SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND -SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

- 2.4-inch I.D. split barrel
- Standard Penetration Test (SPT)
- Shelby tube
- Piston
- Direct-Push
- Bulk or grab
- Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

- Measured groundwater level in exploration, well, or piezometer
- Measured free product in well or piezometer

Graphic Log Contact

- Distinct contact between soil strata
- Approximate contact between soil strata

Material Description Contact

- Contact between geologic units
- Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

GEOENGINEERS

Figure A-1

NOTES:

1. FOR BOREHOLE AND TEST PIT LOCATIONS SEE GEOTECHNICAL REPORT.
2. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DESIGNED BY: DATE

CHJS 2019/12/06
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B. PSCHANDER 2019/12/06
CHECKED BY: DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE KEY

SHEET: TLC-G-400
SCALE: AS SHOWN
FILENAME: A088367-G-400-421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	71.5	Logged By	EF	Driller	Geologic Drill Exploration, Inc.	Drilling Method	Hollow-stem Auger
Drilled 1/30/2017	1/30/2017			Checked By	HRP				

Surface Elevation (ft) Vertical Datum	128.51 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309792.61 261723.77	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							TS	6 inches topsoil			
								SM	Brown silty fine to medium sand with gravel and organic matter (loose, wet) (fill?)			
125		☒	10	7		1						
	5	☒	8	2		2 MC		SP-SM	Grayish brown fine to medium sand with silt (very loose to medium dense, wet)	24		Groundwater observed at 6 feet at time of drilling
120		☒	8	P		3						
	10	☒	8	P		4 SA				25	7	
115												
	15	☒	7	9		5			Grades to with occasional gravel			Added drilling mud to borehole
110												
	20	☒	10	18		6 MC				20		
105								SM	Grayish brown silty fine to coarse sand with gravel (dense, wet)			Driller noted gravel at 22 feet
	25	☒	18	43		7						
100								ML	Brown silt with sand (very stiff to hard, wet)			Driller noted easier drilling at 27 feet
	30	☒	18	27		8						
95								CL	Orange-brown lean clay with sand and gravel (hard, wet)			
	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-1

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-2
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	35	☒	12	41		9 AL				24		AL (LL = 33; PI = 10)
90								CL	Gray lean clay with sand, gravel and cobbles (very stiff to hard, wet)			
	40	☒	10	31		10						
85												Auger refusal at 42½ feet; moved 3 feet to the north and drilled to 45 feet
	45	☒	18	48		11 MC				26		
80												
	50	☒	18	21		12						
75								SP	Gray fine to coarse sand with gravel and cobbles (dense to very dense, wet)			
	55	☒	12	39		13 SA				15	4	1 foot of heave
70												
	60	☒	10	86/11"		14						
65								SP-SM	Gray fine sand with silt and gravel (very dense, wet)			
	65	☒	12	60		15						
60								SP	Gray fine to medium sand with gravel (very dense, wet)			
	70	☒	10	70		16						

Log of Boring B-1 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-2
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DATE:

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CHJS DRAWN BY:	2019/12/06 DATE	
B. PSCHANDER CHECKED BY:	2019/12/06 DATE	

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 1

SHEET: TLC–G–401
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Drilled	Start 1/31/2017	End 1/31/2017	Total Depth (ft) 71	Logged By EF / Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger

Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Surface Elevation (ft) / Vertical Datum	129.92 NAVD88	Top of Casing Elevation (ft)	129.69
Easting (X) / Northing (Y)	1309862.77 / 261727.90	Horizontal Datum	WA State Plane North NAD83 (feet)

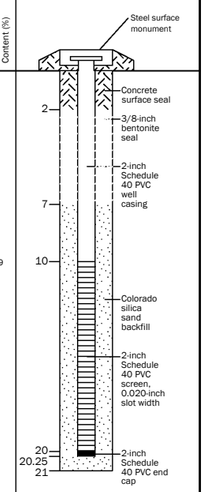
DOE Well I.D.: BIK 733
A 2 (in) well was installed on 1/31/2017 to a depth of 20 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/8/2018	3.32	126.37

Notes: Monitoring well installed in separate boring drilled 5 feet to the southwest.
Groundwater seepage encountered at 6½ feet at time of drilling.

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0							SP-SM	Brown fine to medium sand with occasional gravel (loose, wet)		
		8	5		1 / MC	▼				20	
125	5	10	5		2						
		12	4		1						
120	10	10	13		4 / MC			SP-SM	Brown fine to medium sand with silt (medium dense, wet)	26	9
								SP	Brown fine to medium sand with occasional gravel (loose to medium dense, wet)		
115	15	10	8		5				(1 foot of heave, added drilling mud to borehole)		
110	20	10	13		6						
105	25	12	8		7 / MC			SM/ML	Gray silty fine to coarse sand and brown silt with sand, gravel and organic matter (loose/medium stiff, wet) (Driller noted gravel at 23 feet)	25	
100	30	6	23		8			GM	Orange-brown silty fine to coarse gravel with sand and cobbles (medium dense, wet)		
95	35										

WELL LOG



Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring with Monitoring Well B-2

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-3
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	35	18	19		9 / AL			ML	Orange-brown silt with sand and gravel (very stiff, wet) AL (LL = 30; PI = 7) (Driller noted easier drilling at 36½ feet)	22	
90	40	10	22		10			GM	Orange-brown silty fine to coarse gravel with sand and cobbles (medium dense, wet)		
85	45	18	24		11			ML	Gray silt with sand and occasional gravel (very stiff, wet)		
80	50	12	32		12 / MC			GM	Gray silty fine to coarse gravel with sand and cobbles (dense, wet) (Driller noted cobbles at 46 feet)	15	
75	55	18	88/11"		13 / MC			SP	Gray fine to medium sand with gravel (very dense, wet) (Driller noted easier drilling at 54 feet)	12	
70	60	12	50/6"		14				(1-foot heave)		
65	65	11	50/5"		15						
60	70	10	50/4"		16						

WELL LOG

Log of Boring with Monitoring Well B-2 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-3
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CHJS	DRAWN BY:	2019/12/06 DATE
B. PSCHANDER	CHECKED BY:	2019/12/06 DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 2

SHEET: TLC–G–402
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367–G–400–421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	61.5	Logged By	EF	Driller	Geologic Drill Exploration, Inc.	Drilling Method	Hollow-stem Auger
Drilled 1/30/2017	1/30/2017			Checked By	HRP				

Surface Elevation (ft) Vertical Datum	140.99 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309919.44 261714.16	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
140	0							GP	Gray fine gravel with sand (medium dense, moist) (fill)			
		X	4	8		1 MC		SP-SM	Gray fine to medium sand with silt and gravel (loose, moist) (fill)	9		
135	5	X	10	11		2		SM	Grayish brown silty fine to medium sand with gravel (medium dense, moist) (fill)			
		X	12	3		3 MC		SM	Reddish brown silty fine to medium sand with occasional gravel (very loose to loose, moist) (fill)	16	15	
130	10	X	10	2		4						
125	15	X	12	5		5 MC			Grades to orange-brown	26		
								SP-SM	Brown fine to medium sand with silt (loose to medium dense, wet)			Groundwater observed at 17½ feet at time of drilling
120	20	X	13	10		6						
115	25	X	10	12		7						Added drilling mud to borehole
110	30							SM	Brown silty fine to medium sand with gravel (medium dense to dense, wet)	16		
		X	8	24		8 MC						
	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-3

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-4
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
105	35	X	18	41		9		ML	Brown and gray sandy silt with gravel (hard, wet)			
100	40	X	10	16		10 MC		CL	Brownish gray sandy clay with gravel (stiff to very stiff, wet)	18		
95	45	X	10	22		11 MC		SC	Orange-brown clayey fine to coarse sand with gravel (medium dense, wet)	18		
90	50	X	10	25		12		GM	Orange-brown silty fine to coarse gravel with sand and cobbles (medium dense to dense, wet)			
85	55	X	12	28		13						
80	60	X	10	47		14						

Log of Boring B-3 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-4
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CHJS	2019/12/06	
DRAWN BY:	DATE	
B. PSCHANDER	2019/12/06	
CHECKED BY:	DATE	

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 3

SHEET: TLC–G–403
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367–G–400–421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Drilled	Start 2/1/2017	End 2/1/2017	Total Depth (ft) 66.5	Logged By EF / Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger

Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Surface Elevation (ft) / Vertical Datum	144.48 NAVD88	Top of Casing Elevation (ft)	144.61
Easting (X) / Northing (Y)	1309737.29 / 261545.15	Horizontal Datum	WA State Plane North NAD83 (feet)

DOE Well I.D.: BIK 734
A 2 (in) well was installed on 2/1/2017 to a depth of 25 (ft).

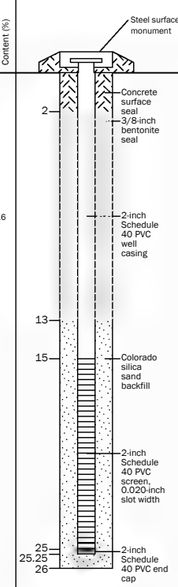
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/8/2018	14.94	129.67

Notes: Monitoring well installed in separate boring drilled 5 feet to the south.
Groundwater seepage encountered at 18 feet at time of drilling.

FIELD DATA

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
0								TS	6 inches topsoil		
								SM	Brown silty fine to medium sand with gravel and cobbles (loose to medium dense, moist) (fill)	15	
5	☒	14	10		1 MC						
	☒	12	6		2						
	☒	12	5		3 MC			SM	Reddish brown silty fine to medium sand (loose to medium dense, moist)	15	16
10	☒	10	12		4						
								GC	Brown clayey fine to coarse gravel with sand and cobbles (medium dense to dense, wet)	11	
15	☒	8	14		5 MC	▽					
20	☒	5	40		6				(Added drilling mud to borehole)		
								ML	Brown silt with sand and occasional gravel (stiff, wet)		
25	☒	18	13		7 AL				AL (LL = 47; PI = 16)	30	
								GM	Brown silty fine to coarse gravel with sand and cobbles (dense, wet)		
30	☒	10	32		8				(Driller noted cobbles at 32 feet)		
35								CL	Gray clay with sand (stiff, wet)		

WELL LOG



Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring with Monitoring Well B-4

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-5
Sheet 1 of 2

FIELD DATA

Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
35	☒	18	11		9 MC					26	
								GC	Brown clayey fine to coarse gravel with sand and cobbles (dense, wet)		
40	☒	10	35		10 MC					19	
								ML	Gray silt with sand (very stiff, wet)		
45	☒	18	19		11						
50	☒	6	27		12						
								GC	Brown clayey fine to coarse gravel with sand and cobbles (very dense, wet)		
55	☒	10	50/6"		13 MC					9	
								SM	Gray silty fine sand with gravel (very dense, wet)		
60	☒	18	95		14						
65	☒	10	85/11"		15						

WELL LOG

Log of Boring with Monitoring Well B-4 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-5
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CHJS 2019/12/06 DRAWN BY DATE
B. PSCHANDER 2019/12/06 CHECKED BY DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 4

SHEET: TLC–G–404
SCALE: AS SHOWN
FILENAME: A088367–G–400–421

Date: 2/13/18 By: mcP: G:\0231\090\DWG\DWG\0231100000.dgn | Bill: tonyv | Library: GEOENGINEERS_GF_STD_US_JUNE_2017 DLB/GEO_GEOTECH_WELL_NF
Save Date: Nov 2019 12:02 PM Saved CHJS
File:

Drilled	Start 2/2/2017	End 2/2/2017	Total Depth (ft) 31.5	Logged By EF / Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 146.73 / Vertical Datum NAVD88			Hammer Data Automatic 140 (lbs) / 30 (in) Drop		Drilling Equipment Diedrich D-50 Track Rig	
Easting (X) 1309590.63 / Northing (Y) 261338.47			System Datum WA State Plane North NAD83 (feet)		See "Remarks" section for groundwater observed	
Notes:						

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						GP	Gray fine gravel with sand (medium dense, moist) (fill)			
145							SM	Brown silty fine to medium sand (medium dense, moist)			
		X	18	12	1 MC				15		
	5	X	12	26	2						
140							CL	Light gray lean clay with sand (stiff, moist)			
		X	18	14	3 MC				25		
	10	X	6	20	4 AL		ML	Light brown silt with sand and occasional gravel (very stiff, wet)	26		AL (LL = 45; PI = 14)
135											Groundwater observed at 12½ at time of drilling
							SC	Brown clayey fine to coarse sand with gravel (dense, wet)			
	15	X	7	34	5 MC				16		
130							ML	Gray sandy silt (very stiff, wet)			
	20	X	14	23	6						
125							CL	Gray clay with sand and occasional gravel (stiff, wet)			
	25	X	12	9	7						
120							CL	Gray sandy clay with gravel (hard, wet)			Driller noted gravel at 27 feet
	30	X	12	62	8 MC				19		

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-5

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-6
Sheet 1 of 1

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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0	2019/12/06	CHJS	DCO	100% ISSUE FOR BID

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GEOENGINEERS

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DATE:

D. OVERBAY	DESIGNED BY:	2019/12/06 DATE
CHJS	DRAWN BY:	2019/12/06 DATE
B. PSCHANDER	CHECKED BY:	2019/12/06 DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 5

SHEET: TLC–G–405
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	81	Logged By MWB	Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Drilled 10/16/2017	10/16/2017						

Surface Elevation (ft) Vertical Datum	139.54 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309835.71 261646.62	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							TS	6 inches topsoil			
		X	12	7		1 / GA		SM	Brown silty fine to medium sand with gravel and occasional roots (loose, moist) (fill)	NS	<1	SA (MC = 10%; %F = 23)
135	5	X	10	10		2 / GA		SM	Orange-brown silty fine to medium sand with organic matter (loose, moist)	NS	<1	
		X	10	10		3 / MC		SP-SM	Tan fine to medium sand with silt and trace organic matter (loose, moist)	NS	<1	MC = 5%
130	10	X	14	11		4 / GA		SP	Tan fine to medium sand (medium dense, moist)	NS	<1	
125	15	X	18	10		5 / MC, %F		SP-SM	Light brown fine to medium sand with silt (loose to medium dense, wet)	NS	<1	Groundwater observed at 14½ feet at time of drilling MC = 24%; %F = 8
												Driller added mud to borehole
120	20	X	16	18		6				NS	<1	
115	25	X	12	16		7		CL	Orange-brown and gray lean clay with sand and gravel (stiff to very stiff, wet)			
110	30	X	18	21		8 / AL						AL (MC = 20%; LL = 31; PI = 9)
105	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-13

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-14
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	35	X	18	20		9						
100	40	X	14	17		10						
95	45	X	18	22		11						
90	50	X	18	55		12 / MC		SM	Gray silty fine to medium sand with gravel and cobbles (very dense, wet)			MC = 21%
85	55	X	17	85/11"		13		SP-SM	Gray fine to medium sand with silt and gravel (very dense, wet)			2 feet of heave
80	60	X	17	85/11"		14 / %F						3 feet of heave MC = 14%; %F = 10
75	65	X	17	50/5"		15		SP	Gray fine to medium sand with occasional gravel (very dense, wet)			
70	70	X	17	80/11"		16		SP	Gray fine to medium sand with gravel (very dense, wet)			
65	75	X	18	38		17						

Log of Boring B-13 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-14
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
60	80	X	12	50/6"		18						

Log of Boring B-13 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-14
Sheet 3 of 3

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DATE:

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CHJS	2019/12/06	DRAWN BY: DATE
B. PSCHANDER	2019/12/06	CHECKED BY: DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 13

SHEET: TLC–G–413
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Drilled	Start 2/2/2017	End 2/2/2017	Total Depth (ft) 21.5	Logged By EF / Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Surface Elevation (ft) / Vertical Datum	147.61 NAVD88		Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) / Northing (Y)	1309517.75 261256.19		System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						GP	Fine gravel with sand (medium dense, moist) (fill)			
145		☒	18	29	1		ML	Gray silt with sand (very stiff, moist)			
	5	☒	18	48	2 MC		ML	Gray silt with lenses of peat (hard, moist)	38		
140		☒	18	32	3		ML	Gray sandy silt (very stiff to hard, moist to wet)			
	10	☒	18	35	4						Groundwater observed at 11½ feet at time of drilling
135							SM	Gray silty fine sand (dense, wet)			
	15	☒	18	41	5 MC				23		
130							ML	Gray sandy silt (hard, wet)			
	20	☒	18	55	6						

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-6

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-7
Sheet 1 of 1

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CHJS	2019/12/06	
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B. PSCHANDER	2019/12/06	
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CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 6

SHEET: TLC–G–406
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS
Date: 2/12/2019 Time: 9:04:03 Path: S:\0231\090\DWG\0231090000.GPJ BB\Library\Library\GEOENGINEERS GF STD (6 JUNE 2017)\GB-GEOTECH STANDARD 36 X 48.gpk

Drilled	Start 2/2/2017	End 2/2/2017	Total Depth (ft) 21.5	Logged By EF	Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 150.47	Vertical Datum NAVD88		Hammer Data Automatic 140 (lbs) / 30 (in) Drop			Drilling Equipment Diedrich D-50 Track Rig	
Easting (X) 1309310.13	Northing (Y) 261022.93		System Datum WA State Plane North NAD83 (feet)			See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample / Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
150	0						GP	Gray fine gravel with sand (medium dense, moist) (fill)			
							GM	Brown silty fine to coarse gravel with sand (medium dense, moist) (fill)			
		☒	16	36	1 MC		SM	Gray silty fine to coarse sand with gravel (dense, moist) (fill)	8		
145	5	☒	10	16	2		ML/PT	Gray sandy silt with gravel and occasional thin lenses of peat (stiff to hard, moist)			
		☒	18	21	3 MC				31		
140	10	☒	18	39	4 MC			Becomes wet	61		Groundwater observed at 12½ feet at time of drilling
135	15	☒	18	50	5						
							ML	Gray sandy silt (hard, wet)			
130	20	☒	18	48	6						

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-7

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-00

Figure A-8
Sheet 1 of 1

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CHJS 2019/12/06
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CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 7

SHEET: TLC–G–407
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	51	Logged By MWB / Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Drilled 10/11/2017	10/11/2017					

Surface Elevation (ft) / Vertical Datum	159.51 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) / Northing (Y)	1309411.42 / 261175.51	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							TS	6 inches topsoil			
								SM	Brown silty fine to medium sand with gravel and roots (medium dense, moist)			
155		☒	10	24		1						
	5	☒	12	27		2 MC		SM	Orange-brown silty fine to medium sand with gravel (medium dense, moist)	7		
		☒	12	25		3		SM	Light brownish gray silty fine to medium sand with occasional gravel (medium dense, moist)			
150	10	☒	8	28		4		SM	Grayish brown silty fine to coarse sand (medium dense, moist)			
145	15	☒	18	26		5 MC		ML	Gray sandy silt with gravel and thin lenses of peat (very stiff, moist)	24		
140	20	☒	18	52		6			Becomes wet and hard			Groundwater observed at 20 feet at time of drilling
135	25	☒	18	43		7		ML	Gray sandy silt (hard, wet)			
130	30	☒	18	39		8						
125	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-8

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-9
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	35	☒	18	42		9						
120	40	☒	18	48		10						
115	45	☒	18	46		11		CL	Gray sandy lean clay with gravel (hard, wet)			
110	50	☒	9	50/3"		12						

Log of Boring B-8 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-9
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CHJS 2019/12/06
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B. PSCHANDER 2019/12/06
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CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 8

SHEET: TLC–G–408
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	61.5	Logged By MWB	Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Drilled 10/10/2017	10/10/2017						

Surface Elevation (ft) Vertical Datum	148.06 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309551.07 261337.75	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							TS	6 inches topsoil			
145		☒	10	14		1 SA		SM	Tan silty fine to medium sand with organic matter (medium dense, moist)	NS	<1	SA (MC = 6%; %F = 16)
	5	☒	10	21		2 SA		SM	Tan silty fine to medium sand (medium dense, moist)	NS	<1	
140		☒	12	34		3		SM	Orange-brown silty fine to medium sand with gravel (dense, moist)	NS	<1	
	10	☒	14	53		4 SA				NS	<1	SA (MC = 11%; %F = 41)
135												
	15	☒	12	15		5 AL CA		ML	Light gray silt (stiff, wet)	NS	<1	AL (MC = 31%; LL = 34; PI = 9) Groundwater osbserved at 16½ feet at time of drilling
130												
	20	☒	12	32		6 MC		CL	Dark gray and brown sandy lean clay with organic matter (very stiff to hard, wet)	NS	<1	MC = 27%
125												
	25	☒	18	47		7		ML	Gray sandy silt (hard, wet)			
120												
	30	☒	18	63		8 SA		SP-SM	Gray fine to coarse sand with silt, gravel and occasional cobbles (very dense, wet)			SA (MC = 11%; %F=7)
115												
	35							SM				

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-9

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-10
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	35	☒	10	50/4"		9		SM	Grayish brown silty fine to medium sand with gravel (very dense, wet)			
110												
	40	☒	9	50/3"		10		SP-SM	Gray fine to medium sand with silt and gravel (very dense, wet)			
105												
	45	☒	16	50/4"		11						
100												
	50	☒	18	5*		12		SP	Gray fine to medium sand with gravel (very dense, wet)			2 feet of heave *Blow count understated due to heave
95												
	55	☒	10	50/4"		13		SM	Gray silty fine to medium sand with gravel (very dense, wet)			
90												
	60	☒	18	65		14		SP-SM	Gray fine to medium sand with silt and occasional gravel (very dense, wet)			

Log of Boring B-9 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-10
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DATE:

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CHJS 2019/12/06
DRAWN BY: DATE

B. PSCHANDER 2019/12/06
CHECKED BY: DATE

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TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 9

SHEET: TLC–G–409
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

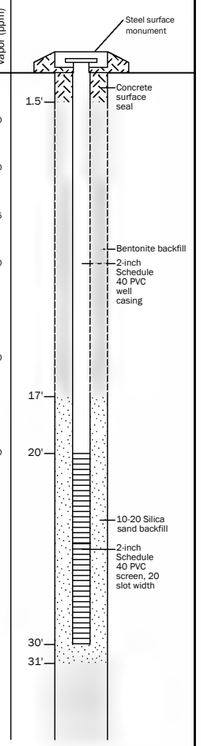
File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Drilled	Start 10/10/2017	End 10/10/2017	Total Depth (ft) 66.5	Logged By MWB / Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Hammer Data	Automatic 140 (lbs) / 30 (in) Drop		Drilling Equipment	Diedrich D-50 Track Rig	DOE Well I.D.: BKP202 A 2 (in) well was installed on 10/10/2017 to a depth of 30 (ft). Well was developed on 10/10/2017.	
Surface Elevation (ft) Vertical Datum	144.94 NAVD88		Top of Casing Elevation (ft)	145.03	Groundwater	
Easting (X) Northing (Y)	1309611.46 261403.03		Horizontal Datum	WA State Plane North NAD83 (feet)	Date Measured: 1/8/2018	Depth to Water (ft): 9.96 / Elevation (ft): 135.07

Notes: Groundwater seepage encountered at 19 feet at time of drilling.

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								TS	6 inches topsoil		
			6	5		1			SP-SM	Dark orange-brown fine to medium sand with silt and trace organic matter (loose, moist) (fill?)	NS	0.0
140	5		18	5		2 CA, SA			SM	Brown silty fine to medium sand (loose, moist) SA (MC = 14%; %F = 21)	SS	0.0
			8	11		3					SS	0.5
135	10		8	5		4 AL			CL	Tan and brown lean clay with sand (medium stiff, moist) AL (MC = 31%; LL = 48; PI = 21)	NS	0.0
130	15		8	10		5				Becomes stiff and wet	NS	0.0
125	20		18	20		6 SA					NS	0.0
120	25		18	28		7 MC			SC	Brown clayey fine sand (medium dense, wet) (MC = 25%; %F = 32)		
115	30		18	23		8			CL	Gray sandy clay (very stiff, wet)		
110	35								CL	Gray lean clay with sand (very stiff, wet)		

WELL LOG



Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Monitoring Well B-10

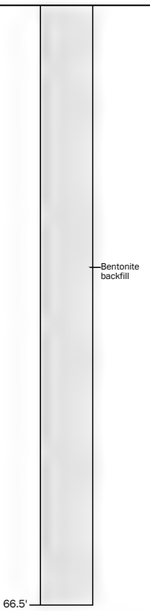
GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-11
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	35		8	20		10 AL				AL (MC = 25%; LL = 38; PI = 15)		
105	40		18	50/5"		10			SM	Brownish gray silty fine to medium sand with gravel (very dense, wet)		
100	45		3	50/3"		11						
95	50		18	56		12 MC			ML	Gray silt with sand and occasional gravel (hard, wet) (MC = 23%)		
90	55		18	69		13						
85	60		18	57		14			CL	Gray sandy lean clay with occasional gravel (hard, wet)		
			17	85/11"		15						
80	65								SM	Gray silty fine to medium sand with occasional gravel (very dense, wet)		
	66.5'											

WELL LOG



Log of Monitoring Well B-10 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-11
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DATE:

D. OVERBAY 2019/12/06
DESIGNED BY. DATE

CHJS 2019/12/06
DRAWN BY. DATE

B. PSCHANDER 2019/12/06
CHECKED BY. DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 10

SHEET: TLC–G–410
SCALE: AS SHOWN
FILENAME: A088367–G–400–421

Start	End	Total Depth (ft)	71.5	Logged By MWB	Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Drilled 10/9/2017	10/9/2017						

Surface Elevation (ft) Vertical Datum	144.99 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309713.74 261514.27	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							SOD	6 inches sod and topsoil			
		☒	3	50/3"*		1		SM	Light brown silty fine sand with gravel and organic matter (loose, moist) (fill)	NS	<1	*Blow count not representative, driving on rock
140	5	☒	14	9		2 CA,MC		SM	Dark brown silty fine to medium sand with gravel (loose, moist)	NS	<1	MC = 10%
		☒	5	4		3		SM	Dark orange-brown silty fine to medium sand with gravel (loose to medium dense, moist)	NS	<1	
135	10	☒	6	15		4 CA				NS	<1	
130	15	☒	6	16		5 MC		SC	Brown clayey fine to medium sand with gravel and occasional cobbles (medium dense, wet)	NS	<1	MC = 10%
125	20	☒	2	19		6		ML	Orange-brown and tan silt with sand and gravel (stiff, wet)	NS	<1	Groundwater observed at 20½ feet at time of drilling
120	25	☒	14	19		7 AL						AL (MC = 28%; LL = 39; PI = 12)
115	30	☒	12	44		8			Becomes hard			
110	35							CL	Gray sandy lean clay with gravel (very stiff, wet)			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-11

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-12
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	35	☒	12	26		9						
105	40	☒	18	24		10 MC		ML	Gray silt (very stiff, wet)			MC = 24%
100	45	☒	16	60		11			Becomes hard			
95	50	☒	18	47		12						
90	55	☒	18	32		13 MC		ML	Gray sandy silt with occasional gravel (hard, wet)			MC = 15%
85	60	☒	18	60		14		SM	Brownish gray silty fine sand with occasional gravel (very dense, wet)			
80	65	☒	18	50/5"		15 SA		SP-SM	Gray fine to medium sand with silt and occasional gravel (very dense, wet)			2 feet of heave SA (MC = 16%; %F = 8)
75	70	☒	18	50/5"		16						3 feet of heave

Log of Boring B-11 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-12
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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APPROVED BY:

DATE:

D. OVERBAY DESIGNED BY:	2019/12/06 DATE	
CHJS DRAWN BY:	2019/12/06 DATE	
B. PSCHANDER CHECKED BY:	2019/12/06 DATE	

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 11

SHEET: TLC–G–411
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	71.5	Logged By MWB	Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Drilled 10/9/2017	10/9/2017						

Surface Elevation (ft) Vertical Datum	143.37 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309754.33 261558.39	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0							SOD	6 inches sod and topsoil			
140		☒	16	14		1 SA		SM	Dark orange-brown silty fine to medium sand with gravel (medium dense, moist) (fill)	NS	<1	SA (MC = 12%; %F = 35)
	5	☒	12	6		2 SA			Becomes loose	NS	<1	
135		☒	10	9		3 MC		SM	Light brown silty fine to medium sand (loose, moist)	NS	<1	MC = 17%
	10	☒	14	12		4 SA		SP-SM	Light brown fine to medium sand with silt (medium dense, moist)	NS	<1	SA (MC = 6%; %F = 7)
130												
	15	☒	12	6		5 SA		CL	Light orange-brown sandy lean clay with gravel (medium stiff, wet)	NS	<1	
125												Groundwater observed at 17½ feet at time of drilling
	20	☒	8	16		6			Becomes stiff	NS	<1	
120												
	25	☒	16	19		7 AL		ML	Light brown and gray silt with sand and occasional gravel (very stiff, wet)			AL (MC = 28%; LL = 37; PI = 10)
115												
	30	☒	10	34		8 SA		GP-GC	Orange-brown fine to coarse gravel with clay, sand and cobbles (dense, wet)			SA (MC = 10%; %F = 9)
110												
	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-12

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-13
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
105	35	☒	12	28		9		CL	Orange-brown sandy lean clay with gravel (very stiff, wet)			
	40	☒	18	23		10						
100								SC	Orange-brown clayey fine to medium sand with gravel and cobbles (medium dense, wet)			
	45	☒	18	24		11						
95								ML	Gray sandy silt (hard, wet)			
	50	☒	3	50/3"		12 MC						MC = 16%
90												
	55	☒	17	50/5"		13						
85								SM	Gray silty fine sand (very dense, wet)			
	60	☒	17	85/11"		14						
80												
	65	☒	17	90/11"		15		SP-SM	Gray fine to medium sand with silt, occasional gravel and lenses of silty fine sand (very dense, wet)			2 feet of heave
75												
	70	☒	18	34*		16						*Blow count not representative due to heave

Log of Boring B-12 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-13
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DATE:

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DESIGNED BY: DATE

CHJS 2019/12/06
DRAWN BY: DATE

B. PSCHANDER 2019/12/06
CHECKED BY: DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 12

SHEET: TLC–G–412
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	81.5	Logged By MWB	Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Drilled 10/16/2017	10/16/2017						

Surface Elevation (ft) Vertical Datum	135.8 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309885.87 261703.44	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
135	0							TS	6 inches topsoil			
		X	8	2		1 / MC		SM	Dark orange-brown silty fine to medium sand with gravel and organic matter (very loose, moist) (fill)	NS	<1	MC = 11%; %F = 9
130	5	X	14	6		2 / SA		SP-SM	Brown fine to medium sand with silt and occasional gravel (loose to medium dense, moist)	NS	<1	
		X	8	3		3				NS	<1	
125	10	X	12	8		4 / SA				NS	<1	
									Becomes wet			Groundwater observed at 12 feet at time of drilling
120	15	X	18	14		5 / MC				NS	<1	Driller added mud to borehole MC = 24%
115	20	X	18	4		6 / SA						SA (MC = 25%; %F = 8)
								SC	Orange-brown clayey fine to medium sand with gravel (medium dense, wet)			
110	25	X	16	11		7						
								ML	Gray silt with sand and occasional gravel (stiff to very stiff, wet)			
105	30	X	10	19		8 / AL						AL (MC = 36%; LL = 42; PI = 12)
	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-14

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-15
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
100	35	X	18	13		9						
95	40	X	14	30		10 / MC		CL	Orange-brown sandy lean clay with gravel (very stiff, wet)			MC = 22%
90	45	X	18	38		11						
85	50	X	8	24		12		CL	Gray sandy lean clay with gravel (very stiff, wet)			
80	55	X	11	50/5"		13			Becomes hard			
75	60	X	18	34		14						
								SM	Gray silty fine to medium sand with gravel and cobbles (very dense, wet)			
70	65	X	16	90/2"		15 / MC						MC = 12%
								SP	Gray fine to medium sand with gravel (very dense, wet)			
65	70	X	12	86/		16						
60	75	X	17	50/5"		17						1 foot of heave

Log of Boring B-14 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-15
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
55	80	X	17	85/11"		18						1 foot of heave

Log of Boring B-14 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-15
Sheet 3 of 3

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CHJS 2019/12/06
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B. PSCHANDER 2019/12/06
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CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 14

SHEET: TLC–G–414
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	81	Logged By MWB	Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger
Drilled 10/17/2017	10/17/2017						

Surface Elevation (ft) Vertical Datum	127.21 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309898.00 261745.80	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							TS	6 inches topsoil			
125								SM	Dark brown silty fine to medium sand with gravel and organic matter (very loose, wet) (fill)			
		☒	12	3		1						
	5	☒	14	1		2		SM	Grayish brown silty fine to medium sand with occasional gravel (very loose to loose, wet)			Groundwater observed at 4½ feet at time of drilling Driller added mud to borehole
120		☒	18	10		3 / MC		SP	Brownish gray fine to medium sand (loose, wet)	28	5	
	10	☒	12	7		4						
115												
	15	☒	10	8		5						
110												
	20	☒	16	11		6			Becomes medium dense			
105												
	25	☒	12	21		7		SM	Orange-brown silty fine to medium sand with gravel (medium dense, wet)			
100												
	30	☒	18	10		8 / AL		CL	Gray lean clay with sand and gravel (stiff to very stiff, wet)	21		AL (LL = 38; PI = 14)
95												
	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-15

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-16
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	35	☒	2	19		9						
90												
	40	☒	18	23		10						
85												
	45	☒	18	18		11 / MC		ML	Gray silt with sand (very stiff, wet)	31		
80												
	50	☒	18	63		12		ML	Gray silt with thin lenses of peat (hard, wet)			
75												
	55	☒	18	36		13						
70												
	60	☒	12	77		14 / MC		GC	Orange-brown clayey fine to coarse gravel with sand and cobbles (very dense, wet)	15		
65												
	65	☒	12	71		15 / MC		SM	Gray silty fine to medium sand with gravel and cobbles (very dense, wet)	15		
60												
	70	☒	16	76		16		SP-SM	Gray fine to medium sand with gravel (very dense, wet)			2 feet of heave
55												
	75	☒	12	64		17						

Log of Boring B-15 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-16
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
75												
	80	☒	10	50/4"		18		CL	Gray sandy lean clay with gravel (hard, wet)			

Log of Boring B-15 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-16
Sheet 3 of 3

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DATE:

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DESIGNED BY: DATE

CHJS 2019/12/06
DRAWN BY: DATE

B. PSCHANDER 2019/12/06
CHECKED BY: DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 15

SHEET: TLC–G–415
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
Drilled 7/25/2018	7/25/2018	81	EAW	HRP	Geologic Drill Exploration, Inc.	Hollow-stem Auger

Surface Elevation (ft) Vertical Datum	125.25 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309871.36 261788.14	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
125	0							TS	10 inches topsoil			
								ML	Dark brown sandy silt with trace organic matter (very soft, wet)			Groundwater observed at 1 foot at time of drilling
		☒	12	P		1 / MC				36		
120	5	☒	12	3		2		SP-SM	Gray-brown fine to medium sand with silt (very loose to loose, wet)			
		☒	14	8		3 / GA				26	10	
115	10	☒	16	7		4						Driller added mud to borehole
		☒	12	10		5 / GR				25	11	
110	15	☒	12	8		6						1 foot of heave
105	20	☒	12	7		7 / GA		SW-SM	Gray-brown fine to coarse sand with silt and gravel (loose, wet)	21	10	
100	25	☒	16	12		8 / MC		MH	Dark gray elastic silt with sand and trace wood fragments (stiff, wet)	22		
									Grades to hard			
95	30	☒	12	39		9 / MC, AL				45		AL (LL=52; PI=17)
									Grades to very stiff			
	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-16

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-17
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
90	35	☒	18	20		10 / MC				22		
85	40	☒	16	21		11 / MC		ML	Gray and brown sandy silt with gravel and trace organic matter (very stiff, wet)	28		
80	45	☒	18	30		12 / MC, AL		ML	Gray silt with sand (very stiff, wet)	28		AL (non-plastic)
75	50	☒	18	27		13						
70	55	☒	18	22		14 / MC		CL	Gray sandy clay with gravel (very stiff, wet)	30		
65	60	☒	10	22		15 / MC		GP-GM	Gray fine to coarse gravel with silt, sand, cobbles and trace organic matter (medium dense, wet)	10		
60	65	☒	12	50/4"		16 / SA		SP-SM	Gray fine to coarse sand with silt, gravel and cobbles (very dense, wet)	8	7	1 foot of heave
55	70	☒	10	50/6"		17						1 foot of heave
50	75	☒	12	80		18 / MC		ML	Gray silt with sand (hard, wet)	15		1 foot of heave

Log of Boring B-16 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-17
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
								SM	Gray silty fine sand (very dense, wet)			
75	80	☒	11	50/5"		19 / MC				17		1 foot of heave

Log of Boring B-16 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-17
Sheet 3 of 3

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DATE:

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CHJS	DRAWN BY:	2019/12/06 DATE
B. PSCHANDER	CHECKED BY:	2019/12/06 DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 16

SHEET: TLC–G–416
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
Drilled 7/23/2018	7/23/2018	80.5	EAW	HRP	Geologic Drill Exploration, Inc.	Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	124.4 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop
Drilling Equipment	Diedrich D-50 Track Rig		
Easting (X) / Northing (Y)	1309821.39 / 261796.19	System Datum	WA State Plane North NAD83 (feet)
See "Remarks" section for groundwater observed			

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0						TS	6 inches topsoil			
							ML	Gray silt with sand and organic matter (stiff, wet)	26		Groundwater observed at 1 foot at time of drilling
120		☒	16	9		1 MC					
	5	☒	18	3		2	SM	Dark gray silty fine to medium sand with lenses of silt (very loose, wet)	34	14	
		☒	18	16		3	SM	Gray silty fine to medium sand with trace organic matter (medium dense, wet)			Driller added mud to borehole
115	10	☒	12	7		4 CP	SP-SM	Gray-brown fine to medium sand with silt (loose, wet)	25	11	
		☒	13	9		5					
110	15	☒	14	9		6 CP			24	10	
105	20	☒	18	7		7		Grades with occasional gravel			
100	25	☒	18	13		8 SA	SW-SM	Light brown fine to coarse sand with silt and gravel (medium dense, wet)	17	8	
95	30	☒	12	28		9 MC	ML	Gray silt with sand and gravel (very stiff, wet)	24		
90	35						ML	Gray silt with sand (hard, wet)			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-17

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-18
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
85	35	☒	18	33		10					
80	40	☒	10	34		11 MC, AL	CL	Gray lean clay with occasional gravel (very stiff to hard, wet)	28		AL (LL-31; PI-9)
75	45	☒	12	26		12					
70	50	☒	0	23		13					
65	55	☒	12	23		14 MC			29		
60	60	☒	12	50/6"		15 MC	SP	Gray fine sand with occasional gravel (dense, wet)	19		1 foot of heave
55	65	☒	18	75		16 SA	SM	Gray silty fine to coarse sand with gravel and cobbles (very dense, wet)	13	24	6 inches of heave
50	70	☒	14	78		17	SP	Gray fine to medium sand with gravel (very dense, wet)			
45	75	☒	11	70/5"		18 MC	SM	Gray silty fine to medium sand with gravel (very dense, wet)	14		

Log of Boring B-17 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-18
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
75	80	☒	5	100/5"		19					

Log of Boring B-17 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-18
Sheet 3 of 3

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CHJS	DRAWN BY:	2019/12/06 DATE
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CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 17

SHEET: TLC–G–417
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS
Date: 11/28/18 Plot: P:\0231090\GINT\023109001.GPJ DBLibrary:\Library\GEOENGINEERS_OF_STD_US_JUNE_2017.GLB\GEIB_GEOTECH_STANDARD_SF_NO_GW

Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
Drilled 7/24/2018	7/24/2018	81	EAW	HRP	Geologic Drill Exploration, Inc.	Hollow-stem Auger

Surface Elevation (ft) Vertical Datum	124.77 NAVD88	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Easting (X) Northing (Y)	1309783.85 261763.93	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							TS	10 inches of topsoil			
								ML	Gray sandy silt with organic matter (very soft, wet)			Groundwater observed at 1 foot at time of drilling
120	5		12	12		1		SP-SM	Gray-brown fine to medium sand with silt (medium dense, wet)			
			12	10		2 / MC				25		
			14	12		3 / GA				24	6	
115	10		10	10		4			Grades to loose			Driller added mud to borehole
			8	5		5 / GA				7		
110	15		8	4		6			Grades with occasional wood fragments			
105	20		12	10		7 / GA		SP-SM	Brown medium to coarse sand with silt and gravel (medium dense, wet)	18	10	
100	25		10	17		8 / MC		GC	Brown clayey fine to coarse gravel with sand and cobbles (medium dense, wet)	11		
95	30		14	25		9 / SA; AL		GM	Brown silty fine to coarse gravel with sand and cobbles (medium dense, wet)	21	29	AL (LL=40; PI=13)
90	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-18

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-19
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
85	35		6	24		10						
								ML	Gray silt with sand and gravel (very stiff, wet)			
80	40		12	26		11 / MC; %F; AL				31	78	AL (LL-34; PI=10)
75	45		18	29		12 / MC				19		
								ML	Gray silt with lenses of organic matter (very stiff, wet)			
70	50		18	21		13						
65	55		18	23		14		SP-SM	Gray-brown fine to medium sand with silt, gravel and cobbles (medium dense, wet)			
								SP-SM	Gray fine to medium sand with silt and gravel (dense, wet)			
60	60		12	65		15 / GA				12	7	
	65		9	50/3"		16			Grades to very dense			
55	70		12	50/6"		17 / MC				9		2 feet of heave
50	75		10	50/4"		18		ML	Gray silt (hard, wet)			

Log of Boring B-18 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-19
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
45	80		10	50/5"		19			Grades with sand and gravel			

Log of Boring B-18 (continued)

GeoEngineers

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-19
Sheet 3 of 3

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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DATE:

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B. PSCHANDER	CHECKED BY:	2019/12/06 DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 18

SHEET: TLC–G–418
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Drilled	Start 10/11/2017	End 10/11/2017	Total Depth (ft) 71.25	Logged By MWB	Checked By HRP	Driller Geologic Drill Exploration, Inc.	Drilling Method Hollow-stem Auger

Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Surface Elevation (ft) Vertical Datum	129.01 NAVD88	Top of Casing Elevation (ft)	128.54
Easting (X) Northing (Y)	1309780.43 261722.72	Horizontal Datum	WA State Plane North NAD83 (feet)

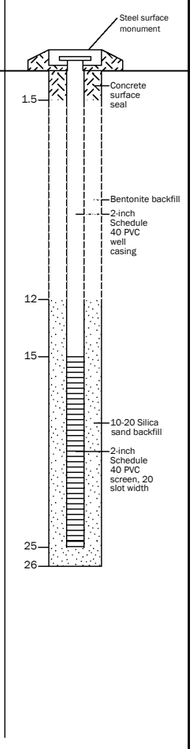
DOE Well I.D.: BKP203
A 2 (in) well was installed on 10/11/2017 to a depth of 25 (ft). Well was developed on 10/11/2017.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
1/8/2018	2.33	126.21

Notes: Monitoring well installed to 25 feet in separate boring drilled 2 feet to the south.
Groundwater seepage encountered at 4½ feet at time of drilling.

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
	0							TS	6 inches topsoil		
		4	5		1			SM	Brown silty fine to medium sand with gravel and organic matter (loose, wet) (fill)		
125	5	6	2		2						
		12	3		3			SP-SM	Grayish brown fine to medium sand with silt (very loose, wet)		
120	10	18	2		4 g					24	9
115	15	18	15		5				Becomes medium dense (2 feet of heave, driller added mud to borehole)		
110	20	18	17		6						
105	25	12	31		7 MC			SC	Brown clayey fine to coarse sand with gravel and cobbles (dense, wet)	23	
100	30	16	21		8 AL			ML	Brown and gray sandy silt with gravel (very stiff, wet)		
									AL (LL = 28; PI = 5)	22	
95	35										

WELL LOG



Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Monitoring Well B-19

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-20
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)
90	35	8	30		9						
	40	18	30		10				Grades with lenses of organic matter		
85	45	16	25		11						
80								ML	Gray silt (hard, wet)		
	50	18	34		12 MC					29	
75								SP-SM	Gray fine to medium sand with silt, gravel and cobbles (dense to very dense, wet)		
	55	11	95/11"		13 MC					10	
70									Driller added mud to borehole		
	60	16	85/10"		14 SA					14	10
65								SP	Gray fine to medium sand with gravel (very dense, wet)		
	65	15	90/9"		15				(15 feet of heave)		
60	70	4	92/8"		16						

WELL LOG

Log of Monitoring Well B-19 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-20
Sheet 2 of 2

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

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CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 19

SHEET: TLC–G–419
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

File: D:\Projectwise\COWI\d0301252\A088367-G-400-421.dwg Save Date: Nov 04, 2019 12:02 PM Saved By: CHJS

Start	End	Total Depth (ft)	81	Logged By	MWB	Checked By	HRP	Driller	Geologic Drill Exploration, Inc.	Drilling Method	Hollow-stem Auger
Drilled 10/12/2017	10/12/2017										

Surface Elevation (ft)	137.16	Hammer Data	Automatic 140 (lbs) / 30 (in) Drop	Drilling Equipment	Diedrich D-50 Track Rig
Vertical Datum	NAVD88				
Easting (X)	1309817.80	System Datum	WA State Plane North NAD83 (feet)	See "Remarks" section for groundwater observed	
Northing (Y)	261681.91				

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							TS	6 inches topsoil			
135		☒	3	19		1		SM	Dark brown silty fine to medium sand with gravel and organic matter (medium dense, moist) (fill)			
	5	☒	12	5		2		SM	Light orange-brown silty fine sand with gravel and organic matter (loose to medium dense, moist)			
130		☒	10	17		3						
	10	☒	10	25		4						
125								SP-SM	Brown fine to medium sand with silt and occasional gravel (medium dense, wet)			
	15	☒	18	12		5 / MC				22	6	Groundwater observed at 13½ feet at time of drilling. Driller added mud to borehole
120												
	20	☒	18	16		6						
115								CL	Brown and gray sandy fine lean clay with gravel (stiff to very stiff, wet)			
	25	☒	17	16		7 / MC				10		
110												
	30	☒	3	16		8 / MC				10		
105												
	35							ML	Light orange-brown and gray silt with sand and gravel (very stiff, wet)			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Alliance Geomatics.
Vertical approximated based on Survey by Alliance Geomatics.

Log of Boring B-20

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-21
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
100	35	☒	10	31		AL / PL				28		AL (LL = 29; PI = 1)
	40	☒	18	27		10 / MC				21		
95								CL	Gray lean clay with sand and occasional gravel (very stiff, wet)			
	45	☒	18	19		11						
90								CL	Orange-brown sandy lean clay with gravel (very stiff, wet)			
	50	☒	12	30		12						
85								SM	Brownish gray silty fine to medium sand with gravel and cobbles (very dense, wet)			
	55	☒	6	50/6"		13 / MC				12		
80												
	60	☒	12	50/6"		14						2 feet of heave
75								SP-SM	Gray fine to medium sand with silt, gravel and occasional cobbles (very dense, wet)			
	65	☒	17	50/5"		15 / SA				14	8	2 feet of heave
70												
	70	☒	16	50/4"		16						2 feet of heave
65												
	75	☒	18	61		17						2 feet of heave

Log of Boring B-20 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-21
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
80	80	☒	12	50/6"		18						

Log of Boring B-20 (continued)

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-21
Sheet 3 of 3

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR BOREHOLE LOCATIONS SEE DRAWING TLC–S–102.
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CHJS 2019/12/06
DRAWN BY: DATE

B. PSCHANDER 2019/12/06
CHECKED BY: DATE

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL BOREHOLE 20

SHEET: TLC–G–420
SCALE: AS SHOWN
FILENAME: A088367–G–400–421.dwg

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Date Excavated 11/7/2017	Total Depth (ft) 9.5	Logged By CRG Checked By HRP	Excavator Kelly's Excavating, Inc. Equipment Komatsu 140 Backhoe	See "Remarks" section for groundwater observed See "Remarks" section for caving observed	
Surface Elevation (ft) 147.5 Vertical Datum NAVD88		Easting (X) 1309571 Northing (Y) 261354		Coordinate System WA State Plane North Horizontal Datum NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
147					TS	Topsoil 12 inches thick			
146	1				SP-SM	Brown fine to medium sand with silt and occasional organic matter (loose, moist)			
145	2								
144	3								
143	4		1 SA OC				9	11	Caving observed at 4 to 7 feet below ground surface OC = 1%; CEC
142	5								
141	6		2						Groundwater seepage observed at 6 feet below ground surface following infiltration test
140	7								
139	8		3		ML	Light brown and orange-brown silt with sand and gravel (stiff, moist to wet)			
138	9		4						

Test pit initially excavated to 4 feet for infiltration test; test pit completed at 9½ feet below ground surface following infiltration test

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on topographic map. Vertical approximated based on topographic map.

Log of Test Pit TP-1

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-22
Sheet 1 of 1

Date Excavated 11/8/2017	Total Depth (ft) 9.5	Logged By CRG Checked By HRP	Excavator Kelly's Excavating, Inc. Equipment Komatsu 140 Backhoe	Groundwater not observed Caving not observed	
Surface Elevation (ft) 145 Vertical Datum NAVD88		Easting (X) 1309728 Northing (Y) 261533		Coordinate System WA State Plane North Horizontal Datum NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SOD	6 inches sod and topsoil			
					TS				
144	1				SM	Brown silty fine to medium sand with gravel and asphalt fragments (loose, moist) (fill)			
143	2								
142	3					Asphalt debris at 3 feet			
141	4		1 SA OC				8	16	OC = 2%; CEC
140	5				ML	Brown silt with sand and gravel (stiff, moist)			
139	6		2		SM	Dark orange-brown silty fine to medium sand with organic matter (medium dense, moist)			
138	7								
137	8		3						
136	9		4		ML	Brownish gray silt with sand (stiff, moist)			

Test pit initially excavated to 4 feet for infiltration test; test pit completed at 9½ feet below ground surface following infiltration test

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on topographic map. Vertical approximated based on topographic map.

Log of Test Pit TP-2

GEOENGINEERS

Project: Totem Lake Connector
Project Location: Kirkland, Washington
Project Number: 0231-090-01

Figure A-23
Sheet 1 of 1

NOTES:

1. FOR BOREHOLE KEY SEE DRAWING TLC–G–400.
2. FOR TEST PIT LOCATIONS SEE GEOTECHNICAL REPORT.
3. THIS BOREHOLE LOG IS ONLY A PORTION OF A REPORT PREPARED BY GEOENGINEERS "TOTEM LAKE CONNECTOR PHASE 2 GEOTECHNICAL ENGINEERING SERVICES" DATED OCTOBER 2018.

THIS DRAWING HAS BEEN PREPARED FOR THE TOTEM LAKE CONNECTOR PROJECT. COWI, GEOENGINEERS, THEIR EMPLOYEES, SUBCONSULTANTS OR AGENTS ACCEPT NO RESPONSIBILITY FOR ANY OTHER USE.

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NO.	DATE	BY	APPR.	REVISION
0	2019/12/06	CHJS	DCO	100% ISSUE FOR BID

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GEOENGINEERS

APPROVED BY:

DATE:

D. OVERBAY	2019/12/06	
DESIGNED BY.	DATE	
CHJS	2019/12/06	
DRAWN BY.	DATE	
B. PSCHANDER	2019/12/06	
CHECKED BY.	DATE	

CITY OF KIRKLAND
TOTEM LAKE CONNECTION

GEOTECHNICAL TEST PITS

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