REPORT OF

GEOTECHNICAL STUDY

PROPOSED PUBLIC SERVICE FACILITY/NURSERY
BEXLEY, OHIO

FOR

THE CITY OF BEXLEY

JANUARY 2003

H. C. NUTTING COMPANY

H. C. NUTTING COMPANY
EMPLOYEE OWNED
GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS
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January 31, 2003

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Mr. Daniel J. Lorek
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The City of Bexley
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Re: Report of Geotechnical Study
Proposed Public Service Facility/Nursery
Vacant 1.695 Acre Lot Located at Mayfield Place
Bexley, Ohio

Dear Mr. Lorek:

H. C. Nutting Company (HCN) is pleased to present our report of the geotechnical study for the proposed Public Service Facility/Nursery to be located on a vacant 1.695 acre lot at Mayfield Place in Bexley, Ohio. Additionally, this report summarizes the findings of three borings drilled on the adjacent vacant lot located north of the referenced 1.695-acre lot. This report includes findings of our recent subsurface exploration, results of our analyses, conclusions and recommendations addressing foundation design and construction for the proposed building, floor slab, pavement and other related geotechnical issues.

This study was performed in general accordance with our proposal letter dated November 20, 2003 and our letter summarizing costs associated with additional drilling dated January 9, 2003. Written authorization to proceed with the work described in our

proposal was provided by The City of Bexley on December 18, 2002. Verbal authorization to proceed with additional drilling summarized in our January 9, 2003 letter was provided by you on January 15, 2003. The subsurface exploration phase for the proposed development was completed on January 25, 2003.

We appreciate the opportunity of working with you on this project. Please contact us concerning any questions that may arise during review of the report, or if you require additional information as you proceed into the final design and construction stage of this project.

Thank you for your consideration.

Respectfully submitted,
H. C. NUTTING COMPANY

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Project Geotechnical Engineer

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INTRODUCTION

Purpose

The purpose of this geotechnical study was to characterize the subsurface conditions across the project site. Engineering recommendations have been developed to highlight the foundation design and construction aspects, floor slab design, pavement construction of associated access drives and parking areas and other related geotechnical issues for site development purposes.

Scope of Study and Report Format

This study included performing 11 test borings (B-1 through B-11), laboratory testing on selected samples, analysis and development of engineering recommendations, and preparation of this report. The following text describes the project, our findings and geotechnical recommendations. Following the text of the report is an appendix, which contains two figures and reclassified test boring logs. Also, included in the appendix are descriptions of terminology used in the test boring logs and important information regarding the basis and limitations of this study.

Project Description

We understand that City of Bexley is planning for construction of a 21,200 nsf public service facility/nursery in Bexley, Ohio. The approximate 1.695-acre site is located north of the City of Hilliard Heritage Trail, located at Mayfield Place in the southwest quadrant of Bexley. The property is currently vacant. The new proposed structures will consist of about 20,000 nsf for vehicles and equipment, material and storage, and 1,200 nsf for offices, 3 mechanic bays with portable lifts, a fuel storage system with 2 gas pumps and 4,000-gallon each UST/AST, and about 30 parking spaces.

A preliminary site plan provided by Davis King Architects showing the proposed site

layout is shown in Figure 1. Preliminary building loads are not available. Based on the type of construction described, we have assumed that building loads will be light, with maximum column loads on the order of 50 kips and wall loads on the order of 3 kip/lineal foot.

Site Description and Background Information

The site visit by the project geologist indicated that the site is located immediately north of a one-way access drives that connects "dead end" streets Mayfield Place and Ferndale Place (Figure 1). The site is level for the most part, with clusters of small to medium size trees and brush growing within the generally grassy/weeded lot. The top of the bank to the Alum Creek is located at the western boundary of the site. The ground surface at the western limits of the site slopes downward sharply with an elevation drop of about 15-ft. to Alum Creek.

Information provided by The City of Bexley indicates that property in the general area of the site was landfilled in the past. Please refer to our Phase 1 Environmental Site Assessment for a summary of known or documented filling activities at the site, as well as a summary of any related environmental issues. Evaluation of environmental issues regarding this site is not within the scope of this geotechnical report. Visual observations made at the site by our project geologist corroborate the presence of landfilling at the site and vicinity. Some of these observations include structural distress/settlement of sections of pavement and nearby building structures. Additionally, from discussion with local police officials during drilling operations, we understand that a tennis court located immediately to the north of the site is reportedly supported on a platform founded on deep foundations.

EXPLORATION AND TESTING PROGRAMS

Field Exploration

Eleven Standard Penetration Test (SPT) borings (B-1 through B-11) were drilled for this project. The "as-drilled" test boring locations are depicted on the Test Boring Location Plan (Figure 1). This plan was developed from a preliminary layout provided by Davis King Architects (Architect). Borings B-1 through B-8 were drilled at locations provided by the Architect for the proposed facility at the referenced 1.695-acre site. Boring B-9, B-10 and B-11 were drilled at locations provided to HCN by the Architect at the vacant lot located north of the 1.695-acre lot in order to evaluate general subsurface conditions there. The test borings were located in the field by HCN by referencing existing site features. The ground surface elevations at the boring locations were estimated by HCN using standard leveling methods and referencing a temporary benchmark (steel bolt) set in pavement at the centerline of Mayfield Place at its extreme north end (Arbitrary Elevation = 100.0 ft.).

The test borings were performed utilizing a drill rig mounted on an All-Terrain vehicle (ATV). The drilling equipment was mobilized to the site on January 8, 2003, to perform drilling and sampling of the borings for the project. Upon encountering relatively deep uncontrolled fill at the site in the first boring drilling, the drilling equipment was demobilized from the site pending authorization by The City of Bexley to proceed with proposed additional drilling at the site. Following authorization to proceed, the drilling equipment was mobilized to the site on January 20, 2003. Drilling was completed on January 25, 2003. Boreholes were advanced and stabilized using hollow-stem augers while sampling was accomplished using the SPT procedure (ASTM D 1586). Split-spoon samples were obtained at 2.5-ft. intervals for the first 16.5-ft. of depth, and at 5.0-ft. intervals thereafter.

The drill foreman maintained a log of the drilling operation. This log included a description of the soils encountered from each split-spoon, the depth at which the soil changed, the depth from which each sample was recovered, and the type of sample.

The log also included the number of blows for each 6" of drive on the split-barrel sampler. Levels at which any groundwater and seepage were encountered were also noted, along with other pertinent information developed during the drilling operations.

Laboratory Testing

Upon completion of the field exploration program, the collected samples were returned to our laboratory. A laboratory-testing program was conducted on selected samples; the program consisted of pocket penetrometer readings on cohesive samples.
After completion of the laboratory program, reclassified test boring logs were prepared by the project engineer based upon visual inspection of samples, and laboratory test data. These classified logs and test results are included in the appendix section of this report.

SITE CONDITIONS

Encountered Subsurface Conditions

Uncontrolled random fill material was encountered in all eight borings at the subject 1.695-acre site to depths varying from 8.0 to 20.0 ft. below the existing ground surface. Uncontrolled random fill was also encountered in the three borings performed in the area north of the subject 1.695-acre site. The depth of the uncontrolled fill in these borings ranged between 7.5 to 12.5 ft. below the existing ground surface. Beneath this existing fill material, the test borings revealed natural granular deposits, except in borings B-1, B-7, B-10 and B-11 where a layer of cohesive soils was encountered below the fill, underlain by the granular deposits. A description of each of the major soil stratum encountered during our subsurface exploration phase is included below.

Uncontrolled Random Fill Material

The borings revealed varying depths of uncontrolled random fill across the site. The fill encountered during our exploration may be the result of past landfilling operations. In

the following table we have tabulated the fill depths encountered in each of the borings performed during our exploration.

Boring	Fill Depth below Existing Ground Surface (ft.)
B-1	8.0
B-2	12.5
B-3	12.5
B-4	13.5
B-5	12.5
B-6	18.5
B-7	20.0
B-8	15.0
B-9	12.5
B-10	10.0
B-11	7.5

The fill encountered in the borings indicated a heterogeneous composition. The fill consisted of both cohesive, as well as granular soils with varying amounts of organic and deleterious materials consisting of decayed wood fragments, roots, brick, rock fragments, gravel, asphalt fragments, cinders, glass fragments etc. SPT N-values within the fill varied from 0 (weight of hammer/tools) to 15 blows per foot (bpf). The granular fill indicated a very loose to loose compactness and the cohesive fill indicated a medium stiff consistency.

The wide variation in consistency rating, heterogeneous composition, and presence of organic and other deleterious matter is an indicative that this fill material was placed in an "uncontrolled" and "random" fashion.

Natural Cohesive Soils

Natural soils consisting of sandy lean clay, lean clay, clay and sandy silty clay were encountered beneath the fill in Borings B-1, B-7, B-10 and B-11. SPT N-values within these soils varied from 2 to 15 bpf and pocket penetrometer readings varied from 1.25 to 2.75 tsf. These soils indicated consistency varying from very soft to stiff. The thickness of these layers varied from about 2.5 to 5.0 ft.

Natural Granular Deposits

Natural granular deposits were encountered beneath the uncontrolled fill and cohesive soils described above at depths varying from 12.5 to 25.0 ft. below the existing ground surface. The granular deposits consisted of silty clayey sand, sand, silty clayey gravel, clayey gravel, silty gravel and sandy silt. SPT N-values within these deposits varied from 3 to 36 bpf. Very loose to loose deposits were encountered in Boring B-3 between 18.5 to 25.0 ft., in Boring B-8 between 20.0 to 30.0 ft. and in Boring B-10 between 12.5 to 25.0 ft. below the existing ground surface. Medium dense to dense deposits were encountered elsewhere.

Groundwater

In the following table we have provided the groundwater (GW) information recorded during and at completion of drilling and 24-hours after completion of drilling.

Boring No.	Immediate GW Reading (ft. bgs*)	At Completion GW Reading (ft. bgs*)	GW reading 24-Hours After Drilling (ft. bgs*)
B-1	20.0	18.5	--
B-2	15.0	14.0	--
B-3	12.5	15.0	--
B-4	13.5	12.5	--
B-5	12.5	12.0	--
B-6	20.0	17.0	--
B-7	25.0	21.0	--
B-8	15.0	13.0	10.5
B-9	15.0	13.0	12.0
B-10	15.0	11.5	10.0
B-11	15.0	15.0	13.0

* bgs – Below existing ground surface

-- Borings backfilled prior to 24 hours

Based on the groundwater readings recorded during our field exploration, it appears that the groundwater table is deep enough that seepage may not be a factor in shallow excavations that may be required for underground utilities. It is likely that the granular deposits are hydraulically "connected" to the nearby Alum Creek. It should be anticipated that groundwater levels will fluctuate with changes in the water level of the creek.

CONCLUSIONS AND RECOMMENDATIONS

Development of Site Consisting Uncontrolled Fill – A General Overview

Development of the site with thick deposits of uncontrolled fill should occur with the understanding that a certain level of risk will be associated with its development. The risks associated with constructing buildings with conventional foundation systems (e.g., spread footings with slab-on-grade) at the site may include long-term subsidence; settlement and surficial cracking of building foundations and floor slabs; and potential periodic maintenance of buildings and pavement due to the long-term consolidation/densification of the underlying fill soils. This is because of the significant depth of the existing fill and its non-uniformity in material characteristics, moisture characteristics, and density.

There are no theoretical or analytical geotechnical methods presently available to accurately predict the amount of potential settlement that will occur when a foundation or floor slab bears directly on existing deposits of heterogeneous fill. We know from long-term experience, that settlement of structures bearing over random heterogeneous fills is a long-term phenomenon, which can occur over the life of the structure. It should be understood that the settlement is not only due to the foundation and floor slab loads, but also due to the long-term degradation and consolidation of the existing fill under its own weight. Experience has shown that the subsidence is inherently uneven, resulting in differential settlement and associated structural distress.

General Assessment

Due to uncontrolled nature of the random fill, it would be advisable to minimize the excavation on the site. Excavations would expose the highly inconsistent underlying uncontrolled random fill consisting of various deleterious materials.

The depth and variability of the uncontrolled fill preclude the use of conventional shallow foundations at the site. We considered various foundation options for the site. One option considered consisted of partially undercutting uncontrolled fill and replacing it with structural fill to support shallow foundations. Our evaluation of this option indicated that this option would likely not provide an acceptable settlement response for the proposed building structures. A full depth undercut option would not be practical or economical due to significant depth of the fill. Therefore, in this report we are presenting two options for development of the site. The first option consists of constructing proposed building structures on a system of grade beams and structural slab supported on deep foundations bearing within the underlying natural granular deposits. The type of deep foundation system we recommend is auger cast grout-injected (auger cast) piles. The second option presented in this report consists of ground improvement using deep dynamic compaction at the site. After deep dynamic compaction is completed building structures may be supported on shallow foundations after performance of appropriate site grading operations.

We are also provided recommendations for construction of pavement areas using a geotextile reinforced base.

Initial Site Development

In general, the initial site grading measures should include complete removal of all vegetation and topsoil in the building footprint and pavement areas. Such unsuitable material should be stripped off within and at least 10 ft. beyond the limits of the proposed structural areas (building floor slab, parking areas and areas to receive

structural fill).

Foundation Construction

Because of the significant depth of fill present at the site and its non-uniformity in material characteristics, moisture characteristics, density, and presence of organic matter, construction of conventional shallow foundations directly on these fill soils is not recommended. This is because of the potential for excessive total and differential settlements and subsidence if slab-on-grade type construction (with associated shallow foundations) is adopted.

A deep foundation option consisting of auger cast piles or a shallow foundation option after ground improvement using deep dynamic compaction is recommended for proposed building structures at the site.

As part of the recommendations associated with the auger cast pile foundation option, we are also providing recommendations for a structural floor slab, subgrade preparation for pavement areas and utilities considerations.

Auger Cast Pile Foundation Option

The approximate pile tip bearing depths for the auger cast piles are tabulated in the table found in this section. Please note that the "ground surface" referred to in this table is the existing ground surface at the boring locations at the time of drilling. The actual bearing depths of each pile should be determined in the field during inspection by a representative of the geotechnical engineer.

We recommend that the following criteria be used in the design and construction of the auger cast pile foundation system.

Design Recommendations

1. We have evaluated 16" diameter auger cast piles for 25 and 50 kip capacities. The

analyses were performed at boring locations B-8 and B-7. The analysis at Boring B-8 is for auger cast piles in the proposed office area and the parking bay area. The analysis at Boring B-7 is for auger cast piles in the Green House building area. The table below provides the pile tip depths within the granular strata that would be required to achieve the 25 and 50 kip capacities. These capacities refer to the downward load bearing capacity for a pile. We are assuming that significant uplift forces are not anticipated.

Boring Location	Pile Diameter	25 Kip Capacity	50 Kip Capacity
		Min. Depth BGS*	Min. Depth BGS*
B-8	16"	35 ft.	42 ft.
B-7	16"	35 ft.	42 ft.

* BGS – Below Ground Surface

2. The Ohio Basic Building Code (OBBC) limits compression capacity to 25 percent of the 28-day specified grout compressive strength. We recommend using at least 3000-psi grout. Using this value and pile diameter listed in the table above, the maximum allowable pile capacity computed using this OBBC criterion exceeds the allowable design capacities presented in the table.

3. A reinforcing steel bar should be specified in each pile, as specified in the following installation recommendation section.

4. Piles should be spaced no closer than 2.5 diameters, center to center.

5. The project drawings should indicate the estimated pile tip elevations. The drawings should indicate that these tip elevations are approximate and variations may occur. However, if variations occur by more than 5 ft., the engineer should be notified immediately for evaluation.

6. The specifications should clearly state that obstructions might be encountered in the old fill, and the granular deposits.

7. The specifications should require that the total grout volume in each pile be at least 115 percent of the theoretical "neat" pile volume.

Installation

1. A steel reinforcing bar should be included per structural design requirements. We recommend that this bar be at least No. 8 bar or larger, centered within the pile. Other reinforcing within the upper section of the pile may also be required for structural considerations.

2. The piles shall not be installed within 6 pile diameters center-to-center of a pile filled with concrete less than 24 hours old.

3. A bottom discharge bit should be used (specified) in lieu of a side discharge bit. With this type of bit, centralizers should not be needed for placement of the center bar. The hole in the bottom of the bit should be closed while the auger is advanced. The plug should be removed by the rebar placement prior to grouting.

4. Close inspection by geotechnical personnel is necessary during pile installation to monitor plumbness, grouting procedures and to sample grout, monitor the auger withdrawal rate during grouting, placement of reinforcing, etc.

5. The pile capacity estimates are based on empirical calculations. Pile load tests may be performed to confirm loading capacities.

Structural Floor Slab

A structural floor slab fully supported on the grade beams on auger cast piles is recommended.

Subgrade Preparation – Pavement Areas

For support of the pavement areas, we recommend that the existing fill be partially undercut and replaced in accordance with recommendations provided in the following paragraphs. We recommend that the existing fill material within and 5 ft. beyond the pavement areas be undercut to a minimum specified depth below the rough subgrade level.

- The minimum undercut depth for the proposed pavement areas and rigid pavement areas is recommended to be 2.0 ft.

After the minimum undercut as recommended above is performed in these areas, proofrolling should be performed, if practical, with a pneumatic tired device, preferably a loaded tandem axle dump truck weighing at least 20-tons to detect any yielding areas which may require further removal. The surface across the bottom of the undercut should then be choked off with crushed aggregate and compacted with the largest practical compaction equipment. After this step, if possible the surface should be smoothed with a drum roller to establish a relatively rut-free subgrade.

After the above operation is completed, we recommend that a structural base be constructed. The construction of a structural pavement base would begin by placing a geosynthetic layer across the bottom of the entire undercut. The geosynthetic layer serves two primary purposes. First, this layer provides reinforcement at the base of the new structural fill. Secondly, the geosynthetic layer serves as a separator between the overlying structural fill and the underlying random fill. If an isolated area of subsidence were to occur within the underlying fill, the geosynthetic layer would help to resist loss of the structural fill materials down into a void.

We recommend using a single layer of heavy-duty woven geotextile to develop this geosynthetic barrier. We recommend that the geotextile have strength properties of an Amoco 2044, or equivalent. A number of manufactured products are locally available to meet this requirement.

The geosynthetic layer would be placed as continuous strips across the bottom of the undercut area. There should be a minimum 3 ft. wide overlap of adjoining strips of geotextile.

After placement of the geotextile, granular structural fill placement should take place up to about 12" above the geotextile. Care should be taken to work fill out over the geotextile gradually. Construction equipment should not be allowed to traffic directly on the geotextile. See manufacturer guidelines for additional details. We recommend using an ODOT 304 crushed aggregate for this structural fill. The existing fill (to be undercut) is not suitable for reuse as structural fill. The new granular structural fill should be placed in loose lifts of 6 to 8" and be compacted to at least 98% of maximum dry density, as determined by the Standard Proctor method (ASTM D 698). Each lift of granular fill should be compacted, tested by geotechnical personnel, and approved prior to placement of any subsequent lifts.

After placement of the 12" layer of ODOT 304 aggregate, we recommend that geogrid (Tensar BX 1200 or equal) be placed across the top of the aggregate layer. Prior to placement, the surface should be smoothed, if possible, with a smooth drum roller to establish a relatively rut-free subgrade. The strips of geogrid should be edge butted next to each other per the manufacturer recommendations.

After placement of the geogrid layer, construction of a structural base should continue by placing a 12" layer of compacted ODOT 304 crushed stone aggregate to pavement subgrade elevation as illustrated in Figure 3. A geogrid is not required over the final lift of ODOT 304 aggregate. Care should be taken while working base material over the geogrid as described before.

These layer of new structural aggregate should be placed in loose lifts of 6 to 8" and be compacted to at least 98% of maximum dry density, as determined by the Standard Proctor method (ASTM D 698). Each lift of granular fill should be compacted, tested by geotechnical personnel, and approved prior to placement of any subsequent lifts.

As an alternate to constructing this structural base, a cement-stabilized subgrade could be considered to establish a relatively uniform subbase layer to "bridge" over uncontrolled fill at the site. This might consist of cement stabilizing the uppermost 18 to 24 inches of the existing subgrade materials within pavement areas and then constructing a standard pavement section of aggregate base and asphalt. This process would require a specialty contractor and associated equipment. If you desire to further evaluate this option, we can provide contact information for soil stabilization contractors whom we have worked with in the past. As an addendum to our scope of work we can work with the contractor to provide consultation relative to the mix design and geotechnical design parameters associated with the stabilization process.

Please note that with either of these pavement subgrade preparation options, a significant thickness of the existing uncontrolled fill is left in place in an unimproved condition. Thus, long-term maintenance of pavement areas should be anticipated due to the unpredictable long-term settlement characteristics of the fill.

Underground Utilities

Construction of underground utilities at this site would be challenging, as it would involve excavations within the random fill and exposure of the uncontrolled random fill. The contractor should carefully plan this operation. We recommend that special connections to accommodate the pipe movement due to future settlement/subsidence within the random fill be considered.

Deep Dynamic Compaction Option

The second option that may be considered is ground improvement of the existing random fill at the site by using deep dynamic compaction equipment. In general, deep dynamic compaction consists of using a large crane to drop a heavy weight to compact foundation materials. The dynamic compaction will densify the underlying fill, allowing for the use of conventional shallow foundations, slab on grade floors and conventional pavement sections. This process will require importing structural fill for site grading

after the dynamic compaction process.

A specialty contractor specializing in deep dynamic compaction may be contacted for further evaluation of this option. Considering the subsurface conditions and other site constraints (e.g., site boundaries, nearby structures and utilities, etc.), the specialty contractor can provide design criteria for the dynamic compaction process, including the specifications for equipment, the pattern for the weight drops, number of drops, etc. If requested we can provide contact information for dynamic compaction contractors whom we have worked with in the past. As an addendum to our scope or work, we would be available to work with the contractor to assist in developing the required specifications for this option and provide further recommendations for design of shallow foundations, floor slabs and pavement areas after deep dynamic compaction is completed.

Close monitoring of the adjacent buildings and structures would be required during the dynamic compaction process, as vibration or densification of supporting foundation soils resulting from dynamic compaction operations at the subject site may lead to damage to structures on adjacent property. The contractor should be responsible for damage claims, accidents, injuries, or losses resulting from dynamic compaction process. This should be carefully considered and discussed with the specialty contractor. A pre-construction survey of the adjacent structures should be performed. Additonally, the dynamic compaction contractor should be required to monitor seismic response for construction within a distance of 300 ft. from the limits of the work area. In most cases, the peak particle velocity should be limited to 0.75 inch per second at the building closest to the work area to minimize building damage.

It should be noted that the area of dynamic compaction at the site could be significantly reduced by dynamically compacting only those areas that support building foundations and other critical structures. In this case, we recommend that the structural base or cement stabilized subgrade as described in the "Subgrade Preparation – Pavement Areas" Section above be constructed for pavement areas where dynamic compaction has not been performed.

Miscellaneous Considerations

Provisions should be made for collection and disposition of any gases (methane, etc.) that may escape from the underlying landfill, both during and after construction. This may include design and construction of gas/vapor collection system below the floor slabs of buildings.

Additionally, in order to minimize excavation activities at the site, consideration should be given to the use of above ground storage tanks for the fuel storage system.

Preliminary Recommendations for the Area North of the Subject 1.695-acre Site

Three borings (Borings B-9, B-10 and B-11) were performed north of the subject site to determine subsurface conditions in that area. These borings indicated subsurface conditions similar to those encountered in Borings B-1 through B-8, consisting of random uncontrolled fill at the top underlain by natural soils. The thickness of the random uncontrolled fill in Borings B-9 through B-11 varied from 7.5 to 12.5 ft. below the existing ground surface. Therefore, our preliminary analysis indicates that development of this site would also require special considerations with regards to foundation, floor slab and pavement construction. Recommendations for this site would be similar to the recommendations provided above for the subject 1.695-acre site.

CONSTRUCTION MONITORING AND TESTING

Construction testing and inspection by qualified geotechnical personnel should be performed to confirm design assumptions made in this report. Monitoring by geotechnical personnel should be performed during site preparation and grading activities, subgrade preparation for asphalt concrete pavement areas, engineered fill placement and compaction and foundation construction and for material testing.

The H. C. Nutting Company respectfully requests continued involvement in this project by providing testing and monitoring services throughout the construction phase. The scope of work and related fees for these services can be provided upon request.

LIMITATIONS OF LIABILITY

OUR WARRANTY

We warrant that the services performed by H. C. Nutting Company are conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE. While the services of H. C. Nutting Company are a valuable and integral part of the design and construction teams, we do not warrant, guarantee, or insure the quality or completeness of services provided by other members of those teams, the quality, completeness, or satisfactory performance of construction plans and specifications which we have not prepared, nor the ultimate performance of building site materials.

SUBSURFACE EXPLORATION

Subsurface exploration is normally accomplished by test borings; test pits are sometimes employed. The method of determining the boring location and the surface elevation at the boring is noted in the report. The information is represented on a drawing or on the boring log. The location and elevation of the boring should be considered accurate only to the degree inherent with the method used.

The boring log includes sampling information, description of the materials recovered, approximate depth of boundaries between soil and rock strata and groundwater data. The log represents conditions specifically at the location and time the boring was made. The boundaries between different soil strata are indicated at specific depths; however, these depths are in fact approximate and dependent upon the frequency of sampling. The transition between soil strata is often gradual. Water level readings are made at the times and under the conditions stated on the boring logs. Water levels change with time and season. The borehole does not always remain open sufficiently long for the measured water level to coincide with the groundwater table.

LABORATORY AND FIELD TESTS

Tests are performed in accordance with specific ASTM Standards unless otherwise indicated. All determinations included in a given ASTM Standard are not always required and performed. Each test report indicates the measurements and determinations actually made.

ANALYSIS AND RECOMMENDATIONS

The geotechnical report is prepared primarily to aid in the design of site work and structural foundations. Although the information in the report is expected to be sufficient for these purposes, it is not intended to determine the cost of construction or to stand alone as a construction specification.

Report recommendations are based primarily on data from test borings made at the test locations shown on a boring location drawing included. Soil variations may exist between borings and these variations may not become evident until construction. If significant variations are then noted, the geotechnical engineer should be contacted so that field conditions can be examined and recommendations revised if necessary.

The geotechnical report states our understanding as to the location, dimensions and structural features proposed for the site. Any significant changes in the nature, design, or location of the site improvements MUST be communicated to the geotechnical engineer so that the geotechnical analysis, conclusions, and recommendations can be appropriately adjusted.

The geotechnical engineer should be given the opportunity to review all drawings that have been prepared based on his recommendations.

CONSTRUCTION MONITORING

Construction monitoring is a vital element of complete geotechnical services. The field engineer/inspector is the owner's "representative" observing the work of the contractor, performing tests as required in the specifications, and reporting data developed from such tests and observations. THE FIELD ENGINEER OR INSPECTOR DOES NOT DIRECT THE CONTRACTOR'S CONSTRUCTION MEANS, METHODS, OPERATIONS OR PERSONNEL. He does not interfere with the relationship between the owner and the contractor and, except as an observer, does not become a substitute owner on site. He is responsible for his own safety but has no responsibility for the safety of other personnel at the site. He is an important member of a team whose responsibility is to watch and test the work being done and report to the owner whether that work is being carried out in general conformance with the plans and specifications.

APPENDIX

BORING TERMINOLOGY

SOIL CLASSIFICATION

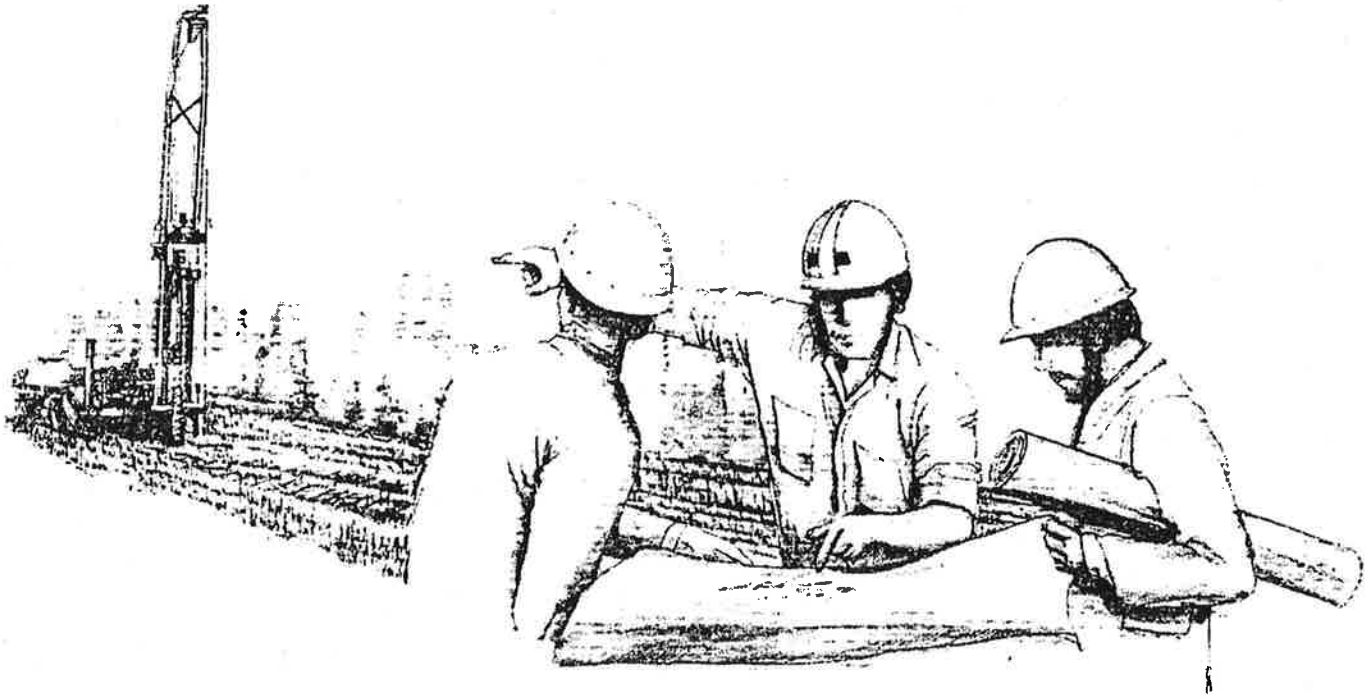
FIGURE 1: TEST BORING LOCATION PLAN

FIGURE 2: PAVEMENT AREA STRUCTURAL BASE

LOG OF TEST BORINGS

A description of terminology and symbols used in the logs of test borings, and a copy of ASTM D 2487-83, "Classification of Soils for Engineering Purposes", are included in the following two pages.

Readers of this report who wish an in-depth discussion on the basis for geotechnics, including procedures used in subsurface exploration, laboratory testing, and geotechnical analyses are referred to H. C. Nutting Geotechnical and Test Engineering Manual. Those readers not having a copy of this manual may obtain one at nominal cost by contacting H. C. Nutting Company at (614) 863-3113.



STANDARD PENETRATION TEST

THE PENETRATION RESISTANCE OR N-VALUE AS IT IS COMMONLY REFERRED TO IS THE SUMMATION OF THE NUMBER OF BLOWS REQUIRED TO DRIVE TWO SUCCESSIVE 6" PENETRATIONS OF THE 2" OD SPLIT BARREL SAMPLER. THE SAMPLER IS DRIVEN WITH A 140 LB. WEIGHT FALLING 30" AND IS SEATED TO A DEPTH OF 6" BEFORE COMMENCING THE STANDARD PENETRANON TEST.

THE STANDARD PENETRATION TEST IS PERFORMED IN COMPLIANCE WITH PROCEDURES AS SET FORTH IN ASTM D 1586.

TERMINOLOGY

GRAIN SIZE (PER ASTM D 2487)

SOIL FRACTION		PARTICLE SIZE	U.S. STANDARD SIEVE SIZE
BOULDERS		LARGER THAN 12" (300mm)	LARGER THAN 12"
COBBLES		3' (75 mm) TO 12' (300 mm)	3" TO 12"
GRAVEL:	COARSE	¾" (19 mm) TO 3' (75 mm)	¾" TO 3"
	FINE	4.75 mm TO 19mm	#4 TO ¾"
SAND:	COARSE	2.00 mm TO 4.75 mm	#10 TO #4
	MEDIUM	0.425 mm TO 2.00 mm	#40 TO #10
	FINE	0.075 mm TO 0.425 mm	#200 TO #40
FINES:	(SILTS & CLAYS)	SMALLER THAN 0.075 mm	SMALLER THAN #200

PLASTICITY CHARACTERISTICS DIFFERENTIATE BETWEEN SILTS AND CLAYS

RELATIVE DENSITY OF GRANULAR SOILS

TERM*	N VALUE
VERY LOOSE	0 – 4
LOOSE	5 – 10
MEDIUM DENSE	11 – 29
DENSE	30 – 50
VERY DENSE	OVER 50

*THESE ARE USUALLY BASED ON AN EXAMINATION OF SOIL SAMPLES, PENETRATION RESISTANCE AND SOIL DENSITY DATA.

RELATIVE PROPORTIONS OF COHESIONLESS SOILS

(PER ASTM D 2488)

PROPORTIONAL TERM	DEFINING RANGE BY PERCENTAGE OF WEIGHT
TRACE	<5%
FEW	5 TO 10%
LITTLE	15 TO 25%
SOME	30 TO 45%

FOR RELATIVE PERCENTAGE OF GRAVELS, SAND AND FINES.

CONSISTENCY OF COHESIVE SOILS

TERM	N VALUE	STRENGTH (Q_u, TSF)	IDENTIFICATION PROCEDURE
VERY SOFT	0 – 2	0 – 0.25	EASILY PENETRATED SEVERAL INCHES BY FIST.
SOFT	3 – 4	0.25 – 0.5	EASILY PENETRATED SEVERAL INCHES BY THUMB.
MEDIUM STIFF	5 – 8	0.5 – 1.0	PENETRATED SEVERAL INCHES BY THUMB WITH MODERATE EFFORT.
STIFF	9 – 15	1.0 – 2.0	READILY INDENTED BY THUMB, BUT PENETRATED ONLY WITH GREAT EFFORT.
VERY STIFF	16 – 30	2.0 – 4.0	READILY INDENTED BY THUMBNAIL
HARD	OVER 30	>4.0	INDENTED WITH DIFFICULTY BY THUMBNAIL.

RELATIVE PROPORTIONS OF COHESIONLESS SOILS

(PER ASTM D 2488)

DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL IS BELOW WATER TABLE

SYMBOLS

DRILLING AND SAMPLING

RC –	ROCK CORING: SIZE NW, NX = 2-1/8" diameter
RQD –	ROCK QUALITY DESIGNATION
FT –	FISH TAIL
DC –	DRIVE CASING
C –	CASING SIZE NW, 4", HW, 6"
CW –	CLEAR WATER
DM –	DRILLING MUD
HSA –	HOLLOW STEM AUGER
FA –	FLIGHT AUGER
HA –	HAND AUGER
COA –	CLEAN-OUT AUGER
SS –	2" DIAMETER SPLIT BARREL SAMPLE
ST –	3" DIAMETER THIN-WALLED TUBE SAMPLE
PT –	3" DIAMETER PISTON TUBE SAMPLE
AS –	AUGER SAMPLE
WS –	WASH SAMPLE
PTS –	PEAT SAMPLE
PS –	PITCHER SAMPLE
NR –	NO RECOVERY
S –	SOUNDING
PMT –	BOREHOLE PRESSUREMETER TEST
VS –	VANE SHEAR TEST
WPT –	WATER PRESSURE TEST
ATV –	ALL TERRAIN VEHICLE
R –	REFUSAL CONDITION

LABORATORY TESTS

PP –	PENETROMETER READING, TONS/SQ. FT.
QU –	UNCONFINED STRENGTH, TONS/SQ. FT.
W –	MOISTURE CONTENT, %
LL –	LIQUID LIMIT, %
PL –	PLASTIC LIMIT, %
SL –	SHRINKAGE LIMIT, %
LOI –	LOSS ON IGNITION, %
D –	DRY UNIT WEIGHT, LBS./CU. FT.
PH –	MEASURE OF SOIL ALKALINITY OR ACIDITY

WATER LEVER MEASUREMENT

NW –	NO WATER ENCOUNTERED
WD –	WHILE DRILLING
BCR–	BEFORE CASING REMOVAL
ACR –	AFTER CASING REMOVAL
CM –	CAVED AND MOIST
BF –	BACKFILLED UPON COMPLETION

NOTE: WATER LEVEL MEASUREMENTS SHOWN ON THE BORING LOGS REPRESENT CONDITIONS AT THE TIME INDICATED AND MAY NOT REFLECT STATIC LEVELS, ESPECIALLY IN COHESIVE SOILS

ASTM Designation: D 2487 – 83
(Based on Unified Soil Classification System)

			Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]		Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean gravels Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines More that 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands More than 50% coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well graded sand [I]
			$Cu > 6$ and/or $1 < Cc < 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less that 50	inorganic	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
		organic	PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
			Liquid limit – oven dried / Liquid limit – not dried	<0.75	OL	Organic clay [K,L,M,N] / Organic silt [K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic silt [K,L,M]
		organic	Liquid limit – oven dried / Liquid limit – not dried	<0.75	OH	Organic clay [K,L,M,P] / Organic silt [K,L,M,Q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor.			PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt,
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add " with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to the group name.

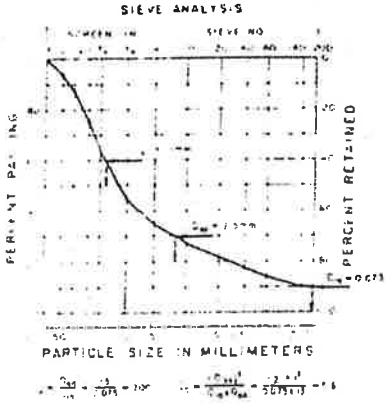
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to the group name.

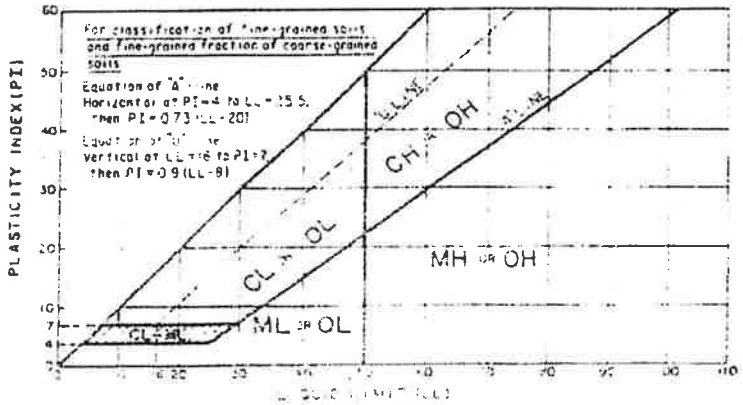
[N] PI ≥ 4 and plots on or above "A" line

[O] PI ≤ 4 or plots below "A" line

[P] PI plots on or above "A" line

[Q] PI plots below "A" line





LOG OF TEST BORING

CLIENT:	City of Bexley	**BORING NO.:**	B-2
PROJECT:	Public Service Facility at Mayfield Place	**DATE STARTED:**	1/20/03
BORING LOCATION:	As Shown on Boring Location Plan	**DATE COMPLETED:**	1/20/03
ELEVATION REFERENCE:	Steel Bolt Set in Pavement at CL Extreme North End of Mayfield Place (Assumed EL. 100')	**WORK ORDER NO.:**	61441.001

ELEV. (feet)	DEPTH (feet)	DESCRIPTION OF MATERIALS	SAMPLE NO.	SAMPLE TYPE	SAMPLE DEPTH (feet)	BLOW PER 6 INCHES	RECOVERY (Inches)	SOIL PROPERTIES W (%)	SOIL PROPERTIES LL/PL	SOIL PROPERTIES PP *
102.6	0.0	5.0' Dark brown lean clay with sand, few gravel, rock fragments, brick fragments, cinders, wood and roots, moist – medium stiff. (FILL)	1	SS	0.0-1.5	6-3-3	18			
			2	SS	2.5-4.0	6-3-4	18			
97.6	5.0	3.0' Dark brown silty clayey sand with cinders, roots, brick, rock fragments and wood, moist – loose. (FILL)	3	SS	5.0-6.5	1-1-0	8			
94.6	8.0	2.0' Dark brown sandy lean clay with brick, trace roots, moist – stiff. (FILL)	4	SS	7.5-9.0	2-5-5	12			
92.6	10.0	2.5' Yellowish brown, tan and black lean clay with sand, few gravel and rock fragments, trace organics, moist – stiff. (FILL)	5	SS	10.0-11.5	5-4-7	12			
90.1	12.5	8.5' Dark brown and some yellowish brown SILTY CLAYEY SAND with shale fragments, few gravel, moist to wet – medium dense.	6	SS	12.5-14.0	4-5-7	18			
			7	SS	15.0-16.5	8-11-12	18			
81.6	21.0	0.5' Dark gray SILTY CLAYEY GRAVEL with sand and rock fragments, wet – dense.	8	SS	20.0-21.5	8-12-21	18			
81.1	21.5	BORING COMPLETED								

* Pocket Penetrometer Reading – Unconfined Compressive Strength, Tons/Sq. Ft.

GENERAL NOTES

Driller:	L. Wanstrath
Rig No.:	D-120
Rig Type:	ATV
Method:	3.25" HSA
Sampling:	Split-Spoon
Remarks:	

H. C. NUTTING COMPANY

GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921
GAHANNA COMMERCE CENTER 790 MORRISON ROAD COLUMBUS, OHIO 43230-6642

WATER LEVEL OBSERVATIONS

Immediate:	15.0	Ft.
At Completion:	14.0	Ft.
After 24 Hours:	BF	Ft.
Water Used in Drilling:	None	Ft.

Remarks: BF - Backfilled

(Measured from ground surface)

LOG OF TEST BORING

CLIENT:	City of Bexley	**BORING NO.:**	B-3
PROJECT:	Public Service Facility at Mayfield Place	**DATE STARTED:**	1/8/03
BORING LOCATION:	As Shown on Boring Location Plan	**DATE COMPLETED:**	1/8/03
ELEVATION REFERENCE:	Steel Bolt Set in Pavement at CL Extreme North End of Mayfield Place (Assumed EL. 100')	**WORK ORDER NO.:**	61441.001

ELEV. (feet)	DEPTH (feet)	DESCRIPTION OF MATERIALS	SAMPLE NO.	SAMPLE TYPE	SAMPLE DEPTH (feet)	BLOW PER 6 INCHES	RECOVERY (Inches)	SOIL PROPERTIES W (%)	LL/PL	PP *
102.2	0.0	2.5' Dark brown lean clay with sand, few glass fragments, cinders and rock fragments, moist – medium stiff. (FILL)	1	SS	0.0-1.5	2-3-4	18			
99.7	2.5	2.5' Dark brown and gray silty clayey sand with gravel, rock fragments, few cinders, brick fragments, grass, wood and roots, moist – loose. (FILL)	2	SS	2.5-4.0	3-5-5	18			
97.2	5.0	5.0' Dark brown fine silty sand with wood, rock fragments, cinders and gravel, moist – very loose. (FILL)	3	SS	5.0-6.5	1-1-1	18			
			4	SS	7.5-9.0	0-1-0	3			
92.2	10.0	2.5' Dark brown and yellowish brown lean clay with sand, gravel and rock fragments, trace topsoil and organics, moist – medium stiff. (FILL)	5	SS	10.0-11.5	3-4-5	18			
89.7	12.5	2.5' Yellowish brown CLAYEY GRAVEL with sand and rock fragments, wet – medium dense.	6	SS	12.5-14.0	5-5-10	18			
87.2	15.0	3.5' Brown CLAYEY GRAVEL with sand and rock fragments, wet – medium dense.	7	SS	15.0-16.5	10-11-12	18			
83.7	18.5	6.5' Dark gray SAND, trace gravel and silt, wet – loose.	8	SS	18.5-20.0	2-3-6	18			
77.2	25.0	11.5' Dark gray SAND with gravel, few rock fragments, trace silt, wet to very moist – medium dense to dense.	9	SS	25.0-26.5	5-6-5	18			
			10	SS	30.0-31.5	9-11-15	18			
			11	SS	35.0-36.5	11-15-21	18			
65.7	36.5	BORING COMPLETED								

* Pocket Penetrometer Reading – Unconfined Compressive Strength, Tons/Sq. Ft.

GENERAL NOTES

Driller:	L. Wanstrath
Rig No.:	D-120
Rig Type:	ATV
Method:	3.25" HSA
Sampling:	Split-Spoon
Remarks:	

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WATER LEVEL OBSERVATIONS

Immediate:	12.5	Ft.
At Completion:	15.0	Ft.
After 24 Hours:	BF	Ft.
Water Used in Drilling:	18.5	Ft.

Remarks: BF - Backfilled

(Measured from ground surface)

LOG OF TEST BORING

CLIENT:	City of Bexley	**BORING NO.:**	B-7
PROJECT:	Public Service Facility at Mayfield Place	**DATE STARTED:**	1/21/03
BORING LOCATION:	As Shown on Boring Location Plan	**DATE COMPLETED:**	1/21/03
ELEVATION REFERENCE:	Steel Bolt Set in Pavement at CL Extreme North End of Mayfield Place (Assumed EL. 100')	**WORK ORDER NO.:**	61441.001

ELEV. (feet)	DEPTH (feet)	DESCRIPTION OF MATERIALS	SAMPLE NO.	SAMPLE TYPE	SAMPLE DEPTH (feet)	BLOW PER 6 INCHES	RECOVERY (Inches)	SOIL PROPERTIES W (%)	SOIL PROPERTIES LL/PL	SOIL PROPERTIES PP*
101.5	0.0	2.5' Dark brown silty clayey sand with brick fragments, rock fragments, gravel, cinders, roots, moist – loose. (FILL)	1	SS	0.0-1.5	6-3-2	6			
99.0	2.5	5.0' Dark brown sandy lean clay with cinders, rock fragments, gravel, organics, moist – medium stiff. (FILL)	2	SS	2.5-4.0	3-3-3	18			
			3	SS	5.0-6.5	4-5-6	18			
94.0	7.5	6.0' Dark gray to black sandy silty clay with cinders, gravel, rock fragments, trace brick fragments, roots and organics, moist – soft. (FILL)	4	SS	7.5-9.0	1-2-2	18			
			5	SS	10.0-11.5	1-2-1	18			
			6	SS	12.5-14.0	1-1-1	18			
88.0	13.5	6.5' Dark gray silty clay with sand, few wood and organics, moist – soft. (FILL)	7	SS	15.0-16.5	1-2-2	4			
81.5	20.0	5.0' Dark gray SANDY SILTY CLAY with fine sand lenses, strong organic odor, moist – very soft.	8	SS	20.0-21.5	1-1-1	18			
76.5	25.0	5.0' Brown SILTY CLAYEY GRAVEL with sand and rock fragments, wet – dense.	9	SS	25.0-26.5	8-11-26	18			
71.5	30.0	6.5' Gray SANDY SILT, few gravel, noted organic odor, moist – medium dense.	10	SS	30.0-31.5	9-13-14	18			
			11	SS	35.0-36.5	7-13-18	18			
65.0	36.5	BORING COMPLETED								

* Pocket Penetrometer Reading – Unconfined Compressive Strength, Tons/Sq. Ft.

GENERAL NOTES

Driller:	L. Wanstrath
Rig No.:	D-120
Rig Type:	ATV
Method:	3.25" HSA
Sampling:	Split-Spoon
Remarks:	

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WATER LEVEL OBSERVATIONS

Immediate:	25.0	Ft.
At Completion:	21.0	Ft.
After 24 Hours:	BF	Ft.
Water Used in Drilling:	None	Ft.

Remarks: BF - Backfilled

(Measured from ground surface)

LOG OF TEST BORING

CLIENT: City of Bexley
PROJECT: Public Service Facility at Mayfield Place
BORING LOCATION: As Shown on Boring Location Plan
ELEVATION REFERENCE: Steel Bolt Set in Pavement at CL Extreme North End of Mayfield Place (Assumed EL. 100')

BORING NO.: B-8
DATE STARTED: 1/25/03
DATE COMPLETED: 1/25/03
WORK ORDER NO.: 61441.001

ELEV. (feet)	DEPTH (feet)	DESCRIPTION OF MATERIALS	SAMPLE NO.	SAMPLE TYPE	SAMPLE DEPTH (feet)	BLOW PER 6 INCHES	RECOVERY (inches)	SOIL PROPERTIES W (%)	LL/PL	PP *
102.8	0.0	2.5' Dark brown lean clay with sand, few gravel, rock fragments, cinders, brick fragments, organics and roots, trace glass fragments, moist – medium stiff. (FILL)	1	SS	0.0-1.5	6-5-5	18			
100.3	2.5	5.0' Dark brown silty clayey sand, few roots and organics, gravel, rock fragments, brick fragments, cinders, trace glass, moist – very loose. (FILL)	2 3	SS SS	2.5-4.0 5.0-6.5	2-2-2 1-1-1	2 4			
95.3	7.5	5.0' Dark brown lean clay with sand, few gravel and rock fragments, trace brick fragments, moist – medium stiff. (FILL)	4 5	SS SS	7.5-9.0 10.0-11.5	1-11-3 3-8-7	12 18			
90.3	12.5	2.5' Yellowish brown and dark brown SILTY CLAYEY GRAVEL with sand, trace organics, moist – medium dense.	6	SS	12.5-14.0	5-7-8	12			
87.8	15.0	5.0' Brown and black SILTY CLAYEY SAND with gravel and shale fragments, wet – medium dense.	7	SS	15.0-16.5	3-7-9	18			
82.8	20.0	5.0' Dark brown SILTY CLAYEY SAND, few gravel, wet – very loose.	8	SS	20.0-21.5	2-2-2	18			
77.8	25.0	5.0' Dark brown and black fine to coarse SAND, trace gravel, trace silt, wet – loose.	9	SS	25.0-26.5	2-4-5	18			
72.8	30.0	10.0' Dark brown SILTY CLAYEY SAND, trace gravel, wet – medium dense.	10 11	SS SS	30.0-31.5 35.0-36.5	5-7-7 5-7-10	18 18			
62.8	40.0	1.5' Gray SILTY GRAVEL with rock fragments and sand, very moist – dense.	12	SS	40.0-41.5	12-21-24	18			
61.3	41.5	BORING COMPLETED								

* Pocket Penetrometer Reading – Unconfined Compressive Strength, Tons/Sq. Ft.

GENERAL NOTES

Driller: L. Wanstrath
Rig No.: D-120
Rig Type: ATV
Method: 3.25" HSA
Sampling: Split-Spoon
Remarks:

H. C. NUTTING COMPANY
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WATER LEVEL OBSERVATIONS

Immediate:	15.0	Ft.
At Completion:	13.0	Ft.
After 24 Hours:	10.5	Ft.
Water Used in Drilling:	15.0	Ft.

Remarks:

(Measured from ground surface)

LOG OF TEST BORING

CLIENT:	City of Bexley	**BORING NO.:**	B-9
PROJECT:	Public Service Facility at Mayfield Place	**DATE STARTED:**	1/25/03
BORING LOCATION:	As Shown on Boring Location Plan	**DATE COMPLETED:**	1/25/03
ELEVATION REFERENCE:	Steel Bolt Set in Pavement at CL Extreme North End of Mayfield Place (Assumed EL. 100')	**WORK ORDER NO.:**	61441.001

ELEV. (feet)	DEPTH (feet)	DESCRIPTION OF MATERIALS	SAMPLE NO.	SAMPLE TYPE	SAMPLE DEPTH (feet)	BLOW PER 6 INCHES	RECOVERY (Inches)	SOIL PROPERTIES W (%)	SOIL PROPERTIES LL/PL	SOIL PROPERTIES PP *
102.5	0.0	2.5' Dark brown sandy lean clay, few cinders, gravel and rock fragments, trace glass and organics, moist – medium stiff. (FILL)	1	SS	0.0-1.5	1-2-3	18			
			2	SS	2.5-4.0	5-8-6	12			
97.5	5.0	2.5' Dark brown silty clayey sand with gravel and rock fragments, few cinders, trace glass and organics, moist – very loose. (FILL)	3	SS	5.0-6.5	3-3-1	6			
95.0	7.5	2.5' Dark brown sandy silty clay with wood, trace rock fragments, dry to moist – stiff. (FILL)	4	SS	7.5-9.0	3-7-6	18			
92.5	10.0	2.5' Yellowish brown and brown lean clay with sand, few shale fragments and gravel, trace brick fragments, moist – stiff. (FILL)	5	SS	10.0-11.5	6-5-5	18			
90.0	12.5	2.5 Yellowish brown and dark brown SILTY CLAYEY SAND with gravel and rock fragments, few shale fragments, moist – medium dense.	6	SS	12.5-14.0	9-10-8	18			
87.5	15.0	5.0' Dark brown SILTY CLAYEY GRAVEL with sand and rock fragments, wet – medium dense.	7	SS	15.0-16.5	13-12-15	18			
82.5	20.0	1.5' Dark gray fine SAND, trace silt, wet – medium dense.	8	SS	20.0-21.5	3-5-7	18			
81.0	21.5	BORING COMPLETED								

* Pocket Penetrometer Reading – Unconfined Compressive Strength, Tons/Sq. Ft.

GENERAL NOTES

Driller:	L. Wanstrath
Rig No.:	D-120
Rig Type:	ATV
Method:	3.25" HSA
Sampling:	Split-Spoon

Remarks:

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WATER LEVEL OBSERVATIONS

Immediate:	15.0	Ft.
At Completion:	13.0	Ft.
After 24 Hours:	12.0	Ft.
Water Used in Drilling:	None	

Remarks:

(Measured from ground surface)

LOG OF TEST BORING

CLIENT:	City of Bexley	**BORING NO.:**	B-10
PROJECT:	Public Service Facility at Mayfield Place	**DATE STARTED:**	1/25/03
BORING LOCATION:	As Shown on Boring Location Plan	**DATE COMPLETED:**	1/25/03
ELEVATION REFERENCE:	Steel Bolt Set in Pavement at CL Extreme North End of Mayfield Place (Assumed EL. 100')	**WORK ORDER NO.:**	61441.001

ELEV. (feet)	DEPTH (feet)	DESCRIPTION OF MATERIALS	SAMPLE NO.	TYPE	DEPTH (feet)	BLOW PER 6 INCHES	RECOVERY (Inches)	SOIL PROPERTIES W (%)	LL/PL	PP *
102.2	0.0	1.0' Dark brown sandy lean clay, trace organics and gravel, moist – stiff (FILL).	1	SS	0.0-1.0	8-9	12			
101.2	1.0	7.5' Dark brown and black silty sand with asphalt, cinders, rock fragments, few brick fragments, trace glass, moist – medium dense to very loose. (FILL)	1A	SS	1.0-1.5	-9-	6			
			2	SS	2.5-4.0	3-2-1	12			
			3	SS	5.0-6.5	2-1-2	6			
			4	SS	7.5-8.5	1-1	12			
93.7	8.5	1.5' Dark brown lean clay, few sand, moist – very soft. (FILL)	4A	SS	8.5-9.0	-1-	6			
92.2	10.0	2.5' Yellowish brown CLAY, few black concretions, moist – stiff.	5	SS	10.0-11.5	3-5-6	18			2.75
89.7	12.5	5.0' Yellowish brown and black SILTY CLAYEY SAND with gravel and rock fragments, wet – loose.	6	SS	12.5-14.0	2-4-4	18			
87.2	15.0	5.0' Brown CLAYEY GRAVEL with rock fragments and sand, wet – very loose.	7	SS	15.0-16.5	2-2-2	18			
82.2	20.0	5.0' Brown and black SAND with gravel and rock fragments, wet – very loose.	8	SS	20.0-21.5	3-1-2	4			
77.2	25.0	1.5' Brown CLAYEY SAND with gravel and rock fragments, wet – medium dense.	9	SS	25.0-26.5	7-12-15	12			
75.7	26.5	BORING COMPLETED								

* Pocket Penetrometer Reading – Unconfined Compressive Strength, Tons/Sq. Ft.

GENERAL NOTES

Driller:	L. Wanstrath
Rig No.:	D-120
Rig Type:	ATV
Method:	3.25" HSA
Sampling:	Split-Spoon
Remarks:	

H. C. NUTTING COMPANY

GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921
GAHANNA COMMERCE CENTER 790 MORRISON ROAD COLUMBUS, OHIO 43230-6642

WATER LEVEL OBSERVATIONS

Immediate:	15.0	Ft.
At Completion:	11.5	Ft.
After 24 Hours:	10.0	Ft.
Water Used in Drilling:	None	

Remarks:

(Measured from ground surface)

LOG OF TEST BORING

CLIENT:	City of Bexley	**BORING NO.:**	B-11
PROJECT:	Public Service Facility at Mayfield Place	**DATE STARTED:**	1/25/03
BORING LOCATION:	As Shown on Boring Location Plan	**DATE COMPLETED:**	1/25/03
ELEVATION REFERENCE:	Steel Bolt Set in Pavement at CL Extreme North End of Mayfield Place (Assumed EL. 100')	**WORK ORDER NO.:**	61441.001

ELEV. (feet)	DEPTH (feet)	DESCRIPTION OF MATERIALS	SAMPLE NO.	SAMPLE TYPE	SAMPLE DEPTH (feet)	BLOW PER 6 INCHES	RECOVERY (Inches)	SOIL PROPERTIES W (%)	SOIL PROPERTIES LL/PL	SOIL PROPERTIES PP *
102.7	0.0									
		3.5' Dark brown silty clay, few sand, trace rock fragments, roots and topsoil, moist – medium stiff (FILL)	1	SS	0.0-1.0	3-3-4	18			
			2	SS	2.5-4.0	4-7-5	18			
99.2	3.5	4.0' Dark brown silty clayey sand with cinders, coal, rock fragments, few brick and glass fragments, trace wood and roots, moist – very loose. (FILL)	3	SS	5.0-6.5	1-1-1	6			
95.2	7.5	2.5' Dark brown SANDY SILTY CLAY, moist – stiff.	4	SS	7.5-9.0	3-4-5	18			
92.7	10.0	2.5' Brown SANDY LEAN CLAY, trace black concretions, moist – stiff.	5	SS	10.0-11.5	4-7-8	18			2.5
90.2	12.5	2.5' Tan and dark brown SILTY GRAVEL with rock fragments and sand, few shale fragments, moist – medium dense.	6	SS	12.5-14.0	6-7-8	18			
87.7	15.0	5.0' Dark brown CLAYEY SAND with gravel and rock fragments, wet – medium dense.	7	SS	15.0-16.5	12-5-9	12			
82.7	20.0	1.5' Yellowish brown CLAYEY GRAVEL with rock fragments and gravel, wet – dense.	8	SS	20.0-21.5	15-17-15	18			
81.2	21.5	BORING COMPLETED								

* Pocket Penetrometer Reading – Unconfined Compressive Strength, Tons/Sq. Ft.

GENERAL NOTES

Driller:	L. Wanstrath
Rig No.:	D-120
Rig Type:	ATV
Method:	3.25" HSA
Sampling:	Split-Spoon

Remarks:

H. C. NUTTING COMPANY

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GAHANNA COMMERCE CENTER 790 MORRISON ROAD COLUMBUS, OHIO 43230-6642

WATER LEVEL OBSERVATIONS

Immediate:	15.0	Ft.
At Completion:	15.0	Ft.
After 24 Hours:	13.0	Ft.
Water Used in Drilling:	None	

Remarks:

(Measured from ground surface)