

GEOTECHNICAL REPORT

**Blomberg Industrial Park
Blomberg Street SW and 93rd Avenue SW
Tumwater, Washington**

Project No. T-6055-4

Terra Associates, Inc.

Prepared for:

**Puget Western, Inc.
Bothell, Washington**

December 3, 2009

TERRA ASSOCIATES, Inc.

Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

December 3, 2009
Project No. T-6055-4

Mr. Robert Boyd
Puget Western, Inc.
19515 North Creek Parkway, Suite 310
Bothell, Washington 98011

Subject: Geotechnical Report
Blomberg Industrial Park
Blomberg Street SW and 93rd Avenue SW
Tumwater, Washington

Dear Mr. Boyd:

As requested, we have conducted a geotechnical engineering study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

Our field exploration indicates the site is generally underlain by dense to very dense sand and gravel recessional outwash. The outwash was observed in the test borings to their termination depths with the exception of Test Borings B-102 and B-104. At these locations, we observed a hard gray silt formation below the outwash at depths of 80 and 60 feet, respectively. Groundwater was observed at depths ranging from 9 to 15 feet below current site elevations.

In our opinion, the native soils on the site will be suitable for the proposed development, provided the recommendations presented in this report are incorporated into project design and construction.

We trust the information presented in this report is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.


Carolyn Scheppel
Staff Engineer


Theodore Scheppel, P.E.
President



12-3-09

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**Geotechnical Report
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Tumwater, Washington**

1.0 PROJECT DESCRIPTION

The project consists of developing a 67.5-acre site with 2 approximately 659,000 square-foot commercial buildings along with associated paved access, parking, and utility improvements. As currently planned, design grades will require one to four feet of fill material to establish exterior pavement elevations and about eight feet of fill to establish building floor elevations. Stormwater will be discharged using infiltration trenches installed beneath the pavement.

We expect the structures will be constructed using precast concrete tilt-up perimeter wall panels with interior columns spaced at 40- to 50-foot centers. Floor slabs will be constructed at grade with dock-high access on the north and south sides of each structure. Structural loading is expected to be light with isolated columns carrying loads of 80 to 100 kips and bearing walls carrying 4 to 8 kips per foot. Product loading on slab-on-grade floors is expected in the range of 300 to 600 pounds per square foot (psf).

The recommendations in the following sections of this report are based on our understanding of the design features outlined above. We should review design drawings as they become available to verify that our recommendations have been properly interpreted and to supplement them, if required.

2.0 SCOPE OF WORK

Our work was completed in accordance with our authorized proposal dated March 3, 2009. On March 5, 2009 through March 20, 2009, we subcontracted with Holocene Drilling to perform 15 soil test borings. Six test borings were drilled on the property to depths of 60 to 80 feet to supplement existing soil and groundwater data. Nine test borings located on the adjacent perimeter roadways were drilled to a depth of five feet. Using the information obtained from our subsurface exploration along with existing soil and groundwater data, we performed analyses to develop geotechnical recommendations for project design and construction. Specifically, this report addresses the following:

- Soil and groundwater conditions
- Seismic – site class determination per 2006 International Building Code (IBC)
- Site preparation and grading
- Excavations
- Foundations
- Floor slabs

- Hydrogeologic assessment per Salmon Creek Basin requirements
- Stormwater infiltration
- Drainage
- Utilities
- Pavements for on-site access and parking and off-site roadway improvements

It should be noted that recommendations outlined in this report regarding drainage are associated with soil strength, design earth pressures, erosion, and stability. Design and performance issues with respect to moisture as it relates to the structure environment (i.e., humidity, mildew, mold) is beyond Terra Associates' purview. A building envelope specialist or contactor should be consulted to address these issues, as needed.

3.0 SITE CONDITIONS

3.1 Surface

The site consists of 3 tax parcels totaling 68 acres located southeast of the intersection of Blomberg Street SW and 93rd Avenue SW in Tumwater, Washington. The approximate location of the site is shown on Figure 1. The site is bordered by industrial buildings to the south, Blomberg Street to the west, 93rd Avenue to the north, and Lathrop Industrial Drive to the east.

The project site is currently occupied by three houses and two garage/barn type structures. The homes and structures are located in the northwest corner, north center, and south center portions of the site. The rest of the site is open land. The site has been recently logged and all the vegetation has been ground up and removed from the site with one exception at the northwest site corner the existing home and some trees remain. Site topography is almost flat with a gradual slope towards the west-southwest. Local elevation relief in this direction is about five feet across the site.

3.2 Subsurface

In general, soil conditions we observed in our exploration locations consisted of dense to very dense sand and gravel with varying silt content. This sand and gravel unit is mapped as recessional outwash and was observed in the test borings to depths of 60 to 80 feet. At Test Borings B-102 and B-104, hard gray silt formation was observed below the outwash at depths of approximately 80 and 60 feet, respectively.

The *Map of Hydrology and Quality of Ground Water in Northern Thurston County*, Thurston County, Washington, by Drost, B.W., Turney, G.L., Dion, N.P. and Jones, M.A. (1998) maps the site as Vashon recessional outwash with younger alluvium, (Qvr). This mapped description is consistent with the native soil we observed at depth in the test pits and test borings.

The preceding discussion is intended to be a general review of the soil conditions encountered. For more detailed descriptions, please refer to the Boring Logs and Test Pit Logs in Appendix A.

3.3 Groundwater

We observed groundwater at depths ranging from 9 to 15 feet below current surface elevations in our explorations. Previous studies by others also reported groundwater at these depths. The groundwater observed represents the regional shallow unconfined aquifer within Vashon recessional outwash soils. The site falls within the Salmon Creek Drainage Basin an area known to be subject to shallow groundwater flooding during periods of significant prolonged rainfall. A complete hydrogeologic assessment of the site in accordance with Thurston County requirements for development in the Salmon Creek Basin is included in Appendix B.

3.4 Seismic

Section 17.15.200 of the Thurston County Code defines seismic hazard as those areas subject to severe risk of damage as a result of earthquake induced ground shaking, slope failure, settlement or soil liquefaction, such as artificial fill areas, and areas underlain by glaciolacustrine deposits and/or glacial outwash.

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations. Liquefaction mainly affects geologically recent deposits of loose to medium dense fine-grained sand and silty sand that are below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure that is generated by ground shaking essentially separates the soil grains and eliminates this intergranular friction; thus, eliminating the soil's strength.

The site is underlain by glacial outwash soils indicated by field testing to be in a dense to very dense condition. In addition, the outwash exhibits moderate permeability that will allow for dissipation of excess pore water pressure that may be generated during a seismic event. Given these conditions, in our opinion, the risk for liquefaction to occur at the site and its associated impacts to site buildings and infrastructure is low.

Based on the soil conditions encountered and the local geology, per the 2006 International Building Code (IBC), site class "C" should be used in design of the structures. Based on this site class, in accordance with the 2006 IBC, the following parameters should be used in computing seismic forces:

Seismic Design Parameters (IBC 2006)

Spectral response acceleration (Short Period), S_s	1.125
Spectral response acceleration (1 - Second Period), S_1	0.43
Site coefficient, F_a	1.000
Site coefficient, F_v	1.37
Five percent damped .2 second period, $S_{D,0.2}$	0.750
Five percent damped 1.0 second period, $S_{D,1}$	0.393

Values determined using the United States Geological Survey (USGS) Ground Motion Parameter Calculator accessed on 4-21-09 at the web site <http://earthquake.usgs.gov/research/hazmaps/design/index.php>.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 General

Based on our study, there are no geotechnical conditions that would preclude the planned development. The industrial buildings can be supported on conventional spread footings bearing on competent native soils below the upper four to six inches of organic topsoil or on structural fill placed and compacted above these native soils. Floor slabs and pavements can be similarly supported.

Most of the site outwash soils are relatively clean and could be used for structural fill during most weather conditions. Our exploration did reveal areas where the fines content of the upper outwash will make it sensitive to moisture variations and difficult to compact structurally when too wet or dry of its optimum moisture content. The grading and utility contractors should be prepared to moisture condition on-site soils as needed to facilitate compacting them in a structural manner.

Detailed recommendations regarding these issues and other geotechnical design considerations are provided in the following sections. These recommendations should be incorporated into the final design drawings and construction specifications.

4.2 Site Preparation and Grading

To prepare the site for construction, all vegetation should be stripped and removed from below areas of new construction. Following clearing and grubbing, where the depth of structural fill required to achieve design subgrade elevations is less than three feet, the upper organic surface layer should also be stripped and removed. Based on our exploration, surface stripping depths ranging from four to six inches should be expected to remove organic topsoil. Demolition of existing structures should include removal of existing foundations, floor slabs, oil tanks, septic systems, and other buried utilities. Abandoned utility pipes that fall outside of new building areas can be left in place provided they are sealed to prevent intrusion of groundwater seepage and soil. Organic topsoil will not be suitable for use as structural fill, but may be used for limited depths in nonstructural areas or for landscaping purposes.

Once demolition and stripping operations are complete, fill operations can be initiated to establish desired building grades. Prior to placing fill, all exposed bearing surfaces should be observed by a representative of Terra Associates to verify soil conditions are as expected and suitable for support of new fill or building elements. Our representative may request a proofroll using heavy rubber-tired equipment to determine if any isolated soft and yielding areas are present. If excessively yielding areas are observed, and they cannot be stabilized in place by compaction, the affected soils should be excavated and removed to firm bearing and grade restored with new structural fill. If the depth of excavation to remove unstable soils is excessive, the use of geotextile fabrics, such as Mirafi 500X, or an equivalent fabric, can be used in conjunction with clean granular structural fill. Our experience has shown that, in general, a minimum of 18 inches of a clean, granular structural fill placed and compacted over the geotextile fabric should establish a stable bearing surface.

The ability to use native soil from site excavations as structural fill will depend on its moisture content and the prevailing weather conditions at the time of construction. Most of the native sand and gravel outwash should be suitable for use as structural fill and trench backfill during most weather conditions. Our exploration and laboratory testing did find areas where the fines content of the upper outwash will make the soil sensitive to moisture and difficult to compact especially when wet of optimum moisture. The grading and utility contractors should be prepared to moisture condition native soils as needed to facilitate compaction.

If it becomes necessary to import material, we recommend importing a granular soil that meets the following grading requirements:

U.S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	30 maximum* (Dry Weather) 5 maximum* (Wet Weather)

* Based on the 3/4-inch fraction.

Prior to use, Terra Associates, Inc. should examine and test all materials imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soil's maximum dry density, as determined by American Society for Testing and Materials (ASTM) Test Designation D-698 (Standard Proctor). The moisture content of the soil at the time of compaction should be within two percent of its optimum, as determined by this ASTM standard. In nonstructural areas, the degree of compaction can be reduced to 90 percent.

4.3 Excavations

All excavations at the site associated with confined spaces, such as utility trenches, must be completed in accordance with local, state, and federal requirements. Based on regulations outlined in the Washington Industrial Safety and Health Act (WISHA), the outwash soils would be classified as Type C.

Accordingly, temporary excavations in Type C soils should have their slopes laid back at an inclination of 1.5:1 or flatter, from the toe to the crest of the excavated temporary slope. All temporary slope faces that will be exposed for a long-term should be covered with a durable reinforced plastic membrane during construction to prevent slope raveling and rutting during periods of precipitation. For utility trenches, a properly designed and installed shoring trench box can be used to support the excavation sidewalls.

This information is provided solely for the benefit of the owner and other design consultants, and should not be construed to imply that Terra Associates, Inc. assumes responsibility for job site safety. Job site safety is the sole responsibility of the project contractor.

4.4 Foundations

The industrial buildings may be supported on conventional spread footing foundations bearing on competent native soils or on structural fill placed above competent native soils. Foundation subgrade should be prepared as recommended in Section 5.2 of this report. Perimeter foundations exposed to the weather should bear at a minimum depth of 1.5 feet below final exterior grades for frost protection. Interior foundations can be constructed at any convenient depth below the floor slab.

Foundations supported on undisturbed bearing surfaces composed of the clean outwash sand and gravel, or structural fill can be dimensioned for a net allowable bearing capacity of 3,500 pounds per square foot (psf). For short-term loads, such as wind and seismic, a one-third increase in this allowable capacity can be used. With structural loading as anticipated and these bearing stresses applied, estimated total foundation settlement ranges from one-half to one-inch.

For designing foundations to resist lateral loads, a base friction coefficient of 0.35 can be used. Passive earth pressures acting on the side of the footing can also be considered. We recommend calculating this lateral resistance using an equivalent fluid weight of 350 pounds per cubic foot (pcf). We recommend not including the upper 12 inches of soil in this computation because it can be affected by weather or disturbed by future grading activity. This value assumes the foundation will be constructed neat against competent native soil or backfilled with structural fill as described in Section 5.2 of this report. The values recommended include a safety factor of 1.5.

4.5 Slabs-on-Grade

Slabs-on-grade may be supported on the subgrade prepared as recommended in Section 4.2 of this report. Immediately below the floor slab, we recommend placing a four-inch thick capillary break layer composed of clean, coarse sand or fine gravel that has less than three percent passing the No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab.

The capillary break layer will not prevent moisture intrusion through the slab caused by water vapor transmission. Where moisture by vapor transmission is undesirable, such as covered floor areas, a common practice is to place a durable plastic membrane on the capillary break layer and then cover the membrane with a layer of clean sand or fine gravel to protect it from damage during construction, and aid in uniform curing of the concrete slab. It should be noted that if the sand or gravel layer overlying the membrane is saturated prior to pouring the slab, it will be ineffective in assisting uniform curing of the slab, and can actually serve as a water supply for moisture transmission through the slab and affecting floor coverings. Therefore, in our opinion, covering the membrane with a layer of sand or gravel should be avoided if floor slab construction occurs during the wet winter months and the layer cannot be effectively drained. We recommend floor designers and contractors refer to the 2003 American Concrete Institute (ACI) Manual of Concrete Practice, Part 2, 302.1R-96, for further information regarding vapor barrier installation below slab-on-grade floors.

4.6 Stormwater Infiltration

As noted earlier, development stormwater will be routed for treatment and eventual discharge by infiltration to infiltration trenches located under the pavement. The recessional outwash sands and gravels we observed at the site would be a suitable receptor formation for infiltration discharge.

To determine the long-term design infiltration rate, we used procedures developed by Massmann (2003) as outlined in Section 3.3.8, Volume III of the Ecology's *Stormwater Management Manual for Western Washington*. This method correlates the permeability of the receptor soils with gradation testing in accordance with ASTM Test Designation D-422. Gradation curves from laboratory testing on the soils are attached in Appendix A. The procedure also takes into account facility geometry and depth to the seasonal high groundwater table or barrier layer. We expect the infiltration elements will consist of perforated pipes bedded and backfilled with drainage aggregate. We have also assumed that the invert elevation of the infiltration elements will be at least three feet above the estimated 1999 groundwater levels determined for this study as outlined in Appendix B of this report. Based on these assumptions and for various infiltration system layouts on a preliminary basis, we recommend using a long-term design infiltration rate of three inches per hour.

We should review the actual system layout for the project when designs are near final to verify our assumptions are correct and to modify the design rate, if needed. Depending on final site elevations, mounding analysis may also be required to verify that the potential permanent rise of the groundwater table at the property lines complies with Thurston Counties requirements for the Salmon Creek Basin.

The permeability of the native outwash soils will be significantly impacted by the intrusion of soil fines (silt- and clay-sized particles). Even a relatively minor amount of soil fines can reduce the permeability of the formation by a factor of ten. The greatest exposure to soil fines contamination will occur during mass grading and construction. Therefore, we recommend that the Temporary Erosion and Sedimentation Control (TESC) plans route construction stormwater to a location other than the permanent infiltration site. If this is not possible, the TESC pond bottom elevation should be kept two feet above the final infiltration elevation with final grade established after site areas have been substantially stabilized.

4.7 Drainage

Surface

Final exterior grades should promote free and positive drainage away from the site at all times. Water must not be allowed to pond or collect adjacent to foundations, or within the immediate building areas. We recommend providing a gradient of at least three percent for a minimum distance of ten feet from the building perimeters. If this gradient cannot be provided, surface water should be collected adjacent to the structures and disposed to appropriate storm facilities.

Subsurface

Considering the well-drained nature of the native site soil and that paved surfaces will extend to the building perimeters, provided the finish floor grade is at or above the adjacent exterior grade and positive drainage away from the structure is maintained, in our opinion, perimeter foundation drains would not be required.

4.8 Utilities

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA), or City of Tumwater specifications. Native soils will provide a suitable foundation for pipe support. As a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 4.2 of this report.

4.9 Pavements

Pavement subgrade should be prepared as described in Section 4.2 of this report. Regardless of the degree of relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proofrolled with heavy construction equipment to verify this condition. Based on the results of our field and laboratory testing along with our experience, we have assigned the subgrade a resilient modulus (M_r) of 15,000 pounds per square inch (psi) for design of the pavement sections.

The pavement design section is dependent upon the supporting capability of the subgrade soils and the traffic conditions to which it will be subjected. A traffic study for the site was prepared by Shea, Carr, and Jewell, Inc. on February 22, 2008. Based on the current traffic levels and projected traffic from the development outlined in the study using a 20-year design life, we have calculated the following 18-kip Equivalent Single Axle Loading (ESAL) for the site pavement and adjacent roadways:

Pavement Location	ESAL
<i>On-Site</i>	856,290
<i>Blomberg</i>	933,466
<i>93rd</i>	3,444,097
<i>Lathrop</i>	848,586

Pavement design calculations using the American Association of State Highway Transportation Officials (AASHTO) procedure indicates the following pavement sections should be used:

On-site, Blomberg Street SW and Lathrop Industrial Drive SW

- Four inches of hot mix asphalt (HMA) over five inches of crushed rock base (CRB)
- Three inches of HMA over four inches of asphalt-treated base (ATB)

93rd Avenue SW

- Five inches of HMA over six inches of CRB
- Four inches of HMA over 4 ½ inches of ATB

Asphalt concrete should meet the requirements for ½-inch class HMA as outlined in Washington State Department of Transportation's (WSDOT) standard specifications. Asphalt-treated base and crushed rock base should also meet WSDOT requirements.

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability. For optimum pavement performance, we recommend surface drainage gradients of at least two percent. Some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

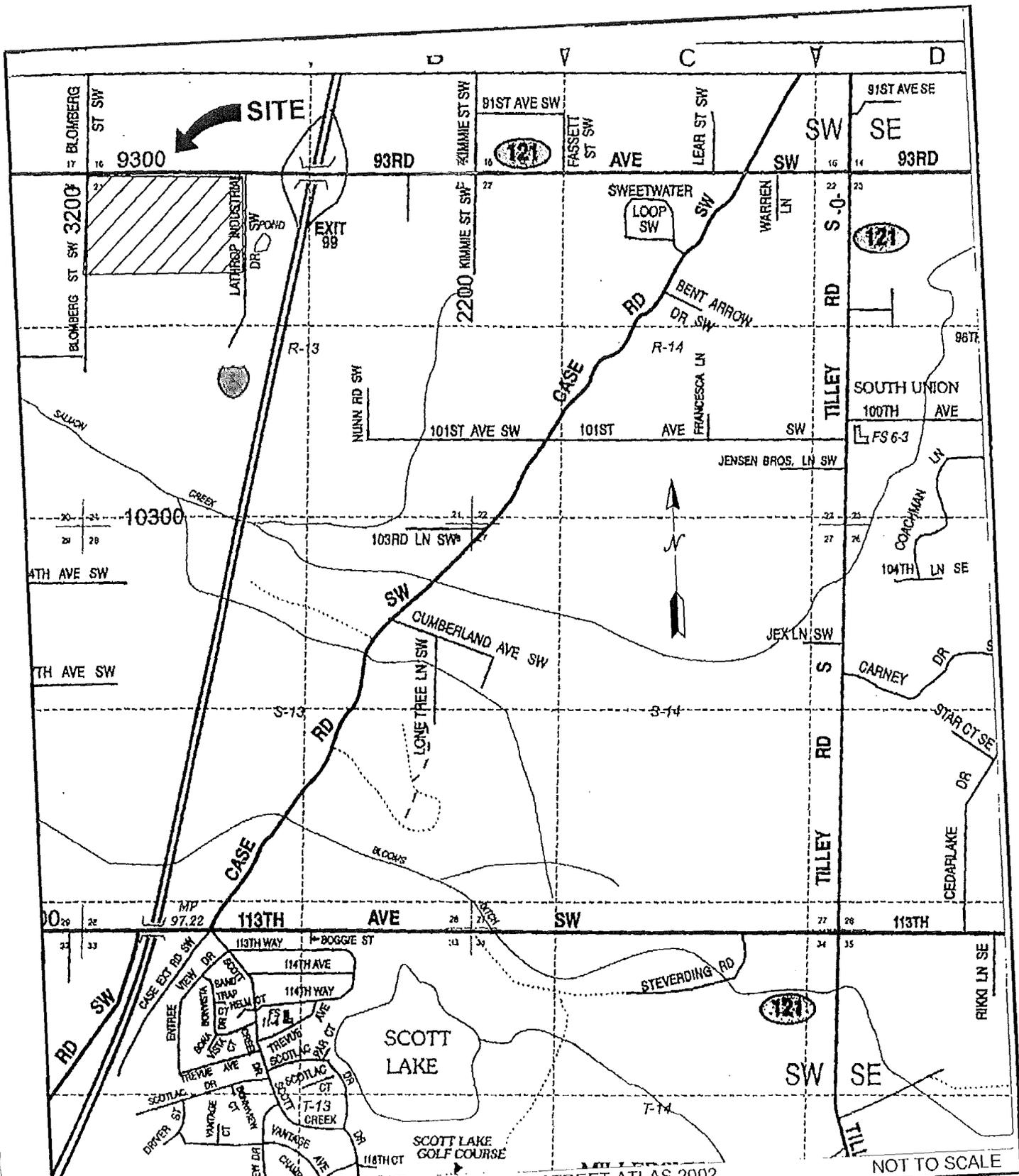
5.0 ADDITIONAL SERVICES

Terra Associates, Inc. should review the final design drawings and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and implemented in project design. We should also provide geotechnical services during construction to observe compliance with our design concepts, specifications, and recommendations. This will allow for design changes if subsurface conditions differ from those anticipated prior to the start of construction.

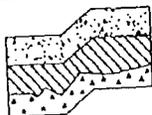
6.0 LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made. This report is the copyrighted property of Terra Associates, Inc. and is intended for specific application to the Blomberg Industrial Park project. This report is for the exclusive use of Puget Western, Inc. and their authorized representatives.

The analyses and recommendations presented in this report are based on data obtained from the test pits excavated on the site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.



REFERENCE: THE ROADRUNNER THURSTON COUNTY STREET ATLAS 2002



Terra Associates, Inc.
 Consultants in Geotechnical Engineering
 Geology and
 Environmental Earth Sciences

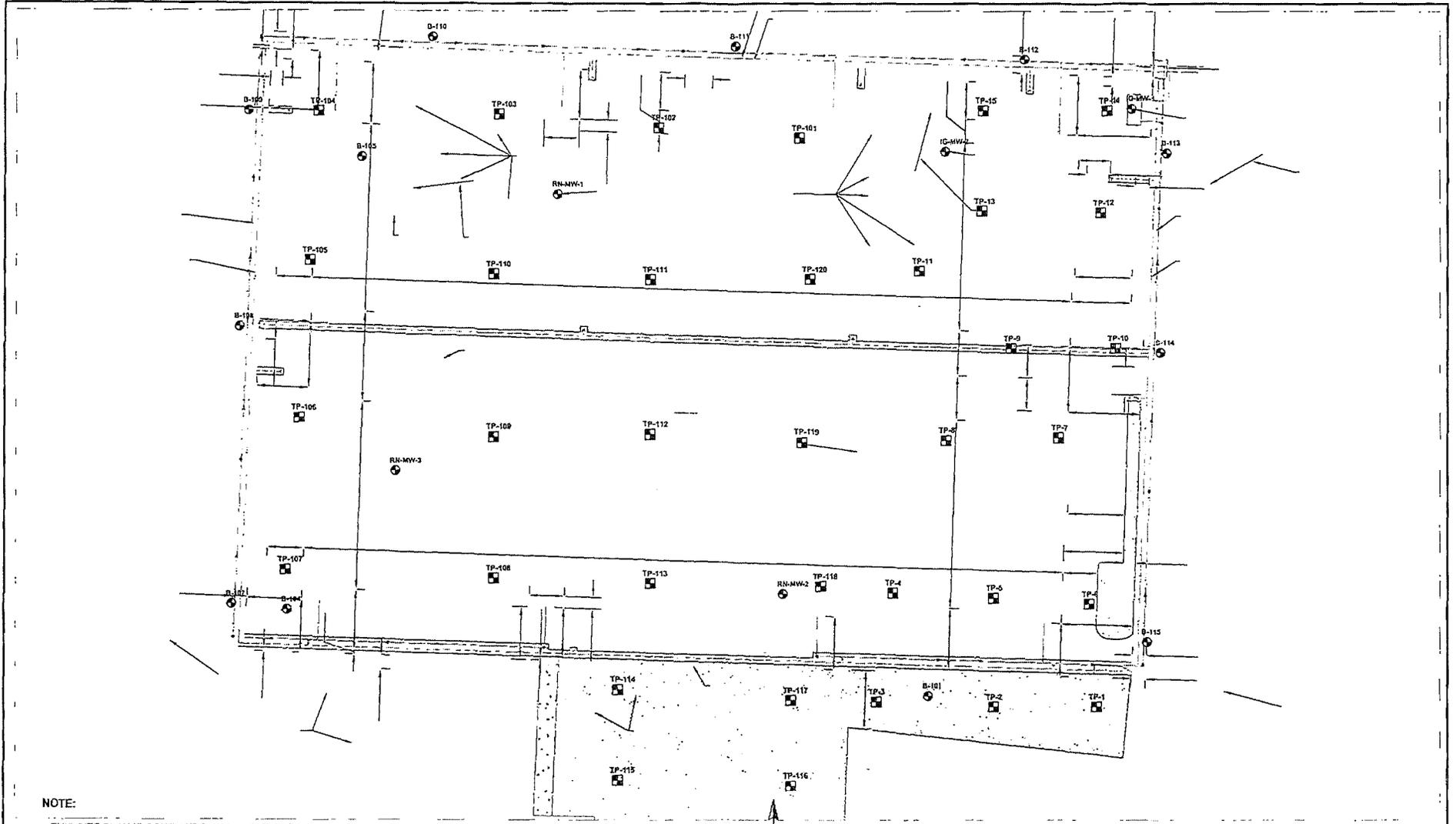
VICINITY MAP
 BLOMBERG INDUSTRIAL PARK
 TUMWATER, WASHINGTON

Proj. No. T-6055-4

Date DEC 2009

Figure 1

NOT TO SCALE



NOTE:

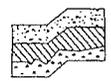
THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE:

SITE PLAN PROVIDED BY BARGHAUSEN CONSULTING ENGINEERS

LEGEND:

-  APPROXIMATE TEST PIT LOCATION NOVEMBER 2007
-  APPROXIMATE WELL/BORING LOCATION



Terra Associates, Inc.
 Consultants in Geotechnical Engineering
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**EXPLORATION LOCATION PLAN
 BLOMBERG INDUSTRIAL PARK
 TUMWATER, WASHINGTON**

Proj. No. T-6055-4

Date DEC 2009

Figure 2

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

Blomberg Industrial Park
Tumwater, Washington

On March 9 through 20, 2009, we observed the drilling of 15 soil test borings to depths ranging from 5 to 81.5 feet below the existing site grades. Previously in November and March 2007, we observed the excavation of 35 test pits to depths ranging from 10 to 15 feet below the existing site grades. Test pit locations were determined in the field by measurements from existing site features and buildings. Test boring and well locations were field surveyed by Barghausen Consulting Engineers. The approximate location of the test borings and test pits are shown on the attached Exploration Location Plan, Figure 2. Boring Logs and Test Pit Logs are attached as Figures A-2 through A-36.

A geotechnical engineer from our office conducted the field exploration. Our representative classified the soil conditions encountered, maintained a log of each test boring, obtained representative soil samples, and recorded water levels observed during drilling and excavation. During drilling, soil samples were obtained in general accordance with ASTM Test Designation D-1586. Using this procedure, a 2-inch (outside diameter) split barrel sampler is driven into the ground 18 inches using a 140-pound hammer free falling a height of 30 inches. The number of blows required to drive the sampler 12 inches after an initial 6-inch set is referred to as the Standard Penetration Resistance value or N value. This is an index related to the consistency of cohesive soils and relative density of cohesionless materials. N values obtained for each sampling interval are recorded on the Boring Logs, Figures A-2 through A-16. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1.

Representative soil samples obtained from the test borings and test pits were placed in closed containers and taken to our laboratory for further examination and testing. The moisture content of each sample was measured and is reported on the individual Boring Logs and Test Pit Logs. Grain size analyses were performed on selected samples, the results of which are shown on Figures A-37 through A-42.

MAJOR DIVISIONS		LETTER SYMBOL	TYPICAL DESCRIPTION			
COARSE GRAINED SOILS	More than 50% material larger than No. 200 sieve size	GRAVELS	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	
		More than 50% of coarse fraction is larger than No. 4 sieve	Gravels with fines	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.	
			SANDS	Clean Sands (less than 5% fines)	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
		More than 50% of coarse fraction is smaller than No. 4 sieve		Sands with fines	GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
				More than 50% material smaller than No. 200 sieve size	SILTS AND CLAYS	SW
		Liquid limit is less than 50%			SILTS AND CLAYS	SP
	Liquid limit is greater than 50%		SILTS AND CLAYS	SM		Silty sands, sand-silt mixtures, non-plastic fines.
		Liquid limit is greater than 50%		SILTS AND CLAYS	SC	Clayey sands, sand-clay mixtures, plastic fines.
	Liquid limit is greater than 50%		SILTS AND CLAYS		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
		Liquid limit is greater than 50%		SILTS AND CLAYS	CL	Inorganic clays of low to medium plasticity, (lean clay).
Liquid limit is greater than 50%	SILTS AND CLAYS		OL		Organic silts and organic clays of low plasticity.	
		Liquid limit is greater than 50%	SILTS AND CLAYS	MH	Inorganic silts, elastic.	
Liquid limit is greater than 50%	SILTS AND CLAYS			CH	Inorganic clays of high plasticity, fat clays.	
		Liquid limit is greater than 50%	SILTS AND CLAYS	OH	Organic clays of high plasticity.	
Liquid limit is greater than 50%	SILTS AND CLAYS			PT	Peat.	
		HIGHLY ORGANIC SOILS				

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS	Density	Standard Penetration Resistance in Blows/Foot	⊥	2" OUTSIDE DIAMETER SPLIT SPOON SAMPLER
	Very loose	0-4	T	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
	Loose	4-10	▼	WATER LEVEL (DATE)
	Medium dense	10-30	Tr	TORVANE READINGS, tsf
	Dense	30-50	Pp	PENETROMETER READING, tsf
COHESIVE	Very dense	>50	DD	DRY DENSITY, pounds per cubic foot
	Consistency	Standard Penetration Resistance in Blows/Foot	LL	LIQUID LIMIT, percent
	Very soft	0-2	PI	PLASTIC INDEX
	Soft	2-4	N	STANDARD PENETRATION, blows per foot
	Medium stiff	4-8		
Stiff	8-16			
Very stiff	16-32			
Hard	>32			



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UNIFIED SOIL CLASSIFICATION SYSTEM
BLOMBERG INDUSTRIAL PARK
TUMWATER, WASHINGTON

Proj. No. T-6055-4

Date DEC 2009

Figure A-1

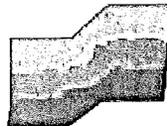
LOG OF BORING NO. B-101

Figure No. A-2

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/5/09
 Client: Puget Western, Inc. Driller: Holocene Drilling Logged By: CS
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					1	2	3	4	
					SPT (N) ● Blows/ft ● 10 20 30 40				
1-3		(LOGGED FOREST)							
4-6		Brown SAND, fine grained, moist, broken rock in shoe. *Hammer bouncing on a rock.	Very Dense	20.9 x				69	
10-11		Gray GRAVEL with fine grained sand, coarse grained, dry.	Very Dense	2.4 x				59	
15-16		Brown SAND with silt, fine grained, saturated. *1-inch of heave.	Medium Dense	21.3 x			20	"	
20-21		Gray silty SAND with gravel, fine to coarse grained, moist to wet.	Very Dense	8.0 x				50/6"	
25-26		Brown SAND with silt and gravel, fine to coarse grained, moist to wet.	Very Dense	17.3 x				85/6"	
30-31		Gray SAND, fine to coarse grained, wet.	Very Dense	10.3 x				50/4"	
32-33		Gray GRAVEL with silt, coarse grained, wet.	Very Dense						
34-35		Hammer bouncing on a rock.		19.5 x				50/3"	
36-37		Gray SAND with silt, fine to coarse grained, saturated, rock in shoe.	Very Dense						
38-40		*Continued on Next Page.						50/6"	

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. B-101

Figure No. A-2

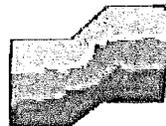
Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/5/09

Client: Puget Western, Inc. Driller: Holocene Drilling Logged By: CS

Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Monitor Well
					1	2	3	4	
41		*6-inch heave, broken rock in shoe.							
42									
43									
44				16.2					
45		*6-inch heave, broken cobble in shoe.	Very Dense	x					66/4'
46									
47									
48									
49									
50		*Hammer bouncing on rock, no recovery.							
51									
52									
53									
54				10.5					
55		8-inch heave.	Very Dense	x					50/5'
56									
57									
58		Brown GRAVEL with silt and sand, coarse grained, wet.							
59				5.9					
60				x					87/2'
61									
62									
63									
64				9.0					
65		*8-inch heave, soil becomes gray and saturated.		x					50/5'
66									
67									
68									
69									
70		*7-inch heave.		8.7					
71				x					69/3'
72		Boring terminated at 71 feet.							
73		Converted to 2-inch monitoring well.							
74		Groundwater observed at 15 feet.							
75									
76									
77									
78									
79									
80									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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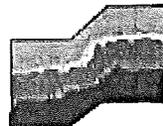
LOG OF BORING NO. B-102

Figure No. A-3

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/6/09
 Client: Puget Western Driller: Holocene Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					Δ	TSF		Δ	
					1	2	3	4	
					●	SPT (N) Blows/ft		●	
					10	20	30	40	
1		(FOREST CUTTINGS)							
2									
3									
4		Grayish-brown SAND with silt, fine grained, moist. (SP-SM)	Loose	17.1					
5				x					
6						8			
7									
8									
9									
10			Medium Dense	11.0			26		
11				x					
12									
13									
14				12.1				37	
15			Dense	x					
16									
17		Gray SAND with gravel, fine to coarse grained, wet. (SP)	Very Dense	11.0					50/5"
18				x					
19									
20									
21									
22									
23									
24		(6 inches heave)		11.6		16			
25				x					
26									
27			Medium Dense						
28									
29									
30				10.1					50/2"
31				x					
32		Gray GRAVEL with silt and sand, fine to coarse grained, wet. (GW-GM)	Very Dense						
33									
34				9.9					50/4"
35				x					
36									
37									
38									
39				10.5					50/3"
40				x					
41									
42									
43									
44		*Continued on Next Page.							50/5.5"
45									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. B-102

Figure No. A-3

Project: Biomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/6/09

Client: Puget Western Driller: Holocene Logged By: DPL

Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Monitor Well
					1	2	3	4	
					SPT (N)				
					Blows/ft				
					10	20	30	40	
46									
47									
48									
49									
50		Gray GRAVEL with silt and sand, fine to coarse grained, wet. (GW-GM)		10.9					
51				*					
52									
53									
54				10.5					50/5.5"
55				*					
56									50/6"
57									
58									
59				13.4					
60				K					50/6"
61			Very Dense						
62									
63									
64									
65			Medium Dense					11	
66		*No recovery							
67									
68									
69									
70									
71		*No recovery							
72			Very Dense						
73									
74									
75		*No recovery							50/2"
76									
77									
78									
79									
80				12.7					
81		Gray SILT. (ML)	Hard	*	34.5				89/4"
82									
83		Boring terminated at 81.5 feet.							
84		Groundwater observed at 15 feet.							
85									
86									
87									
88									
89									
90									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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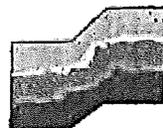
LOG OF BORING NO. 103

Figure No. A-4

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/6/09
 Client: Puget Western Driller: Holocene Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer		Observ. Well
					Δ TSF Δ	SPT (N) Blows/ft	
1		(FOREST DUFF/SCOTCH BROOM)					
2							
3							
4							
5		*No recovery.	Very Dense				50/3'
6							
7							
8							
9				11.8 x			64/5'
10		Grayish-brown GRAVEL with sand, fine to coarse grained, wet. (GP)					
11							
12							
13							
14			Very Dense				
15		Gray silty SAND with gravel, fine to coarse grained, wet. (SM)		10.5 x			50/6'
16							
17							
18							
19				7.8 x			80
20							
21							
22		Gray SAND with silt and gravel, fine to coarse grained, wet. (SP-SM)					
23							
24				12.1 x			50/3'
25							
26		*Rock piece found in the shoe.					
27							
28							
29				12.6 x			50/4'
30							
31			Very Dense				
32							
33							
34		*Continued on Next Page.					
35				10.7 x			50/3'

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 103

Figure No. A-4

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/6/09
 Client: Puget Western Driller: Holocene Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 10 15 25 35	Pocket Penetrometer				Monitor Well
					1	2	3	4	
36		Gray SAND with silt and gravel, fine to coarse grained, wet. (SP-SM)	Very Dense	11.6 x	99				
37									
38									
39									
40									
41		*No recovery.	Dense	13.5 x	50/5'				
42									
43									
44									
45									
46		*Soil has no silt.	Very Dense	12.7 x	50/4"				
47									
48									
49									
50									
51		Boring terminated at 61.5 feet. Groundwater observed at 9 feet.		11.6 x	100				
52									
53									
54									
55									
56									
57									
58									
59									
60									
61									
62									
63									
64									
65									
66									
67									
68									
69									
70									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 104

Figure No. A-5

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/9/09
 Client: Puget Western Driller: Holocene Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					Δ	TSF		Δ	
					1	2	3	4	
					SPT (N) ● Blows/ft ●				
					10	20	30	40	
1-5		Brown to grayish-brown silty SAND, trace gravel, fine grained, roots, wet to moist. (SM)	Loose	20.0 x					
6-9									
10-16		Grayish-brown SAND, fine grained, wet. (SP)	Medium Dense	30.8 x					
17-21									
22-30		Gray SAND with gravel, fine to coarse grained, wet. (SP)	Very Dense	14.4 x					
31-35									
34-35		*Continued on Next Page.		21.8 x					

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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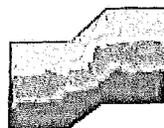
LOG OF BORING NO. 104

Figure No. A-5

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/9/09
 Client: Puget Western Driller: Holocene Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer		Monitor Well
					TSF SPT (N)	Blows/ft	
36		Gray SAND with gravel, fine to coarse grained, wet. (SP)	Very Dense	11.5 *	50/2'	●	
37							
38							
39							
40							
41		Gray SILT, wet. (ML)	Hard	11.0 *	50/3'	●	
42							
43							
44							
45							
46		Boring terminated at 61.5 feet. Groundwater observed at 10 feet. 2-inch monitoring well installed to 60 feet.		16.0 *	50/6'	●	
47							
48							
49							
50							
51				9.5 *	50/5'	●	
52							
53							
54							
55							
56				30.0 *	50/4'	●	
57							
58							
59							
60							
61					75/11'	●	
62							
63							
64							
65							
66							
67							
68							
69							
70							

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 105

Figure No. A-6

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/9/09
 Client: Puget Western Driller: Holocene Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well	
					△	TSF	3	△		
					SPT (N) Blows/ft					
					10	20	30	40		
1		Dark brown to brown silty SAND with gravel, fine grained, roots, wet. (SM)	Loose							
2										
3										
4		Gray GRAVEL with sand, fine to coarse grained, moist to wet. (GP)	Dense to Very Dense	5.3						
5				x						
6										72
7										
8										
9										
10		Gray SAND with silt and gravel, fine to coarse grained, wet. (SW-SM)	Very Dense	10.8						
11				x						43
12										
13										
14										
15						9.2				
16				x						
17										
18										
19										
20				10.4						
21				x					89/10	
22										
23										
24										
25				13.4						
26				x					50/4"	
27										
28										
29										
30				12.4						
31				x					50/4"	
32			Very Dense							
33										
34		*Continued on Next Page.								
35				15.0						
				x						

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 105

Figure No. A-6

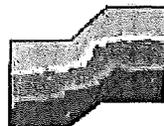
Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/9/09

Client: Puget Western Driller: Holocene Logged By: DPL

Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer		Monitor Well
					TSF 1 2 3 4	SPT (N) Blows/ft	
36							
37							
38							
39							
40				12.1 *			50/5"
41							
42							
43							
44							
45		Gray SAND with silt and gravel, fine to coarse grained, wet. (SW-SM)	Very Dense	11.1 *			50/4"
46							
47							
48							
49							
50				12.6 *			50/3.5"
51							
52							
53							
54							
55		*No recovery					50/2.5"
56							
57							
58							
59							
60				14.1 *			77/11"
61							
62							
63		Boring terminated at 61.5 feet. Groundwater observed at 10 feet. Monitoring well installed to 60 feet.					
64							
65							
66							
67							
68							
69							
70							

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 106

Figure No. A-7

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/10/09
 Client: Puget Western Driller: Holocene Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well			
					Δ	TSF		Δ				
					1	2	3	4				
					SPT (N) ● Blows/ft ●							
					10	20	30	40				
1		Dark brown to brown silty SAND with gravel, fine grained, roots, wet. (SM)	Loose to Dense	3.6 x								
2												
3												
4												
5											43	
6											●	
7		Brown to gray GRAVEL with sand, fine to coarse grained, wet. (GP)	Dense to Very Dense	7.8 x								
8												
9												
10											35	
11											●	
12												
13												
14												
15							11.7 x					50/4"
16												●
17												
18												
19												
20				10.8 x					33			
21									●			
22												
23												
24												
25				12.7 x					50/4.5"			
26									●			
27												
28												
29												
30				10.1 x					50/3"			
31									●			
32												
33												
34		*Continued on Next Page.										
35				9.5 x								

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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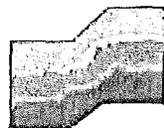
LOG OF BORING NO. 106

Figure No. A-7

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/10/09
 Client: Puget Western Driller: Holocene Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5, 9.5, 15, 25, 35	Pocket Penetrometer				Monitor Well
					1	2	3	4	
					SPT (N) ● Blows/ft ● 10 20 30 40				
36		Brown to gray GRAVEL with sand, fine to coarse grained, wet. (GP)	Very Dense	16.4 x					55/9"
37									
38									
39									
40									
41		Gray SAND with gravel, fine to coarse grained, wet. (SP)	Very Dense	18.4 x					50
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									42
52									
53									
54									
55									50/1.5"
56									
57									
58									
59									
60		*No recovery	Very Dense						50/3"
61									
62									
63									
64		*No recovery							50/5"
65									
66		Boring terminated at 65.5 feet. Groundwater observed at 10 feet.							
67									
68									
69									
70									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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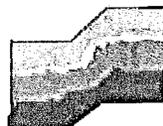
LOG OF BORING NO. 107

Figure No. A-8

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/20/09
 Client: Puget Western Driller: Holocene Drilling Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					Δ	TSF		Δ	
					1	2	3	4	
					SPT (N) ● Blows/ft ●				
					10	20	30	40	
1		(3.5 inches ASPHALT) FILL: brown silty sand with gravel, fine grained, moist, trace organics.	Medium Dense	6.3 x					
2				19.5 x					
3		Dark brown to dark reddish-brown silty SAND, fine grained, moist. (SM)	Loose				3 ●		
4									
5		Brown silty SAND, fine grained, moist. (SM)	Loose	18.6 x					
6							7 ●		
7		Boring terminated at 6.5 feet. No groundwater observed.							
8									
9									
10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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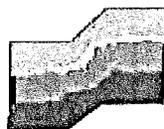
LOG OF BORING NO. 108

Figure No. A-9

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/20/09
 Client: Puget Western Driller: Holocene Drilling Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					1	2	3	4	
1		(5 inches ASPHALT) FILL: brown silty sand with gravel, fine grained, moist.	Loose	4.1 x					
2				4.2 x					
3		Brown to gray silty SAND with gravel, fine grained, moist. (SM)	Medium Dense				29		
4									
5		Gray GRAVEL, fine to coarse grained, moist. (GP)	Very Dense	1.3 x					
6									60
7		Boring terminated at 6.5 feet. No groundwater observed.							
8									
9									
10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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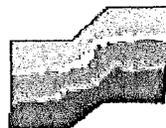
LOG OF BORING NO. 109

Figure No. A-10

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/20/09
 Client: Puget Western Driller: Holocene Drilling Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp ----- Wl 5 15 25 35	Pocket Penetrometer TSF SPT (N) Blows/ft				Observ. Well
					1	2	3	4	
0 - 1		(4.5 inches ASPHALT) FILL: brown silty sand with gravel, fine grained, moist.	Medium Dense	5.2 x					
1 - 2		Dark brown to brown silty SAND, fine grained, trace gravel, moist. (SM)	Loose	14.5 x					
2 - 4									
4 - 5		Brown GRAVEL with sand, fine to coarse grained, moist. (GP)	Dense	4.5 x					
5 - 6									
6 - 6.5		Boring terminated at 6.5 feet. No groundwater observed.							
6.5 - 7									
7 - 8									
8 - 9									
9 - 10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 110

Figure No. A-11

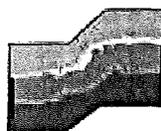
Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/20/09

Client: Puget Western Driller: Holocene Drilling Logged By: DPL

Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					1	2	3	4	
1		(3.5 inches ASPHALT, 4 inches CRUSHED ROCK) FILL: gray gravel with sand, fine to coarse, moist.	Medium Dense	3.8 x					
2		Brown silty SAND, fine grained, moist. (SM)	Medium Dense	8.5 x		20			
3				3.4 x					
4						22			
5		Grayish-brown GRAVEL with sand, fine grained, moist. (GP)	Medium Dense	4.2 x					
6						21			
7		Boring terminated at 6.5 feet. No groundwater observed.							
8									
9									
10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 111

Figure No. A-12

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/20/09
 Client: Puget Western Driller: Holocene Drilling Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp [----x----] Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					1	2	3	4	
1		(3 inches ASPHALT, 4.5 inches CRUSHED ROCK) FILL: dark brown silty sand with gravel, fine grained, moist, trace burn't organics.	Medium Dense	8.1 x				24 •	
2				5.0 x					
3		Brown to grayish-brown SAND with gravel, fine grained, moist. (SP)	Medium Dense					18 •	
4									
5				2.6 x					
6		Grayish-brown GRAVEL with sand, fine to coarse grained, moist. (GP)	Dense						46 •
7		Boring terminated at 6.5 feet. No groundwater observed.							
8									
9									
10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 112

Figure No. A-13

Project: Blomberg Industrial Park

Project No: T-6055-4

Date Drilled: 3/20/09

Client: Puget Western

Driller: Holocene Drilling

Logged By: DPL

Location: Tumwater, Washington

Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp [----x----] Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					1	2	3	4	
					SPT (N) ● Blows/ft ● 10 20 30 40				
1		(3 inches ASPHALT, 5.5 inches CRUSHED ROCK) FILL: brown to gray silty sand, fine grained, moist.	Medium Dense	7.4 x					
2				16.2 x			15		
3				15.7 x					
4		Brown to grayish-brown silty SAND, fine grained, moist. (SM)	Loose				6		
5				9.3 x					
6							9		
7		Boring terminated at 6.5 feet. No groundwater observed.							
8									
9									
10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 113

Figure No. A-14

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/20/09
 Client: Puget Western Driller: Holocene Drilling Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					Δ	TSF		Δ	
					1	2	3	4	
					SPT (N)				
					● Blows/ft ●				
					10	20	30	40	
1		(2 inches ASPHALT, 5 inches CRUSHED ROCK) FILL: gray gravel with sand, fine to coarse, moist.	Medium Dense	4.7 x					
				17.4 x		15			
2		Brown silty SAND, fine grained, moist. (Slightly disturbed) (SM)	Medium Dense	5.3 x					
3									
4		Grayish-brown GRAVEL with sand, fine grained, moist. (GP)	Medium Dense				21		
5				12.8 x					
6		Brown silty SAND, fine grained, moist. (SM)	Medium Dense				16		
7		Boring terminated at 6.5 feet. No groundwater observed.							
8									
9									
10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 114

Figure No. A-15

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/20/09
 Client: Puget Western Driller: Holocene Drilling Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp -----x----- Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					1	2	3	4	
1		(2 inches ASPHALT, 5.5 inches CRUSHED ROCK) FILL: gray gravel with sand, fine grained, moist.	Medium Dense	6.5 x					
2		Brown silty SAND, fine grained, moist. (SM)	Medium Dense	5.3 x				15 ●	
3									
4		Gray GRAVEL with sand, fine to coarse grained, moist. (GP)	Medium Dense					16 ●	
5				7.6 x					
6		Gray SAND, fine grained, moist. (SP)	Loose					9 ●	
7		Boring terminated at 6.5 feet. No groundwater observed.							
8									
9									
10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF BORING NO. 115

Figure No. A-16

Project: Blomberg Industrial Park Project No: T-6055-4 Date Drilled: 3/20/09
 Client: Puget Western Driller: Holocene Drilling Logged By: DPL
 Location: Tumwater, Washington Approx. Elev: N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	Moisture Content % Wp [-----x-----] Wl 5 15 25 35	Pocket Penetrometer				Observ. Well
					Δ	TSF		Δ	
					1	2	3	4	
					SPT (N) ● Blows/ft ●				
					10	20	30	40	
1		(3 inches ASPHALT, 5 inches CRUSHED ROCK) FILL: brown silty sand with gravel, fine grained, moist.	Medium Dense	6.1 x				10	
2		Brown to tan brown silty SAND, fine grained, trace gravel, moist. (SM)	Loose	8.7 x					
3								4	
4									
5				11.2 x					
6								7	
7		Boring terminated at 6.5 feet. No groundwater observed.							
8									
9									
10									

Note: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpreted as being indicative of other areas of the site.



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LOG OF TEST PIT NO. 1

FIGURE A-17

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 5 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
5		(9 inches ORGANICS) Brown silty SAND, fine grained, moist, sticks. (SM)	Medium Dense	18.2		
10		Brown GRAVEL with silt and sand, coarse grained, moist, occasional cobbles. (GP-GM)	Dense	4.9		
15		Test pit terminated at approximately 10.5 feet. No seepage observed. Minor caving observed at 5 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 2

FIGURE A-18

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 6 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
5		(8 inches ORGANICS) Brown silty SAND with gravel, fine to coarse grained, moist, roots. (SM)	Medium Dense	15.1		
10		Gray GRAVEL with silt and sand, coarse grained, moist. (GP-GM)	Dense	7.2		
15		Test pit terminated at approximately 11 feet. No seepage observed. Minor caving observed at 6 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 3

FIGURE A-19

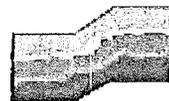
PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS

LOCATION: Tumwater, Washington SURFACE CONDS: Grass APPROX. ELEV: _____

DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 1.5 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(5 inches ORGANICS) Brown silty SAND with gravel, fine to coarse grained, moist, roots. (SM)	Medium Dense	20.6		
5		Gray GRAVEL with silt and sand, coarse grained, moist to dry. (GP-GM)	Dense	6.6		
10		Test pit terminated at approximately 10 feet. No seepage observed. Minor caving below 1.5 feet.				
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 5

FIGURE A-21

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS

LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____

DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: 10.5 Feet DEPTH TO CAVING: 3 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(10 inches ORGANICS)				
		Brown silty SAND with gravel, fine to coarse grained, moist, roots. (SM)	Medium Dense	21.8		
5		Gray GRAVEL with sand and silt, coarse grained, moist to wet, occasional cobble. (GP-GM)	Dense	5.4		
10		Gray silty SAND with gravel, fine to coarse grained, moist. (SM)	Very Dense	8.4		
15		Test pit terminated at approximately 12 feet. Minor groundwater seepage observed at 10.5 feet. Caving observed below 3 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 6

FIGURE A-22

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS

LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____

DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: 9 Feet DEPTH TO CAVING: 2 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(5 inches ORGANICS) Brown silty SAND with gravel, fine to coarse grained, moist, roots. (SM)	Medium Dense	29		
		Gray SAND with gravel, fine to coarse grained, moist. (SP)	Dense	6.8		
5		Gray GRAVEL with silt and sand, coarse grained, moist. (GP-GM)	Dense	5.5		
10		Test pit terminated at approximately 10 feet. Groundwater observed at 9 feet. Massive caving below 2 feet.				
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 7

FIGURE A-23

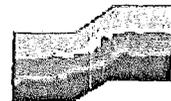
PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS

LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____

DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: 15 Feet DEPTH TO CAVING: 6 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
5		(5 inches ORGANICS) Yellow brown silty SAND, fine grained, moist. (SM)	Medium Dense	20.1		
10		Gray SAND, fine grained, moist. (SP)	Medium Dense	11.1		
15		Test pit terminated at approximately 15.5 feet. Groundwater observed at 15 feet. Caving observed below 6 feet.				
20						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 8

FIGURE A-24

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 3 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(5 inches ORGANICS)				
		Brown silty SAND, fine grained, moist, roots. (SM)	Medium Dense	20.0		
5		Gray GRAVEL with sand and silt, coarse grained, moist, occasional cobbles. (GP-GM)	Dense	7.7		
10						
15		Test pit terminated at approximately 11 feet. No seepage observed. Minor caving observed below 3 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 9

FIGURE A-25

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(6 inches ORGANICS) Brown silty SAND with gravel, fine grained, moist, roots. (SM)	Medium Dense	19.1		
5		Brown GRAVEL with sand, coarse grained, moist, occasional cobble. (GP) *Soil becomes gray.	Dense			
10		Gray silty SAND with gravel, fine to coarse grained, moist. (SM)	Dense	9.0		
15		Test pit terminated at approximately 11.5 feet. No seepage observed.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 10

FIGURE A-26

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 6 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(6 inches ORGANICS) Brown silty SAND with gravel, fine to coarse grained, moist, roots. (SM)	Medium Dense	18.2		
5		Gray GRAVEL with sand, coarse grained, moist. (GP)	Dense	4.0		
10						
15		Test pit terminated at approximately 11 feet. No seepage observed. Caving observed below 6 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 11

FIGURE A-27

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 2.5 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(5 inches ORGANICS) Brown silty SAND, fine grained, moist, roots. (SM)	Medium Dense	24.1		
5		Brown GRAVEL with sand and silt, coarse grained, moist, occasional cobble. (GP-GM) *Soil becomes gray.	Dense	5.2		
10						
15		Test pit terminated at approximately 11 feet. No seepage observed. Minor caving observed below 2.5 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 12

FIGURE A-28

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS

LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____

DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: 9 Feet DEPTH TO CAVING: N/A

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSP)	REMARKS
		(6 inches ORGANICS) Brown silty SAND, fine grained, moist, roots. (SM)	Medium Dense	19.0		
5		Brown GRAVEL with silt and sand, coarse grained, moist, occasional cobble. (GP-GM)	Dense	9.8		
		Gray SAND with gravel, fine to coarse grained, moist. (SP)	Dense	9.8		
10		Gray GRAVEL with silt and sand, coarse grained, moist, occasional cobbles. (GP-GM)	Dense			
15		Test pit terminated at approximately 10 feet. Groundwater observed at 9 feet. Minor caving observed.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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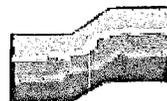
LOG OF TEST PIT NO. 13

FIGURE A-29

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Access Road APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 3 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(5 inches ORGANICS)				
		Brown silty SAND with gravel, fine grained, moist, roots. (SM)	Medium Dense	16.9		
5		Gray SAND with gravel, fine to coarse grained, moist. (SP)	Dense	8.1		
		Gray GRAVEL with sand, coarse grained, moist, occasional cobbles. (GP)	Dense	6.0		
10		Gray silty SAND with gravel, fine to coarse grained, moist. (SM)	Very Dense	7.8		
		Test pit terminated at approximately 10 feet. No seepage observed. Minor caving observed below 3 feet.				
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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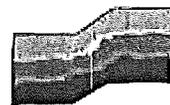
LOG OF TEST PIT NO. 14

FIGURE A-30

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Grass APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 2 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(9 inches ORGANICS) Brown silty SAND with gravel, fine grained, moist. (SM)	Medium Dense	21.3		
5		Gray GRAVEL with sand and silt, coarse grained, moist, occasional cobble. (GP-GM)	Dense	4.8		
10						
15		Test pit terminated at approximately 11 feet. No seepage observed. Minor caving observed below 2 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 15

FIGURE A-31

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Tall Grass APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 7 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
5		(9 inches ORGANICS) Brown silty SAND, fine grained, moist. (SM)	Medium Dense	21.7		
10		Gray SAND, fine to coarse grained, moist. (GP)	Medium Dense	8.4		
15		Test pit terminated at approximately 15 feet. No seepage observed. Extensive caving observed below 7 feet.				
20						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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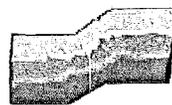
LOG OF TEST PIT NO. 16

FIGURE A-32

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Tall Grass APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 5 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
5		(7 Inches ORGANICS) Brown silty SAND, fine grained, moist. (SM)	Medium Dense	21.5		
10		Gray GRAVEL with silt and sand, coarse grained, moist to wet, occasional cobble. (GP-GM)	Dense	10.4		
15		Test pit terminated at approximately 10 feet. No seepage observed. Minor caving below 5 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 17

FIGURE A-33

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS

LOCATION: Tumwater, Washington SURFACE CONDS: Tall Grass APPROX. ELEV: _____

DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: _____

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
5		(9 inches ORGANICS) Brown silty SAND, fine grained, moist. (SM)	Medium Dense	19.8		
		Gray GRAVEL with sand and silt, coarse grained, moist to wet, occasional cobble. (GP-GM)	Dense	6.9		
		Gray SAND, fine grained, moist to wet. (SP)	Dense			
10		Gray GRAVEL with sand and silt, coarse grained, moist to wet. (GP-GM)	Dense			
15		Test pit terminated at approximately 12 feet. No seepage observed. Minor caving observed.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 18

FIGURE A-34

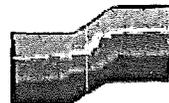
PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS

LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____

DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 5 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
5		(7 inches ORGANICS) Brown silty SAND, fine grained, moist, roots. (SM)	Medium Dense	17.6		
10		Gray SAND with silt and gravel, coarse grained, moist to wet, occasional cobbles. (SP-SM)	Dense	6.1		
15		Test pit terminated at approximately 10 feet. No seepage observed. Minor caving observed below 5 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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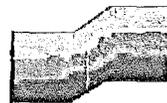
LOG OF TEST PIT NO. 19

FIGURE A-35

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Tall Grass/Brush APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 6 Feet

DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
5		(6 inches ORGANICS) Yellow brown silty SAND, fine grained, moist. (SM)	Medium Dense	18.8		
		Gray SAND, fine grained, moist. (SP)	Medium Dense	8.7		
10		Gray GRAVEL with silt and sand, coarse grained, moist to wet, occasional cobble. (GP-GM)	Dense	6.3		
15		Test pit terminated at approximately 12 feet. No seepage observed. Caving observed below 6 feet.				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 20

FIGURE A-36

PROJECT NAME: Blomberg Industrial Park PROJ. NO: T-6055-4 LOGGED BY: CS
 LOCATION: Tumwater, Washington SURFACE CONDS: Brush APPROX. ELEV: _____
 DATE LOGGED: November 19, 2007 DEPTH TO GROUNDWATER: N/A DEPTH TO CAVING: 3 Feet

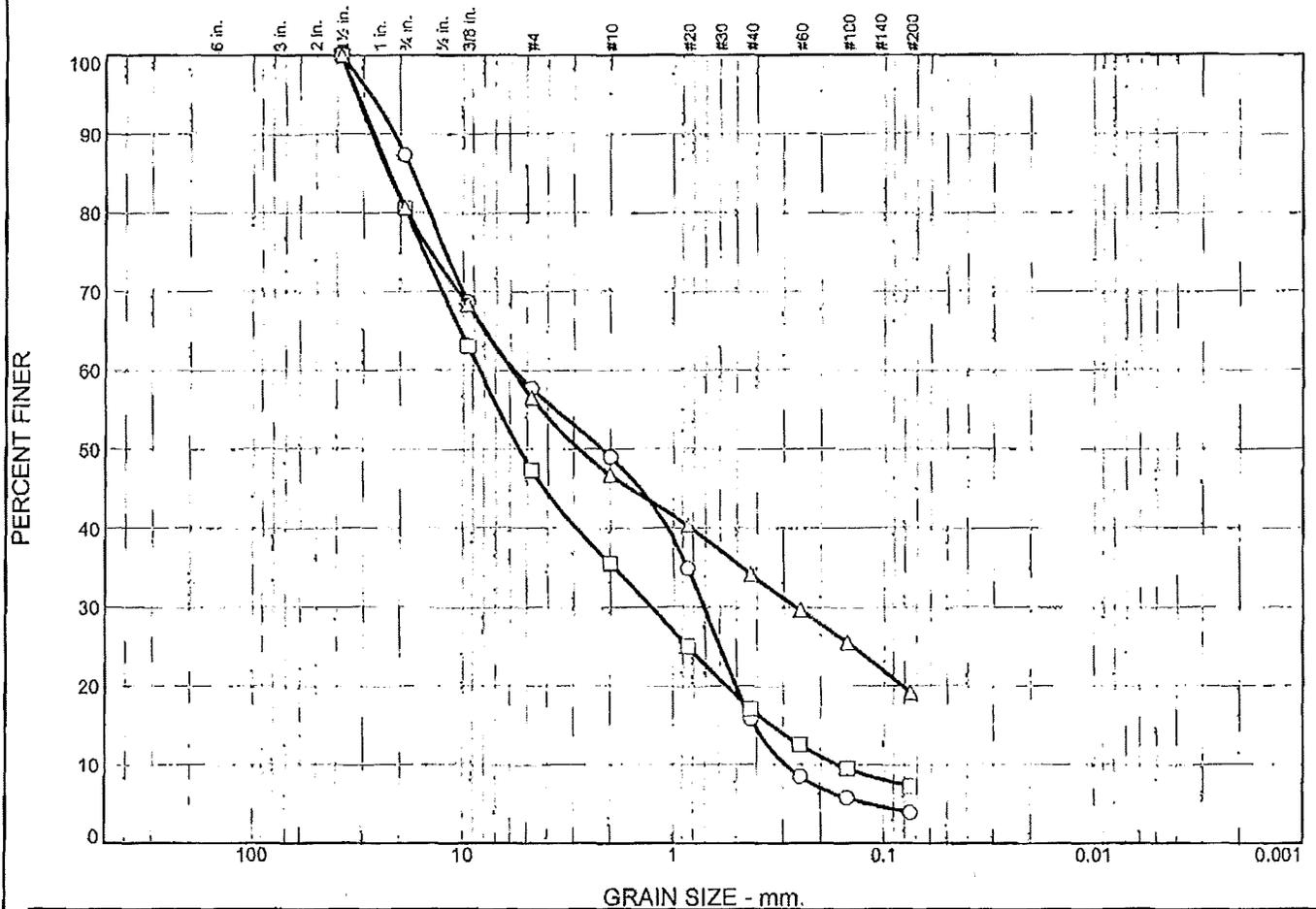
DEPTH (FT.)	SAMPLE NO.	DESCRIPTION	CONSISTENCY/ RELATIVE DENSITY	W (%)	POCKET PEN. (TSF)	REMARKS
		(5 inches ORGANICS) Brown silty SAND with gravel, fine grained, moist. (SM)	Medium Dense	19.0		
5		Brown GRAVEL with sand, fine to coarse grained, moist to wet, occasional cobble. (GP) *Soil becomes gray.	Dense	5.5		
10		Test pit terminated at approximately 10 feet. No seepage observed. Minor caving observed below 3 feet.				
15						

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines		Clay	
		Coarse	Fine	Coarse	Medium	Fine	Silt			
○	0.0	12.6	29.7	8.7	33.2	11.9	3.9			
□	0.0	19.4	33.3	11.8	18.4	9.8	7.3			
△	0.0	19.3	24.2	9.8	12.6	15.0	19.1			
⊗	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			17.3317	5.7708	2.1989	0.7112	0.4092	0.2942	0.30	19.62
□			22.4165	8.3995	5.4473	1.2718	0.3406	0.1666	1.16	50.41
△			22.7273	5.8974	2.8489	0.2627				

Material Description	USCS	AASHTO
○ Poorly graded SAND with gravel	SP	
□ Well graded GRAVEL with silt and sand	GW-GM	
△ Silty SAND with gravel	SM	

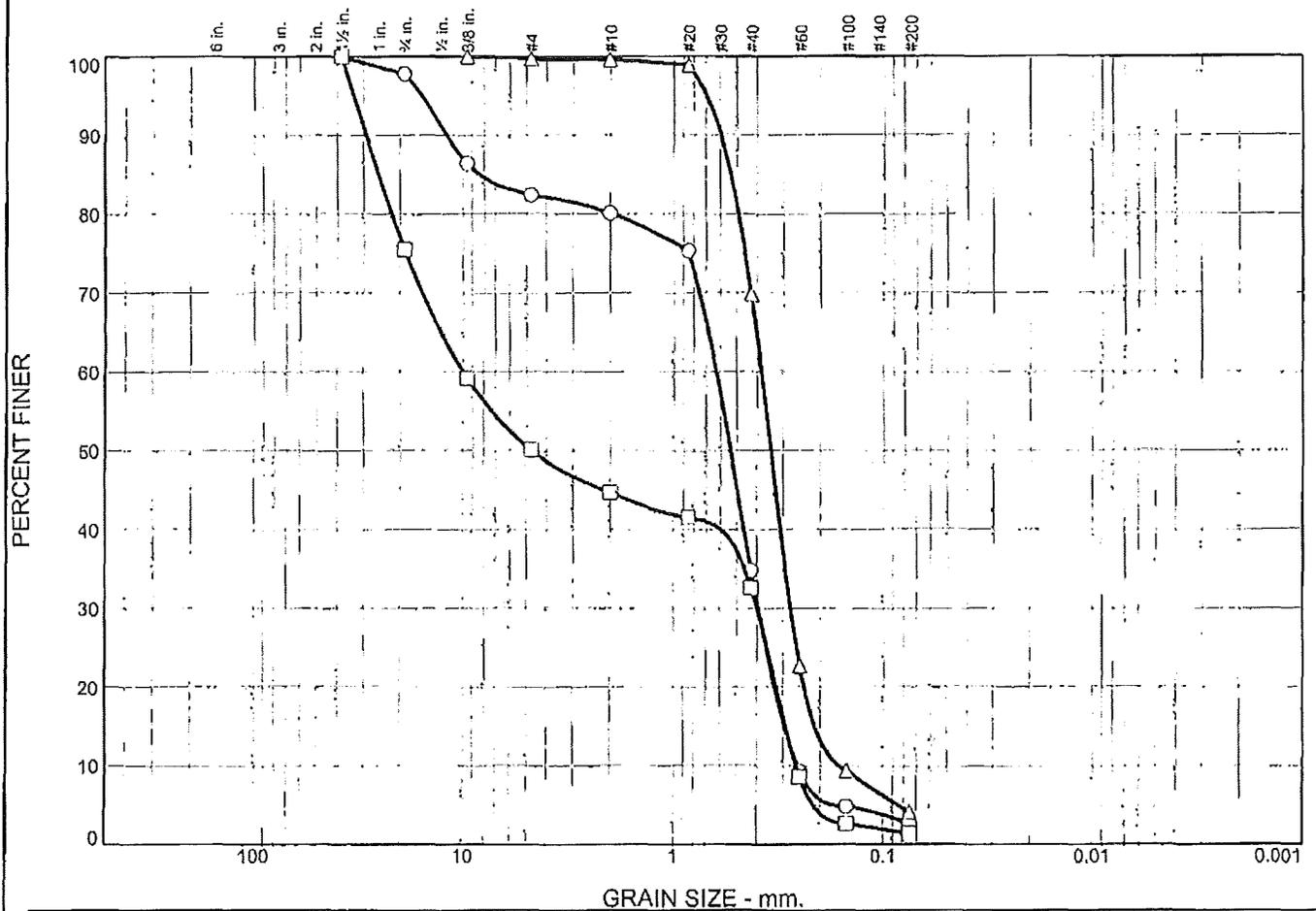
Project No. T-6055-4 Client: Puget Western, Inc. Project: Blomberg Industrial Park	Remarks:
○ Location: Boring B-102 Depth: -20' Sample Number: B-102 □ Location: Boring B-102 Depth: -35' Sample Number: B-102 △ Location: Boring B-103 Depth: -15' Sample Number: B-103	
Terra Associates, Inc.	
Kirkland, WA	

Figure A-38

Tested By: FQ

Checked By: CS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines			
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay		
○	0.0	2.2	15.4	2.3	45.3	32.1	2.7			
□	0.0	24.5	25.4	5.4	12.1	31.2	1.4			
△	0.0	0.0	0.3	0.1	29.8	65.7	4.1			
×	LL	PL	D ₈₅	D ₆₀	D ₅₀	D ₃₀	D ₁₅	D ₁₀	C _c	C _u
○			8.3510	0.6257	0.5352	0.3935	0.2951	0.2564	0.96	2.44
□			25.4057	9.9595	4.6978	0.3984	0.2925	0.2602	0.06	38.28
△			0.5346	0.3806	0.3432	0.2766	0.2132	0.1638	1.23	2.32

Material Description	USCS	AASHTO
○ Poorly graded SAND with gravel	SP	
□ Poorly graded SAND with gravel	SP	
△ Poorly graded SAND	SP	

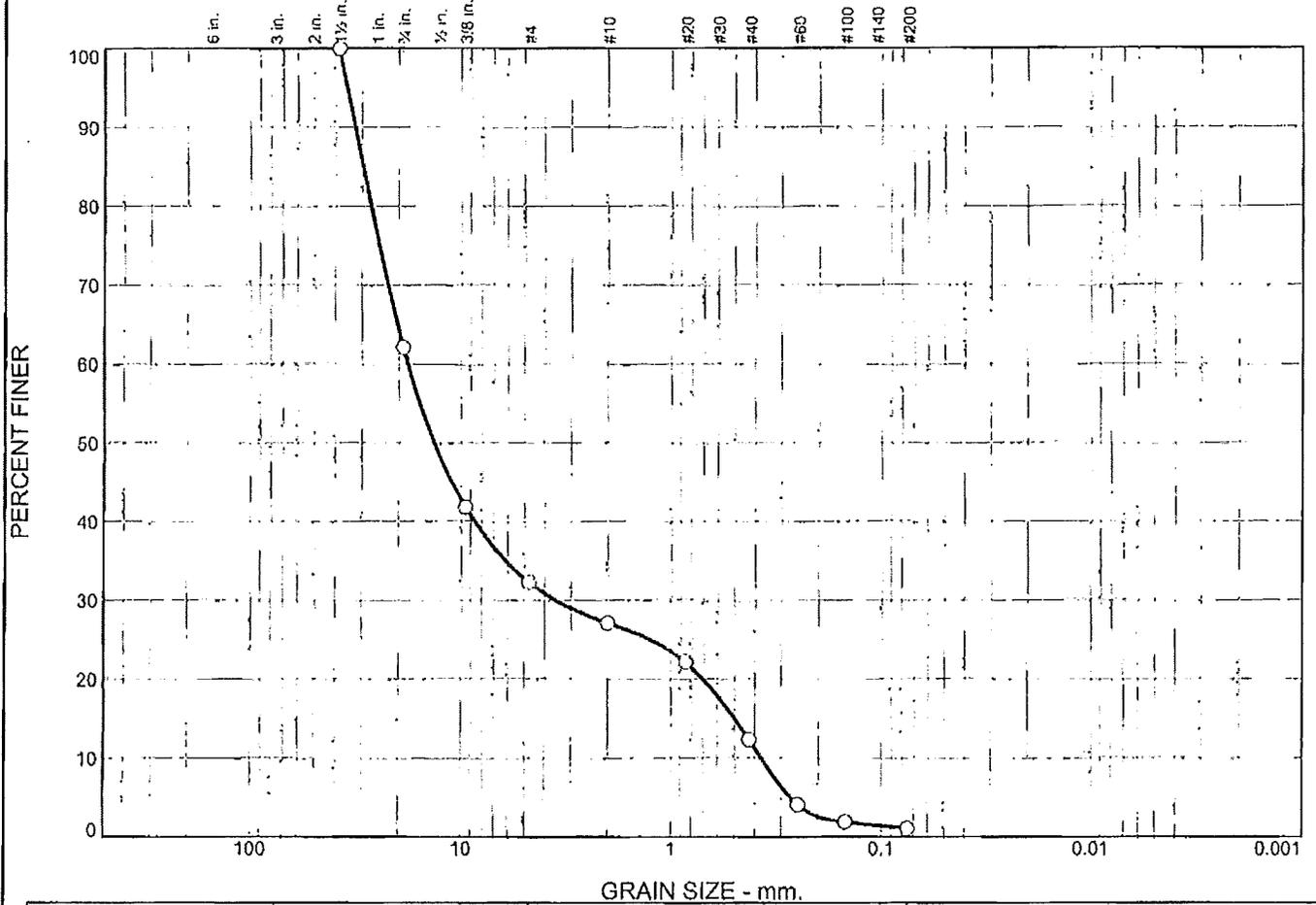
Project No. T-6055-4 Client: Puget Western, Inc. Project: Blomberg Industrial Park	Remarks:
○ Location: Boring B-106 Depth: -45' Sample Number: B-106 □ Location: Test Pit TP-6 Depth: -4' Sample Number: TP-6 △ Location: Test Pit TP-7 Depth: -9' Sample Number: TP-7	
Terra Associates, Inc.	
Kirkland, WA	

Figure A-40

Tested By: FQ

Checked By: CS

Particle Size Distribution Report



% +3"		% Gravel		% Sand			% Fines				
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay			
0.0		37.9	29.8	5.2	14.8	11.2	1.1				
X LL		PL		D85	D60	D50	D30	D15	D10	Cc	Cu
				29.6380	18.1170	13.5278	3.5365	0.4993	0.3727	1.85	48.61

Material Description	USCS	AASHTO
○ Poorly graded GRAVEL with sand	GP	

<p>Project No. T-6055-4 Client: Puget Western, Inc.</p> <p>Project: Blomberg Industrial Park</p> <p>○ Location: Test Pit TP-20 Depth: -6' Sample Number: TP-20</p> <p style="text-align: center;">Terra Associates, Inc.</p> <p style="text-align: center;">Kirkland, WA</p>	<p>Remarks:</p> <p style="text-align: right;">Figure A-42</p>
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Tested By: FQ

Checked By: CS

APPENDIX B

HYDROGEOLOGIC ASSESSMENT PER SALMON CREEK BASIN REQUIREMENTS

The site falls within the Salmon Creek Drainage basin, which is a basin designated by Thurston County as an area of high groundwater concern due to flooding in 1996 and 1999. Development standards in this basin require an evaluation to estimate the depth to the historically high groundwater table beneath the site. If this groundwater elevation is within six feet of the base of the infiltration facilities, additional analysis and modeling of the infiltration system proposed is required to determine if infiltration is feasible and if so the potential effect on adjacent properties. The develop standards require that mounding beneath the infiltration facilities does not result in a permanent groundwater rise at the adjacent property lines of more than six inches.

The elevation of the 1999 water year groundwater elevations at the site has been studied by others including Insight Geologic (April 2007), Robinson, Noble and Saltbush (April 2008) and Pacific Groundwater Group (July 2008). In these studies, county reference wells LRS-08 and LRS-09 were used to complete the regression analysis to estimate the maximum 1999 water year groundwater elevations. The location of the county reference wells in the site vicinity is shown on Figure B-1.

The Insight Geologic (IG) study focused on the eastern one-third of the current property dimensions. In their study, Insight completed an analysis that first regressed LRS-09 data with data from four on-site wells. Because LRS-09 does not have water level data for the 1999 water year, Insight regressed the LRS-09 data with well LRS-08 to obtain an estimate of the water level at LRS-09 in 1999. This elevation was then used to with the on-site well regression equations to obtain an estimate of the 1999 site water elevations. The results of this analysis indicated that portions of the site would have been flooded with water depths up to 1 ½ feet. Flooding of the site had not historically occurred. Therefore, it was concluded that it would be reasonable to establish the maximum 1999 water year groundwater elevation at the calculated LRS-09 elevation, which was Elev. 189.9 feet.

Robinson, Noble and Saltbush (RNS) and Pacific Groundwater Group (PGG) completed a study that included the entire approximately 68-acre property. The study was based on water level data from three wells installed by RNS in 2007. No data was obtained during the study period from the existing IG wells in the eastern site area. The data from the three wells were regressed directly with county reference well LRS-08 for estimation of the maximum 1999 water year groundwater elevations. Results were presented on a groundwater contour map showing groundwater elevations descending relatively uniformly from Elev. 191 feet near the sites northeast corner to Elev. 186 near the southwest site corner. This estimation indicates that some low areas located in the northeast site area would have been flooded in 1999.

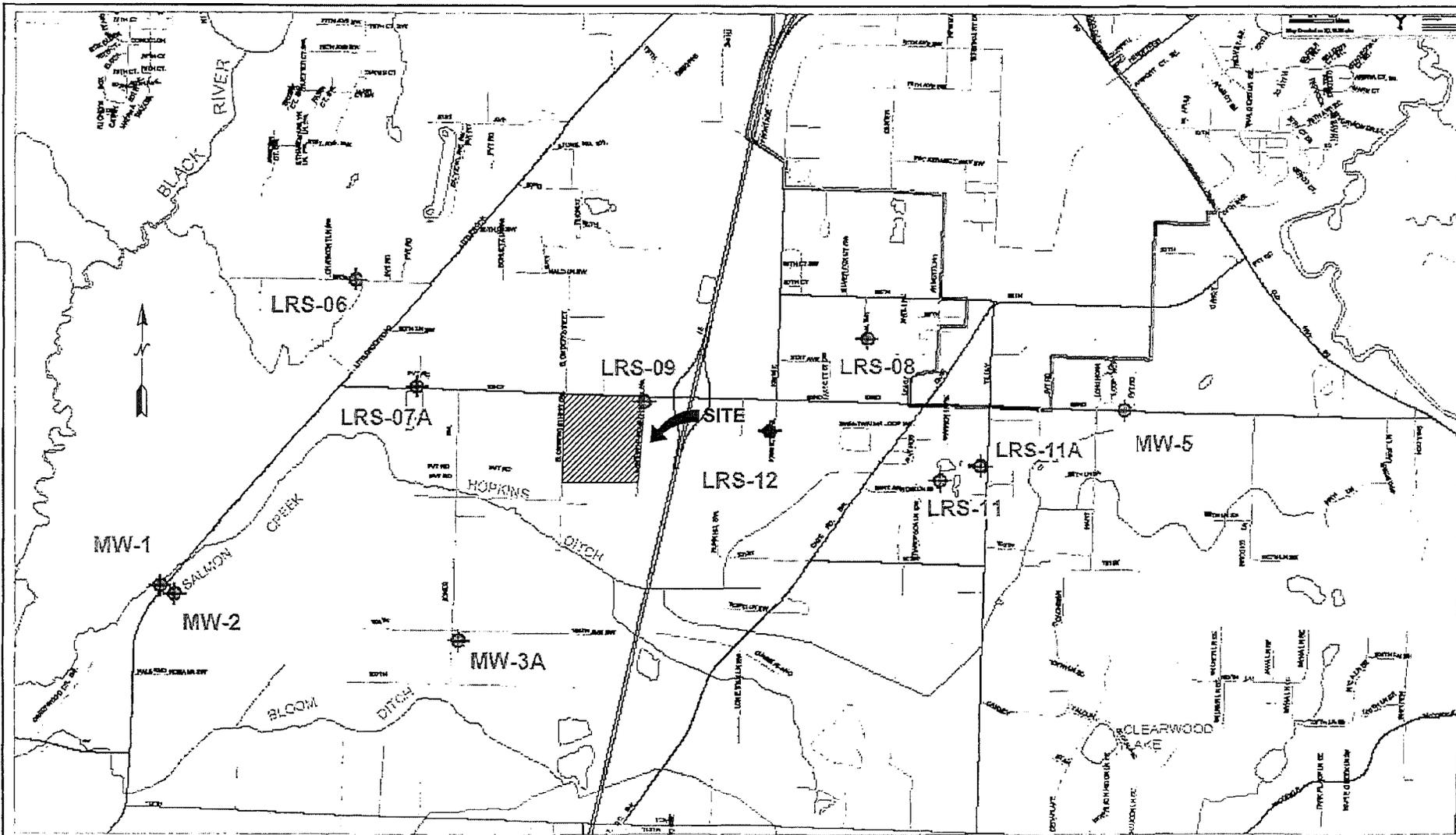
Three of the six deep borings completed for this report were converted into observations wells. These included Borings B-101, B104, and B-105. These wells along with four existing wells (IG-MW-1, IG-MW-2, RNS-MW-1, and RNS MW-2) were instrumented with automated data loggers and set to record water levels at one hour intervals for a 4-month duration beginning on March 12, 2009 and ending on June 20, 2009. The locations of the wells were surveyed by Barghausen Engineering Consultants and are shown on Figure 2.

Based on review of the previous analysis completed for the property, it is apparent that the use of county reference well LRS-08 in the regression analysis overestimates the elevation of the groundwater at the site during the 1999 water year. Historically, this particular area of the Salmon Creek basin has not been reported to have experienced surface flooding due to rapid rises in the groundwater table during heavy winter storms. With this considered, we completed our analysis using county reference well LRS-7A, which is located west of the site on 93rd Avenue SW about one-mile, the same distance LRS-08 is located to the east. The regressed data indicates good correlation between the data sets with coefficients of variation (R^2) greater than .93 for all seven wells monitored. Regression curves along with their respective equations are attached as Figure B-2.

Based on the regression analysis, the estimated 1999 groundwater elevations at the site varied from Elev. 184.00 to 187.00 feet, which is approximately 4 to 8 feet below current site grades. The following table summarizes the estimated 1999 water year maximum groundwater elevation for each well used in the study.

Well	Ground Elevation	1999 W.Y. Estimated Maximum Groundwater Elevation
B-101	194.87	186.03
B-104	190.26	184.34
B-105	190.36	186.60
IG-MW-1	194.55	184.60
IG-MW-2	191.71	184.32
RN-MW-1	191.55	185.49
RN-MW-2	191.51	185.31

Contours of the maximum 1999 estimated groundwater elevations across the site were constructed using the Surfer computer program. The resulting contours are shown on attached Figure B-3. Groundwater flow gradients are to the west over a relatively uniform gradient.



REFERENCE:

MAP PROVIDED BY THURSTON COUNTY WEBSITE FOR SALMON CREEK BASIN



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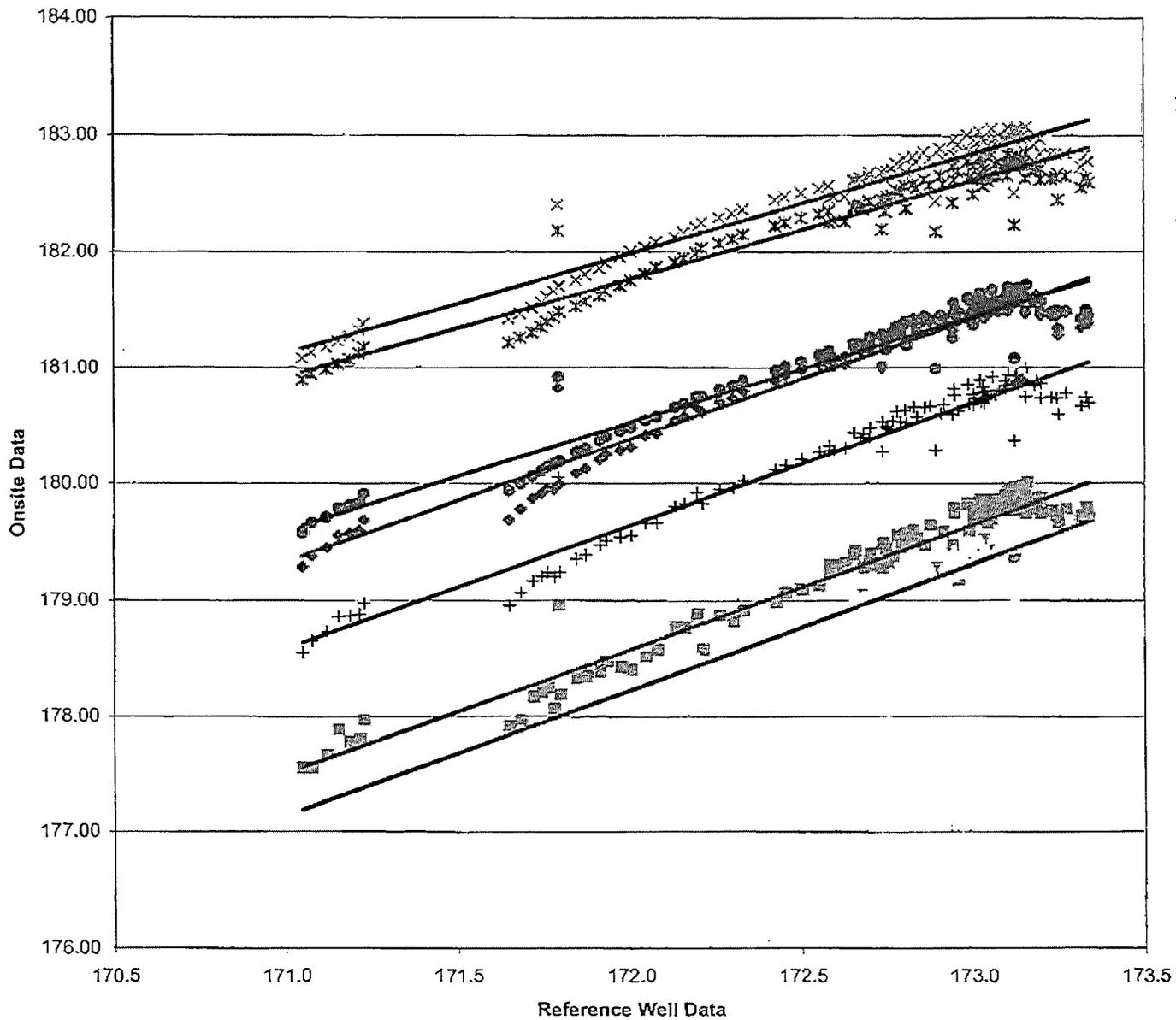
COUNTY REFERENCE WELLS AND SITE VICINITY
 BLOMBERG INDUSTRIAL PARK
 TUMWATER, WASHINGTON

Proj. No. T-6055-4

Date DEC 2009

Figure B-1

**Bloomberg Industrial Park Regression Analysis
Thurston County Reference Well LRS-07A**



B-101
 $y = 1.0483x + 0.0672$
 $R^2 = 0.9451$

B-104
 $y = 1.0687x - 5.2352$
 $R^2 = 0.944$

B-105
 $y = 1.0856x - 8.5063$
 $R^2 = 0.9586$

IG-MW-1
 $y = 0.8579x + 34.416$
 $R^2 = 0.9304$

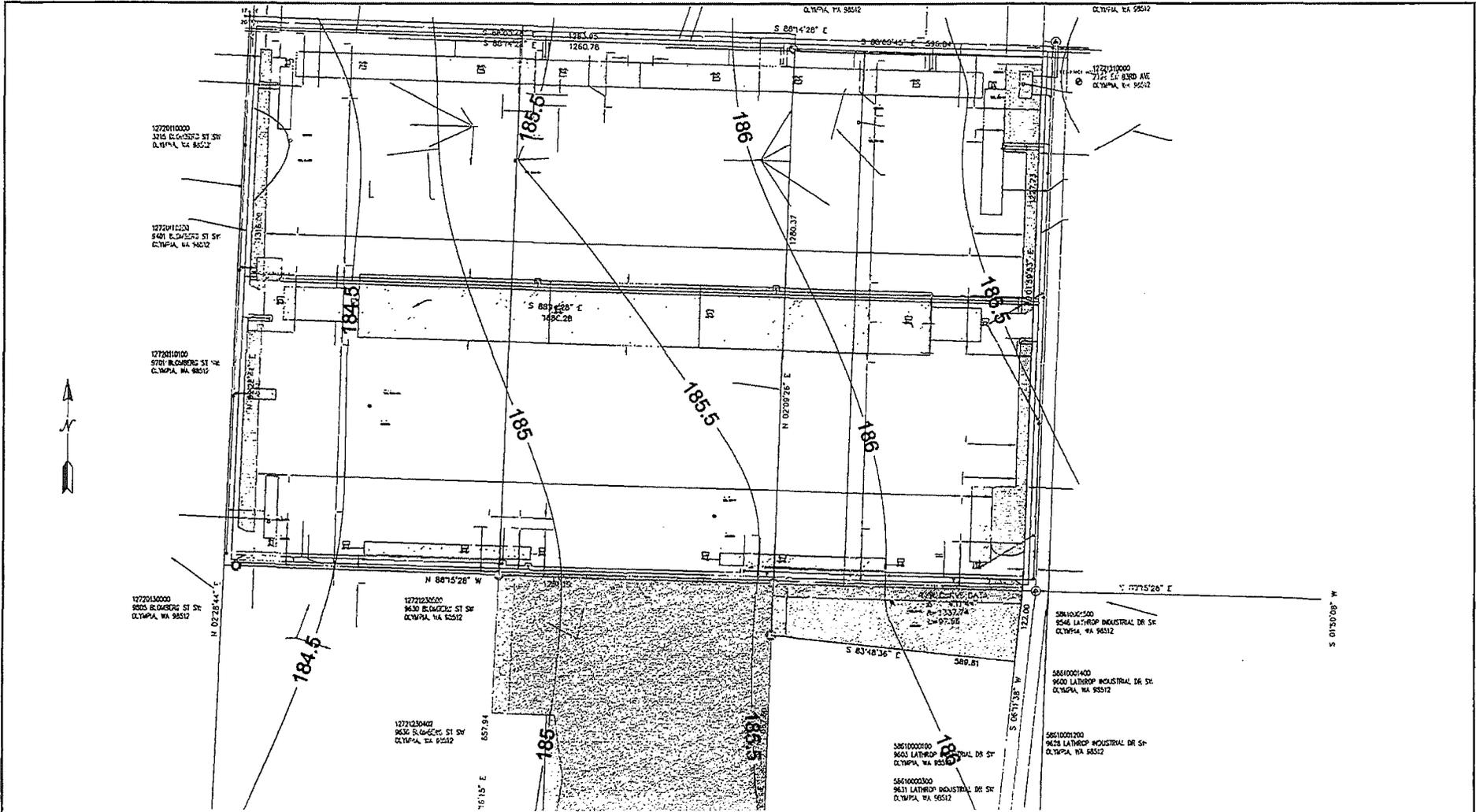
IG-MW-2
 $y = 0.845x + 36.424$
 $R^2 = 0.9306$

RN-MW-1
 $y = 0.923x + 21.761$
 $R^2 = 0.9429$

RN-MW-2
 $y = 1.0516x - 1.2344$
 $R^2 = 0.952$

- ◆ B-101
- B-104
- B-105
- × IG-MW-1
- * IG-MW-2
- RN-MW-1
- + RN-MW-2

Figure B-2

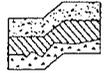


NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE:

SITE PLAN PROVIDED BY BARGHAUSEN CONSULTING ENGINEERS, INC.


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ESTIMATED 1999 WATER YEAR MAXIMUM GROUNDWATER CONTOURS BLOMBERG INDUSTRIAL PARK TUMWATER, WASHINGTON		
Proj. No. T-6055-4	Date DEC 2009	Figure B-3