NELSON GEOTECHNICAL ASSOCIATES, INC.
GEOTECHNICAL ENGINEERS & GEOLOGISTS

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June 17, 2015

Joe Messerly
Production Manager
Wizard International, Inc.
Mukilteo, WA 98275

Geotechnical Engineering Evaluation
Wizard International, Inc. Addition
Mukilteo, Washington
NGA File No. 925615

Dear Mr. Messerly:

We are pleased to submit the attached report titled "Geotechnical Engineering Evaluation – Wizard International, Inc. Addition – Mukilteo, Washington." This report summarizes the existing surface and subsurface conditions within the site and provides general recommendations for the proposed site improvements. Our services were completed in general accordance with our proposal signed by you on May 18, 2015.

The property is currently occupied by the existing Wizard International, Inc. building, a paved parking area, and an unoccupied grass area. Project plans include constructing an addition to the existing building. The northern side of site is lower in elevation than the southern side with a moderate slope located within the middle of the area. Most of the addition area is covered with grass, while the northeastern portion has been used for grass clippings and vegetation debris.

We explored the proposed development area with four drilled borings extending to depths in the range of 16.5 to 21.0 feet below the existing ground surface. Our explorations indicated that the site was underlain by approximately five feet of fill which was underlain by native glacial soils at depth. We have concluded that the site was generally compatible with the planned development. Foundations should be advanced through the loose soils down to the competent glacial material interpreted to underlie the site, for bearing capacity and settlement considerations. These soils should generally be encountered approximately five feet below the existing ground surface, based on our explorations. The slab-on-grade could be "floated" on the existing materials. We recommend, however, that the slab subgrade be over-excavated by a minimum of 12 inches and the over-excavation replaced with granular structural fill. The exposed subgrade should also be compacted to a firm unyielding state prior to placement of the structural fill.

Plans for stormwater handling were not apparent at the time this report was written; however, we understand that on-site infiltration in the form of shallow infiltration systems, pervious pavements, and/or rain gardens is being considered. It is our opinion that on-site infiltration will be limited to specific areas of the site due to the silty nature of the upper portion of the site soils. We should work with the civil engineer to finalize stormwater plans.

We appreciate the opportunity to provide service to you on this project. Please contact us if you have any questions regarding this report or require further information.

Sincerely,

NELSON GEOTECHNICAL ASSOCIATES, INC.

Khaled M. Shawish, PE
Principal

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Geotechnical Engineering Evaluation
Wizard International, Inc. Addition
Mukilteo, Washington

INTRODUCTION

This report presents the results of our geotechnical engineering investigation and evaluation of the proposed addition to the existing Wizard International building located at 4600 – 116th Street SW in Mukilteo, Washington as shown on the Vicinity Map in Figure 1.

The property is currently occupied by the existing Wizard International Building, a paved parking area, and an unoccupied grass-covered area. The new addition is planned within the grass area to the west of the existing building. The northern side of the site is lower in elevation than the southern side with a moderate slope within the middle area. Most of the planned addition area is covered with grass, while the northeastern portion has been used for grass clippings and vegetation debris. Final site grading and drainage plans have not been developed at the time of this report. The existing site layout is shown on the Schematic Site Plan in Figure 2.

SCOPE

The purpose of this updated study is to explore and characterize the site surface and subsurface conditions, and provide general recommendations for the planned development. Specifically, our scope of services includes the following:

1. Review available soil and geologic maps of the area.
2. Explore the subsurface soil and groundwater conditions within the site with four 15- to 20-foot deep drilled boings, using a truck-mounted drill rig. Drill rig was subcontracted by NGA.
3. Perform laboratory analysis on selected samples for classification and to help determine the soil suitability for Stormwater infiltration.
4. Provide recommendations for earthwork activities.
5. Provide recommendations for temporary and permanent slopes.
6. Provide recommendations for foundation support.
7. Provide recommendations for slab and pavement subgrade preparation.
8. Provide recommendations for construction observations and testing.

9. Provide our opinion on the feasibility of on-site infiltration.
10. Provide recommendations for site drainage and erosion control.
11. Document the results of our findings, conclusions, and recommendations in a written geotechnical report.

SITE CONDITIONS

Surface Conditions

The property is currently occupied by the existing Wizard International Building, a paved parking area, and an unoccupied grass-covered area. The northern side of the addition area is lower in elevation than the southern side with a moderate slope connecting the two portions. Most of the addition area is covered with grass, while the northeastern portion has been used for grass clippings and vegetation debris. The area of the planned addition is bounded to the north by 116th Street SW, to the west and south by commercial property, and to the east by the existing Wizard International Building. We did not observe standing water within the proposed development area during our site visit on May 26, 2015.

Subsurface Conditions

Geology: The geologic units for this area are shown in the "Distribution and Description of Geologic Units in the Mukilteo Quadrangle, Washington," by James P. Minard (1982). The site is mapped as glacial till (Qvt). The till is described as a non-sorted clay, silt, sand, pebbles, cobbles, and boulders. Our explorations generally encountered a surficial layer of undocumented fill underlain by medium dense to very dense, silty fine to medium sand with gravel consistent with the description of glacial till soils.

Explorations: The subsurface conditions within the proposed development area were explored on May 26, 2015 by drilling four borings to depths ranging between 16.5 to 21.0 feet below the existing surface using a truck-mounted drill rig. The approximate locations of our explorations are shown on the Schematic Site Plan in Figure 2. A geologist from NGA was present during the explorations, examined the soils and geologic conditions encountered, obtained samples of the different soil types, and maintained logs of the boring logs.

For the borings, a Standard Penetration Test (SPT) was performed on each of the samples during drilling to document soil density at depth. The SPT consists of driving a 2-inch outer-diameter, split-spoon

sampler 18 inches using a 140-pound hammer with a drop of 30 inches. The number of blows required to drive the sampler the final 12 inches is referred to as the "**N**" value and is presented on the boring logs. The **N** value is used to evaluate the strength and density of the deposit.

The soils were visually classified in general accordance with the Unified Soil Classification System, presented in Figure 3. The logs of our borings are attached to this report and are presented as Figures 4 through 7. We present a brief summary of the subsurface conditions in the following paragraphs. For a detailed description of the subsurface conditions, the boring logs should be reviewed.

At the surface of all of the borings, we encountered a surficial layer of grass underlain approximately by five feet of gray-brown, silty fine to course sand with varying amounts of organics, interpreted as topsoil and undocumented fill. Below the topsoil/fill, we encountered medium dense to very dense silty fine to medium sand and fine to medium sand with silt, that we interpreted as native glacial soils. All of the borings were terminated in the native glacial material at depths in the range of 16.5 to 21.0 feet below the existing ground surface.

Hydrologic Conditions

Groundwater seepage was encountered in Boring 1 at approximately 7.5 feet; Boring 2 at approximately 10.0 feet; and Boring 4 at approximately 12.5 feet. We interpreted this water to be perched water. Perched water occurs when surface water infiltrates through less dense, more permeable soils and accumulates on top of relatively low permeability materials. Perched water does not represent a regional groundwater "table" within the upper soil horizons. Perched water tends to vary spatially and is dependent upon the amount of rainfall. We would expect the amount of perched groundwater to decrease during drier times of the year and increase during wetter periods. Due to the relatively large area of recharge, we anticipate that this is a permanent condition.

SENSITIVE AREA EVALUATION

Seismic Hazard

We reviewed the 2012 International Building Code (IBC) for seismic site classification for this project. Since competent glacial soils are inferred to underlie the site at depth, the site conditions best fit the IBC description for Site Class D.

Hazards associated with seismic activity include liquefaction potential and amplification of ground motion by soft deposits. Liquefaction is caused by a rise in pore pressures in a loose, fine sand deposit beneath the groundwater table. The native glacial soils interpreted to underlie the site have a low potential for liquefaction or amplification of ground motion.

Erosion Hazard

The criteria used for determination of erosion hazard areas include soil type, slope gradient, vegetation cover, and groundwater conditions. The erosion sensitivity is related to the vegetative cover and the specific surface soil types, which are related to the underlying geologic soil units. The "Soil Survey of Snohomish County Area, Washington" by the Soil Conservation Service (SCS) was reviewed to determine the erosion hazard of the on-site soils. The site surface soils were classified using the SCS classification system as Alderwood gravelly sandy loam, 2 to 8 percent slopes. These soils are listed as having a slight erosion hazard.

LABORATORY ANALYSIS

We conducted a grain-size sieve analysis on a sample obtained from Boring 2 at 5.0 feet. The test results indicated that the soil consists of silt with fine sand. Test results are shown in Figure 8.

CONCLUSIONS AND RECOMMENDATIONS

General

It is our opinion from a geotechnical standpoint that the site is generally compatible with the planned development. Plans include the construction of an addition within the existing grass field to the west of the existing building. Our explorations indicated that the site is generally underlain by approximately five feet of topsoil/undocumented fill with competent native glacial soils at depth. The native soils should provide adequate support for foundation, slab, and pavement loads. We recommend that the planned structure be designed utilizing shallow foundations. Footings should be founded on the underlying medium dense or better native soil, or structural fill extending to these soils. The medium dense or better soil should typically be encountered approximately five feet below the existing surface, based on our explorations. We do not recommend placing the slab or pavement directly on this fill material if any settlement or settlement-related distress cannot be tolerated. In this case, all of the fill should be removed and the over-excavation replaced with rock spalls. If some settlement could be tolerated, the slabs and

pavement could be floated on the fill material by over-excavating a minimum of 12 inches below the capillary break layer and replacing the material with a layer of 2-inch crushed rock. This is discussed further in the **Slab-on-Grade** and **Pavement** subsections of this report.

We conducted a grain-size analysis on a sample obtained from one of the borings to determine the suitability of the site for on-site infiltration. It is our opinion that this material is not conducive for on-site infiltration due to the high silt content; however, shallow infiltration systems in the form of pervious pavements, bio swales, or rain gardens may be feasible at specific areas within the site. This should be further discussed during final design.

Grading plans were not developed at the time this report was issued. Depending on the final location of the building, retaining walls may be necessary. After the plans are developed, we should review them to determine if retaining walls would be necessary and to provide design level recommendations for wall design.

The soils encountered on this site are considered moisture-sensitive, and will disturb easily when wet. We recommend that construction take place during the drier summer months, if possible. If construction is to take place during wet weather, the soils may disturb and additional expenses and delays may be expected due to the wet conditions. Additional expenses could include the need for placing a blanket of rock spalls to protect exposed subgrades and construction traffic areas. Some of the non-organic on-site soils could be used as structural fill, provided they could be compacted to specifications. This will depend on the moisture content of the soils at the time of construction. NGA should be retained to determine if the on-site soils can be used as structural fill material during construction.

Erosion Control

The erosion hazard for the on-site soils is listed as slight. Best Management Practices (BMPs) should be used to control erosion. Areas disturbed during construction should be protected from erosion. Erosion control measures may include diverting surface water away from the stripped or disturbed areas. Silt fences and/or straw bales should be erected to prevent muddy water from leaving the site or flowing down the sloping ground surface. Stockpiles should be covered with plastic sheeting during wet weather. Disturbed areas should be planted as soon as practical and the vegetation should be maintained until it is established. The erosion potential for areas not stripped of vegetation should be low.

Site Preparation and Grading

After erosion control measures are implemented, site preparation should consist of removing loose soils, topsoil, and any undocumented fill from foundations, slab, and pavement areas, to expose medium dense or better native soils at depth. The stripped soil should be removed from the site or stockpiled for later use as a landscaping fill. Based on our observations, we anticipate native, medium dense or better soil to be encountered approximately five feet across the site, but this depth could increase in unexplored areas of the site. After site preparation, if the exposed subgrade is loose, it should be compacted to a non-yielding condition and then proof-rolled with a heavy rubber-tired piece of equipment. Areas observed to pump or weave during the proof-roll test should be reworked to structural fill specifications or over-excavated and replaced with properly compacted structural fill or rock spalls. If loose soils are encountered in the foundation areas, the loose soils should be removed and replaced with rock spalls. If significant surface water flow is encountered during construction, this flow should be diverted around areas to be developed, and the exposed subgrades should be maintained in a semi-dry condition. As mentioned earlier, slab-on-grade and pavement areas could be supported on a portion of the upper soils with the over-excavation and replacement of the upper 12 inches of material with crushed rock, and the understanding that some settlement and settlement-related distress could still occur.

If wet conditions are encountered, alternative site grading techniques might be necessary. These could include using large excavators equipped with wide tracks and a smooth bucket to complete site grading, and covering exposed subgrade with a layer of crushed rock for protection. If wet conditions are encountered or construction is attempted in wet weather, the subgrade should not be compacted, as this could cause further subgrade disturbance. In wet conditions, it may be necessary to cover the exposed subgrade with a layer of crushed rock as soon as it is exposed to protect the moisture sensitive soils from disturbance by machine or foot traffic during construction. The prepared subgrade should be protected from construction traffic and surface water should be diverted around areas of prepared subgrade.

The site soils are considered to be moisture-sensitive and will disturb easily when wet. We recommend that construction take place during the drier summer months if possible. However, if construction takes place during the wet season, additional expenses and delays should be expected due to the wet conditions. Additional expenses could include the need for placing a blanket of rock spalls on exposed subgrades, construction traffic areas, and paved areas prior to placing structural fill. Wet weather grading will also require additional erosion control and site drainage measures. Some of the on-site soils may be suitable for use as structural fill, depending on the moisture and organic content of the soil at the time of

construction. NGA should be retained to evaluate the suitability of all on-site and imported structural fill material during construction.

Temporary and Permanent Slopes

Temporary cut slope stability is a function of many factors, including the type and consistency of soils, depth of the cut, surcharge loads adjacent to the excavation, length of time a cut remains open, and the presence of surface or groundwater. It is exceedingly difficult under these variable conditions to estimate a stable, temporary, cut slope angle. Therefore, it should be the responsibility of the contractor to maintain safe slope configurations since he is continuously at the job site, able to observe the subsurface materials and groundwater conditions encountered and able to monitor the nature and condition of the cut slopes.

The following information is provided solely for the benefit of the owner and other design consultants and should not be construed to imply that Nelson Geotechnical Associates, Inc. assumes responsibility for job site safety. Job site safety is the sole responsibility of the project contractor.

For planning purposes, we recommend that temporary cuts in the on-site soils be no steeper than 1.5 Horizontal to 1 Vertical (1.5H:1V). If significant groundwater seepage or surface water flow were encountered, we would expect that flatter inclinations would be necessary. We recommend that cut slopes be protected from erosion. The slope protection measures may include covering cut slopes with plastic sheeting and diverting surface runoff away from the top of cut slopes. We do not recommend vertical slopes for cuts deeper than four feet, if worker access is necessary. We recommend that cut slope heights and inclinations conform to appropriate OSHA/WISHA regulations.

Permanent cut and fill slopes should be no steeper than 2H:1V, unless specifically approved by NGA. Also, flatter inclinations may be required in areas where loose soils are encountered. Permanent slopes should be vegetated and the vegetative cover maintained until established.

Foundation Support

Conventional shallow spread foundations for the planned structure should be placed on medium dense or better native soils, or be supported on structural fill or rock spalls extending to those soils. Medium dense soils should be encountered approximately five feet below ground surface based on our explorations. However, this depth may vary in unexplored areas of the site and as such we should be on site during construction to make that determination. Where undocumented fill or less dense soils are encountered at

footing bearing elevation, the subgrade should be over-excavated to expose suitable bearing soil. The over-excavation may be filled with 2- to 4-inch rock spalls, or the footing may be extended down to the native bearing soils. If footings are supported on structural fill, the fill zone should extend outside the edges of the footing a distance equal to one half of the depth of the over-excavation below the bottom of the footing.

All footings should extend at least 18 inches below the lowest adjacent finished ground surface for frost protection and bearing capacity considerations. Foundations should be designed in accordance with the 2012 IBC. Footing widths should be based on the anticipated loads and allowable soil bearing pressure. Water should not be allowed to accumulate in footing trenches. All loose or disturbed soil should be removed from the foundation excavation prior to placing concrete.

For foundations constructed as outlined above, we recommend an allowable design bearing pressure of not more than 2,500 pounds per square foot (psf) be used for the design of footings founded on the medium dense or better native soils or rock spalls extending to the competent native material. The foundation bearing soil should be evaluated by a representative of NGA. We should be consulted if higher bearing pressures are needed. Current IBC guidelines should be used when considering increased allowable bearing pressure for short-term transitory wind or seismic loads. Potential foundation settlement using the recommended allowable bearing pressure is estimated to be less than one-inch total and ½-inch differential between adjacent footings or across a distance of about 20 feet, based on our experience with similar projects.

Lateral loads may be resisted by friction on the base of the footing and passive resistance against the subsurface portions of the foundation. A coefficient of friction of 0.35 may be used to calculate the base friction and should be applied to the vertical dead load only. Passive resistance may be calculated as a triangular equivalent fluid pressure distribution. An equivalent fluid density of 200 pounds per cubic foot (pcf) should be used for passive resistance design for a level ground surface adjacent to the footing. This level surface should extend a distance equal to at least three times the footing depth. These recommended values incorporate safety factors of 1.5 and 2.0 applied to the estimated ultimate values for frictional and passive resistance, respectively. To achieve this value of passive resistance, the foundations should be poured "neat" against the native medium dense soils or compacted fill should be used as backfill against the front of the footing. We recommend that the upper one foot of soil be neglected when calculating the passive resistance.

Structural Fill

General: Fill placed beneath foundations, pavement, or other settlement-sensitive structures should be placed as structural fill. Structural fill, by definition, is placed in accordance with prescribed methods and standards, and is monitored by an experienced geotechnical professional or soils technician. Field monitoring procedures would include the performance of a representative number of in-place density tests to document the attainment of the desired degree of relative compaction. The area to receive the fill should be suitably prepared as described in the **Site Preparation and Grading** subsection of this report prior to beginning fill placement. Sloping areas to receive structural fill should be benched prior to fill placement to key the fill into the slope. The benches should be level and have a minimum width of six to eight feet. The benches should be constructed by cutting into the native sloping ground, then fill can be placed on the level benches.

Materials: Structural fill should consist of a good quality, granular soil, free of organics and other deleterious material, and be well graded to a maximum size of about three inches. All-weather structural fill should contain no more than five-percent fines (soil finer than U.S. No. 200 sieve, based on that fraction passing the U.S. 3/4-inch sieve). The use of some of the on-site soils as structural fill may be feasible, but this will be highly dependent on moisture and organic contents of the material at the time construction takes place. We should be retained to evaluate proposed structural fill material prior to placement.

Fill Placement: Following subgrade preparation, placement of structural fill may proceed. All fill placements should be accomplished in uniform lifts up to eight inches thick. Each lift should be spread evenly and be thoroughly compacted prior to placement of subsequent lifts.

All structural fill underlying building areas and pavement subgrade should be compacted to a minimum of 95 percent of its maximum dry density. Maximum dry density, in this report, refers to that density as determined by the ASTM D-1557 Compaction Test procedure. The moisture content of the soils to be compacted should be within about two percent of optimum so that a readily compactable condition exists. It may be necessary to over-excavate and remove wet soils in cases where drying to a compactable condition is not feasible. All compaction should be accomplished by equipment of a type and size sufficient to attain the desired degree of compaction.

Slab-on-Grade

Slabs-on-grade should be supported on subgrade soils prepared as described in the **Site Preparation and Grading** subsection of this report. If no settlement related issues can be tolerated, we recommend that all of the undocumented fill material be over-excavated to expose medium dense or better native soil. The over excavation could be backfilled with crushed rock, pit run, or 2- to 4-inch rock spalls. If some settlement related issues could be tolerated, we recommend that the slab-on-grade be over-excavated by a minimum of 12 inches below the capillary break layer and replaced with 2-inch crushed rock. In addition to the 2-inch crushed rock, we recommend that all floor slabs be underlain by at least six inches of free-draining gravel with less than three percent by weight of the material passing Sieve #200 for use as a capillary break. We recommend that the capillary break be hydraulically connected to the footing drain system to allow free drainage from under the slab. A suitable vapor barrier, such as heavy plastic sheeting (6-mil minimum), should be placed over the capillary break material. An additional 2-inch thick moist sand layer may be used to cover the vapor barrier. This sand layer is optional and is intended to protect the vapor barrier membrane during construction.

Pavement Subgrade

Pavement subgrade preparation and structural filling where required, should be completed as recommended in the **Site Preparation and Grading** and **Structural Fill** subsections of this report. We recommend that the pavement subgrade be over-excavated and replaced with a minimum of 12 inches of 2-inch crushed rock. Prior to placement of the crushed rock, the pavement subgrade should be proof-rolled with a heavy, rubber-tired piece of equipment, to identify soft or yielding areas that require repair. We should be retained to observe the proof-rolling and recommend subgrade repairs prior to placement of the crushed rock. The pavement section consisting of base and top courses as well as the asphalt layer should be placed over the 2-inch crushed rock.

Site Drainage

Surface Drainage: The finished ground surface should be graded such that runoff is directed to an appropriate stormwater collection system. Water should not be allowed to collect in any areas where footings, slabs, or pavements are to be constructed. Final site grades should allow for drainage away from the structures. We suggest that the finished ground be sloped at a minimum gradient of three percent, for a distance of at least 10 feet away from the structures. Surface water should be collected by permanent catch basins and drain lines, and be routed into an appropriate discharge system.

Subsurface Drainage: If groundwater is encountered during construction, we recommend that the contractor slope the bottom of the excavation and collect the water into ditches and small sump pits where the water can be pumped from the excavation and routed to a suitable discharge point. We anticipate that excavations below five to seven feet to encounter groundwater.

We recommend the use of footing drains around the structure. Footing drains should be installed at least one foot below planned finished floor elevation. The drains should consist of a minimum 4-inch-diameter, rigid, slotted or perforated, PVC pipe surrounded by free-draining material wrapped in a filter fabric. We recommend that the free-draining material consist of an 18-inch-wide zone of clean (less than three-percent fines), granular material placed along the back of walls. Washed rock is an acceptable drain material, or drainage composite may be used instead. The free-draining material or the drainage composite should extend up the wall to one foot below the finished surface. The top foot of backfill should consist of low permeability soil placed over plastic sheeting or building paper to minimize the migration of surface water or silt into the footing drain. Footing drains should discharge into tightlines leading to an appropriate collection and discharge point with convenient cleanouts to prolong the useful life of the drains. Roof drains should not be connected to wall or footing drains.

USE OF THIS REPORT

NGA has prepared this report for Joe Messerly and his agents for use in the planning and design of the proposed development on this site only. The scope of our work does not include services related to construction safety precautions and our recommendations are not intended to direct the contractors' methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. There are possible variations in subsurface conditions between the explorations and also with time. Our report, conclusions, and interpretations should not be construed as a warranty of subsurface conditions. A contingency for unanticipated conditions should be included in the budget and schedule.

We recommend that NGA be retained to provide monitoring and consultation services during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork and foundation installation activities comply with contract plans and specifications. We should be contacted a minimum of one week prior to construction activities and could attend pre-construction meetings if requested.

Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering practices in effect in this area at the time this report was prepared. No other warranty, expressed or implied, is made. Our observations, findings, and opinions are a means to identify and reduce the inherent risks to the owner.

o-O-o

It has been a pleasure to provide service to you on this project. If you have any questions or require further information, please call.

Sincerely,

NELSON GEOTECHNICAL ASSOCIATES, INC.

Bala Dodoye-Alali
Project Geologist

Exp. July 28, 2015

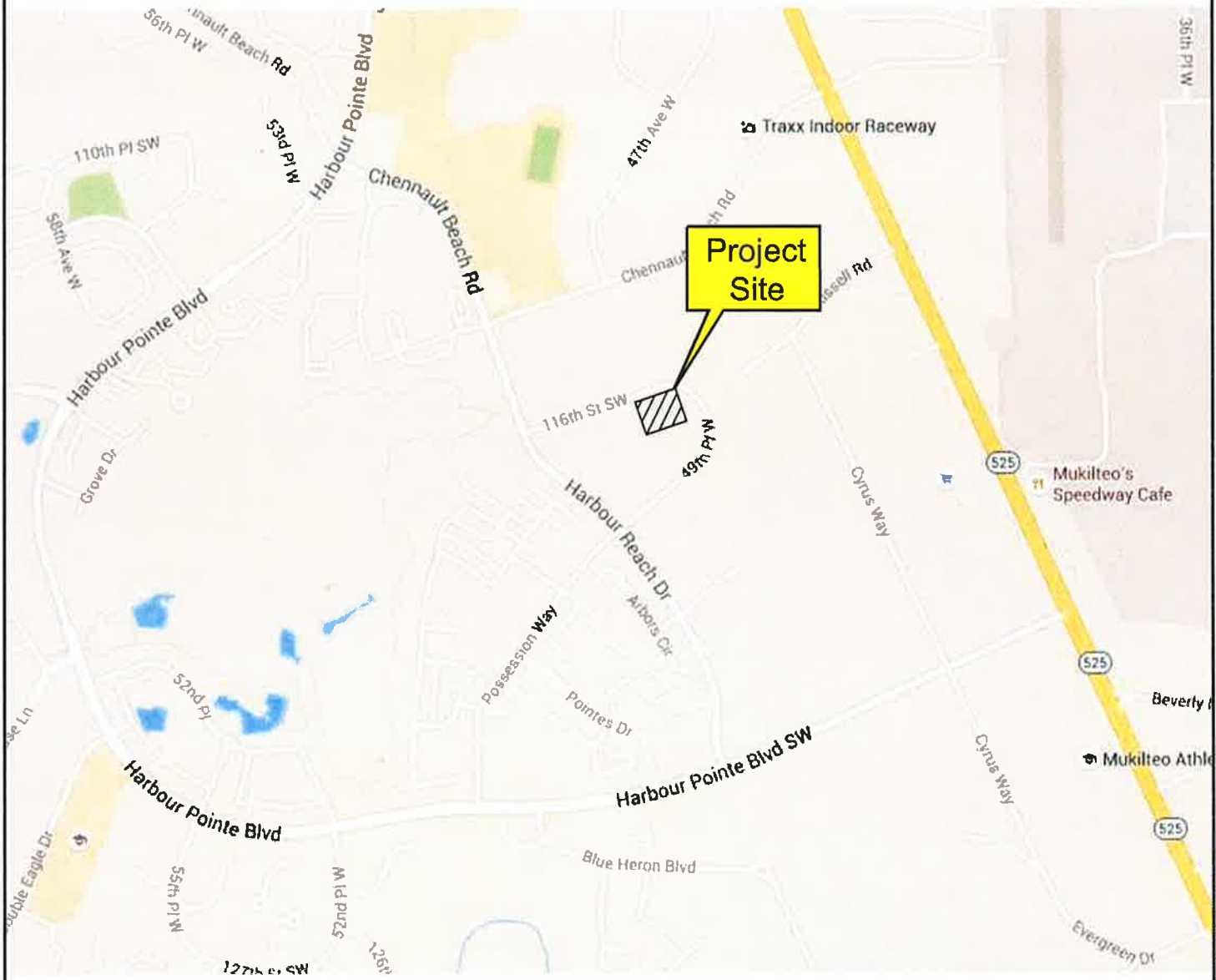
Khaled M. Shawish, PE
Principal

Eight Figures Attached

BD:KMS:cja

VICINITY MAP

Not to Scale



Mukilteo, WA

Project Number	Wizard International Addition Vicinity Map	NELSON GEOTECHNICAL ASSOCIATES, INC. NGA GEOTECHNICAL ENGINEERS & GEOLOGISTS	No.	Date	Revision	By	CK
925615			1	6/3/15	Original	DPN	BD
Figure 1		

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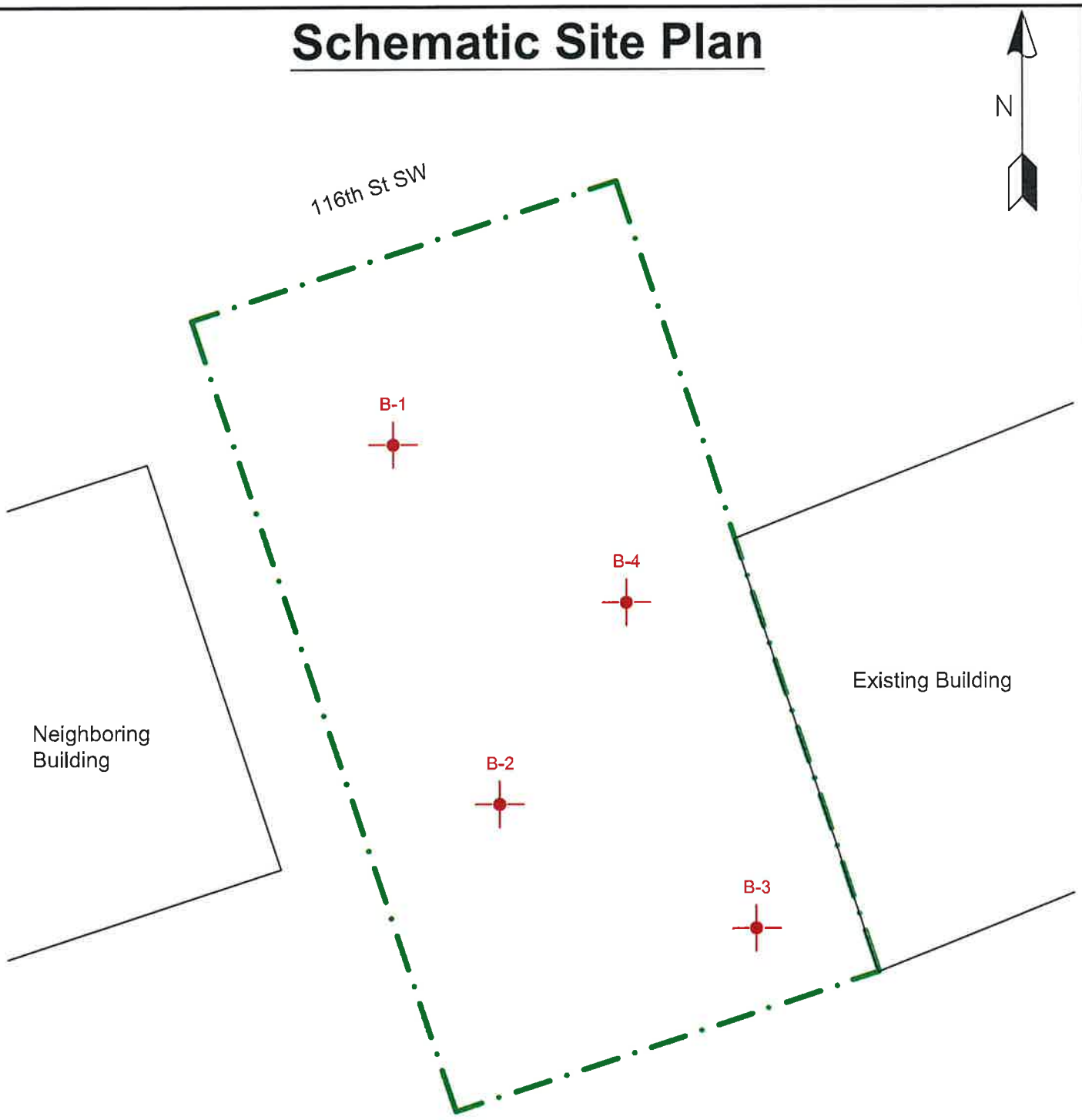
Schematic Site Plan



LEGEND

Property line (Area of Planned Addition)

B-1 — Number and approximate location of boring

0 50 100

Approximate Scale: 1 inch = 50 feet

Reference: Site Plan based on field measurements, observations, and aerial photo review.

Project Number 925615	Wizard International Addition Schematic Site Plan	NELSON GEOTECHNICAL ASSOCIATES, INC. NGA GEOTECHNICAL ENGINEERS & GEOLOGISTS
Figure 2		17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 486-1669 / Fax 481-2510
		Snohomish County (425) 337-1669 Wenatchee/Chelan (509) 665-7696 www.nelsongeotech.com

No.	Date	Revision	By	CK
1	6/3/15	Original	DPN	BD

2015 NGA Project Folders\9256-15 Wizard International Addition\Drafting\Schematic SP.dwg

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE - GRAINED SOILS MORE THAN 50 % RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50 % OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50 % OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE - GRAINED SOILS MORE THAN 50 % PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50 %	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY LIQUID LIMIT 50 % OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FLAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1) Field classification is based on visual examination of soil in general accordance with ASTM D 2488-93.
2) Soil classification using laboratory tests is based on ASTM D 2488-93.
3) Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry - Absence of moisture, dusty, dry to the touch

Moist - Damp, but no visible water.

Wet - Visible free water or saturated, usually soil is obtained from below water table

Project Number 925615	Wizard International Addition Soil Classification Chart	NELSON GEOTECHNICAL ASSOCIATES, INC. NGA GEOTECHNICAL ENGINEERS & GEOLOGISTS	No.	Date	Revision	By	CK
Figure 3		17311-135th Ave. NE, A-500 Woodinville, WA 98072 (425) 486-1669 / Fax 481-2510 Snohomish County (425) 337-1669 Wenatchee/Chelan (509) 665-7696 www.nelsongeotech.com	1	6/3/15	Original	DPN	BD

BORING LOG

B-1

Approximate Ground Surface Elevation: ??

Soil Profile: Description	Graphic Log	Group Symbol	Sample Data: Blow Count	Sample Data: Sample Location (Depth in feet)
Topsoil				
Gray, silty fine to medium sand with iron-oxide staining to silt with sand (loose, moist)		SM	5	
Gray silt with fine sand (medium stiff, moist)		ML	7	
Brown-gray, silty fine to medium sand with iron-oxide staining (medium dense, moist)		SM	17	
Gray, silty fine to medium sand (dense, moist)		SM	37	
-becomes very dense -with trace gravel			50-4"	
-no gravel			50-6"	
Boring terminated below existing grade at 21.0 feet on 5/26/15. Groundwater seepage was encountered at 7.5 feet during drilling.				

Penetration Resistance (Blows/foot - ●) / Moisture Content (Percent - ■): 10 20 30 40 50 50+

Laboratory Testing

Piezometer Installation - Ground Water Data (Depth in Feet)

Depth scale: 5, 10, 15, 20, 25

Logged by: BD on 5/26/2015

LEGEND

- Depth Driven and Amount Recovered with 2-inch O.D. Split-Spoon Sampler
- Depth Driven and Amount Recovered with 3-inch Shelby Tube Sampler
- Solid PVC Pipe
- Slotted PVC Pipe
- Monument/ Cap to Piezometer
- * Liquid Limit
- + Plastic Limit
- Concrete
- Bentonite
- Native Soil
- Silica Sand
- Water Level
- M Moisture Content
- A Atterberg Limits
- G Grain-size Analysis
- DS Direct Shear
- PP Pocket Penetrometer Readings, tons/ft
- P Sample Pushed
- T Triaxial

NOTE: Subsurface conditions depicted represent our observations at the time and location of this exploratory hole, modified by engineering tests, analysis and judgement. They are not necessarily representative of other times and locations. We cannot accept responsibility for the use or interpretation by others of information presented on this log.

Project Number	Wizard International Addition Boring Log
925615	
Figure 4	
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NELSON GEOTECHNICAL ASSOCIATES, INC.
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www.nelsongeotech.com

No.	Date	Revision	By	CK
1	6/3/15	Original	DPN	BD

BORING LOG

B-2

Approximate Ground Surface Elevation: ??

Soil Profile: Description	Graphic Log	Group Symbol	Sample Data: Blow Count	Sample Location (Depth in feet)
Gray-brown and gray, silty fine to coarse sand with iron-oxide staining and organics (loose, moist) (FILL)			9	
Brown-gray, fine to medium sand (loose, moist to wet)		SP	9	
Brown-gray silt with fine sand (medium stiff, moist)		ML		
Brown-gray, fine to medium sand with silt to silty fine to medium sand with iron-oxide staining (loose, moist)		SP-SM - SM	9	
Brown-gray, fine to medium sand with silt (medium dense, wet)		SP-SM	18	
-becomes dense, moist to wet -with silt lenses			37	
Brown-gray, silty fine to medium sand (moist to wet)		SM	40	
Boring terminated below existing grade at 19.0 feet on 5/26/15. Groundwater seepage was encountered at 10.0 feet during drilling.				

Penetration Resistance (Blows/foot - ●)
10 20 30 40 50 50+
Moisture Content (Percent - ■)
10 20 30 40 50 50+

Laboratory Testing: G,M

Piezometer Installation - Ground Water Data (Depth in Feet)

5 10 15 20 25

LEGEND

- Depth Driven and Amount Recovered with 2-inch O.D. Split-Spoon Sampler
- Depth Driven and Amount Recovered with 3-inch Shelby Tube Sampler
- Solid PVC Pipe
- Slotted PVC Pipe
- Monument/ Cap to Piezometer
- * Liquid Limit
- + Plastic Limit
- Concrete
- Bentonite
- Native Soil
- Silica Sand
- Water Level

M	Moisture Content
A	Atterberg Limits
G	Grain-size Analysis
DS	Direct Shear
PP	Pocket Penetrometer Readings, tons/ft
P	Sample Pushed
T	Triaxial

NOTE: Subsurface conditions depicted represent our observations at the time and location of this exploratory hole, modified by engineering tests, analysis and judgement. They are not necessarily representative of other times and locations. We cannot accept responsibility for the use or interpretation by others of information presented on this log.

Project Number	Wizard International Addition Boring Log
925615	
Figure 5	
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No.	Date	Revision	By	CK
1	6/3/15	Original	DPN	BD

Logged by: BD on 5/26/2015

BORING LOG

B-3

Approximate Ground Surface Elevation: ??

Soil Profile: Description	Graphic Log	Group Symbol	Sample Data: Blow Count	Sample Location (Depth in feet)
Brown, silty fine sand (loose, moist) (**topsoil**)			9	
-becomes moist to wet -with organics				
Brown-gray, silty fine to medium sand with gravel and iron-oxide staining (medium dense, moist)		SM	12	
Brown-gray, fine to coarse sand with silt (dense, moist to wet)		SP-SM	31	
Brown-gray, fine to coarse sand with silt to silty fine to coarse sand (very dense, wet) -pounding on a rock		SP-SM - SM	50-5"	
Brown-gray, silty fine to coarse sand with gravel (very dense, moist)		SM	76	
Boring terminated below existing grade at 19.0 feet on 5/26/15. Groundwater seepage was not encountered during drilling.				

Penetration Resistance (Blows/foot - ●) / Moisture Content (Percent - ■): 10 20 30 40 50 50+

Laboratory Testing

Piezometer Installation - Ground Water Data (Depth in Feet)

5 10 15 20 25

Logged by: BD on 5/26/2015

LEGEND

- Depth Driven and Amount Recovered with 2-inch O.D. Split-Spoon Sampler
- Depth Driven and Amount Recovered with 3-inch Shelby Tube Sampler
- Solid PVC Pipe
- Slotted PVC Pipe
- Monument/ Cap to Piezometer
- * Liquid Limit
- + Plastic Limit
- Concrete
- Bentonite
- Native Soil
- Silica Sand
- Water Level
- M Moisture Content
- A Atterberg Limits
- G Grain-size Analysis
- DS Direct Shear
- PP Pocket Penetrometer Readings, tons/ft
- P Sample Pushed
- T Triaxial

NOTE: Subsurface conditions depicted represent our observations at the time and location of this exploratory hole, modified by engineering tests, analysis and judgement. They are not necessarily representative of other times and locations. We cannot accept responsibility for the use or interpretation by others of information presented on this log.

Project Number	Wizard International Addition Boring Log
925615	
Figure 6	
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No.	Date	Revision	By	CK
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BORING LOG

B-4

Approximate Ground Surface Elevation: ??

Soil Profile: Description	Graphic Log	Group Symbol	Sample Data: Blow Count	Sample Location (Depth in feet)
Light brown, sily fine to medium sand (very loose, dry to moist) (**FILL**)			3	
Dark gray-brown, silty fine sand with trace organics (very loose, moist) (**FILL**)			3	
Gray, fine to medium sand with gravel (loose, moist)		SP	11	
Gray, fine sand with silt lenses and iron-oxide staining (medium dense, moist)		SP-SM		
Brown-gray, fine to medium sand with silt, iron-oxide staining, and silt lenses (medium dense, moist)		SP-SM	12	
Brown-gray, silty fine to medium sand (dense, moist)		SM	44	
Boring terminated below existing grade at 16.5 feet on 5/26/15. Groundwater seepage was encountered at 12.5 feet during drilling.				

Penetration Resistance (Blows/foot - ●): 10 20 30 40 50 50+

Moisture Content (Percent - ■): 10 20 30 40 50 50+

Laboratory Testing

Piezometer Installation - Ground Water Data (Depth in Feet)

5 10 15 20 25

LEGEND

- Depth Driven and Amount Recovered with 2-inch O.D. Split-Spoon Sampler
- Depth Driven and Amount Recovered with 3-inch Shelby Tube Sampler
- Solid PVC Pipe
- Slotted PVC Pipe
- Monument/ Cap to Piezometer
- * Liquid Limit
- + Plastic Limit
- Concrete
- Bentonite
- Native Soil
- Silica Sand
- Water Level
- M Moisture Content
- A Atterberg Limits
- G Grain-size Analysis
- DS Direct Shear
- PP Pocket Penetrometer Readings, tons/ft
- P Sample Pushed
- T Triaxial

NOTE: Subsurface conditions depicted represent our observations at the time and location of this exploratory hole, modified by engineering tests, analysis and judgement. They are not necessarily representative of other times and locations. We cannot accept responsibility for the use or interpretation by others of Information presented on this log.

Project Number	Wizard International Addition Boring Log
925615	
Figure 7	
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Project Number 925615

Figure 8

Wizard International Addition
Sieve Analysis

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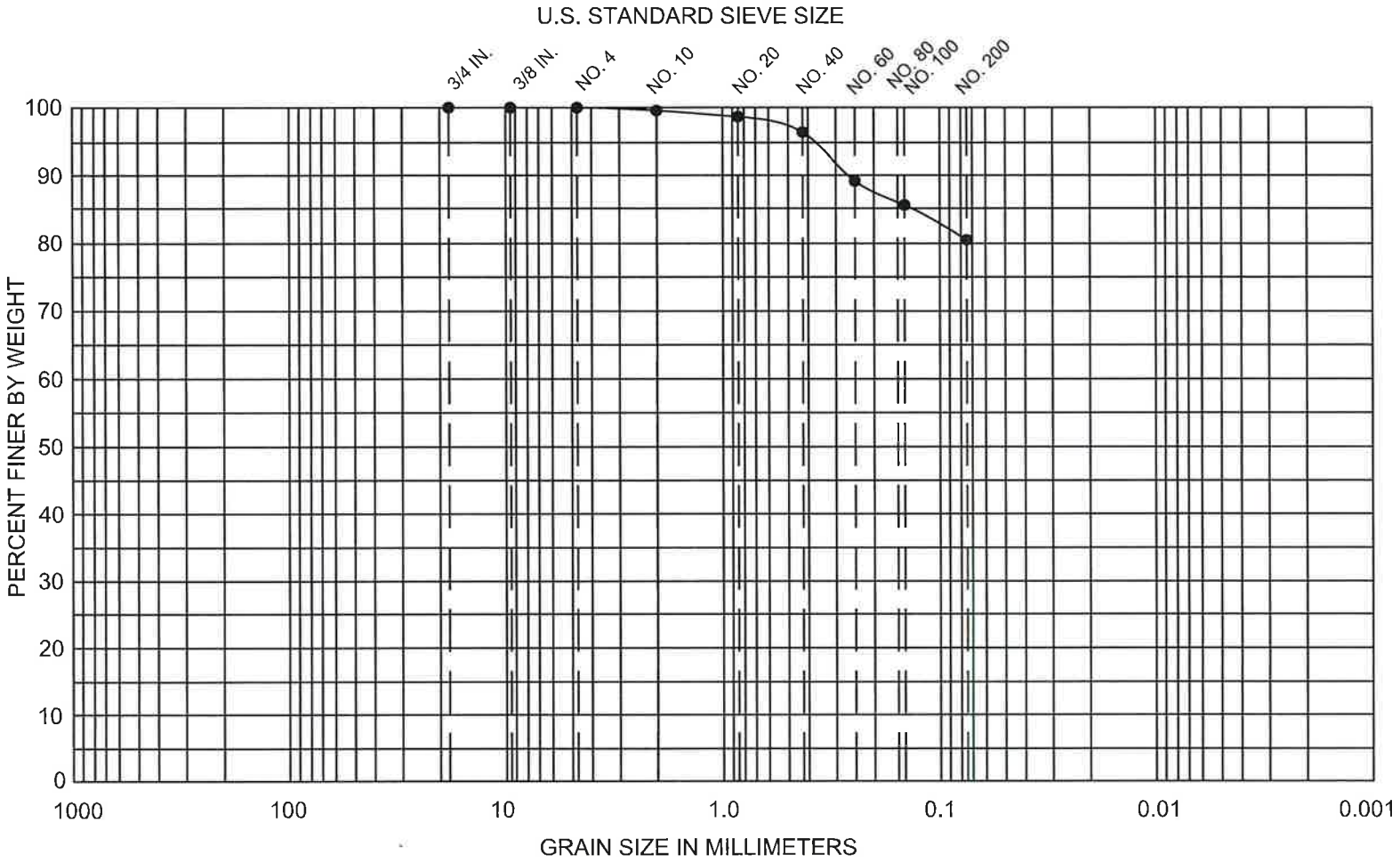

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

U.S.C. SYMBOL	EXPLORATION NUMBER	SAMPLE DEPTH	SOIL DESCRIPTION	SOIL DISTRIBUTION
●ML	B-2	5.0 - 6.5 feet	Brown-gray silt with fine sand	Gravel = 0% Sand = 19% Silt/Clay = 81%

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