Date: 12/10/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-10

Name: J. Sobolew

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Fines: Silt	Particle % Dist.: Fines: Clay	Grain Size: Sand: Fine	Grain Size: Sand: Medium	Grain Size: Sand: Coarse	Grain Size: Gravel: Fine	Grain Size: Gravel: Coarse	Grain Size: Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
0		10YR 4/3 brown		X			5	95	tr			X	X	X	> 20		X	X				X		X				X				X	X				X						SP	Poorly graded sand, 95% sand mc, Subrounded, F c gravel QF
2		10YR 4/4 dark yellowish brown		X			tr	100			X	X	X	X	c		X				X	X		X				X				X	X		X								SP	Poorly graded sand 100% F-C, Subangular to Subrounded, QFA
3		10YR 5/4 yellowish brown		X				100	tr		X	X	X				X				X	X		X				X				X	X		X		X						SP	Poorly graded sand 100% F-C, Subangular to Subrounded QFA, tr clay balls
4		7.5YR 4/4 brown		X				100	tr		X	X	X				X				X	X		X				X				X	X		X		X						SP	Poorly graded sand, 100% F-C, Subangular to Subrounded, QFA trace clay balls
5		10YR 4/2 brown		X			tr	100	tr		X	X	X		X	63 mm	X				X	X		X				X				X	X		X		X						SP	Poorly graded sand, 100% F-C, Subangular to Subrounded, QFA trace cobble

Drilling Contractor: Cascade

Drilling Rig Type: Prosonic

Drilling Method: Sonic

Sampling Method: hand auger

Descriptive Location:

Date: 12/10/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-10

Name: J. Sobolew

Margin notes	Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist. (Fines): Silt	Particle % Dist. (Fines): Clay	Grain Size Sand: Fine	Grain Size Sand: Medium	Grain Size Sand: Coarse	Grain Size Gravel: Fine	Grain Size Gravel: Coarse	Grain Size Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
1.8' Recov 5-15' Full 15-17	5 / 17	0818 / 0840	10YR 5/4 Yellowish brown		X				100	tr		X	X	X				X				X	X		X				X				X	X		X							SP	Poorly graded Sand, 100% F-C, Subangular to subrounded, QFA trace silt
2' Recov 17-23' 1.5' 23-25' 1.3 25-27	27	0855	10YR 5/4 to 4/3 Yellowish brown to brown		X				100	tr		X	X	X				X				X	X		X				X				X	X		X		X					SP	Poorly graded sand, 100% F-C, Subangular to subrounded, QFA
1.5 27-29	28.5	0910	2.5Y 5/4 light Olive brown		X				95		5	X	X					X	X				X			X			X				X	X		X		X					SP-SC	Poorly graded sands, 95/5% sand F-M, Subrounded QFA, 5% clay layers: low plasticity
1.8' 28.5-31 1.5' 31-33	33		10YR 5/4 Yellowish brown		X				100	tr		X	X					X					X		X				X				X	X		X		X					SP	Poorly graded Sand, 100% F-M, Subrounded, QFA trace silt
1.5' 33-35 1.5' 33-37	37	[illegible]	10YR 6/3 Pale brown		X				100			X	X	X				X			X	X			X				X				X	X	X	X		X					SP	Poorly graded sand, 100% F-C, angular to subangular QFAM

Drilling Contractor: Cascade

Drilling Rig Type: Pro Sonic

Drilling Method: Son...

Sampling Method:

Descriptive Location: Comox, Marina

Date: 12/10/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-1D

Name: J. Sobolev

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Fines: Silt	Particle % Dist.: Fines: Clay	Grain Size: Sand: Fine	Grain Size: Sand: Medium	Grain Size: Sand: Coarse	Grain Size: Gravel: Fine	Grain Size: Gravel: Coarse	Grain Size: Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
37 47	0910	10YR 6/3 Pale Brown		X				100			X	X	X				X			X	X			X		X		X				X	X	X	X		X						SP	Poorly graded sand, 100% F-C, angular to subangular, QFMA saturated @ 41
53		10YR 6/4 light yellowish brown			X		15	85			X	X	X	X	X	X	X			X	X			X				X				X	X		X		X						SP	Poorly graded sand w/ gravel, 85% sand F-C, subangular to subrounded, F-C gravel QFA
55		2.5Y 5/3 light olive brown			X		tr	95		5	X	X		X		5		X	X	X	X			X				X				X	X	X	X		X						SP	Poorly graded sand, 95% sand F-M, subangular to subrounded, 5% clay, clay balls, trace gravel
61.5		2.5Y 5/3 light olive brown			X		tr	100			X	X	X	X		5	X	X			X	X		X				X				X	X	X	X		X						SP	Poorly graded sand 100% sand F-C, subangular to subrounded, tr gravel
67		10YR 4/3 brown			X			100	tr		X						X					X		X				X				X	X	X	X		X						SP	Poorly graded sand, 100% very fine, subrounded trace silt

1.9, 1.4, 1.4, 1.6, 1.5

1.5, 1.9, 1.7

1.6

1.6, 2.1

1.4, 1.6, 1.5

Drilling Contractor:

Drilling Rig Type:

Drilling Method:

Sampling Method:

Descriptive Location:

Date: 12/10/14

BOREHOLE LOGICAL LOG

Well Number/Name: MW-10

Name: J. Sobolew

	Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist. Fines: Silt	Particle % Dist. Fines: Clay	Grain Size Sand: Fine	Grain Size Sand: Medium	Grain Size Sand: Coarse	Grain Size Gravel: Fine	Grain Size Gravel: Coarse	Grain Size Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
0.8 1.9	67 71		10YR 5/3 brown			X		10	90	tr		X	X	X	X	✓	10		X	✓		X	✓		✓				X				X	X	X	X		✓					SP	Poorly graded sand, 90% sand F-C, subangular to subrounded, F-C gravel, QFMA / 69-70 very fine sand w/ ~~gravel~~ but trace silt
1.6 2.1 1.9 2.1,6,2	81.5		2.5Y 4/3 olive brown			X			85	15		X						X				✓	X		X				✓				X	X	X	X		✓					SM	Silty sand, 85% v.fine sand, subangular to subrounded, 15% silt QFMA
2 1.4	83		2.5Y 5/4 light olive brown			X			95	5		X	X	X				X	✓		X	✓			X				X				X	X	X	X		✓					SP	Poorly graded sand, 95% F-C sand, 5% silt, subangular to subrounded
	84.5		2.5Y 4/3 olive brown			X			85	15		✓						X				X	X		X				✓				X	X	X	X		X					SM	Silty sand, 85% v.fine sand, subangular to subrounded, 15% silt QFMA
0.5 0.4	85.5		5YR 5/6 yellowish red					30	65		5	X	X	X	X	X	5s			✓		X	✓			✓			X				X			X		X					SP	Poorly Graded Sand w/ gravel, 65% F-C sand, subangular to subrounded, 30% gravel F-C, QA, 5% clay low plasticity

Drilling Contractor:

Sampling Method:

Drilling Rig Type:

Descriptive Location:

Drilling Method:

Date: 12/10/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-10

Name: J. Sobolew

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Fines: Silt	Particle % Dist.: Fines: Clay	Grain Size: Sand: Fine	Grain Size: Sand: Medium	Grain Size: Sand: Coarse	Grain Size: Gravel: Fine	Grain Size: Gravel: Coarse	Grain Size: Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
85.5 1.6 87		5YR 5/6 yellowish red			X		15	85	tr	X	X	X	X	X	22		X				X	X		X				X				X	X		X		X						SP	Poorly graded sand w/gravel, 85% F-C subangular to subrounded, 15% F-C gravel QFA
2 89		2.5Y 5/4 light olive brown			X		10	90	tr	X	X	X	X	X	11	X	X				X	X		X				X				X	X		X		X						SP	Poorly graded sand, 90% F-C subangular to subrounded, 10% F-C gravel QFA
1.5 91		2.5Y 5/4 light olive brown			X			100	tr	X	X						X				X	X		X				X				X	X	X			X						SP	Poorly graded sand, 100% F-C sand, subangular to subrounded, trace silt QFM
1.5 93		2.5Y 5/4 light olive brown			X		15	85	tr	X	X	X	X	X	32		X					X		X				X				X	X		X		X						SP	Poorly graded sand, 85% F-C sand, subangular to subrounded, F-C gravel 15% QFA
1.7 1.6 97		2.5Y 5/3 light olive brown			X			100	tr	X	X						X				X			X				X				X	X	X	X		X						SP	Poorly graded sand, 100% F-M sand, grading finer towards bottom subangular QFMA

Drilling Contractor:

Drilling Rig Type:

Drilling Method:

Sampling Method:

Descriptive Location:

Date: 12/11/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-10

Name: J. Sobdan

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Silt	Particle % Dist.: Clay	Grain Size (Sand): Fine	Grain Size (Sand): Medium	Grain Size (Sand): Coarse	Grain Size (Gravel): Fine	Grain Size (Gravel): Coarse	Grain Size (Gravel): Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
2' 97 100		10YR 4/3 brown			X			58	5	10	X	X	X	X		6		X			X	X		X				X				X	X	X	X		X					SP-SM	Poorly Graded Sand w/silt 85% F-C Sand, 10% silt Subangular to subrounded, 5% F gravel, QFMA
1.8 1.7 1.9 1.8 2.1 2 2.2 113		10YR 4/3 Brown (100-109) 2.5Y 4/3 olive brown (109-113)			X			75	25		X						X				X	X		X				X				X	X	X	X		X					SM	Silty Sand, 75% Sand very fine to fine, Subangular to subrounded, 25% silt QFMA Shells found 100-109
1.9 2.4 1.8 2.0 121		5YR 5/8 yellowish red (114.4) 2.5Y 6/4 light yellowish brown			X			100	0		X	X	X				X				X	X		X				X				X	X		X		X	X		X			SP	Poorly graded sand, 100% F-C sand, Subangular to Subrounded, trace silt Color change 113-114.4, 114.4 to 117, 117-121
1.2 2.1 2 125		7.5YR 5/6 strong brown 121-122 10YR 5/4 yellowish brown			X			85	15		X	X						X				X		X				X	X	X	X	X	X	X	X	X	X					SM	Silty Sand, 85% F-M Sand, Predominantly Fine, Subrounded, 15% silt QFMA, Pockets of coarse sand and gravel
2 126		10YR 5/4 yellowish brown						100	85	5	X	X	X	X		5		X	X	X	X			X				X	X			X	X		X		X					SP	Poorly Graded Sand, 85% F-C Sand, angular to subangular, 10% F gravel, 5% silt, QFA

Drilling Contractor:

Drilling Rig Type:

Drilling Method:

Sampling Method:

Descriptive Location:

Date: 12/11/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-1D

Name: J. Sobolew

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Fines: Silt	Particle % Dist.: Fines: Clay	Grain Size: Sand: Fine	Grain Size: Sand: Medium	Grain Size: Sand: Coarse	Grain Size: Gravel: Fine	Grain Size: Gravel: Coarse	Grain Size: Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
126 – 127		7.5YR 5/6 strong brown		X				80		20	X						X				X					X		X				X		X		X	X						SC	Clayey sand, 80% F sand subangular, 20% clay low plasticity QA
2 1.5 2 133.5		7.5YR 5/4 brown / 5YR 4/6 Yellow: 54 red 132-133.5					15	75		10	X	X	X	X	X	bl		X			X	X				X		X				X	X	X	X		X						SP/SC	Poorly graded sand w/clay, 75% F-C sand, subangular to subrounded, F-C gravel 15% QFMA, 10% clay M plasticity
135		2.5Y 6/3 light yellowish brown		X			5	80		15	X	X	X	X		5		X			X	X				X			X			X		X	X								SM	Silty sand, 80% F-C sand, subangular to subrounded, low plasticity, QMA
147		7.5YR brown / 140.2-147 7.5YR 4/6 strong brown		X				5		95	X	X					X				X				X			X				X						X						ML	Silt, 95% silt, F-M sand, Quartz subangular trace clay found found 140.2-147
149.5		2.5Y 4/2 dark grayish brown	X					15		10		X					X					X						X	X			X						X						CH	Fat clay, 100% clay, high plasticity trace sand, subrounded

Drilling Contractor:

Drilling Rig Type:

Drilling Method:

Sampling Method:

Descriptive Location:

Date: 12/12/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-1D

Name: J. Sobolew

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Fines: Silt	Particle % Dist.: Fines: Clay	Grain Size: Sand: Fine	Grain Size: Sand: Medium	Grain Size: Sand: Coarse	Grain Size: Gravel: Fine	Grain Size: Gravel: Coarse	Grain Size: Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
149.5 – 157		2.5Y 5/4 light olive brown	X					85	15		X	X						X			X				X	X		X				X			X	X							SM SC	Silty Sand / Clayey Sand, 85% F-M Sand, subangular, medium sorting, Low-med plasticity, QA
157 – 167		10YR 4/6 dark yellowish brown	X					85	15		X							X			X				X	X		X				X			X		X						SC	Clayey sand, 85% Fine sand, subangular, Clay 15% low to medium plasticity
167 – 177		10YR 4/4 dark yellowish brown	X					95	5		X	X						X			X				X			X				X	X		X		X						SP	Poorly graded Sand, 95% F-M Sand, subangular, 5% silt, trace course sand, QFA
177 – 197		5YR 4/6 yellowish red 177-183 / 5Y 4/2 Olive gray	X					85	15		X	X						X			X	X			X	X		X				X	X		X	X	X						SC	Clayey Sand, 85% F-M Sand, Subangular to Subrounded, 15% clay, low to high plasticity, QFA, Alteration in color
197 – 212.25		10YR 3/3 dark brown						85	15		X	X						X			X	X		X				X				X			X		X						SM	Silty Sand, 85% F-M Sand, predominantly fine, Subangular to subrounded, 15% silt, QA

Drilling Contractor: Casade

Drilling Rig Type: Prosonic 600T

Drilling Method: Sonic

Sampling Method:

Descriptive Location: Cemex - MW-1D

Date: 12/12/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-10

Name: J. Sobolew

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Fines: Silt	Particle % Dist.: Fines: Clay	Grain Size: Sand: Fine	Grain Size: Sand: Medium	Grain Size: Sand: Coarse	Grain Size: Gravel: Fine	Grain Size: Gravel: Coarse	Grain Size: Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
212.2 223.5		2.5Y 5/3 light Olive brown		X				5		100	X						X				X						X	X				X					X						CH	Fat Clay, 100% Clay, trace fine sand Subangular, Quartz
227		2.5Y 6/6 Olive Yellow		X				15		85	X	X						X			X					X	X	X				X	X	X	X		X						CH	Fat clay w/ sand, 85% clay, 15% sand F-M, Subangular, QFMA, Medium to high plasticity
241		5Y 5/2 Olive gray		X						100							X										X												X					CH	Fat clay, 100% clay high plasticity
243		5Y 6/2 light Olive gray		X				35		65	X	X						X	X		X					X	X		X				X		X	X	X	X						CL	Sandy lean clay, 65% clay, low to medium plasty, 35% F-M sand, subang, QMA
272		2.5Y 6/3 light yellow brown				40	55		5		X	X	X	X	X	46			X		X			X			X					X	X	X	X		X						SP	Poorly graded sand w/ gravel, 55% F-C sand, 40% F-C gravel, subangular to subrounded, 5% silt, large cobble,

Drilling Contractor:

Drilling Rig Type:

Drilling Method:

Sampling Method:

Descriptive Location:

Date: 12/12/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-1D

Name: J. Sobol[illegible]

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moist	Saturated	Particle % Dist.: Cobbles	Gravel	Sand	Fines: Silt	Fines: Clay	Grain Size Sand: Fine	Medium	Coarse	Grain Size Gravel: Fine	Coarse	Max	Sorting: Well	Medium	Poor
247 – 263		5Y 6/3 Pale Olive 247-250.5' / Gley 1 4/ dark gray	X							100									
267		2.5Y 5/3 light olive brown					10	30		60	X	X	X	X	X	53			✓
269.2		5Y 5/2 olive gray					5	10		85	X	X	X	X		5		X	X
271.3		2.5Y 6/2 Gray					15	75		10	X	X	X	X	X	18			X
274.3		10YR 6/4 light yellowish brown / Gley 1 4/ dark gray					45	40		15	X	X	X	X	X	81			✓

Sample Depth (ft)	Grain Shape: Angular	Sub-Angular	Sub-Rounded	Rounded	Plasticity: None	Low	Medium	High	Cementation: None	Weak	Moderate	Strong	Mineral Composition: Quartz	Feldspar	Mica	Amphibole	Evaporites	Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
247 – 263								X															CH	Fat Clay, 100% Fat Clay, high plasticity.
267		X	X				X	X	X				X			X		X					CH	Sandy Fat Clay w/gravel 60% Clay, med to high plasticity, 30% Sand F-C, 10% gravel, Subangular to subrounded, QA
269.2		X	X				X		✓				X	X	X	X	X	X					CL	Lean clay w/sand, 85% Clay, Medium plasticity, 10% F-C sand, 5% gravel, Subangular to subrounded
271.3		X				✓	✓		X				X	X		X		X					SP-SC	Poorly graded sand w/clay and gravel. 75% F-C sand, 15% F-C gravel, subangular, 10% Clay low to medium plasticity, predominantly Quartz
274.3		✓				X	X		X				X	X	X	✓		X					GC	Clayey Gravel w/sand, 45% gravel F-C, 40% sand F-C, 15% clay low to med plasticity large cobbles 81mm (layer of clay) chert

Drilling Contractor: Cascade

Drilling Rig Type: Prosonic 600T

Drilling Method: Sonic

Sampling Method:

Descriptive Location: Cemex MW-1D

Date: 12/13/14

Well Number/Name: MW-1D

BOREHOLE LITHOLOGICAL LOG

Name: J. Sobolev

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Fines: Silt	Particle % Dist.: Fines: Clay	Grain Size: Sand: Fine	Grain Size: Sand: Medium	Grain Size: Sand: Coarse	Grain Size: Gravel: Fine	Grain Size: Gravel: Coarse	Grain Size: Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
274.5 – 276.4		2.5Y 4/3 olive brown	X					tr		100																X		X																CH	Fat clay, 100% clay medium plasticity, brittle, trace interbeds of sand
276.4 – 282.1		10YR 6/3 pale Brown			X		10	90			X	X	X	X		7		X			X	X		X				X				X	X	X	X		X						SP	Poorly graded sand w/ gravel, 90% sand F-C, 10% F gravel, Subangular to Subrounded QFMA Grading
282.1 – 287		10YR 5/2 grayish brown			X		30	65		5	X	X	X	X		21			X	X		X			X			X				X	X		X		X						SP	Poorly graded sand w/ gravel, 85% F-C sand, 8 0% gravel, Subangular to Subrounded, QFA 5% clay
287 – 291		7.5Y 5/4 Brown		X				30	70		X						X					X		X				X				X	X	X			X						ML	Sandy silt, 70% silt, 30% very fine sand, Subrounded, QFM
291 – 301		10YR 6/4 light yellowish Brown			X		5	95	tr		X	X	X	X		5		X			X	X		X				X				X	X	tr	X		X						SP	Poorly graded sand, 95% sand, F-C sand, Subangular to Subrounded, 5% F gravel trace silt QFMA

Drilling Contractor: Cascade

Drilling Rig Type: Prosonic 600T

Drilling Method: Sonic

Sampling Method:

Descriptive Location: Cemex MW-1D

Date: 12/13/14

BOREHOLE LITHOLOGICAL LOG

Well Number/Name: MW-1D

Name: J. Sobolew

Sample Depth (ft)	Drilling Rate (ft/hr)	Color: Munsell Name and Class	Moisture Content: Dry	Moisture Content: Moist	Moisture Content: Saturated	Particle % Dist.: Cobbles	Particle % Dist.: Gravel	Particle % Dist.: Sand	Particle % Dist.: Fines: Silt	Particle % Dist.: Fines: Clay	Grain Size: Sand: Fine	Grain Size: Sand: Medium	Grain Size: Sand: Coarse	Grain Size: Gravel: Fine	Grain Size: Gravel: Coarse	Grain Size: Gravel: Max	Sorting: Well	Sorting: Medium	Sorting: Poor	Grain Shape: Angular	Grain Shape: Sub-Angular	Grain Shape: Sub-Rounded	Grain Shape: Rounded	Plasticity: None	Plasticity: Low	Plasticity: Medium	Plasticity: High	Cementation: None	Cementation: Weak	Cementation: Moderate	Cementation: Strong	Mineral Composition: Quartz	Mineral Composition: Feldspar	Mineral Composition: Mica	Mineral Composition: Amphibole	Mineral Composition: Evaporites	Mineral Composition: Other	Alteration Visible	Grading Analysis	Well Graded	Fat Clay	Rock Type (USCS Group)	Comment
301 – 317		10YR 5/4 Yellowish Brown		✓			25	65		10		✓	✓	✓	✓	20			✓		✓	✓		✓				✓				✓	✓	✓	✓		✓						SW-SC	Well graded sand w/clay and gravel, 65% sand F-C predominantly F-M, F-C 25% gravel, subangular to subrounded, 10% clay, low plasticity
319.5'		7.5YR 4/2 Brown		✓				95	5		✓	✓					✓					✓		✓				✓				✓				✓		✓						SP-SM	Poorly graded sand w/silt, 95% sand F-M, subround predominantly v. fine to fine, 5% silt
325.1		7.5YR 4/4 Brown		✓				tr	95		✓						✓					✓			✓			✓				✓		✓				✓						ML	silt, 100% silt, trace very fine sand, subrounded, QMA
327		10YR 5/3 Brown		✓				100	tr		✓	✓					✓	✓			✓	✓		✓				✓				✓		✓	✓			✓						SP	Poorly graded, 100% F-M sand, subangular to subrounded, trace silt, QMA
327 – 337		10YR 4/4 Brown 327-329.3; 5Y 5/2 Olive Gray	✓							100																	✓	✓																CH	Fat clay, 100% clay, high plasticity, 327-329.3 brittle

Drilling Contractor: Cascade

Drilling Rig Type: Prosonic 600T

Drilling Method: Sonic

Sampling Method: core

Descriptive Location: Cemex - MW-1D