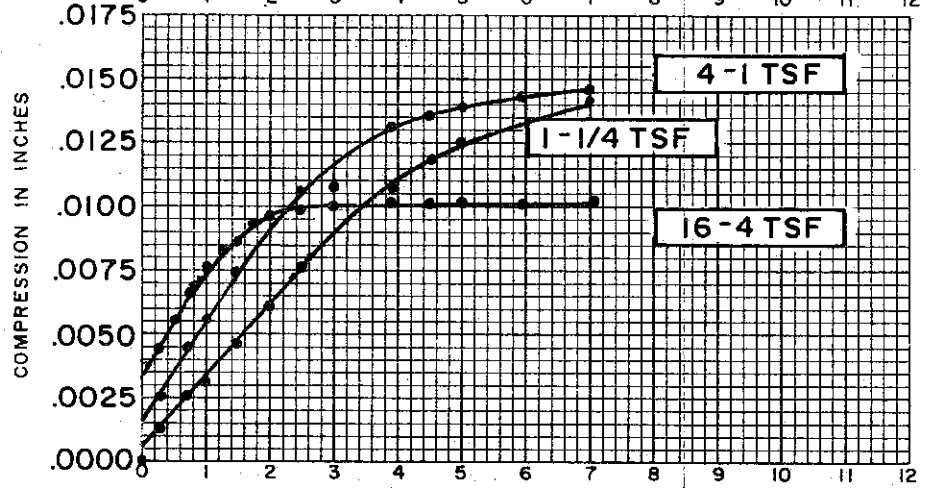
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

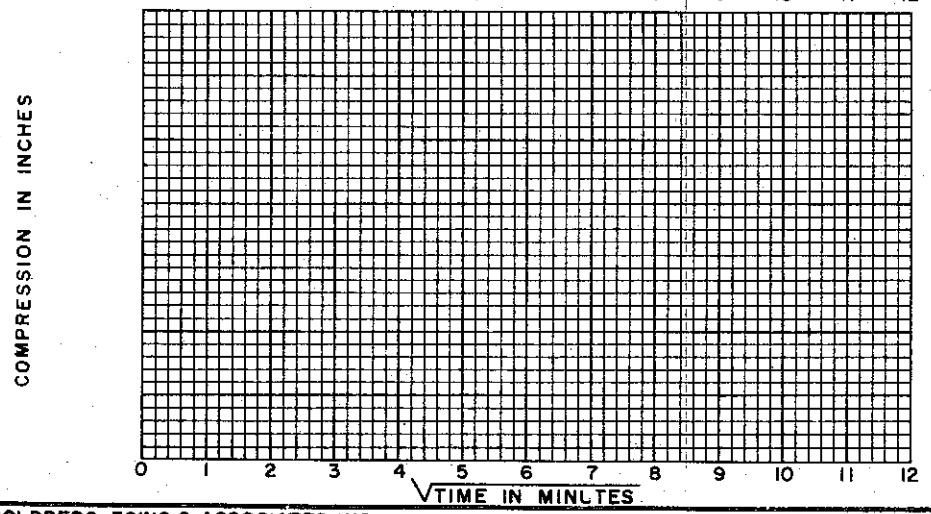
FILE 1255

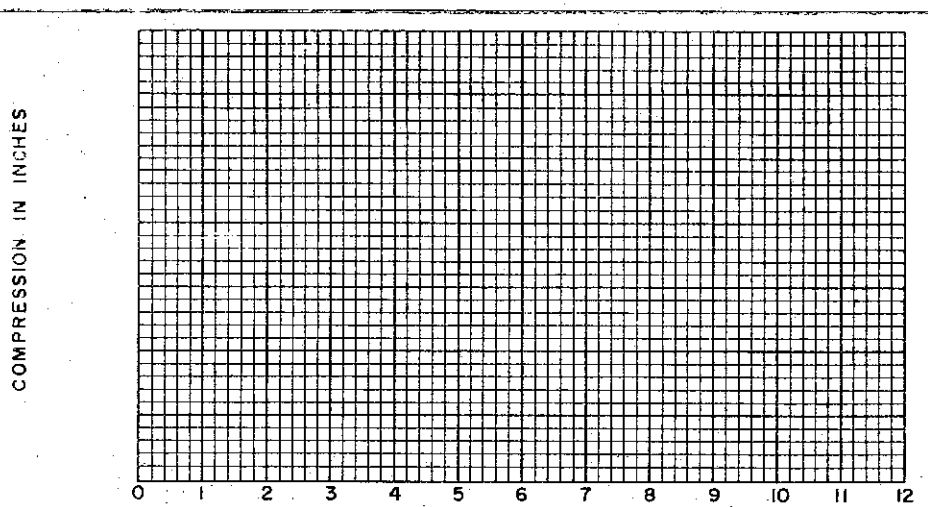
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

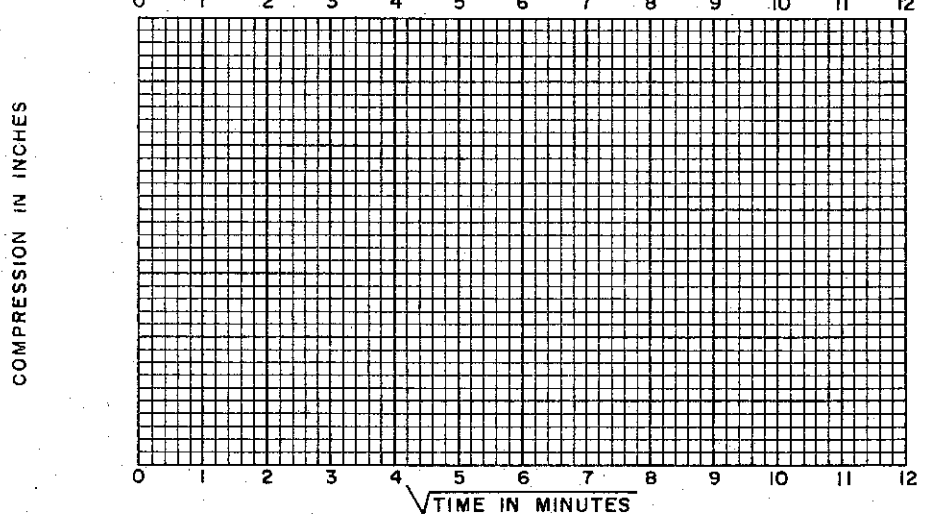
C-468











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 36.0 %
FINAL WATER CONTENT 27.7%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.935

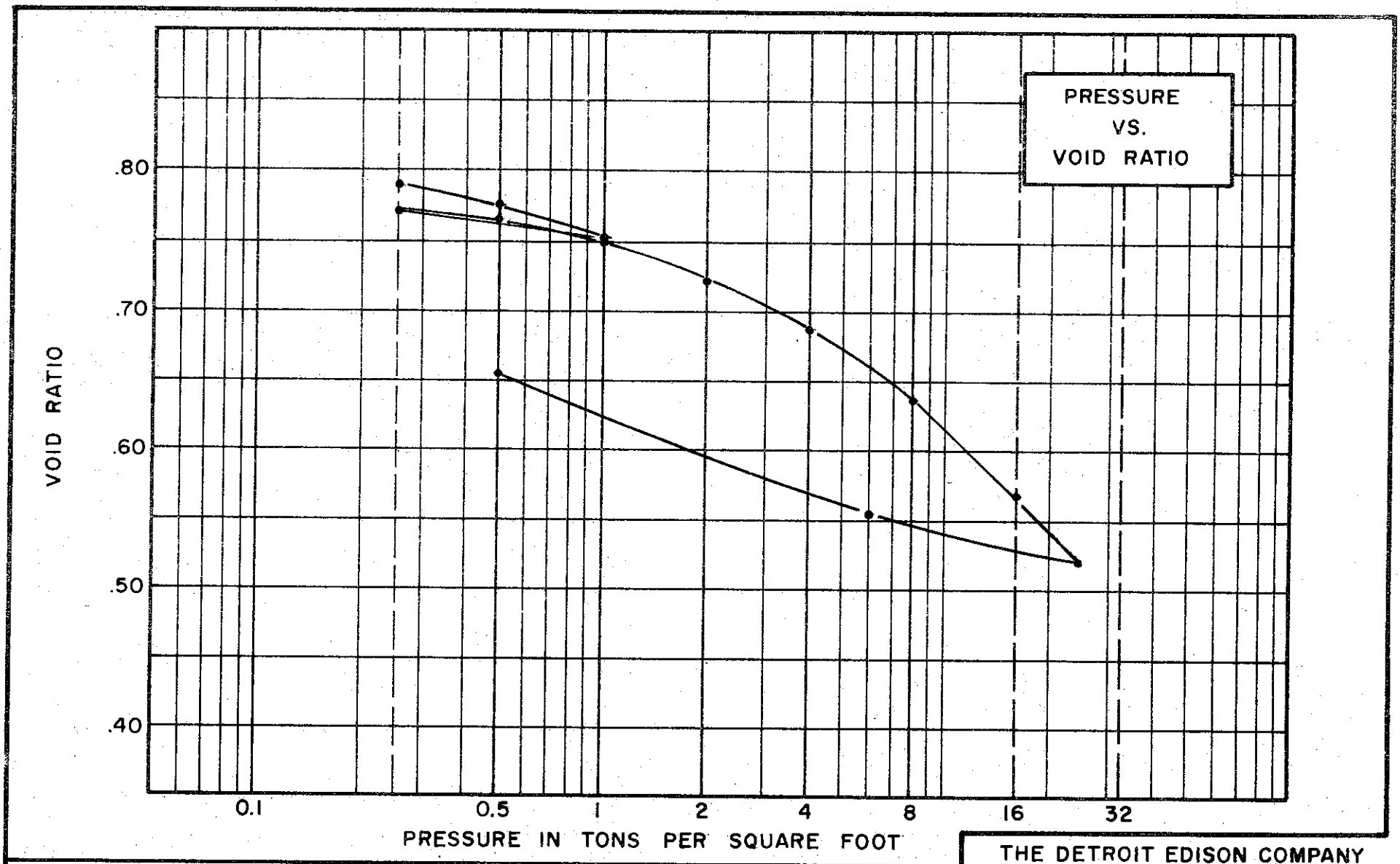
BORING NO. 38
SAMPLE NO. 16
DEPTH 74.0 TO 74.1

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.72

WATER CONTENT, INITIAL 29.5% FINAL 27.7%

ATTERBERG LIMITS:
LIQUID LIMIT 46 % PLASTIC LIMIT 23%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.799

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

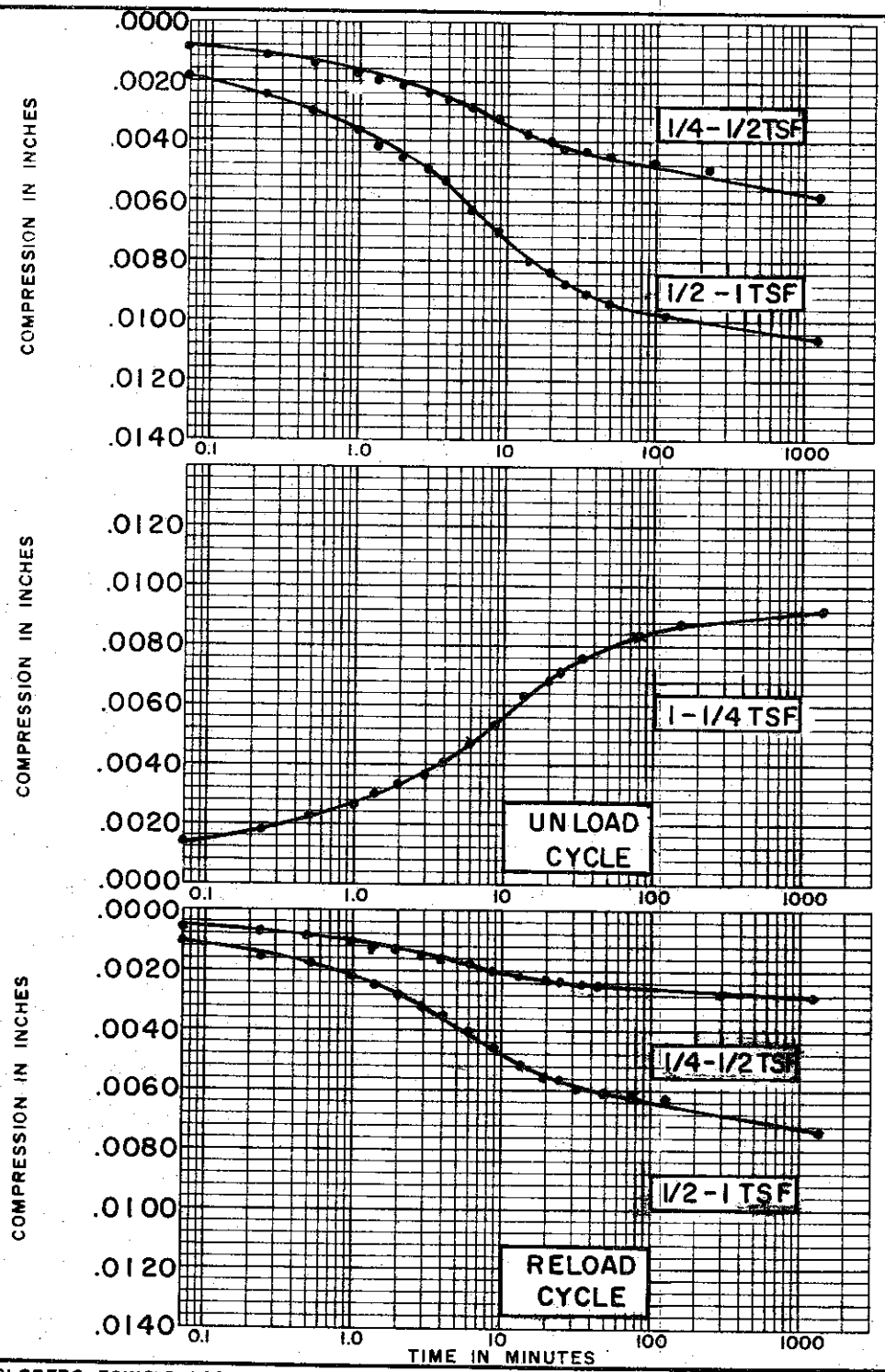
BORING NO. 41 TEST NO. C29.1

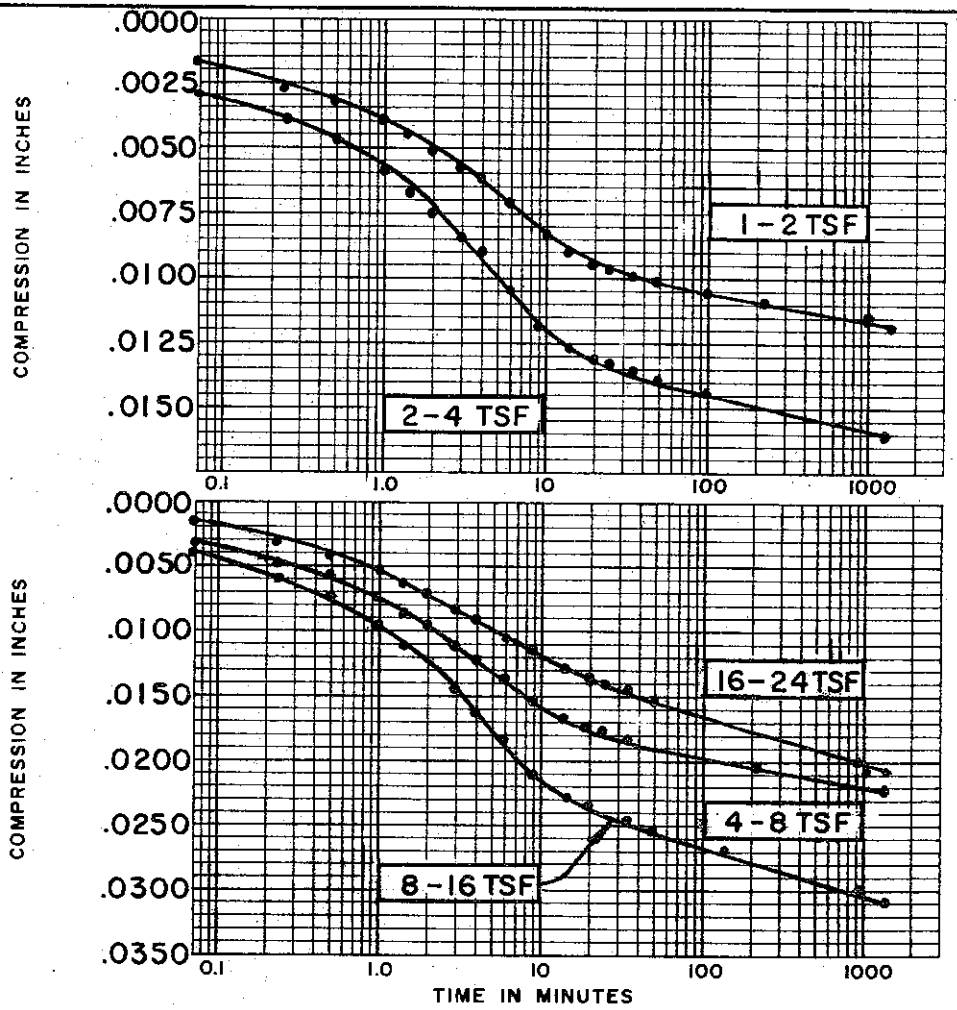
SAMPLE NO. 5 DATE JAN 74

DEPTH 10.8'

C-469

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 20.5 %
FINAL WATER CONTENT 27.7 %

BORING NO. 41
SAMPLE NO. 5
DEPTH 10.8'

TEST DATA

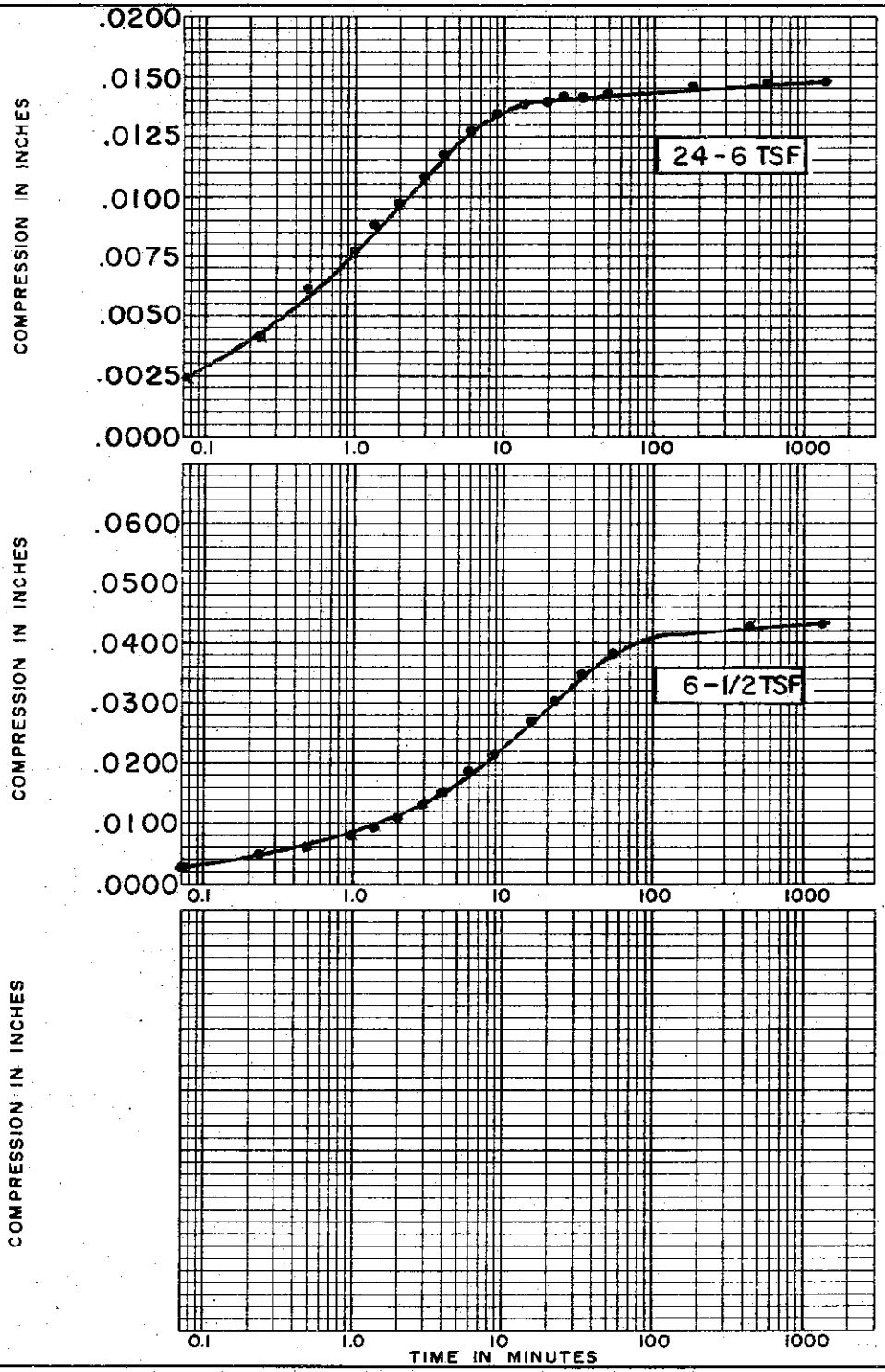
INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.799

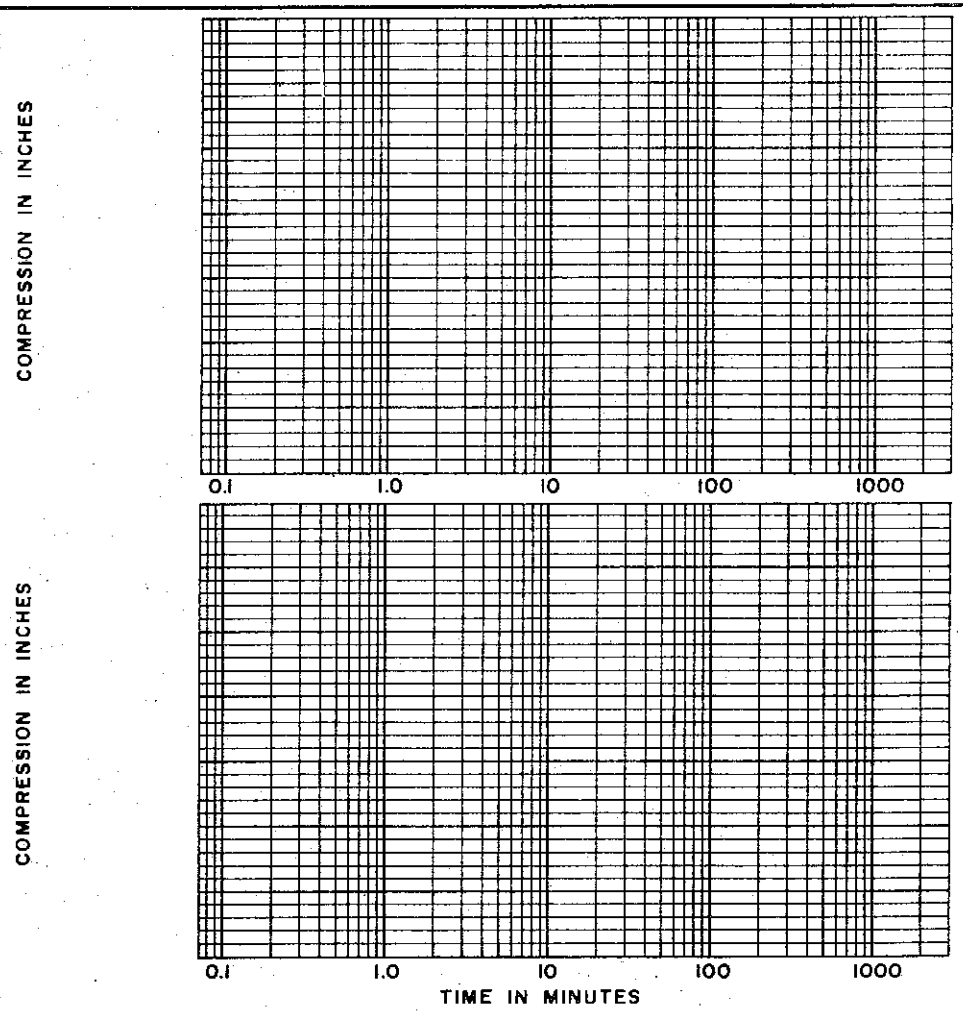
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 29.5 %
FINAL WATER CONTENT 27.7 %

BORING NO. 41
SAMPLE NO. 5
DEPTH 10.6'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.799

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

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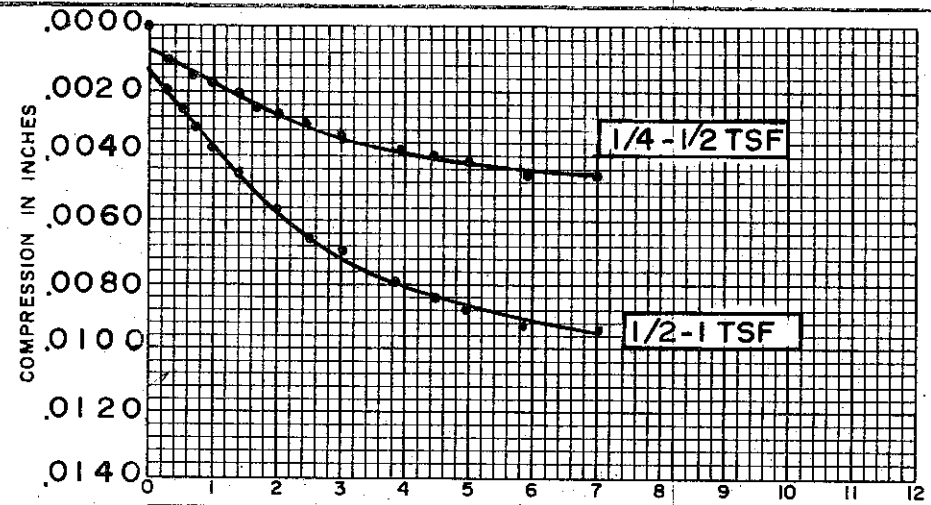
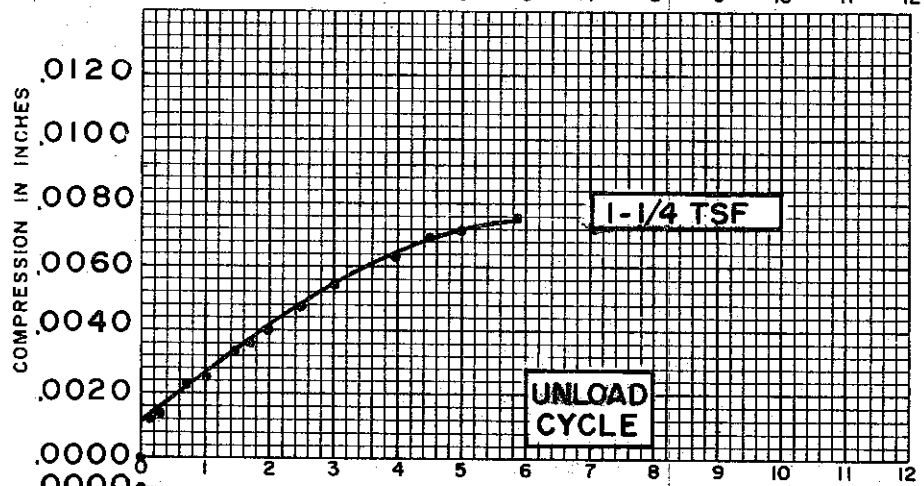
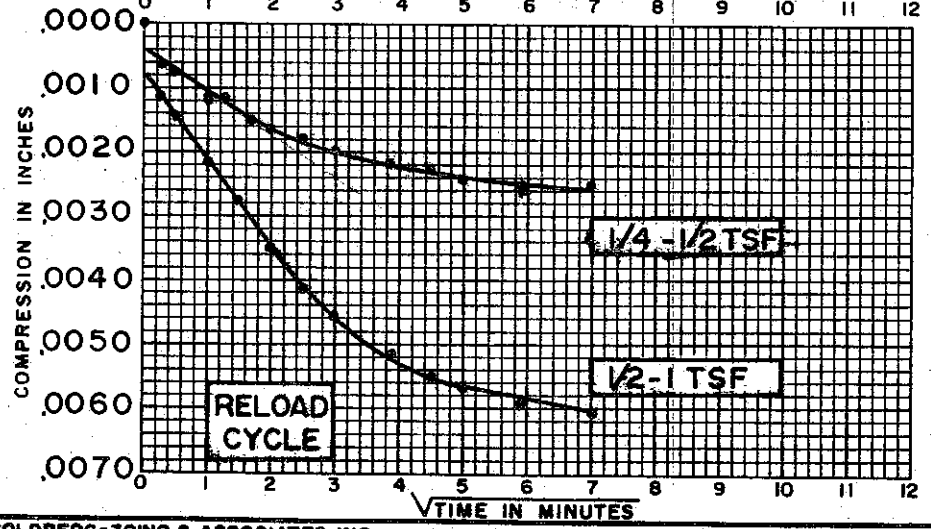
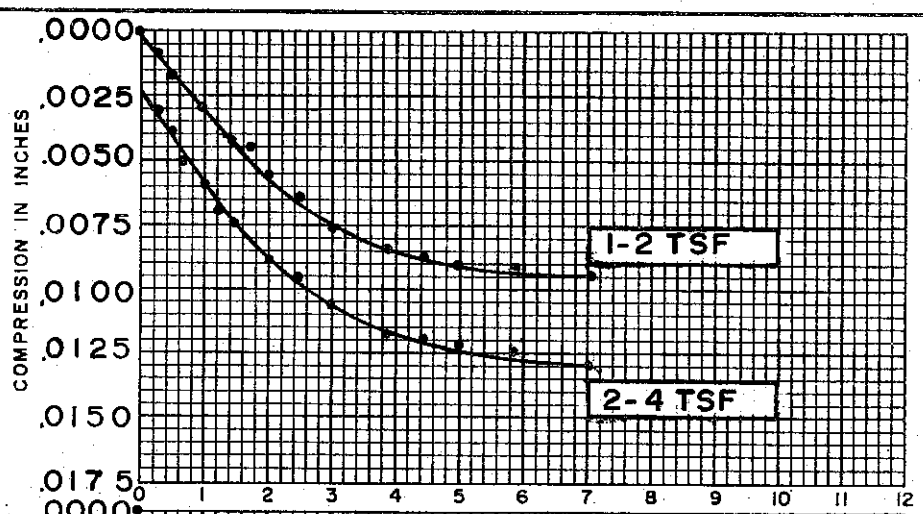
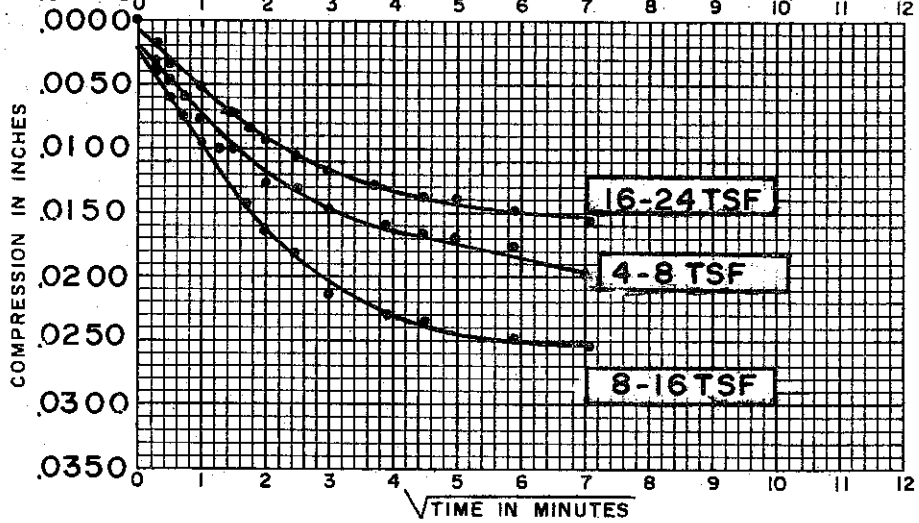










SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 29.5%
FINAL WATER CONTENT 27.7%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO .799

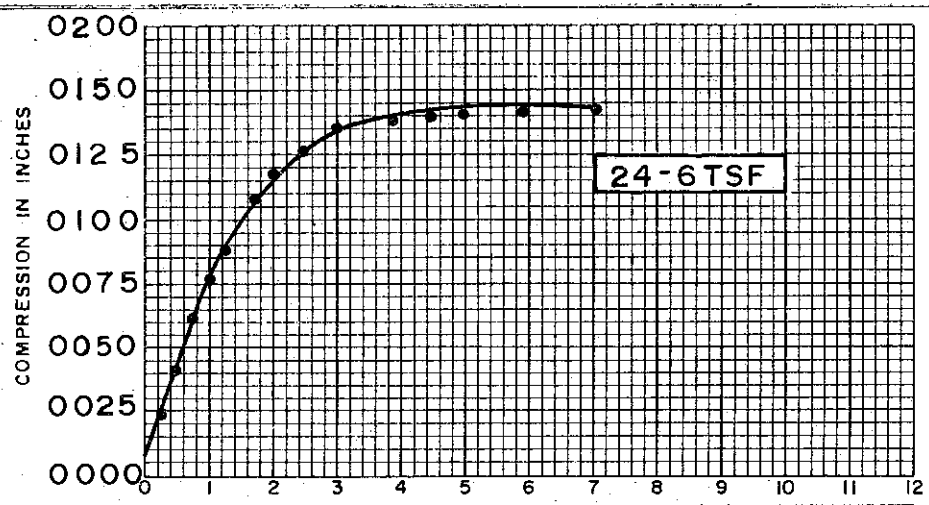
BORING NO. 41
SAMPLE NO. 5
DEPTH 10.8'

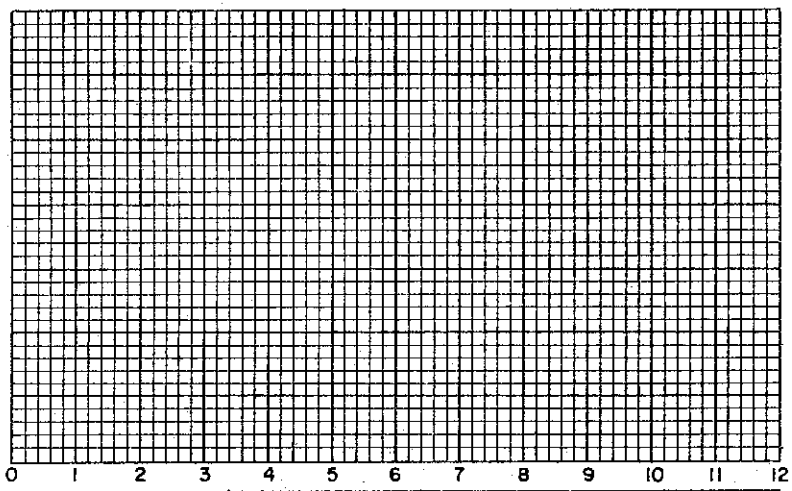
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

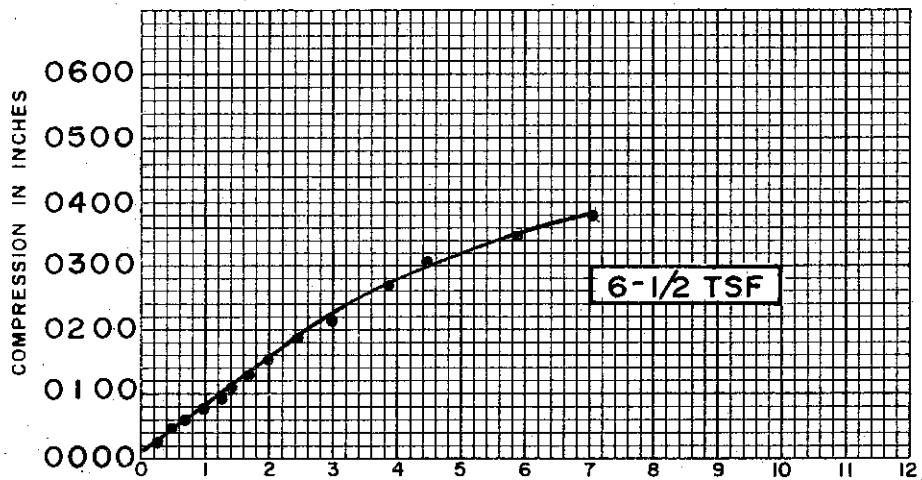
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

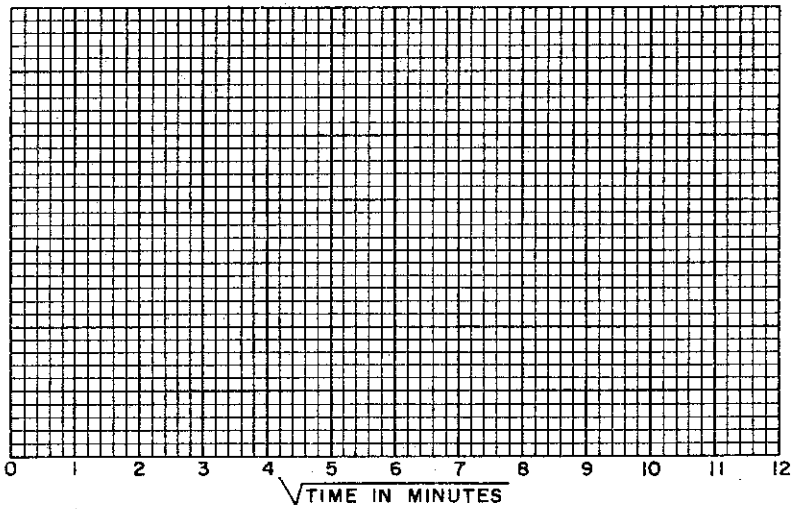
FILE 1255

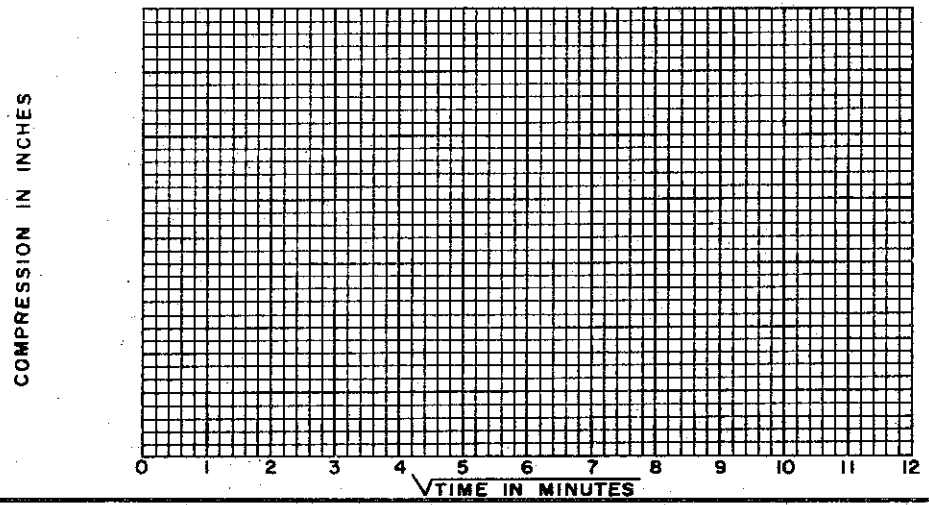
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 29.5 %
FINAL WATER CONTENT 27.7 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO .799

BORING NO. 41
SAMPLE NO. 5
DEPTH 10.6'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

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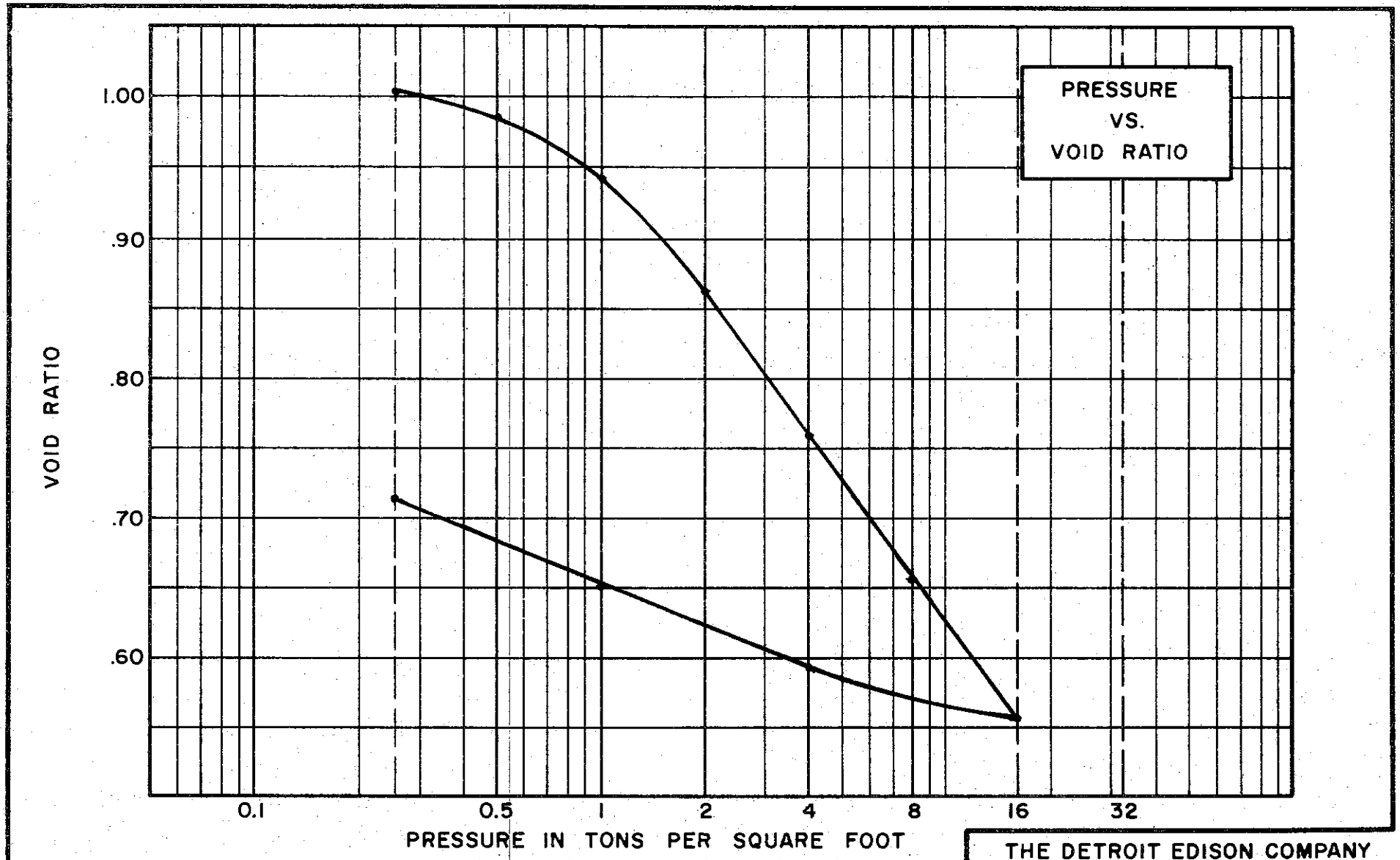
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-474



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 38.1% FINAL 30.1%

ATTERBERG LIMITS:
LIQUID LIMIT 47 % PLASTIC LIMIT 24 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.055

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

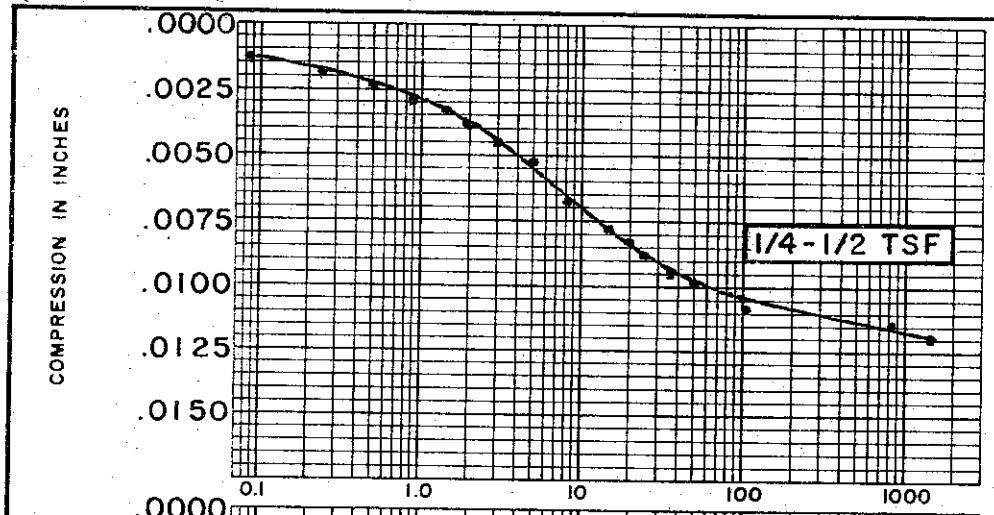
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

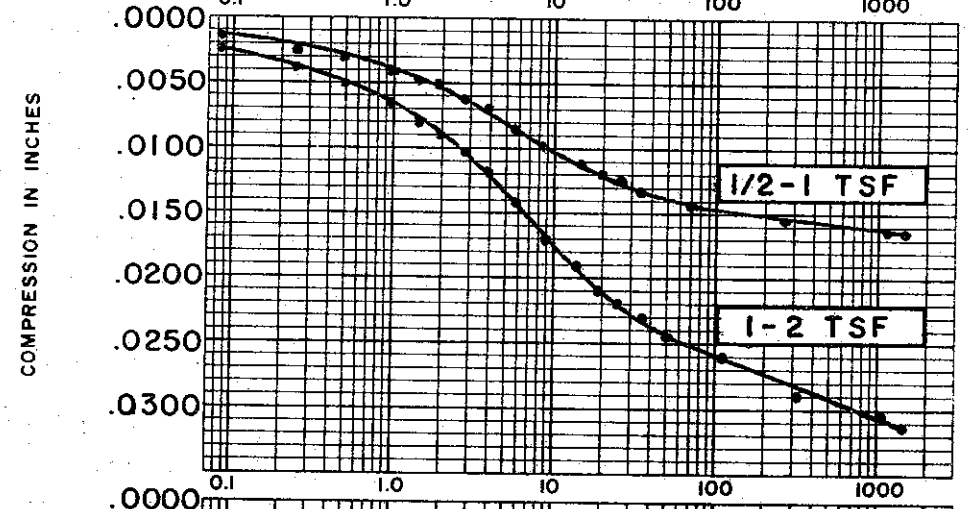
BORING NO. 41 TEST NO. C 30.1

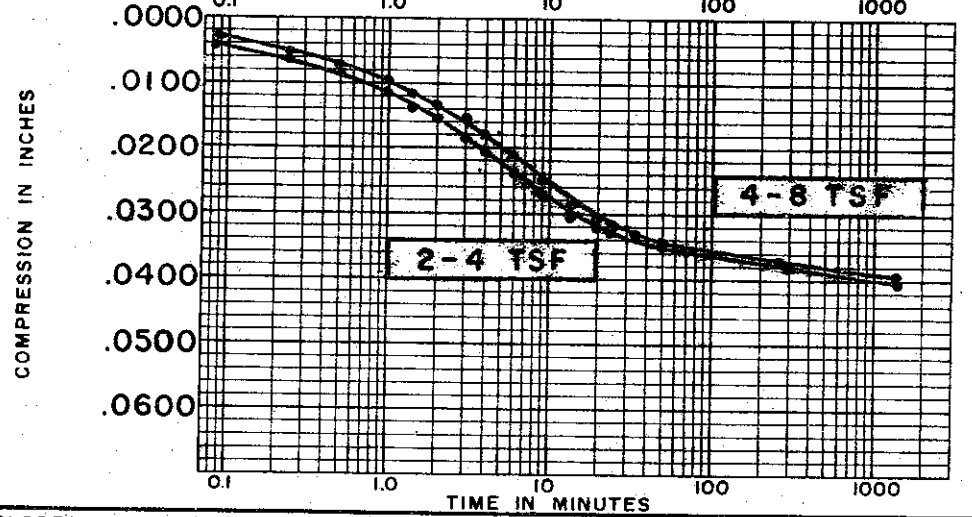
SAMPLE NO. 7 DATE FEB 74

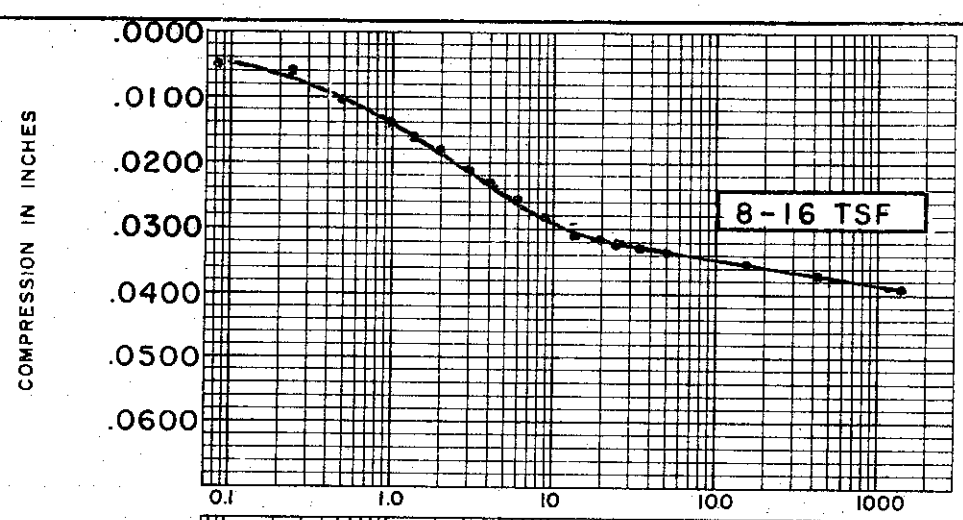
DEPTH 21.0' TO 21.1'

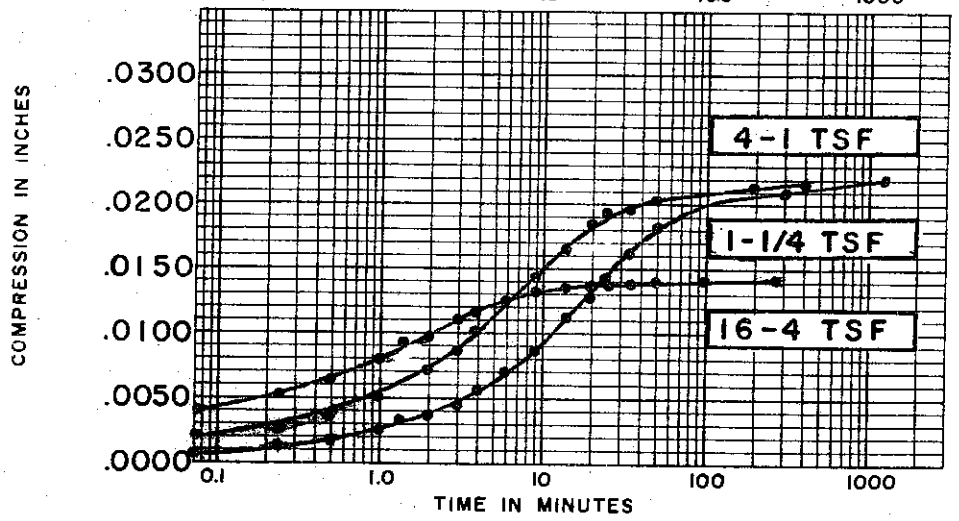
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 38.1 %
FINAL WATER CONTENT 30.1 %

BORING NO. 41
SAMPLE NO. 7
DEPTH 21.1

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.055

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

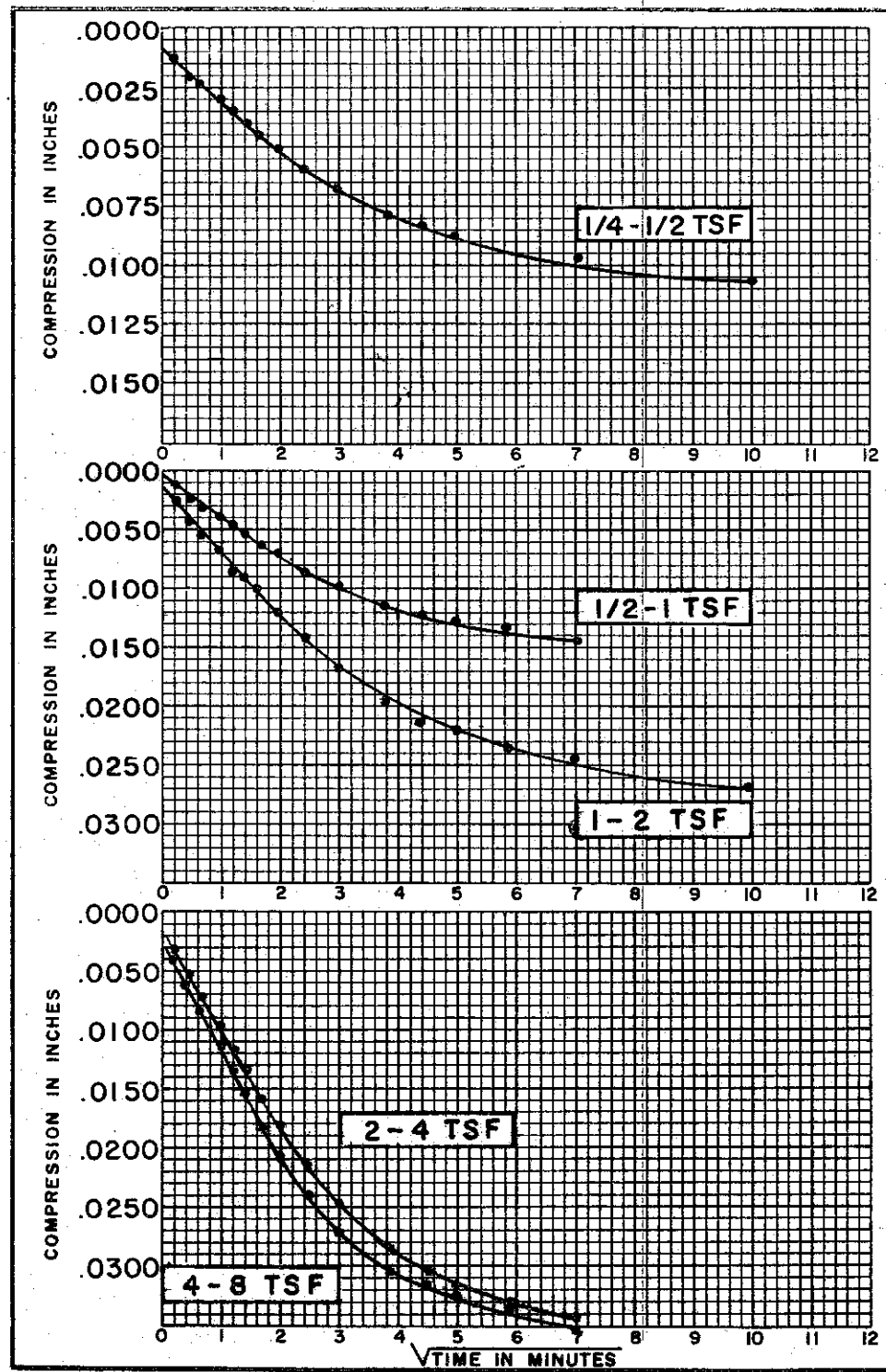
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

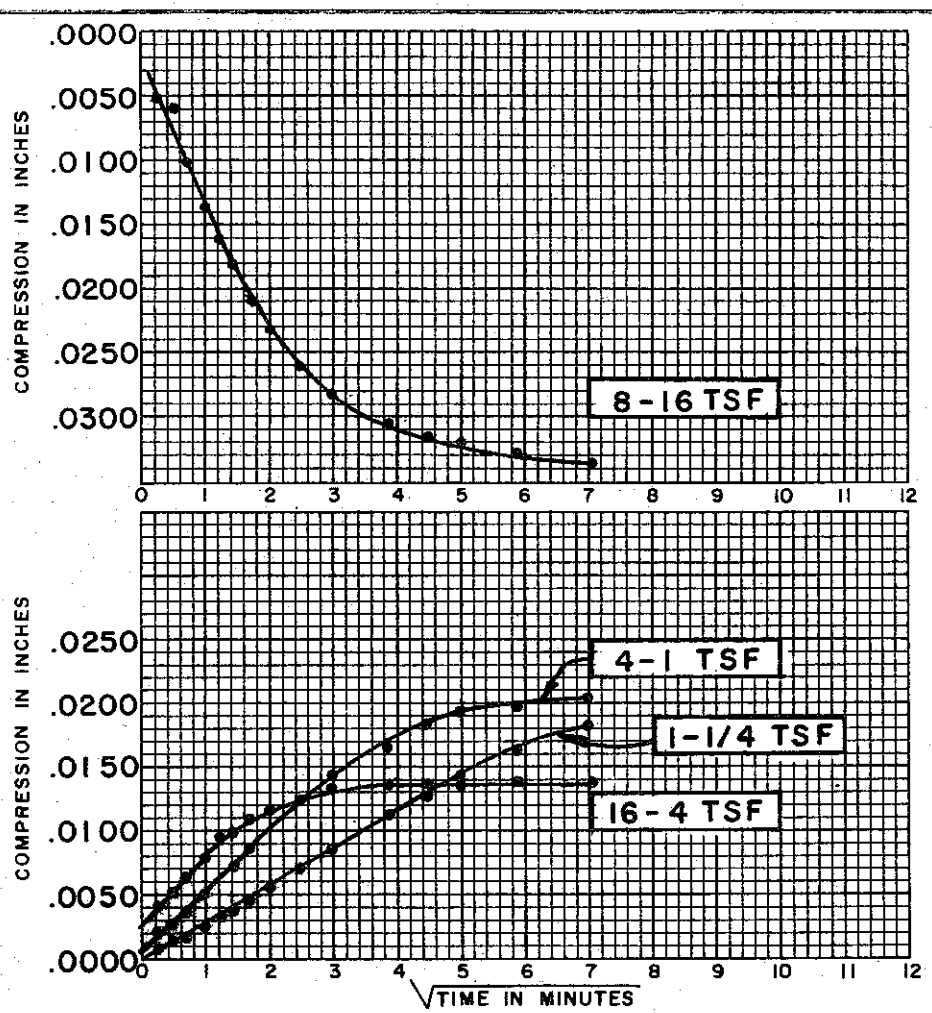
FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-475

C-476





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 38.1 %
FINAL WATER CONTENT 30.1 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.055

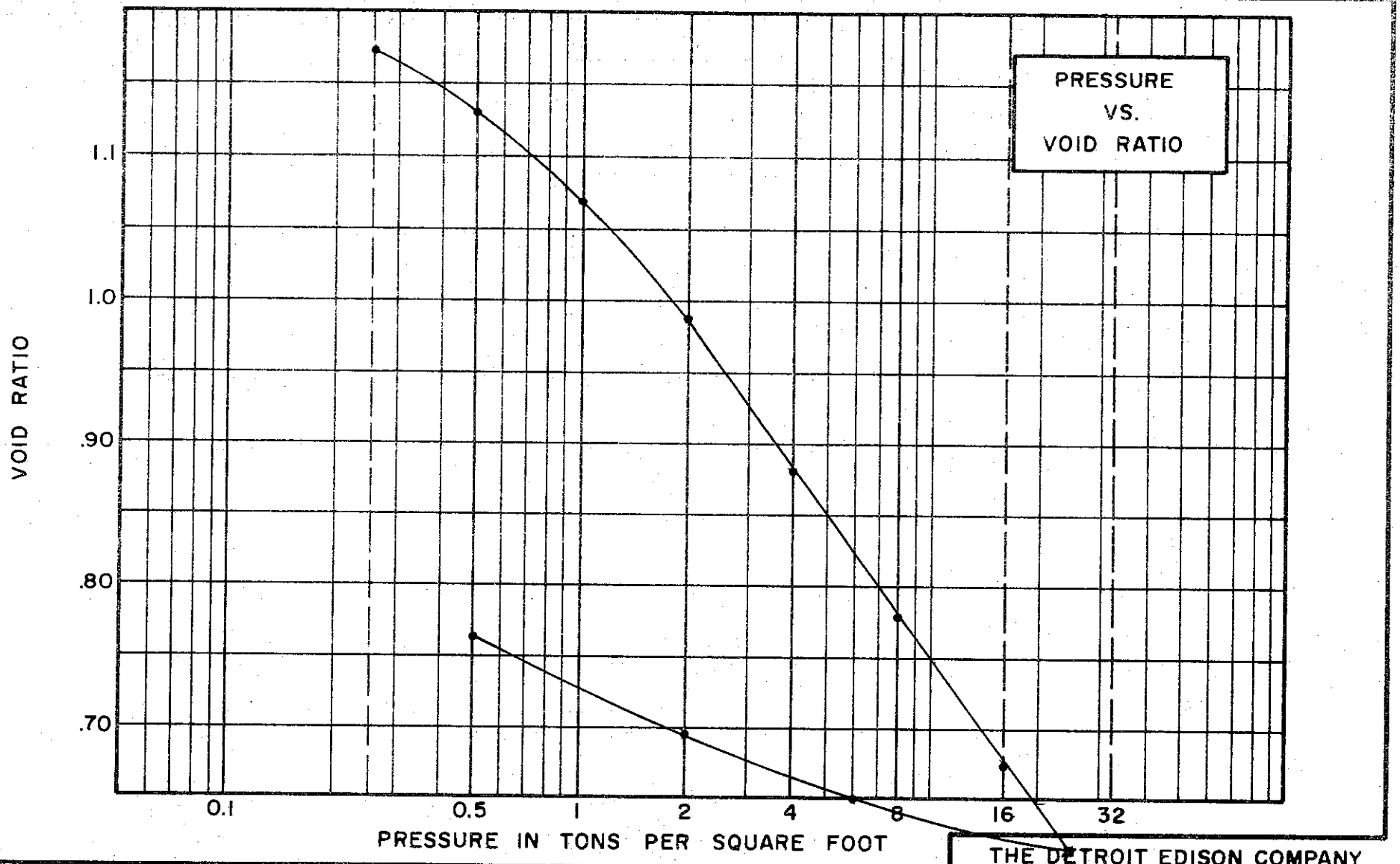
BORING NO. 41
SAMPLE NO. 7
DEPTH 21.0

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.75

WATER CONTENT, INITIAL 46.5% FINAL 31.9%

ATTERBERG LIMITS:

LIQUID LIMIT 52 % PLASTIC LIMIT 25 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.235

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

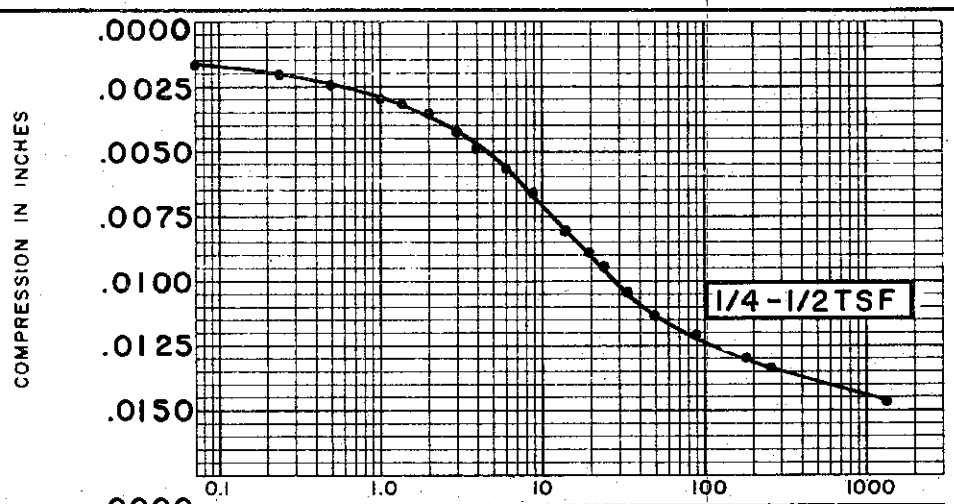
BORING NO. 41 TEST NO. C33.1

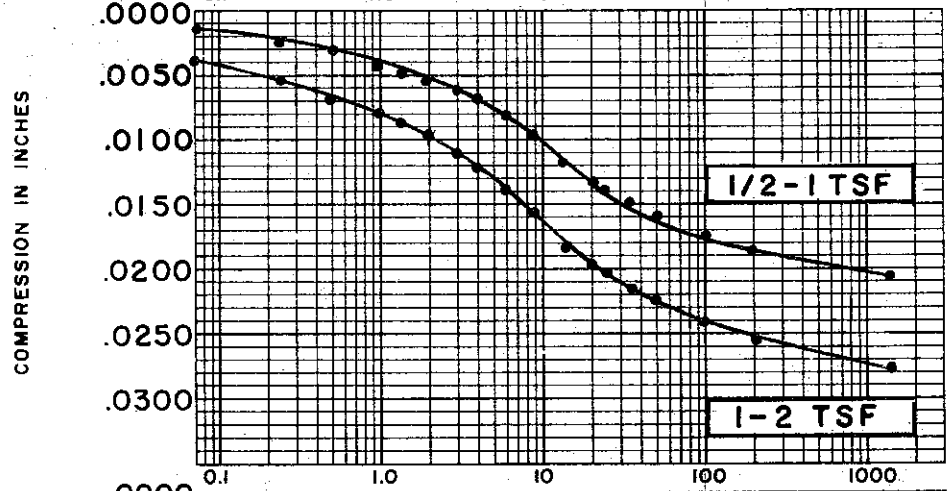
SAMPLE NO. 13 DATE JAN. 1974

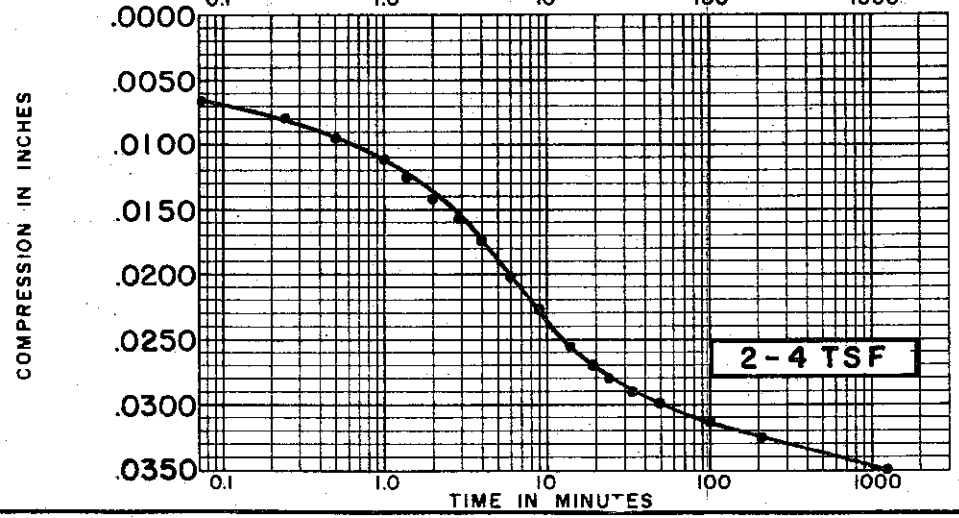
DEPTH 53'

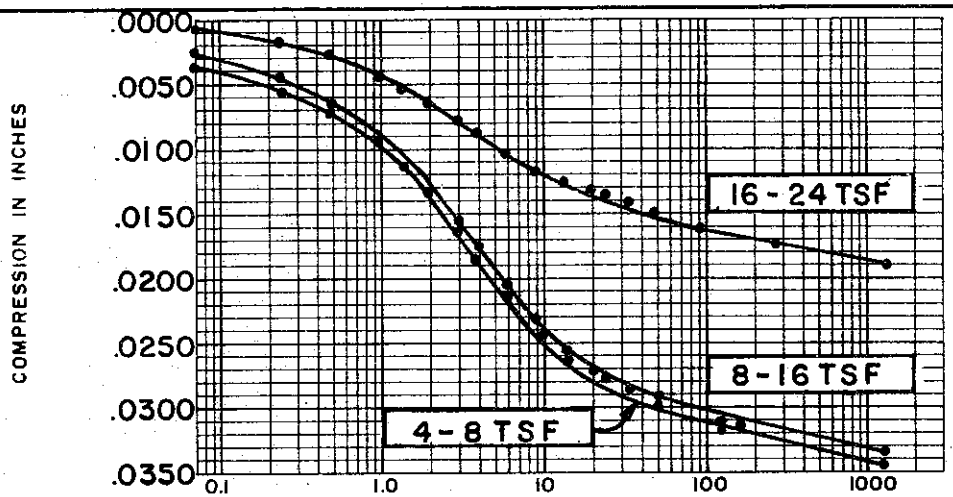
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

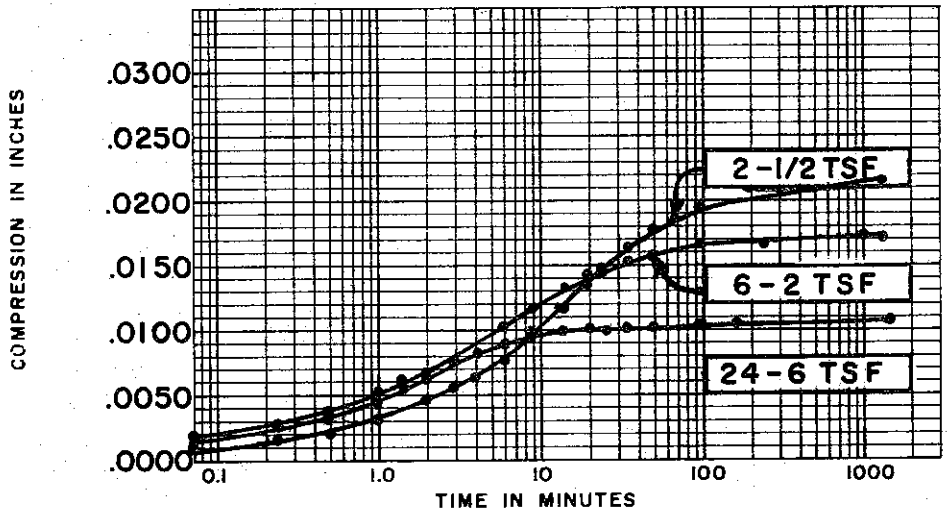
C-477











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL - CH)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT 43.5 %
FINAL WATER CONTENT 37.9 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.235

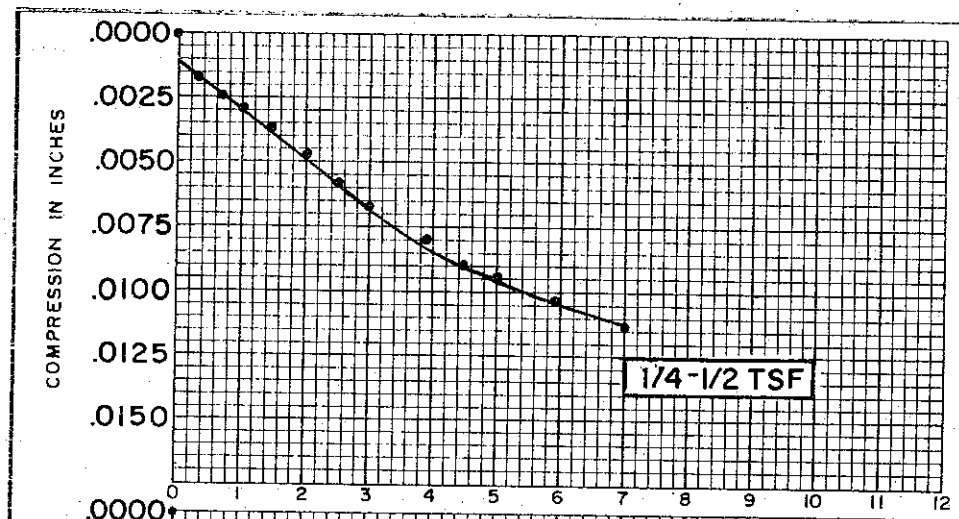
BORING NO. 41
SAMPLE NO. 13
DEPTH 53.0'

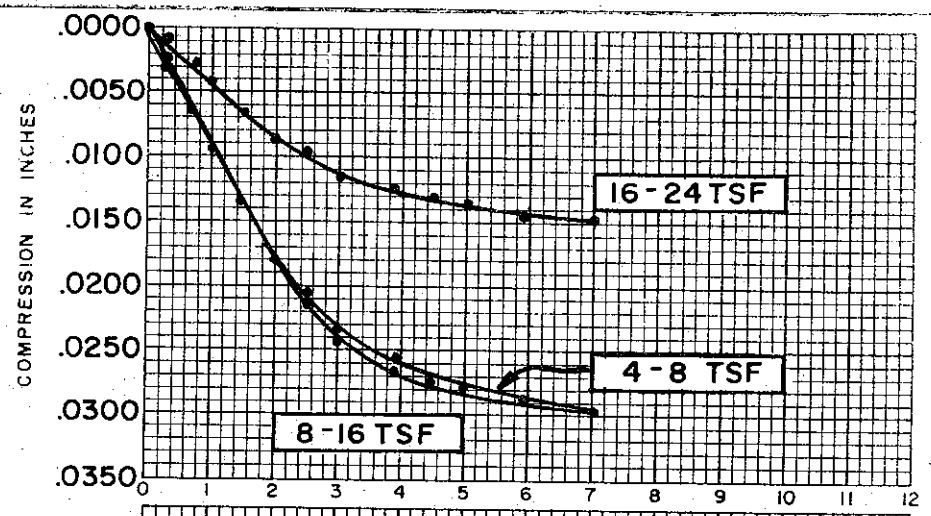
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

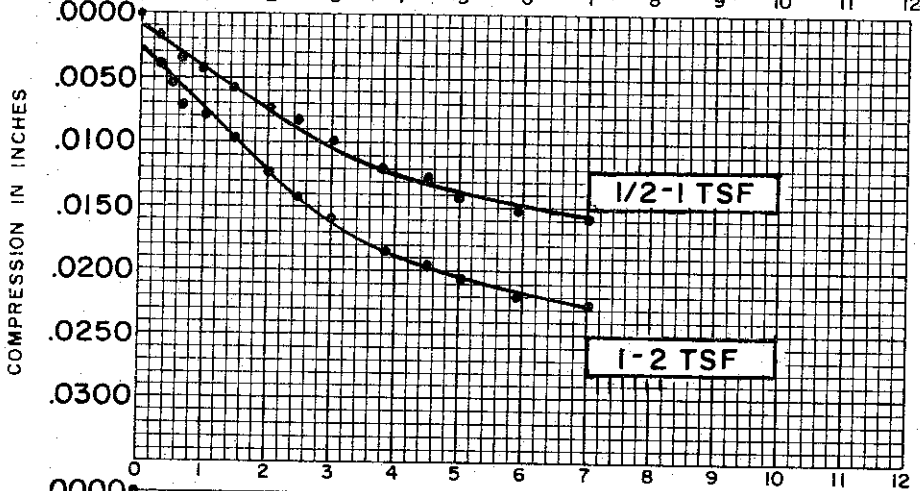
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

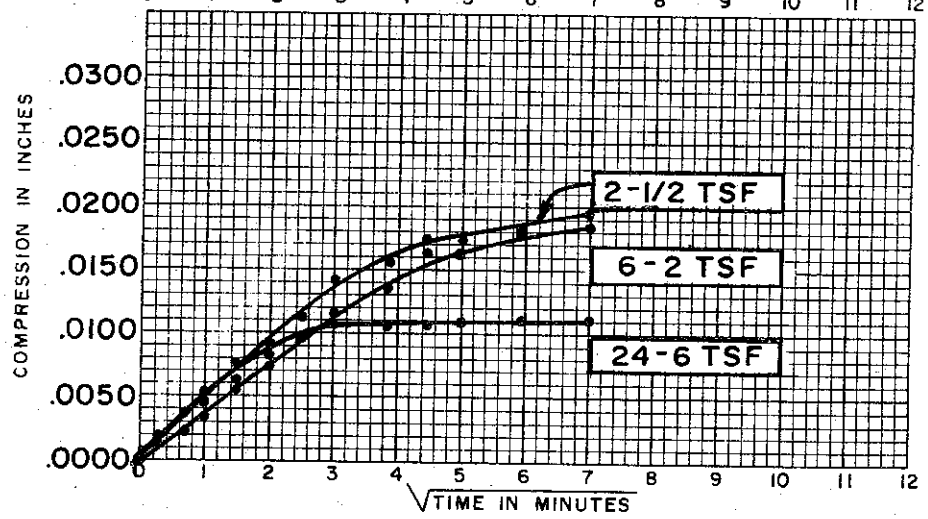
FILE 1255

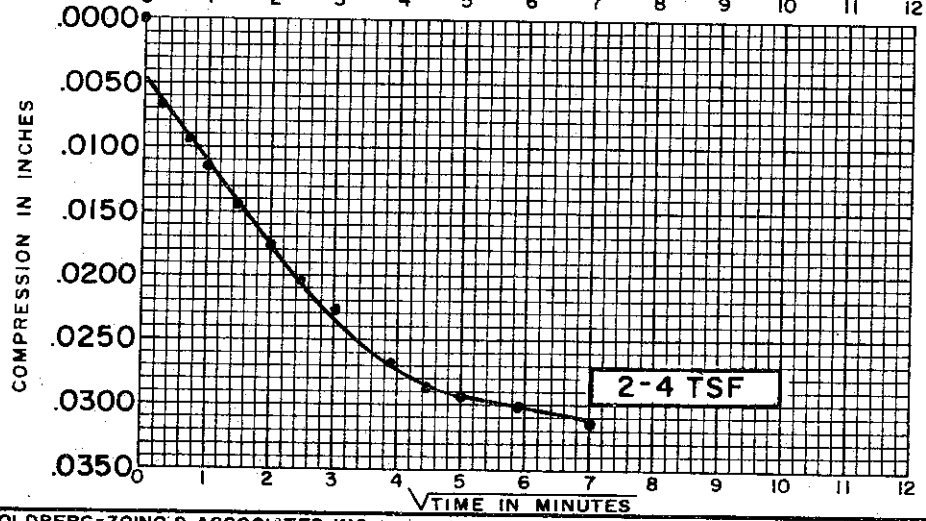
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT 46.5%
FINAL WATER CONTENT 31.9%

BORING NO. 41
SAMPLE NO. 13
DEPTH 53.0'

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.235

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

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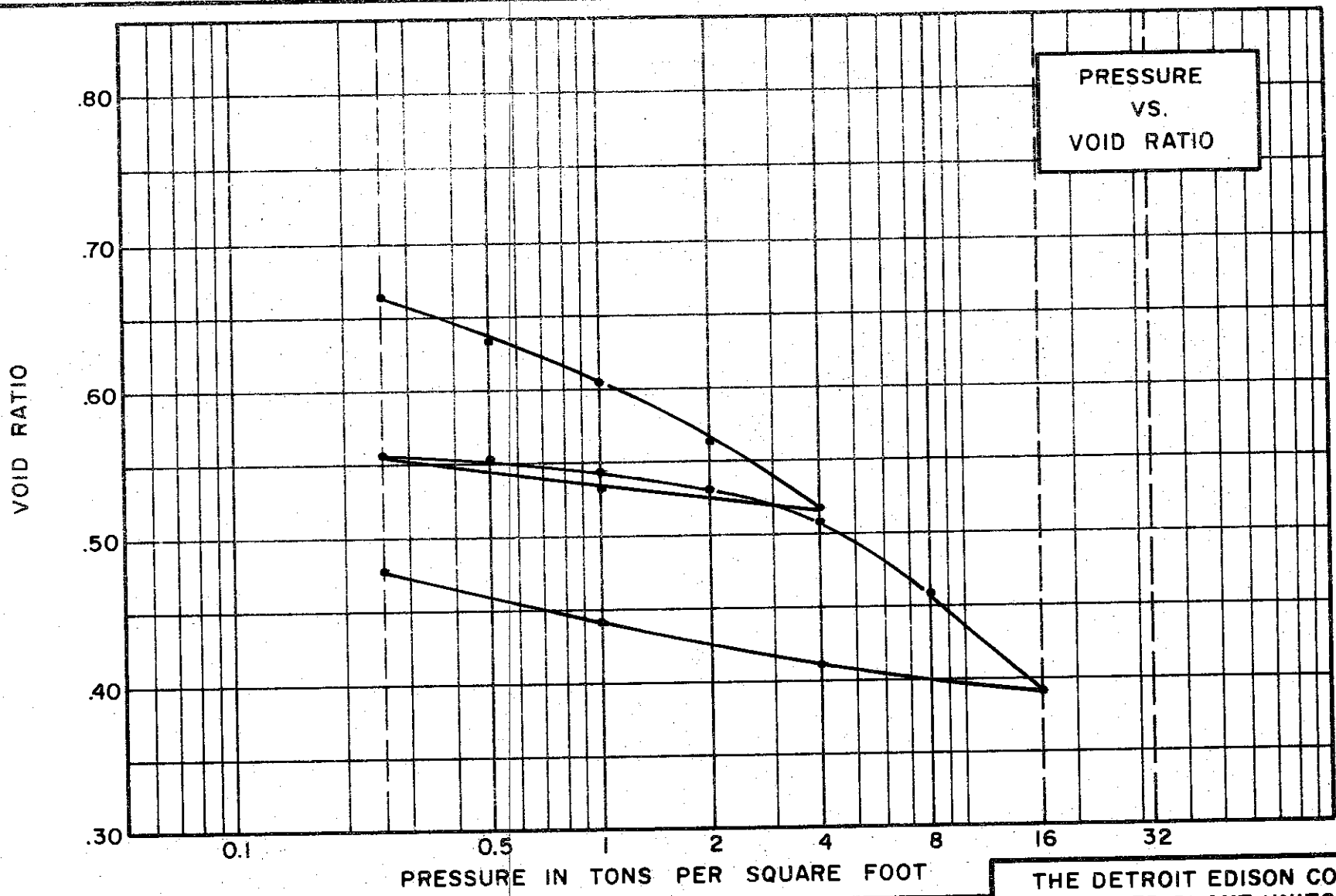
C-480



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY; SANDY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 26.7% FINAL 19.7%

ATTERBERG LIMITS:
LIQUID LIMIT 25 % PLASTIC LIMIT 15 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.697

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

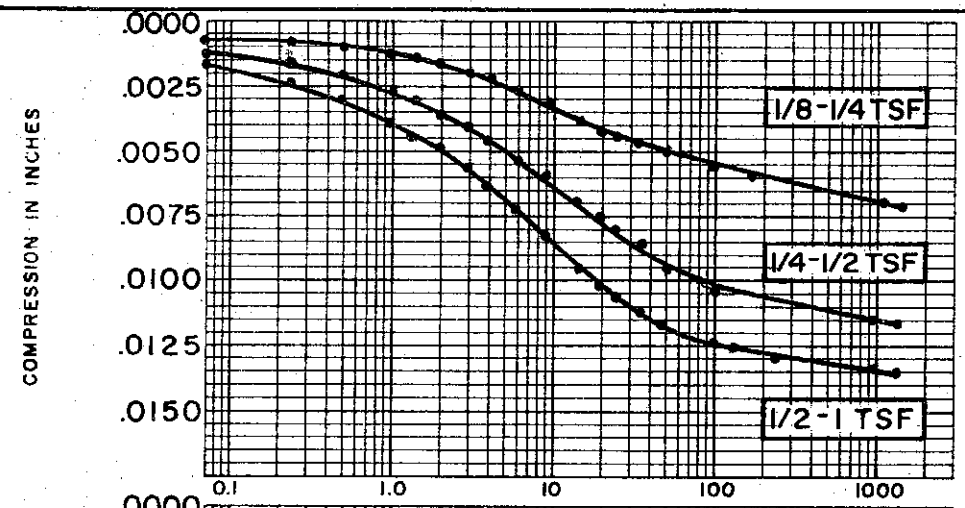
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

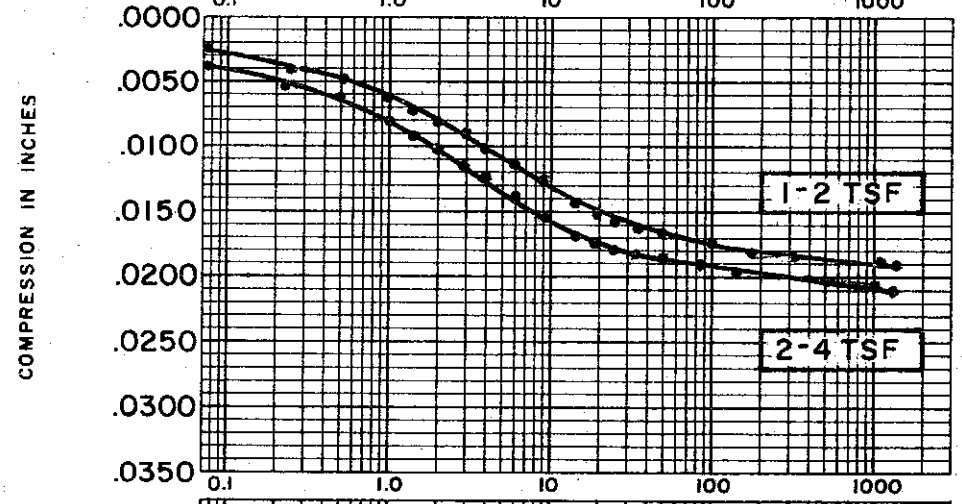
BORING NO. 41 TEST NO. C35.1

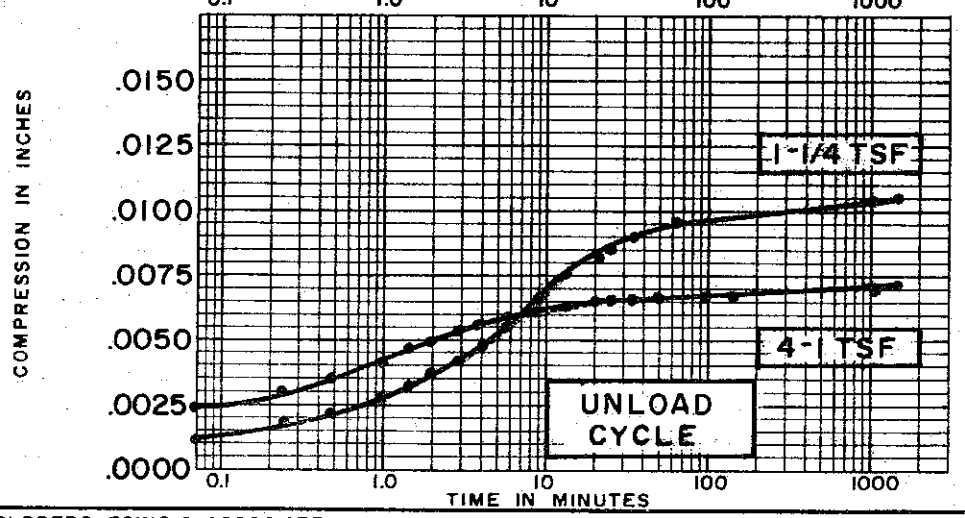
SAMPLE NO. 17 DATE JAN. 1974

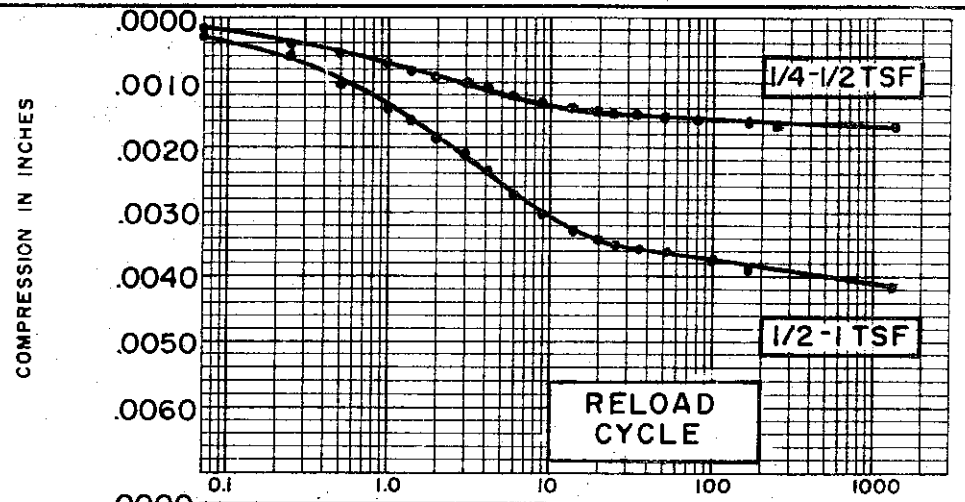
DEPTH 73.5'

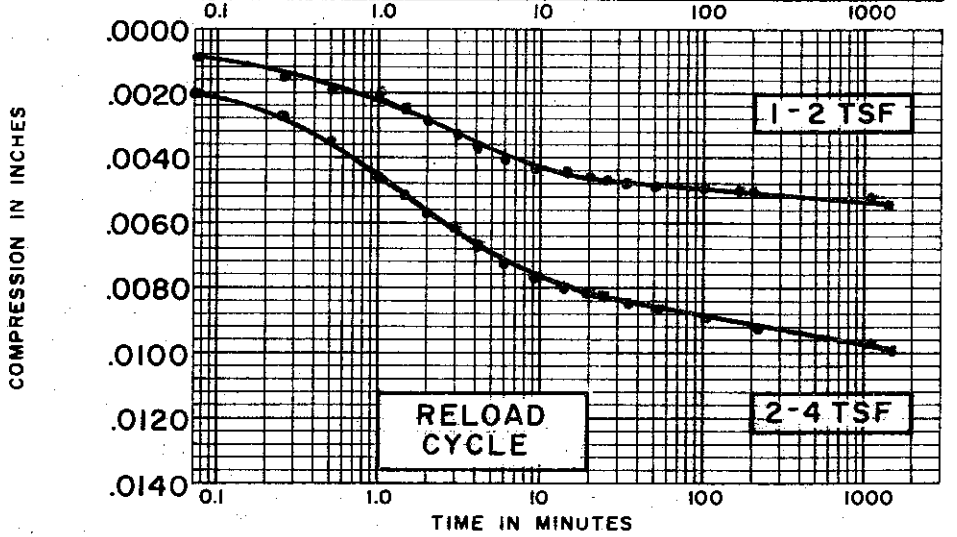
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.68
INITIAL WATER CONTENT 26.7%
FINAL WATER CONTENT 19.7%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.697

BORING NO. 41
SAMPLE NO. 17
DEPTH 73.5'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

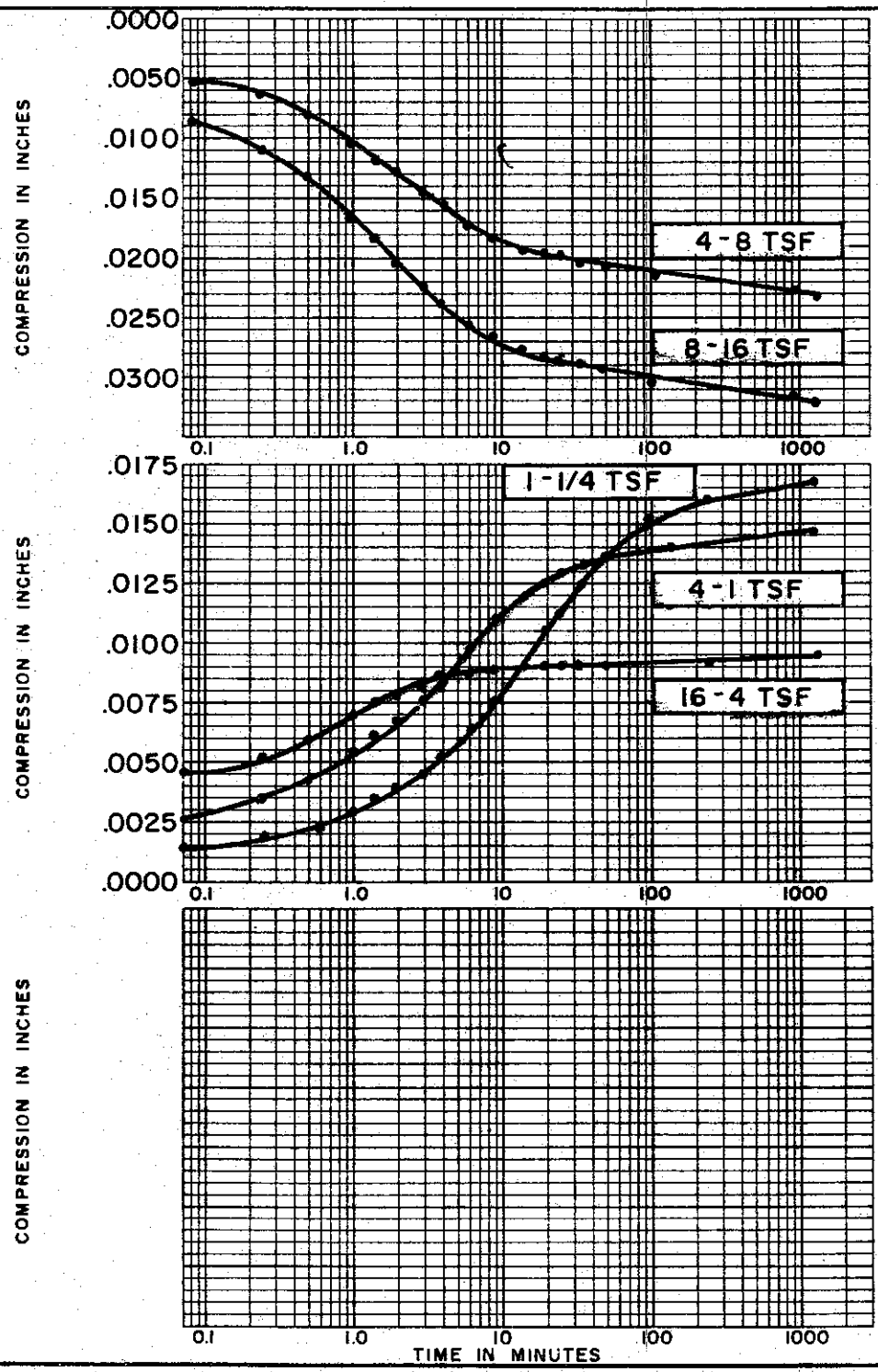
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

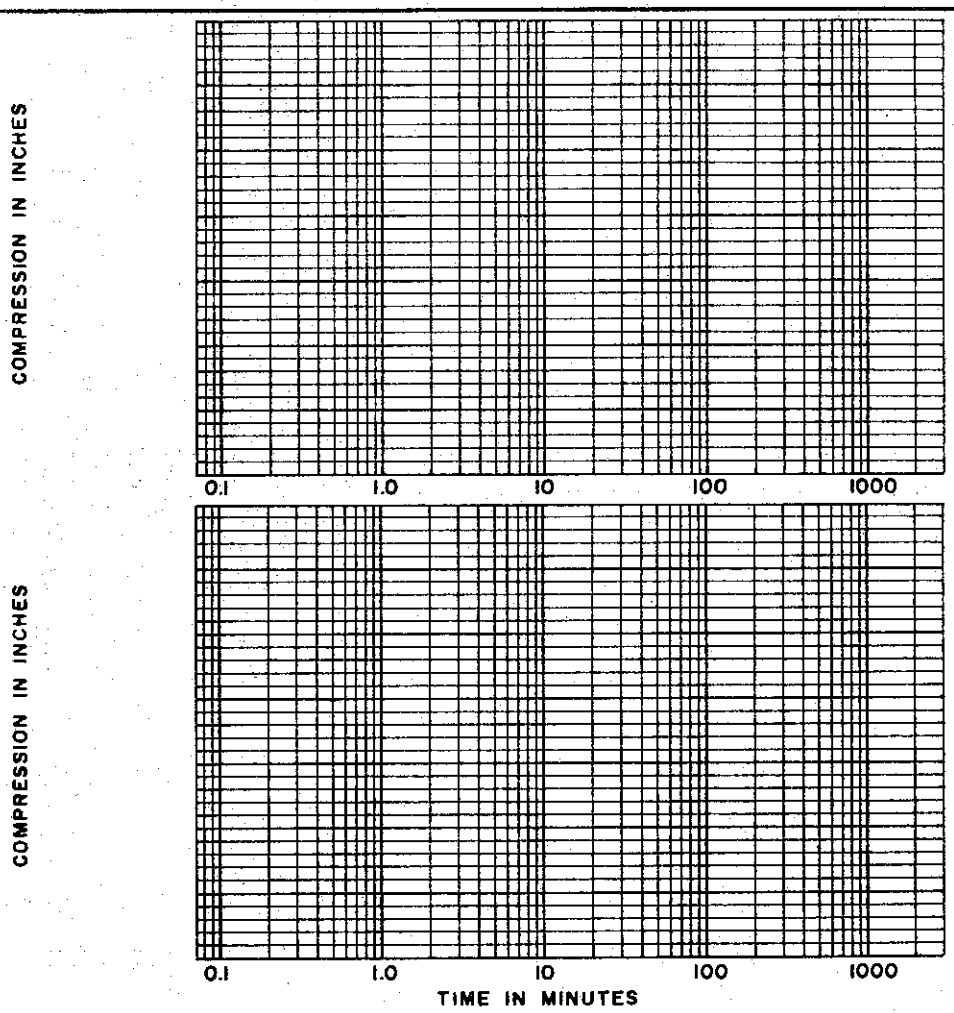
FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-481

C-482





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.68
INITIAL WATER CONTENT 26.7%
FINAL WATER CONTENT 19.7%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.697

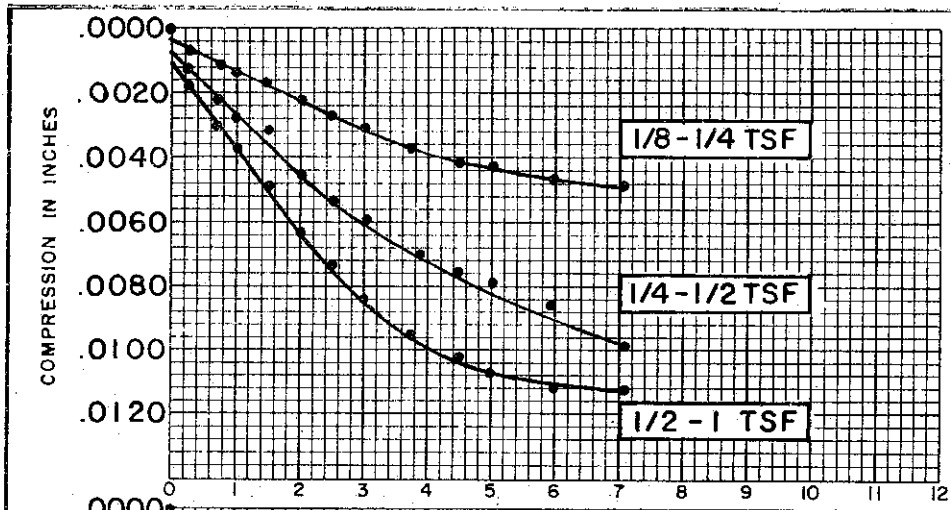
BORING NO. 41
SAMPLE NO. 17
DEPTH 73.5

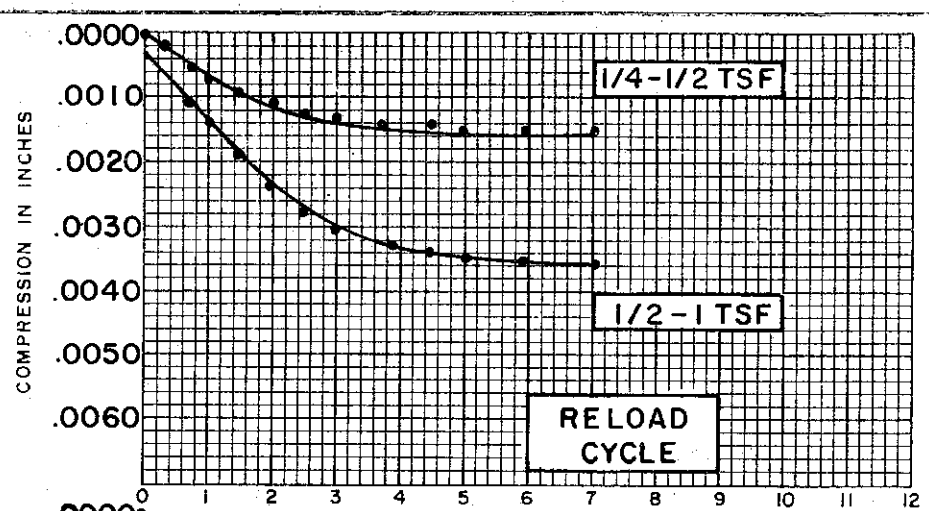
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

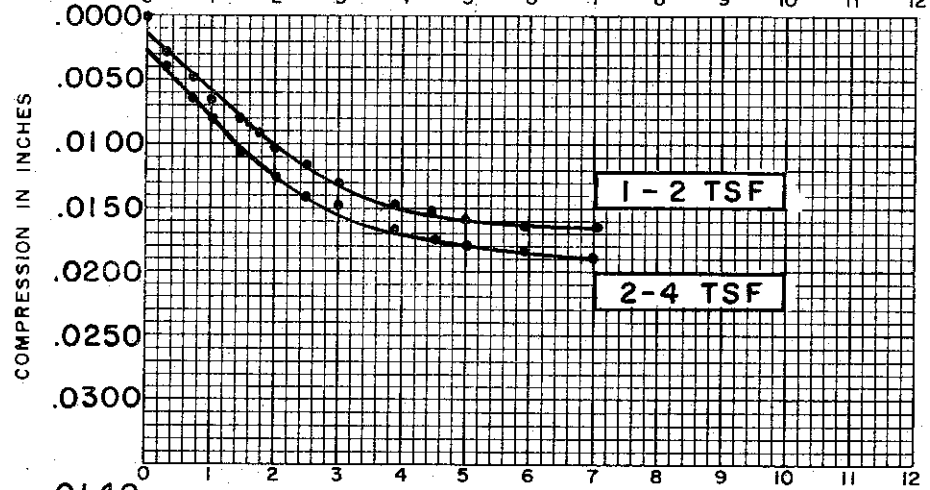
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

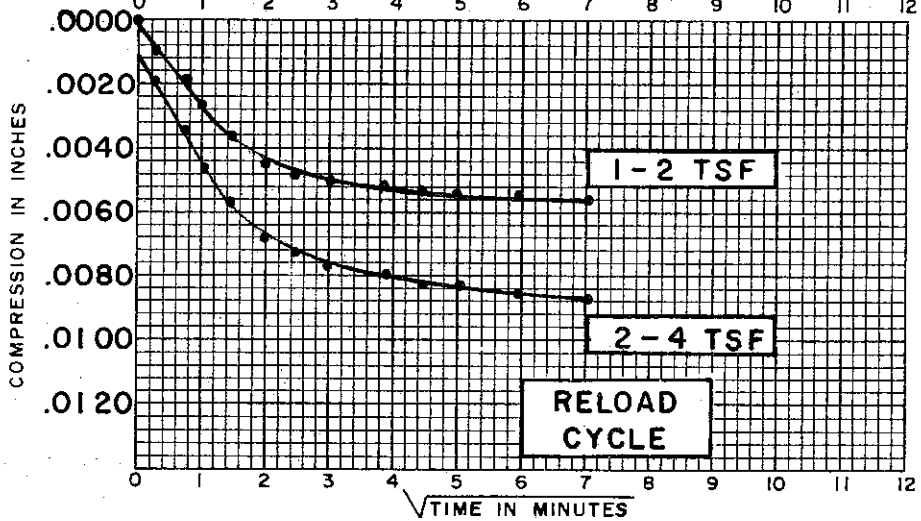
FILE 1255

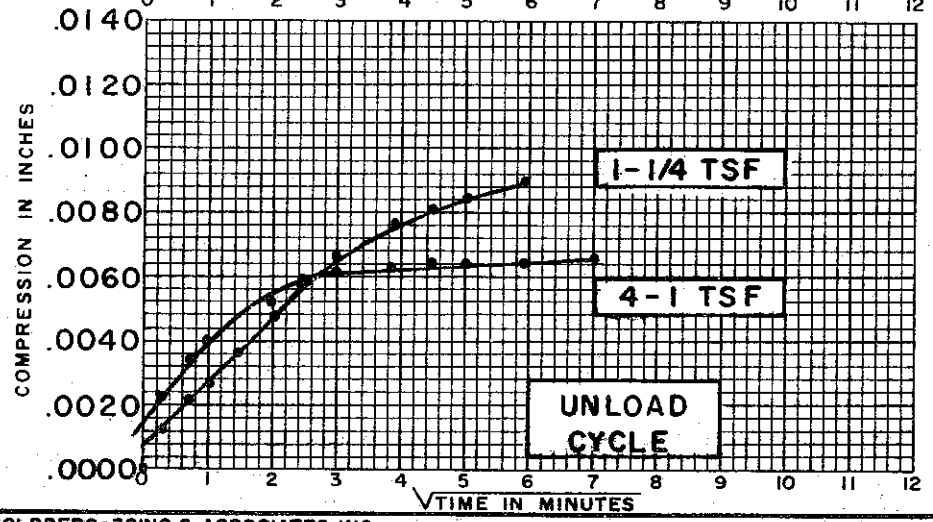
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.68
INITIAL WATER CONTENT 26.7%
FINAL WATER CONTENT 19.7%

BORING NO. 41
SAMPLE NO. 17
DEPTH 73.5

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.697

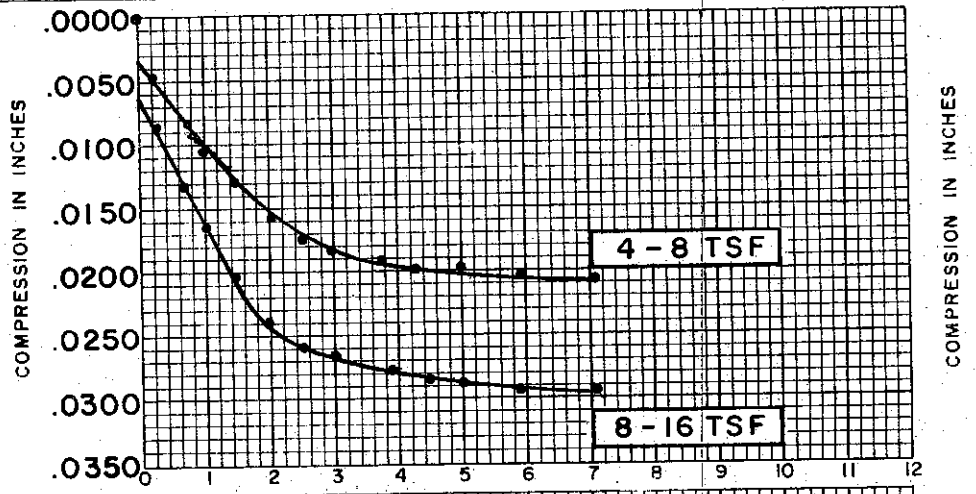
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

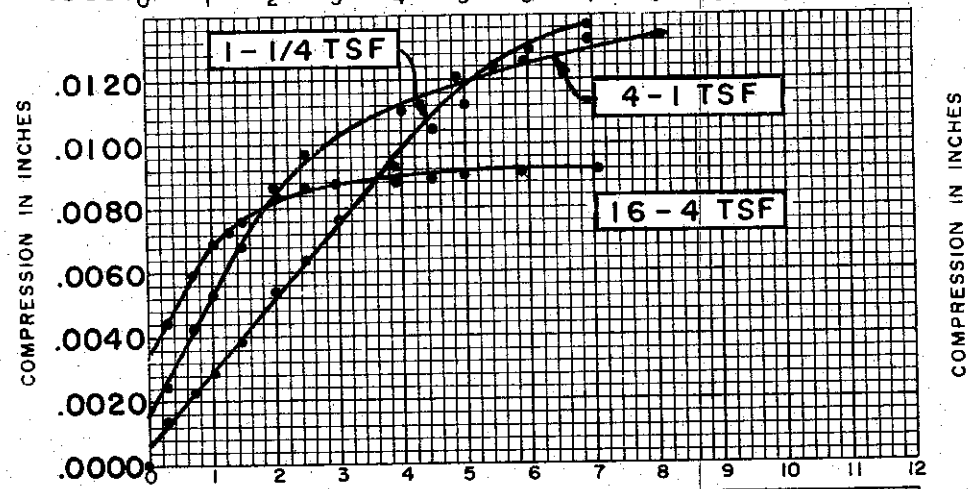
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

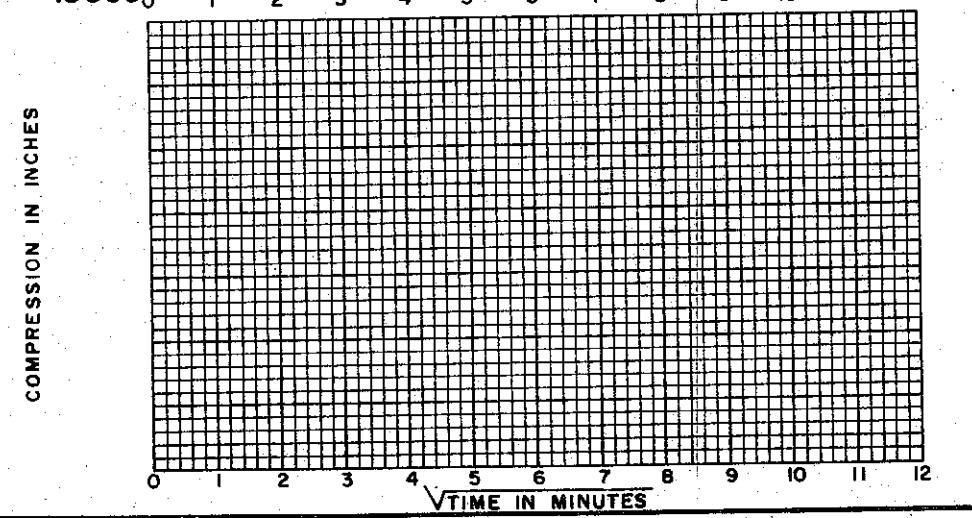
FILE 1255

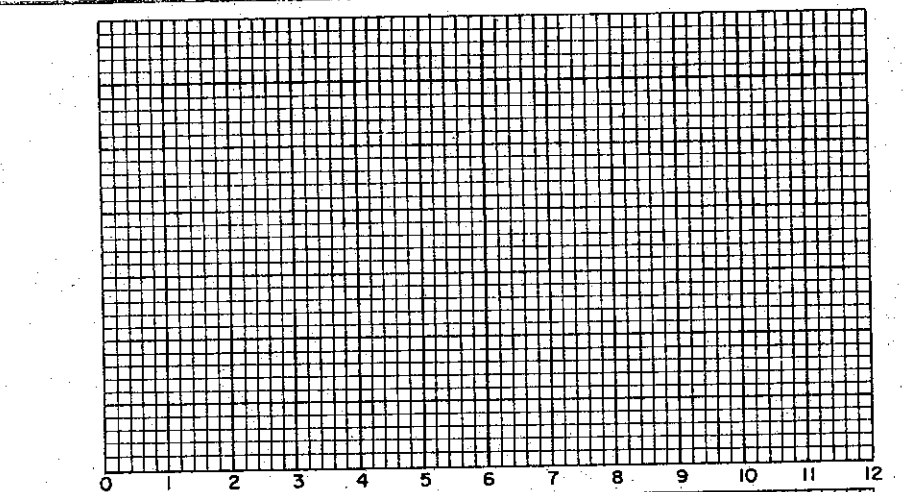
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

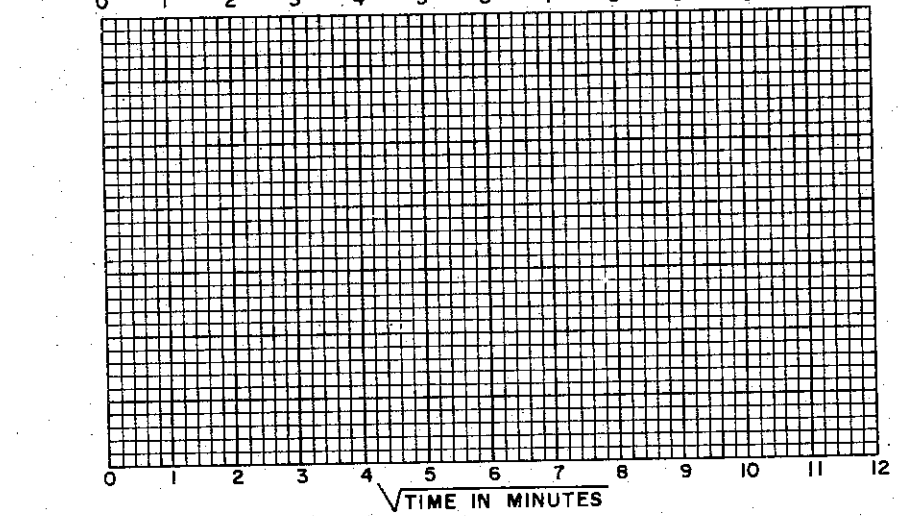
C-484











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.68
INITIAL WATER CONTENT 26.7 %
FINAL WATER CONTENT 19.7 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.697

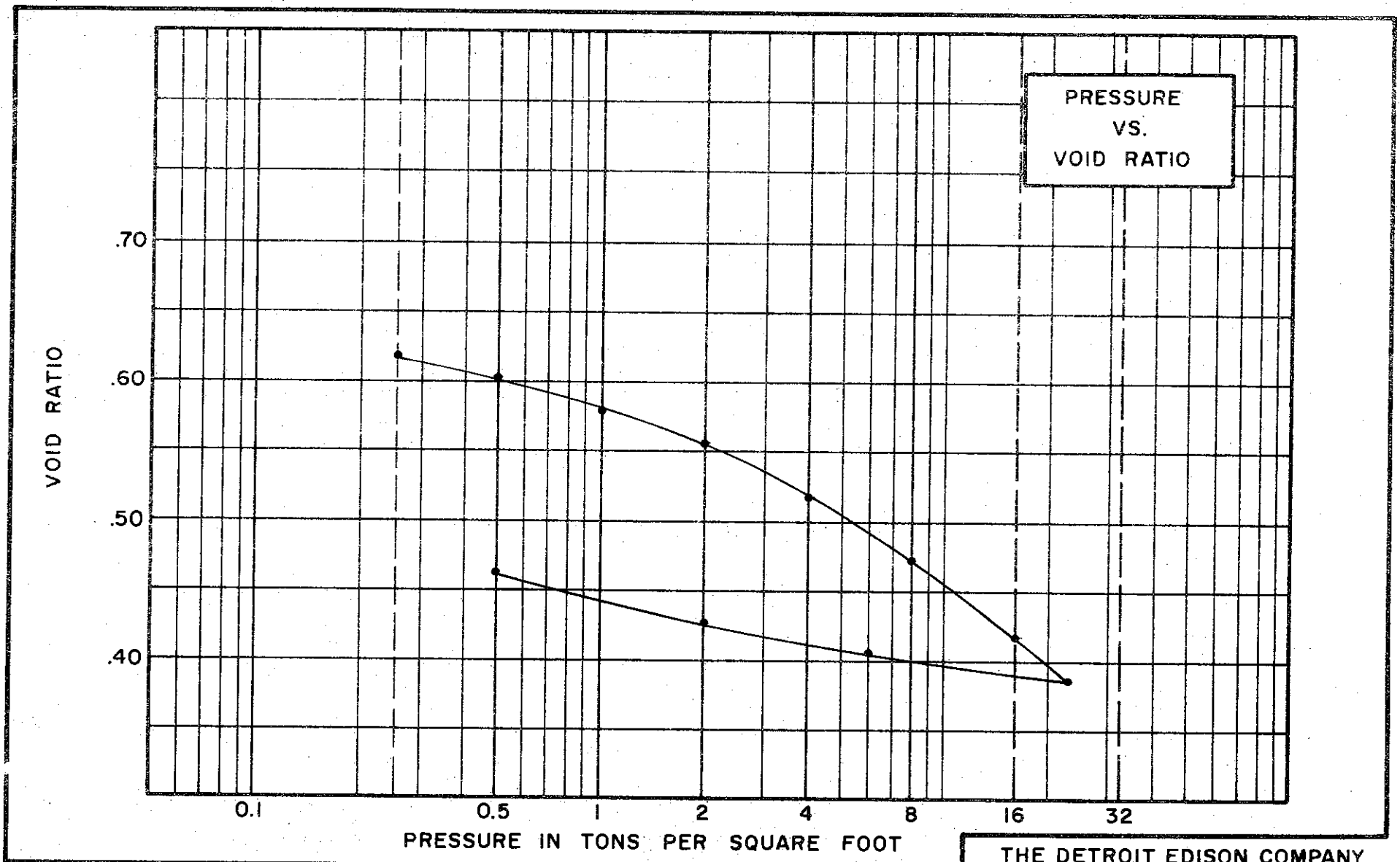
BORING NO. 41
SAMPLE NO. 17
DEPTH 73.5

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

SPECIFIC GRAVITY 2.71

WATER CONTENT, INITIAL 24.2% FINAL 19.4%

ATTERBERG LIMITS:
LIQUID LIMIT 29 % PLASTIC LIMIT 19 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 41 TEST NO. C38.1

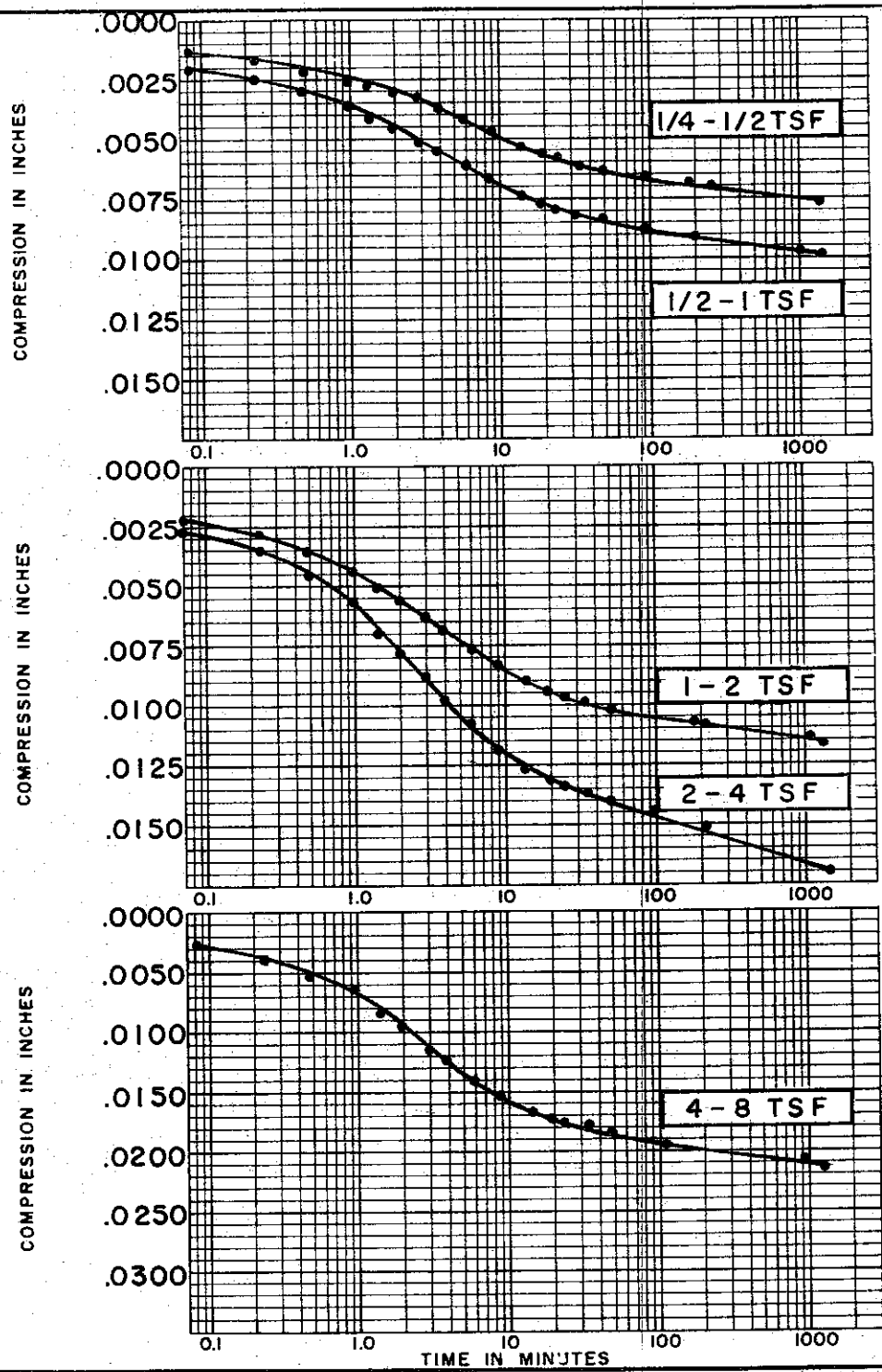
SAMPLE NO. 25 DATE JAN. 1974

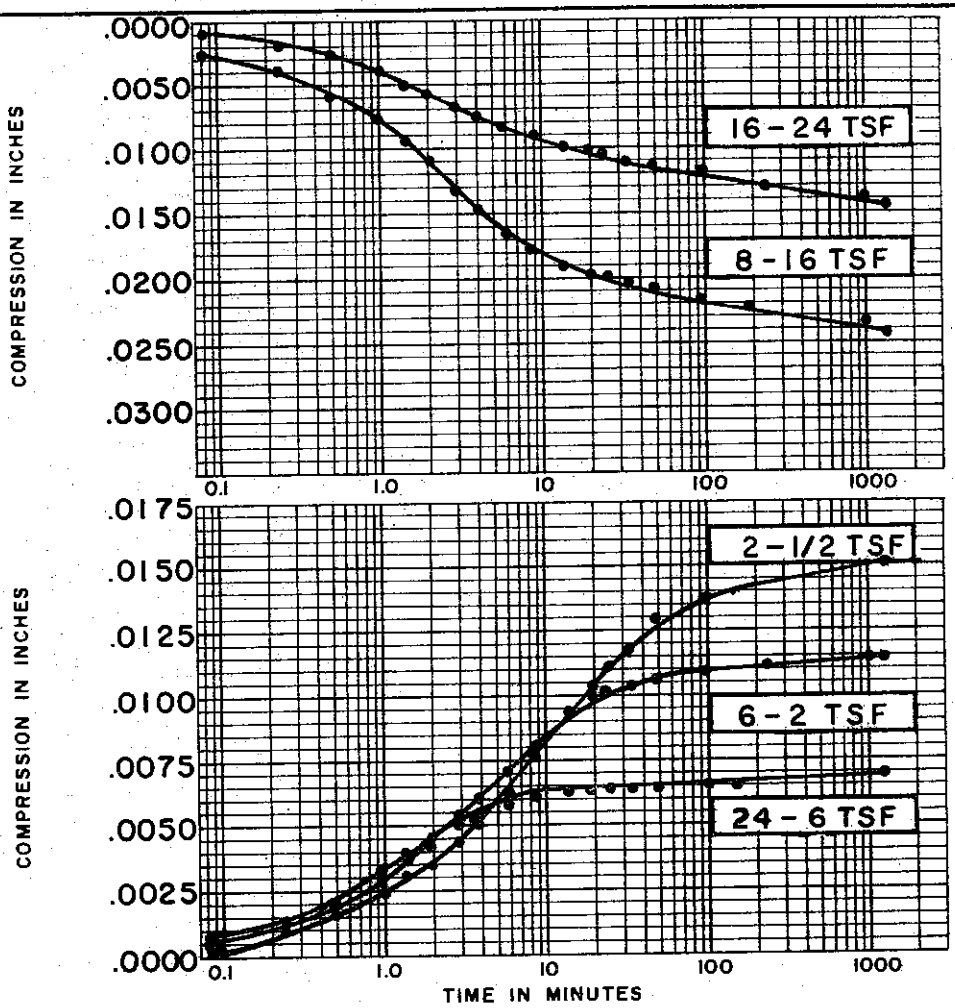
DEPTH 113'

C-485

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-486





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 24.2 %
FINAL WATER CONTENT 19.4 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.642

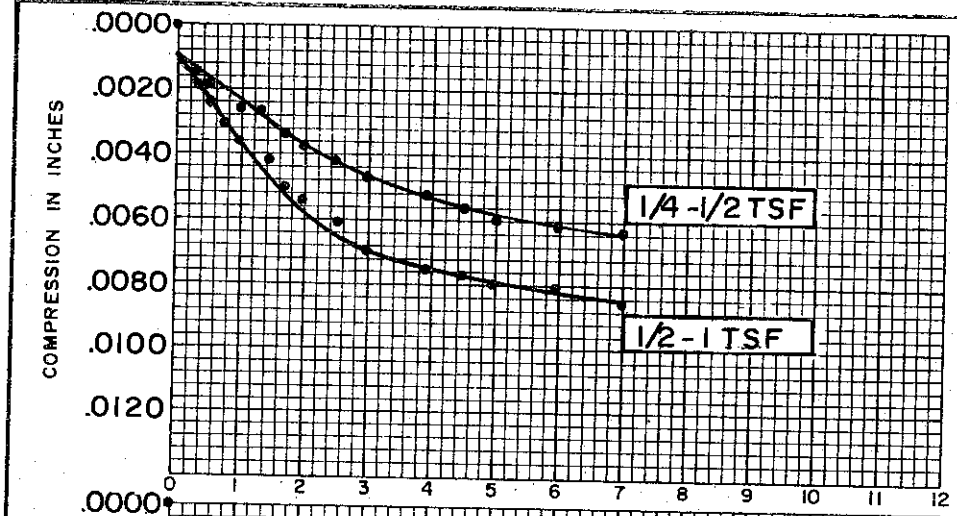
BORING NO. 41
SAMPLE NO. 25
DEPTH 113'

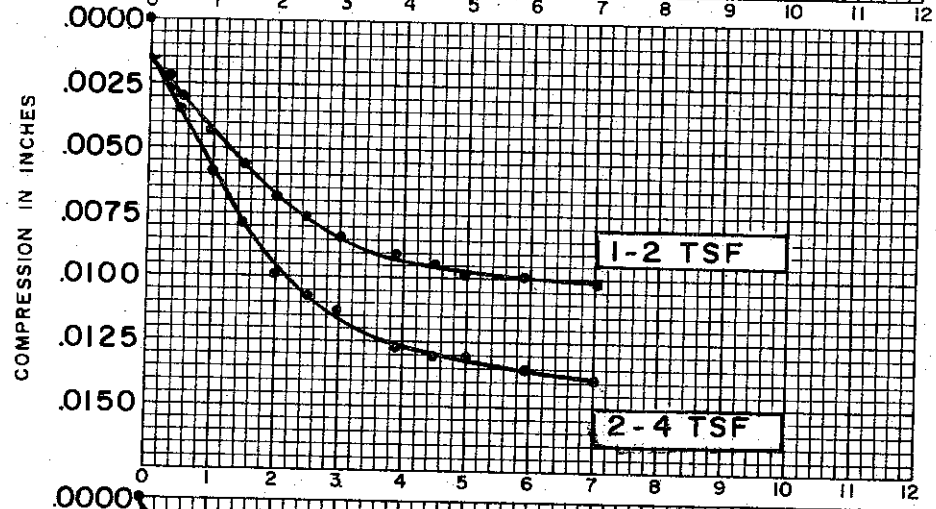
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

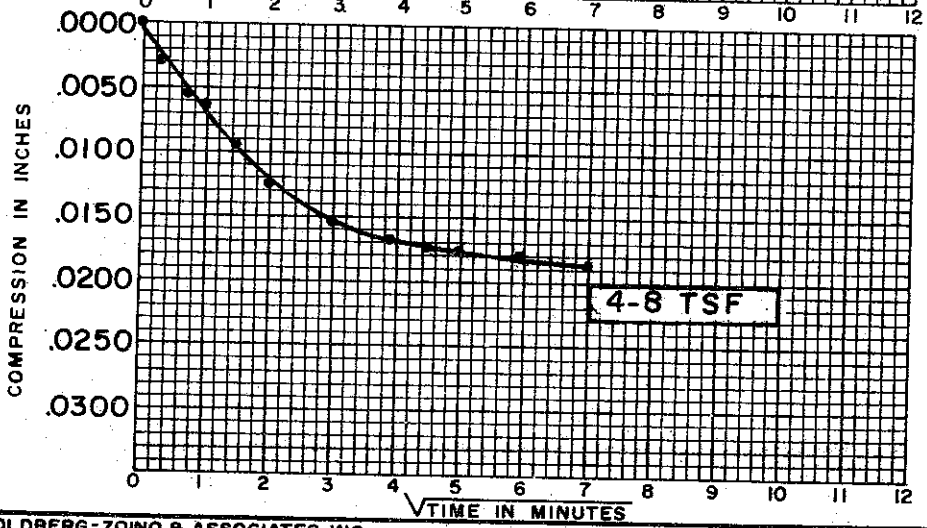
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

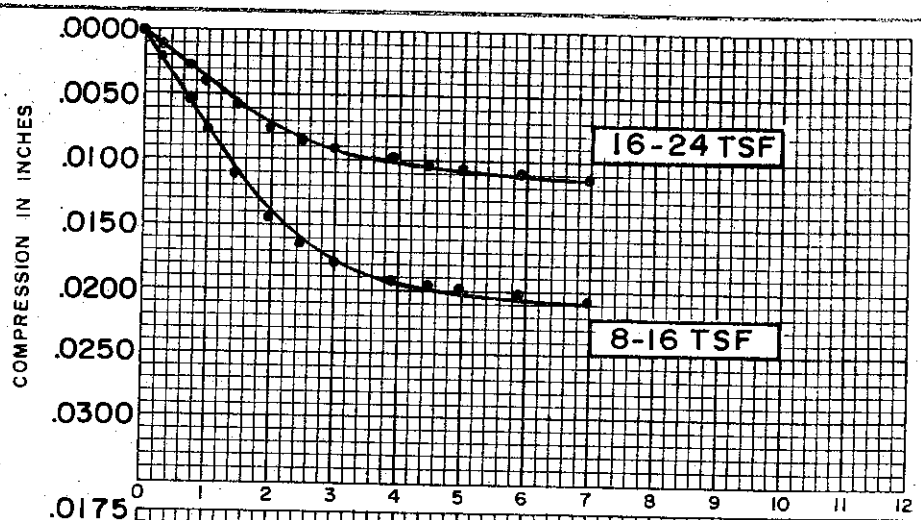
FILE 1255

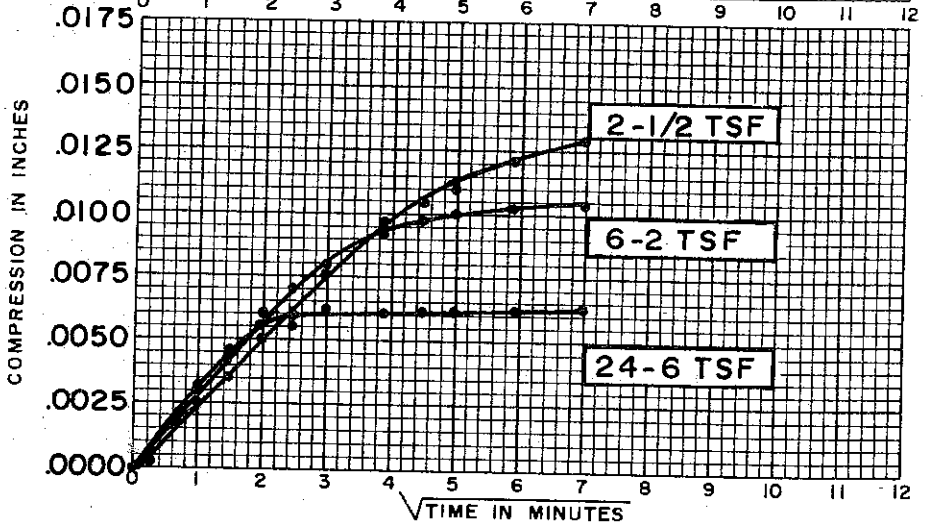
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 24.2 %
FINAL WATER CONTENT 19.4 %

BORING NO. 41
SAMPLE NO. 25
DEPTH 113'

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.642

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

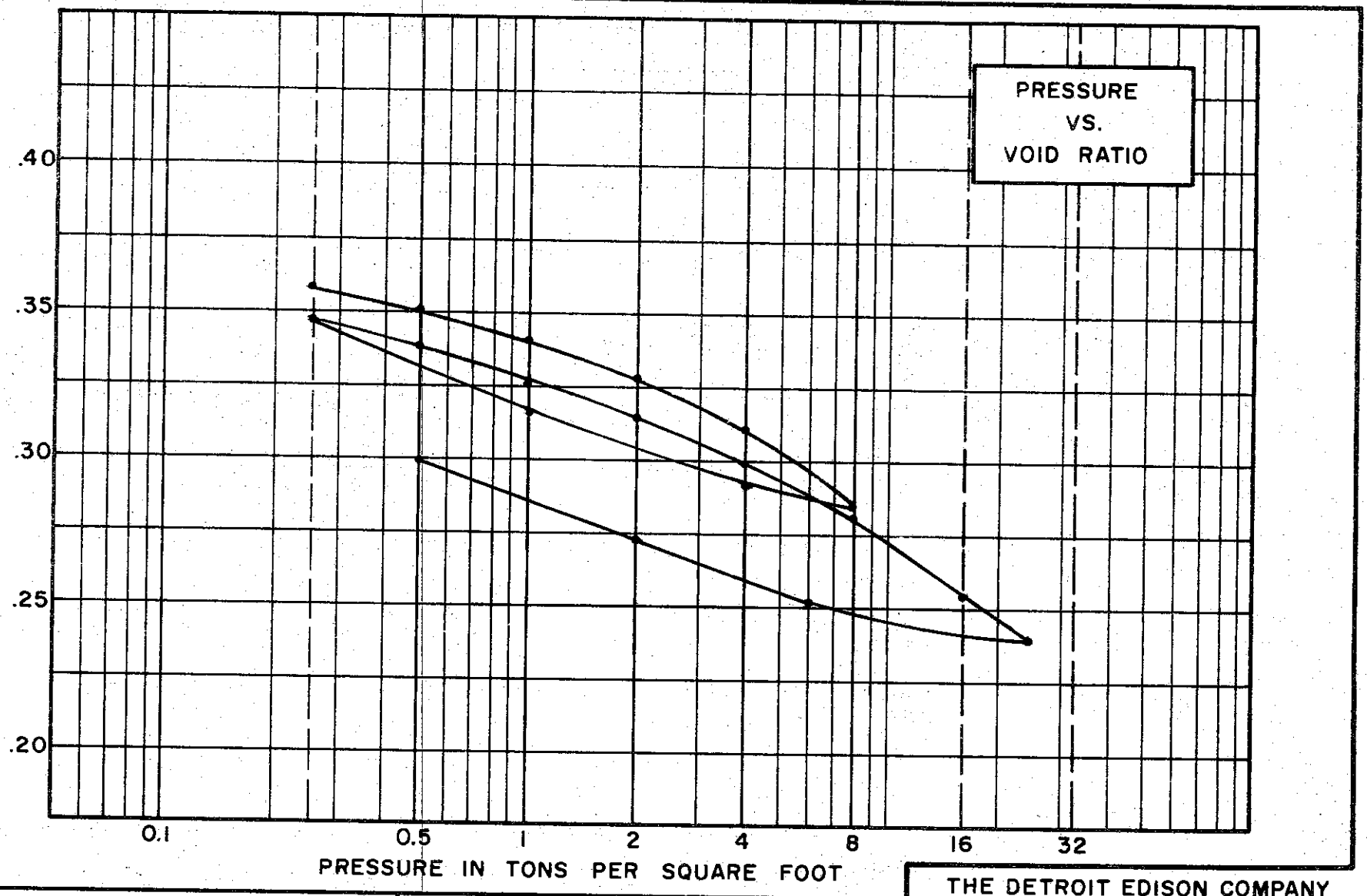
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

G-487

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-488



SOIL PROPERTIES

SOIL DESCRIPTION CLAYEY SAND, GRAVELLY (GC-SC)

SPECIFIC GRAVITY 2.69

WATER CONTENT, INITIAL 11.3% FINAL 12.0%

ATTERBERG LIMITS:
LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.370

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

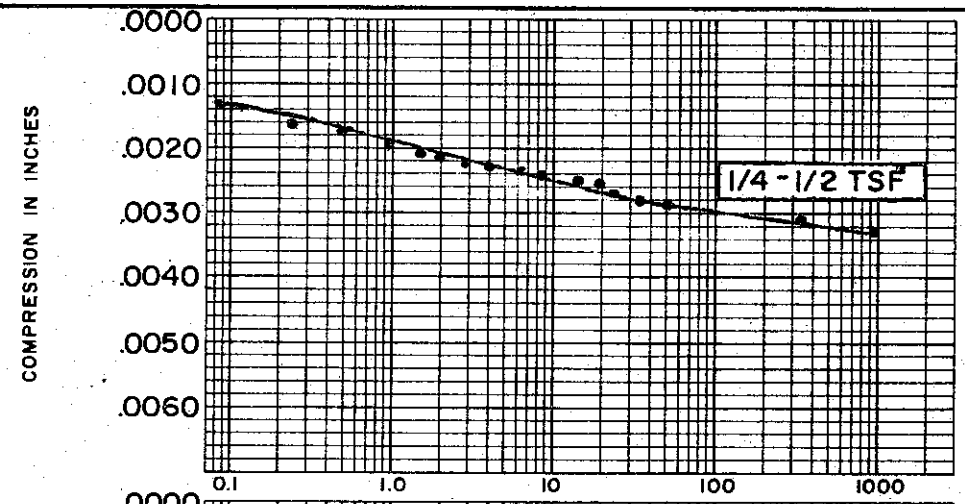
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

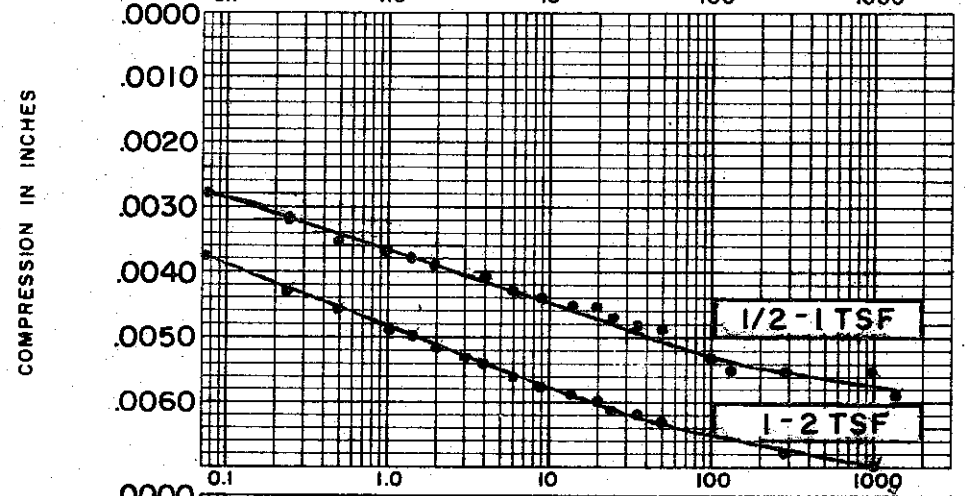
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

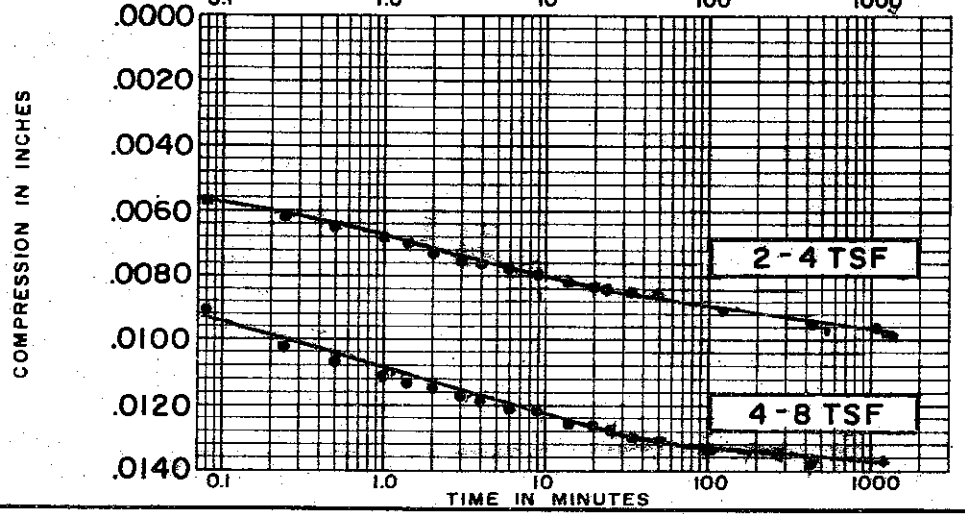
BORING NO. 41 TEST NO. C4C.1

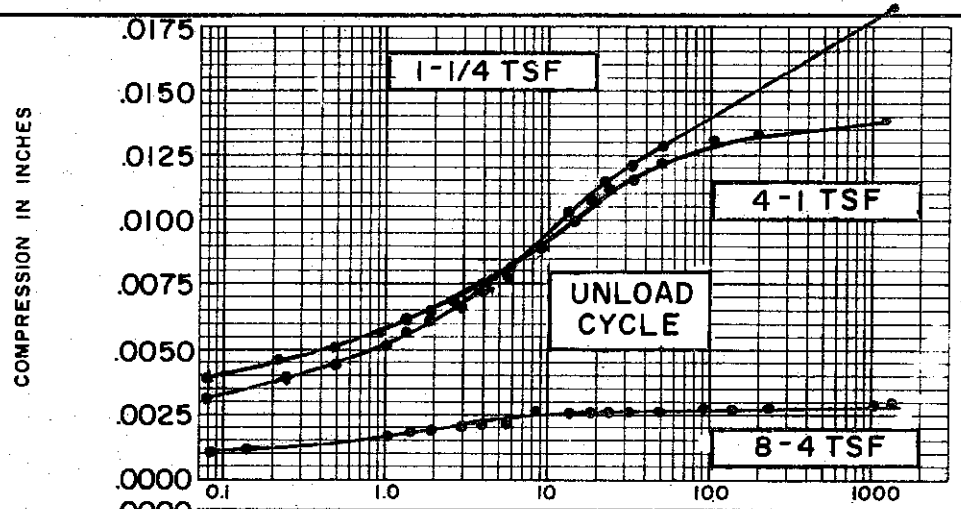
SAMPLE NO. 29 DATE FEB. 1974

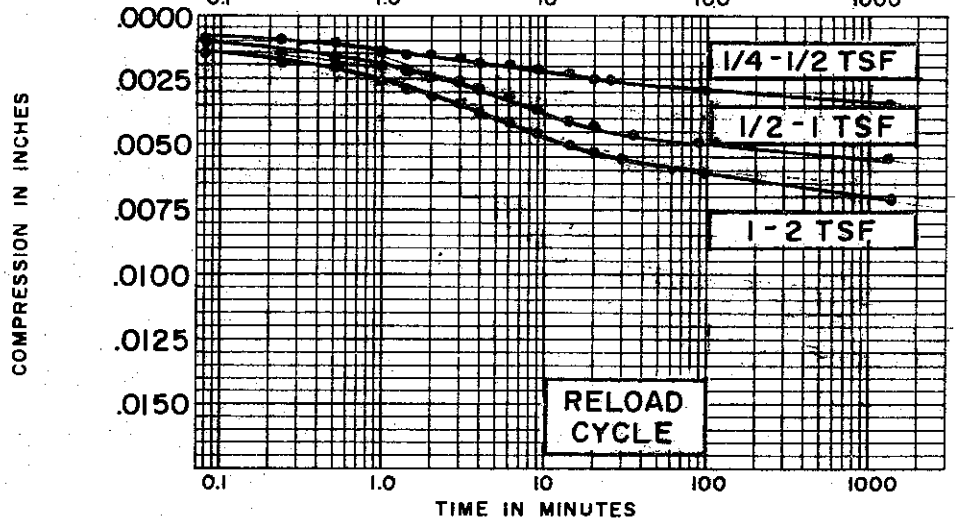
DEPTH 130.8'











SOIL PROPERTIES

SOIL DESCRIPTION: CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY 2.69
INITIAL WATER CONTENT 11.3%
FINAL WATER CONTENT 12.0%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO .370

BORING NO. 41
SAMPLE NO. 29
DEPTH 130.8'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

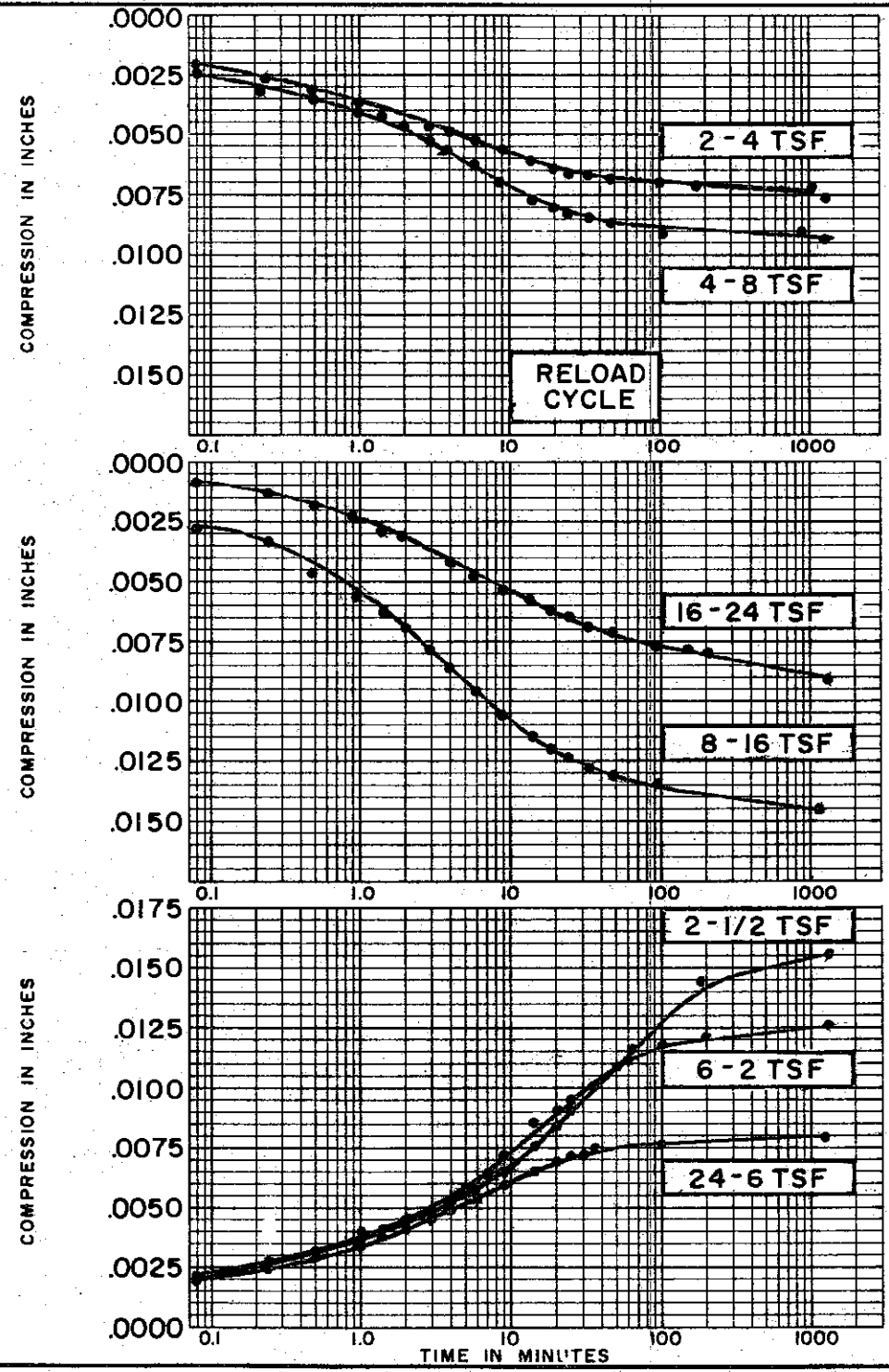
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

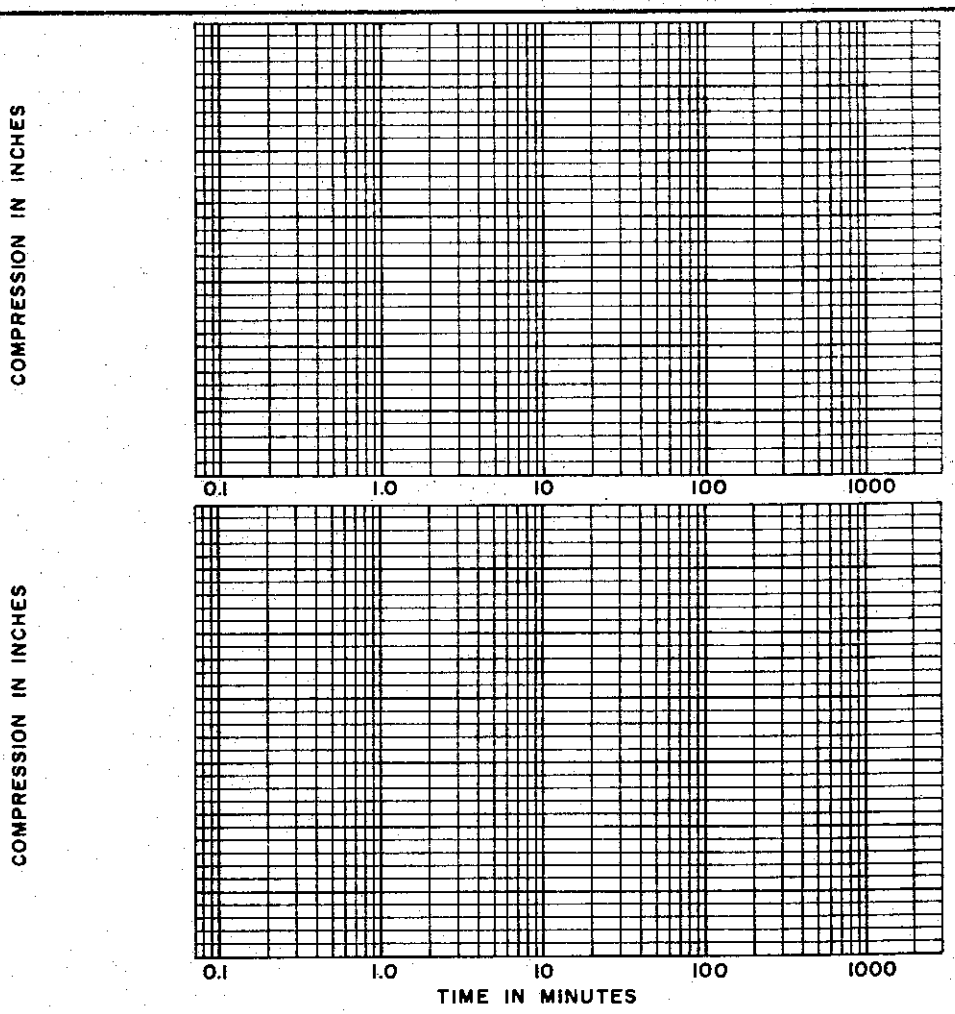
FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-489

C-490





SOIL PROPERTIES

SOIL DESCRIPTION: CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY 2.69
INITIAL WATER CONTENT 11.3%
FINAL WATER CONTENT 12.0%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO .370

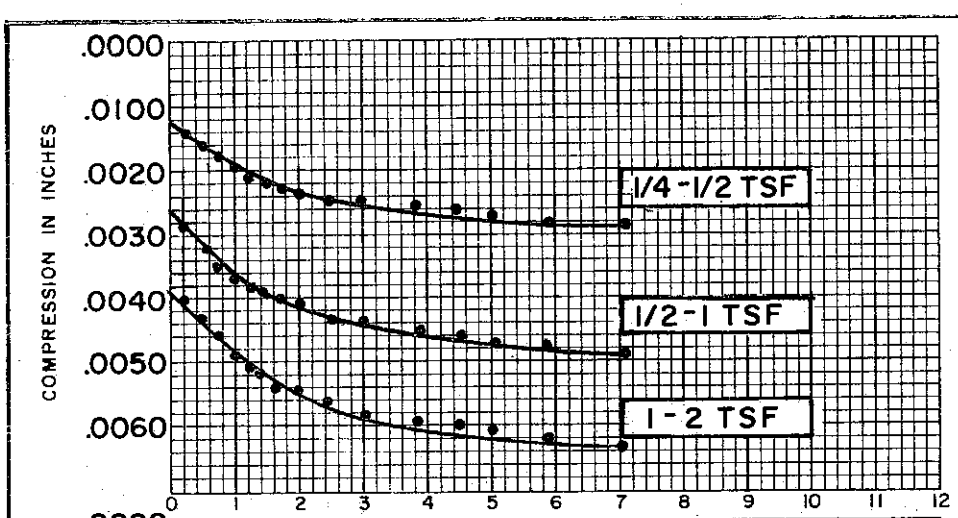
BORING NO. 41
SAMPLE NO. 29
DEPTH 130.8'

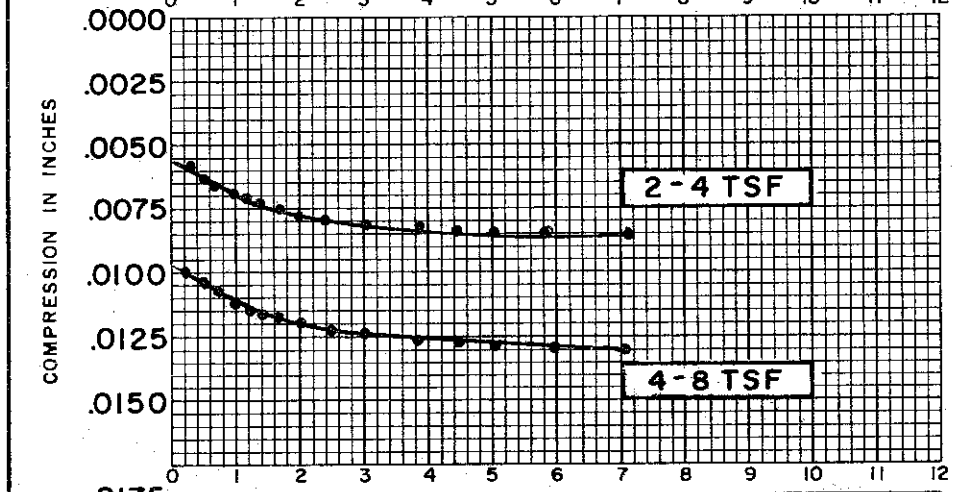
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

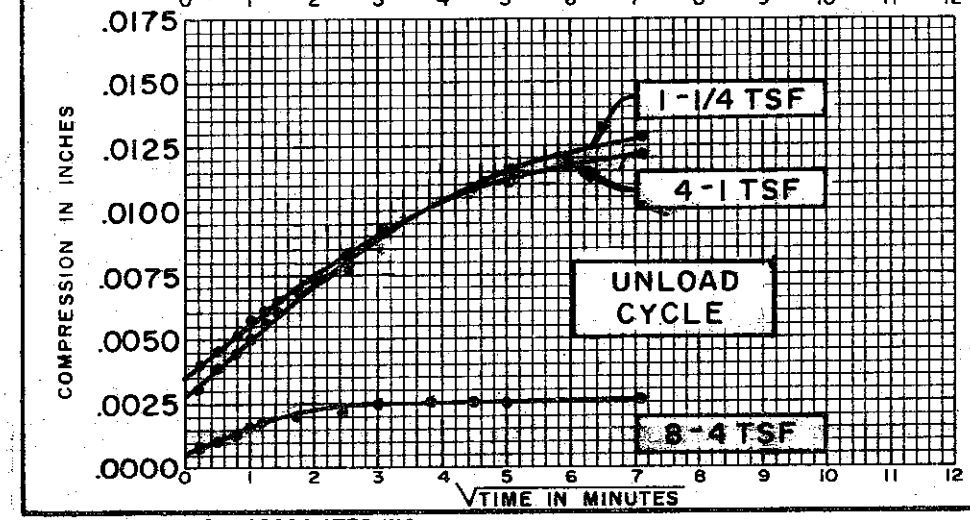
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

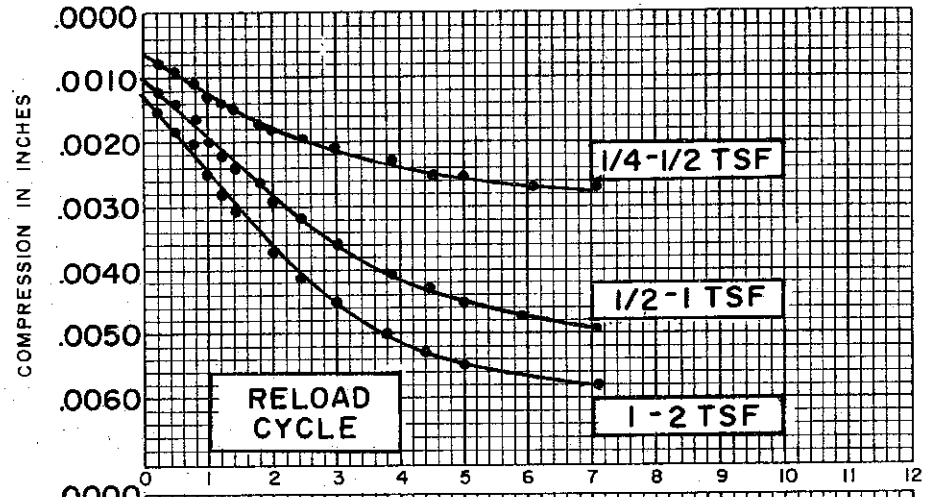
FILE 1255

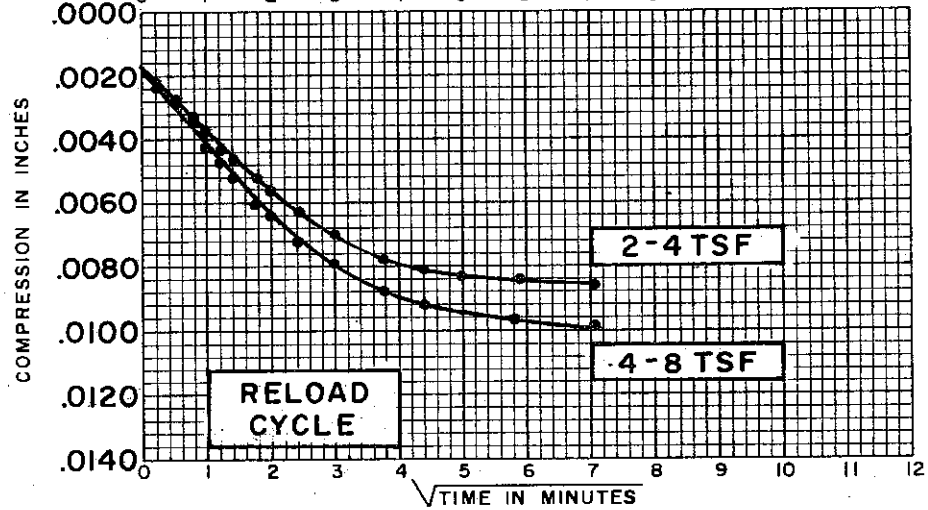
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY 2.69
INITIAL WATER CONTENT 11.3 %
FINAL WATER CONTENT 12.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO .370

BORING NO. 41
SAMPLE NO. 29
DEPTH 130.8'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

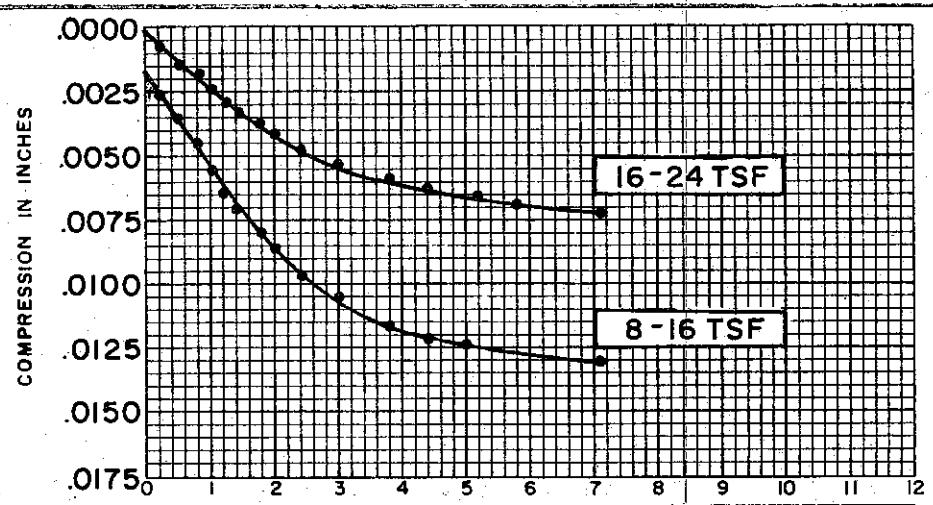
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

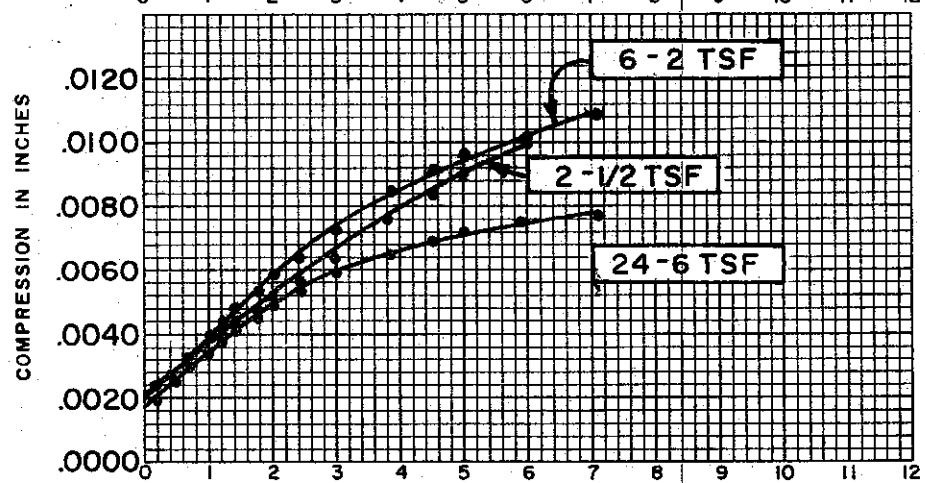
FILE 1255

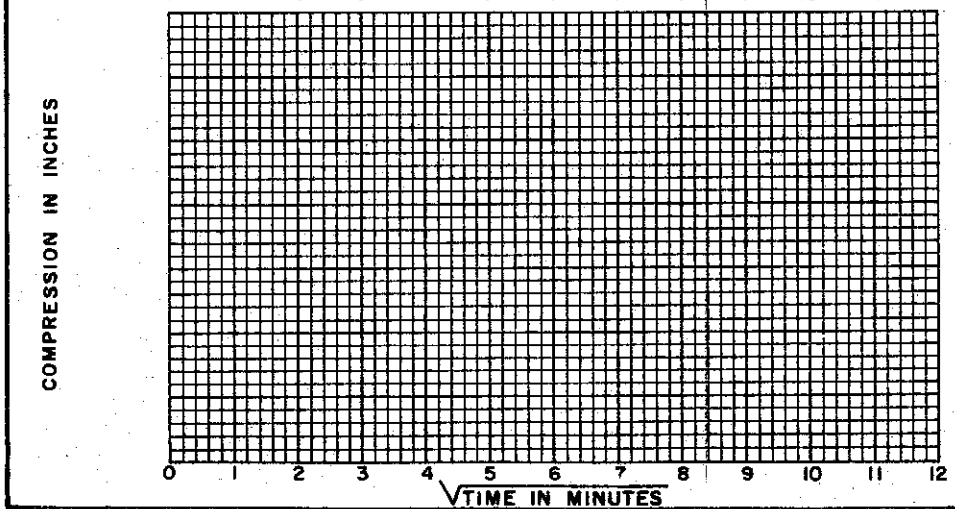
C-491

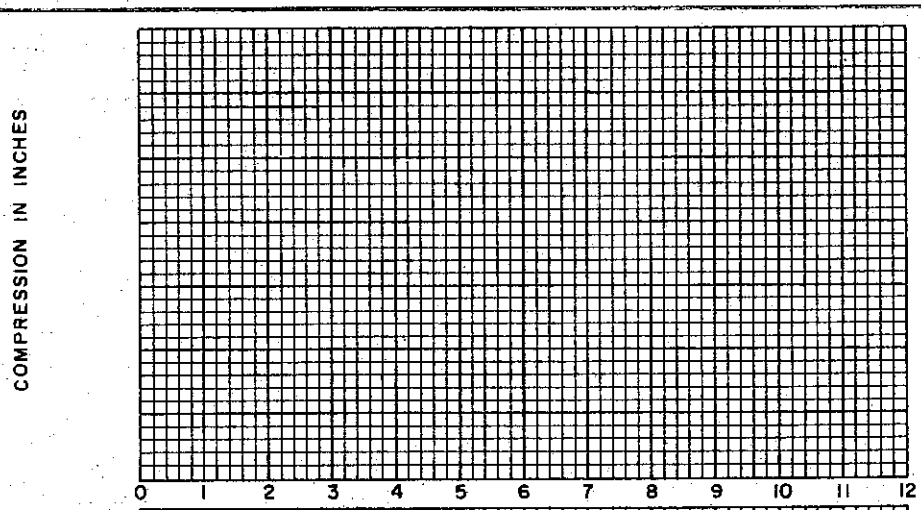
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

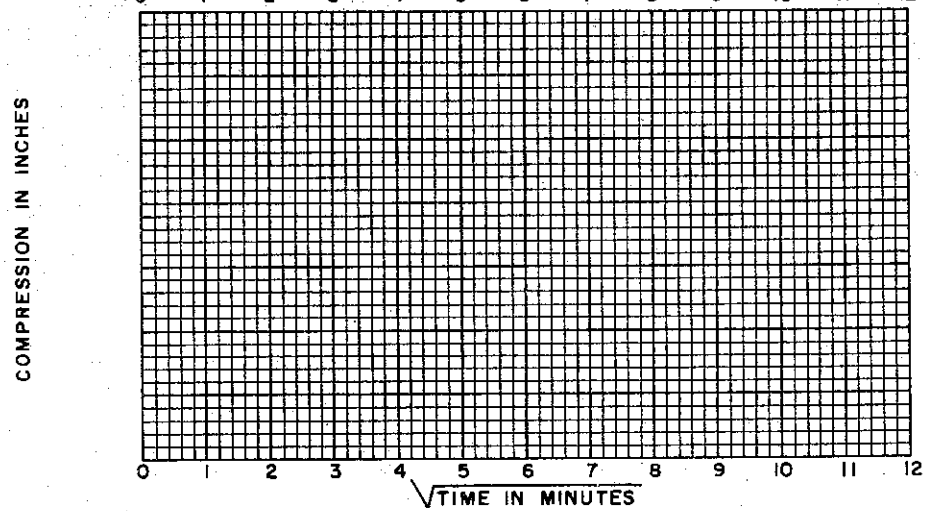
C-492











SOIL PROPERTIES

SOIL DESCRIPTION: CLAYEY SAND, GRAVELLY (GC-SC)
SPECIFIC GRAVITY 2.69
INITIAL WATER CONTENT 11.5 %
FINAL WATER CONTENT 12.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO .370

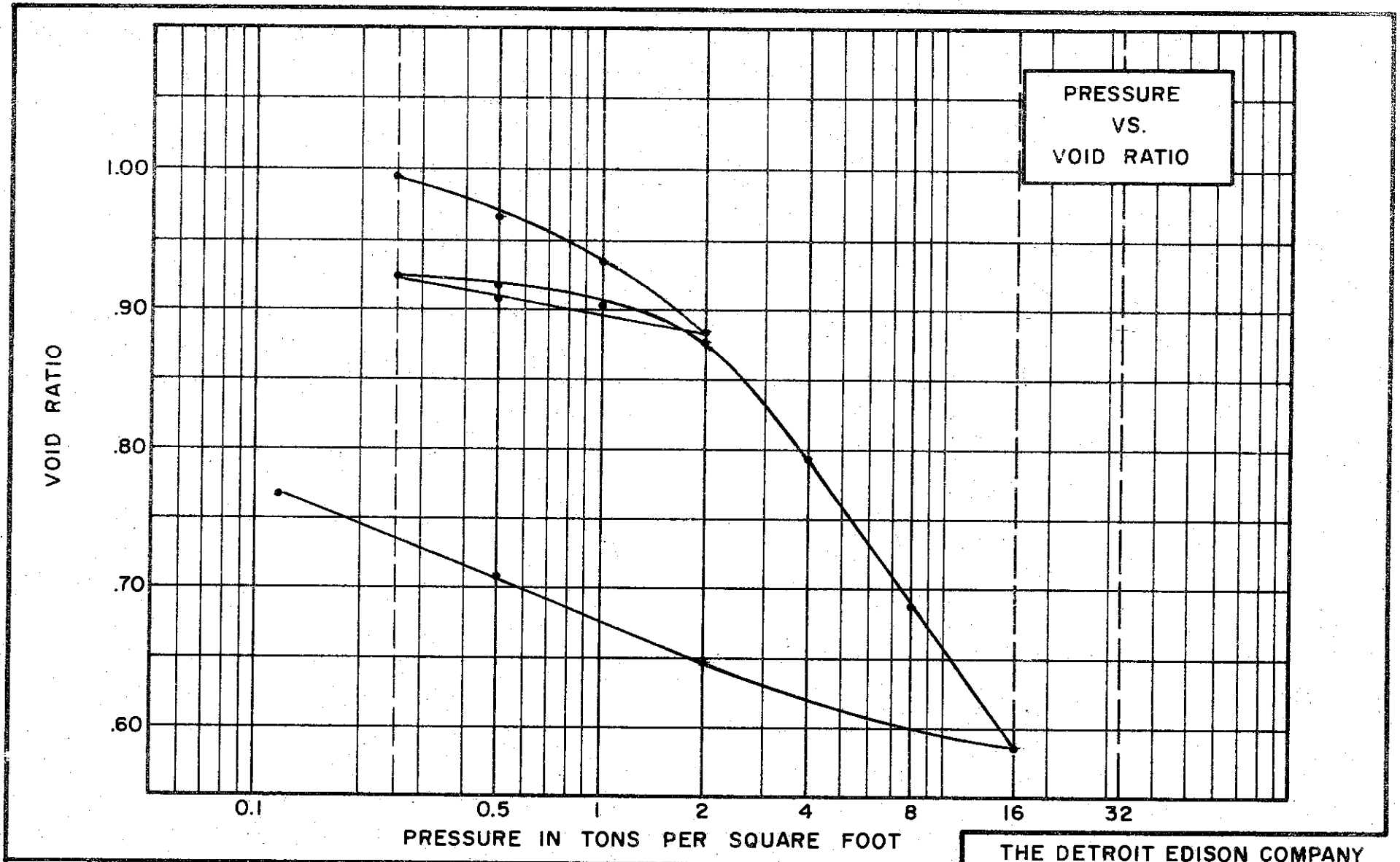
BORING NO. 41
SAMPLE NO. 29
DEPTH 130.8'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.73

WATER CONTENT, INITIAL 38.8% FINAL 31.5%

ATTERBERG LIMITS:

LIQUID LIMIT 47 % PLASTIC LIMIT 24 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.027

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 48 TEST NO. C202.1

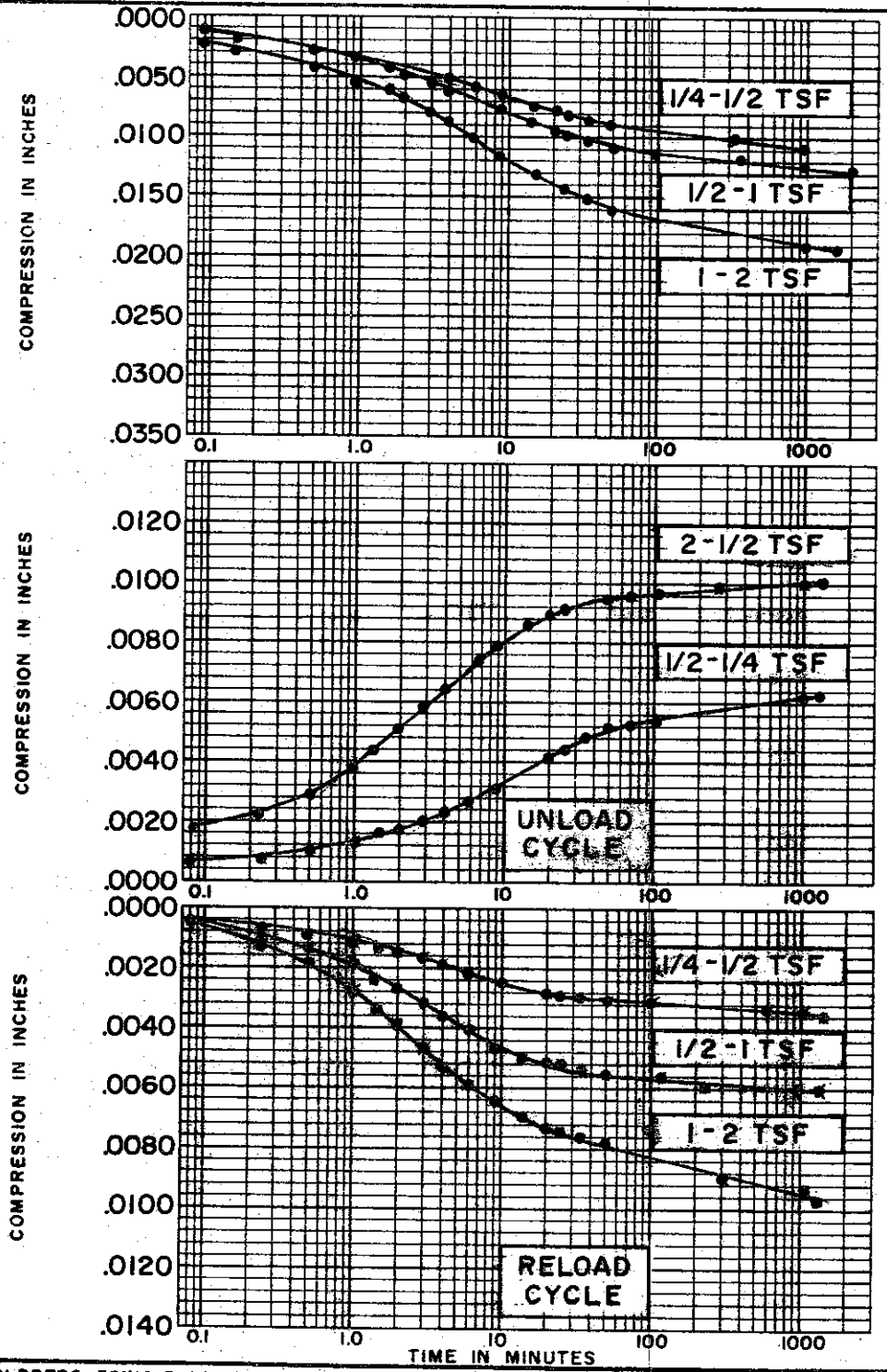
SAMPLE NO. 10 DATE MARCH 74

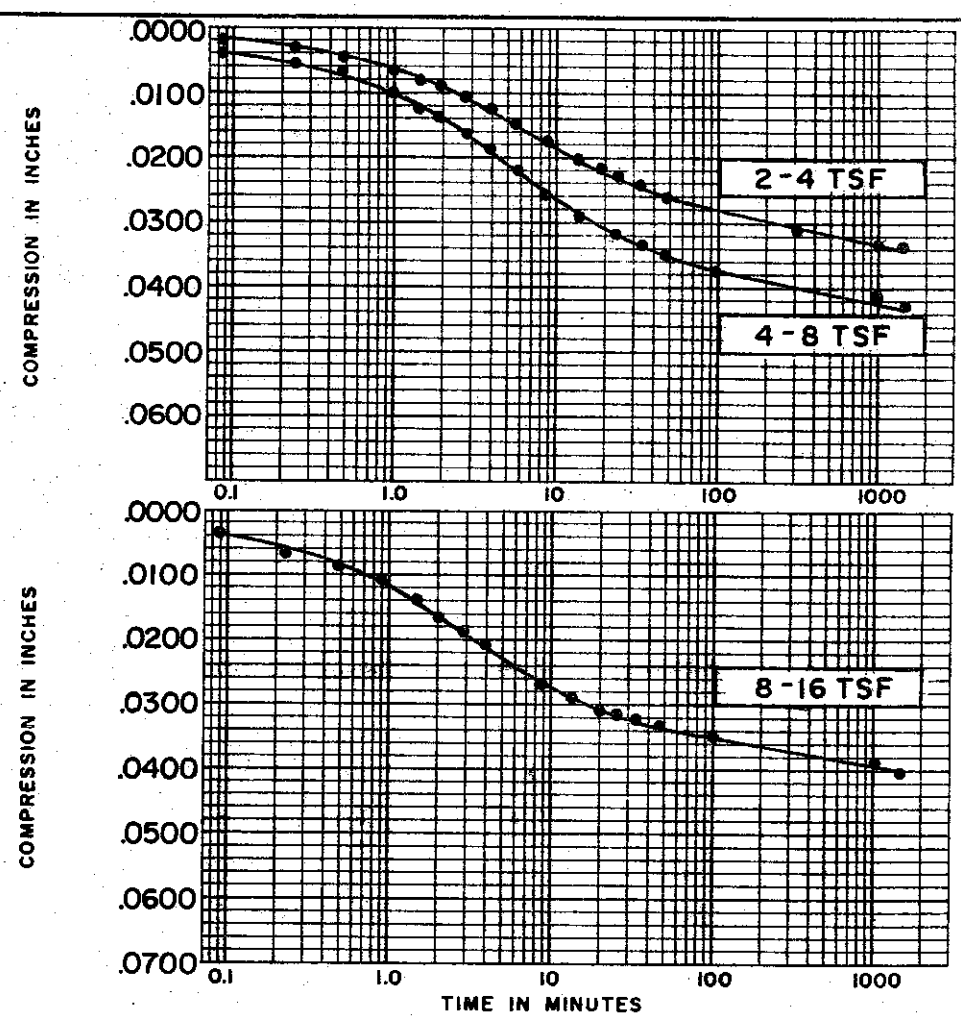
DEPTH 39.2' TO 39.4'

C-493

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-494





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 28.8%
FINAL WATER CONTENT 31.5%

BORING NO. 48
SAMPLE NO. 10
DEPTH 39.2' TO 39.4'

TEST DATA

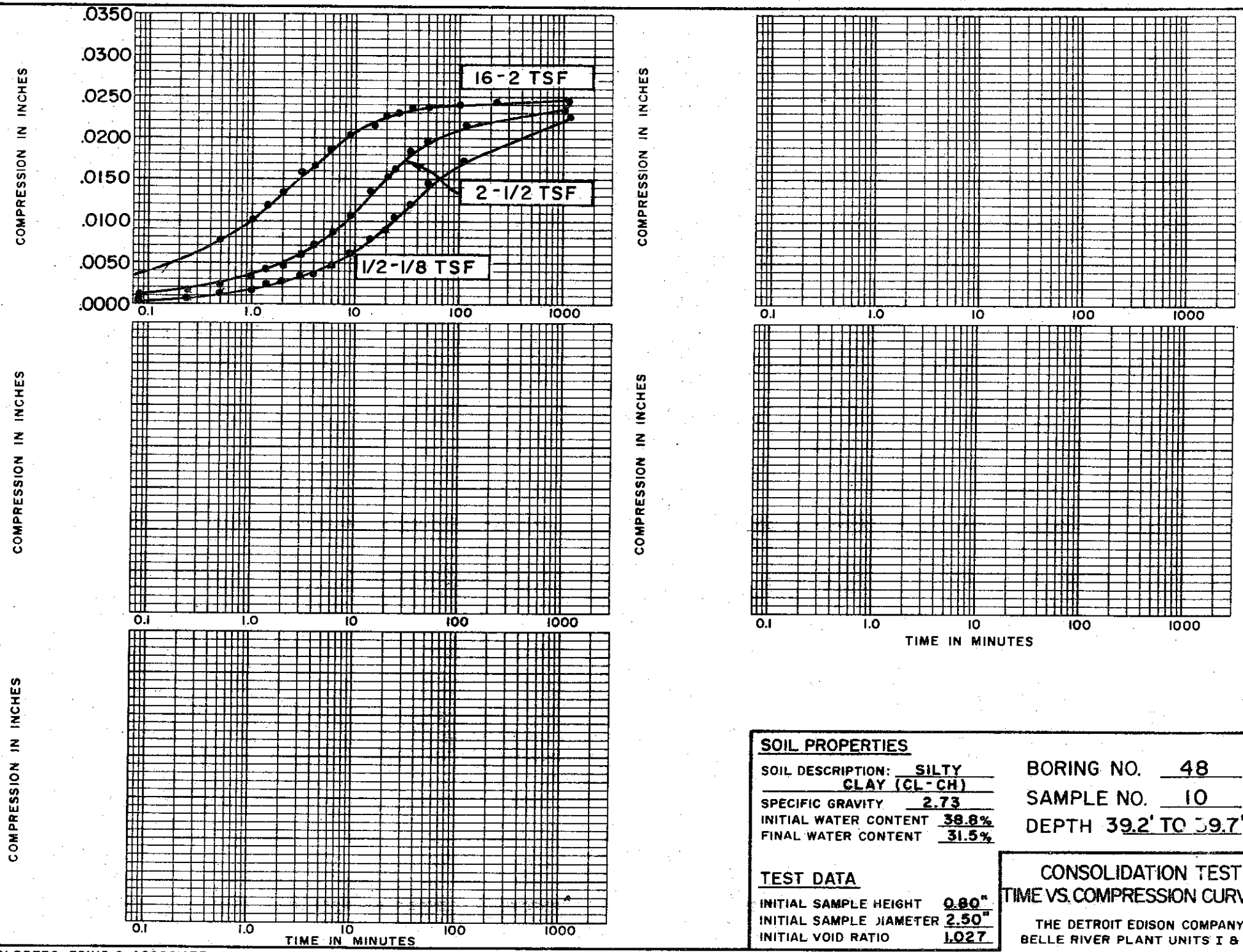
INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.027

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 38.8%
FINAL WATER CONTENT 31.5%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.027

BORING NO. 48
SAMPLE NO. 10
DEPTH 39.2' TO 39.7'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

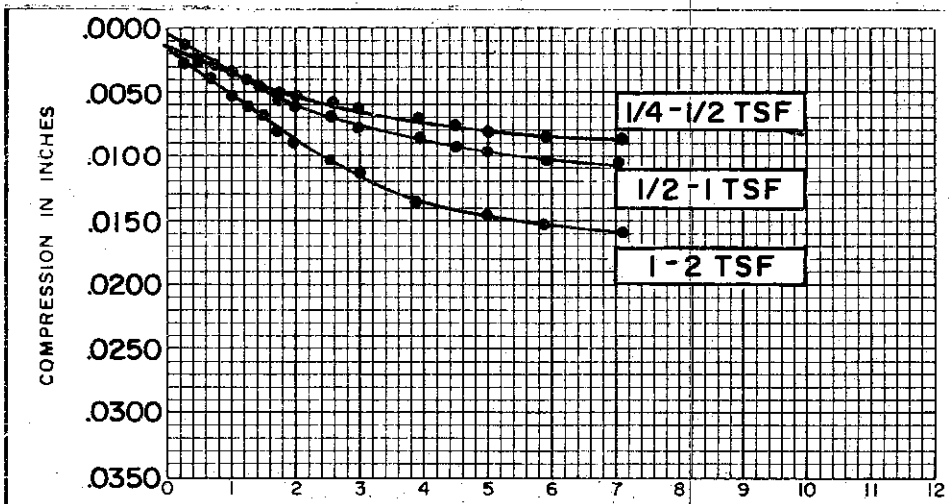
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

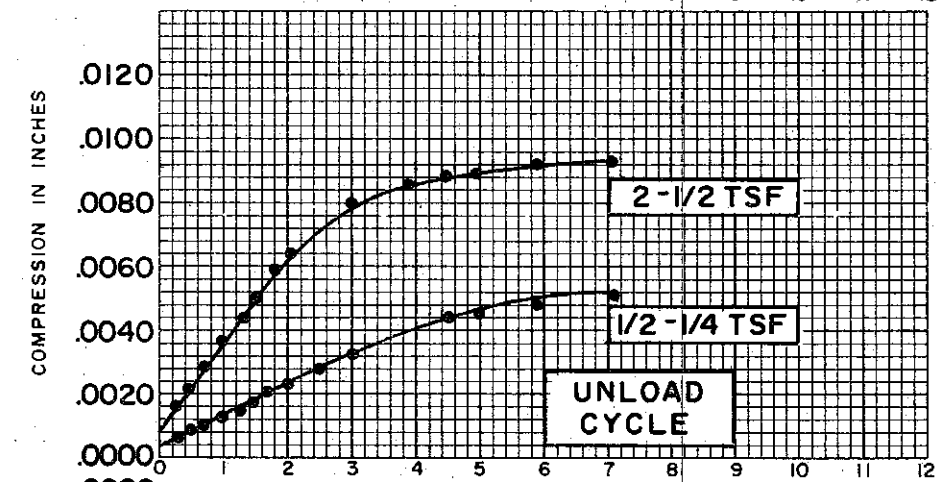
FILE 1255

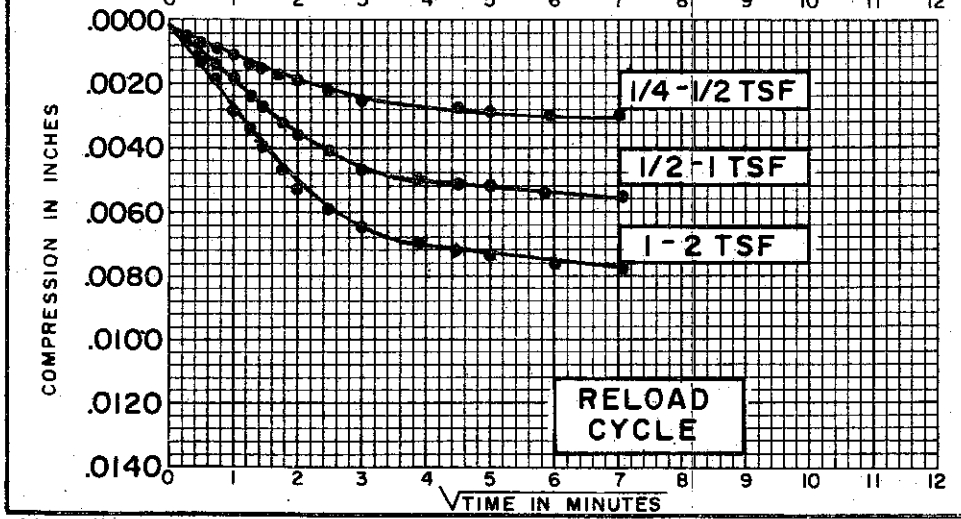
C-495

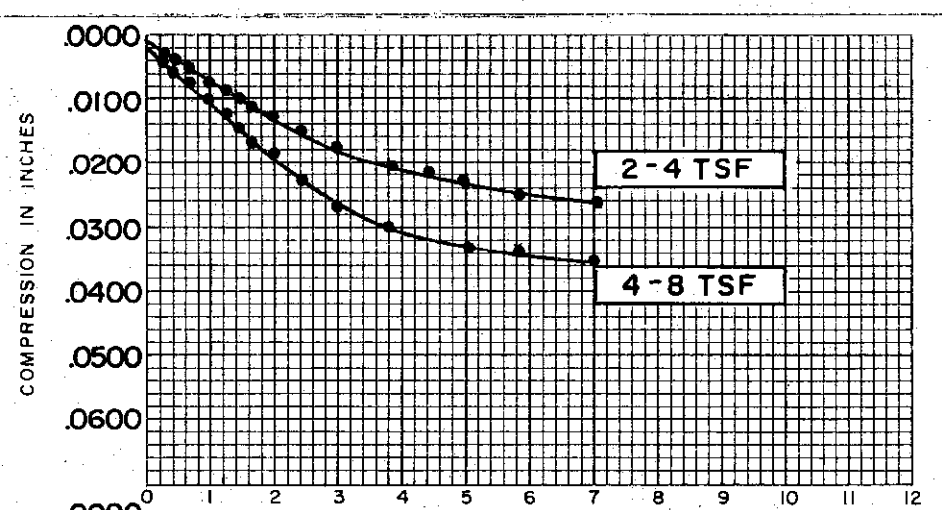
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

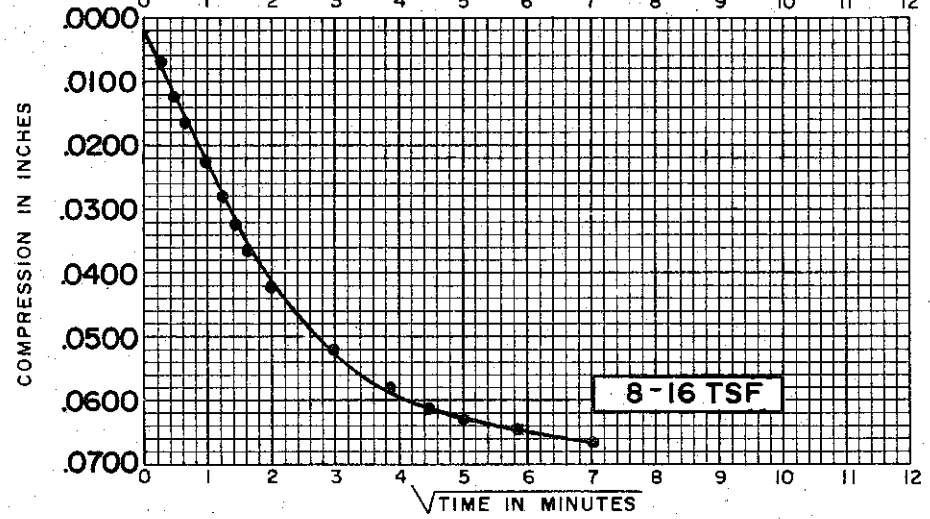
C-496











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 38.8%
FINAL WATER CONTENT 31.5%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.027

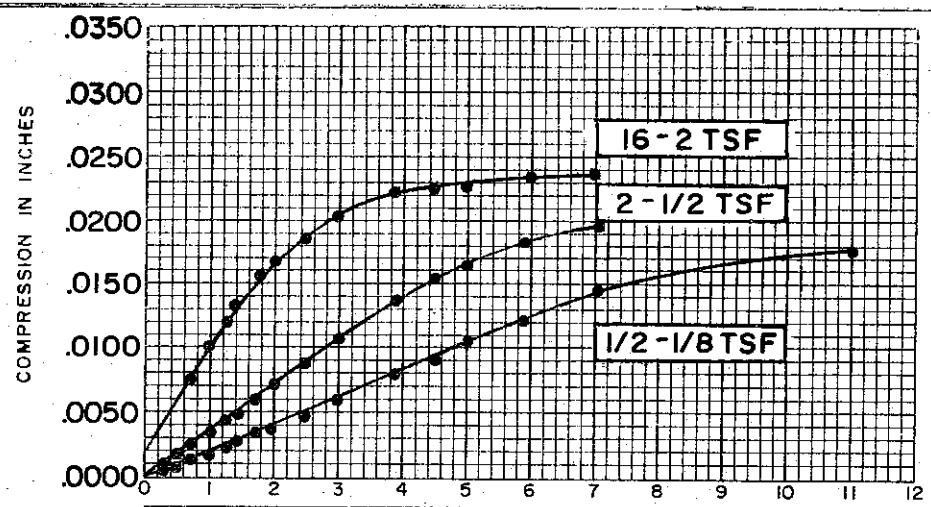
BORING NO. 48
SAMPLE NO. 10
DEPTH 39.2' TO 39.4'

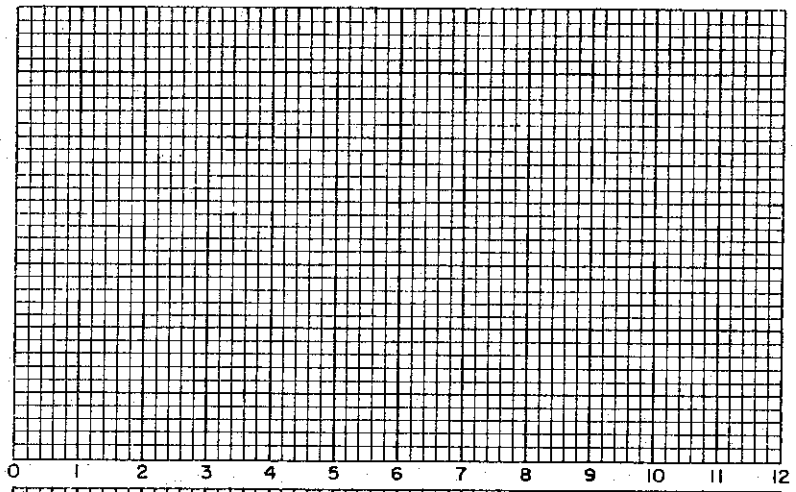
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

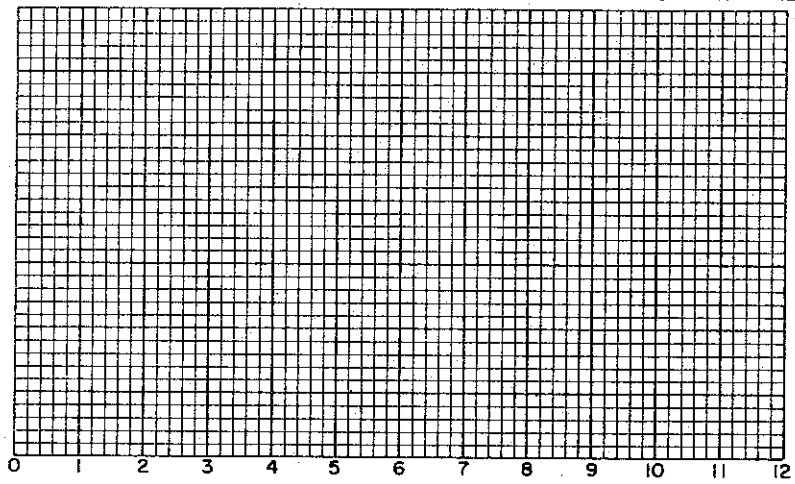
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

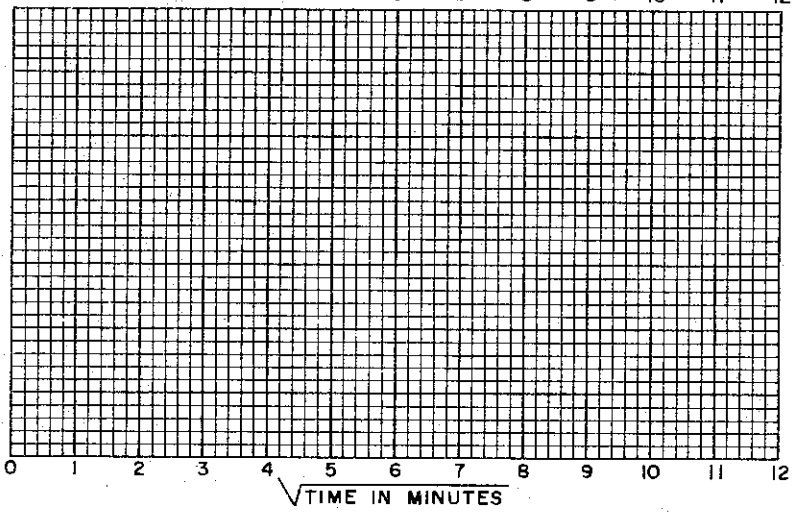
FILE 1255

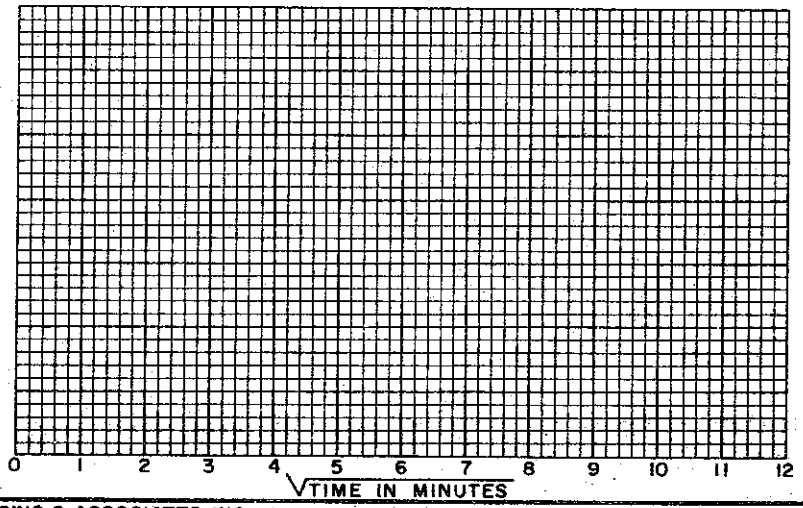
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 38.8%
FINAL WATER CONTENT 31.5%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.027

BORING NO. 48
SAMPLE NO. 10
DEPTH 39.2' TO 39.4'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

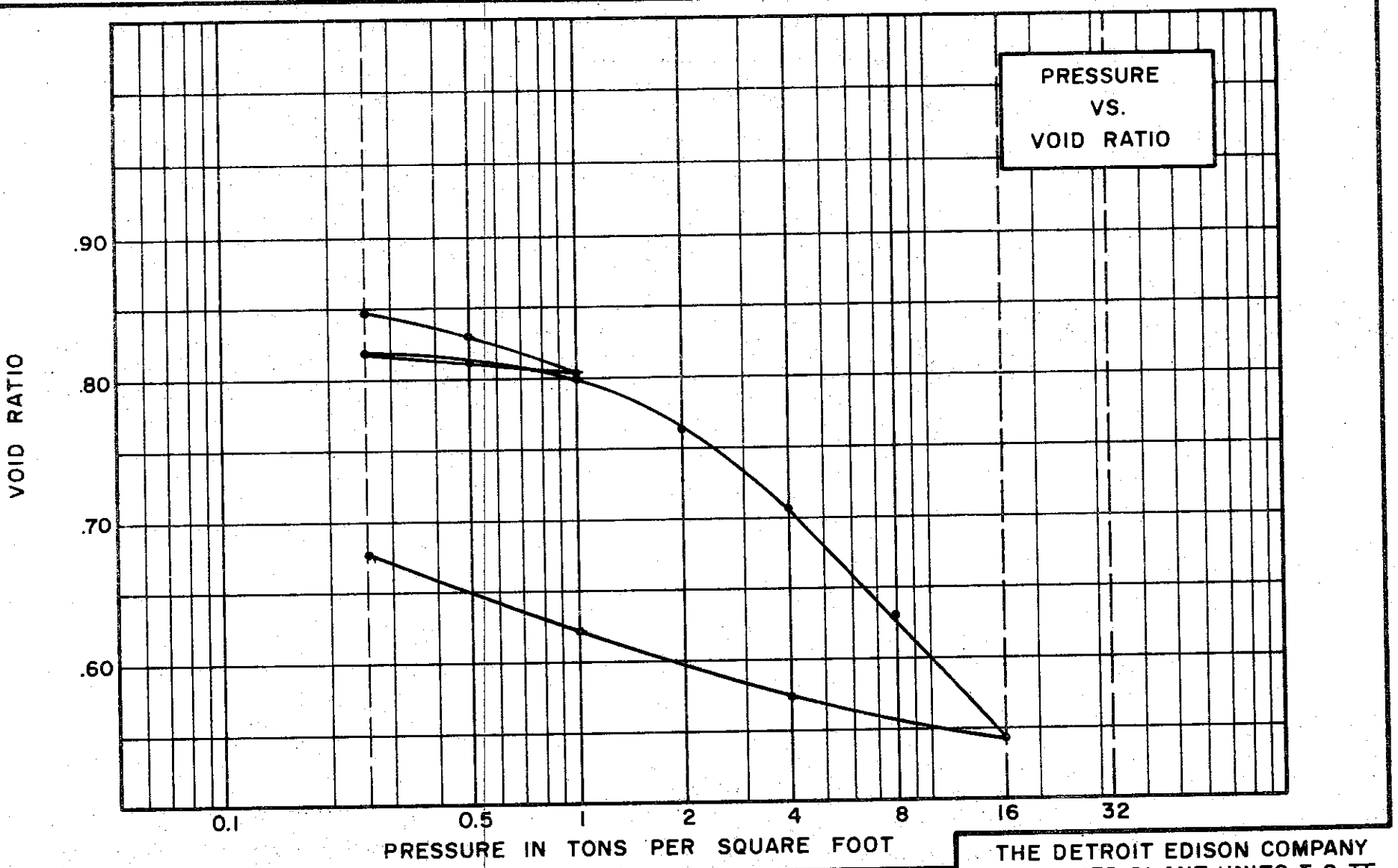
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-497

C-498



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.72

WATER CONTENT, INITIAL 33.3% FINAL 28.5%

ATTERBERG LIMITS:
LIQUID LIMIT 47 % PLASTIC LIMIT 23 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.863

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

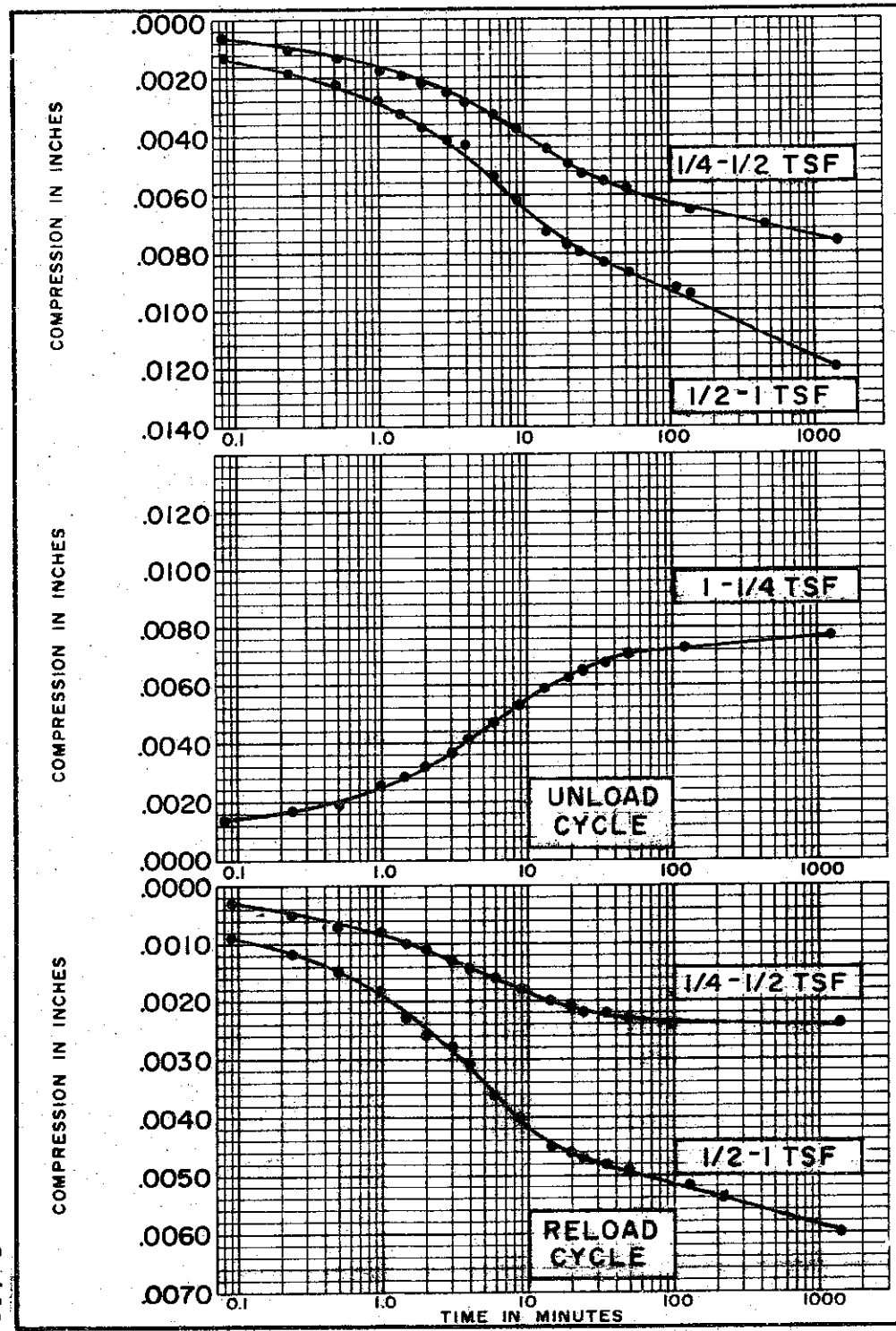
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

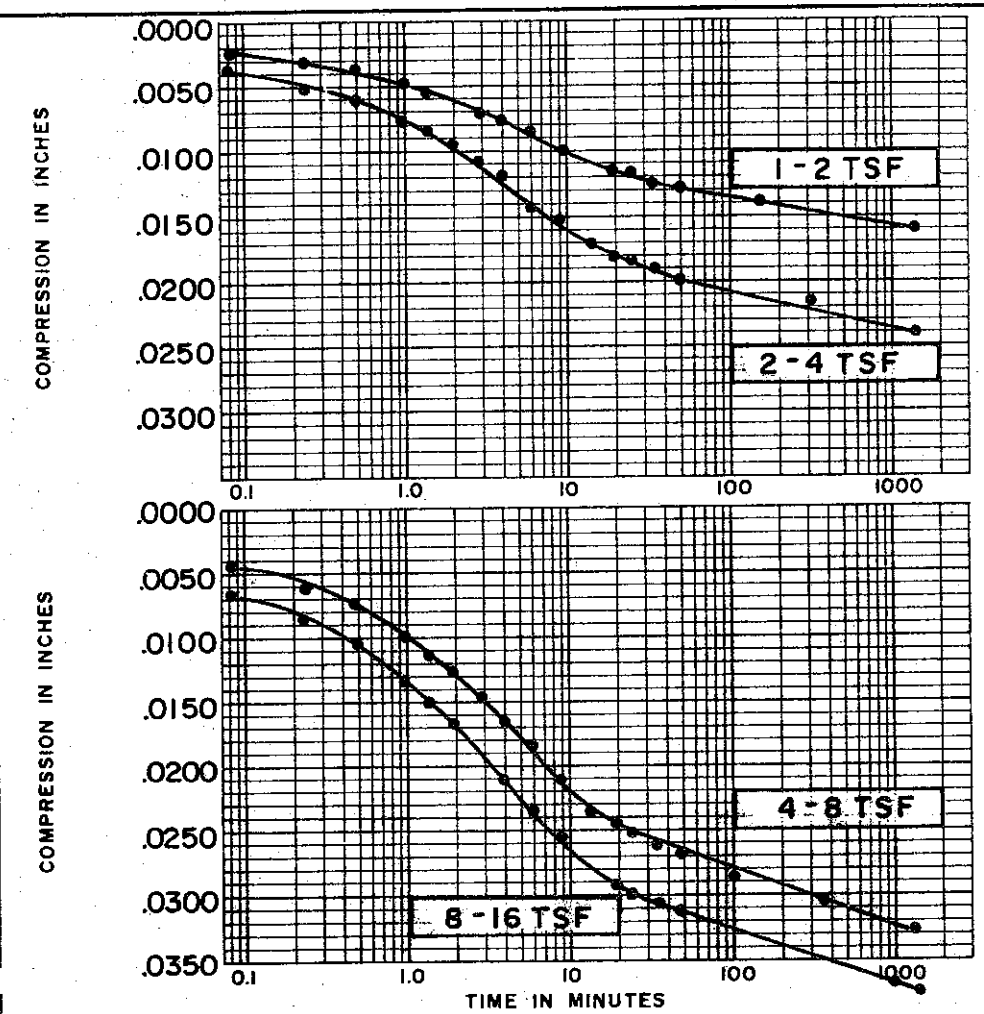
BORING NO. 49 TEST NO. C133.1

SAMPLE NO. 3 DATE FEB. 1974

DEPTH 13.7' TO 14.0'

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 33.3%
FINAL WATER CONTENT 28.5%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.863

BORING NO. 49
SAMPLE NO. 3
DEPTH 13.7' TO 14.0'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

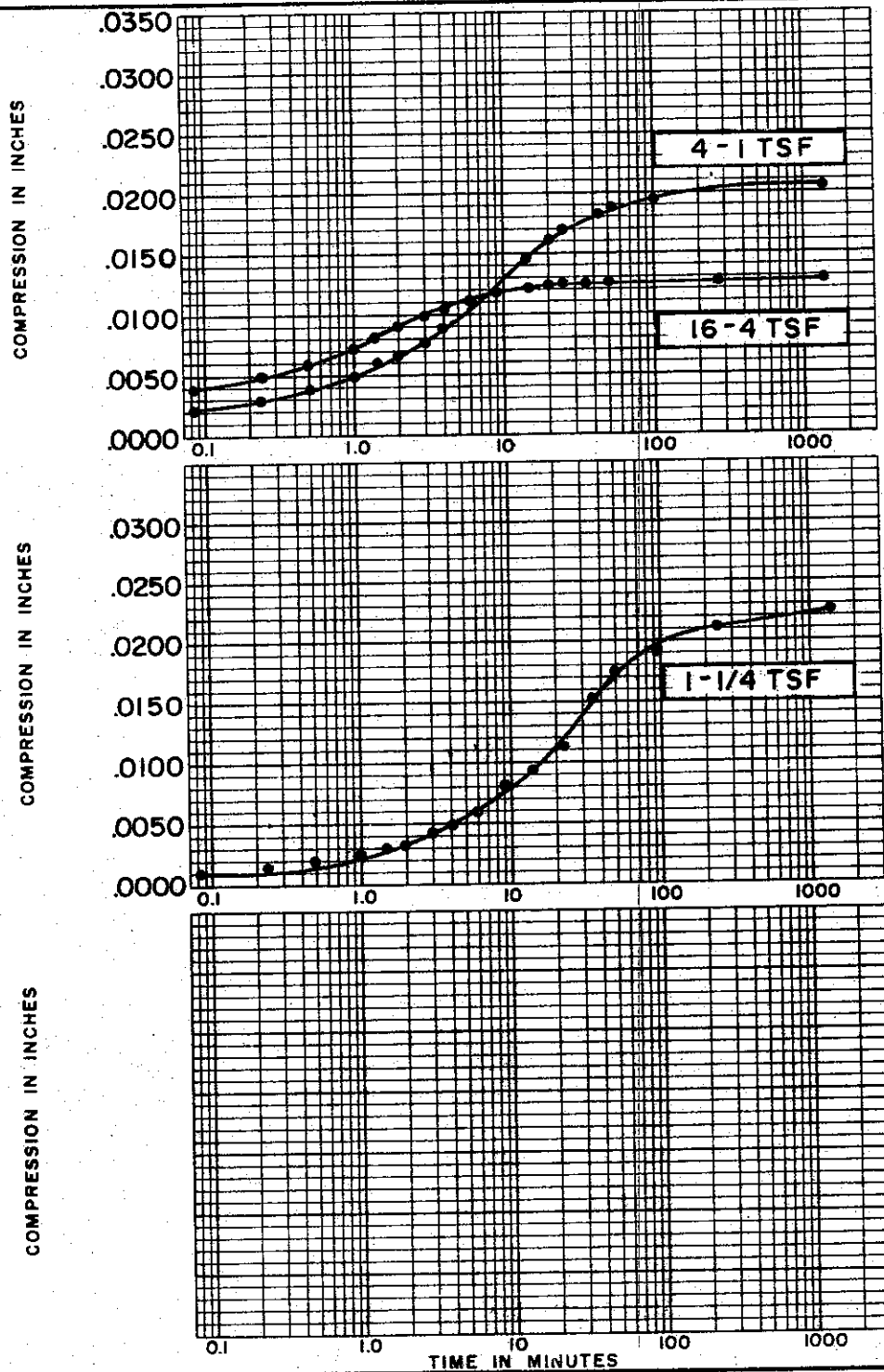
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

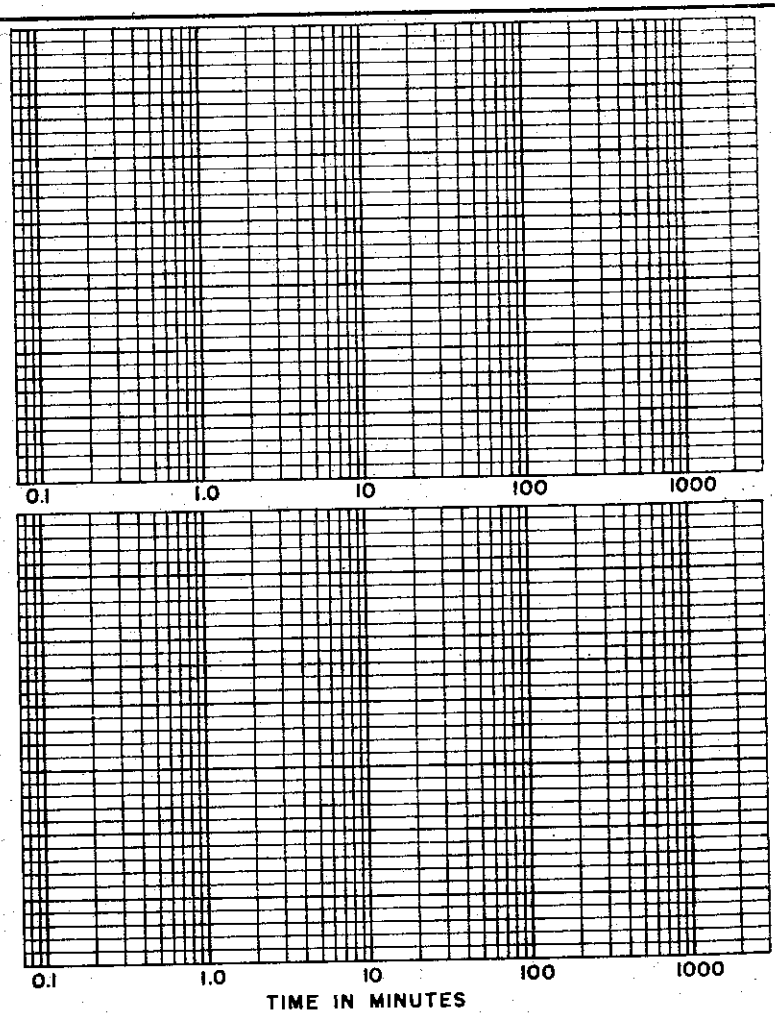
FILE 1255

C-499

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-500





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL - CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 33.3%
FINAL WATER CONTENT 28.5%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.863

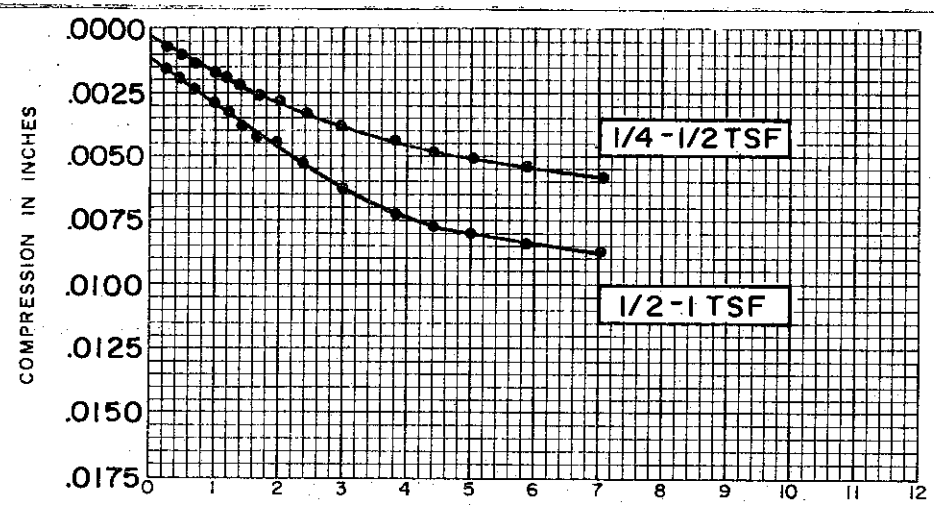
BORING NO. 49
SAMPLE NO. 3
DEPTH 13.7' TO 14.0'

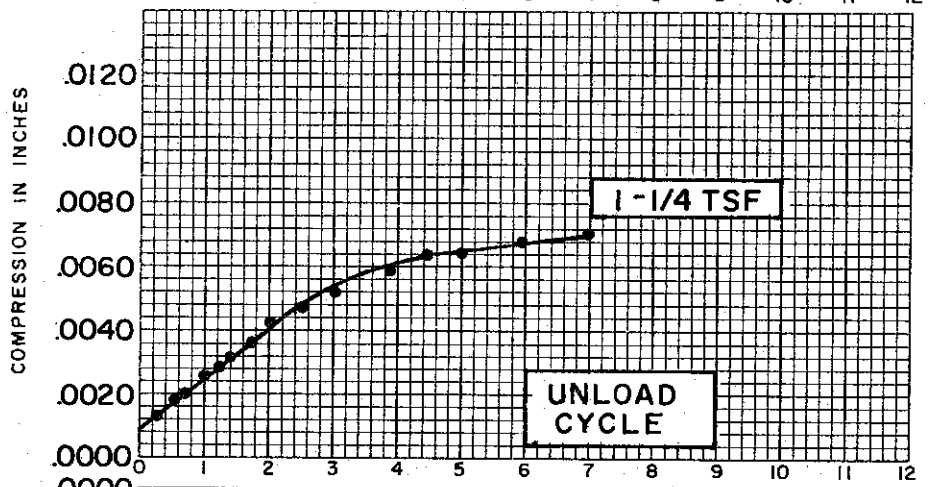
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

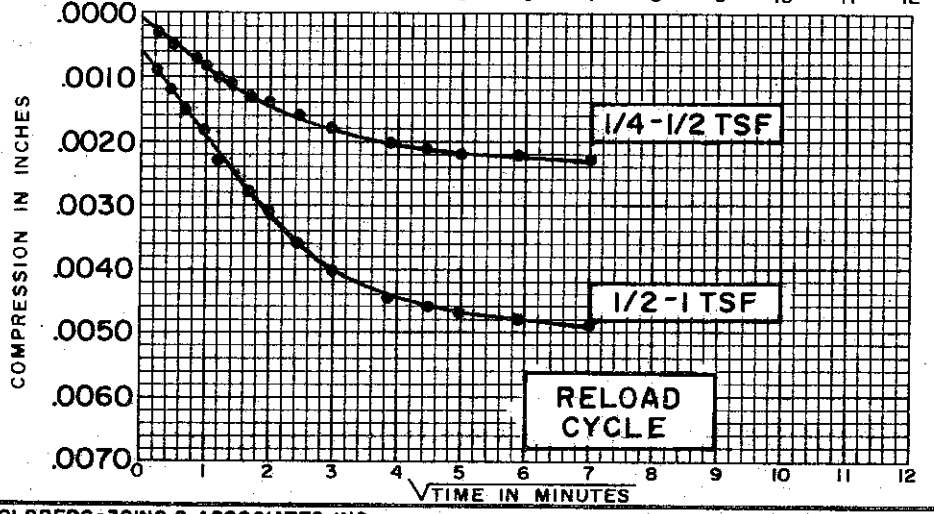
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS 1 & 2

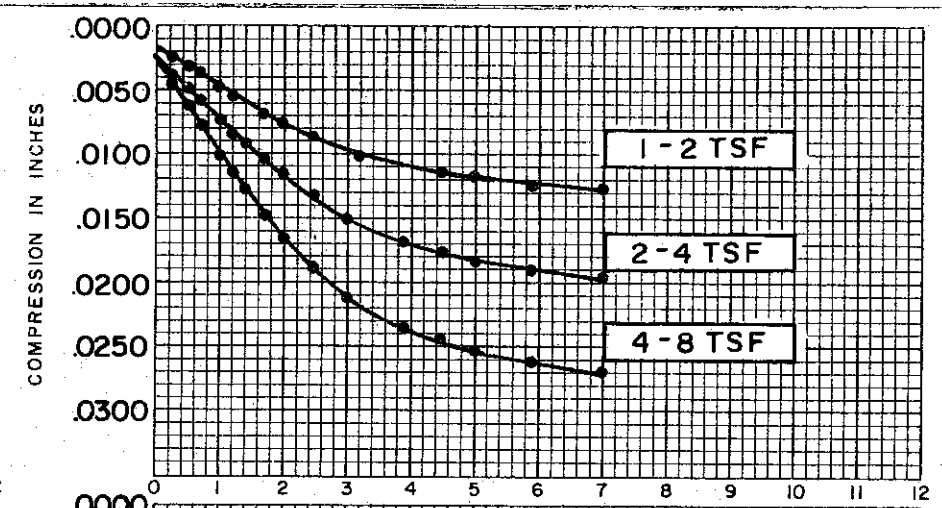
FILE 1255

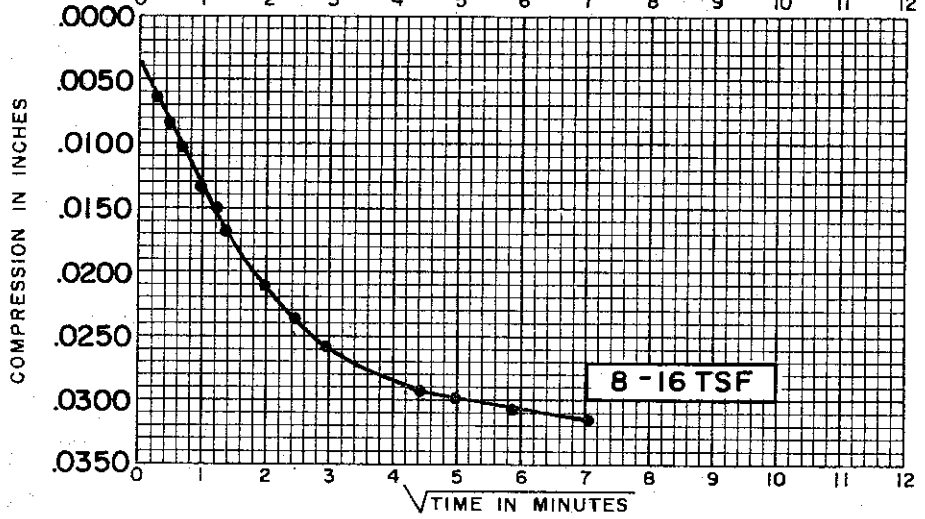
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 33.3%
FINAL WATER CONTENT 28.5%

BORING NO. 49
SAMPLE NO. 3
DEPTH 13.7' TO 14.0'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.863

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

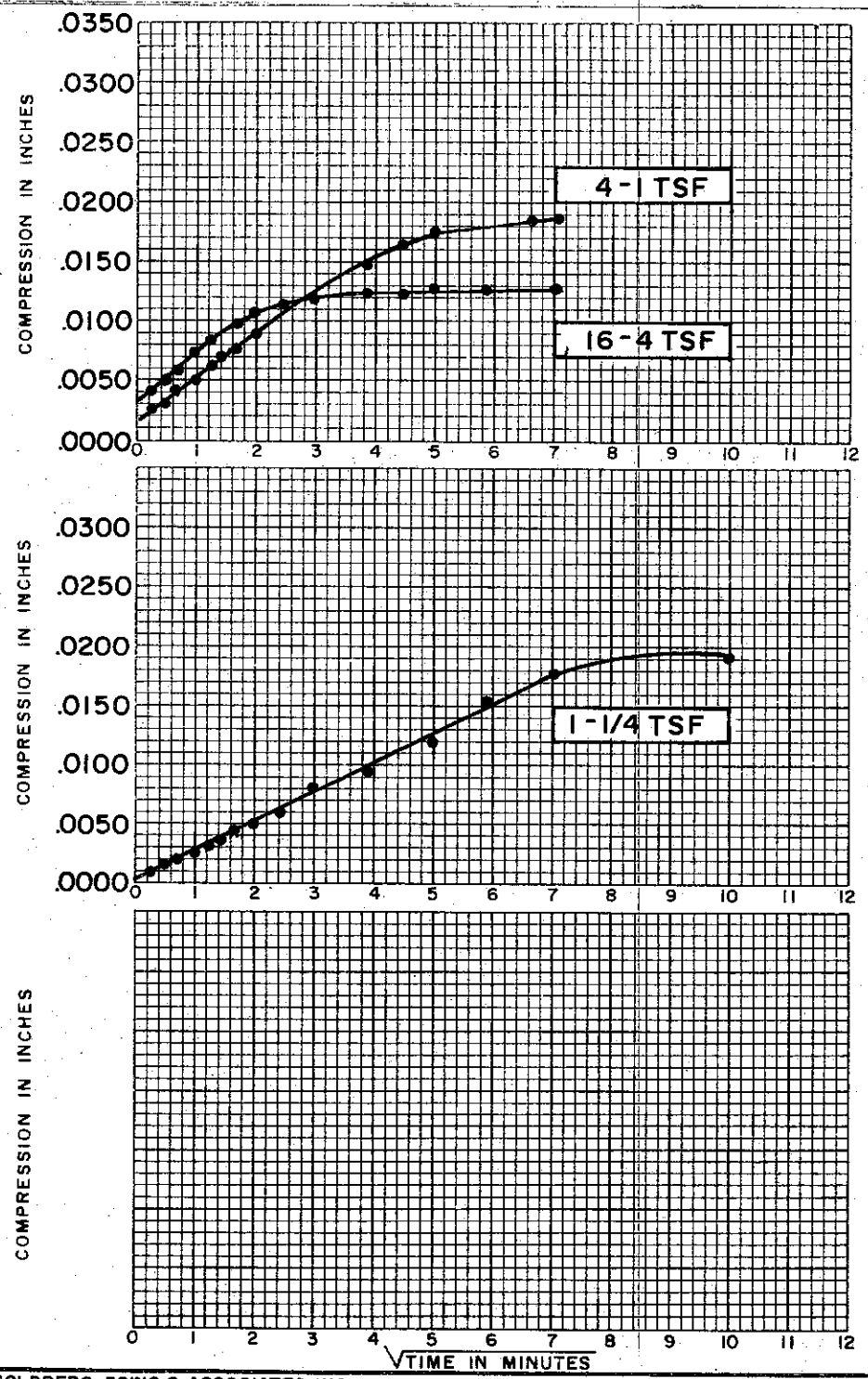
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

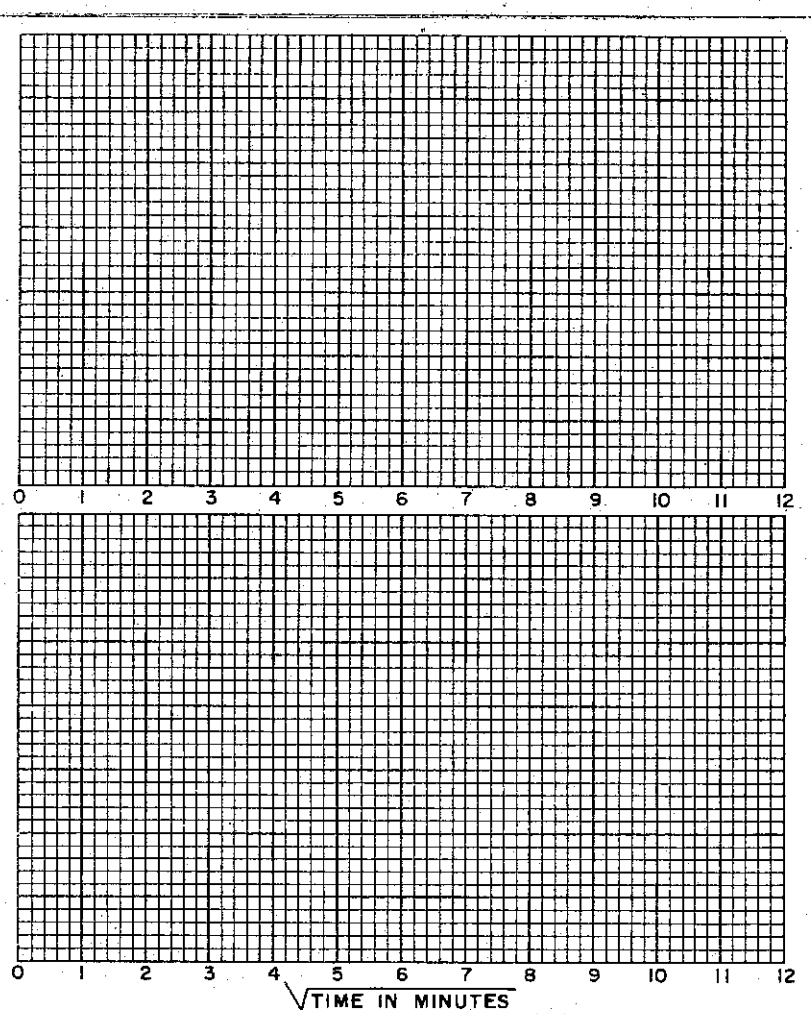
FILE 1255

C-501

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-502





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 33.3%
FINAL WATER CONTENT 28.5%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.863

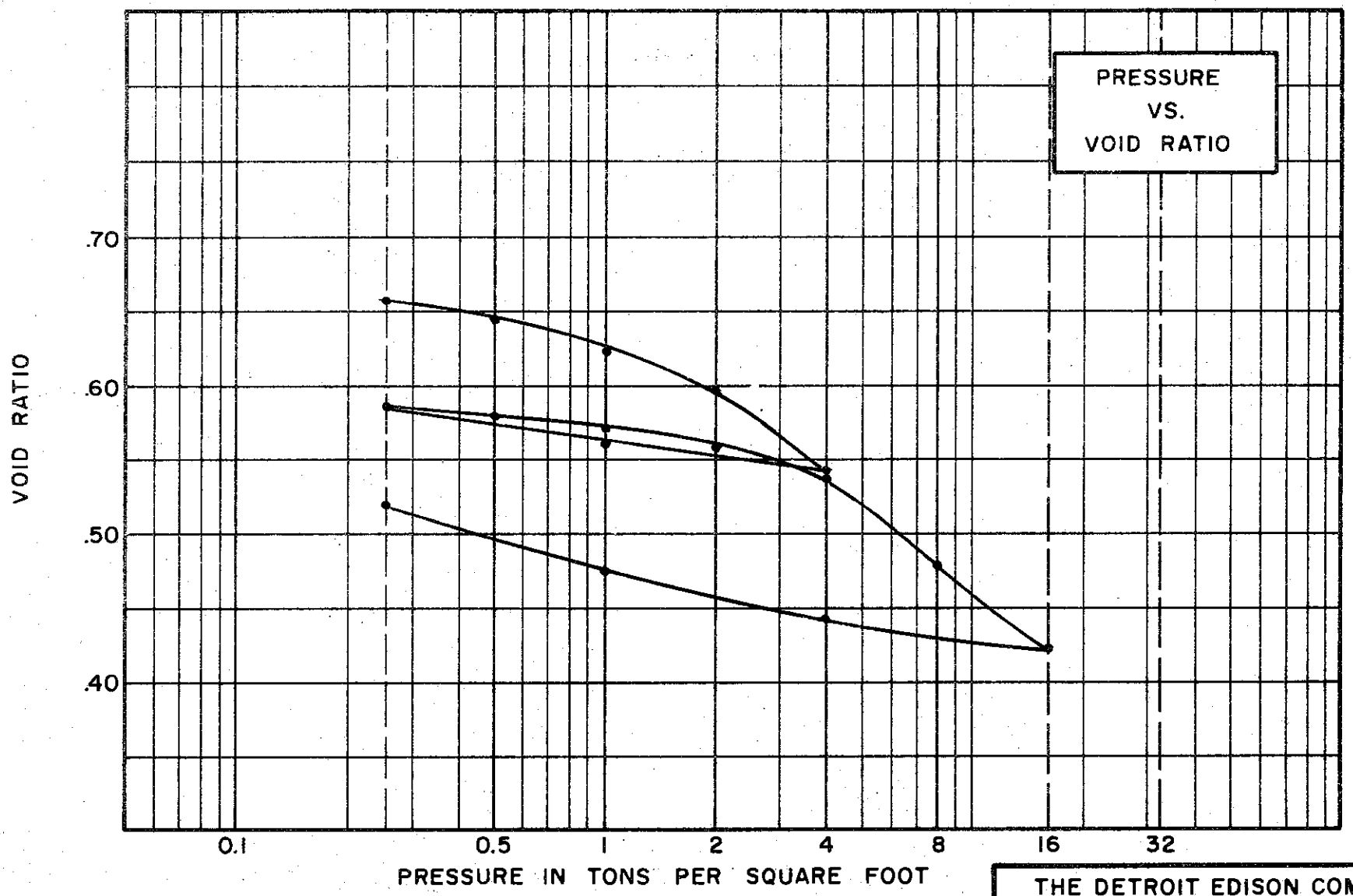
BORING NO. 49
SAMPLE NO. 3
DEPTH 13.7' TO 14.0'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.68

WATER CONTENT, INITIAL 28.6% FINAL 24.4%

ATTERBERG LIMITS:

LIQUID LIMIT 37 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.701

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 49 TEST NO. C141.1

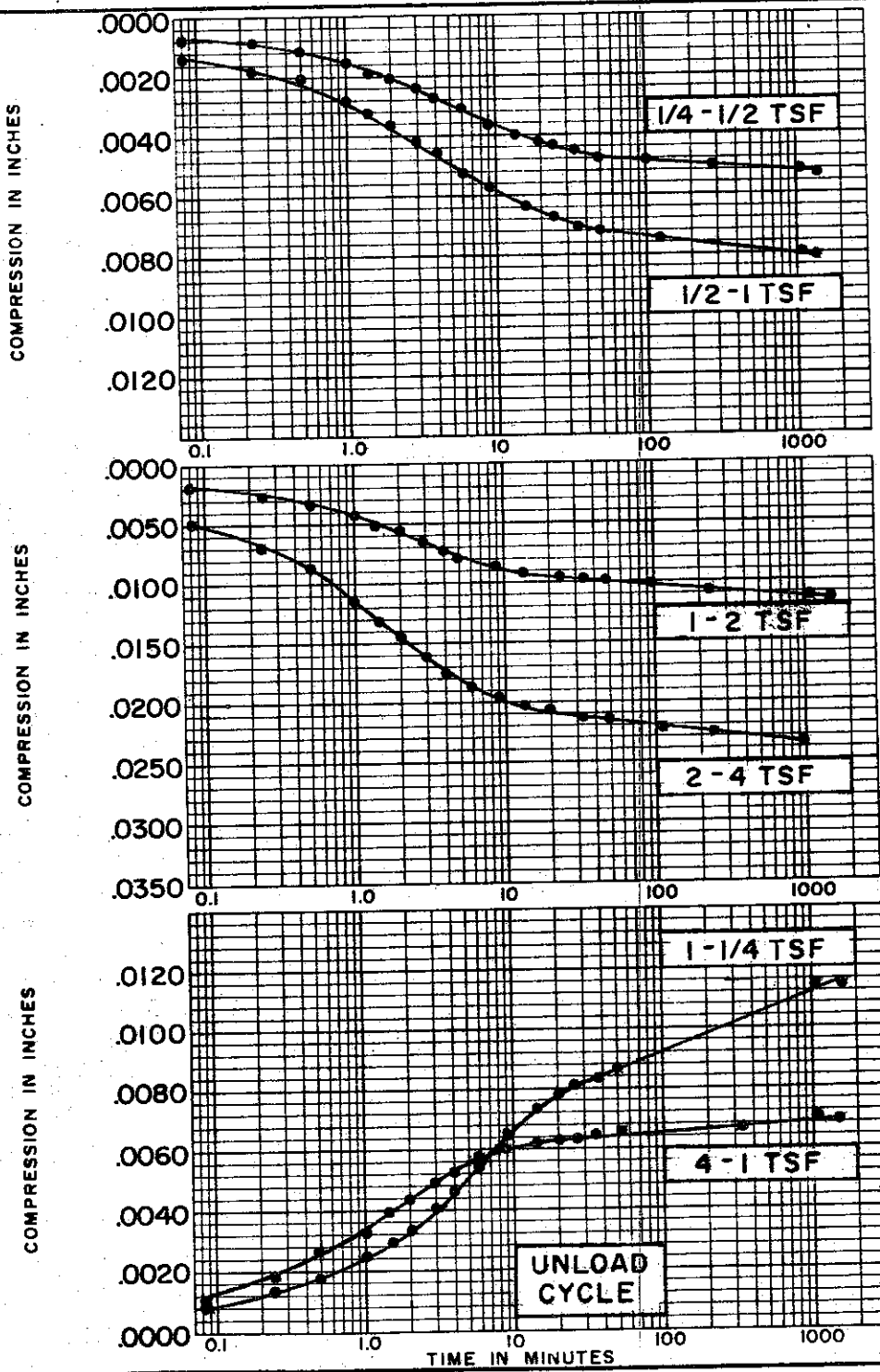
SAMPLE NO. 11 DATE MARCH 74

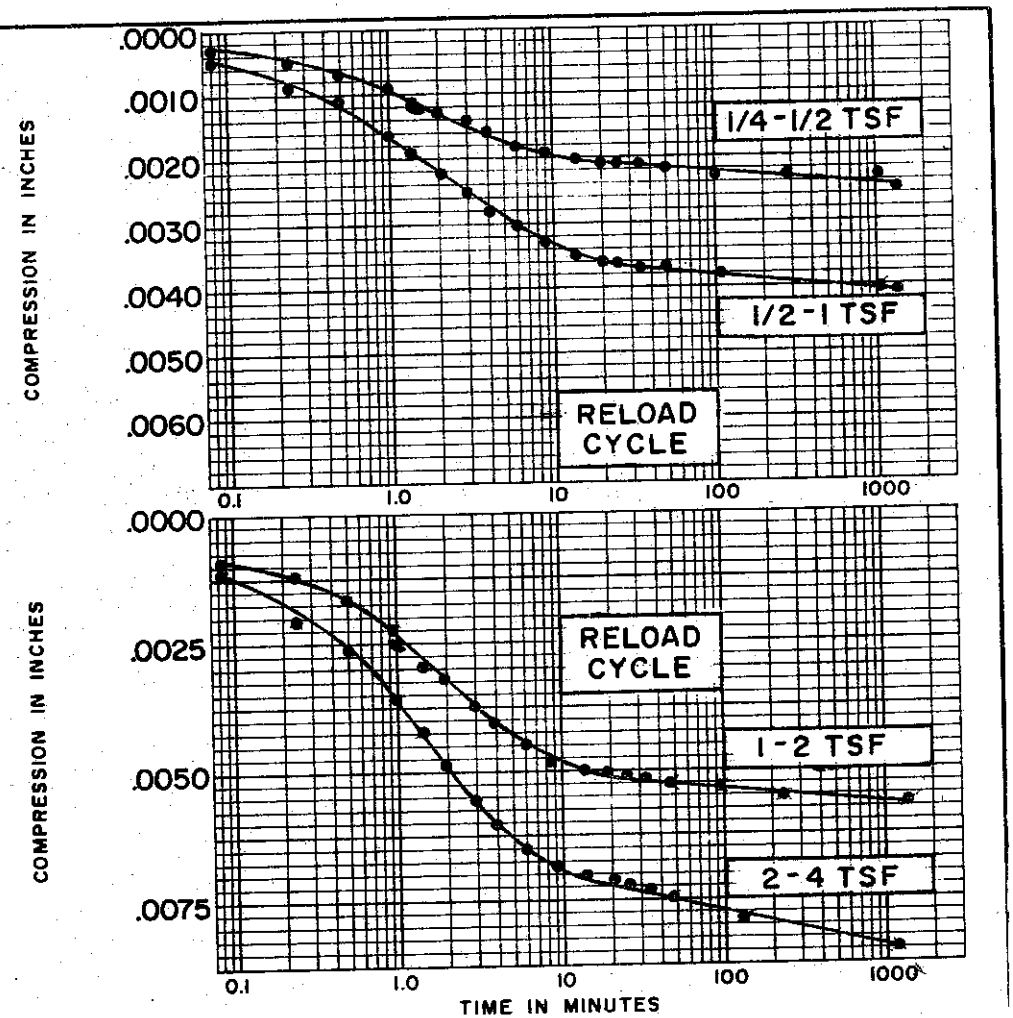
DEPTH 93.8' TO 94.0'

C-503

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-504





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.68
INITIAL WATER CONTENT 28.6%
FINAL WATER CONTENT 24.4%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.701

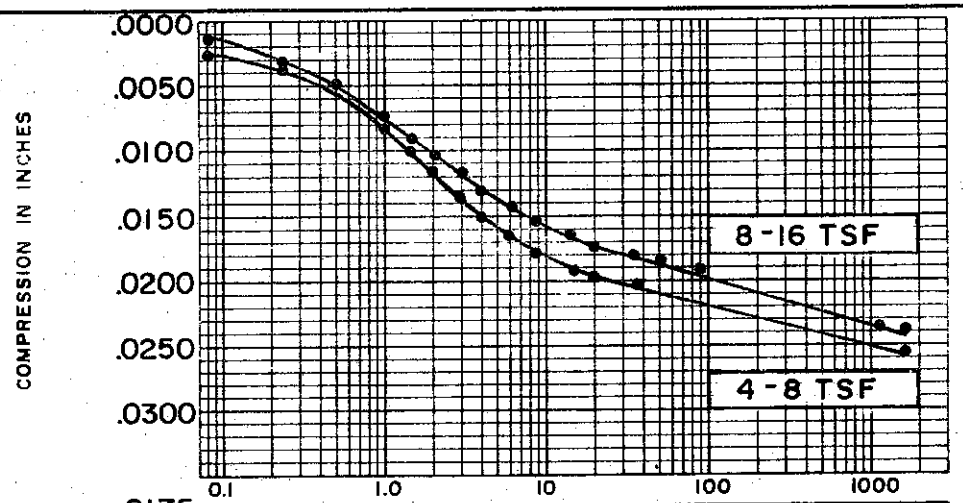
BORING NO. 49
SAMPLE NO. 11
DEPTH 93.8' TO 94.0'

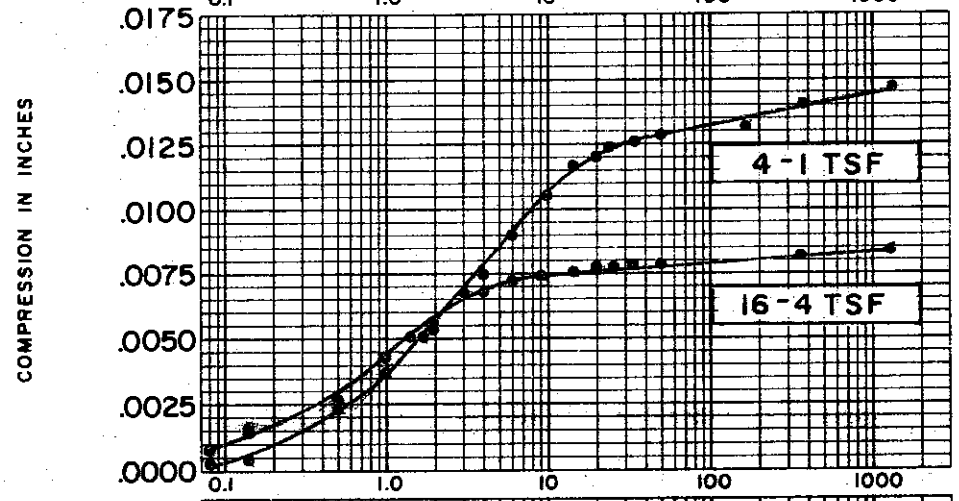
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

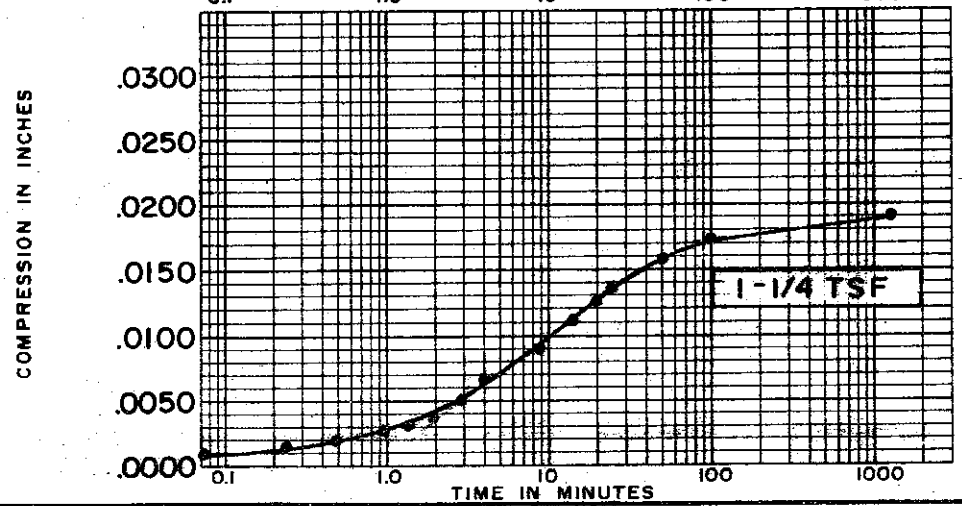
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

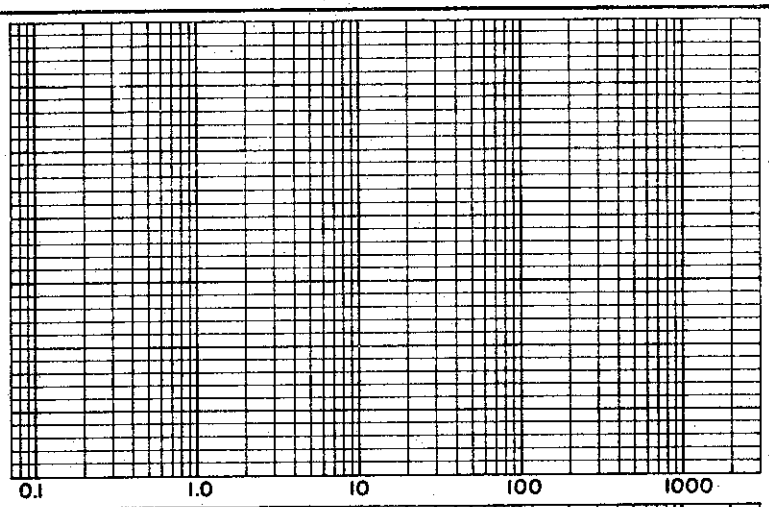
FILE 1255

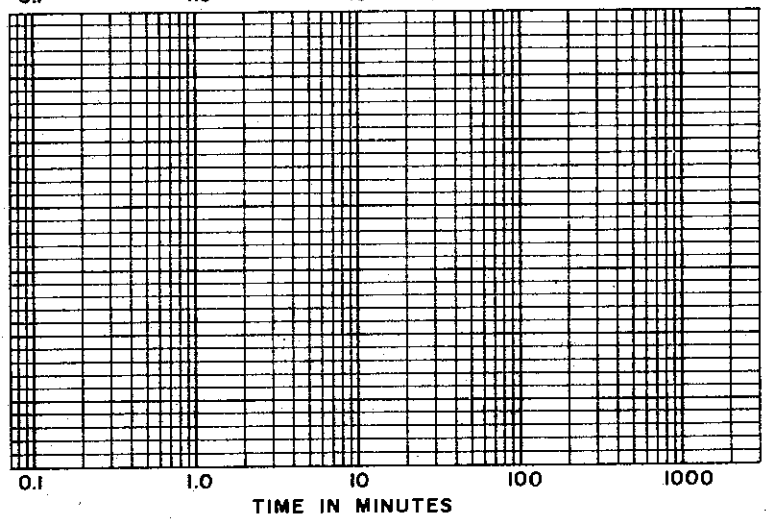
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.68
INITIAL WATER CONTENT 28.6%
FINAL WATER CONTENT 24.4%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.701

BORING NO. 49
SAMPLE NO. 11
DEPTH 93.8' TO 94.0'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

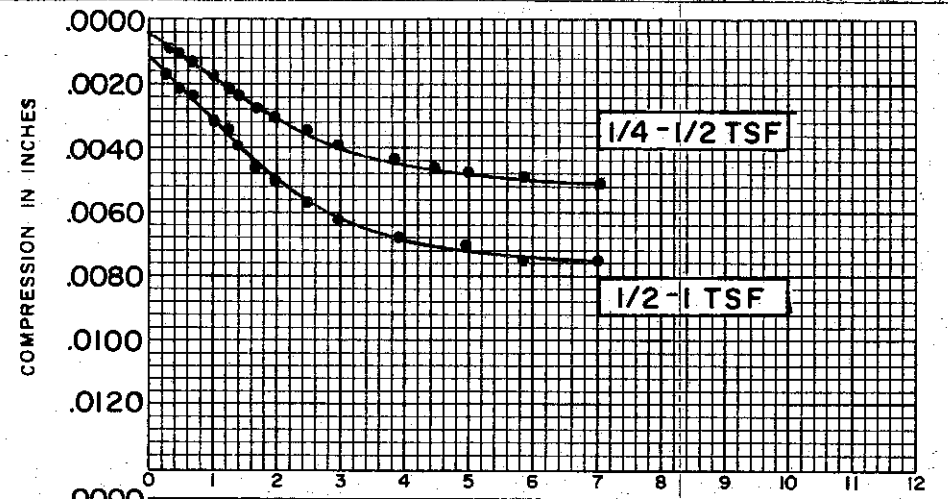
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

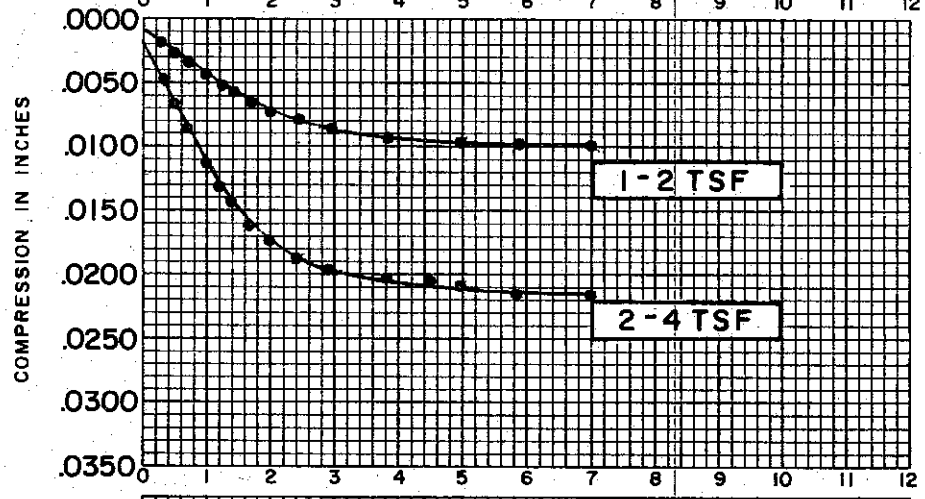
FILE 1255

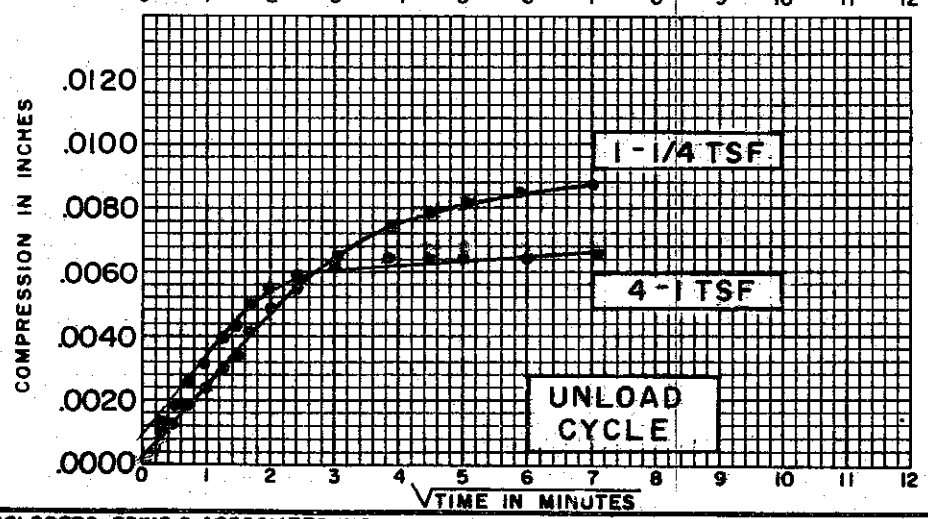
C-505

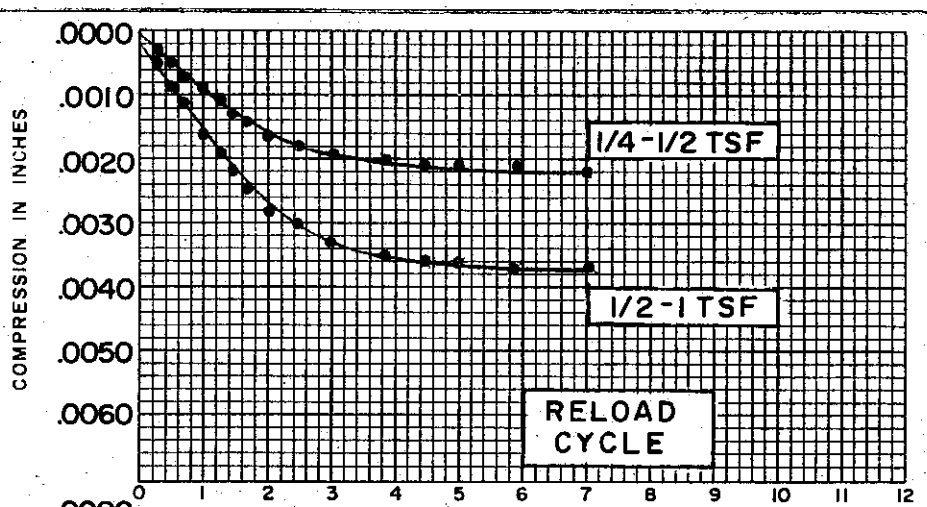
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

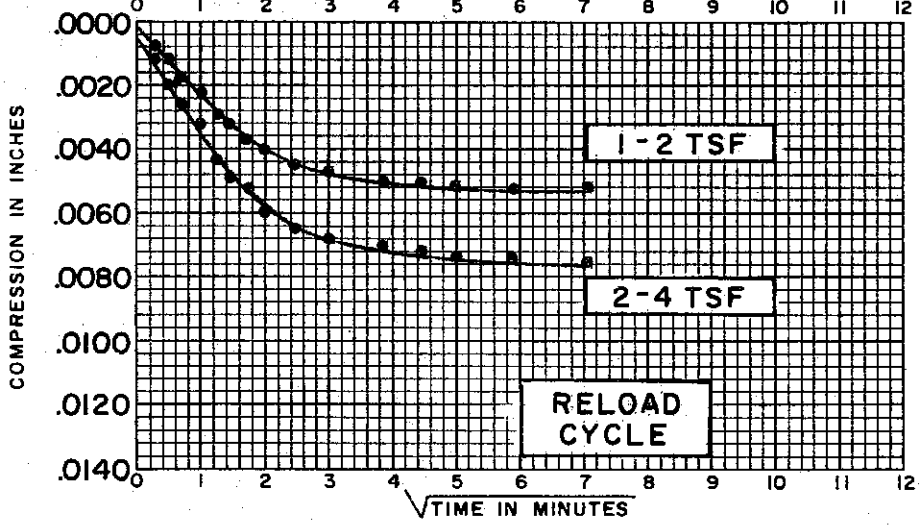
C-506











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.68
INITIAL WATER CONTENT 28.6%
FINAL WATER CONTENT 24.4%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.701

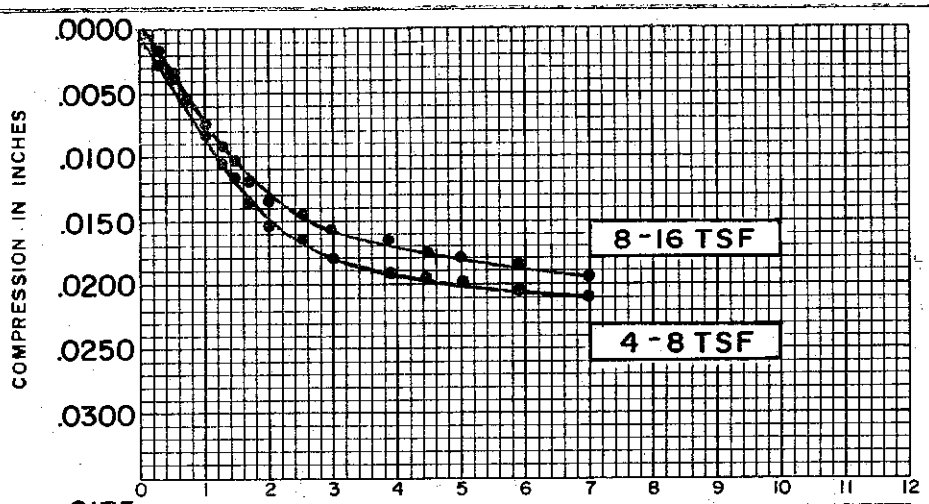
BORING NO. 49
SAMPLE NO. 11
DEPTH 93.8' TO 94.0'

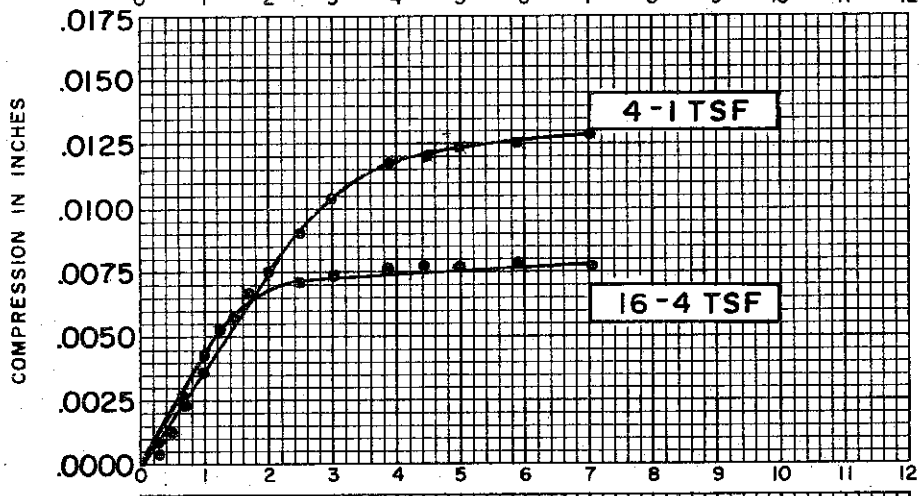
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

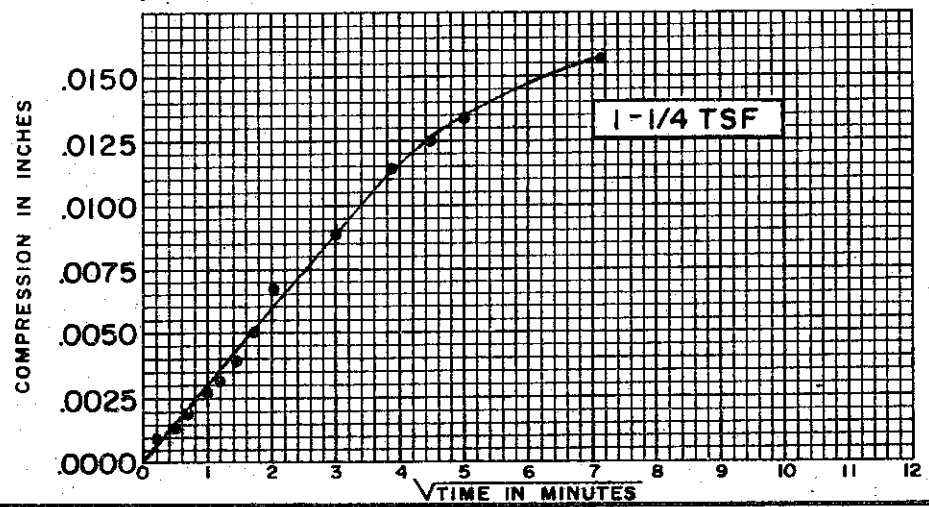
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

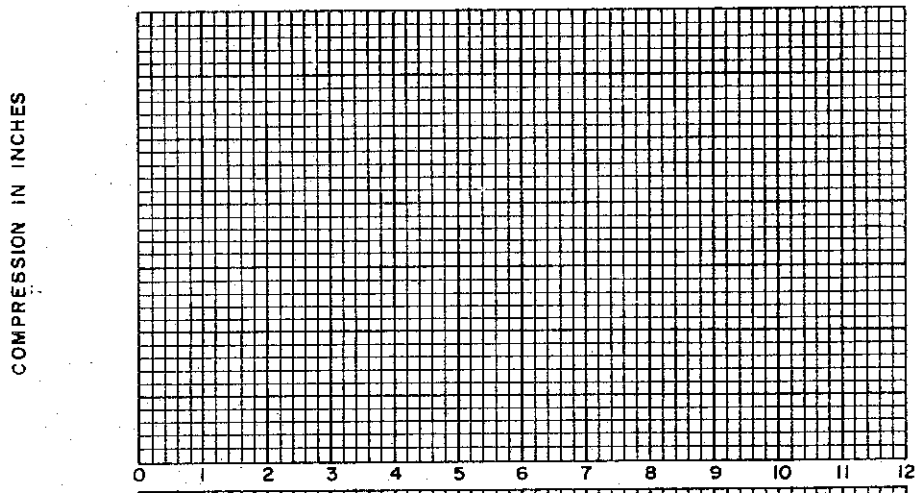
FILE 1255

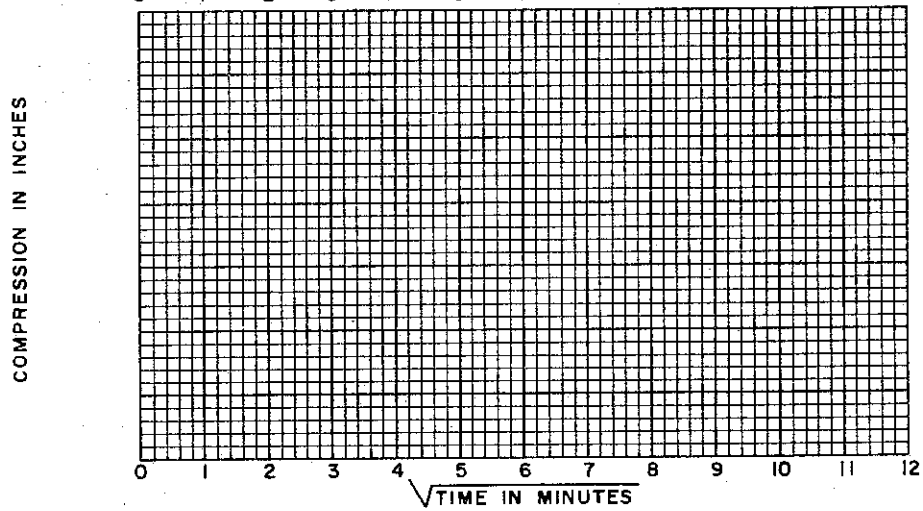
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.68
INITIAL WATER CONTENT 28.6%
FINAL WATER CONTENT 24.4%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.701

BORING NO. 49
SAMPLE NO. 11
DEPTH 93.8' TO 94.0'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

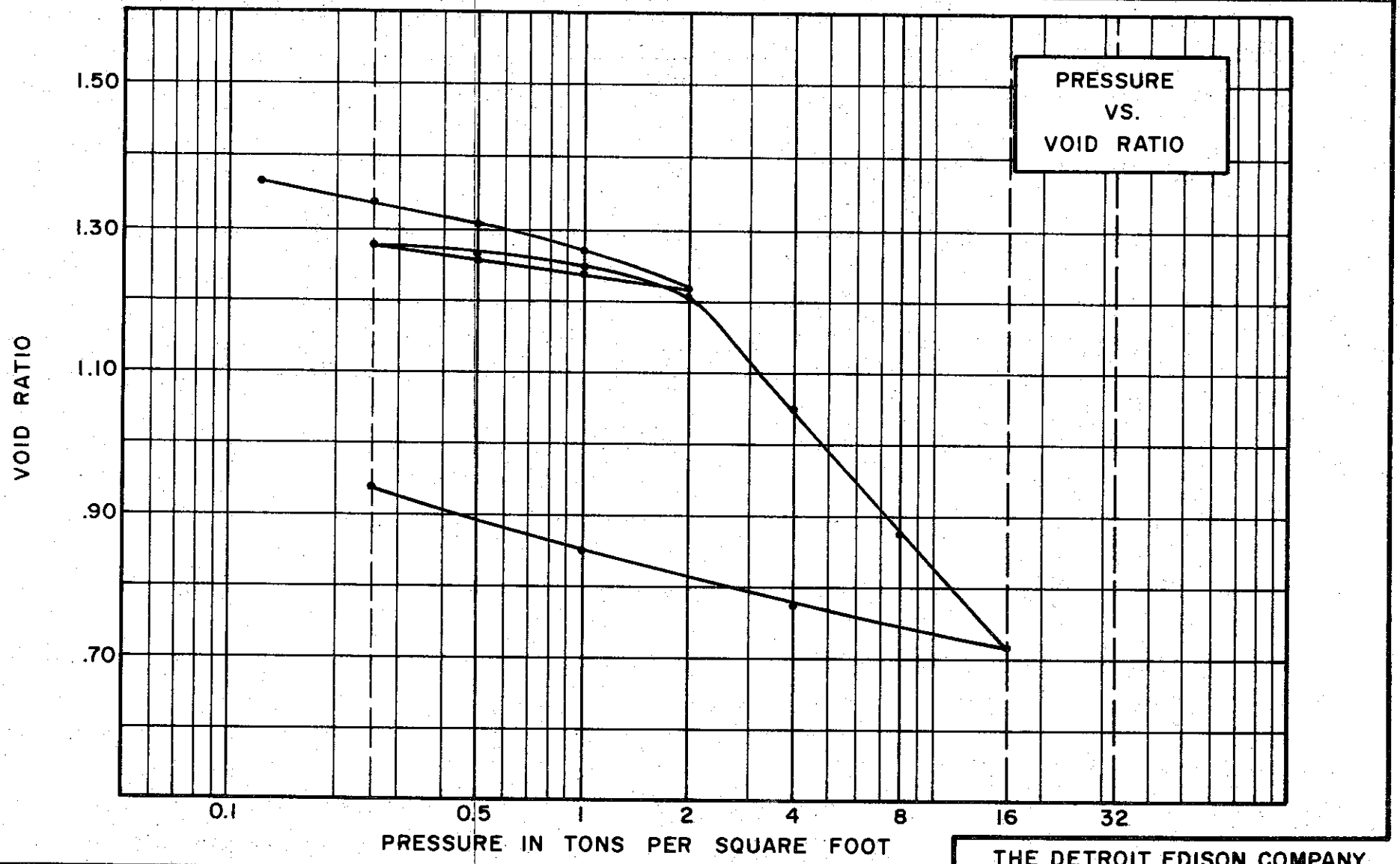
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-507

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-508



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CH)

SPECIFIC GRAVITY 2.75

WATER CONTENT, INITIAL 51.6% FINAL 39.9%

ATTERBERG LIMITS:

LIQUID LIMIT 55 % PLASTIC LIMIT 23 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.383

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

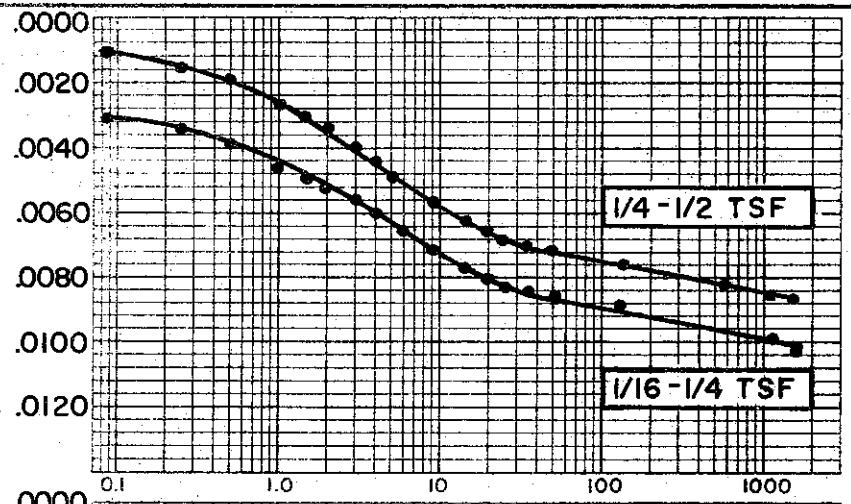
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

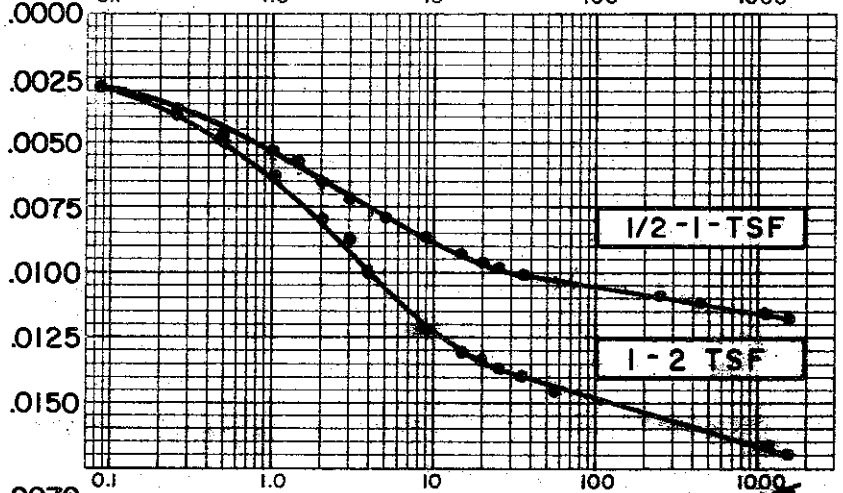
BORING NO. 50 TEST NO. C86.1

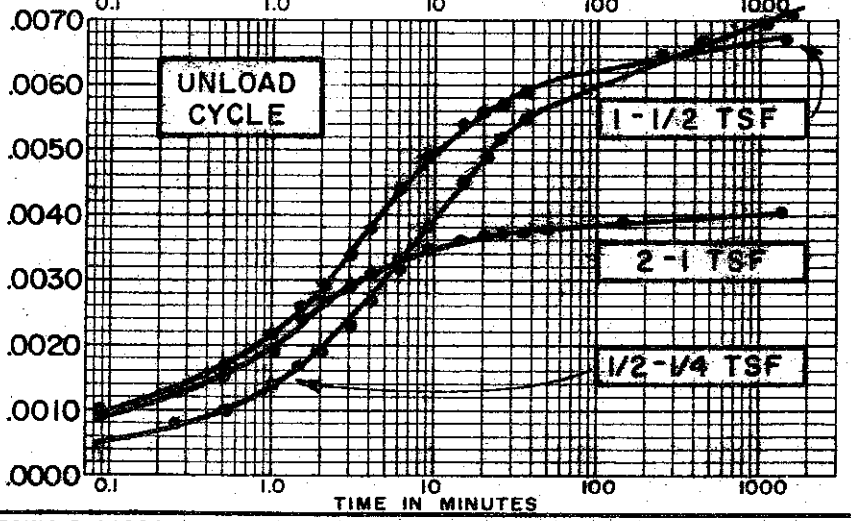
SAMPLE NO. 8 DATE JULY 1974

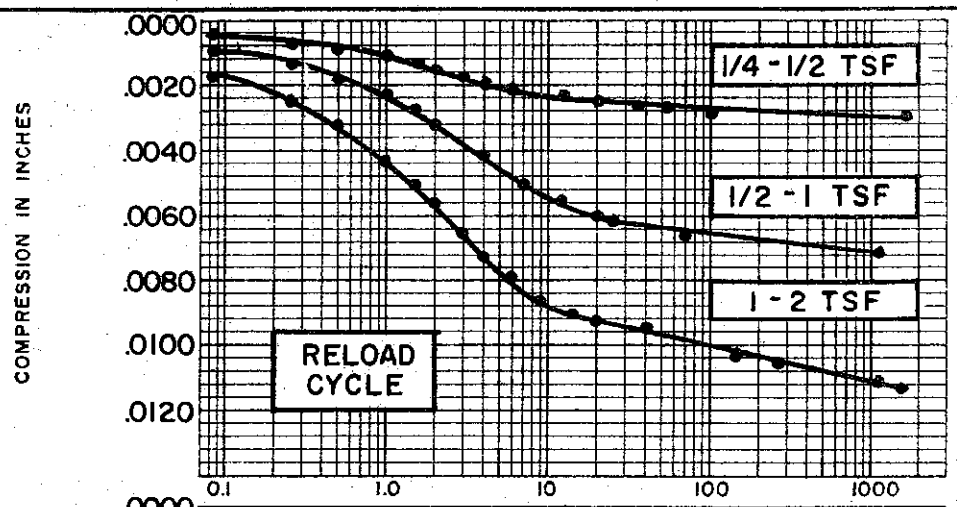
DEPTH 38.5' TO 38.9'

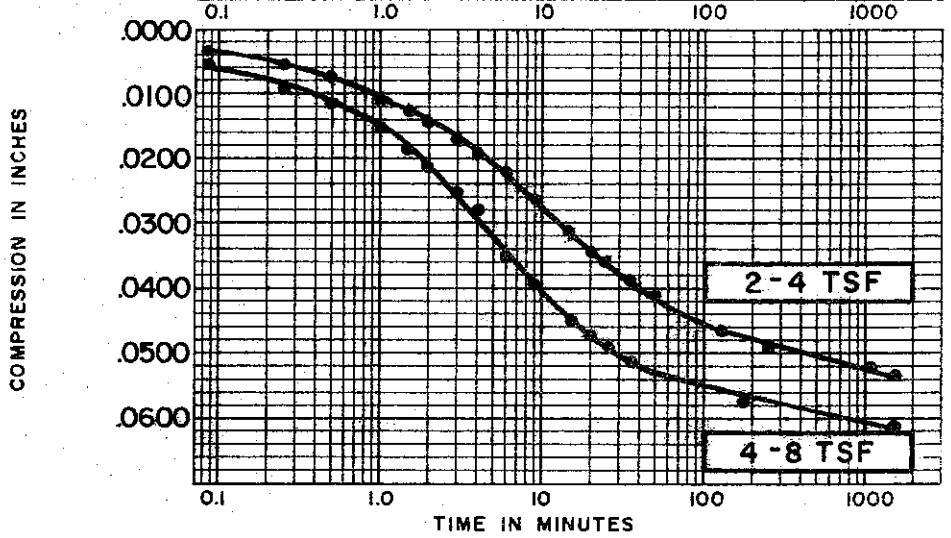
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CH)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT 51.6 %
FINAL WATER CONTENT 39.9 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.383

BORING NO. 50
SAMPLE NO. 8
DEPTH 38.5' - 38.9'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

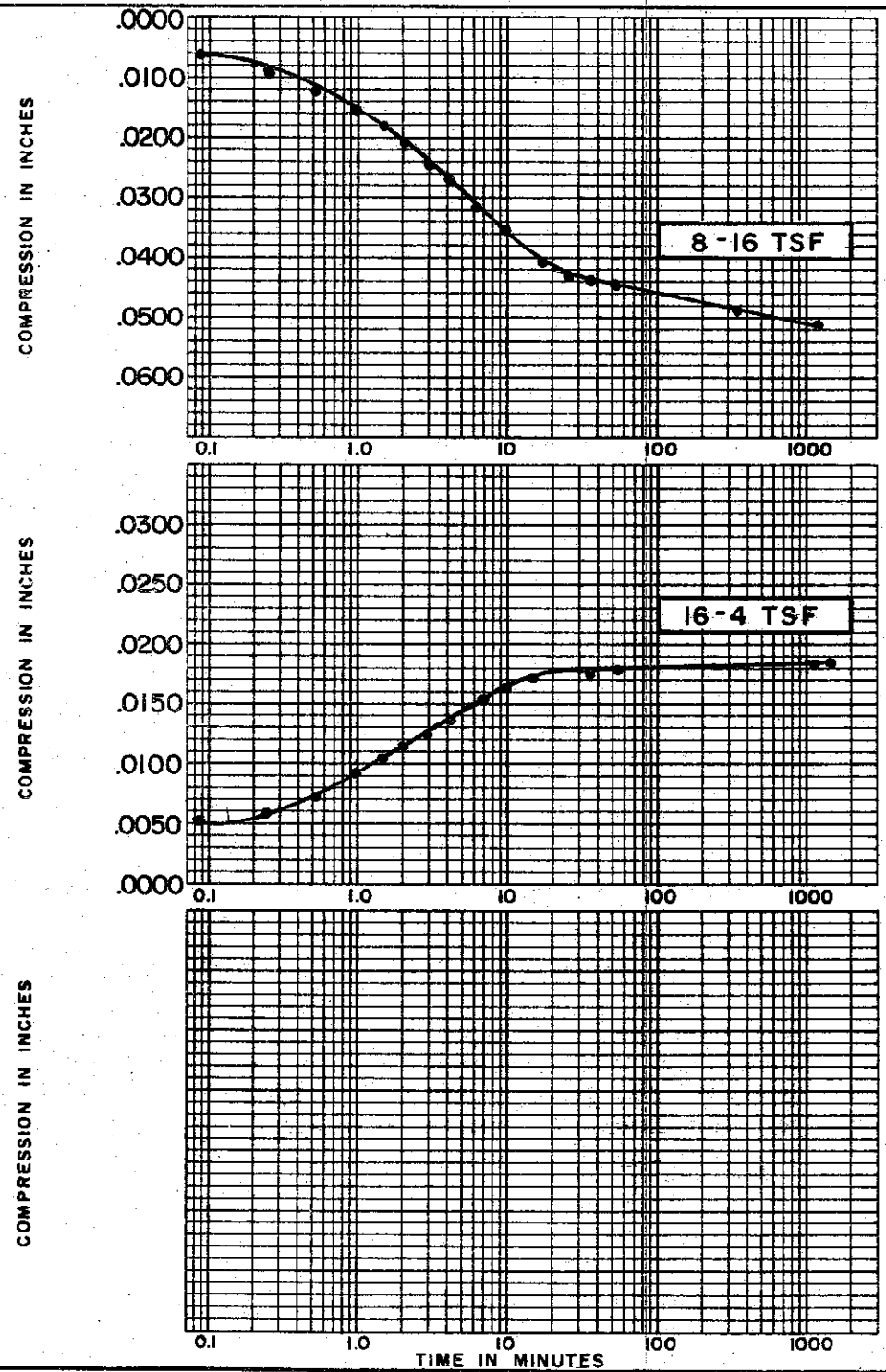
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

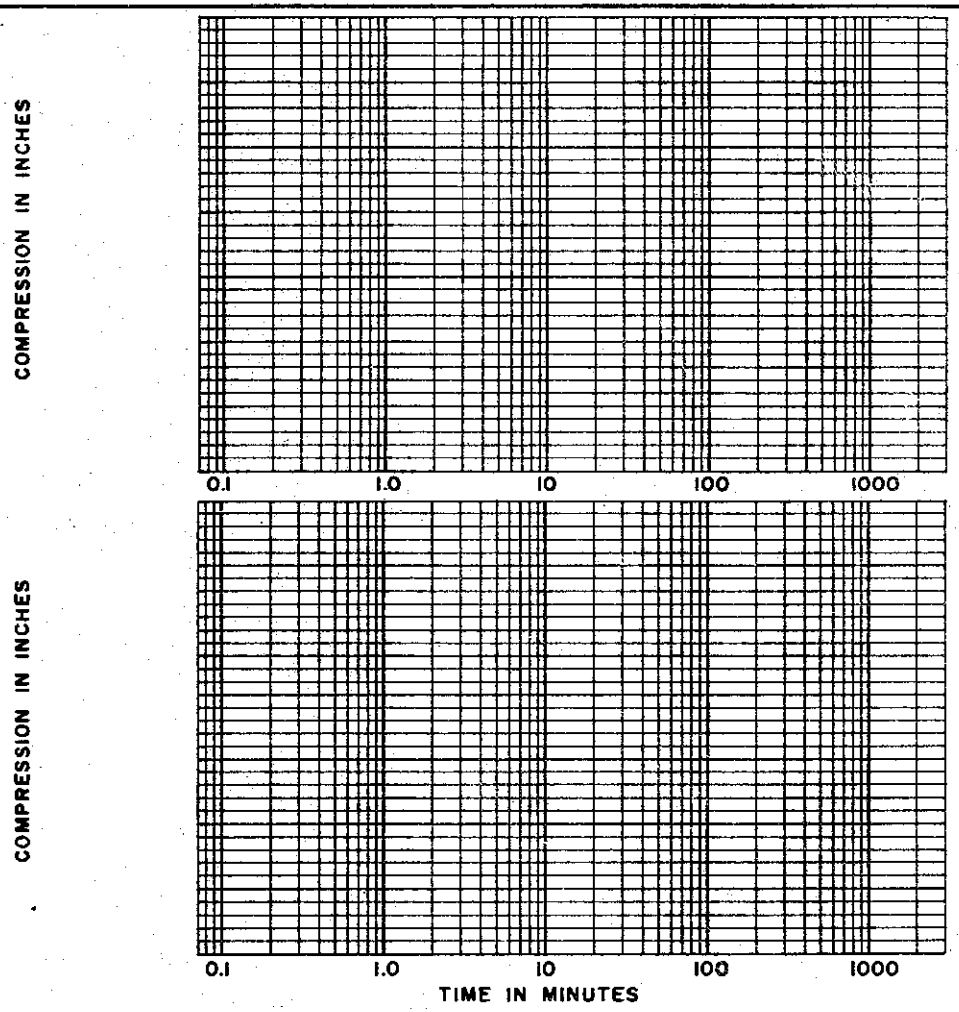
FILE 1255

C-509

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-510





SOIL PROPERTIES

SOIL OESCRIPTION: SILTY CLAY (CH)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT 51.6 %
FINAL WATER CONTENT 39.9 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.383

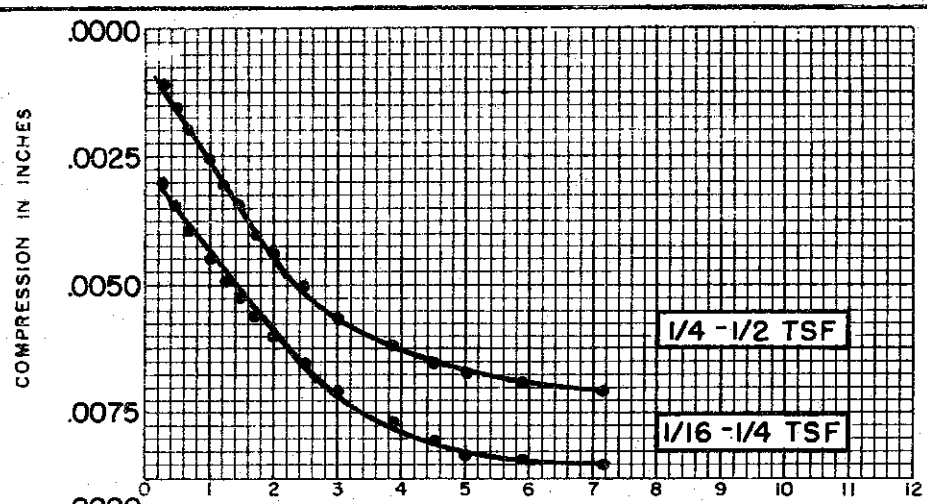
BORING NO. 50
SAMPLE NO. 8
DEPTH 38.5'-38.9'

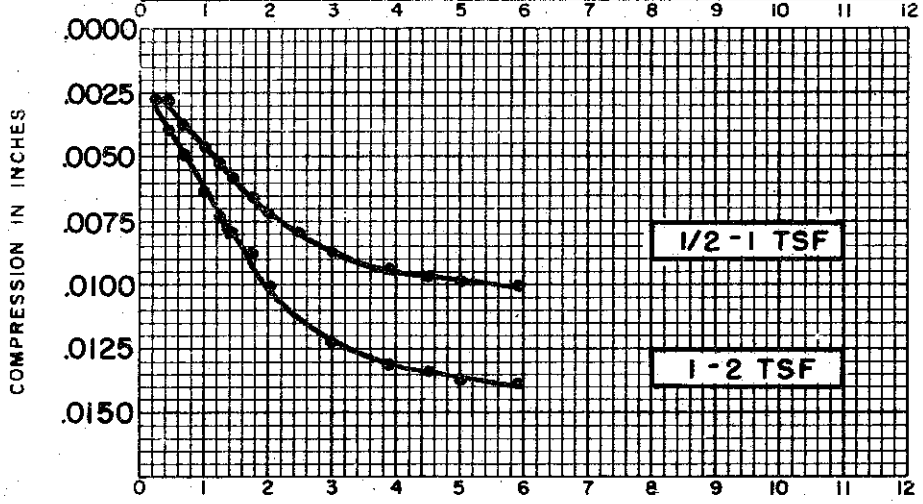
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

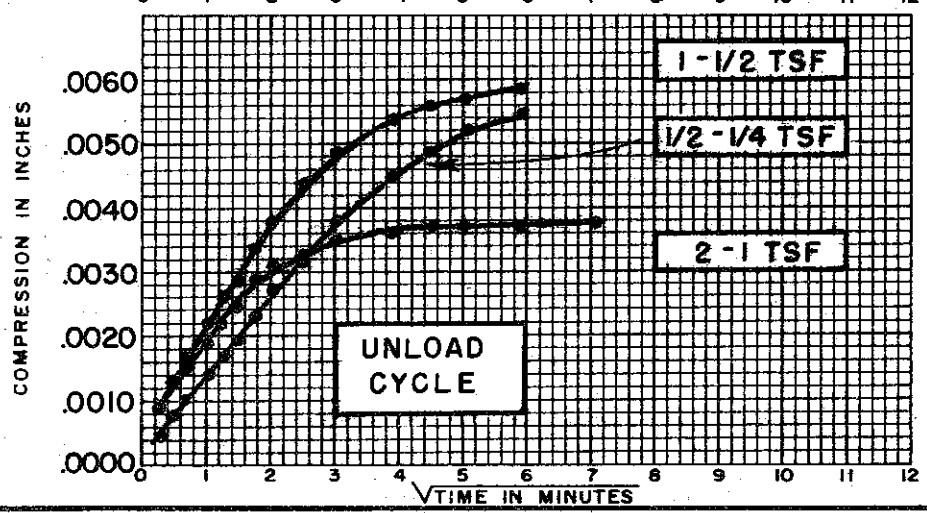
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

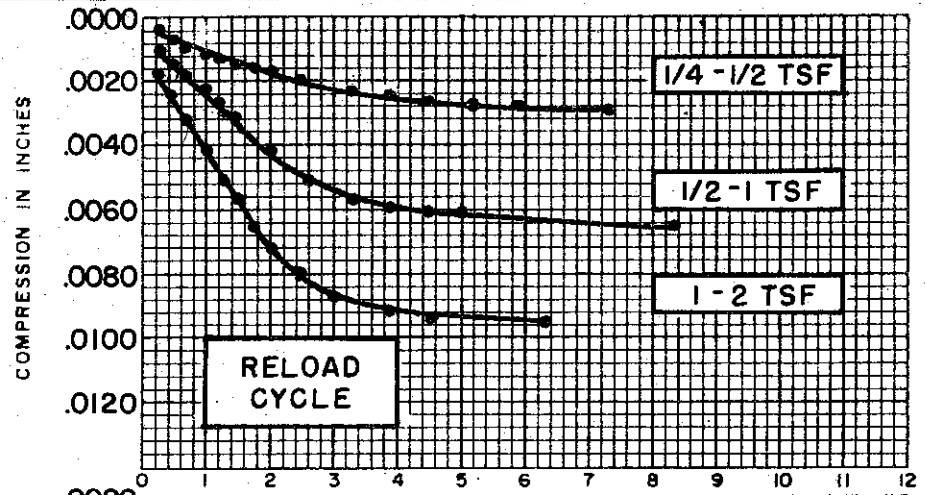
FILE 1255

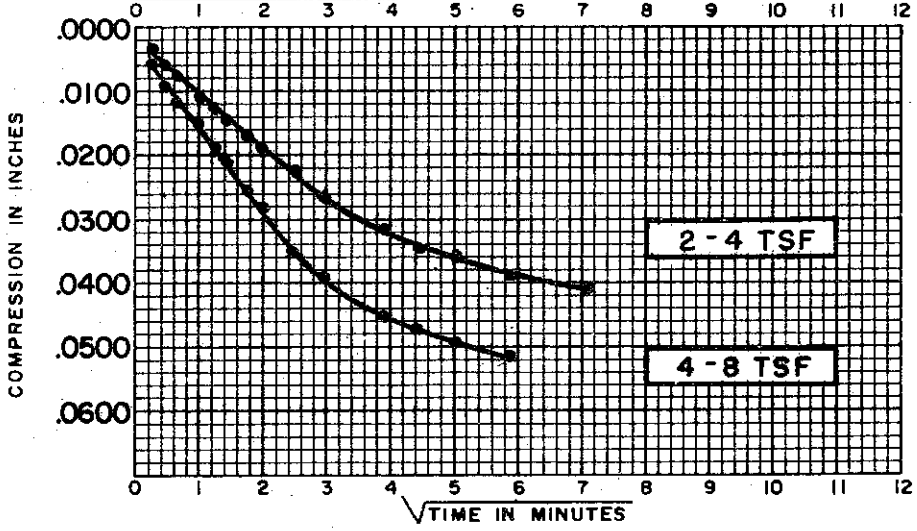
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CH)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT 51.6 %
FINAL WATER CONTENT 39.9 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.383

BORING NO. 50
SAMPLE NO. 8
DEPTH 38.5' - 38.9'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

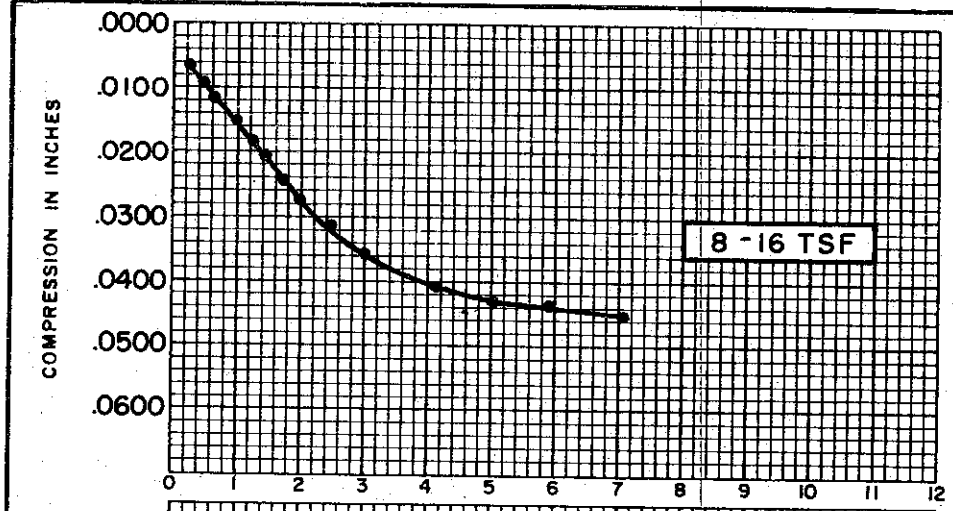
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

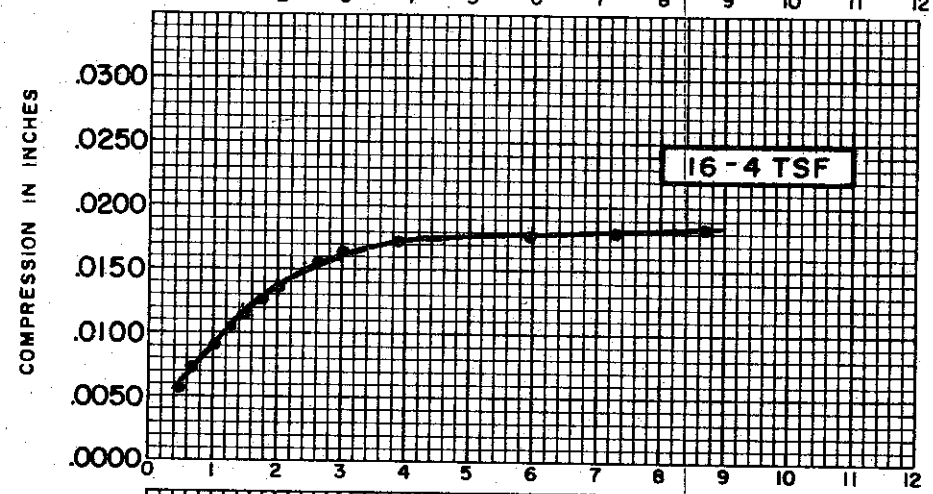
FILE 1255

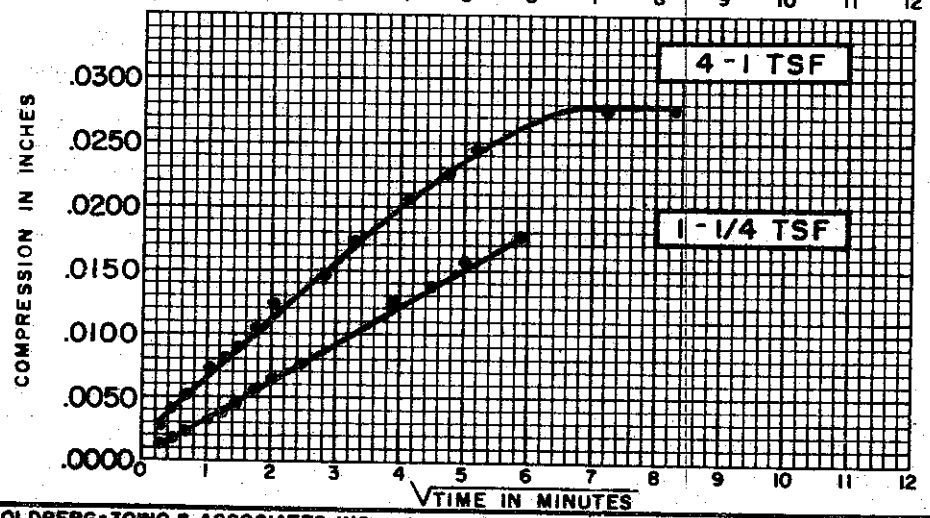
C-511

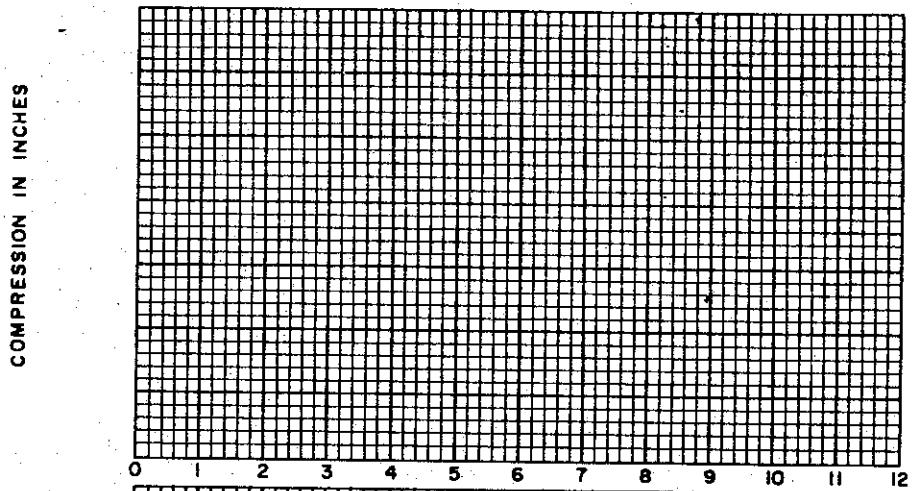
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

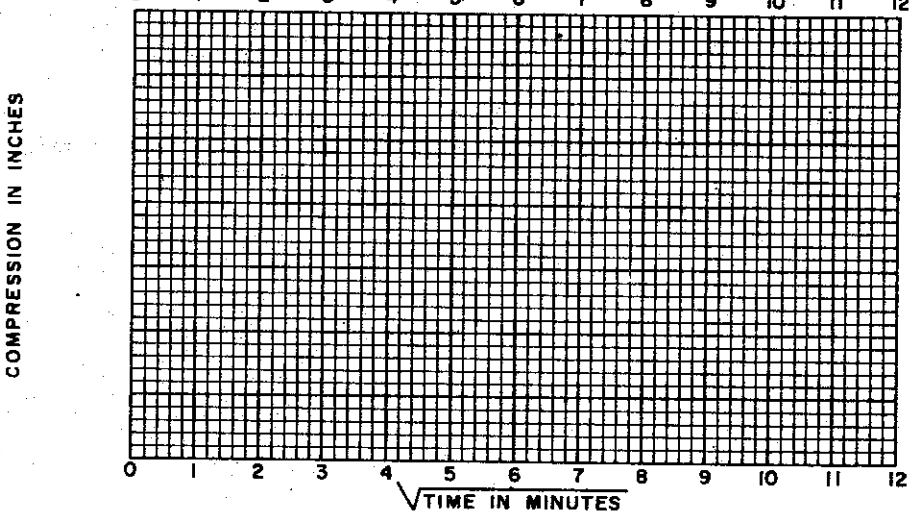
C-512











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CH)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT 51.6 %
FINAL WATER CONTENT 39.9 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.383

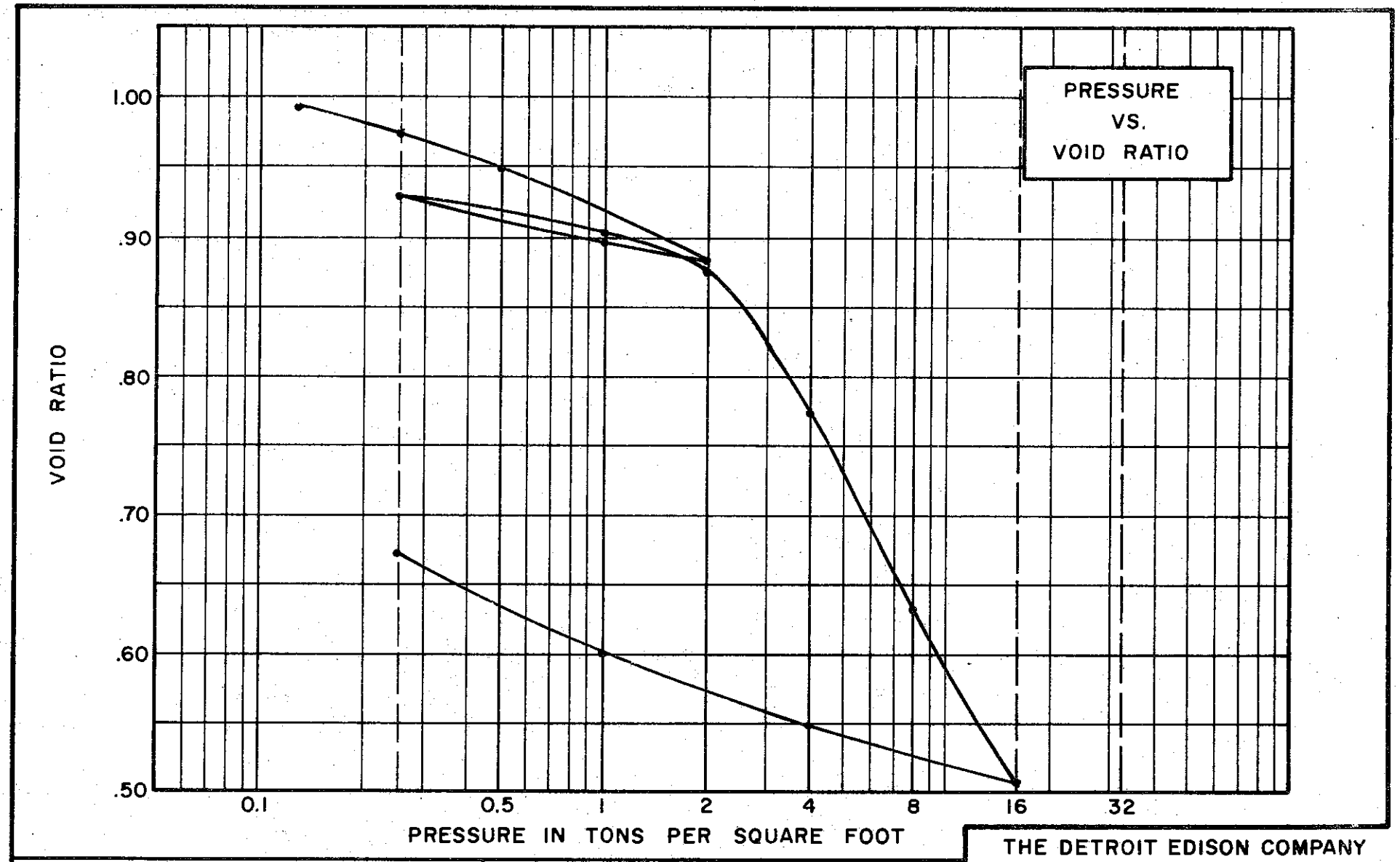
BORING NO. 50
SAMPLE NO. 8
DEPTH 38.5'-38.9'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 40.5% FINAL 28.9%

ATTERBERG LIMITS:
LIQUID LIMIT 49 % PLASTIC LIMIT 20 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.013

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 52 TEST NO. C109.1

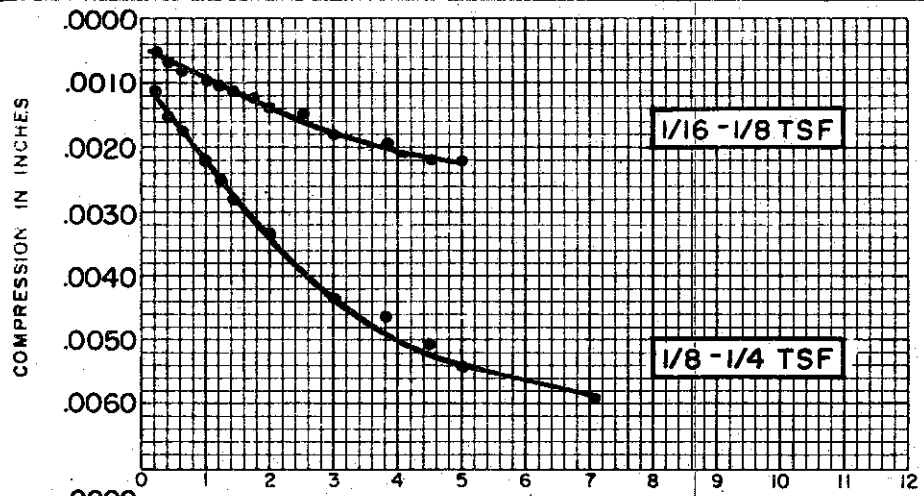
SAMPLE NO. 4 DATE JULY 1974

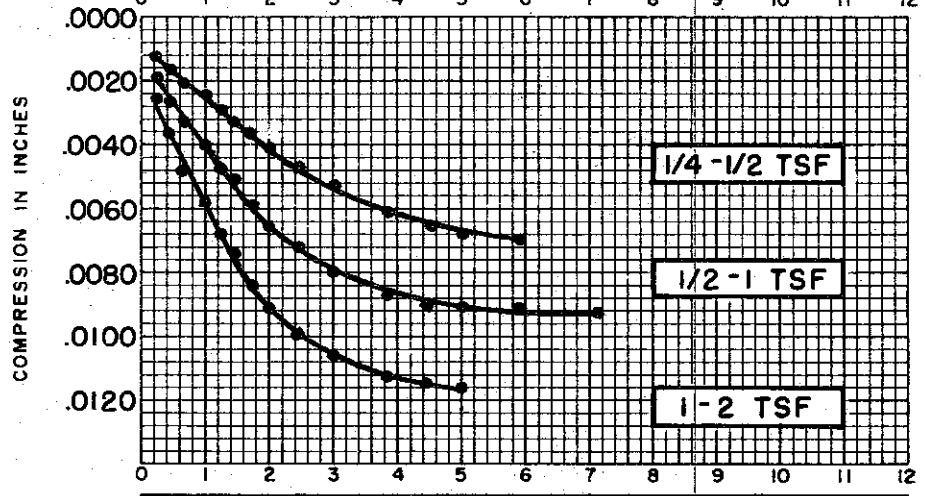
DEPTH 29.9' TO 30.2'

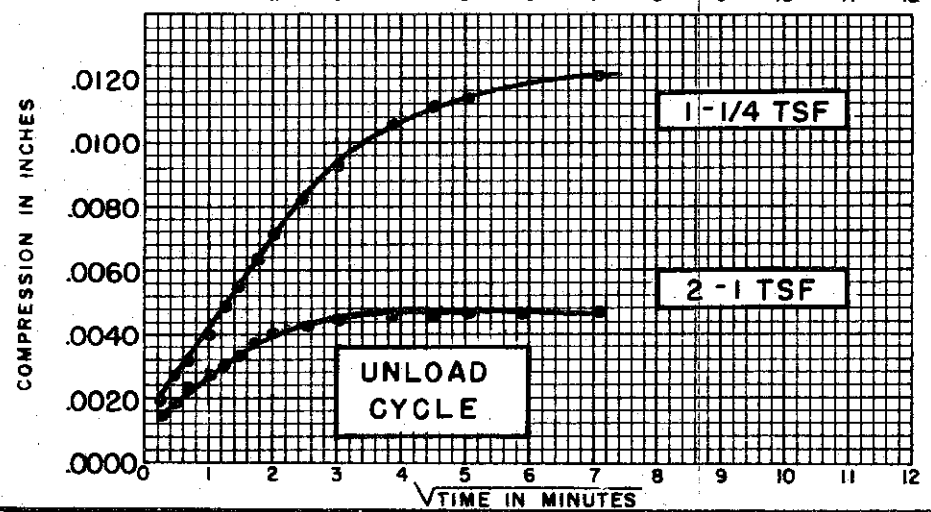
C-513

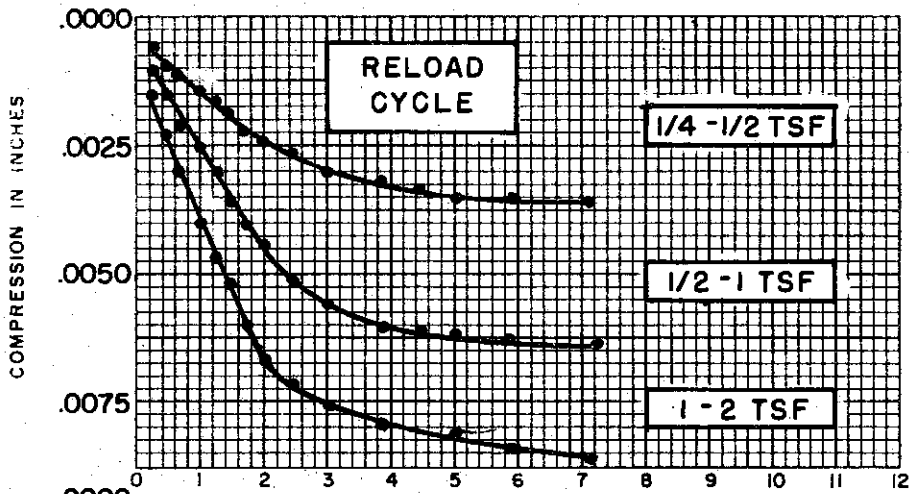
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

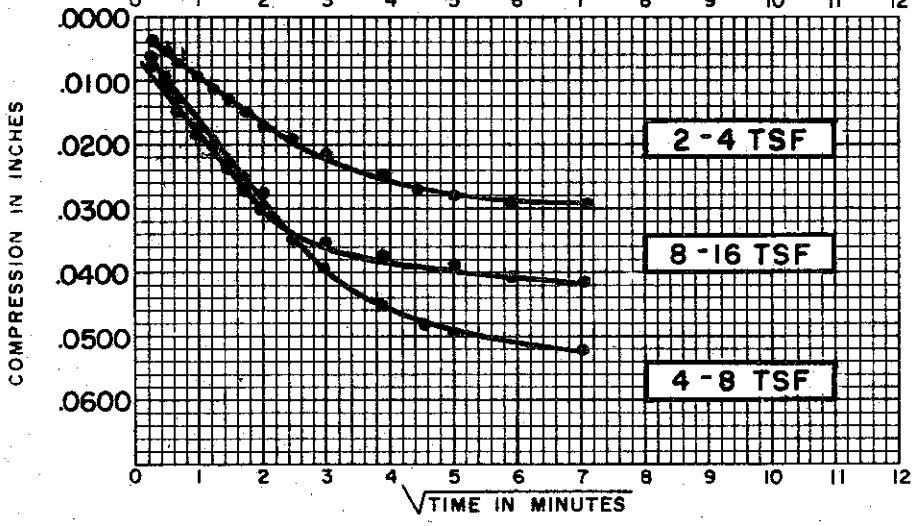
C-514











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 40.5 %
FINAL WATER CONTENT 28.9 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.013

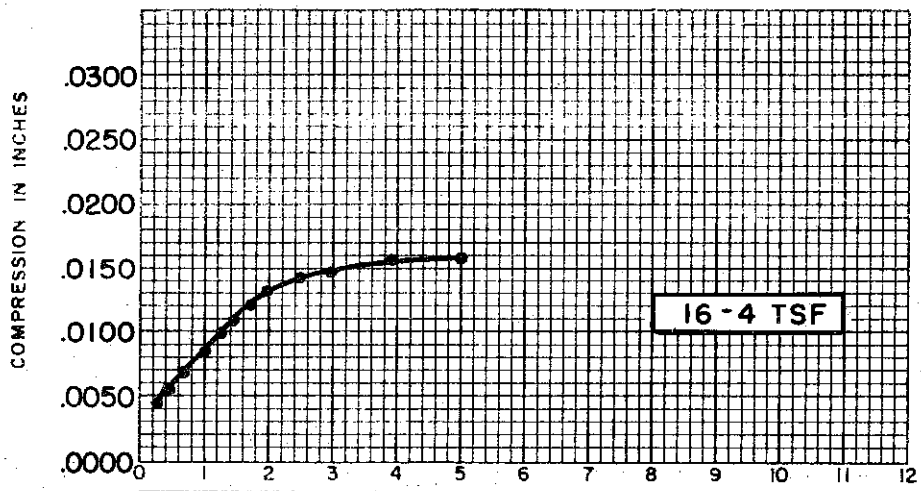
BORING NO. 52
SAMPLE NO. 4
DEPTH 29.9' - 30.2'

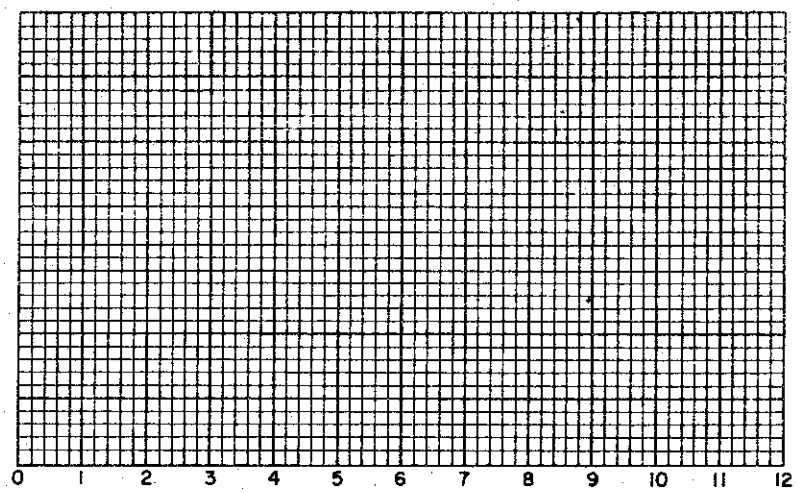
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

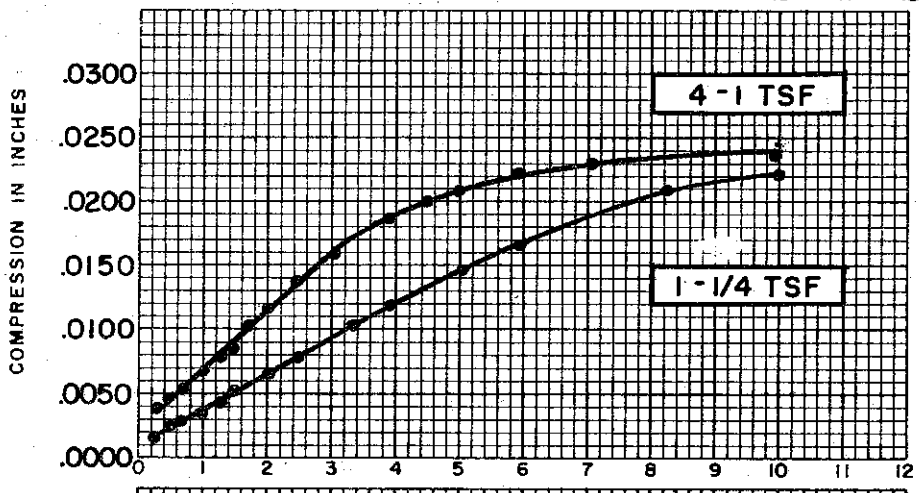
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

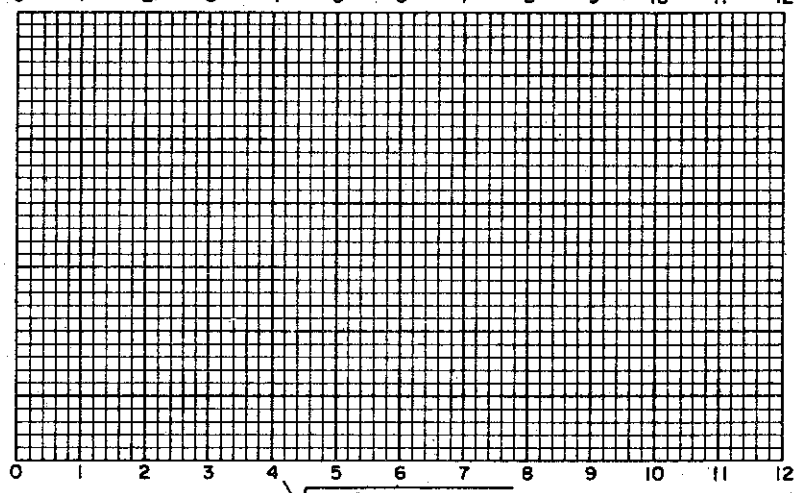
FILE 1255

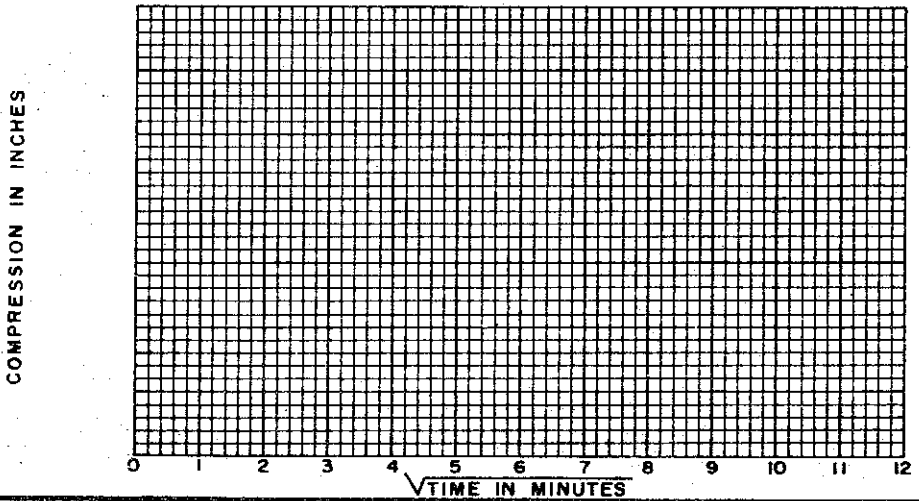
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

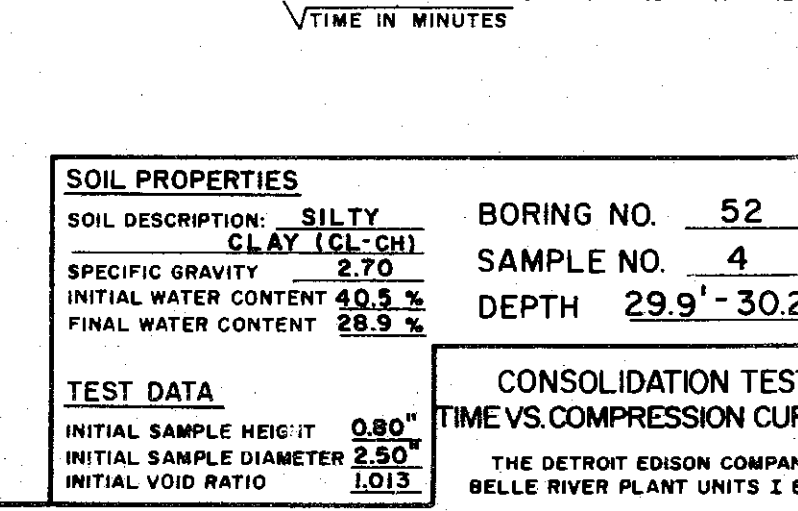












SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 40.5 %
FINAL WATER CONTENT 28.9 %

BORING NO. 52
SAMPLE NO. 4
DEPTH 29.9' - 30.2'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.013

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

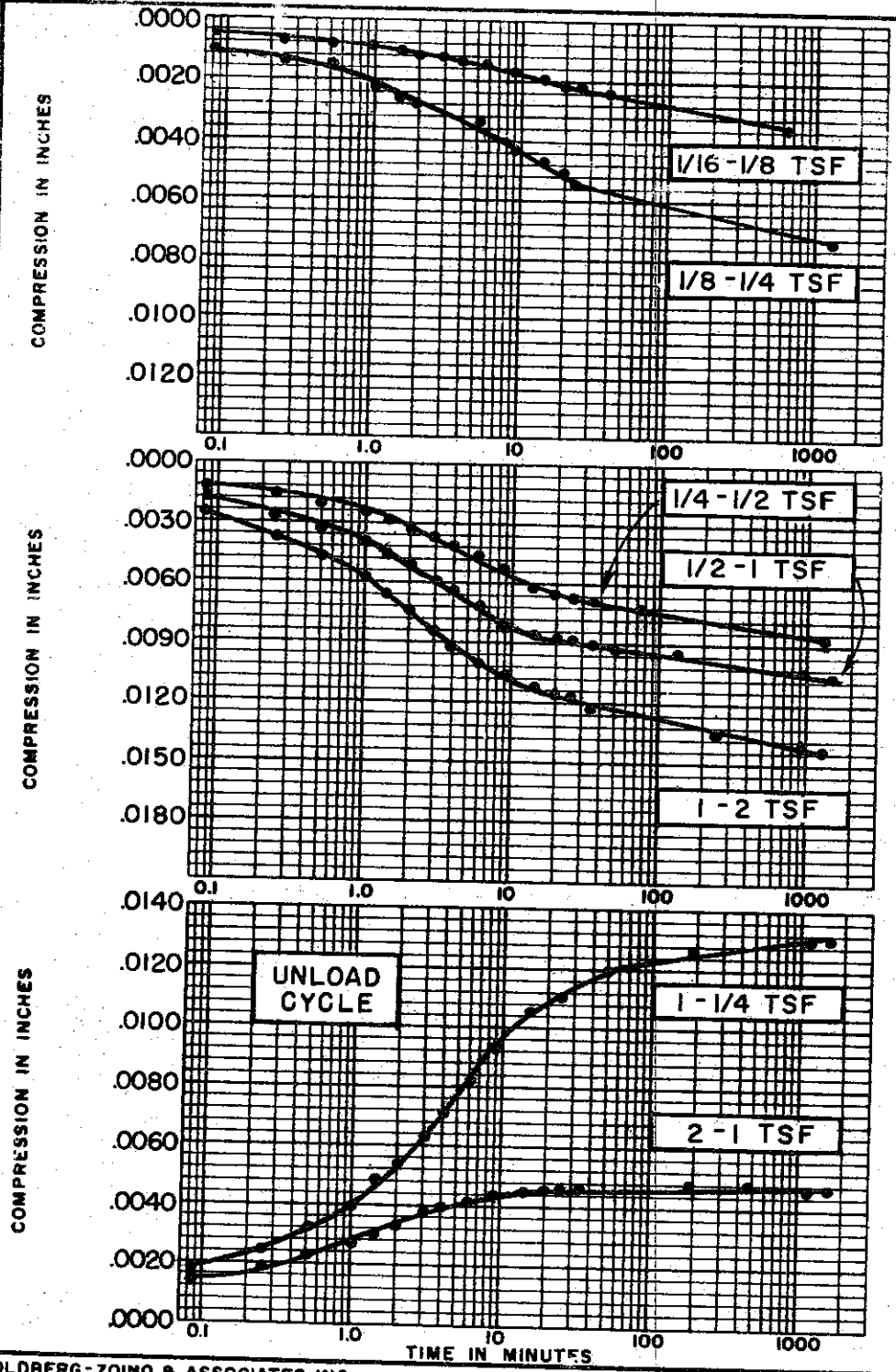
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

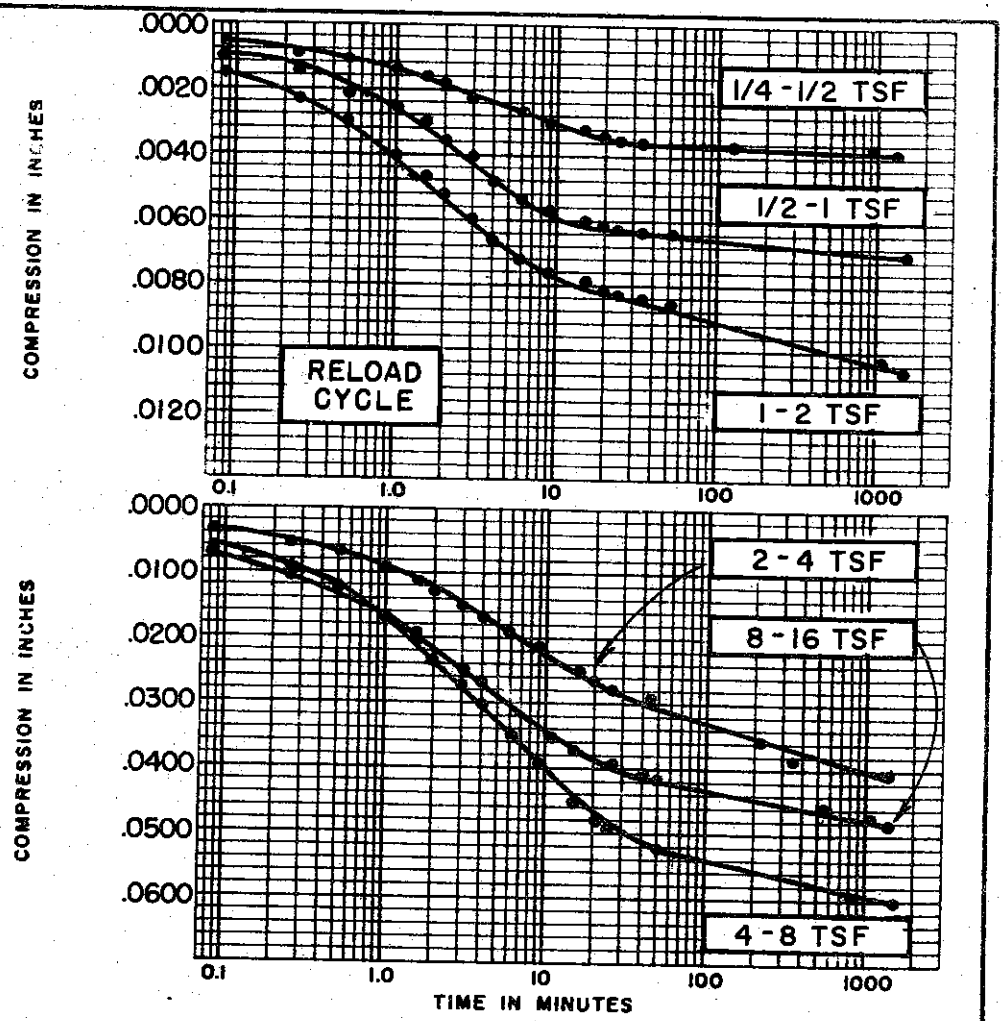
FILE 1255

C-515

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-516





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 40.5 %
FINAL WATER CONTENT 28.9 %

BORING NO. 52
SAMPLE NO. 4
DEPTH 29.9'-30.2'

TEST DATA

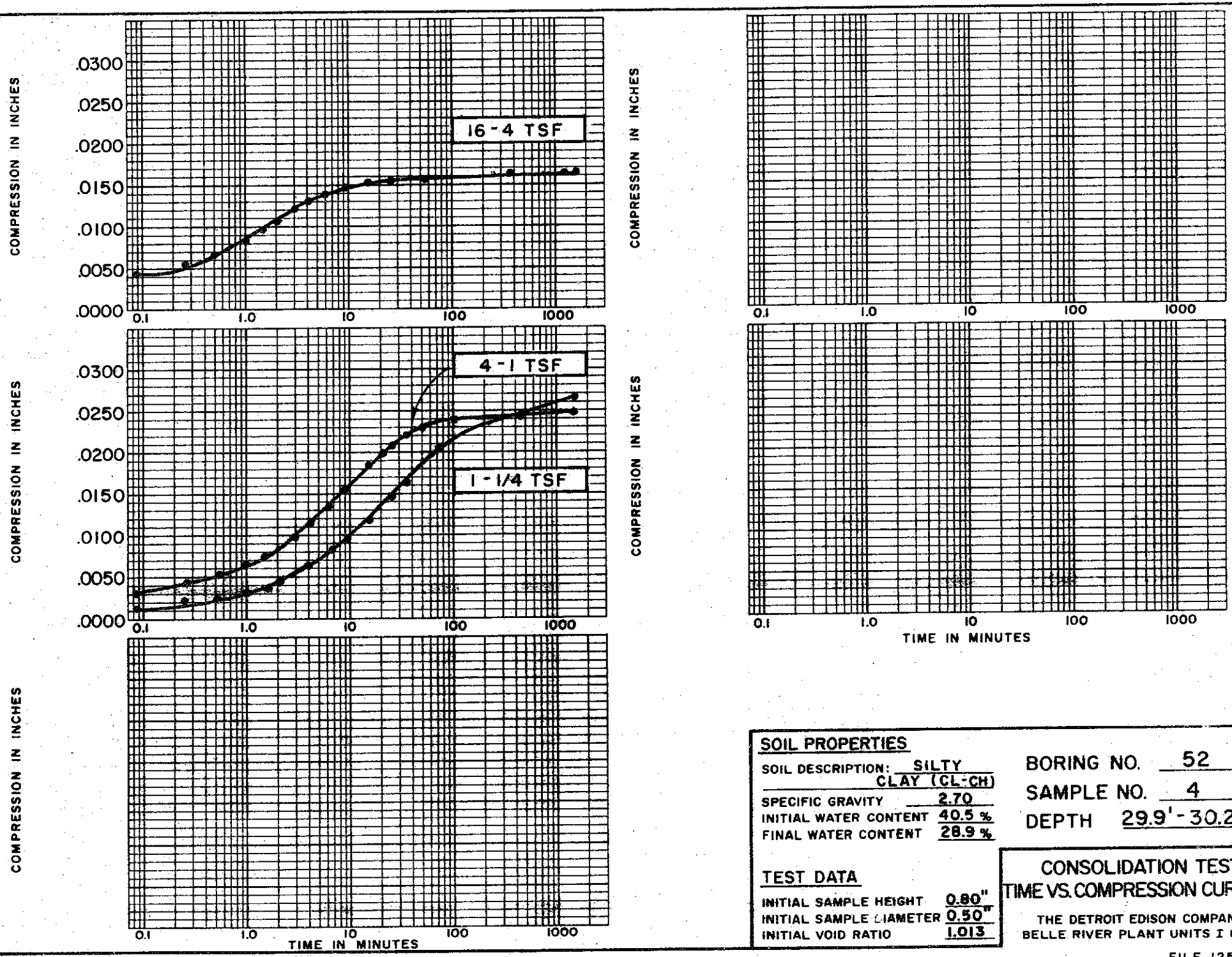
INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.013

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 40.5 %
FINAL WATER CONTENT 28.9 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 0.50"
INITIAL VOID RATIO 1.013

BORING NO. 52
SAMPLE NO. 4
DEPTH 29.9' - 30.2'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

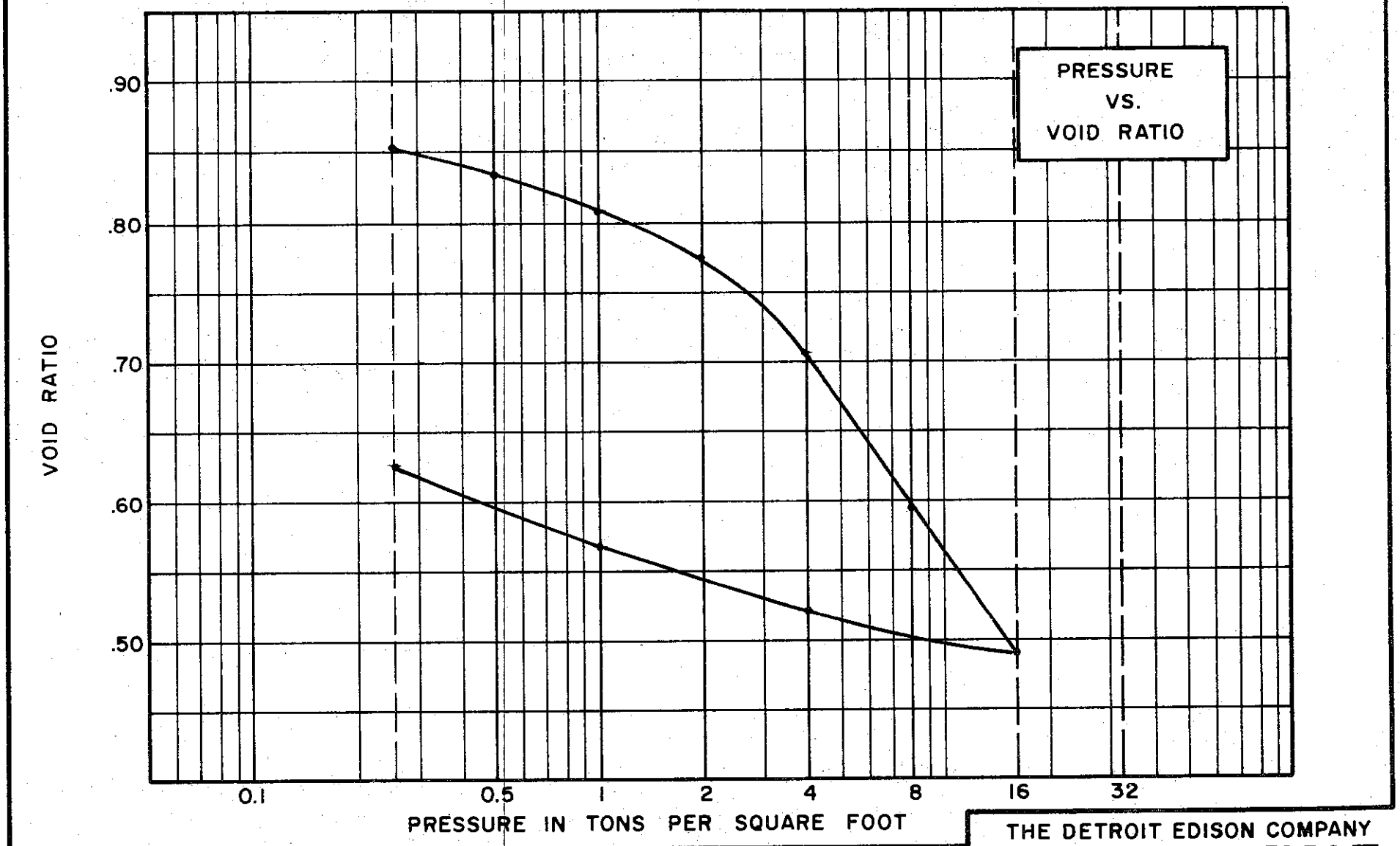
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-517

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-518



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

SPECIFIC GRAVITY 2.72

WATER CONTENT, INITIAL 309% FINAL 227%

ATTERBERG LIMITS:
LIQUID LIMIT 39 % PLASTIC LIMIT 20 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.872

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

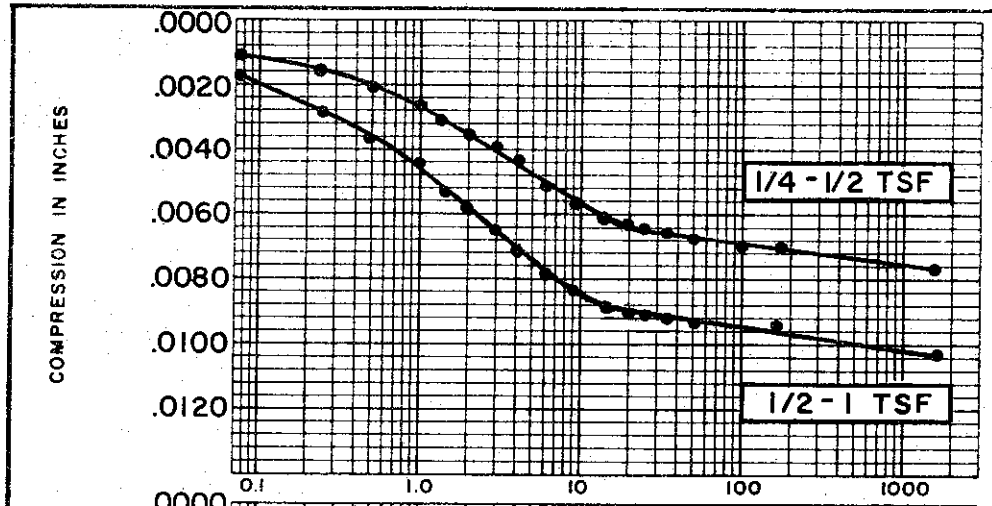
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

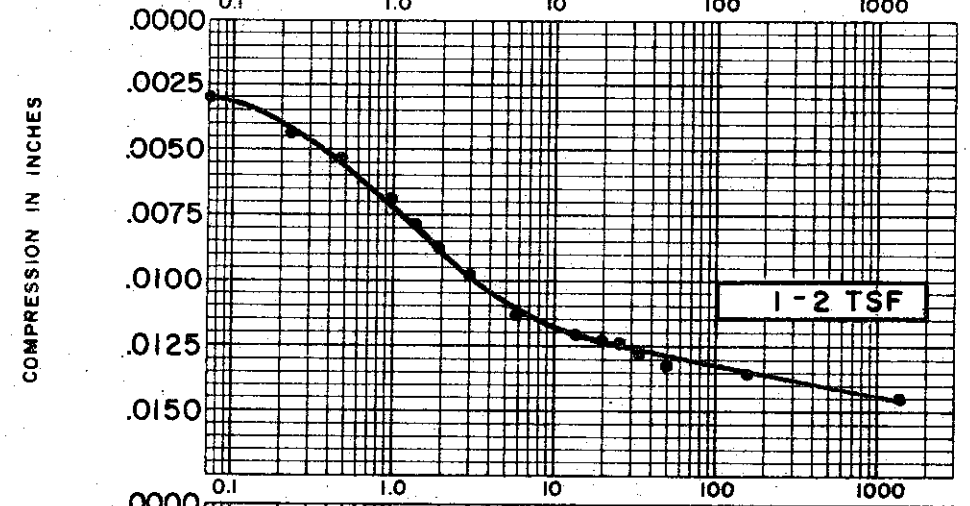
BORING NO. 53 TEST NO. C98.1

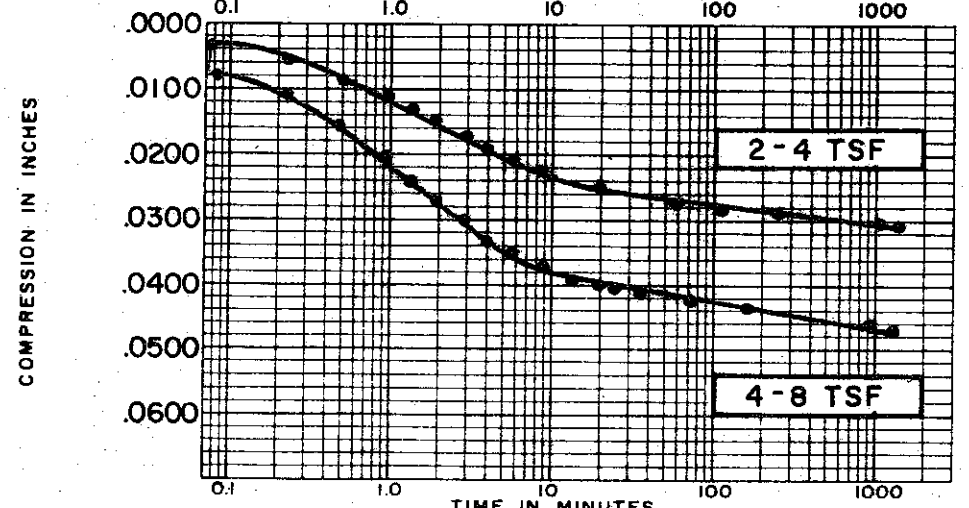
SAMPLE NO. 5 DATE JULY 1974

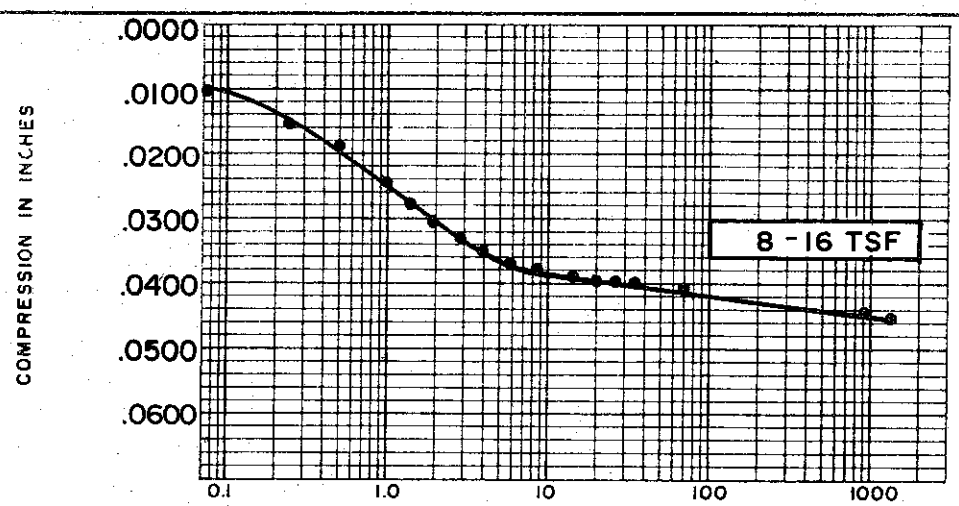
DEPTH 39.5' TO 39.8'

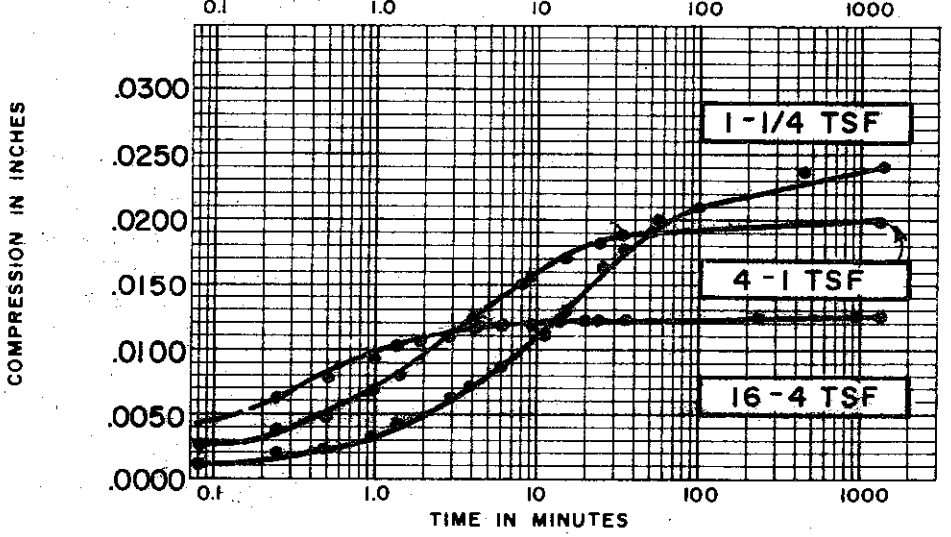
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 30.9 %
FINAL WATER CONTENT 22.7 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.872

BORING NO. 53
SAMPLE NO. 5
DEPTH 39.5' - 39.8'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

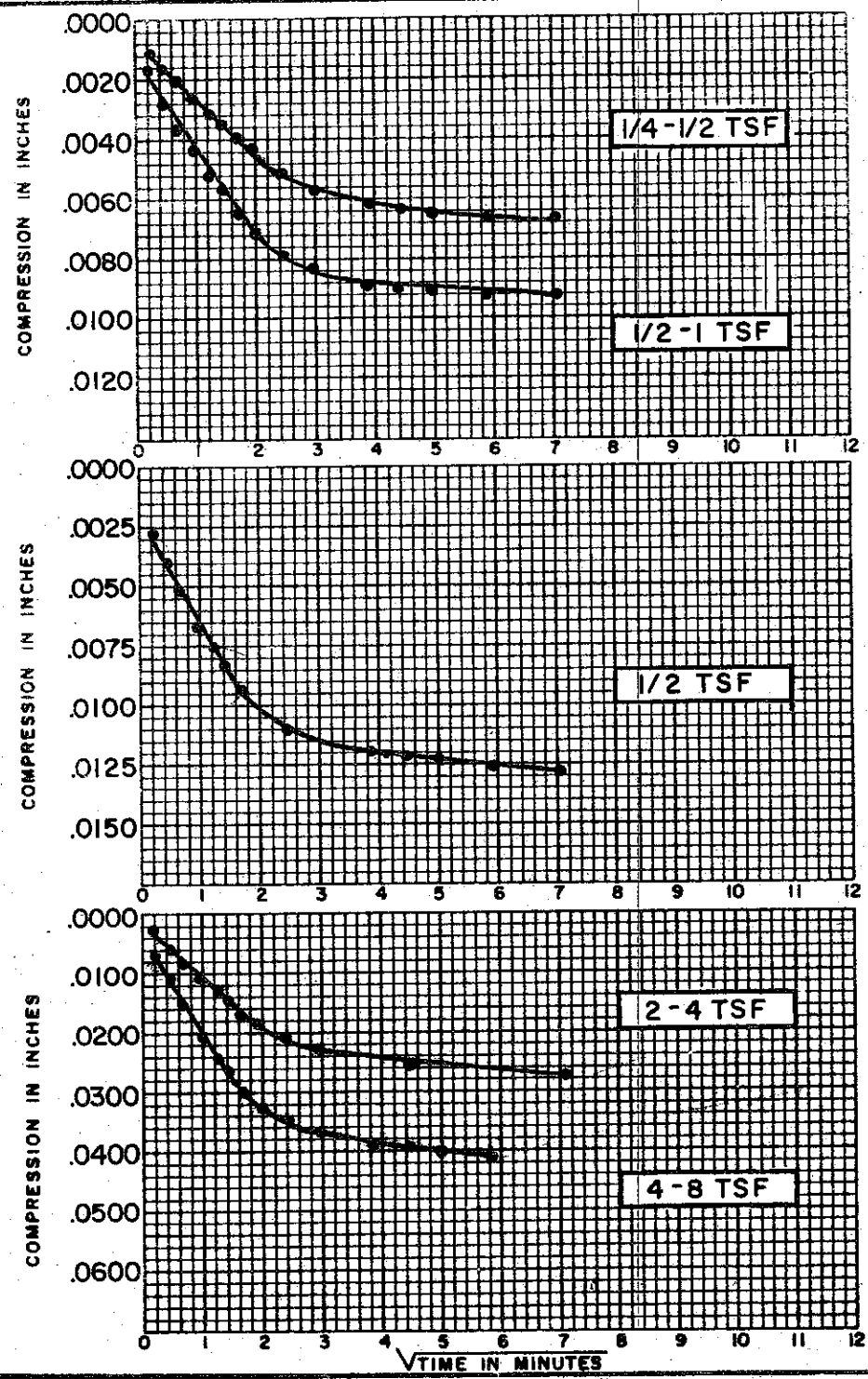
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

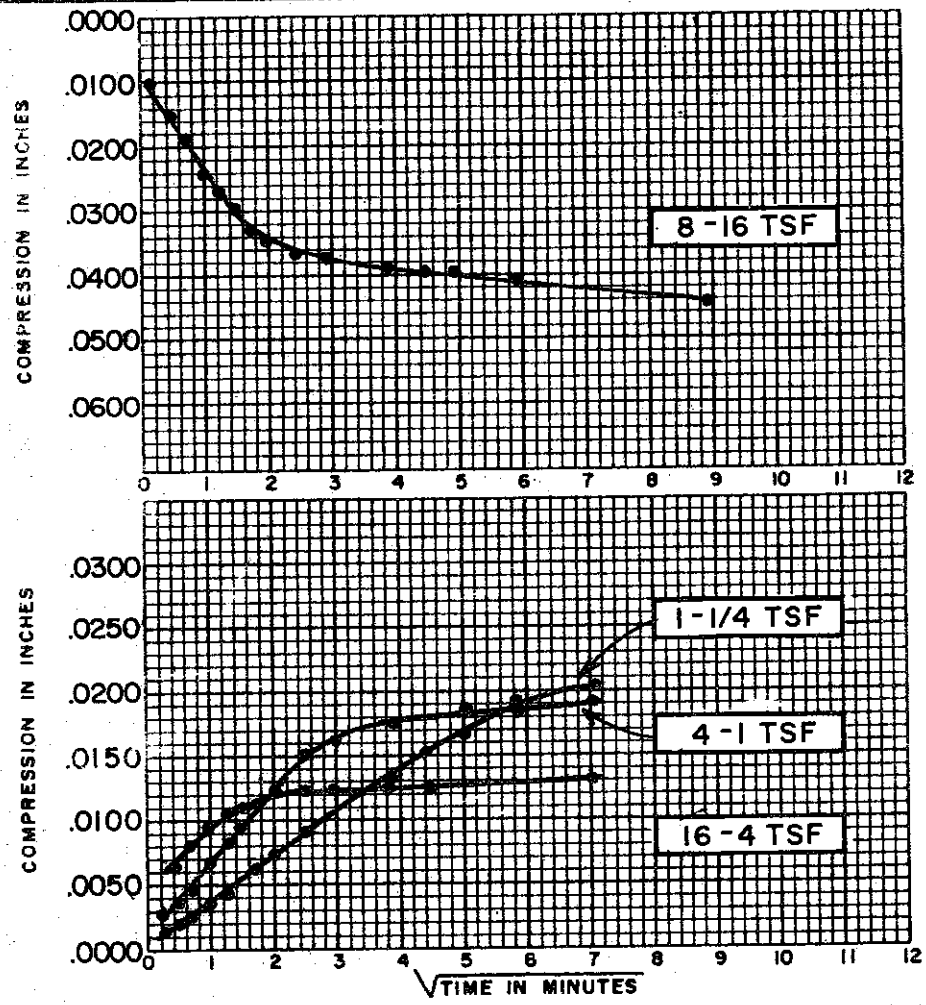
FILE 1255

C-519

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-520





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 30.9 %
FINAL WATER CONTENT 22.7 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.872

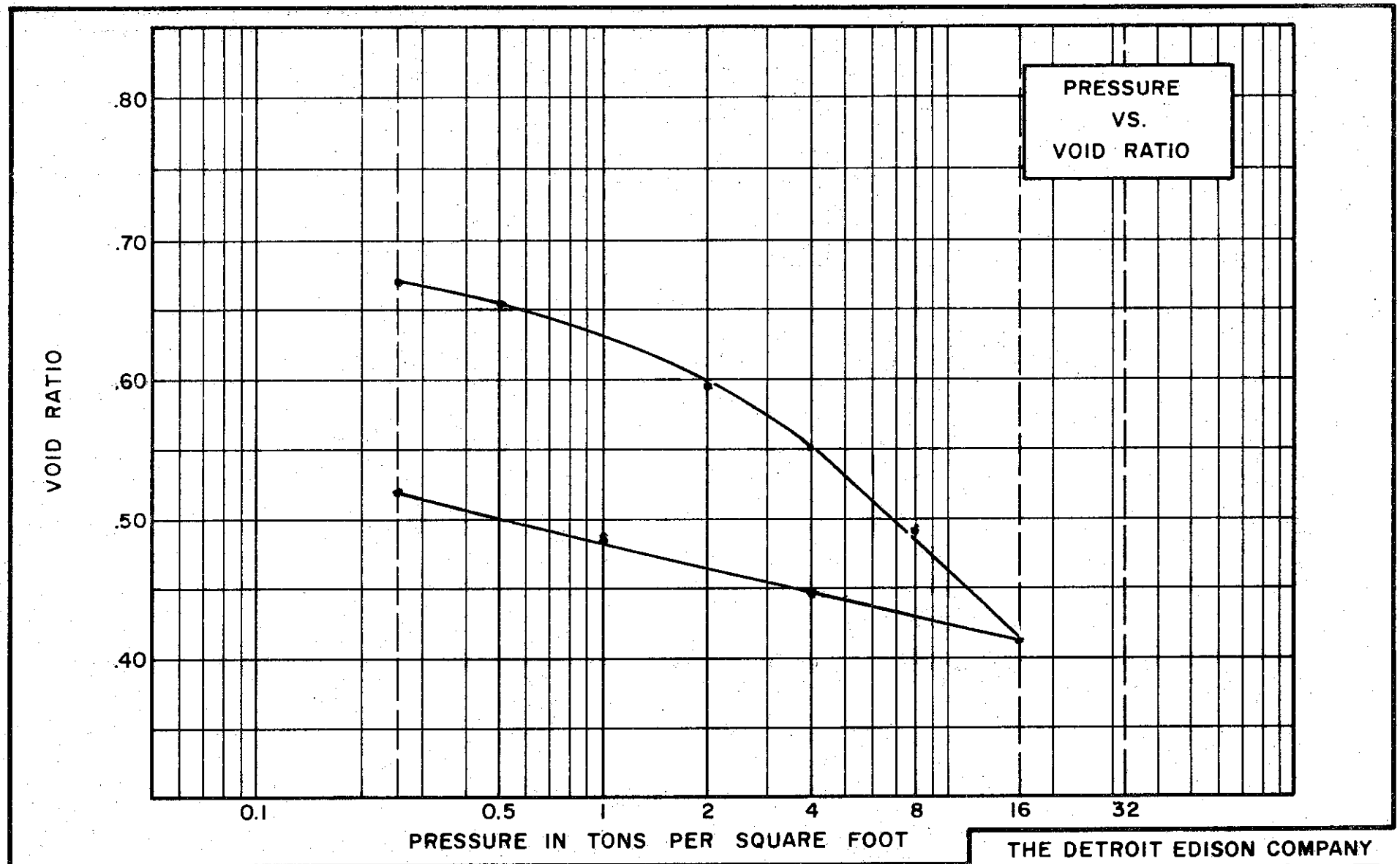
BORING NO. 53
SAMPLE NO. 5
DEPTH 39.5'-39.8'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)

SPECIFIC GRAVITY 2.71

WATER CONTENT, INITIAL 26.0% FINAL 22.0%

ATTERBERG LIMITS:
LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.696

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

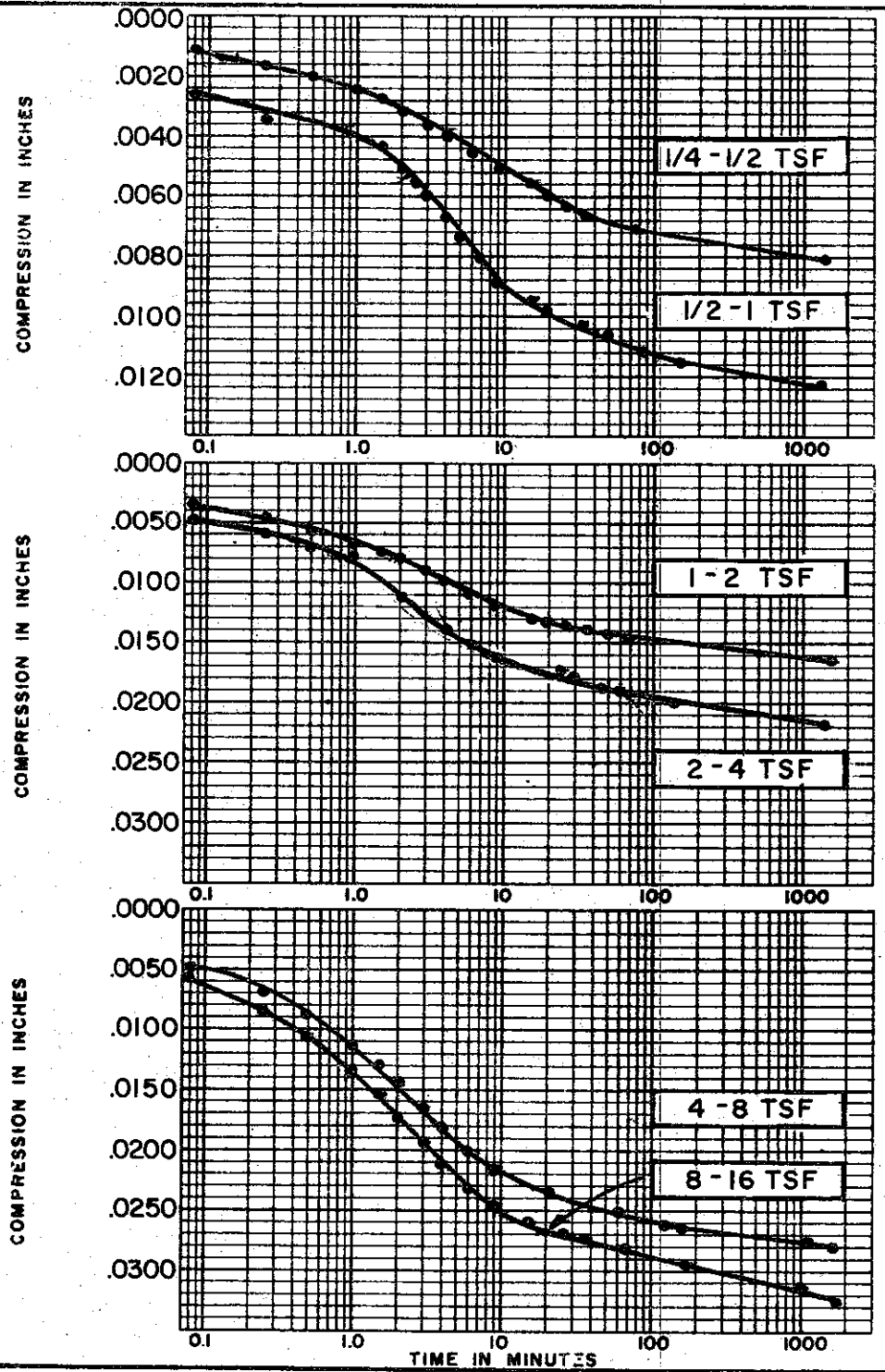
BORING NO. 54 TEST NO. C399.1

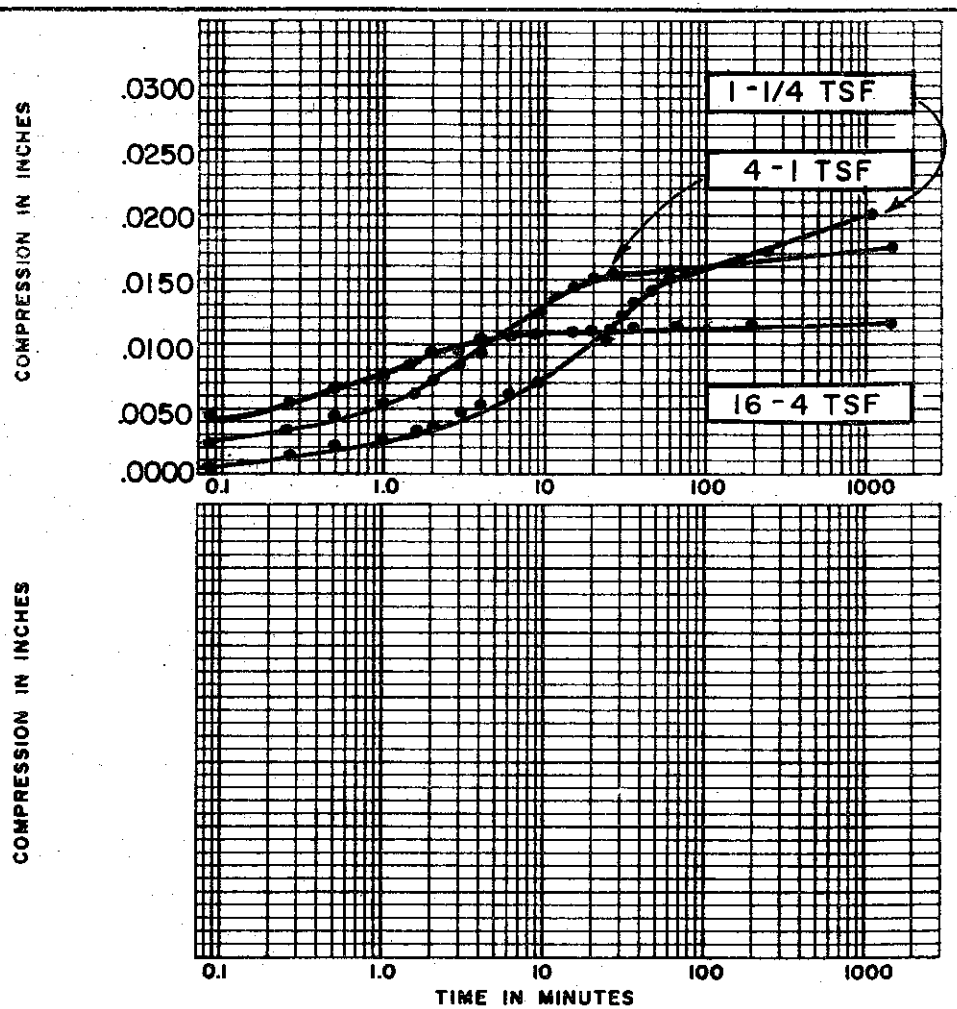
SAMPLE NO. 6 DATE JULY 1974

DEPTH 63.5' TO 63.8'

C-521

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 20.0 %
FINAL WATER CONTENT 22.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.696

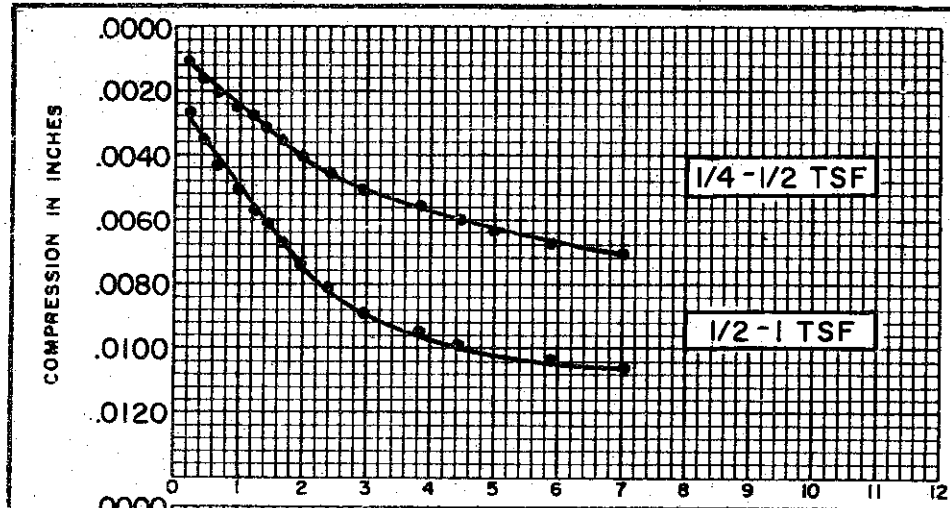
BORING NO. 54
SAMPLE NO. 6
DEPTH 63.5' - 63.8'

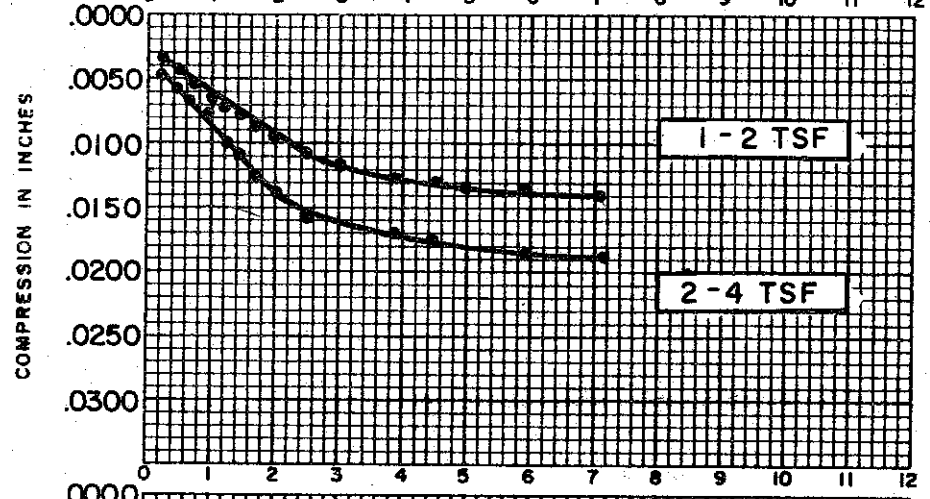
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

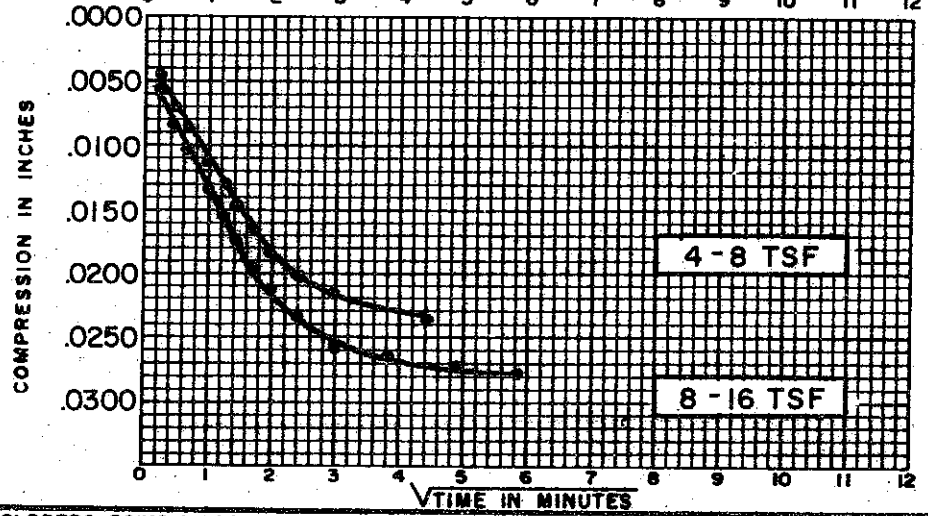
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

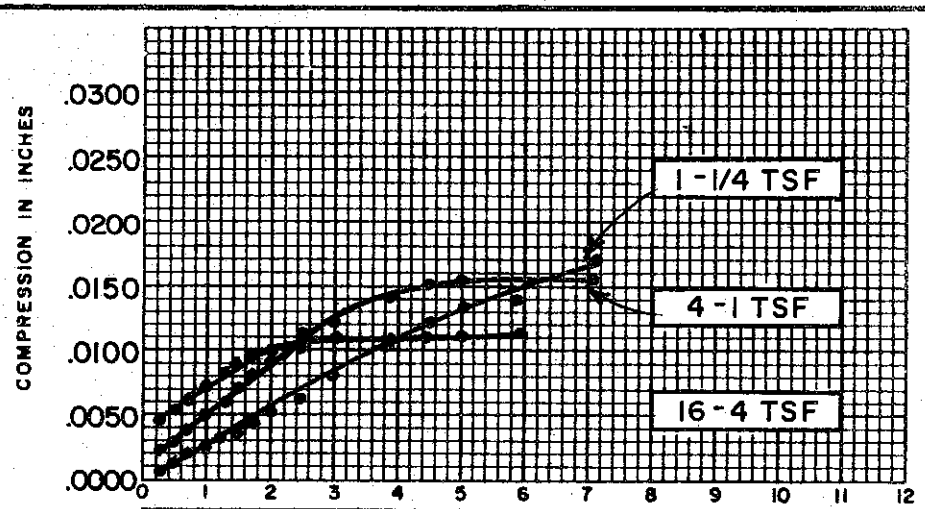
FILE 1255

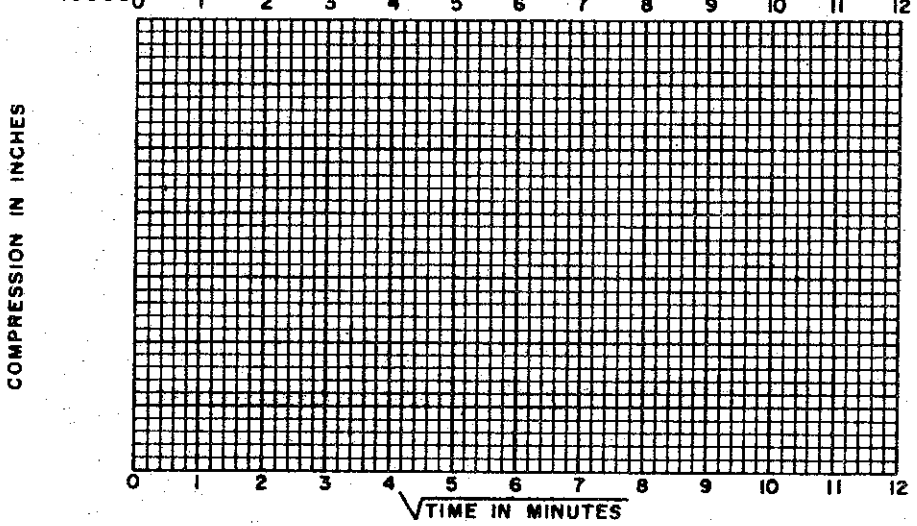
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 26.0 %
FINAL WATER CONTENT 22.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.696

BORING NO. 54
SAMPLE NO. 6
DEPTH 63.5' - 63.8'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

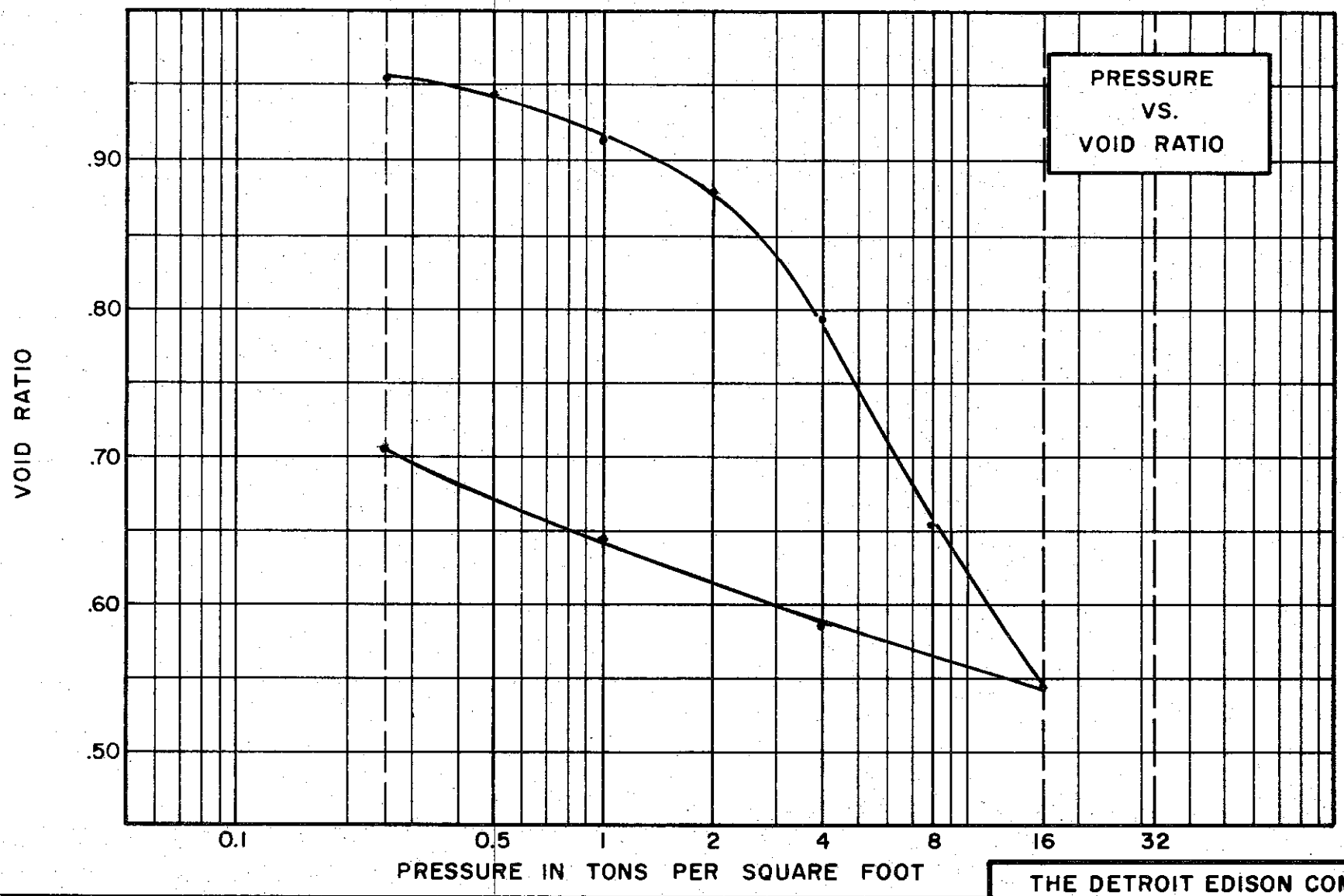
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-523

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-524



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.73

WATER CONTENT, INITIAL 38.3% FINAL 30.6%

ATTERBERG LIMITS:

LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.982

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

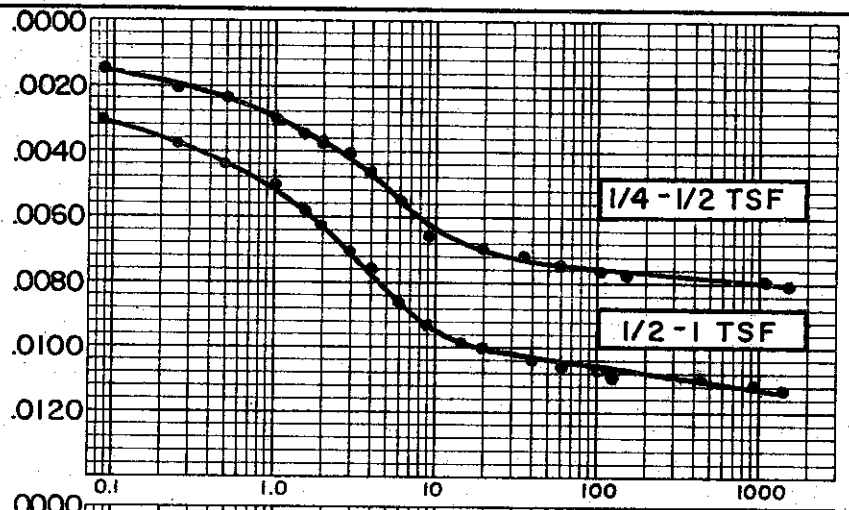
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

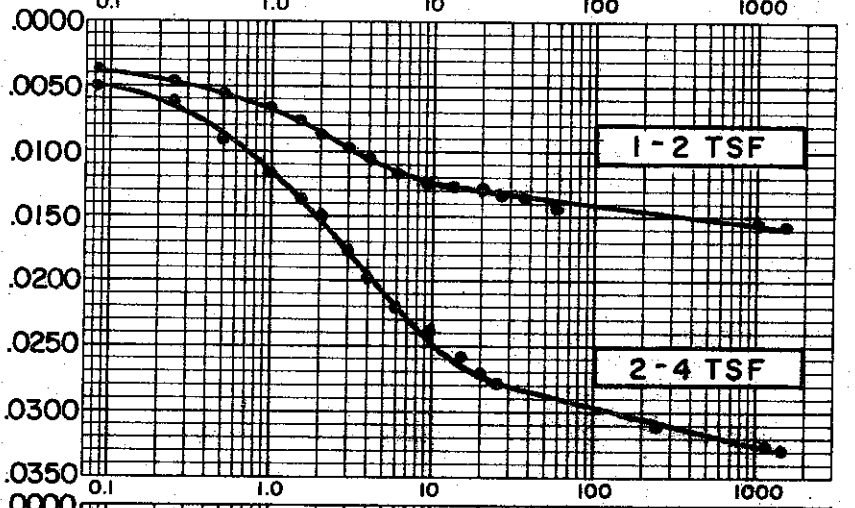
BORING NO. 54 TEST NO. C401.1

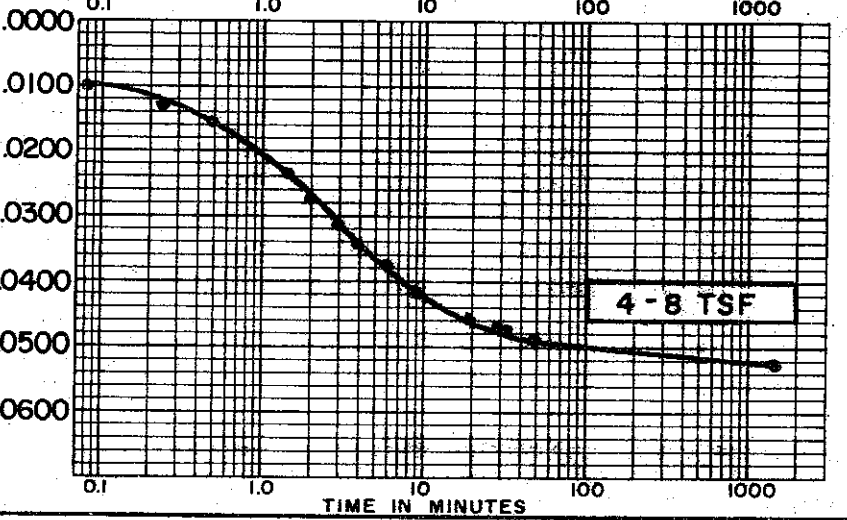
SAMPLE NO. 8 DATE JULY 1974

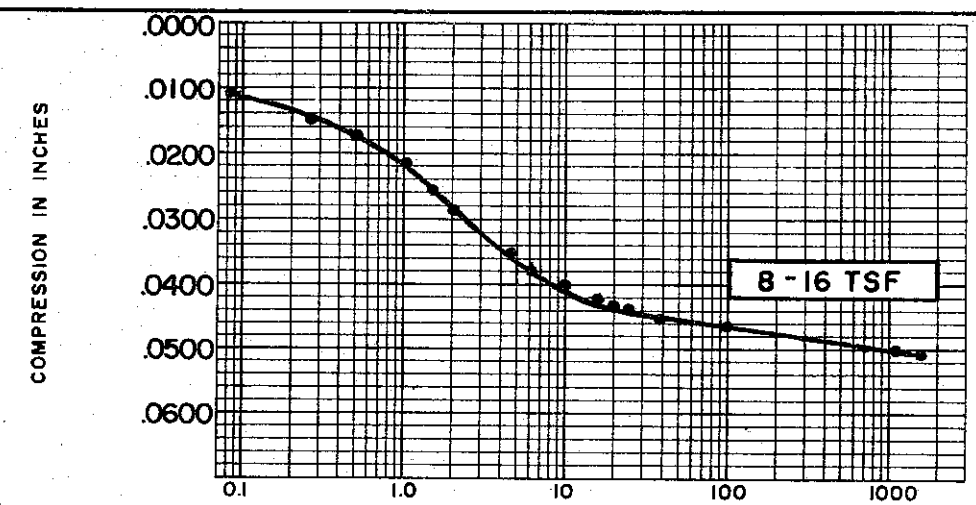
DEPTH 73.7' TO 74.0'

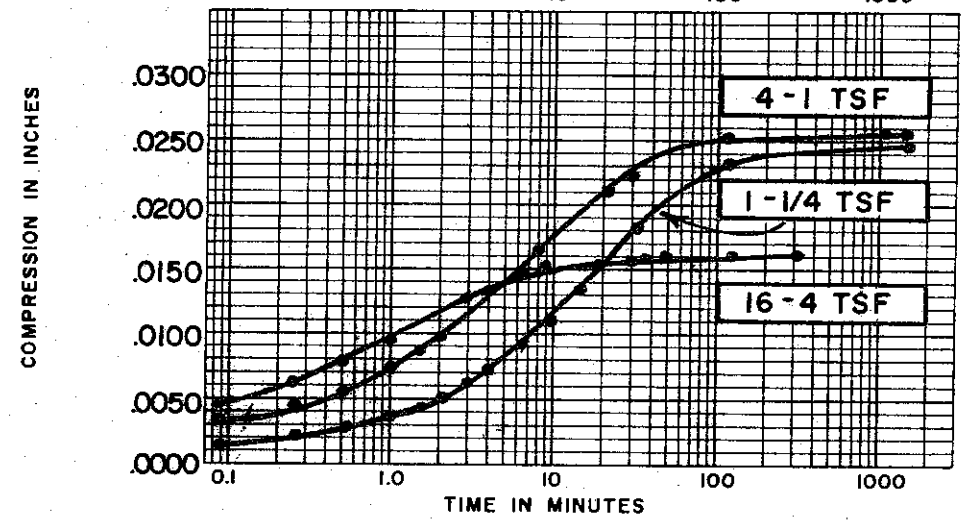
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 38.3 %
FINAL WATER CONTENT 30.6 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.982

BORING NO. 54
SAMPLE NO. 8
DEPTH 73.7' - 74.0'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

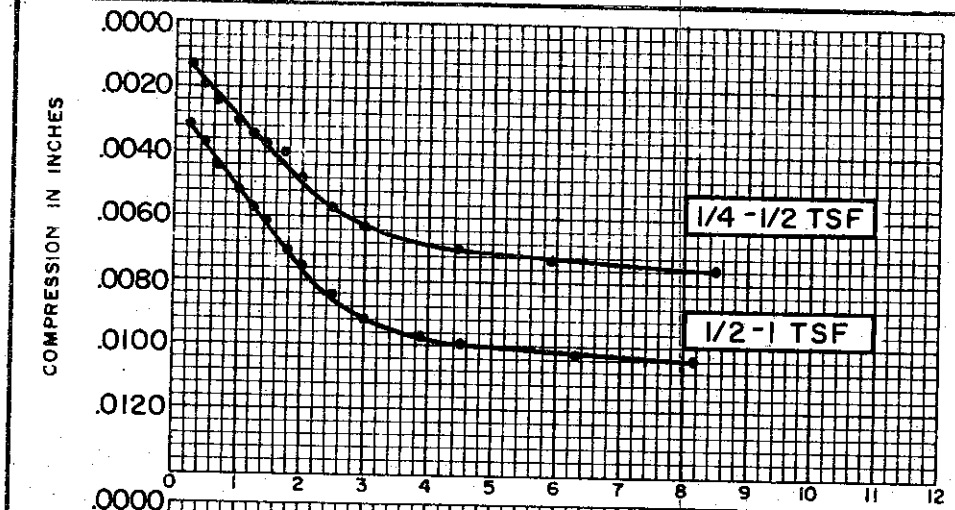
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

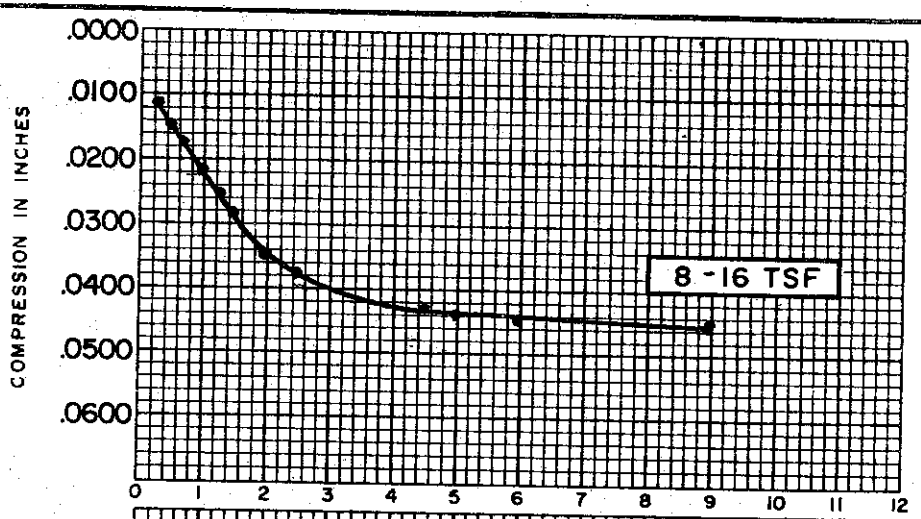
FILE 1255

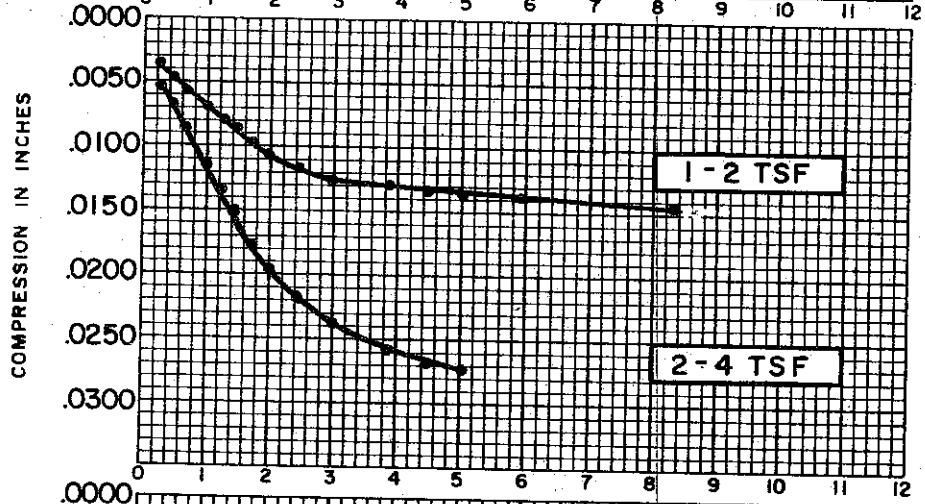
C-525

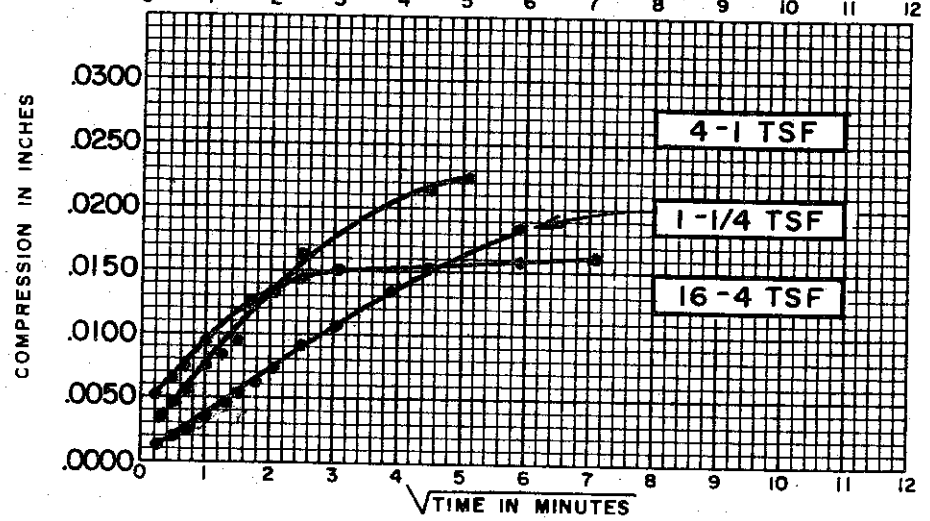
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

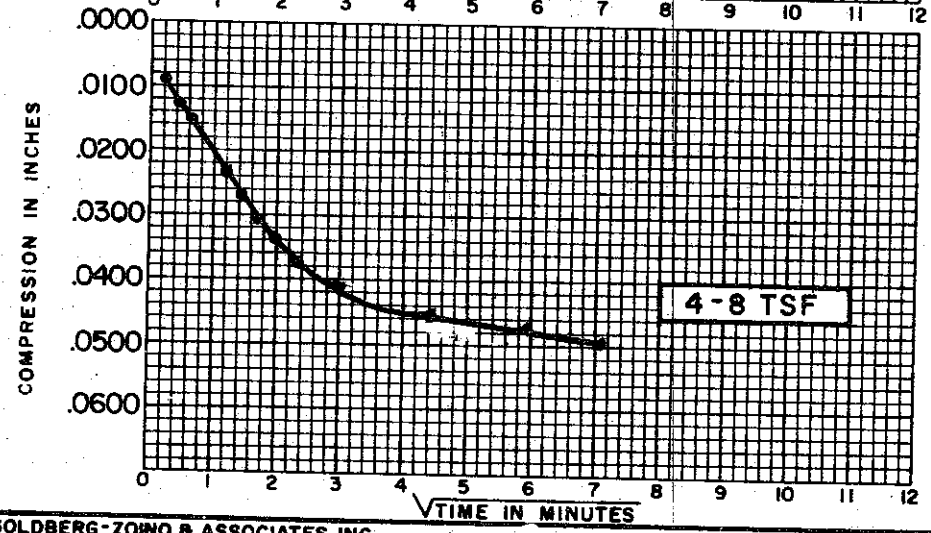
C-529











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 38.3 %
FINAL WATER CONTENT 30.6 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.982

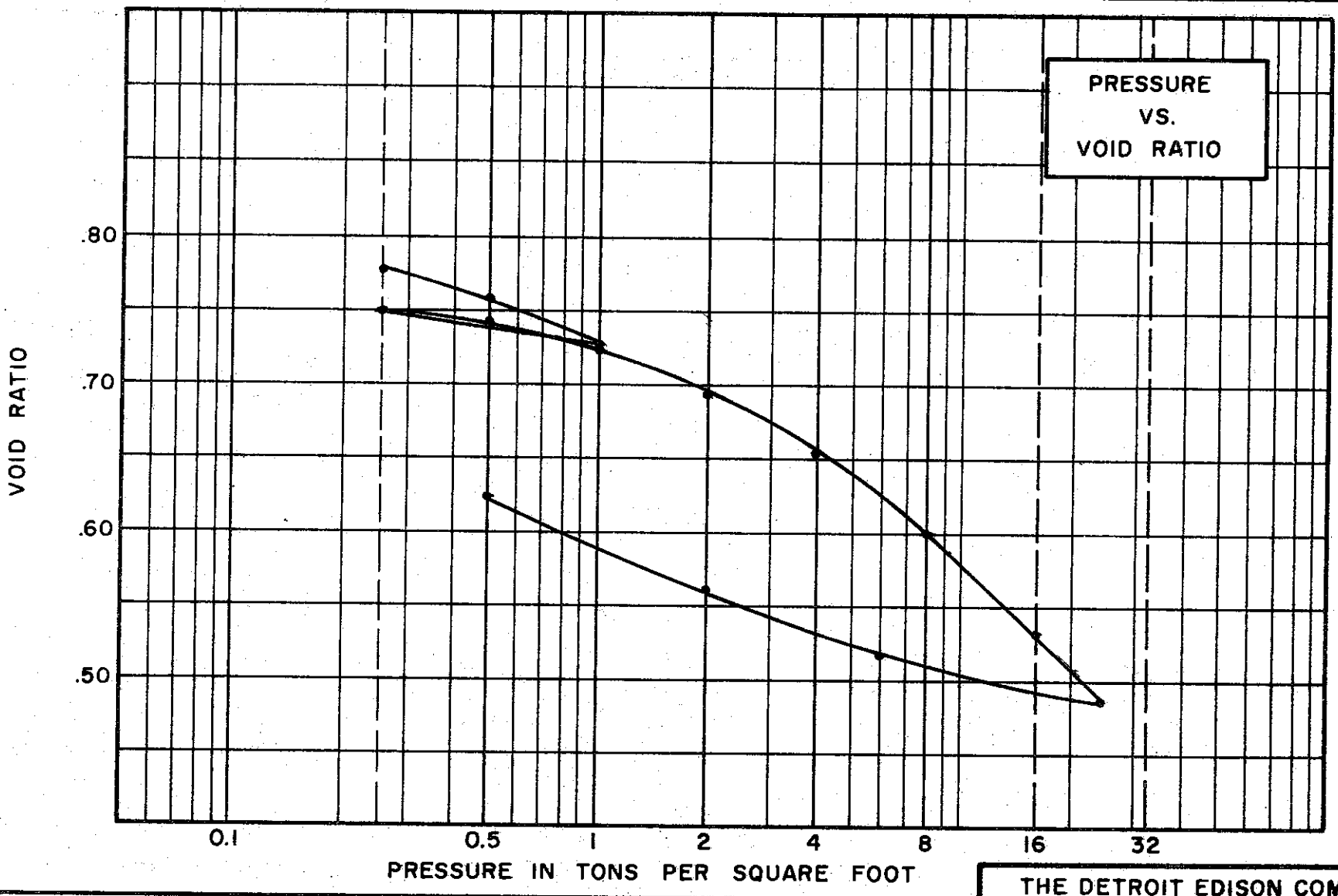
BORING NO. 54
SAMPLE NO. 8
DEPTH 73.7' - 74.0'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.71

WATER CONTENT, INITIAL 30.0% FINAL 28.8%

ATTERBERG LIMITS:

LIQUID LIMIT 53 % PLASTIC LIMIT 26 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.787

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 60 TEST NO. C42.1

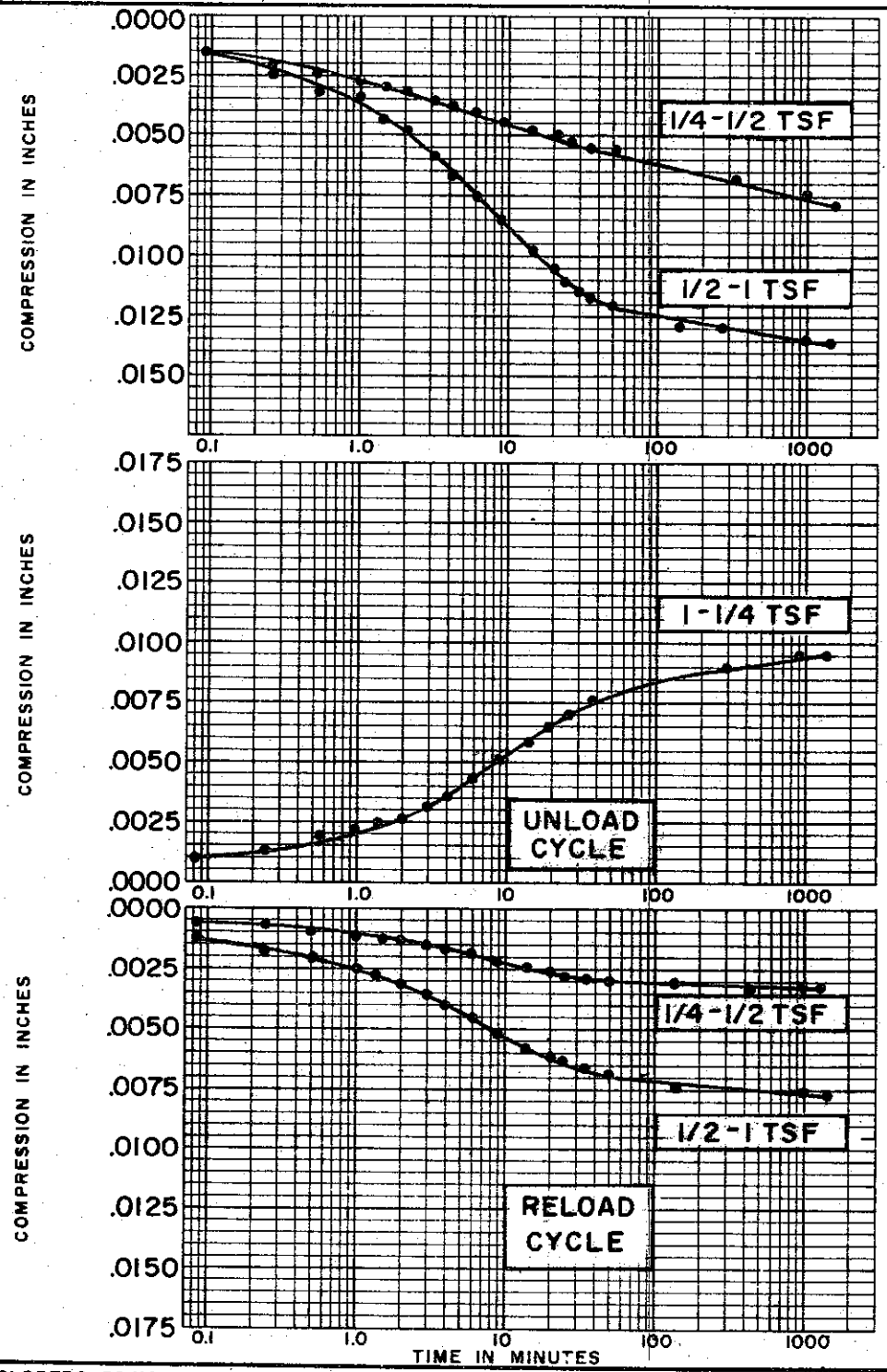
SAMPLE NO. 2 DATE FEB. 1974

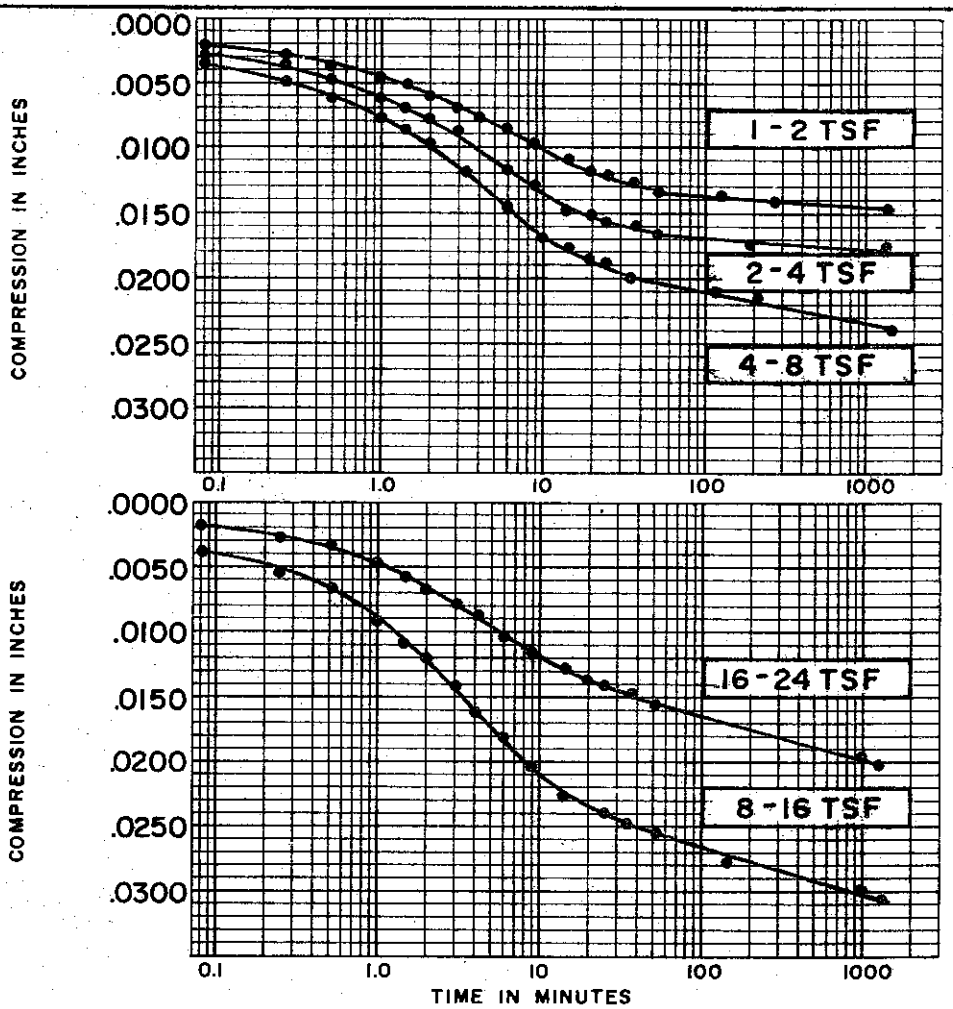
DEPTH 9.8' TO 10.0'

C-527

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-528





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 20.0%
FINAL WATER CONTENT 28.8%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.787

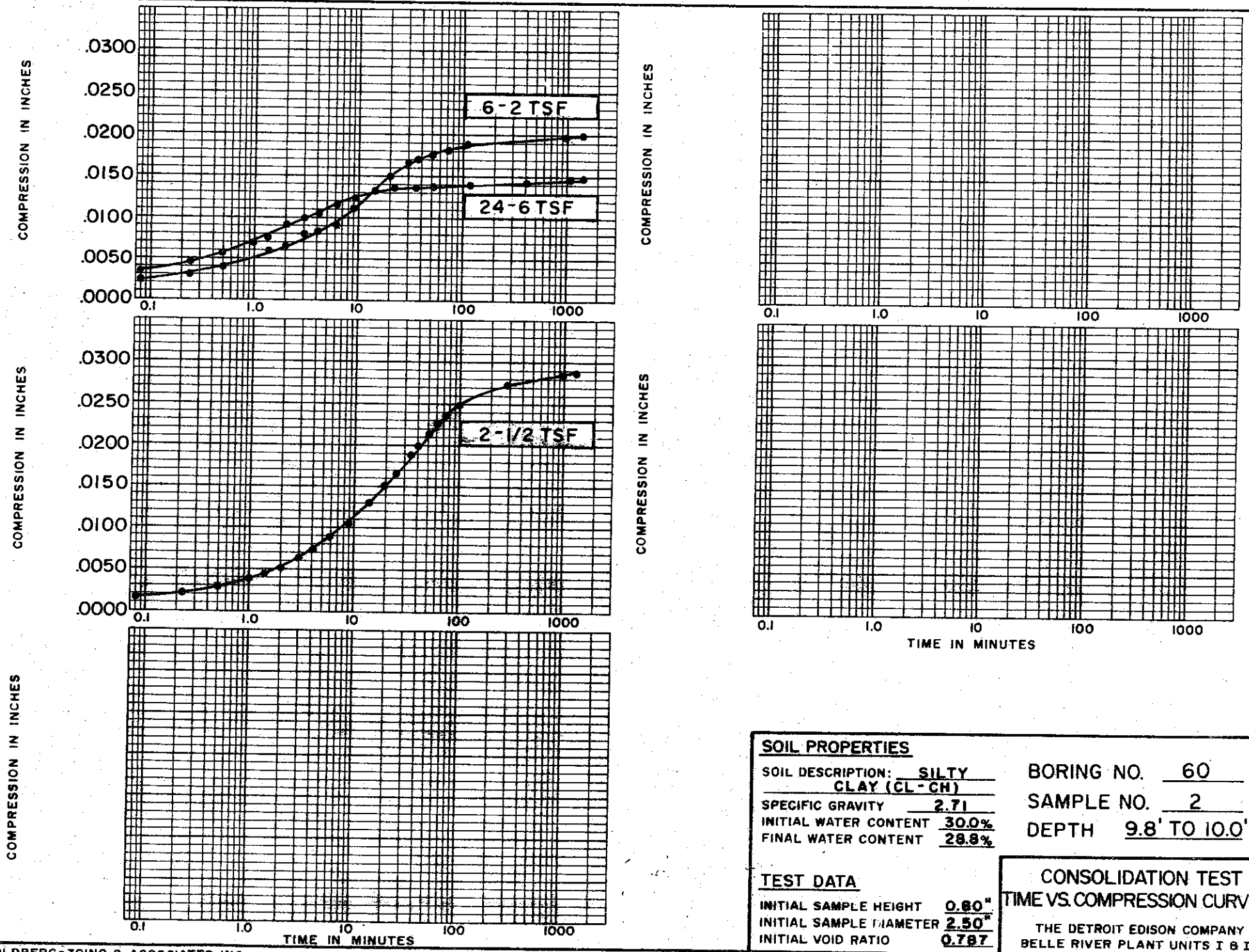
BORING NO. 60
SAMPLE NO. 2
DEPTH 9.8' TO 10.0'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 30.0%
FINAL WATER CONTENT 28.8%

BORING NO. 60
SAMPLE NO. 2
DEPTH 9.8' TO 10.0'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.787

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

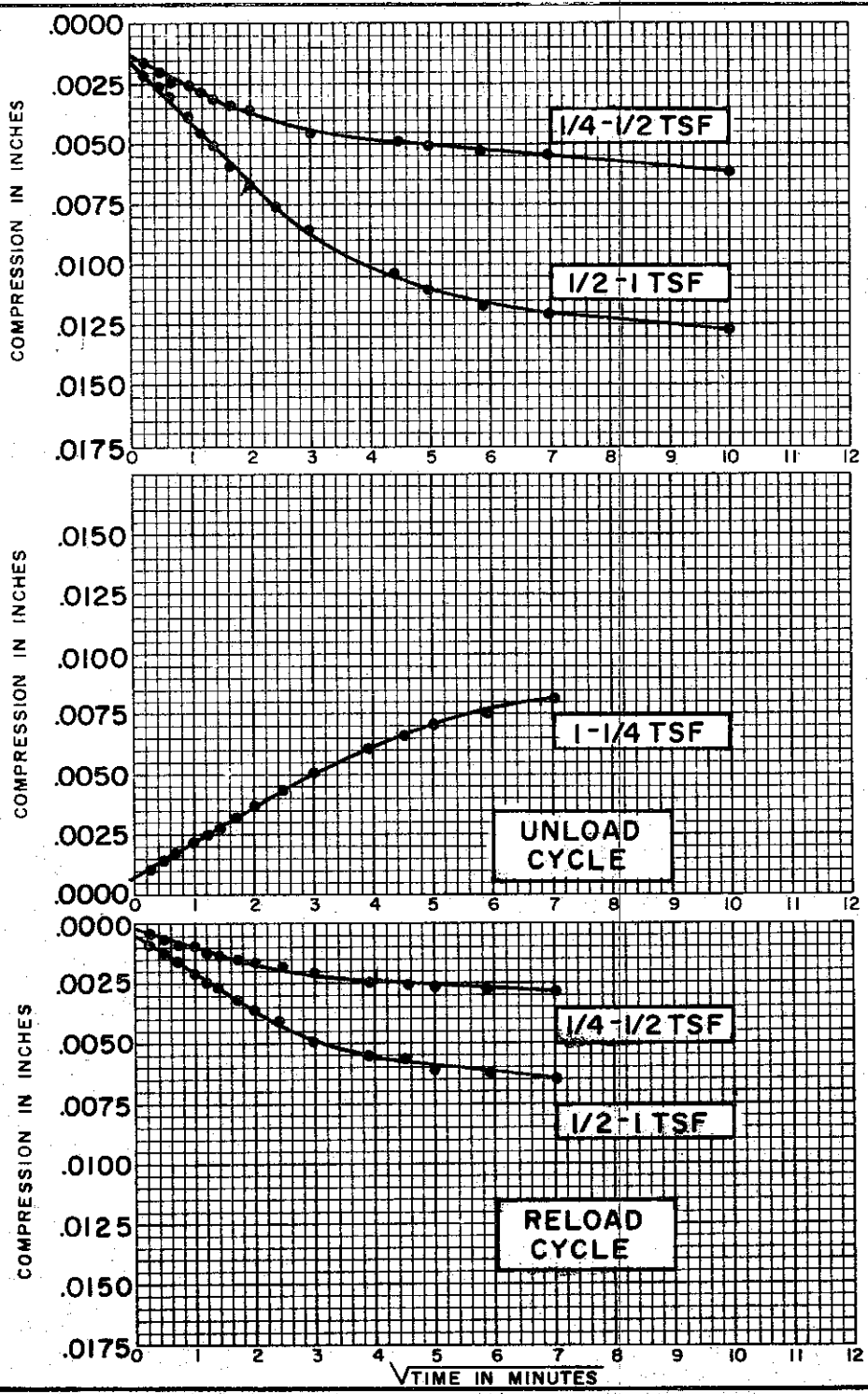
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

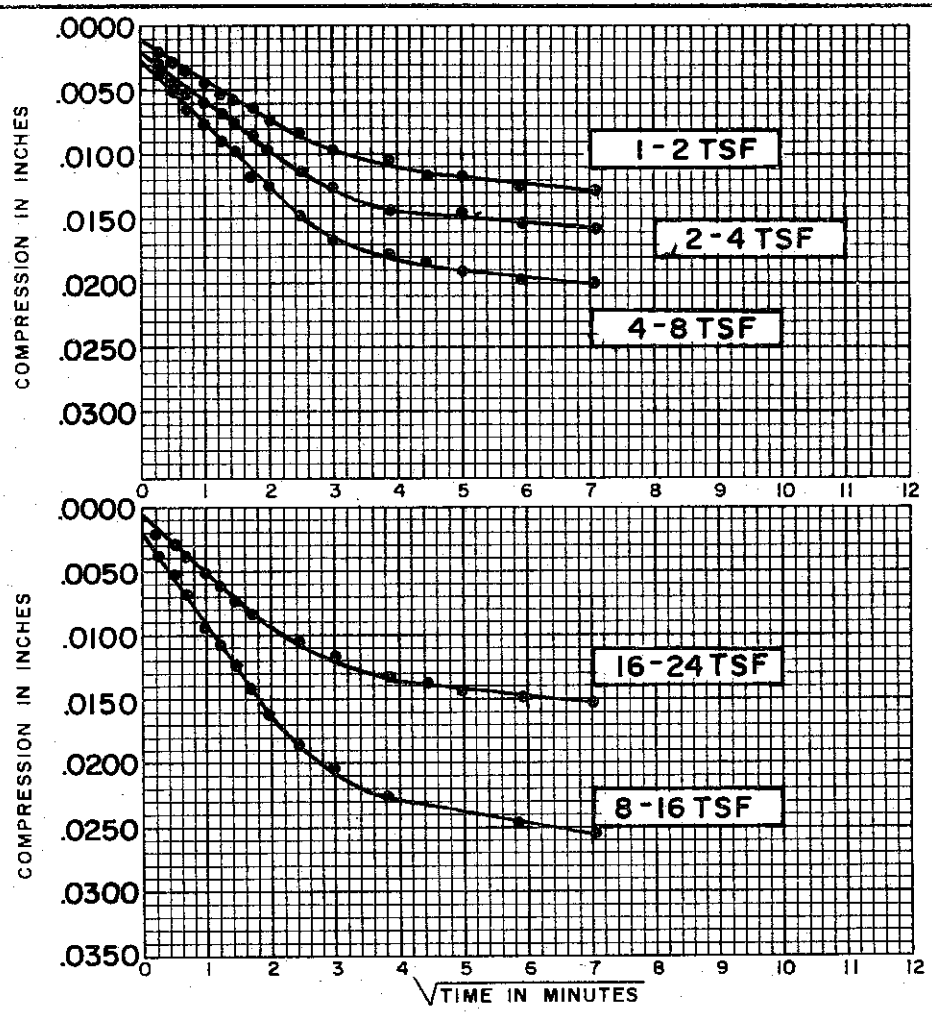
FILE 1255

C-529

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-530





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 30.0%
FINAL WATER CONTENT 28.8%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.787

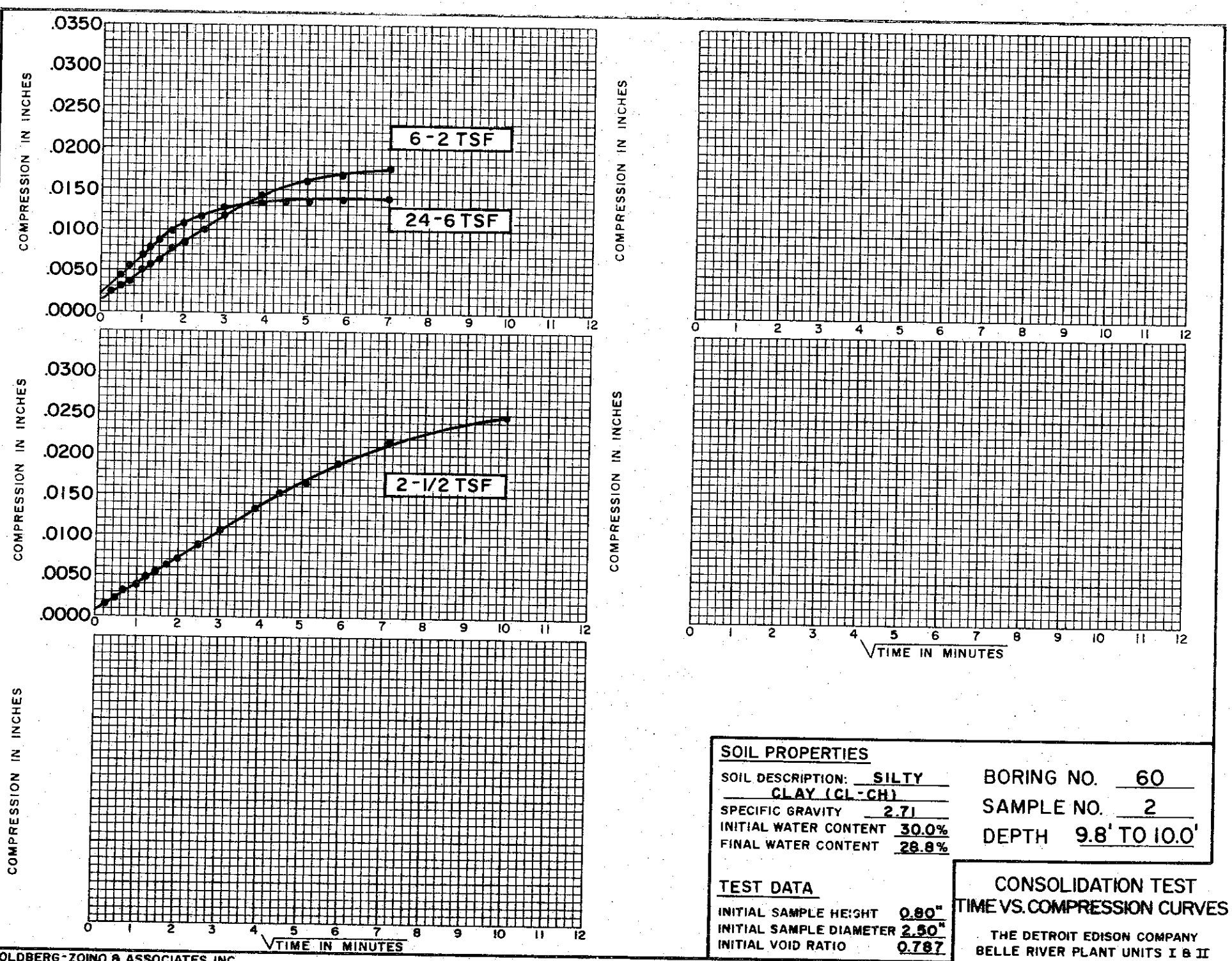
BORING NO. 60
SAMPLE NO. 2
DEPTH 9.8' TO 10.0'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 30.0%
FINAL WATER CONTENT 28.8%

BORING NO. 60
SAMPLE NO. 2
DEPTH 9.8' TO 10.0'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.787

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

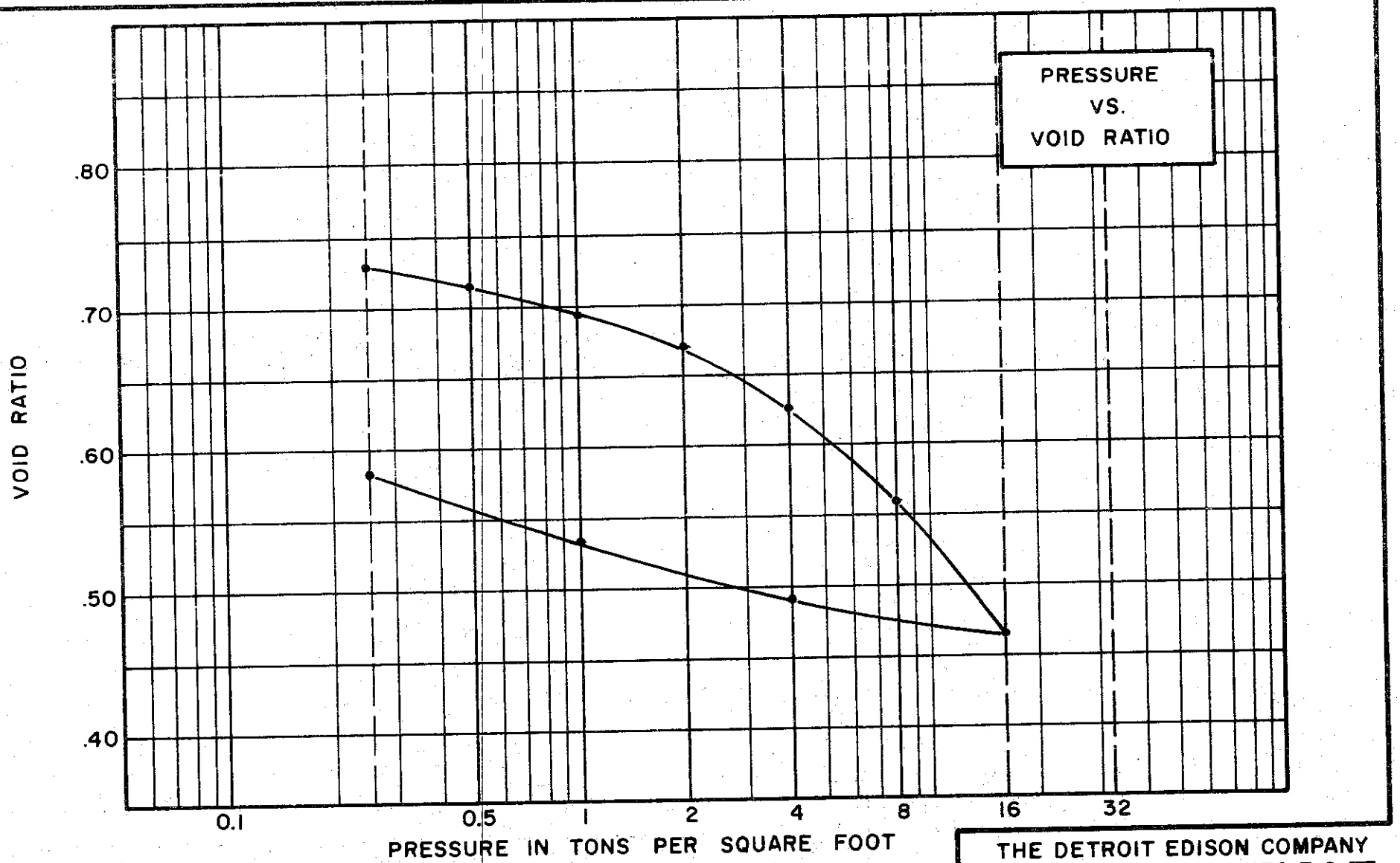
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-531

C-532



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.73

WATER CONTENT, INITIAL 27.9% FINAL 25.5%

ATTERBERG LIMITS:
LIQUID LIMIT 40% PLASTIC LIMIT 19%

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.744

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

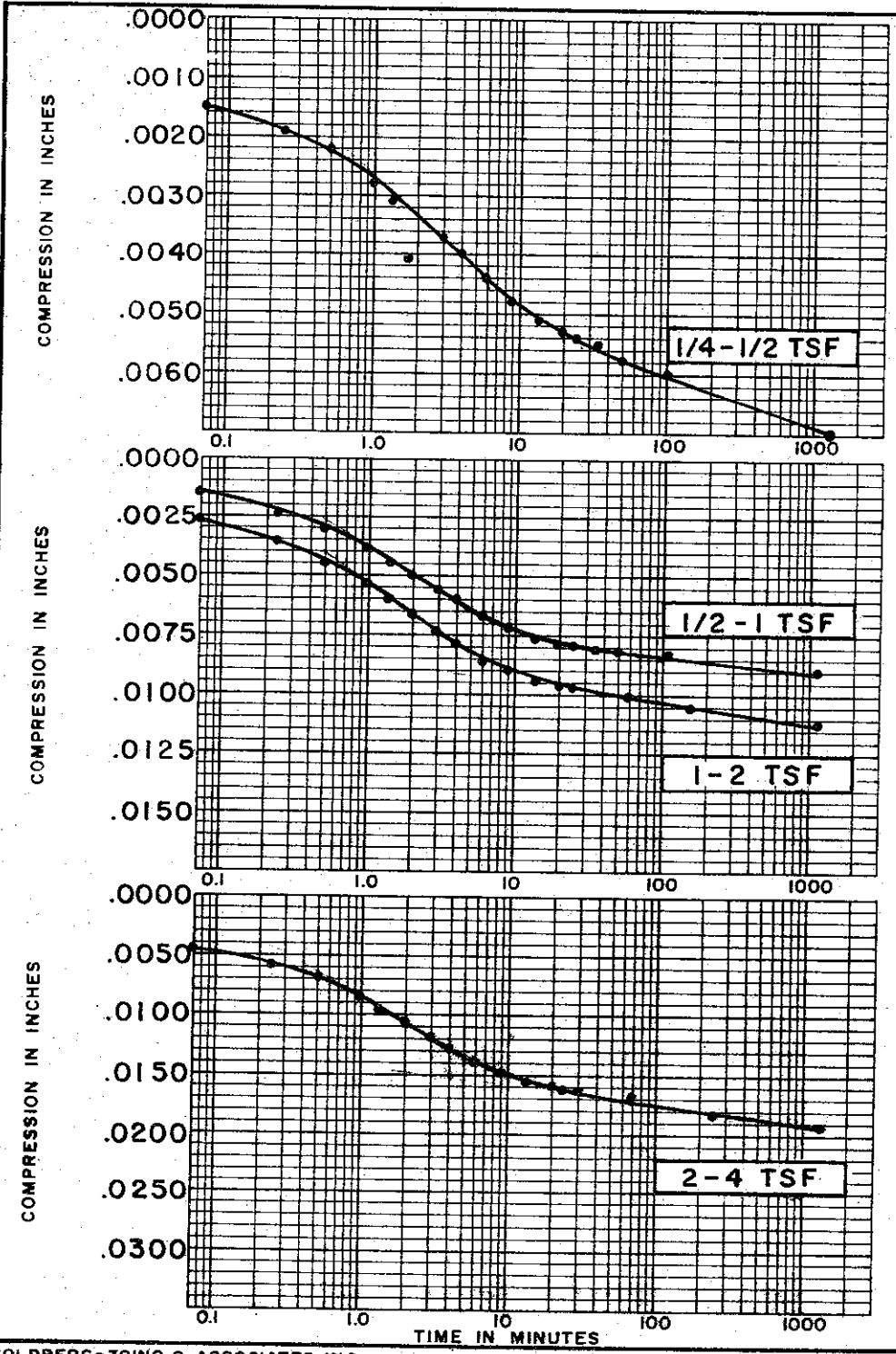
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

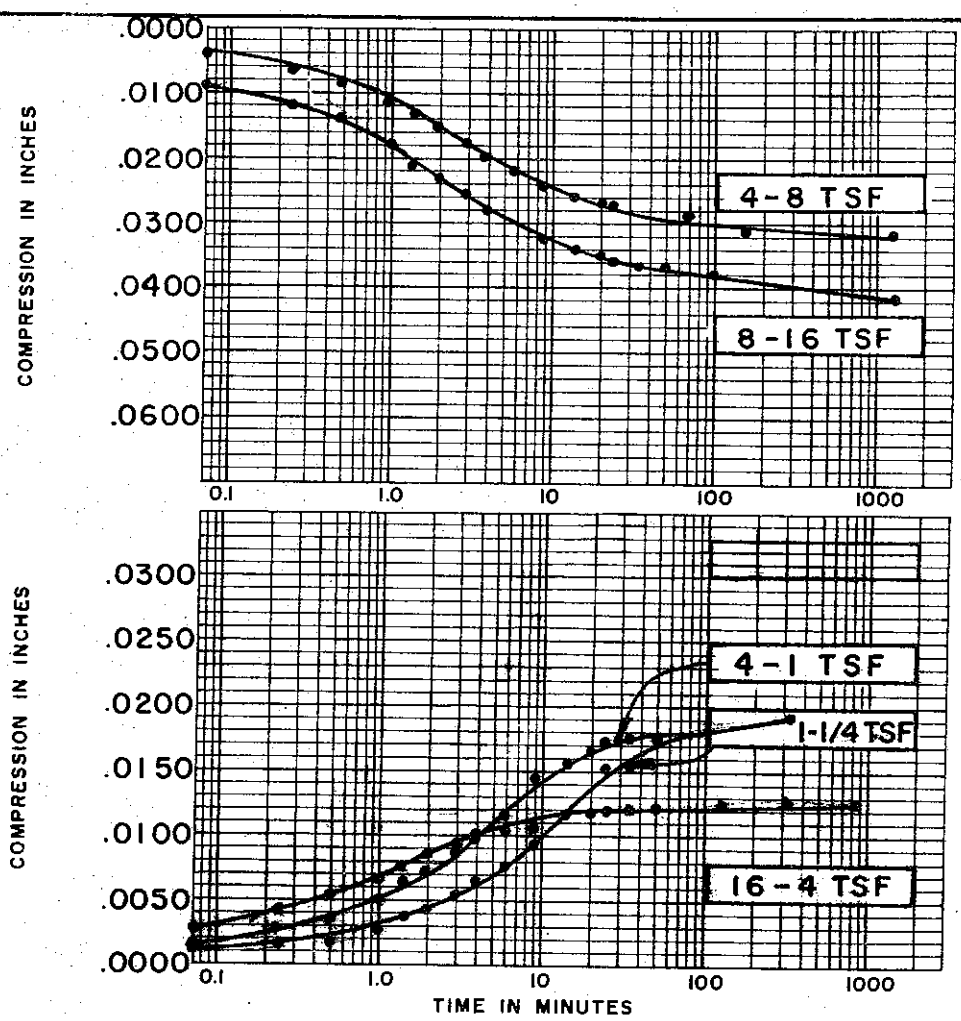
BORING NO. 60 TEST NO. C56.1

SAMPLE NO. 16 DATE JAN. 1974

DEPTH 85.5'

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 27.9 %
FINAL WATER CONTENT 25.5 %

BORING NO. 60
SAMPLE NO. 16
DEPTH 85.5'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.744

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

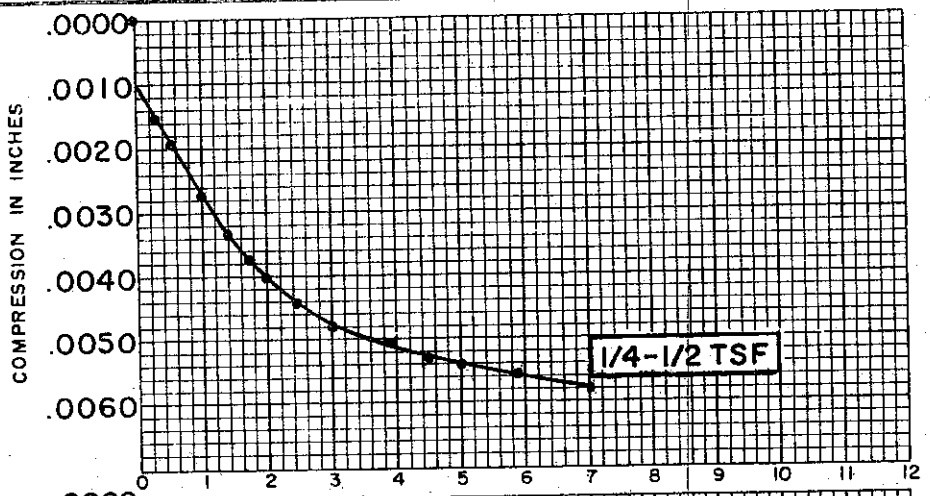
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

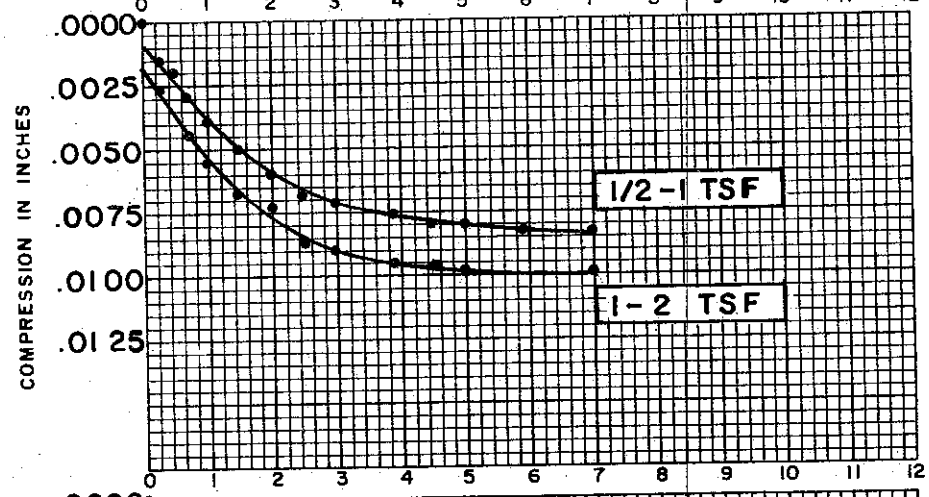
FILE 1255

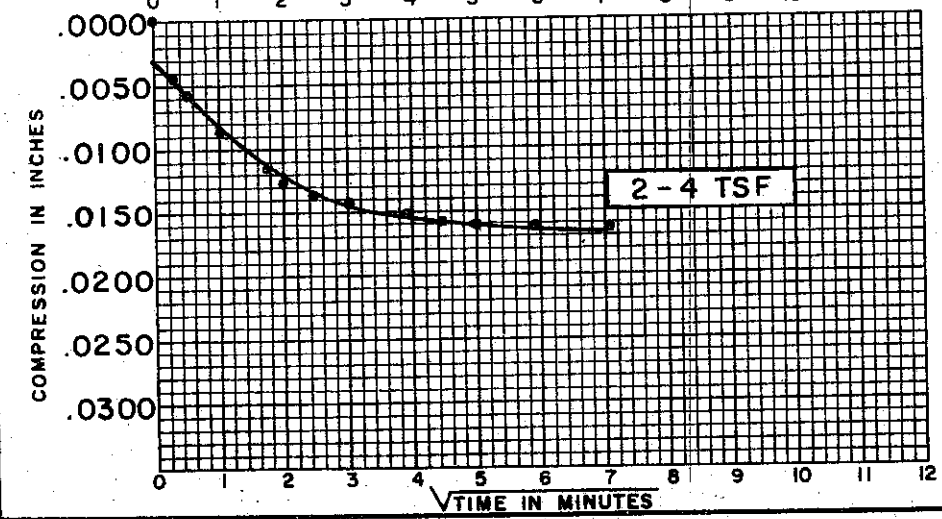
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

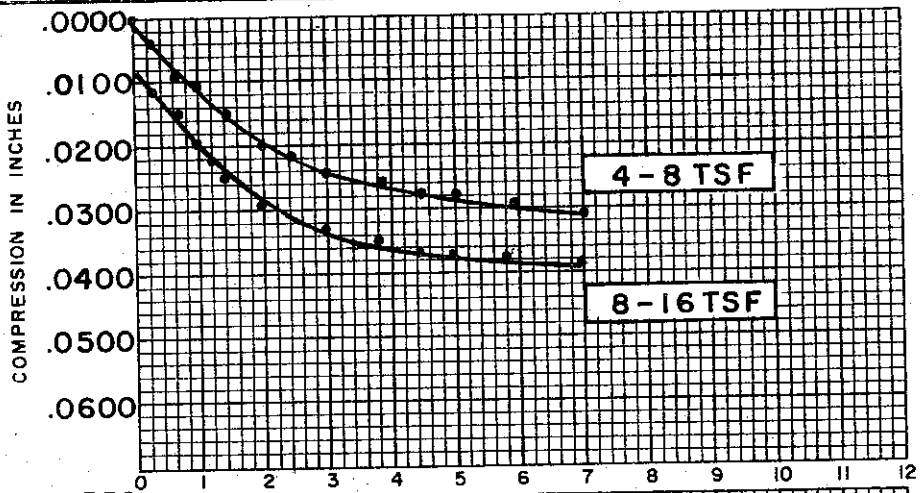
C-533

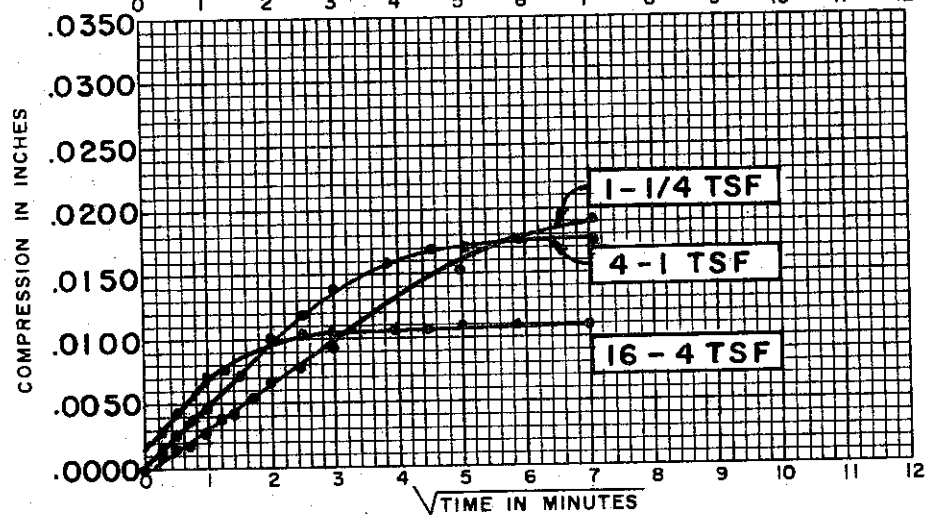
C-534











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 27.9 %
FINAL WATER CONTENT 25.5 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.60"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.744

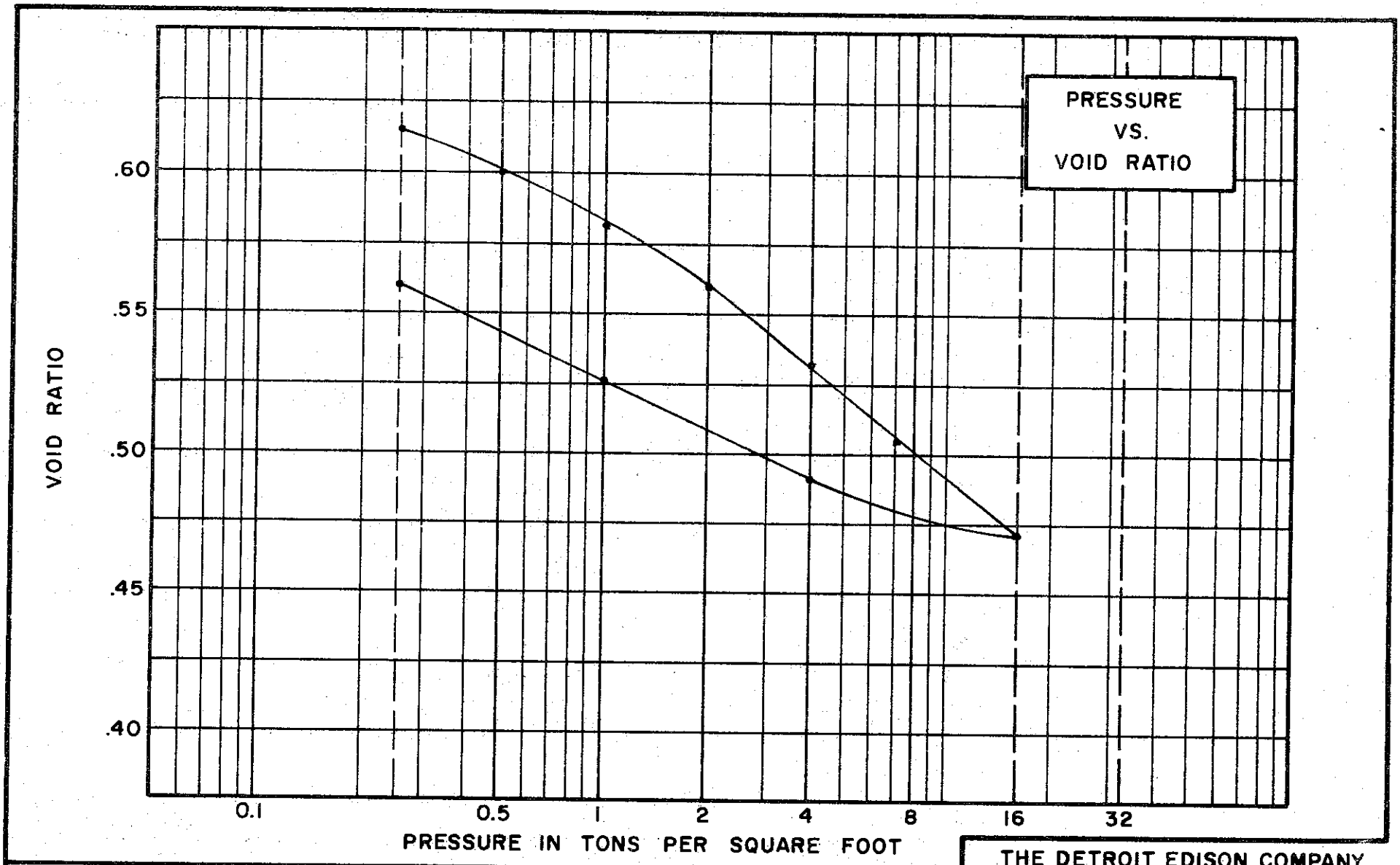
BORING NO. 60
SAMPLE NO. 16
DEPTH 85.5'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CH)

SPECIFIC GRAVITY 2.72

WATER CONTENT, INITIAL 23.6% FINAL 23.4%

ATTERBERG LIMITS:
LIQUID LIMIT 53 % PLASTIC LIMIT 24 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.642

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 105 TEST NO. C373.1

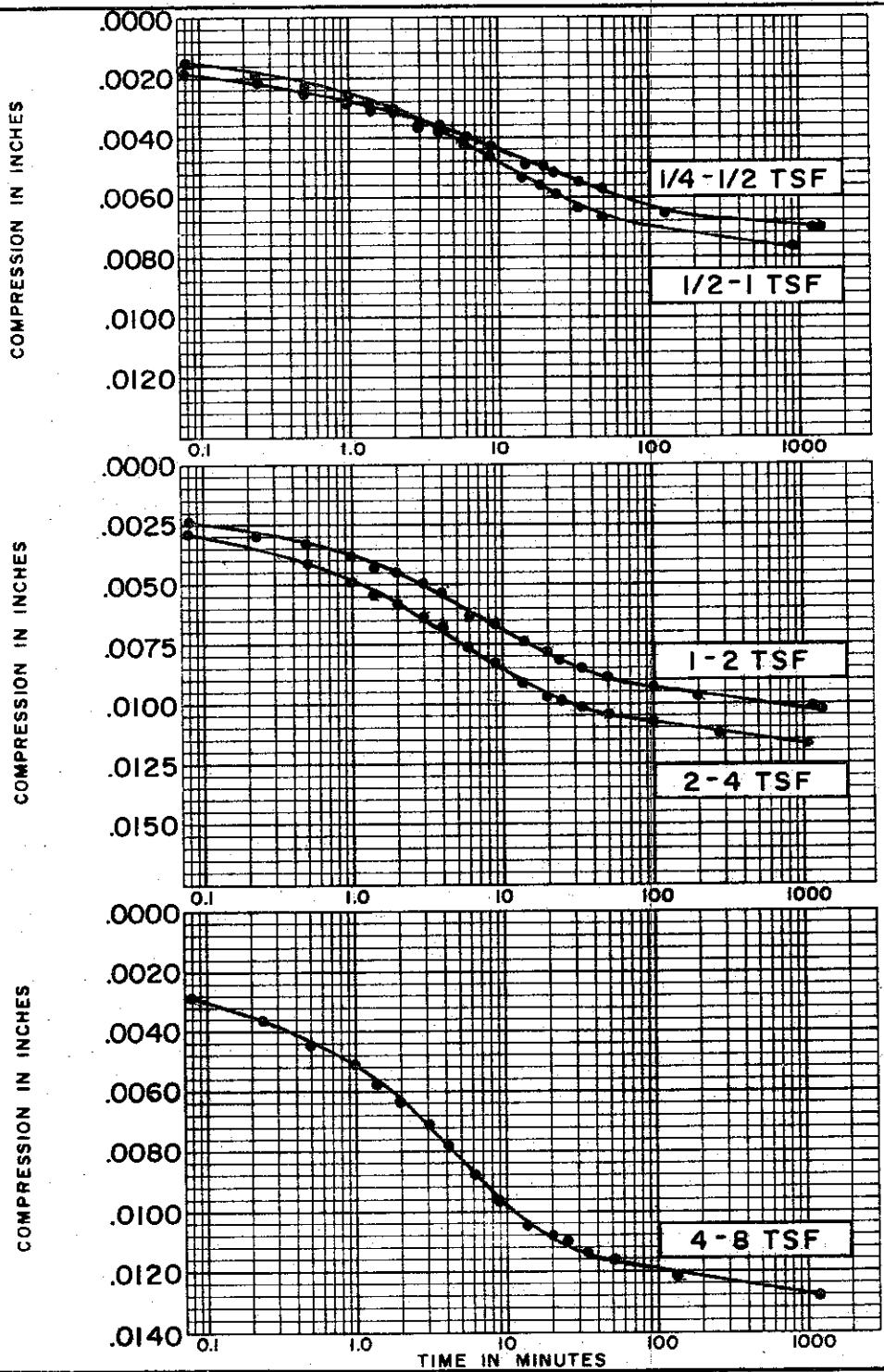
SAMPLE NO. 1 DATE APRIL 74

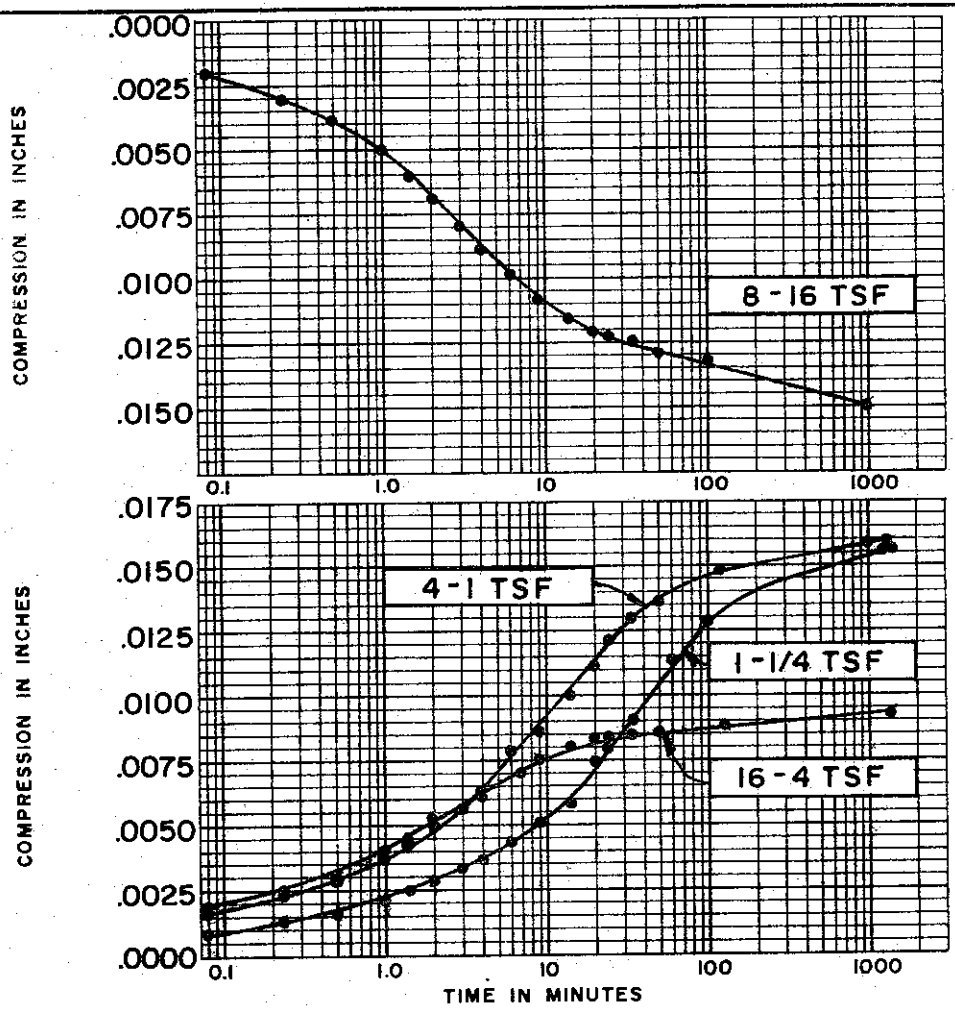
DEPTH 5.1' TO 5.4'

C-535

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-536





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 23.6%
FINAL WATER CONTENT 23.4%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.642

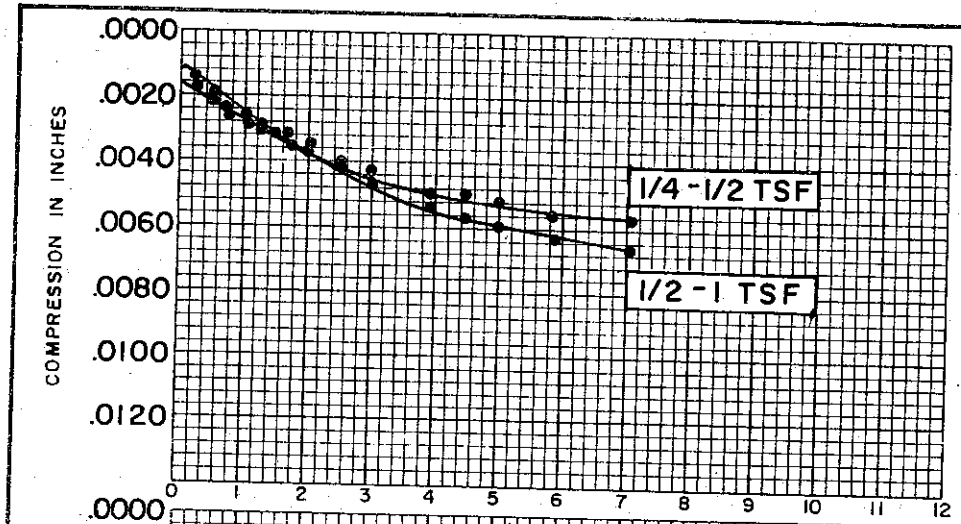
BORING NO. 105
SAMPLE NO. 1
DEPTH 5.1' TO 5.4'

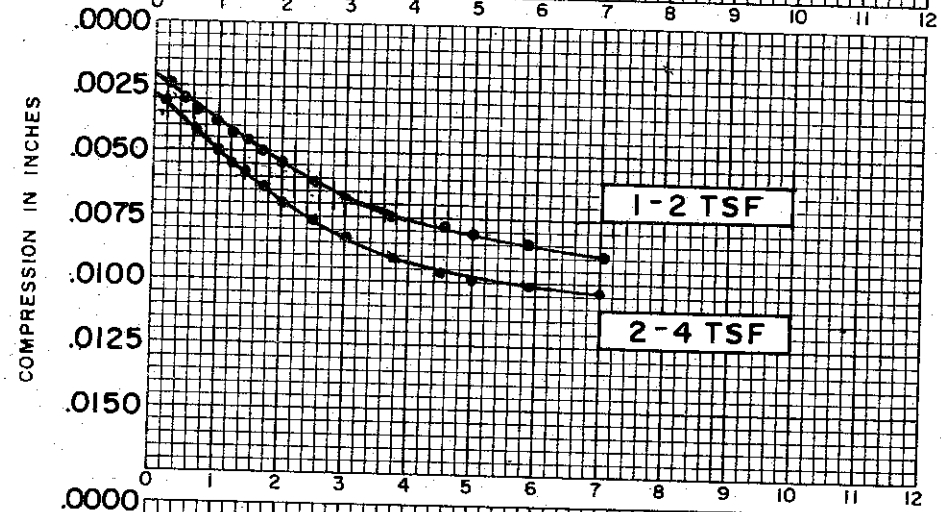
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

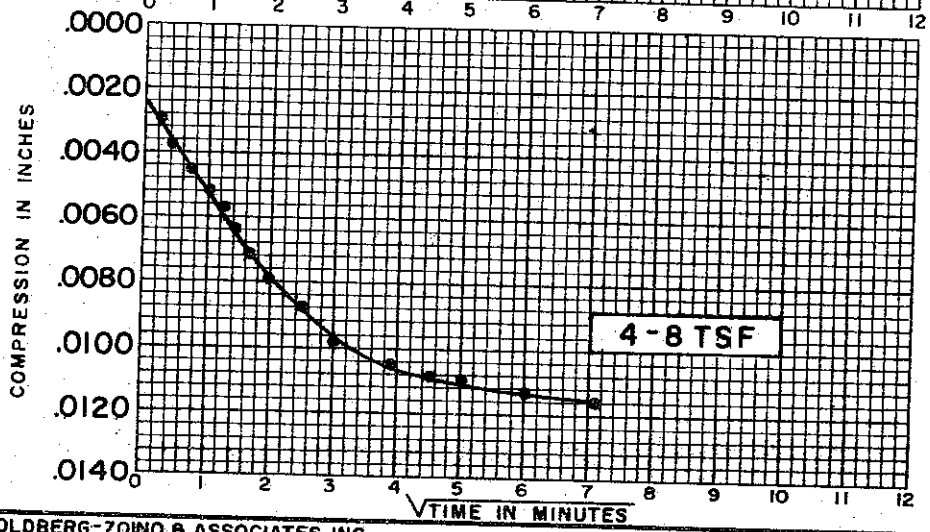
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

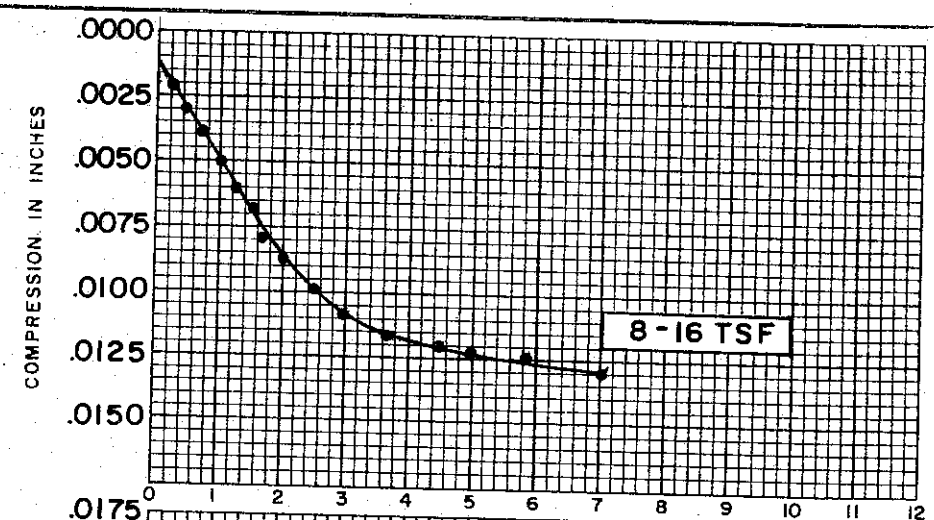
FILE 1255

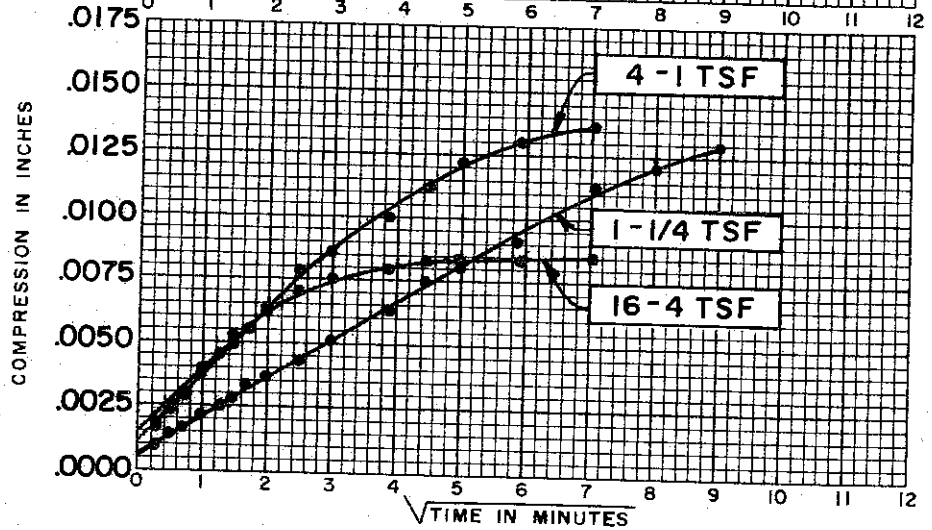
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 23.6%
FINAL WATER CONTENT 23.4%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.642

BORING NO. 105
SAMPLE NO. 1
DEPTH 5.1' TO 5.4'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

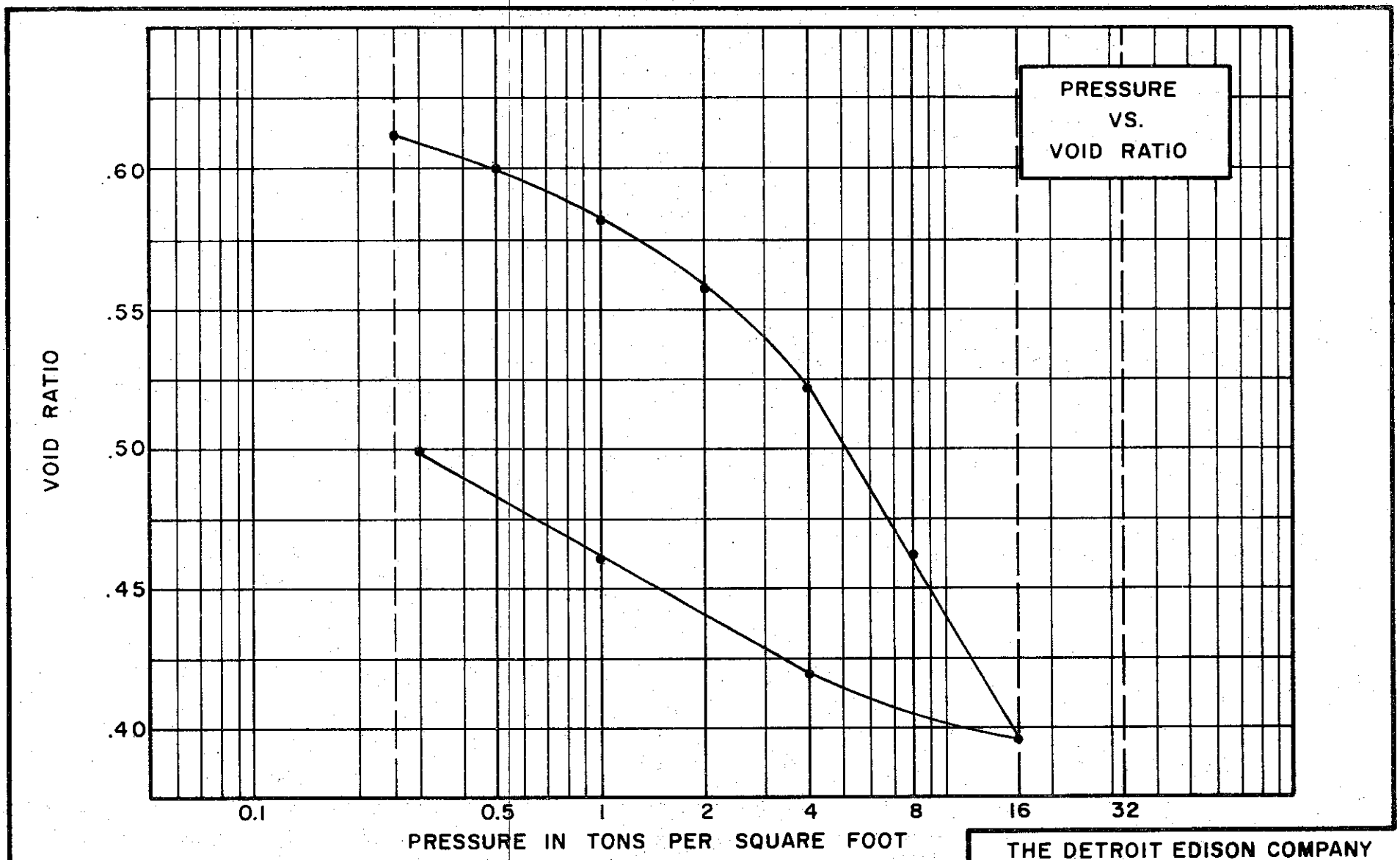
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-537

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-538



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, (CL)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 23.7%

ATTERBERG LIMITS:
LIQUID LIMIT 37 % PLASTIC LIMIT 19 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.625

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

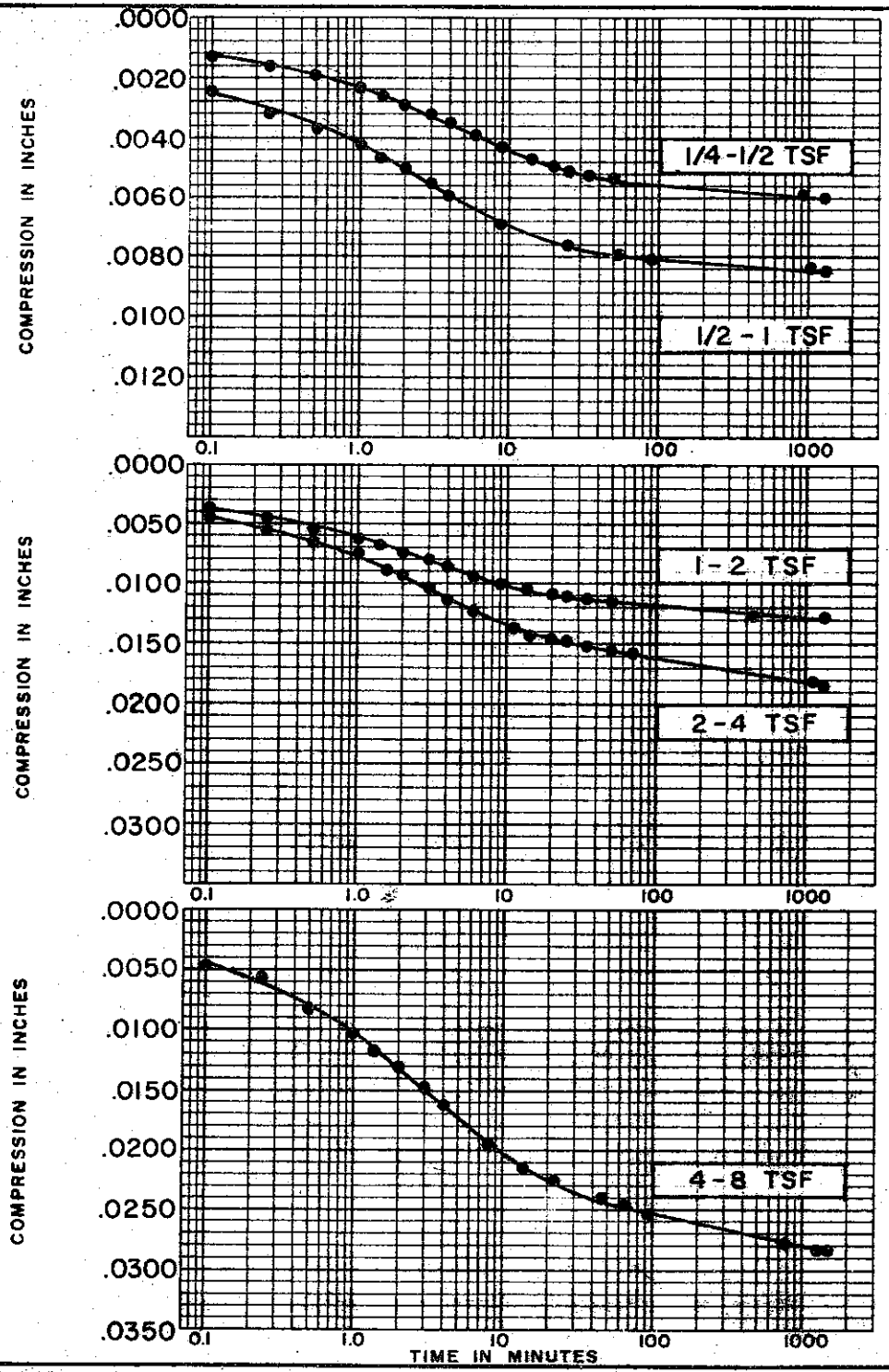
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

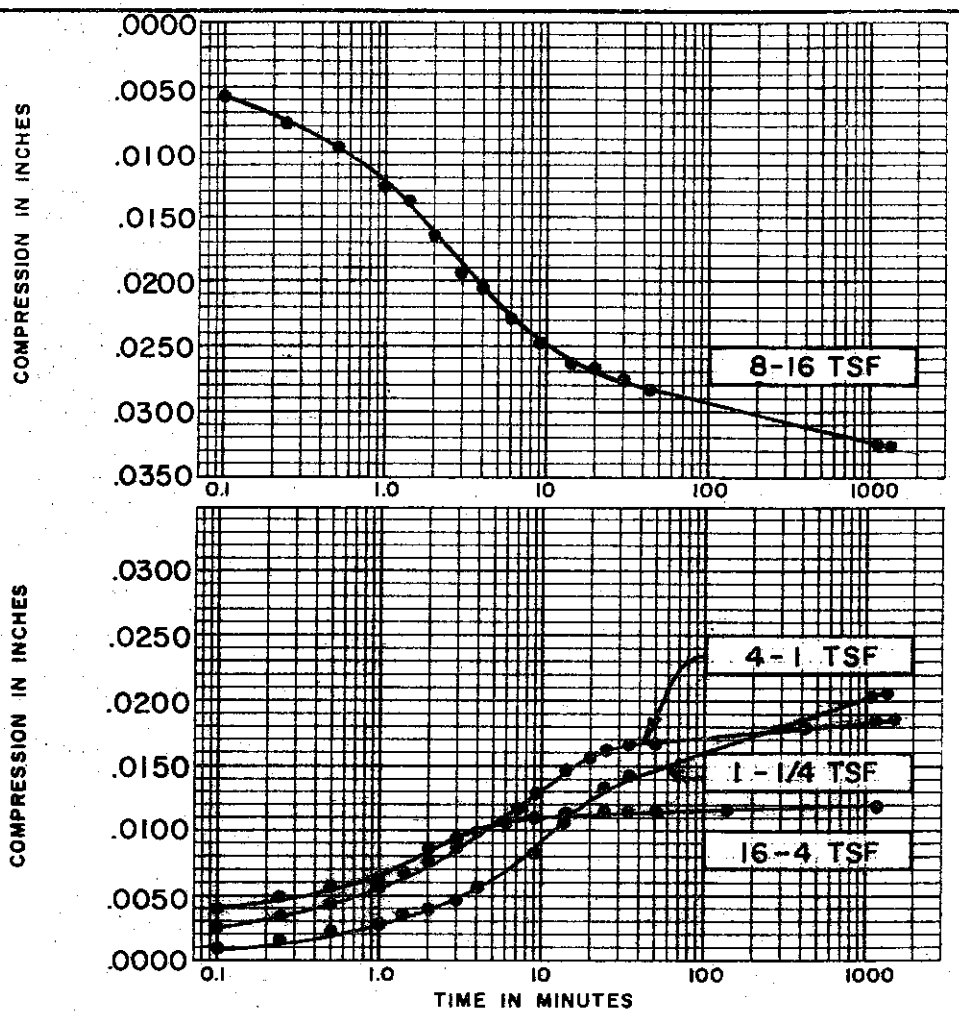
BORING NO. 105 TEST NO. C380.1

SAMPLE NO. 8 DATE JULY 1974

DEPTH 70.9' TO 71.2'

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 23.7 %
FINAL WATER CONTENT 22.5 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.625

BORING NO. 105
SAMPLE NO. 8
DEPTH 70.9' TO 71.2'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

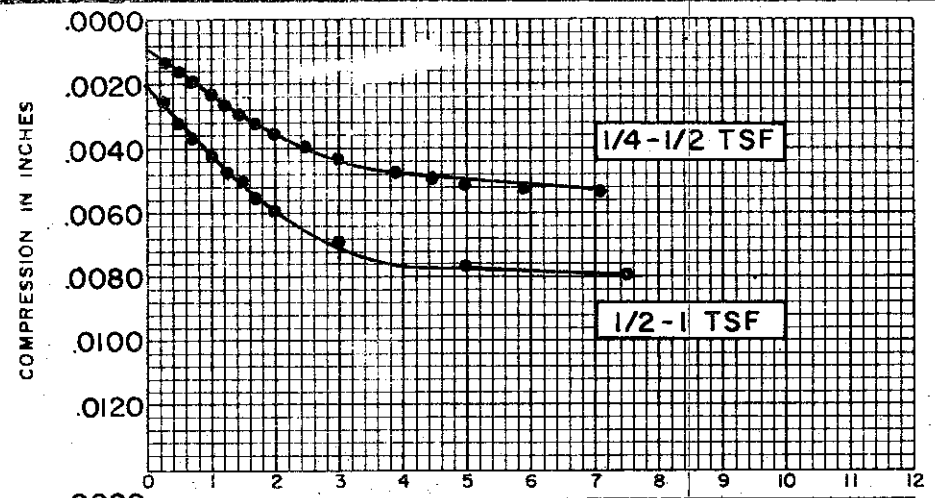
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

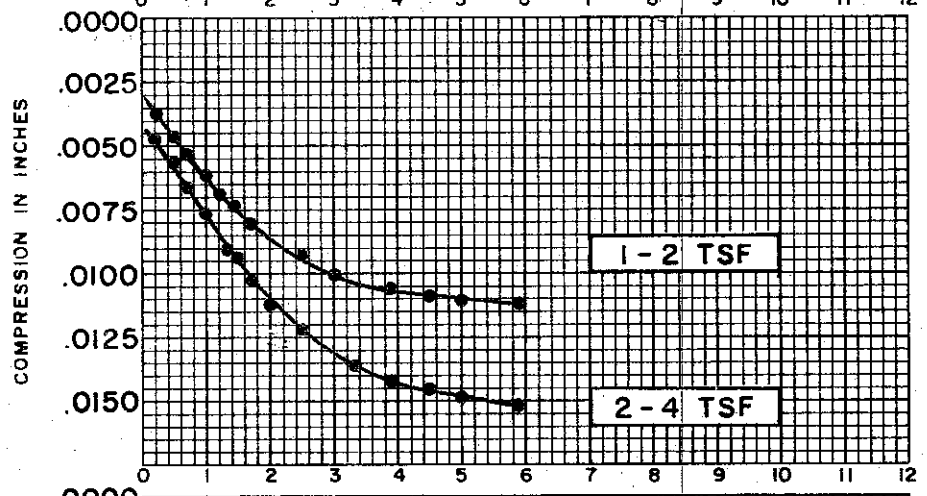
FILE 1255

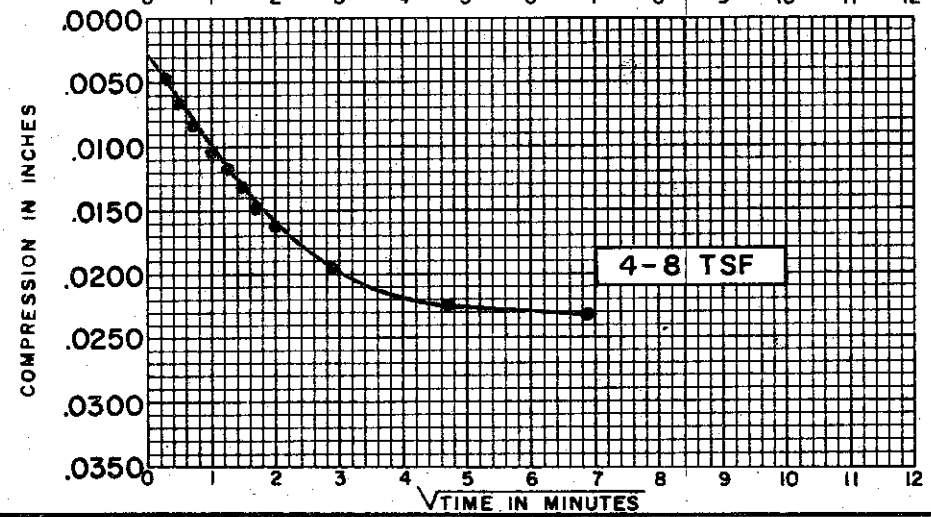
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

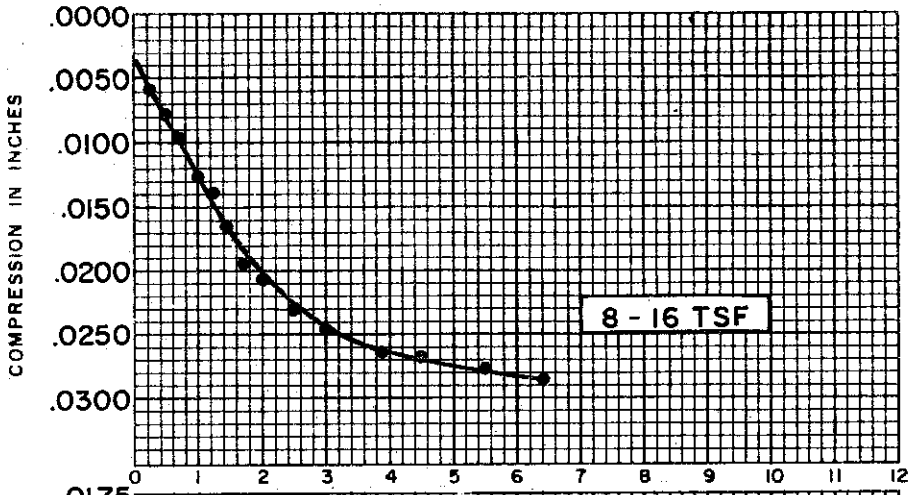
C-539

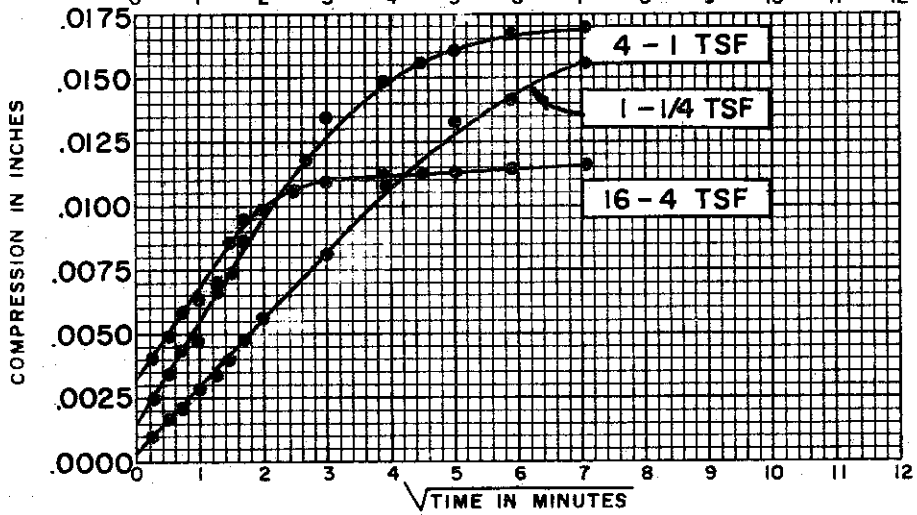
C-540











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 23.7 %
FINAL WATER CONTENT 22.5 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.625

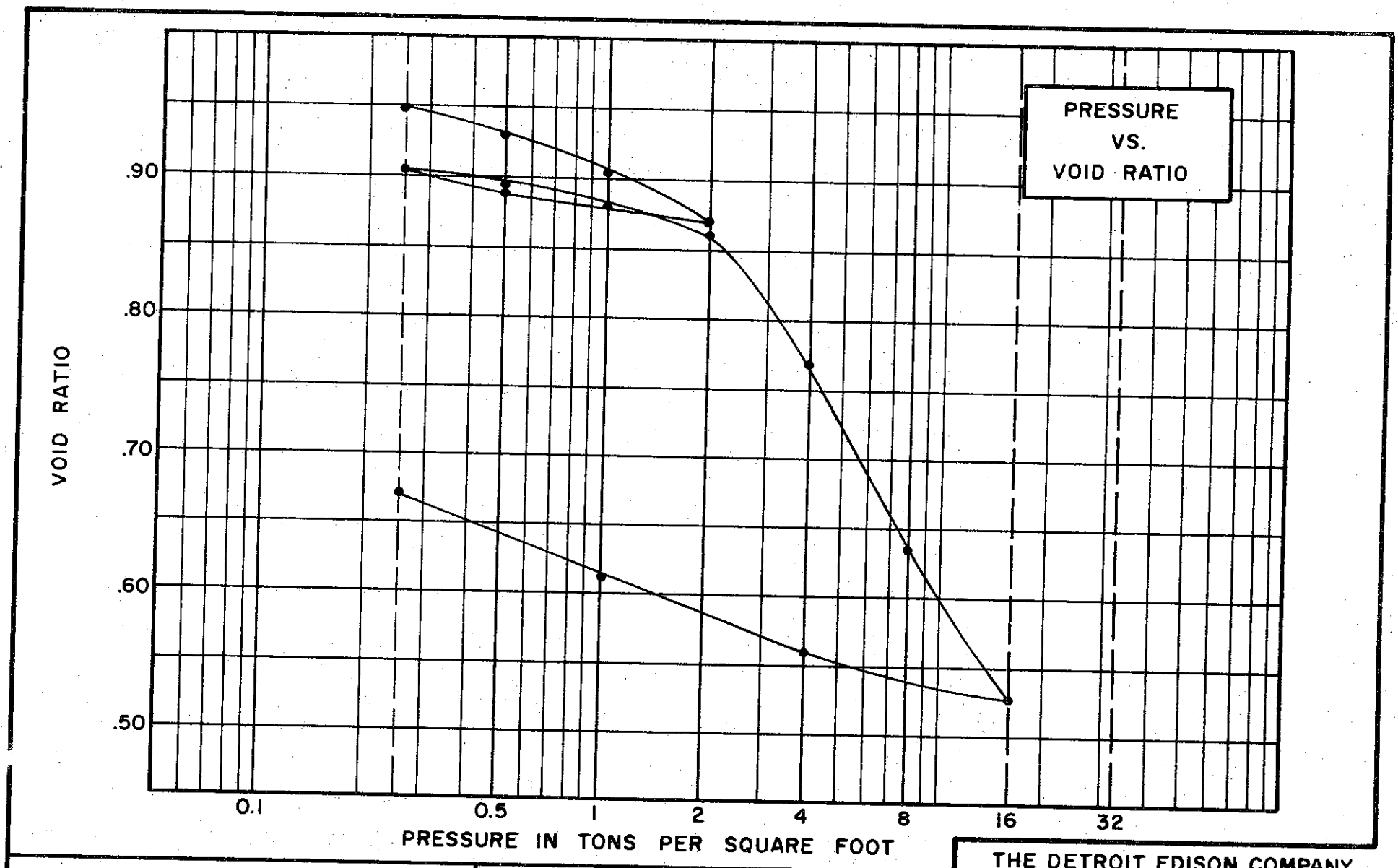
BORING NO. 105
SAMPLE NO. 8
DEPTH 70.9' TO 71.2

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 36.9%

ATTERBERG LIMITS:

LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.969

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

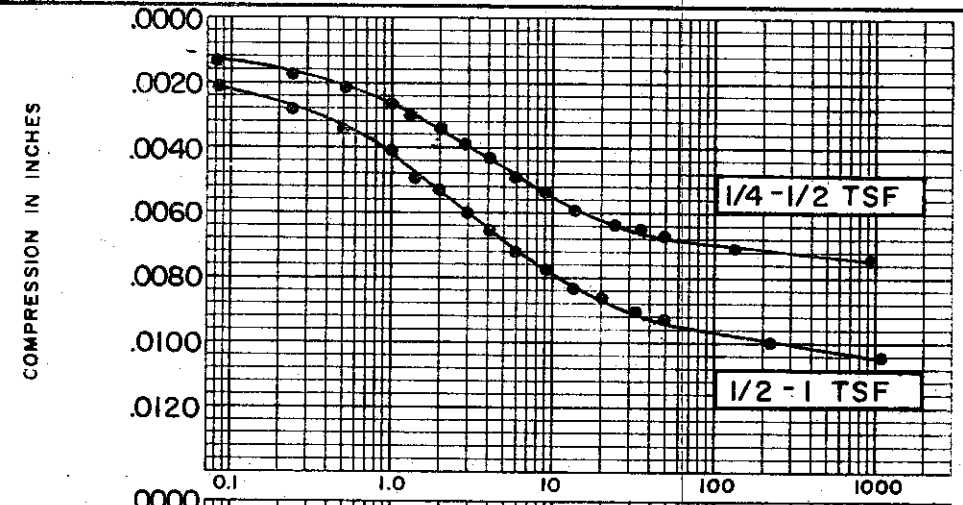
BORING NO. 118 TEST NO. C256.1

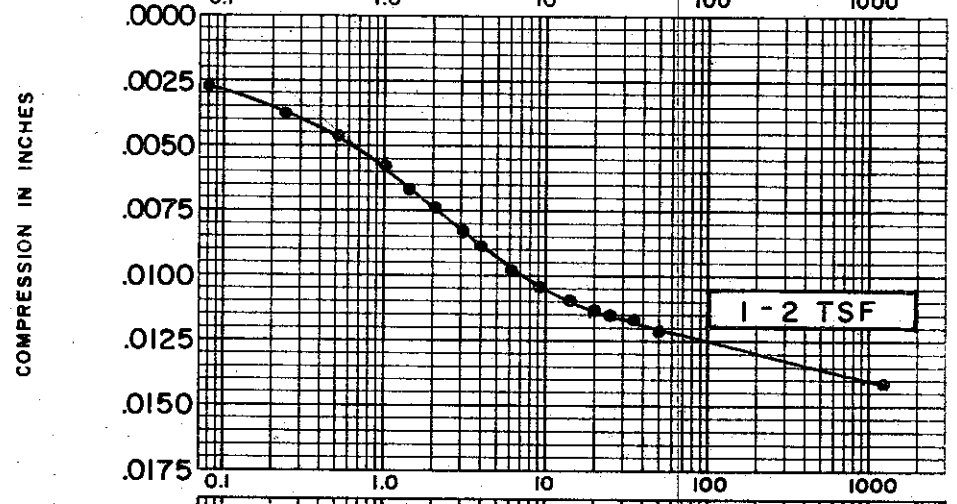
SAMPLE NO. 5 DATE JULY 1974

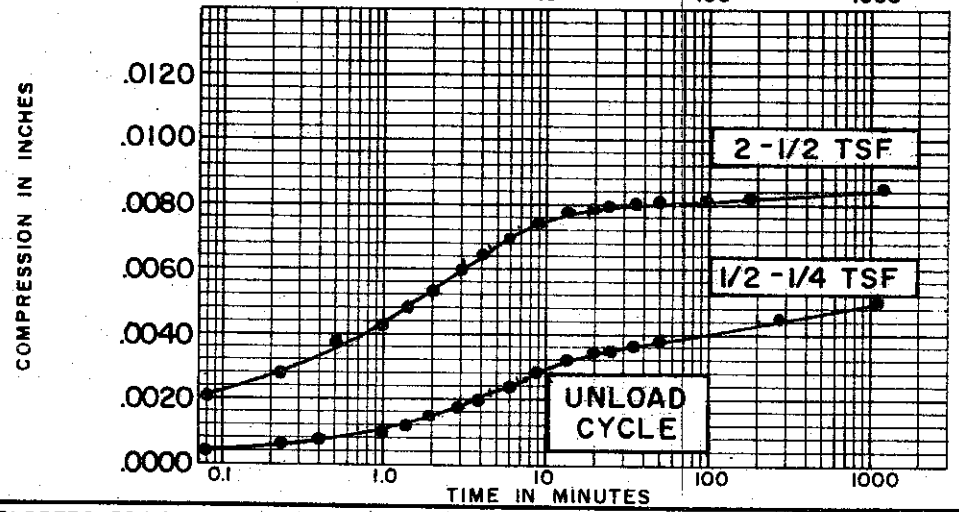
DEPTH 38.6' TO 38.9'

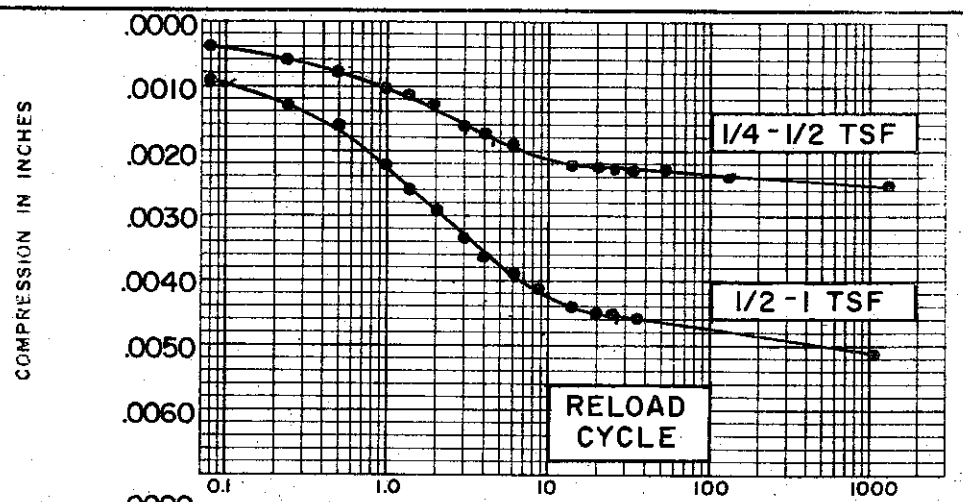
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

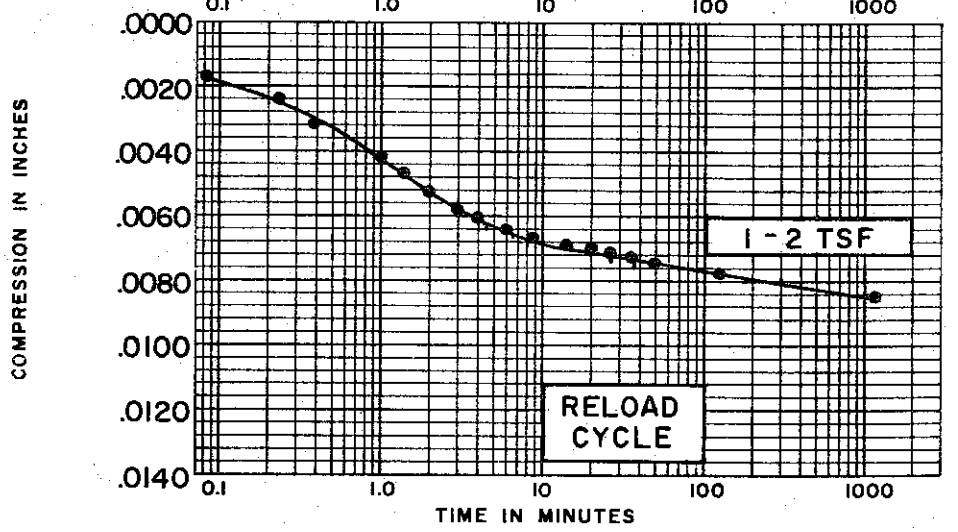
C-542











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 36.9 %
FINAL WATER CONTENT %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.969

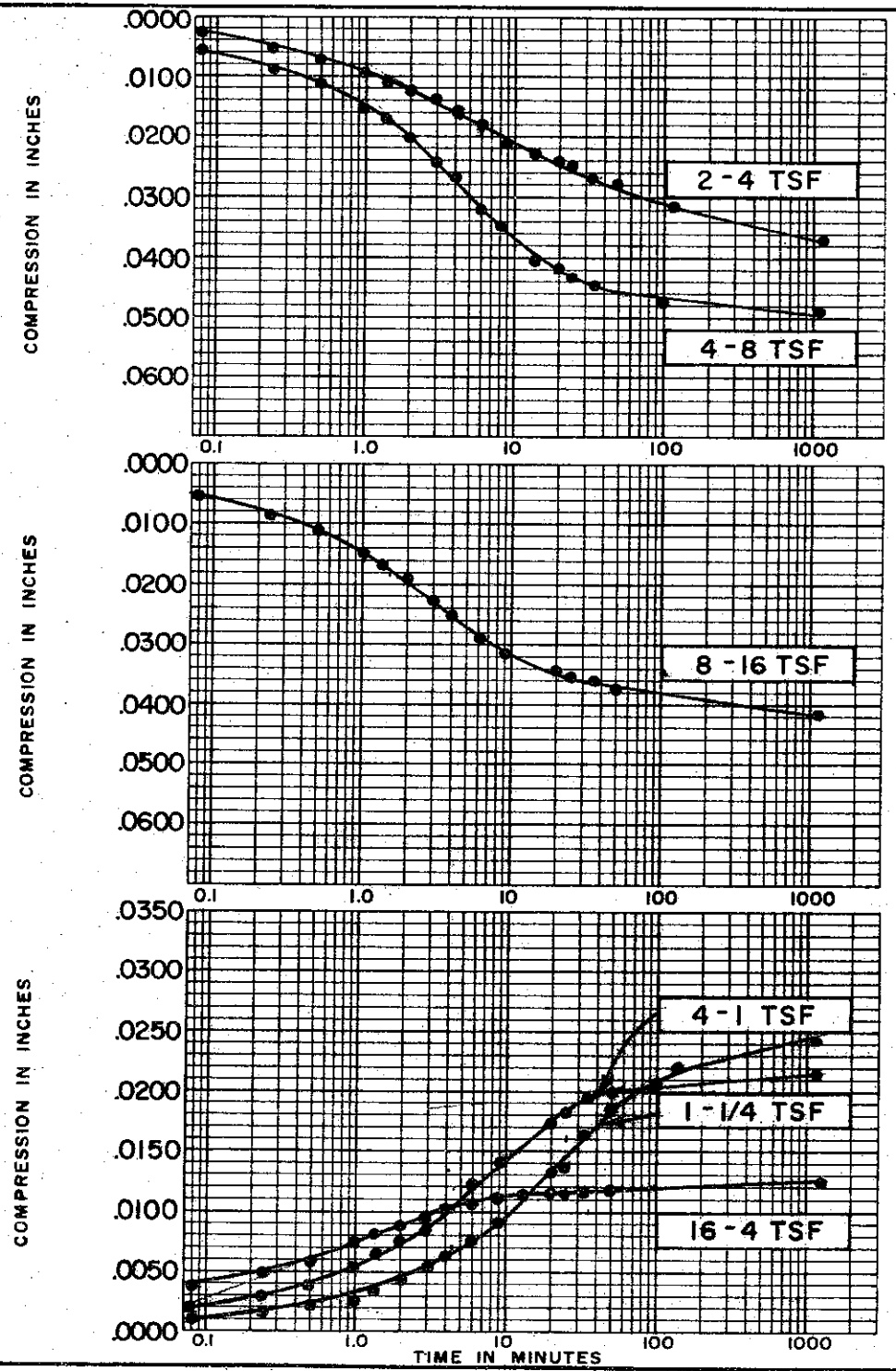
BORING NO. 118
SAMPLE NO. 5
DEPTH 38.6' TO 38.9'

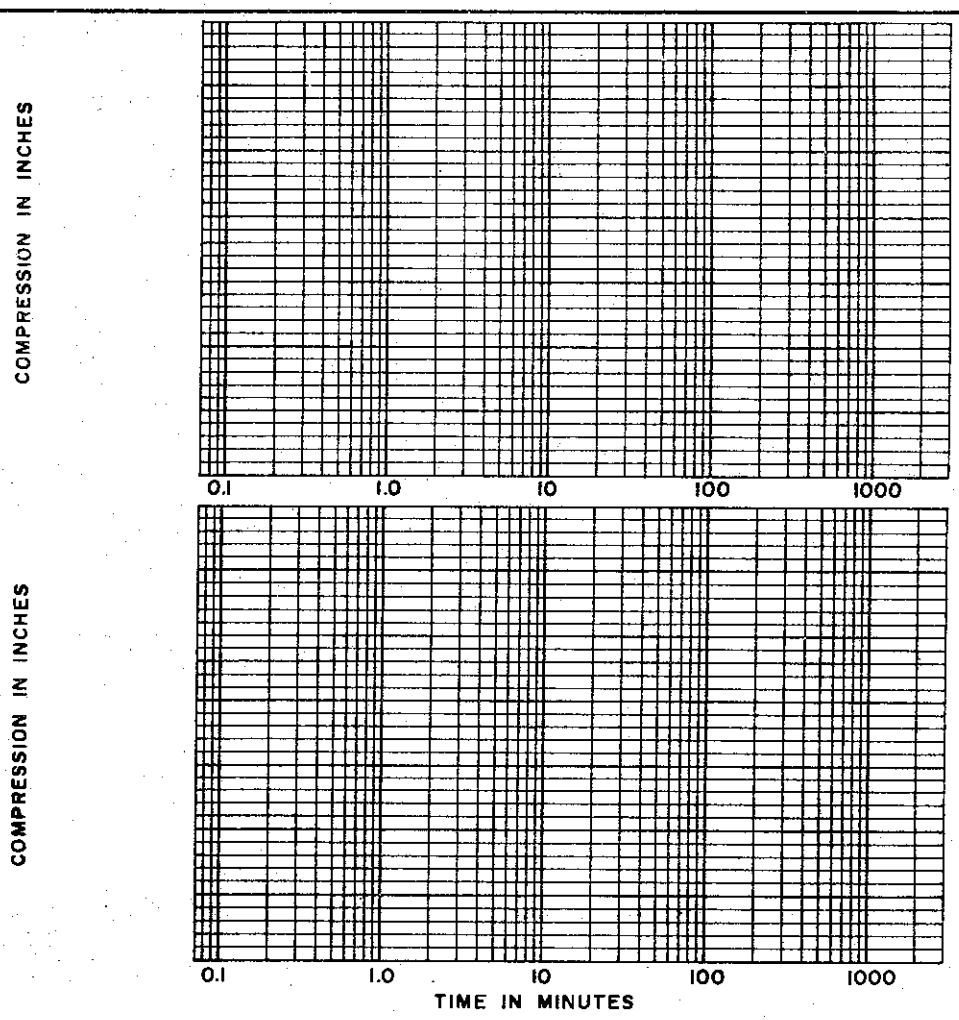
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 36.9 %
FINAL WATER CONTENT ___ %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.963

BORING NO. 118
SAMPLE NO. 5
DEPTH 38.6' TO 38.9'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

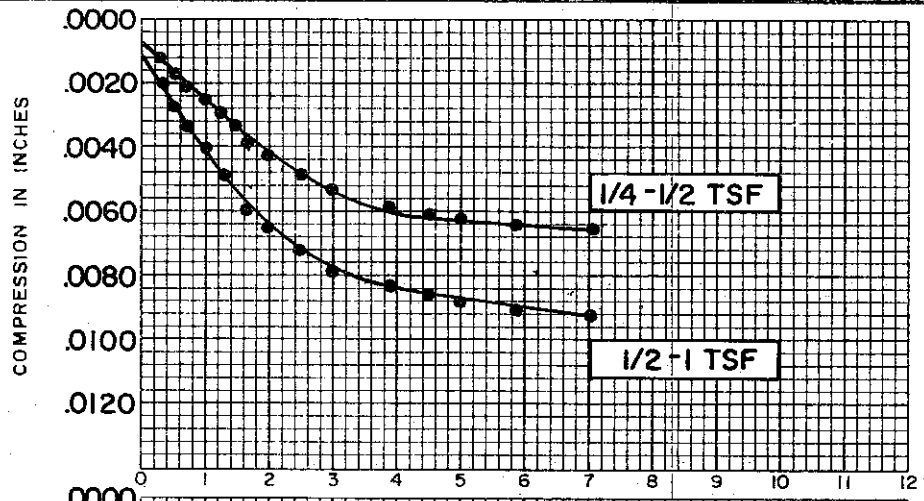
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

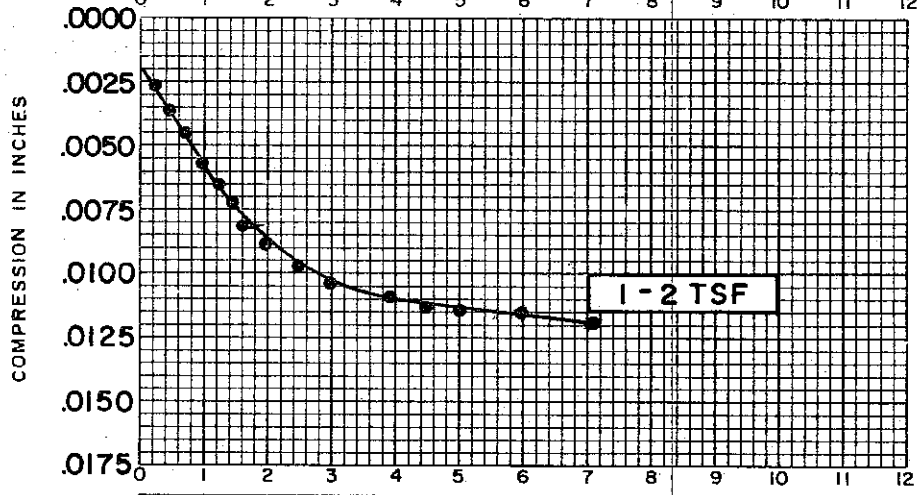
FILE 1255

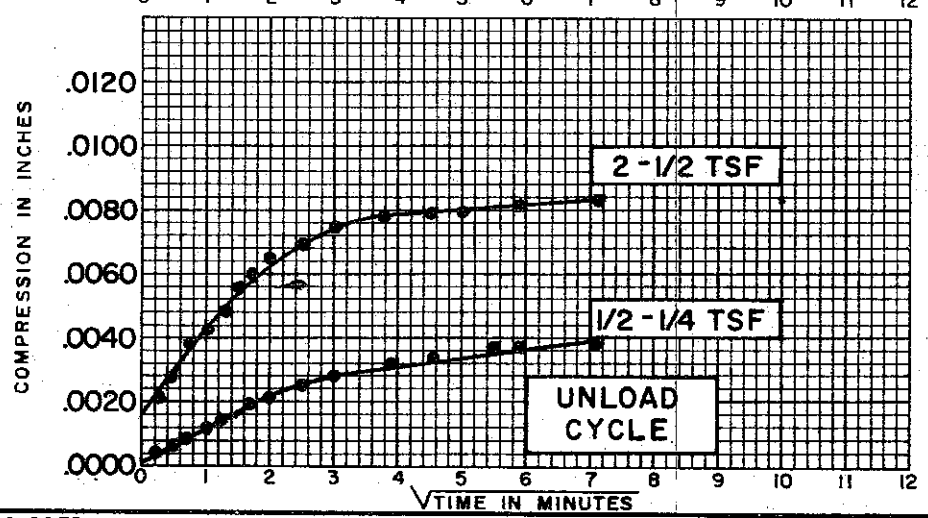
C-543

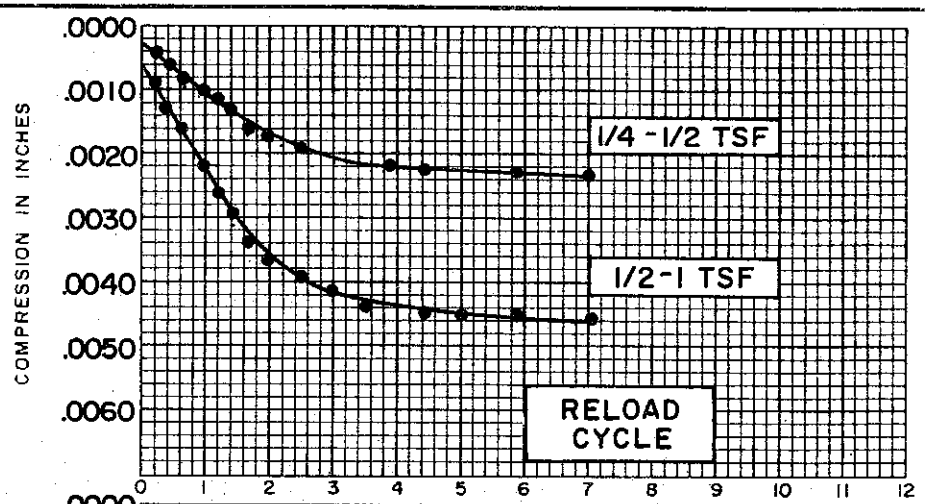
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

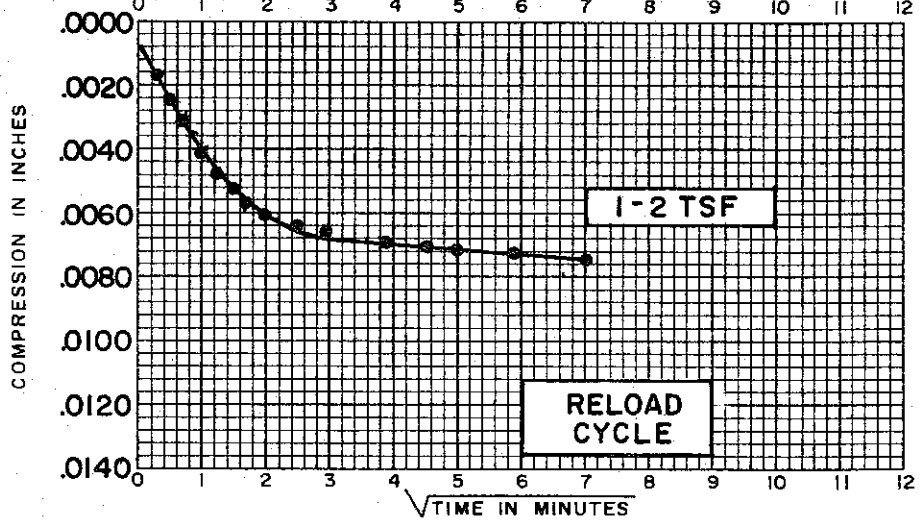
C-544











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 36.9 %
FINAL WATER CONTENT %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.969

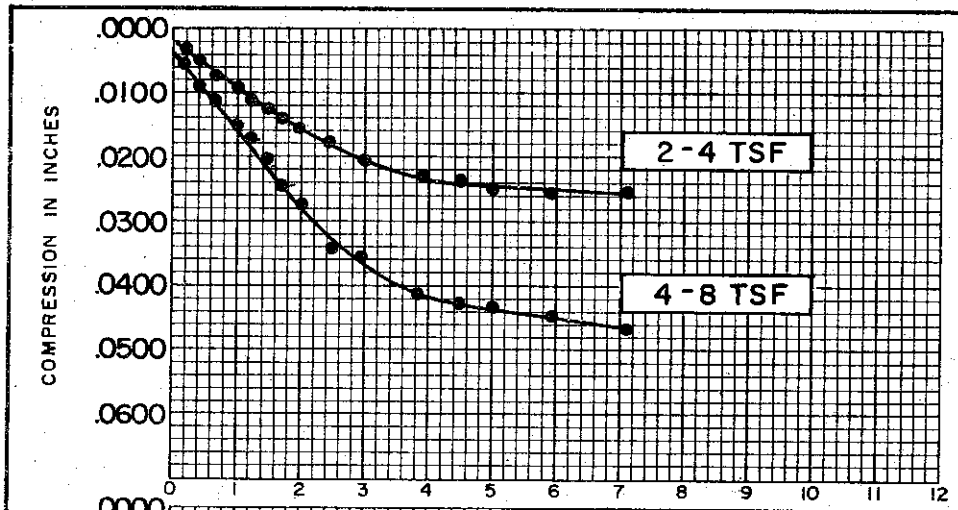
BORING NO. 118
SAMPLE NO. 5
DEPTH 38.6' TO 38.9'

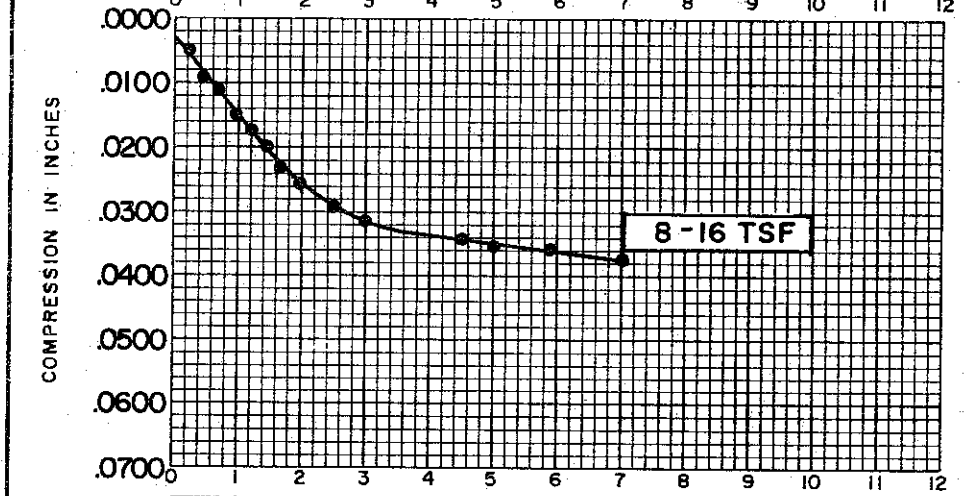
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

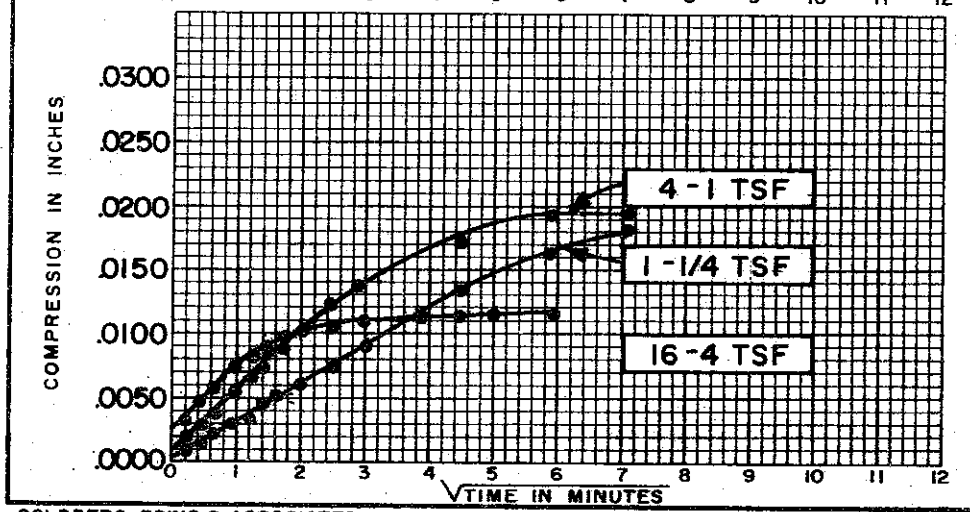
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

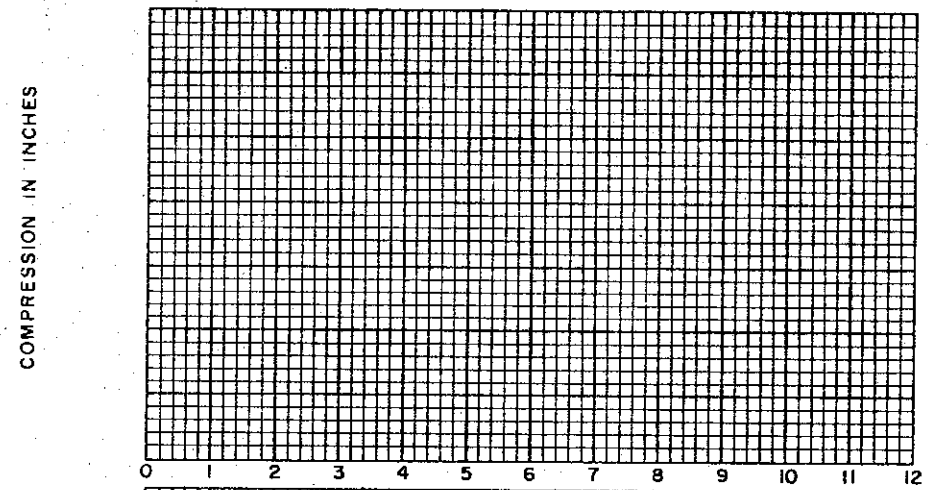
FILE 1255

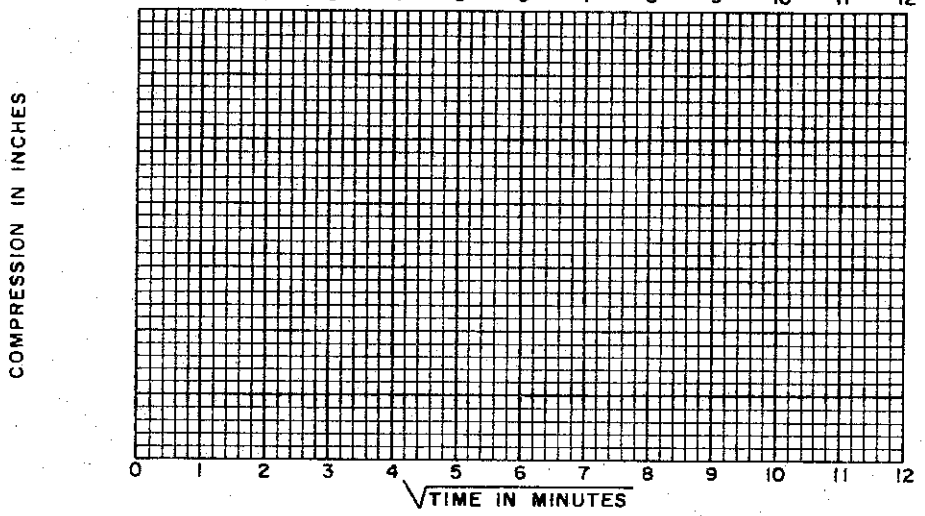
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 36.9 %
FINAL WATER CONTENT %

BORING NO. 118
SAMPLE NO. 5
DEPTH 38.6' TO 38.9'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.969

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

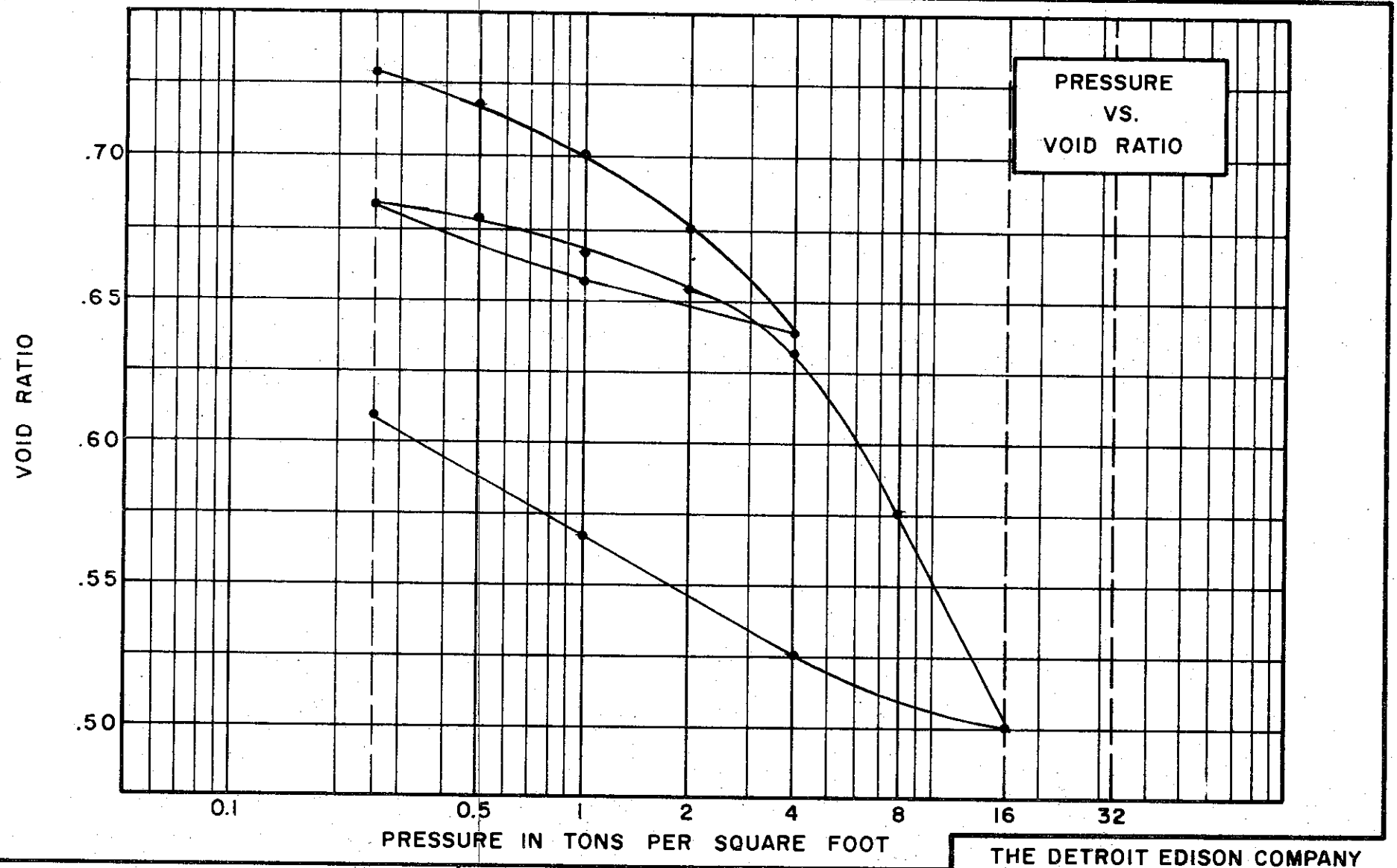
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-545

C-546



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, (CL)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 27.8%

ATTERBERG LIMITS:
LIQUID LIMIT 42 % PLASTIC LIMIT 23 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.741

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

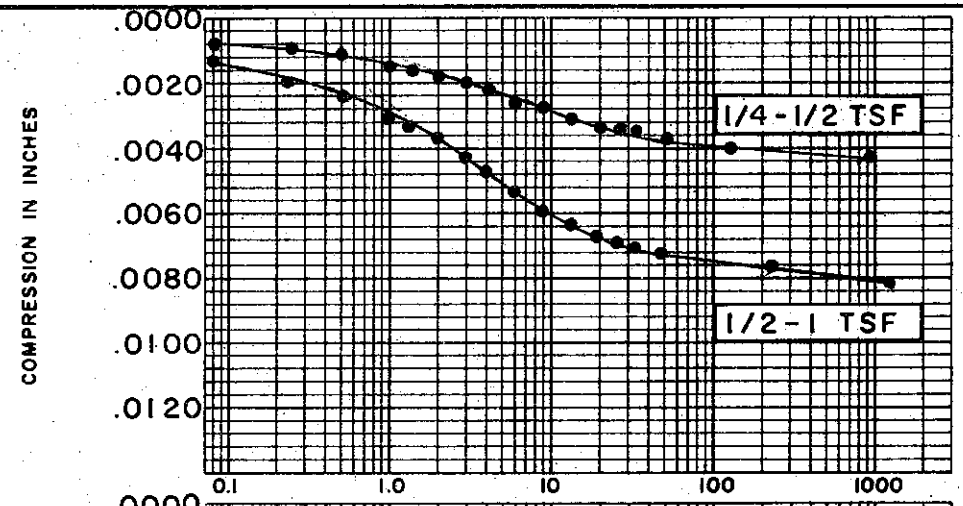
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

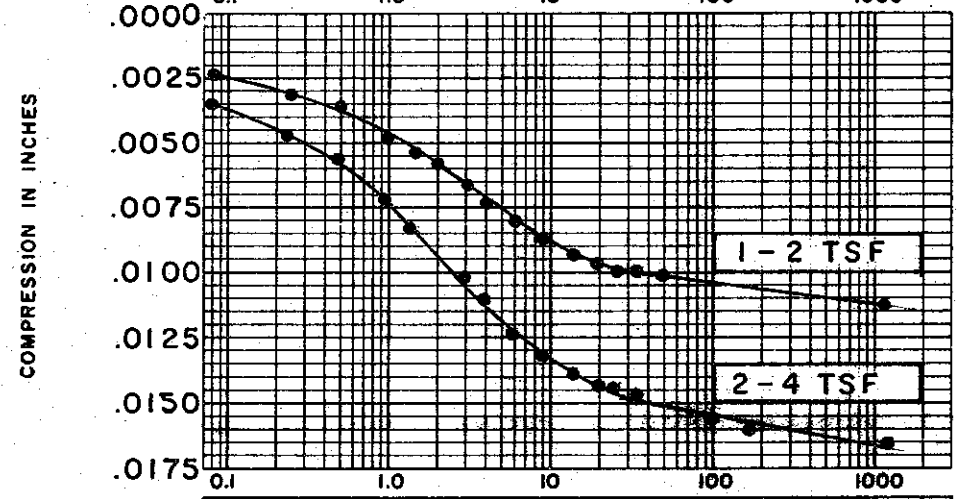
BORING NO. 118 TEST NO. C260.1

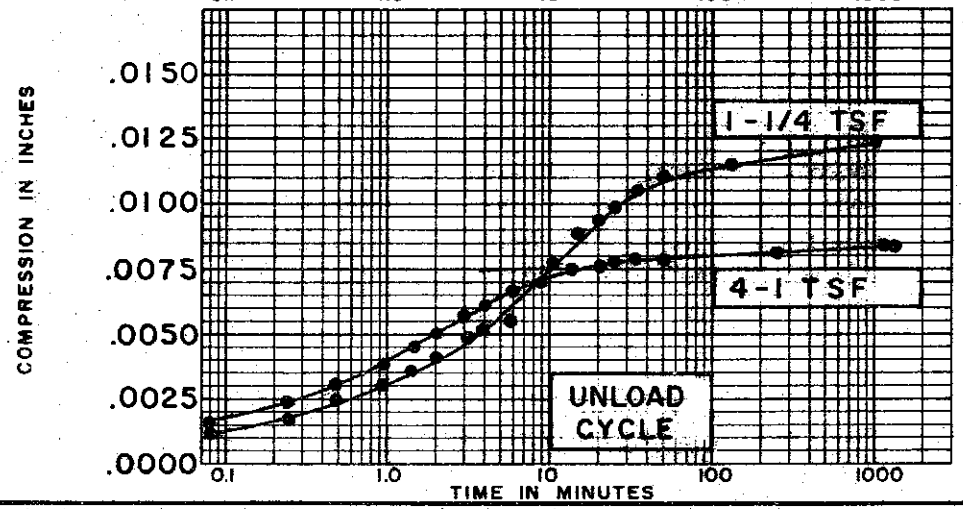
SAMPLE NO. 9 DATE JULY 1974

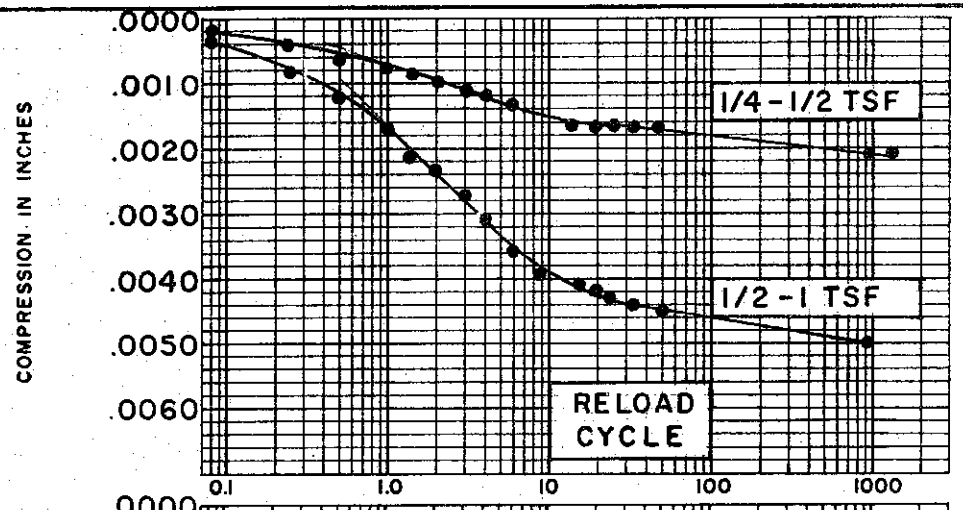
DEPTH 78.7' TO 79.0'

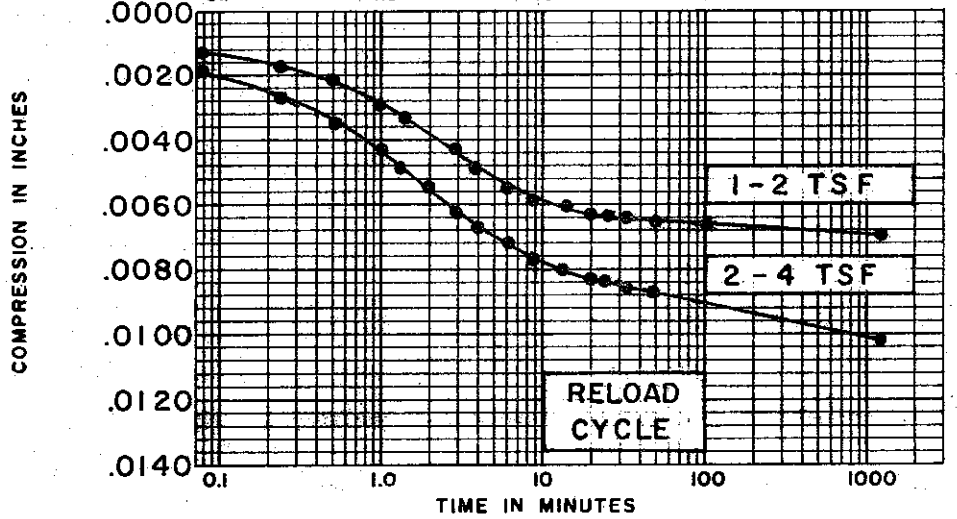
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 27.8 %
FINAL WATER CONTENT 25.6 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.741

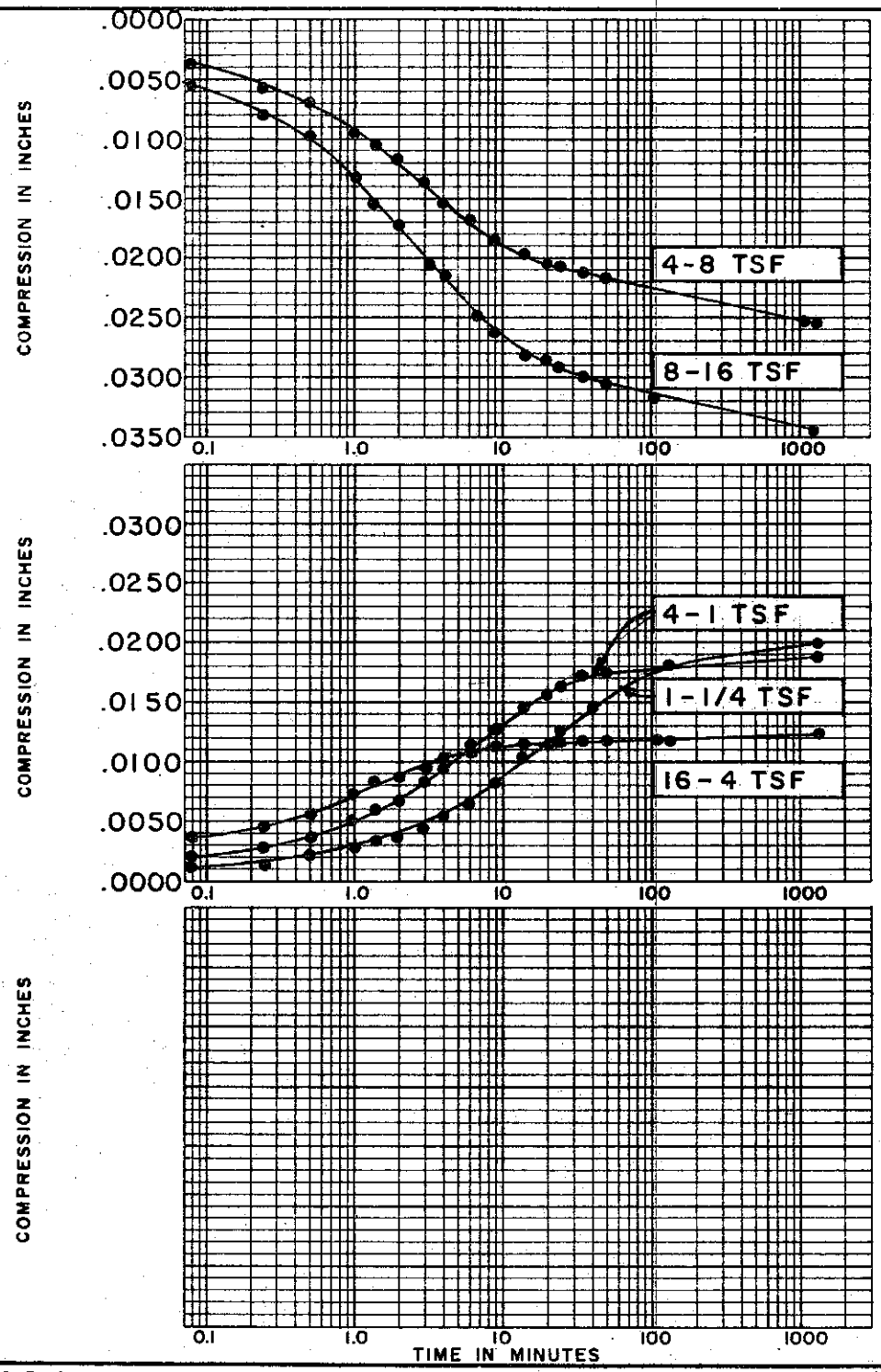
BORING NO. 118
SAMPLE NO. 9
DEPTH 78.7'TO79.0'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 27.8 %
FINAL WATER CONTENT 25.6 %

BORING NO. 118
SAMPLE NO. 9
DEPTH 78.7' TO 79.0'

TEST DATA

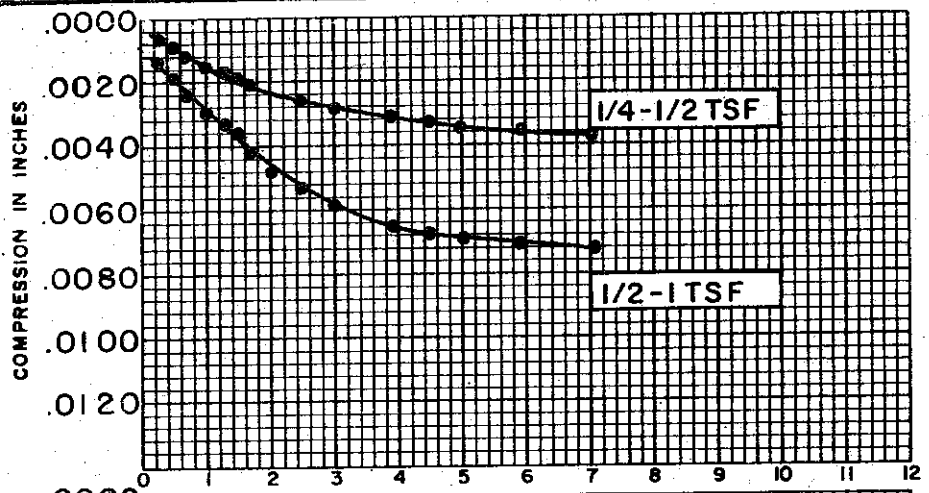
INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.741

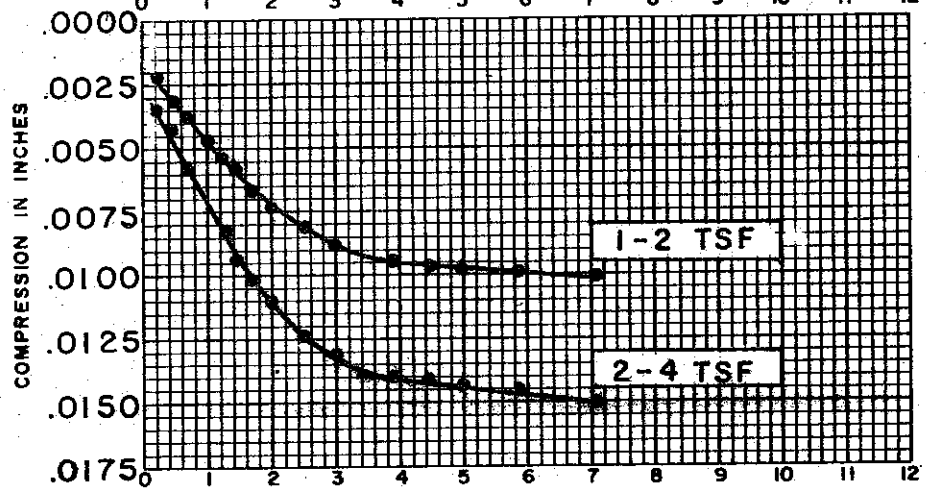
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

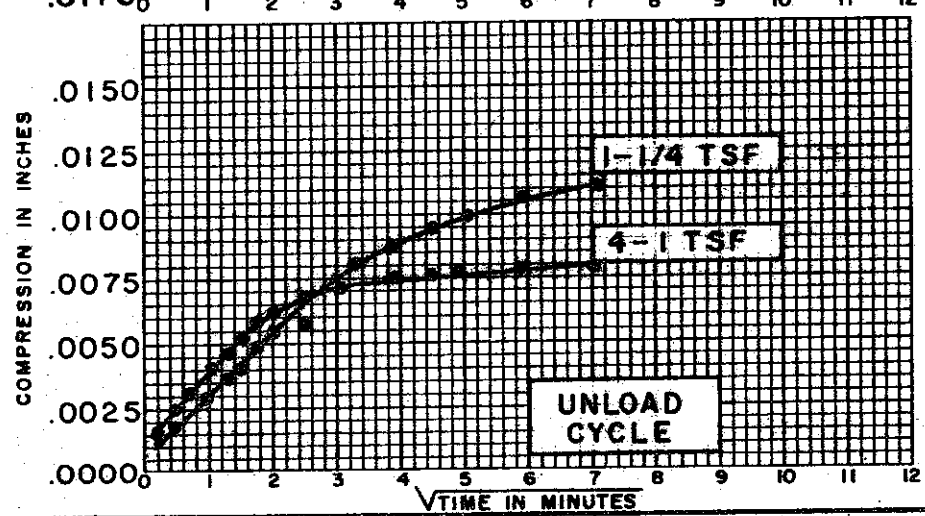
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

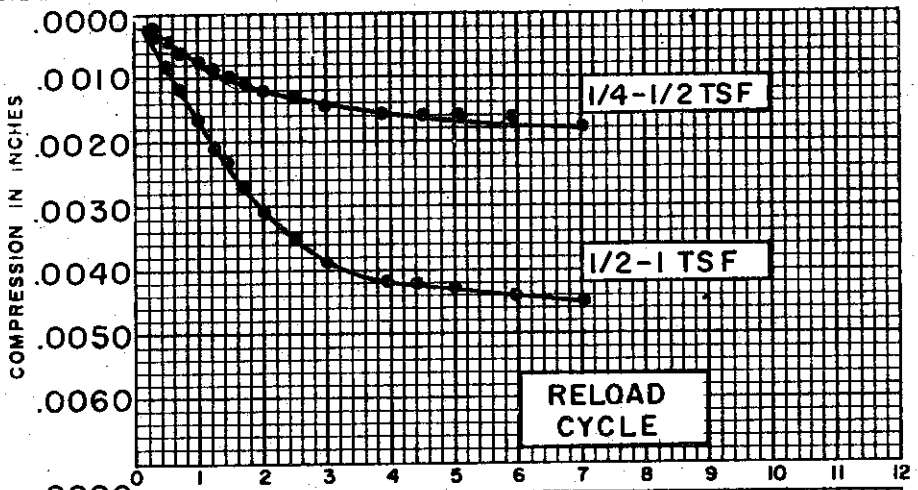
FILE 1255

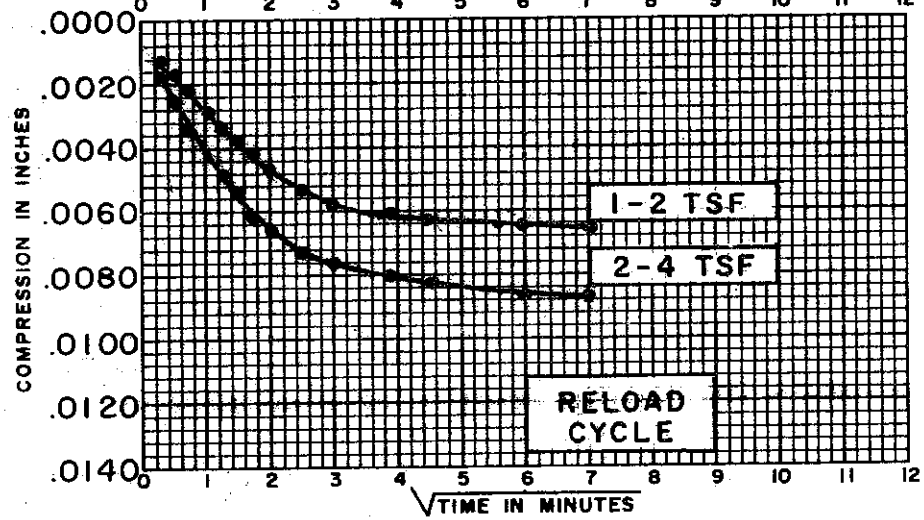
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 27.8 %
FINAL WATER CONTENT 25.6 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.741

BORING NO. 118
SAMPLE NO. 9
DEPTH 78.7' TO 79.0'

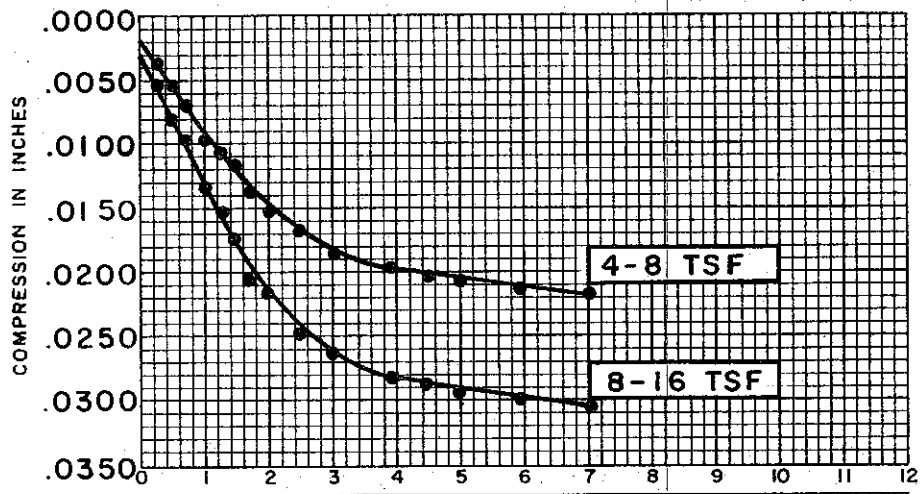
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

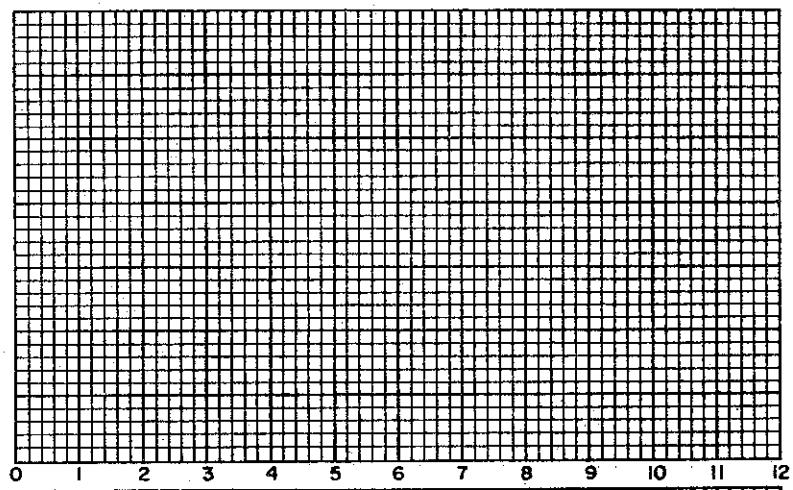
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

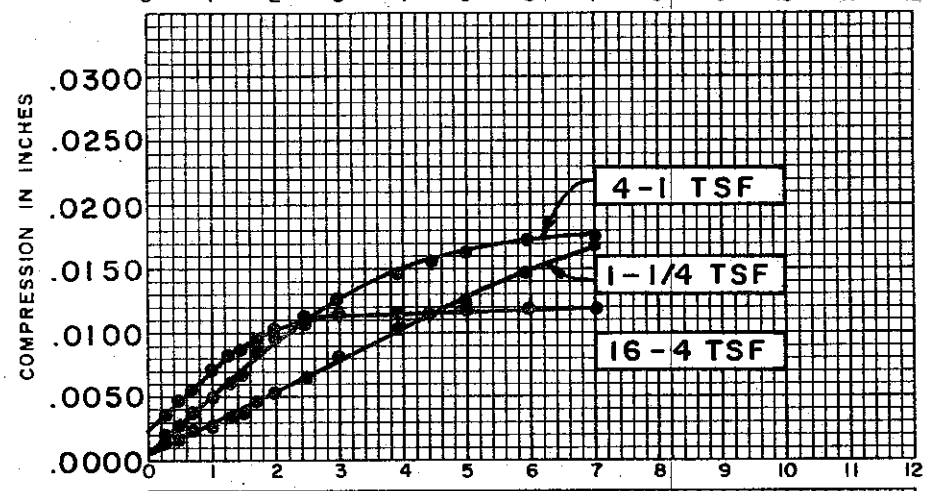
FILE 1255

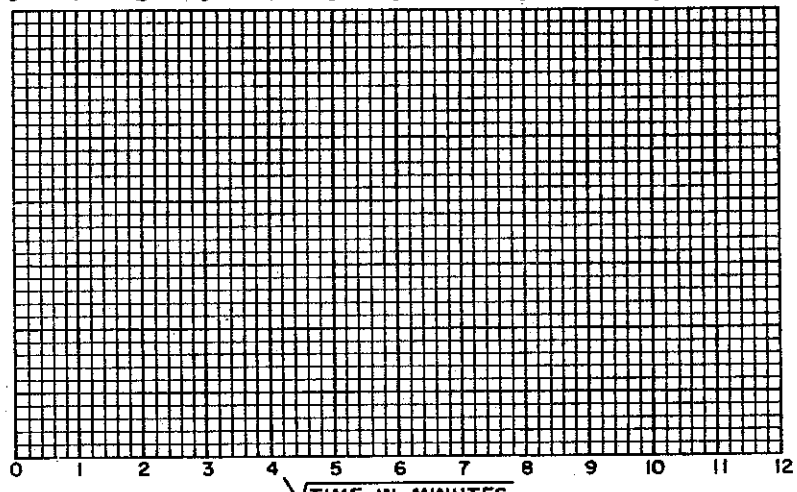
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

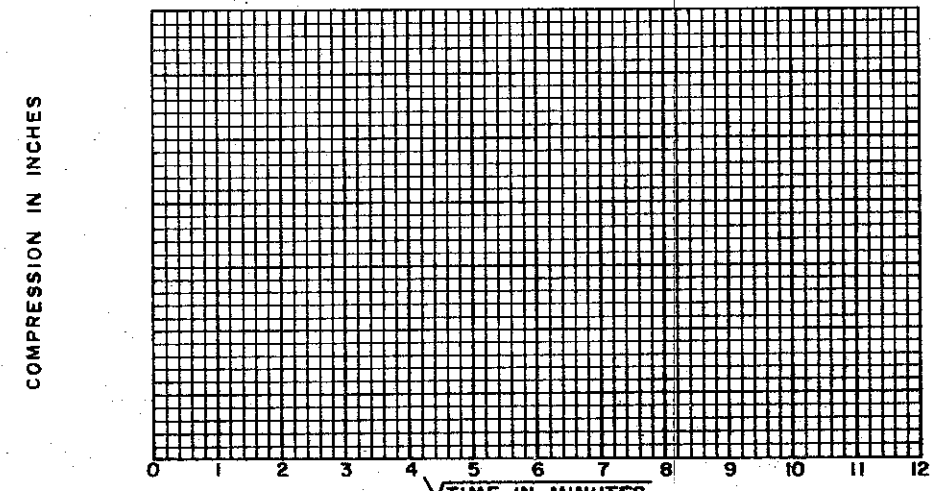
C-550











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 27.8 %
FINAL WATER CONTENT 25.6 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.741

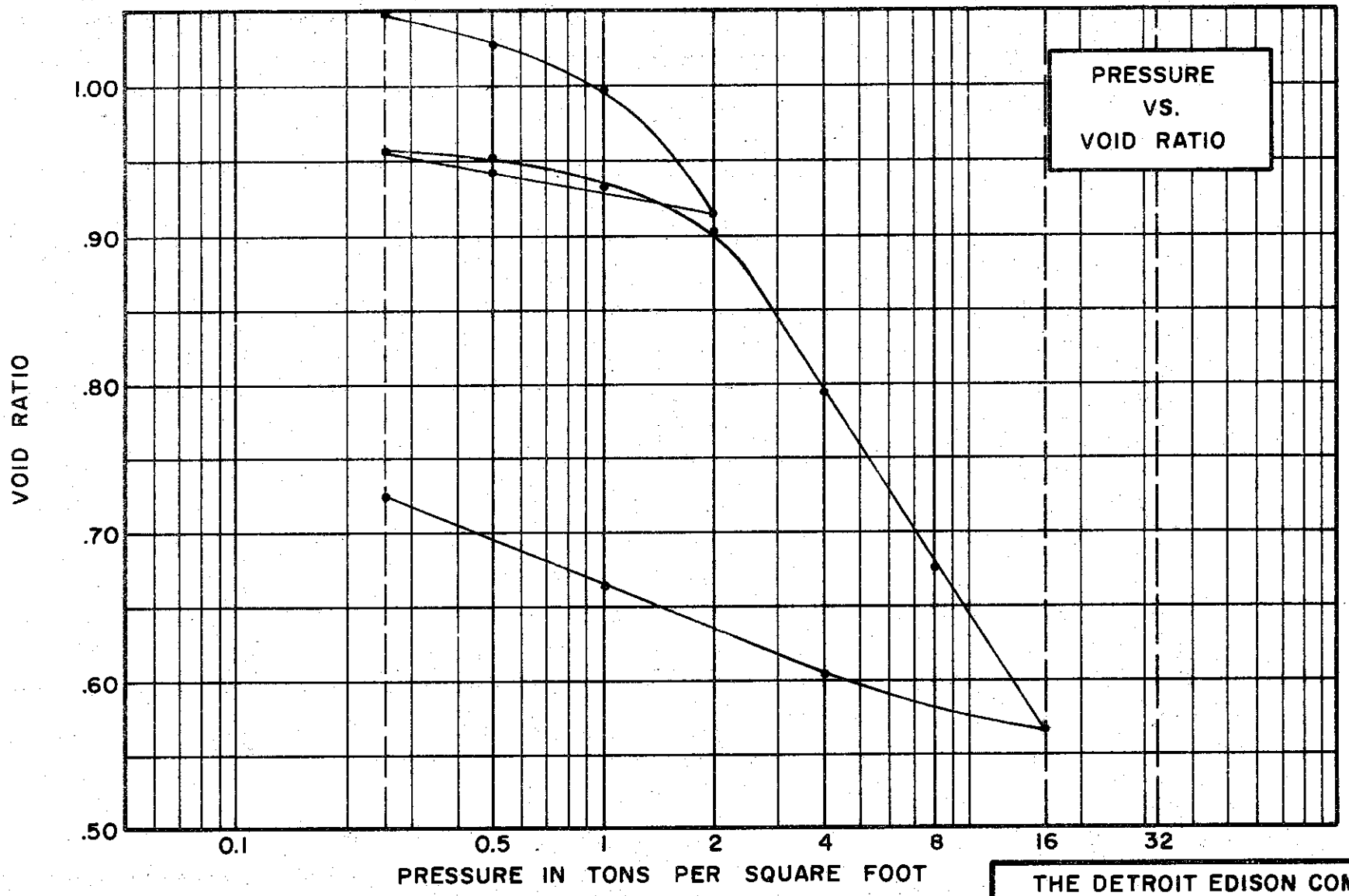
BORING NO. 118
SAMPLE NO. 9
DEPTH 78.7' TO 79.0'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.73

WATER CONTENT, INITIAL 402% FINAL 300%

ATTERBERG LIMITS:
LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.075

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 129 TEST NO. C389.1

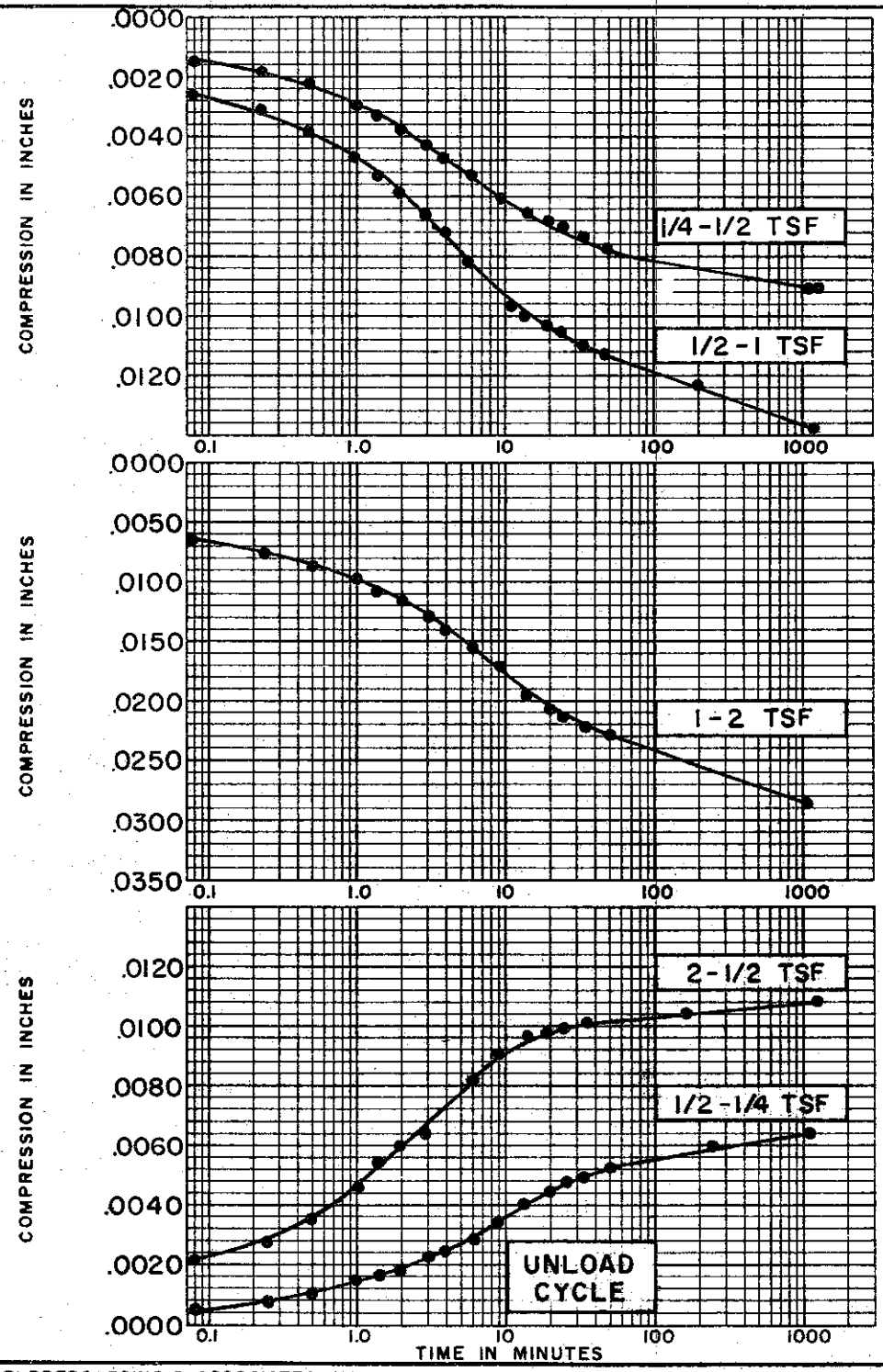
SAMPLE NO. 9 DATE APRIL 74

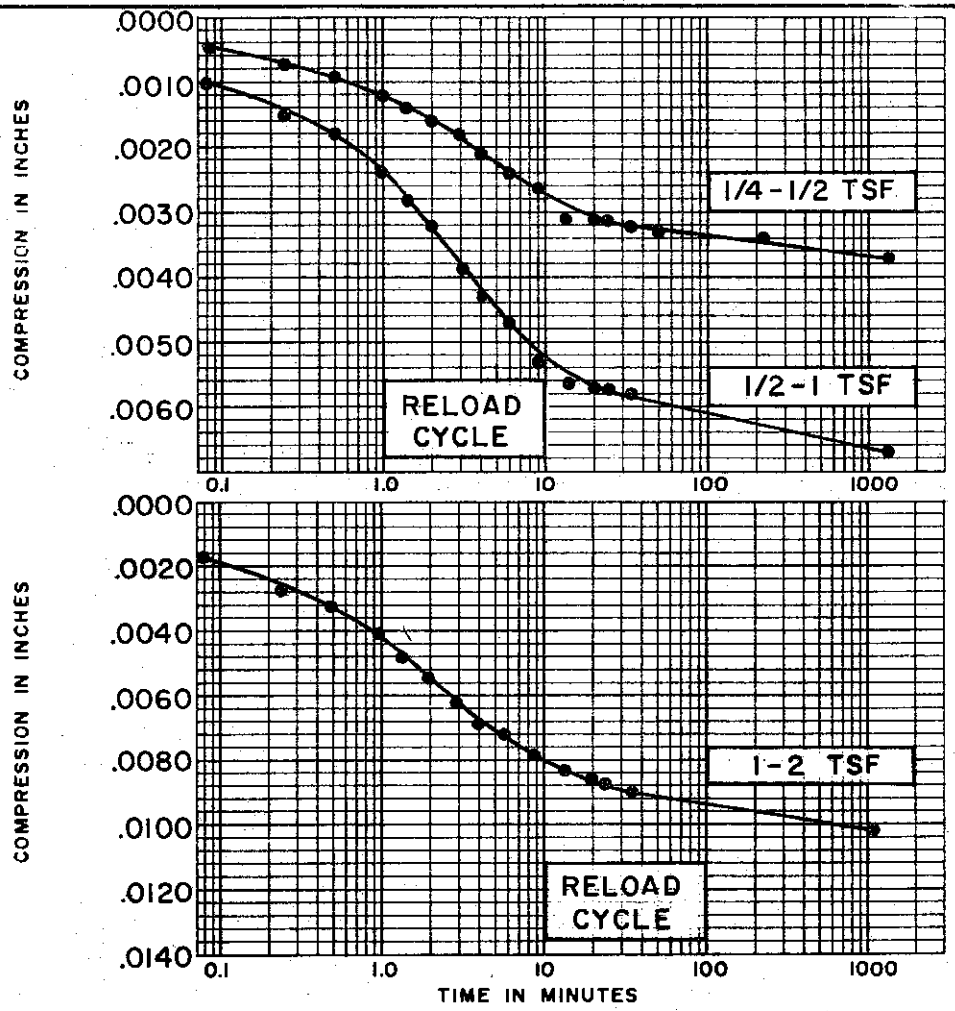
DEPTH 39.1' TO 39.3'

C-551

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-552





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 40.2 %
FINAL WATER CONTENT 30.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.075

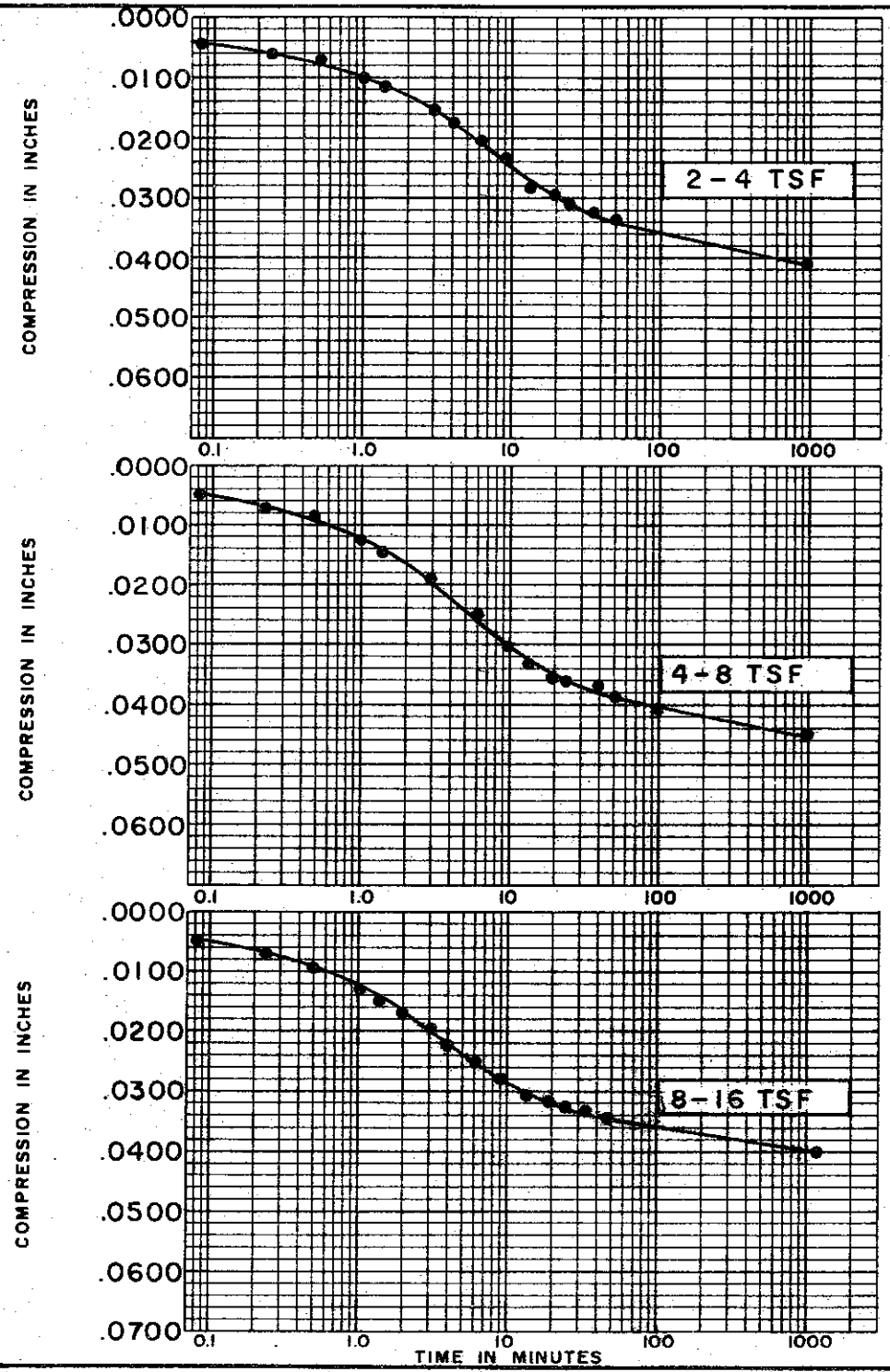
BORING NO. 129
SAMPLE NO. 9
DEPTH 39.1' TO 39.3'

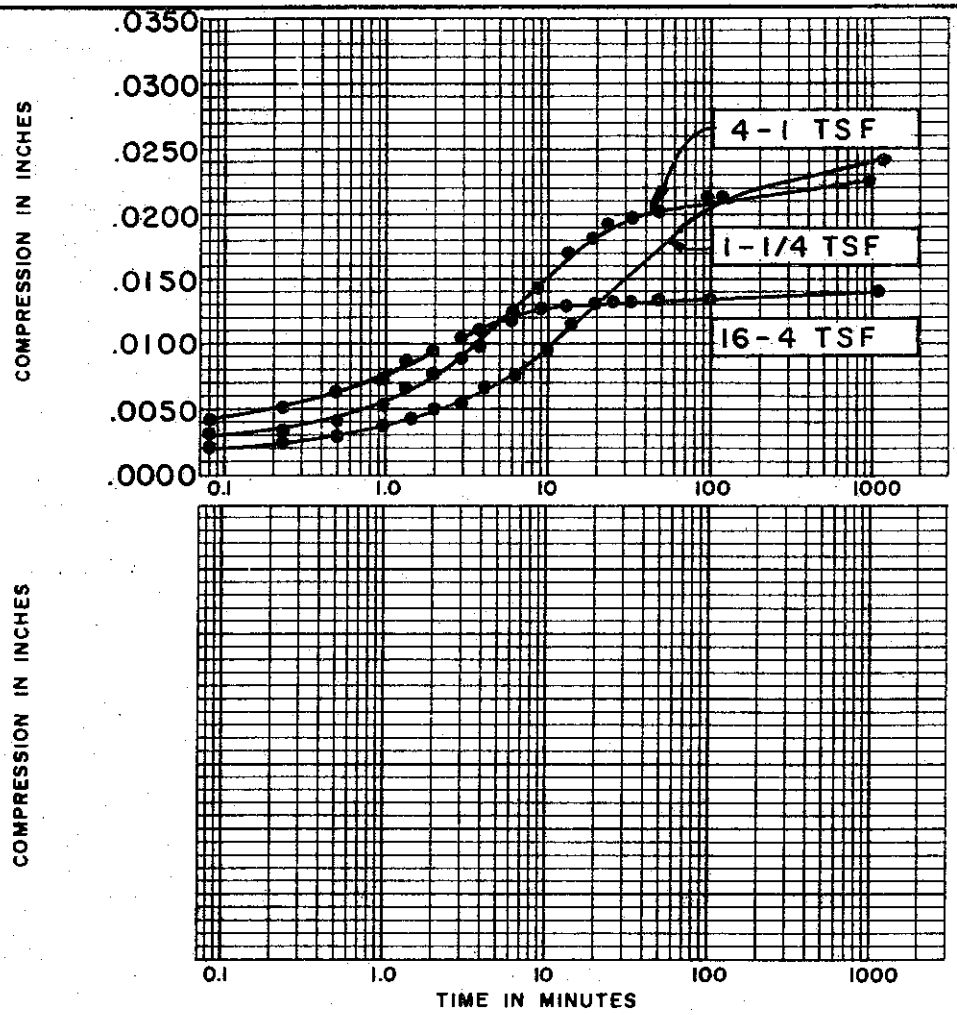
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 40.2 %
FINAL WATER CONTENT 30.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.075

BORING NO. 129
SAMPLE NO. 9
DEPTH 39.1' TO 39.3'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

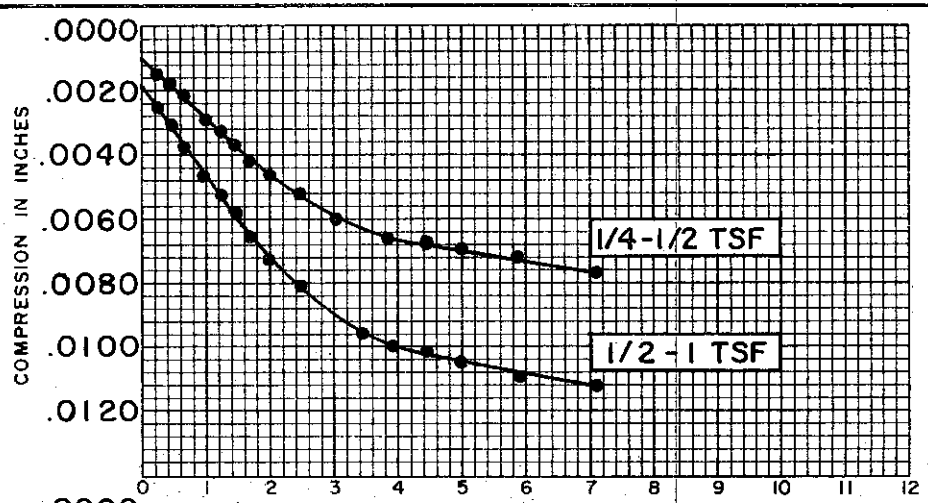
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

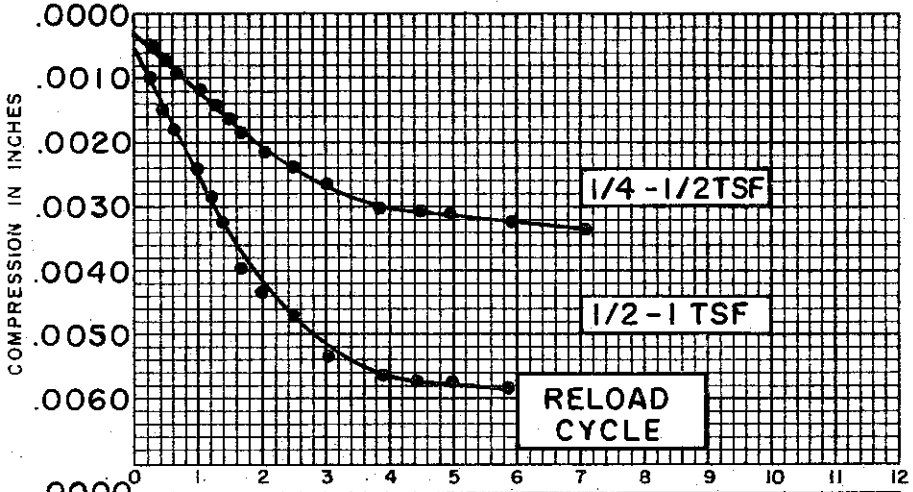
FILE 1255

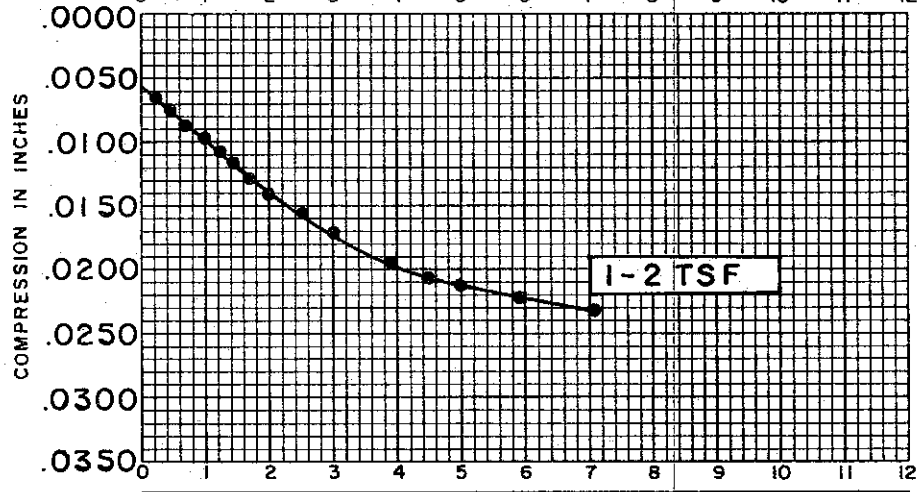
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

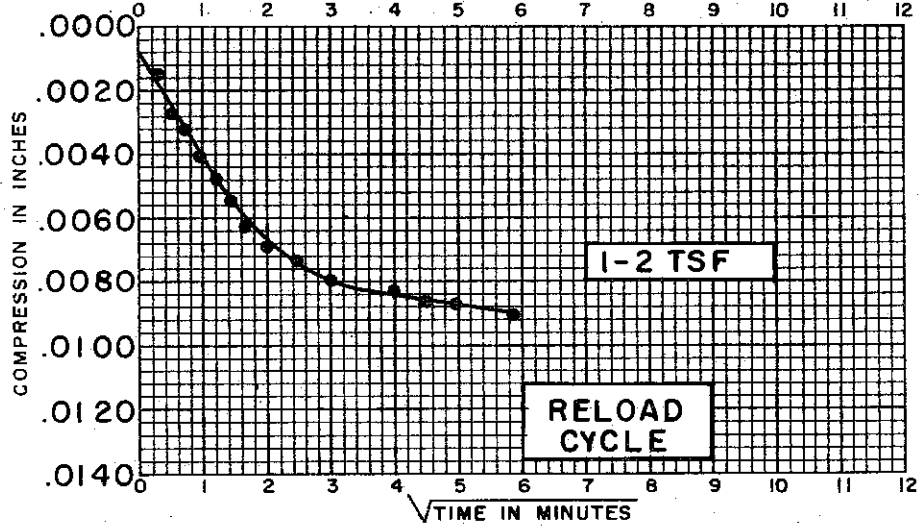
C-553

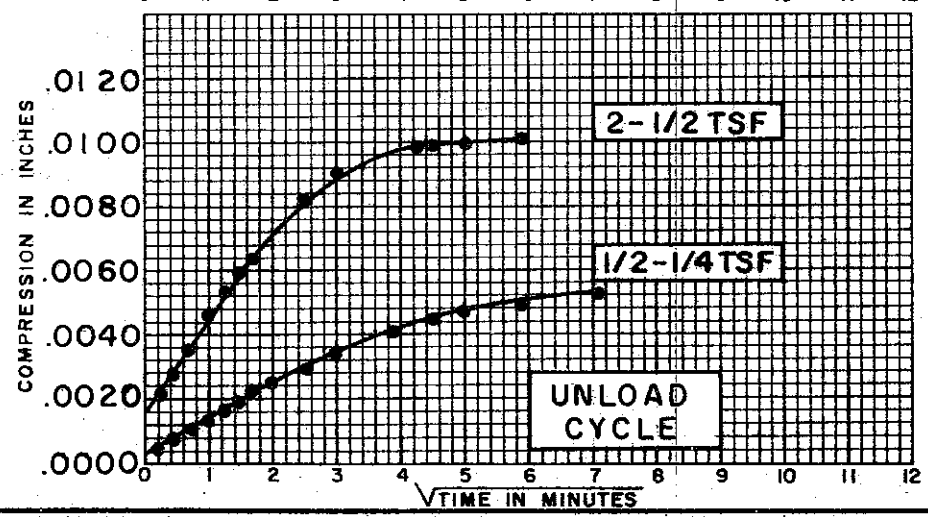
C-554











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 40.2 %
FINAL WATER CONTENT 30.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.075

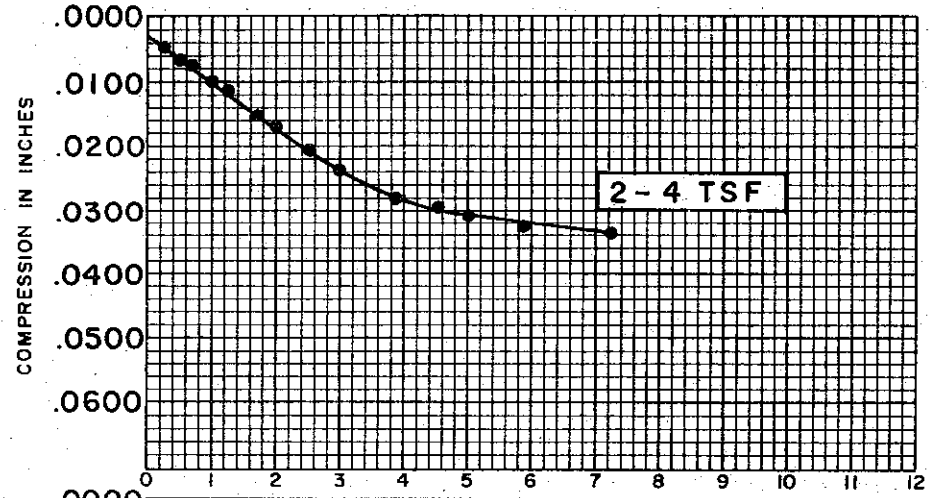
BORING NO. 129
SAMPLE NO. 9
DEPTH 39.1' TO 39.3'

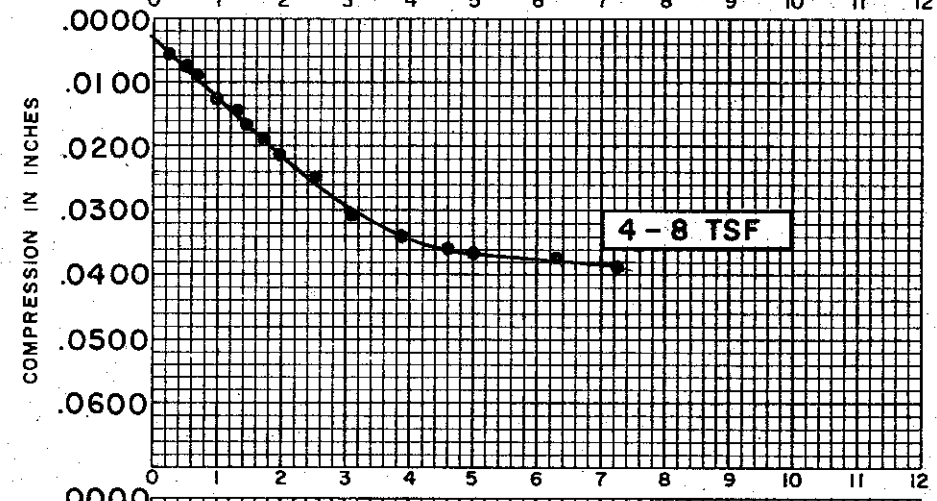
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

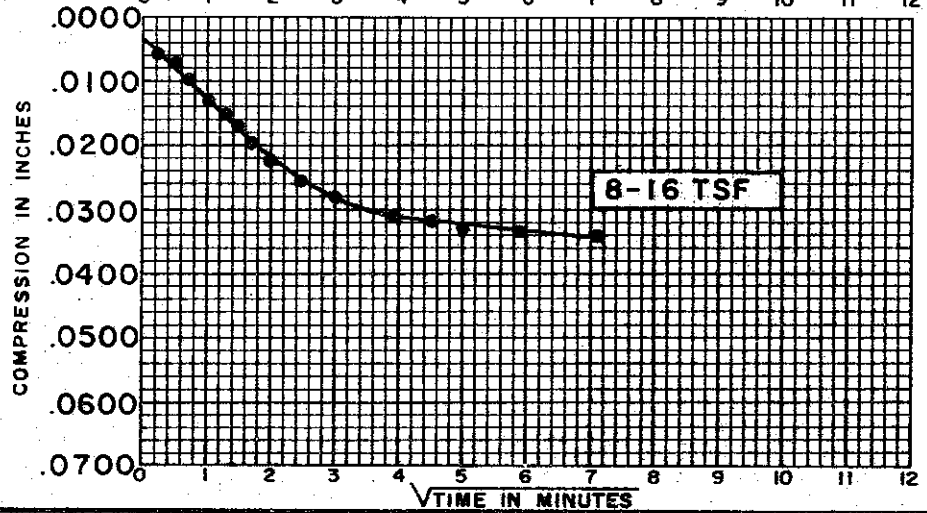
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

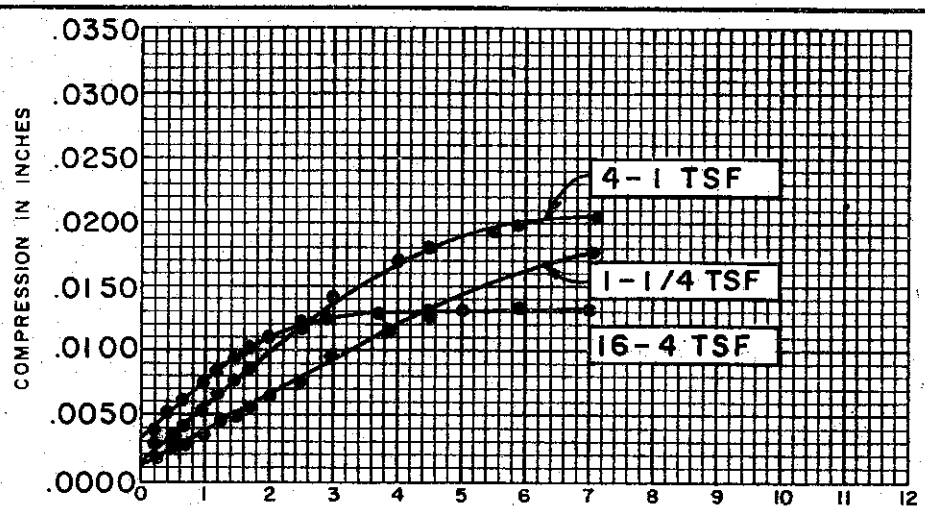
FILE 1255

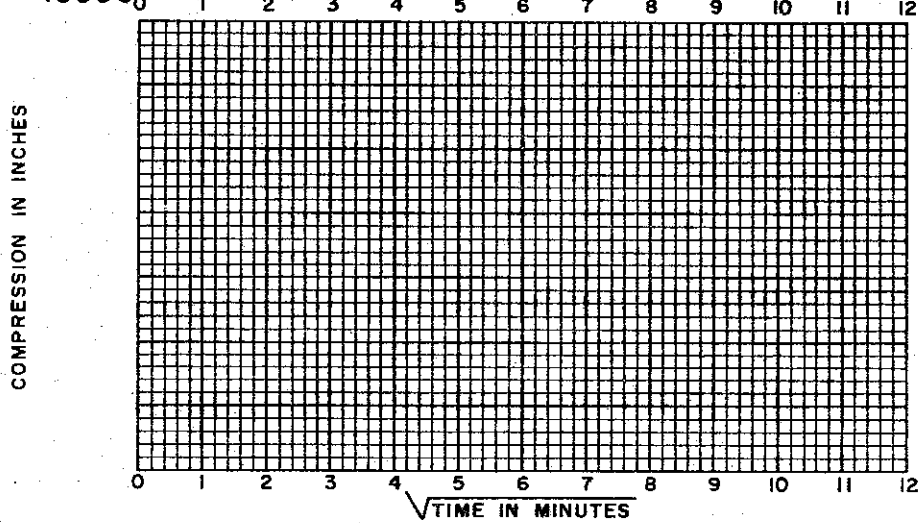
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.73
INITIAL WATER CONTENT 40.2 %
FINAL WATER CONTENT 30.0 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.075

BORING NO. 129
SAMPLE NO. 9
DEPTH 39.1' TO 39.3'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

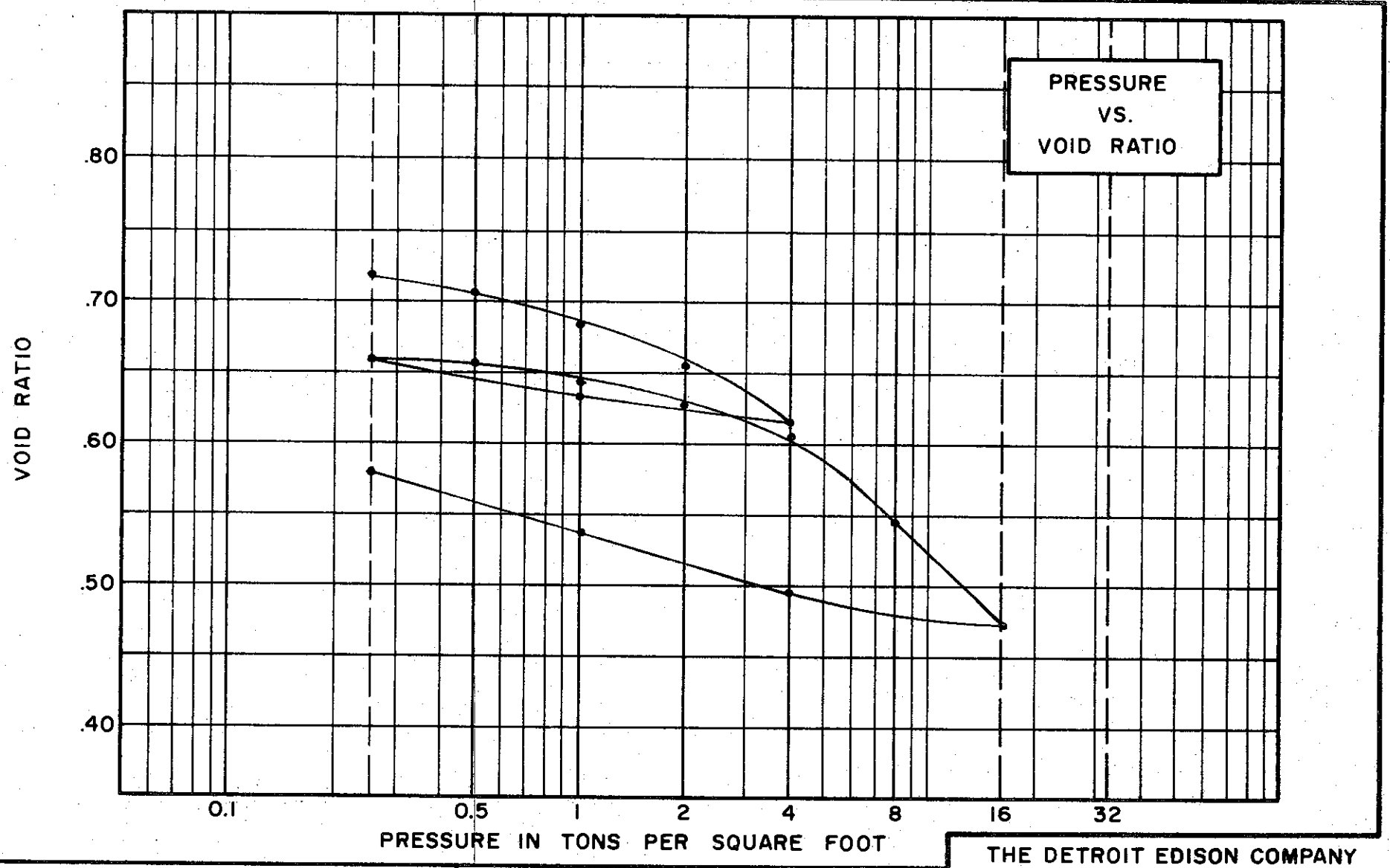
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

C-555

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-556



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY; SANDY (CL)

SPECIFIC GRAVITY 2.71

WATER CONTENT, INITIAL 28.0% FINAL 24.5%

ATTERBERG LIMITS:
LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.703

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

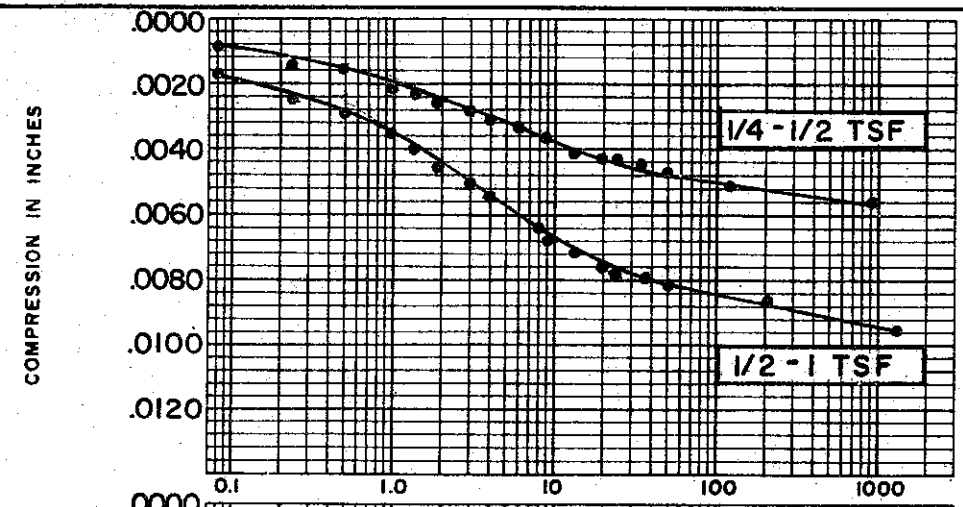
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

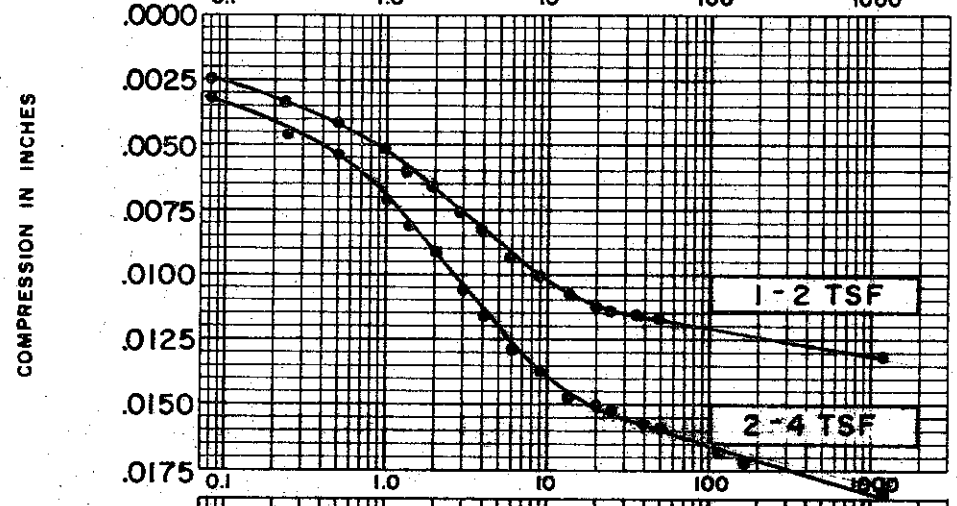
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

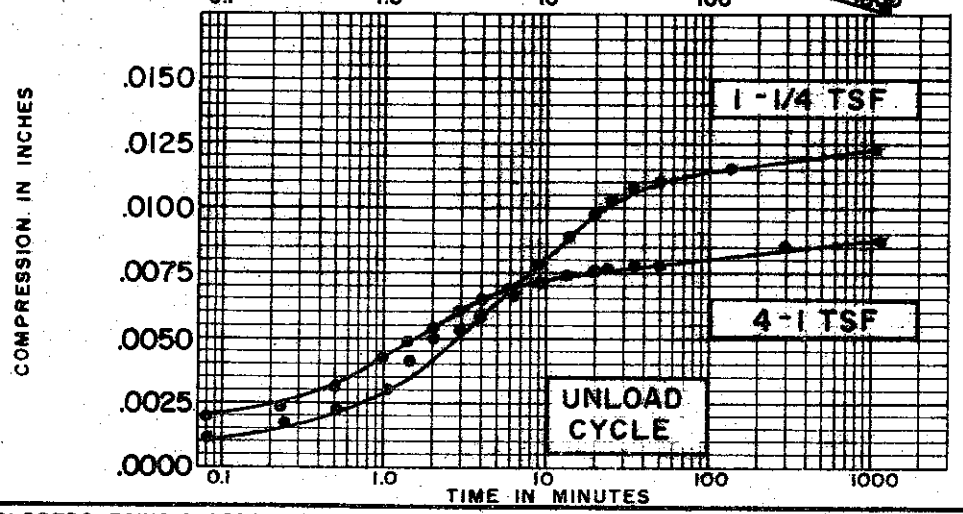
BORING NO. 129 TEST NO. C395.1

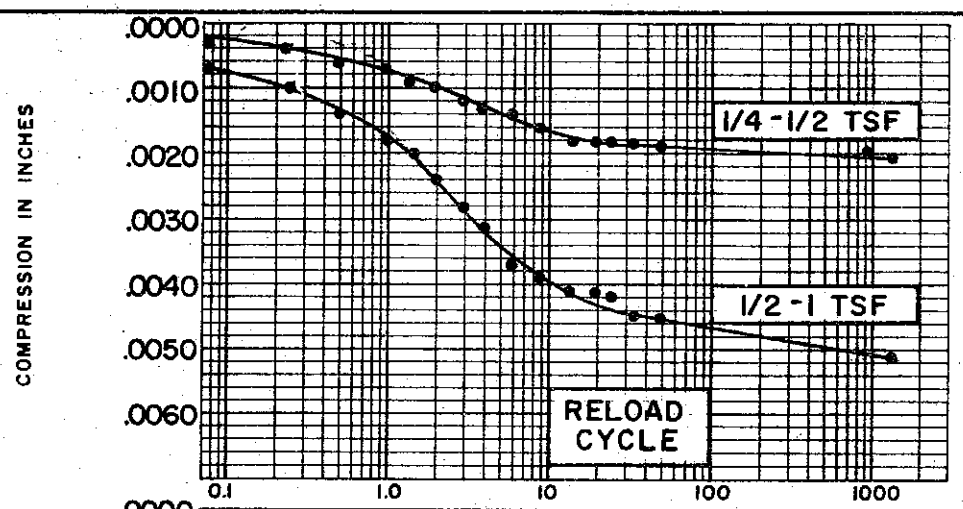
SAMPLE NO. 21 DATE APRIL 74

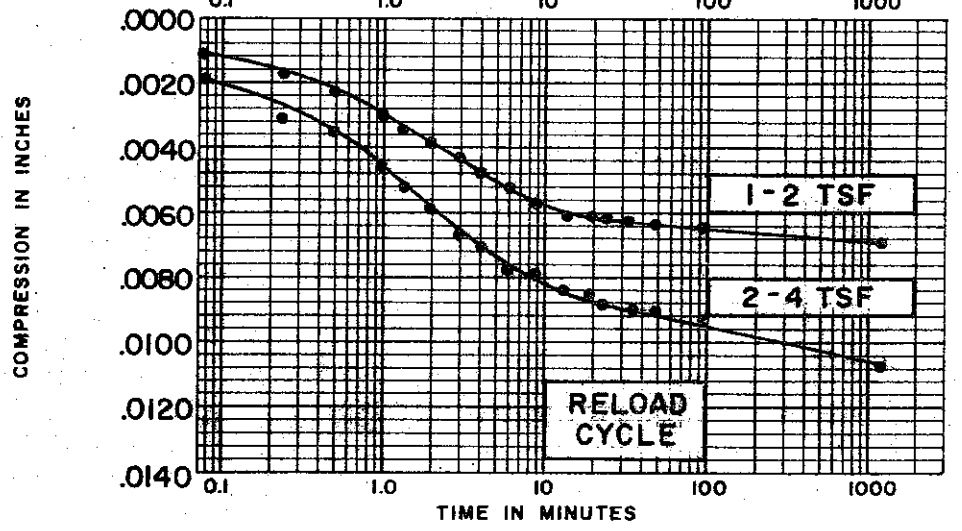
DEPTH 103.7' TO 104.0'











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 28.0 %
FINAL WATER CONTENT 24.5 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.730

BORING NO. 129
SAMPLE NO. 21
DEPTH 103.7' TO 104.0'

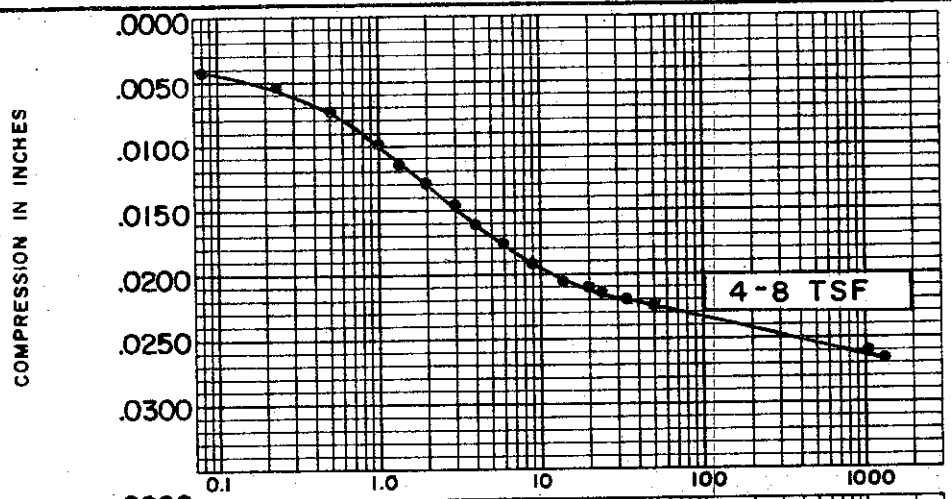
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVE

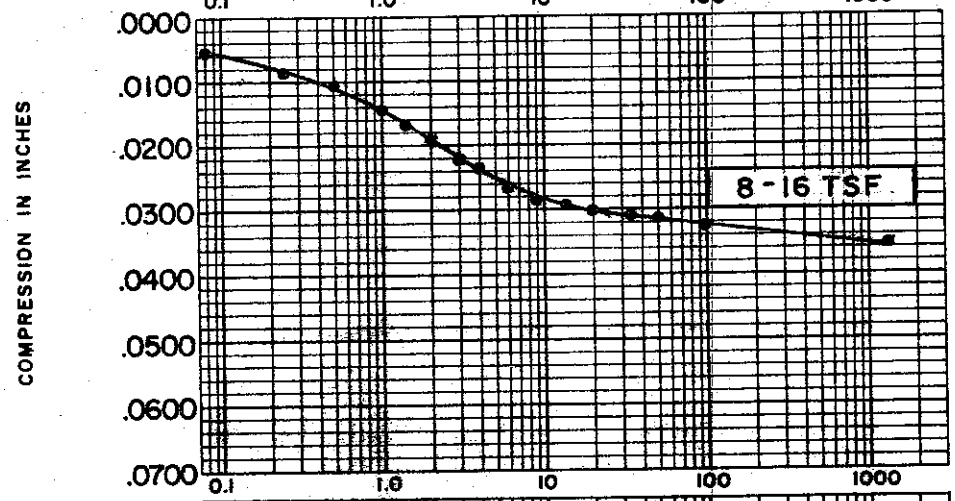
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

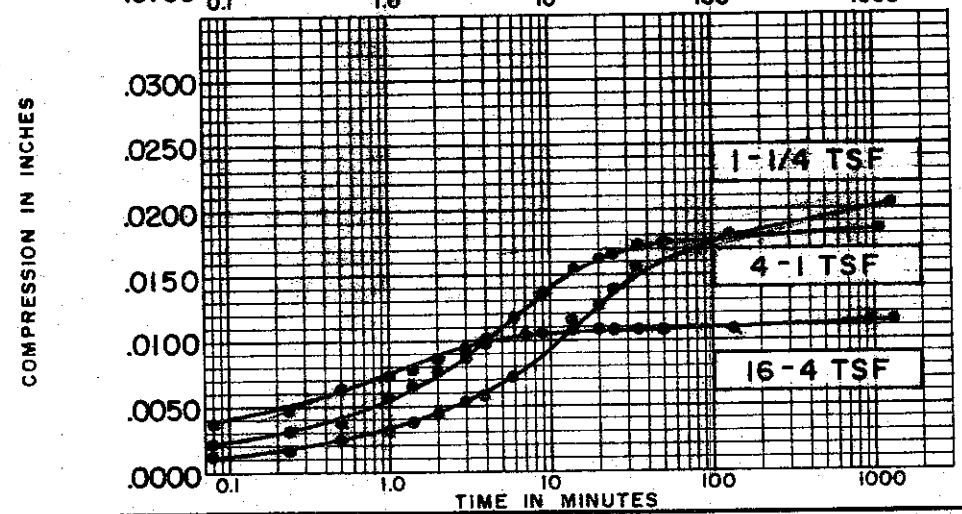
FILE 1255

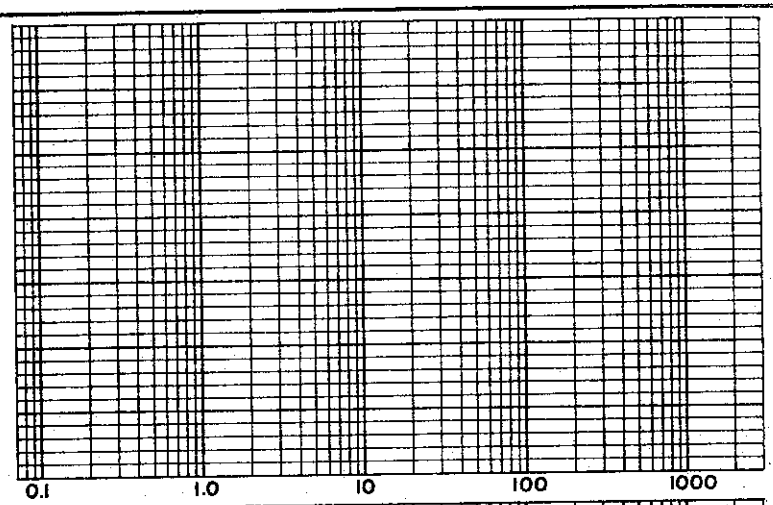
C-557

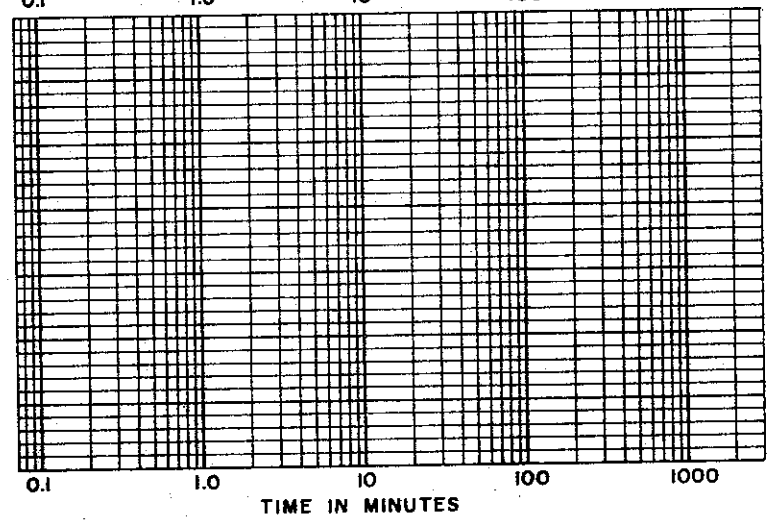
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 28.0 %
FINAL WATER CONTENT 24.5 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.730

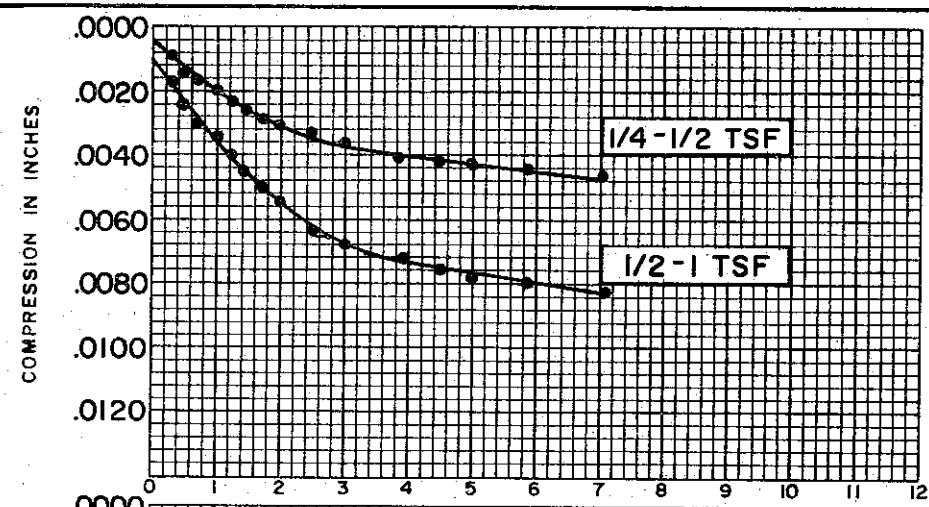
BORING NO. 129
SAMPLE NO. 21
DEPTH 103.7' TO 104.0'

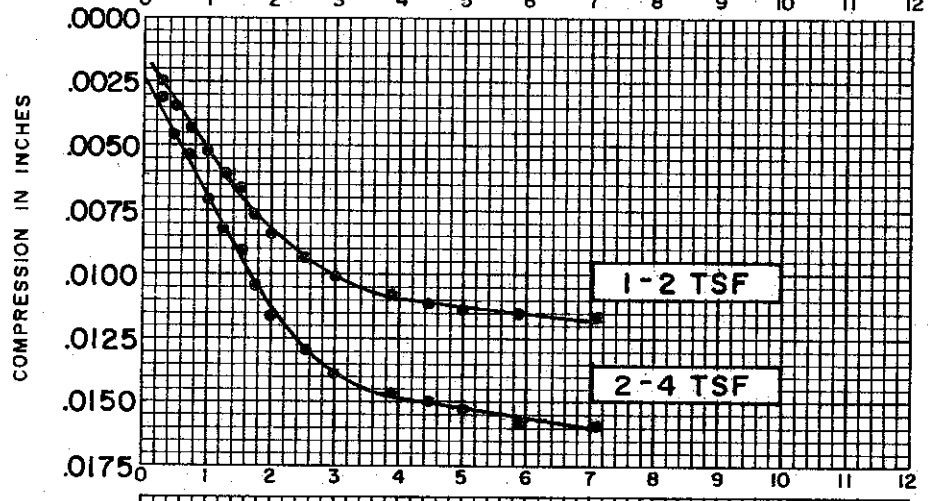
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

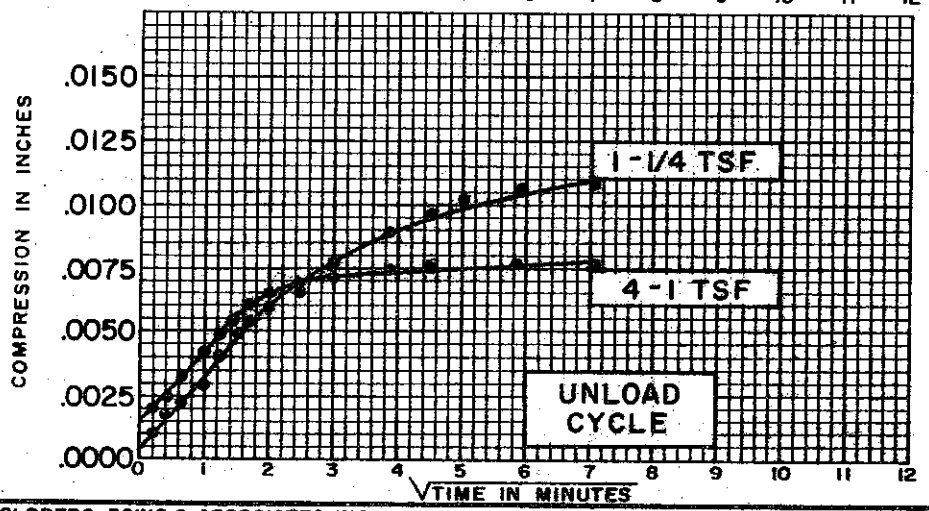
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

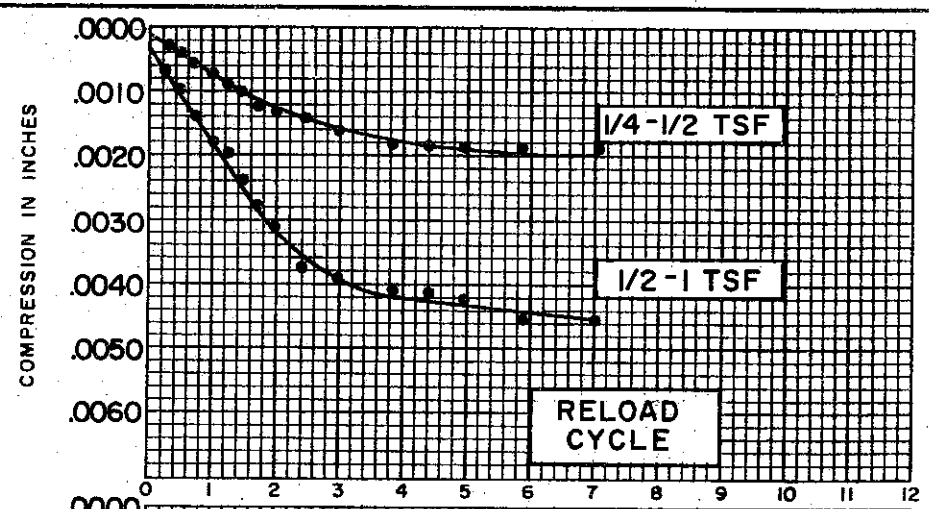
FILE 1255

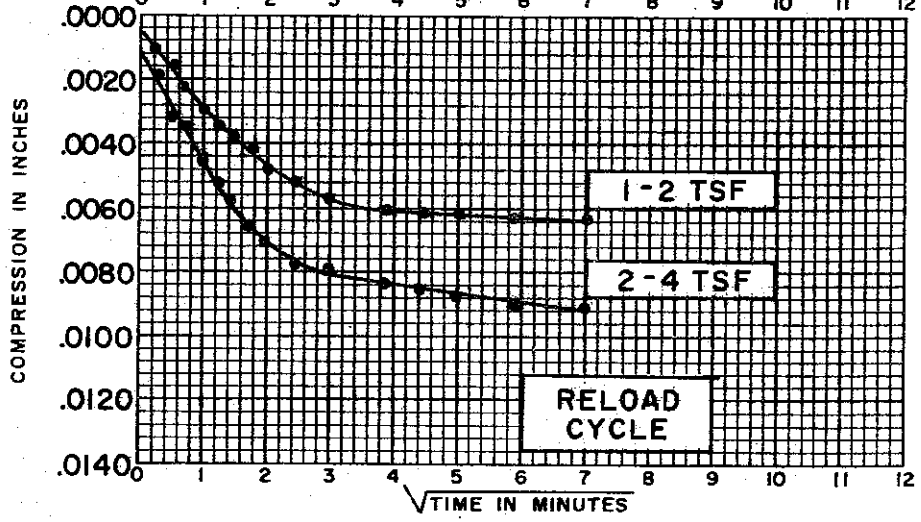
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 28.0 %
FINAL WATER CONTENT 24.5 %

BORING NO. 129
SAMPLE NO. 21
DEPTH 103.7' TO 104.0'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.730

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

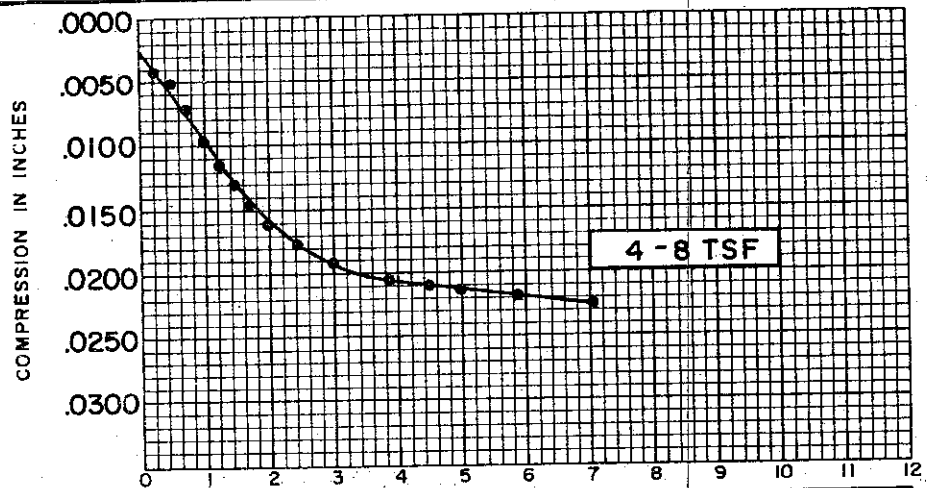
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

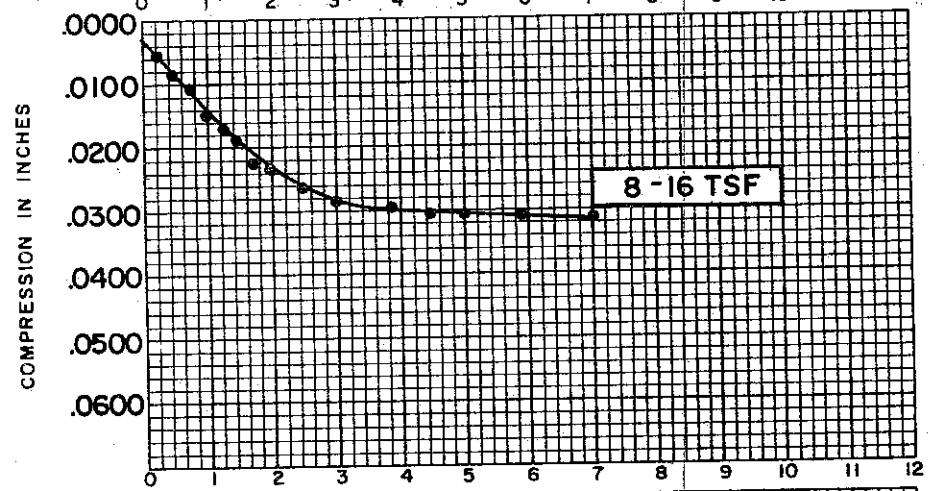
FILE 1255

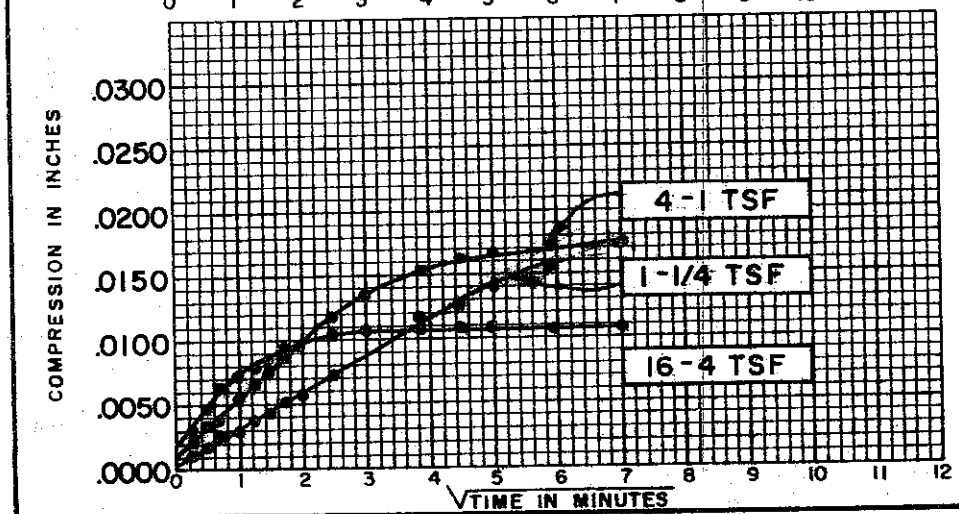
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

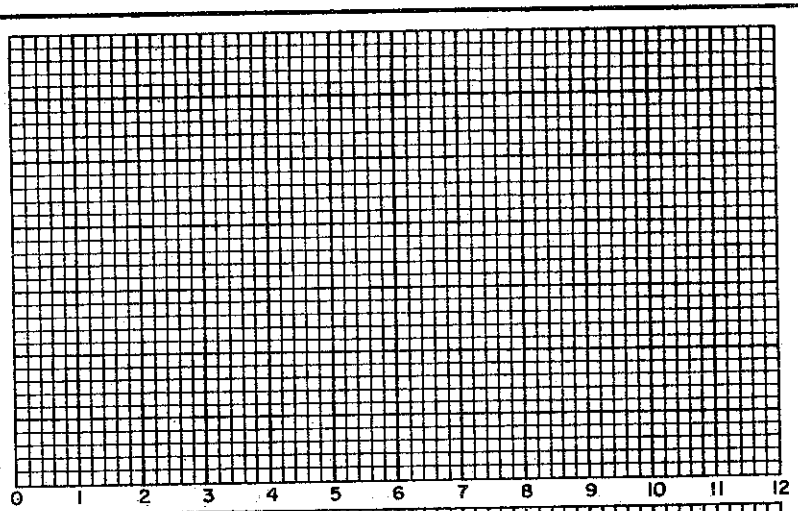
C-559

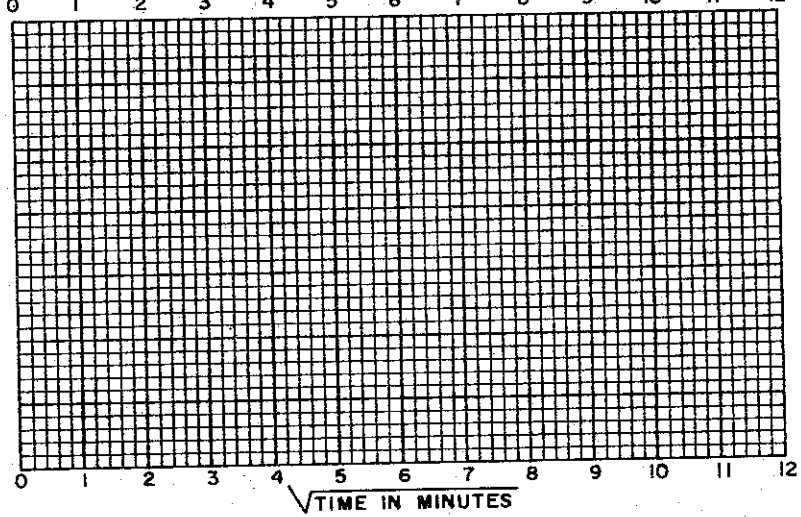
C-560











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71
INITIAL WATER CONTENT 28.0 %
FINAL WATER CONTENT 24.5 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.730

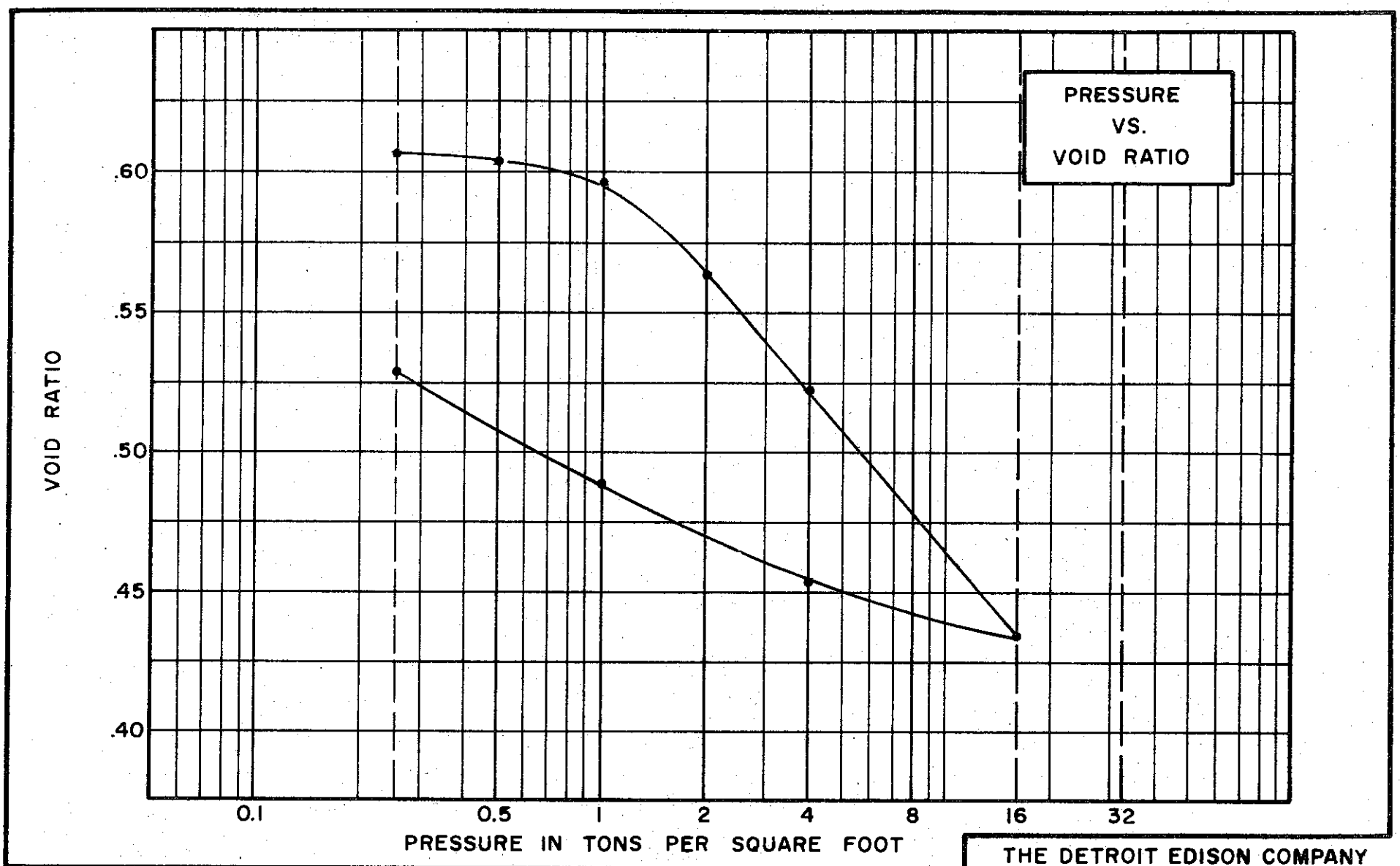
BORING NO. 129
SAMPLE NO. 21
DEPTH 103.7' TO 104.0'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.74

WATER CONTENT, INITIAL (17.3)% FINAL 21.3%

ATTERBERG LIMITS:

LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.750"

INITIAL SAMPLE DIAMETER 2.500"

INITIAL HEIGHT OF SOIL SOLIDS 0.448"

INITIAL VOID RATIO (0.675) AS COMPACTED

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

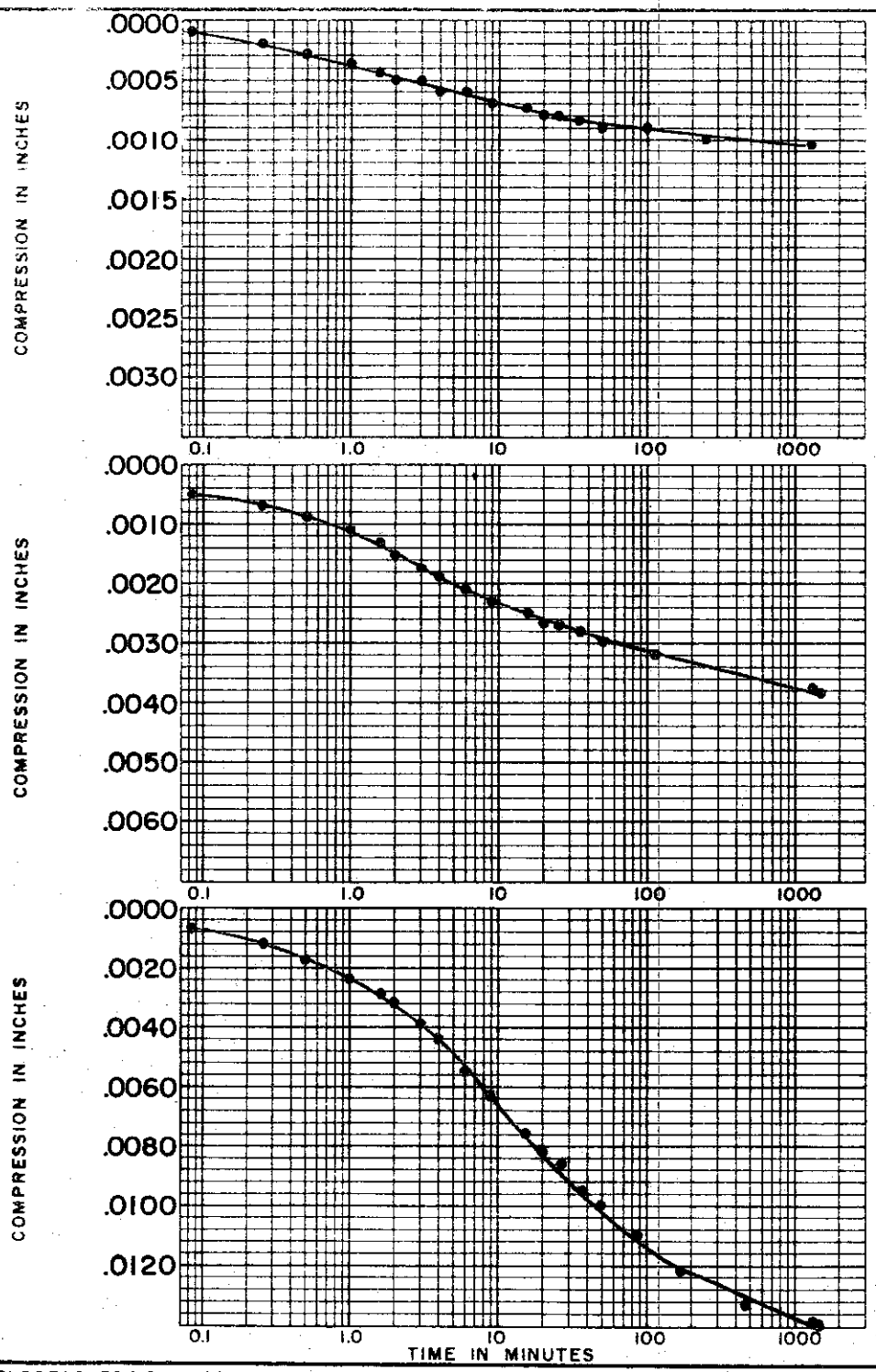
BORING NO. 136 TEST NO. C527.1

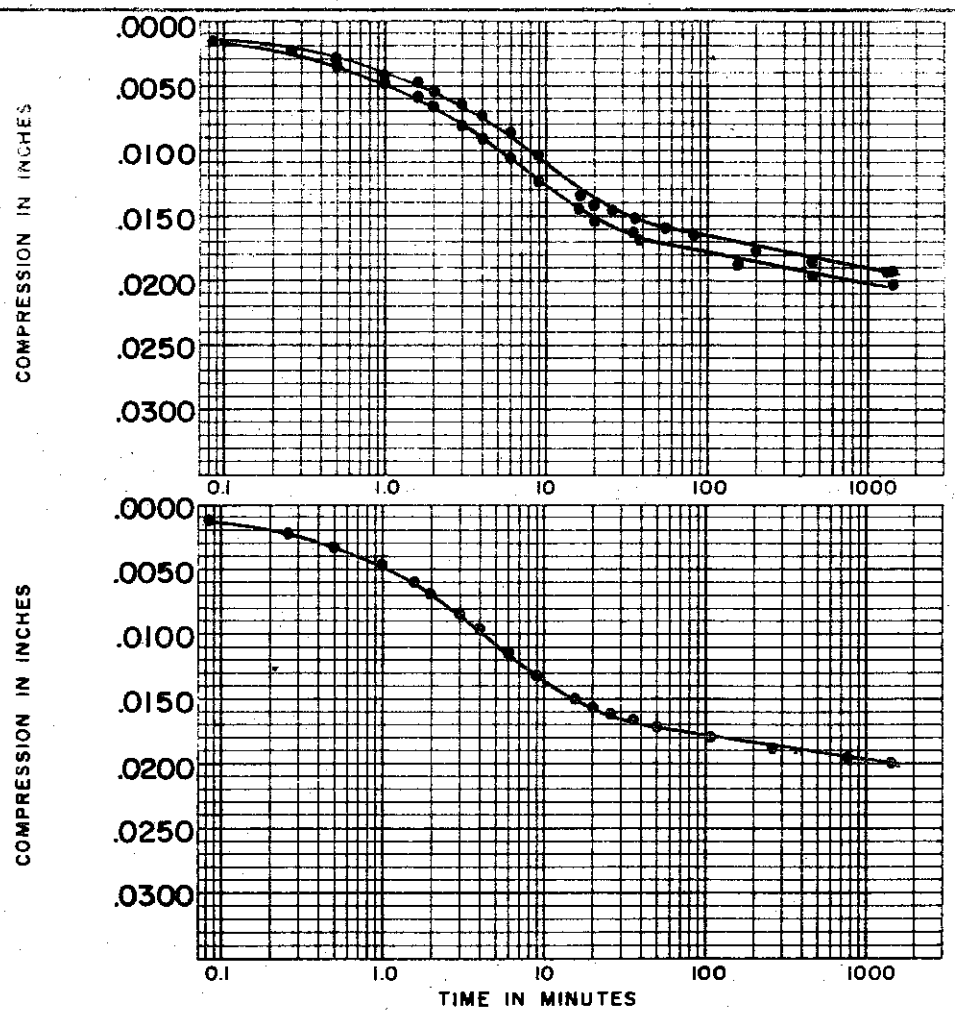
SAMPLE NO. ST 6 DATE DEC. 1974

DEPTH 13.0' TO 14.6'

C-561

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.74
INITIAL WATER CONTENT (17.3) %
FINAL WATER CONTENT 21.3 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO (0.675)

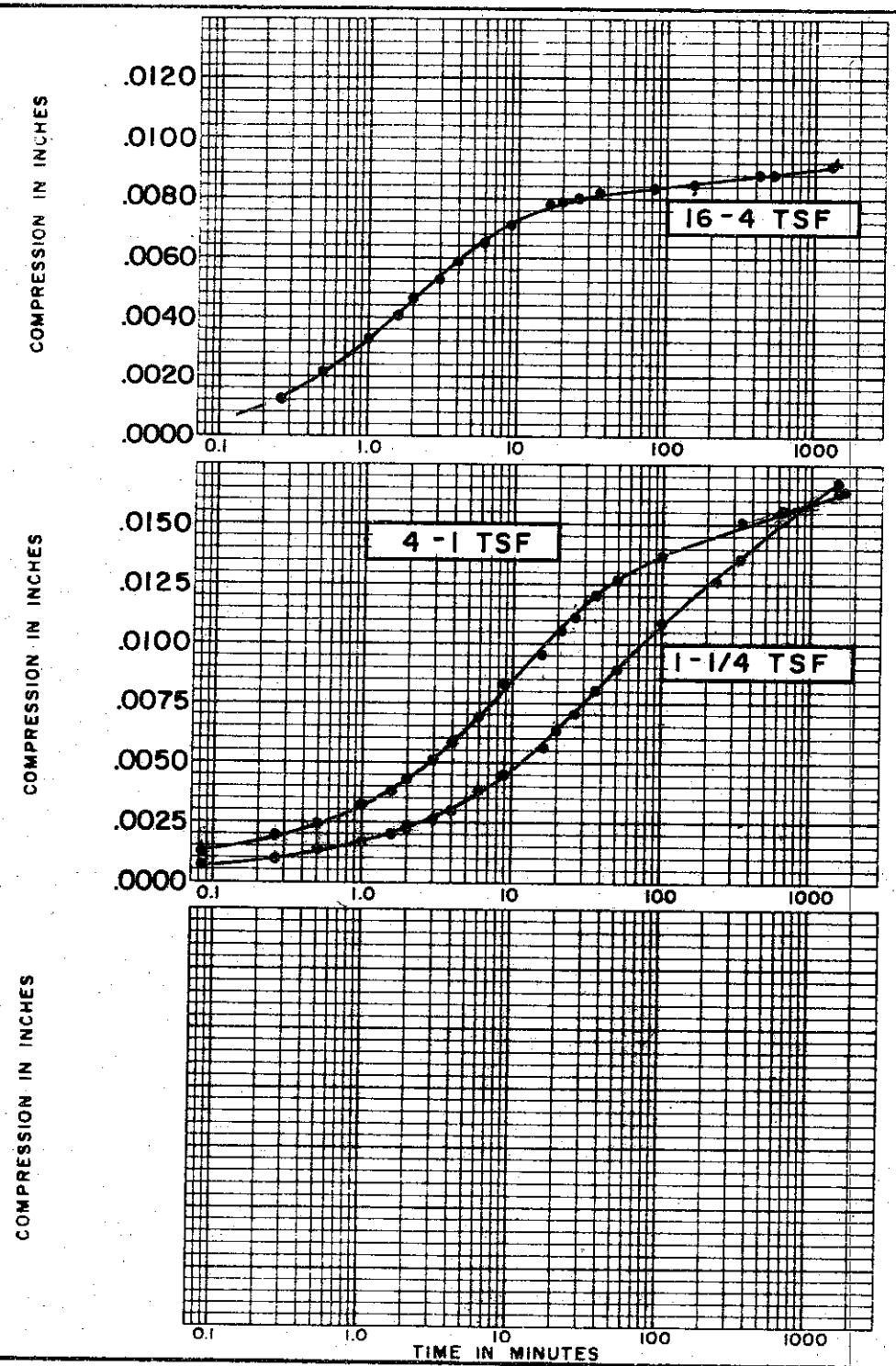
BORING NO. 136
SAMPLE NO. ST 6
DEPTH 13.0' TO 14.6'

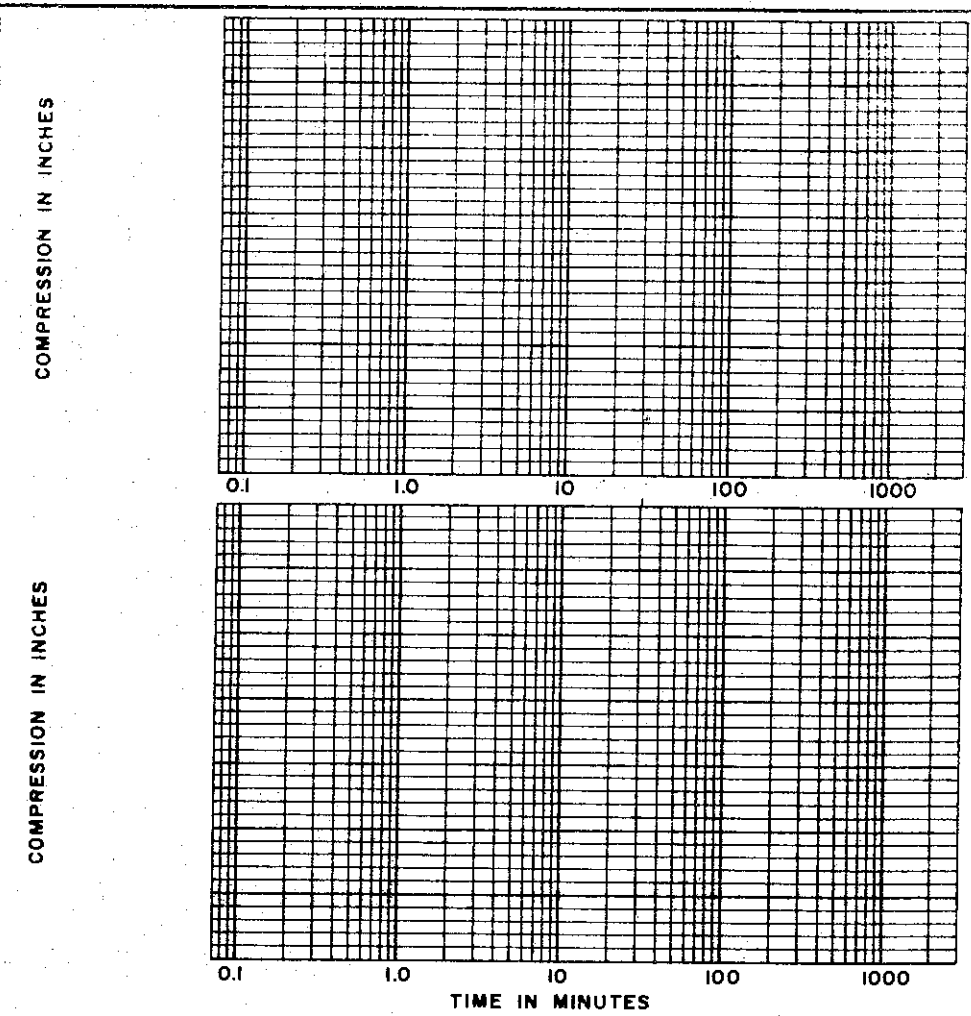
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.74
INITIAL WATER CONTENT (17.3) %
FINAL WATER CONTENT 21.3 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO (0.675)

BORING NO. 136
SAMPLE NO. ST 6
DEPTH 13.0' TO 14.6'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

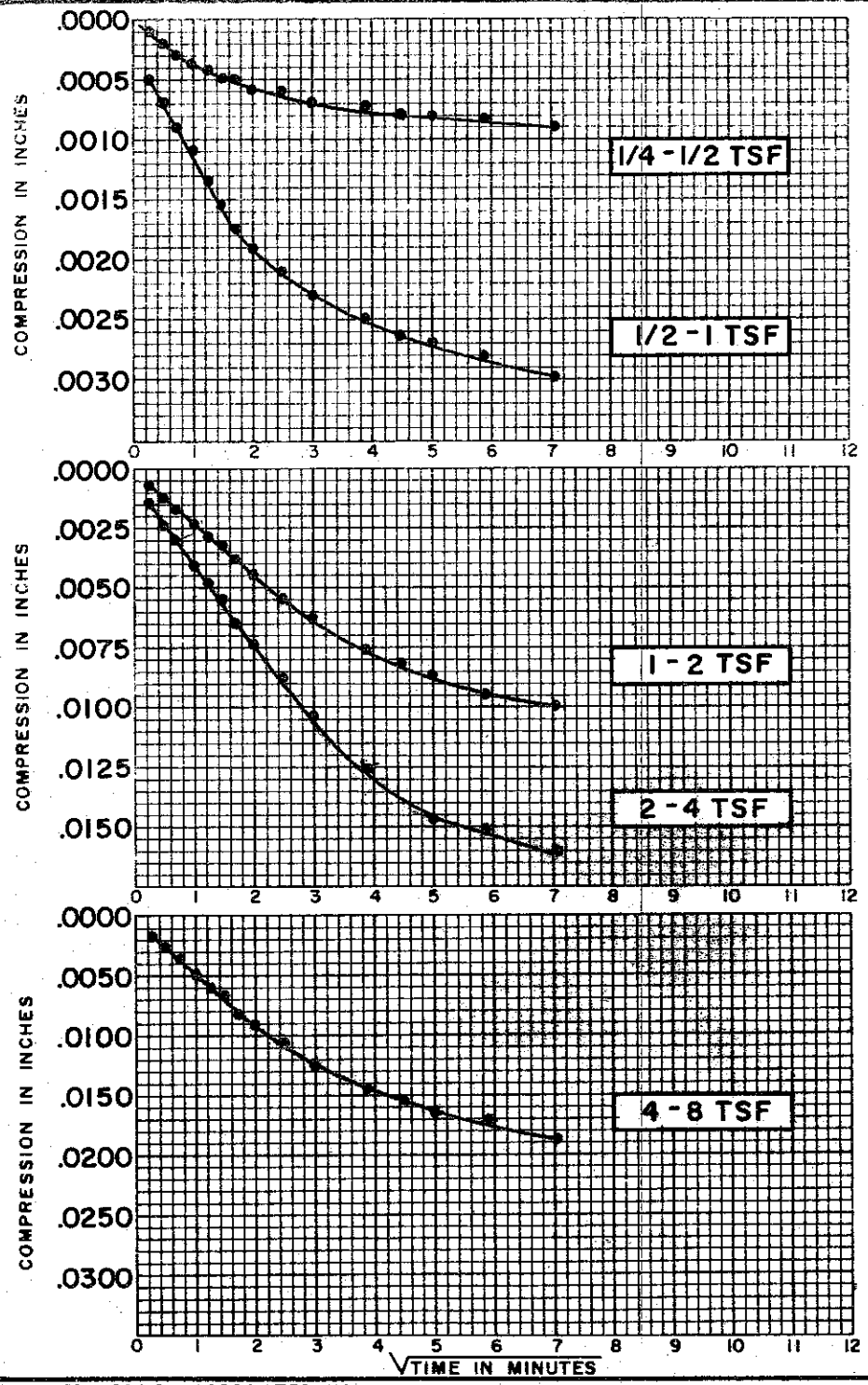
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

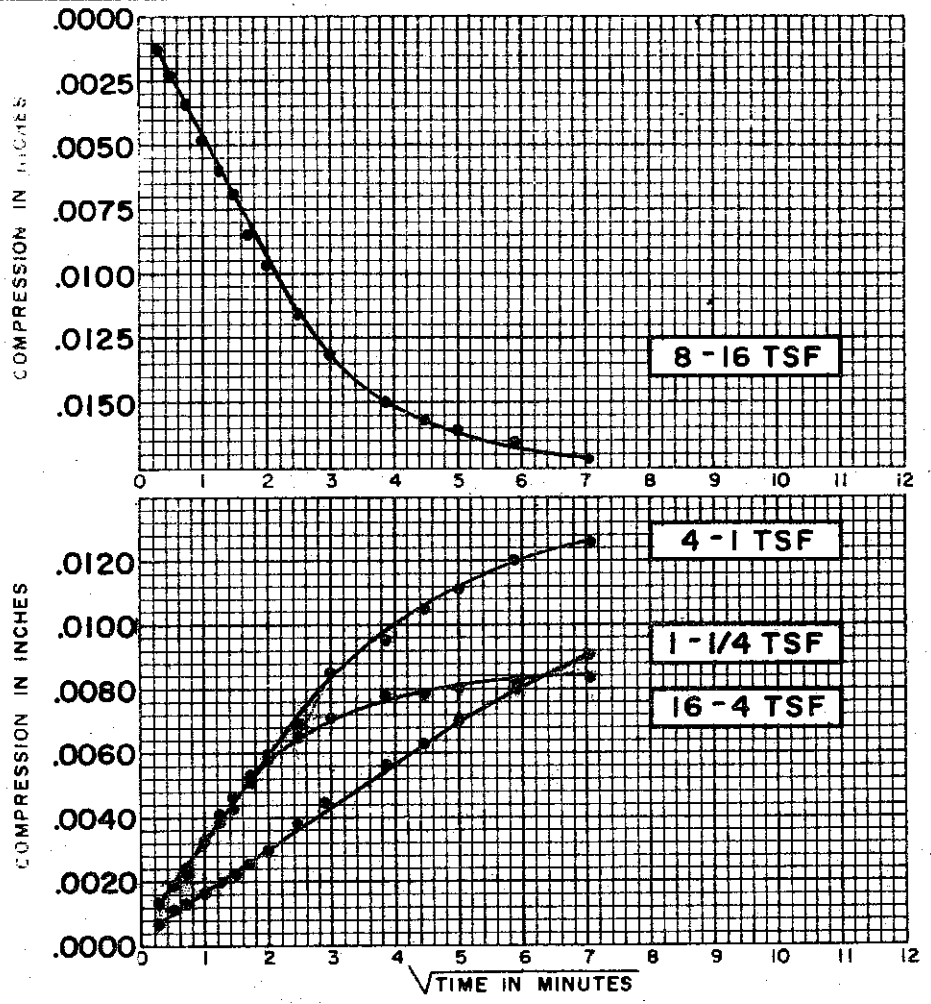
FILE 1255

C-563

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-564





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.74
INITIAL WATER CONTENT (17.3) %
FINAL WATER CONTENT 21.3 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO (0.675)

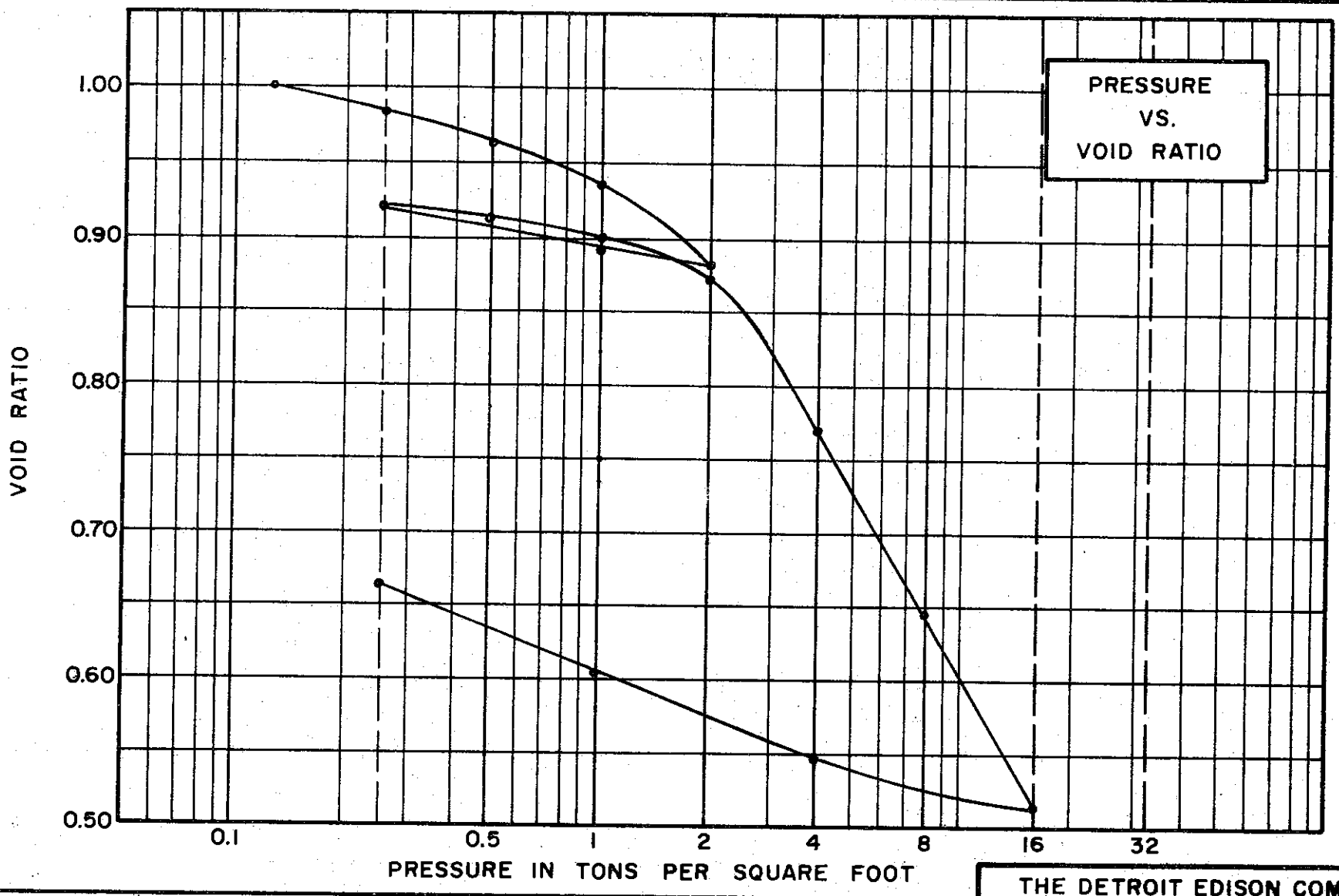
BORING NO. 136
SAMPLE NO. ST 6
DEPTH 13.0' TO 14.6'

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.70

WATER CONTENT, INITIAL 38.2% FINAL 30.5%

ATTERBERG LIMITS:

LIQUID LIMIT 45 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 1.019

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 142 TEST NO. C535.1

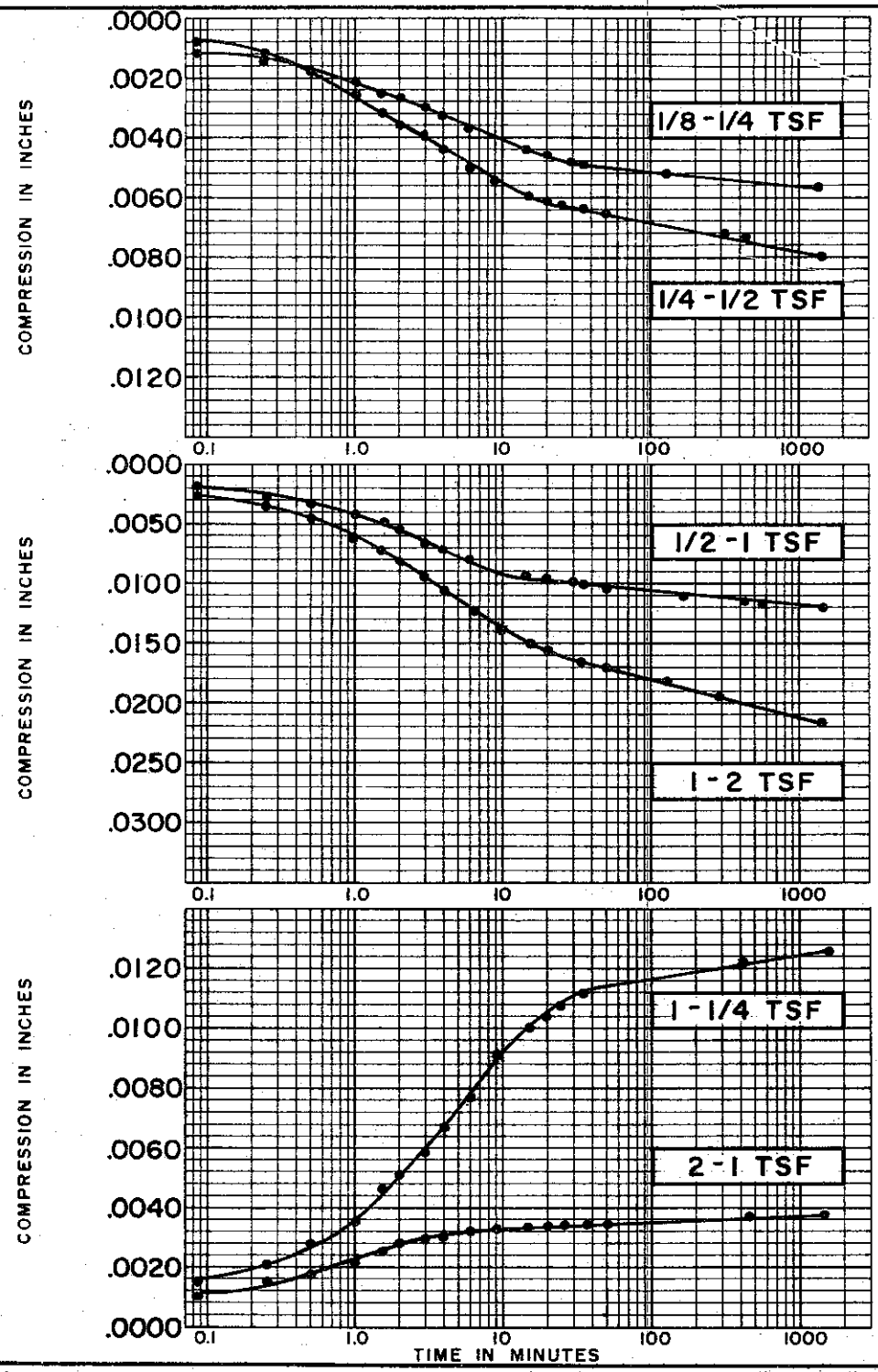
SAMPLE NO. 6 DATE NOV. 1974

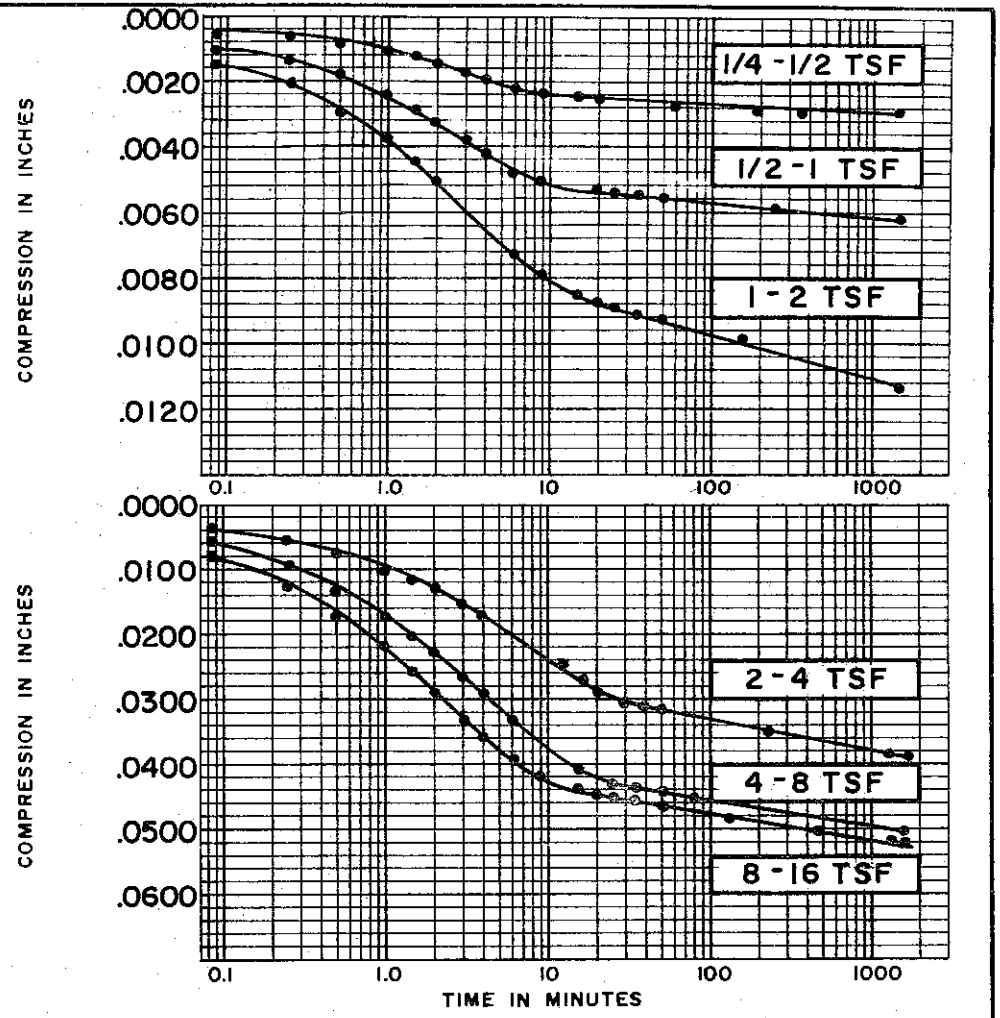
DEPTH 20.1' TO 20.5'

C-565

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

FILE 1255





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 38.2 %
FINAL WATER CONTENT 30.5 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.019

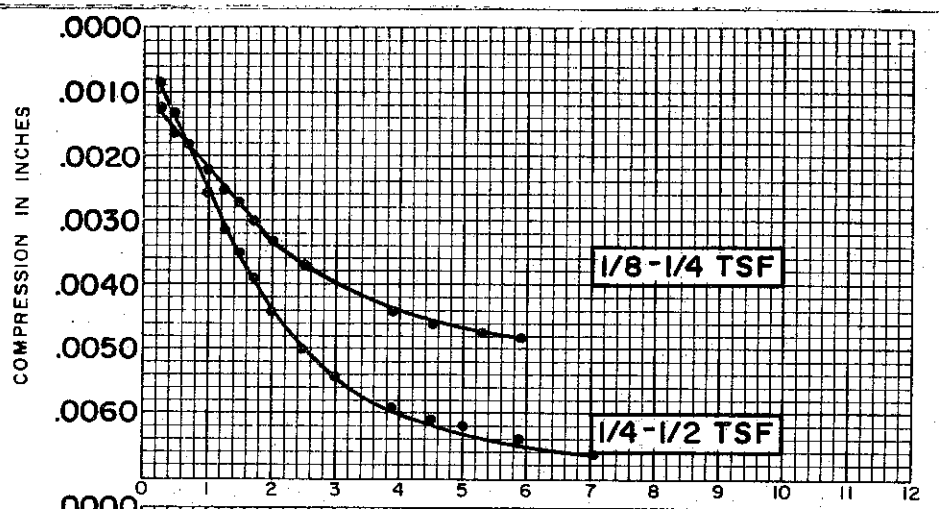
BORING NO. 142
SAMPLE NO. 6
DEPTH 20.1' TO 20.5'

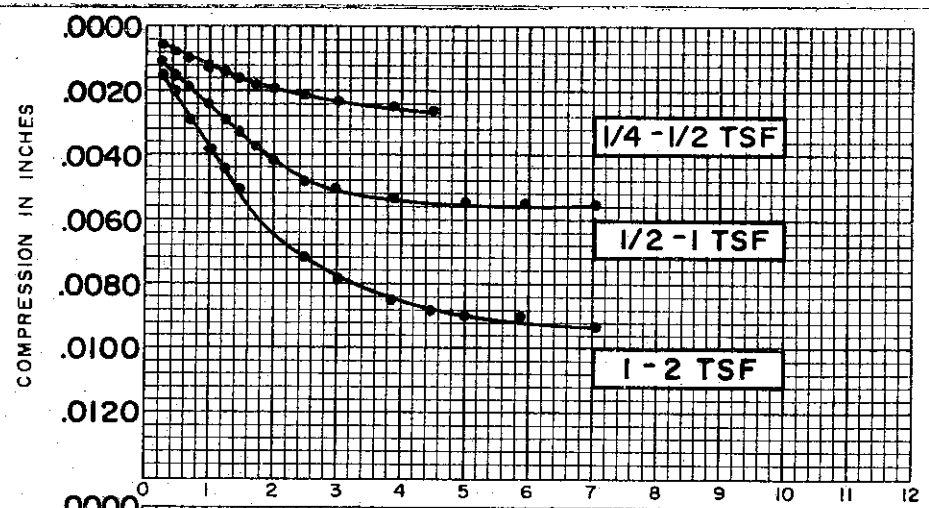
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

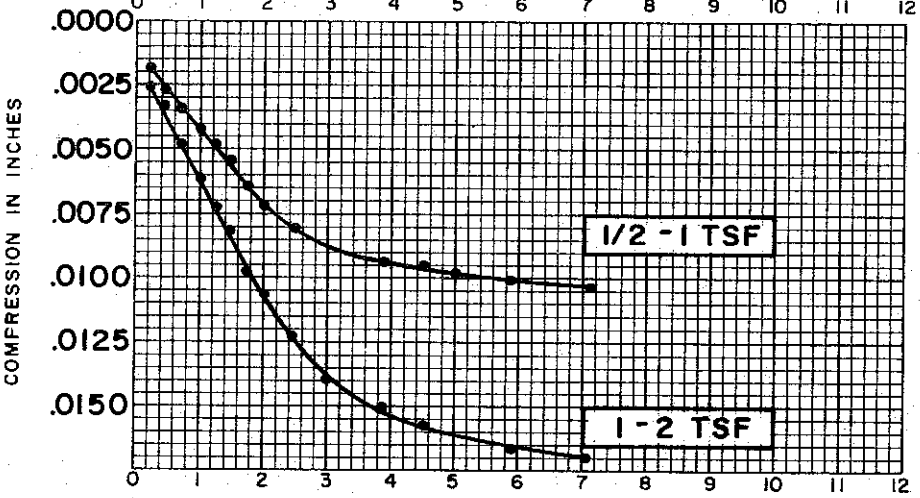
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

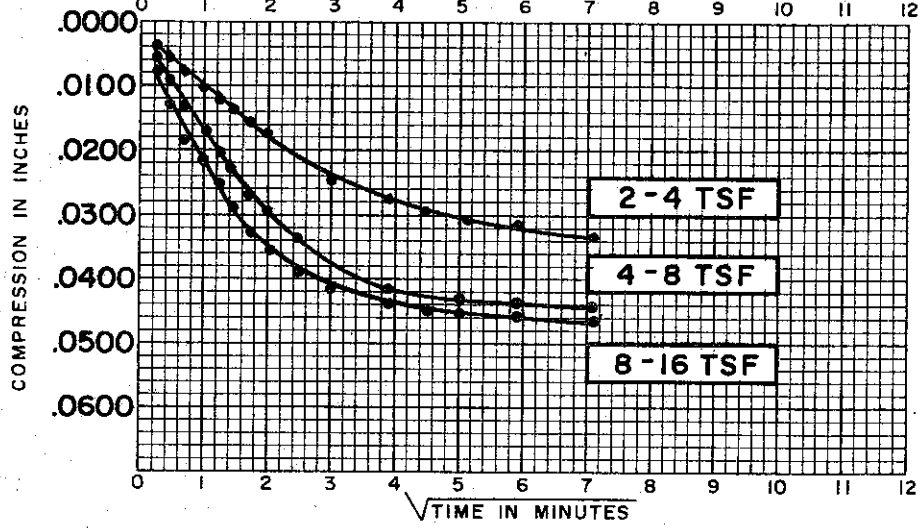
FILE 1255

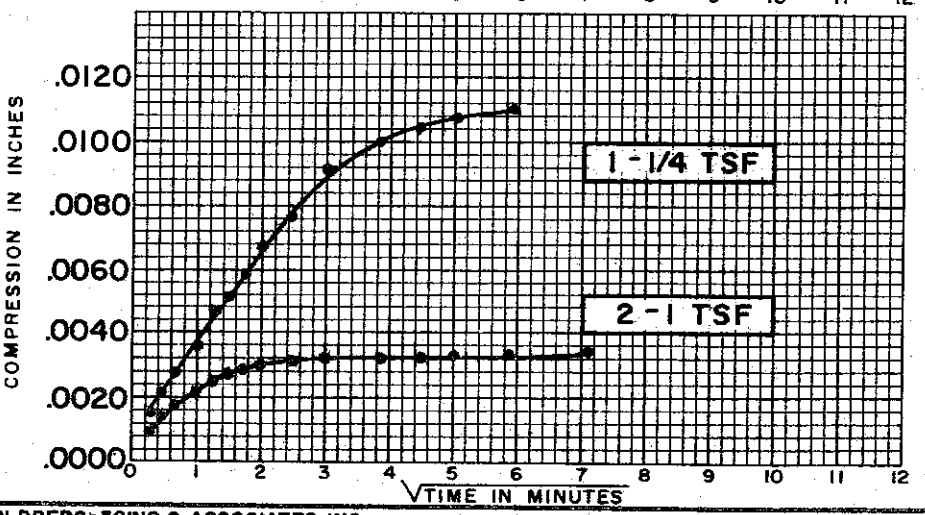
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.70
INITIAL WATER CONTENT 38.2 %
FINAL WATER CONTENT 30.5 %

BORING NO. 142
SAMPLE NO. 6
DEPTH 20.1' TO 20.5'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 1.019

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-567

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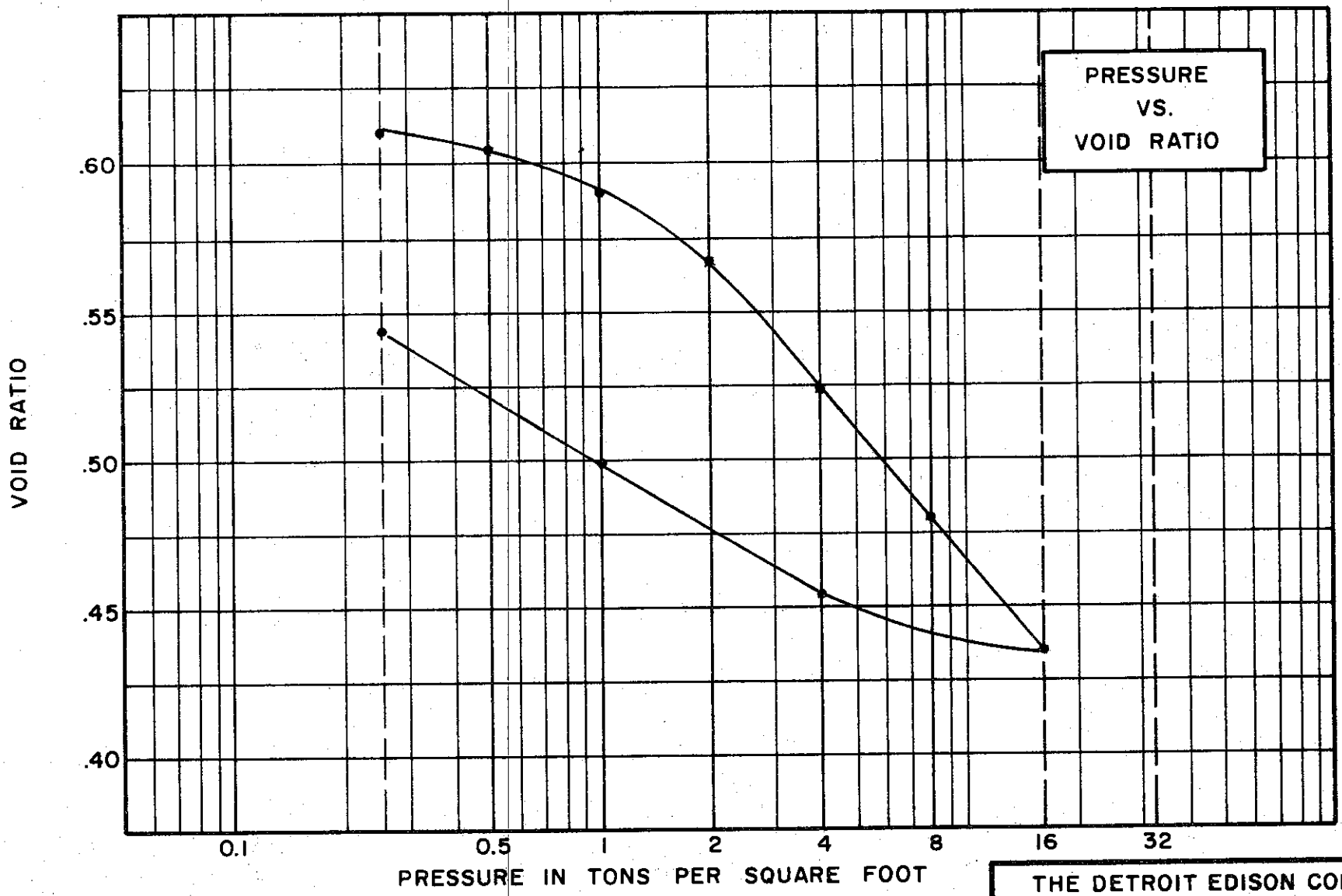


SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.75

WATER CONTENT, INITIAL 15.9% FINAL 22.2%

ATTERBERG LIMITS:

LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.750"

INITIAL SAMPLE DIAMETER 2.500"

INITIAL HEIGHT OF SOIL SOLIDS 0.447"

INITIAL VOID RATIO (0.679) AS COMPACTED

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

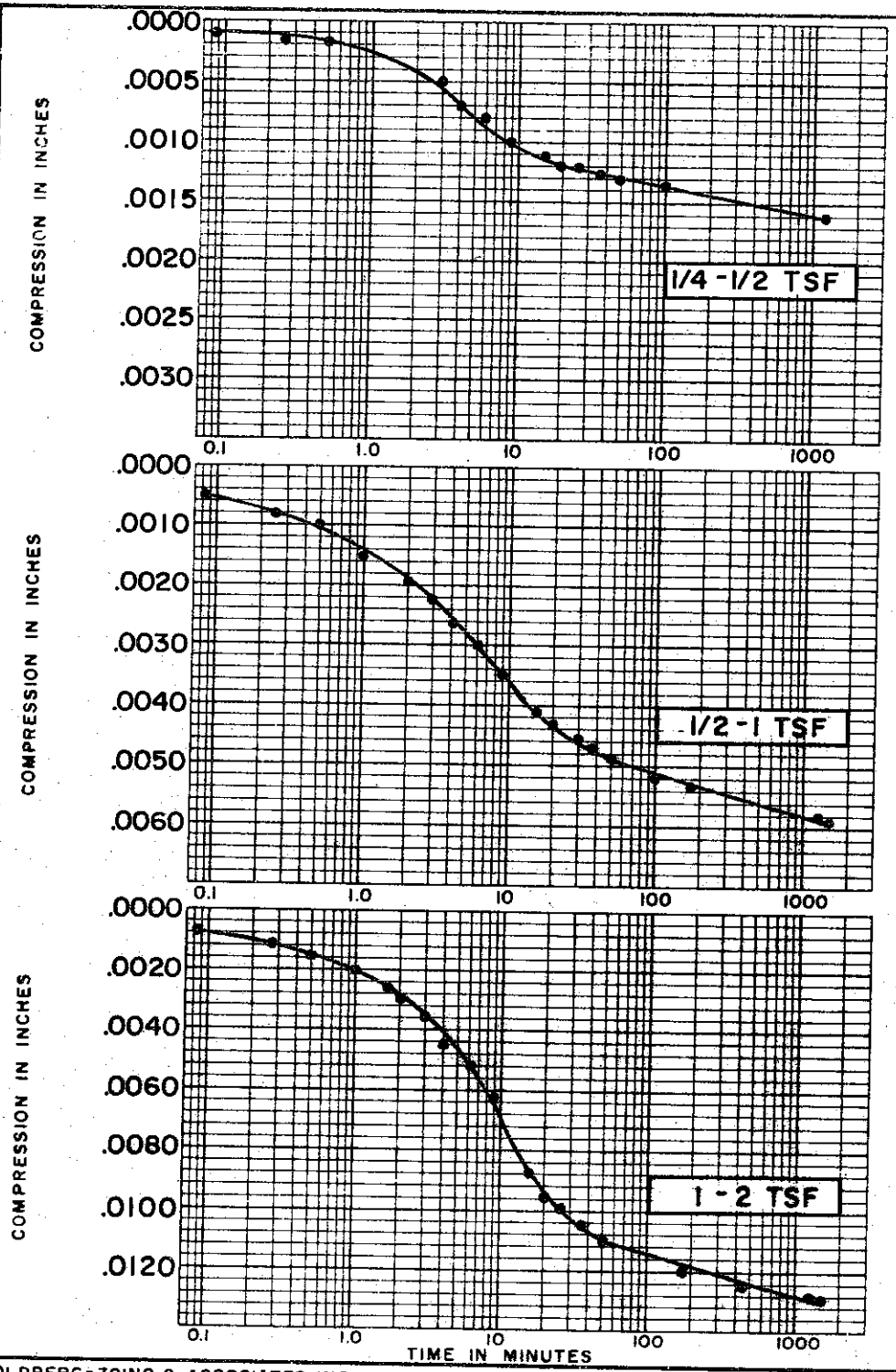
CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

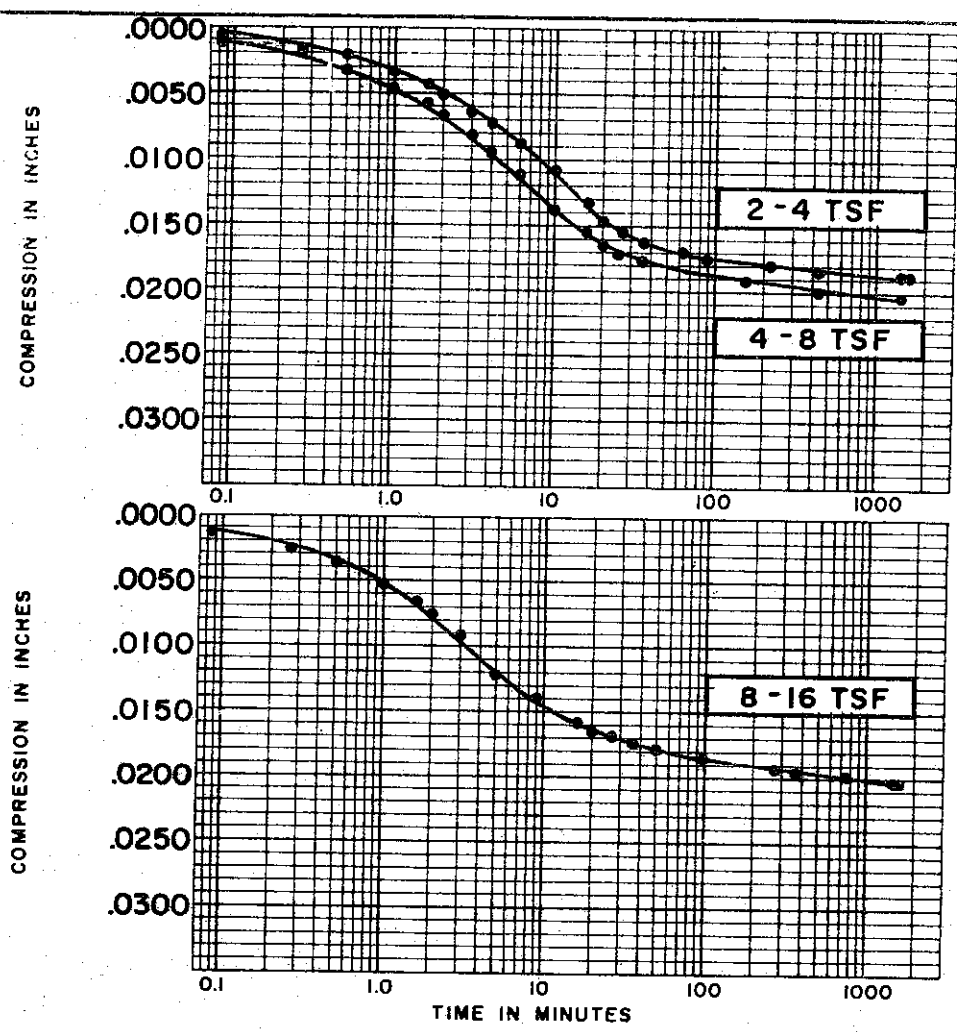
BORING NO. 146 TEST NO. C542.1

SAMPLE NO. 7 DATE DEC. 1974

DEPTH 14.0' TO 16.1'

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT (15.9)%
FINAL WATER CONTENT 22.2%

BORING NO. 146
SAMPLE NO. ST 7
DEPTH 14.0' TO 16.1'

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO (0.679)

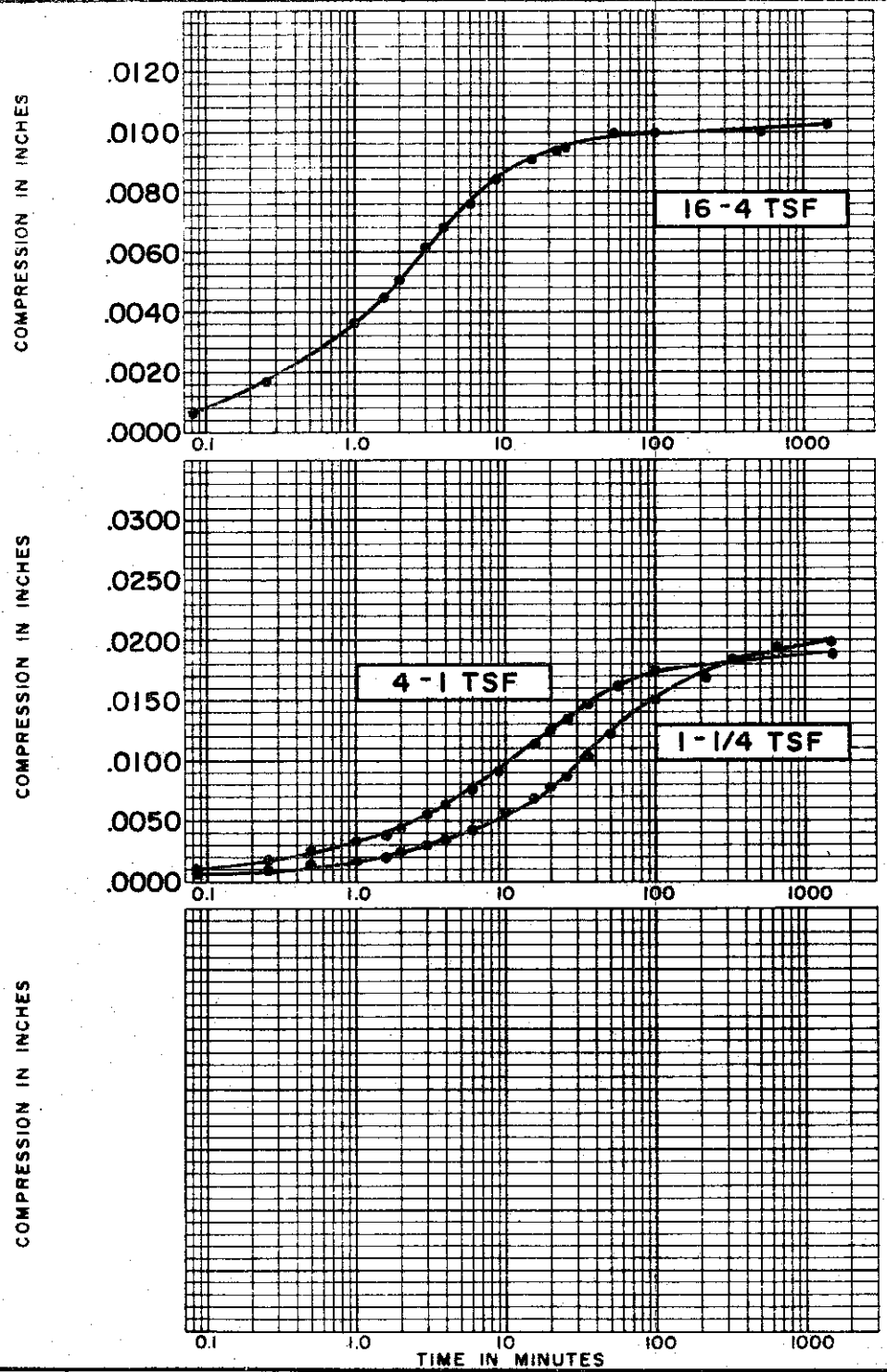
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

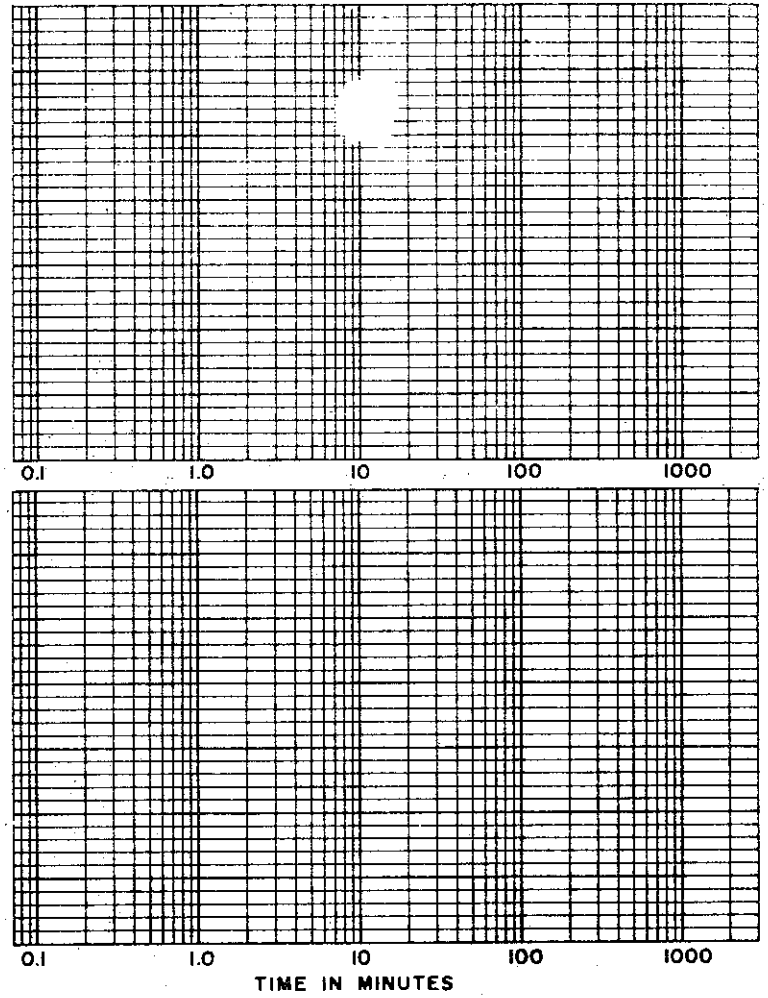
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-570





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT (15.9)%
FINAL WATER CONTENT 22.2%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO (0.679)

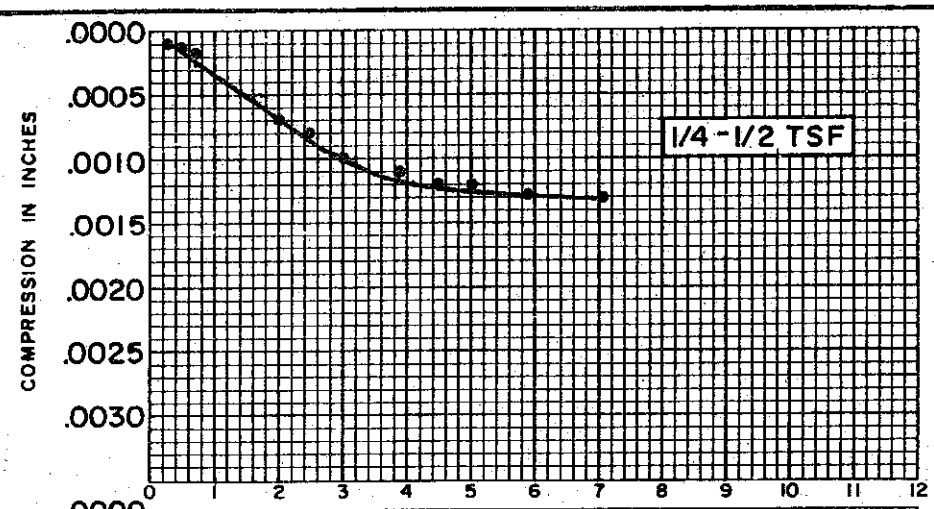
BORING NO. 146
SAMPLE NO. ST 7
DEPTH 14.0' TO 16.1'

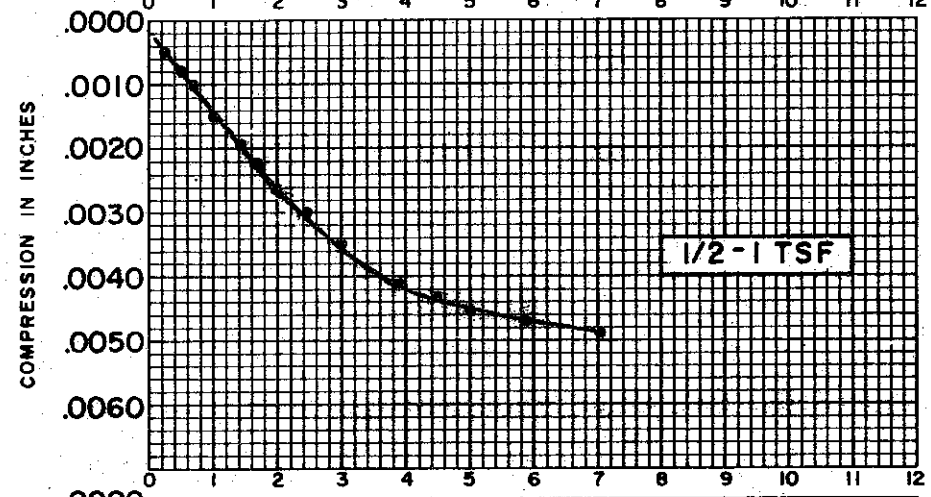
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

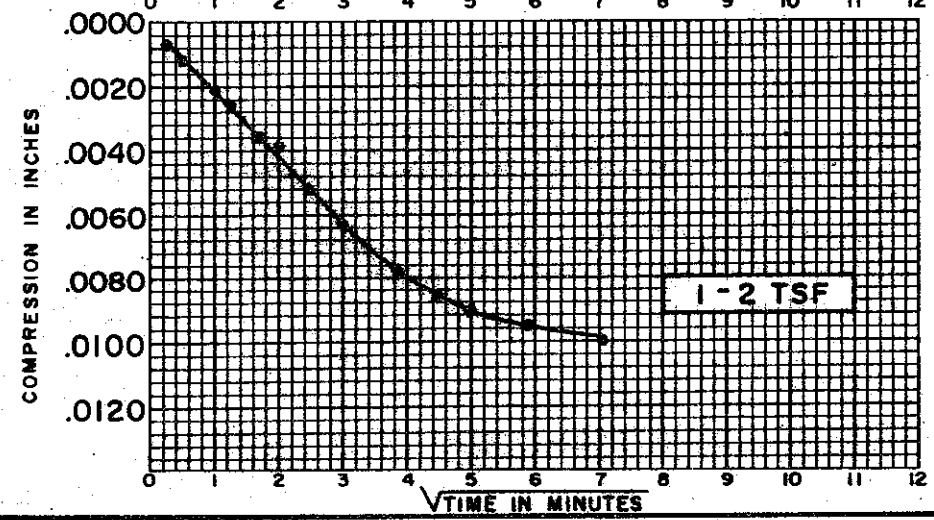
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

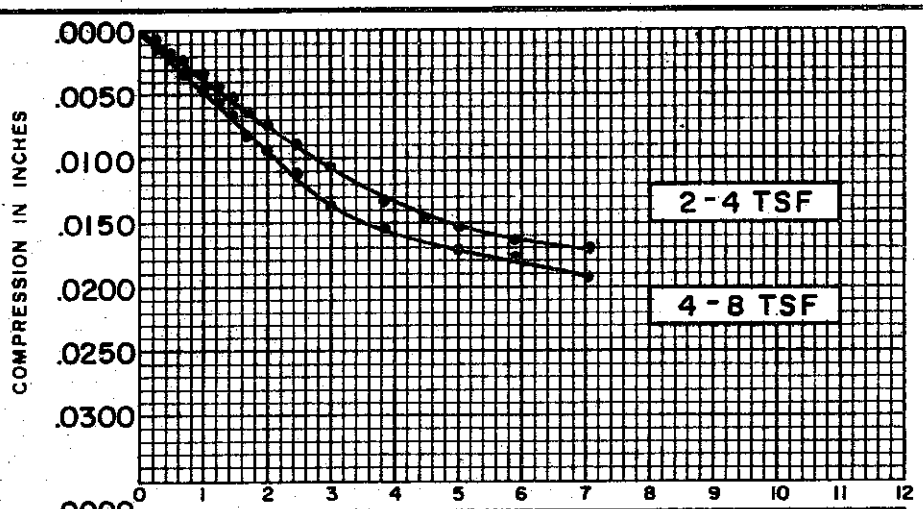
FILE 1255

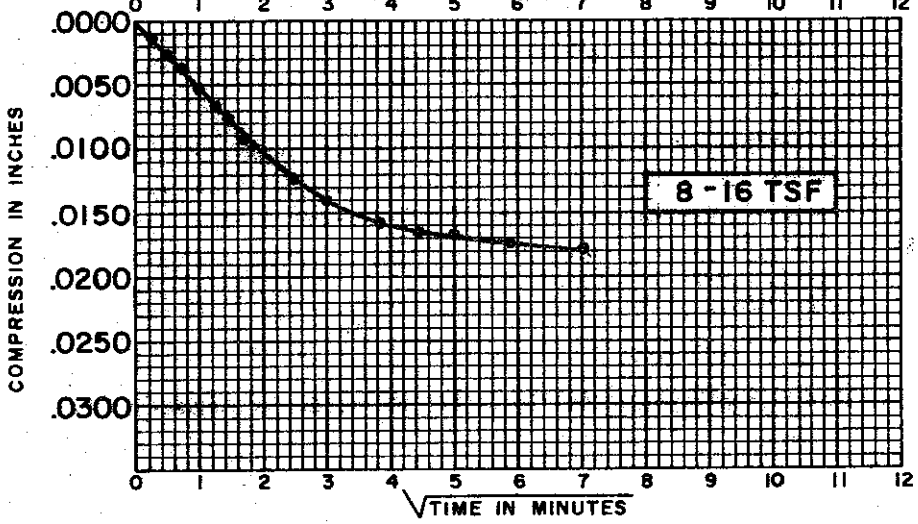
GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT (15.9) %
FINAL WATER CONTENT 22.2 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO (0.679)

BORING NO. 146
SAMPLE NO. ST 7
DEPTH 14.0' TO 16.1'

CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

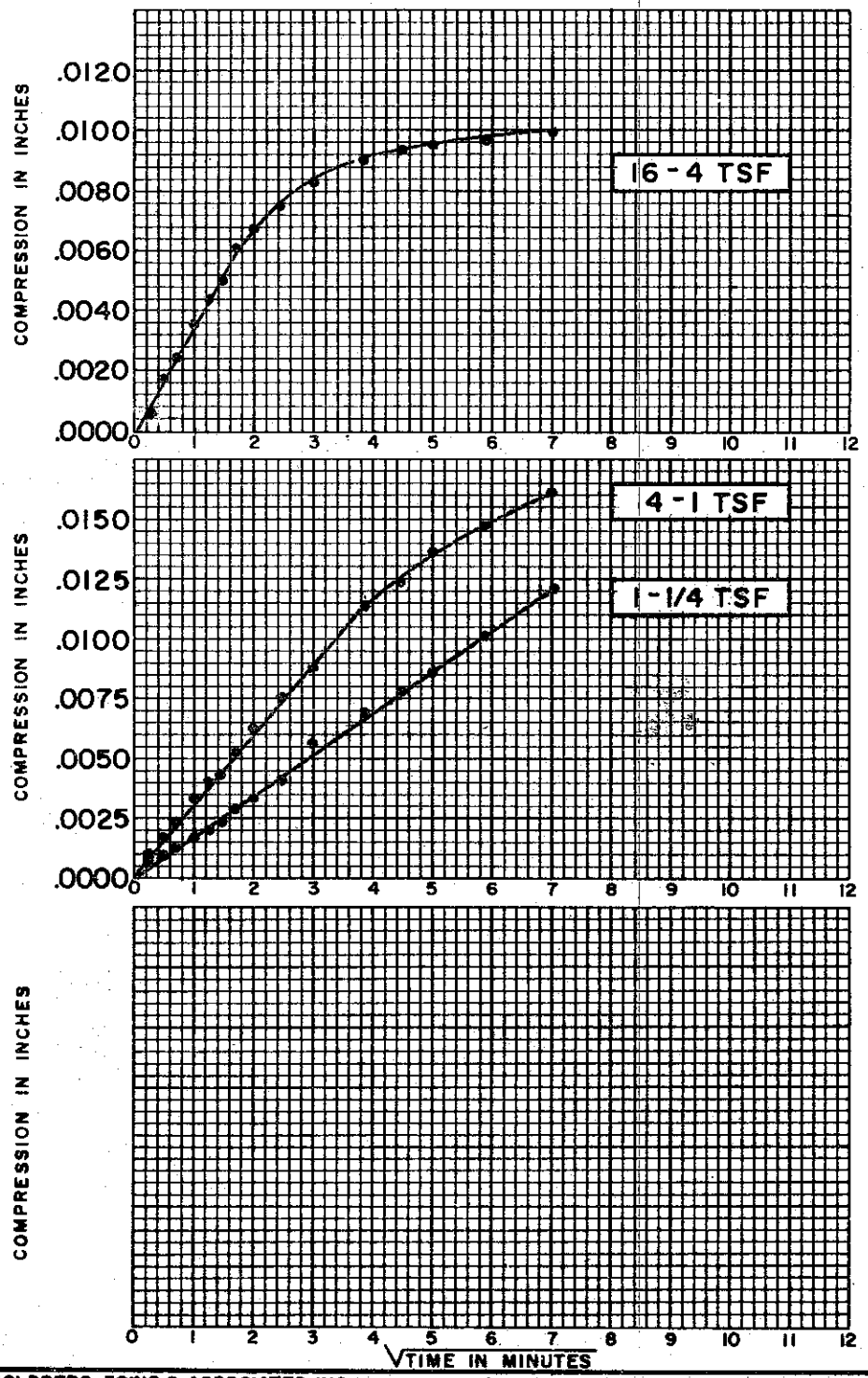
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

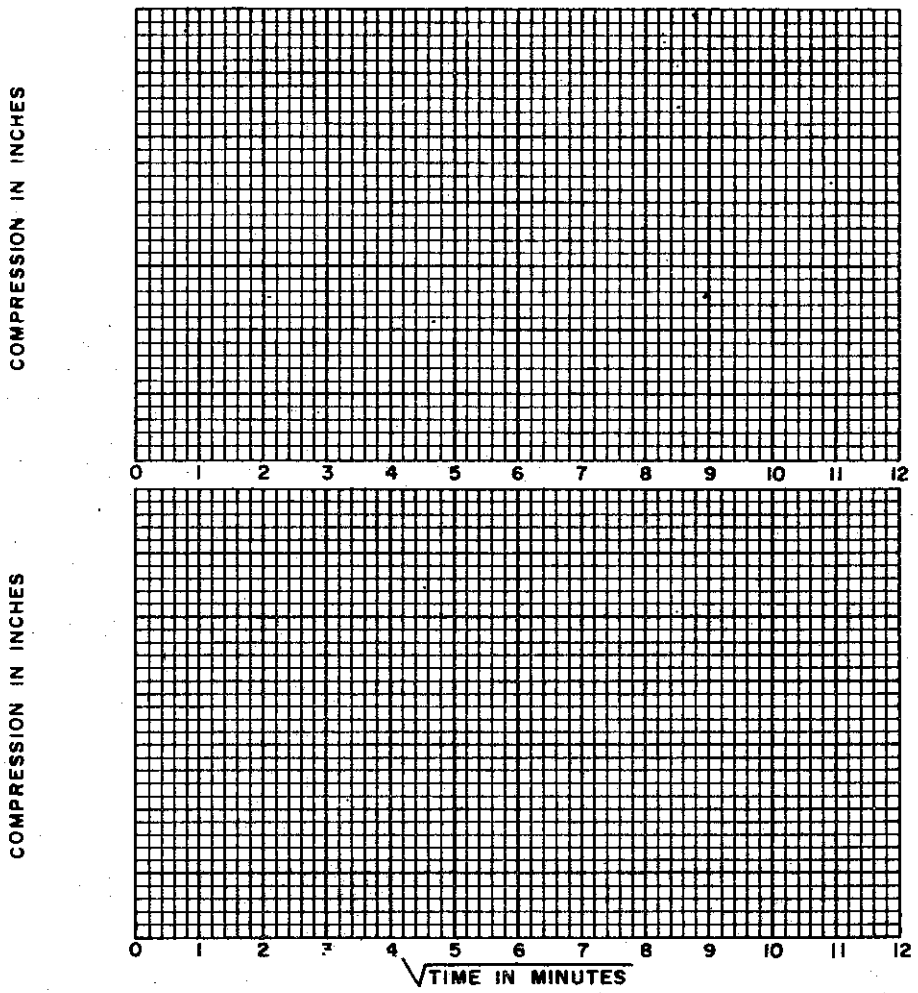
FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-571

C-572





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)
SPECIFIC GRAVITY 2.75
INITIAL WATER CONTENT 15.9 %
FINAL WATER CONTENT 22.2%

TEST DATA

INITIAL SAMPLE HEIGHT 0.75"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO (0.679)

BORING NO. 146
SAMPLE NO. ST 7
DEPTH 14.0' TO 16.1'

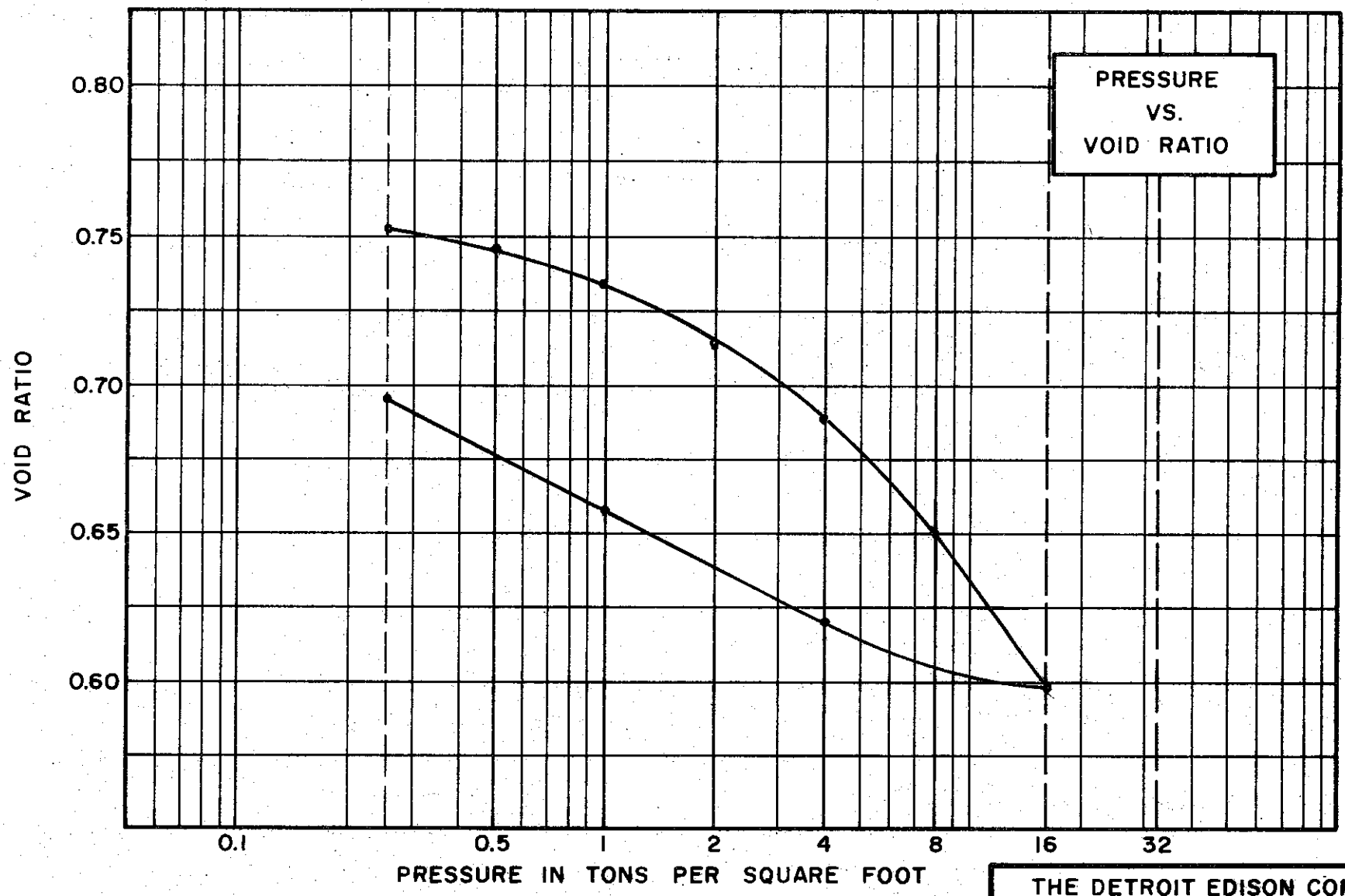
CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-454



SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL-CH)

SPECIFIC GRAVITY 2.72

WATER CONTENT, INITIAL 29.1% FINAL 28.9%

ATTERBERG LIMITS:
LIQUID LIMIT 50 % PLASTIC LIMIT 23 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"

INITIAL SAMPLE DIAMETER 2.50"

INITIAL VOID RATIO 0.757

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

CONSOLIDATION TEST
VOID RATIO VS. LOG PRESSURE

BORING NO. 185 TEST NO. C552.1

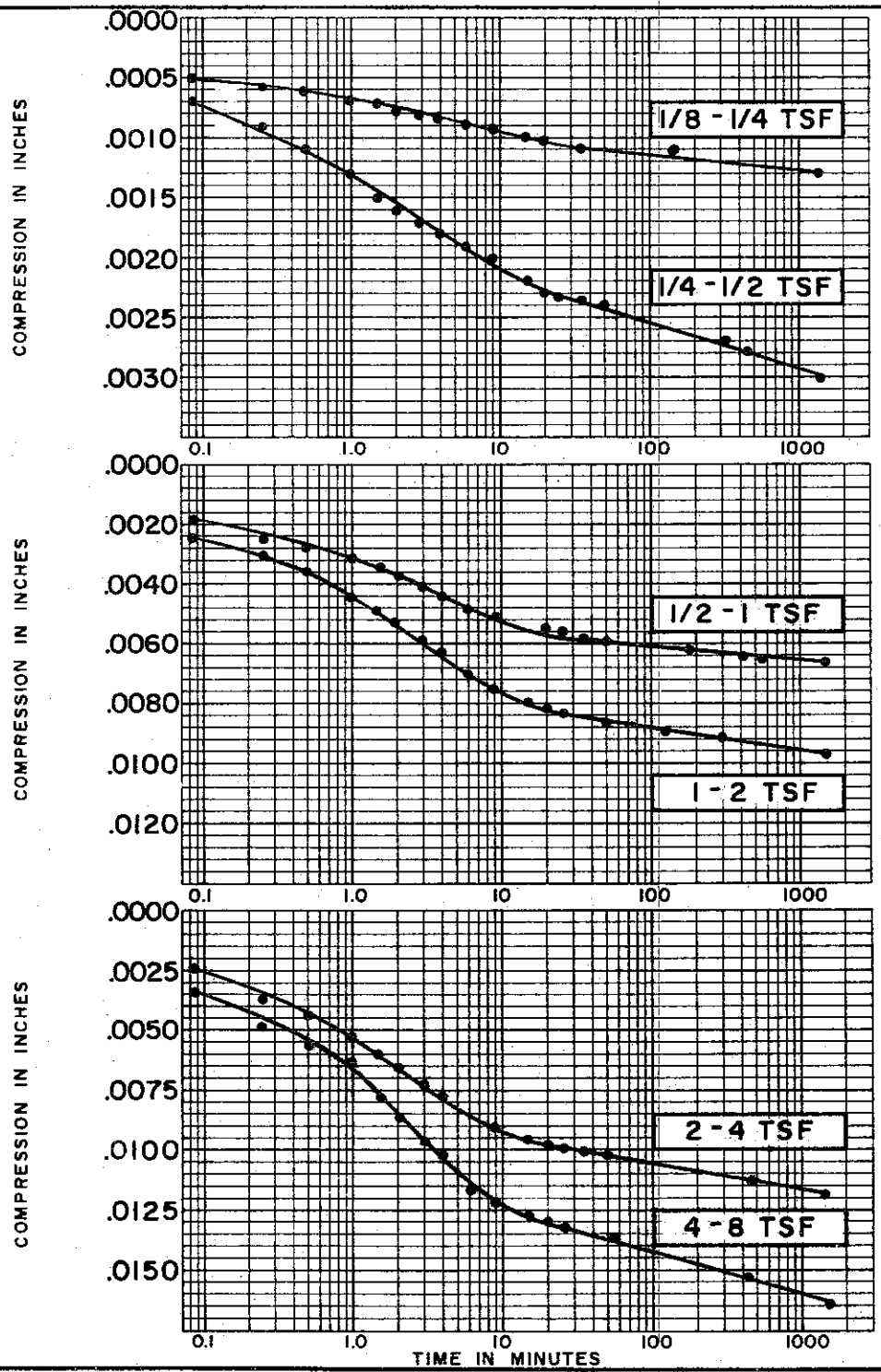
SAMPLE NO. 3 DATE NOV. 1974

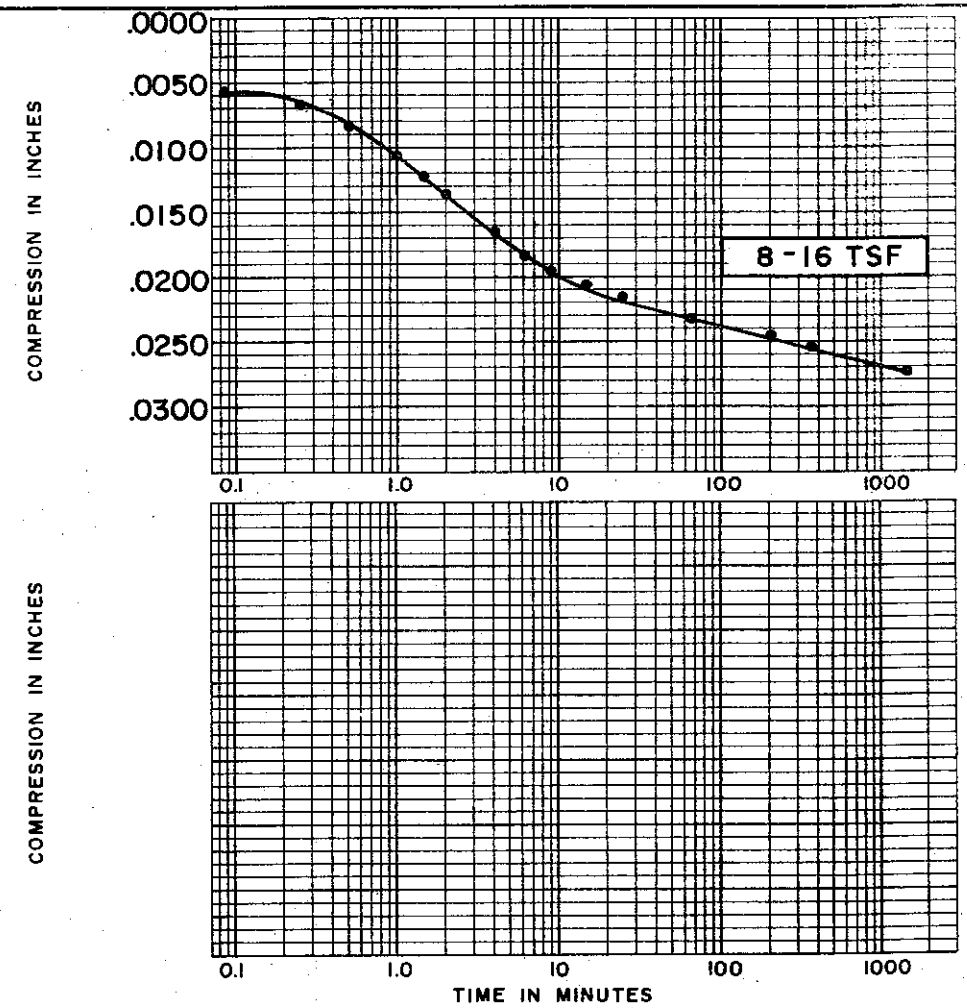
DEPTH 7.9' TO 8.1'

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

FILE 1255

C-573





SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 29.1 %
FINAL WATER CONTENT 28.9 %

BORING NO. 185
SAMPLE NO. 3
DEPTH 7.9' TO 8.1'

TEST DATA

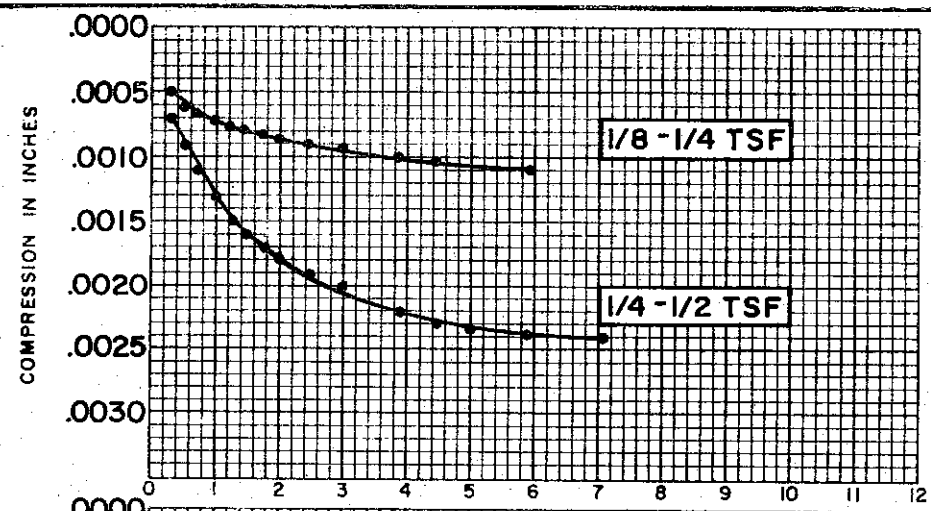
INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.757

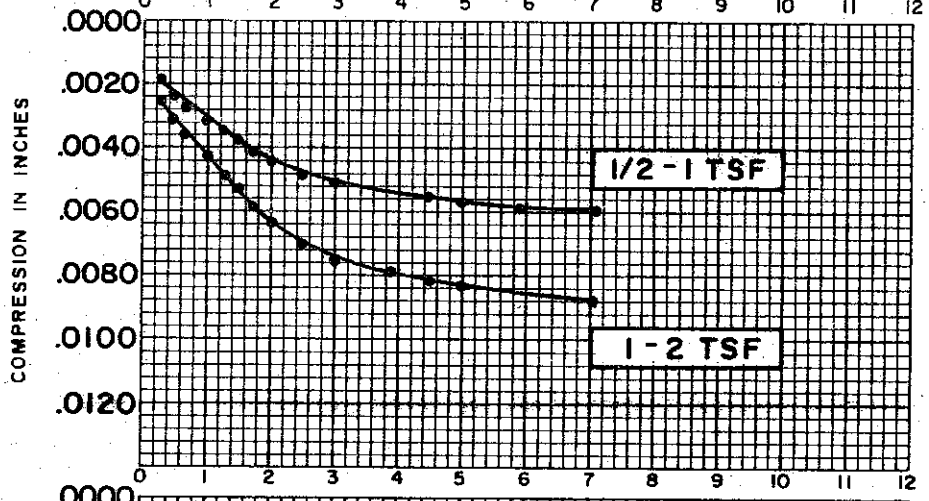
CONSOLIDATION TEST
TIME VS. COMPRESSION CURVES

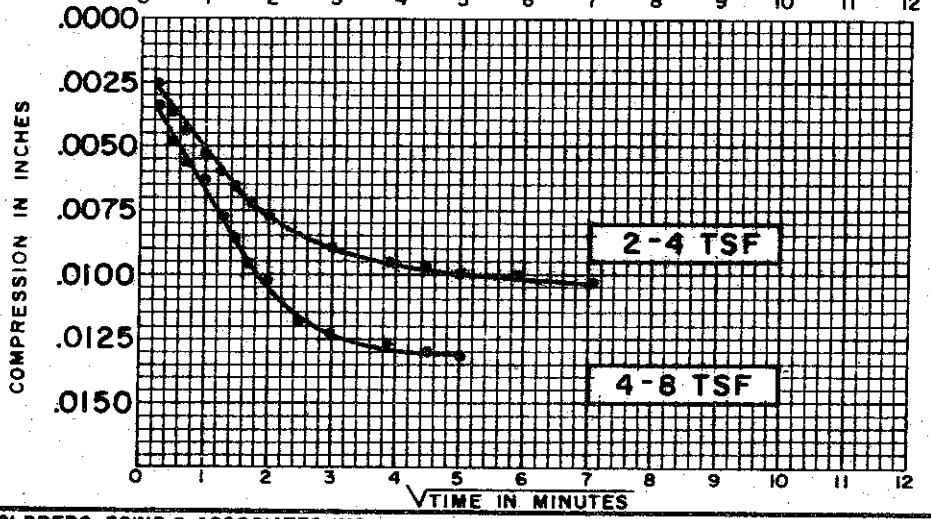
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

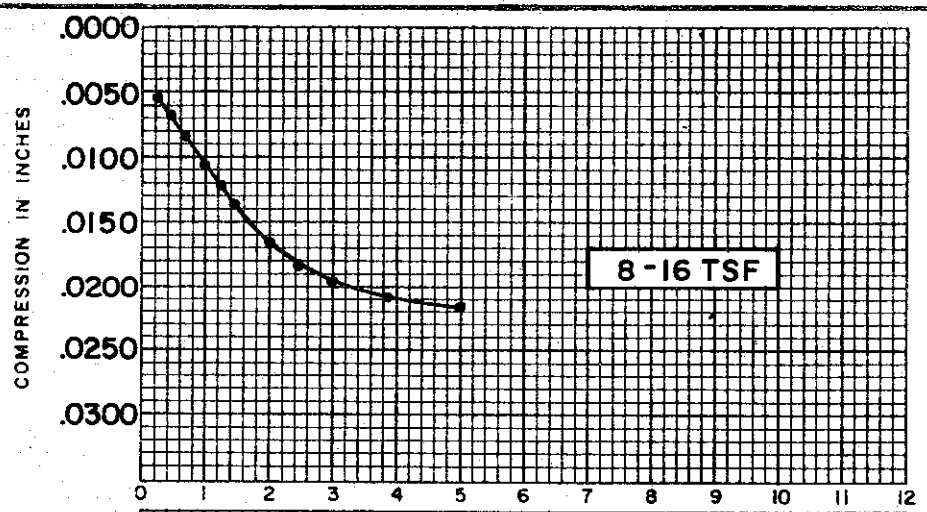
FILE 1255

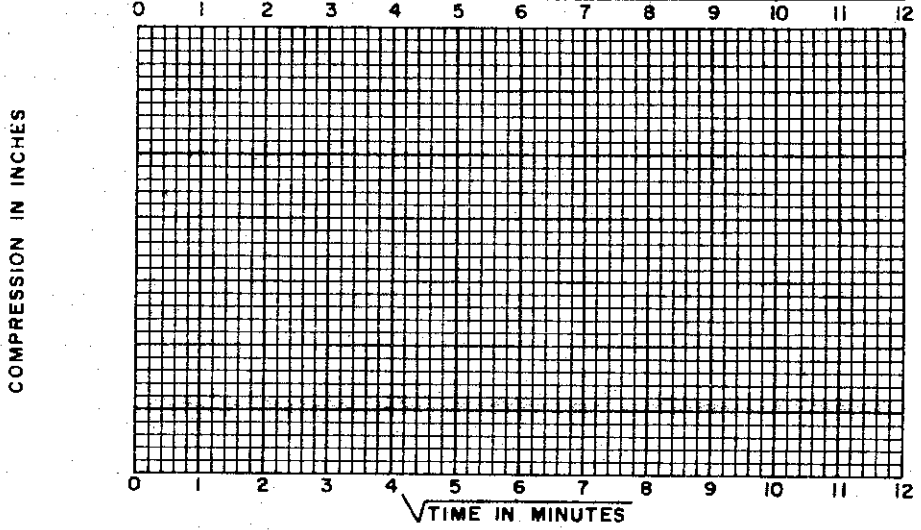
GOLOBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS











SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL-CH)
SPECIFIC GRAVITY 2.72
INITIAL WATER CONTENT 29.1%
FINAL WATER CONTENT 28.9%

BORING NO. 185
SAMPLE NO. 3
DEPTH 7.9' TO 8.1'

TEST DATA

INITIAL SAMPLE HEIGHT 0.80"
INITIAL SAMPLE DIAMETER 2.50"
INITIAL VOID RATIO 0.757

CONSOLIDATION TEST TIME VS. COMPRESSION CURVES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE 1255

GOLDBERG-ZOINO & ASSOCIATES, INC.
SOIL AND FOUNDATION ENGINEERS

C-575

C-576

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	738	.11	.0012	300	.07	.0007
1/2 - 1	612	.13	.0014	180	.10	.0011
1 - 2	540	.14	.0015	138	.13	.0014
2 - 4	378	.19	.0020	78	.21	.0023
4 - 8	468	.15	.0016	108	.15	.0016
8 - 16	378	.17	.0018	108	.19	.0015
16 - 4	174	.36	.0039	60	.24	.0026
4 - 1	1164	.06	.0006	240	.07	.0007
1 - 1/4	3024	.02	.0002	900	.02	.0002

BORING NO. 38
SAMPLE NO. 4
DEPTH 14.6' to 14.7'
TEST NO. C18.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL-CH)

INITIAL WATER CONTENT 29.0 %

ATTERBERG LIMITS

LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO .770 C_c .19

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/8 - 1/4	960	.08	.0009	---	---	-----
1/4 - 1/2	612	.12	.0013	180	.10	.0011
1/2 - 1	468	.16	.0017	156	.11	.0012
1 - 2	378	.19	.0020	120	.13	.0014
2 - 4	288	.22	.0024	90	.17	.0018
4 - 1	135	.46	.0050	54	.27	.0029
1 - 1/4	912	.07	.0008	216	.07	.0007
1/4 - 1/2	264	.25	.0027	102	.15	.0016
1/2 - 1	438	.15	.0016	84	.18	.0019
1 - 2	173	.37	.0040	48	.31	.0033
2 - 4	135	.46	.0050	36	.40	.0043
4 - 8	216	.27	.0029	48	.28	.0030
8 - 16	192	.27	.0029	42	.29	.0031
16 - 4	138	.36	.0039	33	.34	.0037
4 - 1	576	.09	.0010	150	.08	.0009
1 - 1/4	1380	.04	.0004	450	.03	.0003

BORING NO. 38
SAMPLE NO. 16
DEPTH 74.0' to 74.1'
TEST NO. C24.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CH)

INITIAL WATER CONTENT 36.0 %

ATTERBERG LIMITS

LIQUID LIMIT 55 % PLASTIC LIMIT 24 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO .935 C_c .33

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	540	.15	.0016	168	.11	.0012
1/2 - 1	408	.20	.0021	180	.10	.0011
1 - 1/4	1164	.07	.0007	312	.06	.0006
1/4 - 1/2	438	.18	.0019	120	.15	.0016
1/2 - 1	822	.09	.0010	180	.10	.0011
1 - 2	378	.20	.0022	132	.13	.0014
2 - 4	408	.18	.0019	120	.14	.0015
4 - 8	408	.17	.0018	102	.16	.0017
8 - 16	540	.11	.0012	120	.13	.0014
24 - 6	138	.42	.0046	45	.31	.0033
6 - 1/2	1218	.06	.0006	450	.04	.0004

BORING NO. 41
SAMPLE NO. 5
DEPTH 10.8' to 11.0'
TEST NO. C29.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL-CH)
INITIAL WATER CONTENT 29.5 %
ATTERBERG LIMITS
LIQUID LIMIT 46 % PLASTIC LIMIT 23 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 0.799 C_c 0.23

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	614	.12	.0013	240	.07	.0008
1/2 - 1	540	.14	.0015	210	.08	.0009
1 - 2	614	.11	.0012	225	.07	.0008
2 - 4	778	.08	.0009	210	.07	.0007
4 - 8	614	.09	.0010	162	.08	.0009
8 - 16	406	.12	.0013	96	.12	.0013
16 - 4	194	.24	.0026	54	.20	.0022
4 - 1	1110	.05	.0005	240	.05	.0005
1 - 1/4	3024	.02	.0002	720	.02	.0002

BORING NO. 41
SAMPLE NO. 7
DEPTH 21.0' to 21.1'
TEST NO. C30.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL-CH)
INITIAL WATER CONTENT 38.1 %
ATTERBERG LIMITS
LIQUID LIMIT 47 % PLASTIC LIMIT 24 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 1.055 C_c 0.34

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

C-577

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	1500	.05	.0005	420	.04	.0004
1/2 - 1	1056	.06	.0006	300	.05	.0005
1 - 2	738	.08	.0009	240	.06	.0006
2 - 4	696	.07	.0008	228	.06	.0006
4 - 8	540	.09	.0010	150	.07	.0008
8 - 16	504	.08	.0009	108	.09	.0010
24 - 6	378	.10	.0011	90	.10	.0011
6 - 2	912	.05	.0005	192	.05	.0005
2 - 1/2	1500	.03	.0003	480	.02	.0002

BORING NO. 41
SAMPLE NO. 13
DEPTH 53.0' to 53.2'
TEST NO. C33.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL-CH)
INITIAL WATER CONTENT 46.5 %
ATTERBERG LIMITS
LIQUID LIMIT 52 % PLASTIC LIMIT 25 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.
INITIAL VOID RATIO 1.235 C_c 0.35

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/8 - 1/4	1500	.06	.0006	360	.05	.0005
1/4 - 1/2	696	.11	.0012	240	.07	.0008
1/2 - 1	696	.10	.0011	180	.09	.0010
1 - 2	468	.15	.0016	168	.10	.0011
2 - 4	318	.21	.0023	120	.13	.0014
4 - 1	240	.27	.0029	45	.33	.0036
1 - 1/4	1008	.07	.0007	228	.07	.0007
1/4 - 1/2	264	.26	.0028	60	.26	.0028
1/2 - 1	504	.13	.0014	102	.15	.0016
1 - 2	174	.38	.0041	78	.20	.0021
2 - 4	216	.30	.0032	54	.28	.0030
4 - 8	348	.18	.0019	96	.15	.0016
8 - 16	348	.17	.0018	72	.19	.0020
16 - 4	138	.40	.0043	36	.35	.0038
4 - 1	438	.13	.0014	54	.24	.0026
1 - 1/4	2382	.03	.0003	660	.02	.0002

BORING NO. 41
SAMPLE NO. 17
DEPTH 73.3'
TEST NO. C35.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY, sandy (CL)
INITIAL WATER CONTENT 26.7%
ATTERBERG LIMITS
LIQUID LIMIT 25 % PLASTIC LIMIT 15 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO .697 C_c 0.21

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	540	.13	.0014	210	.07	.0008
1/2 - 1	408	.17	.0018	132	.12	.0013
1 - 2	378	.18	.0019	114	.13	.0014
2 - 4	408	.16	.0017	108	.13	.0014
4 - 8	408	.15	.0016	114	.12	.0013
8 - 16	408	.14	.0015	96	.13	.0014
24 - 6	216	.24	.0026	54	.22	.0024
6 - 2	822	.07	.0007	168	.07	.0008
2 - 1/2	1686	.04	.0004	348	.04	.0004

BORING NO. 41
SAMPLE NO. 25
DEPTH 113'
TEST NO. C38.1

SOIL PROPERTIES

SOIL DESCRIPTION:
Silty CLAY, sandy (CL)

INITIAL WATER CONTENT 24.2 %

ATTERBERG LIMITS

LIQUID LIMIT 29 % PLASTIC LIMIT 19 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.

INITIAL VOID RATIO 0.642 C_c 0.18

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	240	.33	.0036	108	.17	.0018
1/2 - 1	216	.36	.0039	120	.15	.0016
1 - 2	318	.24	.0026	90	.20	.0021
2 - 4	240	.32	.0034	108	.16	.0017
4 - 8	240	.31	.0033	108	.16	.0017
8 - 4	174	.41	.0044	54	.31	.0033
4 - 1	780	.09	.0010	276	.07	.0007
1 - 1/4	1380	.06	.0006	276	.07	.0007
1/4 - 1/2	348	.22	.0024	150	.12	.0013
1/2 - 1	540	.14	.0015	174	.10	.0011
1 - 2	780	.09	.0010	150	.11	.0012
2 - 4	654	.11	.0012	108	.16	.0017
4 - 8	468	.15	.0016	150	.11	.0012
8 - 16	378	.19	.0020	120	.13	.0014
24 - 6	540	.12	.0013	150	.10	.0011
6 - 2	960	.07	.0008	540	.03	.0003
2 - 1/2	1272	.06	.0006	960	.02	.0002

BORING NO. 41
SAMPLE NO. 29
DEPTH 130.9' to 131.1'
TEST NO. C40.1

SOIL PROPERTIES

SOIL DESCRIPTION:
Clayey SAND, gravelly (GC-SC)

INITIAL WATER CONTENT 11.3%

ATTERBERG LIMITS

LIQUID LIMIT 25 % PLASTIC LIMIT 17 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 0.370 C_c 0.09

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

C-576

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	438	.18	.0019	180	.10	.0011
1/2 - 1	540	.14	.0015	210	.08	.0009
1 - 2	654	.11	.0012	156	.10	.0011
2 - 1/2	504	.13	.0014	114	.14	.0015
1/2 - 1/4	1500	.05	.0005	390	.05	.0005
1/4 - 1/2	576	.13	.0014	138	.12	.0013
1/2 - 1	468	.15	.0016	138	.12	.0013
1 - 2	504	.14	.0015	108	.15	.0016
2 - 4	696	.09	.0010	300	.05	.0005
4 - 8	654	.09	.0010	174	.08	.0009
8 - 16	504	.10	.0011	144	.08	.0009
16 - 2	438	.12	.0013	108	.11	.0012
2 - 1/2	2232	.03	.0003	540	.11	.0002
1/2 - 1/8	4440	.01	.0001	1020	.01	.0001

BORING NO. 48
SAMPLE NO. 10
DEPTH 39.2' to 39.4'
TEST NO. C202.1

SOIL PROPERTIES

SOIL DESCRIPTION:
Silty CLAY (CL-CH)
INITIAL WATER CONTENT 38.8 %
ATTERBERG LIMITS
LIQUID LIMIT 47 % PLASTIC LIMIT 24 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 1.027 C_c 0.33

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	470	.17	.0018	240	.07	.0008
1/2 - 1	540	.14	.0015	162	.11	.0012
1 - 1/4	738	.10	.0011	210	.08	.0009
1/4 - 1/2	264	.29	.0031	126	.14	.0015
1/2 - 1	540	.14	.0015	120	.15	.0016
1 - 2	540	.14	.0015	156	.11	.0012
2 - 4	540	.13	.0014	156	.10	.0011
4 - 8	504	.13	.0014	126	.12	.0013
8 - 16	318	.19	.0020	108	.13	.0014
16 - 4	318	.18	.0019	66	.20	.0021
4 - 1	1320	.05	.0005	330	.05	.0005
1 - 1/4	4620	.01	.0001	1140	.01	.0001

BORING NO. 49
SAMPLE NO. 3
DEPTH 13.7' to 14.0'
TEST NO. C133.1

SOIL PROPERTIES

SOIL DESCRIPTION:
Silty CLAY (CL-CH)
INITIAL WATER CONTENT 33.3%
ATTERBERG LIMITS
LIQUID LIMIT 47 % PLASTIC LIMIT 23 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 0.863 C_c 0.26

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT ____ %

ATTERBERG LIMITS

LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT ____ IN ____ CM.

INITIAL VOID RATIO ____ C_c ____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	504	.13	.0014	174	.09	.0010
1/2 - 1	504	.13	.0014	132	.11	.0012
1 - 2	348	.19	.0020	96	.16	.0017
2 - 4	192	.32	.0034	57	.25	.0027
4 - 1	264	.22	.0024	48	.29	.0031
1 - 1/4	780	.07	.0008	168	.08	.0009
1/4 - 1/2	288	.22	.0023	66	.22	.0023
1/2 - 1	318	.20	.0021	84	.17	.0018
1 - 2	264	.23	.0025	84	.17	.0018
2 - 4	240	.25	.0027	60	.23	.0025
4 - 8	264	.22	.0023	72	.19	.0020
8 - 16	264	.20	.0021	60	.21	.0022
16 - 4	156	.33	.0035	39	.30	.0032
4 - 1	738	.07	.0008	120	.10	.0011
1 - 1/4	2016	.03	.0003	420	.03	.0003

BORING NO. 49
SAMPLE NO. 11
DEPTH 93.8' to 94.0'
TEST NO. C141.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL)

INITIAL WATER CONTENT 28.6%

ATTERBERG LIMITS

LIQUID LIMIT 37 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.

INITIAL VOID RATIO 0.701 C_c 0.20

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

C-581

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

C-582

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES
SOIL DESCRIPTION: _____
INITIAL WATER CONTENT ____ %
ATTERBERG LIMITS
LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA
INITIAL SAMPLE HEIGHT ____ IN ____ CM.
INITIAL VOID RATIO ____ C_c ____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/16 - 1/4	438	.18	.0019	174	.10	.0011
1/4 - 1/2	540	.14	.0015	138	.13	.0014
1/2 - 1	438	.18	.0019	84	.20	.0022
1 - 2	438	.17	.0018	84	.20	.0022
2 - 1	264	.27	.0029	60	.28	.0030
1 - 1/2	576	.13	.0014	156	.11	.0012
1/2 - 1/4	1272	.06	.0006	240	.07	.0008
1/4 - 1/2	240	.31	.0033	60	.29	.0031
1/2 - 1	468	.16	.0017	120	.14	.0015
1 - 2	408	.18	.0019	60	.28	.0030
2 - 4	960	.07	.0007	360	.05	.0005
4 - 8	698	.08	.0009	240	.06	.0006
8 - 16	612	.07	.0008	156	.07	.0007
16 - 4	288	.15	.0016	90	.11	.0012
4 - 1	2538	.02	.0002			
1 - 1/4	4338	.01	.0001			

BORING NO. 50
SAMPLE NO. 8
DEPTH 38.5 - 38.9
TEST NO. C86.1

SOIL PROPERTIES
SOIL DESCRIPTION: Silty CLAY (CH)
INITIAL WATER CONTENT 51.6 %
ATTERBERG LIMITS
LIQUID LIMIT 55 % PLASTIC LIMIT 23 %

TEST DATA
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 1.383 C_c 0.55

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT _____ %
ATTERBERG LIMITS
LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT _____ IN _____ CM.
INITIAL VOID RATIO _____ C_c _____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/16 - 1/8	378	.21	.0023	150	.12	.0013
1/8 - 1/4	690	.11	.0012	210	.08	.0009
1/4 - 1/2	576	.13	.0014	168	.10	.0011
1/2 - 1	378	.20	.0021	90	.20	.0021
1 - 2	288	.25	.0027	72	.24	.0026
2 - 1	288	.25	.0027	51	.33	.0035
1 - 1/4	780	.09	.0010	144	.12	.0013
1/4 - 1/2	348	.21	.0023	114	.15	.0016
1/2 - 1	504	.15	.0016	108	.16	.0017
1 - 2	378	.19	.0020	60	.28	.0030
2 - 4	648	.10	.0011	156	.10	.0011
4 - 8	540	.11	.0012	156	.08	.0009
8 - 16	624	.07	.0008	120	.09	.0010
16 - 4	318	.15	.0016	84	.13	.0014
4 - 1	1164	.05	.0005	312	.04	.0004
1 - 1/4	3744	.02	.0002	840	.02	.0002

BORING NO. 52
SAMPLE NO. 4
DEPTH 29.9' - 30.2'
TEST NO. C109.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL-CH)

INITIAL WATER CONTENT 405 %
ATTERBERG LIMITS
LIQUID LIMIT 49 % PLASTIC LIMIT 20 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 1.013 C_c 0.45

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

FILE NO. 1255

C-583

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

C-584

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	504	.16	.0017	72	.25	.0027
1/2 - 1	438	.18	.0019	114	.16	.0017
1 - 2	288	.26	.0028	43	.40	.0043
2 - 4	240	.29	.0031	60	.27	.0029
4 - 8	264	.24	.0026	45	.33	.0035
8 - 16	240	.23	.0025	36	.35	.0038
16 - 4	138	.38	.0041	18	.68	.0073
4 - 1	654	.08	.0009	144	.09	.0010
1 - 1/4	2616	.02	.0002	600	.02	.0002

BORING NO. 53
SAMPLE NO. 5
DEPTH 39.5'-39.8'
TEST NO. C98.1

SOIL PROPERTIES

SOIL DESCRIPTION:
Silty CLAY, Sandy (CL)

INITIAL WATER CONTENT 30.9 %

ATTERBERG LIMITS
LIQUID LIMIT 39 % PLASTIC LIMIT 20 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO .872 C_c 0.35

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO.
SAMPLE NO.
DEPTH
TEST NO.

SOIL PROPERTIES

SOIL DESCRIPTION:

INITIAL WATER CONTENT ____ %

ATTERBERG LIMITS
LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT ____ IN ____ CM.
INITIAL VOID RATIO ____ C_c ____

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	540	.15	.0016	216	.08	.0009
1/2 - 1	438	.18	.0019	216	.08	.0009
1 - 2	540	.14	.0015	132	.13	.0014
2 - 4	438	.16	.0017	114	.14	.0015
4 - 8	408	.16	.0017	84	.18	.0019
8 - 16	348	.18	.0019	84	.17	.0018
16 - 4	348	.17	.0018	27		
4 - 1	1008	.06	.0006	144	.10	.0011
1 - 1/4	2304	.03	.0003	540	.03	.0003

BORING NO. 54
SAMPLE NO. 6
DEPTH 63.5' - 63.8'
TEST NO. C399.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY, sandy (CL)

INITIAL WATER CONTENT 26.0 %

ATTERBERG LIMITS

LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 0.696 C_c 0.24

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT ____ %

ATTERBERG LIMITS

LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT ____ IN ____ CM.

INITIAL VOID RATIO ____ C_c ____

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

C-585

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

C-586

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	540	.15	.0016	156	.12	.0013
1/2 - 1	540	.14	.0015	102	.18	.0019
1 - 2	408	.19	.0020	96	.18	.0019
2 - 4	348	.20	.0022	108	.15	.0016
4 - 8	438	.14	.0015	120	.12	.0013
8 - 16	318	.17	.0018	96	.13	.0014
16 - 4	216	.23	.0025	45	.26	.0028
4 - 1	576	.09	.0010	240	.06	.0006
1 - 1/4	2160	.03	.0003	570	.03	.0003

BORING NO. 54
SAMPLE NO. 8
DEPTH 73.7' - 74.0'
TEST NO. C401.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL)

INITIAL WATER CONTENT 38.3 %

ATTERBERG LIMITS

LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 0.982 C_c 0.41

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT ____ %

ATTERBERG LIMITS

LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT ____ IN ____ CM.

INITIAL VOID RATIO ____ C_c ____

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	348	.23	.0025	114	.16	.0017
1/2 - 1	654	.12	.0013	216	.08	.0009
1 - 1/4	1560	.05	.0005	330	.06	.0006
1/4 - 1/2	318	.24	.0026	180	.10	.0011
1/2 - 1	774	.10	.0011	270	.07	.0007
1 - 2	468	.16	.0017	180	.09	.0010
2 - 4	576	.12	.0013	168	.10	.0011
4 - 8	540	.12	.0013	156	.10	.0011
8 - 16	318	.20	.0021	132	.11	.0012
24 - 6	318	.18	.0019	72	.19	.0020
6 - 2	1218	.05	.0005	420	.04	.0004
2 - 1/2	3378	.02	.0002	960	.02	.0002

BORING NO. 60
SAMPLE NO. 2
DEPTH 9.8' to 10.0'
TEST NO. C42.1

SOIL PROPERTIES

SOIL DESCRIPTION:
Silty CLAY (CL-CH)

INITIAL WATER CONTENT 30.0 %

ATTERBERG LIMITS

LIQUID LIMIT 53 % PLASTIC LIMIT 26 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 0.787 C_c 0.23

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	240	.33	.0035	90	.20	.0022
1/2 - 1	240	.33	.0035	78	.23	.0025
1 - 2	192	.39	.0042	54	.33	.0035
2 - 4	264	.28	.0030	72	.23	.0025
4 - 8	264	.26	.0028	84	.19	.0020
8 - 16	348	.18	.0019	84	.17	.0018
16 - 4	156	.37	.0040	51	.26	.0028
4 - 1	864	.07	.0008	210	.07	.0007
1 - 1/4	2400	.03	.0003	450	.04	.0004

BORING NO. 60
SAMPLE NO. 16
DEPTH 85.2' to 85.4'
TEST NO. C56.1

SOIL PROPERTIES

SOIL DESCRIPTION:
Silty CLAY (CL)

INITIAL WATER CONTENT 27.9 %

ATTERBERG LIMITS

LIQUID LIMIT 40 % PLASTIC LIMIT 19 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 0.744 C_c 0.27

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

C-587

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

C-588

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES
SOIL DESCRIPTION: _____
INITIAL WATER CONTENT ____ %
ATTERBERG LIMITS
LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA
INITIAL SAMPLE HEIGHT ____ IN ____ CM.
INITIAL VOID RATIO ____ C_c ____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	408	.20	.0021	138	.14	.0014
1/2 - 1	318	.24	.0026	96	.19	.0020
1 - 2	318	.24	.0026	102	.17	.0018
2 - 4	408	.18	.0019	90	.19	.0020
4 - 8	438	.16	.0017	114	.14	.0015
8 - 16	318	.20	.0021	96	.15	.0016
16 - 4	318	.20	.0021	72	.20	.0021
4 - 1	774	.08	.0008	180	.09	.0009
1 - 1/4	2454	.03	.0003	480	.03	.0003

BORING NO. 105
SAMPLE NO. 8
DEPTH 70.9 - 71.2
TEST NO. C380.1

SOIL PROPERTIES
SOIL DESCRIPTION: Silty CLAY (CL)
INITIAL WATER CONTENT 23.7 %
ATTERBERG LIMITS
LIQUID LIMIT 37 % PLASTIC LIMIT 19 %

TEST DATA
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 0.625 C_c 0.21

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

_____

INITIAL WATER CONTENT _____ %

ATTERBERG LIMITS

LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT _____ IN _____ CM.

INITIAL VOID RATIO _____ C_c _____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	540	.15	.0016	156	.13	.0013
1/2 - 1	378	.21	.0022	108	.17	.0018
1 - 2	264	.28	.0030	84	.21	.0022
2 - 1/2	264	.28	.0030	72	.24	.0026
1/2 - 1/4	468	.16	.0017	132	.13	.0014
1/4 - 1/2	240	.31	.0034	78	.22	.0024
1/2 - 1	318	.24	.0025	72	.24	.0026
1 - 2	174	.42	.0045	45	.38	.0041
2 - 4	576	.12	.0013	192	.09	.0009
4 - 8	654	.10	.0010	138	.11	.0011
8 - 16	378	.14	.0014	102	.12	.0013
16 - 4	102	.51	.0053	42	.28	.0030
4 - 1	816	.07	.0007	240	.05	.0005
1 - 1/4	2856	.02	.0002	780	.02	.0002

BORING NO. 118
SAMPLE NO. 5
DEPTH 38.9' - 39.3'
TEST NO. C256.1

SOIL PROPERTIES

SOIL DESCRIPTION: _____

Silty CLAY (CL)

INITIAL WATER CONTENT 36.9 %

ATTERBERG LIMITS

LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 0.969 C_c 0.39

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

C-589

C-590

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT ____ %
ATTERBERG LIMITS
LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT ____ IN ____ CM.
INITIAL VOID RATIO ____ C_c ____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	540	.15	.0016	186	.11	.0011
1/2 - 1	540	.15	.0016	138	.13	.0014
1 - 2	378	.20	.0022	114	.16	.0017
2 - 4	348	.21	.0023	96	.18	.0019
4 - 1	318	.22	.0025	72	.23	.0025
1 - 1/4	1008	.08	.0008	288	.06	.0006
1/4 - 1/2	240	.31	.0034	78	.22	.0024
1/2 - 1	288	.26	.0028	84	.21	.0022
1 - 2	408	.19	.0020	108	.16	.0017
2 - 4	264	.28	.0030	66	.25	.0027
4 - 8	264	.26	.0028	90	.18	.0019
8 - 16	348	.20	.0022	96	.17	.0017
16 - 4	216	.28	.0031	48	.30	.0032
4 - 1	738	.09	.0009	228	.07	.0007
1 - 1/4	3198	.02	.0002	630	.03	.0003

BORING NO. 118
SAMPLE NO. 9
DEPTH 78.7' - 79.0'
TEST NO. C260.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL)

INITIAL WATER CONTENT 27.8%
ATTERBERG LIMITS
LIQUID LIMIT 42 % PLASTIC LIMIT 23 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 0.741 C_c 0.24

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT ____ %

ATTERBERG LIMITS

LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT ____ IN ____ CM.

INITIAL VOID RATIO ____ C_c ____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	540	.14	.0015	180	.11	.0011
1/2 - 1	468	.16	.0017	156	.12	.0012
1 - 2	780	.10	.0010	216	.08	.0008
2 - 1/2	438	.16	.0017	96	.17	.0018
1/2 - 1/4	1110	.07	.0007	270	.07	.0007
1/4 - 1/2	540	.13	.0014	144	.12	.0012
1/2 - 1	318	.22	.0024	102	.16	.0017
1 - 2	264	.26	.0028	78	.20	.0022
2 - 4	738	.09	.0009	186	.08	.0008
4 - 8	738	.08	.0008	168	.08	.0008
8 - 16	540	.10	.0010	132	.09	.0009
16 - 4	288	.17	.0018	72	.15	.0016
4 - 1	1056	.05	.0005	264	.05	.0005
1 - 1/4	2779	.02	.0002	840	.01	.0001

BORING NO. 129
SAMPLE NO. 9
DEPTH 39.1' - 39.3'
TEST NO. C389

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL)

INITIAL WATER CONTENT 40.2%

ATTERBERG LIMITS

LIQUID LIMIT 41 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 1.083 C_c 0.39

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

C-591

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

C-592

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT ____ %

ATTERBERG LIMITS

LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT ____ IN ____ CM.

INITIAL VOID RATIO ____ C_c ____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	348	.22	.0024	108	.17	.0018
1/2 - 1	378	.20	.0022	120	.15	.0016
1 - 2	318	.23	.0026	96	.19	.0020
2 - 4	438	.17	.0018	96	.18	.0019
4 - 1	288	.24	.0027	51	.32	.0035
1 - 1/4	540	.14	.0015	192	.09	.0009
1/4 - 1/2	288	.26	.0028	78	.22	.0024
1/2 - 1	432	.17	.0018	96	.22	.0024
1 - 2	240	.30	.0033	72	.23	.0025
2 - 4	240	.29	.0032	60	.28	.0030
4 - 8	438	.16	.0016	90	.18	.0019
8 - 16	288	.21	.0023	78	.19	.0020
16 - 4	120	.48	.0053	30	.47	.0050
4 - 1	780	.09	.0009	186	.08	.0008
1 - 1/4	2265	.02	.0002	480	.03	.0003

BORING NO. 129
SAMPLE NO. 21
DEPTH 103.7 - 104.0
TEST NO. C395.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY, Sandy (CL)

INITIAL WATER CONTENT 28.0 %

ATTERBERG LIMITS

LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 0.730 C_c .23

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4 - 1/2	135		.0052	72		.0023
1/2 - 1	317		.0022	102		.0016
1 - 2	1009		.0007	348		.0005
2 - 4	913		.0007	270		.0006
4 - 8	738		.0008	216		.0007
8 - 16	778		.0007	180		.0007
16 - 4	346		.0016	66		.0020
4 - 1	960		.0006	330		.0004
1 - 1/4	4338		.0001	1440		.0001

BORING NO. 136
SAMPLE NO. ST6
DEPTH 13.0' to 16.0'
TEST NO. C527.1

SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)

INITIAL WATER CONTENT 17.3 %

ATTERBERG LIMITS

LIQUID LIMIT 43 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 3.28 IN 8.33 CM.

INITIAL VOID RATIO (0.675) C_c 0.15

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT ____ %

ATTERBERG LIMITS

LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA

INITIAL SAMPLE HEIGHT ____ IN ____ CM.

INITIAL VOID RATIO ____ C_c ____

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

C-593

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

C-594

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES
SOIL DESCRIPTION: _____
INITIAL WATER CONTENT ____ %
ATTERBERG LIMITS
LIQUID LIMIT ____ % PLASTIC LIMIT ____ %

TEST DATA
INITIAL SAMPLE HEIGHT ____ IN ____ CM.
INITIAL VOID RATIO ____ C_c ____

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4-1/2	378	.21	.0022	84	.21	.0023
1/2-1	504	.15	.0016	114	.17	.0017
1 - 2	576	.14	.0014	150	.12	.0012
2 - 1	812	.09	.0009	180	.10	.0010
1 - 1/4	72	1.0	.0105	36	.50	.0050
1/4-1/2	288	.25	.0027	108	.17	.0017
1/2-1	345	.21	.0022	108	.17	.0017
1 - 2	318	.23	.0024	102	.17	.0017
2 - 4	696	.10	.0010	186	.09	.0009
4 - 8	378	.17	.0017	108	.13	.0013
8 - 16	290	.19	.0020	72	.17	.0017

BORING NO. 142
SAMPLE NO. 6
DEPTH 20.1' to 20.5'
TEST NO. C535.1

SOIL PROPERTIES
SOIL DESCRIPTION: Silty CLAY (CL)
INITIAL WATER CONTENT 38.2 %
ATTERBERG LIMITS
LIQUID LIMIT 45 % PLASTIC LIMIT 22 %

TEST DATA
INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.
INITIAL VOID RATIO 1.019 C_c 0.41

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/2 - 1	540	.12	.0013	228	.07	.0007
1 - 2	1440	.05	.0005	408	.04	.0004
2 - 4	1272	.05	.0005	306	.05	.0005
4 - 8	612	.09	.0010	216	.07	.0007
8 - 16	540	.10	.0011	150	.08	.0009
16 - 4	438	.12	.0013	96	.13	.0014
4 - 1	1752	.03	.0003	450	.03	.0003
1 - 1/4				1560	.01	.0001

BORING NO. 146
SAMPLE NO. 7
DEPTH 14.0' to 16.0'
TEST NO. C542.1

SOIL PROPERTIES

SOIL DESCRIPTION: SILTY CLAY (CL)

INITIAL WATER CONTENT 15.9 %

ATTERBERG LIMITS

LIQUID LIMIT 46 % PLASTIC LIMIT 22 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.75 IN 1.905 CM.

INITIAL VOID RATIO 0.679 C_c 0.14

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT _____ %

ATTERBERG LIMITS

LIQUID LIMIT _____ % PLASTIC LIMIT _____ %

TEST DATA

INITIAL SAMPLE HEIGHT _____ IN _____ CM.

INITIAL VOID RATIO _____ C_c _____

CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

C-595

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

C-596

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.
1/4-1/2	194	.43	.0045	72	.26	.0028
1/2- 1	317	.25	.0027	96	.20	.0021
1 - 2	378	.21	.0022	96	.19	.0020
2 - 4	345	.23	.0024	72	.24	.0026
4 - 8	378	.19	.0020	84	.21	.0022
8-16	324	.20	.0021	108	.16	.0016

BORING NO. 185
SAMPLE NO. 3
DEPTH 7.9' to 8.1'
TEST NO. C552.1

SOIL PROPERTIES

SOIL DESCRIPTION: Silty CLAY (CL-CH)

INITIAL WATER CONTENT 29.1 %

ATTERBERG LIMITS

LIQUID LIMIT 50 % PLASTIC LIMIT 23 %

TEST DATA

INITIAL SAMPLE HEIGHT 0.80 IN 2.03 CM.

INITIAL VOID RATIO 0.757 C_c 0.18

APPLIED PRESSURE in tons/ft.²	SQUARE ROOT FITTING METHOD t_{90} in sec.	c_v ft.²/day	c_v cm.²/sec.	LOG FITTING METHOD t_{50} in sec.	c_v ft.²/day	c_v cm.²/sec.

BORING NO. _____
SAMPLE NO. _____
DEPTH _____
TEST NO. _____

SOIL PROPERTIES

SOIL DESCRIPTION: _____

INITIAL WATER CONTENT _____ %

ATTERBERG LIMITS

LIQUID LIMIT _____ % PLASTIC LIMIT _____ %

TEST DATA

INITIAL SAMPLE HEIGHT _____ IN _____ CM.

INITIAL VOID RATIO _____ C_c _____

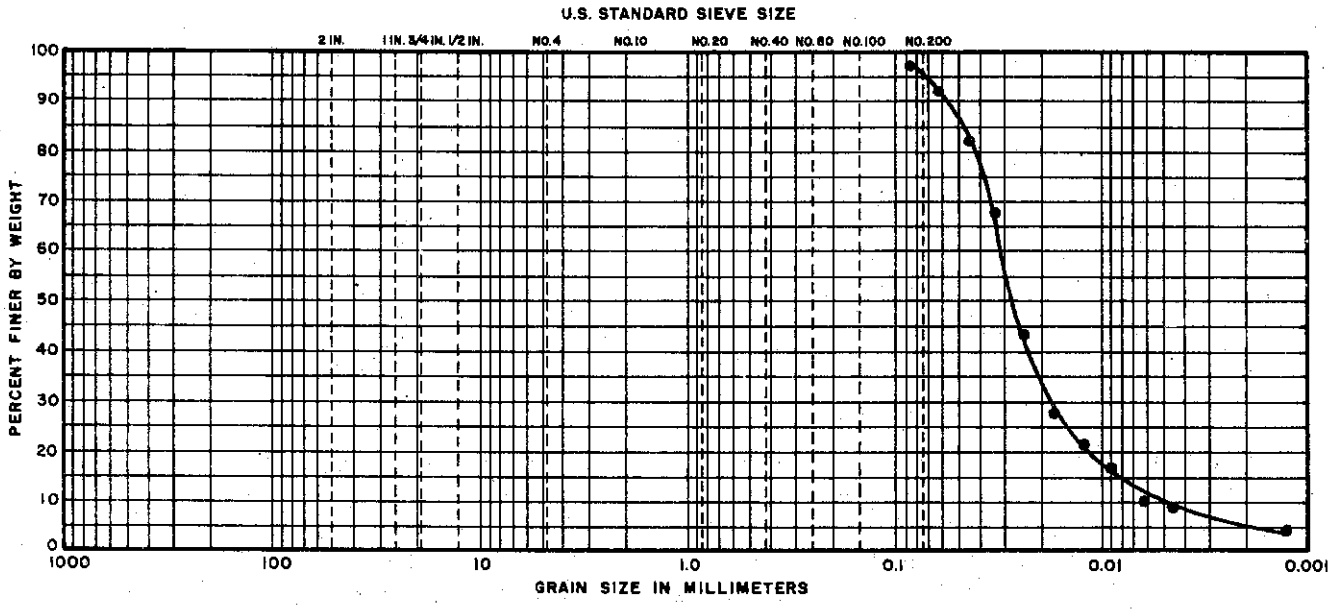
CONSOLIDATION TEST SUMMARY OF c_v VALUES

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

GOLDBERG-ZOINO & ASSOCIATES, INC.
CONSULTANTS IN GEOTECHNICAL ENGINEERING

FILE NO. 1255

GRAIN SIZE DISTRIBUTION

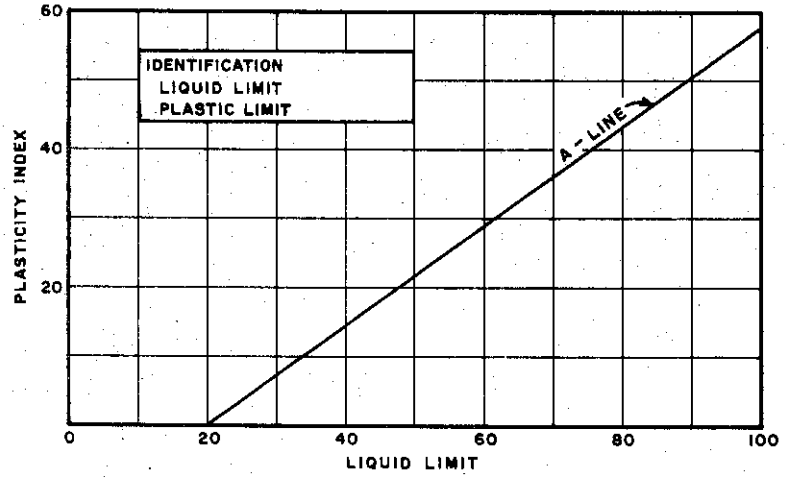


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

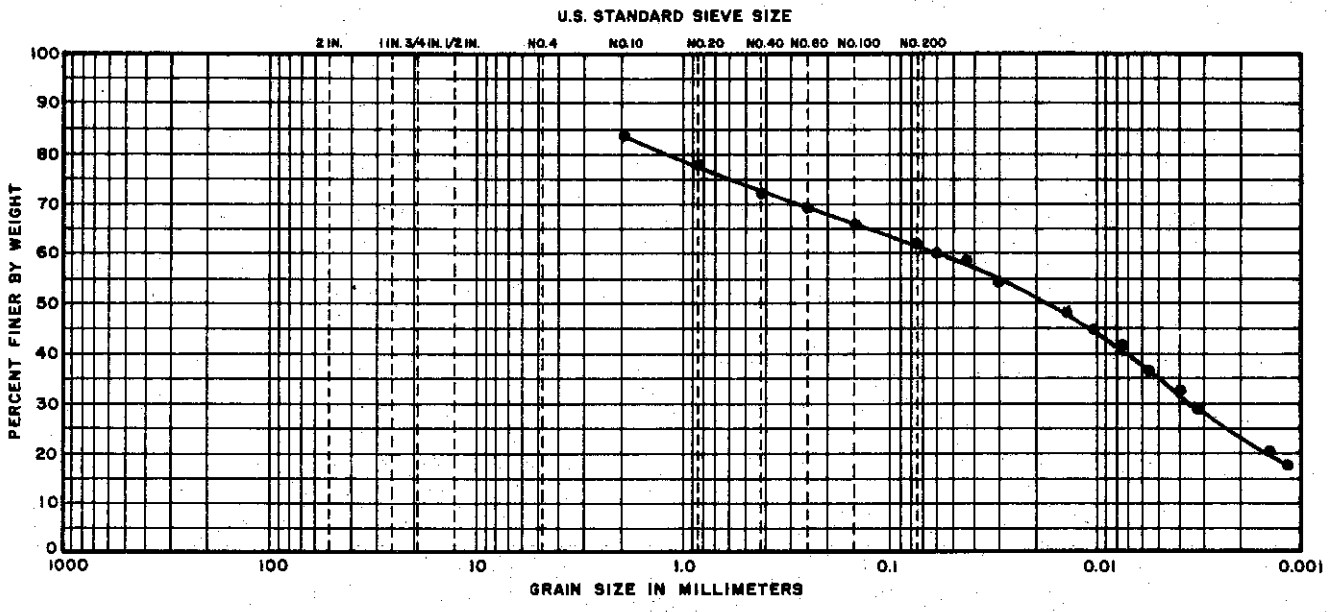
IDENTIFICATION : CLAYEY SILT (CL-ML)
EXPLORATION: BORING 7
SAMPLE : SS 28
DEPTH : 129.5' TO 131.0'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

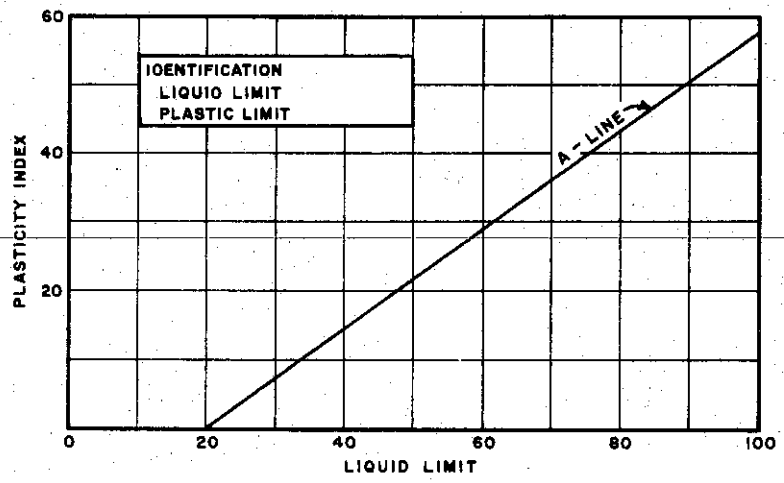


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)
EXPLORATION: BORING 7
SAMPLE : SS30
DEPTH : 138.8' TO 140.3'

SPECIFIC GRAVITY : USED 2.70

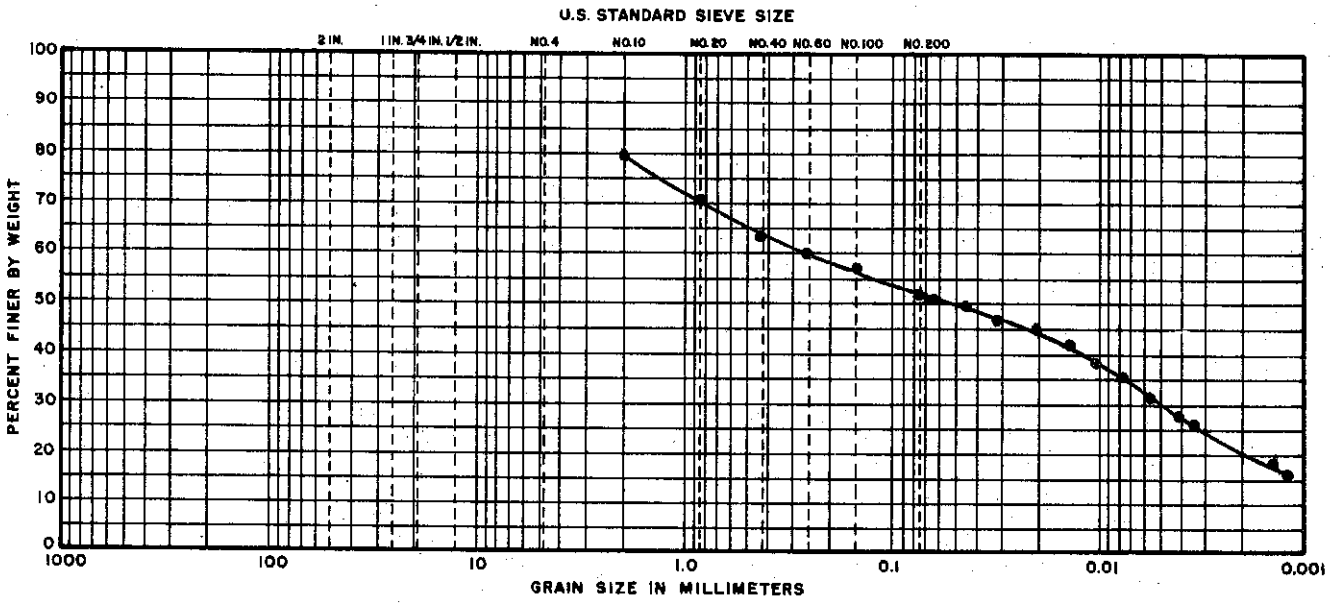
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

C-598

FILE NO. 1255 DATE JAN. 74

GOLDBERG – ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

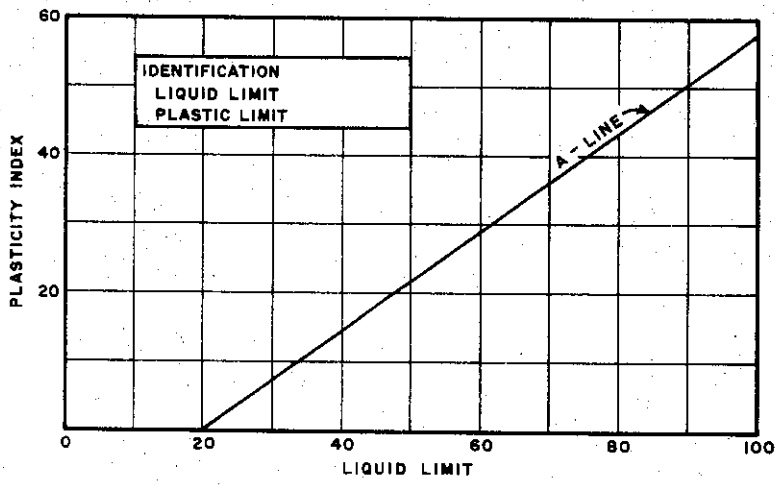


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

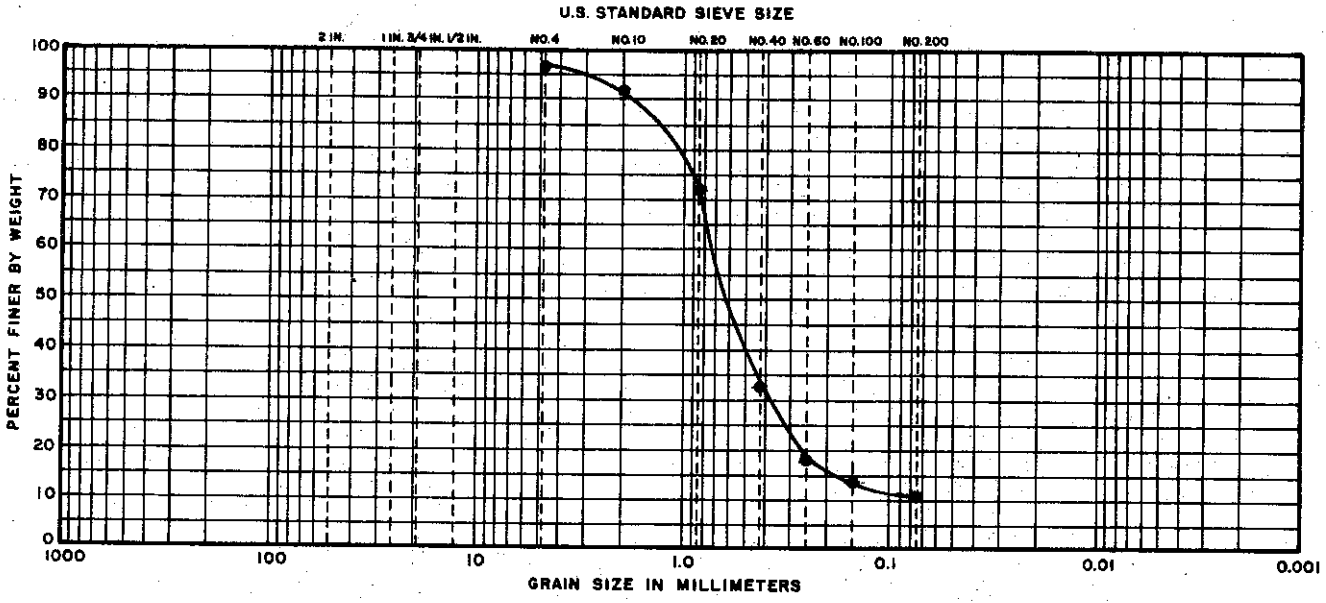
IDENTIFICATION : SILTY CLAY, SANDY (CL-ML)
EXPLORATION: BORING 10
SAMPLE : SS30
DEPTH : 141'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

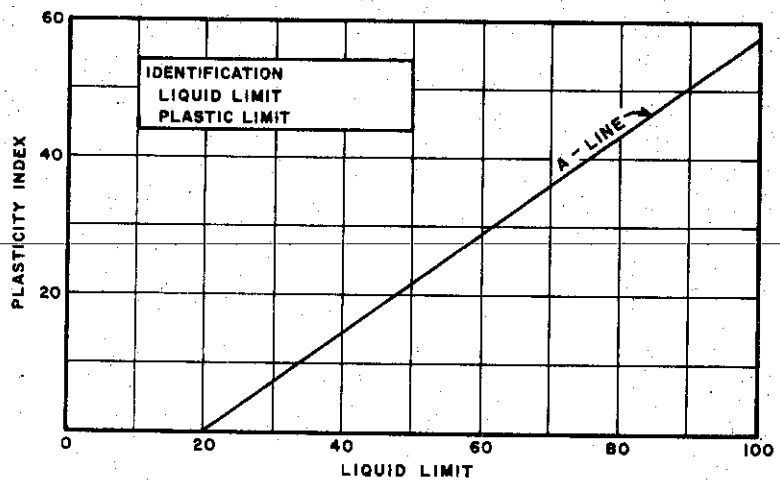


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY SAND (SM-SW)
EXPLORATION: BORING 18
SAMPLE : 11
DEPTH : 103.5' TO 105.0'

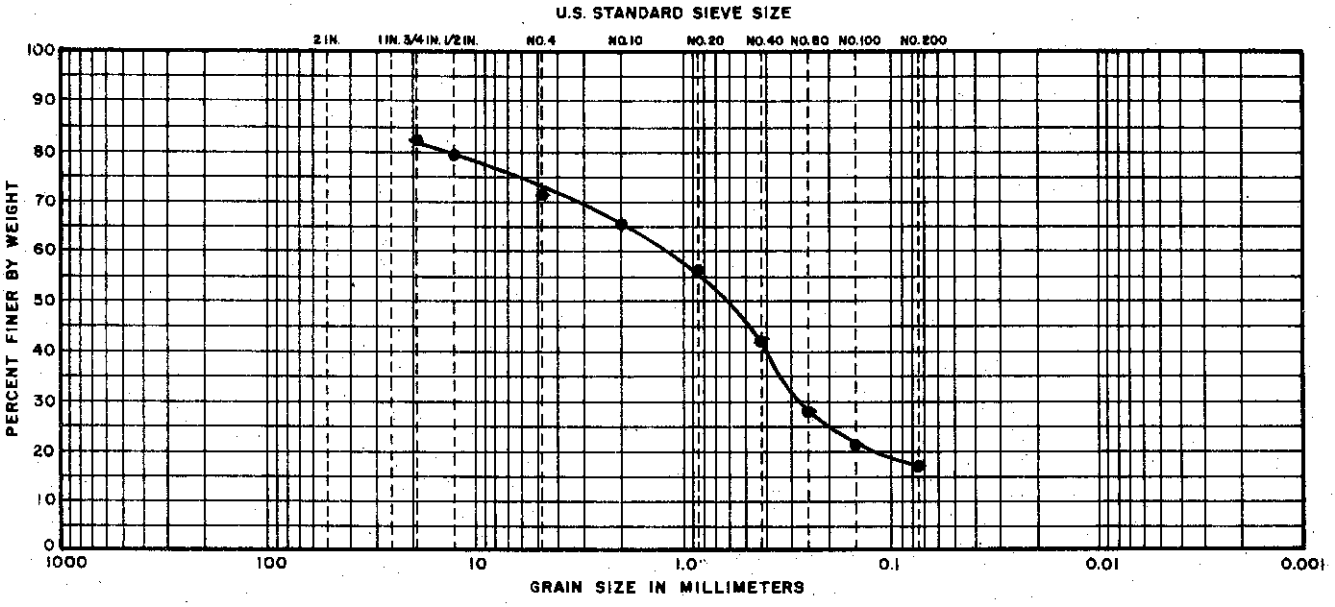
SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

C-600

GRAIN SIZE DISTRIBUTION

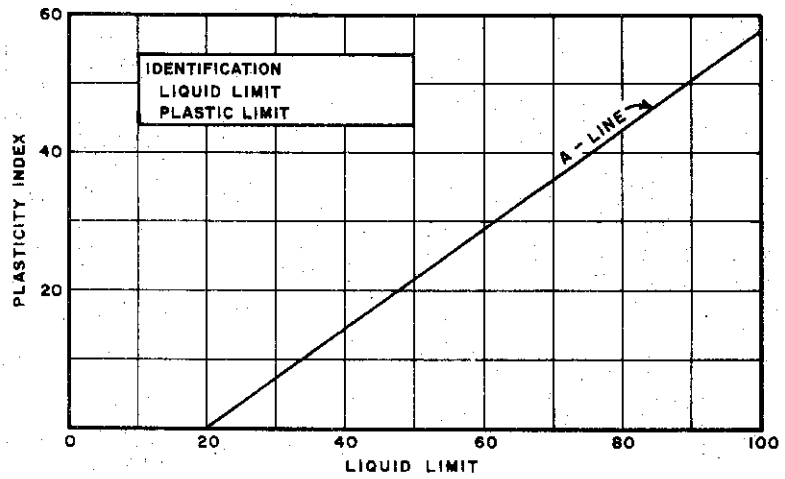


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

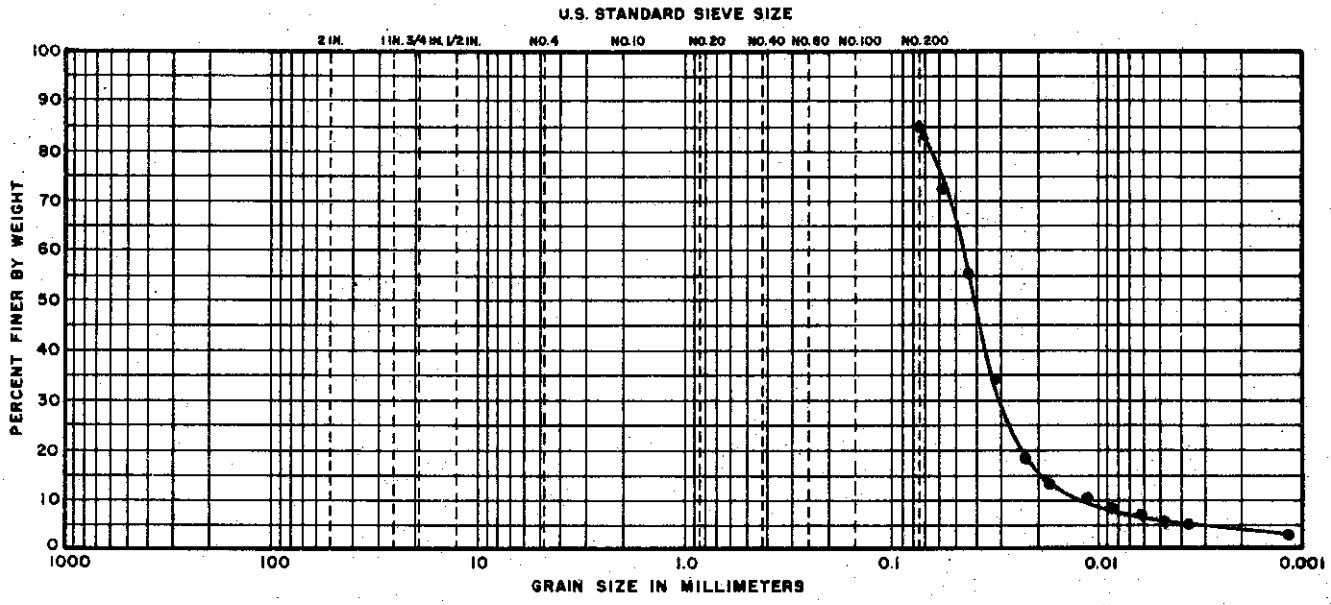
IDENTIFICATION : SILTY SAND, GRAVELLY (SM)
EXPLORATION: BORING 18
SAMPLE : 16
DEPTH : 139.5' TO 141.0'

SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

GRAIN SIZE DISTRIBUTION

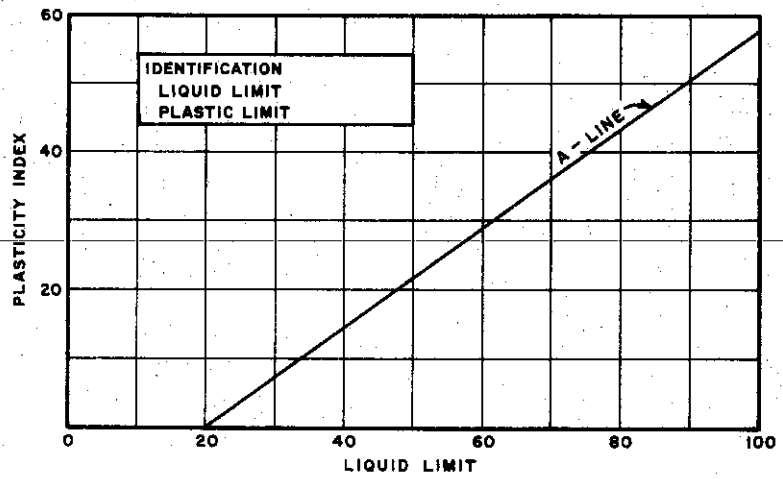


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT (CL-ML)
EXPLORATION: BORING 22
SAMPLE : SS29
DEPTH : 133.5' TO 135.5'

SPECIFIC GRAVITY : USED 2.70

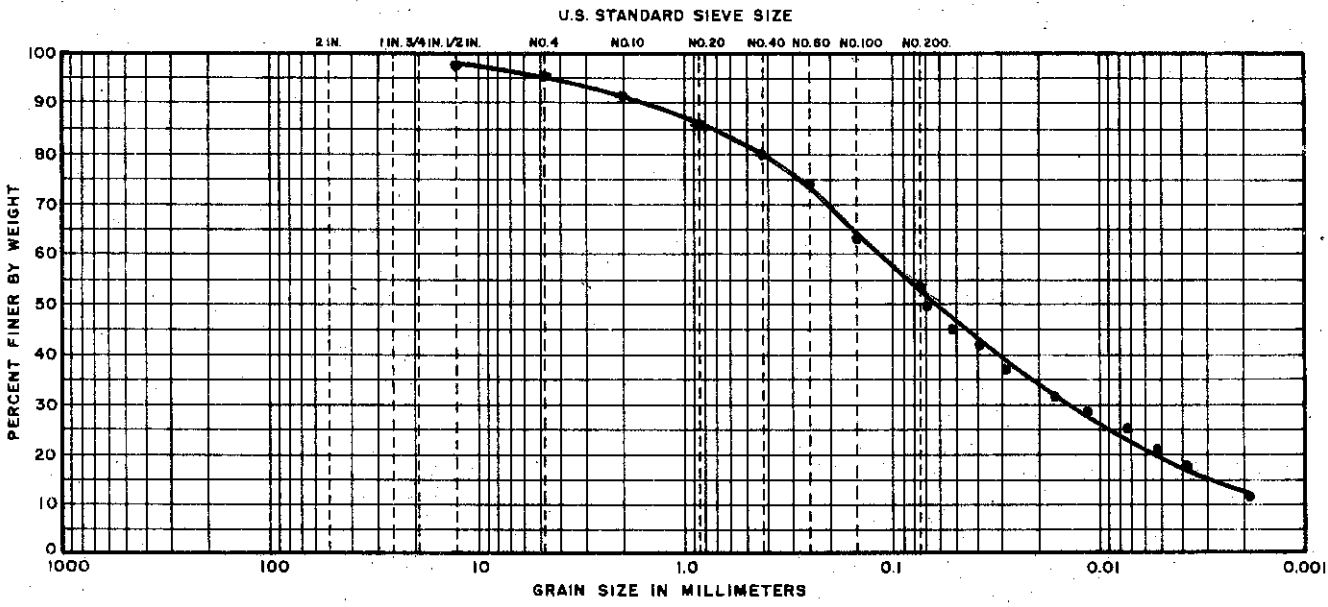
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-602

GOLDBERG – ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

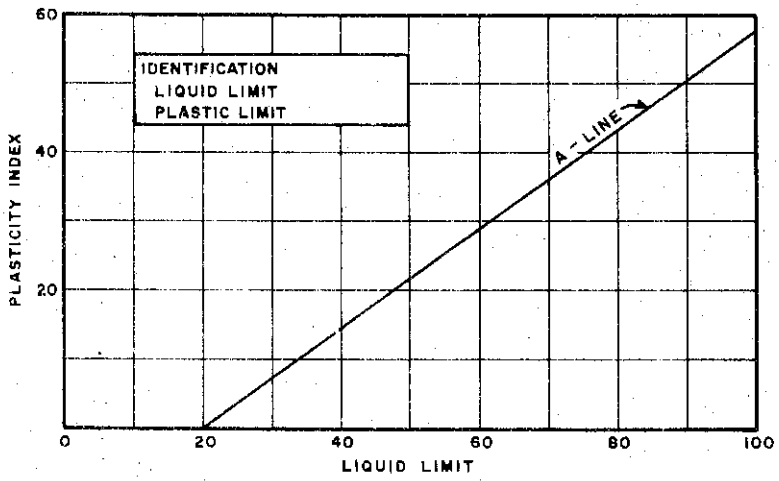


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

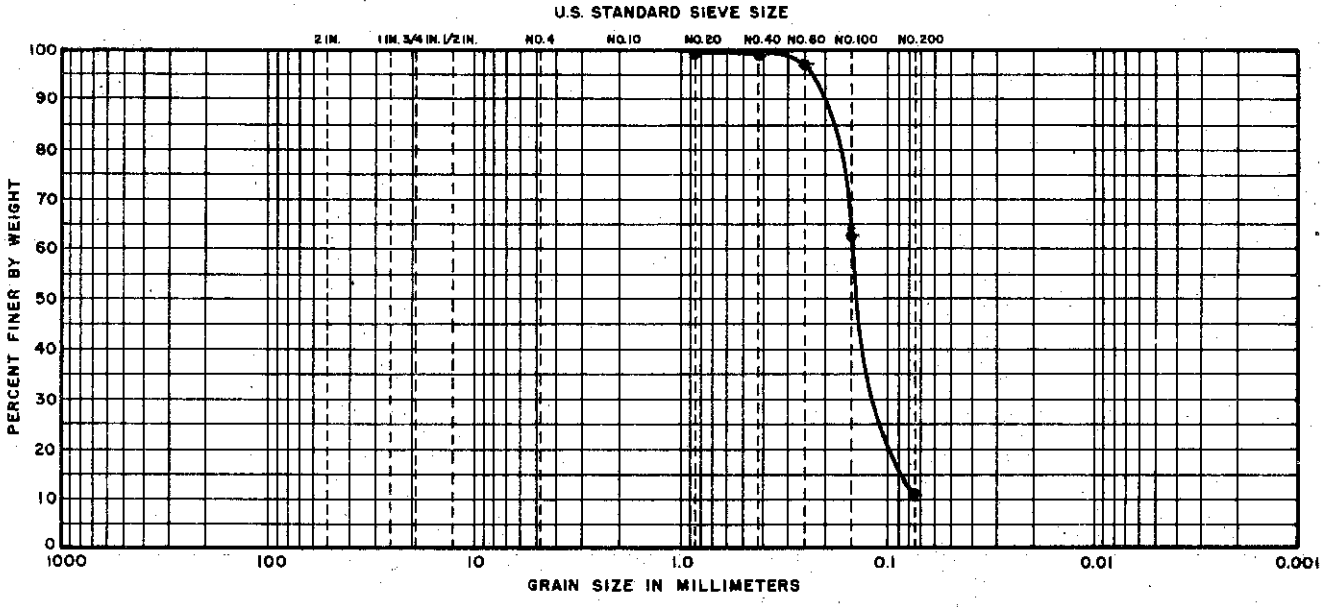
IDENTIFICATION : CLAYEY SILT; SANDY (CL-ML)
EXPLORATION: BORING 27
SAMPLE : SS17
DEPTH : 68.5' TO 70.0'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

GRAIN SIZE DISTRIBUTION

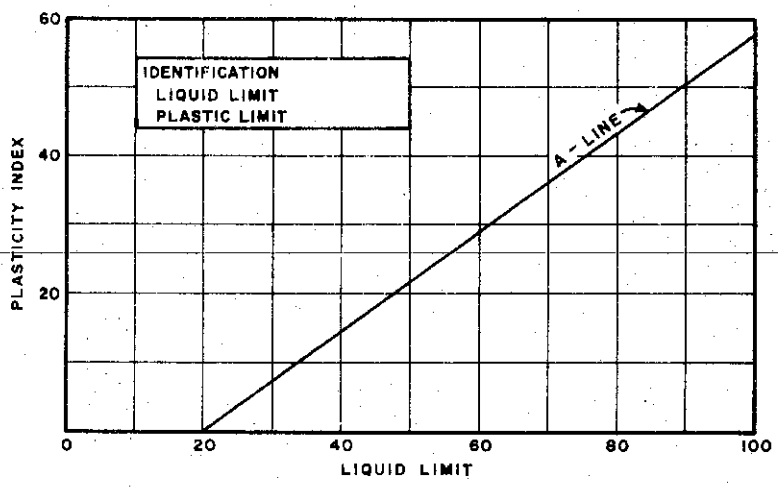


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY FINE SAND (SM-SP)
EXPLORATION: BORING 27
SAMPLE : 26
DEPTH : 113.6' TO 114.4'

SPECIFIC GRAVITY : USED 2.70

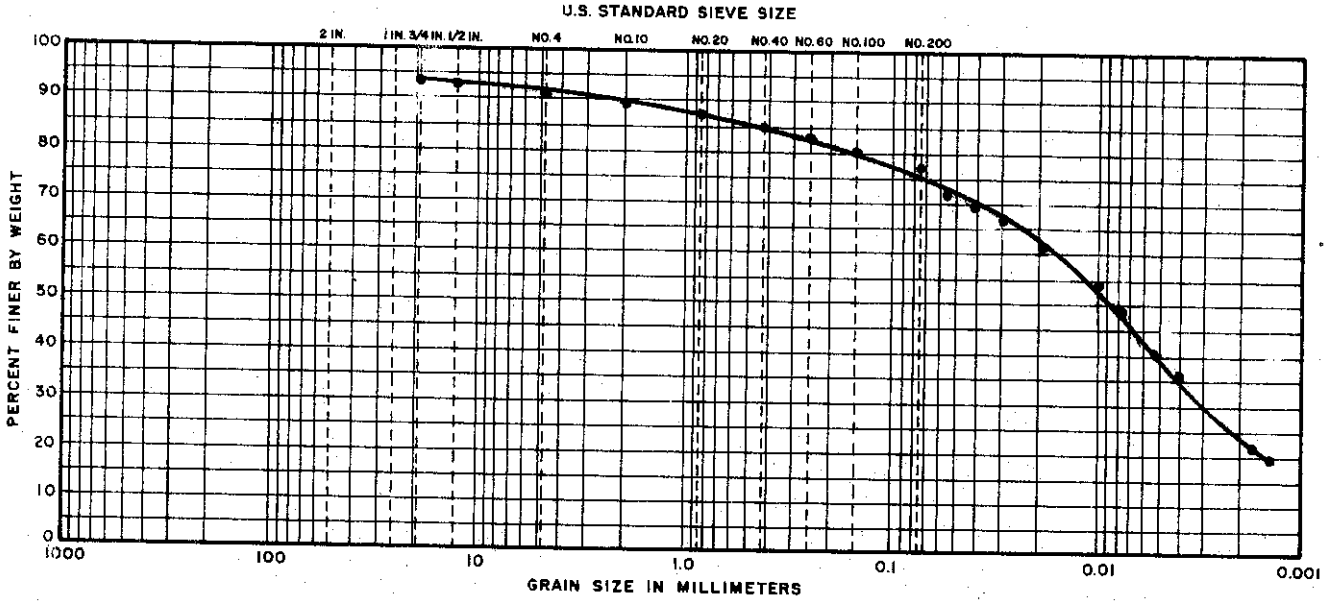
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

C-604

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

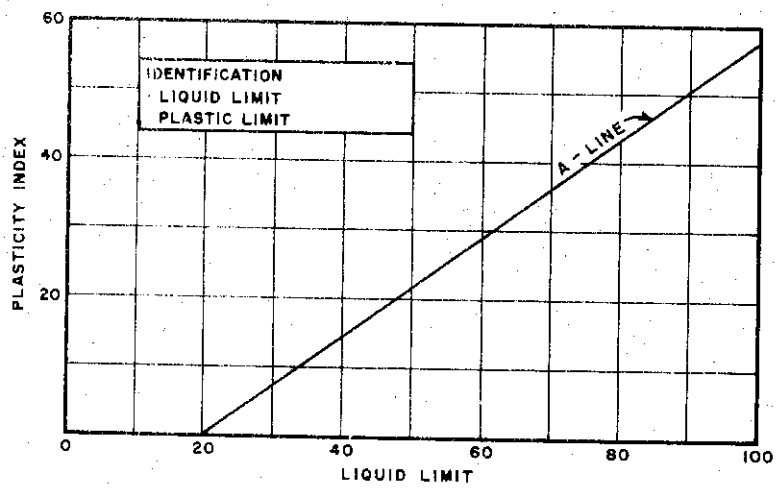


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

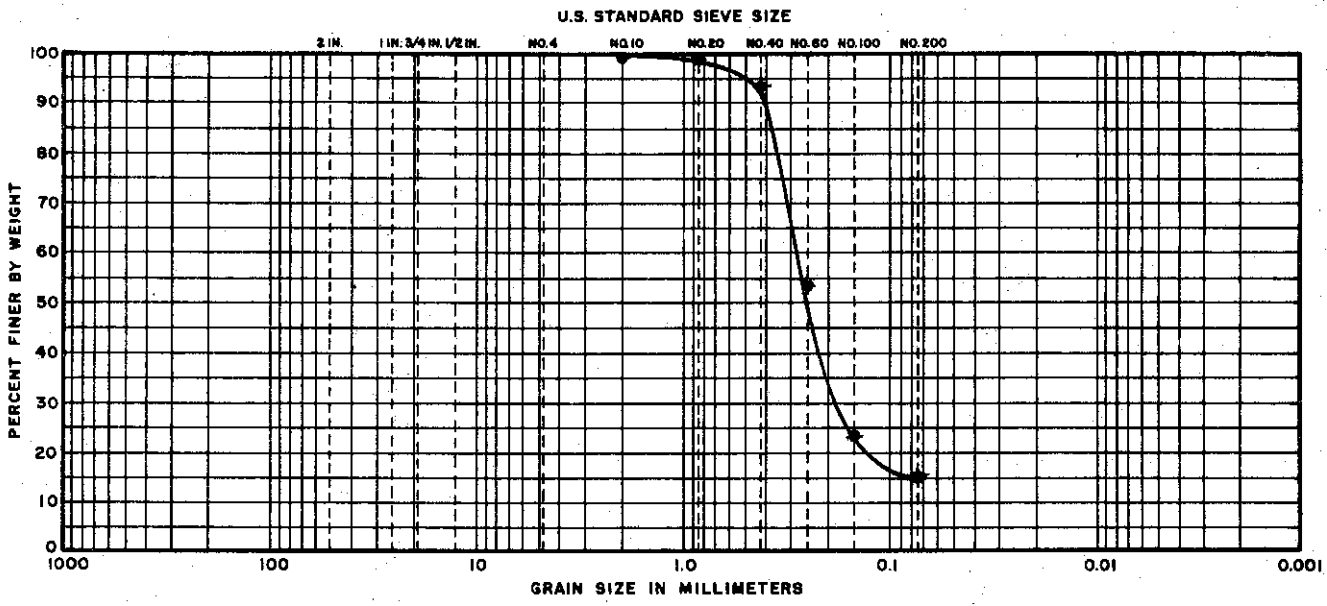
IDENTIFICATION : SILTY CLAY, SANDY (CL)
EXPLORATION: BORING 30
SAMPLE : SS15
DEPTH : 68.5' TO 70.0'

SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

GRAIN SIZE DISTRIBUTION

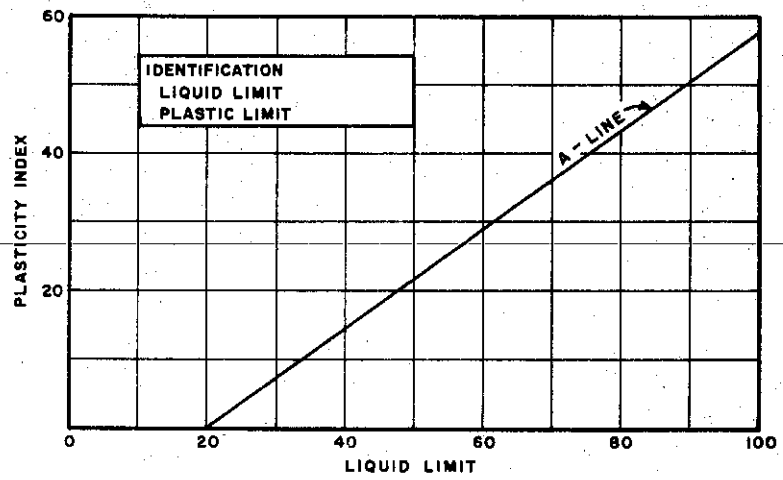


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY FINE SAND (SM)
EXPLORATION: BORING 30
SAMPLE : 21
DEPTH : 98.5' TO 100.0'

SPECIFIC GRAVITY : USED 2.70

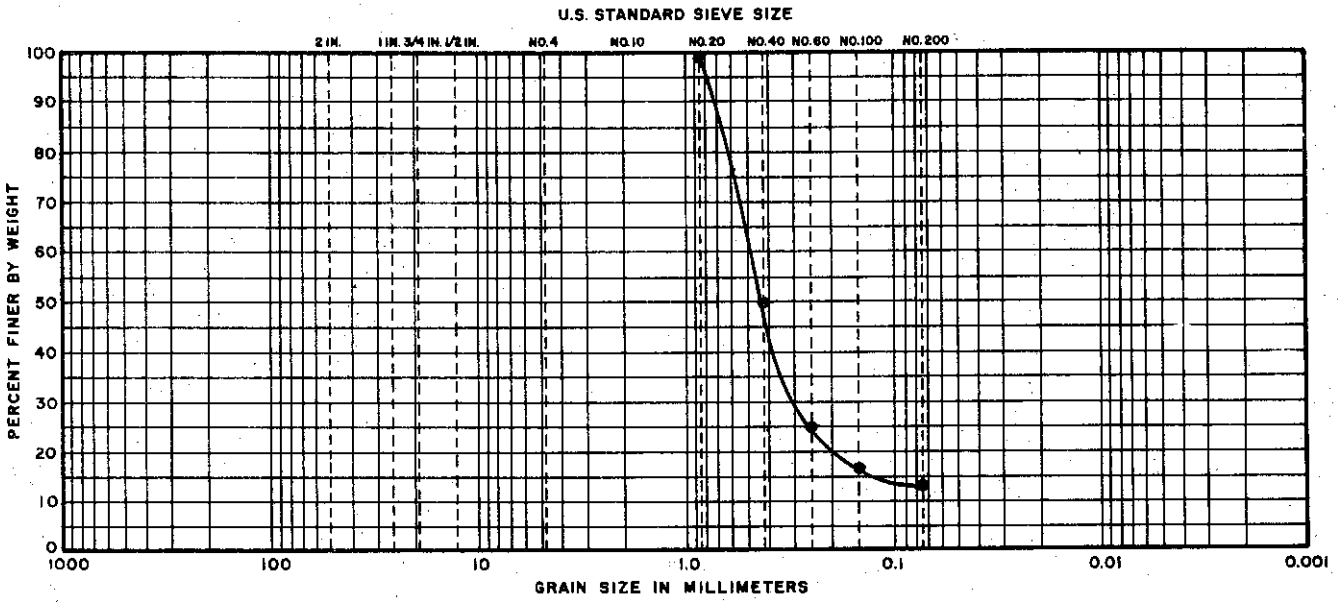
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

C-606

FILE NO. 1255 DATE JULY 1974

GOLDBERG – ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

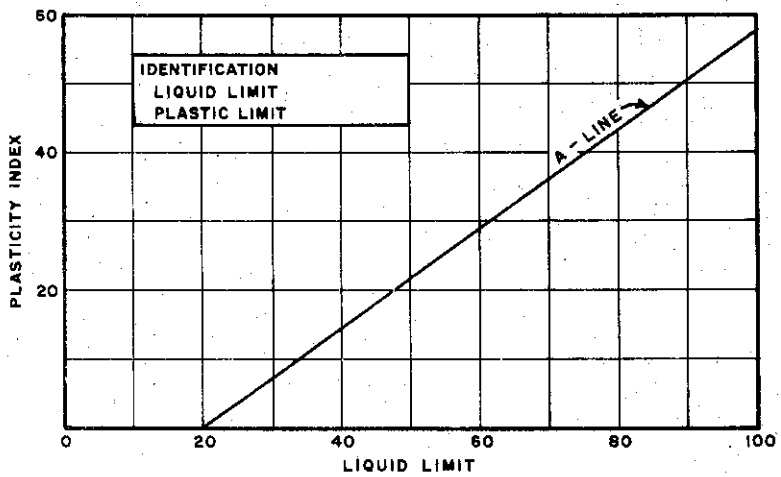


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

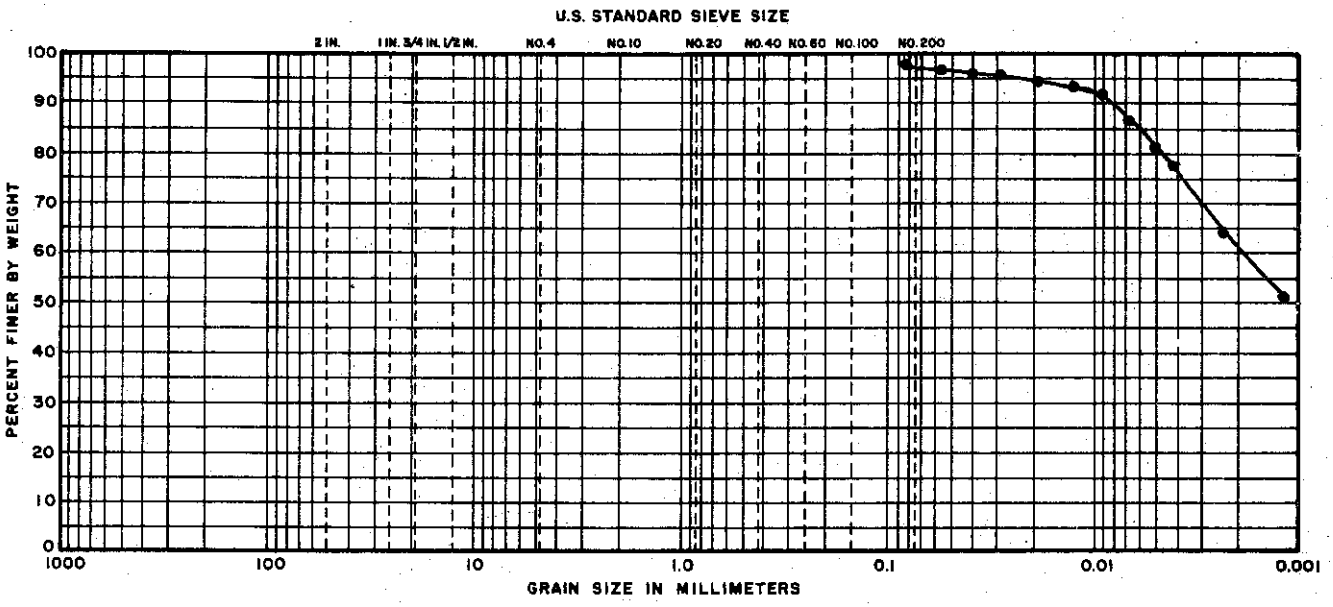
IDENTIFICATION : SILTY SAND (SM)
EXPLORATION: BORING 30
SAMPLE : 25
DEPTH : 118.5' TO 120.0'

SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

GRAIN SIZE DISTRIBUTION

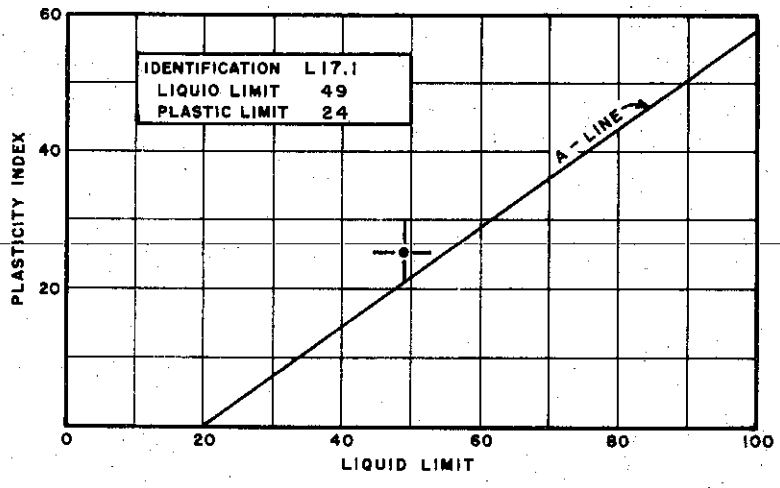


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)
EXPLORATION: BORING 38
SAMPLE : 3
DEPTH : 8.7' TO 9.0'

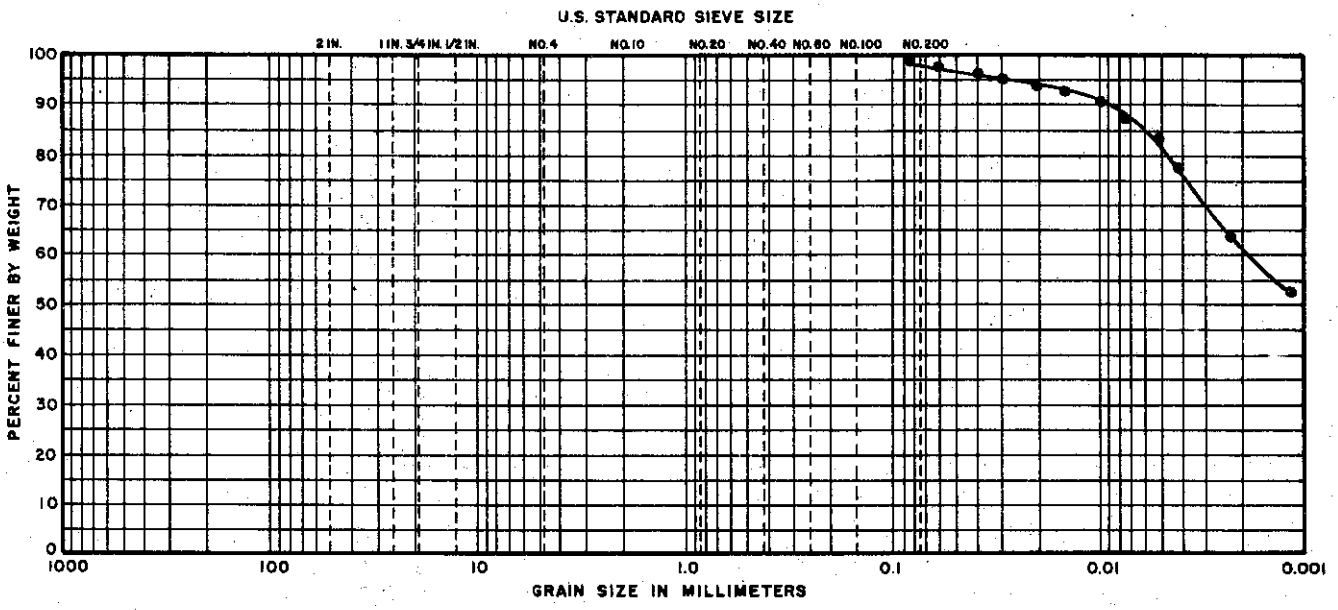
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-608

GRAIN SIZE DISTRIBUTION

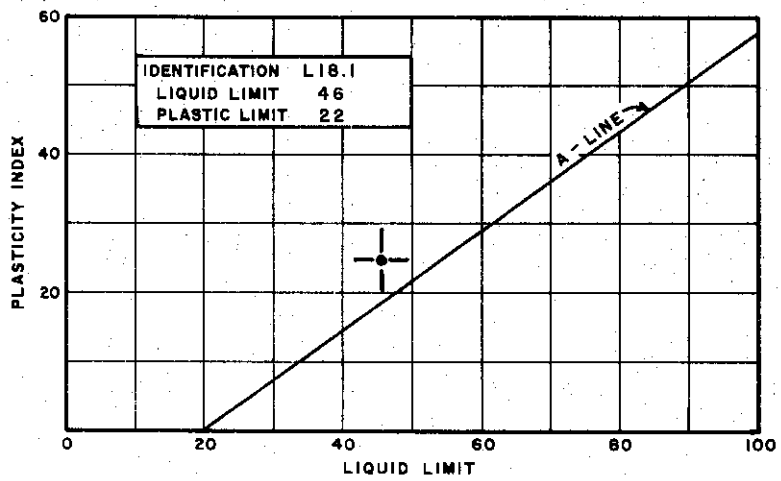


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

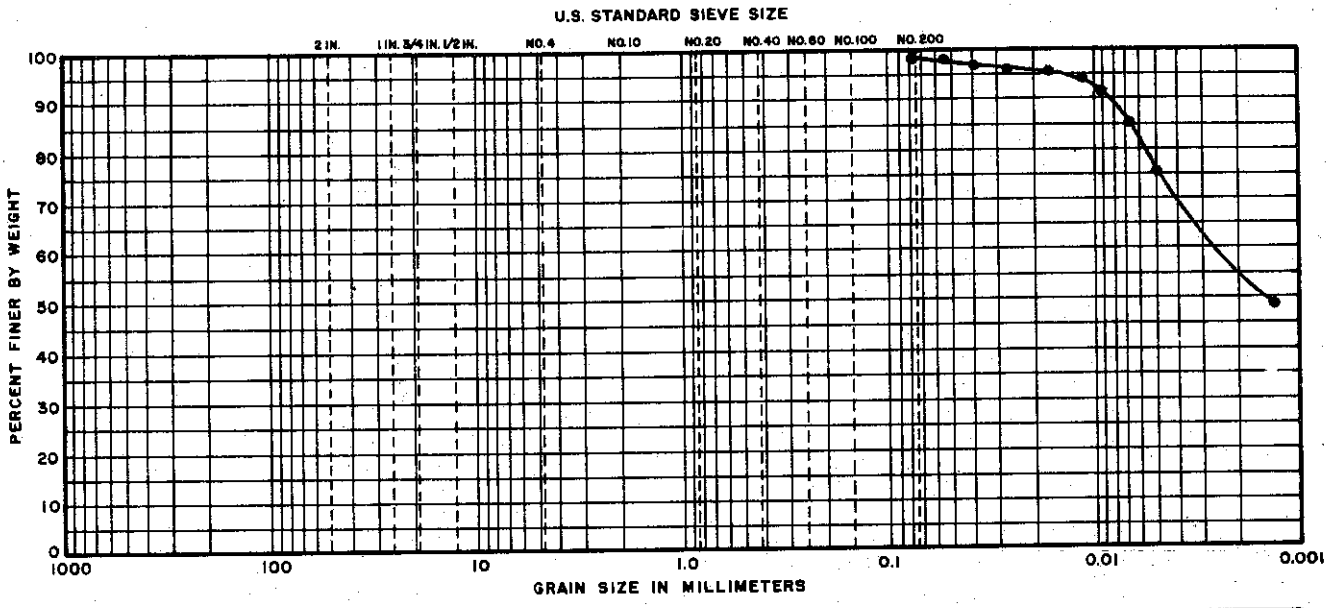
IDENTIFICATION : SILTY CLAY (CL-CH)
EXPLORATION: BORING 38
SAMPLE : 4
DEPTH : 14.3' TO 14.6'

SPECIFIC GRAVITY = 2.71

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

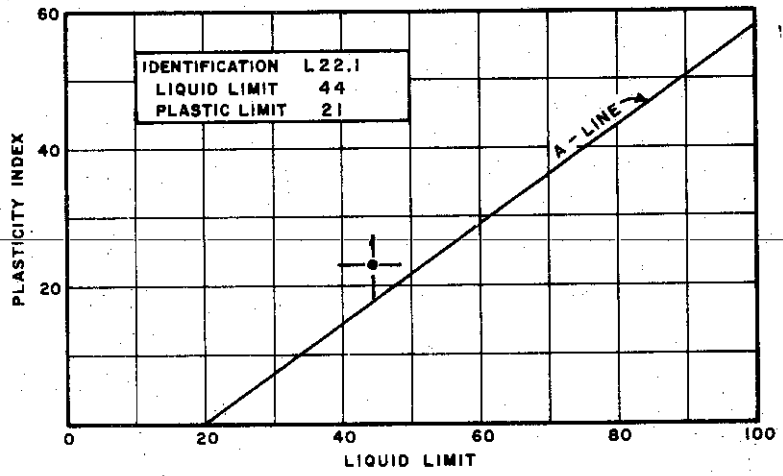


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 38
SAMPLE : 12
DEPTH : 54.1' TO 54.5'

SPECIFIC GRAVITY : USED 2.70

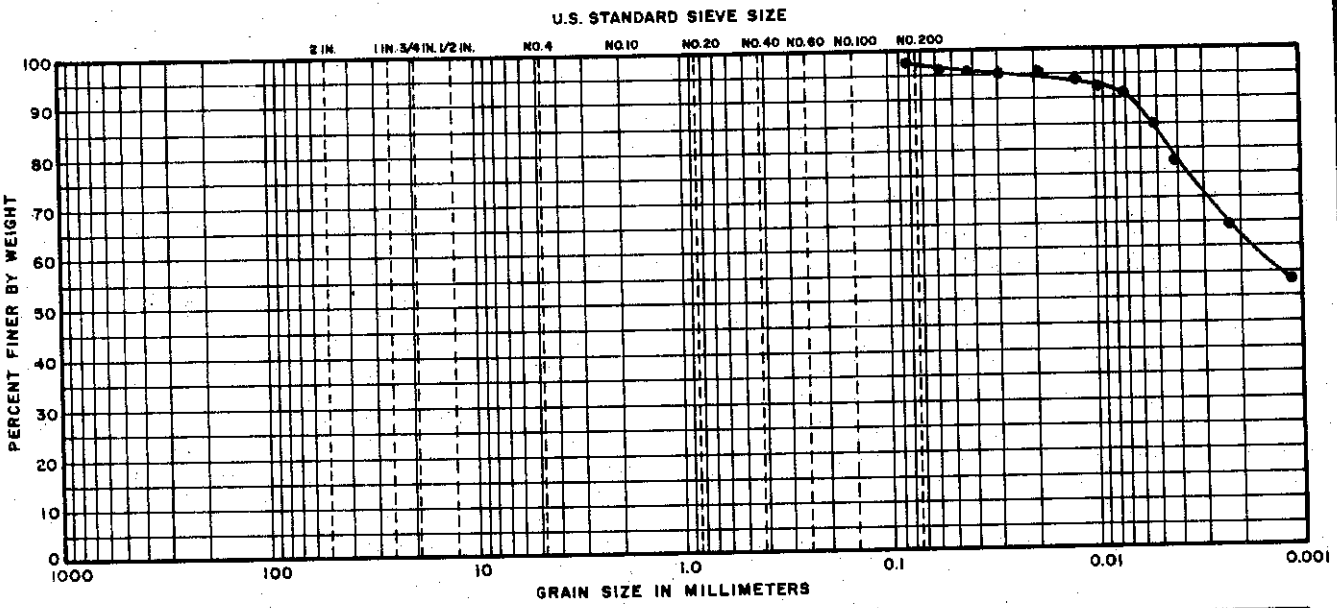
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-610

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

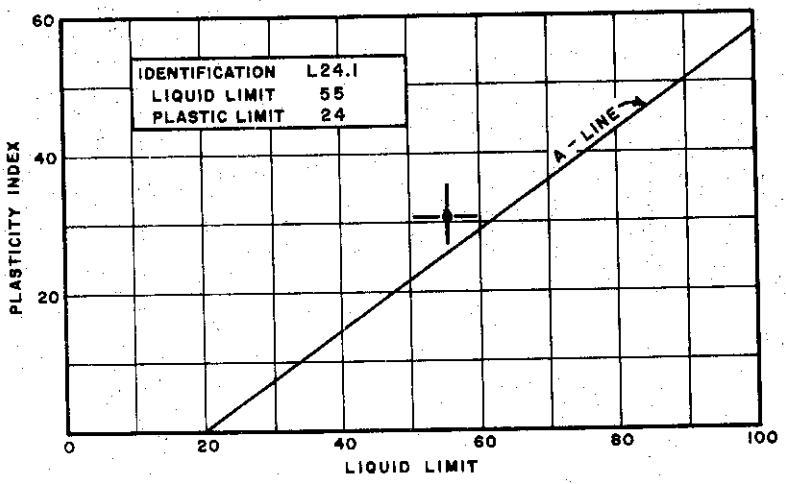


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

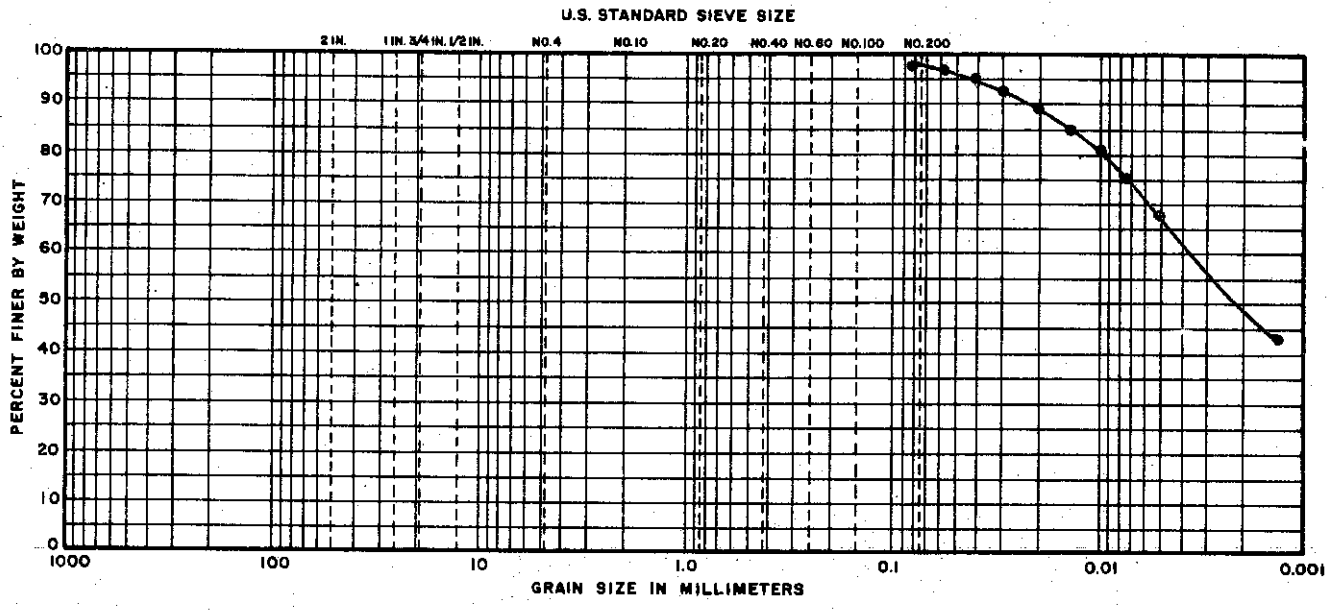
IDENTIFICATION : SILTY CLAY (CH)
EXPLORATION: BORING 38
SAMPLE : 16
DEPTH : 74.0' TO 74.1'

SPECIFIC GRAVITY = 2.72

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

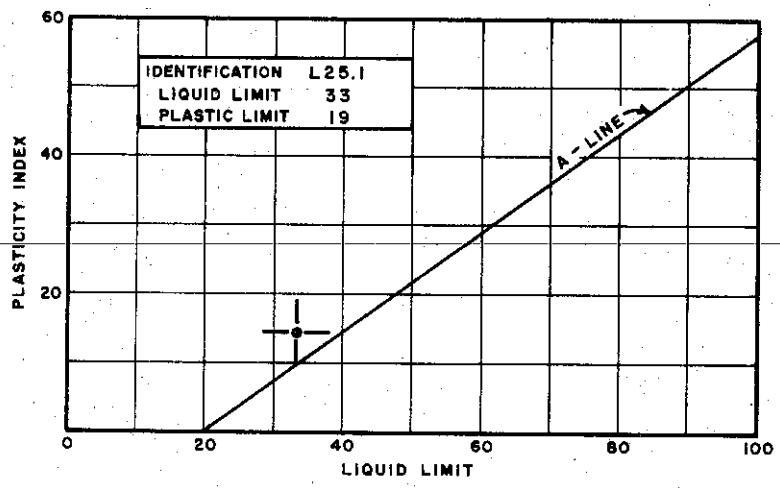


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 38
SAMPLE : 18
DEPTH : 84.6' TO 84.9'

SPECIFIC GRAVITY : USED 2.70

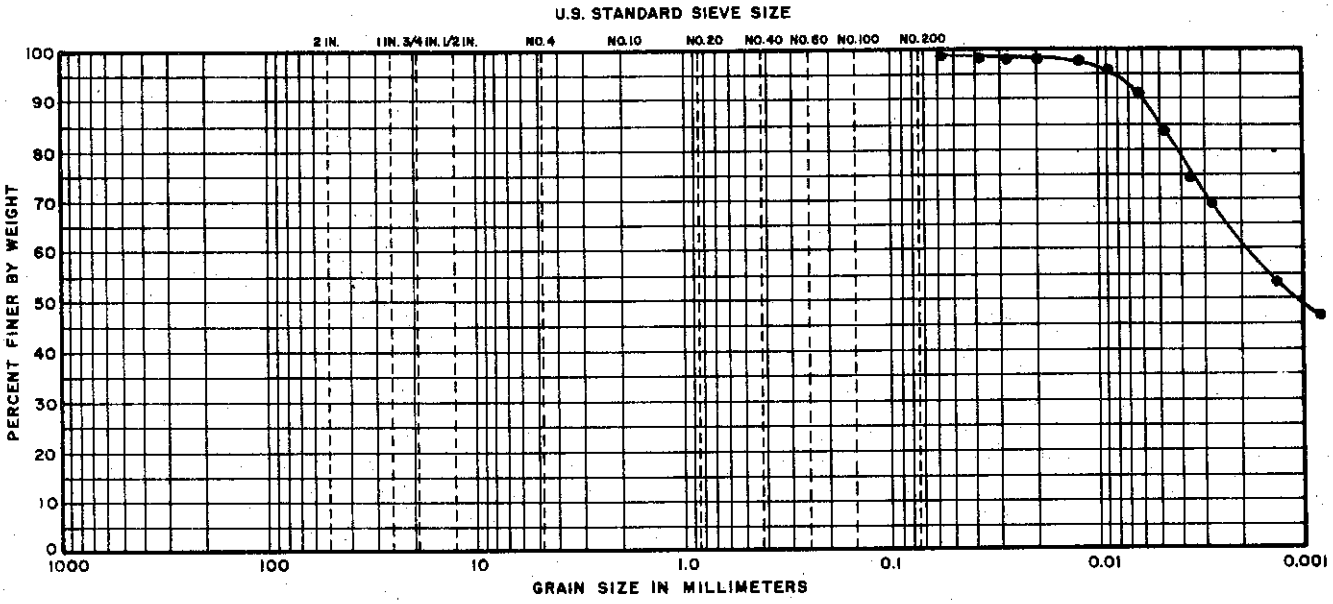
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-612

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

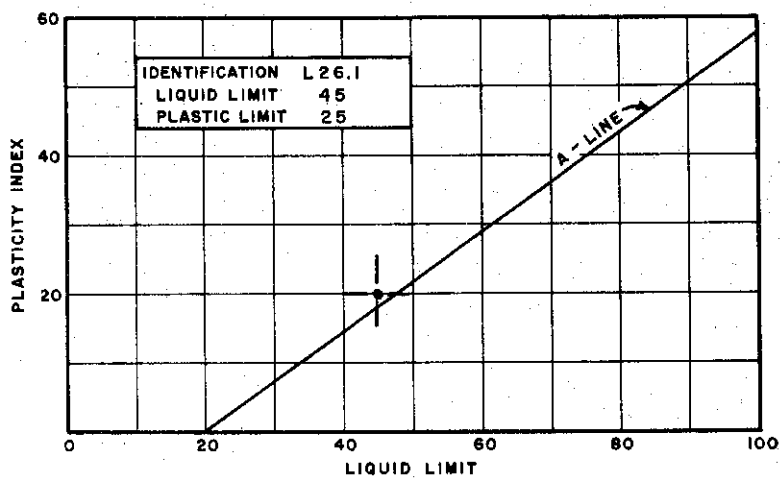


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

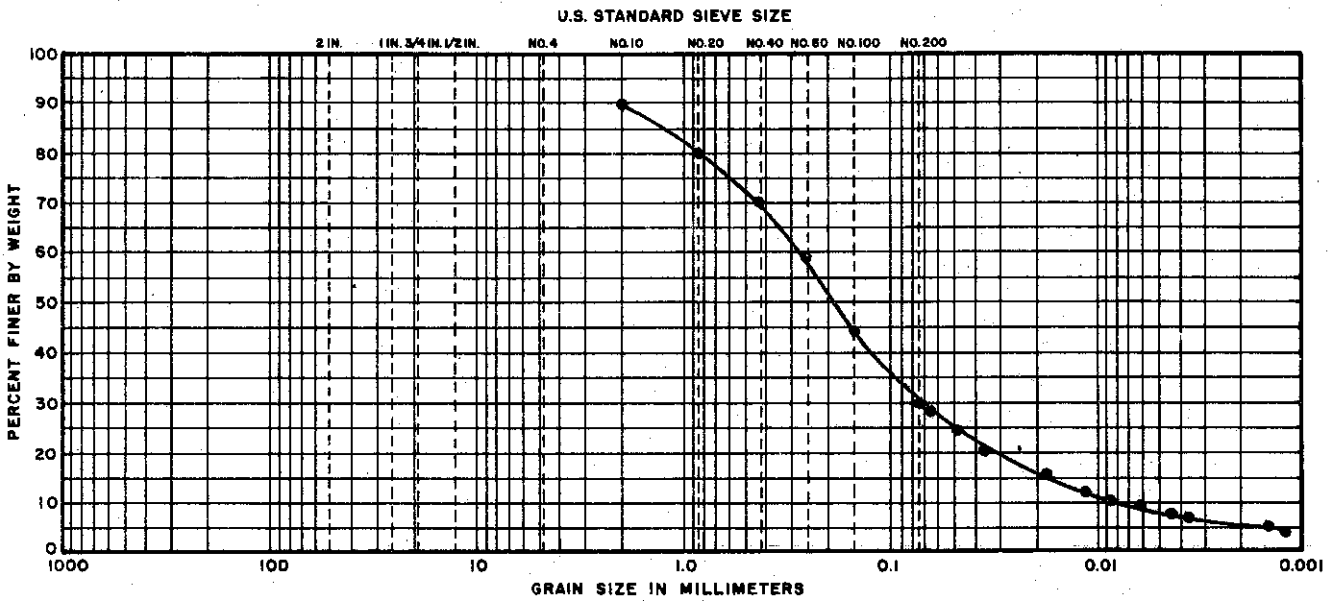
IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 38
SAMPLE : 24
DEPTH : 114.2' TO 114.5'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

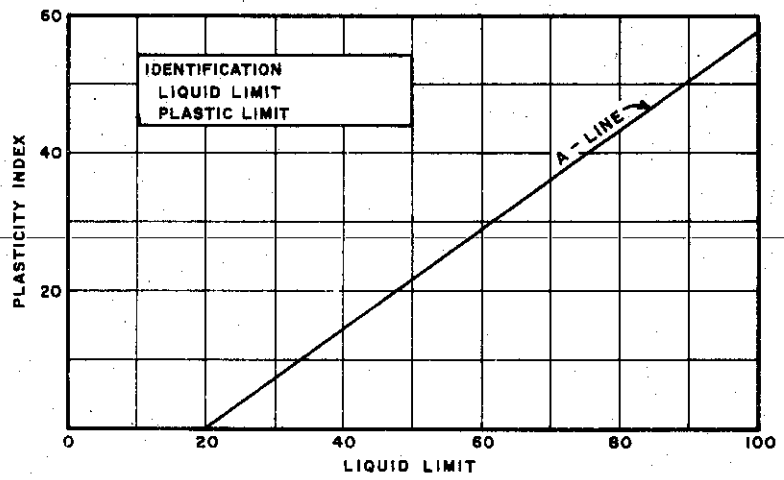


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY SAND (SM)
EXPLORATION: BORING 38
SAMPLE : SS 30
DEPTH : 138.5' TO 140.0'

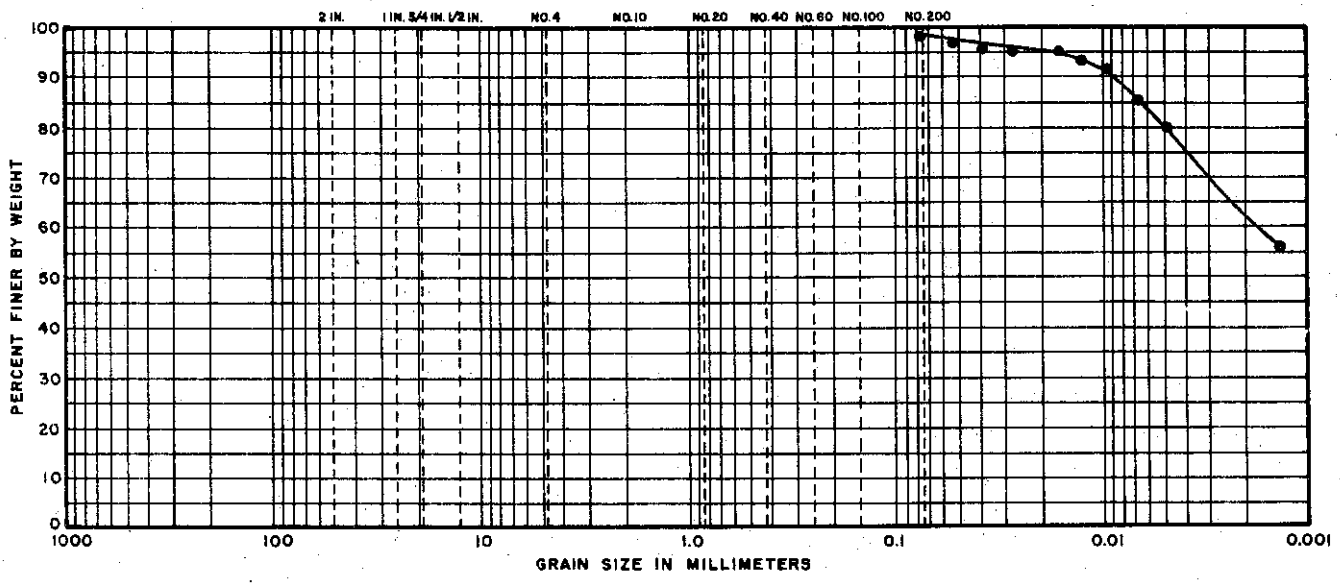
SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-614

GRAIN SIZE DISTRIBUTION

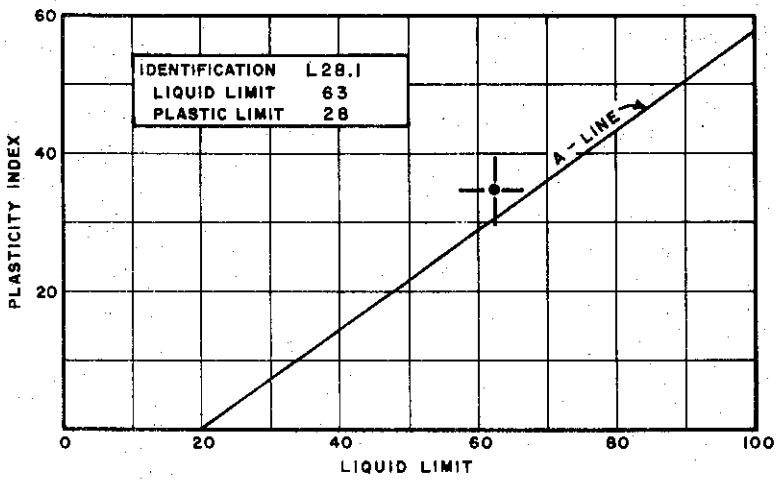


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

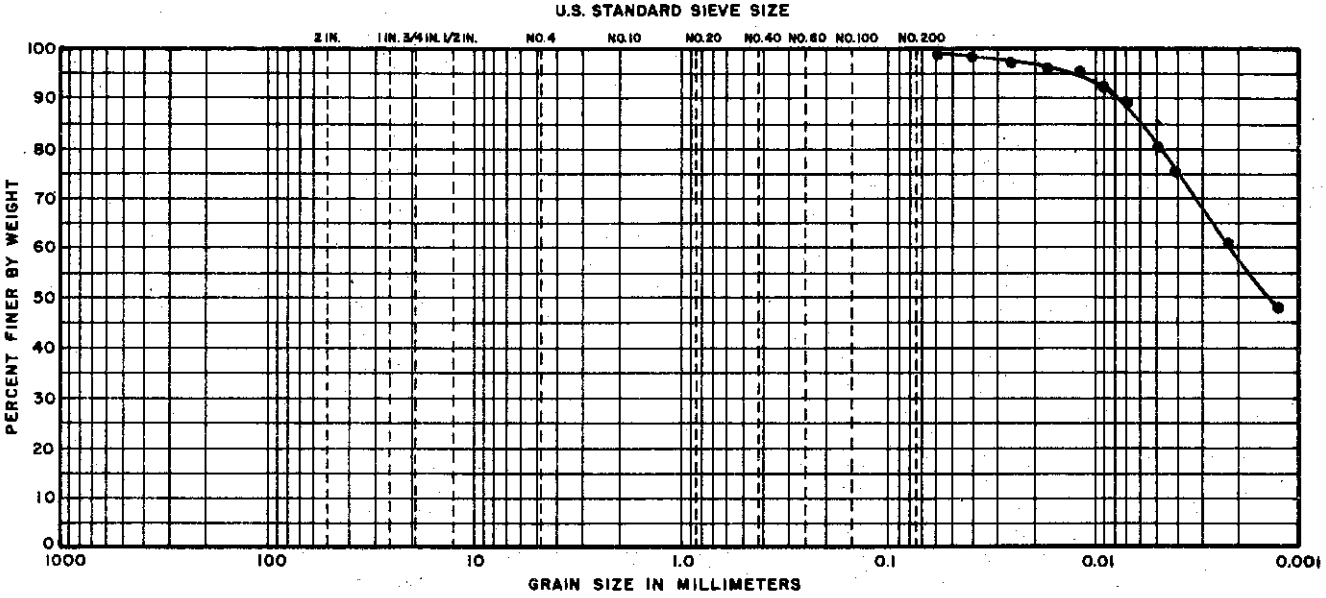
IDENTIFICATION : SILTY CLAY (CH)
EXPLORATION: BORING 41
SAMPLE : 2
DEPTH : 4.5' TO 4.8'

SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

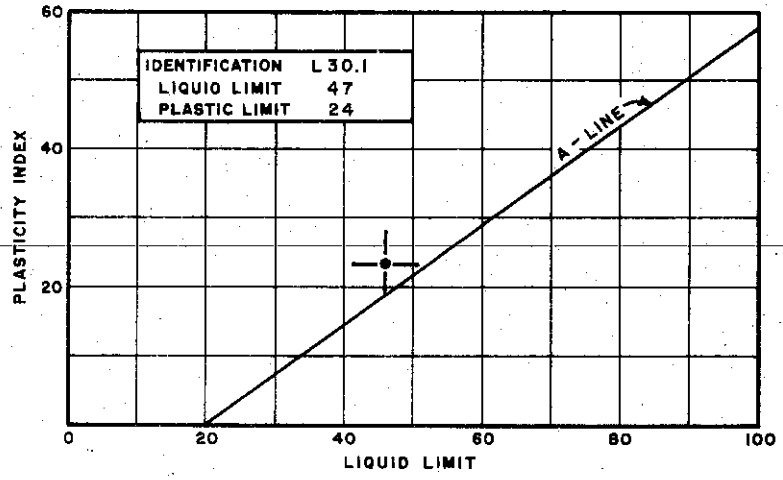


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 41
SAMPLE : 7
DEPTH : 20.6' TO 21.0'

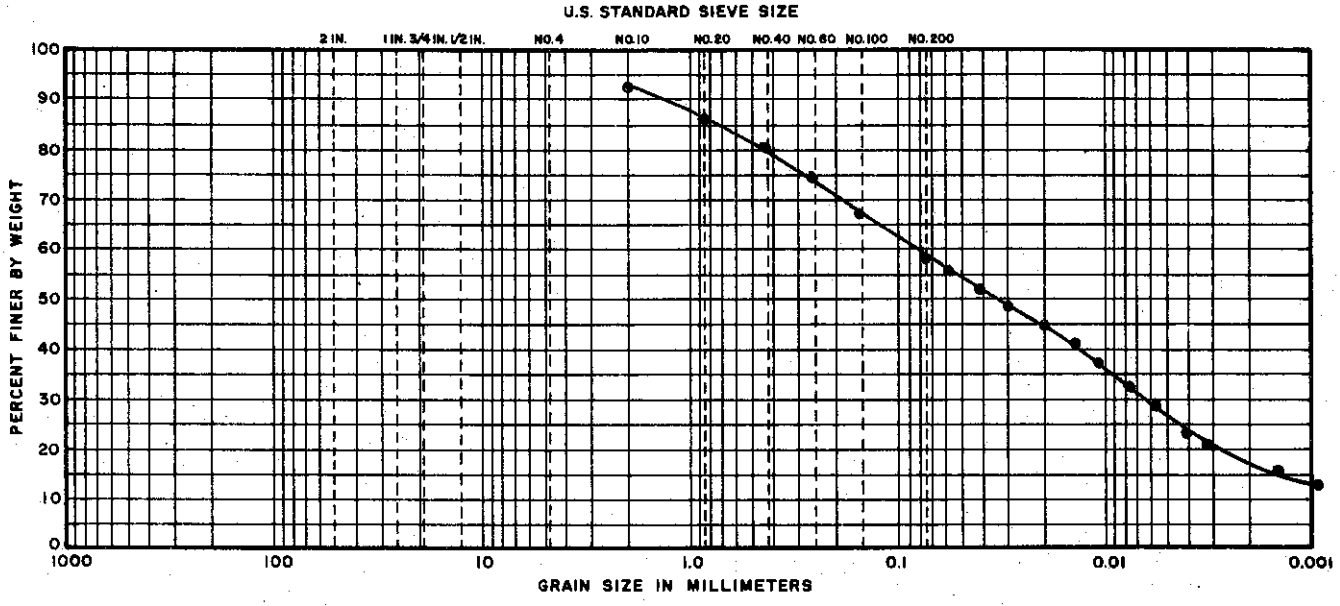
SPECIFIC GRAVITY = 2.66

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-616

GRAIN SIZE DISTRIBUTION

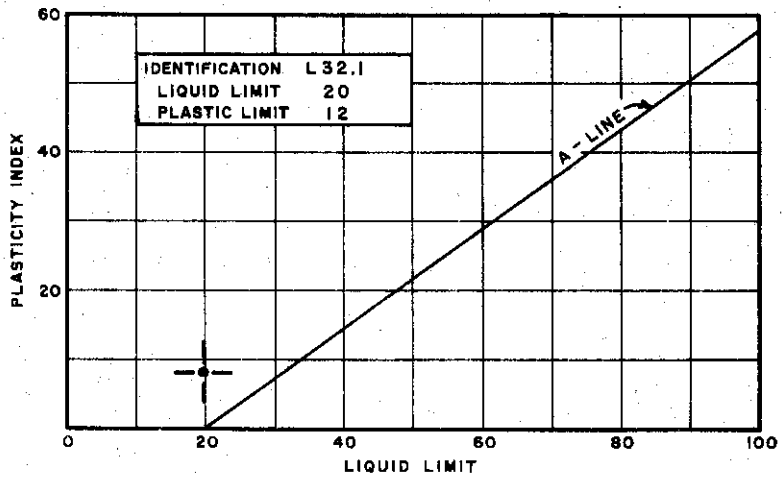


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

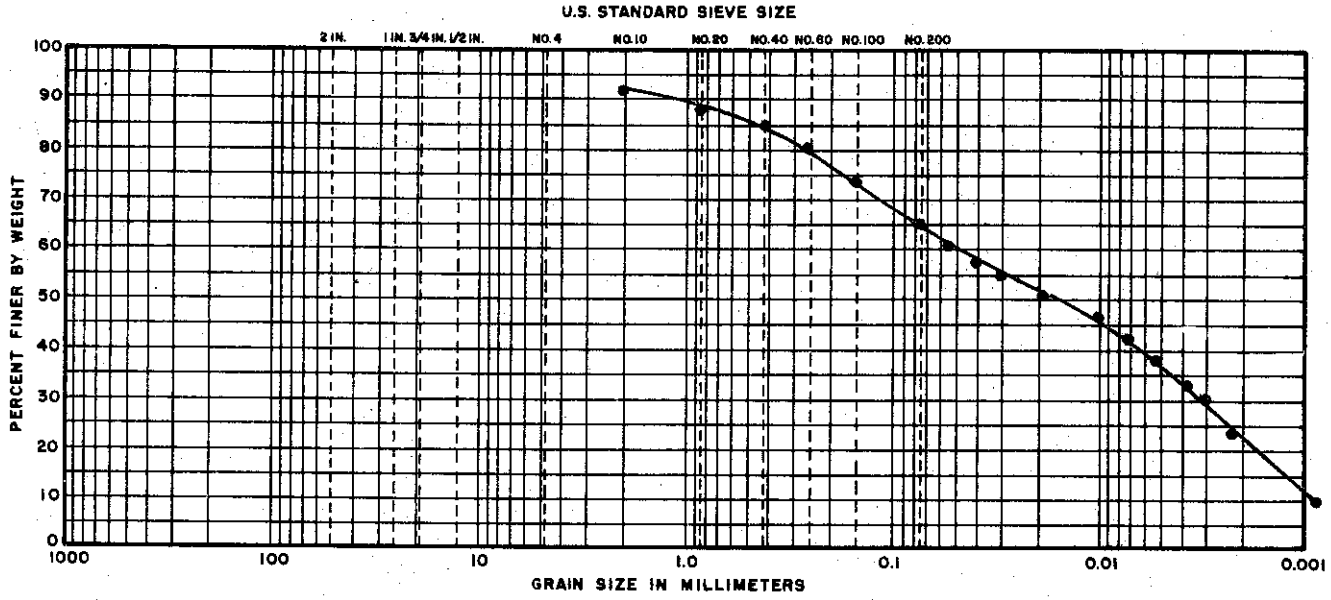
IDENTIFICATION : CLAYEY SAND (SC)
EXPLORATION: BORING 41
SAMPLE : 11
DEPTH : 40.7' TO 41.0'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

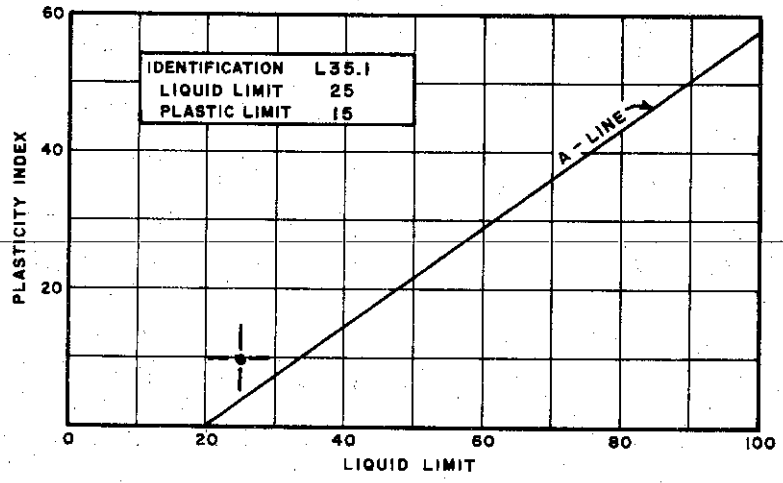


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY; ZONES OF SAND (CL-SC)
EXPLORATION: BORING 41
SAMPLE : 17
DEPTH : 72.9' TO 73.2'

SPECIFIC GRAVITY = 2.68

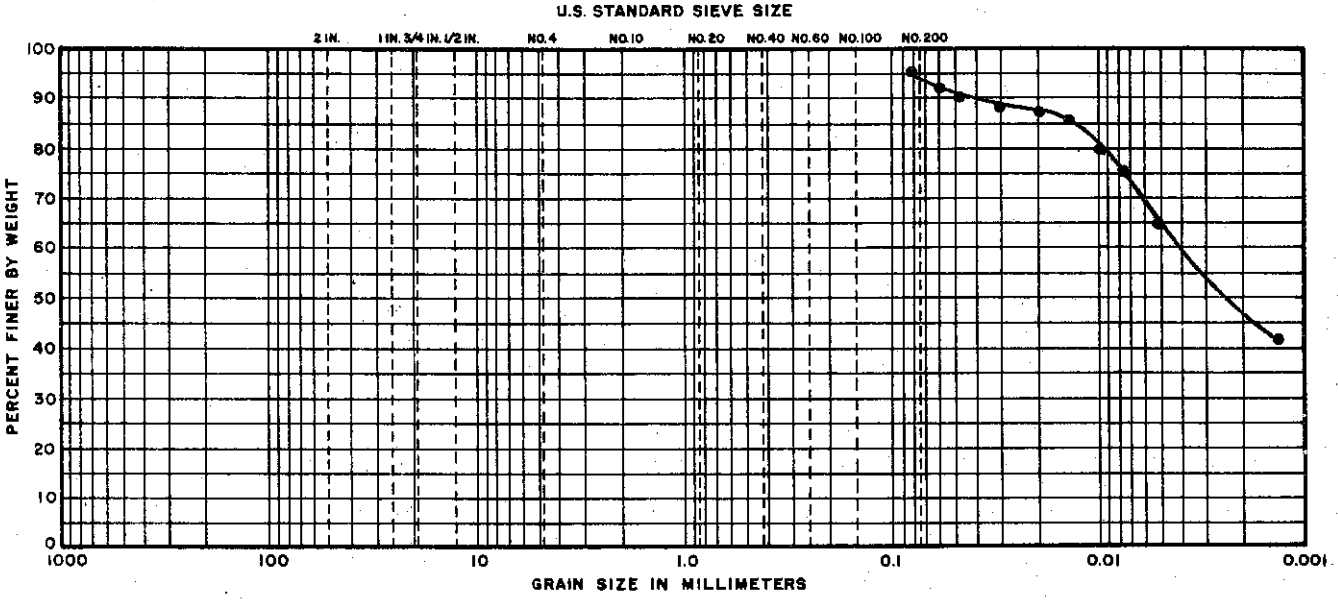
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-618

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

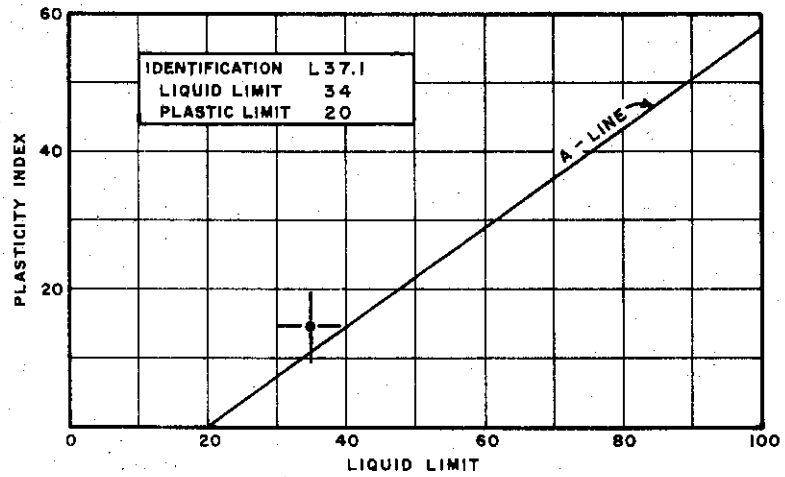


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

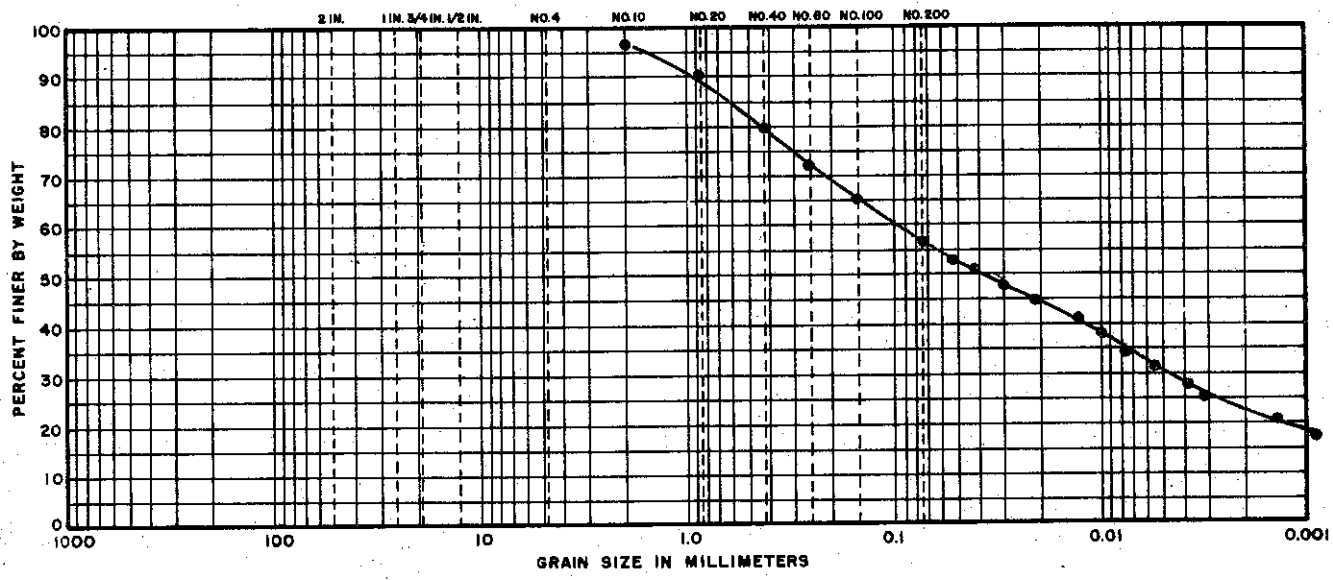
IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 41
SAMPLE : 23
DEPTH : 101.9' TO 102.2'

SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

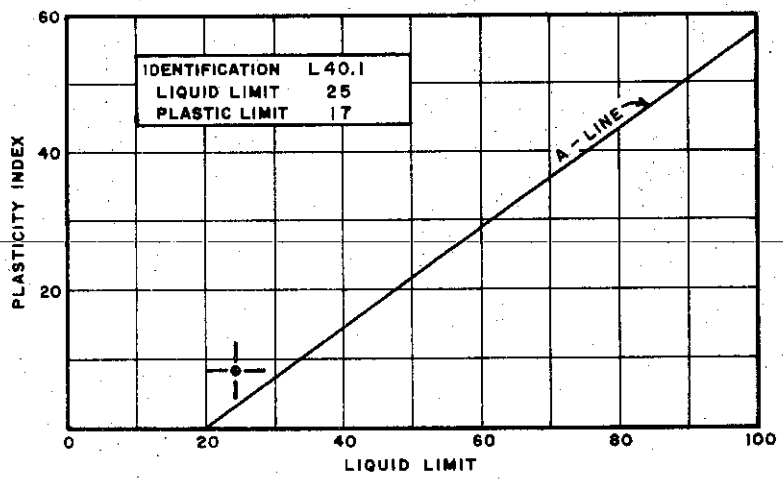


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : CLAYEY SAND (GC-SC)
EXPLORATION: BORING 41
SAMPLE : 29
DEPTH : 130.7' TO 130.9'

SPECIFIC GRAVITY = 2.69

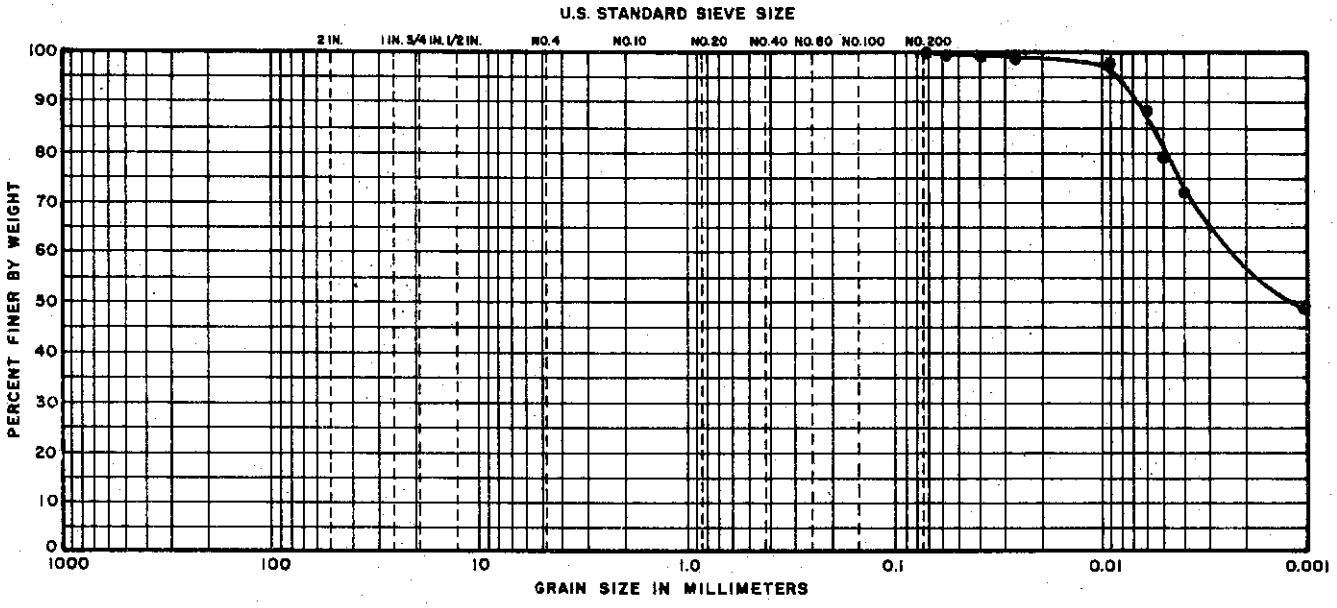
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-620

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

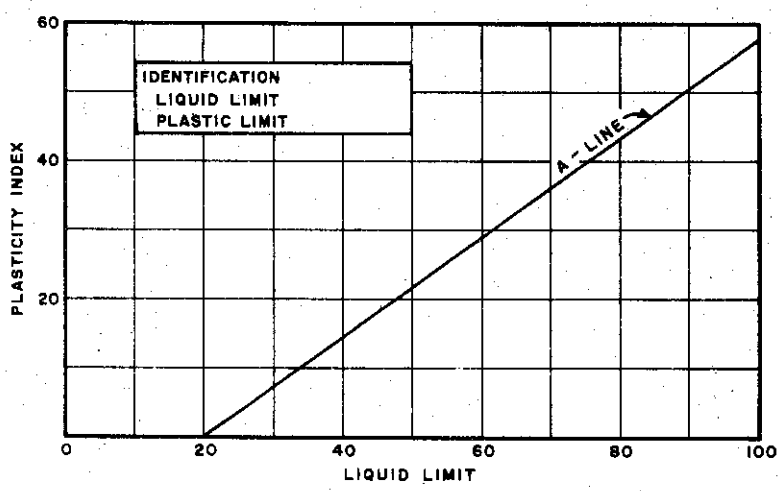


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

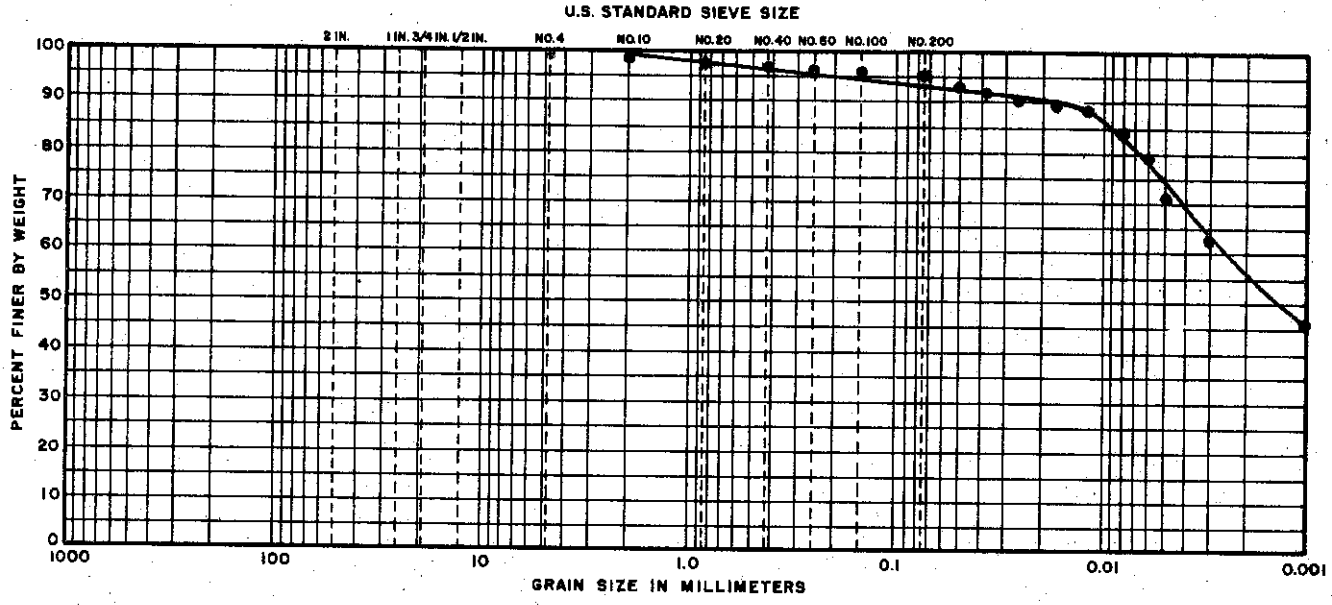
IDENTIFICATION : SILTY CLAY (CL-CH)
EXPLORATION: BORING 48
SAMPLE : 4
DEPTH : 8' - 10'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

GRAIN SIZE DISTRIBUTION

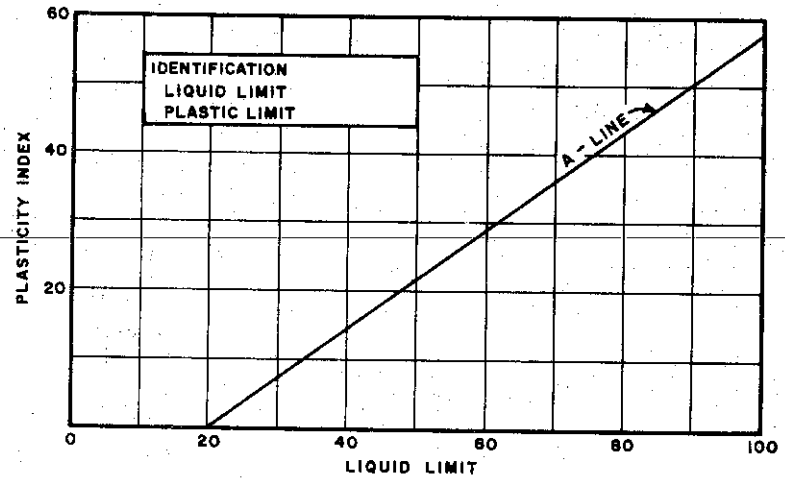


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 48
SAMPLE : 26
DEPTH : 118' - 120.6'

SPECIFIC GRAVITY : USED 2.70

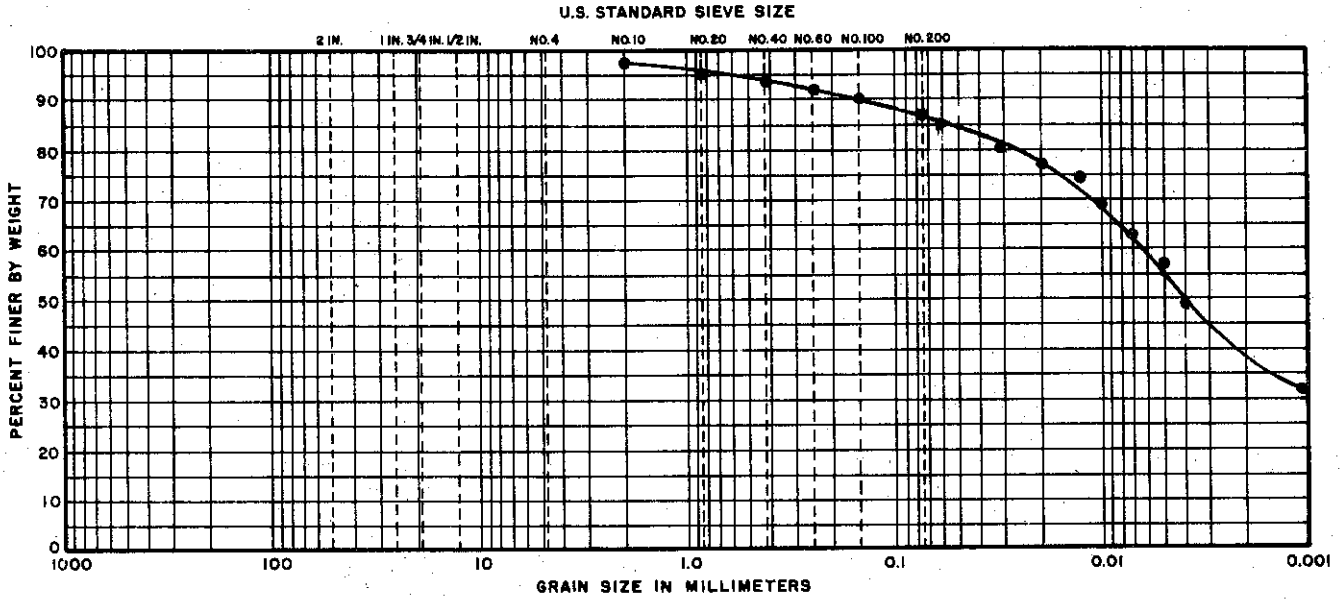
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

C-622

FILE NO. 1255 DATE MARCH 74

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

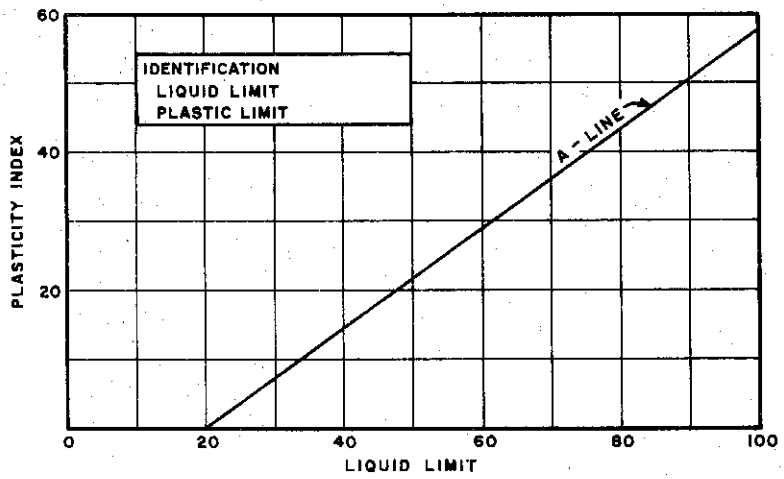


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

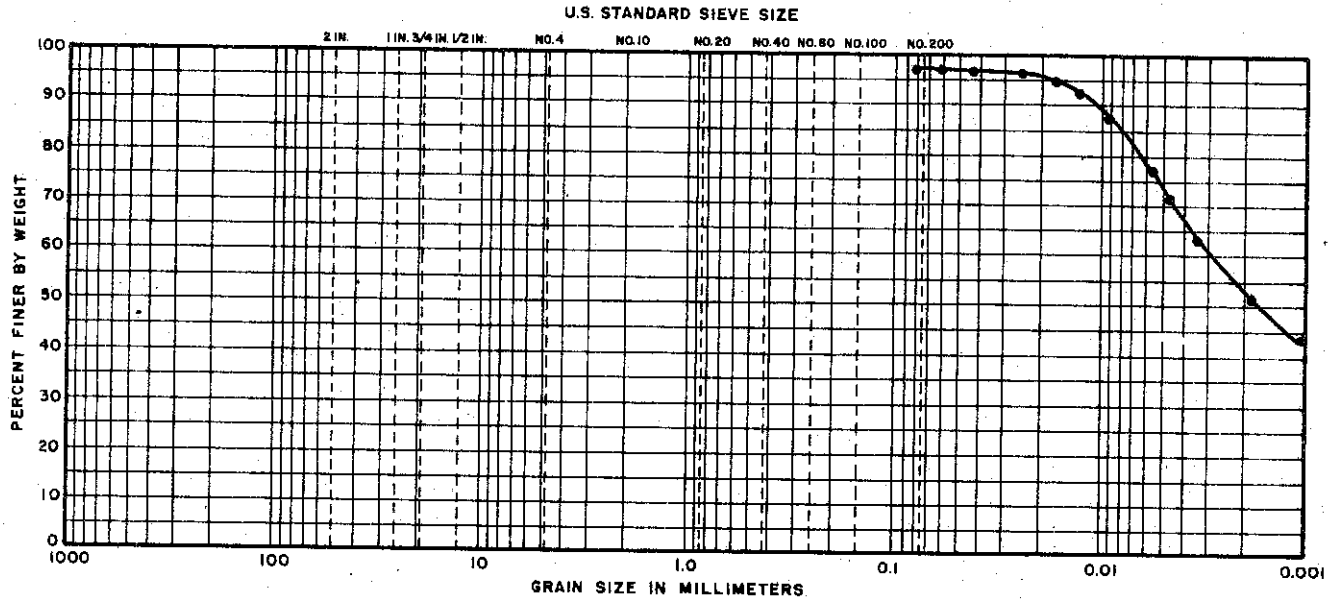
IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 49
SAMPLE : 7
DEPTH : 53'-55'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

GRAIN SIZE DISTRIBUTION

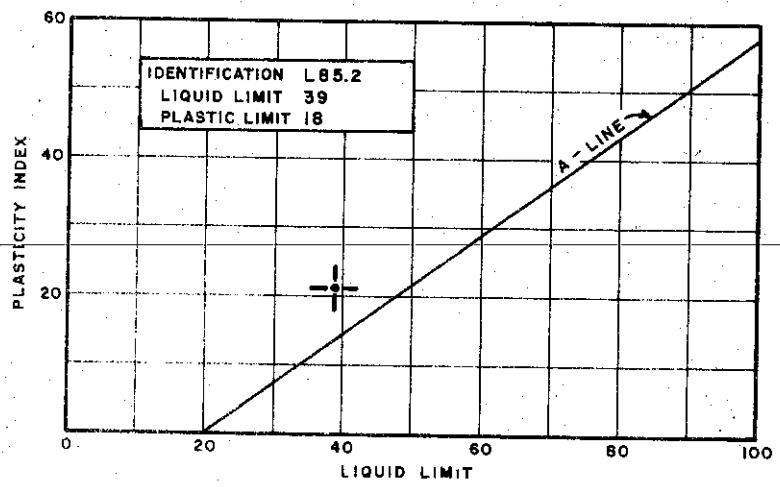


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 50
SAMPLE : 6
DEPTH : 28.3' TO 28.5'

SPECIFIC GRAVITY: USED 2.70

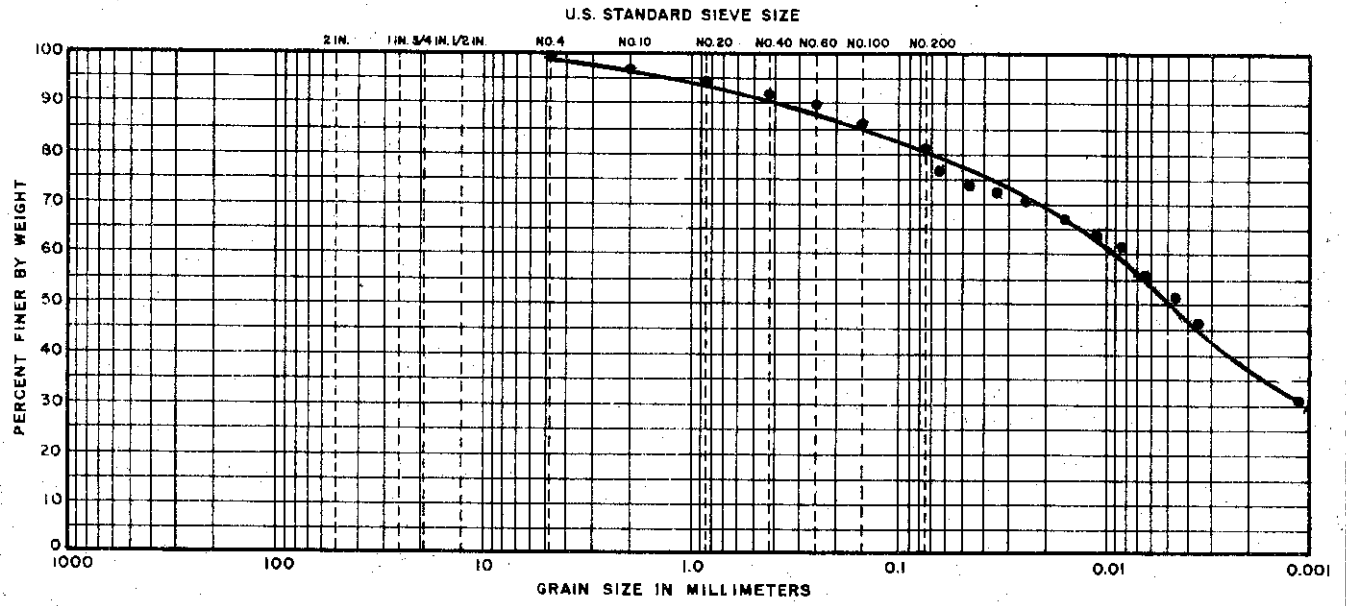
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

C-624

FILE NO. 1255 DATE JULY 1974

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

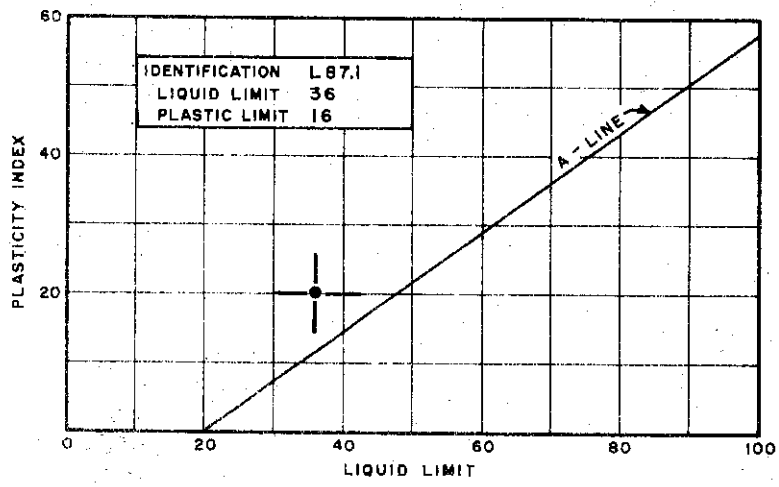


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

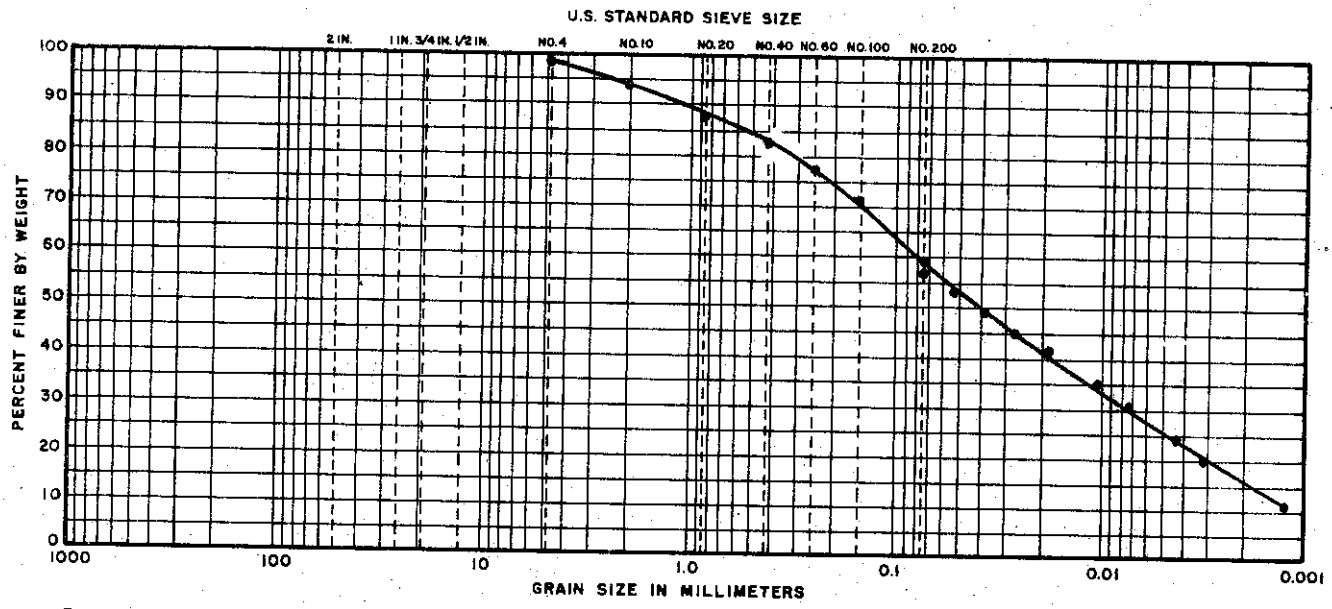
IDENTIFICATION: SILTY CLAY, SANDY (CL)
EXPLORATION: BORING 50
SAMPLE : 10
DEPTH : 48.6' TO 48.8'

SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

GRAIN SIZE DISTRIBUTION

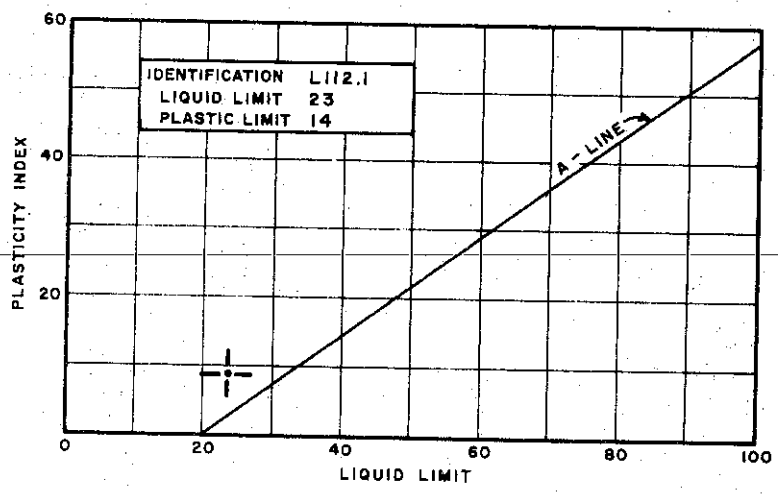


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL)
EXPLORATION: BORING 52
SAMPLE : 7
DEPTH : 58.6' TO 58.9'

SPECIFIC GRAVITY: USED 2.70

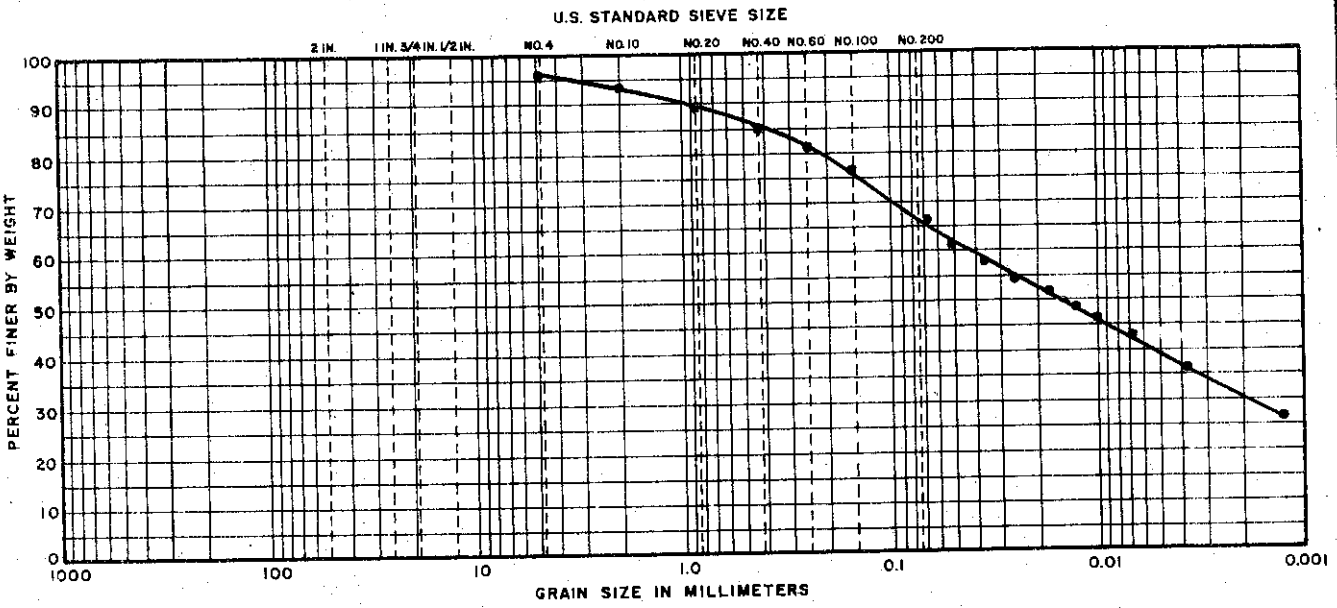
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

C-626

FILE NO. 1255 DATE JULY 1974

GOLDBERG – ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

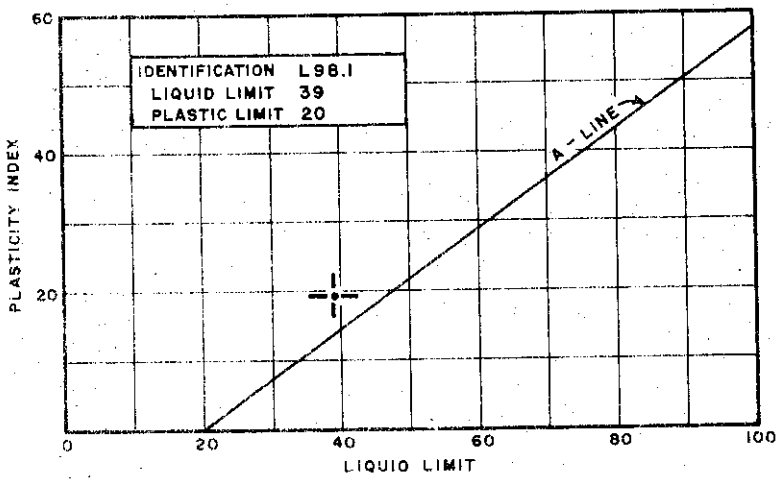


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION: SILTY CLAY, SANDY (CL)
EXPLORATION: BORING 53
SAMPLE: 5
DEPTH: 39.5' TO 39.8'

SPECIFIC GRAVITY: 2.72

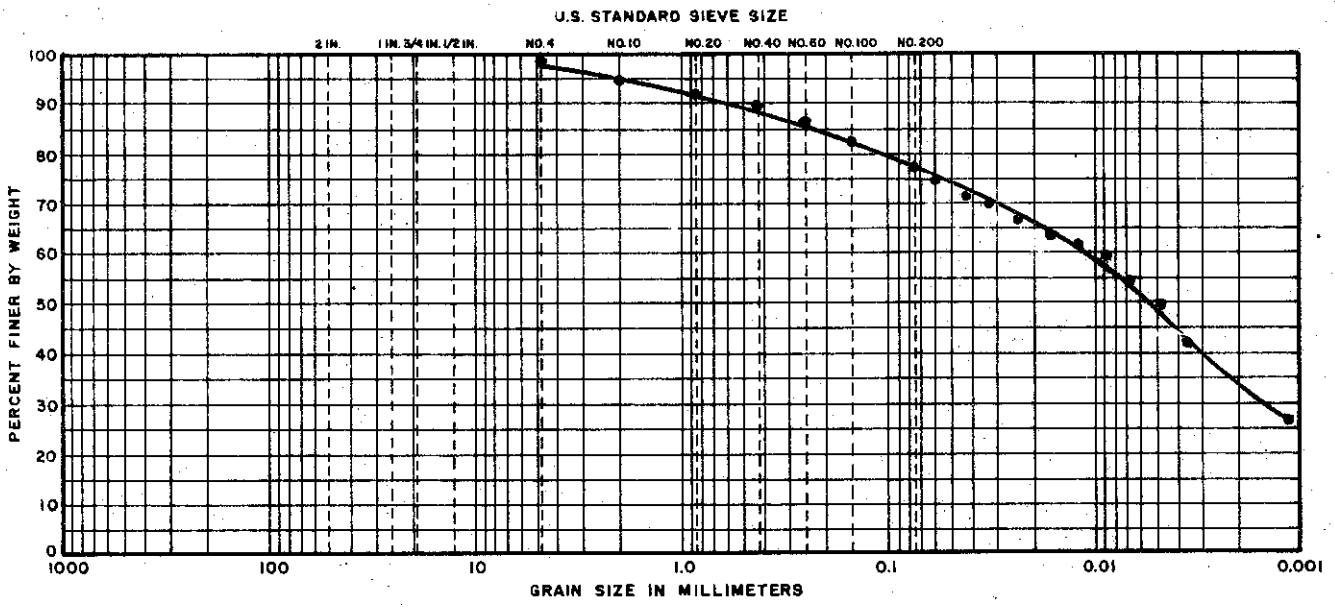
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

C-627

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

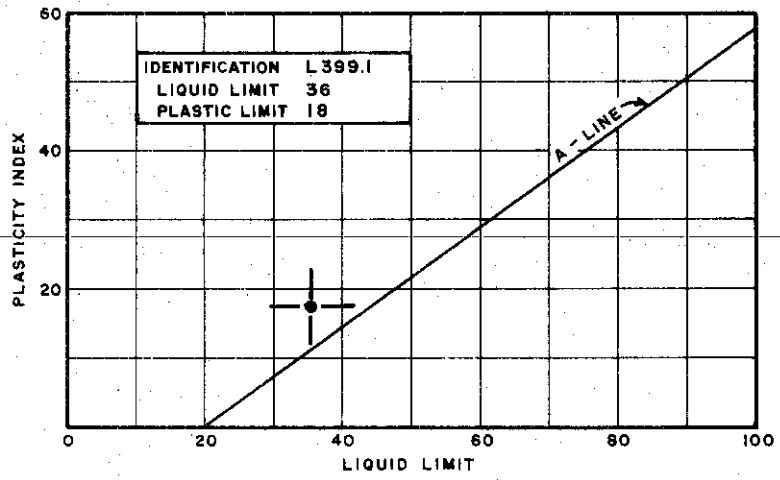


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY, SANDY (CL)
EXPLORATION: BORING 54
SAMPLE : 6
DEPTH : 63.5' TO 63.8'

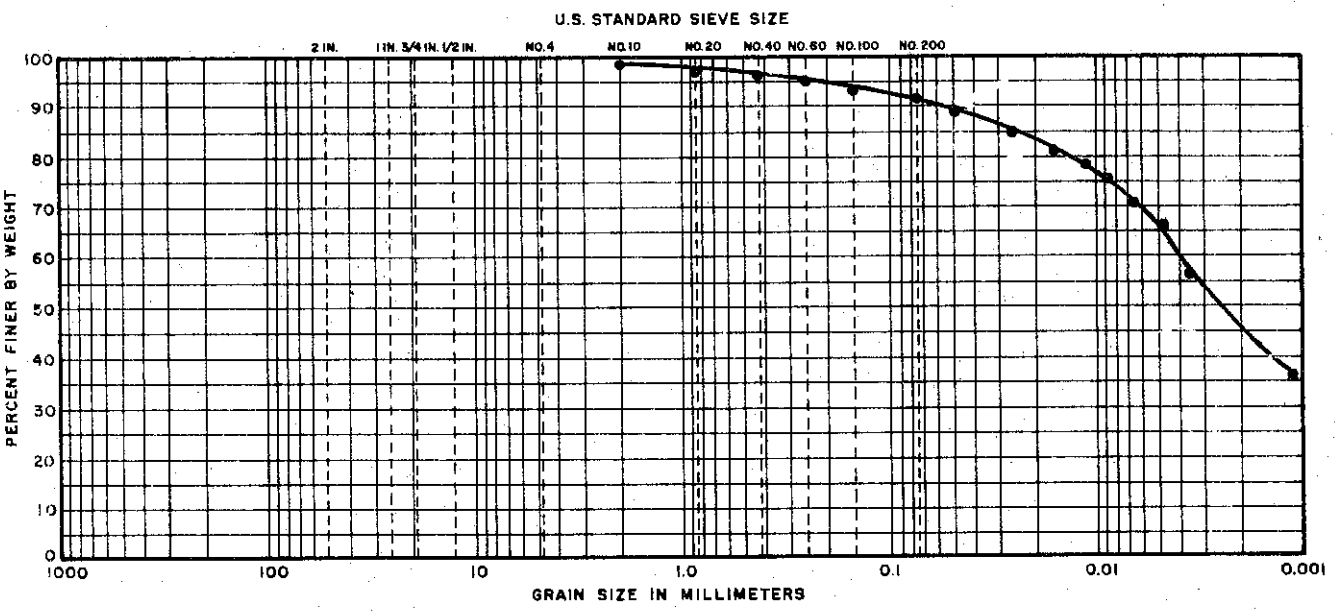
SPECIFIC GRAVITY: 2.71

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

C-628

GRAIN SIZE DISTRIBUTION

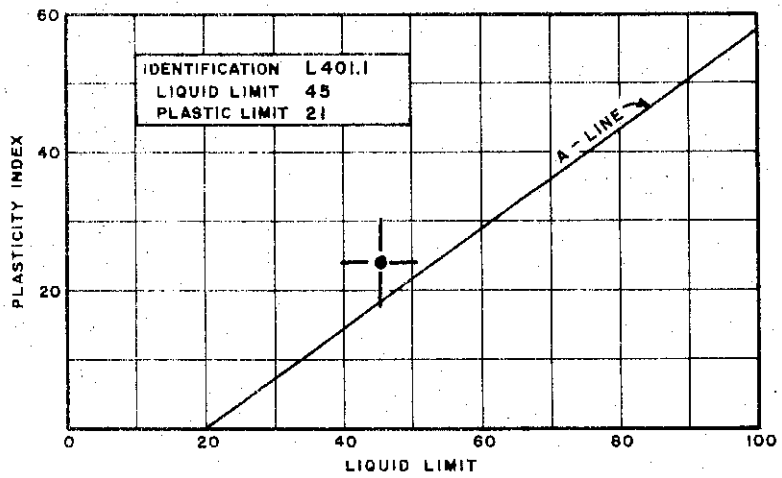


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

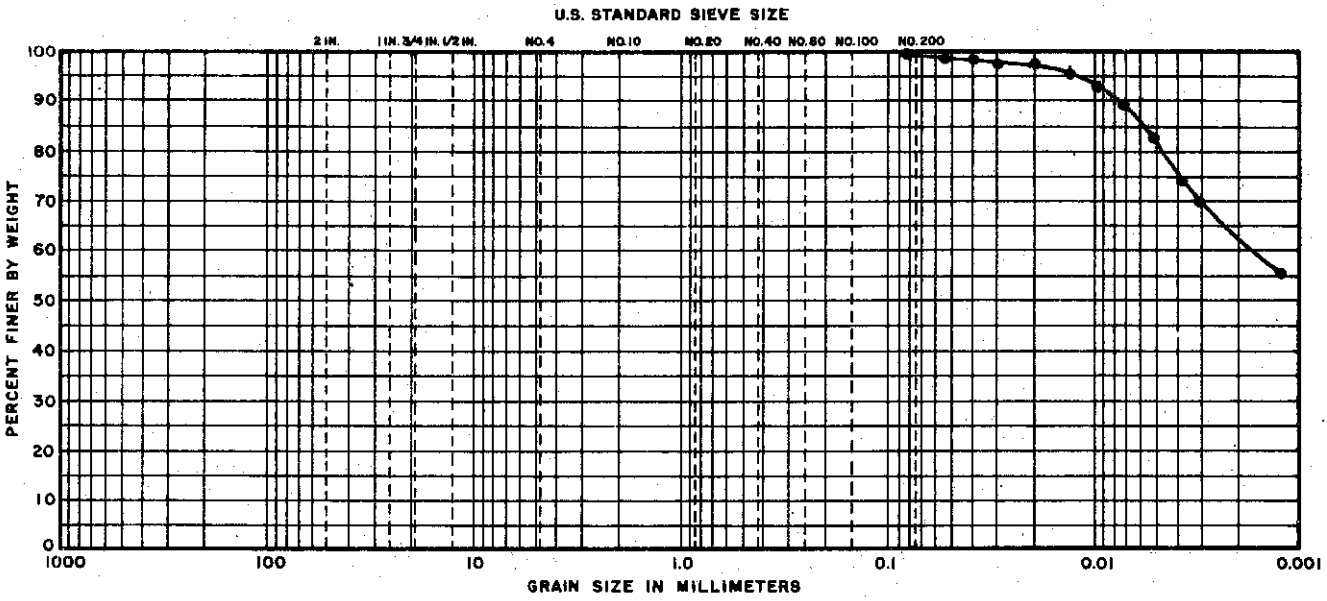
IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 54
SAMPLE : 8
DEPTH : 73.7' TO 74.0'

SPECIFIC GRAVITY : 2.73

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

GRAIN SIZE DISTRIBUTION

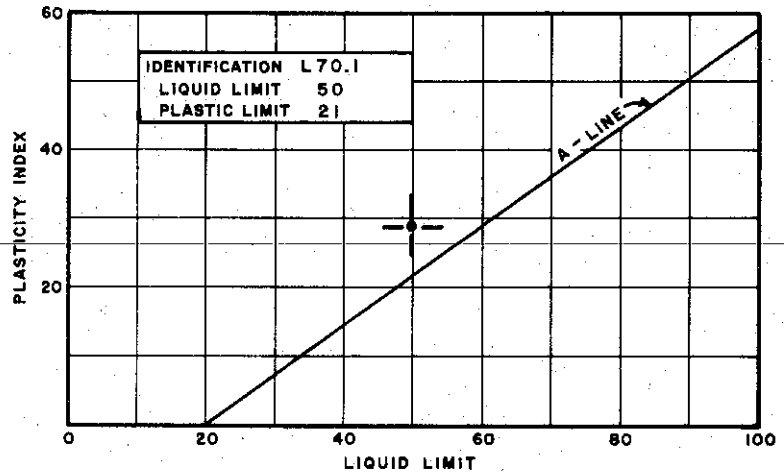


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)
EXPLORATION: BORING 60
SAMPLE : SS1
DEPTH : 5.0' TO 6.5'

SPECIFIC GRAVITY : USED 2.70

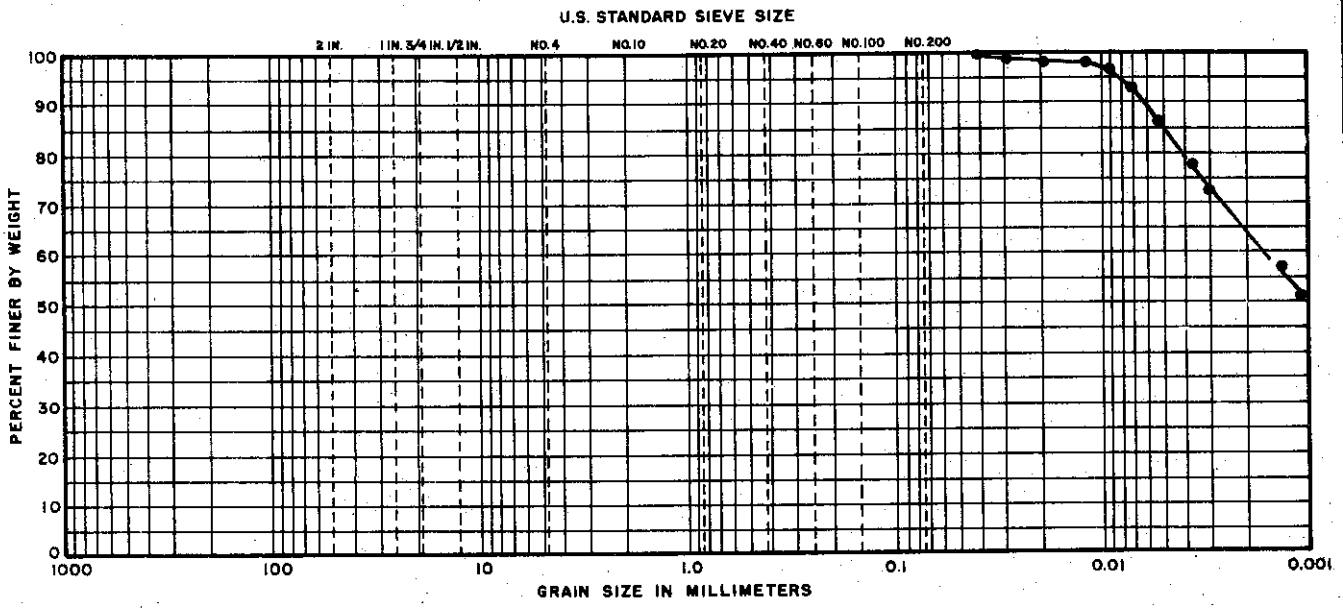
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-630

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

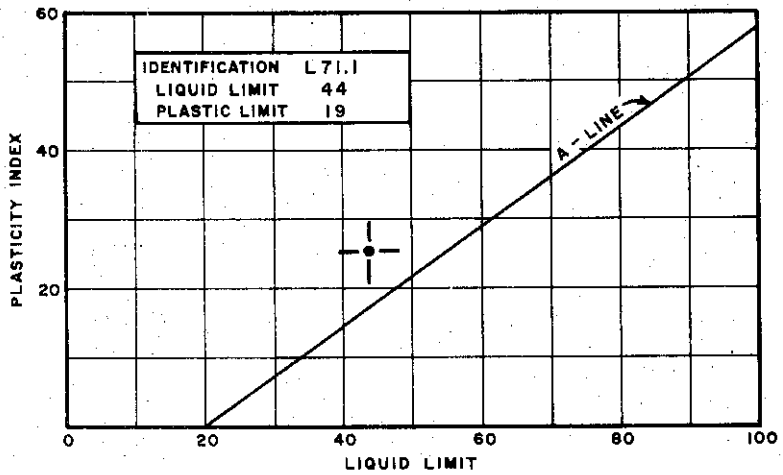


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

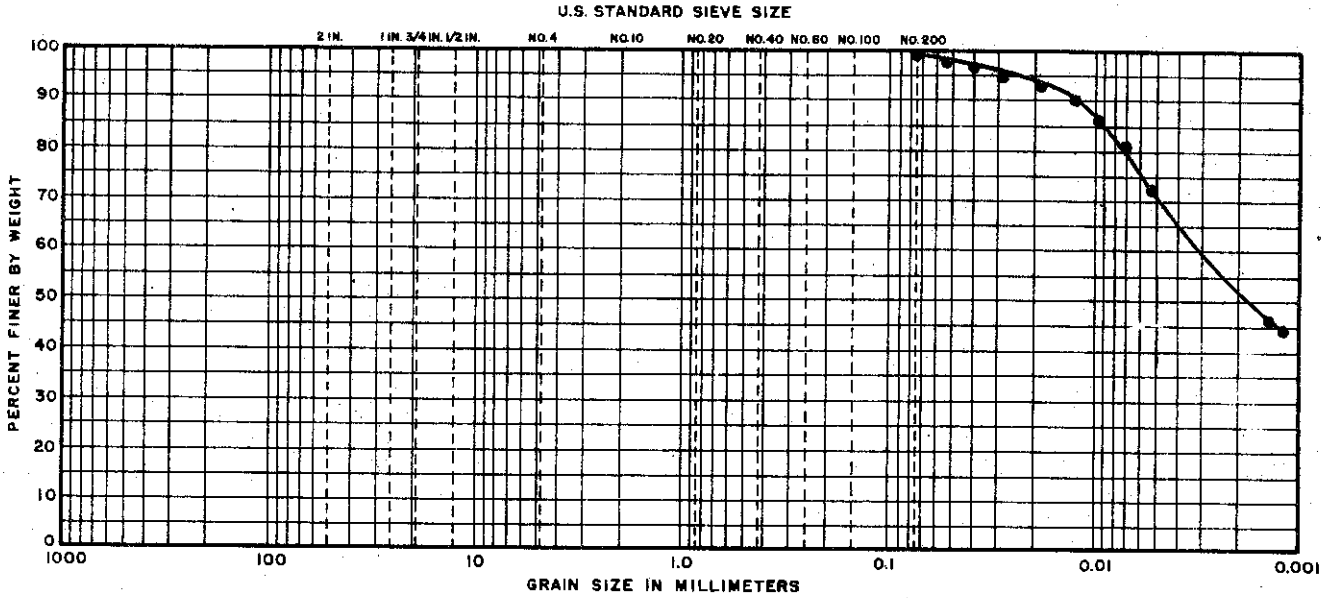
IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 60
SAMPLE : SS2
DEPTH : 10' TO 12.5'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

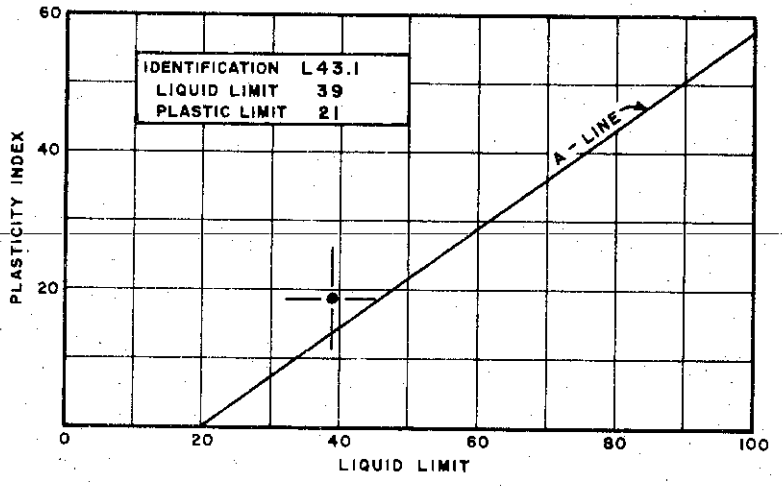


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 60
SAMPLE : 3
DEPTH : 18.1' TO 18.3'

SPECIFIC GRAVITY ASSUMED 2.70

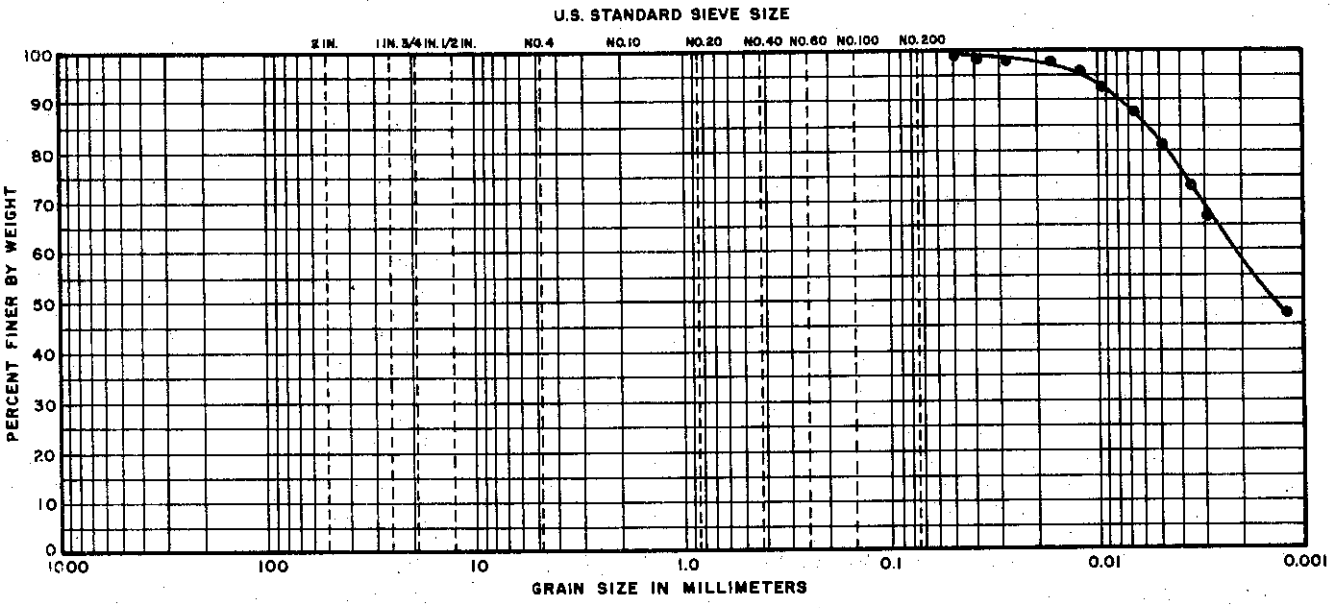
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

C-632

FILE NO. 1255 DATE MARCH 74

GOLDBERG – ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

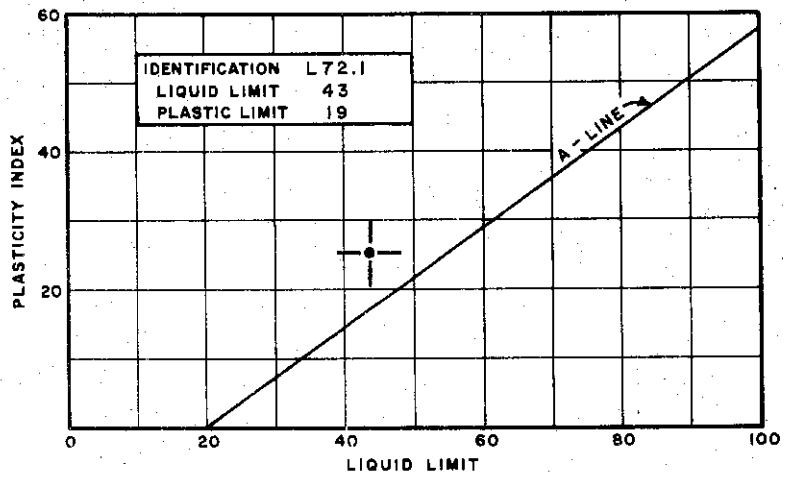


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

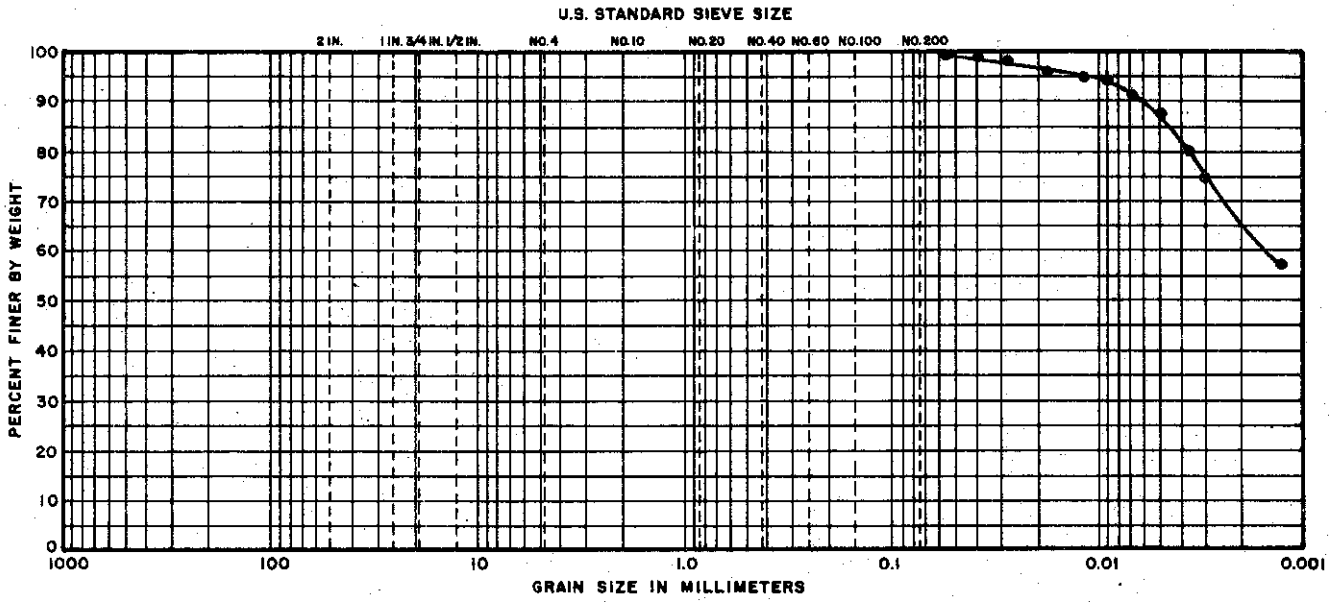
IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 60
SAMPLE : SS3
DEPTH : 19' TO 20.5'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

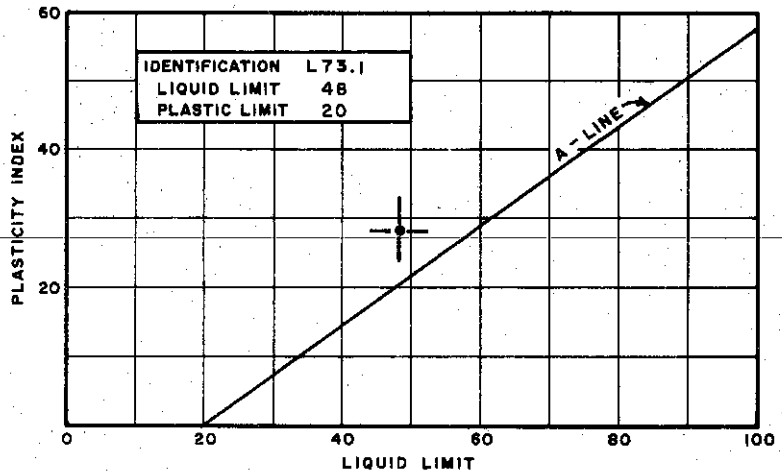


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)
EXPLORATION: BORING 60
SAMPLE : SS5
DEPTH : 27' TO 28.5'

SPECIFIC GRAVITY : USED 2.70

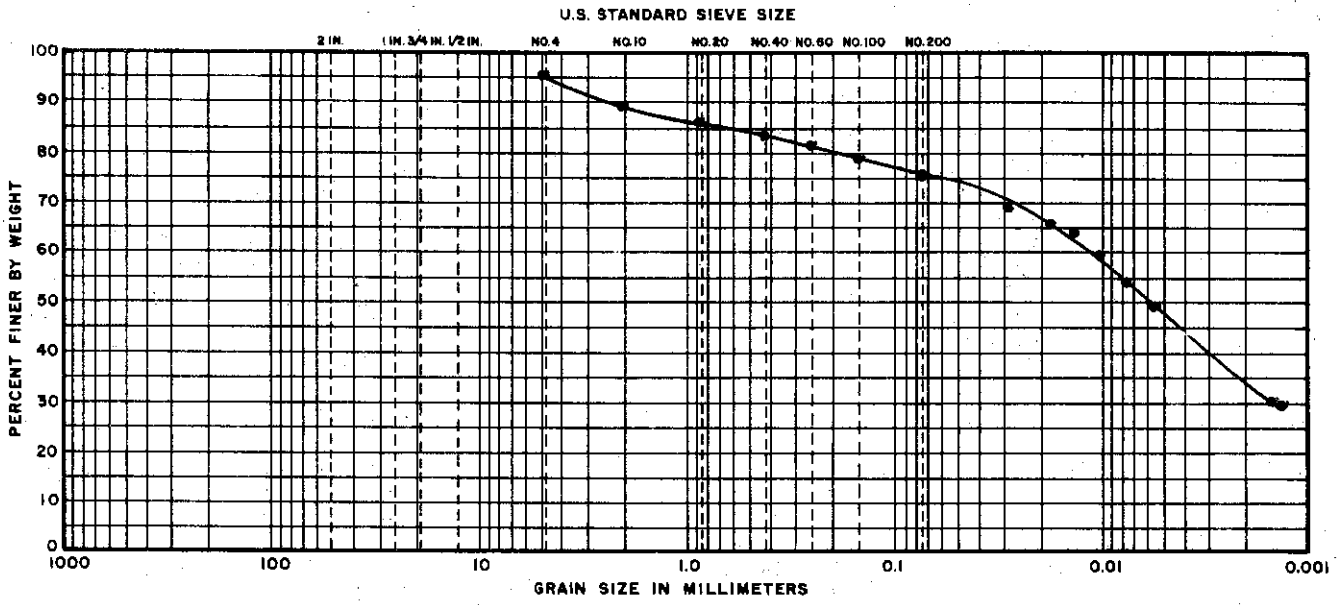
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

C-634

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

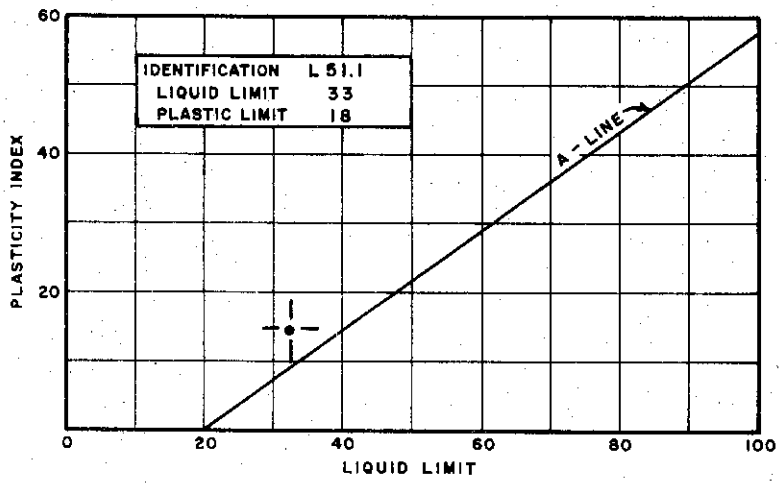


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

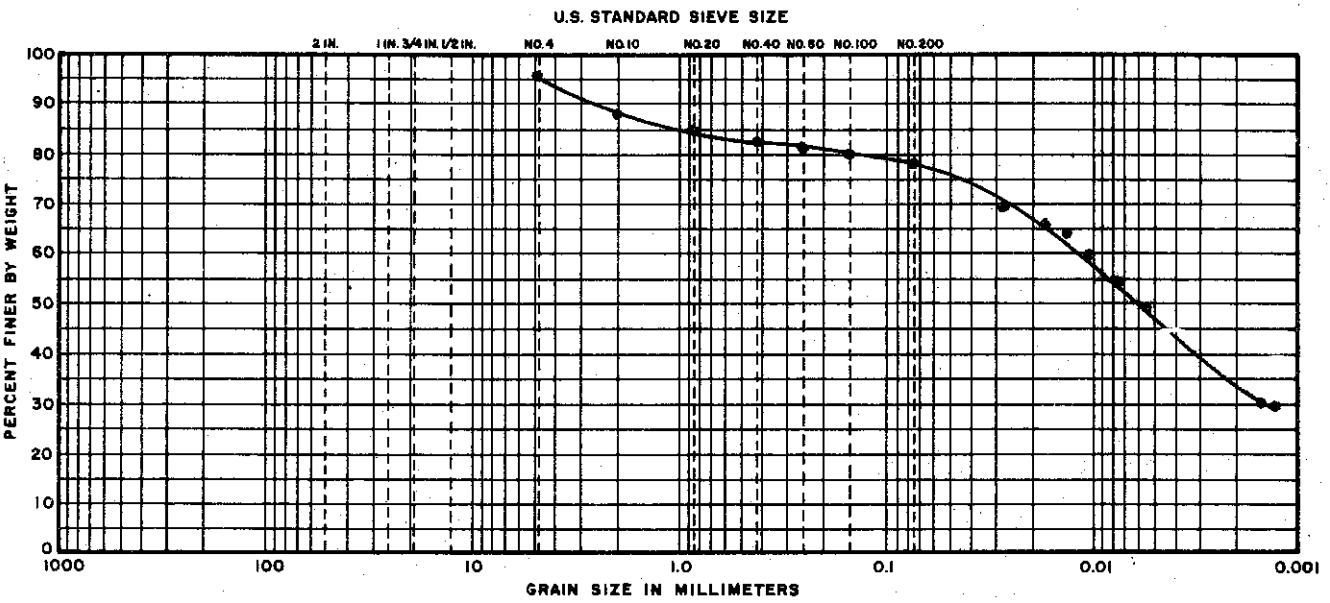
IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 60
SAMPLE : 11
DEPTH : 56.1' TO 56.4'

SPECIFIC GRAVITY ASSUMED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE MARCH 74

GRAIN SIZE DISTRIBUTION

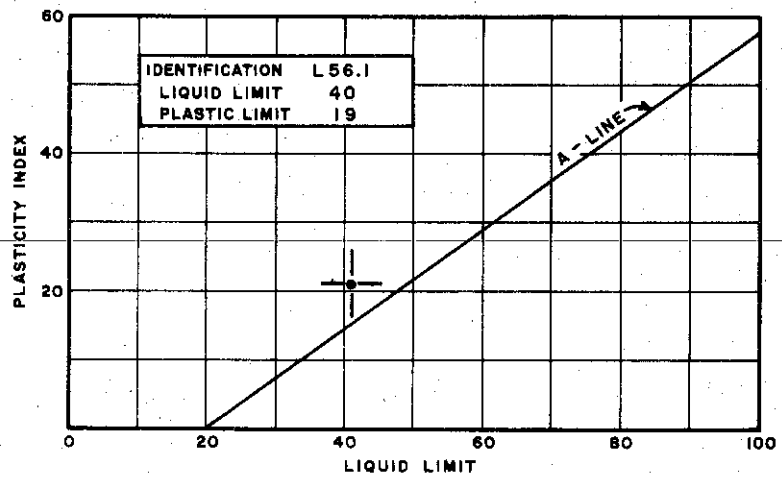


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 60
SAMPLE : 16
DEPTH : 85.6' TO 86.1'

SPECIFIC GRAVITY 2.73

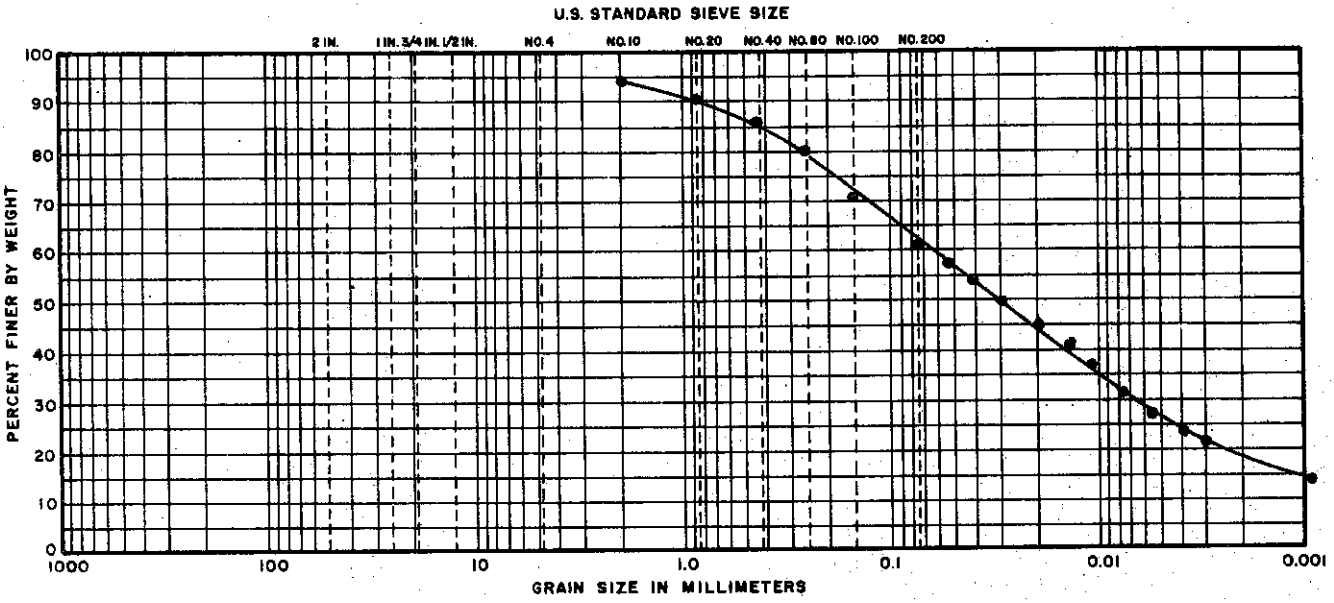
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

C-636

FILE NO. 1255 DATE MARCH 74

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

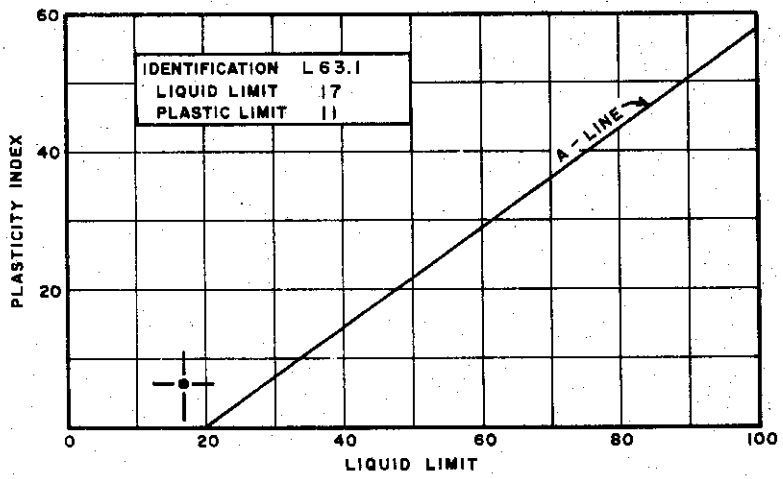


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

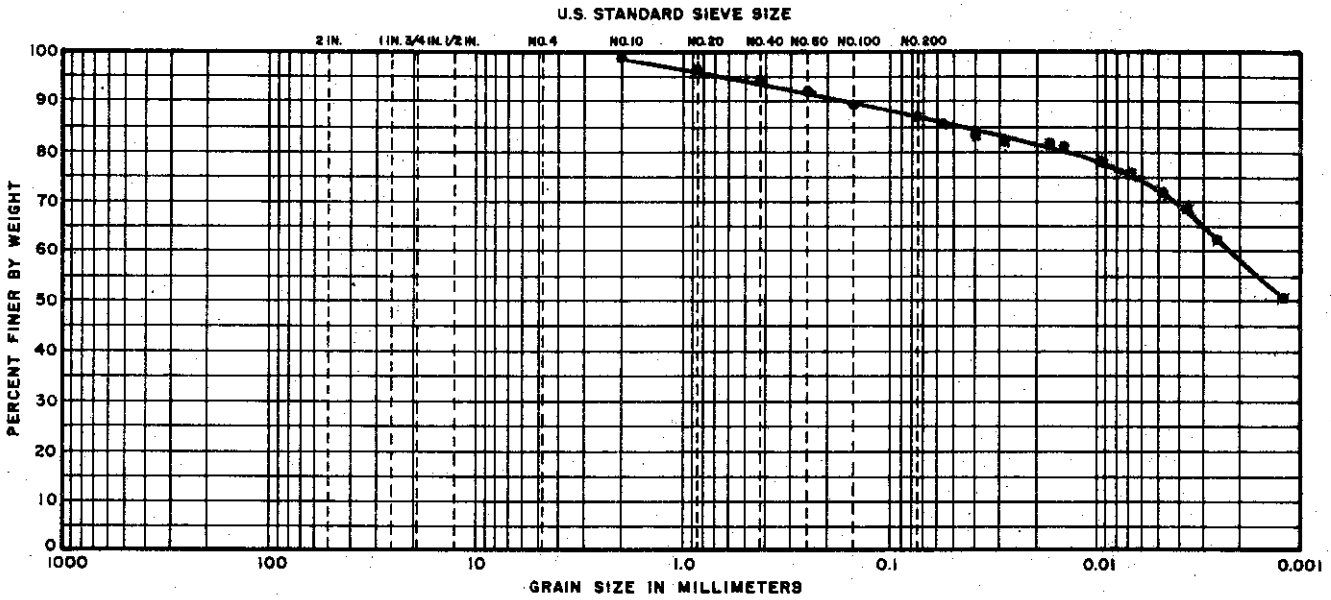
IDENTIFICATION : SILTY CLAY, SANDY (CL)
EXPLORATION: BORING 60
SAMPLE : 23
DEPTH : 119.5' TO 119.9'

SPECIFIC GRAVITY : USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JAN. 74

GRAIN SIZE DISTRIBUTION

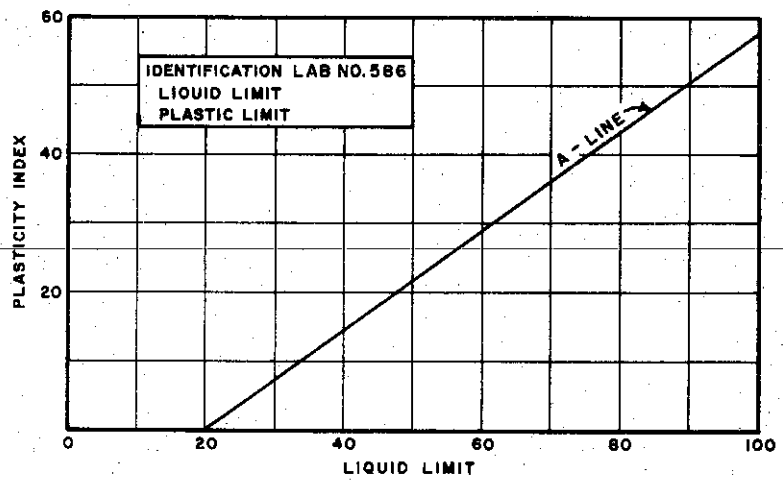


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL-CH)
EXPLORATION: BORING 137
SAMPLE : SS1
DEPTH : 1.5' TO 3.0'

SPECIFIC GRAVITY: USED 2.70

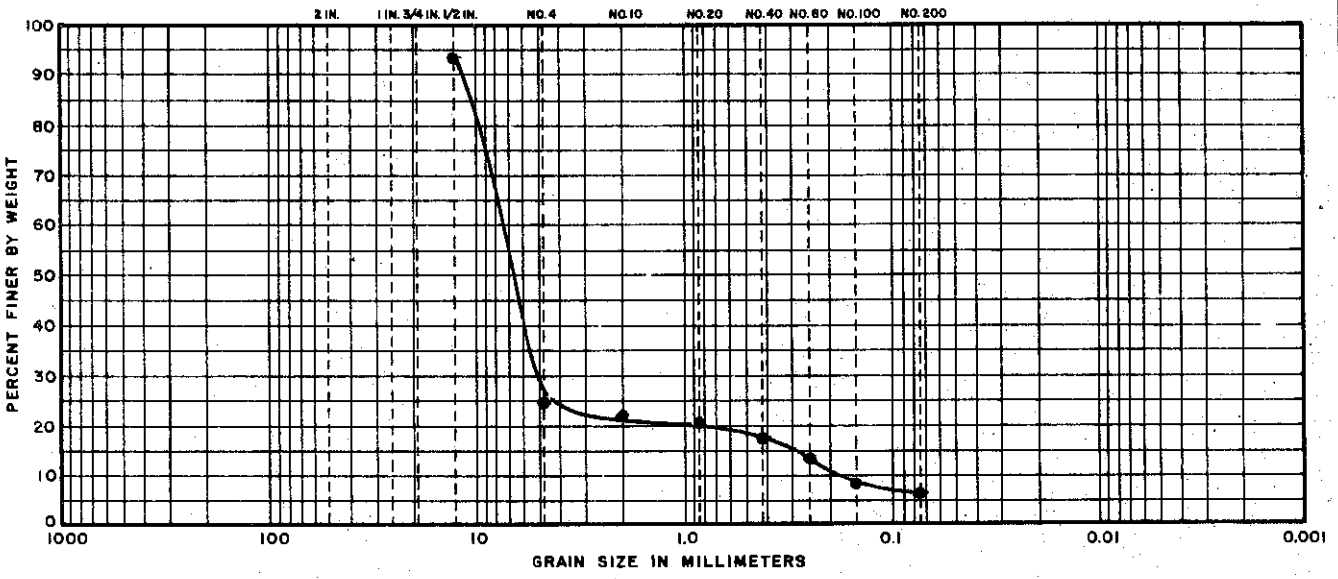
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

C-638

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

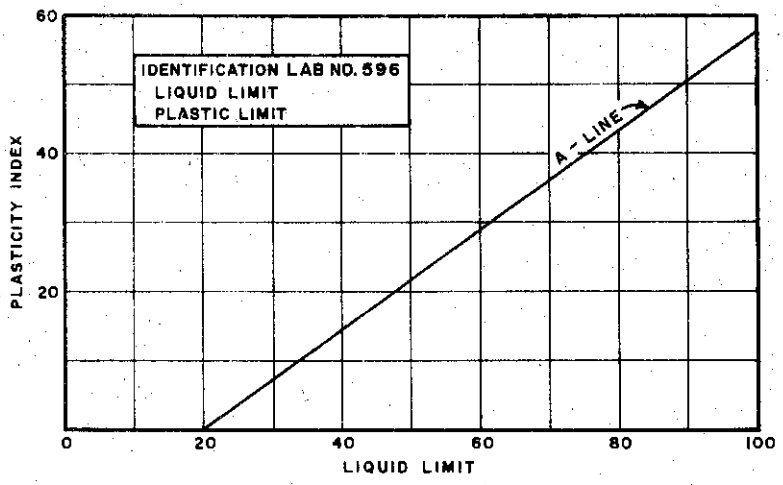


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

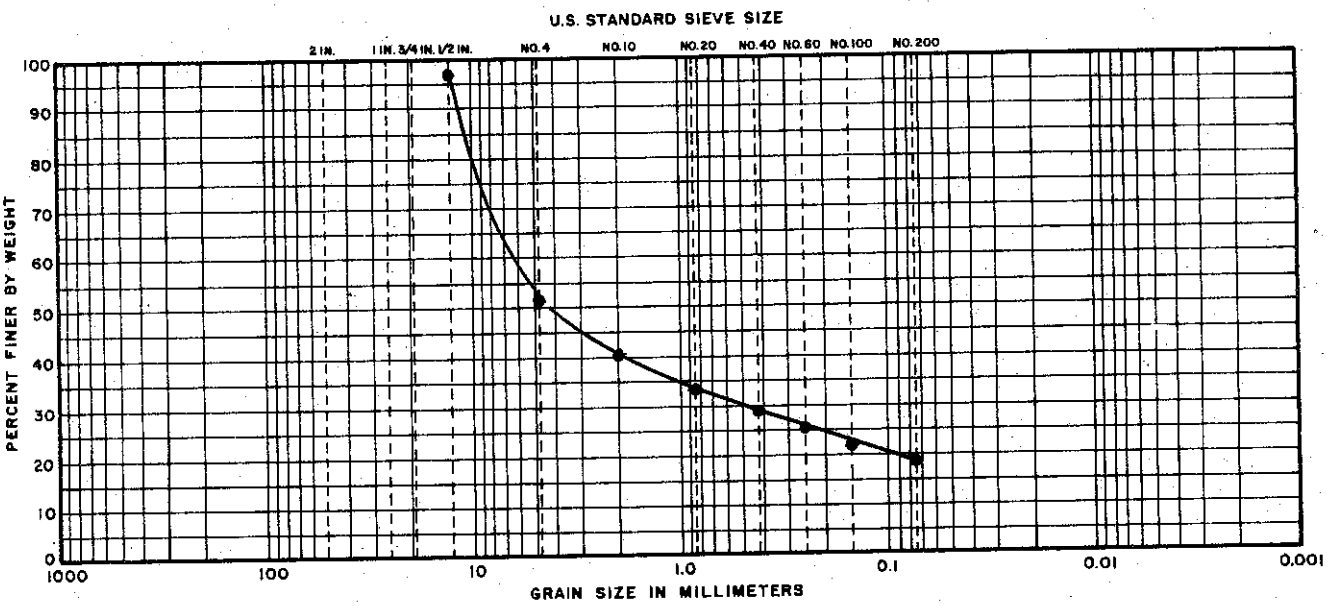
IDENTIFICATION : GRAVEL (GP)
EXPLORATION: BORING 139
SAMPLE : SS22
DEPTH : 99.5' TO 101.0'

SPECIFIC GRAVITY

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

GRAIN SIZE DISTRIBUTION

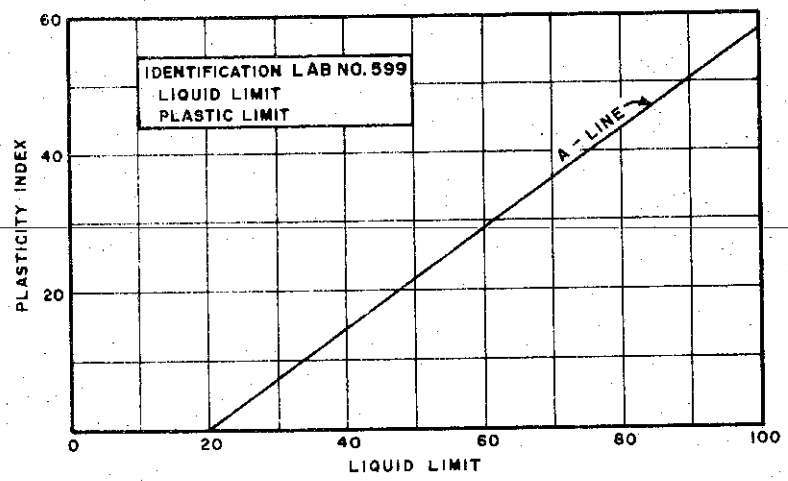


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SANDY GRAVEL (GM)
EXPLORATION: BORING 141
SAMPLE : SS21
DEPTH : 114.5' TO 116.0'

SPECIFIC GRAVITY

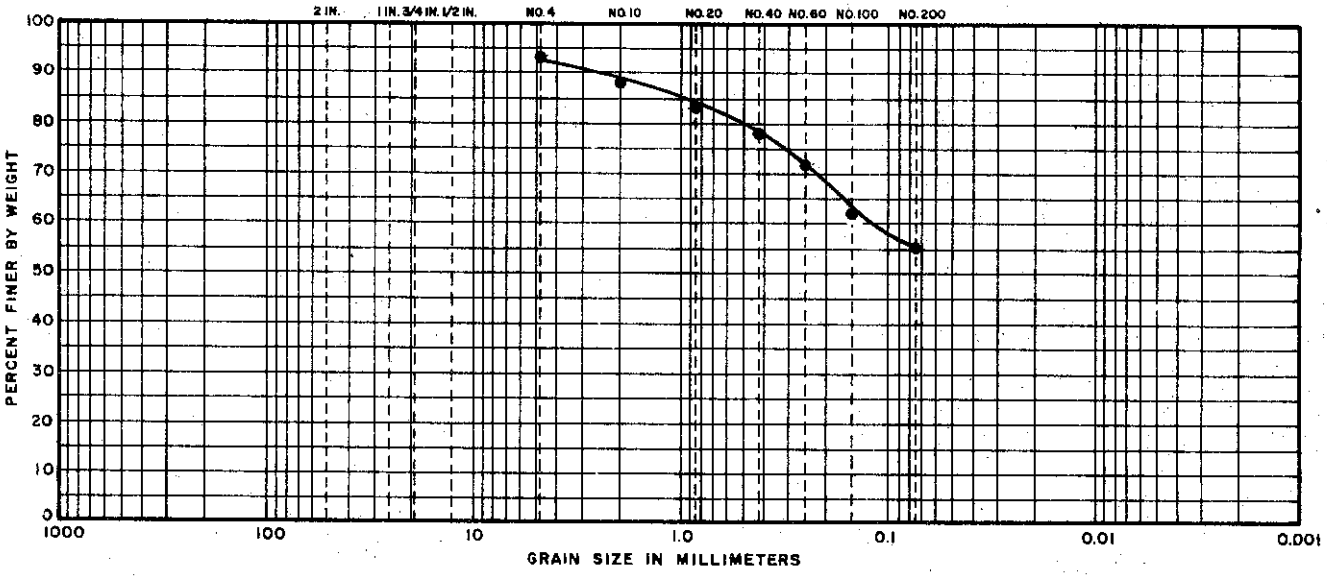
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

C-640

GOLDBERG - ZOINO & ASSOCIATES

GRAIN SIZE DISTRIBUTION

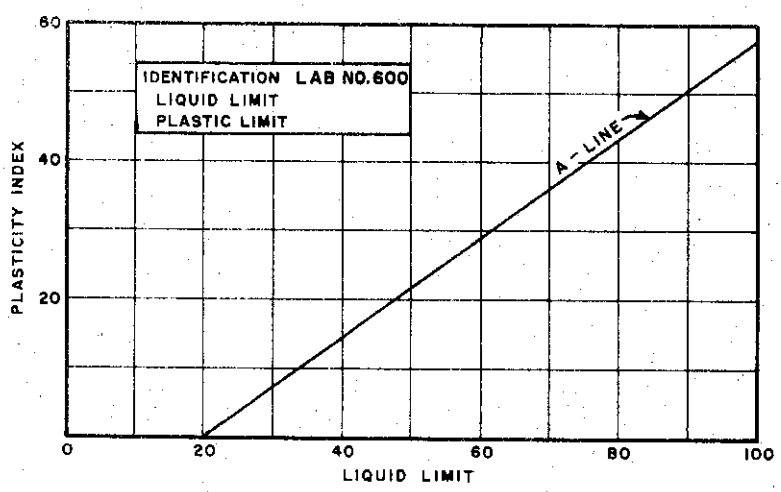


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

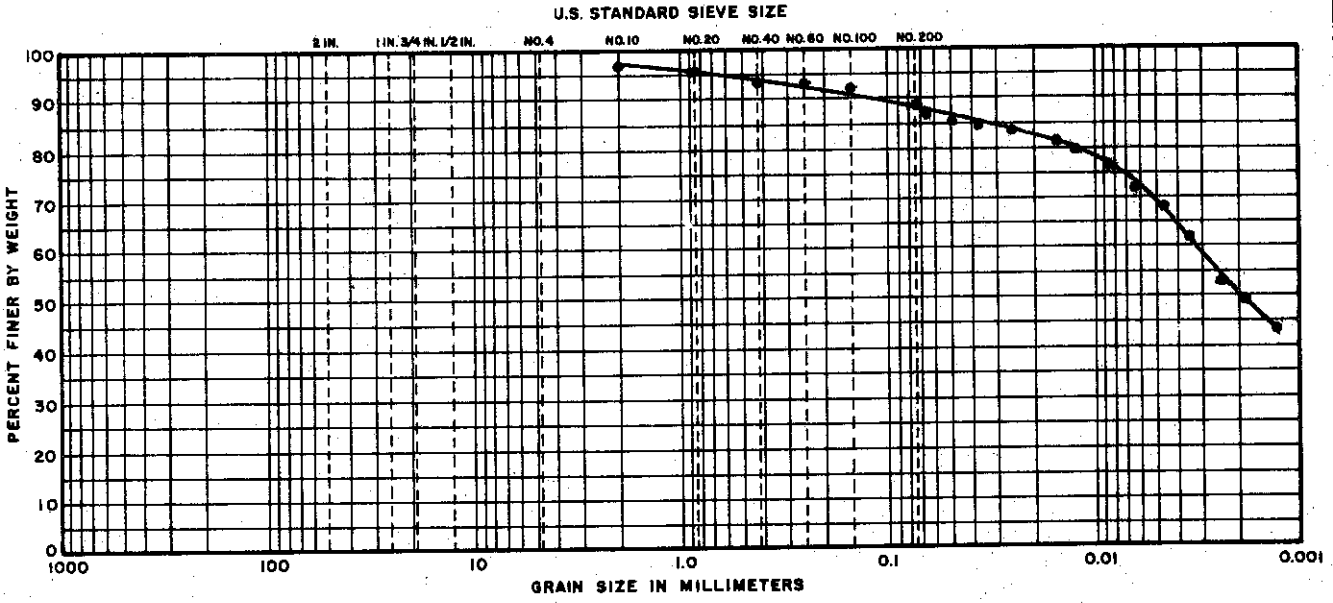
IDENTIFICATION : SANDY CLAY (SM-SC)
EXPLORATION: BORING 141
SAMPLE : SS27
DEPTH : 144.5' TO 146.0'

SPECIFIC GRAVITY

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

GRAIN SIZE DISTRIBUTION

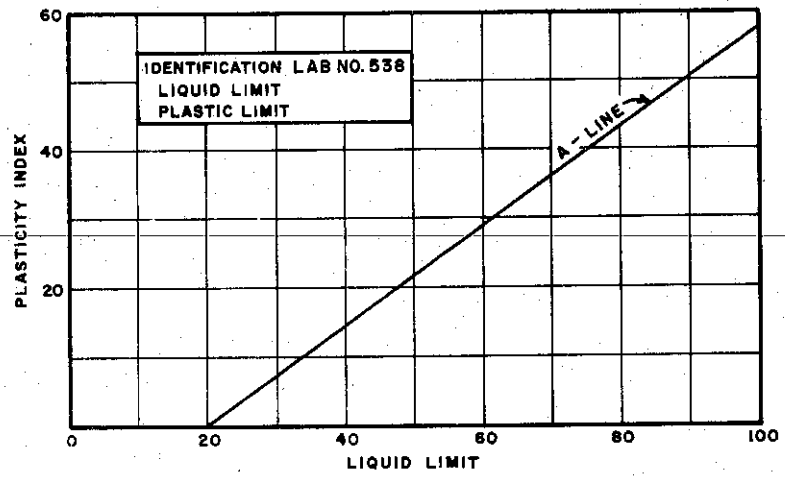


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : SILTY CLAY (CL)
EXPLORATION: BORING 144
SAMPLE : 6
DEPTH : 13.8' TO 14.1'

SPECIFIC GRAVITY: USED 2.70

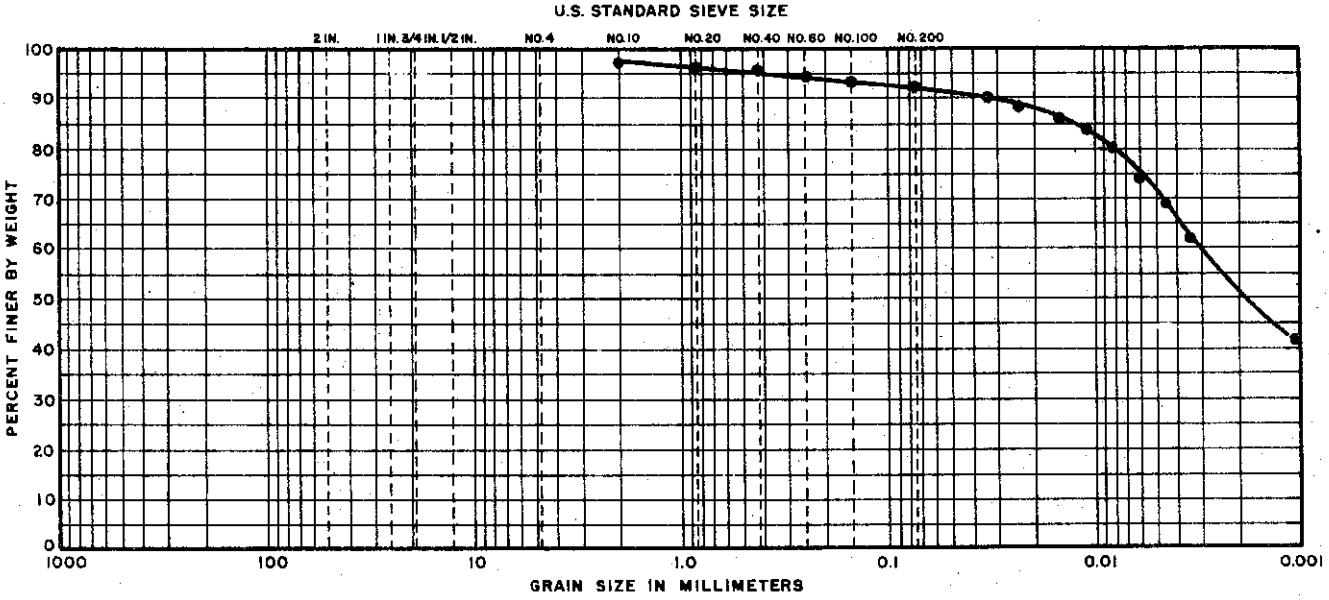
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

C-642

GOLDBERG - ZOINO & ASSOCIATES
CONSULTANTS IN GEOTECHNICAL ENGINEERING

GRAIN SIZE DISTRIBUTION

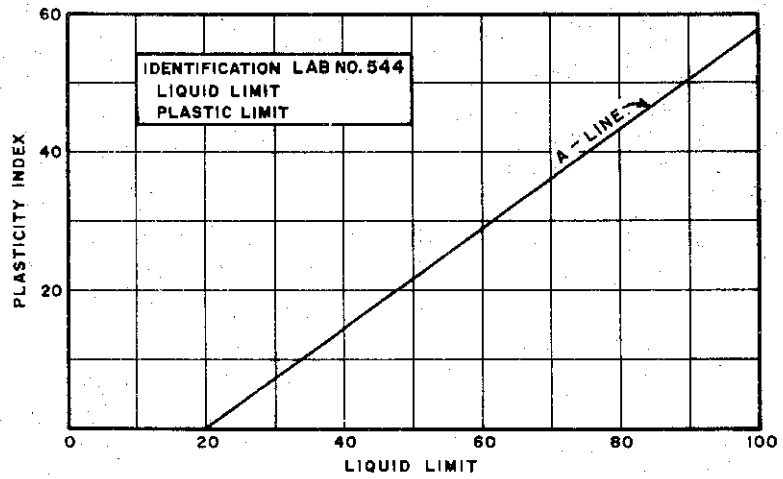


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

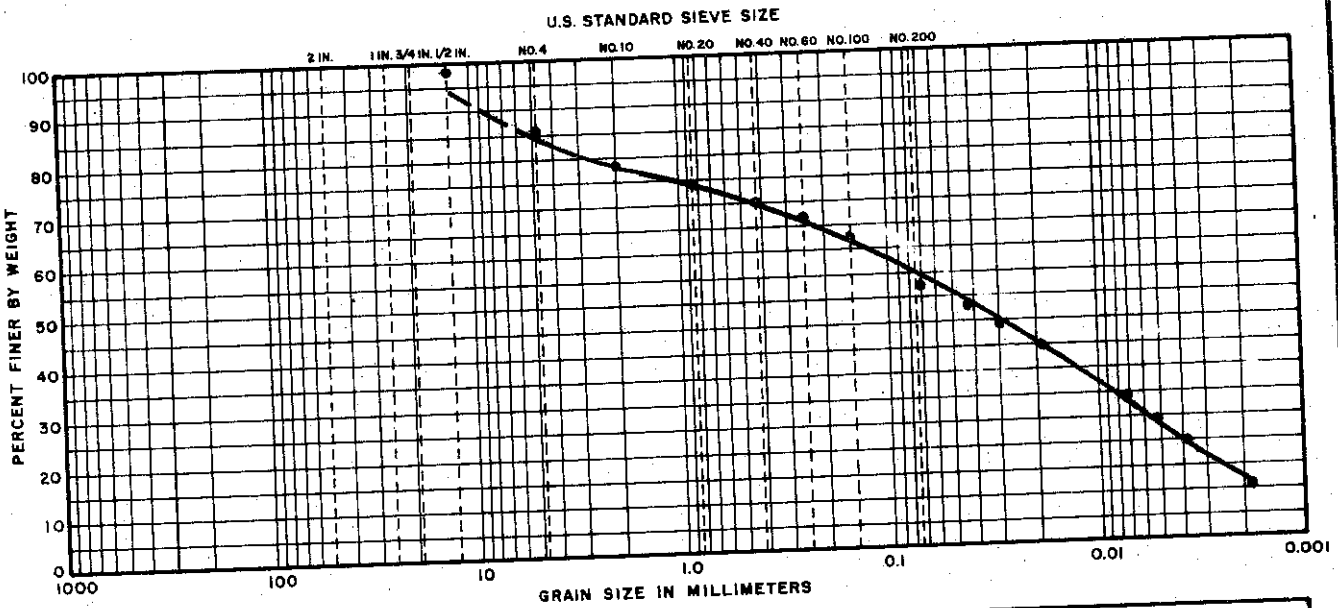
IDENTIFICATION : SILTY CLAY (CL-CH)
EXPLORATION: BORING 151A
SAMPLE : 2
DEPTH : 7.7' TO 8.0'

SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE NOV. 1974

GRAIN SIZE DISTRIBUTION

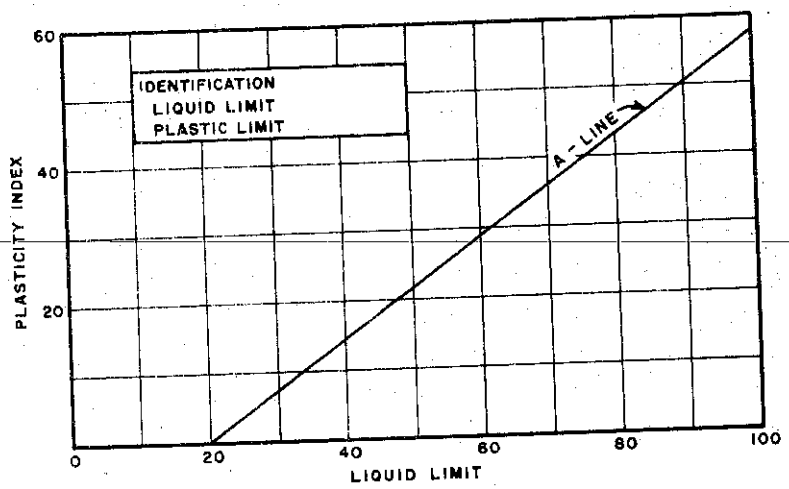


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

PLASTICITY CHART

(COHESIVE SOIL ONLY)



MATERIAL SOURCE

IDENTIFICATION : CLAYEY SILT, SANDY (CL-ML)
EXPLORATION: BORING 187
SAMPLE : SS14
DEPTH : 58.5' TO 60.0'

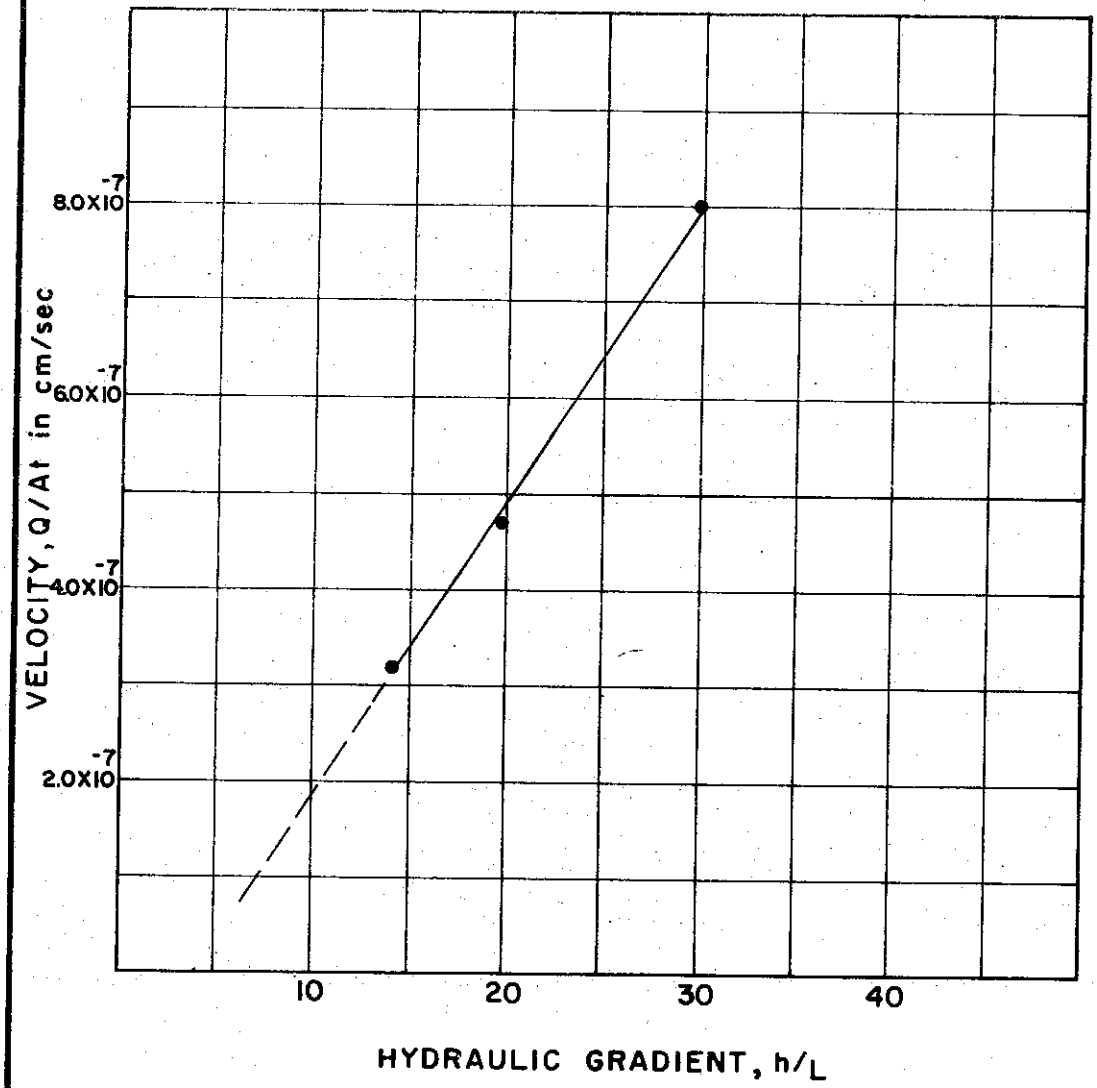
SPECIFIC GRAVITY: USED 2.70

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
SOIL CLASSIFICATION TESTS

FILE NO. 1255 DATE JULY 1974

C-644

GOLDBERG - ZOINO & ASSOCIATES



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.875

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY ≈2.70 DRY UNIT WEIGHT 84 pcf

INITIAL WATER CONTENT 37.2 % INITIAL VOID RATIO 1.002

ATTERBERG LIMITS:

LIQUID LIMIT 39 % PLASTIC LIMIT 18 %

TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		1.50	1.50	1.50	1.50	
BACK PRESSURE TOP kg/cm^2	u_{top}			2.841	2.854	2.876	
BOTTOM	u_{bot}			2.806	2.806	2.806	
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31	
SAMPLE LENGTH cm.	L	2.540	2.39	2.39	2.39	2.39	
HYDRAULIC GRADIENT	i			14.72	20.6	29.44	
SAMPLE AREA cm^2	A	31.67	31.67	31.67	31.67	31.67	
WATER DISCHARGED cm^3	Q			1.94	4.00	6.85	
TIME OF DISCHARGE sec	t			190,800	266,400	270,000	
PERMEABILITY cm/sec	k			2.18×10^{-8}	2.30×10^{-8}	2.72×10^{-8}	

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 50

SAMPLE NO. 6

DEPTH 28.3' TO 28.5'

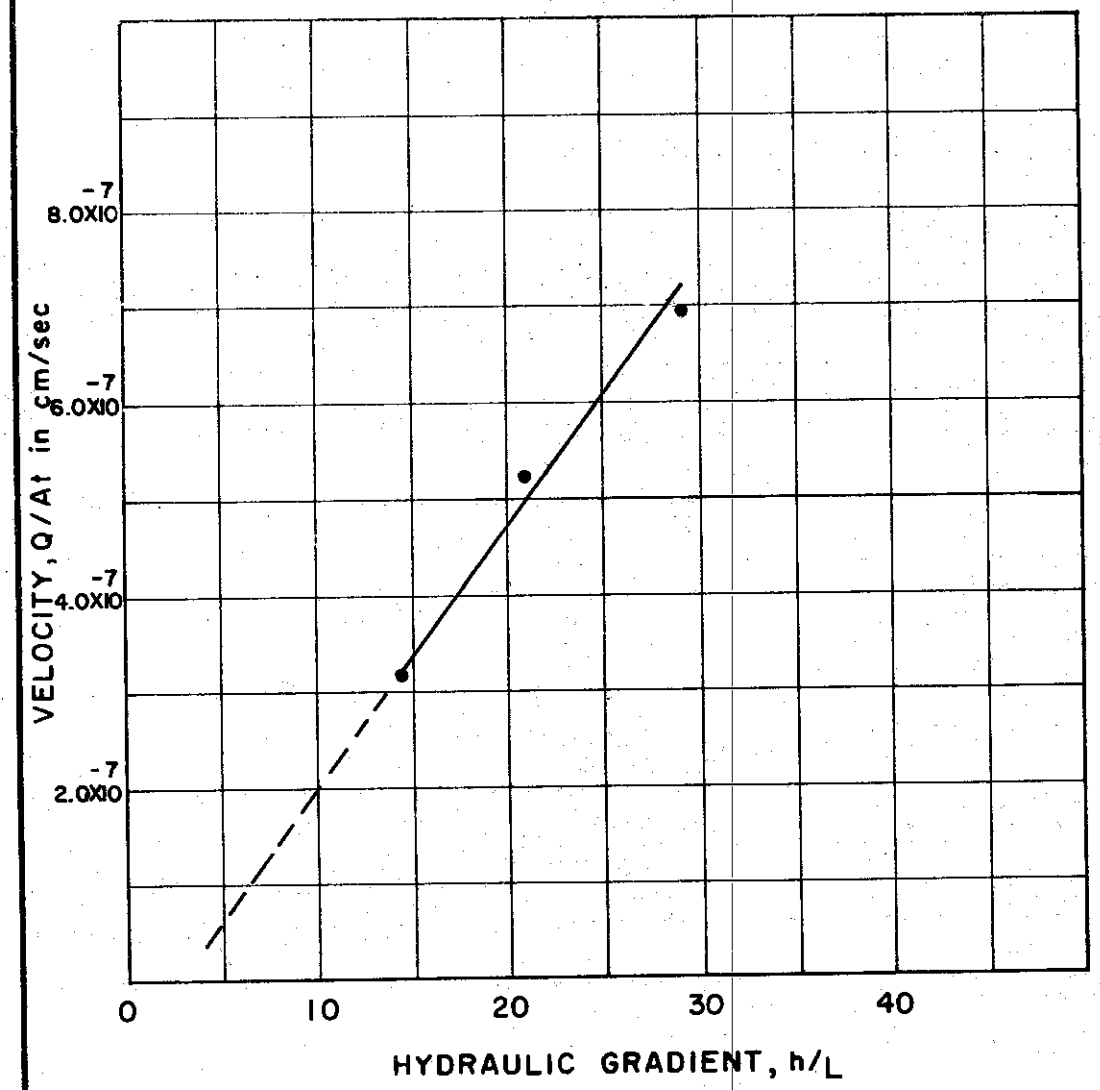
TEST NO. k 85.1

DATE JULY 74

FILE 1255

C-945

C-646



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.645

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.70 DRY UNIT WEIGHT 97 pcf
INITIAL WATER CONTENT 26.9 % INITIAL VOID RATIO 0.730
ATTERBERG LIMITS:
LIQUID LIMIT 36 % PLASTIC LIMIT 16 %

TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		2.00	2.00	2.00	2.00	
BACK PRESSURE TOP kg/cm^2	u_{top}			2.847	2.862	2.883	
BOTTOM	u_{bot}			2.812	2.812	2.812	
DIFFERENTIAL HEAD cm.	h			35.15	49.21	70.31	
SAMPLE LENGTH cm.	L	2.540	2.420	2.420	2.420	2.420	
HYDRAULIC GRADIENT	i			14.52	20.31	29.00	
SAMPLE AREA cm^2	A	31.67	31.67	31.67	31.67	31.67	
WATER DISCHARGED cm^3	Q			0.94	1.38	1.66	
TIME OF DISCHARGE sec	t			93,600	82,800	75,600	
PERMEABILITY cm/sec	k			$2.18X10^{-8}$	$2.58X10^{-8}$	$2.39X10^{-8}$	

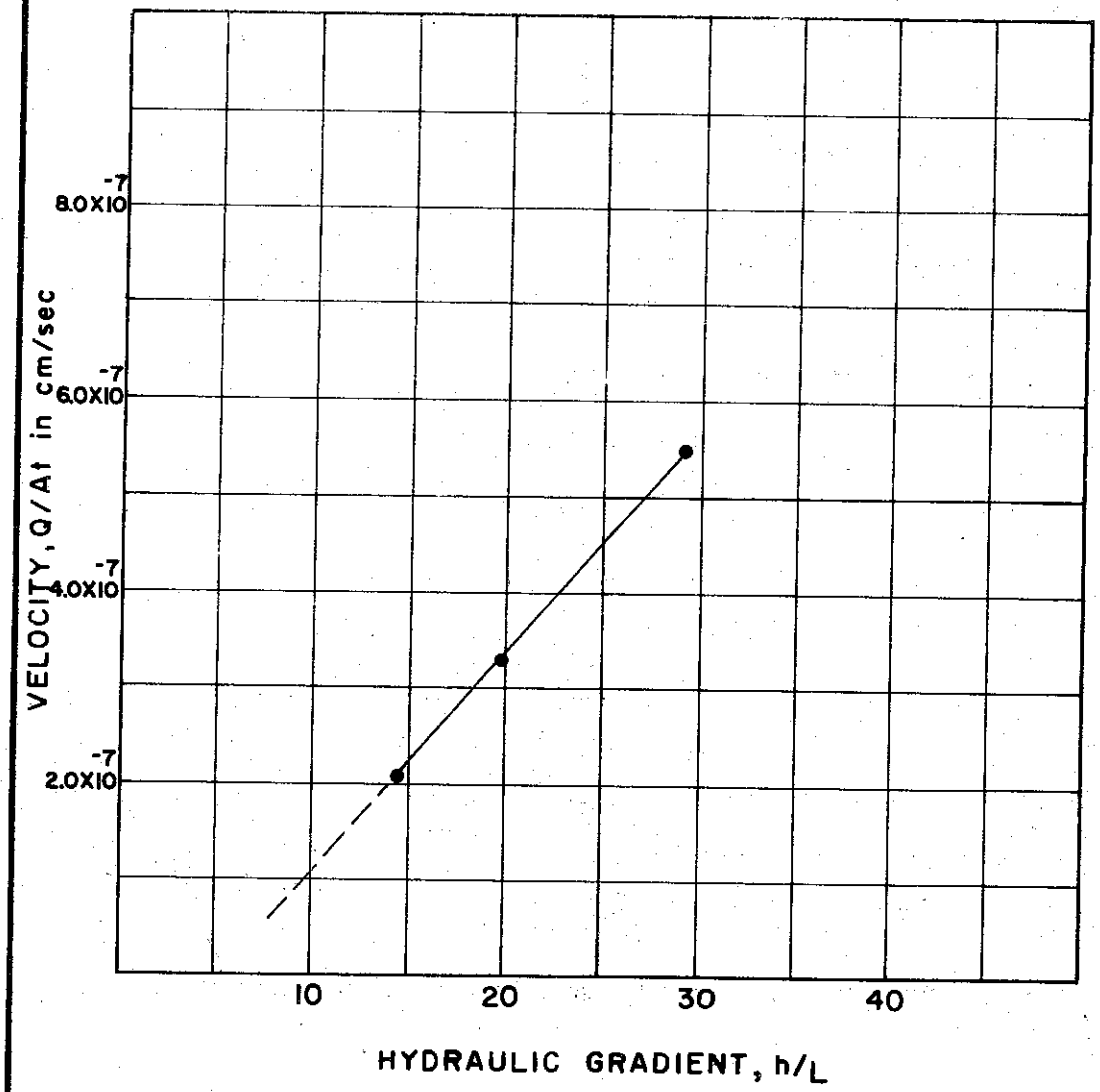
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 50
SAMPLE NO. 10
DEPTH 48.6' TO 48.8'

TEST NO. K 87.1
DATE JULY 1974

FILE 1255



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.374

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY ≈2.70 DRY UNIT WEIGHT 119 pcf
INITIAL WATER CONTENT 15.1 % INITIAL VOID RATIO 0.411
ATTERBERG LIMITS:
LIQUID LIMIT 23 % PLASTIC LIMIT 14 %

TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		2.30	2.30	2.30	2.30	
BACK PRESSURE TOP kg/cm^2	u_{top}			2.841	2.854	2.876	
BOTTOM	u_{bot}			2.806	2.806	2.806	
DIFFERENTIAL HEAD cm.	h			35.16	49.21	70.31	
SAMPLE LENGTH cm.	L	2.54	2.47	2.47	2.47	2.47	
HYDRAULIC GRADIENT	i			14.20	19.87	28.40	
SAMPLE AREA cm^2	A	31.67	31.67	31.67	31.67	31.67	
WATER DISCHARGED cm^3	Q			1.26	3.38	3.40	
TIME OF DISCHARGE sec	t			190,800	320,400	198,000	
PERMEABILITY cm/sec	k			1.46×10^{-8}	1.68×10^{-8}	1.91×10^{-8}	

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

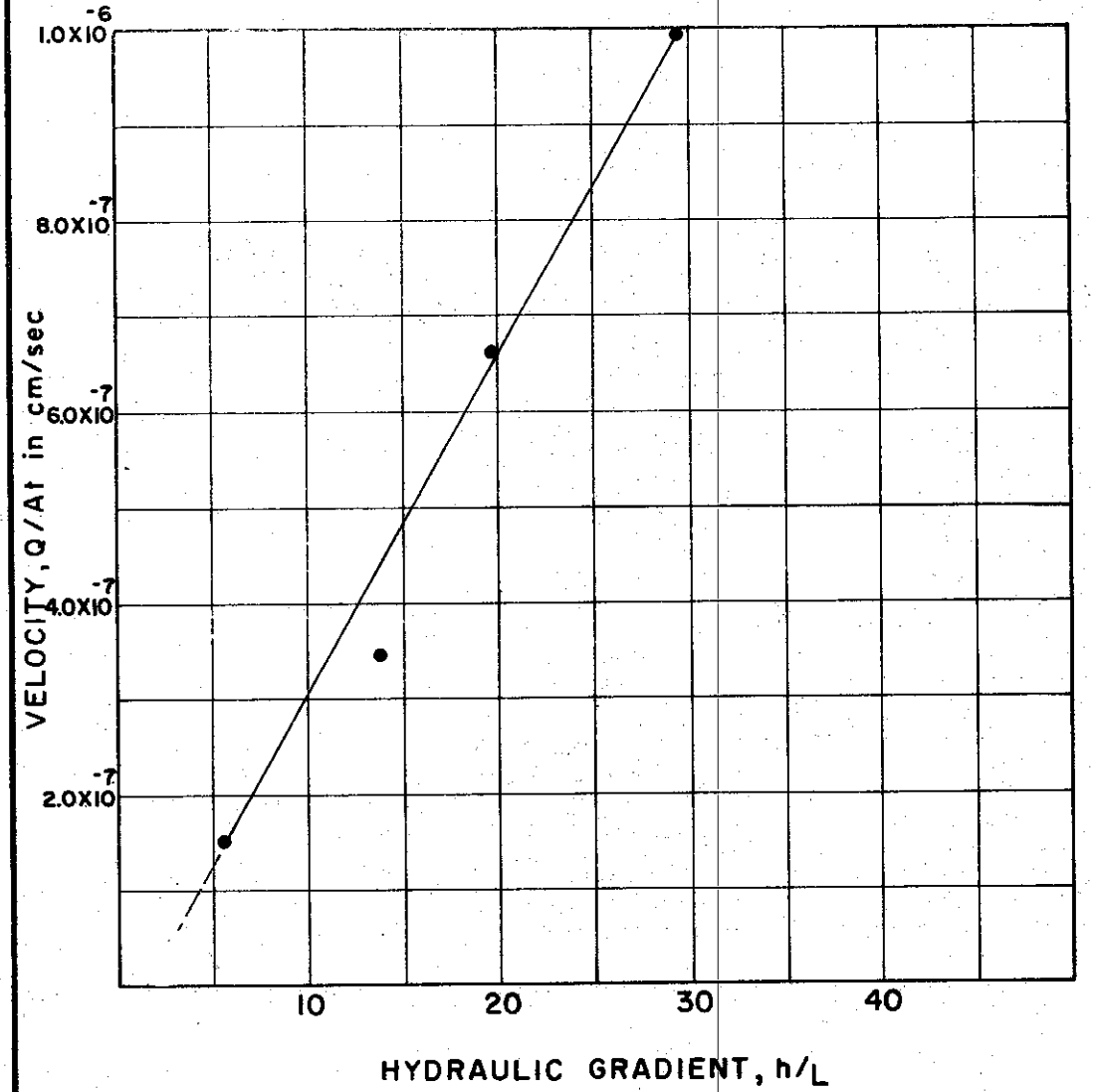
BORING NO. 52
SAMPLE NO. 7
DEPTH 58.6' TO 58.9'

TEST NO. k112.1
DATE JULY 74

C-647

FILE 1255

C-648



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.685

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.72 DRY UNIT WEIGHT 104 pcf
INITIAL WATER CONTENT 30.2 % INITIAL VOID RATIO 0.732
ATTERBERG LIMITS:
LIQUID LIMIT 39 % PLASTIC LIMIT 20 %

TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		1.74	1.74	1.74	1.74	1.74
BACK PRESSURE TOP kg/cm^2	u_{top}			2.810	2.841	2.854	2.876
BACK PRESSURE BOTTOM kg/cm^2	u_{bot}			2.806	2.806	2.806	2.806
DIFFERENTIAL HEAD cm.	h			14.06	35.16	49.21	70.31
SAMPLE LENGTH cm.	L	2.54	2.49	2.49	2.49	2.49	2.49
HYDRAULIC GRADIENT	i			5.64	14.11	19.75	28.22
SAMPLE AREA cm^2	A	31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm^3	Q			1.22	2.30	5.89	8.50
TIME OF DISCHARGE sec	t			248,400	212,400	277,200	270,000
PERMEABILITY cm/sec	k			2.75×10^{-8}	2.42×10^{-8}	3.40×10^{-8}	3.52×10^{-8}

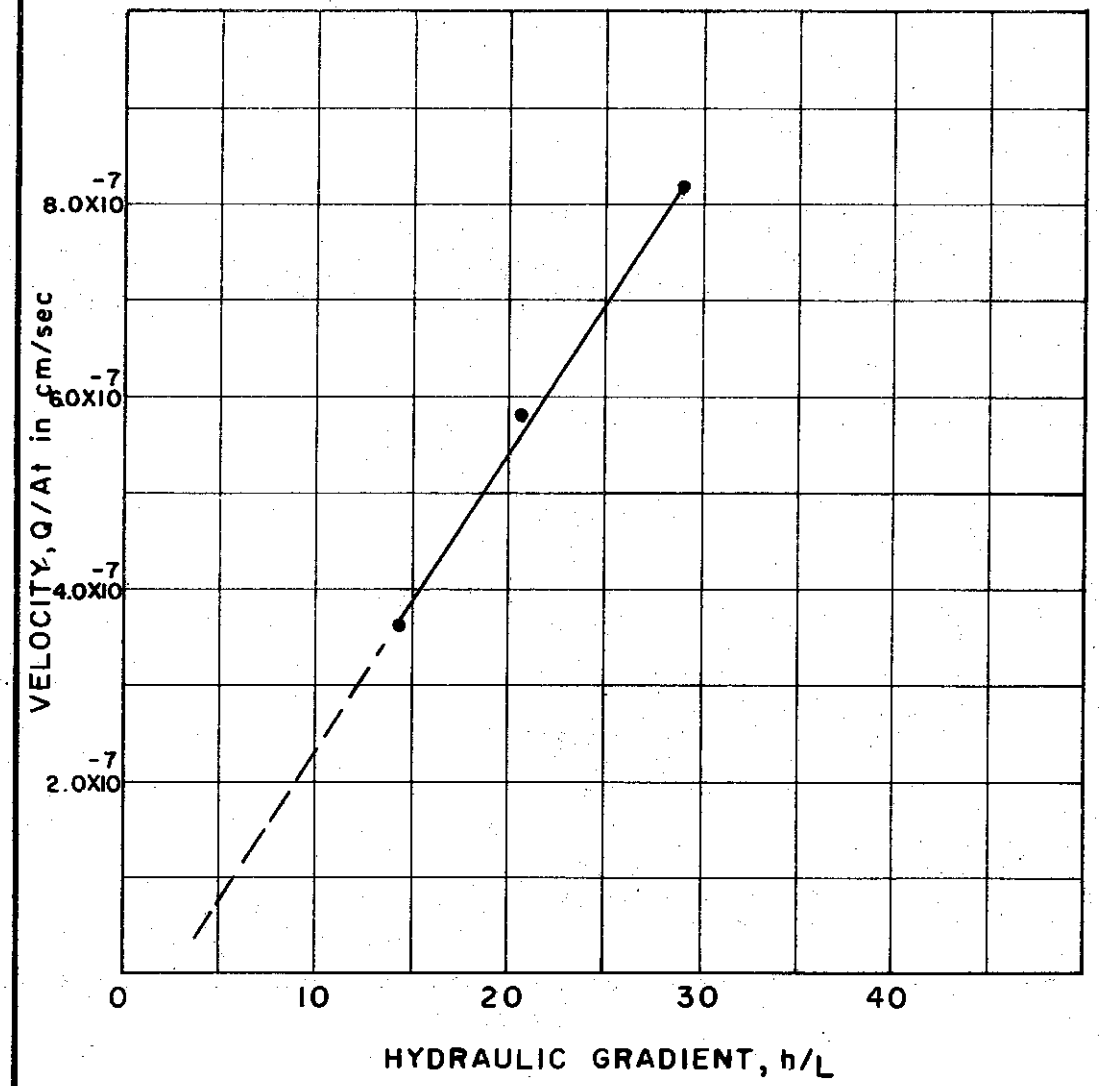
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 53
SAMPLE NO. 5
DEPTH 39.5' TO 39.8'

TEST NO. k98.1
DATE JULY 74

1255



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE=0.641

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY, SANDY (CL)
SPECIFIC GRAVITY 2.71 DRY UNIT WEIGHT 98 pcf
INITIAL WATER CONTENT 27.2 % INITIAL VOID RATIO 0.724
ATTERBERG LIMITS:
LIQUID LIMIT 36 % PLASTIC LIMIT 18 %

TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		2.40	2.40	2.40	2.40	
BACK PRESSURE TOP kg/cm^2	u_{top}			2.847	2.862	2.883	
BOTTOM	u_{bot}			2.812	2.812	2.812	
DIFFERENTIAL HEAD cm.	h			35.15	49.21	70.31	
SAMPLE LENGTH cm.	L	2.540	2420	2.420	2.420	2.420	
HYDRAULIC GRADIENT	i			14.52	20.33	29.0	
SAMPLE AREA cm^2	A	31.67	31.67	31.67	31.67	31.67	
WATER DISCHARGED cm^3	Q			1.08	1.52	1.76	
TIME OF DISCHARGE sec	t			93,600	82,800	75,600	
PERMEABILITY cm/sec	k			$2.52X10^{-8}$	$2.85X10^{-8}$	$2.53X10^{-8}$	

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

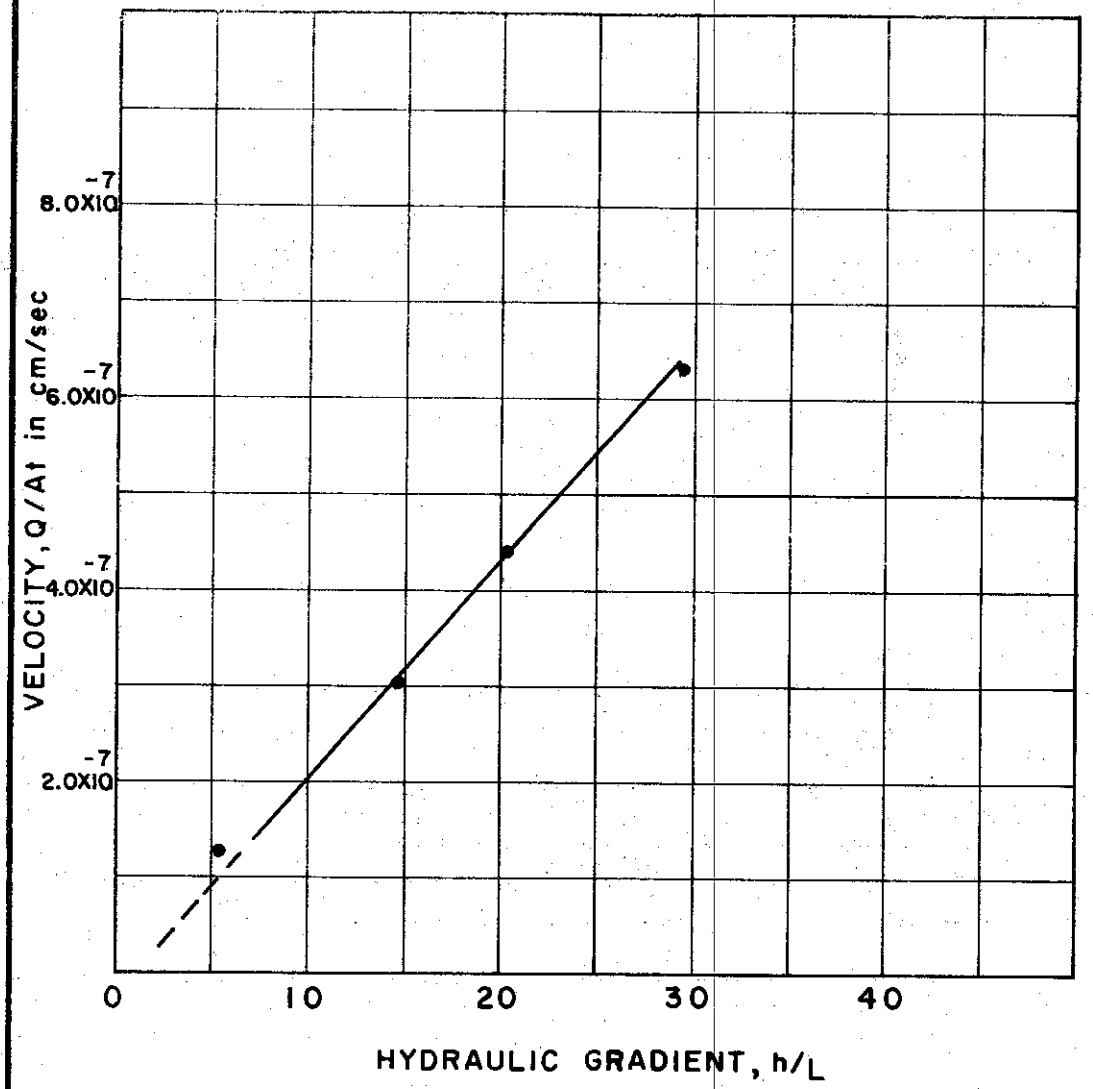
BORING NO. 54
SAMPLE NO. 6
DEPTH 63.5' TO 63.8'

TEST NO. K 399.1
DATE JULY 1974

FILE 1255

C-649

C-650



REMARKS: VOID RATIO AT END OF CONSOLIDATION STAGE = 0.729

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.73 DRY UNIT WEIGHT 90 pcf

INITIAL WATER CONTENT 31.6 % INITIAL VOID RATIO 0.851

ATTERBERG LIMITS:

LIQUID LIMIT 45 % PLASTIC LIMIT 21 %

TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		2.71	2.71	2.71	2.71	2.71
BACK PRESSURE TOP kg/cm^2	u_{top}			2.826	2.847	2.862	2.883
BACK PRESSURE BOTTOM kg/cm^2	u_{bot}			2.812	2.812	2.812	2.812
DIFFERENTIAL HEAD cm.	h			14.06	35.15	49.21	70.31
SAMPLE LENGTH cm.	L	2.540	2.376	2.376	2.376	2.376	2.376
HYDRAULIC GRADIENT	i			5.92	14.80	20.71	29.50
SAMPLE AREA cm^2	A	31.67	31.67	31.67	31.67	31.67	31.67
WATER DISCHARGED cm^3	Q			0.48	0.88	1.10	1.39
TIME OF DISCHARGE sec	t			108,000	90,000	79,200	75,600
PERMEABILITY cm/sec	k			$2.37X10^{-8}$	$2.09X10^{-8}$	$2.18X10^{-8}$	$2.00X10^{-8}$

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

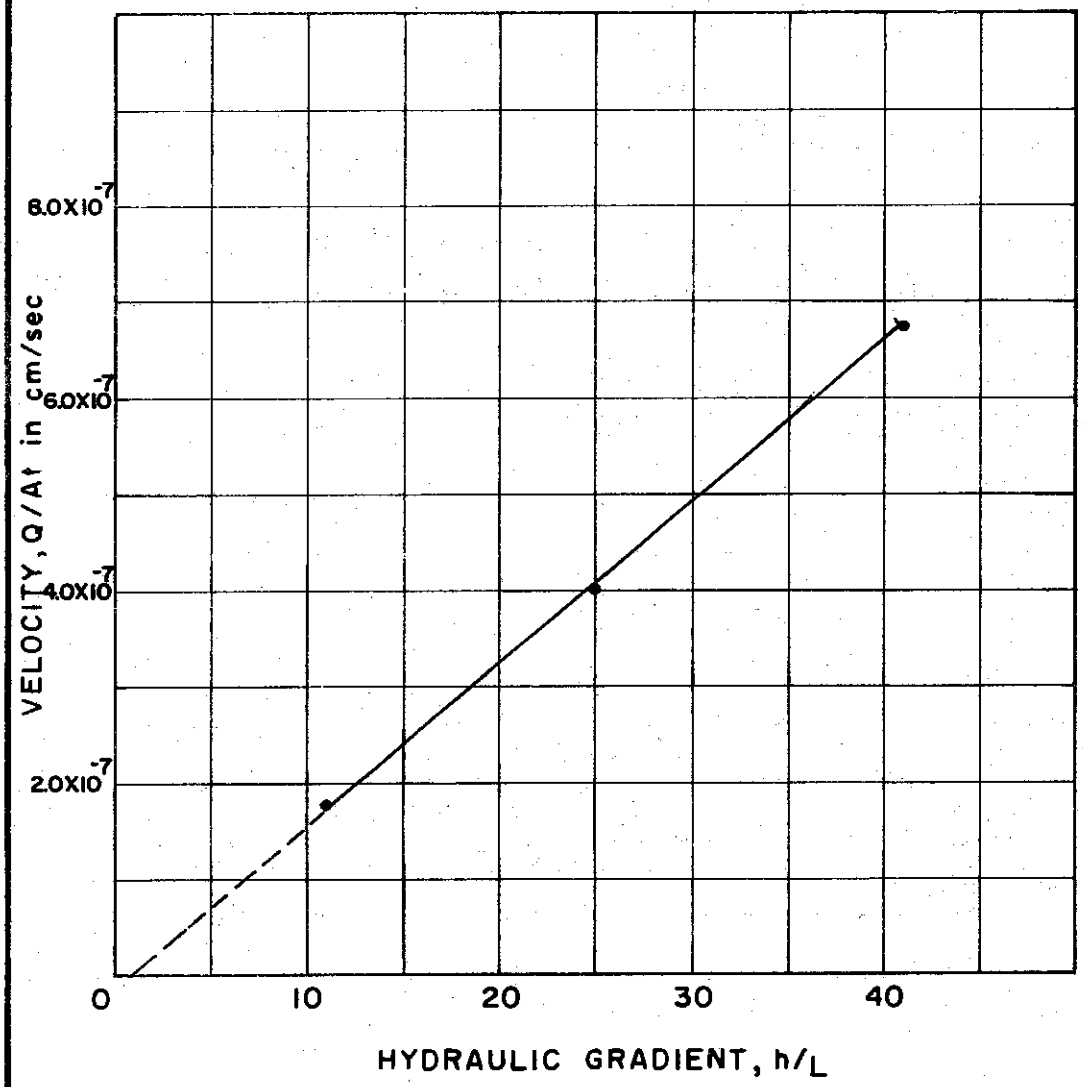
BORING NO. 54

SAMPLE NO. 8

DEPTH 73.7'TO74.0'

TEST NO. K 401.1

DATE JULY 1974



REMARKS:

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY≈2.70 DRY UNIT WEIGHT 103 pcf

INITIAL WATER CONTENT 26.1 % INITIAL VOID RATIO .707

ATTERBERG LIMITS:

LIQUID LIMIT 39 % PLASTIC LIMIT 21 %

TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		1.05	1.05	1.05	1.05	
BACK PRESSURE TOP kg/cm^2	u_{top}			2.488	2.521	2.565	
BOTTOM	u_{bot}			2.460	2.460	2.460	
DIFFERENTIAL HEAD cm.	h			27.7	63.0	103.8	
SAMPLE LENGTH cm.	L	6.48	6.40	6.40	6.40	6.40	
HYDRAULIC GRADIENT	i			11.0	25.0	41.2	
SAMPLE AREA cm^2	A	11.37	11.37	11.37	11.37	11.37	
WATER DISCHARGED cm^3	Q			.13	.29	.58	
TIME OF DISCHARGE sec	t			72,000	72,000	86,000	
PERMEABILITY cm/sec	k			1.60×10^{-8}	1.61×10^{-8}	1.63×10^{-8}	

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 60

SAMPLE NO. 3

DEPTH 18.1' TO 18.3'

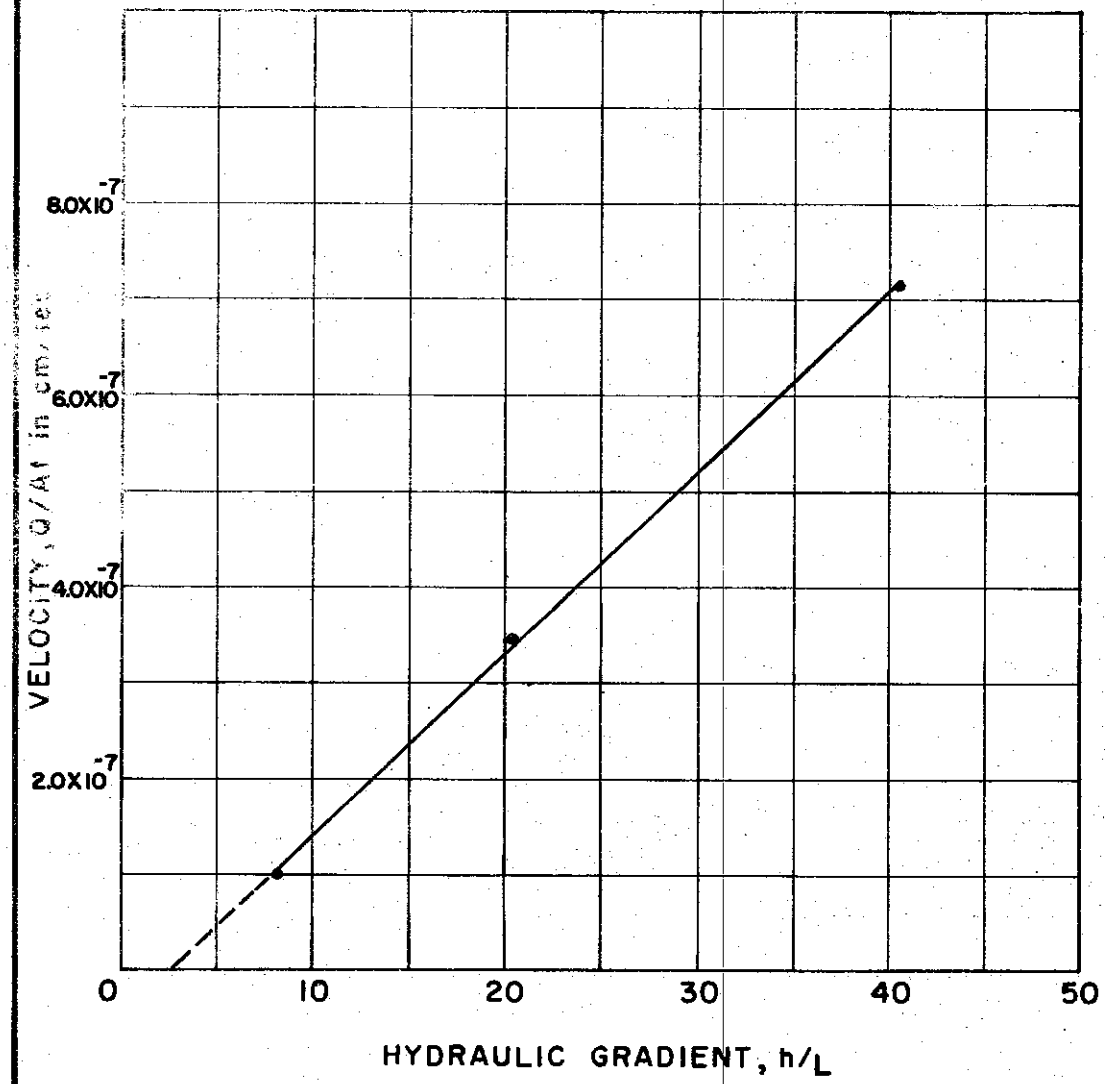
TEST NO. k43.1

DATE MARCH 74

FILE 1255

C-651

C-652



REMARKS:

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY≈2.70 DRY UNIT WEIGHT 98 pcf

INITIAL WATER CONTENT 27.2% INITIAL VOID RATIO .730

ATTERBERG LIMITS:

LIQUID LIMIT 33 % PLASTIC LIMIT 18 %

TEST DATA

	SYM	INITIAL	CONSOL STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		2.20	2.20	2.20	2.20	
BACK PRESSURE TOP kg/cm^2	u_{top}			2.826	2.847	2.882	
BOTTOM	u_{bot}			2.812	2.812	2.812	
DIFFERENTIAL HEAD cm.	h			14.06	35.16	70.30	
SAMPLE LENGTH cm.	L	1.90	1.73	1.73	1.73	1.73	
HYDRAULIC GRADIENT	i			8.13	20.32	40.63	
SAMPLE AREA cm^2	A	31.70	31.70	31.70	31.70	31.70	
WATER DISCHARGED cm^3	Q			.21	.66	.23	
TIME OF DISCHARGE sec	t			66,600	59,400	10,200	
PERMEABILITY cm/sec	k			1.25×10^{-8}	1.75×10^{-8}	1.76×10^{-8}	

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

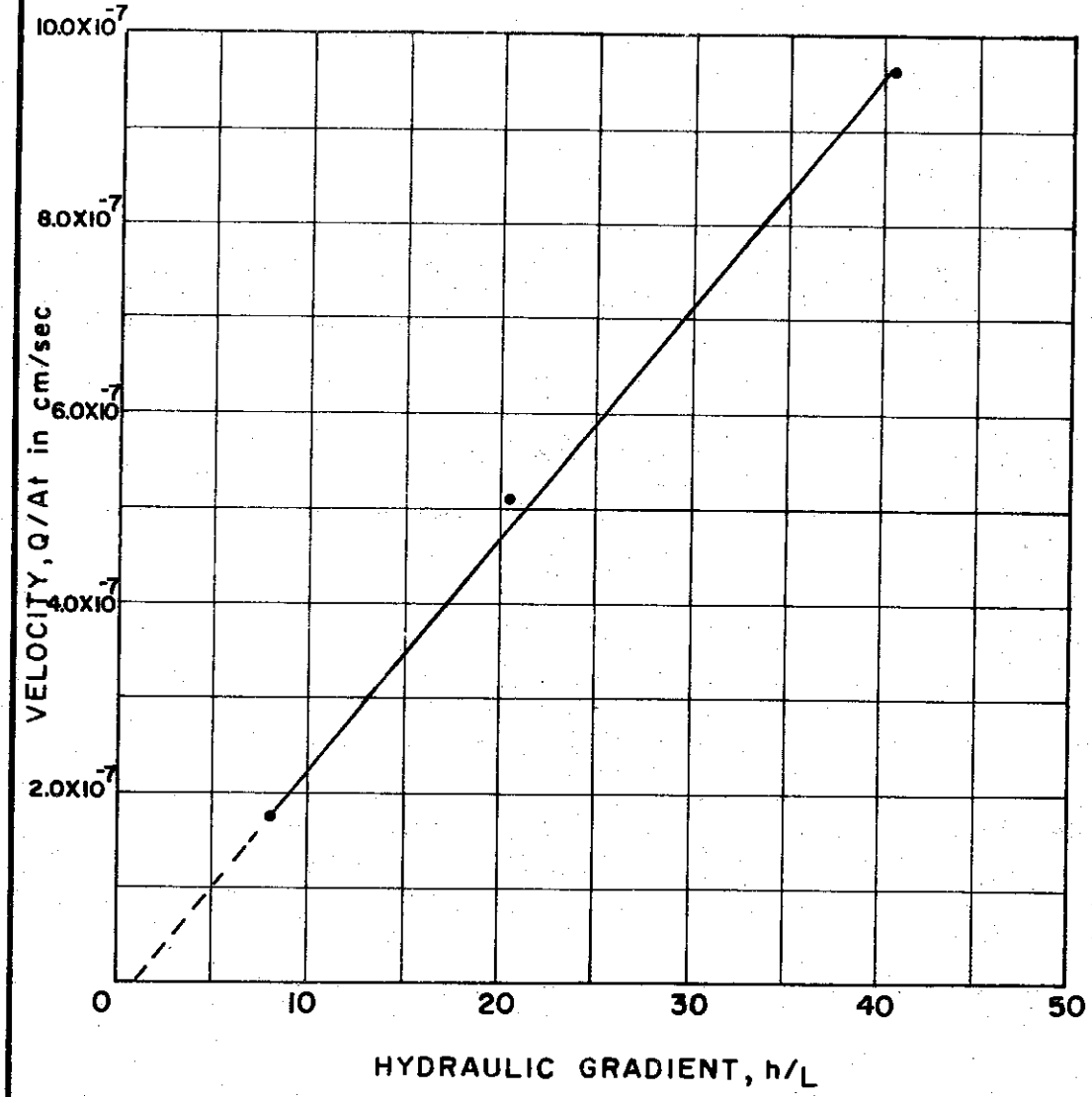
BORING NO. 60

SAMPLE NO. 11

DEPTH 56.1' TO 56.4'

TEST NO. k51.1

DATE MARCH 74



REMARKS:

SOIL PROPERTIES

SOIL DESCRIPTION SILTY CLAY (CL)

SPECIFIC GRAVITY 2.73 DRY UNIT WEIGHT 96 pcf

INITIAL WATER CONTENT 29.1 % INITIAL VOID RATIO .753

ATTERBERG LIMITS:

LIQUID LIMIT 40 % PLASTIC LIMIT 19 %

TEST DATA

	SYM	INITIAL	CONSOL-STAGE	PERMEABILITY STAGES			
CONSOLIDATION PRESSURE kg/cm^2	$\bar{\sigma}$		3.00	3.00	3.00	3.00	
BACK PRESSURE TOP kg/cm^2	u_{top}			2.836	2.847	2.882	
BOTTOM	u_{bot}			2.812	2.812	2.812	
DIFFERENTIAL HEAD cm.	h			14.06	35.16	70.30	
SAMPLE LENGTH cm.	L	1.90	1.74	1.74	1.74	1.74	
HYDRAULIC GRADIENT	i			8.08	20.20	40.40	
SAMPLE AREA cm^2	A	31.70	31.70	31.70	31.70	31.70	
WATER DISCHARGED cm^3	Q			.34	.97	.31	
TIME OF DISCHARGE sec	t			63,000	59,400	10,200	
PERMEABILITY cm/sec	k			2.10×10^{-8}	2.55×10^{-8}	2.37×10^{-8}	

THE DETROIT EDISON COMPANY

BELLE RIVER PLANT UNITS I & II

PERMEABILITY TEST
VELOCITY VS. HYDRAULIC GRADIENT

BORING NO. 60

SAMPLE NO. 16

DEPTH 85.6' TO 86.1'

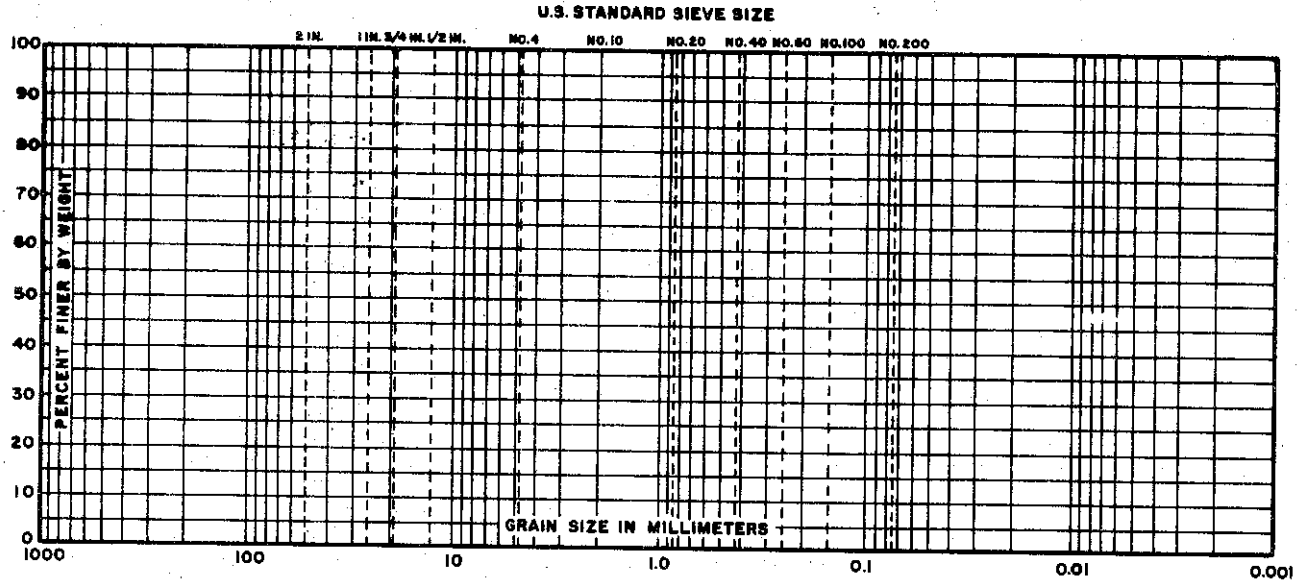
TEST NO. k56.1

DATE MARCH 74

FILE 1255

C-653

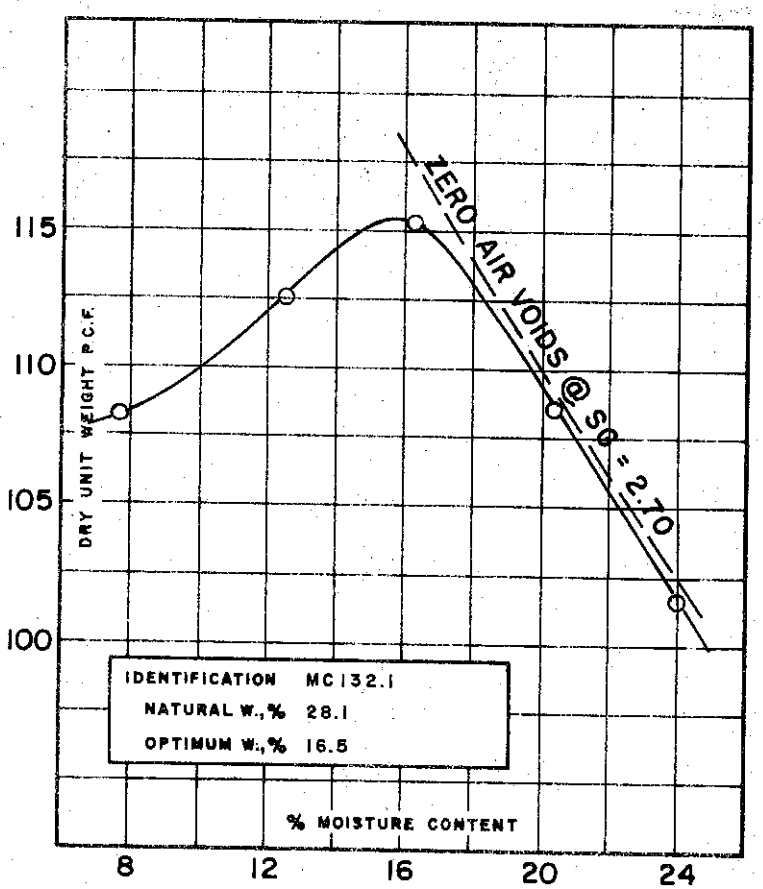
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

COMPACTION



ATTERBERG LIMITS

IDENTIFICATION	SILTY CLAY (CL-CH)
LIQUID LIMIT	50
PLASTIC LIMIT	17

MATERIAL SOURCE

IDENTIFICATION	SILTY CLAY (CL-CH)
EXPLORATION	BORING 49
SAMPLE	2
DEPTH	6.0' TO 8.1'

COMPACTION METHOD

ASTM TEST D1557 - METHOD C
AASHO TEST
MOLD HEIGHT 4.584", MOLD DIAM. 4.000".
NO. LAYERS 5 , BLOWS/LAYER 25 ,
HAMMER WT. 10 LBS, DROP HT. 18 ".

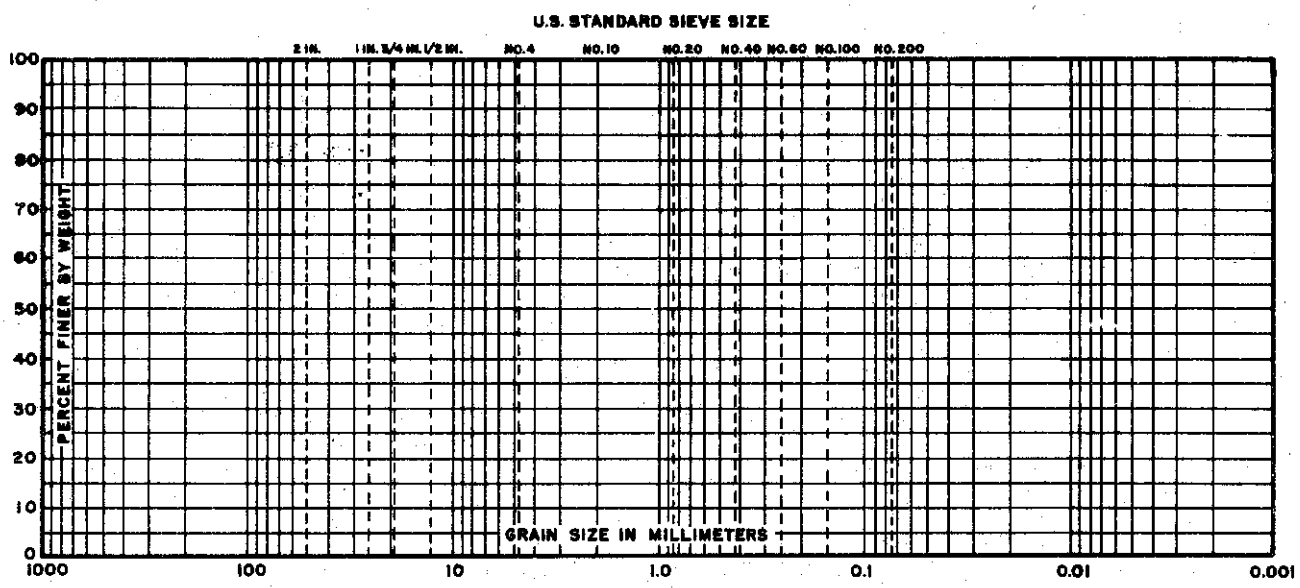
NOTES:

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE MARCH 74

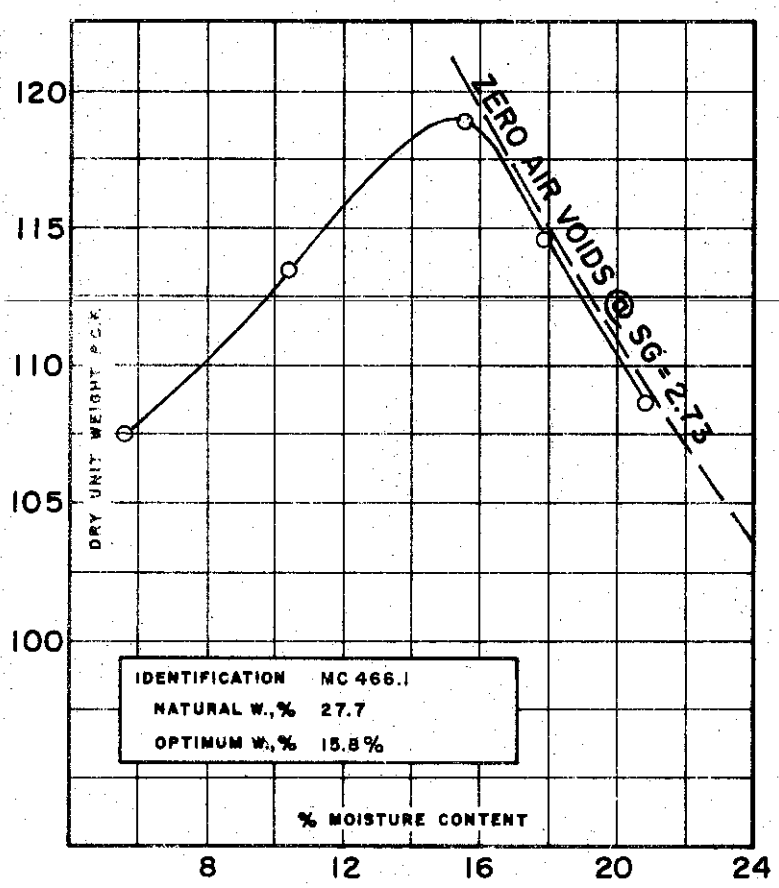
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

COMPACTION



ATTERBERG LIMITS

IDENTIFICATION	SEE DATA FOR
LIQUID LIMIT	INDIVIDUAL
PLASTIC LIMIT	SAMPLES

MATERIAL SOURCE

IDENTIFICATION	SILTY CLAY (CL-CH)
EXPLORATION	BORING 101,105,127,128,180 & 183
SAMPLE	COMBINED SAMPLES
DEPTH	2.0' TO 10.0'

COMPACTION METHOD

ASTM TEST D1557 - METHOD C
AASHO TEST
MOLD HEIGHT 4.584", MOLD DIAM. 4.000".
NO. LAYERS 5 , BLOWS/LAYER 25 ,
HAMMER WT. 10 LBS, DROP HT. 18 ".

NOTES:

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

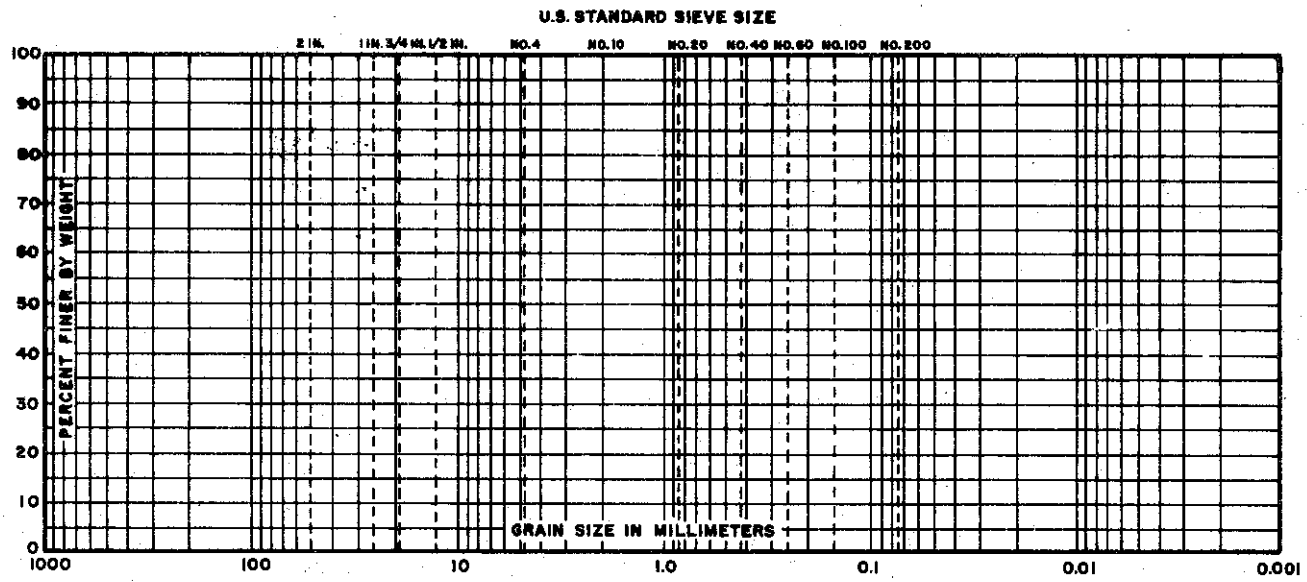
COMPACTION - GRADATION TESTS

C-656

FILE NO. 1255 DATE APRIL 74

GOLDBERG - ZOINO & ASSOCIATES
Soil & Foundation Engineers

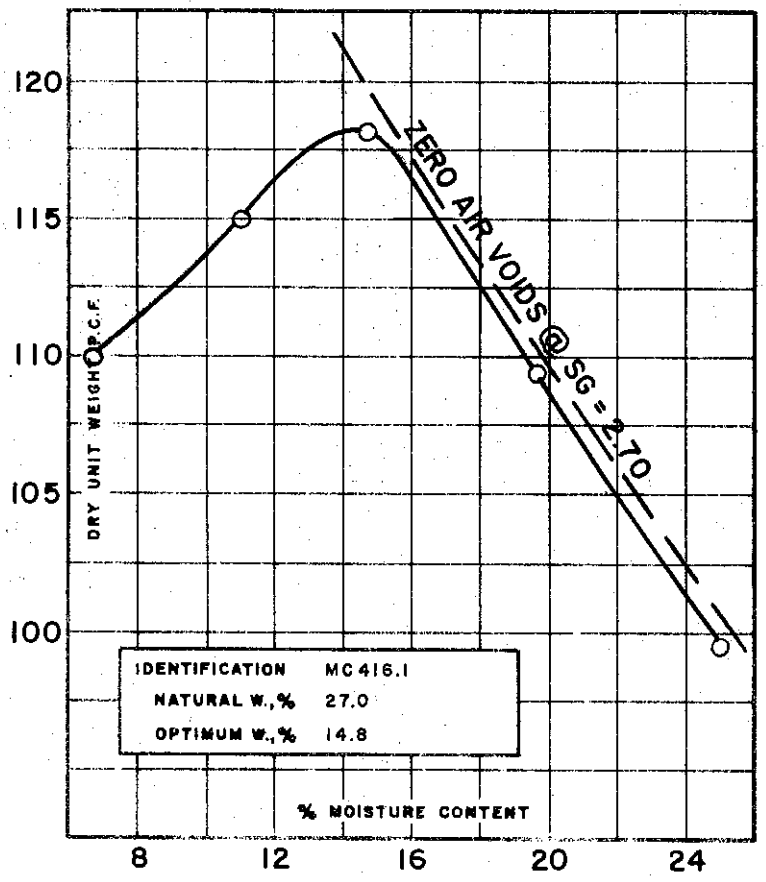
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

COMPACTION



ATTERBERG LIMITS

IDENTIFICATION	SILTY CLAY (CL-CH)
LIQUID LIMIT	49
PLASTIC LIMIT	22

MATERIAL SOURCE

IDENTIFICATION	SILTY CLAY (CL-CH)
EXPLORATION	BORING 127
SAMPLE	3
DEPTH	5.6' TO 7.0'

COMPACTION METHOD

ASTM TEST D1557 - METHOD C
AASHO TEST
MOLD HEIGHT 4.58 ", MOLD DIAM. 4.00 ".
NO. LAYERS 5 , BLOWS/LAYER 25 ,
HAMMER WT. 10 LBS, DROP HT. 18 ".

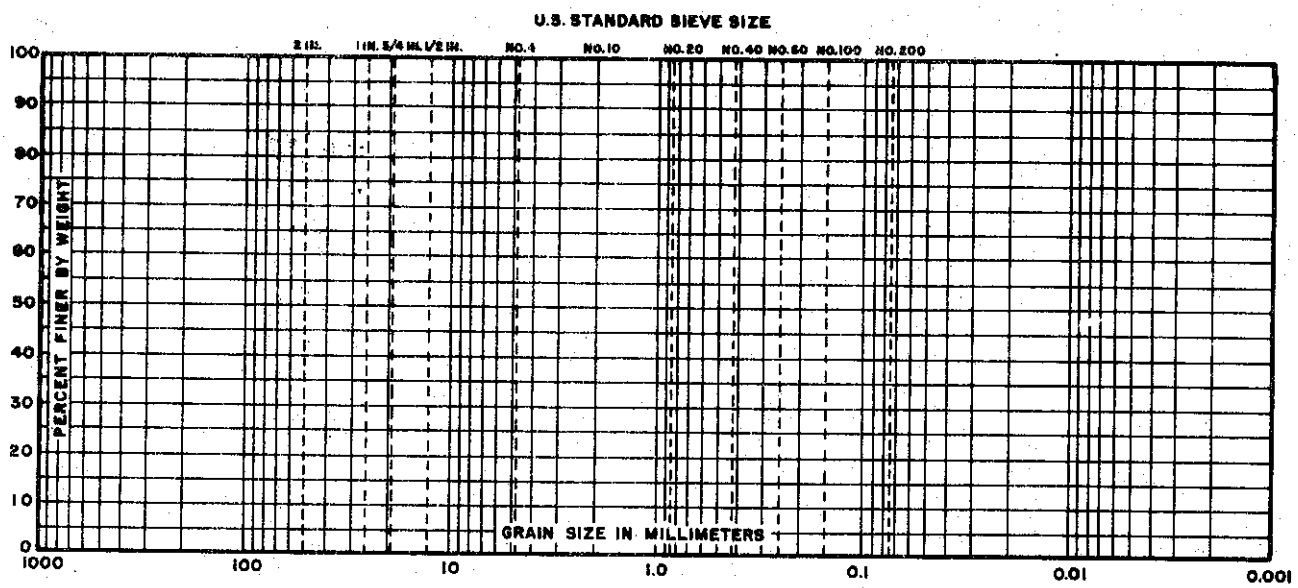
NOTES:

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE JULY 74

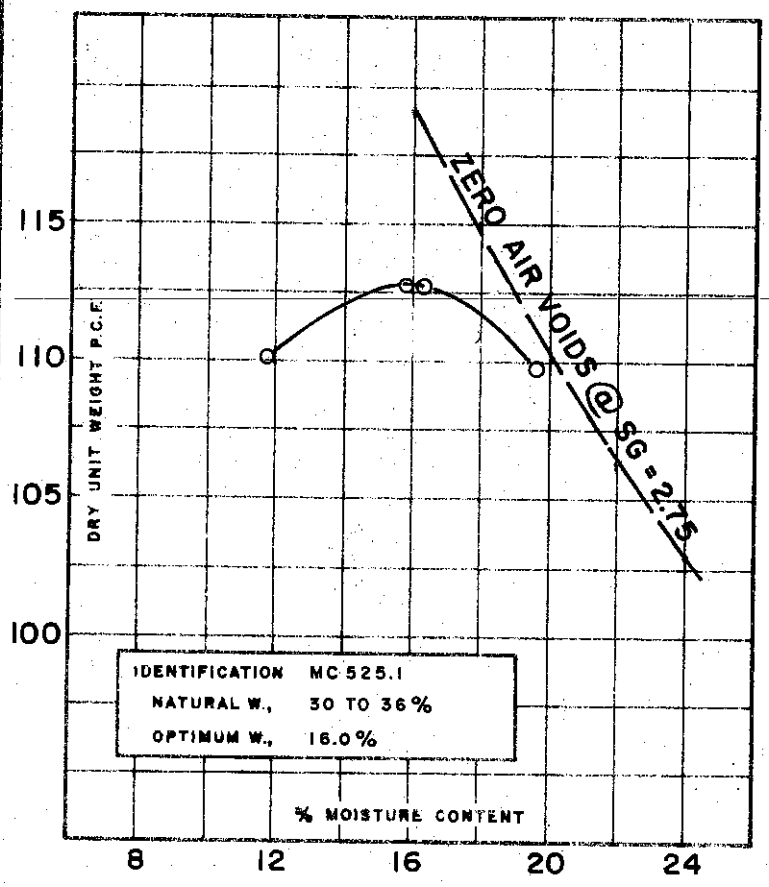
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

COMPACTION



ATTERBERG LIMITS

IDENTIFICATION
LIQUID LIMIT
PLASTIC LIMIT

MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)
EXPLORATION BORING 136
SAMPLE 2
DEPTH 3.0' TO 5.0'

COMPACTION METHOD

ASTM TEST D1557 - METHOD C
AASHO TEST
MOLD HEIGHT 4.58", MOLD DIAM. 4.00".
NO. LAYERS 5 , BLOWS/LAYER 25 ,
HAMMER WT. 10 LBS, DROP HT. 18 ".

NOTES:

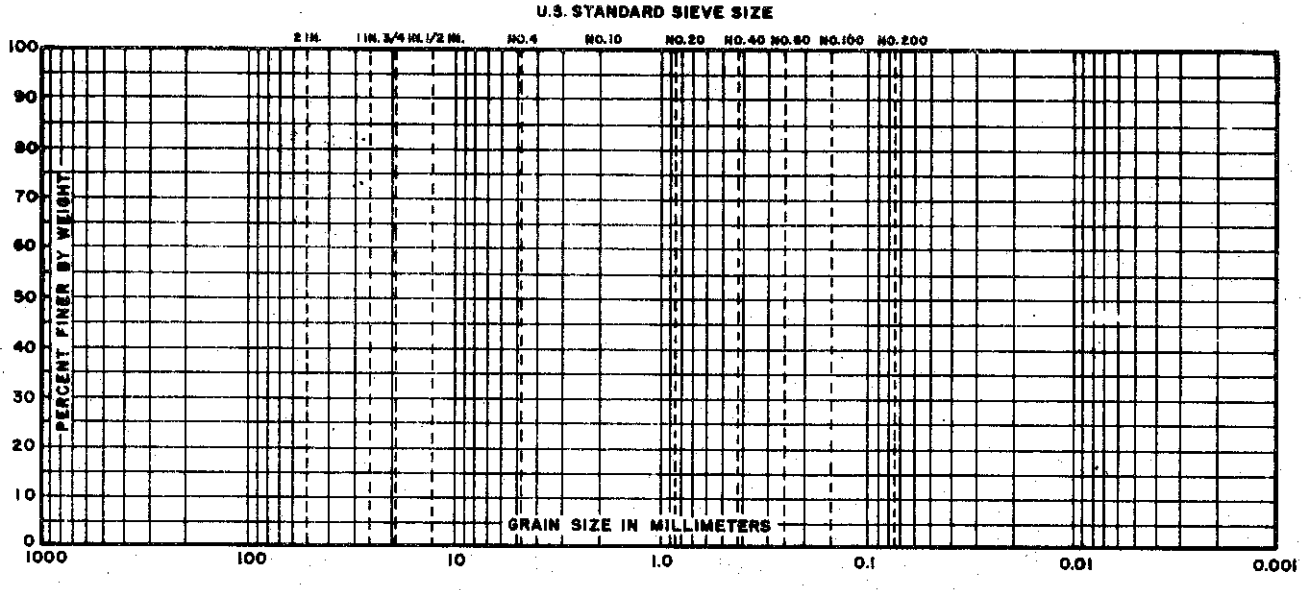
THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
COMPACTION - GRADATION TESTS

C-658

FILE NO. 1255 DATE NOV. 74

GOLDBERG - ZOINO & ASSOCIATES
Soil & Foundation Engineers

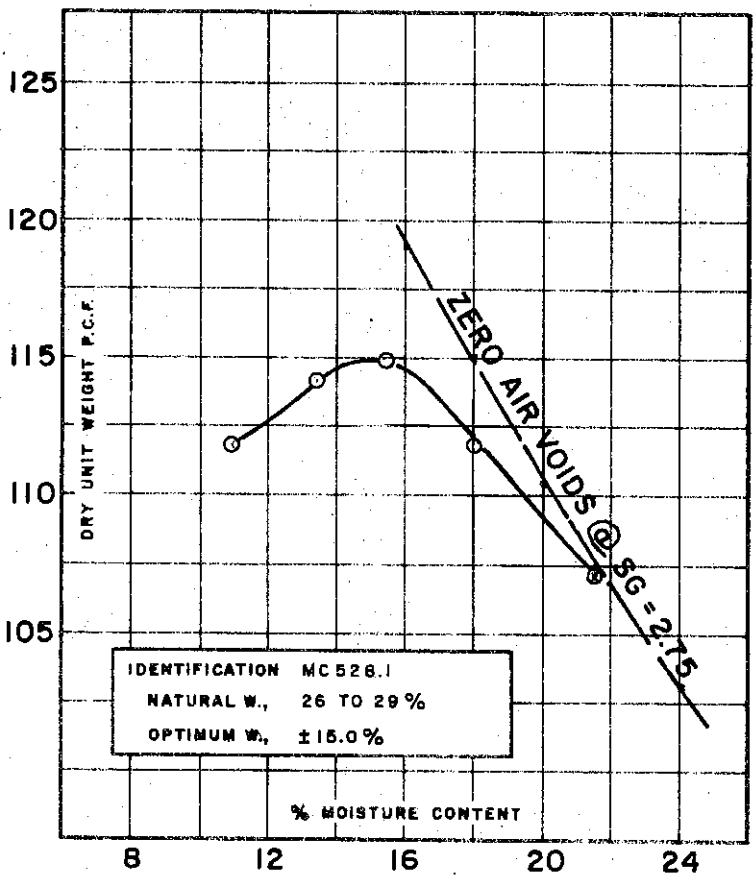
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

COMPACTION



ATTERBERG LIMITS

IDENTIFICATION L526.1
LIQUID LIMIT 56
PLASTIC LIMIT 23

MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)
EXPLORATION BORING 141
SAMPLE 1
DEPTH 3.0' TO 5.0'

COMPACTION METHOD

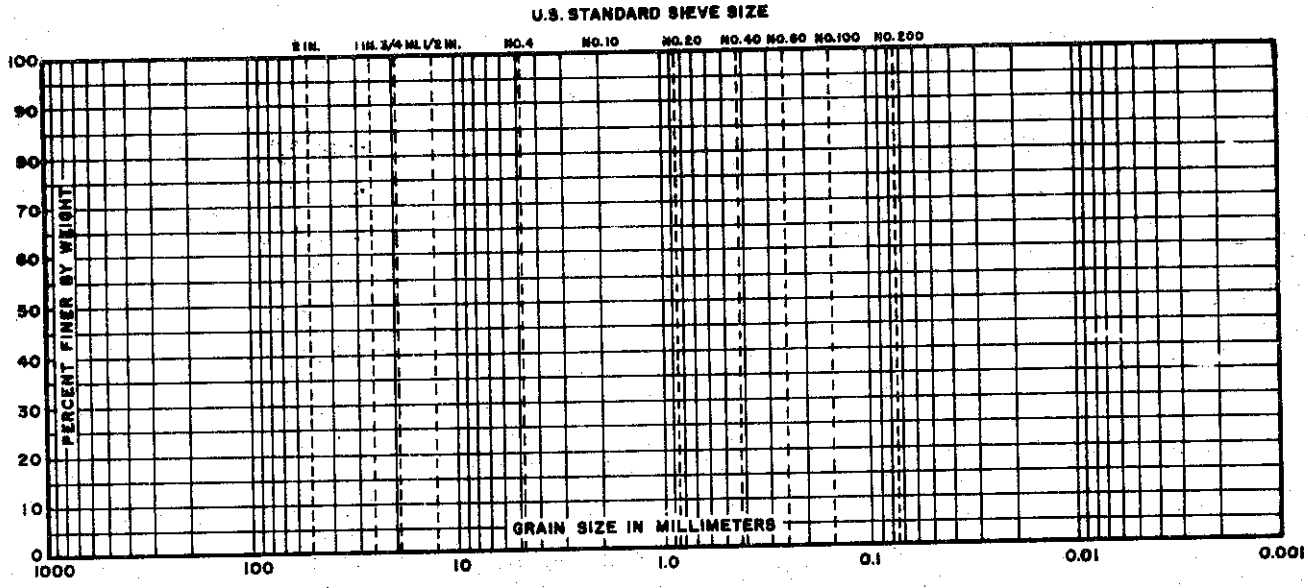
ASTM TEST D1557 - METHOD C.
AASHO TEST
MOLD HEIGHT 4.58", MOLD DIAM. 4.00".
NO. LAYERS 5 , BLOWS/LAYER 25 ,
HAMMER WT. 10 LBS, DROP HT. 18 ".

NOTES:

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II
COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE NOV. 74

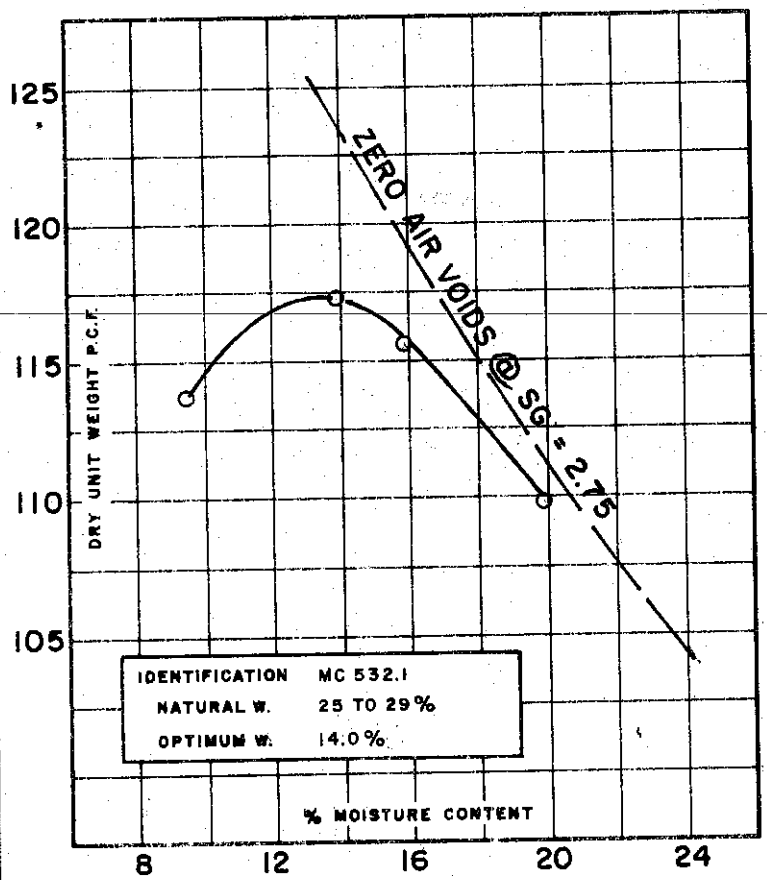
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

COMPACTION



ATTERBERG LIMITS

IDENTIFICATION L 532.1
LIQUID LIMIT 54
PLASTIC LIMIT 23

MATERIAL SOURCE

IDENTIFICATION SILTY CLAY (CH)
EXPLORATION BORING 142
SAMPLE 1
DEPTH 3.0' TO 5.5'

COMPACTION METHOD

ASTM TEST D1557 - METHOD C
AASHO TEST
MOLD HEIGHT 4.58 ", MOLD DIAM. 4.00 ".
NO. LAYERS 5 , BLOWS/LAYER 25 ,
HAMMER WT. 10 LBS, DROP HT. 18 ".

NOTES:

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

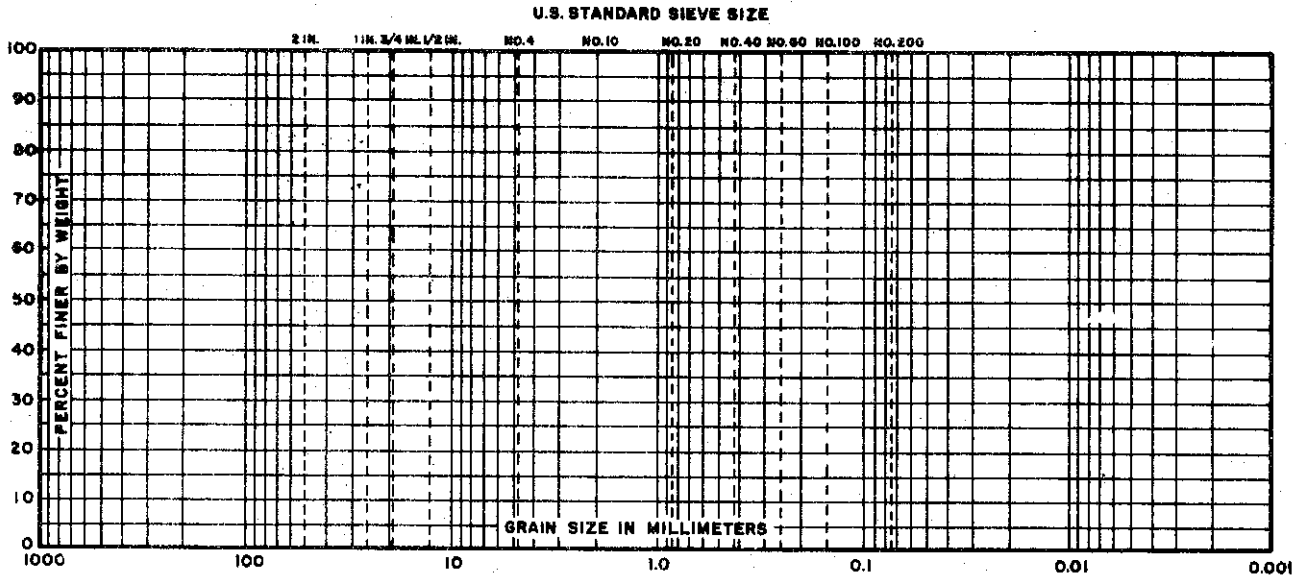
COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE APRIL 74

C-660

GOLDBERG - ZOINO & ASSOCIATES
Soil & Foundation Engineers

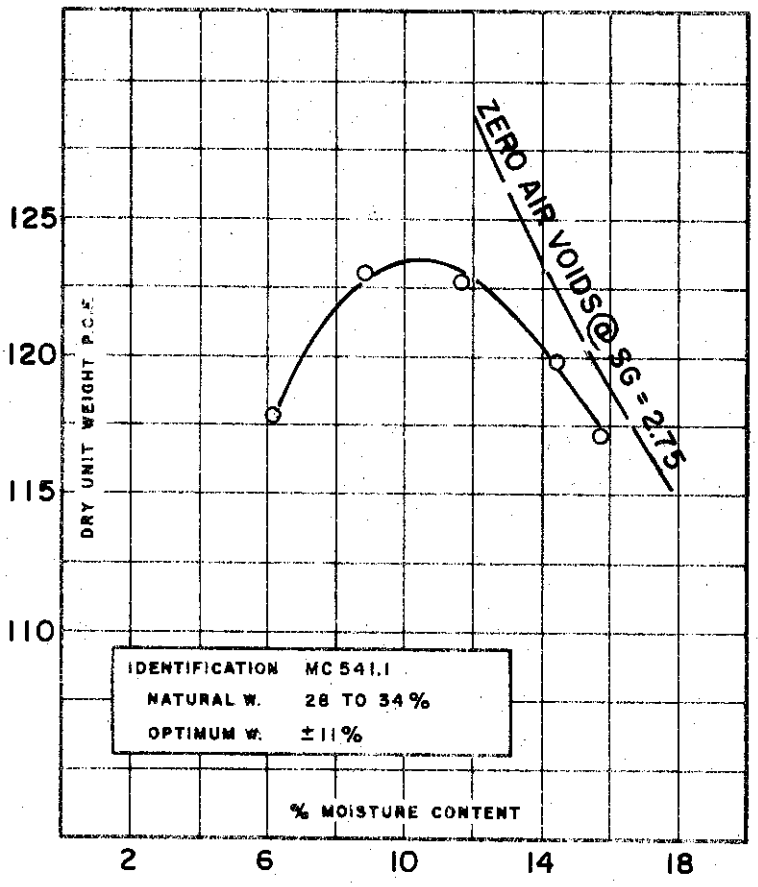
GRAIN SIZE DISTRIBUTION



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

UNIFIED SOIL CLASSIFICATION SYSTEM

COMPACTION



ATTERBERG LIMITS

IDENTIFICATION L 541.1
LIQUID LIMIT 38
PLASTIC LIMIT 19

MATERIAL SOURCE

IDENTIFICATION SILTY CLAY, SANDY (CL)
EXPLORATION BORING 146
SAMPLE 5
DEPTH 10.0' TO 12.0'

COMPACTION METHOD

ASTM TEST D1557 - METHOD C
AASHO TEST
MOLD HEIGHT 4.58 ", MOLD DIAM. 4.00 ".
NO. LAYERS 5 , BLOWS/LAYER 25 ,
HAMMER WT. 10 LBS, DROP HT. 18 ".

NOTES:

THE DETROIT EDISON COMPANY
BELLE RIVER PLANT UNITS I & II

COMPACTION - GRADATION TESTS

FILE NO. 1255 DATE APRIL 74

Appendix D

U.W. STOLL AND ASSOCIATES soil mechanics and foundation consultants
111 WEST KINGSLEY STREET ANN ARBOR, MICHIGAN 48103 (313) 994-5055

ULRICH W. STOLL
GARRETT EVANS
IN-KUIN KIM

September 8, 1975

Mr. Sherif Afifi
Bechtel Power Corporation
P. O. Box 1000
777 East Eisenhower Parkway
Ann Arbor, Michigan 48106

SUBJECT: Soil Testing
Hopper Investigation
Belle River Coal Handling
Detroit Edison Company
Technical Specification, 10539-3-C-13
REFERENCE: Purchase Order No. AA2184

Dear Sir:

Enclosed herewith is the summary of laboratory testing conducted on soil samples received from the subject site, as authorized by the referenced purchase order. The laboratory testing was performed in accordance with your technical specification 10539-3-C-13 and included the following tests:

		Pages
30	Visual Classification and In-Situ Moistures	B-1, B-2, B-9
10	Atterberg Limits	B-3, B-4, B-5
30	Unconfined Compression	B-6 through B-28
2	In-Situ Moisture and Density	B-6, B-8
5	Mechanical Analysis	B-29, B-30

We appreciate the opportunity of serving you and trust that this work has been performed to your satisfaction.

Very truly yours,

U. W. STOLL AND ASSOCIATES

In-Kuin Kim, P.E.

IKK/jb

Enclosures

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION - BELLE RIVER
JOB LOCATION: BELLE RIVER, MICHIGAN
CLIENT: BECHTEL CORPORATION

BY: IKK DATE: 8/75
SUBJECT: NATURAL MOISTURES OF BOTTLE SAMPLES

BORING NUMBER	SAMPLE NUMBER	MOISTURE CONTENT (%)	VISUAL CLASSIFICATION
B-191	S-1	23.2	GRAY-BROWN MOTTLED CLAY
	S-2	25.6	BROWN LAYERED CLAY
	S-3	38.6	GRAY CLAY WITH DRILL WASH
	S-4	35.9	GRAY CLAY WITH DRILL WASH
	S-5	39.6	GRAY CLAY WITH DRILL WASH
	S-6	43.1	GRAY CLAY WITH DRILL WASH
	S-7	39.4	GRAY CLAY
	S-8	32.5	GRAY CLAY
	S-9	34.6	GRAY CLAY
	S-10	37.1	GRAY CLAY
	S-11	33.4	GRAY CLAY
	S-12	30.7	GRAY CLAY WITH DRILL WASH
	S-13	28.7	GRAY CLAY WITH TRACE OF DRILL WASH
	S-14	27.2	GRAY CLAY WITH TRACE OF DRILL WASH
	S-15	27.1	GRAY CLAY
	S-16	24.2	GRAY CLAY
	S-17	24.0	GRAY CLAY
	S-18	24.8	GRAY CLAY
	S-19	26.8	GRAY CLAY WITH TRACE OF DRILL WASH
	S-20	25.4	GRAY CLAY
	S-21	25.9	GRAY CLAY
	S-22	27.8	GRAY CLAY
	S-23	26.7	GRAY CLAY
	S-24	25.9	GRAY CLAY
	S-25	32.2	GRAY CLAY

U. W. STULL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION - BELLE RIVER
JOB LOCATION: BELLE RIVER, MICHIGAN
CLIENT: BECHTEL CORPORATION

BY: IKK DATE: 8/75
SUBJECT: NATURAL MOISTURES OF BOTTLE SAMPLES

BORING NUMBER	SAMPLE NUMBER	MOISTURE CONTENT (%)	VISUAL CLASSIFICATION
B-191	S-26	40.6	GRAY CLAY
	S-27	25.7	WET CLAYEY SILT
	S-28	12.6	SANDY SILT
	S-29	10.2	DECOMPOSED SHALE

U. W. STOLL and ASSOCIATES
SOIL MECHANICS AND FOUNDATION CONSULTANTS

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT: LABORATORY TEST DATA SUMMARY
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION		MOISTURE DENSITY		GRAIN SIZE DISTRIBUTION (% OF TEST SAMPLE)								ATTERBERG LIMITS			STRENGTH TESTS				
BORING NO.	SAMPLE NO.	DEPTH OF SAMPLE (FT.)	NATURAL MOISTURE (% OF DRY WTS.)	NATURAL DRY DENSITY (LBS/CU.FT.)	COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC INDEX	SHRINKAGE LIMIT	TYPE OF TEST	MAX. PRINCIPAL STRESS (KG/SQ.CM.)	MIN. PRINCIPAL STRESS (KG/SQ.CM.)	AXIAL STRAIN AT FAILURE (%)	SHEAR STRENGTH (PSF)
B-193	ST-1	6	13.4	103.6								44	21		UNCONF.			5%	4200
	ST-4	18.5	36.3	85.5								40	18		UNCONF.			3%	870
	ST-7	33.5	42.6	80.5								45	21		UNCONF.			3%	690
	ST-11	51.5	27.5	95.5								49	23		UNCONF.			6%	680
	ST-13	61.5	25.7	99.3								33	14		UNCONF.			16%	1190
	ST-15	72.5	22.2	103.6								36	16		UNCONF.			14%	1690
	ST-16	77.0	26.9	95.5								32	13		UNCONF.			5%	500
	ST-16	78.0	26.3	96.1											UNCONF.			4%	1560
	ST-19	98.0	23.6	99.3								33	13		UNCONF.				590
B-192	ST-1	20.0	31.9	88.7								39	18		UNCONF.			8%	460
	ST-4	35.0	33.1	88.0								48	22		UNCONF.			2%	710
	ST-6	45.0	39.2	78.7											UNCONF.			1%	630
	ST-7	52.0	34.5	87.4											UNCONF.			4%	660

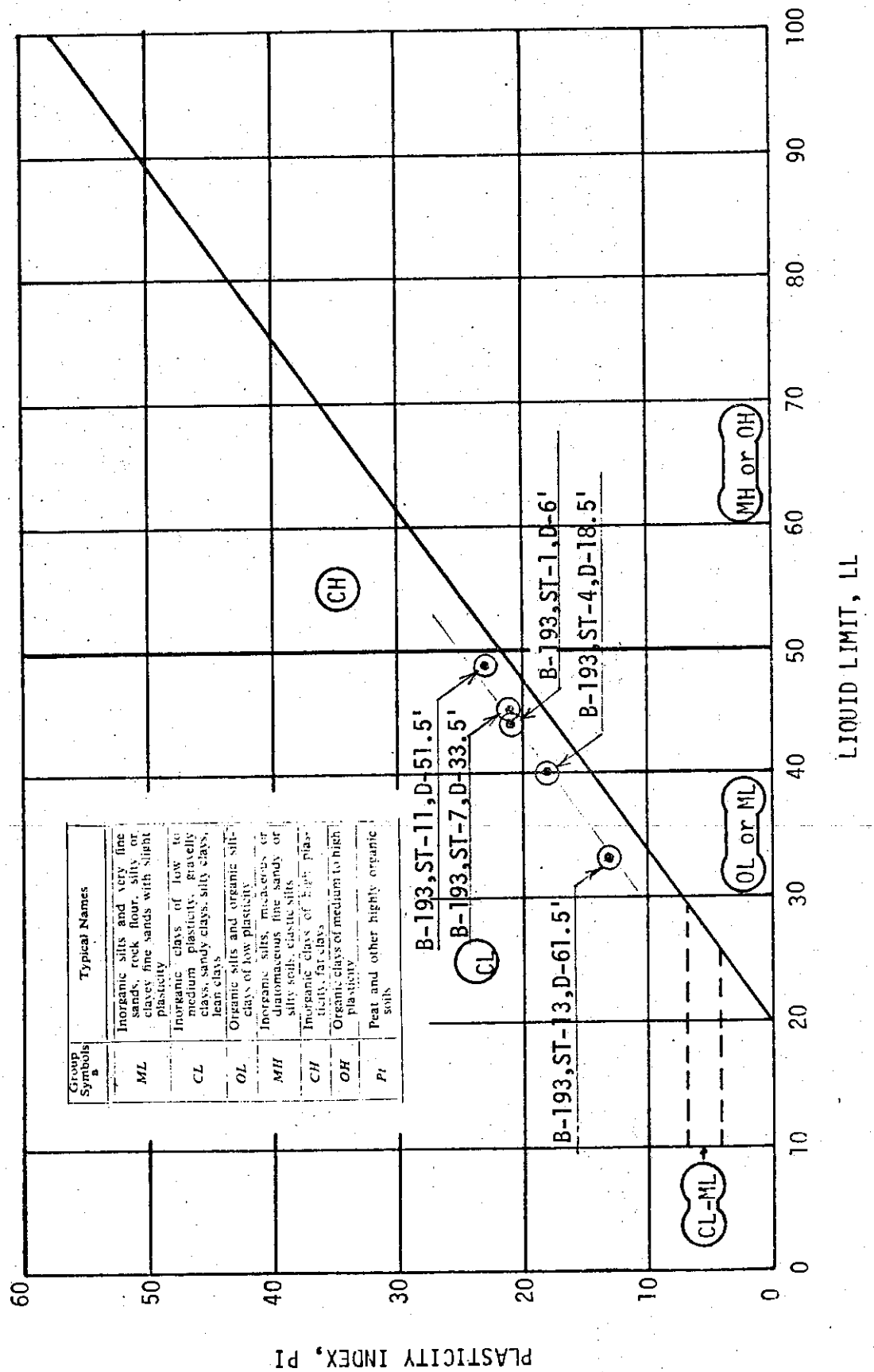
U. W. STOLL and ASSOCIATES

SOIL MECHANICS AND FOUNDATION CONSULTANTS

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75

JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT: PLASTICITY CHART

CLIENT: BECHTEL POWER CORPORATION



Group Symbols[a]	Typical Names
ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL	Organic silts and organic silty clays of low plasticity
MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
CH	Inorganic clays of high plasticity, fat clays
OH	Organic clays of medium to high plasticity
Pt	Peat and other highly organic soils

U. W. STOLL and ASSOCIATES

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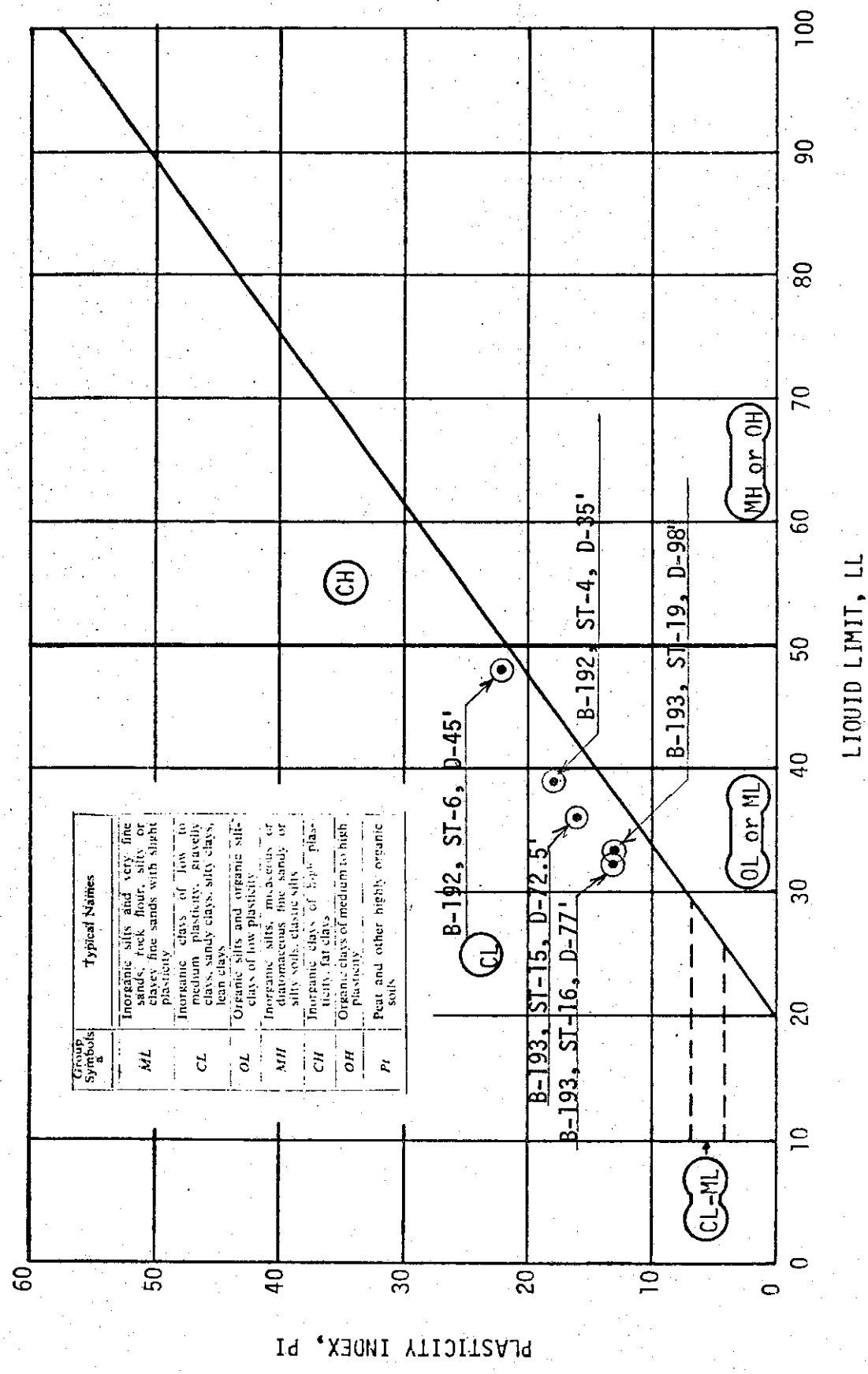

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

FIELD DATA				LABORATORY DATA				
BORING SAMPLE	DEPTH A.S.T.M. ELEV	PENETRATION BLOW	DEPTH	LABORATORY DESCRIPTION	TEST DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST REMOLD (KN/SQ.M)	NATURAL MOISTURE DRY DENS (MG/CU.M)
B-193 ST-1	6.0 -6.0	PUSHED $		STIFF BROWN SILT CLAY WITH PEBBLE QU=4.5 TSF	UNCF 72.0	5%	201.0	13.4% 1.66
B-193 ST-2	10.0 -10.0	PUSHED		BROWN MOTTLED CLAY WITH PEBBLE SAMPLING DISTURBED QU=1.75TSF	NONE 72.5			30.0% 1.49
B-193 ST-3	12.8 -12.8	PUSHED		SOFT GRAY, CLAY WITH SEAM OF SILTY DARK GRAY SANDY CLAY, TV=.57TSF	UNCF 72.5	4%	61.3	32.6% 1.44
B-193 ST-4	18.5 -18.5	PUSHED		TAN GRAY SOFT SILTY CLAY (LACUSTRINE) TV=.32TSF	UNCF 72.5	3%	41.8	36.3% 1.37
B-193 ST-5	23.5 -23.5	PUSHED		TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.29TSF	UNCF 72.5	2%	39.3	32.8% 1.38
B-193 ST-6	28.5 -28.5	PUSHED		TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.27TSF	UNCF 72.0	2%	29.6	41.4% 1.32
B-193 ST-7	33.5 -33.5	PUSHED		TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.27TSF	UNCF 72.1	3%	32.9	42.6% 1.29

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

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soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER
JOB LOCATION: BELLE RIVER, MICHIGAN
CLIENT: BECHTEL POWER CORPORATION

BY: IKK
SUBJECT:

DATE: 8/75

FIELD DATA				LABORATORY DATA				
BORING SAMPLE	DEPTH A.S.T.M. ELEV	PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST REMOLD (KN/SQ.M)	NATURAL MOISTURE DRY DENS (MG/CU.M)	
B-193 ST-8	38.5 -38.5	PUSHED	TAN GRAY SOFT PLASTIC CLAY (LACUSTRINE) TV=.37TSF	UNCF 72.9	3%	42.9	38.4% 1.33	
B-193 ST-9	41.5 -41.5	PUSHED	TAN GRAY SOFT LACUSTRINE CLAY TV=0.35TSF	UNCF 72.3	2%	31.6	40.6% 1.30	
B-193 ST-10	46.5 -46.5	PUSHED	REDDISH-GRAY SOFT CLAY (LACUSTRINE) TV=0.35TSF	UNCF 72.2	2%	40.4	46.5% 1.21	
B-193 ST-11	51.5 -51.5	PUSHED	SOFT GRAY MOTTLED LACUSTRINE CLAY TV=.29 TSF	UNCF 72.3	6%	32.4	27.5% 1.53	
B-193 ST-12	56.5 -56.5	PUSHED	SOFT GRAY PEBBLY SANDY CLAY TV=.41TSF	UNCF 72.3	16%	41.1	20.6% 1.52	
B-193 ST-13	61.5 -61.5	PUSHED	PLASTIC GRAY SILTY CLAY WITH PEBBLES TV=.5 TSF	UNCF 72.5	16%	56.9	25.7% 1.59	

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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

FIELD DATA				LABORATORY DATA				
BORING / SAMPLE	DEPTH A.S.T.M. ELEV	PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST / REMOLD (KN/SQ.M)	NATURAL MOISTURE / DRY DENS (MG/CU.M)
B-193 ST-14	66.0 -66.0	PUSHED	FIRM GRAY SILTY CLAY WITH PEBBLES TV= 0.63 TSF	UNCF 72.3	20%	78.9	22.3% 1.67
B-193 ST-15	72.5 -72.5	PUSHED	GRAY SILTY CLAY WITH PEBBLES TV=.67-.78 TSF	UNCF 72.4	14%	80.8	22.2% 1.66
B-193 ST-16	77.0 -77.0	PUSHED	FIRM V. SILTY GRAY CLAY SAND SEAMS TV=.65 TSF	UNCF 72.9	5%	24.1	26.9% 1.53
B-193 ST-16	78.0 -78.0	PUSHED	GRAY SILTY CLAY WITH PEBBLES TV= .77 TSF	UNCF 72.1	4%	74.9	26.3% 1.54
B-193 ST-17	82.0 -82.0	PUSHED	GRAY SILTY CLAY WITH PEBBLES TV= .85 TSF	UNCF 72.2	14%	70.8	20.4% 1.72
B-193 ST-18	93.5 -93.5	PUSHED	GRAY SILTY CLAY WITH PEBBLES DRILL WASH	NONE 71.1			25.5% 1.62

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

FIELD DATA				LABORATORY DATA				
BORING SAMPLE	DEPTH ELEV	A.S.T.M. PENETRATION BLOW	LABORATORY DEPTH DESCRIPTION	TEST DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST REMOLD (KN/SQ.M)	NATURAL MOISTURE DRY DENS (MG/CU.M)	
B-193	98.0		GRAY SILTY	UNCF		28.0	23.6%	
		PUSHED	CLAY WITH SOME		20%			
ST-19	-98.0		PEBBLES & MOTTLE	72.4			1.59	
			TV=.45 TSF					
B-193, ST-20		PUSHED	GRAY SILTY CLAY WITH PEBBLES & DRILL WASH	NO TEST			31.1%	
B-193	112.0		SOFT GRAY	UNCF		19.1	28.5%	
		PUSHED	SILTY CLAY		20%			
ST-21	-112.0		WITH PEBBLES	72.7			1.47	
			TV=0.22 TSF					
B-193, ST-22								
B-193, ST-23			NO TESTS DUE TO DRILL WASH					

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soil mechanics and foundation consultants

JOB NAME HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

FIELD DATA				LABORATORY DATA				
BORING SAMPLE	DEPTH ELEV	A.S.T.M. PENETRATION BLOW	DEPTH	LABORATORY DESCRIPTION	TEST DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST REMOLD (KN/SQ.M)	NATURAL MOISTURE DRY DENS (MG/CU.M)
B-192 ST-1	20.0 -20.0	PUSHED		GRAYISH BROWN PLASTIC SOFT LACUSTRINE CLAY TV=.27 TSF	UNCF 72.7	8%	22.1	31.9% 1.42
B-192 ST-2	25.0 -25.0	PUSHED		GRAYISH BROWN SOFT PLASTIC LACUSTRINE CLAY TV=.27 TSF	UNCF 72.2	4%	27.8	35.6% 1.37
B-192 ST-3	30.0 -30.0	PUSHED		GRAYISH BROWN PLASTIC SOFT LACUSTRINE CLAY TV=.25 TSF	UNCF 72.3	3%	27.7	41.8% 1.28
B-192 ST-4	35.0 -35.0	PUSHED		GRAYISH BROWN SOFT PLASTIC CLAY(LACUSTRINE) TV=.28 TSF	UNCF 72.5	2%	34.2	33.1% 1.41
B-192 ST-5	40.0 -40.0	PUSHED		GRAYISH BROWN PLASTIC SOFT LACUSTRINE CLAY TV=.28 TSF	UNCF 72.4	2%	40.5	36.4% 1.31
B-192 ST-6	45.0 -45.0	PUSHED		BROWNISH GRAY PLASTIC LACUSTRI CLAY (MOTTLED) TV=.32 TSF	UNCF 72.3	1%	30.2	39.2% 1.26
B-192 ST-7	52.0 -52.0	PUSHED		FIRM GRAY SILTY CLAY WITH PEBBLES TV= 0.26 TSF	UNCF 72.3	4%	31.4	34.5% 1.40

(UNIT CONVERSIONS: 1 KN/SQ.M=20.88 PSF, 1 MG/CU.M=62.43 PCF)

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER
JOB LOCATION: BELLE RIVER, MICHIGAN
CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 8/75
SUBJECT:

FIELD DATA				LABORATORY DATA				
BORING SAMPLE	DEPTH ELEV	A.S.T.M. PENETRATION BLOW	DEPTH	DESCRIPTION	TEST DIAM (MM)	STRAIN	SHEAR STRENGTH UNDIST REMOLD (KN/SQ.M)	NATURAL MOISTURE DRY DENS (MG/CU.M)
B-192 ST-8	55.0 -55.0	PUSHED		SOFT GRAY SILTY CLAY WITH PEBBLES TV=0.40 TSF	UNCF 72.5	10%	36.8	27.8% 1.54
B-192 ST-11	80.0 -80.0	PUSHED		SOFT GRAY SILTY CLAY WITH FINE SAND LAYERS TV=.52 TSF	UNCF 72.5	7%	84.5	26.6% 1.55
B-192 ST-9	60.0 -60.0	PUSHED		PLASTIC GRAY SILTY CLAY WITH PEBBLES TV=0.50 TSF	UNCF 72.5	16%	46.0	26.5% 1.57
B-192 ST-10	70.0 -70.0	PUSHED		FIRM GRAY SILTY CLAY WITH PEBBLES TV=0.82 TSF	UNCF 72.3	20%	85.2	24.3% 1.64

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-193,ST-1,D-6

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
1.50	.0	.00	119.33	
2.00	5.0	.33	1064.92	
2.50	11.0	.66	2192.85	
3.00	16.5	.98	3219.35	
3.50	21.0	1.31	4051.68	
4.00	25.0	1.64	4785.06	
4.50	28.5	1.97	5420.41	
5.00	31.8	2.29	6014.33	
5.50	35.0	2.62	6585.65	
6.00	37.5	2.95	7024.04	
6.50	39.8	3.28	7422.60	
7.00	41.8	3.60	7763.41	
7.50	43.5	3.93	8047.02	
8.00	44.9	4.26	8274.00	
8.50	45.6	4.59	8372.46	
9.00	45.9	4.91	8397.85	⇦
9.50	45.9	5.24	8368.92	
10.00	44.0	5.57	7999.41	
10.50	39.0	5.90	7078.55	

SAMPLE IDENTIFICATION; B-193,ST-3,D-12.8

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
1.00	.0	.00	117.69	
1.50	113.0	.35	595.39	
2.00	222.0	.71	1052.83	
2.50	332.0	1.06	1511.20	
3.00	422.0	1.41	1882.54	
3.50	485.0	1.77	2138.56	
4.00	527.0	2.12	2305.42	
4.50	558.0	2.48	2425.46	
5.00	578.0	2.83	2499.18	
5.50	590.0	3.18	2539.42	
6.00	597.5	3.54	2560.86	
6.50	600.0	3.89	2561.68	⇦
6.80	600.0	4.10	2556.02	
7.00	599.0	4.24	2548.19	
7.50	596.0	4.60	2526.63	
8.00	593.0	4.95	2505.15	

SAMPLE IDENTIFICATION; B-193,ST-4,D-18.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
6.50	.0	.00	117.69	
7.00	87.0	.33	485.48	
7.50	160.0	.67	791.74	
8.00	230.0	1.00	1083.33	
8.50	290.0	1.34	1331.04	
9.00	336.0	1.67	1518.59	
9.50	366.0	2.00	1638.26	
10.00	385.0	2.34	1711.47	
10.50	395.0	2.67	1746.94	
11.00	396.5	3.01	1747.13	⇦
11.50	388.0	3.34	1706.22	
12.00	364.0	3.67	1608.17	

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-193,ST-5,D-23.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
4.50	.0	.00	117.69	
5.00	80.0	.33	455.87	
5.50	175.0	.66	855.09	
6.00	272.0	.99	1260.05	
6.50	337.0	1.32	1528.21	
7.00	363.0	1.65	1631.69	
7.30	366.0	1.85	1640.91	⇦
7.50	355.0	1.98	1592.92	
8.00	323.0	2.31	1454.83	
8.50	310.0	2.64	1396.17	

SAMPLE IDENTIFICATION; B-193,ST-6,D-28.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	119.33	
1.00	124.0	.64	649.00	
1.50	200.0	.96	970.96	
2.00	250.0	1.28	1180.32	
2.50	264.0	1.60	1235.80	
3.00	265.0	1.92	1236.00	⇦
4.00	260.0	2.56	1206.94	
5.00	250.0	3.21	1157.33	
6.00	244.0	3.85	1124.83	

SAMPLE IDENTIFICATION; B-193,ST-7,D-33.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
2.00	.0	.00	119.00	
3.00	89.0	.65	497.86	
4.00	177.0	1.30	867.51	
5.00	260.0	1.95	1211.21	
6.00	300.5	2.60	1372.55	⇦
7.00	290.0	3.25	1319.78	
8.00	272.0	3.90	1236.66	
9.00	262.0	4.55	1187.32	

SAMPLE IDENTIFICATION; B-193,ST-8,D-38.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
1.00	.0	.00	116.41	
1.50	85.0	.35	471.73	
2.00	138.0	.70	691.11	
2.50	198.0	1.04	938.03	
3.00	267.0	1.39	1220.47	
3.50	331.0	1.74	1480.26	
4.00	376.0	2.09	1660.05	
4.50	400.0	2.44	1752.48	
5.00	411.0	2.79	1791.13	⇦
5.50	412.5	3.13	1790.82	
6.00	408.0	3.48	1766.14	
6.50	398.0	3.83	1723.42	

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-193,ST-9,D-41.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	118.35	
.50	91.0	.32	505.25	
1.00	151.0	.64	758.14	
1.25	179.0	.81	875.50	
1.50	203.0	.97	975.56	
1.75	224.0	1.13	1062.62	
2.00	244.0	1.29	1145.18	
2.50	272.0	1.61	1259.07	
3.00	288.0	1.93	1321.94	⇦
3.50	288.0	2.26	1317.60	
3.80	286.0	2.45	1306.66	
4.30	281.0	2.77	1281.59	
4.50	278.0	2.90	1267.45	
5.00	270.0	3.22	1230.19	

SAMPLE IDENTIFICATION; B-193,ST-10,D-46.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	118.67	
.25	69.0	.16	413.41	
.50	116.0	.33	613.30	
.75	160.0	.49	799.74	
1.00	205.0	.66	989.82	
1.25	245.0	.82	1158.03	
1.50	285.0	.99	1325.68	
2.00	349.0	1.32	1591.68	
2.50	373.0	1.64	1687.44	⇦
3.00	358.0	1.97	1618.84	
4.00	325.0	2.63	1470.41	

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION: B-193,ST-11,D-51.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
1.00	.0	.00	118.35	
1.25	38.0	.17	280.13	
1.50	60.0	.33	373.29	
2.00	100.0	.66	541.71	
2.50	138.0	.99	700.54	
3.00	176.0	1.32	858.31	
3.50	205.0	1.65	977.21	
4.00	232.0	1.98	1086.93	
4.50	252.0	2.31	1166.68	
5.00	266.0	2.64	1220.93	
5.50	277.0	2.97	1262.36	
6.00	284.5	3.30	1289.03	
6.50	290.5	3.63	1309.31	
7.00	295.0	3.96	1323.28	
7.50	299.0	4.29	1335.07	
8.00	302.0	4.62	1342.68	
8.50	303.5	4.95	1344.12	
9.00	306.0	5.28	1349.56	
9.50	307.5	5.61	1350.90	
10.00	309.0	5.94	1352.20	⇦
10.50	309.5	6.27	1349.45	
11.00	310.2	6.61	1347.49	
11.50	310.9	6.94	1345.50	
12.00	311.3	7.27	1342.31	
12.50	311.6	7.60	1338.72	
13.00	311.7	7.93	1334.32	
13.50	311.7	8.26	1329.54	
14.50	310.5	8.92	1315.30	
15.00	310.0	9.25	1308.59	

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-193,ST-12,D-56.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
.25	44.0	.16	305.71
.50	63.0	.33	386.06
.75	81.0	.49	461.89
1.00	96.0	.66	524.75
1.75	135.0	1.15	686.75
2.00	150.0	1.32	748.81
2.50	177.0	1.64	859.69
3.00	204.0	1.97	969.82
3.50	227.0	2.30	1062.51
4.00	249.0	2.63	1150.39
4.50	268.0	2.96	1225.22
5.00	284.0	3.29	1287.14
6.00	309.0	3.95	1380.91
7.00	329.0	4.61	1452.91
8.00	345.0	5.26	1507.61
9.00	358.5	5.92	1551.37
10.00	369.5	6.58	1584.40
11.00	379.0	7.24	1610.86
12.00	387.5	7.89	1632.87
13.00	395.0	8.55	1650.49
14.00	401.5	9.21	1663.81
16.00	413.0	10.53	1683.63
17.00	418.0	11.18	1690.21
18.00	422.5	11.84	1694.63
19.00	428.0	12.50	1702.53
20.00	432.5	13.16	1706.41
21.00	437.0	13.82	1710.04
22.00	441.0	14.47	1711.60
24.00	449.5	15.79	1715.82
25.00	453.5	16.45	1716.69 ⇦
27.00	461.0	17.76	1715.99
28.00	465.0	18.42	1716.19
29.00	468.0	19.08	1712.72
30.40	471.5	20.00	1705.18

JOB NAME: HOPPER. INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-193,ST-13,D-61.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
1.00	.0	.00	117.69	
1.50	76.0	.33	438.93	
2.00	113.0	.67	593.53	
2.50	48.0	1.00	318.30	
3.00	182.0	1.33	878.63	
3.50	218.0	1.66	1025.99	
4.00	255.0	2.00	1176.49	
4.50	292.0	2.33	1325.94	
5.00	323.0	2.66	1449.55	
5.50	353.0	2.99	1568.17	
6.00	378.0	3.33	1665.41	
6.50	398.0	3.66	1741.49	
7.00	414.0	3.99	1800.71	
7.50	429.0	4.32	1855.40	
8.00	443.0	4.66	1905.63	
8.50	456.0	4.99	1951.42	
9.00	467.5	5.32	1990.82	
9.50	478.0	5.66	2025.89	
10.00	487.0	5.99	2054.67	
10.50	496.0	6.32	2083.20	
11.00	504.5	6.65	2109.50	
12.00	520.0	7.32	2155.46	
13.00	534.0	7.98	2194.68	
14.00	547.0	8.65	2229.24	
15.00	558.0	9.31	2255.36	
16.00	569.0	9.98	2280.86	
17.00	579.5	10.65	2303.84	
18.00	588.5	11.31	2320.58	
19.00	597.0	11.98	2334.94	
20.00	604.5	12.64	2345.11	
21.00	612.0	13.31	2354.86	
22.00	619.0	13.97	2362.35	
23.00	626.5	14.64	2371.27	
24.00	633.0	15.30	2376.16	
25.00	639.0	15.97	2378.90	⇦
26.00	644.0	16.63	2377.77	
27.00	648.5	17.30	2374.59	
28.00	653.0	17.96	2371.16	
29.00	657.0	18.63	2365.75	
30.00	660.5	19.29	2358.40	
31.06	664.0	20.00	2349.68	

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-193,ST-14,D-66

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.35
1.00	105.0	.68	562.77
2.00	205.0	1.37	980.01
3.00	300.0	2.05	1370.48
4.00	382.0	2.74	1701.42
5.00	446.0	3.42	1953.33
6.00	495.0	4.11	2140.09
7.00	535.0	4.79	2287.40
8.00	570.0	5.48	2412.19
9.00	598.0	6.16	2506.89
10.00	625.0	6.85	2595.98
11.00	651.0	7.53	2679.54
12.00	675.0	8.22	2753.74
13.00	697.0	8.90	2818.76
14.00	717.0	9.59	2874.77
15.00	736.0	10.27	2925.78
16.00	755.0	10.96	2975.68
17.00	773.0	11.64	3020.69
18.00	788.0	12.33	3053.42
19.00	804.0	13.01	2088.99
20.00	818.0	13.70	3116.25
21.00	834.0	14.38	3150.01
22.00	848.0	15.07	3175.58
23.00	861.0	15.75	3196.73
24.00	875.0	16.44	3220.69
25.00	887.0	17.12	3236.75
26.00	900.0	17.81	3255.62
27.00	911.0	18.49	3266.77
28.00	923.0	19.18	3280.73
29.00	935.0	19.86	3293.99
29.20	937.0	20.00	3295.19 ⇦
30.00	947.0	20.55	3306.54
31.00	958.0	21.23	3315.03

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION: B-193,ST-15,D-72.5

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	118.02	
1.00	80.0	.62	455.81	
2.00	130.0	1.24	663.23	
3.00	180.0	1.86	868.02	
4.00	230.0	2.47	1070.18	
5.00	290.0	3.09	1310.96	
6.00	355.0	3.71	1569.09	
7.00	418.0	4.33	1815.64	
8.00	476.0	4.95	2038.64	
9.00	529.0	5.57	2238.48	
11.00	620.0	6.80	2570.27	
12.00	659.0	7.42	2706.94	
13.00	692.0	8.04	2818.07	
14.00	722.0	8.66	2915.80	
15.00	751.0	9.28	3008.08	
16.00	776.0	9.89	3083.49	
17.00	798.0	10.51	3146.15	
18.00	818.0	11.13	3200.08	
19.00	838.0	11.75	3252.97	
20.00	857.0	12.37	3301.06	
22.00	890.0	13.61	3375.86	⇦
24.00	902.5	14.84	3372.86	
26.00	880.0	16.08	3243.47	
28.00	850.0	17.32	3090.05	

SAMPLE IDENTIFICATION: B-193,ST-16,D-77

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
1.00	.0	.00	116.41	
2.00	88.0	.61	483.01	
3.00	145.0	1.22	716.51	
4.00	187.0	1.83	885.24	
5.00	210.0	2.44	973.98	
7.00	217.0	3.66	990.13	
8.00	222.0	4.27	1003.96	
10.00	226.0	5.49	1007.05	⇦
11.00	225.0	6.10	996.61	

SAMPLE IDENTIFICATION: B-193,ST-16,D-78

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	119.00	
1.00	250.0	.53	1186.01	
2.00	420.0	1.06	1901.79	
3.00	535.0	1.59	2377.45	
4.00	610.0	2.12	2679.78	
5.00	663.0	2.66	2886.75	
6.00	698.0	3.19	3016.48	
7.00	722.0	3.72	3099.14	
8.00	733.0	4.25	3127.27	⇦

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
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CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-193,ST-17,D-82

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
4.00	.0	.00	118.67
4.50	105.0	.28	566.65
5.00	138.0	.56	705.57
6.00	192.0	1.11	930.26
7.00	242.0	1.67	1135.54
8.00	289.0	2.22	1325.88
9.00	333.0	2.78	1501.50
10.00	374.0	3.33	1662.61
11.00	412.0	3.89	1809.42
12.00	447.0	4.44	1942.15
13.00	481.0	5.00	2069.15
14.00	510.0	5.56	2174.32
15.00	538.0	6.11	2274.08
16.00	565.0	6.67	2368.52
17.00	590.0	7.22	2453.73
18.00	611.0	7.78	2521.95
19.00	634.0	8.33	2597.03
20.00	655.0	8.89	2663.21
22.00	692.0	10.00	2773.30
24.00	724.0	11.11	2860.85
26.00	751.0	12.22	2926.56
28.00	768.0	13.33	2952.59
30.00	780.0	14.44	2958.69
32.00	786.0	15.56	2941.96
34.00	789.5	16.67	2915.74
35.00	793.0	17.22	2908.70
36.00	796.0	17.78	2899.74

B-193, ST-18 NO STRENGTH TEST DUE TO DRILL WASH

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION: B-193, ST-19, D-98

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.02
1.00	23.0	.66	214.53
2.00	49.0	1.32	322.35
3.00	68.0	1.97	399.51
4.00	85.0	2.63	467.31
5.00	98.0	3.29	517.68
6.00	112.0	3.95	571.41
7.00	124.0	4.61	616.24
8.00	136.0	5.26	660.40
9.00	147.0	5.92	699.87
10.00	158.0	6.58	738.73
11.00	169.0	7.24	776.98
12.00	179.0	7.89	810.68
13.00	188.0	8.55	839.94
14.00	198.0	9.21	872.55
15.00	207.0	9.87	900.77
16.00	215.0	10.53	924.67
17.00	224.0	11.18	951.90
18.00	233.0	11.84	978.64
19.00	241.0	12.50	1001.14
20.00	250.0	13.16	1026.89
21.00	257.0	13.82	1044.80
22.00	265.0	14.47	1065.95
23.00	272.0	15.13	1083.05
24.00	279.0	15.79	1099.75
25.00	285.0	16.45	1112.51
26.00	292.0	17.11	1128.45
27.00	297.0	17.76	1137.00
28.00	302.0	18.42	1145.27
29.00	307.0	19.08	1153.27
30.00	311.5	19.74	1159.27
30.40	316.0	20.00	1170.80 ⇦

B-193, ST-20 NO STRENGTH TEST DUE TO DRILL WASH
(w_n = 31.1 %)

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-193, ST-21, D-112

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
1.00	10.0	.65	158.23
2.00	28.0	1.31	232.21
3.00	45.0	1.96	301.05
4.00	58.0	2.62	352.50
5.00	70.0	3.27	399.15
6.00	80.0	3.92	437.02
7.00	90.0	4.58	474.34
8.00	98.0	5.23	503.10
9.00	105.0	5.89	527.45
10.00	112.0	6.54	551.41
11.00	119.0	7.19	574.98
12.00	126.0	7.85	598.17
13.00	132.0	8.50	617.11
14.00	138.0	9.16	635.71
15.00	144.0	9.81	653.99
16.00	148.0	10.46	664.37
17.00	153.0	11.12	678.28
18.00	158.0	11.77	691.92
19.00	163.0	12.43	705.28
20.00	168.0	13.08	718.37
21.00	172.0	13.73	727.53
22.00	177.0	14.39	740.09
23.00	180.0	15.04	745.20
24.00	185.0	15.70	757.26
25.00	188.0	16.35	761.99
26.00	192.0	17.00	770.05
27.00	195.0	17.66	774.41
28.00	198.0	18.31	778.61
29.00	202.0	18.97	786.06
30.00	205.0	19.62	789.90
31.00	210.0	20.27	800.31
32.00	212.0	20.93	800.42
30.60	208.0	20.01	796.18 ⇦

B-193 ST-22 } NO TEST DUE TO DRILL WASH
B-193 ST-23 }

U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-192,ST-1,D-20

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.05
.40	11.5	.26	165.17
.80	20.0	.52	200.45
1.20	28.0	.79	233.44
1.60	35.0	1.05	262.07
2.00	42.0	1.31	290.55
2.40	50.0	1.57	323.03
2.80	57.0	1.83	351.18
3.20	65.0	2.10	383.32
3.60	73.0	2.36	415.28
4.00	81.0	2.62	447.07
4.40	90.0	2.88	482.77
4.80	99.0	3.14	518.28
5.20	108.0	3.41	553.59
5.60	118.0	3.67	592.77
6.80	147.0	4.45	704.94
7.20	157.0	4.72	743.24
7.60	166.0	4.98	777.31
8.00	174.0	5.24	807.18
8.40	181.0	5.50	832.88
8.80	187.0	5.76	854.45
9.20	192.0	6.02	871.92
9.60	197.0	6.29	889.27
10.00	200.0	6.55	898.63
10.40	203.0	6.81	907.91
10.80	206.0	7.07	917.13
11.20	208.0	7.33	922.38
11.60	209.0	7.60	923.67
12.00	210.0	7.86	924.94 ⇦

SAMPLE IDENTIFICATION; B-192,ST-2,D-25

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	118.67
.50	27.0	.33	233.50
1.00	51.0	.66	334.80
1.50	78.0	.99	448.15
2.00	105.0	1.32	560.73
2.50	135.0	1.65	685.17
3.00	165.0	1.98	808.78
3.50	192.0	2.31	918.98
4.00	213.0	2.64	1003.41
4.50	229.0	2.97	1066.48
5.00	242.0	3.30	1116.67
5.50	250.0	3.63	1145.87
6.00	255.0	3.96	1162.51
6.50	256.0	4.29	1162.61 ⇦
7.00	251.0	4.62	1138.18

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION: B-192,ST-3,D-30

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	118.35	
.50	45.0	.32	309.47	
1.00	83.0	.65	469.65	
1.50	118.0	.97	616.10	
2.00	157.0	1.30	778.43	
2.50	193.0	1.62	927.07	
3.00	222.0	1.95	1045.42	
3.50	241.0	2.27	1121.23	
4.00	250.0	2.60	1154.93	
4.30	251.0	2.79	1156.77	⇦
4.50	250.0	2.92	1151.08	
5.00	247.0	3.25	1134.84	

SAMPLE IDENTIFICATION: B-192,ST-4,D-35

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	117.69	
1.00	136.0	.65	690.61	
2.00	275.0	1.31	1268.54	
2.80	315.0	1.83	1428.53	⇦
4.00	254.0	2.62	1164.87	

SAMPLE IDENTIFICATION: B-192,ST-5,D-40

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	118.02	
.50	86.0	.33	482.60	
1.00	147.0	.66	739.02	
1.50	205.0	.99	981.08	
2.00	263.0	1.32	1221.51	
2.50	313.0	1.65	1426.81	
3.00	354.0	1.98	1593.15	
3.50	377.0	2.31	1683.47	
3.70	379.5	2.44	1691.58	⇦
4.10	372.0	2.70	1655.94	
4.50	336.0	2.97	1502.71	
5.00	310.0	3.30	1390.55	

SAMPLE IDENTIFICATION: B-192,ST-6,D-45

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	118.35	
.50	111.0	.33	590.33	
1.00	194.0	.66	940.43	
1.50	249.0	.99	1169.84	
2.00	272.0	1.31	1262.87	⇦
2.15	272.0	1.41	1261.61	
2.50	266.0	1.64	1233.47	
3.00	254.0	1.97	1179.12	
3.50	247.0	2.30	1145.97	

U. W. STOLL AND ASSOCIATES
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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT:
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-192,ST-7,D-52

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	118.35	
1.00	100.0	.71	541.43	
2.00	170.0	1.42	832.16	
3.00	224.0	2.14	1051.79	
4.00	262.0	2.85	1201.77	
5.00	285.0	3.56	1287.67	
6.00	293.0	4.27	1310.87	⇦
7.00	270.0	4.98	1207.81	

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER
JOB LOCATION: BELLE RIVER, MICHIGAN
CLIENT: BECHTEL POWER CORPORATION
BY: IKK DATE: 8/75
SUBJECT: STRESS-STRAIN RELATIONS

SAMPLE IDENTIFICATION; B-192,ST-8,D-55

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	103.0	.62	551.62
2.00	165.0	1.23	808.20
3.00	132.0	1.85	665.62
4.00	195.0	2.47	922.33
5.00	247.0	3.09	1130.48
6.00	282.0	3.70	1266.39
7.00	305.0	4.32	1351.71
8.00	322.0	4.94	1411.61
9.00	334.0	5.56	1450.56
11.00	352.0	6.79	1502.84
12.00	358.0	7.41	1516.48
13.00	363.0	8.02	1525.90
14.00	367.5	8.64	1533.11
15.00	370.0	9.26	1532.38
16.00	373.5	9.88	1535.35
18.00	379.0	11.11	1535.08
19.00	381.0	11.73	1531.92
20.00	382.0	12.35	1524.93
21.00	383.0	12.96	1517.88
22.00	384.0	13.58	1510.79
23.00	384.0	14.20	1500.00
24.00	383.5	14.81	1487.40
25.00	381.0	15.43	1467.64

SAMPLE IDENTIFICATION; B-192,ST-9,D-60

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
1.00	70.0	.63	412.31
2.00	130.0	1.26	661.26
3.00	185.0	1.89	886.18
4.00	235.0	2.52	1087.46
5.00	280.0	3.14	1265.51
6.00	317.0	3.77	1408.47
7.00	347.0	4.40	1521.04
8.00	371.0	5.03	1607.81
9.00	389.0	5.66	1669.27
10.00	404.0	6.29	1717.83
11.00	417.0	6.92	1757.68
12.00	429.0	7.55	1792.91
13.00	439.0	8.18	1819.70
14.00	447.0	8.81	1838.22
16.00	463.0	10.06	1873.96
17.00	471.0	10.69	1891.20
18.00	476.0	11.32	1896.70
19.00	482.0	11.95	1905.68
20.00	488.0	12.58	1914.34
21.00	493.0	13.21	1919.00
22.00	497.0	13.84	1919.73

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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT: STRESS-STRAIN RELATIONS
CLIENT: BECHTEL POWER CORPORATION

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
24.00	505.0	15.09	1920.54	
25.00	509.0	15.72	1920.63	⇦
26.00	512.0	16.35	1916.95	
27.00	516.0	16.98	1916.64	
28.00	519.0	17.61	1912.62	
29.00	523.0	18.24	1911.90	
30.00	525.0	18.87	1904.09	
31.80	530.5	20.00	1896.20	

SAMPLE IDENTIFICATION; B-192,ST-10,D-70

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)	
.00	.0	.00	118.35	
.25	30.0	.16	246.05	
.50	60.0	.31	373.36	
.75	90.0	.47	500.27	
1.00	117.0	.62	614.05	
1.50	164.0	.93	810.94	
2.00	209.0	1.24	998.14	
2.50	252.0	1.55	1175.75	
3.00	295.0	1.86	1352.21	
3.50	336.0	2.17	1519.18	
4.00	377.0	2.48	1685.06	
4.50	417.0	2.80	1845.71	
5.00	450.0	3.11	1976.33	
5.50	482.0	3.42	2101.96	
6.00	512.0	3.73	2218.52	
6.50	537.0	4.04	2313.79	
7.00	560.0	4.35	2400.23	
7.50	582.0	4.66	2482.00	
8.00	603.0	4.97	2559.12	
9.00	639.0	5.59	2687.51	
10.00	672.0	6.21	2801.97	
11.00	702.0	6.83	2902.75	
12.00	727.0	7.45	2982.19	
13.00	751.0	8.07	3056.37	
14.00	773.0	8.70	3121.48	
15.00	792.0	9.32	3173.81	
16.00	810.0	9.94	3221.29	
17.00	827.0	10.56	3263.99	
18.00	844.0	11.18	3305.79	
19.00	859.0	11.80	3339.16	
20.00	874.0	12.42	3371.74	
22.00	900.0	13.66	3419.75	
24.00	926.0	14.91	3465.01	
26.00	949.0	16.15	3496.77	
28.00	971.0	17.39	3522.56	
30.00	992.0	18.63	3542.54	
32.20	1014.0	20.00	3558.20	⇦
34.00	1037.0	21.12	3585.93	

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JOB NAME: HOPPER INVESTIGATION, BELLE RIVER BY: IKK DATE: 8/75
JOB LOCATION: BELLE RIVER, MICHIGAN SUBJECT: STRESS-STRAIN RELATIONS
CLIENT: BECHTEL POWER CORPORATION

SAMPLE IDENTIFICATION; B-192,ST-11,D-80

DIAL GAGE	LOAD GAGE	STRAIN %	STRESS (PSF)
.00	.0	.00	117.69
.25	42.0	.16	295.57
.50	92.0	.31	506.76
.75	137.0	.47	696.15
1.00	177.0	.62	863.86
1.25	216.0	.78	1026.83
1.50	253.0	.93	1180.87
1.75	288.0	1.09	1326.02
2.00	324.0	1.24	1474.90
2.25	360.0	1.40	1623.31
2.50	395.0	1.55	1767.07
3.00	460.0	1.86	2032.36
3.50	522.0	2.17	2283.48
4.00	578.0	2.48	2508.12
4.50	622.0	2.79	2681.75
5.00	664.0	3.10	2846.00
5.50	696.0	3.41	2968.13
6.00	726.0	3.72	3081.24
6.50	752.0	4.03	3177.26
7.00	774.0	4.34	3256.35
7.50	795.0	4.65	3330.81
8.00	810.0	4.96	3380.51
8.50	826.0	5.27	3433.83
9.00	838.0	5.58	3470.69
9.50	848.0	5.89	3499.25
10.00	856.0	6.20	3519.58
11.00	864.5	6.82	3529.93
11.50	850.0	7.13	3461.00
12.00	820.0	7.44	3331.54
12.50	795.0	7.75	3222.46

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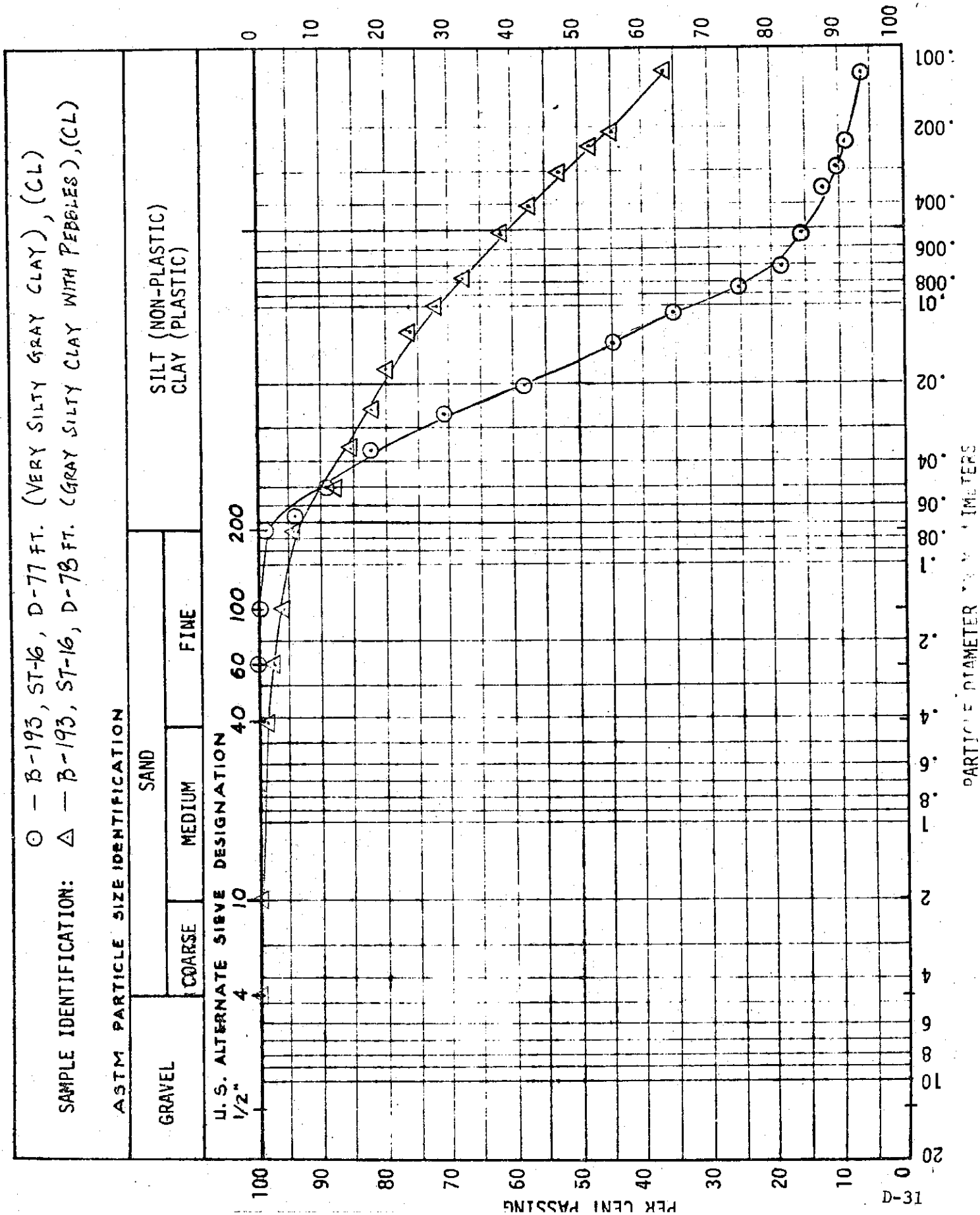
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER
JOB LOCATION: BELLE RIVER, MICHIGAN
CLIENT: BECHTEL POWER CORPORATION

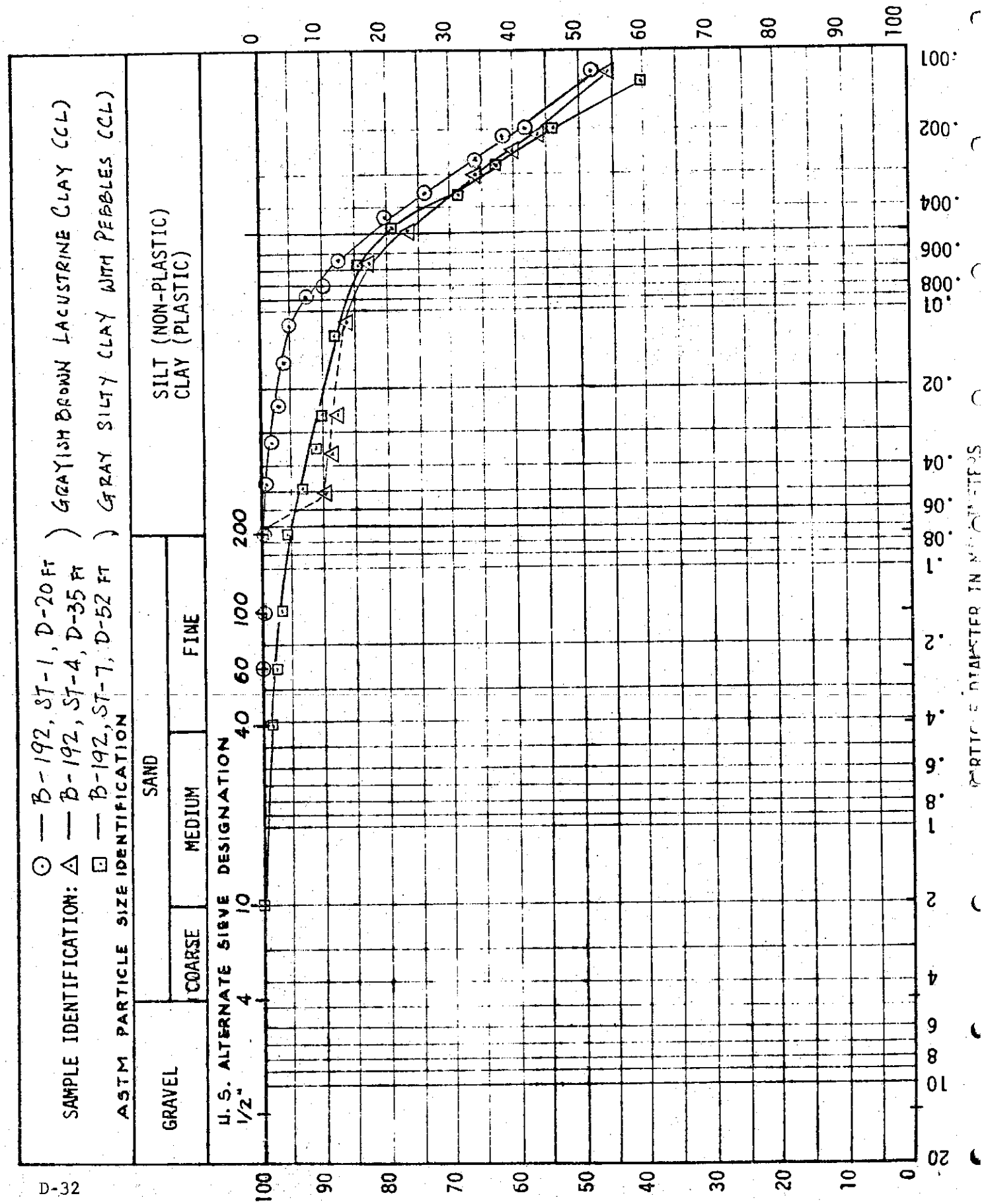
BY: IKK DATE: 9/75
SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY



U. W. STOLL AND ASSOCIATES
soil mechanics and foundation consultants

JOB NAME: HOPPER INVESTIGATION, BELLE RIVER
JOB LOCATION: BELLE RIVER, MICHIGAN
CLIENT: BECHTEL POWER CORPORATION

BY: IKK DATE: 9/75
SUBJECT: PARTICLE SIZE DISTRIBUTION ANALYSIS SUMMARY



D-32

Geosyntec
consultants

Appendix G
2016 Lab Test Results

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH

QA: JPH

Project Name:	DTE - BRPP BAB and DB	Cell #:	8
Project #:	231828.0003.0000	USCS Description:	N/A
Sample Name:	MW-16-01, 50-52'	USCS Classification:	N/A
Visual Descript:	Gray lean clay	Average Kv =	2.9E-08 cm/s

		Initial Values	Final Values			
Sample Type:	Undisturbed					
Sample Dia. (in)		2.87	2.87	Permeant:	Water	
Sample Ht. (in)		3.02	3.02	Permeant Specific Gravity:	1.00	
Tare & Wet (g)		775.10	649.20	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)		562.60	471.50	Confining Pressure (psi):	100.0	
Tare (g)		88.86	88.64	Burette Diameter (in):	0.250	
Sample Wt. (g)		563.65	560.56	Burette Zero (cm):	100.0	
Moisture (%)		44.9	46.4	Maximum Gradient:	7.0	
Wet Density (pcf)		109.9	109.5	Average Gradient:	6.5	
Dry Density (pcf)		75.9	74.8	Max. Effect. Stress (psi):	5.7	
Saturation (%)		99.2	100.0	Min. Effect. Stress (psi):	4.3	
				Ave. Effect. Stress (psi):	4.8	

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	3	15	8	10.00		0.0	95	95	55.40		3.45		102.60				
2	2016	3	15	11	15.00	11100	23.0	95	95	56.10	0.70	4.05	0.60	101.30	1.30	-36.8	4.7E-08	
3	2016	3	15	14	16.00	10860	23.0	95	95	57.00	0.90	4.75	0.70	100.60	0.70	0.0	3.6E-08	
4	2016	3	15	18	15.00	14340	23.0	95	95	57.75	0.75	5.55	0.80	99.75	0.85	-3.0	3.3E-08	
5	2016	3	16	4	55.00	38400	22.0	95	95	59.30	1.55	7.65	2.10	97.50	2.25	-3.4	3.4E-08	
6	2016	3	16	8	38.00	13380	23.0	95	95	59.80	0.50	8.35	0.70	96.80	0.70	0.0	3.2E-08	
7	2016	3	16	11	56.00	11880	23.0	95	95	60.35	0.55	9.05	0.70	96.30	0.50	16.7	3.1E-08	
8	2016	3	16	15	1.00	11100	23.0	95	95	60.40	0.05	9.60	0.55	95.70	0.60	-4.3	3.2E-08	
9	2016	3	17	5	14.00	51180	22.0	95	95	61.30	0.90	12.10	2.50	93.20	2.50	0.0	3.2E-08	
10	2016	3	17	8	17.00	10980	24.0	95	95	62.05	0.75	12.65	0.55	92.75	0.45	10.0	3.0E-08	
11	2016	3	17	12	19.00	14520	23.0	95	95	62.15	0.10	13.25	0.60	92.05	0.70	-7.7	3.0E-08	
12	2016	3	17	17	49.00	19800	23.0	95	95	62.60	0.45	14.15	0.90	91.30	0.75	9.1	2.9E-08	
13	2016	3	18	5	23.00	41640	22.0	95	95	63.15	0.55	16.00	1.85	89.40	1.90	-1.3	3.3E-08	
14	2016	3	18	8	58.00	12900	24.0	95	95	63.60	0.45	16.55	0.55	88.90	0.50	4.8	3.0E-08	
15	2016	3	18	12	55.00	14220	23.0	95	95	63.80	0.20	17.10	0.55	88.30	0.60	-4.3	3.0E-08	
16	2016	3	18	16	30.00	12900	23.0	95	95	64.10	0.30	17.65	0.55	87.90	0.40	15.8	2.8E-08	
17	2016	3	21	4	58.00	217680	22.0	95	95	67.20	3.10	25.35	7.70	80.20	7.70	0.0	3.1E-08	
18	2016	3	21	8	1.00	10980	24.0	95	95	67.60	0.40	25.70	0.35	79.85	0.35	0.0	3.1E-08	
19	2016	3	21	12	10.00	14940	23.0	95	95	67.60	0.00	26.15	0.45	79.40	0.45	0.0	3.0E-08	
20	2016	3	21	15	12.00	10920	23.0	95	95	67.70	0.10	26.40	0.25	79.15	0.25	0.0	2.3E-08	1
21	2016	3	21	19	36.00	15840	23.0	95	95	68.30	0.60	26.90	0.50	78.70	0.45	5.3	3.1E-08	1
22	2016	3	21	21	31.00	6900	23.0	95	95	68.10	-0.20	27.10	0.20	78.50	0.20	0.0	3.0E-08	1
23	2016	3	22	5	52.00	30060	25.0	95	95	68.90	0.80	28.05	0.95	77.65	0.85	5.6	3.1E-08	1
24	2016	3	22	10	31.00	16740	23.0	95	95	68.85	-0.05	28.45	0.40	77.20	0.45	-5.9	2.8E-08	1
25	2016	3	22	15	59.00	19680	24.0	95	95	69.40	0.55	29.00	0.55	76.70	0.50	4.8	2.9E-08	1
26	2016	3	22	22	32.00	23580	24.0	95	95	69.80	0.40	29.55	0.55	76.10	0.60	-4.3	2.7E-08	1

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column.

2.9E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH

QA: JPH

Project Name:	DTE - BRPP BAB and DB	Cell #:	9
Project #:	231828.0003.0000	USCS Description:	N/A
Sample Name:	MW-16-05, 50-52'	USCS Classification:	N/A
Visual Descript:	Gray lean clay	Average Kv =	2.7E-08 cm/s

		Initial Values	Final Values			
Sample Type:	Undisturbed					
Sample Dia. (in)		2.87	2.84	Permeant:	Water	
Sample Ht. (in)		3.25	3.20	Permeant Specific Gravity:	1.00	
Tare & Wet (g)		536.11	691.40	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)		403.90	517.10	Confining Pressure (psi):	100.0	
Tare (g)		93.83	91.24	Burette Diameter (in):	0.250	
Sample Wt. (g)		610.40	600.16	Burette Zero (cm):	100.0	
Moisture (%)		42.6	40.9	Maximum Gradient:	7.3	
Wet Density (pcf)		110.6	112.8	Average Gradient:	6.9	
Dry Density (pcf)		77.5	80.0	Max. Effect. Stress (psi):	6.1	
Saturation (%)		98.2	100.0	Min. Effect. Stress (psi):	4.6	
				Ave. Effect. Stress (psi):	5.1	

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	3	15	8	11.00		0.0	95	95	25.20		1.95		101.75				
2	2016	3	15	11	15.00		0.0	95	95	27.70		1.80		99.60				
3	2016	3	15	14	17.00	10920	23.0	95	95	29.40	1.70	2.00	0.20	98.65	0.95	-65.2	3.2E-08	
4	2016	3	15	18	16.00	14340	23.0	95	95	30.65	1.25	2.40	0.40	97.60	1.05	-44.8	3.1E-08	
5	2016	3	16	4	56.00	38400	22.0	95	95	32.20	1.55	3.85	1.45	95.40	2.20	-20.5	3.1E-08	
6	2016	3	16	8	39.00	13380	23.0	95	95	32.40	0.20	4.40	0.55	94.85	0.55	0.0	2.6E-08	
7	2016	3	16	11	57.00	11880	23.0	95	95	33.85	1.45	4.95	0.55	94.40	0.45	10.0	2.7E-08	
8	2016	3	16	15	2.00	11100	23.0	95	95	34.00	0.15	5.35	0.40	93.90	0.50	-11.1	2.7E-08	
9	2016	3	17	5	15.00	51180	22.0	95	95	35.20	1.20	7.35	2.00	91.80	2.10	-2.4	2.8E-08	
10	2016	3	17	8	17.00	10920	24.0	95	95	35.80	0.60	7.80	0.45	91.45	0.35	12.5	2.5E-08	
11	2016	3	17	12	20.00	14580	23.0	95	95	35.90	0.10	8.30	0.50	89.85	1.60	-52.4	5.1E-08	
12	2016	3	17	17	50.00	19800	23.0	95	95	36.40	0.50	9.10	0.80	89.25	0.60	14.3	2.6E-08	
13	2016	3	18	5	23.00	41580	22.0	95	95	37.00	0.60	10.65	1.55	88.60	0.65	40.9	2.0E-08	
14	2016	3	18	8	58.00	12900	24.0	95	95	37.50	0.50	11.15	0.50	88.15	0.45	5.3	2.7E-08	
15	2016	3	18	12	55.00	14220	23.0	95	95	37.70	0.20	11.65	0.50	87.60	0.55	-4.8	2.8E-08	
16	2016	3	18	16	31.00	12960	23.0	95	95	38.00	0.30	12.10	0.45	87.20	0.40	5.9	2.5E-08	
17	2016	3	21	4	59.00	217680	22.0	95	95	41.00	3.00	19.25	7.15	79.85	7.35	-1.4	3.0E-08	
18	2016	3	21	8	2.00	10980	24.0	95	95	41.40	0.40	19.55	0.30	79.60	0.25	9.1	2.4E-08	
19	2016	3	21	12	10.00	14880	23.0	95	95	41.40	0.00	19.95	0.40	79.15	0.45	-5.9	2.8E-08	
20	2016	3	21	15	13.00	10980	23.0	95	95	41.60	0.20	20.25	0.30	78.85	0.30	0.0	2.7E-08	1
21	2016	3	21	19	37.00	15840	23.0	95	95	42.00	0.40	20.80	0.55	78.55	0.30	29.4	2.7E-08	1
22	2016	3	21	21	32.00	6900	23.0	95	95	41.80	-0.20	20.90	0.10	78.30	0.25	-42.9	2.6E-08	1
23	2016	3	22	5	53.00	30060	25.0	95	95	42.75	0.95	21.75	0.85	77.55	0.75	6.3	2.6E-08	1
24	2016	3	22	10	32.00	16740	23.0	95	95	42.75	0.00	22.20	0.45	77.10	0.45	0.0	2.8E-08	1
25	2016	3	22	16	0.00	19680	24.0	95	95	43.25	0.50	22.75	0.55	76.65	0.45	10.0	2.7E-08	1
26	2016	3	22	22	33.00	23580	24.0	95	95	43.60	0.35	23.35	0.60	76.10	0.55	4.3	2.6E-08	1

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column. 2.7E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH

QA: JPH

Project Name:	DTE - BRPP BAB and DB	Cell #:	9
Project #:	231828.0003.0000	USCS Description:	N/A
Sample Name:	MW-16-07, 50-52'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel	Average Kv =	2.9E-08 cm/s

		Initial Values	Final Values			
Sample Type:	Undisturbed					
Sample Dia. (in)		2.86	2.83	Permeant:	Water	
Sample Ht. (in)		3.50	3.48	Permeant Specific Gravity:	1.00	
Tare & Wet (g)		512.00	737.80	Sample Specific Gravity:	2.68	Est.
Tare & Dry (g)		387.40	552.10	Confining Pressure (psi):	100.0	
Tare (g)		92.18	89.22	Burette Diameter (in):	0.250	
Sample Wt. (g)		666.40	648.58	Burette Zero (cm):	100.0	
Moisture (%)		42.2	40.1			
Wet Density (pcf)		112.9	112.9			
Dry Density (pcf)		79.4	80.6	Max. Effect. Stress (psi):	6.2	
Saturation (%)		102.4	100.0	Min. Effect. Stress (psi):	4.5	
				Ave. Effect. Stress (psi):	5.0	

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	4	21	11	16.00		0.0	95	95	16.80		2.50		102.25				
2	2016	4	21	20	32.00	33360	27.0	95	95	27.60	10.80	1.25	-1.25	96.40	5.85	-154.3	4.1E-08	
3	2016	4	22	9	22.00	46200	24.0	95	95	32.50	4.90	2.40	1.15	93.40	3.00	-44.6	3.0E-08	
4	2016	4	22	12	18.00	10560	24.0	95	95	33.50	1.00	2.85	0.45	92.90	0.50	-5.3	3.1E-08	
5	2016	4	22	18	33.00	22500	25.0	95	95	35.05	1.55	3.80	0.95	91.95	0.95	0.0	2.9E-08	
6	2016	4	25	11	30.00	233820	23.0	95	95	44.30	9.25	12.75	8.95	83.10	8.85	0.6	3.1E-08	
7	2016	4	25	17	41.00	22260	24.0	95	95	45.35	1.05	13.50	0.75	82.40	0.70	3.4	2.9E-08	
8	2016	4	25	20	39.00	10680	24.0	95	95	45.30	-0.05	13.80	0.30	82.00	0.40	-14.3	3.0E-08	
9	2016	4	25	23	15.00	9360	24.0	95	95	45.35	0.05	14.10	0.30	81.70	0.30	0.0	3.0E-08	
10	2016	4	26	4	59.00	20640	25.0	95	95	46.00	0.65	14.75	0.65	81.00	0.70	-3.7	3.0E-08	
11	2016	4	26	8	19.00	12000	24.0	95	95	45.95	-0.05	15.10	0.35	80.60	0.40	-6.7	3.0E-08	
12	2016	4	26	13	18.00	17940	24.0	95	95	46.40	0.45	15.70	0.60	80.10	0.50	9.1	3.0E-08	
13	2016	4	27	4	57.00	56340	23.0	95	95	47.60	1.20	17.40	1.70	78.60	1.50	6.2	2.9E-08	
14	2016	4	27	12	47.00	28200	23.0	95	95	47.95	0.35	18.20	0.80	77.90	0.70	6.7	2.8E-08	
15	2016	4	27	15	8.00	8460	23.0	95	95	47.90	-0.05	18.45	0.25	77.65	0.25	0.0	3.2E-08	
16	2016	4	28	5	1.00	49980	22.0	95	95	48.80	0.90	19.80	1.35	76.35	1.30	1.9	3.0E-08	
17	2016	4	28	8	5.00	11040	24.0	95	95	49.40	0.60	20.15	0.35	76.15	0.20	27.3	2.8E-08	
18	2016	4	28	14	56.00	24660	23.0	95	95	49.60	0.20	20.75	0.60	75.55	0.60	0.0	2.8E-08	
19	2016	4	28	20	48.00	21120	23.0	95	95	49.90	0.30	21.30	0.55	75.10	0.45	10.0	2.8E-08	
20	2016	4	29	5	31.00	31380	26.0	95	95	51.05	1.15	22.10	0.80	74.35	0.75	3.2	2.8E-08	
21	2016	4	29	10	27.00	17760	23.0	95	95	50.90	-0.15	22.50	0.40	73.90	0.45	-5.9	3.0E-08	
22	2016	4	29	14	41.00	15240	23.0	95	95	51.25	0.35	22.90	0.40	73.60	0.30	14.3	2.9E-08	
23	2016	4	29	18	0.00	11940	23.0	95	95	51.55	0.30	23.20	0.30	73.40	0.20	20.0	2.7E-08	
24	2016	5	1	16	23.00	166980	22.0	95	95	54.25	2.70	26.95	3.75	70.05	3.35	5.6	3.0E-08	
25	2016	5	2	4	58.00	45300	23.0	95	95	55.05	0.80	27.85	0.90	69.25	0.80	5.9	2.9E-08	
26	2016	5	2	8	4.00	11160	23.0	95	95	55.30	0.25	28.10	0.25	69.05	0.20	11.1	3.1E-08	

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column.

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

TRC Environmental Corporation

QC: JPH

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QA: JPH

Project Name:	DTE - BRPP BAB and DB	Cell #:	9
Project #:	231828.0003.0000	USCS Description:	N/A
Sample Name:	MW-16-07, 50-52'	USCS Classification:	N/A
Visual Descript:	Gray sandy lean clay, with gravel		

Sample Type:	Undisturbed	Initial Values	Final Values			
Sample Dia. (in)		2.86	2.83	Permeant:	Water	
Sample Ht. (in)		3.50	3.48	Permeant Specific Gravity:	1.00	
Tare & Wet (g)		512.00	737.80	Sample Specific Gravity:	2.68	Est.
Tare & Dry (g)		387.40	552.10	Confining Pressure (psi):	100.0	
Tare (g)		92.18	89.22	Burette Diameter (in):	0.250	
Sample Wt. (g)		666.40	648.58	Burette Zero (cm):	100.0	
Moisture (%)		42.2	40.1	Maximum Gradient:	3.8	
Wet Density (pcf)		112.9	112.9	Average Gradient:	3.6	
Dry Density (pcf)		79.4	80.6	Max. Effect. Stress (psi):	5.2	
Saturation (%)		102.4	100.0	Min. Effect. Stress (psi):	4.6	
				Ave. Effect. Stress (psi):	4.9	

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	5	2	8	4.00		0.0	95	95	55.30		28.10		69.05				
2	2016	5	2	13	15.00	18660	23.0	95	95	55.65	0.35	28.50	0.40	68.80	0.25	23.1	2.8E-08	
3	2016	5	2	20	45.00	27000	26.0	95	95	56.30	0.65	29.00	0.50	68.35	0.45	5.3	2.6E-08	
4	2016	5	3	4	50.00	29100	23.0	95	95	56.00	-0.30	29.50	0.50	67.75	0.60	-9.1	3.1E-08	
5	2016	5	3	8	0.00	11400	25.0	95	95	56.35	0.35	29.70	0.20	67.60	0.15	14.3	2.5E-08	
6	2016	5	3	11	10.00	11400	23.0	95	95	56.30	-0.05	29.90	0.20	67.35	0.25	-11.1	3.4E-08	
7	2016	5	3	14	12.00	10920	23.0	95	95	56.40	0.10	30.15	0.25	67.25	0.10	42.9	2.8E-08	
8	2016	5	3	19	36.00	19440	24.0	95	95	57.20	0.80	30.55	0.40	67.05	0.20	33.3	2.6E-08	
9	2016	5	4	5	24.00	35280	23.0	95	95	57.60	0.40	31.15	0.60	66.50	0.55	4.3	2.9E-08	
10	2016	5	4	9	48.00	15840	23.0	95	95	57.60	0.00	31.40	0.25	66.25	0.25	0.0	2.9E-08	
11	2016	5	4	14	50.00	18120	23.0	95	95	57.70	0.10	31.70	0.30	66.00	0.25	9.1	2.8E-08	
12	2016	5	4	20	0.00	18600	25.0	95	95	58.25	0.55	32.10	0.40	65.80	0.20	33.3	2.9E-08	
13	2016	5	5	5	24.00	33840	24.0	95	95	58.35	0.10	32.60	0.50	65.30	0.50	0.0	2.8E-08	1
14	2016	5	5	10	25.00	18060	24.0	95	95	58.60	0.25	32.90	0.30	65.10	0.20	20.0	2.7E-08	1
15	2016	5	5	14	42.00	15420	24.0	95	95	58.90	0.30	33.20	0.30	64.85	0.25	9.1	3.5E-08	1
16	2016	5	6	4	52.00	51000	23.0	95	95	59.50	0.60	34.00	0.80	64.25	0.60	14.3	2.8E-08	1
17	2016	5	6	9	32.00	16800	23.0	95	95	59.70	0.20	34.25	0.25	64.05	0.20	11.1	2.9E-08	1
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column.

2.9E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH

QA: JPH

Project Name:	DTE - BRPP BAB and DB	Cell #:	10
Project #:	231828.0003.0000	USCS Description:	N/A
Sample Name:	SB-16-01, 50-52'	USCS Classification:	N/A
Visual Descript:	Gray lean clay	Average Kv =	2.1E-08 cm/s

		Initial Values	Final Values			
Sample Type:	Undisturbed					
Sample Dia. (in)		2.87	2.82	Permeant:	Water	
Sample Ht. (in)		2.88	2.86	Permeant Specific Gravity:	1.00	
Tare & Wet (g)		534.46	607.60	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)		400.40	448.80	Confining Pressure (psi):	100.0	
Tare (g)		98.45	86.36	Burette Diameter (in):	0.250	
Sample Wt. (g)		532.36	521.24	Burette Zero (cm):	100.0	
Moisture (%)		44.4	43.8	Maximum Gradient:	8.9	
Wet Density (pcf)		109.0	111.0	Average Gradient:	8.4	
Dry Density (pcf)		75.5	77.2	Max. Effect. Stress (psi):	6.1	
Saturation (%)		97.4	100.0	Min. Effect. Stress (psi):	4.5	
				Ave. Effect. Stress (psi):	5.1	

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2016	3	15	8	11.00		0.0	95	95	24.00		1.65		102.30				
2	2016	3	15	11	16.00		0.0	95	95	27.35		1.15		99.70				
3	2016	3	15	14	17.00		0.0	95	95	29.50		1.15		98.60				
4	2016	3	15	18	17.00	14400	23.0	95	95	30.90	1.40	1.35	0.20	97.50	1.10	-69.2	2.5E-08	
5	2016	3	16	4	56.00	38340	22.0	95	95	34.75	3.85	2.00	0.65	95.00	2.50	-58.7	2.4E-08	
6	2016	3	16	8	39.00	13380	23.0	95	95	35.00	0.25	2.50	0.50	94.55	0.45	5.3	2.0E-08	
7	2016	3	16	11	58.00	11940	23.0	95	95	35.45	0.45	3.00	0.50	94.10	0.45	5.3	2.3E-08	
8	2016	3	16	15	3.00	11100	23.0	95	95	35.80	0.35	3.35	0.35	93.60	0.50	-17.6	2.2E-08	
9	2016	3	17	5	15.00	51120	22.0	95	95	38.75	2.95	4.55	1.20	91.10	2.50	-35.1	2.2E-08	
10	2016	3	17	8	18.00	10980	24.0	95	95	38.25	-0.50	5.25	0.70	90.95	0.15	64.7	2.3E-08	
11	2016	3	17	12	21.00	14580	23.0	95	95	38.60	0.35	5.65	0.40	90.35	0.60	-20.0	2.1E-08	
12	2016	3	17	17	51.00	19800	23.0	95	95	38.50	-0.10	6.45	0.80	89.85	0.50	23.1	2.1E-08	
13	2016	3	18	5	24.00	41580	22.0	95	95	40.80	2.30	7.40	0.95	87.95	1.90	-33.3	2.3E-08	
14	2016	3	18	8	59.00	12900	24.0	95	95	40.40	-0.40	8.05	0.65	87.70	0.25	44.4	2.3E-08	
15	2016	3	18	12	56.00	14220	23.0	95	95	40.70	0.30	8.40	0.35	87.25	0.45	-12.5	1.9E-08	
16	2016	3	18	16	32.00	12960	23.0	95	95	40.70	0.00	8.95	0.55	86.90	0.35	22.2	2.4E-08	
17	2016	3	21	4	59.00	217620	22.0	95	95	45.25	4.55	15.10	6.15	80.30	6.60	-3.5	2.2E-08	
18	2016	3	21	8	2.00	10980	24.0	95	95	45.25	0.00	15.50	0.40	80.10	0.20	33.3	2.2E-08	
19	2016	3	21	12	11.00	14940	23.0	95	95	45.40	0.15	15.90	0.40	79.65	0.45	-5.9	2.4E-08	1
20	2016	3	21	15	13.00	10920	23.0	95	95	45.70	0.30	16.10	0.20	79.35	0.30	-20.0	1.9E-08	1
21	2016	3	21	19	38.00	15900	23.0	95	95	45.70	0.00	16.65	0.55	79.10	0.25	37.5	2.1E-08	1
22	2016	3	21	21	33.00	6900	23.0	95	95	46.10	0.40	16.70	0.05	78.80	0.30	-71.4	2.2E-08	1
23	2016	3	22	5	53.00	30000	25.0	95	95	47.20	1.10	17.35	0.65	78.00	0.80	-10.3	2.0E-08	1
24	2016	3	22	10	32.00	16740	23.0	95	95	47.10	-0.10	17.80	0.45	77.60	0.40	5.9	2.2E-08	1
25	2016	3	22	16	0.00	19680	24.0	95	95	47.40	0.30	18.35	0.55	77.15	0.45	10.0	2.2E-08	1
26	2016	3	22	22	34.00	23640	24.0	95	95	47.10	-0.30	19.10	0.75	76.80	0.35	36.4	2.1E-08	1

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column. 2.1E-08 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

Geosyntec
consultants

Appendix H
2020 Lab Test Results

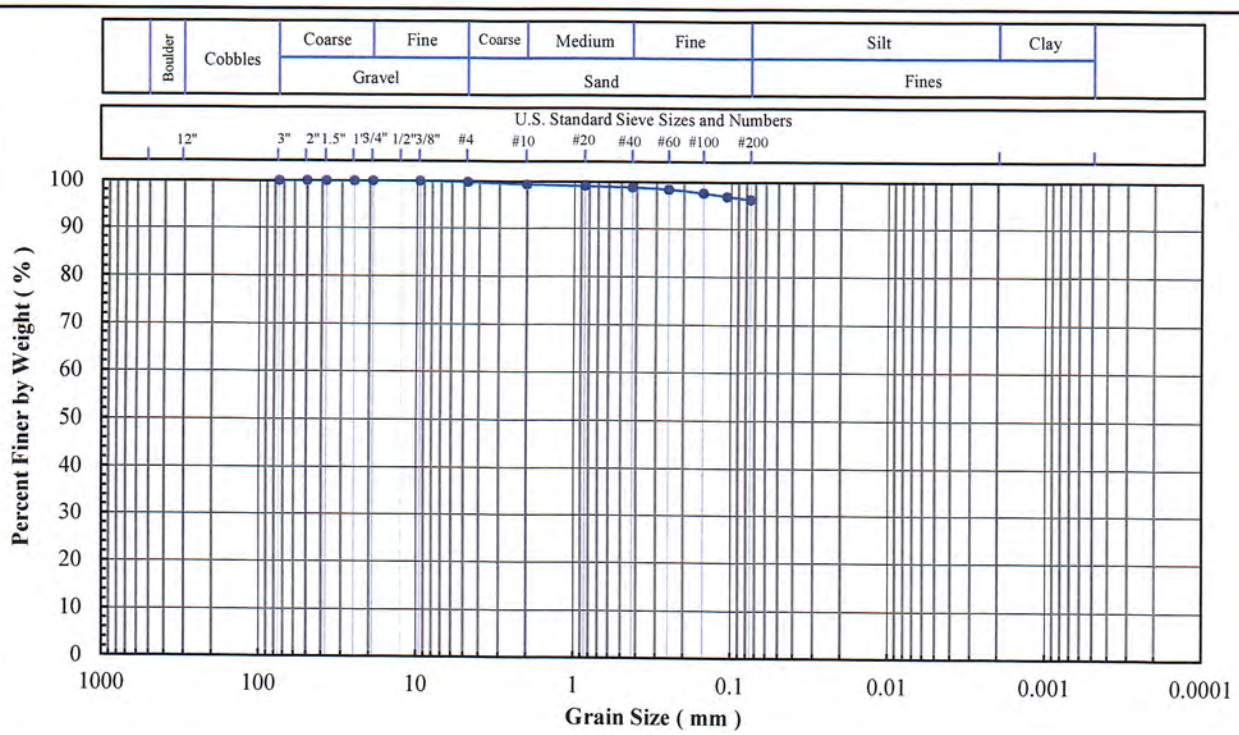
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B1-1 (3')
Lab Sample No:	20L186

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

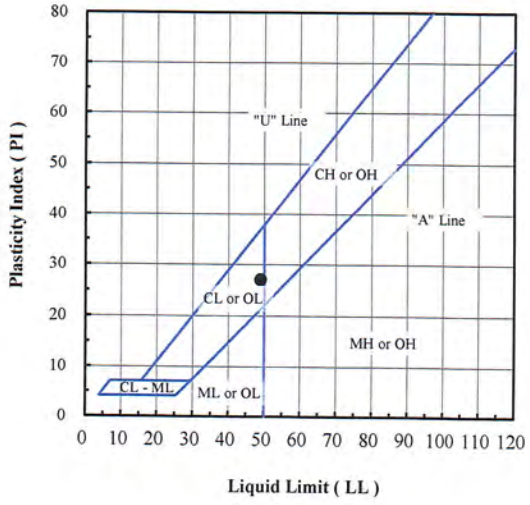


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	99.0
#40	0.425	98.7
#60	0.250	98.3
#100	0.150	97.5
#140	0.106	96.8
#200	0.075	96.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	3.7
Fines (%):	96.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B1-1 (3')	20L186	22.6	96.1	49	22	27	CL - Lean clay

Note(s):

01-25-2021
AA/NSR

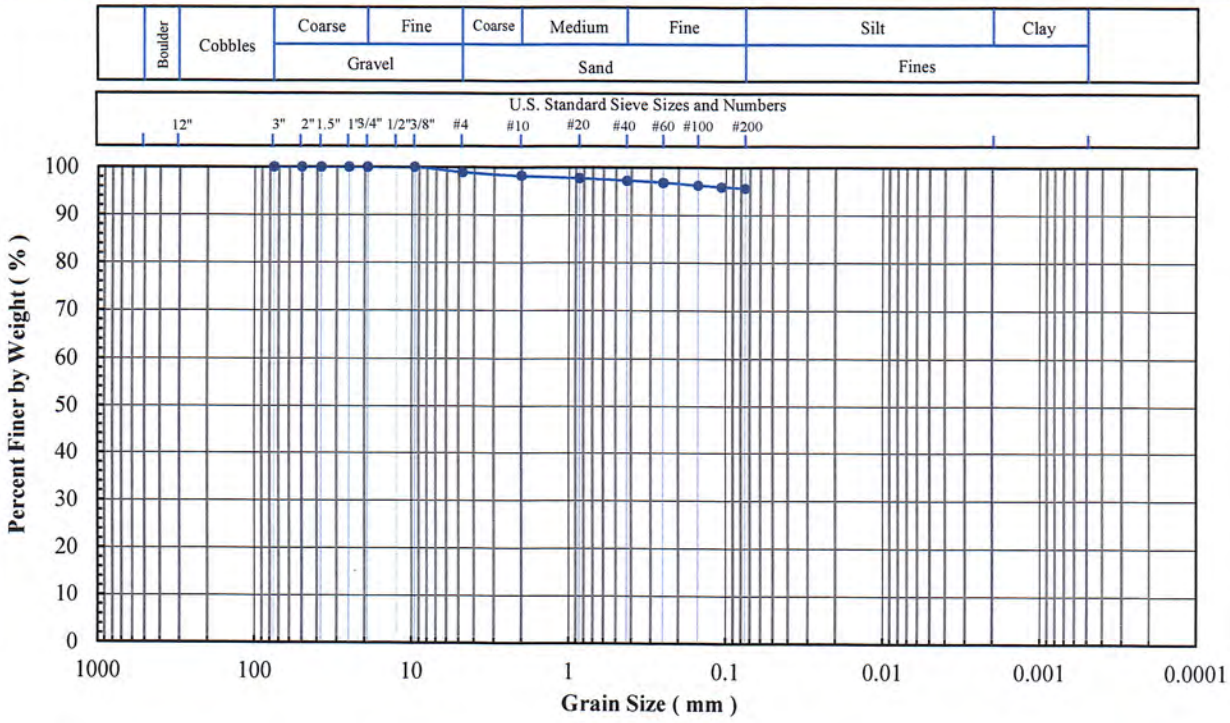
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Bell River ALD Support
Project No:	PN1017
Client Sample ID:	B1-6 (25')
Lab Sample No:	20L191

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

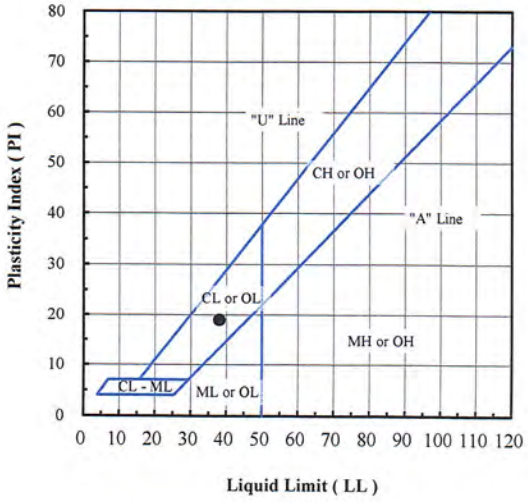


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.9
#10	2.00	98.2
#20	0.850	97.7
#40	0.425	97.2
#60	0.250	96.8
#100	0.150	96.2
#140	0.106	95.9
#200	0.075	95.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.1
Sand (%):	3.3
Fines (%):	95.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B1-6 (25')	20L191	35.5	95.6	38	19	19	CL - Lean clay

Note(s):

01-26-2021
AA, NSR

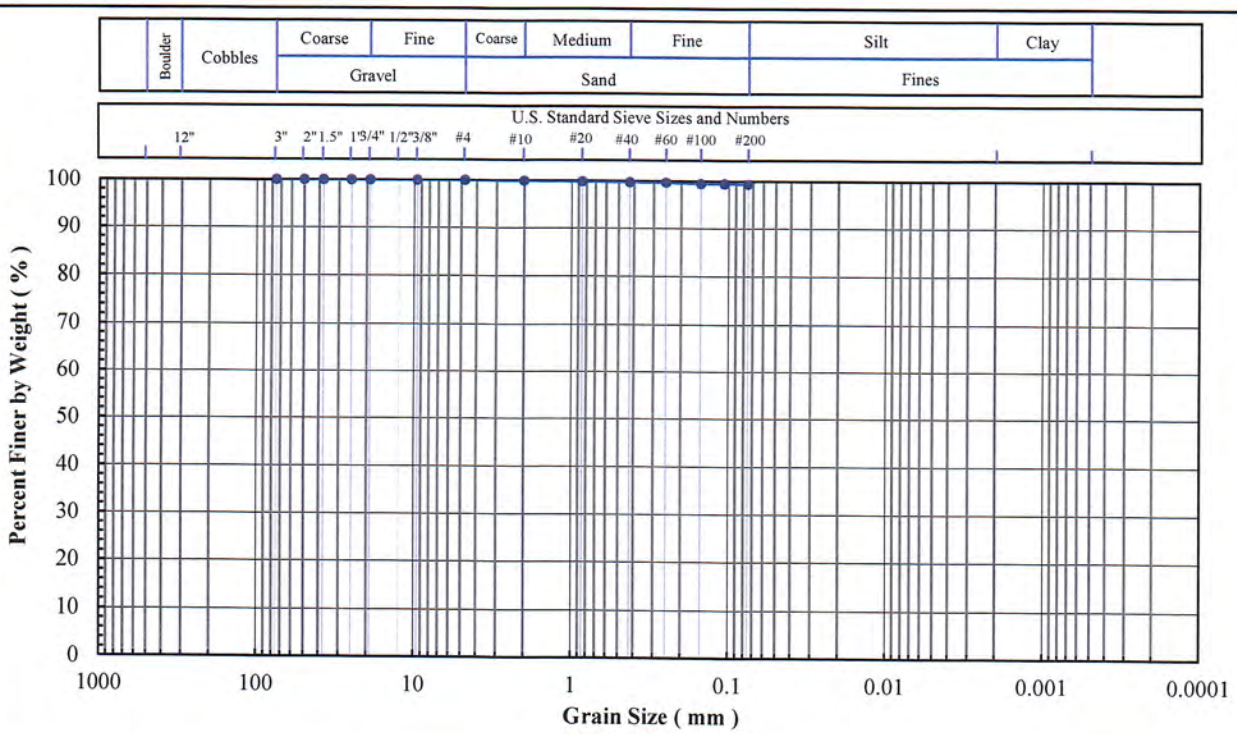
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B1-9 (48')
Lab Sample No:	20L194

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

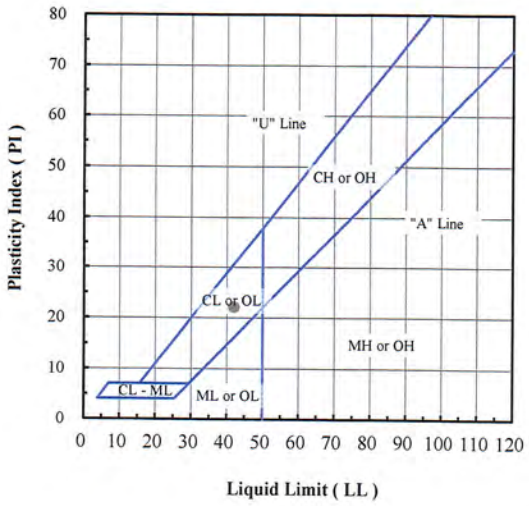


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.6
#100	0.150	99.4
#140	0.106	99.4
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B1-9 (48')	20L194	39.5	99.3	42	20	22	CL - Lean clay

Note(s):

01-21-2021
AA, NSR

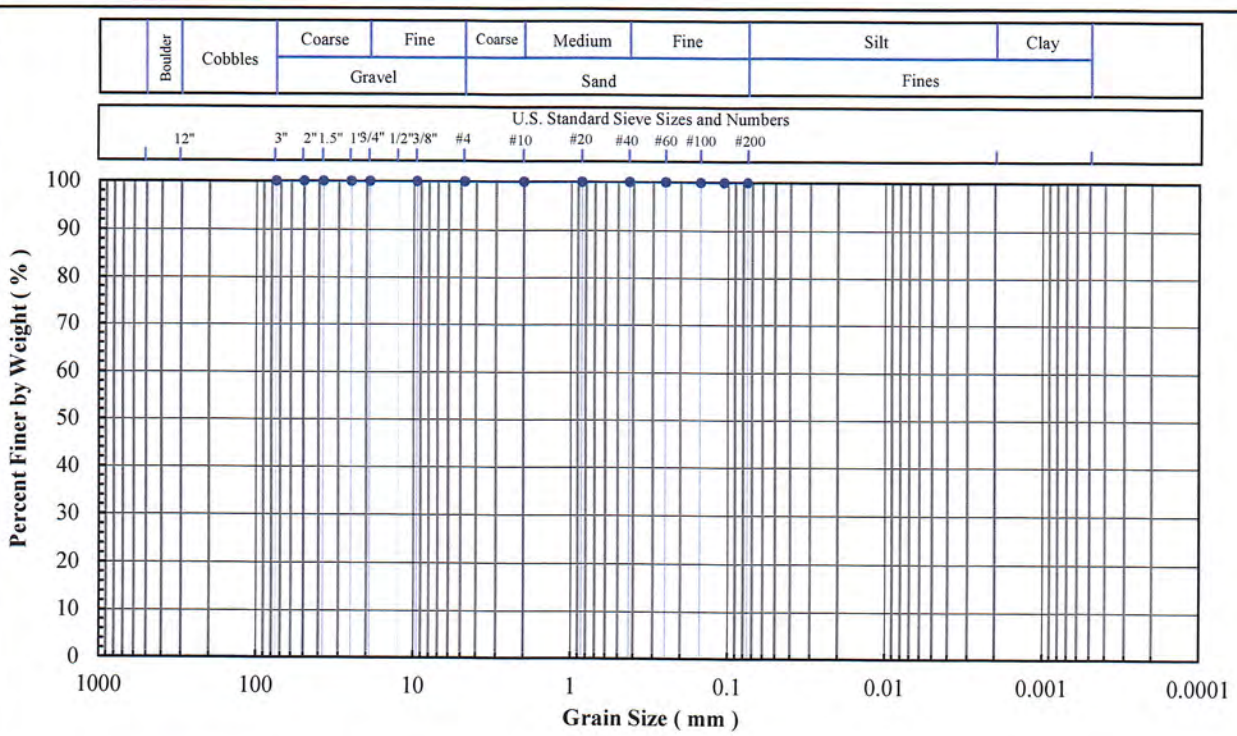
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B1-11 (59')
Lab Sample No:	20L196

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

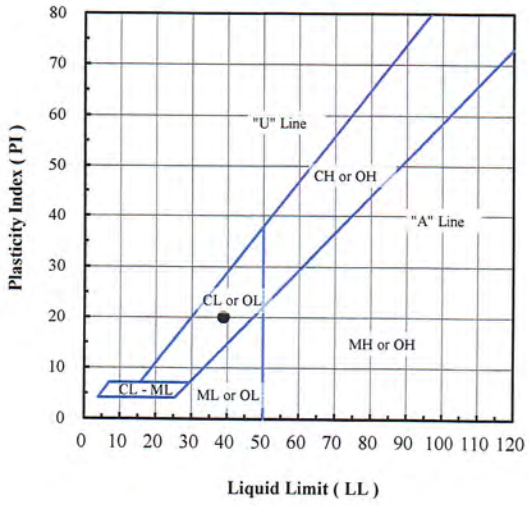


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	100.0
#60	0.250	100.0
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B1-11 (59')	20L196	36.8	99.9	39	19	20	CL - Lean clay

Note(s):

01-25-2021
AA, NSR

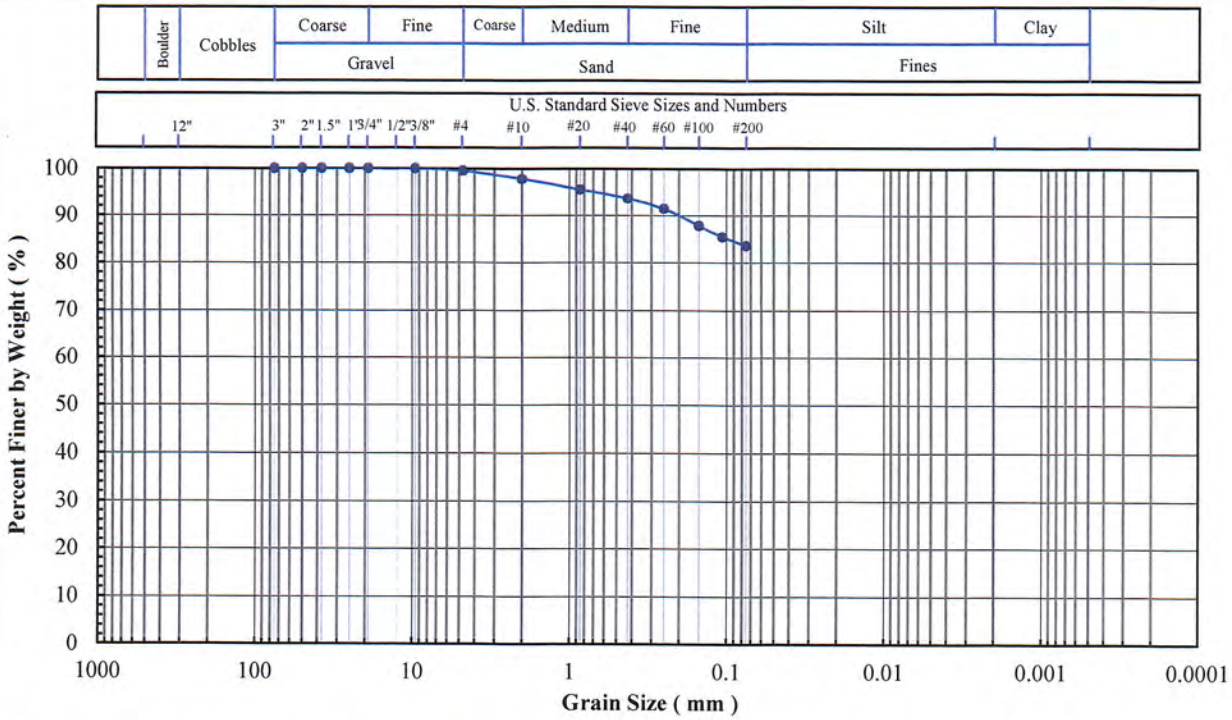
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B1-14 (80')
Lab Sample No:	20L199

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

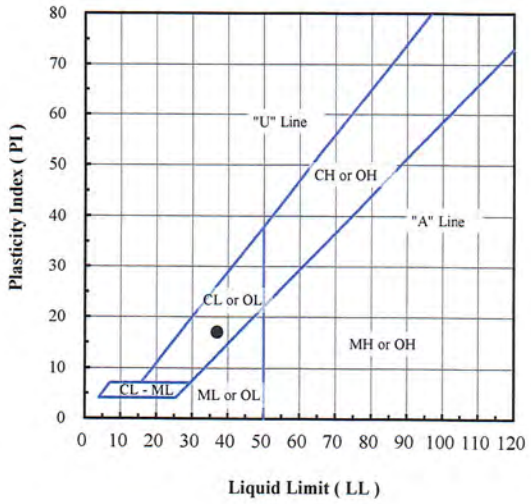


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	97.8
#20	0.850	95.5
#40	0.425	93.6
#60	0.250	91.4
#100	0.150	87.8
#140	0.106	85.4
#200	0.075	83.5

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	16.0
Fines (%):	83.5
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B1-14 (80')	20L199	24.6	83.5	37	20	17	CL - Lean clay with sand

Note(s):

01-25-2021
AA, NSR

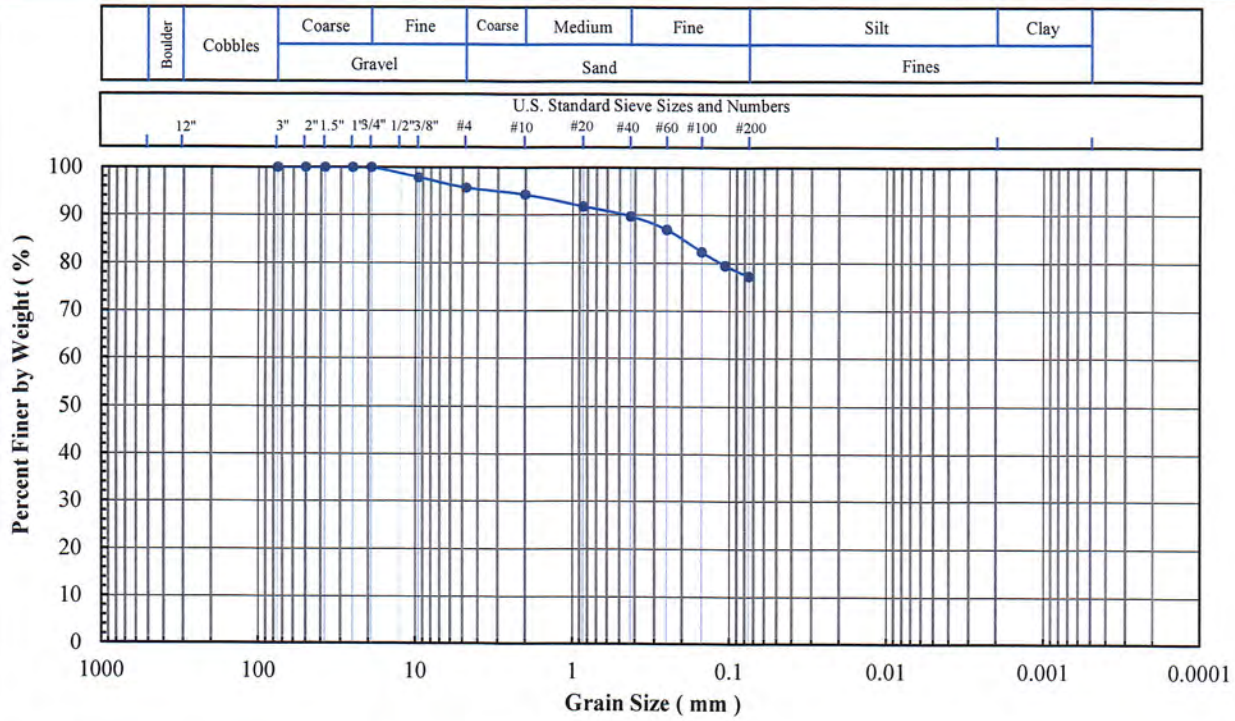
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Bell River ALD Support
Project No:	PN1017
Client Sample ID:	B1-16 (85')
Lab Sample No:	20L201

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

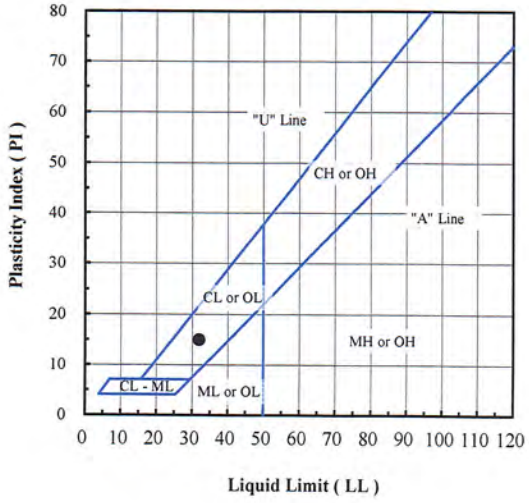


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	98
#4	4.75	96
#10	2.00	94
#20	0.850	92
#40	0.425	90
#60	0.250	87
#100	0.150	82
#140	0.106	79
#200	0.075	77

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	4
Sand (%):	19
Fines (%):	77
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B1-16 (85')	20L201	19.5	77	32	17	15	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-26-2021
AA, MSR

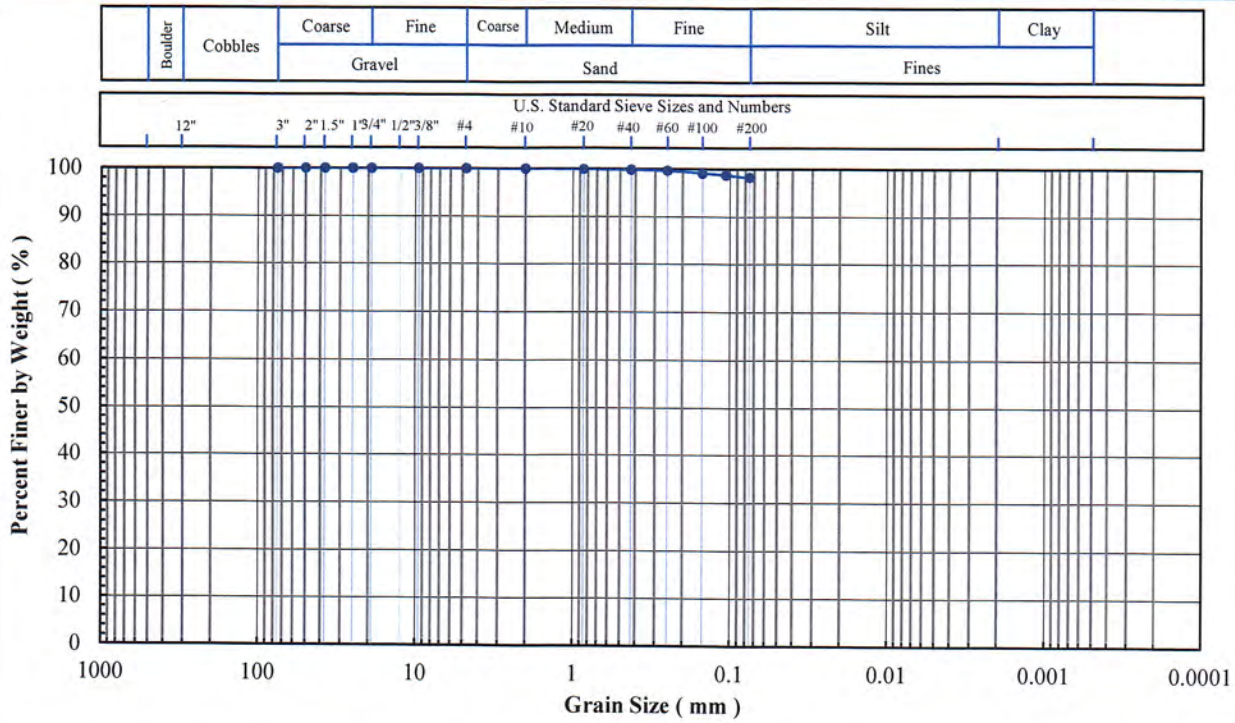
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B1-ST-1 (7-9')
Lab Sample No:	20L143

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

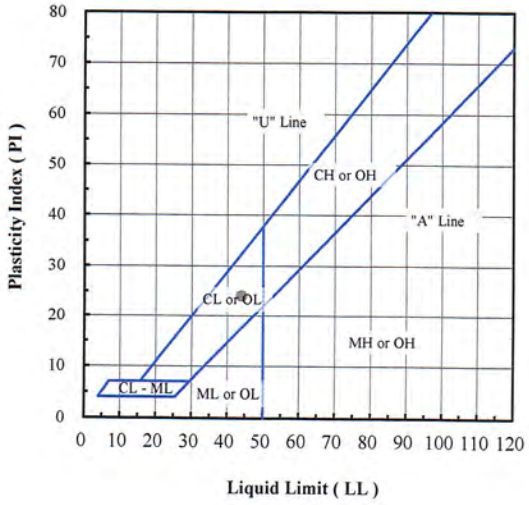


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	99.9
#40	0.425	99.8
#60	0.250	99.6
#100	0.150	99.1
#140	0.106	98.7
#200	0.075	98.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	1.8
Fines (%):	98.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B1-ST-1 (7-9')	20L143	22.7	98.2	44	20	24	CL - Lean clay

Note(s):

02-01-2021
AA, NSR

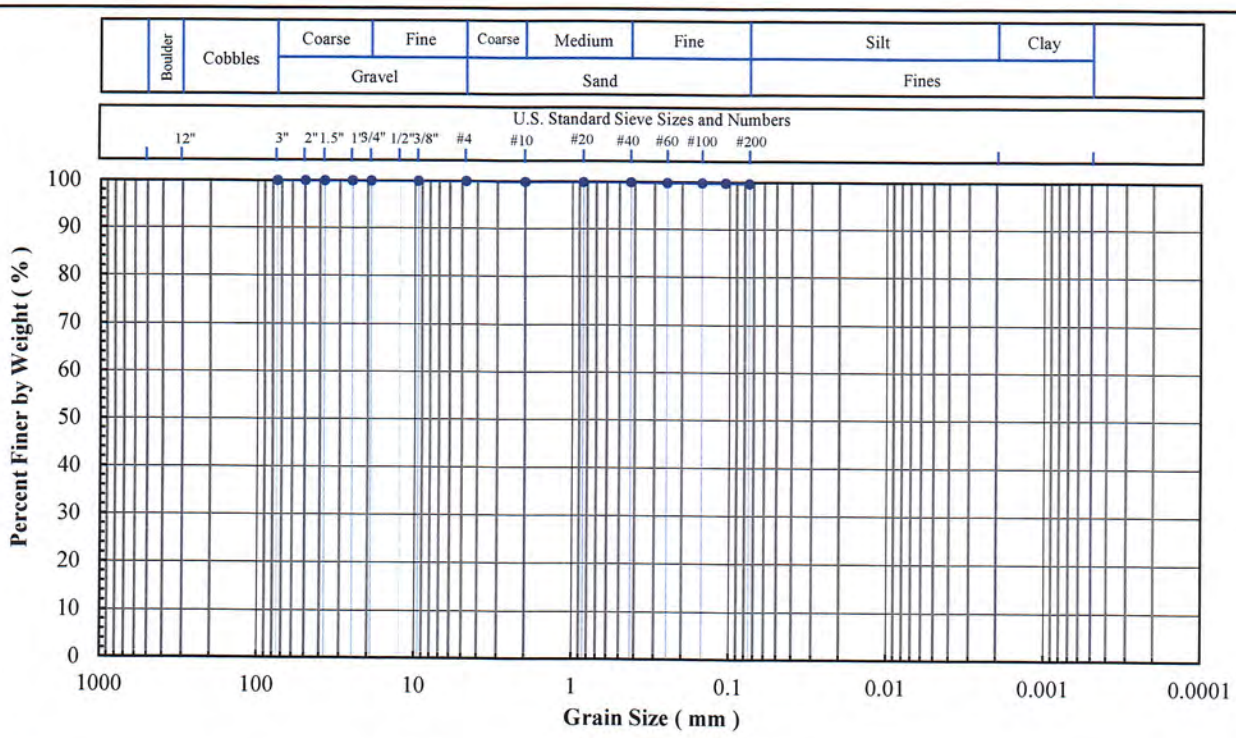
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B1-ST-3 (36-38')
Lab Sample No:	20L145

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

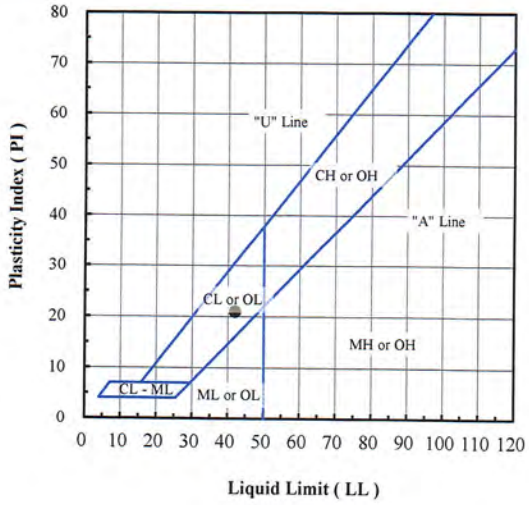


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.9
#40	0.425	99.9
#60	0.250	99.8
#100	0.150	99.8
#140	0.106	99.8
#200	0.075	99.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.3
Fines (%):	99.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B1-ST-3 (36-38')	20L145	35.2	99.7	42	21	21	CL - Lean clay

Note(s):

02-01-2021
AA, NSR

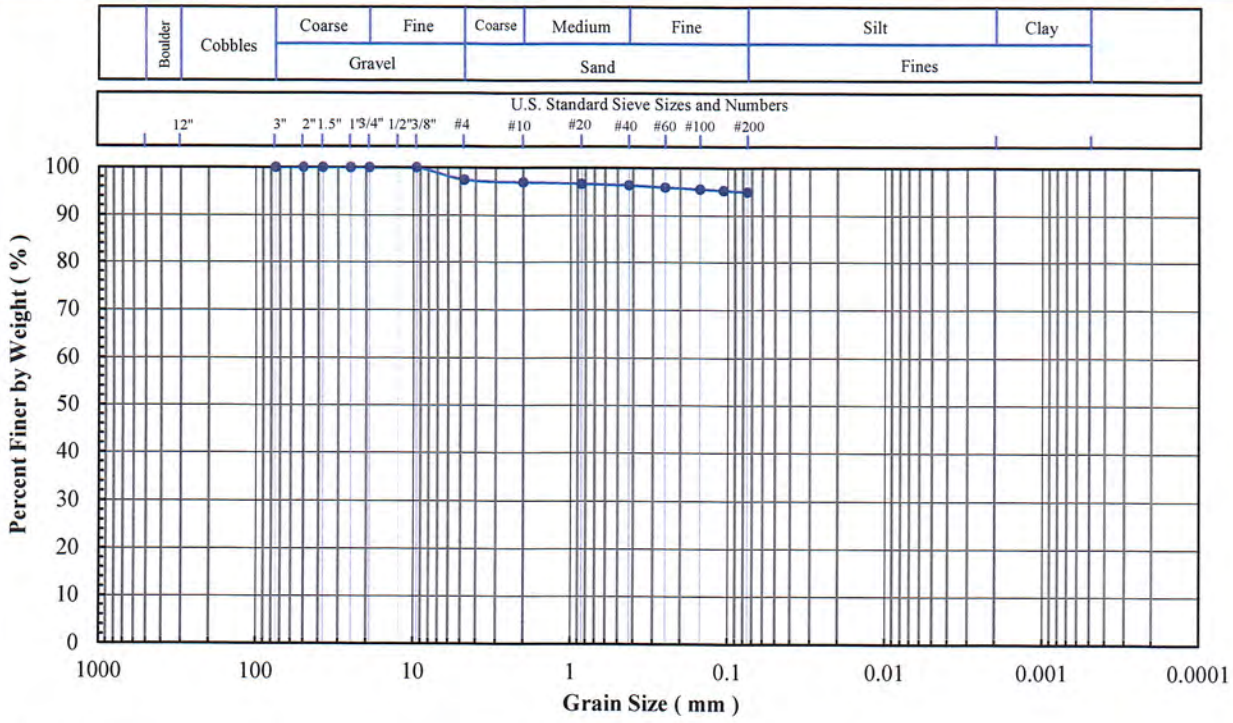
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B2-2 (5')
Lab Sample No:	20L205

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

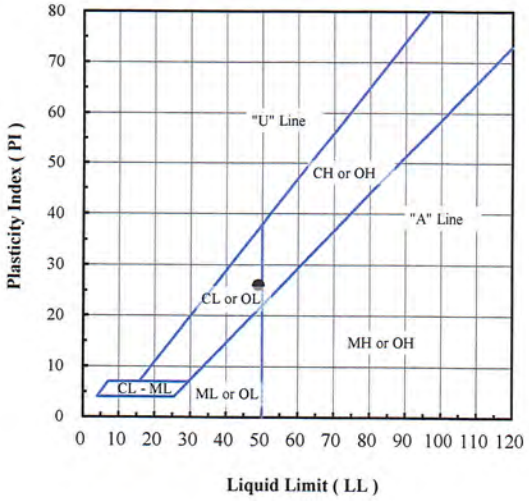


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	96.9
#20	0.850	96.6
#40	0.425	96.3
#60	0.250	95.9
#100	0.150	95.5
#140	0.106	95.2
#200	0.075	94.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	2.5
Fines (%):	94.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B2-2 (5')	20L205	26.9	94.9	49	23	26	CL - Lean clay

Note(s):

01-25-2021
AA, NSR

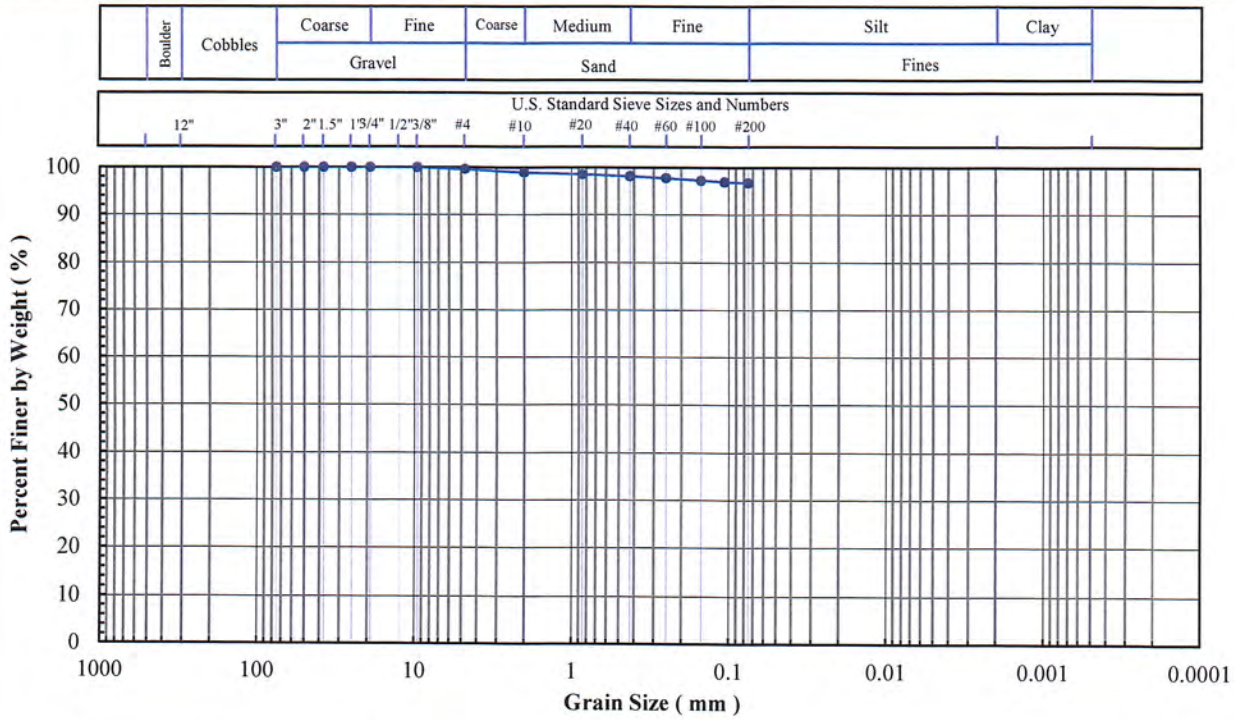
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B2-5 (18')
Lab Sample No:	20L208

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

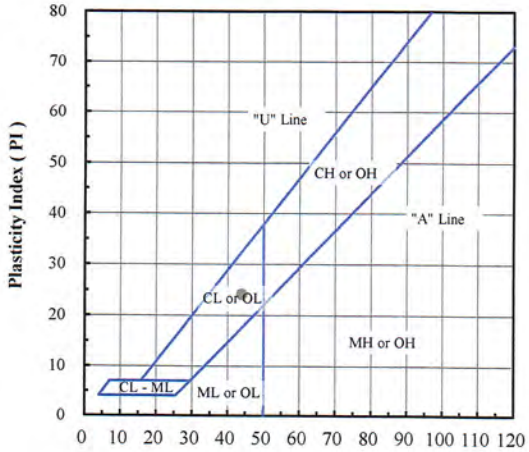


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	98.9
#20	0.850	98.5
#40	0.425	98.1
#60	0.250	97.7
#100	0.150	97.2
#140	0.106	96.9
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	2.9
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B2-5 (18')	20L208	36.3	96.7	44	20	24	CL - Lean Clay

Note(s):

01-25-2021
AA, NSR

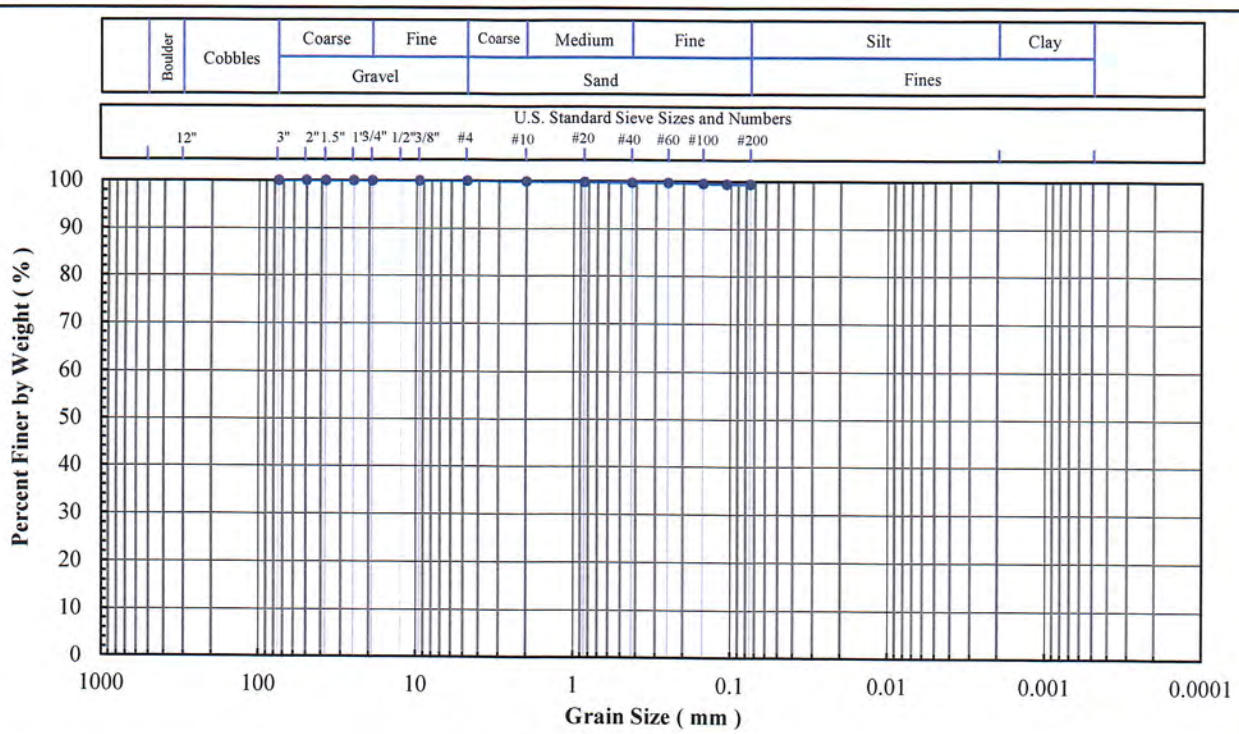
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B2-8 (40')
Lab Sample No:	20L211

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

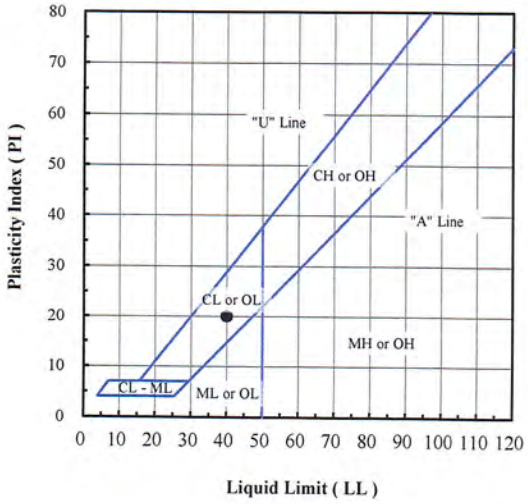


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.5
#140	0.106	99.4
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B2-8 (40')	20L211	37.5	99.4	40	20	20	CL - Lean clay

Note(s):

01-25-2021 AM, WSR

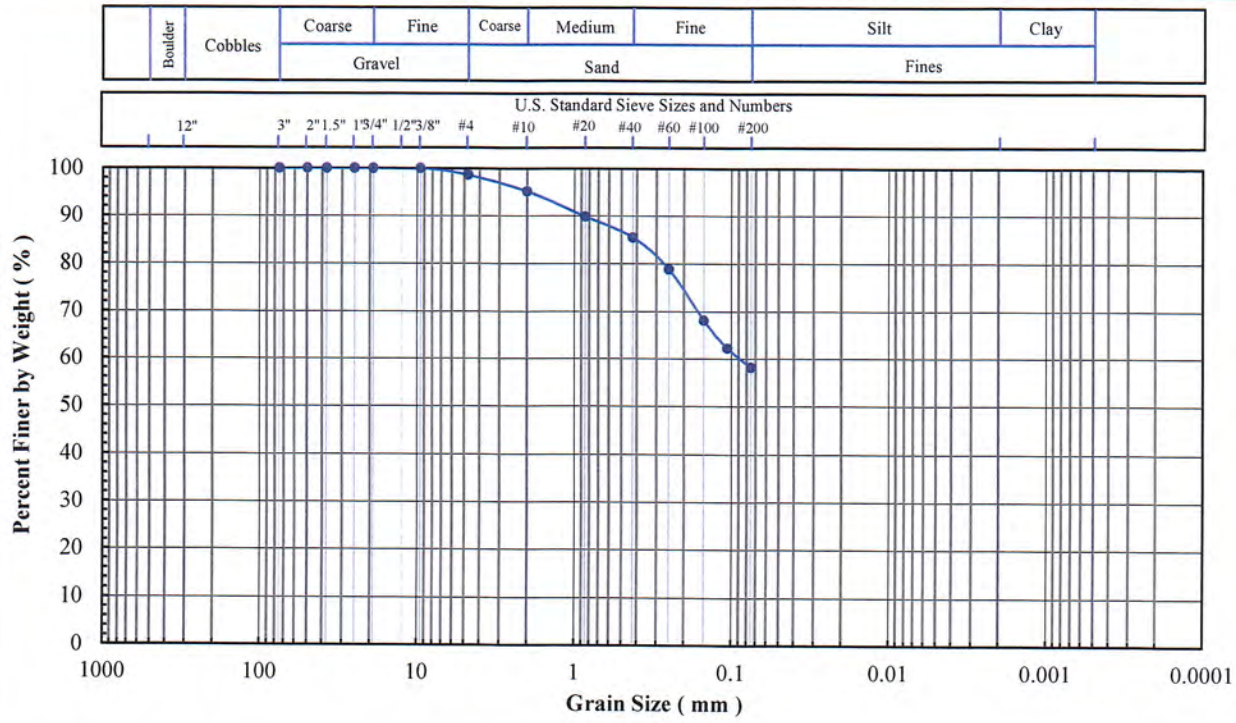
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B2-12 (60')
Lab Sample No:	20L215

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

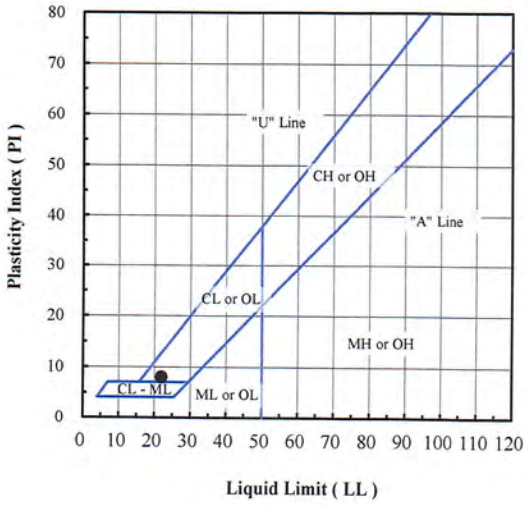


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.6
#10	2.00	95.1
#20	0.850	89.8
#40	0.425	85.4
#60	0.250	78.8
#100	0.150	68.1
#140	0.106	62.2
#200	0.075	58.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.4
Sand (%):	40.5
Fines (%):	58.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B2-12 (60')	20L215	17.4	58.1	22	14	8	CL - Sandy lean clay

Note(s):

01-25-2021
AA, NJR

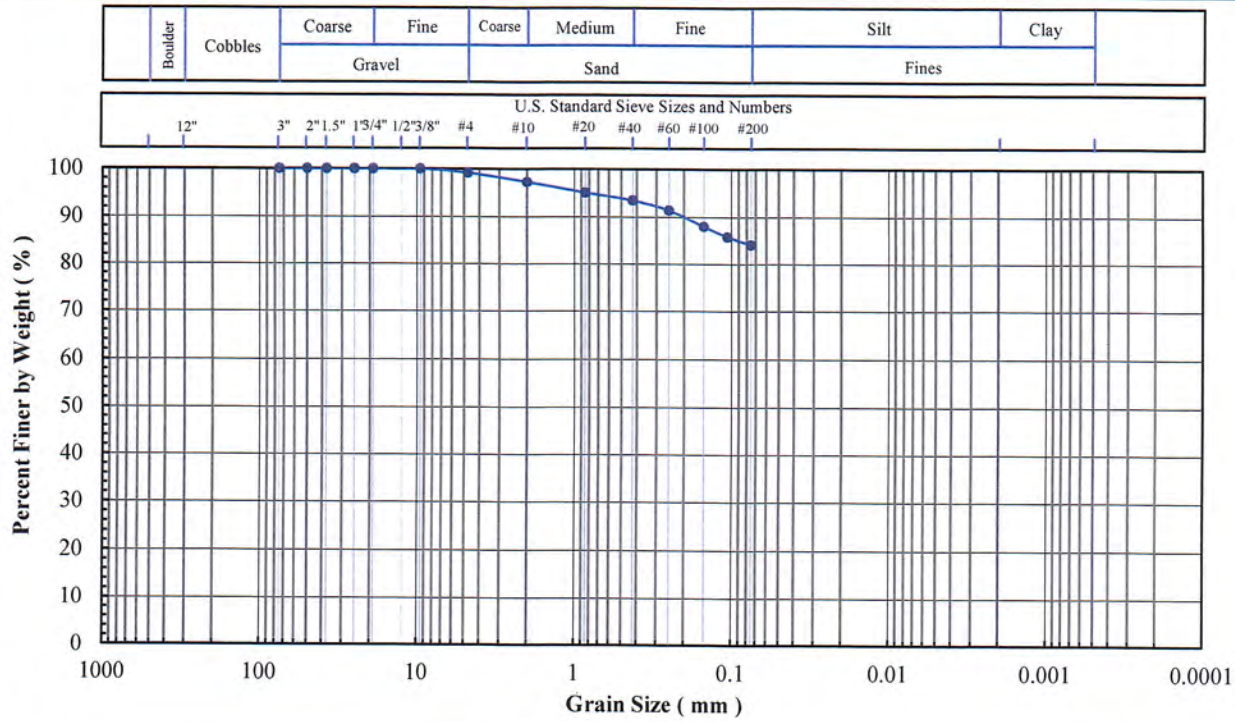
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B2-16 (80')
Lab Sample No:	20L219

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

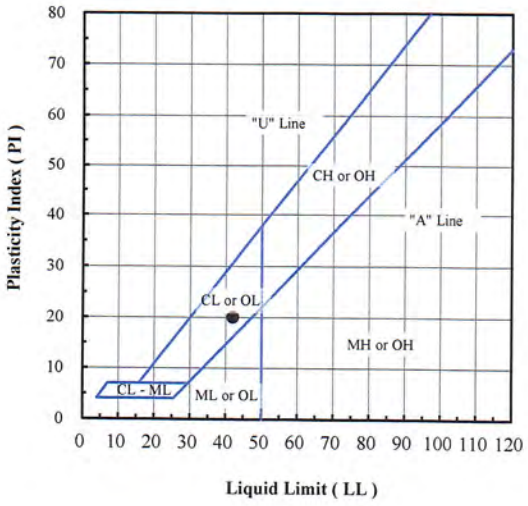


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	97.3
#20	0.850	95.1
#40	0.425	93.5
#60	0.250	91.4
#100	0.150	88.0
#140	0.106	85.8
#200	0.075	84.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	15.1
Fines (%):	84.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B2-16 (80')	20L219	25.2	84.1	42	22	20	CL - Lean clay with sand

Note(s):

01-25-2021
AA, NSR

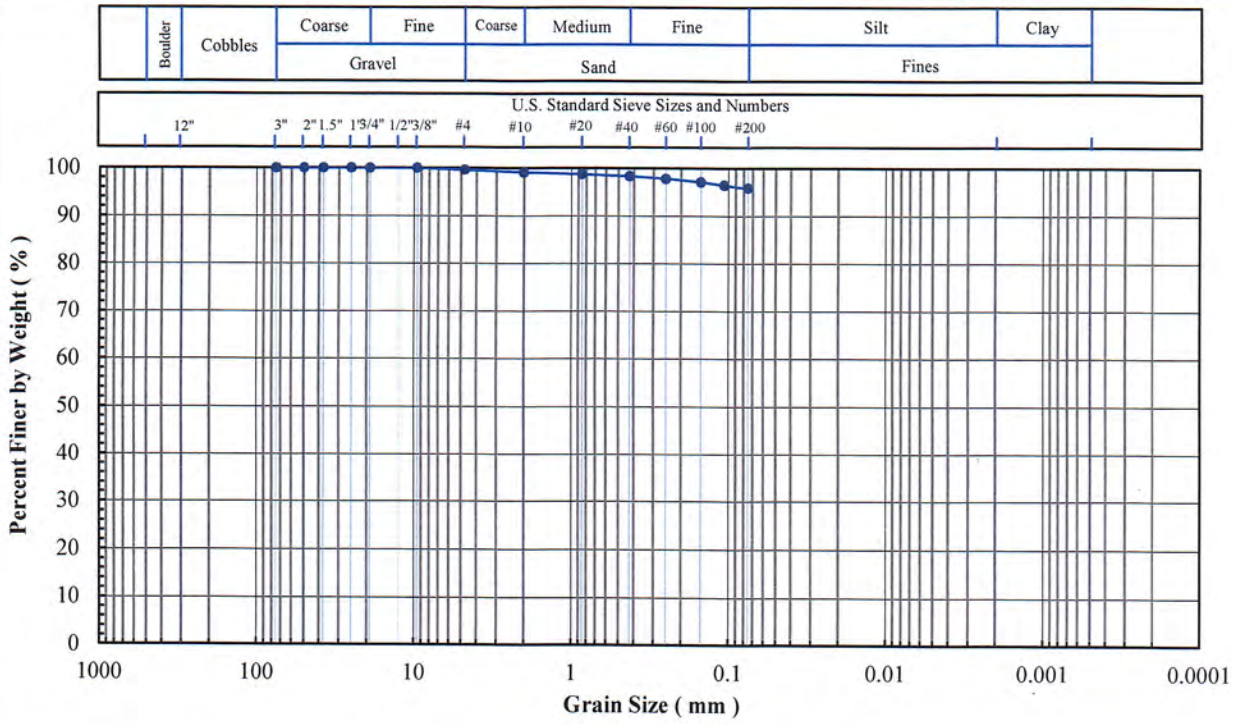
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B2-ST-1 (1-3')
Lab Sample No:	20L149

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

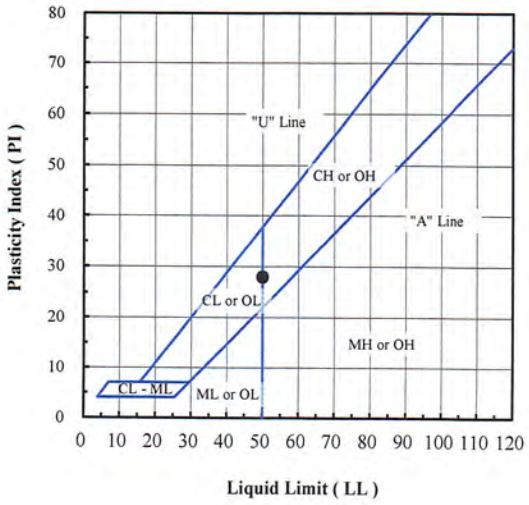


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	99.1
#20	0.850	98.7
#40	0.425	98.3
#60	0.250	97.8
#100	0.150	97.1
#140	0.106	96.4
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	3.8
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B2-ST-1 (1-3')	20L149	23.0	95.8	50	22	28	CL - Lean clay

Note(s):

02-01-2021
AA, NSA

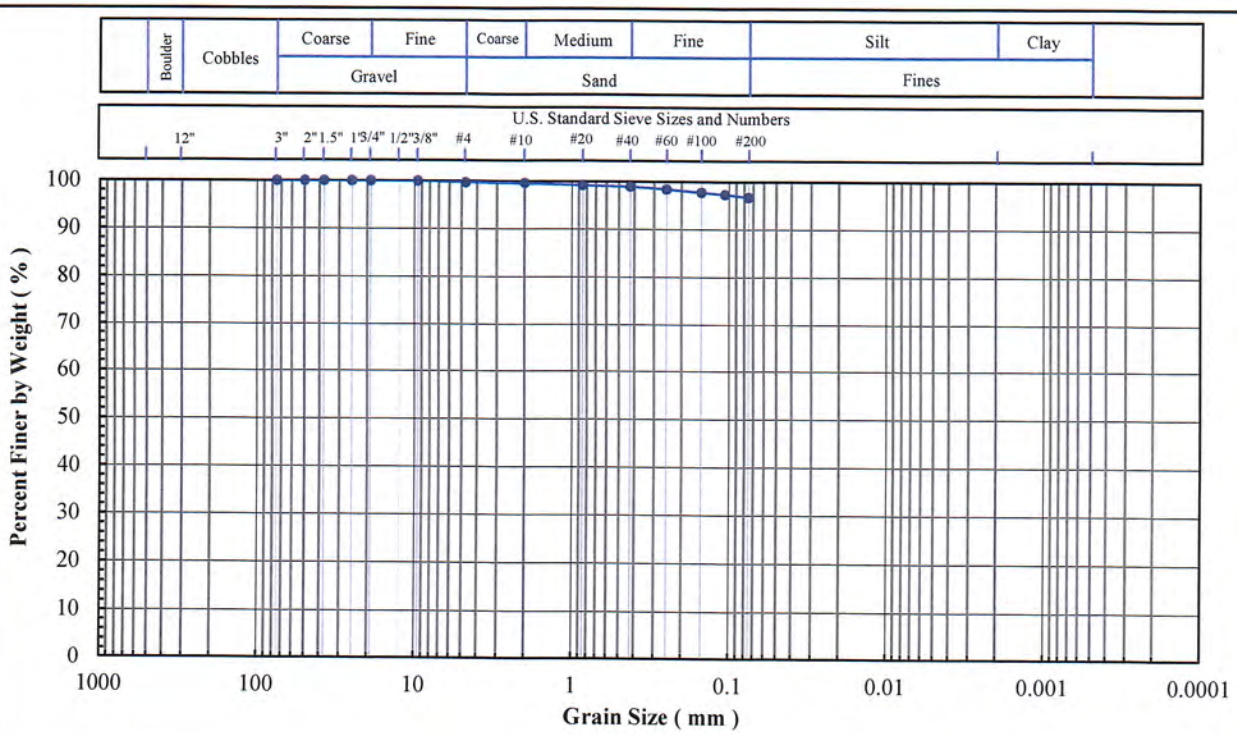
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B3-2 (5')
Lab Sample No:	20L224

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

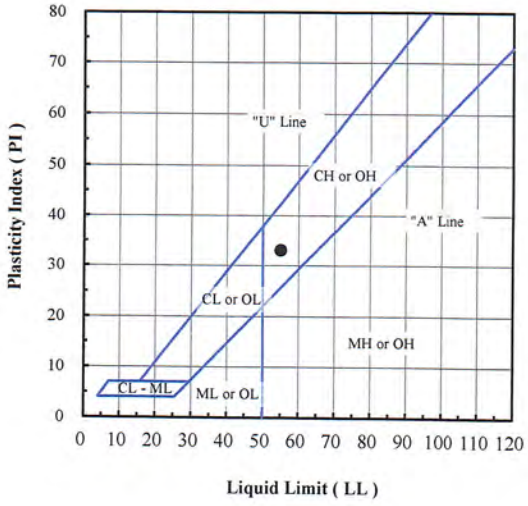


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.6
#20	0.850	99.2
#40	0.425	98.9
#60	0.250	98.4
#100	0.150	97.7
#140	0.106	97.3
#200	0.075	96.7

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	3.0
Fines (%):	96.7
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B3-2 (5')	20L224	24.1	96.7	55	22	33	CH - Fat clay

Note(s):

01-25-2021
AA, NSR

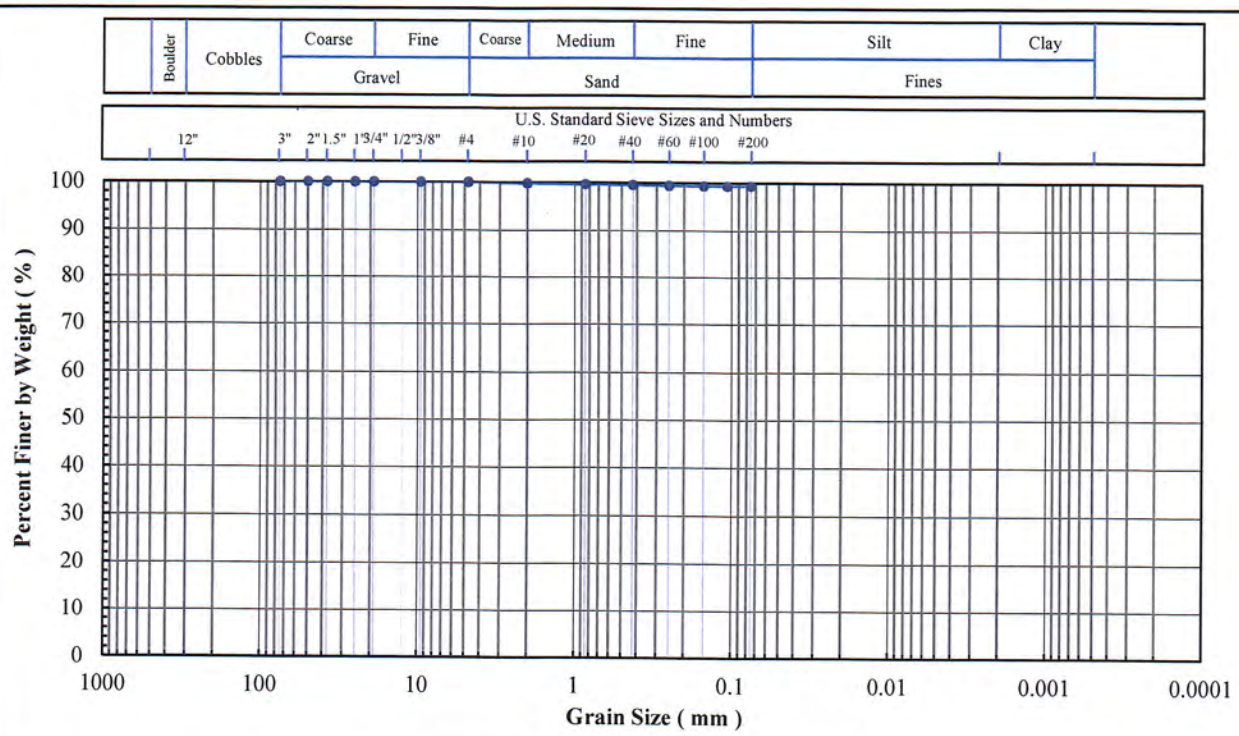
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B3-6 (25')
Lab Sample No:	20L228

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

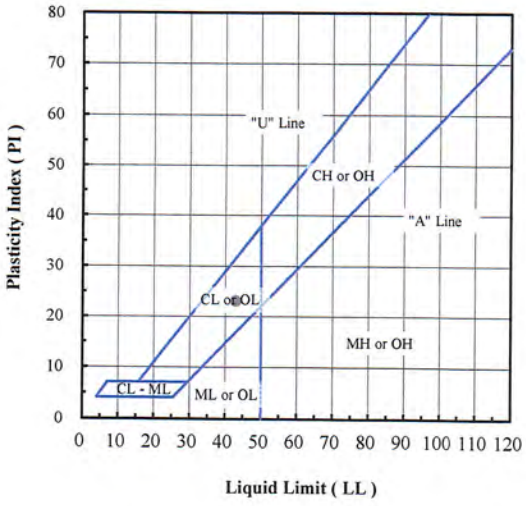


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.8
#20	0.850	99.6
#40	0.425	99.5
#60	0.250	99.4
#100	0.150	99.3
#140	0.106	99.3
#200	0.075	99.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.7
Fines (%):	99.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B3-6 (25')	20L228	37.7	99.3	43	20	23	CL - Lean clay

Note(s):

01-25-2021
AA, NJR

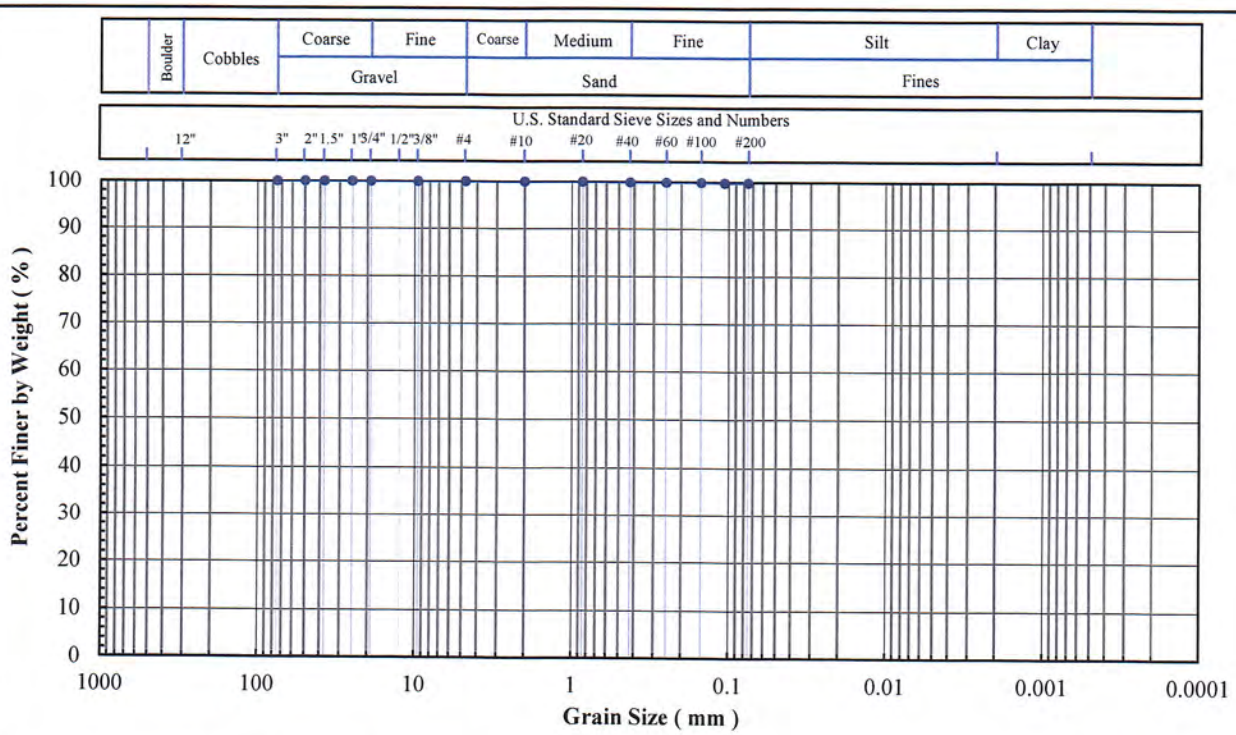
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B3-10 (45')
Lab Sample No:	20L232

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

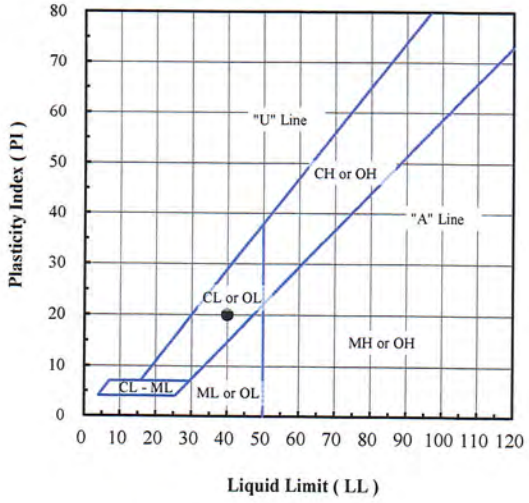


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.8
#200	0.075	99.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.2
Fines (%):	99.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B3-10 (45')	20L232	36.5	99.8	40	20	20	CL - Lean clay

Note(s):

01-25-2021
AA, NSK

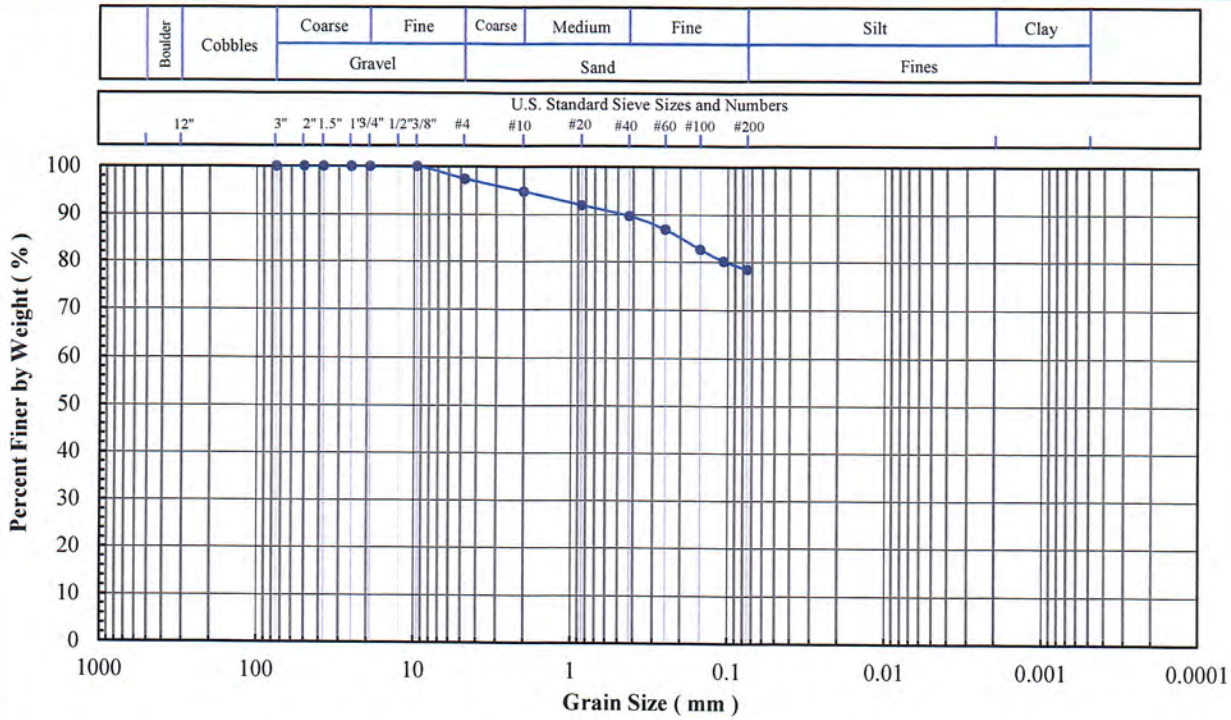
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B3-18 (85')
Lab Sample No:	20L240

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

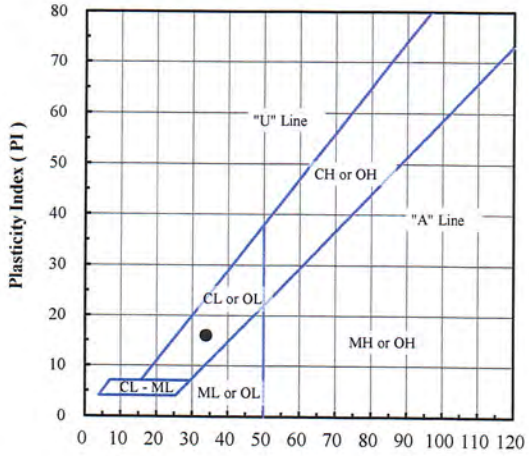


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	97.4
#10	2.00	94.8
#20	0.850	91.9
#40	0.425	89.7
#60	0.250	86.8
#100	0.150	82.6
#140	0.106	80.1
#200	0.075	78.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	2.6
Sand (%):	19.0
Fines (%):	78.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B3-18 (85')	20L240	21.9	78.4	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021
AA/NSR

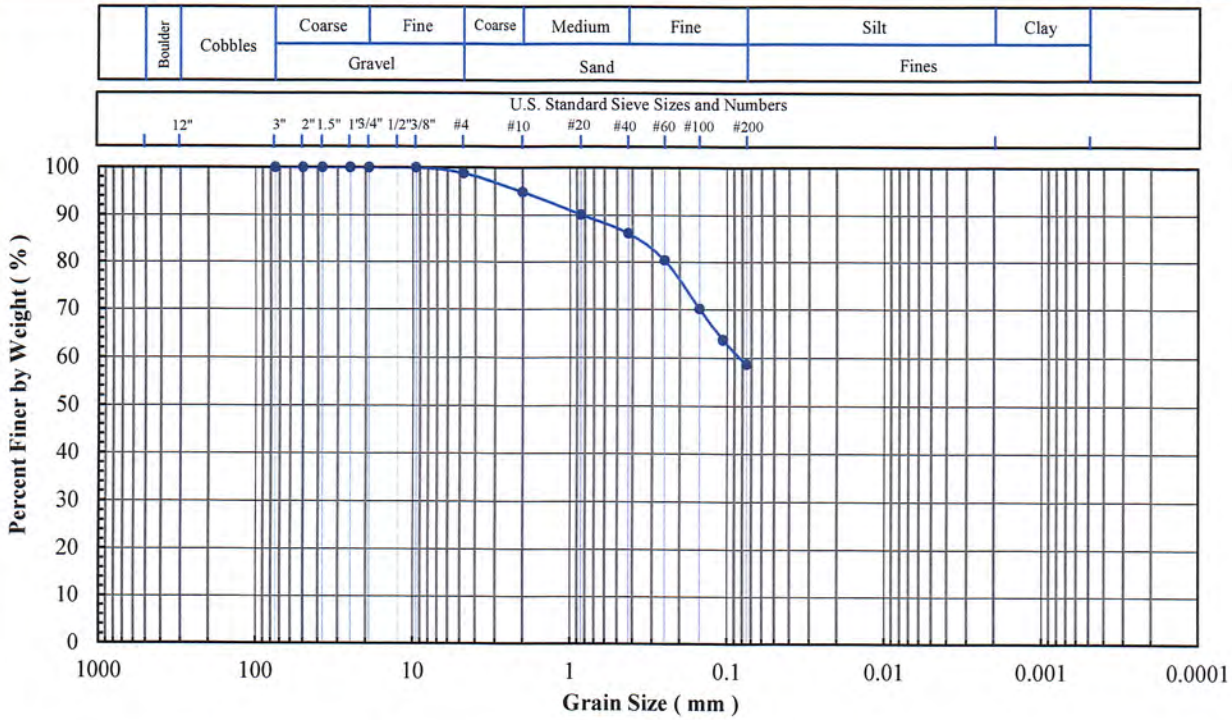
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Bell River ALD Support
Project No:	PN1017
Client Sample ID:	B3-14 (67')
Lab Sample No:	20L236

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

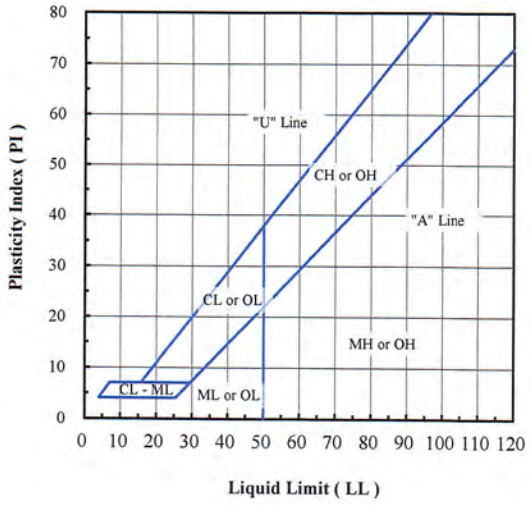


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	94.9
#20	0.850	90.1
#40	0.425	86.2
#60	0.250	80.4
#100	0.150	70.1
#140	0.106	63.7
#200	0.075	58.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	40.2
Fines (%):	58.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B3-14 (67')	20L236	15.2	58.6				

Note(s):

02-03-2021
AA, NSR

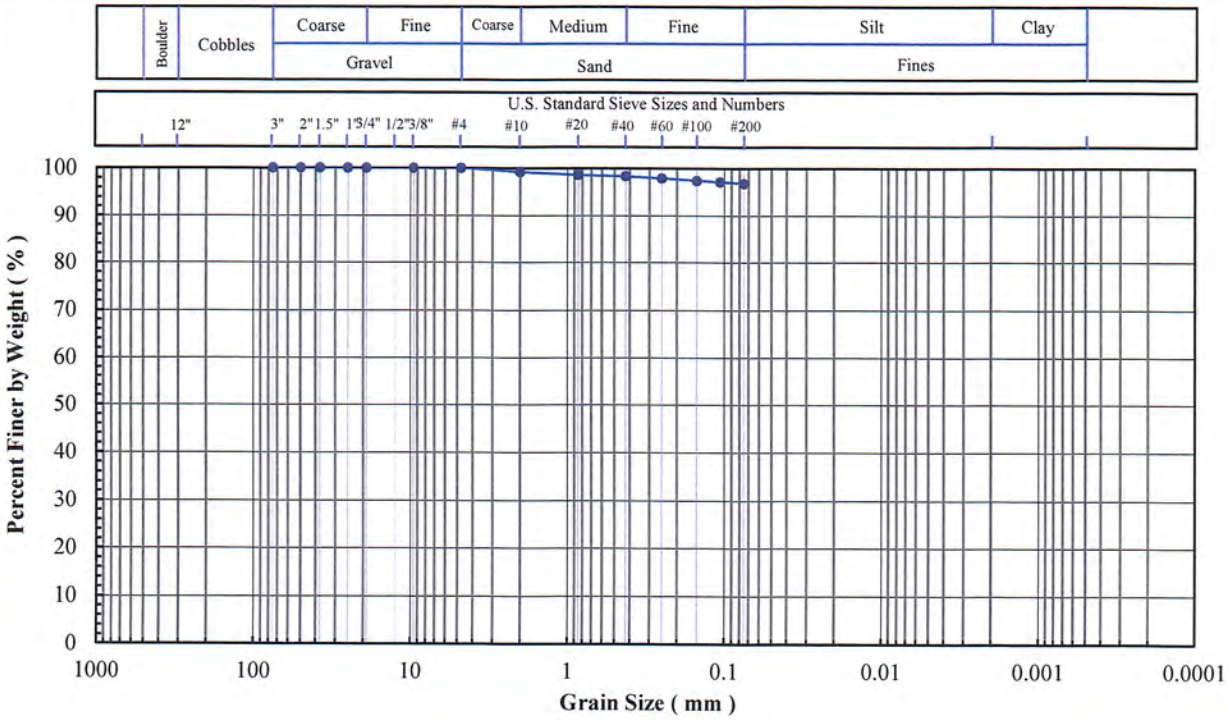
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B4-1 (10')
Lab Sample No:	20L243

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

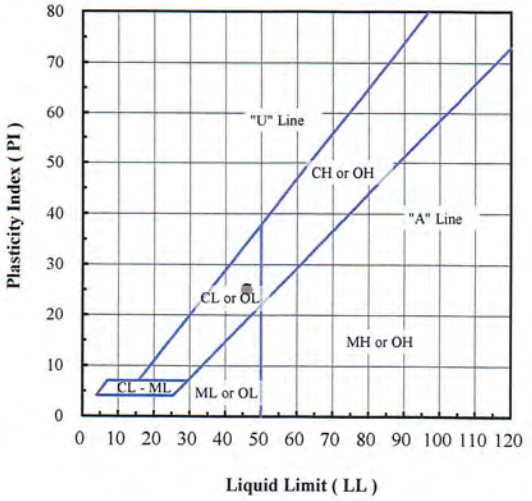


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.2
#20	0.850	98.6
#40	0.425	98.3
#60	0.250	97.9
#100	0.150	97.4
#140	0.106	97.1
#200	0.075	96.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	3.2
Fines (%):	96.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B4-1 (10')	20L243	25.6	96.8	46	21	25	CL - Lean clay

Note(s):

01-25-2021
AA, NSR

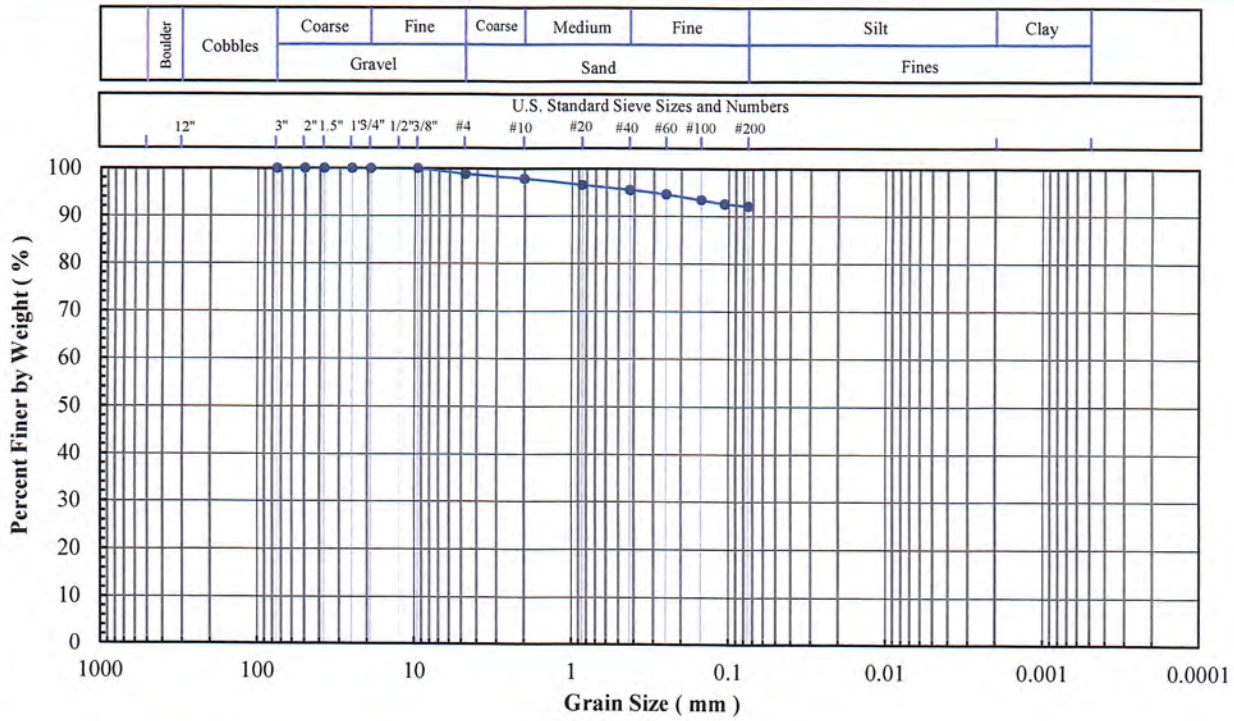
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B4-7 (34')
Lab Sample No:	20L249

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

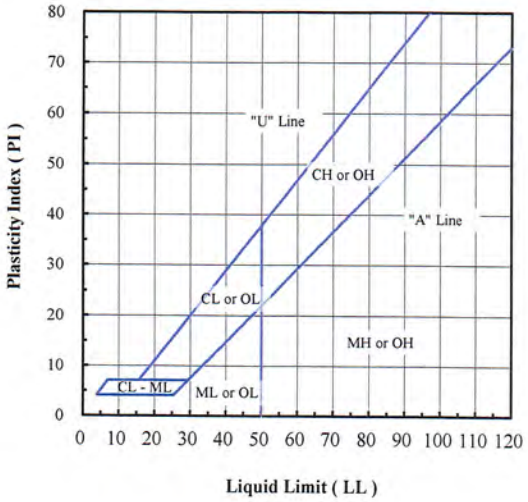


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	98.8
#10	2.00	97.8
#20	0.850	96.4
#40	0.425	95.4
#60	0.250	94.5
#100	0.150	93.3
#140	0.106	92.5
#200	0.075	92.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	1.2
Sand (%):	6.8
Fines (%):	92.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B4-7 (34')	20L249	33.9	92.0				

Note(s):

01-25-2021
AA, NSR

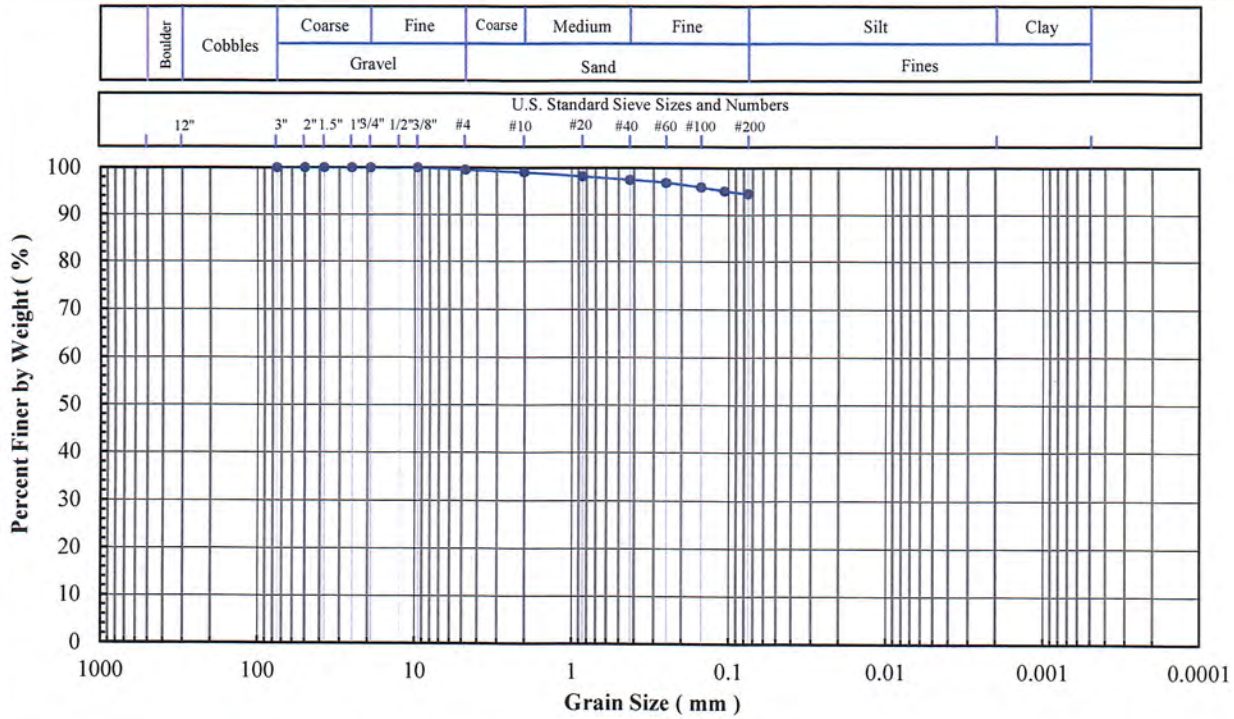
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B4-12 (55')
Lab Sample No:	20L254

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

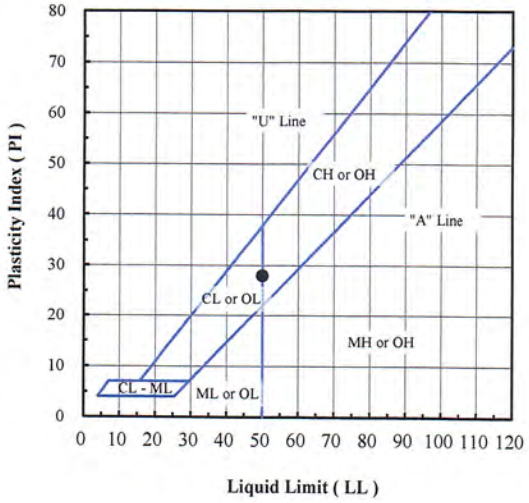


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.5
#10	2.00	99.0
#20	0.850	98.1
#40	0.425	97.4
#60	0.250	96.8
#100	0.150	95.8
#140	0.106	95.0
#200	0.075	94.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.5
Sand (%):	5.1
Fines (%):	94.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B4-12 (55')	20L254	41.4	94.4	50	22	28	CH - Fat clay

Note(s):

01-25-2021
AA, NSR

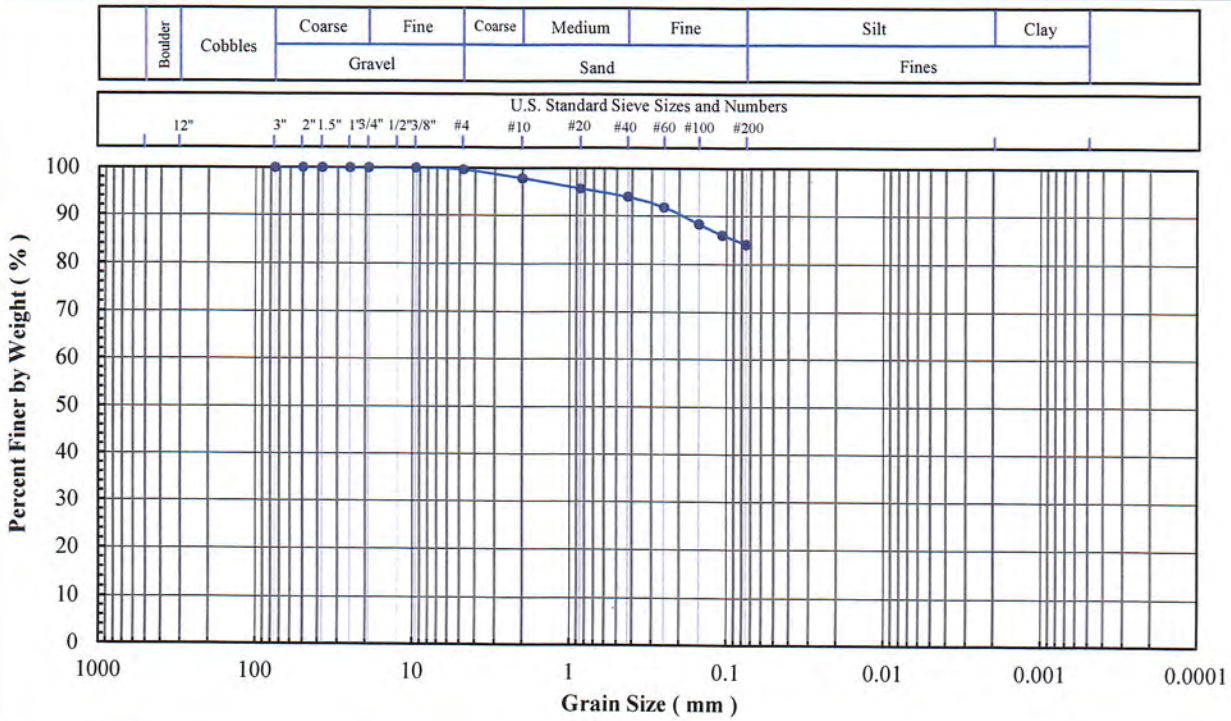
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B4-16 (75')
Lab Sample No:	20L258

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

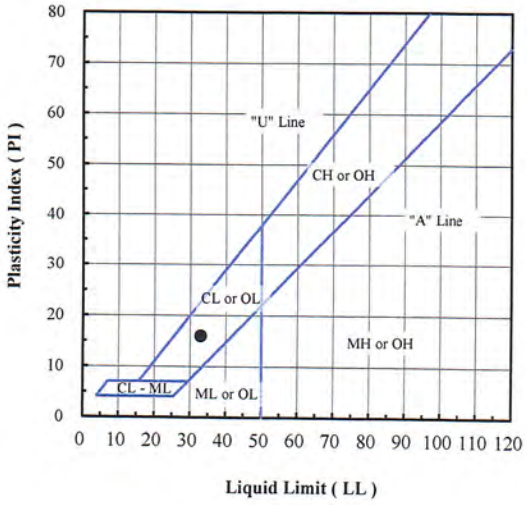


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.6
#10	2.00	97.8
#20	0.850	95.6
#40	0.425	93.9
#60	0.250	91.7
#100	0.150	88.2
#140	0.106	85.9
#200	0.075	84.0

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.4
Sand (%):	15.6
Fines (%):	84.0
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B4-16 (75')	20L258	24.0	84.0	33	17	16	CL - Lean clay with sand

Note(s):

01-25-2021
AA, NSR

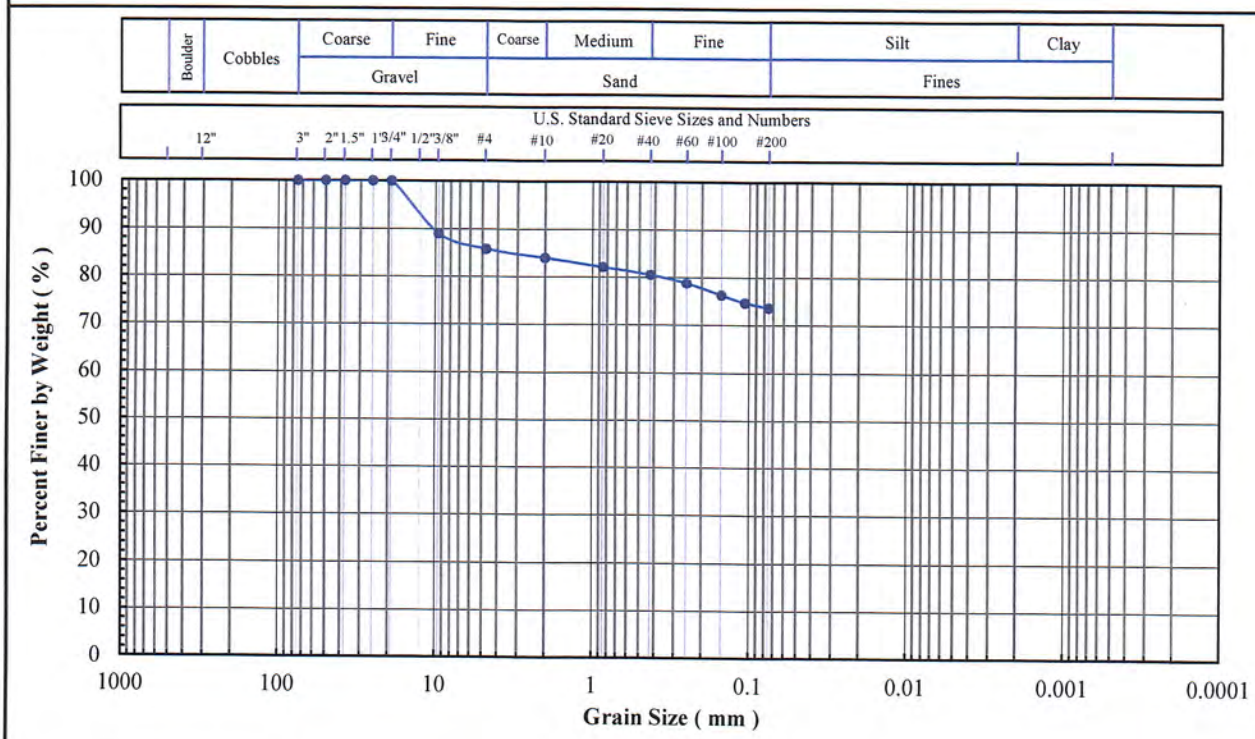
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B4-20 (95')
Lab Sample No:	20L262

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

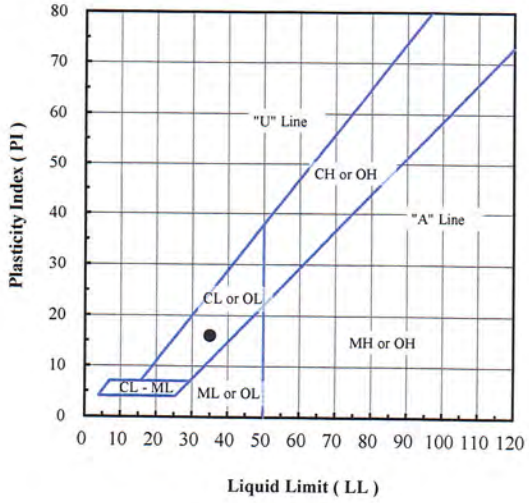


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	89
#4	4.75	86
#10	2.00	84
#20	0.850	82
#40	0.425	81
#60	0.250	79
#100	0.150	76
#140	0.106	75
#200	0.075	74

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	14
Sand (%):	12
Fines (%):	74
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B4-20 (95')	20L262	21.7	74	35	19	16	CL - Lean clay with gravel

Note(s): Sieve specimen was undersized.

01-25-2021
AA, NSR

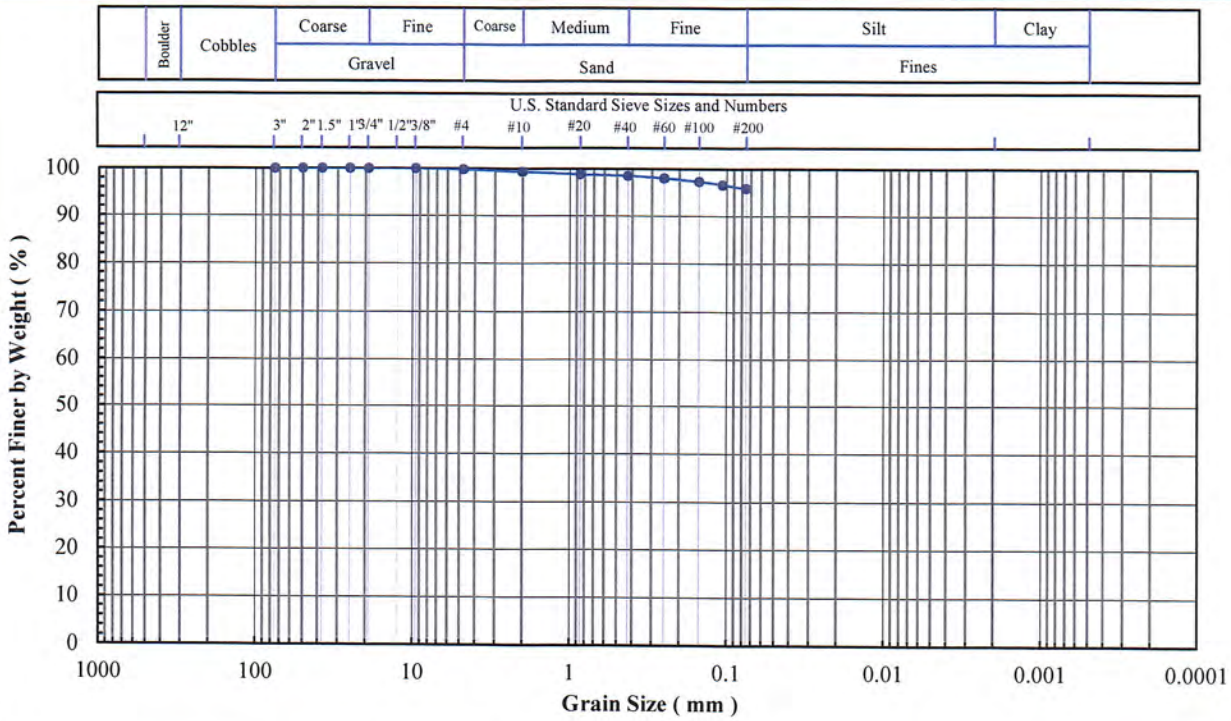
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B5-1 (7')
Lab Sample No:	20L263

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

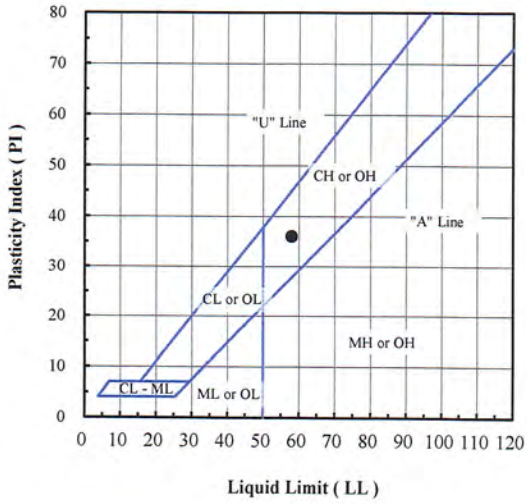


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	99.3
#20	0.850	98.8
#40	0.425	98.5
#60	0.250	98.0
#100	0.150	97.3
#140	0.106	96.6
#200	0.075	95.8

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	4.0
Fines (%):	95.8
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B5-1 (7')	20L263	35.7	95.8	58	22	36	CH - Fat clay

Note(s):

01-25-2021
AA, NSR

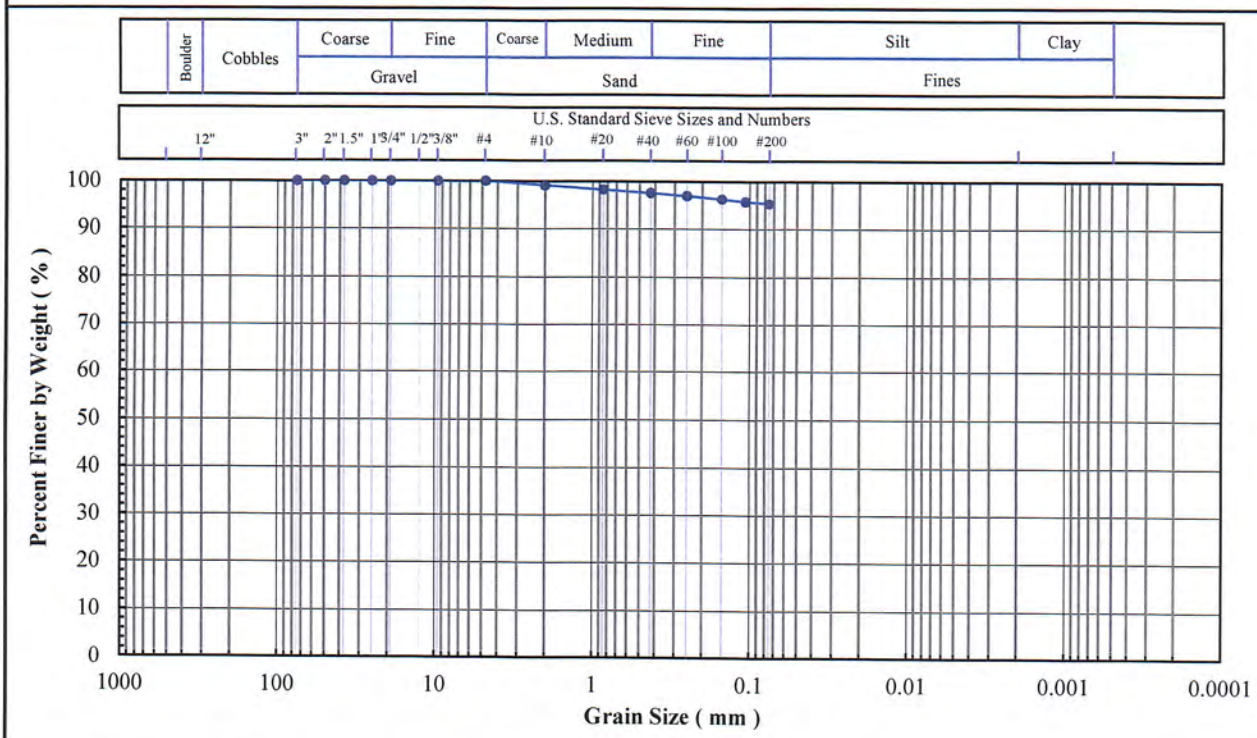
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B5-4 (29')
Lab Sample No:	20L266

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

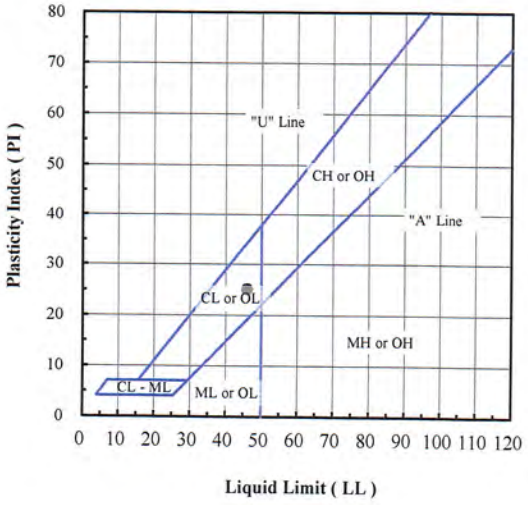


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.1
#20	0.850	98.2
#40	0.425	97.5
#60	0.250	96.9
#100	0.150	96.2
#140	0.106	95.7
#200	0.075	95.3

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	4.7
Fines (%):	95.3
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B5-4 (29')	20L266	39.1	95.3	46	21	25	CL - Lean clay

Note(s):

01-25-2021
AA/MSR

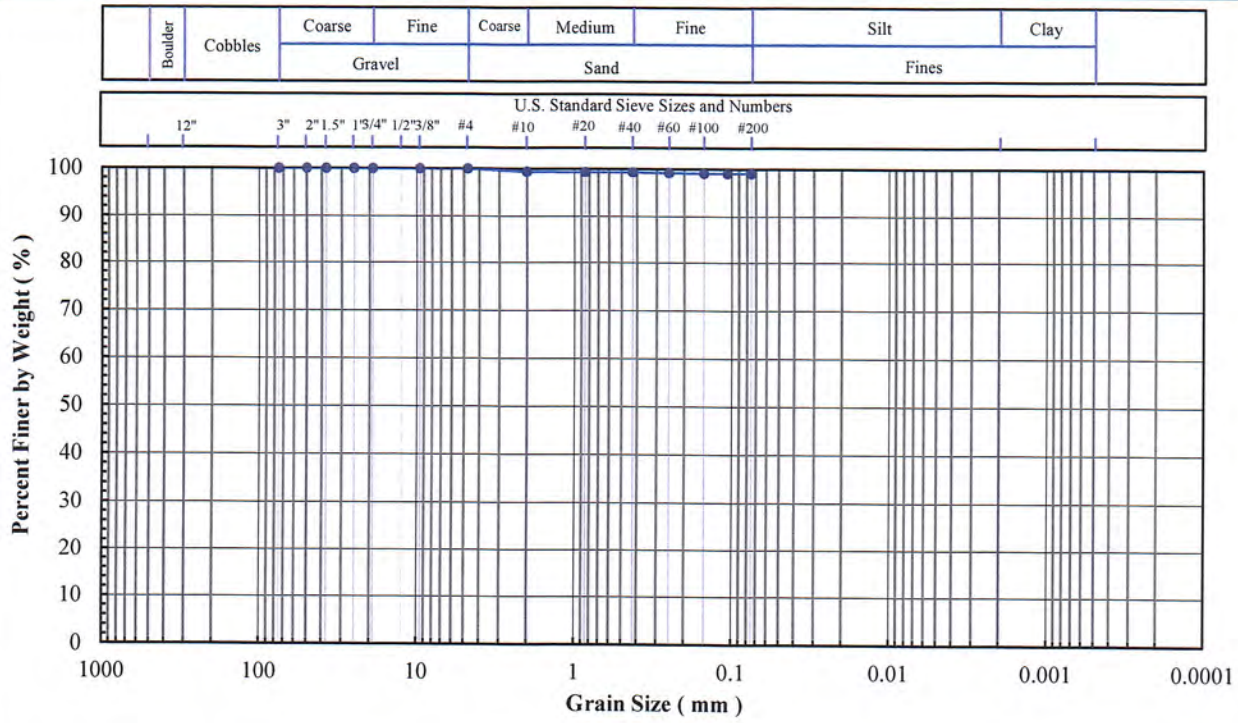
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B5-9 (52')
Lab Sample No:	20L271

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

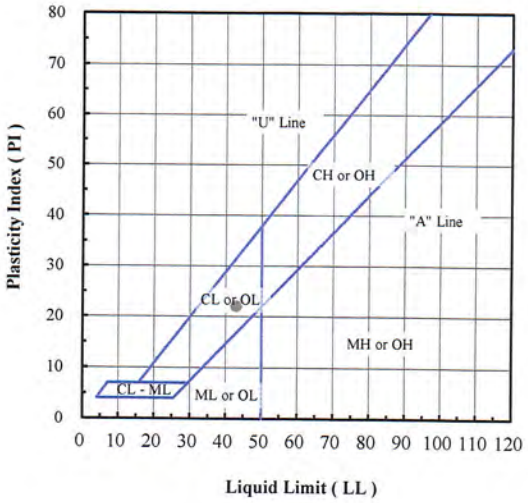


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.4
#20	0.850	99.3
#40	0.425	99.3
#60	0.250	99.2
#100	0.150	99.1
#140	0.106	99.1
#200	0.075	99.1

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.9
Fines (%):	99.1
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B5-9 (52')	20L271	40.2	99.1	43	21	22	CL - Lean clay

Note(s):

01-25-2021
AA, NSR

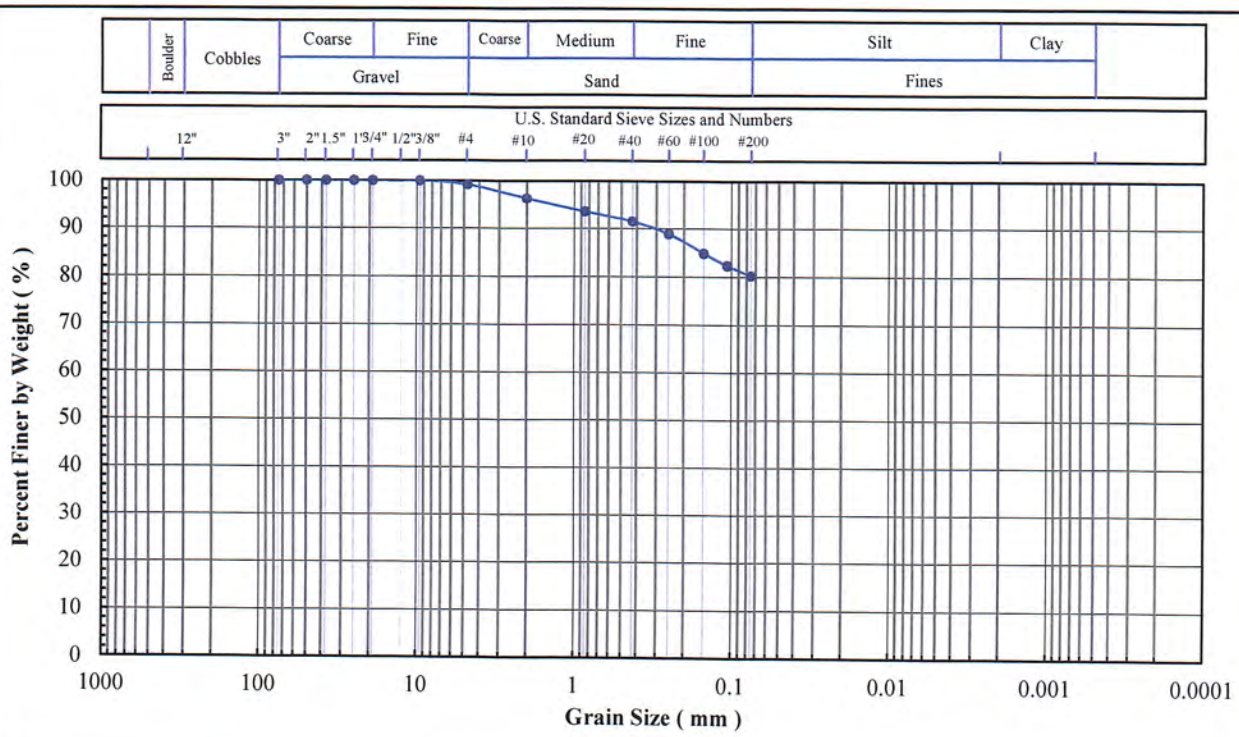
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B5-13 (72')
Lab Sample No:	20L275

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

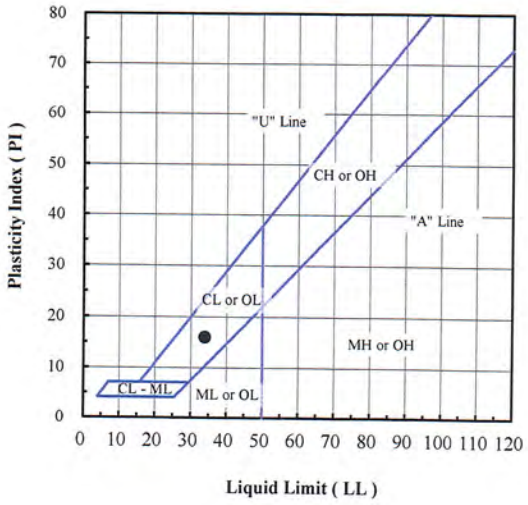


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.2
#10	2.00	96.2
#20	0.850	93.5
#40	0.425	91.4
#60	0.250	88.8
#100	0.150	84.8
#140	0.106	82.3
#200	0.075	80.2

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.8
Sand (%):	19.0
Fines (%):	80.2
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B5-13 (72')	20L275	27.1	80.2	34	18	16	CL - Lean clay with sand

Note(s):

01-25-2021
AA, NSP

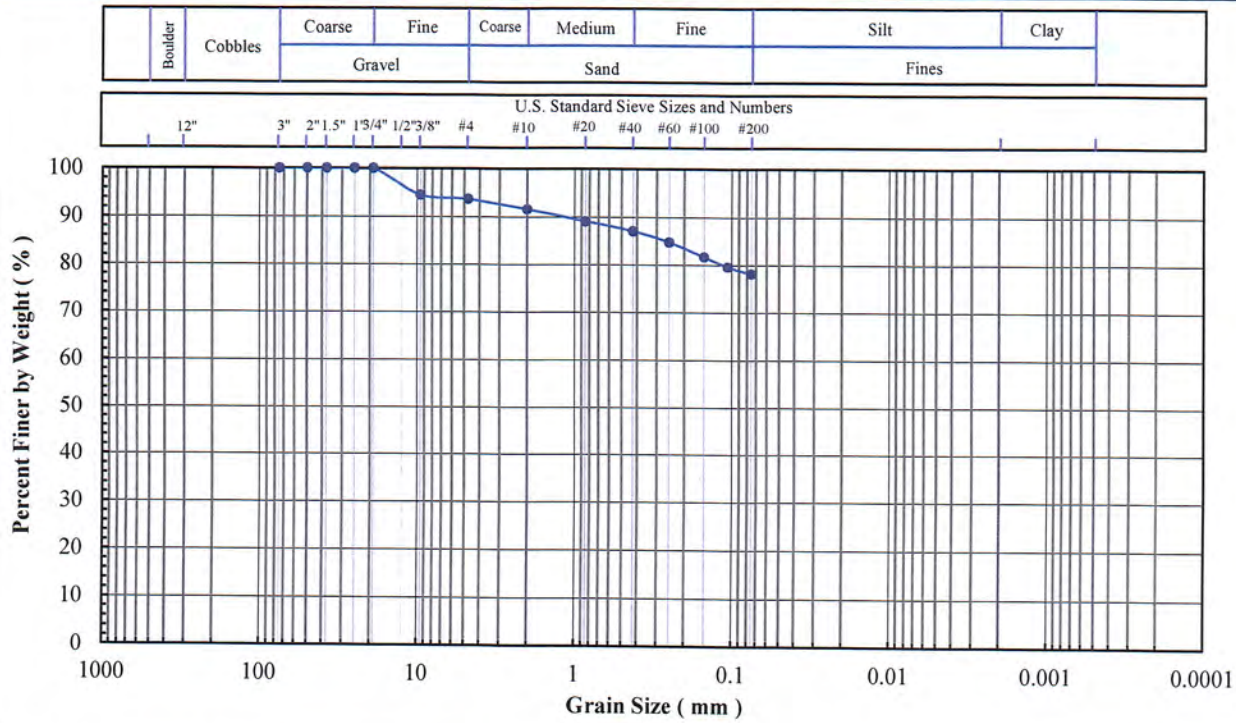
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B5-17 (92')
Lab Sample No:	20L279

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

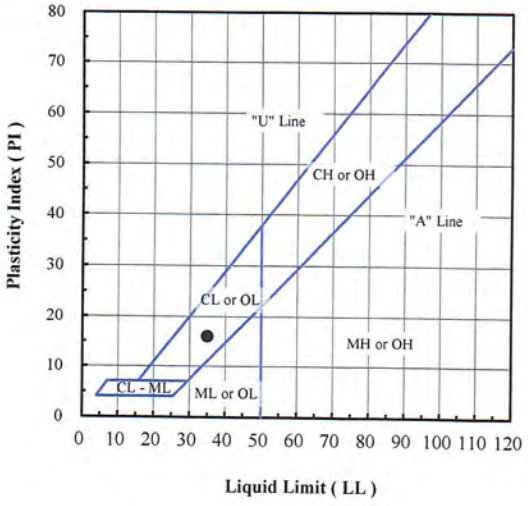


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	92
#20	0.850	89
#40	0.425	87
#60	0.250	85
#100	0.150	82
#140	0.106	80
#200	0.075	78

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	16
Fines (%):	78
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B5-17 (92')	20L279	22.0	78	35	19	16	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

01-25-2021
AA, NSR

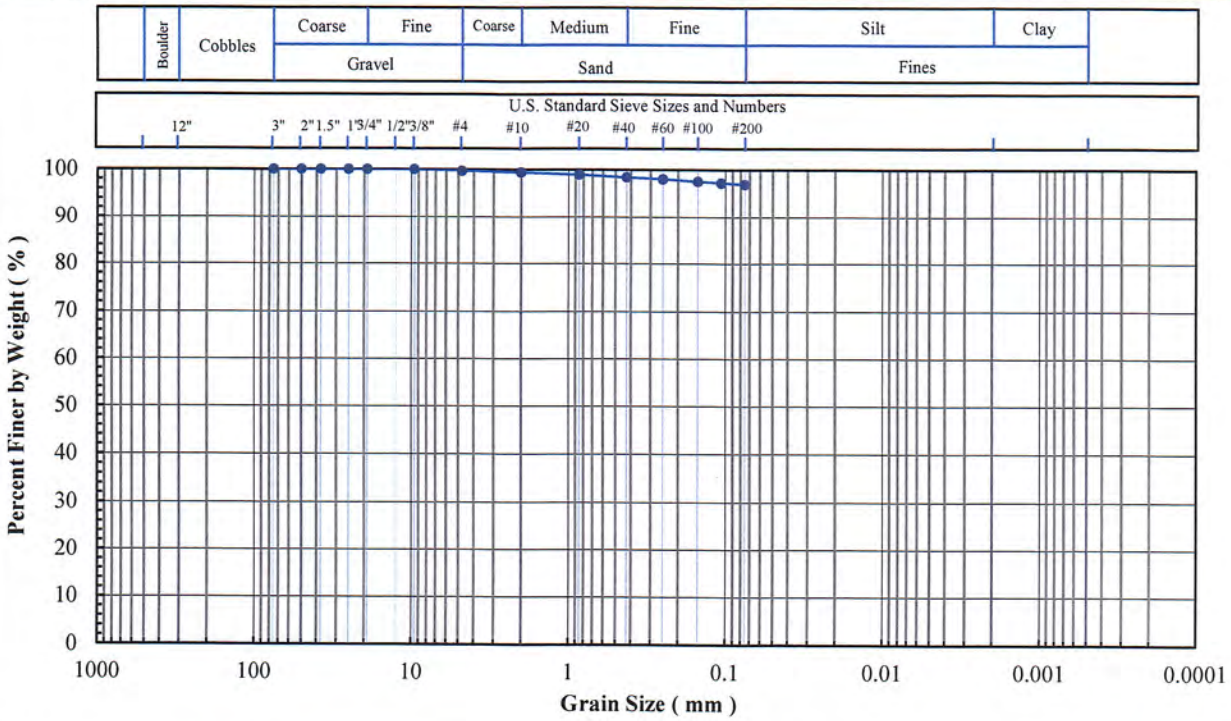
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B6-3 (15')
Lab Sample No:	20L284

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

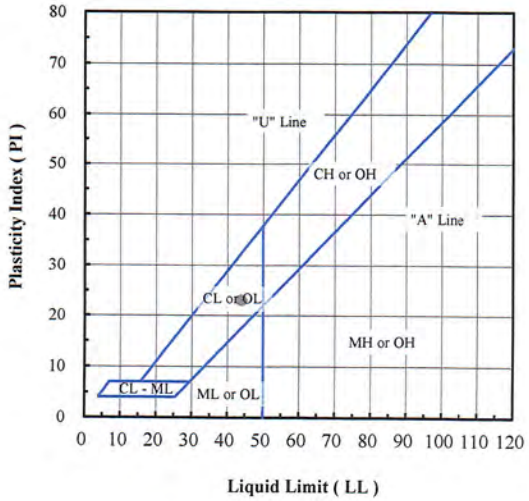


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.7
#10	2.00	99.4
#20	0.850	98.9
#40	0.425	98.4
#60	0.250	98.0
#100	0.150	97.5
#140	0.106	97.2
#200	0.075	96.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.3
Sand (%):	2.8
Fines (%):	96.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	PL (-)	PI (-)	Engineering Classification
B6-3 (15')	20L284	36.7	96.9	44	21	23	CL - Lean clay

Note(s):

01-26-2021
AA, NSR

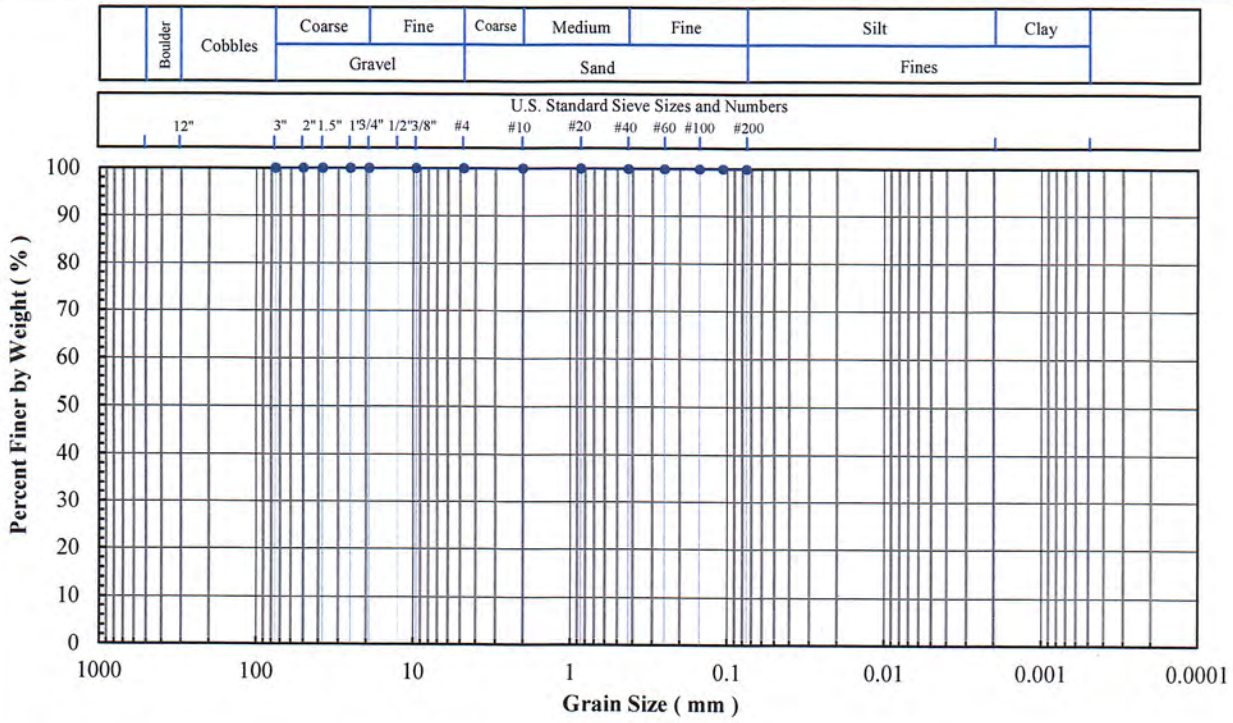
Excel Geotechnical Testing, Inc.
"Excellence in Testing"
953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B6-7 (35')
Lab Sample No:	20L288

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

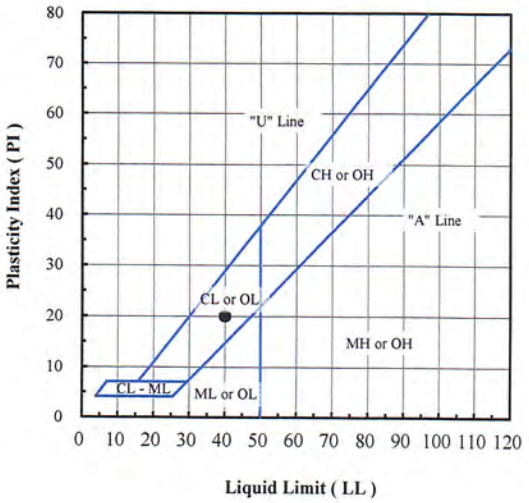


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	100.0
#20	0.850	100.0
#40	0.425	99.9
#60	0.250	99.9
#100	0.150	99.9
#140	0.106	99.9
#200	0.075	99.9

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.1
Fines (%):	99.9
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B6-7 (35')	20L288	37.8	99.9	40	20	20	CL - Lean clay

Note(s):

01-26-2021
AA, NSR

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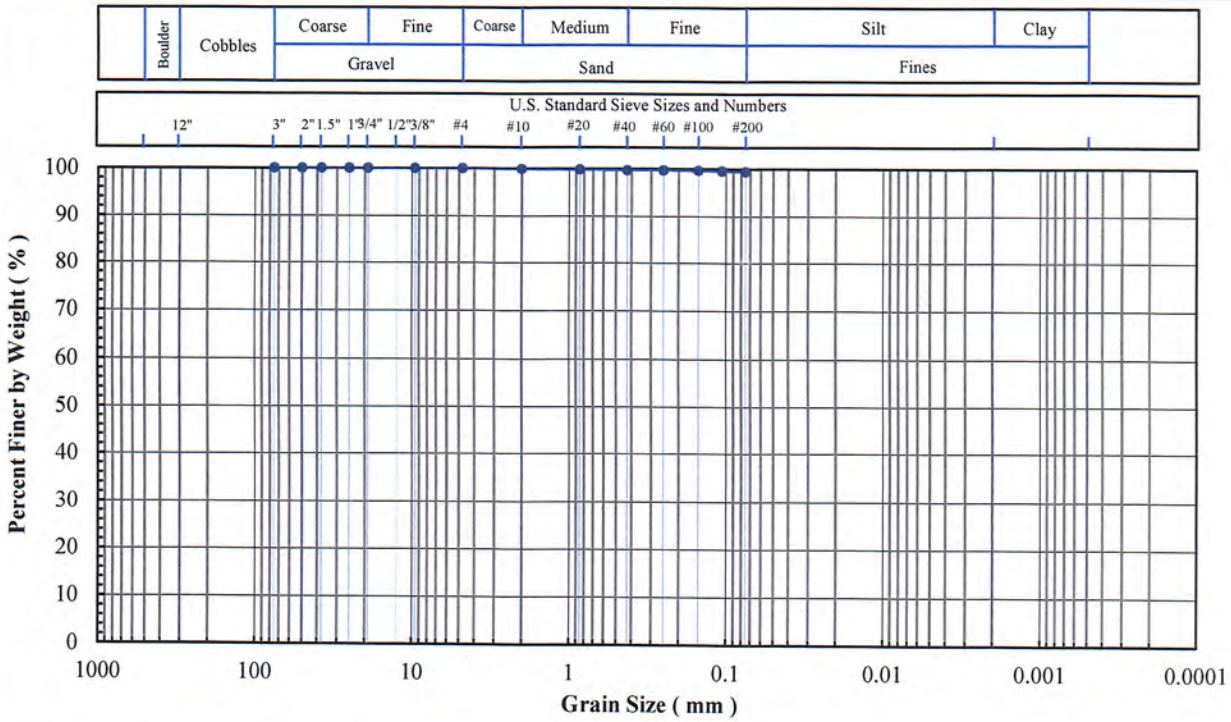
Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B6-11 (55')
Lab Sample No:	20L292

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

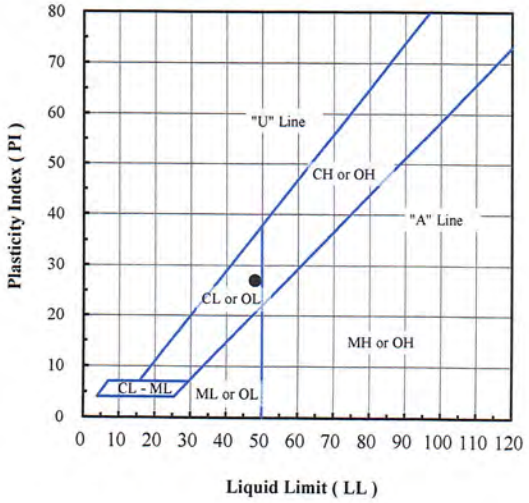


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	100.0
#10	2.00	99.9
#20	0.850	99.8
#40	0.425	99.7
#60	0.250	99.7
#100	0.150	99.6
#140	0.106	99.5
#200	0.075	99.4

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	
Sand (%):	0.6
Fines (%):	99.4
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B6-11 (55')	20L292	38.7	99.4	48	21	27	CL - Lean Clay

Note(s):

01-26-2021
AA, NSR

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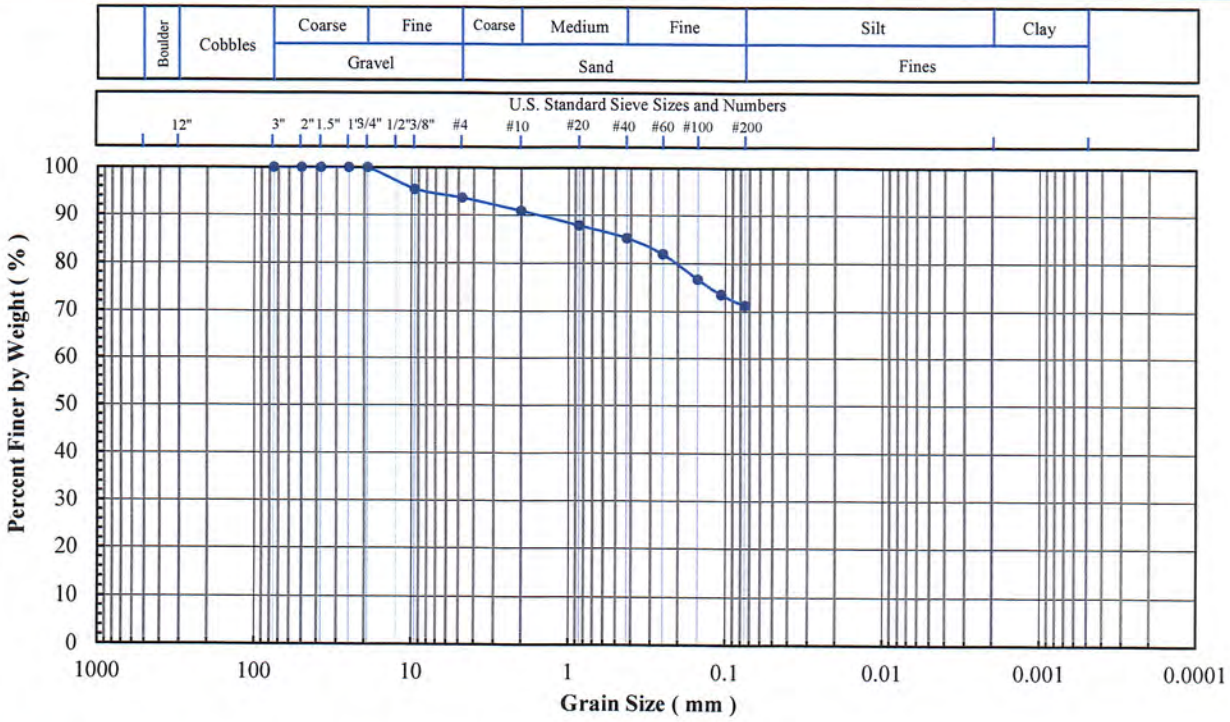
Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B6-15 (75')
Lab Sample No:	20L296

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

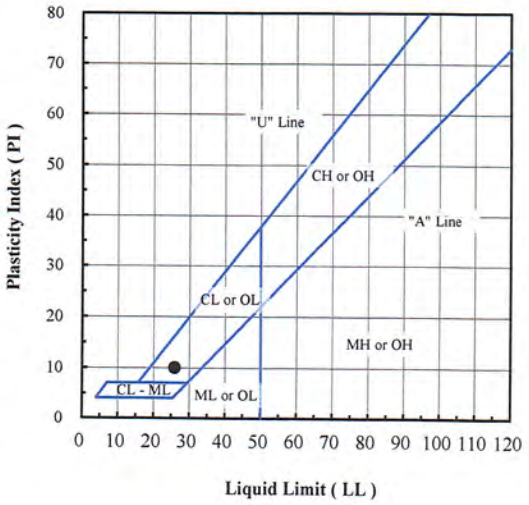


Sieve No.	Size (mm)	% Finer
3"	75	100
2"	50	100
1.5"	37.5	100
1"	25	100
3/4"	19	100
3/8"	9.5	95
#4	4.75	94
#10	2.00	91
#20	0.850	88
#40	0.425	85
#60	0.250	82
#100	0.150	77
#140	0.106	74
#200	0.075	71

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	6
Sand (%):	23
Fines (%):	71
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B6-15 (75')	20L296	20.5	71	26	16	10	CL - Lean clay with sand

Note(s): Sieve specimen was undersized.

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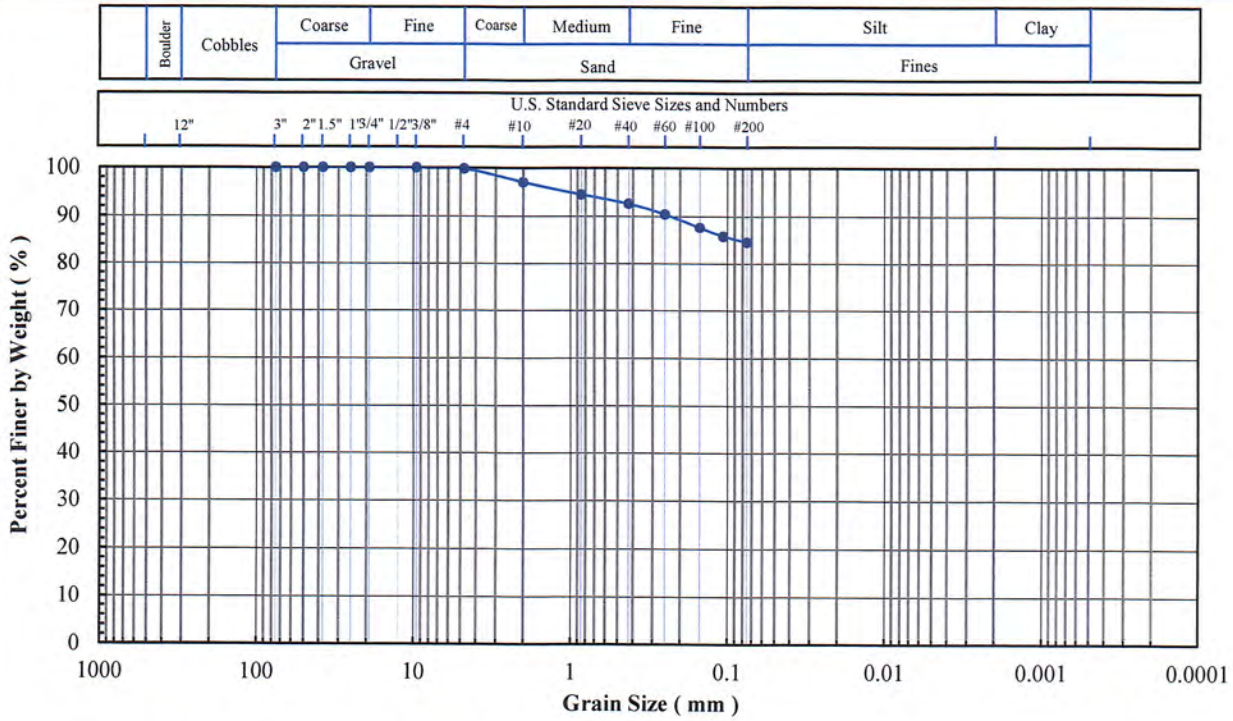
Project Name:	Belle River ALD Support
Project No:	PN1017
Client Sample ID:	B6-19 (95')
Lab Sample No:	20L300

ASTM C136, D422, D854, D1140, D2216, D2487, D2974, D4318, D4373, D6913, D7928

SOIL INDEX PROPERTIES

Grain Size, Spec. Gravity, Moist. Cont, Eng. Classification, Organic Content, Atterberg Limits, Carbonate Content

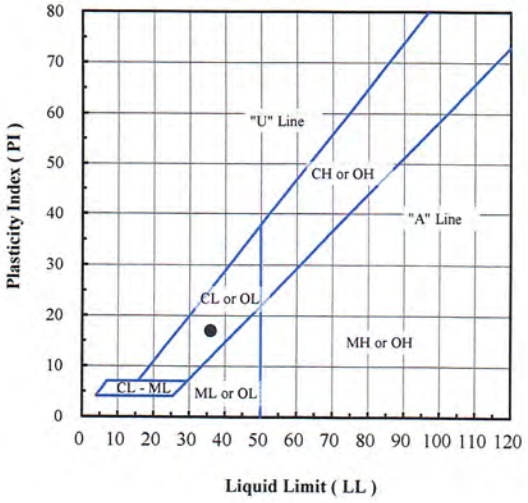


Sieve No.	Size (mm)	% Finer
3"	75	100.0
2"	50	100.0
1.5"	37.5	100.0
1"	25	100.0
3/4"	19	100.0
3/8"	9.5	100.0
#4	4.75	99.8
#10	2.00	97.0
#20	0.850	94.5
#40	0.425	92.6
#60	0.250	90.4
#100	0.150	87.6
#140	0.106	85.8
#200	0.075	84.6

Hydrometer Particle Diameter (mm)	% Finer

Gravel (%):	0.2
Sand (%):	15.2
Fines (%):	84.6
Silt (%):	
Clay (%):	

Coeff. Unif. (Cu):	
Coeff. Curv. (Cc):	



Specific Gravity (-):	

Org. Content (%):	

Carbon. Content (%):	

Client Sample ID.	Lab Sample No:	Moisture Content (%)	Fines Content < No. 200 (%)	Atterberg Limits LL (-)	Atterberg Limits PL (-)	Atterberg Limits PI (-)	Engineering Classification
B6-19 (95')	20L300	26.5	84.6	36	19	17	CL - Lean clay with sand

Note(s):

01-26-2021
AA, NSR

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D5084

Project Name:	Belle River ALD Support
Project Number:	PN1017
Client Name:	Geosyntec Consultants
Site Sample ID:	B1-ST-3 (36-38')
Lab Sample Number:	20L145
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/26/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions / Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	(cm/s)
ST	3.43	7.37	89.5	35.0	53.0	50.0	3.0	DDW	12	2.2E-8
	3.47	7.04	97.4	27.6	63.00	50.0	13.0	DDW	10	2.7E-9

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D5084

Project Name:	Belle River ALD Support
Project Number:	PN1017
Client Name:	Geosyntec Consultants
Site Sample ID:	B2-ST-2 (7-9')
Lab Sample Number:	20L150
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	1/26/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions / Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	(cm/s)
ST	3.54	7.22	98.2	26.8	53.0	50.0	3.0	DDW	12	2.1E-8
	3.54	7.20	98.8	26.4	54.00	50.0	4.0	DDW	12	2.0E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D5084

Project Name:	Belle River ALD Support
Project Number:	PN1017
Client Name:	Geosyntec Consultants
Site Sample ID:	B2-ST-7 (97-99')
Lab Sample Number:	20L155
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	2/15/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions / Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	(cm/s)
ST	3.53	7.24	110.9	20.3	53.0	50.0	3.0	DDW	3	3.3E-8
	3.50	7.16	114.2	18.5	77.00	50.0	27.0	DDW	6	2.2E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

* Deviations:

Laboratory temperature at 22±3 °C.

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D5084

Project Name:	Belle River ALD Support
Project Number:	PN1017
Client Name:	Geosyntec Consultants
Site Sample ID:	B3-ST-1 (1-3')
Lab Sample Number:	20L156
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	2/8/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions / Specimen Final Conditions				Test Conditions					Hydraulic Conductivity (cm/s)
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	
ST	3.53	7.17	111.4	19.1	53.0	50.0	3.0	DDW	8	9.6E-9
	3.62	7.29	104.7	22.7						

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-21-2021
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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D5084

Project Name:	Belle River ALD Support
Project Number:	PN1017
Client Name:	Geosyntec Consultants
Site Sample ID:	B4-ST-4 (67-69')
Lab Sample Number:	20L165
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	2/15/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions / Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	(cm/s)
ST	3.53	7.23	129.8	11.6	53.0	50.0	3.0	DDW	5	2.8E-8
	3.55	7.21	129.5	11.1	69.00	50.0	19.0	DDW	10	1.8E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D5084

Project Name:	Belle River ALD Support
Project Number:	PN1017
Client Name:	Geosyntec Consultants
Site Sample ID:	B5-ST-2 (27-29')
Lab Sample Number:	20L169
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	2/15/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions / Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	(cm/s)
ST	3.49	7.34	85.9	36.8	53.0	50.0	3.0	DDW	9	3.4E-8
	3.48	7.02	93.4	30.7	60.00	50.0	10.0	DDW	4	2.1E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-21-2021
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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D5084

Project Name:	Belle River ALD Support
Project Number:	PN1017
Client Name:	Geosyntec Consultants
Site Sample ID:	B6-ST-4 (47-49')
Lab Sample Number:	20L177
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	2/17/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions / Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	(cm/s)
ST	3.49	7.32	86.6	38.3	53.0	50.0	3.0	DDW	5	2.5E-8
	3.45	7.16	93.3	29.6	65.00	50.0	15.0	DDW	10	1.8E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-21-2021
AK, NSR

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FLEXIBLE WALL PERMEABILITY TEST [1]

ASTM D5084

Project Name:	Belle River ALD Support
Project Number:	PN1017
Client Name:	Geosyntec Consultants
Site Sample ID:	B6-ST-7 (97-99')
Lab Sample Number:	20L180
Material Type:	Soil
Specified Value (cm/sec):	NA
Date Test Started:	2/17/2021

Specimen Type (See Note2) (-)	Specimen Initial Conditions / Specimen Final Conditions				Test Conditions					Hydraulic Conductivity
	Spec. Length (cm)	Spec. Diameter (cm)	Dry Unit Weight (pcf)	Moisture Content (%)	Cell Press. (psi)	Back Press. (psi)	Consolid. Press. (psi)	Permeant Liquid [3] (-)	Average Gradient (-)	(cm/s)
ST	3.53	7.29	104.1	23.5	53.0	50.0	3.0	DDW	4	2.4E-8
	3.51	7.18	108.3	21.0	76.00	50.0	26.0	DDW	9	1.2E-8

Notes:

1. Method C, "Falling-Head, Increasing-Tailwater" test procedures were followed during the testing.
2. Specimen preparation: ST = Shelby Tube, R = Remolded, B = Block Sample.
3. Type of permeant liquid: DTW = Deaired Tap Water, DDW = Deaired Deionized (Distilled) Water

7-21-2021
APK, MSK

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LAST PAGE

Test Applicability and Limitations:

- The results are applicable only for the materials received at the laboratory and tested which may or may not be representative of the materials at the site.

Storage Policy:

- Uncontaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter the samples will be discarded unless a written request for extended storage is received. A rate of $1.00 per sample per day will be applied after the initial 3 month storage period.

- Contaminated Material: All samples (or what is left) will be archived for a period of 3 months from the date received. Thereafter, the samples will be returned to the project manager or his/her designated receiver unless a written request for extended storage is received. A rate of $1.30 per sample per day will be applied after the initial 3 months storage.

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Appendix I1

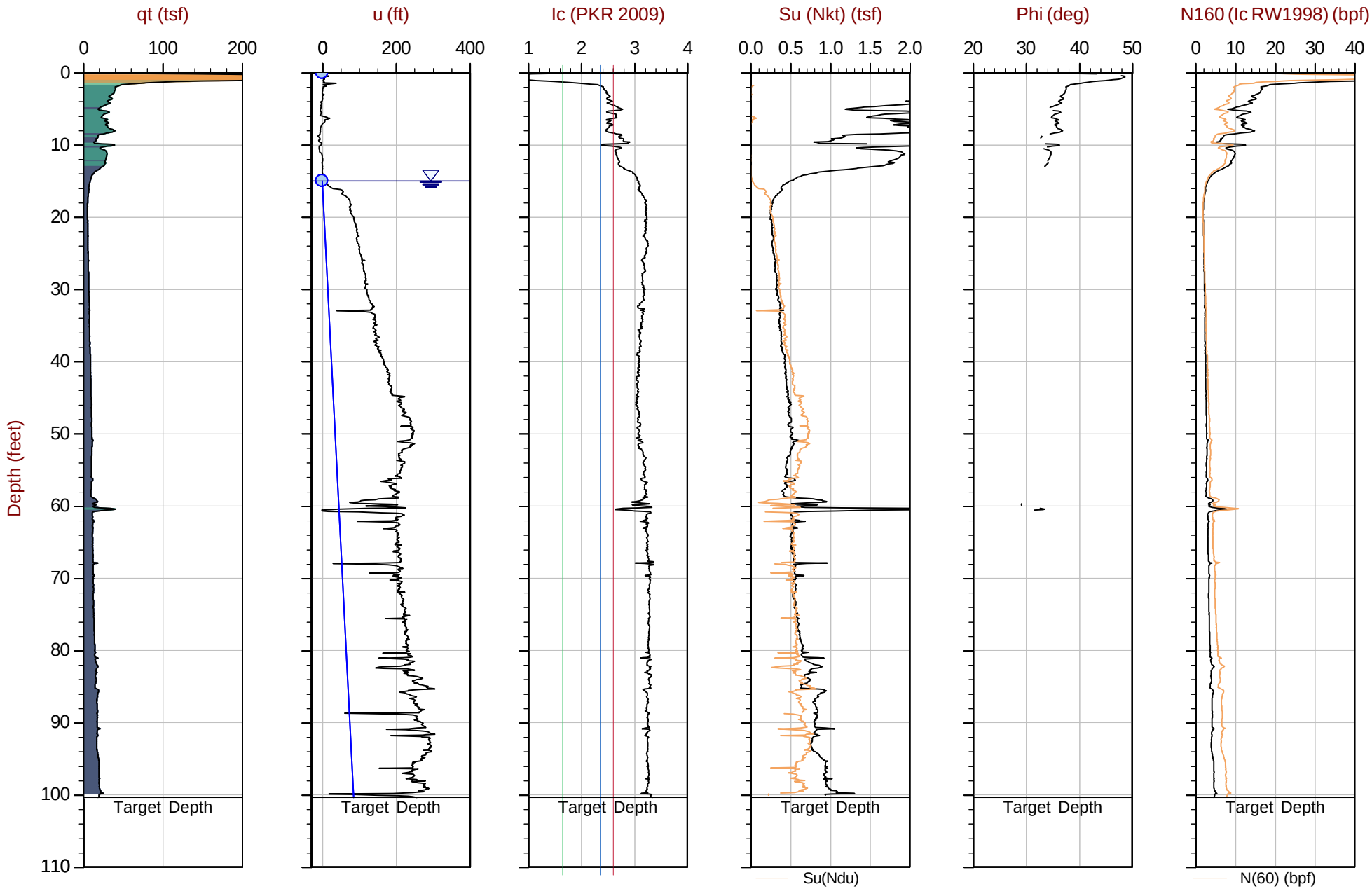
CPT Logs

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-10 14:55
Site: DTE Belle River Power Plant

Sounding: CPT20-01
Cone: 551:T1500F15U500



Max Depth: 30.600 m / 100.39 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP01.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

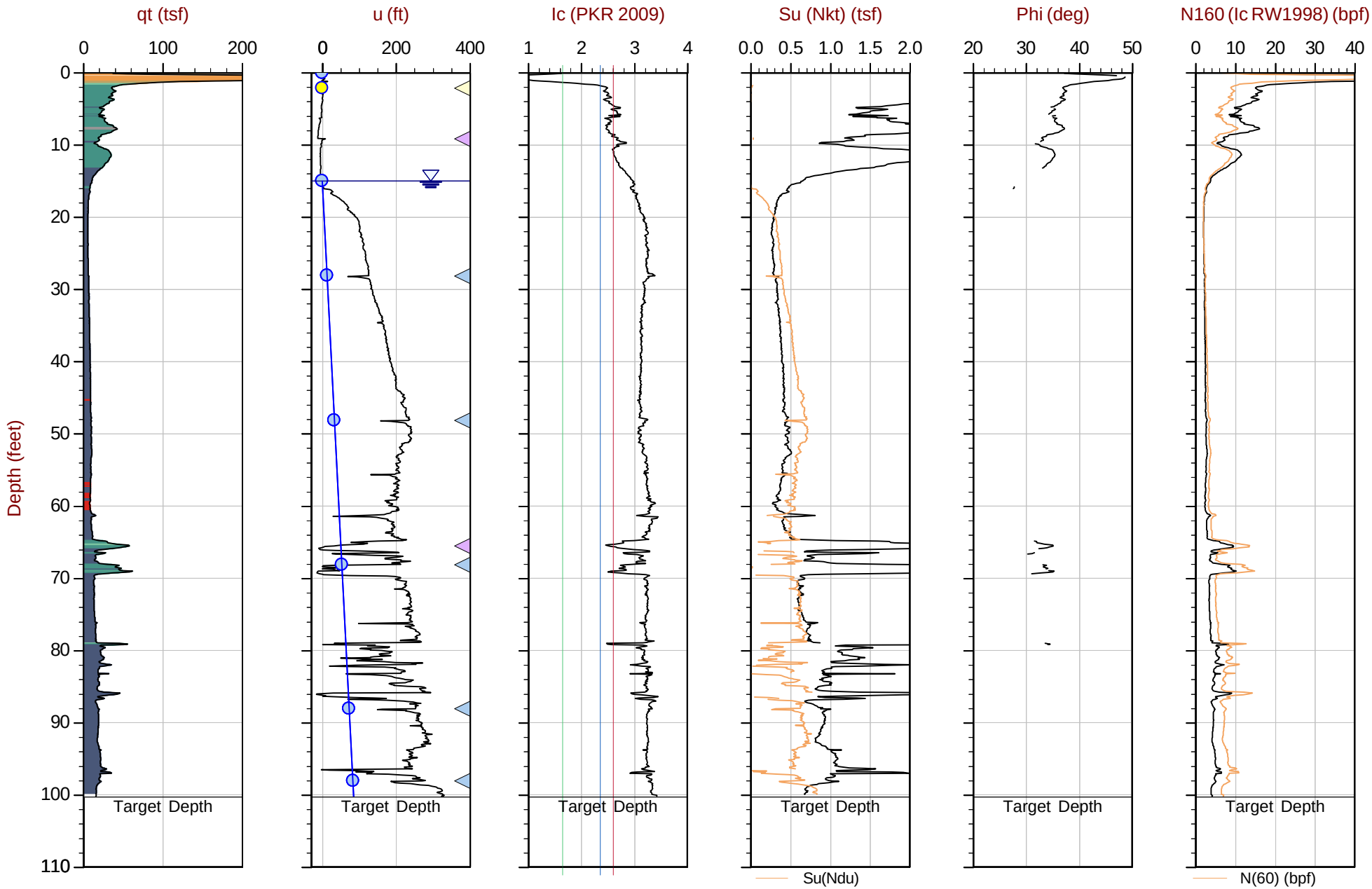
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470985ft E: 13625925ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-11 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP01B.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

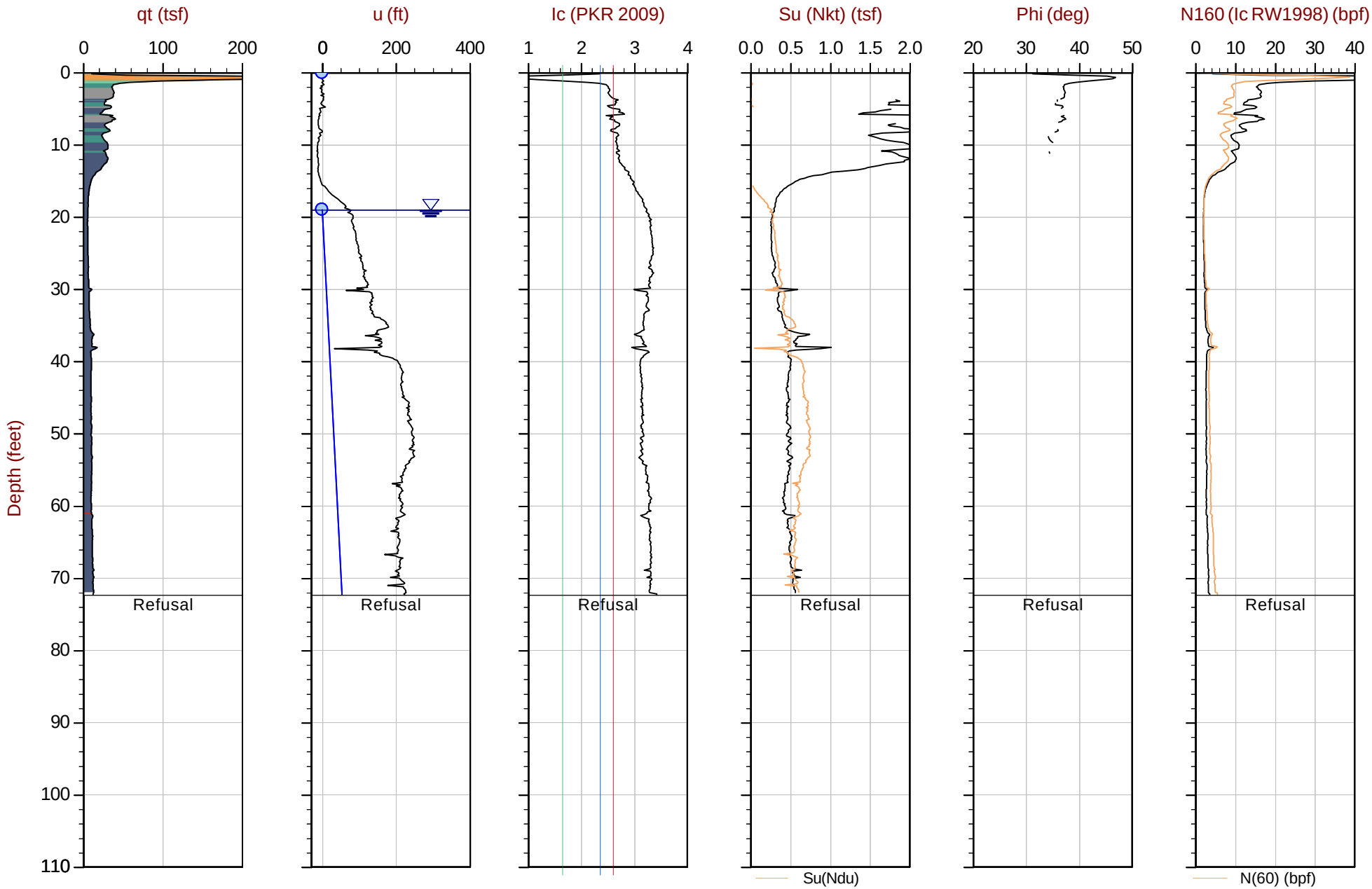
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470980ft E: 13625906ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-09 12:28
Site: DTE Belle River Power Plant

Sounding: CPT20-02
Cone: 513:T1500F15U500



Max Depth: 22.050 m / 72.34 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP02.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

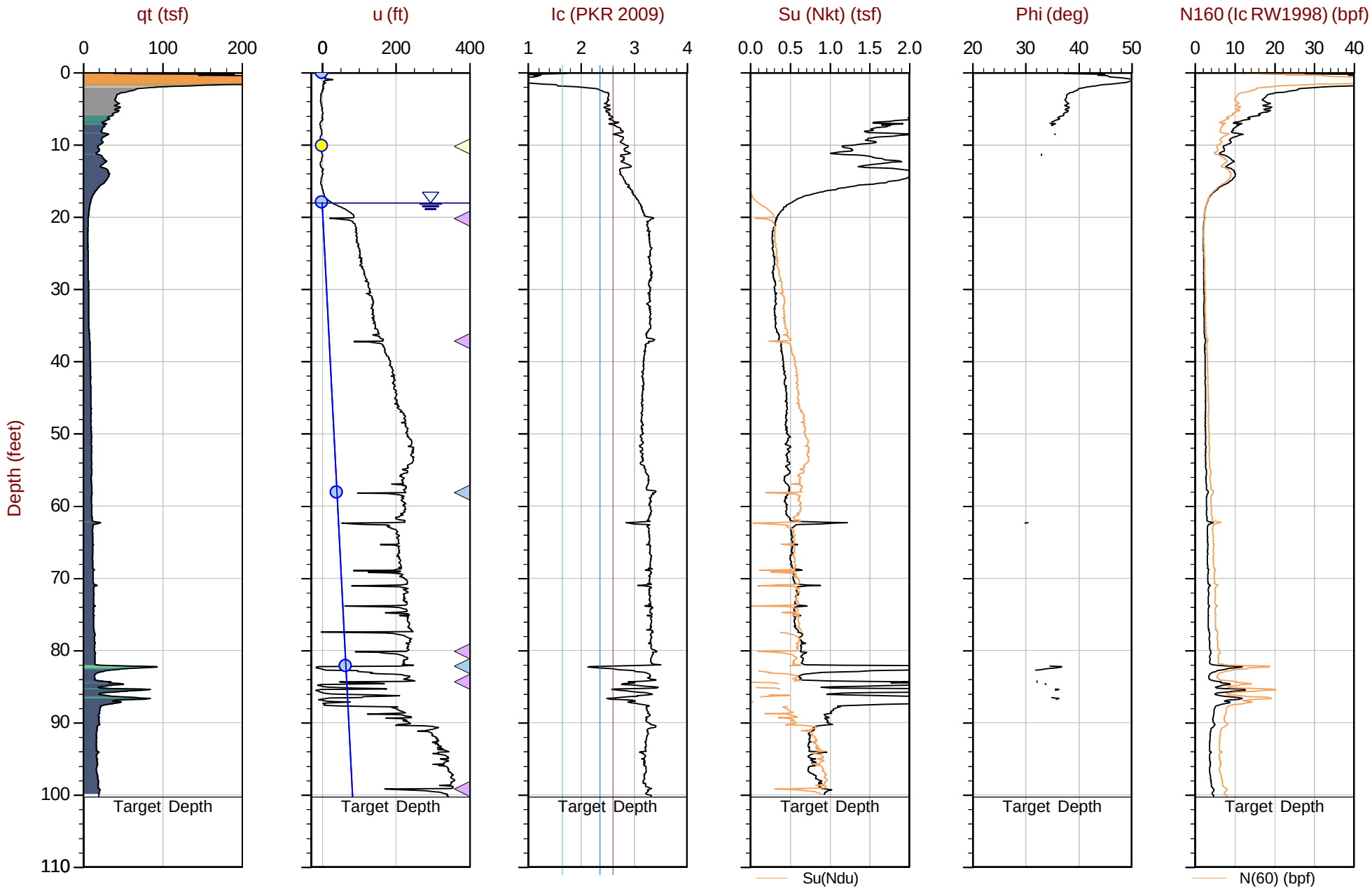
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470997ft E: 13626119ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-09 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP03.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

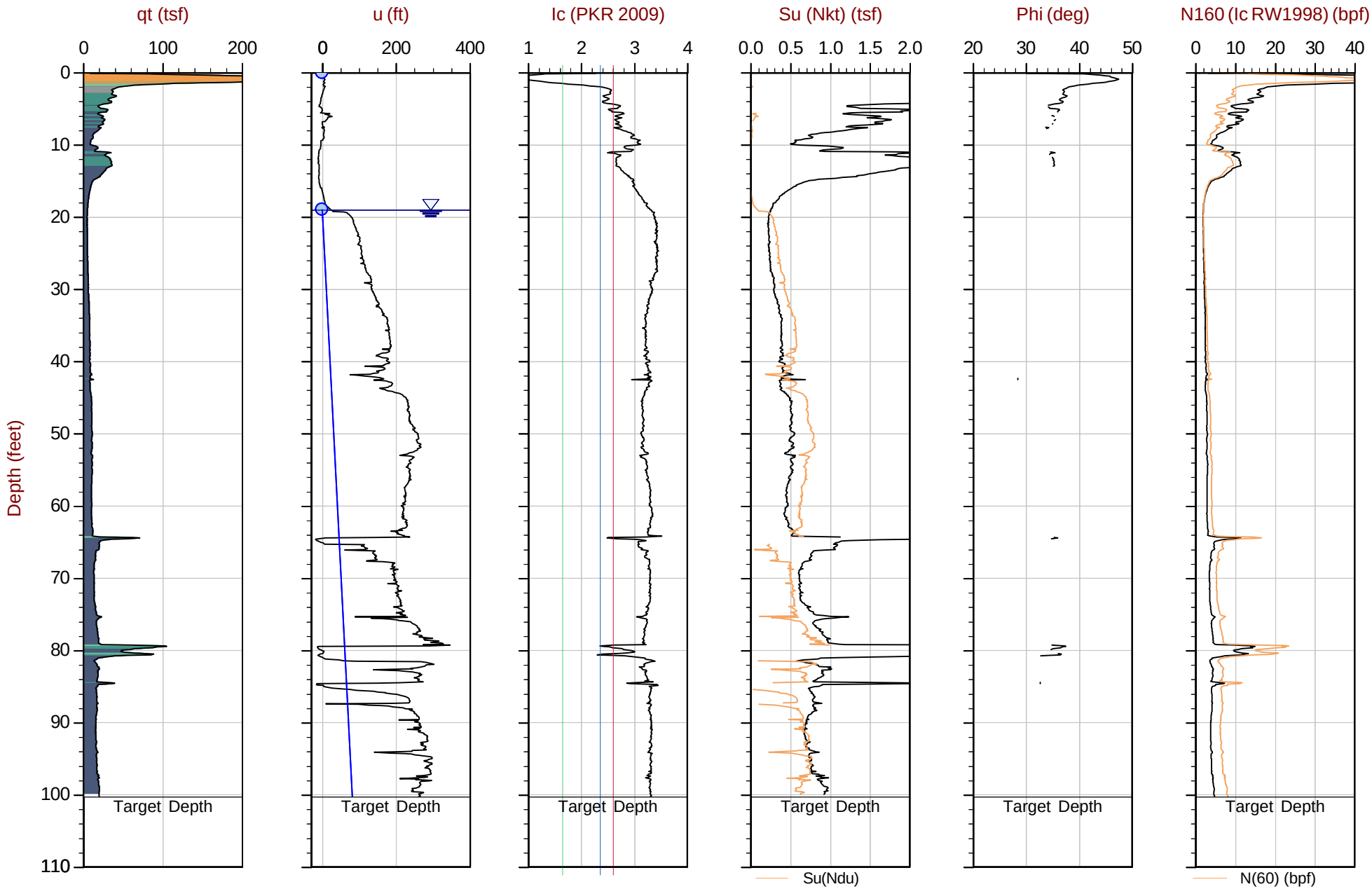
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 471039ft E: 13626171ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-09 11:05
Site: DTE Belle River Power Plant

Sounding: CPT20-04
Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP04.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

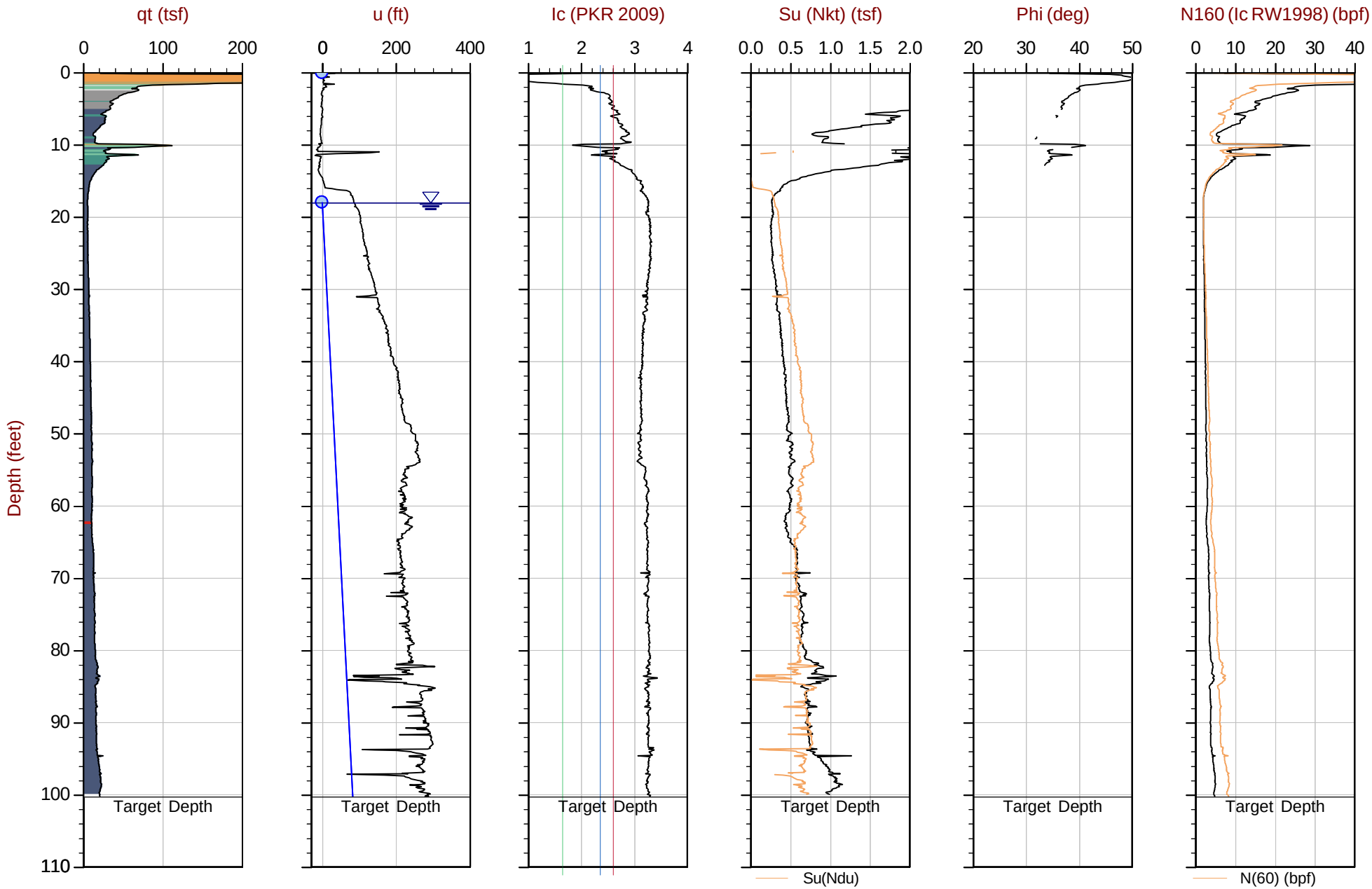
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 471237ft E: 13626152ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-09 12:02
Site: DTE Belle River Power Plant

Sounding: CPT20-05
Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP05.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

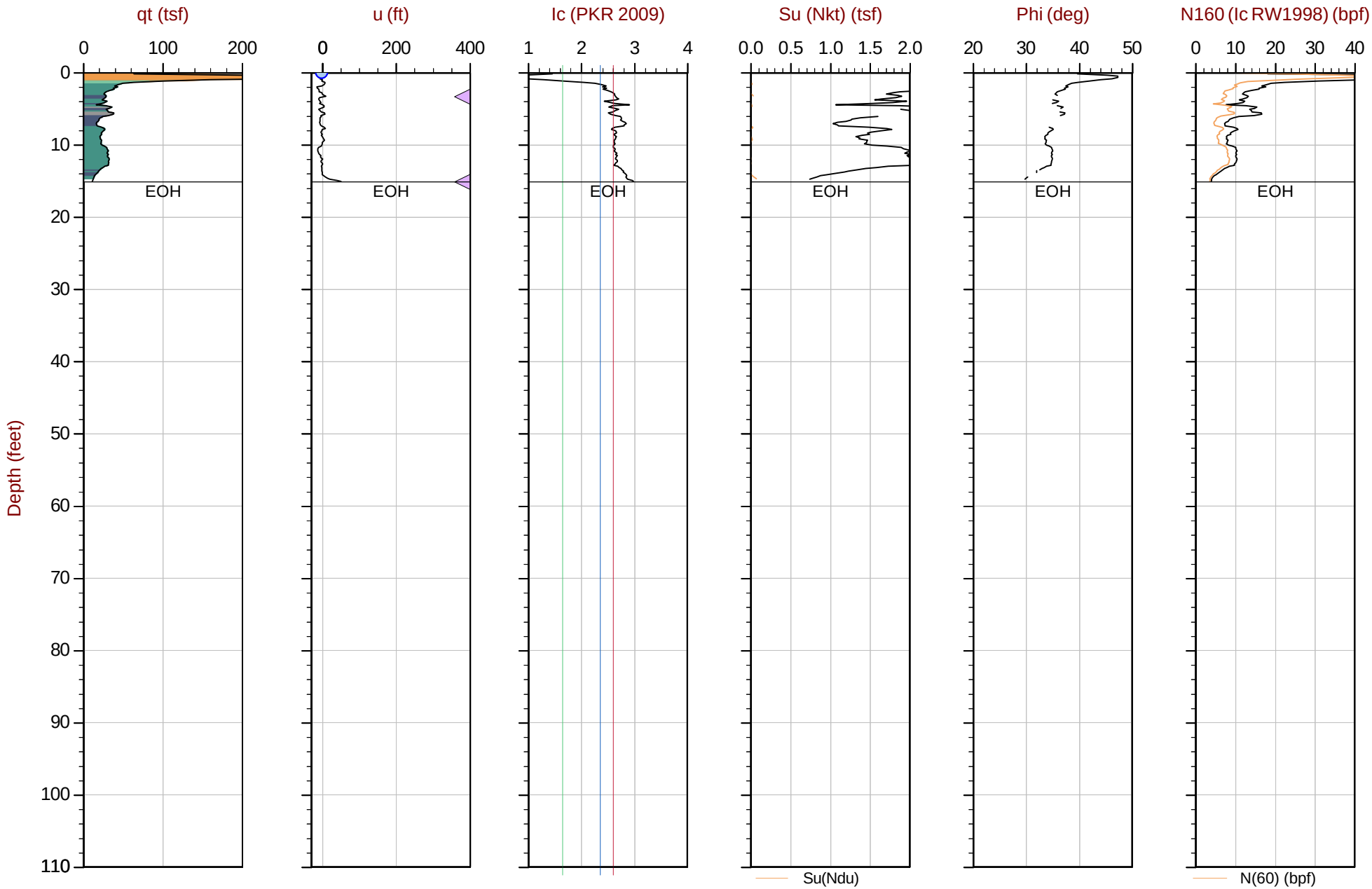
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 471243ft E: 13625954ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-09 13:54
Site: DTE Belle River Power Plant

Sounding: CPT20-06
Cone: 513:T1500F15U500



Max Depth: 4.600 m / 15.09 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21681_CP06.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 471221ft E: 13625753ft
Sheet No: 1 of 1

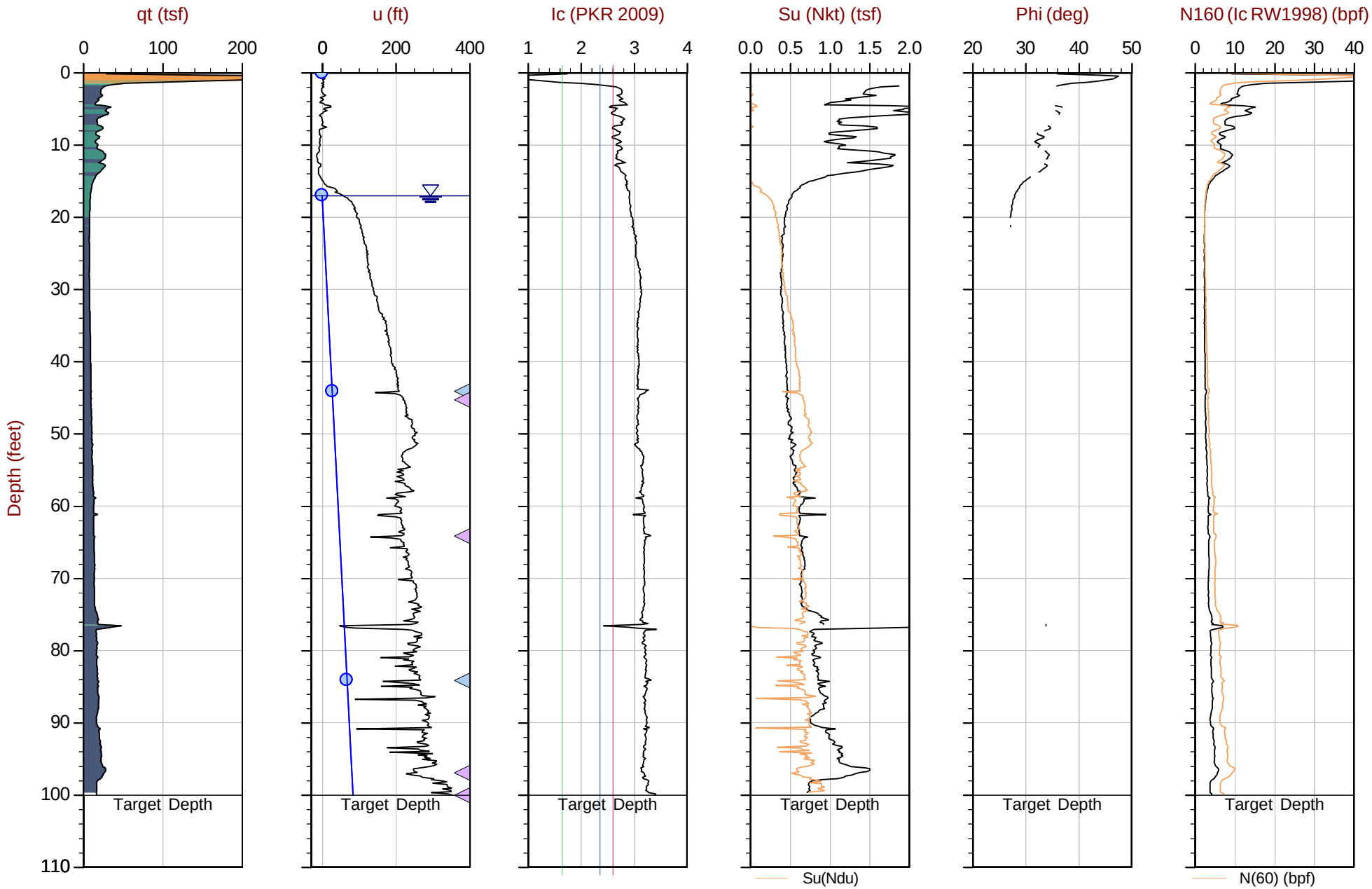
Overplot Item: Ueq | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Dissipation, Ueq assumed | Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-10 08:43
Site: DTE Belle River Power Plant

Sounding: CPT20-06B
Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP06B.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

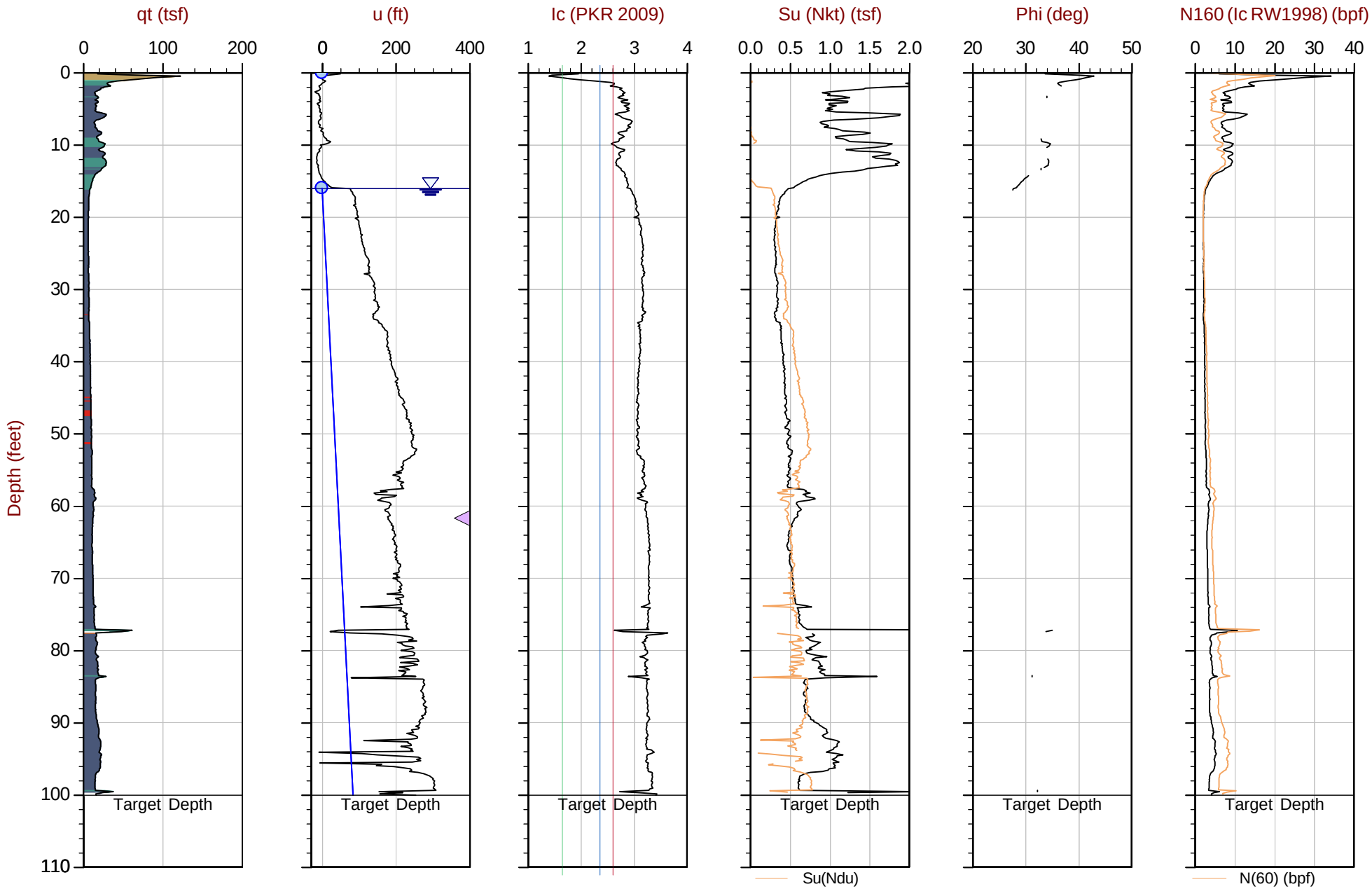
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 471216ft E: 13625742ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-09 11:04
Site: DTE Belle River Power Plant

Sounding: CPT20-07
Cone: 513:T1500F15U500



Max Depth: 30.500 m / 100.06 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21681_CP07.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 471015ft E: 13625752ft
Sheet No: 1 of 1

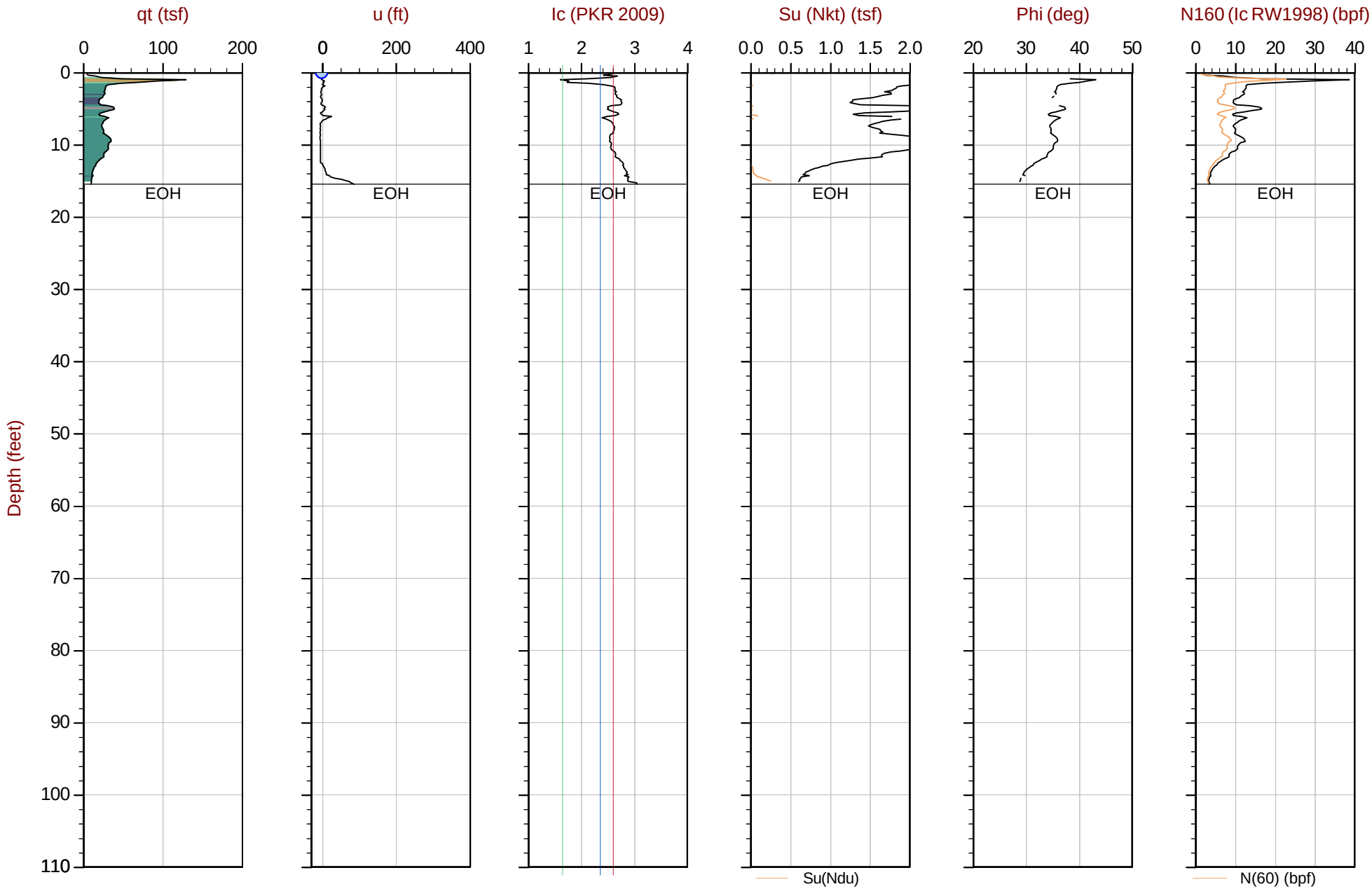
Overplot Item: Ueq | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Dissipation, Ueq assumed | Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-11 12:09
Site: DTE Belle River Power Plant

Sounding: CPT20-08
Cone: 568:T1500F15U500



Max Depth: 4.700 m / 15.42 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP08.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

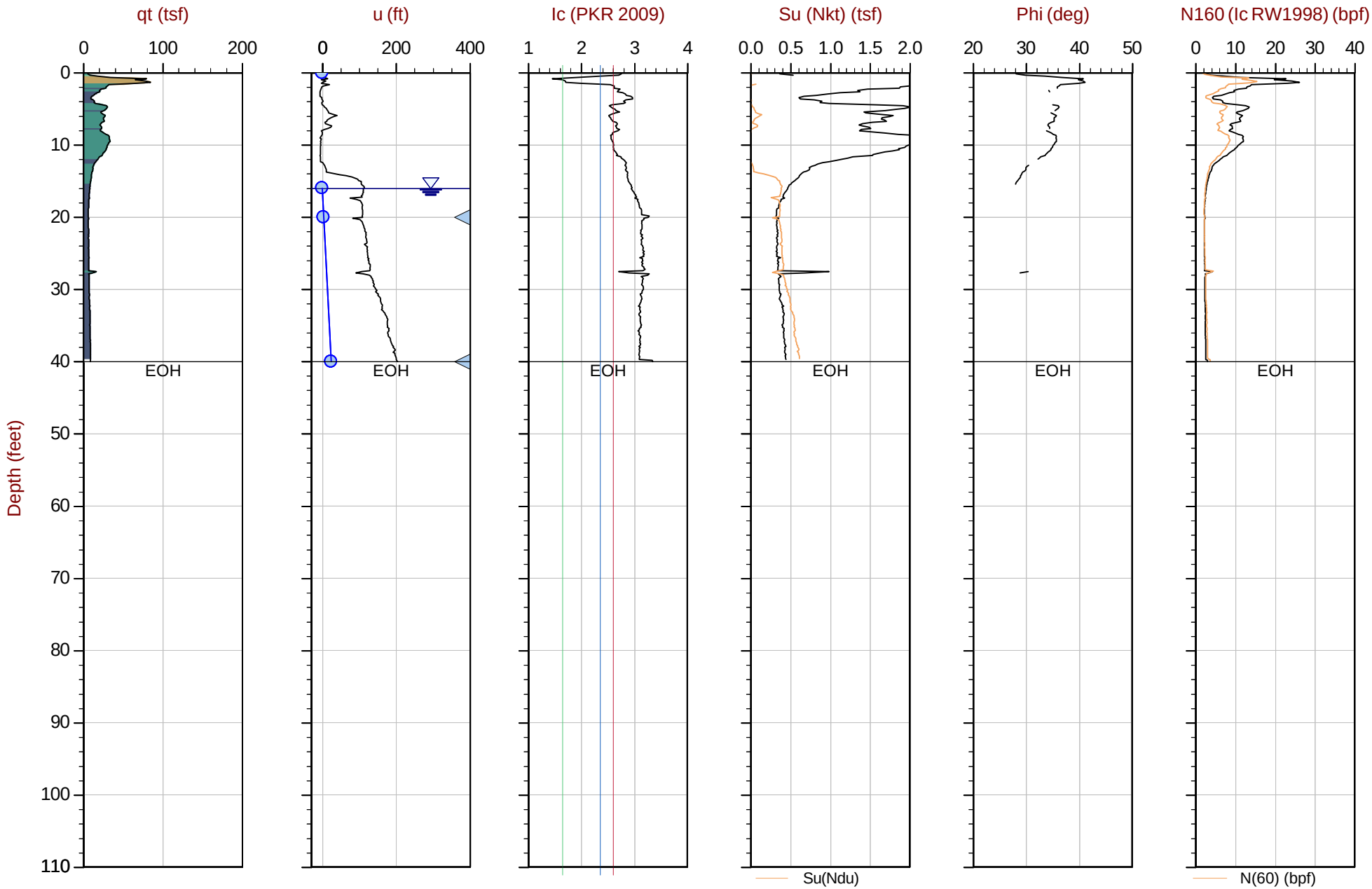
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470392ft E: 13626398ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-11 12:35
Site: DTE Belle River Power Plant

Sounding: CPT20-08B
Cone: 568:T1500F15U500



Max Depth: 12.200 m / 40.03 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq

File: 20-61-21681_CP08B.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470382ft E: 13626396ft
Sheet No: 1 of 1

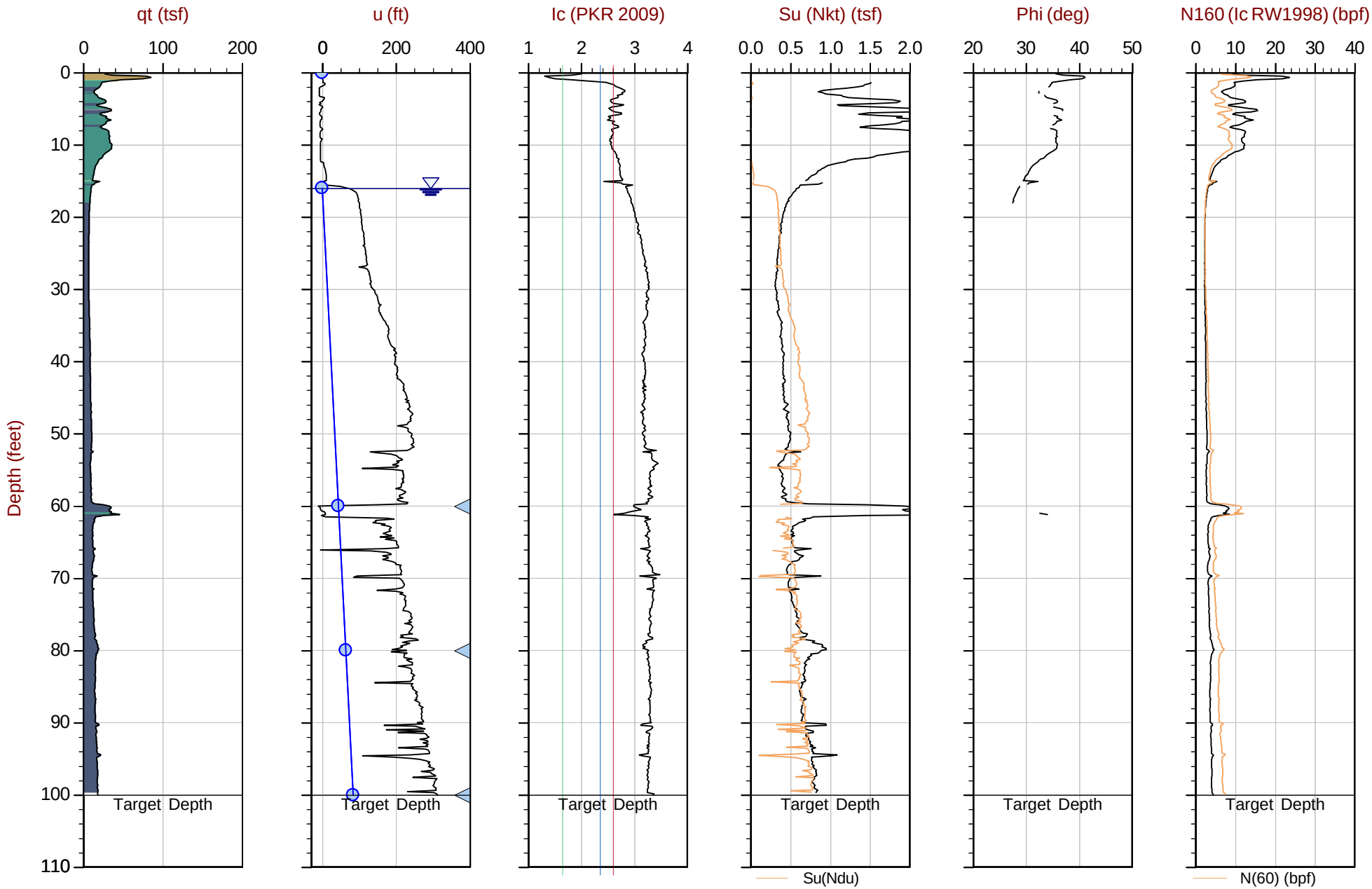
Dissipation, Ueq achieved; Dissipation, Ueq not achieved; Dissipation, Ueq assumed; Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-15 08:41
Site: DTE Belle River Power Plant

Sounding: CPT20-08C
Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP08C.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

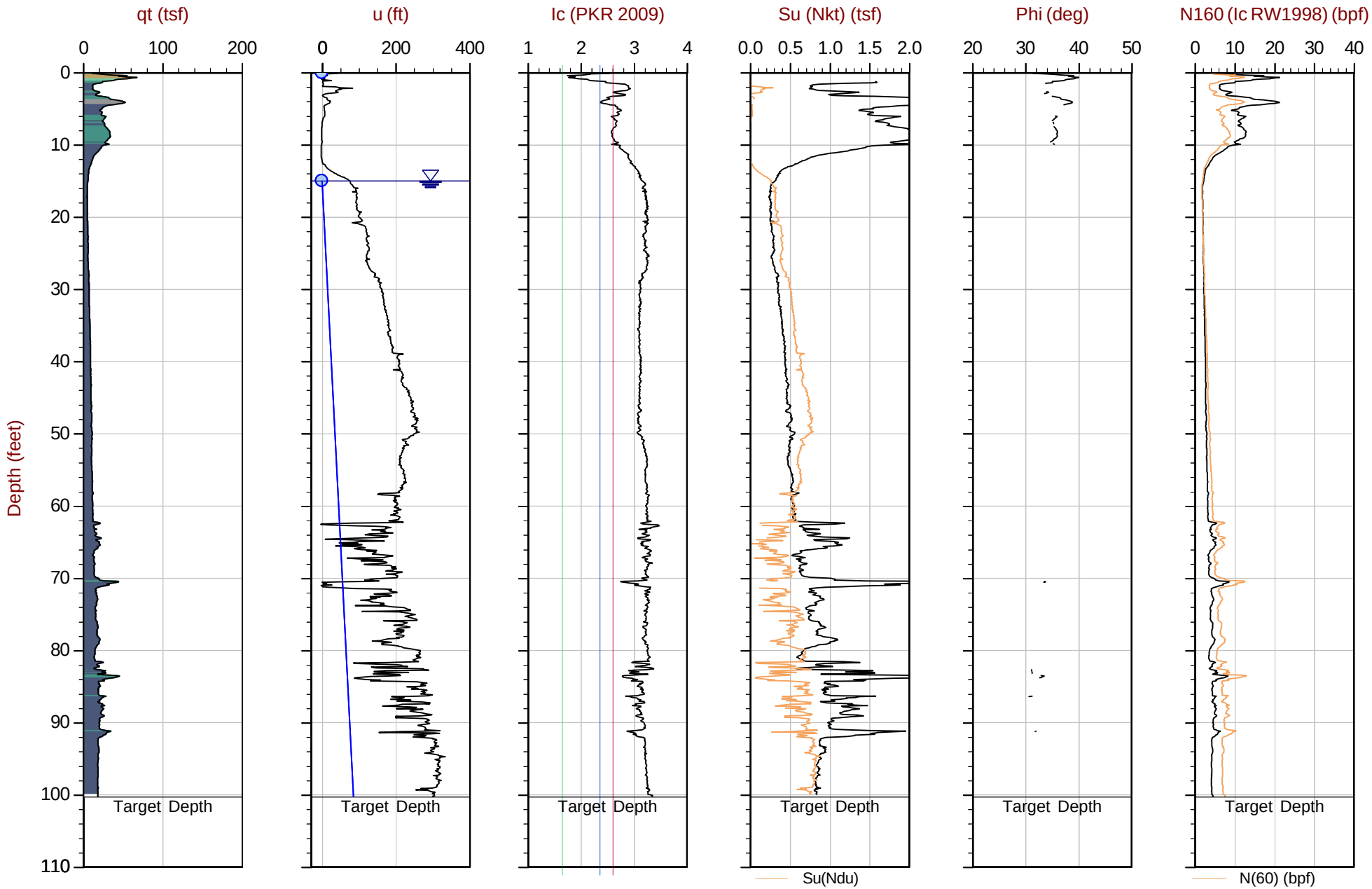
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470384ft E: 13626391ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-16 11:02
Site: DTE Belle River Power Plant

Sounding: CPT20-10.1
Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP10.1.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

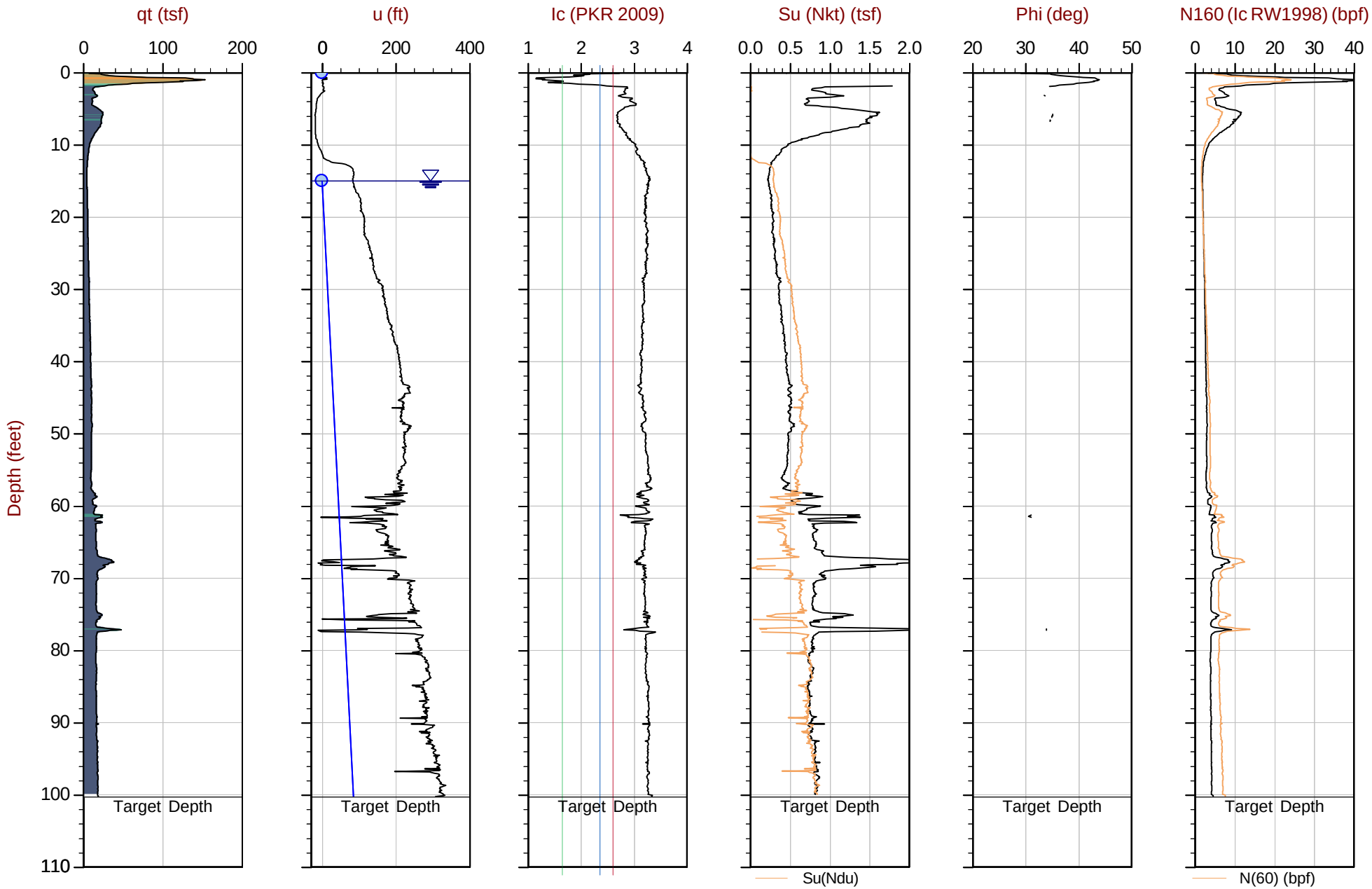
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 469861ft E: 13626732ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-16 11:53
Site: DTE Belle River Power Plant

Sounding: CPT20-10A
Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq

File: 20-61-21681_CP10A.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 469934ft E: 13626592ft
Sheet No: 1 of 1

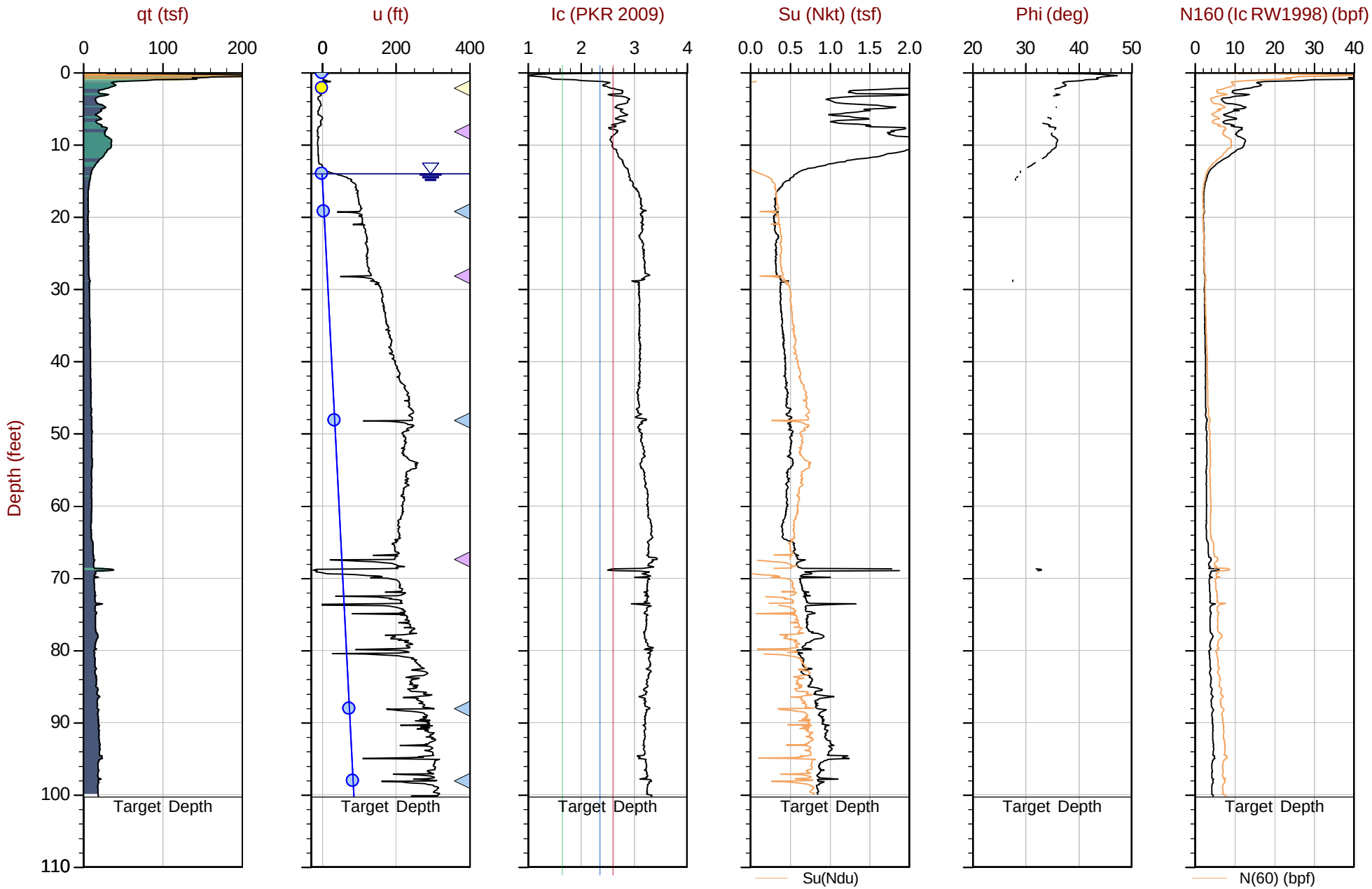
Dissipation, Ueq achieved; Dissipation, Ueq not achieved; Dissipation, Ueq assumed; Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-15 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500



Max Depth: 30.575 m / 100.31 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq not achieved, Dissipation, Ueq assumed, Hydrostatic Line

File: 20-61-21681_CP11.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

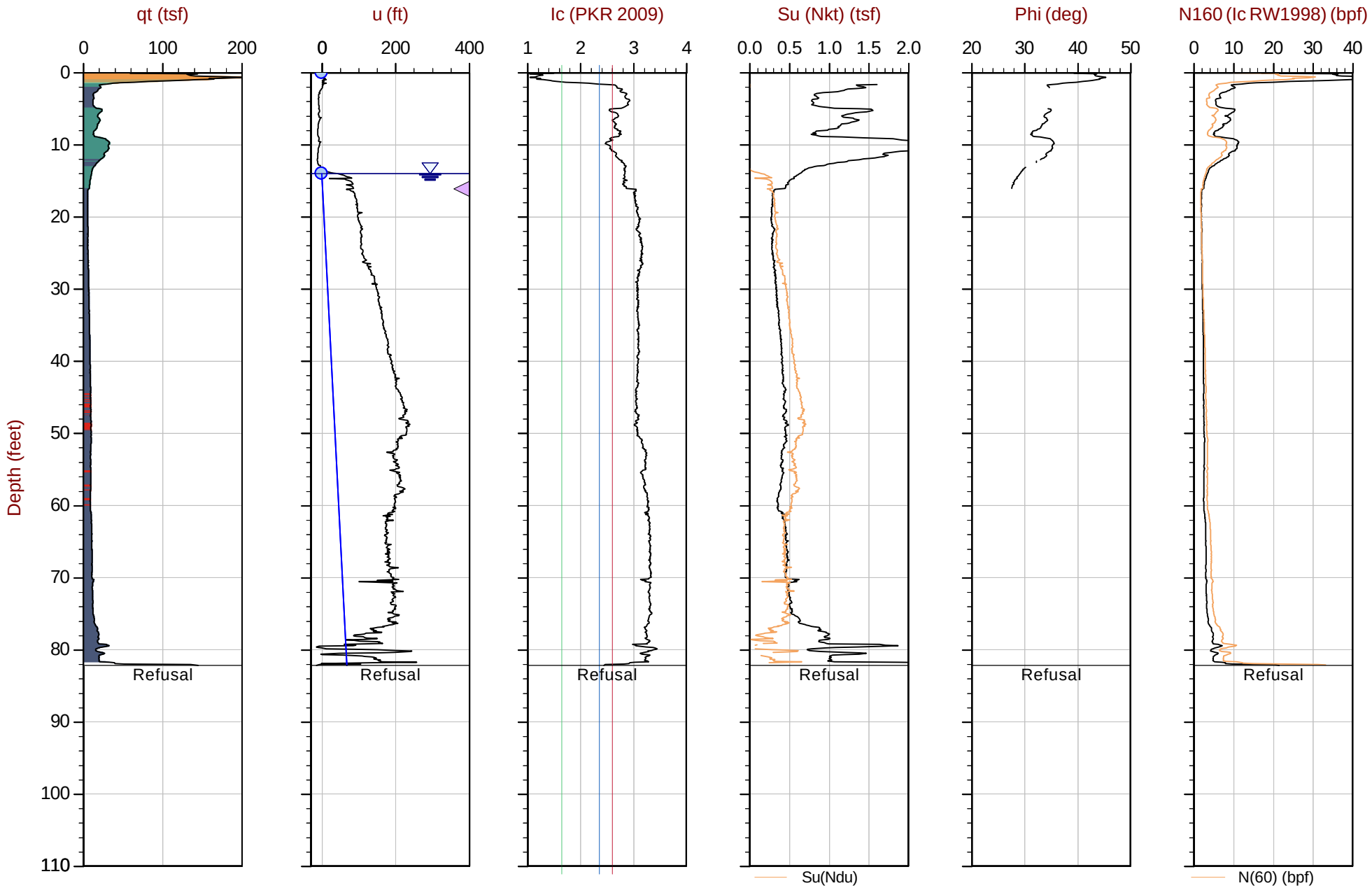
SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 469979ft E: 13626765ft
Sheet No: 1 of 1

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-15 08:44
Site: DTE Belle River Power Plant

Sounding: CPT20-12
Cone: 551:T1500F15U500



Max Depth: 25.050 m / 82.18 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq

File: 20-61-21681_CP12.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470292ft E: 13626802ft
Sheet No: 1 of 1

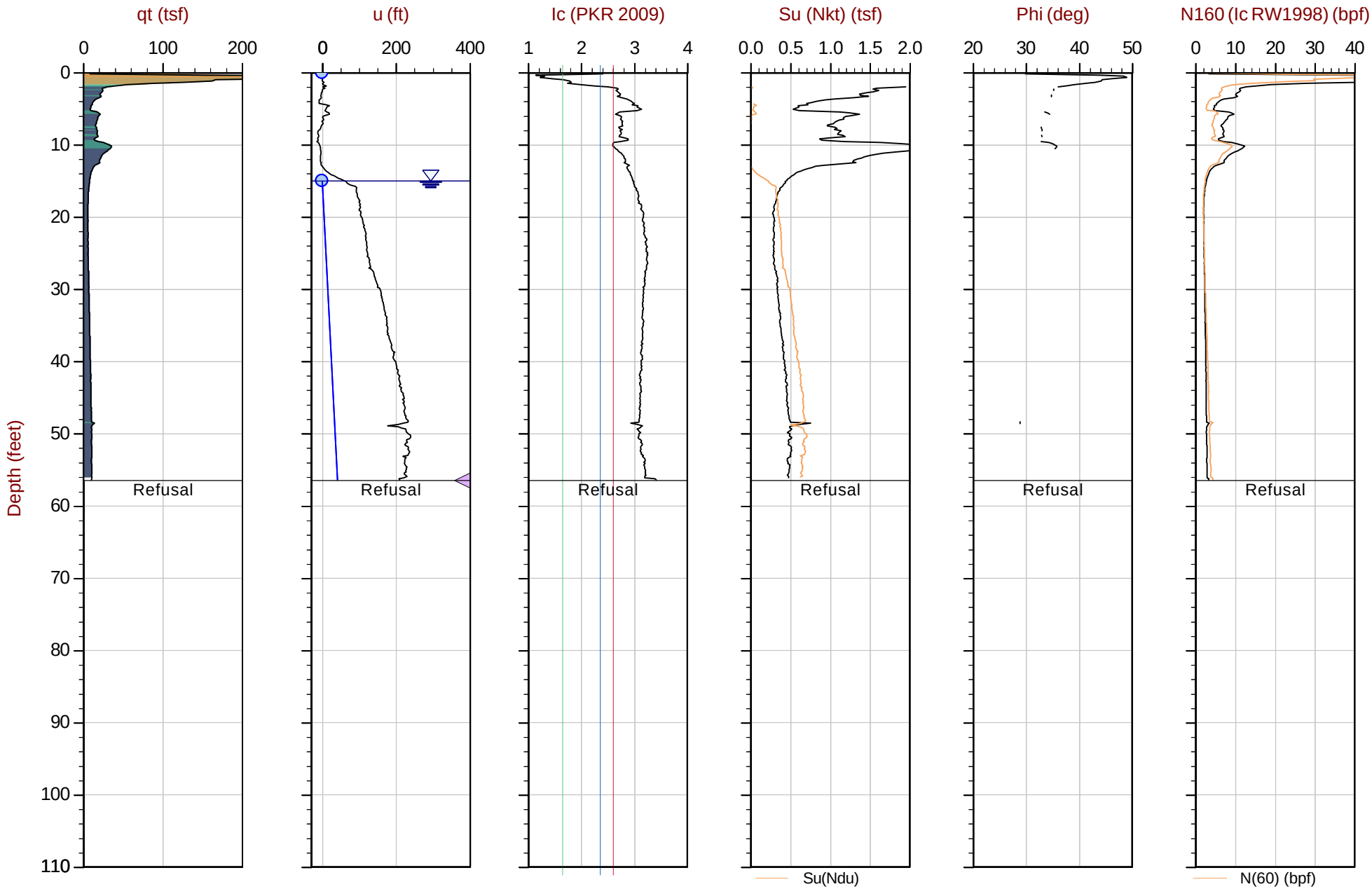
Dissipation, Ueq achieved; Dissipation, Ueq not achieved; Dissipation, Ueq assumed; Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-10 15:00
Site: DTE Belle River Power Plant

Sounding: CPT20-13
Cone: 513:T1500F15U500



Max Depth: 17.200 m / 56.43 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point
Overplot Item: Ueq, Assumed Ueq

File: 20-61-21681_CP13.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470478ft E: 13626800ft
Sheet No: 1 of 1

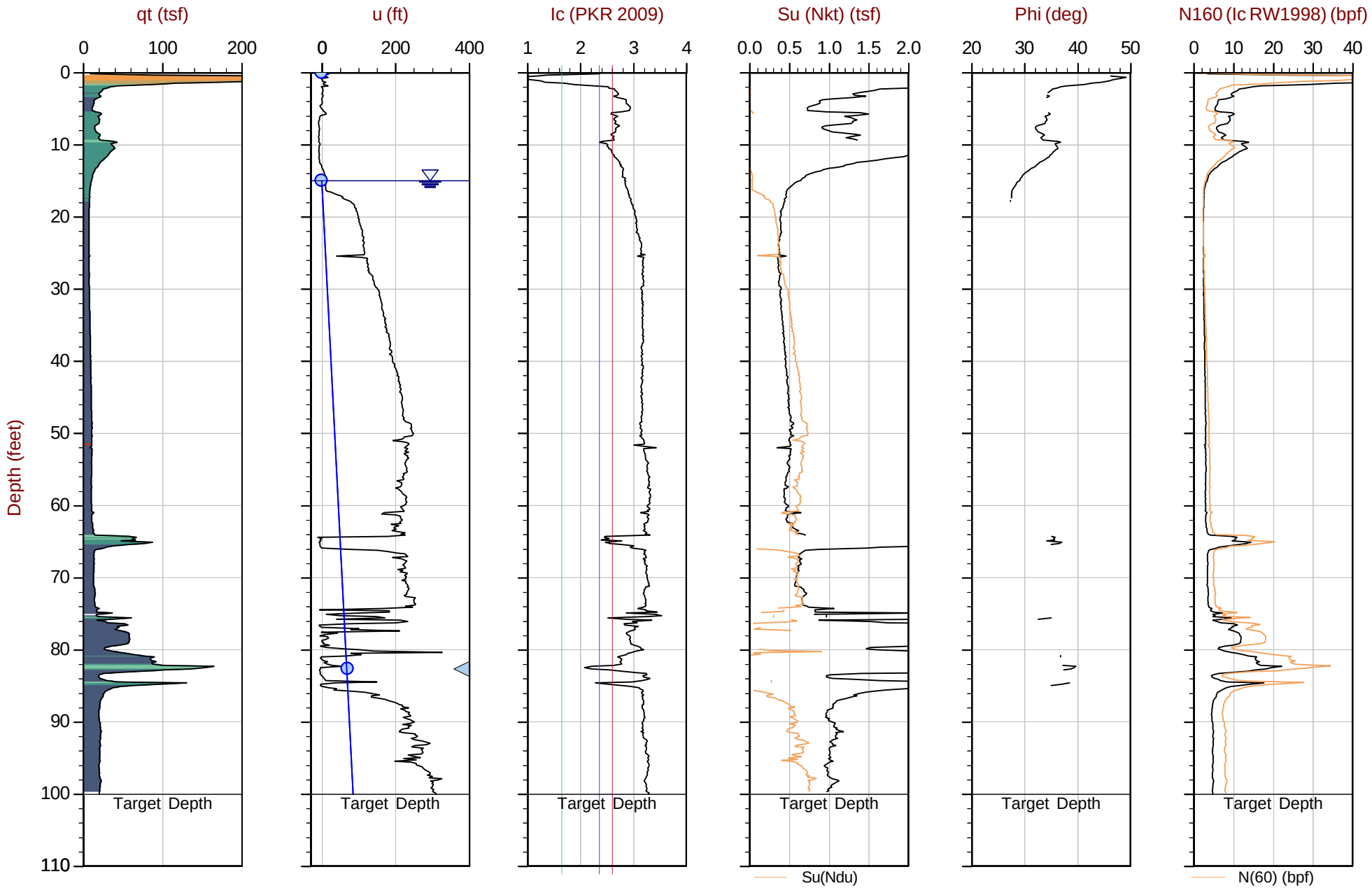
Dissipation, Ueq achieved; Dissipation, Ueq not achieved; Dissipation, Ueq assumed; Hydrostatic Line

CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-11 09:09
Site: DTE Belle River Power Plant

Sounding: CPT20-13B
Cone: 568:T1500F15U500



Max Depth: 30.500 m / 100.06 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 20-61-21681_CP13B.COR
Unit Wt: SBTQtn (PKR2009)
Su Nkt/Ndu: 15.0 / 9.0

SBT: Robertson, 2009 and 2010
Coords: Michigan State Plane South N: 470491ft E: 13626793ft
Sheet No: 1 of 1

Overplot Item: Ueq | Assumed Ueq | Dissipation, Ueq achieved | Dissipation, Ueq not achieved | Dissipation, Ueq assumed | Hydrostatic Line

Soil Behavior Type (SBT) Scatter Plots

CONETEC

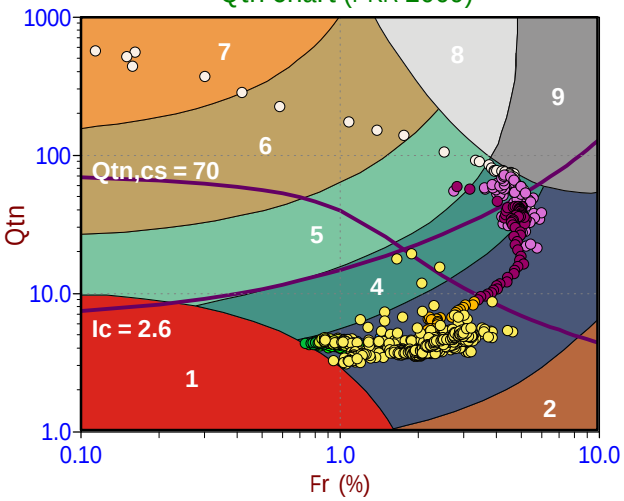
CONETEC

GeoSyntec

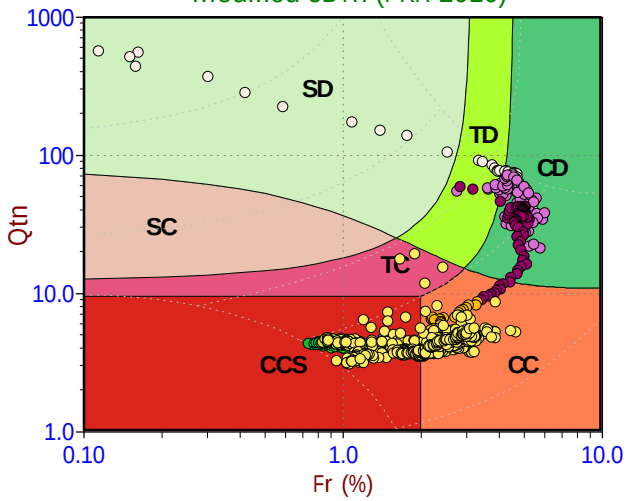
Job No: 20-61-21681
Date: 2020-12-10 14:55
Site: DTE Belle River Power Plant

Sounding: CPT20-01
Cone: 551:T1500F15U500

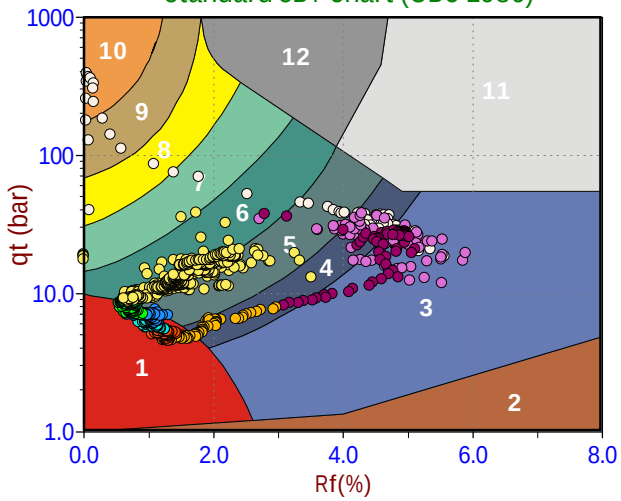
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

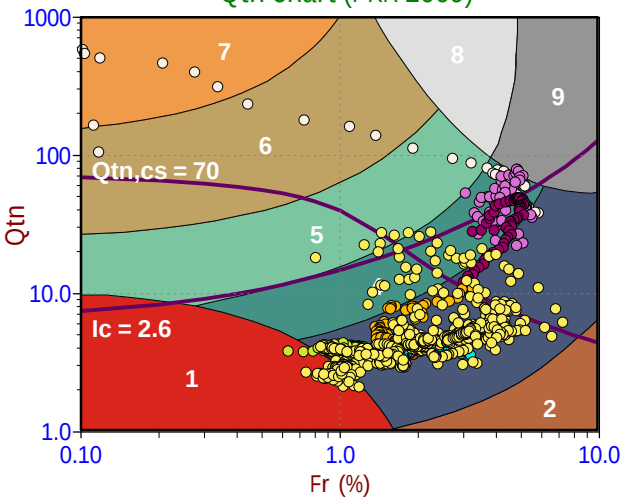
CONETEC

GeoSyntec

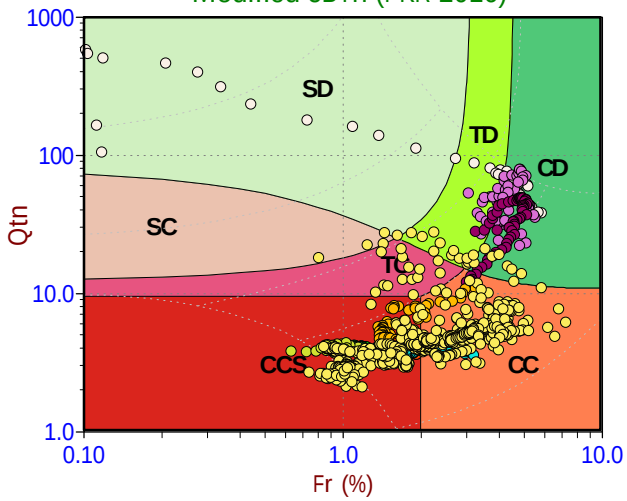
Job No: 20-61-21681
Date: 2020-12-11 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500

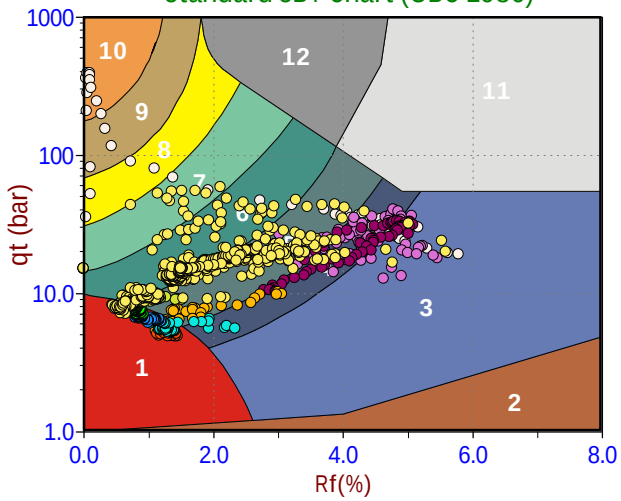
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

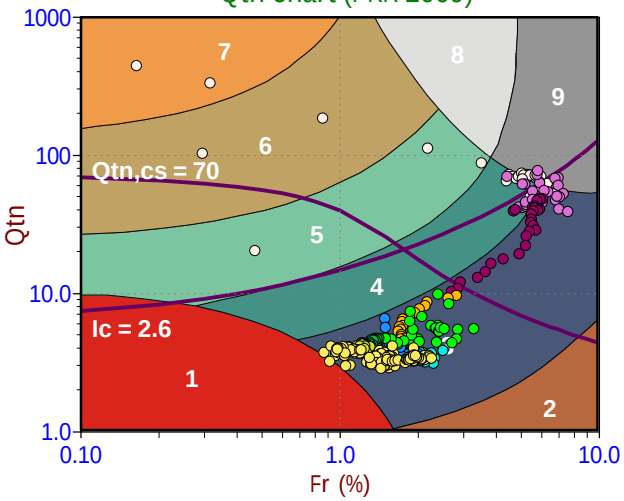
CONETEC

GeoSyntec

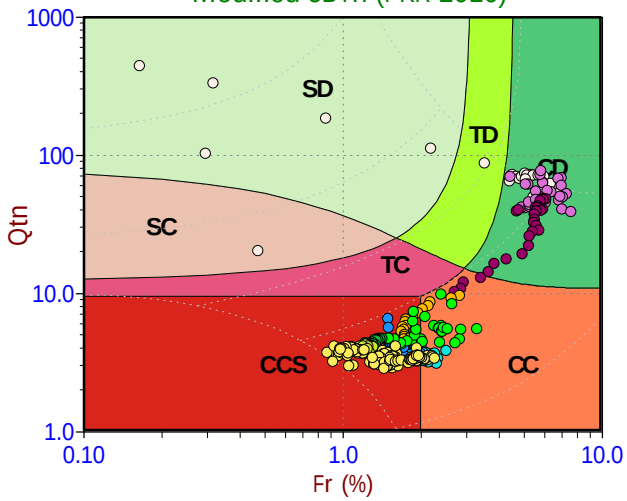
Job No: 20-61-21681
Date: 2020-12-09 12:28
Site: DTE Belle River Power Plant

Sounding: CPT20-02
Cone: 513:T1500F15U500

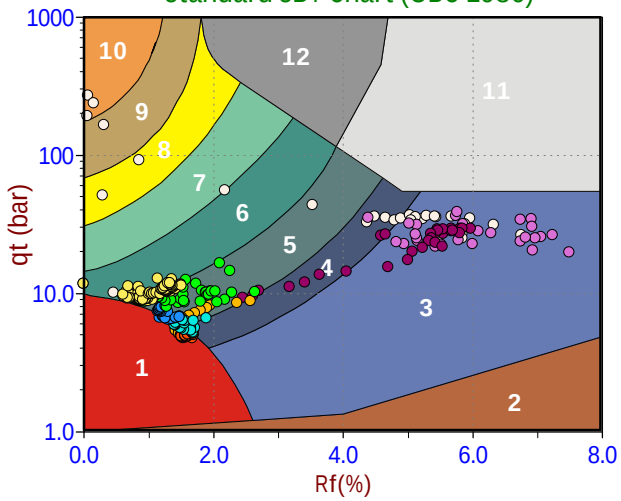
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

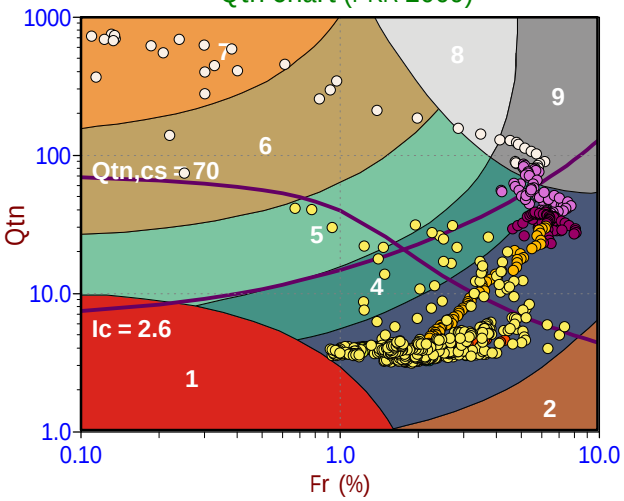
CONETEC

GeoSyntec

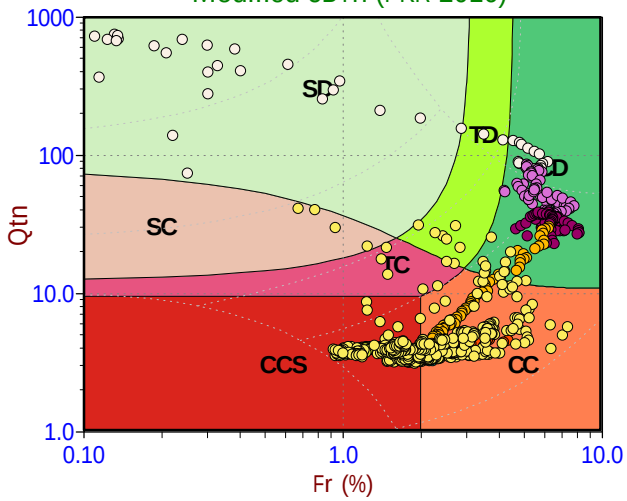
Job No: 20-61-21681
Date: 2020-12-09 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500

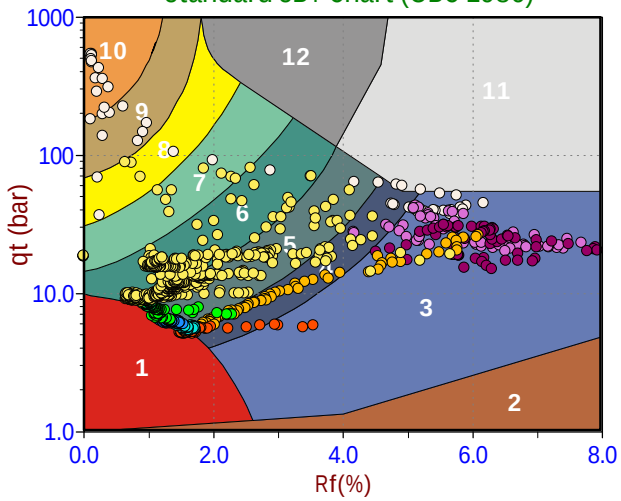
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

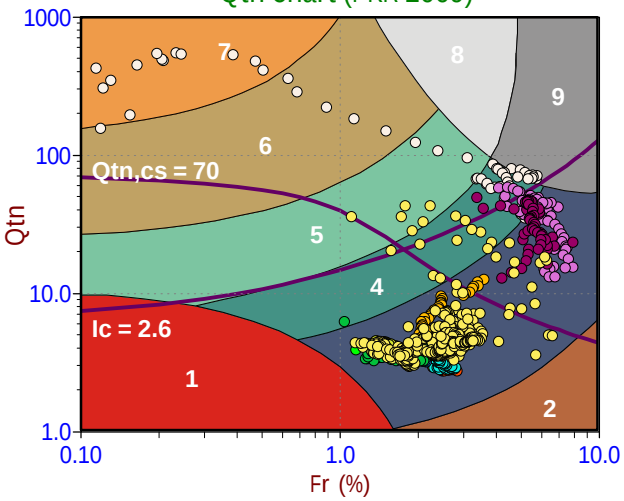
CONETEC

GeoSyntec

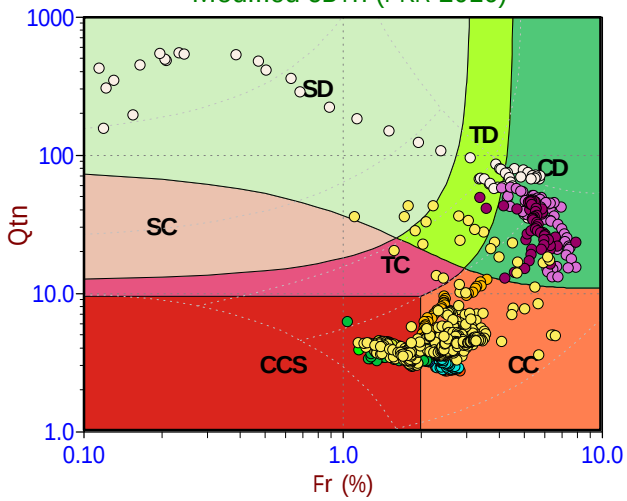
Job No: 20-61-21681
Date: 2020-12-09 11:05
Site: DTE Belle River Power Plant

Sounding: CPT20-04
Cone: 551:T1500F15U500

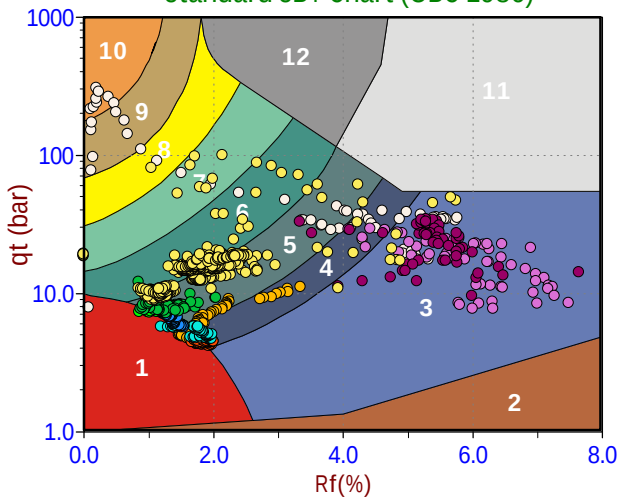
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

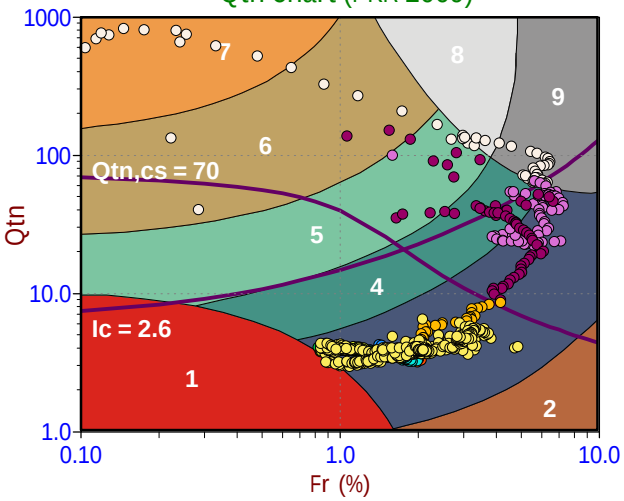
CONETEC

GeoSyntec

Job No: 20-61-21681
Date: 2020-12-09 12:02
Site: DTE Belle River Power Plant

Sounding: CPT20-05
Cone: 551:T1500F15U500

Qtn Chart (PKR 2009)



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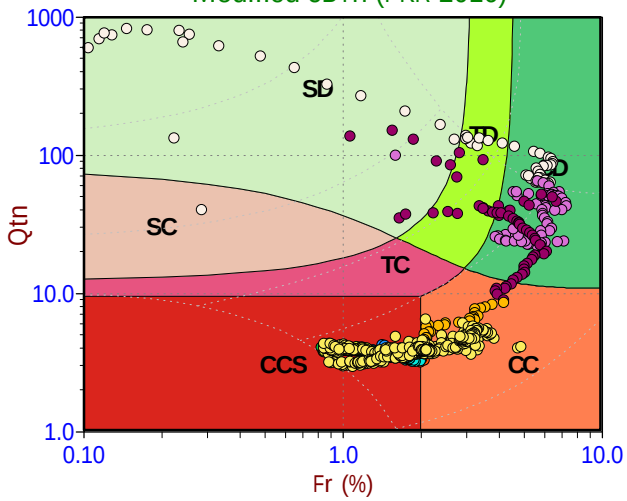
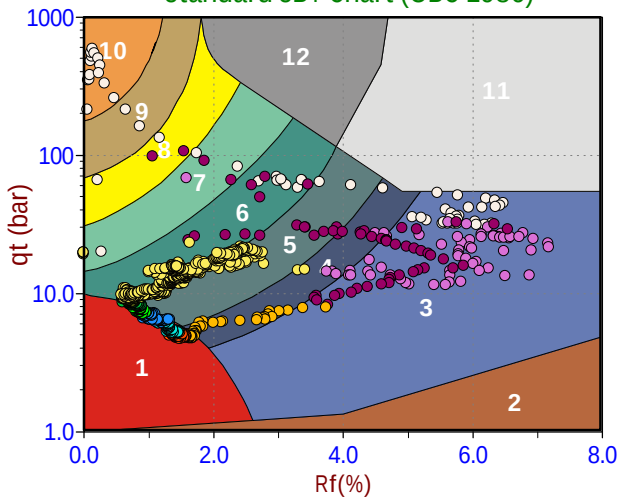


Standard SBT Chart (UBC 1986)



Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

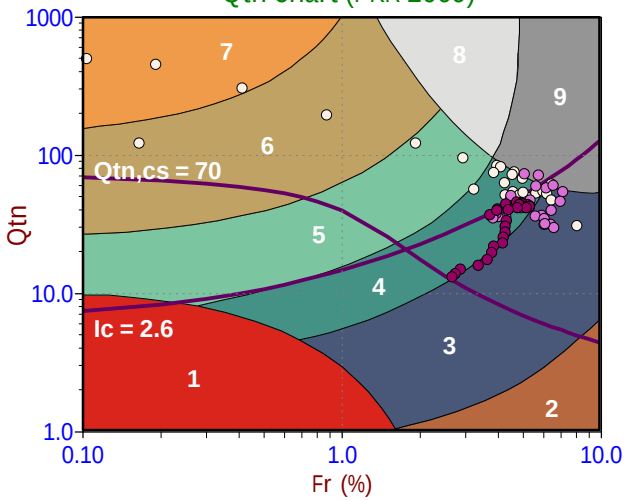
CONETEC

GeoSyntec

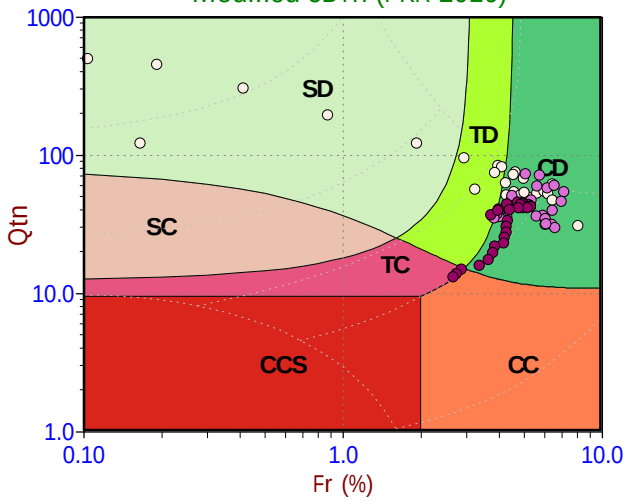
Job No: 20-61-21681
Date: 2020-12-09 13:54
Site: DTE Belle River Power Plant

Sounding: CPT20-06
Cone: 513:T1500F15U500

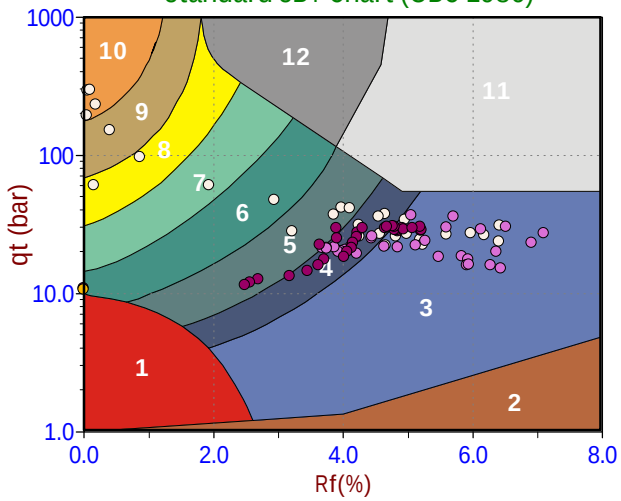
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

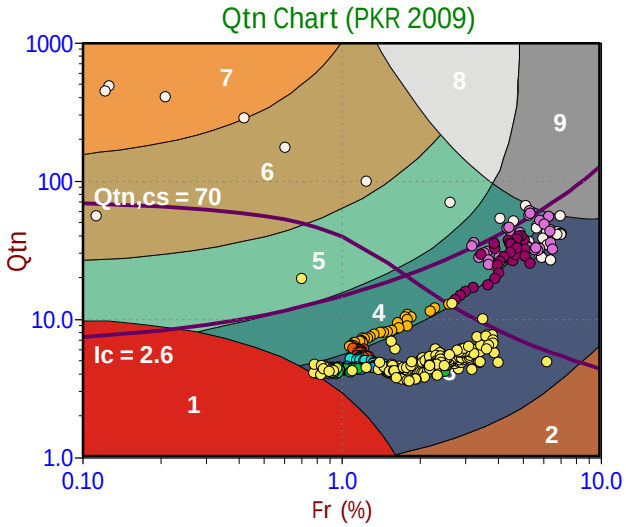
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

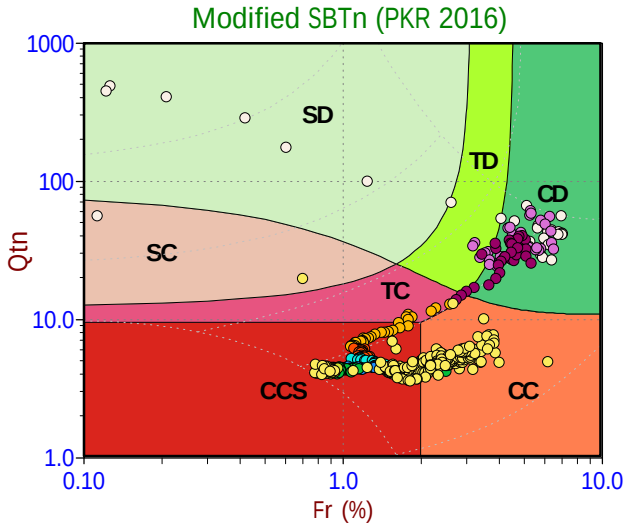
CONETEC

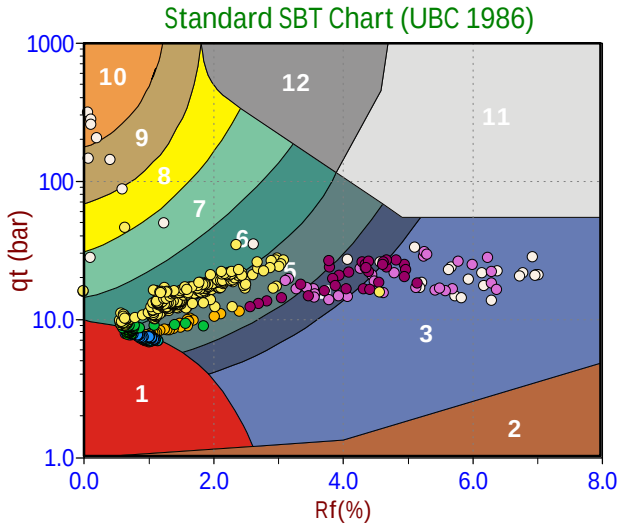
GeoSyntec

Job No: 20-61-21681
Date: 2020-12-10 08:43
Site: DTE Belle River Power Plant

Sounding: CPT20-06B
Cone: 513:T1500F15U500







Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

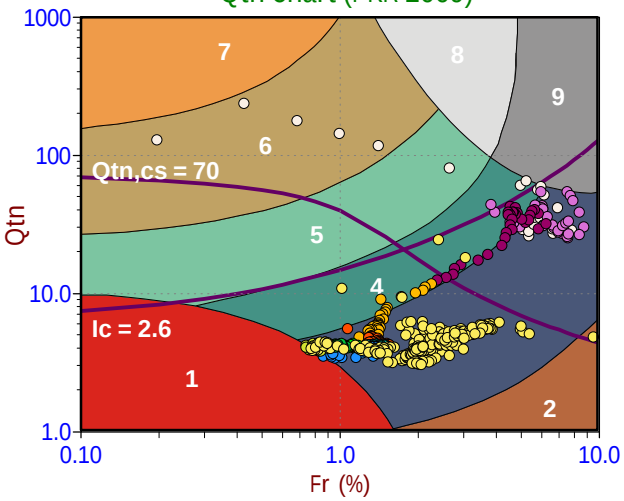
CONETEC

GeoSyntec

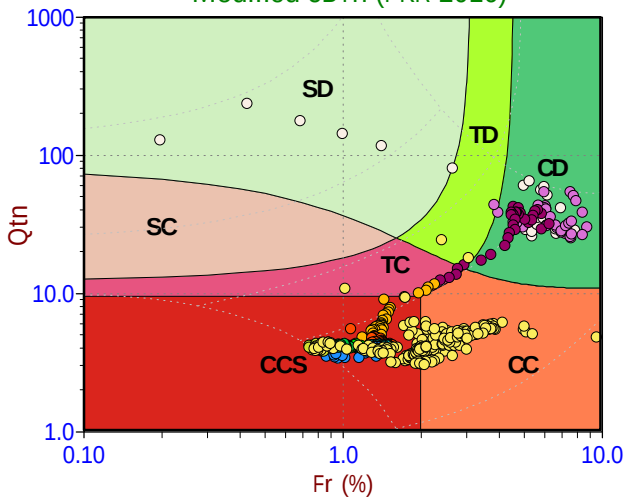
Job No: 20-61-21681
Date: 2020-12-09 11:04
Site: DTE Belle River Power Plant

Sounding: CPT20-07
Cone: 513:T1500F15U500

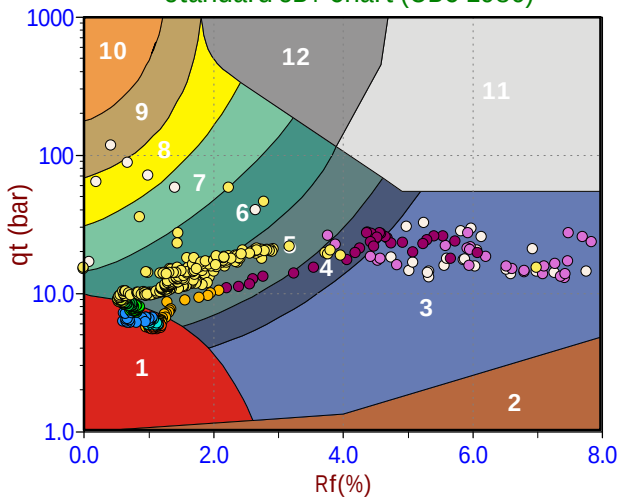
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

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- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

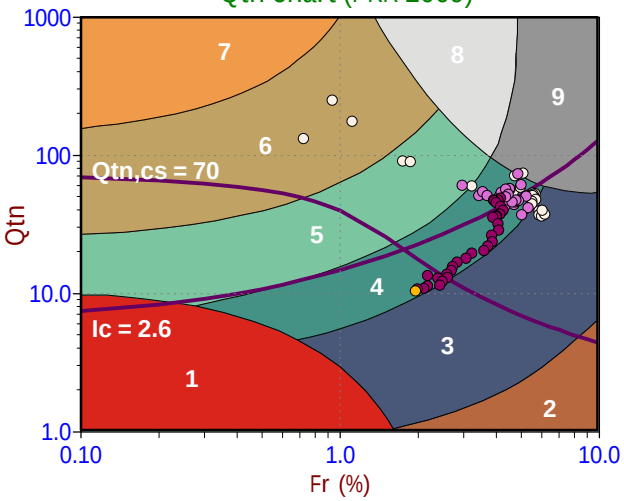
CONETEC

GeoSyntec

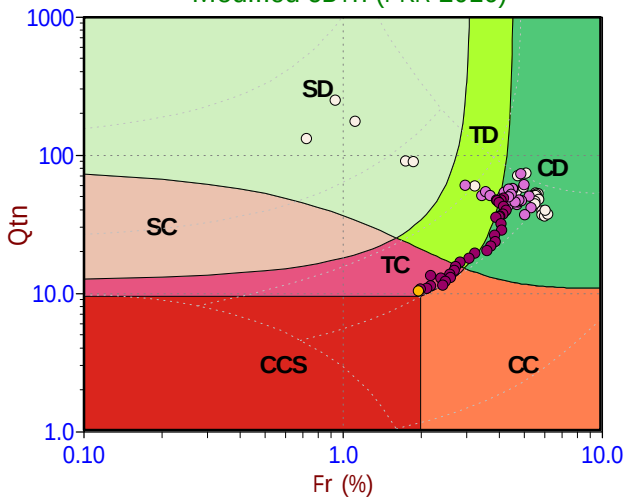
Job No: 20-61-21681
Date: 2020-12-11 12:09
Site: DTE Belle River Power Plant

Sounding: CPT20-08
Cone: 568:T1500F15U500

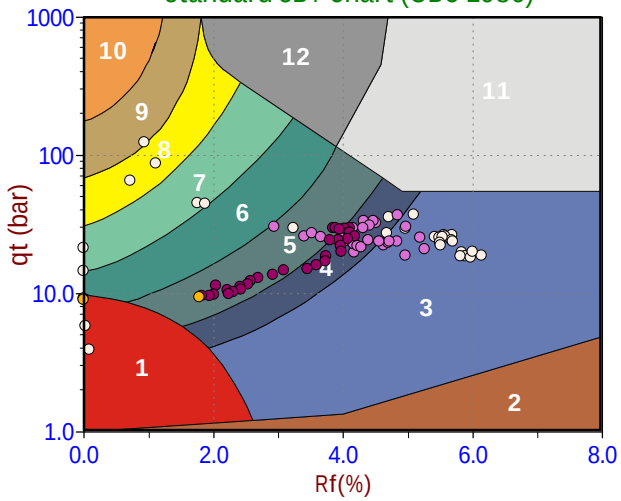
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges
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- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

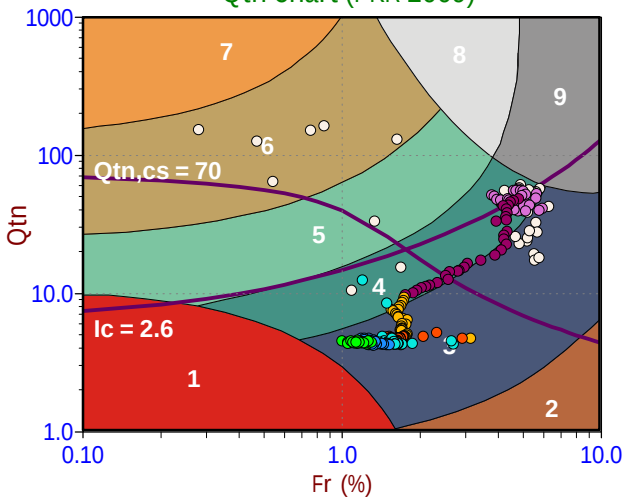
CONETEC

GeoSyntec

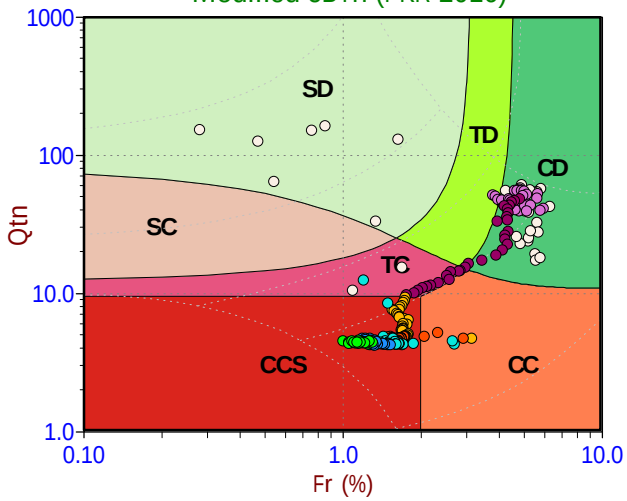
Job No: 20-61-21681
Date: 2020-12-11 12:35
Site: DTE Belle River Power Plant

Sounding: CPT20-08B
Cone: 568:T1500F15U500

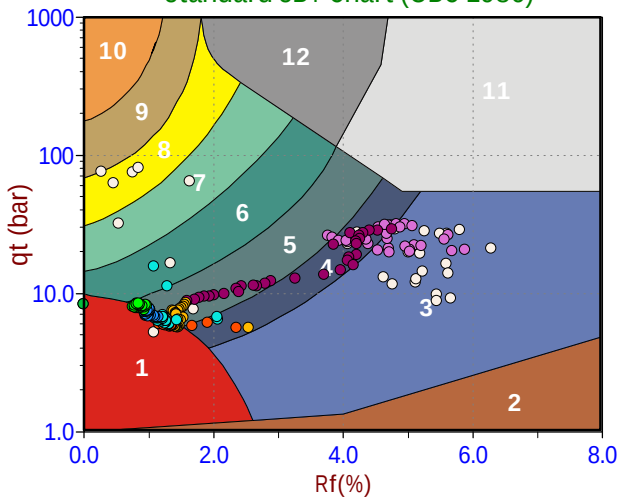
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

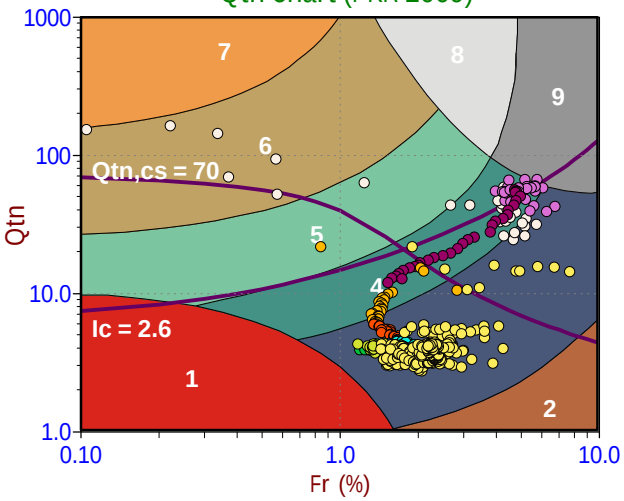
CONETEC

GeoSyntec

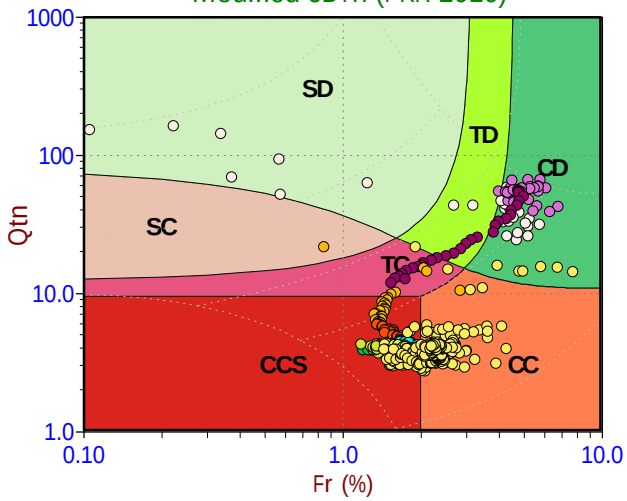
Job No: 20-61-21681
Date: 2020-12-15 08:41
Site: DTE Belle River Power Plant

Sounding: CPT20-08C
Cone: 568:T1500F15U500

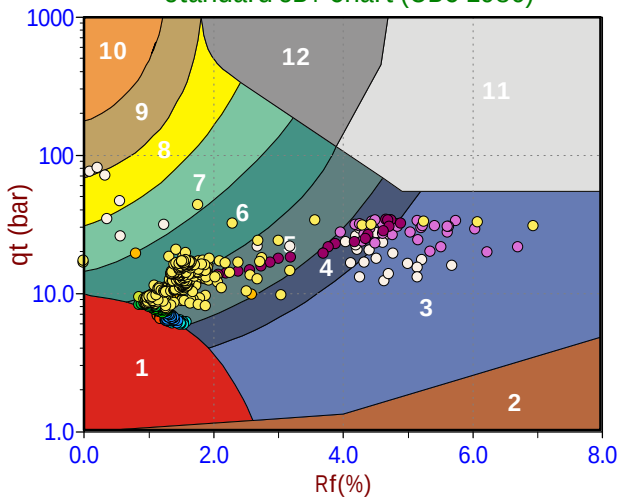
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

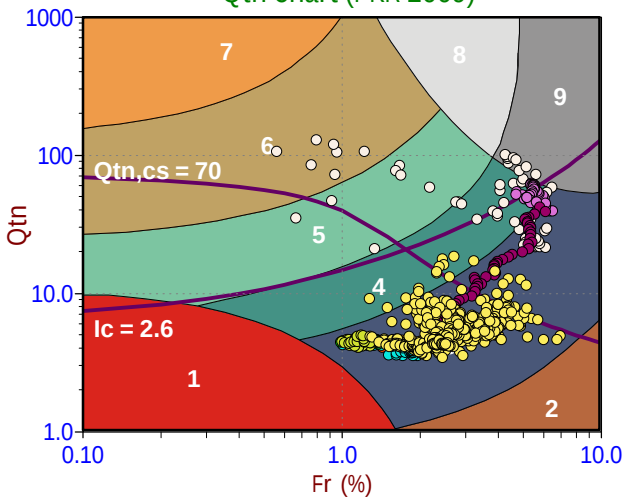
CONETEC

GeoSyntec

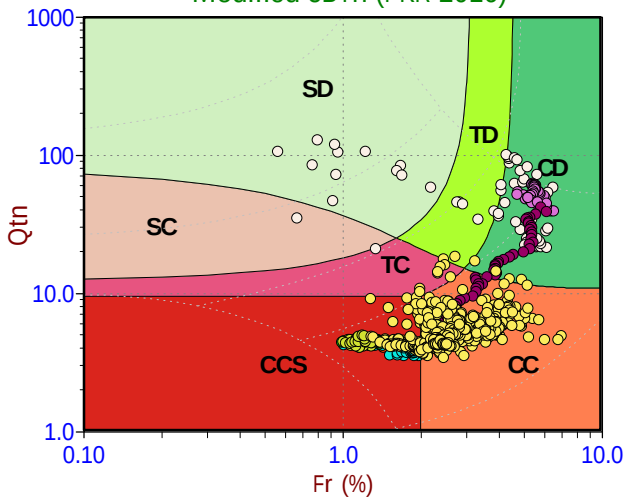
Job No: 20-61-21681
Date: 2020-12-16 11:02
Site: DTE Belle River Power Plant

Sounding: CPT20-10.1
Cone: 551:T1500F15U500

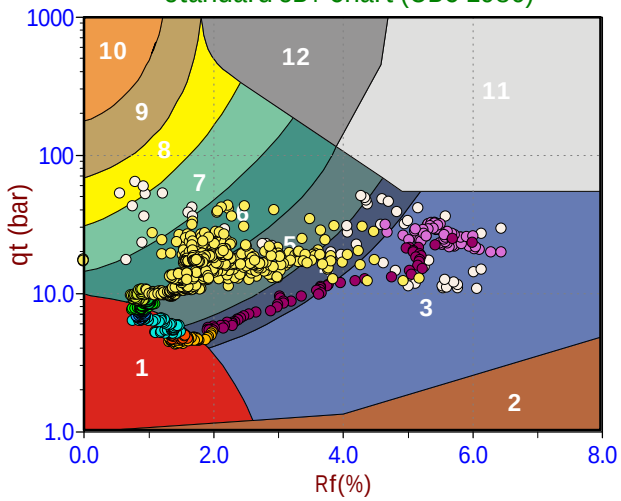
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

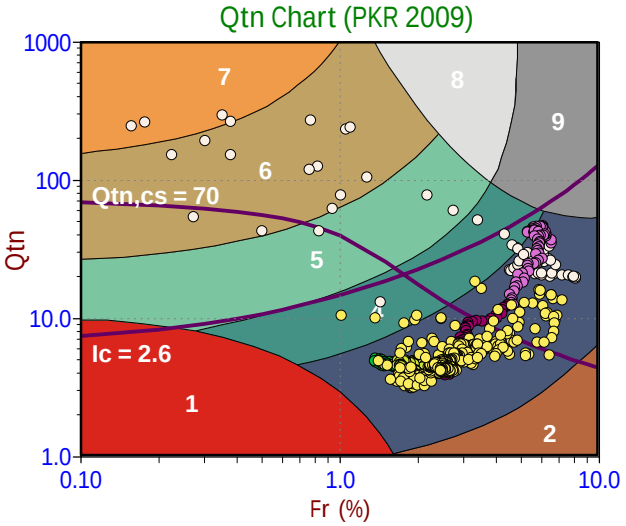
Legend

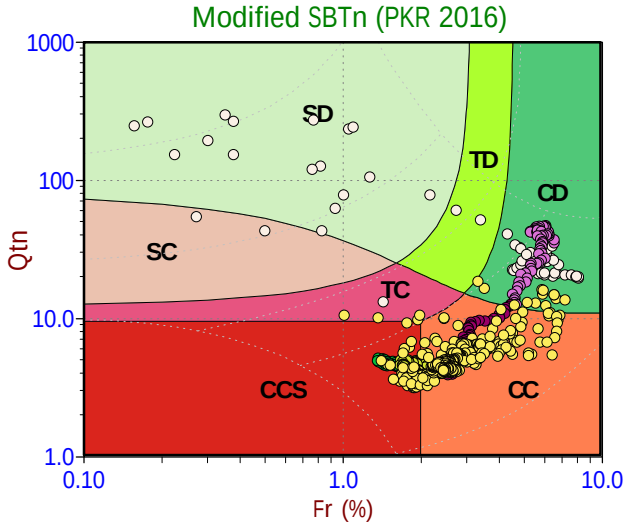
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

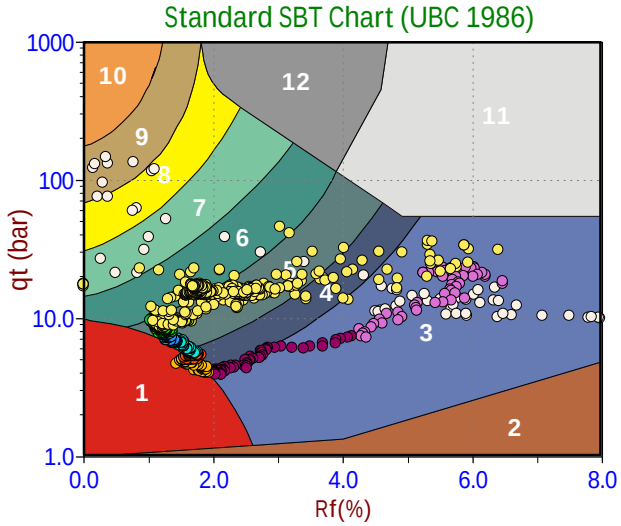
GeoSyntec

Job No: 20-61-21681
Date: 2020-12-16 11:53
Site: DTE Belle River Power Plant

Sounding: CPT20-10A
Cone: 551:T1500F15U500







Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

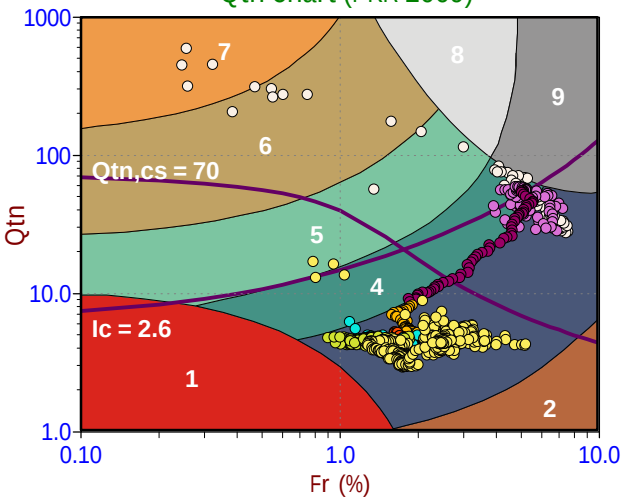
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

GeoSyntec

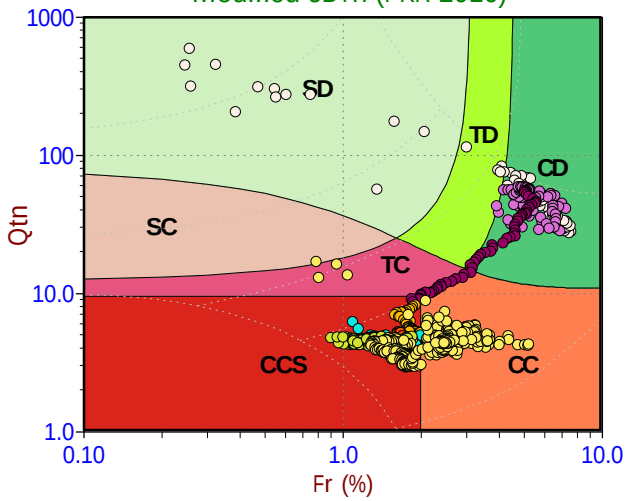
Job No: 20-61-21681
Date: 2020-12-15 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500

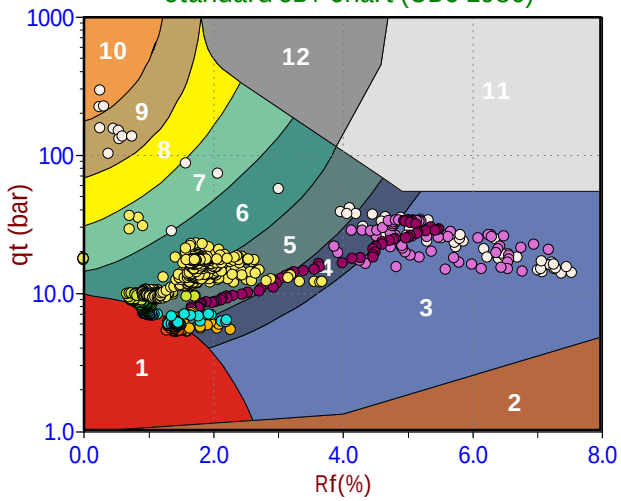
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

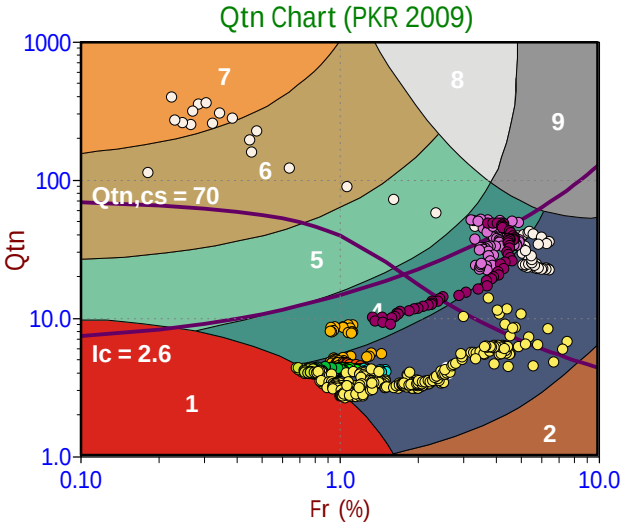
Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

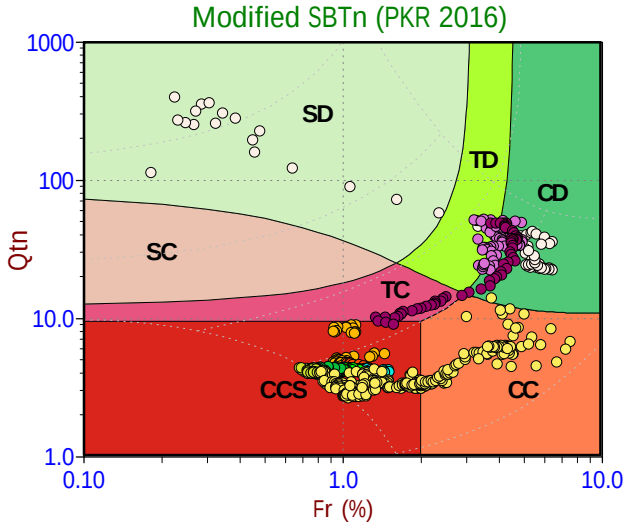
Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

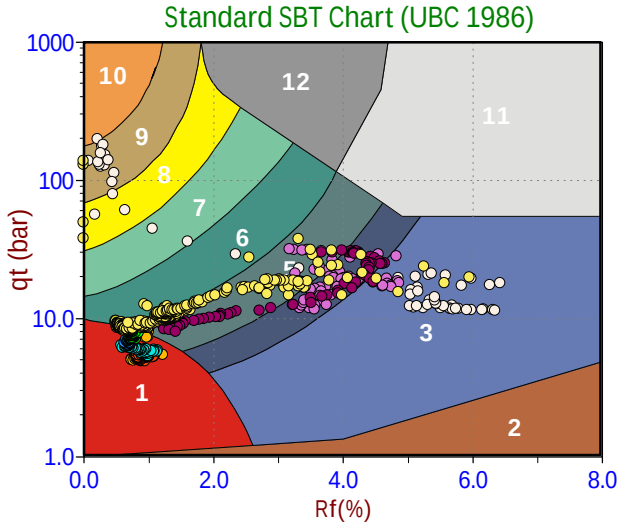
GeoSyntec

Job No: 20-61-21681
Date: 2020-12-15 08:44
Site: DTE Belle River Power Plant

Sounding: CPT20-12
Cone: 551:T1500F15U500







Depth Ranges
- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend
- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend
- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

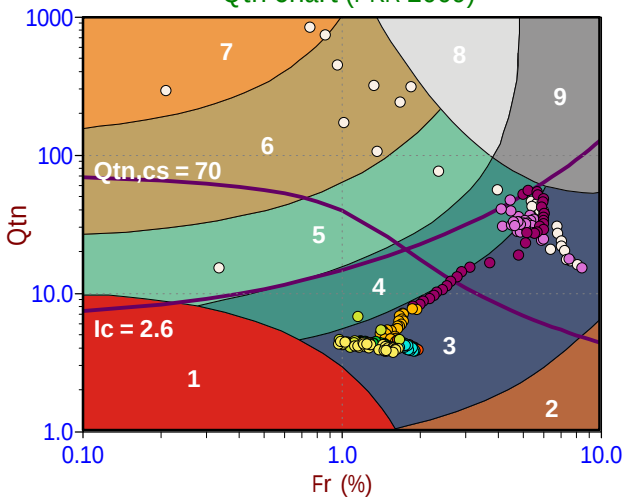
CONETEC

GeoSyntec

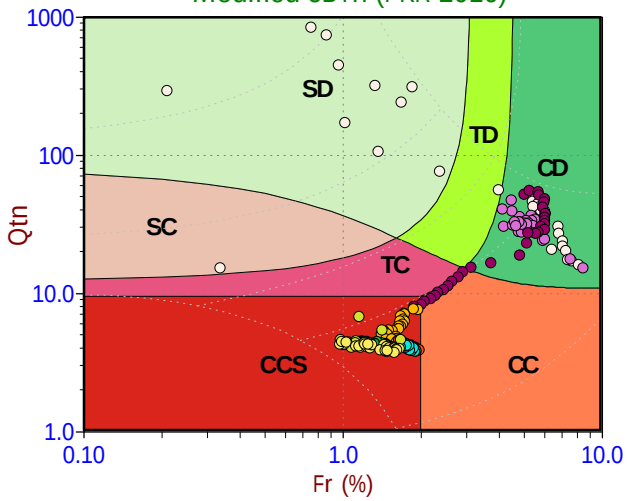
Job No: 20-61-21681
Date: 2020-12-10 15:00
Site: DTE Belle River Power Plant

Sounding: CPT20-13
Cone: 513:T1500F15U500

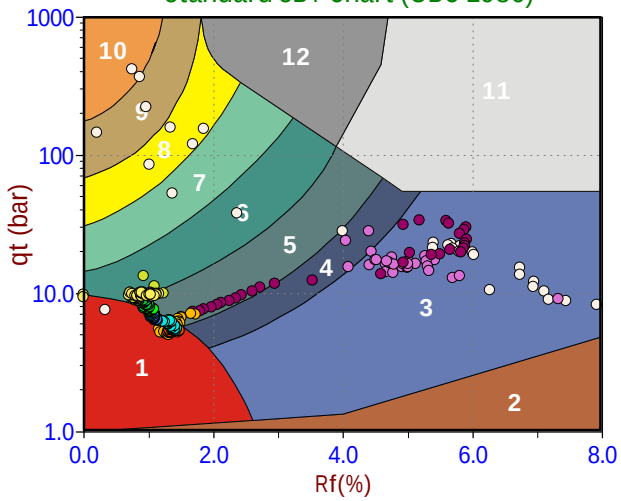
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

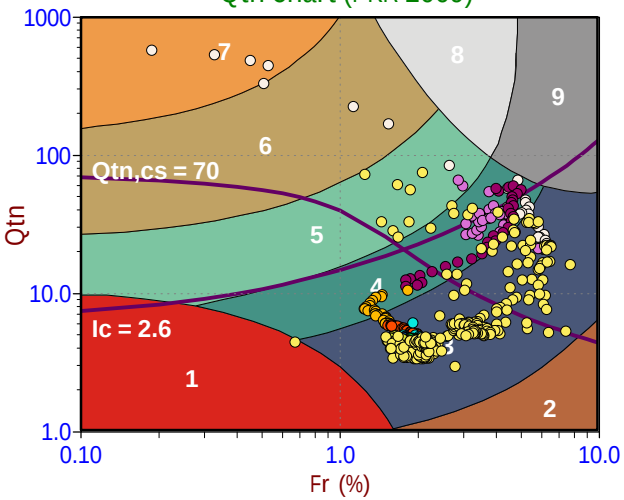
CONETEC

GeoSyntec

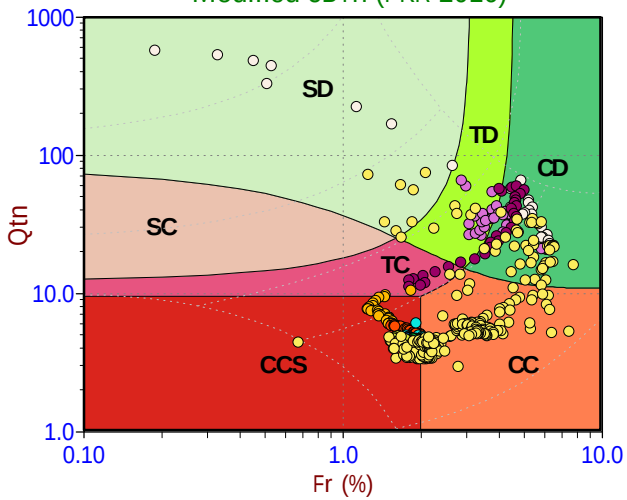
Job No: 20-61-21681
Date: 2020-12-11 09:09
Site: DTE Belle River Power Plant

Sounding: CPT20-13B
Cone: 568:T1500F15U500

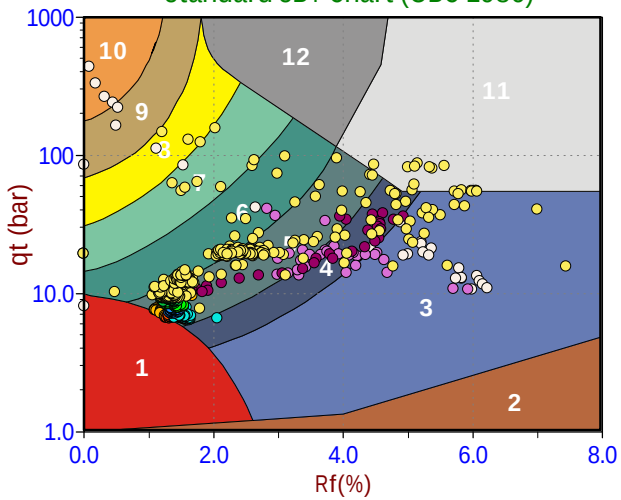
Qtn Chart (PKR 2009)



Modified SBTn (PKR 2016)



Standard SBT Chart (UBC 1986)



Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

Legend

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

Legend

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

Geosyntec
consultants

Appendix I2

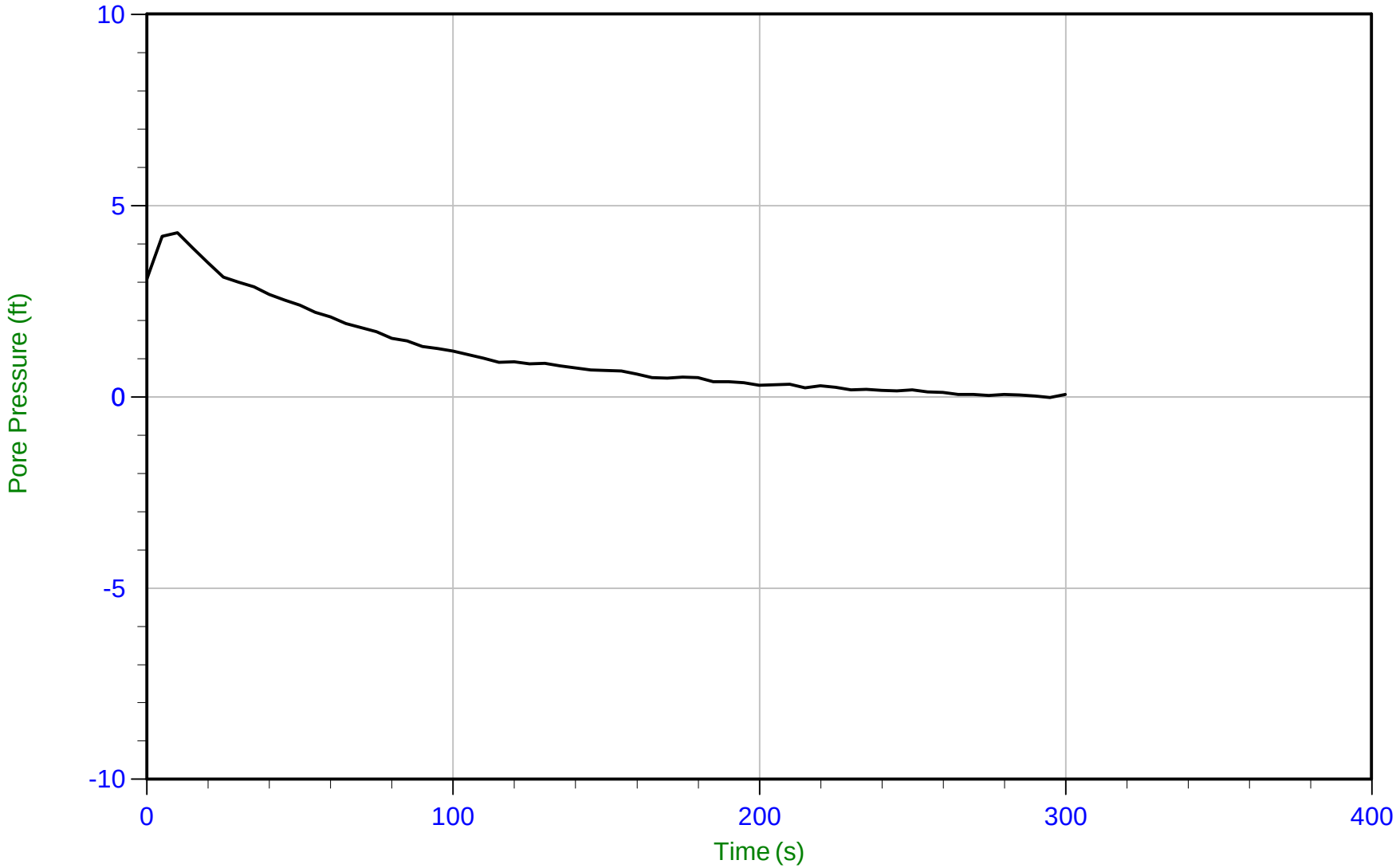
PPD Test Results

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP01B.PPF
Depth: 0.650 m / 2.133 ft
Duration: 300.0 s

u Min: -0.0 ft
u Max: 4.3 ft
u Final: 0.1 ft

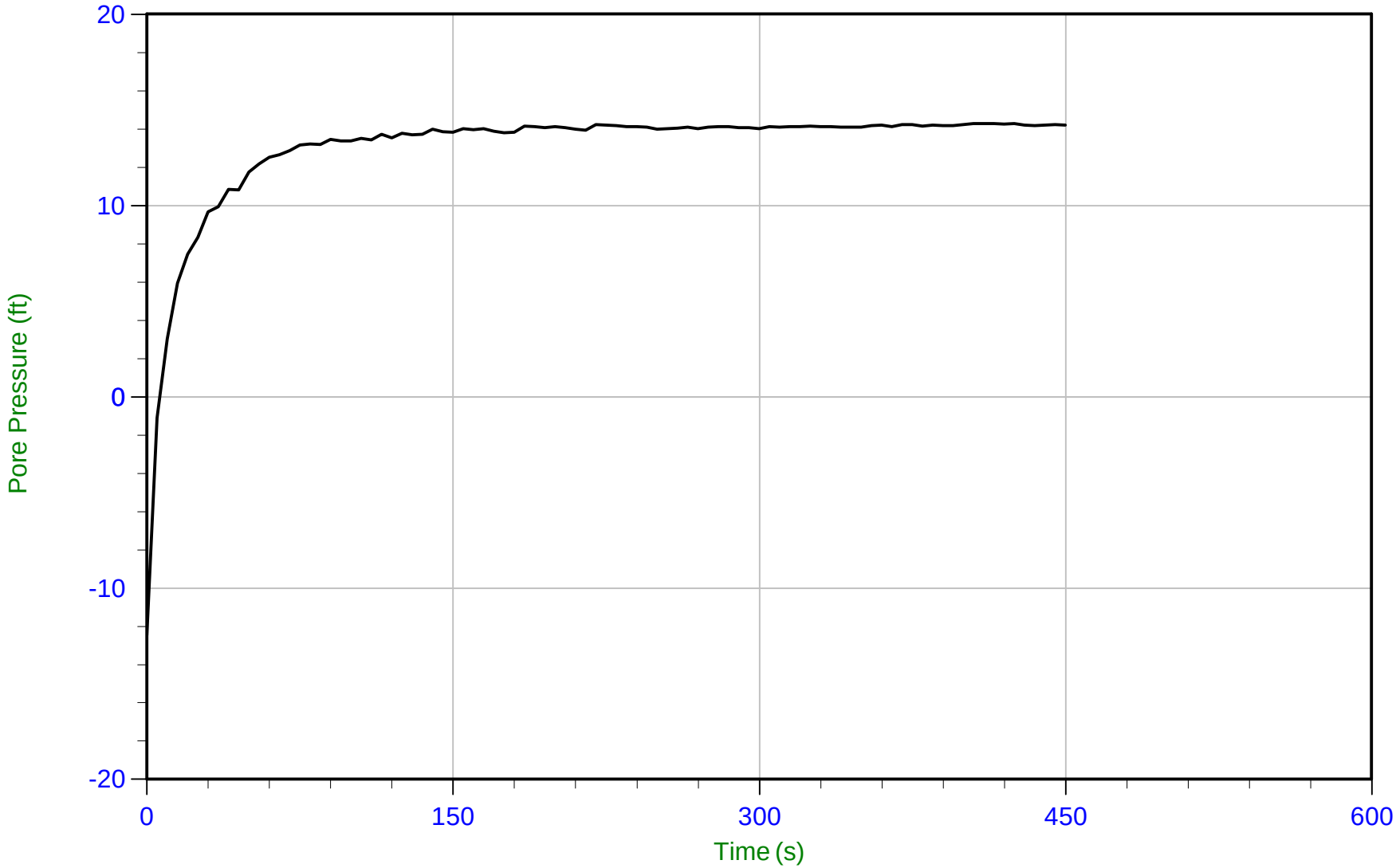
WT: 0.650 m / 2.133 ft
Ueq: 0.0 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP01B.PPF
Depth: 2.775 m / 9.104 ft
Duration: 450.0 s

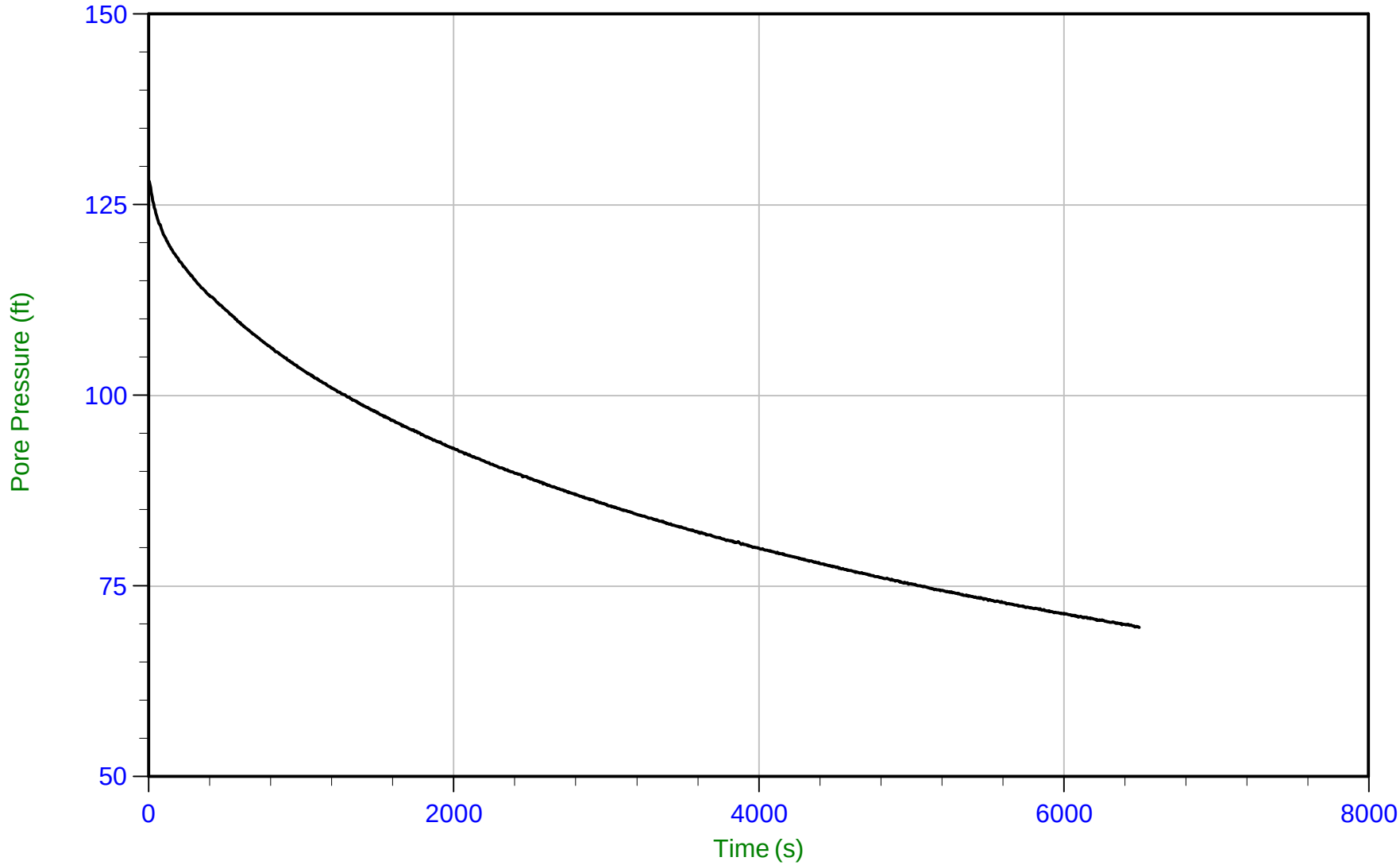
u Min: -12.5 ft
u Max: 14.3 ft
u Final: 14.2 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP01B.PPF
Depth: 8.575 m / 28.133 ft
Duration: 6500.0 s

u Min: 69.6 ft
u Max: 128.1 ft
u Final: 69.6 ft

WT: 4.572 m / 15.000 ft
Ueq: 13.1 ft
U(50): 70.62 ft

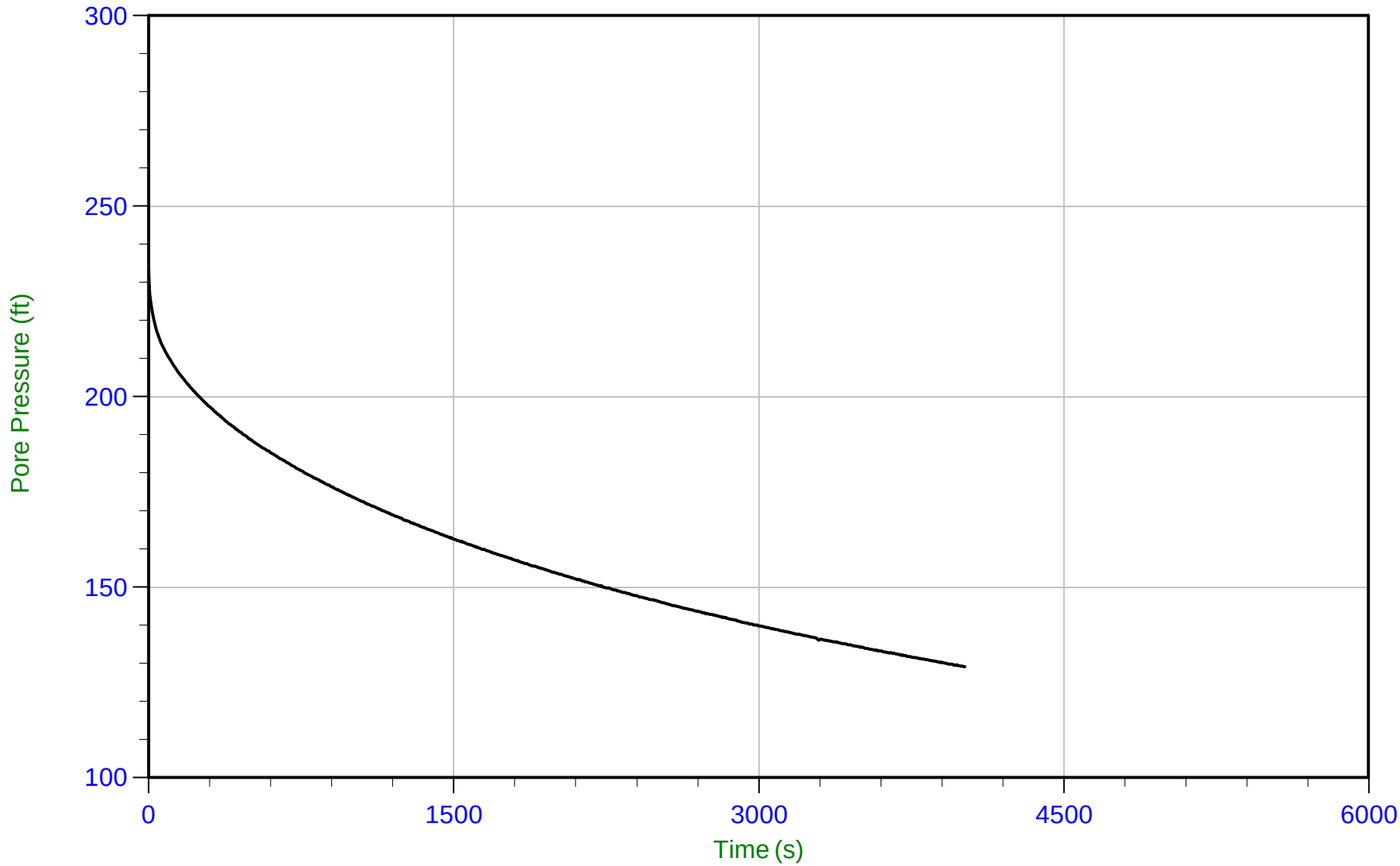
T(50): 6203.4 s
Ir: 100
Ch: 0.1 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP01B.PPF
Depth: 14.675 m / 48.146 ft
Duration: 4015.0 s

u Min: 129.2 ft
u Max: 234.0 ft
u Final: 129.2 ft

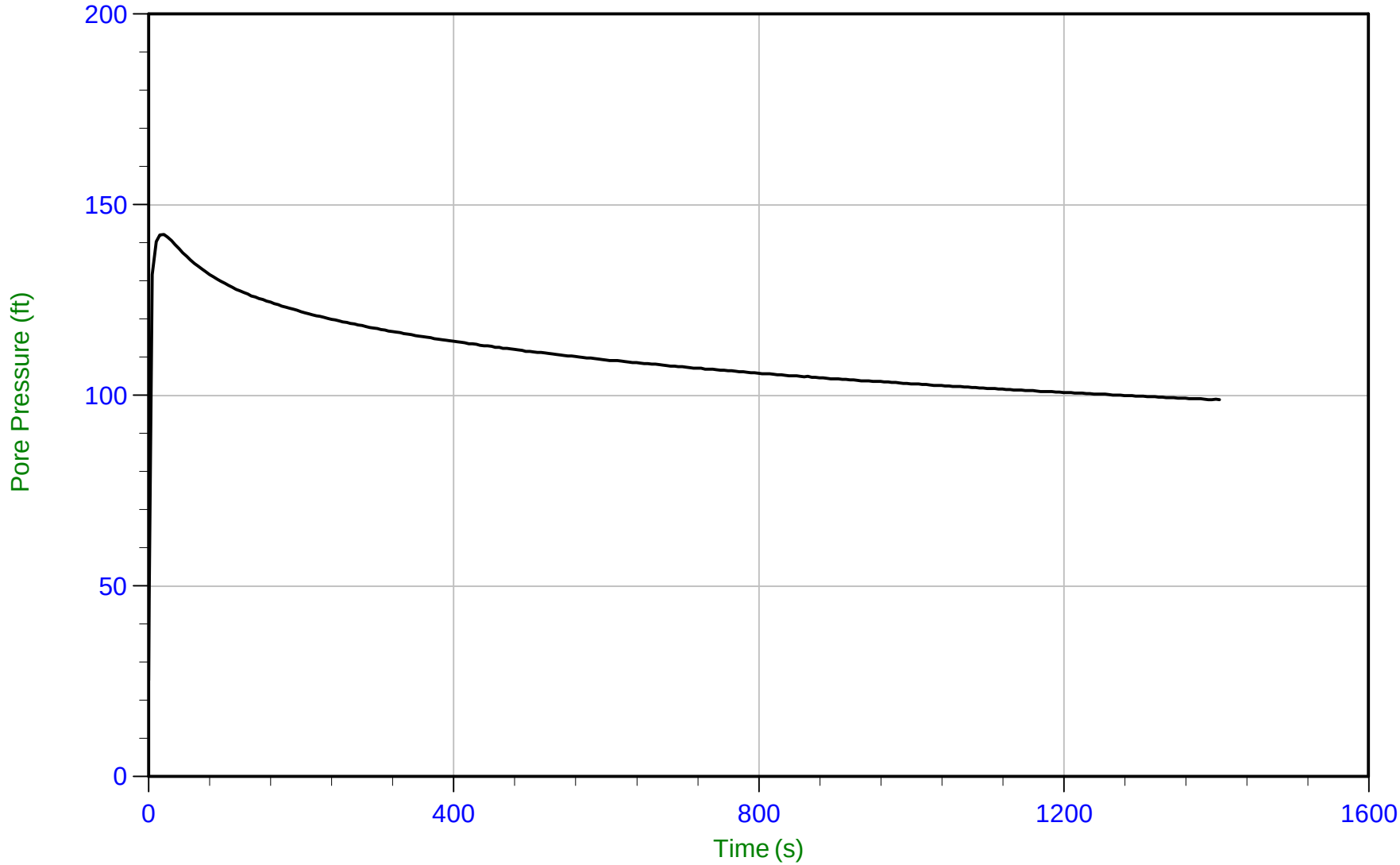
WT: 4.572 m / 15.000 ft
Ueq: 33.1 ft
U(50): 133.60 ft

T(50): 3564.5 s
Ir: 100
Ch: 0.2 cm²/min

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP01B.PPF
Depth: 19.975 m / 65.534 ft
Duration: 1405.0 s

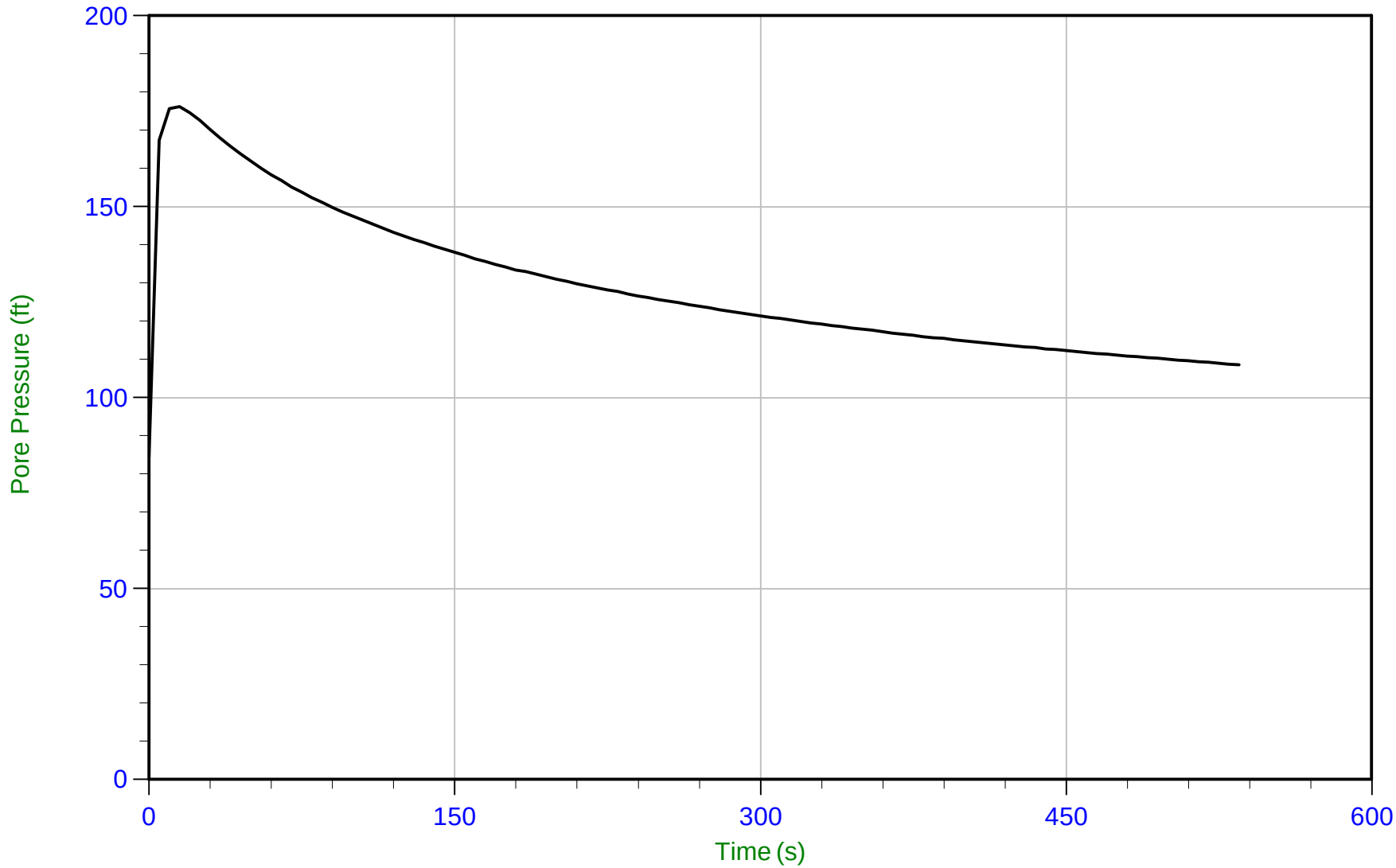
u Min: 25.2 ft
u Max: 142.2 ft
u Final: 98.9 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP01B.PPF
Depth: 20.775 m / 68.159 ft
Duration: 535.0 s

u Min: 84.4 ft
u Max: 176.2 ft
u Final: 108.6 ft

WT: 4.572 m / 15.000 ft
Ueq: 53.2 ft
U(50): 114.66 ft

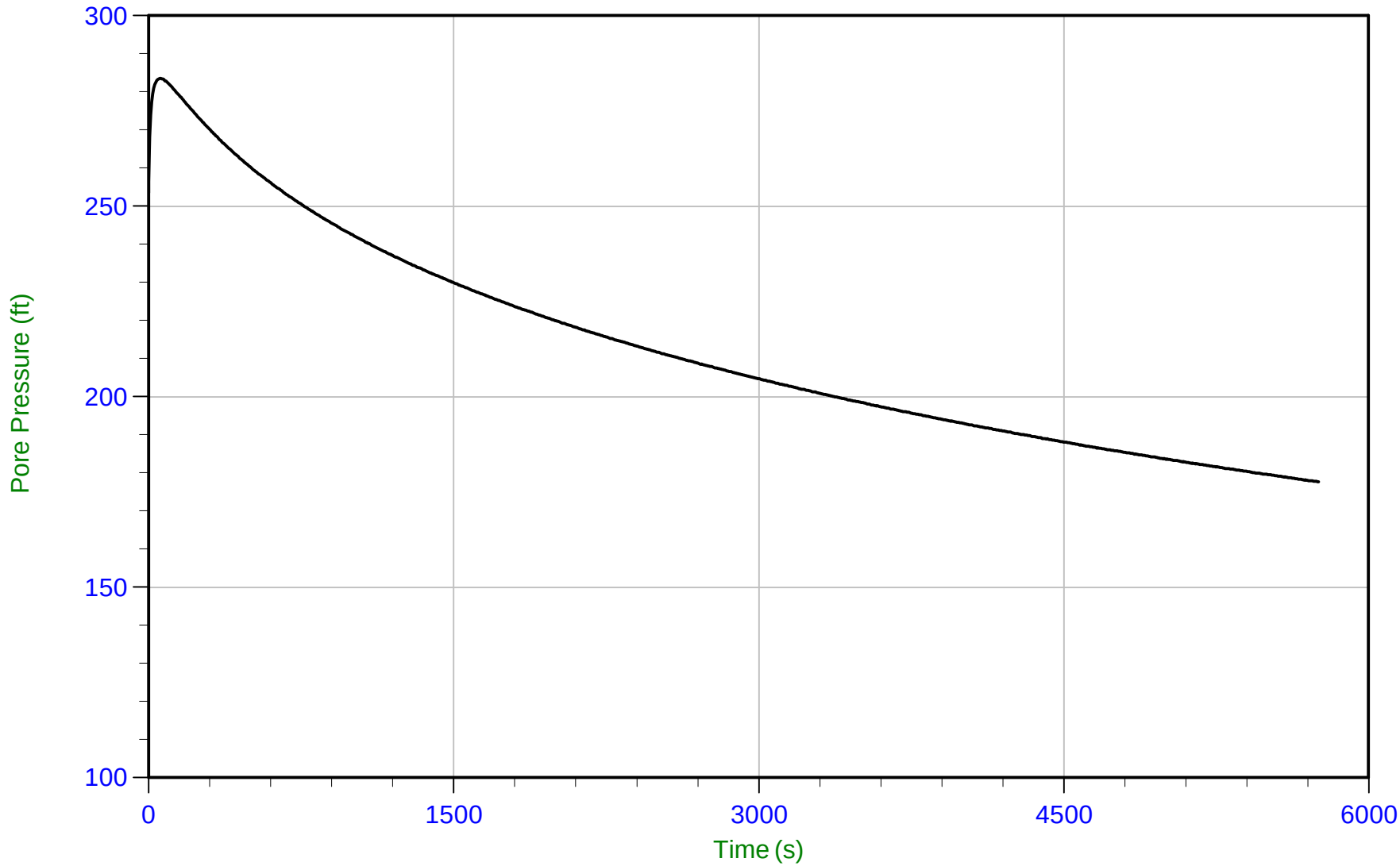
T(50): 389.0 s
Ir: 100
Ch: 1.8 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP01B.PPF
Depth: 26.850 m / 88.089 ft
Duration: 5755.0 s

u Min: 177.6 ft
u Max: 283.6 ft
u Final: 177.6 ft

WT: 4.572 m / 15.000 ft
Ueq: 73.1 ft
U(50): 178.34 ft

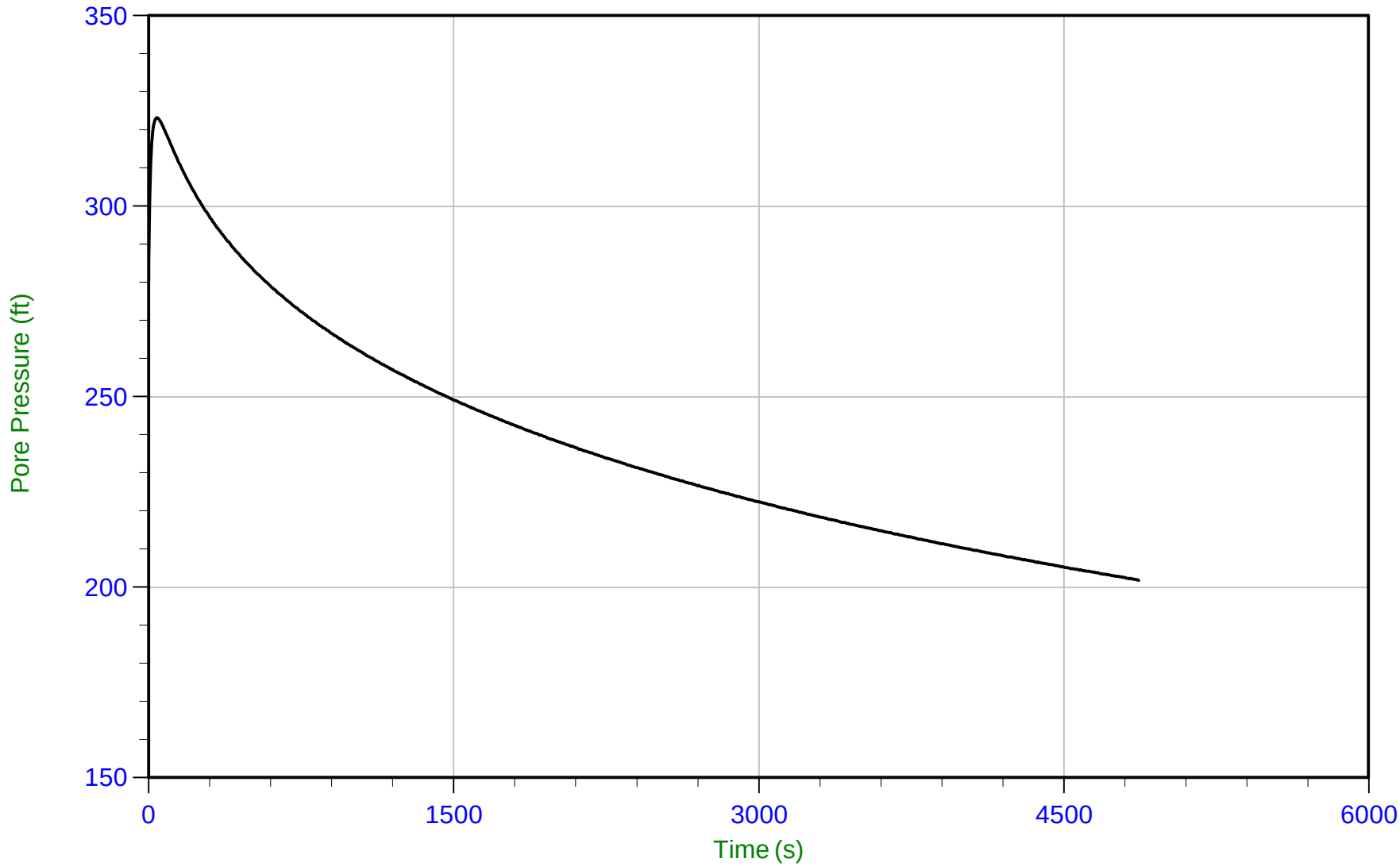
T(50): 5600.8 s
Ir: 100
Ch: 0.1 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 08:28
Site: DTE Belle River Power Plant

Sounding: CPT20-01B
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP01B.PPF
Depth: 29.900 m / 98.096 ft
Duration: 4870.0 s

u Min: 201.9 ft
u Max: 323.3 ft
u Final: 201.9 ft

WT: 4.572 m / 15.000 ft
Ueq: 83.1 ft
U(50): 203.21 ft

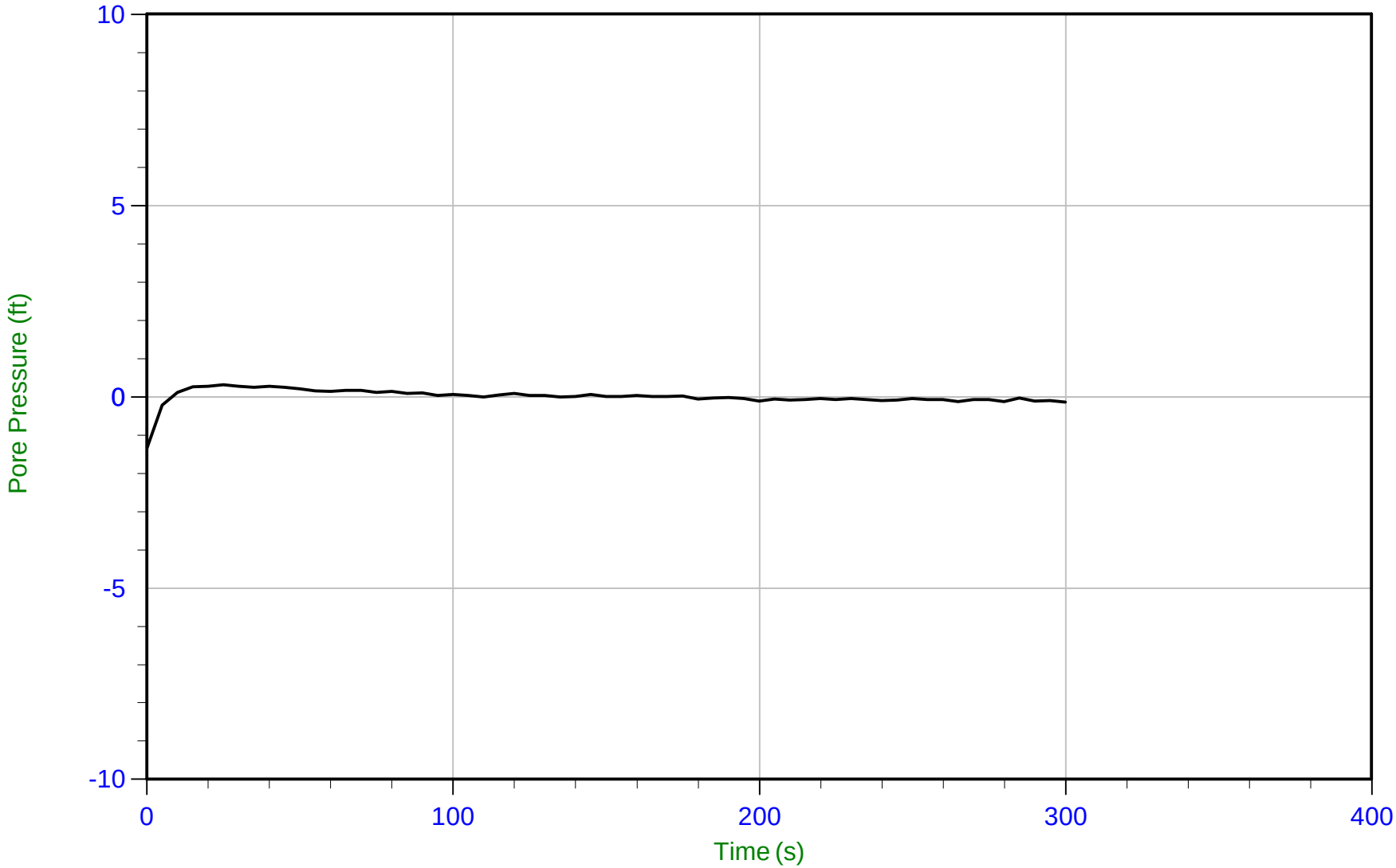
T(50): 4686.3 s
Ir: 100
Ch: 0.1 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP03.PPF
Depth: 3.100 m / 10.170 ft
Duration: 300.0 s

u Min: -1.4 ft
u Max: 0.3 ft
u Final: -0.1 ft

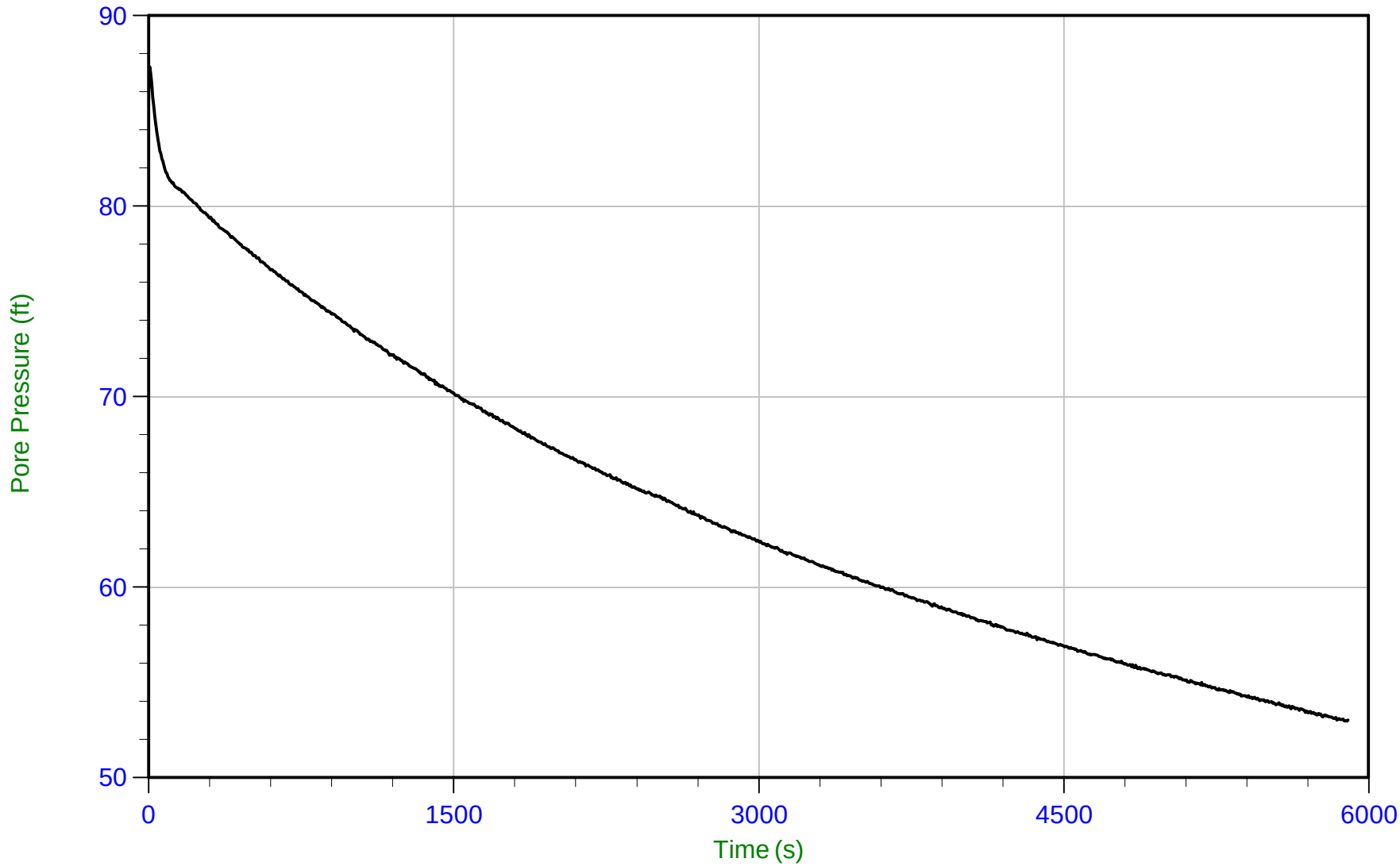
WT: 3.100 m / 10.170 ft
Ueq: 0.0 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP03.PPF
Depth: 6.150 m / 20.177 ft
Duration: 5900.0 s

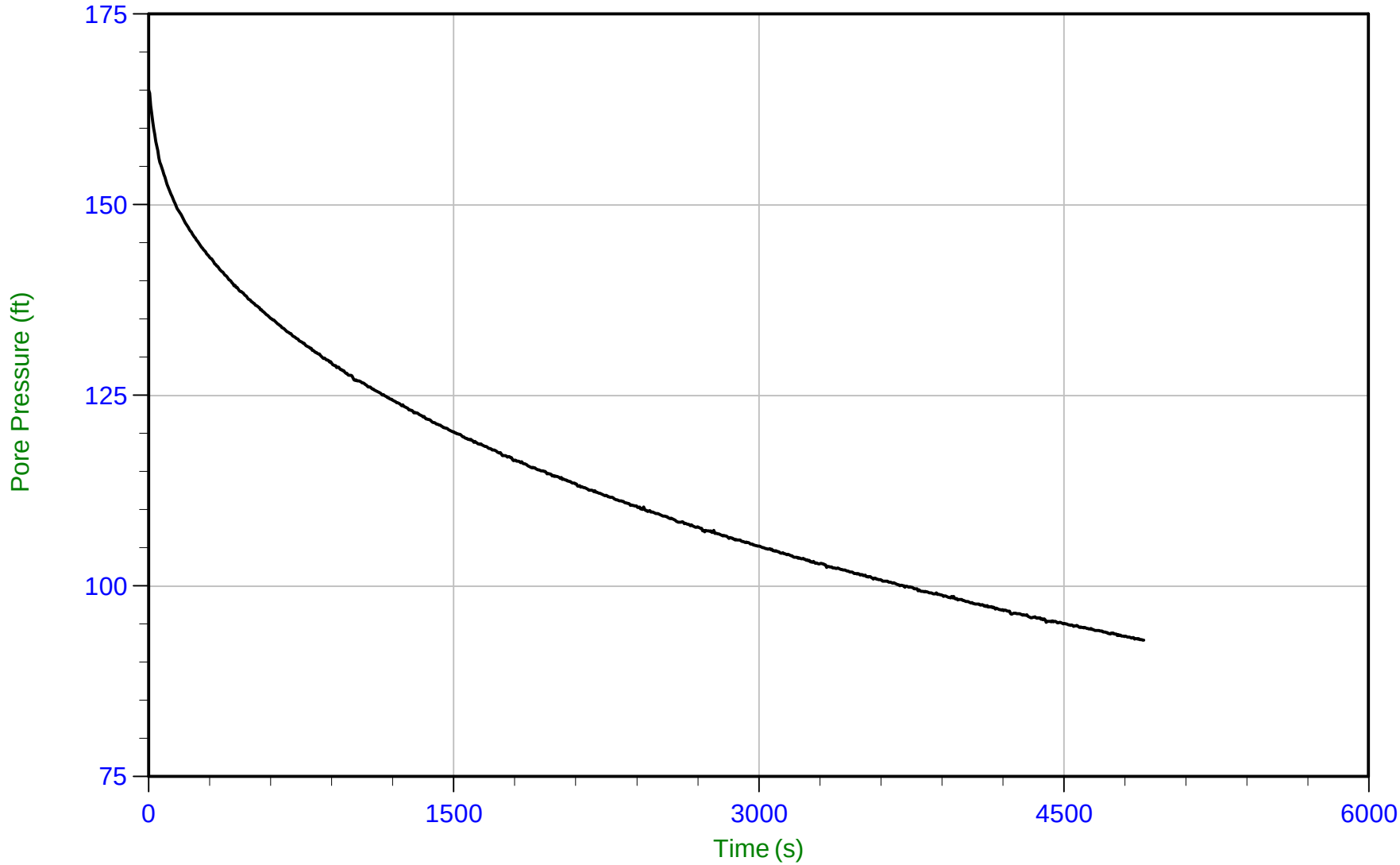
u Min: 53.0 ft
u Max: 87.3 ft
u Final: 53.0 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP03.PPF
Depth: 11.325 m / 37.155 ft
Duration: 4895.0 s

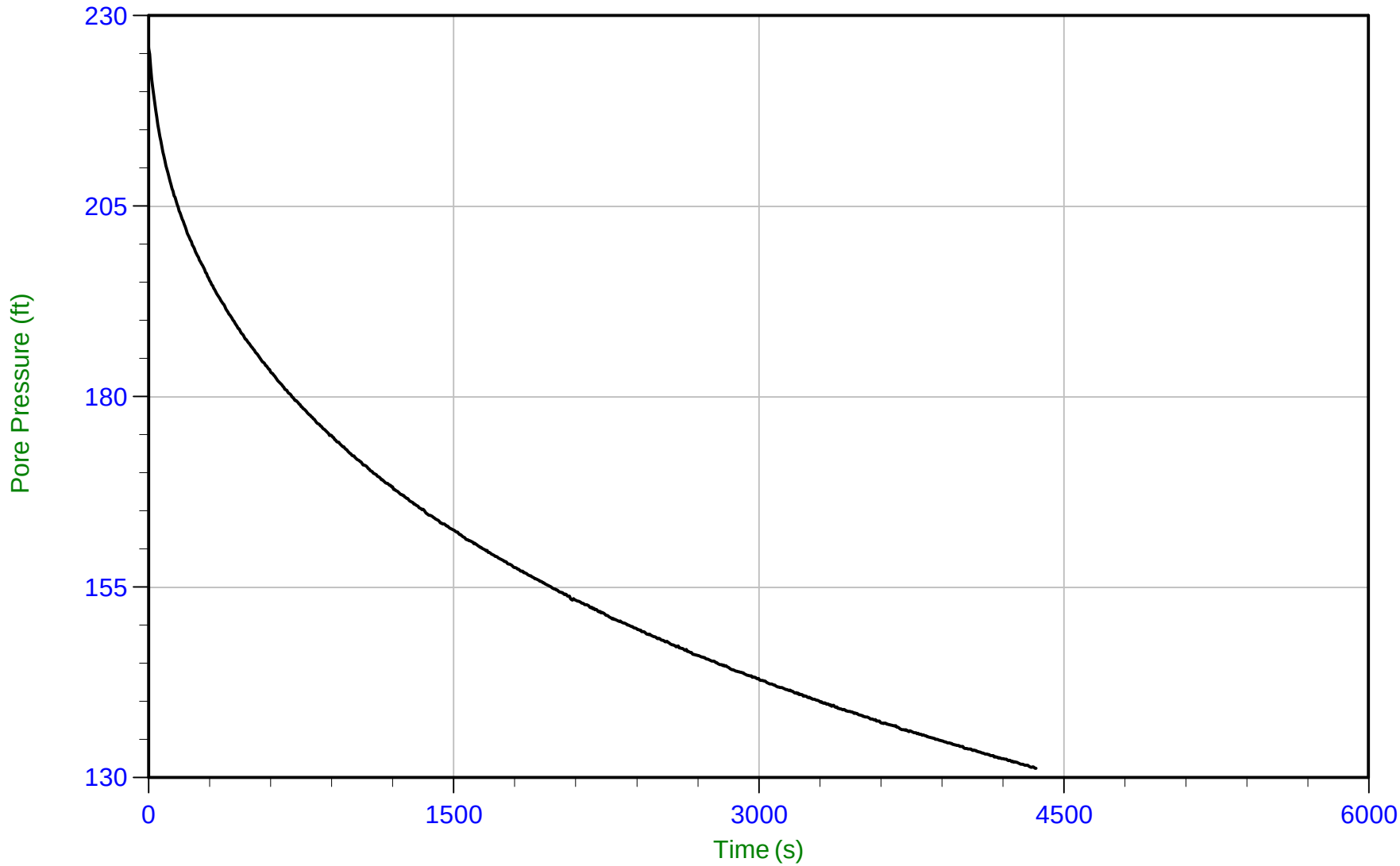
u Min: 92.9 ft
u Max: 165.1 ft
u Final: 92.9 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP03.PPF
Depth: 17.725 m / 58.152 ft
Duration: 4365.0 s

u Min: 131.3 ft
u Max: 225.8 ft
u Final: 131.3 ft

WT: 5.486 m / 17.998 ft
Ueq: 40.2 ft
U(50): 133.00 ft

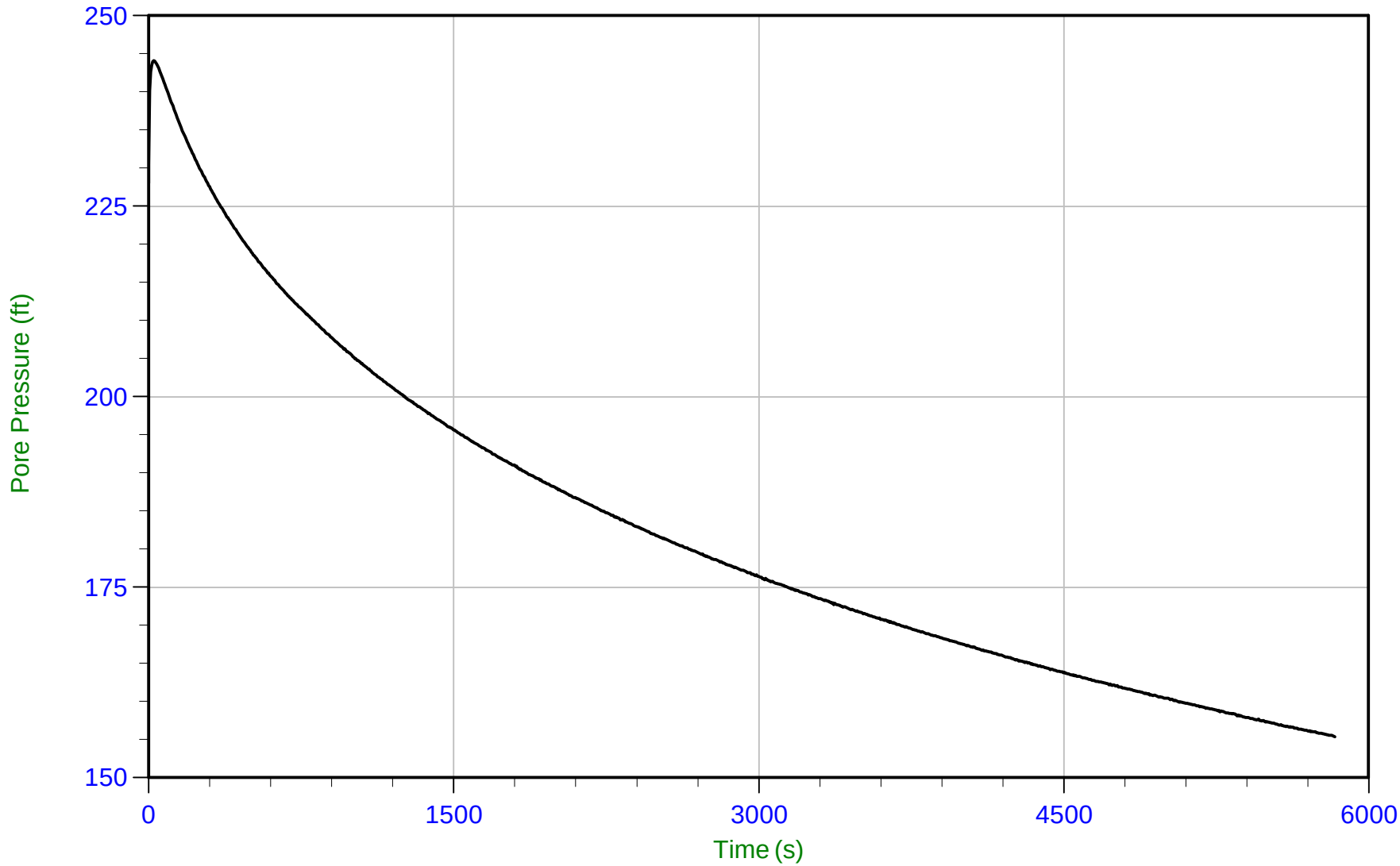
T(50): 4136.3 s
Ir: 100
Ch: 0.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP03.PPF
Depth: 24.425 m / 80.134 ft
Duration: 5835.0 s

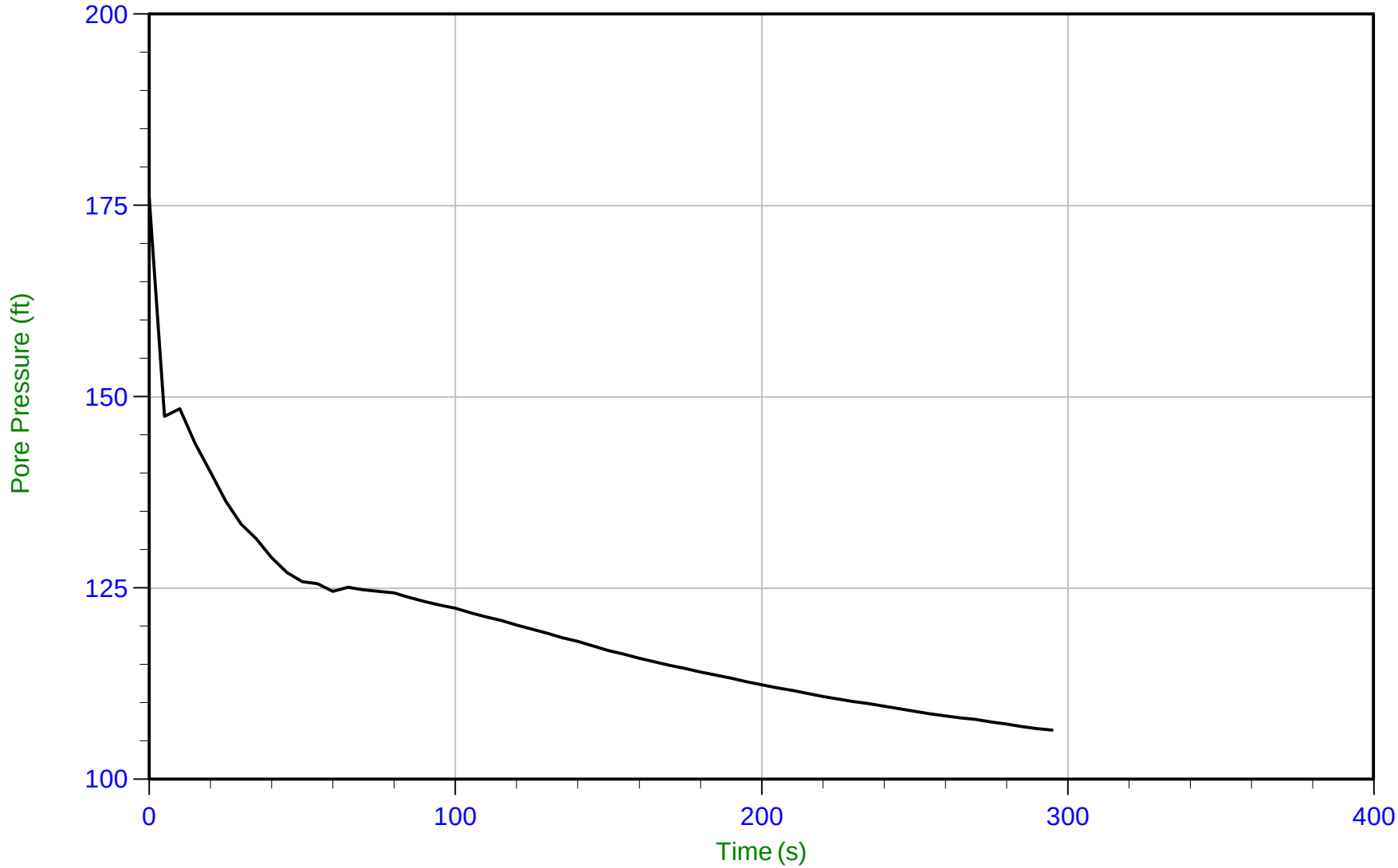
u Min: 155.4 ft
u Max: 244.1 ft
u Final: 155.4 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP03.PPF
Depth: 25.050 m / 82.184 ft
Duration: 295.0 s

u Min: 106.4 ft
u Max: 176.0 ft
u Final: 106.4 ft

WT: 5.486 m / 17.998 ft
Ueq: 64.2 ft
U(50): 120.10 ft

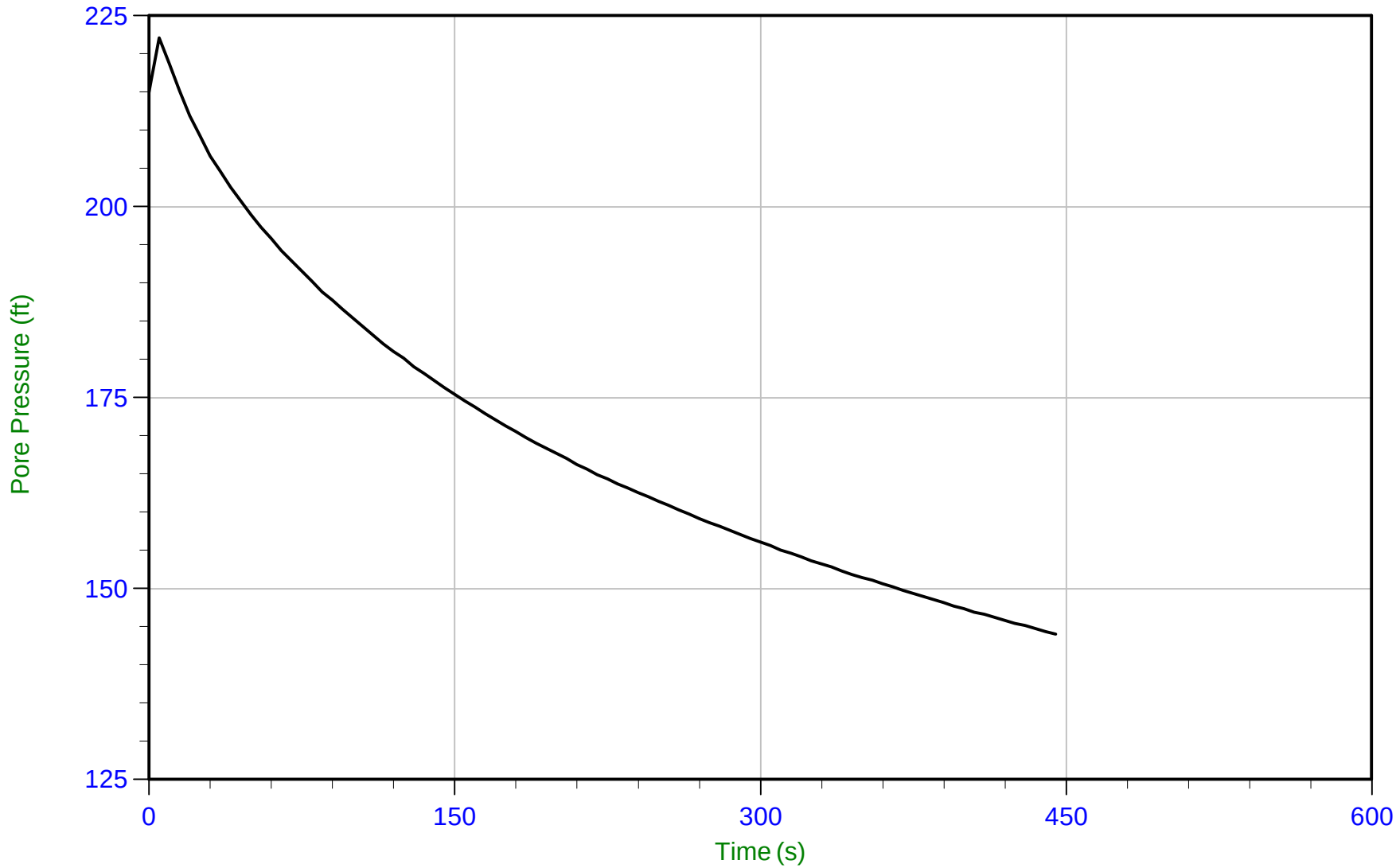
T(50): 120.6 s
Ir: 100
Ch: 5.8 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP03.PPF
Depth: 25.700 m / 84.317 ft
Duration: 445.0 s

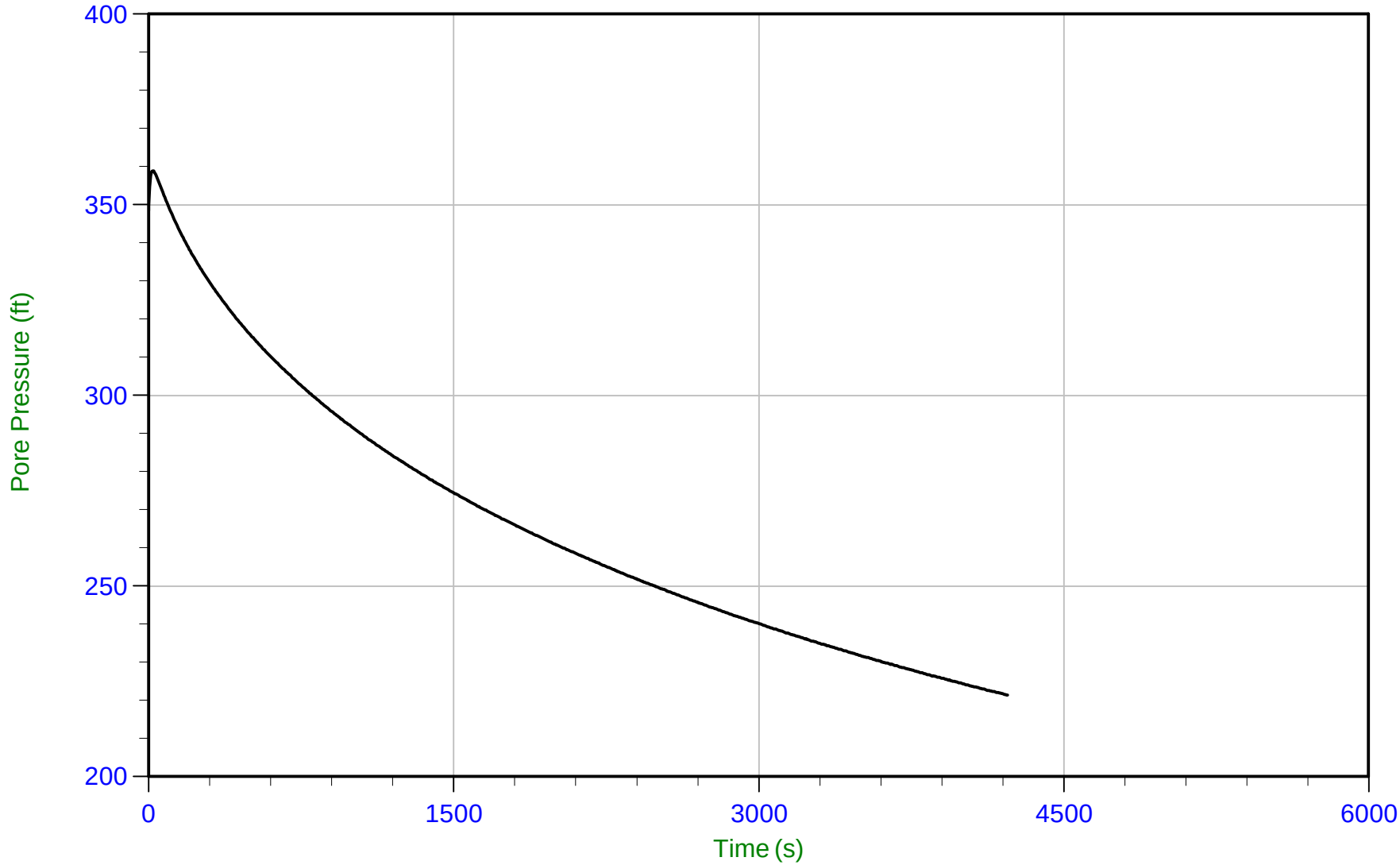
u Min: 144.0 ft
u Max: 222.1 ft
u Final: 144.0 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 14:00
Site: DTE Belle River Power Plant

Sounding: CPT20-03
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP03.PPF
Depth: 30.225 m / 99.162 ft
Duration: 4225.0 s

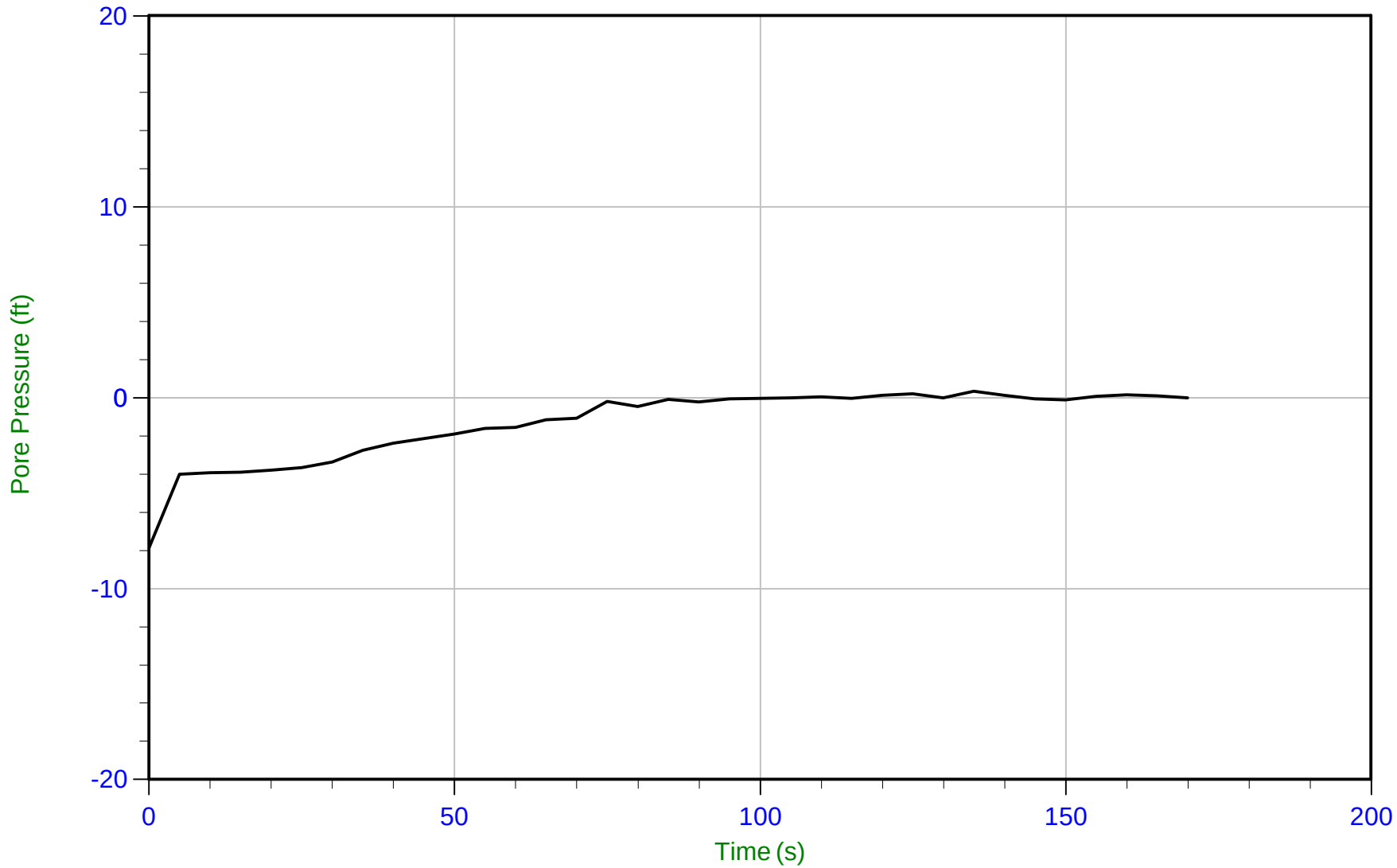
u Min: 221.4 ft
u Max: 358.9 ft
u Final: 221.4 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP11.PPF
Depth: 0.650 m / 2.133 ft
Duration: 170.0 s

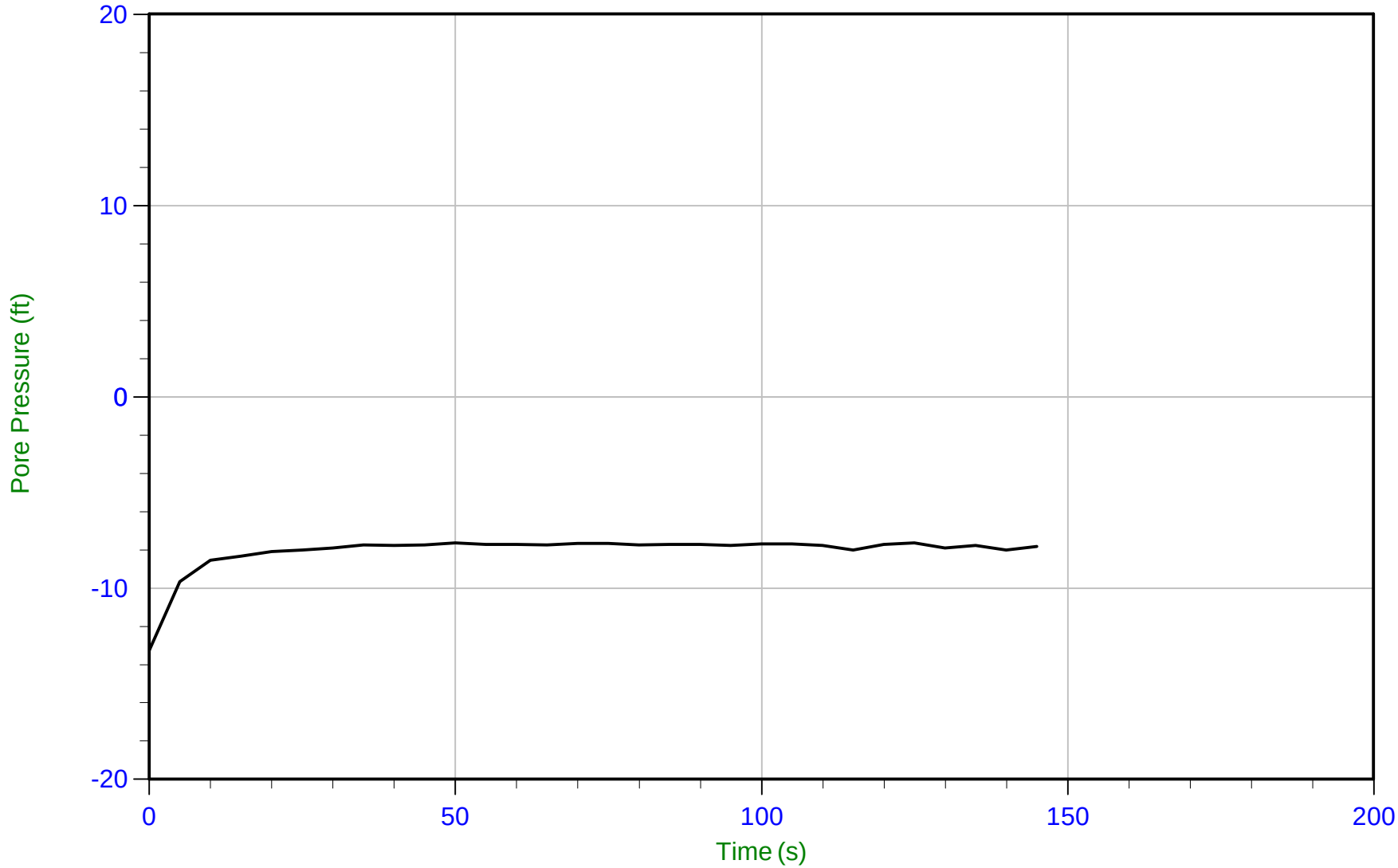
u Min: -7.9 ft
u Max: 0.3 ft
u Final: -0.0 ft

WT: 0.650 m / 2.133 ft
Ueq: 0.0 ft

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP11.PPF
Depth: 2.475 m / 8.120 ft
Duration: 145.0 s

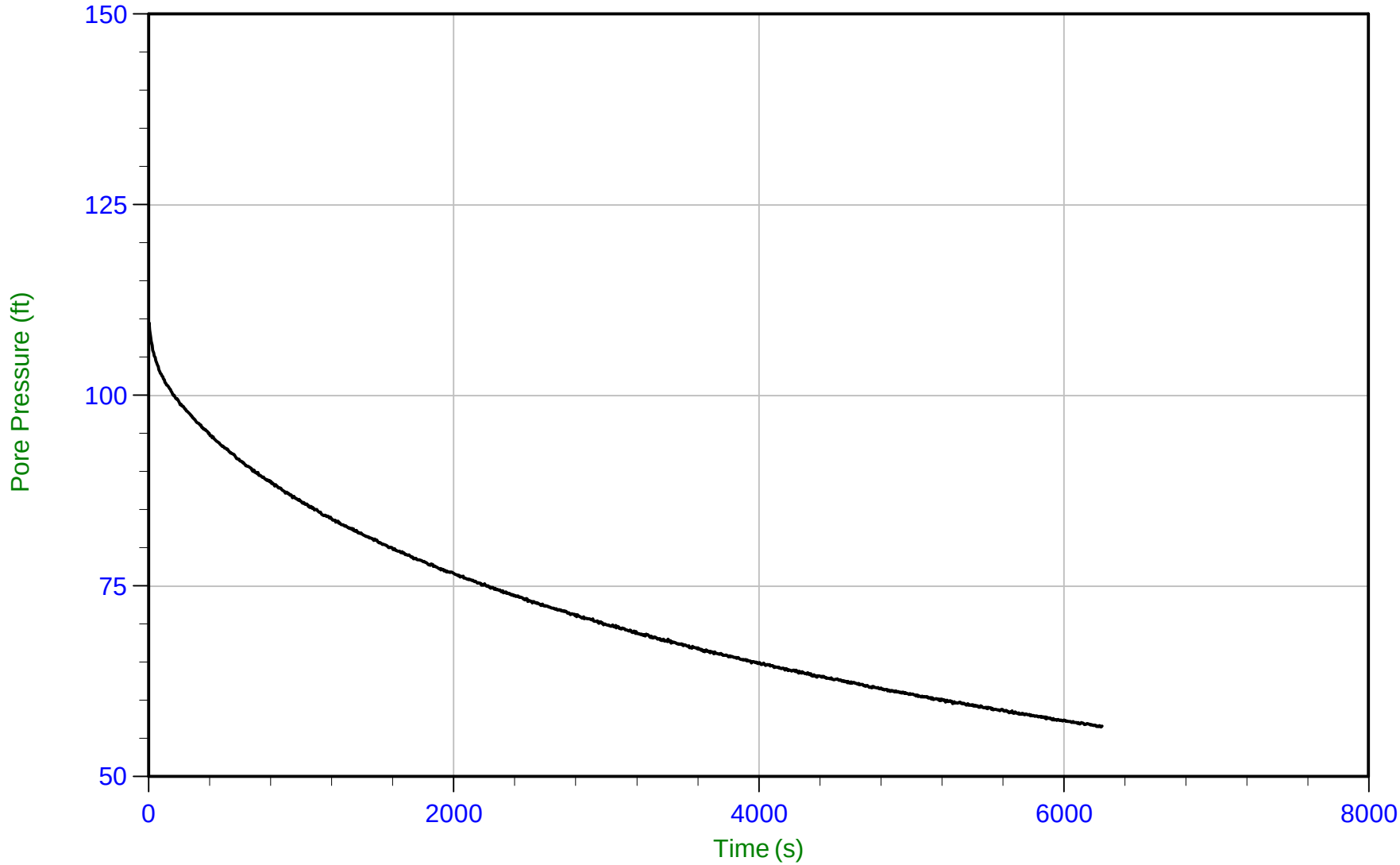
u Min: -13.3 ft
u Max: -7.6 ft
u Final: -7.8 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP11.PPF
Depth: 5.850 m / 19.193 ft
Duration: 6255.0 s

u Min: 56.5 ft
u Max: 109.5 ft
u Final: 56.6 ft

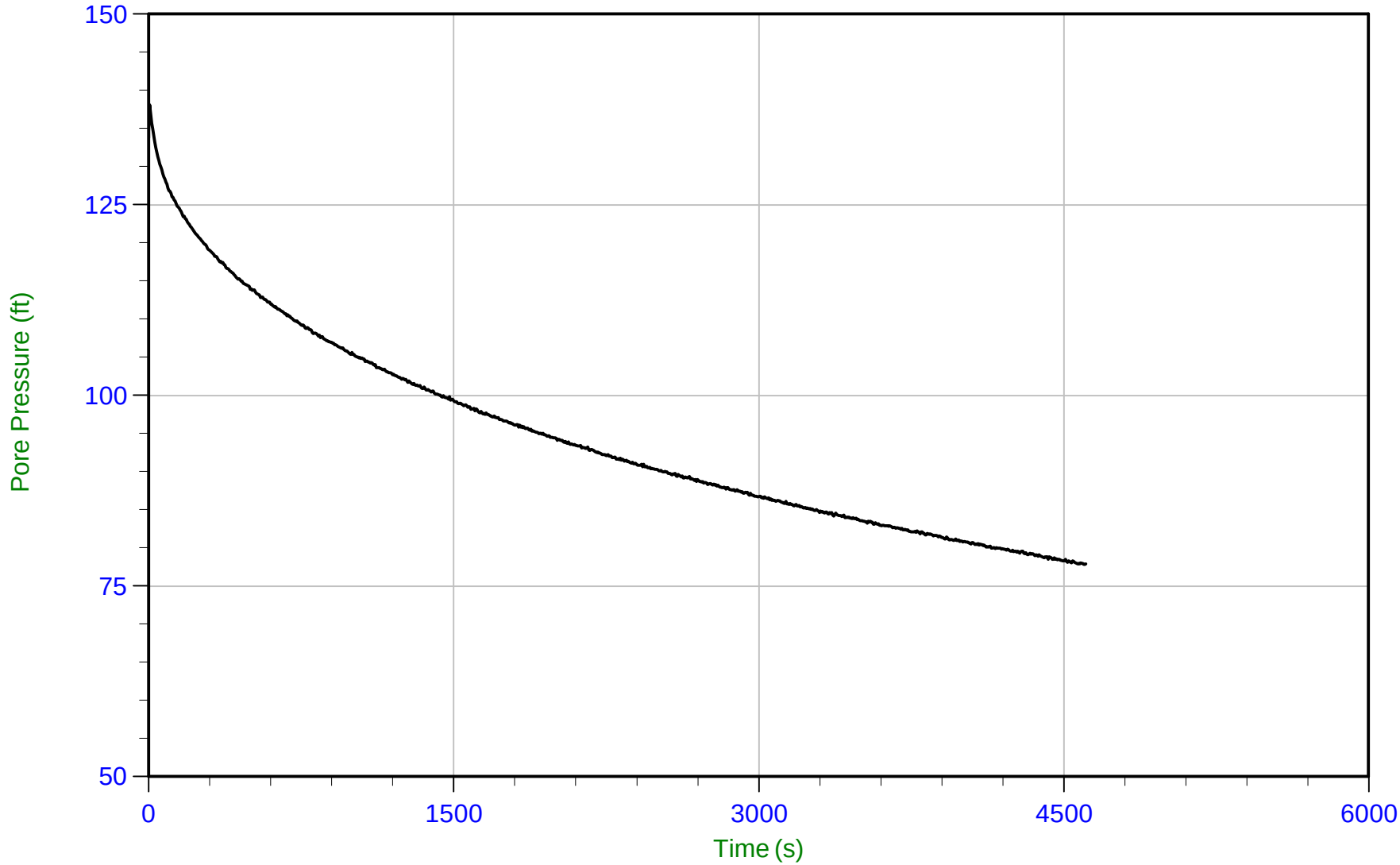
WT: 4.267 m / 13.999 ft
Ueq: 5.2 ft
U(50): 57.33 ft

T(50): 5985.9 s
Ir: 100
Ch: 0.1 cm²/min

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP11.PPF
Depth: 8.575 m / 28.133 ft
Duration: 4610.0 s

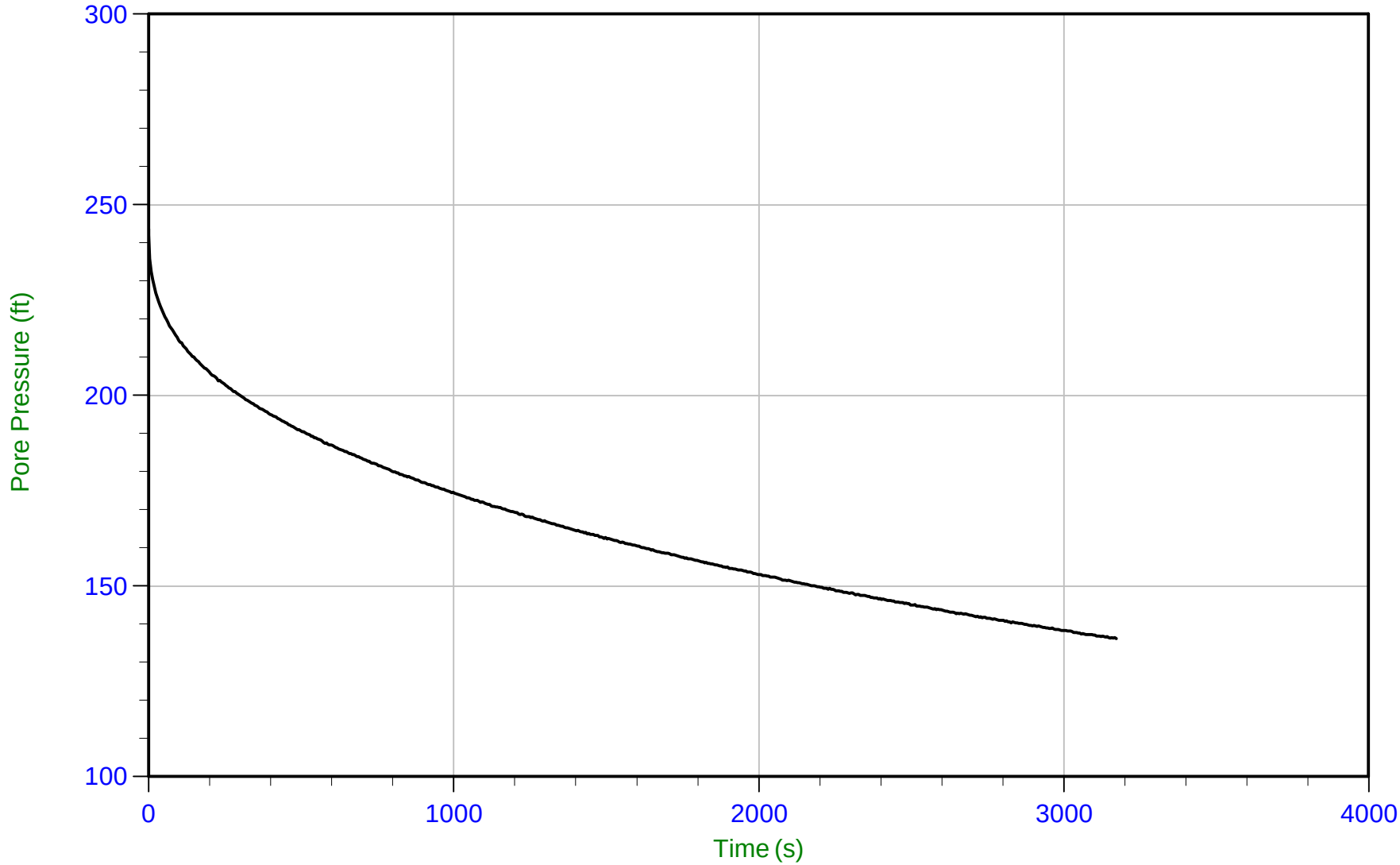
u Min: 77.8 ft
u Max: 138.1 ft
u Final: 77.9 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP11.PPF
Depth: 14.675 m / 48.146 ft
Duration: 3175.0 s

u Min: 136.1 ft
u Max: 243.7 ft
u Final: 136.1 ft

WT: 4.267 m / 13.999 ft
Ueq: 34.1 ft
U(50): 138.91 ft

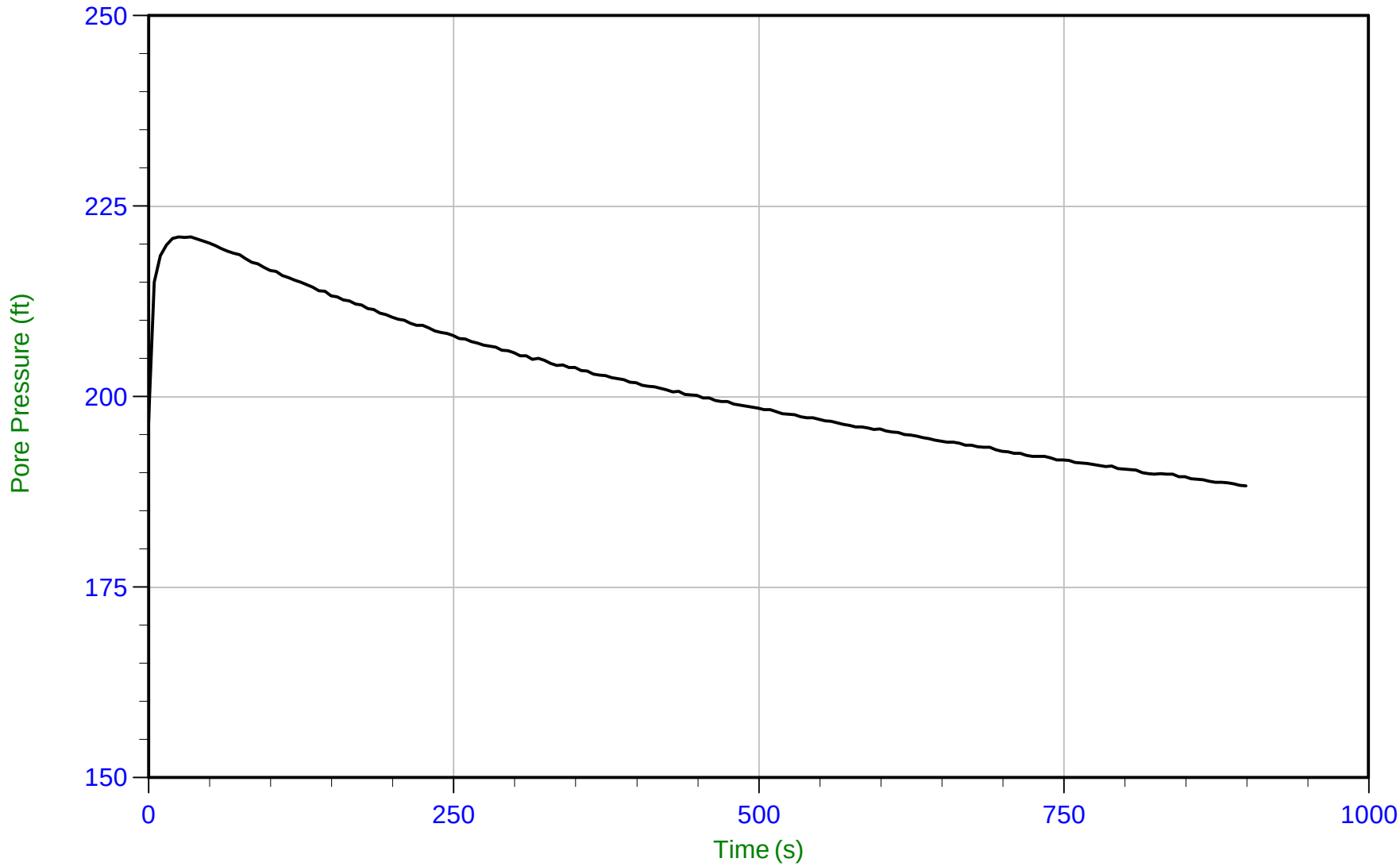
T(50): 2952.5 s
Ir: 100
Ch: 0.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP11.PPF
Depth: 20.550 m / 67.420 ft
Duration: 900.0 s

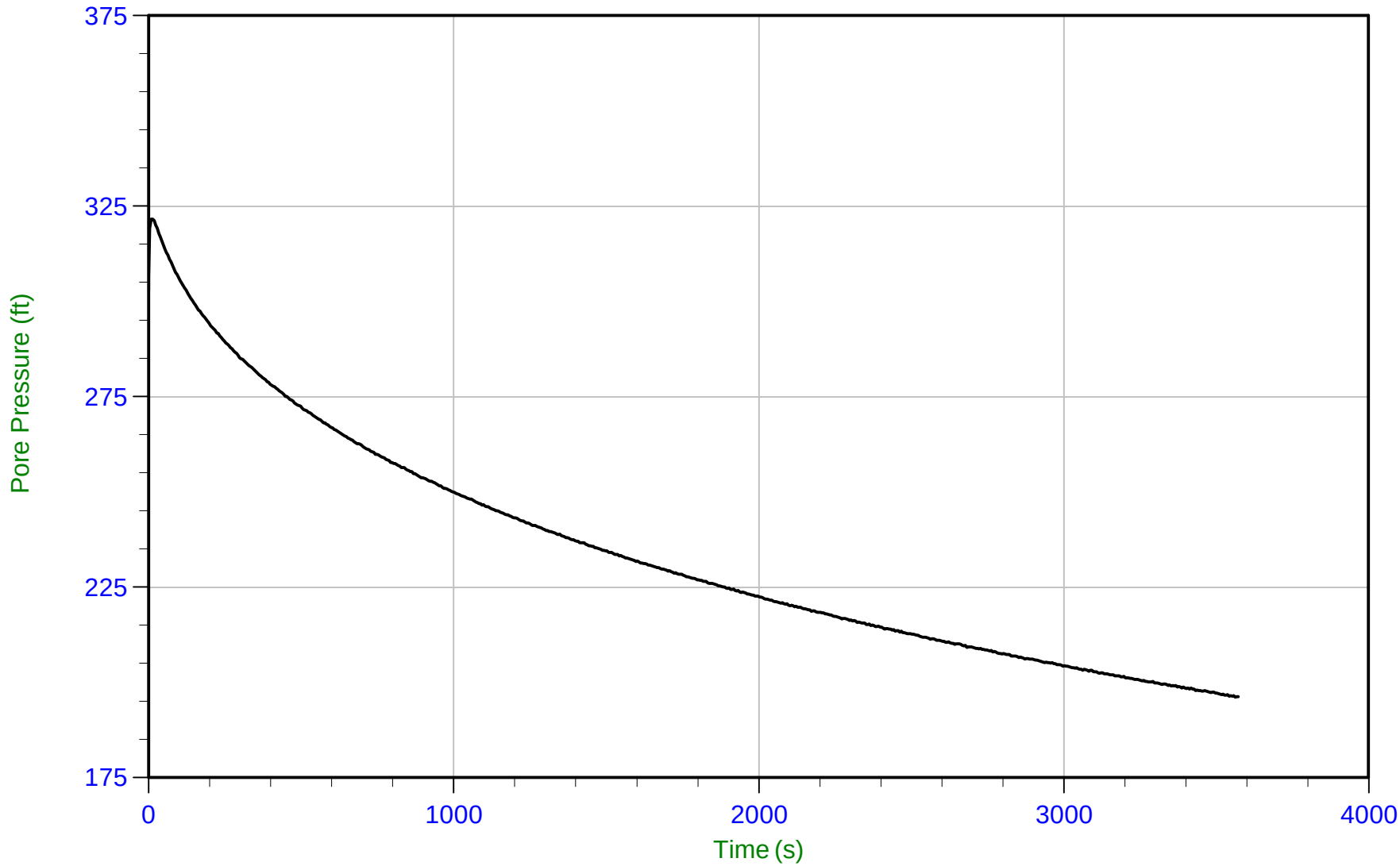
u Min: 188.3 ft
u Max: 221.0 ft
u Final: 188.3 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP11.PPF
Depth: 26.850 m / 88.089 ft
Duration: 3575.0 s

u Min: 196.1 ft
u Max: 321.7 ft
u Final: 196.3 ft

WT: 4.267 m / 13.999 ft
Ueq: 74.1 ft
U(50): 197.88 ft

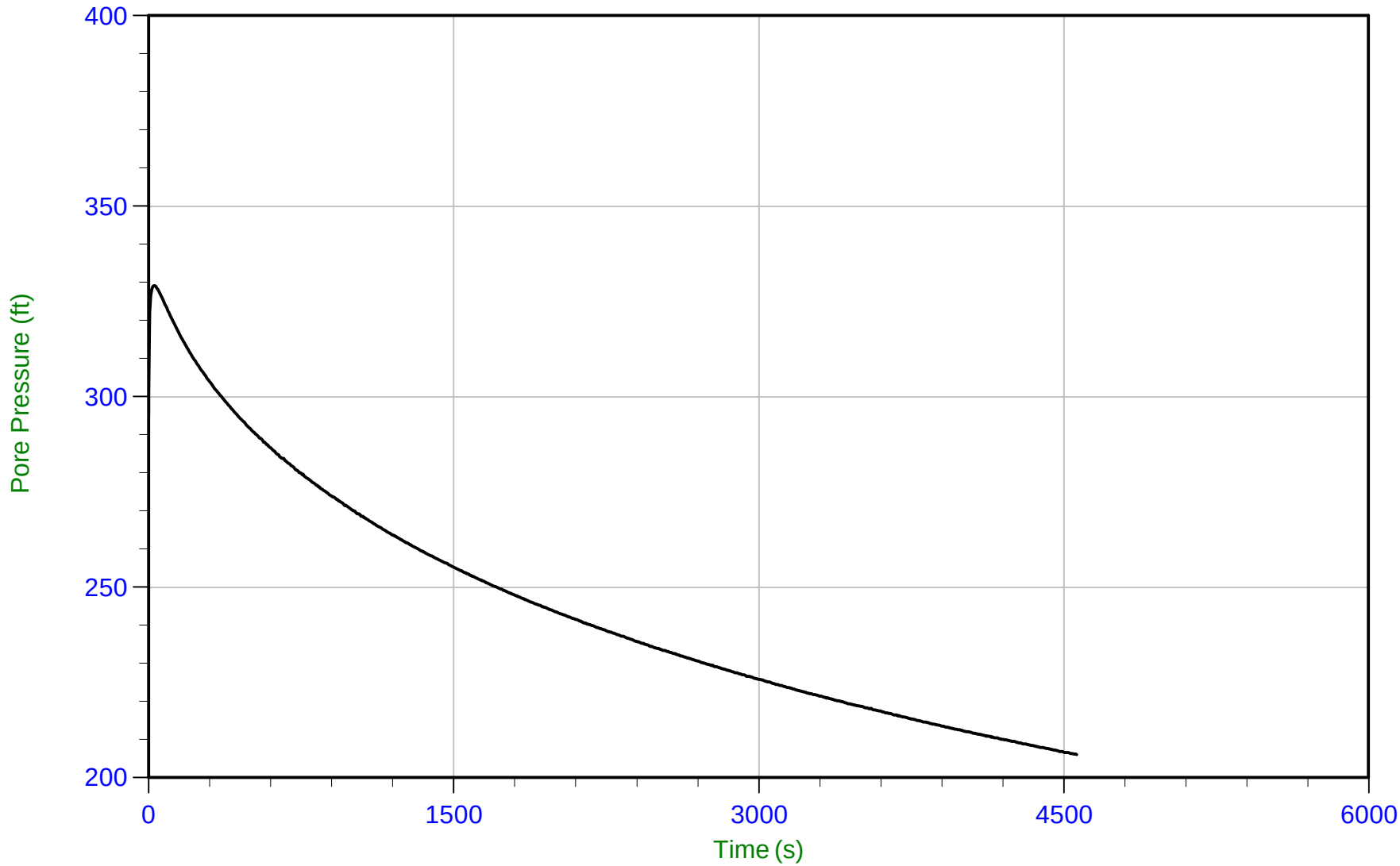
T(50): 3435.4 s
Ir: 100
Ch: 0.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 11:07
Site: DTE Belle River Power Plant

Sounding: CPT20-11
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP11.PPF
Depth: 29.900 m / 98.096 ft
Duration: 4565.0 s

u Min: 206.1 ft
u Max: 329.2 ft
u Final: 206.1 ft

WT: 4.267 m / 13.999 ft
Ueq: 84.1 ft
U(50): 206.63 ft

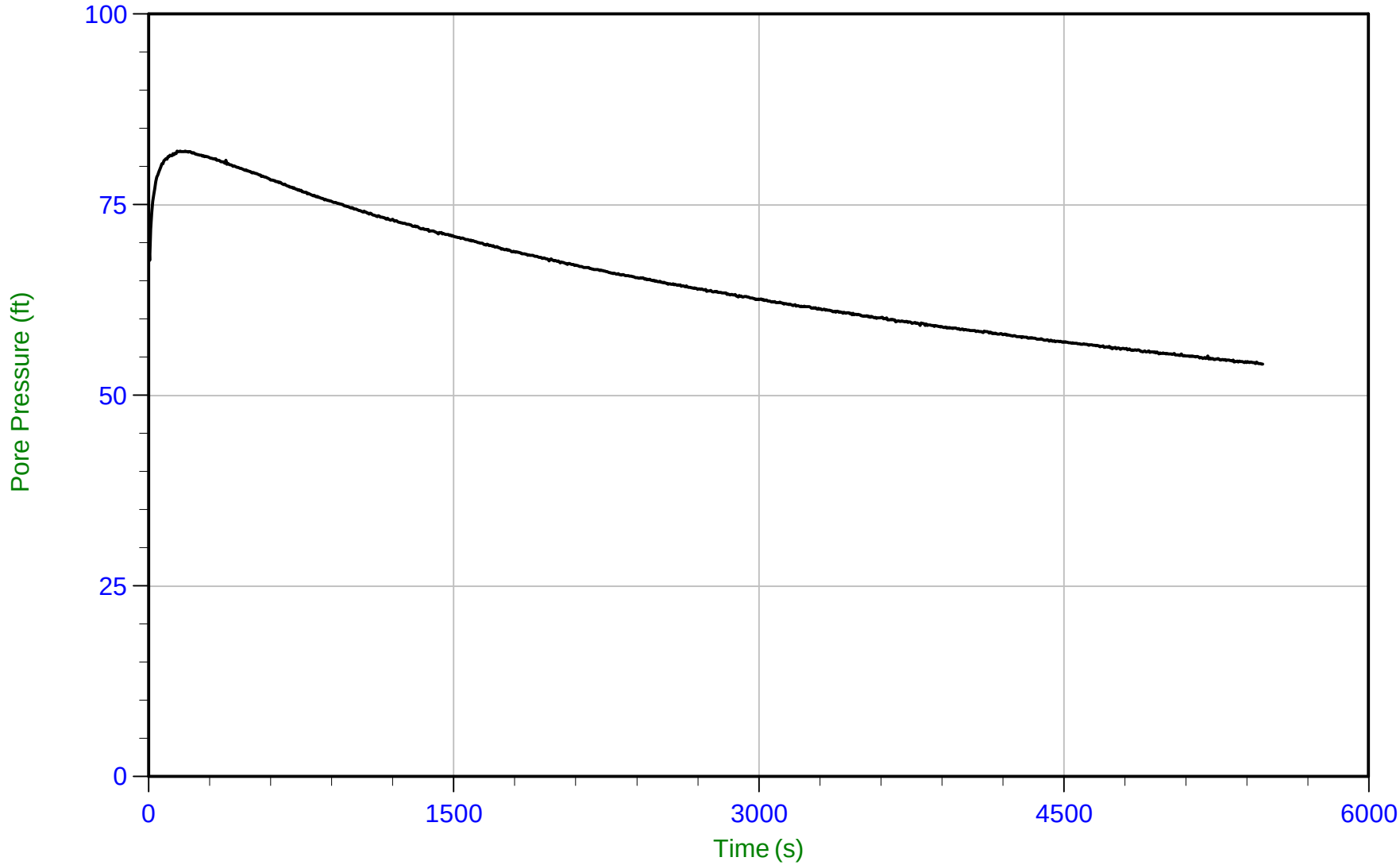
T(50): 4484.0 s
Ir: 100
Ch: 0.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 08:44
Site: DTE Belle River Power Plant

Sounding: CPT20-12
Cone: 551:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP12.PPF
Depth: 4.900 m / 16.076 ft
Duration: 5480.0 s

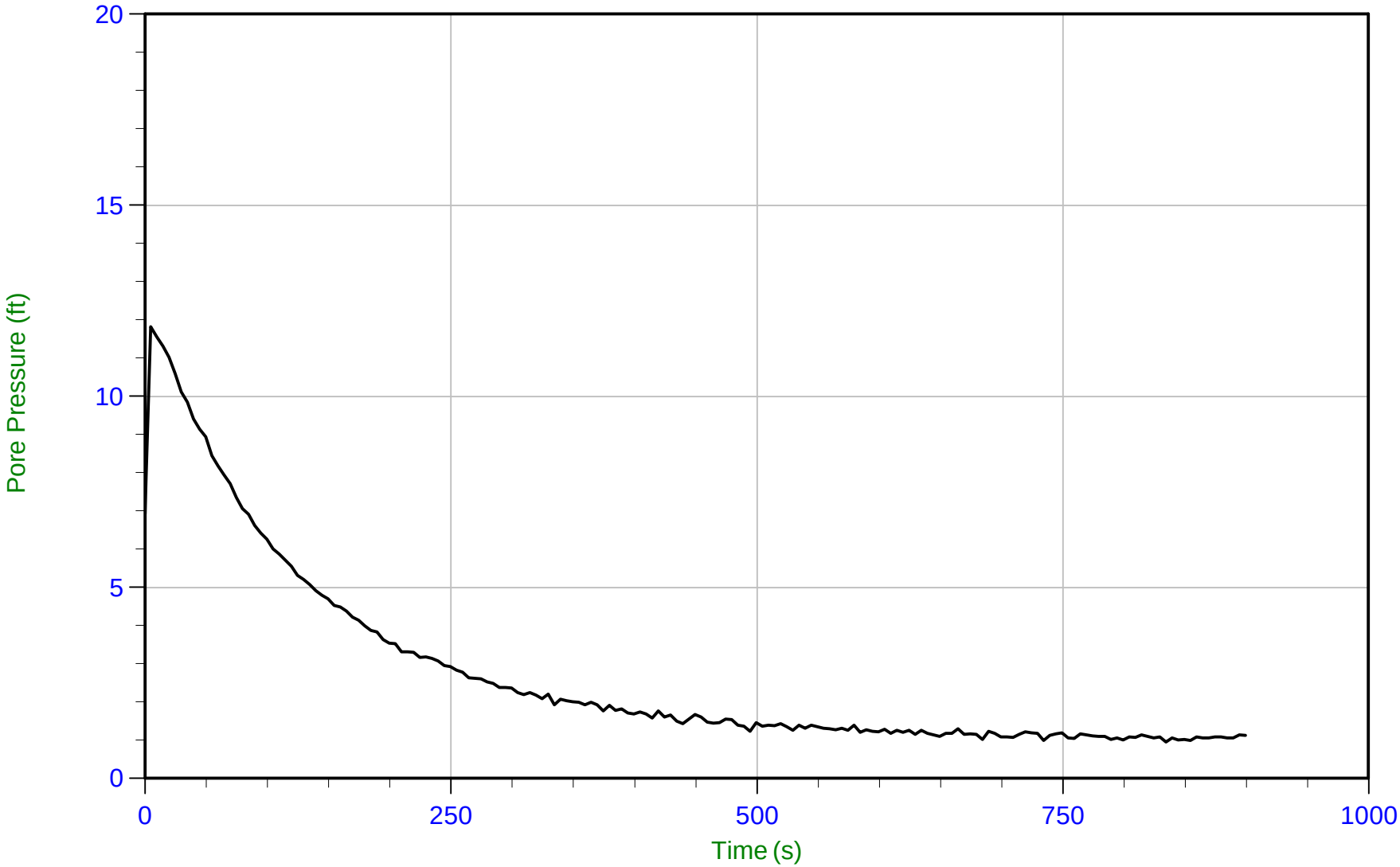
u Min: 54.1 ft
u Max: 82.0 ft
u Final: 54.1 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 13:54
Site: DTE Belle River Power Plant

Sounding: CPT20-06
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP06.PPF
Depth: 1.000 m / 3.281 ft
Duration: 900.0 s

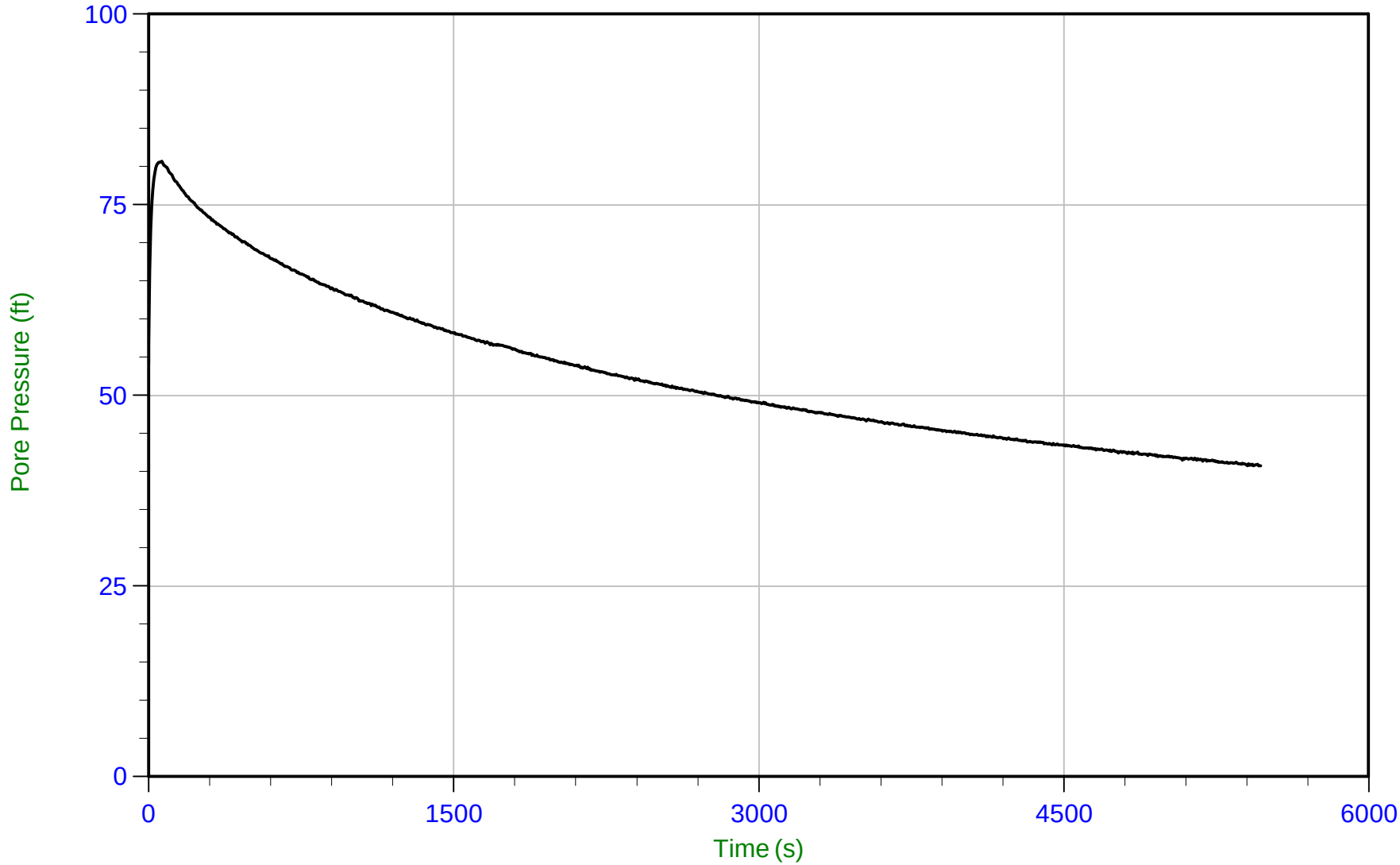
u Min: 1.0 ft
u Max: 11.8 ft
u Final: 1.1 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 13:54
Site: DTE Belle River Power Plant

Sounding: CPT20-06
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP06.PPF
Depth: 4.600 m / 15.092 ft
Duration: 5470.0 s

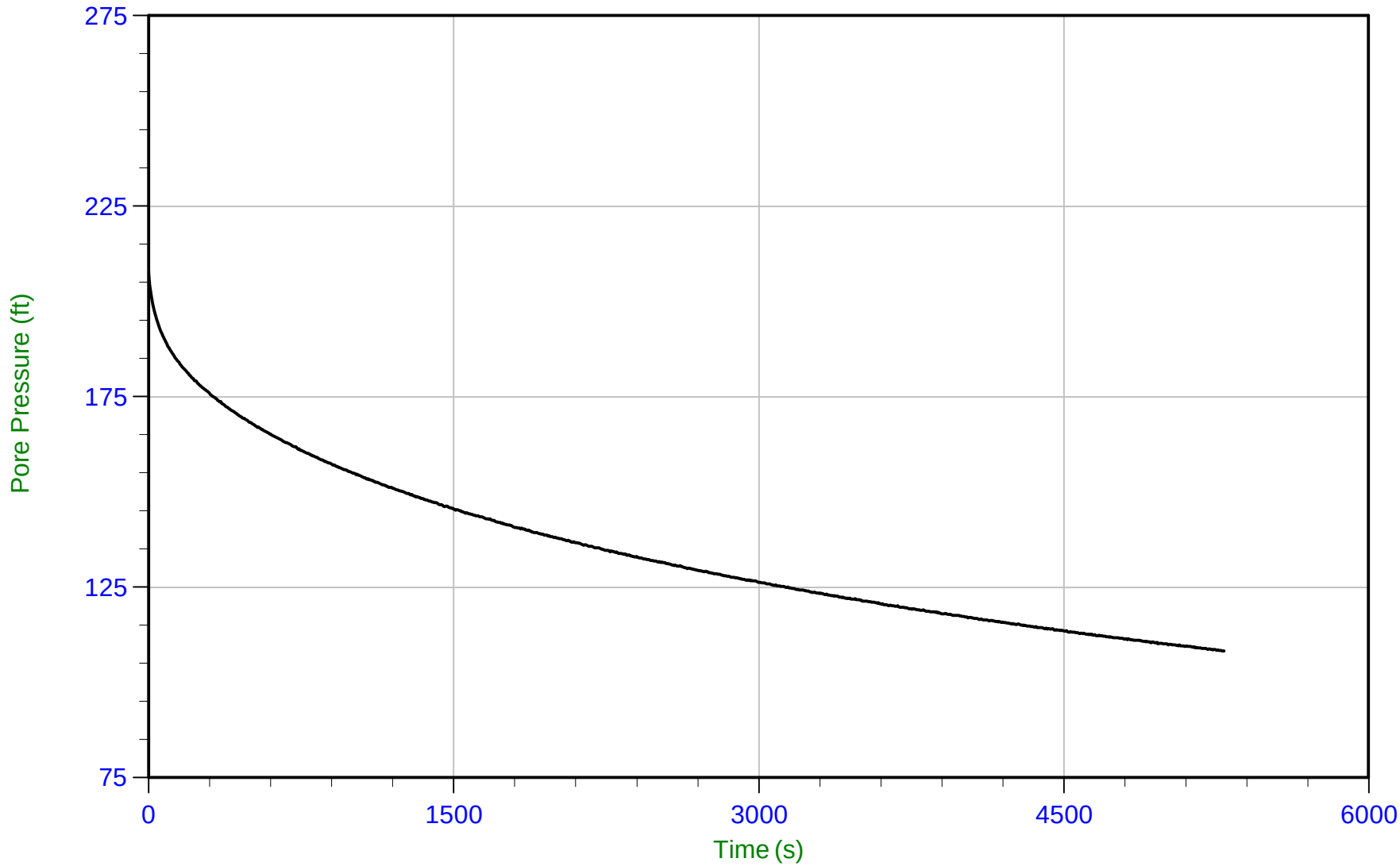
u Min: 40.7 ft
u Max: 80.7 ft
u Final: 40.8 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/10/2020 08:43
Site: DTE Belle River Power Plant

Sounding: CPT20-06B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP06B.PPF
Depth: 13.450 m / 44.127 ft
Duration: 5290.0 s

u Min: 108.2 ft
u Max: 208.0 ft
u Final: 108.3 ft

WT: 5.182 m / 17.000 ft
Ueq: 27.1 ft
U(50): 117.58 ft

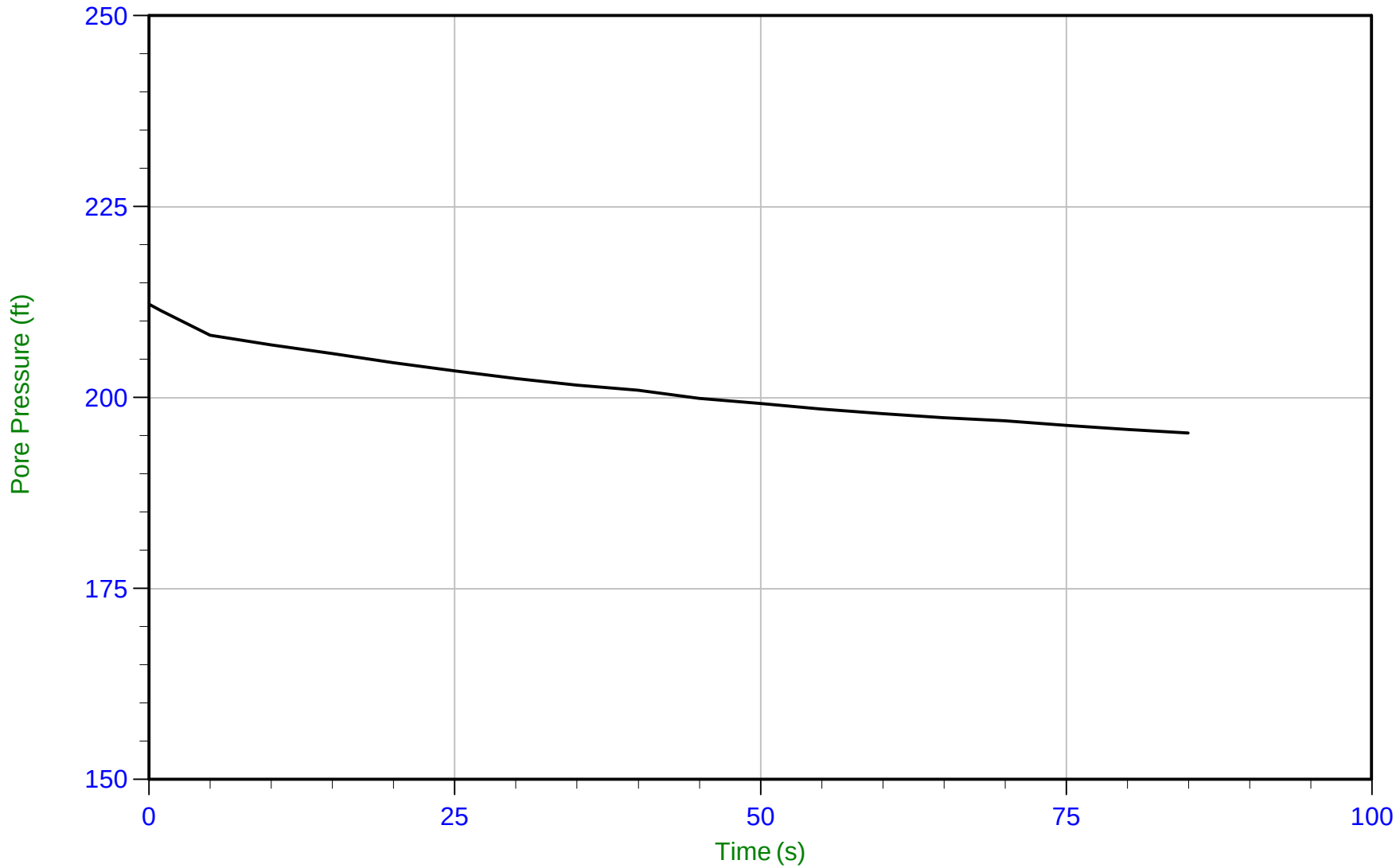
T(50): 3964.4 s
Ir: 100
Ch: 0.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/10/2020 08:43
Site: DTE Belle River Power Plant

Sounding: CPT20-06B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP06B.PPF
Depth: 13.800 m / 45.275 ft
Duration: 85.0 s

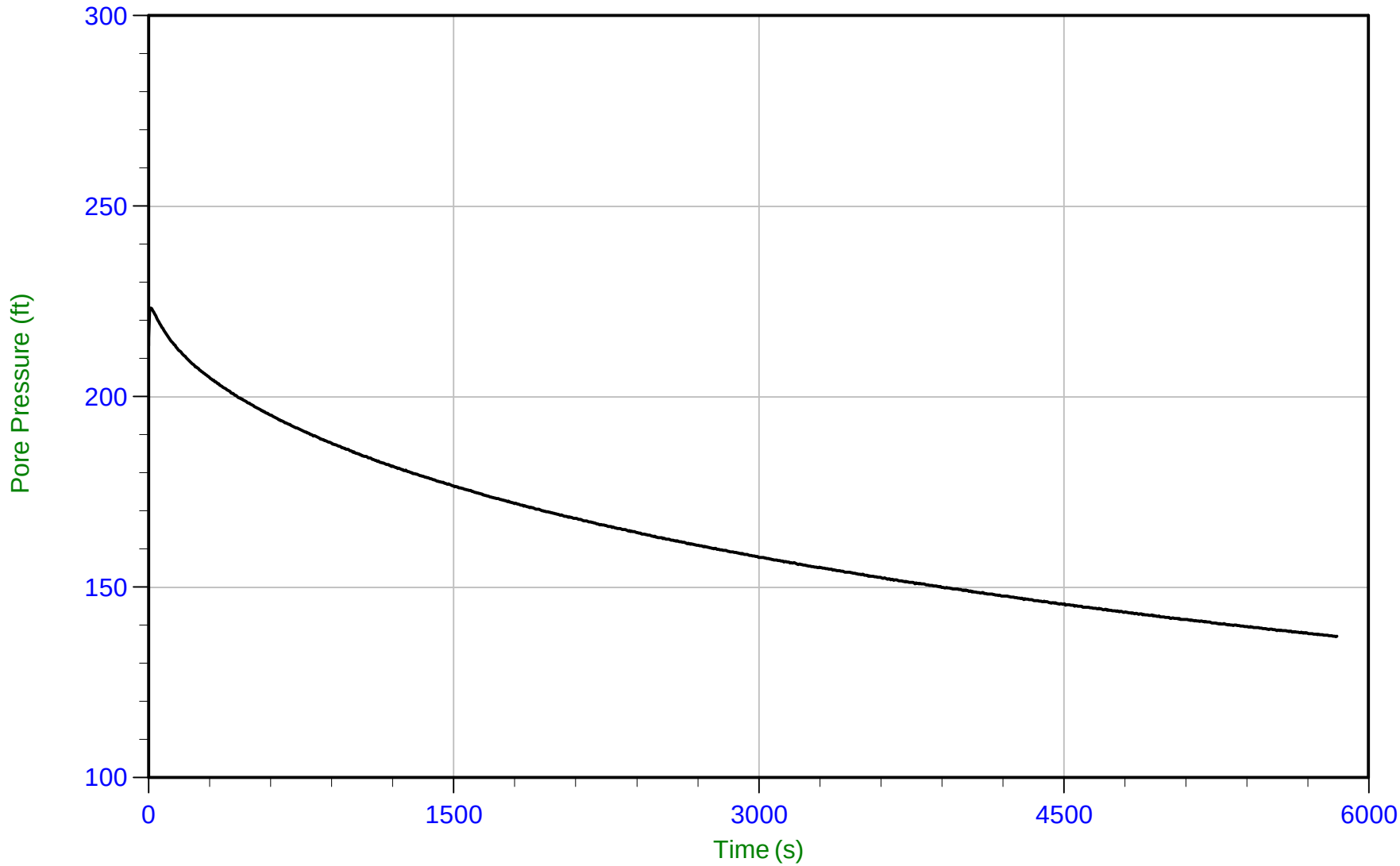
u Min: 195.3 ft
u Max: 212.2 ft
u Final: 195.3 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/10/2020 08:43
Site: DTE Belle River Power Plant

Sounding: CPT20-06B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP06B.PPF
Depth: 19.550 m / 64.140 ft
Duration: 5845.0 s

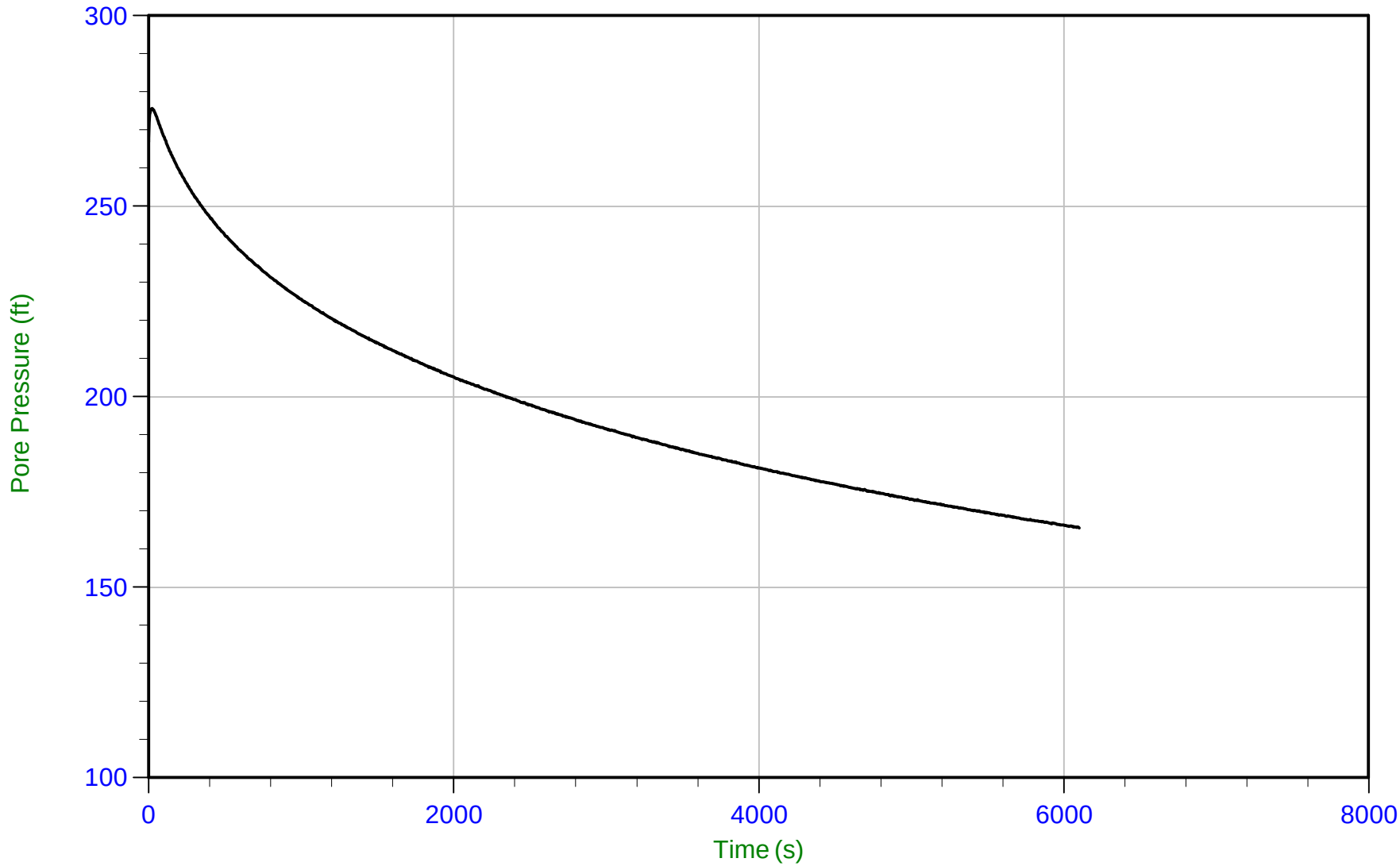
u Min: 137.0 ft
u Max: 223.2 ft
u Final: 137.1 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/10/2020 08:43
Site: DTE Belle River Power Plant

Sounding: CPT20-06B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP06B.PPF
Depth: 25.650 m / 84.153 ft
Duration: 6105.0 s

u Min: 165.5 ft
u Max: 275.6 ft
u Final: 165.5 ft

WT: 5.182 m / 17.000 ft
Ueq: 67.2 ft
U(50): 171.39 ft

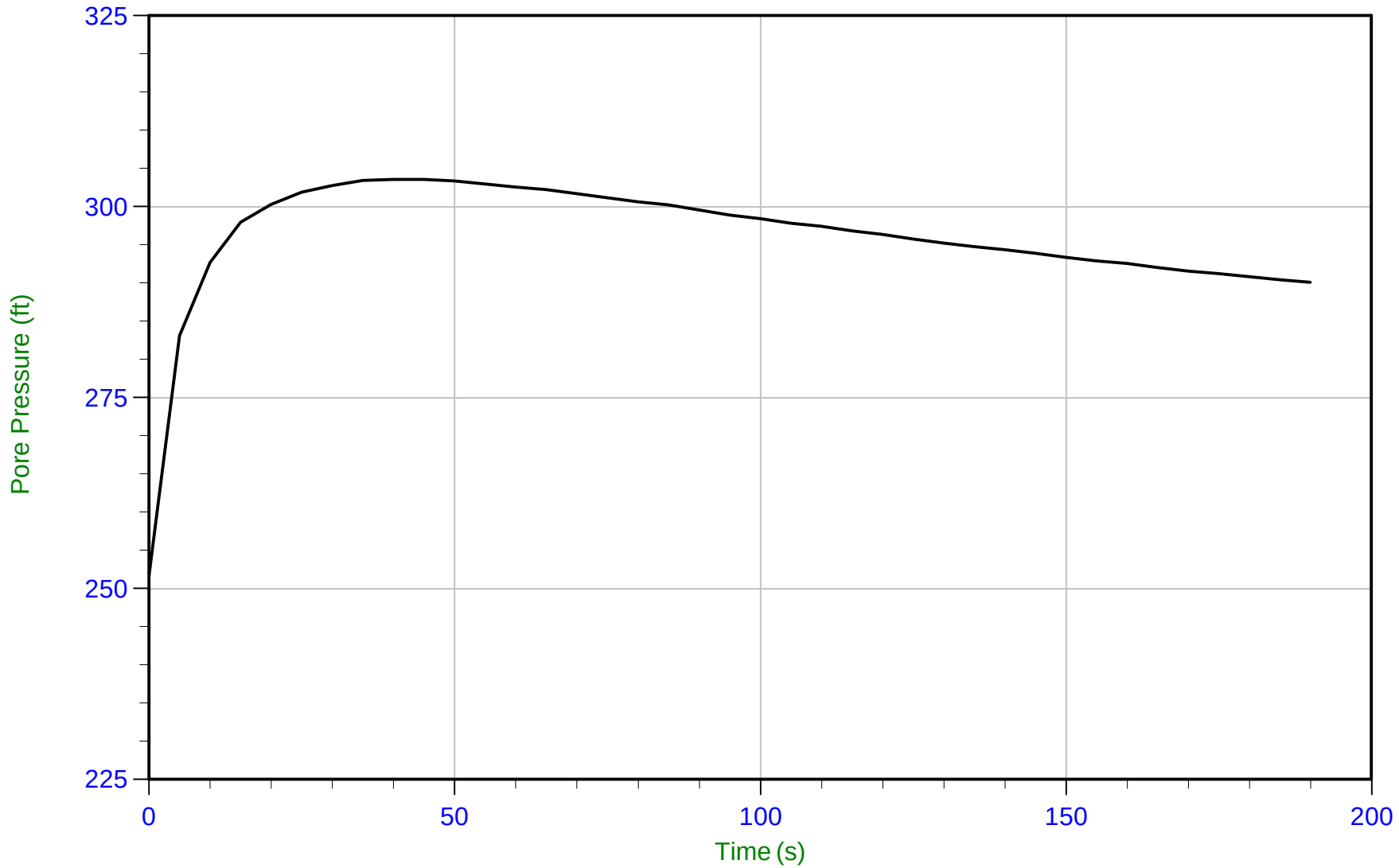
T(50): 5203.0 s
Ir: 100
Ch: 0.1 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/10/2020 08:43
Site: DTE Belle River Power Plant

Sounding: CPT20-06B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP06B.PPF
Depth: 29.550 m / 96.948 ft
Duration: 190.0 s

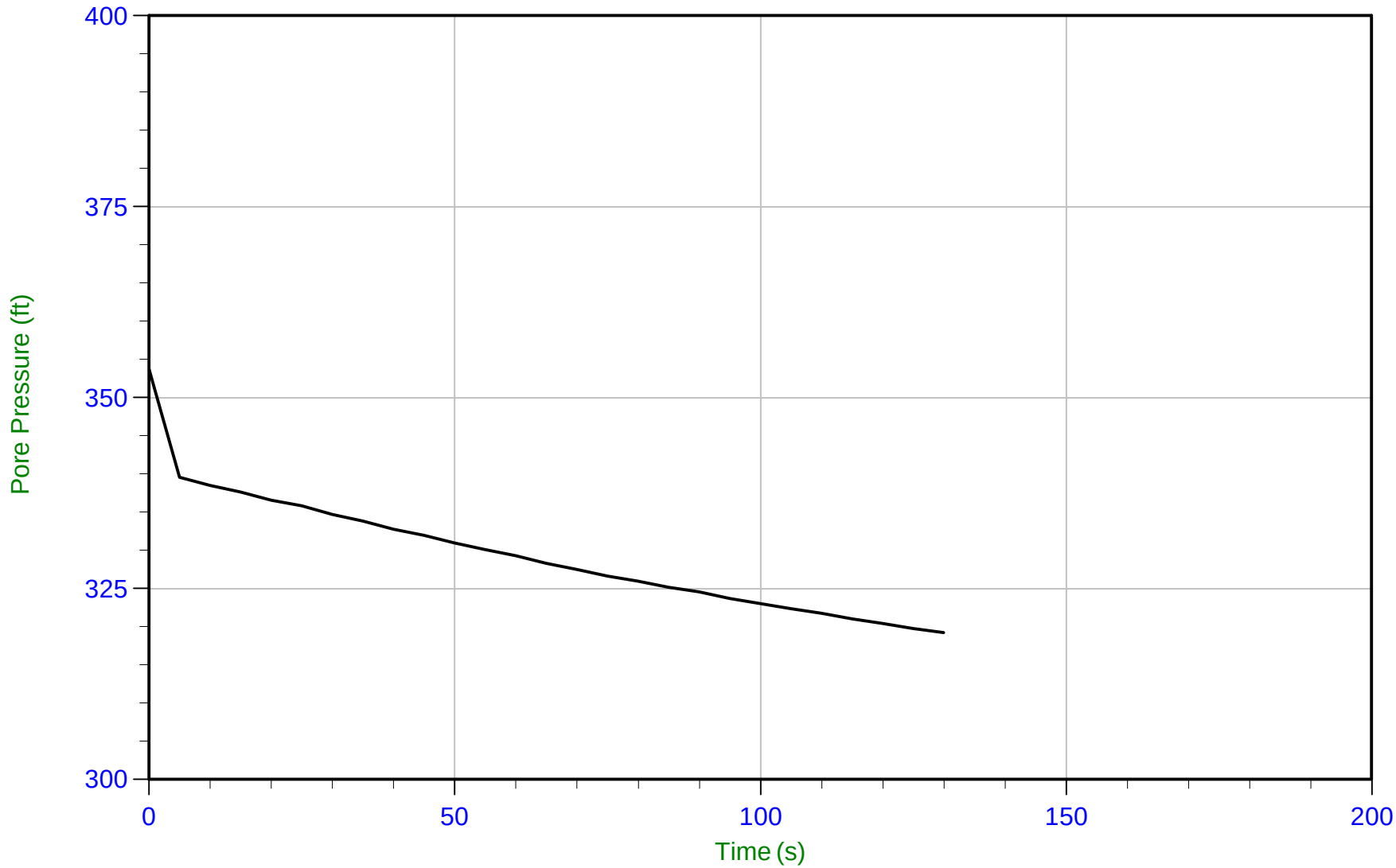
u Min: 251.6 ft
u Max: 303.6 ft
u Final: 290.1 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/10/2020 08:43
Site: DTE Belle River Power Plant

Sounding: CPT20-06B
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

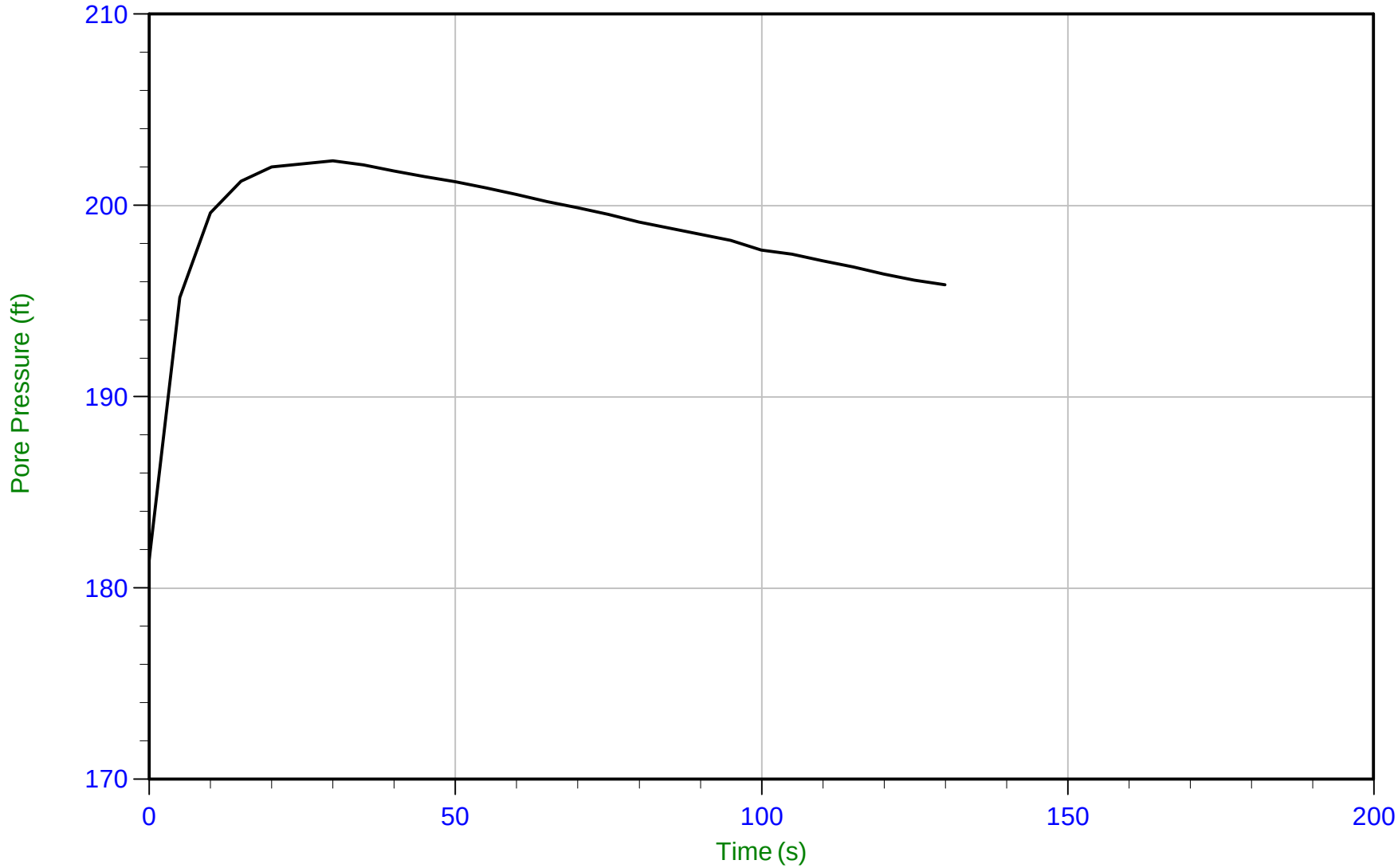
Filename: 20-61-21681_CP06B.PPF
Depth: 30.500 m / 100.064 ft
Duration: 130.0 s

u Min: 319.2 ft
u Max: 353.7 ft
u Final: 319.2 ft

Geosyntec

Job No: 20-61-21681
Date: 12/09/2020 11:04
Site: DTE Belle River Power Plant

Sounding: CPT20-07
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP07.PPF
Depth: 18.800 m / 61.679 ft
Duration: 130.0 s

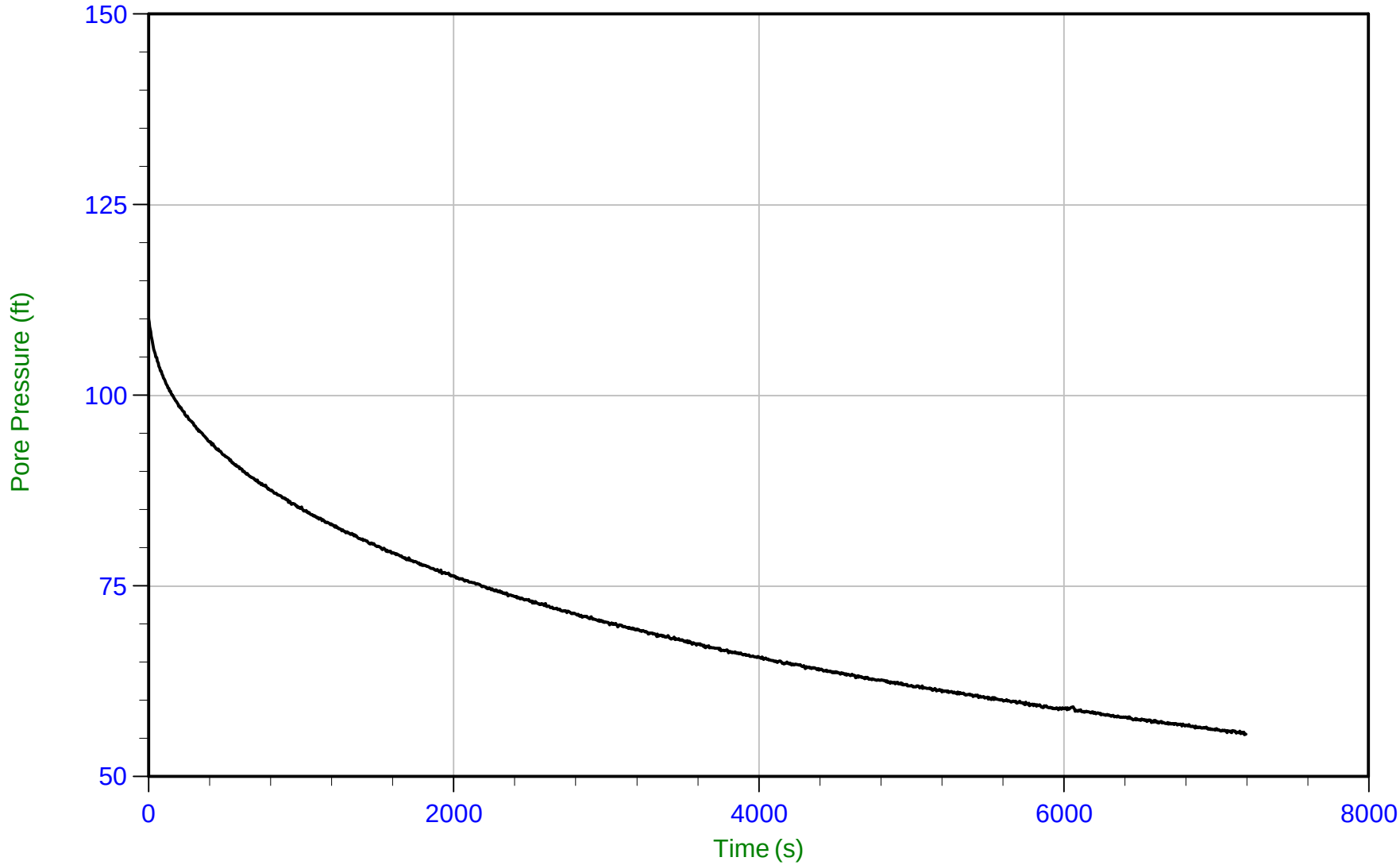
u Min: 181.5 ft
u Max: 202.3 ft
u Final: 195.9 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 12:35
Site: DTE Belle River Power Plant

Sounding: CPT20-08B
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP08B.PPF
Depth: 6.100 m / 20.013 ft
Duration: 7200.0 s

u Min: 55.5 ft
u Max: 110.1 ft
u Final: 55.5 ft

WT: 4.877 m / 16.000 ft
Ueq: 4.0 ft
U(50): 57.04 ft

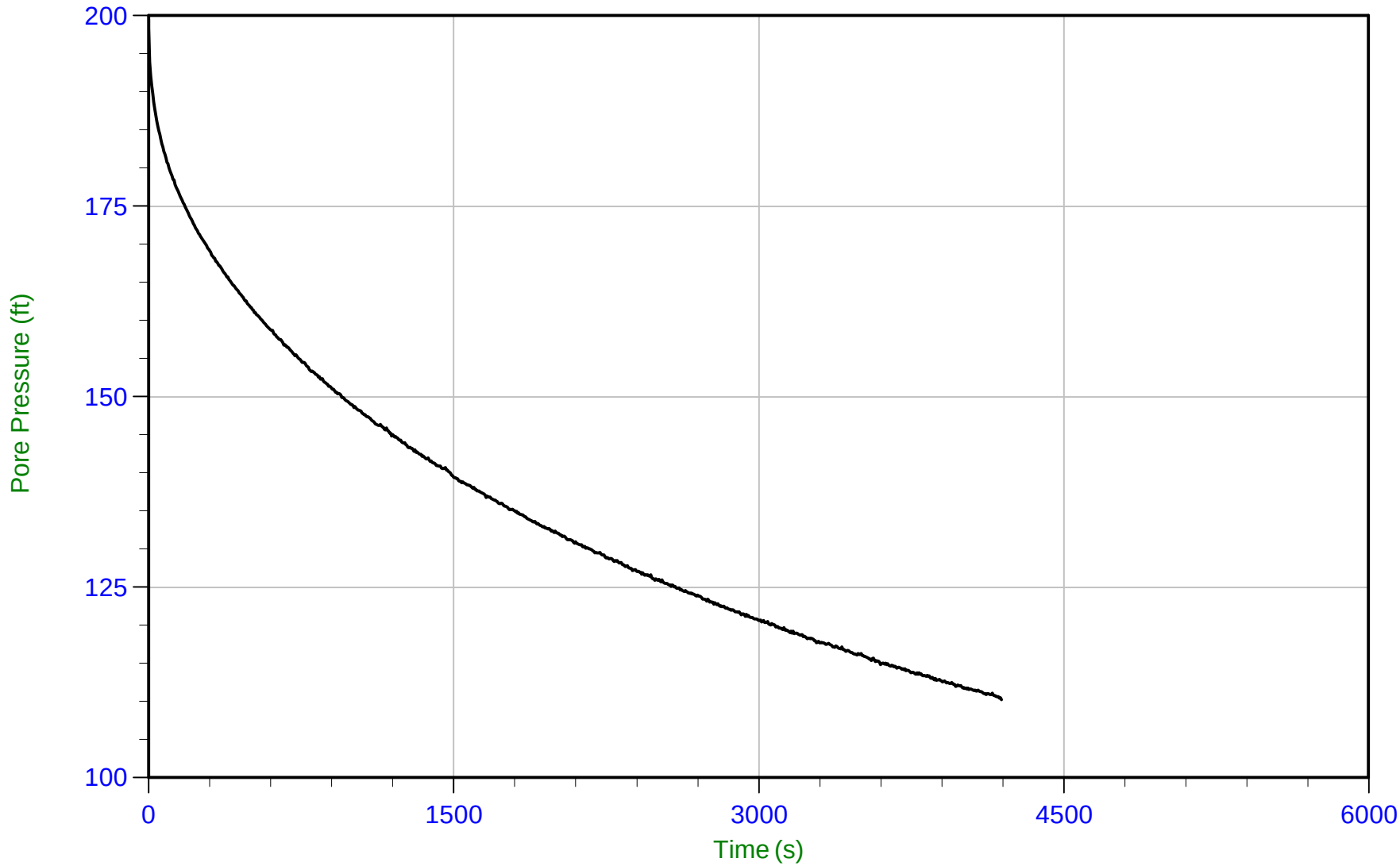
T(50): 6624.7 s
Ir: 100
Ch: 0.1 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 12:35
Site: DTE Belle River Power Plant

Sounding: CPT20-08B
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP08B.PPF
Depth: 12.200 m / 40.026 ft
Duration: 4195.0 s

u Min: 110.2 ft
u Max: 199.5 ft
u Final: 110.2 ft

WT: 4.877 m / 16.000 ft
Ueq: 24.0 ft
U(50): 111.76 ft

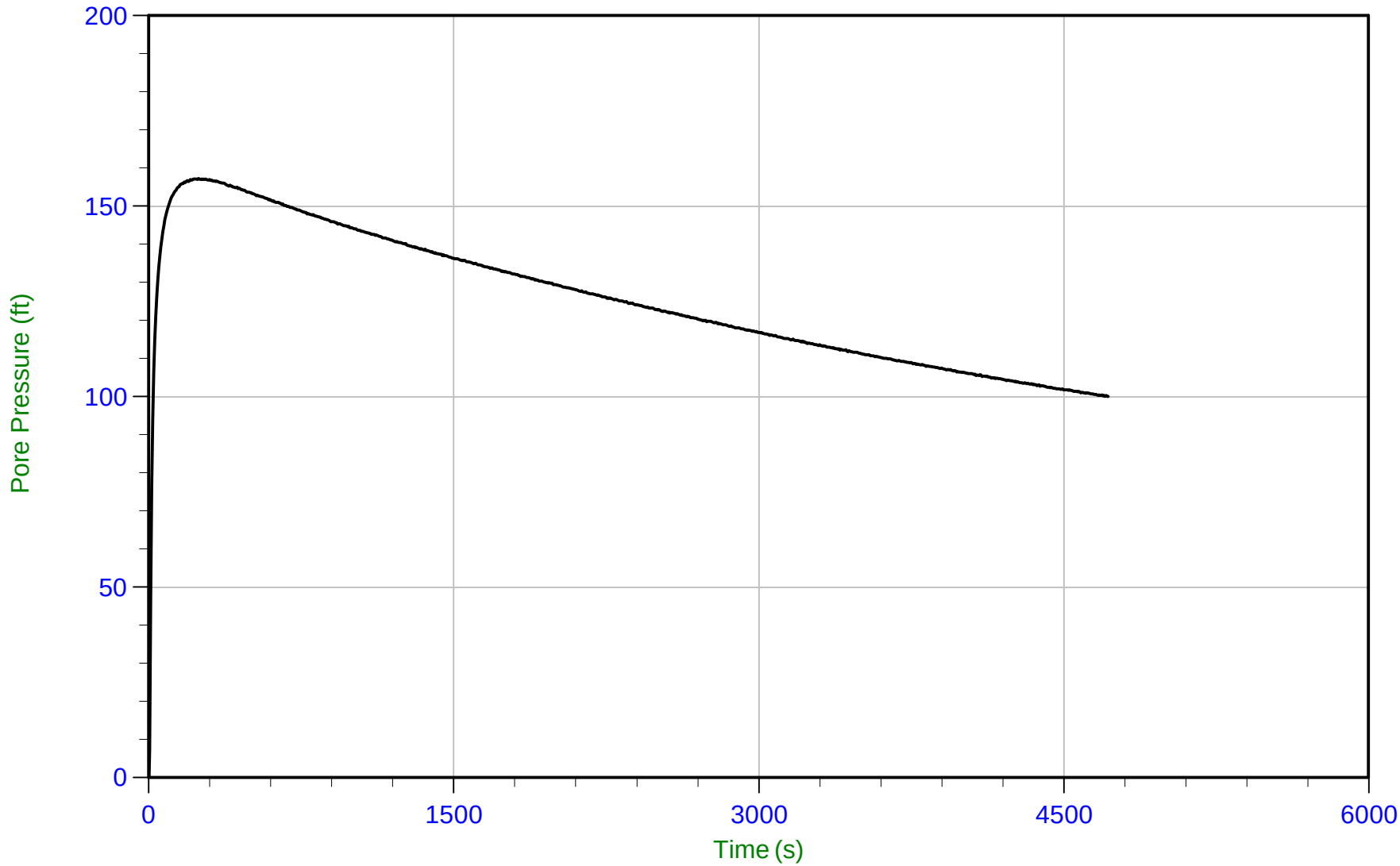
T(50): 4004.2 s
Ir: 100
Ch: 0.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 08:41
Site: DTE Belle River Power Plant

Sounding: CPT20-08C
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP08C.PPF
Depth: 18.300 m / 60.039 ft
Duration: 4720.0 s

u Min: -7.2 ft
u Max: 157.2 ft
u Final: 100.1 ft

WT: 4.877 m / 16.000 ft
Ueq: 44.0 ft
U(50): 100.63 ft

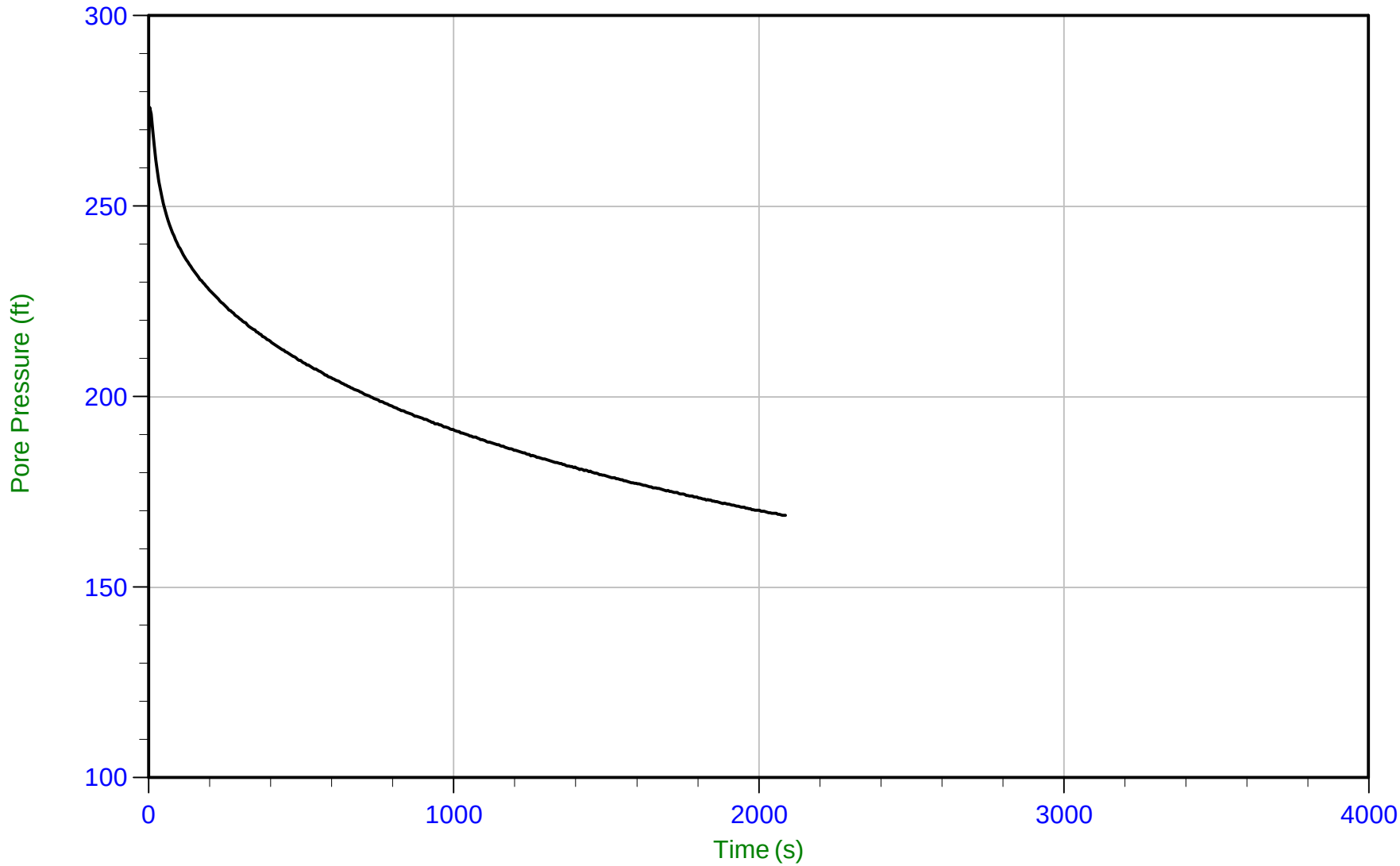
T(50): 4406.0 s
Ir: 100
Ch: 0.2 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 08:41
Site: DTE Belle River Power Plant

Sounding: CPT20-08C
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP08C.PPF
Depth: 24.400 m / 80.052 ft
Duration: 2090.0 s

u Min: 168.8 ft
u Max: 276.0 ft
u Final: 168.8 ft

WT: 4.877 m / 16.000 ft
Ueq: 64.1 ft
U(50): 170.02 ft

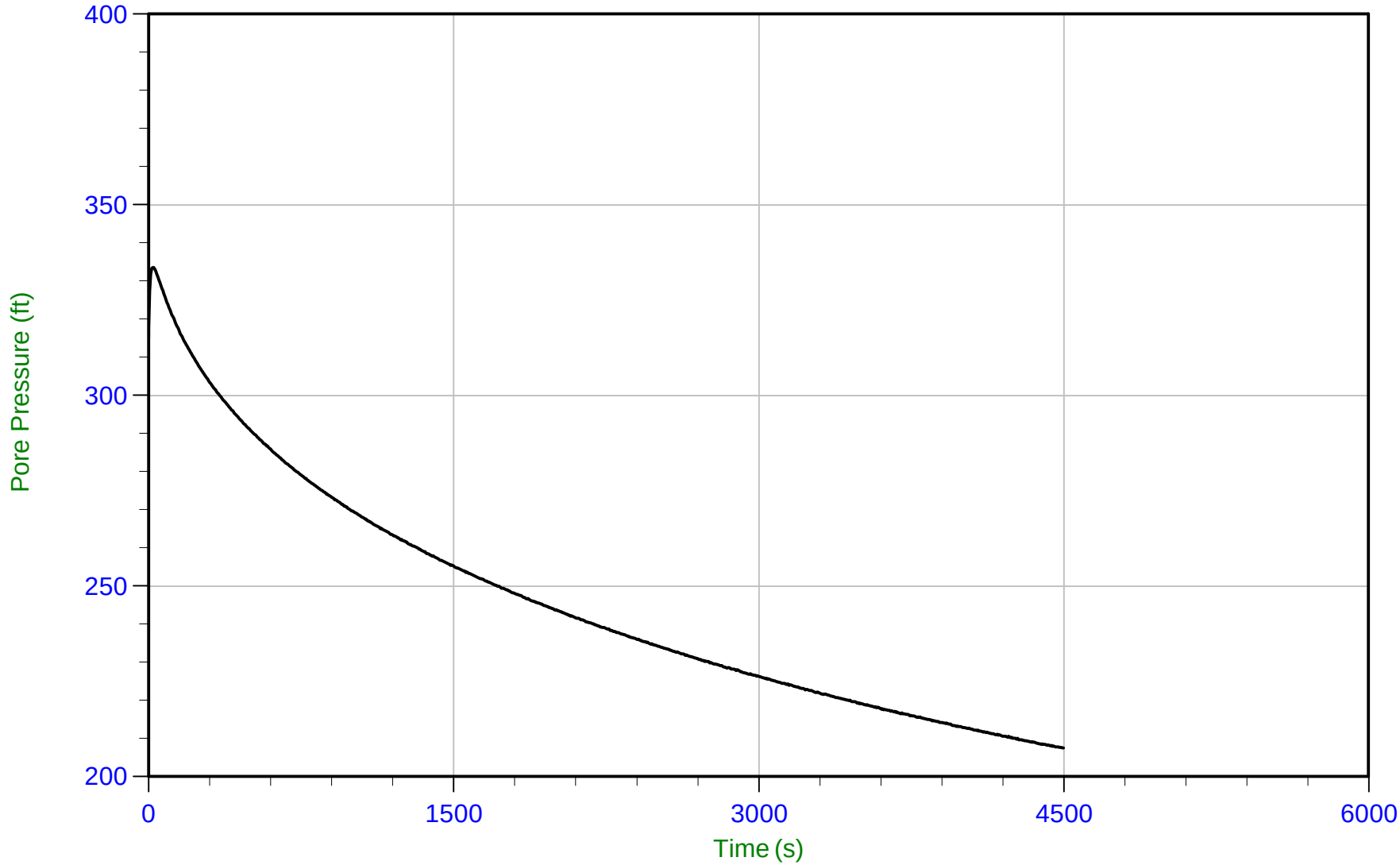
T(50): 2003.9 s
Ir: 100
Ch: 0.4 cm²/min

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/15/2020 08:41
Site: DTE Belle River Power Plant

Sounding: CPT20-08C
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP08C.PPF
Depth: 30.500 m / 100.064 ft
Duration: 4500.0 s

u Min: 207.5 ft
u Max: 333.6 ft
u Final: 207.5 ft

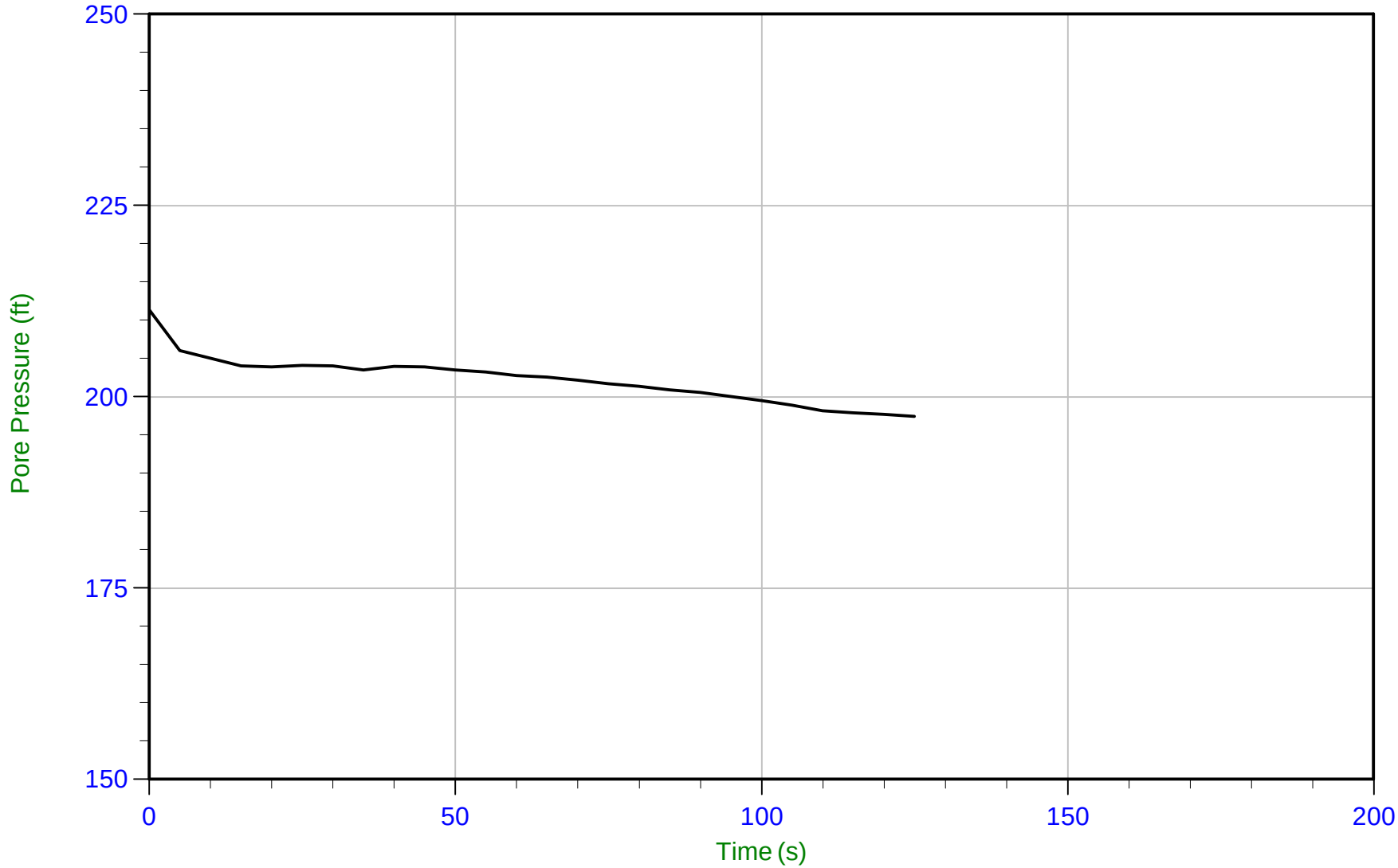
WT: 4.877 m / 16.000 ft
Ueq: 84.1 ft
U(50): 208.83 ft

T(50): 4346.6 s
Ir: 100
Ch: 0.2 cm²/min

Geosyntec

Job No: 20-61-21681
Date: 12/10/2020 15:00
Site: DTE Belle River Power Plant

Sounding: CPT20-13
Cone: 513:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP13.PPF
Depth: 17.200 m / 56.430 ft
Duration: 125.0 s

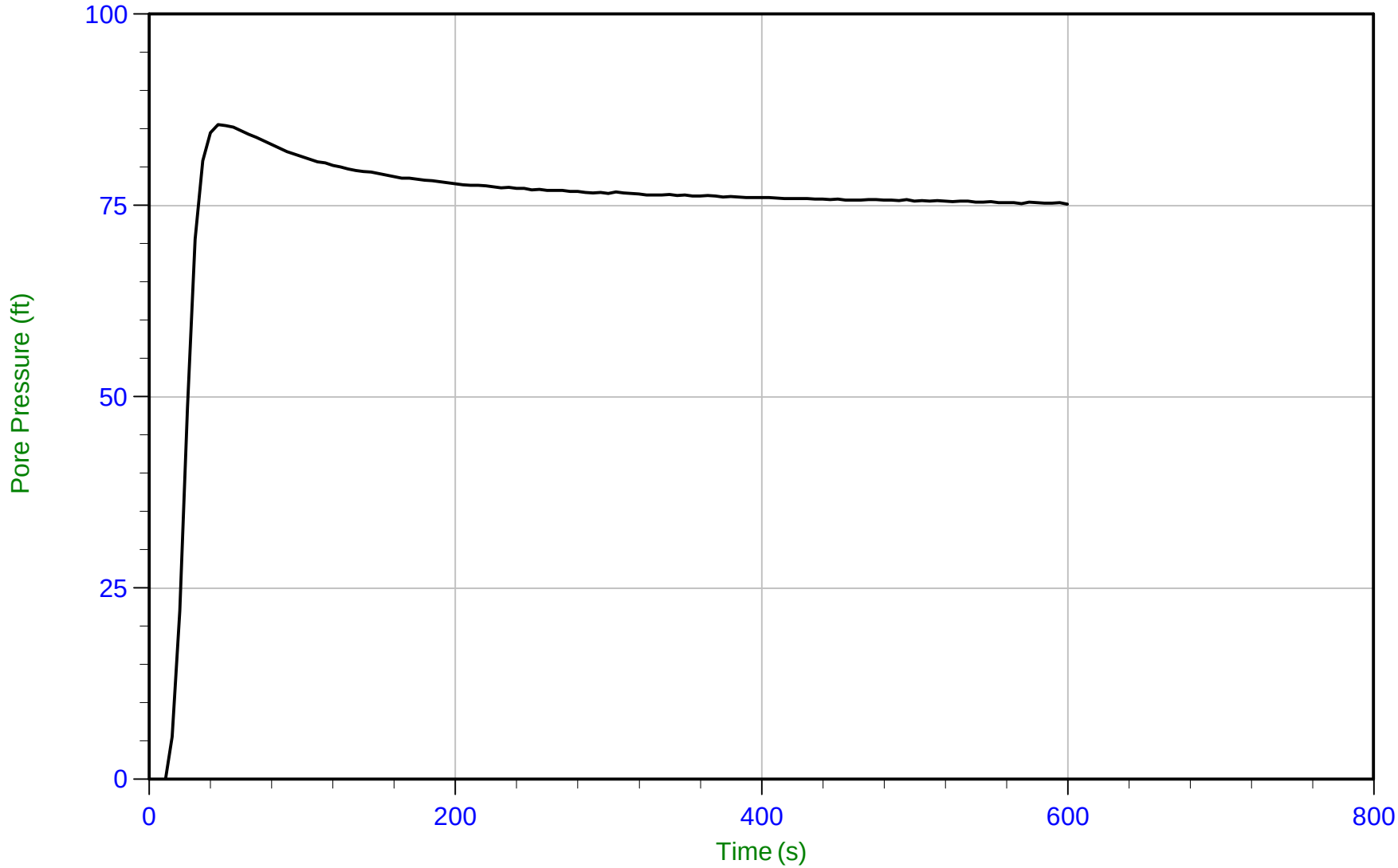
u Min: 197.4 ft
u Max: 211.4 ft
u Final: 197.4 ft

CONETEC

Geosyntec

Job No: 20-61-21681
Date: 12/11/2020 09:09
Site: DTE Belle River Power Plant

Sounding: CPT20-13B
Cone: 568:T1500F15U500 Area=15 cm²



Trace Summary:

Filename: 20-61-21681_CP13B.PPF
Depth: 25.200 m / 82.676 ft
Duration: 600.0 s

u Min: -3.9 ft
u Max: 85.6 ft
u Final: 75.2 ft

WT: 3.962 m / 13.000 ft
Ueq: 69.7 ft
U(50): 77.63 ft

T(50): 171.6 s
Ir: 100
Ch: 4.1 cm²/min

Geosyntec
consultants

Appendix J

Chemistry Analysis of Site-Specific Water

05-Jan-2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd.
Suite 100
Ann Arbor, MI 48105

Re: **DTE- Belle River (GLP-8017)** Work Order: **20121752**

Dear Michael,

ALS Environmental received 3 samples on 18-Dec-2020 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 21.

If you have any questions regarding this report, please feel free to contact me:

ADDRESS: 3352 128th Avenue, Holland, MI, USA
PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Sincerely,

Electronically approved by: Chad Whelton

Chad Whelton
Project Manager

Report of Laboratory Analysis

ALS Group, USA

Date: 05-Jan-21

Client: Geosyntec Consultants
Project: DTE- Belle River (GLP-8017)
Work Order: **20121752**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
20121752-01	BAB-E	Groundwater		12/16/2020 15:00	12/18/2020 10:00	☐
20121752-02	BAB-W	Groundwater		12/16/2020 14:00	12/18/2020 10:00	☐
20121752-03	DB	Groundwater		12/16/2020 16:00	12/18/2020 10:00	☐

Client:	Geosyntec Consultants
Project:	DTE- Belle River (GLP-8017)
Work Order:	20121752

Case Narrative

Samples for the above noted Work Order were received on 12/18/2020. The attached "Sample Receipt Checklist" documents the status of custody seals, container integrity, preservation, and temperature compliance.

Samples were analyzed according to the analytical methodology previously transmitted in the "Work Order Acknowledgement". Methodologies are also documented in the "Analytical Result" section for each sample. Quality control results are listed in the "QC Report" section. Sample association for the reported quality control is located at the end of each batch summary. If applicable, results are appropriately qualified in the Analytical Result and QC Report sections. The "Qualifiers" section documents the various qualifiers, units, and acronyms utilized in reporting. A copy of the laboratory's scope of accreditation is available upon request.

With the following exceptions, all sample analyses achieved analytical criteria.

Metals:
No other deviations or anomalies were noted.

Wet Chemistry:

Batch R306912, Method SW9040C, Sample BAB-E (20121752-01B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample BAB-W (20121752-02B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R306912, Method SW9040C, Sample DB (20121752-03B): pH is considered a "field test" and, as such, the recommended sample holding time expired prior to sample receipt.

Batch R307145, Method SW9056A, Sample 20121752-03B MSD: The MSD recovery was outside of the control limit for Sulfate; however, the result in the parent sample is greater than 4x the spike amount. No qualification is required.

Qualifier	Description
*	Value exceeds Regulatory Limit
**	Estimated Value
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
Hr	BOD/CBOD - Sample was reset outside Hold Time, value should be considered estimated.
J	Analyte is present at an estimated concentration between the MDL and Report Limit
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Acronym	Description
DUP	Method Duplicate
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection (see MDL)
LOQ	Limit of Quantitation (see PQL)
MBLK	Method Blank
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PQL	Practical Quantitation Limit
RPD	Relative Percent Difference
TDL	Target Detection Limit
TNTC	Too Numerous To Count
A	APHA Standard Methods
D	ASTM
E	EPA
SW	SW-846 Update III

Units Reported	Description
°C	Degrees Celcius
mg/L	Milligrams per Liter
s.u.	Standard Units

ALS Group, USA

Date: *05-Jan-21*

Client: Geosyntec Consultants
Project: DTE- Belle River (GLP-8017)
Work Order: 20121752
Sample ID: BAB-E
Lab ID: 20121752-01
Collection Date: 12/16/2020 03:00 PM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:26 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Barium	**0.21**		**0.0050**	**mg/L**	1	12/30/2020 09:06 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
Boron	**0.26**		**0.020**	**mg/L**	1	12/30/2020 09:06 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:06 PM
Calcium	**39**		**0.50**	**mg/L**	1	12/30/2020 09:06 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Iron	ND		0.080	mg/L	1	12/30/2020 09:06 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Lithium	**0.014**		**0.010**	**mg/L**	1	12/30/2020 09:06 PM
Magnesium	**7.9**		**0.20**	**mg/L**	1	12/30/2020 09:06 PM
Manganese	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Molybdenum	**0.024**		**0.0050**	**mg/L**	1	12/30/2020 09:06 PM
Potassium	**3.0**		**0.20**	**mg/L**	1	12/30/2020 09:06 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
Sodium	**29**		**0.20**	**mg/L**	1	12/30/2020 09:06 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:06 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	**71**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	**20**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3	**10**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**91**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**8.6**		**1.0**	**mg/L**	1	12/30/2020 07:11 PM
Fluoride	**0.25**		**0.10**	**mg/L**	1	12/30/2020 07:11 PM
Sulfate	**94**		**8.0**	**mg/L**	8	12/31/2020 02:59 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**8.84**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**20.8**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/22/20 11:40	Analyst: **AJS**
Total Dissolved Solids	**240**		**50**	**mg/L**	1	12/23/2020 02:50 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

Client: Geosyntec Consultants
Project: DTE- Belle River (GLP-8017) **Work Order:** 20121752
Sample ID: BAB-W **Lab ID:** 20121752-02
Collection Date: 12/16/2020 02:00 PM **Matrix:** GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:28 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Arsenic	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Barium	**0.30**		**0.0050**	**mg/L**	1	12/30/2020 09:08 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
Boron	**0.21**		**0.020**	**mg/L**	1	12/30/2020 09:08 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:08 PM
Calcium	**54**		**0.50**	**mg/L**	1	12/30/2020 09:08 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Iron	**0.28**		**0.080**	**mg/L**	1	12/31/2020 05:14 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Lithium	**0.013**		**0.010**	**mg/L**	1	12/30/2020 09:08 PM
Magnesium	**10**		**0.20**	**mg/L**	1	12/30/2020 09:08 PM
Manganese	**0.0078**		**0.0050**	**mg/L**	1	12/30/2020 09:08 PM
Molybdenum	**0.016**		**0.0050**	**mg/L**	1	12/30/2020 09:08 PM
Potassium	**3.4**		**0.20**	**mg/L**	1	12/30/2020 09:08 PM
Selenium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
Sodium	**33**		**0.20**	**mg/L**	1	12/30/2020 09:08 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:08 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	**83**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**89**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**9.9**		**1.0**	**mg/L**	1	12/30/2020 07:30 PM
Fluoride	**0.22**		**0.10**	**mg/L**	1	12/30/2020 07:30 PM
Sulfate	**140**		**8.0**	**mg/L**	8	12/30/2020 06:36 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**8.43**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**20.7**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/22/20 11:40	Analyst: **AJS**
Total Dissolved Solids	**330**		**50**	**mg/L**	1	12/23/2020 02:50 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: *05-Jan-21*

Client: Geosyntec Consultants
Project: DTE- Belle River (GLP-8017)
Work Order: 20121752
Sample ID: DB
Lab ID: 20121752-03
Collection Date: 12/16/2020 04:00 PM
Matrix: GROUNDWATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
MERCURY BY CVAA			**SW7470A**		Prep: SW7470 12/30/20 13:08	Analyst: **MAC**
Mercury	ND		0.00020	mg/L	1	12/30/2020 01:30 PM
METALS BY ICP-MS			**SW6020B**		Prep: SW3005A 12/30/20 15:00	Analyst: **STP**
Antimony	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Arsenic	**0.0057**		**0.0050**	**mg/L**	1	12/30/2020 09:09 PM
Barium	**0.19**		**0.0050**	**mg/L**	1	12/30/2020 09:09 PM
Beryllium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
Boron	**6.0**		**0.20**	**mg/L**	10	12/31/2020 05:15 PM
Cadmium	ND		0.0020	mg/L	1	12/30/2020 09:09 PM
Calcium	**110**		**0.50**	**mg/L**	1	12/30/2020 09:09 PM
Chromium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Cobalt	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Iron	**0.35**		**0.080**	**mg/L**	1	12/31/2020 05:17 PM
Lead	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
Lithium	**0.061**		**0.010**	**mg/L**	1	12/30/2020 09:09 PM
Magnesium	**18**		**0.20**	**mg/L**	1	12/30/2020 09:09 PM
Manganese	**0.068**		**0.0050**	**mg/L**	1	12/30/2020 09:09 PM
Molybdenum	**0.30**		**0.0050**	**mg/L**	1	12/30/2020 09:09 PM
Potassium	**13**		**0.20**	**mg/L**	1	12/30/2020 09:09 PM
Selenium	**0.0087**		**0.0050**	**mg/L**	1	12/30/2020 09:09 PM
Sodium	**510**		**2.0**	**mg/L**	10	12/31/2020 05:15 PM
Thallium	ND		0.0050	mg/L	1	12/30/2020 09:09 PM
ALKALINITY			**A2320 B-11**			Analyst: **QTN**
Alkalinity, Bicarbonate (as CaCO3)	**140**		**10**	**mg/L**	1	12/29/2020 11:55 AM
Alkalinity, Carbonate (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Hydroxide (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Phenolphthalein (as CaCO3)	ND		10	mg/L	1	12/29/2020 11:55 AM
Alkalinity, Total (as CaCO3)	**140**		**10**	**mg/L**	1	12/29/2020 11:55 AM
ANIONS BY ION CHROMATOGRAPHY			**SW9056A**			Analyst: **JDR**
Chloride	**43**		**20**	**mg/L**	20	12/30/2020 06:55 PM
Fluoride	**0.44**		**0.10**	**mg/L**	1	12/30/2020 07:49 PM
Sulfate	**1,200**		**100**	**mg/L**	100	12/31/2020 03:21 PM
PH (LABORATORY)			**SW9040C**			Analyst: **QTN**
pH (laboratory)	**8.32**	H	**0.100**	**s.u.**	1	12/29/2020 11:55 AM
Temperature	**20.1**	H	**0.100**	**°C**	1	12/29/2020 11:55 AM
TOTAL DISSOLVED SOLIDS			**A2540 C-11**		Prep: FILTER 12/22/20 11:40	Analyst: **AJS**
Total Dissolved Solids	**2,100**		**300**	**mg/L**	1	12/23/2020 02:50 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group, USA

Date: 05-Jan-21

Client: Geosyntec Consultants

QC BATCH REPORT

Work Order: 20121752

Project: DTE- Belle River (GLP-8017)

Batch ID: **170071** Instrument ID **HG4** Method: **SW7470A**

MBLK Sample ID: **MBLK-170071-170071** Units: **mg/L** Analysis Date: **12/30/2020 01:14 PM**

Client ID: Run ID: **HG4_201230A** SeqNo: **7040771** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	ND	0.00020								

LCS Sample ID: **LCS-170071-170071** Units: **mg/L** Analysis Date: **12/30/2020 01:16 PM**

Client ID: Run ID: **HG4_201230A** SeqNo: **7040772** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002085	0.00020	0.002	0	104	80-120	0			

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/30/2020 01:55 PM**

Client ID: Run ID: **HG4_201230A** SeqNo: **7040812** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.00219	0.00020	0.002	0.000003	109	75-125	0			

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/30/2020 01:57 PM**

Client ID: Run ID: **HG4_201230A** SeqNo: **7040815** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Mercury	0.002115	0.00020	0.002	0.000003	106	75-125	0.00219	3.48	20	

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MBLK Sample ID: **MBLK-170083-170083** Units: **mg/L** Analysis Date: **12/30/2020 08:51 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043005** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	ND	0.0050								
Arsenic	ND	0.0050								
Barium	ND	0.0050								
Beryllium	ND	0.0020								
Boron	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	0.50								
Chromium	ND	0.0050								
Cobalt	ND	0.0050								
Iron	ND	0.080								
Lead	ND	0.0050								
Lithium	ND	0.010								
Magnesium	ND	0.20								
Manganese	ND	0.0050								
Molybdenum	ND	0.0050								
Potassium	ND	0.20								
Selenium	ND	0.0050								
Sodium	ND	0.20								
Thallium	ND	0.0050								

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

LCS	Sample ID: **LCS-170083-170083**				Units: **mg/L**			Analysis Date: **12/30/2020 08:52 PM**		
Client ID:	Run ID: **ICPMS4_201230A**				SeqNo: **7043006**			Prep Date: **12/30/2020**		DF: **1**
Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09984	0.0050	0.1	0	99.8	80-120	0			
Arsenic	0.099	0.0050	0.1	0	99	80-120	0			
Barium	0.1005	0.0050	0.1	0	100	80-120	0			
Beryllium	0.09793	0.0020	0.1	0	97.9	80-120	0			
Boron	0.4459	0.020	0.5	0	89.2	80-120	0			
Cadmium	0.1049	0.0020	0.1	0	105	80-120	0			
Calcium	9.959	0.50	10	0	99.6	80-120	0			
Chromium	0.09764	0.0050	0.1	0	97.6	80-120	0			
Cobalt	0.09865	0.0050	0.1	0	98.6	80-120	0			
Iron	9.742	0.080	10	0	97.4	80-120	0			
Lead	0.09896	0.0050	0.1	0	99	80-120	0			
Lithium	0.09939	0.010	0.1	0	99.4	80-120	0			
Magnesium	10.41	0.20	10	0	104	80-120	0			
Manganese	0.09726	0.0050	0.1	0	97.3	80-120	0			
Molybdenum	0.09949	0.0050	0.1	0	99.5	80-120	0			
Potassium	10.09	0.20	10	0	101	80-120	0			
Selenium	0.09876	0.0050	0.1	0	98.8	80-120	0			
Sodium	10.48	0.20	10	0	105	80-120	0			
Thallium	0.09419	0.0050	0.1	0	94.2	80-120	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MS Sample ID: **20121813-01DMS** Units: **mg/L** Analysis Date: **12/30/2020 09:13 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043018** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.0939	0.0050	0.1	0.000019	93.9	75-125	0			
Arsenic	0.09542	0.0050	0.1	0.000523	94.9	75-125	0			
Barium	0.1197	0.0050	0.1	0.01914	101	75-125	0			
Beryllium	0.1028	0.0020	0.1	0.003422	99.4	75-125	0			
Boron	0.5173	0.020	0.5	0.07866	87.7	75-125	0			
Cadmium	0.09866	0.0020	0.1	0.003046	95.6	75-125	0			
Calcium	63.88	0.50	10	53.04	108	75-125	0			O
Chromium	0.09053	0.0050	0.1	0.000351	90.2	75-125	0			
Cobalt	0.2039	0.0050	0.1	0.1134	90.5	75-125	0			
Iron	8.964	0.080	10	0.02083	89.4	75-125	0			
Lead	0.09794	0.0050	0.1	0.000674	97.3	75-125	0			
Lithium	0.1112	0.010	0.1	0.01095	100	75-125	0			
Magnesium	61.4	0.20	10	51.16	102	75-125	0			O
Molybdenum	0.09472	0.0050	0.1	0.001008	93.7	75-125	0			
Potassium	12.35	0.20	10	2.605	97.4	75-125	0			
Selenium	0.1012	0.0050	0.1	0.005949	95.3	75-125	0			
Sodium	65.82	0.20	10	55.83	99.9	75-125	0			O
Thallium	0.09224	0.0050	0.1	0.000037	92.2	75-125	0			

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/30/2020 09:35 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043031** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09845	0.0050	0.1	0.000041	98.4	75-125	0			
Arsenic	0.1005	0.0050	0.1	0.00021	100	75-125	0			
Barium	0.125	0.0050	0.1	0.02584	99.1	75-125	0			
Beryllium	0.1046	0.0020	0.1	0.002214	102	75-125	0			
Boron	0.5169	0.020	0.5	0.056	92.2	75-125	0			
Cadmium	0.1056	0.0020	0.1	0.005454	100	75-125	0			
Calcium	34.88	0.50	10	25.15	97.2	75-125	0			
Chromium	0.09457	0.0050	0.1	0.000785	93.8	75-125	0			
Cobalt	0.2768	0.0050	0.1	0.1806	96.2	75-125	0			
Iron	9.488	0.080	10	0.143	93.5	75-125	0			
Lead	0.09729	0.0050	0.1	0.001591	95.7	75-125	0			
Lithium	0.107	0.010	0.1	0.006549	100	75-125	0			
Magnesium	24.92	0.20	10	15.27	96.4	75-125	0			
Molybdenum	0.0977	0.0050	0.1	0.000386	97.3	75-125	0			
Potassium	12.88	0.20	10	3.03	98.5	75-125	0			
Selenium	0.09792	0.0050	0.1	0.001894	96	75-125	0			
Sodium	71.55	0.20	10	61.63	99.1	75-125	0			O
Thallium	0.09151	0.0050	0.1	0.000106	91.4	75-125	0			

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MS Sample ID: **20121813-01DMS** Units: **mg/L** Analysis Date: **12/31/2020 05:20 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046543** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	3.991	0.050	0.1	3.949	41.3	75-125	0			SO

MS Sample ID: **20121813-10DMS** Units: **mg/L** Analysis Date: **12/31/2020 05:39 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046555** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.091	0.050	0.1	3.865	227	75-125	0			SO

MSD Sample ID: **20121813-01DMSD** Units: **mg/L** Analysis Date: **12/30/2020 09:15 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043019** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09655	0.0050	0.1	0.000019	96.5	75-125	0.0939	2.78	20	
Arsenic	0.09753	0.0050	0.1	0.000523	97	75-125	0.09542	2.18	20	
Barium	0.1208	0.0050	0.1	0.01914	102	75-125	0.1197	0.848	20	
Beryllium	0.1044	0.0020	0.1	0.003422	101	75-125	0.1028	1.59	20	
Boron	0.5179	0.020	0.5	0.07866	87.8	75-125	0.5173	0.103	20	
Cadmium	0.1013	0.0020	0.1	0.003046	98.3	75-125	0.09866	2.67	20	
Calcium	62.93	0.50	10	53.04	98.9	75-125	63.88	1.49	20	O
Chromium	0.09296	0.0050	0.1	0.000351	92.6	75-125	0.09053	2.65	20	
Cobalt	0.2064	0.0050	0.1	0.1134	92.9	75-125	0.2039	1.18	20	
Iron	9.236	0.080	10	0.02083	92.1	75-125	8.964	2.99	20	
Lead	0.09947	0.0050	0.1	0.000674	98.8	75-125	0.09794	1.55	20	
Lithium	0.1128	0.010	0.1	0.01095	102	75-125	0.1112	1.45	20	
Magnesium	61.51	0.20	10	51.16	104	75-125	61.4	0.185	20	O
Molybdenum	0.09663	0.0050	0.1	0.001008	95.6	75-125	0.09472	2	20	
Potassium	12.63	0.20	10	2.605	100	75-125	12.35	2.27	20	
Selenium	0.1029	0.0050	0.1	0.005949	96.9	75-125	0.1012	1.62	20	
Sodium	66.86	0.20	10	55.83	110	75-125	65.82	1.56	20	O
Thallium	0.09366	0.0050	0.1	0.000037	93.6	75-125	0.09224	1.53	20	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **170083** Instrument ID **ICPMS4** Method: **SW6020B**

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/30/2020 09:37 PM**
Client ID: Run ID: **ICPMS4_201230A** SeqNo: **7043032** Prep Date: **12/30/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Antimony	0.09824	0.0050	0.1	0.000041	98.2	75-125	0.09845	0.211	20	
Arsenic	0.09954	0.0050	0.1	0.00021	99.3	75-125	0.1005	0.917	20	
Barium	0.1229	0.0050	0.1	0.02584	97	75-125	0.125	1.7	20	
Beryllium	0.1039	0.0020	0.1	0.002214	102	75-125	0.1046	0.636	20	
Boron	0.517	0.020	0.5	0.056	92.2	75-125	0.5169	0.0288	20	
Cadmium	0.1044	0.0020	0.1	0.005454	99	75-125	0.1056	1.11	20	
Calcium	34.42	0.50	10	25.15	92.7	75-125	34.88	1.31	20	
Chromium	0.09402	0.0050	0.1	0.000785	93.2	75-125	0.09457	0.58	20	
Cobalt	0.2727	0.0050	0.1	0.1806	92.2	75-125	0.2768	1.48	20	
Iron	9.402	0.080	10	0.143	92.6	75-125	9.488	0.913	20	
Lead	0.0969	0.0050	0.1	0.001591	95.3	75-125	0.09729	0.394	20	
Lithium	0.1057	0.010	0.1	0.006549	99.1	75-125	0.107	1.23	20	
Magnesium	24.72	0.20	10	15.27	94.4	75-125	24.92	0.809	20	
Molybdenum	0.09638	0.0050	0.1	0.000386	96	75-125	0.0977	1.36	20	
Potassium	12.71	0.20	10	3.03	96.8	75-125	12.88	1.33	20	
Selenium	0.09719	0.0050	0.1	0.001894	95.3	75-125	0.09792	0.75	20	
Sodium	70.5	0.20	10	61.63	88.7	75-125	71.55	1.48	20	O
Thallium	0.09051	0.0050	0.1	0.000106	90.4	75-125	0.09151	1.1	20	

MSD Sample ID: **20121813-01DMSD** Units: **mg/L** Analysis Date: **12/31/2020 05:22 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046544** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.164	0.050	0.1	3.949	215	75-125	3.991	4.26	20	SO

MSD Sample ID: **20121813-10DMSD** Units: **mg/L** Analysis Date: **12/31/2020 05:41 PM**
Client ID: Run ID: **ICPMS4_201231A** SeqNo: **7046556** Prep Date: **12/30/2020** DF: **10**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Manganese	4.094	0.050	0.1	3.865	229	75-125	4.091	0.0533	20	SO

The following samples were analyzed in this batch: 20121752-01A 20121752-02A 20121752-03A

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **169727** Instrument ID **TDS** Method: **A2540 C-11**

MBLK Sample ID: **MBLK-169727-169727** Units: **mg/L** Analysis Date: **12/23/2020 02:50 PM**
Client ID: Run ID: **TDS_201223B** SeqNo: **7021476** Prep Date: **12/22/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	ND	30								

LCS Sample ID: **LCS-169727-169727** Units: **mg/L** Analysis Date: **12/23/2020 02:50 PM**
Client ID: Run ID: **TDS_201223B** SeqNo: **7021475** Prep Date: **12/22/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	476	30	495	0	96.2	85-109	0			

DUP Sample ID: **20121752-03B DUP** Units: **mg/L** Analysis Date: **12/23/2020 02:50 PM**
Client ID: **DB** Run ID: **TDS_201223B** SeqNo: **7021469** Prep Date: **12/22/2020** DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total Dissolved Solids	1940	300	0	0	0	0-0	2100	7.92	10	

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **R306910** Instrument ID **Titrator 1** Method: **A2320 B-11**

MBLK Sample ID: **MB-R306910-R306910** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033262** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	ND	10								
Alkalinity, Carbonate (as CaCO3)	ND	10								
Alkalinity, Hydroxide (as CaCO3)	ND	10								
Alkalinity, Phenolphthalein (as CaCO3	ND	10								
Alkalinity, Total (as CaCO3)	ND	10								

LCS Sample ID: **LCS-R306910-R306910** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033263** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Carbonate (as CaCO3)	923.7	10	925	0	99.9	88-110	0			
Alkalinity, Total (as CaCO3)	996.2	10	1000	0	99.6	89-103	0			

DUP Sample ID: **20121803-01E DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033273** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Bicarbonate (as CaCO3)	219.1	10	0	0	0	0-0	224.9	2.6	10	
Alkalinity, Carbonate (as CaCO3)	ND	10	0	0	0	0-0	0	0	10	

DUP Sample ID: **20121990-05A DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033276** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	66.2	10	0	0	0	0-0	62.95	5.03	10	

DUP Sample ID: **20122120-08C DUP** Units: **mg/L** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229A** SeqNo: **7033278** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Alkalinity, Total (as CaCO3)	127.7	10	0	0	0	0-0	127.9	0.11	10	

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **R306912** Instrument ID **Titrator 1** Method: **A4500-H B-11**

LCS Sample ID: **LCS-R306912-R306912** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033301** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

LCS Sample ID: **LCS-R306912-R306912** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033308** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	3.99	0.10	4	0	99.8	92-108	0			

DUP Sample ID: **20122120-08C DUP** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033305** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	8.05	0.10	0	0	0	0-0	7.99	0.748	5	H
Temperature	20.95	0.10	0	0	0	0-0	20.76	0.911		H

DUP Sample ID: **20121990-05A DUP** Units: **s.u.** Analysis Date: **12/29/2020 11:55 AM**
Client ID: Run ID: **TITRATOR 1_201229B** SeqNo: **7033315** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
pH (laboratory)	7.51	0.10	0	0	0	0-0	7.56	0.664	5	H
Temperature	20.63	0.10	0	0	0		19.96	3.3		H

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **R307142** Instrument ID **IC3** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307142** Units: **mg/L** Analysis Date: **12/30/2020 04:56 PM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043048** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Fluoride	ND	0.10								

LCS Sample ID: **LCS-R307142** Units: **mg/L** Analysis Date: **12/30/2020 05:15 PM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043049** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.321	1.0	10	0	93.2	88-110	0			
Fluoride	2.135	0.10	2	0	107	82-116	0			

MS Sample ID: **20122223-01D MS** Units: **mg/L** Analysis Date: **12/31/2020**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043070** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	405	40	400	28.42	94.1	88-110	0			
Fluoride	84.26	4.0	80	0	105	82-116	0			

MSD Sample ID: **20122223-01D MSD** Units: **mg/L** Analysis Date: **12/31/2020 12:19 AM**
Client ID: Run ID: **IC3_201230A** SeqNo: **7043071** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	406.1	40	400	28.42	94.4	88-110	405	0.286	20	
Fluoride	83.74	4.0	80	0	105	82-116	84.26	0.614	20	

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **R307145** Instrument ID **IC4** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307145** Units: **mg/L** Analysis Date: **12/30/2020 01:43 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043217** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	ND	1.0								
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307145** Units: **mg/L** Analysis Date: **12/30/2020 02:39 PM**
Client ID: Run ID: **IC4_201230A** SeqNo: **7043218** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	9.353	1.0	10	0	93.5	88-110	0			
Sulfate	9.647	1.0	10	0	96.5	90-110	0			

MS Sample ID: **20121752-03B MS** Units: **mg/L** Analysis Date: **12/30/2020 07:14 PM**
Client ID: **DB** Run ID: **IC4_201230A** SeqNo: **7043233** Prep Date: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	228.2	20	200	42.57	92.8	88-110	0			
Sulfate	1470	20	200	1251	109	90-110	0			EO

MSD Sample ID: **20121752-03B MSD** Units: **mg/L** Analysis Date: **12/30/2020 07:34 PM**
Client ID: **DB** Run ID: **IC4_201230A** SeqNo: **7043234** Prep Date: DF: **20**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Chloride	229.3	20	200	42.57	93.4	88-110	228.2	0.476	20	
Sulfate	1480	20	200	1251	114	90-110	1470	0.669	20	SEO

The following samples were analyzed in this batch: 20121752-01B 20121752-02B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Client: Geosyntec Consultants
Work Order: 20121752
Project: DTE- Belle River (GLP-8017)

QC BATCH REPORT

Batch ID: **R307276** Instrument ID **IC3** Method: **SW9056A**

MBLK Sample ID: **MBLK-R307276** Units: **mg/L** Analysis Date: **12/31/2020 01:42 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047811** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	ND	1.0								

LCS Sample ID: **LCS-R307276** Units: **mg/L** Analysis Date: **12/31/2020 02:01 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047812** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	9.654	1.0	10	0	96.5	90-110	0			

MS Sample ID: **20122530-06A MS** Units: **mg/L** Analysis Date: **12/31/2020 06:35 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047826** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	424.4	40	400	43.11	95.3	90-110	0			

MSD Sample ID: **20122530-06A MSD** Units: **mg/L** Analysis Date: **12/31/2020 06:54 PM**
Client ID: Run ID: **IC3_201231A** SeqNo: **7047827** Prep Date: DF: **40**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Sulfate	425.5	40	400	43.11	95.6	90-110	424.4	0.255	20	

The following samples were analyzed in this batch: 20121752-01B 20121752-03B

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

Chain of Custody Form

Page 1 of 1

☑ ALS Environmental
3352 128th Avenue
Holland, Michigan 49424
(Tel) 616.399.6070
(Fax) 616.399.6185

2012752

ALS Project Manager:		ALS Work Order #:	33730

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	DTE Belle River	A	Metals
Work Order		Project Number	GLP 8017	B	pH, Anions, TDS, Alkalinity
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants	C	
Send Report To	Michael Coram	Invoice Attn.	Michael Coram	D	
Address	2100 Commonwealth Blvd.	Address	2100 Commonwealth Blvd.	E	
	Suite 100		Suite 100	F	
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105	G	
Phone	734-794-1547	Phone	734-794-1547	H	
Fax	734-332-8063	Fax	734-332-8063	I	
e-Mail Address				J	

No.	Sample Description	Date	Time	Matrix	Pres. Key Numbers	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E	12/16/2020	3:00	GW	2	2	x	x									
2	BAB-W	12/16/2020	2:00	GW	2	2	x	x									
3	DB	12/16/2020	4:00	GW	2	2	x	x									
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	

Sampler(s): Please Print & Sign: Mike Coram

Shipment Method: ~~Carrier~~ FedEx

Turnaround Time: (Business Days) ☑ 10 BD ☐ 5 BD ☐ 3 BD ☐ 2 BD ☐ 1 BD ☐ Other _____

Results Due Date:

Relinquished by:	Date:	Time:	Received by:	Date:	Time:	Notes: Separate Report
	12/17	3:00				
Relinquished by: Feder	Date: 12/18/20	Time: 10:00	Received by (Laboratory):	Date:	Time:	
Logged by (Laboratory): MTG	Date: 12/18/20	Time: 17:46	Checked by (Laboratory):			

ALS Cooler ID	Cooler Temp	QC Package: (Check Box Below)
	5.8°C	☑ Level II: Standard QC ☐ Level III: Raw Data
	IR1	☐ TRRP LRC ☐ TRRP Level IV
	PA23	☐ Level IV: SW846 Methods/CLP like
		☐ Other:

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C

Note: Any changes must be made in writing once samples and COC Form have been submitted to ALS.

ALS Group, USA

Sample Receipt Checklist

Client Name: **GEOSYNTEC - AA** Date/Time Received: **18-Dec-20 10:00**

Work Order: **20121752** Received by: **MJG**

Checklist completed by Matthew Gaylord (eSignature) 18-Dec-20 (Date) Reviewed by: Chad Whelton (eSignature) 18-Dec-20 (Date)

Matrices: Groundwater
Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Sample(s) received on ice?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):	5.8/5.8C	IR1	
Cooler(s)/Kit(s):			
Date/Time sample(s) sent to storage:	12/18/2020 1:47:53 PM		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☑	N/A ☐
pH adjusted by:	-		

Login Notes:

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Tuesday, January 19, 2021

Michael Coram
Geosyntec Consultants
2100 Commonwealth Blvd. Suite 100
Ann Arbor, MI 48105

Re: ALS Workorder: 2012397
Project Name: DTE - Belle River
Project Number: GLP-8017

Dear Mr. Coram:

Three water samples were received from Geosyntec Consultants, on 12/18/2020. The samples were scheduled for the following analyses:

Radium-226
Radium-228

The results for these analyses are contained in the enclosed reports.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental.

Thank you for your confidence in ALS Environmental. Should you have any questions, please call.

Sincerely,

ALS Environmental
Julie Ellingson
Project Manager

Accreditations: ALS Environmental – Fort Collins is accredited by the following accreditation bodies for various testing scopes in accordance with requirements of each accreditation body. All testing is performed under the laboratory management system, which is maintained to meet these requirement and regulations. Please contact the laboratory or accreditation body for the current scope testing parameters.

ALS Environmental – Fort Collins	
Accreditation Body	License or Certification Number
California (CA)	2926
Colorado (CO)	CO01099
Florida (FL)	E87914
Idaho (ID)	CO01099
Kansas (KS)	E-10381
Kentucky (KY)	90137
PJ-LA (DoD ELAP/ISO 170250)	95377
Maryland (MD)	285
Missouri (MO)	175
Nebraska(NE)	NE-OS-24-13
Nevada (NV)	CO010992018-1
New York (NY)	12036
North Dakota (ND)	R-057
Oklahoma (OK)	1301
Pennsylvania (PA)	68-03116
Tennessee (TN)	TN02976
Texas (TX)	T104704241
Utah (UT)	CO01099
Washington (WA)	C1280

40 CFR Part 136: All analyses for Clean Water Act samples are analyzed using the 40 CFR Part 136 specified method and include all the QC requirements.

2012397

Radium-228:
The samples were analyzed for the presence of ^{228}Ra by low background gas flow proportional counting of ^{228}Ac, which is the ingrown progeny of ^{228}Ra, according to the current revision of SOP 724.

All remaining acceptance criteria were met.

Radium-226:
The samples were prepared and analyzed according to the current revision of SOP 783.

Sample 2012397-2 has a calculated yield as determined by ICP-AES above the 110% control limit at 132%. It is believed that there was native barium present in the sediment portion of the sample that was unaccounted for in the initial ICP aliquot. The result has been calculated conservatively, assuming a quantitative yield of 100%. This sample is identified with a “Y2” flag in the final reports, and the results are submitted without further qualification.

All remaining acceptance criteria were met.

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 2012397
Client Name: Geosyntec Consultants
Client Project Name: DTE - Belle River
Client Project Number: GLP-8017
Client PO Number:

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
BAB-E	2012397-1		WATER	16-Dec-20	15:00
BAB-W	2012397-2		WATER	16-Dec-20	14:00
DB	2012397-3		WATER	16-Dec-20	16:00

Cincinnati, OH +1 513 733 5336
Fort Collins, CO +1 970 490 1511
Everett, WA +1 425 356 2600
Holland, MI +1 616 399 6070
Houston, TX +1 281 530 5656
Spring City, PA +1 610 948 4903
South Charleston, WV +1 304 356 3168
Middletown, PA +1 717 944 5541
Salt Lake City, UT +1 801 266 7700
York, PA +1 717 505 5280

Chain of Custody Form

Page 1 of 1

COC ID: 230240

2012397

ALS Project Manager: | ALS Work Order #: 33730

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	DTE - Belle River	A	Radium 226 and 228 combined
Work Order		Project Number	GLP - 8017	B	
Company Name	Geosyntec Consultants	Bill To Company	Geosyntec Consultants	C	Report Separate
Send Report To	Michael Coram	Invoice Attn	Michael Coram	D	
Address	2100 Commonwealth Blvd Suite 100	Address	2100 Commonwealth Blvd Suite 100	E	
				F	
City/State/Zip	Ann Arbor, MI 48105	City/State/Zip	Ann Arbor, MI 48105	G	
Phone	(734) 794-1547	Phone	(734) 794-1547	H	
Fax	(734) 332-8063	Fax	(734) 332-8063	I	
e-Mail Address		e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	BAB-E 1	12/16	3:00	GW	2	2	X										
2	BAB-W 2	12/16	2:00	GW	2	2	X										
3	DB 3	12/16	4:00	GW	2	2	X										
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Sampler(s) Please Print & Sign: Mike Coram

Shipment Method: Fed Ex

Required Turnaround Time: (Check Box) [X] Std 10 WK Days [ ] 5 WK Days [ ] Other [ ] 2 WK Days [ ] 24 Hour

Results Due Date:

Relinquished by:	Date: 12/17	Time: 3:00	Received by:	Notes:
Relinquished by:	Date:	Time:	Received by (Laboratory):	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)
[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other
[ ] TRRP CheckList
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client Name/ID: Geosyntec MI Workorder No: 2012397

Project Manager: Initials: RGA Date: 12/18/2020

1. Are airbills / shipping documents present and/or removable?	☐ Drop Off	☑ YES	☐ NO	
2. Are custody seals on **shipping** containers intact?	☐ NONE	☑ YES	☐ NO*	
3. Are custody seals on **sample** containers intact?	☑ NONE	☐ YES	☐ NO*	
4. Is there a COC (chain-of-custody) present?		☑ YES	☐ NO*	
5. Is the COC in agreement with samples received? (IDs, dates, times, # of samples, # of containers, matrix, requested analyses, etc.)		☑ YES	☐ NO*	
6. Are short-hold samples present?		☐ YES	☑ NO	
7. Are all samples within holding times for the requested analyses?		☑ YES	☐ NO*	
8. Were all sample containers received intact? (not broken or leaking)		☑ YES	☐ NO*	
9. Is there sufficient sample for the requested analyses?		☑ YES	☐ NO*	
10. Are samples in proper containers for requested analyses? (form 250, *Sample Handling Guidelines*)		☑ YES	☐ NO*	
11. Are all aqueous samples preserved correctly, if required?	☐ N/A	☐ YES	☑ NO*	
12. Were unpreserved samples pH checked, if required?	☑ N/A	☐ YES	☐ NO	
13. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, radon) free of bubbles > 6 mm in diameter?	☑ N/A	☐ YES	☐ NO	
14. Were the samples shipped on ice?		☑ YES	☐ NO	
15. Were cooler temperatures measured at 0.1 - 6.0°C? IR gun used*: ☐ #3 ☑ #5	☐ Rad Only	☑ YES	☐ NO	

Cooler #: 1

Temperature (°C): 3.2

# of custody seals on cooler: 1

External mR/hr reading: 12

Background mR/hr reading: 9

Were external mR/hr readings ≤ two times background and within DOT acceptance criteria? (If no, see Form 008) ☐ N/A ☑ YES ☐ NO

* Please provide details below for 'NO' responses in gray boxes above - for 2 thru 5 & 7 thru 12, notify PM & continue w/ login.

11) Sample 2012397-1-2 had a pH of 4, 0.5mL of HNO3 was added to achieve a pH<2

All client bottle ID's vs ALS lab ID's double-checked by: RGA

If applicable, was the client contacted? ☐ YES ☐ N/A Contact Name Date:

Project Manager Signature / Date: 12/21/20

Form 201r30.xls
(06/04/2020)

+IR Gun #3, VWR SN 170647571
+IR Gun #5, VWR SN 192272629

ORIGIN ID:DEOA (248) 390-5748
MIKE CORAM

SUITE 100
2100 COMMONWEALTH BLVD STE 100
ANN ARBOR, MI 48105
UNITED STATES US

SHIP DATE: 17DEC20
ACTWGT: 56.90 LB
CAD: 6997566/SSFO2121
DIMS: 25x14x13 IN

BILL THIRD PARTY

Part # 156287-XXX RRDB EXP 11/21

TO ALS FT. COLLINS
ATTN: SAMPLE RECIEVING
225 COMMERCE DR

FORT COLLINS CO 80524

(616) 582-6201 REF:
INV:
PO: DEPT:

12-1
3.2

FedEx Express

TRK# 0201 7816 0264 9731

FRI - 18 DEC 10:30A
PRIORITY OVERNIGHT

NA FTCA

DSR
80524
CO-US DEN

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8017 DTE - Belle River	**Work Order:**	2012397
Sample ID:	BAB-E	**Lab ID:**	2012397-1
Legal Location:		**Matrix:**	WATER
Collection Date:	12/16/2020 15:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **1/4/2021**	PrepBy: **TRB**
Ra-226	**0.57 (+/- 0.35)**	Y1	**0.41**	**pCi/l**	NA	1/12/2021 11:32
Carr: BARIUM	*101*	Y1	*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**			Prep Date: **1/11/2021**	PrepBy: **RGS**
COMBINED RADIUM (226+228)	**1.49 (+/- 0)**		**0.78**	**pCi/l**	NA	1/15/2021 07:48
Ra-228	**0.92 (+/- 0.45)**		**0.78**	**pCi/l**	NA	1/15/2021 07:48
Carr: BARIUM	*99.2*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8017 DTE - Belle River	**Work Order:**	2012397
Sample ID:	BAB-W	**Lab ID:**	2012397-2
Legal Location:		**Matrix:**	WATER
Collection Date:	12/16/2020 14:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **1/4/2021**	PrepBy: **TRB**
Ra-226	**1.78 (+/- 0.66)**	Y2	**0.3**	**pCi/l**	NA	1/12/2021 11:32
Carr: BARIUM	*132*	Y2	*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**			Prep Date: **1/11/2021**	PrepBy: **RGS**
COMBINED RADIUM (226+228)	**1.78 (+/- 0)**		**1.32**	**pCi/l**	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.69)	U,M	1.32	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*57*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8017 DTE - Belle River	**Work Order:**	2012397
Sample ID:	DB	**Lab ID:**	2012397-3
Legal Location:		**Matrix:**	WATER
Collection Date:	12/16/2020 16:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
Radium-226 by Radon Emanation - Method 903.1		**SOP 783**			Prep Date: **1/4/2021**	PrepBy: **TRB**
Ra-226	ND (+/- 0.21)	U	0.3	pCi/l	NA	1/12/2021 11:32
Carr: BARIUM	*95*		*40-110*	*%REC*	DL = NA	1/12/2021 11:32
Radium-228 Analysis by GFPC		**SOP 724**			Prep Date: **1/11/2021**	PrepBy: **RGS**
COMBINED RADIUM (226+228)	ND (+/- 0)	U	1.8	pCi/l	NA	1/15/2021 07:48
Ra-228	ND (+/- 0.83)	U,M	1.8	pCi/l	NA	1/15/2021 07:48
Carr: BARIUM	*45*		*40-110*	*%REC*	DL = NA	1/15/2021 07:48

Client:	Geosyntec Consultants	**Date:**	*19-Jan-21*
Project:	GLP-8017 DTE - Belle River	**Work Order:**	2012397
Sample ID:	DB	**Lab ID:**	2012397-3
Legal Location:		**Matrix:**	WATER
Collection Date:	12/16/2020 16:00	**Percent Moisture:**	

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed

Explanation of Qualifiers

Radiochemistry:

- "Report Limit" is the MDC

U or ND - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.

Y2 - Chemical Yield outside default limits.

W - DER is greater than Warning Limit of 1.42

* - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

G - Sample density differs by more than 15% of LCS density.

D - DER is greater than Control Limit

M - Requested MDC not met.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

Inorganics:

B - Result is less than the requested reporting limit but greater than the instrument method detection limit (MDL).

U or ND - Indicates that the compound was analyzed for but not detected.

E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

M - Duplicate injection precision was not met.

N - Spiked sample recovery not within control limits. A post spike is analyzed for all ICP analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

* - Duplicate analysis (relative percent difference) not within control limits.

S - SAR value is estimated as one or more analytes used in the calculation were not detected above the detection limit.

Organics:

U or ND - Indicates that the compound was analyzed for but not detected.

B - Analyte is detected in the associated method blank as well as in the sample. It indicates probable blank contamination and warns the data user.

E - Analyte concentration exceeds the upper level of the calibration range.

J - Estimated value. The result is less than the reporting limit but greater than the instrument method detection limit (MDL).

A - A tentatively identified compound is a suspected aldol-condensation product.

X - The analyte was diluted below an accurate quantitation level.

* - The spike recovery is equal to or outside the control criteria used.

+ - The relative percent difference (RPD) equals or exceeds the control criteria.

G - A pattern resembling gasoline was detected in this sample.

D - A pattern resembling diesel was detected in this sample.

M - A pattern resembling motor oil was detected in this sample.

C - A pattern resembling crude oil was detected in this sample.

4 - A pattern resembling JP-4 was detected in this sample.

5 - A pattern resembling JP-5 was detected in this sample.

H - Indicates that the fuel pattern was in the heavier end of the retention time window for the analyte of interest.

L - Indicates that the fuel pattern was in the lighter end of the retention time window for the analyte of interest.

Z - This flag indicates that a significant fraction of the reported result did not resemble the patterns of any of the following petroleum hydrocarbon products:
- gasoline
- JP-8
- diesel
- mineral spirits
- motor oil
- Stoddard solvent
- bunker C

QC BATCH REPORT

Batch ID: **RE210104-1-3** Instrument ID: **Alpha Scin** Method: **Radium-226 by Radon Emanation**

LCS Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**

Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	46 (+/- 12)	0	46.8		98.8	67-120					P
Carr: BARIUM	15230		15490		98.3	40-110					

MB Sample ID: **RE210104-1** Units: **pCi/l** Analysis Date: **1/12/2021 12:16**

Client ID: Run ID: **RE210104-1A** Prep Date: **1/4/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Ra-226	ND	0.31									U
Carr: BARIUM	15370		15490		99.2	40-110					

The following samples were analyzed in this batch: 2012397-1 2012397-2 2012397-3

Client: Geosyntec Consultants
Work Order: 2012397
Project: GLP-8017 DTE - Belle River

QC BATCH REPORT

Batch ID: **RA210111-1-5** Instrument ID: **GASPROP** Method: **Radium-228 Analysis by GFPC**

LCS Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34290		36030		95.2	40-110					
Ra-228	17.3 (+/- 4.1)	0.7	22.86		75.6	70-130					P

LCSD Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	33960		36030		94.2	40-110		34290			
Ra-228	22.7 (+/- 5.3)	0.7	22.86		99.3	70-130		17.3	0.81	2.13	P

MB Sample ID: **RA210111-1** Units: **ug** Analysis Date: **1/15/2021 07:48**
Client ID: Run ID: **RA210111-1A** Prep Date: **1/11/2021** DF: **NA**

Analyte	Result	ReportLimit	SPK Val	SPK Ref Value	%REC	Control Limit	Decision Level	DER Ref Value	DER	DER Limit	Qual
Carr: BARIUM	34280		36150		94.8	40-110					
Ra-228	ND	0.77									U

The following samples were analyzed in this batch: 2012397-1 2012397-2 2012397-3

Geosyntec
consultants

Appendix K

ALD Hydraulic Conductivity Test Results

Excel Geotechnical Testing, Inc.
"Excellence in Testing"

953 Forrest Street, Roswell, Georgia 30075
Tel: (770) 910 7537, www.excelgeotesting.com

Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B1-ST-1 (7-9')	20L143	26.7	98.1	-	-	3/15/2021	0	1.2E-08	0.0434	-	-	-	-	
						3/22/2021	7	9.3E-09	0.0434	-	-	-	-	
						3/29/2021	14	7.3E-09	0.0710	8.3	8.4	-	-	
						4/05/2021	21	7.0E-09	0.1122	-	-	-	-	
						4/12/2021	28	7.1E-09	0.1402	-	-	-	-	
						4/14/2021	30	6.9E-09	0.1468	8.2	8.5	-	-	
						4/19/2021	35	7.8E-09	0.1798	-	-	-	-	
						4/26/2021	42	6.4E-09	0.2107	-	-	-	-	
						4/27/2021	43	6.9E-09	0.2146	8.2	8.4	656	1614	
						5/3/2021	49	7.6E-09	0.2537	-	-	-	-	
						5/04/2021	50	7.8E-09	0.2592	-	-	-	-	
						5/07/2021	53	7.7E-09	0.2730	-	-	-	-	
						5/10/2021	56	6.8E-09	0.2843	8.3	8.2	-	-	
						5/14/2021	60	8.0E-09	0.3114	-	-	-	-	
						5/21/2021	67	7.2E-09	0.3464	-	-	-	-	
						5/24/2021	70	6.9E-09	0.3568	8.5	8.6	-	-	
						5/28/2021	74	8.1E-09	0.3840	-	-	-	-	
						6/04/2021	81	7.0E-09	0.4176	8.4	8.6	660	1411	
						6/11/2021	88	7.6E-09	0.4591	-	-	-	-	
						6/17/2021	94	6.4E-09	0.4830	8.3	8.2	-	-	
						6/18/2021	95	7.3E-09	0.4929	-	-	-	-	
						6/25/2021	102	7.6E-09	0.5356	-	-	-	-	
						7/01/2021	108	6.4E-09	0.5602	8.5	8.2	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.4 657 1418

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B1-ST-1 (7-9')	20L143	26.7	98.1	-	-	7/02/2021	109	7.6E-09	0.5692	-	-	-	-	
						7/09/2021	116	7.0E-09	0.6119	-	-	-	-	
						7/16/2021	123	6.9E-09	0.6399	8.5	8.2	656	1230	
						7/23/2021	130	7.6E-09	0.6838	-	-	-	-	
						7/30/2021	137	7.0E-09	0.7116	8.6	8.5	-	-	
						8/06/2021	144	6.9E-09	0.7521	-	-	-	-	
						8/13/2021	151	6.7E-09	0.7806	8.5	8.1	-	-	
						8/20/2021	158	8.2E-09	0.8267	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.4 657 1418

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Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-1 (1-3')	20L149	20.4	105.7	-	-	3/15/2021	0	1.8E-08	0.0911	-	-	-	-	
						3/22/2021	7	1.7E-08	0.0911	8.5	8.1	-	-	
						3/29/2021	14	1.3E-08	0.1666	-	-	-	-	
						3/30/2021	15	1.3E-08	0.1716	8.5	8.3	-	-	
						4/05/2021	21	1.4E-08	0.2192	-	-	-	-	
						4/09/2021	25	1.3E-08	0.2442	8.0	8.1	782	3050	
						4/12/2021	28	1.4E-08	0.2807	-	-	-	-	
						4/16/2021	32	1.3E-08	0.3163	8.2	8.5	-	-	
						4/19/2021	35	1.3E-08	0.3522	-	-	-	-	
						4/26/2021	42	1.1E-08	0.4021	8.0	7.9	-	-	
						5/03/2021	49	1.3E-08	0.4766	8.2	8.5	560	2300	
						5/07/2021	53	1.3E-08	0.5194	-	-	-	-	
						5/12/2021	58	1.2E-08	0.5592	8.1	8.3	-	-	
						5/14/2021	60	1.3E-08	0.5859	-	-	-	-	
						5/21/2021	67	1.2E-08	0.6498	8.3	8.1	-	-	
						5/28/2021	74	1.2E-08	0.7192	8.4	8.2	621	1790	
						6/04/2021	81	1.2E-08	0.7866	-	-	-	-	
						6/11/2021	88	1.2E-08	0.8573	-	-	-	-	
						6/14/2021	91	1.1E-08	0.8748	8.3	8.2	-	-	
						6/18/2021	95	1.3E-08	0.9204	-	-	-	-	
						6/22/2021	99	1.1E-08	0.9495	8.3	8.1	595	1982	
						6/25/2021	102	1.3E-08	0.9867	-	-	-	-	
						7/01/2021	108	1.1E-08	1.0332	8.5	8.5	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.2 645 2146

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-1 (1-3')	20L149	20.4	105.7	-	-	7/02/2021	109	1.2E-08	1.0459	-	-	-	-	
						7/09/2021	116	1.1E-08	1.1124	8.8	8.4	-	-	
						7/16/2021	123	1.2E-08	1.1811	8.7	8.1	657	1988	
						7/23/2021	130	1.2E-08	1.2542	8.3	8.4	-	-	
						7/30/2021	137	1.2E-08	1.3223	-	-	-	-	
						8/02/2021	140	1.1E-08	1.3400	8.7	8.1	-	-	
						8/06/2021	144	1.2E-08	1.3836	-	-	-	-	
						8/13/2021	151	1.1E-08	1.4327	8.2	8.1	652	1764	
						8/20/2021	158	1.2E-08	1.5042	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.2 645 2146

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-4 (47-49')	20L152	36.6	84.2	-	-	3/15/2021	0	2.4E-08	0.0736	-	-	-	-	
						3/22/2021	7	1.9E-08	0.0736	8.2	8.0	-	-	
						3/29/2021	14	2.0E-08	0.1494	8.2	8.1	-	-	
						4/05/2021	21	1.9E-08	0.2090	8.1	8.2	523	1271	
						4/12/2021	28	2.0E-08	0.2804	-	-	-	-	
						4/13/2021	29	2.0E-08	0.2860	8.3	8.3	-	-	
						4/19/2021	35	2.0E-08	0.3546	8.2	8.1	-	-	
						4/26/2021	42	1.9E-08	0.4262	8.1	8.0	578	1313	
						4/30/2021	46	2.2E-08	0.4799	8.4	8.1	-	-	
						5/05/2021	51	2.1E-08	0.5425	8.4	8.2	-	-	
						5/07/2021	53	2.0E-08	0.5706	-	-	-	-	
						5/10/2021	56	1.9E-08	0.6011	8.3	8.0	607	1081	
						5/14/2021	60	2.1E-08	0.6528	-	-	-	-	
						5/19/2021	65	2.1E-08	0.7152	8.0	8.2	-	-	
						5/21/2021	67	2.1E-08	0.7473	-	-	-	-	
						5/24/2021	70	2.1E-08	0.7774	8.2	8.2	666	1197	
						5/28/2021	74	2.2E-08	0.8301	8.3	8.1	-	-	
						6/02/2021	79	2.1E-08	0.8917	8.2	8.2	-	-	
						6/04/2021	81	2.1E-08	0.9222	-	-	-	-	
						6/07/2021	84	2.1E-08	0.9528	8.6	8.3	598	1074	
						6/11/2021	88	2.2E-08	1.0062	8.4	8.1	-	-	
						6/16/2021	93	2.1E-08	1.0692	8.4	8.0	-	-	
						6/18/2021	95	2.1E-08	1.1005	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 609 1087

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B2-ST-4 (47-49')	20L152	36.6	84.2	-	-	6/21/2021	98	2.0E-08	1.1309	8.4	8.2	665	944	
						6/25/2021	102	2.2E-08	1.1877	-	-	-	-	
						6/29/2021	106	2.2E-08	1.2408	8.6	8.4	-	-	
						7/02/2021	109	1.9E-08	1.2789	8.6	8.1	618	1000	
						7/07/2021	114	2.0E-08	1.3455	8.1	8.1	-	-	
						7/09/2021	116	2.0E-08	1.3736	-	-	-	-	
						7/13/2021	120	2.1E-08	1.4129	8.3	8.4	-	-	
						7/16/2021	123	2.2E-08	1.4552	-	-	-	-	
						7/19/2021	126	2.0E-08	1.4823	8.2	8.4	612	974	
						7/23/2021	130	2.1E-08	1.5353	8.2	8.1	-	-	
						7/29/2021	136	2.0E-08	1.6059	8.2	8.1	-	-	
						7/30/2021	137	2.1E-08	1.6223	-	-	-	-	
						8/04/2021	142	1.9E-08	1.6722	8.3	8.2	610	933	
						8/06/2021	144	1.8E-08	1.6991	-	-	-	-	
						8/10/2021	148	2.0E-08	1.7386	8.2	8.1	-	-	
						8/13/2021	151	2.1E-08	1.7827	-	-	-	-	
						8/16/2021	154	2.2E-08	1.8112	8.3	8.1	-	-	
						8/20/2021	158	2.2E-08	1.8678	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 609 1087

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B3-ST-5 (77-79')	20L160	20.5	106.6	-	-	3/15/2021	0	2.2E-08	0.1027	-	-	-	-	
						3/22/2021	7	2.1E-08	0.1027	8.5	8.2	-	-	
						3/29/2021	14	1.9E-08	0.1903	8.1	8.2	-	-	
						4/05/2021	21	1.8E-08	0.2806	8.2	8.2	633	1118	
						4/12/2021	28	1.9E-08	0.3709	-	-	-	-	
						4/13/2021	29	1.9E-08	0.3789	8.3	8.1	-	-	
						4/19/2021	35	1.9E-08	0.4651	8.2	8.1	-	-	
						4/26/2021	42	1.8E-08	0.5563	8.4	8.0	648	1027	
						5/03/2021	49	2.0E-08	0.6537	8.5	8.1	-	-	
						5/10/2021	56	1.8E-08	0.7482	8.1	7.8	-	-	
						5/14/2021	60	1.9E-08	0.8117	8.5	8.1	719	980	
						5/20/2021	66	1.9E-08	0.8996	8.6	8.4	-	-	
						5/21/2021	67	1.9E-08	0.9209	-	-	-	-	
						5/25/2021	71	1.9E-08	0.9765	8.1	8.1	-	-	
						5/28/2021	74	2.0E-08	1.0299	8.3	8.2	611	1024	
						6/04/2021	81	1.8E-08	1.1265	8.6	8.0	-	-	
						6/10/2021	87	2.0E-08	1.2169	8.8	8.6	-	-	
						6/11/2021	88	2.0E-08	1.2366	-	-	-	-	
						6/16/2021	93	1.9E-08	1.3037	8.5	8.1	699	927	
						6/18/2021	95	1.9E-08	1.3425	-	-	-	-	
						6/22/2021	99	1.8E-08	1.3929	8.2	7.9	-	-	
						6/25/2021	102	2.1E-08	1.4542	-	-	-	-	
						6/28/2021	105	2.0E-08	1.4939	8.3	8.6	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 680 946

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Compatibility Test Results

Project Name: Belle River ALD Support

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Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B3-ST-5 (77-79')	20L160	20.5	106.6	-	-	7/02/2021	109	2.0E-08	1.5670	8.2	7.8	-	-	
						7/08/2021	115	1.9E-08	1.6590	8.2	8.2	735	816	
						7/09/2021	116	1.8E-08	1.6784	-	-	-	-	
						7/14/2021	121	1.9E-08	1.7482	8.3	8.1	-	-	
						7/16/2021	123	1.8E-08	1.7795	-	-	-	-	
						7/20/2021	127	1.9E-08	1.8074	8.2	8.2	-	-	
						7/23/2021	130	2.0E-08	1.8619	-	-	-	-	
						7/27/2021	134	1.9E-08	1.9098	8.7	8.2	681	862	
						7/30/2021	137	1.8E-08	1.9593	-	-	-	-	
						8/03/2021	141	1.6E-08	1.9998	8.4	8.3	-	-	
						8/06/2021	144	1.7E-08	2.0456	-	-	-	-	
						8/10/2021	148	1.7E-08	2.0883	8.1	8.1	-	-	
						8/13/2021	151	1.9E-08	2.1392	-	-	-	-	
						8/16/2021	154	2.0E-08	2.1745	8.1	8.1	714	817	
						8/20/2021	158	1.9E-08	2.2383	-	-	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.3 8.2 680 946

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

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Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-3 (47-49')	20L164	42.1	80.7	-	-	3/15/2021	0	2.7E-08	0.0636	-	-	-	-	
						3/19/2021	4	3.1E-08	0.0636	8.6	8.4	-	-	
						3/22/2021	7	2.9E-08	0.1133	-	-	-	-	
						3/24/2021	9	3.1E-08	0.1358	8.7	8.2	-	-	
						3/29/2021	14	2.5E-08	0.2018	8.4	8.3	565	910	
						4/02/2021	18	2.3E-08	0.2600	8.5	8.1	-	-	
						4/05/2021	21	2.4E-08	0.3038	-	-	-	-	
						4/07/2021	23	2.4E-08	0.3234	7.9	8.0	-	-	
						4/12/2021	28	2.6E-08	0.3905	-	-	-	-	
						4/13/2021	29	2.6E-08	0.3978	7.7	8.0	661	930	
						4/19/2021	35	2.5E-08	0.4718	8.0	8.0	-	-	
						4/23/2021	39	2.6E-08	0.5303	8.5	8.7	-	-	
						4/26/2021	42	2.5E-08	0.5757	-	-	-	-	
						4/27/2021	43	2.6E-08	0.5880	8.1	8.0	586	823	
						5/03/2021	49	2.7E-08	0.6796	8.4	8.1	-	-	
						5/07/2021	53	2.7E-08	0.7380	8.7	8.1	-	-	
						5/12/2021	58	2.6E-08	0.8059	8.3	8.1	518	788	
						5/14/2021	60	2.6E-08	0.8380	-	-	-	-	
						5/17/2021	63	2.6E-08	0.8719	8.2	8.2	-	-	
						5/21/2021	67	2.6E-08	0.9310	7.7	7.8	-	-	
						5/25/2021	71	2.7E-08	0.9895	7.8	7.8	584	746	
						5/28/2021	74	2.7E-08	1.0384	7.8	8.0	-	-	
						6/01/2021	78	2.7E-08	1.0976	7.9	7.9	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.2 8.1 625 778

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B4-ST-3 (47-49')	20L164	42.1	80.7	-	-	6/04/2021	81	2.7E-08	1.1447	8.0	7.9	586	778	
						6/08/2021	85	2.7E-08	1.2046	8.1	8.2	-	-	
						6/11/2021	88	2.7E-08	1.2536	8.2	8.1	-	-	
						6/15/2021	92	2.7E-08	1.3129	8.2	8.2	730	597	
						6/18/2021	95	2.6E-08	1.3630	8.1	8.2	-	-	
						6/23/2021	100	2.6E-08	1.4333	8.4	8.3	-	-	
						6/25/2021	102	2.8E-08	1.4724	-	-	-	-	
						6/28/2021	105	2.7E-08	1.5088	8.5	8.3	650	774	
						7/02/2021	109	2.7E-08	1.5703	8.2	7.8	-	-	
						7/06/2021	113	2.7E-08	1.6320	8.3	8.4	-	-	
						7/09/2021	116	2.6E-08	1.6795	8.5	8.1	710	830	
						7/14/2021	121	2.6E-08	1.7543	8.3	8.2	-	-	
						7/16/2021	123	2.9E-08	1.7946	-	-	-	-	
						7/19/2021	126	2.8E-08	1.8287	8.3	8.2	-	-	
						7/23/2021	130	2.7E-08	1.8868	8.4	8.2	651	734	
						7/28/2021	135	2.7E-08	1.9561	8.2	8.2	-	-	
						7/30/2021	137	2.6E-08	1.9925	-	-	-	-	
						8/03/2021	141	2.4E-08	2.0346	8.3	8.2	-	-	
						8/06/2021	144	2.5E-08	2.0800	-	-	-	-	
						8/09/2021	147	2.5E-08	2.1094	8.3	8.2	651	749	
						8/13/2021	151	2.7E-08	2.1691	8.1	8.1	-	-	
						8/17/2021	155	2.8E-08	2.2325	8.3	8.3	-	-	
						8/20/2021	158	2.8E-08	2.2807	8.3	8.2	611	671	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.2 8.1 625 778

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B5-ST-5 (87-89')	20L172	21.6	107.5	-	-	3/15/2021	0	1.7E-08	0.0905	-	-	-	-	
						3/22/2021	7	1.6E-08	0.0905	8.4	8.0	-	-	
						3/29/2021	14	1.5E-08	0.1730	-	-	-	-	
						3/30/2021	15	1.5E-08	0.1794	8.4	8.3	-	-	
						4/02/2021	18	1.6E-08	0.2136	8.5	8.4	605	2010	
						4/05/2021	21	1.6E-08	0.2577	-	-	-	-	
						4/09/2021	25	1.5E-08	0.2972	7.9	8.0	-	-	
						4/12/2021	28	1.6E-08	0.3419	-	-	-	-	
						4/16/2021	32	1.6E-08	0.3816	8.6	8.5	-	-	
						4/19/2021	35	1.6E-08	0.4302	-	-	-	-	
						4/23/2021	39	1.4E-08	0.4658	8.5	8.3	676	1372	
						4/26/2021	42	1.1E-08	0.4844	-	-	-	-	
						5/05/2021	51	7.8E-09	0.5510	8.5	8.2	-	-	
						5/07/2021	53	1.2E-08	0.5830	-	-	-	-	
						5/12/2021	58	1.5E-08	0.6371	8.5	8.3	-	-	
						5/14/2021	60	1.6E-08	0.6685	-	-	-	-	
						5/18/2021	64	1.6E-08	0.7166	8.3	8.2	697	1569	
						5/21/2021	67	1.4E-08	0.7643	-	-	-	-	
						5/24/2021	70	1.3E-08	0.7968	8.4	8.3	-	-	
						5/28/2021	74	1.8E-08	0.8590	8.5	8.1	-	-	
						6/04/2021	81	1.5E-08	0.9471	8.3	8.2	760	1192	
						6/11/2021	88	1.6E-08	1.0343	8.2	8.5	-	-	
						6/18/2021	95	1.5E-08	1.1243	8.1	8.4	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.2 678 1341

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Test Results Summary

Compatibility Test Results

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information												Remarks
		Initial Conditions		Final Conditions		Date	Number of Days After Injection	Permeability	Pore Volumes Passed After Injection	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Moisture Content	Dry Unit Weight			Notes 1 & 2	Note 1	In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(%)	(pcf)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B5-ST-5 (87-89')	20L172	21.6	107.5	-	-	6/24/2021	101	1.6E-08	1.2048	8.6	8.0	679	1067	
						6/25/2021	102	1.6E-08	1.2226	-	-	-	-	
						6/29/2021	106	1.6E-08	1.2773	8.3	8.0	-	-	
						7/02/2021	109	1.6E-08	1.3251	-	-	-	-	
						7/06/2021	113	1.6E-08	1.3731	8.6	8.1	-	-	
						7/09/2021	116	1.5E-08	1.4176	-	-	-	-	
						7/13/2021	120	1.5E-08	1.4573	8.3	8.3	598	1134	
						7/16/2021	123	1.6E-08	1.5039	-	-	-	-	
						7/21/2021	128	1.5E-08	1.5523	8.2	8.1	-	-	
						7/23/2021	130	1.5E-08	1.5831	-	-	-	-	
						7/28/2021	135	1.5E-08	1.6370	8.1	8.1	-	-	
						7/30/2021	137	1.4E-08	1.6636	-	-	-	-	
						8/06/2021	144	1.3E-08	1.7350	8.6	8.4	733	1040	
						8/13/2021	151	1.4E-08	1.7722	8.1	8.1	-	-	
						8/20/2021	158	1.5E-08	1.8667	8.2	8.1	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average Values: 8.4 8.2 678 1341

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Test Results Summary

Compatibility Test Results as of August 20, 2021

Project Name: Belle River ALD Support

21H21 **Project No.: PN1017** **R23**

Site ID	Lab No.	Test Information														Remarks
		Initial Conditions				Specific Gravity ASTM D854	Date Test Started	Date Comp Started (Injection)	Number of Days After Injection	Permeability Notes 1 & 2	Pore Volumes Passed After Injection Note 1	pH		Electrical Conductivity		
		Moisture Content	Dry Unit Weight	Total Volume	Volume of Pores							In Flow	Out Flow	In Flow	Out Flow	
(-)	(-)	(%)	(pcf)	(cm3)	(cm3)	(-)	(-)	(-)	(-)	(cm/s)	(-)	(-)	(-)	(µs/cm)	(µs/cm)	
B1-ST-1 (7-9')	20L143	26.7	98.1	145.8	62.5	2.750	1/29/2021	3/15/2021	123	6.9E-09	0.6399	8.5	8.2	656	1230	
									151	6.7E-09	0.7806	8.5	8.1	-	-	
									158	8.2E-09	0.8267	-	-	-	-	
B2-ST-1 (1-3')	20L149	20.4	105.7	144.9	57.1	2.796	2/12/2021	3/15/2021	151	1.1E-08	1.4327	8.2	8.1	652	1764	
									158	1.2E-08	1.5042	-	-	-	-	
B2-ST-4 (47-49')	20L152	36.6	84.2	146.8	75.6	2.781	2/12/2021	3/15/2021	142	1.9E-08	1.6722	8.3	8.2	610	933	
									154	2.2E-08	1.8112	8.3	8.1	-	-	
									158	2.2E-08	1.8678	-	-	-	-	
B3-ST-5 (77-79')	20L160	20.5	106.6	149.0	55.1	2.709	2/12/2021	3/15/2021	154	2.0E-08	2.1745	8.1	8.1	714	817	
									158	1.9E-08	2.2383	-	-	-	-	
B4-ST-3 (47-49')	20L164	42.1	80.7	143.2	77.0	2.795	2/12/2021	3/15/2021	158	2.8E-08	2.2807	8.3	8.2	611	671	
B5-ST-5 (87-89')	20L172	21.6	107.5	146.2	54.3	2.740	2/20/2021	3/15/2021	144	1.3E-08	1.7350	8.6	8.4	733	1040	
									158	1.5E-08	1.8667	8.2	8.1	-	-	

Notes: 1- Based on Specimen Initial Conditions. 2- Based on average of four readings. Average: 8.3 663

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Appendix L

Groundwater Protection Standard Calculations

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Technical Memorandum

Date:	November 24, 2021
To:	Chris Scieszka, DTE Electric Company
From:	Vince Buening, TRC Sarah Holmstrom, TRC Kristin Lowery, TRC
Project No.:	413591.0003.0000 Phase 1 Task 1
Subject:	Groundwater Protection Standard Calculation – DTE Electric Company, Belle River Power Plant Bottom Ash Basins

DTE Electric Company (DTE Electric) is pursuing an Alternate Liner Demonstration (ALD) for the Belle River Power Plant (BRPP) Bottom Ash Basins (BABs) coal combustion residual (CCR) unit. On November 12, 2020, the U.S. EPA published the Part B: Alternate Demonstration for Unlined Surface Impoundments amendments to the CCR Rule[1] ("Part B") that allows a facility to prepare demonstration to request approval to operate an existing CCR surface impoundment with an alternate liner. Although the BRPP BABs remain in detection monitoring, per § 257.71(d)(1)(ii)(C)(2), the ALD must demonstrate that, for each Appendix IV constituent, there is no reasonable probability that the peak groundwater concentration that may result from releases that occur over the active life of the CCR surface impoundment will exceed the groundwater protection standard (GWPS) at the waste boundary.

GWPSs are set as either specific regulatory standards identified in the CCR Rule or background groundwater concentrations, whichever is higher, for the Appendix IV constituents. Per the CCR Rule §257.95(h)[2], the EPA maximum contaminant levels (MCLs) will be the GWPSs for those constituents that have established MCLs. For Appendix IV constituents that do not have established MCLs, the GWPSs are based upon the EPA Regional Screening Levels (RSLs). For constituents that have statistically derived background levels higher than the MCL and/or RSL, the GWPS becomes equal to the background level.

This memorandum presents the background statistical limits and GWPS derived for the Appendix IV parameters for the BRPP BABs CCR unit using the aforementioned approach pursuant to §257.95(h). Per 40 CFR §257.94, a minimum of eight rounds of background sampling for the Appendix IV constituents were completed at the BRPP BABs from August 2016 through September 2017, as part of

[1] On April 17, 2015, the U.S. EPA issued the Final Rule: Disposal of CCR from Electric Utilities (CCR Rule), 40 CFR 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fired units.
[2] As amended per Phase One, Part One of the CCR Rule (83 FR 36435).

initiating the detection monitoring program. Since fluoride is in both the Appendix III and Appendix IV constituent lists, additional fluoride data were collected under the detection monitoring program subsequent to September 2017 and were also used in the development of the GWPS. All of the Appendix IV data used in this analysis (August 2016 through December 2020) and details on how the data were collected are included in the annual reports prepared in accordance with the CCR Rule through January 2021.

The background data for the BRPP BABs were evaluated in accordance with the *Groundwater Statistical Evaluation Plan* (Stats Plan) (TRC, October 2017). Per the Stats Plan, the BRPP BABs CCR unit uses an intra-well statistical approach. For intra-well methods, the background data set is comprised of the historical data established at each individual monitoring well, which accounts for natural spatial variability that occurs in background encountered across the site. Background data were evaluated utilizing ChemStat™ statistical software. ChemStat™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (Unified Guidance; UG). Within the ChemStat™ statistical program (and the UG), tolerance limits were selected to perform the statistical calculation for background limits. Use of tolerance limits is a streamlined approach that offers adequate statistical power and is an acceptable approach under the CCR Rule. As such, upper tolerance limits (UTLs) were calculated for each of the CCR Appendix IV parameters, and, given that intra-well methods have been established for this site, a background UTL was calculated for each monitoring well and used to compare to the respective MCL or RSL. The following narrative describes the methods employed and the results obtained for the UTL calculations and the resulting GWPSs. The ChemStat™ output files are included as an attachment.

The set of background wells utilized for BRPP BABs includes MW-16-01, MW-16-02, MW-16-03, MW-16-04, and MW-16-09. The background data evaluation included the following steps:

- Review of data quality checklists for the baseline/background data sets for CCR Appendix IV constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of nondetects for each baseline/background well-constituent (w/c) pair;
- Distribution of the data;
- Calculation of the UTLs for each cumulative baseline/background data set; and
- Establishment of GWPS as the higher of the MCL/RSL or the UTL for each Appendix IV constituent.

The results of these evaluations are presented and discussed below.

Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum

included chain-of-custody forms, investigative sample results including blind field duplicates, and, as provided by the laboratory, method blanks, laboratory control spikes, laboratory duplicates. Data collected at MW-16-09 on 7/24/2017 were found to be anomalous due to high turbidity in the sample. Monitoring well MW-16-09 was resampled on 7/25/2017 with acceptable turbidity; therefore, the 7/24/2017 data was rejected and replaced with the 7/25/2017 data. The remaining data were found to be complete and usable for the purposes of the CCR monitoring program.

Time versus Concentration Graphs

The time versus concentration (T v. C) graphs (Attachment A) do not show potential or suspect outliers for any of the Appendix IV parameters.

While variations in results are present, the graphs show consistent baseline data and do not suggest that data sets, as a whole, likely have overall trending or seasonality. However, due to limitations on CCR Rule implementation timelines, the data sets, with the exception of fluoride, are of relatively short duration for making such observations regarding overall trending or seasonality.

Outlier Testing

No outliers were identified in the T v. C graphs. Therefore, outlier testing was not applicable.

As noted above, data collected at MW-16-09 on 7/24/2017 was found to be anomalous due to high turbidity in the sample. Therefore, these data were removed from the background data set and replaced with acceptable data from 7/25/2017. Outlier removal from the background data set is summarized in Table 1.

Distribution of the Data Sets

ChemStat™ was utilized to evaluate each data set for normality. If the skewness coefficient was calculated to be between negative one and one, then the data were assumed to be approximately normally distributed. If the skewness coefficient was calculated as greater than one (or less than negative one) then the calculation was performed on the natural log (Ln) of the data. If the Ln of the data still determined that the data appeared to be skewed, then the Shapiro-Wilk test of normality (Shapiro-Wilk) was performed. The Shapiro-Wilk statistic was calculated on both non-transformed data and the Ln-transformed data. If the Shapiro-Wilk statistic indicated that normal distributional assumptions were not valid, then the parameter was considered a candidate for non-parametric statistical evaluation. The data distributions are summarized in Table 2.

Tolerance Limits

Table 2 presents the calculated UTLs for the background/baseline data sets. As discussed above, the BRPP BABs CCR unit uses intra-well statistical methods; therefore, UTLs were calculated for each individual monitoring well. For normal and lognormal distributions, UTLs are calculated for 95 percent confidence using parametric methods. For non-normal background datasets, a nonparametric UTL is utilized, resulting in the highest value from the background dataset as the UTL. The achieved confidence levels for nonparametric tolerance limits depend entirely on the number of background data points, which are shown in the ChemStat™ outputs. The intra-well tolerance limits for each parameter were compared to the MCL/RSL and the higher value was established as the GWPS for that well.

Groundwater Protection Standards

The resulting GWPSs were established as the higher of the MCL/RSL or the UTL for each Appendix IV constituent at each monitoring well. The GWPSs are summarized in Table 3.

Attachments

Table 1 – Summary of Outlier Evaluation

Table 2 – Summary of Descriptive Statistics and Tolerance Limit Calculations

Table 3 – Summary of Groundwater Protection Standards

Attachment A – ChemStat™ Outputs

Tables

Table 1
Summary of Outlier Evaluation
DTE Electric Company – Belle River Power Plant Bottom Ash Basins

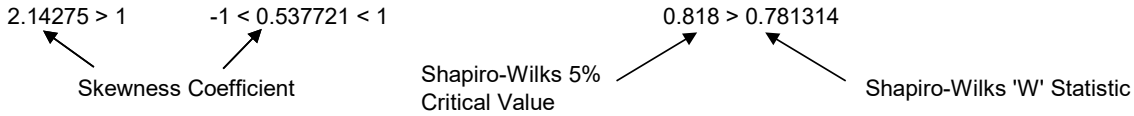
Parameter	Units	Monitoring Well	Sample Date	Data Outlier	Basis for Removal of Outlier
Antimony	ug/L	MW-16-09	7/24/2017	< 2.0	High turbidity in sample; results replaced by 7/25/2017 sample
Arsenic	ug/L	MW-16-09	7/24/2017	< 5.0	High turbidity in sample; results replaced by 7/25/2017 sample
Barium	ug/L	MW-16-09	7/24/2017	310	High turbidity in sample; results replaced by 7/25/2017 sample
Beryllium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample
Cadmium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample
Chromium	ug/L	MW-16-09	7/24/2017	18	High turbidity in sample; results replaced by 7/25/2017 sample
Cobalt	ug/L	MW-16-09	7/24/2017	6.3	High turbidity in sample; results replaced by 7/25/2017 sample
Fluoride	mg/L	MW-16-09	7/24/2017	1.6	High turbidity in sample; results replaced by 7/25/2017 sample
Lead	ug/L	MW-16-09	7/24/2017	5	High turbidity in sample; results replaced by 7/25/2017 sample
Lithium	ug/L	MW-16-09	7/24/2017	57	High turbidity in sample; results replaced by 7/25/2017 sample
Mercury	ug/L	MW-16-09	7/24/2017	< 0.20	High turbidity in sample; results replaced by 7/25/2017 sample
Molybdenum	ug/L	MW-16-09	7/24/2017	66	High turbidity in sample; results replaced by 7/25/2017 sample
Radium-226/228	pCi/L	MW-16-09	7/24/2017	1.67	High turbidity in sample; results replaced by 7/25/2017 sample
Selenium	ug/L	MW-16-09	7/24/2017	< 5.0	High turbidity in sample; results replaced by 7/25/2017 sample
Thallium	ug/L	MW-16-09	7/24/2017	< 1.0	High turbidity in sample; results replaced by 7/25/2017 sample

Notes:
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 2
Summary of Descriptive Statistics and Tolerance Limit Calculations
DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Antimony (ug/L)							
MW-16-01	100% Non-Detect				N	PQL	2.0
MW-16-02	100% Non-Detect				N	PQL	2.0
MW-16-03	100% Non-Detect				N	PQL	2.0
MW-16-04	100% Non-Detect				N	PQL	2.0
MW-16-09	100% Non-Detect				Y	PQL	2.0
Arsenic (ug/L)							
MW-16-01	100% Non-Detect				N	PQL	5.0
MW-16-02	100% Non-Detect				N	PQL	5.0
MW-16-03	100% Non-Detect				N	PQL	5.0
MW-16-04	> 50% Non-Detect				N	Non-Parametric	7.0
MW-16-09	> 50% Non-Detect				Y	Non-Parametric	7.2
Barium (ug/L)							
MW-16-01	1 < 1.93433	1 < 1.85565	0.829 > 0.647993	0.829 > 0.665248	N	Non-Parametric	300
MW-16-02	1 < 1.09096	1 < 1.04324	0.829 > 0.778715	0.829 > 0.789832	N	Non-Parametric	330
MW-16-03	-1.40422 < -1	-1.4678 < -1	0.818 > 0.800797	0.818 > 0.787552	N	Non-Parametric	310
MW-16-04	1 < 1.50819	1 < 1.41108	0.829 > 0.737494	0.829 > 0.756518	N	Non-Parametric	440
MW-16-09	-1 < -0.562075 < 1	--	--	--	Y	Parametric	330
Beryllium (ug/L)							
MW-16-01	> 50% Non-Detect				N	Non-Parametric	2.8
MW-16-02	> 50% Non-Detect				N	Non-Parametric	2.8
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	> 50% Non-Detect				N	Non-Parametric	1.0
MW-16-09	100% Non-Detect				Y	PQL	1.0

Notes:

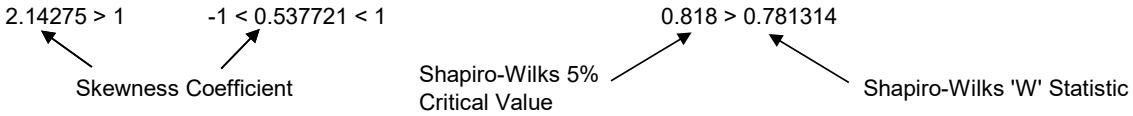


PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 2
Summary of Descriptive Statistics and Tolerance Limit Calculations
DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Cadmium (ug/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-09	100% Non-Detect				Y	PQL	1.0
Chromium (ug/L)							
MW-16-01	> 50% Non-Detect				N	Non-Parametric	13
MW-16-02	> 50% Non-Detect				N	Non-Parametric	19
MW-16-03	100% Non-Detect				N	PQL	2.0
MW-16-04	1 < 1.19014	1 < 1.01083	0.829 > 0.703824	0.829 > 0.772663	N	Non-Parametric	27
MW-16-09	-1 < -0.0757045 < 1	--	--	--	Y	Parametric	25
Cobalt (ug/L)							
MW-16-01	> 50% Non-Detect				N	Non-Parametric	3.6
MW-16-02	> 50% Non-Detect				N	Non-Parametric	3.9
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	1 < 1.05578	-1 < 0.709812 < 1	--	--	N	Parametric	13
MW-16-09	-1 < 0.577785 < 1	--	--	--	Y	Parametric	7.7
Fluoride (mg/L)							
MW-16-01	-1 < -0.926404 < 1	--	--	--	N	Parametric	2.0
MW-16-02	-1 < -0.531685 < 1	--	--	--	N	Parametric	1.4
MW-16-03	-1 < -0.534079 < 1	--	--	--	N	Parametric	2.0
MW-16-04	-1 < -0.959228 < 1	--	--	--	N	Parametric	1.9
MW-16-09	-1 < -0.838747 < 1	--	--	--	Y	Parametric	1.8

Notes:

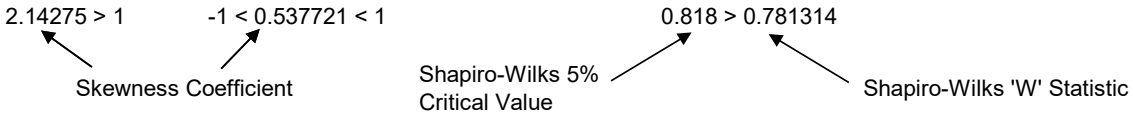


PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 2
Summary of Descriptive Statistics and Tolerance Limit Calculations
DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Lead (ug/L)							
MW-16-01	> 50% Non-Detect				N	Non-Parametric	3.5
MW-16-02	> 50% Non-Detect				N	Non-Parametric	2.9
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	1 < 1.03004	-1 < 0.630363 < 1	--	--	N	Parametric	12
MW-16-09	-1 < 0.692648 < 1	--	--	--	Y	Parametric	6.9
Lithium (ug/L)							
MW-16-01	1 < 1.09646	-1 < -0.656345 < 1	--	--	N	Parametric	42
MW-16-02	1 < 1.83731	1 < 1.66952	0.829 > 0.693604	0.829 > 0.735502	N	Non-Parametric	19
MW-16-03	-1 < -0.163822 < 1	--	--	--	N	Parametric	24
MW-16-04	1 < 1.69658	1 < 1.51405	0.829 > 0.748153	0.829 > 0.790765	N	Non-Parametric	37
MW-16-09	-1 < 0.201671 < 1	--	--	--	Y	Parametric	65
Mercury (ug/L)							
MW-16-01	100% Non-Detect				N	PQL	0.20
MW-16-02	100% Non-Detect				N	PQL	0.20
MW-16-03	100% Non-Detect				N	PQL	0.20
MW-16-04	100% Non-Detect				N	PQL	0.20
MW-16-09	100% Non-Detect				Y	PQL	0.20
Molybdenum (ug/L)							
MW-16-01	-1 < 0.522804 < 1	--	--	--	N	Parametric	96
MW-16-02	1 < 2.33768	1 < 2.23139	0.829 > 0.55159	0.829 > 0.606275	N	Non-Parametric	65
MW-16-03	-1 < -0.738383 < 1	--	--	--	N	Parametric	110
MW-16-04	-1 < 0.881343 < 1	--	--	--	N	Parametric	120
MW-16-09	-1 < -0.202509 < 1	--	--	--	Y	Parametric	69

Notes:

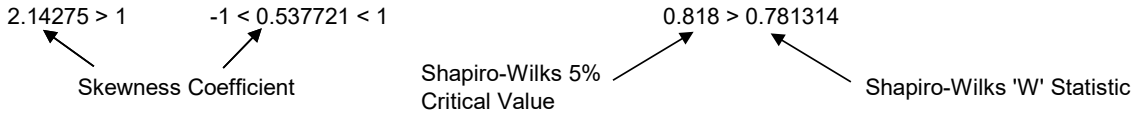


PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 2
Summary of Descriptive Statistics and Tolerance Limit Calculations
DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Monitoring Well	Skewness Test		Shapiro-Wilks Test (5% Critical Value)		Outliers Removed	Tolerance Limit Test	95% Tolerance Limit
	Un-Transformed Data	Natural Log Transformed Data	Un-Transformed Data	Natural Log Transformed Data			
Radium 226/228 (pCi/L)							
MW-16-01	-1 < 0.444198 < 1	--	--	--	N	Parametric	2.36
MW-16-02	1 < 1.14403	-1 < 0.68333 < 1	--	--	N	Parametric	3.63
MW-16-03	1 < 1.45519	-1 < 0.909563 < 1	--	--	N	Parametric	4.87
MW-16-04	-1 < 0.379575 < 1	--	--	--	N	Parametric	3.49
MW-16-09	-1 < 0.00907827 < 1	--	--	--	Y	Parametric	4.14
Selenium (ug/L)							
MW-16-01	100% Non-Detect				N	PQL	5.0
MW-16-02	100% Non-Detect				N	PQL	5.0
MW-16-03	100% Non-Detect				N	PQL	5.0
MW-16-04	100% Non-Detect				N	PQL	5.0
MW-16-09	100% Non-Detect				Y	PQL	5.0
Thallium (ug/L)							
MW-16-01	100% Non-Detect				N	PQL	1.0
MW-16-02	100% Non-Detect				N	PQL	1.0
MW-16-03	100% Non-Detect				N	PQL	1.0
MW-16-04	100% Non-Detect				N	PQL	1.0
MW-16-09	100% Non-Detect				Y	PQL	1.0

Notes:



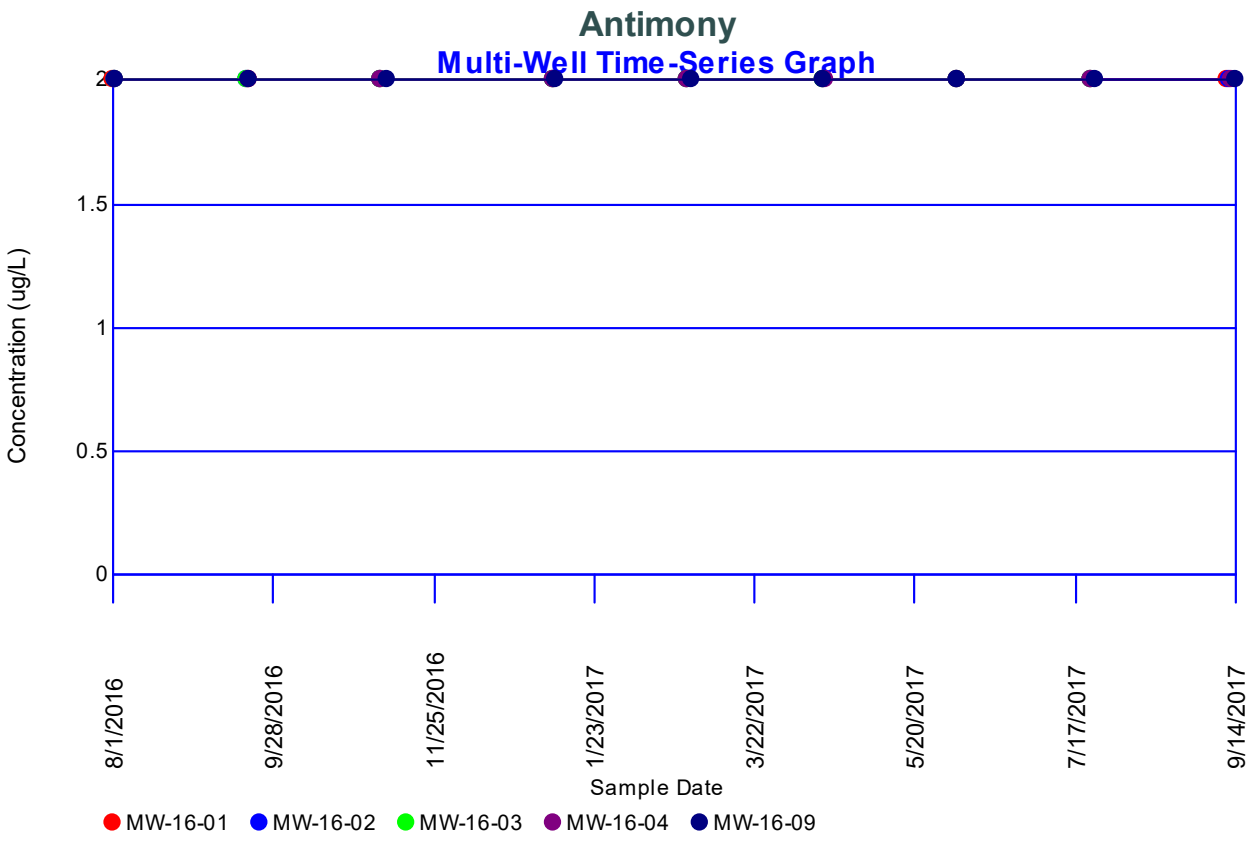
PQL = Practical Quantitation Limit
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

Table 3
Summary of Groundwater Protection Standards
DTE Electric Company – Belle River Power Plant Bottom Ash Basins

Constituent	Unit	GWPS Selection	MCL/RSL	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
				UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS	UTL	GWPS
Antimony	ug/L	MCL	6	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**	2.0	**6.0**
Arsenic	ug/L	MCL	10	5.0	**10**	5.0	**10**	5.0	**10**	7.0	**10**	7.2	**10**
Barium	ug/L	MCL	2,000	300	**2,000**	330	**2,000**	310	**2,000**	440	**2,000**	330	**2,000**
Beryllium	ug/L	MCL	4	2.8	**4.0**	2.8	**4.0**	1.0	**4.0**	1.0	**4.0**	1.0	**4.0**
Cadmium	ug/L	MCL	5	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**	1.0	**5.0**
Chromium	ug/L	MCL	100	13	**100**	19	**100**	2.0	**100**	27	**100**	25	**100**
Cobalt	ug/L	Background or RSL	6	3.6	**6.0**	3.9	**6.0**	1.0	**6.0**	13	**13**	7.7	**7.7**
Fluoride	mg/L	MCL	4	2.0	**4.0**	1.4	**4.0**	2.0	**4.0**	1.9	**4.0**	1.8	**4.0**
Lead	ug/L	RSL	15	3.5	**15**	2.9	**15**	1.0	**15**	12	**15**	6.9	**15**
Lithium	ug/L	Background or RSL	40	42	**42**	19	**40**	24	**40**	37	**40**	65	**65**
Mercury	ug/L	MCL	2	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**	0.20	**2.0**
Molybdenum	ug/L	Background or RSL	100	96	**100**	65	**100**	110	**110**	120	**120**	69	**100**
Radium-226/228	pCi/L	MCL	5	2.36	**5.00**	3.63	**5.00**	4.87	**5.00**	3.49	**5.00**	4.14	**5.00**
Selenium	ug/L	MCL	50	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**	5.0	**50**
Thallium	ug/L	MCL	2	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**	1.0	**2.0**

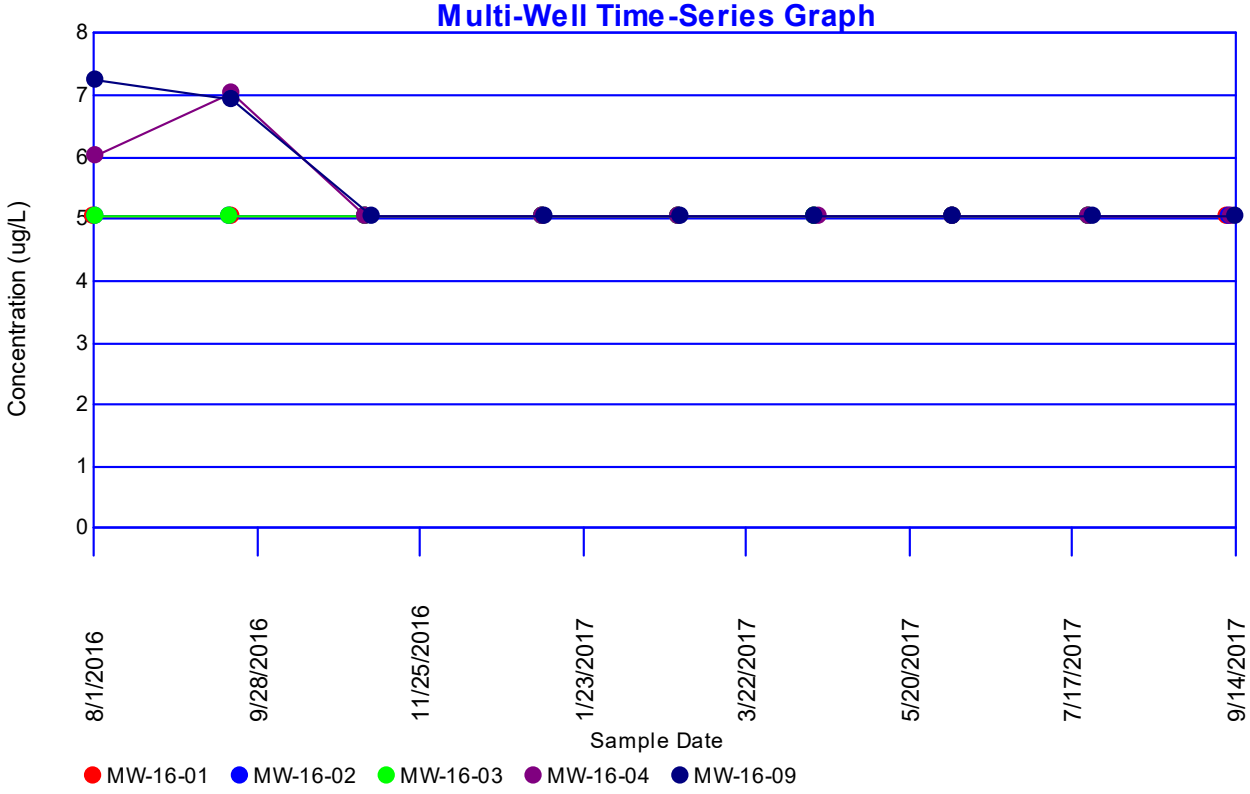
Notes:
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
RSL - Regional Screening Level from 83 FR 36435.
UTL - Upper Tolerance Limit (95%) of the background data set.
GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL.
ug/L = micrograms per liter
mg/L = milligrams per liter
pCi/L = picocuries per liter

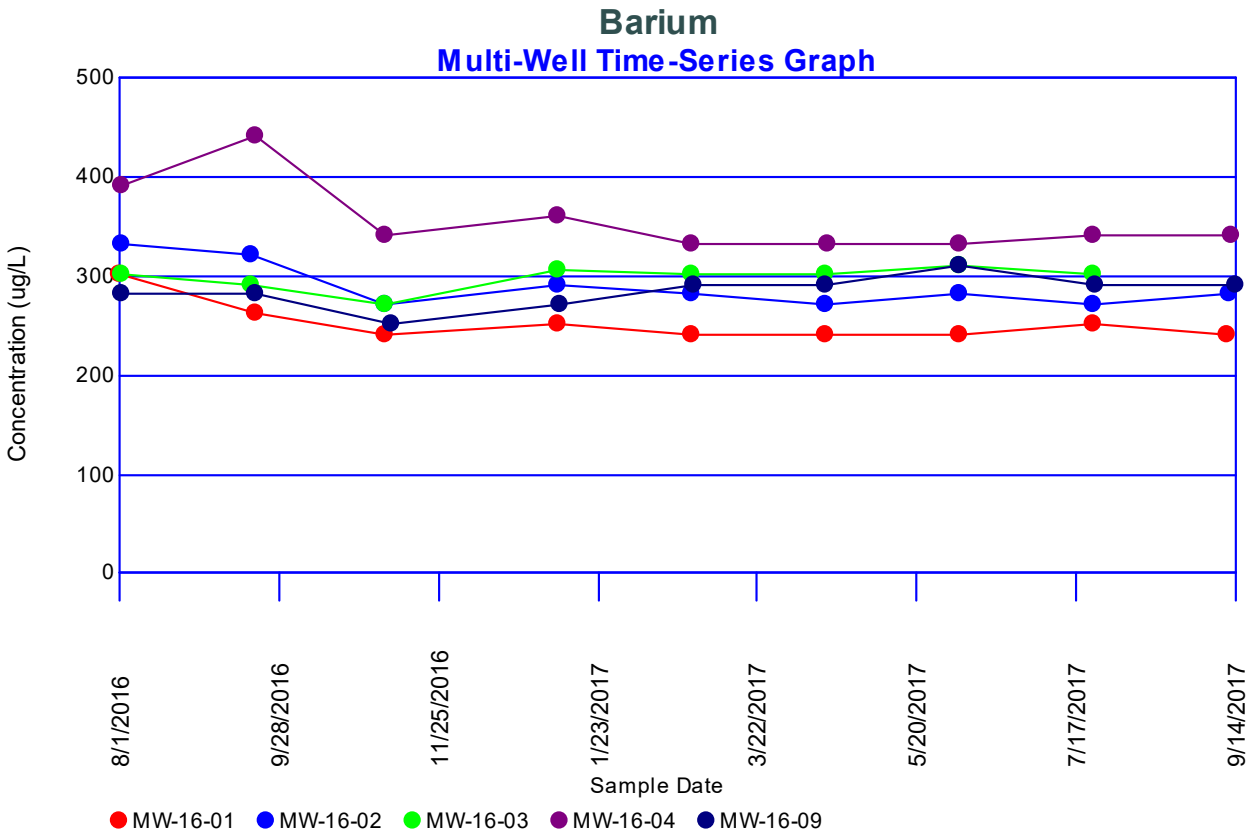
Attachment A
ChemStat™ Outputs


Antimony
Multi-Well Time-Series Graph
Concentration (ug/L)
2
1.5
1
0.5
0
8/1/2016
9/28/2016
11/25/2016
1/23/2017
3/22/2017
5/20/2017
7/17/2017
9/14/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-09

Arsenic

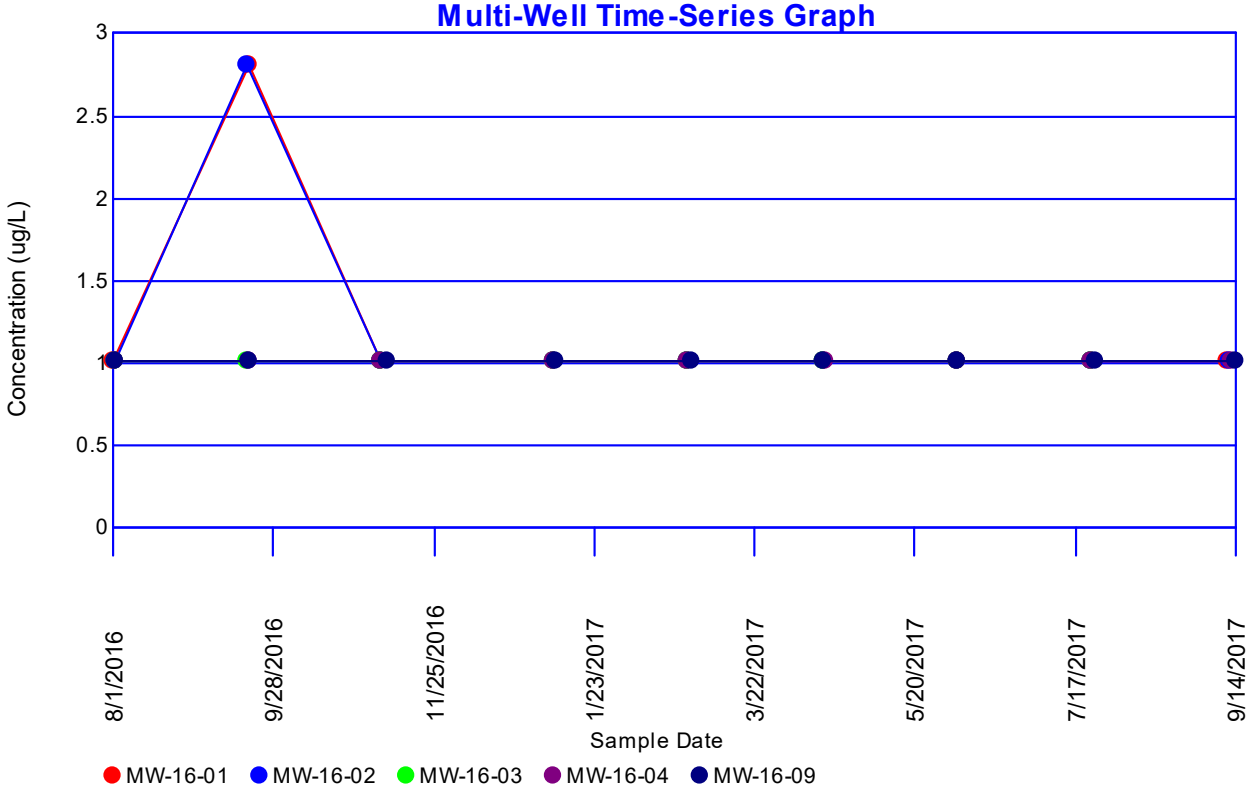
Multi-Well Time-Series Graph

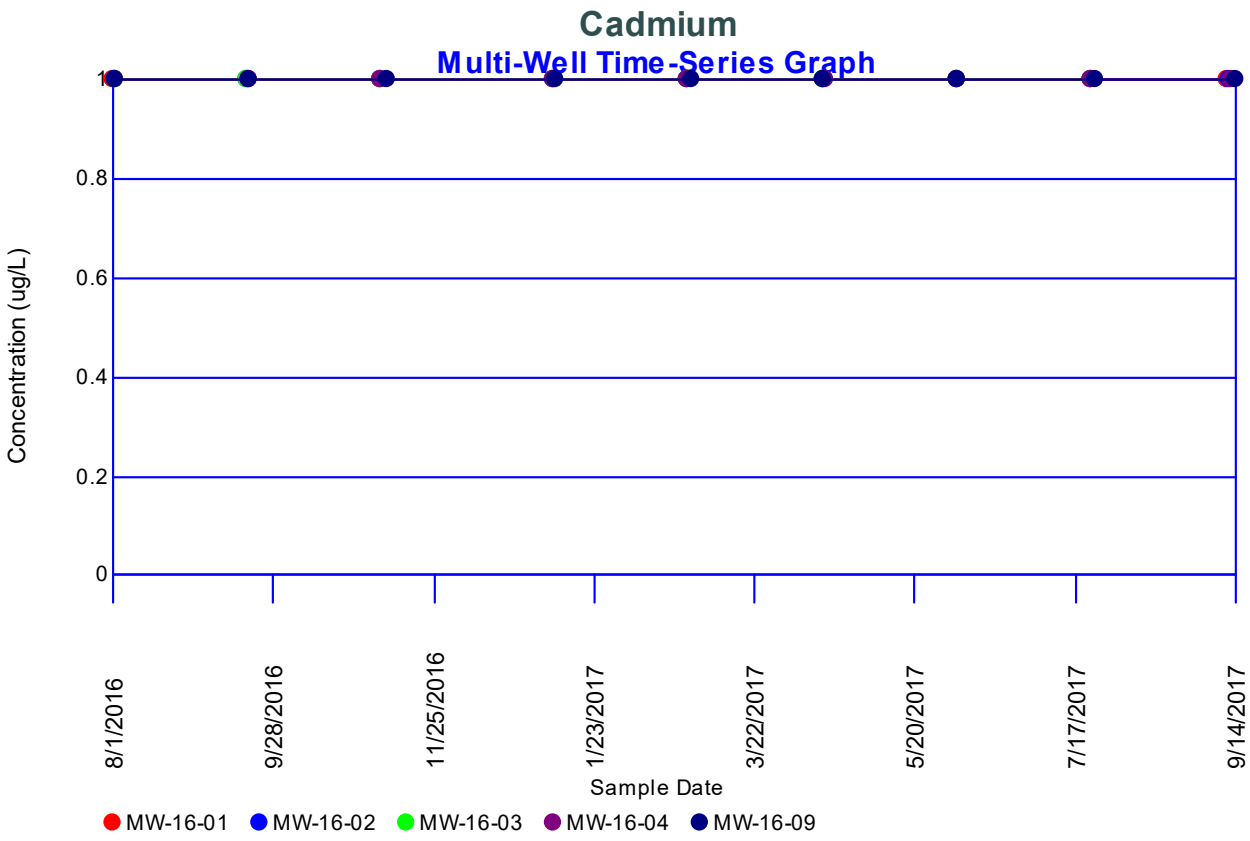



Barium
Multi-Well Time-Series Graph
Concentration (ug/L)
500
400
300
200
100
0
8/1/2016
9/28/2016
11/25/2016
1/23/2017
3/22/2017
5/20/2017
7/17/2017
9/14/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-09

Beryllium

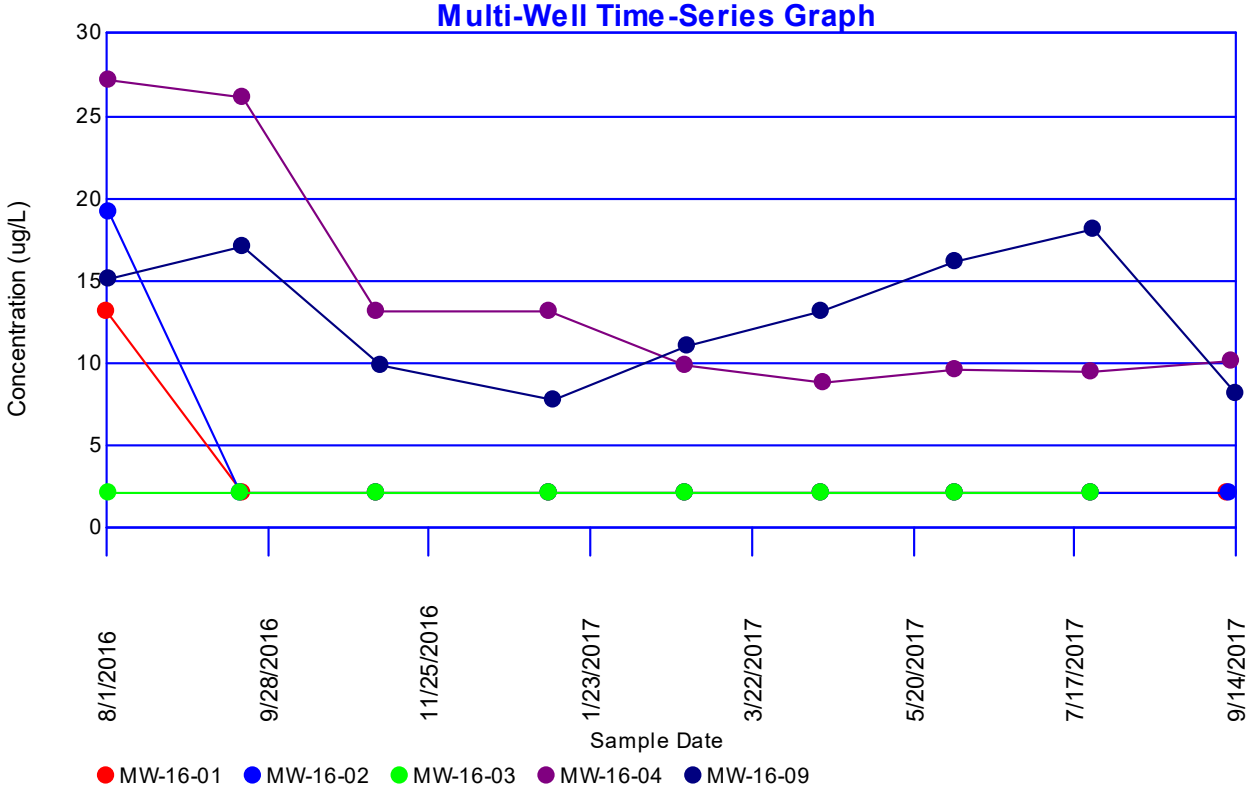
Multi-Well Time-Series Graph




Cadmium
Multi-Well Time-Series Graph
Concentration (ug/L)
1
0.8
0.6
0.4
0.2
0
8/1/2016
9/28/2016
11/25/2016
1/23/2017
3/22/2017
5/20/2017
7/17/2017
9/14/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-09

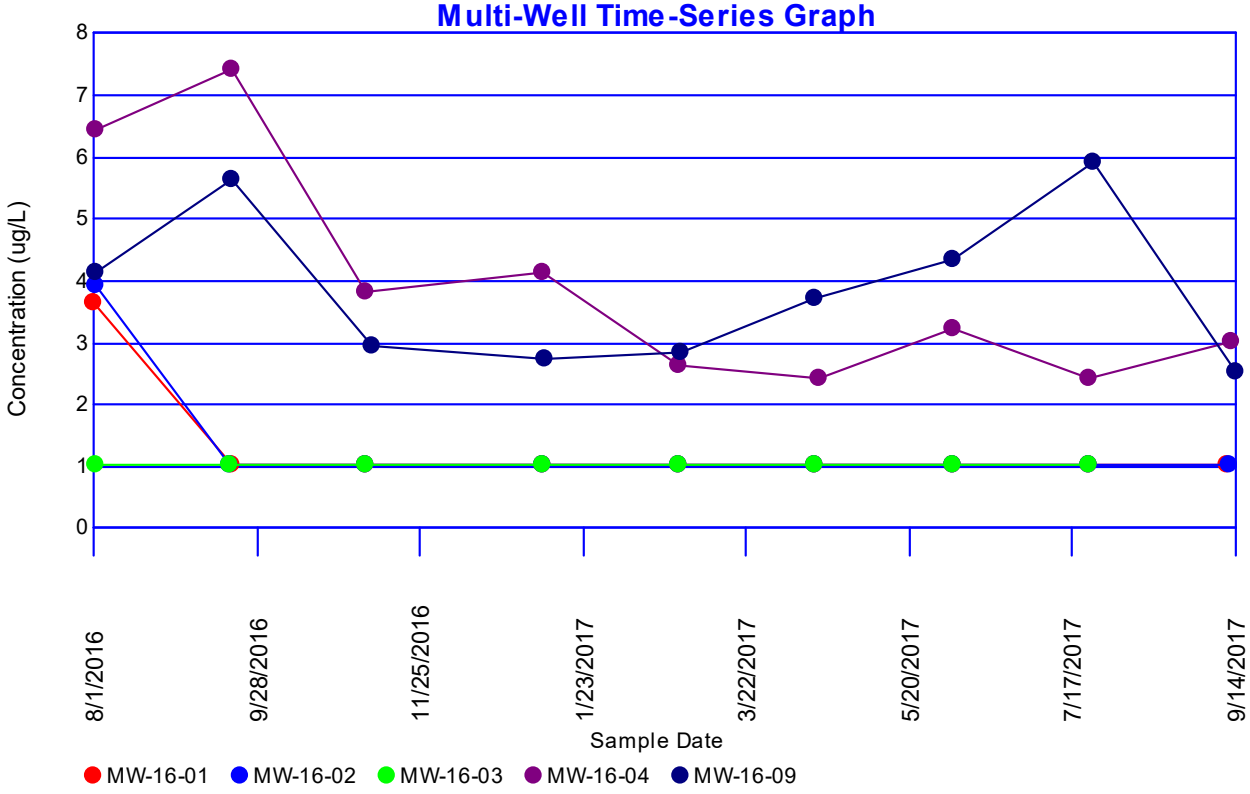
Chromium

Multi-Well Time-Series Graph



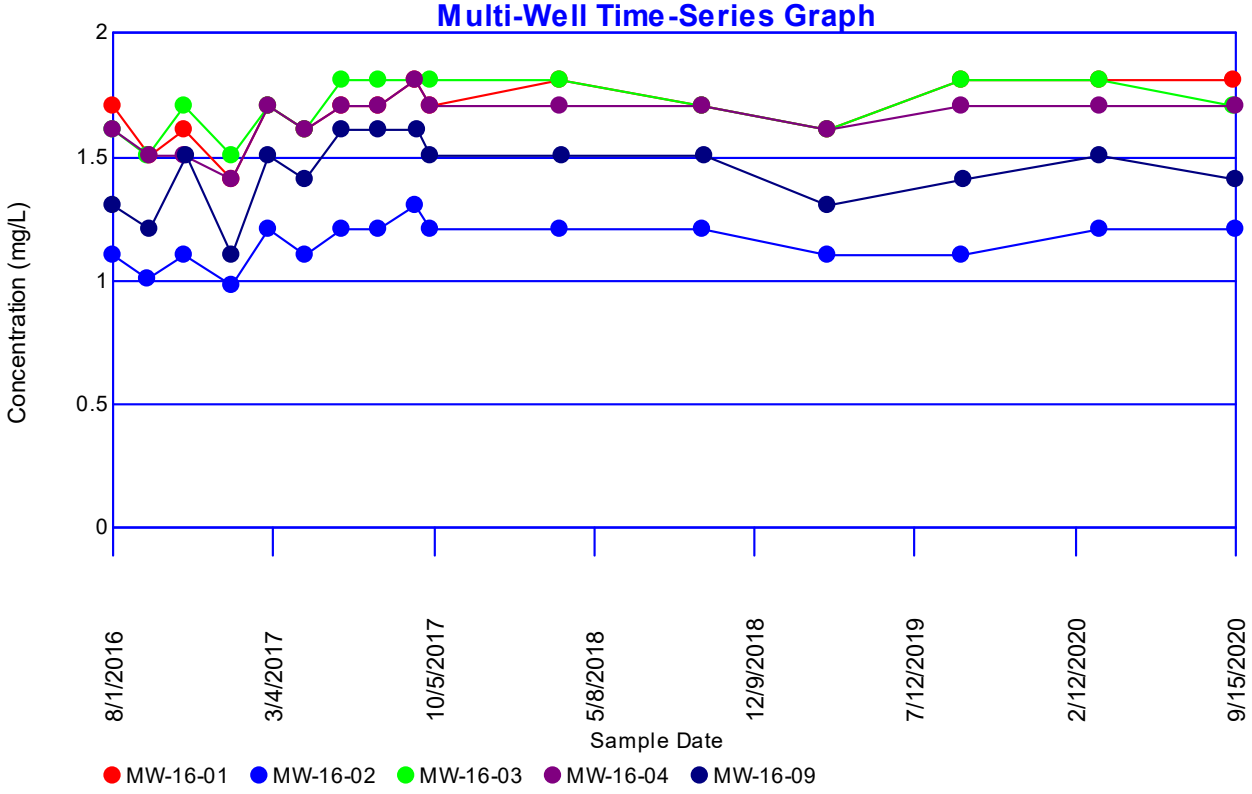
Cobalt

Multi-Well Time-Series Graph



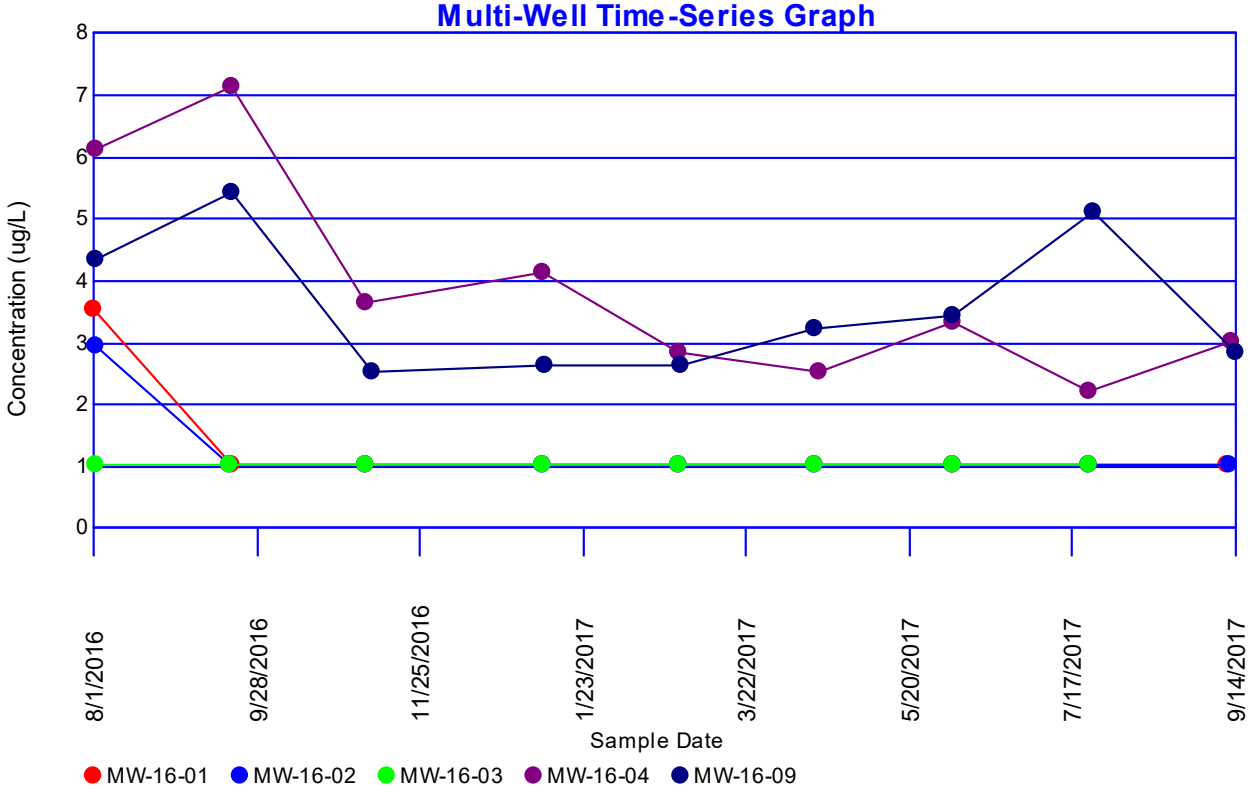
Fluoride

Multi-Well Time-Series Graph



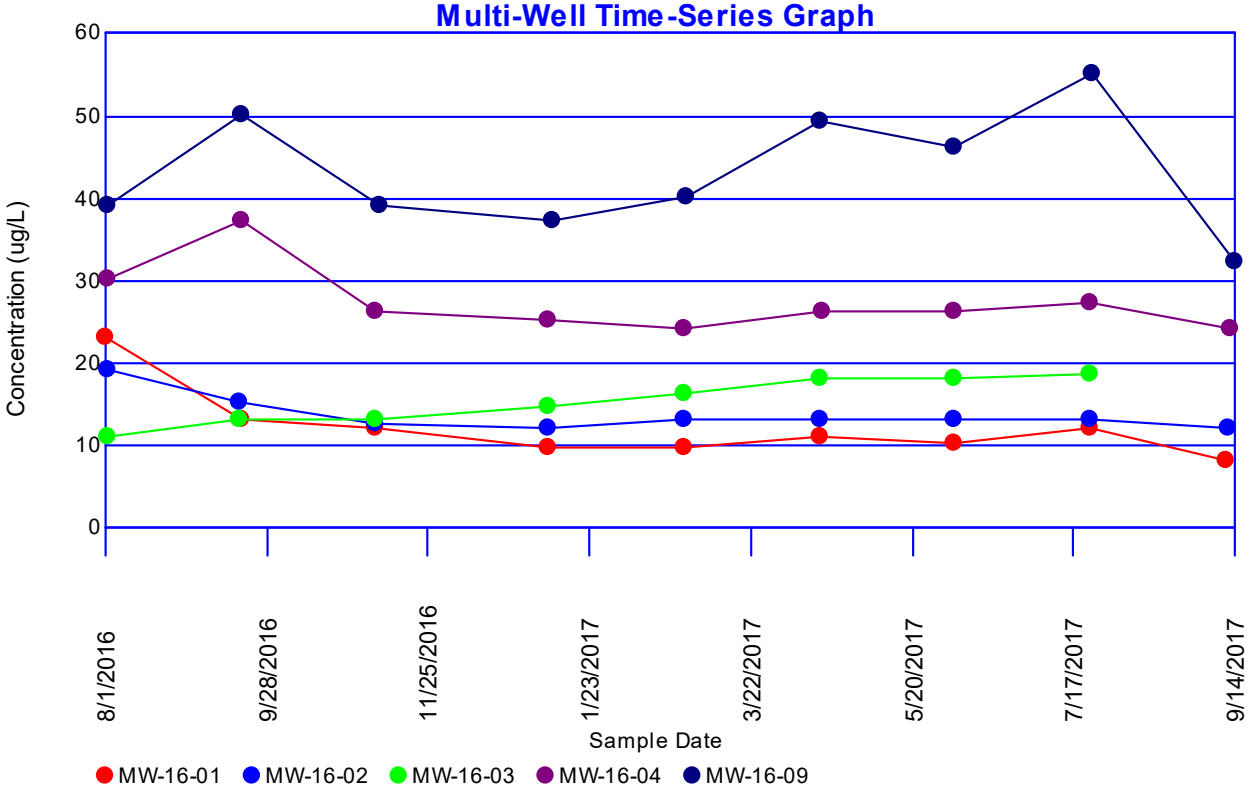
Lead

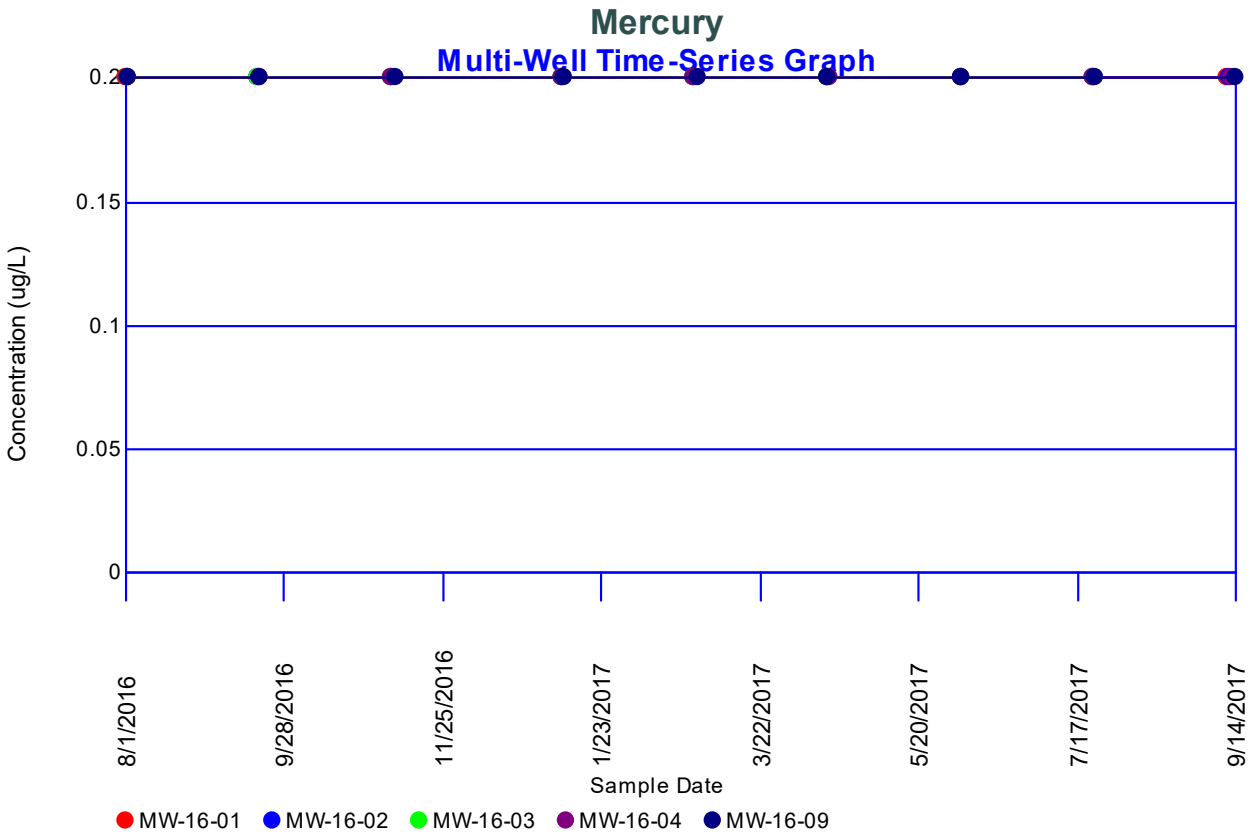
Multi-Well Time-Series Graph



Lithium

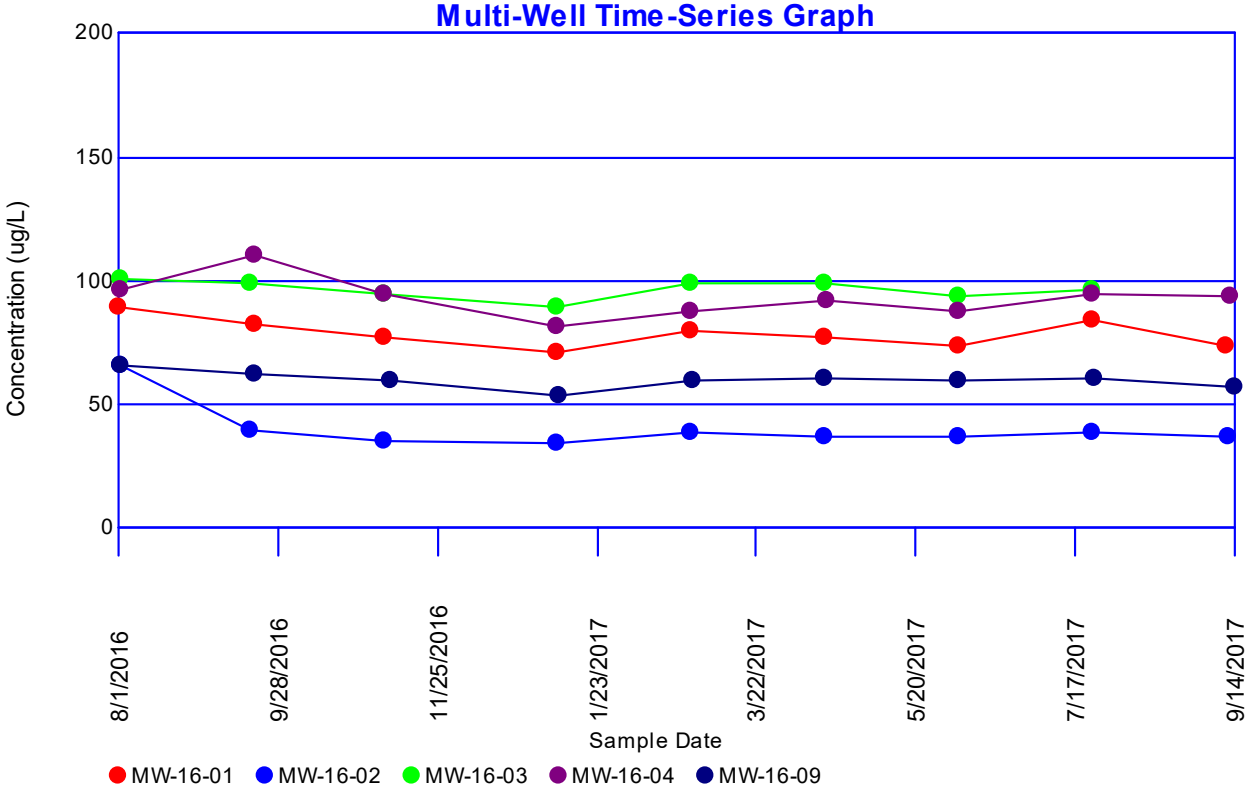
Multi-Well Time-Series Graph




Mercury
Multi-Well Time-Series Graph
Concentration (ug/L)
0.2
0.15
0.1
0.05
0
8/1/2016
9/28/2016
11/25/2016
1/23/2017
3/22/2017
5/20/2017
7/17/2017
9/14/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-09

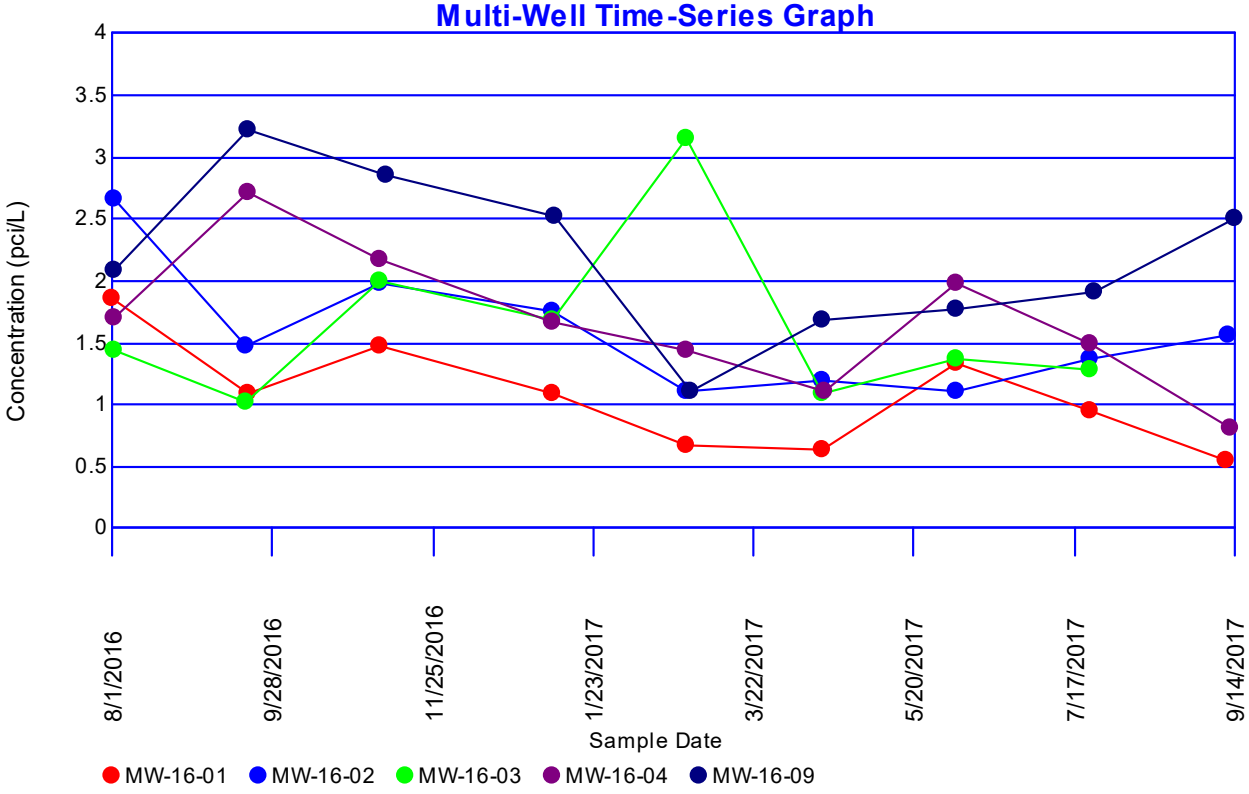
Molybdenum

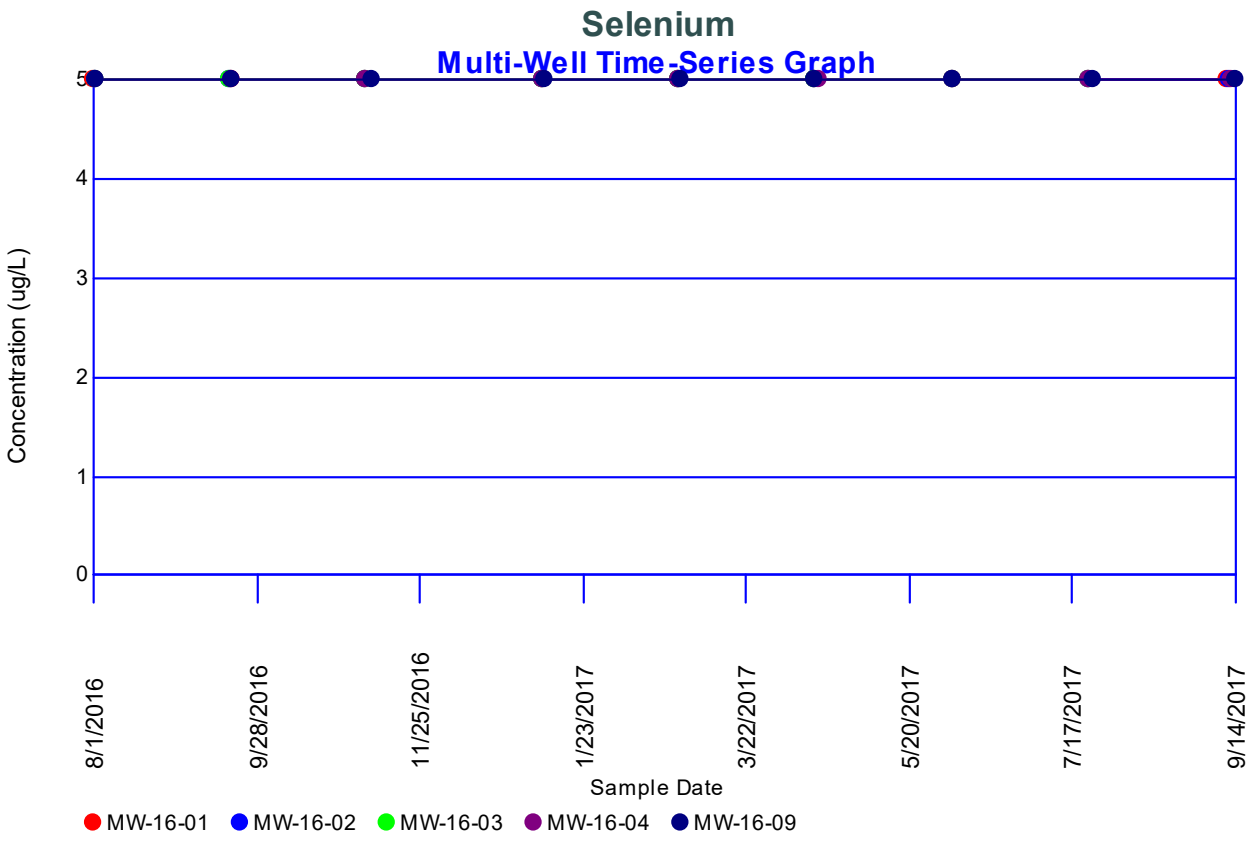
Multi-Well Time-Series Graph

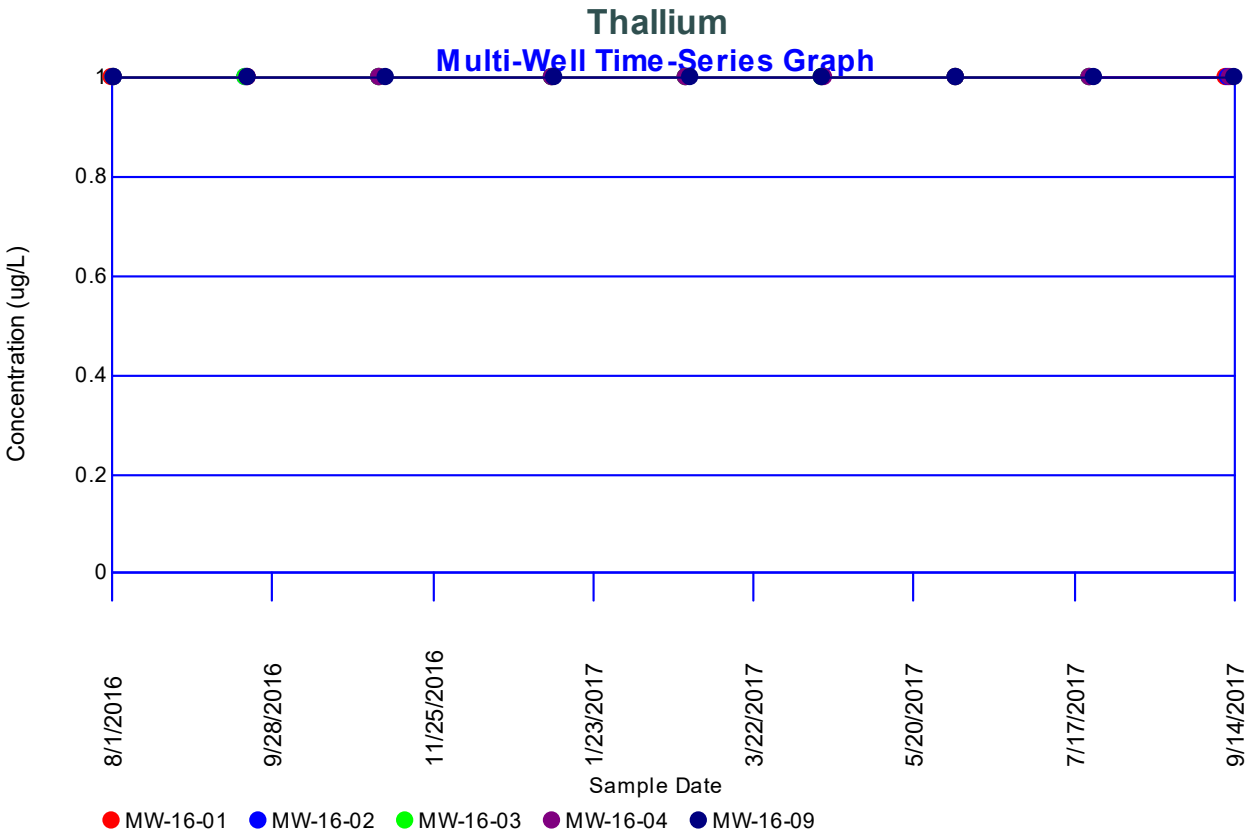


Radium-226/228

Multi-Well Time-Series Graph




Selenium
Multi-Well Time-Series Graph
Concentration (ug/L)
5
4
3
2
1
0
8/1/2016
9/28/2016
11/25/2016
1/23/2017
3/22/2017
5/20/2017
7/17/2017
9/14/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-09


Thallium
Multi-Well Time-Series Graph
Concentration (ug/L)
1
0.8
0.6
0.4
0.2
0
8/1/2016
9/28/2016
11/25/2016
1/23/2017
3/22/2017
5/20/2017
7/17/2017
9/14/2017
Sample Date
MW-16-01
MW-16-02
MW-16-03
MW-16-04
MW-16-09

Concentrations (ug/L)

Parameter: Antimony

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 44
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/11/2017	ND<2 U	ND<2 U
MW-16-02	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016	ND<2 U	ND<2 U
			11/7/2016 ~	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/12/2017	ND<2 U	ND<2 U
MW-16-03	8	8 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016 ~	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017 ~	ND<2 U	ND<2 U
			2/27/2017 ~	ND<2 U	ND<2 U
			4/17/2017 ~	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017 ~	ND<2 U	ND<2 U
MW-16-04	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/18/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/13/2017	ND<2 U	ND<2 U
MW-16-09	9	9 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/20/2016	ND<2 U	ND<2 U
			11/9/2016	ND<2 U	ND<2 U
			1/10/2017	ND<2 U	ND<2 U
			2/28/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/25/2017	ND<2 U	ND<2 U
			9/14/2017	ND<2 U	ND<2 U
			7/24/2017	**ND<2 U**	**ND<2 U**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 40
Percent Non-Detects: 90.9091%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/11/2017	ND<5 U	ND<5 U
MW-16-02	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016	ND<5 U	ND<5 U
			11/7/2016 ~	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/12/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016 ~	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017 ~	ND<5 U	ND<5 U
			2/27/2017 ~	ND<5 U	ND<5 U
			4/17/2017 ~	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017 ~	ND<5 U	ND<5 U
MW-16-04	9	7 (77.7778%)	8/2/2016	6	6
			9/20/2016	7	7
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/18/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/13/2017	ND<5 U	ND<5 U
MW-16-09	9	7 (77.7778%)	8/2/2016	7.2	7.2
			9/20/2016	6.9	6.9
			11/9/2016	ND<5 U	ND<5 U
			1/10/2017	ND<5 U	ND<5 U
			2/28/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/25/2017	ND<5 U	ND<5 U
			9/14/2017	ND<5 U	ND<5 U
			7/24/2017	**ND<5 U**	**ND<5 U**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	0 (0%)	8/1/2016	300	300
			9/20/2016	260	260
			11/7/2016	240	240
			1/9/2017	250	250
			2/27/2017	240	240
			4/17/2017	240	240
			6/5/2017	240	240
			7/24/2017	250	250
			9/11/2017	240	240
MW-16-02	9	0 (0%)	8/2/2016	330	330
			9/19/2016	320	320
			11/7/2016 ~	270	270
			1/9/2017	290	290
			2/27/2017	280	280
			4/17/2017	270	270
			6/5/2017	280	280
			7/24/2017	270	270
			9/12/2017	280	280
MW-16-03	8	0 (0%)	8/2/2016	300	300
			9/19/2016 ~	290	290
			11/7/2016	270	270
			1/9/2017 ~	305	305
			2/27/2017 ~	300	300
			4/17/2017 ~	300	300
			6/5/2017	310	310
			7/24/2017 ~	300	300
MW-16-04	9	0 (0%)	8/2/2016	390	390
			9/20/2016	440	440
			11/7/2016	340	340
			1/9/2017	360	360
			2/27/2017	330	330
			4/18/2017	330	330
			6/5/2017	330	330
			7/24/2017	340	340
			9/13/2017	340	340
MW-16-09	9	0 (0%)	8/2/2016	280	280
			9/20/2016	280	280
			11/9/2016	250	250
			1/10/2017	270	270
			2/28/2017	290	290
			4/17/2017	290	290
			6/5/2017	310	310
			7/25/2017	290	290
			9/14/2017	290	290
			7/24/2017	**310**	**310**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 41
Percent Non-Detects: 93.1818%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	2.8	2.8
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	8 (88.8889%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	2.8	2.8
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U^	ND<1 U^
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	8 (88.8889%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	1	1
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U^	ND<1 U^
			2/27/2017	ND<1 U	ND<1 U
			4/18/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/13/2017	ND<1 U	ND<1 U
MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U^	ND<1 U^
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			7/24/2017	**ND<1 U**	**ND<1 U**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 44
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/18/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/13/2017	ND<1 U	ND<1 U
MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U	ND<1 U
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			7/24/2017	**ND<1 U**	**ND<1 U**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 24
Percent Non-Detects: 54.5455%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	13	13
			9/20/2016	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/11/2017	ND<2 U	ND<2 U
MW-16-02	9	8 (88.8889%)	8/2/2016	19	19
			9/19/2016	ND<2 U	ND<2 U
			11/7/2016 ~	ND<2 U	ND<2 U
			1/9/2017	ND<2 U	ND<2 U
			2/27/2017	ND<2 U	ND<2 U
			4/17/2017	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017	ND<2 U	ND<2 U
			9/12/2017	ND<2 U	ND<2 U
MW-16-03	8	8 (100%)	8/2/2016	ND<2 U	ND<2 U
			9/19/2016 ~	ND<2 U	ND<2 U
			11/7/2016	ND<2 U	ND<2 U
			1/9/2017 ~	ND<2 U	ND<2 U
			2/27/2017 ~	ND<2 U	ND<2 U
			4/17/2017 ~	ND<2 U	ND<2 U
			6/5/2017	ND<2 U	ND<2 U
			7/24/2017 ~	ND<2 U	ND<2 U
MW-16-04	9	0 (0%)	8/2/2016	27	27
			9/20/2016	26	26
			11/7/2016	13	13
			1/9/2017	13	13
			2/27/2017	9.8	9.8
			4/18/2017	8.7	8.7
			6/5/2017	9.5	9.5
			7/24/2017	9.4	9.4
			9/13/2017	10	10
MW-16-09	9	0 (0%)	8/2/2016	15	15
			9/20/2016	17	17
			11/9/2016	9.8	9.8
			1/10/2017	7.6	7.6
			2/28/2017	11	11
			4/17/2017	13	13
			6/5/2017	16	16
			7/25/2017	18	18
			9/14/2017	8	8
			7/24/2017	**18**	**18**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 24
Percent Non-Detects: 54.5455%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	3.6	3.6
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	8 (88.8889%)	8/2/2016	3.9	3.9
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	0 (0%)	8/2/2016	6.4	6.4
			9/20/2016	7.4	7.4
			11/7/2016	3.8	3.8
			1/9/2017	4.1	4.1
			2/27/2017	2.6	2.6
			4/18/2017	2.4	2.4
			6/5/2017	3.2	3.2
			7/24/2017	2.4	2.4
			9/13/2017	3	3
MW-16-09	9	0 (0%)	8/2/2016	4.1	4.1
			9/20/2016	5.6	5.6
			11/9/2016	2.9	2.9
			1/10/2017	2.7	2.7
			2/28/2017	2.8	2.8
			4/17/2017	3.7	3.7
			6/5/2017	4.3	4.3
			7/25/2017	5.9	5.9
			9/14/2017	2.5	2.5
			7/24/2017	**6.3**	**6.3**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (mg/L)

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 79
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	16	0 (0%)	8/1/2016	1.7	1.7
			9/20/2016	1.5	1.5
			11/7/2016	1.6	1.6
			1/9/2017	1.4	1.4
			2/27/2017	1.7	1.7
			4/17/2017	1.6	1.6
			6/5/2017	1.7	1.7
			7/24/2017	1.7	1.7
			9/11/2017	1.8	1.8
			10/2/2017	1.7	1.7
			3/26/2018	1.8	1.8
			10/1/2018	1.7	1.7
			3/18/2019 ~	1.6	1.6
			9/16/2019 ~	1.8	1.8
			3/17/2020 ~	1.8	1.8
			9/14/2020 ~	1.8	1.8
MW-16-02	16	0 (0%)	8/2/2016	1.1	1.1
			9/19/2016	1	1
			11/7/2016 ~	1.1	1.1
			1/9/2017	0.97	0.97
			2/27/2017	1.2	1.2
			4/17/2017	1.1	1.1
			6/5/2017	1.2	1.2
			7/24/2017	1.2	1.2
			9/12/2017	1.3	1.3
			10/2/2017	1.2	1.2
			3/26/2018	1.2	1.2
			10/1/2018	1.2	1.2
			3/18/2019	1.1	1.1
			9/16/2019	1.1	1.1
			3/17/2020	1.2	1.2
			9/15/2020	1.2	1.2
MW-16-03	15	0 (0%)	8/2/2016	1.6	1.6
			9/19/2016 ~	1.5	1.5
			11/7/2016	1.7	1.7
			1/9/2017 ~	1.5	1.5
			2/27/2017 ~	1.7	1.7
			4/17/2017 ~	1.6	1.6
			6/5/2017	1.8	1.8
			7/24/2017 ~	1.8	1.8
			10/2/2017	1.8	1.8
			3/26/2018	1.8	1.8
			10/1/2018 ~	1.7	1.7
			3/18/2019	1.6	1.6
			9/16/2019	1.8	1.8
			3/17/2020	1.8	1.8
			9/14/2020	1.7	1.7

MW-16-04	16	0 (0%)	8/2/2016	1.6	1.6
			9/20/2016	1.5	1.5
			11/7/2016	1.5	1.5
			1/9/2017	1.4	1.4
			2/27/2017	1.7	1.7
			4/18/2017	1.6	1.6
			6/5/2017	1.7	1.7
			7/24/2017	1.7	1.7
			9/13/2017	1.8	1.8
			10/2/2017	1.7	1.7
			3/26/2018	1.7	1.7
			10/1/2018	1.7	1.7
			3/18/2019	1.6	1.6
			9/16/2019	1.7	1.7
			3/17/2020	1.7	1.7
			9/15/2020	1.7	1.7
MW-16-09	16	0 (0%)	8/2/2016	1.3	1.3
			9/20/2016	1.2	1.2
			11/9/2016	1.5	1.5
			1/10/2017	1.1	1.1
			2/28/2017	1.5	1.5
			4/17/2017	1.4	1.4
			6/5/2017	1.6	1.6
			7/25/2017	1.6	1.6
			9/14/2017	1.6	1.6
			10/3/2017 ~	1.5	1.5
			3/27/2018	1.5	1.5
			10/4/2018	1.5	1.5
			3/20/2019	1.3	1.3
			9/17/2019	1.4	1.4
			3/19/2020	1.5	1.5
			9/15/2020	1.4	1.4
			7/24/2017	**1.6**	**1.6**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 24
Percent Non-Detects: 54.5455%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	8 (88.8889%)	8/1/2016	3.5	3.5
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	8 (88.8889%)	8/2/2016	2.9	2.9
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	0 (0%)	8/2/2016	6.1	6.1
			9/20/2016	7.1	7.1
			11/7/2016	3.6	3.6
			1/9/2017	4.1	4.1
			2/27/2017	2.8	2.8
			4/18/2017	2.5	2.5
			6/5/2017	3.3	3.3
			7/24/2017	2.2	2.2
			9/13/2017	3	3
MW-16-09	9	0 (0%)	8/2/2016	4.3	4.3
			9/20/2016	5.4	5.4
			11/9/2016	2.5	2.5
			1/10/2017	2.6	2.6
			2/28/2017	2.6	2.6
			4/17/2017	3.2	3.2
			6/5/2017	3.4	3.4
			7/25/2017	5.1	5.1
			9/14/2017	2.8	2.8
			7/24/2017	**5**	**5**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 1
Percent Non-Detects: 2.27273%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	1 (11.1111%)	8/1/2016	23	23
			9/20/2016	13	13
			11/7/2016	12	12
			1/9/2017	9.5	9.5
			2/27/2017	9.6	9.6
			4/17/2017	11	11
			6/5/2017	10	10
			7/24/2017	12	12
			9/11/2017	ND<8 U	ND<8 U
MW-16-02	9	0 (0%)	8/2/2016	19	19
			9/19/2016	15	15
			11/7/2016 ~	12.5	12.5
			1/9/2017	12	12
			2/27/2017	13	13
			4/17/2017	13	13
			6/5/2017	13	13
			7/24/2017	13	13
			9/12/2017	12	12
MW-16-03	8	0 (0%)	8/2/2016	11	11
			9/19/2016 ~	13	13
			11/7/2016	13	13
			1/9/2017 ~	14.5	14.5
			2/27/2017 ~	16	16
			4/17/2017 ~	18	18
			6/5/2017	18	18
			7/24/2017 ~	18.5	18.5
MW-16-04	9	0 (0%)	8/2/2016	30	30
			9/20/2016	37	37
			11/7/2016	26	26
			1/9/2017	25	25
			2/27/2017	24	24
			4/18/2017	26	26
			6/5/2017	26	26
			7/24/2017	27	27
			9/13/2017	24	24
MW-16-09	9	0 (0%)	8/2/2016	39	39
			9/20/2016	50	50
			11/9/2016	39	39
			1/10/2017	37	37
			2/28/2017	40	40
			4/17/2017	49	49
			6/5/2017	46	46
			7/25/2017	55	55
			9/14/2017	32	32
			7/24/2017	**57**	**57**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Mercury

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 44
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<0.2 U	ND<0.2 U
			9/20/2016	ND<0.2 U	ND<0.2 U
			11/7/2016	ND<0.2 U	ND<0.2 U
			1/9/2017	ND<0.2 U	ND<0.2 U
			2/27/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			9/11/2017	ND<0.2 U	ND<0.2 U
MW-16-02	9	9 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/19/2016	ND<0.2 U	ND<0.2 U
			11/7/2016 ~	ND<0.2 U	ND<0.2 U
			1/9/2017	ND<0.2 U	ND<0.2 U
			2/27/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			9/12/2017	ND<0.2 U	ND<0.2 U
MW-16-03	8	8 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/19/2016 ~	ND<0.2 U	ND<0.2 U
			11/7/2016	ND<0.2 U	ND<0.2 U
			1/9/2017 ~	ND<0.2 U	ND<0.2 U
			2/27/2017 ~	ND<0.2 U	ND<0.2 U
			4/17/2017 ~	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017 ~	ND<0.2 U	ND<0.2 U
MW-16-04	9	9 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/20/2016	ND<0.2 U	ND<0.2 U
			11/7/2016	ND<0.2 U	ND<0.2 U
			1/9/2017	ND<0.2 U	ND<0.2 U
			2/27/2017	ND<0.2 U	ND<0.2 U
			4/18/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	ND<0.2 U	ND<0.2 U
			9/13/2017	ND<0.2 U	ND<0.2 U
MW-16-09	9	9 (100%)	8/2/2016	ND<0.2 U	ND<0.2 U
			9/20/2016	ND<0.2 U	ND<0.2 U
			11/9/2016	ND<0.2 U	ND<0.2 U
			1/10/2017	ND<0.2 U	ND<0.2 U
			2/28/2017	ND<0.2 U	ND<0.2 U
			4/17/2017	ND<0.2 U	ND<0.2 U
			6/5/2017	ND<0.2 U	ND<0.2 U
			7/25/2017	ND<0.2 U	ND<0.2 U
			9/14/2017	ND<0.2 U	ND<0.2 U
			7/24/2017	**ND<0.2 U**	**ND<0.2 U**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 0
Percent Non-Detects: 0%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	0 (0%)	8/1/2016	89	89
			9/20/2016	82	82
			11/7/2016	76	76
			1/9/2017	70	70
			2/27/2017	79	79
			4/17/2017	76	76
			6/5/2017	73	73
			7/24/2017	83	83
			9/11/2017	73	73
MW-16-02	9	0 (0%)	8/2/2016	65	65
			9/19/2016	39	39
			11/7/2016 ~	34.5	34.5
			1/9/2017	34	34
			2/27/2017	38	38
			4/17/2017	36	36
			6/5/2017	36	36
			7/24/2017	38	38
			9/12/2017	36	36
MW-16-03	8	0 (0%)	8/2/2016	100	100
			9/19/2016 ~	98.5	98.5
			11/7/2016	94	94
			1/9/2017 ~	89	89
			2/27/2017 ~	98.5	98.5
			4/17/2017 ~	98	98
			6/5/2017	93	93
			7/24/2017 ~	96	96
MW-16-04	9	0 (0%)	8/2/2016	96	96
			9/20/2016	110	110
			11/7/2016	94	94
			1/9/2017	81	81
			2/27/2017	87	87
			4/18/2017	91	91
			6/5/2017	87	87
			7/24/2017	94	94
			9/13/2017	93	93
MW-16-09	9	0 (0%)	8/2/2016	65	65
			9/20/2016	62	62
			11/9/2016	59	59
			1/10/2017	53	53
			2/28/2017	59	59
			4/17/2017	60	60
			6/5/2017	59	59
			7/25/2017	60	60
			9/14/2017	56	56
			7/24/2017	**66**	**66**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (pci/L)

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 1
Percent Non-Detects: 2.27273%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	0 (0%)	8/1/2016	1.84	1.84
			9/20/2016	1.07	1.07
			11/7/2016	1.46	1.46
			1/9/2017	1.08	1.08
			2/27/2017	0.656	0.656
			4/17/2017	0.619	0.619
			6/5/2017	1.32	1.32
			7/24/2017	0.942	0.942
			9/11/2017	0.536	0.536
MW-16-02	9	0 (0%)	8/2/2016	2.65	2.65
			9/19/2016	1.46	1.46
			11/7/2016 ~	1.96	1.96
			1/9/2017	1.73	1.73
			2/27/2017	1.1	1.1
			4/17/2017	1.18	1.18
			6/5/2017	1.1	1.1
			7/24/2017	1.35	1.35
			9/12/2017	1.55	1.55
MW-16-03	8	0 (0%)	8/2/2016	1.43	1.43
			9/19/2016 ~	1.008	1.008
			11/7/2016	1.98	1.98
			1/9/2017 ~	1.66	1.66
			2/27/2017 ~	3.1365	3.1365
			4/17/2017 ~	1.074	1.074
			6/5/2017	1.36	1.36
			7/24/2017 ~	1.26	1.26
MW-16-04	9	1 (11.1111%)	8/2/2016	1.69	1.69
			9/20/2016	2.7	2.7
			11/7/2016	2.16	2.16
			1/9/2017	ND<1.65 U	ND<1.65 U
			2/27/2017	1.43	1.43
			4/18/2017	1.09	1.09
			6/5/2017	1.97	1.97
			7/24/2017	1.47	1.47
			9/13/2017	0.802	0.802
MW-16-09	9	0 (0%)	8/2/2016	2.07	2.07
			9/20/2016	3.2	3.2
			11/9/2016	2.83	2.83
			1/10/2017	2.51	2.51
			2/28/2017	1.1	1.1
			4/17/2017	1.67	1.67
			6/5/2017	1.75	1.75
			7/25/2017	1.9	1.9
			9/14/2017	2.49	2.49
			7/24/2017	**1.67**	**1.67**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Selenium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 44
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/11/2017	ND<5 U	ND<5 U
MW-16-02	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016	ND<5 U	ND<5 U
			11/7/2016 ~	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/12/2017	ND<5 U	ND<5 U
MW-16-03	8	8 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/19/2016 ~	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017 ~	ND<5 U	ND<5 U
			2/27/2017 ~	ND<5 U	ND<5 U
			4/17/2017 ~	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017 ~	ND<5 U	ND<5 U
MW-16-04	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/7/2016	ND<5 U	ND<5 U
			1/9/2017	ND<5 U	ND<5 U
			2/27/2017	ND<5 U	ND<5 U
			4/18/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/24/2017	ND<5 U	ND<5 U
			9/13/2017	ND<5 U	ND<5 U
MW-16-09	9	9 (100%)	8/2/2016	ND<5 U	ND<5 U
			9/20/2016	ND<5 U	ND<5 U
			11/9/2016	ND<5 U	ND<5 U
			1/10/2017	ND<5 U	ND<5 U
			2/28/2017	ND<5 U	ND<5 U
			4/17/2017	ND<5 U	ND<5 U
			6/5/2017	ND<5 U	ND<5 U
			7/25/2017	ND<5 U	ND<5 U
			9/14/2017	ND<5 U	ND<5 U
			7/24/2017	**ND<5 U**	**ND<5 U**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Concentrations (ug/L)

Parameter: Thallium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Measurements: 44
Total Non-Detect: 44
Percent Non-Detects: 100%
Total Background Measurements: 0
There are 0 background locations

Loc.	Meas.	ND	Date	Conc.	Original

There are 5 compliance locations

Loc.	Meas.	ND	Date	Conc.	Original
MW-16-01	9	9 (100%)	8/1/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/11/2017	ND<1 U	ND<1 U
MW-16-02	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016	ND<1 U	ND<1 U
			11/7/2016 ~	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/12/2017	ND<1 U	ND<1 U
MW-16-03	8	8 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/19/2016 ~	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017 ~	ND<1 U	ND<1 U
			2/27/2017 ~	ND<1 U	ND<1 U
			4/17/2017 ~	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017 ~	ND<1 U	ND<1 U
MW-16-04	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/7/2016	ND<1 U	ND<1 U
			1/9/2017	ND<1 U	ND<1 U
			2/27/2017	ND<1 U	ND<1 U
			4/18/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/24/2017	ND<1 U	ND<1 U
			9/13/2017	ND<1 U	ND<1 U
MW-16-09	9	9 (100%)	8/2/2016	ND<1 U	ND<1 U
			9/20/2016	ND<1 U	ND<1 U
			11/9/2016	ND<1 U	ND<1 U
			1/10/2017	ND<1 U	ND<1 U
			2/28/2017	ND<1 U	ND<1 U
			4/17/2017	ND<1 U	ND<1 U
			6/5/2017	ND<1 U	ND<1 U
			7/25/2017	ND<1 U	ND<1 U
			9/14/2017	ND<1 U	ND<1 U
			7/24/2017	**ND<1 U**	**ND<1 U**

There are 0 unused locations

Loc.	Meas.	ND	Date	Conc.	Original

Skewness Coefficient

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	251.111	19.6497	**1.93433**
MW-16-02	9	287.778	22.2361	**1.09096**
MW-16-03	8	296.875	12.2292	**-1.40422**
MW-16-04	9	355.556	37.1184	**1.50819**
MW-16-09	9	283.333	16.5831	-0.562075

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	294.886	41.3084	**1.14494**

Skewness Coefficient

Parameter: Barium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	5.5234	0.0733807	**1.85565**
MW-16-02	9	5.65966	0.0745478	**1.04324**
MW-16-03	8	5.69254	0.0424051	**-1.4678**
MW-16-04	9	5.86924	0.0978708	**1.41108**
MW-16-09	9	5.64506	0.0596884	-0.725993

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	5.67765	0.133294	0.658393

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	240	300	60	0.5888	35.328
2	240	260	20	0.3244	6.488
3	240	250	10	0.1976	1.976
4	240	250	10	0.0947	0.947
5	240	240	0		
6	250	240	-10		
7	250	240	-10		
8	260	240	-20		
9	300	240	-60		

Sum of b values = 44.739

Sample Standard Deviation = 19.6497

W Statistic = 0.647993

5% Critical value of 0.829 exceeds 0.647993

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.647993

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-01

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	5.48064	5.70378	0.223144	0.5888	0.131387
2	5.48064	5.56068	0.0800427	0.3244	0.0259659
3	5.48064	5.52146	0.040822	0.1976	0.00806643
4	5.48064	5.52146	0.040822	0.0947	0.00386584
5	5.48064	5.48064	0		
6	5.52146	5.48064	-0.040822		
7	5.52146	5.48064	-0.040822		
8	5.56068	5.48064	-0.0800427		
9	5.70378	5.48064	-0.223144		

Sum of b values = 0.169285

Sample Standard Deviation = 0.0733807

W Statistic = 0.665248

5% Critical value of 0.829 exceeds 0.665248

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.665248

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	270	330	60	0.5888	35.328
2	270	320	50	0.3244	16.22
3	270	290	20	0.1976	3.952
4	280	280	0	0.0947	0
5	280	280	0		
6	280	280	0		
7	290	270	-20		
8	320	270	-50		
9	330	270	-60		

Sum of b values = 55.5

Sample Standard Deviation = 22.2361

W Statistic = 0.778715

5% Critical value of 0.829 exceeds 0.778715

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 is less than 0.778715

Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	5.59842	5.79909	0.200671	0.5888	0.118155
2	5.59842	5.76832	0.169899	0.3244	0.0551152
3	5.59842	5.66988	0.071459	0.1976	0.0141203
4	5.63479	5.63479	0	0.0947	0
5	5.63479	5.63479	0		
6	5.63479	5.63479	0		
7	5.66988	5.59842	-0.071459		
8	5.76832	5.59842	-0.169899		
9	5.79909	5.59842	-0.200671		

Sum of b values = 0.18739

Sample Standard Deviation = 0.0745478

W Statistic = 0.789832

5% Critical value of 0.829 exceeds 0.789832

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 is less than 0.789832

Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	270	310	40	0.6052	24.208
2	290	305	15	0.3164	4.746
3	300	300	0	0.1743	0
4	300	300	0	0.0561	0
5	300	300	0		
6	300	300	0		
7	305	290	-15		
8	310	270	-40		

Sum of b values = 28.954

Sample Standard Deviation = 12.2292

W Statistic = 0.800797

5% Critical value of 0.818 exceeds 0.800797

Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.800797

Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-03

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 8 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	5.59842	5.73657	0.13815	0.6052	0.0836086
2	5.66988	5.72031	0.0504309	0.3164	0.0159563
3	5.70378	5.70378	0	0.1743	0
4	5.70378	5.70378	0	0.0561	0
5	5.70378	5.70378	0		
6	5.70378	5.70378	0		
7	5.72031	5.66988	-0.0504309		
8	5.73657	5.59842	-0.13815		

Sum of b values = 0.0995649

Sample Standard Deviation = 0.0424051

W Statistic = 0.787552

5% Critical value of 0.818 exceeds 0.787552

Evidence of non-normality at 95% level of significance

1% Critical value of 0.749 is less than 0.787552

Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-04

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	330	440	110	0.5888	64.768
2	330	390	60	0.3244	19.464
3	330	360	30	0.1976	5.928
4	340	340	0	0.0947	0
5	340	340	0		
6	340	340	0		
7	360	330	-30		
8	390	330	-60		
9	440	330	-110		

Sum of b values = 90.16

Sample Standard Deviation = 37.1184

W Statistic = 0.737494

5% Critical value of 0.829 exceeds 0.737494

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.737494

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	5.79909	6.08677	0.287682	0.5888	0.169387
2	5.79909	5.96615	0.167054	0.3244	0.0541923
3	5.79909	5.8861	0.0870114	0.1976	0.0171934
4	5.82895	5.82895	0	0.0947	0
5	5.82895	5.82895	0		
6	5.82895	5.82895	0		
7	5.8861	5.79909	-0.0870114		
8	5.96615	5.79909	-0.167054		
9	6.08677	5.79909	-0.287682		

Sum of b values = 0.240773

Sample Standard Deviation = 0.0978708

W Statistic = 0.756518

5% Critical value of 0.829 exceeds 0.756518

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.756518

Evidence of non-normality at 99% level of significance

Skewness Coefficient

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	2.33333	4	**2.47487**
MW-16-02	9	3	6	**2.47487**
MW-16-03	8	1	0	**Div 0**
MW-16-04	9	14.0444	7.22947	**1.19014**
MW-16-09	9	12.8222	3.90697	-0.0757045

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	6.76818	7.36676	**1.12792**

Skewness Coefficient

Parameter: Chromium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.284994	0.854983	**2.47487**
MW-16-02	9	0.32716	0.98148	**2.47487**
MW-16-03	8	0	0	**Div 0**
MW-16-04	9	2.54712	0.436647	**1.01083**
MW-16-09	9	2.50634	0.324454	-0.313661

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.15888	1.30696	0.421281

Shapiro-Wilks Test of Normality

Parameter: Chromium

Location: MW-16-04

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	8.7	27	18.3	0.5888	10.775
2	9.4	26	16.6	0.3244	5.38504
3	9.5	13	3.5	0.1976	0.6916
4	9.8	13	3.2	0.0947	0.30304
5	10	10	0		
6	13	9.8	-3.2		
7	13	9.5	-3.5		
8	26	9.4	-16.6		
9	27	8.7	-18.3		

Sum of b values = 17.1547
Sample Standard Deviation = 7.22947
W Statistic = 0.703824

5% Critical value of 0.829 exceeds 0.703824
Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.703824
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Chromium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	2.16332	3.29584	1.13251	0.5888	0.666824
2	2.24071	3.2581	1.01739	0.3244	0.33004
3	2.25129	2.56495	0.313658	0.1976	0.0619787
4	2.28238	2.56495	0.282567	0.0947	0.0267591
5	2.30259	2.30259	0		
6	2.56495	2.28238	-0.282567		
7	2.56495	2.25129	-0.313658		
8	3.2581	2.24071	-1.01739		
9	3.29584	2.16332	-1.13251		

Sum of b values = 1.0856

Sample Standard Deviation = 0.436647

W Statistic = 0.772663

5% Critical value of 0.829 exceeds 0.772663

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 is less than 0.772663

Data is normally distributed at 99% level of significance

Skewness Coefficient

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.844444	1.03333	**2.47487**
MW-16-02	9	0.877778	1.13333	**2.47487**
MW-16-03	8	0.5	0	**Div 0**
MW-16-04	9	3.92222	1.80401	**1.05578**
MW-16-09	9	3.83333	1.25996	0.577785

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	2.02955	1.94321	**1.08691**

Skewness Coefficient

Parameter: Cobalt

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.473805	0.658027	**2.47487**
MW-16-02	9	-0.464911	0.684708	**2.47487**
MW-16-03	8	-0.693147	0	**Div 0**
MW-16-04	9	1.28578	0.411047	0.709812
MW-16-09	9	1.29773	0.318513	0.309567

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.210406	1.02611	0.46083

Skewness Coefficient

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	16	1.68125	0.116726	-0.926404
MW-16-02	16	1.14812	0.085574	-0.531685
MW-16-03	15	1.69333	0.109978	-0.534079
MW-16-04	16	1.64375	0.103078	-0.959228
MW-16-09	16	1.43125	0.14477	-0.838747

All Locations

Obs.	Mean	Std. Dev.	Skewness
79	1.51734	0.237701	-0.645165

Skewness Coefficient

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	0.833333	1	**2.47487**
MW-16-02	9	0.766667	0.8	**2.47487**
MW-16-03	8	0.5	0	**Div 0**
MW-16-04	9	3.85556	1.67415	**1.03004**
MW-16-09	9	3.54444	1.11816	0.692648

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.93182	1.81554	**1.10528**

Skewness Coefficient

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.476935	0.648637	**2.47487**
MW-16-02	9	-0.49783	0.585953	**2.47487**
MW-16-03	8	-0.693147	0	**Div 0**
MW-16-04	9	1.27636	0.392994	0.630363
MW-16-09	9	1.22423	0.298626	0.509869

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.186074	0.997788	0.459565

Skewness Coefficient

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	11.5667	5.01647	**1.09646**
MW-16-02	9	13.6111	2.20479	**1.83731**
MW-16-03	8	15.25	2.80306	-0.163822
MW-16-04	9	27.2222	4.08588	**1.69658**
MW-16-09	9	43	7.38241	0.201671

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	22.2864	12.8073	0.945088

Skewness Coefficient

Parameter: Lithium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	2.36334	0.453983	-0.656345
MW-16-02	9	2.60087	0.144581	**1.66952**
MW-16-03	8	2.70913	0.190083	-0.33224
MW-16-04	9	3.29525	0.13616	**1.51405**
MW-16-09	9	3.74805	0.172324	-0.0300527

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	2.94865	0.568928	-0.0332975

Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	12	19	7	0.5888	4.1216
2	12	15	3	0.3244	0.9732
3	12.5	13	0.5	0.1976	0.0988
4	13	13	0	0.0947	0
5	13	13	0		
6	13	13	0		
7	13	12.5	-0.5		
8	15	12	-3		
9	19	12	-7		

Sum of b values = 5.1936

Sample Standard Deviation = 2.20479

W Statistic = 0.693604

5% Critical value of 0.829 exceeds 0.693604

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.693604

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	2.48491	2.94444	0.459532	0.5888	0.270573
2	2.48491	2.70805	0.223144	0.3244	0.0723878
3	2.52573	2.56495	0.0392207	0.1976	0.00775001
4	2.56495	2.56495	0	0.0947	0
5	2.56495	2.56495	0		
6	2.56495	2.56495	0		
7	2.56495	2.52573	-0.0392207		
8	2.70805	2.48491	-0.223144		
9	2.94444	2.48491	-0.459532		

Sum of b values = 0.35071

Sample Standard Deviation = 0.144581

W Statistic = 0.735502

5% Critical value of 0.829 exceeds 0.735502

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.735502

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-04

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	24	37	13	0.5888	7.6544
2	24	30	6	0.3244	1.9464
3	25	27	2	0.1976	0.3952
4	26	26	0	0.0947	0
5	26	26	0		
6	26	26	0		
7	27	25	-2		
8	30	24	-6		
9	37	24	-13		

Sum of b values = 9.996

Sample Standard Deviation = 4.08588

W Statistic = 0.748153

5% Critical value of 0.829 exceeds 0.748153

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.748153

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Lithium

Location: MW-16-04

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	3.17805	3.61092	0.432864	0.5888	0.25487
2	3.17805	3.4012	0.223144	0.3244	0.0723878
3	3.21888	3.29584	0.076961	0.1976	0.0152075
4	3.2581	3.2581	0	0.0947	0
5	3.2581	3.2581	0		
6	3.2581	3.2581	0		
7	3.29584	3.21888	-0.076961		
8	3.4012	3.17805	-0.223144		
9	3.61092	3.17805	-0.432864		

Sum of b values = 0.342466

Sample Standard Deviation = 0.13616

W Statistic = 0.790765

5% Critical value of 0.829 exceeds 0.790765

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 is less than 0.790765

Data is normally distributed at 99% level of significance

Skewness Coefficient

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	77.8889	5.9675	0.522804
MW-16-02	9	39.6111	9.66236	**2.33768**
MW-16-03	8	95.875	3.6718	-0.738383
MW-16-04	9	92.5556	8.04846	0.881343
MW-16-09	9	59.2222	3.38296	-0.202509

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	72.5114	22.2618	-0.385541

Skewness Coefficient

Parameter: Molybdenum

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	4.35272	0.0755176	0.407973
MW-16-02	9	3.659	0.198488	**2.23139**
MW-16-03	8	4.56239	0.0388519	-0.787655
MW-16-04	9	4.52457	0.0846274	0.636649
MW-16-09	9	4.07983	0.0576437	-0.358962

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	4.22828	0.354139	-0.782091

Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-02

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	34	65	31	0.5888	18.2528
2	34.5	39	4.5	0.3244	1.4598
3	36	38	2	0.1976	0.3952
4	36	38	2	0.0947	0.1894
5	36	36	0		
6	38	36	-2		
7	38	36	-2		
8	39	34.5	-4.5		
9	65	34	-31		

Sum of b values = 20.2972

Sample Standard Deviation = 9.66236

W Statistic = 0.55159

5% Critical value of 0.829 exceeds 0.55159

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.55159

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Molybdenum

Location: MW-16-02

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 4 for 9 measurements

i	x(i)	x(n-i+1)	x(n-1+1)-x(i)	a(n-i+1)	b(i)
1	3.52636	4.17439	0.648027	0.5888	0.381558
2	3.54096	3.66356	0.122602	0.3244	0.0397722
3	3.58352	3.63759	0.0540672	0.1976	0.0106837
4	3.58352	3.63759	0.0540672	0.0947	0.00512017
5	3.58352	3.58352	0		
6	3.63759	3.58352	-0.0540672		
7	3.63759	3.58352	-0.0540672		
8	3.66356	3.54096	-0.122602		
9	4.17439	3.52636	-0.648027		

Sum of b values = 0.437134

Sample Standard Deviation = 0.198488

W Statistic = 0.606275

5% Critical value of 0.829 exceeds 0.606275

Evidence of non-normality at 95% level of significance

1% Critical value of 0.764 exceeds 0.606275

Evidence of non-normality at 99% level of significance

Skewness Coefficient

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	1.05811	0.430503	0.444198
MW-16-02	9	1.56444	0.499828	**1.14403**
MW-16-03	8	1.61356	0.690404	**1.45519**
MW-16-04	9	1.57078	0.632875	0.379575
MW-16-09	9	2.16889	0.648911	0.00907827

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	1.59474	0.664125	0.701046

Skewness Coefficient

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Skewness > 1 indicates positively skewed data
Skewness < -1 indicates negatively skewed data

Compliance Locations

Location	Obs.	Mean	Std. Dev.	Skewness
MW-16-01	9	-0.0193514	0.418258	-0.0790602
MW-16-02	9	0.407617	0.291247	0.68333
MW-16-03	8	0.413581	0.367002	0.909563
MW-16-04	9	0.375802	0.420285	-0.16482
MW-16-09	9	0.730349	0.324062	-0.577924

All Locations

Obs.	Mean	Std. Dev.	Skewness
44	0.380873	0.42673	-0.220691

Non-Parametric Tolerance Interval

MW-16-01

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 9
Maximum Background Concentration = 300
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-01

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 2.8
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-01

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 13
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-01

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 3.6
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16
Background mean = 1.68125
Background standard deviation = 0.116726
One-sided normal tolerance factor (K) at 95% confidence = 2.523
Upper tolerance limit = 1.97575

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-01

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 3.5
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-01

Parameter: Lithium

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 2.36334
Background standard deviation = 0.453983
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 3.73936

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-01

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 77.8889
Background standard deviation = 5.9675
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 95.9764

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-01

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 1.05811
Background standard deviation = 0.430503
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 2.36297

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-02

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 9
Maximum Background Concentration = 330
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-02

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 2.8
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-02

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 19
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-02

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 3.9
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-02

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16
Background mean = 1.14812
Background standard deviation = 0.085574
One-sided normal tolerance factor (K) at 95% confidence = 2.523
Upper tolerance limit = 1.36403

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-02

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 2.9
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-02

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 9
Maximum Background Concentration = 19
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-02

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 9
Maximum Background Concentration = 65
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-02

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 0.407617
Background standard deviation = 0.291247
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 1.29039

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-03

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 8
Maximum Background Concentration = 310
Minimum Coverage = 68.8%
Average Coverage = 88.8889%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 15
Background mean = 1.69333
Background standard deviation = 0.109978
One-sided normal tolerance factor (K) at 95% confidence = 2.566
Upper tolerance limit = 1.97554

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 15.25
Background standard deviation = 2.80306
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 24.1862

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 95.875
Background standard deviation = 3.6718
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 107.581

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-03

Parameter: Radium-226/228

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 8
Background mean = 0.413581
Background standard deviation = 0.367002
One-sided normal tolerance factor (K) at 95% confidence = 3.188
Upper tolerance limit = 1.58358

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-04

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%
Background measurements (n) = 9
Maximum Background Concentration = 7
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-04

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 9
Maximum Background Concentration = 440
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-04

Parameter: Beryllium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 88.8889%
Background measurements (n) = 9
Maximum Background Concentration = 1
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Non-Parametric Tolerance Interval MW-16-04

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 9
Maximum Background Concentration = 27
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Cobalt

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 1.28578
Background standard deviation = 0.411047
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 2.53166

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-04

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16
Background mean = 1.64375
Background standard deviation = 0.103078
One-sided normal tolerance factor (K) at 95% confidence = 2.523
Upper tolerance limit = 1.90381

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-04

Parameter: Lead

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 1.27636
Background standard deviation = 0.392994
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 2.46752

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-04

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 0%
Background measurements (n) = 9
Maximum Background Concentration = 37
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 92.5556
Background standard deviation = 8.04846
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 116.95

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-04

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 1.57078
Background standard deviation = 0.632875
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 3.48902

Location	Date	Value	Significant

Non-Parametric Tolerance Interval

MW-16-09

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

Total Percent Non-Detects = 77.7778%
Background measurements (n) = 9
Maximum Background Concentration = 7.2
Minimum Coverage = 71.7%
Average Coverage = 90%

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-09

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 283.333
Background standard deviation = 16.5831
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 333.597

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-09

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 12.8222
Background standard deviation = 3.90697
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 24.6643

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-09

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 3.83333
Background standard deviation = 1.25996
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 7.65227

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-09

Parameter: Fluoride

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 16
Background mean = 1.43125
Background standard deviation = 0.14477
One-sided normal tolerance factor (K) at 95% confidence = 2.523
Upper tolerance limit = 1.7965

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis

MW-16-09

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 3.54444
Background standard deviation = 1.11816
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 6.93358

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-09

Parameter: Lithium

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 43
Background standard deviation = 7.38241
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 65.3761

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-09

Parameter: Molybdenum

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 59.2222
Background standard deviation = 3.38296
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 69.476

Location	Date	Value	Significant

Parametric Tolerance Interval Analysis MW-16-09

Parameter: Radium-226/228

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

USEPA 1989 Guidance Tolerance Limit Formula (One-Tailed)

Background observations = 9
Background mean = 2.16889
Background standard deviation = 0.648911
One-sided normal tolerance factor (K) at 95% confidence = 3.031
Upper tolerance limit = 4.13574

Location	Date	Value	Significant

Geosyntec
consultants

Appendix M

Fate and Transport Model Inputs

Calculation Package

Geosyntec consultants

COMPUTATION COVER SHEET

Client: **DTE** Project: **BRPP ALD** Project/ Proposal No.: **GLP8017** Task No.

Title of Computations: **Vertical Darcy Velocity and Travel Time Calculations**

Computations by:	Signature		11/17/2021
	Printed Name	Nick Williams	Date
	Title	Senior Staff Professional	
Assumptions and Procedures Checked by: (peer reviewer)	Signature		11/17/2021
	Printed Name	Jesse Varsho	Date
	Title		
Computations Checked by:	Signature		11/17/2021
	Printed Name	Isaiah Vaught	Date
	Title		
Computations backchecked by: (originator)	Signature		11/17/2021
	Printed Name	Nick Williams	Date
	Title		
Approved by: (pm or designate)	Signature		11/24/2021
	Printed Name	Omer Bozok	Date
	Title		

Approval notes:

Revisions (number and initial all revisions)

No.	Sheet	Date	By	Checked by	Approval

TABLE OF CONTENTS

1. PURPOSE

The purpose of this calculation package is to calculate the vertical Darcy velocity of the model lithology for input in Fate and Transport numerical model at the Belle River Power Plant Bottom Ash Basins (BAB). Following Darcy velocity calculation, the solution is used to calculate the time of travel from the BABs to the Uppermost Aquifer.

2. ASSUMPTIONS

- Vertical flow is the dominant influence on contaminant transport; horizontal flow is not considered since a one-dimensional model was selected.
- Vertical hydraulic conductivity calculated in the laboratory using samples collected from borings is representative of subsurface conditions.

3. SOLUTION

The Darcy velocity (q) through the model lithologies or layers is expressed in m/year =

$$= K(i) = K\left(\frac{H_1 - H_2}{l_1 - l_2}\right)$$

Where,

K = vertical hydraulic conductivity (laboratory measured)

i = vertical gradient

$H_1 - H_2$ = difference in hydraulic head between the BAB water level and the upper most aquifer potentiometric surface

$l_1 - l_2$ = distance in direction of flow

Thus:

K =	Geomean of Clay with Sand hydraulic conductivity value (data provided in Attachment 1) =	2.15 x 10^{-8} cm/s
H_1 =	Total head at the bottom of BAB =	590 ft
H_2 =	Average water level elevation from monitoring wells (data provided in Attachment 2) =	574.28[1] ft
l_1 =	Bottom of ash pond =	580 ft
l_2 =	Average elevation of well screen midpoints =	470.98[1] ft
q =	**Darcy velocity in m/year (= cm/s * 315360) =**	**1.02 x 10^{-3} m/year**

[1] ***Value is an average taken from all monitoring wells***

4. TRAVEL TIME SOLUTION

Travel time (*T*) through the model lithology is expressed in years =

$$T = t / \left(\frac{K * i}{n} \right)$$

Where:

t =	minimum model thickness
K =	vertical hydraulic conductivity (laboratory measured)
i =	vertical gradient
n =	effective porosity

Thus:

t =	Minimum model thickness per EVS model =	26.21 m
K =	Hydraulic conductivity =	2.15×10^{-8} cm/s
i =	Calculated using variables in Section 3 =	0.15
n =	Average of porosity data from Clay with Sand layer, converted to effective porosity using Sara (1994) =	0.34
***T* =**	**Travel time in years (= s / 31536000) =**	**8,762 years**

Note: Time travel is not an input to Pollute model. It has been calculated to provide time estimate for the travel of water molecule from the bottom of BAB to top of uppermost aquifer.

Attachment 1

Table M-1

Location ID	Layer	Elevation (ft)	Vertical Hydraulic Conductivity, k_v (cm/s)		Vertical Hydraulic Conductivity, kv (cm/s)		
			DDW	Site Water	Clay	Clay with Sand	Dike
B1-ST-3 (36-38)	Clay	555.8	2.20E-08		2.20E-08		
	Clay	555.8	2.60E-09		2.60E-09		
B2-ST-2 (7-9)	Dike	584.0	2.10E-08				2.10E-08
	Dike	584.0	1.90E-08				1.90E-08
B2-ST-7 (97-99)	Clay with Sand	494.0	3.30E-08			3.30E-08	
	Clay with Sand	494.0	2.00E-08			2.00E-08	
B3-ST-1 (1-3)	Dike	590.0	9.50E-09				9.50E-09
B4-ST-4 (67-69)	Clay with Sand	518.0	2.80E-08			2.80E-08	
	Clay with Sand	518.0	1.80E-08			1.80E-08	
B5-ST-2 (27-29)	Clay	563.3	3.40E-08		3.40E-08		
	Clay	563.3	2.30E-08		2.30E-08		
B6-ST-4 (47-49)	Clay	541.3	2.50E-08		2.50E-08		
	Clay	541.3	1.80E-08		1.80E-08		
B6-ST-7 (97-99)	Clay with Sand	491.3	2.40E-08			2.40E-08	
	Clay with Sand	491.3	1.20E-08			1.20E-08	
B1-ST-1 (7-9)	Dike	584.8		8.20E-09			8.20E-09
B2-ST-1 (1-3)	Dike	590.0		1.20E-08			1.20E-08
B2-ST-4 (47-49)	Clay	544.0		2.20E-08	2.20E-08		
B3-ST-5 (77-79)	Clay with Sand	514.0		1.90E-08		1.90E-08	
B4-ST-3 (47-49)	Clay	538.0		2.80E-08	2.80E-08		
B5-ST-5 (87-89)	Clay with Sand	503.3		1.50E-08		1.50E-08	
MW-16-01	Clay with Sand	537.2	2.90E-08			2.90E-08	
MW-16-05	Clay with Sand	537.3	2.70E-08			2.70E-08	
MW-16-07	Clay	538.9	2.90E-08		2.90E-08		
MW-16-02	Sand	491.7					
MW-16-03	Sand	453.7					
MW-16-06	Sand	452.5					
MW-16-08	Sand	453.8					
MW-16-09	Sand	449.9					
MW-16-10	Sand	441.8					
MW-16-11A	Sand	450.0					
SB-16-01	Clay	537.7	2.10E-08		2.10E-08		

Statistical Parameter	Clay	Clay with Sand	Dike
Mean	2.25E-08	2.25E-08	1.39E-08
GeoMean	**1.94E-08**	**2.15E-08**	**1.30E-08**
Maximum	3.40E-08	3.30E-08	2.10E-08
Minimum	2.60E-09	1.20E-08	8.20E-09
Count	10	10	5
Standard Deviation	8.37E-09	6.75E-09	5.74E-09

Attachment 2

Edited by Geosyntec to assess vertical gradient - IJV

Table 1
Summary of Groundwater Elevation Data – March and September 2020
Belle River Power Plant Bottom Ash Basins – RCRA CCR Monitoring Program
China Township, Michigan

Well ID	MW-16-01		MW-16-02		MW-16-03		MW-16-04		MW-16-09	
Date Installed	3/17/2016		3/15/2016		6/1/2016		3/8/2016		6/2/2016	
TOC Elevation	590.06		588.94		590.66		590.51		590.80	
Geologic Unit of Screened Interval	Sand		Sand		Silty Sand		Sand		Sand	
Screened Interval Elevation	496.3 to 491.3		494.3 to 489.3		456.0 to 451.0		468.5 to 463.5		452.3 to 447.3	
Unit	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft	ft BTOC	ft
Measurement Date	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation	Depth to Water	GW Elevation
03/17/2020	15.83	574.23	13.28	575.66	16.13	574.53	16.48	574.03	16.31	574.49
09/14/2020	16.16	573.90	13.58	575.36	16.46	574.20	16.83	573.68	16.60	574.20

Notes:

Elevations are reported in feet relative to the North American Vertical Datum of 1988.

ft BTOC - feet Below top of casing.

Well ID	MW-06-01	MW-06-02	MW-06-03	MW-06-04	MW-16-09
Screen Mid Point Elevation, l_2 (ft)	493.8	491.8	453.5	466	449.8
Aquifer Water Level, H_2 (ft)	573.9	575.4	574.2	573.7	574.2
Total Head Difference, $H_1 - H_2$ (ft)	16.1	14.6	15.8	16.3	15.8
Flow Distance, $l_1 - l_2$ (ft)	86.2	88.2	126.5	114	130.2
Gradient, i	0.19	0.17	0.12	0.14	0.12

Pond Water Elevation, H_1 (ft)	590
Elevation of Pond Outflow, l_1 (ft)	580

Average Gradient	0.15

POLLUTE Model Inputs

POLLUTE Model Inputs - Bottom Ash Basins
Table M-2

Basin	Layer	Darcy Velocity (m/year)	Darcy Velocity for Sensitivity (m/year)	Thickness (m)	Max Thickness (m)	Min Thickness (m)	Sublayers	Kv (cm/s)	CoHD	CoHD +25%	CoHD -25%	Effective Porosity	Eff. Porosity Max	Eff. Porosity Min	Dist. Coeff.	Dry Density (kg/m3)
BAB	Clay	1.02E-03	2.03E-03	12.01	13.99	11.03	25	1.94E-08	0.019	0.02375	0.01425	0.37	0.45	0.28	0	1509.084
	Clay with Sand	1.02E-03	2.03E-03	19.29	23.62	15.18	40	2.15E-08	0.019	0.02375	0.01425	0.34	0.45	0.20	0	1509.084

Notes:

1. Kv = vertical hydraulic conductivity as determined by the analysis of field and laboratory data summarized in Table M-1
2. Analysis of vertical hydraulic conductivity includes data from long term tests updated on 8/20/2021
3. Kv of Clay with Sand selected for the calculation of the Darcy velocity as the higher and thus more conservative value of the two layers; POLLUTE only allows one input for Darcy velocity
4. CoHD = Coefficient of Hydrodynamic Dispersion
5. Effective Porosity determined by multiplying estimated porosity from field and lab data by 0.81, based on data provided by Sara, 1994

Model Thickness

BAB Clay Thickness (ft)

Value

High : 45.9706

Low : 36.2093

0 62.5 125 250 375 500

Feet

Bottom Ash Basin Clay Thickness

Geosyntec consultants

8/9/2021 | Chicago, IL

Figure M-1

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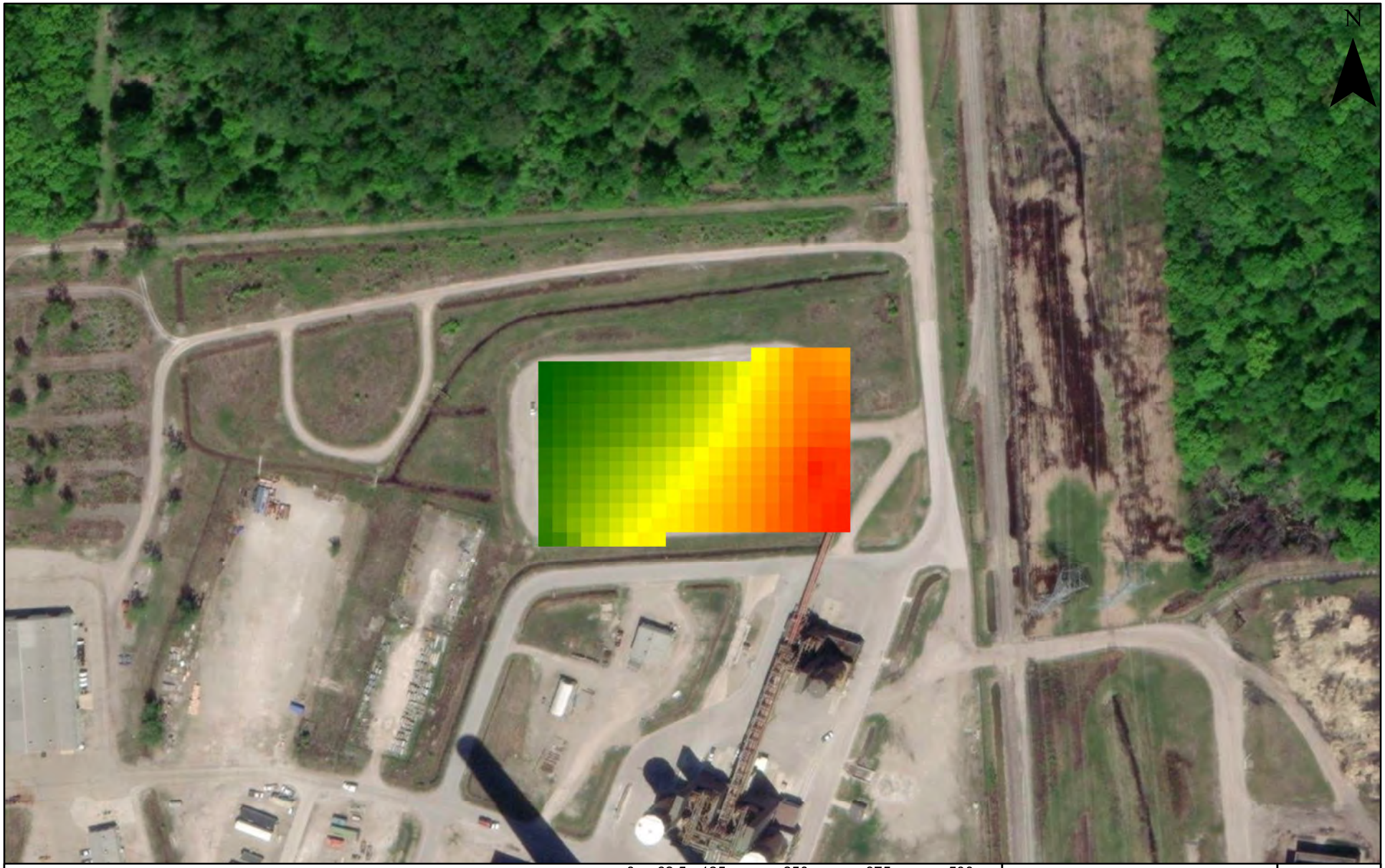


BAB Clay with Sand Thickness

Value

High : 77.4516

Low : 49.829

0 62.5 125 250 375 500 Feet

Bottom Ash Basin
Clay with Sand Thickness

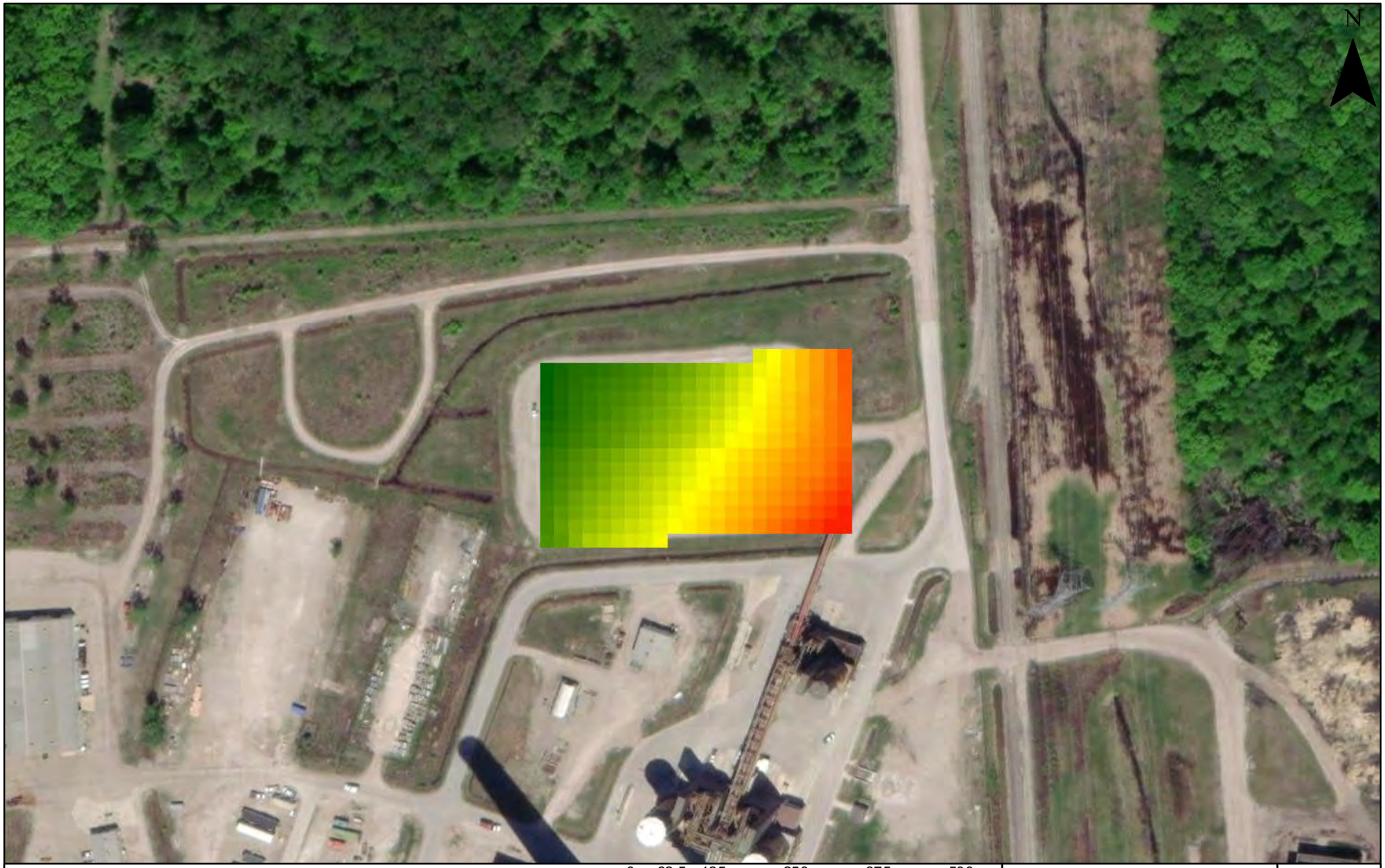
Geosyntec consultants

8/9/2021 | Chicago, IL

Figure

M-2

Document Path: W:\prj1\CWP\GLP8017 - Belle River ALD\500 - Technical\GIS\20210809_Belle_River_Thickness_Figures_10_8.mxd; User Name: NWilliams



Model Interval Thickness

Value

High : 120.074

Low : 88.6598

0 62.5 125 250 375 500

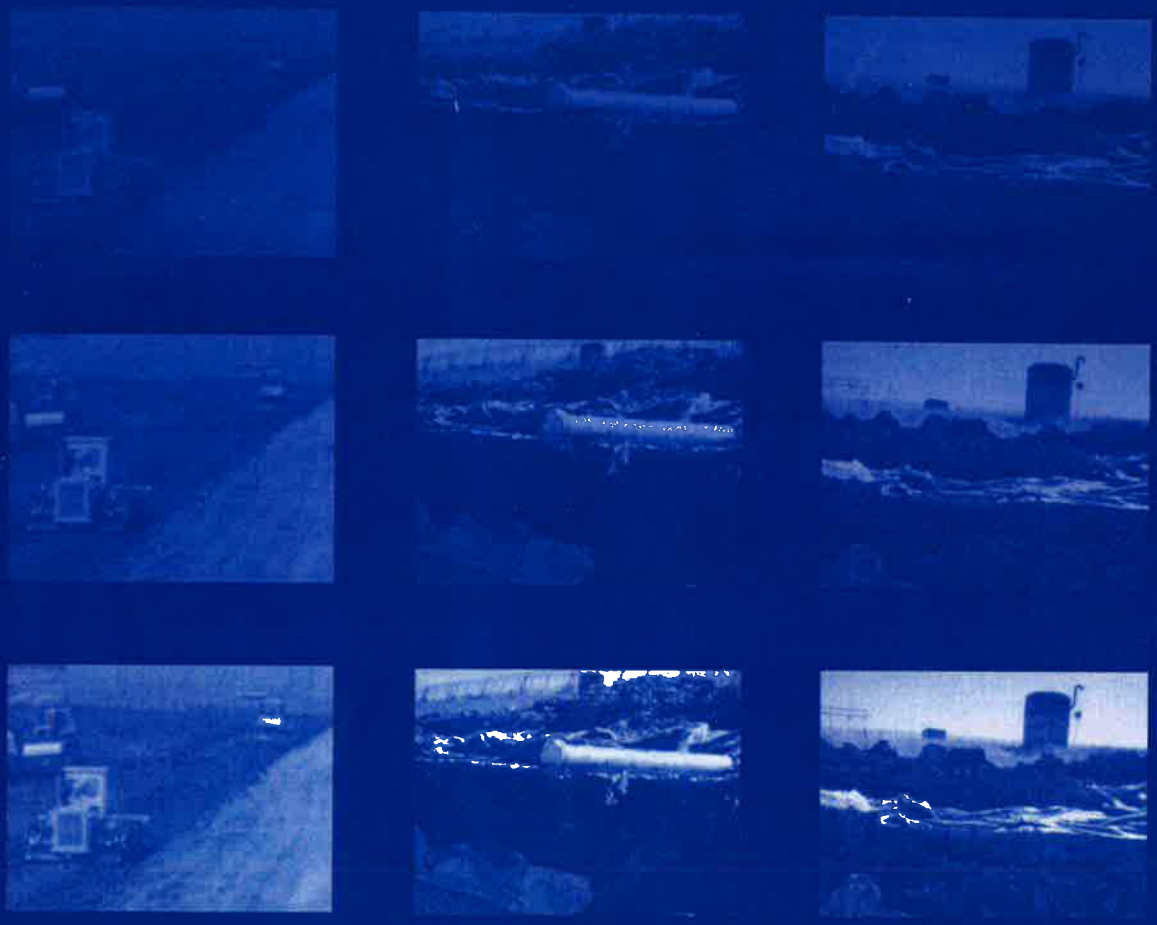
Feet

Bottom Ash Basins Model Interval Thickness		**Figure M-3**
Geosyntec consultants		
11/11/2021	Chicago, IL	

Document Path: W:\prj1\CWP\GLP8017 - Belle River ALD\500 - Technical\GIS\20210809_Belle_River_Thickness_Figures_10_8 (DB Clay).mxd; User Name: NWilliams

Reference Material

CRC Press
Taylor & Francis Group
A CHAPMAN & HALL BOOK



BARRIER SYSTEMS FOR WASTE DISPOSAL FACILITIES

2ND EDITION

R. Kerry Rowe, Robert M. Quigley,
Richard W.I. Brachman & John R. Booker

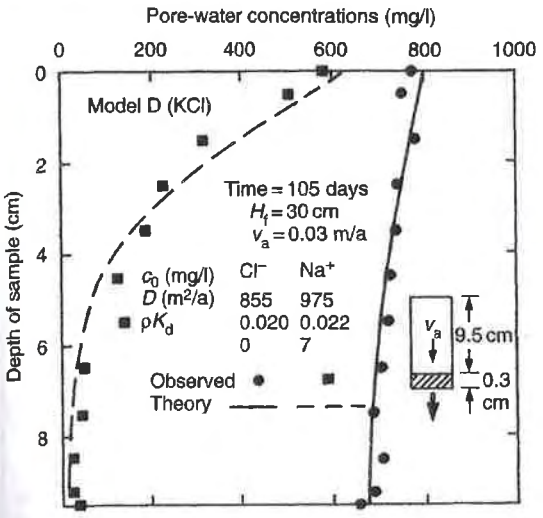


Figure 8.10 Chloride and potassium concentration versus depth in sample for model D (modified from Rowe *et al.*, 1988).

variation in concentration with depth in the soil at the end of each test. The consistency of results demonstrates the power of the analytical model (program POLLUTE) and provides some confidence in the parameters D and ρK_d for the clay and source fluids examined.

To provide an indication of parameter variation that might be expected for a given soil, a number of tests were duplicated. The diffusion coefficient, D, for chloride was deduced for each model and ranged between 0.018 and 0.02 m^2/a with an average value of 0.019 m^2/a. This small variation in D does not appear to be related to small differences in Darcy velocity, nor does it appear to be particularly related to the nature of the associated cation (see Table 8.3). Rather, the variability from 0.018 to 0.02 m^2/a is seen as an indication of the level of repeatability that may be achieved for this type of test.

The application of an effective stress to the soil sample adopted in these tests is not an essential part of the proposed technique for determining the parameters D and K_d. Tests performed for the particular combination of clay and permeants considered herein gave similar results both with and without the application of the effective stress. However, for some combinations of clay and permeant, shrinkage of the clay may occur in the absence of a confining stress and this can give quite misleading results (e.g., see Quigley and Fernandez, 1989). For these clays, and for GCLs (see Chapter 12), tests should be performed at an effective stress similar to that anticipated in the field.

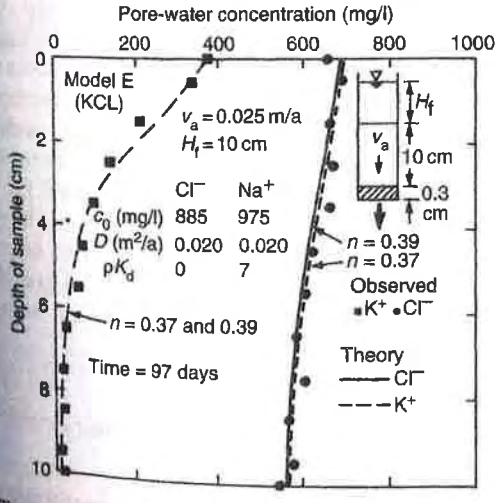


Figure 8.11 Chloride and potassium concentration versus depth in sample for model E (modified from Rowe *et al.*, 1988).

8.3.2 Pure diffusion tests

In many cases, it is not necessary to perform an advection–diffusion test. Under these circumstances, a simple diffusion test can be performed for boundary conditions shown in Figure 8.2. In this test, the soil sample is placed in a Plexiglass cylinder by trimming the sample to a size marginally greater than the specimen and then pressing the specimen into the cylinder, using a cutting shoe attached to the cylinder, to perform the final trim. This procedure is found to work well for many clays. However, it does not work well for clays with a significant stone content because the

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Martin N. Sara

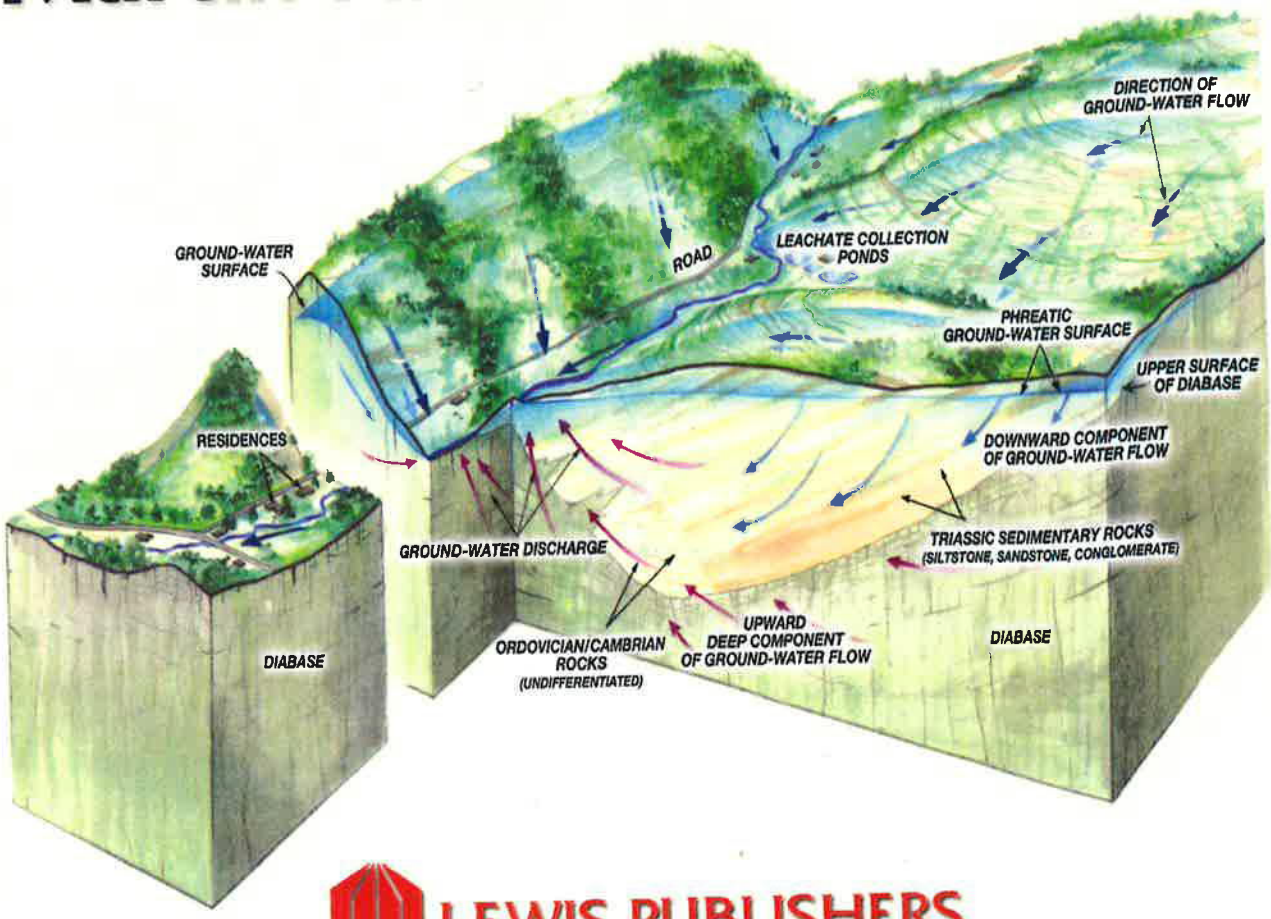

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Table 5-9 Porosity, Residual Saturation and Effective Porosity of Common Soils

Texture Class	Sample Size	Total Porosity (ϕ) cm^3/cm^3	Residual Saturation (ϕr) cm^3/cm^3	Effective Porosity (ϕ_c) cm^3/cm^3
Sand	762	0.437 (0.374: 0.500)	0.020 (0.001: 0.039)	0.417 (0.354: 0.480)
Loamy Sand	338	0.437 0.368: 0.506)	0.035 (0.003: 0.067)	0.401 (0.329: 0.473)
Sandy Loam	666	0.453 (0.351: 0.555)	0.041 (0.0: 0.106)	0.412 (0.283: 0.541)
Loam	383	0.463 0.375: 0.551)	0.027 (0.0: 0.074)	0.434 (0.334: 0.534)
Silt Loam	1206	0.501 (0.420: 0.582)	0.015 (0.0: 0.058)	0.486 (0.394: 0.578)
Sandy Clay Loam	498	0.398 (0.332: 0.464)	0.068 (0.0: 0.137)	0.330 (0.235: 0.425)
Clay Loam	366	0.464 (0.409: 0.519)	0.076 (0.0: 0.174)	0.390 (0.279: 0.501)
Silty Clay Loam	689	0.471 (0.428: 0.524)	0.040 (0.0: 0.118)	0.432 (0.347: 0.517)
Sandy Clay	45	0.430 (0.370: 0.490)	0.109 (0.0: 0.205)	0.321 (0.207: 0.435)
Silty Clay	127	0.479 (0.425: 0.533)	0.056 (0.0: 0.136)	0.423 (0.334: 0.512)
Clay	291	0.475 (0.427: 0.523)	0.090 (0.0: 0.195)	0.385 (0.269: 0.501)

First line is the mean value
Second line is + one standard deviation about the mean

Adapted from: Rawls, W.J., D.C. Brakensiek, K.E. Saxton, 1982

The ratio of effective porosity to total porosity is 0.81 for Clay, and 0.88 for Silty Clay. Use 0.81 to be conservative.

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Appendix N

Fate and Transport Model Outputs

POLLUTEv7

Version 7.13

BAB_Baseline

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

	2.400E+00	4.368E-08
	2.880E+00	4.885E-11
	3.360E+00	1.037E-13
	3.840E+00	9.638E-15
	4.320E+00	7.843E-16
	4.800E+00	4.641E-17
	5.280E+00	1.960E-18
	5.760E+00	5.783E-20
	6.240E+00	1.164E-21
	6.720E+00	1.553E-23
	7.200E+00	1.336E-25
	7.680E+00	7.408E-28
	8.160E+00	4.152E-30
	8.640E+00	1.022E-31
	9.120E+00	4.221E-33
	9.600E+00	1.474E-34
	1.008E+01	4.135E-36
	1.056E+01	9.227E-38
	1.104E+01	1.619E-39
	1.152E+01	2.210E-41
	1.200E+01	2.440E-43
	1.248E+01	2.078E-45
	1.296E+01	2.050E-47
	1.345E+01	4.107E-49
	1.393E+01	1.173E-50
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.538E+01	0.000E+00
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.248E+01	4.063E-32
	1.296E+01	4.214E-33
	1.345E+01	3.967E-34
	1.393E+01	3.349E-35
	1.441E+01	2.524E-36
	1.489E+01	1.693E-37
	1.538E+01	1.006E-38
	1.586E+01	5.275E-40
	1.634E+01	2.433E-41
	1.682E+01	9.869E-43
	1.730E+01	3.565E-44
	1.779E+01	1.217E-45
	1.827E+01	4.720E-47
	1.875E+01	2.657E-48
	1.923E+01	2.038E-49
	1.972E+01	1.680E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.248E+01	1.905E-25
	1.296E+01	9.961E-27
	1.345E+01	4.599E-28
	1.393E+01	2.189E-29
	1.441E+01	1.653E-30
	1.489E+01	2.239E-31
	1.538E+01	3.623E-32
	1.586E+01	5.716E-33
	1.634E+01	8.453E-34
	1.682E+01	1.163E-34
	1.730E+01	1.486E-35
	1.779E+01	1.758E-36
	1.827E+01	1.923E-37
	1.875E+01	1.940E-38
	1.923E+01	1.802E-39
	1.972E+01	1.537E-40

	2.020E+01	1.203E-41
	2.068E+01	8.647E-43
	2.116E+01	5.763E-44
	2.165E+01	3.677E-45
	2.213E+01	2.449E-46
	2.261E+01	1.979E-47
	2.309E+01	2.100E-48
	2.357E+01	2.648E-49
	2.406E+01	3.480E-50
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
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	9.600E-01	2.900E-01
	1.440E+00	1.093E-01
	1.920E+00	3.172E-02
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	2.880E+00	1.174E-03
	3.360E+00	1.479E-04
	3.840E+00	1.397E-05
	4.320E+00	9.858E-07
	4.800E+00	5.191E-08
	5.280E+00	2.037E-09
	5.760E+00	6.011E-11
	6.240E+00	1.582E-12
	6.720E+00	1.317E-13
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	1.104E+01	5.233E-19
	1.152E+01	8.741E-20
	1.200E+01	1.381E-20
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	1.345E+01	2.563E-23
	1.393E+01	2.535E-24
	1.441E+01	2.237E-25
	1.489E+01	1.762E-26

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	1.586E+01	8.656E-29
	1.634E+01	7.250E-30
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	1.875E+01	1.541E-33
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	1.972E+01	4.915E-35
	2.020E+01	8.068E-36
	2.068E+01	1.250E-36
	2.116E+01	1.825E-37
	2.165E+01	2.506E-38
	2.213E+01	3.236E-39
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	2.550E+01	4.001E-46
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	2.647E+01	5.936E-48
	2.695E+01	9.487E-49
	2.743E+01	1.631E-49
	2.791E+01	2.821E-50
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
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	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.248E+01	3.811E-19
	1.296E+01	7.543E-20
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	1.634E+01	8.855E-26
	1.682E+01	8.831E-27
	1.730E+01	8.198E-28
	1.779E+01	7.583E-29
	1.827E+01	8.408E-30
	1.875E+01	1.377E-30
	1.923E+01	3.071E-31
	1.972E+01	7.550E-32
	2.020E+01	1.846E-32
	2.068E+01	4.362E-33
	2.116E+01	9.891E-34
	2.165E+01	2.147E-34
	2.213E+01	4.459E-35
	2.261E+01	8.846E-36
	2.309E+01	1.676E-36
	2.357E+01	3.027E-37
	2.406E+01	5.209E-38
	2.454E+01	8.531E-39
	2.502E+01	1.329E-39
	2.550E+01	1.966E-40
	2.599E+01	2.761E-41
	2.647E+01	3.685E-42
	2.695E+01	4.684E-43
	2.743E+01	5.716E-44
	2.791E+01	6.827E-45
	2.840E+01	8.322E-46
	2.888E+01	1.110E-46
	2.936E+01	1.731E-47
	2.984E+01	3.169E-48
	3.033E+01	6.406E-49
	3.081E+01	1.340E-49
	3.129E+01	2.793E-50
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

	5.760E+00	1.039E-07
	6.240E+00	7.979E-09
	6.720E+00	5.041E-10
	7.200E+00	2.665E-11
	7.680E+00	1.409E-12
	8.160E+00	1.774E-13
	8.640E+00	6.128E-14
	9.120E+00	2.484E-14
	9.600E+00	9.733E-15
	1.008E+01	3.628E-15
	1.056E+01	1.284E-15
	1.104E+01	4.311E-16
	1.152E+01	1.375E-16
	1.200E+01	4.295E-17
	1.248E+01	1.217E-17
	1.296E+01	3.249E-18
	1.345E+01	8.170E-19
	1.393E+01	1.931E-19
	1.441E+01	4.282E-20
	1.489E+01	8.893E-21
	1.538E+01	1.727E-21
	1.586E+01	3.127E-22
	1.634E+01	5.273E-23
	1.682E+01	8.262E-24
	1.730E+01	1.201E-24
	1.779E+01	1.616E-25
	1.827E+01	2.017E-26
	1.875E+01	2.354E-27
	1.923E+01	2.655E-28
	1.972E+01	3.184E-29
	2.020E+01	4.867E-30
	2.068E+01	1.044E-30
	2.116E+01	2.756E-31
	2.165E+01	7.703E-32
	2.213E+01	2.135E-32
	2.261E+01	5.747E-33
	2.309E+01	1.495E-33
	2.357E+01	3.753E-34
	2.406E+01	9.078E-35
	2.454E+01	2.115E-35
	2.502E+01	4.742E-36
	2.550E+01	1.022E-36
	2.599E+01	2.118E-37
	2.647E+01	4.214E-38
	2.695E+01	8.043E-39
	2.743E+01	1.472E-39
	2.791E+01	2.581E-40
	2.840E+01	4.333E-41
	2.888E+01	6.971E-42
	2.936E+01	1.076E-42
	2.984E+01	1.601E-43
	3.033E+01	2.320E-44
	3.081E+01	3.353E-45
	3.129E+01	5.038E-46
35	0.000E+00	1.000E+00
	4.800E-01	7.006E-01

	9.600E-01	4.337E-01
	1.440E+00	2.346E-01
	1.920E+00	1.100E-01
	2.400E+00	4.443E-02
	2.880E+00	1.538E-02
	3.360E+00	4.547E-03
	3.840E+00	1.145E-03
	4.320E+00	2.451E-04
	4.800E+00	4.452E-05
	5.280E+00	6.852E-06
	5.760E+00	8.927E-07
	6.240E+00	9.837E-08
	6.720E+00	9.162E-09
	7.200E+00	7.219E-10
	7.680E+00	4.860E-11
	8.160E+00	3.069E-12
	8.640E+00	3.171E-13
	9.120E+00	9.445E-14
	9.600E+00	4.044E-14
	1.008E+01	1.740E-14
	1.056E+01	7.194E-15
	1.104E+01	2.849E-15
	1.152E+01	1.083E-15
	1.200E+01	4.061E-16
	1.248E+01	1.399E-16
	1.296E+01	4.591E-17
	1.345E+01	1.434E-17
	1.393E+01	4.262E-18
	1.441E+01	1.203E-18
	1.489E+01	3.220E-19
	1.538E+01	8.164E-20
	1.586E+01	1.958E-20
	1.634E+01	4.437E-21
	1.682E+01	9.480E-22
	1.730E+01	1.907E-22
	1.779E+01	3.606E-23
	1.827E+01	6.400E-24
	1.875E+01	1.065E-24
	1.923E+01	1.658E-25
	1.972E+01	2.421E-26
	2.020E+01	3.336E-27
	2.068E+01	4.437E-28
	2.116E+01	6.086E-29
	2.165E+01	9.850E-30
	2.213E+01	2.127E-30
	2.261E+01	5.837E-31
	2.309E+01	1.773E-31
	2.357E+01	5.466E-32
	2.406E+01	1.658E-32
	2.454E+01	4.894E-33
	2.502E+01	1.402E-33
	2.550E+01	3.896E-34
	2.599E+01	1.049E-34
	2.647E+01	2.733E-35
	2.695E+01	6.891E-36
	2.743E+01	1.681E-36
	2.791E+01	3.962E-37

	2.840E+01	9.023E-38
	2.888E+01	1.984E-38
	2.936E+01	4.207E-39
	2.984E+01	8.605E-40
	3.033E+01	1.696E-40
	3.081E+01	3.222E-41
	3.129E+01	5.901E-42
40	0.000E+00	1.000E+00
	4.800E-01	7.210E-01
	9.600E-01	4.668E-01
	1.440E+00	2.689E-01
	1.920E+00	1.369E-01
	2.400E+00	6.120E-02
	2.880E+00	2.395E-02
	3.360E+00	8.170E-03
	3.840E+00	2.425E-03
	4.320E+00	6.249E-04
	4.800E+00	1.396E-04
	5.280E+00	2.699E-05
	5.760E+00	4.514E-06
	6.240E+00	6.524E-07
	6.720E+00	8.142E-08
	7.200E+00	8.772E-09
	7.680E+00	8.163E-10
	8.160E+00	6.612E-11
	8.640E+00	4.961E-12
	9.120E+00	5.024E-13
	9.600E+00	1.306E-13
	1.008E+01	5.687E-14
	1.056E+01	2.613E-14
	1.104E+01	1.168E-14
	1.152E+01	5.054E-15
	1.200E+01	2.166E-15
	1.248E+01	8.607E-16
	1.296E+01	3.284E-16
	1.345E+01	1.202E-16
	1.393E+01	4.218E-17
	1.441E+01	1.417E-17
	1.489E+01	4.558E-18
	1.538E+01	1.401E-18
	1.586E+01	4.113E-19
	1.634E+01	1.151E-19
	1.682E+01	3.072E-20
	1.730E+01	7.798E-21
	1.779E+01	1.881E-21
	1.827E+01	4.308E-22
	1.875E+01	9.352E-23
	1.923E+01	1.922E-23
	1.972E+01	3.734E-24
	2.020E+01	6.852E-25
	2.068E+01	1.187E-25
	2.116E+01	1.945E-26
	2.165E+01	3.034E-27
	2.213E+01	4.604E-28
	2.261E+01	7.193E-29
	2.309E+01	1.293E-29

	2.357E+01	2.983E-30
	2.406E+01	8.642E-31
	2.454E+01	2.804E-31
	2.502E+01	9.357E-32
	2.550E+01	3.096E-32
	2.599E+01	1.003E-32
	2.647E+01	3.170E-33
	2.695E+01	9.752E-34
	2.743E+01	2.919E-34
	2.791E+01	8.498E-35
	2.840E+01	2.405E-35
	2.888E+01	6.611E-36
	2.936E+01	1.765E-36
	2.984E+01	4.574E-37
	3.033E+01	1.150E-37
	3.081E+01	2.804E-38
	3.129E+01	6.625E-39
45	0.000E+00	1.000E+00
	4.800E-01	7.380E-01
	9.600E-01	4.953E-01
	1.440E+00	2.999E-01
	1.920E+00	1.628E-01
	2.400E+00	7.884E-02
	2.880E+00	3.394E-02
	3.360E+00	1.295E-02
	3.840E+00	4.369E-03
	4.320E+00	1.301E-03
	4.800E+00	3.413E-04
	5.280E+00	7.884E-05
	5.760E+00	1.602E-05
	6.240E+00	2.859E-06
	6.720E+00	4.481E-07
	7.200E+00	6.164E-08
	7.680E+00	7.440E-09
	8.160E+00	7.886E-10
	8.640E+00	7.389E-11
	9.120E+00	6.430E-12
	9.600E+00	6.905E-13
	1.008E+01	1.666E-13
	1.056E+01	7.256E-14
	1.104E+01	3.501E-14
	1.152E+01	1.670E-14
	1.200E+01	7.925E-15
	1.248E+01	3.512E-15
	1.296E+01	1.503E-15
	1.345E+01	6.206E-16
	1.393E+01	2.471E-16
	1.441E+01	9.480E-17
	1.489E+01	3.502E-17
	1.538E+01	1.245E-17
	1.586E+01	4.254E-18
	1.634E+01	1.397E-18
	1.682E+01	4.400E-19
	1.730E+01	1.329E-19
	1.779E+01	3.847E-20
	1.827E+01	1.066E-20

	1.875E+01	2.821E-21
	1.923E+01	7.133E-22
	1.972E+01	1.720E-22
	2.020E+01	3.954E-23
	2.068E+01	8.648E-24
	2.116E+01	1.798E-24
	2.165E+01	3.554E-25
	2.213E+01	6.675E-26
	2.261E+01	1.195E-26
	2.309E+01	2.055E-27
	2.357E+01	3.479E-28
	2.406E+01	6.139E-29
	2.454E+01	1.249E-29
	2.502E+01	3.187E-30
	2.550E+01	9.940E-31
	2.599E+01	3.436E-31
	2.647E+01	1.223E-31
	2.695E+01	4.333E-32
	2.743E+01	1.508E-32
	2.791E+01	5.136E-33
	2.840E+01	1.709E-33
	2.888E+01	5.549E-34
	2.936E+01	1.758E-34
	2.984E+01	5.433E-35
	3.033E+01	1.637E-35
	3.081E+01	4.806E-36
	3.129E+01	1.375E-36
50	0.000E+00	1.000E+00
	4.800E-01	7.526E-01
	9.600E-01	5.201E-01
	1.440E+00	3.279E-01
	1.920E+00	1.875E-01
	2.400E+00	9.685E-02
	2.880E+00	4.502E-02
	3.360E+00	1.879E-02
	3.840E+00	7.025E-03
	4.320E+00	2.349E-03
	4.800E+00	7.012E-04
	5.280E+00	1.867E-04
	5.760E+00	4.432E-05
	6.240E+00	9.366E-06
	6.720E+00	1.762E-06
	7.200E+00	2.947E-07
	7.680E+00	4.385E-08
	8.160E+00	5.798E-09
	8.640E+00	6.822E-10
	9.120E+00	7.192E-11
	9.600E+00	7.099E-12
	1.008E+01	8.326E-13
	1.056E+01	1.981E-13
	1.104E+01	8.651E-14
	1.152E+01	4.354E-14
	1.200E+01	2.233E-14
	1.248E+01	1.078E-14
	1.296E+01	5.051E-15
	1.345E+01	2.293E-15

	1.393E+01	1.008E-15
	1.441E+01	4.292E-16
	1.489E+01	1.768E-16
	1.538E+01	7.039E-17
	1.586E+01	2.709E-17
	1.634E+01	1.006E-17
	1.682E+01	3.609E-18
	1.730E+01	1.248E-18
	1.779E+01	4.159E-19
	1.827E+01	1.334E-19
	1.875E+01	4.118E-20
	1.923E+01	1.222E-20
	1.972E+01	3.481E-21
	2.020E+01	9.514E-22
	2.068E+01	2.493E-22
	2.116E+01	6.255E-23
	2.165E+01	1.502E-23
	2.213E+01	3.446E-24
	2.261E+01	7.553E-25
	2.309E+01	1.581E-25
	2.357E+01	3.165E-26
	2.406E+01	6.081E-27
	2.454E+01	1.135E-27
	2.502E+01	2.120E-28
	2.550E+01	4.221E-29
	2.599E+01	9.821E-30
	2.647E+01	2.819E-30
	2.695E+01	9.560E-31
	2.743E+01	3.517E-31
	2.791E+01	1.323E-31
	2.840E+01	4.953E-32
	2.888E+01	1.825E-32
	2.936E+01	6.596E-33
	2.984E+01	2.334E-33
	3.033E+01	8.084E-34
	3.081E+01	2.739E-34
	3.129E+01	9.072E-35
55	0.000E+00	1.000E+00
	4.800E-01	7.651E-01
	9.600E-01	5.420E-01
	1.440E+00	3.533E-01
	1.920E+00	2.110E-01
	2.400E+00	1.149E-01
	2.880E+00	5.689E-02
	3.360E+00	2.556E-02
	3.840E+00	1.039E-02
	4.320E+00	3.821E-03
	4.800E+00	1.268E-03
	5.280E+00	3.794E-04
	5.760E+00	1.023E-04
	6.240E+00	2.483E-05
	6.720E+00	5.421E-06
	7.200E+00	1.065E-06
	7.680E+00	1.879E-07
	8.160E+00	2.981E-08
	8.640E+00	4.249E-09

	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.967E-12
	1.056E+01	9.016E-13
	1.104E+01	2.215E-13
	1.152E+01	9.850E-14
	1.200E+01	5.229E-14
	1.248E+01	2.697E-14
	1.296E+01	1.359E-14
	1.345E+01	6.658E-15
	1.393E+01	3.172E-15
	1.441E+01	1.468E-15
	1.489E+01	6.598E-16
	1.538E+01	2.878E-16
	1.586E+01	1.218E-16
	1.634E+01	5.000E-17
	1.682E+01	1.988E-17
	1.730E+01	7.659E-18
	1.779E+01	2.856E-18
	1.827E+01	1.030E-18
	1.875E+01	3.591E-19
	1.923E+01	1.209E-19
	1.972E+01	3.932E-20
	2.020E+01	1.233E-20
	2.068E+01	3.727E-21
	2.116E+01	1.085E-21
	2.165E+01	3.039E-22
	2.213E+01	8.185E-23
	2.261E+01	2.118E-23
	2.309E+01	5.260E-24
	2.357E+01	1.253E-24
	2.406E+01	2.864E-25
	2.454E+01	6.279E-26
	2.502E+01	1.324E-26
	2.550E+01	2.703E-27
	2.599E+01	5.438E-28
	2.647E+01	1.120E-28
	2.695E+01	2.536E-29
	2.743E+01	6.808E-30
	2.791E+01	2.205E-30
	2.840E+01	8.115E-31
	2.888E+01	3.161E-31
	2.936E+01	1.247E-31
	2.984E+01	4.888E-32
	3.033E+01	1.887E-32
	3.081E+01	7.156E-33
	3.129E+01	2.662E-33

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_ExtendedRun

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

	2.400E+00	4.368E-08
	2.880E+00	4.885E-11
	3.360E+00	1.037E-13
	3.840E+00	9.638E-15
	4.320E+00	7.843E-16
	4.800E+00	4.641E-17
	5.280E+00	1.960E-18
	5.760E+00	5.783E-20
	6.240E+00	1.164E-21
	6.720E+00	1.553E-23
	7.200E+00	1.336E-25
	7.680E+00	7.408E-28
	8.160E+00	4.152E-30
	8.640E+00	1.022E-31
	9.120E+00	4.221E-33
	9.600E+00	1.474E-34
	1.008E+01	4.135E-36
	1.056E+01	9.227E-38
	1.104E+01	1.619E-39
	1.152E+01	2.210E-41
	1.200E+01	2.440E-43
	1.248E+01	2.078E-45
	1.296E+01	2.050E-47
	1.345E+01	4.107E-49
	1.393E+01	1.173E-50
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.538E+01	0.000E+00
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.248E+01	1.905E-25
	1.296E+01	9.961E-27
	1.345E+01	4.599E-28
	1.393E+01	2.189E-29
	1.441E+01	1.653E-30
	1.489E+01	2.239E-31
	1.538E+01	3.623E-32
	1.586E+01	5.716E-33
	1.634E+01	8.453E-34
	1.682E+01	1.163E-34
	1.730E+01	1.486E-35
	1.779E+01	1.758E-36
	1.827E+01	1.923E-37
	1.875E+01	1.940E-38
	1.923E+01	1.802E-39
	1.972E+01	1.537E-40
	2.020E+01	1.203E-41
	2.068E+01	8.647E-43
	2.116E+01	5.763E-44
	2.165E+01	3.677E-45
	2.213E+01	2.449E-46
	2.261E+01	1.979E-47
	2.309E+01	2.100E-48
	2.357E+01	2.648E-49
	2.406E+01	3.480E-50
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
	1.920E+00	5.605E-02
	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16
	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.248E+01	3.811E-19
	1.296E+01	7.543E-20
	1.345E+01	1.382E-20
	1.393E+01	2.335E-21
	1.441E+01	3.635E-22
	1.489E+01	5.194E-23
	1.538E+01	6.795E-24
	1.586E+01	8.122E-25
	1.634E+01	8.855E-26
	1.682E+01	8.831E-27
	1.730E+01	8.198E-28
	1.779E+01	7.583E-29
	1.827E+01	8.408E-30
	1.875E+01	1.377E-30
	1.923E+01	3.071E-31
	1.972E+01	7.550E-32

	2.020E+01	1.846E-32
	2.068E+01	4.362E-33
	2.116E+01	9.891E-34
	2.165E+01	2.147E-34
	2.213E+01	4.459E-35
	2.261E+01	8.846E-36
	2.309E+01	1.676E-36
	2.357E+01	3.027E-37
	2.406E+01	5.209E-38
	2.454E+01	8.531E-39
	2.502E+01	1.329E-39
	2.550E+01	1.966E-40
	2.599E+01	2.761E-41
	2.647E+01	3.685E-42
	2.695E+01	4.684E-43
	2.743E+01	5.716E-44
	2.791E+01	6.827E-45
	2.840E+01	8.322E-46
	2.888E+01	1.110E-46
	2.936E+01	1.731E-47
	2.984E+01	3.169E-48
	3.033E+01	6.406E-49
	3.081E+01	1.340E-49
	3.129E+01	2.793E-50
35	0.000E+00	1.000E+00
	4.800E-01	7.006E-01
	9.600E-01	4.337E-01
	1.440E+00	2.346E-01
	1.920E+00	1.100E-01
	2.400E+00	4.443E-02
	2.880E+00	1.538E-02
	3.360E+00	4.547E-03
	3.840E+00	1.145E-03
	4.320E+00	2.451E-04
	4.800E+00	4.452E-05
	5.280E+00	6.852E-06
	5.760E+00	8.927E-07
	6.240E+00	9.837E-08
	6.720E+00	9.162E-09
	7.200E+00	7.219E-10
	7.680E+00	4.860E-11
	8.160E+00	3.069E-12
	8.640E+00	3.171E-13
	9.120E+00	9.445E-14
	9.600E+00	4.044E-14
	1.008E+01	1.740E-14
	1.056E+01	7.194E-15
	1.104E+01	2.849E-15
	1.152E+01	1.083E-15
	1.200E+01	4.061E-16
	1.248E+01	1.399E-16
	1.296E+01	4.591E-17
	1.345E+01	1.434E-17
	1.393E+01	4.262E-18
	1.441E+01	1.203E-18
	1.489E+01	3.220E-19

	1.538E+01	8.164E-20
	1.586E+01	1.958E-20
	1.634E+01	4.437E-21
	1.682E+01	9.480E-22
	1.730E+01	1.907E-22
	1.779E+01	3.606E-23
	1.827E+01	6.400E-24
	1.875E+01	1.065E-24
	1.923E+01	1.658E-25
	1.972E+01	2.421E-26
	2.020E+01	3.336E-27
	2.068E+01	4.437E-28
	2.116E+01	6.086E-29
	2.165E+01	9.850E-30
	2.213E+01	2.127E-30
	2.261E+01	5.837E-31
	2.309E+01	1.773E-31
	2.357E+01	5.466E-32
	2.406E+01	1.658E-32
	2.454E+01	4.894E-33
	2.502E+01	1.402E-33
	2.550E+01	3.896E-34
	2.599E+01	1.049E-34
	2.647E+01	2.733E-35
	2.695E+01	6.891E-36
	2.743E+01	1.681E-36
	2.791E+01	3.962E-37
	2.840E+01	9.023E-38
	2.888E+01	1.984E-38
	2.936E+01	4.207E-39
	2.984E+01	8.605E-40
	3.033E+01	1.696E-40
	3.081E+01	3.222E-41
	3.129E+01	5.901E-42
45	0.000E+00	1.000E+00
	4.800E-01	7.380E-01
	9.600E-01	4.953E-01
	1.440E+00	2.999E-01
	1.920E+00	1.628E-01
	2.400E+00	7.884E-02
	2.880E+00	3.394E-02
	3.360E+00	1.295E-02
	3.840E+00	4.369E-03
	4.320E+00	1.301E-03
	4.800E+00	3.413E-04
	5.280E+00	7.884E-05
	5.760E+00	1.602E-05
	6.240E+00	2.859E-06
	6.720E+00	4.481E-07
	7.200E+00	6.164E-08
	7.680E+00	7.440E-09
	8.160E+00	7.886E-10
	8.640E+00	7.389E-11
	9.120E+00	6.430E-12
	9.600E+00	6.905E-13
	1.008E+01	1.666E-13

	1.056E+01	7.256E-14
	1.104E+01	3.501E-14
	1.152E+01	1.670E-14
	1.200E+01	7.925E-15
	1.248E+01	3.512E-15
	1.296E+01	1.503E-15
	1.345E+01	6.206E-16
	1.393E+01	2.471E-16
	1.441E+01	9.480E-17
	1.489E+01	3.502E-17
	1.538E+01	1.245E-17
	1.586E+01	4.254E-18
	1.634E+01	1.397E-18
	1.682E+01	4.400E-19
	1.730E+01	1.329E-19
	1.779E+01	3.847E-20
	1.827E+01	1.066E-20
	1.875E+01	2.821E-21
	1.923E+01	7.133E-22
	1.972E+01	1.720E-22
	2.020E+01	3.954E-23
	2.068E+01	8.648E-24
	2.116E+01	1.798E-24
	2.165E+01	3.554E-25
	2.213E+01	6.675E-26
	2.261E+01	1.195E-26
	2.309E+01	2.055E-27
	2.357E+01	3.479E-28
	2.406E+01	6.139E-29
	2.454E+01	1.249E-29
	2.502E+01	3.187E-30
	2.550E+01	9.940E-31
	2.599E+01	3.436E-31
	2.647E+01	1.223E-31
	2.695E+01	4.333E-32
	2.743E+01	1.508E-32
	2.791E+01	5.136E-33
	2.840E+01	1.709E-33
	2.888E+01	5.549E-34
	2.936E+01	1.758E-34
	2.984E+01	5.433E-35
	3.033E+01	1.637E-35
	3.081E+01	4.806E-36
	3.129E+01	1.375E-36
55	0.000E+00	1.000E+00
	4.800E-01	7.651E-01
	9.600E-01	5.420E-01
	1.440E+00	3.533E-01
	1.920E+00	2.110E-01
	2.400E+00	1.149E-01
	2.880E+00	5.689E-02
	3.360E+00	2.556E-02
	3.840E+00	1.039E-02
	4.320E+00	3.821E-03
	4.800E+00	1.268E-03
	5.280E+00	3.794E-04

	5.760E+00	1.023E-04
	6.240E+00	2.483E-05
	6.720E+00	5.421E-06
	7.200E+00	1.065E-06
	7.680E+00	1.879E-07
	8.160E+00	2.981E-08
	8.640E+00	4.249E-09
	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.967E-12
	1.056E+01	9.016E-13
	1.104E+01	2.215E-13
	1.152E+01	9.850E-14
	1.200E+01	5.229E-14
	1.248E+01	2.697E-14
	1.296E+01	1.359E-14
	1.345E+01	6.658E-15
	1.393E+01	3.172E-15
	1.441E+01	1.468E-15
	1.489E+01	6.598E-16
	1.538E+01	2.878E-16
	1.586E+01	1.218E-16
	1.634E+01	5.000E-17
	1.682E+01	1.988E-17
	1.730E+01	7.659E-18
	1.779E+01	2.856E-18
	1.827E+01	1.030E-18
	1.875E+01	3.591E-19
	1.923E+01	1.209E-19
	1.972E+01	3.932E-20
	2.020E+01	1.233E-20
	2.068E+01	3.727E-21
	2.116E+01	1.085E-21
	2.165E+01	3.039E-22
	2.213E+01	8.185E-23
	2.261E+01	2.118E-23
	2.309E+01	5.260E-24
	2.357E+01	1.253E-24
	2.406E+01	2.864E-25
	2.454E+01	6.279E-26
	2.502E+01	1.324E-26
	2.550E+01	2.703E-27
	2.599E+01	5.438E-28
	2.647E+01	1.120E-28
	2.695E+01	2.536E-29
	2.743E+01	6.808E-30
	2.791E+01	2.205E-30
	2.840E+01	8.115E-31
	2.888E+01	3.161E-31
	2.936E+01	1.247E-31
	2.984E+01	4.888E-32
	3.033E+01	1.887E-32
	3.081E+01	7.156E-33
	3.129E+01	2.662E-33
85	0.000E+00	1.000E+00
	4.800E-01	8.161E-01

	9.600E-01	6.342E-01
	1.440E+00	4.678E-01
	1.920E+00	3.265E-01
	2.400E+00	2.152E-01
	2.880E+00	1.336E-01
	3.360E+00	7.805E-02
	3.840E+00	4.283E-02
	4.320E+00	2.205E-02
	4.800E+00	1.064E-02
	5.280E+00	4.813E-03
	5.760E+00	2.037E-03
	6.240E+00	8.062E-04
	6.720E+00	2.984E-04
	7.200E+00	1.032E-04
	7.680E+00	3.337E-05
	8.160E+00	1.007E-05
	8.640E+00	2.839E-06
	9.120E+00	7.470E-07
	9.600E+00	1.834E-07
	1.008E+01	4.203E-08
	1.056E+01	8.987E-09
	1.104E+01	1.794E-09
	1.152E+01	3.350E-10
	1.200E+01	6.126E-11
	1.248E+01	1.037E-11
	1.296E+01	1.895E-12
	1.345E+01	4.859E-13
	1.393E+01	2.040E-13
	1.441E+01	1.127E-13
	1.489E+01	6.674E-14
	1.538E+01	3.955E-14
	1.586E+01	2.312E-14
	1.634E+01	1.328E-14
	1.682E+01	7.490E-15
	1.730E+01	4.148E-15
	1.779E+01	2.255E-15
	1.827E+01	1.203E-15
	1.875E+01	6.295E-16
	1.923E+01	3.231E-16
	1.972E+01	1.626E-16
	2.020E+01	8.021E-17
	2.068E+01	3.877E-17
	2.116E+01	1.836E-17
	2.165E+01	8.518E-18
	2.213E+01	3.868E-18
	2.261E+01	1.719E-18
	2.309E+01	7.476E-19
	2.357E+01	3.180E-19
	2.406E+01	1.322E-19
	2.454E+01	5.373E-20
	2.502E+01	2.133E-20
	2.550E+01	8.269E-21
	2.599E+01	3.129E-21
	2.647E+01	1.155E-21
	2.695E+01	4.160E-22
	2.743E+01	1.461E-22
	2.791E+01	4.996E-23

	2.840E+01	1.665E-23
	2.888E+01	5.401E-24
	2.936E+01	1.706E-24
	2.984E+01	5.243E-25
	3.033E+01	1.569E-25
	3.081E+01	4.573E-26
	3.129E+01	1.302E-26

POLLUTEv7

Version 7.13

BAB_Darcy

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00203 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.899E-01
	9.600E-01	3.170E-02
	1.440E+00	1.173E-03
	1.920E+00	1.395E-05

	2.400E+00	5.182E-08
	2.880E+00	5.999E-11
	3.360E+00	1.314E-13
	3.840E+00	1.263E-14
	4.320E+00	1.064E-15
	4.800E+00	6.514E-17
	5.280E+00	2.848E-18
	5.760E+00	8.699E-20
	6.240E+00	1.812E-21
	6.720E+00	2.503E-23
	7.200E+00	2.229E-25
	7.680E+00	1.279E-27
	8.160E+00	7.406E-30
	8.640E+00	1.881E-31
	9.120E+00	8.046E-33
	9.600E+00	2.907E-34
	1.008E+01	8.446E-36
	1.056E+01	1.951E-37
	1.104E+01	3.543E-39
	1.152E+01	5.008E-41
	1.200E+01	5.723E-43
	1.248E+01	5.059E-45
	1.296E+01	5.171E-47
	1.345E+01	1.074E-48
	1.393E+01	3.182E-50
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.538E+01	0.000E+00
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.667E-01
	9.600E-01	1.368E-01
	1.440E+00	2.392E-02
	1.920E+00	2.422E-03
	2.400E+00	1.393E-04
	2.880E+00	4.505E-06
	3.360E+00	8.123E-08
	3.840E+00	8.141E-10
	4.320E+00	4.946E-12
	4.800E+00	1.302E-13
	5.280E+00	2.603E-14
	5.760E+00	5.001E-15
	6.240E+00	8.235E-16
	6.720E+00	1.154E-16
	7.200E+00	1.368E-17
	7.680E+00	1.362E-18
	8.160E+00	1.129E-19
	8.640E+00	7.730E-21
	9.120E+00	4.326E-22
	9.600E+00	1.960E-23
	1.008E+01	7.110E-25
	1.056E+01	2.058E-26
	1.104E+01	4.950E-28
	1.152E+01	1.367E-29
	1.200E+01	9.120E-31
	1.248E+01	9.788E-32
	1.296E+01	1.054E-32
	1.345E+01	1.030E-33
	1.393E+01	9.032E-35
	1.441E+01	7.071E-36
	1.489E+01	4.924E-37
	1.538E+01	3.039E-38
	1.586E+01	1.655E-39
	1.634E+01	7.928E-41
	1.682E+01	3.340E-42
	1.730E+01	1.252E-43
	1.779E+01	4.434E-45
	1.827E+01	1.780E-46
	1.875E+01	1.037E-47
	1.923E+01	8.241E-49
	1.972E+01	7.051E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.613E-01
	9.600E-01	2.330E-01
	1.440E+00	6.923E-02
	1.920E+00	1.443E-02
	2.400E+00	2.080E-03
	2.880E+00	2.056E-04
	3.360E+00	1.385E-05
	3.840E+00	6.325E-07
	4.320E+00	1.954E-08
	4.800E+00	4.085E-10
	5.280E+00	6.240E-12
	5.760E+00	2.330E-13
	6.240E+00	5.558E-14
	6.720E+00	1.544E-14
	7.200E+00	3.900E-15
	7.680E+00	8.876E-16
	8.160E+00	1.814E-16
	8.640E+00	3.318E-17
	9.120E+00	5.408E-18
	9.600E+00	7.826E-19
	1.008E+01	1.001E-19
	1.056E+01	1.125E-20
	1.104E+01	1.106E-21
	1.152E+01	9.464E-23
	1.200E+01	7.294E-24
	1.248E+01	4.610E-25
	1.296E+01	2.503E-26
	1.345E+01	1.199E-27
	1.393E+01	5.909E-29
	1.441E+01	4.600E-30
	1.489E+01	6.445E-31
	1.538E+01	1.082E-31
	1.586E+01	1.772E-32
	1.634E+01	2.722E-33
	1.682E+01	3.890E-34
	1.730E+01	5.160E-35
	1.779E+01	6.341E-36
	1.827E+01	7.203E-37
	1.875E+01	7.548E-38
	1.923E+01	7.281E-39
	1.972E+01	6.450E-40

	2.020E+01	5.243E-41
	2.068E+01	3.914E-42
	2.116E+01	2.708E-43
	2.165E+01	1.792E-44
	2.213E+01	1.236E-45
	2.261E+01	1.032E-46
	2.309E+01	1.132E-47
	2.357E+01	1.479E-48
	2.406E+01	2.017E-49
	2.454E+01	2.688E-50
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	6.220E-01
	9.600E-01	3.097E-01
	1.440E+00	1.207E-01
	1.920E+00	3.624E-02
	2.400E+00	8.296E-03
	2.880E+00	1.437E-03
	3.360E+00	1.873E-04
	3.840E+00	1.830E-05
	4.320E+00	1.337E-06
	4.800E+00	7.288E-08
	5.280E+00	2.960E-09
	5.760E+00	9.038E-11
	6.240E+00	2.454E-12
	6.720E+00	2.092E-13
	7.200E+00	6.417E-14
	7.680E+00	2.148E-14
	8.160E+00	6.709E-15
	8.640E+00	1.939E-15
	9.120E+00	5.176E-16
	9.600E+00	1.273E-16
	1.008E+01	2.878E-17
	1.056E+01	5.965E-18
	1.104E+01	1.131E-18
	1.152E+01	1.955E-19
	1.200E+01	3.197E-20
	1.248E+01	4.532E-21
	1.296E+01	5.791E-22
	1.345E+01	6.648E-23
	1.393E+01	6.829E-24
	1.441E+01	6.259E-25
	1.489E+01	5.118E-26

	1.538E+01	3.783E-27
	1.586E+01	2.704E-28
	1.634E+01	2.336E-29
	1.682E+01	3.250E-30
	1.730E+01	6.459E-31
	1.779E+01	1.395E-31
	1.827E+01	2.945E-32
	1.875E+01	5.923E-33
	1.923E+01	1.129E-33
	1.972E+01	2.038E-34
	2.020E+01	3.474E-35
	2.068E+01	5.590E-36
	2.116E+01	8.475E-37
	2.165E+01	1.209E-37
	2.213E+01	1.621E-38
	2.261E+01	2.040E-39
	2.309E+01	2.407E-40
	2.357E+01	2.662E-41
	2.406E+01	2.767E-42
	2.454E+01	2.728E-43
	2.502E+01	2.618E-44
	2.550E+01	2.598E-45
	2.599E+01	2.946E-46
	2.647E+01	4.109E-47
	2.695E+01	6.794E-48
	2.743E+01	1.211E-48
	2.791E+01	2.174E-49
	2.840E+01	3.811E-50
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.650E-01
	9.600E-01	3.710E-01
	1.440E+00	1.707E-01
	1.920E+00	6.399E-02
	2.400E+00	1.936E-02
	2.880E+00	4.702E-03
	3.360E+00	9.118E-04
	3.840E+00	1.407E-04
	4.320E+00	1.724E-05
	4.800E+00	1.674E-06
	5.280E+00	1.286E-07
	5.760E+00	7.805E-09
	6.240E+00	3.753E-10
	6.720E+00	1.488E-11
	7.200E+00	7.609E-13
	7.680E+00	1.541E-13
	8.160E+00	5.784E-14
	8.640E+00	2.173E-14
	9.120E+00	7.705E-15
	9.600E+00	2.568E-15
	1.008E+01	8.033E-16

	1.056E+01	2.354E-16
	1.104E+01	6.455E-17
	1.152E+01	1.656E-17
	1.200E+01	4.109E-18
	1.248E+01	9.107E-19
	1.296E+01	1.872E-19
	1.345E+01	3.561E-20
	1.393E+01	6.251E-21
	1.441E+01	1.010E-21
	1.489E+01	1.499E-22
	1.538E+01	2.037E-23
	1.586E+01	2.529E-24
	1.634E+01	2.864E-25
	1.682E+01	2.965E-26
	1.730E+01	2.856E-27
	1.779E+01	2.735E-28
	1.827E+01	3.124E-29
	1.875E+01	5.263E-30
	1.923E+01	1.214E-30
	1.972E+01	3.094E-31
	2.020E+01	7.855E-32
	2.068E+01	1.927E-32
	2.116E+01	4.539E-33
	2.165E+01	1.023E-33
	2.213E+01	2.207E-34
	2.261E+01	4.548E-35
	2.309E+01	8.947E-36
	2.357E+01	1.679E-36
	2.406E+01	3.000E-37
	2.454E+01	5.105E-38
	2.502E+01	8.257E-39
	2.550E+01	1.269E-39
	2.599E+01	1.852E-40
	2.647E+01	2.567E-41
	2.695E+01	3.388E-42
	2.743E+01	4.290E-43
	2.791E+01	5.313E-44
	2.840E+01	6.703E-45
	2.888E+01	9.228E-46
	2.936E+01	1.484E-46
	2.984E+01	2.806E-47
	3.033E+01	5.872E-48
	3.081E+01	1.274E-48
	3.129E+01	2.757E-49
30	0.000E+00	1.000E+00
	4.800E-01	6.974E-01
	9.600E-01	4.209E-01
	1.440E+00	2.168E-01
	1.920E+00	9.438E-02
	2.400E+00	3.445E-02
	2.880E+00	1.049E-02
	3.360E+00	2.653E-03
	3.840E+00	5.557E-04
	4.320E+00	9.615E-05
	4.800E+00	1.372E-05
	5.280E+00	1.613E-06

	5.760E+00	1.559E-07
	6.240E+00	1.239E-08
	6.720E+00	8.099E-10
	7.200E+00	4.430E-11
	7.680E+00	2.413E-12
	8.160E+00	3.099E-13
	8.640E+00	1.102E-13
	9.120E+00	4.621E-14
	9.600E+00	1.874E-14
	1.008E+01	7.231E-15
	1.056E+01	2.649E-15
	1.104E+01	9.205E-16
	1.152E+01	3.039E-16
	1.200E+01	9.825E-17
	1.248E+01	2.890E-17
	1.296E+01	8.014E-18
	1.345E+01	2.093E-18
	1.393E+01	5.136E-19
	1.441E+01	1.183E-19
	1.489E+01	2.551E-20
	1.538E+01	5.143E-21
	1.586E+01	9.675E-22
	1.634E+01	1.694E-22
	1.682E+01	2.757E-23
	1.730E+01	4.161E-24
	1.779E+01	5.817E-25
	1.827E+01	7.539E-26
	1.875E+01	9.134E-27
	1.923E+01	1.067E-27
	1.972E+01	1.322E-28
	2.020E+01	2.076E-29
	2.068E+01	4.582E-30
	2.116E+01	1.251E-30
	2.165E+01	3.628E-31
	2.213E+01	1.044E-31
	2.261E+01	2.919E-32
	2.309E+01	7.887E-33
	2.357E+01	2.056E-33
	2.406E+01	5.165E-34
	2.454E+01	1.250E-34
	2.502E+01	2.910E-35
	2.550E+01	6.518E-36
	2.599E+01	1.403E-36
	2.647E+01	2.899E-37
	2.695E+01	5.747E-38
	2.743E+01	1.092E-38
	2.791E+01	1.990E-39
	2.840E+01	3.470E-40
	2.888E+01	5.799E-41
	2.936E+01	9.295E-42
	2.984E+01	1.436E-42
	3.033E+01	2.158E-43
	3.081E+01	3.230E-44
	3.129E+01	5.017E-45
35	0.000E+00	1.000E+00
	4.800E-01	7.231E-01

	9.600E-01	4.624E-01
	1.440E+00	2.586E-01
	1.920E+00	1.254E-01
	2.400E+00	5.238E-02
	2.880E+00	1.876E-02
	3.360E+00	5.738E-03
	3.840E+00	1.495E-03
	4.320E+00	3.312E-04
	4.800E+00	6.226E-05
	5.280E+00	9.918E-06
	5.760E+00	1.337E-06
	6.240E+00	1.525E-07
	6.720E+00	1.470E-08
	7.200E+00	1.199E-09
	7.680E+00	8.351E-11
	8.160E+00	5.441E-12
	8.640E+00	5.737E-13
	9.120E+00	1.751E-13
	9.600E+00	7.746E-14
	1.008E+01	3.448E-14
	1.056E+01	1.476E-14
	1.104E+01	6.048E-15
	1.152E+01	2.380E-15
	1.200E+01	9.237E-16
	1.248E+01	3.303E-16
	1.296E+01	1.125E-16
	1.345E+01	3.651E-17
	1.393E+01	1.126E-17
	1.441E+01	3.301E-18
	1.489E+01	9.176E-19
	1.538E+01	2.416E-19
	1.586E+01	6.019E-20
	1.634E+01	1.416E-20
	1.682E+01	3.143E-21
	1.730E+01	6.567E-22
	1.779E+01	1.290E-22
	1.827E+01	2.377E-23
	1.875E+01	4.107E-24
	1.923E+01	6.644E-25
	1.972E+01	1.007E-25
	2.020E+01	1.441E-26
	2.068E+01	1.987E-27
	2.116E+01	2.815E-28
	2.165E+01	4.682E-29
	2.213E+01	1.038E-29
	2.261E+01	2.939E-30
	2.309E+01	9.246E-31
	2.357E+01	2.959E-31
	2.406E+01	9.317E-32
	2.454E+01	2.857E-32
	2.502E+01	8.502E-33
	2.550E+01	2.453E-33
	2.599E+01	6.858E-34
	2.647E+01	1.856E-34
	2.695E+01	4.862E-35
	2.743E+01	1.232E-35
	2.791E+01	3.017E-36

	2.840E+01	7.136E-37
	2.888E+01	1.630E-37
	2.936E+01	3.590E-38
	2.984E+01	7.628E-39
	3.033E+01	1.562E-39
	3.081E+01	3.082E-40
	3.129E+01	5.863E-41
40	0.000E+00	1.000E+00
	4.800E-01	7.440E-01
	9.600E-01	4.975E-01
	1.440E+00	2.962E-01
	1.920E+00	1.559E-01
	2.400E+00	7.209E-02
	2.880E+00	2.917E-02
	3.360E+00	1.030E-02
	3.840E+00	3.163E-03
	4.320E+00	8.434E-04
	4.800E+00	1.950E-04
	5.280E+00	3.901E-05
	5.760E+00	6.753E-06
	6.240E+00	1.010E-06
	6.720E+00	1.305E-07
	7.200E+00	1.455E-08
	7.680E+00	1.401E-09
	8.160E+00	1.174E-10
	8.640E+00	9.096E-12
	9.120E+00	9.416E-13
	9.600E+00	2.497E-13
	1.008E+01	1.121E-13
	1.056E+01	5.331E-14
	1.104E+01	2.466E-14
	1.152E+01	1.104E-14
	1.200E+01	4.898E-15
	1.248E+01	2.020E-15
	1.296E+01	8.002E-16
	1.345E+01	3.041E-16
	1.393E+01	1.108E-16
	1.441E+01	3.866E-17
	1.489E+01	1.291E-17
	1.538E+01	4.121E-18
	1.586E+01	1.256E-18
	1.634E+01	3.652E-19
	1.682E+01	1.012E-19
	1.730E+01	2.667E-20
	1.779E+01	6.684E-21
	1.827E+01	1.590E-21
	1.875E+01	3.584E-22
	1.923E+01	7.651E-23
	1.972E+01	1.544E-23
	2.020E+01	2.943E-24
	2.068E+01	5.295E-25
	2.116E+01	9.008E-26
	2.165E+01	1.458E-26
	2.213E+01	2.293E-27
	2.261E+01	3.700E-28
	2.309E+01	6.834E-29

	2.357E+01	1.617E-29
	2.406E+01	4.823E-30
	2.454E+01	1.619E-30
	2.502E+01	5.606E-31
	2.550E+01	1.926E-31
	2.599E+01	6.481E-32
	2.647E+01	2.127E-32
	2.695E+01	6.796E-33
	2.743E+01	2.113E-33
	2.791E+01	6.389E-34
	2.840E+01	1.878E-34
	2.888E+01	5.363E-35
	2.936E+01	1.487E-35
	2.984E+01	4.004E-36
	3.033E+01	1.046E-36
	3.081E+01	2.648E-37
	3.129E+01	6.501E-38
45	0.000E+00	1.000E+00
	4.800E-01	7.614E-01
	9.600E-01	5.277E-01
	1.440E+00	3.301E-01
	1.920E+00	1.852E-01
	2.400E+00	9.278E-02
	2.880E+00	4.131E-02
	3.360E+00	1.631E-02
	3.840E+00	5.692E-03
	4.320E+00	1.754E-03
	4.800E+00	4.762E-04
	5.280E+00	1.138E-04
	5.760E+00	2.393E-05
	6.240E+00	4.420E-06
	6.720E+00	7.171E-07
	7.200E+00	1.021E-07
	7.680E+00	1.275E-08
	8.160E+00	1.399E-09
	8.640E+00	1.356E-10
	9.120E+00	1.219E-11
	9.600E+00	1.339E-12
	1.008E+01	3.286E-13
	1.056E+01	1.473E-13
	1.104E+01	7.351E-14
	1.152E+01	3.628E-14
	1.200E+01	1.782E-14
	1.248E+01	8.196E-15
	1.296E+01	3.641E-15
	1.345E+01	1.561E-15
	1.393E+01	6.451E-16
	1.441E+01	2.570E-16
	1.489E+01	9.857E-17
	1.538E+01	3.638E-17
	1.586E+01	1.291E-17
	1.634E+01	4.401E-18
	1.682E+01	1.440E-18
	1.730E+01	4.518E-19
	1.779E+01	1.358E-19
	1.827E+01	3.906E-20

	1.875E+01	1.074E-20
	1.923E+01	2.821E-21
	1.972E+01	7.066E-22
	2.020E+01	1.687E-22
	2.068E+01	3.832E-23
	2.116E+01	8.278E-24
	2.165E+01	1.699E-24
	2.213E+01	3.314E-25
	2.261E+01	6.159E-26
	2.309E+01	1.099E-26
	2.357E+01	1.927E-27
	2.406E+01	3.507E-28
	2.454E+01	7.318E-29
	2.502E+01	1.914E-29
	2.550E+01	6.144E-30
	2.599E+01	2.197E-30
	2.647E+01	8.112E-31
	2.695E+01	2.983E-31
	2.743E+01	1.078E-31
	2.791E+01	3.814E-32
	2.840E+01	1.318E-32
	2.888E+01	4.445E-33
	2.936E+01	1.463E-33
	2.984E+01	4.696E-34
	3.033E+01	1.470E-34
	3.081E+01	4.482E-35
	3.129E+01	1.332E-35
50	0.000E+00	1.000E+00
	4.800E-01	7.762E-01
	9.600E-01	5.539E-01
	1.440E+00	3.607E-01
	1.920E+00	2.132E-01
	2.400E+00	1.139E-01
	2.880E+00	5.476E-02
	3.360E+00	2.364E-02
	3.840E+00	9.143E-03
	4.320E+00	3.163E-03
	4.800E+00	9.770E-04
	5.280E+00	2.693E-04
	5.760E+00	6.613E-05
	6.240E+00	1.446E-05
	6.720E+00	2.816E-06
	7.200E+00	4.876E-07
	7.680E+00	7.507E-08
	8.160E+00	1.027E-08
	8.640E+00	1.251E-09
	9.120E+00	1.365E-10
	9.600E+00	1.391E-11
	1.008E+01	1.669E-12
	1.056E+01	4.032E-13
	1.104E+01	1.809E-13
	1.152E+01	9.410E-14
	1.200E+01	4.991E-14
	1.248E+01	2.502E-14
	1.296E+01	1.217E-14
	1.345E+01	5.733E-15

	1.393E+01	2.617E-15
	1.441E+01	1.156E-15
	1.489E+01	4.944E-16
	1.538E+01	2.044E-16
	1.586E+01	8.168E-17
	1.634E+01	3.152E-17
	1.682E+01	1.174E-17
	1.730E+01	4.214E-18
	1.779E+01	1.458E-18
	1.827E+01	4.859E-19
	1.875E+01	1.558E-19
	1.923E+01	4.799E-20
	1.972E+01	1.420E-20
	2.020E+01	4.032E-21
	2.068E+01	1.097E-21
	2.116E+01	2.860E-22
	2.165E+01	7.131E-23
	2.213E+01	1.700E-23
	2.261E+01	3.870E-24
	2.309E+01	8.415E-25
	2.357E+01	1.749E-25
	2.406E+01	3.488E-26
	2.454E+01	6.750E-27
	2.502E+01	1.304E-27
	2.550E+01	2.672E-28
	2.599E+01	6.367E-29
	2.647E+01	1.873E-29
	2.695E+01	6.539E-30
	2.743E+01	2.489E-30
	2.791E+01	9.711E-31
	2.840E+01	3.774E-31
	2.888E+01	1.444E-31
	2.936E+01	5.421E-32
	2.984E+01	1.993E-32
	3.033E+01	7.168E-33
	3.081E+01	2.522E-33
	3.129E+01	8.679E-34
55	0.000E+00	1.000E+00
	4.800E-01	7.890E-01
	9.600E-01	5.770E-01
	1.440E+00	3.885E-01
	1.920E+00	2.397E-01
	2.400E+00	1.350E-01
	2.880E+00	6.913E-02
	3.360E+00	3.212E-02
	3.840E+00	1.351E-02
	4.320E+00	5.140E-03
	4.800E+00	1.765E-03
	5.280E+00	5.465E-04
	5.760E+00	1.525E-04
	6.240E+00	3.829E-05
	6.720E+00	8.654E-06
	7.200E+00	1.759E-06
	7.680E+00	3.213E-07
	8.160E+00	5.276E-08
	8.640E+00	7.783E-09

	9.120E+00	1.033E-09
	9.600E+00	1.242E-10
	1.008E+01	1.410E-11
	1.056E+01	1.866E-12
	1.104E+01	4.650E-13
	1.152E+01	2.121E-13
	1.200E+01	1.163E-13
	1.248E+01	6.223E-14
	1.296E+01	3.253E-14
	1.345E+01	1.655E-14
	1.393E+01	8.183E-15
	1.441E+01	3.931E-15
	1.489E+01	1.834E-15
	1.538E+01	8.309E-16
	1.586E+01	3.651E-16
	1.634E+01	1.556E-16
	1.682E+01	6.425E-17
	1.730E+01	2.570E-17
	1.779E+01	9.949E-18
	1.827E+01	3.726E-18
	1.875E+01	1.349E-18
	1.923E+01	4.719E-19
	1.972E+01	1.593E-19
	2.020E+01	5.190E-20
	2.068E+01	1.629E-20
	2.116E+01	4.927E-21
	2.165E+01	1.433E-21
	2.213E+01	4.010E-22
	2.261E+01	1.078E-22
	2.309E+01	2.781E-23
	2.357E+01	6.882E-24
	2.406E+01	1.634E-24
	2.454E+01	3.720E-25
	2.502E+01	8.142E-26
	2.550E+01	1.725E-26
	2.599E+01	3.592E-27
	2.647E+01	7.637E-28
	2.695E+01	1.774E-28
	2.743E+01	4.871E-29
	2.791E+01	1.617E-29
	2.840E+01	6.137E-30
	2.888E+01	2.475E-30
	2.936E+01	1.013E-30
	2.984E+01	4.121E-31
	3.033E+01	1.652E-31
	3.081E+01	6.509E-32
	3.129E+01	2.515E-32

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_CoHD_High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.02375 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.02375 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	3.338E-01
	9.600E-01	5.164E-02
	1.440E+00	3.400E-03
	1.920E+00	9.115E-05

	2.400E+00	9.708E-07
	2.880E+00	4.053E-09
	3.360E+00	6.926E-12
	3.840E+00	6.577E-14
	4.320E+00	8.320E-15
	4.800E+00	8.803E-16
	5.280E+00	7.224E-17
	5.760E+00	4.538E-18
	6.240E+00	2.150E-19
	6.720E+00	7.558E-21
	7.200E+00	1.934E-22
	7.680E+00	3.527E-24
	8.160E+00	4.501E-26
	8.640E+00	4.087E-28
	9.120E+00	4.009E-30
	9.600E+00	1.369E-31
	1.008E+01	7.950E-33
	1.056E+01	4.144E-34
	1.104E+01	1.821E-35
	1.152E+01	6.687E-37
	1.200E+01	2.121E-38
	1.248E+01	5.230E-40
	1.296E+01	1.051E-41
	1.345E+01	1.722E-43
	1.393E+01	2.411E-45
	1.441E+01	3.679E-47
	1.489E+01	9.715E-49
	1.538E+01	3.893E-50
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.997E-01
	9.600E-01	1.729E-01
	1.440E+00	3.985E-02
	1.920E+00	5.964E-03
	2.400E+00	5.711E-04
	2.880E+00	3.462E-05
	3.360E+00	1.320E-06
	3.840E+00	3.151E-08
	4.320E+00	4.703E-10
	4.800E+00	4.698E-12
	5.280E+00	1.268E-13
	5.760E+00	2.655E-14
	6.240E+00	6.112E-15
	6.720E+00	1.249E-15
	7.200E+00	2.249E-16
	7.680E+00	3.552E-17
	8.160E+00	4.899E-18
	8.640E+00	5.867E-19
	9.120E+00	6.067E-20
	9.600E+00	5.382E-21
	1.008E+01	4.067E-22
	1.056E+01	2.600E-23
	1.104E+01	1.395E-24
	1.152E+01	6.249E-26
	1.200E+01	2.446E-27
	1.248E+01	8.159E-29
	1.296E+01	3.510E-30
	1.345E+01	3.160E-31
	1.393E+01	4.157E-32
	1.441E+01	5.497E-33
	1.489E+01	6.749E-34
	1.538E+01	7.602E-35
	1.586E+01	7.830E-36
	1.634E+01	7.355E-37
	1.682E+01	6.283E-38
	1.730E+01	4.867E-39
	1.779E+01	3.410E-40
	1.827E+01	2.155E-41
	1.875E+01	1.229E-42
	1.923E+01	6.370E-44
	1.972E+01	3.102E-45
	2.020E+01	1.571E-46
	2.068E+01	1.002E-47
	2.116E+01	8.801E-49
	2.165E+01	9.189E-50
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.854E-01
	9.600E-01	2.699E-01
	1.440E+00	9.561E-02
	1.920E+00	2.561E-02
	2.400E+00	5.127E-03
	2.880E+00	7.616E-04
	3.360E+00	8.346E-05
	3.840E+00	6.721E-06
	4.320E+00	3.966E-07
	4.800E+00	1.711E-08
	5.280E+00	5.399E-10
	5.760E+00	1.283E-11
	6.240E+00	3.836E-13
	6.720E+00	6.447E-14
	7.200E+00	2.010E-14
	7.680E+00	6.005E-15
	8.160E+00	1.655E-15
	8.640E+00	4.196E-16
	9.120E+00	9.755E-17
	9.600E+00	2.075E-17
	1.008E+01	4.027E-18
	1.056E+01	7.111E-19
	1.104E+01	1.139E-19
	1.152E+01	1.649E-20
	1.200E+01	2.238E-21
	1.248E+01	2.595E-22
	1.296E+01	2.685E-23
	1.345E+01	2.469E-24
	1.393E+01	2.011E-25
	1.441E+01	1.450E-26
	1.489E+01	9.391E-28
	1.538E+01	5.897E-29
	1.586E+01	4.633E-30
	1.634E+01	6.093E-31
	1.682E+01	1.123E-31
	1.730E+01	2.202E-32
	1.779E+01	4.173E-33
	1.827E+01	7.498E-34
	1.875E+01	1.272E-34
	1.923E+01	2.033E-35
	1.972E+01	3.058E-36

	2.020E+01	4.322E-37
	2.068E+01	5.730E-38
	2.116E+01	7.115E-39
	2.165E+01	8.263E-40
	2.213E+01	8.963E-41
	2.261E+01	9.074E-42
	2.309E+01	8.583E-43
	2.357E+01	7.635E-44
	2.406E+01	6.513E-45
	2.454E+01	5.607E-46
	2.502E+01	5.374E-47
	2.550E+01	6.342E-48
	2.599E+01	9.145E-49
	2.647E+01	1.458E-49
	2.695E+01	2.364E-50
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	6.396E-01
	9.600E-01	3.430E-01
	1.440E+00	1.516E-01
	1.920E+00	5.455E-02
	2.400E+00	1.585E-02
	2.880E+00	3.693E-03
	3.360E+00	6.872E-04
	3.840E+00	1.018E-04
	4.320E+00	1.197E-05
	4.800E+00	1.115E-06
	5.280E+00	8.214E-08
	5.760E+00	4.784E-09
	6.240E+00	2.208E-10
	6.720E+00	8.406E-12
	7.200E+00	4.163E-13
	7.680E+00	8.183E-14
	8.160E+00	2.952E-14
	8.640E+00	1.064E-14
	9.120E+00	3.621E-15
	9.600E+00	1.158E-15
	1.008E+01	3.474E-16
	1.056E+01	9.769E-17
	1.104E+01	2.570E-17
	1.152E+01	6.322E-18
	1.200E+01	1.505E-18
	1.248E+01	3.188E-19
	1.296E+01	6.263E-20
	1.345E+01	1.138E-20
	1.393E+01	1.910E-21
	1.441E+01	2.950E-22
	1.489E+01	4.183E-23

	1.538E+01	5.432E-24
	1.586E+01	6.442E-25
	1.634E+01	6.971E-26
	1.682E+01	6.899E-27
	1.730E+01	6.356E-28
	1.779E+01	5.837E-29
	1.827E+01	6.430E-30
	1.875E+01	1.046E-30
	1.923E+01	2.317E-31
	1.972E+01	5.653E-32
	2.020E+01	1.372E-32
	2.068E+01	3.217E-33
	2.116E+01	7.239E-34
	2.165E+01	1.560E-34
	2.213E+01	3.214E-35
	2.261E+01	6.328E-36
	2.309E+01	1.189E-36
	2.357E+01	2.132E-37
	2.406E+01	3.641E-38
	2.454E+01	5.919E-39
	2.502E+01	9.147E-40
	2.550E+01	1.343E-40
	2.599E+01	1.872E-41
	2.647E+01	2.480E-42
	2.695E+01	3.128E-43
	2.743E+01	3.788E-44
	2.791E+01	4.491E-45
	2.840E+01	5.435E-46
	2.888E+01	7.199E-47
	2.936E+01	1.115E-47
	2.984E+01	2.028E-48
	3.033E+01	4.069E-49
	3.081E+01	8.449E-50
	3.129E+01	1.748E-50
25	0.000E+00	1.000E+00
	4.800E-01	6.778E-01
	9.600E-01	3.996E-01
	1.440E+00	2.024E-01
	1.920E+00	8.716E-02
	2.400E+00	3.172E-02
	2.880E+00	9.700E-03
	3.360E+00	2.483E-03
	3.840E+00	5.306E-04
	4.320E+00	9.442E-05
	4.800E+00	1.397E-05
	5.280E+00	1.715E-06
	5.760E+00	1.746E-07
	6.240E+00	1.473E-08
	6.720E+00	1.029E-09
	7.200E+00	6.011E-11
	7.680E+00	3.191E-12
	8.160E+00	2.774E-13
	8.640E+00	7.725E-14
	9.120E+00	3.135E-14
	9.600E+00	1.266E-14
	1.008E+01	4.884E-15

	1.056E+01	1.794E-15
	1.104E+01	6.266E-16
	1.152E+01	2.085E-16
	1.200E+01	6.811E-17
	1.248E+01	2.024E-17
	1.296E+01	5.686E-18
	1.345E+01	1.509E-18
	1.393E+01	3.777E-19
	1.441E+01	8.901E-20
	1.489E+01	1.972E-20
	1.538E+01	4.099E-21
	1.586E+01	7.982E-22
	1.634E+01	1.453E-22
	1.682E+01	2.468E-23
	1.730E+01	3.905E-24
	1.779E+01	5.745E-25
	1.827E+01	7.851E-26
	1.875E+01	9.990E-27
	1.923E+01	1.197E-27
	1.972E+01	1.403E-28
	2.020E+01	1.790E-29
	2.068E+01	2.963E-30
	2.116E+01	6.749E-31
	2.165E+01	1.840E-31
	2.213E+01	5.246E-32
	2.261E+01	1.479E-32
	2.309E+01	4.057E-33
	2.357E+01	1.076E-33
	2.406E+01	2.759E-34
	2.454E+01	6.825E-35
	2.502E+01	1.629E-35
	2.550E+01	3.746E-36
	2.599E+01	8.299E-37
	2.647E+01	1.770E-37
	2.695E+01	3.630E-38
	2.743E+01	7.155E-39
	2.791E+01	1.355E-39
	2.840E+01	2.462E-40
	2.888E+01	4.293E-41
	2.936E+01	7.183E-42
	2.984E+01	1.154E-42
	3.033E+01	1.788E-43
	3.081E+01	2.691E-44
	3.129E+01	4.007E-45
30	0.000E+00	1.000E+00
	4.800E-01	7.066E-01
	9.600E-01	4.449E-01
	1.440E+00	2.472E-01
	1.920E+00	1.203E-01
	2.400E+00	5.092E-02
	2.880E+00	1.869E-02
	3.360E+00	5.922E-03
	3.840E+00	1.617E-03
	4.320E+00	3.794E-04
	4.800E+00	7.640E-05
	5.280E+00	1.319E-05

	5.760E+00	1.950E-06
	6.240E+00	2.465E-07
	6.720E+00	2.665E-08
	7.200E+00	2.463E-09
	7.680E+00	1.952E-10
	8.160E+00	1.360E-11
	8.640E+00	1.019E-12
	9.120E+00	1.683E-13
	9.600E+00	6.369E-14
	1.008E+01	2.830E-14
	1.056E+01	1.234E-14
	1.104E+01	5.181E-15
	1.152E+01	2.096E-15
	1.200E+01	8.385E-16
	1.248E+01	3.094E-16
	1.296E+01	1.093E-16
	1.345E+01	3.688E-17
	1.393E+01	1.189E-17
	1.441E+01	3.658E-18
	1.489E+01	1.072E-18
	1.538E+01	2.993E-19
	1.586E+01	7.941E-20
	1.634E+01	2.001E-20
	1.682E+01	4.782E-21
	1.730E+01	1.082E-21
	1.779E+01	2.315E-22
	1.827E+01	4.679E-23
	1.875E+01	8.914E-24
	1.923E+01	1.599E-24
	1.972E+01	2.699E-25
	2.020E+01	4.284E-26
	2.068E+01	6.420E-27
	2.116E+01	9.192E-28
	2.165E+01	1.305E-28
	2.213E+01	2.009E-29
	2.261E+01	3.847E-30
	2.309E+01	9.682E-31
	2.357E+01	2.900E-31
	2.406E+01	9.214E-32
	2.454E+01	2.930E-32
	2.502E+01	9.138E-33
	2.550E+01	2.776E-33
	2.599E+01	8.202E-34
	2.647E+01	2.353E-34
	2.695E+01	6.556E-35
	2.743E+01	1.772E-35
	2.791E+01	4.644E-36
	2.840E+01	1.180E-36
	2.888E+01	2.904E-37
	2.936E+01	6.921E-38
	2.984E+01	1.596E-38
	3.033E+01	3.560E-39
	3.081E+01	7.675E-40
	3.129E+01	1.599E-40
35	0.000E+00	1.000E+00
	4.800E-01	7.292E-01

	9.600E-01	4.821E-01
	1.440E+00	2.866E-01
	1.920E+00	1.523E-01
	2.400E+00	7.192E-02
	2.880E+00	3.008E-02
	3.360E+00	1.111E-02
	3.840E+00	3.615E-03
	4.320E+00	1.034E-03
	4.800E+00	2.598E-04
	5.280E+00	5.721E-05
	5.760E+00	1.104E-05
	6.240E+00	1.865E-06
	6.720E+00	2.755E-07
	7.200E+00	3.559E-08
	7.680E+00	4.019E-09
	8.160E+00	3.973E-10
	8.640E+00	3.479E-11
	9.120E+00	2.932E-12
	9.600E+00	3.622E-13
	1.008E+01	1.086E-13
	1.056E+01	4.930E-14
	1.104E+01	2.334E-14
	1.152E+01	1.082E-14
	1.200E+01	4.982E-15
	1.248E+01	2.138E-15
	1.296E+01	8.845E-16
	1.345E+01	3.527E-16
	1.393E+01	1.354E-16
	1.441E+01	5.004E-17
	1.489E+01	1.778E-17
	1.538E+01	6.069E-18
	1.586E+01	1.989E-18
	1.634E+01	6.250E-19
	1.682E+01	1.882E-19
	1.730E+01	5.426E-20
	1.779E+01	1.496E-20
	1.827E+01	3.939E-21
	1.875E+01	9.897E-22
	1.923E+01	2.370E-22
	1.972E+01	5.403E-23
	2.020E+01	1.171E-23
	2.068E+01	2.412E-24
	2.116E+01	4.713E-25
	2.165E+01	8.738E-26
	2.213E+01	1.540E-26
	2.261E+01	2.593E-27
	2.309E+01	4.252E-28
	2.357E+01	7.107E-29
	2.406E+01	1.329E-29
	2.454E+01	3.085E-30
	2.502E+01	8.975E-31
	2.550E+01	2.980E-31
	2.599E+01	1.034E-31
	2.647E+01	3.590E-32
	2.695E+01	1.226E-32
	2.743E+01	4.098E-33
	2.791E+01	1.337E-33

	2.840E+01	4.257E-34
	2.888E+01	1.321E-34
	2.936E+01	3.998E-35
	2.984E+01	1.178E-35
	3.033E+01	3.383E-36
	3.081E+01	9.453E-37
	3.129E+01	2.570E-37
40	0.000E+00	1.000E+00
	4.800E-01	7.477E-01
	9.600E-01	5.133E-01
	1.440E+00	3.214E-01
	1.920E+00	1.826E-01
	2.400E+00	9.365E-02
	2.880E+00	4.324E-02
	3.360E+00	1.792E-02
	3.840E+00	6.654E-03
	4.320E+00	2.209E-03
	4.800E+00	6.550E-04
	5.280E+00	1.732E-04
	5.760E+00	4.083E-05
	6.240E+00	8.570E-06
	6.720E+00	1.601E-06
	7.200E+00	2.660E-07
	7.680E+00	3.929E-08
	8.160E+00	5.160E-09
	8.640E+00	6.029E-10
	9.120E+00	6.312E-11
	9.600E+00	6.189E-12
	1.008E+01	7.218E-13
	1.056E+01	1.710E-13
	1.104E+01	7.421E-14
	1.152E+01	3.710E-14
	1.200E+01	1.889E-14
	1.248E+01	9.055E-15
	1.296E+01	4.210E-15
	1.345E+01	1.897E-15
	1.393E+01	8.277E-16
	1.441E+01	3.496E-16
	1.489E+01	1.429E-16
	1.538E+01	5.648E-17
	1.586E+01	2.157E-17
	1.634E+01	7.954E-18
	1.682E+01	2.831E-18
	1.730E+01	9.714E-19
	1.779E+01	3.212E-19
	1.827E+01	1.023E-19
	1.875E+01	3.133E-20
	1.923E+01	9.223E-21
	1.972E+01	2.608E-21
	2.020E+01	7.074E-22
	2.068E+01	1.839E-22
	2.116E+01	4.580E-23
	2.165E+01	1.091E-23
	2.213E+01	2.485E-24
	2.261E+01	5.405E-25
	2.309E+01	1.123E-25

	2.357E+01	2.230E-26
	2.406E+01	4.253E-27
	2.454E+01	7.880E-28
	2.502E+01	1.462E-28
	2.550E+01	2.891E-29
	2.599E+01	6.687E-30
	2.647E+01	1.908E-30
	2.695E+01	6.428E-31
	2.743E+01	2.348E-31
	2.791E+01	8.767E-32
	2.840E+01	3.257E-32
	2.888E+01	1.191E-32
	2.936E+01	4.272E-33
	2.984E+01	1.500E-33
	3.033E+01	5.156E-34
	3.081E+01	1.733E-34
	3.129E+01	5.698E-35
45	0.000E+00	1.000E+00
	4.800E-01	7.630E-01
	9.600E-01	5.400E-01
	1.440E+00	3.523E-01
	1.920E+00	2.109E-01
	2.400E+00	1.154E-01
	2.880E+00	5.759E-02
	3.360E+00	2.612E-02
	3.840E+00	1.075E-02
	4.320E+00	4.008E-03
	4.800E+00	1.352E-03
	5.280E+00	4.124E-04
	5.760E+00	1.136E-04
	6.240E+00	2.823E-05
	6.720E+00	6.328E-06
	7.200E+00	1.279E-06
	7.680E+00	2.329E-07
	8.160E+00	3.820E-08
	8.640E+00	5.644E-09
	9.120E+00	7.516E-10
	9.600E+00	9.065E-11
	1.008E+01	1.019E-11
	1.056E+01	1.242E-12
	1.104E+01	2.549E-13
	1.152E+01	1.026E-13
	1.200E+01	5.365E-14
	1.248E+01	2.780E-14
	1.296E+01	1.412E-14
	1.345E+01	6.983E-15
	1.393E+01	3.360E-15
	1.441E+01	1.572E-15
	1.489E+01	7.149E-16
	1.538E+01	3.158E-16
	1.586E+01	1.355E-16
	1.634E+01	5.639E-17
	1.682E+01	2.277E-17
	1.730E+01	8.912E-18
	1.779E+01	3.380E-18
	1.827E+01	1.241E-18

	1.875E+01	4.410E-19
	1.923E+01	1.515E-19
	1.972E+01	5.033E-20
	2.020E+01	1.614E-20
	2.068E+01	4.994E-21
	2.116E+01	1.490E-21
	2.165E+01	4.284E-22
	2.213E+01	1.186E-22
	2.261E+01	3.156E-23
	2.309E+01	8.077E-24
	2.357E+01	1.985E-24
	2.406E+01	4.685E-25
	2.454E+01	1.061E-25
	2.502E+01	2.310E-26
	2.550E+01	4.850E-27
	2.599E+01	9.922E-28
	2.647E+01	2.025E-28
	2.695E+01	4.329E-29
	2.743E+01	1.047E-29
	2.791E+01	3.040E-30
	2.840E+01	1.045E-30
	2.888E+01	3.964E-31
	2.936E+01	1.561E-31
	2.984E+01	6.177E-32
	3.033E+01	2.419E-32
	3.081E+01	9.324E-33
	3.129E+01	3.530E-33
50	0.000E+00	1.000E+00
	4.800E-01	7.761E-01
	9.600E-01	5.630E-01
	1.440E+00	3.799E-01
	1.920E+00	2.373E-01
	2.400E+00	1.369E-01
	2.880E+00	7.266E-02
	3.360E+00	3.542E-02
	3.840E+00	1.584E-02
	4.320E+00	6.480E-03
	4.800E+00	2.425E-03
	5.280E+00	8.289E-04
	5.760E+00	2.586E-04
	6.240E+00	7.360E-05
	6.720E+00	1.910E-05
	7.200E+00	4.514E-06
	7.680E+00	9.718E-07
	8.160E+00	1.905E-07
	8.640E+00	3.399E-08
	9.120E+00	5.519E-09
	9.600E+00	8.163E-10
	1.008E+01	1.104E-10
	1.056E+01	1.395E-11
	1.104E+01	1.835E-12
	1.152E+01	3.569E-13
	1.200E+01	1.361E-13
	1.248E+01	6.921E-14
	1.296E+01	3.720E-14
	1.345E+01	1.977E-14

	1.393E+01	1.027E-14
	1.441E+01	5.210E-15
	1.489E+01	2.577E-15
	1.538E+01	1.243E-15
	1.586E+01	5.838E-16
	1.634E+01	2.672E-16
	1.682E+01	1.191E-16
	1.730E+01	5.167E-17
	1.779E+01	2.181E-17
	1.827E+01	8.949E-18
	1.875E+01	3.569E-18
	1.923E+01	1.383E-18
	1.972E+01	5.202E-19
	2.020E+01	1.899E-19
	2.068E+01	6.721E-20
	2.116E+01	2.306E-20
	2.165E+01	7.662E-21
	2.213E+01	2.464E-21
	2.261E+01	7.667E-22
	2.309E+01	2.306E-22
	2.357E+01	6.700E-23
	2.406E+01	1.879E-23
	2.454E+01	5.084E-24
	2.502E+01	1.326E-24
	2.550E+01	3.335E-25
	2.599E+01	8.084E-26
	2.647E+01	1.892E-26
	2.695E+01	4.289E-27
	2.743E+01	9.516E-28
	2.791E+01	2.111E-28
	2.840E+01	4.893E-29
	2.888E+01	1.265E-29
	2.936E+01	3.849E-30
	2.984E+01	1.372E-30
	3.033E+01	5.406E-31
	3.081E+01	2.226E-31
	3.129E+01	9.257E-32
55	0.000E+00	1.000E+00
	4.800E-01	7.874E-01
	9.600E-01	5.833E-01
	1.440E+00	4.046E-01
	1.920E+00	2.619E-01
	2.400E+00	1.577E-01
	2.880E+00	8.811E-02
	3.360E+00	4.559E-02
	3.840E+00	2.181E-02
	4.320E+00	9.633E-03
	4.800E+00	3.924E-03
	5.280E+00	1.473E-03
	5.760E+00	5.089E-04
	6.240E+00	1.618E-04
	6.720E+00	4.732E-05
	7.200E+00	1.272E-05
	7.680E+00	3.140E-06
	8.160E+00	7.121E-07
	8.640E+00	1.483E-07

	9.120E+00	2.835E-08
	9.600E+00	4.975E-09
	1.008E+01	8.020E-10
	1.056E+01	1.192E-10
	1.104E+01	1.664E-11
	1.152E+01	2.378E-12
	1.200E+01	4.763E-13
	1.248E+01	1.661E-13
	1.296E+01	8.416E-14
	1.345E+01	4.648E-14
	1.393E+01	2.562E-14
	1.441E+01	1.386E-14
	1.489E+01	7.335E-15
	1.538E+01	3.796E-15
	1.586E+01	1.919E-15
	1.634E+01	9.484E-16
	1.682E+01	4.577E-16
	1.730E+01	2.156E-16
	1.779E+01	9.914E-17
	1.827E+01	4.447E-17
	1.875E+01	1.945E-17
	1.923E+01	8.296E-18
	1.972E+01	3.447E-18
	2.020E+01	1.395E-18
	2.068E+01	5.495E-19
	2.116E+01	2.106E-19
	2.165E+01	7.850E-20
	2.213E+01	2.844E-20
	2.261E+01	1.001E-20
	2.309E+01	3.421E-21
	2.357E+01	1.135E-21
	2.406E+01	3.649E-22
	2.454E+01	1.138E-22
	2.502E+01	3.435E-23
	2.550E+01	1.004E-23
	2.599E+01	2.840E-24
	2.647E+01	7.769E-25
	2.695E+01	2.055E-25
	2.743E+01	5.262E-26
	2.791E+01	1.305E-26
	2.840E+01	3.153E-27
	2.888E+01	7.494E-28
	2.936E+01	1.793E-28
	2.984E+01	4.499E-29
	3.033E+01	1.256E-29
	3.081E+01	4.079E-30
	3.129E+01	1.528E-30

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_CoHD_Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.01425 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.01425 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.131E-01
	9.600E-01	1.205E-02
	1.440E+00	1.567E-04
	1.920E+00	4.396E-07

	2.400E+00	2.590E-10
	2.880E+00	1.363E-13
	3.360E+00	8.267E-15
	3.840E+00	4.334E-16
	4.320E+00	1.477E-17
	4.800E+00	3.176E-19
	5.280E+00	4.163E-21
	5.760E+00	3.191E-23
	6.240E+00	1.370E-25
	6.720E+00	3.310E-28
	7.200E+00	1.168E-30
	7.680E+00	2.505E-32
	8.160E+00	5.805E-34
	8.640E+00	1.017E-35
	9.120E+00	1.315E-37
	9.600E+00	1.236E-39
	1.008E+01	8.309E-42
	1.056E+01	4.014E-44
	1.104E+01	1.686E-46
	1.152E+01	1.365E-48
	1.200E+01	2.308E-50
	1.248E+01	0.000E+00
	1.296E+01	0.000E+00
	1.345E+01	0.000E+00
	1.393E+01	0.000E+00
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.538E+01	0.000E+00
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	3.859E-01
	9.600E-01	7.908E-02
	1.440E+00	8.025E-03
	1.920E+00	3.879E-04
	2.400E+00	8.739E-06
	2.880E+00	9.056E-08
	3.360E+00	4.292E-10
	3.840E+00	1.174E-12
	4.320E+00	5.004E-14
	4.800E+00	7.766E-15
	5.280E+00	1.001E-15
	5.760E+00	1.044E-16
	6.240E+00	8.714E-18
	6.720E+00	5.762E-19
	7.200E+00	2.980E-20
	7.680E+00	1.189E-21
	8.160E+00	3.603E-23
	8.640E+00	8.164E-25
	9.120E+00	1.369E-26
	9.600E+00	1.793E-28
	1.008E+01	3.152E-30
	1.056E+01	1.699E-31
	1.104E+01	1.295E-32
	1.152E+01	8.982E-34
	1.200E+01	5.637E-35
	1.248E+01	2.896E-36
	1.296E+01	1.273E-37
	1.345E+01	4.757E-39
	1.393E+01	1.503E-40
	1.441E+01	3.997E-42
	1.489E+01	9.025E-44
	1.538E+01	1.845E-45
	1.586E+01	4.392E-47
	1.634E+01	1.716E-48
	1.682E+01	9.340E-50
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	4.845E-01
	9.600E-01	1.557E-01
	1.440E+00	3.172E-02
	1.920E+00	3.990E-03
	2.400E+00	3.046E-04
	2.880E+00	1.397E-05
	3.360E+00	3.817E-07
	3.840E+00	6.194E-09
	4.320E+00	6.011E-11
	4.800E+00	5.503E-13
	5.280E+00	5.673E-14
	5.760E+00	1.266E-14
	6.240E+00	2.519E-15
	6.720E+00	4.361E-16
	7.200E+00	6.535E-17
	7.680E+00	8.432E-18
	8.160E+00	9.309E-19
	8.640E+00	8.734E-20
	9.120E+00	6.912E-21
	9.600E+00	4.578E-22
	1.008E+01	2.515E-23
	1.056E+01	1.137E-24
	1.104E+01	4.199E-26
	1.152E+01	1.286E-27
	1.200E+01	3.924E-29
	1.248E+01	1.898E-30
	1.296E+01	1.950E-31
	1.345E+01	2.398E-32
	1.393E+01	2.786E-33
	1.441E+01	2.950E-34
	1.489E+01	2.832E-35
	1.538E+01	2.457E-36
	1.586E+01	1.920E-37
	1.634E+01	1.346E-38
	1.682E+01	8.449E-40
	1.730E+01	4.730E-41
	1.779E+01	2.362E-42
	1.827E+01	1.061E-43
	1.875E+01	4.462E-45
	1.923E+01	1.998E-46
	1.972E+01	1.190E-47

	2.020E+01	9.916E-49
	2.068E+01	9.499E-50
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	5.493E-01
	9.600E-01	2.230E-01
	1.440E+00	6.479E-02
	1.920E+00	1.320E-02
	2.400E+00	1.861E-03
	2.880E+00	1.798E-04
	3.360E+00	1.183E-05
	3.840E+00	5.283E-07
	4.320E+00	1.595E-08
	4.800E+00	3.260E-10
	5.280E+00	4.871E-12
	5.760E+00	1.789E-13
	6.240E+00	4.181E-14
	6.720E+00	1.135E-14
	7.200E+00	2.803E-15
	7.680E+00	6.235E-16
	8.160E+00	1.245E-16
	8.640E+00	2.226E-17
	9.120E+00	3.546E-18
	9.600E+00	5.015E-19
	1.008E+01	6.267E-20
	1.056E+01	6.886E-21
	1.104E+01	6.617E-22
	1.152E+01	5.532E-23
	1.200E+01	4.167E-24
	1.248E+01	2.568E-25
	1.296E+01	1.360E-26
	1.345E+01	6.358E-28
	1.393E+01	3.063E-29
	1.441E+01	2.338E-30
	1.489E+01	3.204E-31

	1.538E+01	5.248E-32
	1.586E+01	8.386E-33
	1.634E+01	1.256E-33
	1.682E+01	1.750E-34
	1.730E+01	2.264E-35
	1.779E+01	2.714E-36
	1.827E+01	3.006E-37
	1.875E+01	3.072E-38
	1.923E+01	2.890E-39
	1.972E+01	2.497E-40
	2.020E+01	1.979E-41
	2.068E+01	1.441E-42
	2.116E+01	9.725E-44
	2.165E+01	6.282E-45
	2.213E+01	4.234E-46
	2.261E+01	3.460E-47
	2.309E+01	3.715E-48
	2.357E+01	4.741E-49
	2.406E+01	6.309E-50
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	5.960E-01
	9.600E-01	2.797E-01
	1.440E+00	1.009E-01
	1.920E+00	2.754E-02
	2.400E+00	5.616E-03
	2.880E+00	8.498E-04
	3.360E+00	9.486E-05
	3.840E+00	7.782E-06
	4.320E+00	4.678E-07
	4.800E+00	2.056E-08
	5.280E+00	6.609E-10
	5.760E+00	1.600E-11
	6.240E+00	4.860E-13
	6.720E+00	8.295E-14
	7.200E+00	2.633E-14
	7.680E+00	8.017E-15
	8.160E+00	2.251E-15
	8.640E+00	5.813E-16
	9.120E+00	1.377E-16
	9.600E+00	2.984E-17
	1.008E+01	5.900E-18

	1.056E+01	1.061E-18
	1.104E+01	1.731E-19
	1.152E+01	2.554E-20
	1.200E+01	3.532E-21
	1.248E+01	4.179E-22
	1.296E+01	4.413E-23
	1.345E+01	4.142E-24
	1.393E+01	3.442E-25
	1.441E+01	2.533E-26
	1.489E+01	1.674E-27
	1.538E+01	1.072E-28
	1.586E+01	8.572E-30
	1.634E+01	1.147E-30
	1.682E+01	2.156E-31
	1.730E+01	4.311E-32
	1.779E+01	8.339E-33
	1.827E+01	1.529E-33
	1.875E+01	2.647E-34
	1.923E+01	4.319E-35
	1.972E+01	6.630E-36
	2.020E+01	9.563E-37
	2.068E+01	1.294E-37
	2.116E+01	1.640E-38
	2.165E+01	1.944E-39
	2.213E+01	2.152E-40
	2.261E+01	2.223E-41
	2.309E+01	2.146E-42
	2.357E+01	1.948E-43
	2.406E+01	1.695E-44
	2.454E+01	1.488E-45
	2.502E+01	1.453E-46
	2.550E+01	1.745E-47
	2.599E+01	2.564E-48
	2.647E+01	4.169E-49
	2.695E+01	6.898E-50
	2.743E+01	1.116E-50
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
30	0.000E+00	1.000E+00
	4.800E-01	6.315E-01
	9.600E-01	3.276E-01
	1.440E+00	1.369E-01
	1.920E+00	4.544E-02
	2.400E+00	1.187E-02
	2.880E+00	2.425E-03
	3.360E+00	3.852E-04
	3.840E+00	4.743E-05
	4.320E+00	4.514E-06
	4.800E+00	3.314E-07
	5.280E+00	1.874E-08

	5.760E+00	8.163E-10
	6.240E+00	2.792E-11
	6.720E+00	9.915E-13
	7.200E+00	1.306E-13
	7.680E+00	4.394E-14
	8.160E+00	1.533E-14
	8.640E+00	5.021E-15
	9.120E+00	1.535E-15
	9.600E+00	4.375E-16
	1.008E+01	1.160E-16
	1.056E+01	2.853E-17
	1.104E+01	6.501E-18
	1.152E+01	1.371E-18
	1.200E+01	2.771E-19
	1.248E+01	4.928E-20
	1.296E+01	8.029E-21
	1.345E+01	1.195E-21
	1.393E+01	1.621E-22
	1.441E+01	1.995E-23
	1.489E+01	2.224E-24
	1.538E+01	2.238E-25
	1.586E+01	2.037E-26
	1.634E+01	1.700E-27
	1.682E+01	1.387E-28
	1.730E+01	1.343E-29
	1.779E+01	1.983E-30
	1.827E+01	4.131E-31
	1.875E+01	9.526E-32
	1.923E+01	2.173E-32
	1.972E+01	4.763E-33
	2.020E+01	9.964E-34
	2.068E+01	1.986E-34
	2.116E+01	3.765E-35
	2.165E+01	6.784E-36
	2.213E+01	1.160E-36
	2.261E+01	1.882E-37
	2.309E+01	2.891E-38
	2.357E+01	4.200E-39
	2.406E+01	5.766E-40
	2.454E+01	7.473E-41
	2.502E+01	9.148E-42
	2.550E+01	1.060E-42
	2.599E+01	1.171E-43
	2.647E+01	1.261E-44
	2.695E+01	1.385E-45
	2.743E+01	1.684E-46
	2.791E+01	2.444E-47
	2.840E+01	4.209E-48
	2.888E+01	7.979E-49
	2.936E+01	1.553E-49
	2.984E+01	2.986E-50
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
35	0.000E+00	1.000E+00
	4.800E-01	6.598E-01

	9.600E-01	3.683E-01
	1.440E+00	1.712E-01
	1.920E+00	6.546E-02
	2.400E+00	2.043E-02
	2.880E+00	5.174E-03
	3.360E+00	1.058E-03
	3.840E+00	1.742E-04
	4.320E+00	2.302E-05
	4.800E+00	2.439E-06
	5.280E+00	2.067E-07
	5.760E+00	1.401E-08
	6.240E+00	7.593E-10
	6.720E+00	3.345E-11
	7.200E+00	1.466E-12
	7.680E+00	1.778E-13
	8.160E+00	6.083E-14
	8.640E+00	2.330E-14
	9.120E+00	8.513E-15
	9.600E+00	2.935E-15
	1.008E+01	9.533E-16
	1.056E+01	2.912E-16
	1.104E+01	8.357E-17
	1.152E+01	2.253E-17
	1.200E+01	5.901E-18
	1.248E+01	1.385E-18
	1.296E+01	3.028E-19
	1.345E+01	6.159E-20
	1.393E+01	1.163E-20
	1.441E+01	2.032E-21
	1.489E+01	3.279E-22
	1.538E+01	4.876E-23
	1.586E+01	6.663E-24
	1.634E+01	8.350E-25
	1.682E+01	9.588E-26
	1.730E+01	1.012E-26
	1.779E+01	1.003E-27
	1.827E+01	1.001E-28
	1.875E+01	1.212E-29
	1.923E+01	2.138E-30
	1.972E+01	5.034E-31
	2.020E+01	1.297E-31
	2.068E+01	3.329E-32
	2.116E+01	8.270E-33
	2.165E+01	1.976E-33
	2.213E+01	4.529E-34
	2.261E+01	9.954E-35
	2.309E+01	2.095E-35
	2.357E+01	4.219E-36
	2.406E+01	8.123E-37
	2.454E+01	1.494E-37
	2.502E+01	2.621E-38
	2.550E+01	4.385E-39
	2.599E+01	6.986E-40
	2.647E+01	1.060E-40
	2.695E+01	1.530E-41
	2.743E+01	2.107E-42
	2.791E+01	2.779E-43

	2.840E+01	3.559E-44
	2.888E+01	4.552E-45
	2.936E+01	6.138E-46
	2.984E+01	9.363E-47
	3.033E+01	1.678E-47
	3.081E+01	3.422E-48
	3.129E+01	7.443E-49
40	0.000E+00	1.000E+00
	4.800E-01	6.830E-01
	9.600E-01	4.034E-01
	1.440E+00	2.033E-01
	1.920E+00	8.653E-02
	2.400E+00	3.089E-02
	2.880E+00	9.194E-03
	3.360E+00	2.273E-03
	3.840E+00	4.654E-04
	4.320E+00	7.873E-05
	4.800E+00	1.098E-05
	5.280E+00	1.262E-06
	5.760E+00	1.192E-07
	6.240E+00	9.259E-09
	6.720E+00	5.917E-10
	7.200E+00	3.164E-11
	7.680E+00	1.691E-12
	8.160E+00	2.145E-13
	8.640E+00	7.485E-14
	9.120E+00	3.069E-14
	9.600E+00	1.217E-14
	1.008E+01	4.588E-15
	1.056E+01	1.643E-15
	1.104E+01	5.579E-16
	1.152E+01	1.800E-16
	1.200E+01	5.689E-17
	1.248E+01	1.632E-17
	1.296E+01	4.415E-18
	1.345E+01	1.124E-18
	1.393E+01	2.691E-19
	1.441E+01	6.043E-20
	1.489E+01	1.271E-20
	1.538E+01	2.500E-21
	1.586E+01	4.585E-22
	1.634E+01	7.831E-23
	1.682E+01	1.243E-23
	1.730E+01	1.829E-24
	1.779E+01	2.493E-25
	1.827E+01	3.151E-26
	1.875E+01	3.725E-27
	1.923E+01	4.252E-28
	1.972E+01	5.157E-29
	2.020E+01	7.962E-30
	2.068E+01	1.725E-30
	2.116E+01	4.608E-31
	2.165E+01	1.304E-31
	2.213E+01	3.660E-32
	2.261E+01	9.980E-33
	2.309E+01	2.630E-33

	2.357E+01	6.686E-34
	2.406E+01	1.638E-34
	2.454E+01	3.865E-35
	2.502E+01	8.776E-36
	2.550E+01	1.917E-36
	2.599E+01	4.022E-37
	2.647E+01	8.104E-38
	2.695E+01	1.567E-38
	2.743E+01	2.904E-39
	2.791E+01	5.157E-40
	2.840E+01	8.771E-41
	2.888E+01	1.429E-41
	2.936E+01	2.234E-42
	2.984E+01	3.366E-43
	3.033E+01	4.939E-44
	3.081E+01	7.223E-45
	3.129E+01	1.098E-45
45	0.000E+00	1.000E+00
	4.800E-01	7.024E-01
	9.600E-01	4.340E-01
	1.440E+00	2.331E-01
	1.920E+00	1.079E-01
	2.400E+00	4.278E-02
	2.880E+00	1.445E-02
	3.360E+00	4.142E-03
	3.840E+00	1.005E-03
	4.320E+00	2.060E-04
	4.800E+00	3.560E-05
	5.280E+00	5.181E-06
	5.760E+00	6.341E-07
	6.240E+00	6.523E-08
	6.720E+00	5.637E-09
	7.200E+00	4.099E-10
	7.680E+00	2.558E-11
	8.160E+00	1.640E-12
	8.640E+00	2.339E-13
	9.120E+00	8.492E-14
	9.600E+00	3.674E-14
	1.008E+01	1.551E-14
	1.056E+01	6.271E-15
	1.104E+01	2.423E-15
	1.152E+01	8.963E-16
	1.200E+01	3.267E-16
	1.248E+01	1.091E-16
	1.296E+01	3.467E-17
	1.345E+01	1.046E-17
	1.393E+01	2.994E-18
	1.441E+01	8.118E-19
	1.489E+01	2.082E-19
	1.538E+01	5.044E-20
	1.586E+01	1.153E-20
	1.634E+01	2.480E-21
	1.682E+01	5.017E-22
	1.730E+01	9.522E-23
	1.779E+01	1.693E-23
	1.827E+01	2.816E-24

	1.875E+01	4.377E-25
	1.923E+01	6.356E-26
	1.972E+01	8.667E-27
	2.020E+01	1.130E-27
	2.068E+01	1.486E-28
	2.116E+01	2.240E-29
	2.165E+01	4.483E-30
	2.213E+01	1.177E-30
	2.261E+01	3.507E-31
	2.309E+01	1.072E-31
	2.357E+01	3.226E-32
	2.406E+01	9.452E-33
	2.454E+01	2.685E-33
	2.502E+01	7.389E-34
	2.550E+01	1.967E-34
	2.599E+01	5.066E-35
	2.647E+01	1.261E-35
	2.695E+01	3.031E-36
	2.743E+01	7.035E-37
	2.791E+01	1.575E-37
	2.840E+01	3.400E-38
	2.888E+01	7.071E-39
	2.936E+01	1.416E-39
	2.984E+01	2.729E-40
	3.033E+01	5.062E-41
	3.081E+01	9.041E-42
	3.129E+01	1.558E-42
50	0.000E+00	1.000E+00
	4.800E-01	7.190E-01
	9.600E-01	4.609E-01
	1.440E+00	2.607E-01
	1.920E+00	1.292E-01
	2.400E+00	5.570E-02
	2.880E+00	2.082E-02
	3.360E+00	6.720E-03
	3.840E+00	1.869E-03
	4.320E+00	4.467E-04
	4.800E+00	9.164E-05
	5.280E+00	1.612E-05
	5.760E+00	2.427E-06
	6.240E+00	3.126E-07
	6.720E+00	3.443E-08
	7.200E+00	3.241E-09
	7.680E+00	2.616E-10
	8.160E+00	1.856E-11
	8.640E+00	1.413E-12
	9.120E+00	2.363E-13
	9.600E+00	9.087E-14
	1.008E+01	4.112E-14
	1.056E+01	1.827E-14
	1.104E+01	7.811E-15
	1.152E+01	3.219E-15
	1.200E+01	1.312E-15
	1.248E+01	4.940E-16
	1.296E+01	1.780E-16
	1.345E+01	6.132E-17

	1.393E+01	2.018E-17
	1.441E+01	6.333E-18
	1.489E+01	1.895E-18
	1.538E+01	5.396E-19
	1.586E+01	1.461E-19
	1.634E+01	3.758E-20
	1.682E+01	9.164E-21
	1.730E+01	2.116E-21
	1.779E+01	4.622E-22
	1.827E+01	9.532E-23
	1.875E+01	1.854E-23
	1.923E+01	3.394E-24
	1.972E+01	5.845E-25
	2.020E+01	9.471E-26
	2.068E+01	1.448E-26
	2.116E+01	2.115E-27
	2.165E+01	3.060E-28
	2.213E+01	4.793E-29
	2.261E+01	9.325E-30
	2.309E+01	2.386E-30
	2.357E+01	7.279E-31
	2.406E+01	2.358E-31
	2.454E+01	7.653E-32
	2.502E+01	2.436E-32
	2.550E+01	7.552E-33
	2.599E+01	2.277E-33
	2.647E+01	6.668E-34
	2.695E+01	1.896E-34
	2.743E+01	5.229E-35
	2.791E+01	1.399E-35
	2.840E+01	3.628E-36
	2.888E+01	9.113E-37
	2.936E+01	2.217E-37
	2.984E+01	5.217E-38
	3.033E+01	1.188E-38
	3.081E+01	2.613E-39
	3.129E+01	5.557E-40
55	0.000E+00	1.000E+00
	4.800E-01	7.334E-01
	9.600E-01	4.848E-01
	1.440E+00	2.863E-01
	1.920E+00	1.499E-01
	2.400E+00	6.931E-02
	2.880E+00	2.815E-02
	3.360E+00	1.002E-02
	3.840E+00	3.114E-03
	4.320E+00	8.444E-04
	4.800E+00	1.994E-04
	5.280E+00	4.094E-05
	5.760E+00	7.303E-06
	6.240E+00	1.131E-06
	6.720E+00	1.520E-07
	7.200E+00	1.770E-08
	7.680E+00	1.789E-09
	8.160E+00	1.574E-10
	8.640E+00	1.249E-11

	9.120E+00	1.129E-12
	9.600E+00	2.265E-13
	1.008E+01	9.312E-14
	1.056E+01	4.385E-14
	1.104E+01	2.032E-14
	1.152E+01	9.138E-15
	1.200E+01	4.074E-15
	1.248E+01	1.689E-15
	1.296E+01	6.736E-16
	1.345E+01	2.581E-16
	1.393E+01	9.496E-17
	1.441E+01	3.352E-17
	1.489E+01	1.134E-17
	1.538E+01	3.675E-18
	1.586E+01	1.139E-18
	1.634E+01	3.375E-19
	1.682E+01	9.547E-20
	1.730E+01	2.575E-20
	1.779E+01	6.617E-21
	1.827E+01	1.618E-21
	1.875E+01	3.757E-22
	1.923E+01	8.282E-23
	1.972E+01	1.730E-23
	2.020E+01	3.422E-24
	2.068E+01	6.401E-25
	2.116E+01	1.133E-25
	2.165E+01	1.901E-26
	2.213E+01	3.055E-27
	2.261E+01	4.832E-28
	2.309E+01	8.055E-29
	2.357E+01	1.590E-29
	2.406E+01	4.035E-30
	2.454E+01	1.249E-30
	2.502E+01	4.222E-31
	2.550E+01	1.452E-31
	2.599E+01	4.935E-32
	2.647E+01	1.642E-32
	2.695E+01	5.330E-33
	2.743E+01	1.686E-33
	2.791E+01	5.191E-34
	2.840E+01	1.556E-34
	2.888E+01	4.536E-35
	2.936E+01	1.286E-35
	2.984E+01	3.545E-36
	3.033E+01	9.491E-37
	3.081E+01	2.467E-37
	3.129E+01	6.226E-38

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_ClayPoro_High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.45	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.786E-01
	9.600E-01	2.926E-02
	1.440E+00	1.040E-03
	1.920E+00	1.187E-05

	2.400E+00	4.235E-08
	2.880E+00	4.707E-11
	3.360E+00	9.937E-14
	3.840E+00	9.178E-15
	4.320E+00	7.423E-16
	4.800E+00	4.365E-17
	5.280E+00	1.832E-18
	5.760E+00	5.373E-20
	6.240E+00	1.074E-21
	6.720E+00	1.425E-23
	7.200E+00	1.218E-25
	7.680E+00	6.713E-28
	8.160E+00	3.740E-30
	8.640E+00	9.150E-32
	9.120E+00	3.757E-33
	9.600E+00	1.303E-34
	1.008E+01	3.635E-36
	1.056E+01	8.061E-38
	1.104E+01	1.405E-39
	1.152E+01	1.907E-41
	1.200E+01	2.287E-43
	1.248E+01	1.948E-45
	1.296E+01	1.921E-47
	1.345E+01	3.851E-49
	1.393E+01	1.100E-50
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.538E+01	0.000E+00
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.487E-01
	9.600E-01	1.264E-01
	1.440E+00	2.123E-02
	1.920E+00	2.064E-03
	2.400E+00	1.140E-04
	2.880E+00	3.540E-06
	3.360E+00	6.129E-08
	3.840E+00	5.898E-10
	4.320E+00	3.444E-12
	4.800E+00	8.769E-14
	5.280E+00	1.686E-14
	5.760E+00	3.109E-15
	6.240E+00	4.915E-16
	6.720E+00	6.615E-17
	7.200E+00	7.529E-18
	7.680E+00	7.195E-19
	8.160E+00	5.727E-20
	8.640E+00	3.763E-21
	9.120E+00	2.022E-22
	9.600E+00	8.792E-24
	1.008E+01	3.062E-25
	1.056E+01	8.509E-27
	1.104E+01	1.966E-28
	1.152E+01	5.237E-30
	1.200E+01	3.684E-31
	1.248E+01	3.813E-32
	1.296E+01	3.954E-33
	1.345E+01	3.722E-34
	1.393E+01	3.141E-35
	1.441E+01	2.368E-36
	1.489E+01	1.588E-37
	1.538E+01	9.434E-39
	1.586E+01	4.947E-40
	1.634E+01	2.282E-41
	1.682E+01	9.255E-43
	1.730E+01	3.343E-44
	1.779E+01	1.141E-45
	1.827E+01	4.427E-47
	1.875E+01	2.493E-48
	1.923E+01	1.912E-49
	1.972E+01	1.576E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.400E-01
	9.600E-01	2.154E-01
	1.440E+00	6.150E-02
	1.920E+00	1.231E-02
	2.400E+00	1.705E-03
	2.880E+00	1.618E-04
	3.360E+00	1.046E-05
	3.840E+00	4.589E-07
	4.320E+00	1.361E-08
	4.800E+00	2.733E-10
	5.280E+00	4.013E-12
	5.760E+00	1.453E-13
	6.240E+00	3.338E-14
	6.720E+00	8.906E-15
	7.200E+00	2.160E-15
	7.680E+00	4.720E-16
	8.160E+00	9.261E-17
	8.640E+00	1.626E-17
	9.120E+00	2.545E-18
	9.600E+00	3.535E-19
	1.008E+01	4.340E-20
	1.056E+01	4.684E-21
	1.104E+01	4.421E-22
	1.152E+01	3.632E-23
	1.200E+01	2.936E-24
	1.248E+01	1.786E-25
	1.296E+01	9.342E-27
	1.345E+01	4.313E-28
	1.393E+01	2.054E-29
	1.441E+01	1.551E-30
	1.489E+01	2.102E-31
	1.538E+01	3.401E-32
	1.586E+01	5.366E-33
	1.634E+01	7.934E-34
	1.682E+01	1.092E-34
	1.730E+01	1.394E-35
	1.779E+01	1.650E-36
	1.827E+01	1.804E-37
	1.875E+01	1.820E-38
	1.923E+01	1.690E-39
	1.972E+01	1.442E-40

	2.020E+01	1.128E-41
	2.068E+01	8.111E-43
	2.116E+01	5.406E-44
	2.165E+01	3.449E-45
	2.213E+01	2.298E-46
	2.261E+01	1.857E-47
	2.309E+01	1.971E-48
	2.357E+01	2.485E-49
	2.406E+01	3.266E-50
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	5.985E-01
	9.600E-01	2.866E-01
	1.440E+00	1.073E-01
	1.920E+00	3.096E-02
	2.400E+00	6.807E-03
	2.880E+00	1.132E-03
	3.360E+00	1.417E-04
	3.840E+00	1.330E-05
	4.320E+00	9.329E-07
	4.800E+00	4.882E-08
	5.280E+00	1.904E-09
	5.760E+00	5.584E-11
	6.240E+00	1.461E-12
	6.720E+00	1.210E-13
	7.200E+00	3.575E-14
	7.680E+00	1.150E-14
	8.160E+00	3.447E-15
	8.640E+00	9.567E-16
	9.120E+00	2.452E-16
	9.600E+00	5.789E-17
	1.008E+01	1.256E-17
	1.056E+01	2.500E-18
	1.104E+01	4.550E-19
	1.152E+01	7.567E-20
	1.200E+01	1.296E-20
	1.248E+01	1.768E-21
	1.296E+01	2.176E-22
	1.345E+01	2.405E-23
	1.393E+01	2.378E-24
	1.441E+01	2.099E-25
	1.489E+01	1.652E-26

	1.538E+01	1.177E-27
	1.586E+01	8.120E-29
	1.634E+01	6.804E-30
	1.682E+01	9.195E-31
	1.730E+01	1.766E-31
	1.779E+01	3.676E-32
	1.827E+01	7.472E-33
	1.875E+01	1.447E-33
	1.923E+01	2.656E-34
	1.972E+01	4.614E-35
	2.020E+01	7.574E-36
	2.068E+01	1.173E-36
	2.116E+01	1.713E-37
	2.165E+01	2.352E-38
	2.213E+01	3.037E-39
	2.261E+01	3.678E-40
	2.309E+01	4.178E-41
	2.357E+01	4.448E-42
	2.406E+01	4.452E-43
	2.454E+01	4.229E-44
	2.502E+01	3.914E-45
	2.550E+01	3.754E-46
	2.599E+01	4.124E-47
	2.647E+01	5.573E-48
	2.695E+01	8.907E-49
	2.743E+01	1.531E-49
	2.791E+01	2.648E-50
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.401E-01
	9.600E-01	3.435E-01
	1.440E+00	1.519E-01
	1.920E+00	5.471E-02
	2.400E+00	1.591E-02
	2.880E+00	3.710E-03
	3.360E+00	6.909E-04
	3.840E+00	1.024E-04
	4.320E+00	1.205E-05
	4.800E+00	1.123E-06
	5.280E+00	8.284E-08
	5.760E+00	4.829E-09
	6.240E+00	2.230E-10
	6.720E+00	8.496E-12
	7.200E+00	4.211E-13
	7.680E+00	8.283E-14
	8.160E+00	2.990E-14
	8.640E+00	1.079E-14
	9.120E+00	3.673E-15
	9.600E+00	1.175E-15
	1.008E+01	3.530E-16

	1.056E+01	9.933E-17
	1.104E+01	2.615E-17
	1.152E+01	6.467E-18
	1.200E+01	1.677E-18
	1.248E+01	3.578E-19
	1.296E+01	7.082E-20
	1.345E+01	1.297E-20
	1.393E+01	2.192E-21
	1.441E+01	3.412E-22
	1.489E+01	4.874E-23
	1.538E+01	6.377E-24
	1.586E+01	7.621E-25
	1.634E+01	8.309E-26
	1.682E+01	8.285E-27
	1.730E+01	7.691E-28
	1.779E+01	7.115E-29
	1.827E+01	7.894E-30
	1.875E+01	1.293E-30
	1.923E+01	2.886E-31
	1.972E+01	7.093E-32
	2.020E+01	1.734E-32
	2.068E+01	4.098E-33
	2.116E+01	9.290E-34
	2.165E+01	2.017E-34
	2.213E+01	4.187E-35
	2.261E+01	8.307E-36
	2.309E+01	1.573E-36
	2.357E+01	2.842E-37
	2.406E+01	4.890E-38
	2.454E+01	8.009E-39
	2.502E+01	1.247E-39
	2.550E+01	1.845E-40
	2.599E+01	2.592E-41
	2.647E+01	3.459E-42
	2.695E+01	4.396E-43
	2.743E+01	5.364E-44
	2.791E+01	6.407E-45
	2.840E+01	7.811E-46
	2.888E+01	1.042E-46
	2.936E+01	1.626E-47
	2.984E+01	2.976E-48
	3.033E+01	6.016E-49
	3.081E+01	1.259E-49
	3.129E+01	2.623E-50
30	0.000E+00	1.000E+00
	4.800E-01	6.716E-01
	9.600E-01	3.899E-01
	1.440E+00	1.931E-01
	1.920E+00	8.077E-02
	2.400E+00	2.833E-02
	2.880E+00	8.285E-03
	3.360E+00	2.013E-03
	3.840E+00	4.048E-04
	4.320E+00	6.728E-05
	4.800E+00	9.220E-06
	5.280E+00	1.040E-06

	5.760E+00	9.658E-08
	6.240E+00	7.369E-09
	6.720E+00	4.627E-10
	7.200E+00	2.431E-11
	7.680E+00	1.279E-12
	8.160E+00	1.602E-13
	8.640E+00	5.502E-14
	9.120E+00	2.216E-14
	9.600E+00	8.632E-15
	1.008E+01	3.198E-15
	1.056E+01	1.125E-15
	1.104E+01	3.755E-16
	1.152E+01	1.199E-16
	1.200E+01	4.036E-17
	1.248E+01	1.143E-17
	1.296E+01	3.053E-18
	1.345E+01	7.675E-19
	1.393E+01	1.814E-19
	1.441E+01	4.021E-20
	1.489E+01	8.351E-21
	1.538E+01	1.621E-21
	1.586E+01	2.936E-22
	1.634E+01	4.950E-23
	1.682E+01	7.755E-24
	1.730E+01	1.127E-24
	1.779E+01	1.516E-25
	1.827E+01	1.893E-26
	1.875E+01	2.209E-27
	1.923E+01	2.491E-28
	1.972E+01	2.989E-29
	2.020E+01	4.572E-30
	2.068E+01	9.807E-31
	2.116E+01	2.590E-31
	2.165E+01	7.239E-32
	2.213E+01	2.006E-32
	2.261E+01	5.400E-33
	2.309E+01	1.405E-33
	2.357E+01	3.526E-34
	2.406E+01	8.528E-35
	2.454E+01	1.987E-35
	2.502E+01	4.454E-36
	2.550E+01	9.601E-37
	2.599E+01	1.989E-37
	2.647E+01	3.957E-38
	2.695E+01	7.552E-39
	2.743E+01	1.382E-39
	2.791E+01	2.423E-40
	2.840E+01	4.068E-41
	2.888E+01	6.544E-42
	2.936E+01	1.010E-42
	2.984E+01	1.503E-43
	3.033E+01	2.178E-44
	3.081E+01	3.147E-45
	3.129E+01	4.730E-46
35	0.000E+00	1.000E+00
	4.800E-01	6.965E-01

	9.600E-01	4.286E-01
	1.440E+00	2.305E-01
	1.920E+00	1.074E-01
	2.400E+00	4.311E-02
	2.880E+00	1.483E-02
	3.360E+00	4.359E-03
	3.840E+00	1.091E-03
	4.320E+00	2.321E-04
	4.800E+00	4.189E-05
	5.280E+00	6.408E-06
	5.760E+00	8.297E-07
	6.240E+00	9.086E-08
	6.720E+00	8.410E-09
	7.200E+00	6.586E-10
	7.680E+00	4.407E-11
	8.160E+00	2.767E-12
	8.640E+00	2.845E-13
	9.120E+00	8.432E-14
	9.600E+00	3.589E-14
	1.008E+01	1.534E-14
	1.056E+01	6.306E-15
	1.104E+01	2.485E-15
	1.152E+01	9.481E-16
	1.200E+01	3.819E-16
	1.248E+01	1.315E-16
	1.296E+01	4.316E-17
	1.345E+01	1.348E-17
	1.393E+01	4.006E-18
	1.441E+01	1.130E-18
	1.489E+01	3.025E-19
	1.538E+01	7.670E-20
	1.586E+01	1.839E-20
	1.634E+01	4.167E-21
	1.682E+01	8.902E-22
	1.730E+01	1.791E-22
	1.779E+01	3.386E-23
	1.827E+01	6.009E-24
	1.875E+01	9.994E-25
	1.923E+01	1.556E-25
	1.972E+01	2.272E-26
	2.020E+01	3.131E-27
	2.068E+01	4.165E-28
	2.116E+01	5.714E-29
	2.165E+01	9.252E-30
	2.213E+01	1.999E-30
	2.261E+01	5.487E-31
	2.309E+01	1.666E-31
	2.357E+01	5.139E-32
	2.406E+01	1.558E-32
	2.454E+01	4.600E-33
	2.502E+01	1.318E-33
	2.550E+01	3.661E-34
	2.599E+01	9.852E-35
	2.647E+01	2.567E-35
	2.695E+01	6.474E-36
	2.743E+01	1.579E-36
	2.791E+01	3.722E-37

	2.840E+01	8.475E-38
	2.888E+01	1.863E-38
	2.936E+01	3.951E-39
	2.984E+01	8.081E-40
	3.033E+01	1.593E-40
	3.081E+01	3.026E-41
	3.129E+01	5.541E-42
40	0.000E+00	1.000E+00
	4.800E-01	7.168E-01
	9.600E-01	4.613E-01
	1.440E+00	2.642E-01
	1.920E+00	1.336E-01
	2.400E+00	5.940E-02
	2.880E+00	2.310E-02
	3.360E+00	7.832E-03
	3.840E+00	2.310E-03
	4.320E+00	5.917E-04
	4.800E+00	1.313E-04
	5.280E+00	2.524E-05
	5.760E+00	4.196E-06
	6.240E+00	6.026E-07
	6.720E+00	7.475E-08
	7.200E+00	8.004E-09
	7.680E+00	7.402E-10
	8.160E+00	5.960E-11
	8.640E+00	4.445E-12
	9.120E+00	4.480E-13
	9.600E+00	1.159E-13
	1.008E+01	5.018E-14
	1.056E+01	2.293E-14
	1.104E+01	1.021E-14
	1.152E+01	4.443E-15
	1.200E+01	2.038E-15
	1.248E+01	8.097E-16
	1.296E+01	3.089E-16
	1.345E+01	1.130E-16
	1.393E+01	3.966E-17
	1.441E+01	1.333E-17
	1.489E+01	4.285E-18
	1.538E+01	1.317E-18
	1.586E+01	3.865E-19
	1.634E+01	1.082E-19
	1.682E+01	2.886E-20
	1.730E+01	7.325E-21
	1.779E+01	1.767E-21
	1.827E+01	4.047E-22
	1.875E+01	8.783E-23
	1.923E+01	1.805E-23
	1.972E+01	3.506E-24
	2.020E+01	6.433E-25
	2.068E+01	1.114E-25
	2.116E+01	1.826E-26
	2.165E+01	2.848E-27
	2.213E+01	4.322E-28
	2.261E+01	6.754E-29
	2.309E+01	1.215E-29

	2.357E+01	2.804E-30
	2.406E+01	8.126E-31
	2.454E+01	2.636E-31
	2.502E+01	8.798E-32
	2.550E+01	2.911E-32
	2.599E+01	9.432E-33
	2.647E+01	2.980E-33
	2.695E+01	9.167E-34
	2.743E+01	2.744E-34
	2.791E+01	7.987E-35
	2.840E+01	2.260E-35
	2.888E+01	6.212E-36
	2.936E+01	1.659E-36
	2.984E+01	4.298E-37
	3.033E+01	1.080E-37
	3.081E+01	2.634E-38
	3.129E+01	6.223E-39
45	0.000E+00	1.000E+00
	4.800E-01	7.337E-01
	9.600E-01	4.895E-01
	1.440E+00	2.946E-01
	1.920E+00	1.590E-01
	2.400E+00	7.652E-02
	2.880E+00	3.274E-02
	3.360E+00	1.242E-02
	3.840E+00	4.163E-03
	4.320E+00	1.232E-03
	4.800E+00	3.213E-04
	5.280E+00	7.375E-05
	5.760E+00	1.489E-05
	6.240E+00	2.641E-06
	6.720E+00	4.114E-07
	7.200E+00	5.625E-08
	7.680E+00	6.748E-09
	8.160E+00	7.108E-10
	8.640E+00	6.619E-11
	9.120E+00	5.726E-12
	9.600E+00	6.120E-13
	1.008E+01	1.470E-13
	1.056E+01	6.371E-14
	1.104E+01	3.064E-14
	1.152E+01	1.474E-14
	1.200E+01	7.461E-15
	1.248E+01	3.306E-15
	1.296E+01	1.415E-15
	1.345E+01	5.840E-16
	1.393E+01	2.325E-16
	1.441E+01	8.918E-17
	1.489E+01	3.294E-17
	1.538E+01	1.171E-17
	1.586E+01	4.000E-18
	1.634E+01	1.313E-18
	1.682E+01	4.136E-19
	1.730E+01	1.249E-19
	1.779E+01	3.616E-20
	1.827E+01	1.001E-20

	1.875E+01	2.651E-21
	1.923E+01	6.701E-22
	1.972E+01	1.616E-22
	2.020E+01	3.714E-23
	2.068E+01	8.121E-24
	2.116E+01	1.689E-24
	2.165E+01	3.337E-25
	2.213E+01	6.268E-26
	2.261E+01	1.122E-26
	2.309E+01	1.929E-27
	2.357E+01	3.267E-28
	2.406E+01	5.766E-29
	2.454E+01	1.173E-29
	2.502E+01	2.996E-30
	2.550E+01	9.348E-31
	2.599E+01	3.232E-31
	2.647E+01	1.150E-31
	2.695E+01	4.075E-32
	2.743E+01	1.418E-32
	2.791E+01	4.829E-33
	2.840E+01	1.607E-33
	2.888E+01	5.217E-34
	2.936E+01	1.653E-34
	2.984E+01	5.107E-35
	3.033E+01	1.539E-35
	3.081E+01	4.517E-36
	3.129E+01	1.292E-36
50	0.000E+00	1.000E+00
	4.800E-01	7.482E-01
	9.600E-01	5.141E-01
	1.440E+00	3.221E-01
	1.920E+00	1.831E-01
	2.400E+00	9.400E-02
	2.880E+00	4.344E-02
	3.360E+00	1.802E-02
	3.840E+00	6.695E-03
	4.320E+00	2.224E-03
	4.800E+00	6.600E-04
	5.280E+00	1.747E-04
	5.760E+00	4.120E-05
	6.240E+00	8.655E-06
	6.720E+00	1.618E-06
	7.200E+00	2.690E-07
	7.680E+00	3.977E-08
	8.160E+00	5.227E-09
	8.640E+00	6.113E-10
	9.120E+00	6.404E-11
	9.600E+00	6.284E-12
	1.008E+01	7.335E-13
	1.056E+01	1.740E-13
	1.104E+01	7.584E-14
	1.152E+01	3.858E-14
	1.200E+01	2.103E-14
	1.248E+01	1.016E-14
	1.296E+01	4.757E-15
	1.345E+01	2.159E-15

	1.393E+01	9.491E-16
	1.441E+01	4.039E-16
	1.489E+01	1.663E-16
	1.538E+01	6.622E-17
	1.586E+01	2.548E-17
	1.634E+01	9.467E-18
	1.682E+01	3.394E-18
	1.730E+01	1.174E-18
	1.779E+01	3.910E-19
	1.827E+01	1.254E-19
	1.875E+01	3.871E-20
	1.923E+01	1.148E-20
	1.972E+01	3.271E-21
	2.020E+01	8.940E-22
	2.068E+01	2.342E-22
	2.116E+01	5.876E-23
	2.165E+01	1.411E-23
	2.213E+01	3.237E-24
	2.261E+01	7.094E-25
	2.309E+01	1.485E-25
	2.357E+01	2.972E-26
	2.406E+01	5.710E-27
	2.454E+01	1.066E-27
	2.502E+01	1.991E-28
	2.550E+01	3.966E-29
	2.599E+01	9.232E-30
	2.647E+01	2.651E-30
	2.695E+01	8.994E-31
	2.743E+01	3.309E-31
	2.791E+01	1.245E-31
	2.840E+01	4.659E-32
	2.888E+01	1.717E-32
	2.936E+01	6.204E-33
	2.984E+01	2.195E-33
	3.033E+01	7.602E-34
	3.081E+01	2.575E-34
	3.129E+01	8.530E-35
55	0.000E+00	1.000E+00
	4.800E-01	7.607E-01
	9.600E-01	5.357E-01
	1.440E+00	3.472E-01
	1.920E+00	2.060E-01
	2.400E+00	1.115E-01
	2.880E+00	5.489E-02
	3.360E+00	2.451E-02
	3.840E+00	9.907E-03
	4.320E+00	3.620E-03
	4.800E+00	1.194E-03
	5.280E+00	3.550E-04
	5.760E+00	9.512E-05
	6.240E+00	2.294E-05
	6.720E+00	4.979E-06
	7.200E+00	9.718E-07
	7.680E+00	1.705E-07
	8.160E+00	2.688E-08
	8.640E+00	3.808E-09

	9.120E+00	4.852E-10
	9.600E+00	5.604E-11
	1.008E+01	6.131E-12
	1.056E+01	7.900E-13
	1.104E+01	1.942E-13
	1.152E+01	8.750E-14
	1.200E+01	4.929E-14
	1.248E+01	2.542E-14
	1.296E+01	1.280E-14
	1.345E+01	6.272E-15
	1.393E+01	2.987E-15
	1.441E+01	1.382E-15
	1.489E+01	6.212E-16
	1.538E+01	2.709E-16
	1.586E+01	1.147E-16
	1.634E+01	4.705E-17
	1.682E+01	1.871E-17
	1.730E+01	7.205E-18
	1.779E+01	2.686E-18
	1.827E+01	9.686E-19
	1.875E+01	3.377E-19
	1.923E+01	1.137E-19
	1.972E+01	3.696E-20
	2.020E+01	1.159E-20
	2.068E+01	3.503E-21
	2.116E+01	1.020E-21
	2.165E+01	2.856E-22
	2.213E+01	7.690E-23
	2.261E+01	1.990E-23
	2.309E+01	4.941E-24
	2.357E+01	1.177E-24
	2.406E+01	2.690E-25
	2.454E+01	5.897E-26
	2.502E+01	1.243E-26
	2.550E+01	2.539E-27
	2.599E+01	5.107E-28
	2.647E+01	1.053E-28
	2.695E+01	2.383E-29
	2.743E+01	6.402E-30
	2.791E+01	2.074E-30
	2.840E+01	7.636E-31
	2.888E+01	2.974E-31
	2.936E+01	1.174E-31
	2.984E+01	4.599E-32
	3.033E+01	1.775E-32
	3.081E+01	6.732E-33
	3.129E+01	2.504E-33

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_ClayPoro_Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.27	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.839E-01
	9.600E-01	3.038E-02
	1.440E+00	1.101E-03
	1.920E+00	1.281E-05

	2.400E+00	4.657E-08
	2.880E+00	5.275E-11
	3.360E+00	1.133E-13
	3.840E+00	1.067E-14
	4.320E+00	8.793E-16
	4.800E+00	5.270E-17
	5.280E+00	2.255E-18
	5.760E+00	6.740E-20
	6.240E+00	1.374E-21
	6.720E+00	1.857E-23
	7.200E+00	1.619E-25
	7.680E+00	9.091E-28
	8.160E+00	5.158E-30
	8.640E+00	1.285E-31
	9.120E+00	5.377E-33
	9.600E+00	1.901E-34
	1.008E+01	5.406E-36
	1.056E+01	1.222E-37
	1.104E+01	2.172E-39
	1.152E+01	3.003E-41
	1.200E+01	2.853E-43
	1.248E+01	2.430E-45
	1.296E+01	2.395E-47
	1.345E+01	4.798E-49
	1.393E+01	1.370E-50
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.538E+01	0.000E+00
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.571E-01
	9.600E-01	1.312E-01
	1.440E+00	2.246E-02
	1.920E+00	2.225E-03
	2.400E+00	1.253E-04
	2.880E+00	3.965E-06
	3.360E+00	6.997E-08
	3.840E+00	6.864E-10
	4.320E+00	4.083E-12
	4.800E+00	1.057E-13
	5.280E+00	2.070E-14
	5.760E+00	3.891E-15
	6.240E+00	6.271E-16
	6.720E+00	8.601E-17
	7.200E+00	9.979E-18
	7.680E+00	9.720E-19
	8.160E+00	7.886E-20
	8.640E+00	5.282E-21
	9.120E+00	2.893E-22
	9.600E+00	1.282E-23
	1.008E+01	4.553E-25
	1.056E+01	1.290E-26
	1.104E+01	3.036E-28
	1.152E+01	8.218E-30
	1.200E+01	4.578E-31
	1.248E+01	4.737E-32
	1.296E+01	4.913E-33
	1.345E+01	4.627E-34
	1.393E+01	3.907E-35
	1.441E+01	2.945E-36
	1.489E+01	1.976E-37
	1.538E+01	1.174E-38
	1.586E+01	6.158E-40
	1.634E+01	2.841E-41
	1.682E+01	1.153E-42
	1.730E+01	4.163E-44
	1.779E+01	1.421E-45
	1.827E+01	5.510E-47
	1.875E+01	3.100E-48
	1.923E+01	2.377E-49
	1.972E+01	1.960E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.500E-01
	9.600E-01	2.235E-01
	1.440E+00	6.504E-02
	1.920E+00	1.327E-02
	2.400E+00	1.872E-03
	2.880E+00	1.811E-04
	3.360E+00	1.194E-05
	3.840E+00	5.337E-07
	4.320E+00	1.614E-08
	4.800E+00	3.302E-10
	5.280E+00	4.940E-12
	5.760E+00	1.816E-13
	6.240E+00	4.249E-14
	6.720E+00	1.155E-14
	7.200E+00	2.856E-15
	7.680E+00	6.361E-16
	8.160E+00	1.272E-16
	8.640E+00	2.277E-17
	9.120E+00	3.632E-18
	9.600E+00	5.143E-19
	1.008E+01	6.435E-20
	1.056E+01	7.080E-21
	1.104E+01	6.813E-22
	1.152E+01	5.699E-23
	1.200E+01	3.653E-24
	1.248E+01	2.223E-25
	1.296E+01	1.163E-26
	1.345E+01	5.370E-28
	1.393E+01	2.554E-29
	1.441E+01	1.926E-30
	1.489E+01	2.607E-31
	1.538E+01	4.218E-32
	1.586E+01	6.657E-33
	1.634E+01	9.846E-34
	1.682E+01	1.355E-34
	1.730E+01	1.731E-35
	1.779E+01	2.049E-36
	1.827E+01	2.242E-37
	1.875E+01	2.262E-38
	1.923E+01	2.101E-39
	1.972E+01	1.793E-40

	2.020E+01	1.403E-41
	2.068E+01	1.009E-42
	2.116E+01	6.725E-44
	2.165E+01	4.291E-45
	2.213E+01	2.857E-46
	2.261E+01	2.307E-47
	2.309E+01	2.447E-48
	2.357E+01	3.085E-49
	2.406E+01	4.054E-50
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	6.096E-01
	9.600E-01	2.973E-01
	1.440E+00	1.135E-01
	1.920E+00	3.335E-02
	2.400E+00	7.473E-03
	2.880E+00	1.267E-03
	3.360E+00	1.616E-04
	3.840E+00	1.546E-05
	4.320E+00	1.105E-06
	4.800E+00	5.896E-08
	5.280E+00	2.344E-09
	5.760E+00	7.005E-11
	6.240E+00	1.865E-12
	6.720E+00	1.568E-13
	7.200E+00	4.717E-14
	7.680E+00	1.546E-14
	8.160E+00	4.724E-15
	8.640E+00	1.336E-15
	9.120E+00	3.491E-16
	9.600E+00	8.401E-17
	1.008E+01	1.859E-17
	1.056E+01	3.770E-18
	1.104E+01	6.992E-19
	1.152E+01	1.180E-19
	1.200E+01	1.608E-20
	1.248E+01	2.196E-21
	1.296E+01	2.703E-22
	1.345E+01	2.988E-23
	1.393E+01	2.956E-24
	1.441E+01	2.610E-25
	1.489E+01	2.055E-26

	1.538E+01	1.464E-27
	1.586E+01	1.010E-28
	1.634E+01	8.446E-30
	1.682E+01	1.139E-30
	1.730E+01	2.186E-31
	1.779E+01	4.553E-32
	1.827E+01	9.256E-33
	1.875E+01	1.793E-33
	1.923E+01	3.293E-34
	1.972E+01	5.722E-35
	2.020E+01	9.395E-36
	2.068E+01	1.456E-36
	2.116E+01	2.125E-37
	2.165E+01	2.920E-38
	2.213E+01	3.771E-39
	2.261E+01	4.569E-40
	2.309E+01	5.190E-41
	2.357E+01	5.527E-42
	2.406E+01	5.533E-43
	2.454E+01	5.256E-44
	2.502E+01	4.864E-45
	2.550E+01	4.663E-46
	2.599E+01	5.119E-47
	2.647E+01	6.911E-48
	2.695E+01	1.104E-48
	2.743E+01	1.898E-49
	2.791E+01	3.283E-50
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.518E-01
	9.600E-01	3.563E-01
	1.440E+00	1.606E-01
	1.920E+00	5.892E-02
	2.400E+00	1.746E-02
	2.880E+00	4.149E-03
	3.360E+00	7.876E-04
	3.840E+00	1.190E-04
	4.320E+00	1.427E-05
	4.800E+00	1.356E-06
	5.280E+00	1.019E-07
	5.760E+00	6.054E-09
	6.240E+00	2.849E-10
	6.720E+00	1.106E-11
	7.200E+00	5.569E-13
	7.680E+00	1.112E-13
	8.160E+00	4.089E-14
	8.640E+00	1.503E-14
	9.120E+00	5.217E-15
	9.600E+00	1.702E-15
	1.008E+01	5.209E-16

	1.056E+01	1.494E-16
	1.104E+01	4.008E-17
	1.152E+01	9.990E-18
	1.200E+01	2.076E-18
	1.248E+01	4.433E-19
	1.296E+01	8.777E-20
	1.345E+01	1.608E-20
	1.393E+01	2.719E-21
	1.441E+01	4.233E-22
	1.489E+01	6.051E-23
	1.538E+01	7.919E-24
	1.586E+01	9.467E-25
	1.634E+01	1.032E-25
	1.682E+01	1.030E-26
	1.730E+01	9.559E-28
	1.779E+01	8.838E-29
	1.827E+01	9.788E-30
	1.875E+01	1.601E-30
	1.923E+01	3.569E-31
	1.972E+01	8.773E-32
	2.020E+01	2.146E-32
	2.068E+01	5.071E-33
	2.116E+01	1.150E-33
	2.165E+01	2.497E-34
	2.213E+01	5.186E-35
	2.261E+01	1.029E-35
	2.309E+01	1.950E-36
	2.357E+01	3.523E-37
	2.406E+01	6.064E-38
	2.454E+01	9.934E-39
	2.502E+01	1.547E-39
	2.550E+01	2.290E-40
	2.599E+01	3.217E-41
	2.647E+01	4.294E-42
	2.695E+01	5.459E-43
	2.743E+01	6.661E-44
	2.791E+01	7.955E-45
	2.840E+01	9.695E-46
	2.888E+01	1.292E-46
	2.936E+01	2.014E-47
	2.984E+01	3.686E-48
	3.033E+01	7.449E-49
	3.081E+01	1.559E-49
	3.129E+01	3.248E-50
30	0.000E+00	1.000E+00
	4.800E-01	6.838E-01
	9.600E-01	4.044E-01
	1.440E+00	2.040E-01
	1.920E+00	8.696E-02
	2.400E+00	3.108E-02
	2.880E+00	9.263E-03
	3.360E+00	2.293E-03
	3.840E+00	4.701E-04
	4.320E+00	7.963E-05
	4.800E+00	1.112E-05
	5.280E+00	1.279E-06

	5.760E+00	1.210E-07
	6.240E+00	9.412E-09
	6.720E+00	6.023E-10
	7.200E+00	3.225E-11
	7.680E+00	1.725E-12
	8.160E+00	2.190E-13
	8.640E+00	7.652E-14
	9.120E+00	3.141E-14
	9.600E+00	1.247E-14
	1.008E+01	4.708E-15
	1.056E+01	1.688E-15
	1.104E+01	5.735E-16
	1.152E+01	1.831E-16
	1.200E+01	4.985E-17
	1.248E+01	1.413E-17
	1.296E+01	3.775E-18
	1.345E+01	9.496E-19
	1.393E+01	2.245E-19
	1.441E+01	4.980E-20
	1.489E+01	1.035E-20
	1.538E+01	2.009E-21
	1.586E+01	3.640E-22
	1.634E+01	6.140E-23
	1.682E+01	9.623E-24
	1.730E+01	1.399E-24
	1.779E+01	1.883E-25
	1.827E+01	2.350E-26
	1.875E+01	2.744E-27
	1.923E+01	3.094E-28
	1.972E+01	3.707E-29
	2.020E+01	5.659E-30
	2.068E+01	1.212E-30
	2.116E+01	3.199E-31
	2.165E+01	8.943E-32
	2.213E+01	2.479E-32
	2.261E+01	6.675E-33
	2.309E+01	1.737E-33
	2.357E+01	4.361E-34
	2.406E+01	1.055E-34
	2.454E+01	2.459E-35
	2.502E+01	5.513E-36
	2.550E+01	1.189E-36
	2.599E+01	2.464E-37
	2.647E+01	4.902E-38
	2.695E+01	9.359E-39
	2.743E+01	1.713E-39
	2.791E+01	3.004E-40
	2.840E+01	5.045E-41
	2.888E+01	8.118E-42
	2.936E+01	1.253E-42
	2.984E+01	1.864E-43
	3.033E+01	2.702E-44
	3.081E+01	3.904E-45
	3.129E+01	5.865E-46
35	0.000E+00	1.000E+00
	4.800E-01	7.091E-01

	9.600E-01	4.444E-01
	1.440E+00	2.434E-01
	1.920E+00	1.156E-01
	2.400E+00	4.728E-02
	2.880E+00	1.658E-02
	3.360E+00	4.964E-03
	3.840E+00	1.266E-03
	4.320E+00	2.745E-04
	4.800E+00	5.051E-05
	5.280E+00	7.874E-06
	5.760E+00	1.039E-06
	6.240E+00	1.160E-07
	6.720E+00	1.094E-08
	7.200E+00	8.733E-10
	7.680E+00	5.955E-11
	8.160E+00	3.806E-12
	8.640E+00	3.966E-13
	9.120E+00	1.193E-13
	9.600E+00	5.173E-14
	1.008E+01	2.254E-14
	1.056E+01	9.438E-15
	1.104E+01	3.779E-15
	1.152E+01	1.432E-15
	1.200E+01	4.707E-16
	1.248E+01	1.622E-16
	1.296E+01	5.325E-17
	1.345E+01	1.665E-17
	1.393E+01	4.948E-18
	1.441E+01	1.397E-18
	1.489E+01	3.740E-19
	1.538E+01	9.488E-20
	1.586E+01	2.276E-20
	1.634E+01	5.159E-21
	1.682E+01	1.103E-21
	1.730E+01	2.219E-22
	1.779E+01	4.197E-23
	1.827E+01	7.451E-24
	1.875E+01	1.240E-24
	1.923E+01	1.931E-25
	1.972E+01	2.820E-26
	2.020E+01	3.886E-27
	2.068E+01	5.169E-28
	2.116E+01	7.085E-29
	2.165E+01	1.145E-29
	2.213E+01	2.469E-30
	2.261E+01	6.771E-31
	2.309E+01	2.056E-31
	2.357E+01	6.342E-32
	2.406E+01	1.924E-32
	2.454E+01	5.680E-33
	2.502E+01	1.628E-33
	2.550E+01	4.524E-34
	2.599E+01	1.218E-34
	2.647E+01	3.174E-35
	2.695E+01	8.007E-36
	2.743E+01	1.953E-36
	2.791E+01	4.606E-37

	2.840E+01	1.049E-37
	2.888E+01	2.307E-38
	2.936E+01	4.893E-39
	2.984E+01	1.001E-39
	3.033E+01	1.973E-40
	3.081E+01	3.750E-41
	3.129E+01	6.868E-42
40	0.000E+00	1.000E+00
	4.800E-01	7.297E-01
	9.600E-01	4.783E-01
	1.440E+00	2.790E-01
	1.920E+00	1.438E-01
	2.400E+00	6.511E-02
	2.880E+00	2.580E-02
	3.360E+00	8.916E-03
	3.840E+00	2.680E-03
	4.320E+00	6.996E-04
	4.800E+00	1.583E-04
	5.280E+00	3.100E-05
	5.760E+00	5.252E-06
	6.240E+00	7.689E-07
	6.720E+00	9.721E-08
	7.200E+00	1.061E-08
	7.680E+00	1.000E-09
	8.160E+00	8.205E-11
	8.640E+00	6.231E-12
	9.120E+00	6.368E-13
	9.600E+00	1.670E-13
	1.008E+01	7.356E-14
	1.056E+01	3.422E-14
	1.104E+01	1.545E-14
	1.152E+01	6.631E-15
	1.200E+01	2.506E-15
	1.248E+01	9.963E-16
	1.296E+01	3.803E-16
	1.345E+01	1.393E-16
	1.393E+01	4.889E-17
	1.441E+01	1.644E-17
	1.489E+01	5.288E-18
	1.538E+01	1.626E-18
	1.586E+01	4.774E-19
	1.634E+01	1.337E-19
	1.682E+01	3.568E-20
	1.730E+01	9.061E-21
	1.779E+01	2.187E-21
	1.827E+01	5.009E-22
	1.875E+01	1.088E-22
	1.923E+01	2.236E-23
	1.972E+01	4.345E-24
	2.020E+01	7.975E-25
	2.068E+01	1.382E-25
	2.116E+01	2.265E-26
	2.165E+01	3.533E-27
	2.213E+01	5.360E-28
	2.261E+01	8.369E-29
	2.309E+01	1.503E-29

	2.357E+01	3.462E-30
	2.406E+01	1.002E-30
	2.454E+01	3.250E-31
	2.502E+01	1.085E-31
	2.550E+01	3.590E-32
	2.599E+01	1.164E-32
	2.647E+01	3.677E-33
	2.695E+01	1.132E-33
	2.743E+01	3.388E-34
	2.791E+01	9.864E-35
	2.840E+01	2.792E-35
	2.888E+01	7.677E-36
	2.936E+01	2.050E-36
	2.984E+01	5.314E-37
	3.033E+01	1.336E-37
	3.081E+01	3.259E-38
	3.129E+01	7.701E-39
45	0.000E+00	1.000E+00
	4.800E-01	7.469E-01
	9.600E-01	5.074E-01
	1.440E+00	3.110E-01
	1.920E+00	1.710E-01
	2.400E+00	8.385E-02
	2.880E+00	3.656E-02
	3.360E+00	1.413E-02
	3.840E+00	4.828E-03
	4.320E+00	1.456E-03
	4.800E+00	3.870E-04
	5.280E+00	9.054E-05
	5.760E+00	1.863E-05
	6.240E+00	3.368E-06
	6.720E+00	5.347E-07
	7.200E+00	7.452E-08
	7.680E+00	9.111E-09
	8.160E+00	9.781E-10
	8.640E+00	9.283E-11
	9.120E+00	8.177E-12
	9.600E+00	8.865E-13
	1.008E+01	2.155E-13
	1.056E+01	9.484E-14
	1.104E+01	4.613E-14
	1.152E+01	2.175E-14
	1.200E+01	9.154E-15
	1.248E+01	4.059E-15
	1.296E+01	1.738E-15
	1.345E+01	7.180E-16
	1.393E+01	2.860E-16
	1.441E+01	1.098E-16
	1.489E+01	4.057E-17
	1.538E+01	1.443E-17
	1.586E+01	4.932E-18
	1.634E+01	1.620E-18
	1.682E+01	5.105E-19
	1.730E+01	1.543E-19
	1.779E+01	4.467E-20
	1.827E+01	1.238E-20

	1.875E+01	3.278E-21
	1.923E+01	8.289E-22
	1.972E+01	2.000E-22
	2.020E+01	4.597E-23
	2.068E+01	1.006E-23
	2.116E+01	2.092E-24
	2.165E+01	4.135E-25
	2.213E+01	7.769E-26
	2.261E+01	1.391E-26
	2.309E+01	2.392E-27
	2.357E+01	4.048E-28
	2.406E+01	7.139E-29
	2.454E+01	1.450E-29
	2.502E+01	3.695E-30
	2.550E+01	1.152E-30
	2.599E+01	3.981E-31
	2.647E+01	1.417E-31
	2.695E+01	5.020E-32
	2.743E+01	1.748E-32
	2.791E+01	5.954E-33
	2.840E+01	1.981E-33
	2.888E+01	6.435E-34
	2.936E+01	2.039E-34
	2.984E+01	6.303E-35
	3.033E+01	1.899E-35
	3.081E+01	5.578E-36
	3.129E+01	1.596E-36
50	0.000E+00	1.000E+00
	4.800E-01	7.615E-01
	9.600E-01	5.328E-01
	1.440E+00	3.400E-01
	1.920E+00	1.969E-01
	2.400E+00	1.030E-01
	2.880E+00	4.849E-02
	3.360E+00	2.049E-02
	3.840E+00	7.760E-03
	4.320E+00	2.628E-03
	4.800E+00	7.946E-04
	5.280E+00	2.143E-04
	5.760E+00	5.153E-05
	6.240E+00	1.103E-05
	6.720E+00	2.102E-06
	7.200E+00	3.562E-07
	7.680E+00	5.367E-08
	8.160E+00	7.190E-09
	8.640E+00	8.569E-10
	9.120E+00	9.149E-11
	9.600E+00	9.141E-12
	1.008E+01	1.082E-12
	1.056E+01	2.590E-13
	1.104E+01	1.136E-13
	1.152E+01	5.632E-14
	1.200E+01	2.575E-14
	1.248E+01	1.244E-14
	1.296E+01	5.832E-15
	1.345E+01	2.649E-15

	1.393E+01	1.165E-15
	1.441E+01	4.963E-16
	1.489E+01	2.045E-16
	1.538E+01	8.147E-17
	1.586E+01	3.136E-17
	1.634E+01	1.166E-17
	1.682E+01	4.182E-18
	1.730E+01	1.447E-18
	1.779E+01	4.823E-19
	1.827E+01	1.548E-19
	1.875E+01	4.779E-20
	1.923E+01	1.418E-20
	1.972E+01	4.041E-21
	2.020E+01	1.105E-21
	2.068E+01	2.896E-22
	2.116E+01	7.269E-23
	2.165E+01	1.745E-23
	2.213E+01	4.006E-24
	2.261E+01	8.784E-25
	2.309E+01	1.839E-25
	2.357E+01	3.682E-26
	2.406E+01	7.075E-27
	2.454E+01	1.321E-27
	2.502E+01	2.466E-28
	2.550E+01	4.905E-29
	2.599E+01	1.139E-29
	2.647E+01	3.266E-30
	2.695E+01	1.107E-30
	2.743E+01	4.071E-31
	2.791E+01	1.532E-31
	2.840E+01	5.735E-32
	2.888E+01	2.114E-32
	2.936E+01	7.641E-33
	2.984E+01	2.705E-33
	3.033E+01	9.369E-34
	3.081E+01	3.175E-34
	3.129E+01	1.052E-34
55	0.000E+00	1.000E+00
	4.800E-01	7.742E-01
	9.600E-01	5.551E-01
	1.440E+00	3.664E-01
	1.920E+00	2.215E-01
	2.400E+00	1.221E-01
	2.880E+00	6.125E-02
	3.360E+00	2.787E-02
	3.840E+00	1.148E-02
	4.320E+00	4.274E-03
	4.800E+00	1.437E-03
	5.280E+00	4.354E-04
	5.760E+00	1.189E-04
	6.240E+00	2.923E-05
	6.720E+00	6.465E-06
	7.200E+00	1.286E-06
	7.680E+00	2.300E-07
	8.160E+00	3.695E-08
	8.640E+00	5.335E-09

	9.120E+00	6.929E-10
	9.600E+00	8.156E-11
	1.008E+01	9.082E-12
	1.056E+01	1.185E-12
	1.104E+01	2.912E-13
	1.152E+01	1.268E-13
	1.200E+01	6.022E-14
	1.248E+01	3.108E-14
	1.296E+01	1.566E-14
	1.345E+01	7.681E-15
	1.393E+01	3.661E-15
	1.441E+01	1.695E-15
	1.489E+01	7.623E-16
	1.538E+01	3.327E-16
	1.586E+01	1.409E-16
	1.634E+01	5.784E-17
	1.682E+01	2.301E-17
	1.730E+01	8.868E-18
	1.779E+01	3.308E-18
	1.827E+01	1.193E-18
	1.875E+01	4.162E-19
	1.923E+01	1.402E-19
	1.972E+01	4.560E-20
	2.020E+01	1.431E-20
	2.068E+01	4.325E-21
	2.116E+01	1.259E-21
	2.165E+01	3.529E-22
	2.213E+01	9.507E-23
	2.261E+01	2.460E-23
	2.309E+01	6.113E-24
	2.357E+01	1.457E-24
	2.406E+01	3.330E-25
	2.454E+01	7.302E-26
	2.502E+01	1.540E-26
	2.550E+01	3.144E-27
	2.599E+01	6.323E-28
	2.647E+01	1.302E-28
	2.695E+01	2.943E-29
	2.743E+01	7.890E-30
	2.791E+01	2.552E-30
	2.840E+01	9.388E-31
	2.888E+01	3.657E-31
	2.936E+01	1.443E-31
	2.984E+01	5.656E-32
	3.033E+01	2.184E-32
	3.081E+01	8.285E-33
	3.129E+01	3.083E-33

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_SandPoro_High

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.019 m2/a	0.45	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05
	2.400E+00	4.368E-08

	2.880E+00	4.885E-11
	3.360E+00	1.037E-13
	3.840E+00	9.638E-15
	4.320E+00	7.843E-16
	4.800E+00	4.641E-17
	5.280E+00	1.960E-18
	5.760E+00	5.783E-20
	6.240E+00	1.164E-21
	6.720E+00	1.553E-23
	7.200E+00	1.336E-25
	7.680E+00	7.408E-28
	8.160E+00	4.152E-30
	8.640E+00	1.022E-31
	9.120E+00	4.221E-33
	9.600E+00	1.474E-34
	1.008E+01	4.135E-36
	1.056E+01	9.227E-38
	1.104E+01	1.619E-39
	1.152E+01	2.210E-41
	1.200E+01	2.139E-43
	1.248E+01	1.806E-45
	1.296E+01	1.766E-47
	1.345E+01	3.509E-49
	1.393E+01	0.000E+00
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.538E+01	0.000E+00
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00

	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.057E-30
	1.200E+01	3.442E-31
	1.248E+01	3.531E-32
	1.296E+01	3.631E-33
	1.345E+01	3.389E-34
	1.393E+01	2.837E-35
	1.441E+01	2.120E-36
	1.489E+01	1.410E-37
	1.538E+01	8.304E-39
	1.586E+01	4.318E-40
	1.634E+01	1.975E-41
	1.682E+01	7.941E-43
	1.730E+01	2.844E-44
	1.779E+01	9.624E-46
	1.827E+01	3.702E-47
	1.875E+01	2.067E-48
	1.923E+01	1.572E-49
	1.972E+01	1.285E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00

	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.202E-23
	1.200E+01	2.744E-24
	1.248E+01	1.655E-25
	1.296E+01	8.583E-27
	1.345E+01	3.929E-28
	1.393E+01	1.855E-29
	1.441E+01	1.389E-30
	1.489E+01	1.865E-31
	1.538E+01	2.992E-32
	1.586E+01	4.681E-33
	1.634E+01	6.863E-34
	1.682E+01	9.364E-35
	1.730E+01	1.186E-35
	1.779E+01	1.391E-36
	1.827E+01	1.509E-37
	1.875E+01	1.509E-38
	1.923E+01	1.390E-39
	1.972E+01	1.175E-40
	2.020E+01	9.118E-42

	2.068E+01	6.499E-43
	2.116E+01	4.295E-44
	2.165E+01	2.717E-45
	2.213E+01	1.794E-46
	2.261E+01	1.438E-47
	2.309E+01	1.514E-48
	2.357E+01	1.892E-49
	2.406E+01	2.466E-50
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	6.021E-01
	9.600E-01	2.900E-01
	1.440E+00	1.093E-01
	1.920E+00	3.172E-02
	2.400E+00	7.017E-03
	2.880E+00	1.174E-03
	3.360E+00	1.479E-04
	3.840E+00	1.397E-05
	4.320E+00	9.858E-07
	4.800E+00	5.191E-08
	5.280E+00	2.037E-09
	5.760E+00	6.011E-11
	6.240E+00	1.582E-12
	6.720E+00	1.317E-13
	7.200E+00	3.914E-14
	7.680E+00	1.266E-14
	8.160E+00	3.820E-15
	8.640E+00	1.067E-15
	9.120E+00	2.751E-16
	9.600E+00	6.535E-17
	1.008E+01	1.427E-17
	1.056E+01	2.858E-18
	1.104E+01	5.232E-19
	1.152E+01	8.719E-20
	1.200E+01	1.210E-20
	1.248E+01	1.638E-21
	1.296E+01	1.998E-22
	1.345E+01	2.190E-23
	1.393E+01	2.148E-24
	1.441E+01	1.879E-25
	1.489E+01	1.467E-26
	1.538E+01	1.036E-27

	1.586E+01	7.086E-29
	1.634E+01	5.886E-30
	1.682E+01	7.886E-31
	1.730E+01	1.501E-31
	1.779E+01	3.100E-32
	1.827E+01	6.247E-33
	1.875E+01	1.200E-33
	1.923E+01	2.184E-34
	1.972E+01	3.761E-35
	2.020E+01	6.121E-36
	2.068E+01	9.401E-37
	2.116E+01	1.361E-37
	2.165E+01	1.853E-38
	2.213E+01	2.372E-39
	2.261E+01	2.849E-40
	2.309E+01	3.208E-41
	2.357E+01	3.387E-42
	2.406E+01	3.361E-43
	2.454E+01	3.165E-44
	2.502E+01	2.904E-45
	2.550E+01	2.762E-46
	2.599E+01	3.009E-47
	2.647E+01	4.033E-48
	2.695E+01	6.392E-49
	2.743E+01	1.090E-49
	2.791E+01	1.868E-50
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
	1.920E+00	5.605E-02
	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16
	1.056E+01	1.135E-16

	1.104E+01	3.005E-17
	1.152E+01	7.402E-18
	1.200E+01	1.565E-18
	1.248E+01	3.312E-19
	1.296E+01	6.501E-20
	1.345E+01	1.181E-20
	1.393E+01	1.979E-21
	1.441E+01	3.053E-22
	1.489E+01	4.326E-23
	1.538E+01	5.612E-24
	1.586E+01	6.650E-25
	1.634E+01	7.189E-26
	1.682E+01	7.108E-27
	1.730E+01	6.542E-28
	1.779E+01	6.001E-29
	1.827E+01	6.600E-30
	1.875E+01	1.072E-30
	1.923E+01	2.372E-31
	1.972E+01	5.781E-32
	2.020E+01	1.402E-32
	2.068E+01	3.284E-33
	2.116E+01	7.382E-34
	2.165E+01	1.589E-34
	2.213E+01	3.271E-35
	2.261E+01	6.435E-36
	2.309E+01	1.208E-36
	2.357E+01	2.164E-37
	2.406E+01	3.692E-38
	2.454E+01	5.996E-39
	2.502E+01	9.257E-40
	2.550E+01	1.358E-40
	2.599E+01	1.891E-41
	2.647E+01	2.502E-42
	2.695E+01	3.153E-43
	2.743E+01	3.815E-44
	2.791E+01	4.518E-45
	2.840E+01	5.462E-46
	2.888E+01	7.226E-47
	2.936E+01	1.118E-47
	2.984E+01	2.030E-48
	3.033E+01	4.070E-49
	3.081E+01	8.443E-50
	3.129E+01	1.744E-50
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06
	5.760E+00	1.039E-07

	6.240E+00	7.979E-09
	6.720E+00	5.041E-10
	7.200E+00	2.665E-11
	7.680E+00	1.409E-12
	8.160E+00	1.774E-13
	8.640E+00	6.128E-14
	9.120E+00	2.484E-14
	9.600E+00	9.733E-15
	1.008E+01	3.628E-15
	1.056E+01	1.284E-15
	1.104E+01	4.307E-16
	1.152E+01	1.361E-16
	1.200E+01	3.765E-17
	1.248E+01	1.057E-17
	1.296E+01	2.801E-18
	1.345E+01	6.983E-19
	1.393E+01	1.636E-19
	1.441E+01	3.598E-20
	1.489E+01	7.409E-21
	1.538E+01	1.426E-21
	1.586E+01	2.561E-22
	1.634E+01	4.282E-23
	1.682E+01	6.652E-24
	1.730E+01	9.583E-25
	1.779E+01	1.279E-25
	1.827E+01	1.582E-26
	1.875E+01	1.832E-27
	1.923E+01	2.048E-28
	1.972E+01	2.436E-29
	2.020E+01	3.695E-30
	2.068E+01	7.860E-31
	2.116E+01	2.058E-31
	2.165E+01	5.705E-32
	2.213E+01	1.567E-32
	2.261E+01	4.184E-33
	2.309E+01	1.079E-33
	2.357E+01	2.686E-34
	2.406E+01	6.441E-35
	2.454E+01	1.488E-35
	2.502E+01	3.307E-36
	2.550E+01	7.069E-37
	2.599E+01	1.452E-37
	2.647E+01	2.864E-38
	2.695E+01	5.420E-39
	2.743E+01	9.832E-40
	2.791E+01	1.709E-40
	2.840E+01	2.846E-41
	2.888E+01	4.539E-42
	2.936E+01	6.946E-43
	2.984E+01	1.024E-43
	3.033E+01	1.472E-44
	3.081E+01	2.109E-45
	3.129E+01	3.144E-46
35	0.000E+00	1.000E+00
	4.800E-01	7.006E-01
	9.600E-01	4.337E-01

	1.440E+00	2.346E-01
	1.920E+00	1.100E-01
	2.400E+00	4.443E-02
	2.880E+00	1.538E-02
	3.360E+00	4.547E-03
	3.840E+00	1.145E-03
	4.320E+00	2.451E-04
	4.800E+00	4.452E-05
	5.280E+00	6.852E-06
	5.760E+00	8.927E-07
	6.240E+00	9.837E-08
	6.720E+00	9.162E-09
	7.200E+00	7.219E-10
	7.680E+00	4.860E-11
	8.160E+00	3.069E-12
	8.640E+00	3.171E-13
	9.120E+00	9.445E-14
	9.600E+00	4.044E-14
	1.008E+01	1.740E-14
	1.056E+01	7.192E-15
	1.104E+01	2.844E-15
	1.152E+01	1.067E-15
	1.200E+01	3.560E-16
	1.248E+01	1.216E-16
	1.296E+01	3.957E-17
	1.345E+01	1.226E-17
	1.393E+01	3.612E-18
	1.441E+01	1.011E-18
	1.489E+01	2.683E-19
	1.538E+01	6.746E-20
	1.586E+01	1.604E-20
	1.634E+01	3.604E-21
	1.682E+01	7.634E-22
	1.730E+01	1.523E-22
	1.779E+01	2.855E-23
	1.827E+01	5.024E-24
	1.875E+01	8.285E-25
	1.923E+01	1.279E-25
	1.972E+01	1.852E-26
	2.020E+01	2.530E-27
	2.068E+01	3.337E-28
	2.116E+01	4.540E-29
	2.165E+01	7.290E-30
	2.213E+01	1.562E-30
	2.261E+01	4.252E-31
	2.309E+01	1.281E-31
	2.357E+01	3.915E-32
	2.406E+01	1.177E-32
	2.454E+01	3.446E-33
	2.502E+01	9.790E-34
	2.550E+01	2.697E-34
	2.599E+01	7.195E-35
	2.647E+01	1.859E-35
	2.695E+01	4.648E-36
	2.743E+01	1.124E-36
	2.791E+01	2.627E-37
	2.840E+01	5.931E-38

	2.888E+01	1.293E-38
	2.936E+01	2.718E-39
	2.984E+01	5.512E-40
	3.033E+01	1.077E-40
	3.081E+01	2.029E-41
	3.129E+01	3.684E-42
40	0.000E+00	1.000E+00
	4.800E-01	7.210E-01
	9.600E-01	4.668E-01
	1.440E+00	2.689E-01
	1.920E+00	1.369E-01
	2.400E+00	6.120E-02
	2.880E+00	2.395E-02
	3.360E+00	8.170E-03
	3.840E+00	2.425E-03
	4.320E+00	6.249E-04
	4.800E+00	1.396E-04
	5.280E+00	2.699E-05
	5.760E+00	4.514E-06
	6.240E+00	6.524E-07
	6.720E+00	8.142E-08
	7.200E+00	8.772E-09
	7.680E+00	8.163E-10
	8.160E+00	6.612E-11
	8.640E+00	4.961E-12
	9.120E+00	5.024E-13
	9.600E+00	1.306E-13
	1.008E+01	5.686E-14
	1.056E+01	2.612E-14
	1.104E+01	1.165E-14
	1.152E+01	4.955E-15
	1.200E+01	1.899E-15
	1.248E+01	7.482E-16
	1.296E+01	2.831E-16
	1.345E+01	1.028E-16
	1.393E+01	3.575E-17
	1.441E+01	1.191E-17
	1.489E+01	3.799E-18
	1.538E+01	1.158E-18
	1.586E+01	3.370E-19
	1.634E+01	9.356E-20
	1.682E+01	2.475E-20
	1.730E+01	6.228E-21
	1.779E+01	1.490E-21
	1.827E+01	3.383E-22
	1.875E+01	7.281E-23
	1.923E+01	1.483E-23
	1.972E+01	2.858E-24
	2.020E+01	5.199E-25
	2.068E+01	8.931E-26
	2.116E+01	1.451E-26
	2.165E+01	2.244E-27
	2.213E+01	3.376E-28
	2.261E+01	5.232E-29
	2.309E+01	9.334E-30
	2.357E+01	2.137E-30

	2.406E+01	6.141E-31
	2.454E+01	1.976E-31
	2.502E+01	6.538E-32
	2.550E+01	2.145E-32
	2.599E+01	6.892E-33
	2.647E+01	2.159E-33
	2.695E+01	6.585E-34
	2.743E+01	1.954E-34
	2.791E+01	5.641E-35
	2.840E+01	1.582E-35
	2.888E+01	4.313E-36
	2.936E+01	1.142E-36
	2.984E+01	2.934E-37
	3.033E+01	7.312E-38
	3.081E+01	1.767E-38
	3.129E+01	4.140E-39
45	0.000E+00	1.000E+00
	4.800E-01	7.380E-01
	9.600E-01	4.953E-01
	1.440E+00	2.999E-01
	1.920E+00	1.628E-01
	2.400E+00	7.884E-02
	2.880E+00	3.394E-02
	3.360E+00	1.295E-02
	3.840E+00	4.369E-03
	4.320E+00	1.301E-03
	4.800E+00	3.413E-04
	5.280E+00	7.884E-05
	5.760E+00	1.602E-05
	6.240E+00	2.859E-06
	6.720E+00	4.481E-07
	7.200E+00	6.164E-08
	7.680E+00	7.440E-09
	8.160E+00	7.886E-10
	8.640E+00	7.389E-11
	9.120E+00	6.430E-12
	9.600E+00	6.905E-13
	1.008E+01	1.666E-13
	1.056E+01	7.250E-14
	1.104E+01	3.485E-14
	1.152E+01	1.630E-14
	1.200E+01	6.948E-15
	1.248E+01	3.054E-15
	1.296E+01	1.296E-15
	1.345E+01	5.306E-16
	1.393E+01	2.095E-16
	1.441E+01	7.970E-17
	1.489E+01	2.920E-17
	1.538E+01	1.029E-17
	1.586E+01	3.487E-18
	1.634E+01	1.135E-18
	1.682E+01	3.546E-19
	1.730E+01	1.062E-19
	1.779E+01	3.048E-20
	1.827E+01	8.370E-21
	1.875E+01	2.197E-21

	1.923E+01	5.508E-22
	1.972E+01	1.317E-22
	2.020E+01	3.001E-23
	2.068E+01	6.508E-24
	2.116E+01	1.342E-24
	2.165E+01	2.629E-25
	2.213E+01	4.896E-26
	2.261E+01	8.688E-27
	2.309E+01	1.482E-27
	2.357E+01	2.488E-28
	2.406E+01	4.355E-29
	2.454E+01	8.790E-30
	2.502E+01	2.226E-30
	2.550E+01	6.890E-31
	2.599E+01	2.363E-31
	2.647E+01	8.339E-32
	2.695E+01	2.929E-32
	2.743E+01	1.011E-32
	2.791E+01	3.413E-33
	2.840E+01	1.126E-33
	2.888E+01	3.624E-34
	2.936E+01	1.138E-34
	2.984E+01	3.488E-35
	3.033E+01	1.042E-35
	3.081E+01	3.033E-36
	3.129E+01	8.600E-37
50	0.000E+00	1.000E+00
	4.800E-01	7.526E-01
	9.600E-01	5.201E-01
	1.440E+00	3.279E-01
	1.920E+00	1.875E-01
	2.400E+00	9.685E-02
	2.880E+00	4.502E-02
	3.360E+00	1.879E-02
	3.840E+00	7.025E-03
	4.320E+00	2.349E-03
	4.800E+00	7.012E-04
	5.280E+00	1.867E-04
	5.760E+00	4.432E-05
	6.240E+00	9.366E-06
	6.720E+00	1.762E-06
	7.200E+00	2.947E-07
	7.680E+00	4.385E-08
	8.160E+00	5.798E-09
	8.640E+00	6.822E-10
	9.120E+00	7.192E-11
	9.600E+00	7.099E-12
	1.008E+01	8.325E-13
	1.056E+01	1.979E-13
	1.104E+01	8.597E-14
	1.152E+01	4.230E-14
	1.200E+01	1.957E-14
	1.248E+01	9.376E-15
	1.296E+01	4.355E-15
	1.345E+01	1.961E-15
	1.393E+01	8.550E-16

	1.441E+01	3.609E-16
	1.489E+01	1.474E-16
	1.538E+01	5.820E-17
	1.586E+01	2.221E-17
	1.634E+01	8.182E-18
	1.682E+01	2.909E-18
	1.730E+01	9.976E-19
	1.779E+01	3.296E-19
	1.827E+01	1.048E-19
	1.875E+01	3.209E-20
	1.923E+01	9.438E-21
	1.972E+01	2.666E-21
	2.020E+01	7.225E-22
	2.068E+01	1.877E-22
	2.116E+01	4.670E-23
	2.165E+01	1.111E-23
	2.213E+01	2.529E-24
	2.261E+01	5.495E-25
	2.309E+01	1.141E-25
	2.357E+01	2.263E-26
	2.406E+01	4.312E-27
	2.454E+01	7.980E-28
	2.502E+01	1.479E-28
	2.550E+01	2.921E-29
	2.599E+01	6.745E-30
	2.647E+01	1.922E-30
	2.695E+01	6.466E-31
	2.743E+01	2.359E-31
	2.791E+01	8.801E-32
	2.840E+01	3.266E-32
	2.888E+01	1.193E-32
	2.936E+01	4.276E-33
	2.984E+01	1.500E-33
	3.033E+01	5.152E-34
	3.081E+01	1.730E-34
	3.129E+01	5.682E-35
55	0.000E+00	1.000E+00
	4.800E-01	7.651E-01
	9.600E-01	5.420E-01
	1.440E+00	3.533E-01
	1.920E+00	2.110E-01
	2.400E+00	1.149E-01
	2.880E+00	5.689E-02
	3.360E+00	2.556E-02
	3.840E+00	1.039E-02
	4.320E+00	3.821E-03
	4.800E+00	1.268E-03
	5.280E+00	3.794E-04
	5.760E+00	1.023E-04
	6.240E+00	2.483E-05
	6.720E+00	5.421E-06
	7.200E+00	1.065E-06
	7.680E+00	1.879E-07
	8.160E+00	2.981E-08
	8.640E+00	4.249E-09
	9.120E+00	5.449E-10

	9.600E+00	6.332E-11
	1.008E+01	6.967E-12
	1.056E+01	9.009E-13
	1.104E+01	2.201E-13
	1.152E+01	9.540E-14
	1.200E+01	4.585E-14
	1.248E+01	2.345E-14
	1.296E+01	1.172E-14
	1.345E+01	5.694E-15
	1.393E+01	2.690E-15
	1.441E+01	1.235E-15
	1.489E+01	5.503E-16
	1.538E+01	2.381E-16
	1.586E+01	9.991E-17
	1.634E+01	4.066E-17
	1.682E+01	1.603E-17
	1.730E+01	6.124E-18
	1.779E+01	2.264E-18
	1.827E+01	8.096E-19
	1.875E+01	2.799E-19
	1.923E+01	9.346E-20
	1.972E+01	3.013E-20
	2.020E+01	9.368E-21
	2.068E+01	2.807E-21
	2.116E+01	8.103E-22
	2.165E+01	2.250E-22
	2.213E+01	6.009E-23
	2.261E+01	1.542E-23
	2.309E+01	3.796E-24
	2.357E+01	8.968E-25
	2.406E+01	2.032E-25
	2.454E+01	4.416E-26
	2.502E+01	9.232E-27
	2.550E+01	1.869E-27
	2.599E+01	3.729E-28
	2.647E+01	7.621E-29
	2.695E+01	1.712E-29
	2.743E+01	4.562E-30
	2.791E+01	1.466E-30
	2.840E+01	5.355E-31
	2.888E+01	2.069E-31
	2.936E+01	8.094E-32
	2.984E+01	3.145E-32
	3.033E+01	1.204E-32
	3.081E+01	4.526E-33
	3.129E+01	1.670E-33

obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_SandPoro_Low

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.019 m2/a	0.20	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

	2.400E+00	4.368E-08
	2.880E+00	4.885E-11
	3.360E+00	1.037E-13
	3.840E+00	9.638E-15
	4.320E+00	7.843E-16
	4.800E+00	4.641E-17
	5.280E+00	1.960E-18
	5.760E+00	5.783E-20
	6.240E+00	1.164E-21
	6.720E+00	1.553E-23
	7.200E+00	1.336E-25
	7.680E+00	7.408E-28
	8.160E+00	4.152E-30
	8.640E+00	1.022E-31
	9.120E+00	4.221E-33
	9.600E+00	1.474E-34
	1.008E+01	4.135E-36
	1.056E+01	9.227E-38
	1.104E+01	1.619E-39
	1.152E+01	2.210E-41
	1.200E+01	3.094E-43
	1.248E+01	2.714E-45
	1.296E+01	2.757E-47
	1.345E+01	5.691E-49
	1.393E+01	1.674E-50
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.538E+01	0.000E+00
	1.586E+01	0.000E+00
	1.634E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.779E+01	0.000E+00
	1.827E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.972E+01	0.000E+00
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00

	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.072E-30
	1.200E+01	4.978E-31
	1.248E+01	5.304E-32
	1.296E+01	5.665E-33
	1.345E+01	5.493E-34
	1.393E+01	4.776E-35
	1.441E+01	3.708E-36
	1.489E+01	2.562E-37
	1.538E+01	1.568E-38
	1.586E+01	8.470E-40
	1.634E+01	4.025E-41
	1.682E+01	1.682E-42
	1.730E+01	6.258E-44
	1.779E+01	2.200E-45
	1.827E+01	8.783E-47
	1.875E+01	5.088E-48
	1.923E+01	4.018E-49
	1.972E+01	3.411E-50
	2.020E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.165E+01	0.000E+00
	2.213E+01	0.000E+00
	2.261E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.406E+01	0.000E+00
	2.454E+01	0.000E+00

	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.209E-23
	1.200E+01	3.969E-24
	1.248E+01	2.487E-25
	1.296E+01	1.340E-26
	1.345E+01	6.371E-28
	1.393E+01	3.123E-29
	1.441E+01	2.426E-30
	1.489E+01	3.383E-31
	1.538E+01	5.634E-32
	1.586E+01	9.156E-33
	1.634E+01	1.394E-33
	1.682E+01	1.976E-34
	1.730E+01	2.600E-35
	1.779E+01	3.169E-36
	1.827E+01	3.571E-37
	1.875E+01	3.712E-38
	1.923E+01	3.551E-39
	1.972E+01	3.121E-40

	2.020E+01	2.516E-41
	2.068E+01	1.863E-42
	2.116E+01	1.279E-43
	2.165E+01	8.406E-45
	2.213E+01	5.761E-46
	2.261E+01	4.786E-47
	2.309E+01	5.224E-48
	2.357E+01	6.779E-49
	2.406E+01	9.175E-50
	2.454E+01	1.213E-50
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.599E+01	0.000E+00
	2.647E+01	0.000E+00
	2.695E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.840E+01	0.000E+00
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	6.021E-01
	9.600E-01	2.900E-01
	1.440E+00	1.093E-01
	1.920E+00	3.172E-02
	2.400E+00	7.017E-03
	2.880E+00	1.174E-03
	3.360E+00	1.479E-04
	3.840E+00	1.397E-05
	4.320E+00	9.858E-07
	4.800E+00	5.191E-08
	5.280E+00	2.037E-09
	5.760E+00	6.011E-11
	6.240E+00	1.582E-12
	6.720E+00	1.317E-13
	7.200E+00	3.914E-14
	7.680E+00	1.266E-14
	8.160E+00	3.820E-15
	8.640E+00	1.067E-15
	9.120E+00	2.751E-16
	9.600E+00	6.535E-17
	1.008E+01	1.427E-17
	1.056E+01	2.858E-18
	1.104E+01	5.233E-19
	1.152E+01	8.788E-20
	1.200E+01	1.750E-20
	1.248E+01	2.460E-21
	1.296E+01	3.117E-22
	1.345E+01	3.548E-23
	1.393E+01	3.615E-24
	1.441E+01	3.286E-25
	1.489E+01	2.665E-26

	1.538E+01	1.955E-27
	1.586E+01	1.389E-28
	1.634E+01	1.196E-29
	1.682E+01	1.661E-30
	1.730E+01	3.281E-31
	1.779E+01	7.035E-32
	1.827E+01	1.473E-32
	1.875E+01	2.937E-33
	1.923E+01	5.555E-34
	1.972E+01	9.940E-35
	2.020E+01	1.681E-35
	2.068E+01	2.682E-36
	2.116E+01	4.033E-37
	2.165E+01	5.708E-38
	2.213E+01	7.591E-39
	2.261E+01	9.475E-40
	2.309E+01	1.109E-40
	2.357E+01	1.216E-41
	2.406E+01	1.254E-42
	2.454E+01	1.227E-43
	2.502E+01	1.169E-44
	2.550E+01	1.154E-45
	2.599E+01	1.302E-46
	2.647E+01	1.807E-47
	2.695E+01	2.971E-48
	2.743E+01	5.258E-49
	2.791E+01	9.366E-50
	2.840E+01	1.629E-50
	2.888E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.033E+01	0.000E+00
	3.081E+01	0.000E+00
	3.129E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
	1.920E+00	5.605E-02
	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.007E-17
	1.152E+01	7.542E-18
	1.200E+01	2.263E-18
	1.248E+01	4.973E-19
	1.296E+01	1.014E-19
	1.345E+01	1.912E-20
	1.393E+01	3.328E-21
	1.441E+01	5.333E-22
	1.489E+01	7.849E-23
	1.538E+01	1.058E-23
	1.586E+01	1.302E-24
	1.634E+01	1.462E-25
	1.682E+01	1.502E-26
	1.730E+01	1.436E-27
	1.779E+01	1.367E-28
	1.827E+01	1.558E-29
	1.875E+01	2.620E-30
	1.923E+01	6.011E-31
	1.972E+01	1.521E-31
	2.020E+01	3.830E-32
	2.068E+01	9.322E-33
	2.116E+01	2.177E-33
	2.165E+01	4.868E-34
	2.213E+01	1.041E-34
	2.261E+01	2.128E-35
	2.309E+01	4.152E-36
	2.357E+01	7.727E-37
	2.406E+01	1.370E-37
	2.454E+01	2.312E-38
	2.502E+01	3.709E-39
	2.550E+01	5.654E-40
	2.599E+01	8.183E-41
	2.647E+01	1.125E-41
	2.695E+01	1.473E-42
	2.743E+01	1.852E-43
	2.791E+01	2.277E-44
	2.840E+01	2.855E-45
	2.888E+01	3.911E-46
	2.936E+01	6.265E-47
	2.984E+01	1.178E-47
	3.033E+01	2.450E-48
	3.081E+01	5.278E-49
	3.129E+01	1.133E-49
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

	5.760E+00	1.039E-07
	6.240E+00	7.979E-09
	6.720E+00	5.041E-10
	7.200E+00	2.665E-11
	7.680E+00	1.409E-12
	8.160E+00	1.774E-13
	8.640E+00	6.128E-14
	9.120E+00	2.484E-14
	9.600E+00	9.733E-15
	1.008E+01	3.628E-15
	1.056E+01	1.284E-15
	1.104E+01	4.318E-16
	1.152E+01	1.405E-16
	1.200E+01	5.443E-17
	1.248E+01	1.587E-17
	1.296E+01	4.364E-18
	1.345E+01	1.130E-18
	1.393E+01	2.749E-19
	1.441E+01	6.277E-20
	1.489E+01	1.342E-20
	1.538E+01	2.684E-21
	1.586E+01	5.007E-22
	1.634E+01	8.695E-23
	1.682E+01	1.403E-23
	1.730E+01	2.100E-24
	1.779E+01	2.912E-25
	1.827E+01	3.743E-26
	1.875E+01	4.500E-27
	1.923E+01	5.224E-28
	1.972E+01	6.442E-29
	2.020E+01	1.011E-29
	2.068E+01	2.225E-30
	2.116E+01	6.042E-31
	2.165E+01	1.739E-31
	2.213E+01	4.962E-32
	2.261E+01	1.376E-32
	2.309E+01	3.688E-33
	2.357E+01	9.534E-34
	2.406E+01	2.376E-34
	2.454E+01	5.701E-35
	2.502E+01	1.317E-35
	2.550E+01	2.925E-36
	2.599E+01	6.243E-37
	2.647E+01	1.279E-37
	2.695E+01	2.516E-38
	2.743E+01	4.744E-39
	2.791E+01	8.569E-40
	2.840E+01	1.483E-40
	2.888E+01	2.457E-41
	2.936E+01	3.908E-42
	2.984E+01	5.988E-43
	3.033E+01	8.937E-44
	3.081E+01	1.329E-44
	3.129E+01	2.052E-45
35	0.000E+00	1.000E+00
	4.800E-01	7.006E-01

	9.600E-01	4.337E-01
	1.440E+00	2.346E-01
	1.920E+00	1.100E-01
	2.400E+00	4.443E-02
	2.880E+00	1.538E-02
	3.360E+00	4.547E-03
	3.840E+00	1.145E-03
	4.320E+00	2.451E-04
	4.800E+00	4.452E-05
	5.280E+00	6.852E-06
	5.760E+00	8.927E-07
	6.240E+00	9.837E-08
	6.720E+00	9.162E-09
	7.200E+00	7.219E-10
	7.680E+00	4.860E-11
	8.160E+00	3.069E-12
	8.640E+00	3.171E-13
	9.120E+00	9.445E-14
	9.600E+00	4.044E-14
	1.008E+01	1.740E-14
	1.056E+01	7.197E-15
	1.104E+01	2.860E-15
	1.152E+01	1.118E-15
	1.200E+01	5.147E-16
	1.248E+01	1.824E-16
	1.296E+01	6.163E-17
	1.345E+01	1.982E-17
	1.393E+01	6.063E-18
	1.441E+01	1.761E-18
	1.489E+01	4.855E-19
	1.538E+01	1.268E-19
	1.586E+01	3.131E-20
	1.634E+01	7.305E-21
	1.682E+01	1.607E-21
	1.730E+01	3.330E-22
	1.779E+01	6.486E-23
	1.827E+01	1.186E-23
	1.875E+01	2.032E-24
	1.923E+01	3.259E-25
	1.972E+01	4.902E-26
	2.020E+01	6.956E-27
	2.068E+01	9.526E-28
	2.116E+01	1.343E-28
	2.165E+01	2.231E-29
	2.213E+01	4.940E-30
	2.261E+01	1.393E-30
	2.309E+01	4.352E-31
	2.357E+01	1.382E-31
	2.406E+01	4.316E-32
	2.454E+01	1.312E-32
	2.502E+01	3.874E-33
	2.550E+01	1.109E-33
	2.599E+01	3.073E-34
	2.647E+01	8.251E-35
	2.695E+01	2.144E-35
	2.743E+01	5.386E-36
	2.791E+01	1.308E-36

	2.840E+01	3.069E-37
	2.888E+01	6.952E-38
	2.936E+01	1.519E-38
	2.984E+01	3.201E-39
	3.033E+01	6.502E-40
	3.081E+01	1.273E-40
	3.129E+01	2.401E-41
40	0.000E+00	1.000E+00
	4.800E-01	7.210E-01
	9.600E-01	4.668E-01
	1.440E+00	2.689E-01
	1.920E+00	1.369E-01
	2.400E+00	6.120E-02
	2.880E+00	2.395E-02
	3.360E+00	8.170E-03
	3.840E+00	2.425E-03
	4.320E+00	6.249E-04
	4.800E+00	1.396E-04
	5.280E+00	2.699E-05
	5.760E+00	4.514E-06
	6.240E+00	6.524E-07
	6.720E+00	8.142E-08
	7.200E+00	8.772E-09
	7.680E+00	8.163E-10
	8.160E+00	6.612E-11
	8.640E+00	4.961E-12
	9.120E+00	5.024E-13
	9.600E+00	1.306E-13
	1.008E+01	5.687E-14
	1.056E+01	2.616E-14
	1.104E+01	1.176E-14
	1.152E+01	5.269E-15
	1.200E+01	2.745E-15
	1.248E+01	1.122E-15
	1.296E+01	4.406E-16
	1.345E+01	1.660E-16
	1.393E+01	5.995E-17
	1.441E+01	2.074E-17
	1.489E+01	6.865E-18
	1.538E+01	2.173E-18
	1.586E+01	6.566E-19
	1.634E+01	1.893E-19
	1.682E+01	5.200E-20
	1.730E+01	1.359E-20
	1.779E+01	3.378E-21
	1.827E+01	7.966E-22
	1.875E+01	1.781E-22
	1.923E+01	3.770E-23
	1.972E+01	7.545E-24
	2.020E+01	1.426E-24
	2.068E+01	2.545E-25
	2.116E+01	4.295E-26
	2.165E+01	6.900E-27
	2.213E+01	1.078E-27
	2.261E+01	1.731E-28
	2.309E+01	3.192E-29

	2.357E+01	7.545E-30
	2.406E+01	2.244E-30
	2.454E+01	7.486E-31
	2.502E+01	2.572E-31
	2.550E+01	8.765E-32
	2.599E+01	2.925E-32
	2.647E+01	9.520E-33
	2.695E+01	3.017E-33
	2.743E+01	9.302E-34
	2.791E+01	2.790E-34
	2.840E+01	8.132E-35
	2.888E+01	2.303E-35
	2.936E+01	6.335E-36
	2.984E+01	1.692E-36
	3.033E+01	4.382E-37
	3.081E+01	1.101E-37
	3.129E+01	2.679E-38
45	0.000E+00	1.000E+00
	4.800E-01	7.380E-01
	9.600E-01	4.953E-01
	1.440E+00	2.999E-01
	1.920E+00	1.628E-01
	2.400E+00	7.884E-02
	2.880E+00	3.394E-02
	3.360E+00	1.295E-02
	3.840E+00	4.369E-03
	4.320E+00	1.301E-03
	4.800E+00	3.413E-04
	5.280E+00	7.884E-05
	5.760E+00	1.602E-05
	6.240E+00	2.859E-06
	6.720E+00	4.481E-07
	7.200E+00	6.164E-08
	7.680E+00	7.440E-09
	8.160E+00	7.886E-10
	8.640E+00	7.389E-11
	9.120E+00	6.430E-12
	9.600E+00	6.905E-13
	1.008E+01	1.667E-13
	1.056E+01	7.269E-14
	1.104E+01	3.536E-14
	1.152E+01	1.758E-14
	1.200E+01	1.004E-14
	1.248E+01	4.578E-15
	1.296E+01	2.016E-15
	1.345E+01	8.564E-16
	1.393E+01	3.509E-16
	1.441E+01	1.386E-16
	1.489E+01	5.269E-17
	1.538E+01	1.928E-17
	1.586E+01	6.783E-18
	1.634E+01	2.292E-18
	1.682E+01	7.437E-19
	1.730E+01	2.313E-19
	1.779E+01	6.895E-20
	1.827E+01	1.966E-20

	1.875E+01	5.362E-21
	1.923E+01	1.396E-21
	1.972E+01	3.469E-22
	2.020E+01	8.210E-23
	2.068E+01	1.850E-23
	2.116E+01	3.963E-24
	2.165E+01	8.067E-25
	2.213E+01	1.561E-25
	2.261E+01	2.877E-26
	2.309E+01	5.095E-27
	2.357E+01	8.876E-28
	2.406E+01	1.609E-28
	2.454E+01	3.354E-29
	2.502E+01	8.766E-30
	2.550E+01	2.806E-30
	2.599E+01	9.974E-31
	2.647E+01	3.654E-31
	2.695E+01	1.333E-31
	2.743E+01	4.779E-32
	2.791E+01	1.676E-32
	2.840E+01	5.745E-33
	2.888E+01	1.922E-33
	2.936E+01	6.273E-34
	2.984E+01	1.997E-34
	3.033E+01	6.198E-35
	3.081E+01	1.875E-35
	3.129E+01	5.525E-36
50	0.000E+00	1.000E+00
	4.800E-01	7.526E-01
	9.600E-01	5.201E-01
	1.440E+00	3.279E-01
	1.920E+00	1.875E-01
	2.400E+00	9.685E-02
	2.880E+00	4.502E-02
	3.360E+00	1.879E-02
	3.840E+00	7.025E-03
	4.320E+00	2.349E-03
	4.800E+00	7.012E-04
	5.280E+00	1.867E-04
	5.760E+00	4.432E-05
	6.240E+00	9.366E-06
	6.720E+00	1.762E-06
	7.200E+00	2.947E-07
	7.680E+00	4.385E-08
	8.160E+00	5.798E-09
	8.640E+00	6.822E-10
	9.120E+00	7.192E-11
	9.600E+00	7.099E-12
	1.008E+01	8.328E-13
	1.056E+01	1.986E-13
	1.104E+01	8.768E-14
	1.152E+01	4.623E-14
	1.200E+01	2.828E-14
	1.248E+01	1.405E-14
	1.296E+01	6.770E-15
	1.345E+01	3.162E-15

	1.393E+01	1.431E-15
	1.441E+01	6.267E-16
	1.489E+01	2.656E-16
	1.538E+01	1.089E-16
	1.586E+01	4.312E-17
	1.634E+01	1.650E-17
	1.682E+01	6.090E-18
	1.730E+01	2.168E-18
	1.779E+01	7.439E-19
	1.827E+01	2.458E-19
	1.875E+01	7.811E-20
	1.923E+01	2.386E-20
	1.972E+01	7.002E-21
	2.020E+01	1.971E-21
	2.068E+01	5.320E-22
	2.116E+01	1.375E-22
	2.165E+01	3.400E-23
	2.213E+01	8.037E-24
	2.261E+01	1.815E-24
	2.309E+01	3.913E-25
	2.357E+01	8.068E-26
	2.406E+01	1.596E-26
	2.454E+01	3.067E-27
	2.502E+01	5.892E-28
	2.550E+01	1.204E-28
	2.599E+01	2.867E-29
	2.647E+01	8.427E-30
	2.695E+01	2.933E-30
	2.743E+01	1.109E-30
	2.791E+01	4.296E-31
	2.840E+01	1.656E-31
	2.888E+01	6.285E-32
	2.936E+01	2.339E-32
	2.984E+01	8.529E-33
	3.033E+01	3.043E-33
	3.081E+01	1.062E-33
	3.129E+01	3.624E-34
55	0.000E+00	1.000E+00
	4.800E-01	7.651E-01
	9.600E-01	5.420E-01
	1.440E+00	3.533E-01
	1.920E+00	2.110E-01
	2.400E+00	1.149E-01
	2.880E+00	5.689E-02
	3.360E+00	2.556E-02
	3.840E+00	1.039E-02
	4.320E+00	3.821E-03
	4.800E+00	1.268E-03
	5.280E+00	3.794E-04
	5.760E+00	1.023E-04
	6.240E+00	2.483E-05
	6.720E+00	5.421E-06
	7.200E+00	1.065E-06
	7.680E+00	1.879E-07
	8.160E+00	2.981E-08
	8.640E+00	4.249E-09

	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.968E-12
	1.056E+01	9.031E-13
	1.104E+01	2.247E-13
	1.152E+01	1.052E-13
	1.200E+01	6.623E-14
	1.248E+01	3.513E-14
	1.296E+01	1.820E-14
	1.345E+01	9.176E-15
	1.393E+01	4.497E-15
	1.441E+01	2.141E-15
	1.489E+01	9.904E-16
	1.538E+01	4.447E-16
	1.586E+01	1.937E-16
	1.634E+01	8.182E-17
	1.682E+01	3.350E-17
	1.730E+01	1.328E-17
	1.779E+01	5.099E-18
	1.827E+01	1.893E-18
	1.875E+01	6.797E-19
	1.923E+01	2.357E-19
	1.972E+01	7.892E-20
	2.020E+01	2.549E-20
	2.068E+01	7.935E-21
	2.116E+01	2.379E-21
	2.165E+01	6.864E-22
	2.213E+01	1.904E-22
	2.261E+01	5.075E-23
	2.309E+01	1.298E-23
	2.357E+01	3.187E-24
	2.406E+01	7.502E-25
	2.454E+01	1.694E-25
	2.502E+01	3.680E-26
	2.550E+01	7.735E-27
	2.599E+01	1.601E-27
	2.647E+01	3.388E-28
	2.695E+01	7.856E-29
	2.743E+01	2.157E-29
	2.791E+01	7.154E-30
	2.840E+01	2.703E-30
	2.888E+01	1.083E-30
	2.936E+01	4.399E-31
	2.984E+01	1.775E-31
	3.033E+01	7.059E-32
	3.081E+01	2.758E-32
	3.129E+01	1.057E-32

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_ClayThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	13.99 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	35	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	5.596E-01	2.074E-01
	1.119E+00	1.110E-02
	1.679E+00	1.326E-04
	2.238E+00	3.313E-07

	2.798E+00	1.687E-10
	3.358E+00	1.053E-13
	3.917E+00	6.573E-15
	4.477E+00	3.228E-16
	5.036E+00	1.020E-17
	5.596E+00	2.009E-19
	6.156E+00	2.381E-21
	6.715E+00	1.625E-23
	7.275E+00	6.112E-26
	7.834E+00	1.312E-28
	8.394E+00	5.687E-31
	8.954E+00	1.289E-32
	9.513E+00	2.746E-34
	1.007E+01	4.370E-36
	1.063E+01	5.094E-38
	1.119E+01	4.272E-40
	1.175E+01	2.540E-42
	1.231E+01	1.092E-44
	1.287E+01	4.584E-47
	1.343E+01	4.416E-49
	1.399E+01	0.000E+00
	1.454E+01	0.000E+00
	1.509E+01	0.000E+00
	1.564E+01	0.000E+00
	1.619E+01	0.000E+00
	1.675E+01	0.000E+00
	1.730E+01	0.000E+00
	1.785E+01	0.000E+00
	1.840E+01	0.000E+00
	1.895E+01	0.000E+00
	1.950E+01	0.000E+00
	2.005E+01	0.000E+00
	2.060E+01	0.000E+00
	2.115E+01	0.000E+00
	2.171E+01	0.000E+00
	2.226E+01	0.000E+00
	2.281E+01	0.000E+00
	2.336E+01	0.000E+00
	2.391E+01	0.000E+00
	2.446E+01	0.000E+00
	2.501E+01	0.000E+00
	2.556E+01	0.000E+00
	2.612E+01	0.000E+00
	2.667E+01	0.000E+00
	2.722E+01	0.000E+00
	2.777E+01	0.000E+00
	2.832E+01	0.000E+00
	2.887E+01	0.000E+00
	2.942E+01	0.000E+00
	2.997E+01	0.000E+00
	3.052E+01	0.000E+00
	3.108E+01	0.000E+00
	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00

10	0.000E+00	1.000E+00
	5.596E-01	3.789E-01
	1.119E+00	7.525E-02
	1.679E+00	7.293E-03
	2.238E+00	3.316E-04
	2.798E+00	6.919E-06
	3.358E+00	6.539E-08
	3.917E+00	2.785E-10
	4.477E+00	7.419E-13
	5.036E+00	4.038E-14
	5.596E+00	6.048E-15
	6.156E+00	7.436E-16
	6.715E+00	7.356E-17
	7.275E+00	5.796E-18
	7.834E+00	3.595E-19
	8.394E+00	1.732E-20
	8.954E+00	6.394E-22
	9.513E+00	1.779E-23
	1.007E+01	3.669E-25
	1.063E+01	5.574E-27
	1.119E+01	6.856E-29
	1.175E+01	1.410E-30
	1.231E+01	8.584E-32
	1.287E+01	6.288E-33
	1.343E+01	4.094E-34
	1.399E+01	2.400E-35
	1.454E+01	1.218E-36
	1.509E+01	5.299E-38
	1.564E+01	1.964E-39
	1.619E+01	6.169E-41
	1.675E+01	1.637E-42
	1.730E+01	3.719E-44
	1.785E+01	7.865E-46
	1.840E+01	2.059E-47
	1.895E+01	8.904E-49
	1.950E+01	5.044E-50
	2.005E+01	0.000E+00
	2.060E+01	0.000E+00
	2.115E+01	0.000E+00
	2.171E+01	0.000E+00
	2.226E+01	0.000E+00
	2.281E+01	0.000E+00
	2.336E+01	0.000E+00
	2.391E+01	0.000E+00
	2.446E+01	0.000E+00
	2.501E+01	0.000E+00
	2.556E+01	0.000E+00
	2.612E+01	0.000E+00
	2.667E+01	0.000E+00
	2.722E+01	0.000E+00
	2.777E+01	0.000E+00
	2.832E+01	0.000E+00
	2.887E+01	0.000E+00
	2.942E+01	0.000E+00
	2.997E+01	0.000E+00
	3.052E+01	0.000E+00
	3.108E+01	0.000E+00

	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
15	0.000E+00	1.000E+00
	5.596E-01	4.773E-01
	1.119E+00	1.498E-01
	1.679E+00	2.953E-02
	2.238E+00	3.558E-03
	2.798E+00	2.576E-04
	3.358E+00	1.108E-05
	3.917E+00	2.813E-07
	4.477E+00	4.196E-09
	5.036E+00	3.721E-11
	5.596E+00	3.645E-13
	6.156E+00	4.527E-14
	6.715E+00	9.827E-15
	7.275E+00	1.881E-15
	7.834E+00	3.124E-16
	8.394E+00	4.474E-17
	8.954E+00	5.495E-18
	9.513E+00	5.752E-19
	1.007E+01	5.095E-20
	1.063E+01	3.789E-21
	1.119E+01	2.346E-22
	1.175E+01	1.199E-23
	1.231E+01	5.010E-25
	1.287E+01	1.706E-26
	1.343E+01	4.859E-28
	1.399E+01	1.504E-29
	1.454E+01	9.140E-31
	1.509E+01	1.040E-31
	1.564E+01	1.293E-32
	1.619E+01	1.498E-33
	1.675E+01	1.583E-34
	1.730E+01	1.518E-35
	1.785E+01	1.318E-36
	1.840E+01	1.032E-37
	1.895E+01	7.267E-39
	1.950E+01	4.586E-40
	2.005E+01	2.588E-41
	2.060E+01	1.306E-42
	2.115E+01	5.952E-44
	2.171E+01	2.565E-45
	2.226E+01	1.197E-46
	2.281E+01	7.519E-48
	2.336E+01	6.496E-49
	2.391E+01	6.348E-50
	2.446E+01	0.000E+00
	2.501E+01	0.000E+00
	2.556E+01	0.000E+00
	2.612E+01	0.000E+00
	2.667E+01	0.000E+00
	2.722E+01	0.000E+00
	2.777E+01	0.000E+00
	2.832E+01	0.000E+00

	2.887E+01	0.000E+00
	2.942E+01	0.000E+00
	2.997E+01	0.000E+00
	3.052E+01	0.000E+00
	3.108E+01	0.000E+00
	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
20	0.000E+00	1.000E+00
	5.596E-01	5.421E-01
	1.119E+00	2.158E-01
	1.679E+00	6.106E-02
	2.238E+00	1.203E-02
	2.798E+00	1.626E-03
	3.358E+00	1.495E-04
	3.917E+00	9.299E-06
	4.477E+00	3.892E-07
	5.036E+00	1.093E-08
	5.596E+00	2.064E-10
	6.156E+00	2.927E-12
	6.715E+00	1.337E-13
	7.275E+00	3.293E-14
	7.834E+00	8.683E-15
	8.394E+00	2.071E-15
	8.954E+00	4.441E-16
	9.513E+00	8.528E-17
	1.007E+01	1.461E-17
	1.063E+01	2.225E-18
	1.119E+01	2.999E-19
	1.175E+01	3.558E-20
	1.231E+01	3.700E-21
	1.287E+01	3.352E-22
	1.343E+01	2.631E-23
	1.399E+01	1.853E-24
	1.454E+01	1.127E-25
	1.509E+01	5.915E-27
	1.564E+01	2.793E-28
	1.619E+01	1.452E-29
	1.675E+01	1.288E-30
	1.730E+01	1.905E-31
	1.785E+01	3.168E-32
	1.840E+01	5.076E-33
	1.895E+01	7.618E-34
	1.950E+01	1.065E-34
	2.005E+01	1.384E-35
	2.060E+01	1.668E-36
	2.115E+01	1.860E-37
	2.171E+01	1.917E-38
	2.226E+01	1.821E-39
	2.281E+01	1.592E-40
	2.336E+01	1.278E-41
	2.391E+01	9.450E-43
	2.446E+01	6.493E-44
	2.501E+01	4.283E-45
	2.556E+01	2.959E-46

	2.612E+01	2.478E-47
	2.667E+01	2.712E-48
	2.722E+01	3.513E-49
	2.777E+01	4.741E-50
	2.832E+01	0.000E+00
	2.887E+01	0.000E+00
	2.942E+01	0.000E+00
	2.997E+01	0.000E+00
	3.052E+01	0.000E+00
	3.108E+01	0.000E+00
	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
25	0.000E+00	1.000E+00
	5.596E-01	5.888E-01
	1.119E+00	2.717E-01
	1.679E+00	9.583E-02
	2.238E+00	2.541E-02
	2.798E+00	5.007E-03
	3.358E+00	7.274E-04
	3.917E+00	7.749E-05
	4.477E+00	6.029E-06
	5.036E+00	3.416E-07
	5.596E+00	1.406E-08
	6.156E+00	4.210E-10
	6.715E+00	9.567E-12
	7.275E+00	3.244E-13
	7.834E+00	6.495E-14
	8.394E+00	2.034E-14
	8.954E+00	6.012E-15
	9.513E+00	1.635E-15
	1.007E+01	4.082E-16
	1.063E+01	9.326E-17
	1.119E+01	1.945E-17
	1.175E+01	3.694E-18
	1.231E+01	6.365E-19
	1.287E+01	9.920E-20
	1.343E+01	1.394E-20
	1.399E+01	1.831E-21
	1.454E+01	2.144E-22
	1.509E+01	2.242E-23
	1.564E+01	2.087E-24
	1.619E+01	1.725E-25
	1.675E+01	1.266E-26
	1.730E+01	8.420E-28
	1.785E+01	5.583E-29
	1.840E+01	4.893E-30
	1.895E+01	7.155E-31
	1.950E+01	1.388E-31
	2.005E+01	2.799E-32
	2.060E+01	5.436E-33
	2.115E+01	1.001E-33
	2.171E+01	1.743E-34
	2.226E+01	2.861E-35
	2.281E+01	4.425E-36

	2.336E+01	6.438E-37
	2.391E+01	8.798E-38
	2.446E+01	1.128E-38
	2.501E+01	1.353E-39
	2.556E+01	1.519E-40
	2.612E+01	1.593E-41
	2.667E+01	1.564E-42
	2.722E+01	1.445E-43
	2.777E+01	1.281E-44
	2.832E+01	1.144E-45
	2.887E+01	1.132E-46
	2.942E+01	1.368E-47
	2.997E+01	2.021E-48
	3.052E+01	3.315E-49
	3.108E+01	5.554E-50
	3.163E+01	0.000E+00
	3.218E+01	0.000E+00
	3.273E+01	0.000E+00
	3.328E+01	0.000E+00
30	0.000E+00	1.000E+00
	5.596E-01	6.244E-01
	1.119E+00	3.189E-01
	1.679E+00	1.306E-01
	2.238E+00	4.230E-02
	2.798E+00	1.073E-02
	3.358E+00	2.116E-03
	3.917E+00	3.229E-04
	4.477E+00	3.800E-05
	5.036E+00	3.439E-06
	5.596E+00	2.388E-07
	6.156E+00	1.271E-08
	6.715E+00	5.187E-10
	7.275E+00	1.668E-11
	7.834E+00	6.215E-13
	8.394E+00	9.993E-14
	8.954E+00	3.402E-14
	9.513E+00	1.157E-14
	1.007E+01	3.683E-15
	1.063E+01	1.093E-15
	1.119E+01	3.016E-16
	1.175E+01	7.728E-17
	1.231E+01	1.835E-17
	1.287E+01	4.026E-18
	1.343E+01	8.160E-19
	1.399E+01	1.582E-19
	1.454E+01	2.787E-20
	1.509E+01	4.506E-21
	1.564E+01	6.663E-22
	1.619E+01	8.985E-23
	1.675E+01	1.102E-23
	1.730E+01	1.224E-24
	1.785E+01	1.231E-25
	1.840E+01	1.123E-26
	1.895E+01	9.463E-28
	1.950E+01	7.936E-29
	2.005E+01	8.177E-30

	2.060E+01	1.293E-30
	2.115E+01	2.780E-31
	2.171E+01	6.476E-32
	2.226E+01	1.485E-32
	2.281E+01	3.273E-33
	2.336E+01	6.888E-34
	2.391E+01	1.382E-34
	2.446E+01	2.641E-35
	2.501E+01	4.801E-36
	2.556E+01	8.292E-37
	2.612E+01	1.360E-37
	2.667E+01	2.113E-38
	2.722E+01	3.111E-39
	2.777E+01	4.332E-40
	2.832E+01	5.702E-41
	2.887E+01	7.096E-42
	2.942E+01	8.367E-43
	2.997E+01	9.415E-44
	3.052E+01	1.031E-44
	3.108E+01	1.147E-45
	3.163E+01	1.400E-46
	3.218E+01	2.023E-47
	3.273E+01	3.476E-48
	3.328E+01	6.616E-49
35	0.000E+00	1.000E+00
	5.596E-01	6.528E-01
	1.119E+00	3.592E-01
	1.679E+00	1.639E-01
	2.238E+00	6.132E-02
	2.798E+00	1.864E-02
	3.358E+00	4.577E-03
	3.917E+00	9.036E-04
	4.477E+00	1.430E-04
	5.036E+00	1.808E-05
	5.596E+00	1.825E-06
	6.156E+00	1.467E-07
	6.715E+00	9.390E-09
	7.275E+00	4.787E-10
	7.834E+00	1.990E-11
	8.394E+00	8.944E-13
	8.954E+00	1.325E-13
	9.513E+00	4.698E-14
	1.007E+01	1.762E-14
	1.063E+01	6.273E-15
	1.119E+01	2.103E-15
	1.175E+01	6.635E-16
	1.231E+01	1.966E-16
	1.287E+01	5.461E-17
	1.343E+01	1.423E-17
	1.399E+01	3.597E-18
	1.454E+01	8.374E-19
	1.509E+01	1.818E-19
	1.564E+01	3.676E-20
	1.619E+01	6.904E-21
	1.675E+01	1.202E-21
	1.730E+01	1.934E-22

	1.785E+01	2.872E-23
	1.840E+01	3.924E-24
	1.895E+01	4.924E-25
	1.950E+01	5.672E-26
	2.005E+01	6.026E-27
	2.060E+01	6.045E-28
	2.115E+01	6.204E-29
	2.171E+01	7.879E-30
	2.226E+01	1.457E-30
	2.281E+01	3.508E-31
	2.336E+01	9.122E-32
	2.391E+01	2.354E-32
	2.446E+01	5.882E-33
	2.501E+01	1.414E-33
	2.556E+01	3.265E-34
	2.612E+01	7.232E-35
	2.667E+01	1.536E-35
	2.722E+01	3.123E-36
	2.777E+01	6.077E-37
	2.832E+01	1.131E-37
	2.887E+01	2.009E-38
	2.942E+01	3.406E-39
	2.997E+01	5.508E-40
	3.052E+01	8.486E-41
	3.108E+01	1.246E-41
	3.163E+01	1.745E-42
	3.218E+01	2.344E-43
	3.273E+01	3.051E-44
	3.328E+01	3.952E-45
40	0.000E+00	1.000E+00
	5.596E-01	6.760E-01
	1.119E+00	3.940E-01
	1.679E+00	1.953E-01
	2.238E+00	8.144E-02
	2.798E+00	2.838E-02
	3.358E+00	8.217E-03
	3.917E+00	1.969E-03
	4.477E+00	3.890E-04
	5.036E+00	6.327E-05
	5.596E+00	8.453E-06
	6.156E+00	9.264E-07
	6.715E+00	8.319E-08
	7.275E+00	6.117E-09
	7.834E+00	3.689E-10
	8.394E+00	1.870E-11
	8.954E+00	1.021E-12
	9.513E+00	1.567E-13
	1.007E+01	5.753E-14
	1.063E+01	2.319E-14
	1.119E+01	8.972E-15
	1.175E+01	3.297E-15
	1.231E+01	1.149E-15
	1.287E+01	3.792E-16
	1.343E+01	1.187E-16
	1.399E+01	3.638E-17
	1.454E+01	1.036E-17

	1.509E+01	2.784E-18
	1.564E+01	7.049E-19
	1.619E+01	1.679E-19
	1.675E+01	3.757E-20
	1.730E+01	7.879E-21
	1.785E+01	1.546E-21
	1.840E+01	2.835E-22
	1.895E+01	4.844E-23
	1.950E+01	7.698E-24
	2.005E+01	1.136E-24
	2.060E+01	1.556E-25
	2.115E+01	1.979E-26
	2.171E+01	2.362E-27
	2.226E+01	2.740E-28
	2.281E+01	3.416E-29
	2.336E+01	5.474E-30
	2.391E+01	1.220E-30
	2.446E+01	3.302E-31
	2.501E+01	9.410E-32
	2.556E+01	2.656E-32
	2.612E+01	7.285E-33
	2.667E+01	1.932E-33
	2.722E+01	4.948E-34
	2.777E+01	1.222E-34
	2.832E+01	2.909E-35
	2.887E+01	6.671E-36
	2.942E+01	1.472E-36
	2.997E+01	3.124E-37
	3.052E+01	6.372E-38
	3.108E+01	1.248E-38
	3.163E+01	2.346E-39
	3.218E+01	4.229E-40
	3.273E+01	7.308E-41
	3.328E+01	1.211E-41
45	0.000E+00	1.000E+00
	5.596E-01	6.955E-01
	1.119E+00	4.243E-01
	1.679E+00	2.244E-01
	2.238E+00	1.020E-01
	2.798E+00	3.953E-02
	3.358E+00	1.302E-02
	3.917E+00	3.626E-03
	4.477E+00	8.521E-04
	5.036E+00	1.685E-04
	5.596E+00	2.801E-05
	6.156E+00	3.907E-06
	6.715E+00	4.567E-07
	7.275E+00	4.472E-08
	7.834E+00	3.666E-09
	8.394E+00	2.522E-10
	8.954E+00	1.499E-11
	9.513E+00	9.883E-13
	1.007E+01	1.692E-13
	1.063E+01	6.491E-14
	1.119E+01	2.768E-14
	1.175E+01	1.143E-14

	1.231E+01	4.507E-15
	1.287E+01	1.697E-15
	1.343E+01	6.112E-16
	1.399E+01	2.167E-16
	1.454E+01	7.188E-17
	1.509E+01	2.269E-17
	1.564E+01	6.809E-18
	1.619E+01	1.940E-18
	1.675E+01	5.238E-19
	1.730E+01	1.339E-19
	1.785E+01	3.238E-20
	1.840E+01	7.391E-21
	1.895E+01	1.590E-21
	1.950E+01	3.218E-22
	2.005E+01	6.120E-23
	2.060E+01	1.092E-23
	2.115E+01	1.823E-24
	2.171E+01	2.849E-25
	2.226E+01	4.167E-26
	2.281E+01	5.734E-27
	2.336E+01	7.567E-28
	2.391E+01	1.014E-28
	2.446E+01	1.567E-29
	2.501E+01	3.213E-30
	2.556E+01	8.552E-31
	2.612E+01	2.568E-31
	2.667E+01	7.889E-32
	2.722E+01	2.388E-32
	2.777E+01	7.041E-33
	2.832E+01	2.014E-33
	2.887E+01	5.583E-34
	2.942E+01	1.499E-34
	2.997E+01	3.894E-35
	3.052E+01	9.786E-36
	3.108E+01	2.377E-36
	3.163E+01	5.579E-37
	3.218E+01	1.264E-37
	3.273E+01	2.764E-38
	3.328E+01	5.826E-39
50	0.000E+00	1.000E+00
	5.596E-01	7.122E-01
	1.119E+00	4.510E-01
	1.679E+00	2.514E-01
	2.238E+00	1.224E-01
	2.798E+00	5.171E-02
	3.358E+00	1.888E-02
	3.917E+00	5.935E-03
	4.477E+00	1.602E-03
	5.036E+00	3.707E-04
	5.596E+00	7.339E-05
	6.156E+00	1.241E-05
	6.715E+00	1.792E-06
	7.275E+00	2.207E-07
	7.834E+00	2.317E-08
	8.394E+00	2.073E-09
	8.954E+00	1.587E-10

	9.513E+00	1.078E-11
	1.007E+01	8.563E-13
	1.063E+01	1.706E-13
	1.119E+01	6.908E-14
	1.175E+01	3.086E-14
	1.231E+01	1.342E-14
	1.287E+01	5.604E-15
	1.343E+01	2.254E-15
	1.399E+01	8.956E-16
	1.454E+01	3.349E-16
	1.509E+01	1.199E-16
	1.564E+01	4.110E-17
	1.619E+01	1.346E-17
	1.675E+01	4.208E-18
	1.730E+01	1.255E-18
	1.785E+01	3.565E-19
	1.840E+01	9.639E-20
	1.895E+01	2.477E-20
	1.950E+01	6.041E-21
	2.005E+01	1.397E-21
	2.060E+01	3.056E-22
	2.115E+01	6.322E-23
	2.171E+01	1.234E-23
	2.226E+01	2.271E-24
	2.281E+01	3.937E-25
	2.336E+01	6.429E-26
	2.391E+01	9.922E-27
	2.446E+01	1.466E-27
	2.501E+01	2.152E-28
	2.556E+01	3.431E-29
	2.612E+01	6.790E-30
	2.667E+01	1.756E-30
	2.722E+01	5.392E-31
	2.777E+01	1.756E-31
	2.832E+01	5.726E-32
	2.887E+01	1.833E-32
	2.942E+01	5.720E-33
	2.997E+01	1.737E-33
	3.052E+01	5.125E-34
	3.108E+01	1.469E-34
	3.163E+01	4.089E-35
	3.218E+01	1.104E-35
	3.273E+01	2.894E-36
	3.328E+01	7.350E-37
55	0.000E+00	1.000E+00
	5.596E-01	7.266E-01
	1.119E+00	4.748E-01
	1.679E+00	2.765E-01
	2.238E+00	1.424E-01
	2.798E+00	6.459E-02
	3.358E+00	2.567E-02
	3.917E+00	8.910E-03
	4.477E+00	2.695E-03
	5.036E+00	7.091E-04
	5.596E+00	1.620E-04
	6.156E+00	3.209E-05

	6.715E+00	5.507E-06
	7.275E+00	8.182E-07
	7.834E+00	1.052E-07
	8.394E+00	1.169E-08
	8.954E+00	1.124E-09
	9.513E+00	9.404E-11
	1.007E+01	7.200E-12
	1.063E+01	6.928E-13
	1.119E+01	1.641E-13
	1.175E+01	7.044E-14
	1.231E+01	3.275E-14
	1.287E+01	1.486E-14
	1.343E+01	6.534E-15
	1.399E+01	2.847E-15
	1.454E+01	1.173E-15
	1.509E+01	4.647E-16
	1.564E+01	1.771E-16
	1.619E+01	6.485E-17
	1.675E+01	2.280E-17
	1.730E+01	7.687E-18
	1.785E+01	2.484E-18
	1.840E+01	7.686E-19
	1.895E+01	2.274E-19
	1.950E+01	6.431E-20
	2.005E+01	1.735E-20
	2.060E+01	4.465E-21
	2.115E+01	1.094E-21
	2.171E+01	2.548E-22
	2.226E+01	5.639E-23
	2.281E+01	1.184E-23
	2.336E+01	2.355E-24
	2.391E+01	4.438E-25
	2.446E+01	7.918E-26
	2.501E+01	1.342E-26
	2.556E+01	2.180E-27
	2.612E+01	3.493E-28
	2.667E+01	5.902E-29
	2.722E+01	1.178E-29
	2.777E+01	3.009E-30
	2.832E+01	9.348E-31
	2.887E+01	3.170E-31
	2.942E+01	1.095E-31
	2.997E+01	3.742E-32
	3.052E+01	1.253E-32
	3.108E+01	4.093E-33
	3.163E+01	1.304E-33
	3.218E+01	4.046E-34
	3.273E+01	1.223E-34
	3.328E+01	3.598E-35

NOTICE

Although this program has been tested and experience would indicate that it is accurate within the limits given by the assumptions of the theory used, we make no warranty as to workability of this software or any other

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POLLUTEv7

Version 7.13

BAB_ClayThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	11.03 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	19.29 m	40	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.412E-01	3.215E-01
	8.824E-01	4.575E-02
	1.324E+00	2.633E-03
	1.765E+00	5.850E-05

	2.206E+00	4.895E-07
	2.647E+00	1.521E-09
	3.088E+00	2.003E-12
	3.530E+00	4.222E-14
	3.971E+00	5.016E-15
	4.412E+00	4.678E-16
	4.853E+00	3.324E-17
	5.294E+00	1.773E-18
	5.736E+00	6.980E-20
	6.177E+00	1.991E-21
	6.618E+00	4.028E-23
	7.059E+00	5.650E-25
	7.500E+00	5.417E-27
	7.942E+00	3.994E-29
	8.383E+00	6.190E-31
	8.824E+00	3.037E-32
	9.265E+00	1.564E-33
	9.706E+00	6.804E-35
	1.015E+01	2.455E-36
	1.059E+01	7.290E-38
	1.103E+01	1.840E-39
	1.151E+01	2.481E-41
	1.199E+01	2.590E-43
	1.248E+01	2.208E-45
	1.296E+01	2.166E-47
	1.344E+01	4.307E-49
	1.392E+01	1.229E-50
	1.441E+01	0.000E+00
	1.489E+01	0.000E+00
	1.537E+01	0.000E+00
	1.585E+01	0.000E+00
	1.633E+01	0.000E+00
	1.682E+01	0.000E+00
	1.730E+01	0.000E+00
	1.778E+01	0.000E+00
	1.826E+01	0.000E+00
	1.875E+01	0.000E+00
	1.923E+01	0.000E+00
	1.971E+01	0.000E+00
	2.019E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.164E+01	0.000E+00
	2.212E+01	0.000E+00
	2.260E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00
	2.405E+01	0.000E+00
	2.453E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.598E+01	0.000E+00
	2.646E+01	0.000E+00
	2.694E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.839E+01	0.000E+00

	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.032E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.412E-01	4.894E-01
	8.824E-01	1.623E-01
	1.324E+00	3.496E-02
	1.765E+00	4.767E-03
	2.206E+00	4.050E-04
	2.647E+00	2.121E-05
	3.088E+00	6.802E-07
	3.530E+00	1.329E-08
	3.971E+00	1.585E-10
	4.412E+00	1.392E-12
	4.853E+00	7.583E-14
	5.294E+00	1.717E-14
	5.736E+00	3.657E-15
	6.177E+00	6.840E-16
	6.618E+00	1.117E-16
	7.059E+00	1.586E-17
	7.500E+00	1.946E-18
	7.942E+00	2.051E-19
	8.383E+00	1.846E-20
	8.824E+00	1.407E-21
	9.265E+00	9.019E-23
	9.706E+00	4.821E-24
	1.015E+01	2.134E-25
	1.059E+01	7.805E-27
	1.103E+01	2.554E-28
	1.151E+01	6.681E-30
	1.199E+01	4.060E-31
	1.248E+01	4.193E-32
	1.296E+01	4.353E-33
	1.344E+01	4.103E-34
	1.392E+01	3.468E-35
	1.441E+01	2.618E-36
	1.489E+01	1.758E-37
	1.537E+01	1.046E-38
	1.585E+01	5.493E-40
	1.633E+01	2.537E-41
	1.682E+01	1.031E-42
	1.730E+01	3.727E-44
	1.778E+01	1.272E-45
	1.826E+01	4.919E-47
	1.875E+01	2.757E-48
	1.923E+01	2.110E-49
	1.971E+01	1.740E-50
	2.019E+01	0.000E+00
	2.068E+01	0.000E+00
	2.116E+01	0.000E+00
	2.164E+01	0.000E+00
	2.212E+01	0.000E+00
	2.260E+01	0.000E+00
	2.309E+01	0.000E+00
	2.357E+01	0.000E+00

	2.405E+01	0.000E+00
	2.453E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.598E+01	0.000E+00
	2.646E+01	0.000E+00
	2.694E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.839E+01	0.000E+00
	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.032E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.412E-01	5.768E-01
	8.824E-01	2.583E-01
	1.324E+00	8.750E-02
	1.765E+00	2.204E-02
	2.206E+00	4.077E-03
	2.647E+00	5.499E-04
	3.088E+00	5.374E-05
	3.530E+00	3.791E-06
	3.971E+00	1.925E-07
	4.412E+00	7.018E-09
	4.853E+00	1.842E-10
	5.294E+00	3.785E-12
	5.736E+00	1.736E-13
	6.177E+00	4.277E-14
	6.618E+00	1.291E-14
	7.059E+00	3.616E-15
	7.500E+00	9.282E-16
	7.942E+00	2.178E-16
	8.383E+00	4.658E-17
	8.824E+00	9.057E-18
	9.265E+00	1.596E-18
	9.706E+00	2.540E-19
	1.015E+01	3.637E-20
	1.059E+01	4.672E-21
	1.103E+01	5.578E-22
	1.151E+01	4.581E-23
	1.199E+01	3.249E-24
	1.248E+01	1.980E-25
	1.296E+01	1.037E-26
	1.344E+01	4.794E-28
	1.392E+01	2.277E-29
	1.441E+01	1.706E-30
	1.489E+01	2.301E-31
	1.537E+01	3.721E-32
	1.585E+01	5.875E-33
	1.633E+01	8.695E-34
	1.682E+01	1.198E-34
	1.730E+01	1.531E-35
	1.778E+01	1.813E-36
	1.826E+01	1.985E-37
	1.875E+01	2.005E-38

	1.923E+01	1.863E-39
	1.971E+01	1.591E-40
	2.019E+01	1.246E-41
	2.068E+01	8.970E-43
	2.116E+01	5.983E-44
	2.164E+01	3.817E-45
	2.212E+01	2.539E-46
	2.260E+01	2.046E-47
	2.309E+01	2.165E-48
	2.357E+01	2.727E-49
	2.405E+01	3.583E-50
	2.453E+01	0.000E+00
	2.502E+01	0.000E+00
	2.550E+01	0.000E+00
	2.598E+01	0.000E+00
	2.646E+01	0.000E+00
	2.694E+01	0.000E+00
	2.743E+01	0.000E+00
	2.791E+01	0.000E+00
	2.839E+01	0.000E+00
	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.032E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.412E-01	6.323E-01
	8.824E-01	3.317E-01
	1.324E+00	1.418E-01
	1.765E+00	4.872E-02
	2.206E+00	1.335E-02
	2.647E+00	2.895E-03
	3.088E+00	4.948E-04
	3.530E+00	6.640E-05
	3.971E+00	6.981E-06
	4.412E+00	5.736E-07
	4.853E+00	3.679E-08
	5.294E+00	1.840E-09
	5.736E+00	7.234E-11
	6.177E+00	2.501E-12
	6.618E+00	1.884E-13
	7.059E+00	5.423E-14
	7.500E+00	1.945E-14
	7.942E+00	6.652E-15
	8.383E+00	2.134E-15
	8.824E+00	6.406E-16
	9.265E+00	1.797E-16
	9.706E+00	4.699E-17
	1.015E+01	1.144E-17
	1.059E+01	2.592E-18
	1.103E+01	5.655E-19
	1.151E+01	9.405E-20
	1.199E+01	1.420E-20
	1.248E+01	1.941E-21
	1.296E+01	2.391E-22
	1.344E+01	2.646E-23
	1.392E+01	2.620E-24

	1.441E+01	2.316E-25
	1.489E+01	1.826E-26
	1.537E+01	1.302E-27
	1.585E+01	8.974E-29
	1.633E+01	7.485E-30
	1.682E+01	1.005E-30
	1.730E+01	1.926E-31
	1.778E+01	4.010E-32
	1.826E+01	8.154E-33
	1.875E+01	1.580E-33
	1.923E+01	2.903E-34
	1.971E+01	5.046E-35
	2.019E+01	8.289E-36
	2.068E+01	1.285E-36
	2.116E+01	1.877E-37
	2.164E+01	2.580E-38
	2.212E+01	3.334E-39
	2.260E+01	4.041E-40
	2.309E+01	4.594E-41
	2.357E+01	4.895E-42
	2.405E+01	4.903E-43
	2.453E+01	4.659E-44
	2.502E+01	4.312E-45
	2.550E+01	4.132E-46
	2.598E+01	4.528E-47
	2.646E+01	6.103E-48
	2.694E+01	9.741E-49
	2.743E+01	1.674E-49
	2.791E+01	2.895E-50
	2.839E+01	0.000E+00
	2.887E+01	0.000E+00
	2.936E+01	0.000E+00
	2.984E+01	0.000E+00
	3.032E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.412E-01	6.715E-01
	8.824E-01	3.890E-01
	1.324E+00	1.918E-01
	1.765E+00	7.964E-02
	2.206E+00	2.766E-02
	2.647E+00	7.991E-03
	3.088E+00	1.912E-03
	3.530E+00	3.778E-04
	3.971E+00	6.151E-05
	4.412E+00	8.236E-06
	4.853E+00	9.055E-07
	5.294E+00	8.166E-08
	5.736E+00	6.037E-09
	6.177E+00	3.664E-10
	6.618E+00	1.866E-11
	7.059E+00	1.001E-12
	7.500E+00	1.444E-13
	7.942E+00	5.192E-14
	8.383E+00	2.082E-14
	8.824E+00	8.030E-15
	9.265E+00	2.943E-15

	9.706E+00	1.023E-15
	1.015E+01	3.369E-16
	1.059E+01	1.053E-16
	1.103E+01	3.222E-17
	1.151E+01	7.951E-18
	1.199E+01	1.827E-18
	1.248E+01	3.904E-19
	1.296E+01	7.734E-20
	1.344E+01	1.418E-20
	1.392E+01	2.399E-21
	1.441E+01	3.737E-22
	1.489E+01	5.345E-23
	1.537E+01	7.001E-24
	1.585E+01	8.376E-25
	1.633E+01	9.142E-26
	1.682E+01	9.126E-27
	1.730E+01	8.477E-28
	1.778E+01	7.835E-29
	1.826E+01	8.657E-30
	1.875E+01	1.411E-30
	1.923E+01	3.141E-31
	1.971E+01	7.718E-32
	2.019E+01	1.888E-32
	2.068E+01	4.463E-33
	2.116E+01	1.012E-33
	2.164E+01	2.199E-34
	2.212E+01	4.568E-35
	2.260E+01	9.068E-36
	2.309E+01	1.719E-36
	2.357E+01	3.106E-37
	2.405E+01	5.348E-38
	2.453E+01	8.765E-39
	2.502E+01	1.366E-39
	2.550E+01	2.022E-40
	2.598E+01	2.842E-41
	2.646E+01	3.795E-42
	2.694E+01	4.827E-43
	2.743E+01	5.892E-44
	2.791E+01	7.037E-45
	2.839E+01	8.573E-46
	2.887E+01	1.142E-46
	2.936E+01	1.777E-47
	2.984E+01	3.248E-48
	3.032E+01	6.561E-49
30	0.000E+00	1.000E+00
	4.412E-01	7.010E-01
	8.824E-01	4.350E-01
	1.324E+00	2.364E-01
	1.765E+00	1.116E-01
	2.206E+00	4.545E-02
	2.647E+00	1.591E-02
	3.088E+00	4.769E-03
	3.530E+00	1.220E-03
	3.971E+00	2.661E-04
	4.412E+00	4.935E-05
	4.853E+00	7.774E-06

	5.294E+00	1.039E-06
	5.736E+00	1.178E-07
	6.177E+00	1.131E-08
	6.618E+00	9.212E-10
	7.059E+00	6.408E-11
	7.500E+00	4.090E-12
	7.942E+00	3.816E-13
	8.383E+00	1.024E-13
	8.824E+00	4.337E-14
	9.265E+00	1.880E-14
	9.706E+00	7.856E-15
	1.015E+01	3.146E-15
	1.059E+01	1.211E-15
	1.103E+01	4.597E-16
	1.151E+01	1.460E-16
	1.199E+01	4.382E-17
	1.248E+01	1.242E-17
	1.296E+01	3.320E-18
	1.344E+01	8.353E-19
	1.392E+01	1.976E-19
	1.441E+01	4.384E-20
	1.489E+01	9.113E-21
	1.537E+01	1.771E-21
	1.585E+01	3.209E-22
	1.633E+01	5.417E-23
	1.682E+01	8.494E-24
	1.730E+01	1.235E-24
	1.778E+01	1.664E-25
	1.826E+01	2.079E-26
	1.875E+01	2.428E-27
	1.923E+01	2.738E-28
	1.971E+01	3.279E-29
	2.019E+01	4.993E-30
	2.068E+01	1.067E-30
	2.116E+01	2.813E-31
	2.164E+01	7.863E-32
	2.212E+01	2.179E-32
	2.260E+01	5.870E-33
	2.309E+01	1.528E-33
	2.357E+01	3.837E-34
	2.405E+01	9.285E-35
	2.453E+01	2.164E-35
	2.502E+01	4.854E-36
	2.550E+01	1.047E-36
	2.598E+01	2.170E-37
	2.646E+01	4.319E-38
	2.694E+01	8.248E-39
	2.743E+01	1.510E-39
	2.791E+01	2.649E-40
	2.839E+01	4.451E-41
	2.887E+01	7.163E-42
	2.936E+01	1.106E-42
	2.984E+01	1.646E-43
	3.032E+01	2.387E-44
35	0.000E+00	1.000E+00
	4.412E-01	7.242E-01

	8.824E-01	4.728E-01
	1.324E+00	2.758E-01
	1.765E+00	1.428E-01
	2.206E+00	6.528E-02
	2.647E+00	2.623E-02
	3.088E+00	9.240E-03
	3.530E+00	2.846E-03
	3.971E+00	7.647E-04
	4.412E+00	1.790E-04
	4.853E+00	3.648E-05
	5.294E+00	6.461E-06
	5.736E+00	9.942E-07
	6.177E+00	1.328E-07
	6.618E+00	1.539E-08
	7.059E+00	1.547E-09
	7.500E+00	1.356E-10
	7.942E+00	1.069E-11
	8.383E+00	9.446E-13
	8.824E+00	1.808E-13
	9.265E+00	7.239E-14
	9.706E+00	3.364E-14
	1.015E+01	1.542E-14
	1.059E+01	6.860E-15
	1.103E+01	3.027E-15
	1.151E+01	1.145E-15
	1.199E+01	4.135E-16
	1.248E+01	1.425E-16
	1.296E+01	4.679E-17
	1.344E+01	1.463E-17
	1.392E+01	4.349E-18
	1.441E+01	1.228E-18
	1.489E+01	3.289E-19
	1.537E+01	8.346E-20
	1.585E+01	2.003E-20
	1.633E+01	4.541E-21
	1.682E+01	9.710E-22
	1.730E+01	1.955E-22
	1.778E+01	3.699E-23
	1.826E+01	6.570E-24
	1.875E+01	1.094E-24
	1.923E+01	1.705E-25
	1.971E+01	2.491E-26
	2.019E+01	3.434E-27
	2.068E+01	4.568E-28
	2.116E+01	6.260E-29
	2.164E+01	1.010E-29
	2.212E+01	2.174E-30
	2.260E+01	5.955E-31
	2.309E+01	1.807E-31
	2.357E+01	5.574E-32
	2.405E+01	1.691E-32
	2.453E+01	4.993E-33
	2.502E+01	1.431E-33
	2.550E+01	3.978E-34
	2.598E+01	1.071E-34
	2.646E+01	2.792E-35
	2.694E+01	7.044E-36

	2.743E+01	1.719E-36
	2.791E+01	4.053E-37
	2.839E+01	9.234E-38
	2.887E+01	2.031E-38
	2.936E+01	4.309E-39
	2.984E+01	8.817E-40
	3.032E+01	1.739E-40
40	0.000E+00	1.000E+00
	4.412E-01	7.432E-01
	8.824E-01	5.047E-01
	1.324E+00	3.109E-01
	1.765E+00	1.727E-01
	2.206E+00	8.609E-02
	2.647E+00	3.839E-02
	3.088E+00	1.527E-02
	3.530E+00	5.405E-03
	3.971E+00	1.700E-03
	4.412E+00	4.741E-04
	4.853E+00	1.172E-04
	5.294E+00	2.563E-05
	5.736E+00	4.961E-06
	6.177E+00	8.486E-07
	6.618E+00	1.283E-07
	7.059E+00	1.712E-08
	7.500E+00	2.019E-09
	7.942E+00	2.108E-10
	8.383E+00	1.987E-11
	8.824E+00	1.909E-12
	9.265E+00	3.014E-13
	9.706E+00	1.067E-13
	1.015E+01	5.108E-14
	1.059E+01	2.514E-14
	1.103E+01	1.237E-14
	1.151E+01	5.322E-15
	1.199E+01	2.202E-15
	1.248E+01	8.752E-16
	1.296E+01	3.341E-16
	1.344E+01	1.223E-16
	1.392E+01	4.295E-17
	1.441E+01	1.444E-17
	1.489E+01	4.647E-18
	1.537E+01	1.429E-18
	1.585E+01	4.197E-19
	1.633E+01	1.176E-19
	1.682E+01	3.138E-20
	1.730E+01	7.971E-21
	1.778E+01	1.924E-21
	1.826E+01	4.409E-22
	1.875E+01	9.578E-23
	1.923E+01	1.969E-23
	1.971E+01	3.829E-24
	2.019E+01	7.031E-25
	2.068E+01	1.219E-25
	2.116E+01	1.998E-26
	2.164E+01	3.118E-27
	2.212E+01	4.733E-28

	2.260E+01	7.388E-29
	2.309E+01	1.325E-29
	2.357E+01	3.047E-30
	2.405E+01	8.810E-31
	2.453E+01	2.856E-31
	2.502E+01	9.532E-32
	2.550E+01	3.155E-32
	2.598E+01	1.023E-32
	2.646E+01	3.232E-33
	2.694E+01	9.946E-34
	2.743E+01	2.978E-34
	2.791E+01	8.672E-35
	2.839E+01	2.455E-35
	2.887E+01	6.751E-36
	2.936E+01	1.803E-36
	2.984E+01	4.674E-37
	3.032E+01	1.176E-37
45	0.000E+00	1.000E+00
	4.412E-01	7.590E-01
	8.824E-01	5.319E-01
	1.324E+00	3.420E-01
	1.765E+00	2.008E-01
	2.206E+00	1.072E-01
	2.647E+00	5.185E-02
	3.088E+00	2.268E-02
	3.530E+00	8.947E-03
	3.971E+00	3.180E-03
	4.412E+00	1.017E-03
	4.853E+00	2.920E-04
	5.294E+00	7.530E-05
	5.736E+00	1.742E-05
	6.177E+00	3.613E-06
	6.618E+00	6.716E-07
	7.059E+00	1.118E-07
	7.500E+00	1.667E-08
	7.942E+00	2.225E-09
	8.383E+00	2.665E-10
	8.824E+00	2.905E-11
	9.265E+00	3.119E-12
	9.706E+00	4.640E-13
	1.015E+01	1.457E-13
	1.059E+01	7.010E-14
	1.103E+01	3.699E-14
	1.151E+01	1.753E-14
	1.199E+01	8.045E-15
	1.248E+01	3.567E-15
	1.296E+01	1.527E-15
	1.344E+01	6.308E-16
	1.392E+01	2.513E-16
	1.441E+01	9.644E-17
	1.489E+01	3.564E-17
	1.537E+01	1.268E-17
	1.585E+01	4.334E-18
	1.633E+01	1.423E-18
	1.682E+01	4.487E-19
	1.730E+01	1.356E-19

	1.778E+01	3.927E-20
	1.826E+01	1.088E-20
	1.875E+01	2.883E-21
	1.923E+01	7.292E-22
	1.971E+01	1.760E-22
	2.019E+01	4.046E-23
	2.068E+01	8.855E-24
	2.116E+01	1.843E-24
	2.164E+01	3.644E-25
	2.212E+01	6.847E-26
	2.260E+01	1.226E-26
	2.309E+01	2.110E-27
	2.357E+01	3.571E-28
	2.405E+01	6.297E-29
	2.453E+01	1.278E-29
	2.502E+01	3.252E-30
	2.550E+01	1.013E-30
	2.598E+01	3.498E-31
	2.646E+01	1.245E-31
	2.694E+01	4.411E-32
	2.743E+01	1.536E-32
	2.791E+01	5.232E-33
	2.839E+01	1.741E-33
	2.887E+01	5.655E-34
	2.936E+01	1.792E-34
	2.984E+01	5.540E-35
	3.032E+01	1.670E-35
50	0.000E+00	1.000E+00
	4.412E-01	7.724E-01
	8.824E-01	5.555E-01
	1.324E+00	3.699E-01
	1.765E+00	2.271E-01
	2.206E+00	1.281E-01
	2.647E+00	6.616E-02
	3.088E+00	3.122E-02
	3.530E+00	1.344E-02
	3.971E+00	5.270E-03
	4.412E+00	1.879E-03
	4.853E+00	6.089E-04
	5.294E+00	1.791E-04
	5.736E+00	4.781E-05
	6.177E+00	1.157E-05
	6.618E+00	2.537E-06
	7.059E+00	5.041E-07
	7.500E+00	9.069E-08
	7.942E+00	1.477E-08
	8.383E+00	2.179E-09
	8.824E+00	2.915E-10
	9.265E+00	3.578E-11
	9.706E+00	4.280E-12
	1.015E+01	6.459E-13
	1.059E+01	1.882E-13
	1.103E+01	9.133E-14
	1.151E+01	4.559E-14
	1.199E+01	2.264E-14
	1.248E+01	1.094E-14

	1.296E+01	5.126E-15
	1.344E+01	2.328E-15
	1.392E+01	1.024E-15
	1.441E+01	4.361E-16
	1.489E+01	1.797E-16
	1.537E+01	7.157E-17
	1.585E+01	2.755E-17
	1.633E+01	1.024E-17
	1.682E+01	3.674E-18
	1.730E+01	1.271E-18
	1.778E+01	4.238E-19
	1.826E+01	1.360E-19
	1.875E+01	4.200E-20
	1.923E+01	1.247E-20
	1.971E+01	3.553E-21
	2.019E+01	9.717E-22
	2.068E+01	2.547E-22
	2.116E+01	6.395E-23
	2.164E+01	1.536E-23
	2.212E+01	3.526E-24
	2.260E+01	7.734E-25
	2.309E+01	1.620E-25
	2.357E+01	3.244E-26
	2.405E+01	6.235E-27
	2.453E+01	1.164E-27
	2.502E+01	2.174E-28
	2.550E+01	4.323E-29
	2.598E+01	1.003E-29
	2.646E+01	2.874E-30
	2.694E+01	9.731E-31
	2.743E+01	3.578E-31
	2.791E+01	1.346E-31
	2.839E+01	5.039E-32
	2.887E+01	1.857E-32
	2.936E+01	6.714E-33
	2.984E+01	2.377E-33
	3.032E+01	8.233E-34
55	0.000E+00	1.000E+00
	4.412E-01	7.840E-01
	8.824E-01	5.762E-01
	1.324E+00	3.951E-01
	1.765E+00	2.517E-01
	2.206E+00	1.485E-01
	2.647E+00	8.097E-02
	3.088E+00	4.069E-02
	3.530E+00	1.881E-02
	3.971E+00	7.994E-03
	4.412E+00	3.118E-03
	4.853E+00	1.115E-03
	5.294E+00	3.653E-04
	5.736E+00	1.096E-04
	6.177E+00	3.009E-05
	6.618E+00	7.557E-06
	7.059E+00	1.735E-06
	7.500E+00	3.641E-07
	7.942E+00	6.982E-08

	8.383E+00	1.223E-08
	8.824E+00	1.958E-09
	9.265E+00	2.869E-10
	9.706E+00	3.888E-11
	1.015E+01	5.127E-12
	1.059E+01	8.143E-13
	1.103E+01	2.354E-13
	1.151E+01	1.030E-13
	1.199E+01	5.299E-14
	1.248E+01	2.734E-14
	1.296E+01	1.378E-14
	1.344E+01	6.753E-15
	1.392E+01	3.218E-15
	1.441E+01	1.490E-15
	1.489E+01	6.699E-16
	1.537E+01	2.924E-16
	1.585E+01	1.238E-16
	1.633E+01	5.082E-17
	1.682E+01	2.022E-17
	1.730E+01	7.791E-18
	1.778E+01	2.906E-18
	1.826E+01	1.048E-18
	1.875E+01	3.657E-19
	1.923E+01	1.232E-19
	1.971E+01	4.007E-20
	2.019E+01	1.257E-20
	2.068E+01	3.802E-21
	2.116E+01	1.107E-21
	2.164E+01	3.103E-22
	2.212E+01	8.361E-23
	2.260E+01	2.164E-23
	2.309E+01	5.378E-24
	2.357E+01	1.282E-24
	2.405E+01	2.931E-25
	2.453E+01	6.429E-26
	2.502E+01	1.356E-26
	2.550E+01	2.770E-27
	2.598E+01	5.572E-28
	2.646E+01	1.147E-28
	2.694E+01	2.593E-29
	2.743E+01	6.944E-30
	2.791E+01	2.245E-30
	2.839E+01	8.253E-31
	2.887E+01	3.214E-31
	2.936E+01	1.268E-31
	2.984E+01	4.970E-32
	3.032E+01	1.919E-32

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_SandThick

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	23.62 m	40	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

	2.400E+00	4.368E-08
	2.880E+00	4.885E-11
	3.360E+00	1.037E-13
	3.840E+00	9.638E-15
	4.320E+00	7.843E-16
	4.800E+00	4.641E-17
	5.280E+00	1.960E-18
	5.760E+00	5.783E-20
	6.240E+00	1.164E-21
	6.720E+00	1.553E-23
	7.200E+00	1.336E-25
	7.680E+00	7.408E-28
	8.160E+00	4.152E-30
	8.640E+00	1.022E-31
	9.120E+00	4.221E-33
	9.600E+00	1.474E-34
	1.008E+01	4.135E-36
	1.056E+01	9.227E-38
	1.104E+01	1.619E-39
	1.152E+01	2.210E-41
	1.200E+01	2.440E-43
	1.259E+01	7.107E-46
	1.318E+01	3.241E-48
	1.377E+01	3.736E-50
	1.436E+01	0.000E+00
	1.495E+01	0.000E+00
	1.554E+01	0.000E+00
	1.613E+01	0.000E+00
	1.672E+01	0.000E+00
	1.731E+01	0.000E+00
	1.791E+01	0.000E+00
	1.850E+01	0.000E+00
	1.909E+01	0.000E+00
	1.968E+01	0.000E+00
	2.027E+01	0.000E+00
	2.086E+01	0.000E+00
	2.145E+01	0.000E+00
	2.204E+01	0.000E+00
	2.263E+01	0.000E+00
	2.322E+01	0.000E+00
	2.381E+01	0.000E+00
	2.440E+01	0.000E+00
	2.499E+01	0.000E+00
	2.558E+01	0.000E+00
	2.617E+01	0.000E+00
	2.676E+01	0.000E+00
	2.735E+01	0.000E+00
	2.794E+01	0.000E+00
	2.853E+01	0.000E+00
	2.912E+01	0.000E+00
	2.971E+01	0.000E+00
	3.031E+01	0.000E+00
	3.090E+01	0.000E+00
	3.149E+01	0.000E+00
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00

	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.259E+01	2.459E-32
	1.318E+01	1.478E-33
	1.377E+01	7.600E-35
	1.436E+01	3.305E-36
	1.495E+01	1.206E-37
	1.554E+01	3.670E-39
	1.613E+01	9.243E-41
	1.672E+01	1.919E-42
	1.731E+01	3.330E-44
	1.791E+01	5.372E-46
	1.850E+01	1.161E-47
	1.909E+01	4.401E-49
	1.968E+01	2.063E-50
	2.027E+01	0.000E+00
	2.086E+01	0.000E+00
	2.145E+01	0.000E+00
	2.204E+01	0.000E+00
	2.263E+01	0.000E+00
	2.322E+01	0.000E+00
	2.381E+01	0.000E+00
	2.440E+01	0.000E+00
	2.499E+01	0.000E+00
	2.558E+01	0.000E+00
	2.617E+01	0.000E+00
	2.676E+01	0.000E+00
	2.735E+01	0.000E+00

	2.794E+01	0.000E+00
	2.853E+01	0.000E+00
	2.912E+01	0.000E+00
	2.971E+01	0.000E+00
	3.031E+01	0.000E+00
	3.090E+01	0.000E+00
	3.149E+01	0.000E+00
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00
	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.259E+01	9.949E-26
	1.318E+01	2.533E-27
	1.377E+01	5.772E-29
	1.436E+01	2.084E-30
	1.495E+01	1.787E-31
	1.554E+01	1.921E-32
	1.613E+01	1.935E-33
	1.672E+01	1.755E-34
	1.731E+01	1.424E-35
	1.791E+01	1.031E-36
	1.850E+01	6.623E-38
	1.909E+01	3.765E-39
	1.968E+01	1.886E-40
	2.027E+01	8.306E-42
	2.086E+01	3.225E-43
	2.145E+01	1.133E-44

	2.204E+01	3.993E-46
	2.263E+01	1.798E-47
	2.322E+01	1.201E-48
	2.381E+01	9.812E-50
	2.440E+01	0.000E+00
	2.499E+01	0.000E+00
	2.558E+01	0.000E+00
	2.617E+01	0.000E+00
	2.676E+01	0.000E+00
	2.735E+01	0.000E+00
	2.794E+01	0.000E+00
	2.853E+01	0.000E+00
	2.912E+01	0.000E+00
	2.971E+01	0.000E+00
	3.031E+01	0.000E+00
	3.090E+01	0.000E+00
	3.149E+01	0.000E+00
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00
	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	6.021E-01
	9.600E-01	2.900E-01
	1.440E+00	1.093E-01
	1.920E+00	3.172E-02
	2.400E+00	7.017E-03
	2.880E+00	1.174E-03
	3.360E+00	1.479E-04
	3.840E+00	1.397E-05
	4.320E+00	9.858E-07
	4.800E+00	5.191E-08
	5.280E+00	2.037E-09
	5.760E+00	6.011E-11
	6.240E+00	1.582E-12
	6.720E+00	1.317E-13
	7.200E+00	3.914E-14
	7.680E+00	1.266E-14
	8.160E+00	3.820E-15
	8.640E+00	1.067E-15
	9.120E+00	2.751E-16
	9.600E+00	6.535E-17
	1.008E+01	1.427E-17
	1.056E+01	2.858E-18
	1.104E+01	5.233E-19
	1.152E+01	8.741E-20
	1.200E+01	1.381E-20
	1.259E+01	1.188E-21
	1.318E+01	8.744E-23
	1.377E+01	5.464E-24
	1.436E+01	2.882E-25
	1.495E+01	1.281E-26
	1.554E+01	4.947E-28

	1.613E+01	2.004E-29
	1.672E+01	1.417E-30
	1.731E+01	1.821E-31
	1.791E+01	2.661E-32
	1.850E+01	3.707E-33
	1.909E+01	4.783E-34
	1.968E+01	5.685E-35
	2.027E+01	6.207E-36
	2.086E+01	6.211E-37
	2.145E+01	5.681E-38
	2.204E+01	4.738E-39
	2.263E+01	3.594E-40
	2.322E+01	2.475E-41
	2.381E+01	1.548E-42
	2.440E+01	8.878E-44
	2.499E+01	4.830E-45
	2.558E+01	2.759E-46
	2.617E+01	1.974E-47
	2.676E+01	1.907E-48
	2.735E+01	2.173E-49
	2.794E+01	2.534E-50
	2.853E+01	0.000E+00
	2.912E+01	0.000E+00
	2.971E+01	0.000E+00
	3.031E+01	0.000E+00
	3.090E+01	0.000E+00
	3.149E+01	0.000E+00
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00
	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
	1.920E+00	5.605E-02
	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.259E+01	2.667E-19
	1.318E+01	3.555E-20
	1.377E+01	4.211E-21
	1.436E+01	4.412E-22
	1.495E+01	4.069E-23
	1.554E+01	3.287E-24
	1.613E+01	2.316E-25
	1.672E+01	1.424E-26
	1.731E+01	7.810E-28
	1.791E+01	4.310E-29
	1.850E+01	3.416E-30
	1.909E+01	4.775E-31
	1.968E+01	8.465E-32
	2.027E+01	1.507E-32
	2.086E+01	2.543E-33
	2.145E+01	4.029E-34
	2.204E+01	5.975E-35
	2.263E+01	8.278E-36
	2.322E+01	1.070E-36
	2.381E+01	1.287E-37
	2.440E+01	1.439E-38
	2.499E+01	1.492E-39
	2.558E+01	1.433E-40
	2.617E+01	1.274E-41
	2.676E+01	1.049E-42
	2.735E+01	8.085E-44
	2.794E+01	6.002E-45
	2.853E+01	4.627E-46
	2.912E+01	4.213E-47
	2.971E+01	4.915E-48
	3.031E+01	6.838E-49
	3.090E+01	1.007E-49
	3.149E+01	1.466E-50
	3.208E+01	0.000E+00
	3.267E+01	0.000E+00
	3.326E+01	0.000E+00
	3.385E+01	0.000E+00
	3.444E+01	0.000E+00
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

	5.760E+00	1.039E-07
	6.240E+00	7.979E-09
	6.720E+00	5.041E-10
	7.200E+00	2.665E-11
	7.680E+00	1.409E-12
	8.160E+00	1.774E-13
	8.640E+00	6.128E-14
	9.120E+00	2.484E-14
	9.600E+00	9.733E-15
	1.008E+01	3.628E-15
	1.056E+01	1.284E-15
	1.104E+01	4.311E-16
	1.152E+01	1.375E-16
	1.200E+01	4.295E-17
	1.259E+01	9.092E-18
	1.318E+01	1.762E-18
	1.377E+01	3.114E-19
	1.436E+01	5.009E-20
	1.495E+01	7.304E-21
	1.554E+01	9.623E-22
	1.613E+01	1.141E-22
	1.672E+01	1.214E-23
	1.731E+01	1.154E-24
	1.791E+01	9.778E-26
	1.850E+01	7.416E-27
	1.909E+01	5.180E-28
	1.968E+01	3.764E-29
	2.027E+01	3.832E-30
	2.086E+01	6.311E-31
	2.145E+01	1.295E-31
	2.204E+01	2.708E-32
	2.263E+01	5.446E-33
	2.322E+01	1.040E-33
	2.381E+01	1.883E-34
	2.440E+01	3.221E-35
	2.499E+01	5.206E-36
	2.558E+01	7.934E-37
	2.617E+01	1.139E-37
	2.676E+01	1.538E-38
	2.735E+01	1.950E-39
	2.794E+01	2.319E-40
	2.853E+01	2.585E-41
	2.912E+01	2.704E-42
	2.971E+01	2.666E-43
	3.031E+01	2.514E-44
	3.090E+01	2.359E-45
	3.149E+01	2.386E-46
	3.208E+01	2.876E-47
	3.267E+01	4.253E-48
	3.326E+01	7.150E-49
	3.385E+01	1.250E-49
	3.444E+01	2.164E-50
	3.503E+01	0.000E+00
	3.562E+01	0.000E+00
35	0.000E+00	1.000E+00
	4.800E-01	7.006E-01

	9.600E-01	4.337E-01
	1.440E+00	2.346E-01
	1.920E+00	1.100E-01
	2.400E+00	4.443E-02
	2.880E+00	1.538E-02
	3.360E+00	4.547E-03
	3.840E+00	1.145E-03
	4.320E+00	2.451E-04
	4.800E+00	4.452E-05
	5.280E+00	6.852E-06
	5.760E+00	8.927E-07
	6.240E+00	9.837E-08
	6.720E+00	9.162E-09
	7.200E+00	7.219E-10
	7.680E+00	4.860E-11
	8.160E+00	3.069E-12
	8.640E+00	3.171E-13
	9.120E+00	9.445E-14
	9.600E+00	4.044E-14
	1.008E+01	1.740E-14
	1.056E+01	7.194E-15
	1.104E+01	2.849E-15
	1.152E+01	1.083E-15
	1.200E+01	4.061E-16
	1.259E+01	1.094E-16
	1.318E+01	2.740E-17
	1.377E+01	6.371E-18
	1.436E+01	1.372E-18
	1.495E+01	2.730E-19
	1.554E+01	5.008E-20
	1.613E+01	8.445E-21
	1.672E+01	1.306E-21
	1.731E+01	1.845E-22
	1.791E+01	2.376E-23
	1.850E+01	2.781E-24
	1.909E+01	2.952E-25
	1.968E+01	2.841E-26
	2.027E+01	2.505E-27
	2.086E+01	2.121E-28
	2.145E+01	2.010E-29
	2.204E+01	2.759E-30
	2.263E+01	5.556E-31
	2.322E+01	1.299E-31
	2.381E+01	3.058E-32
	2.440E+01	6.959E-33
	2.499E+01	1.516E-33
	2.558E+01	3.153E-34
	2.617E+01	6.253E-35
	2.676E+01	1.181E-35
	2.735E+01	2.123E-36
	2.794E+01	3.626E-37
	2.853E+01	5.880E-38
	2.912E+01	9.042E-39
	2.971E+01	1.317E-39
	3.031E+01	1.816E-40
	3.090E+01	2.368E-41
	3.149E+01	2.925E-42

	3.208E+01	3.435E-43
	3.267E+01	3.880E-44
	3.326E+01	4.339E-45
	3.385E+01	5.095E-46
	3.444E+01	6.822E-47
	3.503E+01	1.094E-47
	3.562E+01	2.023E-48
40	0.000E+00	1.000E+00
	4.800E-01	7.210E-01
	9.600E-01	4.668E-01
	1.440E+00	2.689E-01
	1.920E+00	1.369E-01
	2.400E+00	6.120E-02
	2.880E+00	2.395E-02
	3.360E+00	8.170E-03
	3.840E+00	2.425E-03
	4.320E+00	6.249E-04
	4.800E+00	1.396E-04
	5.280E+00	2.699E-05
	5.760E+00	4.514E-06
	6.240E+00	6.524E-07
	6.720E+00	8.142E-08
	7.200E+00	8.772E-09
	7.680E+00	8.163E-10
	8.160E+00	6.612E-11
	8.640E+00	4.961E-12
	9.120E+00	5.024E-13
	9.600E+00	1.306E-13
	1.008E+01	5.687E-14
	1.056E+01	2.613E-14
	1.104E+01	1.168E-14
	1.152E+01	5.054E-15
	1.200E+01	2.166E-15
	1.259E+01	6.958E-16
	1.318E+01	2.102E-16
	1.377E+01	5.966E-17
	1.436E+01	1.588E-17
	1.495E+01	3.955E-18
	1.554E+01	9.208E-19
	1.613E+01	1.999E-19
	1.672E+01	4.040E-20
	1.731E+01	7.581E-21
	1.791E+01	1.318E-21
	1.850E+01	2.118E-22
	1.909E+01	3.139E-23
	1.968E+01	4.279E-24
	2.027E+01	5.356E-25
	2.086E+01	6.150E-26
	2.145E+01	6.513E-27
	2.204E+01	6.515E-28
	2.263E+01	6.686E-29
	2.322E+01	8.541E-30
	2.381E+01	1.592E-30
	2.440E+01	3.848E-31
	2.499E+01	1.001E-31
	2.558E+01	2.582E-32

	2.617E+01	6.442E-33
	2.676E+01	1.546E-33
	2.735E+01	3.564E-34
	2.794E+01	7.878E-35
	2.853E+01	1.669E-35
	2.912E+01	3.386E-36
	2.971E+01	6.570E-37
	3.031E+01	1.219E-37
	3.090E+01	2.158E-38
	3.149E+01	3.647E-39
	3.208E+01	5.875E-40
	3.267E+01	9.015E-41
	3.326E+01	1.318E-41
	3.385E+01	1.839E-42
	3.444E+01	2.459E-43
	3.503E+01	3.192E-44
	3.562E+01	4.133E-45
45	0.000E+00	1.000E+00
	4.800E-01	7.380E-01
	9.600E-01	4.953E-01
	1.440E+00	2.999E-01
	1.920E+00	1.628E-01
	2.400E+00	7.884E-02
	2.880E+00	3.394E-02
	3.360E+00	1.295E-02
	3.840E+00	4.369E-03
	4.320E+00	1.301E-03
	4.800E+00	3.413E-04
	5.280E+00	7.884E-05
	5.760E+00	1.602E-05
	6.240E+00	2.859E-06
	6.720E+00	4.481E-07
	7.200E+00	6.164E-08
	7.680E+00	7.440E-09
	8.160E+00	7.886E-10
	8.640E+00	7.389E-11
	9.120E+00	6.430E-12
	9.600E+00	6.905E-13
	1.008E+01	1.666E-13
	1.056E+01	7.256E-14
	1.104E+01	3.501E-14
	1.152E+01	1.670E-14
	1.200E+01	7.925E-15
	1.259E+01	2.912E-15
	1.318E+01	1.015E-15
	1.377E+01	3.351E-16
	1.436E+01	1.047E-16
	1.495E+01	3.092E-17
	1.554E+01	8.617E-18
	1.613E+01	2.263E-18
	1.672E+01	5.590E-19
	1.731E+01	1.297E-19
	1.791E+01	2.822E-20
	1.850E+01	5.745E-21
	1.909E+01	1.092E-21
	1.968E+01	1.937E-22

	2.027E+01	3.193E-23
	2.086E+01	4.888E-24
	2.145E+01	6.935E-25
	2.204E+01	9.115E-26
	2.263E+01	1.113E-26
	2.322E+01	1.284E-27
	2.381E+01	1.473E-28
	2.440E+01	1.929E-29
	2.499E+01	3.444E-30
	2.558E+01	8.324E-31
	2.617E+01	2.301E-31
	2.676E+01	6.494E-32
	2.735E+01	1.795E-32
	2.794E+01	4.808E-33
	2.853E+01	1.243E-33
	2.912E+01	3.099E-34
	2.971E+01	7.443E-35
	3.031E+01	1.721E-35
	3.090E+01	3.830E-36
	3.149E+01	8.192E-37
	3.208E+01	1.683E-37
	3.267E+01	3.320E-38
	3.326E+01	6.281E-39
	3.385E+01	1.139E-39
	3.444E+01	1.978E-40
	3.503E+01	3.292E-41
	3.562E+01	5.249E-42
50	0.000E+00	1.000E+00
	4.800E-01	7.526E-01
	9.600E-01	5.201E-01
	1.440E+00	3.279E-01
	1.920E+00	1.875E-01
	2.400E+00	9.685E-02
	2.880E+00	4.502E-02
	3.360E+00	1.879E-02
	3.840E+00	7.025E-03
	4.320E+00	2.349E-03
	4.800E+00	7.012E-04
	5.280E+00	1.867E-04
	5.760E+00	4.432E-05
	6.240E+00	9.366E-06
	6.720E+00	1.762E-06
	7.200E+00	2.947E-07
	7.680E+00	4.385E-08
	8.160E+00	5.798E-09
	8.640E+00	6.822E-10
	9.120E+00	7.192E-11
	9.600E+00	7.099E-12
	1.008E+01	8.326E-13
	1.056E+01	1.981E-13
	1.104E+01	8.651E-14
	1.152E+01	4.354E-14
	1.200E+01	2.233E-14
	1.259E+01	9.120E-15
	1.318E+01	3.557E-15
	1.377E+01	1.323E-15

	1.436E+01	4.690E-16
	1.495E+01	1.582E-16
	1.554E+01	5.074E-17
	1.613E+01	1.545E-17
	1.672E+01	4.463E-18
	1.731E+01	1.221E-18
	1.791E+01	3.160E-19
	1.850E+01	7.724E-20
	1.909E+01	1.780E-20
	1.968E+01	3.864E-21
	2.027E+01	7.881E-22
	2.086E+01	1.508E-22
	2.145E+01	2.704E-23
	2.204E+01	4.533E-24
	2.263E+01	7.097E-25
	2.322E+01	1.037E-25
	2.381E+01	1.418E-26
	2.440E+01	1.838E-27
	2.499E+01	2.349E-28
	2.558E+01	3.286E-29
	2.617E+01	5.910E-30
	2.676E+01	1.434E-30
	2.735E+01	4.132E-31
	2.794E+01	1.247E-31
	2.853E+01	3.733E-32
	2.912E+01	1.089E-32
	2.971E+01	3.084E-33
	3.031E+01	8.451E-34
	3.090E+01	2.241E-34
	3.149E+01	5.746E-35
	3.208E+01	1.424E-35
	3.267E+01	3.406E-36
	3.326E+01	7.864E-37
	3.385E+01	1.751E-37
	3.444E+01	3.758E-38
	3.503E+01	7.769E-39
	3.562E+01	1.546E-39
55	0.000E+00	1.000E+00
	4.800E-01	7.651E-01
	9.600E-01	5.420E-01
	1.440E+00	3.533E-01
	1.920E+00	2.110E-01
	2.400E+00	1.149E-01
	2.880E+00	5.689E-02
	3.360E+00	2.556E-02
	3.840E+00	1.039E-02
	4.320E+00	3.821E-03
	4.800E+00	1.268E-03
	5.280E+00	3.794E-04
	5.760E+00	1.023E-04
	6.240E+00	2.483E-05
	6.720E+00	5.421E-06
	7.200E+00	1.065E-06
	7.680E+00	1.879E-07
	8.160E+00	2.981E-08
	8.640E+00	4.249E-09

	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.967E-12
	1.056E+01	9.016E-13
	1.104E+01	2.215E-13
	1.152E+01	9.850E-14
	1.200E+01	5.229E-14
	1.259E+01	2.318E-14
	1.318E+01	9.898E-15
	1.377E+01	4.054E-15
	1.436E+01	1.590E-15
	1.495E+01	5.971E-16
	1.554E+01	2.144E-16
	1.613E+01	7.352E-17
	1.672E+01	2.407E-17
	1.731E+01	7.511E-18
	1.791E+01	2.232E-18
	1.850E+01	6.309E-19
	1.909E+01	1.694E-19
	1.968E+01	4.317E-20
	2.027E+01	1.042E-20
	2.086E+01	2.380E-21
	2.145E+01	5.135E-22
	2.204E+01	1.045E-22
	2.263E+01	2.003E-23
	2.322E+01	3.612E-24
	2.381E+01	6.118E-25
	2.440E+01	9.734E-26
	2.499E+01	1.459E-26
	2.558E+01	2.083E-27
	2.617E+01	2.932E-28
	2.676E+01	4.441E-29
	2.735E+01	8.330E-30
	2.794E+01	2.069E-30
	2.853E+01	6.181E-31
	2.912E+01	1.968E-31
	2.971E+01	6.278E-32
	3.031E+01	1.964E-32
	3.090E+01	5.980E-33
	3.149E+01	1.770E-33
	3.208E+01	5.083E-34
	3.267E+01	1.416E-34
	3.326E+01	3.827E-35
	3.385E+01	1.002E-35
	3.444E+01	2.542E-36
	3.503E+01	6.240E-37
	3.562E+01	1.482E-37

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.

POLLUTEv7

Version 7.13

BAB_SandThin

THE DARCY VELOCITY (Flux) THROUGH THE LAYERS Va = 0.00102 m/year

Layer Properties

Layer	Thickness	Number of Sublayers	Coefficient of Hydrodynamic Dispersion	Matrix Porosity	Distributon Coefficient	Dry Density
Clay	12 m	25	0.019 m2/a	0.37	0 m3/kg	1510 kg/m3
Clay with Sand	15.17 m	40	0.019 m2/a	0.34	0 m3/kg	1510 kg/m3

Boundary Conditions

Contant Concentration
Source Concentration = 1 mg/L

Infinite Thickness Bottom Boundary

Laplace Transform Parameters

TAU = 7 **N =** 20 **SIG =** 0 **RNU =** 2

Calculated Concentrations at Selected Times and Depths

Time year	Depth m	Concentration mg/L
5	0.000E+00	1.000E+00
	4.800E-01	2.803E-01
	9.600E-01	2.962E-02
	1.440E+00	1.059E-03
	1.920E+00	1.217E-05

	2.400E+00	4.368E-08
	2.880E+00	4.885E-11
	3.360E+00	1.037E-13
	3.840E+00	9.638E-15
	4.320E+00	7.843E-16
	4.800E+00	4.641E-17
	5.280E+00	1.960E-18
	5.760E+00	5.783E-20
	6.240E+00	1.164E-21
	6.720E+00	1.553E-23
	7.200E+00	1.336E-25
	7.680E+00	7.408E-28
	8.160E+00	4.152E-30
	8.640E+00	1.022E-31
	9.120E+00	4.221E-33
	9.600E+00	1.474E-34
	1.008E+01	4.135E-36
	1.056E+01	9.227E-38
	1.104E+01	1.619E-39
	1.152E+01	2.210E-41
	1.200E+01	2.440E-43
	1.238E+01	5.794E-45
	1.276E+01	1.384E-46
	1.314E+01	4.621E-48
	1.352E+01	2.432E-49
	1.390E+01	1.493E-50
	1.428E+01	0.000E+00
	1.465E+01	0.000E+00
	1.503E+01	0.000E+00
	1.541E+01	0.000E+00
	1.579E+01	0.000E+00
	1.617E+01	0.000E+00
	1.655E+01	0.000E+00
	1.693E+01	0.000E+00
	1.731E+01	0.000E+00
	1.769E+01	0.000E+00
	1.807E+01	0.000E+00
	1.845E+01	0.000E+00
	1.883E+01	0.000E+00
	1.921E+01	0.000E+00
	1.959E+01	0.000E+00
	1.996E+01	0.000E+00
	2.034E+01	0.000E+00
	2.072E+01	0.000E+00
	2.110E+01	0.000E+00
	2.148E+01	0.000E+00
	2.186E+01	0.000E+00
	2.224E+01	0.000E+00
	2.262E+01	0.000E+00
	2.300E+01	0.000E+00
	2.338E+01	0.000E+00
	2.376E+01	0.000E+00
	2.414E+01	0.000E+00
	2.452E+01	0.000E+00
	2.489E+01	0.000E+00
	2.527E+01	0.000E+00
	2.565E+01	0.000E+00

	2.603E+01	0.000E+00
	2.641E+01	0.000E+00
	2.679E+01	0.000E+00
	2.717E+01	0.000E+00
10	0.000E+00	1.000E+00
	4.800E-01	4.514E-01
	9.600E-01	1.279E-01
	1.440E+00	2.162E-02
	1.920E+00	2.115E-03
	2.400E+00	1.176E-04
	2.880E+00	3.673E-06
	3.360E+00	6.399E-08
	3.840E+00	6.196E-10
	4.320E+00	3.640E-12
	4.800E+00	9.319E-14
	5.280E+00	1.802E-14
	5.760E+00	3.345E-15
	6.240E+00	5.321E-16
	6.720E+00	7.205E-17
	7.200E+00	8.251E-18
	7.680E+00	7.934E-19
	8.160E+00	6.355E-20
	8.640E+00	4.202E-21
	9.120E+00	2.272E-22
	9.600E+00	9.939E-24
	1.008E+01	3.484E-25
	1.056E+01	9.740E-27
	1.104E+01	2.264E-28
	1.152E+01	6.062E-30
	1.200E+01	3.927E-31
	1.238E+01	6.542E-32
	1.276E+01	1.121E-32
	1.314E+01	1.825E-33
	1.352E+01	2.787E-34
	1.390E+01	3.975E-35
	1.428E+01	5.288E-36
	1.465E+01	6.547E-37
	1.503E+01	7.532E-38
	1.541E+01	8.034E-39
	1.579E+01	7.931E-40
	1.617E+01	7.234E-41
	1.655E+01	6.090E-42
	1.693E+01	4.742E-43
	1.731E+01	3.448E-44
	1.769E+01	2.417E-45
	1.807E+01	1.771E-46
	1.845E+01	1.553E-47
	1.883E+01	1.758E-48
	1.921E+01	2.357E-49
	1.959E+01	3.315E-50
	1.996E+01	0.000E+00
	2.034E+01	0.000E+00
	2.072E+01	0.000E+00
	2.110E+01	0.000E+00
	2.148E+01	0.000E+00
	2.186E+01	0.000E+00

	2.224E+01	0.000E+00
	2.262E+01	0.000E+00
	2.300E+01	0.000E+00
	2.338E+01	0.000E+00
	2.376E+01	0.000E+00
	2.414E+01	0.000E+00
	2.452E+01	0.000E+00
	2.489E+01	0.000E+00
	2.527E+01	0.000E+00
	2.565E+01	0.000E+00
	2.603E+01	0.000E+00
	2.641E+01	0.000E+00
	2.679E+01	0.000E+00
	2.717E+01	0.000E+00
15	0.000E+00	1.000E+00
	4.800E-01	5.432E-01
	9.600E-01	2.180E-01
	1.440E+00	6.263E-02
	1.920E+00	1.261E-02
	2.400E+00	1.757E-03
	2.880E+00	1.678E-04
	3.360E+00	1.092E-05
	3.840E+00	4.820E-07
	4.320E+00	1.439E-08
	4.800E+00	2.906E-10
	5.280E+00	4.293E-12
	5.760E+00	1.562E-13
	6.240E+00	3.611E-14
	6.720E+00	9.695E-15
	7.200E+00	2.366E-15
	7.680E+00	5.201E-16
	8.160E+00	1.027E-16
	8.640E+00	1.814E-17
	9.120E+00	2.857E-18
	9.600E+00	3.994E-19
	1.008E+01	4.933E-20
	1.056E+01	5.357E-21
	1.104E+01	5.089E-22
	1.152E+01	4.205E-23
	1.200E+01	3.130E-24
	1.238E+01	3.508E-25
	1.276E+01	3.577E-26
	1.314E+01	3.336E-27
	1.352E+01	2.925E-28
	1.390E+01	2.669E-29
	1.428E+01	3.187E-30
	1.465E+01	5.746E-31
	1.503E+01	1.312E-31
	1.541E+01	3.144E-32
	1.579E+01	7.371E-33
	1.617E+01	1.662E-33
	1.655E+01	3.585E-34
	1.693E+01	7.392E-35
	1.731E+01	1.455E-35
	1.769E+01	2.733E-36
	1.807E+01	4.889E-37

	1.845E+01	8.326E-38
	1.883E+01	1.348E-38
	1.921E+01	2.073E-39
	1.959E+01	3.025E-40
	1.996E+01	4.186E-41
	2.034E+01	5.491E-42
	2.072E+01	6.840E-43
	2.110E+01	8.135E-44
	2.148E+01	9.371E-45
	2.186E+01	1.081E-45
	2.224E+01	1.331E-46
	2.262E+01	1.889E-47
	2.300E+01	3.186E-48
	2.338E+01	6.089E-49
	2.376E+01	1.227E-49
	2.414E+01	2.484E-50
	2.452E+01	0.000E+00
	2.489E+01	0.000E+00
	2.527E+01	0.000E+00
	2.565E+01	0.000E+00
	2.603E+01	0.000E+00
	2.641E+01	0.000E+00
	2.679E+01	0.000E+00
	2.717E+01	0.000E+00
20	0.000E+00	1.000E+00
	4.800E-01	6.021E-01
	9.600E-01	2.900E-01
	1.440E+00	1.093E-01
	1.920E+00	3.172E-02
	2.400E+00	7.017E-03
	2.880E+00	1.174E-03
	3.360E+00	1.479E-04
	3.840E+00	1.397E-05
	4.320E+00	9.858E-07
	4.800E+00	5.191E-08
	5.280E+00	2.037E-09
	5.760E+00	6.011E-11
	6.240E+00	1.582E-12
	6.720E+00	1.317E-13
	7.200E+00	3.914E-14
	7.680E+00	1.266E-14
	8.160E+00	3.820E-15
	8.640E+00	1.067E-15
	9.120E+00	2.751E-16
	9.600E+00	6.535E-17
	1.008E+01	1.427E-17
	1.056E+01	2.858E-18
	1.104E+01	5.233E-19
	1.152E+01	8.741E-20
	1.200E+01	1.381E-20
	1.238E+01	2.908E-21
	1.276E+01	5.748E-22
	1.314E+01	1.064E-22
	1.352E+01	1.843E-23
	1.390E+01	2.977E-24
	1.428E+01	4.483E-25

	1.465E+01	6.287E-26
	1.503E+01	8.233E-27
	1.541E+01	1.019E-27
	1.579E+01	1.239E-28
	1.617E+01	1.650E-29
	1.655E+01	2.838E-30
	1.693E+01	6.647E-31
	1.731E+01	1.851E-31
	1.769E+01	5.392E-32
	1.807E+01	1.555E-32
	1.845E+01	4.367E-33
	1.883E+01	1.188E-33
	1.921E+01	3.127E-34
	1.959E+01	7.951E-35
	1.996E+01	1.953E-35
	2.034E+01	4.629E-36
	2.072E+01	1.058E-36
	2.110E+01	2.333E-37
	2.148E+01	4.952E-38
	2.186E+01	1.012E-38
	2.224E+01	1.989E-39
	2.262E+01	3.758E-40
	2.300E+01	6.822E-41
	2.338E+01	1.190E-41
	2.376E+01	1.996E-42
	2.414E+01	3.225E-43
	2.452E+01	5.053E-44
	2.489E+01	7.777E-45
	2.527E+01	1.207E-45
	2.565E+01	1.974E-46
	2.603E+01	3.581E-47
	2.641E+01	7.412E-48
	2.679E+01	1.715E-48
	2.717E+01	4.228E-49
25	0.000E+00	1.000E+00
	4.800E-01	6.439E-01
	9.600E-01	3.476E-01
	1.440E+00	1.547E-01
	1.920E+00	5.605E-02
	2.400E+00	1.640E-02
	2.880E+00	3.847E-03
	3.360E+00	7.210E-04
	3.840E+00	1.075E-04
	4.320E+00	1.273E-05
	4.800E+00	1.194E-06
	5.280E+00	8.861E-08
	5.760E+00	5.197E-09
	6.240E+00	2.415E-10
	6.720E+00	9.257E-12
	7.200E+00	4.612E-13
	7.680E+00	9.118E-14
	8.160E+00	3.312E-14
	8.640E+00	1.202E-14
	9.120E+00	4.118E-15
	9.600E+00	1.326E-15
	1.008E+01	4.007E-16

	1.056E+01	1.135E-16
	1.104E+01	3.005E-17
	1.152E+01	7.447E-18
	1.200E+01	1.785E-18
	1.238E+01	5.333E-19
	1.276E+01	1.521E-19
	1.314E+01	4.137E-20
	1.352E+01	1.072E-20
	1.390E+01	2.642E-21
	1.428E+01	6.189E-22
	1.465E+01	1.376E-22
	1.503E+01	2.898E-23
	1.541E+01	5.780E-24
	1.579E+01	1.090E-24
	1.617E+01	1.941E-25
	1.655E+01	3.267E-26
	1.693E+01	5.218E-27
	1.731E+01	8.006E-28
	1.769E+01	1.223E-28
	1.807E+01	2.025E-29
	1.845E+01	4.106E-30
	1.883E+01	1.075E-30
	1.921E+01	3.337E-31
	1.959E+01	1.103E-31
	1.996E+01	3.669E-32
	2.034E+01	1.200E-32
	2.072E+01	3.837E-33
	2.110E+01	1.195E-33
	2.148E+01	3.625E-34
	2.186E+01	1.070E-34
	2.224E+01	3.070E-35
	2.262E+01	8.565E-36
	2.300E+01	2.322E-36
	2.338E+01	6.114E-37
	2.376E+01	1.563E-37
	2.414E+01	3.875E-38
	2.452E+01	9.319E-39
	2.489E+01	2.173E-39
	2.527E+01	4.907E-40
	2.565E+01	1.073E-40
	2.603E+01	2.274E-41
	2.641E+01	4.668E-42
	2.679E+01	9.294E-43
	2.717E+01	1.800E-43
30	0.000E+00	1.000E+00
	4.800E-01	6.756E-01
	9.600E-01	3.946E-01
	1.440E+00	1.966E-01
	1.920E+00	8.274E-02
	2.400E+00	2.920E-02
	2.880E+00	8.592E-03
	3.360E+00	2.100E-03
	3.840E+00	4.250E-04
	4.320E+00	7.107E-05
	4.800E+00	9.800E-06
	5.280E+00	1.113E-06

	5.760E+00	1.039E-07
	6.240E+00	7.979E-09
	6.720E+00	5.041E-10
	7.200E+00	2.665E-11
	7.680E+00	1.409E-12
	8.160E+00	1.774E-13
	8.640E+00	6.128E-14
	9.120E+00	2.484E-14
	9.600E+00	9.733E-15
	1.008E+01	3.628E-15
	1.056E+01	1.284E-15
	1.104E+01	4.311E-16
	1.152E+01	1.375E-16
	1.200E+01	4.295E-17
	1.238E+01	1.600E-17
	1.276E+01	5.753E-18
	1.314E+01	1.993E-18
	1.352E+01	6.648E-19
	1.390E+01	2.134E-19
	1.428E+01	6.586E-20
	1.465E+01	1.953E-20
	1.503E+01	5.555E-21
	1.541E+01	1.516E-21
	1.579E+01	3.960E-22
	1.617E+01	9.903E-23
	1.655E+01	2.367E-23
	1.693E+01	5.405E-24
	1.731E+01	1.177E-24
	1.769E+01	2.446E-25
	1.807E+01	4.849E-26
	1.845E+01	9.190E-27
	1.883E+01	1.678E-27
	1.921E+01	3.012E-28
	1.959E+01	5.577E-29
	1.996E+01	1.161E-29
	2.034E+01	2.962E-30
	2.072E+01	9.236E-31
	2.110E+01	3.241E-31
	2.148E+01	1.186E-31
	2.186E+01	4.353E-32
	2.224E+01	1.576E-32
	2.262E+01	5.599E-33
	2.300E+01	1.947E-33
	2.338E+01	6.621E-34
	2.376E+01	2.201E-34
	2.414E+01	7.153E-35
	2.452E+01	2.271E-35
	2.489E+01	7.040E-36
	2.527E+01	2.131E-36
	2.565E+01	6.292E-37
	2.603E+01	1.813E-37
	2.641E+01	5.093E-38
	2.679E+01	1.395E-38
	2.717E+01	3.723E-39
35	0.000E+00	1.000E+00
	4.800E-01	7.006E-01

	9.600E-01	4.337E-01
	1.440E+00	2.346E-01
	1.920E+00	1.100E-01
	2.400E+00	4.443E-02
	2.880E+00	1.538E-02
	3.360E+00	4.547E-03
	3.840E+00	1.145E-03
	4.320E+00	2.451E-04
	4.800E+00	4.452E-05
	5.280E+00	6.852E-06
	5.760E+00	8.927E-07
	6.240E+00	9.837E-08
	6.720E+00	9.162E-09
	7.200E+00	7.219E-10
	7.680E+00	4.860E-11
	8.160E+00	3.069E-12
	8.640E+00	3.171E-13
	9.120E+00	9.445E-14
	9.600E+00	4.044E-14
	1.008E+01	1.740E-14
	1.056E+01	7.194E-15
	1.104E+01	2.849E-15
	1.152E+01	1.083E-15
	1.200E+01	4.061E-16
	1.238E+01	1.763E-16
	1.276E+01	7.433E-17
	1.314E+01	3.040E-17
	1.352E+01	1.206E-17
	1.390E+01	4.636E-18
	1.428E+01	1.726E-18
	1.465E+01	6.224E-19
	1.503E+01	2.171E-19
	1.541E+01	7.321E-20
	1.579E+01	2.385E-20
	1.617E+01	7.503E-21
	1.655E+01	2.277E-21
	1.693E+01	6.660E-22
	1.731E+01	1.877E-22
	1.769E+01	5.089E-23
	1.807E+01	1.327E-23
	1.845E+01	3.326E-24
	1.883E+01	8.007E-25
	1.921E+01	1.850E-25
	1.959E+01	4.108E-26
	1.996E+01	8.783E-27
	2.034E+01	1.820E-27
	2.072E+01	3.719E-28
	2.110E+01	7.773E-29
	2.148E+01	1.776E-29
	2.186E+01	4.783E-30
	2.224E+01	1.548E-30
	2.262E+01	5.698E-31
	2.300E+01	2.227E-31
	2.338E+01	8.837E-32
	2.376E+01	3.488E-32
	2.414E+01	1.357E-32
	2.452E+01	5.194E-33

	2.489E+01	1.951E-33
	2.527E+01	7.190E-34
	2.565E+01	2.599E-34
	2.603E+01	9.211E-35
	2.641E+01	3.200E-35
	2.679E+01	1.089E-35
	2.717E+01	3.633E-36
40	0.000E+00	1.000E+00
	4.800E-01	7.210E-01
	9.600E-01	4.668E-01
	1.440E+00	2.689E-01
	1.920E+00	1.369E-01
	2.400E+00	6.120E-02
	2.880E+00	2.395E-02
	3.360E+00	8.170E-03
	3.840E+00	2.425E-03
	4.320E+00	6.249E-04
	4.800E+00	1.396E-04
	5.280E+00	2.699E-05
	5.760E+00	4.514E-06
	6.240E+00	6.524E-07
	6.720E+00	8.142E-08
	7.200E+00	8.772E-09
	7.680E+00	8.163E-10
	8.160E+00	6.612E-11
	8.640E+00	4.961E-12
	9.120E+00	5.024E-13
	9.600E+00	1.306E-13
	1.008E+01	5.687E-14
	1.056E+01	2.613E-14
	1.104E+01	1.168E-14
	1.152E+01	5.054E-15
	1.200E+01	2.166E-15
	1.238E+01	1.052E-15
	1.276E+01	4.981E-16
	1.314E+01	2.300E-16
	1.352E+01	1.035E-16
	1.390E+01	4.535E-17
	1.428E+01	1.935E-17
	1.465E+01	8.038E-18
	1.503E+01	3.248E-18
	1.541E+01	1.276E-18
	1.579E+01	4.871E-19
	1.617E+01	1.806E-19
	1.655E+01	6.503E-20
	1.693E+01	2.271E-20
	1.731E+01	7.691E-21
	1.769E+01	2.524E-21
	1.807E+01	8.021E-22
	1.845E+01	2.467E-22
	1.883E+01	7.339E-23
	1.921E+01	2.110E-23
	1.959E+01	5.860E-24
	1.996E+01	1.571E-24
	2.034E+01	4.066E-25
	2.072E+01	1.015E-25

	2.110E+01	2.450E-26
	2.148E+01	5.728E-27
	2.186E+01	1.308E-27
	2.224E+01	2.969E-28
	2.262E+01	6.941E-29
	2.300E+01	1.773E-29
	2.338E+01	5.250E-30
	2.376E+01	1.827E-30
	2.414E+01	7.140E-31
	2.452E+01	2.957E-31
	2.489E+01	1.247E-31
	2.527E+01	5.249E-32
	2.565E+01	2.186E-32
	2.603E+01	8.978E-33
	2.641E+01	3.629E-33
	2.679E+01	1.443E-33
	2.717E+01	5.641E-34
45	0.000E+00	1.000E+00
	4.800E-01	7.380E-01
	9.600E-01	4.953E-01
	1.440E+00	2.999E-01
	1.920E+00	1.628E-01
	2.400E+00	7.884E-02
	2.880E+00	3.394E-02
	3.360E+00	1.295E-02
	3.840E+00	4.369E-03
	4.320E+00	1.301E-03
	4.800E+00	3.413E-04
	5.280E+00	7.884E-05
	5.760E+00	1.602E-05
	6.240E+00	2.859E-06
	6.720E+00	4.481E-07
	7.200E+00	6.164E-08
	7.680E+00	7.440E-09
	8.160E+00	7.886E-10
	8.640E+00	7.389E-11
	9.120E+00	6.430E-12
	9.600E+00	6.905E-13
	1.008E+01	1.666E-13
	1.056E+01	7.256E-14
	1.104E+01	3.501E-14
	1.152E+01	1.670E-14
	1.200E+01	7.925E-15
	1.238E+01	4.191E-15
	1.276E+01	2.169E-15
	1.314E+01	1.098E-15
	1.352E+01	5.439E-16
	1.390E+01	2.633E-16
	1.428E+01	1.246E-16
	1.465E+01	5.761E-17
	1.503E+01	2.601E-17
	1.541E+01	1.147E-17
	1.579E+01	4.934E-18
	1.617E+01	2.071E-18
	1.655E+01	8.474E-19
	1.693E+01	3.380E-19

	1.731E+01	1.314E-19
	1.769E+01	4.971E-20
	1.807E+01	1.831E-20
	1.845E+01	6.559E-21
	1.883E+01	2.285E-21
	1.921E+01	7.736E-22
	1.959E+01	2.544E-22
	1.996E+01	8.120E-23
	2.034E+01	2.515E-23
	2.072E+01	7.551E-24
	2.110E+01	2.198E-24
	2.148E+01	6.199E-25
	2.186E+01	1.694E-25
	2.224E+01	4.487E-26
	2.262E+01	1.154E-26
	2.300E+01	2.897E-27
	2.338E+01	7.168E-28
	2.376E+01	1.786E-28
	2.414E+01	4.658E-29
	2.452E+01	1.342E-29
	2.489E+01	4.454E-30
	2.527E+01	1.697E-30
	2.565E+01	7.096E-31
	2.603E+01	3.106E-31
	2.641E+01	1.379E-31
	2.679E+01	6.110E-32
	2.717E+01	2.682E-32
50	0.000E+00	1.000E+00
	4.800E-01	7.526E-01
	9.600E-01	5.201E-01
	1.440E+00	3.279E-01
	1.920E+00	1.875E-01
	2.400E+00	9.685E-02
	2.880E+00	4.502E-02
	3.360E+00	1.879E-02
	3.840E+00	7.025E-03
	4.320E+00	2.349E-03
	4.800E+00	7.012E-04
	5.280E+00	1.867E-04
	5.760E+00	4.432E-05
	6.240E+00	9.366E-06
	6.720E+00	1.762E-06
	7.200E+00	2.947E-07
	7.680E+00	4.385E-08
	8.160E+00	5.798E-09
	8.640E+00	6.822E-10
	9.120E+00	7.192E-11
	9.600E+00	7.099E-12
	1.008E+01	8.326E-13
	1.056E+01	1.981E-13
	1.104E+01	8.651E-14
	1.152E+01	4.354E-14
	1.200E+01	2.233E-14
	1.238E+01	1.263E-14
	1.276E+01	7.010E-15
	1.314E+01	3.817E-15

	1.352E+01	2.038E-15
	1.390E+01	1.067E-15
	1.428E+01	5.476E-16
	1.465E+01	2.754E-16
	1.503E+01	1.356E-16
	1.541E+01	6.543E-17
	1.579E+01	3.090E-17
	1.617E+01	1.428E-17
	1.655E+01	6.458E-18
	1.693E+01	2.856E-18
	1.731E+01	1.235E-18
	1.769E+01	5.218E-19
	1.807E+01	2.154E-19
	1.845E+01	8.685E-20
	1.883E+01	3.418E-20
	1.921E+01	1.312E-20
	1.959E+01	4.915E-21
	1.996E+01	1.795E-21
	2.034E+01	6.385E-22
	2.072E+01	2.212E-22
	2.110E+01	7.463E-23
	2.148E+01	2.450E-23
	2.186E+01	7.822E-24
	2.224E+01	2.428E-24
	2.262E+01	7.327E-25
	2.300E+01	2.149E-25
	2.338E+01	6.128E-26
	2.376E+01	1.701E-26
	2.414E+01	4.614E-27
	2.452E+01	1.231E-27
	2.489E+01	3.280E-28
	2.527E+01	8.970E-29
	2.565E+01	2.627E-29
	2.603E+01	8.616E-30
	2.641E+01	3.226E-30
	2.679E+01	1.348E-30
	2.717E+01	6.021E-31
55	0.000E+00	1.000E+00
	4.800E-01	7.651E-01
	9.600E-01	5.420E-01
	1.440E+00	3.533E-01
	1.920E+00	2.110E-01
	2.400E+00	1.149E-01
	2.880E+00	5.689E-02
	3.360E+00	2.556E-02
	3.840E+00	1.039E-02
	4.320E+00	3.821E-03
	4.800E+00	1.268E-03
	5.280E+00	3.794E-04
	5.760E+00	1.023E-04
	6.240E+00	2.483E-05
	6.720E+00	5.421E-06
	7.200E+00	1.065E-06
	7.680E+00	1.879E-07
	8.160E+00	2.981E-08
	8.640E+00	4.249E-09

	9.120E+00	5.449E-10
	9.600E+00	6.332E-11
	1.008E+01	6.967E-12
	1.056E+01	9.016E-13
	1.104E+01	2.215E-13
	1.152E+01	9.850E-14
	1.200E+01	5.229E-14
	1.238E+01	3.112E-14
	1.276E+01	1.827E-14
	1.314E+01	1.055E-14
	1.352E+01	5.987E-15
	1.390E+01	3.338E-15
	1.428E+01	1.829E-15
	1.465E+01	9.839E-16
	1.503E+01	5.197E-16
	1.541E+01	2.695E-16
	1.579E+01	1.372E-16
	1.617E+01	6.849E-17
	1.655E+01	3.355E-17
	1.693E+01	1.611E-17
	1.731E+01	7.587E-18
	1.769E+01	3.501E-18
	1.807E+01	1.583E-18
	1.845E+01	7.009E-19
	1.883E+01	3.039E-19
	1.921E+01	1.290E-19
	1.959E+01	5.354E-20
	1.996E+01	2.174E-20
	2.034E+01	8.633E-21
	2.072E+01	3.350E-21
	2.110E+01	1.270E-21
	2.148E+01	4.702E-22
	2.186E+01	1.699E-22
	2.224E+01	5.993E-23
	2.262E+01	2.061E-23
	2.300E+01	6.913E-24
	2.338E+01	2.260E-24
	2.376E+01	7.199E-25
	2.414E+01	2.235E-25
	2.452E+01	6.762E-26
	2.489E+01	1.997E-26
	2.527E+01	5.772E-27
	2.565E+01	1.642E-27
	2.603E+01	4.653E-28
	2.641E+01	1.342E-28
	2.679E+01	4.075E-29
	2.717E+01	1.357E-29

computer program. The user accepts full responsibility for assessing the validity and applicability of the results obtained with this program for any specific case.