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APPENDIX E

**Geotechnical Report, Modret Technical Memorandum,
and Daily Field Report (CD)**

**Report
Geotechnical Engineering Services
South Sammamish Segment
East Lake Sammamish Trail
Sammamish, Washington**

**December 11, 2013
ICE File No. 0105-010**

**Prepared For:
Parametrix**

**Prepared By:
Icicle Creek Engineers, Inc.**

ICICLE CREEK ENGINEERS

Geotechnical, Geologic and Environmental Services

December 11, 2013

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We are pleased to submit an electronic copy (pdf) and two original copies of our *Report, Geotechnical Engineering Services, South Sammamish Segment – East Lake Sammamish Trail, Sammamish, Washington*. Icicle Creek Engineers' services were completed in general accordance with Parametrix Revised Amendment No. 4 to Subconsultant Agreement for Professional Services, and were authorized in writing by John Perlic, Transportation Division Manager for Parametrix, on August 6, 2013. Our report was submitted in draft form for your review and comment on December 11, 2013 (30% design).

Please contact us if you require additional information or an interpretation of the information presented in this report. We appreciate the opportunity to be of service to you.

Yours very truly,

Icicle Creek Engineers, Inc.

Kathy S. Killman, LEG
Principal Engineering Geologist

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Attachments

cc: Yammie Ho and Phoebe Johannessen, Parametrix (email)

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**REPORT
GEOTECHNICAL ENGINEERING SERVICES
SOUTH SAMMAMISH SEGMENT – EAST LAKE SAMMAMISH TRAIL
SAMMAMISH, WASHINGTON
FOR
PARAMETRIX**

1.0 INTRODUCTION

This report presents the results of Icicle Creek Engineers' (ICE's) geotechnical engineering services for preliminary design related to the proposed South Sammamish Segment of the East Lake Sammamish Trail (SSS ELST) that extends north for about 4.7 miles from the Issaquah/Sammamish city limit boundary (Sammamish South Station 217+00) to Kokomo Drive (in the vicinity of Inglewood Hill Road – Station 472+75). The general location of the project alignment is shown on the Vicinity Map, Figure 1. A plan view of the alignment is shown on the East Lake Sammamish Master Plan Trail Design, South Sammamish Segment Plans, Figures 2 through 31.

2.0 PROJECT DESCRIPTION

Yammie Ho of Parametrix, the project engineer, provided ICE with the following design documents for our use and review:

- Parametrix, September 2008 (30% review submittal), *East Lake Sammamish Master Plan Trail Design, From Gilman Boulevard, Issaquah to Bear Creek, Redmond, King County, Washington*, sheets G1, G3, and AL12 to AL41.

Based on our review of the project design plans and discussions/email correspondence with Ms. Ho, the SSS ELST will follow a former rail line that is between and parallels East Lake Sammamish Parkway SE and the Lake Sammamish waterfront including numerous residential properties. The rail line (tracks and ties) were removed several years ago as King County converted (railbanked) the former rail line into an approximately 10-foot wide, gravel-surfaced trail which provided temporary access for the public.

The current plan is to widen the SSS ELST to 16 feet (12-foot paved surface and 2-foot shoulders). While the existing ELST right-of-way (ROW) is relatively wide (up to 100 feet), wetland areas and steep slopes (including the road embankment for East Lake Sammamish Parkway SE in local areas), along with other local modifications (landscape walls, driveways, and other) within the ROW by adjacent property owners, constrain the space needed to accomplish the ELST widening.

To widen the SSS ELST, additional fill will be required in local areas, typically on the downhill (west) side of the existing SSS ELST. The fill will be placed so as to widen the existing fill prism of the rail line. Some of this fill may be placed on open fill slopes, depending on available space. In other areas where space is limited (wetlands, residential encroachment, etc.), retaining walls (Structural Earth Walls) will be used to support the fill; the proposed locations of these retaining walls are shown on Figures 2 through 31. Structural Earth Walls (SEWs) using Concrete Block Units (CBUs) have been successfully used along other finished and full design segments of the ELST.

Additional stormwater runoff will result from SSS ELST widening. At this time, stormwater runoff disposal by infiltration trenches is being considered in areas along the south part the SSS ELST. The specific locations of these infiltration trenches are not known at this time. In other areas, stormwater runoff will be collected in a paralleling open ditch and routed to stream crossings, which is similar to the current method of stormwater disposal for the existing ELST.

Box (fish-passage) culverts are planned at four stream crossings. Wing walls are planned on the inlet and outlet ends of each box culvert. The size and location of these culverts are not known at this time.

3.0 SCOPE OF SERVICES

The purpose of our services was to explore subsurface soil and ground water conditions along the SSS ELST as a basis for providing geotechnical recommendations for project design. Specifically, our services included the following:

- Review readily available geologic, critical areas and geotechnical data, along with the 30% design plans.
- Complete a geologic reconnaissance of the SSS ELST with emphasis on existing fill slopes where retaining walls are planned and areas where infiltration facilities are proposed.
- Explore subsurface soil and ground water conditions by drilling 98 test borings with track-mounted drill equipment to depths ranging from about 11 to 26.5 feet. Piezometers were installed in 18 of these test borings for the purpose of longer term measurement of ground water levels.
- Evaluate the field infiltration rate in the areas where stormwater infiltration is being considered by completing five in-situ infiltration tests using the Single Ring Infiltrometer Test (SRIT) procedure as described in the 2009 King County Surface Water Design Manual (SWDM).
- Measure the depth to ground water in the piezometers.
- Complete laboratory tests with the appropriate ASTM standards on selected soil samples from the test borings and infiltration test sites. The laboratory testing program included moisture content determination and grain-size analysis.
- Evaluate pertinent physical and engineering characteristics of the soils based on our observations and site knowledge, test borings and laboratory test results.
- Describe and characterize soil and ground water conditions along the SSS ELST.
- Provide recommendations for SEWs, including allowable bearing pressures, active and passive lateral soil pressures, and embedment depth.
- Provide recommendations for unsuitable soil excavation where soft and/or organic soils may be encountered at SEW foundation subgrade (leveling course zone).
- Provide recommendations for earthwork including suitability of on-site soils for use as structural fill, constraints for wet weather construction, structural fill criteria and construction dewatering.
- Provide recommendations for ELST subgrade preparation, where appropriate.
- Provide preliminary recommendations for box culverts (fish passage), including foundation support and lateral earth pressures.
- Evaluate field (short-term) and design (long-term) infiltration characteristics based on the results of the SRITs, grain size analysis and our site observations, using methods described in the 2009 King County SWDM, and, for comparison purposes, the Washington State Department of Ecology's (Ecology's) February 2005 Stormwater Management Manual for Western Washington (SMMWW).

4.0 GEOLOGIC SETTING AND REGIONAL HYDROGEOLOGY

4.1 GEOLOGIC SETTING

The surficial geologic units along the South Sammamish Segment ELST were mapped based on published geologic information, review of aerial photographs, field reconnaissance and test borings. The most recent regional geologic mapping in the site area was conducted by the US Geological Survey (USGS - Booth, D.B. and Minard, J.P., 1992, "Geologic Map of the Issaquah 7.5' Quadrangle, King County, Washington," Miscellaneous Field Studies, Map MF-2206, scale 1 inch = 2,000 feet).

The geology and landforms of the site area are the result of interglacial, glacial and postglacial events within the Puget Sound area. Bedrock underlies the entire site area, though at a depth of several tens or hundreds of feet.

Native soils composed of interglacial, glacial and postglacial deposits overlie the bedrock. The most recent glaciation, the Vashon Stade of the Fraser glaciation, covered the entire site area with up to 3,000 feet of ice at its maximum extent. The Vashon ice sheet completely melted from the site area approximately 13,500 to 15,000 years ago.

Before the Vashon Stade, interglacial and glacial soils were deposited over a period of several tens of thousands of years and are referred to as pre-Fraser Sediments. Pre-Fraser Sediments have been overridden by glacial ice and are typically in dense to very dense (granular soils) or very stiff to hard (cohesive soils) condition. Vashon age Ice-Contact Deposits was deposited along the margins of the retreating (melting) ice sheet. Recessional Outwash was deposited in meltwater streams and rivers in front of the melting ice sheet. Ice-Contact Deposits and Recessional Outwash are typically in a medium dense condition; Ice-Contact Deposits tend to have a higher silt content.

Older Alluvium was deposited in the past 10,500 years overlying the glacial and interglacial sediments in low areas and during a time frame when Lake Sammamish was at a higher level. Older Alluvium is typically in a loose to medium dense (granular soils) or soft to medium stiff (cohesive soils) condition.

Recent sedimentation and human activities (cuts and fills) have modified the land surface along the SSS ELST alignment. Human activities, primarily the original rail line construction (dating to the 1880s) and other modifications for driveways, homes, etc., have resulted in regrading (cuts and fills) of the ground surface along the alignment. The native soils, described above, typically are mantled with Fill and/or Topsoil.

4.2 REGIONAL HYDROGEOLOGY

The project location, paralleling the Lake Sammamish waterfront along the toe of a hillside area, provides an ideal condition for emerging ground water as springs and seepage. The native soils that underlie the hillside above the SSS ELST likely contain multiple layers of ground water zones. These zones, or “layers” of subperched ground water, have been truncated by glacial and postglacial erosion (hence the hillside) with this ground water emerging as springs and seepage in local areas along the ELST alignment.

5.0 SITE CONDITIONS

5.1 SURFACE CONDITIONS

Surface conditions were evaluated based on field reconnaissance completed by ICE on September 9 and 10, October 5, 7, 8, 11, 12, 14 through 19, 21 through 25, and 28 through 31, 2013. The weather during this time period was seasonably cool (40s) in the morning and warm (50s and low 60s) in the afternoon, though was unseasonably dry (rain occurred only on October 8, 2013). The weather preceding our field reconnaissance was relatively normal.

The SSS ELST parallels the Lake Sammamish waterfront at the toe of a hillside at about Elevation 43 to 59 feet (NAVD88 vertical datum, Parametrix, September 2008, sheets AL12 to AL41). The level of Lake Sammamish ranges from about Elevation 27 to 30 feet according to USGS records from 2008 to 2012 (<http://nwis.waterdata.usgs.gov>).

Because the SSS ELST is located at the base of the hillside, the uphill (east) side of the ELST is commonly in a “cut” and the downhill (west) side is in Fill. Locally, the Fill is estimated to be up to 6- to 16-feet thick (approximate Stations 329+00 to 338+00 and 357+25 to 359+00) though the Fill is more typically less than 6-feet thick in other areas. Private property improvements have cut into the toe of the downhill Fill area in local areas; these cuts have often been replaced with a “landscape wall” such as a rockery. Landscape walls refer to non-structural walls that are often used to face cuts; in these cases,

the cuts are in the toe of the existing SSS ELST embankment. Landscape walls should only be used for fills up to 2-feet thick, especially at the toe of a Fill embankment.

In other areas along the uphill side of the SSS ELST, the hillside is natural, sometimes nearly level, or gently to moderately sloping (less than 40 percent grade). Locally, the SSS ELST prism is entirely in Fill, creating a topographic depression on the uphill side of the SSS ELST. The level/depression areas are often occupied by “wetlands” (wetlands have been identified by others); these wetlands are shown on Figures 2 through 31. Typically, the SSS ELST surface is “raised” as would be expected for standard rail line construction, with ditch lines paralleling the east (uphill) shoulder of the ELST.

Typically, residential development, including access roads/driveways, parking areas, landscape areas, houses and cabins, occur along the downhill (west) side of the SSS ELST. Typically, East Lake Sammamish Parkway SE parallels the uphill (east) side of the SSS ELST. Residential development occurs along both sides of the SSS ELST from Mint Grove (about Station 361+00) to Waverly Hills Club beach park (about Station 291+00). Numerous private roads and driveways cross the SSS ELST. In some areas, the waterfront is within a few tens of feet of the current SSS ELST. Other areas are natural, forested and undeveloped. The downhill (west) side of the SSS ELST is notably “drier” than the uphill (east) side of the ELST.

Streams cross the SSS ELST at about Station 241+10, 257+50, 258+00, 290+00, 316+75, 315+90, 378+30, 411+10, 423+40, 440+20, 454+60, 464+00 and 459+00.

We did not observe evidence of landslides or severe erosion on either side of the SSS ELST.

5.2 SUBSURFACE CONDITIONS

5.2.1 General

Subsurface conditions were evaluated based on published and unpublished geologic information for the area, including an on-line database of test borings maintained by the Washington State Department of Natural Resources (<https://fortress.wa.gov/dnr/geology/?Site=subsurf>). ICE also completed 98 test borings (Borings B-1 through B-98) along the SSS ELST, primarily targeted at proposed SEW and stormwater infiltration (trench) locations. The test borings ranged from about 11- to 26½-feet deep. The locations of the test borings are shown on Figures 2 through 31. Piezometers were installed in 18 of the test borings. In addition, we completed five (SRITs in proposed stormwater infiltration areas (in the south end of the SSS ELST). Our field exploration program is described in Appendix A, along with our test boring logs. Details of the laboratory testing program, along with the test results, are presented in Appendix B.

In general, our test borings encountered native soil conditions consistent with the regional geologic mapping by the USGS (1992) including Older Alluvium, Recessional Outwash, Ice-Contact Deposits and pre-Fraser Sediments. Topsoil, Fill and Buried Topsoil was encountered in the test borings but are not mapped by the USGS (1992). It is important to note that Fill thicknesses can vary significantly as most of the trail is constructed into a hillside resulting in a “wedge” of Fill that thickness in the downhill (transverse) trail orientation.

5.2.2 Soil Conditions

The following is a summary of the soil conditions encountered in our test borings.

Topsoil – Topsoil was encountered in Borings B-42, B-50, B-84 and B-88. Topsoil is typically a loose silty sand or soft sandy silt with sod and abundant roots about 6-inches thick covering the ground surface in the areas adjacent to the SSS ELST.

Fill – Fill is typically in a loose to medium dense or soft to medium stiff condition. The Fill encountered in the test borings typically consisted of about 1½ to 2 feet of fine gravel with sand and a trace of silt (crushed rock or railroad ballast – referred to in this report as Railroad Embankment Fill), though in some areas the Fill appeared to consist of reworked native soils and is up to 16-feet thick. In many areas, the Fill forms a “wedge” shape where the railroad grade is “cut” into an existing hillside. For that reason, Fill may be absent on the uphill side of the SSS ELST and be several feet thick on the downhill side.

Buried Topsoil – Buried Topsoil was encountered in Borings B-67, B-69 and B-81. Buried Topsoil occurs when Fill is placed over the ground surface that has not been stripped of organic material (the former topsoil) and generally consists of dark brown or black stiff silt with variable amounts of sand, gravel and roots or loose silty sand with gravel.

Older Alluvium – Older Alluvium typically consists of very loose to medium dense sand or gravel with variable amounts of silt and organic material; very soft to stiff silt, clay or peat with variable amounts of sand and gravel and is often laminated (horizontally layered).

Recessional Outwash – Recessional Outwash typically consists of loose to medium dense (more typically medium dense) sand or gravel with variable amounts of silt. Less frequent discontinuous layers of soft to stiff silt can be present.

Ice-Contact Deposits – Ice-Contact Deposits typically consist of loose to medium dense sand or gravel with variable amounts of silt; these deposits tend to be more silty than Recessional Outwash.

Pre-Fraser Sediments – Pre-Fraser Sediments typically consist of dense to very dense sand or gravel with variable amounts of silt and stiff to hard silt or clayey silt with variable amounts of sand and occasional gravel.

5.2.3 Ground Water Conditions

Ground water was encountered in most of the test borings during drilling. Ground water was measured in the piezometers installed in 18 of the test borings on November 13, 2013. Our observations and ground water measurements are noted on the boring logs in Appendix A. Based on our test borings, we expect that ground water is relatively deep (more than 10 feet below the ground surface) in the south part of the alignment (between about Stations 250+00 and 306+00/Boring B-6 through B-20 area). Ground water is relatively shallow (less than 10-feet deep) north of Station 306+00.

We observed several areas of ground water springs and seepage (known wetlands, water in ditch lines and wetland type vegetation), typically along the east (uphill) side of the SSS ELST.

Ground water is expected to fluctuate seasonally. Our test borings were completed during a time period when the ground water level is expected to be at the seasonal low. Shallow ground water can occur as shallow (less than 10-feet deep) perched system during the late winter and early spring months.

5.3 SLOPE STABILITY

As previously described, cuts for the existing SSS ELST have been made in the hillside or Fill slopes created for the west shoulder of the SSS ELST. These cuts and fills have created oversteepened areas (1 to 1.5H:1V (horizontal to vertical) - 65 to over 100 percent grade) in local areas. None of the cut slope or fill slope areas appeared to be unstable at the time of our field work. As previously described, private property owners appear to have modified the west side of the SSS ELST area by constructing landscape walls (timber, rockeries and modular blocks) in local areas. Some of these walls appear to be over 6-feet high, are of unknown character and may be unstable.

6.0 INFILTRATION ANALYSIS

6.1 GENERAL

The field (short-term) and design (long-term) infiltration rate characteristics were evaluated based on the results of the SRITs (Infiltration Tests IT-1 through IT-5) and grain size analysis at the SRIT locations using methods described in the 2009 King County SWDM (SRITs – Method 1), and, for comparison purposes, Ecology’s February 2005 SMMWW (grain size analysis – Method 2). Infiltration Test IT-5 was attempted in the field, but was curtailed because of shallow ground water and the presence of nearly impermeable silt at the test depth. Based on our knowledge of the site conditions, the infiltration testing is generally representative from the area between Station 250+00 and 306+00 where Recessional Outwash and a relatively deep ground water level (more than 10 feet below the ground surface) are present. The balance of the area is underlain by low permeability soil or has a high ground water level.

6.2 METHOD 1 – SINGLE-RING INFILTROMETER TEST (SRIT)

The following is a summary of our field infiltration analysis using Method 1 (Single-Ring Infiltrometer Test – King County SWDM, 2009).

Test Location	Test Depth (feet)	Soil Type	Soil Infiltration Rate (iph)*
IT-1 / B-83	2½	Sand with Gravel	131
IT-2 / B-84	2	Sand with Gravel	155
IT-3 / B-11	3	Sand with Gravel	133
IT-4 / B-93	2	Sand with Gravel	55
IT-5 / B-97	3	Silt	0 **

* field (short-term) field infiltration rate, iph = inches per hour

** not tested – shallow ground water at test depth and silt (impermeable) soil

A design (long-term) infiltration rate was evaluated by using the formulas presented in the King County 2009 SWDM (Appendix III-A) as follows:

$$I_{infiltration} = I_{measured} \times F_{testing} \times F_{geometry} \times F_{plugging}$$

where: $I_{measured}$ = field infiltration rate in iph

$$F_{testing} = 0.5$$

$$F_{geometry} = 1.0$$

$$F_{plugging} = 0.9$$

Using the above equation and parameters, the calculated **long-term (design) infiltration rate ranges from 25 to 70 iph. However, King County SWDM (page 5-58) indicates that the design infiltration rate “must not exceed 20 inches/hour.”**

6.3 METHOD 2 – USDA SOIL TEXTURAL CLASSIFICATION

The following is a summary of our infiltration analysis using Method 2 (USDA Soil Textural Classification – Ecology 2005 SMMWW):

Test Location	Sample Depth (feet)	USDA Type	Soil Infiltration Rate (iph)*
IT-1	2½	Gravelly Sand	20 / 10
IT-2	2	Gravelly Sand	20 / 10
IT-3	3	Gravelly Sand	20 / 10
IT-4	2	Gravelly Sand	20 / 10
IT-5	3	Silt	0 / 0

* Short-term (field) infiltration rate / long-term (design) infiltration rate (includes correction factor to account for maintenance and biofouling). The long-term infiltration rate should be used for design (sizing) infiltration facilities.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 GENERAL

Based on our field reconnaissance, explorations, testing and analyses, we conclude that proposed improvements for SSS ELST widening related to the geotechnical conditions along the alignment are feasible. The improvements most sensitive to the geotechnical conditions are related to limited space because of adjacent improvements along with choosing an appropriate slope support method.

Some overexcavation of the Topsoil and Fill likely will be required in order to support SEWs (and other walls that require foundation support) on a reasonably firm and uniform soil type. The actual amount of overexcavation should be a field decision depending on the surficial soils encountered. We suggest maintaining site grades as high as practical to preserve the existing Fill that occurs along the full length of the SSS ELST.

Because most of the near surface soils are “granular” (sand and gravel), it is likely that most of the settlements from new Fill will occur rapidly (within a few weeks) once the Fill is placed. Holding off as long as possible to place the pavement surfacing would help the performance of the pavement section where there is overlapping new Fill and the existing Railroad Embankment Fill.

Stormwater infiltration in the south part of the SSS ELST and dispersion to open ditches in the central, north and far south end of the SSS ELST are the most likely practical methods of stormwater disposal. Introduction of additional water into the ground by infiltration may affect downslope properties. Establishing infiltration systems can also drain nearby wetlands. Stormwater infiltration systems should be evaluated on a site-specific basis during design considering adjacent property use and topographic/soil conditions. Small amounts of collected water or runoff introduced into the ground at several locations is more likely to have less impact on the existing conditions compared with collecting surface runoff from large areas and disposing of this water at specific locations.

7.2 STRUCTURAL EARTH WALLS

7.2.1 General

SEWs are typically used in fill applications where sufficient space is available for fill placement within the Reinforced Fill Zone. The SEW system consists of a Reinforced Fill Zone, often reinforced with layers of geotextile fabric depending on the wall height, and a CBU facing which is usually connected (pinned) with the Reinforced Fill Zone geogrid reinforcement layers. The CBUs are typically supported on a Leveling Course Pad of crushed rock to provide uniform support and to allow for easier installation (leveling).

In cut sections, an SEW application is treated as a slope “facing” (such as a rockery) and is not regarded as a structural solution for cut slope retention. As a general guideline, a slope facing can typically be used for competent cut materials to heights of up to 8 feet for a level backslope and 6 feet for a 2H:1V backslope. The CBU supplier should be contacted regarding the height of cut that can be faced with CBUs.

7.2.2 SEW Design Parameters

SEW internal design (geogrid type, length and spacing, Reinforced Fill Zone soil material and compaction specification, drainage) should be completed by the SEW material supplier. To assist in this design, we recommend the following soil parameters.

Parameter	Reinforced Fill Zone	Retained Soil	Foundation Soil
Unit Weight (pcf)	125	120	125
Phi (degrees)	32	32	34
Cohesion (psf)	0	0	200

pcf = pounds per cubic foot; psf = pounds per square foot

We strongly recommend that the Reinforced Fill Zone consist of free-draining soil such as Gravel Borrow as described in the 2012 Washington State Department of Transportation (WSDOT) Standard Specification Section 9-03.14(1). The on-site soils contain a relatively high percentage of fines and may not be suitable for use in the Reinforced Fill Zone.

We recommend using an allowable soil bearing capacity of 2,500 psf.

The design heights of SEWs should include the aboveground wall heights as well as the full embedment depths of the walls down to the Leveling Course Pad. The minimum embedment depth is as follows:

Slope in Front of Wall	Minimum Embedment Depth (feet)
Horizontal	H/20 or 1 foot, whichever is greater
3H:1V	H/10 or 1 foot, whichever is greater
2H:1V	H/7 or 1 foot, whichever is greater

H:V = horizontal to vertical

H = Wall Height

The minimum embedment depth assumes use of a 6-inch thick, free-draining crushed rock leveling pad. The wall embedment could be further reduced to 0.5 feet if the leveling pad thickness is increased to 1 foot, or if non-frost susceptible soils are observed at wall subgrade at the time of construction.

Depending on the SEW type and height, geogrid reinforcement of the backfill may not be required and should be discussed with the SEW material supplier. For any height of SEW, we recommend the use of free-draining soil for backfill to provide adequate drainage.

SEWs should be designed with minimum factors of safety of 1.5 for sliding and pullout of reinforcing elements and 2.0 for overturning. If proprietary wall systems are used, the wall manufacturer is responsible for evaluating these items. However, we recommend that proprietary wall system designs be reviewed by a qualified geotechnical engineer to evaluate if valid assumptions were used relative to material properties and other factors such as site specific topography and soil/ground water conditions.

If SEWs are subject to the influence of traffic loading or nearby retaining walls within a horizontal distance equal to the height of the SEW, the walls should be designed for the additional horizontal pressure using appropriate design methods. A common practice is to assume a surcharge loading equivalent to 2 feet of additional fill to simulate traffic loads.

7.2.3 SEW Subgrade Preparation

7.2.3.1 General

SEW subgrade preparation typically consists of first excavating the Leveling Course Pad for the SEW, followed by additional excavation for the Reinforced Fill Zone. We recommend that the subgrade be evaluated by probing by a representative of our firm. Acceptable Leveling Course Pad and Reinforced Fill Zone subgrade is defined by probe penetration of less than 12 inches.

7.2.3.2 Leveling Course Pad Subgrade Special Conditions

Special Condition 1 - Where subgrade soils cannot be adequately compacted, or where soft, loose or disturbed soil is present, these areas should be excavated to expose competent material or to a maximum depth of 18 inches below subgrade, and replaced with Structural Fill (Structural Fill is described in **Section 7.5.2**). Alternatively, a geotextile soil reinforcement fabric such as TenCate Mirafi RS80i, or equivalent, may be placed over the soft, loose or disturbed subgrade, rather than overexcavation.

Special Condition 2 - Where subgrade preparation exposes Topsoil or other organic soils (such as peat or organic silt), these organic soils should be removed and replaced with Structural Fill. We expect the thickness of Topsoil or other organic soils to be less than 18 inches. It should be a field decision by the geotechnical engineer to evaluate the appropriate method of subgrade improvement when the Topsoil or other organic soils exceed 18 inches in thickness.

Special Condition 3 – Where ground water or wet subgrade is encountered at the base of the excavation, quarry spalls as defined by Section 9-13.6 of the 2012 WSDOT Standard Specifications may be used to provide a stable base on which to place Structural Fill. We recommend placing a nonwoven geotextile soil separation fabric such as TenCate Mirafi 180N, or equivalent, on the subgrade to reduce the loss of this rock material into the underlying soils.

7.2.3.3 Reinforced Fill Zone Subgrade Preparation

Special Conditions 2 and 3 as described above applies to the preparation of subgrade for the Reinforced Fill Zone.

7.3 BOX (FISH PASSAGE) CULVERTS

7.3.1 Foundation Support

We expect that the box culverts and wing walls will be founded on medium dense or better soil. Foundation subgrade preparation should be handled similar to that described for SEWs in **Section 7.2.3** of this report. Foundations designed for these soil conditions may be proportioned using an allowable bearing pressure of 2,500 psf. This allowable bearing pressure includes a factor of safety of 3.0. The anticipated settlement of the foundation designed for this allowable bearing capacity is less than 1 inch. This allowable bearing pressure may be increased by one-third for short-term transient loads such as for seismic or wind loads.

7.3.2 Lateral Earth Pressures

For buried structures that are free to displace laterally, active soil pressures may be used for design. An equivalent fluid pressure of 35 pcf may be used to calculate active lateral earth pressures on the culvert walls and wingwalls. The equivalent fluid pressure does not include line load surcharge.

If buried structures are fixed against lateral deflection, at-rest pressures will be appropriate for design. An equivalent, at-rest fluid pressure of 50 pcf may be used to calculate at-rest earth pressures on the culvert walls. This equivalent fluid pressure does not include live load surcharge.

As needed, an equivalent fluid pressure of 300 pcf may be used to resist the active lateral pressures.

7.4 PAVEMENT SUBGRADE

We understand that the standard pavement section for the ELST consists of 3 inches of Hot Mix Asphalt (HMA) pavement underlain by 4 inches of Crushed Surfacing Base Course (CSBC). If soft subgrade is encountered during subgrade preparation, the CSBC should be increased to 8 inches (which will require

a 4-inch deep overexcavation) underlain by a geotextile reinforcement fabric such as Tencate Mirafi RS50i, or equivalent.

Based on our experience with the Issaquah Segment ELST, the depth of overexcavation may be up to 12 inches or more depending on the subgrade conditions, along with use of 2-inch-minus crushed rock (railroad ballast) to replace the CSBC, especially if the subgrade area is used for heavy construction traffic during wet or cool weather. As previously mentioned, maintaining the highest final subgrade level is recommended so that the existing suitable Fill is not removed to expose less suitable subgrade conditions.

7.5 EARTHWORK

7.5.1 General

Where the SSS ELST widening crosses areas underlain by soft organic soils or loose/soft, wet Fill, we recommend that these soils be removed. This may require excavation of 2 to 3 feet of unsuitable soil. Where the SSS ELST widening Fill will be 3 feet or more in height, soft organic soils may be left in place, although vegetation must be cut at the ground surface and removed.

We recommend that the SSS ELST subgrade be evaluated by proofrolling and/or probing by a representative of our firm. Where subgrade soils cannot be adequately compacted, or where soft or disturbed soil is present, these areas should be excavated to expose competent material or to a maximum depth of 2 feet below final ELST grade, and replaced with Structural Fill.

It is important to note that the underlying soil conditions (Recessional Outwash) between Stations 250+00 and 306+00 are relatively clean (low silt content) soils; it is reasonable to schedule earthwork in this area during the winter and early spring months with less delays as compared to the rest of the SSS ELST. Earthwork in other areas should be scheduled during the normally drier months, unless project delays and extra costs associated with maintaining an adequate trail subgrade for use by heavy construction equipment are acceptable.

7.5.2 Structural Fill

7.5.2.1 General

All new Fill for the SSS ELST should be placed as Structural Fill. Structural Fill material should be free of debris, organic contaminants and rock fragments larger than 6 inches. The suitability of material for use as Structural Fill will depend on the gradation and moisture content of the soil. As the amount of fines (portion of 3/4-inch minus soil particles passing the US Standard No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult to achieve.

7.5.2.2 Unclassified Fill

We recommend that unclassified imported fill consist primarily of granular material with less than 30 percent passing the US Standard No. 200 sieve. Unclassified material will be sensitive to changes in moisture content and compaction will be difficult or impossible to achieve during wet weather. We recommend that unclassified material be used as Structural Fill only during dry weather conditions when proper moisture conditioning can be achieved.

7.5.2.3 Gravel Borrow

We recommend that Structural Fill consist of Gravel Borrow for the Reinforced Fill Zone for SEWs. Gravel Borrow should conform with Section 9-03.14(1) of the 2012 WSDOT Standard Specifications.

7.5.2.4 Reuse of On-Site Materials

The site soils (Fill, Older Alluvium, Ice-Contact Deposits and pre-Fraser Sediments) may be reused for Structural Fill during periods of extended dry weather, though may be of limited use within the Reinforced Fill Zone (for SEWs) depending on the fines content (see **Section 7.2.2** for material specifications). Recessional Outwash is typically considered an “all-weather” Fill, because of the low silt content and could be used for the SEWs Reinforced Fill Zone.

Soil containing more than 20 percent organic material (roots, forest duff and topsoil) should only be used in landscaping areas or for other purposes where specific compaction criteria is not required.

7.5.2.5 Base and Drainage Layer

We recommend that the base and drainage layer material for the pavement section consist of Gravel Borrow as described above with the further restriction that the Gravel Borrow contain no more than 5 percent fines (based on the fraction of ¾-inch-minus material passing the US Standard No. 200 sieve).

7.5.2.6 Placement and Compaction

All Structural Fill placed in trail and shoulder areas should be compacted to at least 95 percent of the Maximum Dry Density (MDD) determined in accordance with ASTM Test Method D 1557. Waste fill in landscaping areas need only be compacted to the extent required for trafficability of construction equipment and erosion control.

As a guideline, we recommend that Structural Fill for the SSS ELST be placed in horizontal lifts which are 10 inches or less in loose thickness. The actual lift thickness will be a function of the fill quality and size of the compaction equipment used. Each lift should be compacted to the required specification before placing subsequent layers.

For placement during wet weather or on wet subgrades, Structural Fill should contain no more than 5 percent fines. Structural Fill placement over wet ground should commence with an initial lift of about 12 to 18 inches of clean sand and gravel with less than 5 percent fines, or quarry spalls (Section 9-13.3, 2012 WSDOT Standard Specification). During dry weather, the fines content may be up to about 30 percent, provided that the fill can be moisture-conditioned and compacted to the degree specified below.

We recommend that a representative from our firm observe the preparation for, placement, and compaction of Structural Fill. An adequate number of in-place density tests should be completed in the fill to evaluate if the desired degree of compaction is being achieved.

Nonstructural Fill placed in landscape and waste-fill areas where the existing surface slope is no steeper than 4H:1V needs to be compacted only to the degree required for trafficability of construction equipment and effective surface drainage/erosion control. All Nonstructural Fills should be sloped no steeper than 4H:1V. Nonstructural Fill is very susceptible to erosion. Therefore, we recommend that all Nonstructural Fill areas be immediately seeded, planted, or otherwise protected from erosion.

7.5.3 Fill Settlement

Most of the SSS ELST widening Fill will be underlain by loose to dense or soft to stiff soils. Settlement of these underlying soils is expected to range from ½ to 1 inch and should occur rapidly as Fill is placed. Some settlement will also occur within the Fill itself, especially where the Fill thickness is greater than 5 feet. We estimate that the maximum amount of settlement within the Fill will be no more than 1 percent of the Fill thickness. Thus, for a 5-foot Fill section, settlements on the order of ½ to 1 inch

might occur. Therefore, we recommend placing the final SSS ELST pavement at least three weeks after placement of fill where the fill thickness is greater than 5 feet.

7.5.4 Construction Dewatering

It is possible that excavation dewatering may be required in local areas along the SSS ELST alignment. The box culvert locations could also be likely areas of shallow ground water. The level and amount of ground water will depend on when earthwork occurs. In the late Winter and early Spring, ground water levels and stream flow would be highest.

Because of the complex layering (discontinuous layers of variably permeable soils), pockets of ground water seepage will likely be encountered; we expect that pumping from a sump within the trench may be used for small to moderate amounts of ground water seepage. Well points or pumped wells will be necessary if large amounts of ground water seepage are encountered. We recommend that the contractor be required to submit a proposed dewatering system design and plan layout to the project engineer for review and comment prior to beginning construction.

7.5.5 Cut and Fill Slopes

7.5.5.1 Cut Slopes

Temporary cuts less than 4 feet in height may be made near-vertical in medium dense or better soil. Temporary cuts greater than 4 feet in height may be made at 1H:1V or flatter.

Permanent cut slopes should be inclined no steeper than 2H:1V. We recommend constructing a bench on all cut slopes for every 15 feet of vertical height of slope face.

Some of the upper portions of cut slopes will expose loose soil that may be several feet thick. The loose soil will be subject to localized raveling and sloughing and must therefore be sloped no steeper than 3H:1V or covered with quarry spalls or a suitable geotextile for the purpose of stabilization.

Where cut benches are required (cut slopes more than 10-feet high), the benches should be sloped downward into the hill to allow for collection of surface water runoff. We recommend that the benches be sloped no steeper than 5 percent.

Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. All excavations more than 4 feet in depth should be sloped in accordance with Part N of WAC 296-155 or be shored. The loose to medium dense Fill, Older Alluvium and Ice-Contact Deposits soils classify as a Type C soil (OSHA 1926 Subpart P, Appendix A and B; OSHA Technical Manual, Section V, Chapter 2, sections V and VIII, dated January 20, 1999) and may be inclined (temporary slope) as steep as 1.5H:1V. The medium dense Recessional Outwash and dense pre-Fraser Sediments classify as a Type B soil and may be inclined (temporary slope) as steep as 1H:1V (OSHA, as described above). Flatter slopes may be required where ground water seepage occurs and dewatering may be required to lower the ground water table below the base of the excavation. Alternatively, trench boxes may be used where the excavation is more than 4-feet deep.

7.5.5.2 Fill Slopes

Structural Fill slopes may be sloped at 2H:1V or flatter. All surfaces which will receive Fill should be properly stripped of vegetation and organic matter prior to placing Fill. Fill placed on existing slopes which are steeper than 4H:1V should be properly keyed into the native slope surface. This can be accomplished by constructing the Fill in a series of 4- to 8-foot-wide horizontal benches cut into the slope. The Fill should be placed in horizontal lifts. We recommend that Fill be placed on the cut benches as soon as possible following construction of the benches.

Steeper (1V to 1.5H:1V) Structural Fill slopes are possible provided that these slopes are covered with quarry spalls or a permanent erosion control mat or blanket such as Tensar® Hydramax™, EroNet™, BioNet® or VMax® products, as appropriate.

7.6 STORMWATER INFILTRATION

7.6.1 General

In summary, field infiltration rates obtained using Single Ring Infiltrometer Test and USDA Soil Textural Classification methods suggest that the surficial soils can provide for excellent stormwater infiltration as shown by IT-1 through IT-4 (general area between Stations 250+00 and 306+00). Because of the width of the SSS ELST area (small) compared to its length, and past favorable performance of the existing trail, stormwater dispersion may be considered. Stormwater dispersion is effective where the ground surface is mantled with a thin layer of poorly-drained soil (such as compacted Fill or Topsoil) and sufficient distance is maintained from developed areas.

7.6.2 Stormwater Infiltration Rate

For the area between Stations 250+00 and 306+00, we suggest using a long-term (design) infiltration rate ranging from 25 to 70 iph. However, King County SWDM (page 5-58) indicates that the design infiltration rate “must not exceed 20 inches/hour.” Short term rates measured in the field ranged from 55 to 155 iph.

Stormwater infiltration may be difficult or impossible in other areas of the SSS ELST (south of Station 250+00 and north of Station 306+00) because of the presence of shallow, nearly impermeable soils (Older Alluvium) and shallow ground water.

8.0 USE OF THIS REPORT

We have prepared this report for use by Parametrix in the design of a portion of the project. The data and report should be provided to prospective contractors for bidding or estimating purposes, but our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

If there are significant changes in the grades, configurations or types of facilities to be constructed, the conclusions and recommendations presented in this report may not be fully applicable. When the design has been finalized, we recommend that we be retained to review those portions of the specifications and drawings which relate to geotechnical considerations to see that our recommendations have been interpreted and implemented as intended.

Variations in subsurface conditions are possible between the locations of the explorations. Variations may also occur with time. Some contingency for unanticipated conditions should be included in the project budget and schedule. Sufficient observation, testing and consultation should be provided by our firm during construction to evaluate whether the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions during the work differ from those anticipated, and to evaluate whether or not earthwork and foundation installation activities comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No warranty or other conditions, express or implied, should be understood.

We appreciate the opportunity to be of service to you on this project. If there are any questions concerning this report or if we can provide additional services, please call.

Yours very truly,
Icicle Creek Engineers, Inc.

Kathy S. Killman, LEG
Principal Engineering Geologist

Brian R. Beaman, PE, LEG, LHG
Principal Engineer/Hydrogeologist

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FIGURES

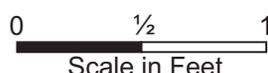
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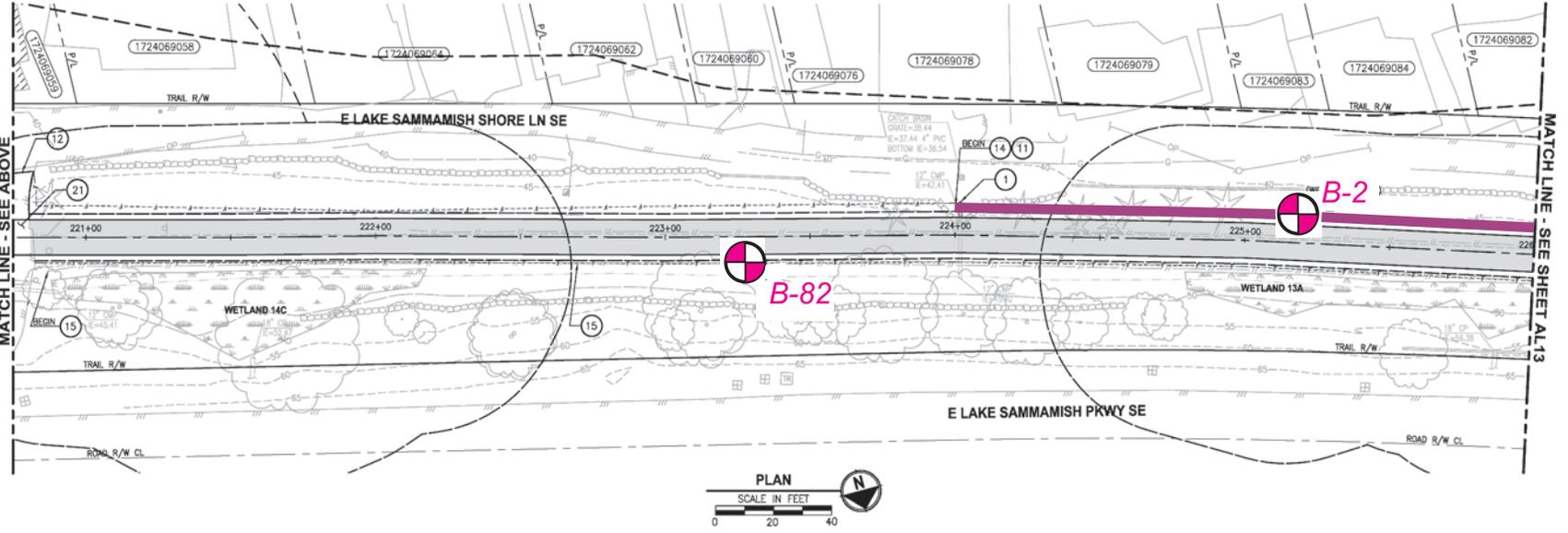
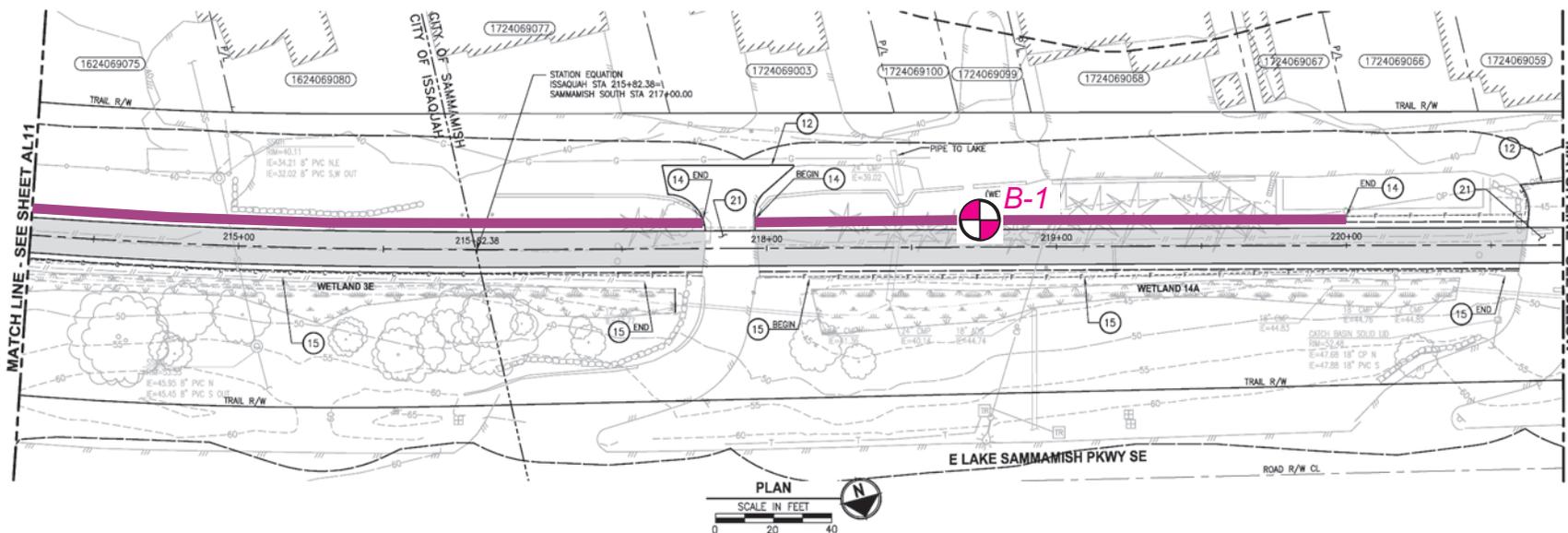


South Sammamish Segment
East Lake Sammamish Trail



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 - 23 STAIRS IMPACTED

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 - STREAM BUFFER
 - LAKE OHM
 - SHORELINE SETBACK

EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

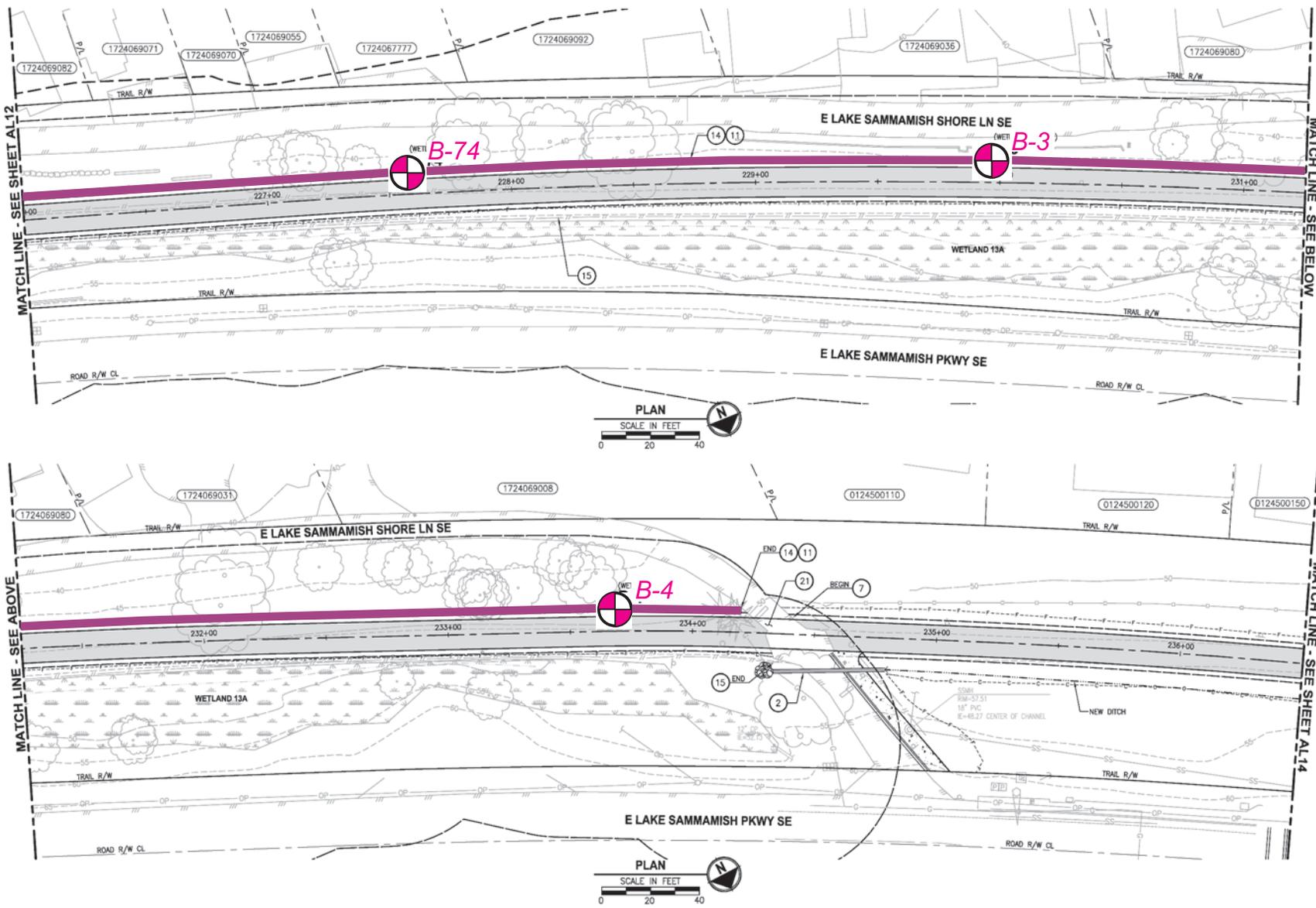
Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

Icicle Creek Engineers, Inc.
29335 NE 20th Street
Carnation, Washington 98027
(425) 333-0093

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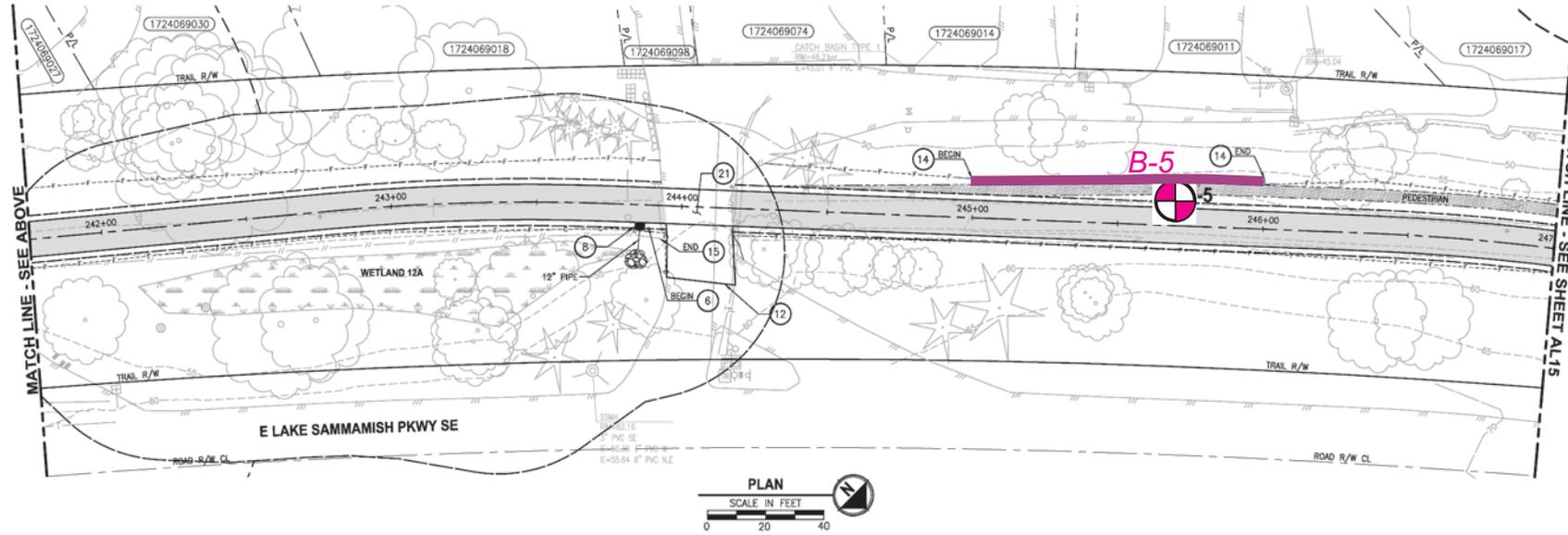
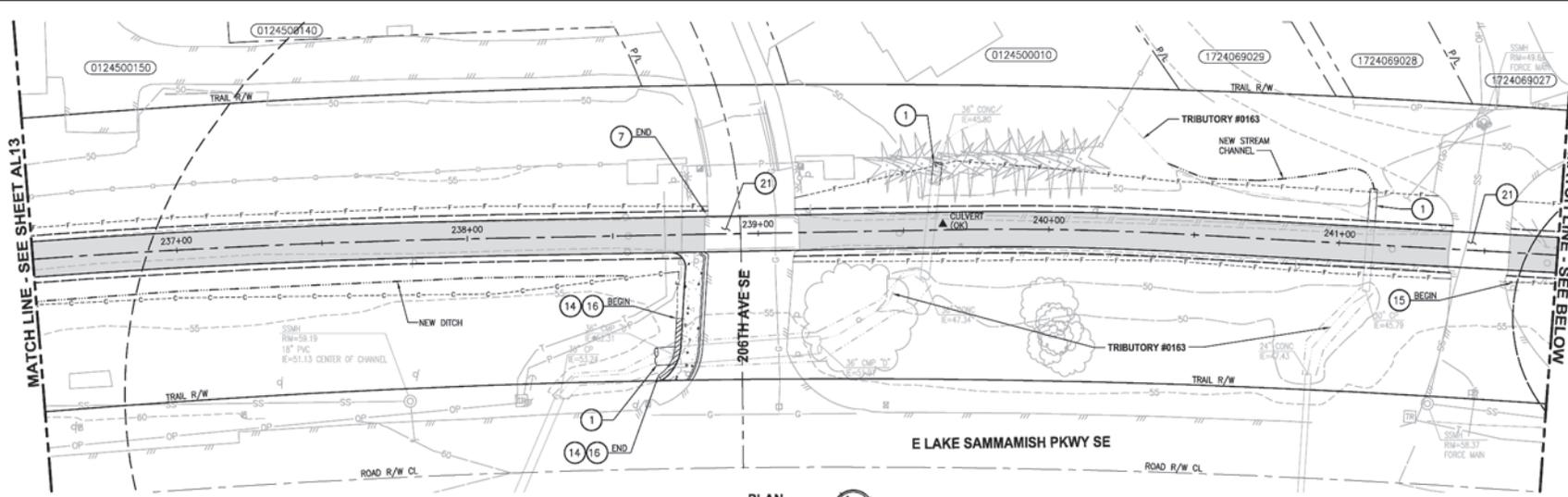
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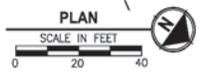
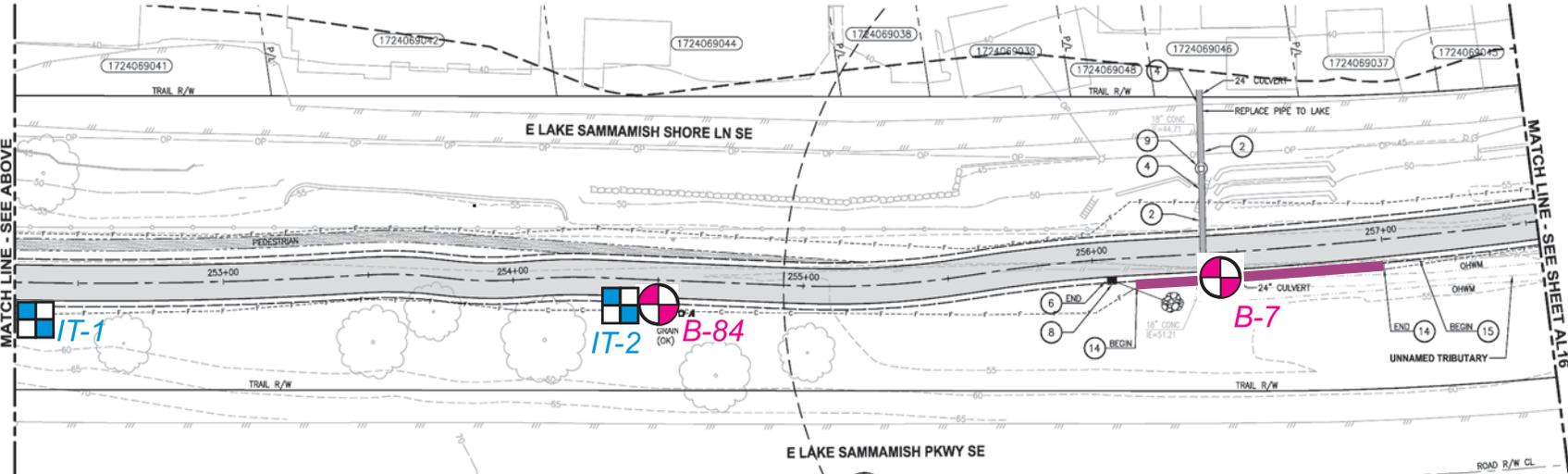
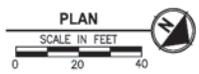
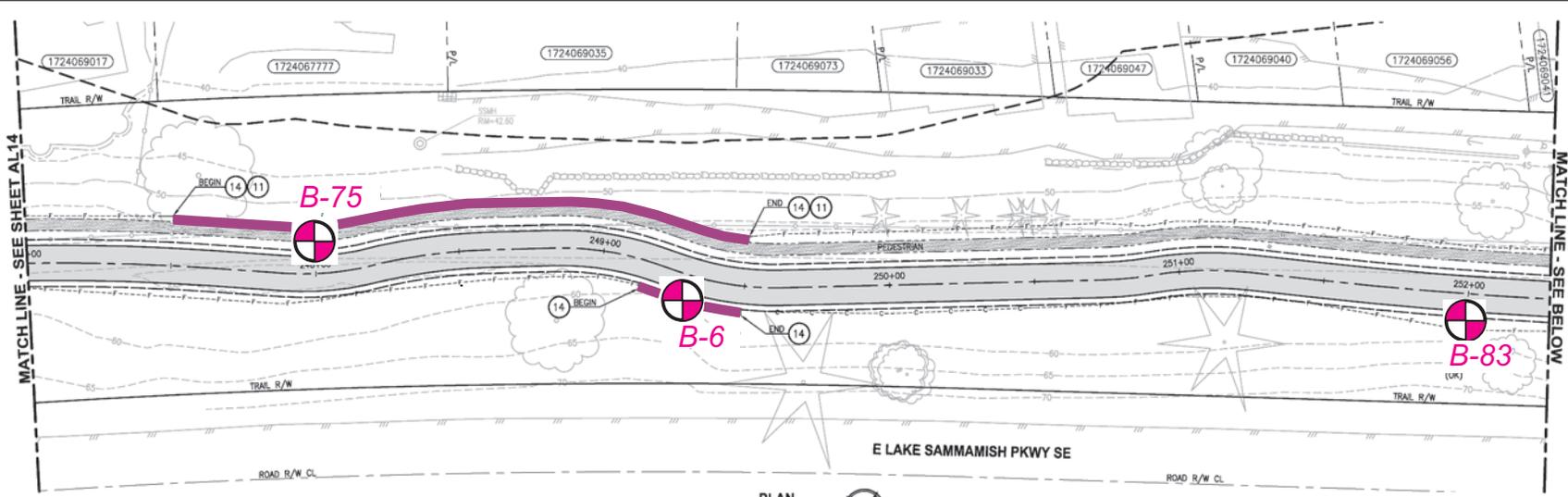
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**EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
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King County

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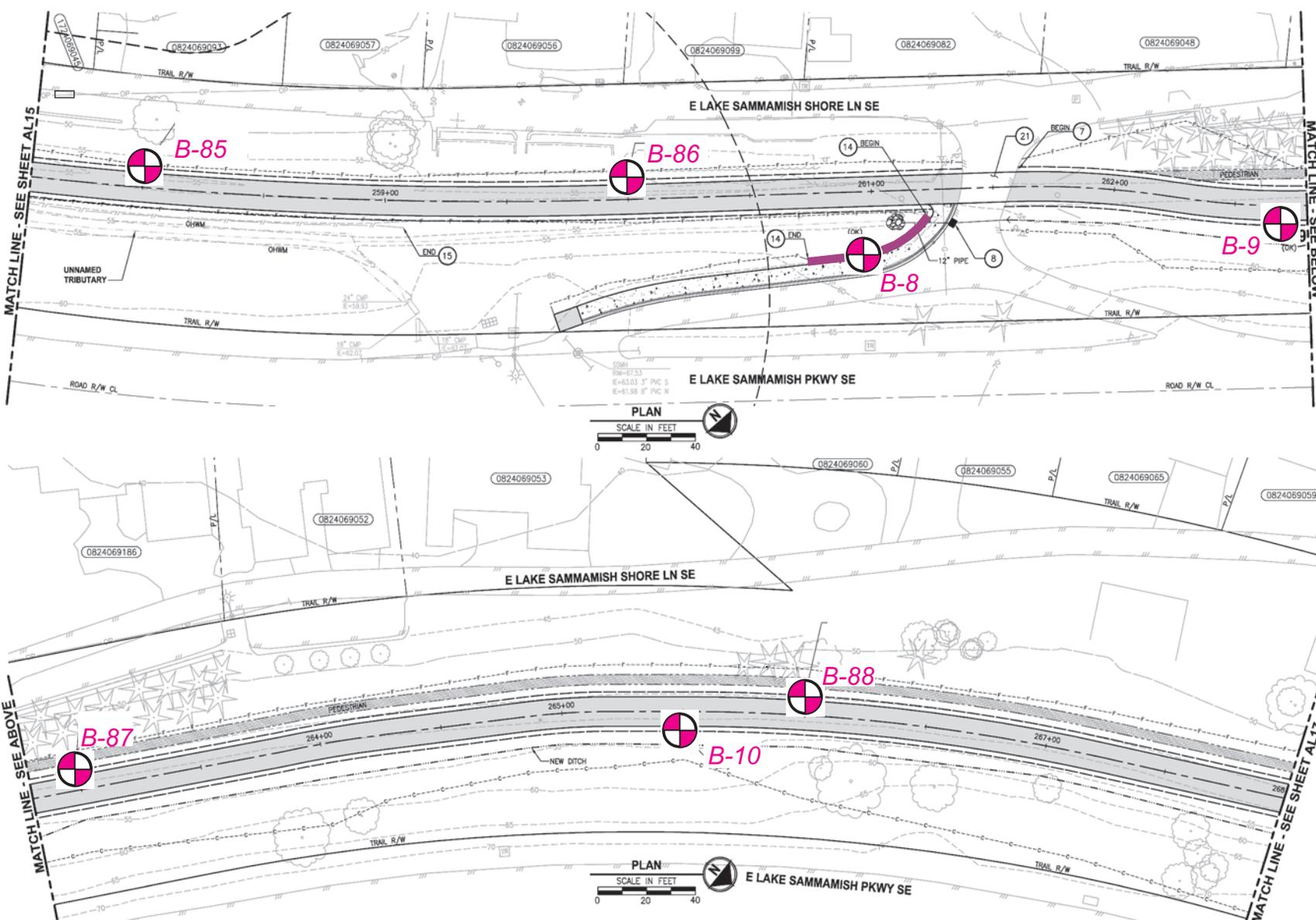
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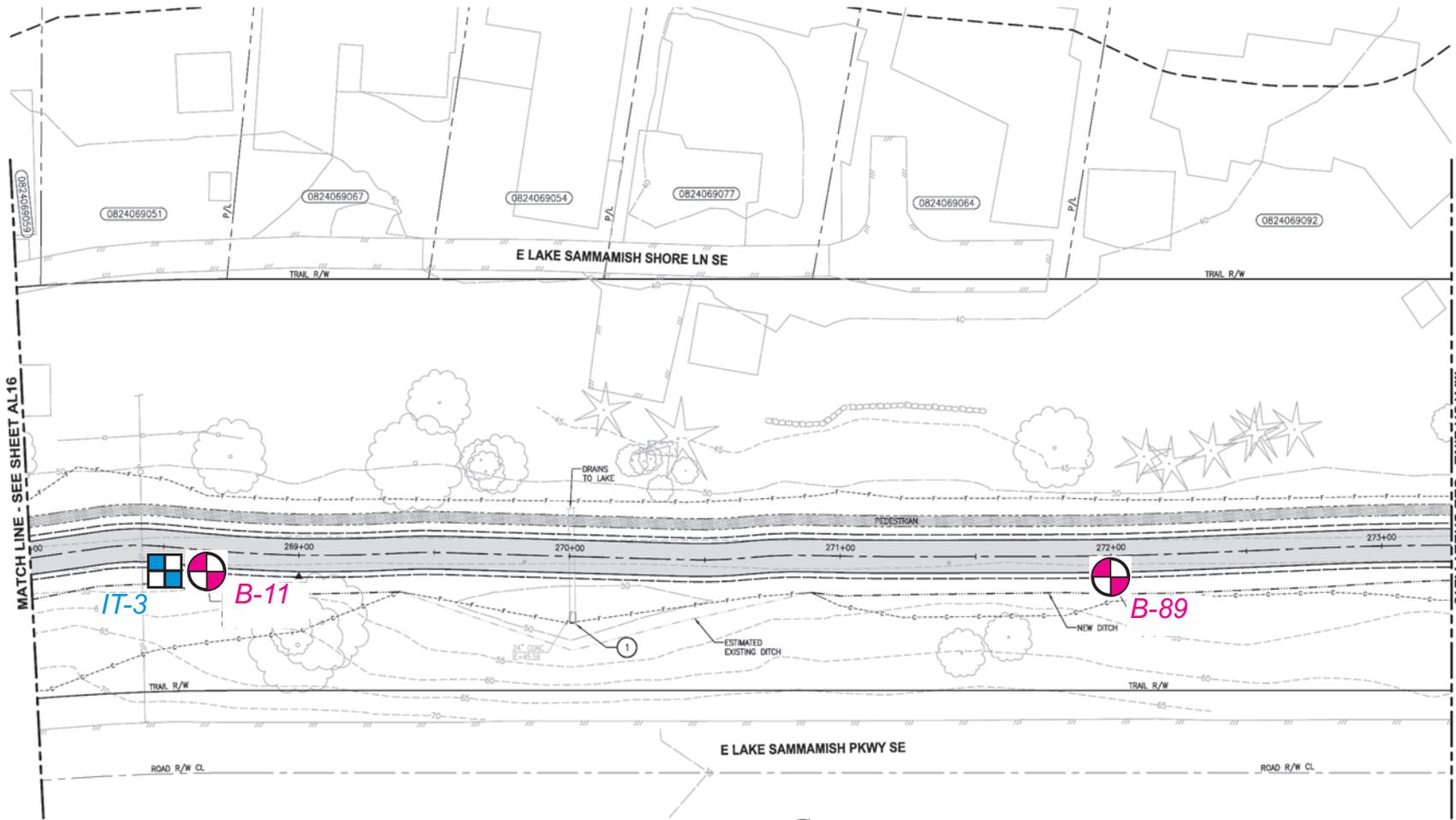
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EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
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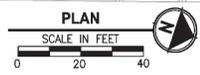
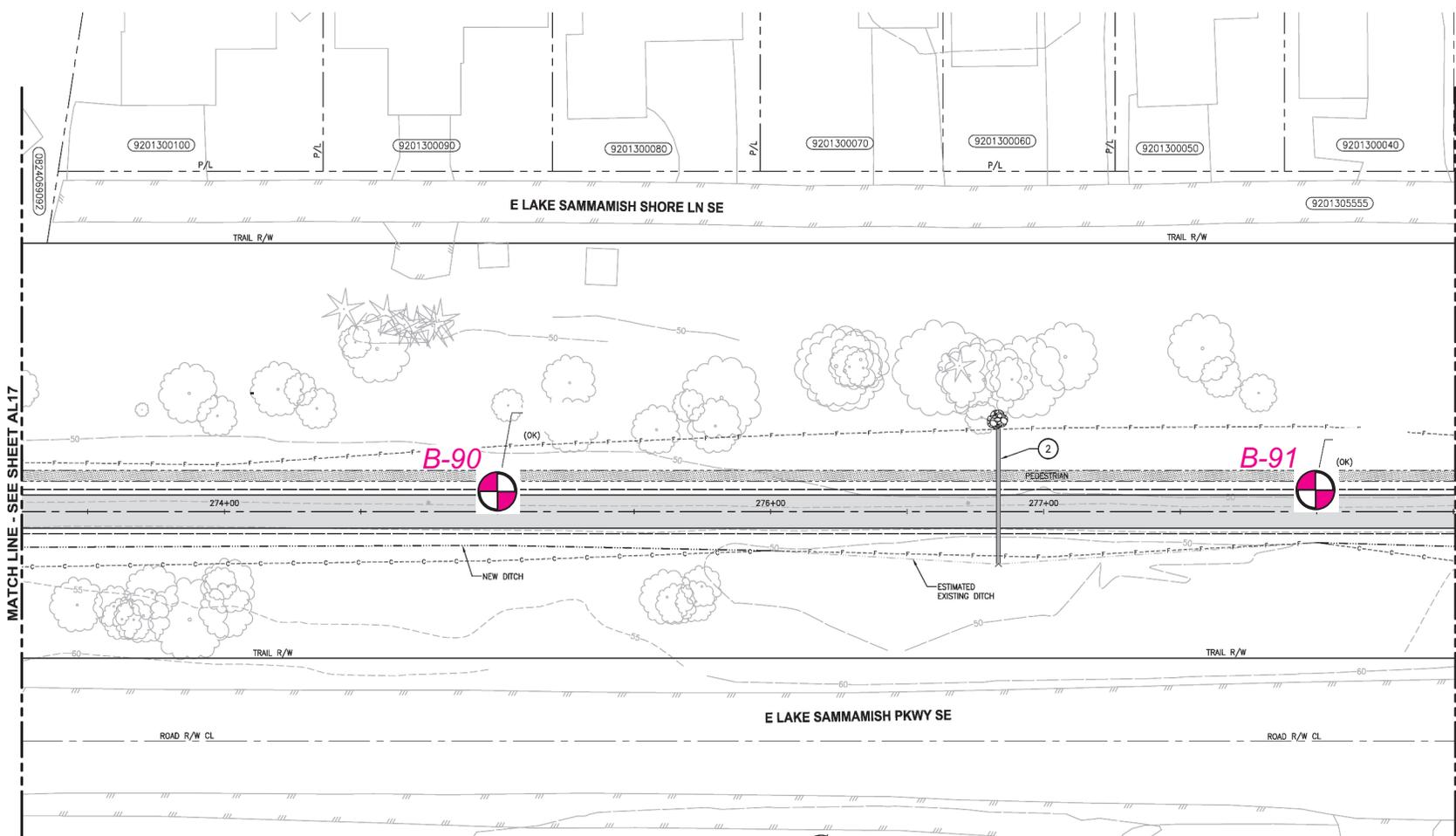
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EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

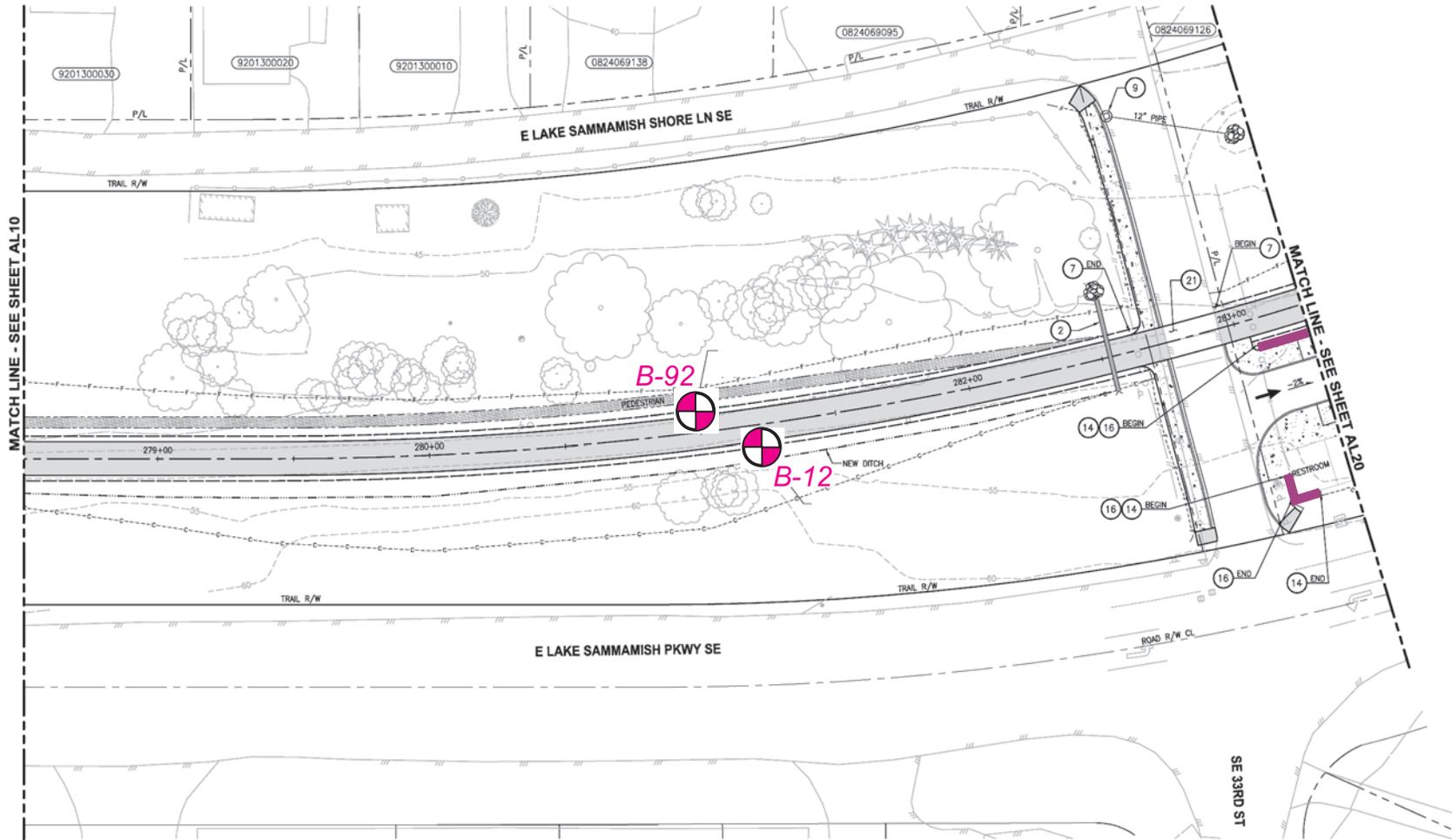
Icicle Creek Engineers, Inc.
29335 NE 20th Street
Carnation, Washington 98027
(425) 333-0093

SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
DRAWN: BRB	
CHECKED: KSK	Figure
DATE: December 11, 2013	8

CONSTRUCTION NOTES:

- 1 EXTEND CULVERT
- 2 NEW CULVERT
- 3 BOX CULVERT (FISH PASSABLE)
- 4 REMOVE CULVERT
- 5 ABANDON CULVERT
- 6 CONVEYANCE TRENCH WITH UNDERDRAIN, SEE DRAINAGE DETAILS
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- 22 CONNECT TO EXISTING DRAINAGE STRUCTURE
- 23 STAIRS IMPACTED

- (OK) OUTSIDE CRITICAL AREA BUFFERS
- WETLAND BUFFER
 - STREAM BUFFER
 - LAKE OHWM
 - SHORELINE SETBACK



EXPLANATION	
B-1	Test Boring Location
IT-1	Infiltration Test Location
	Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT



Icicle Creek Engineers, Inc.

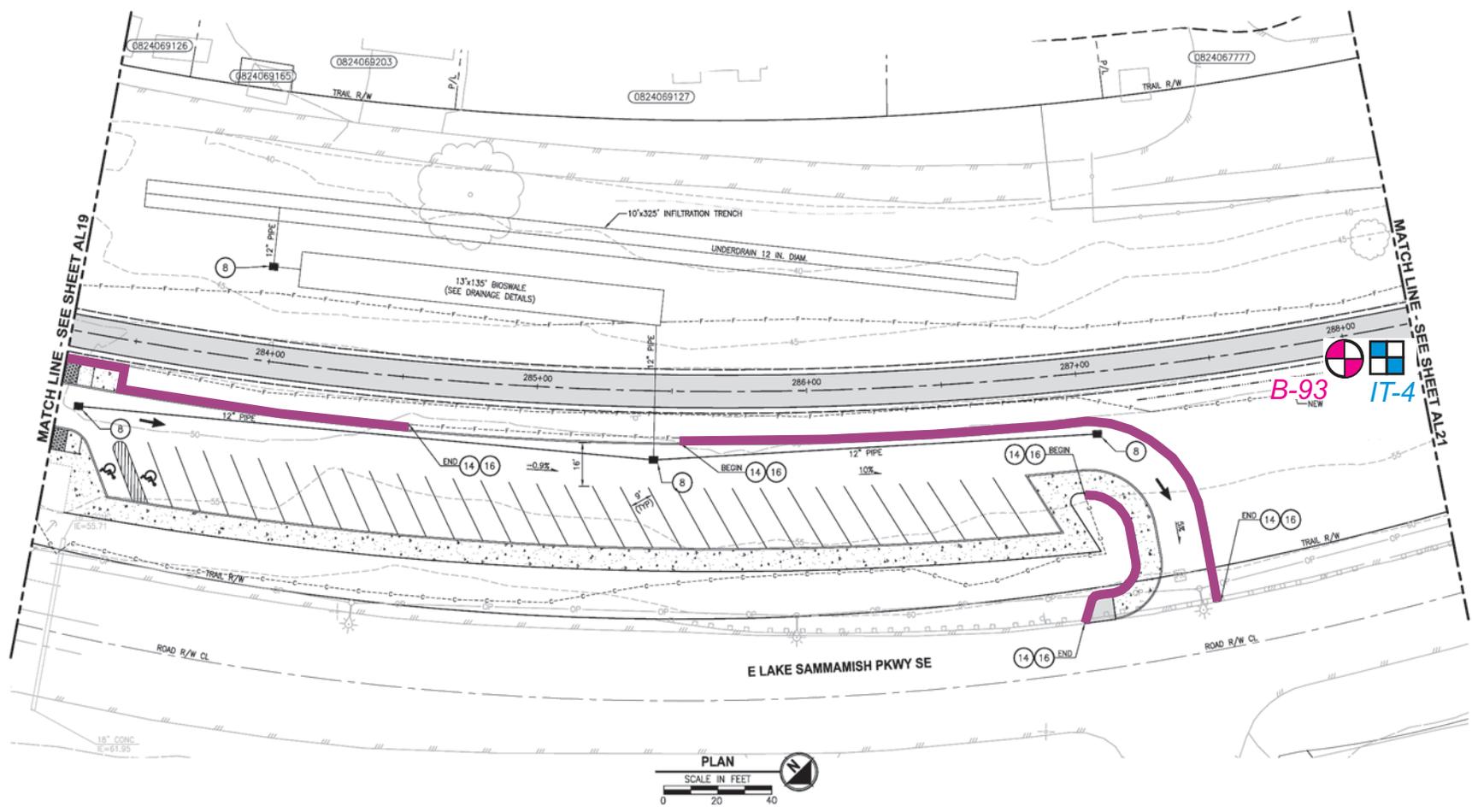
29335 NE 20th Street
Carnation, Washington 98027
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SCALE: AS SHOWN	ICE FILE NUMBER
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DRAWN: BRB	Figure
CHECKED: KSK	9
DATE: December 11, 2013	

CONSTRUCTION NOTES:

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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

**EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT**

King County

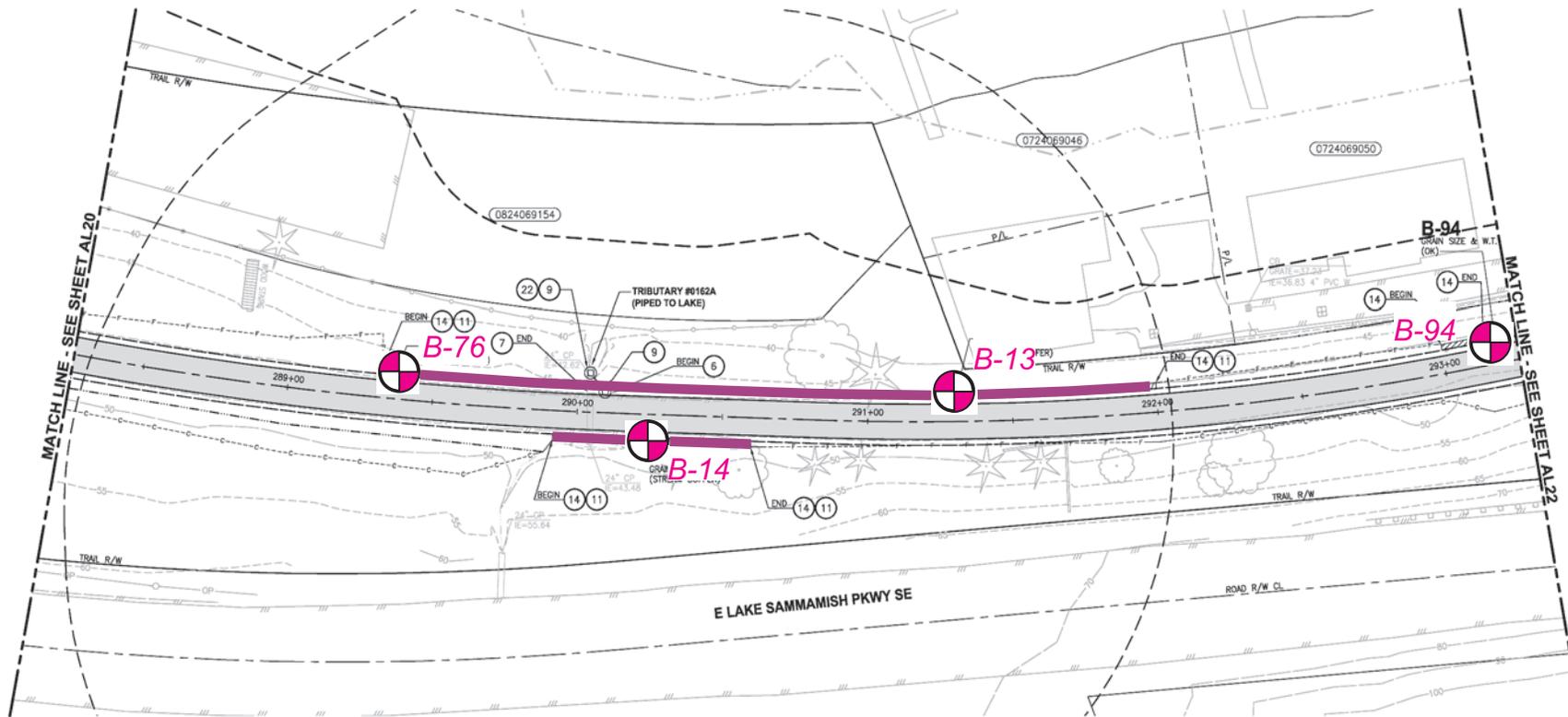
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29335 NE 20th Street
Carnation, Washington 98027
(425) 333-0093

SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
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DATE: December 11, 2013	

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EXPLANATION	
B-1 	Test Boring Location
IT-1 	Infiltration Test Location
	Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

**EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT**

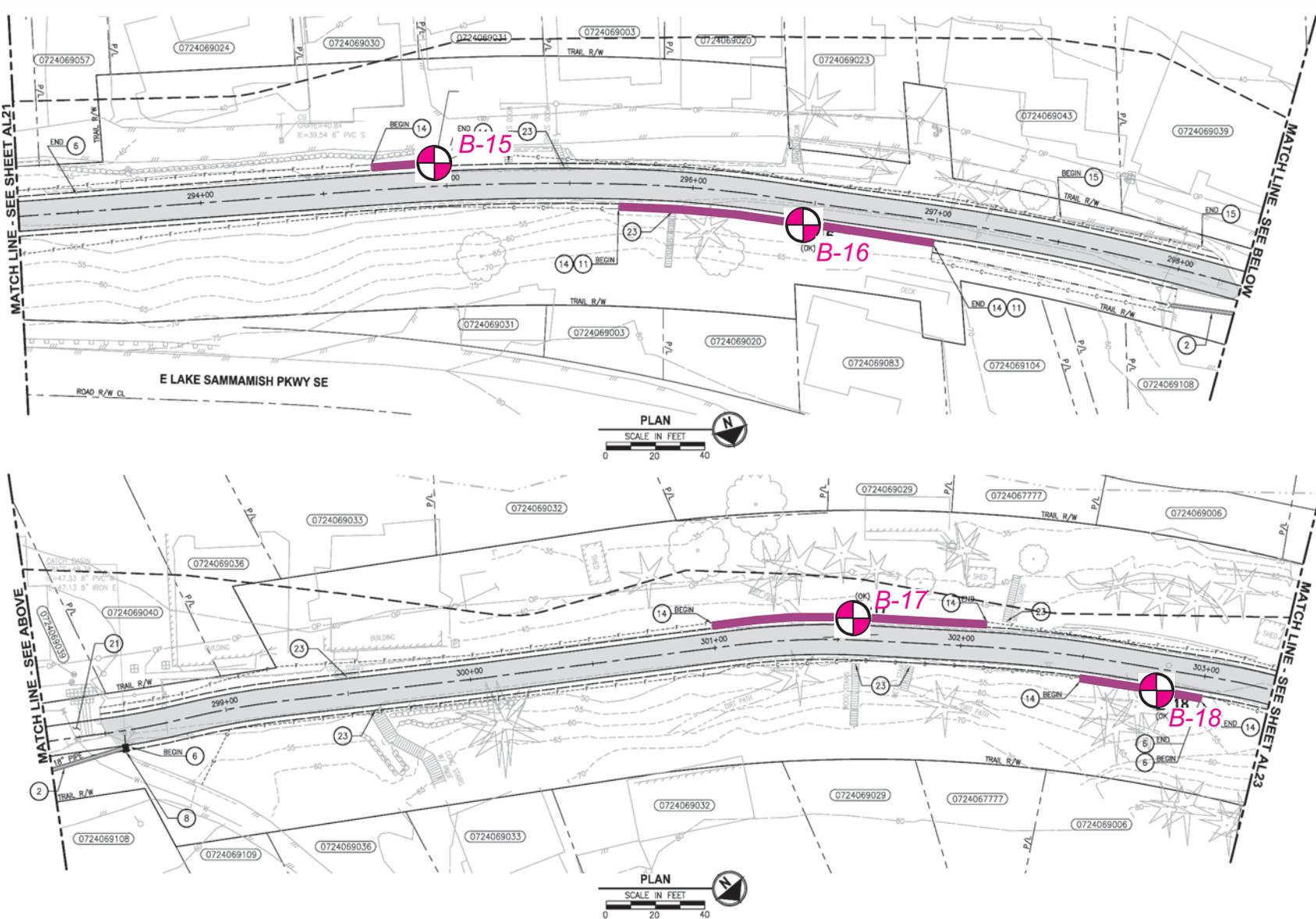


King County

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SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
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CHECKED: KSK	Figure
DATE: December 11, 2013	11



- CONSTRUCTION NOTES:**
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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

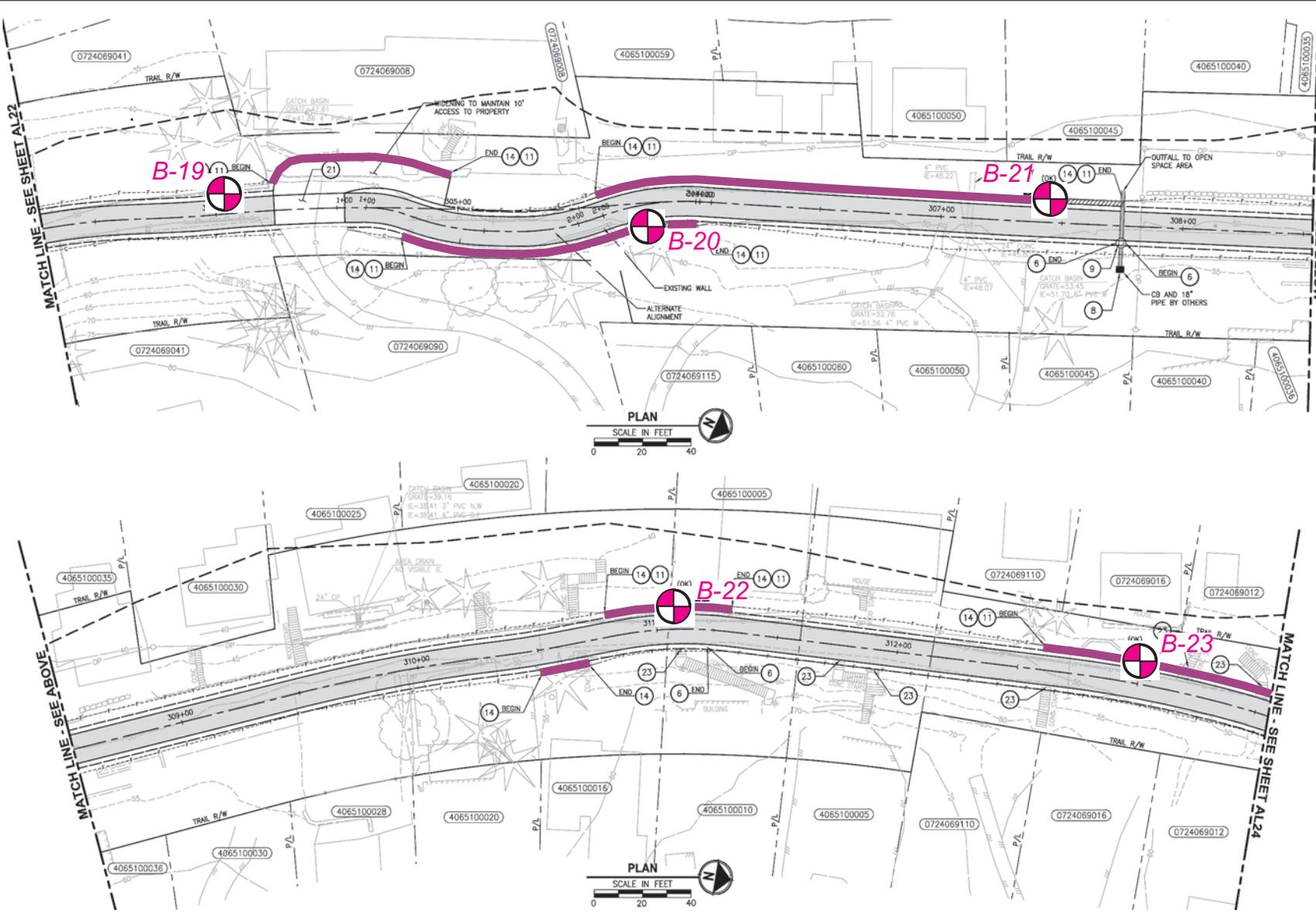
Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

**EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT**

King County

Icicle Creek Engineers, Inc.
29335 NE 20th Street
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(425) 333-0093

SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	
DRAWN: BRB	0105-010
CHECKED: KSK	Figure
DATE: December 11, 2013	12



- CONSTRUCTION NOTES:**
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 - SHORELINE SETBACK

EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

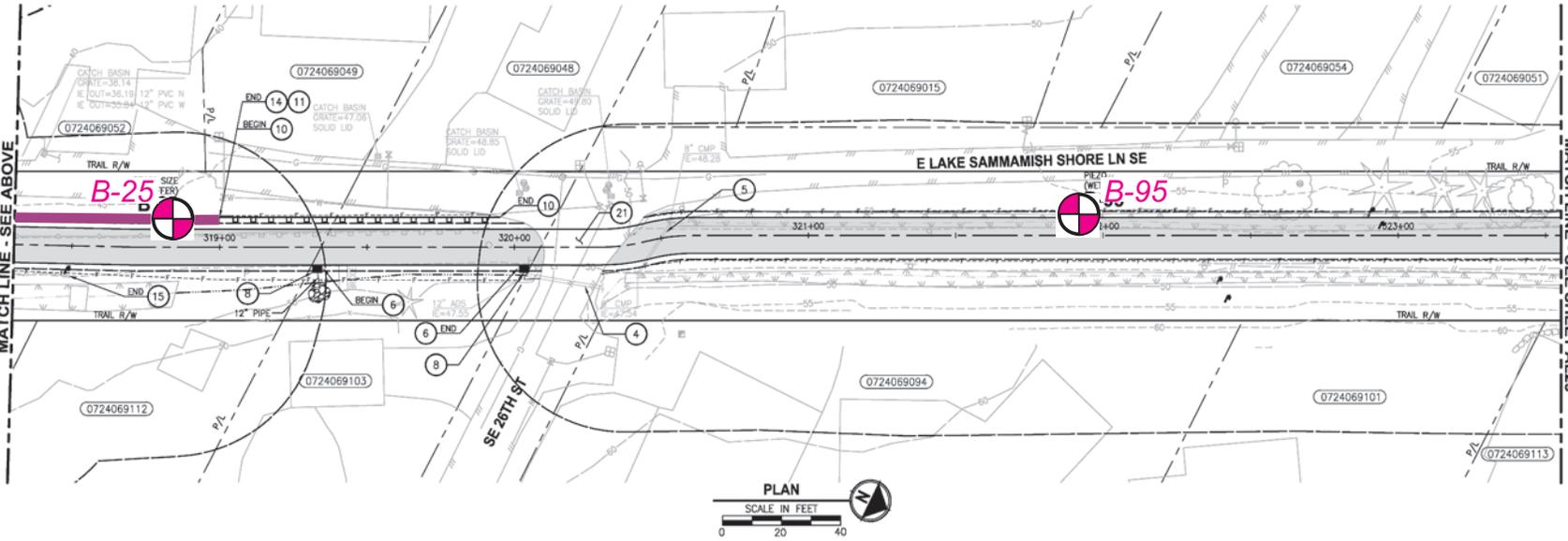
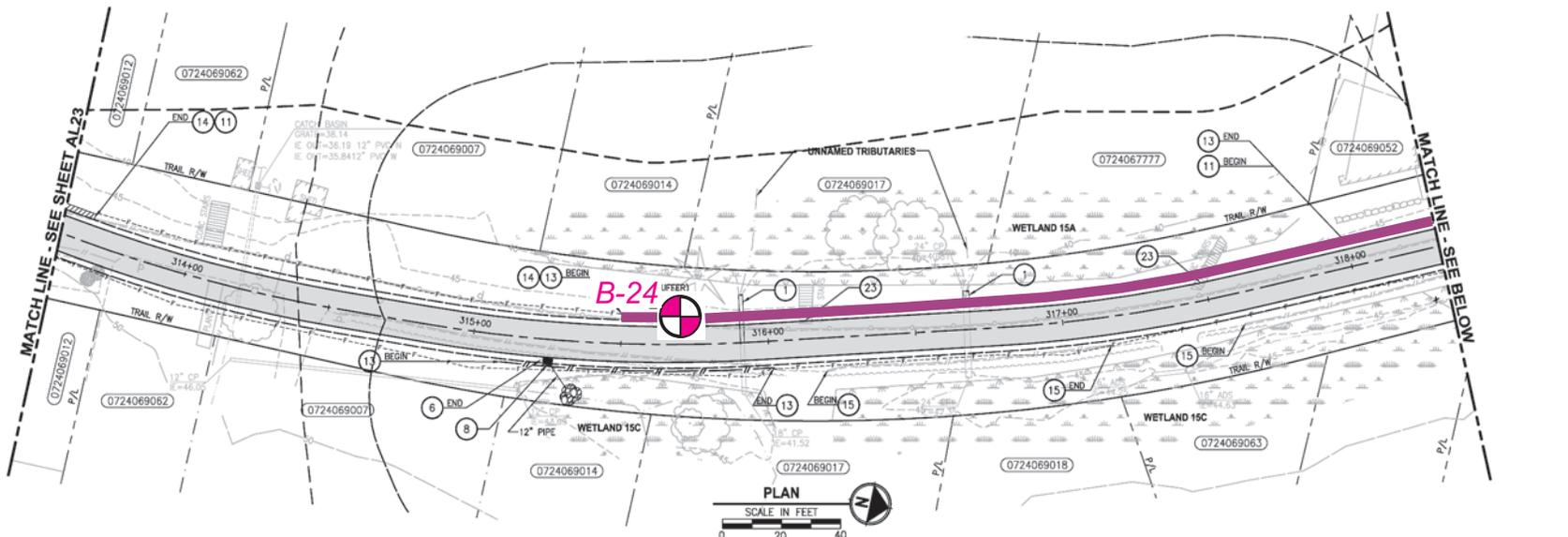
Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

Icicle Creek Engineers, Inc.
29335 NE 20th Street
Carnation, Washington 98027
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SCALE: AS SHOWN	ICE FILE NUMBER
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CHECKED: KSK	13
DATE: December 11, 2013	



CONSTRUCTION NOTES:

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EXPLANATION

B-1  Test Boring Location

IT-1  Infiltration Test Location

 Proposed Structural Earth Wall

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

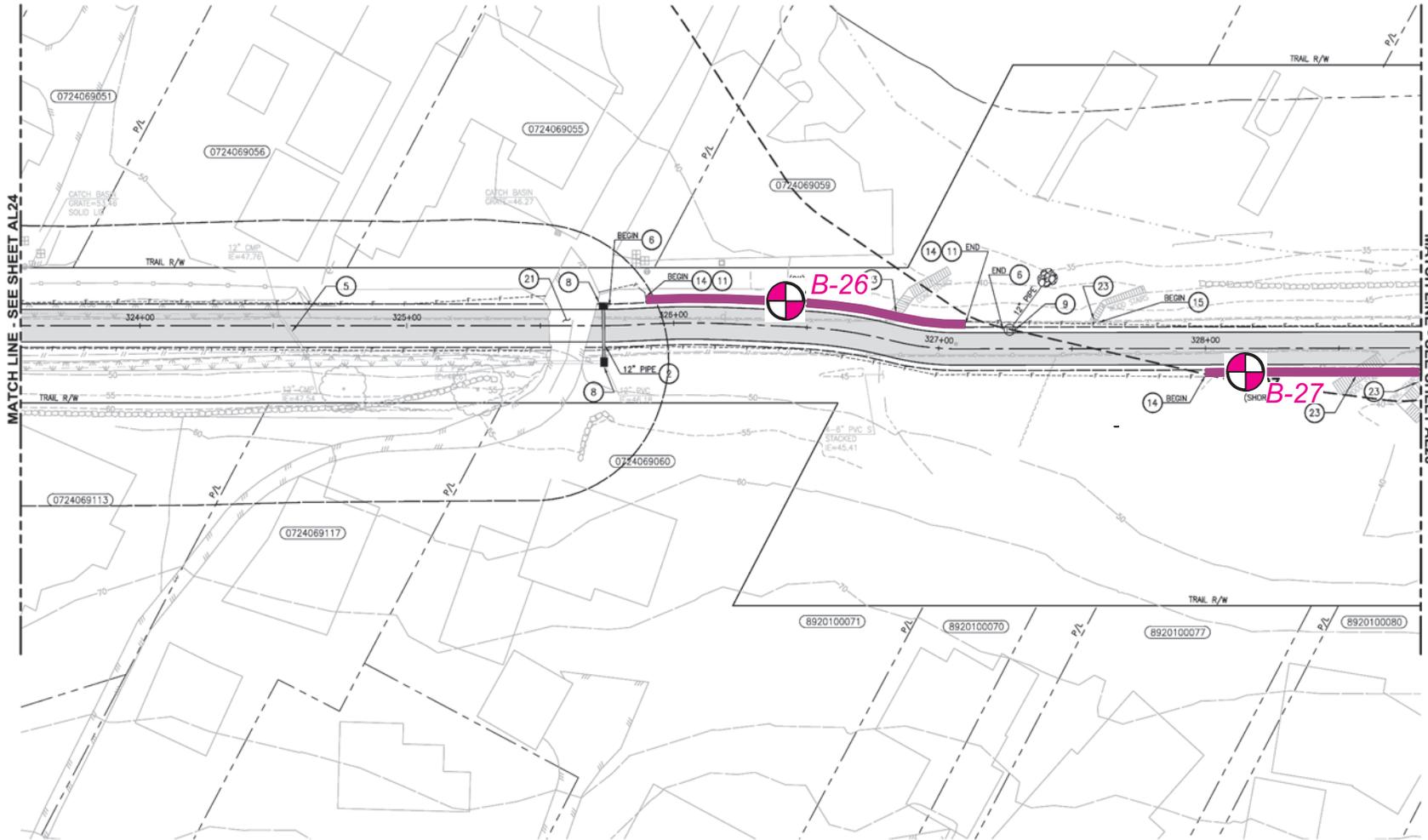


King County

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Carnation, Washington 98027
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SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
DRAWN: BRB	
CHECKED: KSK	Figure
DATE: December 11, 2013	14

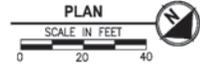
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CONSTRUCTION NOTES:

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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

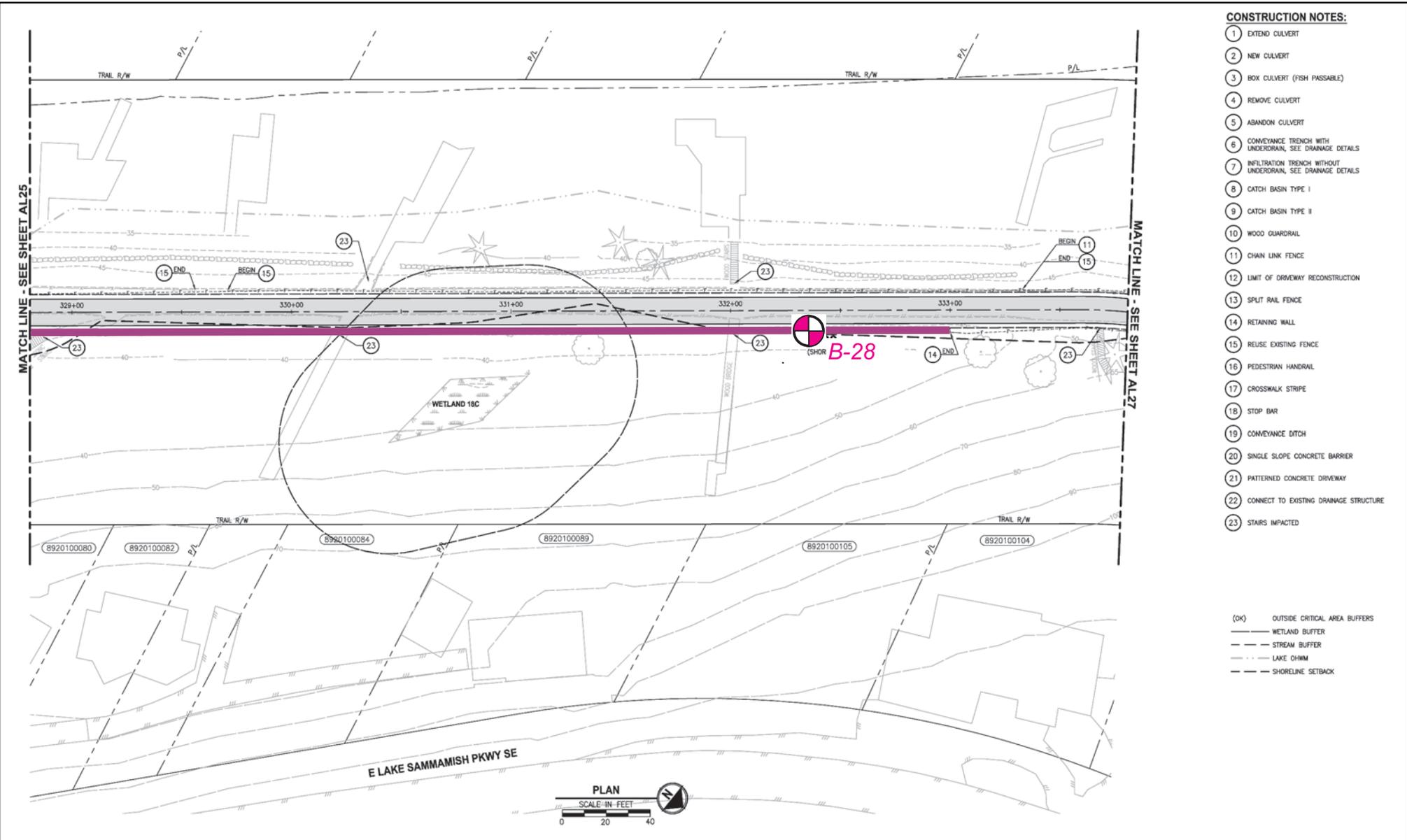
Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

Icicle Creek Engineers, Inc.
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Carnation, Washington 98027
(425) 333-0093

SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
DRAWN: BRB	Figure
CHECKED: KSK	15
DATE: December 11, 2013	



CONSTRUCTION NOTES:

- 1 EXTEND CULVERT
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- (OK) OUTSIDE CRITICAL AREA BUFFERS
- WETLAND BUFFER
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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

King County

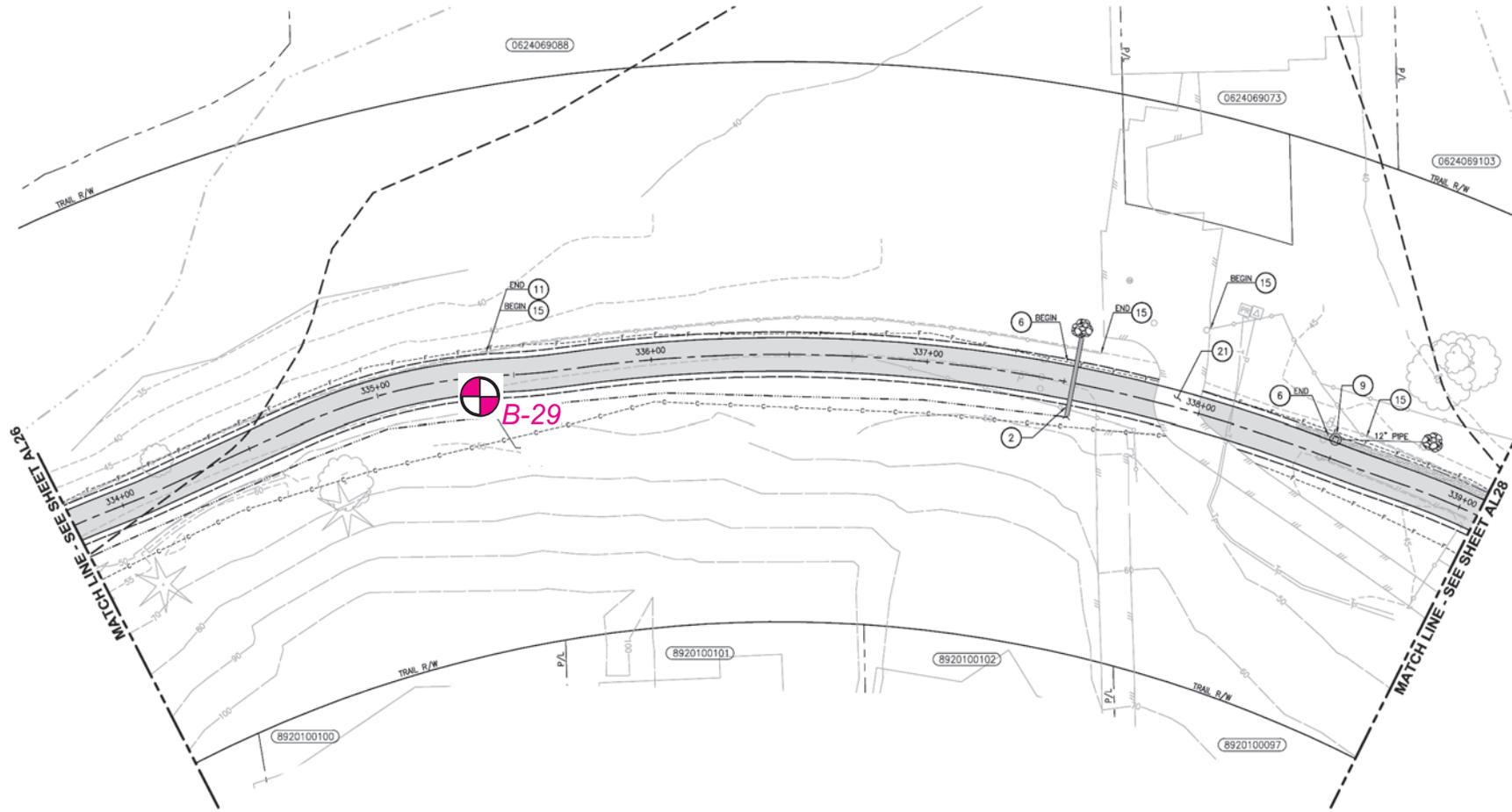
Icicle Creek Engineers, Inc.
29335 NE 20th Street
Carnation, Washington 98027
(425) 333-0093

SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
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CHECKED: KSK	16
DATE: December 11, 2013	

CONSTRUCTION NOTES:

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EXPLANATION	
B-1 	Test Boring Location
IT-1 	Infiltration Test Location
	Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT



King County

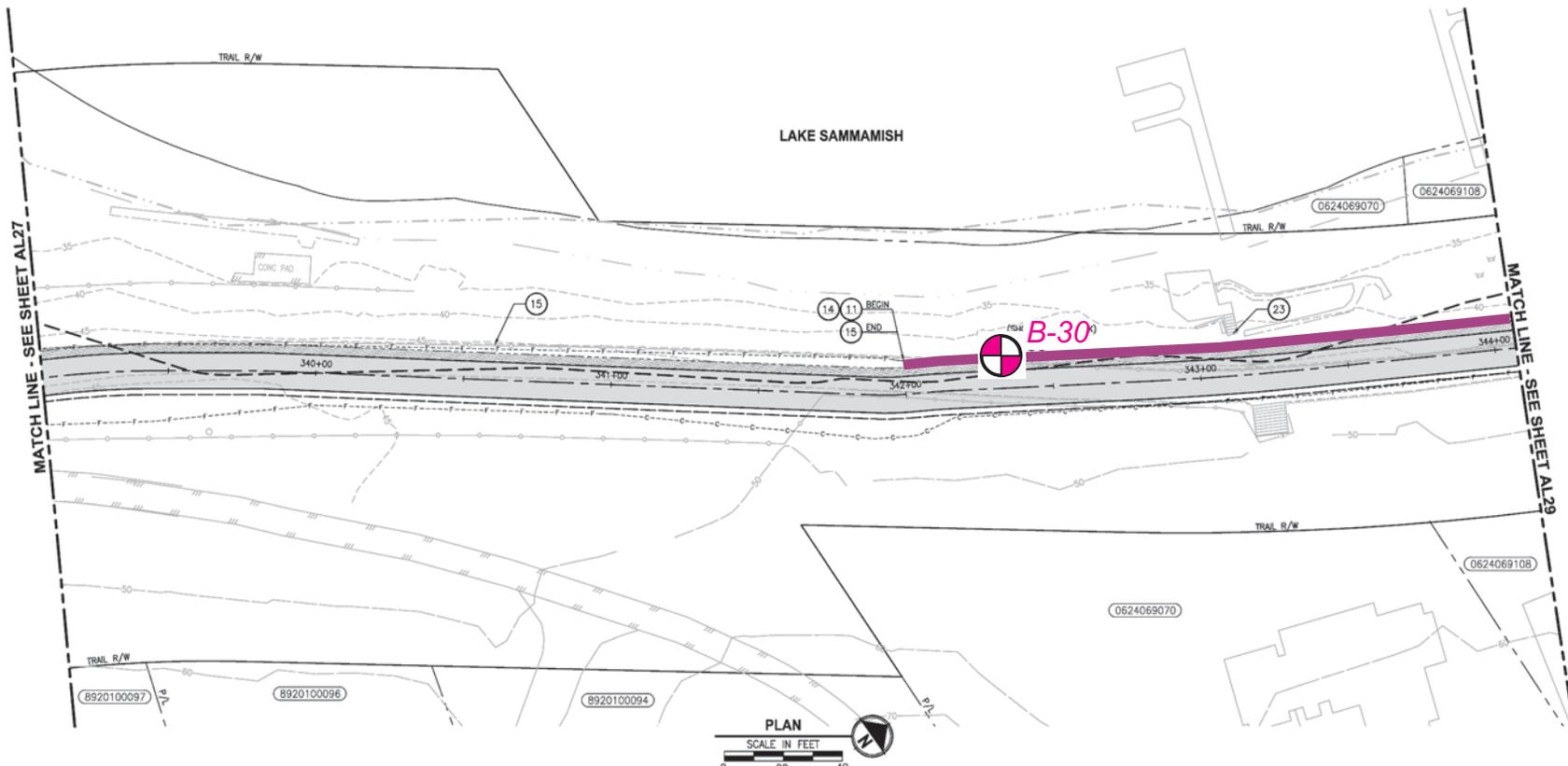
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SCALE: AS SHOWN	ICE FILE NUMBER
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DATE: December 11, 2013	17

CONSTRUCTION NOTES:

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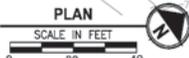


EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

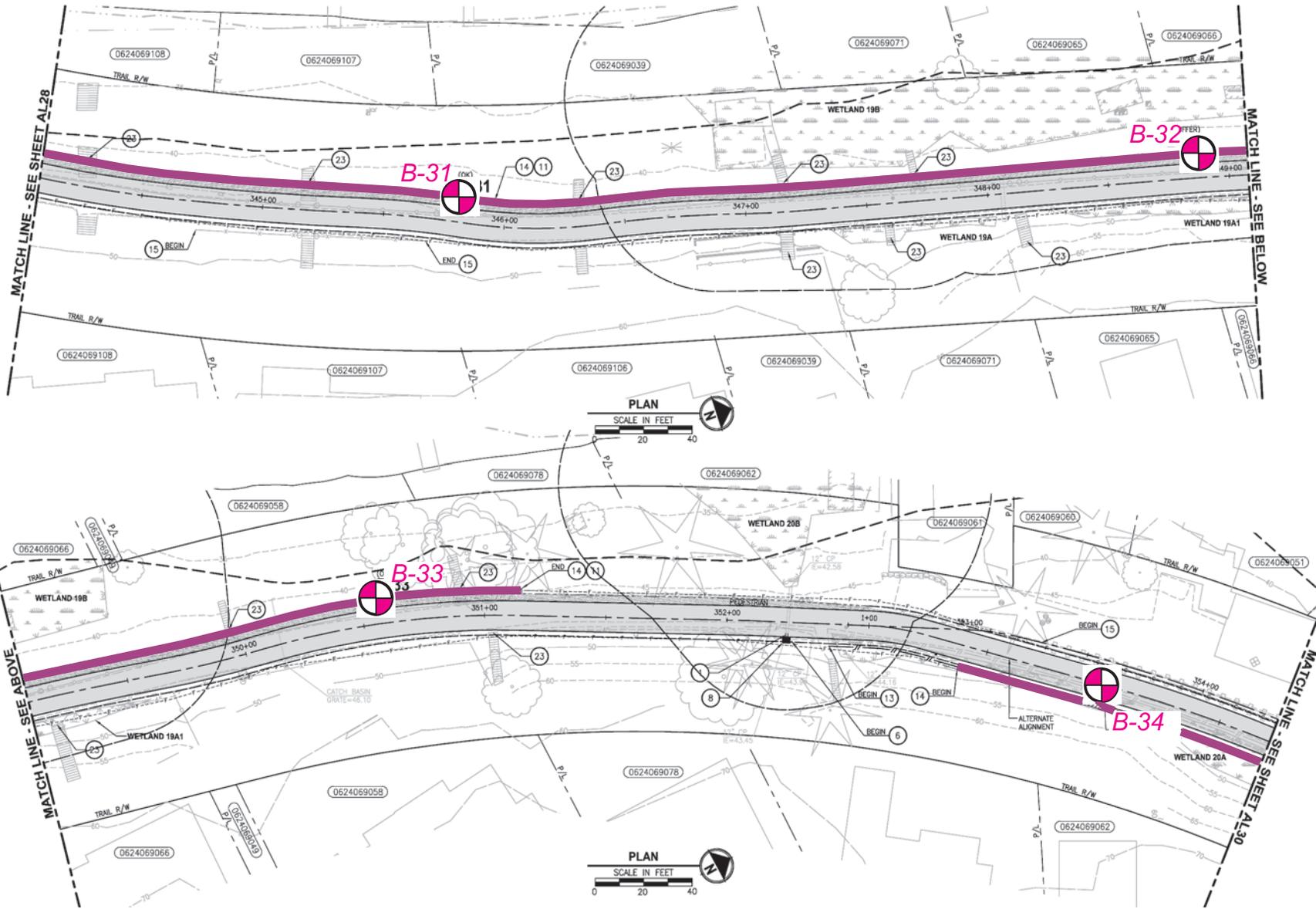


Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

**EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT**

Icicle Creek Engineers, Inc.
29335 NE 20th Street
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SCALE: AS SHOWN	ICE FILE NUMBER
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DRAWN: BRB	0105-010
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- CONSTRUCTION NOTES:**
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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

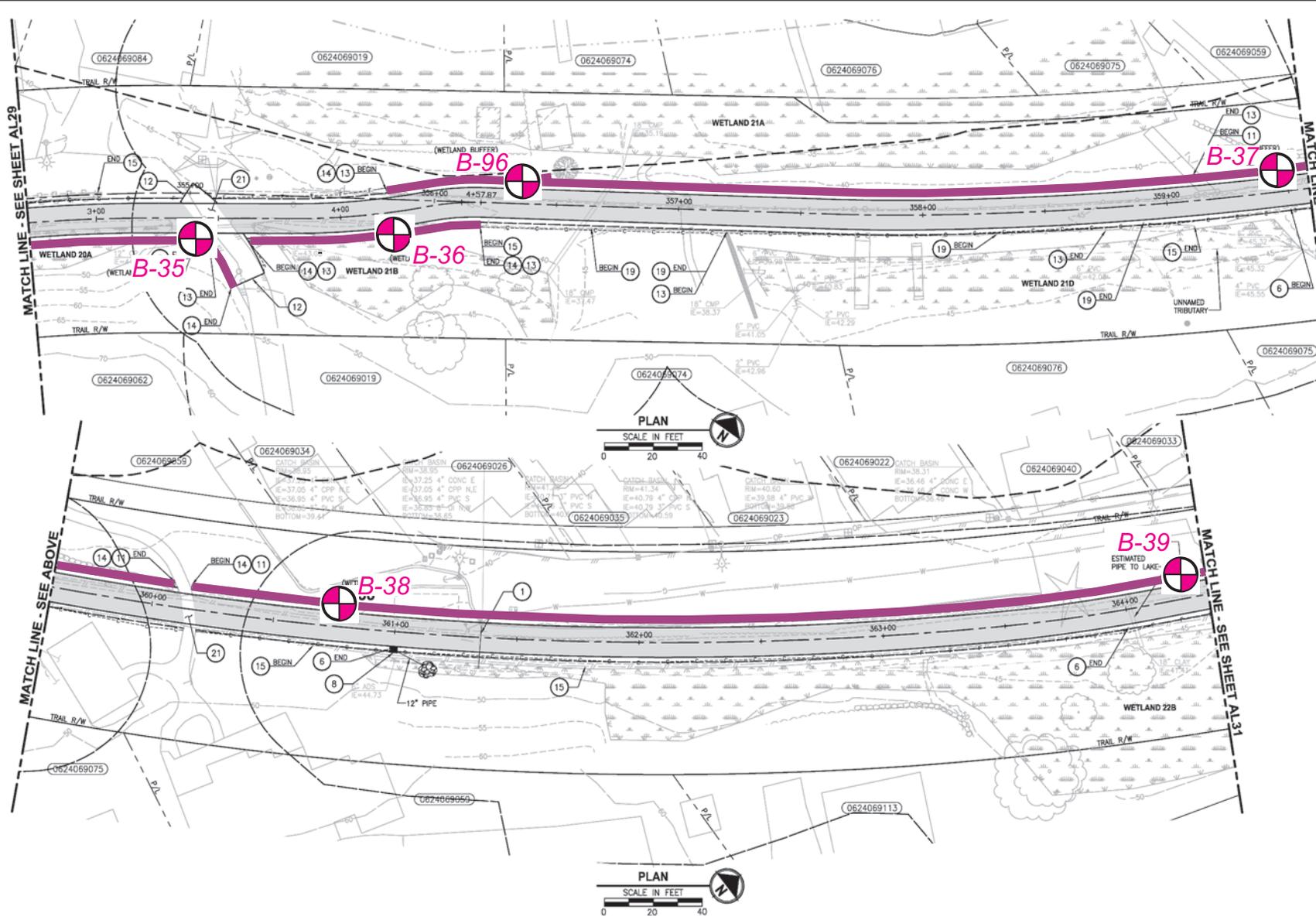
Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

Icicle Creek Engineers, Inc.
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DATE: December 11, 2013	



CONSTRUCTION NOTES:

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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

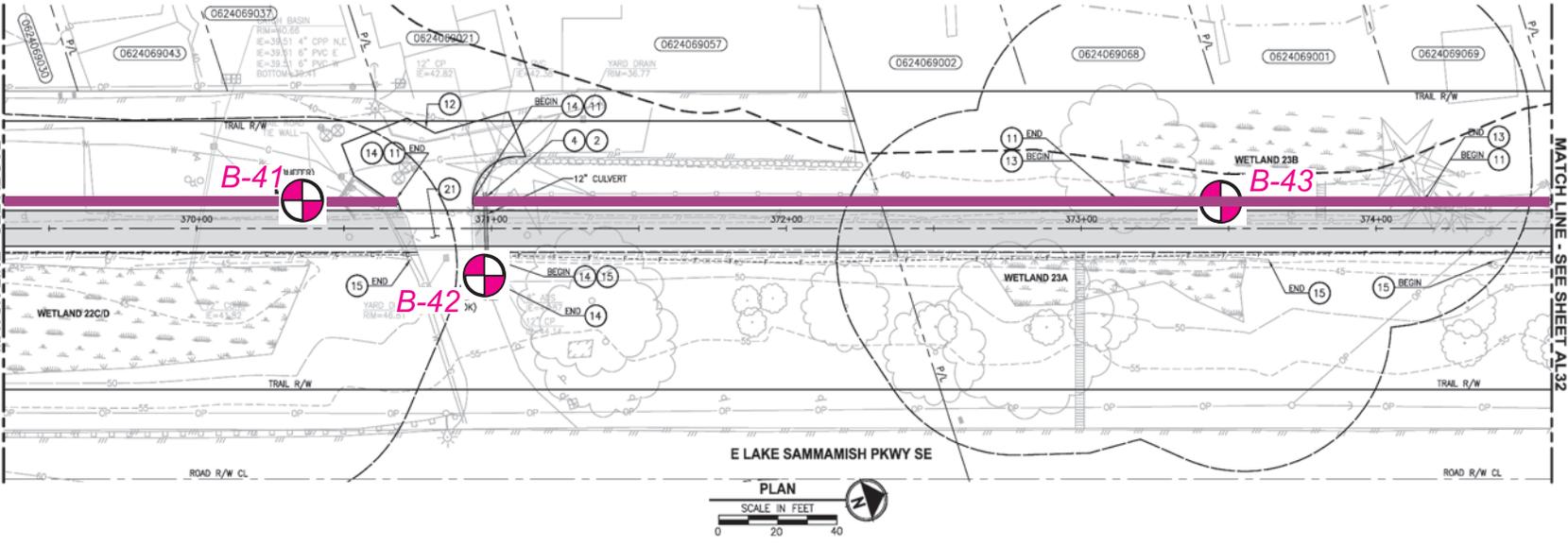
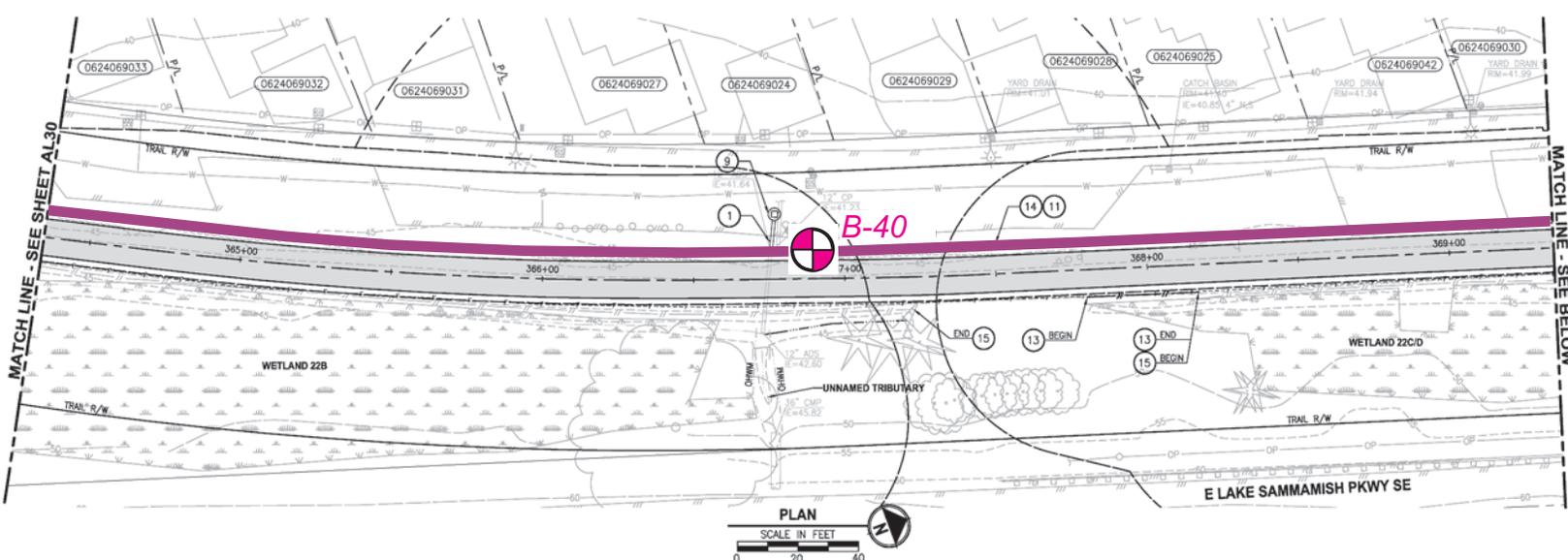
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EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

King County

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- 23 STAIRS IMPACTED

- (OK) OUTSIDE CRITICAL AREA BUFFERS
- WETLAND BUFFER
 - - - STREAM BUFFER
 - - - LAKE OHM
 - - - SHORELINE SETBACK

EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

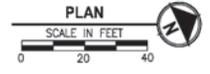
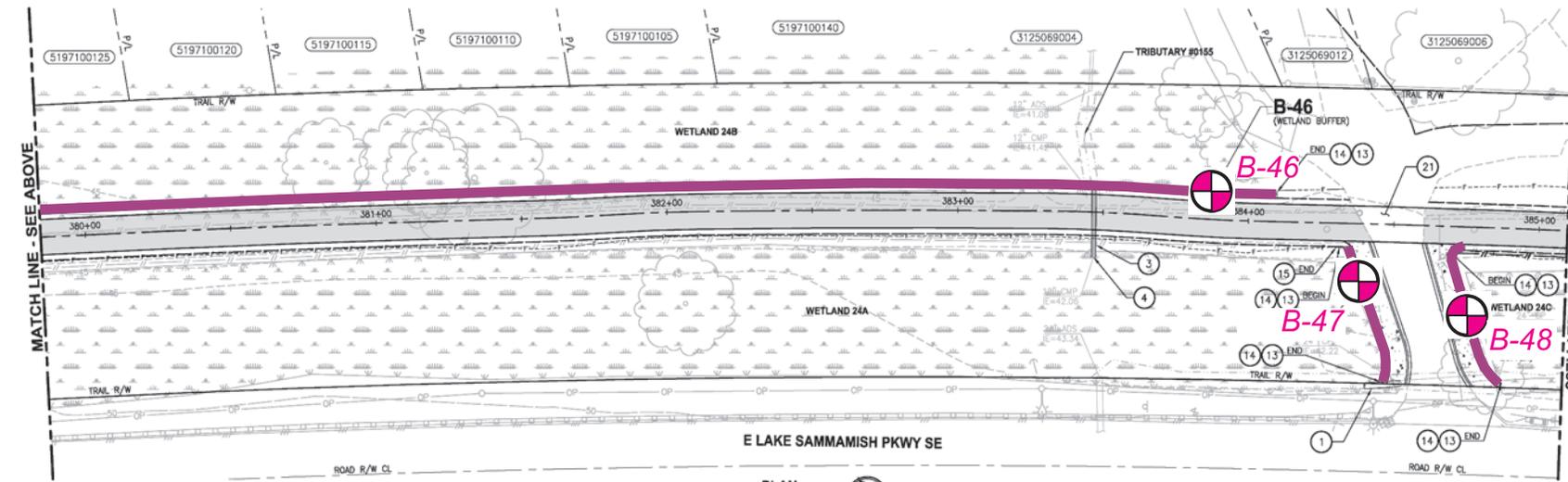
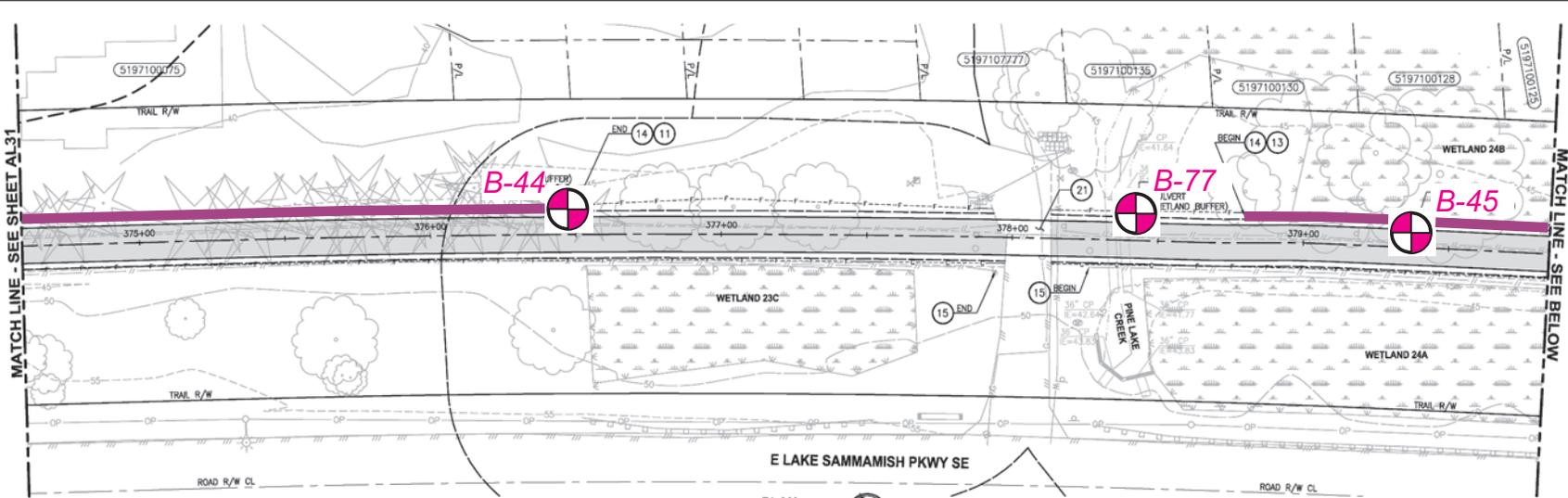
Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

**EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT**

King County

Icicle Creek Engineers, Inc.
29335 NE 20th Street
Carnation, Washington 98027
(425) 333-0093

SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
DRAWN: BRB	Figure
CHECKED: KSK	21
DATE: December 11, 2013	



CONSTRUCTION NOTES:

- 1 EXTEND CULVERT
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EXPLANATION

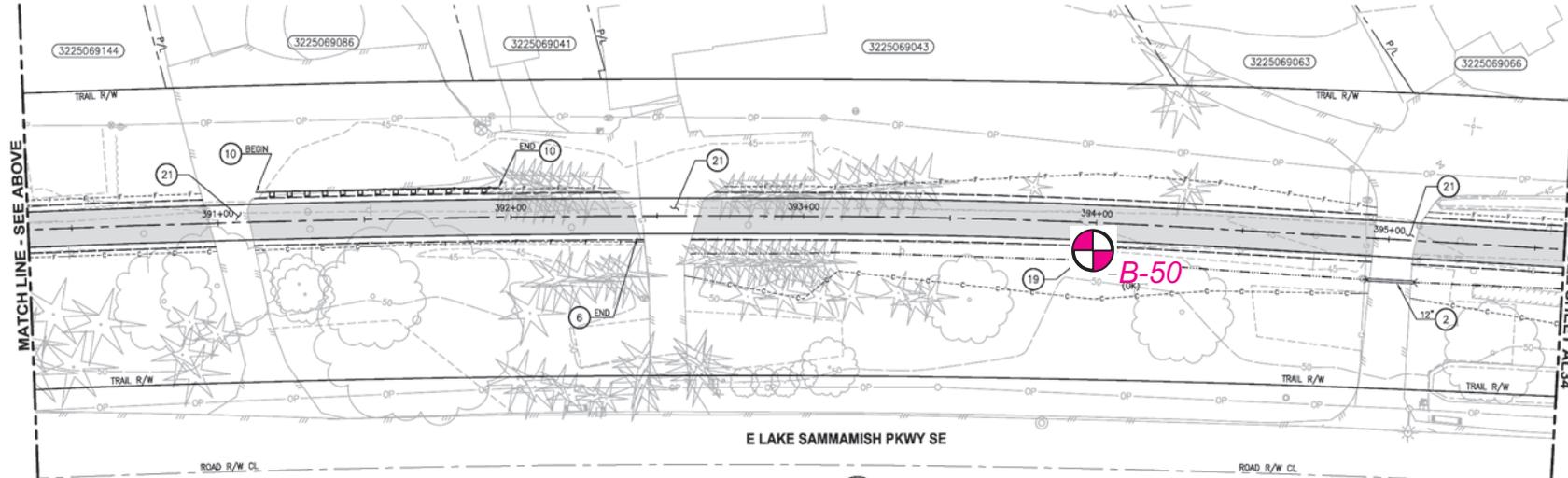
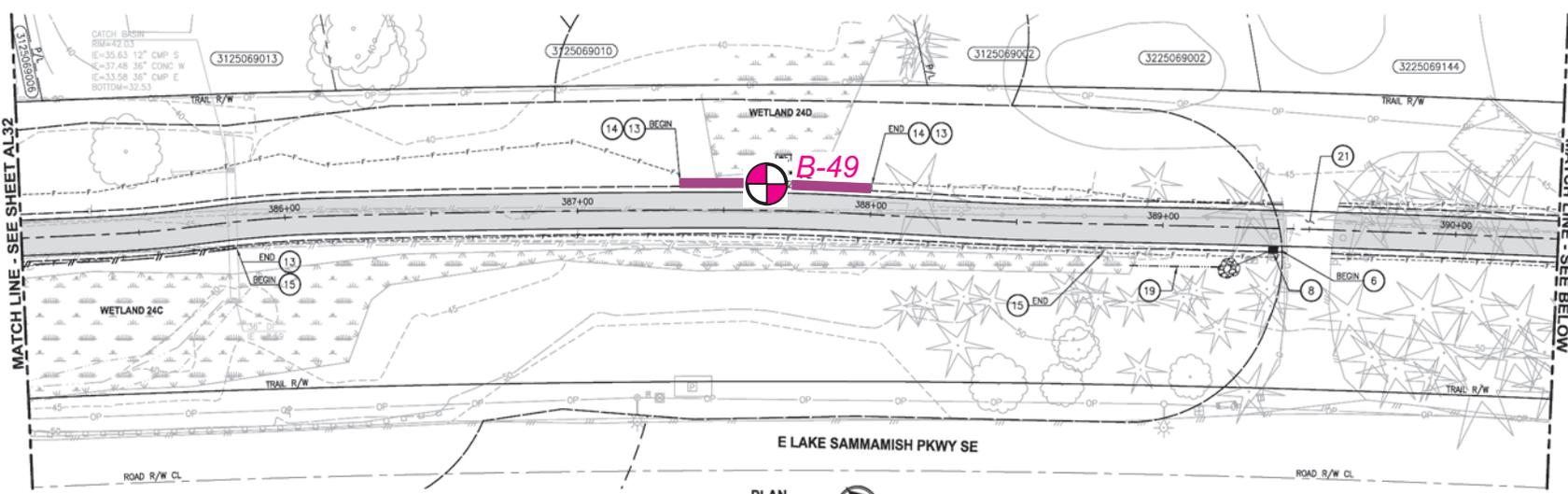
B-1 Test Boring Location
IT-1 Infiltration Test Location
 Proposed Structural Earth Wall

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

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SOUTH SAMMAMISH SEGMENT

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SCALE: AS SHOWN	ICE FILE NUMBER
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DRAWN: BRB	0105-010
CHECKED: KSK	Figure
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EXPLANATION

B-1  Test Boring Location

IT-1  Infiltration Test Location

 Proposed Structural Earth Wall

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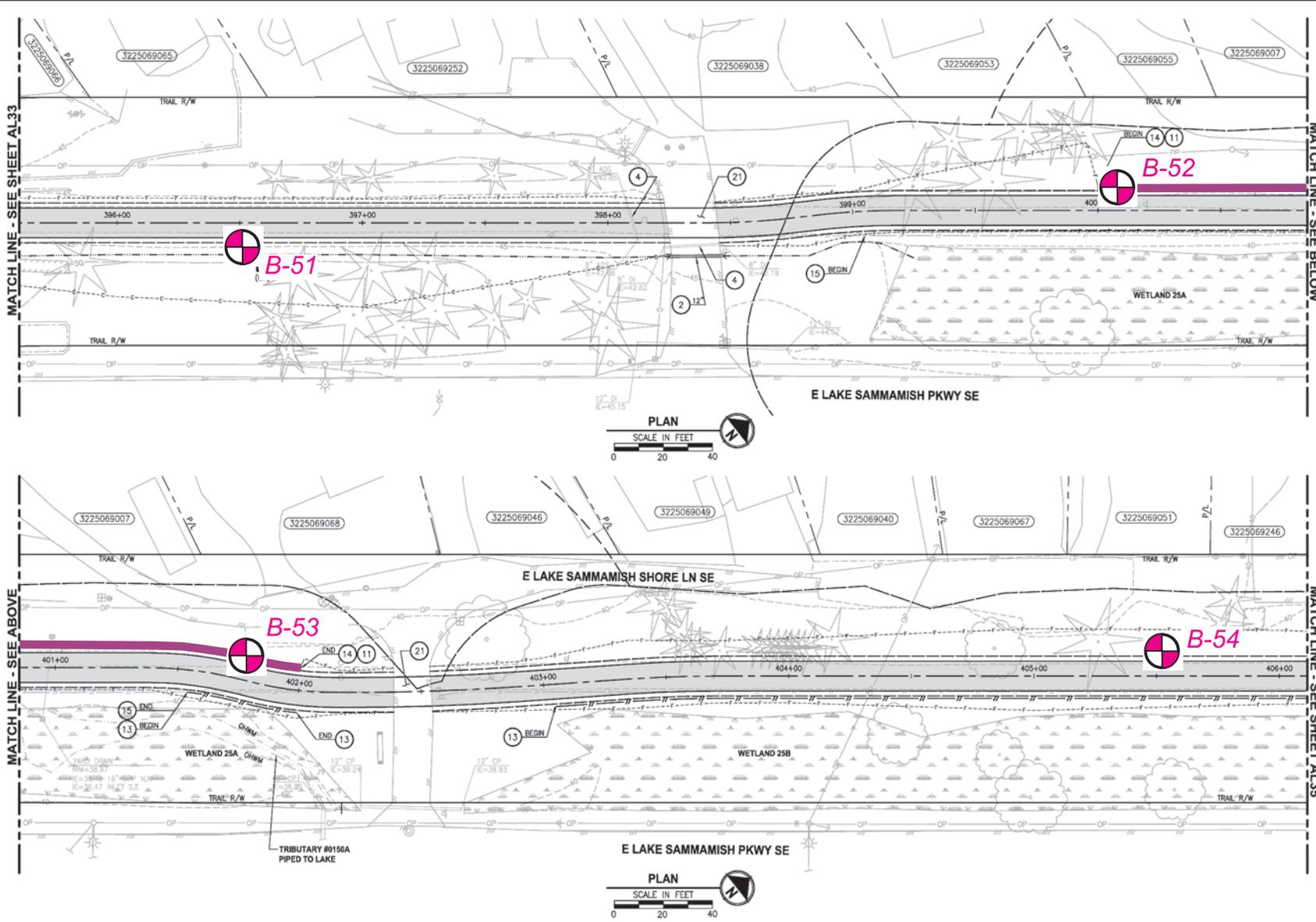
EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT



King County

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CHECKED: KSK	23
DATE: December 11, 2013	



- CONSTRUCTION NOTES:**
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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

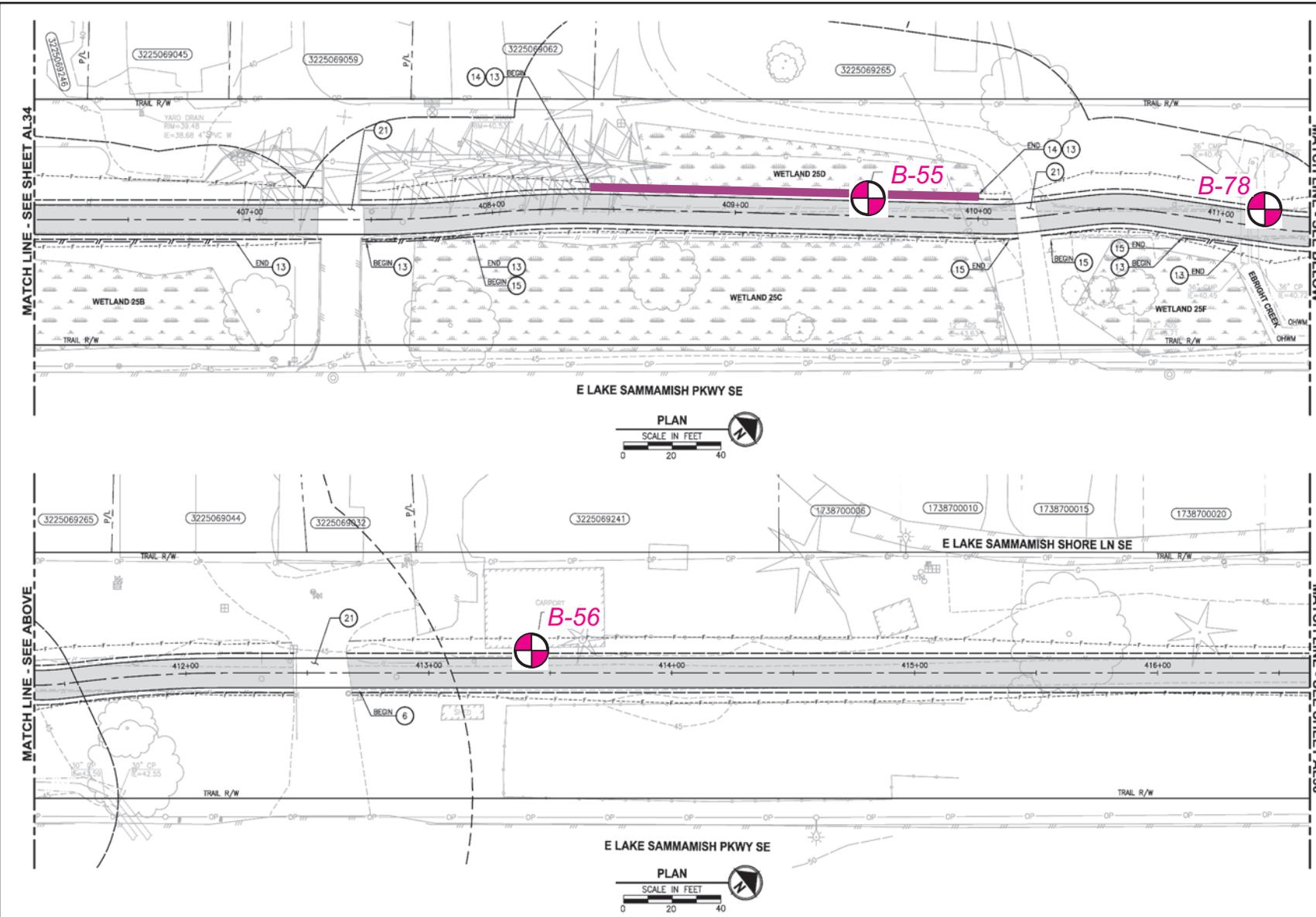
Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

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CHECKED: KSK	Figure
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EXPLANATION

B-1 Test Boring Location
 Proposed Structural Earth Wall

IT-1 Infiltration Test Location

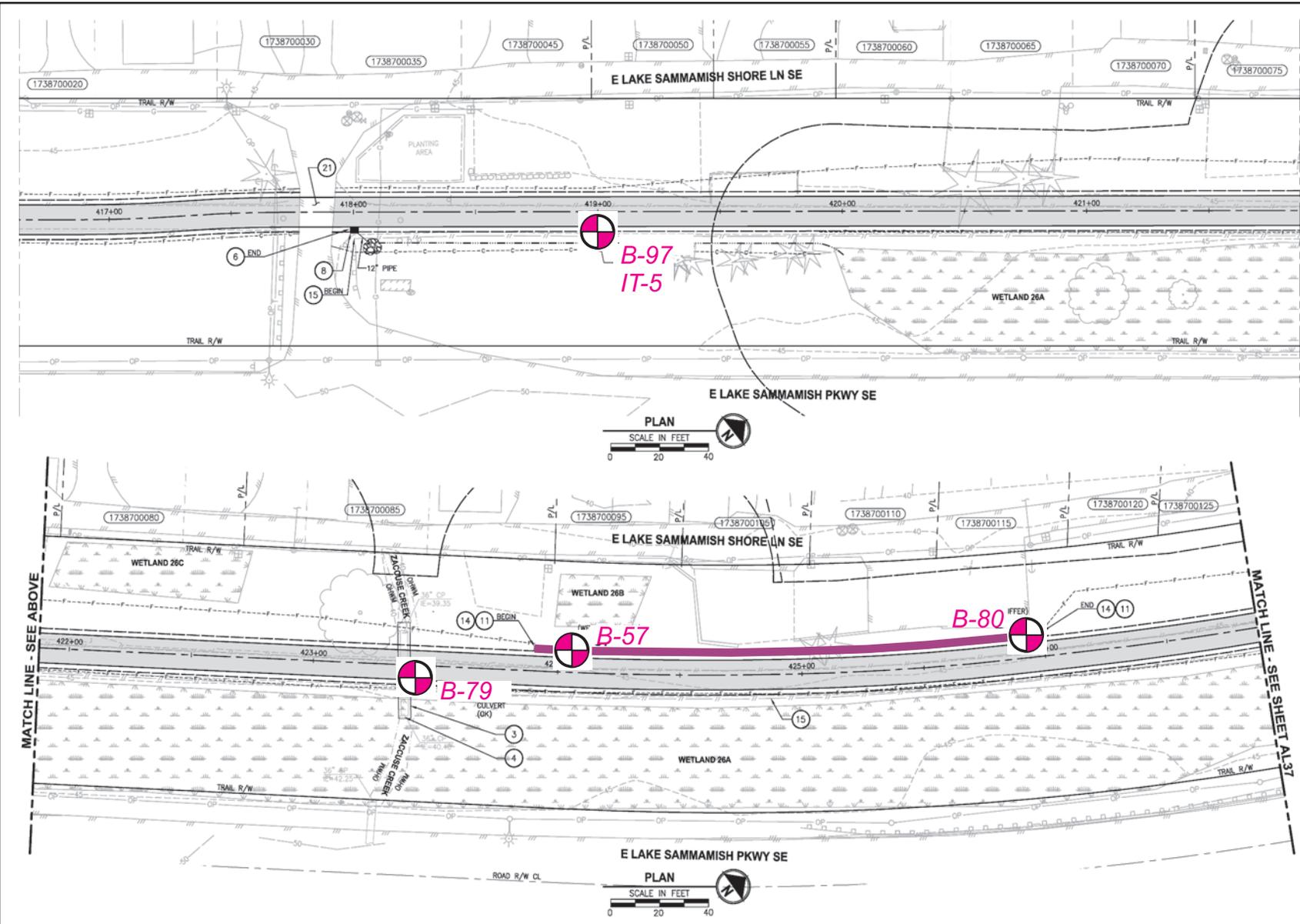
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EXPLANATION

B-1 Test Boring Location

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Proposed Structural Earth Wall

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

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29335 NE 20th Street
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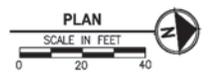
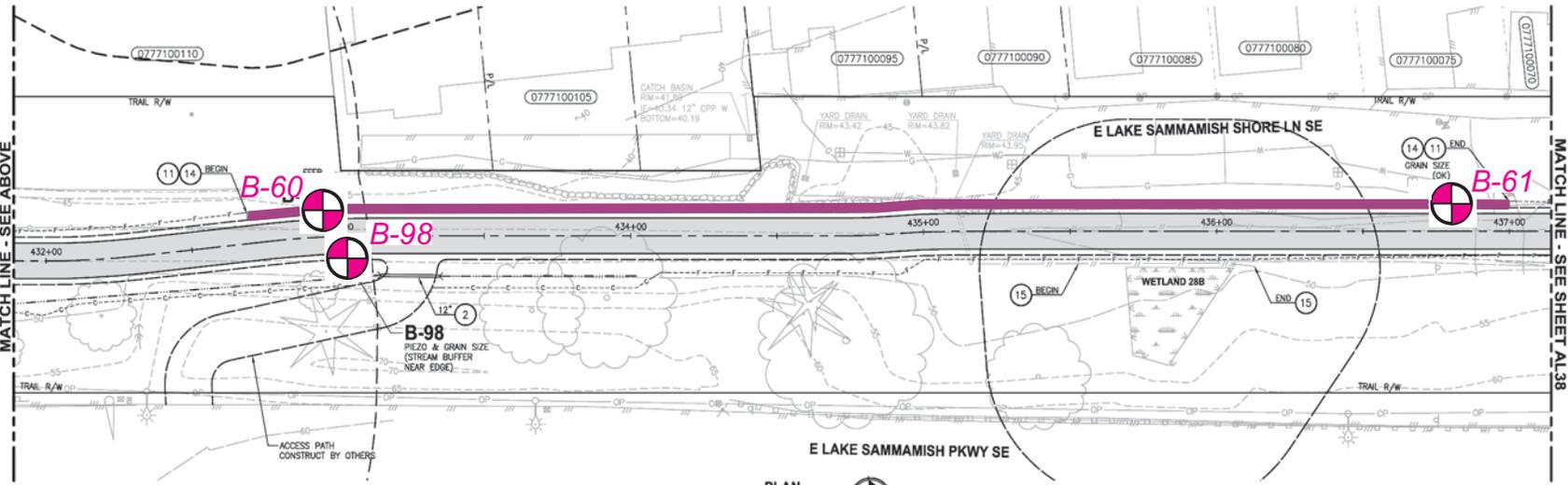
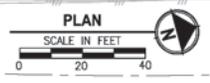
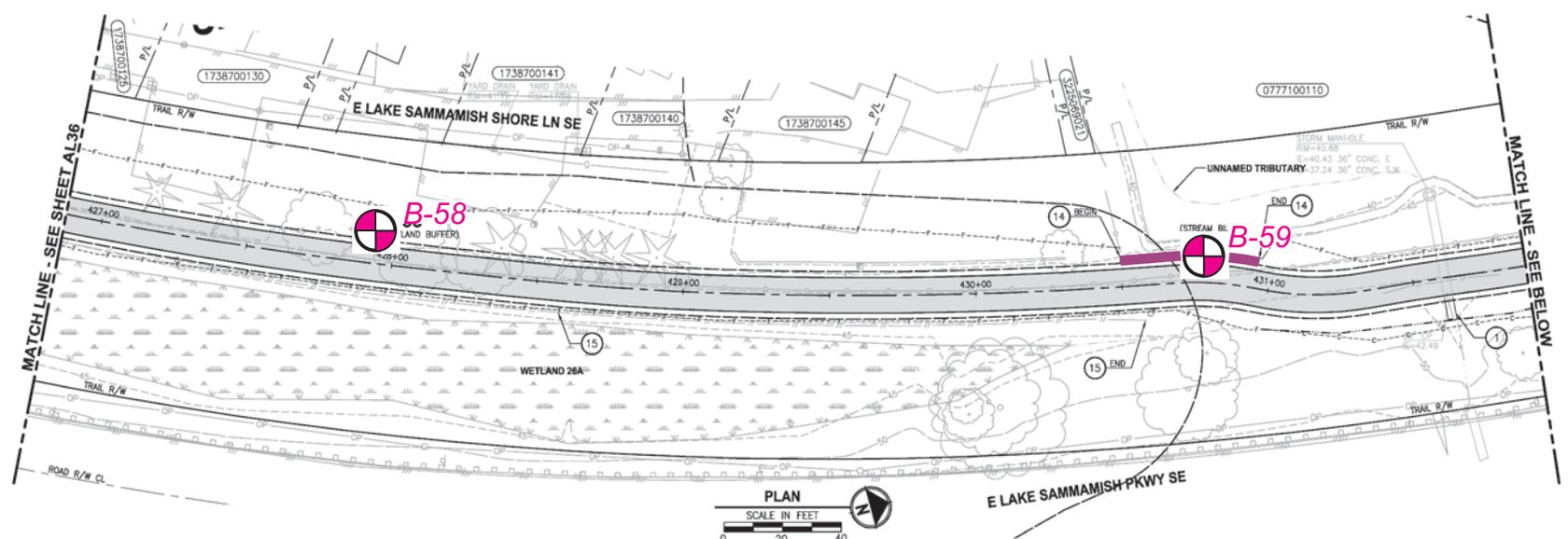
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DESIGNED: Parametrix	0105-010
DRAWN: BRB	Figure
CHECKED: KSK	26
DATE: December 11, 2013	

Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

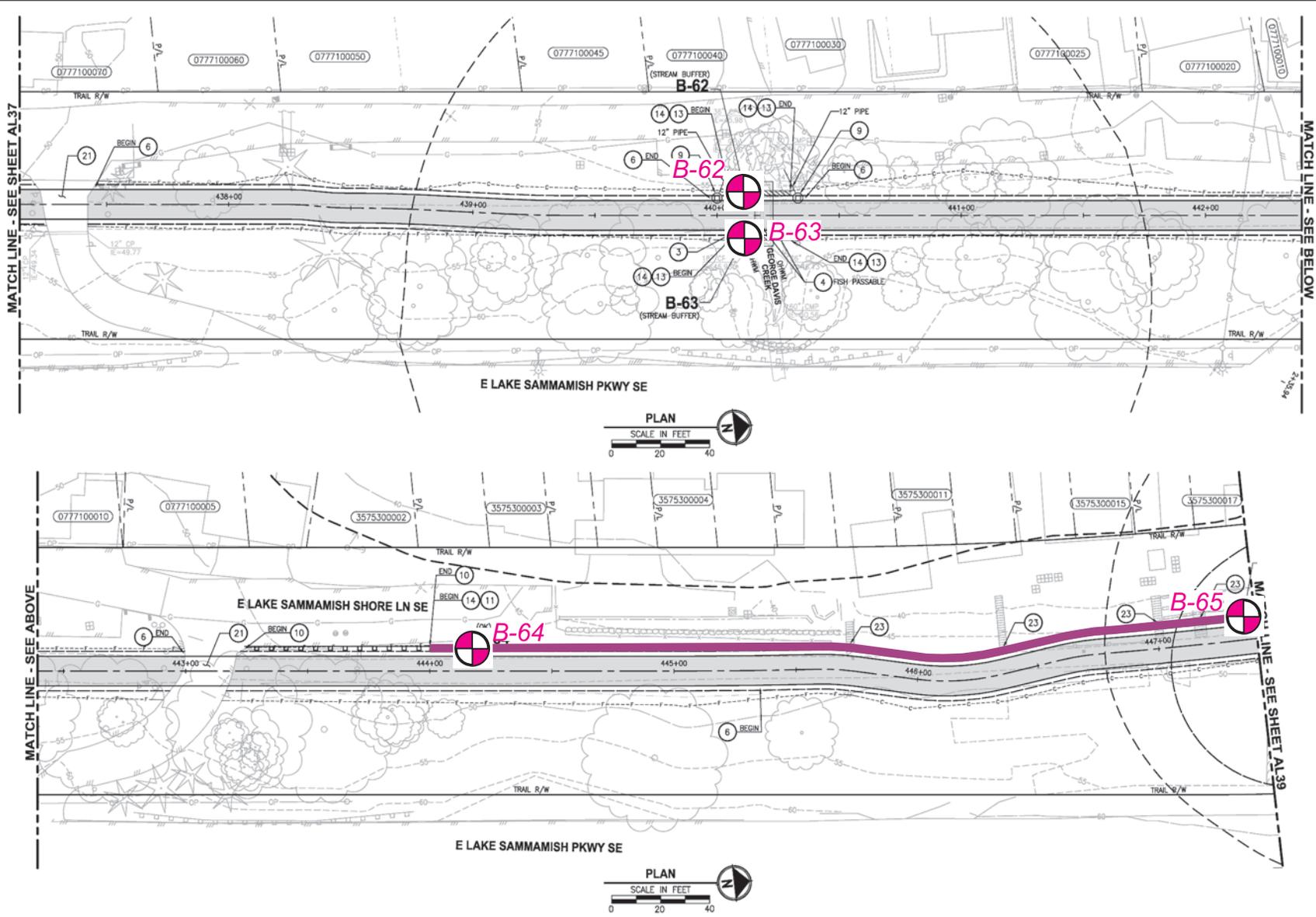
Base Map Reference: Parametrix, September 2008, East Lake Sammamish Master Plan Trail Design, from Gilman Boulevard, Issaquah to Bear Creek, Redmond, Sheets A12 to A41.

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

King County

Icicle Creek Engineers, Inc.
29335 NE 20th Street
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(425) 333-0093

SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
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CHECKED: KSK	27
DATE: December 11, 2013	



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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

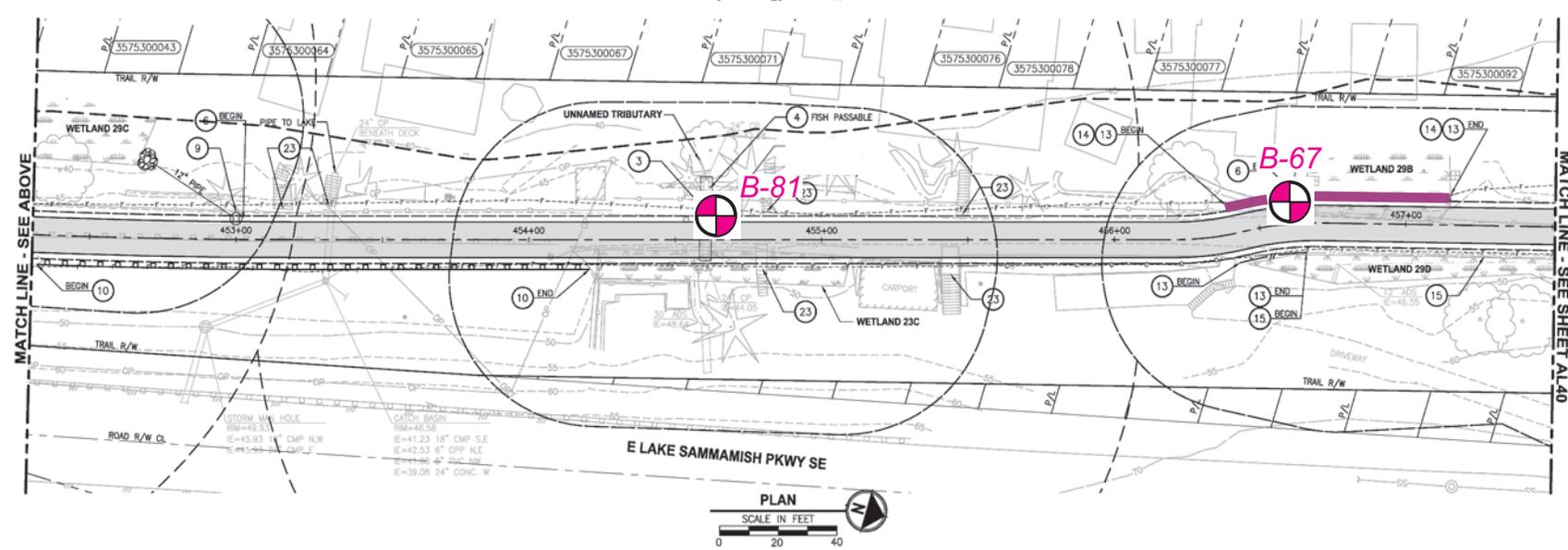
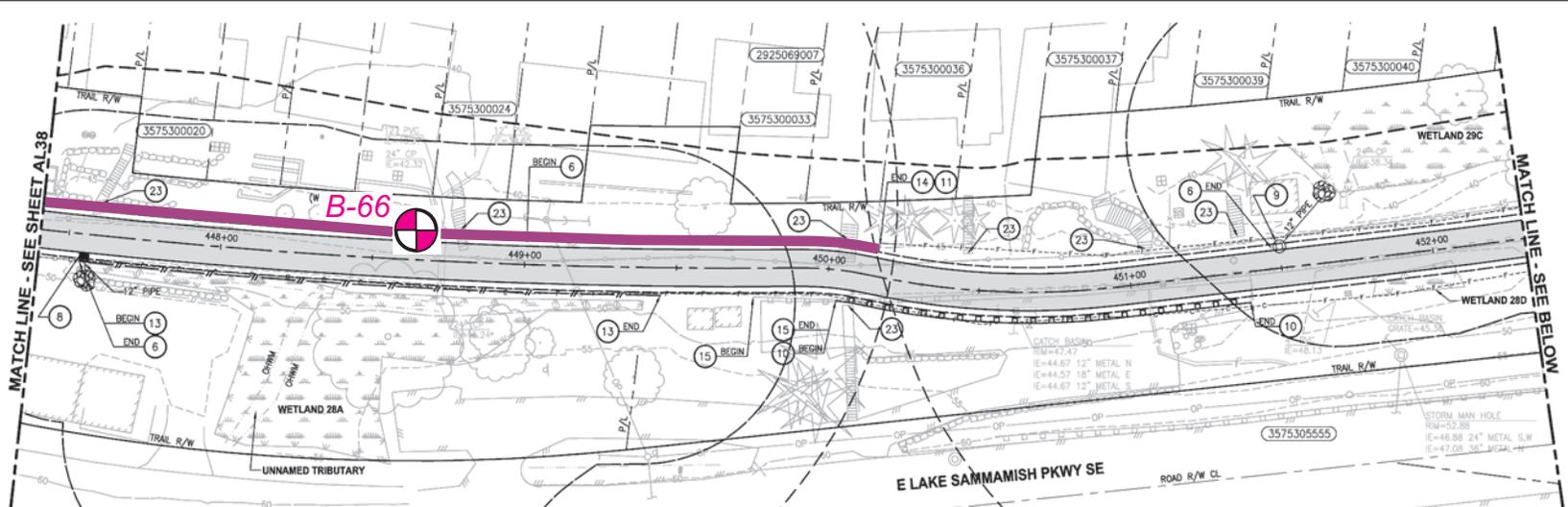
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**EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT**

King County

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29335 NE 20th Street
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(425) 333-0093

SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
DRAWN: BRB	Figure
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CONSTRUCTION NOTES:

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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

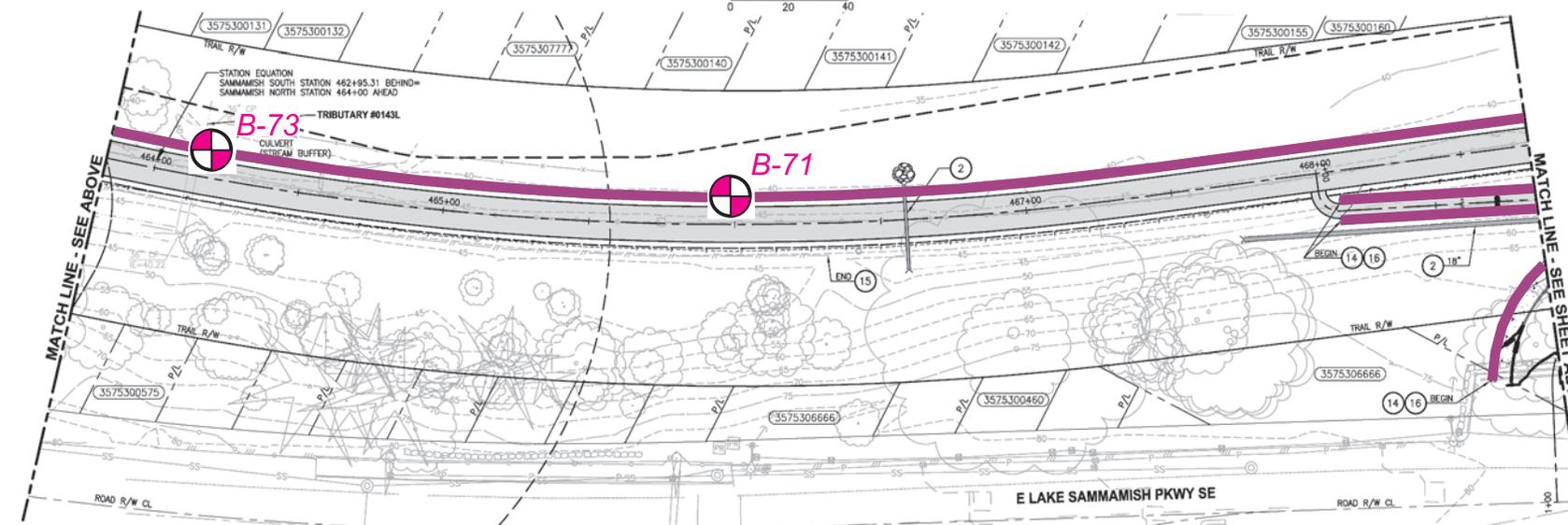
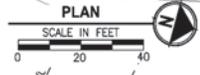
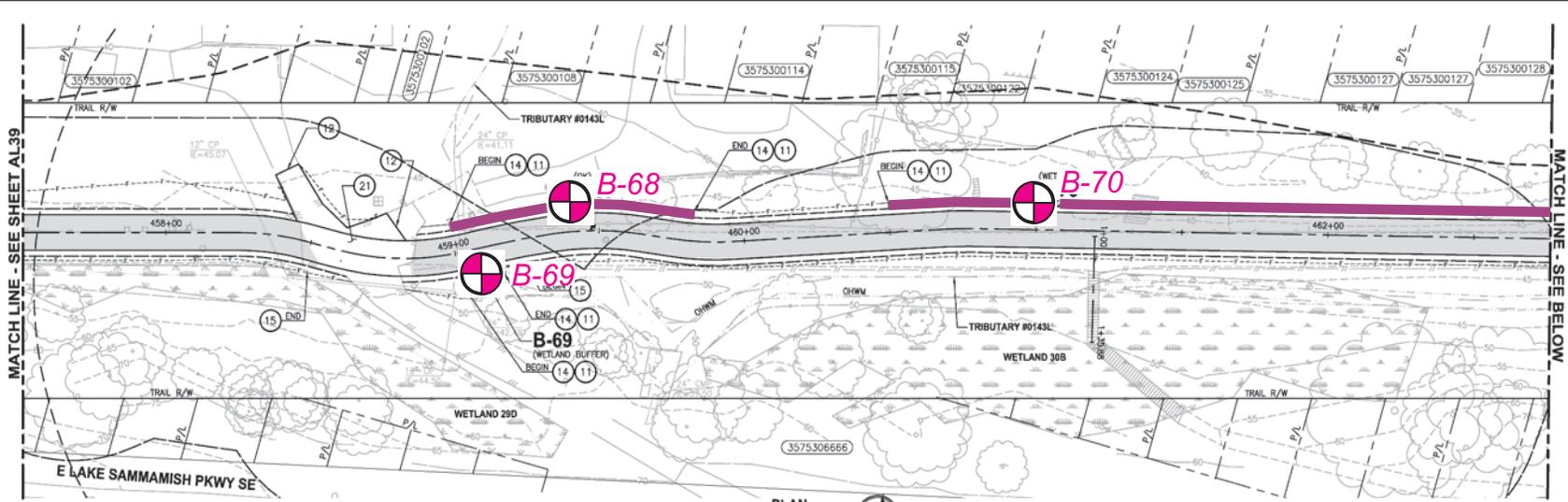
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**EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
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SCALE: AS SHOWN	ICE FILE NUMBER
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DRAWN: BRB	Figure
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EXPLANATION

B-1 Test Boring Location

IT-1 Infiltration Test Location

Proposed Structural Earth Wall

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EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT

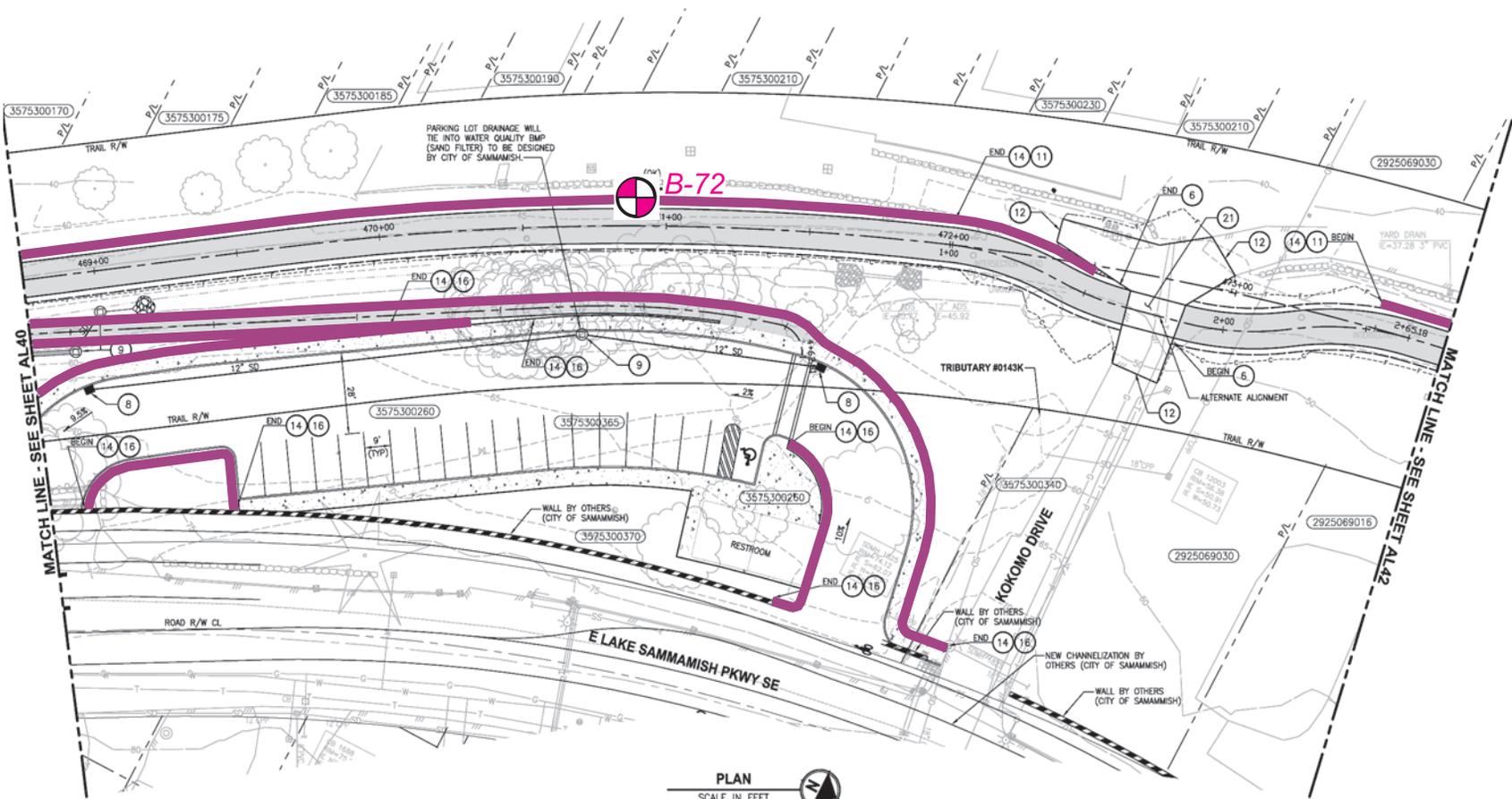
Icicle Creek Engineers, Inc.
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SCALE: AS SHOWN	ICE FILE NUMBER
DESIGNED: Parametrix	0105-010
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EXPLANATION

B-1  Test Boring Location

IT-1  Infiltration Test Location

 Proposed Structural Earth Wall

EAST LAKE SAMMAMISH MASTER PLAN TRAIL DESIGN
SOUTH SAMMAMISH SEGMENT



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APPENDIX A

FIELD EXPLORATION PROGRAM

DRAFT

APPENDIX A

A.0 FIELD EXPLORATION PROGRAM

A.1 GEOLOGICAL RECONNAISSANCE

ICE completed geological reconnaissance on September 6, October 5, 8, 11, 16 and 25, 2013 by Brian Beaman, PE, LEG, LHG of ICE; on October 7, 12, 14 through 19 and 21 through 25, 2013 by Andy Glandon, LEG; on October 18, 19, 21 through 25 and 28 through 31, 2013 by Jeff Schwartz, LEG, and on October 25 and 28 through 31, 2013 by Sydney Beaman. The reconnaissance and mapping included the following:

- Observation and preliminary evaluation of man-made features including road and trail embankments (cuts and fills), ditchlines, oversteepened areas and overall existing trail conditions.
- Reconnaissance and mapping included photograph documentation of the existing trail conditions and test boring locations.

A.2 TEST BORINGS

Subsurface conditions along the SSS ELST were explored by drilling 98 test borings (Borings B-1 through B-98) to depths of about 11 to 21½ feet. The test borings were drilled on October 7, 8, 12, 14 through 19 and 21 through 25, 2013 using track-mounted, hollow-stem auger drilling equipment owned and operated by Bortec, Inc. of Valleyford, Washington. The locations of the test borings are shown on Figures 2 through 99.

The explorations were continuously observed by an engineering geologist from ICE who classified the soils, obtained representative soil samples, observed ground water conditions and prepared a detailed log of each exploration. After completion, the test borings were either backfilled in general accordance with Washington State Department of Ecology (Ecology) guidelines, or piezometers were installed as described in the following section. Soil cuttings from the test borings were hauled off-site by Boretac. The ground surface, typically along the edge of the existing trail, was restored and protected from erosion by smoothing the surface and spreading crushed rock in the disturbed area of each test boring.

The soil consistencies noted on the test boring logs are based on the conditions observed, our experience and judgement, and blow count data obtained during drilling. Representative samples were obtained from the test borings by collecting soil samples at 2½- or 5-foot depth intervals using a 1.5-inch inside diameter split barrel (SPT – Standard Penetration Test) sampler. The sampler was driven 18 inches, if possible, by a 140-pound weight falling a minimum vertical distance of 30 inches. The number of blows required to drive the sampler the last 12 inches, or other indicated distance, was recorded on the boring log.

Soils encountered were classified in general accordance with the classification system described in Figure A-1. The boring logs are presented in Figures A-2 through A-99. The boring logs are based on our interpretation of the field and laboratory data and indicate the various types of soil encountered. They also indicate the depths at which the soil characteristics change, although the change might actually be gradual. If the change occurred between samples in the boring, it was interpreted. The laboratory testing program for soil samples obtained from the test borings is described in Appendix B.

Elevations of the test borings as shown on the boring logs are based on plans and profiles provided by Parametrix (NAVD88 vertical datum, Parametrix, September 2008, sheets AL12 to AL41).

A.3 PIEZOMETERS AND GROUND WATER OBSERVATIONS

Ground water observations as noted on the boring logs (for test borings where no piezometer was installed) are based on our observations of the soil samples and drilling equipment, or by direct observation or measurement through the auger.

Piezometers (for measuring ground water) were installed in 18 of the test borings (Borings B-6, B-11, B-82 through B-95, B-97 and B-98). Piezometer installation was completed in general accordance with Ecology requirements; installation details are shown on the Figures A-7, A-12, A-83 through A-96, A-98 and A-99. Mr. Schwartz of ICE measured the water levels in the piezometers using an electronic water level indicator on November 13, 2013; these measurements are shown on Figures A-7, A-12, A-83 through A-96, A-98 and A-99.

A.4 INFILTRATION TESTING

Single-Ring Infiltrometer Tests (SRITs) were completed at a depth of 2 to 3 feet adjacent to Borings B-83, B-84, B-11, B-93 and B-97 (Infiltration Tests IT-1 through IT-5, respectively) on October 25 and 28 through 31, 2013 by Mr. Beaman, Ms. Beaman and Mr. Schwartz of ICE. The test holes were excavated using a Deere 310 backhoe provided by Bill Wheeler Construction Company. A 2,200-gallon water truck was also provided by Bill Wheeler Construction Company for the SRITs. Representative soil samples were collected at each SRIT location that were used to perform grain size analysis based on methods described in the 2009 King County SWDM (SRITs – Method 1); the laboratory testing program for soil samples obtained from the SRIT sites is described in Appendix B.

DRAFT

Unified Soil Classification System

MAJOR DIVISIONS			Soil Classification and Generalized Group Description	
Coarse-Grained Soils More than 50% retained on the No. 200 sieve	GRAVEL More than 50% of coarse fraction retained on the No. 4 sieve	CLEAN GRAVEL	GW	Well-graded gravels
			GP	Poorly-graded gravels
		GRAVEL WITH FINES	GM	Gravel and silt mixtures
			GC	Gravel and clay mixtures
	SAND More than 50% of coarse fraction passes the No. 4 sieve	CLEAN SAND	SW	Well-graded sand
			SP	Poorly-graded sand
		SAND WITH FINES	SM	Sand and silt mixtures
			SC	Sand and clay mixtures
Fine-Grained Soils More than 50% passing the No. 200 sieve	SILT AND CLAY Liquid Limit less than 50	INORGANIC	ML	Low-plasticity silts
			CL	Low-plasticity clays
	SILT AND CLAY Liquid Limit greater than 50	INORGANIC	OL	Low plasticity organic silts and organic clays
			MH	High-plasticity silts
	ORGANIC	CH	High-plasticity clays	
		OH	High-plasticity organic silts and organic clays	
Highly Organic Soils	Primarily organic matter with organic odor	PT	Peat	

Notes: 1) Soil classification based on visual classification of soil is based on ASTM D 2488.
 2) Soil classification using laboratory tests is based on ASTM D 2487-00.
 3) Description of soil density or consistency is based on interpretation of blow count data and/or test data.

Soil Particle Size Definitions

Component	Size Range
Boulders	Coarser than 12 inch
Cobbles	3 inch to 12 inch
Gravel	3 inch to No. 4 (4.78 mm)
Coarse	3 inch to 3/4 inch
Fine	3/4 inch to No. 4 (4.78 mm)
Sand	No. 4 (4.78 mm) to No. 200 (0.074mm)
Coarse	No. 4 (4.78 mm) to No. 10 (2.0 mm)
Medium	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Finer than No. 200 (0.074 mm)

Soil Moisture Modifiers

Soil Moisture	Description
Dry	Absence of moisture
Moist	Damp, but no visible water
Wet	Visible water

Key to Boring Log Symbols

Sampling Method	Boring Log Symbol	Description
Blows required to drive a 2.4 inch I.D. split-barrel sampler 12-inches or other indicated distance using a 300-pound hammer falling 30 inches.	34 	Location of relatively undisturbed sample
	12 	Location of disturbed sample
	21 	Location of sample attempt with no recovery
Blows required to drive a 1.5-inch I.D. split barrel sampler (SPT - Standard Penetration Test) 12-inches or other indicated distance using a 140-pound hammer falling 30 inches.	14 	Location of sample obtained in general accordance with Standard Penetration Test (ASTM D-1586) test procedures.
	30 	Location of SPT sampling attempt with no recovery.
Pushed Sampler	P 	Sampler pushed with the weight of the hammer or against weight of the drilling rig.
Grab Sample	G 	Sample obtained from drill cuttings.

Note: The lines separating soil types on the logs represents approximate boundaries only. The actual boundaries may vary or be gradual.

Laboratory Tests

Test	Symbol
Moisture Content	MC
Density	DN
Grain Size	GS
Percent Fines	PF
Atterberg Limits	AL
Hydrometer Analysis	HA
Consolidation	CN
Compaction	CP
Permeability	PM
Unconfined Compression	UC
Unconsolidated Undrained TX	UU
Consolidated Undrained TX	CU
Consolidated Drained TX	CD
Chemical Analysis	CA

SAB: 11/05/13

Boring B-1

Station 218+74, 9 feet south; 47.568331, -122.058111

Approximate Elevation: 46 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	22							MC	Crushed Rock Backfill →
	Black to brown fine to coarse GRAVEL with sand and a trace of silt (medium dense, wet) (Fill)		GP/GW	12							MC	
5	Brown and gray clayey SILT with organic material (very soft, wet) (Older Alluvium)		OL	2							MC	Ground water measured at about 4 feet at the time of drilling
	Dark brown organic SILT and PEAT (very soft, wet) (Older Alluvium)		OL/PT	2							MC	
15	Gray silty fine SAND with a trace of organic material (loose, wet) (Older Alluvium)		SM	5							MC	Bentonite Backfill →
	Gray SILT/CLAY (stiff, wet) (Older Alluvium)		ML/CL	10							MC	
21.5	Boring completed at about 21.5 feet on October 24, 2013											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/06/13

Boring B-2

Station 225+20, 10 feet south; 47.568772, -122.060639

Approximate Elevation: 46 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	11		●	●					Crushed Rock Backfill →
	grades to brown		GP	7		●	■					
5	Light brown to gray sandy SILT with a trace of organic material (medium stiff, moist) (Older Alluvium)		ML	7		●	■					
	Gray sandy SILT with thin layers of sand and fine gravel and a trace of organic material (medium stiff, wet) (Older Alluvium)		ML	7		●	■					Ground water measured at about 10 feet at the time of drilling
10	grades to very stiff		ML	17		●	■					Bentonite Backfill →
15	Boring completed at about 16.5 feet on October 24, 2013											
20												
25												

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/06/13
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Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-3

Station 229+96, 9 feet south; 47.569166, -122.062459

Approximate Elevation: 46 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)					
						20	40	60	80		
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	12	█	■	●			MC	Crushed Rock Backfill →
5	Brown and gray sandy SILT with occasional organic material (wood fragments and peat) (medium stiff, moist) (Older Alluvium)		ML	10	█		●			MC	Bentonite Backfill →
10	Gray SILT with a trace of organic material (stiff, moist) (Older Alluvium)		ML	14	█		●	■		MC	
15	Gray fine to medium SAND with silt and thin layers of silt (sense, wet) (Recessional Outwash)		SP-SM	37	█	■	●			MC	Ground water measured at about 15 feet at the time of drilling
	Boring completed at about 16.5 feet on October 24, 2013										
20											
25											

See Figure A-1 for explanation of symbols

Boring B-4

Station 233+68, 8 feet south; 47.569576, -122.063874

Approximate Elevation: 46 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	14		■	●				MC	Crushed Rock Backfill →
	Brown fine to coarse GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP/GW	9			■	●			MC	Bentonite Backfill →
5	Light brown sandy SILT (stiff, wet) (Older Alluvium)		ML	16				●	■		MC	
10	Brown fine to coarse GRAVEL with sand and a trace of silt (dense*, wet) (Recessional Outwash)		GP/GW	50/2**			■			●	MC	Ground water measured at about 10 feet at the time of drilling
15	Boring completed at about 16.5 feet on October 24, 2013		GP/GW?	68*						●		
20	*Blow count and density may not be representative because of the presence of gravel											
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/07/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-5

Station 245+70, 7 feet west; 47.571514, -122.067786

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile			Sample Data		Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)					
						20	40	60	80		
0	Brown and black fine GRAVEL with sand (medium dense, moist) (Fill)		GP								Crushed Rock Backfill → Ground water measured at about 5 feet at the time of drilling Bentonite Backfill →
	Brown fine to medium SAND with a trace of silt and gravel (medium dense, moist) (Fill)		SP	15		●	■			MC	
	Brown fine to medium SAND with silt and fine gravel (medium dense, moist) (Fill)		SP-SM	22		●	■			MC	
5	Light brown silty fine SAND (loose to medium dense, wet) (Older Alluvium)		SM	10		●	■			MC	
			SM	15		●	■			MC	
15	Gray silty fine to medium SAND (medium dense, wet) (Recessional Outwash)		SM	21		●	■			MC	
	Boring completed at about 16.5 feet on October 24, 2013										
20											
25											

See Figure A-1 for explanation of symbols

SAB: 11/07/13
 Project Name: King County Parks, ELST South Sammamish Segment
 Logged by: ALG
 ICE File No. 0105-010

Boring B-6

Station 249+30, 9 feet east; 47.572262, -122.06856

Approximate Elevation: 58 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations		
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			Moisture Content (Percent - ■)	
						20	40	60	80				
0	Brown and black-brown to dark brown fine GRAVEL with silt and sand (very loose, moist) (Fill)		GP-GM	3		●	■			MC	Flush Grade → Steel Monument Concrete Plug →		
5	Light brown fine sandy SILT (soft, wet) (Older Alluvium)		ML	3		●	■			MC, GS			
5			ML	4		●	■			MC, GS	Bentonite Backfill →		
10	grades to stiff		ML	10		●	■			MC	1 1/4-inch PVC Solid Pipe → Sand Backfill →		
15			ML	9		●	■			MC	1 1/4-inch PVC Slotted Pipe → Ground water measured at 14.5 feet (11/13/13) ▼		
16.5	Boring completed at about 16.5 feet on October 23, 2013												
20													
25													

See Figure A-1 for explanation of symbols

SAB: 11/07/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-7

Station 256+44, 9 feet east; 47.573886, -122.070299

Approximate Elevation: 56 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray to dark brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	18		■	●					Crushed Rock Backfill →
	Brown silty fine to coarse SAND with fine gravel (very loose, moist) (Recessional Outwash)		SM	3		●	■					
5	grades to loose		SM	4		●	■					
	Brown fine to coarse GRAVEL with sand (medium dense, moist) (Recessional Outwash)		GP/GW	15			●					Bentonite Backfill →
15	grades to dense*		GP/GW	31*		■	●					
	Boring completed at about 16.5 feet on October 23, 2013 *Blow count and density may not be representative because of the presence of gravel											
20												No ground water observed at the time of drilling
25												

See Figure A-1 for explanation of symbols

SAB: 11/07/13

Boring B-8

Station 260+92, 25 feet east; 47.574716, -122.071647

Approximate Elevation: 59 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)					
						20	40	60	80		
0	Dark brown silty fine to medium SAND with a trace of gravel (loose, moist) (Fill)		SM								Crushed Rock Backfill → Bentonite Backfill → Ground water measured at about 10 feet at the time of drilling
2.5	Grayish-brown sandy SILT (medium stiff, moist) (Fill)		ML				■			MC	
4.5	Light brown silty fine to medium SAND with occasional gravel (loose to medium dense) (Fill)		SM				■			MC	
7.5	Light brown silty fine SAND with a trace of gravel (loose, medium dense) (Recessional Outwash)		SM	10			●	■		MC	
10.5	Brown fine to coarse GRAVEL with sand and a trace of silt (very dense*, wet) (Recessional Outwash)		SM	13			●	■		MC	
15.5	Boring completed at about 16.5 feet on October 25, 2013		GP	56*			■		●	MC	
20	*Blow count and density may not be representative because of the presence of gravel NOTE: A vactor truck was used to remove soils to a depth of about 6.5 feet because of possible underground utilities. ICE used a 1/4-inch diameter extendable steel rod to probe the base of the hole at 2 and 4 feet for density evaluation. Grab soil samples were obtained at about 2 and 4 feet for visual classification.										
25											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/07/13

Boring B-9

Station 262+68, 7 feet east; 47.575075, -122.072131

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Black and brown fine GRAVEL with silt and sand (loose, moist) (Fill)		GP-GM	6							MC	Crushed Rock Backfill →
	Black and brown silty fine to medium SAND with gravel (loose, moist) (Fill)		SM	4		●	■				MC	
5	Brown fine to coarse GRAVEL with sand (dense*, moist) (Recessional Outwash)		GP/GW	34*			■	●			MC	
10	grades to wet		GP/GW	33*			■	●			MC	Ground water measured at about 9 feet at the time of drilling
15	grades to medium dense		GP/GW	20			■	●			MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 22, 2013											
	*Blow count and density may not be representative because of the presence of gravel											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figures A-1 for explanation of symbols

SAB: 11/07/13

Boring B-10

Station 265+47, 7 feet east; 47.575556, -122.072982

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray to dark brown fine to coarse GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	23							MC	Crushed Rock Backfill →
2.5	Brown fine to medium SAND with fine gravel (medium dense, moist) (Fill)		SP	11							MC	
4.5	Brown fine to medium SAND with silt and gravel (medium dense, moist) (Recessional Outwash)		SP-SM	22							MC	
8.5	Brown fine to medium SAND with fine gravel (medium dense to dense*, wet) (Recessional Outwash)		SP	30*							MC	Ground water measured at about 9 feet at the time of drilling
15.5	Brown fine to coarse GRAVEL with sand (very dense*, wet) (Recessional Outwash)		SP	54*							MC	Bentonite Backfill →
16.5	Boring completed at about 16.5 feet on October 22, 2013											
16.5	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/07/13

Boring B-11

Station 268+65, 7 feet east; 47.576335, -122.073675

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray to dark brown fine GRAVEL with fine sand and a trace of silt (medium dense, moist) (Fill)		GP	23							MC	Flush Grade → Steel Monument Concrete Plug
	Brown fine to medium SAND with a trace of gravel (medium dense, moist) (Recessional Outwash)		SP	13							MC	
5	Brown fine to medium SAND with gravel (very dense*, moist) (Recessional Outwash)		SP	87*							MC	Bentonite Backfill →
	Brown fine to coarse GRAVEL with sand and a trace of silt (very dense*, moist) (Recessional Outwash)		GP/GW85/11**								MC	1 1/4-inch PVC Solid Pipe
10											MC	Sand Backfill →
15	grades to wet		GP/GW	28							MC	1 1/4-inch PVC Slotted Pipe
	Boring completed at about 16.5 feet on October 22, 2013											
	*Blow count and density may not be representative because of the presence of gravel											
20												No ground water measured on 11/13/13
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/07/13

Boring B-12

Station 281+22, 7 feet east; 47.579524, -122.075397

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	14		■	●				MC	Crushed Rock Backfill →
2.5	Brown silty fine to medium SAND with gravel (medium dense, moist) (Recessional Outwash)		SM	23		■	●				MC,GS	
5	grades to dense*		SM	36*		■	●				MC,GS	Bentonite Backfill →
10			SM	36*		■	●				MC	
15	grades to medium dense		SM	18		■	●				MC	
16.5	Boring completed at about 16.5 feet on October 21, 2013											
17	*Blow count and density may not be representative because of the presence of gravel											
20												
25												No ground water observed at the time of drilling

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB:11/08/13

Boring B-13

Station 291+30, 10 feet south; 47.581214, -122.078474

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Gray and black fine GRAVEL with sand (medium dense, moist) (Fill)		GP									Crushed Rock Backfill →
	Brown fine to coarse SAND with gravel (medium dense, moist) (Fill)		SP/SW	21			●				MC	
			SP/SW	15			●				MC	Bentonite Backfill →
5	Light gray fine SAND with silt (loose, moist) (Fill)		SP-SM	8			●	■			MC	
	Gray fine SAND with silt and a trace of gravel (dense*, wet) (Recessional Outwash)		SP-SM	40*			■	●			MC	Ground water measured at about 10 feet at the time of drilling
10	Light brown to gray silty fine to medium SAND with fine gravel (medium dense, wet) (Recessional Outwash)		SM	17			■	●			MC	
15	Boring completed at about 16.5 feet on October 21, 2013											
	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-14

Station 290+40, 10 feet north; 47.581183, -122.078033

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	24		■	●				MC	Crushed Rock Backfill →
	Brown fine to coarse SAND with silt and fine gravel (medium dense, moist) (Fill)		SP-SM	12		●	■				MC,GS	
5	Brown fine to coarse GRAVEL with sand and a trace of silt and organic material (very loose, moist) (Older Alluvium)		GP/GW	2		●	■				MC,GS	Bentonite Backfill →
	Gray fine to coarse GRAVEL with sand (medium dense, wet) (Recessional Outwash)		GP/GW	20		■	●				MC	Ground water measured at about 10 feet at the time of drilling
15	Brown fine to coarse GRAVEL with sand (medium dense, wet) (Recessional Outwash)		GP/GW	18		■					MC	
	Boring completed at about 16.5 feet on October 21, 2013											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/11/13
Logged by: ALG
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-15

Station 294+90, 10 feet south; 47.581481, -122.079921

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile			Sample Data		Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray to dark brown fine to coarse GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	18	█	■	●					Crushed Rock Backfill →
5	Light brown silty fine to medium SAND with gravel and a trace of organic material (loose, moist) (Fill)		SM	9	█	■	●					Bentonite Backfill →
10	Light brown silty fine to medium SAND with gravel (very dense*, moist) (Recessional Outwash)		SM	50/5**	█	■				●	MC,GS	
10.5	Boring completed at about 10.5 feet because of drilling refusal on October 21, 2013											
15	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

See Figure A-1 for explanation of symbols

Boring B-16

Station 296+45, 9 feet north; 47.581627, -122.080473

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray to dark brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	28		■	●				MC	Crushed Rock Backfill →
	Brown fine to coarse GRAVEL with sand (very dense*, moist) (Recessional Outwash)		GW	50/5**		■					MC	Bentonite Backfill →
5	grades to wet		GW	55*		■	●				MC	Ground water measured at about 4 feet at the time of drilling
	Boring completed at about 6.5 feet because of drilling refusal on October 19, 2013											
	* Blow count and density may not be representative because of the presence of gravel											
10												
15												
20												
25												

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ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-17

Station 301+55, 10 feet south; 47.58224, -122.082284

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray fine to coarse GRAVEL with sand with a trace of silt (medium dense, moist) (Fill)		GP	18		■	●				MC	Crushed Rock Backfill →
	Brown fine to coarse GRAVEL with sand (medium dense, moist) (Recessional Outwash)		GP/GW	16		■	●				MC	
5			GP/GW	14		■	●				MC	Bentonite Backfill →
10	grades to very dense*		GP/GW	50/6**		■					MC	
	Boring completed at about 12.7 feet because of drilling refusal on October 19, 2013		GP/GW	50/1**		■					MC	No ground water observed at the time of drilling
15	* Blow count and density may not be representative because of the presence of gravel											
20												
25												

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 10/23/13
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ICE File No. 0105-010

Boring B-18

Station 302+80, 10 feet north; 47.582529, -122.082581

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)					
						20	40	60	80		
0	Brown and gray to dark brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	24	[Bar chart showing blow count]	■	●			MC	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 20px;">Crushed Rock Backfill → </div> <div style="margin-bottom: 20px;">Bentonite Backfill → </div> <div>No ground water observed at the time of drilling</div> </div>
5	Brown fine to coarse GRAVEL with sand (very dense*) (Recessional Outwash)		GP	58*	[Bar chart showing blow count]	■	●			MC	
5			GP	50/6**	[Bar chart showing blow count]	■			●	MC	
10			GP	50/6**	[Bar chart showing blow count]	■			●	MC	
11.5	Boring completed at about 11.5 feet because of drilling refusal on October 19, 2013										
15	*Blow count and density may not be representative because of the presence of gravel										
20											
25											

See Figure A-1 for explanation of symbols

Boring B-19

Station 304+60, 20 feet west; 47.582929, -122.083175

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray to dark brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	24							MC	Crushed Rock Backfill →
	Brown fine to coarse GRAVEL with sand (very dense*, moist) (Recessional Outwash)		GP	49*							MC	
5			GP	50/6**							MC	
10			GP	59*							MC	
15	grades to wet		GP	59*							MC	
16.5	Boring completed at about 16.5 feet on October 25, 2013											
	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

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ICE File No. 0105-010

Bentonite Backfill →

Ground water measured at about 14 feet at the time of drilling

See Figure A-1 for explanation of symbols

SAB: 11/05/13

Boring B-20

Station 305+53, 15 feet east; 47.583183, -122.083127

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray to dark brown fine to coarse GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	17		■	●				MC	Crushed Rock Backfill →
	Gray and brown fine to coarse SAND with gravel and a trace of silt (very dense*, moist) (Recessional Outwash)		SP/SW	75*					●		MC	
5	Light brown fine to medium SAND (very dense*, moist) (Recessional Outwash)		SP	50/6**		■					MC	Bentonite Backfill →
10	Dark brown fine to coarse GRAVEL with sand (very dense*, wet) (Recessional Outwash)		GP/GW	69*		■			●		MC	Ground water measured at about 10 feet at the time of drilling
11.5	Boring completed at about 11.5 feet because of drilling refusal on October 25, 2013											
	*Blow count and density may not be representative because of the presence of gravel											

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Project Name: King County Parks, ELST South Sammamish Segment

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See Figure A-1 for explanation of symbols

Boring B-21

Station 307+44, 10 feet west; 47.583638, -122.083602

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand (medium dense, moist) (Fill)		GP	21		■	●					Crushed Rock Backfill →
	Brown fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	8		●	■					
5	Gray sandy SILT (medium stiff, moist) (Older Alluvium)		ML	7		●	■					Ground water measured at about 6 feet at the time of drilling
	Gray sandy SILT (very stiff to hard, moist) (pre-Fraser Sediments)		ML	30		■	●					Bentonite Backfill →
15	Gray fine to medium SAND (medium dense, wet) (pre-Fraser Sediments)		SP	22		■	●					
	Boring completed at about 16.5 feet on October 19, 2013											
20												
25												

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-22

Station 311+06, 10 feet west; 47.584555, -122.084149

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			Moisture Content (Percent - ■)
0	Brown and gray fine GRAVEL with sand (dense, moist) (Fill)		GP	34		■	●				MC	Crushed Rock Backfill →
	Light brown clayey SILT (stiff, moist) (Older Alluvium)		ML	10		●	■				MC	
5	Light brown SILT (very stiff to hard, moist) (pre-Fraser Sediments)		ML	29			■	●			MC	
	Light brown and gray silty fine to coarse SAND with gravel (medium dense to dense) (pre-Fraser Sediments)		SM									
10	Gray SILT with occasional thin layers of fine sand (very stiff, moist) (pre-Fraser Sediments)		ML	19		●	■				MC	Bentonite Backfill →
15	grades to hard		ML	30		●			■		MC	
	Boring completed at about 16.5 feet on October 19, 2013											
20												
25												No ground water observed at the time of drilling

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB:10/24/13

Boring B-23

Station 313+00, 10 feet west; 47.585072, -122.08428

Approximate Elevation: 50 feet

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
0	Brown and gray fine GRAVEL with sand (dense, moist) (Fill)		GP	33						MC	Crushed Rock Backfill →
	Light brown to gray sandy SILT (very stiff, moist) (pre-Fraser Sediments)		ML	29			40			MC	
5			ML	27			40			MC	
10	grades to gray and hard		ML	32			40			MC	Bentonite Backfill →
15			ML	42			40			MC	
	Boring completed at about 16.5 feet on October 19, 2013										
	No ground water observed at the time of drilling										
20											
25											

See Figure A-1 for explanation of symbols

SAB:10/24/13

Boring B-24

Station 315+72, 10 feet west; 47.585807, -122.084156

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand, trace of silt and occasional organic material and roots (medium dense, moist) (Fill)		GP	15		●					MC	Crushed Rock Backfill →
	Light brown silty fine SAND with a trace of gravel (loose, moist) (Fill)		SM	8			●	■			MC	
5	Light brown sandy SILT with a trace of gravel and organic material (medium stiff, moist) (Older Alluvium)		ML	6		●		■			MC	
	Light brown sandy SILT (medium stiff, moist) (Older Alluvium)		ML									Ground water measured at about 6.5 feet at the time of drilling
10	Dark brown PEAT and organic SILT (medium stiff, wet) (Older Alluvium)		PT/OL	14		●		■			MC	
	Light brown sandy SILT with occasional thin layers of sand (very stiff, wet) (pre-Fraser Sediments)		ML									
15			ML	23			●	■			MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 19, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-25

Station 318+85, 10 feet west; 47.586579, -122.084606

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)					
						20	40	60	80		
0	Brown and gray fine GRAVEL with sand and a trace of silt (dense, moist) (Fill)		GP	16						MC	Crushed Rock Backfill →
2.5	Dark gray silty fine to medium SAND with a trace of gravel and thin layers of organic silt (loose, wet) (Older Alluvium)		SM	5						MC,GS	Ground water measured at about 4 feet at the time of drilling
4.5	Dark brown silty SAND with a trace of gravel and organic material and thin layers of fine sand (loose, wet) (Older Alluvium)		SM	5						MC,GS	
10	Light brown fine to medium SAND with a trace of silt and gravel (medium dense, wet) (Older Alluvium)		SP	17						MC	Bentonite Backfill →
15	Brown fine to coarse GRAVEL with sand (very dense wet) (pre-Fraser Sediments)		GP/GW	59						MC	
16.5	Boring completed at about 16.5 feet on October 18, 2013										

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB:10/24/13

Boring B-26

Station 326+40, 10 feet west; 47.588449, -122.086036

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	20		■	●				MC	Crushed Rock Backfill →
	Light brown sandy SILT with a trace of fine gravel (stiff, moist) (Older Alluvium)		ML	10		●	■				MC	
5			ML	14		●	■				MC	
10	Light brown to gray fine to medium SAND with a trace of silt (loose, wet) (Older Alluvium)		SP	7		●	■				MC	Ground water measured at about 10 feet at the time of drilling
15	Light brown to gray fine to medium SAND with a trace of silt and gravel (loose, wet) (Older Alluvium)		SP	7		●	■				MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 18, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-27

Station 328+15, 8 feet east; 47.588909, -122.086317

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
						Moisture Content (Percent - ■)					
0	Brown and gray to dark brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	16		■	●			MC	Crushed Rock Backfill →
	Light brown fine to medium SAND with silt and fine gravel (medium dense, moist) (Fill)		SP-SM	16		■	●			MC	
	Cobbles and boulders (Fill)		GP								
5	Brown fine to coarse GRAVEL with sand and a trace of silt (loose, moist) (Fill)		GP	8		●	■			MC	
	Brown fine to medium SAND with gravel and a trace of silt (loose, moist) (Fill)										Bentonite Backfill →
10	Gray fine to coarse SAND with thin layer of organic silt (loose, wet) (Older Alluvium)		SP	8		●	■			MC	
15	Brown and dark gray fine to coarse GRAVEL with sand and a trace of silt (dense*, wet) (Older Alluvium)		GP	32*		●	■			MC	Ground water measured at about 15 feet at the time of drilling
	Boring completed at about 18 feet on October 18, 2013										
	*Blow count and density may not be representative because of the presence of gravel										
20											
25											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB:10/24/13

Boring B-28

Station 332+35, 8 feet west; 47.589942, -122.087103

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
0	Brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	20		■	●			MC	Crushed Rock Backfill →
	Light brown fine to medium SAND with a trace of fine gravel (loose, moist) (Fill)		SP	6		●	■			MC	
5	grades to very loose to loose		SP	4		●	■			MC	
10	grades to loose		SP	5		●	■			MC	Bentonite Backfill →
15	grades to medium dense and wet		SP			●	■			MC	Ground water measured at about 15 feet at the time of drilling
	Dark gray fine SAND with silt and fine gravel (medium dense, wet) (Older Alluvium)		SP-SM	15						MC	
20	Light brown to gray fine to medium SAND with silt and gravel (medium dense, wet) (Older Alluvium)		SP-SM	27			■	●		MC	
	Boring completed at about 18 feet on October 18, 2013										
25											

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ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/01/13

Boring B-29

Station 335+37, 8 feet west; 47.590701, -122.087487

Approximate Elevation: 49 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	21		■	●				MC	Crushed Rock Backfill →
	Light brown fine SAND (medium dense, moist) (pre-Fraser Sediments)		SP	20		■	●				MC	
5	grades to dense		SP	30		■	●				MC	
10	grades to fine to medium SAND		SP	36		■	●				MC	Bentonite Backfill →
15	grades to very dense and wet		SP	50		■	●				MC	Ground water measured at about 15 feet at the time of drilling
	Boring completed at about 16.5 feet on October 18, 2013											
20												
25												

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ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/01/13

Boring B-30

Station 342+32, 10 feet west; 47.592415, -122.086593

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			Moisture Content (Percent - ■)
0	Brown gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	22							MC	Crushed Rock Backfill →
	Light brown fine SAND with silt and trace of fine gravel and organic material (loose, moist) (Older Alluvium)		SP-SM	7							MC	
5	Light brown fine to medium SAND with a trace of gravel (loose, moist) (Older Alluvium)		SP	6							MC	Ground water measured at about 7 feet at the time of drilling
10	Dark gray fine to medium SAND with fine gravel and a trace of silt and organic material (loose, wet) (Older Alluvium)		SP	5							MC	Bentonite Backfill →
15	grades to medium dense		SP	18							MC	
	Boring completed at about 16.5 feet on October 18, 2013											
20												
25												

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-31

Station 345+80, 10 feet west; 47.593255, -122.085933

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	20		■	●				MC	Crushed Rock Backfill →
	Light grayish-brown fine SAND with silt (very loose to loose, moist) (Older Alluvium)		SP-SM	8			●	■			MC	
5	Gray clayey SILT with sand (soft, moist to wet) (Older Alluvium)		SP-SM	4			●	■			MC	
	Gray silty fine to medium SAND with a trace of gravel (dense*, moist to wet) (Ice-Contact Deposits)		ML								MC	Bentonite Backfill →
10	Gray silty fine to medium SAND with a trace of gravel (dense*, moist to wet) (Ice-Contact Deposits)		SM	45*					■	●	MC	
15	Gray silty fine to medium SAND with a trace of gravel (dense*, moist to wet) (Ice-Contact Deposits)		SM?	10			●				MC	
	Boring completed at about 16.5 feet on October 18, 2013											
	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

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See Figure A-1 for explanation of symbols

SAB: 11/01/13
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Boring B-32

Station 348+87, 10 feet west; 47.594029, -122.085648

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)					
						20	40	60	80		
0	Brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP		█	■	●			MC	Crushed Rock Backfill →
3	Light brown and gray silty fine to medium SAND with fine to coarse gravel (dense*, moist) (Ice-Contact Deposits)		SM	32	█					MC	
4	grades to gray and very dense		SM	74*	█	■		●		MC	
5					█						
6					█	■				MC	Bentonite Backfill →
7					█						
8					█						
9					█						
10					█	■			●	MC	
11.5	Boring completed at about 11.5 feet because of drilling refusal on October 17, 2013										No ground water observed at the time of drilling
12	*Blow count and density may not be representative because of the presence of gravel										
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											

See Figure A-1 for explanation of symbols

SAB: 11/01/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
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Boring B-33

Station 350+57, 10 feet west; 47.594492, -122.085481

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	23							MC	Crushed Rock Backfill →
	Brown fine to medium SAND with silt and fine gravel (medium dense, moist) (Older Alluvium)		SP-SM								MC	
	grades to light brown to gray		SP-SM	15							MC	
	grades to loose		SP-SM	5							MC	
	Gray silty fine to medium SAND with gravel (very dense, moist) (Ice-Contact Deposits)		SM	76*							MC	Bentonite Backfill →
	Boring completed at about 16 feet on October 17, 2013		SM	50/6**							MC	No ground water observed at the time of drilling
	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

See Figure A-1 for explanation of symbols

SAB: 11/01/13
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 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-34

Station 353+55, 2 feet south; 47.595205, -122.08471

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile			Sample Data		Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray fine GRAVEL with sand (dense, moist) (Fill)		GP	53		■		●			MC	Crushed Rock Backfill →
2.5	Light brown and gray fine to coarse SAND with silt and gravel (dense*, wet) (Recessional Outwash)		SP-SM	31*		■		●			MC	Ground water measured at about 4 feet at the time of drilling
5	Brown fine to coarse SAND with occasional gravel and cobbles and a trace of silt (dense*, wet) (Recessional Outwash)		SP/SW	36*		■		●			MC	
8	Gray fine to medium SAND with silt (dense, wet) (pre-Fraser Sediments)		SP-SM	32				●			MC	Bentonite Backfill →
15	Boring completed at about 16.5 feet on October 17, 2013										MC	
16.5	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

See Figure A-1 for explanation of symbols

SAB: 11/01/13

Boring B-35

Station 355+02, 18 feet east; 47.59471, -122.084358

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (very loose, moist) (Fill)		GP	2							MC	Crushed Rock Backfill →
2	Brown fine to coarse GRAVEL with fine sand and a trace of silt (medium dense, wet) (Recessional Outwash)		GP/GW	17							MC	Ground water measured at about 3 feet at the time of drilling
5			GP/GW	23							MC	
10	Gray fine to medium SAND with silt and gravel (medium dense, wet) (pre-Fraser Sediments)		SP-SM	20							MC	Bentonite Backfill →
15	Gray fine to coarse SAND with silt and fine gravel (dense, wet) (pre-Fraser Sediments)		SP-SM	43							MC	
16.5	Boring completed at about 16.5 feet on October 17, 2013											
20												
25												

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB:11/04/13

Boring B-36

Station 355+80, 15 feet east; 47.595572, -122.084117

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	19		■	●				MC	Crushed Rock Backfill →
	Light brown and gray silty fine to medium SAND with fine gravel (loose, moist) (Fill)		SM	7		●	■				MC	
5	grades to light brown with fine to coarse gravel, wet		SM	5		●	■				MC	
10	Brown organic SILT with a thin layer of fine sand (very soft, wet) (Older Alluvium)		OL	2		●					MC	Ground water measured at about 7 feet at the time of drilling
15	Gray fine to medium SAND with fine gravel and a trace of silt (medium dense, wet) (Recessional Outwash)		SP	17		■					MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 17, 2013											
20												
25												

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/04/13
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 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-37

Station 359+46, 10 feet west; 47.59621, -122.082975

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations				
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			Moisture Content (Percent - ■)	20	40	60
0	Brown and gray to dark brown fine GRAVEL with sand and a trace of silt (dense, moist) (Fill)		GP	30	█	■	●								Crushed Rock Backfill →
	Gray fine to coarse SAND with a trace of silt, gravel and organic material (loose, wet) (Older Alluvium)		SP/SW	4	█	●	■								Ground water measured at about 3 feet at the time of drilling
5	Gray silty fine to coarse SAND with gravel and a trace of organic material (loose, wet) (Older Alluvium)		SM	9	█	●	■								
	Gray fine to coarse GRAVEL with sand (medium dense, wet) (Recessional Outwash)		GP/GW	23	█	■	●								
15	Boring completed at about 16.5 feet on October 17, 2013		GP/GW	28	█	■	●								Bentonite Backfill →
20															
25															

See Figure A-1 for explanation of symbols

Boring B-38

Station 360+75, 10 feet west; 47.596461, -122.082573

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
						Moisture Content (Percent - ■)						
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	27							MC	Crushed Rock Backfill →
	Gray fine to medium SAND with a thin layer of silt (loose, moist) (Older Alluvium)		SP	6							MC	
	Gray silty fine to medium SAND with a trace of organic material (loose, wet) (Older Alluvium)		SM	11							MC	Ground water measured at about 4 feet at the time of drilling
	Light gray silty fine SAND with gravel (very dense, moist) (Recessional Outwash)		SM	50/6**							MC	Bentonite Backfill →
	Boring completed at about 13.7 feet because of drilling refusal on October 17, 2013		SM	50/1**							MC	
15	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/04/13

Boring B-39

Station 364+25, 10 feet west; 47.597261, -122.08175

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
0	Brownish gray fine GRAVEL with sand (medium dense, moist) (Fill)		GP	15		●				MC	Crushed Rock Backfill →
	Light brown fine to coarse SAND with silt, gravel and a trace of charcoal (loose, moist) (Fill)		SP-SM	8		●	■			MC	
5	Gray silty fine to medium SAND with thin layers of organic silt (very loose, moist to wet) (Older Alluvium)		SM	3		●		■		MC	Ground water measured at about 6 feet at the time of drilling
10	Gray silty fine SAND with thin layers of organic silt (very loose to loose, wet) (Older Alluvium)		SM	4		●		■		MC	
15	Gray and brown silty fine to coarse SAND with a trace of gravel (very loose, wet) (Older Alluvium)		SM	3		●	■			MC	Bentonite Backfill →
20	Gray fine to medium SAND with a trace of gravel and organic material (medium dense, wet) (Older Alluvium)		SP	13		●	■			MC	
21.5	Boring completed at about 21.5 feet on October 16, 2013										

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/05/13
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Boring B-40

Station 366+90, 9 feet west; 47.597932, -122.081448

Approximate Elevation: 46 feet

Depth in Feet	Soil Profile			Sample Data		Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	20		■	●				MC	Crushed Rock Backfill → Ground water measured at about 5 feet at the time of drilling Bentonite Backfill →
	Gray to black-brown, silty fine to medium SAND with gravel and scattered organic material (medium dense, moist) (Fill)		SM	10		●	■				MC	
	Gray silty fine to medium SAND with thin layers of organic silt (very loose, wet) (Older Alluvium)		SM	2		●			■		MC	
	Gray silty fine to medium SAND with gravel (loose, wet) (Older Alluvium)		SM	7		●	■				MC	
	Reddish-brown organic SILT (medium stiff, wet) (Older Alluvium)		OL	7		●				■	MC	
	Gray fine to medium SAND with silt and thin layers of silt (loose, wet) (Older Alluvium)		SP-SM				■					
	Gray and brown silty fine to medium SAND with gravel with thin layers of silt (medium dense, wet) (Older Alluvium)		SM	16		●	■				MC	
	Boring completed at about 21.5 feet on October 16, 2013											
25												

See Figure A-1 for explanation of symbols

SAB: 11/05/13

Boring B-41

Station 370+36, 10 feet west; 47.5988, -122.080982

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray to dark brown fine GRAVEL with sand (medium dense, moist) (Fill)		GP	14		■	●					Crushed Rock Backfill →
2.5	Brown fine to coarse SAND with silt and gravel (loose, moist) (Fill)		SP-SM	5			●	■				Ground water measured at about 2.5 feet at the time of drilling
5	Dark brown PEAT with thin layers of silt (very soft, wet) (Older Alluvium)		PT	3			●	■				
10	Gray silty fine to medium SAND with gravel (very loose, wet) (Older Alluvium)		PT	2			●				■	
15	Gray silty fine to medium SAND with gravel (very loose, wet) (Older Alluvium)		SM	3			●	■				Bentonite Backfill →
20	Gray fine to coarse GRAVEL with fine sand (very dense, wet) (Recessional Outwash)		GP	55			■		●			
21.5	Boring completed at about 21.5 feet on October 16, 2013											

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ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB:10/23/13

Boring B-42

Station 371+00, 16 feet east; 47.599025, -122.080761

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			Moisture Content (Percent - ■)
0	Sod and Topsoil											
0	Light brown silty fine to medium SAND with gravel (loose, wet) (Older Alluvium)		SM	6		●	■				MC	Crushed Rock Backfill →
3	Gray silty fine SAND with gravel and a trace of organic material (very dense*, moist) (Older Alluvium)		SM	74*			■		●		MC	Ground water measured at about 4 feet at the time of drilling
5	Gray fine to coarse GRAVEL with sand and a trace of silt (very dense*, moist) (Recessional Outwash)		GP/GW	55*		■		●			MC	Bentonite Backfill →
10	Gray silty fine SAND with gravel (very dense, moist) (pre-Fraser Sediments)		SM	50/6"			■			●	MC	
11	Boring completed at about 11 feet because of drilling refusal on October 16, 2013											
11	*Blow count and density may not be representative because of the presence of gravel											

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/11/13

Boring B-43

Station 373+47, 10 feet west; 47.599648, -122.080585

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and dark brown fine GRAVEL with sand and a trace of silt (loose, moist) (Fill)		GP	8		●	■					Crushed Rock Backfill →
3	Light brown silty fine to medium SAND with gravel and a trace of organic material (loose, moist) (Older Alluvium)		SM	5		●	■					
5			SM	5		●	■					
7	Gray fine to coarse GRAVEL with silt and sand (very dense*, wet) (Recessional Outwash)		GP-GM	50/5**			■					Ground water measured at about 7 feet at the time of drilling
10			GP-GM	50/5**						●	MC	
15	Boring completed at about 14.5 feet on October 16, 2013		GP-GM	50/5**						●	MC	Bentonite Backfill →
15	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

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Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/11/13

Boring B-44

Station 376+47, 8 feet west; 47.600425, -122.080242

Approximate Elevation: 47 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Light brown and gray to dark brown fine GRAVEL with silt, sand and a trace of organic material (medium dense, moist) (Fill)		GP-GM	12		●	■					Crushed Rock Backfill →
	Gray and brown SILT with fine sand and gravel (very soft, wet) (Older Alluvium)		ML	2		●	■					
5	Gray fine to coarse SAND with gravel and a trace of silt (medium dense, wet) (pre-Fraser Sediments)		SP	25		■	●					Ground water measured at about 5 feet at the time of drilling
	Gray fine SAND with a trace of gravel (dense, wet) (pre-Fraser Sediments)		SP	50/6"		■					●	Bentonite Backfill →
15	Gray silty fine SAND with gravel (dense, moist) (pre-Fraser Sediments)		SM	50/6"		■					●	
	Boring completed at about 16 feet on October 16, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/12/13

Boring B-45

Station 379+37, 5 feet west; 47.601181, -122.079868

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			20
0	Light brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	15		■	●			MC	Crushed Rock Backfill →	
5	Gray fine SAND with silt and scattered organic material (charcoal and wood debris) (medium dense, moist to wet) (Older Alluvium)		SP-SM	11		●	■			MC	▲ Ground water measured at about 4 feet at the time of drilling	
10	grades to loose Gray silty fine to coarse SAND with gravel and thin layers of organic silt and scattered wood fragments (loose, wet) (Older Alluvium)		SP-SM	9		●	■			MC	Bentonite Backfill →	
15	Gray fine SAND with silt and a trace of organic material (medium dense, moist) (Older Alluvium)		SM	7		●	■			MC		
20	Boring completed at about 16 feet on October 16, 2013											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/12/13

Boring B-46

Station 383+87, 9 feet west; 47.602294, -122.079144

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Light brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	13		■	●					Crushed Rock Backfill →
	Light brown silty fine to medium SAND (loose, moist) (Older Alluvium)		SM	9		●	■					
5	Brown silty fine SAND with gravel (very loose, wet) (Older Alluvium)		SM									
	Gray silty fine to medium SAND with gravel (very loose, wet) (Older Alluvium)		SM	3		●	■					Ground water measured at about 5 feet at the time of drilling
10	grades to medium dense		SM	18		●	■					Bentonite Backfill →
15	Gray silty fine SAND with gravel (medium dense, wet) (Older Alluvium)		SM	14		●						
			SM	22		■	●					
	Boring completed at about 18 feet on October 15, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/27/13

Boring B-47

Station 384+38, 20 feet east; 47.602364, -122.078937

Approximate Elevation: 47 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)					
						20	40	60	80		
0	Dark brown fine GRAVEL with sand, occasional cobbles and a trace of silt (loose to medium dense, moist) (Fill)		GP								Crushed Rock Backfill →
3	grades to brown										
5	Gray silty fine to medium SAND with occasional gravel (medium dense, moist) (Older Alluvium)		SM								
6	Gray silty fine to medium SAND with a trace of gravel and organic material (medium dense, wet) (Older Alluvium)		SM	13			●	■		MC	
10	Gray fine to medium SAND with a trace of silt (medium dense, wet) (pre-Fraser Sediments)		SP	28			■	●		MC	Ground water measured at about 10 feet at the time of drilling
14	Gray silty fine to medium SAND with gravel (very dense, moist) (pre-Fraser Sediments)		SM	54			■	●		MC	Bentonite Backfill →
16.5	Boring completed at about 16.5 on October 25, 2013										
	NOTE: A vector truck was used to remove soils to a depth of about 6 feet because of possible underground utilities. ICE used a 1/2-inch diameter extendable steel rod to probe the base of the hole at 1 foot intervals for density evaluation. Grab soil samples were obtained at 0.5, 3.0 and 5.0 feet for visual classification.										
20											
25											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/27/13

Boring B-48

Station 384+72, 30 feet east; 47.602488, -122.078829

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
						Moisture Content (Percent - ■)					
0	Dark brown fine GRAVEL with sand, occasional cobbles and a trace of silt (loose to medium dense, moist) (Fill)		GP								Crushed Rock Backfill →
5	Bluish-gray silty fine to medium SAND with occasional fine gravel (medium dense, moist) (Older Alluvium)		SM								
7	Bluish-gray silty fine to medium SAND with fine gravel (medium dense, wet) (Older Alluvium)		SM	15							
10			SM	21							Ground water measured at about 10 feet at the time of drilling
11			SM								
15	Gray silty fine to medium SAND with gravel (dense, wet) (pre-Fraser Sediments)		SM	46							Bentonite Backfill →
16.5	Boring completed at about 16.5 feet on October 25, 2013										
17	NOTE: A vactor truck was used to remove soils to a depth of about 7 feet because of possible underground utilities. ICE used a 1/2-inch diameter extendable steel rod to probe the base of the hole at 1 foot intervals for density evaluation. Grab soil samples were obtained at 1.5 and 5.5 feet for visual classification.										
20											
25											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB:11/12/13

Boring B-49

Station 387+62, 10 feet west; 47.603222, -122.07839

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Light brown and gray to dark brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	16		■	●				MC	Crushed Rock Backfill →
	Gray silty fine to medium SAND with gravel and scattered organic material (loose, wet) (Older Alluvium)		SM	7		●	■				MC	Ground water measured at about 2 feet at the time of drilling
5	grades to no organic material		SM	6		●	■				MC	
10			SM	6		●	■				MC	Bentonite Backfill →
15	Gray silty SAND with gravel (medium dense, wet) (pre-Fraser Sediments)		SM?	28				●				
	Boring completed at about 16.5 feet on October 15, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figures A-1 or explanation of symbols

SAB: 11/12/13

Boring B-50

Station 393+98, 9 feet east; 47.604581, -122.076829

Approximate Elevation: 45 feet

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Sod and Topsoil											
0 - 1.5	Brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	26		■	●				MC	Crushed Rock Backfill →
1.5 - 4.5	Light brown silty fine to medium SAND (medium dense, moist) (Older Alluvium)		SM	20			■	●			MC	
4.5 - 10	Gray silty fine to medium SAND with gravel (loose, moist to wet) (Older Alluvium)		SM	9		●	■				MC	Ground water measured at about 6 feet at the time of drilling
10 - 16.5	grades to a trace of gravel		SM	9		●	■				MC	Bentonite Backfill →
16.5	Boring completed at about 16.5 feet on October 15, 2013											
20												
25												

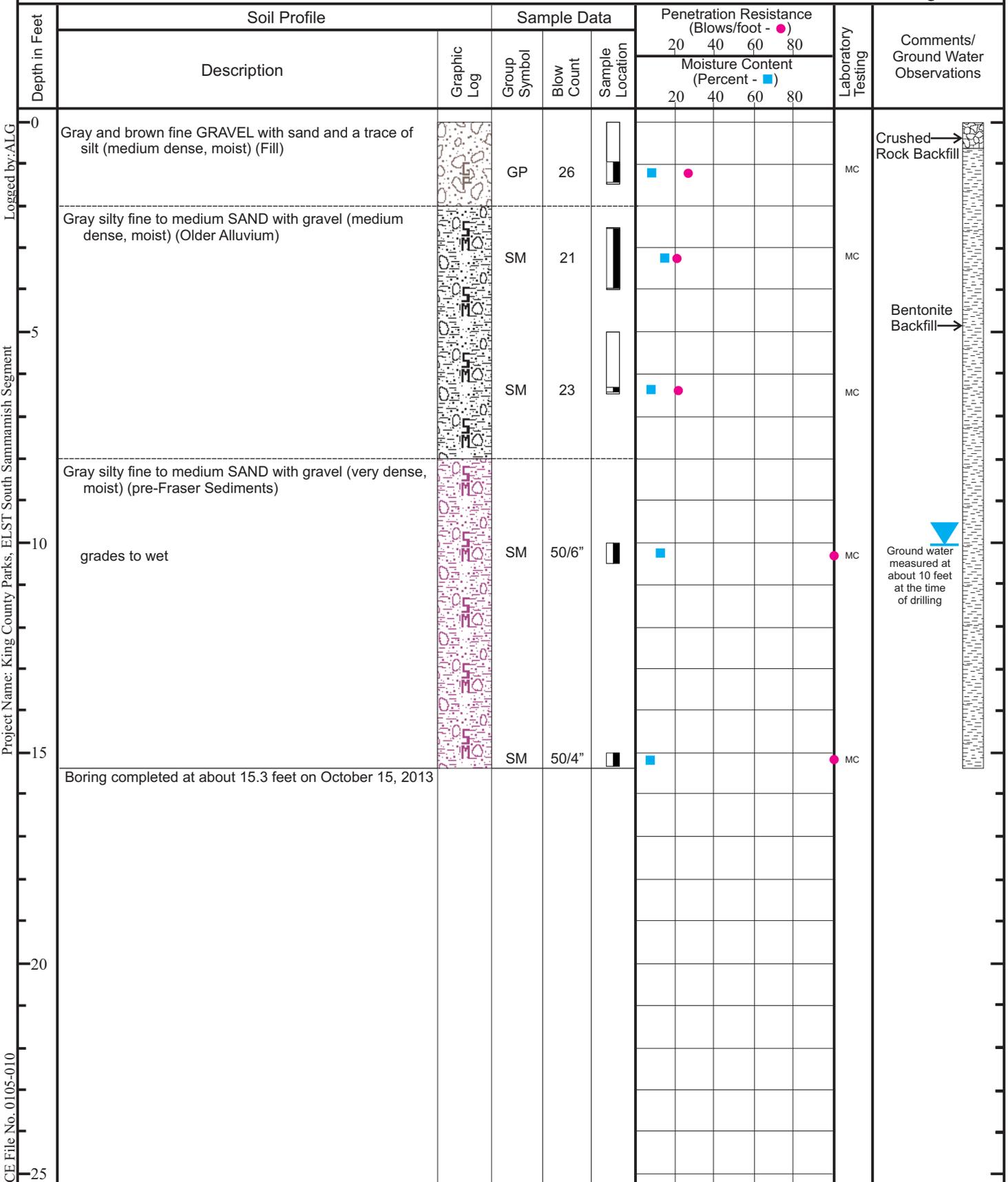
See Figure A-1 for explanation of symbols

SAB: 11/12/13

Boring B-51

Station 396+52, 9 feet east; 47.605201, -122.07628

Approximate Elevation: 45 feet



Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/12/13

Boring B-52

Station 400+08, 10 feet west; 47.606076, -122.075526

Approximate Elevation: 43 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray to dark brown fine GRAVEL with sand and a trace of silt (loose, moist) (Fill)		GP	7		●	■				MC	Crushed Rock Backfill →
	Light brown silty fine SAND with a trace of gravel (loose, moist) (Older Alluvium)		SM	9		●	■				MC	
5	Light brown silty fine to medium SAND with a trace of gravel and organic material (loose, moist to wet) (Older Alluvium)		SM	6		●	■				MC	Ground water measured at about 6 feet at the time of drilling
10	Light gray sandy SILT with a trace of organic material (very soft, wet) (Older Alluvium)		ML	2		●					MC	
15	grades to dark brown and stiff		ML			●					MC	Bentonite Backfill →
	Gray silty fine to medium SAND with a trace of gravel (loose, wet) (Older Alluvium)		SM	9		■					MC	
	Boring completed at about 16.5 feet on October 15, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/12/13

Boring B-53

Station 401+78, 9 feet west; 47.606409, -122.075206

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand (loose, moist) (Fill)		GP	27		■	●				MC	Crushed Rock Backfill →
	Light brown silty fine SAND with gravel (loose, moist) (Older Alluvium)		SM	6		●	■				MC	
5	Light brown to gray silty fine to medium SAND (very loose, wet) (Older Alluvium)		SM	2		●	■				MC	Ground water measured at about 5 feet at the time of drilling
10	Dark gray sandy SILT with a trace of organic material and thin layers of medium sand (soft, wet) (Older Alluvium)		ML	3		●	■				MC	
15	grades to brown and stiff Gray fine to medium SAND with silt and a trace of gravel (medium dense, wet) (Older Alluvium)		ML SP-SM	10		●	■				MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 15, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figures A-1 and A-2 for explanation of symbols

SAB: 11/12/13

Boring B-54

Station 405+50, 10 feet west; 47.607263, -122.074182

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations		
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			Moisture Content (Percent - ■)	
0	Gray and brown fine GRAVEL with sand and a trace of silt (loose, moist) (Fill)		GP									Crushed Rock Backfill →	
	Light brown and brown silty fine SAND with scattered organic material (loose, moist) (Fill)		SM	6		●	■				MC		
	Tan and gray silty fine SAND with a trace of gravel and organic material (loose, moist) (Older Alluvium)		SM	10		●	■				MC		
5			SM	6		●	■				MC		
	Gray sandy SILT (very soft, wet) (Older Alluvium)		ML										
10	Dark brown PEAT (very stiff, wet) (Older Alluvium)		PT	2		●					■		MC
	Dark gray sandy SILT with a trace of organic material (medium stiff, wet) (Older Alluvium)												
15			ML	10		●	■					MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 15, 2013												
20													
25													

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/19/13

Boring B-55

Station 409+54, 6 feet west; 47.608063, -122.073232

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)					
						20	40	60	80		
0	Light brown and gray fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	15		●	■			MC	Crushed Rock Backfill →
	Black and brown SILT (stiff, moist) (Older Alluvium)		ML								
	Light brown fine to coarse SAND with silt and gravel (medium dense, wet) (Older Alluvium)		SP-SM	13		●	■			MC	Ground water measured at about 3 feet at the time of drilling
5	Gray fine SAND with silt and a trace of organic material (loose, wet) (Older Alluvium)		SP-SM	5		●	■			MC	
	Gray silty fine SAND and sandy SILT with thin layers of peat (loose/medium stiff, wet) (Older Alluvium)		SM/ML	7		●	■			MC	
15	Gray sandy SILT with thin layers of peat (soft to medium stiff, wet) (Older Alluvium)		ML	4		●	■			MC	Bentonite Backfill →
	Gray silty fine SAND with scattered organic material (loose, wet) (Older Alluvium)		SM								
20			SM	8		●	■			MC	
	Boring completed at about 21.5 feet on October 15, 2013										
25											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/19/13

Boring B-56

Station 413+40, 8 feet west; 47.608917, -122.07223

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown fine GRAVEL with sand (medium dense, moist) (Fill)		GP	24		■	●				MC	Crushed Rock Backfill →
	Light brown silty fine SAND with a trace of organic material (loose, wet) (Older Alluvium)		SM	7		●	■				MC	Ground water measured at about 4 feet at the time of drilling
5	Gray sandy SILT (medium stiff, wet) (Older Alluvium)		ML	6		●	■				MC	
10	Gray fine to coarse GRAVEL with sand (medium dense, wet) (Older Alluvium)		GP/GW	12		●	■				MC	Bentonite Backfill →
15	Gray fine to coarse SAND with silt and a trace of gravel (loose, wet) (Older Alluvium)		SP-SM	7		●	■				MC	
	Boring completed at about 16.5 feet on October 14, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB:11/19/13

Boring B-57

Station 424+07, 9 feet west; 47.611251, -122.069678

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Light brown fine GRAVEL with sand (medium dense, moist) (Fill)		GP	18		■	●				MC	Crushed Rock Backfill →
	Light brown to black fine to coarse SAND with gravel (loose, moist) (Fill)		SP/SW	8			●	■			MC	
5	Dark brown PEAT (soft, wet) (Older Alluvium)		PT	3			●				MC	Ground water measured at about 4.5 feet at the time of drilling
10	Gray fine to coarse GRAVEL with sand and a trace of silt (medium dense, wet)(Older Alluvium)		GP	21			■	●			MC	Bentonite Backfill →
15	Brown organic SILT with gravel (medium stiff, wet) (Older Alluvium)		OL	5			●			■	MC	
20	Gray fine to coarse GRAVEL with sand (very loose to loose, wet) (Older Alluvium)		GP				■					
	Dark brown organic SILT/PEAT (soft to medium stiff, wet) (Older Alluvium)		OL/PT	4			●				MC	
	Boring completed at about 21.5 feet on October 14, 2013											
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-58

Station 427+93, 12 feet west; 47.612149, -122.068922

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray to black-dark brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	18		■	●				MC	Crushed Rock Backfill →
	Light brown fine to coarse SAND with silt and gravel (medium dense, moist) (Fill)		SP-SM	26		■	●				MC	
5	Light brown fine to coarse GRAVEL with silt and sand (loose to medium dense, wet) (Fill)		GP-GM								MC	Ground water measured at about 5 feet at the time of drilling
	Dark brown organic SILT and PEAT (very soft, wet) (Older Alluvium)		OL/PT	3		●	■				MC	
10			OL/PT	2		●				■	MC	
15			OL/PT	2		●				■	MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 14, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-59

Station 430+75, 8 feet west; 47.612896, -122.068528

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
0	Black and gray to light brown fine GRAVEL with silt and sand (loose to medium dense, moist) (Fill)		GP-GM	10		●				MC	Crushed Rock Backfill →
	Light brown fine to medium SAND with silt and gravel (loose, moist) (Fill)		SP-SM	7		●	■			MC	
5	Light brown fine to medium SAND with silt and a trace of gravel and organic material (loose, moist) (Older Alluvium)		SP-SM	5		●	■			MC	
	Light brown fine to medium SAND with a trace of silt (loose, moist) (Older Alluvium)		SP							MC	Ground water measured at about 5 feet at the time of drilling
10	Light brown and gray silty fine SAND (loose, moist) (Older Alluvium)		SP SM	8		●	■			MC	
	Gray and light brown fine SAND with a trace of silt (medium dense, wet) (Older Alluvium)		SP	15		●	■			MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 14, 2013										
20											
25											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/20/13

Boring B-60

Station 432+95, 9 feet west; 47.61351, -122.068503

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (loose, moist) (Fill)		GP	8		●					MC	Crushed Rock Backfill →
3	Light brown fine to coarse SAND with a trace of silt and gravel (medium dense, moist) (Fill)		SP/SW	15		■					MC	
5	Light brown silty fine to coarse SAND with gravel (medium dense, moist) (Fill)		SM	19		■ ●					MC	Bentonite Backfill →
8	Light brown fine to coarse SAND with gravel and a trace of silt (medium dense, moist to wet) (Fill)		SP	14		■ ●					MC	Ground water measured at about 11.5 feet at the time of drilling
12	Brown and gray fine to coarse GRAVEL with sand and a trace of silt (dense, wet) (pre-Fraser Sediments)		GP	50/6"		■					MC	
16	Boring completed at about 16 feet on October 12, 2013											

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/20/13

Boring B-61

Station 436+80, 10 feet west; 47.614503, -122.06833

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Gray and brown fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	21		■	●				MC	Crushed Rock Backfill →
	Light brown and gray silty fine to medium SAND with gravel (medium dense, moist) (Fill)		SM	21		■	●				MC, GS	
5	Gray and brown gray fine to coarse GRAVEL with silt and sand (loose to medium dense, moist) (Fill)		GP-GM									
	Light brown and gray silty fine to medium SAND (loose to medium dense, moist to wet) (Older Alluvium)		SM	19		■	●				MC, GS	
	Light brown fine to medium SAND with a trace of silt (medium dense, wet) (pre-Fraser Sediments)		SP	25			■				MC	Ground water measured at about 8 feet at the time of drilling
10	grades to dense		SP	46			■				MC	Bentonite Backfill →
	Gray silty fine SAND with gravel (dense, wet) (pre-Fraser Sediments)		SM									
	Boring completed at about 16.5 feet on October 12, 2013											
15												
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/22/13

Boring B-62

Station 440+10, 10 feet west; 47.615463, -122.068257

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile Description	Graphic Log	Sample Data		Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
			Group Symbol	Blow Count	20	40	60	80		
					Moisture Content (Percent - ■)					
					20	40	60	80		
0	Brown fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	16	■	●			MC	Crushed Rock Backfill →
	Brown silty fine to coarse GRAVEL with sand (dense*, moist) (Older Alluvium)		GM	34*	■	●			MC	
5	Brown silty fine SAND with fine gravel (medium dense, wet) (Older Alluvium)		SM	11	●	■			MC	Ground water measured at about 6.5 feet at the time of drilling
10			SM	10	●	■			MC	
15	Brown silty fine to coarse GRAVEL with sand (very dense, wet) (pre-Fraser Sediments)		GM	62	■		●		MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 8, 2013									
	*Blow count and density may not be representative because of the presence of gravel									
20										
25										

Logged by: BRB

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/22/13
Logged by: BRB
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-63

Station 440+10, 10 feet east; 47.61538, -122.068011

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM									Crushed Rock Backfill →
	Brown fine to medium SAND with silt and gravel (medium dense, moist) (Fill)		SP-SM	27		■	●				MC	
	Brown silty fine to coarse SAND with gravel (medium dense, moist to wet) (Fill)		SM	28		■	●					MC
5	Brown silty fine to coarse GRAVEL with sand (medium dense, moist to wet) (Fill)		GM	17		■	●					Ground water measured at about 6.5 feet at the time of drilling ▼
	Brown silty fine to coarse GRAVEL with sand (dense, moist to wet) (pre-Fraser Sediments)		GM	40		■	●				MC	
	grades to very dense*		GM	50/1**		■						MC
15	Boring completed at about 13.6 feet because of drilling refusal on October 8, 2013											
	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

See Figure A-1 for explanation of symbols

SAB: 11/22/13
 Logged by: BRB
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-64

Station 444+17, 10 feet west; 47.616565, -122.068094

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Grayish-brown fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	18		■	●					MC	Crushed Rock Backfill →
2.5	Mottled brown and dark brown silty fine to medium SAND with occasional gravel (medium dense, moist) (Fill)		SM	14		●	■					MC	
5	Brown silty fine to coarse GRAVEL (medium dense, moist to wet) (pre-Fraser Sediments)		GM	17		■	●					MC	Ground water measured at about 6 feet at the time of drilling
7.5	Brown silty fine to medium SAND with gravel (dense, wet) (pre-Fraser Sediments)		SM	35		■	●					MC	
10	Brown silty fine to coarse GRAVEL with sand (dense, wet) (pre-Fraser Sediments)		GM	31		■	●					MC	Bentonite Backfill →
12.5	Boring completed at about 16.5 feet on October 8, 2013												
15													
17.5													
20													
22.5													
25													

See Figure A-1 for explanation of symbols

SAB: 11/22/13

Boring B-65

Station 447+35, 10 feet west; 47.61738, -122.06799

Approximate Elevation: 50 feet

Logged by: BRB

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

Depth in Feet	Soil Profile Description	Graphic Log	Sample Data		Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
			Group Symbol	Blow Count	20	40	60	80		
0	Grayish-brown fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM						MC	Crushed Rock Backfill →
	Brown fine to coarse GRAVEL with sand (medium dense, moist) (Fill)		GP	16						
	Brown fine to medium SAND with silt and a trace of gravel (loose, moist) (Fill)		SP-SM	5					MC	
5	Dark brown organic SILT/PEAT with occasional wood fragments and thin layers of fine sand (very stiff, wet) (Older Alluvium)		OL/PT	17					MC	Ground water measured at about 5 feet at the time of drilling
10	Gray silty fine to coarse GRAVEL with sand (medium dense, wet) (pre-Fraser Sediments)		GM	18					MC	
15	Gray silty fine to medium SAND with fine gravel (dense, moist) (pre-Fraser Sediments)		SM	35					MC	Bentonite Backfill →
	Boring completed at about 16.5 feet on October 8, 2013									
20										
25										

See Figure A-1 for explanation of symbols

SAB: 11/22/13

Boring B-66

Station 448+65, 9 feet west; 47.617745, -122.067993

Approximate Elevation: 50 feet

Logged by: BRB

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

Depth in Feet	Soil Profile Description	Graphic Log	Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
			Group Symbol	Blow Count	Sample Location	20	40	60	80		
0	Brownish-gray fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	11		●				MC	Crushed Rock Backfill →
	Gray fine to coarse SAND with fine gravel and a trace of silt (medium dense, moist to wet) (Fill)		SP/SW	11		■				MC	Ground water measured at about 3 feet at the time of drilling
5	Gray silty medium SAND with a trace of fine gravel (very loose to loose, wet) (Older Alluvium)		SM	4		●	■			MC	
10	Gray silty GRAVEL with fine sand (loose to medium dense, wet) (Recessional Outwash)		GM	10		●	■			MC	
15	Boring completed at about 16.5 feet on October 8, 2013		GM	22		■	●			MC	Bentonite Backfill →
20											
25											

See Figure A-1 for explanation of symbols

SAB: 11/25/13

Boring B-67

Station 456+60, 7 feet west; 47.61993, -122.068792

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
0	Grayish-brown fine GRAVEL with silt and sand (loose, moist to wet) (Fill)		GP-GM	9		●				MC	Crushed Rock Backfill →
	<i>Thin Buried Topsoil layer ~2" thick</i>										
	Brown fine to coarse SAND with fine gravel (medium dense, moist to wet) (Recessional Outwash)		SP/SW	22		■	●			MC	Ground water measured at about 4 feet at the time of drilling
5	Brown fine to coarse SAND with fine gravel and a trace of silt (medium dense, wet) (Recessional Outwash)		SP/SW	18		■	●			MC	
	Brown fine GRAVEL with sand (medium dense, wet) (Recessional Outwash)		GP	13		■	●			MC	Bentonite Backfill →
15	Boring completed at about 16.5 feet on October 8, 2013		GP	16		■	●			MC	
20											
25											

Logged by: BRB

Project Name: King County Parks, ELST South Sammamish Segment

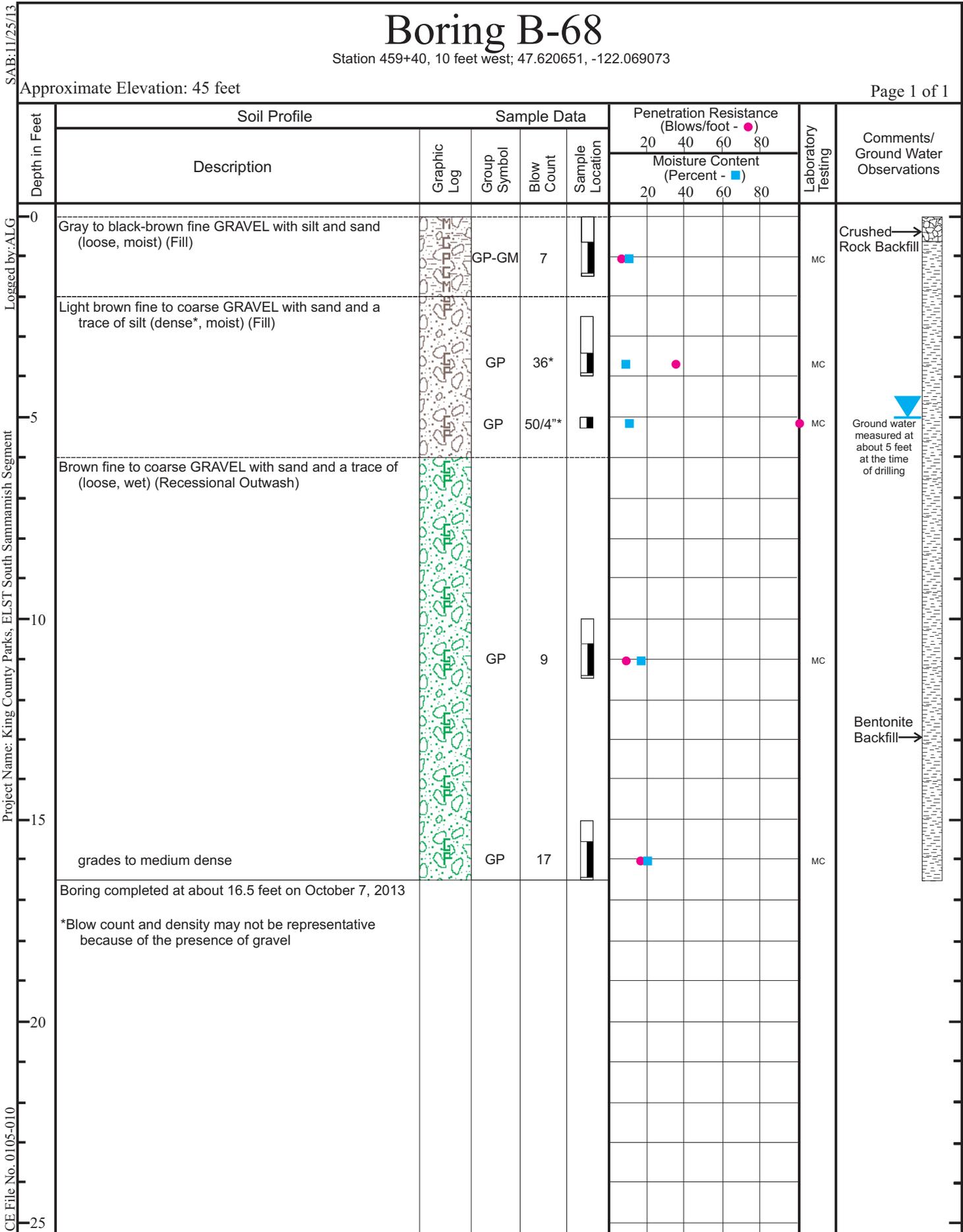
ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-68

Station 459+40, 10 feet west; 47.620651, -122.069073

Approximate Elevation: 45 feet



See Figure A-1 for explanation of symbols

Boring B-69

Station 459+09, 9 feet west; 47.620568, -122.068877

SAB: 11/26/13

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	23							MC	Crushed Rock Backfill →
	Dark brown silty fine to medium SAND with a trace of fine gravel (loose, moist) (Buried Topsoil)		SM	6							MC	
5	Brown fine to medium SAND with occasional fine gravel (very loose to loose, wet) (Recessional Outwash)		SP	4							MC	Ground water measured at about 7 feet at the time of drilling
10	Brown fine to coarse SAND with silt and occasional fine to coarse gravel (medium dense to dense*, wet) (Recessional Outwash)		SP-SM	30*							MC	Bentonite Backfill →
15	Brown fine to coarse SAND with fine gravel and a trace of silt (medium dense, wet) (Recessional Outwash)		SP	24							MC	
	Boring completed at about 16.5 feet on October 8, 2013											
	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

See Figure A-1 for explanation of symbols

SAB: 11/26/13

Boring B-70

Station 461+00, 10 feet west; 47.62103, -122.069213

Approximate Elevation: 45 feet

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

Depth in Feet	Soil Profile Description	Graphic Log	Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
			Group Symbol	Blow Count	Sample Location	20	40	60	80		
						Moisture Content (Percent - ■)					
						20	40	60	80		
0	Brown and gray fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	11		■	●			MC	Crushed Rock Backfill →
	Light brown fine to coarse GRAVEL with silt and sand (medium dense, wet) (Fill)		GP-GM	17		■	●			MC	Ground water measured at about 3 feet at the time of drilling
5	Light brown fine to coarse GRAVEL with sand and a trace of silt (loose to medium dense, wet) (Fill)		GP	10		■	●			MC	
	Light brown silty fine to medium SAND with gravel (medium dense, wet) (Ice-Contact Deposits)		SM	20				■	●	MC	
10	Light brown and gray fine to coarse GRAVEL with silt and sand (dense, wet) (Ice-Contact Deposits)										Bentonite Backfill →
15	Boring completed at about 16.5 feet because of drilling refusal on October 7, 2013		GP-GM	34*		■	●			MC	
	*Blow count and density may not be representative because of the presence of gravel										
20											
25											

See Figure A-1 for explanation of symbols

Boring B-71

Station 466+00, 10 feet west; 47.622094, -122.069736

SAB: 11/26/13

Approximate Elevation: 45 feet

Page 1 of 1

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations		
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80	20			40	60
0	Brown and gray fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	18		■	●							Crushed Rock Backfill →
	Light brown and gray fine to coarse SAND with silt and gravel (medium dense, dry) (Fill)		SP-SM	17		■	●							
5	grades to light brown		SP-SM	11		■	●							
10	Light brown fine to coarse GRAVEL with silt and sand (dense*, moist) (Ice-Contact Deposits)		GP-GM	46*		■	●							Bentonite Backfill →
15	grades to medium dense		GP-GM	26		■	●							
	Boring completed at about 16.5 feet on October 7, 2013													
	*Blow count and density may not be representative because of the presence of gravel												No ground water observed at the time of drilling	
20														
25														

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-72

Station 470+92, 10 feet west; 47.623192, -122.070792

SAB: 11/26/13

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Brown and gray fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	24		■	●					MC	Crushed Rock Backfill →
	Brown and gray to light brown fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	27		■	●					MC	
5	grades to light brown		GP-GM	27		■	●					MC	
	Gray fine to coarse GRAVEL with silt and sand (dense*, moist) (Ice-Contact Deposits)		GP-GM	33*		■	●					MC	Bentonite Backfill →
10	Light brown fine to coarse GRAVEL with silt and sand (medium dense, wet) (Ice-Contact Deposits)		GP-GM	13		■	●					MC	Ground water measured at about 13 feet at the time of drilling
15	Boring completed at about 16.5 feet on October 7, 2013												
	*Blow count and density may not be representative because of the presence of gravel												
20													
25													

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/26/13

Boring B-73

Station 464+20, 10 feet west; 47.621577, -122.069472

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile Description	Graphic Log	Sample Data		Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
			Group Symbol	Blow Count	20	40	60	80		
					Moisture Content (Percent - ■)					
					20	40	60	80		
0	Gray fine GRAVEL with sand and a trace of silt and organic material (loose, moist) (Fill)		GP	8	█	■	●		MC	Crushed Rock Backfill →
	Light brown fine to coarse GRAVEL with silt and sand (medium dense, dry) (Fill)		GP-GM	18	█	■	●		MC	
5			GP-GM	17	█	■	●		MC	
	Light brown fine to coarse GRAVEL with silt and sand (dense*, moist) (Ice-Contact Deposits)		GP-GM	32*	█	■	●		MC	Bentonite Backfill →
10			GP-GM	26	█	■	●		MC	Ground water measured at about 13 feet at the time of drilling
15	grades to medium dense and wet		GP-GM							
	Boring completed at about 16.5 feet on October 7, 2013									
	*Blow count and density may not be representative because of the presence of gravel									
20										
25										

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-74

Station 227+57, 9 feet west; 47.568942, -122.061555

SAB: 11/26/13

Approximate Elevation: 46 feet

Page 1 of 1

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	13		■	●					Crushed Rock Backfill →
	Light brown sandy SILT (stiff, moist) (Older Alluvium)		ML	13			●	■				
5			ML	8			●	■				
10	Gray silty fine SAND with a trace of organic material (loose to medium dense, wet) (Older Alluvium)		SM	10			●	■				Ground water measured at about 10 feet at the time of drilling
15	Gray sandy SILT (very stiff, moist) (Older Alluvium)		ML	21			●	■				Bentonite Backfill →
	Boring completed at about 16.5 feet on October 24, 2013											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

Boring B-75

Station 248+00, 10 feet west; 47.572012, -122.068351

SAB: 11/26/13

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile Description	Graphic Log	Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
			Group Symbol	Blow Count	Sample Location	20	40	60	80		
						Moisture Content (Percent - ■)					
						20	40	60	80		
0	Brown and gray to dark brown fine GRAVEL with sand and a trace of silt (loose, moist) (Fill)		GP	9		●	■			MC	Crushed Rock Backfill →
	Brown fine to medium SAND with silt and gravel (loose, moist) (Fill)		SP-SM	6		●	■			MC	
5			SP-SM	9		■				MC	
	Brown fine to medium SAND with gravel and a trace of silt (medium dense, moist) (Older Alluvium)		SP	11		●	■			MC	Bentonite Backfill →
15	Brown fine to medium SAND with gravel (dense*, moist) (Recessional Outwash)		SP?	37*		●					
	Boring completed at about 16.5 feet on October 23, 2013										
	*Blow count and density may not be representative because of the presence of gravel										
20											
25											No ground water observed at the time of drilling

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/26/13
Logged by: ALG
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-76

Station 289+40, 10 feet south; 47.581011, -122.077818

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Brown and gray fine to coarse GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	14		■	●					MC	Crushed Rock Backfill →
	Brown fine to medium SAND with gravel and a trace of silt (very loose to loose, moist) (Fill)		SP	4		●	■					MC	
5			SP	4		●	■					MC	Bentonite Backfill →
10	Brown and gray fine to coarse GRAVEL with sand and a trace of silt (dense*, moist) (Recessional Outwash)		GP/GW	38*		■	●					MC	
15	Brown and gray fine to coarse SAND with gravel (loose, wet) (Recessional Outwash)		SP/SW	8		●	■					MC	Ground water measured at about 15 feet at the time of drilling
	Boring completed at about 16.5 feet on October 21, 2013												
	*Blow count and density may not be representative because of the presence of gravel												
20													
25													

See Figure A-1 for explanation of symbols

SAB: 11/26/13
Logged by: ALG
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-77

Station 378+40, 10 feet west; 47.6009, -122.080012

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray to brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP									Crushed Rock Backfill →
	Light brown fine to medium SAND with a trace of silt and organic material (medium dense, moist) (Fill)		SP	16		■	●			MC		
	Light brown to brown fine to medium SAND with silt (medium dense, moist) (Older Alluvium)		SP-SM	12			●	■		MC		
5	Light brown fine to medium SAND with a trace of silt and gravel (loose, wet) (Older Alluvium)		SP	9		●	■			MC		Ground water measured at about 5 feet at the time of drilling
	Gray fine to coarse SAND with silt and gravel (medium dense, wet) (Older Alluvium)		SP-SM	10		●		■		MC		
	Gray silty fine to coarse SAND with gravel (medium dense, wet) (Older Alluvium)											
15	Boring completed at about 16.5 feet on October 16, 2013		SM	14		●	■			MC		Bentonite Backfill →
20												
25												

See Figure A-1 for explanation of symbols

SAB: 11/26/13
Logged by: ALG
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-78

Station 411+20, 7 feet west; 47.608475, -122.072811

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	11		■	●					MC	Crushed Rock Backfill →
	Brown fine to coarse GRAVEL with sand (loose, moist) (Fill)		GP	5		●	■					MC	Ground water measured at about 4 feet at the time of drilling
5	Gray silty fine SAND with a trace of organic material (very loose, wet) (Older Alluvium)		SM	4		●	■					MC	
	Dark gray silty fine SAND with a trace of organic material (loose, wet) (Older Alluvium)		SM	5		●	■					MC	
15	Boring completed at about 16.5 feet on October 14, 2013		SM	5		●	■					MC	Bentonite Backfill →
20													
25													

See Figure A-1 for explanation of symbols

SAB: 11/26/13

Boring B-79

Station 423+42, 5 feet east; 47.61106, -122.069697

Approximate Elevation: 45 feet

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80		
						Moisture Content (Percent - ■)					
0	Brown fine GRAVEL with sand (medium dense, moist) (Fill)		GP	14		●	■			MC	Crushed Rock Backfill →
3	Dark brown PEAT (very soft, wet) (Older Alluvium)		PT	2		●	■			MC	Ground water measured at about 3 feet at the time of drilling
4	Gray fine SAND with scattered organic material (loose, wet) (Older Alluvium)		SP	5		●	■			MC	
8	Gray fine SAND with silt and scattered organic material (medium dense, wet) (Older Alluvium)		SP-SM	12		●	■			MC	
15	Gray fine to medium SAND and organic SILT/PEAT (very loose to very soft, wet) (Older Alluvium)		SP/OL/PT	2		●	■			MC	Bentonite Backfill →
19	Dark brown organic SILT and PEAT (soft, wet) (Older Alluvium)		OL/PT								
21	Gray fine to coarse SAND with thin layers of silt and a trace of gravel (medium dense, wet) (Older Alluvium)		SP	12		●		■		MC	
21.5	Boring completed at about 21.5 feet on October 14, 2013										

See Figure A-1 for explanation of symbols

SAB: 11/27/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-80

Station 425+95, 9 feet west; 47.611685, -122.069236

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Gray and brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	11		■	●				MC	Crushed Rock Backfill →
	Light brown to dark brown fine to coarse SAND with gravel and a trace of silt (loose, moist) (Fill)		SP	8		●	■				MC	
5	Dark brown PEAT (very soft, wet) (Older Alluvium)		PT	2		●					MC	Ground water measured at about 4 feet at the time of drilling
	Gray silty fine SAND with thin layers of peat (very loose, wet) (Older Alluvium)		SM	2		●		■			MC	
15	Gray silty fine SAND and sandy SILT with thin layers of organic silt and scattered organic material (very loose/soft, wet) (Older Alluvium)		SM/ML	2		●		■			MC	Bentonite Backfill →
	Gray silty fine SAND with thin layers of peat (very loose to loose, wet) (Older Alluvium)		SM	4		●		■			MC	
25	Brown to dark brown organic SILT with thin layers of fine sand and scattered wood fragments (medium stiff, wet) (Older Alluvium)		OL									

See Figures A-1 for explanation of symbols

SAB: 11/26/13
Logged by: BRB
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-81

Station 454+65, 7 feet west; 47.619388, -122.0685

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Brown silty fine GRAVEL with sand (medium dense, moist) (Fill)		GM	14	█								Crushed Rock Backfill →
	Dark brown silty fine SAND with a trace of fine gravel (medium dense, moist) (Buried Topsoil-Fill)		SM		█	■	●				MC		
	Grayish-brown fine to coarse SAND with silt and fine gravel (medium dense, moist) (Fill)		SP-SM	22	█	■	●				MC		
5	Dark brown organic SILT/fine SAND with thin layers of fibrous peat and scattered organic material (soft, wet) (Older Alluvium)		OL/SP	3	█		●					MC	▲ Ground water measured at about 5 feet at the time of drilling
10	Brown fine to coarse SAND with fine gravel and a trace of silt (medium dense, wet) (Recessional Outwash)		SP/SW	13	█		■					MC	
15	Brown fine GRAVEL with fine to coarse SAND and a trace of silt (medium dense, wet) (Recessional Outwash)				█								→ Bentonite Backfill
	Boring completed at about 16.5 feet on October 8, 2013		GP	13	█		■					MC	
20													
25													

See Figure A-1 for explanation of symbols

SAB: 11/26/13

Boring B-82

Station 223+28, 10 feet north; 47.568662, -122.059813

Approximate Elevation: 46 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown and gray fine GRAVEL with sand and a trace of silt (medium dense, moist to wet) (Fill)		GP	17		■	●				MC	Flush Grade → Steel Monument Concrete Plug
0	Light brown to gray sandy SILT with a trace of organic material (stiff, moist) (Older Alluvium)		ML	10		●	■				MC	Ground water measured at 1.75 feet (11/13/13)
5	grades to gray		ML	11		●	■				MC	Bentonite Backfill →
10			ML	12		●	■				MC	1 1/4-inch PVC Solid Pipe →
15	grades to very stiff		ML	18		●	■				MC	Sand Backfill →
16.5	Boring completed at about 16.5 feet on October 24, 2013											
20												1 1/4-inch PVC Slotted Pipe →
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/26/13
Logged by: ALG
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-83

Station 252+00, 8 feet east; 47.572917, -122.069232

Approximate Elevation: 58 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Brown to light brown fine to coarse GRAVEL with silt and sand (medium dense, moist) (Recessional Outwash)		GP-GM	18	█	■	●					MC	Flush Grade → Steel Monument Concrete Plug →
5	grades to dense* Light brown silty fine to medium SAND with gravel and thin layers of sand and fine gravel (dense*, moist) (Recessional Outwash)		GP-GM	32*	█	■	●					MC	Bentonite Backfill →
10	Light brown fine to coarse GRAVEL with silt and sand (very dense*, moist) (Recessional Outwash)		SM	36*	█	■	●					MC	1 1/4-inch PVC Solid Pipe →
15	Light brown fine to coarse GRAVEL with silt and sand (very dense*, moist) (Recessional Outwash)		GP-GM	69*	█	■	●					MC	Sand Backfill →
20	grades to medium dense		GP-GM	24	█	■	●					MC	1 1/4-inch PVC Slotted Pipe →
25	Boring completed at about 16.5 feet on October 23, 2013												No ground water measured on 11/13/13
	*Blow count and density may not be representative because of the presence of gravel												

See Figure A-1 for explanation of symbols

SAB: 11/26/13
Logged by: ALG
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-84

Station 254+50, 8 feet east; 47.573481, -122.06982

Approximate Elevation: 56 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Sod and Topsoil												Flush Grade → Steel Monument Concrete Plug →
0 - 1	Brown fine GRAVEL with sand (medium dense, moist) (Fill)		GP	12	█	■	●					MC	
1 - 5	Brown fine to medium SAND with silt and gravel (medium dense, moist) (Recessional Outwash)		SP-SM	16	█	■	●					MC, GS	
5 - 10	thin layers of silt and fine sand		SP-SM	22	█	■	●					MC, GS	Bentonite Backfill → 1 1/4-inch PVC Solid Pipe →
10 - 15	Brown fine SAND with a trace of gravel (medium dense, moist) (Recessional Outwash)		SP-SM	25	█	■	●					MC	Sand Backfill → 1 1/4-inch PVC Slotted Pipe →
15 - 16.5	Boring completed at about 16.5 feet on October 23, 2013		SP	25	█	■	●					MC	No ground water measured on 11/13/13
16.5 - 25													

See Figure A-1 for explanation of symbols

SAB: 11/26/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-85

Station 258+02, 9 feet west; 47.574148, -122.070792

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations			
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80	20			40	60	80
0	Brown to orange-brown fine to medium SAND with silt and gravel (loose, moist) (Fill)		SP-SM	5		●	■							MC	Flush Grade → Steel Monument Concrete Plug →
	Brown fine to coarse SAND with fine gravel (loose, moist) (Recessional Outwash)		SP-SW	3		●	■							MC	Bentonite Backfill →
5	grades to medium dense		SP-SW	14		■	●							MC	1 1/4-inch PVC Solid Pipe →
10	Light brown fine to coarse GRAVEL with sand and a trace of silt (dense*, moist) (Recessional Outwash)		GP/GW	37*		■	●							MC	Sand Backfill →
15	grades to medium dense and wet		GP/GW	28		■	●							MC	1 1/4-inch PVC Slotted Pipe →
	Boring completed at about 16.5 feet on October 23, 2013												No ground water measured on 11/13/13		
	*Blow count and density may not be representative because of the presence of gravel														

See Figure A-1 for explanation of symbols

SAB: 11/26/13

Boring B-86

Station 260+00, 9 feet west; 47.574534, -122.071408

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			
0	Brown silty fine SAND with gravel and a trace of organic material (medium dense, moist) (Fill)		SM	13							MC	Flush Grade → Steel Monument Concrete Plug
	Brown silty fine to medium SAND with a trace of gravel (medium dense, moist) (Recessional Outwash)		SM	19							MC,GS	
5	Brown silty fine to medium SAND with gravel (medium dense, moist) (Recessional Outwash)		SM	20							MC,GS	Bentonite Backfill →
	Brown silty fine to medium SAND (loose, wet) (Recessional Outwash)											1 1/4-inch PVC Solid Pipe →
10	Gray fine to coarse GRAVEL with sand and a trace of silt (dense*, wet) (Recessional Outwash)		SM	7							MC	Sand Backfill →
15	Boring completed at about 16.5 feet on October 23, 2013											1 1/4-inch PVC Slotted Pipe →
	*Blow count and density may not be representative because of the presence of gravel											Ground water measured at 14.0 feet (11/13/13)
			GP	39*							MC	
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/26/13

Boring B-87

Station 263+00, 7 feet west; 47.575057, -122.072312

Approximate Elevation: 55 feet

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

Depth in Feet	Soil Profile Description	Graphic Log	Sample Data		Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
			Group Symbol	Blow Count	20	40	60	80		
					Moisture Content (Percent - ■)					
					20	40	60	80		
0	Brown and gray fine GRAVEL with sand (medium dense, moist) (Fill)		GP	23	■	●			MC	Flush Grade → Steel Monument Concrete Plug
	Light brown fine SAND with silt and a trace of organic material (loose, moist) (Fill)		SP-SM	8	●	■			MC	
5	Light brown sandy SILT with a trace of gravel (stiff, dry to moist) (Fill)		ML	9	■				MC	Bentonite Backfill →
	Brown fine to coarse GRAVEL with sand and a trace of silt (dense*, moist) (Recessional Outwash)		GP/GW	44*	■	●			MC	1 1/4-inch PVC Solid Pipe →
	Brown fine to coarse SAND with gravel (medium dense, wet) (Recessional Outwash)		SP/SW	21	■				MC	Sand Backfill →
15	Boring completed at about 16.5 feet on October 22, 2013									
	*Blow count and density may not be representative because of the presence of gravel									
20										1 1/4-inch PVC Slotted Pipe →
25										No ground water measured on 11/13/13

See Figure A-1 for explanation of symbols

SAB: 11/26/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-89

Station 272+00, 7 feet east; 47.577191, -122.074049

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Brown fine to medium SAND with silt and a trace of organic material (loose, moist) (Fill)		SP-SM	3		●	■					MC	Flush Grade → Steel Monument Concrete Plug →
	Brown fine to coarse SAND with silt and gravel (loose, moist) (Recessional Outwash)		SP-SM	6		■	■					MC, GS	
5	grades to medium dense		SP-SM	14		■	●					MC, GS	Bentonite Backfill →
10			SP-SM	23		■	●					MC	1 1/4-inch PVC Solid Pipe → Sand Backfill →
15	grades to very dense*		SP-SM	64*		■	●					MC	1 1/4-inch PVC Slotted Pipe →
	Boring completed at about 16.5 feet on October 22, 2013												
	*Blow count and density may not be representative because of the presence of gravel												
20													No ground water measured on 11/13/13
25													

See Figure A-1 for explanation of symbols

SAB: 11/26/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-90

Station 275+00, 7 feet west; 47.577887, -122.07467

Approximate Elevation: 52 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Brown and brown fine to coarse GRAVEL with silt and sand (loose, moist) (Fill)		GP-GM	5	█	●	■					MC	Flush Grade → Steel Monument Concrete Plug →
	Brown fine sandy SILT (soft, wet) (Older Alluvium)		ML	3	█	●	■					MC,GS	
5	grades to stiff		ML	10	█	●	■					MC,GS	Bentonite Backfill →
	Brown fine to medium SAND with silt and gravel (medium dense, moist) (Recessional Outwash)		SP-SM	21	█	■	●					MC	1 1/4-inch PVC Solid Pipe → Sand Backfill →
10	Brown fine to coarse GRAVEL with sand and a trace of silt (medium dense, moist to wet) (Recessional Outwash)		GP/GW	17	█	■	●					MC	1 1/4-inch PVC Slotted Pipe →
15	Boring completed at about 16.5 feet on October 22, 2013												
20													No ground water measured on 11/13/13
25													

See Figure A-1 for explanation of symbols

SAB: 11/26/13
Logged by: ALG
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-91

Station 278+00, 7 feet west; 47.578647, -122.075115

Approximate Elevation: 50 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Gray to black and brown fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	16	█	■	●					Flush Grade → Steel Monument Concrete Plug
2.5	Brown silty fine to coarse SAND with gravel (loose, moist) (Fill)		SM	4	█	■	●					
5	Brown silty fine to coarse SAND with gravel (dense*, moist) (Recessional Outwash)		SM	37*	█	■	●					Bentonite Backfill →
7.5	Light brown and gray fine to coarse GRAVEL with sand and a trace of silt (medium dense, moist) (Recessional Outwash)		GP/GW	21	█	■	●					1 1/4-inch PVC Solid Pipe →
10	grades to dense*		GP/GW	35*	█	■	●					Sand Backfill →
15	Boring completed at about 16.5 feet on October 22, 2013											1 1/4-inch PVC Slotted Pipe →
16.5	*Blow count and density may not be representative because of the presence of gravel											No ground water measured on 11/13/13
20												
25												

See Figure A-1 for explanation of symbols

SAB: 11/26/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-92

Station 280+96, 7 feet west; 47.579407, -122.07551

Approximate Elevation: 55 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations			
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80	Moisture Content (Percent - ■)					
0	Black and brown fine to coarse GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	15		●						■	MC	Flush Grade → Steel Monument Concrete Plug →	
5	Brown fine to medium SAND with gravel and a trace of silt (medium dense, moist) (Recessional Outwash)		SP	26								■	MC	Bentonite Backfill →	
5			SP	23								■	MC	1 1/4-inch PVC Solid Pipe →	
10			SP	26								■	MC	Sand Backfill →	
15	grades to dense* and wet		SP	32*								■	MC	1 1/4-inch PVC Slotted Pipe →	
	Boring completed at about 16.5 feet on October 21, 2013											MC	No ground water measured on 11/13/13		
	*Blow count and density may not be representative because of the presence of gravel														
20															
25															

See Figure A-1 for explanation of symbols

SAB: 11/26/13

Boring B-93

Station 288+00, 8 feet east; 47.580847, -122.077225

Approximate Elevation: 50 feet

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	20	40	60	80			Moisture Content (Percent - ■)
0	Brown and black to dark brown fine GRAVEL with sand and a trace of silt and organic material (loose, moist) (Fill)		GP	17		■					MC	Flush Grade → Steel Monument Concrete Plug
	Light brown fine to coarse SAND with silt and fine gravel (loose, moist) (Recessional Outwash)		SP-SM	6		■					MC	
5	Light brown fine to coarse GRAVEL with sand (medium dense, moist) (Recessional Outwash)		GP/GW	23		■	●				MC	Bentonite Backfill → 1 1/4-inch PVC Solid Pipe
10	grades to dense*		GP/GW	41*		■	●				MC	Sand Backfill →
15	grades to medium dense		GP/GW?	20		■	●				MC	1 1/4-inch PVC Slotted Pipe
	Boring completed at about 16.5 feet on October 21, 2013											
	*Blow count and density may not be representative because of the presence of gravel											
20												
25												No ground water measured on 11/13/13

See Figure A-1 for explanation of symbols

SAB: 11/27/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-94

Station 293+17, 7 feet south; 47.581373, -122.079231

Approximate Elevation: 50 feet

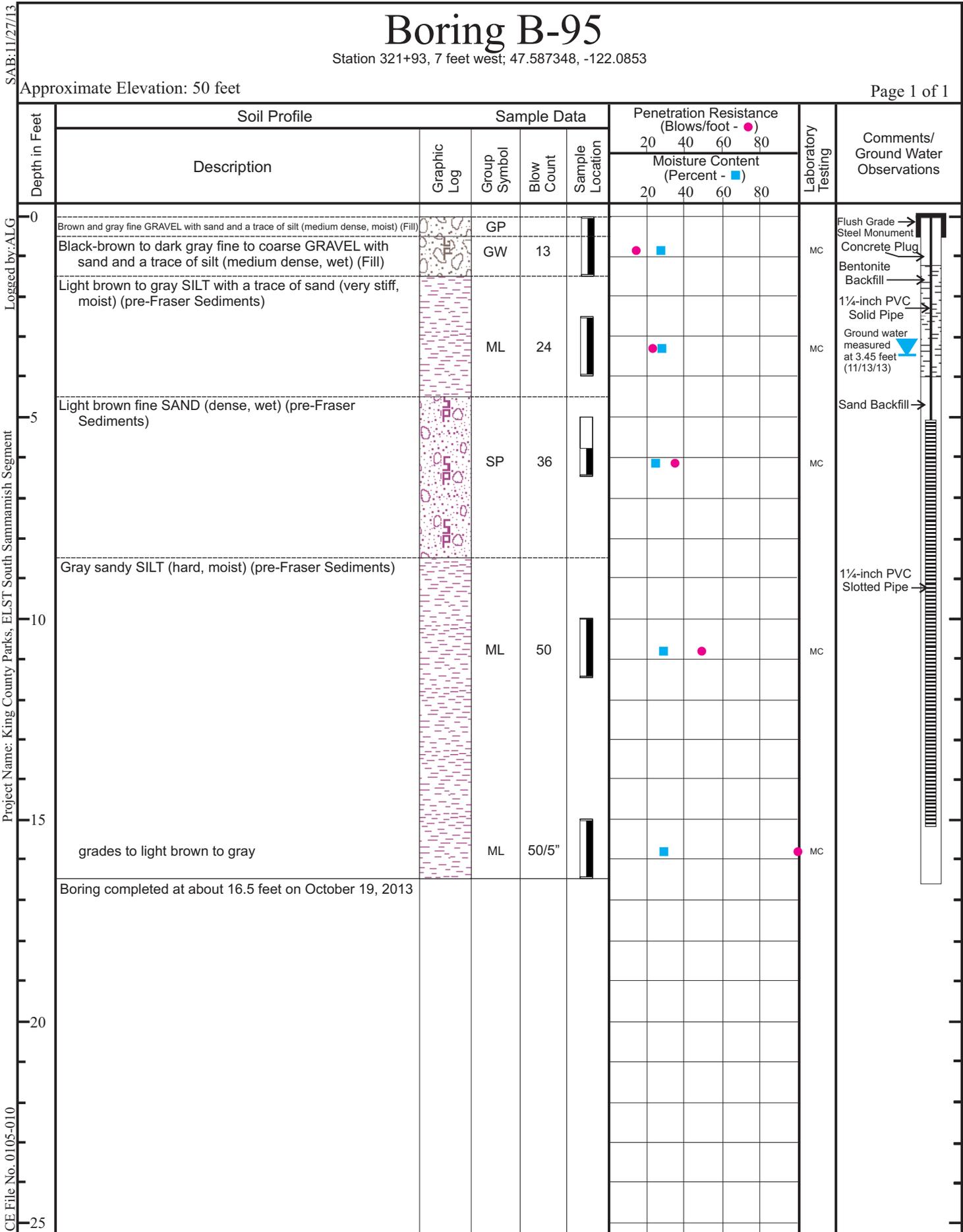
Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Gray and black fine GRAVEL with sand and a trace of silt (medium dense, moist) (Fill)		GP	23		■	●					MC	Flush Grade → Steel Monument Concrete Plug
2.5	Light brown silty fine to coarse SAND with gravel (medium dense, moist) (Fill)		SM	14		■	●					MC,GS	Bentonite Backfill → 1 1/4-inch PVC Solid Pipe
5	grades to loose		SM	8		■	●					MC,GS	Sand Backfill →
7.5	Light brown to gray fine to medium SAND with silt and a trace of gravel (medium dense, wet) (Recessional Outwash)		SP-SM	29		■	●					MC	1 1/4-inch PVC Slotted Pipe →
10	grades to dense*		SP-SM	40*		■	●					MC	Ground water measured at 11.8 feet (11/13/13) ▼
15	Boring completed at about 16.5 feet on October 21, 2013												
17.5	*Blow count and density may not be representative because of the presence of gravel												
20													
22.5													
25													

See Figure A-1 for explanation of symbols

Boring B-95

Station 321+93, 7 feet west; 47.587348, -122.0853

Approximate Elevation: 50 feet



See Figure A-1 for explanation of symbols

SAB: 11/27/13

Boring B-96

Station 356+35, 10 feet west; 47.595704, -122.083893

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data			Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown fine GRAVEL with sand (medium dense, moist) (Fill)		GP	15		■	●					Crushed Rock Backfill →
	Light brown silty fine to medium SAND with gravel and a trace of organic material (very loose to loose, moist to wet) (Fill)		SM	3		●	■					
5	grades to gray with a trace of gravel		SM	2		●	■					Ground water measured at about 5 feet at the time of drilling
10	Gray fine to medium SAND with a trace of fine gravel and thin layers of peat (loose, wet) (Older Alluvium)		SP	9		●	■					
15	Gray fine to coarse GRAVEL with sand and a trace of silt (dense*, wet) (Recessional Outwash)		GP/GW	40*		■	●					Bentonite Backfill →
	Boring completed at about 16.5 feet on October 17, 2013											
	*Blow count and density may not be representative because of the presence of gravel											
20												
25												

Logged by: ALG

Project Name: King County Parks, ELST South Sammamish Segment

ICE File No. 0105-010

See Figure A-1 for explanation of symbols

SAB: 11/27/13
Logged by: ALG
Project Name: King County Parks, ELST South Sammamish Segment
ICE File No. 0105-010

Boring B-97

Station 419+00, 7 feet east; 47.610088, -122.070823

Approximate Elevation: 45 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations	
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)							
						20	40	60	80				
0	Brown fine GRAVEL with silt and sand (medium dense, moist) (Fill)		GP-GM	15	█	■	●					MC	Flush Grade → Steel Monument Concrete Plug →
3	Brown and gray sandy SILT with scattered organic material (medium stiff, wet) (Older Alluvium)		ML	7	█	●	■					MC	Ground water measured at 3.75 feet (11/13/13) →
5	Gray and blue-gray silty fine SAND with a trace of organic material (loose, wet) (Older Alluvium)		SM	6	█	●	■					MC	Bentonite Backfill → 1 1/4-inch PVC Solid Pipe →
10	grades to gray		SM	8	█	●	■					MC	Sand Backfill →
15	Gray fine to medium SAND (loose, wet) (Older Alluvium)		SP	9	█	●	■					MC	1 1/4-inch PVC Slotted Pipe →
16.5	Boring completed at about 16.5 feet on October 14, 2013												

See Figure A-1 for explanation of symbols

SAB: 11/27/13
 Logged by: ALG
 Project Name: King County Parks, ELST South Sammamish Segment
 ICE File No. 0105-010

Boring B-98

Station 433+04, 8 feet east; 47.613481, -122.068417

Approximate Elevation: 48 feet

Depth in Feet	Soil Profile		Sample Data				Penetration Resistance (Blows/foot - ●)				Laboratory Testing	Comments/ Ground Water Observations
	Description	Graphic Log	Group Symbol	Blow Count	Sample Location	Moisture Content (Percent - ■)						
						20	40	60	80			
0	Brown and gray fine GRAVEL with silt and sand (loose, moist) (Fill)		GP-GM	7		●						Flush Grade → Steel Monument Concrete Plug →
	Light brown fine to coarse SAND (medium dense, moist) (Older Alluvium)		SP	15		●						Bentonite Backfill →
5	Light brown silty fine SAND with a trace of wood debris (medium dense, moist) (Older Alluvium)		SM	19		■	●				MC, GS	1 1/4-inch PVC Solid Pipe →
	Light brown fine to medium SAND with a trace of silt (dense, wet) (pre-Fraser Sediments)		SP	43		■	●				MC	Sand Backfill → Ground water measured at 11.2 feet (11/13/13) →
15	Light brown fine to coarse SAND with gravel and a trace of silt (dense, wet) (pre-Fraser Sediments)		SP-SW	45		■	●				MC	1 1/4-inch PVC Slotted Pipe →
	Boring completed at about 16.5 feet on October 12, 2013											
20												
25												

See Figure A-1 for explanation of symbols

APPENDIX B

LABORATORY TESTING PROGRAM

DRAFT

APPENDIX B

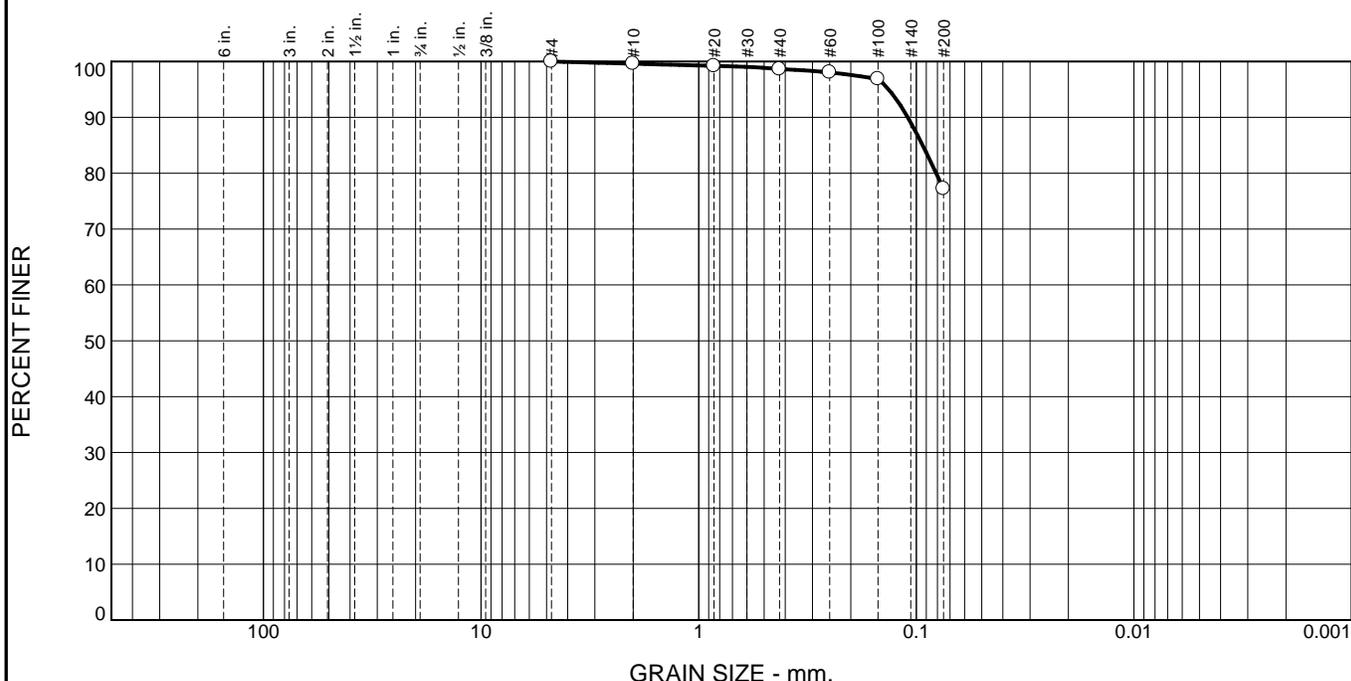
B.0 LABORATORY TESTING PROGRAM

The soil samples obtained from the test borings and infiltration test sites were returned to Icicle Creek Engineers laboratory for further visual examination and laboratory testing. Soil samples obtained from the test borings were tested to determine moisture content in general accordance with ASTM Test Method D 2216. The results of the moisture content tests are presented on the boring logs in Appendix A.

Selected soil samples obtained from the test borings and the infiltration test sites were also tested to determine the particle size distribution (grain size analysis) by ASTM Test Methods C 117 (modified) and C 136. The particle size distribution reports are presented on Figures B-1 through B-15 (test borings) and Figures B-16 through B-20 (infiltration test sites).

DRAFT

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	1.0	21.4	77.2	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#10	99.6		
#20	99.2		
#40	98.6		
#60	98.0		
#100	96.9		
#200	77.2		

Material Description

Light brown fine sandy SILT

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= ML AASHTO (M 145)= A-4(0)

Coefficients

D₉₀= 0.1094 D₈₅= 0.0935 D₆₀=
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/23/13

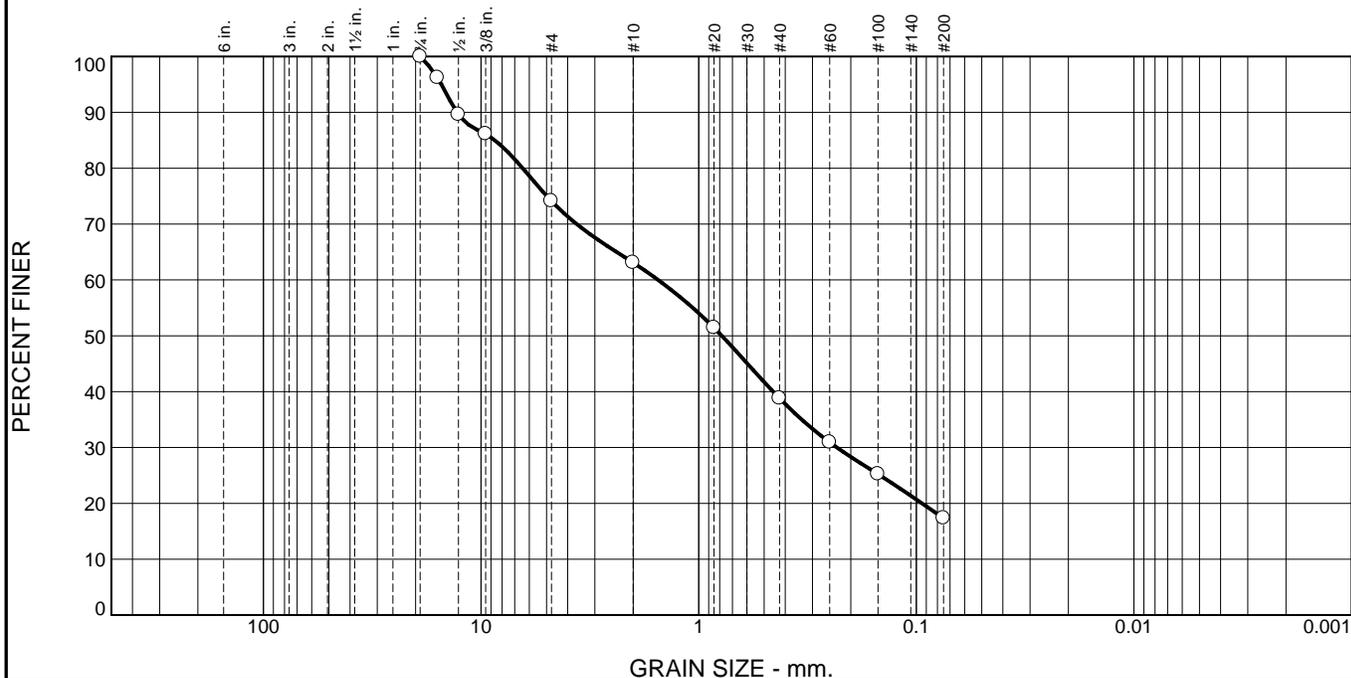
Date Received: 10/23/13 **Date Tested:** 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings **Depth:** 2.5-6.5 feet **Date Sampled:** 10/23/13
Sample Number: Boring B-6, S-2/S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix Project: King County South Sammamish Segment East Lake Sammamish Trail
Carnation, WA	Project No: 0105-010 Figure B-1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	25.9	11.0	24.3	21.4	17.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
5/8	96.2		
1/2	89.6		
3/8	86.1		
#4	74.1		
#10	63.1		
#20	51.4		
#40	38.8		
#60	30.9		
#100	25.2		
#200	17.4		

Material Description

Brown silty fine to coarse SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 12.9154 D₈₅= 8.6397 D₆₀= 1.5365
 D₅₀= 0.7832 D₃₀= 0.2318 D₁₅=
 D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/23/13

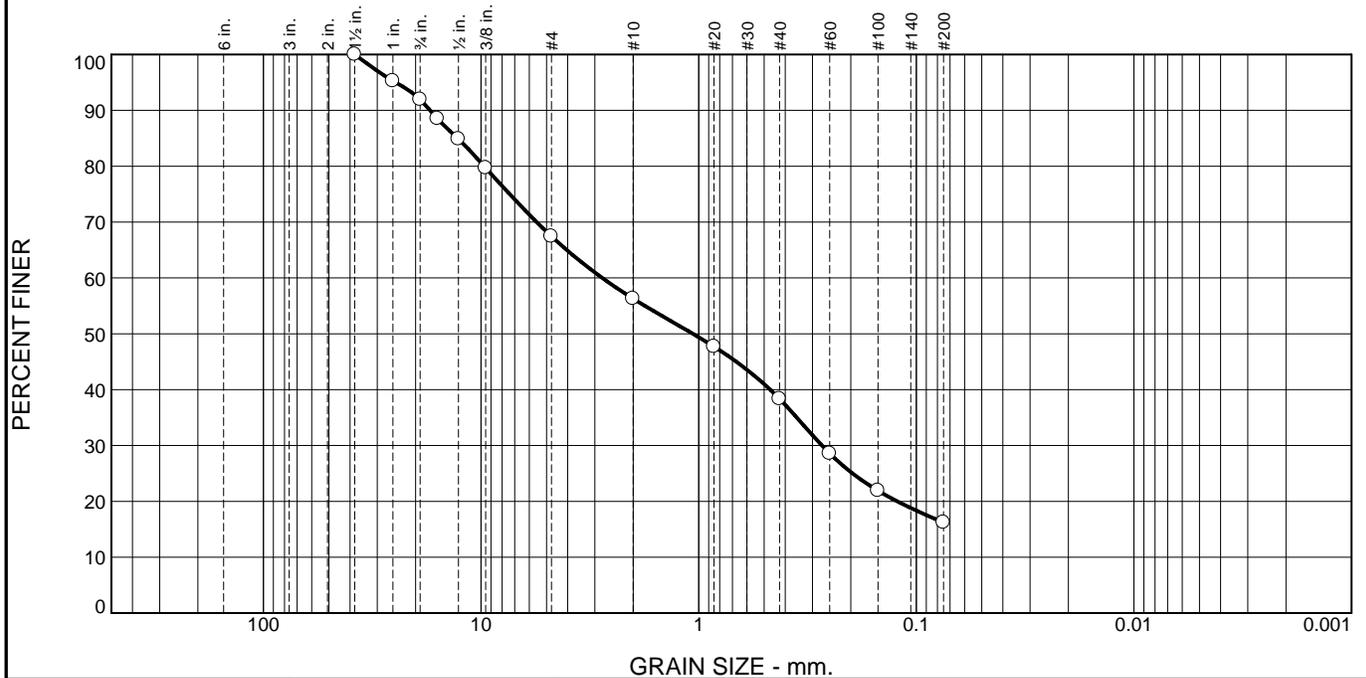
Date Received: 10/23/13 Date Tested: 11/11-11/13/13
 Tested By: SAB
 Checked By: KSK 11/14/13
 Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet Date Sampled: 10/23/13
 Sample Number: Boring B-7, S-2,S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-2

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.1	24.4	11.2	18.0	22.1	16.2	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	95.3		
3/4	91.9		
5/8	88.5		
1/2	84.9		
3/8	79.7		
#4	67.5		
#10	56.3		
#20	47.7		
#40	38.3		
#60	28.6		
#100	21.9		
#200	16.2		

Material Description
Brown silty fine to coarse SAND with gravel

Atterberg Limits (ASTM D 4318)
 PL= NP LL= NV PI= NP

Classification
 USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients
 D₉₀= 17.1528 D₈₅= 12.8139 D₆₀= 2.7744
 D₅₀= 1.0632 D₃₀= 0.2715 D₁₅=
 D₁₀= C_u= C_c=

Remarks
Sampled by ALG 10/21/13

Date Received: 10/21/13 **Date Tested:** 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings **Depth:** 2.5-6.5 feet
Sample Number: Boring B-12, S-2,S-3

Date Sampled: 10/21/13

ICICLE CREEK ENGINEERS, INC.

Client: King County / Parametrix

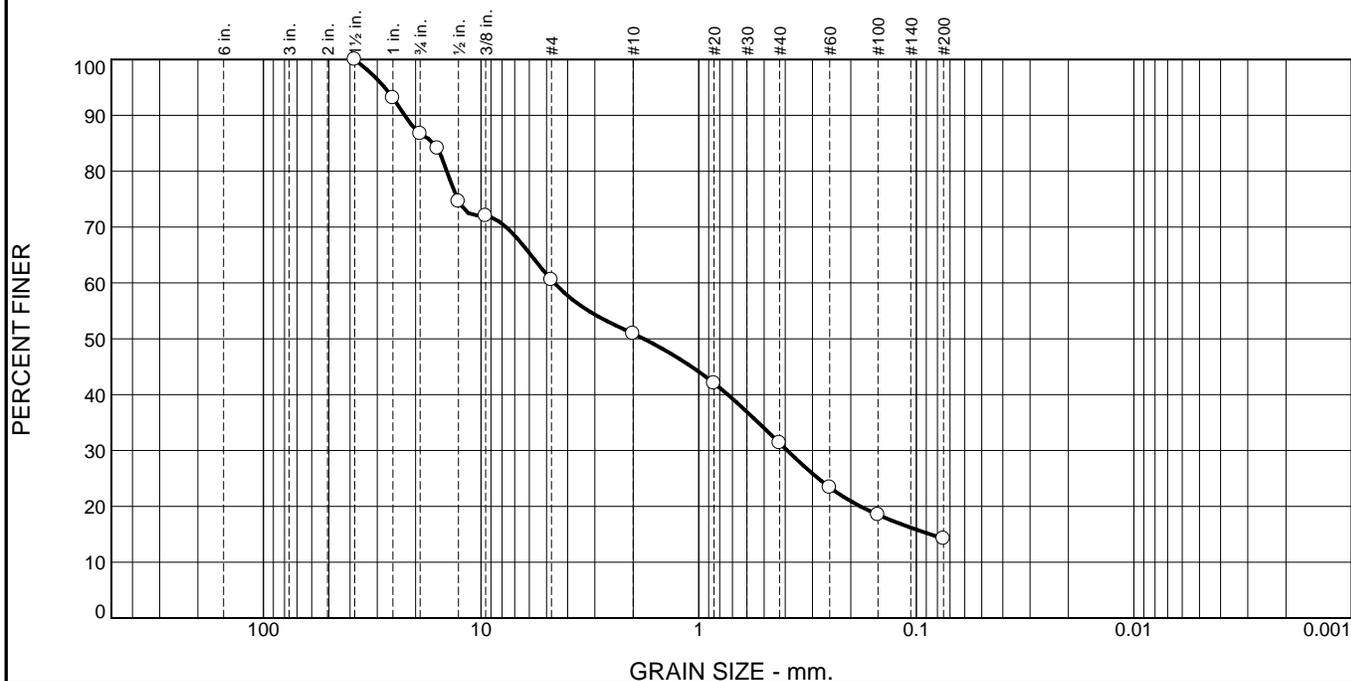
Project: King County South Sammamish Segment East Lake Sammamish Trail

Carnation, WA

Project No: 0105-010

Figure B-3

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.3	26.1	9.7	19.6	17.1	14.2	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	93.1		
3/4	86.7		
5/8	84.1		
1/2	74.6		
3/8	72.0		
#4	60.6		
#10	50.9		
#20	42.0		
#40	31.3		
#60	23.4		
#100	18.5		
#200	14.2		

Material Description

Brown silty fine to medium SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 22.4422 D₈₅= 16.4759 D₆₀= 4.6089
D₅₀= 1.7909 D₃₀= 0.3913 D₁₅= 0.0863
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/21/13

Date Received: 10/21/13 Date Tested: 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

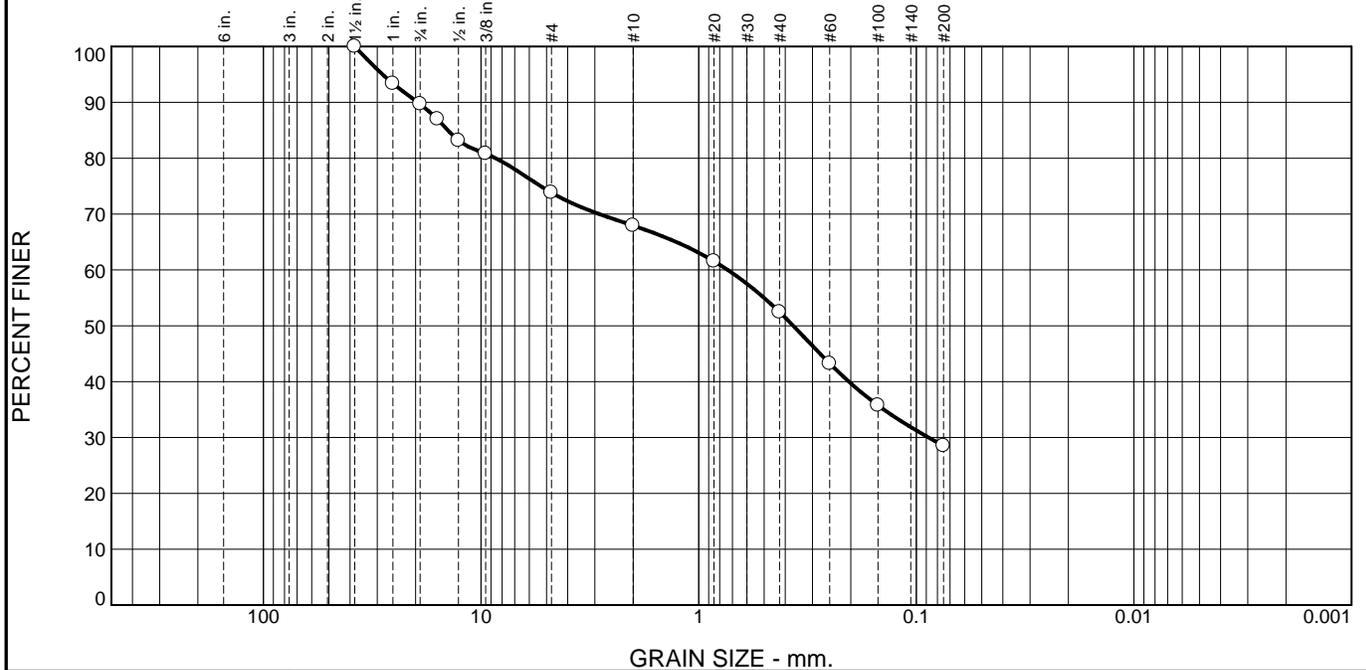
* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet
Sample Number: Boring B-14, S-2,S-3

Date Sampled: 10/21/13

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-4

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.3	15.9	5.9	15.4	24.0	28.5	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	93.4		
3/4	89.7		
5/8	87.0		
1/2	83.2		
3/8	80.8		
#4	73.8		
#10	67.9		
#20	61.5		
#40	52.5		
#60	43.2		
#100	35.7		
#200	28.5		

Material Description

Light brown silty fine to medium SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 19.5246 D₈₅= 14.2225 D₆₀= 0.7353
D₅₀= 0.3676 D₃₀= 0.0878 D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/21/13

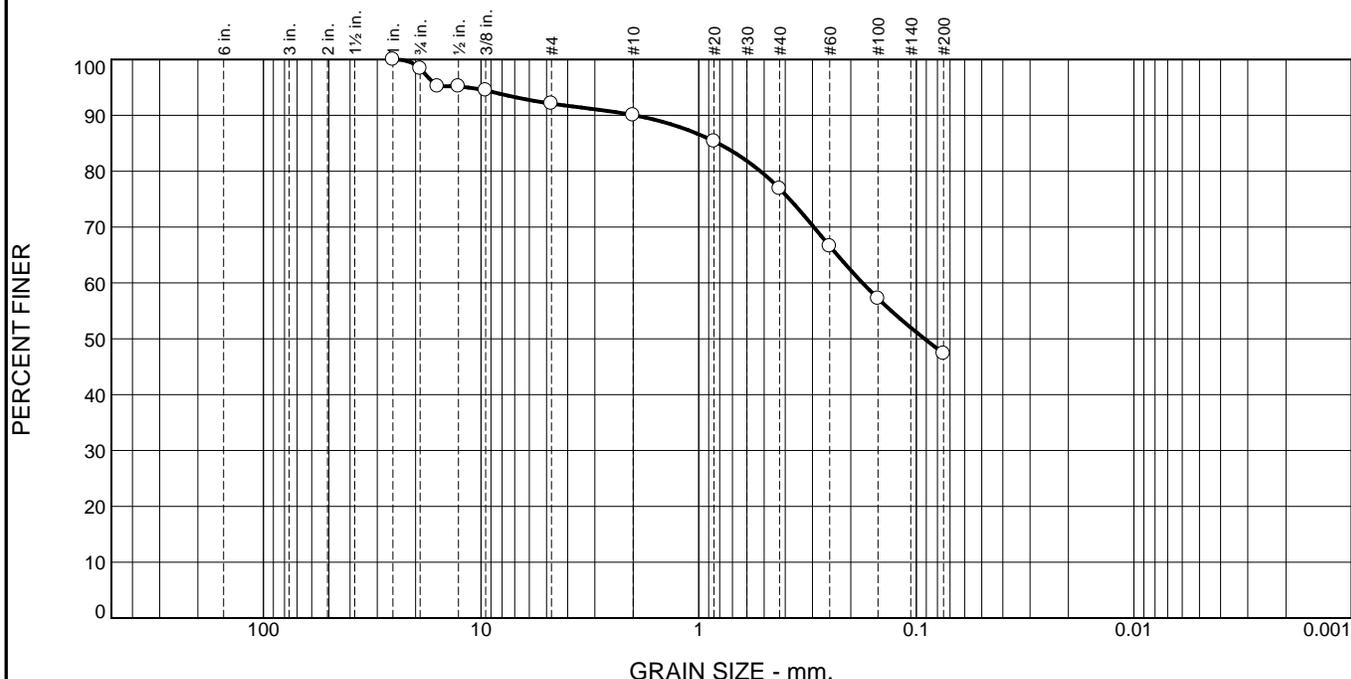
Date Received: 10/21/13 Date Tested: 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6 feet Date Sampled: 10/21/13
Sample Number: Boring B-15, S-2,S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-5

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.6	6.3	2.1	13.1	29.5	47.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.0	100.0		
3/4	98.4		
5/8	95.2		
1/2	95.2		
3/8	94.5		
#4	92.1		
#10	90.0		
#20	85.4		
#40	76.9		
#60	66.6		
#100	57.2		
#200	47.4		

Material Description

Dark grey and brown silty fine to medium SAND with a trace of gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-4(0)

Coefficients

D₉₀= 1.9716 D₈₅= 0.8156 D₆₀= 0.1766
D₅₀= 0.0915 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/18/13

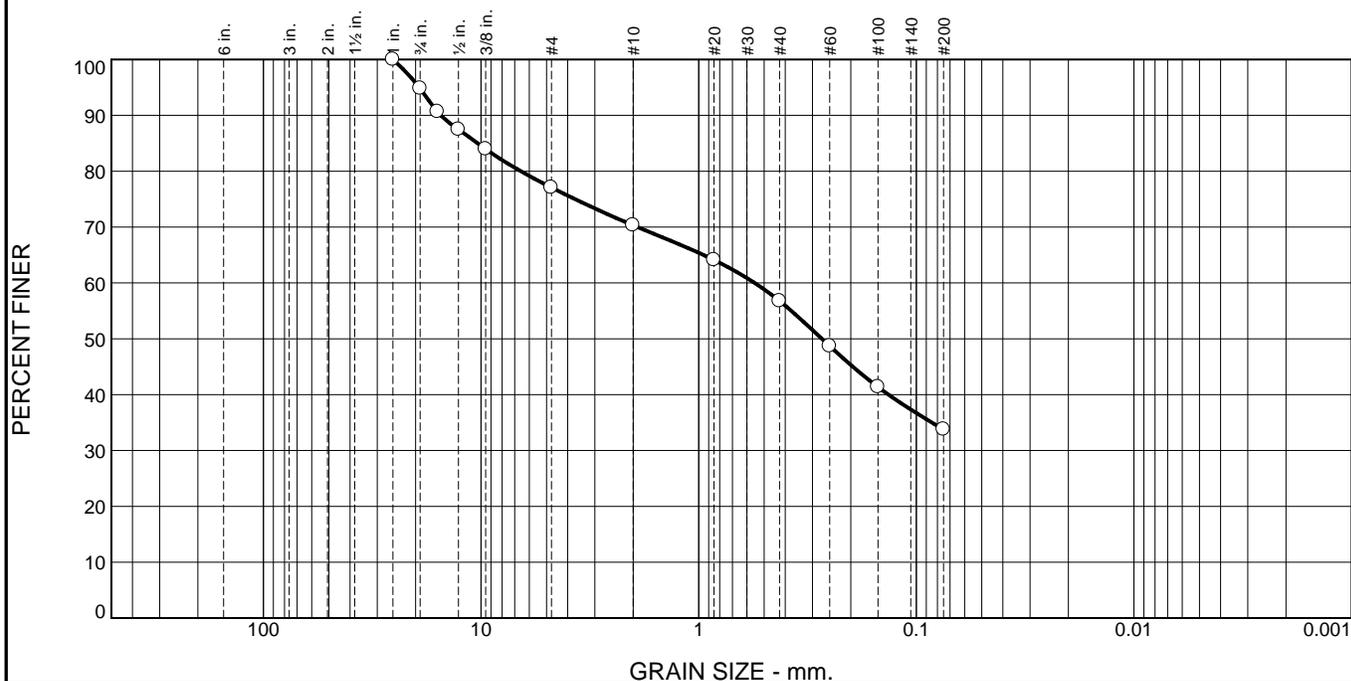
Date Received: 10/18/13 **Date Tested:** 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings **Depth:** 2.5-6.5 feet **Date Sampled:** 10/18/13
Sample Number: Boring B-25, S-2,S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix Project: King County South Sammamish Segment East Lake Sammamish Trail
Carnation, WA	Project No: 0105-010 Figure B-6

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.2	17.7	6.8	13.5	23.0	33.8	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.0	100.0		
3/4	94.8		
5/8	90.6		
1/2	87.5		
3/8	84.0		
#4	77.1		
#10	70.3		
#20	64.1		
#40	56.8		
#60	48.7		
#100	41.4		
#200	33.8		

Material Description

Light brown and gray silty fine to medium SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 15.3381 D₈₅= 10.3828 D₆₀= 0.5529
 D₅₀= 0.2716 D₃₀= D₁₅=
 D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/12/3

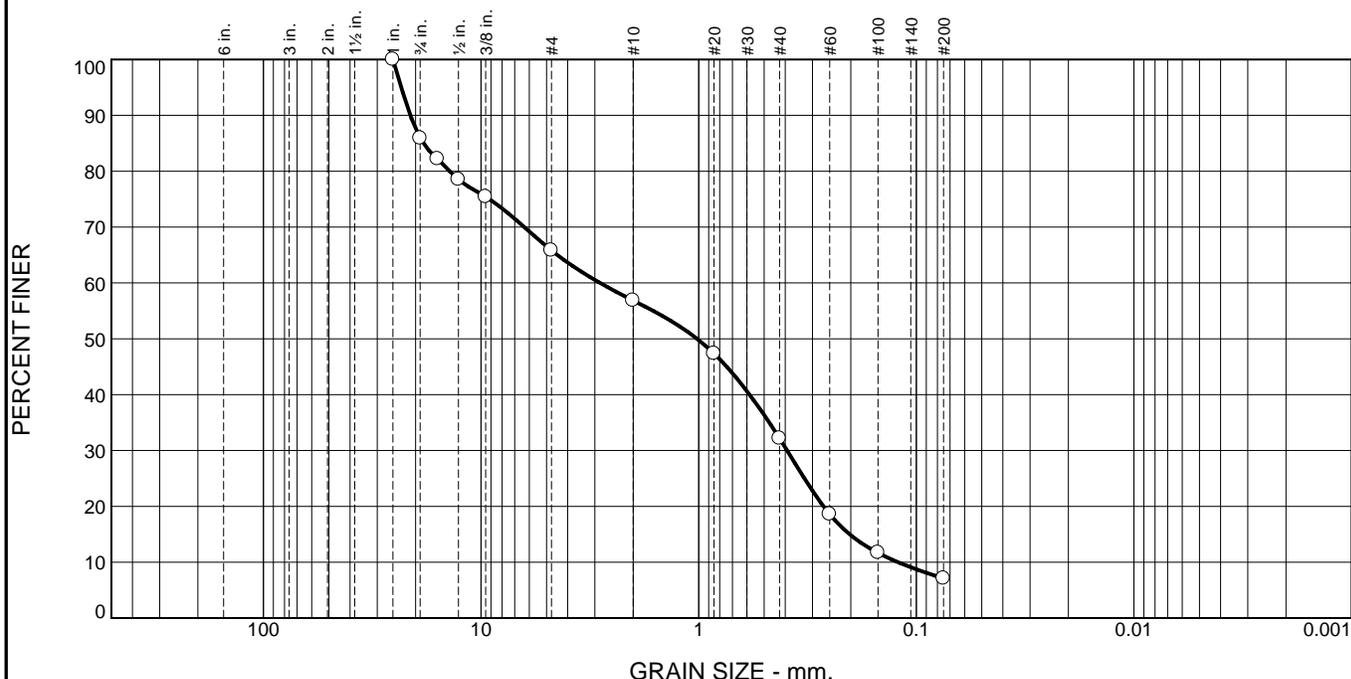
Date Received: 10/12/13 Date Tested: 11/11-11/13/13
 Tested By: SAB
 Checked By: KSK 11/14/13
 Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet Date Sampled: 10/12/13
 Sample Number: Boring B-61, S-2,S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-7

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.1	20.1	9.0	24.6	25.1	7.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.0	100.0		
3/4	85.9		
5/8	82.2		
1/2	78.5		
3/8	75.4		
#4	65.8		
#10	56.8		
#20	47.4		
#40	32.2		
#60	18.6		
#100	11.7		
#200	7.1		

Material Description

Brown fine to medium SAND with silt and gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 21.1274 D₈₅= 18.4388 D₆₀= 2.8395
D₅₀= 1.0172 D₃₀= 0.3923 D₁₅= 0.2025
D₁₀= 0.1212 C_u= 23.42 C_c= 0.45

Remarks

Sampled by ALG 10/23/13

Date Received: 10/23/13 Date Tested: 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet
Sample Number: Boring B-84, S-2,S-3

Date Sampled: 10/23/13

ICICLE CREEK ENGINEERS, INC.

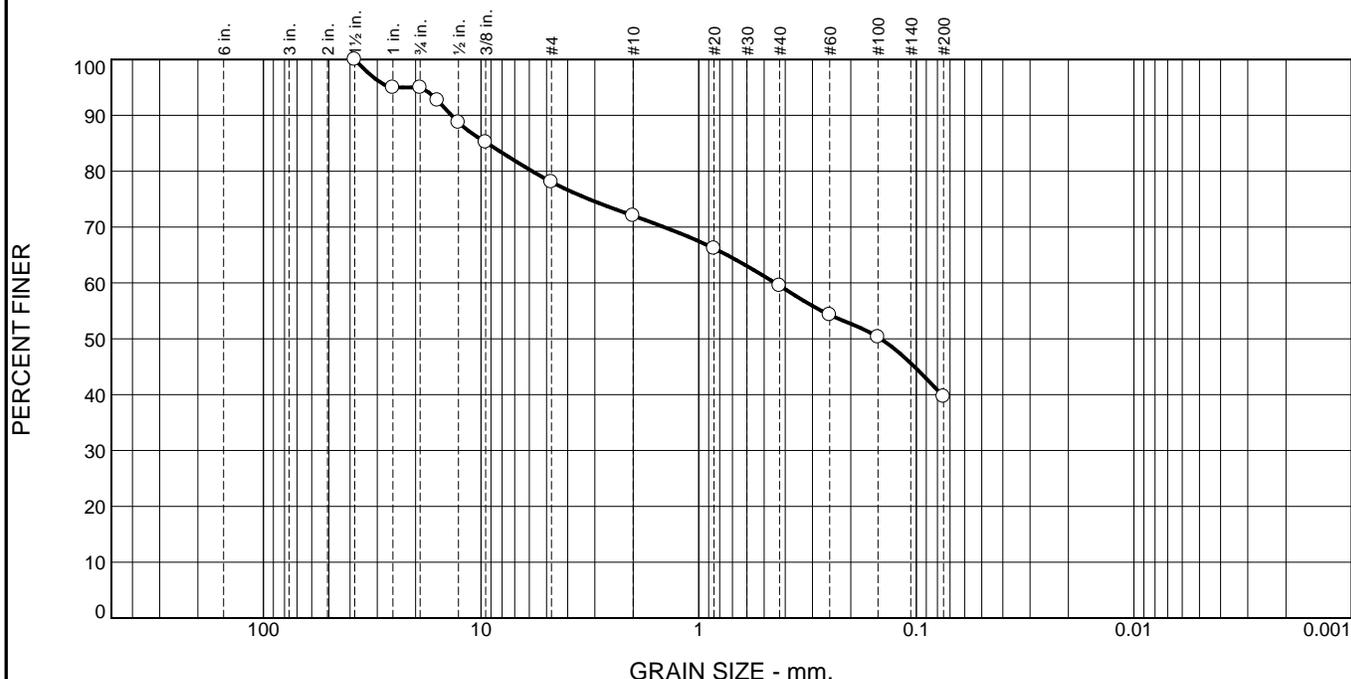
Client: King County / Parametrix
Project: King County South Sammamish Segment East Lake Sammamish Trail

Carnation, WA

Project No: 0105-010

Figure B-8

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.0	16.9	6.1	12.5	19.8	39.7	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	95.0		
3/4	95.0		
5/8	92.7		
1/2	88.7		
3/8	85.2		
#4	78.1		
#10	72.0		
#20	66.2		
#40	59.5		
#60	54.3		
#100	50.3		
#200	39.7		

Material Description

Brown silty fine to medium SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-4(0)

Coefficients

D₉₀= 13.6827 D₈₅= 9.3676 D₆₀= 0.4457
D₅₀= 0.1457 D₃₀= D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/23/13

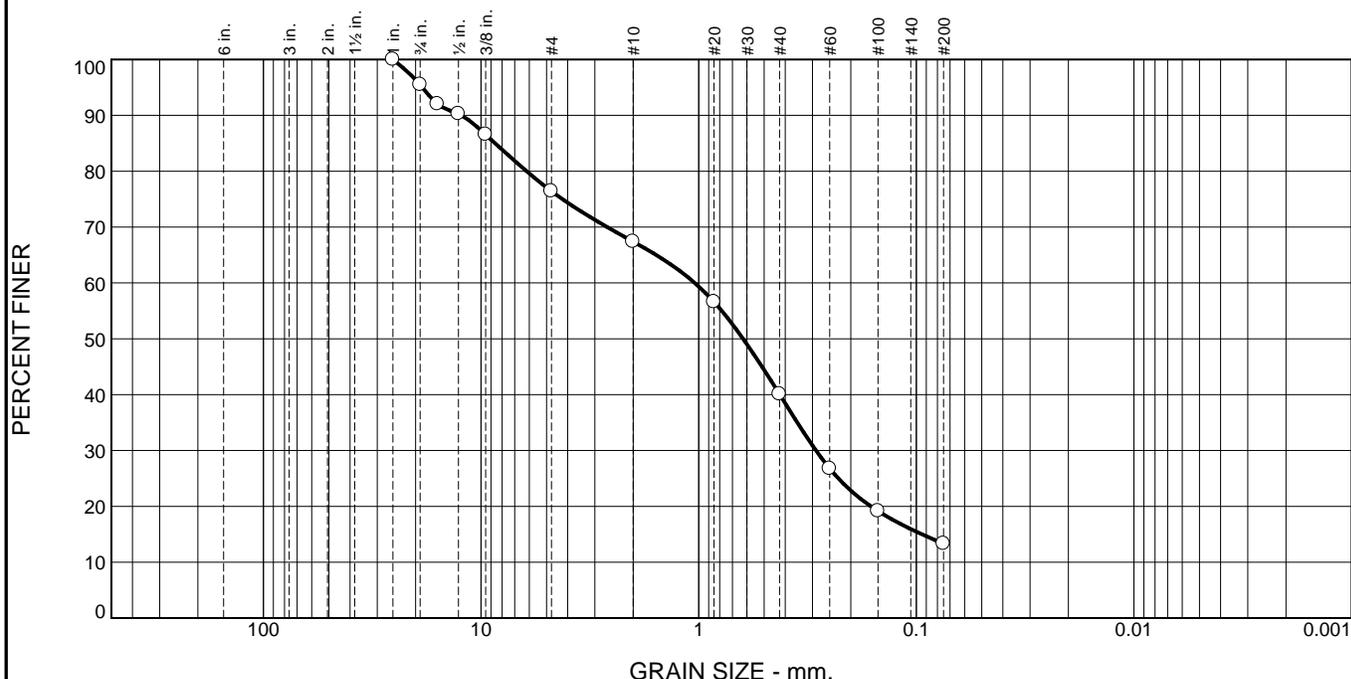
Date Received: 10/23/13 Date Tested: 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet Date Sampled: 10/23/13
Sample Number: Boring B-86, S-2,S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-9

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.5	19.1	9.0	27.3	26.8	13.3	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.0	100.0		
3/4	95.5		
5/8	92.0		
1/2	90.3		
3/8	86.6		
#4	76.4		
#10	67.4		
#20	56.6		
#40	40.1		
#60	26.8		
#100	19.2		
#200	13.3		

Material Description

Brown silty fine to medium SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 12.2951 D₈₅= 8.6176 D₆₀= 1.0430
D₅₀= 0.6250 D₃₀= 0.2891 D₁₅= 0.0941
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/22/13

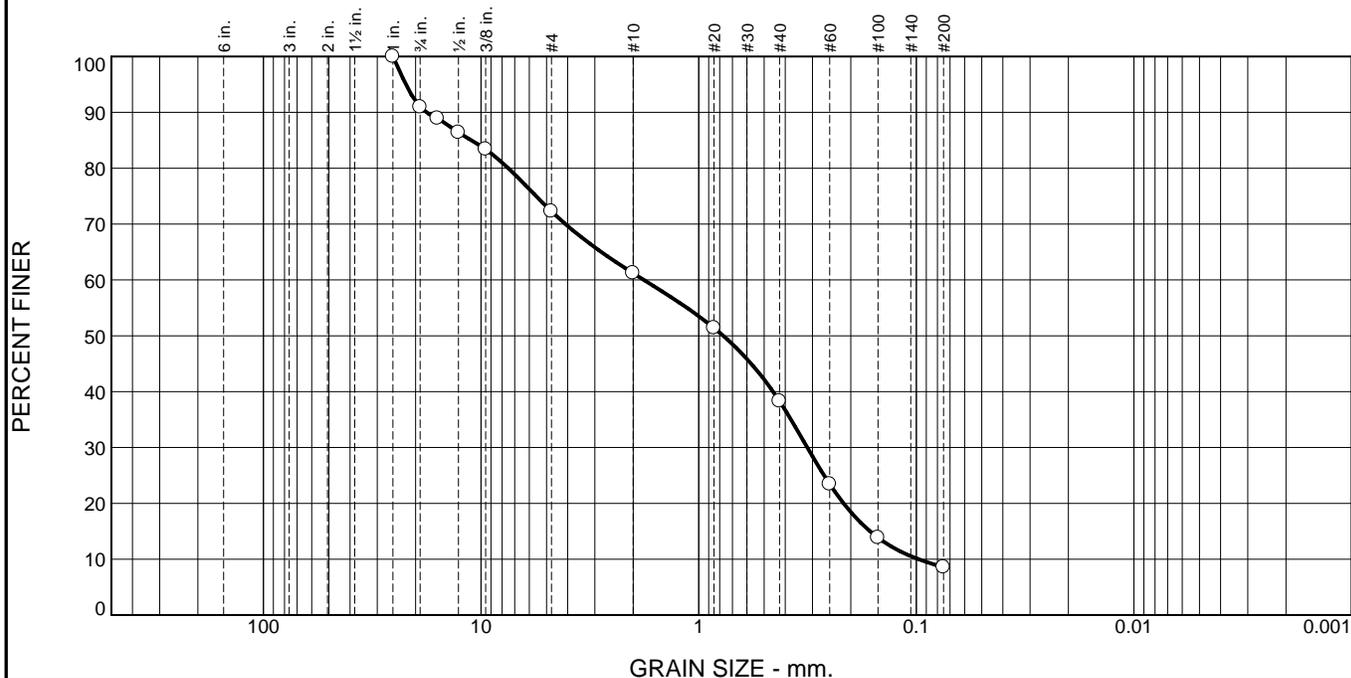
Date Received: 10/22/13 Date Tested: 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet Date Sampled: 10/22/13
Sample Number: Boring B-88, S-2,S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-10

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.1	18.6	11.1	22.9	29.7	8.6	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.0	100.0		
3/4	90.9		
5/8	88.9		
1/2	86.4		
3/8	83.4		
#4	72.3		
#10	61.2		
#20	51.4		
#40	38.3		
#60	23.4		
#100	13.9		
#200	8.6		

Material Description

Brown fine to coarse SAND with silt and gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 17.8653 D₈₅= 11.1027 D₆₀= 1.7853
 D₅₀= 0.7715 D₃₀= 0.3169 D₁₅= 0.1632
 D₁₀= 0.0975 C_u= 18.32 C_c= 0.58

Remarks

Sampled by ALG 10/22/13

Date Received: 10/22/13 Date Tested: 11/11-11/13/13
 Tested By: SAB
 Checked By: KSK 11/14/13
 Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5
 Sample Number: Boring B-89, S-2,S-3

Date Sampled: 10/22/13

ICICLE CREEK ENGINEERS, INC.

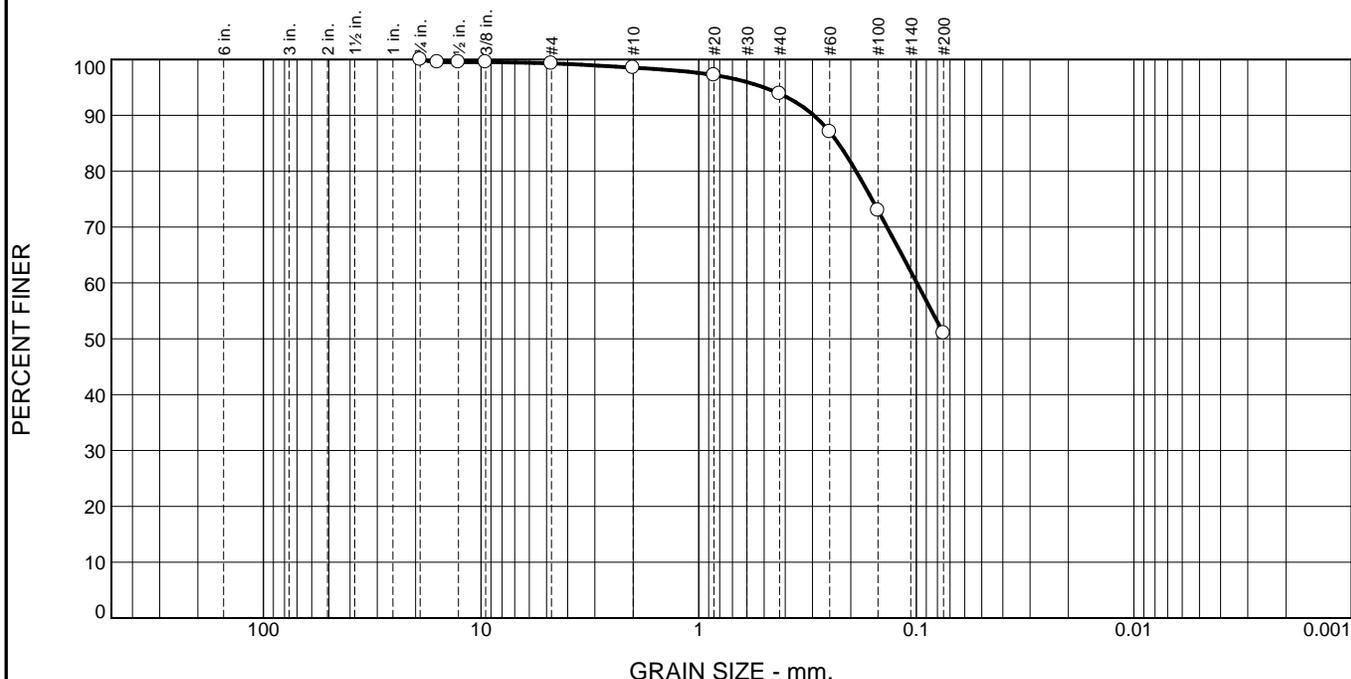
Client: King County / Parametrix
 Project: King County South Sammamish Segment East Lake Sammamish Trail

Carnation, WA

Project No: 0105-010

Figure B-11

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.8	4.6	42.9	51.0	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
5/8	99.5		
1/2	99.5		
3/8	99.5		
#4	99.3		
#10	98.5		
#20	97.2		
#40	93.9		
#60	87.0		
#100	73.0		
#200	51.0		

Material Description

Brown fine sandy SILT

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= ML AASHTO (M 145)= A-4(0)

Coefficients

D₉₀= 0.2957 D₈₅= 0.2283 D₆₀= 0.0994
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/22/13

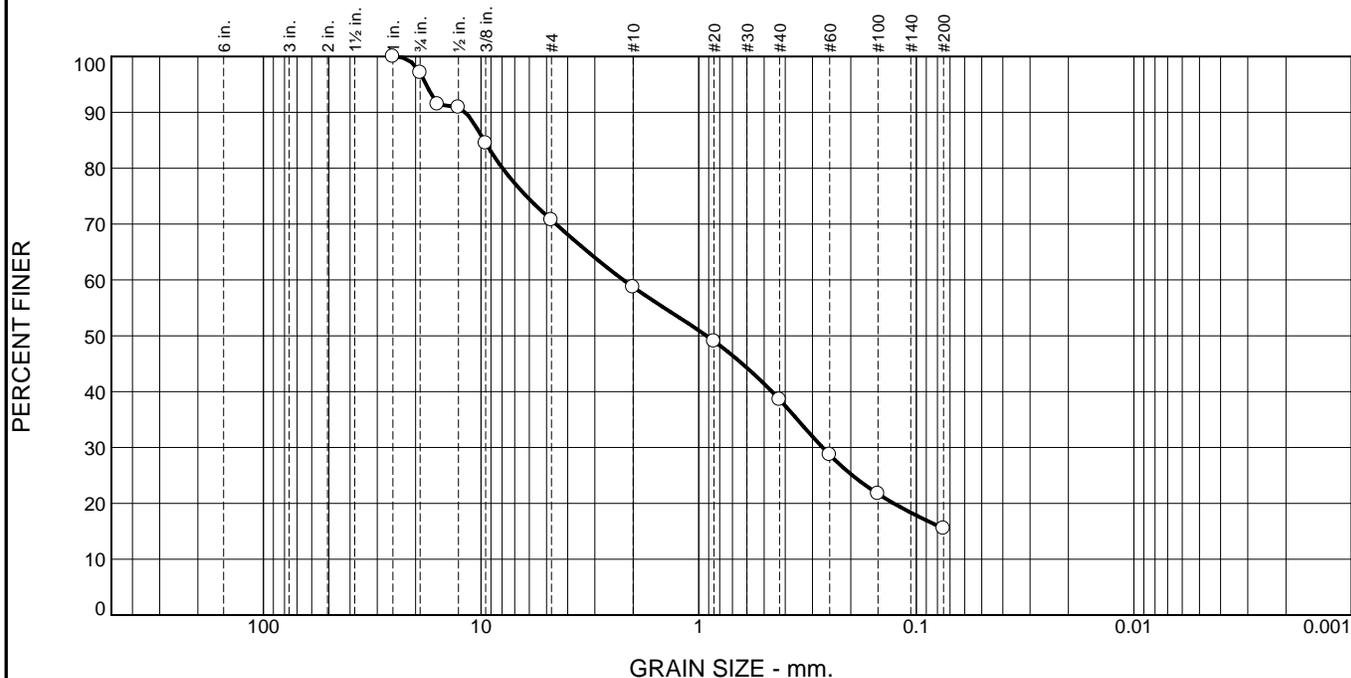
Date Received: 10/22/13 Date Tested: 11/11-11/13/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet Date Sampled: 10/22/13
Sample Number: Boring B-90, S-2,S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-12

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.9	26.4	12.0	20.1	23.1	15.5	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.0	100.0		
3/4	97.1		
5/8	91.5		
1/2	90.9		
3/8	84.5		
#4	70.7		
#10	58.7		
#20	49.0		
#40	38.6		
#60	28.7		
#100	21.7		
#200	15.5		

Material Description

Brown silty fine to coarse SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 11.7868 D₈₅= 9.6958 D₆₀= 2.2198
D₅₀= 0.9205 D₃₀= 0.2697 D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/22/13

Date Received: 10/22/13 Date Tested: 11/11-11/14/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet
Sample Number: Boring B-91, S-2,S-3

Date Sampled: 10/22/13

ICICLE CREEK ENGINEERS, INC.

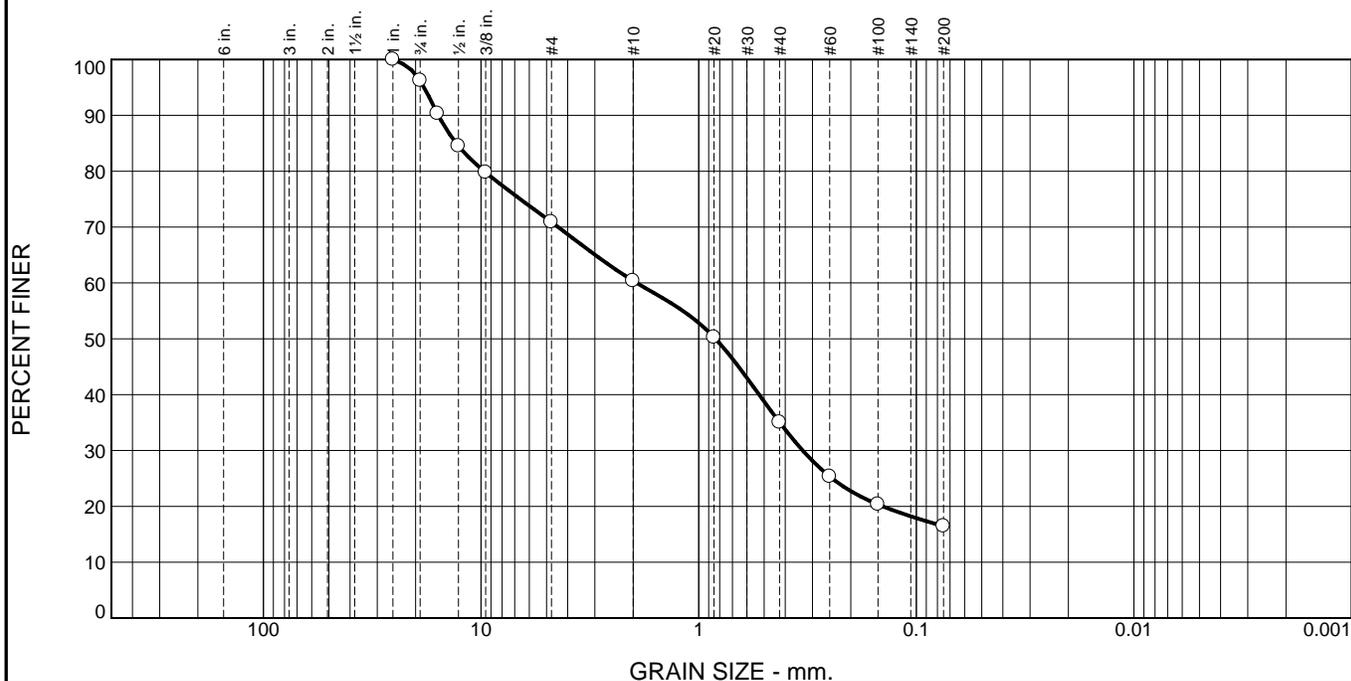
Client: King County / Parametrix
Project: King County South Sammamish Segment East Lake Sammamish Trail

Carnation, WA

Project No: 0105-010

Figure B-13

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.8	25.3	10.5	25.4	18.6	16.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.0	100.0		
3/4	96.2		
5/8	90.3		
1/2	84.5		
3/8	79.8		
#4	70.9		
#10	60.4		
#20	50.3		
#40	35.0		
#60	25.3		
#100	20.4		
#200	16.4		

Material Description

Light brown silty fine to coarse SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 15.7296 D₈₅= 13.0057 D₆₀= 1.9279
D₅₀= 0.8373 D₃₀= 0.3325 D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/21/13

Date Received: 10/21/13 Date Tested: 11/11-11/14/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

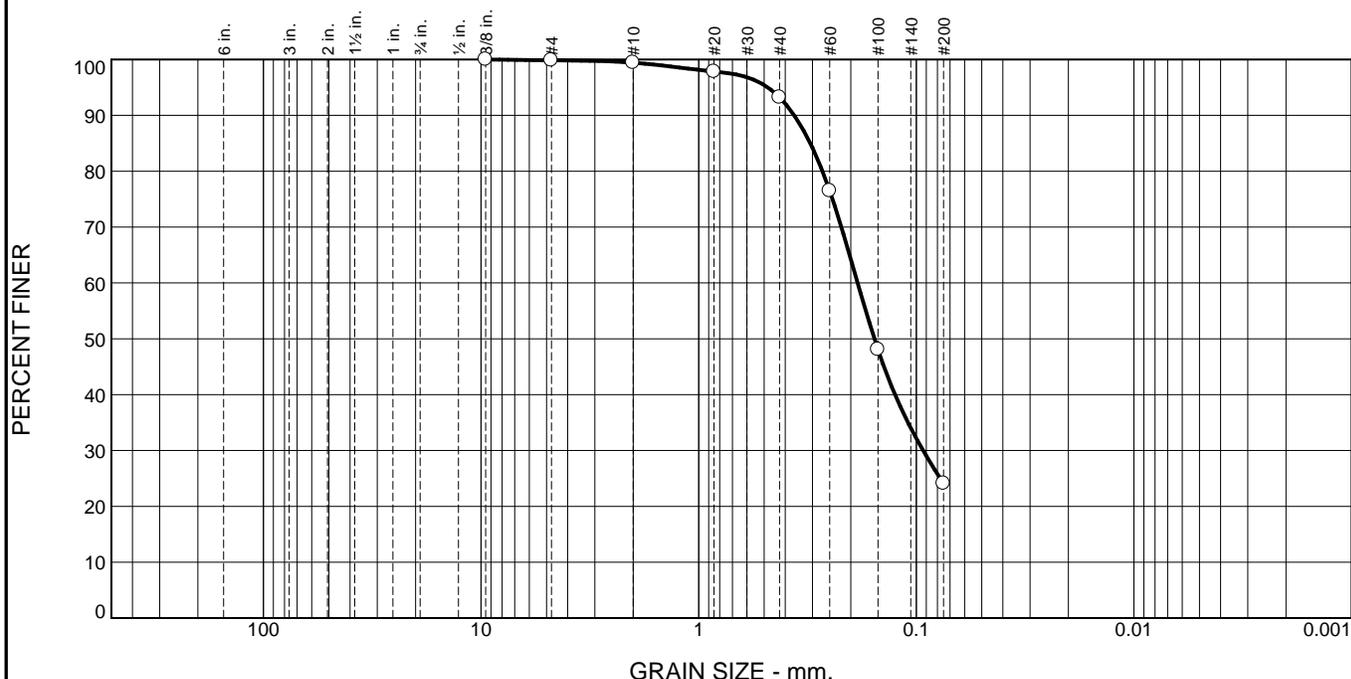
* (no specification provided)

Source of Sample: Test Borings Depth: 2.5-6.5 feet
Sample Number: Boring B-94, S-2,S-3

Date Sampled: 10/21/13

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-14

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.5	6.2	69.1	24.1	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/8	100.0		
#4	99.9		
#10	99.4		
#20	97.8		
#40	93.2		
#60	76.5		
#100	48.1		
#200	24.1		

Material Description

Light brown silty fine SAND

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SM AASHTO (M 145)= A-2-4(0)

Coefficients

D₉₀= 0.3638 D₈₅= 0.3070 D₆₀= 0.1860
D₅₀= 0.1558 D₃₀= 0.0930 D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by ALG 10/12/13

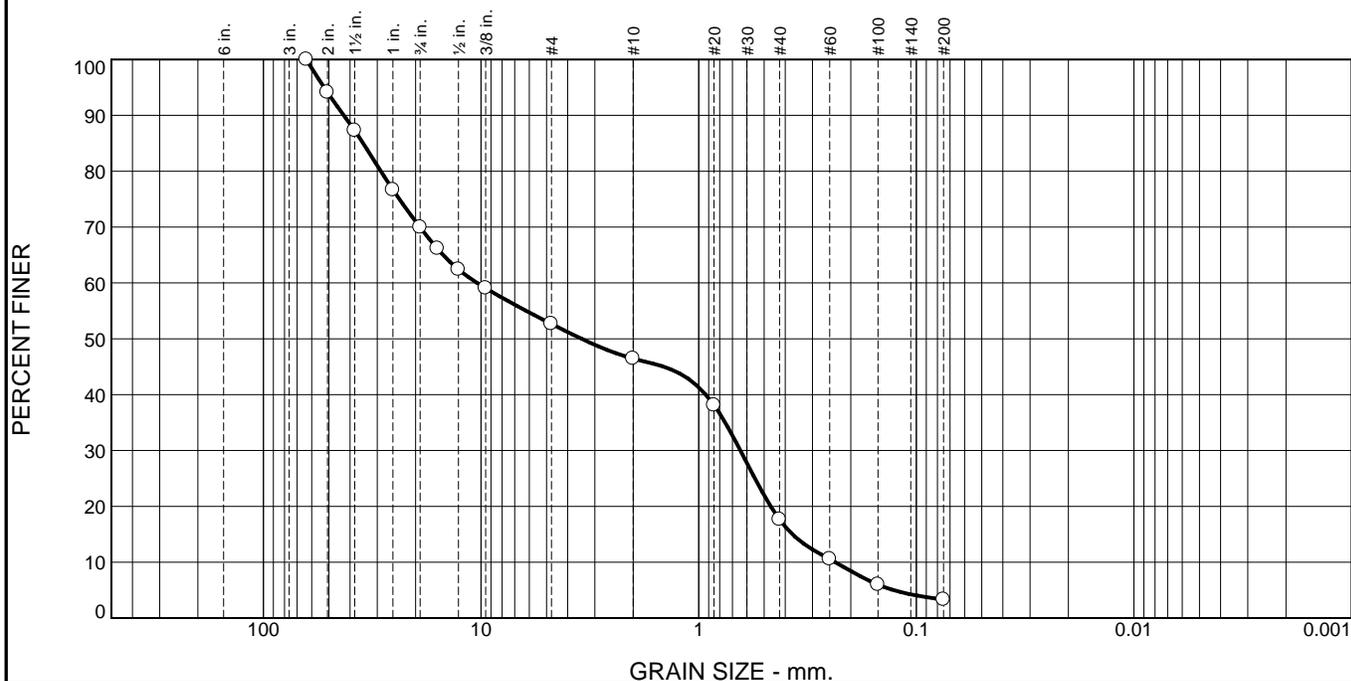
Date Received: 10/12/13 Date Tested: 11/11-11/14/13
Tested By: SAB
Checked By: KSK 11/14/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Test Borings Depth: 5-6.5 feet Date Sampled: 10/12/13
Sample Number: Boring B-98, S-3

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-15

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	30.0	17.3	6.3	28.8	14.3	3.3	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2.5	100.0		
2.0	94.1		
1.5	87.3		
1.0	76.7		
3/4	70.0		
5/8	66.1		
1/2	62.4		
3/8	59.1		
#4	52.7		
#10	46.4		
#20	38.1		
#40	17.6		
#60	10.5		
#100	6.0		
#200	3.3		

Material Description

Brown fine to medium SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP AASHTO (M 145)= A-1-a

Coefficients

D₉₀= 42.7055 D₈₅= 34.8308 D₆₀= 10.4323
D₅₀= 3.4521 D₃₀= 0.6429 D₁₅= 0.3708
D₁₀= 0.2358 C_u= 44.24 C_c= 0.17

Remarks

Sampled by JMS 10/30/13

Date Received: 10/30/13 Date Tested: 11/15-11/21/13

Tested By: SAB

Checked By: KSK 11/21/13

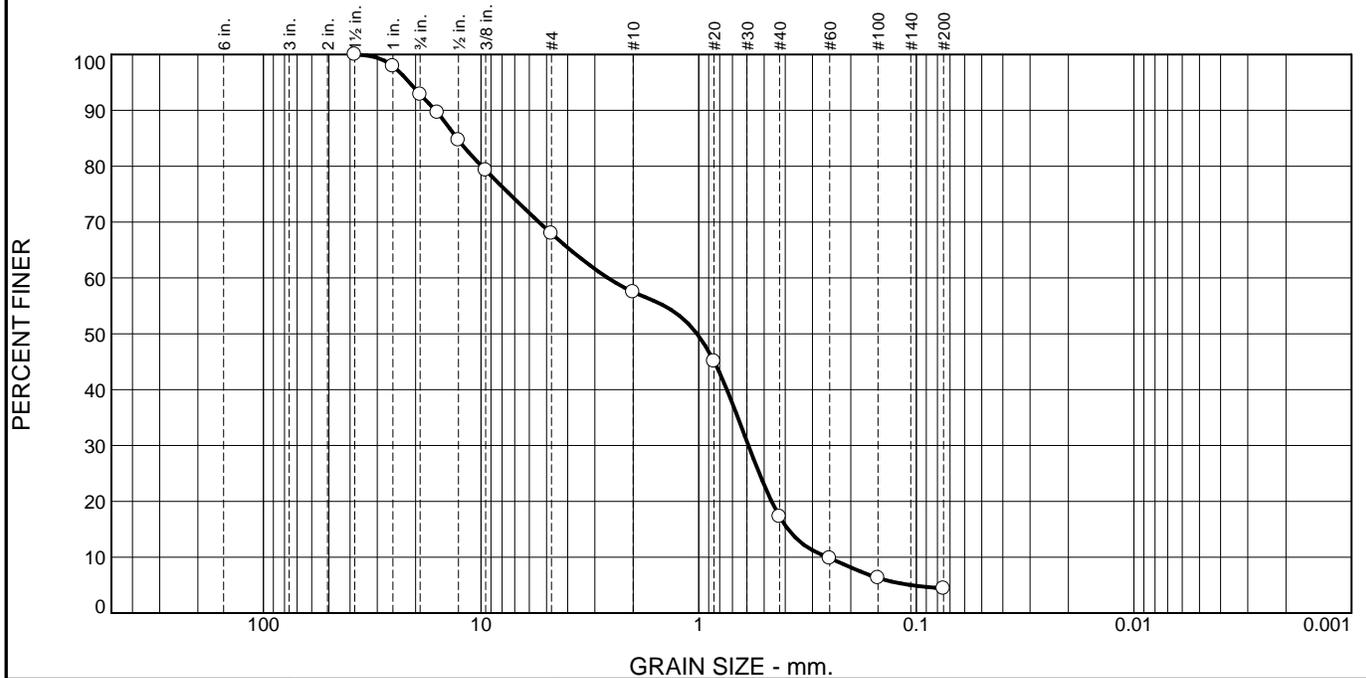
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Infiltration Test Holes Depth: 2.5 feet Date Sampled: 10/30/13
Sample Number: IT-1

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-16

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.2	24.8	10.5	40.2	12.9	4.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1.5	100.0		
1.0	97.9		
3/4	92.8		
5/8	89.6		
1/2	84.7		
3/8	79.3		
#4	68.0		
#10	57.5		
#20	45.1		
#40	17.3		
#60	9.8		
#100	6.3		
#200	4.4		

Material Description

Brown fine to coarse SAND with gravel

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= SP AASHTO (M 145)= A-1-b

Coefficients

D₉₀= 16.1986 D₈₅= 12.9035 D₆₀= 2.6122
 D₅₀= 1.0177 D₃₀= 0.5905 D₁₅= 0.3882
 D₁₀= 0.2560 C_u= 10.20 C_c= 0.52

Remarks

Sampled by JMS 10/29/13

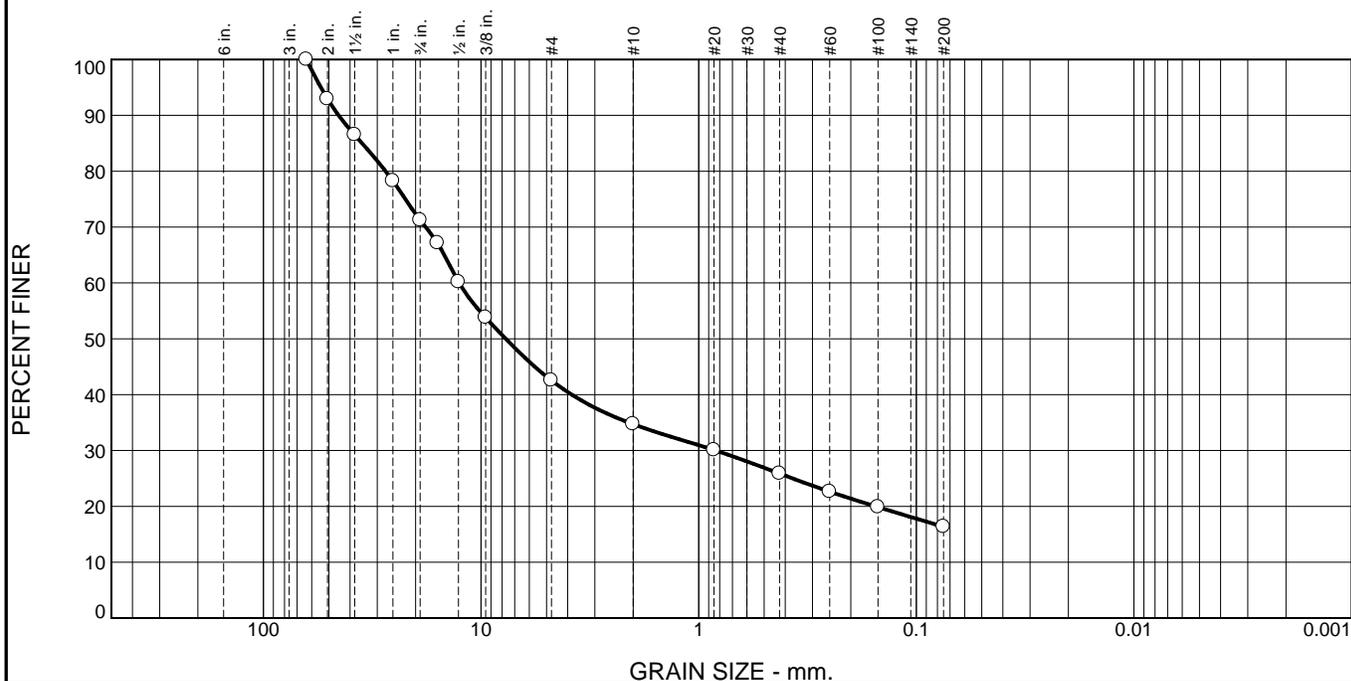
Date Received: 10/29/13 Date Tested: 11/15-11/21/13
 Tested By: SAB
 Checked By: KSK 11/21/13
 Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Infiltration Test Holes Depth: 2.0 feet Date Sampled: 10/29/13
 Sample Number: IT-2

ICICLE CREEK ENGINEERS, INC.	Client: King County / Parametrix
Carnation, WA	Project: King County South Sammamish Segment East Lake Sammamish Trail
Project No: 0105-010	Figure B-17

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	28.8	28.7	7.8	8.8	9.5	16.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2.5	100.0		
2.0	92.9		
1.5	86.5		
1.0	78.2		
3/4	71.2		
5/8	67.2		
1/2	60.2		
3/8	53.8		
#4	42.5		
#10	34.7		
#20	30.1		
#40	25.9		
#60	22.6		
#100	19.9		
#200	16.4		

Material Description
Brown silty fine to coarse GRAVEL with sand

Atterberg Limits (ASTM D 4318)
 PL= NP LL= NV PI= NP

Classification
 USCS (D 2487)= GM AASHTO (M 145)= A-1-b

Coefficients
 D₉₀= 45.1556 D₈₅= 35.2256 D₆₀= 12.6164
 D₅₀= 7.7039 D₃₀= 0.8371 D₁₅=
 D₁₀= C_u= C_c=

Remarks
Sampled by JMS 10/28/13

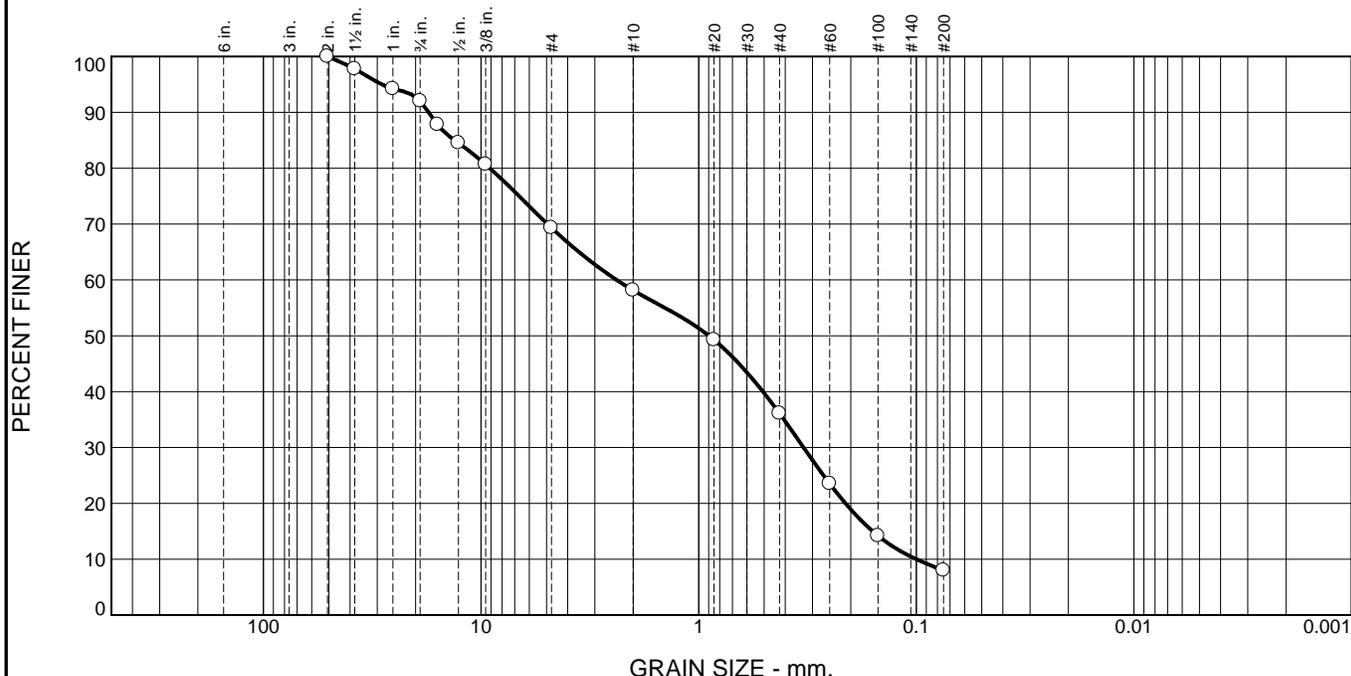
Date Received: 10/28/13 **Date Tested:** 11/15-11/21/13
Tested By: SAB
Checked By: KSK 11/22/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Infiltration Test Holes **Depth:** 3.0 feet **Date Sampled:** 10/28/13
Sample Number: IT-3

ICICLE CREEK ENGINEERS, INC. Carnation, WA	Client: King County / Parametrix Project: King County South Sammamish Segment East Lake Sammamish Trail Project No: 0105-010 Figure B-18
-----------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.0	22.7	11.2	22.0	28.1	8.0	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
2.0	100.0		
1.5	97.8		
1.0	94.2		
3/4	92.0		
5/8	87.8		
1/2	84.5		
3/8	80.7		
#4	69.3		
#10	58.1		
#20	49.3		
#40	36.1		
#60	23.5		
#100	14.2		
#200	8.0		

Material Description
Brown fine to medium SAND with silt and gravel

Atterberg Limits (ASTM D 4318)
 PL= NP LL= NV PI= NP

Classification
 USCS (D 2487)= SP-SM AASHTO (M 145)= A-1-b

Coefficients
 D₉₀= 17.4036 D₈₅= 13.2267 D₆₀= 2.3844
 D₅₀= 0.8966 D₃₀= 0.3295 D₁₅= 0.1588
 D₁₀= 0.1000 C_u= 23.86 C_c= 0.46

Remarks
Sampled by JMS 10/30/13

Date Received: 10/30/13 **Date Tested:** 11/15-11/21/13
Tested By: SAB
Checked By: KSK 11/21/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Infiltration Test Holes
Sample Number: IT-4

Depth: 2.0 feet

Date Sampled: 10/30/13

ICICLE CREEK ENGINEERS, INC.

Client: King County / Parametrix

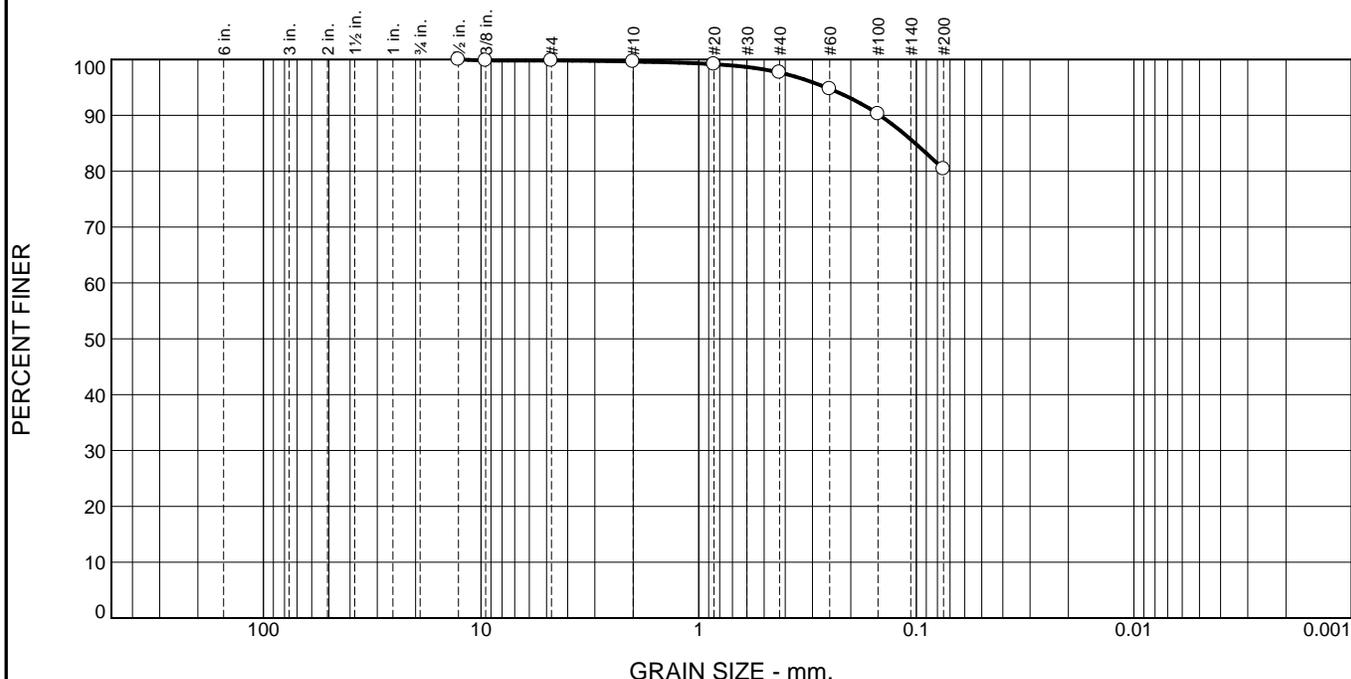
Project: King County South Sammamish Segment East Lake Sammamish Trail

Carnation, WA

Project No: 0105-010

Figure B-19

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.2	1.9	17.3	80.4	

TEST RESULTS			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.5	100.0		
0.375	99.8		
#4	99.8		
#10	99.6		
#20	99.2		
#40	97.7		
#60	94.7		
#100	90.2		
#200	80.4		

Material Description

Brown SILT with fine sand

Atterberg Limits (ASTM D 4318)

PL= NP LL= NV PI= NP

Classification

USCS (D 2487)= ML AASHTO (M 145)= A-4(0)

Coefficients

D₉₀= 0.1468 D₈₅= 0.1012 D₆₀=
D₅₀= D₃₀= D₁₅=
D₁₀= C_u= C_c=

Remarks

Sampled by JMS 10/31/13

Date Received: 10/31/13 Date Tested: 11/19/13
Tested By: SAB
Checked By: KSK 11/19/13
Title: Principal Eng Geologist

* (no specification provided)

Source of Sample: Infiltration Test Holes
Sample Number: IT-5

Depth: 3.0 feet

Date Sampled: 10/31/13

ICICLE CREEK ENGINEERS, INC.

Client: King County / Parametrix

Project: King County South Sammamish Segment East Lake Sammamish Trail

Carnation, WA

Project No: 0105-010

Figure B-20

**Technical Memorandum
Hydrogeological Services
Proposed Stormwater Infiltration
East Lake Sammamish Master Plan Trail
South Sammamish Segment A
MODRET Analysis
Sammamish, Washington**

**December 9, 2014
ICE File No. 0105-010**

**Prepared For:
Parametrix, Inc.**

**Prepared By:
Icicle Creek Engineers, Inc.**

ICICLE CREEK ENGINEERS

Geotechnical, Geologic and Environmental Services

December 9, 2014

Craig Buitrago, PE
Parametrix
719 – 2nd Avenue, Suite 200
Seattle, Washington 98104

Technical Memorandum
Hydrogeological Services
Proposed Stormwater Infiltration
East Lake Sammamish Master Plan Trail
South Sammamish Segment A
MODRET Analysis
Sammamish, Washington
ICE File No. 0105-010

INTRODUCTION

At the request of Craig Buitrago, PE of Parametrix, Icicle Creek Engineers (ICE) completed ground water mounding analysis for six proposed infiltration sites for the South Sammamish Segment of the East Lake Sammamish Master Plan Trail (ELST). ICE previously submitted a geotechnical report to Parametrix related to this project dated December 11, 2013 (draft).

We understand that the Curt Foster of the King County Department of Permitting and Environmental Review (DPER) requested that the ground water mounding analysis be evaluated (modeled) under the stormwater infiltration facilities as part of the permit application process.

Mr. Buitrago provided ICE with the following documents for our review and use:

- Parametrix, October 2014, East Lake Sammamish Master Plan Trail, South Sammamish Segment A, Issaquah/Sammamish City Limit to SE 33rd Street, King County, Washington, Contract No. XX (90% Review Submittal), sheets G1 through G6, CS1, EX1 through EX9, SP1 through SP9, AL1 through AL14, SD1, DD1, DP1 through DP7, WP1 through WP3, WD1, PS1 through PS10, MD1 through MD4 and MP1 through MP3.
- Parametrix, July 2014, East Lake Sammamish Master Plan Trail, South Sammamish Segment A, Technical Information Report, prepared for King County, 234 pages.
- Parametrix, 30-day peak flow and peak volume data as calculated by the KCRTS (King County Runoff Time Series version 6.0) reduced 8-year water record (included as Attachment A).

DESCRIPTION OF PROPOSED STORMWATER INFILTRATION TRENCHES

Based on our review of the preliminary design plans and our discussions with Mr. Buitrago, we understand that six stormwater infiltration trenches are proposed for this project, as summarized in the following table.

Infiltration Trench	Approximate Stations (A-Line)	Approximate Stations (C-Line)
Trench 1	234+77 to 238+67	N/A
Trench 2	244+25 to 249+25	N/A
Trench 3	249+25 to 261+27	N/A
Trench 4	261+71 to 282+54	N/A
Trench 5	282+72	10+15 to 10+85
Trench 6	282+72	11+09 to 11+72

The infiltration trenches are designed to be 2-foot wide by 2-foot deep gravel filled trenches that extend along the shoulder of the planned trail along the above station intervals, except for Trench 1, which is designed to be 3-foot wide. Trenches 5 and 6 are oriented perpendicular to the trail (at about Station 282+72) extending along the south side of SE 33rd Street.

INFILTRATION TESTING AND GROUND WATER MONITORING

In-situ infiltration tests using the Single Ring Infiltrometer Test (SRIT) procedure with a 36-inch diameter single ring as described in the 2009 King County Surface Water Design Manual (SWDM) were completed by ICE between October 23, 2013 and October 30, 2013 in the general vicinity of Trenches 3 through 6 as summarized in our December 11, 2013 draft report. The following is a summary of the field infiltration test results.

Test Location	Approximate Station	Field Infiltration Rate	
		(inches/hour)	(feet/day)
IT-1 / B-83	252+00	55	110
IT-2 / B-84	254+00	155	310
IT-3 / B-11	268+65	133	266
IT-4 / B-93	288+00	131	262

No field infiltration tests were completed in the vicinity of Trenches 1 and 2. However, Borings B-4 and B-5 completed in the vicinity of these trenches suggest that this area may be underlain by less permeable soils (Older Alluvium - silty sand or sandy silt) and should use a lower field infiltration rate, such as 0.5 inch/hour (1 foot/day).

GROUND WATER MOUNDING ANALYSIS

The MODRET (Computer **MOD**el to Design **RET**ention Ponds) computer program was used to simulate stormwater infiltration and ground water mounding. The MODRET program uses the Greene and Ampt equation to simulate unsaturated flow conditions. The data input includes as-built design information, subsurface soil and ground water conditions, and estimates of horizontal and vertical hydraulic conductivities.

Since the basin areas for Trenches 5 and 6 are small and are located at the north end of Trench 4, Parametrix combined the basin areas for Trenches 4, 5 and 6 to be analyzed together to simplify the analysis. MODRET input values for hydraulic conductivity used in the analysis of Trench 3 and combined Trenches 4, 5 and 6 were adjusted using a calibration factor of 2 (decreased hydraulic conductivity by a

factor of 2) based off of the lowest field infiltration rate of 110 feet/day (IT-1 / B-83). Since SRITs were not completed in the areas of Trenches 1 and 2, we used low field infiltration rates for these trenches (0.5 inch/hour, 1 foot/day). The following is a summary of the factors used to determine the hydraulic conductivity for the MODRET analyses.

Infiltration Trench	Lowest Field Infiltration Rate Measured	Calibration Factor (2:1)	Vertical Hydraulic Conductivity Used in MODRET
Trench 1	See Note	See Note	1 foot/day
Trench 2	See Note	See Note	1 foot/day
Trench 3	110 feet/day	55 feet/day	55 feet/day
Trenches 4, 5 and 6	110 feet/day	55 feet/day	55 feet/day

Note: Based on the soil conditions observed in Borings B-4 and B-5 as "loamy sand."

All infiltration trenches were designed by Parametrix to infiltrate 100 percent of contributing trail runoff up to the 100-year peak storm event. Parametrix used MGSFloodV4 to model the storm event for the infiltration trenches as described in the Parametrix Technical Information Report, dated July 2014.

Our MODRET models were set up to analyze the 30-day peak flows and peak volumes as calculated by the KCRTS (King County Runoff Time Series version 6.0) reduced 8-year water record (Attachment A) for the four scenarios indicated in the above table. For an additional factor of safety, we assumed the seasonal high ground water to be between about 3.5 and 6.5 feet below the ground surface, which is about half the depth below the ground surface compared to the seasonal high ground water levels measured in our piezometers.

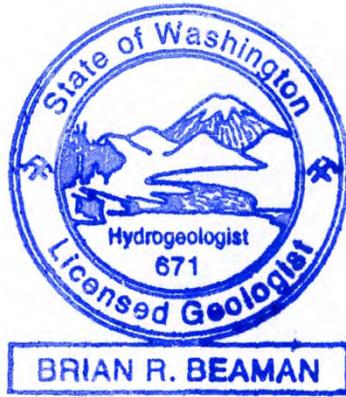
SUMMARY OF FINDINGS

The results of our MODRET simulations indicate a maximum water surface **below** the trench bottom for all four trench scenarios, Trench 1, Trench 2, Trench 3 and combined Trenches 4, 5 and 6, for both the 30-day peak flow and peak volume KCRTS reduced 8-year water record. The results of our MODRET analysis are included in Attachment B.

Craig Buitrago, PE
Parametrix
December 9, 2014
Page 4

We trust this Technical Memorandum meets your present needs. Please call if you have any questions or need additional information.

Yours very truly,
Icicle Creek Engineers, Inc.



Brian R. Beaman, PE, LHG
Principal Engineer/Hydrogeologist

Document ID: 0105010.MODRET.TechMemo
Submitted via email (pdf) and surface mail (two original copies)

Attachment: Attachment A – KCRTS Reduced 8-year Water Record 30-day Peak Flow and Peak Volume Data
(provided by Parametrix)
Attachment B – MODRET Analysis

ATTACHMENT A

**KCRTS REDUCED 8-YEAR WATER RECORD
30-DAY PEAK FLOW AND PEAK VOLUME DATA
(PROVIDED BY PARAMETRIX)**

KCRTS Reduced 8-year Water Record
 30-day Peak Flow for Trench 1 Basin

Date	Daily Flow (CFS)	Daily Volume (CF)	Cumulative Volume (CF)
12/26/2007	-	-	-
12/27/2007	0.002	165	165
12/28/2007	-	33	198
12/29/2007	-	2	200
12/30/2007	-	1	201
12/31/2007	0.002	181	382
1/1/2008	-	38	420
1/2/2008	-	2	422
1/3/2008	0.001	48	470
1/4/2008	0.002	199	669
1/5/2008	0.007	589	1,258
1/6/2008	0.004	341	1,599
1/7/2008	0.007	614	2,213
1/8/2008	0.003	290	2,503
1/9/2008	0.024	2,076	4,579
1/10/2008	-	7	4,586
1/11/2008	-	1	4,587
1/12/2008	-	1	4,588
1/13/2008	-	10	4,598
1/14/2008	-	17	4,615
1/15/2008	0.001	44	4,659
1/16/2008	-	20	4,679
1/17/2008	-	2	4,681
1/18/2008	-	1	4,682
1/19/2008	-	-	4,682
1/20/2008	-	-	4,682
1/21/2008	-	22	4,704
1/22/2008	-	-	4,704
1/23/2008	-	-	4,704
1/24/2008	-	-	4,704

CFS = cubic feet per second

CF = cubic feet

KCRTS Reduced 8-year Water Record
30-day Peak Volume for Trench 1 Basin

Date	Daily Flow (CFS)	Daily Volume (CF)	Cumulative Volume (CF)
2/12/2003	0.004	358	358
2/13/2003	0.002	181	539
2/14/2003	0.001	46	585
2/15/2003	0.001	115	700
2/16/2003	0.004	380	1,080
2/17/2003	0.002	215	1,295
2/18/2003	0.001	69	1,364
2/19/2003	0.002	136	1,500
2/20/2003	0	13	1,513
2/21/2003	0	1	1,514
2/22/2003	0.001	78	1,592
2/23/2003	0	14	1,606
2/24/2003	0.001	99	1,705
2/25/2003	0	7	1,712
2/26/2003	0.002	153	1,865
2/27/2003	0.016	1,386	3,251
2/28/2003	0.01	864	4,115
3/1/2003	0.001	91	4,206
3/2/2003	0.001	54	4,260
3/3/2003	0.001	52	4,312
3/4/2003	0	2	4,314
3/5/2003	0.002	179	4,493
3/6/2003	0.019	1,662	6,155
3/7/2003	0	22	6,177
3/8/2003	0	1	6,178
3/9/2003	0	1	6,179
3/10/2003	0.003	257	6,436
3/11/2003	0.002	212	6,648
3/12/2003	0.004	308	6,956
3/13/2003	0.006	560	7,516

CFS = cubic feet per second

CF = cubic feet

KCRTS Reduced 8-year Water Record
 30-day Peak Flow for Trench 2 Basin

Date	Daily Flow (CFS)	Daily Volume (CF)	Cumulative Volume (CF)
12/26/2007	-	-	-
12/27/2007	0.002	183	183
12/28/2007	-	40	223
12/29/2007	-	2	225
12/30/2007	-	1	226
12/31/2007	0.002	203	429
1/1/2008	-	40	469
1/2/2008	-	3	472
1/3/2008	0.001	55	527
1/4/2008	0.003	226	753
1/5/2008	0.008	662	1,415
1/6/2008	0.004	382	1,797
1/7/2008	0.008	685	2,482
1/8/2008	0.004	324	2,806
1/9/2008	0.027	2,316	5,122
1/10/2008	-	9	5,131
1/11/2008	-	1	5,132
1/12/2008	-	-	5,132
1/13/2008	-	14	5,146
1/14/2008	-	20	5,166
1/15/2008	0.001	52	5,218
1/16/2008	-	24	5,242
1/17/2008	-	2	5,244
1/18/2008	-	1	5,245
1/19/2008	-	-	5,245
1/20/2008	-	-	5,245
1/21/2008	-	25	5,270
1/22/2008	-	-	5,270
1/23/2008	-	-	5,270
1/24/2008	-	-	5,270

CFS = cubic feet per second

CF = cubic feet

KCRTS Reduced 8-year Water Record
 30-day Peak Volume for Trench 2 Basin

Date	Daily Flow (CFS)	Daily Volume (CF)	Cumulative Volume (CF)
2/12/2003	0.005	399	399
2/13/2003	0.002	204	603
2/14/2003	0.001	51	654
2/15/2003	0.001	128	782
2/16/2003	0.005	423	1,205
2/17/2003	0.003	242	1,447
2/18/2003	0.001	77	1,524
2/19/2003	0.002	152	1,676
2/20/2003	-	15	1,691
2/21/2003	-	1	1,692
2/22/2003	0.001	88	1,780
2/23/2003	-	14	1,794
2/24/2003	0.001	116	1,910
2/25/2003	-	6	1,916
2/26/2003	0.002	169	2,085
2/27/2003	0.018	1,554	3,639
2/28/2003	0.011	968	4,607
3/1/2003	0.001	99	4,706
3/2/2003	0.001	61	4,767
3/3/2003	0.001	58	4,825
3/4/2003	-	2	4,827
3/5/2003	0.002	200	5,027
3/6/2003	0.021	1,854	6,881
3/7/2003	-	24	6,905
3/8/2003	-	1	6,906
3/9/2003	-	-	6,906
3/10/2003	0.003	287	7,193
3/11/2003	0.003	242	7,435
3/12/2003	0.004	339	7,774
3/13/2003	0.007	626	8,400

CFS = cubic feet per second

CF = cubic feet

KCRTS Reduced 8-year Water Record
 30-day Peak Flow for Trench 3 Basin

Date	Daily Flow (CFS)	Daily Volume (CF)	Cumulative Volume (CF)
12/26/2007	-	-	-
12/27/2007	0.005	438	438
12/28/2007	0.001	91	529
12/29/2007	-	7	536
12/30/2007	-	2	538
12/31/2007	0.006	478	1,016
1/1/2008	0.001	97	1,113
1/2/2008	-	7	1,120
1/3/2008	0.002	136	1,256
1/4/2008	0.006	531	1,787
1/5/2008	0.018	1,564	3,351
1/6/2008	0.010	903	4,254
1/7/2008	0.019	1,632	5,886
1/8/2008	0.009	761	6,647
1/9/2008	0.064	5,495	12,142
1/10/2008	-	16	12,158
1/11/2008	-	3	12,161
1/12/2008	-	-	12,161
1/13/2008	-	29	12,190
1/14/2008	0.001	45	12,235
1/15/2008	0.001	122	12,357
1/16/2008	0.001	53	12,410
1/17/2008	-	6	12,416
1/18/2008	-	2	12,418
1/19/2008	-	-	12,418
1/20/2008	-	-	12,418
1/21/2008	0.001	59	12,477
1/22/2008	-	-	12,477
1/23/2008	-	-	12,477
1/24/2008	-	-	12,477

CFS = cubic feet per second

CF = cubic feet

KCRTS Reduced 8-year Water Record
 30-day Peak Volume for Trench 3 Basin

Date	Daily Flow (CFS)	Daily Volume (CF)	Cumulative Volume (CF)
2/12/2003	0.011	941	941
2/13/2003	0.006	482	1,423
2/14/2003	0.001	114	1,537
2/15/2003	0.003	298	1,835
2/16/2003	0.012	998	2,833
2/17/2003	0.007	574	3,407
2/18/2003	0.002	182	3,589
2/19/2003	0.004	359	3,948
2/20/2003	-	32	3,980
2/21/2003	-	2	3,982
2/22/2003	0.002	199	4,181
2/23/2003	-	33	4,214
2/24/2003	0.003	270	4,484
2/25/2003	-	10	4,494
2/26/2003	0.005	404	4,898
2/27/2003	0.043	3,673	8,571
2/28/2003	0.027	2,297	10,868
3/1/2003	0.003	235	11,103
3/2/2003	0.002	146	11,249
3/3/2003	0.002	134	11,383
3/4/2003	-	6	11,389
3/5/2003	0.005	475	11,864
3/6/2003	0.051	4,398	16,262
3/7/2003	0.001	55	16,317
3/8/2003	-	2	16,319
3/9/2003	-	1	16,320
3/10/2003	0.008	679	16,999
3/11/2003	0.007	574	17,573
3/12/2003	0.009	806	18,379
3/13/2003	0.017	1,484	19,863

CFS = cubic feet per second

CF = cubic feet

KCRTS Reduced 8-year Water Record
 30-day Peak Flow for Trenches 4, 5 and 6 Basin

Date	Daily Flow (CFS)	Daily Volume (CF)	Cumulative Volume (CF)
12/26/2007	-	-	-
12/27/2007	0.009	795	795
12/28/2007	0.002	162	957
12/29/2007	-	13	970
12/30/2007	-	5	975
12/31/2007	0.010	872	1,847
1/1/2008	0.002	176	2,023
1/2/2008	-	12	2,035
1/3/2008	0.003	247	2,282
1/4/2008	0.011	970	3,252
1/5/2008	0.033	2,844	6,096
1/6/2008	0.019	1,645	7,741
1/7/2008	0.034	2,968	10,709
1/8/2008	0.016	1,392	12,101
1/9/2008	0.116	10,012	22,113
1/10/2008	-	29	22,142
1/11/2008	-	6	22,148
1/12/2008	-	-	22,148
1/13/2008	0.001	50	22,198
1/14/2008	0.001	81	22,279
1/15/2008	0.003	220	22,499
1/16/2008	0.001	93	22,592
1/17/2008	-	12	22,604
1/18/2008	-	2	22,606
1/19/2008	-	-	22,606
1/20/2008	-	1	22,607
1/21/2008	0.001	106	22,713
1/22/2008	-	-	22,713
1/23/2008	-	-	22,713
1/24/2008	-	-	22,713

CFS = cubic feet per second

CF = cubic feet

KCRTS Reduced 8-year Water Record
 30-day Peak Volume for Trenches 4, 5 and 6 Basin

Date	Daily Flow (CFS)	Daily Volume (CF)	Cumulative Volume (CF)
2/12/2003	0.020	1,719	1,719
2/13/2003	0.010	878	2,597
2/14/2003	0.002	213	2,810
2/15/2003	0.006	545	3,355
2/16/2003	0.021	1,820	5,175
2/17/2003	0.012	1,048	6,223
2/18/2003	0.004	325	6,548
2/19/2003	0.008	658	7,206
2/20/2003	0.001	53	7,259
2/21/2003	-	6	7,265
2/22/2003	0.004	366	7,631
2/23/2003	0.001	54	7,685
2/24/2003	0.006	493	8,178
2/25/2003	-	21	8,199
2/26/2003	0.009	735	8,934
2/27/2003	0.078	6,697	15,631
2/28/2003	0.048	4,183	19,814
3/1/2003	0.005	427	20,241
3/2/2003	0.003	266	20,507
3/3/2003	0.003	240	20,747
3/4/2003	-	10	20,757
3/5/2003	0.010	863	21,620
3/6/2003	0.093	8,009	29,629
3/7/2003	0.001	99	29,728
3/8/2003	-	6	29,734
3/9/2003	-	1	29,735
3/10/2003	0.014	1,234	30,969
3/11/2003	0.012	1,047	32,016
3/12/2003	0.017	1,473	33,489
3/13/2003	0.031	2,701	36,190

CFS = cubic feet per second

CF = cubic feet

ATTACHMENT B

MODRET ANALYSIS

MODRET

SUMMARY OF UNSATURATED & SATURATED INPUT PARAMETERS

**PROJECT NAME : Trench 1- Peak Flow KCRTS 8yr reduced
 MANUAL RUNOFF DATA USED
 UNSATURATED ANALYSIS INCLUDED**

Pond Bottom Area	1,170.00 ft ²
Pond Volume between Bottom & DHWL	2,340.00 ft ³
Pond Length to Width Ratio (L/W)	130.00
Elevation of Effective Aquifer Base	46.39 ft
Elevation of Seasonal High Groundwater Table	46.40 ft
Elevation of Starting Water Level	50.00 ft
Elevation of Pond Bottom	46.40 ft
Design High Water Level Elevation	52.00 ft
Avg. Effective Storage Coefficient of Soil for Unsaturated Analysis	0.25
Unsaturated Vertical Hydraulic Conductivity	1.00 ft/d
Factor of Safety	2.00
Saturated Horizontal Hydraulic Conductivity	1.50 ft/d
Avg. Effective Storage Coefficient of Soil for Saturated Analysis	0.20
Avg. Effective Storage Coefficient of Pond/Exfiltration Trench	0.30

Hydraulic Control Features:

	Top	Bottom	Left	Right
Groundwater Control Features - Y/N	N	N	N	N
Distance to Edge of Pond	0.00	0.00	0.00	0.00
Elevation of Water Level	0.00	0.00	0.00	0.00
Impervious Barrier - Y/N	N	N	N	N
Elevation of Barrier Bottom	0.00	0.00	0.00	0.00

MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 1- Peak Flow KCRTS 8yr reduced

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft³)
00.00 - 0.00	46.400	0.000 *		
			0.00000	
0.00	46.400	0.01590		
			0.01173	
67.20	48.474	0.00756		0.00
			0.00607	
91.20	48.167	0.00440		0.00
			0.00273	
115.20	47.994	0.00208		0.00
			0.00143	
139.20	47.889	0.00119		0.00
			0.00094	
163.20	47.821	0.00132		0.00
			0.00170	
187.20	47.850	0.00145		0.00
			0.00120	
211.20	47.793	0.00106		0.00
			0.00092	
235.20	47.727	0.00097		0.00
			0.00103	
259.20	47.693	0.00139		0.00
			0.00174	
283.20	47.734	0.00283		0.00
			0.00392	
307.20	47.948	0.00361		0.00
			0.00329	
331.20	47.996	0.00400		0.00
			0.00470	
355.20	48.174	0.00403		0.00

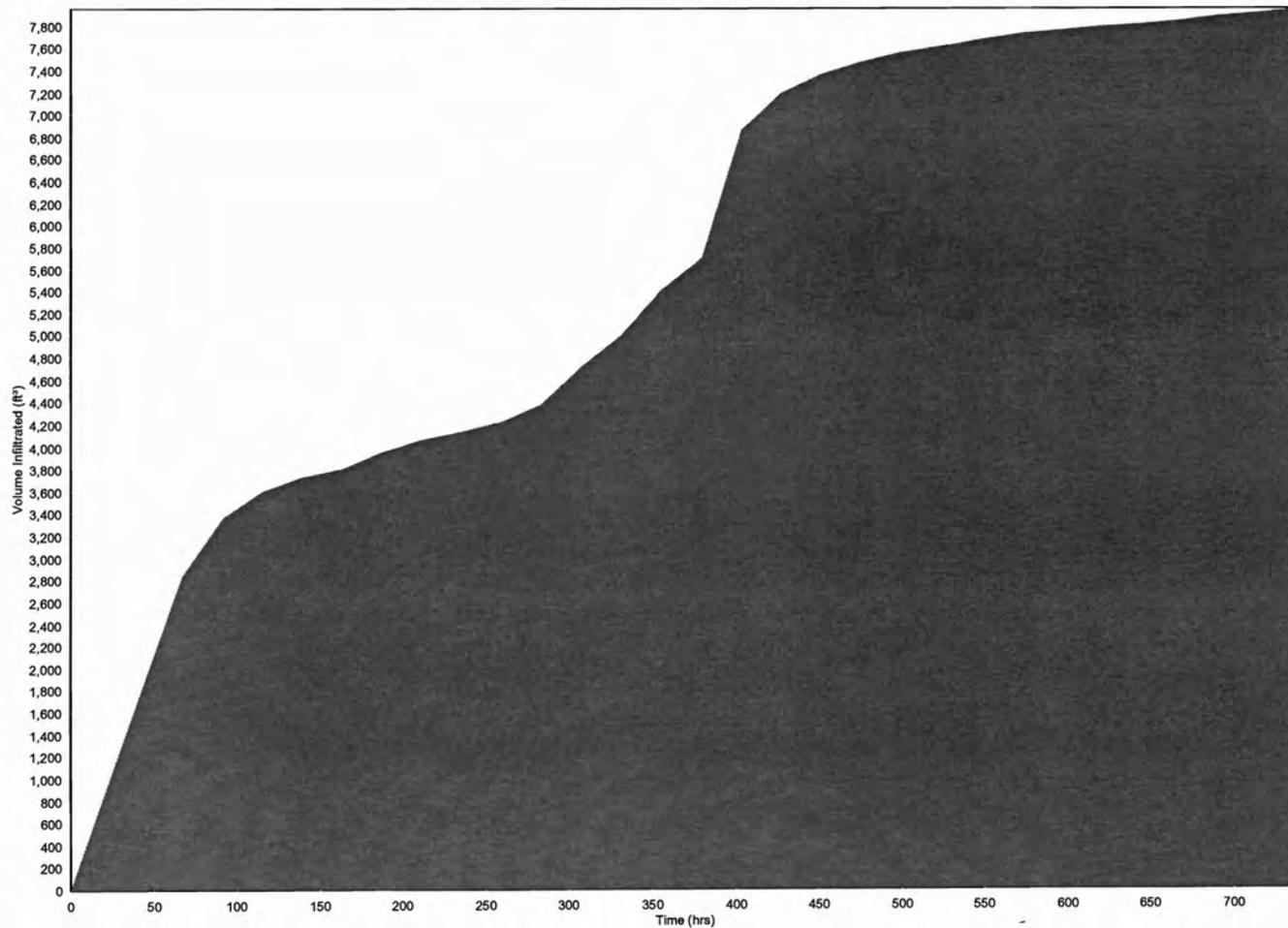
MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 1- Peak Flow KCRTS 8yr reduced

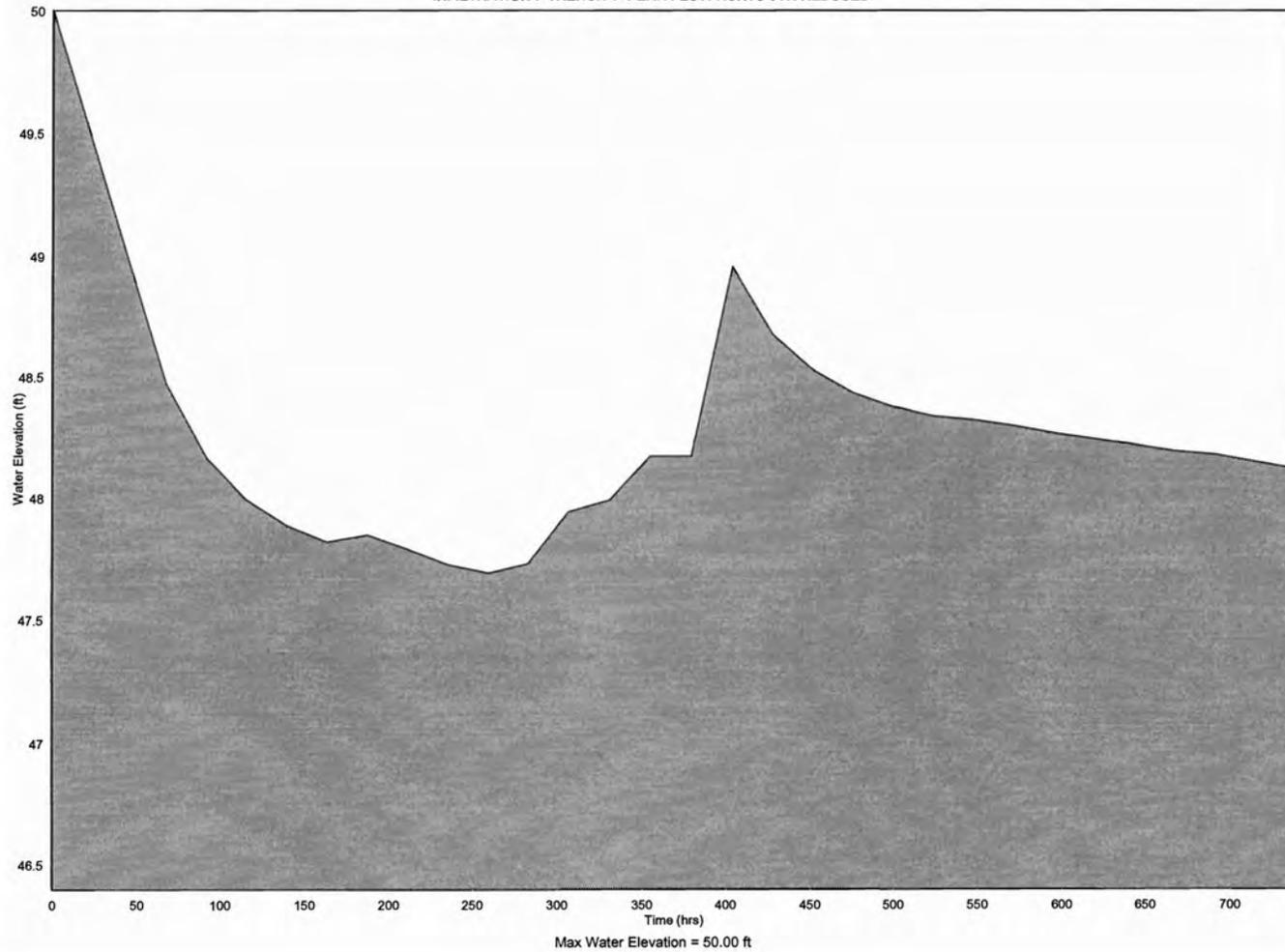
CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
			0.00335	
379.20	48.174	0.00839		0.00
			0.01344	
403.20	48.956	0.00864		0.00
			0.00385	
427.20	48.678	0.00292		0.00
			0.00200	
451.20	48.531	0.00163		0.00
			0.00126	
475.20	48.439	0.00108		0.00
			0.00091	
499.20	48.380	0.00081		0.00
			0.00071	
523.20	48.342	0.00072		0.00
			0.00073	
547.20	48.326	0.00064		0.00
			0.00055	
571.20	48.302	0.00047		0.00
			0.00040	
595.20	48.274	0.00037		0.00
			0.00034	
619.20	48.250	0.00034		0.00
			0.00033	
643.20	48.226	0.00033		0.00
			0.00033	
667.20	48.201	0.00040		0.00
			0.00046	
691.20	48.186	0.00043		0.00

INFILTRATION : TRENCH 1- PEAK FLOW KCRTS 8YR REDUCED



Total Volume Infiltrated = 7,947 ft³

INFILTRATION : TRENCH 1- PEAK FLOW KCRTS 8YR REDUCED



MODRET

SUMMARY OF UNSATURATED & SATURATED INPUT PARAMETERS

**PROJECT NAME : Trench 1-Peak Volume KCRTS 8yr reduced
MANUAL RUNOFF DATA USED
UNSATURATED ANALYSIS INCLUDED**

Pond Bottom Area	1,170.00 ft ²
Pond Volume between Bottom & DHWL	2,340.00 ft ³
Pond Length to Width Ratio (L/W)	130.00
Elevation of Effective Aquifer Base	46.39 ft
Elevation of Seasonal High Groundwater Table	46.40 ft
Elevation of Starting Water Level	50.00 ft
Elevation of Pond Bottom	46.40 ft
Design High Water Level Elevation	52.00 ft
Avg. Effective Storage Coefficient of Soil for Unsaturated Analysis	0.25
Unsaturated Vertical Hydraulic Conductivity	1.00 ft/d
Factor of Safety	2.00
Saturated Horizontal Hydraulic Conductivity	1.50 ft/d
Avg. Effective Storage Coefficient of Soil for Saturated Analysis	0.20
Avg. Effective Storage Coefficient of Pond/Exfiltration Trench	0.30

Hydraulic Control Features:

	Top	Bottom	Left	Right
Groundwater Control Features - Y/N	N	N	N	N
Distance to Edge of Pond	0.00	0.00	0.00	0.00
Elevation of Water Level	0.00	0.00	0.00	0.00
Impervious Barrier - Y/N	N	N	N	N
Elevation of Barrier Bottom	0.00	0.00	0.00	0.00

MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 1-Peak Volume KCRTS 8yr reduced

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
00.00 - 0.00	46.400	0.000 *		
			0.00000	
0.00	46.400	0.01693		
			0.01213	
67.20	48.546	0.00734		0.00
			0.00562	
91.20	48.171	0.00435		0.00
			0.00307	
115.20	48.042	0.00329		0.00
			0.00351	
139.20	48.108	0.00308		0.00
			0.00266	
163.20	48.096	0.00222		0.00
			0.00178	
187.20	48.023	0.00186		0.00
			0.00195	
211.20	47.995	0.00163		0.00
			0.00131	
235.20	47.910	0.00117		0.00
			0.00103	
259.20	47.835	0.00113		0.00
			0.00123	
283.20	47.810	0.00105		0.00
			0.00086	
307.20	47.759	0.00099		0.00
			0.00112	
331.20	47.761	0.00089		0.00
			0.00066	
355.20	47.718	0.00094		0.00

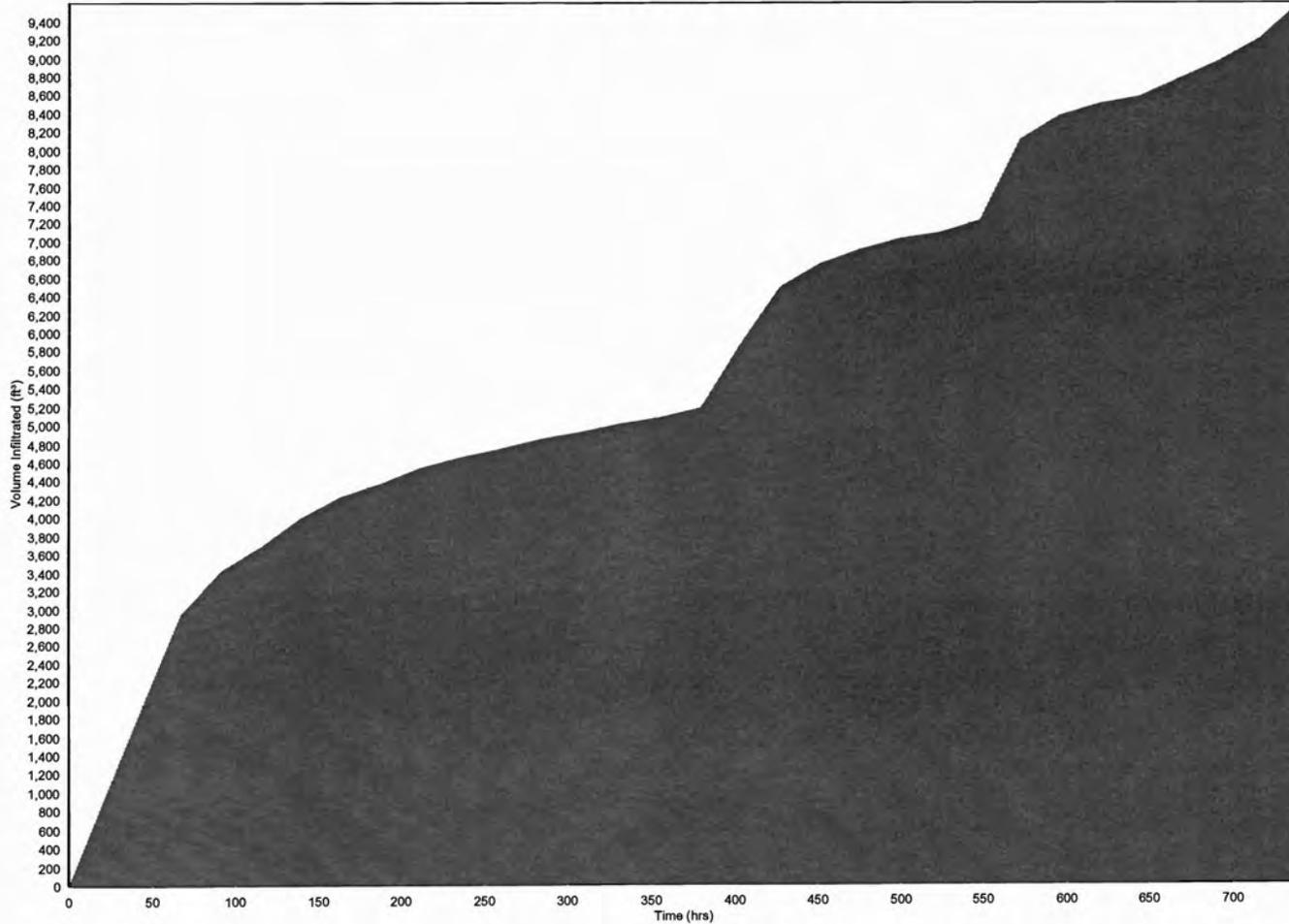
MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 1-Peak Volume KCRTS 8yr reduced

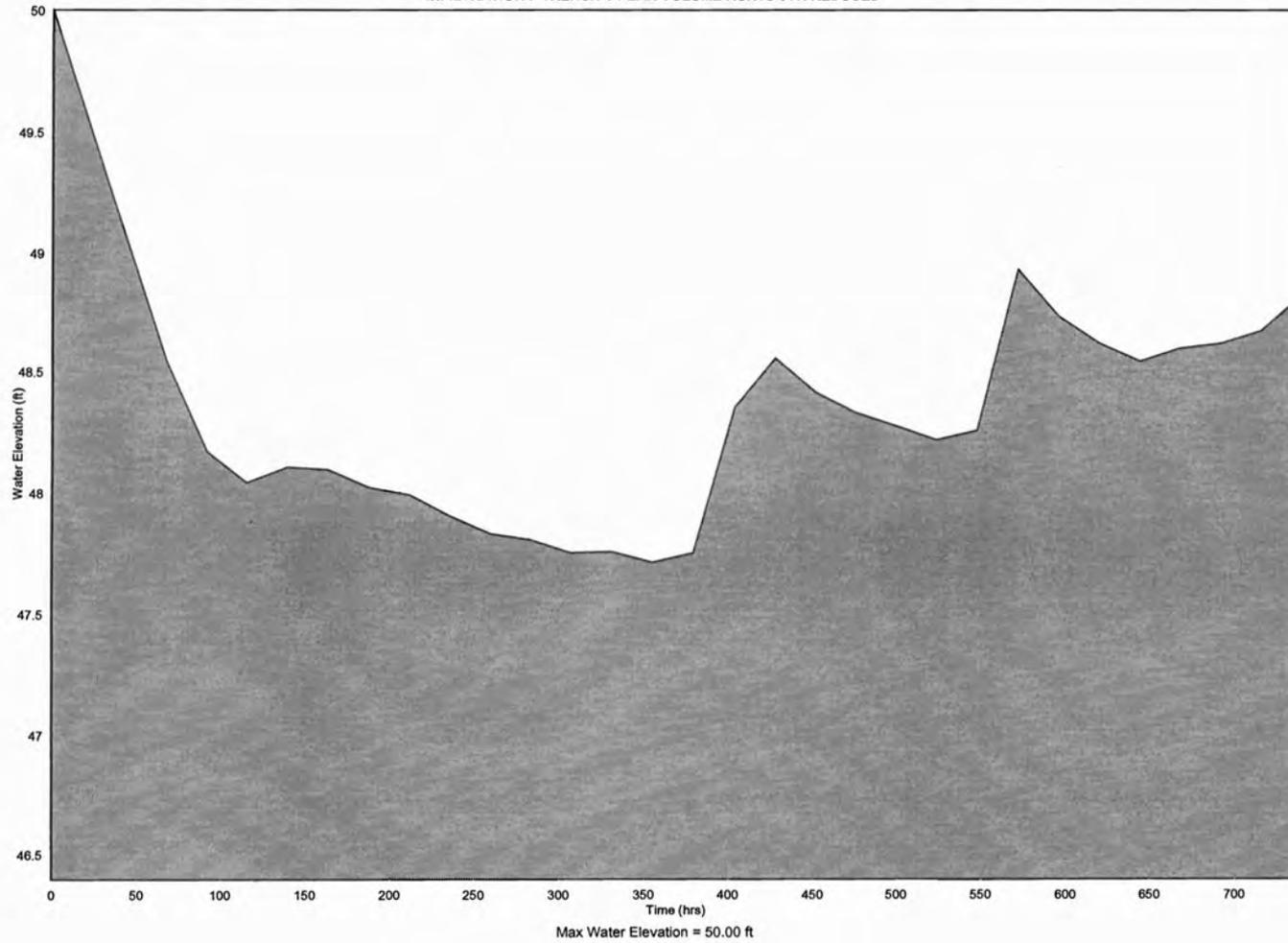
CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
			0.00122	
379.20	47.758	0.00460		0.00
			0.00799	
403.20	48.353	0.00759		0.00
			0.00719	
427.20	48.561	0.00507		0.00
			0.00295	
451.20	48.421	0.00237		0.00
			0.00179	
475.20	48.334	0.00155		0.00
			0.00132	
499.20	48.282	0.00105		0.00
			0.00079	
523.20	48.225	0.00116		0.00
			0.00153	
547.20	48.265	0.00588		0.00
			0.01024	
571.20	48.930	0.00658		0.00
			0.00292	
595.20	48.733	0.00221		0.00
			0.00150	
619.20	48.623	0.00125		0.00
			0.00100	
643.20	48.550	0.00161		0.00
			0.00223	
667.20	48.605	0.00222		0.00
			0.00222	
691.20	48.622	0.00253		0.00

INFILTRATION : TRENCH 1-PEAK VOLUME KCRTS 8YR REDUCED



Total Volume Infiltrated = 9,590 ft³

INFILTRATION : TRENCH 1-PEAK VOLUME KCRTS 8YR REDUCED



MODRET

SUMMARY OF UNSATURATED & SATURATED INPUT PARAMETERS

**PROJECT NAME : Trench 2-Peak Flow KCRTS 8yr reduced
MANUAL RUNOFF DATA USED
UNSATURATED ANALYSIS INCLUDED**

Pond Bottom Area	1,000.00 ft ²
Pond Volume between Bottom & DHWL	2,000.00 ft ³
Pond Length to Width Ratio (L/W)	250.00
Elevation of Effective Aquifer Base	50.39 ft
Elevation of Seasonal High Groundwater Table	50.40 ft
Elevation of Starting Water Level	54.00 ft
Elevation of Pond Bottom	50.40 ft
Design High Water Level Elevation	56.00 ft
Avg. Effective Storage Coefficient of Soil for Unsaturated Analysis	0.25
Unsaturated Vertical Hydraulic Conductivity	1.00 ft/d
Factor of Safety	2.00
Saturated Horizontal Hydraulic Conductivity	1.50 ft/d
Avg. Effective Storage Coefficient of Soil for Saturated Analysis	0.20
Avg. Effective Storage Coefficient of Pond/Exfiltration Trench	0.30

Hydraulic Control Features:

	Top	Bottom	Left	Right
Groundwater Control Features - Y/N	N	N	N	N
Distance to Edge of Pond	0.00	0.00	0.00	0.00
Elevation of Water Level	0.00	0.00	0.00	0.00
Impervious Barrier - Y/N	N	N	N	N
Elevation of Barrier Bottom	0.00	0.00	0.00	0.00

MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 2-Peak Flow KCRTS 8yr reduced

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
00.00 - 0.00	50.400	0.000 *		
			0.00000	
0.00	50.400	0.01567		
			0.01126	
67.20	52.176	0.00685		0.00
			0.00527	
91.20	51.903	0.00387		0.00
			0.00246	
115.20	51.731	0.00198		0.00
			0.00149	
139.20	51.604	0.00125		0.00
			0.00101	
163.20	51.517	0.00146		0.00
			0.00190	
187.20	51.556	0.00145		0.00
			0.00099	
211.20	51.511	0.00076		0.00
			0.00053	
235.20	51.468	0.00059		0.00
			0.00066	
259.20	51.466	0.00116		0.00
			0.00166	
283.20	51.548	0.00314		0.00
			0.00462	
307.20	51.811	0.00414		0.00
			0.00366	
331.20	51.877	0.00464		0.00
			0.00562	
355.20	52.076	0.00469		0.00

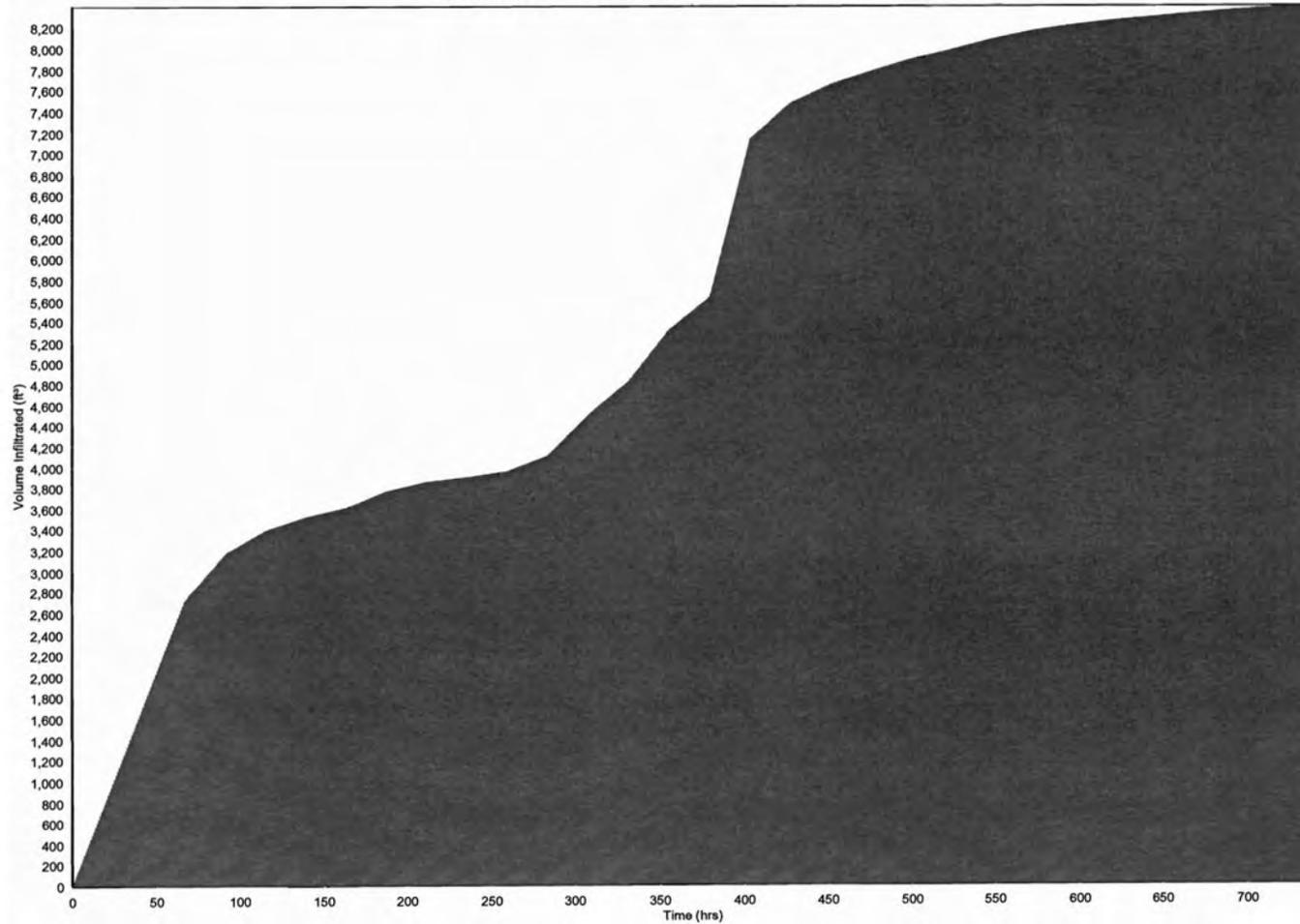
MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 2-Peak Flow KCRTS 8yr reduced

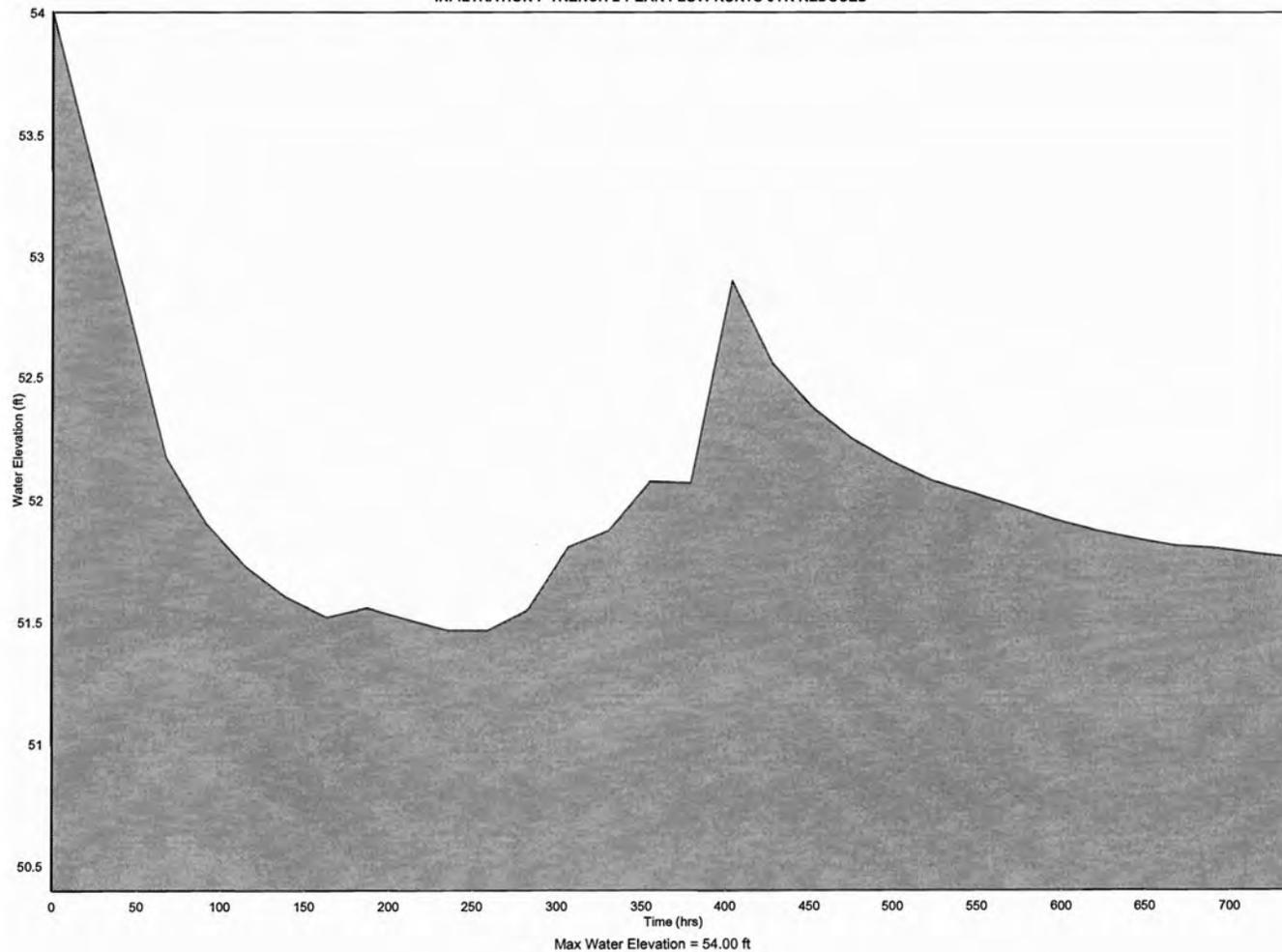
CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
			0.00377	
379.20	52.075	0.01054		0.00
			0.01732	
403.20	52.894	0.01065		0.00
			0.00397	
427.20	52.560	0.00303		0.00
			0.00208	
451.20	52.381	0.00177		0.00
			0.00146	
475.20	52.255	0.00136		0.00
			0.00125	
499.20	52.161	0.00118		0.00
			0.00111	
523.20	52.085	0.00114		0.00
			0.00118	
547.20	52.035	0.00105		0.00
			0.00091	
571.20	51.980	0.00078		0.00
			0.00064	
595.20	51.926	0.00057		0.00
			0.00051	
619.20	51.884	0.00045		0.00
			0.00040	
643.20	51.849	0.00036		0.00
			0.00032	
667.20	51.821	0.00037		0.00
			0.00042	
691.20	51.810	0.00033		0.00

INFILTRATION : TRENCH 2-PEAK FLOW KCRTS 8YR REDUCED



Total Volume Infiltrated = 8,397 ft³

INFILTRATION : TRENCH 2-PEAK FLOW KCRTS 8YR REDUCED



MODRET

SUMMARY OF UNSATURATED & SATURATED INPUT PARAMETERS

**PROJECT NAME : Trench 2-Peak Volume KCRTS 8yr reduced
 MANUAL RUNOFF DATA USED
 UNSATURATED ANALYSIS INCLUDED**

Pond Bottom Area	1,000.00 ft ²
Pond Volume between Bottom & DHWL	2,000.00 ft ³
Pond Length to Width Ratio (L/W)	250.00
Elevation of Effective Aquifer Base	50.39 ft
Elevation of Seasonal High Groundwater Table	50.40 ft
Elevation of Starting Water Level	54.00 ft
Elevation of Pond Bottom	50.40 ft
Design High Water Level Elevation	56.00 ft
Avg. Effective Storage Coefficient of Soil for Unsaturated Analysis	0.25
Unsaturated Vertical Hydraulic Conductivity	1.00 ft/d
Factor of Safety	2.00
Saturated Horizontal Hydraulic Conductivity	1.50 ft/d
Avg. Effective Storage Coefficient of Soil for Saturated Analysis	0.20
Avg. Effective Storage Coefficient of Pond/Exfiltration Trench	0.30

Hydraulic Control Features:

	Top	Bottom	Left	Right
Groundwater Control Features - Y/N	N	N	N	N
Distance to Edge of Pond	0.00	0.00	0.00	0.00
Elevation of Water Level	0.00	0.00	0.00	0.00
Impervious Barrier - Y/N	N	N	N	N
Elevation of Barrier Bottom	0.00	0.00	0.00	0.00

MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 2-Peak Volume KCRTS 8yr reduced

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
00.00 - 0.00	50.400	0.000 *		
			0.00000	
0.00	50.400	0.01701		
			0.01177	
67.20	52.257	0.00653		0.00
			0.00466	
91.20	51.905	0.00381		0.00
			0.00296	
115.20	51.777	0.00359		0.00
			0.00423	
139.20	51.835	0.00368		0.00
			0.00313	
163.20	51.807	0.00244		0.00
			0.00174	
187.20	51.733	0.00176		0.00
			0.00177	
211.20	51.732	0.00129		0.00
			0.00081	
235.20	51.677	0.00064		0.00
			0.00047	
259.20	51.637	0.00067		0.00
			0.00087	
283.20	51.650	0.00069		0.00
			0.00050	
307.20	51.620	0.00078		0.00
			0.00106	
331.20	51.644	0.00080		0.00
			0.00054	
355.20	51.603	0.00100		0.00

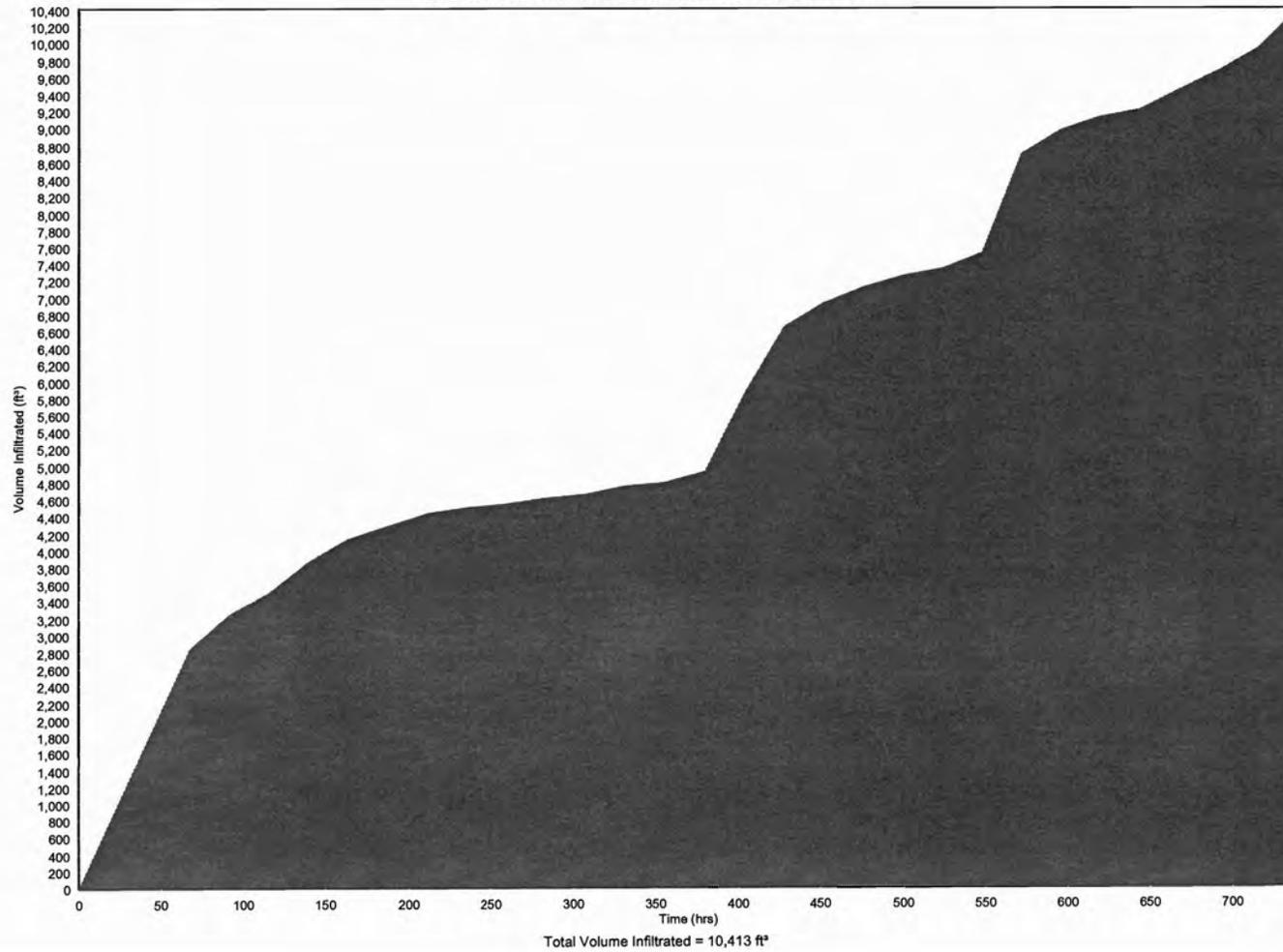
MODRET

SUMMARY OF RESULTS

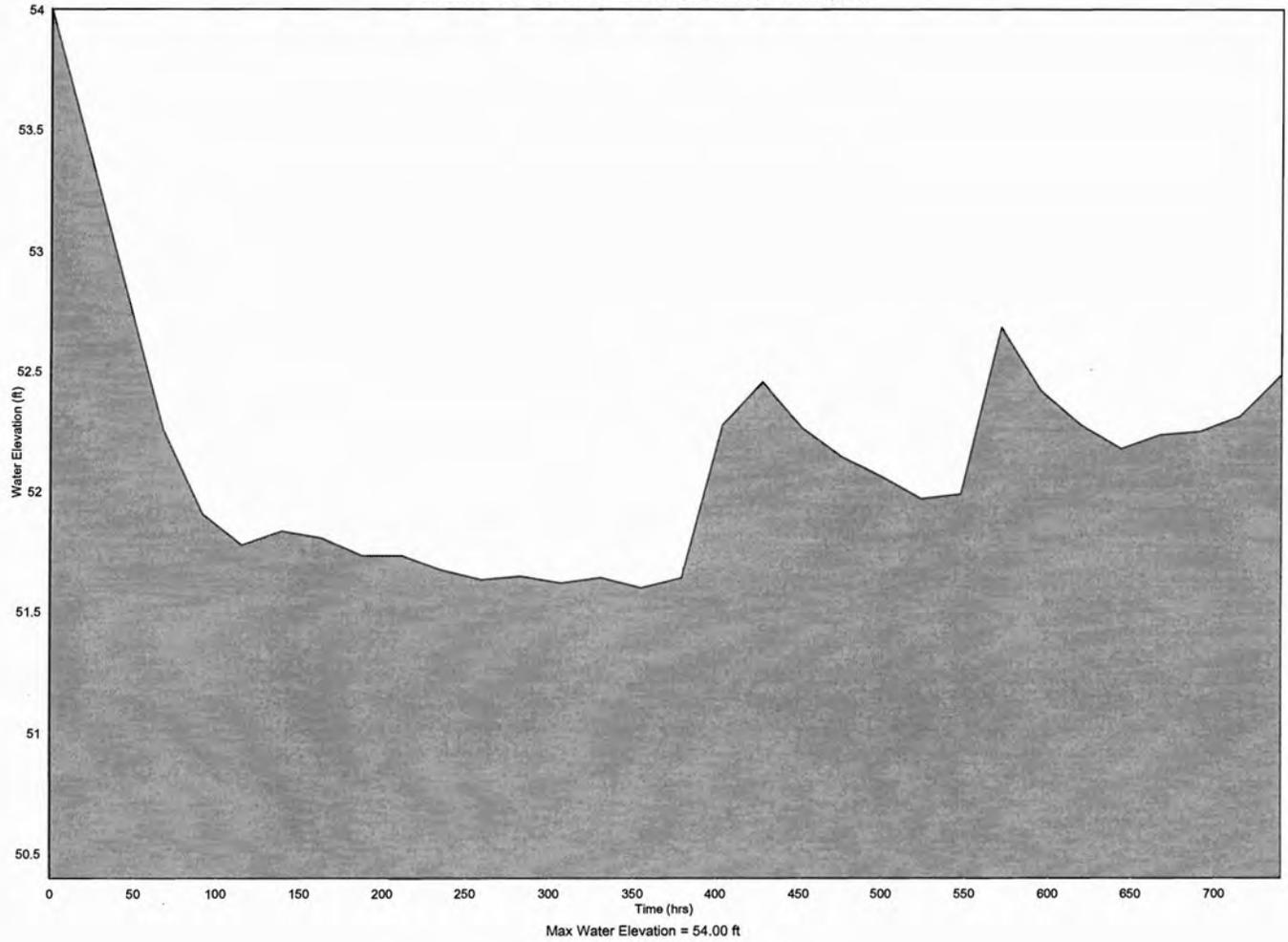
PROJECT NAME : Trench 2-Peak Volume KCRTS 8yr reduced

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft³)
			0.00145	
379.20	51.647	0.00607		0.00
			0.01069	
403.20	52.278	0.00990		0.00
			0.00911	
427.20	52.459	0.00622		0.00
			0.00334	
451.20	52.269	0.00271		0.00
			0.00209	
475.20	52.150	0.00186		0.00
			0.00164	
499.20	52.067	0.00134		0.00
			0.00105	
523.20	51.978	0.00157		0.00
			0.00209	
547.20	51.997	0.00779		0.00
			0.01349	
571.20	52.685	0.00840		0.00
			0.00330	
595.20	52.424	0.00249		0.00
			0.00167	
619.20	52.281	0.00138		0.00
			0.00109	
643.20	52.187	0.00188		0.00
			0.00268	
667.20	52.243	0.00264		0.00
			0.00259	
691.20	52.260	0.00291		0.00

INFILTRATION : TRENCH 2-PEAK VOLUME KCRTS 8YR REDUCED



INFILTRATION : TRENCH 2-PEAK VOLUME KCRTS 8YR REDUCED



MODRET

SUMMARY OF UNSATURATED & SATURATED INPUT PARAMETERS

**PROJECT NAME : Trench 3-Peak Flow KCRTS 8yr reduced
 MANUAL RUNOFF DATA USED
 UNSATURATED ANALYSIS INCLUDED**

Pond Bottom Area	2,404.00 ft ²
Pond Volume between Bottom & DHWL	4,808.00 ft ³
Pond Length to Width Ratio (L/W)	601.00
Elevation of Effective Aquifer Base	52.59 ft
Elevation of Seasonal High Groundwater Table	52.60 ft
Elevation of Starting Water Level	54.00 ft
Elevation of Pond Bottom	52.60 ft
Design High Water Level Elevation	56.00 ft
Avg. Effective Storage Coefficient of Soil for Unsaturated Analysis	0.25
Unsaturated Vertical Hydraulic Conductivity	55.00 ft/d
Factor of Safety	2.00
Saturated Horizontal Hydraulic Conductivity	82.50 ft/d
Avg. Effective Storage Coefficient of Soil for Saturated Analysis	0.20
Avg. Effective Storage Coefficient of Pond/Exfiltration Trench	0.30

Hydraulic Control Features:

	Top	Bottom	Left	Right
Groundwater Control Features - Y/N	N	N	N	N
Distance to Edge of Pond	0.00	0.00	0.00	0.00
Elevation of Water Level	0.00	0.00	0.00	0.00
Impervious Barrier - Y/N	N	N	N	N
Elevation of Barrier Bottom	0.00	0.00	0.00	0.00

MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 3-Peak Flow KCRTS 8yr reduced

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
00.00 - 0.00	52.600	0.000 *		
			0.00000	
0.00	52.600	0.05552		
			0.03916	
24.31	52.924	0.02281		0.00
			0.00666	
48.31	52.867	0.00441		0.00
			0.00216	
72.31	52.828	0.00151		0.00
			0.00087	
96.31	52.799	0.00071		0.00
			0.00056	
120.31	52.780	0.00260		0.00
			0.00464	
144.31	52.812	0.00313		0.00
			0.00163	
168.31	52.794	0.00109		0.00
			0.00055	
192.31	52.777	0.00102		0.00
			0.00149	
216.31	52.780	0.00328		0.00
			0.00507	
240.31	52.819	0.01010		0.00
			0.01514	
264.31	52.926	0.01262		0.00
			0.01010	
288.31	52.938	0.01349		0.00
			0.01688	
312.31	53.011	0.01302		0.00

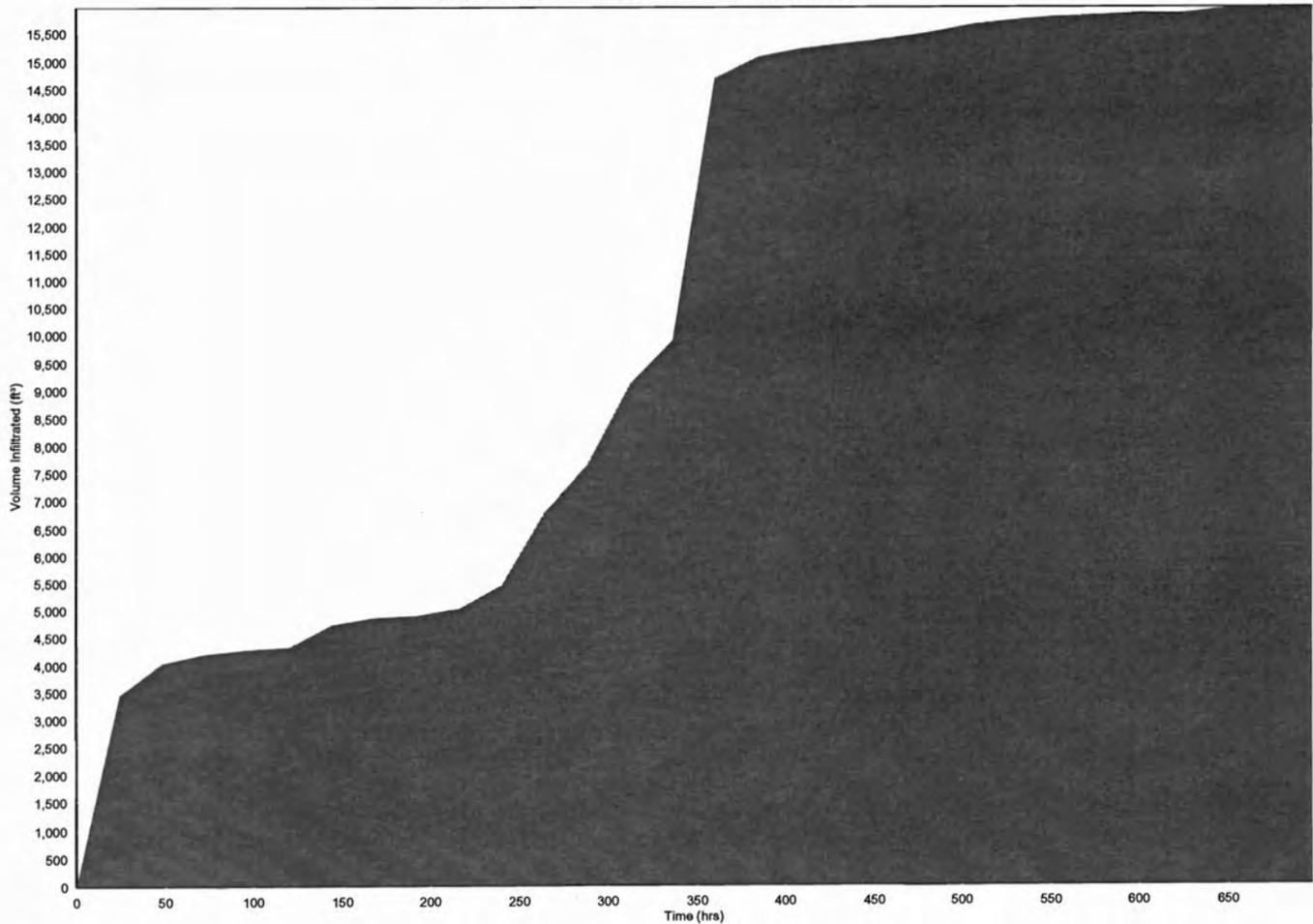
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SUMMARY OF RESULTS

PROJECT NAME : Trench 3-Peak Flow KCRTS 8yr reduced

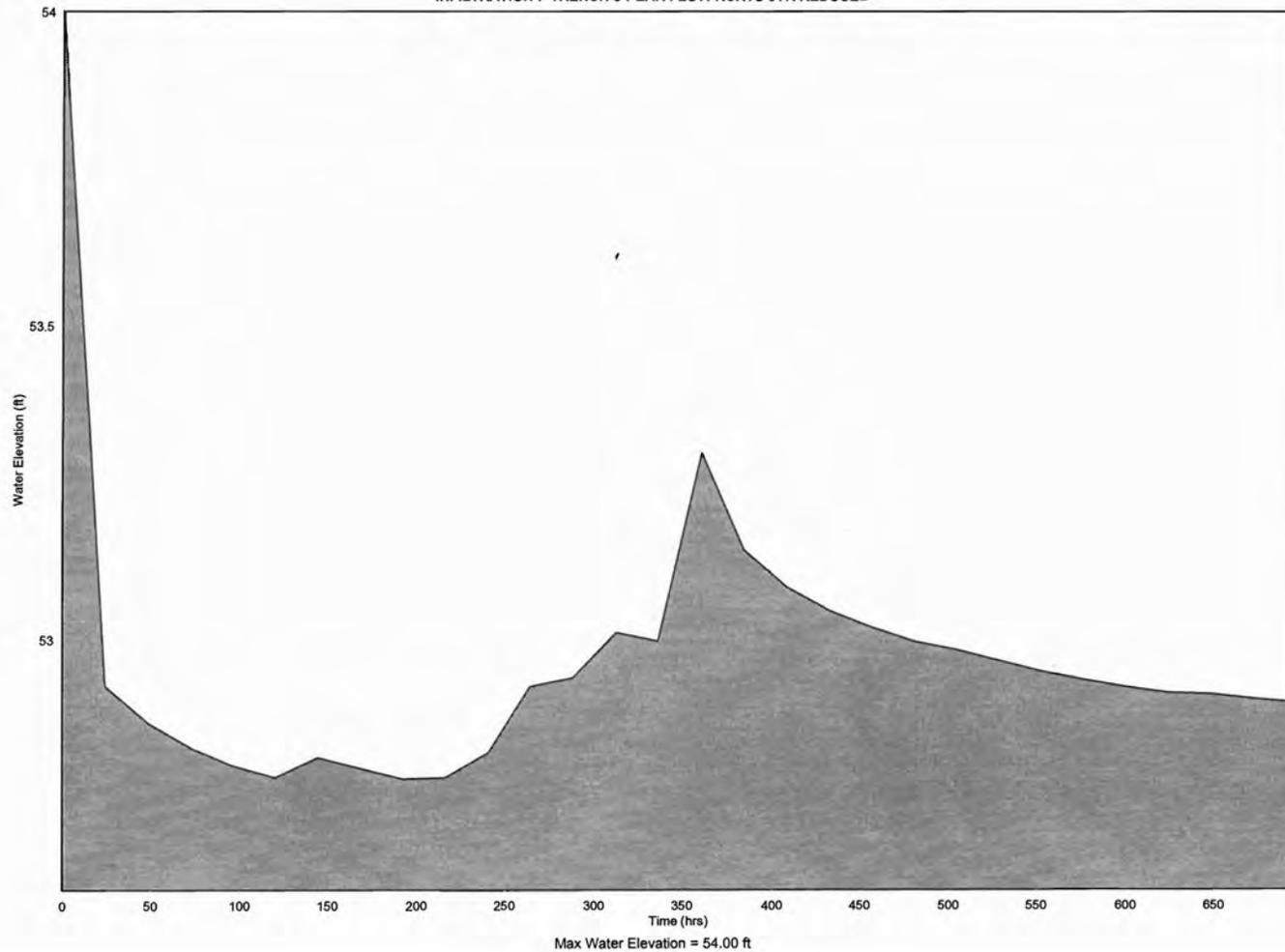
CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft³)
			0.00916	
336.31	52.998	0.03221		0.00
			0.05526	
360.31	53.297	0.02987		0.00
			0.00447	
384.31	53.143	0.00308		0.00
			0.00168	
408.31	53.084	0.00136		0.00
			0.00104	
432.31	53.047	0.00106		0.00
			0.00109	
456.31	53.020	0.00111		0.00
			0.00113	
480.31	52.998	0.00145		0.00
			0.00178	
504.31	52.985	0.00144		0.00
			0.00111	
528.31	52.967	0.00083		0.00
			0.00055	
552.31	52.950	0.00048		0.00
			0.00040	
576.31	52.936	0.00035		0.00
			0.00031	
600.31	52.925	0.00028		0.00
			0.00024	
624.31	52.916	0.00050		0.00
			0.00075	
648.31	52.914	0.00048		0.00

INFILTRATION : TRENCH 3-PEAK FLOW KCRTS 8YR REDUCED



Total Volume Infiltrated = 15,962 ft³

INFILTRATION : TRENCH 3-PEAK FLOW KCRTS 8YR REDUCED



MODRET

SUMMARY OF UNSATURATED & SATURATED INPUT PARAMETERS

**PROJECT NAME : Trench 3-Peak Volume KCRTS 8yr reduced
 MANUAL RUNOFF DATA USED
 UNSATURATED ANALYSIS INCLUDED**

Pond Bottom Area	2,404.00 ft ²
Pond Volume between Bottom & DHWL	4,808.00 ft ³
Pond Length to Width Ratio (L/W)	601.00
Elevation of Effective Aquifer Base	52.59 ft
Elevation of Seasonal High Groundwater Table	52.60 ft
Elevation of Starting Water Level	54.00 ft
Elevation of Pond Bottom	52.60 ft
Design High Water Level Elevation	56.00 ft
Avg. Effective Storage Coefficient of Soil for Unsaturated Analysis	0.25
Unsaturated Vertical Hydraulic Conductivity	55.00 ft/d
Factor of Safety	2.00
Saturated Horizontal Hydraulic Conductivity	82.50 ft/d
Avg. Effective Storage Coefficient of Soil for Saturated Analysis	0.20
Avg. Effective Storage Coefficient of Pond/Exfiltration Trench	0.30

Hydraulic Control Features:

	Top	Bottom	Left	Right
Groundwater Control Features - Y/N	N	N	N	N
Distance to Edge of Pond	0.00	0.00	0.00	0.00
Elevation of Water Level	0.00	0.00	0.00	0.00
Impervious Barrier - Y/N	N	N	N	N
Elevation of Barrier Bottom	0.00	0.00	0.00	0.00

MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 3-Peak Volume KCRTS 8yr reduced

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
00.00 - 0.00	52.600	0.000 *		
			0.00000	
0.00	52.600	0.06375		
			0.04374	
24.31	52.958	0.02374		0.00
			0.00398	
48.31	52.863	0.00393		0.00
			0.00388	
72.31	52.847	0.00701		0.00
			0.01014	
96.31	52.898	0.00846		0.00
			0.00678	
120.31	52.893	0.00484		0.00
			0.00290	
144.31	52.865	0.00348		0.00
			0.00407	
168.31	52.868	0.00256		0.00
			0.00106	
192.31	52.843	0.00075		0.00
			0.00045	
216.31	52.828	0.00126		0.00
			0.00207	
240.31	52.836	0.00138		0.00
			0.00069	
264.31	52.825	0.00170		0.00
			0.00271	
288.31	52.840	0.00163		0.00
			0.00055	
312.31	52.825	0.00224		0.00

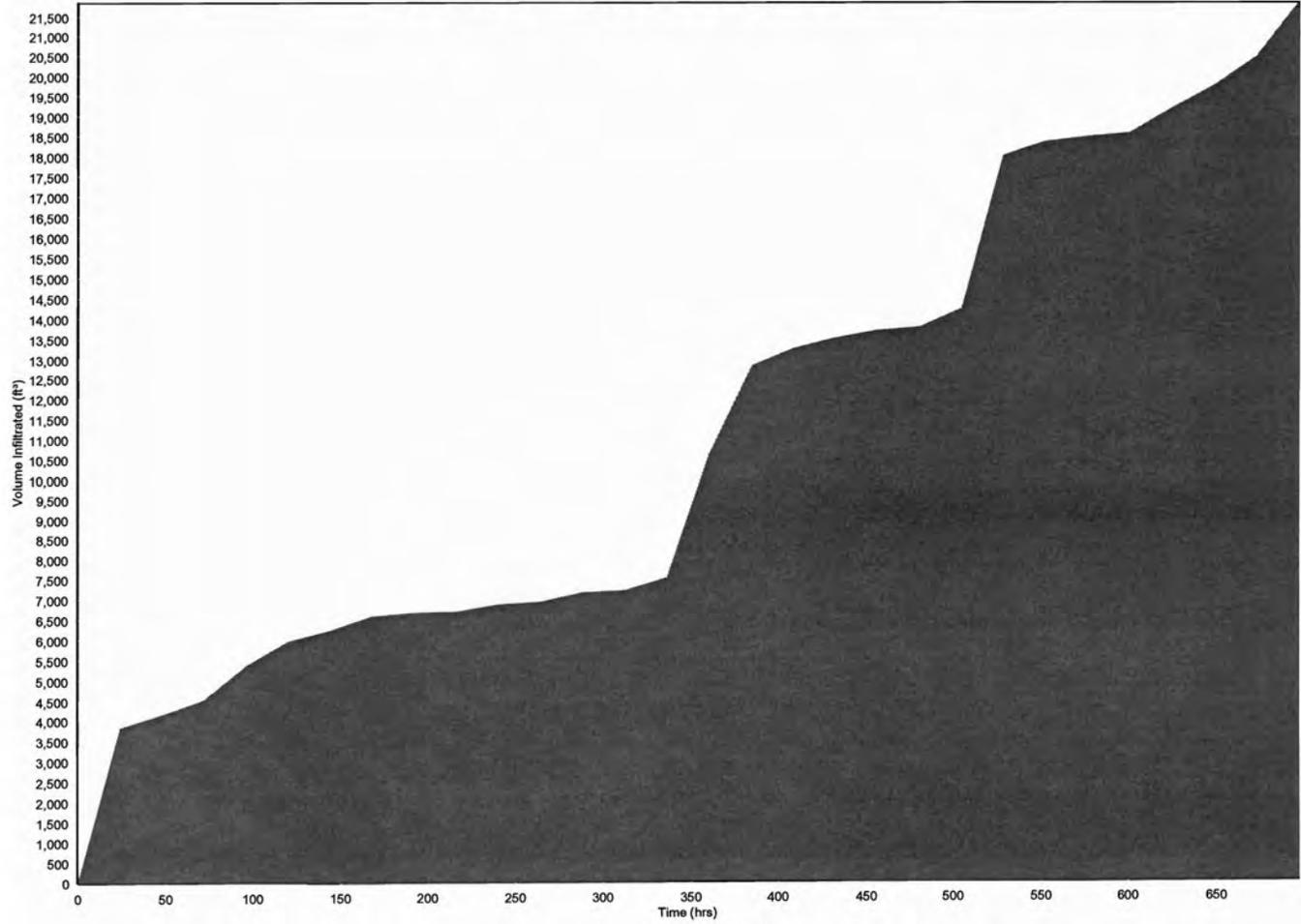
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SUMMARY OF RESULTS

PROJECT NAME : Trench 3-Peak Volume KCRTS 8yr reduced

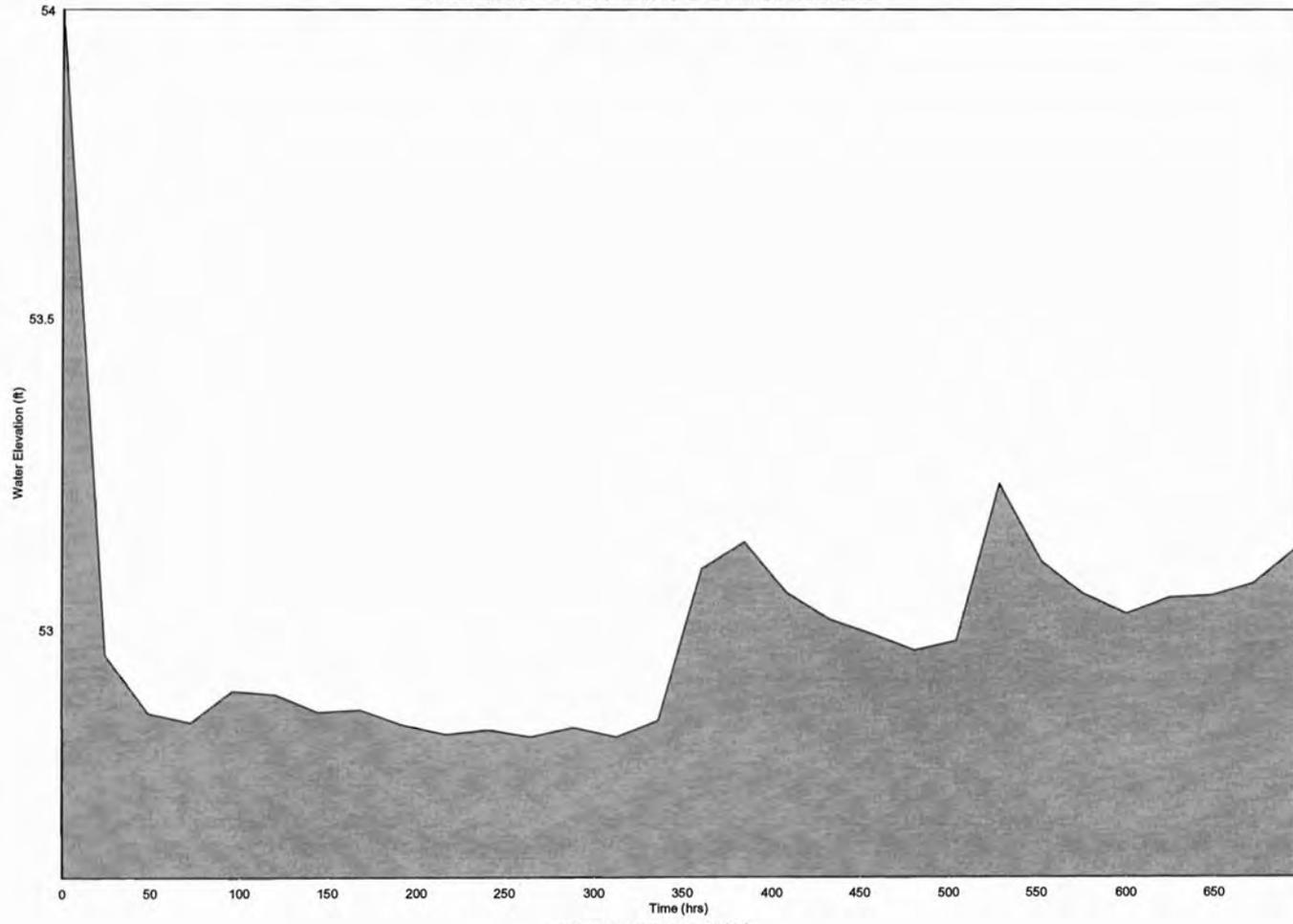
CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
			0.00394	
336.31	52.851	0.01976		0.00
			0.03559	
360.31	53.100	0.03048		0.00
			0.02537	
384.31	53.144	0.01523		0.00
			0.00508	
408.31	53.059	0.00394		0.00
			0.00280	
432.31	53.019	0.00252		0.00
			0.00224	
456.31	52.994	0.00154		0.00
			0.00084	
480.31	52.966	0.00296		0.00
			0.00507	
504.31	52.982	0.02442		0.00
			0.04376	
528.31	53.238	0.02396		0.00
			0.00416	
552.31	53.112	0.00283		0.00
			0.00150	
576.31	53.059	0.00119		0.00
			0.00089	
600.31	53.027	0.00401		0.00
			0.00713	
624.31	53.053	0.00683		0.00
			0.00652	
648.31	53.058	0.00764		0.00

INFILTRATION : TRENCH 3-PEAK VOLUME KCRTS 8YR REDUCED



Total Volume Infiltrated = 21,840 ft³

INFILTRATION : TRENCH 3-PEAK VOLUME KCRTS 8YR REDUCED



MODRET

SUMMARY OF UNSATURATED & SATURATED INPUT PARAMETERS

**PROJECT NAME : Trench 456-Peak Flow KCRTS 8yr red.
 MANUAL RUNOFF DATA USED
 UNSATURATED ANALYSIS INCLUDED**

Pond Bottom Area	4,432.00 ft ²
Pond Volume between Bottom & DHWL	8,864.00 ft ³
Pond Length to Width Ratio (L/W)	1,108.00
Elevation of Effective Aquifer Base	46.93 ft
Elevation of Seasonal High Groundwater Table	46.94 ft
Elevation of Starting Water Level	50.00 ft
Elevation of Pond Bottom	46.94 ft
Design High Water Level Elevation	52.00 ft
Avg. Effective Storage Coefficient of Soil for Unsaturated Analysis	0.25
Unsaturated Vertical Hydraulic Conductivity	55.00 ft/d
Factor of Safety	2.00
Saturated Horizontal Hydraulic Conductivity	82.50 ft/d
Avg. Effective Storage Coefficient of Soil for Saturated Analysis	0.20
Avg. Effective Storage Coefficient of Pond/Exfiltration Trench	0.30

Hydraulic Control Features:

	Top	Bottom	Left	Right
Groundwater Control Features - Y/N	N	N	N	N
Distance to Edge of Pond	0.00	0.00	0.00	0.00
Elevation of Water Level	0.00	0.00	0.00	0.00
Impervious Barrier - Y/N	N	N	N	N
Elevation of Barrier Bottom	0.00	0.00	0.00	0.00

MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 456-Peak Flow KCRTS 8yr red.

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
00.00 - 0.00	46.940	0.000 *		
			0.00000	
0.00	46.940	0.23571		
			0.16211	
24.67	47.517	0.08852		0.00
			0.01691	
48.67	47.366	0.01124		0.00
			0.00557	
72.67	47.294	0.00393		0.00
			0.00228	
96.67	47.253	0.00178		0.00
			0.00127	
120.67	47.229	0.00506		0.00
			0.00884	
144.67	47.254	0.00589		0.00
			0.00293	
168.67	47.236	0.00194		0.00
			0.00095	
192.67	47.220	0.00190		0.00
			0.00285	
216.67	47.220	0.00628		0.00
			0.00970	
240.67	47.250	0.01896		0.00
			0.02823	
264.67	47.342	0.02348		0.00
			0.01872	
288.67	47.348	0.02494		0.00
			0.03117	
312.67	47.410	0.02410		0.00

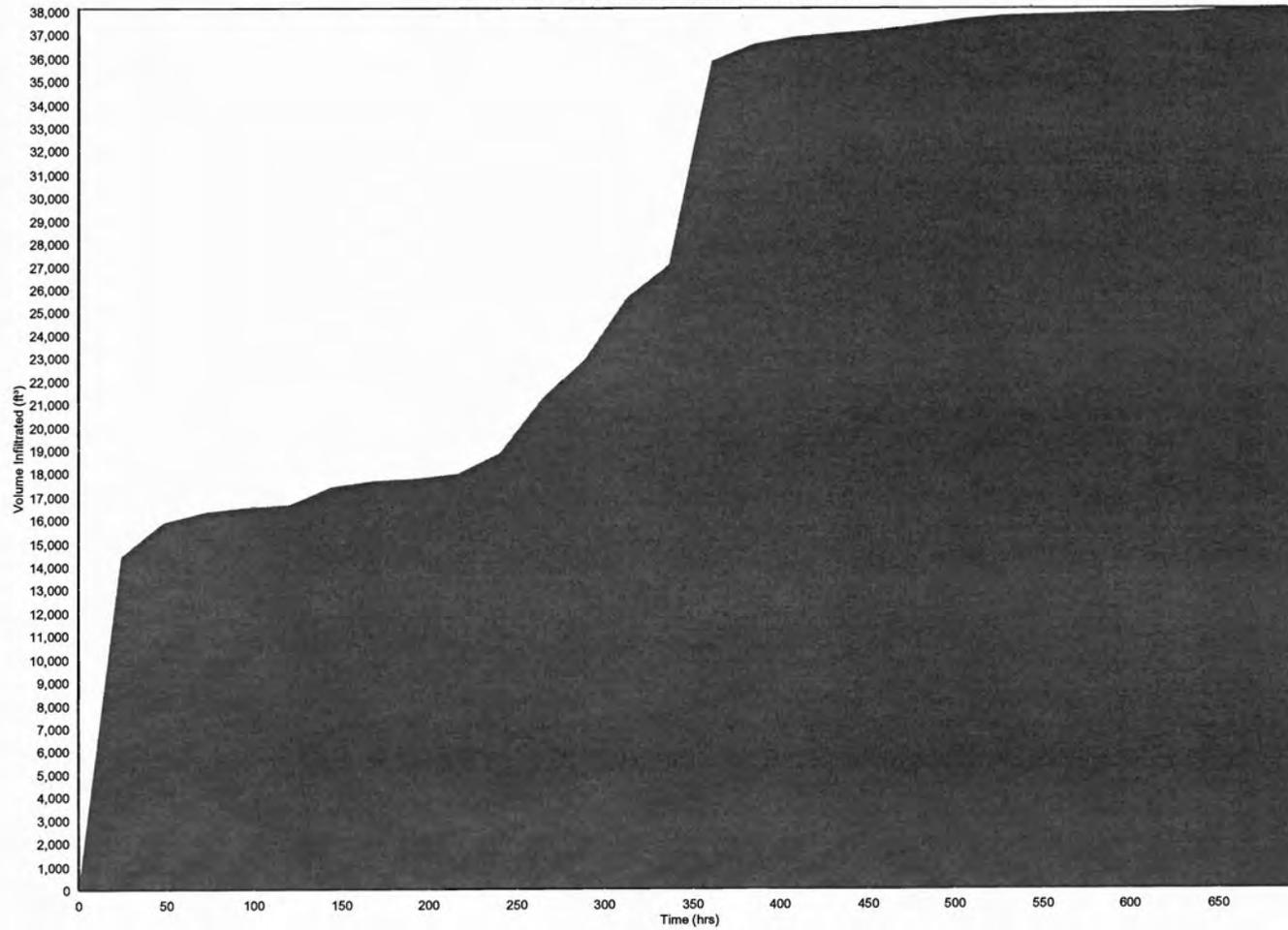
MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 456-Peak Flow KCRTS 8yr red.

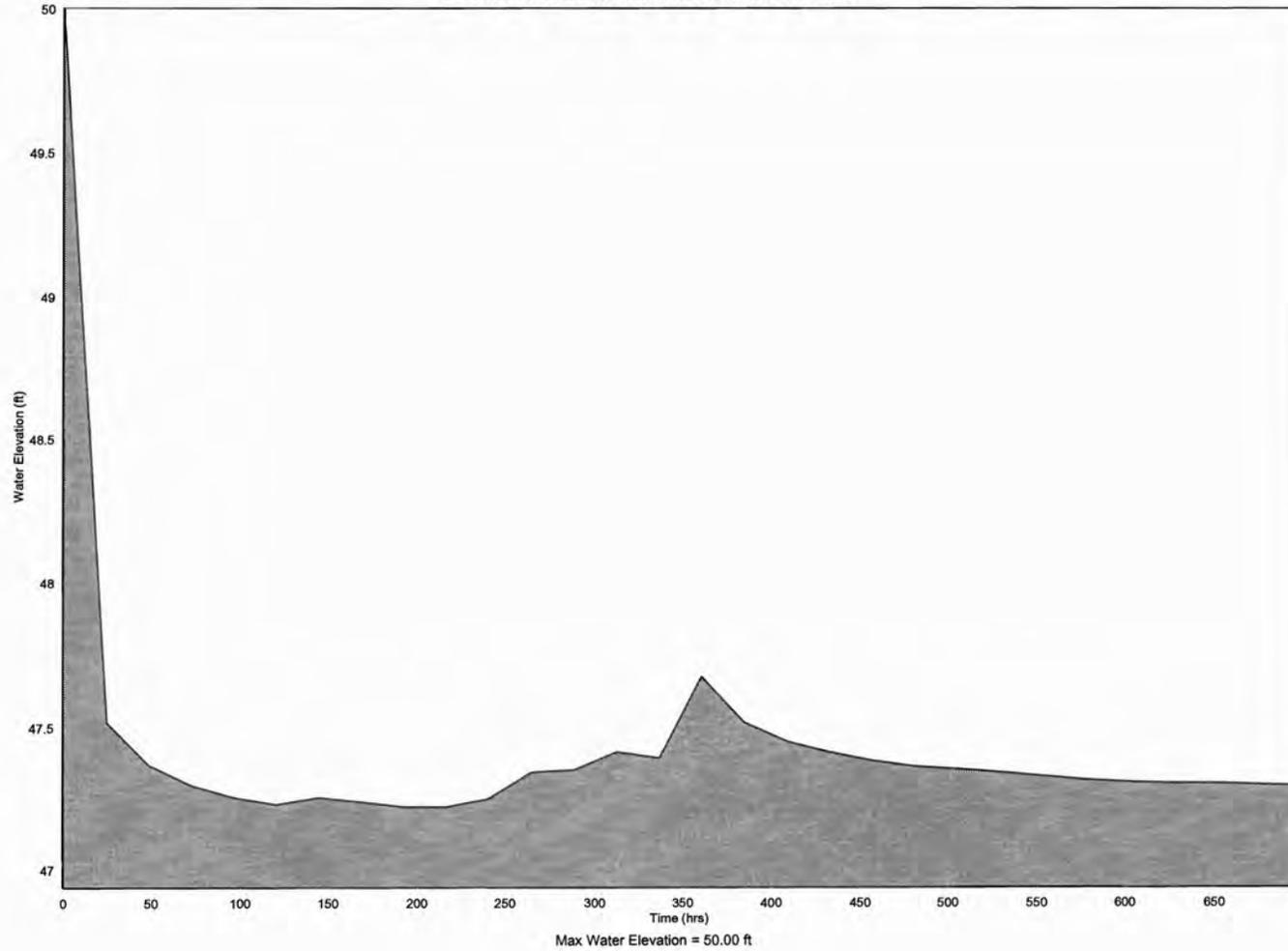
CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft ³)
			0.01703	
336.67	47.392	0.05925		0.00
			0.10147	
360.67	47.673	0.05496		0.00
			0.00845	
384.67	47.515	0.00591		0.00
			0.00337	
408.67	47.450	0.00272		0.00
			0.00206	
432.67	47.410	0.00201		0.00
			0.00196	
456.67	47.383	0.00195		0.00
			0.00194	
480.67	47.364	0.00250		0.00
			0.00305	
504.67	47.354	0.00242		0.00
			0.00178	
528.67	47.340	0.00129		0.00
			0.00080	
552.67	47.327	0.00066		0.00
			0.00052	
576.67	47.317	0.00045		0.00
			0.00038	
600.67	47.310	0.00035		0.00
			0.00031	
624.67	47.304	0.00078		0.00
			0.00125	
648.67	47.304	0.00077		0.00

INFILTRATION : TRENCH 456-PEAK FLOW KCRTS 8YR RED.



Total Volume Infiltrated = 38,098 ft³

INFILTRATION : TRENCH 456-PEAK FLOW KCRTS 8YR RED.



MODRET

SUMMARY OF UNSATURATED & SATURATED INPUT PARAMETERS

**PROJECT NAME : Trench 456-Peak Volume KCRTS 8yr red.
 MANUAL RUNOFF DATA USED
 UNSATURATED ANALYSIS INCLUDED**

Pond Bottom Area	4,432.00 ft ²
Pond Volume between Bottom & DHWL	8,864.00 ft ³
Pond Length to Width Ratio (L/W)	1,108.00
Elevation of Effective Aquifer Base	46.93 ft
Elevation of Seasonal High Groundwater Table	46.94 ft
Elevation of Starting Water Level	50.00 ft
Elevation of Pond Bottom	46.94 ft
Design High Water Level Elevation	52.00 ft
Avg. Effective Storage Coefficient of Soil for Unsaturated Analysis	0.25
Unsaturated Vertical Hydraulic Conductivity	55.00 ft/d
Factor of Safety	2.00
Saturated Horizontal Hydraulic Conductivity	82.50 ft/d
Avg. Effective Storage Coefficient of Soil for Saturated Analysis	0.20
Avg. Effective Storage Coefficient of Pond/Exfiltration Trench	0.30

Hydraulic Control Features:

	Top	Bottom	Left	Right
Groundwater Control Features - Y/N	N	N	N	N
Distance to Edge of Pond	0.00	0.00	0.00	0.00
Elevation of Water Level	0.00	0.00	0.00	0.00
Impervious Barrier - Y/N	N	N	N	N
Elevation of Barrier Bottom	0.00	0.00	0.00	0.00

MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 456-Peak Volume KCRTS 8yr red.

CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft³)
00.00 - 0.00	46.940	0.000 *		
			0.00000	
0.00	46.940	0.25120		
			0.17068	
24.67	47.543	0.09016		0.00
			0.01182	
48.67	47.361	0.01036		0.00
			0.00890	
72.67	47.310	0.01425		0.00
			0.01960	
96.67	47.339	0.01612		0.00
			0.01263	
120.67	47.329	0.00887		0.00
			0.00512	
144.67	47.302	0.00631		0.00
			0.00749	
168.67	47.305	0.00468		0.00
			0.00186	
192.67	47.281	0.00141		0.00
			0.00095	
216.67	47.263	0.00255		0.00
			0.00414	
240.67	47.265	0.00282		0.00
			0.00149	
264.67	47.248	0.00343		0.00
			0.00537	
288.67	47.255	0.00333		0.00
			0.00129	
312.67	47.234	0.00444		0.00

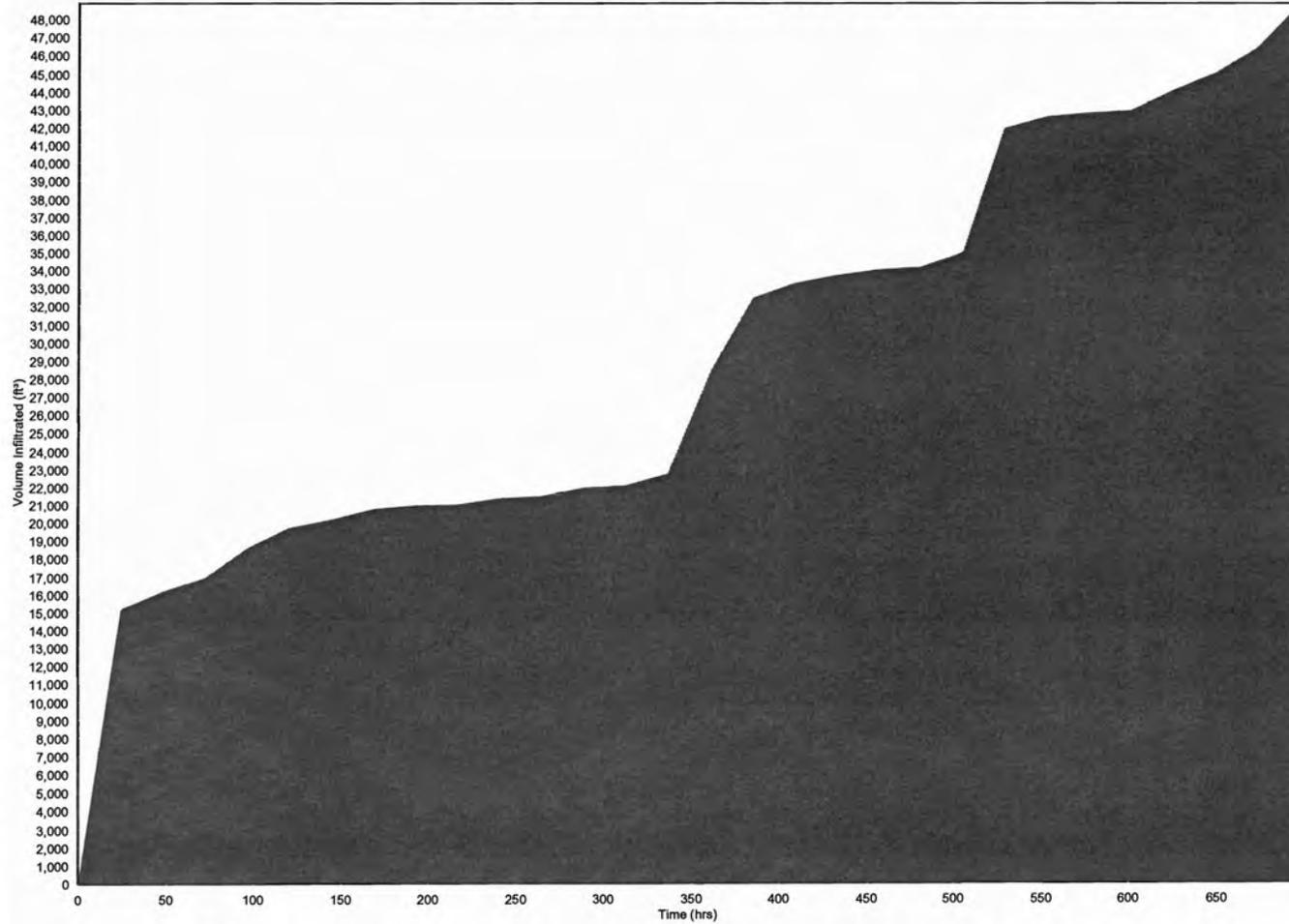
MODRET

SUMMARY OF RESULTS

PROJECT NAME : Trench 456-Peak Volume KCRTS 8yr red.

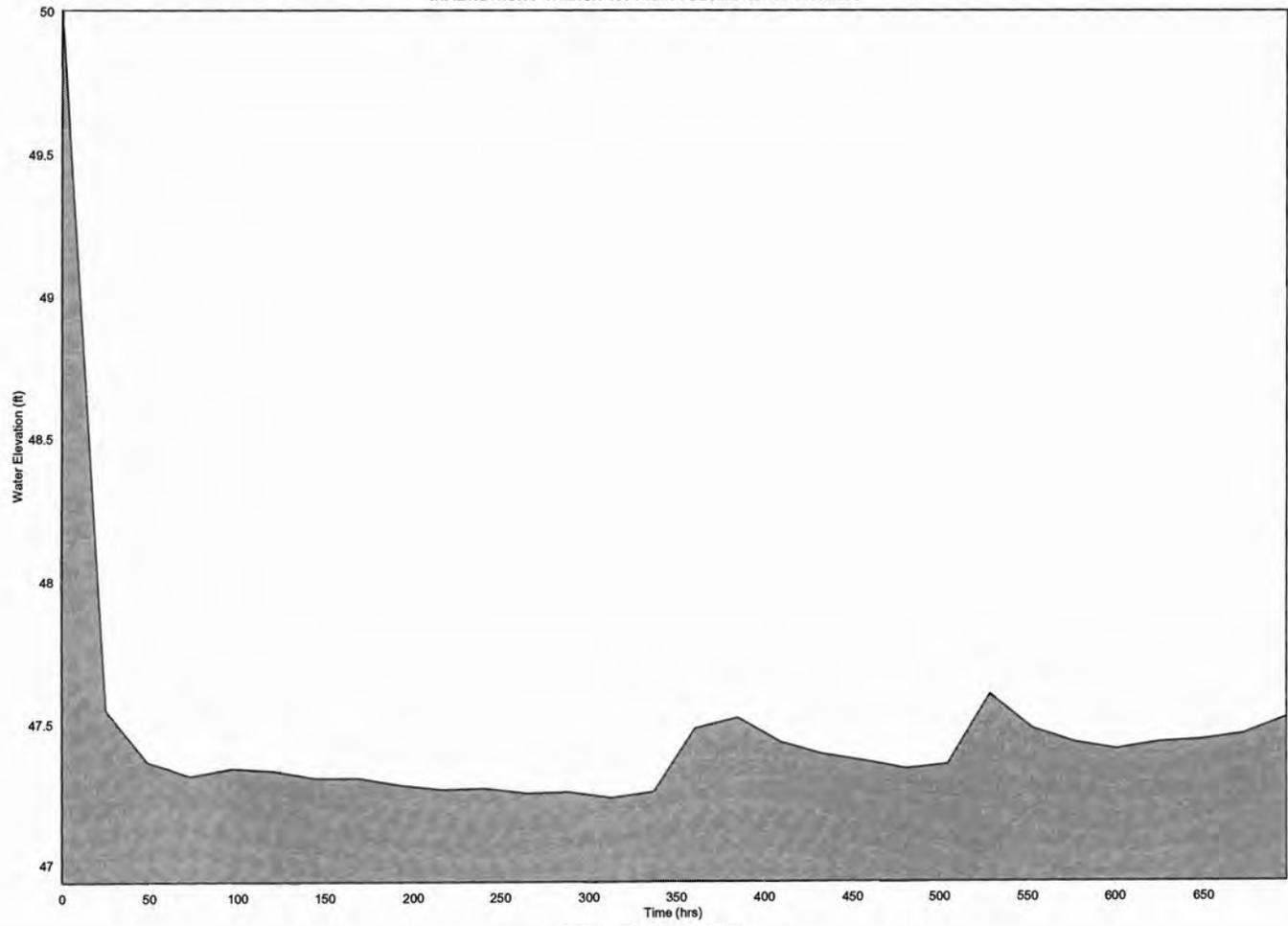
CUMULATIVE TIME (hrs)	WATER ELEVATION (feet)	INSTANTANEOUS INFILTRATION RATE (cfs)	AVERAGE INFILTRATION RATE (cfs)	CUMULATIVE OVERFLOW (ft³)
			0.00758	
336.67	47.252	0.03664		0.00
			0.06570	
360.67	47.483	0.05613		0.00
			0.04655	
384.67	47.519	0.02797		0.00
			0.00938	
408.67	47.432	0.00731		0.00
			0.00523	
432.67	47.390	0.00467		0.00
			0.00410	
456.67	47.365	0.00280		0.00
			0.00149	
480.67	47.338	0.00534		0.00
			0.00919	
504.67	47.353	0.04453		0.00
			0.07986	
528.67	47.603	0.04362		0.00
			0.00737	
552.67	47.482	0.00497		0.00
			0.00257	
576.67	47.433	0.00201		0.00
			0.00145	
600.67	47.405	0.00717		0.00
			0.01289	
624.67	47.433	0.01234		0.00
			0.01179	
648.67	47.439	0.01387		0.00

INFILTRATION : TRENCH 456-PEAK VOLUME KCRTS 8YR RED.



Total Volume Infiltrated = 48,864 ft³

INFILTRATION : TRENCH 456-PEAK VOLUME KCRTS 8YR RED.



Max Water Elevation = 50.00 ft

ICICLE CREEK ENGINEERS

Daily Field Report

Prepared by: Jeff Schwartz	Project No: 0105-010	Date: 04/24/14
Signature: 	Location: South Sammamish Segment, East Lake Sammamish Trail, Sammamish, Washington	Arrival: 1000
Weather: Overcast to partly clear, rain showers, 50's	Owner: King County	Departure: 1430
Reviewed by: 	Client: Parametrix	Page: 1 of 1
Report No: 23	Distribution (email): Jenny Bailey, Parametrix	Attachments: None

Jeff Schwartz of Icicle Creek Engineers (ICE) completed a site visit to the South Sammamish Segment of the East Lake Sammamish Trail in Sammamish, Washington to measure ground water levels in the 18 piezometers installed by ICE in October 2013.

The depth to ground water was measured using an electric water level indicator. The depths as noted below are relative to the adjacent ground surface. Previous ground water measurements are included in the following table.

Piezometer Number	Depth to Ground Water (feet)				Piezometer Depth (feet)
	11/13/13	12/18/13	02/13/14	04/24/14	11/13/13
B-82 (Station 223+28)	1.75	1.70	1.70	1.57*	15.0
B-6 (Station 249+30)	14.50	14.30	12.90	11.12*	15.0
B-83 (Station 252+00)	dry	dry	14.45	10.99	15.0
B-84 (Station 254+50)	dry	dry	dry	13.67	14.9
B-85 (Station 258+02)	dry	dry	14.20	10.07	15.0
B-86 (Station 260+00)	14.00	13.25	10.65	6.80**	15.1
B-87 (Station 263+00)	dry	14.65	13.60	10.11*	14.9
B-88 (Station 266+00)	dry	dry	12.45	11.48	14.8
B-11 (Station 268+65)	dry	13.75	13.64	11.80	14.9
B-89 (Station 272+00)	dry	dry	dry	13.21	15.0
B-90 (Station 275+00)	dry	dry	dry	12.62	15.1
B-91 (Station 278+00)	dry	dry	dry	13.46	15.1
B-92 (Station 280+96)	dry	dry	dry	13.65	15.2
B-93 (Station 288+00)	dry	dry	14.40	12.45*	15.1
B-94 (Station 293+17)	11.80	12.47	9.85	8.68	14.8
B-95 (Station 321+93)	3.45	3.32	3.15	2.83	14.4
B-97 (Station 419+00)	3.75	3.45	3.12	2.94	14.7
B-98 (Station 433+04)	11.20	11.35	10.98	10.49	14.1

*water filling monument above top of pipe, water removed prior to removing well cap.

**pressurized air in riser pipe observed after well cap removed. Water level allowed to rise (equilibrate) in well for about 15 minutes prior to measuring water level.