COMPILED REPORT OF

# SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING ANALYSIS

## NORTHBROOK FITNESS DEVELOPMENT
1000 SKOKIE BOULEVARD
NORTHBROOK, ILLINOIS

ECS PROJECT NO. 16:10306

FOR

LIFE TIME FITNESS
CHANHASSEN, MINNESOTA

JULY 7, 2016

ECS MIDWEST, LLC
"Setting the Standard for Service"
Geotechnical • Construction Materials • Environmental • Facilities

July 7, 2016

Mr. Justin Schmidt, P.E.
Life Time Fitness
Real Estate and Development
2902 Corporate Place
Chanhassen, Minnesota 55317
Email: jschmidt@Life Timefitness.com

ECS Project No. 16:10306

Reference: Revised Report of Subsurface Exploration and Geotechnical Engineering Services, Northbrook Fitness Development, 1000 Skokie Boulevard, Northbrook, Illinois

Dear Mr. Schmidt:

As requested, ECS Midwest, LLC (ECS) has compiled the results of the previously completed subsurface explorations and geotechnical engineering analyses for the proposed Life Time Fitness Facility located at 1000 Skokie Boulevard in Northbrook, Illinois. The data and recommendations presented herein are based on the previously issued geotechnical reports for Projects No. 16:10306-A, 16:10306-B, 16:10306-C, 16:10306-F and 16:10306-G.

A report, including the results of our previously completed soil boring and test pit subsurface explorations, in-situ pressuremeter testing, ReMi testing, infiltration testing, laboratory testing, recommendations regarding the geotechnical design and construction aspects at the project site and a Boring and Test Pit Location Diagram are enclosed herein. The recommendations presented are intended for use by your office and for use by other professionals involved in the design and construction stages of the project described herein.

We appreciate the opportunity to be of service to Life Time Fitness on this project. If you have questions with regard to the information and recommendations contained in this report, or if we may be of further service to you during the planning and/or construction phase of this project, please do not hesitate to contact the undersigned.

Respectfully,

**ECS MIDWEST, LLC**

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# COMPILED REPORT

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PROJECT

Subsurface Exploration and
Geotechnical Engineering Analysis
Northbrook Fitness Development
1000 Skokie Boulevard
Northbrook, Illinois

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CLIENT

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PROJECT NO. 16:10306

DATE July 7, 2016

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# EXECUTIVE SUMMARY

The subsurface conditions encountered during our subsurface exploration and ECS' conclusions and recommendations are summarized below. This summary should not be considered apart from the entire text of the report with all the qualifications and considerations mentioned herein. Details of our conclusions and recommendations are discussed in the following sections and in the Appendix of this report.

The project site is located at 1000 Skokie Boulevard in Northbrook, Illinois. The construction at the project site will consist of a health club facility, a pool deck, a childcare facility and the associated at-grade parking and drive lanes. To better understand the subsurface conditions at the project site, ECS performed sixteen (16) initial exploratory borings, a series of test pits and seventeen (17) supplementary borings throughout the project site. The soil conditions encountered at the borings locations can be summarized as follows:

Surficial materials were observed to consist of about 8 to 13 inches of topsoil or 2 to 8 inches of bituminous pavement or 6 inches or concrete overlying about 7 to 36 inches of crushed gravel subbase. The surficial soils were observed to be typically underlain by FILL (gravel/debris fill or Silty Clay) and/or Lean/Fat CLAY soils to depths of about 3 to 10½ feet (typically 3 to 5½ feet). The FILL was observed to be underlain by Silty CLAY to the termination depth of the soil borings (i.e., approximately 25 feet to 30 feet below existing site grades). Intermittent seams of Sandy SILT and Fine to Medium SAND were observed at varying depths at boring locations B-1 (sand at 24 feet), B-9 (Sandy SILT at 5½ to 7 feet) and B-13 (Sand from 14½ feet to 20 feet).

The granular FILL soils were observed to exhibit SPT N-values ranging from 12 to 45 blows per foot (bpf) which is indicative of a medium dense to dense relative density for granular soils; however, elevated blow counts may indicate larger debris (brick or concrete fragments) and may not be indicative of the in-situ density for the debris fill. The Silty Clay FILL and/or Lean/Fat Clay with trace organics exhibited unconfined compressive strengths ranging from ¼ tsf to greater than 4½ tsf and moisture contents ranging from 14 to 42 percent. The natural Silty CLAY soils were observed to exhibit unconfined compressive strength values in the range of ½ tsf to greater than 4½ tsf (medium stiff to hard, but typically very stiff to hard) and moisture contents in the range of about 14 to 25 percent. The natural Fine to Medium SAND and Sandy SILT exhibited SPT N-values ranging from 10 to 18 bpf (loose to medium dense).

Groundwater was observed at boring locations S-1, S-2, S-4, S-5, S-7 through S-12, S-17, B-2 through B-10, B-13 and B-16 at depths ranging from 2½ to 17 feet below existing site grades during the drilling operations and ranging from 4 to 12½ feet after auger removal. The shallower groundwater levels are, in our opinion, perched water. Perched water occurs when the downward percolation of water is impeded by soils of lower permeability, such as the sandy soils above the lower permeability Silty CLAY soils. Based on the results of this exploration, the long-term groundwater level may be located at a depth of approximately 12 feet below existing site grades.

Based on our understanding of the proposed construction and our conversations with the structural engineer, it is our opinion that the proposed LTF and CLA structures can be supported on a shallow foundation system (i.e., wall and column footings) bearing on competent natural Silty CLAY or granular engineered fill/lean concrete overlying competent natural Silty CLAY. Shallow foundations bearing on competent natural silty Clay or compacted granular fill overlying competent natural soils designed for a maximum net allowable soil bearing pressure of 6,000 psf. Competent soils can be identified on the boring logs and in the field as Silty CLAY with unconfined compressive strength values of 2 tsf or greater. Rammed aggregate piers are planned to provide soil improvements to the foundations for the CLA building.

As this project moves forward, we recommend that ECS be retained to review the project drawings and specifications prior to the start of construction to verify that the recommendations detailed herein are followed. We also recommend that ECS be retained during construction of the proposed facility to monitor all earthwork / subgrade preparation and to verify that the exposed subgrade materials will be suitable for support of the proposed structure.

| Report Prepared By: | Report Reviewed By: | |
|---|---|---|
| Rachel E. Miller<br>Project Manager | Paul J. Giese. P.E.<br>Principal Engineer | Michael T. Bronson, P.E.<br>Geotechnical Manager |

# PROJECT OVERVIEW

## Introduction

This report presents the compiled results of our previously completed subsurface explorations and geotechnical engineering analysis performed for the proposed development to be constructed at 1000 Skokie Boulevard in Northbrook, Illinois. A General Location Plan, included in the Appendix of this report, shows the approximate location of the project site. In preparing this report, we have utilized information from our previously completed subsurface explorations (ECS Projects No. 16:10306-A, 16:10306-B, 16:10306-C, 16:10306-F and 16:10306-G) as well as information from nearby sites.

## Site Location and Existing Site Conditions

The project site is located at 1000 Skokie Boulevard in Northbrook, Illinois. The site is bound to the north by a multi-story office building, to the west by a Metra train line, to the east by Skokie Boulevard and to the south by an electrical company. The site is currently occupied by a heavily vegetated area to the north and parking lots/old slabs to the north which has fallen in to disrepair. The site was previously developed by two office structures which were demolished between 2002 and 2005. It is unclear if the building foundations were removed. Based on our review of the Google Earth®, the existing site grade elevations appear to be in the range from EL. +630 feet to EL. +636 feet (+/-).

## Proposed Construction

The construction at the project site will consist of a health club structure with a combined area of approximately 86,000 square feet in plan-view (footprint area of 31,000 square feet) and a pool deck (30,000 square feet). The structures will be slab-on-grade construction with a FFE of EL. +635 feet. The maximum wall loads are expected to be 10 kips per linear foot and the perimeter and interior column loads will be 400 to 600 kips, respectively. The floor slab-on-grade will impart a load of about 150 psf. The pool will be below grade. The project team indicated the structure can tolerate settlements of up to 2 inches and differential settlements of 1 inch per 100 feet and ½ inch per 30 feet for buildings and ½ inch per 100 feet ¼ inch for 30 feet for the pool deck, pool vessel and slabs. A below-grade detention facility will be installed beneath the parking lot on the east side of the site.

A childcare facility (40,000 square feet) along with the associated parking lot and drive lanes will also be constructed at the south portion of the project site. The FFE of the childcare facility will rest at EL. +635 feet. The column loads are expected to range 150 kips to 300 kips.

The project site will also be developed with site amenities such as curbs and gutters, landscaping, greenscapes parking and drive aisles. The pavement sections were developed by Loren Braun of American Engineering Testing, Inc. using utilizing the AASHTO design method and a 20-year design service life. The light duty sections will be designed assuming 5 ESALs per day and the heavy duty pavement section will be designed assuming 15 ESALs per day.

If ECS' understanding of the proposed construction or loading is inaccurate, or if the proposed construction changes, ECS should be notified immediately to determine if the recommendations detailed herein is appropriate for the proposed construction or to provide revisions, as necessary.

## **Purpose of Exploration and Scope of Work**

The purpose of this exploration was to explore the subsurface conditions within the immediate area of the proposed construction and to develop engineering recommendations to help guide the geotechnical design and construction aspects of the project. We accomplished these purposes by performing the following scope of services:

1. Reviewing the geotechnical reports from nearby project sites by ECS;
2. Drilling sixteen (16) initial soil borings at the project site to depths of 25 to 30 feet below existing site grades using an auger drill rig in September, 2014;
3. Drilling seventeen (17) supplemental soil borings at the project site to depths of 7½ feet to 20 feet below existing site grades in April, 2015;
4. Performing twelve (12) test pits in the area of the proposed underground stormwater detention to depths ranging between 8 and 9½ feet below existing site grades on November 5, 2014;
5. Performing eight (8) LTF test pits and four (4) CLA test pits at the project site to depths ranging between 3 and 8½ feet below existing site grades on May 12, 2016;
6. Performing three (3) infiltration tests at the subject property;
7. Performing eight (8) in-situ pressuremeter tests at the project site;
8. Performing one (1) site seismic survey (ReMi) at the site;
9. Performing laboratory tests on selected representative soil samples from the borings to evaluate pertinent engineering properties;
10. Analyzing the field and laboratory data to develop appropriate geotechnical engineering recommendations; and,
11. Preparing this geotechnical report of our findings and recommendations.

The conclusions and recommendations contained in this report are based on sixteen (16) initial soil borings (Borings B-1 through B-16), seventeen (17) supplemental soil borings (S-1 through S-17), twelve (12) underground stormwater detention test pits (TP-1 through TP-12), eight (8) LTF test pits (LT-1 through LT-8) and four (4) CLA test pits (DC-1 through DC-4) conducted at the project site under ECS' direction. The borings were drilled to depths of approximately 7½ feet to 30 feet below existing site grades within the footprint of the proposed construction. The subsurface exploration included split-spoon soil sampling, standard penetration tests (SPT) and groundwater level observations in the boreholes. The borings were supplemented by eight (8) in-situ pressuremeter tests. The results of the completed soil borings and pressuremeter testing, along with a Boring and Test Pit Location Diagram, are included in the Appendix of this report.

The borings were located in the field by ECS personnel utilizing GPS and existing site features as reference points. Based on available online resources (i.e. Google Earth®) existing site grades are expected to be in the range of approximately EL. +630 feet to EL. +636 feet (+/-). The elevations shown on the boring logs were interpreted from topographic information provided by Google Earth®. Ground elevations derived from Google Earth® can vary and should not be used in the project design. Existing site grades should be surveyed prior to project design.

# EXPLORATION PROCEDURES

## Subsurface Exploration Procedures

The soil borings and test pits were located in the field by ECS at locations agreed upon by the project team. As required by the State of Illinois, the driller/test pit excavator notified Illinois's One-Call System, JULIE, to verify underground utilities in the vicinity of the proposed borings or test pits prior to drilling/excavating operations.

The soil borings were performed with a truck-mounted rotary-type auger drill rig, which utilized hollow-stem augers to advance the boreholes. Representative soil samples were obtained at 2½-foot intervals to a depth of 10 feet and at 5-foot intervals thereafter to the termination depth of the borings by means of conventional split-barrel sampling procedures. In this procedure, a 2-inch O.D., split-barrel sampler is driven into the soil a distance of 18 inches by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler through a 12-inch interval, after an initial setting of 6 inches, is termed the Standard Penetration Test (SPT) or N-value and is indicated for each sample on the boring logs. The SPT value can be used as a qualitative indication of the in-place relative density of cohesionless soils. In a less reliable way, it also indicates the consistency of cohesive soils.

The drill rig utilized an automatic trip hammer to drive the sampler. Consideration of the effect of the automatic hammer's efficiency was included in the interpretation of subsurface information for the analyses prepared for this report.

The drill crew maintained a field log of the soils encountered in the borings. After recovery, each geotechnical soil sample was removed from the sampler and visually classified. Representative portions of each soil sample were then sealed in jars and delivered to our laboratory in Buffalo Grove, Illinois for further visual examination and laboratory testing. After completion of the drilling operations, the boreholes were backfilled with auger cuttings to the existing ground surface.

## Pressuremeter Testing Program

In addition to the soil boring and test pit scopes of work, an ECS engineer performed eight (8) in-situ pressuremeter tests at boring locations B-2, B-8 and B-10 during the initial subsurface exploration program. The in-situ pressuremeter tests were performed at depths ranging from of about 5 to 20 feet below existing site grades. The results of the pressuremeter tests are included in the Appendix of this report.

In the pressuremeter test, a radially expanding cylindrical probe is inserted into a specially prepared 2.5-inch diameter borehole. After insertion, the probe is expanded incrementally against the side of the hole with a combination of pressurized liquid and gas. Each pressure increment is maintained for one minute. The pressure increments are continued until failure of the soil is reached. The change in diameter of each borehole under each pressure increment is measured by the volume change in the center portion of the probe.

By plotting the probe volume versus pressure, a stress-volumetric strain curve is obtained. From this curve, three parameters are obtained for the computation of the soil bearing value and compression. The first parameter is the creep pressure, $P_f$, which indicates the upper limit of the "pseudo-elastic" zone and indicates the pressure at which movements of the soil particles continue under constant load. The second parameter is the limit pressure, $P_l$, which is defined as the pressure at which the soil reaches failure. A third parameter is the modulus of deformation, $E_d$, which is derived from the slope of the stress-volumetric strain curve in the "pseudo-elastic" zone. The modulus of deformation, $E_d$, is used to estimate settlements of the foundation system elements and other loaded areas.

The main purpose of performing the pressuremeter testing program is to obtain a more accurate measure of deformation modulus, which is used to estimate the settlement characteristics of soils more accurately than in modulus correlations derived from conventional SPT testing.

## Shear Wave Velocity Testing

A Reflection Microtremor (ReMi) survey was performed on the site. The data was processed using SeisOpt® ReMi™ software to reveal a one-dimensional average shear-wave (S-wave) velocity image for the line (array). In addition, the survey also provides the average shear wave velocity to a depth of 100 feet that was used to determine the seismic Site Class. The results of ReMi survey are included in the Appendix of this report.

The data gathering process in the field used standard refraction seismic equipment to measure site characteristics using ambient vibrations (micro tremors) as a seismic source. The equipment used for the survey included a SiesOpt ReMi recording unit capable of storing record lengths up to about 100 seconds and 12 10-Hz vertical P-wave geophones. The analysis presented here was developed from the 12 receivers (10 Hz. Geophones) set along relatively straight-line arrays with evenly spaced intervals between the receivers. Twelve unfiltered 30-second records were recorded along each line. The vibration records collected above were processed using proprietary software and the refraction micro tremor method as explained in Louie, J, N, 2001, “Faster, Better: Shear-wave velocity to 100 meters depth from refraction micrometer arrays”, Bulletin of the Seismological Society of America, v. 91, p.347-364.

## Laboratory Testing Program

Representative soil samples were selected and tested in our laboratory to check field classifications and to help estimate pertinent engineering properties. The laboratory testing program included visual classifications, unconfined compressive strength testing utilizing a calibrated pocket penetrometer and moisture content determinations.

Each soil sample was classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System. The group symbols for each soil type are indicated in parentheses following the soil descriptions on the boring log. A brief explanation of the Unified System is included in the Appendix of this report. The various soil types were grouped into the major zones noted on the boring log. The stratification lines designating the interfaces between earth materials on the boring logs and profiles are approximate; in situ, the transitions may be gradual.

Unconfined compressive strength tests were performed on cohesive soil samples with the use of a calibrated hand penetrometer. In the hand penetrometer test, the unconfined compressive strength of a soil sample is estimated, to a maximum of 4½ tons per square foot (tsf) by measuring the resistance of a soil sample to penetration of a small, calibrated spring-loaded cylinder. The soil samples will be retained in our laboratory for a period of 60 days, after which, they will be discarded unless other instructions are received as to their disposal.

## EXPLORATION RESULTS

### Soil Conditions - All Boring Locations

Sixteen (16) initial soil borings (Borings B-1 through B-16) and seventeen (17) supplemental soil borings (S-1 through S-17) were conducted at the project site under ECS' direction. The borings were drilled to depths ranging from approximately 7½ feet to 30 feet below existing site grades throughout the site. The subsurface conditions encountered at the boring locations performed at the site can be summarized as follows.

Surficial materials were observed to consist of about 8 to 13 inches of topsoil or 2 to 8 inches of bituminous pavement or 6 inches or concrete overlying about 7 to 36 inches of crushed gravel subbase. The surficial soils were observed to be typically underlain by FILL (gravel/debris fill or Silty Clay) and/or Lean/Fat CLAY soils to depths of about 3 to 10½ feet (typically 3 to 5½ feet). The FILL was observed to be underlain by Silty CLAY to the termination depth of the soil borings (i.e., approximately 25 feet to 30 feet below existing site grades). Intermittent seams of Sandy SILT and Fine to Medium SAND were observed at varying depths at boring locations B-1 (sand at 24 feet), B-9 (Sandy SILT at 5½ to 7 feet) and B-13 (Sand from 14½ feet to 20 feet). Based on our observations of the subsurface soil conditions, ECS anticipates most soils to fall within OSHA soil type A or B. For design purposes, ECS recommends the project team consider the soil type B for the purposes of excavation.

The granular FILL soils were observed to exhibit SPT N-values ranging from 12 to 45 blows per foot (bpf) which is indicative of a medium dense to dense relative density for granular soils; however, elevated blow counts may indicate larger debris (brick or concrete fragments) and may not be indicative of the in-situ density for the debris fill. The Silty Clay FILL and/or Lean/Fat Clay with trace organics exhibited unconfined compressive strengths ranging from ¼ tsf to greater than 4½ tsf and moisture contents ranging from 14 to 42 percent. The fatter clays exhibited higher moisture contents and lower unconfined compressive strengths. The natural Silty CLAY soils were observed to exhibit unconfined compressive strength values in the range of ½ tsf to greater than 4½ tsf (medium stiff to hard, but typically very stiff to hard) and moisture contents in the range of about 14 to 25 percent. The natural Fine to Medium SAND and Sandy SILT exhibited SPT N-values ranging from 10 to 18 bpf (loose to medium dense).

### Soil Conditions – Underground Stormwater Detention Test Pits

In general, the surficial materials encountered at the test pit locations were observed to consist of approximately 3 to 6 inches of bituminous concrete material, 12 inches of topsoil and 7 inches of Portland cement concrete. The surficial materials were typically underlain by granular fill materials, which consist of brown and gray crushed Sand and Gravel (similar to IDOT CA-6 Aggregate) and gray crushed Gravel (similar to IDOT CA-1 aggregate), to a depth of approximately 1½ to 4 feet (typically about 2 to 3 feet) below existing grades. The granular fill materials were typically underlain by brown Silty Clay Fill to a depth of approximately 4½ to 6 feet below existing site grades. The thickness of the brown Silty Clay Fill was generally in the range of 1½ to 2 feet. Geotextile fabric was noted to have been placed between layers of granular fill and between granular fill and the underlying brown silty clay fill in several test pit locations.

Beneath the brown Silty Clay Fill, buried black and dark gray organic Silty Clay Fill layer was typically encountered. The black and dark gray organic Silty Clay Fill was typically about 1½ to 2 feet in thickness and was encountered between depths of about 4 and 8 feet below existing site grades. The black and dark gray organic Silty Clay Fill was underlain by soft bluish and greenish brown and gray Silty Clay Fill, which overlain the natural brown and gray Silty Clay. The natural brown and gray Silty Clay was typically encountered at a depth of approximately 8 to 9 feet below existing site grades. Intermediate layers of buried black Clayey Silt Topsoil (TP-8 and TP-9) and Sand and Gravel with Debris (TP-7) were encountered.

The brown Silty Clay Fill typically encountered below the granular fill had moisture contents in the range of 13 to 19 percent. The buried black and dark gray organic Silty Clay had relatively high moisture contents ranging from about 30 to 48 percent. The underlying soft bluish to greenish brown and gray Silty Clay Fill soils (encountered between the buried organic clay and natural brown and gray clay) had moisture contents ranging from about 27 to 41 percent.

## Soil Conditions – LTF and CLA Test Pits

A total of twelve (12) test pits, designated as LT-1 through LT-8 and DC-1 through DC-4 were performed, extending to a depth of approximately 3 to 8½ feet below existing site grades. The Boring Location Plan from the previously submitted report for the project (ECS Project No. 16:10306-C, dated April 28, 2016 and revised to include the new test pit locations), a Test Pit Summary and photograph log from the test pit exploration are enclosed herein. The subsurface conditions encountered at the twelve test pit locations can be summarized as follows.

In general, the surficial materials encountered at the test pit locations were observed to consist of approximately 2 to 7 inches of bituminous material or 6 to 7 inches of concrete (at LT-3 and LT-4). The surficial materials were typically underlain by granular fill materials, which consist of brown and gray crushed Sand and Gravel (similar to IDOT CA-6 Aggregate), gray crushed Gravel (similar to IDOT CA-1 aggregate), and/or Tan Poorly Graded Sand to a depth of approximately 1½ to 4 feet (typically about 3 feet) below existing grades. Geotextile fabric was noted to have been placed below the surface concrete and between granular fill and the underlying Silty Clay fill at a few test pit locations.

Black and bluish gray Silty Clay Fill (with some organics) was encountered below the granular Fill strata at several test pit locations, extending to depths of about 2½ to 7 feet below existing site grades. Brick and Concrete debris was observed in the granular Fill and Black Silty Clay Fill soils at several test pit locations. The granular Fill strata and Black and Bluish Gray Silty Clay Fill were typically observed to be underlain by natural Tan and Light Gray Silty Clay. The natural Silty Clay was typically encountered at depths of approximately 3 to 6½ below existing site grades. Several test pits were terminated prior to encountering natural soils; at these locations (LT-4, LT-5, LT-6, DC-2, DC-3, DC-4), therefore, the natural soils begin at depths greater than 3 to 8 feet below grade.

The Black and Bluish Silty Clay Fill soils had moisture contents ranging from about 18 to 43 percent. The deep stratum of natural Tan and Light Gray Silty Clay had moisture contents in the range of 16 to 37 percent (typically 16 to 21 percent).

It should be noted that bid quantity estimation by "averaging" depths and strata changes from boring logs is not recommended. Too many variations exist for such "averaging" to be valid, particularly in the surficial material thicknesses, soil types and condition, depth and groundwater conditions. A different scope of professional services would be required to obtain subsurface information needed for land purchase considerations and earthwork bid preparation. This scope could include additional borings and possibly test pits. Even with this additional information, contingencies should always be carried in construction budgets or land purchase agreements to cover variations in subsurface conditions.

## Groundwater Observations

Observations for groundwater were made during sampling and upon completion of the drilling operations at the boring locations. In auger drilling operations, water is not introduced into the boreholes, and the groundwater position can often be obtained by observing water flowing into or out of the boreholes. Furthermore, visual observation of the soil samples retrieved during the auger drilling exploration can often be used in evaluating the groundwater conditions.

Groundwater was observed at boring locations S-1, S-2, S-4, S-5, S-7 through S-12, S-17, B-2 through B-10, B-13 and B-16 at depths ranging from 2½ to 17 feet below existing site grades during the drilling operations and ranging from 4 to 12½ feet after auger removal. The shallower groundwater levels are, in our opinion, perched water. Perched water occurs when the downward percolation of water is impeded by soils of lower permeability, such as the sandy soils above the lower permeability Silty CLAY soils. Based on the results of this exploration, the long-term groundwater level may be located at a depth of approximately 12 feet below existing site grades.

The highest groundwater observations are normally encountered in late winter and early spring and our current groundwater observations are not expected to be at the seasonal maximum water table. It should be noted that the groundwater level can vary based on precipitation, evaporation, surface run-off and other factors not immediately apparent at the time of this exploration.

## Seismic Zone

A Reflection Microtremor (ReMi) survey was performed on the site to evaluate the seismic site classification. Based on the results of the ReMi survey, the average shear wave velocity at the project site is estimated to be 1,158 ft/s. The average shear wave velocity profile along the performed array is contained on the ReMi Test Results that are included in the Appendix. Based on the average shear wave velocity data obtained to a depth of 100 feet below the existing ground surface from the refraction microtremor surveys, the soil profile type for the site falls into Seismic Site Class D in accordance with section 1613.5.2 of the 2009 International Building Code (IBC).

## Infiltration Results

ECS performed three infiltration tests at the project site on August 21, 2015 to evaluate the infiltration rate of the on-site soils. The infiltration test consisted of installing a 2-inch-diameter open cylinder to the test depth, filling the cylinder with clean water and then observing the water level drop over time. Water is added to the cylinder as needed to restore the water level. The test was performed at depths of about 2 to 7 feet below grade in Silty Clay soils. The results of the infiltration testing are shown in the table below.

### Table 1: Infiltration Test Results

| Test Location | Hydraulic Conductivity (k), cm/sec |
|---|---|
| I-1 | $4.68 \times 10^{-6}$ |
| I-2 | $3.77 \times 10^{-6}$ |
| I-3 | $1.06 \times 10^{-6}$ |

The hydraulic conductivity value measured is consistent with typically published values for Silty Clay soils. The results obtained at boring I-1 may not be representative of the subsurface conditions. The permeability of site soils will vary based on soil composition, in-place condition, and others. The following table is used as a general guideline for evaluation the site soils.

**Table 2: Hydraulic Conductivity**

| Degree of Permeability | Hydraulic Conductivity (k), cm/sec |
|---|---|
| High | Over $10^{-1}$ |
| Medium | $10^{-1}$ to $10^{-3}$ |
| Low | $10^{-3}$ to $10^{-5}$ |
| Very Low | $10^{-5}$ to $10^{-7}$ |
| Practically Impermeable | Less Than $10^{-7}$ |

Based on the results of the infiltration testing, the tested soils exhibited a very low permeability rate at the site of the existing stormwater features. We recommend the Civil Engineer for the project review the infiltration test results and determine if the infiltration rate of the tested soil is suitable for the anticipated drainage and infiltration requirements at the project site.

# ANALYSIS AND RECOMMENDATIONS

## Overview

The conclusions and recommendations presented in this report should be incorporated in the geotechnical engineering design and construction aspects of the project to help reduce possible soil and/or foundation related problems.

The following sections present specific geotechnical engineering recommendations with regard to the design and construction of the proposed addition. These include recommendations with regard to subgrade preparation and earthwork, fill placement, building foundations, floor slab design, excavation recommendations and pavement design recommendations. Discussion of the factors affecting the building foundations for the proposed construction, as well as additional recommendations regarding the geotechnical engineering design and construction aspects at the project site are included below. We recommend that ECS review the final design and specifications to check that the earthwork and foundation recommendations presented in this report have been properly interpreted and implemented in the design and specifications.

### Existing Slab and Vegetation Removal/Demolition

The bituminous pavement and portions of concrete slab at the project site are proposed be demolished as part of the project. Any remaining below-grade (i.e., slabs, walls, foundations, etc.) should be completely removed and backfilled with compacted engineered fill to the final design site grades. If any remaining basement structure is encountered, the basement should be removed and the basement void should be properly backfilled and compacted to the desired subgrade elevation. It has been our experience that many demolition contractors place the debris in excavations from the structure and cap with soil. These types of activities will not provide a suitable subgrade for foundations, slabs or pavements. The foundation contractor should mobilize appropriate equipment to remove and/or break up existing slabs and other obstructions without delay. All underground utilities to remain should be positively located, properly protected and supported prior to and during excavation and subgrade preparation activities. Underground utilities within the proposed building areas should be relocated or removed and backfilled with engineered fill.

ECS highly recommends that the demolition and backfilling operations at the project site be observed by an experienced ECS geotechnical engineer or his qualified representative retained on your behalf to confirm and document that work is performed in general accordance with the recommendations detailed herein and the backfill materials used are approved materials and adequately placed and compacted.

Site preparation will require removal of the trees and vegetation, particularly in the unpaved northern portions of the property. Significant areas of organic materials, such as tree root systems/root mat, may be present in the vegetated areas.

## Subgrade Preparation and Earthwork Operations - Lifetime Fitness Structure and Pool

Initial site preparation at the project site should consist of the complete removal of the existing bituminous pavement, aggregate subbase, concrete pavement, topsoil, root bulbs/landscaping and other deleterious material observed during construction. We recommend the earthwork clearing be extended a minimum of 10 feet beyond the limits of new structures, where possible. Stripping limits should be extended an additional 1 foot for each foot of fill required at a structure's exterior edge. In addition, existing utilities that conflict with the proposed construction should be relocated and the abandoned utility lines removed or grouted in place. Suitable, clean aggregate subbase can be stockpiled for re-use as engineered fill. Once the surficial materials have been removed, the limits of the building footprint should be excavated to the design subgrade elevation. If existing foundation elements are encountered during initial site preparation, ECS recommends completely removing the foundations and backfilling in accordance with the **Fill Placement** section of this report.

The slab/pavement subgrades should not remain exposed to the elements or construction traffic for a prolonged period of time as the subgrade may be disturbed and/or softened. If the slab/pavement is not planned to be constructed within a few days after exposing the final design subgrade, consideration should be given to leaving the subgrade approximately 1 foot above the final design subgrade to help prevent softening of the design subgrade soils (if feasible).

Based on our observations at the boring locations and the variable soil profile at the project site, we anticipate the soils at the pavement or slab subgrade elevation will typically consist of Silty Clay FILL/Fat Clay trace organics or gravel/debris FILL. ECS typically recommends removing and replacing FILL underneath pavements and slabs. As the FILL and/or Silty Clay FILL/Fat CLAY trace organics was observed to extend to depths ranging from 3 to 10½ feet below existing site grades throughout the project site complete removal and replacement of the existing FILL materials may not be feasible from a cost perspective. As such, we are providing one alternate option for support of the slab and/or pavements.

- Complete Removal and Replacement (Slabs and Pool Vessel/Deck) - The existing FILL materials should be completely removed from slab and pavement areas and replaced with engineered fill. Note that as much as 10½ feet of fill was identified at the boring locations (typically 3 to 5½ feet). This option carries a small amount of risk for poor slab/pavement performance, but carries significant construction costs (low risk). After removal of the undocumented fill soils, we recommend the underlying subgrade be densified to the extent practical prior to placing engineered fill. We strongly recommend this option for the floor slab and pool deck. The contractor should be prepared to dewater (perched water) as necessary to remove the undocumented fill and place engineered fill. ECS does not recommend backfilling the pavement or pool slab with frost susceptible soils. Frost susceptible soils are fine sands or silts, but Silty Clay that was observed throughout most of the site is not considered frost susceptible.

## Subgrade Preparation and Earthwork Operations - CLA Structure

Initial site preparation at the project site should consist of the complete removal of the existing bituminous pavement, aggregate subbase, concrete pavement, topsoil, root bulbs/landscaping and other deleterious material observed during construction. We recommend the earthwork clearing be extended a minimum of 10 feet beyond the limits of new structures, where possible. Stripping limits should be extended an additional 1 foot for each foot of fill required at a structure's exterior edge. In addition, existing utilities that conflict with the proposed construction should be relocated and the abandoned utility lines removed or grouted in place. Suitable, clean aggregate subbase can be stockpiled for re-use as engineered fill. Once the surficial materials have been removed, the limits of the building footprint should be excavated to the design subgrade elevation. If existing foundation elements are encountered during initial site preparation, ECS recommends completely removing the foundations and backfilling in accordance with the **Fill Placement** section of this report.

The slab subgrades should not remain exposed to the elements or construction traffic for a prolonged period of time as the subgrade may be disturbed and/or softened. If the slab is not planned to be constructed within a few days after exposing the final design subgrade, consideration should be given to leaving the subgrade approximately 1 foot above the final design subgrade to help prevent softening of the design subgrade soils (if feasible).

Based on our observations at the boring locations and the variable soil profile at the project site, we anticipate the soils at the slab/playground subgrade elevation will typically consist of Silty Clay FILL/Fat Clay trace organics or gravel/debris FILL. ECS typically recommends removing and replacing FILL underneath pavements and slabs. As the FILL and/or Silty Clay FILL/Fat CLAY trace organics was observed to extend to depths ranging from 3 to 10½ feet below existing site grades throughout the project site complete removal and replacement of the existing FILL materials may not be feasible from a cost perspective. As such, we are providing one option for support of the slab and playground.

- Aggregate Piers - The project team could utilize interstitial aggregate piers extended into the suitable natural soils to improve the existing soils and support the slab-on-grade. Design and installation of the aggregate pier system would be performed by a design-build contractor that specializes in the proprietary aggregate pier technology. This option will also provide minimal risk to future settlement and cracking of the slab; however, will likely carry moderate costs (low risk). Note that if aggregate piers are utilized for foundation support, the additional cost for interstitial piers for slab support is anticipated to be reasonable.

## Subgrade Preparation and Earthwork Operations - Pavements

Initial site preparation for the pavements should consist of the complete removal of the existing bituminous pavement, aggregate subbase, concrete pavement, topsoil, root bulbs/landscaping and other deleterious material observed during construction. We recommend the earthwork clearing be extended a minimum of 5 feet beyond paved areas, where possible. In addition, existing utilities that conflict with the proposed construction should be relocated and the abandoned utility lines removed or grouted in place. Suitable, clean aggregate subbase can be stockpiled for re-use as engineered fill. Once the surficial materials have been removed, the limits of the pavements should be excavated to the design subgrade elevation. If existing foundation elements are encountered during initial site preparation, ECS recommends completely removing the foundations and backfilling in accordance with the **Fill Placement** section of this report.

The pavement subgrades should not remain exposed to the elements or construction traffic for a prolonged period of time as the subgrade may be disturbed and/or softened. If the pavement is not planned to be constructed within a few days after exposing the final design subgrade, consideration should be given to leaving the subgrade approximately 1 foot above the final design subgrade to help prevent softening of the design subgrade soils (if feasible).

Based on our observations at the boring locations and the variable soil profile at the project site, we anticipate the soils at the pavement subgrade elevation will typically consist of Silty Clay FILL/Fat Clay trace organics or gravel/debris FILL. ECS typically recommends removing and replacing FILL underneath pavements and slabs. As the FILL and/or Silty Clay FILL/Fat CLAY trace organics was observed to extend to depths ranging from 3 to 10½ feet below existing site grades throughout the project site complete removal and replacement of the existing FILL materials may not be feasible from a cost perspective. As such, ECS is providing an option for proofroll and selective replacement of underperforming subgrade soils provided the owner is willing to accept some risk of premature pavement distress or elevated maintenance costs.

Once the subgrade has been exposed, the subgrade could be proofrolled using a loaded dump truck having an axle weight of at least 10 tons. The intent of the proofroll is to aid in identifying localized soft or unsuitable material which may be required to be removed. If soft or yielding soils are observed during the proofroll of the subgrade, the soft soils should be undercut up to a maximum of 2½ feet and replace with compacted engineered fill to the design subgrade. This option will only identify near surface soils that are unsuitable for slab support and deeper pockets of unsuitable fill may not be fully identified, which could lead to premature deterioration/cracking of the slab and pavements (high risk).

Exposure to the environment may weaken the subgrade soils if the excavations remain open for too long a period. If the subgrade soils are softened by surface water intrusion or exposure, the softened soils must be removed from the subgrade excavation bottom immediately prior to placement of pavement and/or engineered fill. **Note shallow groundwater (likely perched) was observed during the performance of the soil borings. As water may be encountered if undercuts are required, the contractor should be prepared to dewater. We believe a series of sumps and pumps should be sufficient to drop the groundwater level sufficiently to allow for construction operations. It may be necessary to install sheeting and/or layback slopes. We recommend a dewatering contractor be consulted to assist in evaluating dewatering issues.**

All unsuitable soils removed from the site should be disposed of in accordance with applicable Federal, State and local regulations. We recommend all backfilling operations should be observed on a full-time basis by an ECS field representative to determine that the specified compaction requirements are being met.

Excavations should comply with the requirements of OSHA 29CFR, Part 1926, Subpart P, "Excavations" and its appendices, as well as other applicable codes. This document states that the contractor is solely responsible for the design and construction of stable, temporary excavations. The excavations should not only be in accordance with current OSHA excavation and trench safety standards but also with applicable local, state, and federal regulations. The contractor should shore, slope or bench the excavation sides when appropriate.

If problems are encountered during the earthwork operations, or if site conditions deviate from those encountered during our subsurface exploration, ECS should be notified immediately. We recommend that the project geotechnical engineer or his representative should be on site to monitor stripping and site preparation operations and observe that unsuitable soils have been satisfactorily removed and observe the proofrolling of the subgrades.

## Backfilling Test Pits

We anticipate the Lifetime Fitness structure will include a below-grade pool, but neither the LTF building nor the CLA childcare building will include a basement level. Prior to the construction of the slabs-on-grade and parking areas, we recommend the test pits from the two previously completed test pit explorations (ECS Projects No. 16:10306-B and 16:10306-G) be located, re-excavated and backfilled with engineered fill (placed in accordance with the Fill Placement recommendations presented herein). We understand the invert elevation of the below-grade stormwater detention will be about 8 feet below grade, so most of the loose soils from the detention test pits (TP-1 through TP-12) will likely be removed during the underground detention excavations. The test pits were backfilled by the excavator using nominal compactive effort, and the resulting loose soils may lead to settlement if left uncompacted below the proposed buildings and pavements.

## Below-Grade Obstructions

The onsite contractors should be prepared to encounter below-grade obstructions (typically concrete) during the onsite excavation. Test pit locations LT-5, LT-6 and DC-4 were terminated prematurely due to the presence of below-grade obstructions encountered at depths of about 3 to 4 feet below existing site grades. A concrete pipe was encountered at DC-4; the concrete observed at LT-5 and LT-6 may have been remnants of a previously demolished structure. Similar below-grade obstructions may be present elsewhere onsite.

## Re-Use of Pavement and Concrete as Fill

Our experience with previous projects suggests existing bituminous pavement material and Portland cement concrete slab can be used as fill provided they are crushed/graded to well-graded particles. However based on the information provided by Manhard Consulting during our teleconference call on November 7, 2014, we understand the Village of Northbrook may not allow re-utilization of bituminous pavement at all at the project site. In the event that existing bituminous pavement material and Portland cement concrete can be crushed/graded or recycled on site and considered to be used as new fill, we recommend the existing bituminous pavement material and Portland cement concrete material be crushed/graded to gradation similar to IDOT CA-6. We recommend the crushed/graded bituminous pavement material should be used as a subgrade fill (beneath the pavement section) and not as base material for new pavement sections.

## Fill Placement

All fills should consist of an approved material, free of organic matter and debris, particles greater than 3-inches and have a Liquid Limit and Plasticity Index less than 35 and 15, respectively. Unacceptable fill materials include topsoil and organic materials (OH, OL), high plasticity silts and clays (CH, MH), and low-plasticity silts (ML). Under no circumstances should high plasticity soils be used as fill material in proposed structural areas or close to site slopes.

The existing Silty CLAY, Fine to Medium SAND and Gravel FILL soils appear to be suitable for reuse as backfill material provided they are properly moisture conditioned. Sandy SILT is not recommended as this material is difficult to place and compact and can easily lose strength when wet or disturbed. In addition, Sandy SILT is considered frost susceptible and should not be utilized within 3½ feet of exterior site grades (i.e., pavements or pool). The debris FILL may be utilized as engineered fill provided it is screened to remove large debris (i.e., greater than 3 inches) and organic materials. We also do not recommend utilizing topsoil, FAT clay or silty clay containing trace organics in structural areas. The high moisture content on-site clay soils will require significant effort to manipulate (e.g., disc and dry) to attain near optimum moisture content to achieve compaction. As such, the high moisture content bluish to greenish Silty Clay Fill soils should not be used as new fill beneath structure areas (but can be used in landscape areas and other non-structural applications). We do not recommend using pea gravel or 3-inch stone as these materials have large void spaces which may lead to undesirable settlements and the collection of water.

The purpose of the first test pit exploration (Project No 16:10306-B) was to better evaluate the on-site soils to be removed from the proposed stormwater underground detention for utilization as new fill to balance earthwork within the project site. We understand the bottom of the proposed underground detention is approximately 8 feet below existing site grades. Based on the results of the test pits, in ECS' opinion, the existing crushed sand and gravel fill (similar to CA-6) and brown silty clay fill materials, which were typically encountered to a depth of approximately 4½ to 6 feet can be used as engineered fill on site. The crushed gravel (CA-1) may be used but should be placed in limited thickness (1 to 2 feet, in 1 foot maximum lifts).

**Based on the soil boring and test pit explorations, we anticipate suitable fill material may be found within the upper few feet of soils in the area of soil borings B-1, B-3, B-6, B-7, B-9, B-10, B-11, S-1, S-2, S-4, S-6, S-7, S-13, S-14, S-15, S-16. Please note these boring locations are meant to be used as a general guideline. Soils must be approved onsite by an ECS representative prior to reuse as fill.**

The on-site soils may require moisture content adjustments, such as the application of discing or other drying techniques or spraying of water to the soils prior to their use as compacted fill (termed manipulation). The planning of earthwork operations should recognize and account for increased costs associated with manipulation of the on-site materials considered for reuse as compacted fill.

Fill materials should be placed in lifts not exceeding 8-inches in loose thickness and moisture conditioned to within ±2 percentage points of the optimum moisture content. Soil bridging lifts should not be used, since excessive settlement of overlying structures will likely occur. Controlled fill soils should be compacted to a minimum of 95 percent of the maximum dry density obtained in accordance with ASTM D 1557, modified Proctor method.

The expanded footprint of the proposed building additions and fill areas should be well defined, including the limits of the fill zones at the time of fill placement. Grade control should be maintained throughout the fill placement operations. All fill operations should be observed on a full-time basis by a qualified soil technician to determine that the specified compaction requirements are being met. A minimum of one compaction test per 2,500 square foot area or 50 linear feet of wall should be tested in each lift placed. The elevation and location of the tests should be clearly identified at the time of fill placement.

Compaction equipment suitable to the soil type used as fill should be used to compact the fill material. Theoretically, any equipment type can be used as long as the required density is achieved; however, the standard of practice typically dictates that a vibratory roller be utilized for compaction of granular soils and a sheepsfoot roller be utilized for compaction of cohesive soils. In addition, a steel drum roller is typically most efficient for compacting and sealing the surface soils. All areas receiving fill should be graded to facilitate positive drainage from the work areas and free of water associated with precipitation and surface runoff. Care should be taken when utilizing heavy equipment/vibration next to adjacent structures.

It should be noted that prior to the commencement of fill operations and/or utilization of off-site borrow materials, the Geotechnical Engineer of Record should be provided with representative samples to determine the material's suitability for use in a controlled compacted fill and to develop moisture-density relationships. To expedite the earthwork operations, if off-site borrow materials are required, it is recommended they consist of suitable fill materials in accordance with the recommendations previously outlined in this section. If frost susceptible soils are imported to the project site, the frost susceptible soils should not be placed within 3½ feet of final site grades in unheated areas.

Fill materials should not be placed on frozen soils or frost-heaved soils and/or soils that have been recently subjected to precipitation. All frozen soils should be removed prior to continuation of fill operations. Borrow fill materials, if required, should not contain frozen materials at the time of placement. All frost-heaved soils should be removed prior to placement of controlled, compacted fill, granular subbase materials, and foundation or slab concrete.

## Foundation Recommendations - Lifetime Fitness

### Shallow Foundations

Based on our understanding of the proposed construction and our conversations with the structural engineer, column loads ranging from 400 kips to 600 kips and wall loads up to 10 klf, our observations at the boring locations and the results of the in-situ pressuremeter testing, it is our opinion that the proposed structure can be supported on a shallow foundation system (i.e., wall and column footings) bearing on competent natural Silty CLAY or granular engineered fill/lean concrete overlying competent natural Silty CLAY. Shallow foundations bearing on competent natural silty Clay or compacted granular fill overlying competent natural soils designed for a maximum net allowable soil bearing pressure of 6,000 psf. The net allowable soil bearing pressure refers to that pressure which may be transmitted to the foundation bearing soils in excess of the final minimum surrounding overburden pressure. Competent soils can be identified on the boring logs and in the field as Silty CLAY with unconfined compressive strength values of 2 tsf or greater.

Note that the maximum allowable bearing pressure was determined based on the results of the in-situ pressuremeter testing performed at the project site and **proper interpretation of the**

**field conditions encountered during construction is critical to proper foundation construction and performance. The contractor should be prepared to aggressively dewater the footing excavations as groundwater was encountered at some areas within 2½ feet (likely perched water condition) of existing site grades.** Further, there are several seams of FAT Clay encountered below the fill. It is important that all foundations extend through the FAT clay soils where encountered (typically 5 to 8 feet). Therefore, foundations will need to extend to about 8 feet below grades where FAT Clay is encountered. The geotechnical engineer of record should be retained to observe and approve each foundation bearing level during construction. As part of the foundation construction, ECS should be retained to observe and approve each foundation bearing level. Due to the variable depth of the fill at the site and the FAT clay below the FILL or in some cases below natural Silty Clay, ECS recommends hand auger probes be performed to 3 feet below footing bearing elevation supplemented with in-situ DCP testing to evaluate the bearing soils during construction and confirm the soils are suitable.

If soft to stiff natural soils (i.e., less than 2 tsf), FAT Clays or soils with elevated moisture contents (i.e., greater than 25 percent) are encountered at the proposed bearing elevation, the footings should extend until suitable bearing soils are encountered or the unsuitable soils should be removed beneath the base of the footing and replaced with compacted granular engineered fill or lean concrete. If engineered fill is utilized, the engineered fill should be compacted to a minimum of 95 percent of the maximum dry density in accordance with modified Proctor method, ASTM D 1557. The zone of the engineered fill placed below the foundations should extend 1 foot beyond the outside edges of the footings and from that point, outward laterally 1 foot for every 2 feet of fill thickness below the footing. If lean concrete is utilized to replace weaker/low bearing soils or unsuitable soils, no lateral over-excavation will be necessary, but the excavation should be 1 foot wider than the footing (6 inches on each side), and the lean concrete should be allowed to sufficiently harden prior to placement of the foundation concrete. We recommend that the excavation/backfill of foundations be monitored full-time by an ECS Geotechnical Engineer or his representative to verify that the soil bearing pressure is consistent with the boring log information obtained during the geotechnical exploration.

To help reduce the potential for foundation bearing failure and excessive settlement due to local shear or "punching" action, we recommend that continuous footings have a minimum width of 18 inches and that isolated column footings have a minimum lateral dimension of 30 inches. In addition, footings should be placed at a depth to provide adequate frost cover protection. For this region, we recommend the exterior footings and footings beneath unheated areas be placed at a minimum depth of 3½ feet below finished grade. The basement area and interior footings in heated areas can be placed at a minimum of 2 feet below grade provided that suitable soils are encountered and that the foundations will not be subjected to freezing weather either during or after construction.

Settlement of individual footings, designed in accordance with our recommendations presented in this report, is expected to be within tolerable limits for the proposed buildings. For footings placed on suitable natural soils, lean concrete or properly compacted granular engineered fill, maximum total settlement is expected to be in the range of 1 inch or less. Maximum differential settlement between adjacent columns is expected to be in the range of ½ inch. These settlement values are based on our engineering experience with the soil and the anticipated structural loading, and are to guide the structural engineer with his design.

## Foundation Recommendations - CLA Building

### Rammed Aggregate Pier Foundations

Due to the potential for significant undercuts and the resulting removal and off-site disposal of deleterious material from the project site, ECS recommends an intermediate foundation system consisting of aggregate piers be considered for the CLA Building. Note that the same rammed aggregate pier system could also be utilized for support of the slab.

Rammed aggregate piers (densified aggregate piers) are a ground improvement technique in which a column of soil is replaced with crushed stone that is densified with vibratory or ramming techniques. The footings are then designed for a bearing pressure appropriate for the densified aggregate pier and remaining soil surrounding the pier. The aggregate piers are typically extended through existing fill bearing into natural soils and generally consist of 24-inch to 30-inch minimum diameter drilled excavations. The soil reinforcement occurs as a result of the excavation of soft unsuitable soils and replacement by vibrated or compacted dense granular aggregate. The advantages of this option are: (1) foundation subgrades can stay at a relatively uniform subgrade level without the need for undercutting, as the presence of the piers provides adequate support to the shallow foundation, and (2) the volume of undercut material will be reduced, which will reduce the costs associated with disposing of materials off-site.

The aggregate piers can be utilized under the building footprint to support walls and columns. Our analysis indicates that for the anticipated structural loads and subsurface conditions, an allowable bearing pressure (after aggregate pier installation) in the range of 3,000 to 5,000 psf should be feasible. In addition, the aggregate piers can be utilized under floor slabs to reduce undesirable settlement and future maintenance.

The drilled aggregate pier system should be designed by a design-build contractor and the proposed soil improvement plan should be reviewed by the Geotechnical Engineer of Record (GER) before construction begins. While design of this system would be performed by others, the design could be such that total and differential settlements would be limited to 1 inch and ½ inch, respectively. **The design-build contractor should be made aware of the presence of deleterious materials at the site as well as the groundwater depth and should price his/her design and bid accordingly.** The design-build contractor should also be made aware of changes in site grades required to achieve final site grades and should plan construction sequencing accordingly. The design-build contractor will provide final design and quality assurance, but based on soils at the project site and our experience, the maximum allowable bearing capacity is likely to be in the range of 3,000 to 5,000 psf with piers bearing at a depth of about 10 to 15 below existing grades.

## Floor Slab Design

For the design and construction of the slabs-on-grade, the recommendations provided in the section entitled **Subgrade Preparation and Earthwork Operations** should be followed. The slab thickness can be determined utilizing an assumed modulus of subgrade reaction of 150 pounds per cubic inch (pci) for option 1 and 100 pci for options 2.

We also recommend consideration be given to the floor slab being underlain by a minimum of 5 inches granular material having a maximum aggregate size of ¾ inches and no more than 2 percent soil passing the No. 200 sieve. This granular layer will facilitate the fine grading of the subgrade and help prevent the rise of water through the floor slab. Prior to placing the granular material, the floor subgrade should be free of standing water, mud, and frozen soil. Before the placement of concrete, a vapor barrier should be placed on top of the granular material to provide additional moisture protection. The use of a blotter or cushion layer above the vapor retarder can also be considered for project specific reasons. Please refer to ACI 302.1R04 *Guide for Concrete Floor and Slab Construction* and ASTM E 1643 *Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs* for additional guidance on this issue.

## Underslab Sub-Drainage Design

Based on the groundwater levels observed during the subsurface exploration, we do not anticipate a significant volume of water may persist at the slab-on-grade subgrade elevation. It should be noted however that surface runoff and limited groundwater seepage may accumulate at the slab subgrade such as the perched water condition. As such, we recommend that positive drainage be implemented around the perimeter of the proposed structure to reduce the potential for water accumulation under the floor slab and foundation elements, which could potentially weaken the bearing soils. Finger drains should be placed around the perimeter of the building foundation wall with a free draining aggregate material. ECS also recommends the use of filter fabric to reduce the migration of fine grained material into the free draining granular material.

## Pavement Recommendations

We recommend that the pavement subgrade be prepared in accordance with the **Subgrade Preparation and Earthwork Operations** section of this report. We understand about 155,910 SF of standard duty pavements and about 71,918 SF of heavy duty pavements are anticipated onsite. Once the subgrade has been properly prepared, we recommend the following minimum pavement sections for the proposed development. The flexible pavement sections provided in Table 3 were developed by Loren Braun of American Engineering Testing, Inc. using a CBR of 5 for the subgrade soils.

**Table 3: Pavement Section Recommendations**

| Pavement Material | Compacted Material Thicknesses (Inches) | | | | |
|---|---|---|---|---|---|
| | Flexible Pavement (Light Duty) | Flexible Pavement (Light Duty) With Geogrid | Flexible Pavement (Heavy Duty) | Flexible Pavement (Heavy Duty) With Geogrid | Rigid Pavement |
| **Portland Cement Concrete** | -- | -- | -- | -- | 6 |
| **Bituminous Surface Course** | 1½ | 1½ | 1½ | 1½ | -- |
| **Bituminous Base Course** | 2 | 2 | 2 | 3 | -- |
| **Crushed Granular Subbase (CA- 6)** | 11 | 6 | 12 | 6¼ | 6 |
| **Geogrid** | No | Yes | No | Yes | No |
| **Total Pavement Section Thickness** | 14½ | 9½ | 15½ | 10¾ | 12 |

All pavement materials and construction, with the exception of the Modified Proctor compaction specification, should be in accordance with the Guidelines for AASHTO Pavement Design and the current IDOT Standards for Road and Bridge Construction

The pavement sections specified in the table above are based on the anticipated usage at the project site based on specific traffic patterns / loading of 5 ESALs per day for the light duty section and 15 ESALs per day for the heavy duty section. The table above provides “Light and Heavy Duty” flexible pavement recommendations. The rigid pavement section is being provided for the dumpster areas and other areas of the site where a rigid pavement section may be required.

It should also be noted that the pavement sections specified in the table above were developed for the anticipated in-service traffic conditions only and do not provide an allowance for construction traffic conditions or traffic conditions in excess of typical residential / collector street traffic. Therefore, if pavements will be constructed early during site development to accommodate construction traffic, consideration should be given to the construction of designated haul roads, ECS recommends two options for construction/haul roads and the sections are outlined in Table 2.

**Table 4: Construction Roads**

| Pavement Material | Compacted Material Thicknesses (Inches) | |
|---|---|---|
| | Flexible Pavement (Heavy Duty) | Temporary Haul Road Option |
| **Bituminous Base Course** | 5 | -- |
| **Crushed Granular Subbase (CA- 6)** | 12 | 4 |
| **3-Inch Stone (CA-1)** | - | *12 |
| **Total Pavement Section Thickness** | 17 | 16 |

*ECS recommends adding a layer of filter fabric between the temporary haul road subgrade and the 3-inch stone to reduce the risk of fine grained materials migrating into the void spaces.

The project team should decide on the thickened pavement option or temporary haul road option based on the project schedule and budget. If the project team wants to build the pavement section and run the construction traffic over them, then use the first option. The surface course will still need to be places after cleaning and repair for the final pavement section. The temporary haul road may be a more cost effective option but will require more maintenance throughout the construction activities.

An important consideration with the design and construction of pavements is surface and subsurface drainage. Where standing water develops, either on the pavement surface or within the base course layer, softening of the subgrade and other problems related to the deterioration of the pavement can be expected. Furthermore, good drainage should minimize the possibility of the subgrade materials becoming saturated over a long period of time.

We recommend the granular base course should be compacted to at least 95 percent of the maximum dry density obtained in accordance with ASTM Specification D 1557, modified Proctor method. During asphalt pavement construction, the wearing and leveling course should be compacted to a minimum of 93 percent of the theoretical density value. Prior to placing the granular material, the pavement subgrade soil should be properly compacted, proofrolled, and free of standing water, mud, and frozen soil.

Infiltration and subterranean water are the two sources of water that should be considered in the pavement design for the project. Infiltration is surface water that enters the pavement through the joints, pores, cracks in the pavement and through shoulders and adjacent areas pavements as a result of precipitation. Subterranean water is a source of water from a high water table on the site. The long term groundwater level on the site is estimated to be located at a depth of 12 feet below existing site grades. Therefore for the proposed at grade pavements for the project, infiltration is the most important source of water to be considered. To properly direct stormwater runoff and reduce the risk of water infiltration the pavements, ECS recommends installing finger drains around the perimeter of the parking lot and around catch basing in low areas of the parking lot. The finger drains should consist of free draining granular material wrapped in a filter fabric to reduce the migration of fine grained material into the aggregate drain. The drains should be placed parallel to the grade contours.

Pedestrian Paver/Sidewalk Recommendations

We recommend that the pavement subgrade be prepared in accordance with the **Subgrade Preparation and Earthwork Operations** section of this report. Once the subgrade has been properly prepared, we recommend the pedestrian paver section be constructed as shown in Table 2.

**Table 5: Pedestrian Paver Section Recommendations**

| **Pavement Material** | **Compacted Material Thicknesses (Inches)** |
|---|---|
| | **Rigid Pavement** |
| **Concrete Paver** | 2 3/8 |
| **Crushed Granular Subbase (CA- 6)** | 6* |
| **Total Pavement Section Thickness** | 9 |

- The subbase should include 1 inch of bedding sand to create a flat surface of the placement of the concrete paver section.

## Emergency Vehicle Drive Lane

ECS understands the paved area on the south side of the project site within the ComEd right-of-way is planned to be utilized as an emergency vehicle drive lane. ECS performed five (5) borings in the area of the proposed emergency vehicle drive lane (borings S-13 to S-17). The existing pavement section consists of approximately 3 to 8 inches of bituminous pavement over about 7 to 17 inches of granular subbase. Based on our review of the existing pavement sections encountered during our subsurface exploration, we believe the pavement section including both bituminous pavement and underlying aggregate subbase should be suitable to handle the anticipated emergency vehicle traffic. Please note the existing pavement section appears to be large enough to support emergency vehicles but has not been maintained. ECS recommends an aggressive maintenance program be implemented if the existing pavements are to be reutilized.

## Pavement Maintenance

The parking lot and drive lanes should be reviewed for cracks twice a year, once in the spring and once in the fall. Regular maintenance and occasional repairs should be implemented to keep pavements in a serviceable condition. In addition, to minimize water infiltration to the pavement section and within the base course layer resulting in softening of the subgrade and deterioration of the pavement, we recommend the timely sealing of joints and cracks in the existing pavement using elastomeric caulk.

Sound maintenance programs should help maintain and enhance the performance of pavements and attain the design service life. A preventative maintenance program should be implemented early in the pavement life to be effective. The “standard in the industry” supported by research indicates that preventative maintenance should begin within 2 to 5 years of the placement of pavement. Failure to perform preventative maintenance will reduce the service life of the pavement and increase the costs for both corrective maintenance and full pavement rehabilitation.

## Hydrostatic Uplift- Pool

The proposed pools should be designed to resist uplift pressures due to hydrostatic loading or a sump pit and pump system should be provided to remove any seepage into the granular fill around the pool so that uplift pressures should not develop. If water accumulates in granular backfill zones, seepage into the surrounding native soils should be relatively slow. Uplift pressure would be greatest when the pool is empty and a high water level can exist in the pool area. The pool should be designed to resist a water pressure of 62.4 psf per foot of embedment below potential groundwater levels (should assume the groundwater is approximately 12 feet below existing site grades, but as shallow as 3 feet if a perched water condition develops). The total uplift force could be resisted by the dead weight of the structures and the effective weight of backfill placed over horizontal extensions of the foundations. Skin friction can also be considered to resist buoyancy forces from the water table. A skin friction factor of 0.3 can be utilized for Clay.

## Underslab Sub-Drainage Design- Indoor Pool Facility

If a “drained” condition is utilized, we recommend that the below grade areas for the structure be provided with a perimeter and underslab subdrainage system (i.e., a “drained” basement type condition). The system may consist of perforated, closed-joint drain pipes located around the interior perimeter of the below-grade areas, as close as feasible to the exterior wall and below the finished level. We recommend that the perimeter and underslab drain system for the proposed structure be designed to flow to one permanent sump. We recommend that the permanent sump be designed with individual pump rated at no less than 25 gpm. The contractor should monitor the pumping rate of the construction dewatering system in order to verify that the permanent sump pump has been adequately sized. Smaller or conversely larger pumps may ultimately be needed. Once the plans are further developed, please contact ECS so that we can refine our pumping estimates and recommended pump capacities.

## Excavation Design Recommendations

Depending on the orientation of the proposed pool and their (pool) proximity to the proposed structure (depending on construction sequencing), below-grade construction using conventional excavation techniques (i.e., open-cut and sloped excavation methods) may not be feasible. Excavation support measures may be required for the pool construction excavations. As such, sheet piling, soldier piles and lagging, including braced or tied-back excavation methods may be required. Design of the excavation support system should provide support to surrounding buildings/structures, utilities, pavements, etc., accommodate permanent and transient surcharges including appropriate traffic loads and control ground movements to within tolerable values. We recommend specialty earth retention contractors be consulted for feasibility of the various types of retention systems. If feasible, we recommend laid back slopes for this project. The project team should consider excavating for the pool prior to placing structural elements and foundations in the adjacent structure to reduce the need for excavation supports.

Design of structural elements (if required) for the ground support system should be based on conventional geotechnical and structural engineering practice. The distribution of earth pressures on the retaining structure will depend on the flexibility of the structural elements and the positions of internal bracing, if used. The modified Clough approach is a suitable technique for evaluating system stiffness and off-site movements. To provide suitable protection to adjacent structures, utilities and streets, the typical standard of care in the greater Chicago area requires that excavation support systems be designed to keep ground movement at the crest of the excavation to 2 inches or less. However, due to the presence of adjoining structures, the tolerable ground movement may need to be limited to less than 2 inches. The project structural engineer should determine the final tolerable displacement in consideration of the existing adjoining structures.

The stability of the excavation base must also be evaluated. The temporary ground support system is the responsibility of the excavation contractor and must be designed by a licensed structural engineer who is experienced in the design and construction of earth retaining systems. We recommend appropriate instrumentation be included in the design and construction of earth retention systems to validate the performance of the system. Appropriate ground movement monitoring including survey monuments and inclinometers should be implemented. Adjacent structures should be well documented and photographed before excavation begins and periodically throughout and after excavation.

The Contractor is solely responsible for the design and construction of stable, temporary excavations in accordance with current OSHA excavation and trench safety requirements, and should shore, slope or bench the excavation sides. All excavations should comply with applicable Local, State and Federal regulations. Construction site safety is generally the sole responsibility of the Contractor, who shall also be responsible for the means, methods and sequencing of construction operations.

## Below Grade Walls

Permanent below-grade walls such as the pool walls should be designed to withstand lateral earth pressures and surcharge loads. The lateral earth pressures exerted on the walls will be a function of the stiffness and the rotation of the walls. The rotation of the wall controls the degree to which the internal strength of the soil is mobilized. If rotation or deflection of the walls will be less than that required to mobilize the active earth pressure condition due to stiffness, bracing or other mechanism (as is typical with basement walls and pool walls), the "at-rest" earth pressure condition should be evaluated. For the at-rest earth pressure condition, below grade walls can be designed for a linearly increasing lateral earth pressure of 65 psf per vertical foot of wall. The at-rest earth pressure of 65 psf per vertical foot of wall assumes that the below-grade walls will be in a drained condition (i.e., no hydrostatic forces on the back of the wall). In the event that the walls remain undrained, a linearly increasing lateral earth pressure of 65 psf per vertical foot of wall should be utilized above the long-term groundwater level and 100 psf per vertical foot of wall should be utilized below the long-term groundwater level. Long-term ground water level of about 12 feet below existing site grades can be considered in the design. The wall design should also account for surcharge loads within a 45 degree slope from the base of the wall. For the at-rest earth pressure condition, a lateral earth pressure coefficient of 0.45 should be applied to surcharge loads including loads from adjacent shallow foundations.

The "active" earth pressure condition, which results in the minimum applied earth pressure, results when the rotation of the wall about its base and away from the retained soil is approximately 0.001 times the height of the wall or greater. This is typically the case with cantilever-type walls. If the active earth pressure condition develops, we recommend below grade walls be designed for a linearly increasing lateral earth pressure of 40 psf per vertical foot of wall above the long-term groundwater level and 85 psf/ft below the long-term groundwater level. These active lateral earth pressures assume that granular materials are used for wall backfill. The wall design should also account for surcharge loads within a 45 degree slope from the base of the wall. For the active earth pressure condition, a lateral earth pressure coefficient of 0.33 should be applied to surcharge loads.

Rotation or translation of the wall into the retained soil can develop the "passive" earth pressure condition. The displacement required to mobilize the passive earth pressure condition is very much greater than that to mobilize the active condition. If the passive condition develops, a passive lateral earth pressure of 330 psf per vertical foot of wall above the long-term groundwater level and 140 psf/ft below the long-term groundwater level can be used to design pool walls. The passive resistance within the zone of seasonal volume change (i.e., approximately 3½ feet from the final ground surface) should be neglected.

As previously noted, ECS does not recommend utilizing frost susceptible soils within 3½ feet of exterior site grades. Frost susceptible soils are fine SAND or SILTS. Most of the project site consists of Silty CLAY which is not considered a frost susceptible soil.

### Coefficient of Interface Friction

ECS anticipates the primary component of lateral resistance will be developed by friction along the horizontal interface between the footing concrete and underlying soil. For cast-in place concrete, based on the data obtained from this exploration and in accordance with recommendations presented in Chapter 3 of NAVFAC DM 7.2, Table I, the friction coefficients (f) for cohesive and granular materials are provided below. The conventional shallow building footings are anticipated to bear on compacted granular engineered fill and/or cohesive stiff to hard natural clay soils as recommended herein.

| Coefficients of Friction for Spread Footings* | |
|---|---|
| Concrete Over Cohesive Material (Silty Clay) | f = 0.35 |
| Concrete Over Granular Material (Sand/Gravel) | f = 0.55 |

*These Values do Not Reflect a Factor of Safety

# PROJECT CONSTRUCTION RECOMMENDATIONS

## General Construction Considerations

We recommend that the subgrade preparation, installation of the foundations, and construction of slabs-on-grade be monitored by an ECS geotechnical engineer or his representative. Methods of verification and identification such as proofrolling, hand auger probes with in-situ DCP testing will be necessary to further evaluate the subgrade soils and identify unsuitable soils. The contractor should be prepared to over-excavate slab-on-grade subgrades at isolated locations (as necessary). We recommend that excavations of new foundations be monitored on a full-time basis by an ECS geotechnical engineer or his representative to verify that the soil bearing pressure and the subgrade materials will be suitable for the proposed structure and are consistent with the boring log information obtained during this geotechnical exploration. We would be pleased to provide these services.

All unsuitable materials should be removed and legally disposed off site and replaced with environmentally clean, inorganic fill and free of debris or harmful matter. Unsuitable materials removed from the project site should be disposed of in accordance with all applicable Federal, State, and Local regulations.

The contractor should avoid stockpiling excavated materials immediately adjacent to excavation walls. We recommend that stockpile materials be kept back from the excavation a minimum distance equal to the excavation depth to avoid surcharging the excavation walls. If this is impractical due to space constraints, the excavation walls should be retained with bracing designed for the anticipated surcharge loading. We recommend a dewatering consultant/contractor be consulted regarding dewatering needs and systems

Excavations should comply with the requirements of OSHA 29CFR, Part 1926, Subpart P, "Excavations" and its appendices, as well as other applicable codes. This document states that the contractor is solely responsible for the design and construction of stable, temporary excavations. The excavations should not only be in accordance with current OSHA excavation (soil type B) and trench safety standards but also with applicable Local, State and Federal regulations. The contractor should shore, slope or bench the excavation sides when appropriate. Site safety is the sole responsibility of the contractor, who shall also be responsible for the means, methods and sequencing of construction operations.

## Foundation Subgrade

If soft to stiff natural soils (i.e., less than 2 tsf), FAT Clays or soils with elevated moisture contents (i.e., greater than 25 percent) are encountered at the proposed bearing elevation, the footings should extend until suitable bearing soils are encountered or the unsuitable soils should be removed beneath the base of the footing and replaced with compacted granular engineered fill or lean concrete. If engineered fill is utilized, the engineered fill should be compacted to a minimum of 95 percent of the maximum dry density in accordance with modified Proctor method, ASTM D 1557. The zone of the engineered fill placed below the foundations should extend 1 foot beyond the outside edges of the footings and from that point, outward laterally 1 foot for every 2 feet of fill thickness below the footing. If lean concrete is utilized to replace weaker/low bearing soils or unsuitable soils, no lateral over-excavation will be necessary, but the excavation should be 1 foot wider than the footing (6 inches on each side), and the lean concrete should be allowed to sufficiently harden prior to placement of the foundation concrete. We recommend that the excavation/backfill of foundations be monitored full-time by an ECS Geotechnical Engineer or his representative to verify that the soil bearing pressure is consistent with the boring log information obtained during the geotechnical exploration.

## Construction Dewatering

Based on the groundwater conditions encountered at the project site, we anticipate that dewatering efforts will be required during foundation excavations. The general contractor should be prepared to manage groundwater and dewater to lower groundwater and maintain dry excavation during construction period and prior to the placement of fill and concrete. Foundation excavation dewatering to facilitate foundation construction may require more aggressive measures due to the groundwater table level. Provided excavations do not extend generally below about 5 feet, we believe a series of conventional sumps and pumps should be adequate to maintain a dry excavation. It may take some time for the pumps to remove the perched water, but once removed, maintaining the dry excavation should be feasible with a series of sumps. Adequate surface drainage should be provided at the site to minimize increases in moisture contents of the subgrade soils and reduce construction access problems. We also recommend caution with regard to excessive dewatering, as migration of fines could lead to ground movements nearby and potential for damage to adjacent structures supported on shallow foundations.

Exposure to the environment may weaken the soils at the subgrade elevation if excavations remain open for too long a period. If the bearing soils are softened by surface water intrusion or exposure, the softened soils must be removed from the excavation bottom immediately prior to the placement of concrete and/or engineered fill.

## Special Qualifications

The in-situ pressuremeter tests used in the evaluation of this site are a specialized geotechnical tool which requires special experience to accurately analyze the test data. Therefore, we can take no responsibility for the misinterpretation of our analysis by others unfamiliar with pressuremeter engineering or its applications, or for inspections performed by others. Because of this, we recommend that ECS Midwest, LLC observe the foundation excavations and bearing subgrade for all foundations and slabs.

## Closing

This report has been prepared to aid in the evaluation of this property and to assist the architect and/or engineer in the design of this project. The scope is limited to the specific project and locations described herein and our description of the project represents our understanding of the significant aspects relative to soil and foundation characteristics. In the event that any change in the nature or location of the proposed construction outlined in this report are planned, we should be informed so that the changes can be reviewed and the conclusions of this report modified or approved in writing by the geotechnical engineer. It is recommended that all construction operations dealing with earthwork, slab-on-grade and foundations be reviewed by an experienced geotechnical engineer to provide information on which to base a decision as to whether the design requirements are fulfilled in the actual construction. If you wish, we would welcome the opportunity to provide field construction services for you during construction.

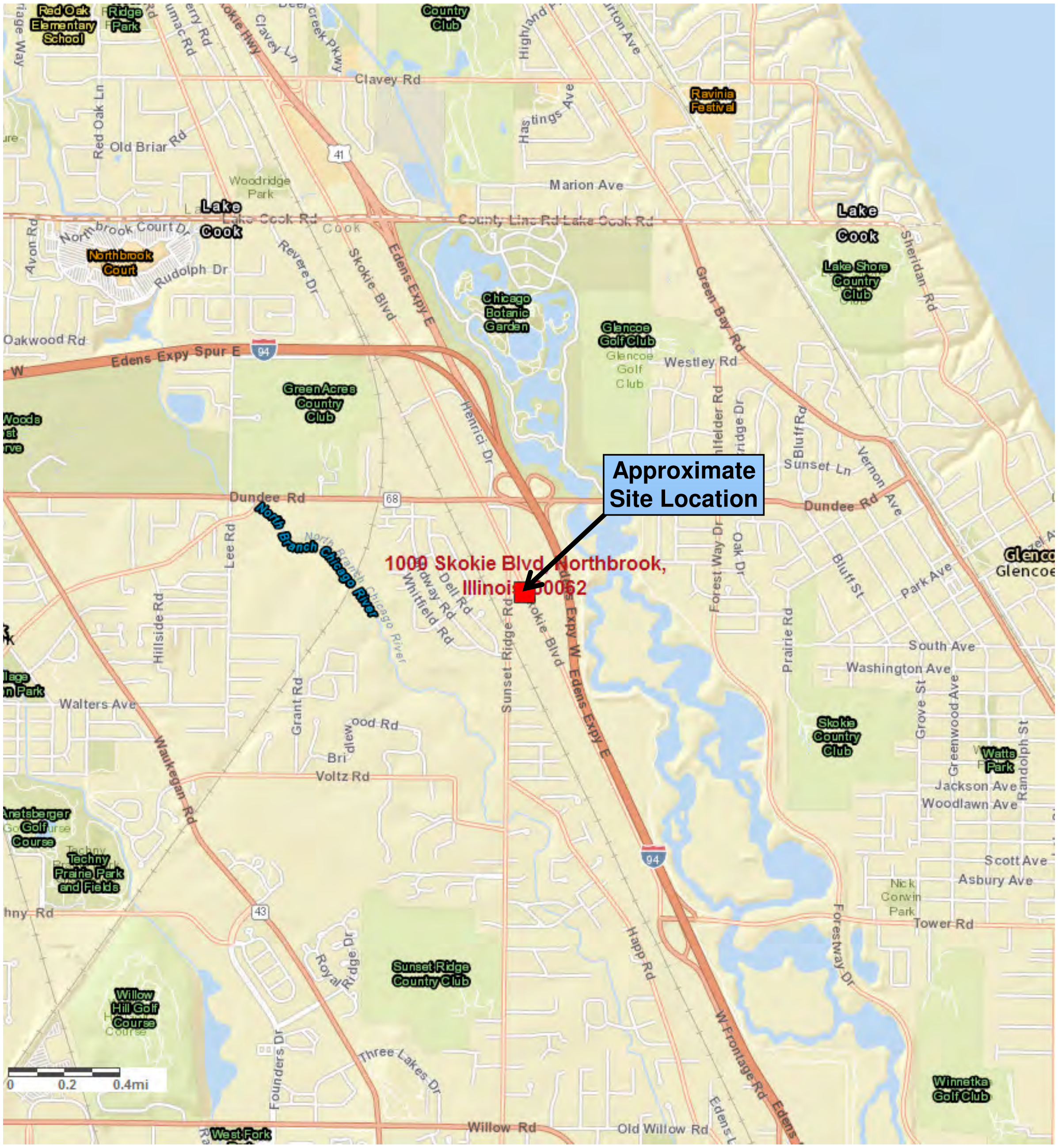
The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings and tests performed at the locations as indicated on the Boring and Test Pit Location Diagram and other information referenced in this report. This report does not reflect variations, which may occur between the borings. In the performance of the subsurface exploration, specific information is obtained at specific locations at specific times. However, it is a well known fact that variations in soil conditions exist on most sites between boring locations and also such situations as groundwater levels vary from time to time. The nature and extent of variations may not become evident until the course of construction. If variations then appear evident, after performing on-site observations during the construction period and noting characteristics and variations, a reevaluation of the recommendations for this report will be necessary.

In addition to geotechnical engineering services, ECS Midwest, LLC has the in-house capability to perform multiple additional services as this project moves forward. These services include the following:

- Environmental Consulting;
- Project Drawing and Specification Review; and,
- Construction Material Testing / Special Inspections

We would be pleased to provide these services for you. If you have questions with regard to this information or need further assistance during the design and construction of the project please feel free to contact us.

# APPENDIX



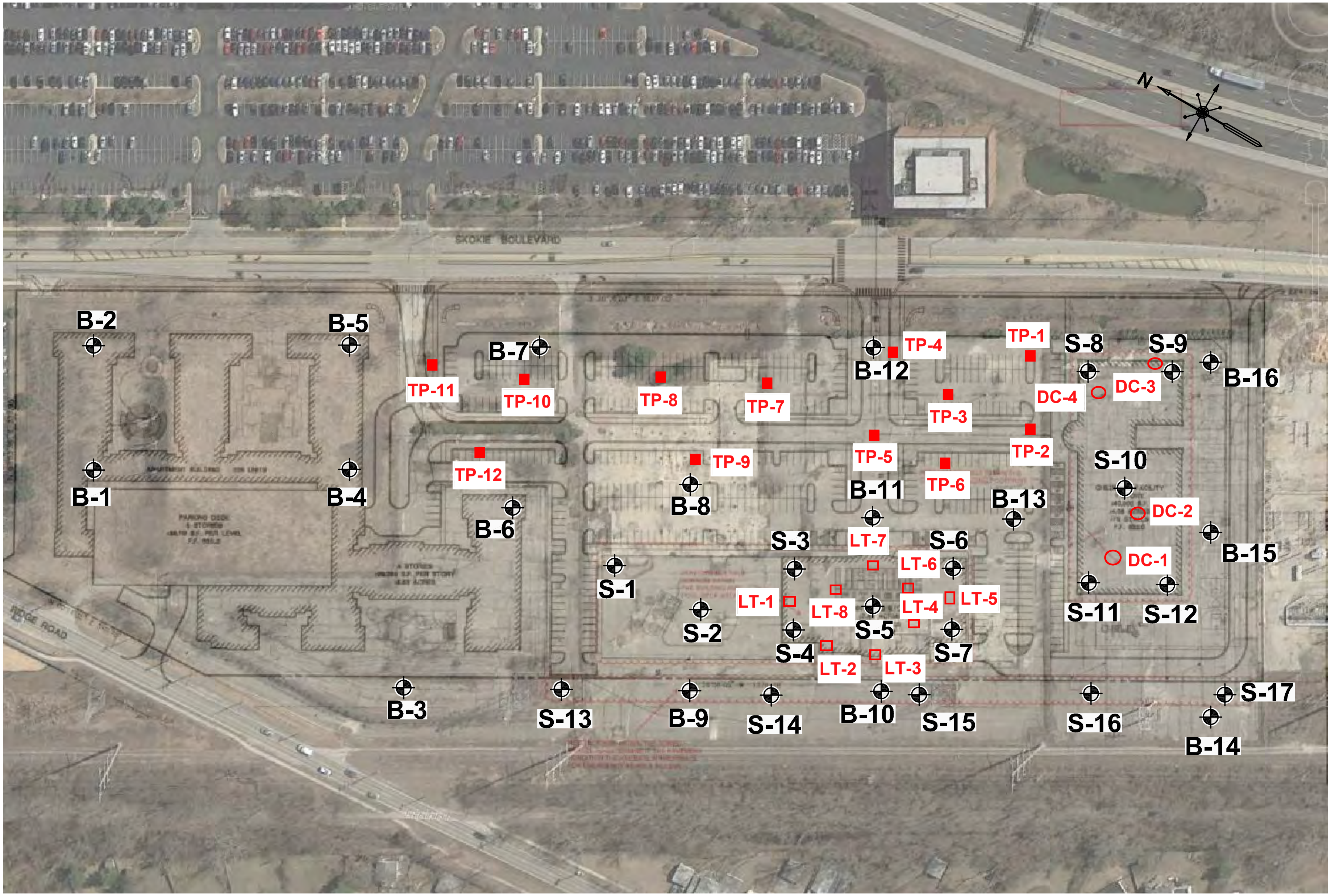
Approximate Site Location

1000 Skokie Blvd Northbrook, Illinois 60062

**GENERAL LOCATION PLAN**

N

**ECS PROJECT NO. 16:10306-A**
**NORTHBROOK FITNESS DEVELOPMENT**
**1000 SKOKIE BOULEVARD**
**NORTHBROOK, ILLINOIS**



■ Approx. Underground Detention Test Pit Location
○ Approximate CLA Test Pit Location
☐ Approximate LTF Test Pit Location

# BORING LOCATION PLAN

Lifetime Fitness Supplemental Test Pits

Lifetime

| | |
|---|---|
| ENGINEER<br>MTB | SCALE<br>NTS |
| DRAFTING<br>LGM | PROJECT NO.<br>10306-G |
| REVISIONS | SHEET<br>FIGURE 2 |
| | DATE<br>5/24/16 |

CLIENT: Braun Intertec Corporation
JOB #: 10306-A
BORING #: B-1
SHEET: 1 OF 1
PROJECT NAME: Northbrook Fitness Development
ARCHITECT-ENGINEER:
SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois
NORTHING:
EASTING:
STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING ➤ LOSS OF CIRCULATION
SURFACE ELEVATION 635

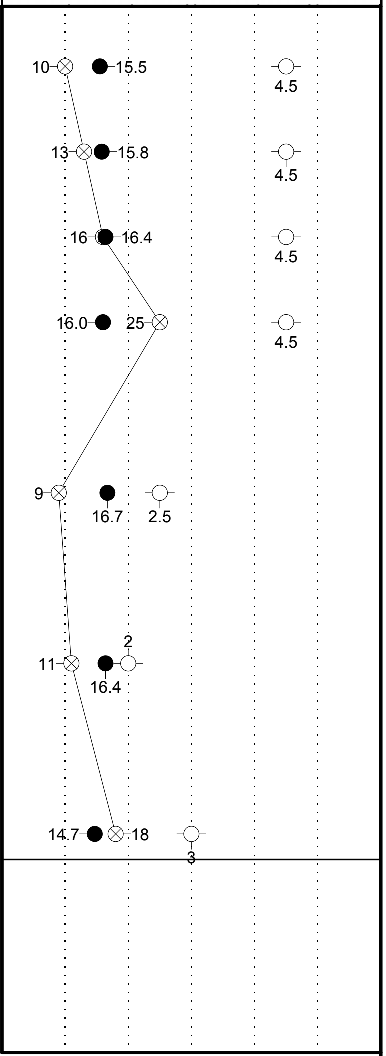
| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | (CL/ML FILL) SILTY CLAY, Trace Sand,Trace Gravel, Brown and Black, Moist, Hard | | 635 | |
| | S-1 | SS | 18 | 18 | | | | 3<br>5<br>5 |
| | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 12 Feet, Moist, Hard to Very Stiff | | | 5<br>6<br>7 |
| 5 | | | | | | | 630 | |
| | S-3 | SS | 18 | 18 | | | | 6<br>7<br>9 |
| | S-4 | SS | 18 | 18 | | | | 7<br>11<br>14 |
| 10 | | | | | | | 625 | |
| | S-5 | SS | 18 | 18 | | | | 3<br>5<br>4 |
| 15 | | | | | | | 620 | |
| | S-6 | SS | 18 | 18 | | | | 4<br>4<br>7 |
| 20 | | | | | | | 615 | |
| | S-7 | SS | 18 | 18 | (SP) FINE TO MEDIUM SAND, Gray, Moist, Medium Dense | | | 6<br>8<br>10 |
| 25 | | | | | END OF BORING @ 25' | | 610 | |
| 30 | | | | | | | 605 | |

-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% ✕ — WATER CONTENT% ● — LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL WS ☐ WD ☐
BORING STARTED 09/25/14
WL(BCR) WL(ACR)
BORING COMPLETED 09/25/14
CAVE IN DEPTH
WL
RIG CME-45
FOREMAN S. Euker
DRILLING METHOD CFA

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Braun Intertec Corporation | 10306-A | B-2 | 1 OF 1 |

PROJECT NAME: Northbrook Fitness Development

ARCHITECT-ENGINEER:

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING:

EASTING:

STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 633

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Topsoil Depth [13"] | | | |
| | S-1 | SS | 18 | 16 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Light Brown, Moist, Very Stiff | | | 4<br>4<br>5 |
| | | | | | | | 630 | |
| | S-2 | SS | 18 | 14 | (CL/CH) LEAN TO FAT CLAY, Trace Sand, Trace Gravel, Light Brown and Gray, Moist, Medium Stiff to Stiff | | | 1<br>1<br>2 |
| 5 | | | | | | ▽ | | |
| | S-3 | SS | 18 | 16 | | | | 1<br>1<br>2 |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray, Moist, Hard to Stiff | | 625 | |
| | S-4 | SS | 18 | 18 | | | | 6<br>9<br>12 |
| 10 | | | | | | | | |
| | | | | | | ▼ | 620 | |
| | S-5 | SS | 18 | 18 | | | | 4<br>6<br>7 |
| 15 | | | | | | | | |
| | | | | | | | 615 | |
| | S-6 | SS | 18 | 18 | | | | 4<br>5<br>7 |
| 20 | | | | | | | | |
| | | | | | | | 610 | |
| | S-7 | SS | 18 | 18 | | | | 5<br>7<br>8 |
| 25 | | | | | END OF BORING @ 25' | | | |
| | | | | | | | 605 | |
| 30 | | | | | | | | |

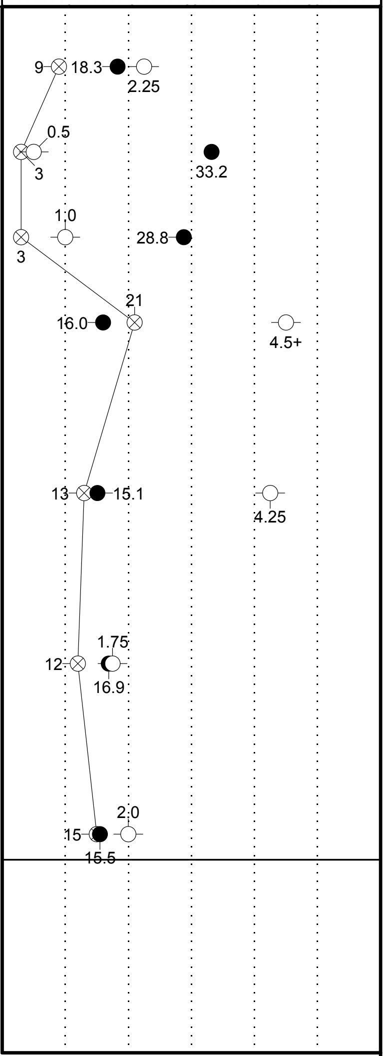
-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY

RQD% – — –   REC% ———

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

⊗ STANDARD PENETRATION BLOWS/FT



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 5.00 WS☐ WD☐ | BORING STARTED 09/25/14 | |
| ▽ WL(BCR) ▼ WL(ACR) 12.50 | BORING COMPLETED 09/25/14 | CAVE IN DEPTH |
| ▽ WL | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

CLIENT
Braun Intertec Corporation

JOB #
10306-A

BORING #
B-3

SHEET
1 OF 1

PROJECT NAME
Northbrook Fitness Development

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

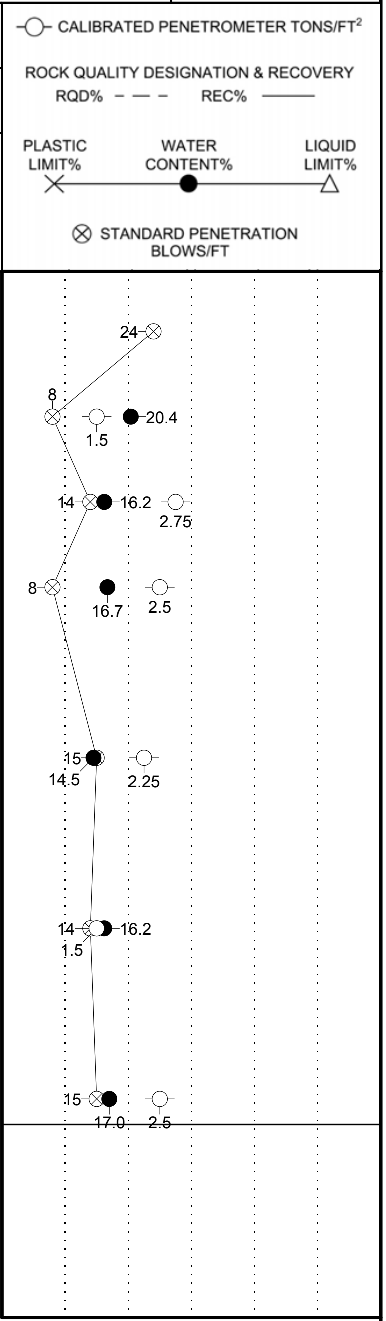
STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION 636

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [4"], Gravel Depth [21"] | | 635 | |
| | S-1 | SS | 18 | 18 | | | | 16<br>13<br>11 |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 8 Feet, Moist, Stiff to Very Stiff | ▽ | | |
| | S-2 | SS | 18 | 18 | | | | 3<br>4<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | 630 | 5<br>6<br>8 |
| | S-4 | SS | 18 | 18 | | | | 3<br>4<br>4 |
| 10 | | | | | | | 625 | |
| | | | | | | ▼ | | |
| | S-5 | SS | 18 | 18 | | | | 4<br>7<br>8 |
| 15 | | | | | | | 620 | |
| | S-6 | SS | 18 | 18 | | | | 4<br>6<br>8 |
| 20 | | | | | | | 615 | |
| | S-7 | SS | 18 | 18 | | | | 4<br>7<br>8 |
| 25 | | | | | END OF BORING @ 25' | | 610 | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | | |
|---|---|---|---|
| ▽ WL 2.5 | WS ☐ WD ☐ | BORING STARTED 09/25/14 | |
| ▽ WL(BCR) | ▼ WL(ACR) 12.5 | BORING COMPLETED 09/25/14 | CAVE IN DEPTH |
| ▽ WL | | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Braun Intertec Corporation | 10306-A | B-4 | 1 OF 1 |

PROJECT NAME: Northbrook Fitness Development

ARCHITECT-ENGINEER:

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING: EASTING: STATION:

-○- CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY

RQD% - — - REC% ———

PLASTIC LIMIT% × WATER CONTENT% ● LIQUID LIMIT% △

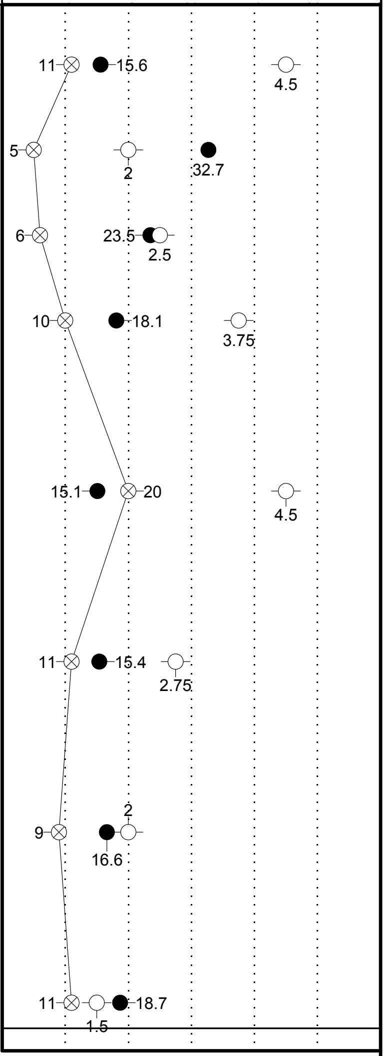
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION 635

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Topsoil Depth [8"] | | 635 | |
| | S-1 | SS | 18 | 18 | (CL/ML FILL) SILTY CLAY, Trace Sand,Trace Gravel, Brown, Moist, Hard | | | 6<br>6<br>5 |
| 5 | S-2 | SS | 18 | 18 | (CL/ML FILL) SILTY CLAY, Trace Sand,Trace Gravel, Contains Organics, Black and Brown, Moist, Very Stiff | | 630 | 2<br>2<br>3 |
| | S-3 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 14 Feet, Moist, Hard to Stiff | | | 2<br>3<br>3 |
| 10 | S-4 | SS | 18 | 18 | | | 625 | 3<br>4<br>6 |
| 15 | S-5 | SS | 18 | 18 | | ▼<br>▽ | 620 | 8<br>9<br>11 |
| 20 | S-6 | SS | 18 | 18 | | | 615 | 3<br>5<br>6 |
| 25 | S-7 | SS | 18 | 18 | | | 610 | 2<br>4<br>5 |
| 30 | S-8 | SS | 18 | 18 | END OF BORING @ 30' | | 605 | 3<br>5<br>6 |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | | |
|---|---|---|---|
| ▽ WL 17 | WS ☐ WD ☐ | BORING STARTED 09/25/14 | |
| ▽ WL(BCR) | ▼ WL(ACR) 15.5 | BORING COMPLETED 09/25/14 | CAVE IN DEPTH |
| ▽ WL | | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Braun Intertec Corporation | 10306-A | B-5 | 1 OF 1 |

PROJECT NAME
Northbrook Fitness Development

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING
EASTING
STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

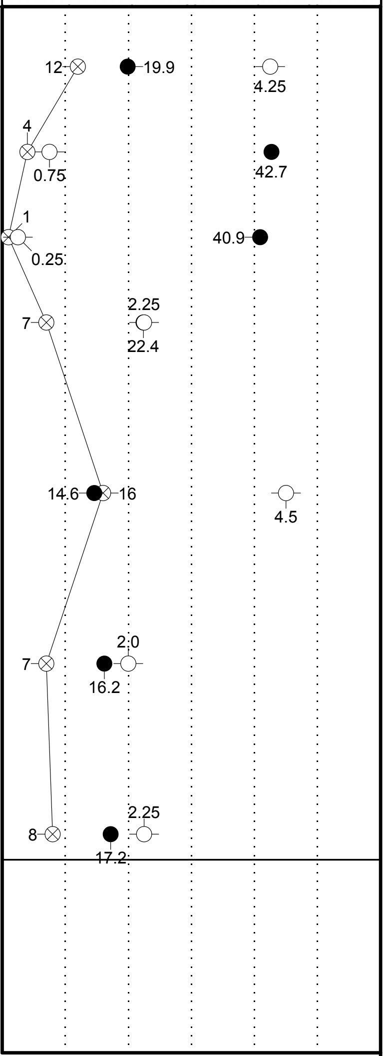
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING — LOSS OF CIRCULATION
SURFACE ELEVATION 633

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Topsoil Depth [12"] | | | |
| | S-1 | SS | 18 | 14 | (CL/ML FILL) SILTY CLAY, Trace Sand,Trace Gravel, Contains Organics, Brown and Black, Moist, Hard to Soft | | | 5<br>5<br>7 |
| | | | | | | | 630 | |
| | S-2 | SS | 18 | 14 | | | | 2<br>2<br>2 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | WOH<br>1<br>1 |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 12 Feet, Moist, Very Stiff to Hard | | 625 | |
| | S-4 | SS | 18 | 18 | | | | 2<br>3<br>4 |
| 10 | | | | | | | | |
| | | | | | | ▽ | 620 | |
| | S-5 | SS | 18 | 18 | | | | 5<br>7<br>9 |
| 15 | | | | | | | | |
| | | | | | | ▼ | 615 | |
| | S-6 | SS | 18 | 18 | | | | 3<br>3<br>4 |
| 20 | | | | | | | | |
| | | | | | | | 610 | |
| | S-7 | SS | 18 | 18 | | | | 2<br>3<br>5 |
| 25 | | | | | END OF BORING @ 25' | | | |
| | | | | | | | 605 | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 12.5 WS ☐ WD ☐ | BORING STARTED 09/25/14 | |
| ▽ WL(BCR) ▼ WL(ACR) 17.5 | BORING COMPLETED 09/25/14 | CAVE IN DEPTH |
| ▽ WL | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Braun Intertec Corporation | 10306-A | B-6 | 1 OF 1 |

PROJECT NAME: Northbrook Fitness Development

ARCHITECT-ENGINEER

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 634

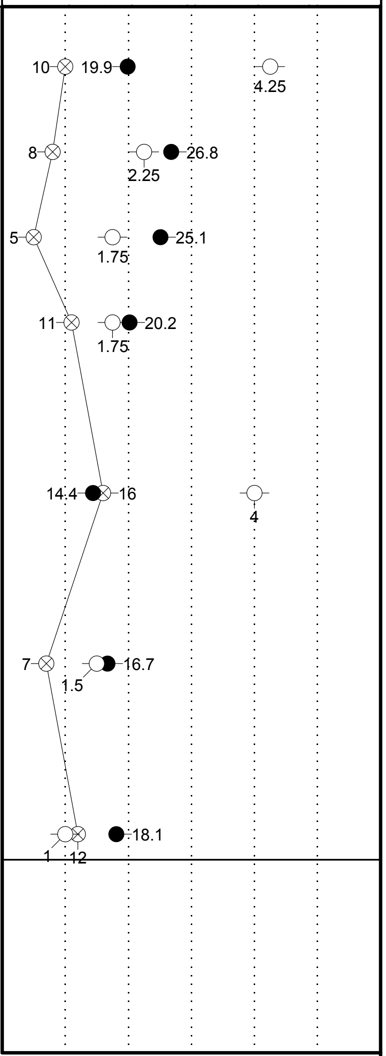
| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [25"] | | | |
| | S-1 | SS | 18 | 18 | | | | 10<br>5<br>5 |
| | | | | | (CL/ML FILL) SILTY CLAY, Trace Sand,Trace Gravel, Contains Organics, Black and Dark Gray, Moist, Hard to Very Stiff | | | |
| | S-2 | SS | 18 | 18 | | | 630 | 3<br>4<br>4 |
| 5 | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 12 Feet, Moist, Stiff to Hard | | | |
| | S-3 | SS | 18 | 18 | | | | 1<br>2<br>3 |
| | S-4 | SS | 18 | 18 | | | 625 | 4<br>5<br>6 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | 620 | 6<br>8<br>8 |
| 15 | | | | | | | | |
| | | | | | | ▽ | | |
| | | | | | | ▼ | | |
| | S-6 | SS | 18 | 18 | | | 615 | 3<br>3<br>4 |
| 20 | | | | | | | | |
| | S-7 | SS | 18 | 18 | | | 610 | 5<br>6<br>6 |
| 25 | | | | | END OF BORING @ 25' | | | |
| | | | | | | | 605 | |
| 30 | | | | | | | | |

-○- CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – – – REC% ———

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

⊗ STANDARD PENETRATION BLOWS/FT



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | | |
|---|---|---|---|
| ▽ WL 17   WS ☐   WD ☐ | BORING STARTED | 09/24/14 | |
| ▽ WL(BCR)   ▼ WL(ACR) 18.5 | BORING COMPLETED | 09/25/14 | CAVE IN DEPTH |
| ▽ WL | RIG CME-45 | FOREMAN S. Euker | DRILLING METHOD CFA |

| | | | |
|---|---|---|---|
| CLIENT<br>Braun Intertec Corporation | JOB #<br>10306-A | BORING #<br>B-7 | SHEET<br>1 OF 1 |
| PROJECT NAME<br>Northbrook Fitness Development | ARCHITECT-ENGINEER | | |
| SITE LOCATION<br>1102 Skokie Boulevard, Northbrook, Illinois | | | |
| NORTHING | EASTING | STATION | |

-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — -   REC% ———

PLASTIC LIMIT% ✕   WATER CONTENT% ●   LIQUID LIMIT% △

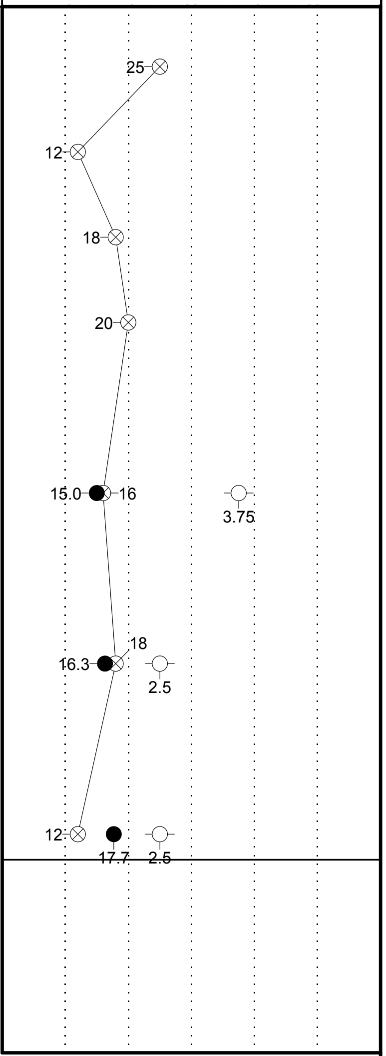
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤   LOSS OF CIRCULATION

SURFACE ELEVATION 633

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [5"], Gravel Depth [7"] | | | |
| | S-1 | SS | 18 | 16 | (GP FILL) GRAVEL WITH SAND, Light Brown, Moist, Medium Dense | | | 13<br>11<br>14 |
| | | | | | | | 630 | |
| | S-2 | SS | 18 | 18 | | ▼ | | 7<br>7<br>5 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 16 | | | | 7<br>10<br>8 |
| | | | | | | | 625 | |
| | S-4 | SS | 18 | 8 | | | | 7<br>10<br>10 |
| 10 | | | | | | | | |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 10½ Feet, Moist, Very Stiff | | | |
| | | | | | | | 620 | |
| | S-5 | SS | 18 | 18 | | | | 7<br>6<br>10 |
| 15 | | | | | | | | |
| | | | | | | | 615 | |
| | S-6 | SS | 18 | 18 | | | | 6<br>8<br>10 |
| 20 | | | | | | | | |
| | | | | | | | 610 | |
| | S-7 | SS | 18 | 0 | | | | 4<br>5<br>7 |
| 25 | | | | | END OF BORING @ 25' | | | |
| | | | | | | | 605 | |
| 30 | | | | | | | | |



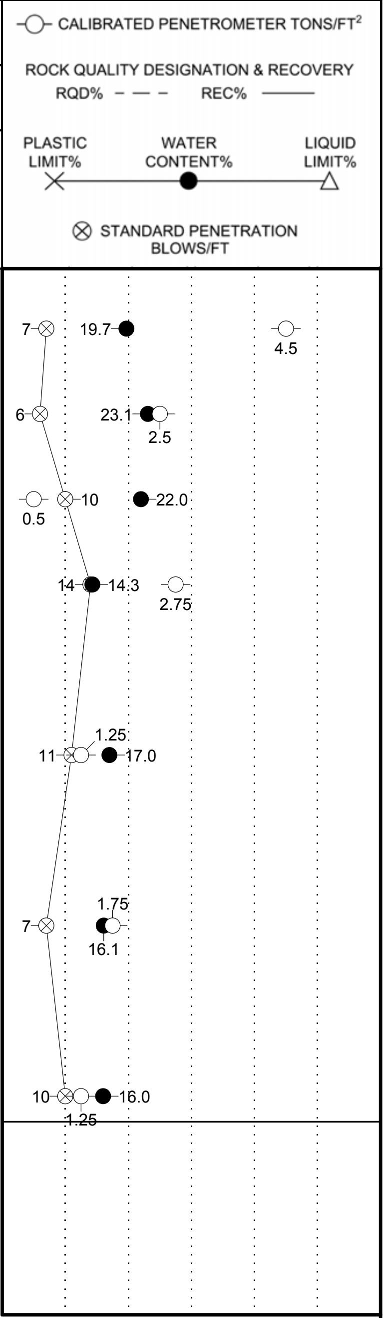
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 4.5   WS ☐   WD ☐ | BORING STARTED 09/25/14 | |
| WL(BCR)   WL(ACR) 4.5 | BORING COMPLETED 09/25/14 | CAVE IN DEPTH @ 5' |
| WL | RIG CME-45   FOREMAN S. Euker | DRILLING METHOD CFA |

CLIENT Braun Intertec Corporation
JOB # 10306-A
BORING # B-9
SHEET 1 OF 1
PROJECT NAME Northbrook Fitness Development
ARCHITECT-ENGINEER
SITE LOCATION 1102 Skokie Boulevard, Northbrook, Illinois
NORTHING
EASTING
STATION

DESCRIPTION OF MATERIAL ENGLISH UNITS
BOTTOM OF CASING ➤ LOSS OF CIRCULATION
SURFACE ELEVATION 635

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [4"], Gravel Depth [21"] | | 635 | |
| | S-1 | SS | 18 | 18 | | | | 4<br>4<br>3 |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown, Moist, Hard | | | |
| | S-2 | SS | 18 | 18 | | | | 2<br>3<br>3 |
| 5 | | | | | | | 630 | |
| | | | | | (ML/SM) SANDY SILT/SILTY SAND, Yellowish Brown, Moist, Loose | | | |
| | S-3 | SS | 18 | 18 | | | | 4<br>5<br>5 |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 12 Feet, Moist, Medium Stiff to Very Stiff | | | |
| | S-4 | SS | 18 | 18 | | | | 4<br>6<br>8 |
| 10 | | | | | | | 625 | |
| | | | | | | ▼ | | |
| | S-5 | SS | 18 | 18 | | | | 3<br>5<br>6 |
| 15 | | | | | | | 620 | |
| | S-6 | SS | 18 | 18 | | | | 3<br>3<br>4 |
| 20 | | | | | | | 615 | |
| | S-7 | SS | 18 | 18 | | | | 4<br>5<br>5 |
| 25 | | | | | END OF BORING @ 25' | | 610 | |
| 30 | | | | | | | 605 | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 12.5 WS ☐ WD ☐ | BORING STARTED 09/24/14 | |
| WL(BCR) WL(ACR) 12.5 | BORING COMPLETED 09/24/14 | CAVE IN DEPTH @ 19.5' |
| WL | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Braun Intertec Corporation | 10306-A | B-10 | 1 OF 1 |

PROJECT NAME: Northbrook Fitness Development

ARCHITECT-ENGINEER:

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING:

EASTING:

STATION:

-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% - — -   REC% ———

PLASTIC LIMIT% ✕ — WATER CONTENT% ● — LIQUID LIMIT% △

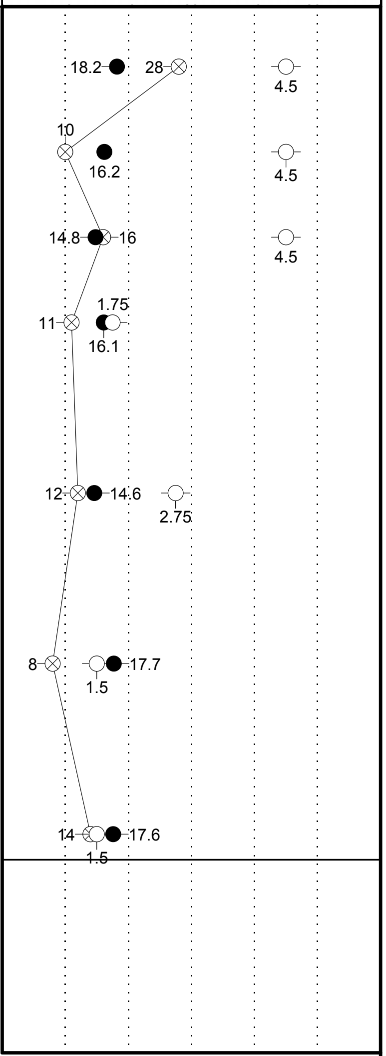
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 634

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [6"], Gravel Depth [19"] | | | |
| | S-1 | SS | 18 | 16 | | | | 11<br>17<br>11 |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 8 Feet, Moist, Hard to Stiff | | | |
| | S-2 | SS | 18 | 18 | | | 630 | 4<br>5<br>5 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 3<br>7<br>9 |
| | | | | | | ▽ | | |
| | S-4 | SS | 18 | 18 | | | 625 | 5<br>4<br>7 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | 620 | 5<br>6<br>6 |
| 15 | | | | | | | | |
| | S-6 | SS | 18 | 18 | | | 615 | 3<br>4<br>4 |
| 20 | | | | | | | | |
| | S-7 | SS | 18 | 18 | | | 610 | 4<br>7<br>7 |
| 25 | | | | | END OF BORING @ 25' | | | |
| | | | | | | | 605 | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 8 WS ☐ WD ☐ | BORING STARTED 09/24/14 | |
| ▽ WL(BCR) ▼ WL(ACR) | BORING COMPLETED 09/24/14 | CAVE IN DEPTH |
| ▽ WL | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Braun Intertec Corporation | 10306-A | B-11 | 1 OF 1 |

PROJECT NAME: Northbrook Fitness Development

ARCHITECT-ENGINEER:

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

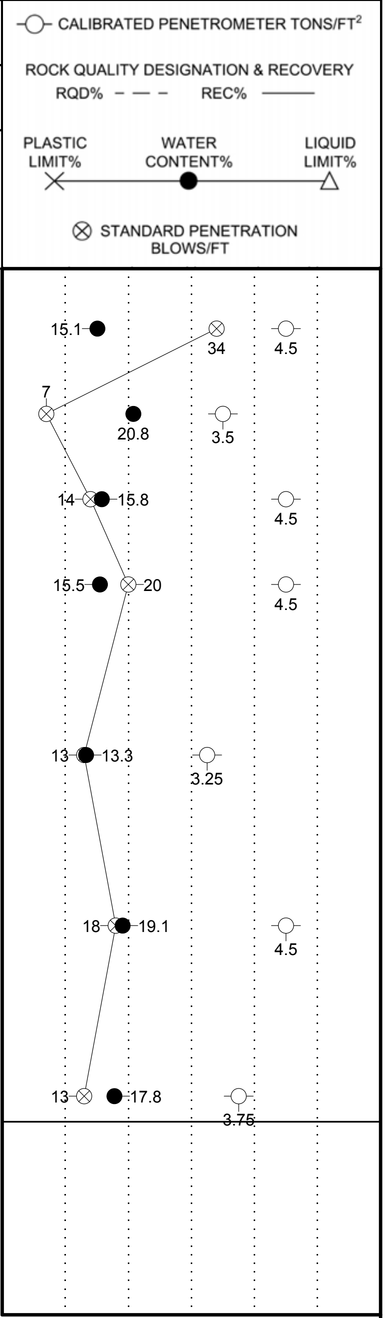
NORTHING: EASTING: STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 633

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [4"], Gravel Depth [24"] | | | |
| | S-1 | SS | 18 | 18 | | | | 45<br>25<br>9 |
| | | | | | (CL/ML FILL) SILTY CLAY WITH SAND, Trace Gravel, Black, Moist, Hard | | 630 | |
| | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 12 Feet, Moist, Very Stiff to Hard | | | 2<br>3<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 5<br>7<br>7 |
| | | | | | | | 625 | |
| | S-4 | SS | 18 | 18 | | | | 7<br>8<br>12 |
| 10 | | | | | | | | |
| | | | | | | | 620 | |
| | S-5 | SS | 18 | 18 | | | | 4<br>6<br>7 |
| 15 | | | | | | | | |
| | | | | | | | 615 | |
| | S-6 | SS | 18 | 18 | | | | 8<br>9<br>9 |
| 20 | | | | | | | | |
| | | | | | | | 610 | |
| | S-7 | SS | 18 | 18 | | | | 4<br>5<br>8 |
| 25 | | | | | END OF BORING @ 25' | | | |
| | | | | | | | 605 | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | | |
|---|---|---|---|
| WL | WS ☐ WD ☐ | BORING STARTED 09/24/14 | |
| WL(BCR) | WL(ACR) | BORING COMPLETED 09/24/14 | CAVE IN DEPTH |
| WL | | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Braun Intertec Corporation | 10306-A | B-13 | 1 OF 1 |

PROJECT NAME Northbrook Fitness Development

ARCHITECT-ENGINEER

SITE LOCATION 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

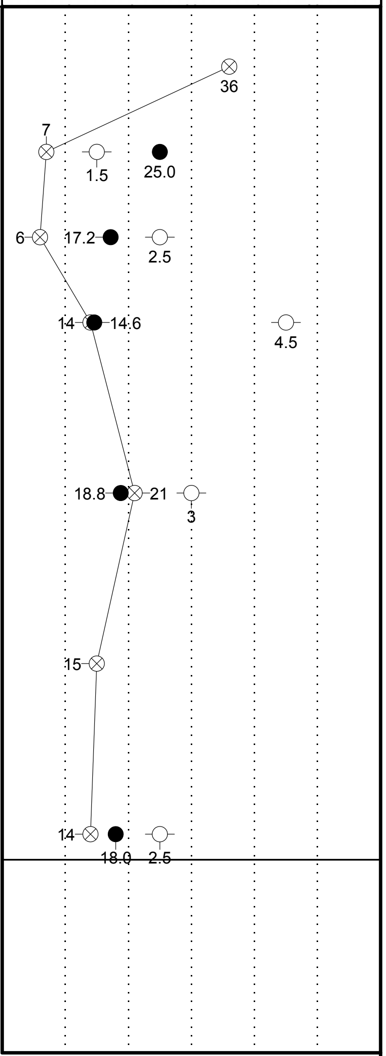
ROCK QUALITY DESIGNATION & RECOVERY

RQD% - — - REC% ———

PLASTIC LIMIT% × WATER CONTENT% ● LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL ENGLISH UNITS | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| | | | | | BOTTOM OF CASING LOSS OF CIRCULATION | | | |
| | | | | | SURFACE ELEVATION 633 | | | |
| 0 | | | | | Bituminous Pavement Depth [4"], Gravel Depth [21"] | | | |
| | S-1 | SS | 18 | 18 | | | | 45<br>25<br>11 |
| | | | | | (CL/ML FILL) SILTY CLAY, Trace Sand,Trace Gravel, Contains Roots, Black, Moist, Stiff | ▽ | 630 | |
| | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 12 Feet, Moist, Stiff to Hard | ▼ | | 2<br>3<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 2<br>3<br>3 |
| | | | | | | | 625 | |
| | S-4 | SS | 18 | 18 | | | | 5<br>6<br>8 |
| 10 | | | | | | | | |
| | | | | | | | 620 | |
| | S-5 | SS | 18 | 18 | | | | 5<br>7<br>14 |
| 15 | | | | | (SP) FINE TO MEDIUM SAND WITH GRAVEL, Gray, Moist, Medium Dense | | | |
| | | | | | | | 615 | |
| | S-6 | SS | 18 | 14 | | | | 10<br>9<br>6 |
| 20 | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Gray, Moist, Very Stiff | | | |
| | | | | | | | 610 | |
| | S-7 | SS | 18 | 18 | | | | 4<br>6<br>8 |
| 25 | | | | | END OF BORING @ 25' | | | |
| | | | | | | | 605 | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 2.5 WS☐ WD☐ | BORING STARTED 09/24/14 | |
| ▽ WL(BCR) ▼ WL(ACR) 4 | BORING COMPLETED 09/24/14 | CAVE IN DEPTH @ 18.5' |
| ▽ WL | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

CLIENT Braun Intertec Corporation

JOB # 10306-A

BORING # B-14

SHEET 1 OF 1

PROJECT NAME Northbrook Fitness Development

ARCHITECT-ENGINEER

SITE LOCATION 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY

RQD% – — –  REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

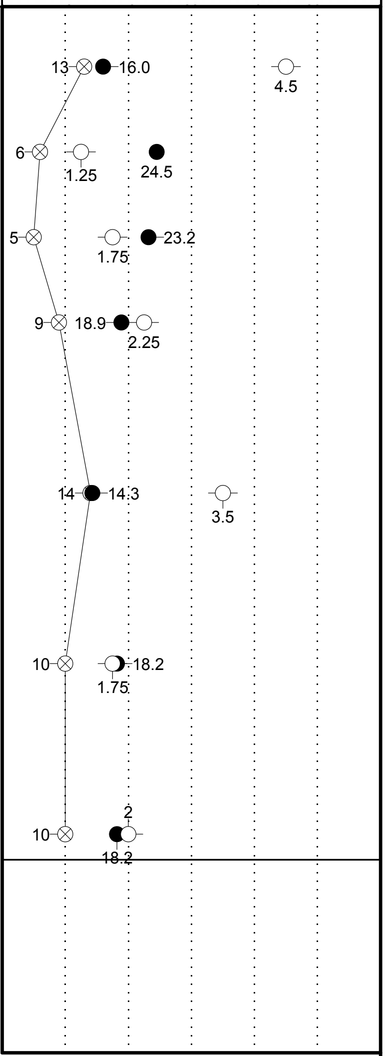
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL  ENGLISH UNITS

BOTTOM OF CASING  LOSS OF CIRCULATION

SURFACE ELEVATION 634

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [16"] | | | |
| | S-1 | SS | 18 | 16 | (CL/ML FILL) SILTY CLAY, Trace Sand,Trace Gravel, Contains Organics, Black, Moist, Hard to Stiff | | | 14<br>8<br>5 |
| | S-2 | SS | 18 | 18 | | | 630 | 2<br>3<br>3 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 13 Feet, Moist, Stiff to Very Stiff | | | 2<br>2<br>3 |
| | S-4 | SS | 18 | 18 | | | 625 | 2<br>4<br>5 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | 620 | 4<br>6<br>8 |
| 15 | | | | | | | | |
| | S-6 | SS | 18 | 18 | | | 615 | 3<br>4<br>6 |
| 20 | | | | | | | | |
| | S-7 | SS | 18 | 18 | | | 610 | 3<br>5<br>5 |
| 25 | | | | | END OF BORING @ 25' | | | |
| | | | | | | | 605 | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL  WS ☐  WD ☐

BORING STARTED 09/24/14

WL(BCR)  WL(ACR)

BORING COMPLETED 09/24/14

CAVE IN DEPTH

WL

RIG CME-45  FOREMAN S. Euker

DRILLING METHOD CFA

CLIENT: Braun Intertec Corporation

JOB #: 10306-A

BORING #: B-15

SHEET: 1 OF 1

PROJECT NAME: Northbrook Fitness Development

ARCHITECT-ENGINEER:

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING:

EASTING:

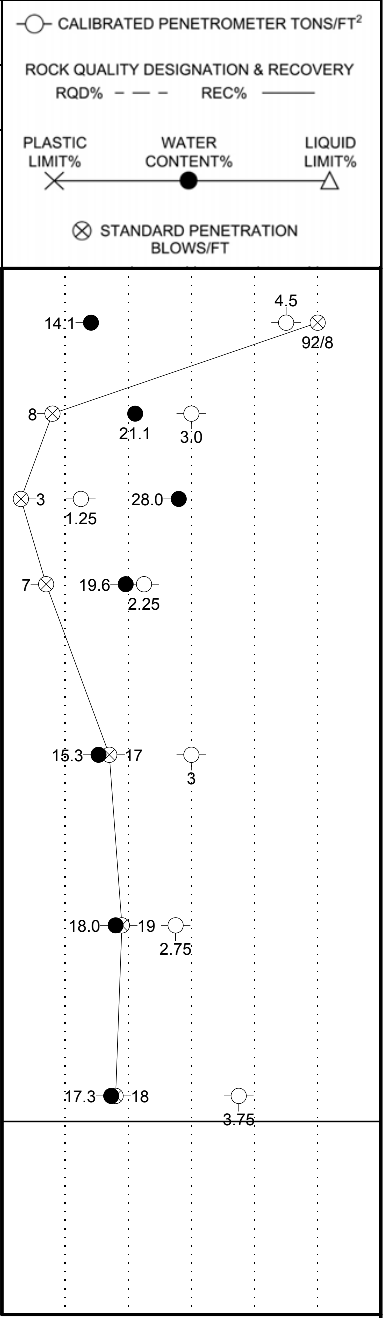
STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING — LOSS OF CIRCULATION

SURFACE ELEVATION 633

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [14"] | | |
| | S-1 | SS | 14 | 12 | (CL/ML FILL) SANDY SILTY CLAY WITH GRAVEL, Trace Sand,Trace Gravel, Contains Roots, Black, Moist, Hard to Very Stiff | 630 | 11<br>42<br>50/2 |
| | S-2 | SS | 18 | 12 | | | 4<br>4<br>4 |
| 5 | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 12 Feet, Moist, Stiff to Very Stiff | | |
| | S-3 | SS | 18 | 18 | | 625 | 1<br>1<br>2 |
| | S-4 | SS | 18 | 18 | | | 2<br>3<br>4 |
| 10 | | | | | | 620 | |
| | S-5 | SS | 18 | 18 | | | 6<br>8<br>9 |
| 15 | | | | | | 615 | |
| | S-6 | SS | 18 | 18 | | | 5<br>8<br>11 |
| 20 | | | | | | 610 | |
| | S-7 | SS | 18 | 18 | | | 6<br>8<br>10 |
| 25 | | | | | END OF BORING @ 25' | 605 | |
| 30 | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL WS ☐ WD ☐ | BORING STARTED 09/24/14 | |
| WL(BCR) WL(ACR) | BORING COMPLETED 09/24/14 | CAVE IN DEPTH |
| WL | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

CLIENT Braun Intertec Corporation
JOB # 10306-A
BORING # B-16
SHEET 1 OF 1

PROJECT NAME Northbrook Fitness Development
ARCHITECT-ENGINEER

SITE LOCATION 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING
EASTING
STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

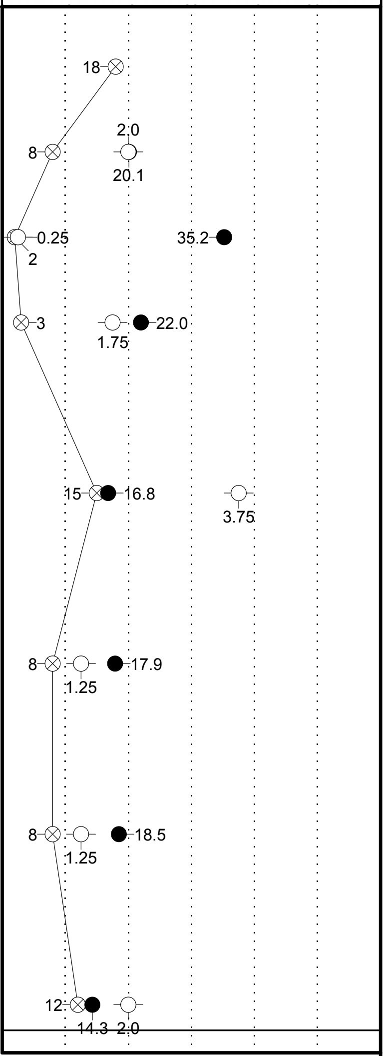
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL ENGLISH UNITS
BOTTOM OF CASING LOSS OF CIRCULATION
SURFACE ELEVATION 633

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [36"] | | | |
| | S-1 | SS | 18 | 6 | | ▼<br>▽ | | 8<br>7<br>11 |
| | | | | | | | 630 | |
| | S-2 | SS | 18 | 14 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown and Gray, Moist, Very Stiff | | | 4<br>4<br>4 |
| 5 | | | | | (CL/CH) LEAN TO FAT CLAY WITH SAND, Brown and Dark Gray, Moist, Soft | | | |
| | S-3 | SS | 18 | 10 | | | | WOH<br>1<br>1 |
| | | | | | | | 625 | |
| | S-4 | SS | 18 | 14 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray at 12 Feet, Moist, Stiff to Very Stiff | | | 1<br>1<br>2 |
| 10 | | | | | | | | |
| | | | | | | | 620 | |
| | S-5 | SS | 18 | 18 | | | | 5<br>6<br>9 |
| 15 | | | | | | | | |
| | | | | | | | 615 | |
| | S-6 | SS | 18 | 18 | | | | 3<br>4<br>4 |
| 20 | | | | | | | | |
| | | | | | | | 610 | |
| | S-7 | SS | 18 | 18 | | | | 3<br>3<br>5 |
| 25 | | | | | | | | |
| | | | | | | | 605 | |
| | S-8 | SS | 18 | 18 | | | | 3<br>5<br>7 |
| 30 | | | | | END OF BORING @ 30' | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

▽ WL 2 WS☐ WD☐
BORING STARTED 09/24/14

▽ WL(BCR) ▼ WL(ACR) 1.5
BORING COMPLETED 09/24/14
CAVE IN DEPTH

▽ WL
RIG CME-45 FOREMAN S. Euker
DRILLING METHOD CFA

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Braun Intertec Corporation | 10306-A | B-8 | 1 OF 1 |

PROJECT NAME: Northbrook Fitness Development

ARCHITECT-ENGINEER:

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING: | EASTING: | STATION:

-○- CALIBRATED PENETROMETER TONS/FT$^2$

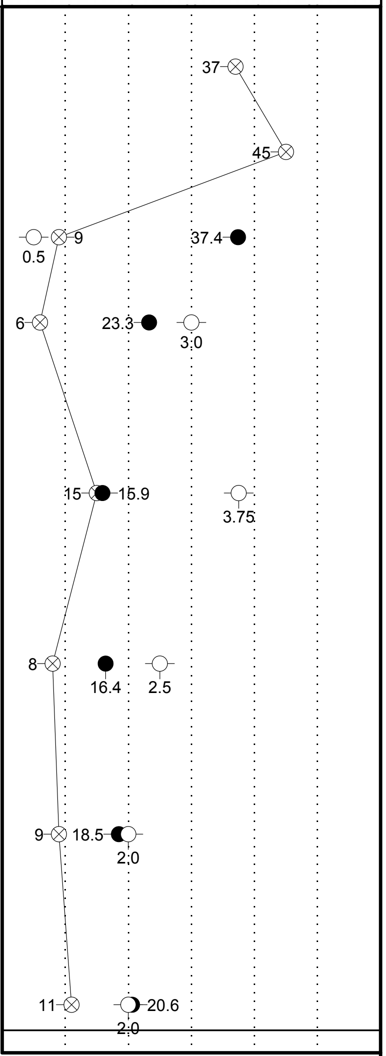
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING — LOSS OF CIRCULATION
SURFACE ELEVATION 636

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Concrete Depth [6"], Gravel Depth [15"] | | | |
| | | | | | | | 635 | |
| | S-1 | SS | 18 | 10 | (DEBRIS FILL), Trace Sand,Trace Gravel, Contains Brick, Brown and Black, Moist | | | 4<br>12<br>25 |
| | S-2 | SS | 18 | 14 | | | | 24<br>24<br>21 |
| 5 | | | | | | | | |
| | | | | | | ∇ | 630 | |
| | S-3 | SS | 18 | 8 | (CL/CH) LEAN TO FAT CLAY, Trace Sand, Trace Gravel, Black to Dark Gray, Moist, Medium Stiff | | | 14<br>7<br>2 |
| | S-4 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray, Moist, Very Stiff | | | 2<br>3<br>3 |
| 10 | | | | | | ▼ | | |
| | | | | | | | 625 | |
| | S-5 | SS | 18 | 18 | | | | 6<br>6<br>9 |
| 15 | | | | | | | | |
| | | | | | | | 620 | |
| | S-6 | SS | 18 | 18 | | | | 3<br>3<br>5 |
| 20 | | | | | | | | |
| | | | | | | | 615 | |
| | S-7 | SS | 18 | 18 | | | | 3<br>4<br>5 |
| 25 | | | | | | | | |
| | | | | | | | 610 | |
| | S-8 | SS | 18 | 18 | | | | 4<br>4<br>7 |
| 30 | | | | | END OF BORING @ 30' | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ∇ WL 6 WS ☐ WD ☐ | BORING STARTED 09/25/14 | |
| ∇ WL(BCR) ▼ WL(ACR) 10 | BORING COMPLETED 09/25/14 | CAVE IN DEPTH |
| ∇ WL | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

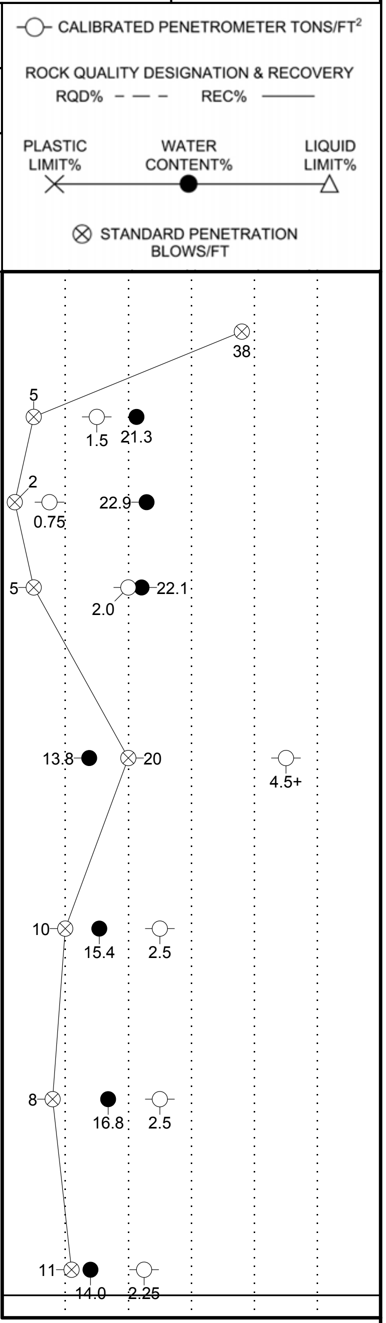
| | | | |
|---|---|---|---|
| CLIENT<br>Braun Intertec Corporation | JOB #<br>10306-A | BORING #<br>B-12 | SHEET<br>1 OF 1 |
| PROJECT NAME<br>Northbrook Fitness Development | ARCHITECT-ENGINEER | | |
| SITE LOCATION<br>1102 Skokie Boulevard, Northbrook, Illinois | | | |
| NORTHING | EASTING | STATION | |

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ — LOSS OF CIRCULATION

SURFACE ELEVATION 633

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [5"], Gravel Depth [20"] | | | |
| | S-1 | SS | 18 | 12 | | | | 18<br>24<br>14 |
| | | | | | (CL/CH FILL) LEAN TO FAT CLAY, Trace Sand,Trace Gravel, Black, Moist, Stiff | | 630 | |
| | S-2 | SS | 18 | 14 | (CL/ML FILL) SILTY CLAY, Trace Sand,Trace Gravel, Greenish Brown and Gray, Moist, Stiff to Medium Stiff | | | 3<br>3<br>2 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 14 | | | | WOH<br>2 |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand,Trace Gravel, Brown to Gray, Moist, Very Stiff to Hard | | 625 | |
| | S-4 | SS | 18 | 18 | | | | 2<br>2<br>3 |
| 10 | | | | | | | | |
| | | | | | | | 620 | |
| | S-5 | SS | 18 | 18 | | | | 9<br>9<br>11 |
| 15 | | | | | | | | |
| | | | | | | | 615 | |
| | S-6 | SS | 18 | 18 | | | | 4<br>4<br>6 |
| 20 | | | | | | | | |
| | | | | | | | 610 | |
| | S-7 | SS | 18 | 18 | | | | 3<br>3<br>5 |
| 25 | | | | | | | | |
| | | | | | | | 605 | |
| | S-8 | SS | 18 | 18 | | | | 4<br>5<br>6 |
| 30 | | | | | END OF BORING @ 30' | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL WS ☐ WD ☐ | BORING STARTED 09/25/14 | |
| WL(BCR) WL(ACR) | BORING COMPLETED 09/25/14 | CAVE IN DEPTH |
| WL | RIG CME-45 FOREMAN S. Euker | DRILLING METHOD CFA |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Lifetime | 10306-C | S-1 | 1 OF 1 |

| PROJECT NAME | ARCHITECT-ENGINEER |
|---|---|
| Lifetime Fitness Supplemental Borings | |

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

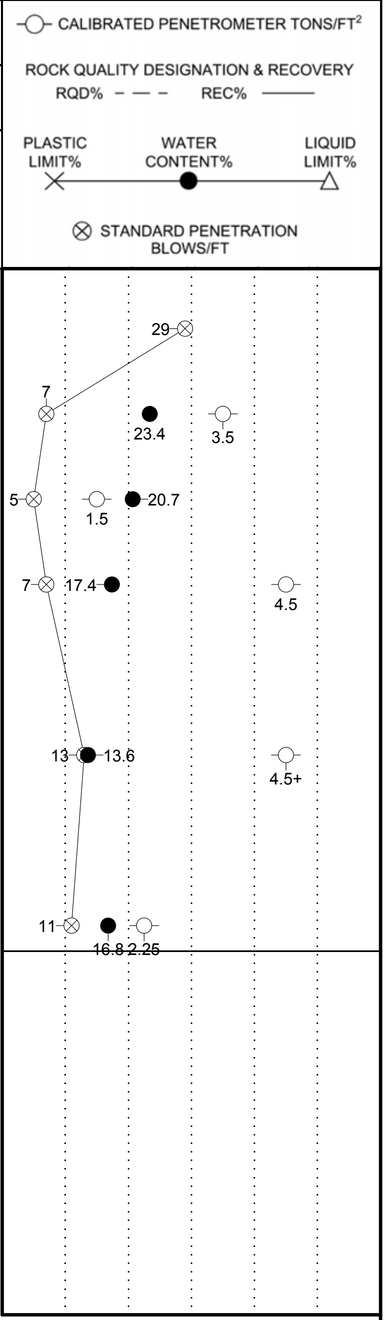
| NORTHING | EASTING | STATION |
|---|---|---|
| | | |

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [4"], Gravel Depth [16"] | | | |
| | S-1 | SS | 18 | 14 | (SM/SC FILL) SILTY/CLAYEY SAND WITH GRAVEL, Brown and Gray, Moist, Medium Dense | ▽ | | 23<br>15<br>14 |
| | S-2 | SS | 18 | 16 | (GP/GW FILL) POORLY GRADED/WELL-GRADED GRAVEL, Black, Moist, Medium Dense, Cinders | | | 2<br>3<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Stiff to Hard, Gray At 12 Feet | | | 1<br>2<br>3 |
| | S-4 | SS | 18 | 18 | | | | 2<br>3<br>4 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | | 4<br>6<br>7 |
| 15 | | | | | | | | |
| | S-6 | SS | 18 | 18 | | | | 3<br>5<br>6 |
| 20 | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 3   WS ☐   WD ☐ | BORING STARTED 04/17/15 | CAVE IN DEPTH |
| ▽ WL(BCR)   ▼ WL(ACR) | BORING COMPLETED 04/17/15 | HAMMER TYPE |
| ▽ WL | RIG CME-45   FOREMAN SE | DRILLING METHOD |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Lifetime | 10306-C | S-2 | 1 OF 1 |

PROJECT NAME: Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

DESCRIPTION OF MATERIAL

ENGLISH UNITS

BOTTOM OF CASING

LOSS OF CIRCULATION

SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [5"], Gravel Depth [18"] | | | |
| | S-1 | SS | 8 | 4 | | | | 30<br>50/2 |
| | | | | | (GP FILL) GRAVEL WITH SAND, Black, Moist, Medium Dense, Cinders | | | |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Greenish Brown to Gray, Moist, Stiff to Hard, Gray At 12 Feet | | | |
| 5 | S-2 | SS | 18 | 16 | | | | 3<br>3<br>4 |
| | | | | | | ▽ | | |
| | S-3 | SS | 18 | 16 | | | | WOH<br>2<br>2 |
| 10 | S-4 | SS | 18 | 18 | | | | 6<br>8<br>10 |
| | | | | | | ▽ | | |
| 15 | S-5 | SS | 18 | 18 | | | | 5<br>5<br>5 |
| 20 | S-6 | SS | 18 | 18 | | | | 3<br>4<br>5 |
| | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |

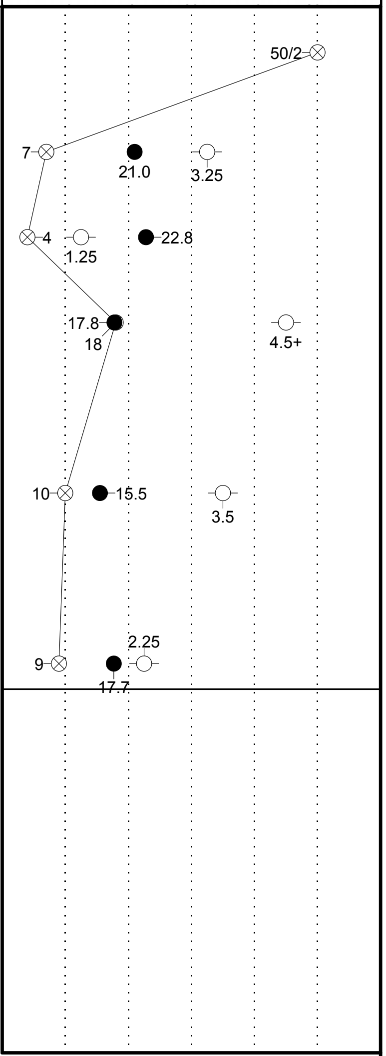
-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY

RQD% – — –  REC% ———

PLASTIC LIMIT% — WATER CONTENT% — LIQUID LIMIT%

⊗ STANDARD PENETRATION BLOWS/FT



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 6 WS ☐ WD ☐ | BORING STARTED 04/17/15 | CAVE IN DEPTH |
| ▽ WL(BCR) 14½ ▼ WL(ACR) | BORING COMPLETED 04/17/15 | HAMMER TYPE |
| ▽ WL | RIG CME-45 FOREMAN SE | DRILLING METHOD |

CLIENT
Lifetime

JOB #
10306-C

BORING #
S-3

SHEET
1 OF 1

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

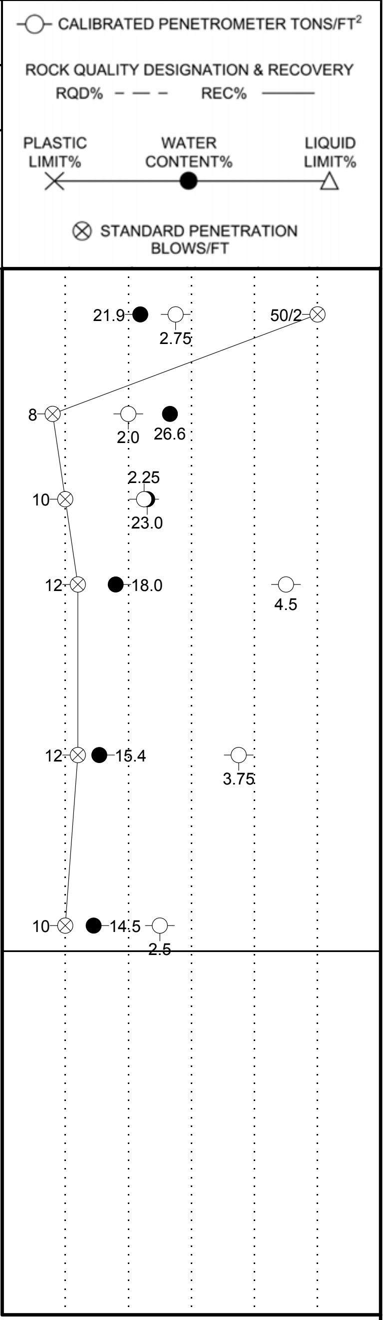
STATION

DESCRIPTION OF MATERIAL ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | S-1 | SS | 8 | 6 | Bituminous Pavement Depth [4"], Gravel Depth [7"], Bituminous Pavement Depth [6"], Gravel Depth [9"] | | | 30<br>50/2 |
| | | | | | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Black, Moist, Very Stiff | | | |
| | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Very Stiff to Hard, Gray At 12 Feet | | | 3<br>4<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 3<br>5<br>5 |
| | S-4 | SS | 18 | 18 | | | | 4<br>5<br>7 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | | 5<br>6<br>6 |
| 15 | | | | | | | | |
| | S-6 | SS | 18 | 18 | | | | 4<br>4<br>6 |
| 20 | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL WS ☐ WD ☐ | BORING STARTED 04/17/15 | CAVE IN DEPTH |
| WL(BCR) WL(ACR) | BORING COMPLETED 04/17/15 | HAMMER TYPE |
| WL | RIG CME-45 FOREMAN | DRILLING METHOD |

CLIENT Lifetime

JOB # 10306-C

BORING # S-4

SHEET 1 OF 1

PROJECT NAME Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

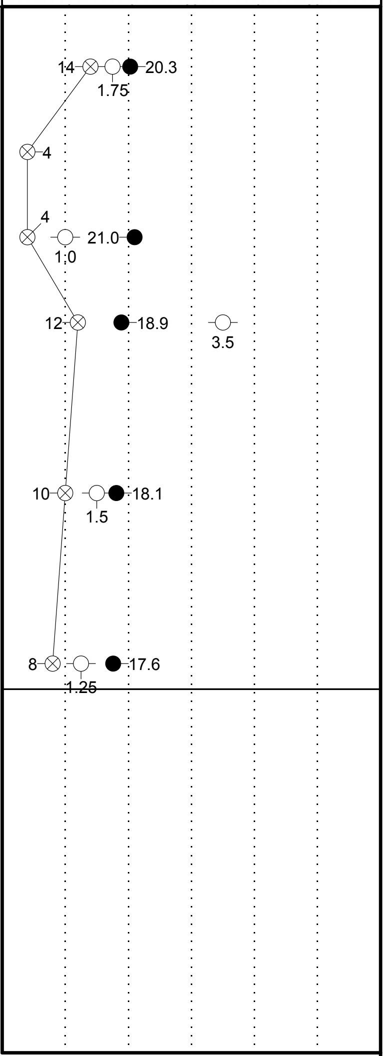
-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL ENGLISH UNITS<br>BOTTOM OF CASING ➤ LOSS OF CIRCULATION<br>SURFACE ELEVATION | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [5"], Gravel Depth [14"] | | | |
| | S-1 | SS | 18 | 14 | (CL/ML FILL) SILTY CLAY WITH GRAVEL, Trace Sand, Brown, Moist, Stiff | | | 10<br>7<br>7 |
| | S-2 | SS | 18 | 10 | (GW FILL) WELL-GRADED GRAVEL WITH SAND, Gray and Black, Moist, Very Loose | ▽<br>▼ | | 3<br>3<br>1 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 10 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Stiff to Very Stiff | | | 3<br>2<br>2 |
| | S-4 | SS | 18 | 16 | | | | 4<br>5<br>7 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | | 4<br>4<br>6 |
| 15 | | | | | | | | |
| | S-6 | SS | 18 | 14 | | | | 4<br>4<br>4 |
| 20 | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 3½ WS ☐ WD ☐ | BORING STARTED 04/17/15 | CAVE IN DEPTH @ 8½' |
| ▽ WL(BCR) ▼ WL(ACR) 4 | BORING COMPLETED 04/17/15 | HAMMER TYPE |
| ▽ WL | RIG CME-45 FOREMAN SE | DRILLING METHOD |

| | | | |
|---|---|---|---|
| CLIENT<br>Lifetime | JOB #<br>10306-C | BORING #<br>S-5 | SHEET<br>1 OF 1 |
| PROJECT NAME<br>Lifetime Fitness Supplemental Borings | ARCHITECT-ENGINEER | | |
| SITE LOCATION<br>1102 Skokie Boulevard, Northbrook, Illinois | | | |
| NORTHING | EASTING | STATION | |

-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY

RQD% – — –  REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

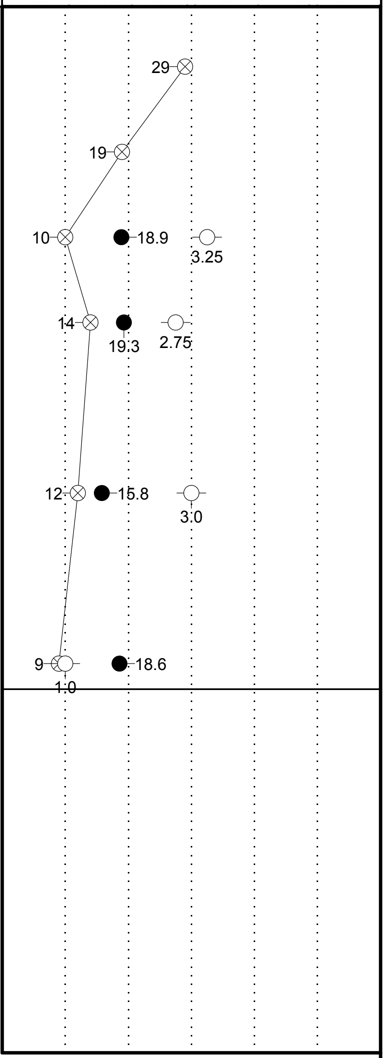
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [6"], Concrete Depth [13"] | | | |
| | S-1 | SS | 18 | 10 | (SP-SC FILL) SAND WITH CLAY AND GRAVEL, Contains Brick and Asphalt, Dark Gray, Moist to Wet, Medium Dense | | | 20<br>11<br>18 |
| | S-2 | SS | 18 | 8 | | ▽ | | 7<br>13<br>6 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Very Stiff to Stiff, Gray At 12 Feet | | | 3<br>4<br>6 |
| | S-4 | SS | 18 | 18 | | | | 4<br>6<br>8 |
| 10 | | | | | | | | |
| | | | | | | ▼ | | |
| | S-5 | SS | 18 | 18 | | | | 4<br>5<br>7 |
| 15 | | | | | | | | |
| | S-6 | SS | 18 | 18 | | | | 3<br>4<br>5 |
| 20 | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 4  WS ☐  WD ☐ | BORING STARTED 04/17/15 | CAVE IN DEPTH |
| ▽ WL(BCR)  ▼ WL(ACR) 13 | BORING COMPLETED 04/17/15 | HAMMER TYPE |
| ▽ WL | RIG CME-45  FOREMAN SE | DRILLING METHOD |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Lifetime | 10306-C | S-6 | 1 OF 1 |

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING
EASTING
STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

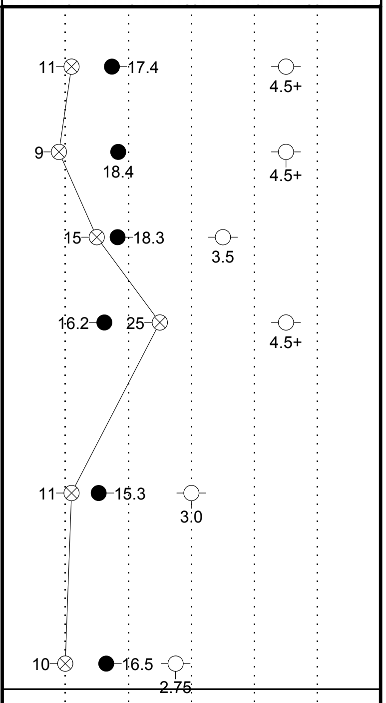
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — –  REC% ———

PLASTIC LIMIT% × — WATER CONTENT% ● — LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING — LOSS OF CIRCULATION
SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [4"], Gravel Depth [16"] | | | |
| | S-1 | SS | 18 | 14 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Gray and Black, Moist, Hard | | | 10<br>5<br>6 |
| | S-2 | SS | 18 | 16 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Hard to Very Stiff, Gray At 12 Feet | | | 3<br>4<br>5 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 4<br>7<br>8 |
| | S-4 | SS | 18 | 18 | | | | 6<br>10<br>15 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | | 4<br>5<br>6 |
| 15 | | | | | | | | |
| | S-6 | SS | 18 | 18 | | | | 4<br>5<br>5 |
| 20 | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL  WS ☐  WD ☐ | BORING STARTED 04/17/15 | CAVE IN DEPTH |
| WL(BCR)  WL(ACR) | BORING COMPLETED 04/17/15 | HAMMER TYPE |
| WL | RIG CME-45  FOREMAN SE | DRILLING METHOD |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Lifetime | 10306-C | S-7 | 1 OF 1 |

PROJECT NAME: Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER:

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING:

EASTING:

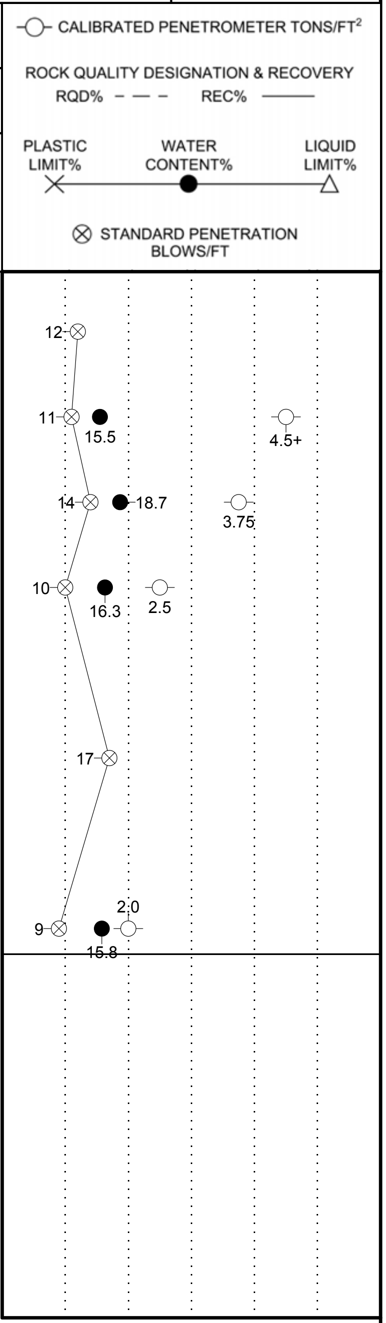
STATION:

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [5"], Gravel Depth [12"] | | | |
| | S-1 | SS | 18 | 14 | (GP-GC) GRAVEL WITH CLAY, Dark Brown, Moist, Medium Dense | | | 9<br>5<br>7 |
| 5 | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Hard to Very Stiff, Gray At 9 Feet | | | 3<br>5<br>6 |
| | S-3 | SS | 18 | 18 | | | | 5<br>6<br>8 |
| 10 | S-4 | SS | 18 | 18 | | | | 4<br>5<br>5 |
| 15 | S-5 | SS | 18 | 18 | (SM) SILTY FINE TO MEDIUM SAND, Gray, Moist to Wet, Medium Dense | ▼ | | 5<br>7<br>10 |
| | S-6 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Gray, Moist, Very Stiff | | | 4<br>4<br>5 |
| 20 | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 15½ WS ☐ WD ☐ | BORING STARTED 04/17/15 | CAVE IN DEPTH @ 16' |
| WL(BCR) ▼ WL(ACR) 15½ | BORING COMPLETED 04/17/15 | HAMMER TYPE |
| WL | RIG CME-45 FOREMAN SE | DRILLING METHOD |

CLIENT
Lifetime

JOB #
10306-C

BORING #
S-8

SHEET
1 OF 1

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

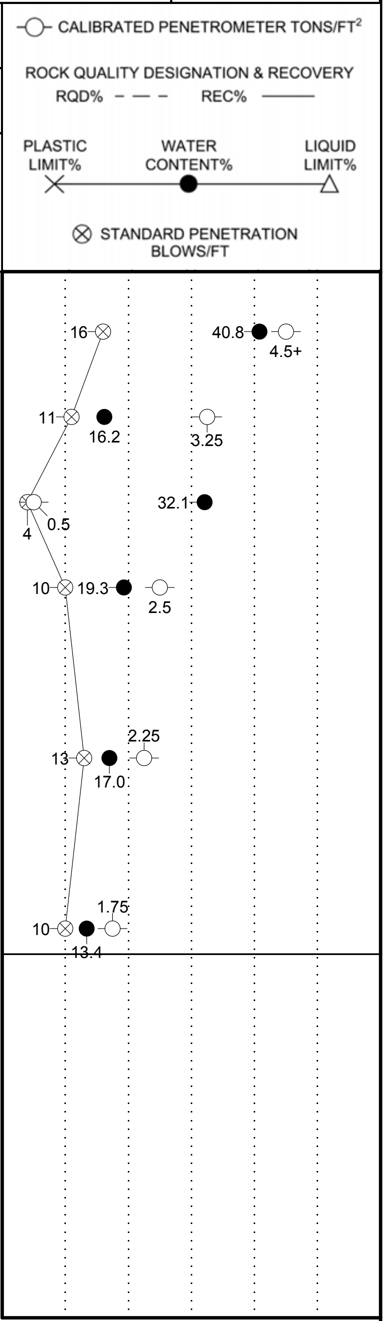
STATION

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤ LOSS OF CIRCULATION

SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [15"] | | | |
| | S-1 | SS | 18 | 18 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Dark Brown and Gray, Moist, Hard to Very Stiff | | | 20<br>10<br>6 |
| 5 | S-2 | SS | 18 | 18 | | | | 5<br>5<br>6 |
| | S-3 | SS | 18 | 14 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Soft to Very Stiff | ▽ | | 1<br>2<br>2 |
| 10 | S-4 | SS | 18 | 18 | | ▼ | | 3<br>5<br>5 |
| 15 | S-5 | SS | 18 | 18 | | | | 6<br>6<br>7 |
| 20 | S-6 | SS | 18 | 18 | | | | 4<br>5<br>5 |
| | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 6   WS ☐   WD ☐ | BORING STARTED 04/16/15 | CAVE IN DEPTH |
| ▽ WL(BCR)   ▼ WL(ACR) 10 | BORING COMPLETED 04/16/15 | HAMMER TYPE |
| ▽ WL | RIG CME-45   FOREMAN | DRILLING METHOD |

CLIENT Lifetime
JOB # 10306-C
BORING # S-9
SHEET 1 OF 1
PROJECT NAME Lifetime Fitness Supplemental Borings
ARCHITECT-ENGINEER
SITE LOCATION 1102 Skokie Boulevard, Northbrook, Illinois
NORTHING
EASTING
STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

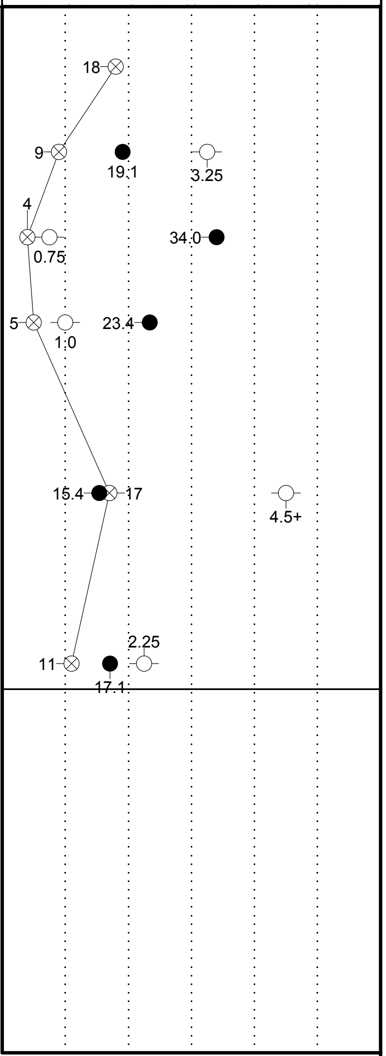
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL ENGLISH UNITS
BOTTOM OF CASING ➤ LOSS OF CIRCULATION
SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [20"] | | | |
| | S-1 | SS | 18 | 16 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Brown and Brownish Gray, Moist, Very Stiff | | | 13<br>10<br>8 |
| 5 | S-2 | SS | 18 | 18 | | | | 4<br>4<br>5 |
| | S-3 | SS | 18 | 18 | (CL/CH) LEAN TO FAT CLAY, Trace Sand, Trace Gravel, Yellowish Brown, Moist, Medium Stiff | ▼<br>∇ | | 1<br>2<br>2 |
| 10 | S-4 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Stiff to Hard, Gray At 12 Feet | | | 1<br>2<br>3 |
| 15 | S-5 | SS | 18 | 18 | | | | 6<br>8<br>9 |
| 20 | S-6 | SS | 18 | 18 | | | | 4<br>6<br>5 |
| | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

∇ WL 7½ WS ☐ WD ☐
BORING STARTED 04/16/15
CAVE IN DEPTH
∇ WL(BCR) ▼ WL(ACR) 6
BORING COMPLETED 04/16/15
HAMMER TYPE
∇ WL
RIG CME-45 FOREMAN SE
DRILLING METHOD

CLIENT
Lifetime

JOB #
10306-C

BORING #
S-10

SHEET
1 OF 1

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

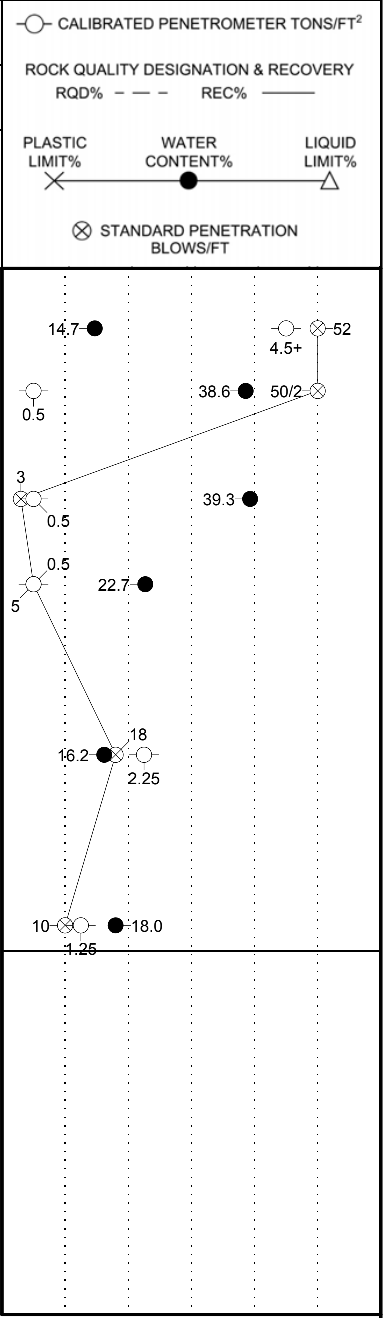
SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL — ENGLISH UNITS<br>BOTTOM OF CASING — LOSS OF CIRCULATION<br>SURFACE ELEVATION | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [2"], Gravel Depth [9"] | | | |
| | S-1 | SS | 18 | 18 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Gray and Black, Moist, Hard | | | 4<br>12<br>40 |
| | S-2 | SS | 2 | 1 | (GP FILL) GRAVEL WITH SAND, Black, Moist, Dense, Cinders | | | 50/2 |
| 5 | | | | | (CL/CH) LEAN TO FAT CLAY, Trace Sand, Trace Gravel, Gray, Moist, Soft | ▽ | | |
| | S-3 | SS | 18 | 18 | | | | WOH<br>1<br>2 |
| | | | | | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Soft to Very Stiff | | | |
| | S-4 | SS | 18 | 18 | | | | 1<br>2<br>3 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | | 5<br>8<br>10 |
| 15 | | | | | | ▼ | | |
| | S-6 | SS | 18 | 18 | | | | 3<br>5<br>5 |
| 20 | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | | |
|---|---|---|---|
| ▽ WL 5½ | WS ☐ WD ☐ | BORING STARTED 04/16/15 | CAVE IN DEPTH |
| ▽ WL(BCR) | ▼ WL(ACR) 15½ | BORING COMPLETED 04/16/15 | HAMMER TYPE |
| ▽ WL | | RIG CME-45 FOREMAN SE | DRILLING METHOD |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Lifetime | 10306-C | S-11 | 1 OF 1 |

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING
EASTING
STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

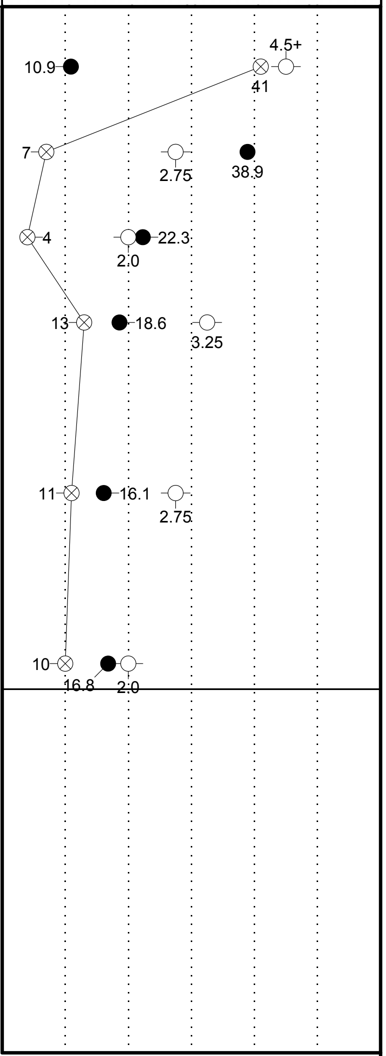
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% ✕ WATER CONTENT% ● LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL ENGLISH UNITS
BOTTOM OF CASING LOSS OF CIRCULATION
SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [13"] | | | |
| | S-1 | SS | 18 | 16 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Brown and Gray, Moist, Hard | | | 15<br>21<br>20 |
| | | | | | (GP FILL) GRAVEL WITH SAND, Light Gray, Moist, Dense, CA-6 Type Material | | | |
| | S-2 | SS | 18 | 18 | (CL/CH) LEAN TO FAT CLAY, Trace Sand, Trace Gravel, Black to Light Gray, Moist, Very Stiff | | | 2<br>3<br>4 |
| 5 | | | | | | ⩡ | | |
| | S-3 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Very Stiff, Gray At 12 Feet | | | 2<br>2<br>2 |
| | S-4 | SS | 18 | 18 | | | | 4<br>5<br>8 |
| 10 | | | | | | | | |
| | S-5 | SS | 18 | 18 | | | | 4<br>5<br>6 |
| 15 | | | | | | | | |
| | S-6 | SS | 18 | 18 | | | | 4<br>4<br>6 |
| 20 | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL 5½ WS ☐ WD ☐ | BORING STARTED 04/16/15 | CAVE IN DEPTH |
| WL(BCR) WL(ACR) | BORING COMPLETED 04/16/15 | HAMMER TYPE |
| WL | RIG CME-45 FOREMAN SE | DRILLING METHOD |

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Lifetime | 10306-C | S-12 | 1 OF 1 |

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING
EASTING
STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

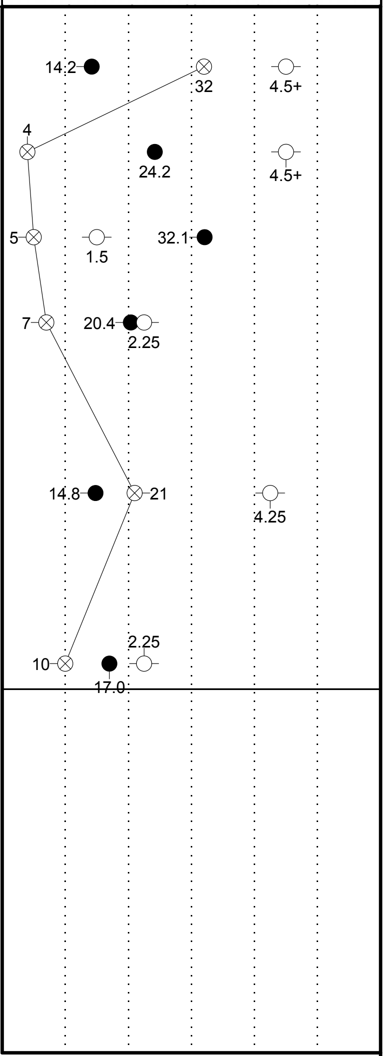
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — – REC% ———

PLASTIC LIMIT% WATER CONTENT% LIQUID LIMIT%

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL ENGLISH UNITS
BOTTOM OF CASING LOSS OF CIRCULATION
SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [15"] | | | |
| | S-1 | SS | 18 | 16 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Contains Asphalt, Black, Moist, Hard | | | 11<br>15<br>17 |
| 5 | S-2 | SS | 18 | 18 | | | | 3<br>2<br>2 |
| | S-3 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown to Gray, Moist, Stiff to Hard, Gray At 12 Feet | ▽ | | 2<br>2<br>3 |
| 10 | S-4 | SS | 18 | 18 | | | | 2<br>3<br>4 |
| 15 | S-5 | SS | 18 | 18 | | ▼ | | 7<br>10<br>11 |
| 20 | S-6 | SS | 18 | 18 | | | | 4<br>5<br>5 |
| | | | | | END OF BORING @ 20' | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 6½ WS ☐ WD ☐ | BORING STARTED 04/16/15 | CAVE IN DEPTH |
| ▽ WL(BCR) ▼ WL(ACR) 15½ | BORING COMPLETED 04/16/15 | HAMMER TYPE |
| ▽ WL | RIG CME-45 FOREMAN SE | DRILLING METHOD |

CLIENT
Lifetime

JOB #
10306-C

BORING #
S-13

SHEET
1 OF 1

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

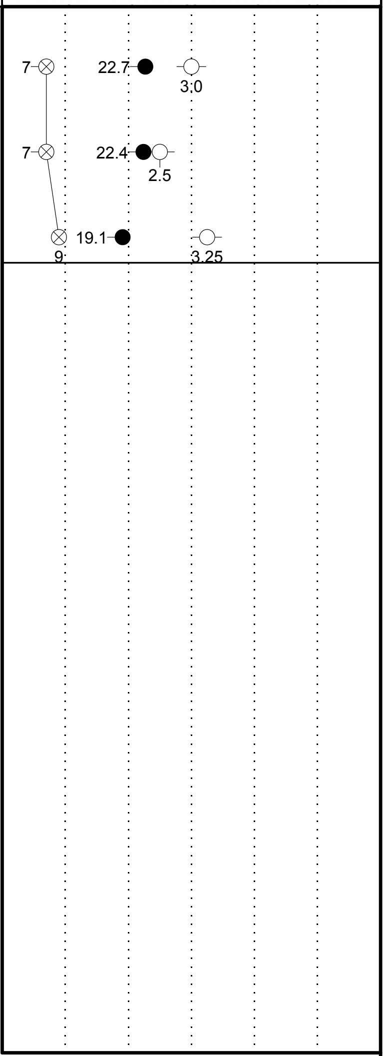
-○- CALIBRATED PENETROMETER TONS/FT$^2$

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — –    REC% ———

PLASTIC LIMIT% ✕    WATER CONTENT% ●    LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL<br>ENGLISH UNITS<br>BOTTOM OF CASING / LOSS OF CIRCULATION<br>SURFACE ELEVATION | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [8"], Gravel Depth [9"] | | | |
| | S-1 | SS | 18 | 10 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Black, Moist, Very Stiff | | | 15<br>4<br>3 |
| | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown and Gray, Moist, Very Stiff | | | 2<br>3<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 3<br>4<br>5 |
| | | | | | END OF BORING @ 7½' | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL    WS ☐    WD ☐
WL(BCR)    WL(ACR)
WL

BORING STARTED 04/17/15
BORING COMPLETED 04/17/15
RIG CME-45    FOREMAN SE

CAVE IN DEPTH
HAMMER TYPE
DRILLING METHOD

CLIENT
Lifetime

JOB #
10306-C

BORING #
S-14

SHEET
1 OF 1

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

-○- CALIBRATED PENETROMETER TONS/FT$^2$

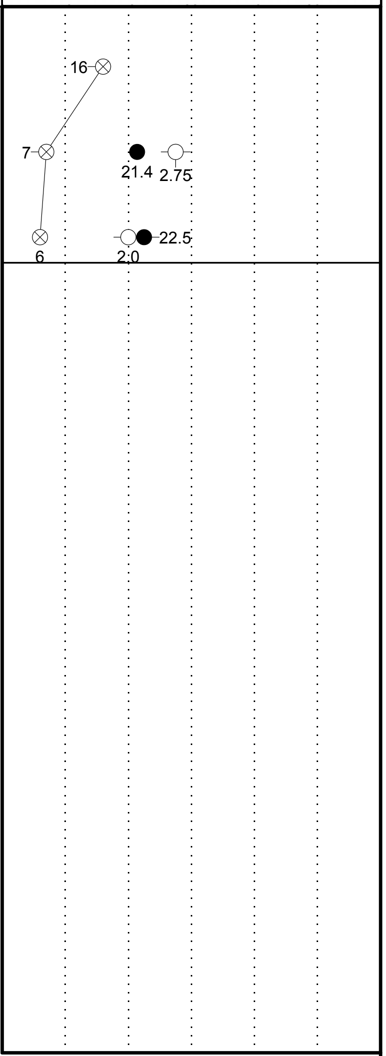
ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — –   REC% ———

PLASTIC LIMIT% ✕ — WATER CONTENT% ● — LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS
BOTTOM OF CASING — LOSS OF CIRCULATION
SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [4"], Gravel Depth [12"] | | | |
| | S-1 | SS | 18 | 18 | (GP FILL) GRAVEL WITH SAND, Black, Moist, Medium Dense | | | 15<br>9<br>7 |
| | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown, Moist, Very Stiff | | | 2<br>3<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 2<br>3<br>3 |
| | | | | | END OF BORING @ 7½' | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL   WS ☐   WD ☐ | BORING STARTED 04/17/15 | CAVE IN DEPTH |
| WL(BCR)   WL(ACR) | BORING COMPLETED 04/17/15 | HAMMER TYPE |
| WL | RIG CME-45   FOREMAN SE | DRILLING METHOD |

CLIENT
Lifetime

JOB #
10306-C

BORING #
S-15

SHEET
1 OF 1

PROJECT NAME
Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION
1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

-○- CALIBRATED PENETROMETER TONS/FT²

ROCK QUALITY DESIGNATION & RECOVERY
RQD% – — –   REC% ———

PLASTIC LIMIT% ✕ —— WATER CONTENT% ● —— LIQUID LIMIT% △

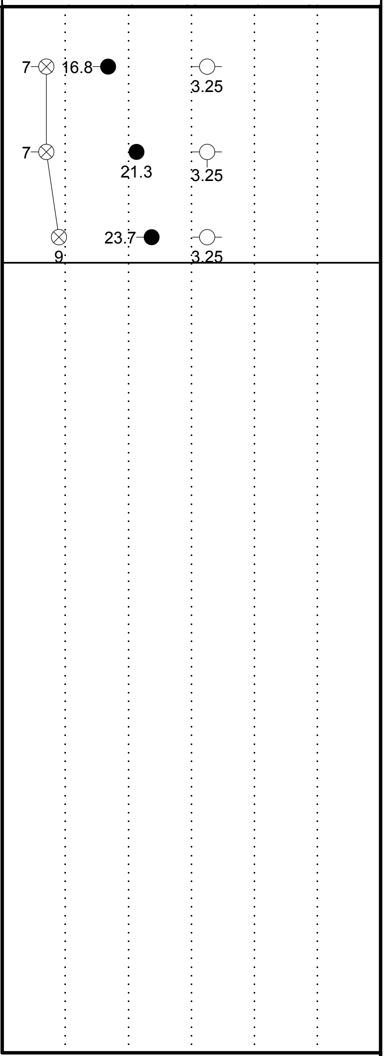
⊗ STANDARD PENETRATION BLOWS/FT

DESCRIPTION OF MATERIAL — ENGLISH UNITS

BOTTOM OF CASING ➤   LOSS OF CIRCULATION

SURFACE ELEVATION

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [5"], Gravel Depth [17"] | | | |
| | S-1 | SS | 18 | 14 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Black, Moist, Very Stiff | | | 7<br>4<br>3 |
| | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown, Moist, Very Stiff | | | 2<br>3<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 3<br>4<br>5 |
| | | | | | END OF BORING @ 7½' | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

WL   WS ☐   WD ☐

BORING STARTED 04/17/15

CAVE IN DEPTH

WL(BCR)   WL(ACR)

BORING COMPLETED 04/17/15

HAMMER TYPE

WL

RIG CME-45   FOREMAN SE

DRILLING METHOD

| CLIENT | JOB # | BORING # | SHEET |
|---|---|---|---|
| Lifetime | 10306-C | S-16 | 1 OF 1 |

PROJECT NAME: Lifetime Fitness Supplemental Borings

ARCHITECT-ENGINEER

SITE LOCATION: 1102 Skokie Boulevard, Northbrook, Illinois

NORTHING

EASTING

STATION

DESCRIPTION OF MATERIAL

ENGLISH UNITS

BOTTOM OF CASING

LOSS OF CIRCULATION

SURFACE ELEVATION

-○- CALIBRATED PENETROMETER TONS/FT²

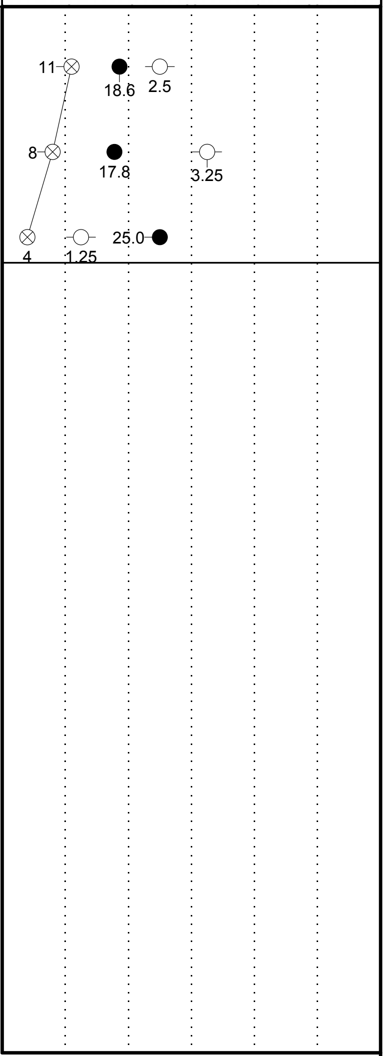
ROCK QUALITY DESIGNATION & RECOVERY

RQD% – — –    REC% ———

PLASTIC LIMIT% ×    WATER CONTENT% ●    LIQUID LIMIT% △

⊗ STANDARD PENETRATION BLOWS/FT

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [3"], Gravel Depth [13"] | | | |
| | S-1 | SS | 18 | 14 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Brown and Black, Moist, Very Stiff | | | 11<br>3<br>8 |
| | S-2 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown and Gray, Moist, Very Stiff to Stiff | | | 3<br>4<br>4 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | | | | 2<br>2<br>2 |
| | | | | | END OF BORING @ 7½' | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |

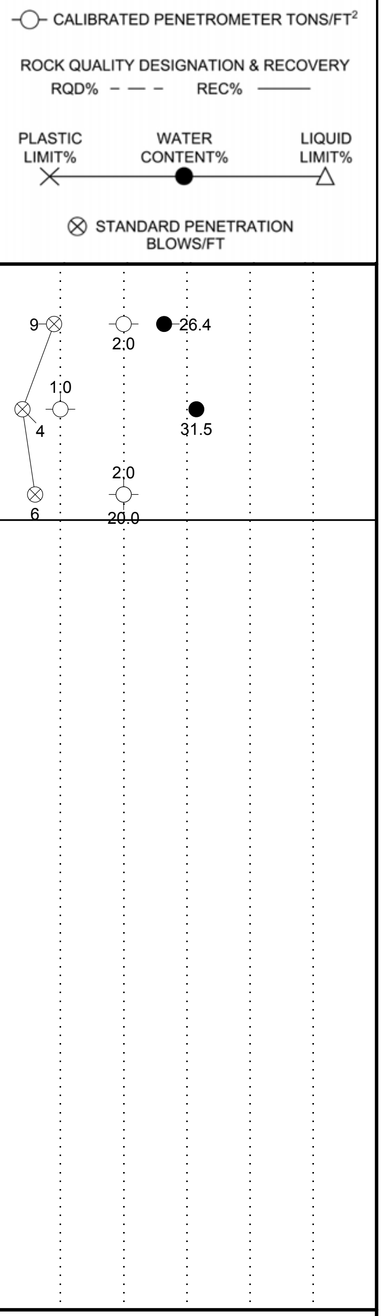


THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| WL    WS ☐    WD ☐ | BORING STARTED 04/16/15 | CAVE IN DEPTH |
| WL(BCR)    WL(ACR) | BORING COMPLETED 04/16/15 | HAMMER TYPE |
| WL | RIG CME-45    FOREMAN SE | DRILLING METHOD |

| | | | |
|---|---|---|---|
| CLIENT<br>Lifetime | JOB #<br>10306-C | BORING #<br>S-17 | SHEET<br>1 OF 1 |
| PROJECT NAME<br>Lifetime Fitness Supplemental Borings | ARCHITECT-ENGINEER | | |
| SITE LOCATION<br>1102 Skokie Boulevard, Northbrook, Illinois | | | |
| NORTHING | EASTING | STATION | |

| DEPTH (FT) | SAMPLE NO. | SAMPLE TYPE | SAMPLE DIST. (IN) | RECOVERY (IN) | DESCRIPTION OF MATERIAL ENGLISH UNITS<br>BOTTOM OF CASING ➤ LOSS OF CIRCULATION 100%<br>SURFACE ELEVATION | WATER LEVELS | ELEVATION (FT) | BLOWS/6" |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | Bituminous Pavement Depth [4"], Gravel Depth [7"] | | | |
| | S-1 | SS | 18 | 16 | (CL/ML FILL) SILTY CLAY, Trace Sand, Trace Gravel, Dark Gray and Black, Moist, Very Stiff | | | 4<br>4<br>5 |
| | S-2 | SS | 18 | 16 | (CL/CH) LEAN TO FAT CLAY, Trace Sand, Trace Gravel, Dark Gray and Black, Moist, Stiff | ▼<br>▽ | | 2<br>2<br>2 |
| 5 | | | | | | | | |
| | S-3 | SS | 18 | 18 | (CL/ML) SILTY CLAY, Trace Sand, Trace Gravel, Brown, Moist, Very Stiff | | | 2<br>3<br>3 |
| | | | | | END OF BORING @ 7½' | | | |
| 10 | | | | | | | | |
| 15 | | | | | | | | |
| 20 | | | | | | | | |
| 25 | | | | | | | | |
| 30 | | | | | | | | |



THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL TYPES. IN-SITU THE TRANSITION MAY BE GRADUAL.

| | | |
|---|---|---|
| ▽ WL 5½ WS ☐ WD ☐ | BORING STARTED 04/16/15 | CAVE IN DEPTH |
| ▽ WL(BCR) ▼ WL(ACR) 4½ | BORING COMPLETED 04/16/15 | HAMMER TYPE |
| ▽ WL | RIG CME-45 FOREMAN SE | DRILLING METHOD |

**SOIL CLASSIFICATION LEGEND**

- FILL - FILL (POSS/PROB) OF ALL TYPES.
- GW - WELL GRADED GRAVEL
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GC - CLAYEY GRAVEL
- SW - WELL GRADED SAND
- ST - SHELBY TUBE
- ML - LOW PLASTICITY SILT
- CL - LOW PLASTICITY CLAY
- MH - HIGH PLASTICITY SILT
- RC - ROCK CORE
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SC - CLAYEY SAND
- PM - PRESSURE METER
- CH - HIGH PLASTICITY CLAY
- OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
- OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
- PT - PEAT
- WR - WEATHERED ROCK
- PWR - PARTIALLY WEATHERED ROCK
- HWR - HIGHLY WEATHERED ROCK
- DR - DECOMPOSED ROCK

**SURFACE MATERIALS**

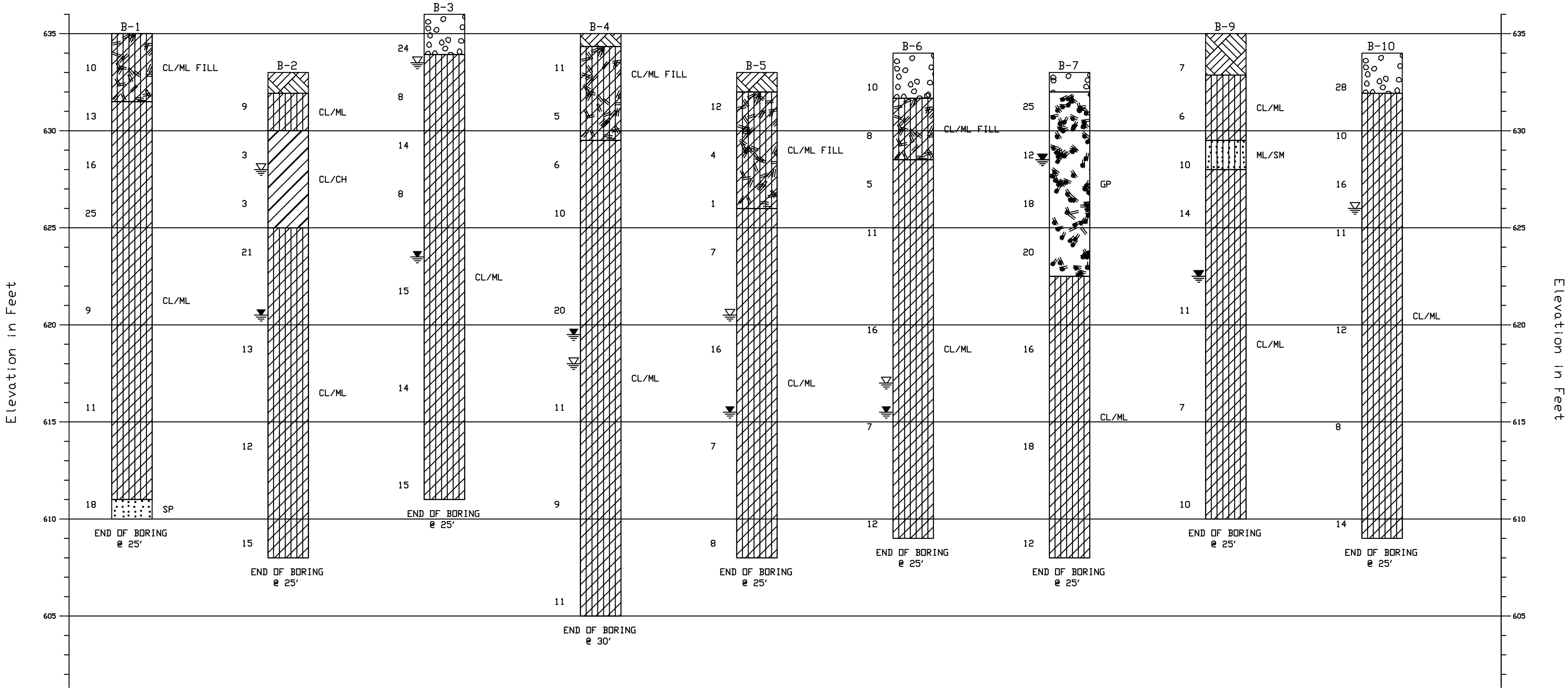
- TOPSOIL
- ASPHALT
- GRAVEL
- CONCRETE
- VOID

**ROCK TYPES**

- IGNEOUS
- METAMORPHIC
- SEDIMENTARY

**SYMBOL LEGEND**

- ▽ WATER LEVEL - DURING DRILLING/SAMPLING
- ▽ WATER LEVEL - BEFORE CASING REMOVAL
- ▼ WATER LEVEL - AFTER CASING REMOVAL
- ▽ WATER LEVEL - AFTER 24 HOURS



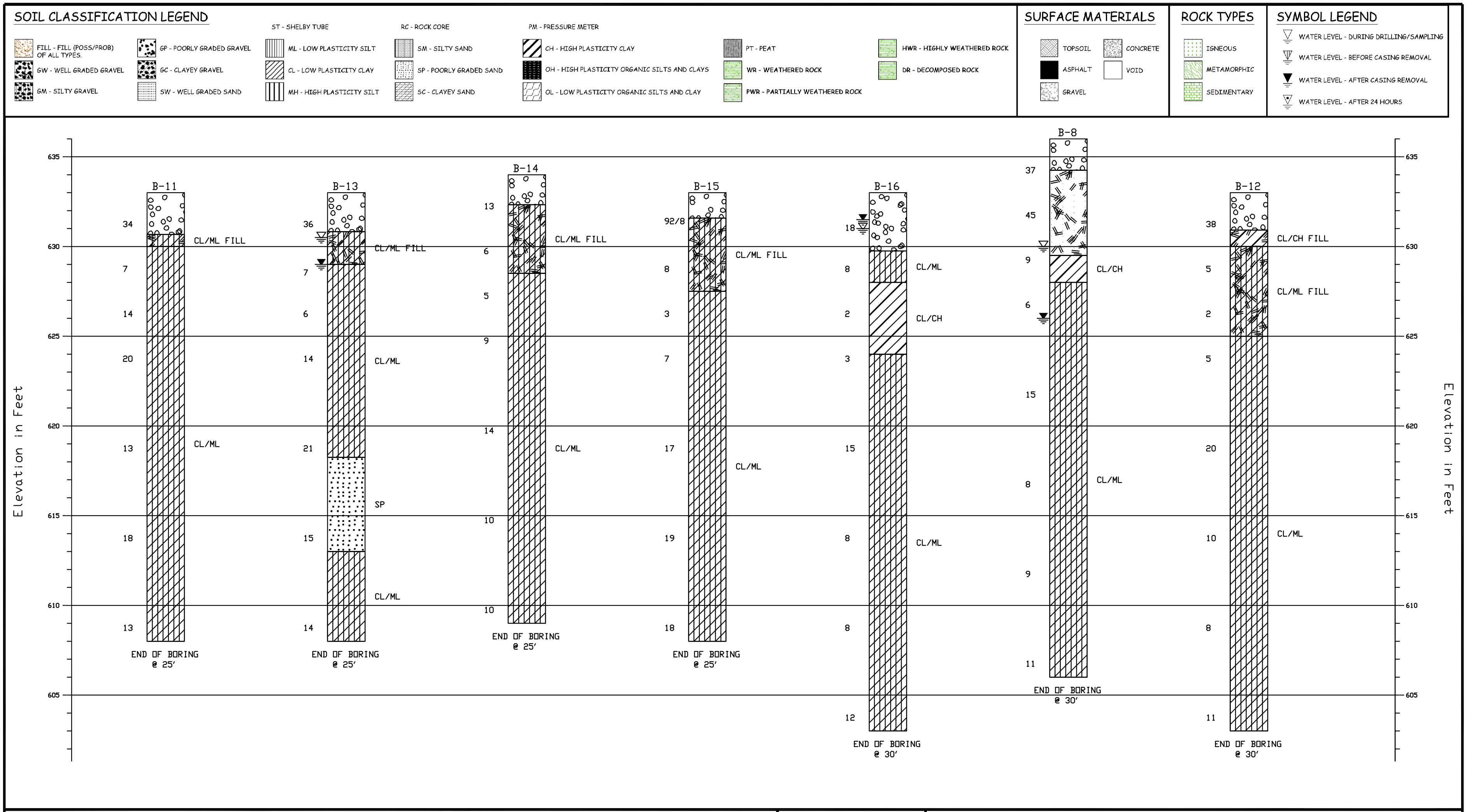
NOTES:
1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
2 PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (ASTM D1586).
3 HORIZONTAL DISTANCES ARE NOT TO SCALE.

ECS

# GENERALIZED SUBSURFACE SOIL PROFILE

Northbrook Fitness Development
Braun Intertec Corporation
1102 Skokie Boulevard, Northbrook, Illinois

PROJECT NO.: 10306-A | DATE: 7/6/2015 | VERTICAL SCALE: 1"=5'



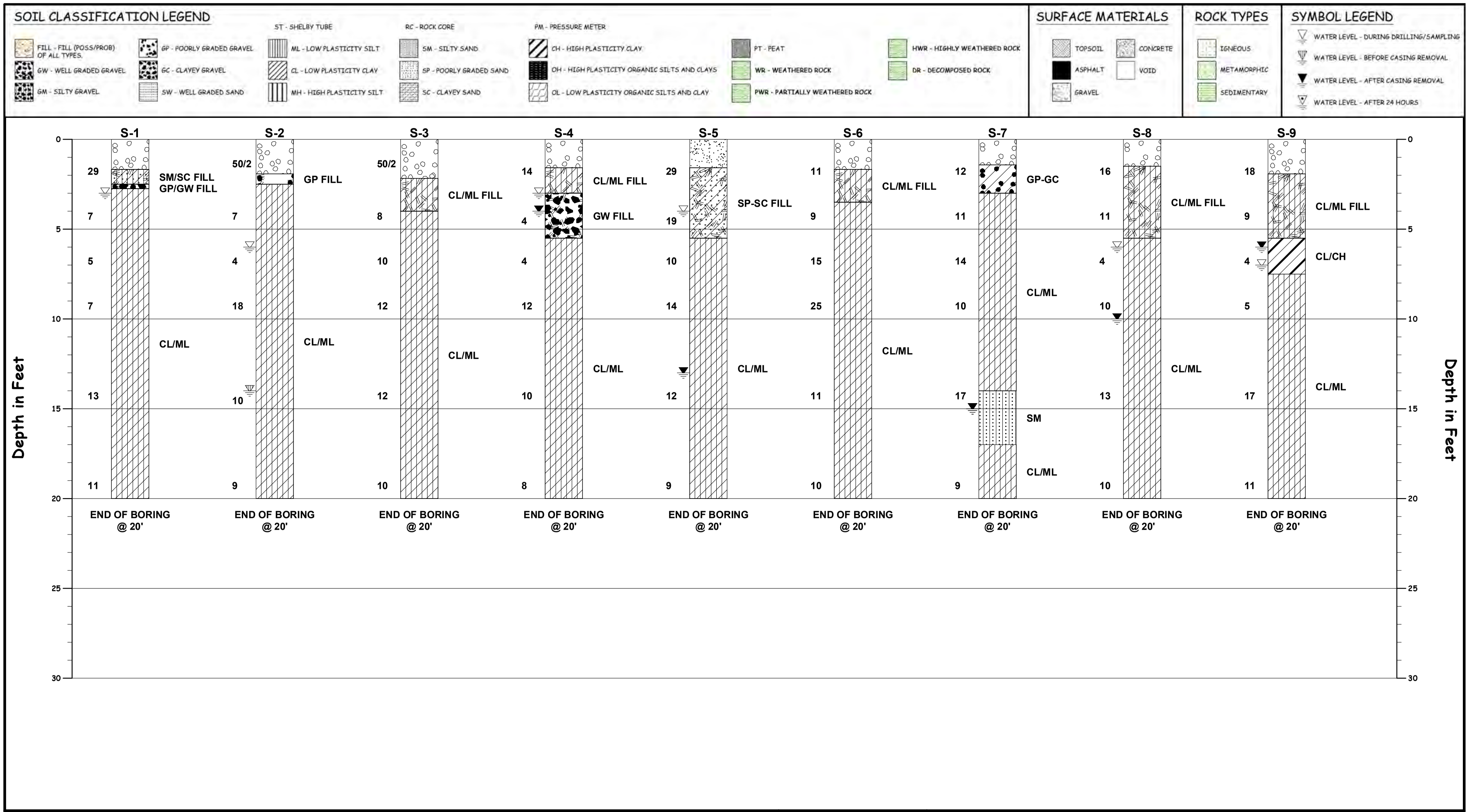
NOTES:
1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
2 PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (ASTM D1586).
3 HORIZONTAL DISTANCES ARE NOT TO SCALE.

ECS

# GENERALIZED SUBSURFACE SOIL PROFILE

Northbrook Fitness Development
Braun Intertec Corporation
1102 Skokie Boulevard, Northbrook, Illinois

| | | | | | |
|---|---|---|---|---|---|
| PROJECT NO.: | 10306-A | DATE: | 7/6/2015 | VERTICAL SCALE: | 1"=5' |



NOTES:
1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
2 PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (ASTM D1586).
3 HORIZONTAL DISTANCES ARE NOT TO SCALE.

# GENERALIZED SUBSURFACE SOIL PROFILE

Lifetime Fitness Supplemental Borings
Lifetime
1102 Skokie Boulevard, Northbrook, Illinois

PROJECT NO.: 10306-C | DATE: 7/6/2015 | VERTICAL SCALE: 1"=5'

## SOIL CLASSIFICATION LEGEND

ST - SHELBY TUBE
RC - ROCK CORE
PM - PRESSURE METER

- FILL - FILL (POSS/PROB) OF ALL TYPES.
- GW - WELL GRADED GRAVEL
- GM - SILTY GRAVEL
- GP - POORLY GRADED GRAVEL
- GC - CLAYEY GRAVEL
- SW - WELL GRADED SAND
- ML - LOW PLASTICITY SILT
- CL - LOW PLASTICITY CLAY
- MH - HIGH PLASTICITY SILT
- SM - SILTY SAND
- SP - POORLY GRADED SAND
- SC - CLAYEY SAND
- CH - HIGH PLASTICITY CLAY
- OH - HIGH PLASTICITY ORGANIC SILTS AND CLAYS
- OL - LOW PLASTICITY ORGANIC SILTS AND CLAY
- PT - PEAT
- WR - WEATHERED ROCK
- PWR - PARTIALLY WEATHERED ROCK
- HWR - HIGHLY WEATHERED ROCK
- DR - DECOMPOSED ROCK

## SURFACE MATERIALS

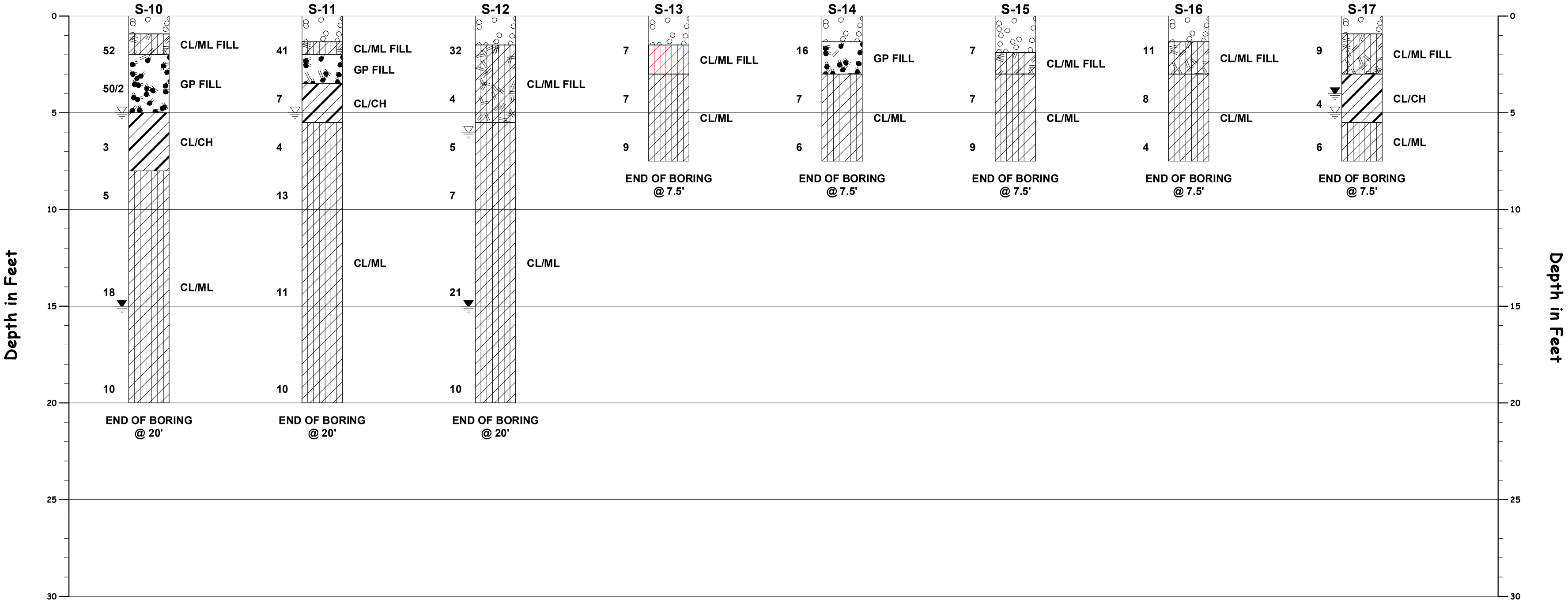
- TOPSOIL
- ASPHALT
- GRAVEL
- CONCRETE
- VOID

## ROCK TYPES

- IGNEOUS
- METAMORPHIC
- SEDIMENTARY

## SYMBOL LEGEND

- ▽ WATER LEVEL - DURING DRILLING/SAMPLING
- ▽ WATER LEVEL - BEFORE CASING REMOVAL
- ▼ WATER LEVEL - AFTER CASING REMOVAL
- ▽ WATER LEVEL - AFTER 24 HOURS



NOTES:
1 SEE INDIVIDUAL BORING LOG AND GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION.
2 PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (ASTM D1586).
3 HORIZONTAL DISTANCES ARE NOT TO SCALE.

# GENERALIZED SUBSURFACE SOIL PROFILE

Lifetime Fitness Supplemental Borings
Lifetime
1102 Skokie Boulevard, Northbrook, Illinois
PROJECT NO.: 10306-C | DATE: 7/6/2015 | VERTICAL SCALE: 1"=5'

# TEST PIT SUMMARY

## ECS Project No. 16:10306-B
## Proposed Northbrook Fitness Development
## 1102 Skokie Boulevard, Northbrook, Illinois

| Test Pit Number | Depth Below Existing Site Grade (Feet) | Soil Conditions | Moisture Content (Percent) | Remarks |
|---|---|---|---|---|
| TP-1<br>(EL. 633) | 0 to ½ | 6 inches Bituminous Material | | With Geotextile Fabric Between 3-inch Rock and Brown Silty Clay Fill.<br>Significant Perched Water Seepage From CA-1 Layer |
| | ½ to 2 | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 2 to 3 | Gray Crushed 3-inch Rock Fill (Similar to CA-1) | | |
| | 3 to 4½ | Brown Silty Clay Fill | 17 | |
| | 4½ to 6 | Black and Dark Gray Organic Silty Gray Fill | 35 | |
| | 6 to 8 | Brown and Gray Silty Clay | 25 | |
| | | | | |
| TP-2<br>(EL. 633) | 0 to ½ | 6 inches Bituminous Material | | With Geotextile Fabric Between Crushed Sand and Gravel Layers.<br>Significant Water Seepage From Sand and Gravel Layer |
| | ½ to 1½ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1½ to 2½ | Gray Crushed Sand and Gravel Fill (Mostly Similar to CA-1) | | |
| | 2½ to 4½ | Brown Silty Clay Fill | 17 | |
| | 4½ to 7 | Black and Dark Gray Organic Silty Clay Fill | 39 | |
| | 7 to 8 | Brown and Gray Silty Clay | 31 | |
| | | | | |
| TP-3<br>(EL. 633) | 0 to ⅓ | 4 inches Bituminous Material | | With Geotextile Fabric Between Crushed Sand and Gravel Layers.<br>Seepage Was Minimal During Excavation. Water Started to Accumulate at the Bottom After Excavation. |
| | ⅓ to 1⅔ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1⅔ to 2⅓ | Gray Crushed Sand and Gravel Fill | | |
| | 2⅓ to 3 | Dark Brown and Black Sandy Clayey Silt Fill With Gravel | 18 | |
| | 3 to 5 | Brown Silty Clay Fill | 19 | |
| | 5 to 7 | Black and Dark Gray Organic Silty Clay Fill | 40 | |
| | 7 to 8 | Greenish Brown and Gray Silty Clay | 27 | |
| | 8 to 8½ | Brown and Gray Silty Clay | | |
| | | | | |
| TP-4<br>(EL. 633) | 0 to ⅓ | 5 inches Bituminous Material | | No Geotextile Fabric<br>Seepage Was Minimal During Excavation. Water Started to Accumulate at the Bottom After Excavation. |
| | ⅓ to 2 | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 2 to 2⅛ | Gray Crushed Sand and Gravel Fill | | |
| | 2⅛ to 3 | Dark Brown Sandy Clayey Silt Fill With Gravel, Trace Brick | | |
| | 3 to 5 | Brown Silty Clay Fill | 16 | |
| | 5 to 6½ | Black and Dark Gray Organic Silty Clay Fill | 44 | |
| | 6½ to 9 | Greenish Brown and Gray Silty Clay | 29 | |
| | 9 to 9½ | Brown and Gray Silty Clay | | |

# TEST PIT SUMMARY

## ECS Project No. 16:10306-B
## Proposed Northbrook Fitness Development
## 1102 Skokie Boulevard, Northbrook, Illinois

| Test Pit Number | Depth Below Existing Site Grade (Feet) | Soil Conditions | Moisture Content (Percent) | Remarks |
|---|---|---|---|---|
| TP-5<br>(EL. 633) | 0 to ⅓ | 4 inches Bituminous Material | | With Geotextile Fabric Between Crushed Sand and Gravel Layers.<br>Seepage Was Minimal During Excavation. Water Started to Accumulate at the Bottom After Excavation. |
| | ⅓ to 1⅔ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1⅔ to 3 | Gray Crushed Sand and Gravel Fill (Mostly Similar to CA-6) | | |
| | 3 to 4½ | Brown Silty Clay Fill | 14 | |
| | 4½ to 6 | Black and Dark Gray Organic Silty Clay Fill | 29 | |
| | 6 to 7½ | Greenish Brown and Gray Silty Clay | 28 | |
| | 7½ to 9 | Brown and Gray Silty Clay | 25 | |
| | | | | |
| TP-6<br>(EL. 633) | 0 to ⅓ | 4 inches Bituminous Material | | With Geotextile Fabric Between Crushed Sand and Gravel Layers.<br>Seepage Was Minimal During Excavation. Water Started to Accumulate at the Bottom After Excavation. |
| | ⅓ to 1⅔ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1⅔ to 2½ | Gray Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 2½ to 4 | Brown Silty Clay Fill | 17 | |
| | 4 to 5½ | Black and Dark Gray Organic Silty Clay Fill | 34 | |
| | 5½ to 6½ | Greenish Brown and Gray Silty Clay | 32 | |
| | 6½ to 8 | Brown and Gray Silty Clay | 25 | |
| | | | | |
| TP-7<br>(EL. 633) | 0 to ⅓ | 5 inches Bituminous Material | | With Geotextile Fabric Between Sand and Gravel and Brown Sandy Clay Fill Layers.<br>Excavation Was Dry During and After Excavation. |
| | ⅓ to 1½ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1½ to 2¾ | Brown Sandy Clay Fill | | |
| | 2¾ to 4 | Sand and Gravel With Debris Fill (Wood, Steel, Ceramics) | | |
| | 4 to 5½ | Brown Silty Clay Fill | 13 | |
| | 5½ to 6½ | Black and Dark Gray Organic Silty Clay Fill | 32 | |
| | 6½ to 7½ | Bluish Gray Silty Clay | 21 | |
| | 7½ to 8 | Brown and Gray Silty Clay With Sand Seam | | |
| | | | | |
| TP-8<br>(EL. 635) | 0 to 1 | 12 inches Topsoil | | Excavation Was Dry During and After Excavation. |
| | 1 to 3 | Brown Sand and Gravel Fill With Clay Mix | | |
| | 3 to 4 | Gray Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 4 to 5 | Black Clayey Silt Fill (Original Topsoil) | | |
| | 5 to 6½ | Brown Silty Clay Fill | 18 | |
| | 6½ to 8 | Black Organic Silty Clay Fill | 48 | |

# TEST PIT SUMMARY

## ECS Project No. 16:10306-B
## Proposed Northbrook Fitness Development
## 1102 Skokie Boulevard, Northbrook, Illinois

| Test Pit Number | Depth Below Existing Site Grade (Feet) | Soil Conditions | Moisture Content (Percent) | Remarks |
|---|---|---|---|---|
| TP-8 | 8 to 9½ | Soft Bluish to Greenish Brown and Gray Silty Clay | 41 | |
| | | | | |
| TP-9<br>(EL. 635) | 0 to ⅔ | 7 inches Portland Cement Concrete | | Excavation Was Dry During and After Excavation. |
| | ⅔ to 1⅔ | Brown Fine Sand Fill | | |
| | 1⅔ to 4 | Brown Sand and Gravel Fill | | |
| | 4 to 4½ | Black Clayey Silt Fill | | |
| | 4½ to 6 | Gravel and Brick Fill | | |
| | 6 to 7 | Brown Silty Clay Fill | | |
| | 7 to 8½ | Black to Dark Gray/Bluish Silty Clay Fill | 38 | |
| | | | | |
| TP-10<br>(EL. 632) | 0 to ⅓ | 4 inches Bituminous Material | | Excavation Was Dry During and After Excavation. |
| | ⅓ to 1½ | Brown Sand and Gravel Fill | | |
| | 1½ to 2½ | Dark Brown and Black Silty Clay Fill | | |
| | 2½ to 4½ | Brown Silty Clay Fill | 17 | |
| | 4½ to 6 | Black Organic Silty Clay Fill | 42 | |
| | 6 to 7 | Bluish Gray Silty Clay Fill | | |
| | 7 to 8 | Brown and Gray Silty Clay | | |
| | | | | |
| TP-11<br>(EL. 632) | 0 to 1 | Topsoil | | The Gray Crushed Sand and Gravel Fill was Wet. Excavation was not Deepened Due to Possible Utility Backfill |
| | 1 to 6 | Brown, Dark Brown and Black Silty Clay Fill | 26 | |
| | 6 to 7 | Black Organic Silty Clay Fill | | |
| | 7 to 8 | Gray Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | | | | |
| TP-12<br>(EL. 632) | 0 to ¼ | 3 inches Bituminous Material | | With Geotextile Fabric Between Sand and Gravel and Sandy Silty Clay Fill Layers.<br>Excavation Was Dry During Excavation. Water Started to Accumulate After Excavation. |
| | ¼ to 1⅓ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1⅓ to 2⅓ | Dark Brown and Black Sandy Silty Clay Fill | | |
| | 2⅓ to 4½ | Brown Silty Clay Fill | 16 | |
| | 4½ to 6 | Black to Bluish Gray Organic Silty Clay Fill | 31 | |
| | 6 to 7 | Greenish Brown and Gray Silty Clay | 28 | |
| | 7 to 8½ | Brown and Gray Silty Clay | 23 | |

# TEST PIT SUMMARY

## ECS Project No. 16:10306-G
## Lifetime Fitness Supplemental Test Pits
## 1102 Skokie Boulevard, Northbrook, Illinois

| Test Pit Number | Depth Below Existing Site Grade (Feet) | Soil Conditions | Moisture Content (Percent) | Remarks |
|---|---|---|---|---|
| LT-1<br>(*EL. 635) | 0 to ⅓ | 4 inches Bituminous Material | | Excavation was dry during and after excavation. |
| | ⅓ to 1⅔ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1⅔ to 2½ | Light Gray Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 2½ to 3½ | Gray Crushed 3-inch Rock Fill (Similar to CA-1) | | |
| | 3½ to 4¼ | Reddish Brown Silty Clay Fill, Slight Organics | | |
| | 4¼ to 5¾ | Black and Dark Gray Silty Clay Fill | | |
| | 5¾ to 8½+ | Tan Silty Clay, Slight Sand | 21 | |
| | | | | |
| LT-2<br>(*EL. 635) | 0 to ½ | 7 inches Bituminous Material | | Excavation was dry during and after excavation. |
| | ½ to 1½ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1½ to 3 | Black Crushed Sand and Gravel Fill (Similar to CA-6) with some Clayey Silt Fill | 19 | |
| | 3 to 8+ | Tan with Light Gray Silty Clay | 18 | |
| | | | | |
| LT-3<br>(*EL. 635) | 0 to ½ | 7 inches Concrete | | Excavation was dry during and after excavation.<br>With geotextile below concrete.<br>Wires and pipes were observed in the Poorly Graded Sand |
| | ½ to 2¼ | Tan Poorly Graded Sand Fill | | |
| | 2¼ to 3 | Black Crushed Gravel and Sand Fill | | |
| | 3 to 8+ | Tan with Light Gray Silty Clay, Slight Sand | 17 | |
| | | | | |
| LT-4<br>(*EL. 635) | 0 to ½ | 6 inches Concrete | | Excavation filled with water from a thin-walled plastic pipe. The water flow eventually subsided.<br>With geotextile below concrete. |
| | ½ to 3½ | Tan Poorly Graded Sand Fill | | |
| | 3½ to 7+ | Black and Gray Silty Clay Fill with Sand | 23 | |

*Please note the test pit ground elevations were estimated using Google Earth® and should not be considered accurate from a design perspective

# TEST PIT SUMMARY

## ECS Project No. 16:10306-G
## Lifetime Fitness Supplemental Test Pits
## 1102 Skokie Boulevard, Northbrook, Illinois

| Test Pit Number | Depth Below Existing Site Grade (Feet) | Soil Conditions | Moisture Content (Percent) | Remarks |
|---|---|---|---|---|
| LT-5 (*EL. 635) | 0 to ¼ | 2 to 5 inches Bituminous Material | | Excavation was dry during and after excavation.<br>**Test pit terminated on an apparent below-grade concrete structure.** |
| | ¼ to 2 | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 2 to 2½ | Black Silty Clay Fill | | |
| | 2½ to 4+ | Brick and Concrete Debris with Black Gravel Fill (Similar to CA-1) | | |
| | | | | |
| LT-6 (*EL. 635) | 0 to ½ | 4 to 7 inches Bituminous Material | | Excavation was dry during and after excavation.<br>Filter fabric was observed below the Brown Sand and Gravel Fill.<br>**Test pit terminated on an apparent below-grade concrete structure.** |
| | ½ to 2 | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 2 to 3 | Gray Crushed Gravel Fill (Similar to CA-1) with some Sand and Silt | | |
| | 3 to 4+ | Black Sand and Gravel Fill | | |
| | | | | |
| LT-7 (*EL. 634) | 0 to ½ | 5 inches Bituminous Material | | Excavation was dry during and after excavation. |
| | ½ to 2 | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 2 to 6½ | Black and Gray Clayey Silt Fill | 18 | |
| | 6½ to 7+ | Tan and Light Gray Silty Clay | 21 | |
| | | | | |
| LT-8 (*EL. 635) | 0 to ½ | 5 inches Bituminous Material | | Excavation was dry during and after excavation.<br>Wires were observed in a pipe around 3 feet below grade. |
| | ½ to 2 | Dark Brown Sand and Gravel Fill | | |
| | 2 to 2⅔ | Gray Crushed Gravel Fill (Similar to CA-1) with Sand | | |
| | 2⅔ to 3½ | Black and Dark Gray Clayey Silt Fill | 20 | |
| | 3½ to 7+ | Tan and Gray Silty Clay | 16 | |

*Please note the test pit ground elevations were estimated using Google Earth® and should not be considered accurate from a design perspective

# TEST PIT SUMMARY

## ECS Project No. 16:10306-G
## Lifetime Fitness Supplemental Test Pits
## 1102 Skokie Boulevard, Northbrook, Illinois

| Test Pit Number | Depth Below Existing Site Grade (Feet) | Soil Conditions | Moisture Content (Percent) | Remarks |
|---|---|---|---|---|
| DC-1<br>(*EL. 635) | 0 to ¼ | 3 inches Bituminous Material | | Perched water was observed in the Black Gravel Fill with Brick and Concrete. |
| | ¼ to 2 | Brown Sand and Gravel Fill | | |
| | 2 to 3 | Black and Dark Gray Silty Clay Fill | | |
| | 3 to 3⅔ | Light Gray Gravel Fill (Similar to CA-1) | | |
| | 3⅔ to 4½ | Reddish Black Sand and Gravel Fill | | |
| | 4½ to 6½ | Black to Bluish Gray Silty Clay Fill with some Concrete | 34 | |
| | 6½ to 8+ | Tan and Gray Silty Clay with Sand | 37 | |
| | | | | |
| DC-2<br>(*EL. 634) | 0 to ⅓ | 3 to 4 inches Bituminous Material | | Perched water was observed in the Black Gravel Fill with Brick and Concrete. |
| | ⅓ to 1½ | Brown Sand and Gravel Fill | | |
| | 1½ to 2½ | Tan Silty Clay Fill | | |
| | 2½ to 2¾ | Light Gray Gravel Fill | | |
| | 2¾ to 4¼ | Black Gravel Fill (Similar to CA-1) with Significant quantities of Brick and Concrete | | |
| | 4¼ to 6+ | Gray Silty Clay Possible Fill, Slight Brick | 25 | |
| | | | | |
| DC-3<br>(*EL. 633) | 0 to ¼ | 3 inches Bituminous Material | | Excavation was dry during and after excavation. |
| | ¼ to 1½ | Brown Sand and Gravel Fill (Similar to CA-6) | | |
| | 1½ to 3 | Gray Sand and Gravel Fill (Similar to CA-6) | | |
| | 3 to 3⅓ | Gray Gravel Fill (Similar to CA-1) | | |
| | 3⅓ to 6 | Tan and Gray Silty Clay Fill with Limestone Chunks | 18 | |
| | 6 to 7 | Black Silt Fill, Slight Organics | | |
| | 7 to 8+ | Bluish Gray Silty Clay Fill | 43 | |
| | | | | |
| DC-4<br>(*EL. 633) | 0 to ¼ | 3 inches Bituminous Material | | Excavation was dry during and after excavation.<br>**Test pit terminated on an apparent below-grade concrete pipe.** |
| | ¼ to 1⅔ | Brown Crushed Sand and Gravel Fill (Similar to CA-6) | | |
| | 1⅔ to 2½ | Light Tan Concrete chunks with Sand and Gravel Fill | | |
| | 2½ to 3+ | Black and Dark Gray Clayey Silt Fill with Brick and Concrete | 22 | |

*Please note the test pit ground elevations were estimated using Google Earth® and should not be considered accurate from a design perspective

**Photograph No. 1**
TP-1

**Photograph No. 2**
TP-2

**Photograph No. 3**
TP-3

**Photograph No. 4**
TP-3

**Photograph No. 5**
TP-4

**Photograph No. 6**
Excavated Soils from TP-4

**Photograph No. 7**
TP-5

**Photograph No. 8**
Excavated Black and Dark Gray Organic Silty Clay and Brown Silty Clay Fill Soils From TP-5

**Photograph No. 9**
TP-6

**Photograph No. 10**
TP-7

**Photograph No. 11**
TP-8

**Photograph No. 12**
Excavated Sand, Gravel and Brick Fill Materials from TP-9

**Photograph No. 13**

Excavated Brown Silty Clay and Black Organic Silty Clay Filll Soils from TP-9

**Photograph No. 14**

TP-10

**Photograph No. 15**
Excavated Granular Soils from TP-10

**Photograph No. 16**
Excavated Brown Silty Clay Fill and Black Organic Silty Clay Fill Soils from TP-10

**Photograph No. 17**
TP-11

**Photograph No. 18**
Excavated Silty Clay Fill Soils from TP-11

**Photograph No. 19**

TP-12

**Photograph No. 20**

Excavated Brown Silty Clay Fill and Underlying Black to Bluish Gray Organic Silty Clay Fill from TP-12

**Photograph No. 21**

Excavated Natural Brown and Gray Silty Clay from TP-12

**Photograph No. 1 – LT-1**

**Photograph No. 2 – LT-2**

Photograph No. 3 – LT-2 Side View

Photograph No. 4 – LT-3

Photograph No. 5 – Excavating LT-4

Photograph No. 6 – LT-4 Filled with Water

Photograph No. 7 – LT-5

Photograph No. 8 – Excavated Brick and Concrete Debris with Black Gravel Fill from LT-5

**Photograph No. 9 – LT-6**

**Photograph No. 10 – LT-7**

**Photograph No. 11 – LT-8**

**Photograph No. 12 – Excavated Wiring from LT-8**

**Photograph No. 13 – DC-1**

**Photograph No. 14 – DC-2**


**Photograph No. 15 – Close-up of DC-2**


**Photograph No. 16 – DC-3**

**Photograph No. 17 – Concrete Pipe Obstruction at DC-4**

# ECS Midwest, LLC
## Buffalo Grove, Illinois
## Pressuremeter Testing Summary

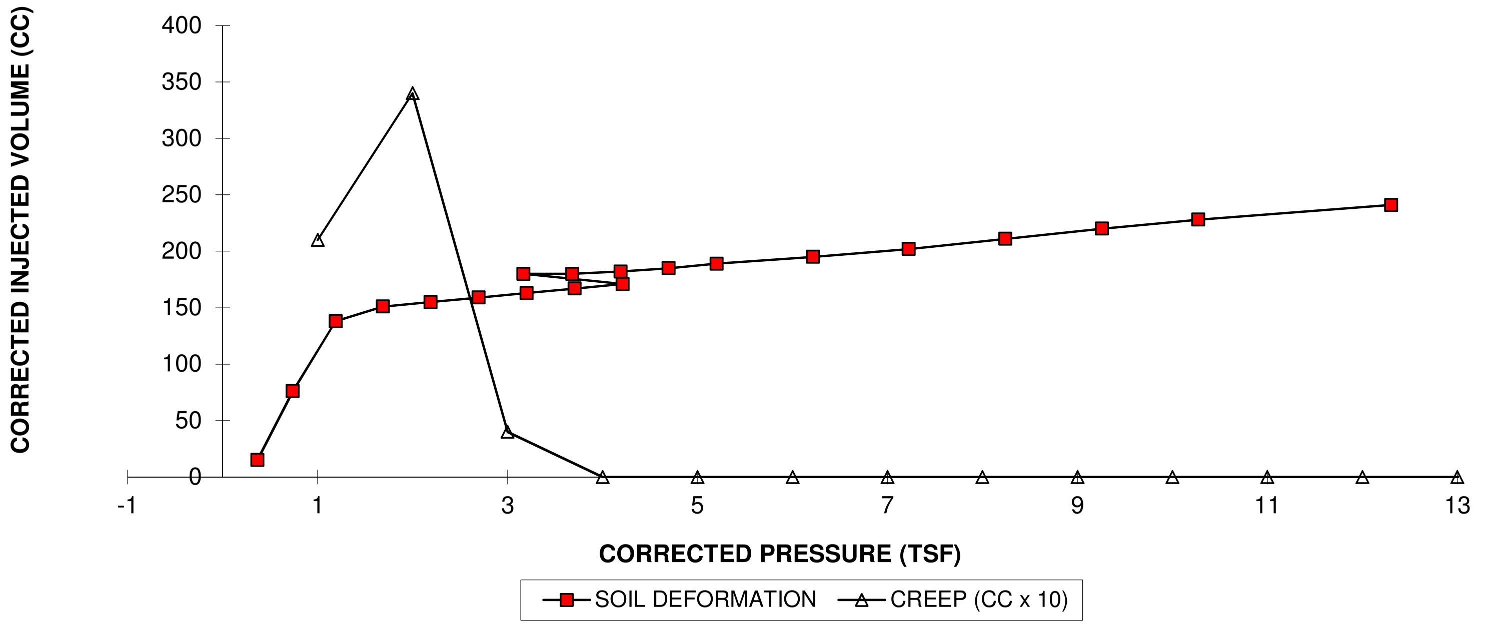
**Project Number: 10306-A** **Project Name: Lifetime Fitenss Northbrook** **Date: 10/2/2014**

**Project Engineer: MTB** **Principal Engineer: BG** **Summary By: MTB**

| Boring Number | Depth (feet) | Elevation (feet) | Depth to Water (feet) | Water Elevation (feet) | USCS | $P_o$ | $P_f$ | $P_l$ | $E_d$ | $E_r$ | "N" | $E_d / P_l$ | $E_d / E_r$ | $E_d$ / "N" | $P_l / P_f$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-2 | 10 | 623 | NA | NA | CL | 1 | 10 | 20 | 240 | 1078 | 21 | 12 | 0.22 | 11.43 | 2 |
| B-2 | 15 | 618 | NA | NA | CL | 0.5 | 3.5 | 7 | 63 | | 13 | 9.00 | | 4.85 | 2 |
| B-2 | 20 | 613 | NA | NA | CL | 1.25 | 3.5 | 7 | 58 | | 12 | 8.29 | | 4.83 | 2 |
| B-8 | 10 | 626 | NA | NA | CL | 1.25 | 3 | 6 | 63 | | 6 | 10.50 | | 10.50 | 2 |
| B-8 | 15 | 621 | 0 | 585 | CL | 1 | 6 | 12 | 83 | 242 | 15 | 6.92 | 0.34 | 5.53 | 2 |
| B-8 | 20 | 618 | NA | NA | CL | 1 | 3 | 6 | 47 | | 8 | 7.83 | | 5.88 | 2 |
| B-10 | 4.5 | 629.5 | NA | NA | CL | 1 | 6 | 12 | 73 | 531 | 9 | 6.08 | 0.14 | 8.11 | 2 |
| B-10 | 7.5 | 626.5 | NA | NA | CL | 1 | 10 | 20 | 233 | 528 | 14 | 11.65 | 0.44 | 16.64 | 2 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

**Notes:**

Po, Pf, Pl, Ed and Er are in units of tons per square foot.



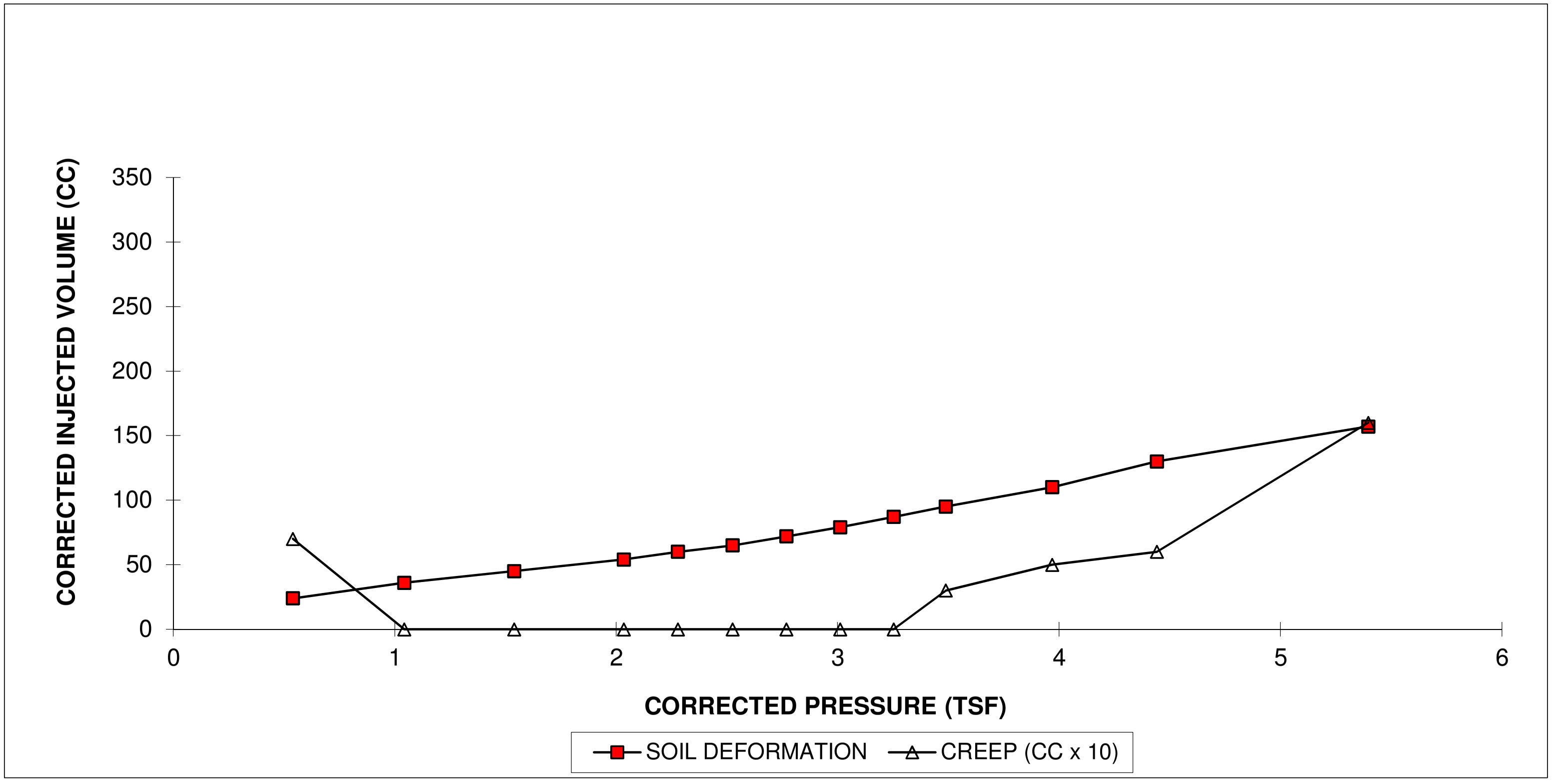
| | | | |
|---|---|---|---|
| Boring No: | B-2 | Depth: | 10 |
| Soil Description: | Silty CLAY | "N": | 21 |
| Classification: | CL | | |

**Project:** **Lifetime Fitness Northbrook**
**Project No.:** **10306-A**

**Date:** **10/2/2014**

**ECS Midwest, LLC**
**Buffalo Grove, Illinois**

**Pressure Meter Data Reduction**



Boring No: B-2

Soil Description: Silty CLAY

Classification: CL

Depth: 15

"N": 13

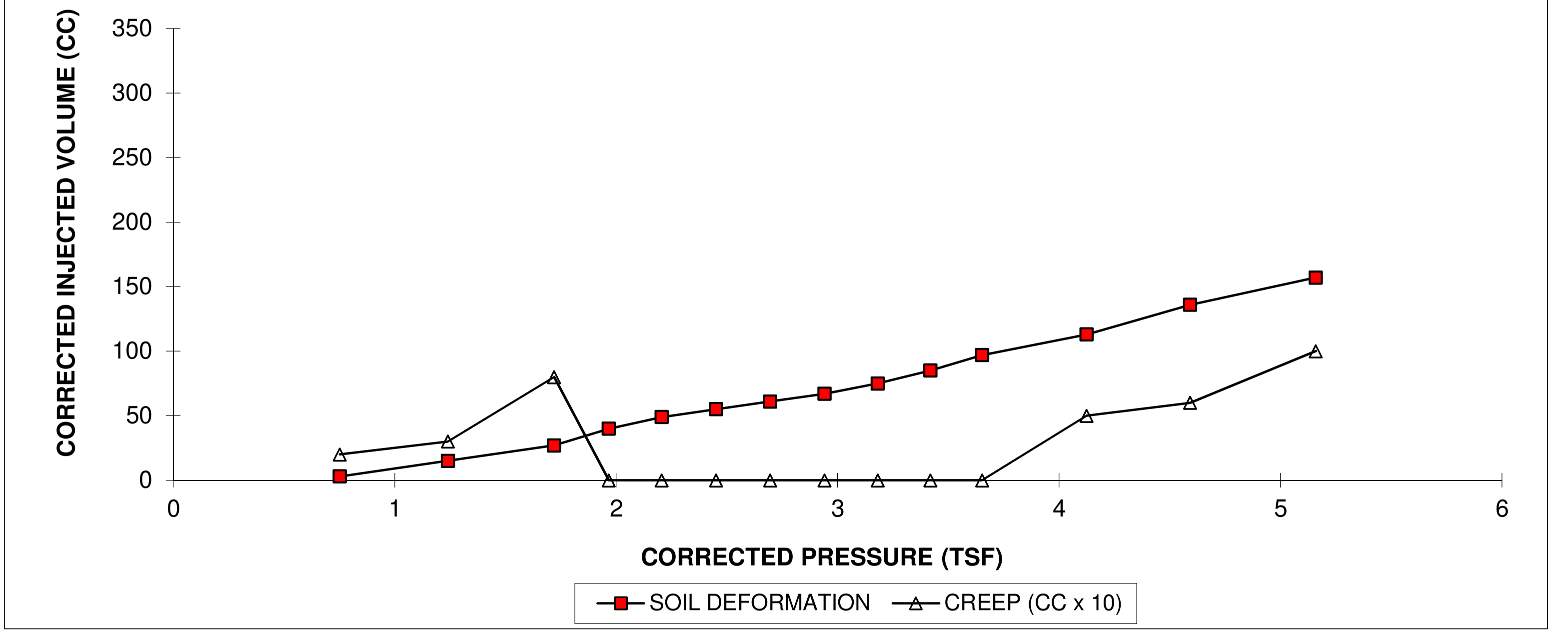
**Project:** **Lifetime Fitness Northbrook**

**Project No.:** **10306-A**

**Date:** **10/2/2014**

**ECS Midwest, LLC**
**Buffalo Grove, Illinois**

**Pressure Meter Data Reduction**



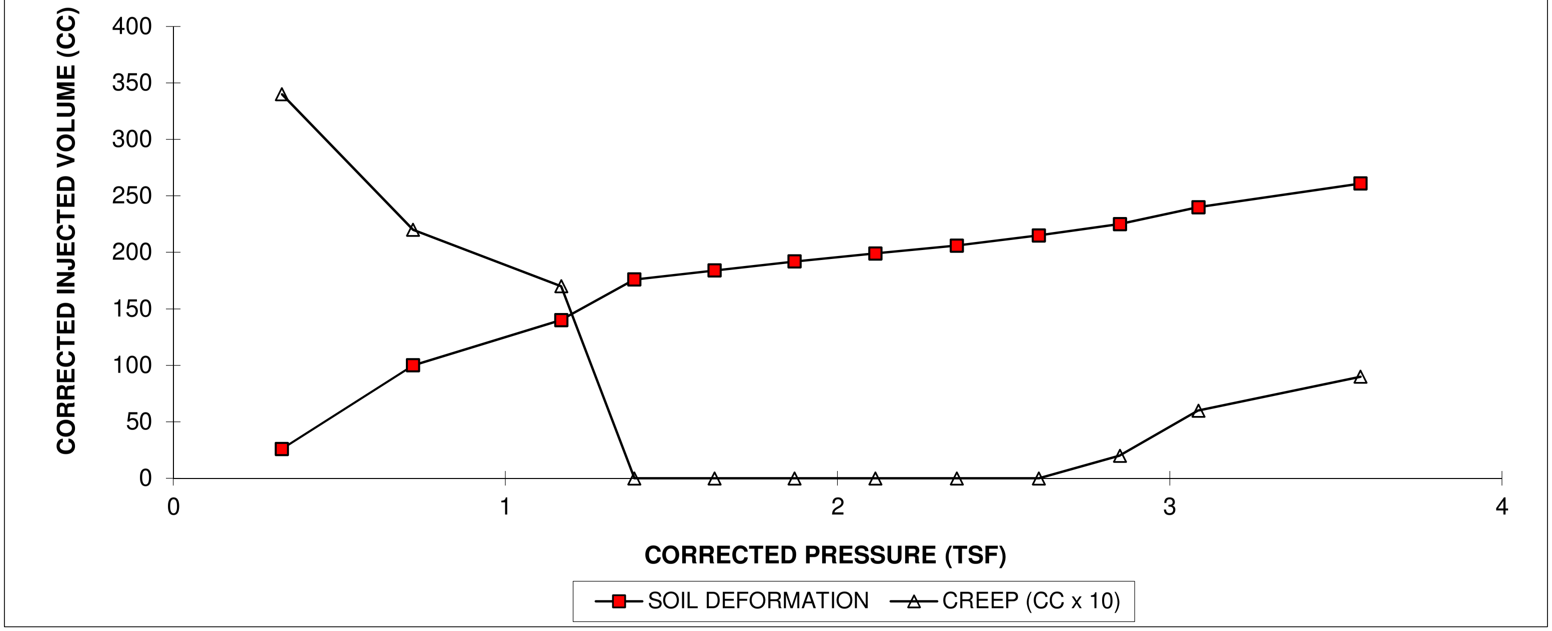
| | | | |
|---|---|---|---|
| Boring No: | B-2 | Depth: | 20 |
| Soil Description: | Silty CLAY | "N": | 12 |
| Classification: | CL | | |

**Project:** **Lifetime Fitness Northbrook**
**Project No.:** **10306-A**

**Date:** **10/2/2014**

**ECS Midwest, LLC**
**Buffalo Grove, Illinois**

**Pressure Meter Data Reduction**



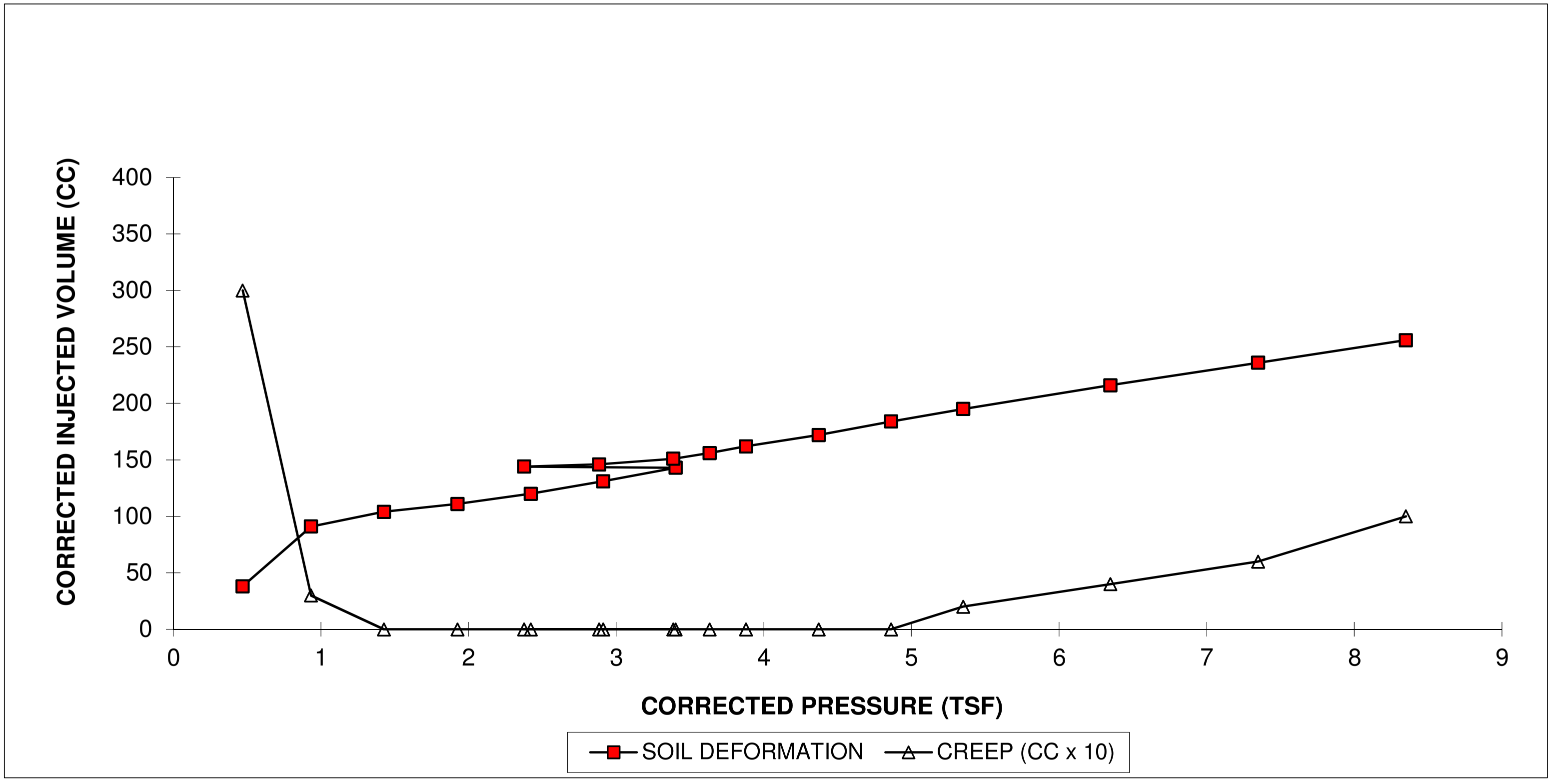
| | | | |
|---|---|---|---|
| Boring No: | B-8 | Depth: | 10 |
| Soil Description: | Silty CLAY | "N": | 6 |
| Classification: | CL | | |

**Project:** **Lifetime Fitness Northbrook**
**Project No.:** **10306-A**

**Date:** **10/2/2014**

**ECS Midwest, LLC**
**Buffalo Grove, Illinois**

**Pressure Meter Data Reduction**



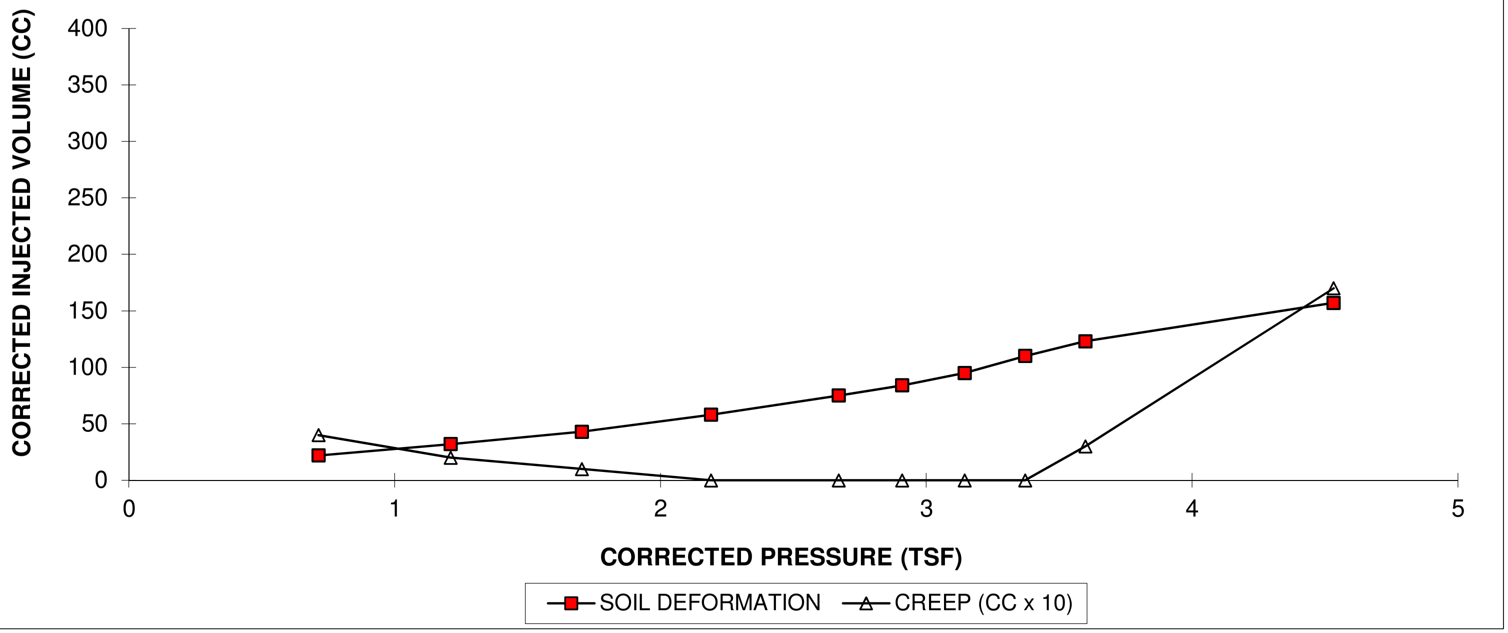
| | | | |
|---|---|---|---|
| Boring No: | B-8 | Depth: | 15 |
| Soil Description: | Silty CLAY | "N": | 15 |
| Classification: | CL | | |

**Project:** **Lifetime Fitness Northbrook**
**Project No.:** **10306-A**

**Date:** **10/2/2014**

**ECS Midwest, LLC**
**Buffalo Grove, Illinois**

**Pressure Meter Data Reduction**



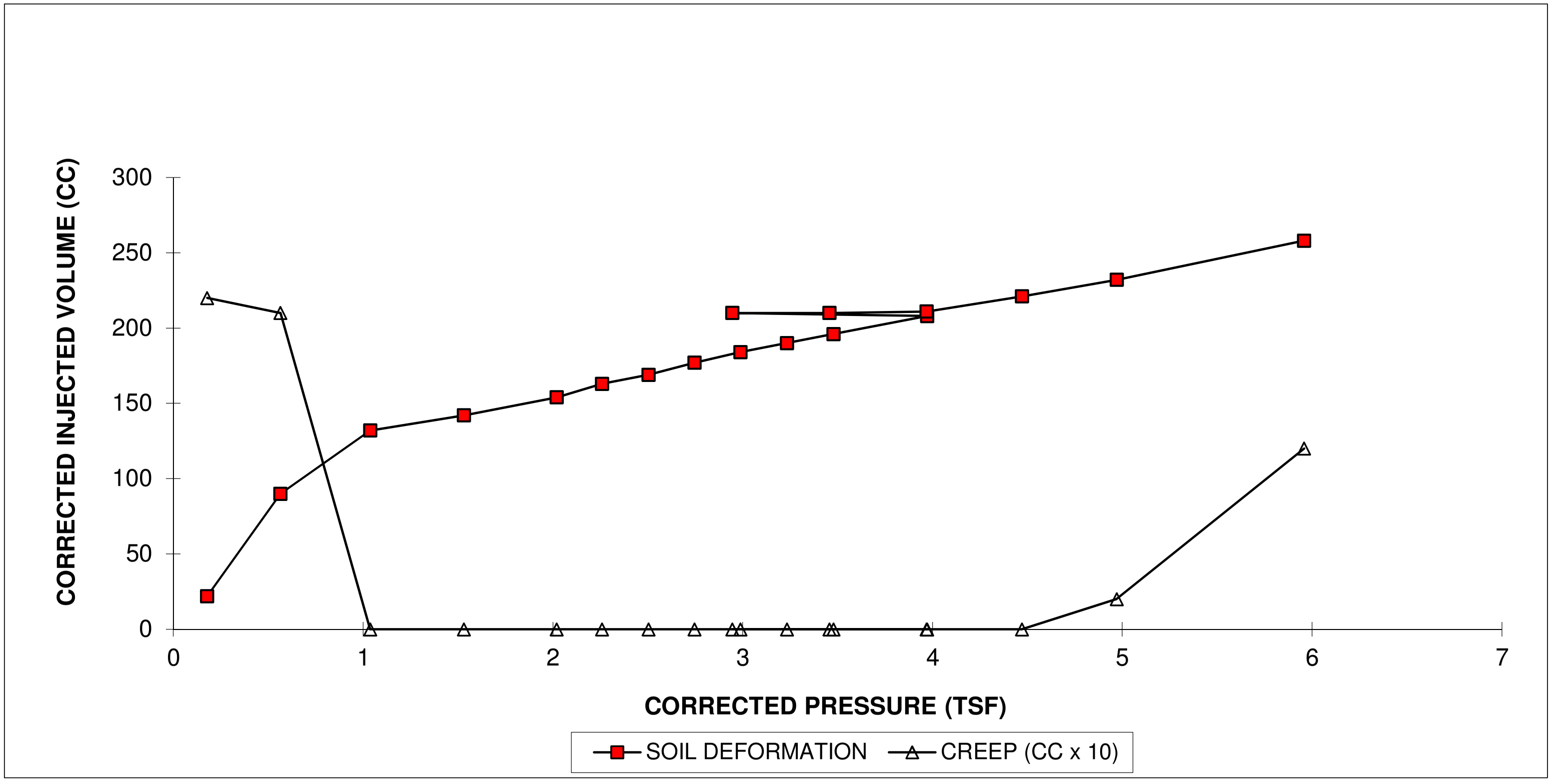
| | | | |
|---|---|---|---|
| Boring No: | B-8 | Depth: | 20 |
| Soil Description: | Silty CLAY | "N": | 8 |
| Classification: | CL | | |

**Project:** **Lifetime Fitness Northbrook**
**Project No.:** **10306-A**

**Date:** **10/2/2014**

**ECS Midwest, LLC**
**Buffalo Grove, Illinois**

**Pressure Meter Data Reduction**



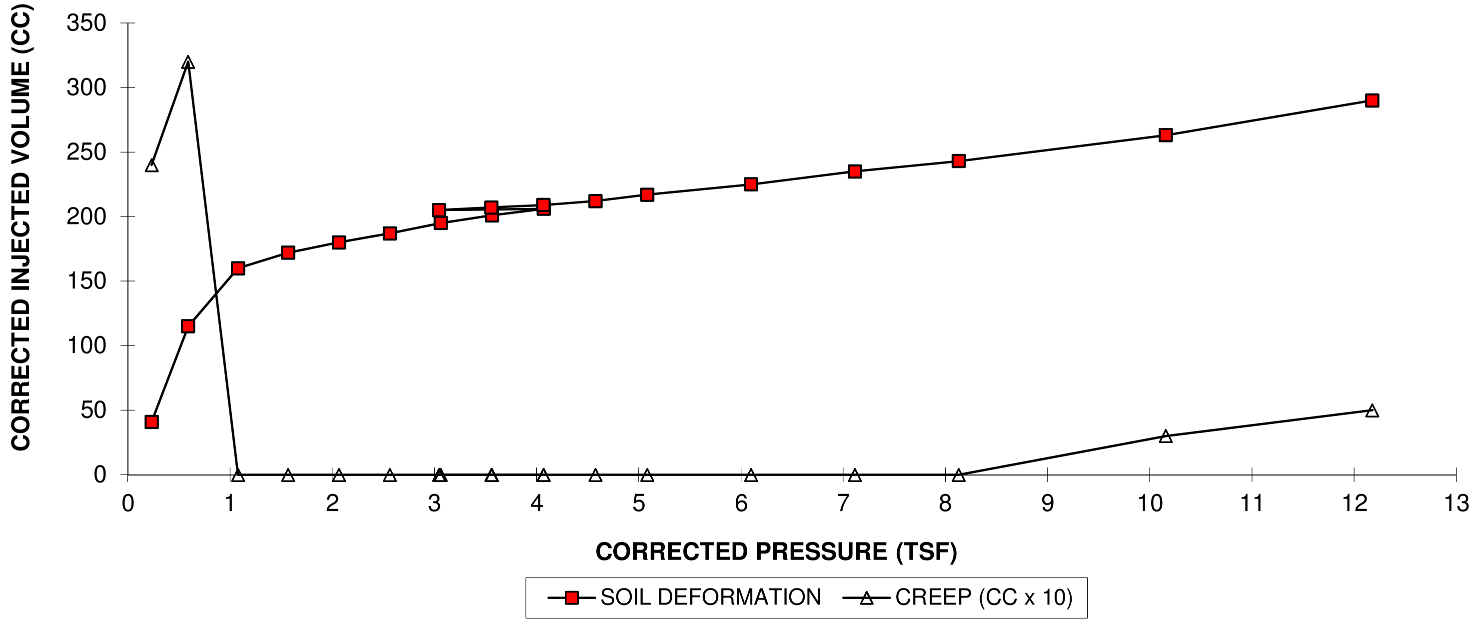
| | | | |
|---|---|---|---|
| Boring No: | B-10 | Depth: | 4.5 |
| Soil Description: | Silty CLAY | "N": | 9 |
| Classification: | CL | | |

**Project:** **Lifetime Fitness Northbrook**
**Project No.:** **10306-A**

**Date:** **10/2/2014**

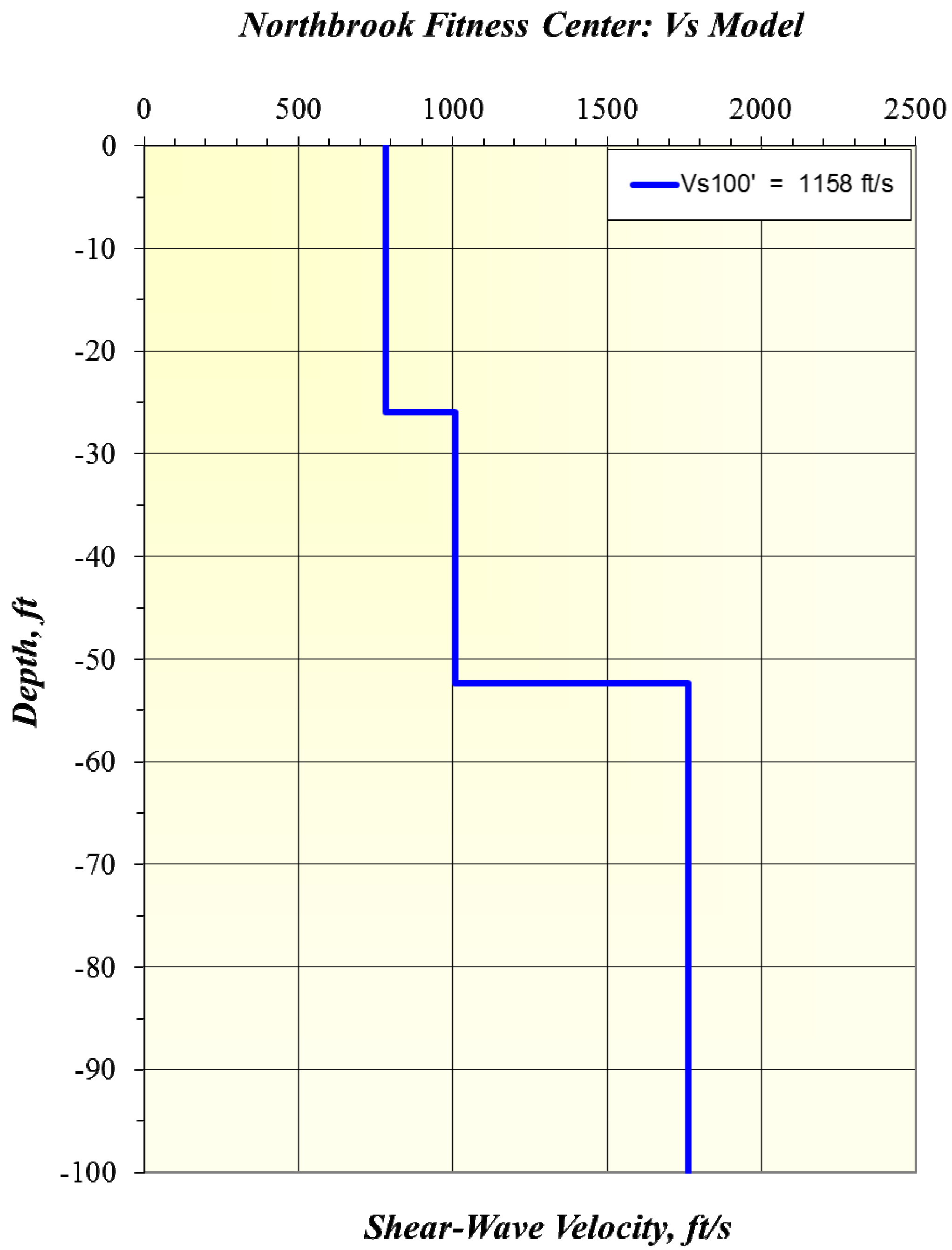
**ECS Midwest, LLC**
**Buffalo Grove, Illinois**

**Pressure Meter Data Reduction**



| | | | |
|---|---|---|---|
| Boring No: | B-10 | Depth: | 7.5 |
| Soil Description: | Silty CLAY | "N": | 14 |
| Classification: | CL | | |

| | | |
|---|---|---|
| **Project:** | **Lifetime Fitness Northbrook** | **ECS Midwest, LLC** |
| **Project No.:** | **10306-A** | **Buffalo Grove, Illinois** |
| **Date:** | **10/2/2014** | **Pressure Meter Data Reduction** |



|  |  |  |
|---|---|---|
| **ARRAY 1**<br>GEOPHONE SPACING = 25 Feet |  | **FIGURE 1**<br>**SHEAR WAVE VELOCITY PROFILE**<br>Lifetime Fitness<br>Northbrook, Illinois<br>ECS Project 16:10306-A |

**HEAVY DUTY PAVERS** 3" pavers

AGGREGATE BASE 5 in. 3500 SPECIFICATION
SUB-BASE ______ in. ______ SPECIFICATION

**LIGHT DUTY PAVERS** 3" pavers

AGGREGATE BASE 6 in. 3000 SPECIFICATION
SUB-BASE ______ in. ______ SPECIFICATION

**CONCRETE SIDEWALK**

CONCRETE 4 in. 3500 SPECIFICATION
AGGREGATE BASE 6 in. ~~3500~~ CA-6 SPECIFICATION

**HEAVY DUTY ASPHALT**

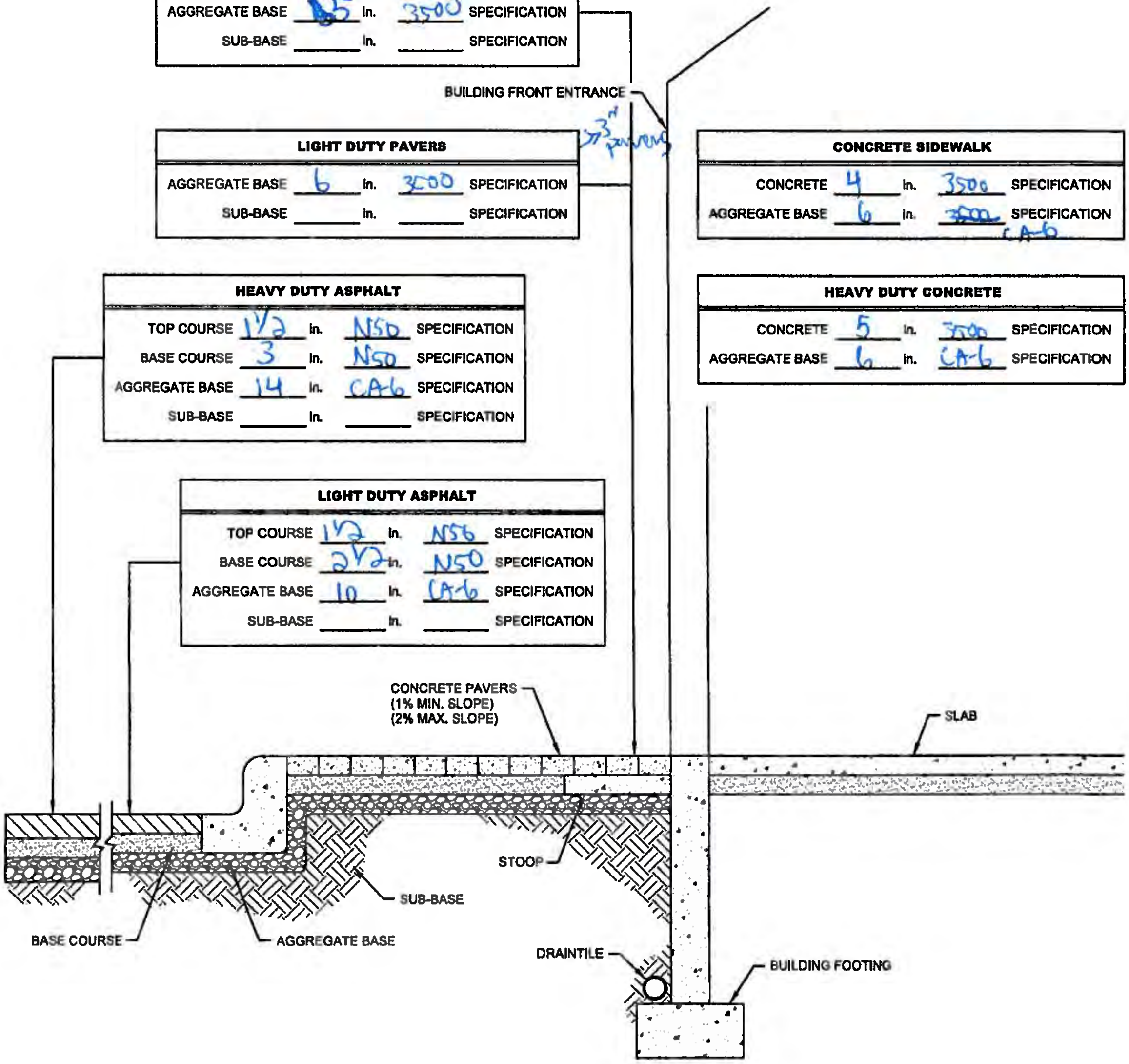
TOP COURSE 1½ in. N50 SPECIFICATION
BASE COURSE 3 in. N50 SPECIFICATION
AGGREGATE BASE 14 in. CA-6 SPECIFICATION
SUB-BASE ______ in. ______ SPECIFICATION

**HEAVY DUTY CONCRETE**

CONCRETE 5 in. 3500 SPECIFICATION
AGGREGATE BASE 6 in. CA-6 SPECIFICATION

**LIGHT DUTY ASPHALT**

TOP COURSE 1½ in. N50 SPECIFICATION
BASE COURSE 2½ in. N50 SPECIFICATION
AGGREGATE BASE 10 in. CA-6 SPECIFICATION
SUB-BASE ______ in. ______ SPECIFICATION

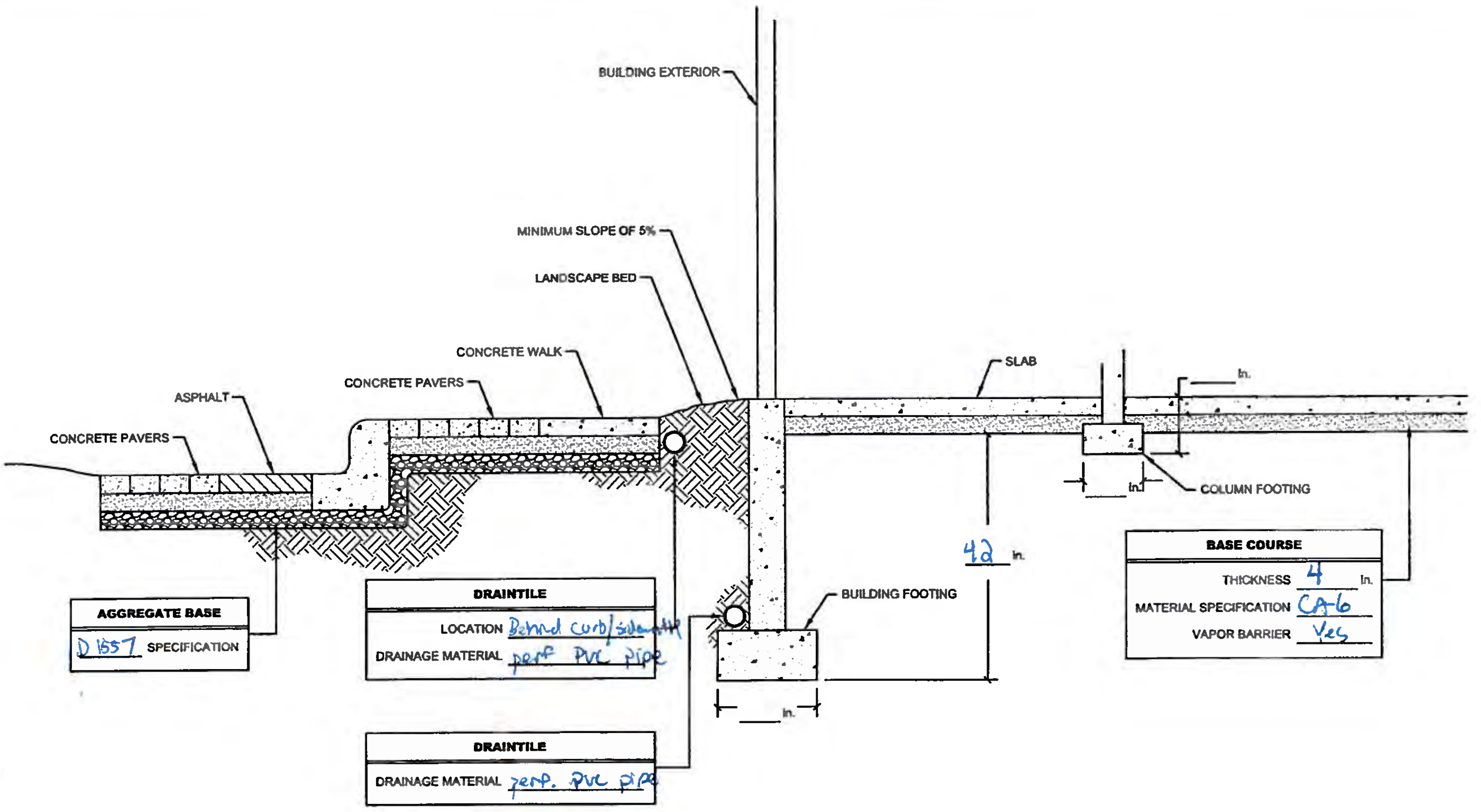


Sheet: of
Fig:

Project No: SP1200774
Drawing No: SP1200774
Scale: NONE
Drawn By: JAG
Date Drawn: 2/15/12
Checked By: GRJ
Last Modified: 8/1/13

### CROSS SECTION NO. 1
GEOTECHNICAL EVALUATION

BRAUN INTERTEC
11001 Hampshire Avenue So
Minneapolis, MN 55438
PH. (952) 995-2000
FAX (952) 995-2020



**AGGREGATE BASE**

D 1557 SPECIFICATION

**DRAINTILE**

LOCATION Behind curb/sidewalk

DRAINAGE MATERIAL perf PVC pipe

**DRAINTILE**

DRAINAGE MATERIAL perf. PVC pipe

**BASE COURSE**

THICKNESS 4 in.

MATERIAL SPECIFICATION CA-6

VAPOR BARRIER Yes

| | |
|---|---|
| Project No: | SP1200774 |
| Drawing No: | SP1200774 |
| Scale: | NONE |
| Drawn By: | JAG |
| Date Drawn: | 2/15/12 |
| Checked By: | GRJ |
| Last Modified: | 4/10/13 |

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Fig:

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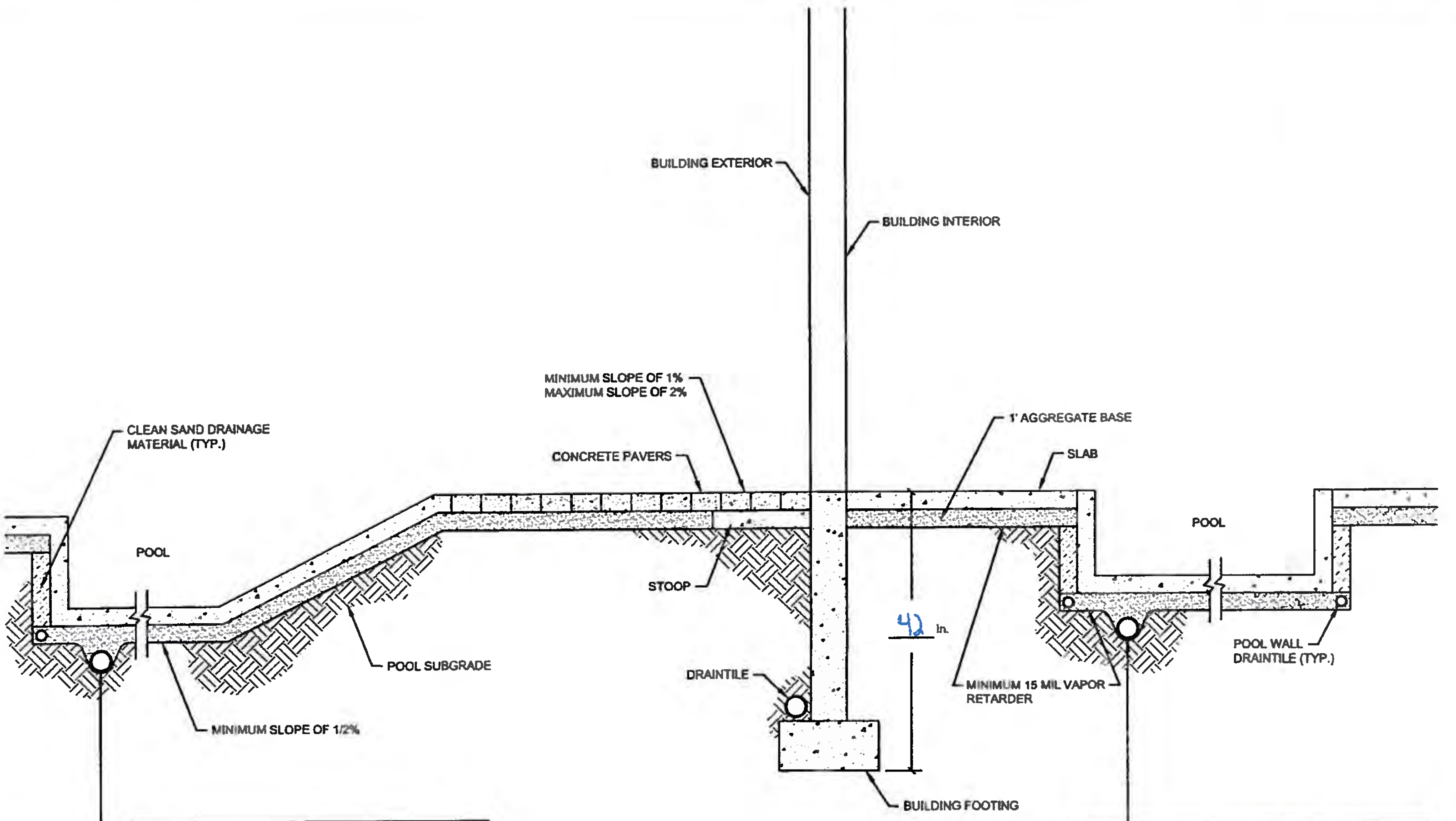
CROSS SECTION NO. 2
GEOTECHNICAL EVALUATION

**BRAUN INTERTEC**

11001 Hampshire Avenue So.
Minneapolis, MN 55438
PH. (952) 995-2000
FAX (952) 995-2020



| POOL DRAINTILE | |
|---|---|
| DRAINAGE MATERIAL | perforated PVC pipe 6" |

| POOL DRAINTILE | |
|---|---|
| DRAINAGE MATERIAL | perf PVC pipe ~ 6 in |

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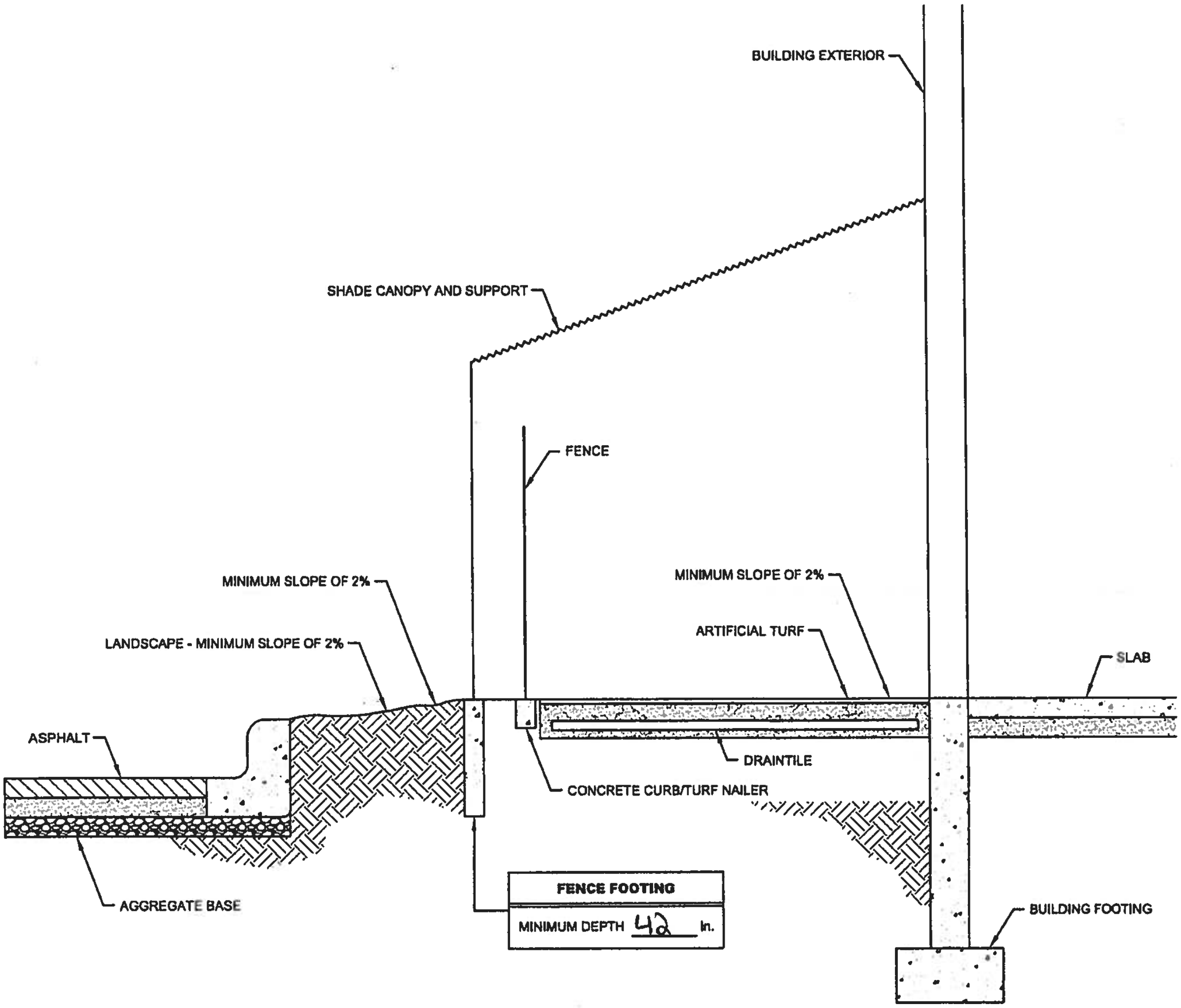
Fig:

Project No: SP1200774
Drawing No: SP1200774
Scale: NONE
Drawn By: JAG
Date Drawn: 2/15/12
Checked By: GRJ
Last Modified: 4/10/13

CROSS SECTION NO. 3
GEOTECHNICAL EVALUATION

**BRAUN INTERTEC**

11001 Hampshire Avenue So.
Minneapolis, MN 55438
PH. (952) 995-2000
FAX (952) 995-2020



Sheet: of

Fig:

Project No: SP1200774

Drawing No: SP1200774

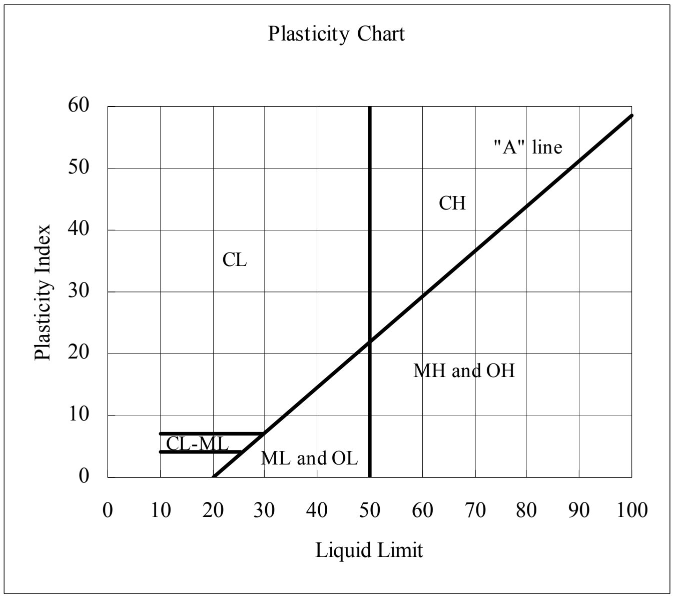
| | |
|---|---|
| Scale: | NONE |
| Drawn By: | JAG |
| Date Drawn: | 2/15/12 |
| Checked By: | GRJ |
| Last Modified: | 4/10/13 |

CROSS SECTION NO. 4
GEOTECHNICAL EVALUATION

BRAUN
INTERTEC

11001 Hampshire Avenue So.
Minneapolis, MN 55438
PH. (952) 995-2000
FAX (952) 995-2020

# UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

| Major Divisions | | | Group Symbols | | Typical Names | Laboratory Classification Criteria | | |
|---|---|---|---|---|---|---|---|---|
| Coarse-grained soils (More than half of material is larger than No. 200 Sieve size) | Gravels (More than half of coarse fraction is larger than No. 4 sieve size) | Clean gravels (Little or no fines) | GW | | Well-graded gravels, gravel-sand mixtures, little or no fines | Determine percentages of sand and gravel from grain-size curve.<br>Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:<br>Less than 5 percent GW, GP, SW, SP<br>More than 12 percent GM, GC, SM, SC<br>5 to 12 percent Borderline cases requiring dual symbols [b] | $C_u = D_{60}/D_{10}$ greater than 4<br>$C_c = (D_{30})^2/(D_{10}xD_{60})$ between 1 and 3 | |
| | | | GP | | Poorly graded gravels, gravel-sand mixtures, little or no fines | | Not meeting all gradation requirements for GW | |
| | | Gravels with fines (Appreciable amount of fines) | GM[a] | d | Silty gravels, gravel-sand mixtures | | Atterberg limits below "A" line or P.I. less than 4 | Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols |
| | | | | u | | | | |
| | | | GC | | Clayey gravels, gravel-sand-clay mixtures | | Atterberg limits below "A" line or P.I. less than 7 | |
| | Sands (More than half of coarse fraction is smaller than No. 4 sieve size) | Clean sands (Little or no fines) | SW | | Well-graded sands, gravelly sands, little or no fines | | $C_u = D_{60}/D_{10}$ greater than 6<br>$C_c = (D_{30})^2/(D_{10}xD_{60})$ between 1 and 3 | |
| | | | SP | | Poorly graded sands, gravelly sands, little or no fines | | Not meeting all gradation requirements for SW | |
| | | Sands with fines (Appreciable amount of fines) | SM[a] | d | Silty sands, sand-silt mixtures | | Atterberg limits above "A" line or P.I. less than 4 | Limits plotting in CL-ML zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols |
| | | | | u | | | | |
| | | | SC | | Clayey sands, sand-clay mixtures | | Atterberg limits above "A" line with P.I. greater than 7 | |
| Fine-grained soils (More than half material is smaller than No. 200 Sieve) | Silts and clays (Liquid limit less than 50) | | ML | | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity |  | | |
| | | | CL | | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays | | | |
| | | | OL | | Organic silts and organic silty clays of low plasticity | | | |
| | Silts and clays (Liquid limit greater than 50) | | MH | | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | | | |
| | | | CH | | Inorganic clays of high plasticity, fat clays | | | |
| | | | OH | | Organic clays of medium to high plasticity, organic silts | | | |
| | Highly Organic soils | | Pt | | Peat and other highly organic soils | | | |

[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.

[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC,well-graded gravel-sand mixture with clay binder. (From Table 2.16 - Winterkorn and Fang, 1975)

# REFERENCE NOTES FOR BORING LOGS

## MATERIALS

| | | |
|---|---|---|
| ■ | **ASPHALT** | |
| ░ | **CONCRETE** | |
| ▤ | **SUBBASE STONE / GRAVEL** | |
| ▩ | **TOPSOIL** | |
| ░ | **FILL** | Man-placed or disturbed soils |
| ▦ | **GW** | **WELL-GRADED GRAVEL**<br>gravel-sand mixtures, little or no fines |
| ▦ | **GP** | **POORLY-GRADED GRAVEL**<br>gravel-sand mixtures, little or no fines |
| ▦ | **GM** | **SILTY GRAVEL**<br>gravel-sand-silt mixtures |
| ▩ | **GC** | **CLAYEY GRAVEL**<br>gravel-sand-clay mixtures |
| ▨ | **SW** | **WELL-GRADED SAND**<br>gravelly sand, little or no fines |
| ░ | **SP** | **POORLY-GRADED SAND**<br>gravelly sand, little or no fines |
| ▥ | **SM** | **SILTY SAND**<br>sand-silt mixtures |
| ▧ | **SC** | **CLAYEY SAND**<br>sand-clay mixtures |
| ▥ | **ML** | **SILT**<br>non-plastic to medium plasticity |
| ▥ | **MH** | **ELASTIC SILT**<br>high plasticity |
| ▧ | **CL** | **LEAN CLAY**<br>low to medium plasticity |
| ▧ | **CH** | **FAT CLAY**<br>high plasticity |
| ░ | **OL** | **ORGANIC SILT or CLAY**<br>non-plastic to low plasticity |
| ▒ | **OH** | **ORGANIC SILT or CLAY**<br>high plasticity |
| ▤ | **PT** | **PEAT**<br>highly organic soils |
| ▨ | **WEATHERED ROCK** | |
| ▒ | **IGNEOUS ROCK** | |
| ▨ | **METAMORPHIC ROCK** | |
| ▦ | **SEDIMENTARY ROCK** | |

## DRILLING SAMPLING SYMBOLS & ABBREVIATIONS

| | | | |
|---|---|---|---|
| SS | Split Spoon Sampler | PM | Pressuremeter Test |
| ST | Shelby Tube Sampler | RD | Rock Bit Drilling |
| WS | Wash Sample | RC | Rock Core, NX, BX, AX |
| BS | Bulk Sample of Cuttings | REC | Rock Sample Recovery % |
| PA | Power Auger (no sample) | RQD | Rock Quality Designation |
| HSA | Hollow Stem Auger | | |

## PARTICLE SIZE IDENTIFICATION

| Designation | | Particle Sizes |
|---|---|---|
| Boulders | | 12-inches (300-mm) or larger |
| Cobbles | | 3-inches to 12- inches (75-mm to 300-mm) |
| Gravel: | Coarse | ¾-inch to 3-inches (19-mm to 75-mm) |
| | Fine | 4.75-mm to 19-mm (No. 4 sieve to ¾-inch) |
| Sand: | Coarse | 2.00-mm to 4.75-mm (No. 10 to No. 4 sieve) |
| | Medium | 0.425-mm to 2.00-mm (No. 40 to No. 10 sieve) |
| | Fine | 0.074-mm to 0.425-mm (No. 200 to No. 40 sieve) |
| Silt & Clay ("Fines") | | <0.074-mm (smaller than a No. 200 sieve) |

## WATER LEVELS[1]

| | | |
|---|---|---|
| ▽ | WL | Water Level (WS)(WD)<br>(WS) While Sampling<br>(WD) While Drilling |
| ▽ | BCR | Before Casing Removal |
| ▼ | ACR | After Casing Removal |
| ▽ | WL | Water Level as stated |
| | DCI | Dry Cave-In |
| | WCI | Wet Cave-In |

## RELATIVE PROPORTIONS

| | |
|---|---|
| Trace | <5% |
| Little | 5% - <15% |
| With | 15% - <30% |
| Adjective<br>*(ex: "Silty")* | 30% - <50% |

## COHESIVE SILTS & CLAYS

| Unconfined Comp. Strength, $Q_P$[2] (tsf) | SPT[3] (bpf) | Consistency (cohesive only) |
|---|---|---|
| <0.25 | ≤2 | Very Soft |
| 0.25 - 0.49 | 3 - 4 | Soft |
| 0.50 - 0.99 | 5 - 8 | Medium Stiff |
| 1.00 - 1.99 | 9 - 15 | Stiff |
| 2.00 - 3.99 | 16 - 30 | Very Stiff |
| 4.00 - 8.00 | 31 - 50 | Hard |
| >8.00 | >50 | Very Hard |

## GRAVELS, SANDS & NON-COHESIVE SILTS

| SPT[3] (bpf) | Density |
|---|---|
| ≤4 | Very Loose |
| 5 - 10 | Loose |
| 11 - 30 | Medium Dense |
| 31 - 50 | Dense |
| 51 - 99 | Very Dense |
| ≥100 | Partially Weathered Rock to Intact Rock |

---

[1] The water levels are those levels actually measured in the borehole at the times indicated by the symbol. The measurements are relatively reliable when augering, without adding fluids, in granular soils. In clay and cohesive silts, the determination of water levels may require several days for the water level to stabilize. In such cases, additional methods of measurement are generally taken.

[2] Typically estimated via pocket penetrometer or Torvane shear test and expressed in tons per square foot (tsf).

[3] Standard Penetration Test (SPT) refers to the number of hammer blows (blow count) of a 140 lb. hammer falling 30 inches on a 2-inch OD split-spoon sampler required to drive the sampler 12 inches (ASTM D 1586). "N-value" is another term for "blow count" and is expressed in blows per foot (bpf).