YEAGER ROAD PHASE II
City of West Lafayette, Indiana

NOTICE OF ADDENDUM NO. 2
August 17, 2012

Bidder Questions and Responses:

Question: Are other soil borings available near the sanitary sewer line?

Response: Another geotechnical study was performed in the area and is made available with this addendum. It is presumed that soil properties of the borings nearest the proposed sanitary sewer are representative of soil properties at the sewer's precise location. If conditions are different that result in additional costs and or time needed to complete sewer installation, a change order will be considered.

Preliminary Geotechnical Engineering Study

Proposed Purdue Research Park –Phase III & IV
Kalberer Road and North Salisbury Street
West Lafayette, Indiana

Schneider Project No. 3505.300

Prepared for:

Purdue Research Foundation
3000 Kent Avenue
West Lafayette, Indiana 47906

Date: August 06, 2007

Schneider

Historic Fort Harrison 8901 Otis Avenue Indianapolis, Indiana 46216
Phone - 317.826.7100 Fax - 317.826.7200
www.schneidercorp.com contact@schneidercorp.com

Schneider

The Schneider Corporation

Historic Fort Harrison 8901 Otis Avenue Indianapolis, IN 46216-1037 Phone: 317.826.7100 Fax: 317.826.7200

INDIANA
Corporate Headquarters
Historic Fort Harrison
8901 Otis Avenue
Indianapolis, IN 46216
Phone: 317.826.7100
Toll-Free: 866.973.7100
Fax: 317.826.7200

Lafayette Office
3725 Rome Drive
Park 26
Lafayette, IN 47905
Phone: 765.448.6661
Fax: 765.448.6665

Carmel Office
12821 E New Market Street
Suite 100
Carmel, IN 46032
Phone: 317.569.8112
Fax: 317.826.6410

Avon Office
Building 1000
5250 E US Highway 36
Suite 250
Avon, IN 46123
Phone: 317.745.9926
Fax: 317.745.9973

Merrillville Office
9800 Connecticut Drive
Suite B1-508
Merrillville, IN 46307
Phone: 219.644.3692
Fax: 219.644.3682

NORTH CAROLINA
Charlotte Office
2151 Hawkins Street
Suite 201
Charlotte, NC 28203
Phone: 704.333.8360
Fax: 704.333.8362

IOWA
ProMap Office
1531 Airport Road
Suite 2
Ames, IA 50010
Phone: 515.233.3311
Fax: 515.233.4575

August, 6 2007

Mr. Dave Hodde
Purdue Research Foundation
3000 Kent Avenue
West Lafayette, Indiana 47906

RE: Report of Preliminary Geotechnical Engineering Study
Purdue Research Park - Phase III & IV
Kalberer Road and North Salisbury Street
West Lafayette, Indiana
Schneider Project No. 3505.300

Dear Mr. Hodde:

Enclosed is The Schneider Corporation (*Schneider's*) Geotechnical engineering investigation report for the above referenced project. This study was completed in general accordance with *Schneider's* proposal.

In our opinion, the project site is suitable for being developed as intended. This preliminary report presents the results of *Schneider's* field and laboratory testing program, an engineering interpretation of this data with respect to the available project characteristics, and recommendations to aid in the design and construction of the foundations and other earthwork related phases of this project.

The Schneider Corporation appreciates having the opportunity to perform this Geotechnical Engineering Study for *Purdue Research Park.* If you have any questions regarding this report, or if we may be of any additional assistance regarding any geotechnical aspect of the project, please do not hesitate to contact our office.

Sincerely,

Mark Behrens
Director – Geotechnical Engineering

Duane Sharrer, P.E.
Executive Vice President

DUANE A. SHARRER
REGISTERED
No.
890258
STATE OF
INDIANA
PROFESSIONAL ENGINEER

EXECUTIVE SUMMARY

- The Schneider Corporation has performed a preliminary geotechnical engineering study for the proposed Purdue Research Park (Phase III & IV) that will be located on the northwest corner of Kalberer Road and Salisbury Street, West Lafayette (Tippecanoe County), Indiana. The site is currently used for agricultural purposes. The following summary highlights the findings of *Schneider*'s final geotechnical investigation. Please refer to the body of this report for more specific conclusions and recommendations of this study for the proposed foundations.

- The topography at the site can be characterized as relatively flat with about 15 feet of elevation change across the site. Thirty-two (32) borings were performed at the project site. The soil borings revealed the following generalized subsurface profile. Please refer to Section 4.2, *Subsurface Conditions*, for more specific information regarding the subsurface profile.

  - The depth of topsoil at the test boring locations ranged from approximately 6 to 10 inches thick. Soil borings SB-5, SB-6, SB-7, SB-11, SB-14, and SB-27 encountered traces of organics beneath the topsoil to depths ranging from 1.5 to 3 feet below the existing grade. The organic content ranged from **1.6 to 6.5 percent**. Soil borings SB-29 and SB-32 encountered organic soils from beneath the topsoil to depths of 5.5 to 11 feet below the existing grade, respectively. The organic content ranged from **2.9 to 5.9 percent**. **An organic content above 4 percent is generally regarded excessive for building and pavement loading areas.**

  - Three types of substrata predominantly characterized the shallow natural soils encountered below the topsoil. Beneath the topsoil, the test borings typically encountered a soil stratigraphy that consists primarily of brown, moist to wet, medium stiff to hard, silty / sandy clay with varying amounts of sand and gravel ranging from approximately 3 to 16 feet below the existing grade. Various thicknesses and densities of inter-bedded layers of moist to wet, medium dense to dense, clayey to coarse grained sand with traces of gravel were noted in the majority of the test borings drilled for this study. The permeable granular layers ranged in depth from about 5 to 20 feet and were noted at varying depths within the primarily cohesive soil profile. In addition to the deeper permeable sand layers, test borings SB-30 and SB-31 encountered a shallow, loose to medium dense silty to coarse grained sand directly beneath the topsoil to a depth of approximately 3 feet below the existing grade. Beneath the brown cohesive soils and permeable sandy soils test borings generally encountered varying thicknesses and consistencies of gray, dry to moist, stiff to hard, silty/sandy clay and clayey/sandy silt with traces of gravel (potential TILL) ranging from 8 feet to the termination depth of the borings.

  - Relatively thin layers of silty / sandy clays were also encountered that contained varying amounts of organics in about 4 of the test borings. Organic contents ranged from approximately 1.6 to 4.8 percent. An organic content above 4 percent is regarded excessive for building and pavement loading conditions. Some soil borings encountered traces of organic soils at greater depths as indicated in the table below:

Soil Boring	Organic Content Range (percent)	Approx. Depth (feet)
SB-21	2.4 to 4.6 %	5.5 to 11
SB-24	2.8 %	3 to 5.5
SB-28	5.1 %	3 to 5.5
SB-31	2.5 %	5.5 to 8

- At the time of this investigation, free groundwater was noted on the drilling tools in the majority of the borings. Groundwater was encountered on the drilling tools at varying depths across the site and ranged from approximately 7 to 15 feet below the existing surface. Soil boring SB-31, encountered groundwater on the drilling tools at a shallow depth of 2 feet below the existing grade. Upon completion of the drilling, free groundwater was noted at various depths ranging from about 4 to 17 feet below the existing surface.

- Although the allowable bearing capacity of the near surface natural soils (within five feet of the existing ground surface) are expected to vary across the site, the subgrade soils are generally considered to be suitable for support of the anticipated loading conditions utilizing spread foundations. Pending the results of more test borings based on proposed finished floor elevation and detailed structural loading information it is anticipated that shallow spread and mat foundations that bear within 5 feet of the existing ground surface can possibly be designed using a net allowable bearing pressure in the range of **2,000 to 3,000 pounds per square foot (psf)**. Soil borings which encountered soft/loose and/or organic soils at a shallow depth should expect some additional undercutting. Additional undercutting should also be expected in areas not covered by the widely spaced soil boring program. However, areas which encountered deeper soft/loose and/or organic soils as encountered within several of the borings should consider basements and / or a deep foundation system. It is anticipated that foundations that bear at depths greater than 5 to 7 feet below the existing ground surface (basement or pit foundations) can possibly be designed using a net allowable bearing pressure in the range of **3,000 to 5,000 pounds per square foot (psf)**. Depending on the final structural loading conditions and the space requirements beneath the floor slab within the building footprint, a deep foundation system can also be used to support the heavier structural loads. Based on the results of the deeper test borings for this study and the anticipated structural loads, it is our opinion that feasible deep foundation systems would include auger-cast concrete piles, caissons (drilled shafts) and rammed aggregate piers (Geopiers). **As a result of the preliminary nature of this geotechnical engineering study *Schneider* recommends additional soil borings be performed to provide more specific and detailed earthwork and foundation design recommendations tailored to the actual building locations and structural loading conditions.**

- Detention ponds will most likely be planned for the development. About one-third of the soil borings encountered shallow permeable sand seams including organic soils. **It is *Schneider's* opinion a clay liner will be necessary if the proposed ponds are designed to retain water at normal pool elevation.** Please refer to Section 5.7, Proposed Ponds, for more specific information regarding detention pond recommendations.

- Shallow silty soils, some of which were encountered on this site, are generally considered to be sensitive to heavy construction traffic during periods of wet weather conditions. In other words, the subgrade soils at this site have the potential to become unstable and lose some

of their strength when simultaneously exposed to wet weather and construction traffic. **It may be prudent to develop a contingency plan for subgrade stabilization where it is determined by field observation to be necessary**. Please refer to Section 5.9, *Special Design and Construction Considerations*, for more specific information regarding construction practices.

- ***Schneider* recommends performing additional test pits after the corn and soybean fields have been harvested. Test pits are a cost effective and efficient method to better delineate the extent and depth of unsuitable soils such as <u>soft/loose and/or organic soils</u> encountered during the preliminary Geotechnical study.**

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APPENDICES

Appendix A: Figure No. 1 Vicinity Map
Figure No. 2 Soil Boring Location Plan
Unified Soil Classification System
Log of Test Boring – General Notes
Soil Boring Logs
Laboratory Test results

Appendix B: Qualifications of this Geotechnical Engineering Study

GEOTECHNICAL PROJECT DATA SHEET

CLIENT: Purdue Research Park
3000 Kent Avenue
West Lafayette, IN 47906

PROJECT NO. 3505.300

PROJECT SIZE: Approx. 370-acres

PROJECT: Purdue Research Park - Phase III & IV

LOCATION: The project site is located on the northwest corner of Kalberer Road and Salisbury Street in West Lafayette, Indiana. Please refer to the Figure No. 1, Vicinity Map and Figure No. 2, Soil Boring Location Plan in the Appendix of the report.

DATE OF FIELD WORK: June 02, 2007 through June 07, 2007

CURRENT SITE CONDITIONS: The topography can be characterized as relatively flat to gently sloping. The majority of the site is currently undeveloped and used for agricultural purposes. An existing shallow detention pond is located on the southwest corner fo the property.

PROPOSED USE OF SITE: Proposed Purdue Research Park for commercial and industrial development.

PROJECT INFORMATION It has been assumed that the proposed structure will be a 1 to 2-story, steel-frame structure with load bearing, tilt-up, and concrete perimeter walls with a slab-on-grade floor. Column, wall and floor loads are unknown at this time.

SCOPE OF SERVICES*

Field Investigation				Lab Tests	
-	Soil Borings to 5' Deep	-	Test Pits	X	Moisture Content
-	Soil Borings to 15' Deep	-	Monitoring Wells	X	Standard Penetration Test
32	Soil Borings to 20' Deep	-	DCP testing	X	Unconfined Compressive Strength
-	Soil Borings to 50' Deep			X	Loss-on-Ignition (LOI)

*See Appendix A for Site Map and Soil Boring Location Map

1.0 INTRODUCTION

1.1 General

Purdue Research Foundation is planning the construction of the Purdue Research Park (Phases III and IV) in West Lafayette, Indiana. The results of the preliminary geotechnical engineering study for this project are presented in this report. This study was carried out in general accordance with *Schneider's* Professional Service Agreement.

1.2 Purpose and Scope

The purpose of this study was to:

1. Determine the general subsurface conditions within the project area,

2. Assess the subsurface conditions encountered in the test borings relative to the proposed development and;

3. Present our findings and preliminary recommendations relative to planning the design and construction of the earth-related elements of this project.

The scope of *Schneider*'s work was achieved by drilling test borings at thirty-two (32) widely spaced locations within the project area and evaluating the results of the field and laboratory testing relative to the proposed development, and preparation of this report.

1.3 Limitations of Study

The recommendations provided herein were developed from the information obtained from the test borings, which depict subsurface conditions only at specific locations. Subsurface conditions at other locations may differ from those occurring at the specific drill sites.

The nature and extent of variations between borings may only become evident during the course of construction. If variations become evident, it will be necessary to re-evaluate the recommendations of this report after performing on-site observations during excavation and noting characteristics of any variation.

Our professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. This company is not responsible for the independent conclusions, opinions, or

recommendations made by others based on the field and laboratory data presented in this report.

The scope of *The Schneider Corporation's* services did not include any environmental assessment, investigation for the presence of wetlands, or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report or on the test boring logs regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client and the owner.

2.0 PROJECT INFORMATION

The project site is an approximately 370-acre tract located northwest of Kalberer Road and North Salisbury Street in West Lafayette, Indiana. Refer to Figure No. 1, Site Map in the Appendix of this report.

It is anticipated the project site is to be developed with 1 to 3-story Commercial and Industrial buildings. The size, configuration, type, and location of the final proposed structure(s) are unknown at this time. For this analysis, it is assumed the proposed structure(s) will be lightly to heavily loaded with structural loads transferred to the soils by spread or continuous wall footings, if possible.

3.0 INVESTIGATIONAL PROCEDURES

3.1 Field Work

A total of thirty-two (32) soil borings were performed across the site. The borings were drilled to a depth of 20 feet below the existing ground surface. All depths are given as feet below existing grade. Please refer to Figure No. 2, Soil Boring Location Plan for specific locations in Appendix A.

Representatives of *Schneider's* Geotechnical Engineering Division positioned the borings in the field. The borings were advanced using 3¼" and 4¼" I.D. hollow-stem augers. Samples were recovered in the undisturbed material below the bottom of the augers using the standard drive sample technique in accordance with ASTM D 1586-74. A 2" O.D. by $1^3/_8$" I.D. split-spoon sampler was driven a total of 18 inches with the number of blows of a 140-pound hammer falling 30-inches recorded for each 6 inches of penetration. The sum of

blows for the final 12 inches of penetration is the Standard Penetration Test result commonly referred to as the N-value (or blow-count). Split-spoon samples were typically recovered at 2.5-foot intervals, beginning at a depth of 1 foot below the existing surface grades, extending to a depth of 10 feet, and at 5-foot intervals thereafter to the termination of the boring. Water levels were monitored at each borehole location during drilling, upon completion of the boring, and if applicable several hours after completing the boring.

3.2 Laboratory Testing

Upon completion of the boring program, all samples recovered were returned to *Schneider's* soils and materials testing laboratory where they were visually examined and placed in groups of like materials. A laboratory log of each boring was prepared based upon the driller's field log, laboratory test results, and visual classification. Test boring logs are included in Appendix A of this report. Indicated on each log is the primary strata encountered, the depth of each stratum change, depth of sample, Standard Penetration Test results, groundwater conditions and selected laboratory test data. The laboratory logs were prepared for each boring giving the appropriate sample data and the textural description and classification.

Representative soil samples recovered in the borings were selected for testing in the laboratory to evaluate their physical properties and engineering characteristics. The results of all field and laboratory tests are summarized on the boring logs. The appropriate laboratory analysis performed on selected samples is as follows:

- Natural moisture content of cohesive soil samples
- Estimation of the unconfined compressive strength (Qp) of cohesive soil samples using a calibrated hand penetrometer.
- Organic content was performed through Loss-on-ignition (LOI) testing procedure.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Conditions

The topography of the site is generally flat to rolling terrain. The majority of the property was being used for agricultural purposes. A pond is located on the southwest portion of the property.

4.2 Subsurface Soil Conditions

Our interpretation of the subsurface conditions is based upon a review of available published literature and thirty-two (32) soil borings, drilled at the approximate locations shown on the Soil Boring Location Plan in Appendix A. The following is a generalized discussion of our findings for the borings drilled for this study. For more specific information, please refer to the Soil Boring Location Plan and test boring logs presented in Appendix A.

The soil borings revealed a surface layer of material that was a blend of silts, sands, and clays, with varying amounts of organic materials, commonly referred to as "topsoil". Topsoil was approximately 6 to 10 inches thick at the test boring locations. Soil borings SB-5, SB-6, SB-7, SB-11, SB-14, and SB-27 encountered traces of organics beneath the topsoil to depths ranging from 1.5 to 3 feet below the existing grade. The organic content ranged from **1.6 to 6.5 percent**. Soil borings SB-29 and SB-32 encountered organic soils from beneath the topsoil to depths of 5.5 to 11 feet below the existing grade, respectively. The organic content ranged from **2.9 to 5.9 percent**. **An organic content above 4 percent is generally regarded as excessive for building and pavement loading areas.**

Three types of substrata predominantly characterized the shallow natural soils encountered below the topsoil. Beneath the topsoil, the test borings typically encountered a soil stratigraphy that consists primarily of brown, moist to wet, medium stiff to hard, silty / sandy clay with varying amounts of sand and gravel ranging from approximately 3 to 16 feet below the existing grade. An estimate of the unconfined compressive strengths (Q_p) of the silty Clay soils, based on a calibrated hand penetrometer, typically ranged from 0.5 to over 4.5 tsf indicating a consistency of medium stiff to hard soil conditions within the zone of foundation bearing.

Natural moisture content tests performed on the selected cohesive soil samples ranged from approximately 8 to 33 percent. The majority of the shallow subgrade soils encountered at the site are anticipated to be above the optimum moisture content for structural fill compaction. Optimum moisture content for compaction purposes is expected to range from 12 to 16 percent. **As a result, substantial drying of the subgrade soils beneath the pavement should also be anticipated.**

Various thicknesses and densities of inter-bedded layers of moist to wet, medium dense to dense, clayey to coarse grained sand with traces of gravel were noted in the majority of the test borings drilled for this study. The permeable granular layers ranged in depth from about

5 to 20 feet and were noted at varying depths within the primarily cohesive soil profile. In addition to the deeper permeable sand layers, test borings SB-30 and SB-31 encountered a shallow, loose to medium dense silty to coarse grained sand directly beneath the topsoil to a depth of approximately 3 feet below the existing grade. Standard Penetration Test results (N-values) for the non-cohesive permeable sandy soils, encountered N-Values ranging from 8 to 50 blows per foot (bpf), thus, indicating a density of **loose to dense**.

Beneath the brown cohesive soils and permeable sandy soils test borings generally encountered varying thicknesses and consistencies of gray, dry to moist, stiff to hard, silty/sandy clay, clayey/sandy silt with traces of gravel (potential TILL) ranging from 8 feet to the termination depth of the borings.

Relatively thin layers of silty / sandy clays were also encountered that contained varying amounts of organics in 4 of the test borings. Organic contents ranged from approximately 1.6 to 4.8 percent. An organic content above 4 percent is regarded as excessive for building and pavement loading conditions. Some soil borings encountered traces of organic soils at greater depths as indicated in the table below:

Soil Boring	Organic Content Range (percent)	Approx. Depth (feet)
SB-21	2.4 to 4.6 %	5.5 to 11
SB-24	2.8 %	3 to 5.5
SB-28	5.1 %	3 to 5.5
SB-31	2.5 %	5.5 to 8

Please refer to the soil boring logs in the Appendix for more specific description for subgrade conditions. The depths were measured at approximate depths below the existing grade.

4.3 Groundwater Conditions

The term groundwater, for the purpose of this report, pertains to any water that percolates through the naturally occurring materials found on site. This includes any overland flow that permeates through a given depth of soil, perched water (which is often transient), and

water that occurs below the water table, a zone that remains saturated and water-bearing year round.

At the time of this investigation, free groundwater was noted on the drilling tools in the majority of the borings. Groundwater was encountered on the drilling tools at varying depths across the site and ranged from approximately 7 to 15 feet below the existing surface. Soil boring SB-31, encountered groundwater on the drilling tools at a shallow depth of 2 feet below the existing grade. Upon completion of the drilling, free groundwater was noted at various depths ranging from about 4 to 17 feet below the existing surface.

It should be noted that shallow ground water in Central Indiana glacial till deposits is typically contained or "perched" within discontinuous sand seams or lenses within the cohesive soils and that relatively short term ground water level readings are not necessarily a reliable indication of the ground water level. Fluctuations in the groundwater level should be expected to occur due to variations in rainfall and other environmental or physical factors at the time measurements are made. The true static groundwater level can only be determined through observations made in cased holes over a long period of time, the installation of which was beyond the scope of this investigation.

5.0 PRELIMINARY DESIGN RECOMMENDATIONS

5.1 Basis

Our recommendations are based on data presented in this report, which includes thirty-two (32) soil borings at widely spaced locations and existing topographic survey information. Subsurface variations not indicated by a dispersive exploratory boring program can exist on any site. If such variations or unexpected conditions are encountered during construction, or if the project information is incorrect or changed, we should be informed immediately since the validity of our recommendations may be affected. Refer to Appendix B for additional qualifications of this preliminary geotechnical engineering study and construction contract considerations.

While the subsurface conditions noted in the soil borings performed on site are relatively uniform, it is possible these conditions may vary significantly. The borings were generally positioned in areas that could be conveniently accessed by the drilling equipment. Consequently, the subsurface conditions encountered at the boring locations may not be representative of the subsurface conditions within the footprint of any new structures. For

this reason it should be recognized that some unsatisfactory soil conditions may exist limiting the application of the following recommendations.

5.2 Further Exploration

Due to the preliminary nature of this geotechnical engineering study and the variable nature of the shallow depth subgrade soils, further site specific soil borings should be performed. In our opinion, the additional borings are expected to provide earthwork and foundation design recommendations tailored to the actual building location and structural load conditions. *Schneider* would also recommend performing test pits with a backhoe to better delineate the extent and depth of soft/loose and/or organic soils encountered during the preliminary geotechnical study.

5.3 Foundations

Pending the results of a more detailed geotechnical investigation, it appears that shallow spread footings and mat foundations can be used to support the anticipated structural loads. **It is recommended that additional building specific borings be performed when final building plans are made available.**

Although the allowable bearing capacity of the near surface natural soils (within five (5) feet of the existing ground surface) are expected to vary across the site, the subgrade soils are generally considered to be suitable for support of the anticipated loading conditions utilizing spread foundations. In our opinion, the proposed structures can be supported on shallow spread foundations with slab-on-grade construction bearing on natural medium stiff to stiff cohesive and medium dense to dense non-cohesive soils, or on structural fill overlying the same. Pending the results of more test borings, the proposed finished floor elevation and more detailed structural loading information it is anticipated that shallow spread and mat foundations that bear within 5 feet of the existing ground surface can possibly be designed using a net allowable bearing pressure in the range of **2,000 to 3,000 pounds per square foot (psf)**. The exterior foundations or foundations in unheated areas should bear at a depth of at least 36 inches below the finished exterior grades. Soil borings which encountered soft/loose and/or organic soils at a shallow depth should expect some additional undercutting. Additional undercutting should also be expected in areas not covered by the widely spaced soil boring program.

Areas which encountered deeper soft/loose and/or organic soils as found within several of the borings should be considered for basements and / or a deep foundation system. It is anticipated that foundations that bear at depths greater than 5 to

7 feet below the existing ground surface (basement or pit foundations) can possibly be designed using a net allowable bearing pressure in the range of **3,000 to 5,000 pounds per square foot (psf)**.

Depending on the final structural loading conditions and the space requirements beneath the floor slab within the building footprint, a deep foundation system can also be used to support the heavier structural loads. Based on the results of the deeper test borings for this study and the anticipated structural loads, it is our opinion that feasible deep foundation systems would include auger-cast concrete piles, caissons (drilled shafts) and rammed aggregate piers (Geopiers). These alternatives can be investigated at the time of the final geotechnical study. **As a result of the preliminary nature of this geotechnical engineering study *Schneider* recommends additional soil borings be performed to provide more specific and detailed earthwork and foundation design recommendations tailored to the actual building locations and structural loading conditions.**

5.4 Seismic Considerations

Based on the results of the test borings and geologic mapping the subsurface soils at this site have been characterized as Site Class – C based on Table No. 1615.1.1 of the 2000 International Building Code.

5.5 Below-Grade Walls

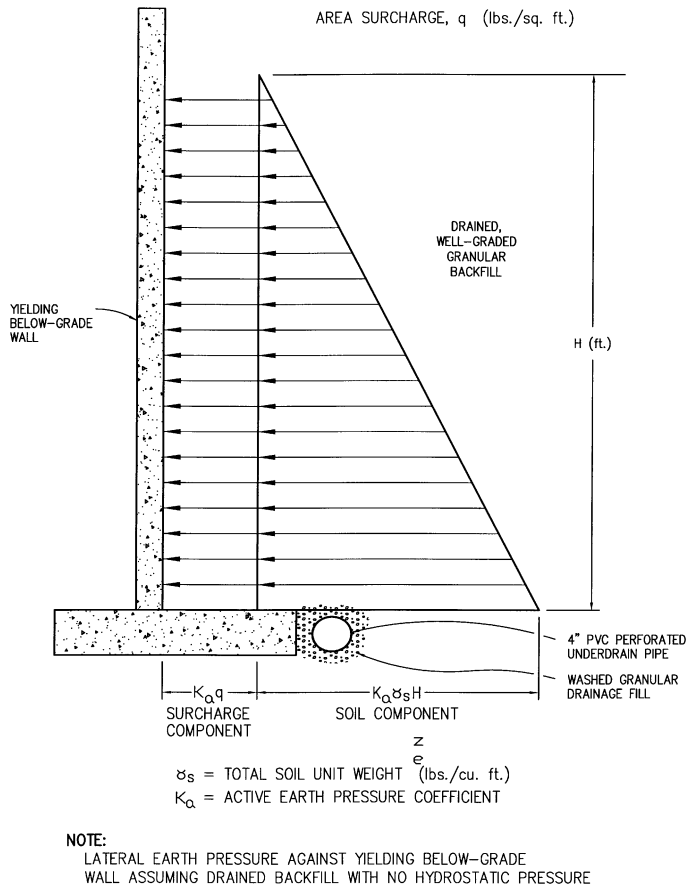
The magnitude of the lateral earth pressure is dependent on the method of backfill placement, the type of backfill soil, drainage provisions and whether or not the wall is permitted to yield during and/or after placement of the backfill. When a wall is held rigidly against horizontal movement, the lateral pressure against the wall is greater than the "active" earth pressure that is typically used in the design of freestanding retaining walls. Therefore, rigid walls should be designed for higher "at rest" pressures (using an at-rest lateral earth pressure coefficient, K_o), while yielding walls can be designed for active pressures (using an active lateral earth pressure coefficient, K_a). For the purpose of this study, we will assume that any walls, which are an integral part of the building, will be designed to be rigid or non-yielding.

It is recommended that only well-graded, free-draining granular material be used for backfill behind the wall defined by a line extending from the base of the wall upward and away from the wall at an angle of 45 degrees from the horizontal. Provided that well-graded granular soils are used for backfill behind the below-grade walls as described above, a total soil unit

weight of 130 lbs./cu. ft and a coefficient of lateral earth pressure at-rest (K_o) of 0.45 can be used to calculate the lateral earth pressure against these walls. If the on-site cohesive soils are used for backfill within any portion of the backfill zone described above, a coefficient of lateral earth pressure at-rest (K_o) of 0.60 should be used for calculating the lateral earth pressure acting on the walls.

A design illustration has been provided below, to aid in computing lateral earth pressures for non-yielding walls below grade. The diagram shows a surcharge component of lateral earth pressure, which should be omitted in cases where it is not applicable. Distributed and point floor loading can create significant horizontal forces and must be accounted for in the design of the below grade walls. If a fully drained condition cannot be maintained, additional hydrostatic pressures should be used to design the below grade walls based on the design high ground water level recommended for the project site and subsurface conditions. The appropriate drainage and weep-holes should be provided to prevent buildup of hydrostatic pressure where applicable (such as behind truck dock walls).

The installation of wall drainage systems (where applicable) should be used to minimize the build up of hydrostatic pressures. Furthermore, the toe pressure for the retaining wall footing should not exceed the maximum allowable bearing pressure recommended for the foundation soils. *A* design illustration has been provided to aid in computing lateral earth pressures for non-yielding walls below grade. The diagram shows a surcharge component of lateral earth pressure, which should be omitted in cases where it is not applicable.



Lateral Earth Pressure Below – Grade Walls

It has been assumed that the static weight per axle of equipment utilized for the compaction of the backfill materials adjacent to the below-grade wall will not exceed 2 tons per axle for non-vibratory equipment and 1 ton per axle for vibratory equipment. All heavy equipment, including compaction equipment heavier than recommended above, should not be allowed closer to the wall (horizontal distance) than the vertical distance from the backfill surface to the bottom of the wall.

5.6 Slabs-on-Grade and Pavements

The natural soils or compacted-engineered fill overlying the same would be adequate to support slab-on-grade floors and “light-duty” pavement sections.

It is recommended that all floor slabs be designed as "floating", that is, fully ground supported and not structurally connected to walls or foundations. This is to minimize the possibility of cracking and displacement of the floor slab because of differential movements

between the slab and the foundation. Although the movements are estimated to be within the tolerable limits for structural safety, such movements could be detrimental to the slabs if they were rigidly connected to the foundations.

Pending further investigation, it is estimated that due to the moderately high plasticity of the near surface clayey soils, any pavement sections would have to be designed utilizing a maximum California Bearing Ratio (CBR) value of 3. It should be recognized though, that an actual CBR test may prove the soils to have higher soil strength than the estimated 3.

If it is not possible to suitably dry the subgrade soils because of weather conditions or scheduling, it is recommended that *Schneider's* geotechnical engineer be contacted. Recommendations could include stabilizing the subgrade by; 1) using hydrated lime, 2) undercutting soft areas and replacing with coarse aggregate, or 3) using a combination of additional aggregate with Geogrid. If deemed necessary, the geotechnical engineer may also specify a perforated subsurface drainage system to improve drainage.

Although subgrade stabilization is not expected to be necessary during dry weather construction, some stabilization such as hydrated lime may be necessary to permit construction access during and after periods of wet weather. Hydrated lime stabilization is typically only used for cohesive subgrade soils that have **excessive** moisture content, or if construction is performed during the wetter periods of the year. If subgrade stabilization is required at the time of construction, it is *Schneider's* opinion that hydrated lime will probably be the most cost-effective soil stabilization treatment.

5.7 Proposed Ponds

Detention ponds will most likely be planned for the development. About one-third of the soil borings encountered shallow permeable sand seams including organic soils. **It is *Schneider's* opinion a clay liner will be necessary if the proposed ponds are designed to retain water at normal pool elevation.**

Hydraulic conductivities in the range of 10^{-9} to 10^{-2} cm/sec are estimated for the silty clays and permeable sand seams. The water level in the retention ponds may fluctuate with the amount of precipitation and groundwater level. In order to reduce the amount of fluctuation within the pond area, a liner may be necessary for all sandy silt soils or permeable sand seams encountered during construction.

5.7.1 Lining Design Recommendations

Based on the potential permeable sandy soils encountered during the soil boring program, we recommend that a low permeable soil liner be placed over this zone to reduce water leakage.

The *Schneider* Geotechnical Engineer should be contacted for the clay liner installation and compaction testing, and if soil variations are encountered during the construction. Where applicable, the clay liner should be a minimum of 12 inches thick on the upper two-thirds of the sides and a minimum of 18 inches in the lower one-third and bottom. The material for the lining must be predominantly a soil classified as a clay or silty clay and capable of providing a permeability coefficient (k) of no greater than 10^{-6} cm/sec. Visual inspection appears to indicate the silty clay soil located onsite, may be capable of providing the desired permeability for use as natural liner material. However, flexiwall permeability testing will need to be performed to evaluate this potential. Sufficient soil should be stockpiled during detention pond excavation and retained as potential liner material, as required.

Laboratory testing, to determine the permeability characteristics and compaction requirements, should be performed at least 1 month prior to initiating lining activities. The clay liner material should be checked during construction by utilizing Atterberg Limits and grain size analysis. Furthermore, field density and moisture testing should be performed frequently during construction to confirm the soil has been compacted to the design density required to achieve the maximum acceptable permeability.

It is imperative that moisture levels of the clay liner material be maintained **above** the optimum moisture content, as determined in laboratory testing. Only by maintaining this condition will it be possible to approach the zero void condition, and maximize natural liner capabilities.

Compaction of the liner should be performed by equipment operating up and down the slope. Engineered natural clay liners should not be compacted by equipment operating around the slopes on or near the same elevation. It is important the natural ground surface be scarified prior to compaction and that hydration of the clay liners takes place after installation is complete. This is typically accomplished by natural rainfall or by application of freshwater at the rate of one-quarter gallon per square foot of surface area for at least 72 hours. This recommended rate of hydration will help prevent shrinkage and cracking of the clay liner and maintain its integrity.

Please note the soils from the wetland area will most likely not be suitable for structural fill and only appropriate for landscaping.

5.8 Groundwater Concerns

Based on the limited information generated from this study, it is not possible to accurately characterize the groundwater regime at this time. The groundwater level in the test borings made for this study was generally shallow and typically within the sandy layers encountered during the subsurface exploration. It is expected that groundwater should be encountered at least 4 feet and deeper below the existing ground surface. The shallow groundwater indicates that groundwater in the permeable zones could pose a problem during construction. Elevating the building pads would reduce the infiltration of groundwater into footing excavations and utility excavations

Groundwater infiltration is not expected to be a significant problem for shallow footing excavations during the drier periods of the year. However, groundwater infiltration should be expected during the wetter periods of the year and in areas in close proximity to wetlands. Construction dewatering, where necessary, can likely be handled by pumping from sumps located within the excavations unless saturated sand areas are encountered at the base of the excavation.

5.9 Special Design and Construction Concerns

The near surface natural clay soils have the potential to become unstable and lose their bearing capacity when exposed to moderate to heavy construction traffic. This potential can be expected to become more acute if the subgrade soils are also exposed to wet weather. Furthermore, drying or aerating these soils, to lower the moisture content to a level necessary for maximum compaction may be difficult. Amending the natural clay subgrade soils with lime or other soil treatment may need to be considered during the wetter periods of the year. It may be prudent to develop a contingency plan for subgrade stabilization where it is determined by field observation to be necessary. However, additional subsurface exploration and sampling should be conducted to verify the in-situ condition.

Due to the preliminary nature of this Geotechnical Engineering study, additional soil borings should be performed to provide more specific and detailed earthwork and foundation design recommendations, tailored to the actual building locations and structural loading conditions.

***Schneider* recommends performing additional test pit after the corn and soybean fields have been harvested. Test pits are a cost effective and efficient method to better delineate the extent and depth of unsuitable soils such as <u>soft/loose and/or organic soils</u> encountered during the preliminary Geotechnical study.**

Appendix A

Figure No. 1 Vicinity Map

Figure No. 2 Soil Boring Location Map

Unified Soil Classification System

Log of test Boring – General Notes

Soil Boring Logs

Laboratory Test results

Appendix B

Qualifications of this Geotechnical Engineering Study

Appendix A

Figure No. 1 Vicinity Map

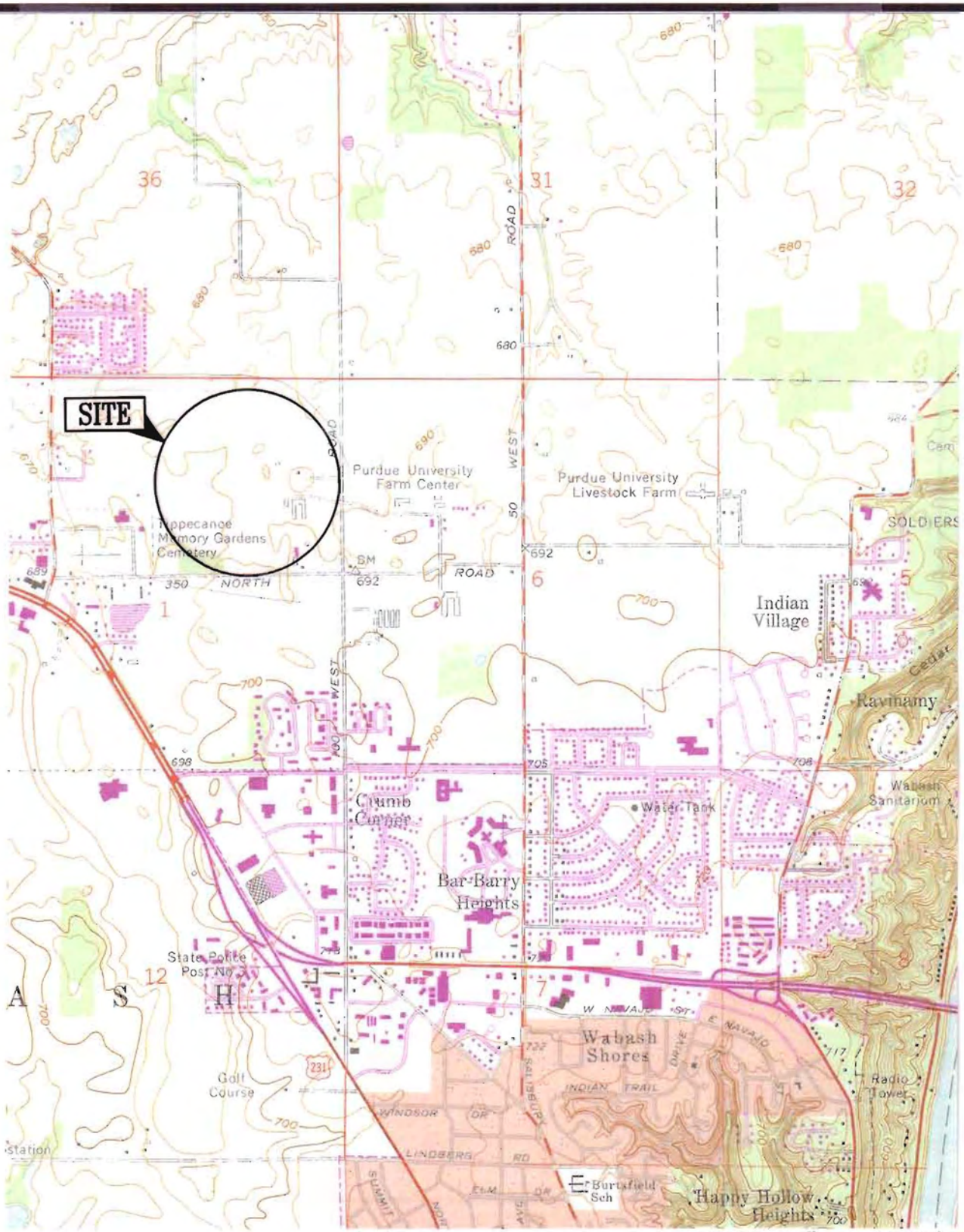
Figure No. 2 Soil Boring Location Map

Unified Soil Classification System

Log of test Boring – General Notes

Soil Boring Logs

Laboratory Test results



The Schneider Corporation

Historic Fort Harrison
8901 Otis Avenue
Indianapolis, Indiana
46216-1037
317-826-7100 Fax
317-826-7300 Fax

Engineering
Surveying
Landscape Architecture
GIS • LIS
Geotechnical/Environmental

Figure No. 1

VICINITY MAP

Proposed Purdue Research Park - Phase III & IV
Kalberer Road and Salisbury Street
West Lafayette, Indiana
Schneider PROJECT No. 3505.300

LEGEND

⊕ SOIL BORING

N

0 175 250 500

(IN FEET)
1 inch = 250 feet

REVISIONS:

DATE:

2007, THE SCHNEIDER CORPORATION

Schneider

THE SCHNEIDER CORPORATION
1330 Win Hentschel Blvd
Suite 100
West Lafayette, IN 47906-4156
Telephone: 765.448.6661
Fax: 765.448.6665
www.schneidercorp.com

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PURDUE RESEARCH PARK
PHASE III & IV MASTER PLAN

WEST LAFAYETTE, IN

PURDUE RESEARCH FOUNDATION
WEST LAFAYETTE, IN

DATE: 08/07/07	PROJECT NO.: 3505.300
DRAWN BY: HS/BMF	CHECKED BY: MB

SHEET TITLE:
FIGURE NO. 2
SOIL BORING LOCATION PLAN

DRAWING FILES:
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SHEET NO.:
NO 2

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Historic Fort Harrison 8901 Otis Avenue Indianapolis, IN 46216-1037 Phone: 317.826.7100 Fax: 317.826.7200

LOG OF TEST BORING
GENERAL NOTES

Typical Order of Soil Descriptions:

Color, Moisture, Soil Density/Consistency, Secondary Soil Type, PRIMARY SOIL TYPE, Descriptive Terms

Non-Cohesive Soils:
(Silt, Sand, Gravel and Combinations)

Term Relative Density	"N" Value
Very Loose	.5 blows/ft (blows/ft
Loose	6 to 10 blows/ft.
Medium Dense	11 to 30 blows/ft.
Dense	31 to 50 blows/ft.
Very Dense	51 blows/ft. or more

Relative Proportions

Descriptive Term	Permit
Trace	1-10
Little	11-20
Some	21-35
And	46-50

Particle Size Identification

Boulders	8 inch diameter or more
Cobles	3 to 8 inch diameter
Gravel	Coarse: 1 to 3 inch Medium: ½ to 1 inch Fine: ¼ to ½ inch
Sand:	Coarse: 6mm to ¼ inch (dia. of pencil led) Fine: 0.05mm to 0.2mm (dia. of human hair)
Fines	Silt: 0.06 to 0.002mm (cannot see particle)

Cohesive Soils
(Clay, Silt and Combinations)
Particle Size less than 0.06 mm

Consistency	"N" value (blows/ft)	Unconfined Compressive Strength (tons/sq.ft.)
Very soft	0-3	Less than 0.25
Soft	4-5	Less than 0.5
Medium Stiff	6-10	0.5-1.0
Stiff	11-15	1.0-2.0
Very Stiff	16-30	2.0-4.0
Hard	31+	Over 4.0

Plasticity

Term	Plastic Index (PI)
None to Slight	0-4
Slight	5-7
Medium	8-22
High/Very High	22+

Relative Portions

trace	1-10%
Little	11-20%
Some	21-35%
And	26-50%

Other Notes

Classification – on logs is made by visual inspection.

Standard Penetration Test – Driving a 2.0" O.D., 1 3/8" I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30 inches. It is customary for Schneider's drillers to drive the spoon a few inches to seat into undisturbed soil, then perform the test. Upon seating the spoon, the number of hammer blows for each 6 inches of penetration are recorded on the drill log (Example – 6/8/9). The Standard Penetration Test results (N-value) can be obtained by adding the last two figures (i.e. 8+9 = 17 blows/ft.) (Compliant with ASTMD-1586)

Strata Changes – In the column "Soil Descriptions" on the drill log the horizontal lines represent strata changes. A solid line (_____) represents an actually observed change, a dashed line (- - - - -) represents an estimated change.

Ground Water – Observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

SYMBOLS
Drilling and Sampling

AS	Auger sample
BS	Bag Sample
C	Casing: Size 64 mm, NW; 100 mm,
COA	HW
CS	Continuous Sampling
CW	Clear Water
DC	Driven Casing
DM	Drilling Mud
FA	Flight Auger
FT	Fish Tail
HA	Hand Auger
HSA	Hollow Stem Auger
NR	Hollow Stem Auger
PMT	No Recovery
PT	Borehole Pressure meter Test
PTS	75 mm OD Piston Tube Sample
RB	Peat Sample
RC	Rock Bit
REC	Rock Coring
RQD	Recovery
RS	Rock Quality Designation
S	Rock Sounding
SS	Soil Sounding
2ST	50 mm OD Split-Barrel Sample
3ST	50 mm OD Thin-Walled Tube Sample
VS	75 mm OD Thin-Walled Tube Sample
WPT	Vane Shear Test
	Water Pressure Test

Laboratory Tests

Qp	Penetrometer Reading, kPa
Qu	Unconfined Strength, KpA
W	Moisture Content, %
LL	Liquid Limit, %
PL	Plastic Limit, %
PI	Plasticity Index
SL	Shrinkage Limit, %
LIO	Loss on Ignition, %
	Dry Unit Weight, kg/m3
pH	Measure of Soil Alkalinity/Acidity

Groundwater Symbols:

Observed groundwater elevation, encountered during drilling

Observed groundwater elevation several hours upon completion of boring

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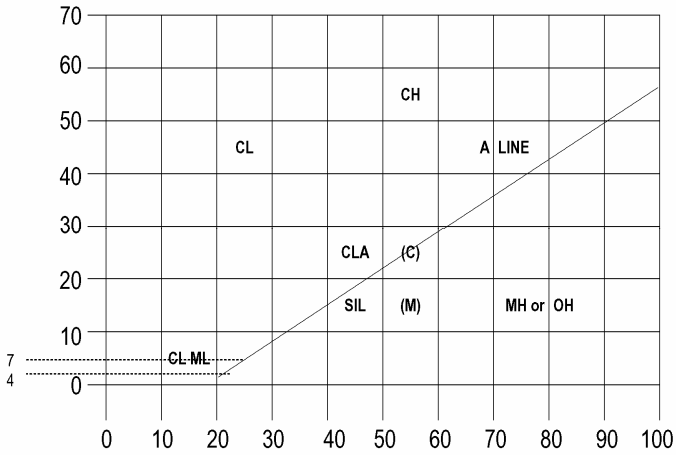
Unified Soil Classification System

Major Divisions			Group Symbol	Typical Names	Laboratory Classification Criteria		
COARSE GRAINED SOILS (More than half of the material is larger than Nop.200 sieve)	Gravels (more than half of coarse fraction is larger than No.4 sieve)	Clean Gravels	GW	Well graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve depending on percentages of fines (fraction smaller than NO.200 sieve size), coarse grained soils are classified as follows: Less than 5% GW, GP, SW, SP; More than 12% GM, GC, SM, SC; 5 to 12% Borderline cases requiring dual symbols	$C_U = \frac{D_{60}}{D_{10}} < 4:1 < C_C = \frac{(D_{30})^2}{D_{10} x D_{60}} < 3$	
			GP	Poorly Graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW	
		Gravel with Fines	GM	Silty Gravels, Gravel-sand-silt mixtures		Atterberg Limits below A-LINE or PT less than 4	Above A-LINE with PT between 4 and 7 are borderline cases requiring the use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg Limits above A-LINE or PT greater than 7	
	Sands (more than half of coarse fraction is smaller than NO.4 sieve)	Clean Sands	SW	Well graded sands, gravelly sands, little or no fines		$C_U = \frac{D_{60}}{D_{10}} < 6:1 < C_C = \frac{(D_{30})^2}{D_{10} x D_{60}} < 3$	
			SP	Poorly graded sands, gravelly sands, little or no lines		Not meeting all gradation requirements for SW	
		Sands with fines	SM	Silty sands, sand-silt mixtures		Atterberg Limits below A-LINE or PT less than 4	Limits plotting in hatched zone with PT between 4 and 7 are borderline cases requiring the use of dual symbols
			SC	Clayey sands, sand-clay mixtures		Atterberg Limits above A-LINE or PT greater than 7	
FINE GRAINED SOILS (More than half of the material is smaller than No.200 sieve)	Silts and clays (LL less than 50)		ML	Inorganic silts, very fine sands, or clayey silts with slight plasticity	1. Plot intersection of PI and LL as determined from Atterberg Limits tests. 2. Points plotted above A-LINE indicate clay soils, those below the A-LINE indicate silt		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL	Organic silts and organic silty clays of low plasticity			
	Silts and clays (LL greater than 50)		MH	Inorganic silts, micoceous or diatomaceous fin sandy or silty soils, elastic silts			
			CH	Inorganic clays of high plasticity, fat clays			
			OH	Organic clays of medium to high plasticity			
	Highly organic soils		PT	Peat and other highly organic soils			



Unified Soil Classification System

ASTM Designation D-2487

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-1

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/29/07	5/29/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		7 feet 17 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	WATER CONTENT (20 40 60)	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
					0			Topsoil (0-9 inches).	
1	100	4-5-6	3.25					Brown, moist, medium stiff to very stiff, sandy CLAY with trace fine gravel.	
2	100	4-5-7	3.75		5				
3	100	6-7-10	-					Brown, wet, medium dense, fine to coarse grain SAND with trace fine gravel.	Ground water on rods at 7 feet.
4	100	7-7-10	4.5+		10			Gray, dry, very stiff to hard, sandy CLAY with trace fine gravel.	
5	100	9-10-10	4.5+		15				Ground water upon completion at 17 feet.
6	100	8-10-12	4.0		20				Bottom of boring at 20 feet.
					25				
					30				
					35				

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GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-2

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/29/07	5/29/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		14 feet 7 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-8 inches).	
1	100	4-6-8	2.0	Brown, moist, stiff, silty CLAY.	
2	100	5-7-9	1.75	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
3	100	7-11-10	1.75		Ground water upon completion at 7 feet.
4	100	10-11-13	3.0		
5	100	13-18-18	-	Gray, moist, dense, very clayey fine to coarse grain SAND with trace fine gravel.	Cave depth at 13 feet. Ground water on rods at 14 feet.
6	100	9-14-16	-	Gray, moist, medium dense, very silty fine to medium grain SAND.	
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-3

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/29/07	5/29/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		▽ 9 feet ▼ 6 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-9 inches).	
1	100	5-5-6	2.0	Brown, moist, stiff, silty CLAY.	
2	100	8-11-15	2.5	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
3	100	9-10-13	1.75		Ground water upon completion at 6 feet.
4	100	18-23-27	-	Brown, wet, dense, clayey fine to medium grain SAND.	Ground water on rods at 9 feet.
5	100	14-20-22	3.5	Gray, moist, very stiff to hard, sandy CLAY with trace fine gravel.	Cave depth at 13 feet.
6	100	10-14-23	2.5		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-4

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/29/07	5/29/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 6 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-9 inches).	
1	100	6-8-6	1.25	Gray, moist, stiff, silty CLAY with trace sand.	
2	100	5-6-7	2.0	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
3	100	6-8-9	2.75		Ground water upon completion at 6 feet.
4	100	6-7-10	-	Brown, moist, medium dense, silty fine to medium grain SAND.	Ground water on rods at 9 feet. Cave depth at 10 feet.
5	100	16-22-24	3.25	Gray, moist, stiff to hard, sandy CLAY with trace fine gravel.	
6	100	17-20-22	1.75		Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-5

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/29/07	5/29/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		8 feet 5 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-8 inches).	
1	100	3-4-7	1.5	Black, moist, medium stiff, sandy CLAY with trace organics.	
				Gray, moist, stiff, silty CLAY.	
2	100	4-6-7	1.5	Black to gray, moist, stiff, sandy CLAY.	
					Ground water upon completion at 5 feet.
3	100	6-6-11	-	Brown, moist, medium dense, fine to coarse grain SAND with trace clay.	
					Ground water on rods at 8 feet.
4	100	6-10-12	-		
					Cave depth at 10 feet.
				Gray, moist, medium stiff to hard, sandy CLAY with trace fine gravel.	
5	100	16-18-22	4.5+		
6	100	12-13-16	0.5		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-6

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/29/07	5/29/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		10 feet 8 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-10 inches).	
1	100	6-8-9	1.25	Black, moist, stiff, sandy CLAY with trace organics.	
				Brown, moist, stiff to very stiff, silty CLAY with trace sand.	
2	100	9-14-16	3.75	Brown, moist, medium stiff to very stiff, sandy CLAY with trace fine gravel and sand seams.	
3	100	10-7-9	3.25		
4	100	7-11-14	0.75		Ground water upon completion at 8 feet. Ground water on rods at 10 feet.
				Gray, moist, dense, fine to coarse grain SAND with trace fine gravel.	Cave depth at 12 feet.
5	100	17-21-27	-		
				Gray, dry, hard, sandy CLAY with trace fine gravel.	
6	100	18-22-37	4.5+		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-7

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/29/07	5/29/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		10 feet 8 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-10 inches).	
1	100	4-4-6	2.0	Brown to black, moist, medium stiff to stiff, silty CLAY with trace organics.	
2	100	7-11-12	1.5	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
3	100	5-7-8	2.5		
4	100	9-12-13	-	Brown to gray, moist, medium dense to dense, fine to coarse grain SAND with trace fine gravel.	Ground water upon completion at 8 feet. Ground water on rods at 10 feet. Cave depth at 11 feet.
5	100	16-19-23	-		
6	100	21-27-38	4.5+	Gray, dry, hard, sandy CLAY.	
					Bottom of boring at 20 feet.

WATER CONTENT (20, 40, 60)

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-8

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/30/07	5/30/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		14 feet 4 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	WATER CONTENT (20 40 60)	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
					0			Topsoil (0-9 inches).	
1	100	5-6-7	2.25					Brown, dry to moist, medium stiff to hard, sandy CLAY with trace fine gravel.	
2	100	4-4-4	2.25		5				Ground water upon completion at 4 feet.
3	100	6-8-8	2.5						
4	100	10-12-18	4.5+		10				
								Gray, moist, hard, sandy CLAY with trace fine gravel and sand seam.	Cave depth at 13 feet.
5	100	15-16-16	4.5+		15			Gray, wet, dense, fine to coarse grain SAND with trace fine gravel.	Ground water on rods at 14 feet.
6	100	14-16-19	-		20				Bottom of boring at 20 feet.
					25				
					30				
					35				

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-9

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/30/07	5/30/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		15 feet 6 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-8 inches).	
1	100	4-5-6	1.75	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
2	100	4-5-7	2.0		
3	100	4-6-7	2.0		Ground water upon completion at 6 feet.
4	100	9-10-10	1.0		
				Gray, dry, very stiff to hard, sandy CLAY with trace fine gravel and sand seams.	
5	100	13-13-15	4.5+		Cave depth at 14 feet. Ground water on rods at 15 feet.
				Brown, moist, dense, fine to coarse grain SAND.	
6	100	12-17-18	-		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-10

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/30/07	5/30/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		14 feet 5 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-7 inches).	
1	100	7-8-8	2.75	Brown, moist, very stiff, sandy CLAY.	
2	100	7-8-10	0.25	Gray to brown, moist, soft to very stiff, sandy CLAY.	
				Brown, moist, stiff, sandy CLAY with trace fine gravel.	Ground water upon completion at 5 feet.
3	100	7-6-9	2.0		
4	100	7-11-16	2.5	Gray, moist, very stiff, sandy CLAY with trace fine gravel.	
				Gray, moist, dense, clayey fine to coarse grain SAND.	
5	100	16-24-19	-		Cave depth at 14 feet. Ground water on rods at 14 feet.
				Gray, dry, very stiff to hard, sandy CLAY.	
6	100	14-15-15	4.5+		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-11

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		10 feet 6 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-7 inches).	
1	100	5-7-7	1.75	Brown to black, moist, stiff, silty CLAY with trace organics.	
2	NR	4-6-12	-	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
3	100	4-6-12	2.5		Ground water upon completion at 6 feet.
4	100	9-10-14	1.75		Ground water on rods at 10 feet. Cave depth at 11 feet.
5	100	11-14-17	2.5	Gray, dry, very stiff to hard, sandy CLAY.	
6	100	13-17-17	3.25	Gray, dry, very stiff to hard, very sandy SILT with sand seams.	
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-12

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		7 feet 15 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-9 inches).	
1	100	4-4-5	1.5	Brown, moist, medium stiff to stiff, silty CLAY with trace sand.	
2	100	4-6-7	4.5+	Brown, dry, stiff to hard, sandy CLAY with trace fine gravel.	
3	100	5-8-9	4.5+		Ground water on rods at 7 feet.
4	75	6-9-11	3.0		
				Gray, dry, very stiff to hard, sandy CLAY with trace fine gravel.	
5	100	7-12-16	4.5+		Ground water upon completion at 15 feet. Cave depth at 17 feet.
6	100	10-11-15	4.25		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-13

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		7 feet 16 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-8 inches).	
1	100	5-5-7	3.5	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
2	100	4-6-7	2.5		
3	75	5-8-9	-	Brown, moist, medium dense, fine to medium grain SAND.	Ground water on rods at 7 feet.
4	100	7-9-11	4.5+	Brown, dry, very stiff to hard, sandy CLAY with trace fine gravel.	
5	100	9-10-13	4.5+	Gray, dry, very stiff to hard, sandy CLAY with trace fine gravel.	Ground water upon completion at 16 feet. Cave depth at 17 feet.
6	50	10-17-14	3.25		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-14

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/31/07	5/31/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		10 feet 6 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-10 inches).	
1	50	4-5-7	1.0	Brown, moist, stiff, sandy CLAY with trace organics.	
2	100	5-6-7	1.25	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
3	100	7-7-9	1.25		Ground water upon completion at 6 feet.
4	100	8-10-14	1.5		Ground water on rods at 10 feet.
				Gray, moist, very stiff to hard, sandy CLAY with trace fine gravel.	
5	100	15-19-21	2.25		Cave depth at 14 feet.
6	100	19-31-28	2.75		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-15

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
5/31/07	5/31/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		10 feet 4 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-10 inches).	
1	100	5-5-7	1.25	Brown to gray, moist, stiff, mottled silty CLAY with trace sand.	
2	100	4-5-7	1.75		Ground water upon completion at 4 feet.
3	100	5-7-8	2.0	Brown, moist, stiff to hard, sandy CLAY with trace fine gravel.	
4	100	6-10-21	2.75		Ground water on rods at 10 feet.
5	100	21-26-37	3.25	Gray, moist, stiff to hard, sandy CLAY with trace fine gravel.	Cave depth at 14 feet.
6	100	19-23-29	1.75		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-16

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/06	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 6 feet

SAMPLE TYPE: ASTM D-1586 ID SS 1.4"

NOTES:

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	WATER CONTENT (20 40 60)	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
					0			Topsoil (0-8 inches).	
1	100	4-4-5	1.25					Brown, moist, medium stiff to hard, sandy CLAY with trace fine gravel.	
2	100	4-5-6	4.5+		5				
3	100	5-5-8	1.5					Ground water upon completion at 6 feet.	
4	100	6-7-9	2.25		10				Ground water on rods at 9 feet.
								Gray, moist, very stiff to hard, sandy CLAY with trace fine gravel.	Cave depth at 12 feet.
5	100	7-14-16	3.0		15				
6	100	13-17-22	3.0		20				Bottom of boring at 20 feet.
					25				
					30				
					35				

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-17

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		7 feet 15 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-9 inches).	
1	100	5-6-6	3.0	Brown, dry to moist, stiff to hard, sandy CLAY with trace fine gravel.	
2	100	4-5-6	1.0		
3	100	7-7-11	4.25		Ground water on rods at 7 feet.
4	100	9-11-16	4.5+	Gray, dry to moist, stiff to hard, sandy CLAY with trace fine gravel.	
5	100	8-13-17	3.0		Ground water upon completion at 15 feet.
6	100	13-17-23	1.75		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-18

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 8 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	WATER CONTENT (20 40 60)	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
					0			Topsoil (0-8 inches).	
1	100	4-6-4	1.0					Brown, moist, medium stiff to very stiff, sandy CLAY with trace fine gravel.	
2	100	5-5-6	3.0		5				
3	100	7-9-10	1.0						
4	100	6-8-10	4.0		10				Ground water upon completion at 8 feet. Ground water on rods at 9 feet. Cave depth at 11 feet.
5	100	9-13-16	1.25		15				
6	100	8-13-15	2.75		20				Bottom of boring at 20 feet.
					25				
					30				
					35				

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-19

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 17 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	WATER CONTENT (20 40 60)	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
					0			Topsoil (0-8 inches).	
1	100	3-4-5	3.5					Brown, moist, medium stiff to very stiff, silty CLAY with trace sand.	
2	100	4-5-5	2.75		5			Brown, moist, medium stiff to hard, sandy CLAY with trace fine gravel.	
3	100	6-8-7	1.25						
4	100	7-9-13	1.75		10				Ground water on rods at 9 feet.
5	50	10-11-27	3.25		15				Ground water upon completion at 17 feet.
6	100	9-13-16	1.25		20				Bottom of boring at 20 feet.
					25				
					30				
					35				

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-20

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		14 feet 9 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	WATER CONTENT (20 40 60)	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
					0			Topsoil (0-7 inches).	
1	100	4-4-4	0.5					Brown, moist, medium stiff to very stiff, sandy CLAY with trace fine gravel.	
2	100	5-6-8	3.5		5				
3	100	6-9-11	2.5						
4	100	8-11-14	4.5+		10			Gray, dry, very stiff to hard, sandy CLAY with trace fine gravel.	
5	100	8-9-16	-		15				
6	100	14-16-11	0.5		20				Bottom of boring at 20 feet.
					25				
					30				
					35				

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-21

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/7/07	6/7/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		14 feet 17 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-6 inches).	
1	100	4-4-6	4.5+	Brown, dry, medium stiff to hard, sandy CLAY with trace fine gravel.	
2	100	4-4-5	3.25		
3	100	6-7-8	3.25	Greenish gray, moist, stiff to very stiff, sandy CLAY with trace organics.	
4	100	6-5-8	1.75		
				Brown, moist, very stiff to hard, sandy CLAY with trace fine gravel.	
5	100	4-7-10	4.5+		Ground water on rods at 14 feet.
				Gray, dry, very stiff, sandy CLAY with trace fine gravel.	Ground water upon completion at 17 feet.
6	100	7-14-16	3.5		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-22

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/7/07	6/7/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 8 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-10 inches).	
1	100	4-6-7	2.25	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
2	100	4-5-6	3.0		
3	100	6-7-10	1.75		
4	100	7-10-12	1.5		Ground water upon completion at 8 feet. Ground water on rods at 9 feet.
				Gray, moist, very stiff to hard, sandy CLAY with trace fine gravel.	
5	100	7-11-14	2.75		
					Cave depth at 16 feet.
6	NR	18-28-37	-		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-23

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/7/07	6/7/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 6 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	WATER CONTENT (20 40 60)	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
					0			Topsoil (0-10 inches).	
1	100	6-7-9	3.25					Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
2	100	7-9-12	3.25		5				
3	100	4-6-6	2.75						Ground water upon completion at 6 feet.
4	100	3-5-8	-		10			Brown, moist, medium dense, silty fine to coarse grain SAND.	Ground water on rods at 9 feet.
5	100	4-12-14	2.25		15			Gray, dry, very stiff, sandy CLAY with trace fine gravel.	Cave depth at 15 feet.
6	100	13-16-21	-		20			Gray, wet, dense, fine to coarse grain SAND with little fine gravel.	Bottom of boring at 20 feet.
					25				
					30				
					35				

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-24

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		14 feet 9 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-8 inches).	
1	100	4-4-5	2.25	Brown, moist, medium stiff to very stiff, silty CLAY.	
2	100	4-5-7	1.25	Brown, moist, stiff, sandy CLAY with trace fine gravel and organics.	
3	100	5-5-7	2.0	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
4	100	8-10-13	1.75		Ground water on rods at 9 feet.
				Gray, moist, stiff to hard, sandy CLAY with trace fine gravel and sand seams.	
5	100	14-16-22	-		Ground water on rods at 14 feet. Cave depth at 15 feet.
6	100	16-17-19	2.0		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-25

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 8 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-9 inches).	
1	100	4-4-6	2.25	Brown, moist, medium stiff to very stiff, silty CLAY.	
2	100	4-5-7	1.5	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	
3	100	6-8-9	2.25		
4	100	8-12-13	4.5+	Gray, dry, very stiff to hard, sandy SILT with trace fine gravel.	Ground water upon completion at 8 feet. Ground water on rods at 9 feet.
5	100	6-9-12	1.0	Brown, moist, stiff to very stiff, sandy CLAY with trace fine gravel.	Cave depth at 14 feet.
6	100	10-13-14	1.0		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-26

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/3/07	6/3/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		7 feet 5 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-7 inches).	
1	100	3-3-6	1.5	Brown to gray, moist, medium stiff to stiff, mottled silty CLAY.	
2	100	4-5-6	0.5	Brown, moist, medium stiff to stiff, sandy CLAY with trace fine gravel.	
3	100	4-6-7	-	Brown, moist, medium dense, sandy SILT with sand seams.	Ground water upon completion at 5 feet. Ground water on rods at 7 feet.
4	100	7-11-12	-	Brown, moist, medium dense, clayey fine to coarse grain SAND with trace fine gravel.	Cave depth at 9 feet.
5	50	9-10-14	-		
6	100	17-21-26	1.75	Gray, moist, stiff to hard, sandy CLAY with trace fine gravel.	
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-27

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 8 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				Topsoil (0-7 inches).	
1	100	3-4-5	0.5	Brown to black, moist, medium stiff, sandy CLAY with trace organics.	
2	100	4-4-6	2.5	Brown to gray, moist, medium stiff to very stiff, mottled silty CLAY.	
3	100	5-8-7	0.75		
4	100	6-9-17	4.0	Brown, moist, medium stiff to very stiff, sandy CLAY with trace fine gravel.	Ground water upon completion at 8 feet. Ground water on rods at 9 feet.
5	100	10-10-14	0.75		Cave depth at 15 feet.
				Gray, dry, hard, sandy CLAY with trace fine gravel.	
6	100	19-22-24	4.5+		Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-28

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		Dry 17 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-7 inches).	
1	100	5-6-8	2.25	Brown, moist, stiff to very stiff, silty CLAY with trace sand.	
2	100	4-6-8	1.5	Black to brown, moist, stiff, sandy CLAY with trace organics.	
3	100	6-6-8	2.0	Brown, dry to moist, stiff to hard, sandy CLAY with trace fine gravel.	
4	100	10-11-13	4.5+		
5	50	14-29-44	1.75		
6	100	24-29-35	4.5+	Gray, dry, hard, sandy CLAY with trace fine gravel.	Ground water upon completion at 17 feet. Cave depth at 17 feet.
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

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GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-29

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/1/07	6/1/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		9 feet 7 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
				Topsoil (0-7 inches).	
1	100	4-5-6	0.75	Brown to black, moist, medium stiff to stiff, sandy CLAY with trace organics.	
2	100	4-6-6	2.0	Brown to gray, moist, stiff, mottled silty CLAY with possible organics.	
3	100	6-8-8	0.75	Brown to black, moist, medium stiff to stiff, sandy CLAY with trace organics.	
4	100	7-8-10	0.75	Brown, moist, medium stiff to very stiff, sandy CLAY with trace fine gravel.	
5	100	6-9-11	0.75		
				Gray, dry, hard, sandy CLAY with trace fine gravel.	
6	100	14-16-19	4.5+		
					Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

DEPTH: 0, 5, 10, 15, 20, 25, 30, 35

GRAPHIC LOG / SAMPLE

Schneider

GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-30

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/2/07	6/2/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		7 feet 4 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DEPTH	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				0	Topsoil (0-7 inches).	
1	50	2-4-4	-		Brown, moist, loose, silty fine to coarse grain SAND with trace fine gravel.	
2	100	6-7-6	1.5	5	Gray to brown, moist, stiff, mottled silty CLAY.	Ground water upon completion at 4 feet.
3	100	5-7-9	-		Brown, moist, medium dense, clayey fine to coarse grain SAND with trace fine gravel.	Ground water on rods at 7 feet. Cave depth at 7 feet.
4	100	8-10-11	-	10		
5	100	12-12-13	-	15		
6	100	11-12-14	3.0	20	Gray, moist, very stiff, sandy CLAY with trace fine gravel.	Bottom of boring at 20 feet.

WATER CONTENT: 20 40 60

GRAPHIC LOG / SAMPLE

25 30 35

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GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-31

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/3/07	6/3/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		2 feet 10 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	Moved boring 15 feet north due to heavy slope and large brush.

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	DEPTH	DESCRIPTION AND CLASSIFICATION (density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor)	DRILLING NOTES (water levels, water return, character of drilling, etc.)
				0	Topsoil (0-8 inches).	
1	100	3-4-4	-		Brown, moist, loose, silty fine to medium grain SAND.	Ground water on rods at 2 feet.
2	100	4-4-6	1.75	5	Brown to gray, moist, medium stiff to stiff, mottled silty CLAY.	
3	100	4-6-7	1.25		Gray to black, moist, stiff, sandy CLAY with trace organics.	
4	100	6-7-10	-	10	Brown, moist, medium dense, fine to coarse grain SAND.	Ground water upon completion at 10 feet. Cave depth at 10 feet.
5	10	13-22-27	3.25	15	Gray, moist, very stiff to hard, sandy CLAY with trace fine gravel.	
6	100	11-17-24	3.5	20		Bottom of boring at 20 feet.
				25		
				30		
				35		

WATER CONTENT: 20 40 60

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GEOLOGIC DRILL LOG

PROJECT	PROJECT NUMBER	BORING NUMBER
Purdue Research Park - Phase 3 & 4	3505.300	SB-32

SITE	LOGGED BY	CHECKED BY
West Lafayette, IN	Ryan/Tim	T-S

BEGUN	COMPLETED	DRILLER	DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH
6/7/07	6/7/07	Axis Earth Services	CME-55	3.25" HSA	20 feet

CORE RECOVERY (FT./%)	CORE BOXES	DEPTH/ELEV. TOP OF ROCK	SAMPLES	GROUND ELEVATION	DEPTH/ELEV. GROUND WATER
			6		14 feet 12 feet

SAMPLE TYPE	NOTES
ASTM D-1586 ID SS 1.4"	

SAMPLE NUMBER	RECOVERY (%)	BLOWS PER 6"	Qp/Qu (tsf)	WATER CONTENT (20 40 60)	DEPTH	GRAPHIC LOG	SAMPLE	DESCRIPTION AND CLASSIFICATION density, grain size/shape, color, structure composition, sorting, texture, moisture facies, odor	DRILLING NOTES water levels, water return, character of drilling, etc.
					0			Topsoil (0-10 inches).	
1	100	4-4-7	1.75					Brown, gray, black, moist, stiff to very stiff, sandy CLAY with trace organics.	
2	100	4-6-8	2.75		5				
3	100	5-7-10	1.25						
4	100	9-11-15	2.5		10				
								Brown, dry, very stiff to hard, sandy CLAY with trace fine gravel.	Ground water upon completion at 12 feet.
5	100	9-12-14	4.5+		15				Ground water on rods at 14 feet. Cave depth at 15 feet.
								Gray, dry, very stiff, sandy CLAY.	
6	100	8-14-17	4.0		20				Bottom of boring at 20 feet.
					25				
					30				
					35				

Schneider

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The Schneider Corporation
Historic Fort Harrison 8901 Otis Avenue Indianapolis, IN 46216-1037 Phone: 317.826.7100 Fax: 317.826.7200

Project: **Purdue Research Park - Phase III & IV**
Location: **West Lafayette, IN**
Client: **Purdue Research Foundation**
TSC Project No.: **3505.300**

REPORT OF LABORATORY TESTING

The Schneider Corporation
(317) 826-7100 / Fax: (317) 826-7200

Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)	Organic Content (%)	Atterberg Limits		
					LL	PL	PI
SB-1	1	1.0 - 2.5	12.0				
SB-1	2	3.5 - 5.0	12.4				
SB-1	3	6.0 - 7.5	SAND				
SB-1	4	8.5 - 10.0	9.3				
SB-1	5	13.5 - 15.0	8.5				
SB-1	6	18.5 - 20.0	10.3				
SB-2	1	1.0 - 2.5	29.1				
SB-2	2	3.5 - 5.0	13.8				
SB-2	3	6.0 - 7.5	12.7				
SB-2	4	8.5 - 10.0	12.5				
SB-2	5	13.5 - 15.0	SAND				
SB-2	6	18.5 - 20.0	SAND				
SB-3	1	1.0 - 2.5	31.3				
SB-3	2	3.5 - 5.0	13.2				
SB-3	3	6.0 - 7.5	12.7				
SB-3	4	8.5 - 10.0	SAND				
SB-3	5	13.5 - 15.0	12.0				
SB-3	6	18.5 - 20.0	12.2				
SB-4	1	1.0 - 2.5	23.2				
SB-4	2	3.5 - 5.0	14.0				
SB-4	3	6.0 - 7.5	15.1				
SB-4	4	8.5 - 10.0	SAND				
SB-4	5	13.5 - 15.0	12.7				
SB-4	6	18.5 - 20.0	12.6				
SB-5	1	1.0 - 2.5	20.8	2.4			
SB-5	2	3.5 - 5.0	15.0				
SB-5	3	6.0 - 7.5	SAND				
SB-5	4	8.5 - 10.0	SAND				
SB-5	5	13.5 - 15.0	11.4				
SB-5	6	18.5 - 20.0	12.4				
SB-6	1	1.0 - 2.5	26.6	2.7			
SB-6	2	3.5 - 5.0	14.8				
SB-6	3	6.0 - 7.5	11.7				
SB-6	4	8.5 - 10.0	17.2				
SB-6	5	13.5 - 15.0	SAND				
SB-6	6	18.5 - 20.0	9.4				
SB-7	1	1.0 - 2.5	26.6	1.6			

Project: **Purdue Research Park - Phase III & IV**
Location: **West Lafayette, IN**
Client: **Purdue Research Foundation**
TSC Project No.: **3505.300**

REPORT OF LABORATORY TESTING

The Schneider Corporation
(317) 826-7100 / Fax: (317) 826-7200

Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)	Organic Content (%)	Atterberg Limits		
					LL	PL	PI
SB-7	2	3.5 - 5.0	11.7				
SB-7	3	6.0 - 7.5	11.6				
SB-7	4	8.5 - 10.0	SAND				
SB-7	5	13.5 - 15.0	SAND				
SB-7	6	18.5 - 20.0	9.8				
SB-8	1	1.0 - 2.5	14.8				
SB-8	2	3.5 - 5.0	13.9				
SB-8	3	6.0 - 7.5	12.7				
SB-8	4	8.5 - 10.0	9.9				
SB-8	5	13.5 - 15.0	SAND				
SB-8	6	18.5 - 20.0	SAND				
SB-9	1	1.0 - 2.5	19.7				
SB-9	2	3.5 - 5.0	13.0				
SB-9	3	6.0 - 7.5	12.7				
SB-9	4	8.5 - 10.0	13.1				
SB-9	5	13.5 - 15.0	10.7				
SB-9	6	18.5 - 20.0	SAND				
SB-10	1	1.0 - 2.5	13.3				
SB-10	2	3.5 - 5.0	21.0				
SB-10	3	6.0 - 7.5	12.3				
SB-10	4	8.5 - 10.0	9.9				
SB-10	5	13.5 - 15.0	SAND				
SB-10	6	18.5 - 20.0	12.5				
SB-11	1	1.0 - 2.5	29.0	6.5			
SB-11	2	3.5 - 5.0	NO REC				
SB-11	3	6.0 - 7.5	12.5				
SB-11	4	8.5 - 10.0	13.6				
SB-11	5	13.5 - 15.0	10.3				
SB-11	6	18.5 - 20.0	15.3				
SB-12	1	1.0 - 2.5	20.0				
SB-12	2	3.5 - 5.0	12.0				
SB-12	3	6.0 - 7.5	9.1				
SB-12	4	8.5 - 10.0	11.1				
SB-12	5	13.5 - 15.0	8.3				
SB-12	6	18.5 - 20.0	10.1				
SB-13	1	1.0 - 2.5	12.0				
SB-13	2	3.5 - 5.0	12.2				
SB-13	3	6.0 - 7.5	SAND				
SB-13	4	8.5 - 10.0	10.6				
SB-13	5	13.5 - 15.0	9.1				
SB-13	6	18.5 - 20.0	10.5				
SB-14	1	1.0 - 2.5	32.5	4.1			

Project: **Purdue Research Park - Phase III & IV**
Location: **West Lafayette, IN**
Client: **Purdue Research Foundation**
TSC Project No.: **3505.300**

REPORT OF LABORATORY TESTING

The Schneider Corporation
(317) 826-7100 / Fax: (317) 826-7200

Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)	Organic Content (%)	Atterberg Limits		
					LL	PL	PI
SB-14	2	3.5 - 5.0	14.3				
SB-14	3	6.0 - 7.5	15.3				
SB-14	4	8.5 - 10.0	11.7				
SB-14	5	13.5 - 15.0	14.1				
SB-14	6	18.5 - 20.0	13.8				
SB-15	1	1.0 - 2.5	17.8				
SB-15	2	3.5 - 5.0	20.6				
SB-15	3	6.0 - 7.5	13.0				
SB-15	4	8.5 - 10.0	10.7				
SB-15	5	13.5 - 15.0	13.4				
SB-15	6	18.5 - 20.0	14.2				
SB-16	1	1.0 - 2.5	20.9				
SB-16	2	3.5 - 5.0	12.2				
SB-16	3	6.0 - 7.5	15.2				
SB-16	4	8.5 - 10.0	11.8				
SB-16	5	13.5 - 15.0	13.4				
SB-16	6	18.5 - 20.0	13.2				
SB-17	1	1.0 - 2.5	15.3				
SB-17	2	3.5 - 5.0	13.9				
SB-17	3	6.0 - 7.5	10.5				
SB-17	4	8.5 - 10.0	8.7				
SB-17	5	13.5 - 15.0	12.8				
SB-17	6	18.5 - 20.0	13.7				
SB-18	1	1.0 - 2.5	18.8				
SB-18	2	3.5 - 5.0	10.7				
SB-18	3	6.0 - 7.5	11.9				
SB-18	4	8.5 - 10.0	10.5				
SB-18	5	13.5 - 15.0	12.6				
SB-18	6	18.5 - 20.0	11.5				
SB-19	1	1.0 - 2.5	19.3				
SB-19	2	3.5 - 5.0	21.1				
SB-19	3	6.0 - 7.5	12.5				
SB-19	4	8.5 - 10.0	11.9				
SB-19	5	13.5 - 15.0	10.5				
SB-19	6	18.5 - 20.0	13.1				
SB-20	1	1.0 - 2.5	17.5				
SB-20	2	3.5 - 5.0	11.7				
SB-20	3	6.0 - 7.5	12.4				
SB-20	4	8.5 - 10.0	9.3				
SB-20	5	13.5 - 15.0	11.5				
SB-20	6	18.5 - 20.0	13.3				
SB-21	1	1.0 - 2.5	10.9				

Project: **Purdue Research Park - Phase III & IV**
Location: **West Lafayette, IN**
Client: **Purdue Research Foundation**
TSC Project No.: **3505.300**

REPORT OF LABORATORY TESTING

The Schneider Corporation
(317) 826-7100 / Fax: (317) 826-7200

Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)	Organic Content (%)	Atterberg Limits		
					LL	PL	PI
SB-21	2	3.5 - 5.0	13.0				
SB-21	3	6.0 - 7.5	21.2	4.6			
SB-21	4	8.5 - 10.0	17.1	2.3			
SB-21	5	13.5 - 15.0	13.9				
SB-21	6	18.5 - 20.0	11.9				
SB-22	1	1.0 - 2.5	18.9				
SB-22	2	3.5 - 5.0	11.0				
SB-22	3	6.0 - 7.5	11.0				
SB-22	4	8.5 - 10.0	12.4				
SB-22	5	13.5 - 15.0	9.2				
SB-22	6	18.5 - 20.0	NO REC				
SB-23	1	1.0 - 2.5	20.8				
SB-23	2	3.5 - 5.0	11.6				
SB-23	3	6.0 - 7.5	11.2				
SB-23	4	8.5 - 10.0	SAND				
SB-23	5	13.5 - 15.0	9.5				
SB-23	6	18.5 - 20.0	SAND				
SB-24	1	1.0 - 2.5	24.3				
SB-24	2	3.5 - 5.0	17.9	2.8			
SB-24	3	6.0 - 7.5	12.1				
SB-24	4	8.5 - 10.0	12.7				
SB-24	5	13.5 - 15.0	21.3				
SB-24	6	18.5 - 20.0	11.9				
SB-25	1	1.0 - 2.5	21.4				
SB-25	2	3.5 - 5.0	21.2				
SB-25	3	6.0 - 7.5	11.1				
SB-25	4	8.5 - 10.0	8.4				
SB-25	5	13.5 - 15.0	12.8				
SB-25	6	18.5 - 20.0	14.0				
SB-26	1	1.0 - 2.5	20.0				
SB-26	2	3.5 - 5.0	12.9				
SB-26	3	6.0 - 7.5	16.0				
SB-26	4	8.5 - 10.0	SAND				
SB-26	5	13.5 - 15.0	SAND				
SB-26	6	18.5 - 20.0	14.2				
SB-27	1	1.0 - 2.5	19.9	3.3			
SB-27	2	3.5 - 5.0	21.8				
SB-27	3	6.0 - 7.5	22.2				
SB-27	4	8.5 - 10.0	11.4				
SB-27	5	13.5 - 15.0	13.7				
SB-27	6	18.5 - 20.0	7.2				
SB-28	1	1.0 - 2.5	25.2				

Project: **Purdue Research Park - Phase III & IV**
Location: **West Lafayette, IN**
Client: **Purdue Research Foundation**
TSC Project No.: **3505.300**

REPORT OF LABORATORY TESTING

The Schneider Corporation
(317) 826-7100 / Fax: (317) 826-7200

Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)	Organic Content (%)	Atterberg Limits		
					LL	PL	PI
SB-28	2	3.5 - 5.0	21.7	5.1			
SB-28	3	6.0 - 7.5	14.5				
SB-28	4	8.5 - 10.0	9.2				
SB-28	5	13.5 - 15.0	12.3				
SB-28	6	18.5 - 20.0	7.3				
SB-29	1	1.0 - 2.5	20.8	5.0			
SB-29	2	3.5 - 5.0	24.0	4.8			
SB-29	3	6.0 - 7.5	18.9	3.9			
SB-29	4	8.5 - 10.0	13.5				
SB-29	5	13.5 - 15.0	13.7				
SB-29	6	18.5 - 20.0	7.4				
SB-30	1	1.0 - 2.5	SAND				
SB-30	2	3.5 - 5.0	22.8				
SB-30	3	6.0 - 7.5	SAND				
SB-30	4	8.5 - 10.0	SAND				
SB-30	5	13.5 - 15.0	SAND				
SB-30	6	18.5 - 20.0	13.6				
SB-31	1	1.0 - 2.5	SAND				
SB-31	2	3.5 - 5.0	22.9				
SB-31	3	6.0 - 7.5	16.3	2.5			
SB-31	4	8.5 - 10.0	SAND				
SB-31	5	13.5 - 15.0	10.1				
SB-31	6	18.5 - 20.0	13.7				
SB-32	1	1.0 - 2.5	21.5	5.4			
SB-32	2	3.5 - 5.0	21.6	6.3			
SB-32	3	6.0 - 7.5	15.2	2.9			
SB-32	4	8.5 - 10.0	21.4	5.9			
SB-32	5	13.5 - 15.0	14.1				
SB-32	6	18.5 - 20.0	10.6				

Appendix B

Qualifications of this Geotechnical Engineering Study

The Schneider Corporation
Historic Fort Harrison 8901 Otis Avenue Indianapolis, IN 46216-1037 Phone: 317.826.7100 Fax: 317.826.7200

GENERAL QUALIFICATIONS
of ***The Schneider Corporation's*** Report

This report has been prepared at the request of our client for their use on this project. The work, including the field work, laboratory testing, and engineering analysis, was performed in accordance with generally accepted soil and foundation engineering practices. This warranty is in lieu of all other warranties either expressed or implied.

This report may not contain sufficient information for purposes of other parties or other uses. Should there be any sufficient differences in structural arrangement, loading or location of the structure, our analysis should be reviewed.

The analysis, conclusions, and recommendations contained in our report are based on site conditions as they existed at the time of our exploration and further assume that the borings are representative of the subsurface conditions throughout the site.

If during construction, different subsurface conditions from those encountered during our explorations are observed or appear to be present beneath excavations, we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary.

If there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

We urge that we be retained to review those portions of the plans and specifications that pertain to earthwork and foundations to determine whether they are consistent with our recommendations. In addition, we are available to observe construction, particularly the compaction of structural backfill and preparation of the foundations, and such other field observations as may be necessary.

In order to fairly consider changed or unexpected conditions that might arise during construction, we recommend the following verbiage (Standard Clause for Unanticipated Subsurface Conditions) be included in the project contract.

STANDARD CLAUSE FOR UNANTICIPATED SUBSURFACE CONDITIONS

"The owner has had a subsurface exploration performed by a soils consultant, the results of which are contained in the consultant's report. The consultant's report represents their conclusions on the subsurface conditions based on their interpretations of the data obtained in the exploration. The contractor acknowledges that they have reviewed the consultant's report and any addenda thereto, and that their bid for earthwork operations is based on the subsurface conditions as described in that report. It is recognized that a subsurface exploration may not disclose all conditions as they actually exist and further, conditions may change, particularly groundwater conditions, between the time of a subsurface exploration and the time of earthwork operations. In recognition of these facts, this clause is entered in the contract to provide a means of equitable additional compensation for the contractor if adverse unanticipated conditions are encountered and to provide a means of rebate to the owner if the conditions are more favorable than anticipated.

At anytime during construction operations that the contractor encounters conditions that are different than those anticipated by the soils consultant's report, they shall immediately (within 24 hours) bring this fact to the owner's attention. If the owner's representative on the construction site observes subsurface conditions which are different than those anticipated by the consultant's report, they shall immediately (within 24 hours) bring this fact to the contractor's attention. Once a fact of unanticipated conditions has been brought to the attention of either the owner or the contractor, and the consultant has concurred, immediate negotiations will be undertaken between the owner and the contractor, to arrive at a change in contract price for additional work or reduction in work because of the unanticipated conditions. The contractor agrees that the following unit prices would apply for additional or reduced work under the contract. For changed conditions for which unit prices are not provided, the additional work shall be paid for on a time and materials basis."

Another example of a changed conditions clause can be found in paper No. 4035 by Robert F. Borg, published in ASCE Construction Division Journal, No. CO2, September 1964, page 37.