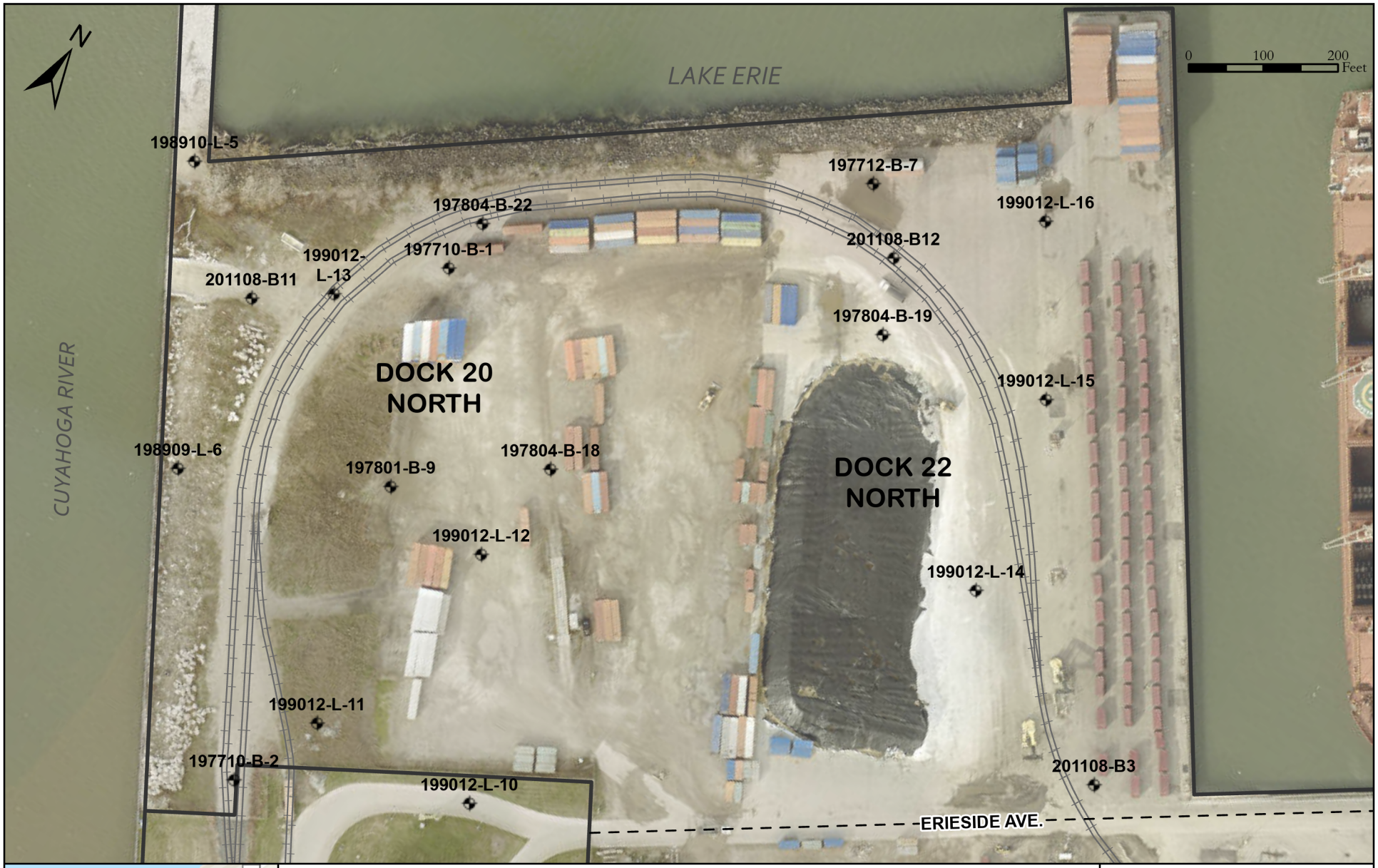
Exhibit F



Docks 20 and 22 North

Historic Borings

Esri, NASA, NGA, USGS, FEMA, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/ NASA, USGS, EPA, NPS, USDA

10/17/2022

PORT CLEVELAND

1100 W. 9th St., Suite 300
Cleveland, OH 44113

Report

Geotechnical Study
Port of Cleveland Rail Expansion

Parsons Brinckerhoff
230 West Monroe Street, Suite 900
Chicago, IL 60606

September 15, 2011
NTH Project No. 86-101394-00

NTH Consultants, Ltd.
820 West Superior Avenue
Suite 320
Cleveland, OH 44113

NTH Consultants, Ltd.
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Mr. Richard Juvinall
Senior Engineering Manager
Parsons Brinckerhoff
230 West Monroe Street, Suite 900
Chicago, IL 60606

September 15, 2011
NTH Project No. 86-101394-00

RE: Report on Geotechnical Investigation
Cleveland-Cuyahoga County Port Rail Expansion Project
Cleveland, Ohio

Dear Mr. Juvinall:

NTH Consultants is pleased to submit this report for the geotechnical investigation performed at the site of the proposed Cleveland-Cuyahoga County Port Rail Expansion project in Cleveland, Ohio. We appreciate this opportunity to be of service to you. If you have any questions or require additional information, please call.

Sincerely,

NTH Consultants, Ltd.

Brian E. Meluch, P.E.
Assistant Project Engineer

David G. Mast, P.E.
Vice President

BEM/DGM/alh

Attachment

Table of Contents

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Table of Contents (continued)

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1.0 BACKGROUND

The Port of Cleveland project site is located in Cleveland, Ohio, on the north side of Front Street, between the Cuyahoga River and West 3rd Street. The site is bounded by Lake Erie on the north, the Cuyahoga River on the west, West 3rd Street on the east, and existing railroad tracks on the south. The property is actively used by the Cleveland-Cuyahoga County Port Authority. The site is generally flat with concrete paved roads, asphalt paved laydown and parking areas, and gravel-covered laydown areas.

NTH understands that the Cleveland-Cuyahoga County Port Authority plans to expand railroad infrastructure at the Port of Cleveland. The proposed site improvements include bridge and roadway construction associated with the rail improvements. The bridge is designated as Structure No. 1, and it will be a 26-foot long, single-span plate-girder bridge with abutments bearing on piles. Structure No. 1 will be built between an existing silo structure and the Cuyahoga River bulkhead wall. Two other structures, Structure Nos. 2 and 3, will support the new rail elements over existing utilities. Structure No. 2 will be located where West 9th Street meets Dock 22, and Structure No. 3 will be located on the east side of the site near the proposed road and railway connections. At this time, we understand that Parsons Brinckerhoff (PB) is evaluating both a reinforced concrete structural slab-on-grade with turned-down edges, and a protective casing (culvert-type system) over the existing utilities. Both options will be designed to support rail and cargo-carrying truck traffic over the utilities.

In addition to the proposed structures, the project includes construction of approximately 4,500 feet of new railway and 2,000 feet of new roadway. Both the proposed railway and roadway will connect to existing infrastructure on the east side of the site.

2.0 GEOLOGIC SETTING

According to the "Physiographic Regions of Ohio," published by the Ohio Department of Natural Resources (ODNR), the project area is located in a geologic region referred to as the Erie Lake Plain, on the Portage Escarpment. The project site is located at the northern boundary of the Erie Lake Plain physiographic region. The site is located north of the glacial boundary line, indicating that the site was covered by soil, rock, and ice which were affected by glacial movements and deposits during the most recent glacial advance.
The Erie Lake Plain is characterized by the ODNR as follows:

"Edge of very low relief (10'), Ice-Age lake basin separated from modern Lake Erie by Shoreline cliffs; major streams in deep gorges; elevation 570-800 feet."

"Pleistocene-age lacustrine sand, silt, clay, and wave-planed till over Devonian- and Mississippian-aged shales and sandstones."

In general, the Physiographic Map indicates that the site is characterized by flat glacially deposited moraine soils. The Glacial Map of Ohio, a separate ODNR publication, also indicates that the site is generally characterized by lake deposit soils, consisting of primarily fine-grained clay and silt-size sediments.

3.0 HISTORICAL DATA

At the start of the project, NTH received a geotechnical exploration report for a 1991 geotechnical investigation, drawings of existing Port of Cleveland facilities, and bulkhead construction plans. The historic information provided to NTH is included in Appendix B.

3.1 Previous Geotechnical Explorations

NTH was provided with a 1991 David Lewin Corp. geotechnical investigation report, which included discussion of several historical borings and which was prepared for URS Consultants and the Cleveland Port Authority. This report (designated as project number C. 4533) summarizes eighteen (18) test borings performed in 1989 and 1990, as well as other investigations performed at the Port of Cleveland. The General Site Plan shows a total of 96 test borings performed, including eighteen (18) L-series borings performed for the 1991 report and thirty (30) B-series test borings performed for David V. Lewin Corporation in 1977 and 1978 (Lewin Project Nos. C. 3033 and 3033A). NTH was not provided with test boring logs for the other forty-eight (48) test borings shown on the 1991 report's General Site Plan.

The 1991 report states, "The subsurface stratification on the site is typically seen as man-deposited heterogeneous fill underlain by relatively thin deposits of sand and/or silt which are in turn underlain by silty clay." The report also states that shale bedrock was generally encountered between elevations 440 and 445, with one location as high as elevation 467 and another location as low as elevation 429.

NTH utilized the historic test borings information during the preparation of our proposal and boring layout.

3.2 Port of Cleveland Historic Drawings

The Port of Cleveland also provided NTH with historic facilities drawings. These historic drawings show general views of the Port of Cleveland facilities, including docks 24 to 32, warehouse facilities, rail lines, and water and electric utilities.

3.3 River Bulkhead and Infrastructure Improvements 1997 Plans

NTH was provided with a 1997 set of construction documents prepared by Finkbeiner, Pettis, and Stout, Inc. (FPS) for river bulkhead improvements. The plans show existing utilities and the approximate location of the river bulkhead tieback anchors.

4.0 FIELD INVESTIGATION

The current geotechnical investigation field work was conducted from August 11 to 23, 2011. A total of thirteen (13) test borings were drilled. Prior to the start of field explorations, test borings were located in the field by an NTH engineer based upon preliminary layout, utility clearance, and site accessibility. The test borings were performed by our drilling subcontractors, Northcoast Drilling Inc. and Ohio TestBor Inc., under the full-time oversight of our engineering staff. As-drilled test boring locations are shown on the Test Boring Location Plan, Figure No. 1 in Appendix A.

4.1 Soil Sampling

Soil samples were obtained using a standard split spoon sampler in accordance with the Standard Penetration Test (SPT) method. The SPT method (ASTM D1586) consists of driving a two-inch outside diameter split-barrel sampler into the soil with a 140-pound weight falling freely through a distance of 30 inches. The sampler is generally driven three successive six-inch increments, with the number of blows for each increment being recorded. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N).

Within the test borings, soil samples were generally obtained at 2 ½-foot intervals to a depth of 10 feet and then at 5-foot intervals to the respective planned termination depth. Based on our assumptions during the proposal preparation, we expected to encounter bedrock at a depth of about 120 feet below the ground surface. During our investigation at test boring location B-02, we did not encounter bedrock up to a depth of 136 feet. It is our experience and within ODOT's standards that borings performed for deep foundations may be terminated prior to encountering bedrock provided that 30 feet of material with N values more than 30 blows per foot are encountered. Our test borings B-01 and B-02 were terminated after meeting this criterion. Soils meeting this criterion are generally considered suitable for support of deep foundations by developing sufficient skin resistance, which will be discussed later in this report.

Soil samples recovered from the split-barrel sampler are designated as "S" on the test boring logs. The soil samples obtained with the split-barrel sampler were sealed in jars and transported to our laboratory for further classification and testing. Samples obtained using the SPT method are generally considered disturbed.

During the field investigation, our field engineer made observations of the ground water level and apparent layer changes due to changes in drilling resistance, and other relevant observations. The NTH field engineer also directed sample collection, classified the soils in the field, and modified the field exploration as necessary to obtain appropriate subsurface information. The field engineer obtained pocket penetrometer measurements on cohesive soil samples in the field as an aid in evaluating their compressive strengths. The pocket penetrometer is designed to estimate the unconfined compressive strength for soils with strengths in the range of 1,000 to 9,000 pounds per square foot (psf). The pocket penetrometer values are indicated on the respective test boring logs included as Figure Nos. 3 to 18 in Appendix A. As a guide to the classifications and sampling methods for soil materials, NTH General Notes are presented as Figure No. 2 in Appendix A.

The stratification shown on the test boring logs represents the general subsurface conditions encountered at the actual boring locations. Variations may occur between the borings. Additionally, the stratigraphic lines represent the approximate boundary between soil types; however, the transition may be more gradual than what is shown. We have prepared the boring logs included with this report on the basis of field classification supplemented by laboratory observation and testing.

5.0 LABORATORY TESTING

A limited number of representative soil samples obtained during the field investigation were subjected to laboratory testing to determine moisture content, grain size distribution, and Atterberg limits. Results of the natural moisture content, unit weight, and unconfined compression strength tests are included on the individual Logs of Test Boring. Results for the moisture contents, Atterberg Limits, and grain-size analysis testing are presented in the Tabulation of Laboratory Test Data, Figure No. 19 in Appendix A. The grain-size distribution curves are presented as Figure Nos. 20 through 25 in Appendix A.

6.0 SUBSURFACE CONDITIONS

6.1 Roadway Borings (Test Boring Locations B-06, B-07, B-08, and B-09)

Test borings B-06, B-07, B-08, and B-09 were drilled to assess the existing subsurface soil's suitability as subgrade for the planned roadway improvements at the Port of Cleveland. At all four of these boring locations, we encountered granular fill materials from the ground surface to their planned termination depth of ten feet. The fill material consists of sand, gravel, brick, and asphalt fragments. In general the fill materials near the surface have higher N-values and are medium compact to very compact. Fill materials encountered at depths of 5 to 10 feet were generally loose to medium compact. The N-value of the fill material ranges from 5 to 42 blows per foot with an average N-value of about 16 blows per foot.

6.2 Railway Borings (Test Boring Locations B-10, B-11, B-12, and B-13)

Test borings B-10, B-11, B-12, and B-13 were drilled to assess the existing subsurface soil's suitability as subgrade for the planned railroad improvements. At all four of these boring locations, we encountered granular fill materials. The fill materials consist of sand, gravel, asphalt fragments, cinders, slag, taconite pellets, brick fragments, and limestone fragments. The N-value of the fill materials ranges from 9 to 78 blows per foot (bpf) with an average of 35 bpf. At two of the boring locations, B-10 and B-13, we encountered natural sand and sandy silt layers below the granular fills but prior to their termination depth of ten feet. The N-value of the natural sand and sandy silt ranges from 4 to 21 blows per foot with an average N-value of about 35 blows per foot.

6.3 Bridge Borings (Test Boring Locations B-01 and B-02)

Test borings B-01 and B-02 were drilled to assess existing subsurface conditions as they relate to the design of a railroad bridge with deep foundation elements.

At test boring locations B-01 and B-02, we encountered fill materials extending from ground surface to depths of 15 and 19 feet below ground surface (bgs), respectively. The fill materials are underlain by soft to medium gray silty clay to a depth of about 59 feet bgs, which is then underlain by stiff to very stiff gray silty clay to a depth of 81 feet bgs. We encountered very compact gray silt and sandy silt between 81 and 92 feet bgs. We encountered very hard sandy clay between 92 and 103 feet bgs. We encountered very compact clayey silt and compact gray sand between 103 and 118 feet bgs. We encountered compact to very compact gray silty sand from 118 to 130 feet bgs. We encountered very compact clayey silt from 130 to 136 feet bgs.

The N-value of the fill materials ranges from 9 to 65 bpf with an average of 42 bpf. The N-value of the soft to medium gray silty clay ranges from 3 to 7 bpf with an average N-value of 5 bpf. The estimated unconfined compressive strength of the soft to medium gray silty clay ranged from 500 to 2500 pounds per square foot (psf). The N-value of the stiff to very stiff gray silt clay ranges from 10 to 28 bpf with an average N-value of 18 bpf. The estimated unconfined compressive strength of the stiff to very stiff gray silty clay ranged from 2000 to 7000 psf. The N-value of the very compact gray silt and gray sandy silt ranges from 55 to 100 bpf with an average of about 90 bpf. The N-value of the very hard sandy clay ranges from 32 to 81 bpf with an average N-value of about 57 bpf, and it has an estimated unconfined compressive strength greater than 9000 psf. The very compact clayey silt and compact gray sands encountered between depths 103 and 118 have N-values that range from 35 to 53 bpf with an average N-value of 44. The compact to very compact gray silty sands encountered from 118 to 130 feet have N-values that range from 45 to 59 bpf with an average N-value of 53 bpf. The very compact clayey silt encountered from 130 to 136 feet has an N-value of 58 bpf.

6.4 Utility Protection Structure Borings (Test Boring Locations B-03, B-04, and B-05)

Test borings B-03, B-04, and B-05 were drilled to assess subsurface conditions at the location of two planned utility protection structures. Borings B-03 and B-04 were drilled for Structure No. 2, and boring B-05 was drilled for Structure No. 3.

6.4.1 Structure No. 2 (Test Boring Locations B-03 and B-04)

We encountered loose to medium compact fill materials from ground surface to a depth of 18-1/2 feet bgs at boring location B-03. The fill materials consist of sand, gravel, rock fragments, brick fragments, and asphalt. The N-values of the fill materials range from 8 to 27 bpf with an average N-value of 19 bpf. The fill materials are underlain by very loose to loose dark gray fine sand to the boring termination depth of 25 feet. The fine sand has N-values that range from 4 to 10 bpf with an average N-value of 7 bpf.

We encountered compact fill materials from ground surface to a depth of 7 feet bgs at boring location B-04. The fill materials consist of sand, gravel, brick fragments, and concrete fragments. N-values of the fill materials range from 35 to 37 bpf. Soft black organic silty clay fill, with an N-value of 2 bpf, is present from 7 to 8 feet bgs. We encountered a gray, fine-grained sandstone boulder at a depth of 8 feet which precluded further soil sampling at location B-04. Subsequently, B-04 was offset two additional times (locations B-04a and B-04b). At both B-04a and B-04b, we encountered obstructions at depths of about 5 feet bgs and were forced to offset the borehole location again. On the third offset attempt (location B-04c), we were able to complete the boring to a depth of 25 bgs. We encountered fill materials containing black sand and slag at depths from 13 feet to 17 feet bgs. The N-value of the fill is 35 bpf. We encountered compact gray sand to a depth of 22 feet bgs, with an N-value of 30 bpf. The gray sand was underlain by medium gray clayey silt with an N-value of 6 and an estimated unconfined compressive strength of 1000 psf.

6.4.2 Structure No. 3 (Test Boring Location B-05)

We encountered fill materials from the ground surface to a depth of 12 feet bgs at test boring location B-05. The top three feet of fill consisted of medium compact clayey silt, with some sand, gravel, and asphalt and brick fragments. This fill has an N-value of 15 blows per foot. The clayey silt fill is underlain by loose to very loose sand, gravel, asphalt, and brick fragments to a depth of 12 feet. These fill materials have an N-value that ranges from 2 to 6 blows per foot with an average N-value of 4. The sand fill is underlain to a depth of 18-1/2 feet bgs by natural loose gray sand with an N-value of 8 blows per foot. We encountered stiff gray silty clay with red mottling from 18-1/2 feet to the termination depth of 25 feet. The silty clay has an N-value of 10 blows per foot and an estimated unconfined compressive strength that ranges from 3000 to 5000 psf.

6.5 Groundwater Conditions

Groundwater was encountered in test borings B-03, B-05, B-07, B-08, B-10, and B-11 during drilling. The depth to groundwater at the time of drilling ranged from 5.6 to 12.9 feet bgs. Groundwater levels at the project site are expected to vary over time and to be hydraulically connected to the Cuyahoga River and Lake Erie.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Subgrade Preparation

All vegetation, topsoil, asphalt and concrete pavements, and other deleterious non-soil materials, as well as any other exposed soils containing appreciable amounts of organic matter or debris, should be removed in their entirety from within the proposed construction limits. Any abandoned utilities and underground structures located within 3 feet vertically of the proposed finished grade or the base of shallow foundations should be removed. Upon reaching the "at-grade" and "cut" subgrade elevations, proof-rolling should be performed in accordance with Item 204.06 of the Ohio Department of Transportation (ODOT) Construction and Material Specifications (CMS), January 1, 2010. We recommend the proof-rolling be performed during dry weather conditions. Areas that exhibit excessive deflections during proof-rolling should be stabilized by removing and replacing the failing materials with engineered fill.

Engineered fill required to achieve design grades should preferably consist of clean granular soils, such as natural sands. The natural on-site sandy soils may be used for engineered fill provided that they are free of organic matter and debris and significant amounts of silt and clay. We do not recommend clayey silt or clayey sand materials be used as engineered fill. These soils tend to have a very narrow moisture content range to achieve proper compaction. Engineered fill should be placed in loose lifts no more than 8 inches thick and compacted to a least 98 percent of the maximum dry density as determined by the Standard Proctor method (ASTM D698). Upon reaching the "at-grade and "cut" subgrade elevations, proof-rolling should be performed.

During the drilling of B-04 for Structure No. 2, we encountered soft organic silty clay from a depth of 7 feet to 8 feet bgs. Based on the anticipated construction scope, this material will not be encountered during

excavations, and the material may be left in place, provided the recommendations in this report are followed. If for some reason the excavations do encounter this material, we recommend removing the organic soils and replacing them with engineered fill or controlled low-strength mortar / flowable fill.

7.2 Railroad Ballast and Subballast

NTH understands that the railroad extension rails will be placed roughly at or above the existing ground surface. NTH recommends that the ballast and sub-ballast thicknesses be determined from the current edition of the American Railway Engineering and Maintenance-of-way Association (AERMA) Manual for Railway Engineering. Laboratory sieve and hydrometer analyses on selected samples indicate that the soils near the likely subgrade elevation consist of either fine-grained sand, which classifies as SM in the Unified Soil Classification System (USCS), or clayey silt, which classifies as CL. Based on the results of the grain-size distribution testing and sub-ballast stone sizing determined by the design engineer, a geotextile filter fabric may be required to segregate the subgrade soils from the railroad ballast and sub-ballast. If required by the design engineer, we recommend the geotextile fabric have a minimum tensile strength of 180 pounds, minimum tear and puncture strengths of 70 pounds, and an apparent opening size less than or equal to 0.3 mm.

7.3 Road Subgrade Design Parameters

The subgrade resulting from the satisfactory completion of site preparation operations should be suitable for the support of pavements anticipated for this project. We anticipate that the pavement subgrade will consist primarily of existing fill or engineered fill. Assuming proper subgrade preparation and considering the impact of seasonal moisture and temperature variations on the anticipated subgrade soils, we recommend an effective California Bearing Ratio (CBR) of 4 percent for development of the pavement cross-sections. The corresponding resilient modulus (Mr) of 4,800 psi can also be used for the design of the pavement section.

Consideration for drainage is of the utmost importance in order for the pavements to perform as intended, and incorporation of subsurface drainage will help to minimize the detrimental effects of groundwater that may shorten the pavement's design service life. The pavement and underlying subgrade should be adequately crowned or sloped to promote effective surface and subsurface drainage and to prevent ponding

of water both above and beneath the pavement structure. It is recommended that the pavement and subgrade soils have a minimum slope of 1 percent, and preferably 1.5 percent, to achieve proper drainage.

7.4 Pavement Design

Parsons Brinkerhoff provided NTH with an anticipated traffic loading of 400 trucks per day and 100 cars per day. We have assumed this traffic consists of single axle trucks. Based on these assumptions, we have estimated the equivalent single axle load (ESAL) per day to be about 400 ESAL. For a 20 year design life of asphalt pavement, this equates to about 2,500,000 design ESALs. For a 30 year design life of concrete pavement, this equates to about 3,750,000 design ESALs.

We performed a pavement design analysis using methodology presented in the 1993 AASHTO Guide for Design of Pavement Structures. Assuming the design ESALs above, we recommend the following flexible pavement cross section:

1.25 inches of ODOT 448 Asphalt Concrete Surface Course, Type 1, medium traffic, PG64-22, over
3.00 inches of ODOT 448 Asphalt Concrete Intermediate Course, Type 2, medium traffic, PG64-28, over
3.00 inches of ODOT 301 Asphalt Concrete Base Course, PG 64-22, over
9 inches of ODOT 304 Aggregate Base.

Parsons Brinkerhoff also asked NTH to analyze a 3 inches thick asphalt pavement section. . Given the traffic loading described above, we calculated a 3-inch pavement section over a 9 –inch ODOT 304 base would have a design life of approximately 10 years.

As an alternatative to the flexible pavement section, we evaluated the required cross section assuming a rigid pavement cross section. We assumed a pavement life of 30 years. The resulting concrete pavement section is as follows:
8.00 inches of reinforced Portland Cement Concrete, over
6.00 inches of ODOT 304 Aggregate Base.

Results of our pavement analysis are presented on Figure Nos. 26 and 27 in Appendix A.

Design of the pavement section is based on a complete removal and replacement of existing soils and pavements to sufficient depth to accommodate the new pavement section as specified. Re-use of any of the existing pavement section or materials would need to be reviewed based on site and area-specific conditions. Re-use of existing materials or pavement structure may not be feasible due to the thickness of existing materials or restriction of elevation or grade changes. We recommend a qualified professional engineer be consulted to evaluate, on a case by case basis, reuse of the existing pavement structure. If additional design ESALs are required to support the anticipated traffic loads, additional subgrade improvements or a thicker pavement section may be necessary.

This design is based on the assumption that a total settlement of approximately one inch is acceptable for pavements founded on the existing fill materials. If this assumption is not acceptable, we recommend undercutting of the existing fill soils to a depth of up to 5 feet below the proposed subgrade and replacing the in-place soils with engineered fill. The final depth of undercut should be determined in the field by a qualified geotechnical engineer or his representative. The field personnel should be qualified to observe deleterious material and material that is adequate for support of the planned construction.

The design lives calculated using the 1993 AASHTO method are based on the assumption that the Owner institutes a regular maintenance program over the life of the pavement. This would include regular crack sealing, repair of isolated failed sections, and maintenance of adequate surface and subsurface drainage. The actual life of an asphalt pavement may be reduced considerably if these maintenance measures are not performed on a regular and frequent basis.

7.5 Groundwater Control

Groundwater was encountered at depths ranging from about 5 feet to 13 feet bgs. We anticipate light groundwater infiltration in relatively shallow excavations (less than 5 feet) for shallow foundations and utilities can be reasonably controlled by the use of localized sump pits and pumping. We anticipate that heavy precipitation can also be controlled in a similar manner. Care should be taken to ensure that excavations are left open for as little time as possible to protect the bearing soils from disturbance by ponded water or construction traffic.

If excavations deeper than five feet are necessary, we recommend the contractor utilize a water tight earth support system, such as gasketed liner plates or tight sheet piling. If watertight support systems are not utilized, groundwater infiltration may result in the piping of soils into the excavation and void development behind the excavation walls.

Likewise, if the designer of records prefers augered pile foundations to support any proposed structures, the contractor should anticipate significant groundwater inflow into the foundation excavation. We anticipate drilling mud would be necessary to maintain the excavation until foundation concrete and steel can be added.

7.6 Foundations

Structural Mat Foundations

The subgrade resulting from the satisfactory completion of site preparation operations as outlined in this report can be used for support of concrete slabs-on-grade for proposed Structure Nos. 2 and 3. In order to provide a uniform bearing surface, we recommend the slabs be designed with a minimum 8-inch thick aggregate base. We recommend the base materials be specified to meet the requirements of ODOT Item 304. The material may consist of crushed natural limestone or recycled concrete materials.

The concrete slab-on-grades should be suitably reinforced. A modulus of subgrade reaction value of 150 pounds per cubic inch (pci) can be used for design of slabs and a net allowable bearing capacity of 2000 can be utilized for slabs bearing in the upper 3 feet. Foundation elements are to be designed based on parameters presented earlier in this report. The design parameters listed above are based on the assumption that recommendations outlined in the Subgrade Preparation section of this report are adhered to. The parameters are also presented assuming the aggregate base is placed to the depth discussed above and compacted to 100 percent of maximum dry density according to the Standard Proctor method.

As part of the structural mat construction, we anticipate that the slab will have turned down edges for frost protection. The turn down portion of the slabs should be extended to a minimum depth of 42-inches below exposed finished grade for protection against frost penetration. If foundations are to be constructed during periods of freezing temperatures, they should be extended below the frost penetration depth or insulated

for protection against freezing temperatures. Furthermore, care will be required during winter construction to verify that foundations are not constructed on frozen soil. The turn down portion of the slab should be at least 18-inches in width, regardless of the resulting bearing pressure.

In the area of the current roadways and where Structure Nos. 2 and 3 are proposed, we anticipate total settlement in the range of 1/8 to 1/2 inch may occur. Resistance to lateral loads may be provided by the frictional resistance at the bottom of the footings, as well as by the passive earth pressure acting against the side of the footings. An allowable interface friction factor of 0.30 may be used between the base of the foundation and the cohesionless bearing soils. Passive earth pressure available in compacted, engineered fill or undisturbed native soils may be taken as an equivalent fluid pressure of 200 pounds per square foot per foot of depth. These recommendations include a factor of safety of 2.0. All fill and backfill materials placed beneath, above and against the sides of the footings should be compacted to specified moisture content and density, as described in the Subgrade Preparations section of this report.

Driven Pile Foundations

Based on the previous geotechnical investigations, we understand that driven piles were successfully utilized for support of other structures at this site. Therefore, we did not evaluate installation of drilled piers or auger cast-in-place pile foundations. The following sections provide our recommendations for design and installation of driven steel piles.

NTH evaluated HP 10x42, HP 12x53, and 12-inch diameter pipe piles to support the proposed railroad bridge structure. We analyzed the piles for their allowable bearing capacity assuming a factor of safety (FOS) of 2.25. Based on the results of our investigation, the proposed structure may be supported on either HP-piles or pipe piles. However, the HP-piles are likely to be more effective at penetrating the upper fill layers. We anticipate that pipe piles will require some pre-drilling in the upper 20 feet to remove obstructions. The HP-piles should be driven to a minimum depth of 90 feet below the existing ground surface while the pipe piles may be driven to a depth of about 80 feet below grade. The HP 10x42 and the HP 12x53 should develop allowable capacities of 55 and 70 tons, respectively, at a depth of 90 bgs. The 12-inch pipe pile should develop an allowable capacity of 65 tons at a depth of 90 feet bgs. Output from our analyses using FHWA's software Driven 1.2 is attached for reference on Figure Nos. 26 through 28 in the Appendix. If additional

capacity is needed from each pile, the piles may be driven deeper. However, special precautions should be considered to prevent over-stressing of the piles during driving. This could include reducing the size of the pile hammer or hammer drop height.

PB provided NTH with a lateral load of 14.2 kips per pile. We utilized the program L-Pile to analyze the deflection of a vertical HP 12x53 steel pile under this lateral load. Based on the results of the testing, we anticipate less than ½-inch of horizontal deflection at the pile head may occur under a load of 14.2 kips. Please note that the lateral deflection calculation is performed using service loads, without a factor of safety being applied to the load or the deflection amount.

If the design engineer chooses to design battered piles to resist the lateral loads, they should be installed with inclinations no greater than 1H:4V, and the horizontal component of the force should be taken into consideration in the analysis.

Please note that the piles recommended for this project are not expected to reach refusal on bedrock. The presence of hard and compact glacial till soils above the bedrock should allow the piles to achieve capacity prior to encountering bedrock. Our recommended allowable capacities are based upon the skin friction component of the HP piles. Any end bearing increases the FOS beyond 2.25 used for design. For this reason, it is recommended that dynamic load tests be performed on a minimum of two (2) piles of each HP-size in accordance with ODOT Item 523 (Dynamic Load Test), and that a CAPWAP analysis be performed on at least one pile of each section tested dynamically. The dynamic load tests will allow the establishing of driving criteria. In no case, however, should the piles be allowed to refuse above Elevation 500. If the piles refuse above this elevation, we should be contacted immediately and revised recommendations will be provided, if necessary.

In accordance with FHWA recommendations, a FOS of 2.25 should be used for piles tested dynamically. If dynamic testing is not performed, a minimum FOS of 3.0 must be used for design.

The pile driving hammer type should be selected in accordance with ODOT Item 507.04, "Driving of Piles" in the CMS so as to avoid over-stressing the piles. Prior to the commencement of pile driving, the contractor should be required to submit equipment specifications such that the proposed pile hammer, along with

the induced stresses in the pile, can be evaluated by wave equation analysis. If excessive compressive or tensile stresses are predicted with this method, steps should be taken prior to pile installation to investigate alternative pile hammers or cushions in order to reduce the possibility of damage to the pile. Pile driving may also result in slight heave of previously driven piles. All piles raised during the driving of adjacent piles should be retapped.

7.7 Structures 2 and 3 Designed as Culverts

We understand PB is evaluating the concept of installing protective pipes around existing utilities for protection. We anticipate the proposed pipe materials may consist of either concrete or corrugated metal. Trench bedding below and above the pipes should conform to the Ohio Department of Transportation 2010 Construction and Material Specifications (CMS) Section 603, entitled Pipe Culverts, Sewers, and Drains. This specification details the thickness and type of bedding and other information pertinent to the proposed construction. The trench should be excavated a minimum 12 inches below the invert level of the pipe, loose materials removed, and pipe bedding should be placed along the full width of the trench bottom. The pipe bedding should be ODOT Type 1 or Type 2 structural backfill and meet the requirements set forth in the ODOT standards and specifications for gradation and compaction. The bedding materials should be clean and free of organics and other deleterious material. We recommend shale or slag not be allowed as structural backfill.

We recommend compaction procedures and equipment for the pipe bedding is chosen based on ODOT Item 603 of the 2010 CMS. Assuming concrete and / or corrugated metal pipe are to be installed, we anticipate that equipment weighing less than one ton should be used for compaction of the pipe bedding materials to at least four feet above to pipe.

Based on the ODOT specifications for Item 603, we expect that the soils excavated from the trenches will not meet the requirements for Type 1 and Type 2 structural fill and therefore will not be suitable for reuse as pipe bedding.

As mentioned previously, design of the culvert structures will be governed by the requirements of the Ohio Department of Transportation. At a minimum, Class B bedding consisting of ¾-inch crushed aggregate should be used below the pipe and up to the springline on each side of the pipe. Properly compacted ODOT

Item 703.11 B sand backfill (or equivalent) should be used above the springline to at least one-foot above the pipe. Alternately, and with permission of the Cleveland-Cuyahoga County Port Authority, the pipe excavation could be backfilled with lean (flowable) concrete fill. If lean concrete fill is utilized, care must be taken by the contractor to place the fill in lifts in order to prevent the flowable fill from floating the sewer pipe.

7.8 Stability of Excavations

Due to the proximity of existing roadways to the proposed shallow foundation / protective pipe locations, we anticipate the excavations will be constructed using near vertical walls with a sliding trench box, or a combination of slopes and vertical walls with properly designed and installed lateral bracing.

We expect that open cut excavations in the existing fill and loose to medium compact sands will have little stand up time. As such, construction excavations should not be left open any longer than necessary, since open excavations are subject to physical disturbance. Seepage of water into any excavation may also compromise the stability of the side slopes, the supporting capacity of the base material if the excavation is left open for an extended period of time, and could allow piping of adjacent soil materials into the excavation and undermining of existing utilities or roadways. As soon as work within the excavation is completed and accepted, the excavation should be promptly backfilled to near final grade.

Bracing systems for trenches may include portable trench boxes or sliding trench shields. In all cases, OSHA requirements must be followed and adequate protection provided for workers. Construction traffic and excavated material stockpiles should be kept away from excavations a minimum distance equal to the full depth of the excavation, unless the resulting surcharge loads are accounted for in the design of the lateral bracing system. The contractor's proposed excavations, support systems, and sequence of construction should be reviewed by a qualified engineer prior to allowing the contractor to commence work.

Temporary retaining structures that are free to move at the top should be designed on the basis of active earth pressures utilizing an active earth pressure coefficient (Ka) of 0.3. Flexible walls can be designed on the basis of an equivalent fluid pressure of 40 pounds per square foot per foot of depth (psf / ft), provided that drainage through the wall is permitted (e.g. as through a cantilever soldier pile and lagging wall). Retaining

structures with bracing at the top and bottom should be designed utilizing an at rest earth pressure coefficient of 0.5, or an equivalent fluid pressure of 60 psf / ft. If free drainage is not possible through the chosen earth retention system, design loads should also include hydrostatic pressures to account for build up behind the wall.

Retaining structures will also have to consider loading from the adjacent pavement and traffic. The lateral component of surcharge loads on walls can be determined by multiplying the surcharge load by the applicable earth pressure coefficient. The lateral component of any surcharge would then be added to the earth pressures presented above.

7.9 Protection of Existing Infrastructure

Care must be taken to minimize the amount of soil that is lost from beneath the adjacent roadway and adjacent utilities, either through unsupported excavations or piping of sands. Soil that is lost from below the pavement during the excavation should be replaced with flowable fill or the pavement should be removed and subgrade re-established with compacted structural fill to provide support of the pavement.

Existing utilities, including water, storm water, gas, and other subsurface items crossing the proposed alignments must be properly protected and supported (hangers or bracing as appropriate) in the area of the proposed shallow excavations. The excavating contractor must make every effort to prevent damage to existing utilities and/or adjacent structural elements.

8.0 DESIGN REVIEW AND MONITORING

Experience indicates that the actual subsurface conditions at a site can vary from those generalized on the basis of test borings made at specific locations. Therefore, in order to maintain consistency between design and construction, the project geotechnical engineer should be retained to provide construction monitoring services during the foundation and subrgrade construction phases of the proposed project. It is very important that construction monitoring be performed to verify compliance with the design concepts, specifications and recommendations contained in this report. Also, field monitoring allows design changes to be made in the event that subsurface conditions differ from those described herein.

9.0 LIMITATIONS

This report is specifically intended for the design of the proposed Port of Cleveland Rail Expansion Project project in Cleveland, Ohio. The work was performed in accordance with the prevailing standard of practice in this area at the time the work was performed. No other warranty, expressed or implied, is provided or intended.

Soil samples obtained during this investigation will be held at our Cleveland, Ohio office for 90 days. At that time, PB will have the option to take possession of the samples for continued storage, or we will make arrangements for sample disposal.

The scope of service for this exploration was limited to an evaluation of subsurface conditions for the support of planned road and railroad improvements including a railroad bridge and other related aspects of the proposed construction. No environmental surveys, hydrological studies or chemical testing or analyses were performed as part of this geotechnical investigation.

We appreciate the opportunity to serve PB on the Port of Cleveland Rail Expansion project. Should you have any questions regarding the recommendations presented in this report or if you need additional assistance, please call.

Respectfully Submitted,

NTH Consultants, Ltd.

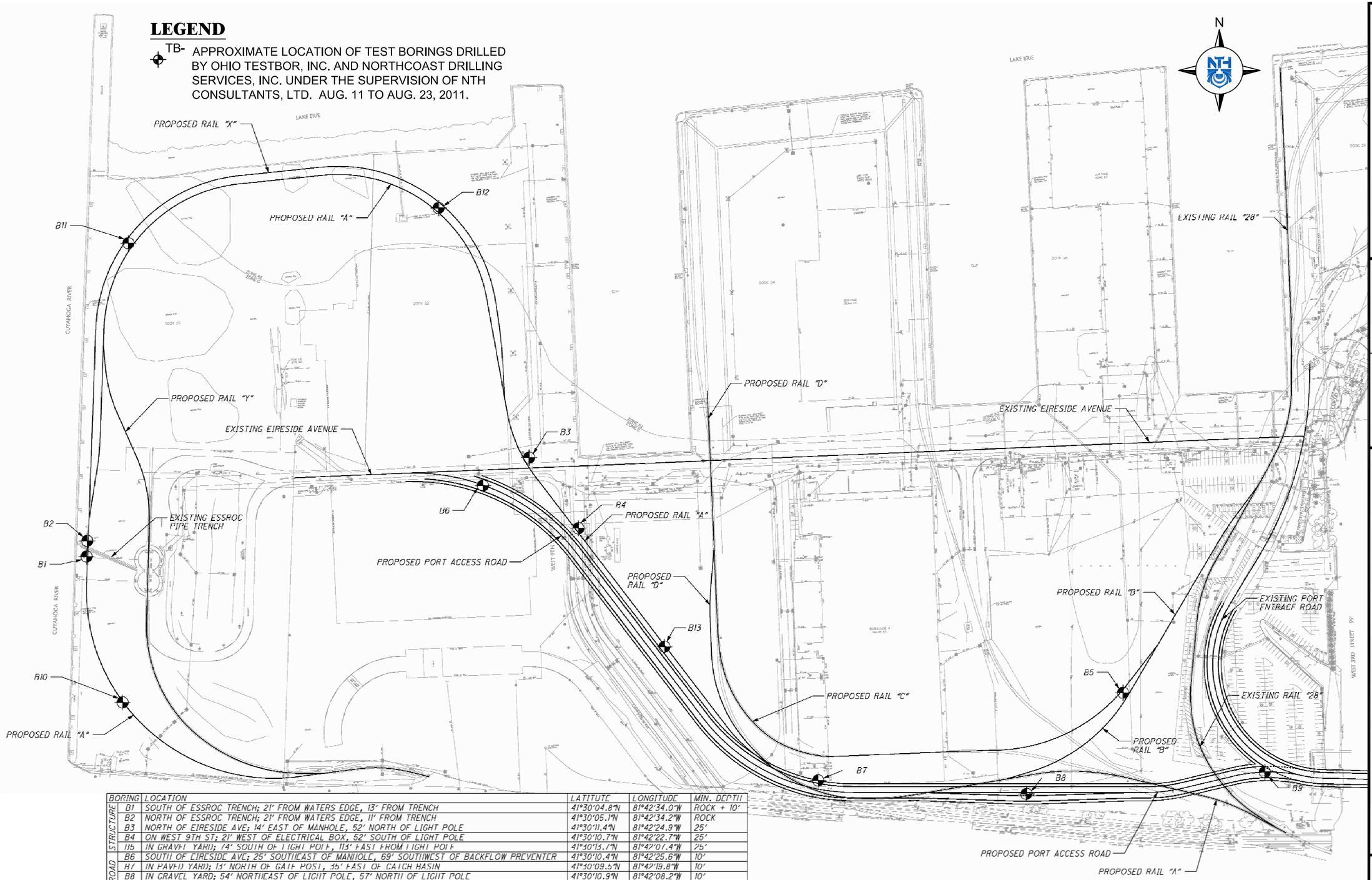
Brian E. Meluch, P.E.
Assistant Project Engineer

David G. Mast, P.E.
Vice President

APPENDIX A

LEGEND

TB- APPROXIMATE LOCATION OF TEST BORINGS DRILLED BY OHIO TESTBOR, INC. AND NORTHCOAST DRILLING SERVICES, INC. UNDER THE SUPERVISION OF NTH CONSULTANTS, LTD. AUG. 11 TO AUG. 23, 2011.



	BORING	LOCATION	LATITUTE	LONGITUDE	MIN. DEPTH
STRUCTURE	B1	SOUTH OF ESSROC TRENCH; 21' FROM WATERS EDGE, 13' FROM TRENCH	41°30'04.8"N	81°42'34.0"W	ROCK + 10'
	B2	NORTH OF ESSROC TRENCH; 21' FROM WATERS EDGE, 11' FROM TRENCH	41°30'05.1"N	81°42'34.2"W	ROCK
	B3	NORTH OF EIRESIDE AVE; 14' EAST OF MANHOLE, 52' NORTH OF LIGHT POLE	41°30'11.4"N	81°42'24.9"W	25'
	B4	ON WEST 9TH ST; 21' WEST OF ELECTRICAL BOX, 52' SOUTH OF LIGHT POLE	41°30'10.7"N	81°42'22.7"W	25'
	B5	IN GRAVEL YARD; 14' SOUTH OF LIGHT POLE, 115' EAST FROM LIGHT POLE	41°30'13.1"N	81°42'07.4"W	25'
	B6	SOUTH OF EIRESIDE AVE; 25' SOUTHEAST OF MANHOLE, 69' SOUTHWEST OF BACKFLOW PREVENTER	41°30'10.4"N	81°42'25.6"W	10'
ROAD	B7	IN PAVED YARD; 13' NORTH OF GATE POST, 35' EAST OF CATCH BASIN	41°30'09.5"N	81°42'19.8"W	10'
	B8	IN GRAVEL YARD; 54' NORTHEAST OF LIGHT POLE, 57' NORTH OF LIGHT POLE	41°30'10.9"N	81°42'08.2"W	10'
	B9	SOUTH OF EXISTING PORT ENTRANCE; 67' WEST OF LIGHT POLE, 115' EAST OF LIGHT POLE	41°30'13.9"N	81°42'02.9"W	10'
RAIL	B10	IN GRASS; 109' FROM WATERS EDGE, 83' FROM EXISTING RAIL	41°30'02.7"N	81°42'32.0"W	10'
	B11	IN GRAVEL PILE YARD; 86' NORTHEAST OF WATERS EDGE, 135' SOUTHWEST FROM WATERS EDGE	41°30'10.9"N	81°42'51.5"W	10'
	B12	IN PAVED YARD; 140' EAST OF FENCE, 120' SOUTHEAST FROM WATERS EDGE	41°30'14.9"N	81°42'30.7"W	10'
	B13	IN PAVED YARD; 100' NORTHEAST OF LIGHT POLE, 98' NORTH OF LIGHT POLE	41°30'09.6"N	81°42'19.0"W	10'

NOTES:
LOCATIONS ARE APPROXIMATE.
FIELD VERIFY TO AVOID EXISTING UNDERGROUND UTILITIES.
B1 & B2 SHALL BE DRILLED TO ROCK (APPROX. 125').
B1 INCLUDES A 10' ROCK CORE

GRAPHIC SCALE
200 0 200
1" = 200'

NTH Consultants, Ltd.
Infrastructure Engineering and Environmental Services

NTH PROJECT No.:	86-101394-00
DESIGNED BY:	BEM
DRAWN BY:	TCG
CHECKED BY:	DGM
CAD FILE NAME:	86-101394-00
INCEP DATE:	AUG. 2011
DRAWING SCALE:	AS SHOWN
PLOT DATE:	SEPT. 2011

TEST BORING LOCATION PLAN

PORT OF CLEVELAND
CLEVELAND, OHIO

FIGURE No.
1

J:\GEOT\86-101394-00 PORT O CLEVE\86-101394-00.dwg, Layout1, 9/2/2011 12:20:22 PM

NTH Consultants, Ltd.
Infrastructure Engineering
and Environmental Services

GENERAL NOTES

TERMINOLOGY

Unless otherwise noted, all terms utilized herein refer to the Standard Definitions presented in ASTM D 653.

PARTICLE SIZES

Boulders	-	Greater than 12 inches (305mm)
Cobbles	-	3 inches (76.2mm) to 12 inches (305mm)
Gravel - Coarse	-	3/4 inches (19.05 mm) to 3 inches (76.2mm)
Fine	-	No. 4 - 3/16 inches (4.75mm) to 3/4 inches (19.05 mm)
Sand - Coarse	-	No. 10 (2.00mm) to No. 4 (4.75mm)
Medium	-	No. 40 (0.425mm) to No. 10 (2.00mm)
Fine	-	No. 200 (0.074mm) to No. 40 (0.425mm)
Silt	-	0.005mm to 0.074mm
Clay	-	Less than 0.005mm

CLASSIFICATION

The major soil constituent is the principal noun, i.e., clay, silt, sand, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent (percent by weight)	Minor Constituents (percent by weight)
Trace - 1 to 12%	Trace - 1 to 12%
Adjective - 12 to 35% (clayey, silty, etc.)	Little - 12 to 23%
And - Over 35%	Some - 23 to 33%

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modified; i.e., silty clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils; i.e., silty clay, trace of sand, little gravel.

Consistency	Unconfined Compressive Strength (psf)	Approximate Range of (N)
Very Soft	Below 500	0 - 2
Soft	500 - 1000	3 - 4
Medium	1000 - 2000	5 - 8
Stiff	2000 - 4000	9 - 15
Very Stiff	4000 - 8000	16 - 30
Hard	8000 - 16000	31 - 50
Very Hard	Over 16000	Over 50

Consistency of cohesive soils is based upon an evaluation of the observed resistance to deformation under load and not upon the Standard Penetration Resistance (N).

COHESIONLESS SOILS

Density Classification	Relative Density %	Approximate Range of (N)
Very Loose	0 - 15	0 - 4
Loose	16 - 35	5 - 10
Medium Compact	36 - 65	11 - 30
Compact	66 - 85	31 - 50
Very Compact	86 - 100	Over 50

Relative density of cohesionless soils is based upon the evaluation of the Standard Penetration Resistance (N), modified as required for depth effects, sampling effects, etc.

SAMPLE DESIGNATIONS

AS - Auger Sample - directly from auger flight
BS - Miscellaneous Sample - bottle or bag
S - Split Spoon Sample - ASTM D 1586
LS - Split Spoon Sample S with Liner Insert 3 inches in length
ST - Shelby Tube Sample - 3 inch diameter unless otherwise noted
PS - Piston Sample - 3 inch diameter unless otherwise noted
RC - Rock Core - NX core unless otherwise noted
CS - Continuous Sample - from rock core barrel or continuous sampling device
VS - Vane Shear

STANDARD PENETRATION TEST (ASTM D 1586) – 2.0" outside-diameter, 1-3/8" inside-diameter, split barrel sampler is driven into undisturbed soil by means of a 140 pound weight falling freely through a vertical distance of 30 inches. The sample is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

LOG OF TEST BORING NO: B-01

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BEM

ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
580													
		579.8	Topsoil	0.2									
			FILL: Very Compact Brown and Gray SILTY SAND, Little Gravel, Contains Clay Pockets and Brick Pieces			S-1	23 41 41	82	18				-
575					5	S-2	39 43 29	72	18				-
		573.0		7.0		S-3	3 16 50	66	13				-
570			FILL: Concrete Rubble and Debris		10	S-4	50	50/6"	1				-
		568.5		11.5									
			FILL: Medium Compact Gray SILTY SAND, Trace Gravel, Contains Wood Pieces										
565		565.5		14.5	15	S-5	2 7 16	23	18				-
			Loose Gray SANDY GRAVEL, Trace Silt										
560		560.0		20.0	20	S-6	2 4 2	6	18				-
			Medium Gray SILTY CLAY, Frequent Silt Seams and Pockets										
555					25	S-7	1 2 4	6	18				1000*
						ST-1	PUSH		24		28.4	98.3	2900
550		550.3		29.7	30	S-8	1 4 2	6	10		21.4		2500*

Total Depth: *115 FT*
Drilling Start Date: *8/19/11*
Drilling End Date: *8/23/11*
Inspector: *J. Brown, R. Kral,*
Contractor: *Ohio TestBor Inc.*
Driller: *J.Minchak*
Drilling Method:
Track Mounted D 50 Drill Rig using 3 1/4" HSA to 18.5'. 2 7/8" Tricone Washbore to end of boring.

Plugging Procedure:
Borehole sealed with cement-bentonite grout

Water Level Observation:
Groundwater encountered at 8.0' during drilling operations. The use of wash rotary drilling methods, precluded further groundwater observations.

Notes:
** Pocket Penetrometer*

GPS Coordinates:

Figure No. 3

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-01

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BM

ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
550			SUBSURFACE PROFILE				SOIL SAMPLE DATA						
545			Very Soft Gray SILTY CLAY, Little Sand, Trace Gravel		35	S-9	1 2 2	4	18		27.5		500
						ST-2	PUSH		24		27.6	96.6	1240
540					40	S-10	WOH 2 2	4	18		35.5		500
		538.0		42.0									
535			Medium to Stiff Gray CLAYEY SILT, Trace Sand, Contains Few Silt Lenses and Pockets		45	S-11	1 3 6	9	18		22.7		2000*
						ST-3	PUSH		24		21.1	109.5	4000
530					50	S-12	4 6 8	14	18		20.7		3000*
525					55	S-13	3 5 6	11	7		22.1		1000*
		521.5		58.5									
520					60	S-14	4 7 10	17	13		22.3		4000*- 4500*
515			Very Stiff Gray SILTY CLAY, Little Fine Sand, Trace Fine Gravel, Contains Many Silt and Fine Sand Seams and Pockets		65	S-15	5 7 9	16	18		16.5		4000*- 4500*

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-01

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BEM

ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		512.0											
510					70	S-16	5 8 10	18	15		13.8		5000*- 7000*
505			Very Stiff Gray SILTY CLAY, Little Fine Sand, Contains Many Silt and Fine Sand Seams and Pockets, Trace Fine Gravel		75	S-17	5 8 11	19	15		16.2		7000*
500					80	S-18	6 10 14	24	15		15.8		7000*
		499.0		81.0									
495					85	S-19	30 50/5"	50/5"	10		14.7		-
490			Very Compact Gray SILT, Little Sand, Trace Clay		90	S-20	23 20 35	55	16		21.0	115.2	-
		488.0		92.0									
485					95	S-21	17 26 40	66	15		11.4		>9000*
480			Hard Gray SILTY CLAY, Trace Sand and Gravel		100	S-22	15 22 33	55	14		12.4	130.4	>9000*
						S-23	50/1"	50/1"	1		11.3		-
475					105								

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-01

Project Name: *Cleveland Port Authority Expansion*

Project Location: *Cleveland, OH*

NTH Consultants, Ltd.

NTH Proj. No.: 86-101394-00

Checked By: BEM

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
470		474.0	Hard Gray SILTY CLAY, Trace Sand and Gravel		110	S-24	9 14 18	32	16		28.2		>9000*
		467.0		113.0									
465		465.0	Compact Gray Sand	115.0	115	S-25	13 15 17	32	15				-
			END OF BORING AT 115.0 FEET.										
460													
455													
450													
445													
440													

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-02

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BSM

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
580		579.8	Topsoil	0.2									
		578.0	FILL: Compact Brown SILTY SAND, Trace Gravel, Contains Brick Fragments	2.0		S-1	15 27 38	65	14				-
		576.0	FILL: Very Compact Gray SILTY SAND, Trace Gravel	4.0									
575			FILL: Loose to Medium Compact Dark Brown SILTY SAND, Trace Gravel, Trace Clay		5	S-2	15 13 8	21	5				-
		573.0		7.0		S-3	1 2 8	10	13				-
570			FILL: Medium Compact Brown SANDY GRAVEL, Some Silt, Contains Brick Pieces		10	S-4	7 15 9	24	12				-
		567.5		12.5									
565			FILL: Loose Gray SANDY GRAVEL, Little Silt		15	S-5	13 5 4	9	12				-
		564.0		16.0									
		561.0	FILL: Very Loose Gray SAND, Trace Gravel	19.0									
560					20	S-6	2 2 3	5	18				2000*
555			Medium Gray SILTY CLAY, Trace Sand and Gravel, Contains Frequent Silt Seams		25	S-7	2 3 4	7	18				2000*
		553.5		26.5									
550		550.0	Medium Gray SILTY CLAY, Trace Sand		30	S-8	3 3 4	7	18		25.3	92.7	2000*

Total Depth: *135 FT*
Drilling Start Date: *8/16/11*
Drilling End Date: *8/18/11*
Inspector: *J. Brown*
Contractor: *Ohio TestBor Inc.*
Driller: *J.Minchak*
Drilling Method:
Track Mounted D 50 Drill Rig using 3 1/4" HSA to 23.5'. 2 7/8" Tricone Washbore to end of boring.

Plugging Procedure:
Borehole sealed with cement-bentonite grout

Water Level Observation:
Groundwater encountered at 13.5' during drilling operations. The use of wash rotary drilling methods, precluded further groundwater observations.

Notes:
** Pocket Penetrometer*

GPS Coordinates:

Figure No. 4

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-02

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BEM

ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
550			SUBSURFACE PROFILE				SOIL SAMPLE DATA						
545			Medium Gray SILTY CLAY, Trace Sand		35	S-9	2 2 2	4	12		30.0		2500*
		542.5		37.5									
540			Soft Gray SILTY CLAY, Trace Sand		40	S-10	1 1 2	3	18		24.2	101.4	<500*
		538.0		42.0									
535			Medium Gray SILTY CLAY, Trace Sand and Gravel		45	S-11	1 2 4	6	18		21.8		1000*
530					50	S-12	2 2 4	6	18		23.1	111.9	1000*
525					55	S-13	2 3 4	7	3		32.5		-
		520.9		59.1									
520			Stiff to Very Stiff Gray SILTY CLAY, Trace Sand and Gravel		60	S-14	2 4 6	10	2		29.9		2000*
515					65	S-15	4 7 8	15	18		22.4		4000*

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-02

Project Name: *Cleveland Port Authority Expansion*

Project Location: *Cleveland, OH*

NTH Consultants, Ltd.

NTH Proj. No.: 86-101394-00

Checked By: BSH

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		512.0											
510					70	S-16	6 8 11	19	18		20.6		4500*
			Stiff to Very Stiff Gray SILTY CLAY, Trace Sand and Gravel										
505					75	S-17	4 5 9	14	18		17.2		3000*
		503.0		77.0									
			Very Stiff Gray SILTY CLAY, Little Sand										
500					80	S-18	7 10 18	28	16		16.6		7000*
		498.8		81.2									
			Very Compact Gray SILT										
495					85	S-19	28 41 50/4"	91	16		21.1		-
		491.7		88.3									
			Very Compact Gray SANDY SILT, Trace Gravel			S-20	40 50/4"	50/4"	10		19.5		-
490					90								
		488.3		91.7									
485					95	S-21	20 34 47	81	13		10.4		>9000*
			Very Hard Gray SANDY CLAY, Little Silt, Trace Gravel										
480					100	S-22	14 21 32	53	18		13.5		-
		476.7		103.3									
			Very Compact Gray CLAYEY SILT, Trace Sand and Gravel										
475					105	S-23	15 23 29	52	18		18.9		-

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-02

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By:

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		474.0		106.0									
470			Compact Gray SAND, Trace Silt and Gravel		110	S-24	12 15 20	35	15		10.7		-
465					115	S-25	15 17 22	39	14		12.8		-
		462.0		118.0									
460			Compact to Very Compact Gray SAND, Little Gravel, Trace Silt, Trace Clay, Contains Clay Pockets		120	S-26	30 45		11		5.7		-
455					125	S-27	20 35 34	69	12		13.8		-
450		449.9		130.1	130	S-28	15 21 24	45	14		18.0		-
445		445.0	Very Compact Gray CLAYEY SILT, Trace To Little Sand	135.0	135	S-29	15 24 34	58	18		8.0		-
			END OF BORING AT 135.0 FEET.										
440													

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-03

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BSM

SUBSURFACE PROFILE					SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 583.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		582.7	Asphalt	0.3									
580			FILL: Medium Compact Brown SAND Some Gravel, Contains Brick Fragments			S-1	3 9 11	20	13				-
					5	S-2	4 11 16	27	10		7.8		-
						S-3	6 12 10	22	10				-
575		574.5		8.5									
			FILL: Medium Compact Brown SAND, Little Gravel, Contains Asphalt fragments from 9.8' to 10.0'		10	S-4	5 6 10	16	10				-
570		569.5		13.5									
			FILL: Loose Dark Brown And Gray Mottled with Black, Fine SAND, Trace Silt Slightly Organic		15	S-5	4 4 4	8	10				-
565		564.5		18.5									
			Very Loose to Loose Dark Gray Fine SAND, Trace Silt		20	S-6	3 2 2	4	6				-
560		558.0		25.0	25	S-7	1 1 9	10	18		18.5		-
			END OF BORING AT 25.0 FEET.										
555													

Total Depth: *25 FT*
Drilling Start Date: *8/11/11*
Drilling End Date: *8/11/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings and bentonite hole plug

Water Level Observation:
Groundwater encountered at 12.9' during drilling operations, groundwater at 16.0' after drilling operations completion. Borehole caved at 15.0'.

Notes:

GPS Coordinates:

Figure No. 5

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-04

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BEM

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 582.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		580.9	Granular Base	1.1									
580			FILL: Compact Dark Brown SAND, Some Gravel, Contains Brick and Concrete Fragments			S-1	4 13 22	35	13				-
		578.5		3.5									
			FILL: Compact Dark Gray and Black SAND, Some Gravel, Contains Brick and Concrete Fragments		5	S-2	11 27 10	37	12				-
575		575.0		7.0		S-3	2 1 1	2	6				-
		573.8	FILL: Very Soft Black Organic SILTY CLAY, Little Gravel, Contains Brick Fragments.	8.2		S-4	50/2"	50/2"	2				-
			END OF BORING AT 8.2 FEET.										
570													
565													
560													
555													

Total Depth: *8.2 FT*
Drilling Start Date: *8/12/11*
Drilling End Date: *8/12/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
No groundwater encountered during or at completion of drilling operations

Notes:
- Auger Refusal at 8.2' Encountered Gray Fine Grained Sandstone BoulderOffset to B-04a

GPS Coordinates:

Figure No. 6

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-04a

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: DEM

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 582.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
580			Profile Drill to 5.0 '										
		577.0		5.0	5								
			END OF BORING AT 5.0 FEET.										
575													
570													
565													
560													
555													

Total Depth: *5 FT*
Drilling Start Date: *8/12/11*
Drilling End Date: *8/12/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
No groundwater encountered during or at completion of drilling operations

Notes:
- Auger Refusal at 5.0' Encountered Gray Fine Grained Sandstone BoulderOffset to B-04b

GPS Coordinates:

Figure No. 7

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-04b

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BEM

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 582.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
580			Profile Drill to 5.0'										
		577.0		5.0	5								
			END OF BORING AT 5.0 FEET.										
575													
570													
565													
560													
555													

Total Depth: *5 FT*
Drilling Start Date: *8/12/11*
Drilling End Date: *8/12/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
No groundwater encountered during or at completion of drilling operations

Notes:
- Auger Refusal at 5.0' Encountered Gray Fine Grained Sandstone Boulder. Offset to B-04c

GPS Coordinates:

Figure No. 8

LOG OF TEST BORING NO: B-04c

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BEM

ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 582.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
			SUBSURFACE PROFILE			SOIL SAMPLE DATA							
580					5								
575			Profile Drill to 13.5', Encountered Cobbles at 8.5'		10								
570		568.5		13.5	15	S-5	5 12 23	35	18				-
565		565.0	FILL: Compact Black Sand, Contains Slag	17.0	20	S-6	5 12 18	30	18				-
560		560.0	Compact Gray SAND	22.0	25	S-7	2 3 3	6	12		26.6		1000*
		557.0	Medium Gray CLAYEY SILT, Trace Sand	25.0									
555			END OF BORING AT 25.0 FEET.										

Total Depth: *25 FT*
Drilling Start Date: *8/23/11*
Drilling End Date: *8/23/11*
Inspector: *B. Meluch*
Contractor: *Ohio TestBor Inc.*
Driller: *J.Minchak*
Drilling Method:
Track Mounted D 50 Drill Rig using 3 1/4" HSA to end of boring

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
No groundwater encountered during or at completion of drilling operations

Notes:
** Pocket Penetrometer*

GPS Coordinates:

Figure No. 9

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-05

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BGM

ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 580.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
580			SUBSURFACE PROFILE / SOIL SAMPLE DATA										
		579.0	Granular Base	1.0									
			FILL: Medium Compact Gray Brown and Black CLAYEY SILT, Some Sand, Some Gravel, Contains Asphalt and Brick Fragments			S-1	1 4 11	15	10				>9000*
		577.0		3.0									
575			FILL: Loose Brown, Dark Gray and Black SAND, Little Gravel, Contains Asphalt and Brick Fragments		5	S-2	1 4 2	6	12				-
		574.5		5.5									
			FILL: Very Loose Brown, Black, and Gray SAND, Some Silty Clay, Some Gravel, Contains Brick and Asphalt Fragments			S-3	2 1 1	2	6		20.9		-
		572.0		8.0									
570			FILL: Very Loose Black, Gray and Brown GRAVEL and SAND, Contains Shell, Asphalt and Brick Fragments		10	S-4	3 2 2	4	4				-
		568.0		12.0									
565			Loose Gray SAND, Trace Fine Gravel		15	S-5	4 4 4	8	18		22.8		-
		561.5		18.5									
560			Stiff to Very Stiff Gray Mottled Red SILTY CLAY, Contains Few Silt and Sand Pockets and Lenses		20	S-6	2 4 6	10	8				3000*
555		555.0		25.0	25	S-7	2 5 5	10	16		19.8		3000*-5000*
			END OF BORING AT 25.0 FEET.										
550													

Total Depth: *25 FT*
Drilling Start Date: *8/12/11*
Drilling End Date: *8/12/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings and bentonite hole plug

Water Level Observation:
Groundwater encountered at 5.6' during drilling operations, groundwater encountered at 8.0' after completion. Groundwater at 5.5' after augers removed. Borehole caved at 8.7'.

Notes:
** Pocket Penetrometer*

GPS Coordinates:

Figure No. 10

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-06

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By:

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 583.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
			FILL: Very Compact Gray Gravel Some Sand			S-1	4 50/6"		12		7.3		-
580		579.5		3.5									
		578.3	FILL: Medium Compact Brown SAND, Little Gravel	4.7	5	S-2T	7	23	10				-
						S-2B	12 11						-
		577.0	FILL: Medium Compact Brown and Black SAND and GRAVEL, Contains Asphalt Fragments	6.0									
			FILL: Medium Compact Red and Brown BRICK FRAGMENTS and SAND			S-3	6 6 7	13	8				-
575		574.5		8.5									
		573.0	FILL: Loose Gray SANDY SILT, Trace Brick Fragments	10.0	10	S-4	4 5 3	8	10				-
			END OF BORING AT 10.0 FEET.										
570													
565													
560													
555													

Total Depth: *10 FT*
Drilling Start Date: *8/11/11*
Drilling End Date: *8/11/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
No groundwater encountered during or at completion of drilling operations,
borehole caved at 7.7'

Notes:

GPS Coordinates:

Figure No. 11

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-07

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BGM

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 581.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
580		580.3	Asphalt	0.7									
			FILL: Medium Compact Dark Gray and Brown SAND, Some Gravel, Contains Asphalt and Brick Fragments			S-1	3 10 10	20	13				-
		578.0		3.0									
					5	S-2	7 4 3	7	13				-
575			FILL: Loose Dark Brown SAND Some to And Gravel, Contains Asphalt and Brick Fragments			S-3	2 2 3	5	6				-
		572.0		9.0									
		571.0	FILL: Medium Compact Gray SAND and GRAVEL, Contains Brick Fragments	10.0	10	S-4	4 6 7	13	6				-
570			END OF BORING AT 10.0 FEET.										
565													
560													
555													

Total Depth: *10 FT*
Drilling Start Date: *8/12/11*
Drilling End Date: *8/12/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
Groundwater encountered at 7.5' during drilling operations, groundwater encountered at 8.3' after completion. Groundwater at 7.3' after augers removed. Borehole caved at7.5' .

Notes:

GPS Coordinates:

Figure No. 12

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-08

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By:

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 582.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		581.0	Granular Base	1.0									
580			FILL: Medium Compact Dark Gray SAND and FINE GRAVEL, Trace Silt			S-1	3 14 12	26	14				-
		577.5		4.5	5	S-2	10 9 4	13	11				-
575			FILL: Medium Compact Brown and Dark Gray SAND, Little Gravel, Contains Brick Fragments			S-3	3 4 3	7	3				-
		573.5		8.5									
		572.0	FILL: Loose Brown and Gray SAND	10.0	10	S-4	3 2 3	5	6		9.1		-
			END OF BORING AT 10.0 FEET.										
570													
565													
560													
555													

Total Depth: *10 FT*
Drilling Start Date: *8/12/11*
Drilling End Date: *8/12/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
Groundwater encountered at 7.9' during drilling operations, no groundwater encountered at completion. Borehole caved at 7.5'.

Notes:

GPS Coordinates:

Figure No. 13

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-09

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BEK

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 584.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		582.7	Granular Base	1.3									
			FILL: Medium Compact to Compact Dark Gray, Brown and Black GRAVEL Contains Asphalt and Brick Fragments			S-1	10 19 23	42	12				-
580					5	S-2	9 11 11	22	14				-
		578.0		6.0									
			FILL: Loose to Medium Compact Dark Gray, Brown, and Black SAND and GRAVEL, Contains Asphalt and Brick Fragments			S-3	10 14 7	21	10				-
575													
		574.0		10.0	10	S-4	8 5 4	9	10				-
			END OF BORING AT 10.0 FEET.										
570													
565													
560													
555													

Total Depth: *10 FT*
Drilling Start Date: *8/12/11*
Drilling End Date: *8/12/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
No groundwater encountered during or at completion of drilling operations, borehole caved at 5.7'

Notes:

GPS Coordinates:

Figure No. 14

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-10

Project Name: *Cleveland Port Authority Expansion*

Project Location: *Cleveland, OH*

NTH Consultants, Ltd.

NTH Proj. No.: 86-101394-00

Checked By: BEA

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 581.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
580		580.9	Topsoil	0.1									
			FILL: Compact Gray SLAG, Contains Brick			S-1	20 20 16	36	7				-
		576.5		4.5									
			FILL: Very Compact Black SAND, Contains Cinders Slag and Taconite Pellets		5	S-2	11 18 50	68	12		17.7		-
575		574.7		6.3									
			Loose to Medium Compact Brown SAND, Trace Silt			S-3	5 12 9	21	9				-
		571.0		10.0	10	S-4	8 5 4	9	13				-
570			END OF BORING AT 10.0 FEET.										
565													
560													
555													

Total Depth: *10 FT*
Drilling Start Date: *8/11/11*
Drilling End Date: *8/11/11*
Inspector: *B. Meluch*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
Groundwater encountered at 9.5' during drilling operations, no groundwater encountered at completion. Borehole caved at 4.0'.

Notes:

GPS Coordinates:

Figure No. 15

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/15/11

LOG OF TEST BORING NO: B-11

Project Name: *Cleveland Port Authority Expansion*
Project Location: *Cleveland, OH*

NTH Consultants, Ltd.
NTH Proj. No.: 86-101394-00
Checked By: BEM

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 579.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		578.3	Gravel	0.8									
			FILL: Compact Dark Gray SAND, Little Silty Clay, Contains Slag, Plastics, Cinders, and Brick			S-1	6 15 24	39	16				-
575					5	S-2	14 23 17	40	15				-
		573.5		5.5									
			FILL: Medium Compact Gray GRAVEL and SAND, Contains Slag and Limestone Fragments			S-3	5 7 4	11	18				-
		571.0		8.0									
570			FILL: Medium Compact Black SLAG		10	S-4	2 9 12	21	6				-
		569.0		10.0									
			END OF BORING AT 10.0 FEET.										
565													
560													
555													
550													

Total Depth: *10 FT*
Drilling Start Date: *8/11/11*
Drilling End Date: *8/11/11*
Inspector: *B. Meluch*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
Groundwater encountered at 7.0' during drilling operations, groundwater encountered at 5.5' completion. Borehole caved at 6.0'

Notes:

GPS Coordinates:

Figure No. 16

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/2/11

LOG OF TEST BORING NO: B-12

Project Name: *Cleveland Port Authority Expansion*

Project Location: *Cleveland, OH*

NTH Consultants, Ltd.

NTH Proj. No.: 86-101394-00

Checked By:

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 584.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
						S-1	24 50/2"	50/2"	6				-
						S-2	3 38 40	78	12				-
580			FILL: Very Compact Gray Gravel , Some Sand, Consisting of Concrete and Brick Fragments		5	S-3	10 50/2"	50/2"	8				-
		576.0		8.0		S-4	14 41 20	61	8				-
575		574.0	FILL: Compact Gray and Brown GRAVEL, Some Sand, Little Clayey Silt	10.0	10	S-5	12 15 12 12	27	8				-
570			END OF BORING AT 10.0 FEET.										
565													
560													
555													

Total Depth: *10 FT*
Drilling Start Date: *8/11/11*
Drilling End Date: *8/11/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
No groundwater encountered during or at completion of drilling operations, borehole caved at 3.8'

Notes:

GPS Coordinates:

Figure No. 17

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/15/11

LOG OF TEST BORING NO: B-13

Project Name: *Cleveland Port Authority Expansion*

Project Location: *Cleveland, OH*

NTH Consultants, Ltd.

NTH Proj. No.: 86-101394-00

Checked By: BEK 9/14/11

SUBSURFACE PROFILE						SOIL SAMPLE DATA							
ELEV. (FT)	PRO-FILE	ELEV	GROUND SURFACE ELEVATION: 583.0(±)	DEPTH	DEPTH (FT)	SAMPLE TYPE/NO.	BLOWS/ 6-INCHES	STD. PEN RESIST. (N)	REC (in)	PID (ppm)	MOIST. CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP ST (PSF)
		582.3	Asphalt	0.7									
580			FILL: Very Compact Gray SAND and GRAVEL, Contains Asphalt Fragments			S-1	13 40 17	57	14				-
		579.0		4.0									
			FILL: Loose Brown SAND, Little Clayey Silt		5	S-2	10 5 4	9	10		20.6		-
		576.5		6.5									
575			Loose Gray SILT and SAND, Trace Clay			S-3	7 5 5	10	10				-
		574.0		9.0									
		573.0	Very Loose Brown and Gray SANDY SILT, Little Clay	10.0	10	S-4	2 2 2	4	6				-
			END OF BORING AT 10.0 FEET.										
570													
565													
560													
555													

Total Depth: *10 FT*
Drilling Start Date: *8/12/11*
Drilling End Date: *8/12/11*
Inspector: *R. Kral*
Contractor: *Northcoast Drilling Inc.*
Driller: *G. Beck*
Drilling Method:
CME 75 Truck Mounted Drill Rig Using 4 1/4" HSA to Boring Completion

Plugging Procedure:
Borehole was backfilled with auger cuttings

Water Level Observation:
No groundwater encountered during or at completion of drilling operations, borehole caved at 5.7'

Notes:

GPS Coordinates:

Figure No. 18

LOG OF TEST BORING 86-101394-00.GPJ NTH CORPORATE NEW.GDT 9/15/11

TABULATION OF LABORATORY TEST DATA

BORING / TEST PIT / PROBE DESIGNATION	SAMPLE NUMBER	DEPTH OF SAMPLE TIP (FT)	ELEVATION OF SAMPLE TIP (FT)	UNCONFINED COMPRESSIVE STRENGTH (PSF)	FAILURE STRAIN (%)	NATURAL WATER CONTENT (% OF DRY WEIGHT)	IN-PLACE DRY DENSITY (LBS/CU.FT)	PERMEABILITY (CM/SEC)	PARTICLE SIZE DISTRIBUTION (%)							ATTERBERG LIMITS (%)			APPARENT SPECIFIC GRAVITY	LOSS ON IGNITION (%)	UNIFIED SOIL CLASSIFICATION
									COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX			
B-1	ST-1	27.5		2900	12.7	28.4	98.3	-	0	69	31	0	0	0	0	38	25	13			CL
	S-8	30.0		-	-	21.4															
	S-9	35.0		-	-	27.5															
	ST-2	38.5		1240	15.0	27.6	96.6	-	0	67	20	8	3	1	1	33	22	11			CL
	S-10	40.0		-	-	35.5															
	S-11	45.0		-	-	22.7															
	ST-3	48.5		4000	15.0	21.1	109.5	-	0	47	48	3	1	1	0	28	19	9			CL-ML
	S-12	50.0		-	-	20.7															
	S-13	55.0		-	-	22.1															
	S-14	60.0		-	-	22.3															
	S-15	65.0		-	-	16.5															
	S-16	70.0		-	-	13.8															
	S-17	75.0		-	-	16.2															
	S-18	80.0		-	-	15.8															
	S-19	85.0		-	-	14.7															
	S-20	90.0		-	-	21.0	115.2														
	S-21	95.0		-	-	11.4															
	S-22	100.0		-	-	12.4	130.4														
	S-23	105.0		-	-	11.3															
	S-24	110.0		-	-	28.2															

FIGURE NO. 19

PROJECT NO. 86-101394-00 NTH CONSULTANTS, LTD. SHEET 2 OF 3

TABULATION OF LABORATORY TEST DATA

BORING / TEST PIT / PROBE DESIGNATION	SAMPLE NUMBER	DEPTH OF SAMPLE TIP (FT)	ELEVATION OF SAMPLE TIP (FT)	UNCONFINED COMPRESSIVE STRENGTH (PSF)	FAILURE STRAIN (%)	NATURAL WATER CONTENT (% OF DRY WEIGHT)	IN-PLACE DRY DENSITY (LBS/CU.FT)	PERMEABILITY (CM/SEC)	PARTICLE SIZE DISTRIBUTION (%)							ATTERBERG LIMITS (%)			APPARENT SPECIFIC GRAVITY	LOSS ON IGNITION (%)	UNIFIED SOIL CLASSIFICATION
									COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX			
B-2	S-8	30.0		-	-	25.3	92.7														
	S-9	35.0		-	-	30.0															
	S-10	40.0		-	-	24.2	101.4														
	S-11	45.0		-	-	21.8															
	S-12	50.0		-	-	23.1	111.9														
	S-13	55.0		-	-	32.5															
	S-14	60.0		-	-	29.9															
	S-15	65.0		-	-	22.4															
	S-16	70.0		-	-	20.6															
	S-17	75.0		-	-	17.2															
	S-18	80.0		-	-	16.6															
	S-19	85.0		-	-	21.1															
	S-20	90.0		-	-	19.5															
	S-21	95.0		-	-	10.4															
	S-22	100.0		-	-	13.5															
	S-23	105.0		-	-	18.9															
	S-24	110.0		-	-	10.7															
	S-25	115.0		-	-	12.8															
	S-26	120.0		-	-	5.7															
	S-27	125.0		-	-	13.8															
	S-28	130.0		-	-	18.0															
	S-29	135.0		-	-	8.0															

FIGURE NO. 19

PROJECT NO. 86-101394-00 NTH CONSULTANTS, LTD. SHEET 3 OF 3

TABULATION OF LABORATORY TEST DATA

BORING / TEST PIT / PROBE DESIGNATION	SAMPLE NUMBER	DEPTH OF SAMPLE TIP (FT)	ELEVATION OF SAMPLE TIP (FT)	UNCONFINED COMPRESSIVE STRENGTH (PSF)	FAILURE STRAIN (%)	NATURAL WATER CONTENT (% OF DRY WEIGHT)	IN-PLACE DRY DENSITY (LBS/CU.FT)	PERMEABILITY (CM/SEC)	PARTICLE SIZE DISTRIBUTION (%)							ATTERBERG LIMITS (%)			APPARENT SPECIFIC GRAVITY	LOSS ON IGNITION (%)	UNIFIED SOIL CLASSIFICATION
									COLLOIDS	CLAY	SILT	FINE SAND	MEDIUM SAND	COARSE SAND	GRAVEL	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX			
B-3	S-3	7.5		-	-	7.8															
	S-7	25.0		-	-	18.5															
B-4	S-7	25.0		-	-	26.6															
B-5	S-3	7.5		-	-	20.9	-	-	-	13	40	26	11	5	5						CL
	S-5	15.0		-	-	22.8	-	-	-	2		89	8	0	0						SM
	S-7	25.0		-	-	19.8	-	-	-	-	-	-	-	-	-	23	17	6			
B-6	S-1	2.5		-	-	7.3	-	-	-	8		17	21	13	41						SM
B-8	S-4	10.0		-	-	9.1	-	-	-	2		17	81	0	0						SM
B-10	S-2	5.0		-	-	17.7	-	-	-	16		42	21	4	17						SM
B-13	S-2	5.0		-	-	20.6	-	-	-	11	50	36	2	0	1						CL

FIGURE NO. 19

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and Environmental Services

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820 West Superior Ave. - Suite 320
Cleveland, OH 44113

Phone: 216.344.4040
Fax: 216.344.4044

Aggregate/Soil Test Report

Report No: MAT:86-101394-00-S001
Issue No: 1

Client: Parsons Brinckerhoff

Project: Port of Cleveland Rail Expansion
Geotechnical Investigation

Job No: 86-101394-00

This laboratory is accredited by the American Association of State Highway and Transportation Officials (AASHTO). The tests reported have been completed in accordance with the terms of the

Ronald A. Kral

Date of Issue: 8/26/2011
Approved Signatory: Ron Kral

Sample Details

Boring No:	B-1
Field Sample No:	ST-1
Sample Depth:	27.5
Date Sampled:	8/19/2011
Sampled By:	Brian Meluch
LWO No:	W009463
Sample Location:	Cleveland Port Authority

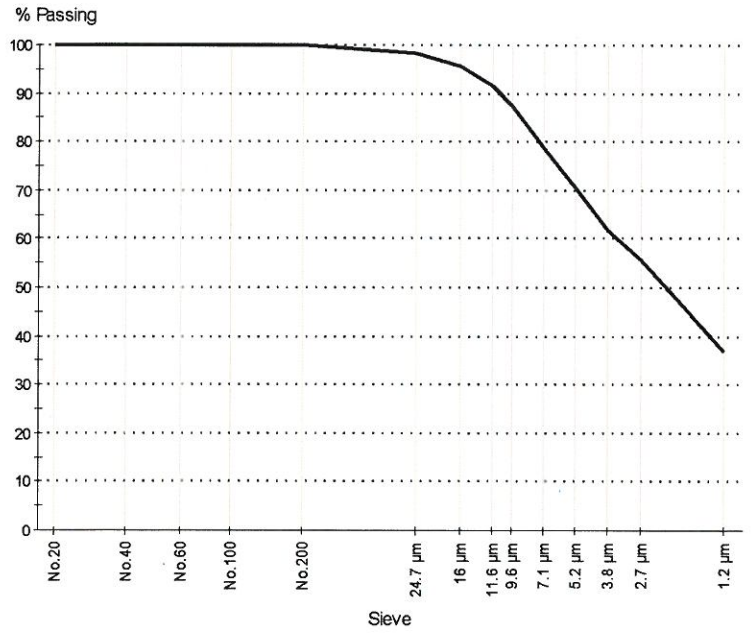
Atterberg Limit:

Liquid Limit:	38
Plastic Limit:	25
Plasticity Index:	13
Linear Shrinkage (%):	N/A

Sample Description:

Gray SILTY CLAY

Particle Size Distribution



Grading: Particle Size Analysis of Soils - Sieve & Hydrometer (ASTM D 422 - 07)

Drying by: Natural
Date Tested: 8/25/2011

Sieve Size	% Passing	Limits
No.20	100	
No.40	100	
No.60	100	
No.100	100	
No.200	100	
24.7 µm	98.4	
16.0 µm	95.5	
11.6 µm	91.5	
9.6 µm	87.5	
7.1 µm	78.6	
5.2 µm	70.6	
3.8 µm	61.7	
2.7 µm	55.7	
1.2 µm	36.8	

COBBLES	GRAVEL		SAND			FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(30.7%)	(69.3%)

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Cleveland, OH 44113

Phone: 216.344.4040
Fax: 216.344.4044

Aggregate/Soil Test Report

Report No: MAT:86-101394-00-S002
Issue No: 1

Client: Parsons Brinckerhoff

Project: Port of Cleveland Rail Expansion
Geotechnical Investigation

Job No: 86-101394-00

This laboratory is accredited by the American Association of State Highway and Transportation Officials (AASHTO). The tests reported have been completed in accordance with the terms of the AASHTO R18

Ronald A. Kral

Date of Issue: 8/26/2011
Approved Signatory: Ron Kral

Sample Details

Boring No:	B-1
Field Sample No:	ST-2
Sample Depth:	38
Date Sampled:	8/19/2011
Sampled By:	Brian Meluch
LWO No:	W009463
Sample Location:	Cleveland Port Authority

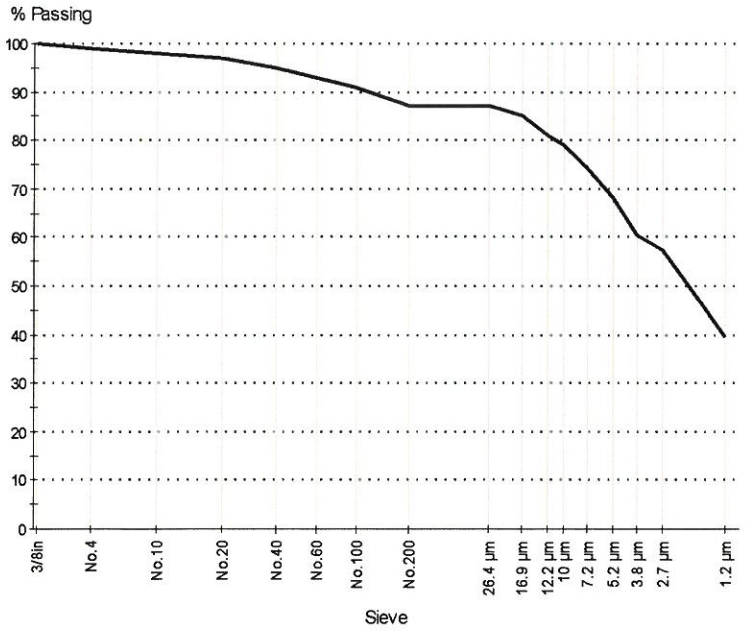
Atterberg Limit:

Liquid Limit:	33
Plastic Limit:	22
Plasticity Index:	11
Linear Shrinkage (%):	N/A

Sample Description:

Gray SILTY CLAY, Little Sand, Trace Fine Gravel

Particle Size Distribution



COBBLES	GRAVEL		SAND			FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
(0.0%)	(0.0%)	(1.0%)	(1.0%)	(3.0%)	(8.0%)	(19.8%)	(67.2%)

Grading: Particle Size Analysis of Soils - Sieve & Hydrometer (ASTM D 422 - 63)

Drying by: Natural
Date Tested: 8/25/2011

Sieve Size	% Passing	Limits
3/8in	100	
No.4	99	
No.10	98	
No.20	97	
No.40	95	
No.60	93	
No.100	91	
No.200	87	
26.4 µm	87.2	
16.9 µm	85.2	
12.2 µm	81.2	
10.0 µm	79.2	
7.2 µm	74.3	
5.2 µm	68.3	
3.8 µm	60.4	
2.7 µm	57.5	
1.2 µm	39.6	

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Cleveland, OH 44113

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Aggregate/Soil Test Report

Report No: MAT:86-101394-00-S003
Issue No: 1

Client: Parsons Brinckerhoff

Project: Port of Cleveland Rail Expansion
Geotechnical Investigation

Job No: 86-101394-00

This laboratory is accredited by the American Association of State Highway and Transportation Officials (AASHTO). The tests reported have been completed in accordance with the terms of the

AASHTO R18

Ronald A. Kral

Date of Issue: 8/26/2011
Approved Signatory: Ron Kral

Sample Details

Boring No:	B-1
Field Sample No:	ST-3
Sample Depth:	48
Date Sampled:	8/19/2011
Sampled By:	Brian Meluch
LWO No:	W009463
Sample Location:	Cleveland Port Authority

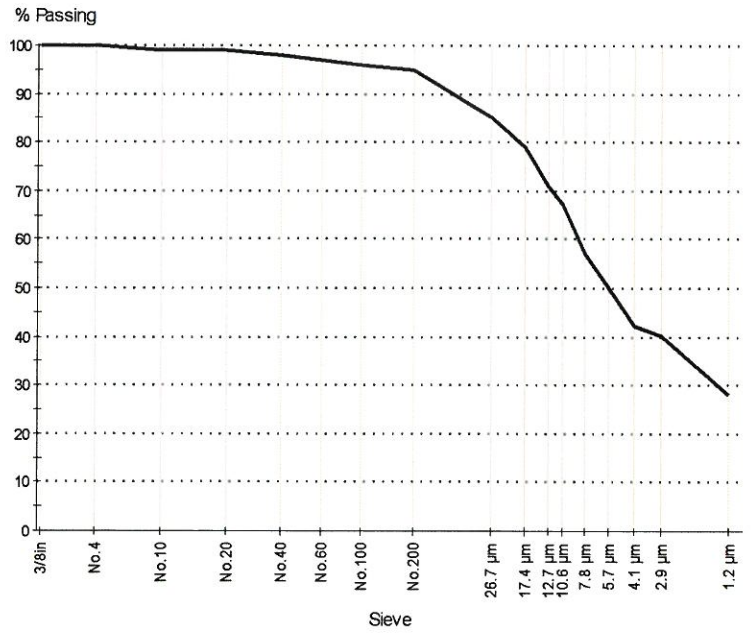
Atterberg Limit:

Liquid Limit:	28
Plastic Limit:	19
Plasticity Index:	9
Linear Shrinkage (%):	N/A

Sample Description:

Gray CLAYEY SILT, Trace Sand

Particle Size Distribution



Grading:

Drying by: Natural
Date Tested: 8/25/2011

Sieve Size	% Passing	Limits
3/8in	100	
No.4	100	
No.10	99	
No.20	99	
No.40	98	
No.60	97	
No.100	96	
No.200	95	
26.7 µm	85.2	
17.4 µm	79.1	
12.7 µm	71.1	
10.6 µm	67.1	
7.8 µm	57.1	
5.7 µm	50.1	
4.1 µm	42.1	
2.9 µm	40.1	
1.2 µm	28.1	

COBBLES	GRAVEL		SAND			FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
(0.0%)	(0.0%)	(0.0%)	(1.0%)	(1.0%)	(3.0%)	(48.4%)	(46.6%)

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Fax: 216.344.4044

Aggregate/Soil Test Report

Report No: MAT:86-101394-00-S038
Issue No: 1

Client: Parsons Brinckerhoff

Project: Port of Cleveland Rail Expansion
Geotechnical Investigation

Job No: 86-101394-00

This laboratory is accredited by the American Association of State Highway and Transportation Officials (AASHTO). The tests reported have been completed in accordance with the terms of the

AASHTO R18

Ronald A. Kral

Date of Issue: 8/26/2011
Approved Signatory: Ron Kral

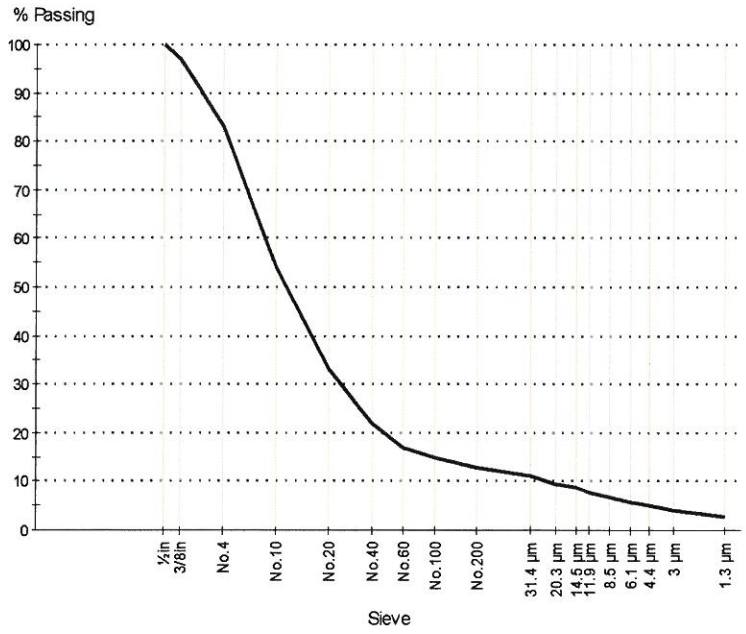
Sample Details

Boring No:	B-2
Field Sample No:	S-25
Sample Depth:	115
Date Sampled:	8/19/2011
Sampled By:	Brian Meluch
LWO No:	W009463
Sample Location:	Cleveland Port Authority

Sample Description:

Gray SAND, Little Gravel, Trace Silt, Trace Clay

Particle Size Distribution



Grading: Particle Size Analysis of Soils - Sieve & Hydrometer (ASTM D 422 - 07)

Drying by: Natural
Date Tested: 8/26/2011

Sieve Size	% Passing	Limits
½in	100	
3/8in	97	
No.4	83	
No.10	54	
No.20	33	
No.40	22	
No.60	17	
No.100	15	
No.200	13	
31.4 µm	11.2	
20.3 µm	9.6	
14.5 µm	8.7	
11.9 µm	7.9	
8.5 µm	6.8	
6.1 µm	5.7	
4.4 µm	4.9	
3.0 µm	4.1	
1.3 µm	2.7	

COBBLES	GRAVEL		SAND			FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
(0.0%)	(0.0%)	(17.0%)	(29.0%)	(32.0%)	(9.0%)	(7.8%)	(5.2%)

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Aggregate/Soil Test Report

Report No: MAT:86-101394-00-S051
Issue No: 1

Client: Parsons Brinckerhoff

Project: Port of Cleveland Rail Expansion
Geotechnical Investigation

Job No: 86-101394-00

This laboratory is accredited by the American Association of State Highway and Transportation Officials (AASHTO). The tests reported have been completed in accordance with the terms of the AASHTO R18

Ronald A Kral

Date of Issue: 8/26/2011
Approved Signatory: Ron Kral

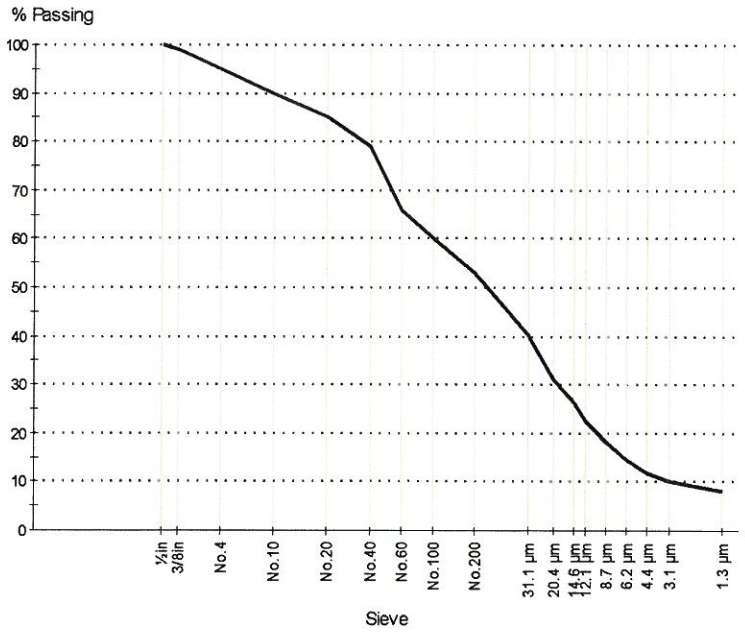
Sample Details

Boring No:	B-5
Field Sample No:	S-3
Sample Depth:	7.5
Date Sampled:	8/11/2011
Sampled By:	Ronald Kral
LWO No:	W009492
Sample Location:	Cleveland Port Authority

Sample Description:

FILL: Brown, Black and Gray SAND anf SILT, Little Clay, Trace Gravel

Particle Size Distribution



Grading: Particle Size Analysis of Soils - Sieve & Hydrometer (ASTM D 422 - 07)

Drying by: Natural
Date Tested: 8/26/2011

Sieve Size	% Passing	Limits
½in	100	
3/8in	99	
No.4	95	
No.10	90	
No.20	85	
No.40	79	
No.60	66	
No.100	60	
No.200	53	
31.1 µm	40.1	
20.4 µm	31.0	
14.6 µm	26.4	
12.1 µm	22.8	
8.7 µm	18.2	
6.2 µm	14.6	
4.4 µm	11.8	
3.1 µm	10.0	
1.3 µm	8.2	

COBBLES	GRAVEL		SAND			FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
(0.0%)	(0.0%)	(5.0%)	(5.0%)	(11.0%)	(26.0%)	(40.3%)	(12.7%)

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Aggregate/Soil Test Report

Report No: MAT:86-101394-00-S052
Issue No: 1

Client: Parsons Brinckerhoff

Project: Port of Cleveland Rail Expansion
Geotechnical Investigation

Job No: 86-101394-00

This laboratory is accredited by the American Association of State Highway and Transportation Officials (AASHTO). The tests reported have been completed in accordance with the terms of the AASHTO R18

Ronald A. Kral

Date of Issue: 8/26/2011
Approved Signatory: Ron Kral

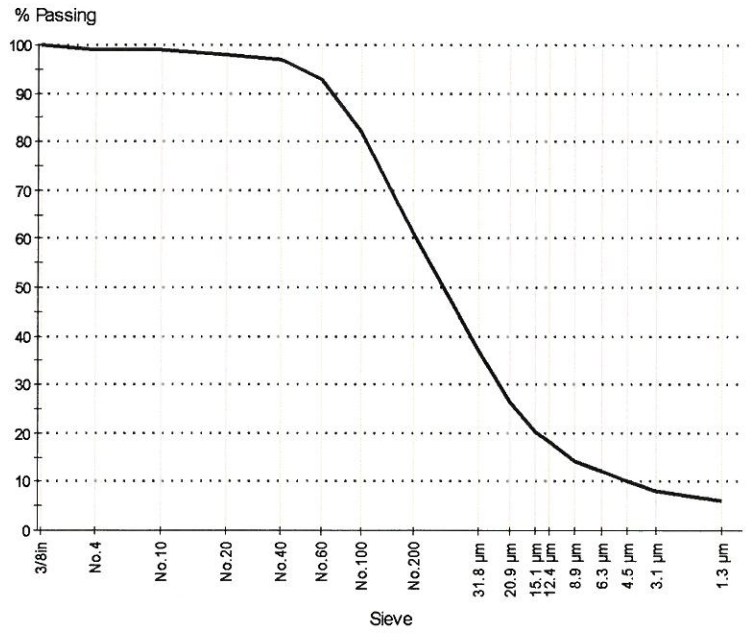
Sample Details

Boring No:	B-13
Field Sample No:	S-2
Sample Depth:	5.0
Date Sampled:	8/11/2011
Sampled By:	Ronald Kral
LWO No:	W009492
Sample Location:	Cleveland Port Authority

Sample Description:

FILL: Brown SILT and Fine SAND, Little Clay, Trace Fine Gravel

Particle Size Distribution



COBBLES	GRAVEL		SAND			FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
(0.0%)	(0.0%)	(1.0%)	(0.0%)	(2.0%)	(36.0%)	(50.3%)	(10.7%)

Grading: Particle Size Analysis of Soils - Sieve & Hydrometer (ASTM D 422 - 07)

Drying by: Natural
Date Tested: 8/26/2011

Sieve Size	% Passing	Limits
3/8in	100	
No.4	99	
No.10	99	
No.20	98	
No.40	97	
No.60	93	
No.100	82	
No.200	61	
31.8 µm	37.3	
20.9 µm	26.2	
15.1 µm	20.2	
12.4 µm	18.2	
8.9 µm	14.1	
6.3 µm	12.1	
4.5 µm	10.1	
3.1 µm	8.1	
1.3 µm	6.1	

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WinPAS

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Flexible Design Inputs

Agency: Cleveland-Cuyahoga County Port Authority
Company: NTH Consultants, Ltd.
Contractor:
Project Description: Port of Cleveland Rail Expansion
Location: Cleveland, Ohio

Flexible Pavement Design/Evaluation

Structural Number	4.17		**Soil Resilient Modulus**	4,800.00	**psi**
Design ESALs	2,434,600.00		**Initial Serviceability**	4.50	
Reliability	85.00	**percent**	**Terminal Serviceability**	2.00	
Overall Deviation	0.49				

Layer Thickness Determination

Layer Material	Layer Coefficient	Drainage Coefficient	Layer Thickness	Layer SN
Asphalt Cement Concrete	0.43	1.00	1.25	0.54
Asphalt Cement Concrete	0.43	1.00	3.00	1.29
Asphalt Cement Concrete	0.36	1.00	3.00	1.08
Crushed Stone Base	0.14	1.00	9.00	1.26
			Σ SN	4.17

WinPAS

Pavement Thickness Design According to

1993 AASHTO Guide for Design of Pavements Structures

American Concrete Pavement Association

Rigid Pavement Design

Agency:	Cleveland-Cuyahoga County Port Authority
Company:	NTH Consultants, Ltd.
Contractor:	
Project Description:	Port of Cleveland Rail Expansion
Location:	Cleveland, Ohio

Rigid Pavement Design/Evaluation

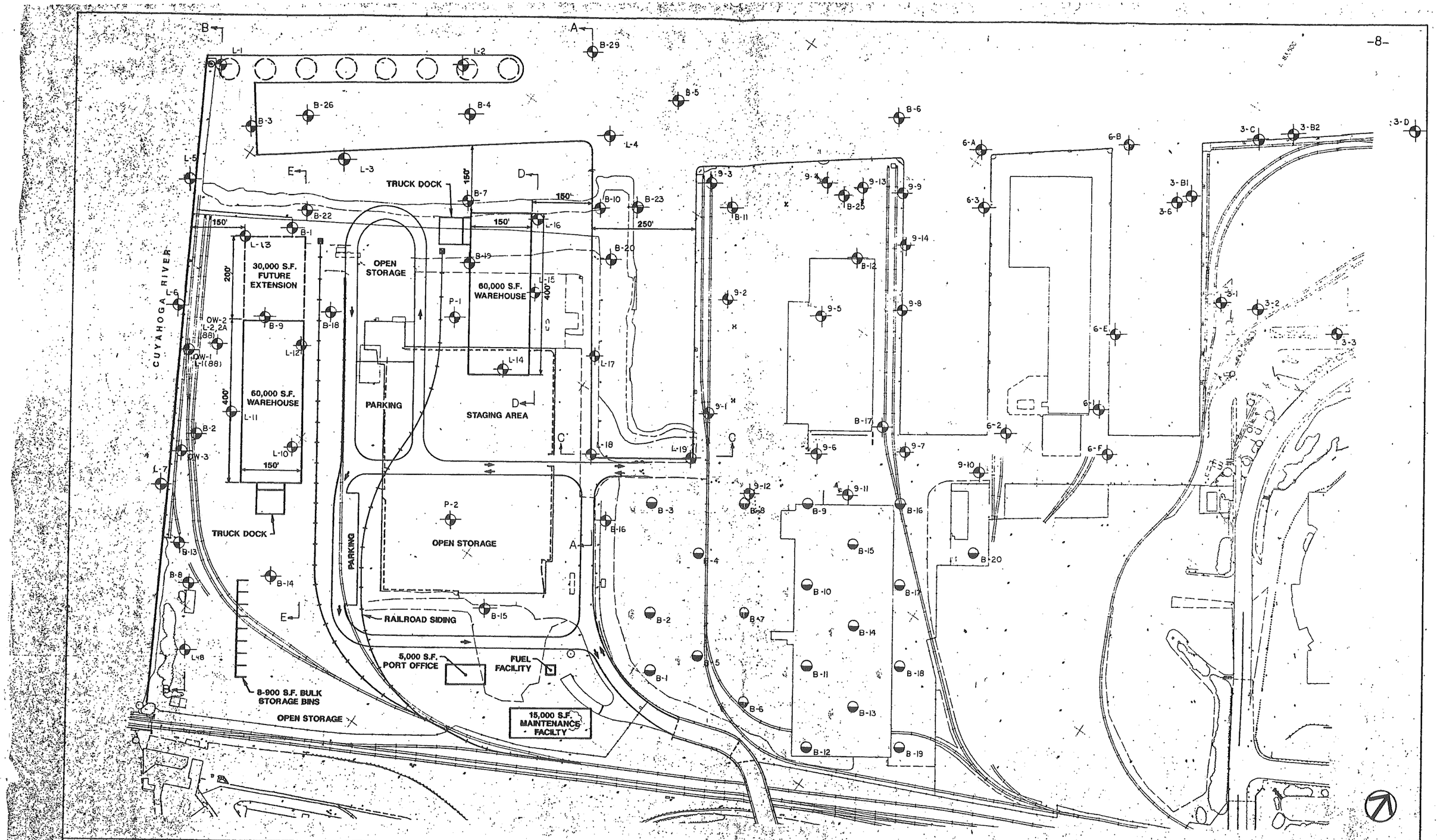
PCC Thickness	7.19	**inches**	**Load Transfer, J**	2.70	
Design ESALs	3,750,000.00		**Mod. Subgrade Reaction, k**	206	**psi/in**
Reliability	80.00	**percent**	**Drainage Coefficient, Cd**	1.00	
Overall Deviation	0.39		**Initial Serviceability**	4.20	
Modulus of Rupture	700	**psi**	**Terminal Serviceability**	2.50	
Modulus of Elasticity	5,000,000	**psi**			

Modulus of Subgrade Reaction (k-value) Determination

Resilient Modulus of the Subgrade	4,118	**psi**
Resilient Modulus of the Subbase	15,000	**psi**
Subbase Thickness	4.00	**inches**
Depth to Rigid Foundation		**feet**
Loss of Support Value (0,1,2,3)		
Modulus of Subgrade Reaction	206.30	**psi/in**

APPENDIX B

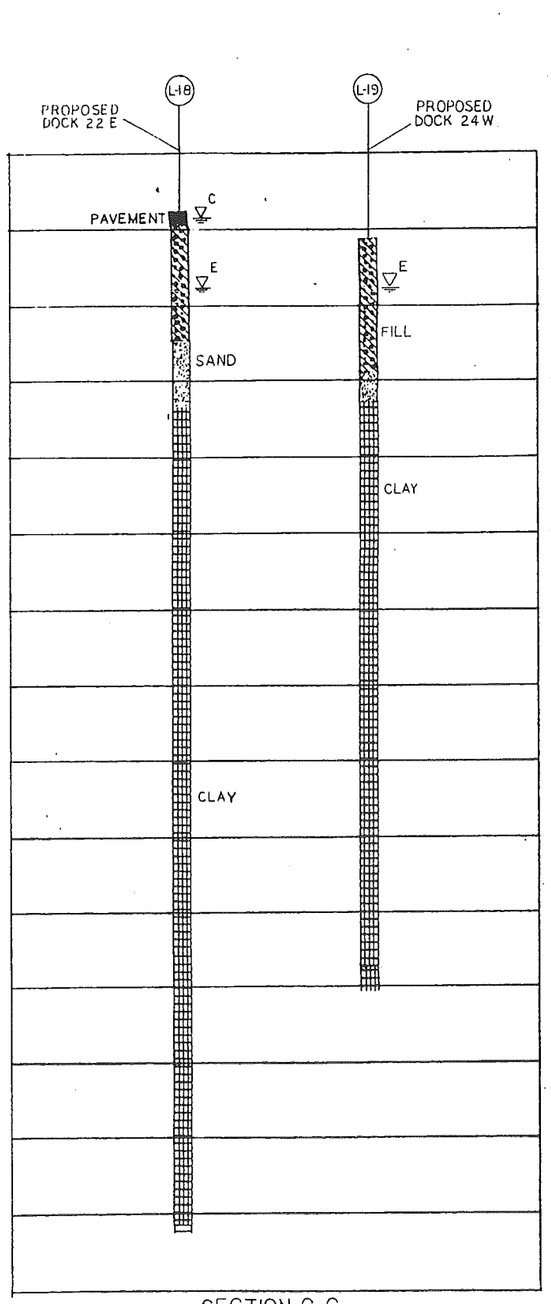
CD-ROM ATTACHED TO REPORT



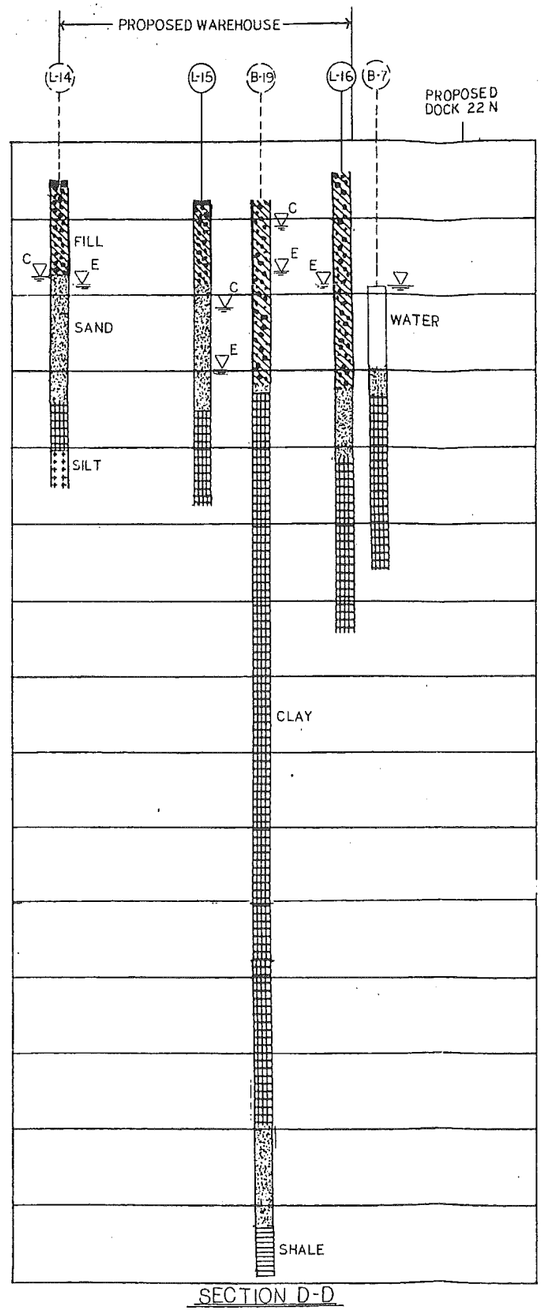
NO.	DATE	BY	REVISION	DESIGNED BY: JLS	DATE: 1-12-90	RELOCATION OF THE PORT OF CLEVELAND CLEVELAND-CUYAHOGA COUNTY PORT AUTHORITY	GENERAL SITE PLAN
				DRAWN BY: SEB	DATE: 1-12-90		
				CHECKED BY:	DATE:		
				SCALE		APPROVED BY:	
						CHIEF ENGINEER	
						DIRECTOR	PROJECT NO. 89213-A

SHEET NO. ____ OF ____

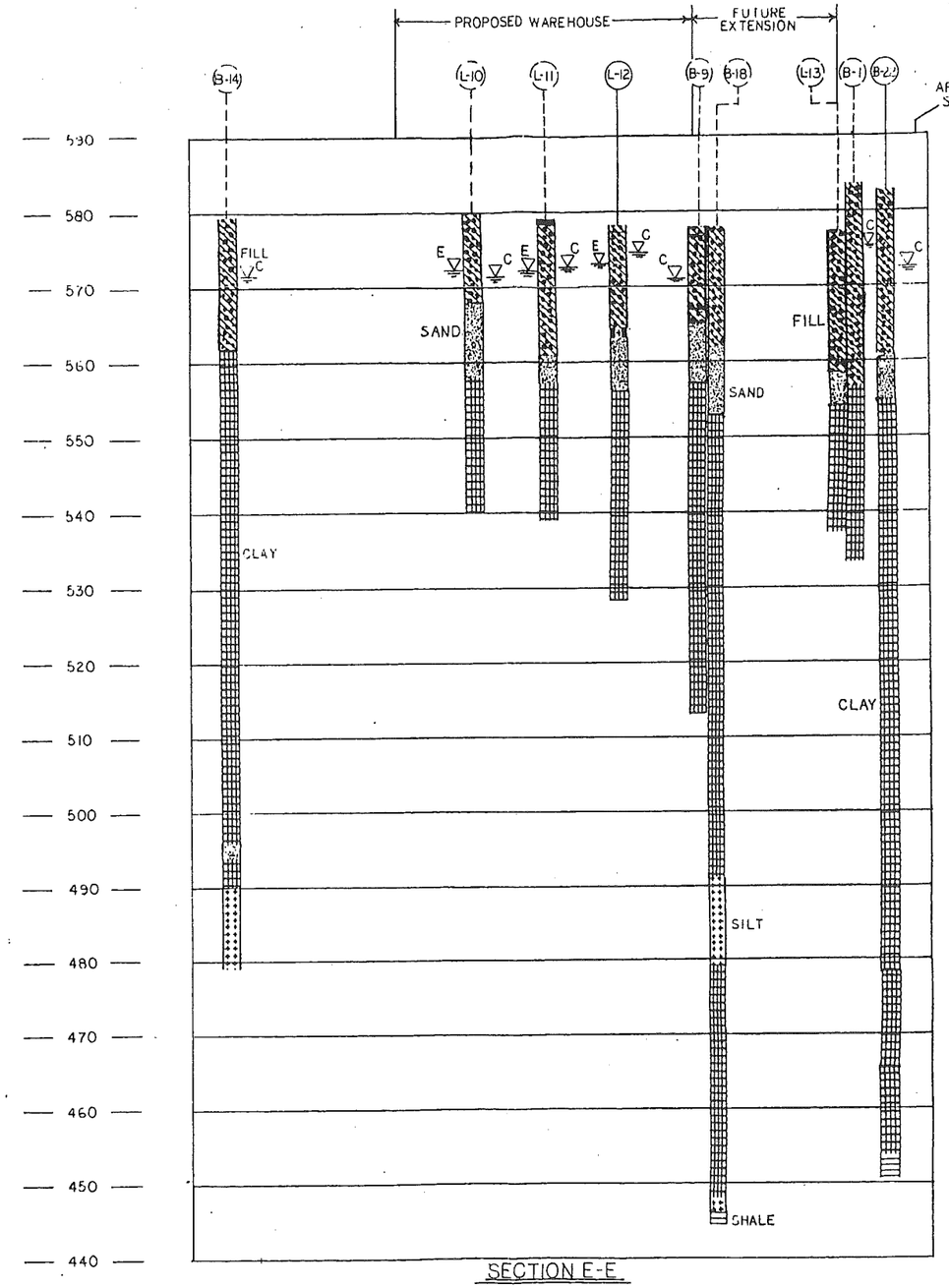
4533-1



SECTION C-C



SECTION D-D



SECTION E-E

NOTE:

- ◯ INDICATES BORING NOT IN PLANE OF SECTION
- ▽E INDICATES WATER LEVEL ENCOUNTERED DURING DRILLING
- ▽C INDICATES WATER LEVEL UPON COMPLETION

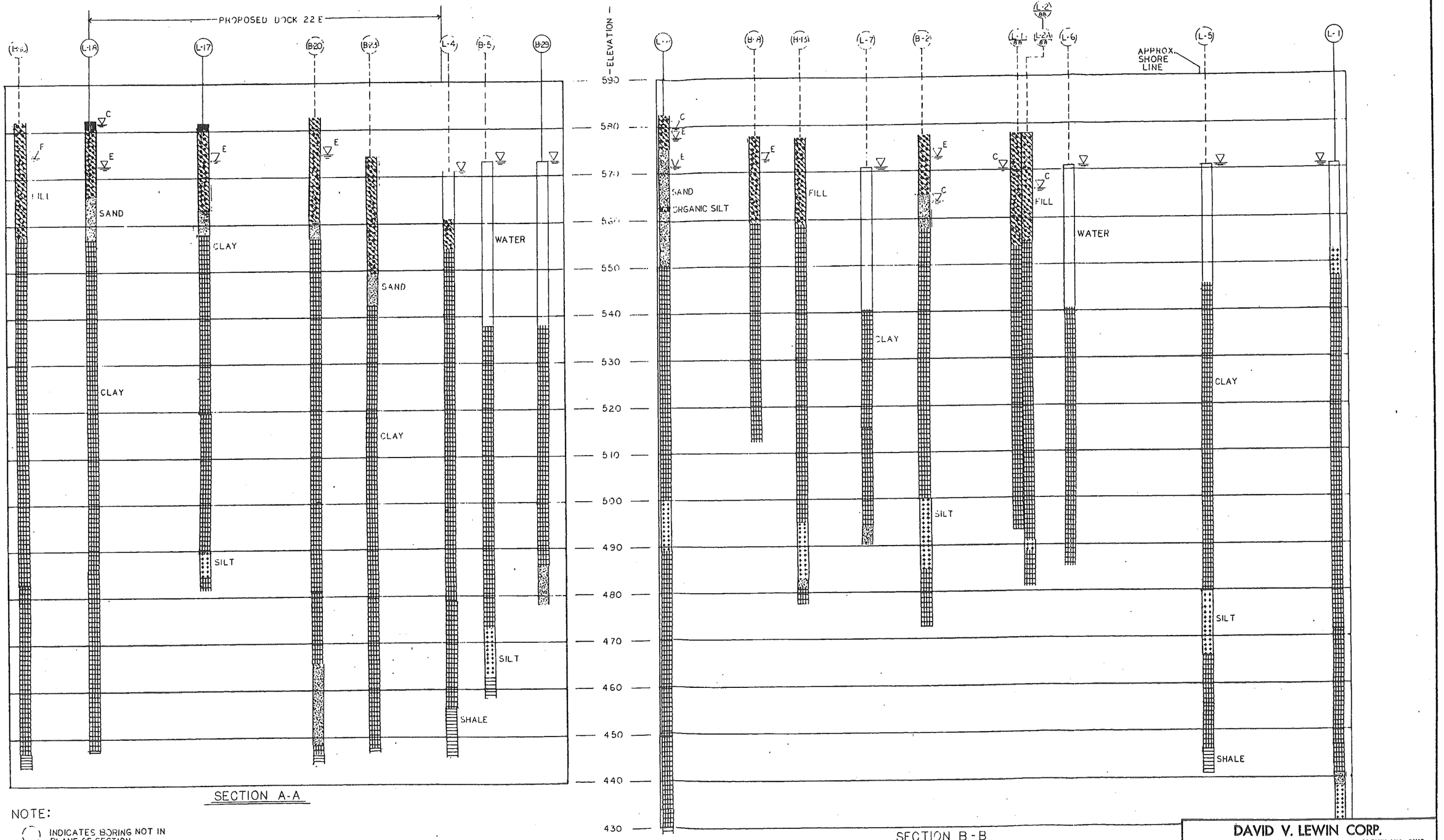
FOR COMPLETE SOIL DESCRIPTIONS AND WATER LEVEL DATA SEE LABORATORY LOGS OF BORINGS

0 50 100
(SCALE IN FEET)

DAVID V. LEWIN CORP.
GEOTECHNICAL ENGINEERING — CLEVELAND, OHIO

RELOCATION OF THE
PORT OF CLEVELAND
CLEVELAND - CUYAHOGA COUNTY
PORT AUTHORITY

No. 4	No. 3	No. 2	REV. No. 1	DRAWN BY PWW	SCALE AS SHOWN	DRAWING NO. 4533-3
				APPROVED BY	DATE	



SECTION A-A

SECTION B-B

NOTE:

( ) INDICATES BORING NOT IN PLANE OF SECTION

▽E INDICATES WATER LEVEL ENCOUNTERED DURING DRILLING

▽C INDICATES WATER LEVEL UPON COMPLETION

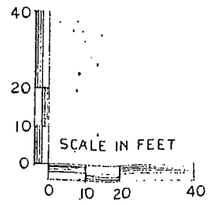
FOR COMPLETE SOIL DESCRIPTIONS AND WATER LEVEL DATA SEE LABORATORY LOGS OF BORINGS

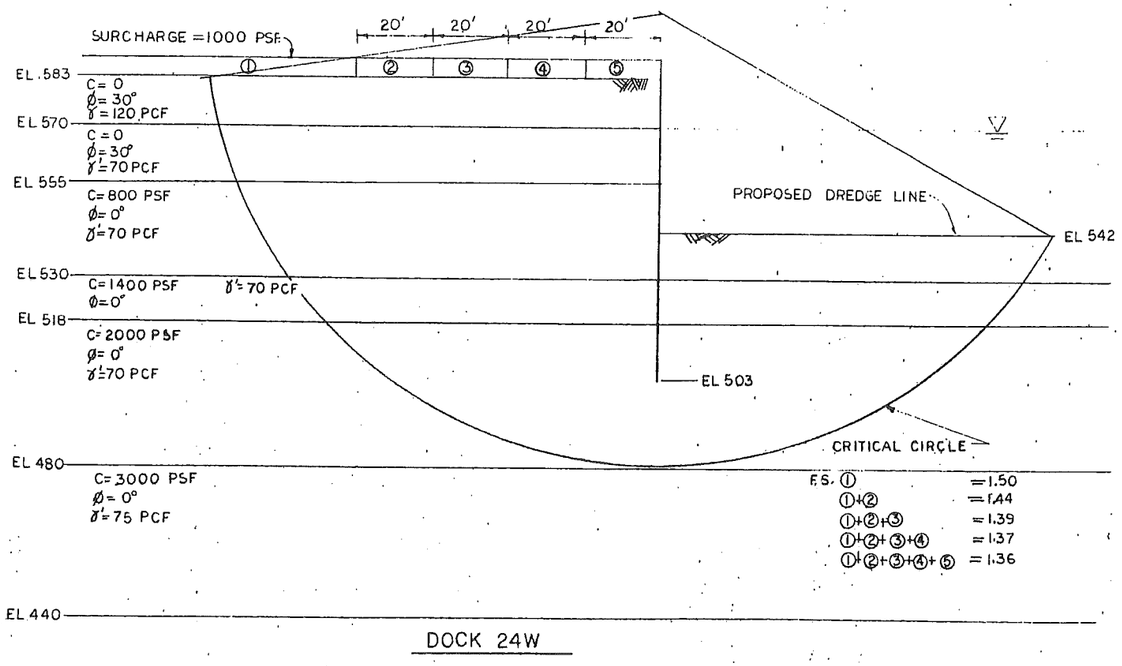
0 50 100
(SCALE IN FEET)

DAVID V. LEWIN CORP.
GEOTECHNICAL ENGINEERING — CLEVELAND, OHIO

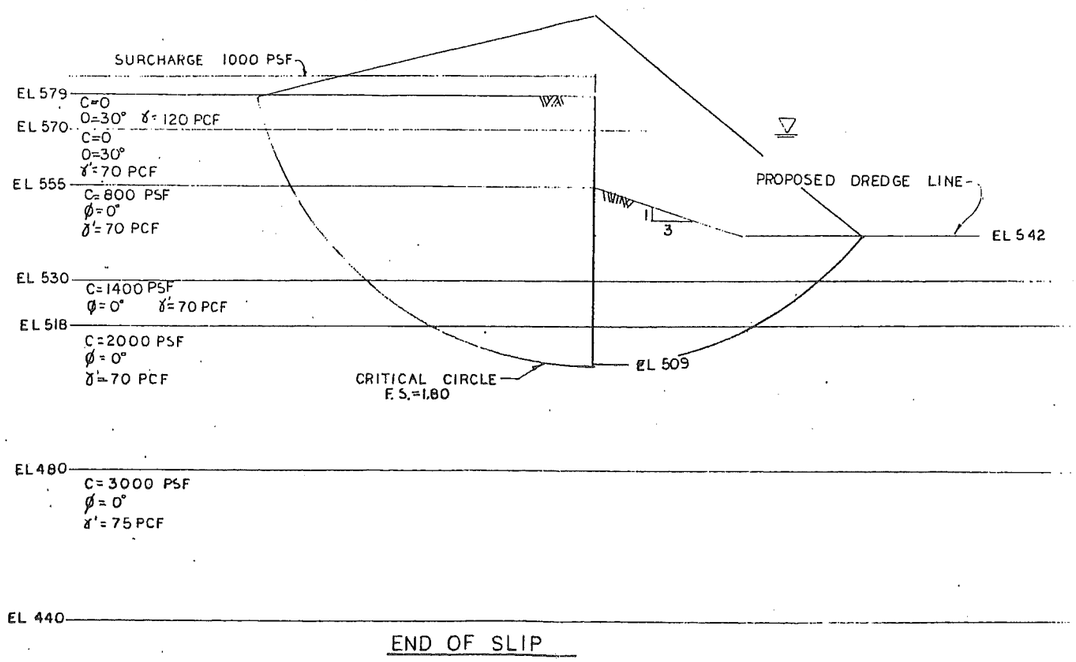
RELOCATION OF THE
PORT OF CLEVELAND
CLEVELAND-CUYAHOGA COUNTY
PORT AUTHORITY

No. 4	No. 3	No. 2	REV. No. 1	DRAWN BY PWW	SCALE AS SHOWN	DRAWING NO. 4533-2
				APPROVED BY	DATE	





DOCK 24W



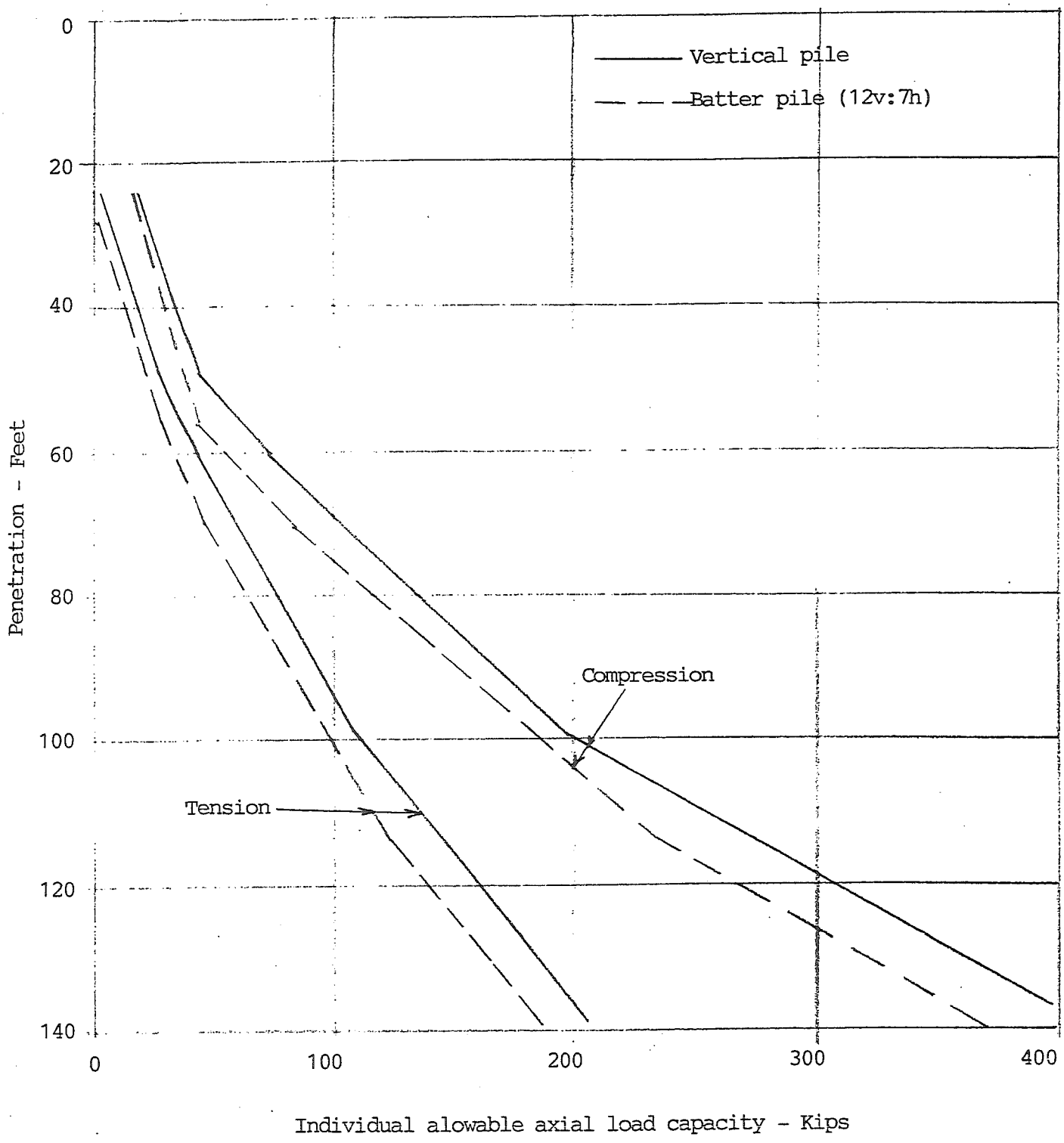
END OF SLIP

DAVID V. LEWIN CORP.
GEOTECHNICAL ENGINEERING CLEVELAND, OHIO

SLOPE STABILITY
DOCK 24W AND END OF SLIP
PORT OF CLEVELAND
CLEVELAND, OHIO

No. 4	No. 3	No. 2	REV. No. 1	DRAWN BY DJS	SCALE AS SHOWN	DRAWING NO. 4533-4
				APPROVED BY	DATE 5-21-91	

Penetration vs. Pile capacity



C-4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-1

Surface Elevation 570.9±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
10		Water									
20		Silt, gray, clayey w/few gravel - organic & oil odor	1	19.5	49.7					8.6	
			2	21.5	44.4					7.3	
		Clay, gray, silty	9	24.5	29.0						
					30.9						
30		gray, silty w/s rock frags. *	S-1	30.0	29.5						
			9	31.5	21.4						
					30.4			365	6.3		96
			8	36.5	22.9						
40											
			7	41.5	34.8						
			6	46.5	31.9			420	9.7		97
50											
			8	51.5	33.1						
		gray, silty w/s sand & rock frags.	9	56.5	29.6			425	9.8		99
60											
			10	61.5	25.3			685	13.6		104
			42	66.5	20.9			1015	16.4		116
70											
			38	71.5	18.5			1800	20.0		123
			51	76.5	19.3						
80											
			60	81.5	21.8			1240	20.0		111
			50/.4	85.9	15.0						
90		gray, silty w/rock frags.	50/.4	90.9	12.1			4760	15.2		127
			50/.4	95.4	11.9						
100			50/.3	100.3							
		gray, silty w/tr. sand	58	106.5	27.3						
110		gray, silty w/s silt seams	50/.3	111.3	24.3						
			91	116.5	22.4						
120			65	121.5	23.7						
			66	126.5	21.3						
130		Sand, gray, fine w/few silt seams	50/.4	130.9	12.6						
		Silt, gray, sandy	50/.2	135.7							
140		sand & gravel seam w/s shale frags. at 135' to 135.7'									
		End of boring at 140.0'									
150		REMARKS:									
		*Shelby Tube									
		Encountered gas at 135.0' to 135.2'									
160											

Boring Completed: 10/25/89

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-2

Surface Elevation 570.9±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
		Water									
		Clay, gray, silty w/s organic mat'l	5	44.5	34.7						
			3	46.5	57.0					9.7	
			4	51.5	38.1						
		gray, silty w/s sand & shale frags.	4	54.5	38.9						
		* S-1		58.5							
			22	60.0	19.1			935	14.3		121
			24	66.5	18.9			995	16.3		116
			29	71.5	19.2			1255	20.0		120
			66	76.5	16.0			2110	20.0		122
		gray, silty, sandy w/s gravel & shale frags.	63	81.5	17.2						
			51	86.5	12.5			3050	9.7		126
			57	91.5	13.4						
			50/.4	95.9	13.7			2315	12.0		118
		gray, silty w/s silt seams	50/.4	100.9	26.7						
			66	106.5	26.6						
		Silt, gray, clayey	74	111.5	18.7						
		End of boring at 111.5'									

REMARKS:

*Shelby Tube

Encountered Gas Pocket at 85 to 87 Feet

Boring Completed: 10/14/89

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. L-3

Surface Elevation 570.9±

Depth in feet	Symbol	DESCRIPTION		Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600C-%	Unit Dry Weight #/cu. ft.
		Water										
		Sand, gray w/s gravel & cinders		8	15.5	31.1				10.8		
				11	17.5	21.4				2.6		
		Clay, gray, silty w/tr. gravel		8	21.5	29.7			490	9.9		97
				9	26.5	28.7			650	13.6		97
		gray, silty w/s sand & tr. gravel		24	31.5	20.9			740	13.7		104
				20	36.5	24.0			775	4.7		107
		gray, silty		5	41.5	31.3						
				6	46.5	31.3						
			*	S-1	52.0							
			*	S-2	54.0							
		gray, silty w/tr. gravel		11	56.5	30.9						
				9	61.5	29.9						
				12	66.5	30.4						
		gray, silty w/s sand & tr. gravel		37	71.5	18.0			1310	20.0		120
				43	76.5	19.2			1505	16.3		120
		End of boring at 76.5'										

REMARKS *Shelby Tube - no recovery

Boring Completed: 10/12/89
Location: Cleveland, Ohio
Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☒ Auger ☐

Boring No. L-4

Surface Elevation 570.9±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	R.Q.D. - %	Unit Dry Weight #/cu. ft.
		Water									
10		Fill: gray sand, gravel, concrete	25	11.5							
		black coal, sand, gravel, cinders, wood, tr. of oily substance	2	13.5							
			3	16.5							
20		Clay, gray, silty w/silt seams & tr. gravel	10	21.5	26.7						
		gray, silty	* S-1	27.0	33.2 32.5						
30			5	28.5	30.4						
			6	31.5	32.1						
			4	36.5	37.3						
40			4	41.5	33.1						
			7	46.5	31.6						
50			8	51.5	30.4						
			7	56.5	36.9						
60		gray, silty w/s sand, gravel & rock frags.	47	61.5	17.0			2250	20.0		123
			33	66.5	16.6			2205	20.0		124
70			44	71.5	15.6						
			55	76.5	16.8			2170	20.0		127
80		sandy	62	81.5	12.2						
		w/few sand & silt seams	70	86.5	13.4						
90			50/.5	91.0							
		gray, silty, sandy w/gravel & rock frags.	73	96.5	15.5						
100		gray, silty w/tr. shale frags.	84	101.5	19.0			2900	10.8		108
			73	106.0	21.7						
110		w/silt seams	47	111.0	27.9						
			50/.4	111.4							
		Shale, gray, hard w/s sandy shale seams	50/.1	115.1							
120			73%	120.1						0	
			75%	125.1						0	
130		End of boring at 125.1'									
		REMARKS: *Shelby Tube									
140											
150											
160											

Boring Completed: 10/25/89

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. L-5

Surface Elevation 570.9±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	R.Q.D. - %	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C - %	Unit Dry Weight #/cu. ft.
10		Water									
20											
		Sand, clayey w/s gravel	4	27.0	32.4						
30		Clay, gray, silty	4	29.0	26.8						
			7	31.5	30.1			675	13.2	5.9	105
			6	36.5	28.9			495	13.6		102
40			* S-1	39.0	28.2 24.5						
			5	41.5	33.0						
					30.1 27.2						
			* S-2	47.0	29.7						
50			8	48.5	30.9						
			10	51.5	22.9			1030	18.2		110
			18	56.5	23.6			1495	20.0		112
60		gray, silty w/shale frags. & tr. sand	27	61.5	17.4			1380	20.0		125
			25	66.5	17.8			1540	20.0		122
70			24	71.5	22.8			1020	20.0		111
			38	76.5	21.0			1495	20.0		112
80			39	81.5	20.9			1710	20.0		113
		gray, silty w/s sand & rock frags.	82	86.5	12.5			3680	16.1		131
90			65	91.0							
		Silt, gray, clayey, sandy w/shale frags.	50/.2	91.2	13.0						
			50/.4	95.4	17.4						
100			50/.3	100.3	11.7						
		Clay, gray, silty w/s silt seams	75	106.5	19.4						
110			49	111.5	17.9						
		w/sand seams	46	116.5	18.4						
120			41	121.5	22.6						
		Shale, gray, hard	50/.2	125.2							
130		vertical fracture at 126.4'-126.8'	80%	130.2		0					
		End of boring at 130.2'									
		REMARKS:									
140		*Shelby Tube									
150											

Boring Completed: 10/30/89

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-6

Surface Elevation 570.9±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
10		Water									
20											
30		Clay, gray, silty w/s organic mat'l w/cinders & tr. oily substance at 30'-31.5'	5	31.5	34.3					5.9	
			8	33.5	31.5						
			18	36.5	28.6						
40			7	41.5	29.8						
		gray, silty w/few silt seams & tr. gravel	19	46.5	21.5			1135	20.0		114
50		gray, silty w/silt seams & tr. rock frags.	44	51.5	22.4			1610	10.1		109
		gray, silty w/rock frags. & some sand seams	33	56.5	17.2			3015	20.0		120
60			44	61.5	16.2			2490	20.0		123
			43	66.5	15.7			2535	20.0		126
70			39	71.5	18.5			1825	20.0		120
			43	76.5	18.1						
80			50/.5	81.0	12.8						
		sand in bottom of sample	50/.4	85.4	14.4						
90		End of boring at 85.4'									

REMARKS Encountered gas at 85± feet vented overnight-gas still venting in a.m. Water before pulling casing at 2'

Boring Completed: 9/27/89
Location: Cleveland, Ohio
Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. L-7

Surface Elevation 570.9±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
10		Water									
20											
30		Clay, gray, silty	9	31.5	30.5						
			14	33.5	22.1			945	18.9		110
			13	36.5	18.7			1170	20.0		120
40			12	39.5	22.9 19.0 20.7						
			* S-1	42.0	22.6						
			18	43.5	21.8			1755	20.0		111
			19	46.5	23.3			1675	20.0		109
50		gray, silty w/rock frags. & some sand seams	27	51.5	17.5						123
			36	56.5	14.7			1885	17.0		123
60			50	61.5	17.0			1840	20.0		124
			43	66.5	16.7			2145	20.0		122
70			85	71.5	17.2			2635	20.0		119
		Sand, gray, silty, fine w/s silt seams	54	76.5	17.2			3295	20.0		119
80			50/.4	80.4							
		End of boring at 80.4'									
90											

REMARKS

*Shelby Tube
Encountered gas at 80± feet

Boring Completed: 10/2/89
Location: Cleveland, Ohio
Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-8

Surface Elevation 582.4

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill: gray & brown silty sandy w/gravel, rock frags., red brick, limestone gravel black cinders, slag, iron ore pellets, concrete, red brick, wood	21	3.5	17.2						
			56	6.0							
			50/.2	6.2							
10		Sand, brown, fine to med. layered w/med. to coarse, silty w/tr. gravel	27	10.0	4.2						
			38	15.0	20.5						
20		Organic Silt, gray & black			12.6						
		Sand, gray, fine to med., silty w/s gravel	8	20.0	57.5					5.6	
			20	25.0	11.5						
30		gray, fine to med., silty w/brown rotted wood	3	30.0							
		Clay, gray, silty w/tr. sand w/s silt seams	9	35.0	35.0						
40			9	40.0	32.5			365	13.3		96
		gray, silty w/fine sand	19	45.0	29.3						
50			19	50.0	24.4			1040	16.8		107
			27	55.0	20.4			2055	15.6		111
60		gray, silty w/silt seams, tr. sand, tr. gravel & rock frags.	39	60.0	21.5			1430	6.4		110
			43	65.0	21.9						
70			34	70.0	18.7			2995	13.2		117
			44	75.0	15.7			3735	20.0		119
80			42	80.0	16.8			3800	20.0		118
		Silt, gray, sandy w/tr. clay w/ gray silty sand seams	48/.5	84.0							
			50/.3	84.3	18.3						
90			79	90.0	19.2						
		Clay, gray, silty, sandy w/gravel & rock frags.	45/.5	94.0							
			50/.3	94.3	10.3						
100			23/.5	99.0							
		gray, silty, sandy w/gravel, rock frags., cobbles	50/.4	99.4	11.8			6900	13.4		125
			74	104.5	13.8			6200	15.2		120
110			50/.4	108.9	13.2						
			50/.4	113.9	12.1						
120			45/.5	119.0							
			50/.4	119.3	11.8			9450	10.8		127
			50/.4	121.4	11.7			5500	6.8		123

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-10

Surface Elevation 580.0

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
		Fill: limestone gravel black cinders, slag, coal, red brick	17	2.5							
			11	5.0							
			13	6.5							
			18	10.0							
		Sand, black, fine to med., silty w/ tr. gravel, some organic mat'l	23	15.0	30.1					4.8	
					23.7					4.9	
		gray, fine to med., silty w/s gravel & organic mat'l gray, med.	24	20.0	18.0					1.1	
		Clay, gray, silty w/tr. fine sand w/clayey silt seams	12	25.0	32.1			610	9.5		94
		gray, silty w/tr. fine sand	10	30.0	27.3			565	9.6		104
			7	35.0	31.4						
			5	40.0	32.6			570	6.7		92
		End of boring at 40.0'									

REMARKS

Encountered water at 7.5'
Water at 8.4' on completion

Boring Completed: 12/15/90

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. L-11

Surface Elevation 579.0

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		2" pavement									
		Fill: limestone gravel concrete	50/.3	1.8							
		black cinders, slag, red brick frags., wood, iron ore pellets	18	5.0							
			14	6.5							
10		black & gray layered silty sand, fine to med., tr.brick frags., cinders, organic mat'l	49	10.0							
		gray sand & brick	53	15.0							
20		Sand, gray w/s decayed wood	37	20.0							
		Clay, gray, silty w/fine sand			24.6			2160	7.0		105
		*	S-1	25.0	22.9 23.1			1280	5.0		106
			29	27.0	21.8			1535	12.9		111
30			26	30.0	28.2			1245	16.0		99
		gray, silty w/s rock frags.									
		gray, silty	20	35.0	24.4			1050	13.7		110
					29.3 30.4			945	10.5		96
		*	S-2	38.5	29.6			905	9.2		96
40			10	40.0	29.8						
		End of boring at 40.0'									
50											

REMARKS: Encountered water at 7.0'
Wate at 6.3' on completion
*Shelby Tube

Boring Completed: 12/21/90

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-12

Surface Elevation 578.5

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
		Fill: 3" brown sand; 6" limestone gravel	20	2.5							
		brown & black layered cinders w/slag & gravel	18	5.0							
		brick layer at 2.3'	44	6.5							
10			8	10.0							
		green organic clayey silt			32.8					8.1	
		Organic Silt, black w/gray, sandy	9	15.0	52.7 61.5					13.7 15.5	
		Sand, brown, fine to med. w/s coarse, tr. gravel									
20			44	20.0	16.0						
		Clay, gray, silty w/fine to med. sand seams	15	25.0	26.1			1430	11.2		106
30			15	30.0	24.8			1900	12.9		107
			20	35.0	23.2			815	7.8		106
40			7	40.0	28.8			480	14.8		101
			15	45.0	21.9			1970	19.2		109
50			17	50.0	22.4			1985	9.9		107

End of boring at 50.0'

REMARKS: Encountered water at 5.0'
Water at 3.5' on completion

Boring Completed: 12/17/90

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-13

Surface Elevation 577.5±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
		Fill: 1" limestone gravel over iron pellets	17	2.5							
		cinders, white									
		cinders, gravel, slag, tr. brick, concrete, glass	15	5.0							
			19	7.5							
10			29	10.5							
		slag, cinders									
			11	15.0							
		wood									
20		Sand, lt. brown, fine to med.	79	20.0	16.2						
		Clay, gray, silty w/s silt seams & sand seams	10	25.0	27.2			635	6.7	1.6	104
30			11	30.0	31.9						
			12	35.0	29.4			810	9.8		101
40			12	40.0	28.2			730	10.2		98
		End of boring at 40.0'									
50											

REMARKS

Encountered water at 5.0'
Hole caved at 3.5' on completion

Boring Completed: 12/17/90

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-14

Surface Elevation 584.8

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
		Fill: 6" concrete; 2" limestone Brown fine to med. sand w/s gravel	48	3.5							
		cinders, gravel, tr. brick & slag w/layers of fine brown sand	45	5.0							
			9	7.5							
10			1/1.5	10.0							
		Sand, brown, silty (possible fill) gray & black, fine, silty w/s med. to coarse gravel & some cobbles & sandstone frags.	3/1.5	15.0	17.8						
20		(possible fill)	14	20.0	18.4					2.0	
		Sand, gray, fine to med. w/tr. organic mat'l, tr. cobbles at 26'	47	25.0	26.4					1.5	
30		Clay, gray, silty w/silt seams	13	30.0	18.2 25.0			1320	9.8	1.4	107
		Silt, gray, clayey	12	35.0	24.3			2205	16.7		106
40			18	40.0	21.6			2530	10.1		113
		End of boring at 40.0'									
50											

REMARKS Encountered water at 13.5'
Water at 12.5' on completion

Boring Completed: 12/13/90

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-15

Surface Elevation 581.9

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Concrete - 12"									
		Fill: brown silty sand	14	2.5							
		Concrete	50/.4	3.9							
10		End of boring at 8.0'									
0											
0											
40											
0											

REMARKS

Water seepage at 2.0'
No water on completion

Boring Completed: 12/14/90

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-15 A

Surface Elevation 582±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Concrete - 7"									
		Fill: brown fine to med. silty sand layered w/gray & brown silty sand	8	4.0	12.9						
		strong oily odor at 5'-6.5' w/s clay & asphalt at 8.5'-10.0'	3	6.5	20.9						
10			3	10.0	15.1						
		Sand, brown, fine to med. silty layered w/gray & brown	6	15.0	19.2						
20			6	20.0	19.5						
		black & gray, fine to med., silty w/some organic mat'l, tr. gravel & sandstone frags.	26	25.0	21.2					4.8	
30		Clay, gray, silty w/s silt seams & few organic silt seams	15	30.0	28.7					4.0	
		gray, silty	11	35.0	26.3			395	3.2	3.6	105
40			13	40.0	29.7			450	6.5		100
		End of boring at 40.0'									
50											

REMARKS
Water seepage at 5' and 22'
Encountered water at 22'
Water at 13.5' on completion

Boring Completed: 12/15/90

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-16

Surface Elevation 585.9

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
		Fill: brown sand w/gravel, brick, concrete, slag, metal, wood, asphalt	50/.3	0.8							
			15	4.0							
		black & gray sandy w/slag, gravel, brick, concrete, tr. glass	42	6.0							
			50/.4	6.4							
10			51	10.0							
		brown sand, gravel w/brick, concrete into black & gray sand & gravel w/sandstone & brick, concrete	100/.3	13.8							
			34	15.5							
			50/.2	15.7							
		black w/gray layer fine to med. sand w/s coarse & brick	53	20.0							
			21	25.0							
		Sand, dk. gray, silty w/s silt seams & organic mat'l	14	30.0	31.1					6.5	
		dk. gray w/organic mat'l	4	35.0	35.0					7.0	
5		Clay, gray, silty	10	40.0	29.7			555	12.3		96
			12	45.0	21.9			615	6.6		111
0			12	50.0	25.7			650	6.8		103
			11	55.0	30.3						
		End of boring at 60.0'	10	60.0	29.9			615	20.0		100

REMARKS: Encountered water at 14.0'
Hole caved at 5.0' on completion

Boring Completed: 12/14/90
Location: Cleveland, Ohio
Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-17

Surface Elevation 581.7

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		2" asphalt; 10" concrete									
		Fill: rock frags., cobbles, wood, brick, sand, silt, granulated slag	50/.5	1.5							
			65	4.0							
		brown silty sand w/s gravel	17	6.5							
		slag, sand, gravel	6	10.0							
		some cobbles sulphur odor	10	15.0							
		Sand, gray, coarse w/s clay seams	19	20.0	22.6						
		Clay, gray, silty w/silt seams	17	25.0	26.0			1630	11.7		98
		gray, silty	11	30.0	30.5			440	9.5		96
			8	35.0	26.3			560	13.2		101
			9	40.0	30.9						
			9	45.0	27.6			1025	16.0		104
		gray, silty w/s sand, tr. gravel & rock frags.	17	50.0	22.8			2000	16.5		110
			15	55.0	20.3			1550	15.9		112
			23	60.0	19.9			1760	20.0		115
			30	65.0	17.1			3295	20.0		120
			33	70.0	16.2			3570	20.0		124
			35	75.0	14.9			5500	20.0		120
			38	80.0	15.1			6200	17.4		130
			104	85.0	16.0			5200	16.3		121
			30	90.0	19.6			2665	16.9		114
		Silt, gray, clayey w/clay seams	34	95.0	22.5						
		Clay, gray, silty w/gravel & rock frags.	61	100.0	12.7			5950	20.0		130
		End of boring at 100.0'									
		REMARKS:									
		Encountered water at 8.0' Hole caved at 17.0' on completion									

Boring Completed: 12/15/80

Boring Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. L-18

Surface Elevation 582.3

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C-%	Unit Dry Weight #/cu. ft.
		4" blacktop; 12" concrete									
		Fill: brown silty sand, cinders, slag, red brick, tr. wood	35	3.5							
			16	6.5							
10		gray fine to med. silty sand, layered coal, gravel, cinders	11	10.5							
		Sand, gray, fine, silty w/tr. gravel	10	15.5							
20			56	20.5	22.1					1.2	
		Clay, gray, silty	16	25.5	17.4 27.9						
30			20	30.5	25.4			855	11.8		107
			20	35.5	25.3			1390	17.0		105
40		gray, silty w/s silt seams & few sand seams	12	40.5	29.1			850	12.9		104
			10	45.5	31.2			440	9.6		95
50			12	50.5	29.2			915	20.0		98
		gray, silty w/few silt seams	19	55.5	22.8			1625	12.9		110
60			20	60.5	22.7			1350	13.2		111
			21	65.5	22.1			1800	11.4		107
70			24	70.5	21.8			1655	11.3		116
		gray, silty, sandy w/gravel, rock frags. & some silt seams	36	75.5	15.6			2950	13.8		122
80			41	80.5	17.0			3960	20.0		118
			52	85.5	15.8			5300	20.0		123
90			52	90.5	20.2			3690	20.0		112
			82	95.5	13.8						
100		gray, silty, sandy w/gravel, rock frags. & cobbles	58 50/.4	100.0 100.4	13.0			7050	20.0		124
			50/.4	104.4	9.4						
110			50/.4	109.4	11.3			11,300	14.5		130
		gray, silty w/silt seams	98	115.0	11.0 23.7			2220	6.8		104
120			69	120.5	21.9						
			46	125.5	27.9			1150	12.9		102
130		sand seam at 129.0'									
		gray, shaley	49	131.0	24.5 23.5 13.4			1535	13.9		110
		Shale, gray, hard	50/.4 50/.2	134.4 135.2	12.7						
140		End of boring at 135.2'									
		REMARKS:									
		Encountered water at 10.0' Water at 1.0' on completion									
150											
160											

Boring Completed: 12/10/90

Location: Cleveland, Ohio

Job No.: C. 4533

LABORATORY LOG OF BORING

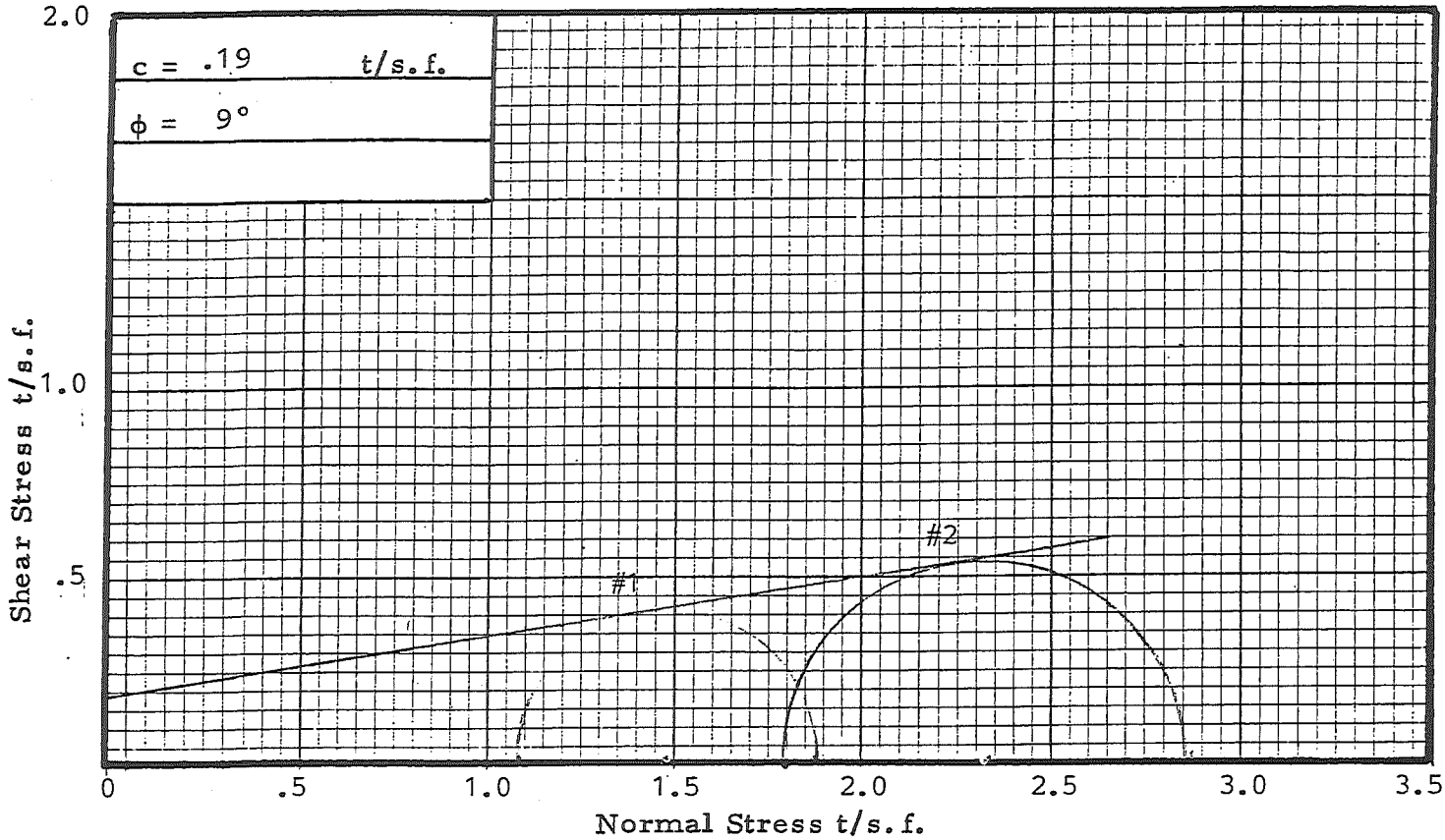
Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

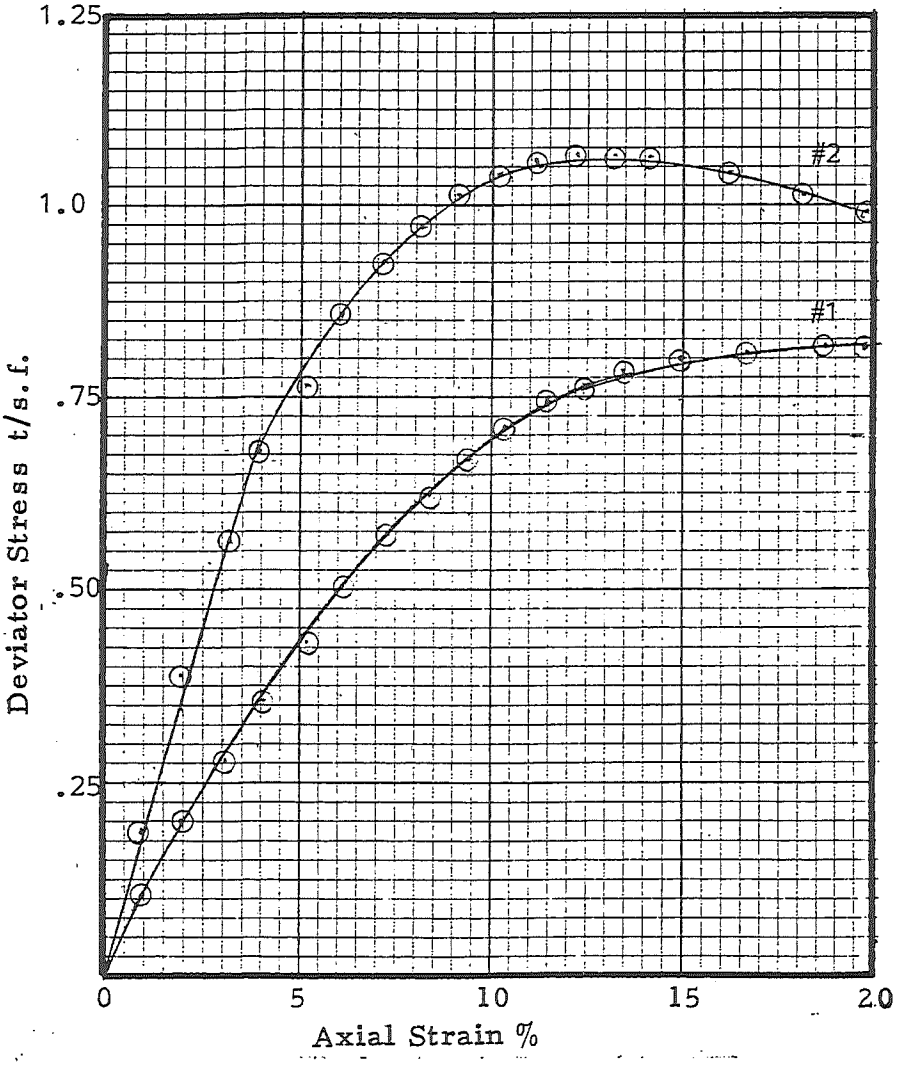
Boring No. L-19

Surface Elevation 578.4

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600C-%	Unit Dry Weight #/cu. ft.
		Fill: black cinders, brown silty sand, slag, tr. brown cinders, brick, wood	9	3.5							
			2	6.5							
10		black fine to med. silty sand w/cinders, brick & sulfur gas odor	25	10.0							
			27	15.0							
		Sand, gray, fine to med., silty w/s silt seams, black seam & sulfur gas odor	27	20.0	21.0					1.5	
20		Clay, gray, silty w/tr. fine sand & some silt seams	14	25.0	25.6					4.5	
30			23	30.0	24.2			945	6.7		108
		gray, silty w/tr. fine sand	34	35.0	21.8			1480	8.1		110
40			6	40.0	29.0						
			9	45.0	28.5			710	12.6		101
50		gray, silty, sandy w/gravel & rock frags. & some silt seams	20	50.0	22.2			815	12.9		109
			16	55.0	26.2			840	12.8		107
60			28	60.0	17.7			2435	20.0		118
			27	65.0	15.8			3100	20.0		126
70			32	70.0	17.0			2395	20.0		124
			31	75.0	16.4			3770	20.0		123
80			38	80.0	18.0			2760	20.0		124
			39	85.0	18.7			2875	20.0		117
90		gray, silty, sandy w/gravel, rock frags. & cobbles	22	90.0	18.5			4020	20.0		121
			87	95.0	11.9			7150	20.0		130
100			50/.5	99.0	9.3						
		End of boring at 99.0'									
		REMARKS:			Boring Completed: 12/8/1990						
110		Encountered water at 6.5'			Location: Cleveland, Ohio						
					Job No.: C. 4533						
120											

Triaxial Compression Test





Sample No.		1	2	3
Diameter, in.	D_o	2.86	2.85	
Area, in.^{2}	A_o	6.42	6.38	
Height, in.	H_o	4.80	4.90	
Volume, in.^{3}	V_o	30.84	31.26	
Moisture Content	%	30.1	28.0	
Wet Unit Weight #/	γ_w	128.2	124.1	
Dry Unit Weight #/	γ_d	98.5	97.1	
Void Ratio	e	.730	.729	
Confining Press., t/s.f.		1.08	1.85	
Deviator Stress, t/s.f.		.798	1.07	

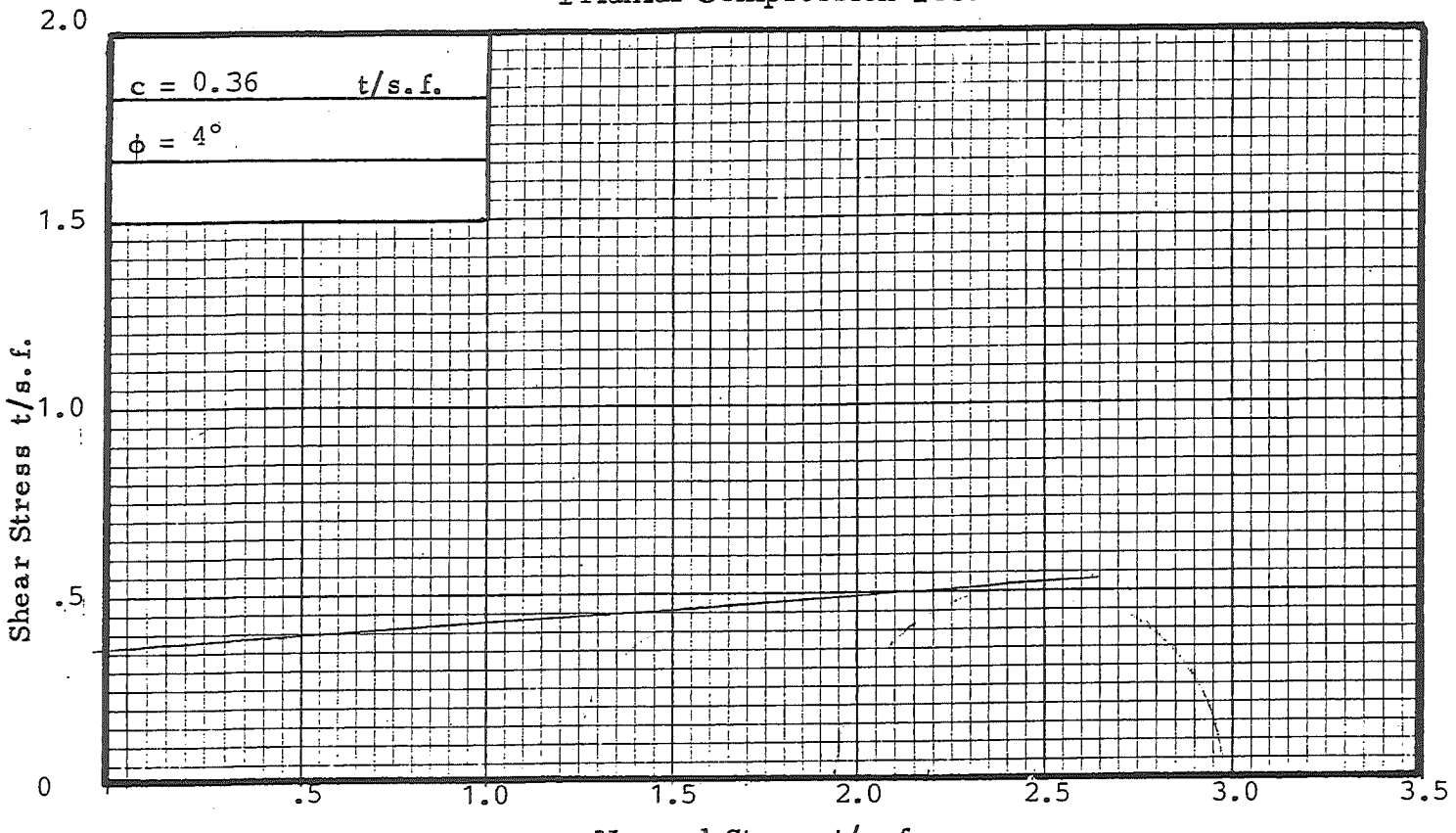
Boring No. L-5

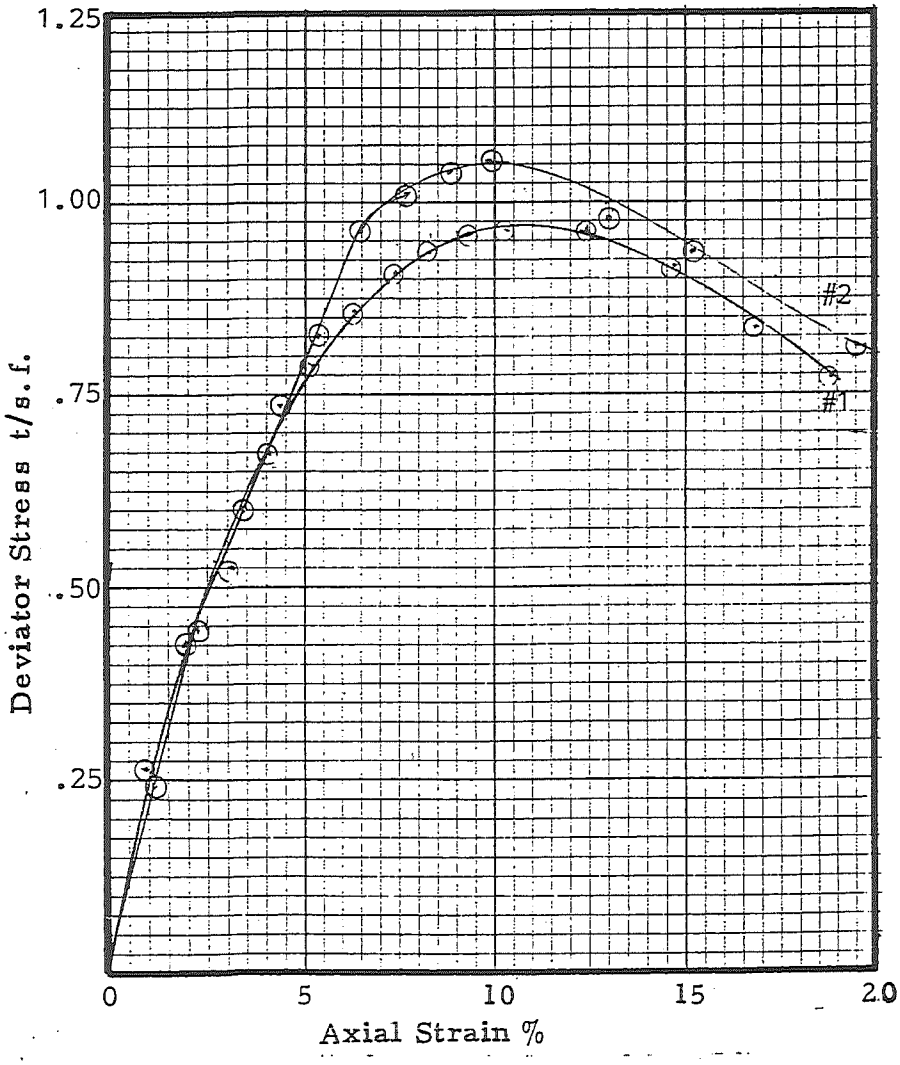
Depth 37.0'-39.0'

Technician CB

C. 4533 Date 1/27/91

Triaxial Compression Test





Sample No.		1	2	3
Diameter, in.	D_o	2.85	2.85	
Area, in.^{2}	A_o	6.38	6.38	
Height, in.	H_o	4.80	4.60	
Volume, in.^{3}	V_o	30.62	24.35	
Moisture Content	%	32.3	28.4	
Wet Unit Weight #/	γ_w	120.3	123.7	
Dry Unit Weight #/	γ_d	90.9	96.3	
Void Ratio	e	.861	.757	
Confining Press., t/s.f.		1.22	1.94	
Deviator Stress, t/s.f.		.97	1.06	

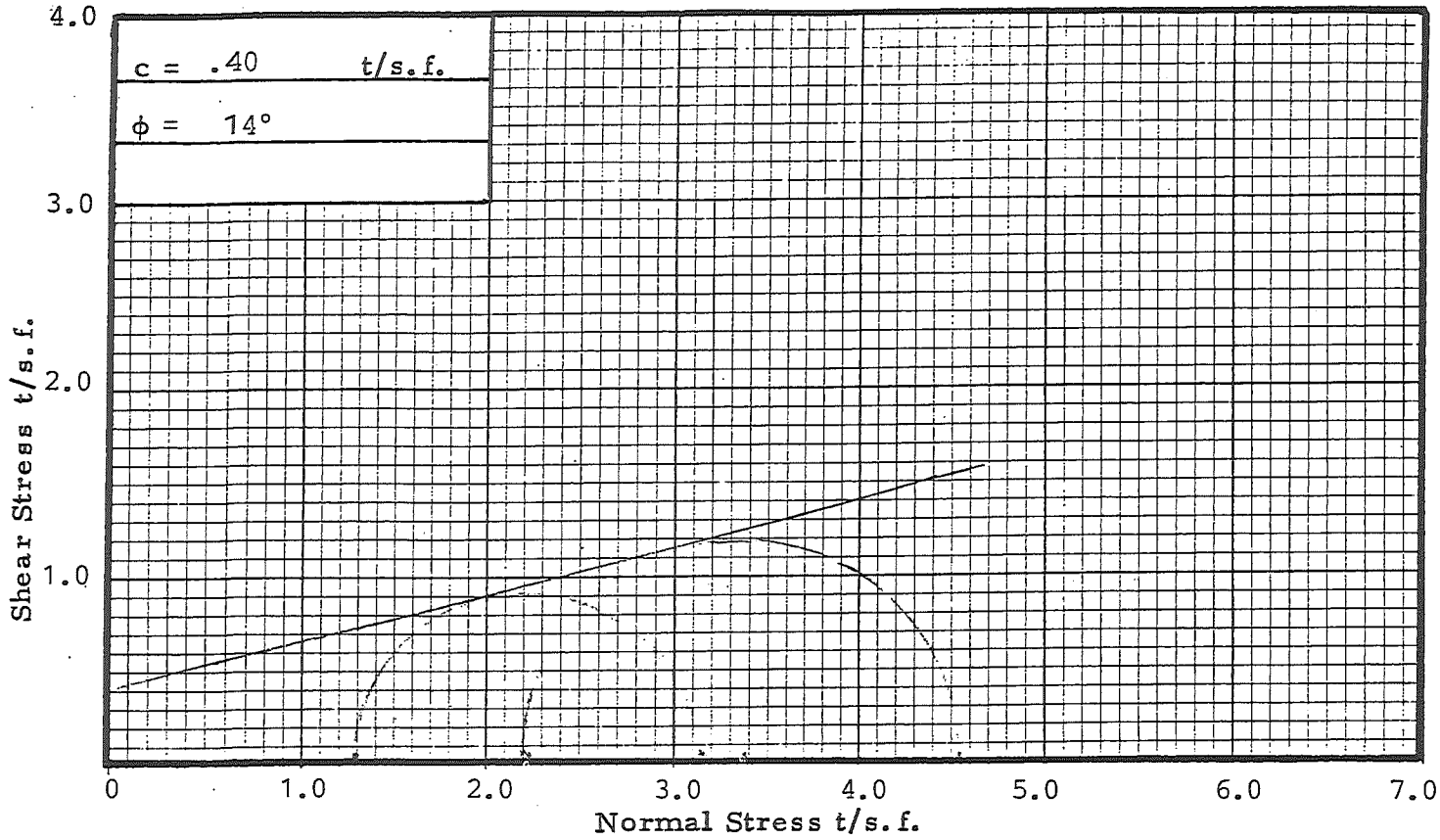
Boring No. L-5

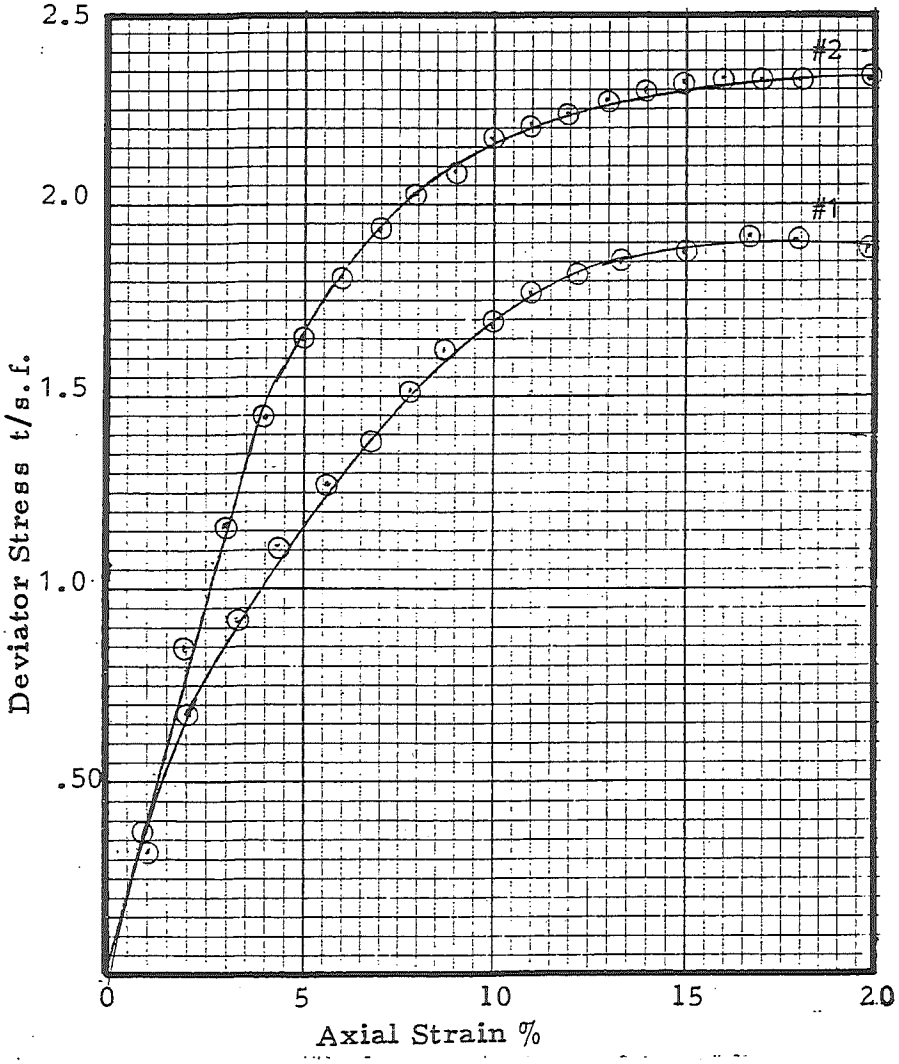
Depth 45.0'-47.0'

Technician CB

C. 4533 Date 1/27/91

Triaxial Compression Test





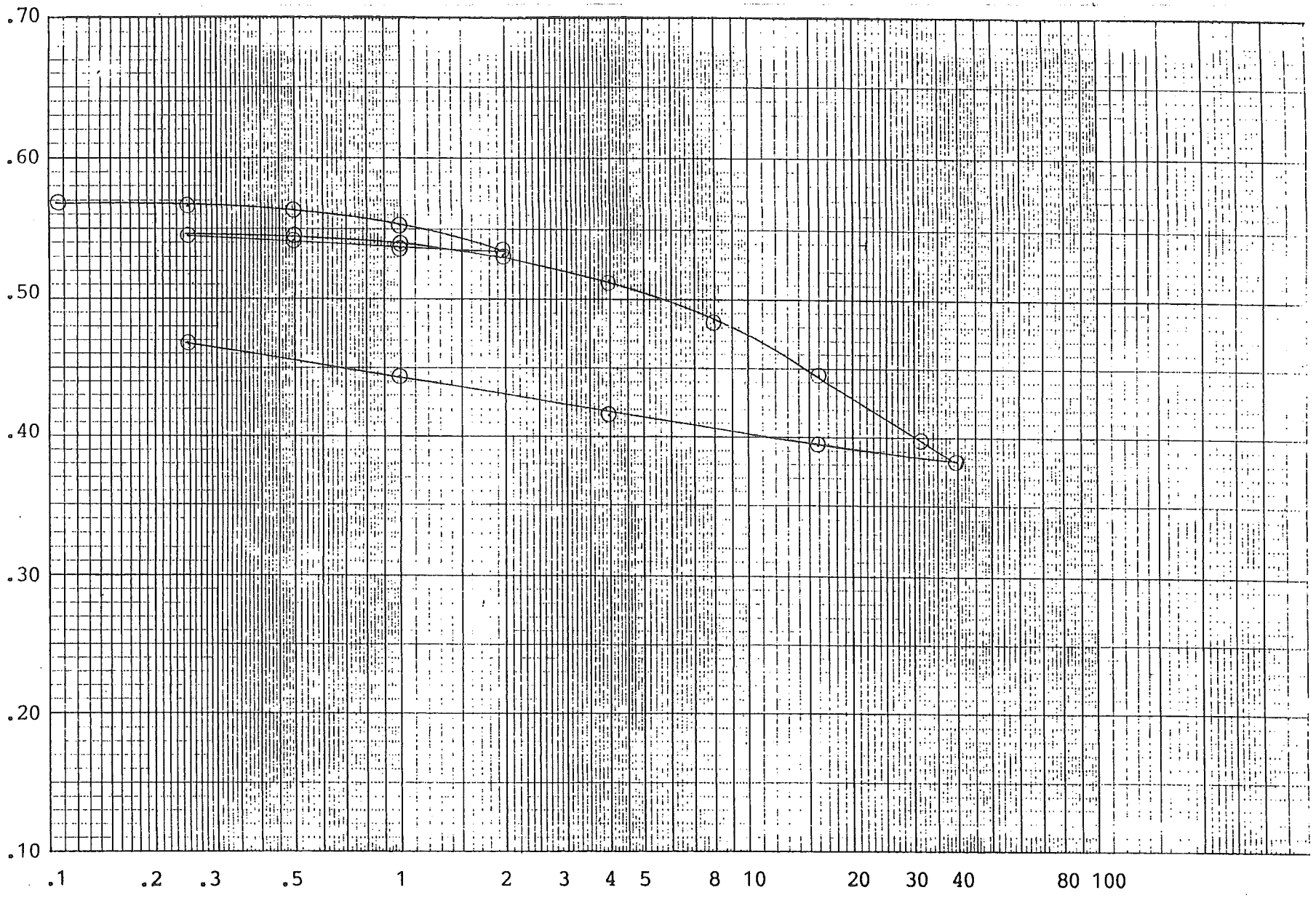
Sample No.		1	2	3
Diameter, in.	D_o	2.85	2.85	
Area, in.^{2}	A_o	6.38	6.38	
Height, in.	H_o	4.50	5.00	
Volume, in.^{3}	V_o	28.71	31.90	
Moisture Content	%	21.8	21.8	
Wet Unit Weight #/	γ_w	131.2	132.7	
Dry Unit Weight #/	γ_d	107.7	108.9	
Void Ratio	e	.577	.559	
Confining Press., t/s.f.		1.30	2.23	
Deviator Stress, t/s.f.		1.87	2.33	

Boring No. L-7

Depth 40.0'-42.0'

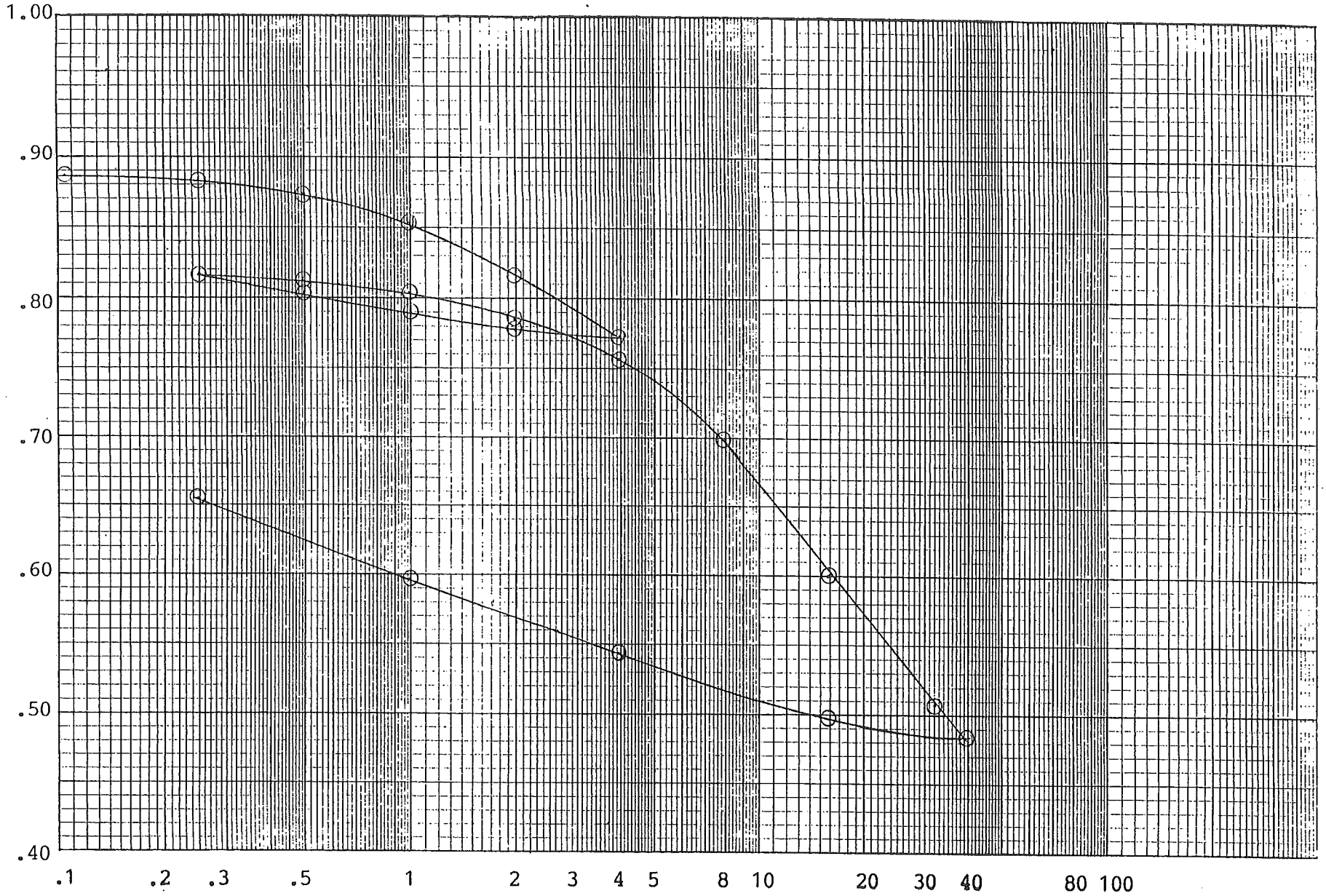
Technician CB

C. 4733 Date 1/27/91



VOID RATIO VERSUS LOAD						
Moist. Cont.	L.L.	P.I.	e_o	Cc	Spec. Gravity	Classification
21.6			.569		2.69	Gray silty clay w/s rock frags.
DAVID V. LEWIN CORP.				CLEVELAND, OHIO		

Boring No. L-1 Sample No.
Depth 28.0'-30.0' C.4533
Technician CB Date 1/27/91

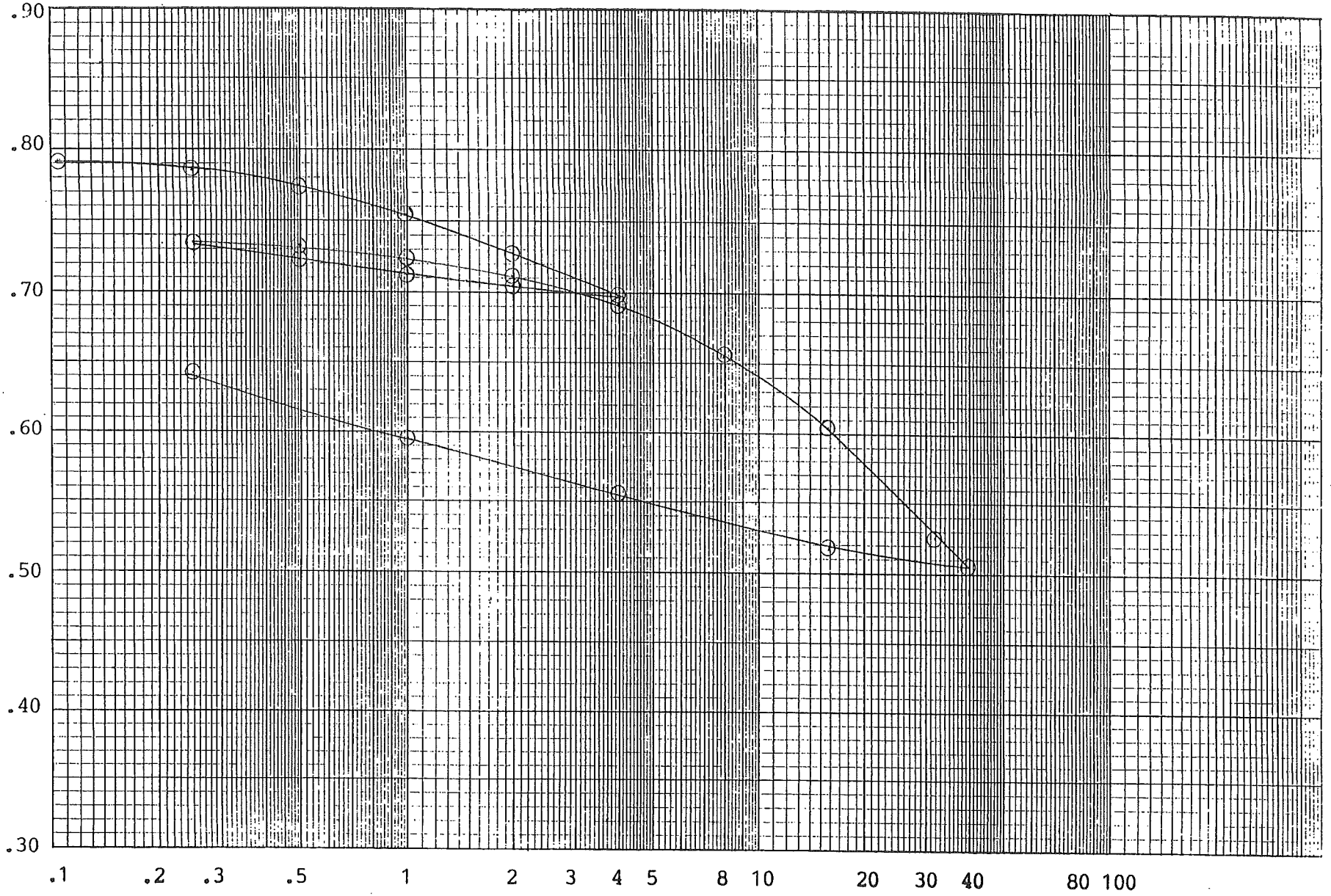


VOID RATIO VERSUS LOAD

Moist. Cont.	L.L.	P.I.	e_o	Cc	Spec. Gravity	Classification
32.5			.887		2.71	Gray silty clay

DAVID V. LEWIN CORP. CLEVELAND, OHIO

Boring No. L-4 Sample No. ____
Depth 25.0'-27.0' C. 4533
Technician CB Date 1/27/91

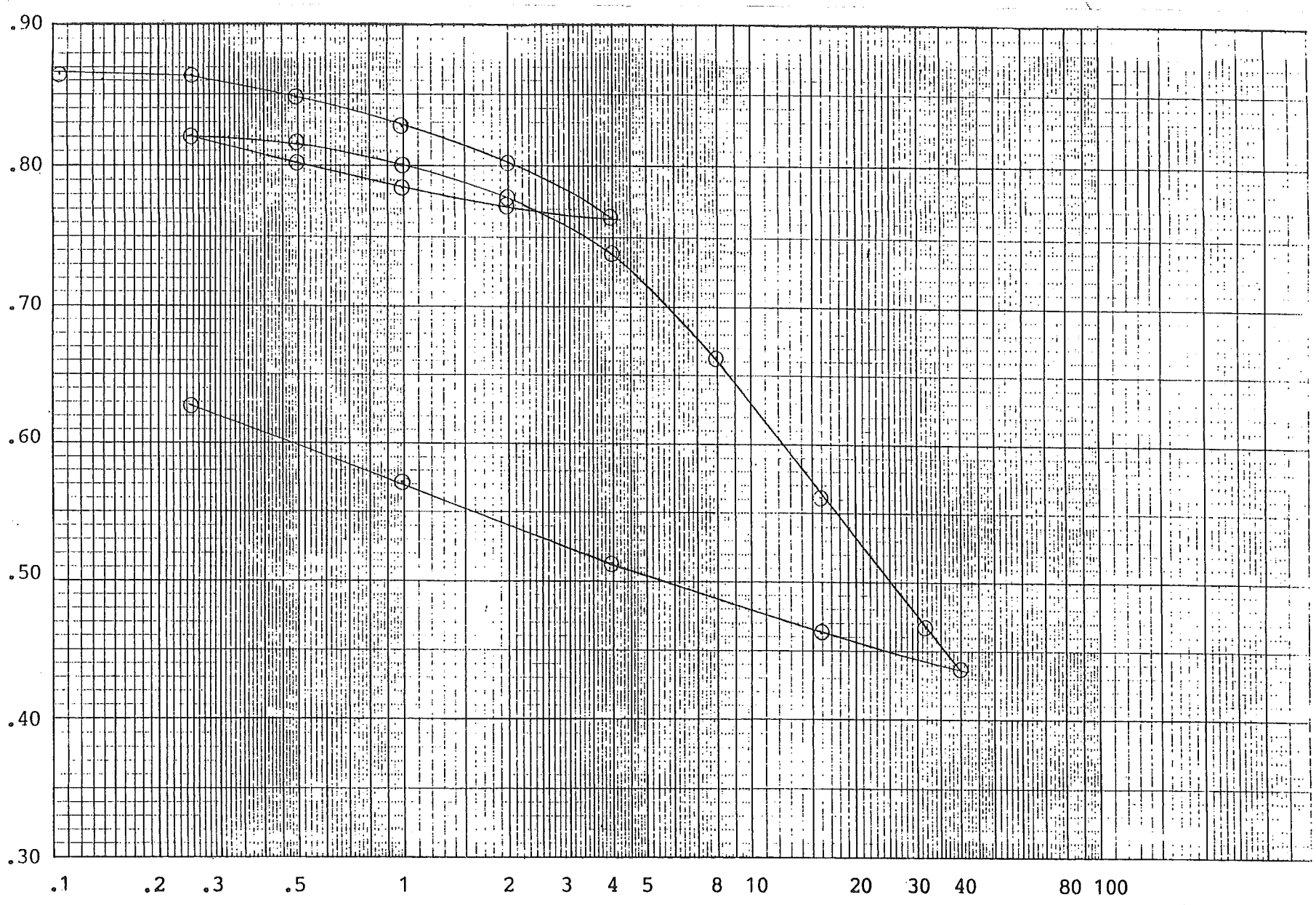


VOID RATIO VERSUS LOAD

Moist. Cont.	L.L.	P.I.	e_o	Cc	Spec. Gravity	Classification
27.6			.791		2.73	Gray silty clay

DAVID V. LEWIN CORP. CLEVELAND, OHIO

Boring No. L-5 Sample No.
Depth 37.0'-39.0' C. 4553
Technician CB Date 1/27/91



VOID RATIO VERSUS LOAD

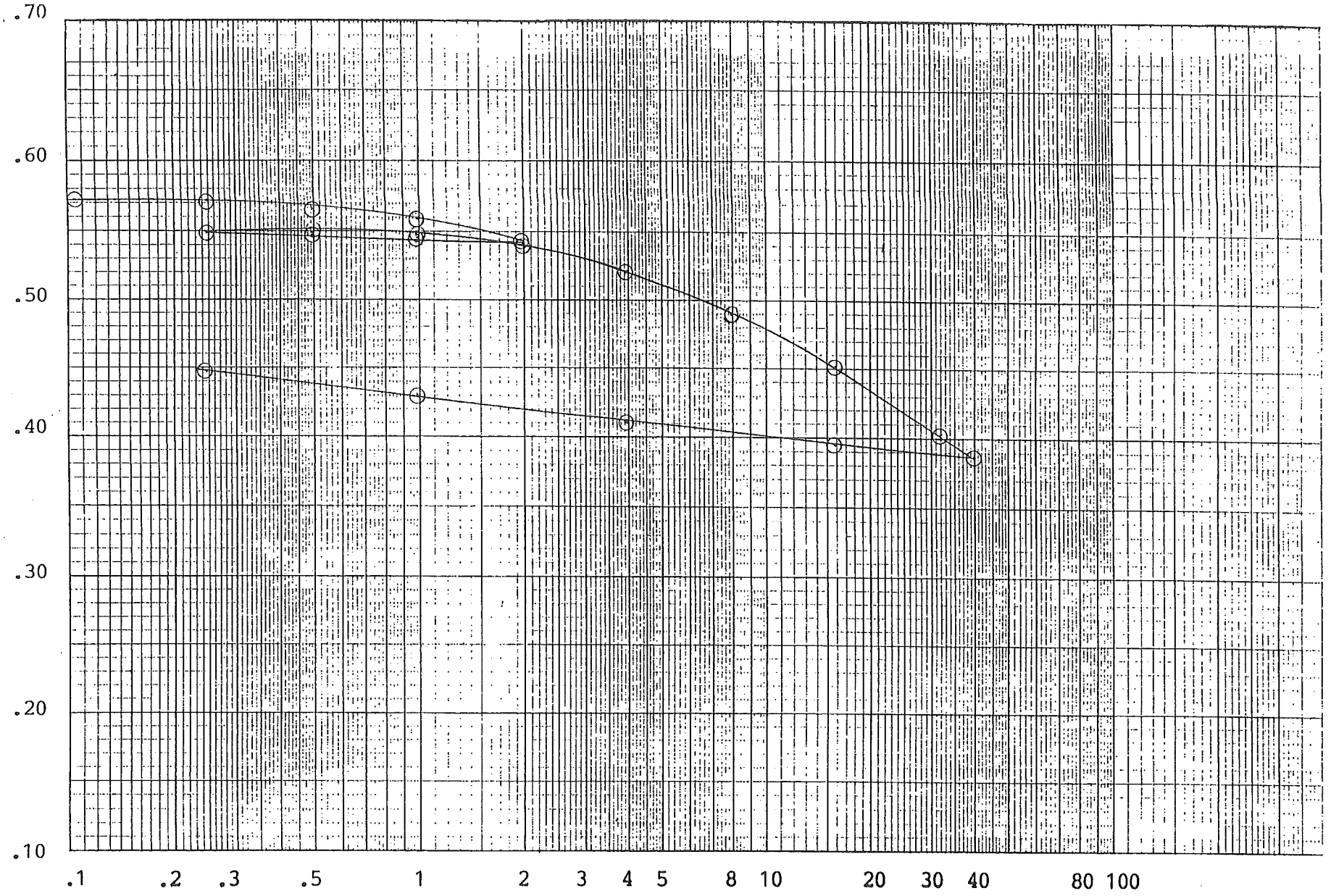
Moist. Cont.	L.L.	P.I.	e_o	Cc	Spec. Gravity	Classification
31.5			.864		2.71	Gray silty clay

DAVID V. LEWIN CORP. CLEVELAND, OHIO

Boring No. L-5 Sample No.

Depth 45.0'-47.0' C. 4533

Technician CB Date 1/27/91

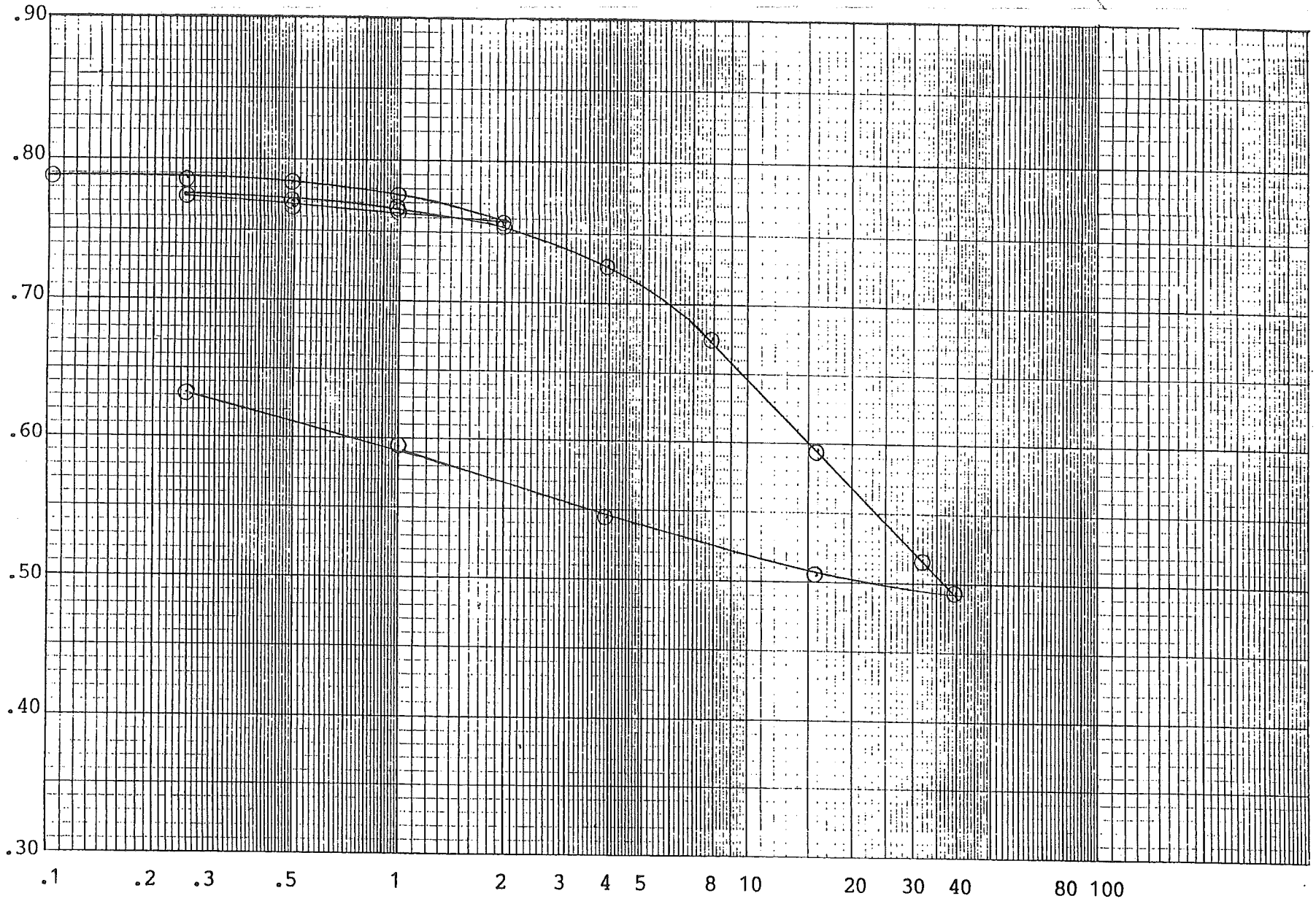


VOID RATIO VERSUS LOAD

Moist. Cont.	L.L.	P.I.	e_o	Cc	Spec. Gravity	Classification
17.8			.572		2.72	Gray silty clay

DAVID V. LEWIN CORP. CLEVELAND, OHIO

Boring No. L-7 Sample No.
Depth 40.0'-42.0' C. 4533
Technician CB Date 1/27/91



VOID RATIO VERSUS LOAD

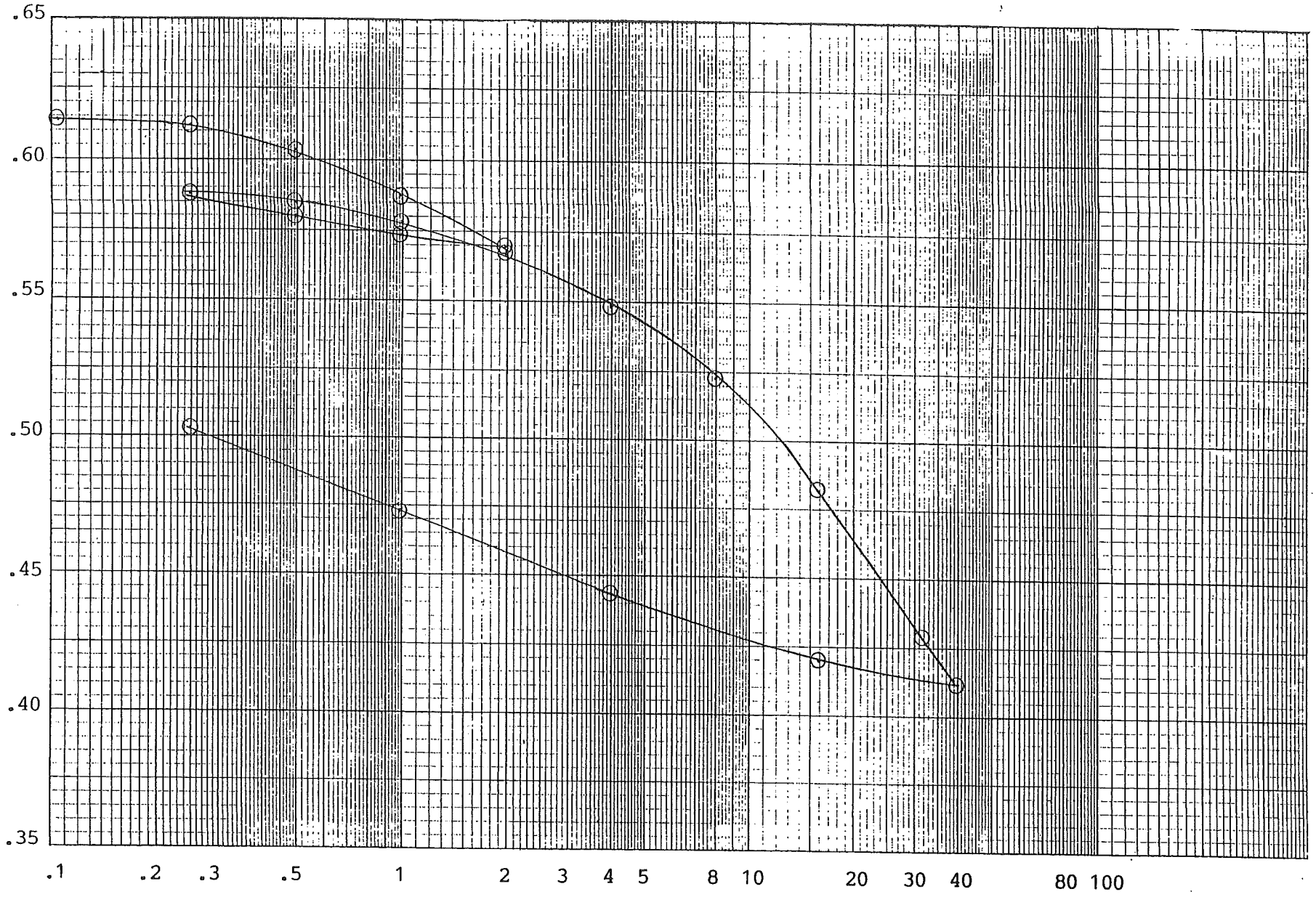
Moist. Cont.	L.L.	P.I.	e_o	Cc	Spec. Gravity	Classification
29.6			.789		2.70	Gray silty clay

DAVID V. LEWIN CORP. CLEVELAND, OHIO

Boring No. L-11 Sample No.

Depth 36.5'-38.5' C. 4533

Technician CB Date 1/27/91



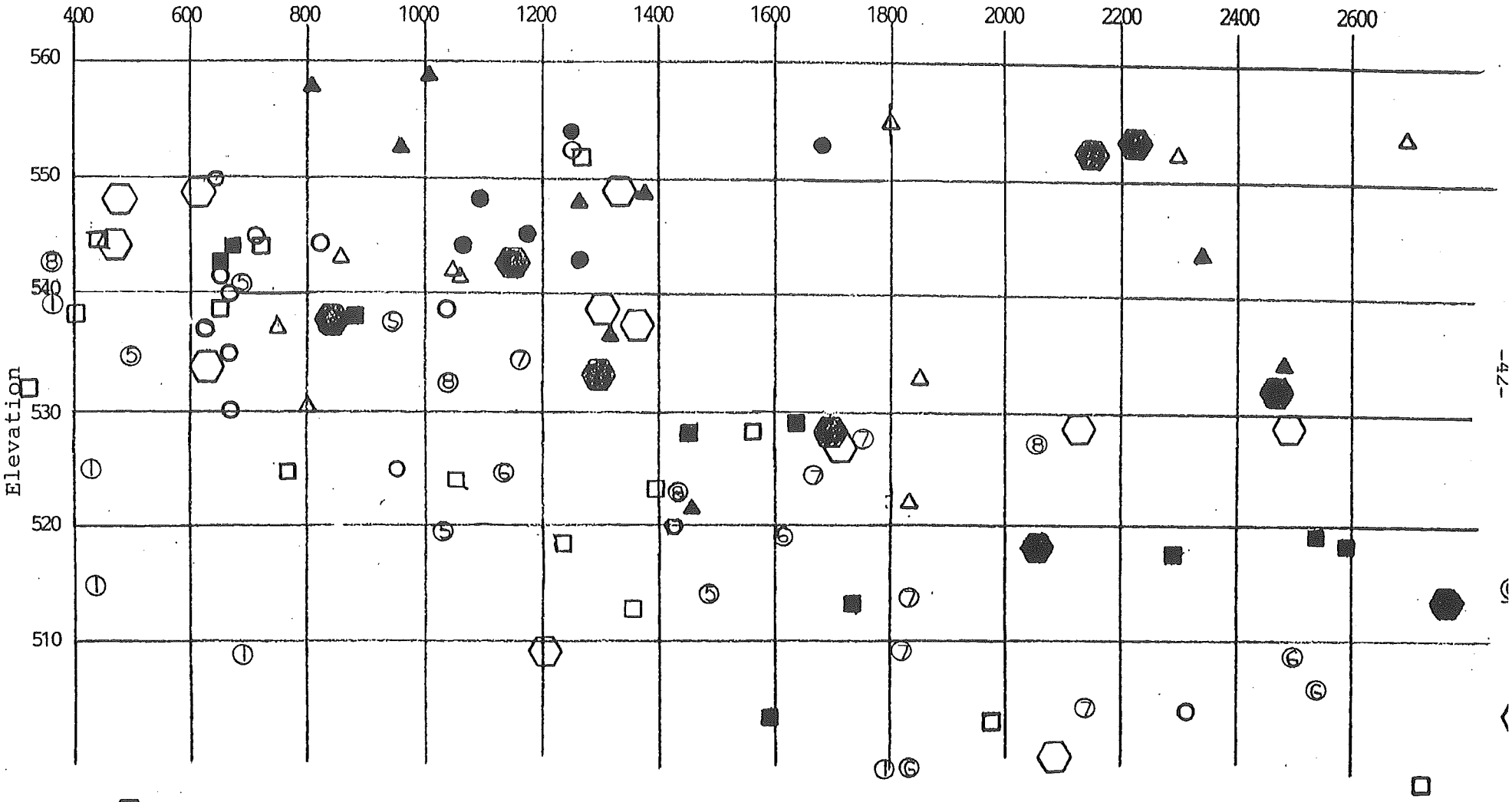
VOID RATIO VERSUS LOAD

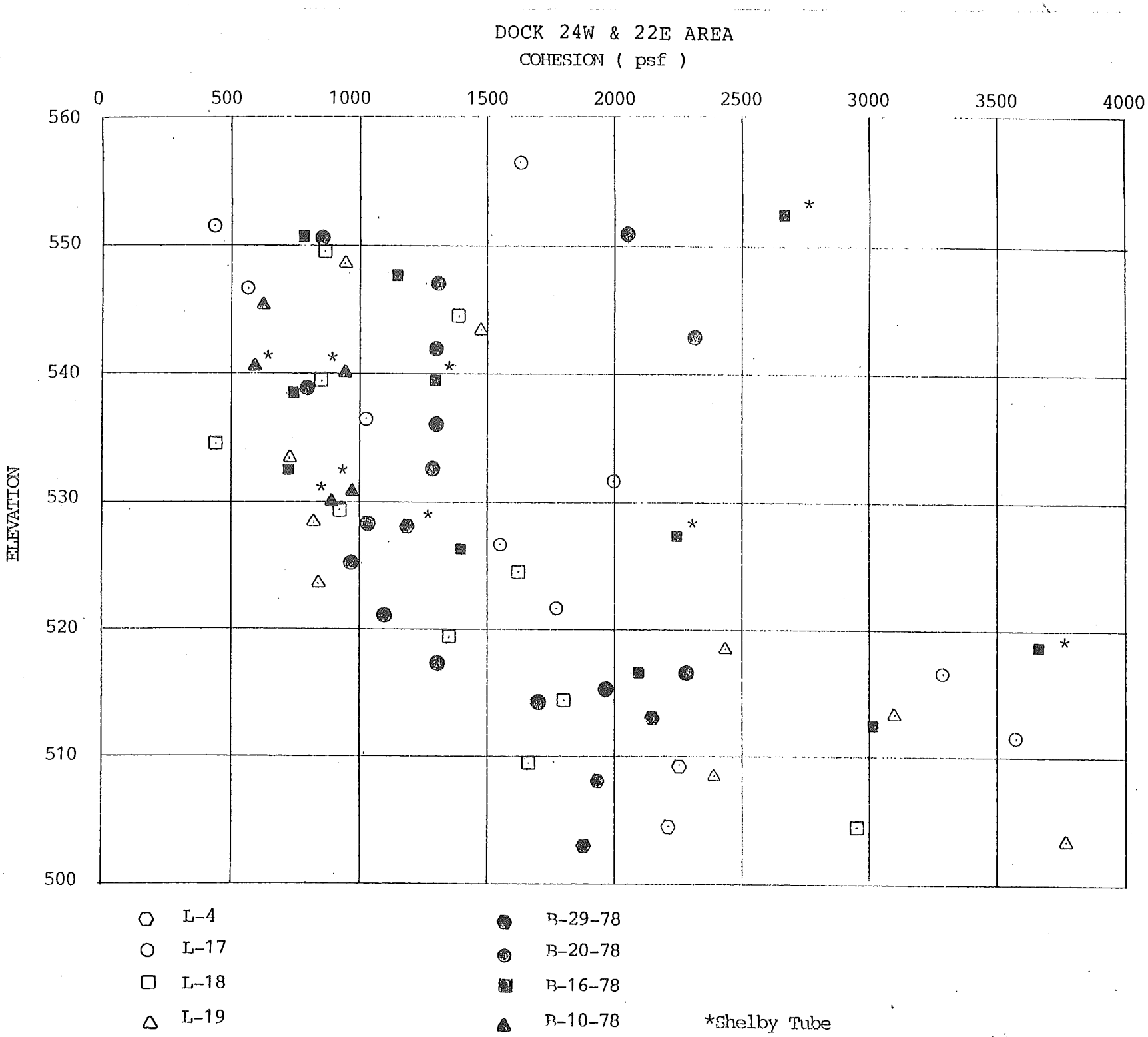
Moist. Cont.	L.L.	P.I.	e_o	Cc	Spec. Gravity	Classification
20.6			.614		2.69	Gray silty clay w/silt seams

DAVID V. LEWIN CORP. CLEVELAND, OHIO

Boring No. L-11 Sample No.
Depth 23.5'-25.5' C. 4533
Technician CB Date 1/27/91

DOCK 20 AREA
COHESION (psf)




DOCK 24W & 22E AREA
COHESION (psf)
0
500
1000
1500
2000
2500
3000
3500
4000
560
550
540
530
520
510
500
ELEVATION
L-4
L-17
L-18
L-19
B-29-78
B-20-78
B-16-78
B-10-78
*Shelby Tube

A P P E N D I X A

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-1

Surface Elevation 578 ± 579.2

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C. - %	Unit Dry Weight #/cu. ft.
		Fill: brick, stone, concrete & sand	47	3.5							
		w/some organic material	1	6.5	25.5						
10		slag	12	10.0						5.7	
		slag									
		Sand, gray, w/few thin silt seams	8	15.0							
20		Clay, gray, silty, w/some silt seams & sand seams	22	20.0							
			11	25.0	24.0	32	13	1025	8.7		105
30		gray, silty, w/trace of gravel	12	30.0	23.5						
			S-1		31.9			1190	17.0		108
					29.6	41	17				
			13	33.5 35.0	28.2 24.9			1160	10.8		96
40			14	40.0	26.5						
		gray, silty						1540	20.0		105
			6	45.0	29.6						
50					29.4			450	20.0		100
			S-2		30.9	36	14				
				48.5	31.7			855	15.8		93
			6	50.0	25.9			1070	12.0		96
		gray, silty, w/trace of gravel & sand						580	20.0		107
60			7	55.0	21.3			1150	20.0		110
			16	60.0	20.0	29	11	2200	20.0		117
			23	65.0	21.1			2290	20.0		115
70		gray, silty, w/some rock fragments & gravel	25	70.0	18.3			3210	20.0		119
			26	75.0	20.8			2370	20.0		113
80			37	80.0	20.5			3150	20.0		112
			41	85.0	20.4			3050	20.0		109
90			36	90.0							
			30	95.0	11.4			5500	9.7		131
100		End of boring @ 100.0'	39	100.0	11.2			8000	15.0		130
110											

REMARKS:
Encountered water at 4.5'
Water at 13.0' on completion

Boring Completed: 10/7/77
Location: Cleveland, Ohio
Job No.: C. 3033

Method of Sampling:
Split spoon ☑ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-2

Surface Elevation 578 ± 577.94

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C. - %	Unit Dry Weight #/cu. ft.
		Fill: brick, rocks, wood, coal	19	3.5							
		w/some organic material	8	6.5	25.8					13.4	
10		gray sand & sandstone	80	10.0							
		Sand, gray, w/trace of gravel silty	23	15.0							
20		Clay, gray, silty, w/silt seams	11	20.0	19.8						
			9	25.0	22.9			2220	17.8		107
					24.4			2150	10.5		103
			S-1		22.4			2860	13.9		106
30				28.0	23.7						
			14	30.0	21.8						
		gray, silty, w/trace of gravel	7	35.0	24.7			1150	20.0		107
40		gray, silty, w/trace of gravel, rock fragments & sand	8	40.0	29.0			850	20.0		107
			10	45.0	21.2			1300	20.0		113
					20.1			2480	14.8		110
			S-2		22.6			3110	8.8		105
50				48.5	19.5						
			10	50.0	22.9			1700	20.0		111
			13	55.0	22.0						
60			16	60.0	20.7			2050	20.0		114
		gray, silty, w/gravel & rock fragments	28	65.0	15.8			2760	17.7		123
70			30	70.0	15.5			3130	20.0		122
			32	75.0	17.2			3700	16.2		120
80		Silt, gray, clayey, w/some sand seams	54	80.0	13.7			5350	3.4		123
			113	84.5	13.4						
90			205	89.5	12.7						
		Clay, gray, silty, w/gravel & rock fragments	105	95.0	11.9						
100			40	100.0	12.6						
		w/sand seams	234	105.0	11.0						
110		End of boring @ 105.0'									
120											

REMARKS:
Encountered water at 4.5'
Water at 14.0' on completion

Boring Completed: 10/5/77
Location: Cleveland, Ohio
Job No.: C. 3033

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-3

Surface Elevation 584.0

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss On Ignition @ 600° C. - %	Unit Dry Weight #/cu. ft.
		Fill: black cinders & slag									
		brown sand	4	3.5							
			8	6.5							
10		black cinders, brick, limestone fragments & sand	16	10.0							
		black & brown sand w/tr. of veg., tr. of glass & cinders	13	15.0						7.6	
20		black & brown silty sand w/ organic mat'l & trs. cinders	19	20.0						5.5	
			12	25.0						5.3	
		Clay, gray, silty w/some silt & sand seams	S-1		25.8			790	20.0		102
30		**			24.6			1080	13.8		98
					25.6						
			10	35.0	29.2						
40		*	10	40.0	27.2			1130	16.7		101
			8	45.0	23.2						
50		*	9	50.0	24.7			1050	20.0		102

F-L-1

REMARKS End of boring at 50.0'

Water at 8.0' upon completion
Water at 6.6' on 2/24/73

Boring Completed: 2/15/73

Location: Cleveland, Ohio

Job No.: C. 2337

*Liner sample
*See Consolidation Test

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. B-3

Surface Elevation 571 ±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Water									
		Sand, brown & gray	10	17.5							
		Clay, gray, silty, w/trace of gravel & silt seams	7	22.5	28.8			950	17.0		105
		gray, silty, w/trace of gravel	7	27.5	24.9						
			9	32.5	27.5			760	20.0		100
			11	37.5	25.2			850	20.0		105
		End of boring @ 37.5'									

F-L-1

EMARKS

Boring Completed: 12/19/77

Location: Cleveland, Ohio

Job No.: C. 3033 A

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☐
Core drill ☐ Auger ☐

Boring No. B-7

Surface Elevation 571+

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Water									
10		Sand, brown & gray, w/some organic matter	18	12.0	29.2						
		Clay, gray, silty, w/trace of gravel & some silt seams	10	17.0	28.5			950	20.0		101
20			11	22.0	28.3						
			10	27.0	29.1						
30		gray, silty	11	32.0	28.0			460	15.3		101
		w/some sand & gravel	9	37.0	18.6			1900	20.0		121
40		End of boring @ 37.0'									
50											

F-L-1

EMARKS

Boring Completed: 12/19/77

Location: Cleveland, Ohio

Job No.: C. 3033 A

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-8

Surface Elevation 578 ± / 577.6

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill: slag, sand, & red brick	7	3.5							
		gray sand, w/some brick, slag, & trace of organic material	6	6.5							
0		gray silty sand, w/some gravel, decayed wood & trace of brick	14	10.0							
			18	15.0							
		Clay, gray, silty, w/some silt seams	S-1		26.8						
0		& few sand seams		20.0	25.7 23.5			1010 805	9.8 11.0		101 102
		trace of organic material @ 20.0'									
			7	25.0	27.8			960	12.9		100
					24.2						
30			S-2		25.1			1380	4.9		100
				30.0	25.2			1270	6.9		100
			10	35.0	21.7			2340	18.3		106
40			X	40.0							
			9	41.5	21.8			1320	9.9		113
					22.6						
			S-3		22.3			2480	20.0		107
				45.0	21.1			2180	20.0		107
0		gray, silty, w/some silt seams	9	50.0	25.3						
			X	55.0							
			12	56.5	22.0			1460	20.0		113
0			10	60.0	21.7						
			12	65.0	21.2						
		End of boring @ 65.0'									
70		REMARKS:									
		Water encountered at 5.0'									
		X - Attempted shelby tube sample, no recovery									

Boring Completed: 12/30/77
Location: Cleveland, Ohio
Job No.: C. 3033 A

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-9

Surface Elevation 578 ± 577.96

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C. - %	Unit Dry Weight #/cu. ft.
		Fill: slag & cinders									
		slag, cinders, sand & brick, organic material @ 3.5'	7	3.5	18.5					6.9	
		brown & gray silty sand	9	6.5							
10		w/some brick @ 10.0'	14	10.0							
		Sand, gray, silty	14	15.0							
20			13	20.0							
		Clay, gray, silty, w/some silt seams & few sand seams	S-1		26.1 27.9			1240	6.0		99
				25.0	25.6			1670	6.9		99
30			9	30.0	26.1			1090	16.7		102
		*	S-2		24.3 25.1			1170 1060	9.9 7.5		101 101
				35.0	26.1	41	17	1260	17.5		99
40			8	40.0	29.5						
			X	45.0							
			4	46.5	28.4						
50		gray, silty	6	50.0	27.0						
			X	53.0							
			5	55.0	27.2						
			X	57.0							
60			8	60.0	29.8						
		End of boring @ 65.0'	10	65.0	22.2						
70											

REMARKS:
Water at 7.0' after casing was pulled
X - Attempted shelby tube sample-no recovery
* - See consolidation graph

Boring Completed: 1/3/78
Location Cleveland, Ohio
Job No.: C. 3033 A

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-10

Surface Elevation 582 ± 586.2

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Loss on Ignition @ 600°C. - %	Unit Dry Weight #/cu. ft.
		Fill: cinders, sand, brick, concrete & trace of wood	9	3.5							
			6	6.5							
10			9	10.0							
			7	15.0	29.3					13.0	
20			14	20.0							
		gray & black silty sand, w/ trace of vegetation & pieces of coal	9	25.0	33.7					8.9	
30		gray & brown silty sand, w/ sandstone fragments	12	30.0							
		Clay, gray, silty, w/some silt seams	7	35.0	35.0						
		trace of wood @ 35.0'	8	36.5	29.6			610	20.0		97
40					33.9						
			S-1		31.0			585	6.9		90
				42.0	28.4			935	9.9		101
		gray, silty, w/some silt seams	10	46.5	23.5						
50					31.6						
		*	S-2		33.0			970	11.0		92
				52.0	31.5	40	17	890	10.9		91
			7	56.5	25.2						
60		gray, silty									
			X	62.0							
			4	63.5	28.4						
70			12	70.0	22.2						
		End of boring @ 70.0'									
80											

REMARKS:
Water at 13.0' on completion
X - Attempted shelby tube sample-no recovery
* - See consolidation graph

Boring Completed: 1/4/78
Location: Cleveland, Ohio
Job No.: C. 3033 A

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☑ Shelby ☑
Core drill ☐ Auger ☐

Boring No. B-11

Surface Elevation 578 ± 579.64

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Concrete - 6"									
		Fill: slag & limestone	30	3.5							
		black cinders & sand	13	6.5							
10		gray silty sand, w/some gravel, silt seams & trace of organic material	28	10.0							
		gray silt, w/some vegetation & slag	11	15.0	21.1						
		gray silty sand, w/some vegetation, cinders & brick	7	20.0							
20		boulders	50/0	24.0							
		Sand, gray, silty									
		Clay, gray, silty, w/some silt seams									
30			14	30.0	27.1						
			9	35.0	25.4			1960	12.9		106
					27.9			1100	5.3		98
			S-1		24.1			1360	8.1		101
40				37.0	24.6						
			12	41.5	24.9			1750	15.0		105
			8	46.5	26.5			1040	20.0		102
50		gray, silty			22.7						
			S-2		27.8						
				52.0	24.6			880	20.0		105
			10	56.5	26.0			1230	20.0		105
60			X	60.0							
			12	61.5							
			15	65.0	21.8			1520	18.5		118
70			16	70.0	21.7						
		End of boring @ 70.0'									
		REMARKS:									
		Water at 8.0' on completion			Boring Completed: 1/6/78						
		X - Attempted shelby tube sample-no recovery			Location: Cleveland, Ohio						
80					Job No.: C. 3033 A						

Boring No. F-1 Job No. C. 3033 Boring No. F-2

Surface Elevation 579.2

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches
		Fill: cinder & gravel	
10			
		Sand, gray, coarse to fine	
20			
		Clay, gray, soft	15
30			9
40			
50			9
60			12
70			12
			16
		gray, stiff, with pebbles	80
80			
90		Sand, dark gray, coarse	
100		Clay, gray, hard	143
110		gray, hard, with stone	150
120			200
130			225
		Shale, gray, soft to hard	
140			

Surface Elevation 580.34

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches
		Fill: cinders & brick	
		Sand, fine, gray	
10			
		Clay, gray, soft	
20			7
30			7
			6
40			6
			11
50			11
			12
60			13
			17
70		gray, stiff with pebbles	19
			28
80			32
		gray, hard, with pebbles	27
90			87
			90
100		Sand, gray, fine, silty	
			179
110		Clay, gray, hard, with pebbles & shale fragments	
			161
		gray, stiff	
120			35
			39
		Sand, gray, medium, with gas	
130		Clay, gray, hard, with stones	
			98
140		Shale, gray, soft to hard	

Boring No. 9-1 Job No. C. 3033

Surface Elevation 579.0

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches
		Fill: cinders & slag	
10		cinders & fine sand	
20		Sand, gray, fine, medium dense	
		Clay, gray, silty, w/silt seams, medium stiff	
		gray, silty, soft	
30			
40			
		gray, silty, w/silt seams, medium stiff	
50			
60			
70		gray, sandy, w/fine gravel, stiff to very stiff	
80			
90			
		gray, sandy, w/fine gravel & shale fragments, hard	
100			
		Silt, gray, w/fine sand, very dense	
110			

Boring No. 9-2

Surface Elevation 576.5

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches
		Fill: cinders & slag	
10		sand, gravel & wood	
20		Sand, brown & gray, fine to silty	
		Clay, gray, silty, w/silt seams, medium stiff	
30		gray, silty, w/trace of fine gravel, soft	
40			
50			
60		gray, silty, w/silt seams, medium stiff	
70		gray, sandy, w/fine gravel, stiff to hard	
80			
90			
100			
110			

Boring No. 9-3 Job No. C. 3033

Surface Elevation 579.0

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches
0		Fill: cinders & slag	
10			
20		Sand, gray, silty, fine w/some cinders, loose	
		Clay, gray, silty, w/silt seams, medium stiff	
30			
40		gray, silty, soft	
50		gray, silty, w/silt seams, medium stiff	
60		gray, sandy, w/fine gravel, medium stiff	
70		gray, sandy, w/fine gravel & shale fragments, very stiff to hard	
80			
90			
100		Shale, gray	
110		w/thin sandstone layers	
		brown & gray	
120			

Boring No. 9-5

Surface Elevation 578.0

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches
0		Fill: cinders & slag	
		cinders, coal & slag	
10		cinders & slag	
		broken sandstone	
20		sand, fine to coarse	
		sand & gravel w/slag fragments	
		Clay, gray, silty, w/silt seams, medium stiff	
30			
40		gray, silty, w/trace of gravel, soft	
50			
60		gray, sandy, w/fine gravel, medium stiff to stiff	
70			
80			
90		gray, sandy, w/fine gravel & silt seams, stiff	
		gray, sandy, w/fine gravel, very stiff to hard	
100			
		gray, silty, w/silt seams, very stiff	
110		Silt, gray, sandy, dense	
		Shale, weathered, w/sandstone fragments gray	
120			

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐
Boring No. B-4
Surface Elevation 573 ±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Water									
		Clay, gray, silty, organic, w/sand, seams	8	16.5	45.9						
			2	18.0	43.0						
		gray, w/silt seams	2	19.5	31.6						
			33	24.0	28.0						
			S-1		22.0			1240	7.1		99
			11	27.0	23.2			1520	10.5		96
				28.5	29.4						
			12	35.0	34.3			580	20.0		93
					24.9						
			S-2		24.8			1330	19.9		104
				40.0	24.8			1330	19.9		100
			8	41.5	31.8						
			9	45.0	30.2						
		gray, silty, w/silt seams & trace of gravel	X	50.0							
			21	51.5	26.8						
			X	54.0							
			33	55.5	24.9						
			16	60.0	20.1						
			37	65.0	22.4			2260	20.0		107
			36	70.0	22.8			2410	20.0		107
			37	75.0	21.6			2450	20.0		111
		gray, silty, w/some gravel & rock fragments	31	80.0	25.6			2250	20.0		106
			63	85.0	20.7			1800	20.0		110
			87	89.5	11.5						
			107	94.5	12.1						
		gray, silty, w/silt seams	92	99.0	15.7						
			84	104.5	20.7						

End of boring @ 104.5'

REMARKS:
X - Attempted shelby tube sample - no recovery

Boring Completed: 4/28/78
Location: Cleveland, Ohio
Job No.: C. 3033 A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☒ Core drill ☐ Auger ☐
Boring No. B-5
Surface Elevation 573 ±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Water									
		Clay, gray	2	36.5	32.9						
			1	38.0	35.1						
			2	39.5	36.9						
			4	41.0	37.2						
					32.6			380	20.0		94
			S-1		45.0	37.6					
					46.5	33.7					
			4	50.0	34.8						
			4	55.0	37.6						
					32.8						
			S-2	60.0	31.1			450	20.0		96
			6	61.5	31.4						
		gray, silty, w/silt seams	38	65.0	23.6			1680	18.0		106
			44	70.0	23.5			2200	20.0		101
			42	75.0	24.1			2010	13.2		104
			34	80.0	23.3						
			34	85.0	19.9			2190	20.0		118
			34	90.0	21.6			1830	17.0		109
		gray, silty, w/gravel & rock fragments	75	94.5	16.7						
		gray, silty, w/gravel, rock fragments & silt seams	48/.5	99.0	11.6						
		Silt, gray, w/some clay seams, gravel & rock fragments	50/.3	105.3	9.4						
		Shale	50/.3	110.3							

End of boring @ 115.0'

REMARKS:

Boring Completed: 9/7/78
Location: Cleveland, Ohio
Job No.: C. 3033A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐
Boring No. B-26
Surface Elevation 573 ±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Water									
		Sand, brown	14	18.5	18.8						
		Clay, gray, silty	14	25.0	25.3						
			S-1	28.0	24.8			1690	15.3		101
					22.2			1720	12.0		103
			12	29.5	26.9			1350	16.9		105
			130	35.0	25.5						
		gray	S-2	39.0	28.6			750	16.9		93
					30.2			550	12.0		95
			6	40.5	31.9						
			5	45.0	33.3						
		gray, silty, w/fine rock fragments	S-3	49.0	28.4			1180	12.6		100
					27.7			1620	15.6		100
			18	50.5	29.1			1240	20.0		106
			16	55.0	19.7						
			S-4	58.0	29.3			1290	13.1		96
					28.6			Insufficient Sample			102
			23	59.5	24.0			1200	10.4		103
								855	13.8		106
			22	65.0	24.5						
			55	70.0	16.6			2740	20.0		119
			43	75.0	16.6						
			58	80.0	19.9						
			63	85.0	20.1			3310	20.0		105
			91	90.0	12.7						
		gray, silty	99	95.0	12.2			5100	11.8		126
			51/.5	99.0	12.4						
			100	104.5	20.2			2800	6.6		111
			42	110.0	26.0						
		gray, w/silty sand seams	57	115.0	23.8						
			59	120.0	23.1						
			66	125.0	23.0						
		Shale, gray	50/0	128.5							

End of boring at 130.0'

REMARKS:

Boring completed 4/28/78
Location: Cleveland, Ohio
Job. No.: C. 3033A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☒ Core drill ☐ Auger ☐
Boring No. B-29
Surface Elevation 573 ±

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Water									
		Clay, gray, silty, w/trace of gravel	11	36.5	31.3						
			12	38.0	23.1						
			15	41.5	21.1						
					20.8			1190	13.5		107
			S-1		23.6			1170	16.5		104
				46.5	23.6						
			15	48.0	24.6						
		gray, silty, w/silt seams									
			15	55.0	26.1						
			33	60.0	23.4			2150	16.7		109
			35	65.0	21.9			1930	20.0		105
			37	70.0	22.4			1870	13.1		104
		gray, silty, w/some gravel & trace of rock fragments	60	75.0	15.5			3210	20.0		116
			66	80.0	15.1			3100	20.0		121
		Sand, gray, w/trace of gravel & some silt seams	82	85.0	15.4			3000	20.0		122
			91	90.0							
			81	95.0							

End of boring @ 95.0'

REMARKS:

Boring Completed: 5/12/78
Location: Cleveland, Ohio
Job No.: C. 3033A

DAVID V. LEWIN CORP.
GEOTECHNICAL ENGINEERING — CLEVELAND, OHIO

LOG OF SOIL BORINGS B-4, 5, 26 & 29
CLEVELAND PELLET TERMINAL
PIER 20

No. 4	No. 3	No. 2	REV. No. 1	DRAWN BY	SCALE	DRAWING NO.
				APPROVED BY	DATE 5/30/78	3033A-5

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐

Boring No. B-13

Surface Elevation 577.49

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill, concrete, brick, sand	7	3.5							
		brown sand, cinders, sandstone	12	6.5							
10			16	10.0							
		brown to gray sand, w/pieces of shale	20	15.0							
20		Clay, gray, silty	7	20.0	24.3						
			S-1	23.0	23.6			4800	15.9		104
					23.6			2890	11.2		104
			12	24.5	21.8			2290	11.9		111
30			7	30.0	25.1			1440	11.9		105
			S-2	35.0	28.5			850	7.1		96
					28.2			1040	4.3		97
			8	36.5	28.0			1050	6.0		99
40			8	40.0	28.0			740	8.5		98
			S-3	45.0	21.9			1850	12.3		107
			11	46.5	24.2			800	11.9		104
50		gray, silty, w/gravel	10	50.0	22.3						
			17	55.0	19.7			1830	20.0		114
60			15	60.0	19.6			3270	20.0		118
			22	65.0	18.1						
70			19	70.0	17.0			3490	20.0		121
			26	75.0	16.3			2910	20.0		118
80			31	80.0	16.3			3600	14.6		119
		Silt, gray, w/clay seams and trace of gravel and rock fragments	62	85.0	17.8						
90			50/.5	89.5	15.2						
		Sand, gray	67	95.0							
100		Clay, gray, silty, w/gravel and rock fragments	81	100.0	13.7						
		End of boring at 100.0'									

REMARKS:

Water at 6.0' after casing was pulled

Boring completed: 4/25/78
Location: Cleveland, Ohio
Job. No. C. 3033A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐

Boring No. B-14

Surface Elevation 579.1

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill, black slag, gravel, brick	8	3.5							
		brown sand, w/ vegetation	9	6.5							
10		gray silty sand	12	10.0							
		black and gray sand, gravel	13	15.0							
20		Clay, gray, silty.	9	20.0							
			10	25.0	25.9						
30			S-1	30.0	29.4						
					29.4			1330	12.6		96
					34.2			610	6.0		88
			7	31.5	30.7			470	8.5		97
			9	35.0	30.3			450	9.8		95
40			S-2	40.0	24.8			1300	8.9		103
			7	41.5	23.3			1350	8.7		103
			8	45.0	25.8			620	20.0		100
50			S-3	50.0	18.5			2480	20.0		108
			17	51.5	19.6			1700	20.0		117
			22	55.0	19.1						
60		gray, silty, w/gravel	S-4a	60.0							
			30	61.5	18.8						
			31	65.0	15.9						
70			40	70.0	18.4			1200	20.0		117
			36	75.0	18.4			2900	20.0		115
80			40	80.0	17.3			2050	20.0		117
		Sand, gray, silty	47	85.0	13.4						
		Clay, gray, silty, w/ gravel and rock fragments									
90		Silt, gray, sw/ sand seams	89	90.0							
		Silt, gray, w/ clay, w/gravel and rock fragments	82	95.0	10.9						
100			97	100.0	10.3						
		End of boring at 100.0'									

REMARKS:

Water at 8.0' after casing was pulled

* No recovery

Boring completed: 4/27/78
Location: Cleveland, Ohio
Job. No. C 3033A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐

Boring No. B-15

Surface Elevation 581.71

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Asphalt - 4"									
		Fill: cinders, stones, clay, silt, sand, & bricks	36	3.5							
			4	6.5							
10			6	10.0							
			11	15.0							
20		w/some decayed wood	4	20.0							
		Clay, gray, silty, w/few silt seams	7	25.0	23.9			1190	13.3		102
30			2	30.0	23.7			830	8.6		102
			5	35.0	30.1			750	13.3		97
			S-1		31.0			1330	10.2		99
				37.5	25.2			1120	8.9		100
40			6	40.0	32.2			970	13.3		99
			X								
			S-2		28.8			940	18.6		97
					28.5			1020	12.3		100
50			7	47.5	22.5			910	11.9		105
				50.0	24.8			1340	20.0		104
			S-3		23.7			2220	9.6		104
					23.2			2180	10.5		105
				55.5	22.8			2570	13.6		105
60			9	60.0	22.9			1670	20.0		111
					22.1			2570	8.2		108
			S-4		22.8			2860	7.3		105
		gray, silty, w/some gravel & rock fragments		65.5	21.9			2680	7.7		105
70			12	70.0	21.2			1660	15.0		107
					14.6						
			S-5		13.5			4750	20.0		123
				75.3	15.2			4800	20.0		121
80			22	80.0	16.8			3780	20.0		121
			24	85.0	16.9			3750	20.0		118
90			21	90.0	21.6			2200	14.1		106
		Silt, gray, sandy Clay, gray, silty, w/rock fragments & gravel	44	94.5	10.6						
100			50	100.0	12.7			3900	8.1		129
		Silt, gray, clayey, w/gravel	79	104.5	9.9						
110		End of boring @ 109.5'	67	109.5	11.6			3950	8.6		127

REMARKS:

Water at 14.5' on completion
Water at 9.0' after pulling casing

Boring Completed: 5/1/78
Location: Cleveland, Ohio
Job No.: C. 3033A

DAVID V. LEWIN CORP.
GEOTECHNICAL ENGINEERS CLEVELAND, OHIO

LOG OF SOIL BORINGS- 13, 14 & 15
CLEVELAND PELLET TERMINAL
PIER -20

REV. NO. 1	DRAWN BY	SCALE	DRAWING NO.
	APPROVED BY	DATE 5/31/78	3033A-6

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-16

Surface Elevation 582.6

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill, cinders	3	3.5							
			8	6.5							
			5	10.0							
		sand and cinders	12	15.0							
		gray sand	20	20.0							
		gray sand, w/pieces of brick	4	25.0	25.3						
		clay, gray, silty, w/silt seams	S-1	30.0	22.0			2790	13.5		102
			5	32.0	22.0			2520	13.5		102
				12.0	28.7			780	9.9		98
			6	35.0	28.8			1140	8.3		100
		grey	S-2	40.0	22.0						
			S-3	44.0	26.8			1270	13.0		97
			4	44.0	30.7			720	13.3		96
			8	50.0	29.1			740	20.0		98
			S-4	52.5	23.0						
			S-5	54.5	26.0			2360	20.0		116
		gray, silty w/rock fragments and silt seams	8	56.0	26.4			1400	20.0		102
			9	60.0	20.6						
			S-6	64.5	18.5			1660	17.2		110
			18	66.0	20.8			2100	18.2		113
			20	70.0	18.8			3010	15.0		116
			80	75.0	16.0			4600	20.0		123
			23	80.0	15.4						
			19	85.0	15.8			3090	13.5		118
			19	90.0	16.9			2800	13.9		115
			25	95.0	14.0						
			34	100.0	12.6						
			38	105.0	13.6			6600	13.2		123
			63	110.0	10.1						
			36	115.0	21.8						
		grey, silty, w/silt seams	24	120.0	24.7			4100	11.8		102
			22	125.0	20.6						
			22	130.0	22.9			3150	11.0		105
		grey, silty, w/gravel and rock fragments	49	135.0							
		Shale, gray	50/0	138.5							
		End of boring at 138.5'									

REMARKS:

Water encountered at 7.5'

o No recovery

Boring completed 4/26/78
Location: Cleveland, Ohio
Job No. C, 3033A

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-17

Surface Elevation 579.15

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill: cinders, rocks & gravel	40	3.5							
		gray sand, w/clay seams	34	6.5							
			9	10.0							
		gray & black sand, w/some gravel, organic material, gray clay seams & trace of slag & metal	3	15.0							
			7	20.0	32.6						
		Clay, gray, silty, w/some silt seams	7	25.0	27.4						
			9	30.0	25.6						
			S-1	32.0	25.1			1280	13.1		102
			10	33.5	24.6			1750	10.9		102
					27.8			1100	20.0		100
		gray, silty	S-2		34.8			590	13.2		91
			8	40.0 41.5	26.2 35.0			1280 420	7.3 17.0		105 93
		gray	9	45.0	28.0						
			S-3		29.7 33.7			930 930	16.9 16.0		96 92
			10	50.0 51.5	30.4 30.4						
			10	55.0	28.9						
			X 2	61.5	31.5						
			4	65.0	27.6						
			S-4		30.3						
				70.0	30.8						
			7	71.5	30.5						
		gray, silty, w/some silt seams	7	75.0	28.1						
			40	80.0	22.2						
		gray, silty, w/some gravel & rock fragments	43	85.0	14.9						
			51	90.0	16.2			3740	20.0		119
		gray, silty, w/some gravel, rock fragments & silt seams	117	94.5	12.0						
			126	99.5	12.6						
		Silt, gray, w/seams of sand & clay	4W.5	104.0	18.7						
		Shale, gray	80W.3	108.3							
		End of boring @ 112.0'									

REMARKS:
X - Attempted shelby tube sample-no recovery

Boring Completed: 4/9/78
Location: Cleveland, Ohio
Job No.: C, 3033A

LABORATORY LOG OF BORING

Method of Sampling:
Split spoon ☒ Shelby ☒
Core drill ☐ Auger ☐

Boring No. B-18

Surface Elevation 578.1

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill, cinders and rock	6	3.5							
		brown sandy clay, w/rock fragments cinders and rocks	7	6.5							
			11	10.0	45.0						
		w/black organic silt	5	15.0	43.0						
		Sand, gray, with trace of organic material	14	20.0	26.0						
		Clay, gray, silty	18	25.0							
			12	30.0	27.0						
		gray	S-1	35.0	33.0			660	4.3		94
			5	36.5	29.0			640	10.3		89
			S-2	40.0	29.0			870	16.7		94
			12	41.5	27.2						
			12	45.0	26.0						
		w/gravel and rock fragments	S-3	50.0	24.3 23.0			1630	16.5		108
			14	51.5	24.0 21.6			1450	12.1		104
		gray, silty	13	55.0	25.0						
		gray, silty, with silt seams and rock fragments	S-4	60.0	22.0 20.0			2330 2390	14.3 13.3		103 103
			28	61.5	20.1			2280	16.8		108
			32	65.0	25.0			1730	13.4		112
			S-4	70.0	21.0 20.0			3110 3200	13.2 18.9		116 116
			26	71.5	19.5						
			37	75.0	21.0			1590	10.8		113
			61	80.0	17.2			3650	20.0		120
			71	85.0	15.1			2410	20.0		120
		Silt, gray, sandy	54	90.0	21.9						
			67	95.0	20.3						
		Clay, gray, silty, w/rock fragments	64	100.0	9.0			5200	20.0		125
		gray, silty	61/.5	104.0	14.2						
			65/.5	109.0	16.7						
			68/.5	114.0	14.9						
			60	120.0	21.5						
		gray	60	125.0	24.8						
		Silt, gray, w/rock fragments	41 50/.3	130.0 130.3	26.3			1830	15.0		104
		Shale, gray	50/.0	133.5							
		End of boring at 133.5'									

REMARKS:

Boring completed: 4/26/78
Location: Cleveland, Ohio
Job No. C, 3033A

DAVID V. LEWIN CORP.
GEOTECHNICAL ENGINEERING CLEVELAND, OHIO

LOG OF SOIL BORINGS - 16, 17 & 18
CLEVELAND PELLET TERMINAL
PIER 20

No. 4	No. 3	No. 2	REV. No. 1	DRAWN BY	SCALE	DRAWING NO
				APPROVED BY	DATE 5/31/78	3033A-7

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐

Boring No. B-19

Surface Elevation 581.99

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill, Clay, cinders, sand, rock fragments, wood	17	3.5							
		w/s organic material	11	6.5							
10			2	10.0	22.3						
			18	15.0	23.3						
20			25	20.0	19.3						
		Sand, gray w/decayed wood	5	25.0	25.6						
		Clay, gray, silty, w/silt seams									
		gray silty	S-1	30.6	32.6	44	19	700	13.9		93
			4	32.0	30.7			1150	10.7		95
			4	35.0	38.7			370	10.4		94
40			S-2		33.6	41	16	710	10.8		91
			4	40.5 42.0	31.1						
			4	45.0	29.9						
50			S-3	50.5	24.2 29.2	31	12	685	7.5		101
			5	52.0	29.8			640	20.0		98
			7	55.0	29.1			900	20.0		100
60		Gray silty w/ few rock fragments & silt seams	S-4	59.5	25.2 23.4	30	11	1980	12.2		103
			17	61.0	23.1			1720	7.7		105
			19	65.0	23.4			2400	16.8		106
70		Gray silty w/gravel and rock fragments	S-5		15.3			3230	18.8		119
			11	69.5 71.0	16.1 16.9						
			13	75.0	21.8						
80			S-6	79.5	16.1	26	10	2800	20.0		121
			23	81.0	15.3			3970 4970	17.2 20.0		119
			27	85.0	15.5			1960	20.0		121
90		Gray silty w/silt seam & sand seams & rock fragments	S-7	89.0	13.3 19.5			2400 4690	16.5 7.8		115 112
			33	90.5	19.9			5350	14.9		111
			35	95.0	13.9						
100			S-8	99.0	13.0 12.8			3350	17.4		122
			48	100.5	11.6						
			52	105.0	11.8			10350	8.9		130
110			34	109.5	13.9						
		Gray silty w/ silt seams	47	115.0	20.0						
120		Sand, gray with few clayey fragments	49	120.0	18.8						
			36	125.0							
130		Gray sand w/few shale fragments	27	131.5							
		Shale, gray	100%								
140				141.0							
		End of boring at 141.0'									
150		REMARKS									
		Water encountered at 9.0'									
		Water at 3.3' upon completion									

Boring completed: 4/14/78
Location: Cleveland, Ohio
Job No.: C 3033A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐

Boring No. B-20

Surface Elevation 582.9

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Fill, brick, stone, clay, sand	26	3.5							
			4	6.5							
10			1/1.5	10.0							
			8	15.0							
20			8	20.0							
		Sand, gray	10	25.0							
30		Clay, gray, silty	S-1	30.5							
			S-2	32.5							
			S-3	34.5							
40			S-4	36.5							
			S-5	38.5							
			S-6	40.5							
			S-7	43.0							
50			S-8	45.0							
			S-9	47.0							
			S-10	49.0							
		gray	S-11	51.0							
			S-12	53.0							
			S-13	55.0							
60			S-14	57.0							
			S-15	59.0							
			S-16	61.0							
			S-17	63.0							
			S-18	65.0							
			S-19	67.0							
			S-20	69.0							
70		gray, silty, with rock fragments	14	70.8	24.3						
			17	74.5	17.7			2330	20.0		119
			16	76.5	17.4						
			S-21	79.0	16.6			3090	18.0		120
80			19	80.5	12.8			3230	18.8		119
			21	85.0	16.6			3840	20.0		118
			31	90.0	21.0						
90			30	95.0	20.3			3220	20.0		111
			62	100.0	11.3						
		Silt, gray, sandy	41	105.0	13.3						
		Clay, gray, silty, with rock fragments	55	110.0	14.4			5100	13.2		127
100			51	115.0	17.4						
			35	120.0	18.4						
		Sand, gray, with few small silty seams	31	125.0							
110			34	130.0							
			37	135.0							
		Clay, silty, w/pebbles and rock fragments	500	138.5							
120		Shale, gray									
		End of boring at 138.5'									
130		REMARKS:									
		Water encountered at 8.0' during drilling									
		Water at 5.0' before casing was pulled									
140		Water at 8.5' after casing was pulled									
		* No recovery									
150											

*Boring completed 4/24/78
Location: Cleveland, Ohio
Job No. C. 3033A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☒

Boring No. B-22

Surface Elevation 582.7

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %		Unit Dry Weight #/cu. ft.
		Auger to 8.5									
10		Fill, black cinders and sand	9	10.0							
		black silty sand	2	15.0							
20		gravel, sand and slag	10	20.0							
		Sand, black to gray, silty	11	25.0	33.6						
30		Clay, gray, silty	4	30.0							
			S-1	32.0							
			S-2	34.0							
			S-3	36.0							
40			S-4	38.0							
			S-5	40.0							
			S-6	42.0							
			S-7	44.0							
50			S-8	46.0							
			* S-9	48.0							
			S-10	50.0							
			S-11	52.0							
			S-12	55.0							
60			S-13	57.0							
			S-14	59.0							
			* S-15	61.0							
			S-16	63.0							
			S-17	66.0							
			S-18	68.5							
			S-19	71.0							
70		gray, silty, w/gravel and rock fragments	36	73.5	20.7						
			56	80.0	19.2			1170	14.9		122
80			S-20	86.0	17.8						
			27	86.5	17.8			1300	20.0		118
								2220	20.0		117
			34	90.0	18.6						
90			37	95.0	18.6			3220	20.0		116
			35	100.0	23.9						
			46	105.0	12.8			5400	20.0		123
100		gray, silty, w/silt, gravel and pieces of rock	52	110.0	10.2						
			57	115.0	13.7			3690	10.2		116
			65	120.0	12.9						
110			37	125.5	27.8						
		Shale, gray	100	129.6							
120		End of boring at 132.0'									
		REMARKS:									
		Water at 10.0' before casing was pulled									
130		Hole caved at 8.0' after casing was pulled									
		* No recovery									
140											
150											

Boring completed: 4/24/78
Location: Cleveland, Ohio
Job No. C. 3033A

DAVID V. LEWIN CORP.
GEOTECHNICAL ENGINEERING — CLEVELAND, OHIO

LOG OF SOIL BORINGS 19, 20 & 22
CLEVELAND PELLET TERMINAL
PIER 20

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐

Boring No. B-23

Surface Elevation 574.5

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Unit Dry Weight #/cu. ft.
		Fill, cinder and bricks	40	3.5						
			14	6.5						
			9	10.0						
			4	15.0						
			16	20.0						
		Sand, gray	6	25.0						
			9	30.0						
		Clay, gray	4	35.0	34.4					
			S-1	40.0	30.9					
			6	41.5	30.2			575	20.0	94
					32.4			800	12.5	
			6	45.0	28.2					
			S-2	50.0	28.8					
			6	51.5	34.2			480	14.0	102
					31.7					
			6	55.0	32.4					
			S-3	60.0	30.6					
			2	61.5	32.6			340	20.0	89
			2	65.0	31.6					
		gray, silty, w/silt seams and traces of gravel and rock fragments	S-4	70.0	21.8					
			23	71.5	27.0			1380	20.0	107
			23	75.0	22.1					
			26	79.5	18.9			3250	20.0	120
			27	85.0	16.8					
		gray, silty, w/gravel and rock fragments	26	90.0	18.0					
			75	95.0	12.2					
			62	100.0	17.3			3570	20.0	120
			67	105.0	17.1			3130	15.0	119
			85	110.0	12.5			6700	10.0	124
		gray, silty, w/silt seams	102	114.5	13.1			5000	11.7	122
			99	120.0	18.9					
		Shale	104	124.5	20.6					
		End of boring at 128.0'	50/0	128.0						

REMARKS:

* No recovery

Boring completed: 5/ /78
Location: Cleveland, Ohio
Job No.: C, 3031A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐

Boring No. B-24

Surface Elevation 578.99

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Unit Dry Weight #/cu. ft.
		Blacktop								
		Fill, limestone, slag	11	3.5						
		brown sand, slag and rock fragments	15	6.5						
			14	10.0						
		gray and black sand, gravel, pieces of rock, slag, cinders, w/organic material	8	15.0	18.4					
			5	20.0	21.0					
		gray silty sand, w/pieces of glass and organic material	5	25.0	25.6					
		Clay, gray, silty, w/silt seams	7	30.0	28.7					
			S-1	32.0	28.9			1828	11.5	93
			8	35.0	29.6					94
			S-2	40.0						
		gray, silty	6	45.0	35.4					
			S-3	50.0	32.1			640	11.6	93
					32.1			835	11.8	97
			9	55.0	31.5					
			S-4	60.0	28.1					
			10	61.5						
		gray, silty, with some silt seams	9	65.0	22.8					
			S-5	70.0	25.0			1660	9.3	188
			11	71.5	26.2			1898	8.4	
					28.5			370	20.0	100
			11	75.0	26.9			820	20.0	101
		gray, silty, with gravel and rock fragments	S-6		20.8			2120	11.1	102
			14	81.5	25.0			1430	4.5	104
					28.2					
			17	85.0	17.8			1680	20.0	115
		gray, silty, with gravel and pieces of shale	S-7		16.7					
			25	90.5	21.1			4050	20.0	117
			34	95.0	21.2			2860	20.0	113
		gray, silty, with silt seams	60	99.5	11.4					
			64	105.0	21.2					
			90/.5	109.5	18.3					
		Shale, gray, broken	80%	117.0						
		gray								
		End of boring at 117.0'								

REMARKS:

Water at 8.0' upon completion

* No recovery

Boring completed: 4/14/78
Location: Cleveland, Ohio
Job No.: C, 3031A

LABORATORY LOG OF BORING

Method of Sampling: Split spoon ☒ Shelby ☐ Core drill ☐ Auger ☐

Boring No. B-25

Surface Elevation 579.66

Depth in feet	Symbol	DESCRIPTION	Blows on spoon for 12 inches	Depth to bottom of sample in feet	SUMMARY OF TEST RESULTS: Natural Moisture %	Liquid Limit	Plasticity Index	Unconfined Shear Stress #/SF	Strain %	Unit Dry Weight #/cu. ft.
		Blacktop								
		Fill, brown to gray limestone gravel	27	3.5						
		black cinder brick sand concrete	21	6.5	11.					
			50/0	8.5						
		brown & gray silty clay w/s shal frag, cinders & brick	5	11.5	25.					
		grout black silty clay w/s cinders organic material	5	18.0	17.					
		black & gray sandy clay gravel, cinders & sand seams	8	20.0	16.					
		Sand, gray silty	7	25.0						
		Clay, gray silty, trace of gravel and some silt seams	11	30.0	28.0			1760	11.7	100
			S-1	35.0	28.			1120	13.7	95
			7	36.5	28.			1160	16.8	101
			11	40.0	28.					
			S-2		23.			1120	11.	104
			10	45.0	23.			910	8.	102
					30.			610	20.0	94
			9	50.0	28.			1050	15.	102
		soft gray silty	S-3		28.					
			8	56.5	23.			1420	12.	93
					27.					
			7	60.0	31.					
		firm gray silty w/few sand seams, silt seams, some gravel	S-4		30.					
			11	66.5	24.			1280	12.	93
			14	70.0	17.			1480	20.	119
			S-5		28.			1210	15.	109
		firm to hard gray silty w/gravel some rock fragments	18	75.0	17.			2970	20.	116
			24	80.0	17.			2970	20.	121
			S-6		17.			3960	16.	118
			36	85.0	17.			4455	16.	117
					16.			2970	20.	116
			38	90.0	19.					
		hard gray silty sandy w/some layers of shale	S-7	94.0	14.					
			42	95.5	16.			1660	20.	116
			69	100.	11.					
			85	105.	11.					
			50/.5	109.5	8.					
		Shale, gray	50/.5	113.						
		End of boring @ 115.0'	50/0	115.						

Remarks:
Water at 8.0' after casing was pulled. Roller bit refusal and spoon refusal at 115.0'

Boring completed: 4/15/78
Location: Cleveland, Ohio
Job No.: C 3031A

DAVID V. LEWIN CORP.
GEOTECHNICAL ENGINEERS
CLEVELAND, OHIO

LOG OF SOIL BORINGS - 23, 24 & 25
CLEVELAND PELLET TERMINAL
PIER 20

A P P E N D I X B

SPECIFICATION

FOR

SUBSURFACE EXPLORATORY WORK

A. **SCOPE OF WORK:**

The work required is to include exploratory soil boring, sampling, and reporting the classification of each soil stratum bored through; the ground water levels in each boring, and the depth below ground surface at which solid rock is encountered, if said rock is encountered before the individual boring meets the specified depth.

At locations indicated on the attached drawing, the contractor shall drill sampling borings and shall perform such other labor and services as may be necessary and reasonably incidental to the gathering and classification of soil samples, and submit a complete and comprehensive log of borings. The following exploratory data shall be determined:

1. A true cross-section and visual classification of the soil passed through in each exploratory borehole showing the thickness of each soil stratum found between the surface and the bottom of the borehole and including the elevation of existing ground surface at each boring.

2. Each uncompleted boring shall be reported in the same manner as completed borings, together with the reason for not completing the hole.

3. All available information on ground water conditions encountered and elevation of water level. This should include water level readings upon completion of boring and 24 hours after completion. When a 24 hour reading is not possible, a reading just prior to backfilling shall be obtained and the time after completion noted. Any encounters or losses of water during or after drilling should be noted.

4. A record of compactness or hardness of each soil stratum encountered in each borehole, determined by the number of blows required to drive a 2" O.D. sampling tube one foot with a 140 lb. weight falling 30 inches. The total penetration depth should be 18 inches and the number of blows every 6 inches shall be recorded.

5. Indication of obstructions or unusual conditions encountered, such as boulders, cobbles, odors, gas and the like. Depths at which squeezing or caving of the sides of the hole occur.

6. Existence, depth and nature of filled ground.

7. Indication of any offset or relocation of boring from staked location.

8. The classification of the rock cores shall be reported, together with the percentage of core recovery and other pertinent data that may be useful to the Owner.

Samples of soil and rock cores shall be saved, carefully preserved, and delivered to the soils laboratory of David V. Lewin Corp., Suite 400 - Bulkley Building, 1501 Euclid Avenue, Cleveland, Ohio 44115.

All work shall be performed in accordance with the applicable building codes, city and state, and as specified in these specifications. The Contractor shall secure any necessary permits and check for the presence of any underground facilities or buried lines with the Owner and local utilities and pipeline companies before starting work.

B. **SAMPLING BORINGS:**

All borings are intended to be carried below the existing ground surface to about the depths shown on the attached drawing. The boring work shall be so performed that frequent undisturbed soil samples may be taken from the boreholes.

Borings shall be made as nearly vertical as is possible; all in accord with standard, sound drilling practices. Unless otherwise directed, drilling, sampling, and reporting shall be performed in accordance with ASTM Standard Methods for: Penetration Test and Split-Barrel Sampling of Soils, ASTM D 1586, Thin-Walled Tube Sampling of Soils, ASTM D 1587, and Diamond Core Drilling for Site Investigation, ASTM D 2113.

The drill hole must be kept open and clean to ensure that the penetration test or pushing of the sampling tube is performed on undisturbed soil. Care must be taken to ensure that the material to be sampled is not disturbed by the drilling operation or by hydrostatic uplift for samples at or below ground water level. Hollow stem augers, casing, or drilling mud may be used to maintain the integrity of the hole. The level of water or drilling fluid in the hole must be maintained above the ground water level. Size of boring and casing shall be sufficient to accommodate the particular type of sampling spoons or other sampling or coring equipment to be utilized by the Contractor.

Unless otherwise directed, samples of soil shall be taken at the ground surface, at 2.5, 5, and 8.5 feet below existing grade and at each change in soil stratification or soil consistency, but not further apart than five feet.

Samples shall be taken by means of a 2" O.D. split-barrel sampler. Samples recovered shall be carefully wrapped in Saran wrapping and put in wide-mouth glass jars. The lid of the jar is to be dipped in

paraffin and tightly screwed on. Care should be taken to minimize any disturbance of the sample in the sampling, jarring and shipping processes. The length of the samples delivered to the laboratory shall not be less than 4 inches.

In soft cohesive material (10 blows per foot of penetration or less), the Engineer may request some samples taken by pushing a 3 inch outside diameter thin walled sampling tube (Shelby tube) at least 30 inches long into the soil. A piston sampler may be required where poor recovery or sample disturbance occurs with an open-tube sampler. When sample is brought to the surface it shall immediately be sealed at both ends of the tube.

C. **PROBES AND AUGER BORINGS:**

Probings or auger borings may be required. No split-barrel soil samples will be required in these probings or auger borings. Representative auger samples in each stratum should however be obtained and the hole logged. See ASTM D 1452.

D. **CORING ROCK:**

When rock is encountered in a soil sampling boring, the elevation thereof shall be recorded by the Contractor, and the rock cored to the depth required. For the purpose of this exploration work, rock cores not less than 2-1/8 inch diameter will be satisfactory. Unless otherwise directed, core runs shall be five feet long. In addition to the report data require By ASTM D 2113, the time required for each core run and the cumulative length of pieces of rock recovered in each run in sections of 4 inches long or longer should be recorded. Rock cores shall be preserved in a wooden core box having a hinged lid, and each core shall be suitable identified.

E. **SAFETY AND SITE MAINTENANCE:**

The Drilling Contractor shall comply at all times with all applicable safety regulations. Drill holes shall not be left open and unattended. When holes are left open to permit observation of ground water conditions, they shall be provided with a cover or other means to prevent access or injury by the public or other workmen. Unless specifically directed, all holes should be backfilled and the drilling area restored as closely as possible to its original condition before the Drilling Contractor leaves the site. Grouting of the full or partial length of each hole shall be done where required by local regulations or where coring has been done in an area prone to sinkhole development or artesian water conditions.

F. **NOTIFICATION:**

Contractor shall contact the David V. Lewin Corp. Tel. 216-696-8151, or its field representative upon arrival on the site and before starting to drill in order to verify drilling sequence, depths, and sampling procedures and frequency.

AKE DRILLING CO. INC. • P.O. BOX 33284 • CLEVELAND, OHIO 44133 — TEST BORING RECORD

LER RICK TOSATTO — HOLE NO. TBL-1 — SURFACE ELEVATION — Sheet No. 1 of 3 Sheets

ER ON COMPLETION — 24 HOUR WATER

TE — TIME — DEPTH 140.0 — FOR DAVID V. LEWIN

ASING HAMMER Wt. — lbs. DROP — in.

IPLER HAMMER Wt. 140 lbs. DROP 30 in.

IPLER SIZE 2 in. O.D. CASING SIZE 4 in. — LOCATION DOCK 20 CLEVELAND, OHIO

JGER SIZE — in. GROUND WATER — STARTED 10-16-89 COMPLETED 10-16-89 JOB NO. 89-010-186

Geologist's Log ☐ Mechanical Analysis ☐

ATION	DEPTH	Driller's Log ☒	Remarks	Sample Depth	Blows on Sampler
		WATER			
		WATER			
		WATER			
		WATER			
	18.0			18.0	1
		GRAY SAND SILT W/FEW GRAVELS		19.5	1/12"
				20.0	1
				21.5	1-1
				23.0	2
				24.5	3-6
		GRAY SANDY SILT W/FEW GRAVELS		28.0	SHELBY
	28.9			30.0	REC. 19"
				30.0	2
		GRAY SILTY CLAY W/SOME ROCK FRAGMENTS		31.5	4-5
				35.0	2
				36.5	4-4
		GRAY SILTY CLAY W/SOME ROCK FRAGMENTS		40.0	2
				41.5	3-4
		GRAY SILTY CLAY W/SOME ROCK FRAGMENTS		45.0	2
				46.5	2-4
				50.0	3
				51.5	4-4

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TEST BORING RECORD

DRILLER RICK TOSATTO
HOLE NO. TBL-1 SURFACE ELEVATION Sheet No. 2 of 3 Sheets
ATER ON COMPLETION 24 HOUR WATER
ATE TIME DEPTH 140.0
FOR DAVID V. LEWIN
CASING HAMMER Wt. lbs. DROP in.
AMPLER HAMMER Wt. 140 lbs. DROP 30 in.
AMPLER SIZE 2 in. O.D. CASING SIZE 4 in.
LOCATION DOCK 20 CLEVELAND, OHIO
AUGER SIZE in. GROUND WATER
STARTED 10-16-89 COMPLETED 10-16-89 JOB NO. 89-010-186

Geologist's Log ☐
Driller's Log ☒
Mechanical Analysis ☐

EVATION	DEPTH	Driller's Log	Remarks	Sample Depth	Blows on Sampler
				50.0	3
				51.5	4-4
				55.0	3
		GRAY SILTY CLAY W/SOME SAND AND ROCK FRAGMENTS		56.5	4-5
				60.0	4
				61.5	5-5
				65.0	10
				66.5	19-23
				70.0	12
		GRAY SILTY CLAY W/SOME SAND AND ROCK FRAGMENTS		71.5	17-21
				75.0	9
				76.5	19-32
				80.0	14
				81.5	26-34
				85.0	33
		GRAY SILTY CLAY W/SOME SAND AND ROCK FRAGMENTS		85.9	50/.4
	90.0			90.0	
				91.5	
		GRAY SILTY CLAY W/ROCK FRAGMENTS			

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TEST BORING RECORD

LLER RICK TOSATTO

TER ON COMPLETION ..... 24 HOUR WATER .....

ATE ..... TIME ..... DEPTH 140.0

SING HAMMER Wt. ..... lbs. DROP ..... In.

MPLER HAMMER Wt. 140 lbs. DROP 30 In.

AMPLER SIZE 2 In. O.D. CASING SIZE 4 In.

UGER SIZE ..... in. GROUND WATER .....

HOLE NO. TBL-1 SURFACE ELEVATION ..... Sheet No. 3 of 3 Sheets

FOR DAVID V. LEWIN

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 10-23-89 COMPLETED 10-25-89 JOB NO. 89-010-186

VATION	DEPTH	Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐	Remarks	Sample Depth	Blows on Sampler
		GRAY SILTY CLAY W/ROCK FRAGMENTS		90.0	33
				90.4	50/.4
	105.0			100.0	50/
		GRAY SILTY CLAY W/TRACE OF SAND		100.3	/.3
				105.0	19
				106.5	26-32
				110.0	34
				111.3	49-50/.3
				115.0	36
				116.5	42-49
				120.0	24
				121.5	34-31
	129.0			125.0	22
		GRAY SILTY FINE SAND		126.5	29-37
	133.0			130.0	28
		GRAY FINE SANDY SILT		130.9	50/.4
	140.0			135.0	50/
			ENCOUNTERED GAS AT 135.0-135.2	135.2	/.2

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TEST BORING RECORD

DRILLER RICK TOSATTO

WATER ON COMPLETION ..... 24 HOUR WATER .....

DATE ..... TIME ..... DEPTH 111.5

CASING HAMMER Wt. ..... lbs. DROP ..... in.

SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.

SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.

AUGER SIZE ..... in. GROUND WATER .....

HOLE NO. TBL-2 SURFACE ELEVATION ..... Sheet No. 1 of 3 Sheets

FOR DAVID V. LEWIN

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 10-13-89 COMPLETED 10-14-89 JOB NO. 89-010-186

Geologist's Log ☐ Mechanical Analysis ☐

ELEVATION	DEPTH	Driller's Log ☒	Remarks	Sample Depth	Blows on Sampler
		WATER			
		WATER			
		WATER			
	43.0			43.0	1
				44.5	2-3
				45.0	1
				46.5	1-2
		SOFT GRAY SILTY CLAY			
				50.0	2
				51.5	2-2

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DRILLER RICK TOSATTO
WATER ON COMPLETION ..... 24 HOUR WATER .....
DATE ..... TIME ..... DEPTH 111.5
CASING HAMMER Wt. ..... lbs. DROP ..... in.
SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.
SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.
AUGER SIZE ..... in. GROUND WATER .....

HOLE NO. TBL-2 SURFACE ELEVATION ..... Sheet No. 2 of 3 Shee
FOR DAVID V. LEWIN
LOCATION DOCK 20 CLEVELAND, OHIO
STARTED 10-13-89 COMPLETED 10-14-89 JOB NO. 89-010-186

Geologist's Log ☐
Mechanical Analysis ☐

ELEVATION	DEPTH	Driller's Log ☒	Remarks	Sample Depth	Blows on Sampler
		SOFT GRAY SILTY CLAY		50.0	2
				51.5	2-2
				53.0	1
				54.5	2-2
	56.0			56.5	SHELBY
		STIFF GRAY SILTY CLAY W/SHALE FRAGMENTS		58.5	NO REC.
				58.5	6
				60.0	10-12
				65.0	10
				66.5	12-12
		STIFF GRAY SILTY CLAY W/SHALE FRAGMENTS		70.0	11
				71.5	14-15
				75.0	12
				76.5	25-38
		STIFF GRAY SILTY CLAY W/SHALE FRAGMENTS		80.0	17
				81.5	25-38
	83.0			85.0	14
		GRAY SILTY SAND	ENCOUNTERED GAS POCKET	86.5	18-33
	87.0				
		GRAY SANDY CLAY W/SHALE FRAGMENTS		90.0	15
				91.5	22-35
				95.0	26
				95.9	50/.4
		GRAY SANDY CLAY W/SHALE FRAGMENTS		100.0	31

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TEST BORING RECORD

DRILLER RICK TOSATTO

WATER ON COMPLETION ..... 24 HOUR WATER .....

DATE ..... TIME ..... DEPTH 111.5

CASING HAMMER Wt. ..... lbs. DROP ..... in.

SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.

SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.

AUGER SIZE ..... in. GROUND WATER .....

HOLE NO. TBL-2 SURFACE ELEVATION ..... Sheet No. 3 of 3 Sheets

FOR DAVID V. LEWIN

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 10-13-89 COMPLETED 10-14-89 JOB NO. 89-010-186

ELEVATION	DEPTH	Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐	Remarks	Sample Depth	Blows on Sampler
	101.0	GRAY SILTY CLAY W/SHALE FRAGMENTS		100.0	31
				100.9	50/.4
		STIFF GRAY SILT W/SOME CLAY	M O I S T		
				105.0	25
				106.5	33-33
		STIFF GRAY SILT W/SOME CLAY		110.0	37
	111.5			111.5	36-38
		TERMINATION DEPTH 111.5			

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TEST BORING RECORD

DRILLER RICK TOSATTO

HOLE NO. TBL-3 SURFACE ELEVATION Sheet No. 1 of 2 Sheets

TER ON COMPLETION 24 HOUR WATER

TE TIME DEPTH 76.5

FOR DAVID V. LEWIN

CASING HAMMER Wt. lbs. DROP in.

AMPLER HAMMER Wt. 140 lbs. DROP 30 in.

MPLER SIZE 2 in. O.D. CASING SIZE 4 in.

LOCATION DOCK 20 CLEVELAND, OHIO

AUGER SIZE in. GROUND WATER

STARTED 10-12-89 COMPLETED 10-12-89 JOB NO. 89-010-186

EVATION	DEPTH	Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐	Remarks	Sample Depth	Blows on Sampler
		WATER			
		WATER			
	14.0			14.0	3
				15.5	6-2
				16.0	3
		GRAY SAND AND GRAVELS		17.5	4-7
	18.5				
				20.0	2
		GRAY SILT W/CLAY W/TRACE OF GRAVELS		21.5	3-5
				25.0	3
				26.5	3-6
		GRAY SILT W/CLAY W/TRACE OF GRAVELS			
			M O I S T	30.0	9
				31.5	11-13
		GRAY SILT W/CLAY W/TRACE OF GRAVELS			
				35.0	7
	36.0			36.5	10-10
		GRAY SILTY CLAY W/TRACE OF GRAVELS			
	39.5			40.0	1
		GRAY SILTY CLAY		41.5	2-3
				45.0	1
				46.5	2-4
		GRAY SILTY CLAY		50.0	SHELBY
				52.0	NO REC.

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TEST BORING RECORD

DRILLER RICK TOSATTO

HOLE NO. TBL-3 SURFACE ELEVATION Sheet No. 2 of 2 Sheets

WATER ON COMPLETION 24 HOUR WATER

DATE TIME DEPTH 76.5

FOR DAVID V. LEWIN

CASING HAMMER Wt. lbs. DROP in.

SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.

SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.

LOCATION DOCK 20 CLEVELAND, OHIO

AUGER SIZE in. GROUND WATER

STARTED 10-12-89 COMPLETED 10-12-89 JOB NO. 89-010-186

Geologist's Log ☐ Mechanical Analysis ☐

ELEVATION	DEPTH	Driller's Log ☒	Remarks	Sample Depth	Blows on Sampler
				50.0	SHELBY
				52.0	NO REC.
				52.0	SHELBY
		GRAY SILTY CLAY		54.0	NO REC.
				55.0	3
	56.0			56.5	5-6
		STIFF GRAY SILTY CLAY W/FEW ROCK FRAGMENTS		60.0	4
				61.5	5-4
			M O I S T		
				65.0	6
				66.5	6-6
		STIFF GRAY SILTY CLAY W/FEW ROCK FRAGMENTS		70.0	8
				71.5	15-22
				75.0	9
	76.5			76.5	17-26
			WATER ON COMP. 7'0		
		TERMINATION DEPTH 76.5			

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TEST BORING RECORD

ER RICK TOSATTO

ON COMPLETION ..... 24 HOUR WATER .....

..... TIME ..... DEPTH 125.1

G HAMMER Wt. ..... lbs. DROP ..... in.

LER HAMMER Wt. 140 lbs. DROP 30 in.

LER SIZE 2 in. O.D. CASING SIZE 4 in.

R SIZE ..... in. GROUND WATER .....

HOLE NO. TBL-4 SURFACE ELEVATION ..... Sheet No. 1 of 3 Sheets

FOR DAVID V. LEWIN

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 10-25-89 COMPLETED 10-27-89 JOB NO. 89-010-186

TION | DEPTH | Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐ | Remarks | Sample Depth | Blows on Sampler

DEPTH		Remarks	Sample Depth	Blows on Sampler
	WATER			
	WATER		10.0	13
10.0	GRAY SAND AND GRAVELS		11.5	13-12
			12.0	1
13.0	BLACK COAL, SAND AND GRAVEL		13.5	1-1
			15.0	1
16.9	GRAY SILTY CLAY W/TRACE OF GRAVLES		16.5	1-2
			20.0	2
			21.5	4-6
			25.0	SHELBY TUBE
		M O I S T	27.0	12"
			27.0	2
			28.5	2-3
			30.0	1
			31.5	3-3
			35.0	1
			36.5	1-3
			40.0	1
			41.5	2-2
			45.0	2
			46.5	3-4
			50.0	1
			51.5	4-4

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TEST BORING RECORD

..ER RICK TOSATTO

HOLE NO. TBL-4 SURFACE ELEVATION Sheet No. 2 of 3 Sheets

..R ON COMPLETION 24 HOUR WATER

.. TIME DEPTH 125.1

FOR DAVID V. LEWIN

..SING HAMMER Wt. lbs. DROP in.

..PLER HAMMER Wt. 140 lbs. DROP 30 in.

..PLER SIZE 2 in. O.D. CASING SIZE 4 in.

LOCATION DOCK 20 CLEVELAND, OHIO

..GER SIZE in. GROUND WATER

STARTED 10-25-89 COMPLETED 10-27-89 JOB NO. 89-010-186

..ATION	DEPTH	Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐	Remarks	Sample Depth	Blows on Sampler
		GRAY SILTY CLAY W/TRACE OF GRAVELS		55.0	2
				56.5	3-4
		GRAY SILTY CLAY W/TRACE OF GRAVELS		60.0	12
	60.0				
		GRAY SILTY CLAY W/ROCK FRAGMENTS		61.5	17-30
				65.0	8
				66.5	16-17
				70.0	10
				71.5	19-25
		GRAY SILTY CLAY W/ROCK FRAGMENTS		75.0	16
				76.5	25-30
			M O I S T	80.0	10
				81.5	20.42
				85.0	17
				86.5	48-22
		GRAY SILTY CLAY W/ROCK FRAGMENTS		90.0	25
				91.0	50/.5
	95.0			95.0	13
		GRAY SILTY CLAY W/SOME SAND & GRAVEL SEAMS		96.5	43-30
				100.0	36
	100.0			101.5	40-44

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TEST BORING RECORD

DRILLER RICK TOSATTO
WATER ON COMPLETION ..... 24 HOUR WATER .....
DATE ..... TIME ..... DEPTH 125.1
CASING HAMMER Wt. ..... lbs. DROP ..... in.
SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.
SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.
AUGER SIZE ..... in. GROUND WATER .....

HOLE NO. TBL-4 SURFACE ELEVATION ..... Sheet No. 3 of 3 Sheets
FOR DAVID V. LEWIN
LOCATION DOCK 20 CLEVELAND, OHIO
STARTED 10-25-89 COMPLETED 10-27-89 JOB NO. 89-010-186

Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐

ELEVATION	DEPTH	Driller's Log	Remarks	Sample Depth	Blows on Sampler
		STIFF GRAY SILTY CLAY W/SHALE FRAGMENTS			
				105.0	15
				106.0	32-41
			M O I S T		
				110.0	10
				111.4	37-50/.4
		STIFF GRAY SILTY CLAY W/SHALE FRAGMENTS			
	115.1		RUN REC.	115.0	50/
				115.1	/.1
		BLACK HARD SHALE	115.1 to 120.1 3'8"		
	120.1				
		BLACK HARD SHALE	120.1 to 125.1 3'9"		
	125.1				
		TERMINATION DEPTH 125.1			

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DRILLER RICK TOSATTO — HOLE NO. TBL-5 — SURFACE ELEVATION — Sheet No. 1 of 3 Sheets

WATER ON COMPLETION — 24 HOUR WATER

DATE — TIME — DEPTH 130.2 — FOR DAVID V. LEWIN

CASING HAMMER Wt. — lbs. DROP — in.

SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.

SAMPLER SIZE 2 in. O.D. — CASING SIZE 4 in. — LOCATION DOCK 20 CLEVELAND, OHIO

AUGER SIZE — in. — GROUND WATER — STARTED 10-28-89 — COMPLETED 10-30-89 — JOB NO. 89-010-186

ELEVATION	DEPTH	Driller's Log ☒ / Geologist's Log ☐ / Mechanical Analysis ☐	Remarks	Sample Depth	Blows on Sampler
		WATER			
		WATER			
		WATER			
	25.5			25.5	1
		GRAY SILTY CLAY		27.0	1-3
				27.5	1
				29.0	2-2
				30.0	2
				31.5	3-4
		GRAY SILTY CLAY		35.0	2
				36.5	2-4
			M O I S T	SHELBY	REC.
				37.0	
				39.0	24"
		GRAY SILTY CLAY		40.0	1
				41.5	2-3
		GRAY SILTY CLAY		SHELBY	REC.
				45.0	
				47.0	24"
				47.0	2
				48.5	4-4
				50.0	3
				51.5	4-6

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TEST BORING RECORD

DRILLER RICK TOSATTO

HOLE NO. TBL-5 SURFACE ELEVATION ..... Sheet No. 2 of 3 Sheets

WATER ON COMPLETION ..... 24 HOUR WATER .....

DATE ..... TIME ..... DEPTH 130.2

FOR DAVID V. LEWIN

CASING HAMMER Wt. ..... lbs. DROP ..... in.

SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.

SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.

AUGER SIZE ..... in. GROUND WATER .....

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 10-28-89 COMPLETED 10-30-89 JOB NO. 89-010-186

ELEVATION | DEPTH | Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐ | Remarks | Sample Depth | Blows on Sampler

DEPTH		Sample Depth	Blows on Sampler
	GRAY SILTY CLAY		
		55.0	5
		56.5	8-10
60.0		60.0	7
		61.5	10-17
	GRAY SILTY CLAY W/SHALE FRAGMENTS AND TRACE OF SAND		
		65.0	8
		66.5	11-14
		70.0	5
		71.5	11-13
		75.0	12
	GRAY SILTY CLAY W/SHALE FRAGMENTS AND TRACE OF SAND	76.5	16-22
		80.0	10
		81.5	14-25
83.0			
	GRAY SILTY CLAY W/SOME SAND AND ROCK FRAGMENTS	85.0	16
		86.2	32-50
		90.0	28-37-50/
91.2		91.2	/.2
	STIFF GRAY SILT W/SHALE FRAGMENTS		
		95.0	50/
		95.4	/.4
		100.0	50/
		100.3	/.3

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TEST BORING RECORD

ILLER RICK TOSATTO

TER ON COMPLETION ..... 24 HOUR WATER .....

DATE ..... TIME ..... DEPTH 130.2

ASING HAMMER Wt. ..... lbs. DROP ..... in.

MPLER HAMMER Wt. 140 lbs. DROP 30 in.

SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.

AUGER SIZE ..... in. GROUND WATER .....

HOLE NO. TBL-5 SURFACE ELEVATION ..... Sheet No. 3 of 3 Sheets

FOR LEWIN CORPORATION

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 10-28-89 COMPLETED 10-30-89 JOB NO. 89-010-186

VATION	DEPTH	Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐	Remarks	Sample Depth	Blows on Sampler
		STIFF GRAY SILT W/SHALE FRAGMENTS			
	105.0			105.0	15
		STIFF GRAY SILT W/TRACE OF CLAY		106.5	31-44
				110.0	14
				111.5	21-28
				115.0	14
		STIFF GRAY SILT W/TRACE OF CLAY		116.5	18-28
				120.0	15
				121.5	19-22
		STIFF GRAY SILT W/TRACE OF CLAY			
	125.2		RUN REC.	125.0	50/
		GRAY HARD SHALE	125.2 to 130.2 4.0	125.2	/.2
	130.2				
		TERMINATION DEPTH 130.2			

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TEST BORING RECORD

DRILLER RICK TOSATTO

ATER ON COMPLETION ..... 24 HOUR WATER .....

ATE ..... TIME ..... DEPTH 85.4

ASING HAMMER Wt. ..... lbs. DROP ..... in.

AMPLER HAMMER Wt. 140 lbs. DROP 30 in.

AMPLER SIZE 2 in. O.D. CASING SIZE 4 in.

AUGER SIZE ..... in. GROUND WATER .....

HOLE NO. TBL-6 SURFACE ELEVATION ..... Sheet No. 1 of 2 Sheets

FOR DAVID V. LEWIN

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 9-27-89 COMPLETED 9-29-89 JOB NO. 89-010-186

EVATION	DEPTH	Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐	Remarks	Sample Depth	Blows on Sampler
		WATER			
		WATER			
		WATER			
	30.0			30.0	5
				31.5	2-3
				32.0	3
				33.5	4-4
		GRAY SILTY CLAY W/TRACE OF GRAVELS		35.0	6
				36.5	8-10
			M O I S T		
				40.0	3
				41.5	3-4
		GRAY SILTY CLAY W/TRACE OF GRAVELS		45.0	5
				46.5	3-4
	50.0			50.0-51.5	10-19-25

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TEST BORING RECORD

DRILLER RICK TOSATTO

HOLE NO. TBL-6 SURFACE ELEVATION ..... Sheet No. 2 of 2 Sheets

WATER ON COMPLETION ..... 24 HOUR WATER .....

DATE ..... TIME ..... DEPTH 85.4

FOR DAVID V. LEWIN

CASING HAMMER Wt. ..... lbs. DROP ..... in.

SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.

SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.

AUGER SIZE ..... in. GROUND WATER .....

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 9-27-89 COMPLETED 9-29-89 JOB NO. 89-010-186

Geologist's Log ☐ Mechanical Analysis ☐

ELEVATION	DEPTH	Driller's Log ☒	Remarks	Sample Depth	Blows on Sampler
		GRAY SANDY SILT W/TRACE OF ROCK FRAGMENTS		55.0	9
	55.5			56.5	14-19
		GRAY SILTY CLAY W/ROCK FRAGMENTS AND SOME SAND SEAMS		60.0	9
				61.5	14-30
		GRAY SILTY CLAY W/ROCK FRAGMENTS AND SOME SAND SEAMS	M O I S T	65.0	7
	65.0			66.5	15-28
		GRAY CLAYEY SILT W/ROCK FRAGMENTS AND SOME SAND LAYERS		70.0	10
				71.5	17-22
				75.0	11
				76.5	18-25
		GRAY CLAYEY SILT W/ROCK FRAGMENTS AND SOME SAND LAYERS		80.0	24
				81.0	50/.6
	85.4		POCKET OF GAS	85.0	50/
		TERMINATION DEPTH 85.4	WATER BEFORE PULLING CASING 2'0	85.4	/.4

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TEST BORING RECORD

RILLER RICK TOSATTO

HOLE NO. TBL-7 SURFACE ELEVATION Sheet No. 1 of 2 Sheets

TER ON COMPLETION 24 HOUR WATER

'E TIME DEPTH 80.4

FOR DAVID V. LEWIN

ASING HAMMER Wt. lbs. DROP in.

MPLER HAMMER Wt. 140 lbs. DROP 30 in.

MPLER SIZE 2 in. O.D. CASING SIZE 4 in.

LOCATION DOCK 20 CLEVELAND, OHIO

UGER SIZE in. GROUND WATER

STARTED 9-30-89 COMPLETED 10-2-89 JOB NO. 89-010-186

VATION	DEPTH	Driller's Log ☒ / Geologist's Log ☐ / Mechanical Analysis ☐	Remarks	Sample Depth	Blows on Sampler
		WATER			
		WATER			
		WATER			
	30.0			30.0	4
				31.5	4-5
				32.0	3
				33.5	5-9
		GRAY SILTY CLAY W/FEW			
				35.0	4
				36.5	6-7
				38.0	MISS
				40.0	
				sample 38.0-39.5	3-5-7
		GRAY SILTY CLAY W/FEW		40.0	REC.
				42.0	24"
				42.0	6
				43.5	7-11
				45.0	6
		GRAY SILTY CLAY W/FEW		46.5	9-10
				50.0-51.5	7-10-17

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TEST BORING RECORD

DRILLER RICK TOSATTO

HOLE NO. TBL-7 SURFACE ELEVATION ..... Sheet No. 2 of 2 Sheets

WATER ON COMPLETION ..... 24 HOUR WATER .....

DATE ..... TIME ..... DEPTH 80.4

FOR DAVID V. LEWIN

CASING HAMMER Wt. ..... lbs. DROP ..... in.

SAMPLER HAMMER Wt. 140 lbs. DROP 30 in.

SAMPLER SIZE 2 in. O.D. CASING SIZE 4 in.

AUGER SIZE ..... in. GROUND WATER .....

LOCATION DOCK 20 CLEVELAND, OHIO

STARTED 9-30-89 COMPLETED 10-2-89 JOB NO. 89-010-186

Driller's Log ☒ Geologist's Log ☐ Mechanical Analysis ☐

ELEVATION	DEPTH		Remarks	Sample Depth	Blows on Sampler
		GRAY SILTY CLAY W/ROCK FRAGMENTS AND SOME SAND SEAMS		55.0	9
				56.5	14-22
				60.0	15
		GRAY SILTY CLAY W/ROCK FRAGMENTS AND SOME SAND SEAMS		61.5	22-28
			M O I S T	65.0	17
				66.5	19-24
		GRAY SILTY CLAY W/ROCK FRAGMENTS AND SOME SAND SEAMS		70.0	25
				71.5	35-50
				75.0	16
	76.5			76.5	23-31
		GRAY SILTY FINE SAND W/SOME SILT SEAMS	ENCOUNTERED GAS POCKET	80.0	50/
	80.4			80.4	/.4
		TERMINATION DEPTH 80.4			

DRILLERS TEST BORING LOG

TEST HOLE L-8

PROJECT: PORT OF CLEVELAND WEST 3RD

CLIENT: LTWIN CORP

DRILLED: 12-19-90 BY: D. HEPNER

WATER/ENCOUNTERED 5.0' & 11.0'

WATER/COMPLETION 3'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					GRAY & BRN CLAYEY SILT SAND, W/ GRAVELS & L. FRAGS, W/ RED BRICK LIMESTONE GRAVEL	
2.5'	2.0	1	SS	7-11-10		
	3.5				BLACK CINDERS SLAG, IRON ORE PELLETS - CONCRETE & RED BRICK, WOOD	5.0' WET
	5.0	2	SS	18-38-50/0"		
7.5'	6.0				FILL -	WET
	8.5					
	10.0'	3	SS	5-10-17	MED DENSE TO DENSE LAYERED BROWN FINE TO MED LAYERED W/ MED TO COURSE SILTY SAND TRACE GRAVELS, POS FILL?	MOIST
	13.5					
	15.0	4	SS	11-15-23		WET
19.5'	18.5					
	20.0	5	SS	12-11-4		
	23.5				MED DENSE GRAY FINE TO MED SILTY SAND W/ SOME GRAVELS	
	25.0	6	SS	8-8-12		WET
28.5'	28.5					
	30.0	7	SS	1-1-2	BROWN ROTTED WOOD, LAYERED W/ GRAY FINE TO MED SILTY SAND	WET
31.5	33.5					
	35.0	8	SS	3-4-5	MED STIFF GRAY SILTY CLAY TRACE FINE SAND	

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DRILLERS TEST BORING LOG

TEST HOLE 1-8

PROJECT: PORT OF CLEVELAND WEST 3RD

CLIENT: HEWIN CORP

WATER/ENCOUNTERED 5' + 11'

DRILLED: 9-19-90 (12) BY: D. HEPNER

WATER/COMPLETION 3'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
	335				MED STIFF GRAY SILTY CLAY	
	350	9	SS	3-4-5	TRACE FINE SAND, W/ SOME	
					SMALL WATERS CLAYEY SILT	MOIST
						TO
	385					WET
	400	10	SS	3-4-5		
420'						
	435				MED DENSE GRAY CLAYEY	
	450	11	SS	6-9-10	SILT W/ FINE SAND	
						MOIST
	485					TO
	500	12	SS	6-8-11		WET
	535					
	550	13	SS	7-11-16		
580						
	585				DENSE GRAY CLAYEY SILT	
	600	14	SS	9-16-23	TRACE FINE SAND, TRACE	MOIST
	635					TO
	650	15	SS	10-18-25	GRAVELS & R. FRAGS	WET

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DRILLERS TEST BORING LOG

TEST HOLE L-8

PROJECT: PORT OF CLEVELAND WEST 3RD

CLIENT: LEWIN CORP | WATER/ENCOUNTERED 5' & 11'

DRILLED: 12-19-90 BY: D. HEPNER | WATER/COMPLETION 3'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
66.5'						
	68.5	16	SS	9-14-20	DENSE GRAY CLAY SILT SANDY W/ GRAVELS & R. FRAGS	
	70.0					
	73.5	17	SS	9-19-25		MOIST TO WET
	75.0+					
	78.5	18	SS	10-19-23		
	80.0					
82.0'						
	83.5	19	SS	48-50/3"	V DENSE GRAY FINE SANDY SILT TRACE CLAY, W/ LAYERS GRAY FINE TO MED SILTY SAND.	WET
	84.3					
	88.5	20	SS	18-29-50		
	90.0'					
93.0'						
	93.5	21	SS	45-50/4"	V DENSE GRAY CLAYEY SILT SANDY W/ GRAVELS & R. FRAGS W/ LAYERS GRAY SILTY CLAY SANDY W/ GRAVELS & R. FRAGS	MOIST TO WET
	94.4					
	98.5	22	SS	23-50/5"		
	99.4					

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DRILLERS TEST BORING LOG

TEST HOLE L-8

PROJECT: PORT OF CLEVELAND WEST 3RD

CLIENT: ATWIN CORP

WATER/ENCOUNTERED 5' & 11'

DRILLED: 12-19-90 BY: D. HEPNER

WATER/COMPLETION 3'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					VICENSE GRAY CLAYEY	
	103.5					
	104.5	23	SS	25-49	SILT SANDY W/ GRAVELS	
					& R. FRAGS, LAYERED W/ GRAY	MOIST
	108.5				SILTY CLAY SANDY W/	
	108.9	24	SS	50/5"		
					GRAVELS & R. FRAGS, W/ SHALE	
					COBBLES & BOULDERS	TD
	113.5					
	113.9	25	SS	50/5"		
						WET
	118.5					
	119.5	26	SS	45-50/4		
	121.0					
	121.4	27	SS	50/5"		
	124.0					
	124.9	28	SS	38-50/5"		
	129.0					
1315'	129.8	29	SS	46-50/4"		
	134.0				GRAY CLAYEY SILT, SANDY	
	135.5	30	SS	38-38-99	TRACE GRAVELS & R. FRAGS W/ SMALL SAND & GRAVEL LAYERS	

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DRILLERS TEST BORING LOG

TEST HOLE L-8

PROJECT: PORT OF CLEVELAND WEST 3RD

CLIENT: LOWIN CORP | WATER/ENCOUNTERED 5'11

DRILLED: 12-20-90 BY: D. HEPNER | WATER/COMPLETION 3'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
						MOIST TO WET
	139.0	31	SS	25-44-50/4"		
140.5'	140.3					
					VI HARD CLAY/CY SILT SAND/	
	144.0	32	SS	68-127	W/ GRAVELS & R. FRAGS W/	MOIST
	145.0				SHALE COBBLES & BOULDERS	TO
						WET
	149.0	33	SS	50/2"		
	149.2					
153.0'						
	154.0	34	SS	50/2"	HARD GRAY SHALE	MOIST
154.2	154.2					
					TD 154.2'	

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DRILLERS TEST BORING LOG

TEST HOLE L-10

PROJECT: PORT OF CLEVELAND W 3RD ST

CLIENT: LEWIN CORP | WATER/ENCOUNTERED 7.5'

DRILLED: 12-15-90 BY: D. HEPNER | WATER/COMPLETION 8.4'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					LIMESTONE GRAVEL FILL	
1.2'	1.0	1	SS	20-10-7		
	2.5				BLACK CINDERS SHAG, WI COAL RED BRICK - FILL	MOIST
	3.5					
	5.0	2	SS	7-7-4		
	5.0	3	SS	6-6-7		
	6.5					7.5 WET
	8.5					
12.5'	10.0	4	SS	7-13-5		
					BLACK FINE TO MED SILTY SAND TRACE GRAVELS	WET
14.0	13.5	5	SS	8-10-13		
	15.0				GRAY FINE TO MED SILTY SAND WI SOME GRAVELS	
	18.5					WET
	20.0	6	SS	7-10-14		
22.0						
	23.5					
	25.0	7	SS	3-5-7	STIFF GRAY SILTY CLAY TRACE FINE SAND W/LAYERS CLAY & SILT	MOIST TO WET
	28.5					
31.0	30.0	8	SS	3-4-6		
	33.5				MED STIFF GRAY SILTY CLAY TRACE FINE SAND	
	35.0	9	SS	2-3-4		

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DRILLERS TEST BORING LOG

TEST HOLE L-10

PROJECT: PORT OF CLEVELAND WS#320

CLIENT: Irwin Corp

WATER/ENCOUNTERED 2.5

DRILLED: 12-15-90 BY: D. Hepner

WATER/COMPLETION 8 1/2'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					MED STIFF GRAY SILTY CLAY TRACE FINE SAND	
	38.5					
400	40.0	10	SS	2-3-2		
					TD 40.0	

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DRILLERS TEST BORING LOG

TEST HOLE L-11

PROJECT: PORT OF CLEVELAND WST 3RD

CLIENT: LEWIS CORP

DRILLED: 12-21-90 BY: D HEPNER

WATER/ENCOUNTERED 7.0'

WATER/COMPLETION 6.3'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
9.0'					PAVEMENT	
	1.5	1	SS	50/3"	LIMESTONE GRAVEL - FILL	
	1.8					
8.5'	3.5				CONCRETE	
	5.0	2	SS	6-7-11	BLACK CINDERS, SLAG - RED BRICK	MOIST
	5.0	3	SS	3-8-6	FRAGS, WOOD FIBERS, IRON ORE PELLETS	
7.0'	6.5'				FILL -	
	8.5					
	10.0	4	SS	10-21-28	DENSE TO V. DENSE, LAYERED, BLACK	
					GRAY MIXED & LAYERED FINE TO	
					MED SILTY SAND, TRACE ORGANICS	
	13.5					
	15.0	5	SS	6-21-32	BRICK FRAGMENTS, POSS FILL?	WET
	18.5					
	20.0	6	SS	12-14-23		
21.5'						
	23.5					
	25.5	7	SHELBY TUBE		MED DENSE GRAY CLAYEY SILT	
	25.5					
	27.0	8	SS	5-11-18	W/ FINE SAND, SOME SILTY	
					CLAY LAYERS	
	28.5					
	30.0	9	SS	8-12-14		
	33.5					
	35.0	10	SS	6-11-9		

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DRILLERS TEST BORING LOG

TEST HOLE L-11

PROJECT: PORT OF CLEVELAND

CLIENT: LEWIN CORP

WATER/ENCOUNTERED 7.0'

DRILLED: 12-21-90 BY: D. HEPNER

WATER/COMPLETION 6.3'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
	36.5					
	38.5	11	SHELBY TUBE			
	38.5					
400	40.0	12	SS	3-5-5		
					TD 40.0'	

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DRILLERS TEST BORING LOG

TEST HOLE L-12

PROJECT: Port of Cleveland.

CLIENT: D.V. Lewin Corp.

DRILLED: 12-17-90 BY: Tom Suchan

WATER/ENCOUNTERED 5.0'

WATER/COMPLETION 3.5'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
3"					Fine Brn Sand	
6"					Limestone Gravel	
		1	SS	12-10-10	Brn + Black Layered Foundry Sand w/ Slag + Gravels w/ Brick Layer @ 2.3'	MOIST
		2	SS	6-7-11		
		3	SS	2-25-19		WET
		4	SS	4-4-4		
14.0'					Green Clayey Silt	
15.0'		5	SS	9-3-6	Black w/ Gray Fine Silty Sand	WET
		6	SS	12-21-23	Dense Brn Fine to MED w/ some Course Sand + Trace Gravels	
22.0'						
		7	SS	5-6-9	Stiff Gray Silty Clay w/ Small Layers Fine to MED. Sand	WET
		8	SS	5-7-8		WET
		9	SS	5-8-12		

W-3-4

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DRILLERS TEST BORING LOG

TEST HOLE L-12

PROJECT: Port of Cleveland

CLIENT: R.V. Lewin Corp

DRILLED: 12-17-90 BY: Tom Suchan

WATER/ENCOUNTERED 5.0'

WATER/COMPLETION 3.5'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					soft to Stiff Gray Silty Clay	
		10	SS	W-3-4		WET
		11	SS	5-7-8		
						WET
50.0'		12	SS	5-7-10		

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DRILLERS TEST BORING LOG

TEST HOLE L-13

PROJECT: Port of Cleveland

CLIENT: D.V. Lewin Corp | WATER/ENCOUNTERED 5.0'

DRILLED: 12-17-90 BY: Tom Suchan | WATER/COMPLETION CAVE 3.5'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
1.0'					1" Limestone Gravel over Iron ore Pellets.	
2.0'		1	SS	29-14-13	whitish Fine to MED Sand	
		2	SS	4-4-11	Black Sand w/ Gravels w/ Some Slag Trace Brick, Concrete, Glass.	MOIST
		3	SS	6-11-8		
		4	SS	50/2"		
		5	SS	13-15-14	(Fill)	WET
12.0'						
		6	SS	10-6-5	Fine to MED Black Sand w/ Some Gravels (Fill)?	
18.0'						WET
19.0'		7	SS	33-33-46	WOOD	
					Lt Brn Fine to MED Sand	
23.5'		8	SS	2-4-6	Stiff Gray Silty Clay w/ Small Lenses silt + Sand + Possible small Layers Fine Sand.	WET
		9	SS	3-5-6		
		10	SS	4-6-6		

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DRILLERS TEST BORING LOG

TEST HOLE L-13

PROJECT: Port of Cleveland

CLIENT: D.U. Lewin Corp.

DRILLED: 12-12-90 BY: Tom Suchan

WATER/ENCOUNTERED 5.0'

WATER/COMPLETION CAVE 3.5'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					stiff Gray Silty Clay	
						WET
40.0'		11	SS	4-6-7		

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DRILLERS TEST BORING LOG

TEST HOLE L-14

PROJECT: Port of Cleveland

CLIENT: D.U. Lewin Corp

DRILLED: 12-13-90 BY: Tom Sucharu

WATER/ENCOUNTERED 13.5'

WATER/COMPLETION 12.5'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
7"					6" concrete 1" to 2" Limestone	
		1	SS	23-24-24	Dense Brn Fine to MED Sand w/ Some Gravels	
5.5'		2	SS	24-26-19	(Fill)	
		3	SS	7-5-4	Loose Black Foundry Sand w/ Gravels Trace Brick & Slag w/ Layers Fine Brn Sand	MOIST
		4	SS	w/12"-1		
12.0'						
		5	SS	1/16"-2/2"	Loose Fine Brn Silty Sand	
15.0'						
		6	SS	6-7-7	MED Dense Gray & Black Fine Silty Sand w/ Some MED to Course Gravels & Some Cobbles	WET
21.5'						
		7	SS	11-17-30	Very Dense to MED Dense Fine To MED Gray Sand w/ Trace Cobbles @ 26.0'	WET
29.0'		8	SS	6-6-7	Stiff Gray Silty Clay w/ Fine Sand Lense	
		9	SS	3-5-7		

4-8-10

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DRILLERS TEST BORING LOG

TEST HOLE L-14

PROJECT: Port of Cleveland

CLIENT: D.V. Lemm Corp

DRILLED: 12-13-90 BY: Tom Sochan

WATER/ENCOUNTERED 13.5'

WATER/COMPLETION 12.5'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					Stiff Gray Silty Clay	
40.0'		10	SS	4-8-10		

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DRILLERS TEST BORING LOG

PAGE 1 of 1

TEST HOLE L-15

PROJECT: Port of Cleveland

CLIENT: D.V. Levin Corp

DRILLED: 12-14-90 BY: Tom Sochan

WATER/ENCOUNTERED 2.0' seepage

WATER/COMPLETION NONE

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
1.0'	1.0'				concrete	
	2.5'	1	SS	6-6-8	Erie Bay Sand	SEEPAGE
4.0'	3.0'					
	3.9'	2	SS	5-50/5"		
					concrete	
8.0'						

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DRILLERS TEST BORING LOG

TEST HOLE L-15

PROJECT: PORT OF CLEVELAND WEST 9TH — SEEPAGE ZONES -5'022

CLIENT: LEWIN CORP — WATER/ENCOUNTERED 22.0'

DRILLED: 12-15-90 BY: D. HEPNER — WATER/COMPLETION 13.5'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
7'					CONCRETE	
	2.5 / 4.0	1	SS	2-3-5	V/ LOOSE BROWN FINE TO MED SILTY SAND LAYERED W/ GRAY & BRN SILTY SAND FILL-?	WET ZONES
	5.0 / 6.5	2	SS	2-2-1		
	8.5 / 10.0	3	SS	2-2-1		
11.0'					LOOSE BROWN FINE TO MED SILTY SAND LAYERED W/ GRAY & BROWN MIXED FINE TO MED SILTY SAND, FILL-?	WET ZONES
	13.5 / 15.0	4	SS	3-3-3		
	18.5 / 20.0	5	SS	2-3-3		
22.0'						22.0' WET
	23.5 / 25.0	6	SS	3-6-20	MED DENSE BLACK & GRAY FINE TO MED SILTY SAND TRACE GRAVELS - W/ GRAVEL LAYERS	WET
27.5'						
	28.5 / 30.0	7	SS	5-8-7	STIFF GRAY SILTY CLAY TRACE FINE SAND LAYERED W/ GRAY CLAYEY SILT TRACE FINE SAND	MOIST TO WET
	33.5 / 35.0	8	SS	3-4-7		

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DRILLERS TEST BORING LOG

TEST HOLE L-15

PROJECT: PORT OF CLEVELAND WEST 9TH — SEEPAGE ZONES 5'+22'

CLIENT: ERWIN CORP — WATER/ENCOUNTERED 22.0

DRILLED: 12-15-90 BY: D. HEPNER — WATER/COMPLETION 13.5'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
						MOIST TO WET
	38.5					
40.0	40.0	9	SS	4-6-7		
					TO 40.0	

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50.0

DRILLERS TEST BORING LOG

TEST HOLE L-16

PROJECT: Port of Cleveland

CLIENT: D.V. Lewin Corp | WATER/ENCOUNTERED 14.0'

DRILLED: 12-14-90 BY: Tom Suchan | WATER/COMPLETION CAVE 5.0'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
	0.0' – 0.8'	1	SS	3-50/4"	Brn Sand w/ Gravels, Brick, Concrete, Slag, metal, wood. (Fill)	
4.5'	2.5' – 4.0'	2	SS	10-9-6		
	5.0' – 6.5'	3	SS	8-34-50/5"	Dense Black + Gray Sand w/ Gravels + Brick, Concrete, Trace Glass, Slag (Fill)	MOIST
	8.5' – 10.0'	4	SS	25-27-24		
14.0'		5	SS	100/4"		
		6	SS	9-25-50/2"	Dense Brn Sand, Gravel, w/ Brick + Concrete into Black + Gray Sand + Gravel w/ Sandstone + Brick (Fill), Concrete	
20.5'		7	SS	14-27-26		WET
		8	SS	18-10-11	Dense Fine to Med Sand w/ some Course Sand + Brick Black w/ Gray Layer	
28.7'		9	SS	4-6-8	Firm Gray Fine Silty Sand.	
		10	SS	W-1-3		

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DRILLERS TEST BORING LOG

TEST HOLE B-16

PROJECT: Port of Cleveland

CLIENT: D. U. Lewin

DRILLED: 12-14-90 BY: Tom Suchan

WATER/ENCOUNTERED 14.0'

WATER/COMPLETION CAVE 5.0'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					Loose Black Fine Silty Sand	
380'						
		11	SS	3-4-6	Stiff Gray Silty Clay	WET
		12	SS	3-5-7	" "	
		13	SS	3-5-7		WET
		14	SS	3-5-6		
600'		15	SS	2-4-6		

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DRILLERS TEST BORING LOG

TEST HOLE L-17

PROJECT: Port of Cleveland

CLIENT: D. Lewin Corp | WATER/ENCOUNTERED 8.0

DRILLED: 12-15-90 BY: Bucey | WATER/COMPLETION CAVG. 11.0

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
12"	1.0				ASPHALT 2" CONCRETE 10"	
	2.5	1	SS	50/6"	(Fill) Rock Frags, cobbles, wood, red brick etc.	
4.5	4.0	2	SS	20-15-50		
	5.0				Firm Brown SAND w/some GRAVELS	
	6.5	3	SS	7-8-9		
8.0	8.5					
	10.0	4	SS	2-3-3	Loose - Fill SLAG SAND, GRAVELS	WET
					some 6" cobbles	
	13.5					
	15.0	5	SS	3-4-6		
18.0						
	18.5				Firm GRAY COARSE SAND w/clay lense	SATURTED
	20.0	6	SS	8-11-8		
23.0						
	23.5				U.STIFF/Firm GRAY SILT + CLAY	
	25.0	7	SS	4-7-10		
28.0						
	28.5				STIFF GRAY STICKY CLAY	
	30.0	8	SS	3-4-7		
33.0						
	33.5				SOFT TO Firm GRAY. STICKY CLAY	
	35.0	9	SS	2-4-4		

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DRILLERS TEST BORING LOG

TEST HOLE L-17

PROJECT: PORT OF CLEVELAND

CLIENT: D. LEWIN CORP.

DRILLED: 12-15-90 BY: BUCEY

WATER/ENCOUNTERED

WATER/COMPLETION

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
					FIRM TO STIFF GRAY STICKY CLAY W/SILT SEAMS	SATURATED
	38.5					U. MOIST
	40.0	10	SS	3-4-5		
	43.5					
	45.0	11	SS	3-4-5		
	48.5					
	50.0	12	SS	5-6-11	U. STIFF	
	53.5					
	55.0	13	SS	4-6-9		
	58.5					
	60.0	14	SS	6-8-15		
	63.5					
	65.0	15	SS	7-12-18		
	68.5					
	70.0	16	SS	7-22-21	HARD	

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DRILLERS TEST BORING LOG

TEST HOLE L-17

PROJECT: PORT OF CLEVELAND

CLIENT: A.C.T.

DRILLED: 12-15-90 BY: Bucey

WATER/ENCOUNTERED

WATER/COMPLETION

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
72.0					HARD GRAY STICK CLAY	SATURATED
	73.5					
	75.0	17	SS	9-13-22	HARD GRAY SILT CLAY w/GRAVELS + ROCK FRAGMENTS	MOIST
	78.5					
	80.0	18	SS	8-16-22		
	83.5					
	85.0	19	SS	8-14-90		
	88.5					
	90.0	20	SS	7-11-19	U. STIFF	
92.0					DENSE GRAY SILT w/CLAY SEAMS	
	93.5					
	95.0	21	SS	7-13-21	[redacted]	
97.0						
	98.5					
	100.0	22	SS	15-21-40	HARD GRAY SILT CLAY w/GRAVELS + ROCK FRAG.	
100.0					T.D. 100.0	

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DRILLERS TEST BORING LOG

TEST HOLE B-18

PROJECT: PORT of CLEVELAND

CLIENT: D. V. LEWIN CORP

DRILLED: 12-9-90 BY: L. Gibel

WATER/ENCOUNTERED 10.0' WET

WATER/COMPLETION 10'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
4"					BLACK TOP	
16"					CONCRETE	
	2.0 3.5	1	SS	12-17-18	BROWN SILTY SAND, CINDERS	
	5.0 6.5	2	SS	9-9-7	SLAG, RED BRICK, TRACE WOOD FIBERS, FILL	MOIST
11.0'	9.0 10.5	3	SS	3-5-6		10.0' WET
	14.0 15.5	4	SS	5-5-5	LOOSE GRAY FINE TO MED SILTY SAND LAYERED COAL & GRAVEL FILL-?	WET
16.5'						
	19.0 20.5	5	SS	16-24-32	VI DENSE GRAY FINE SILTSAND LAYERED W/ MED DENSE FINE TO MED SAND, TRACE SMALL GRAVEL LAYERS	WET
25.1'	24.0 25.5	6	SS	9-7-9		
	29.0 30.5	7	SS	5-8-12	MED DENSE GRAY CLAYEY-SILT TRACE FINE SAND W/ SILTY CLAY LAYERS	MOIST TO WET
	34.0 35.5	8	SS	5-9-11		

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DRILLERS TEST BORING LOG

TEST HOLE L-18

PROJECT: PORT OF CLEVELAND

CLIENT: D. V. LEWIN

DRILLED: 12-9-90 BY: DON. HEPNER

WATER/ENCOUNTERED 100'

WATER/COMPLETION 40'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
38.5'						
	39.0 40.5	9	SS	6-6-6	STIFF GRAY SILTY CLAY TRACE FINE SAND W/ LAYERS GRAY MED DENSE CLAYEY SILT W/ FINE SAND	MOIST TO WET
	44.0 45.5	10	SS	3-4-6		
	49.0 50.5	11	SS	3-4-8		
30'						
	54.0 55.5	12	SS	6-7-12	V/STIFF GRAY SILTY CLAY TRACE FINE W/ LAYERS GRAY MED DENSE CLAYEY SILT W/ FINE SAND	MOIST TO WET
	59.0 60.5	13	SS	5-9-11		
	64.0 65.5	14	SS	6-8-13		
	69.0 70.5	15	SS	6-10-14		

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DRILLERS TEST BORING LOG

TEST HOLE BL-18

PROJECT: PORT OF CLEVELAND

CLIENT: D. V. LEWIN

DRILLED: 12-9-90 BY: DON HEPNER

WATER/ENCOUNTERED 10.0'

WATER/COMPLETION 1.0'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
72.5'						
	74.0 / 75.5	16	SS	9-15-21	HARD GRAY SILTY CLAY / SANDY W/ GRAVELS & R. FRAGS LAYERD W/ CLAYEY SILT SANDY W/ GRAVELS & R. FRAGS TRACE SMALL COBBLES	
	79.0 / 80.5	17	SS	9-17-24		
	84.0 / 85.5	18	SS	12-22-30		
	89.0 / 90.5	19	SS	12-22-30		
	94.0 / 95.5	20	SS	19-32-50		
	99.0 / 100.4	21	SS	20-38-50/5"		

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DRILLERS TEST BORING LOG

TEST HOLE 2.18

PROJECT: PORT OF CLEVELAND 55TH ST

CLIENT: LEWIN CORP

DRILLED: 12-10-90 BY: D. HEPNER

WATER/ENCOUNTERED 10.0'

WATER/COMPLETION 1.0'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
101.0'						
	104.0	22	SS	50 FOR 5"	V/HARD GRAY CLAYEY SILT	MOIST
	104.4				SANDY W/ GRAVELS & R. FRAGS	
					LAYERED W/ SILTY CLAY/SANDY	TO
	109.0	23	SS	50 FOR 5"	W/GRAVELS & R. FRAGS SOME	WET
	109.4				COBBLES	
	114.0	24	SS	4/8-50		
116.5'	116.0					
	119.0	25	SS	22-31-38	HARD GRAY CLAYEY SILT	
	120.5				TRACE FINE SAND LAYERED	MOIST
					W/ GRAY SILTY CLAY	
	124.0	26	SS	17-21-25	SMALL SAND LAYERS	TO
	126.5					WET
130.5'	129.0	27	SS	10-16-33-111		
	131.0				V/HARD GRAY CLAYEY SILT SANDY	
	134.0	28	SS	50/5"	W/GRAVELS & R. FRAGS	
	134.4					

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DRILLERS TEST BORING LOG

TEST HOLE 118

PROJECT: PORT OF CLEVELAND WEST 3RD ST

CLIENT: LEWIN CORP

WATER/ENCOUNTERED 10.0'

DRILLED: 12-10-90 BY: D. HOPNER

WATER/COMPLETION 1.0'

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
134.5'						
					HARD GRAY SHALE	
	135.0					
135.2	135.2	29	SS	50/0.1'		
					TD 135.2'	

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DRILLERS TEST BORING LOG

TEST HOLE L-19

PROJECT: PORT OF CLEVELAND

CLIENT: DAVID LEWIN CORP

DRILLED: 12-8-1990 BY: DHCPNCB

WATER/ENCOUNTERED 6.5'

WATER/COMPLETION

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
	2.0 3.5	1	SS	6-4-5	BLACK CINDERS, BRN SILTY SAND, SLAG - BROWN CINDERS	MOIST
	5.0 6.5	2	SS	2-1-1	TRACES, BRICK, WOOD FIBERS	6.5'
	8.5 10.0	3	SS	7-10-15	FILL	
11.5						
	13.5 15.0	5	SS	5-12-15	BLACK FINE TO MED SILTY SAND	WET
17.5'						
	18.5 20.0	6	SS	12-7-20	GRAY FINE TO MED SILTY SAND	WET
21.5'						
	23.5 25.0	7	SS	4-6-8	GRAY CLAYEY SILT TRACE FINE SAND	WET
	28.5 30.0	8	SS	7-10-13		
	33.5 35.0	9	SS	9-15-19		

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DRILLERS TEST BORING LOG

TEST HOLE L-19

PROJECT: PORT OF CLEVELAND

CLIENT: DAVID L TWIN CORP | WATER/ENCOUNTERED 6.5'

DRILLED: 12-8-90 BY: D HOPNER | WATER/COMPLETION

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
37.0'						
	38.5				MED STIFF GRAY SILTY	
	40.0	10	SS	2-3-3	CLAY TRACE FINE SAND	
						WET
	43.5					
	45.0	11	SS	2-4-5		
48.0'						
	48.5					
	50.0	12	SS	4-8-12	VI STIFF GRAY SILTY CLAY	
					SANDY W/ GRAVELS & ROCK FRAGS	
	53.5				LAYERED, W/ GRAY CLAYEY SILT	
	55.0	13	SS	5-7-9		WET
					SANDY W/ GRAVELS & R. FRAGS	
	58.5					
	60.0	14	SS	8-11-17		
	63.5					
	65.0	15	SS	7-11-16		
	68.5'					
	70.0	16	SS	8-13-19		

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DRILLERS TEST BORING LOG

TEST HOLE L-19

PROJECT: PORT OF CLEVELAND

CLIENT: DAVID LEWIN CORP | WATER/ENCOUNTERED 6.5'

DRILLED: 12-8-90 BY: D HEPNER | WATER/COMPLETION

WATER/

ELEV. FT.	SAMPLE DEPTH	SAMPLE NO.	SAMPLE TYPE	BLOW COUNT	CLASSIFICATION	GROUND WATER
	73.5				V/STIFF GRAY SILTY CLAY SANDY	
	75.0	17	SS	9-14-17	W/GRAVELS & R. FRAGS LAYERD	
	78.5				W/GRAY CLAYEY SILT SANDY	MOIST TO
	80.0	18	SS	10-17-21	W/GRAVELS & R. FRAGS	WET
	82.5					
	85.0	19	SS	12-17-22		
	88.5					
91.0'	90.0	20	SS	7-9-13		
	93.5				HARD GRAY CLAYEY SILT SANDY	MOIST
	95.0	21	SS	35-62	W/GRAVELS & R. FRAGS, SOME	
					COBBLES,	
	98.5					
99.0	99.0	22	SS	57 FOR 6"		
					TD 99.0'	

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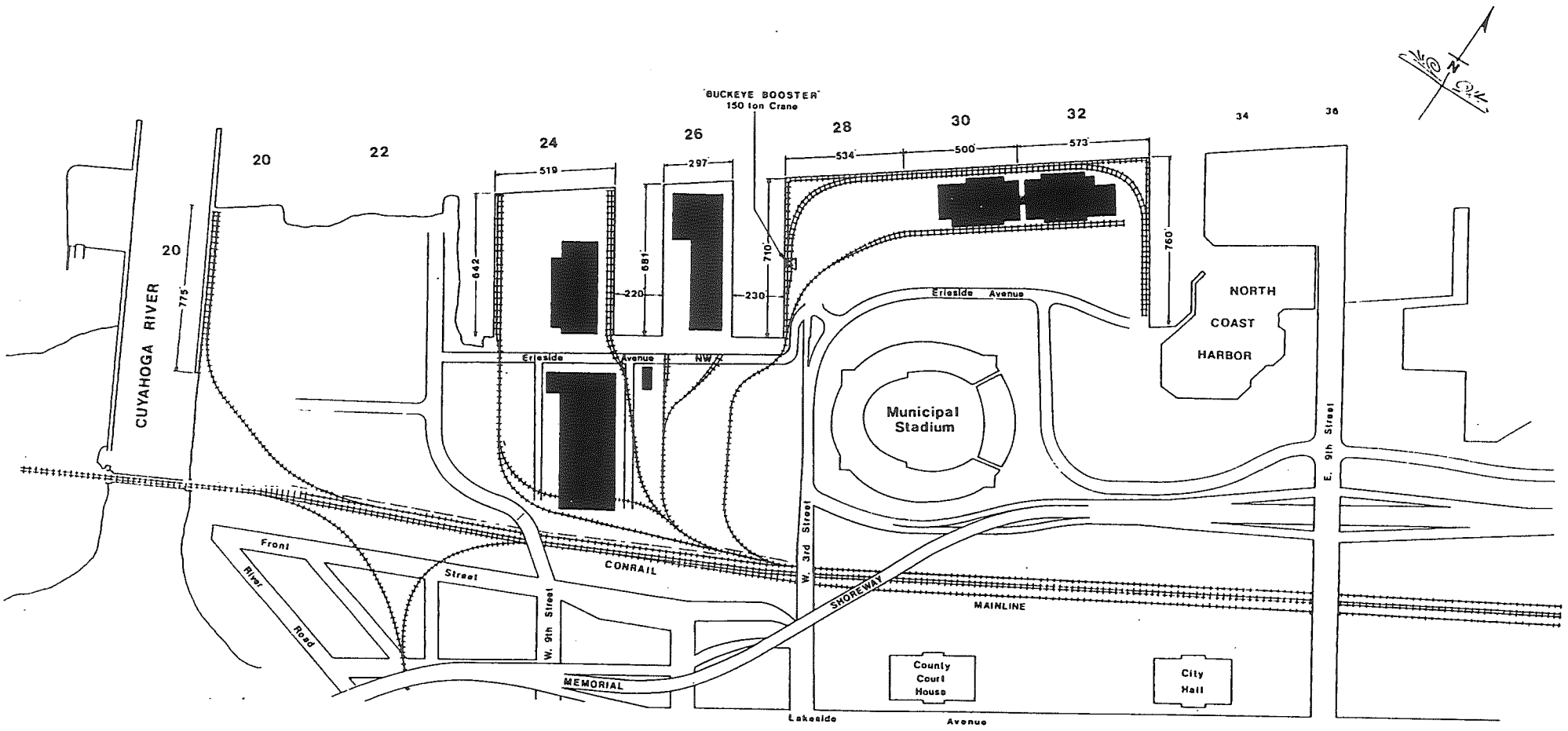
CLEVELAND HARBOR



DOCK NUMBERS: 24

0 100 200 400 600 800 1,000
SCALE

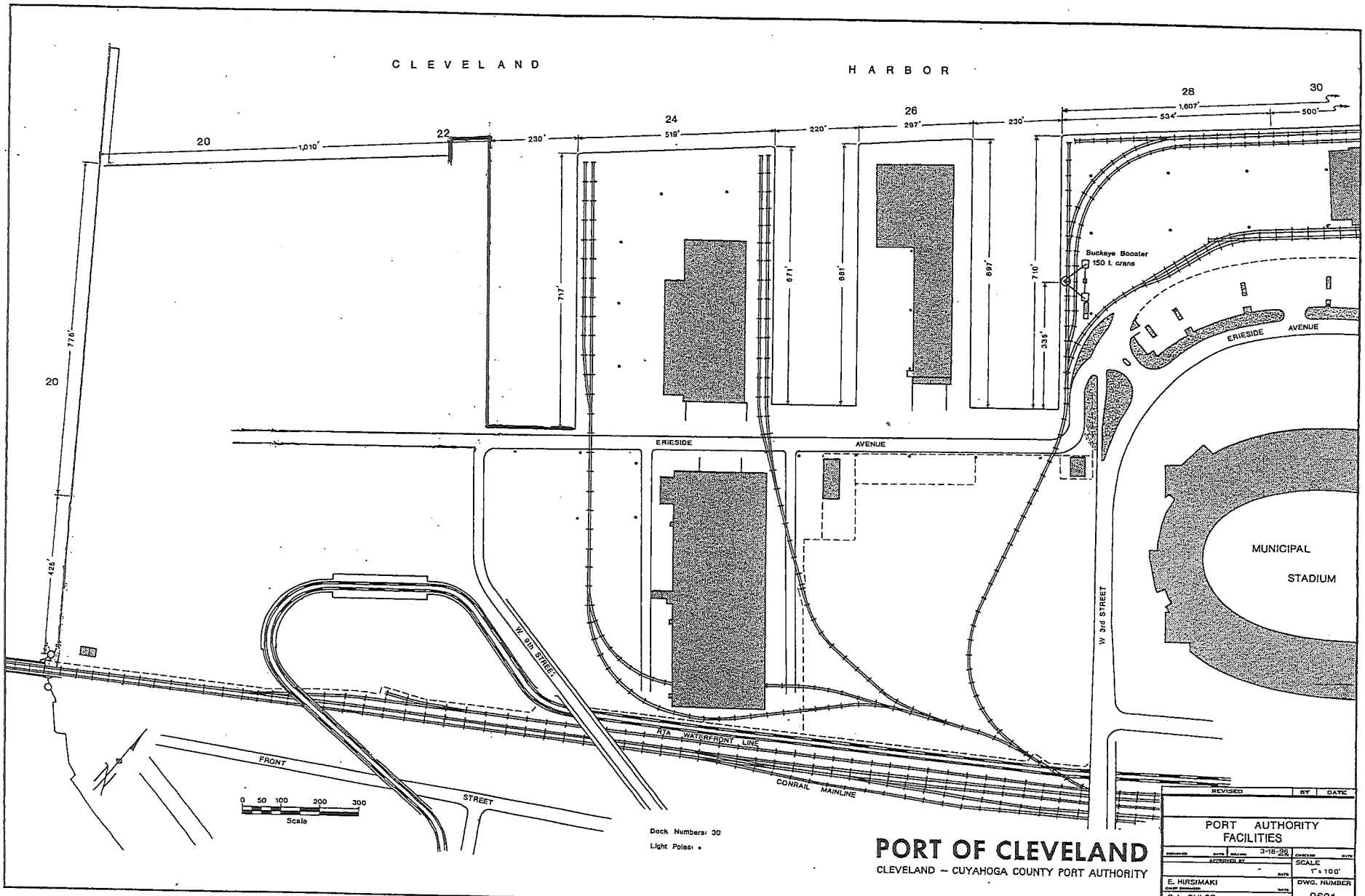
PORT OF CLEVELAND

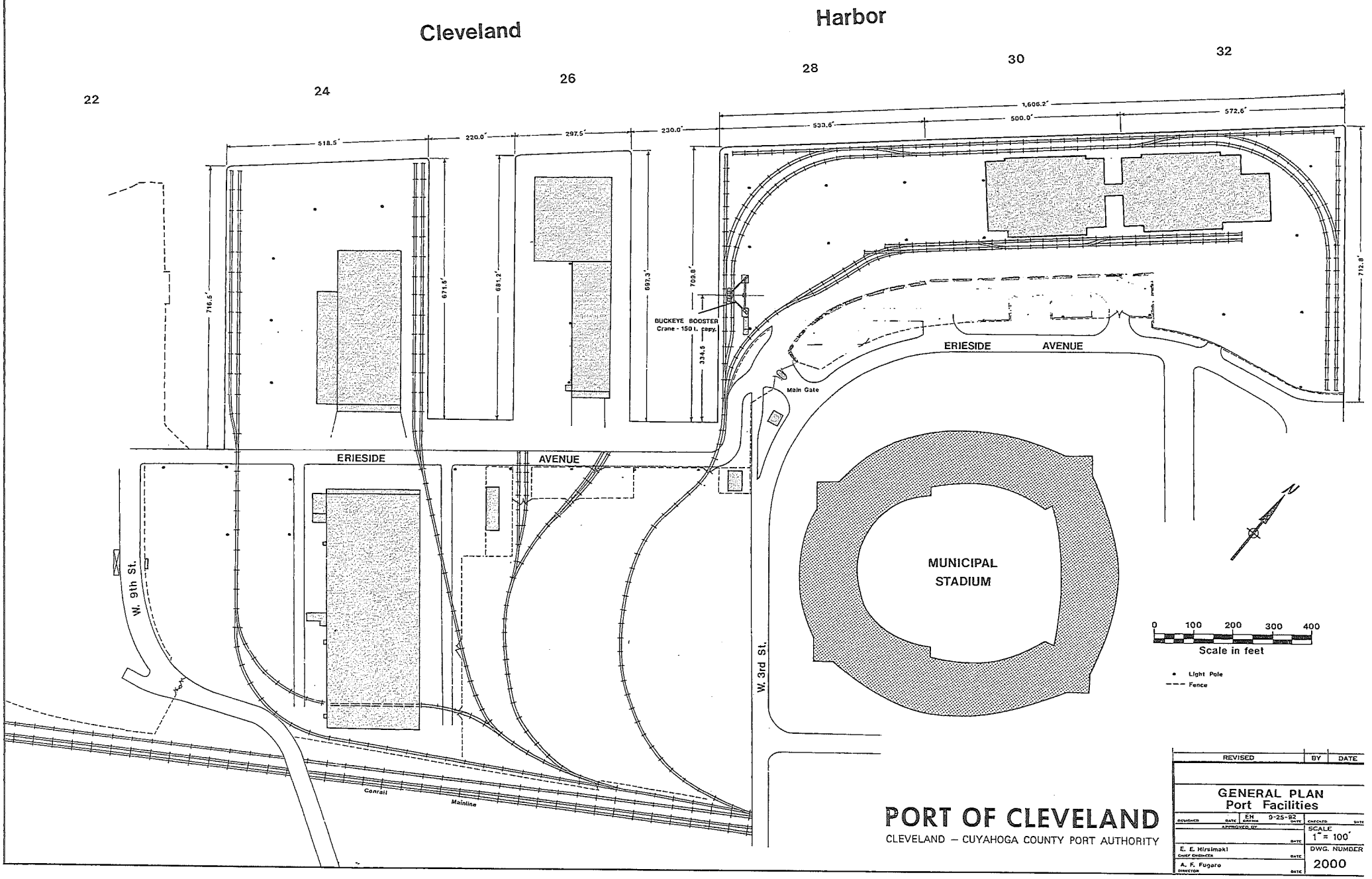
CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

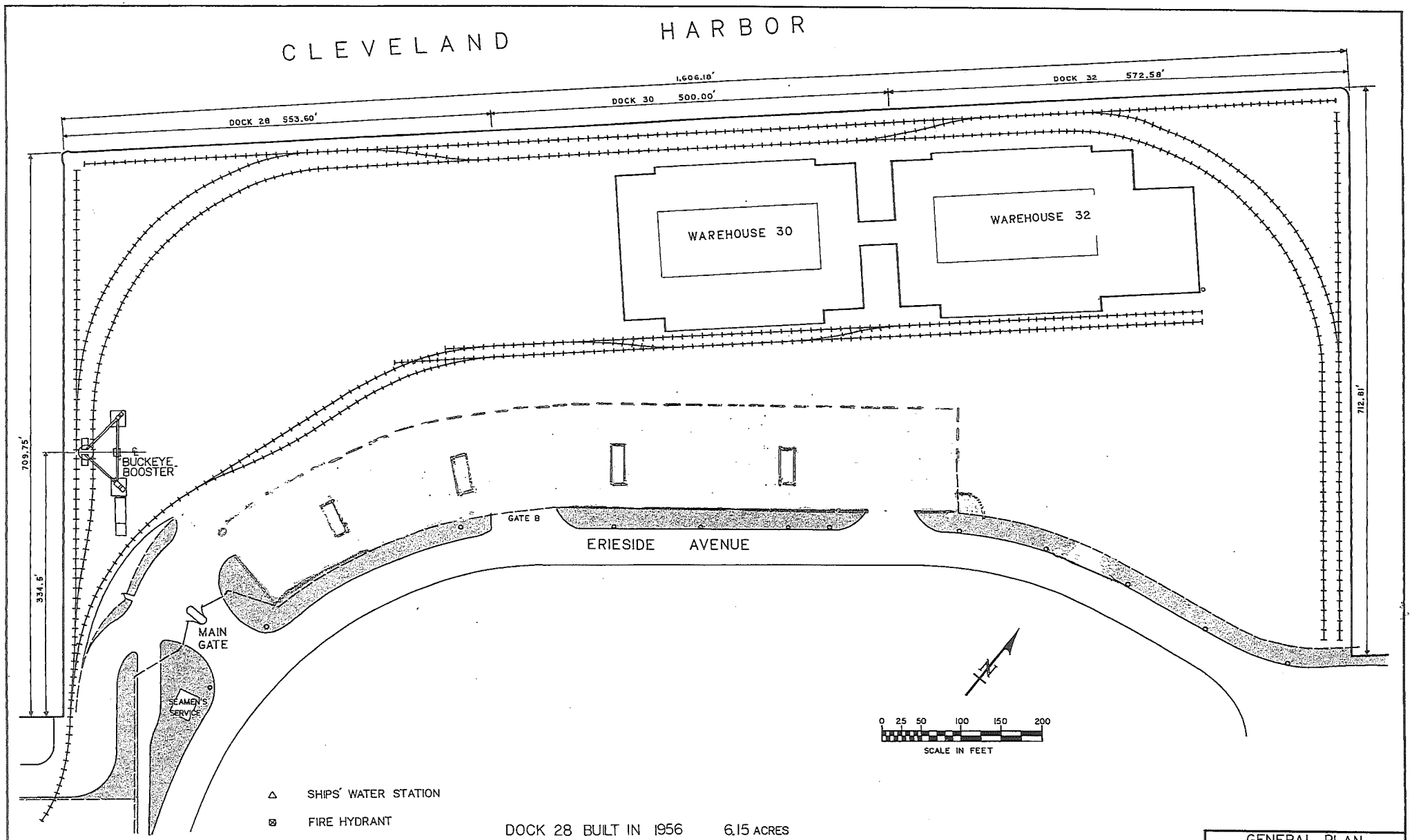
REVISED	A	BY	DATE

PORT AUTHORITY FACILITIES

J.H. 2-19-81		SCALE 1"=200
E. E. HIRSIMAKI		DWG NUMBER 8700
A. F. FUGARO		


CLEVELAND HARBOR
20
1,010'
22
230'
24
518'
220'
26
297'
230'
28
1,607'
534'
30
500'
776'
717'
671'
681'
697'
710'
335'
Buckeye Booster
150 L crane
ERIESIDE AVENUE
ERIESIDE AVENUE
MUNICIPAL STADIUM
W 3rd STREET
W 9th STREET
RTA WATERFRONT LINE
CONRAIL MAINLINE
FRONT STREET
425'
0 50 100 200 300
Scale
Dock Numbers: 30
Light Poles: •
PORT OF CLEVELAND
CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY
REVISED BY DATE
PORT AUTHORITY FACILITIES
DRAWN DATE 3-18-36
APPROVED BY DATE
CHECKED DATE
SCALE 1" = 100'
E. HIRSIMAKI CHIEF ENGINEER DATE
G. L. FAILOR DIRECTOR DATE
DWG. NUMBER 9601


Cleveland Harbor
22
24
26
28
30
32
518.5'
220.0'
297.5'
230.0'
533.6'
500.0'
572.6'
1,606.2'
716.5'
671.6'
681.2'
697.3'
708.8'
712.8'
334.5'
BUCKEYE BOOSTER
Crane - 150 t. capy.
ERIESIDE AVENUE
Main Gate
ERIESIDE AVENUE
W. 9th St.
W. 3rd St.
MUNICIPAL STADIUM
N
0 100 200 300 400
Scale in feet
Light Pole
Fence
Conrail
Mainline
PORT OF CLEVELAND
CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY
REVISED
BY
DATE
GENERAL PLAN
Port Facilities
DESIGNED
DRAWN EH
DATE 9-25-92
CHECKED
DATE
APPROVED BY
DATE
SCALE
1" = 100'
E. E. Hirsimaki
CHIEF ENGINEER
DATE
DWG. NUMBER
A. F. Fugaro
DIRECTOR
DATE
2000



DOCK 28	BUILT IN 1956	6.15 ACRES
DOCK 30	BUILT IN 1961	5.58 ACRES
DOCK 32	BUILT IN 1961	7.86 ACRES
	TOTAL:	19.59 ACRES

PORT OF CLEVELAND

CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

GENERAL PLAN
DOCKS 28 – 30 – 32

DESIGNED DATE | DRAWN DATE | CHECKED DATE

APPROVED BY

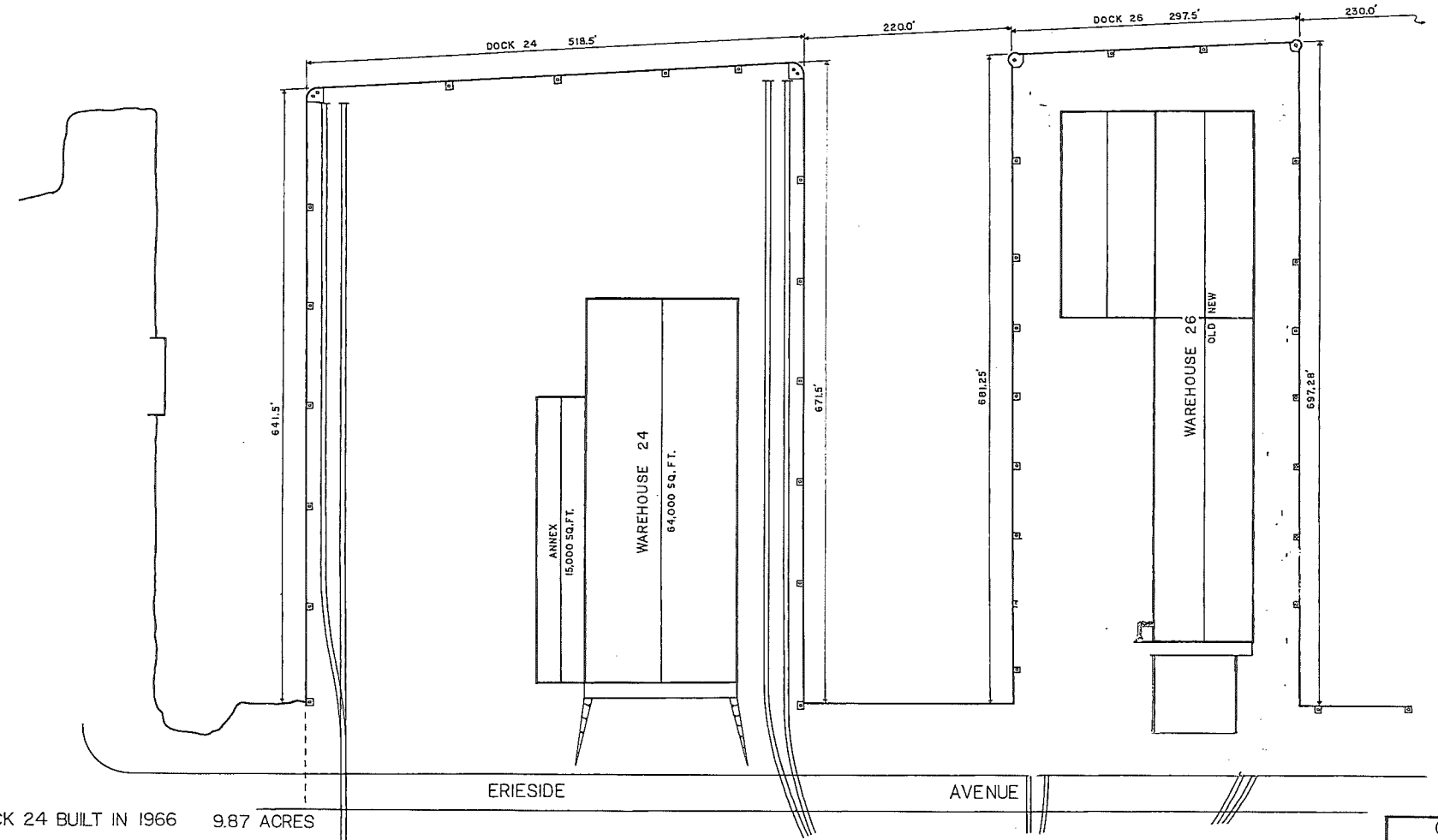
SCALE 1"=50'

E. E. HIRSIMAKI, CHIEF ENGINEER DATE

DWG. NUMBER 1086-1

C. T. BURKE, DIRECTOR DATE

BRUNING



DOCK 24 BUILT IN 1966 9.87 ACRES

DOCK 26 BUILT IN 1958 5.85 ACRES

(ABOVE ACREAGE INCLUDES LAND IN ERIESIDE AVENUE)

PORT OF CLEVELAND

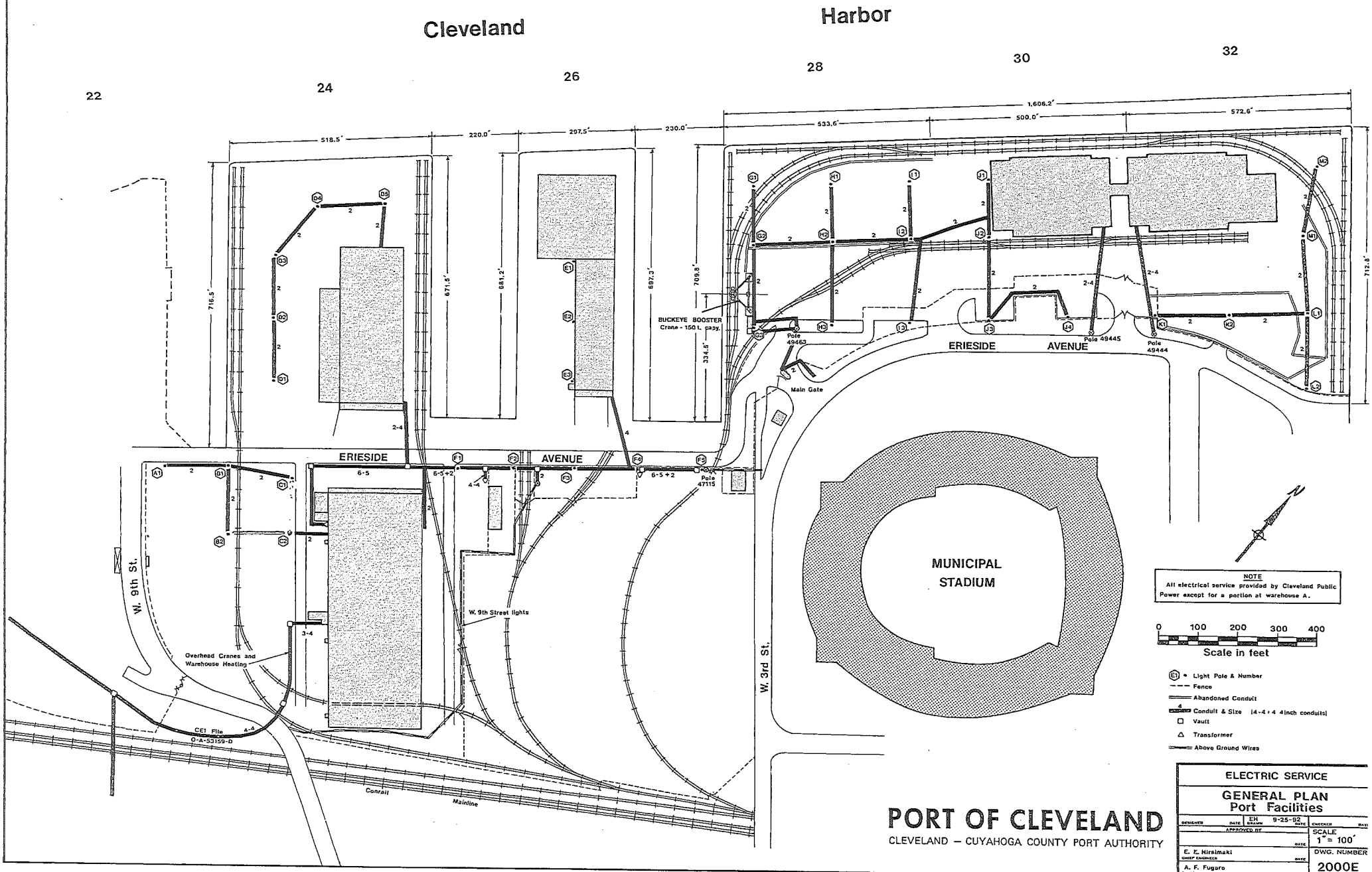
CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

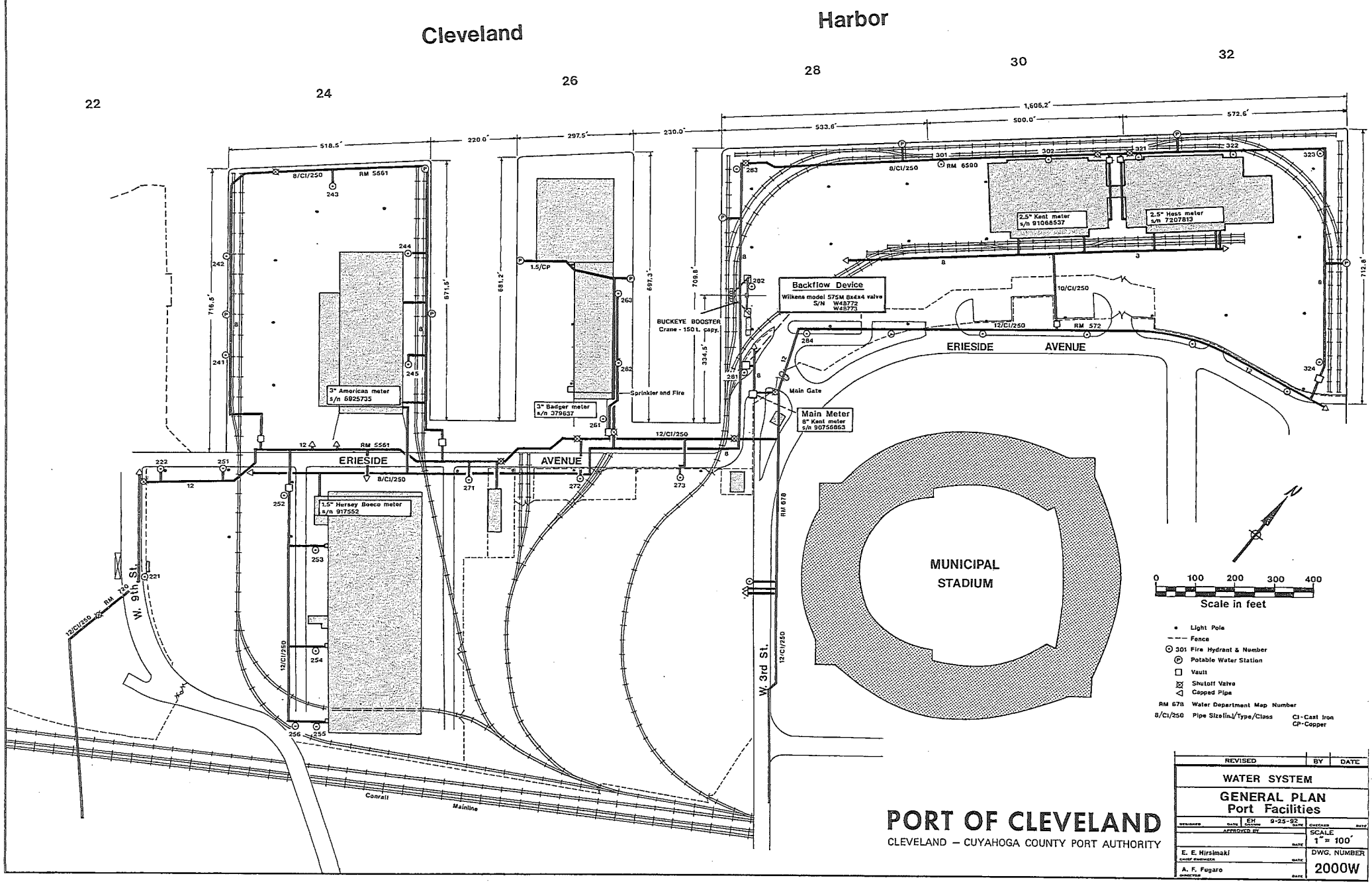
GENERAL PLAN
DOCKS 24-26

DESIGNED	DATE	DRAWN	DATE
APPROVED BY			
	DATE		
E. E. HIRSIMAKI, CHIEF ENGINEER	DATE		
A. F. FUGARO, DIRECTOR	DATE		

SCALE 1" = 50'

DWG. NUMBER 1086-20


Cleveland
Harbor
22
24
26
28
30
32
518.5'
220.0'
297.5'
230.0'
533.6'
500.0'
572.6'
1,606.2'
716.5'
671.5'
681.2'
697.3'
709.8'
712.8'
334.5'
BUCKEYE BOOSTER
Crane - 150 L. capy.
Pole 49463
Pole 49445
Pole 49444
Pole 47115
ERIESIDE AVENUE
Main Gate
W. 9th St.
W. 3rd St.
W. 9th Street lights
Overhead Cranes and Warehouse Heating
CEI File O-A-53159-D
Conrail Mainline
MUNICIPAL STADIUM
NOTE
All electrical service provided by Cleveland Public Power except for a portion at warehouse A.
0 100 200 300 400
Scale in feet
Light Pole & Number
Fence
Abandoned Conduit
Conduit & Size (4-4 x 4 4inch conduits)
Vault
Transformer
Above Ground Wires
ELECTRIC SERVICE
GENERAL PLAN
Port Facilities
DESIGNED
DRAWN EH 9-25-82
CHECKED
APPROVED BY
SCALE 1" = 100'
E. E. Hirsimaki CHIEF ENGINEER
DWG. NUMBER 2000E
A. F. Fugaro DIRECTOR
PORT OF CLEVELAND
CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY



REVISED	BY	DATE

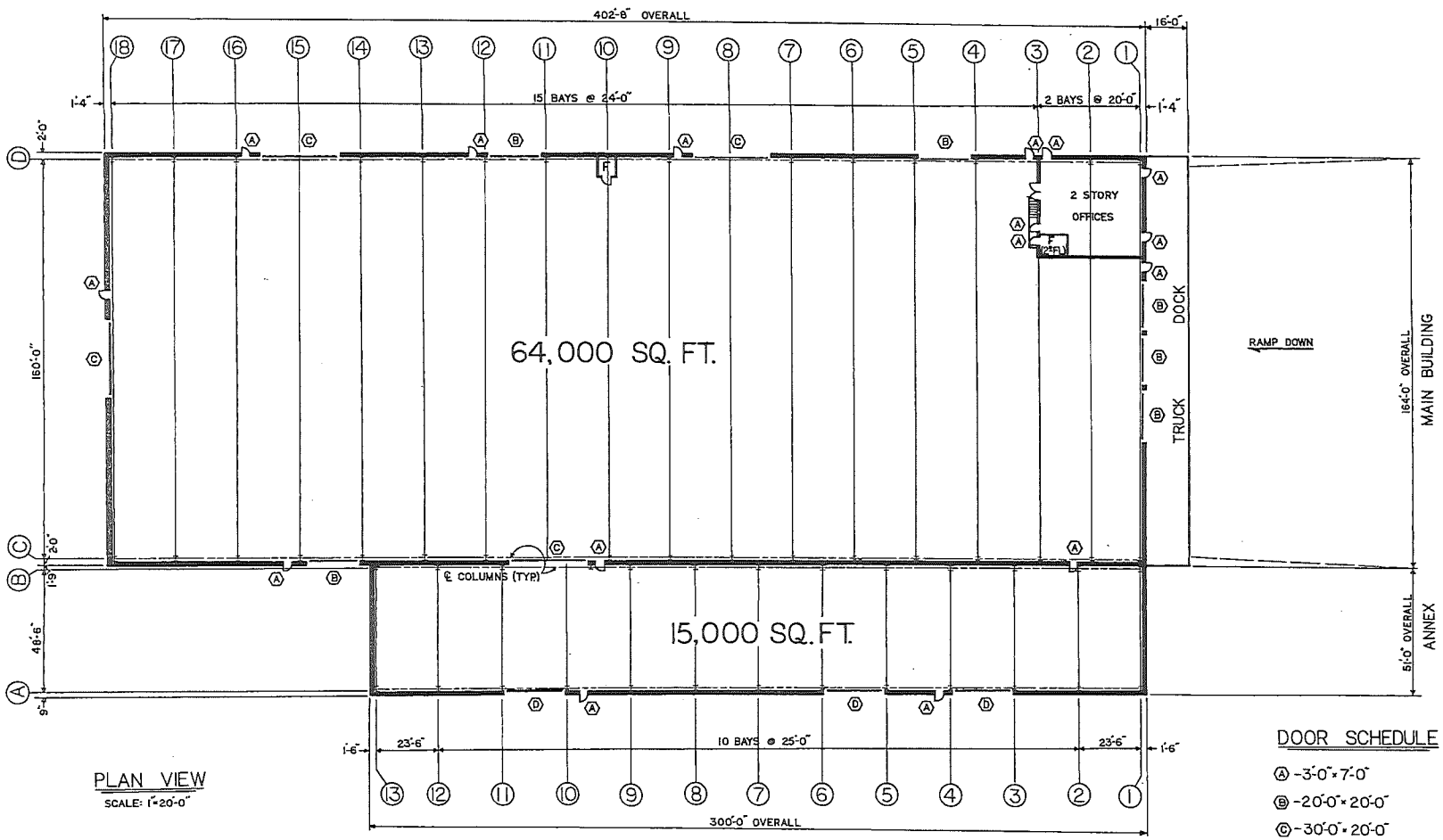
WATER SYSTEM

GENERAL PLAN
Port Facilities

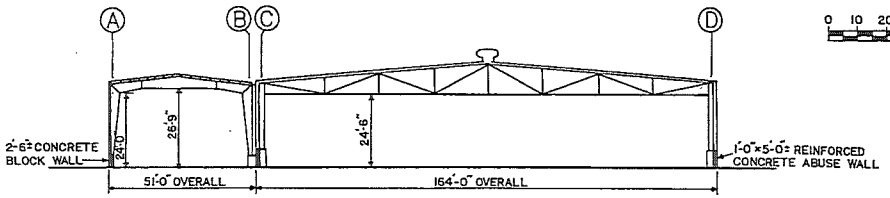
DESIGNED	DATE	CHECKED	DATE
DRAWN EH	9-25-92		
APPROVED BY		SCALE	1" = 100'
E. E. Hirsimaki, CHIEF ENGINEER	DATE	DWG. NUMBER	2000W
A. F. Fugaro, DIRECTOR	DATE		

PORT OF CLEVELAND

CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY



PLAN VIEW
SCALE: 1"=20'-0"



TYPICAL SECTION
SCALE: 1"=20'-0"

DOOR SCHEDULE

Ⓐ - 3'-0" × 7'-0"
Ⓑ - 20'-0" × 20'-0"
Ⓒ - 30'-0" × 20'-0"
Ⓓ - 24'-0" × 24'-0"

NOTE: TYPE Ⓑ AND Ⓒ DOORS ARE OVERHEAD ROLLING STEEL DOORS

F - RISER FOR SPRINKLER SYSTEM

MAIN BUILDING BUILT IN 1970
ANNEX MOVED FROM DOCK 20 IN 1980

PORT OF CLEVELAND

CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

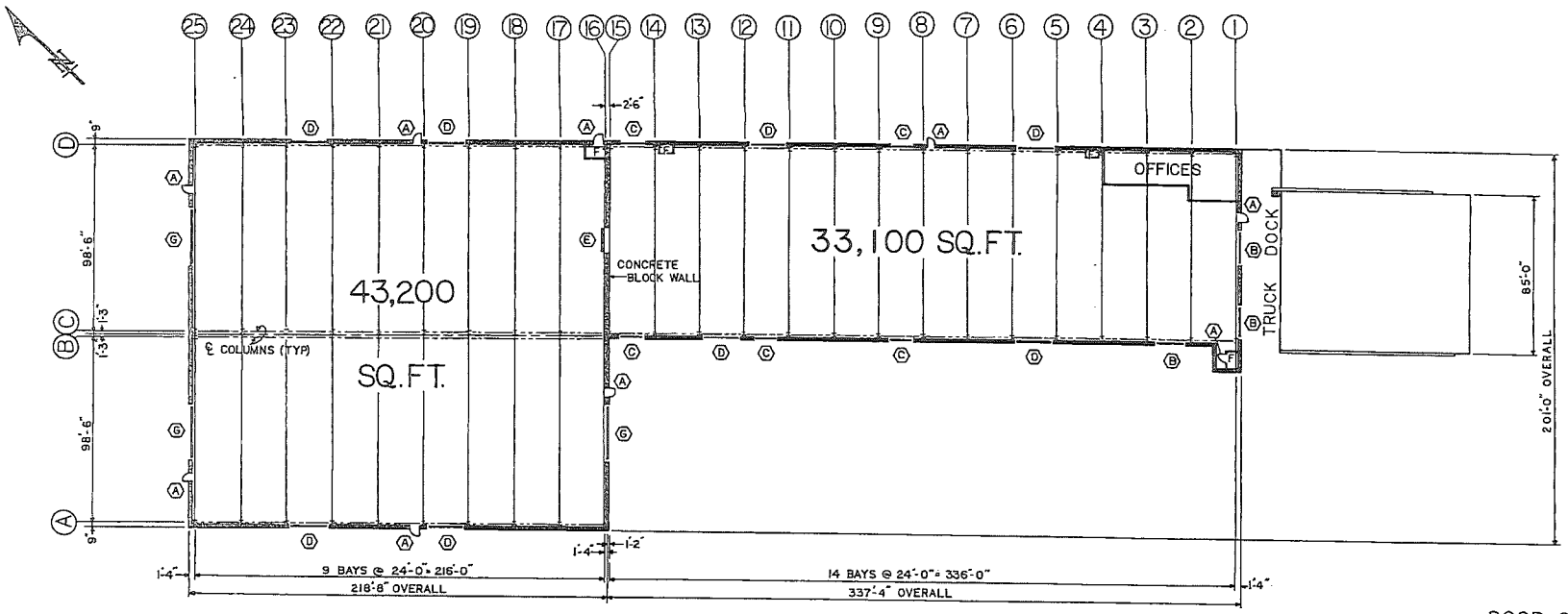
REVISED	BY	DATE

WAREHOUSE 24

GENERAL PLAN AND SECTION OF BUILDING

DESIGNED DATE	DRAWN DATE	CHECKED DATE	
APPROVED BY DATE		SCALE	AS NOTED
E HIRSIMAKI CHIEF ENGINEER DATE		DWG. NUMBER	2486-1
C T BURKE DIRECTOR DATE			

REVISED

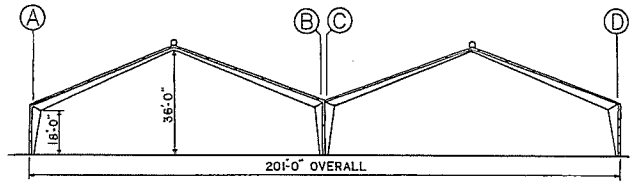


PLAN VIEW

SCALE: 1"=30'-0"

0 10 20 30 40 50 60 70 80 90 100

SCALE IN FEET



TYPICAL SECTION IN ANNEX

DOOR SCHEDULE

- (A) 3'-0" × 7'-0"
- (B) 17'-4" × 14'-0"
- (C) 12'-0" × 14'-0"
- (D) 22'-0" × 18'-0"
- (E) 19'-0" × 19'-0"
- (G) 29'-4" × 20'-0"

NOTE: ALL DOORS EXCEPT TYPE (A) DOORS ARE OVERHEAD ROLLING STEEL DOORS.

F— RISER FOR SPRINKLER SYSTEM OR OUTSIDE WALL HYDRANTS.

MAIN BUILDING BUILT IN 1959
ANNEX BUILT IN 1973 (EDA PROJECT NO: 06-1-0098)

REVISED	BY	DATE
REMOVED ANNEX TO MAIN BUILDING	EH	12/9/89
ENLARGED OVERHEAD DOORS	EH	1/4/89

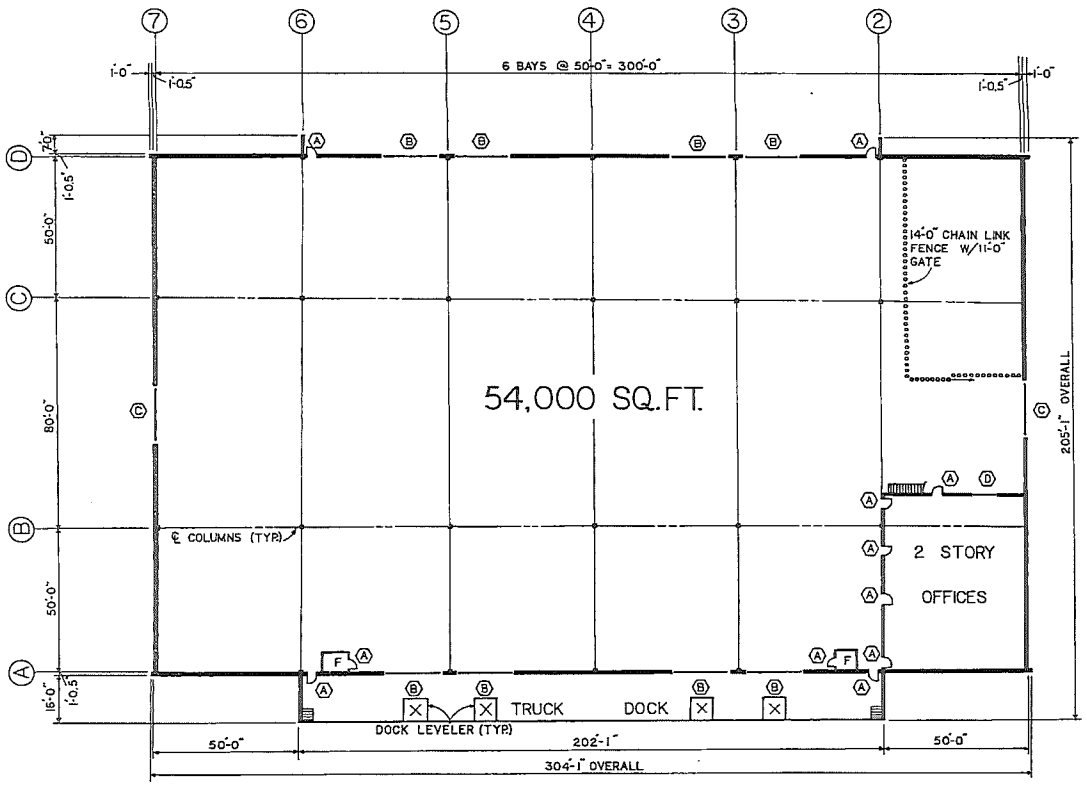
PORT OF CLEVELAND
CLEVELAND — CUYAHOGA COUNTY PORT AUTHORITY

WAREHOUSE 26

GENERAL PLAN AND SECTION OF BUILDING

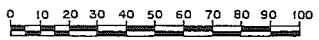
DESIGNED DATE — DRAWN DATE — CHECKED DATE
APPROVED BY EH 2-20-86 DATE
E HIRSIMAKI CHIEF ENGINEER DATE
DIRECTOR DATE

SCALE AS NOTED
DWG. NUMBER 2686-1



PLAN VIEW

SCALE: 1"= 20'-0"



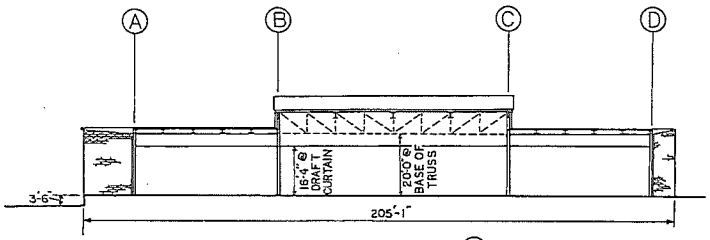
SCALE IN FEET

DOOR SCHEDULE

- Ⓐ 3'-0" × 7'-0"
- Ⓑ 20'-0" × 16'-0"
- Ⓒ 20'-0" × 18'-0"
- Ⓓ 8'-0" × 9'-10"

NOTE: ALL DOORS EXCEPT TYPE Ⓐ DOORS ARE OVERHEAD ROLLING STEEL DOORS

F-RISER FOR SPRINKLER SYSTEM



SECTION @ ⑤

SCALE: 1"= 20'-0"

BUILT IN 1964

PORT OF CLEVELAND

CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

REVISED	BY	DATE

WAREHOUSE 30

GENERAL PLAN AND SECTION OF BUILDING

DESIGNED DATE | DRAWN DATE | CHECKED DATE

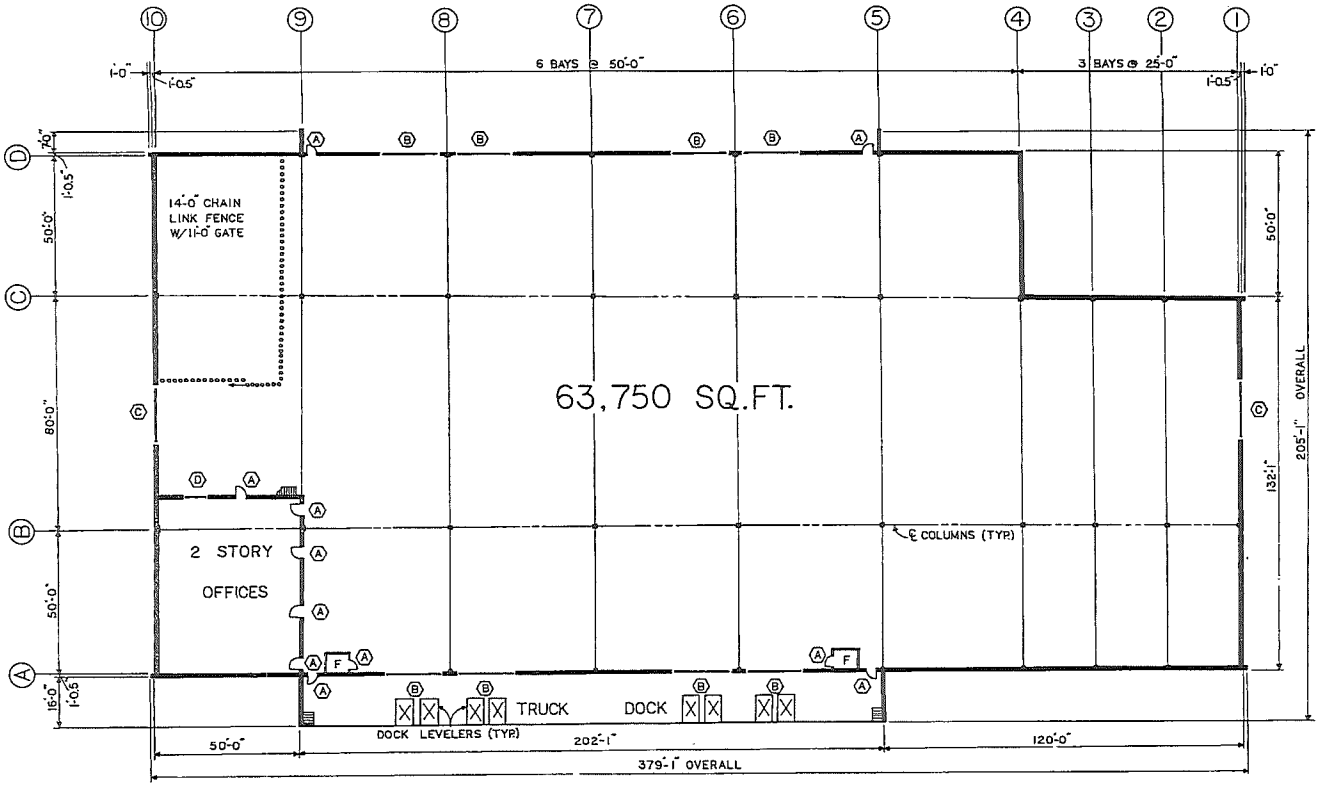
APPROVED BY

SCALE: AS NOTED

E. HIRSIMAKI, CHIEF ENGINEER — DATE

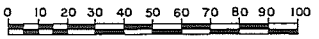
C. T. BURKE, DIRECTOR — DATE

DWG. NUMBER: 3086-1

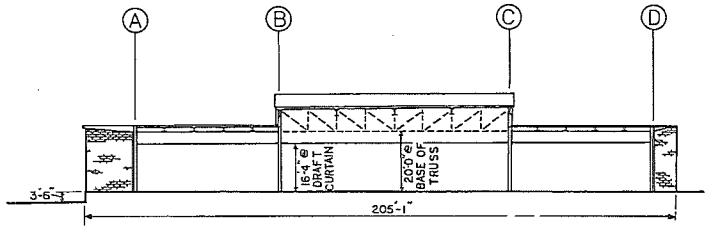


PLAN VIEW

SCALE: 1"=20'-0"



SCALE IN FEET



SECTION @ 7

SCALE: 1"=20'-0"

DOOR SCHEDULE

- (A) 3'-0" × 7'-0"
- (B) 20'-0" × 16'-0"
- (C) 20'-0" × 18'-0"
- (D) 8'-0" × 9'-10"

NOTE: ALL DOORS EXCEPT TYPE A DOORS ARE OVERHEAD ROLLING STEEL DOORS

F - RISER FOR SPRINKLER SYSTEM

BUILT IN 1967

PORT OF CLEVELAND

CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

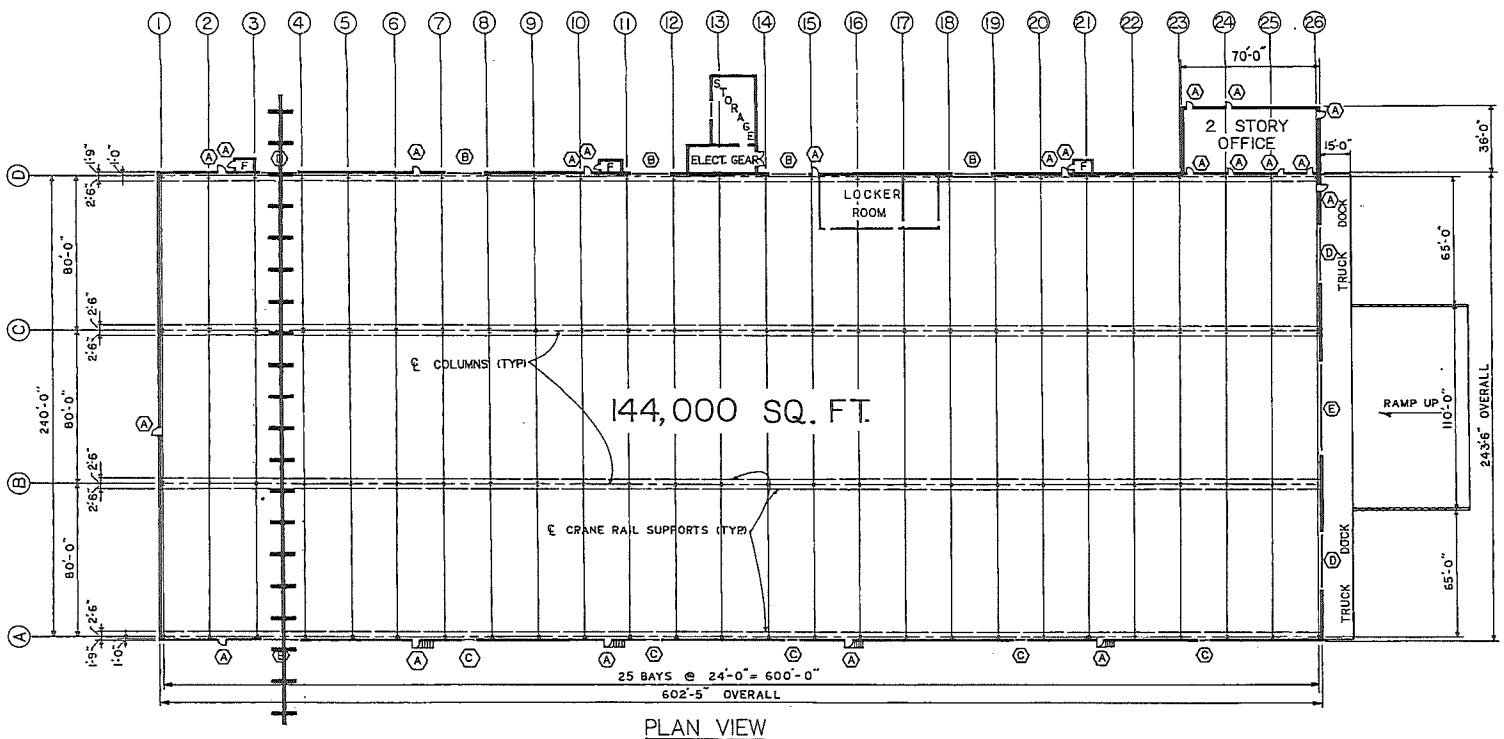
REVISED	BY	DATE

WAREHOUSE 32

GENERAL PLAN AND SECTION OF BUILDING

DESIGNED	DATE	DRAWN	DATE	CHECKED	DATE
APPROVED BY				SCALE	
	DATE			AS NOTED	
E. HIRSIMAKI CHIEF ENGINEER	DATE			DWG. NUMBER	
C. T. BURKE DIRECTOR	DATE			3286-1	

(Returned)



PLAN VIEW

SCALE: 1"=30'-0"

DOOR SCHEDULE

Ⓐ – 3'-0" × 7'-0"

Ⓑ – 20'-0" × 18'-0"

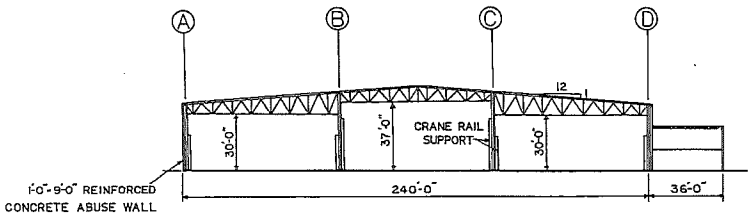
Ⓒ – 8'-0" × 8'-0" (TRUCK DOCK)

Ⓓ – 30'-0" × 22'-0"

Ⓔ – 50'-0" × 22'-0"

NOTE: ALL DOORS EXCEPT TYPE Ⓐ DOORS ARE OVERHEAD ROLLING STEEL DOORS.

F – RISER FOR SPRINKLER SYSTEM.



SECTION AT (25)

SCALE: 1"=30'-0"

0 10 20 30 40 50 60 70 80 90 100

SCALE IN FEET

EDA PROJECT NO. 06-1-00998
HOAG WISMAR JOB NO. 1220

BUILT IN 1975

PORT OF CLEVELAND

CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

REVISED	BY	DATE

WAREHOUSE "A"

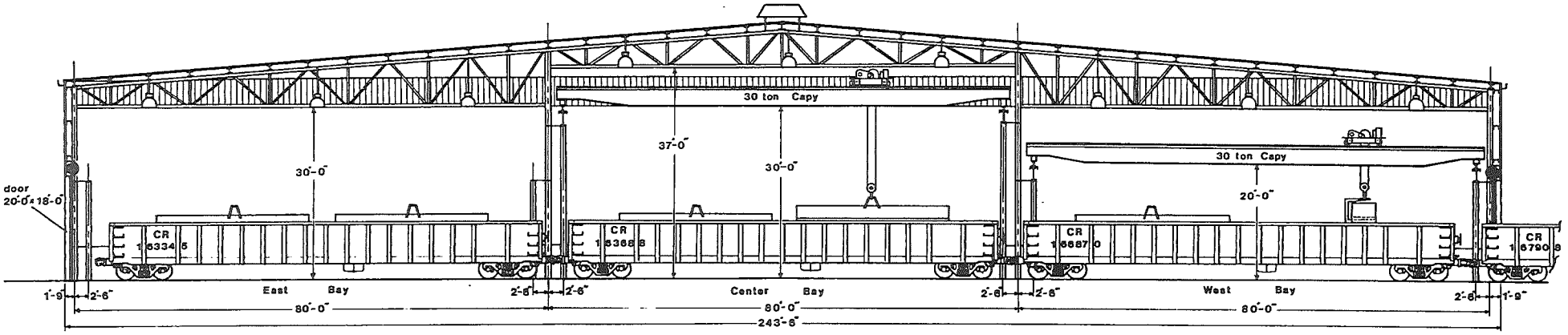
GENERAL PLAN AND SECTION OF BUILDING

DESIGNED DATE | DRAWN E.H. 2-12-86 DATE | CHECKED DATE

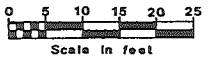
APPROVED BY DATE | SCALE AS NOTED

E HIRSIMAKI CHIEF ENGINEER DATE | DWG. NUMBER 2586-1

C.T. BURKE DIRECTOR DATE



SECTION THRU TRAIN BAY



PORT OF CLEVELAND

CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

REVISED	BY	DATE

WAREHOUSE "A"

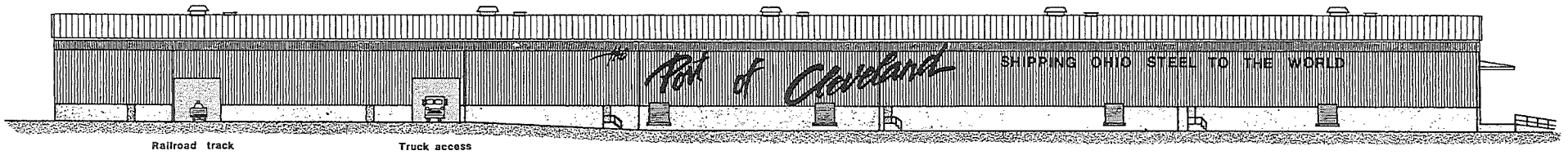
Steel Handling Facility

E. E. HIRSIMAKI

A. F. FUGARO

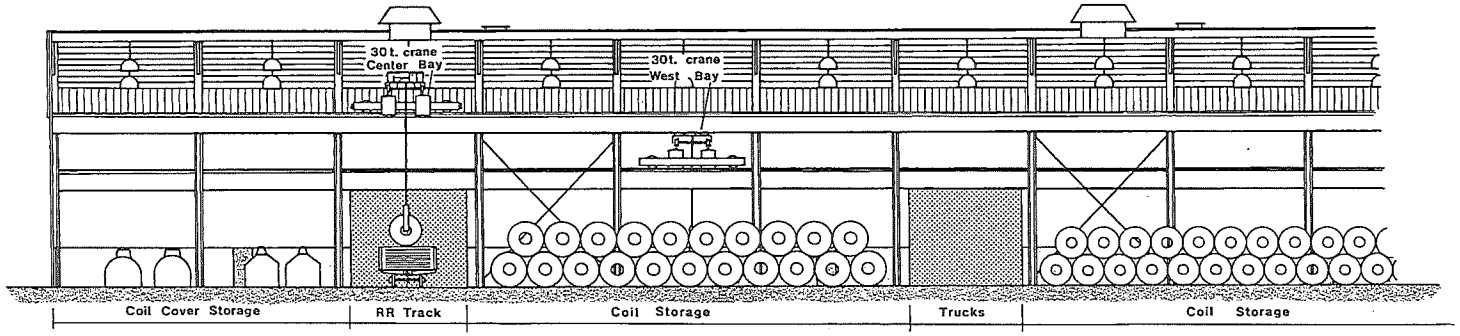
SCALE 1/8" = 1'-0"

DWG. NUMBER



0 10 20 30 40 50 75
feet

EAST ELEVATION
Scale: 1"= 20'



0 5 10 15 20 30 40 50
feet

SECTION THRU CENTER OF WAREHOUSE
Scale: 1"= 10'

PORT OF CLEVELAND
CLEVELAND – CUYAHOGA COUNTY PORT AUTHORITY

REVISED	BY	DATE

WAREHOUSE "A"
DETAILS OF PROPOSED IMPROVEMENTS

DESIGNED DATE | DRAWN DATE | CHECKED DATE
APPROVED BY
DATE
E. E. HIRSIMAKI
CHIEF ENGINEER DATE
A. F. FUGARO
DIRECTOR DATE

SCALE
As Noted
DWG. NUMBER

REPORT ON SOIL CONDITIONS

FOR

CLEVELAND PORT AUTHORITY

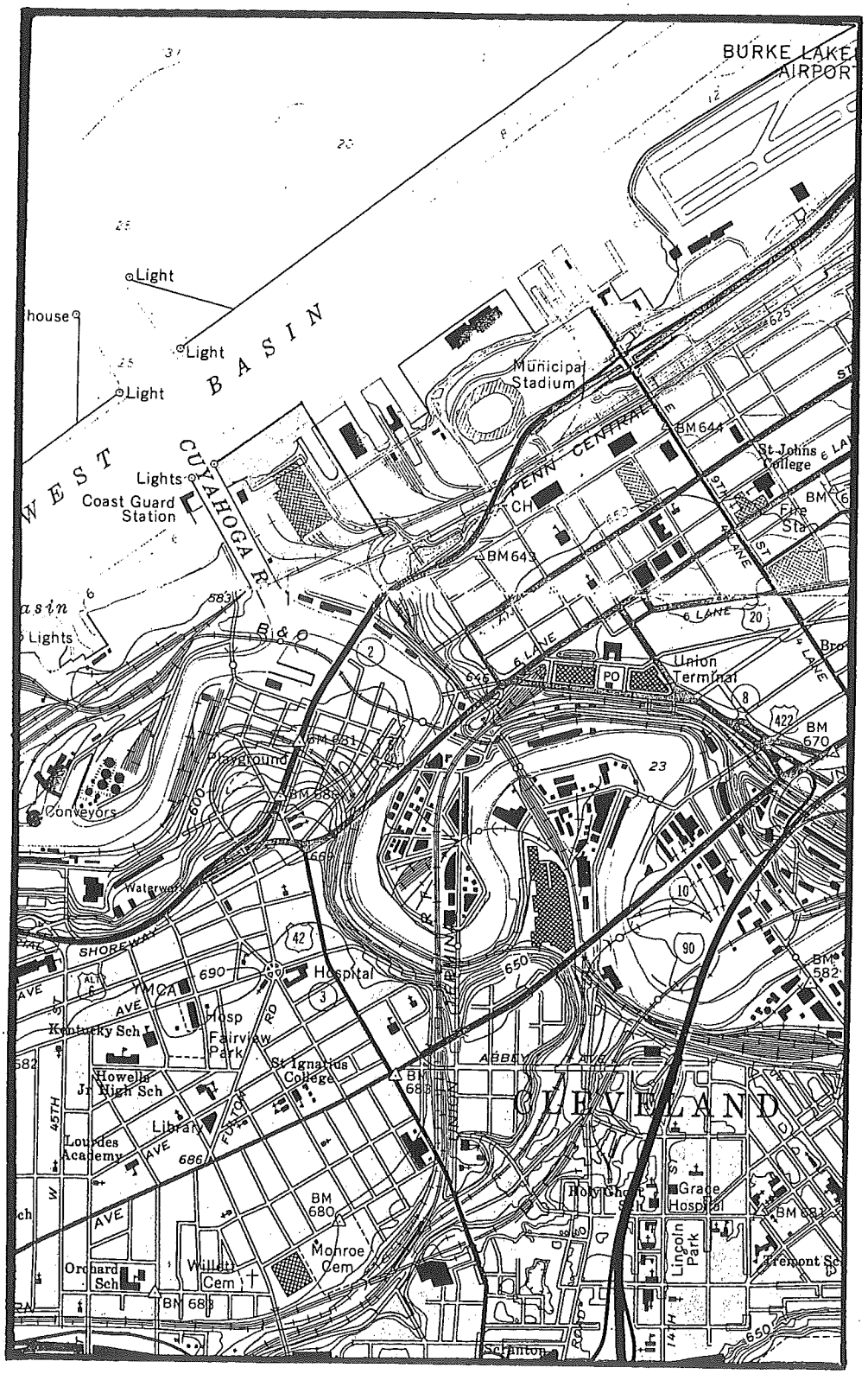
RELOCATION PROJECT

P. O. NO. 2430

C. 4533

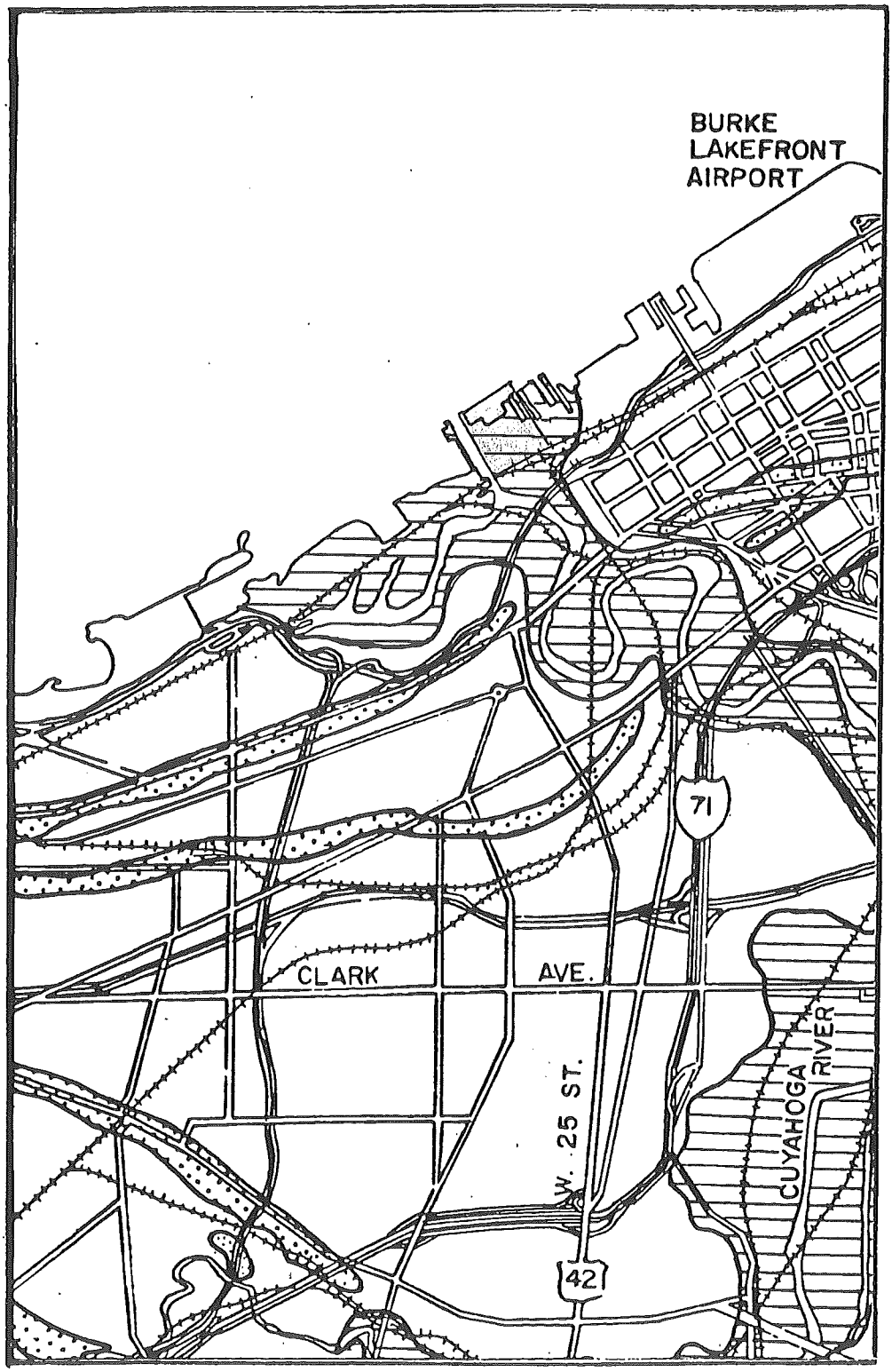
David V. Lewin Corp./Geotechnical Engineering

400 Bulkley Bldg./1501 Euclid Ave., Cleveland, Ohio 44115



SITE LOCATION PLAN
(Scale 1" = 2000' ±)

PLATE I



SURFICIAL GEOLOGY
Scale: 1" = 4000'±

LEGEND

River Alluvium

Glacial Lake Beach Ridge Deposits

Glacial Lake Bottom Deposits

Glacial River Terrace Deposits

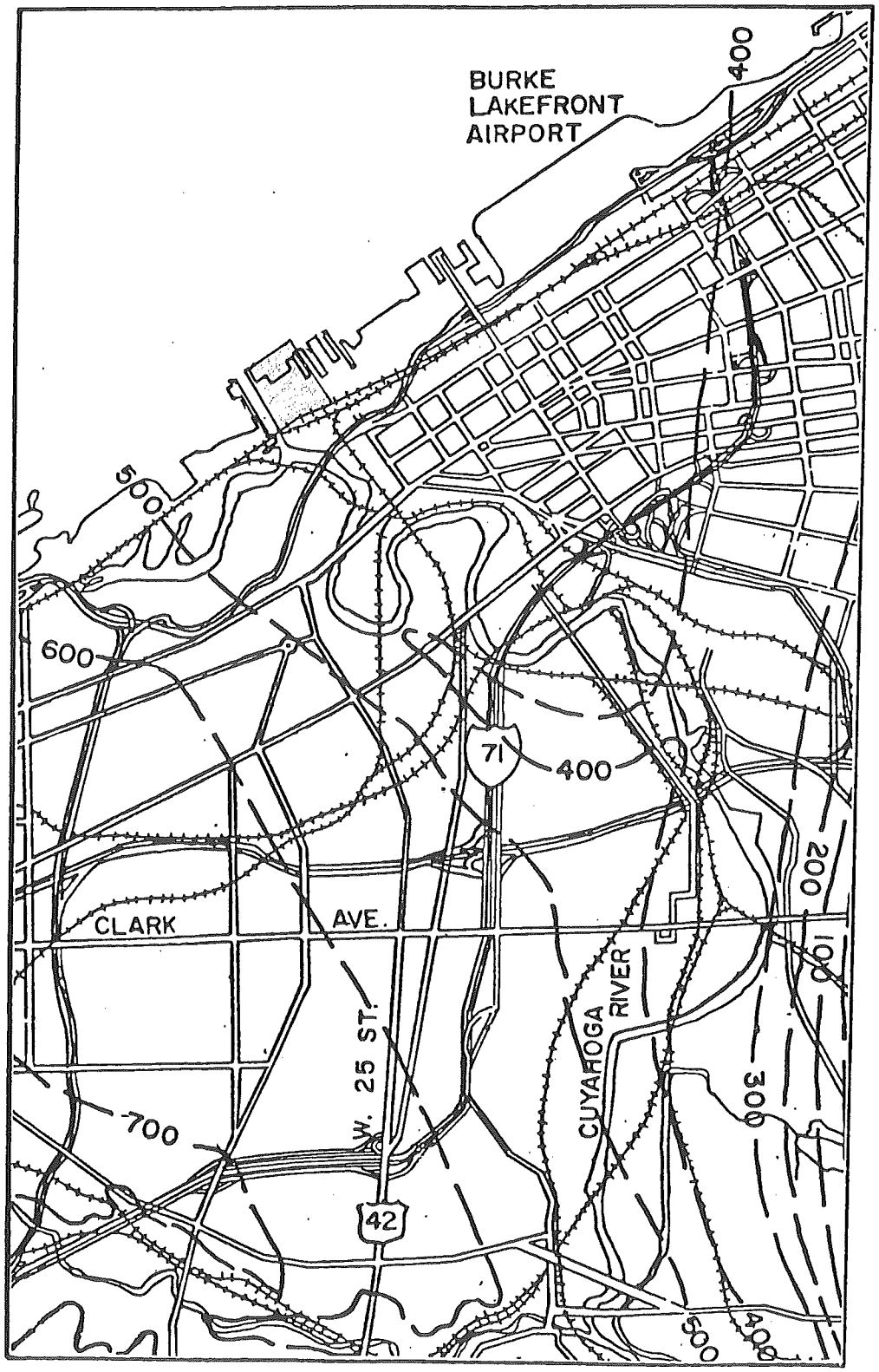
Ice - Deposited Ground Moraine

Ice - Deposited End Moraine

Water-Deposited Glacial Outwash Deposits

AGE — POST GLACIAL AND RECENT — WISCONSINIAN

PLATE II



APPROXIMATE BEDROCK CONTOURS, U. S. G. S. DATUM
(Scale 1" = 4000' ±)

PLATE III

May 22, 1991

URS Consultants
3605 Warrensville Center Road
Cleveland, Ohio 44122-5203

Attn: Mr. David Pyzoha

Re: Cleveland Port Authority
Relocation Project
P.O. No. 2430
C. 4533

Gentlemen:

In accordance with your request, we undertook an investigation of existing subsurface soil conditions for the subject project. The object of this investigation was to determine the subsurface stratification and the engineering properties of the strata encountered. The data developed was used in establishing soil related engineering criteria for use in the design of a breakwater, quay walls, slope stability, earthwork, warehouse foundations, and other substructures.

LOCATION

The area of the Port included within this investigation is generally bounded by Dock 24W on the east and the Cuyahoga River on the west. Plate I was prepared from the U.S. Geological Survey Topographic Map of the Cleveland North (1970) and Cleveland South (1984) quadrangles and shows the location of the area in relation to its surroundings.

GEOLOGY

The surficial geology of the area is shown on Plate II. The site is underlain by river alluvium followed by soils deposited on the

bottom of glacial lakes which preceded the current Lake Erie. Note the beaches of some of the glacial lake stages formed during the advance and retreat of the Wisconsin period glacial ice sheet. Wisconsin period glacial till is generally found between the deep lake bottom deposits and the underlying bedrock, believed to be part of the Chagrin Shale Formation. Plate III shows estimated contours of the bedrock surface.

FIELD EXPLORATION

Several previous investigations were made on this site by our office and by others. A copy of our Report C. 4288, Bulk Storage Capability-Dock 20, dated March 16, 1988 was sent to you previously. Boring data developed by our office in connection with an investigation for a proposed ore pellet terminal extending over Docks 20 and 24, C. 3033 and C. 3033A, warehouse structures south of Dock 24, C. 2337, and other projects by our office and others was reviewed. Some of this data is included in Appendix A for your information. A series of 19 supplemental test boring locations, L-1 through L-19, were selected by our office. Borings were located in the field by your surveyors.

Borings L-1 through L-7 were drilled in the water from a barge. Boring L-9 was not accessible due to a pile of stored material along Dock 20. The borings in the lake and river were drilled in September and October of 1989. The remaining borings, L-8 and L-10 through L-19, were drilled in December, 1990. Approximate locations of these, and previously drilled borings were added to a copy of your general site plan as shown on page 8. Soil and rock core samples obtained were brought to our laboratory for testing and evaluation.

LABORATORY TESTING

Pages 13 through 31, entitled "Laboratory Log of Boring", graphically show the strata encountered as well as the results of some tests performed. The column entitled "Blows on spoon for 12 inches" refers to the standard penetration test and indicates the number of blows of a 140 lb. hammer dropped from a height of 30 inches required to drive a 2 inch O.D. sampling spoon 12 inches into a stratum. Where a figure such as 50/.1 appears in the same column, it means that 50 blows resulted in a penetration of one-tenth of a foot. The column entitled "Unconfined Shear Stress #/SF" refers to one-half of the compressive stress at failure in the unconfined state. Because of disturbance during sampling and the presence of silt or sand seams in some of the samples, the strength of the material in place in the field may differ somewhat from the strength indicated by the laboratory tests. Allowance was made for this in interpreting the strength test data. The column entitled "Loss on Ignition at 600°C.-%" refers to the percent loss in weight of a dried sample of soil when fired in an oven at 600°C. The loss on ignition is indicative of the organic content of the sample. Material exhibiting a loss on ignition of

3 percent or less can generally be considered free of significant concentrations of organic matter. Three inch diameter Shelby Tube samples were obtained at various depths so that tests could be performed on representative "undisturbed" samples. The results of triaxial compression and consolidation tests performed on some of these samples are shown in graphic form on pages 32 through 41. Summaries of shear values determined in the Dock 20 area and Dock 24W and Dock 22E areas are shown on pages 42 and 43.

STRATIFICATION

The subsurface stratification on the site is typically seen as man-deposited heterogeneous fill underlain by relatively thin deposits of sand and/or silt which are in turn underlain by silty clay. Shale bedrock was encountered beneath the site at varying elevations, generally between elevations 440 to 455, but as low as elevation 429± in boring L-8 and as high as 467± in borings B-16 and B-24. The surface of the shale is typically irregular due in part to differential weathering and abrasion from the glaciers. A layer of sand or silt is frequently found immediately over the shale in this area. Gas was encountered in several borings, at depths of 80 to 85 feet in borings L-2, L-6, and L-7, and at a depth of 135± feet in L-1. Such gas encounters are not uncommon in the area and are believed to be pockets of gas.

The man-deposited fill encountered on the site varies in both composition and consistency. The materials in the fill range from sand, slag, coal, iron pellets, and cinders to building debris such as bricks, concrete, asphalt, glass, and wood. Oil or sulphur odors were noted in some of the fill samples. Organic contamination of the fill and the underlying silt and sand deposits may reflect not only those organics which may have been deposited with the fill, but also the presence of natural organic sediments on the lake bottom.

Idealized soil sections through the site are shown on Drawings 4533-2 and 4533-3, pages 9 and 10. These are only intended as an aid to visualizing general relationships between the materials encountered in the borings. Actual transitions in the field from one type of material to another may be expected to be more gradual and irregular than might be inferred from either the soil sections or logs of borings.

GROUNDWATER

Free water was reported in the boreholes at various depths as noted on the logs of borings. As expected, the water levels generally reflect the lake level. Seasonal fluctuations can be expected.

RETAINING STRUCTURES

We believe that the following soil parameters may be used for the computation of lateral pressures.

Dock 24W and End of Slip:

Man-deposited heterogeneous fill and naturally deposited sand and silt to approximate elevation 555: γ = 120 pcf above water table; γ' = 70 pcf below water table; ϕ = 30° C = 0

Clay - Elevation 555 to 530: γ' = 70 pcf; ϕ = 0° C = 950 psf; K_s = 60 kcf

Elevation 530 to 518: γ = 70 pcf; ϕ = 0° C = 1400 psf; K_s = 85 kcf

Elevation 518 to 480: γ' = 70 pcf; ϕ = 0° C = 2000 psf; K_s = 120 kcf

Elevation 480 to 450: γ' = 75 pcf; ϕ = 0° C = 3000 psf

Dock 22E (from south end of slip to 250± ft. north):

Man-deposited heterogeneous fill and naturally-deposited sand and silt to approximate elevation 555: γ = 120 pcf above water table; γ' = 70 pcf below water table; ϕ = 30° C = 0

Clay - Elevation 555 to 530: γ' = 70 pcf; ϕ = 0° C = 950 psf; K_s = 60 kcf

Elevation 530 to 518: γ' = 70 pcf; ϕ = 0° C = 1400 psf; K_s = 85 kcf

Elevation 518 to 480: γ' = 70 pcf; ϕ = 0° C = 2000 psf; K_s = 120 kcf

Elevation 480 to 450: γ' = 75 pcf; ϕ = 0° C = 3000 psf

Dock 22E (from 250± feet north of south end to north end) and Dock 22N:

Man-deposited fill and naturally deposited sand and silt to approximate elevation 555:	γ = 120 pcf above water table γ' = 70 pcf below water table ϕ = 30° C = 0
Clay - Elevation 555 to 510:	γ' = 70 pcf ϕ = 4° C = 600 psf K_s = 45 kcf
Elevation 510 to 480:	γ' = 70 pcf ϕ = 0° C = 2000 psf K_s = 120 kcf
Elevation 480 to 450:	γ' = 75 pcf ϕ = 0° C = 3000 psf

Dock 20 (south of existing jetty):

Man-deposited heterogeneous fill and naturally deposited sand and silt to approximate elevation 555:	γ = 120 pcf above water table γ' = 70 pcf below water table ϕ = 30° C = 0
Clay - Elevation 555 to 545:	γ' = 70 pcf ϕ = 0° C = 1000 psf K_s = 65 kcf
Elevation 545 to 530:	γ' = 70 pcf ϕ = 4° C = 600 psf K_s = 45 kcf
Elevation 530 to 518:	γ' = 70 pcf ϕ = 0° C = 1400 psf K_s = 85 kcf
Elevation 518 to 485:	γ' = 70 pcf ϕ = 0° C = 2000 psf K_s = 120 kcf
Elevation 485 to 440:	γ' = 75 pcf ϕ = 0° C = 3000 psf

Dock 20 (north of south end of jetty):

Same as Dock 22N and north end of Dock 22E

It appears that a single sheet pile retaining wall may not be appropriate for the dock walls along the lake and along the river

in the area of the existing jetty because of the increased depth of softer clays in these areas. Consideration might be given to the use of cofferdams in these areas as well as for the proposed breakwall.

Lateral pressures for controlled granular backfill may be determined on the basis of a unit weight γ = 120 pounds per cubic foot above the water table, a submerged weight γ' = 70 pounds per cubic foot, and an angle of internal friction $\phi = 32^{\circ}$. Materials that are actually going to be used for filling should be reviewed when they are available so that the parameters can be checked.

STABILITY ANALYSIS

Stability analyses of both the Dock 24W extension and the end of the Dock 24W slip were made. The dock section and the soil profiles and properties used in this analysis are shown on Drawing C. 4533-4, page 11. The effect of several positions of an assumed 1000 pound per square foot surcharge relative to the face of the dock was evaluated as shown. Based on this analysis, it appears that a factor of safety of 1.50 can be obtained if the surcharge is kept at least 80 feet back of the face of the dock. The factor of safety is reduced to 1.36 when the surcharge is placed up to the dock face. Note the effect of a reduced dock height and the berm on the water side of the bulkhead on the factor of safety calculated for the bulkhead at the end of the slip. The berm should be constructed of select granular material and should be built with a slope no steeper than three horizontal to one vertical. Scour and washouts may result if suitable armoring is not provided.

EXCAVATION

The material to be excavated for the slips generally consists of man-deposited fill, a layer of silt and/or sand, much of which is contaminated with organic or other matter, followed by silty clay. This material is in general not suitable for use as structural fill in other areas of the site. Should a significant amount of clean, inert material be encountered during excavation, we will be available to discuss the possible use of such material at that time. The sides of unretained excavations should not be expected to stand vertically. Instability may be experienced along temporary slopes as flat as two horizontal to one vertical. Erosion protection will be required along slopes and wherever materials are exposed to the action of water. Your attention is called to the importance of construction methods and sequence with regard to excavation, the installation of retaining structures, and subsequent backfilling. This should be taken into consideration during the design stage and carefully reviewed before and during construction. The possible presence of the

remains of previous docks, structures, and/or shore protection should also be considered.

PILES

A sketch showing the relationships between estimated individual allowable axial pile capacity versus penetration for 12 3/4 inch diameter pipe piles in compression and in tension in the area of Dock 24W was previously sent you and is included on page 12 for reference. The curves were developed for vertical piles and for piles driven at an angle of 30^{o} from the vertical. Ultimate loads were estimated to be P_u = adhesion x pile circumference x stratum penetration. An additional allowance for bearing at the tip was added for piles in compression. Based on our experience with pile tests in this area, we have assumed that adhesion equals the unconfined shear stress for compression piles and varies from 0.7 to 0.5 times the unconfined shear stress for tension piles. A factor of safety of two was applied to P_u in order to determine allowable capacity.

Note that gas was reported in some of the borings at depths of 80 to 85 feet as previously discussed. It is possible that some gas may be encountered during the installation of piles and sheet piling. The environmental and construction implications of any such encounters, if any, should be considered.

LIMITATIONS

The above considerations are based on a substantial but necessarily limited number of borings on the assumption that the materials encountered do not vary significantly between the points explored. This assumption should be verified during construction. Environmental analysis, evaluation or testing were not included in the scope of our investigation.

With the exception of the Dock 24W extension and the end of its slip, we understand the design is still in the early stages. We will be providing recommendations for proposed warehouse structures, storage areas and other facilities as your plans are developed.

Sincerely yours,

DAVID V. LEWIN CORP.

Alvin H. Jaffe

AHJ/ae