

## Appendix D Geotechnical Borehole Logs

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**To:** Aaron McDonald, PE/City of Kirkland Public Works Department;  
Schaun Valdovinos, MS, PE, P.Eng./COWI North America, Inc.

**From:** Bert Pschunder, PE and Debra Overbay, PE

**Date:** January 9, 2017

**File:** 0231-090-00, Task 0200

**Subject:** Exploration Plan, Totem Lake Non-Motorized Bridge Project, Kirkland, Washington

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This memorandum summarizes our geotechnical exploration plan for Phase 1 of the City of Kirkland's Totem Lake Non-Motorized Bridge project in Kirkland, Washington. The bridge will be located at the intersection of NE 124<sup>th</sup> Street and 124<sup>th</sup> Avenue NE, and will provide an elevated connection between segments of the existing Cross Kirkland Corridor (CKC) trail.

The initial concept for the bridge project includes:

- an embankment for the south approach ramp flanked by retaining walls;
- the bridge spanning over NE 124<sup>th</sup> Street and Totem Lake Boulevard with a "touchdown" support in the triangular property ("traffic island") bounded by these roadways and a Rite Aid store on the west; and
- a spiral ramp located just northeast of Totem Lake Boulevard extending over a portion of a park and wetland associated with Totem Lake, transitioning back to the trail alignment.

The purpose of our exploration program is to evaluate subsurface soil and groundwater conditions along the project alignment as a basis for developing preliminary geotechnical recommendations during predesign and 30 percent design development.

Specifics of our exploration program are:

**Right-of-Way Use Permit:** We understand a formal permit to drill the borings in the trail right-of-way will not be required by the City of Kirkland (City). We also understand the City has obtained right-of-entry from King County for drilling borings in the wetland/park area near the north end of the project alignment.

**Activities and Schedule:** Our preferred driller has a current backlog into late January. We have scheduled the explorations to begin the week of January 30, 2017. This will allow sufficient time to complete all the utility locates and GPR scanning of the bore sites, the trench excavation with a vacuum truck to identify if an unknown fiber optic line is at the boring site within the triangular property, and minor clearing and placement of an access road to the north borings.

We will mark all proposed exploration locations and notify the One Call Center for underground utility locates. We will also arrange for a private utility locating service to clear each of our proposed explorations including using GPR equipment to scan three of the boring sites as described below. We will make follow up site visits to check that all notified utilities have marked their lines in the vicinity of the exploration locations.

We understand a fiber optic line is present within the corridor that does not get marked or a response with the one-call service. The line appears to be marked on the east side of the corridor in the south and north portions of the bridge alignment. Based on our discussions with the design team, we plan to subcontract a vacuum truck and ground penetrating radar (GPR) equipment to assist in the effort to clear underground utilities. GPR equipment will be used at Borings 3, 4 and 5 shown on the attached site plan, and a vacuum truck will also be used at the location of Boring 4. The vacuum truck will excavate a shallow trench (up to 5 feet deep or to very dense native soils) across the proposed trail alignment in the traffic island near proposed Boring 4. If a duct bank is not detected within the upper 5 feet, we will proceed with drilling adjacent to the trench. Please notify us if this proposed method is not deemed suitable to reduce the risk of encountering the fiber optic utility.

**Exploration Type and Locations:** We plan to complete a total of seven borings along the project alignment using subcontracted truck- and track-mounted drilling equipment. The borings will typically be 8 inches in diameter, and will be drilled in two groups as follows:

- a. Three borings (Borings 1 through 3) will be drilled within the adjacent Totem Lake park area where the spiral ramp will be located. These borings will be drilled with a track-mounted rig. We anticipate these boring depths will range from about 60 to 70 feet. A piezometer will be installed in one of the park area borings for the purpose of long-term groundwater level measurements.
- b. Four borings (Borings 4, 5, 6 and 7) will be drilled along the west side of the existing trail alignment with a track-mounted rig. We anticipate these borings will be drilled to depths ranging from 20 to 50 feet. Depending on subsurface soil and groundwater conditions encountered, a piezometer may be installed in one or two of the borings. Proposed boring locations are shown on the attached site plan.

**Access Considerations and Pedestrian Traffic Control:** We plan to access Borings 5 through 7 for the south segment of the alignment from the point where the CKC trail crosses 120<sup>th</sup> Avenue NE. The drill crew will travel north along the gravel-surfaced trail to access the three boring locations planned for this segment of the alignment. Plywood sheets will be placed at the boring locations to reduce the potential for disturbing the trail surfacing.

The boring planned within the traffic island bounded by NE 124<sup>th</sup> Street and Totem Lake Boulevard NE will be accessed directly from the southbound Totem Lake Boulevard turn lane to westbound NE 124<sup>th</sup> Street. An existing curb cut on the west edge of the ramp will allow for direct drill rig and service truck access to the traffic island.

The three borings (Borings 1 through 3) planned for the spiral ramp in the Totem Lake park area will be accessed from the point where the CKC trail crosses 128<sup>th</sup> Lane NE. The drill crew will travel southwest along the gravel-surfaced trail to access these boring locations. Plywood sheets will be placed at the boring location on the trail edge (Boring 3) to reduce the potential for disturbing the trail surfacing. We plan to subcontract a small dozer and use hog fuel to access the lower site area. The material will be removed and the surface restored as described in the following section.

The borings will require closure of segments of the CKC trail for periods of up to 2 to 3 hours at each location. During the time of drilling, we will place pedestrian traffic control signs that indicate the trail is closed and cones for exploration activities that will take place within the trail. Trail closed signs will be set up in accordance with the attached Trail Closure Figure. We understand the City will prepare trail closure notification signs and advertise the trail closure at least one week prior to drilling.

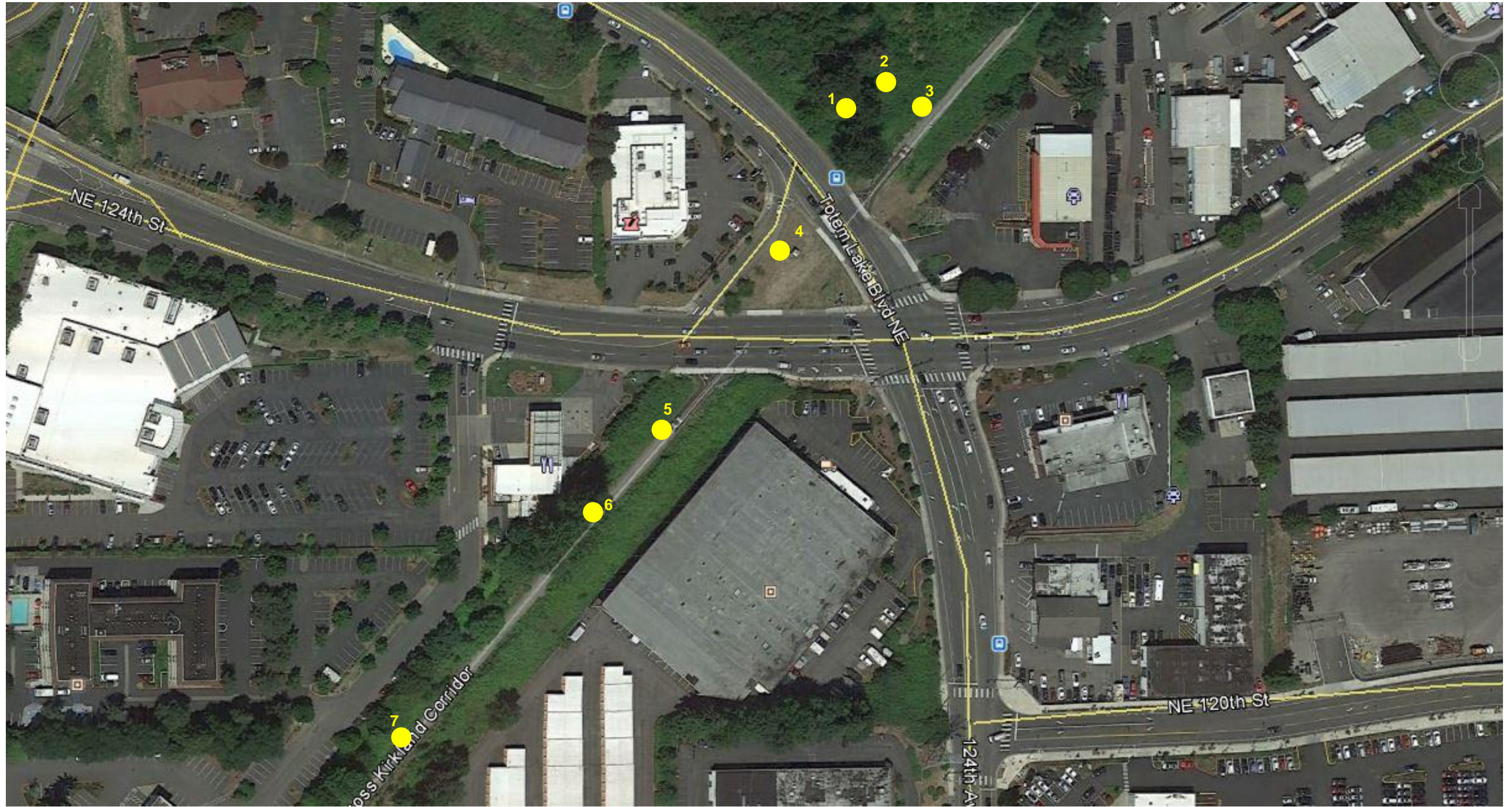
**Erosion Control and Restoration:** Removal of vegetation (brush and small trees) and minor grading will be required to access two of the boring locations for the spiral ramp in the Totem Lake park area. Our boring locations will be selected to minimize the impact on trees to the extent practical. We expect a few small-diameter trees (less than 6-inch diameter) may need to be cleared to access the area. We will arrange for a temporary fill ramp to be constructed so that the drill rig can descend from the trail down to the lower lying park area. We plan to use “hog fuel” for the ramp fill. Some hog fuel or brush cuttings may need to be placed around the two boring locations for equipment support as these areas are currently in a wet and soft condition.

During drilling, we will limit work activities to the immediate area around each boring. We will haul the cuttings off site from the vacuum truck exploration and borings. The vacuum holes will be backfilled with sand and gravel. The driller will backfill the borings in accordance with Washington State Department of Ecology (Ecology) regulations. The piezometers will be installed in accordance with Ecology regulations, and will be protected with 8-inch-diameter, steel flush-grade monuments. The piezometers will eventually need to be abandoned as required by Ecology prior to or during project construction.

We will separate the surficial trail gravel and replace this material on the trail following drilling. We also plan to backfill the upper 2 feet of the borings within the trail with crushed rock. In the vicinity of the park area borings, we will remove the temporary fill ramp, smooth the ground surface at the exploration locations, and cover disturbed areas with straw.

If you have any questions, please contact Bert Pschunder at 425-861-6008 or Debra Overbay at 425-861-6024.

Attachments:        Site Plan  
                         Trail Closure Figure



**Proposed Boring Locations**

City of Kirkland – Totem Lake Pedestrian Bridge



**Figure 1**

## SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS      |                           |  | SYMBOLS |           | TYPICAL DESCRIPTIONS  |
|----------------------|---------------------------|--|---------|-----------|---|
|                      |                           |  | GRAPH   | LETTER    |   |
| COARSE GRAINED SOILS | GRAVEL AND GRAVELLY SOILS | CLEAN GRAVELS<br><small>(LITTLE OR NO FINES)</small>               |         | <b>GW</b> | WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES   |
|                      |                           | GRAVELS WITH FINES<br><small>(APPRECIABLE AMOUNT OF FINES)</small> |         | <b>GP</b> | POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES   |
|                      |                           | GRAVELS WITH FINES<br><small>(APPRECIABLE AMOUNT OF FINES)</small> |         | <b>GM</b> | SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES  |
|                      | SAND AND SANDY SOILS      | CLEAN SANDS<br><small>(LITTLE OR NO FINES)</small>                 |         | <b>SW</b> | WELL-GRADED SANDS, GRAVELLY SANDS   |
|                      |                           | SANDS WITH FINES<br><small>(APPRECIABLE AMOUNT OF FINES)</small>   |         | <b>SP</b> | POORLY-GRADED SANDS, GRAVELLY SAND  |
|                      |                           | SANDS WITH FINES<br><small>(APPRECIABLE AMOUNT OF FINES)</small>   |         | <b>SM</b> | SILTY SANDS, SAND - SILT MIXTURES   |
| FINE GRAINED SOILS   | SILTS AND CLAYS           | LIQUID LIMIT LESS THAN 50  |         | <b>ML</b> | INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY                                  |
|                      |                           | LIQUID LIMIT LESS THAN 50  |         | <b>CL</b> | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS |
|                      |                           | LIQUID LIMIT LESS THAN 50  |         | <b>OL</b> | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY   |
|                      | SILTS AND CLAYS           | LIQUID LIMIT GREATER THAN 50                                       |         | <b>MH</b> | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS  |
|                      |                           | LIQUID LIMIT GREATER THAN 50                                       |         | <b>CH</b> | INORGANIC CLAYS OF HIGH PLASTICITY  |
|                      |                           | LIQUID LIMIT GREATER THAN 50                                       |         | <b>OH</b> | ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY  |
| HIGHLY ORGANIC SOILS |                           |  |         | <b>PT</b> | 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.

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.

## ADDITIONAL MATERIAL SYMBOLS

| SYMBOLS |            | TYPICAL DESCRIPTIONS       |
|---------|------------|----------------------------|
| GRAPH   | LETTER     |                            |
|         | <b>AC</b>  | Asphalt Concrete           |
|         | <b>CC</b>  | Cement Concrete            |
|         | <b>CR</b>  | Crushed Rock/Quarry Spalls |
|         | <b>SOD</b> | Sod/Forest Duff            |
|         | <b>TS</b>  | 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                       |
| 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      |

## Key to Exploration Logs



Figure A-1



Redmond: Date: 2/20/17 Path: \\projects\0231-090\GINT\023109000.GPJ DBTemplate\lib\template\GEOENGINEERS\_DF\_STD\_US\_2017.GDT\GEB\_GEOTECH\_STANDARD\_%F\_NO\_GW

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

**Log of Boring B-1 (continued)**



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

Figure A-2  
 Sheet 2 of 2





| Elevation (feet) | FIELD DATA   |                         |            |                  |                     | Water Level | Graphic Log | Group Classification   | MATERIAL DESCRIPTION | Moisture Content (%) | Fines Content (%) | WELL LOG |
|------------------|--------------|-------------------------|------------|------------------|---------------------|-------------|-------------|--|----------------------|----------------------|-------------------|----------|
|                  | Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample | Sample Name Testing |             |             |  |                      |                      |                   |          |
| 35               | 18           | 19                      |            | AL               |                     |             | ML          | Orange-brown silt with sand and gravel (very stiff, wet)<br>(AL [LL = 30; PI = 7]) | 22                   |                      |                   |          |
| 40               | 10           | 22                      |            | 10               |                     |             | GM          | Orange-brown silty fine to coarse gravel with sand (medium dense, wet)             |                      |                      |                   |          |
| 45               | 18           | 24                      |            | 11               |                     |             | ML          | Gray silt with sand and occasional gravel (very stiff, wet)                        |                      |                      |                   |          |
| 50               | 12           | 32                      |            | MC 12            |                     |             | GM          | Gray silty fine to coarse gravel with sand and cobbles (dense, wet)                | 15                   |                      |                   |          |
| 55               | 18           | 88/11"                  |            | MC 13            |                     |             | SP          | Gray fine to medium sand with gravel (very dense, wet)                             | 12                   |                      |                   |          |
| 60               | 12           | 50/6"                   |            | 14               |                     |             |             |  |                      |                      |                   |          |
| 65               | 11           | 50/5"                   |            | 15               |                     |             |             |  |                      |                      |                   |          |
| 70               | 10           | 50/4"                   |            | 16               |                     |             |             |  |                      |                      |                   |          |

Monitoring well installed in separate boring drilled 5 feet to the southwest.

71.0

3/8-inch bentonite seal

**Log of Monitoring Well B-2 (continued)**



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

Figure A-3  
 Sheet 2 of 2

Redmond: Date: 2/20/17 Path: \\PROJ\PROJECTS\0231-090\GINT\023109000.GPJ DBTemplate\GEOENGINEERS\_DF\_STD\_US\_2017.GDT\GEB\_GEO TECH\_WELL.WF

|                        |           |     |           |                  |                      |           |        |                          |  |   |                                  |                 |                   |
|------------------------|-----------|-----|-----------|------------------|----------------------|-----------|--------|--------------------------|--|---|----------------------------------|-----------------|-------------------|
| Start Drilled          | 1/30/2017 | End | 1/30/2017 | Total Depth (ft) | 61.5                 | Logged By | EF HRP | Checked By               |  | Driller   | Geologic Drill Exploration, Inc. | Drilling Method | Hollow-stem Auger |
| Surface Elevation (ft) | 136       |     |           | Hammer Data      | Automatic            |           |        | 140 (lbs) / 30 (in) Drop |  | Drilling Equipment                                      | D-50 Track Rig                   |                 |                   |
| Vertical Datum         | NAVD88    |     |           | System Datum     | WA State Plane North |           |        | NAD83 (feet)             |  | Groundwater observed at 17½ feet at time of exploration |                                  |                 |                   |
| Easting (X)            | 1309896   |     |           | Notes:           |                      |           |        |                          |  |   |                                  |                 |                   |
| Northing (Y)           | 261720    |     |           |                  |                      |           |        |                          |  |   |                                  |                 |                   |

| Elevation (feet) | FIELD DATA   |                         |            |                  |                     | Graphic Log | Group Classification  | MATERIAL DESCRIPTION | Moisture Content (%) | Fines Content (%) | REMARKS                        |
|------------------|--------------|-------------------------|------------|------------------|---------------------|-------------|---|----------------------|----------------------|-------------------|--------------------------------|
|                  | Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample | Sample Name Testing |             |   |                      |                      |                   |                                |
| 136              | 0            |                         |            |                  |                     | GP          | Gray fine gravel with sand (medium dense, moist) (fill)                                     |                      |                      |                   |                                |
|                  | 4            | 8                       |            | 1                | MC                  | SP-SM       | Gray fine to medium sand with silt and gravel (loose, moist)                                | 9                    |                      |                   |                                |
| 130              | 5            | 10                      | 11         | 2                |                     | SM          | Grayish brown silty fine to medium sand with gravel (loose, moist)                          |                      |                      |                   |                                |
|                  | 12           | 3                       |            | 3                | %F                  | SM          | Reddish brown silty fine to medium sand with occasional gravel (very loose to loose, moist) | 16                   | 15                   |                   |                                |
| 125              | 10           | 10                      | 2          | 4                |                     |             |   |                      |                      |                   |                                |
| 120              | 15           | 12                      | 5          | 5                | MC                  |             | Grades to orange-brown  | 26                   |                      |                   |                                |
| 115              | 20           | 13                      | 10         | 6                |                     | SP-SM       | Brown fine to medium sand with silt (loose to medium dense, wet)                            |                      |                      |                   |                                |
| 110              | 25           | 10                      | 12         | 7                |                     |             |   |                      |                      |                   | Added drilling mud to borehole |
| 105              | 30           |                         |            |                  |                     |             |   |                      |                      |                   |                                |
|                  | 35           | 8                       | 24         | 8                | MC                  | SM          | Brown silty fine to medium sand with gravel (medium dense, wet)                             | 16                   |                      |                   |                                |

Note: See Figure A-1 for explanation of symbols.  
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

### Log of Boring B-3



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

Figure A-4  
Sheet 1 of 2

Ref: 2017 Path: \PROJ\0231-090\GINT\023109000.GPJ DBTemplate\GEOENGINEERS\_DF\_STD\_US\_2017.GDT\GEB\_GEOTECH\_STANDARD\_%F\_NO\_GW

| Elevation (feet) | FIELD DATA   |                         |            |                  | Graphic Log | Group Classification   | MATERIAL DESCRIPTION | Moisture Content (%) | Fines Content (%) | REMARKS |
|------------------|--------------|-------------------------|------------|------------------|-------------|--|----------------------|----------------------|-------------------|---------|
|                  | Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample |             |  |                      |                      |                   |         |
| 35               | 18           | 41                      |            | 9                | ML          | Brown and gray sandy silt with gravel (hard, wet)                      |                      |                      |                   |         |
| 40               | 10           | 16                      |            | 10<br>MC         | CL          | Brownish gray sandy clay with gravel (very stiff, wet)                 | 18                   |                      |                   |         |
| 45               | 10           | 22                      |            | 11<br>MC         | SM          | Orange-brown silty fine to coarse sand with gravel (medium dense, wet) | 18                   |                      |                   |         |
| 50               | 10           | 25                      |            | 12               | GM          | Orange-brown silty fine to coarse gravel with sand (medium dense, wet) |                      |                      |                   |         |
| 55               | 12           | 28                      |            | 13               |             |  |                      |                      |                   |         |
| 60               | 10           | 47                      |            | 14               |             | Grades to dense  |                      |                      |                   |         |

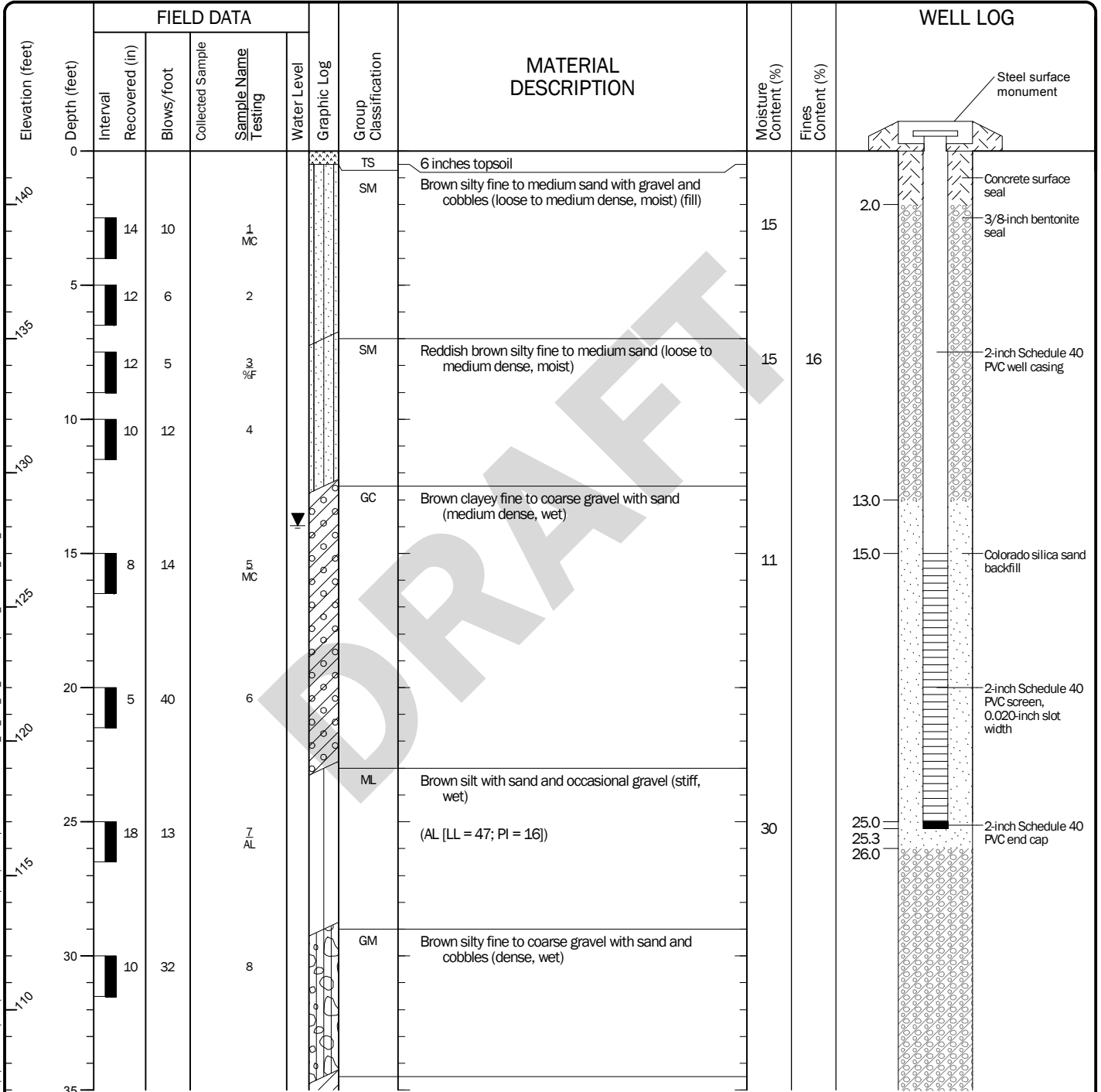
**Log of Boring B-3 (continued)**



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

Figure A-4  
Sheet 2 of 2

|                        |                                       |     |          |                              |                |                                   |    |  |     |               |                                  |                     |                   |        |  |
|------------------------|---------------------------------------|-----|----------|------------------------------|----------------|-----------------------------------|----|--|-----|---------------|----------------------------------|---------------------|-------------------|--------|--|
| Start Drilled          | 2/17/2017                             | 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<br>140 (lbs) / 30 (in) Drop |     |          | Drilling Equipment           | D-50 Track Rig |                                   |    | DOE Well I.D.: BIK 734<br>A 2 (in) well was installed on 2/1/2017 to a depth of 25 (ft). |     |               |                                  |                     |                   |        |  |
| Surface Elevation (ft) | 142                                   |     |          | Top of Casing Elevation (ft) |                |                                   |    | Groundwater  |     | Date Measured |                                  | 2/16/2017           |                   |        |  |
| Vertical Datum         | NAVD88                                |     |          | Horizontal Datum             |                | WA State Plane North NAD83 (feet) |    | Depth to Water (ft)  |     | 13.97         |                                  | Elevation (ft)      |                   | 128.03 |  |
| Easting (X)            | 1309728                               |     |          | Horizontal Datum             |                | WA State Plane North NAD83 (feet) |    | Date Measured  |     | 2/16/2017     |                                  | Depth to Water (ft) |                   | 13.97  |  |
| Northing (Y)           | 261559                                |     |          | Horizontal Datum             |                | WA State Plane North NAD83 (feet) |    | Date Measured  |     | 2/16/2017     |                                  | Depth to Water (ft) |                   | 13.97  |  |
| Notes:                 |                                       |     |          |                              |                |                                   |    |  |     |               |                                  |                     |                   |        |  |



Note: See Figure A-1 for explanation of symbols.  
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

### Log of Monitoring Well B-4



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

Figure A-5  
Sheet 1 of 2

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

3/8-inch bentonite seal

Monitoring well installed in separate boring drilled 5 feet to the south.

Redmond: Date: 2/20/17 Path: \\PROJ\PROJ\0231-090\GINT\023109000.GPJ DBTemplate\libTemplate\GEOENGINEERS\_DF\_STD\_US\_2017.GDT\GEB\_GEO TECH\_WELL.WF

**Log of Monitoring Well B-4 (continued)**



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

Figure A-5  
 Sheet 2 of 2



|  |                   |                 |                     |      |                         |           |                                       |                                  |  |                    |                   |
|--|-------------------|-----------------|---------------------|------|-------------------------|-----------|---------------------------------------|----------------------------------|--|--------------------|-------------------|
| Drilled                                  | Start<br>2/2/2017 | End<br>2/2/2017 | Total<br>Depth (ft) | 21.5 | Logged By<br>Checked By | EF<br>HRP | Driller                               | Geologic Drill Exploration, Inc. |  | Drilling<br>Method | Hollow-stem Auger |
| Surface Elevation (ft)<br>Vertical Datum |                   |                 | 150<br>NAVD88       |      | Hammer<br>Data          |           | Automatic<br>140 (lbs) / 30 (in) Drop |                                  | Drilling<br>Equipment<br>D-50 Track Rig                    |                    |                   |
| Easting (X)<br>Northing (Y)              |                   |                 | 1309507<br>261268   |      | System<br>Datum         |           | WA State Plane North<br>NAD83 (feet)  |                                  | Groundwater observed at 11½ feet at time of<br>exploration |                    |                   |
| Notes:                                   |                   |                 |                     |      |                         |           |                                       |                                  |  |                    |                   |

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

Note: See Figure A-1 for explanation of symbols.  
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

### Log of Boring B-6



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

Figure A-7  
Sheet 1 of 1

Redmond: Date: 2/20/17 Path: \\proj\projects\0231-090\GINT\023109000.GPJ DBTemplate\lib\template\GEOENGINEERS\_DF\_STD\_US\_2017.GDT\GEB\_GEO TECH\_STANDARD\_%F\_NO\_GW



|  |                   |                 |                     |                                       |                         |   |         |                                  |  |                    |                   |
|--|-------------------|-----------------|---------------------|---------------------------------------|-------------------------|---|---------|----------------------------------|--|--------------------|-------------------|
| Drilled                                  | Start<br>2/2/2017 | End<br>2/2/2017 | Total<br>Depth (ft) | 21                                    | Logged By<br>Checked By | EF<br>HRP   | Driller | Geologic Drill Exploration, Inc. |  | Drilling<br>Method | Hollow-stem Auger |
| Surface Elevation (ft)<br>Vertical Datum | 156<br>NAVD88     |                 | Hammer<br>Data      | Automatic<br>140 (lbs) / 30 (in) Drop |                         | Drilling<br>Equipment                                   |         | D-50 Track Rig                   |  |                    |                   |
| Easting (X)<br>Northing (Y)              | 1309282<br>261017 |                 | System<br>Datum     | WA State Plane North<br>NAD83 (feet)  |                         | Groundwater observed at 12½ feet at time of exploration |         |                                  |  |                    |                   |
| Notes:                                   |                   |                 |                     |                                       |                         |   |         |                                  |  |                    |                   |

| Elevation (feet) | FIELD DATA   |                         |            |                  |                     | Graphic Log | Group Classification   | MATERIAL DESCRIPTION | Moisture Content (%) | Fines Content (%) | REMARKS |
|------------------|--------------|-------------------------|------------|------------------|---------------------|-------------|--|----------------------|----------------------|-------------------|---------|
|                  | Depth (feet) | Interval Recovered (in) | Blows/foot | Collected Sample | Sample Name Testing |             |  |                      |                      |                   |         |
| 155              | 0            |                         |            |                  |                     | GP          | Gray fine gravel with sand (medium dense, moist) (fill)                  |                      |                      |                   |         |
|                  |              | 16                      | 36         |                  | 1 MC                | GM          | Brown silty fine to coarse gravel with sand (medium dense, moist) (fill) |                      |                      |                   |         |
|                  |              |                         |            |                  |                     | SM          | Gray silty fine to coarse sand with gravel (dense, moist)                | 8                    |                      |                   |         |
| 150              | 5            | 10                      | 16         |                  | 2                   | ML/PT       | Gray sandy silt with gravel and lenses of peat (very stiff, moist)       |                      |                      |                   |         |
|                  |              | 18                      | 21         |                  | 3 MC                |             |  |                      | 31                   |                   |         |
| 145              | 10           | 18                      | 39         |                  | 4 MC                |             | Grades to hard, wet  |                      | 61                   |                   |         |
| 140              | 15           | 18                      | 50         |                  | 5                   |             |  |                      |                      |                   |         |
| 135              | 20           | 18                      | 48         |                  | 6                   | ML          | Gray sandy silt (hard, wet)  |                      |                      |                   |         |

Note: See Figure A-1 for explanation of symbols.  
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

### Log of Boring B-7



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

Figure A-8  
Sheet 1 of 1

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