NW 2197

Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, WA USA 98052-3333
Telephone (425) 883-0777
Fax (425) 882-5498
www.golder.com

Golder Associates

ADDENDUM TO

PRELIMINARY SUBSURFACE EXPLORATION AND GEOTECHNICAL ENGINEERING REPORT LAKE STREET SOUTH PROPERTY 112 AND 130 LAKE STREET SOUTH KIRKLAND, WASHINGTON

1/11/08

State of Washington
Engineering Geologist
1907
Licensed Geologist
Richard D. Luark

Submitted to:

Stuart McLeod
118 Lake Street South, Suite E
Kirkland, WA, 98033

Submitted by:

Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, Washington 98052-3333

STATE OF WASHINGTON
29321
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES 10/13/09

Alison J. Dennison
Staff Geologist

Christopher S. King
Senior Project Engineer

Richard D. Luark, P.E., L.E.G.
Senior Consultant

Distribution:

3 Copies – Stuart McLeod
3 Copies – Golder Associates Inc.

January 11, 2008

073-93375.001

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1.0 INTRODUCTION

Golder Associates Inc. (Golder) is pleased to provide this geotechnical addendum to our geotechnical report titled *Preliminary Subsurface Exploration and Geotechnical Engineering Report – Lake Street South Property – 112 and 130 Lake Street South – Kirkland, Washington* dated August 23, 2007. The purpose of the addendum is to provide additional geotechnical recommendations for the proposed project. The original project redevelopment plans included the construction of a five-story building with up to two stories below grade. The up-dated project plans indicate the construction of a four-story building with up to five stories below grade.

This addendum is to be used in conjunction with the previously referenced report. The reports used together present all of our geotechnical recommendations. The recommendations included in this addendum should override any previous recommendation.

1.1 PROJECT DESCRIPTION

The proposed project plans indicate demolishing the existing structures and development of one mixed-use, four-story building with five stories of below-grade parking. The depth of the below-grade parking structure has increased since the preparation of the original preliminary geotechnical report. Stock & Associates, Inc., provided us up-dated site development drawings on November 29, 2007. Based on these drawings, it is our understanding the building will cover the majority of the site. The below-grade structure will require the use of temporary shoring due to site constraints.

The project site covers two King County Assessor Parcels located at 112 and 130 Lake Street South in Kirkland, Washington, as shown on the Vicinity Map, Figure 1. The project site is located along the west side of Lake Street South, just north of the intersection with 2nd Avenue. The site is relatively level. A steep slope is located at the southeast corner of the planned building.

1.2 GOLDER'S PREVIOUS REPORT

Our previous field investigation consisted of advancing three soil borings (MW-1 through MW-3), as shown on the Site Plan, Figure 2. The previous investigations encountered 0.5 to 5.3 feet of fill overlying native, stiff to hard, Pre-Fraser fine-grained deposits to the depths explored, 31.5 feet below the existing ground surface (bgs).

A monitoring well was installed in each of the three previous explorations to monitor groundwater conditions. Free groundwater was encountered 20 to 25 feet bgs during drilling on June 22, 2007. On June 26, 2007 the groundwater levels were measured between 3.5 to 5.2 feet bgs.

2.0 FIELD INVESTIGATION

The Golder field investigation was completed on December 12 and 13, 2007 and consisted of drilling four borings (MW-4 and GB-1 through GB-3) with the installation of one monitoring well in MW-4. The approximate exploration locations are shown on the Site Plan, Figure 2. Locations are based on hand measurements from existing site features. Exploration locations were selected based on existing site conditions and accessibility. Detailed boring logs are shown in Appendix A.

The four borings were advanced using a CME 75, truck-mounted drill rig operated by Cascade Drilling, Inc. under the full-time observation of a Golder Staff Geologist, Alison Dennison. The borings were advanced to 51.5 to 71 feet below the existing ground surface. Drilling and sampling of soils were performed in accordance with Golder Technical Procedure TP-1.2-5, "Drilling, Sampling, and Logging of Soils". Standard Penetration Tests (SPT) were performed at 5-foot intervals using a standard, 2-inch diameter split-spoon sampler advanced with a 140-pound auto hammer falling a distance of 30 inches for each strike, in accordance with ASTM D-1586. The number of hammer blows for each six inches of penetration was recorded. The standard penetration resistance (N) of the soil is calculated as the sum of the number of blows required for the final 12 inches of sampler penetration. The N-value is an indication of the relative density of cohesionless soils and the consistency of cohesive soils. If a total of 50 blows are recorded for a single 6-inch interval, the test is terminated and the blow count is recorded as 50 blows for the total inches of penetration. Field judgment is required when assigning density descriptions to soils with a high percentage of gravel or cobbles since the driving resistance is often increased by the presence of such materials. All samples were collected and placed in plastic jars to reduce moisture loss and returned to our Redmond, Washington laboratory for further classification.

At the completion of our investigation, a monitoring well was installed in boring MW-4 in accordance with the appropriate Washington State regulations. The bottom of the well was set at 70 feet below the existing ground surface with 20 feet of screen surrounded by a sand pack. The remaining three borings, GB-1 through GB-3, were backfilled with bentonite chips in accordance with the appropriate Washington State regulations.

The soil conditions were examined and logged by a Staff Geologist from Golder. The soil samples were classified in accordance with Golder Technical Procedure TP-1.2-6, "Field Identification of Soil." Pertinent information was recorded, including soil sample depths, stratigraphy, groundwater occurrence (if any), and soil engineering characteristics.

The stratigraphic contacts shown on the boring logs represent the approximate boundaries between soil types; actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported and, therefore, are not necessarily representative of other locations and times.

3.0 SUBSURFACE CONDITIONS

3.1 Soil

The soils described here represent the conditions observed in all four of our explorations. The borings encountered a relatively thin layer of fill soils overlying Pre-Fraser fine-grained deposits. Please refer to Golder's previous report for the general geologic setting.

- **FILL:** The fill unit refers to soils placed by human activity. This unit was encountered in all four borings from the existing ground surface to depths ranging between 0.4 to 1.5 feet bgs. The artificial fill soils consisted of asphalt and compact, light brown, fine to coarse sand and fine to coarse gravel with trace silt.

- **PRE-FRASER FINE-GRAINED DEPOSITS:** The Pre-Fraser fine-grained deposit is material deposited in a lake environment however it has been over-ridden by a glacier causing it to be over-consolidated. The material consists of fine-grained sand, silt, and clay. We encountered this material in all four borings underlying the fill to the depths explored, 51.5 to 71 feet. In general, the deposits consisted of stiff to hard, light gray, silt with trace fine sand, trace white fine sand partings, and trace fine to medium sand seams.

3.2 Groundwater Conditions

Free groundwater was not encountered in any of our explorations during drilling. Groundwater was measured in the monitoring well MW-4 on December 14, 2007 approximately 9 feet bgs. The monitoring well was developed by pumping the water using a submersible pump inserted into the well approximately 60 feet bgs. After purging approximately 100 gallons, we measured the water level approximately 50 feet bgs. Within approximately two hours, the water level had recovered to 12 feet bgs.

4.0 ENGINEERING RECOMMENDATIONS

This section of this addendum presents our engineering recommendations based on the proposed new building geometry (up to five stories below grade) and subsurface conditions encountered in the explorations completed for this study. The recommendations provided in Golder's previous report should be used in conjunction with this addendum.

Based on our subsurface exploration and investigation, the site is feasible for development from a geotechnical standpoint.

4.1 Building Slabs

In Golder's previous report section 4.5 recommends a 4-inch capillary break. However, based on the conditions encountered, we recommend that if there are more than two levels below grade that the capillary break be a minimum of 8 inches of clean, free draining material that meets the previously described specifications. The slab-on-grade should also be underlain by an under drain system as described in section 4.10 of Golder's previous report.

4.2 Shoring

In section 4.9 of Golder's previous report, we discuss the shoring design criteria. A shored excavation on the order of 50 feet in depth will be required to accommodate construction of the proposed below-grade parking structure. Due to the depth of the below-grade parking structure below the groundwater table, we no longer recommend soil nailing as an option for excavation support. A shoring system consisting of soldier piles with tiebacks or internal bracing appears feasible to support the excavation sidewalls. The design criteria in Golder's previous report remains valid for a soldier pile shoring system.

4.3 Permanent Drainage Provisions

In section 4.10 of Golder's previous report, we discuss permanent drainage provisions. The discharge section discusses a design steady state flow, we recommend increasing this flow rate for design to 40 gallons per minute (gpm). The design flow should be verified once the excavation is completed.

5.0 CONSTRUCTION RECOMMENDATIONS

5.1 Dewatering

In Golder's previous report section 5.8 discusses construction dewatering consisting of ditching and sumping methods. Groundwater was measured 9 feet below the existing ground surface in MW-4. Due to the increased probability of encountering sand seams containing flowing water, we recommend that the contractor be prepared for active dewatering.

Due to the depth excavation below the groundwater table (40 feet), we recommend that the contractor be prepared to install an active dewatering system should ditching and sumping methods prove not to be effective. The active dewatering system should consist of vacuum wellpoints as described below.

A vacuum well point system consists of small diameter wells generally installed on a 6- to 8-foot horizontal spacing, connected to a header system, and then connected to a vacuum pump. Vacuum well points are typically only feasible to lower the groundwater on the order of twenty feet, therefore, we recommend the well points, if needed, be installed from inside the excavation through the shoring at an inclination of 60 to 80 degrees from horizontal. Therefore, the dewatering system would need to be installed and staged with the shoring system.

Decommissioning of the wellpoint system will be a critical step, especially as the wellpoints themselves will provide preferential pathways for rising groundwater to pass through the soldier pile and tieback support system and potentially cause leaks into the final underground structure. If disposable wellpoints are used, these could be grouted up as they are decommissioned. However, groundwater flow up the wellpoint will need to be stemmed prior to grouting. This could be achieved with a simple packer or wad of stemming material to block the flow while a quick-gelling grout is pumped in place.

The contractor should be made responsible for the control of all ground and surface water within the project site. The contractor should be required to provide and maintain pumping equipment, wells, wellpoints, sumps, suction and discharge lines, and other dewatering system components as necessary to keep the excavation free of water. In addition, the contractor should be required to obtain discharge permits for the pumped water, and perform any water-quality testing that may be required.

Where wellpoints are not installed, the contractor should use conventional ditch and sump methods to dewater the site. Even with a properly installed well point system ditching and sumping may be required. Seepage not collected by the wellpoints should be directed to ditches and sumps for pumping out of the excavation.

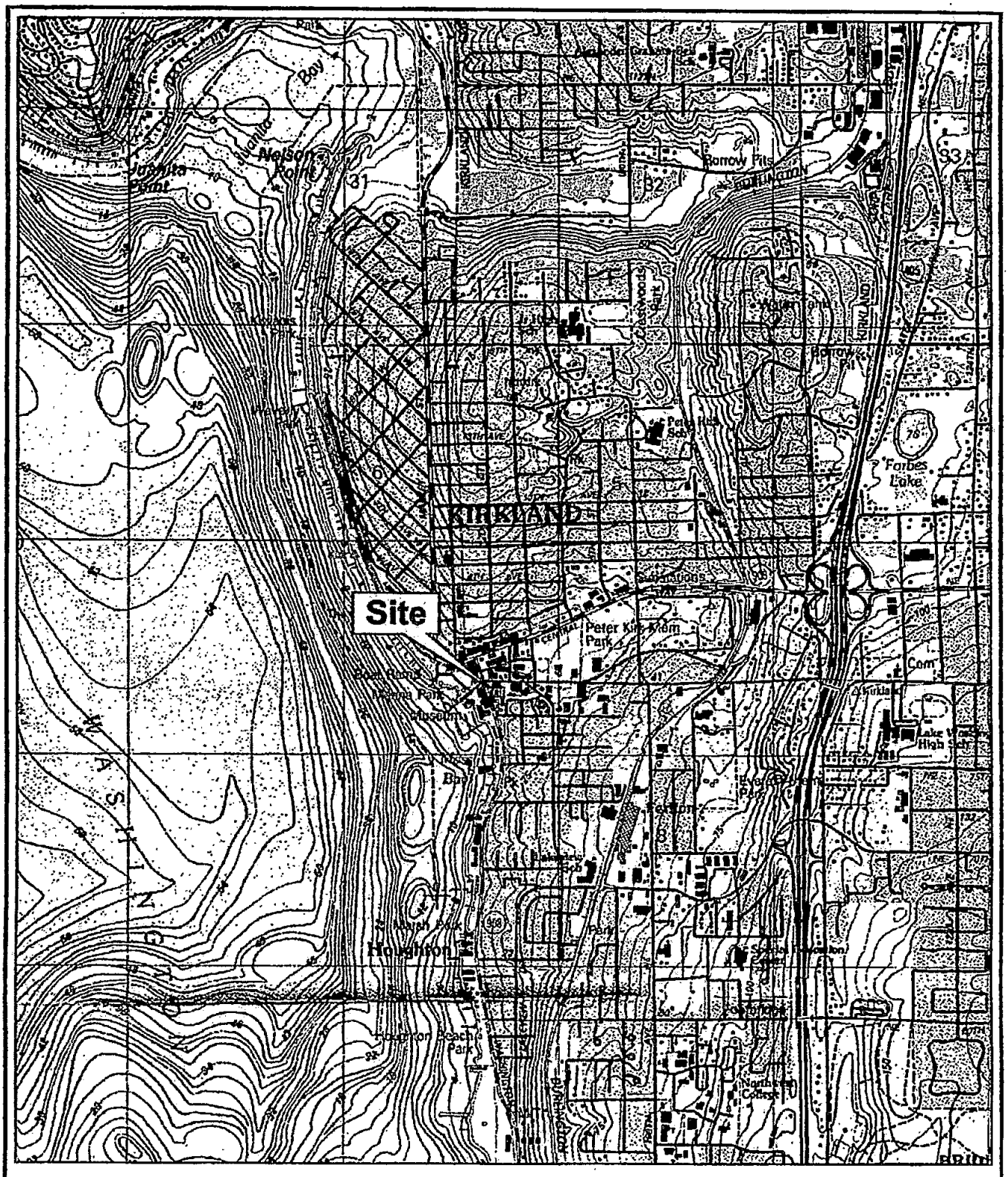
6.0 USE OF REPORT

This report addendum should be used with Golder's previous report titled *Preliminary Subsurface Exploration and Geotechnical Engineering Report – Lake Street South Property – 112 and 130 Lake Street South – Kirkland, Washington* dated August 23, 2007. This report addendum has been prepared exclusively for the use of Stuart McLeod and his consultants for specific application to the Lake Street South Property at 112 and 120 Lake Street South in Kirkland, Washington. We encourage review of this report addendum by bidders and/or contractors as it relates to factual data only (soil descriptions, conclusions, etc.). The conclusions and recommendations presented in this report addendum are based on the explorations and observations completed for this study and conversations regarding the proposed site develop and are not intended, nor should they be construed to represent, a warranty regarding the proposed development, but are forwarded to assist in the planning and design process.

Judgment has been applied in interpreting and presenting the results. Variations in subsurface conditions outside the boring locations are common in glacial environments such as those encountered in Kirkland and the site area. Actual conditions encountered during construction may be different from those observed during drilling. When the site project plans are finalized, we recommend that we be given the opportunity to review the plans and specifications to verify that they are in accordance with the conditions described in this report.

The explorations were performed in general accordance with locally accepted geotechnical engineering practice, subject to the time limits and financial and physical constraints applicable to the services for this project, to provide information for the areas explored. There are possible variations in the subsurface conditions between the test locations and variations over time. We recommend that a contingency for unanticipated conditions be included in the construction schedule and budget.

FIGURES



Source: USGS 7.5 Minute Topographic Quadrangle Map, Bellevue North, WA, 1982

FIGURE 1
SITE LOCATION MAP
MCLEOD/LAKE ST. S. GEOTECH STDY/WA

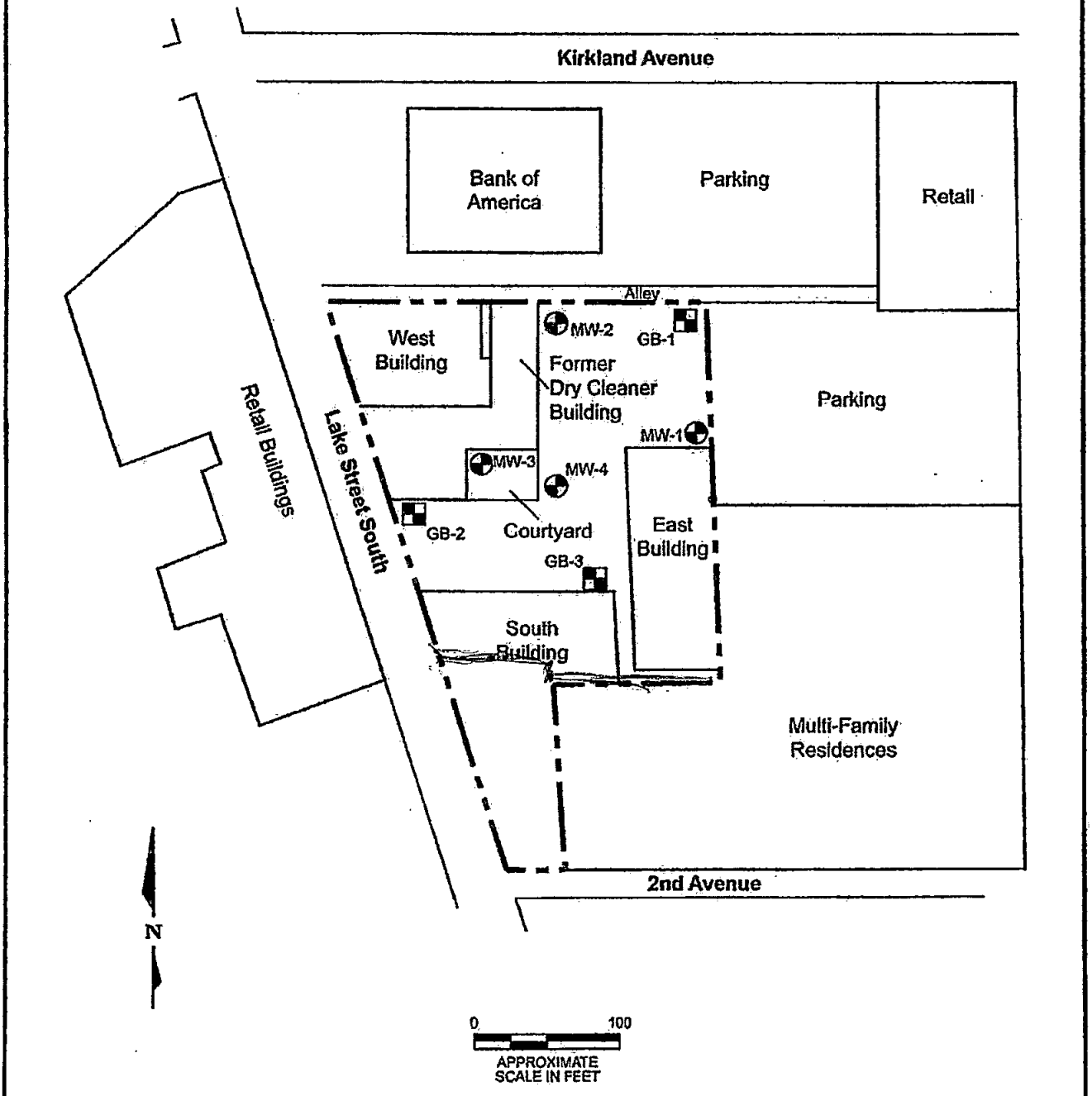


FIGURE 2
SITE PLAN
MCLEOD/LAKE ST. S. GEOTECH STDY/WA

0739337500 1fig02.fh11 | Mod: 01/09/08 | AMP

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APPENDIX A

SOIL CLASSIFICATION/LEGEND
BORING LOGS

Unified Soil Classification System

Criteria for Assigning Group Symbols and Names			Soil Classification Group Symbols	Generalized Group Descriptions
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve	GRAVELS More than 50% of coarse fraction retained on No. 4 Sieve	CLEAN GRAVELS Less than 5% fines	GW	Well-graded Gravels
			GP	Poorly-graded gravels
		GRAVELS WITH FINES More than 12% fines	GM	Gravel and Silt Mixtures
			GC	Gravel and Clay Mixtures
	SANDS 50% or more of coarse fraction passes No. 4 Sieve	CLEAN SANDS Less than 5% fines	SW	Well-graded Sands
			SP	Poorly-graded Sands
		SANDS WITH FINES More than 12% fines	SM	Sand and Silt Mixtures
			SC	Sand and Clay Mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50	INORGANIC	CL	Low-plasticity Clays
			ML	Non-plastic and Low-Plasticity Silts
		ORGANIC	OL	Non-plastic and Low-Plasticity Organic Clays Non-plastic and Low-Plasticity Organic Silts
	SILTS AND CLAYS Liquid limit greater than 50	INORGANIC	CH	High-plasticity Clays
			MH	High-plasticity Silts
		ORGANIC	OH	High-plasticity Organic Clays High-plasticity Organic Silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat

Component Definitions by Gradation

Component	Size Range
Boulders	Above 12 in.
Cobbles	3 in. to 12 in.
Gravel	3 in. to No. 4 (4.76mm)
Coarse gravel	3 in. to 3/4 in.
Fine gravel	3/4 in. to No. 4 (4.76mm)
Sand	No. 4 (4.76mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.76mm) to No. 10 (2.0mm)
Medium sand	No. 10 (2.0mm) to No. 40 (0.42mm)
Fine sand	No. 40 (0.42mm) to No. 200 (0.074mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

Samples

SS	SPT Sampler (2.0" OD)
HD	Heavy Duty Split Spoon
ST	Shelby Tube
P	Pitcher Sampler
B	Bulk
C	Cored

Unless otherwise noted, drive samples advanced with 140 lb. hammer with 30 in. drop.

Relative Density or Consistency Utilizing Standard Penetration Test Values

Cohesionless Soils (a)			Cohesive Soils (b)		
Density (c)	N, blows/ft. (c)	Relative Density (%)	Consistency	N, blows/ft. (c)	Undrained Shear Strength (d) (psf)
Very loose	0 to 4	0 – 15	Very soft	0 to 2	<250
Loose	4 to 10	15 – 35	Soft	2 to 4	250–500
Compact	10 to 30	35 – 65	Firm	4 to 8	500–1000
Dense	30 to 50	65 – 85	Stiff	8 to 15	1000–2000
Very Dense	over 50	>85	Very Stiff	15 to 30	2000–4000
			Hard	over 30	>4000

(a) Soils consisting of gravel, sand, and silt, either separately or in combination, possessing no characteristics of plasticity, and exhibiting drained behavior.

(b) Soils possessing the characteristics of plasticity, and exhibiting undrained behavior.

(c) Refer to test of ASTM D 1586-84 for a definition of N; in normally consolidated cohesionless soils Relative Density terms are based on N values corrected for overburden pressures.

(d) Undrained shear strength = 1/2 unconfined compression strength.

Laboratory Tests

Test	Designation
Moisture	(1)
Density	D
Grain Size	G
Hydrometer	H
Atterberg Limits	(1)
Consolidation	C
Unconfined	U
UU Triax	UU
CU Triax	CU
CD Triax	CD
Permeability	P

(1) Moisture and Atterberg Limits plotted on log.

Descriptive Terminology Denoting Component Proportions

Descriptive Terms	Range of Proportion
Trace	0–5%
Little	5–12%
Some or Adjective (a)	12–30%
And	30–50%

(a) Use Gravelly, Sandy or Silty as appropriate.

Silt and Clay Descriptions

Description	Typical Unified Designation
Silt	ML (non-plastic)
Clayey Silt	CL–ML (low plasticity)
Silty Clay	CL
Clay	CH
Plastic Silt	MH
Organic Soils	OL, OH, Pt

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Figure

SOIL CLASSIFICATION/LEGEND

RECORD OF BOREHOLE GB-1

SHEET 1 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: NE Corner of Site
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 13, 2007
DRILL RIG: CME 75 Truck-Mounted
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION: 38
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS GRAPHIC
0	4-inch inner diameter hollow stem auger with auto-hammer	0.0 - 0.4 Asphalt			37.6							Cement backfill
		0.4 - 51.5 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings; trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS)			0.4							
5						1	SS	7-8-12	20	1.5/1.5		
10			ML			2	SS	4-10-12	22	1.5/1.5		
15						3	SS	4-18-12	30	1.5/1.5		
20		Log continued on next page										

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose
LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

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BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE GB-1

SHEET 2 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: NE Corner of Site
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 13, 2007
DRILL RIG: CME 75 Truck-Mounted
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION: 38
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer, 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p [W] W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
20	4-inch inner diameter hollow stem auger with auto-hammer	0.4 - 51.5 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)*	ML			4	SS	6-11-12	23	1.5/1.5		
25						5	SS	6-10-15	25	1.5/1.5		Bentonite chips backfill.
30		-Increase in fine sand content.				6	SS	6-10-22	32	1.5/1.5		
35						7	SS	7-13-17	30	1.5/1.5		
40		Log continued on next page										

1 In to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose
LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 07393375001BS.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE GB-1

SHEET 3 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: NE Corner of Site
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 13, 2007
DRILL RIG: CME 75 Truck-Mounted
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION: 38.
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_P ⊢ W ⊣ W_L (20 40 60 80)	NOTES WATER LEVELS GRAPHIC
40	4-inch inner diameter hollow stem auger with auto-hammer	0.4 - 51.5 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)*	ML			8	SS	9-12-16	28	1.5/1.5		
45						9	SS	12-18-27	45	1.5/1.5	■	
50		-Sample increases in moisture content.				10	SS	6-14-20	34	1.5/1.5	■	
		Boring completed at 51.5 ft.			-13.5 51.5							
55												
60												

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose
LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

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BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE GB-2

SHEET 1 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: SW Corner of Site

DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 14, 2007
DRILL RIG: CME 75 Truck-Mounted

DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: 33
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) WATER CONTENT (PERCENT) W_P ⊢ W ⊣ W_L (20 40 60 80)	NOTES WATER LEVELS GRAPHIC
0	4-inch inner diameter hollow stem auger with auto-hammer	0.0 - 0.4 Asphalt			32.6 / 0.4							
		0.4 - 51.5 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS)										Cement backfill.
5						1	SS	2-7-14	21	1.5/1.5	■	
10			ML			2	SS	3-7-9	16	1.5/1.5	■	
15						3	SS	11-15-12	27	1.5/1.5	■	
20		Log continued on next page									■	

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose

LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE GB-2

SHEET 2 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: SW Corner of Site
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 14, 2007
DRILL RIG: CME 75 Truck-Mounted
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION: 33
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
20	4-inch inner diameter hollow stem auger with auto-hammer	0.4 - 51.5 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)*	ML			4	SS	4-8-8	16	1.5 / 1.5	■	
25		-Increase in fine sand content.				5	SS	5-11-12	23	1.5 / 1.5	■	Bentonite chips backfill
30						6	SS	9-12-13	25	1.5 / 1.5	■	
35						7	SS	5-10-15	25	1.5 / 1.5	■	
40		Log continued on next page										

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose
LOGGED: A. Dennison
CHECKED: R. Luark
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BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/09

RECORD OF BOREHOLE GB-2

SHEET 3 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: SW Corner of Site
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 14, 2007
DRILL RIG: CME 75 Truck-Mounted
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION: 33
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft (10 20 30 40) / WATER CONTENT (PERCENT) W_p — W — W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
40	4-inch inner diameter hollow stem auger with auto-hammer	0.4 - 51.5 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)*	ML			8	SS	6-8-10	18	1.5 / 1.5	■	
45						9	SS	6-8-10	18	1.5 / 1.5	■	
50						10	SS	5-9-14	23	1.5 / 1.5	■	
					-18.5							
		Boring completed at 51.5 ft.			51.5							
55												
60												

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose
LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 0739337S001BS.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE GB-3

SHEET 1 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: SE Corner of Site

DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 14, 2007
DRILL RIG: CME 75 Truck-Mounted

DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: 32
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS GRAPHIC
0	4-inch inner diameter hollow stem auger with auto-hammer	0.0 - 0.4 Asphalt			31.6							
		0.4 - 1.5 Compact, light brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt, damp (SW/GW) (FILL)	SW/GW		0.4							
		1.5 - 61.6 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS)			30.5 1.5							
5						1	SS	9-12-16	28	1.5/1.5	■	Cement backfill.
10			ML			2	SS	5-8-14	22	1.5/1.5	■	
15						3	SS	5-18-23	41	1.5/1.5	■	
20		Log continued on next page									■	

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose

LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 0739375001BS.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE GB-3

SHEET 2 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: SE Corner of Site
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 14, 2007
DRILL RIG: CME 75 Truck-Mounted
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION: 32
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer, 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS / GRAPHIC
20	4-inch inner diameter hollow stem auger with auto-hammer	1.5 - 51.5 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)*				4	SS	6-10-14	24	1.5 / 1.5		
25						5	SS	4-7-12	19	1.5 / 1.5		Bentonite chips backfill.
30		-Increase in sand content and increase in moisutre content.	ML			6	SS	4-9-13	22	1.5 / 1.5		
35						7	SS	7-15-20	35	1.5 / 1.5		
40		Log continued on next page										

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose
LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 073937500 1BS.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE GB-3

SHEET 3 of 3

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: SE Corner of Site
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 14, 2007
DRILL RIG: CME 75 Truck-Mounted
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION: 32
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40)	WATER CONTENT (PERCENT) W_p ⊢ ○ ⊣ W_l (20 40 60 80)	NOTES WATER LEVELS GRAPHIC
40	4-inch inner diameter hollow stem auger with auto-hammer	1.5 - 51.5 Very stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)* -Sample decreases in moisture content.	ML			8	SS	9-9-12	21	1.5/1.5			
45						9	SS	7-11-14	25	1.5/1.5			
50						10	SS	10-13-22	35	1.5/1.5			
					-19.5								
		Boring completed at 51.5 ft.			51.5								
55													
60													

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose

LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE MW-4

SHEET 1 of 4

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: Center of Site

DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 13, 2007
DRILL RIG: CME 75 Truck-Mounted

DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: 35
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS GRAPHIC
0	4-inch inner diameter hollow stem auger with auto-hammer	0.0 - 0.4 Asphalt			34.6							Flush-mount monument installed in cement.
		0.4 - 1.0 Compact, light brown, fine to coarse SAND and fine to coarse GRAVEL, trace silt, damp (SW/GW) (FILL)	SW/GW		0.4 / 34.0							
		1.0 - 71.0 Stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS)			1.0							
5						1	SS	7-10-15	25	1.5 / 1.5	■	
10			ML			2	SS	6-18-7	25	1.5 / 1.5	■	
15						3	SS	6-10-12	22	1.5 / 1.5	■	
20		Log continued on next page				4	SS	7-12-13	25	1.5 / 1.5	■	

Groundwater measured 9 ft bgs on 12/14/07.

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose

LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE MW-4

SHEET 2 of 4

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: Center of Site
DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 13, 2007
DRILL RIG: CME 75 Truck-Mounted
DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed
ELEVATION: 35
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40); WATER CONTENT (PERCENT) (W_P — W — W_L; 20 40 60 80)	NOTES WATER LEVELS GRAPHIC
20	4-inch inner diameter hollow stem auger with auto-hammer	1.0 - 71.0 Stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)*	ML			4	SS	7-12-13	25	1.5/1.5		
25						5	SS	6-12-18	30	1.5/1.5		Solid 2-inch diameter PVC pipe embedded in bentonite chips.
30		-Increase in fine sand seams, moist.				6	SS	9-13-18	31	1.5/1.5		
35						7	SS	6-12-14	26	1.5/1.5		
40		Log continued on next page				8	SS	6-12-18	30	1.5/1.5		

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose
LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE MW-4

SHEET 3 of 4

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: Center of Site

DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 13, 2007
DRILL RIG: CME 75 Truck-Mounted

DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: 35
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) (W_p 20 40 W 60 80 W_L)	NOTES WATER LEVELS / GRAPHIC
40	4-inch inner diameter hollow stem auger with auto-hammer	1.0 - 71.0 Stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)*	ML			8	SS	8-12-18	30	1.5/1.5	■	
45						9	SS	8-12-16	28	1.5/1.5	■	
50						10	SS	6-11-13	24	1.5/1.5	■	Solid 2-inch diameter PVC pipe embedded in sand.
55						11	SS	7-11-14	25	1.5/1.5	■	
60		Log continued on next page				12	SS	8-11-16	27	1.5/1.5	■	Slotted 2-inch diameter

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose

LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/08

RECORD OF BOREHOLE MW-4

SHEET 4 of 4

PROJECT: McLeod/Lake St. S. Geotech
PROJECT NUMBER: 073-93375.001
LOCATION: Center of Site

DRILLING METHOD: Hollow Stem Auger
DRILLING DATE: December 13, 2007
DRILL RIG: CME 75 Truck-Mounted

DATUM: MSL
AZIMUTH: N/A
COORDINATES: not surveyed

ELEVATION: 35
INCLINATION: -90

DEPTH (ft)	BORING METHOD	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in (140 lb hammer 30 inch drop)	N	REC / ATT	PENETRATION RESISTANCE BLOWS / ft ■ (10 20 30 40) / WATER CONTENT (PERCENT) W_p W W_l (20 40 60 80)	NOTES WATER LEVELS GRAPHIC
60	4-inch inner diameter hollow stem auger with auto-hammer	1.0 - 71.0 Stiff to hard, light gray, massive, SILT, trace fine sand, trace white fine sand partings, trace fine to medium sand seams, damp to wet (ML) (PRE-FRASER FINE-GRAINED DEPOSITS) *(Continued)* -Sample increases in moisture content.				12	SS	8-11-16	27	1.5 / 1.5		PVC pipe embedded in sand.
65		-Sample decreases in moisture content.	ML			13	SS	6-13-15	28	1.5 / 1.5	■	
70						14	SS	6-11-13	24	1.5 / 1.0	■	
		Boring completed at 71.0 ft.			-36.0 / 71.0							
75												
80												

1 in to 3 ft
DRILLING CONTRACTOR: Cascade Drilling Inc
DRILLER: Dave Grose

LOGGED: A. Dennison
CHECKED: R. Luark
DATE: 1/11/2007

Golder Associates

BOREHOLE RECORD 073933750018S.GPJ GLDR_WA.GDT 1/11/08