WEST VAN GIESEN STREET
DESERT VIEW COMMERCIAL DEVELOPMENT
WEST RICHLAND, WASHINGTON

For:

DREW CROSKREY
CROSKREY DEVELOPMENT, LLC
1128 TOMICH AVE
RICHLAND, WA 99352

Provided By:

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June 29, 2023
Project No: 23-183

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Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

June 29, 2023

Drew Croskrey
Croskrey Development, LLC
1128 Tomich Ave
Richland, WA 99352

RE: GEOTECHNICAL ENGINEERING STUDY; PROPOSED DESERT VIEW COMMERCIAL DEVELOPMENT, WEST RICHLAND, WASHINGTON

At your request, Baer Testing & Engineering, Inc. (BAER) conducted a Geotechnical Engineering study for the proposed Desert View Commercial Development in West Richland, Washington. This report presents the results of the field explorations, laboratory testing, and engineering analyses.

This report presents recommendations for site grading, utility design and construction, drainage, and pavements. Recommendations for structure foundation design and construction, and seismic design for the various project features are also provided.

We appreciate the opportunity to be of service. If you have questions or comments, please contact our office.

Sincerely,

BAER TESTING, INC.

Dee J. Burrie, P.E.
Chief Engineer

Enclosures: Geotechnical Engineering Report

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1.0 INTRODUCTION

Baer Testing & Engineering, Inc. (BAER) is pleased to present the results of our geotechnical engineering study for the proposed commercial development on West Van Giesen Street in West Richland, Washington. This geotechnical engineering study provides subsurface information to support site grading, drainage, utility design and construction, and recommendations for foundation design and construction**,** pavements, and IBC seismic design criteria. Our scope of work included:

- observing 4 test pit excavations;
- collecting soil samples;
- performing one infiltration test;
- conducting laboratory testing to determine soil properties;
- performing engineering analyses; and
- preparing this report.

2.0 PROJECT DESCRIPTION AND PROPOSED DEVELOPMENT

The site is located approximately 300 feet east of North 62nd Avenue between Desert View Drive and West Van Giesen Street (**Figure 1 – Site Location**) in West Richland, Washington. The parcel is in the SW4 of SW4 of S31, T10N, R28E, WM in Benton County, Washington with approximate mid-site coordinates 46°18'11.8"N Latitude; 119°22'00.1"W Longitude.

The approximately 0.56-acre site is generally level and currently vacant. A concrete slab occupies much of the eastern 50 feet of the site.

Development plans consist of constructing two approximately 3,780 square-foot (sf) commercial buildings. The buildings will consist of single-story, wood- or steel-framed structures with concrete slabs-on-grade **(Figure 2 – Site Layout)**. Development plans include underground utilities, on-site stormwater management and disposal, and underground utilities.

3.0 FIELD EXPLORATIONS

The exploration plan consisted of excavating four test pits designated TP-1 through TP-4 (**Figure 3 – Exploration Plan**). Stenersen Excavating (SE) excavated the test pits on June 16, 2023, using a Deere 50G excavator equipped with a 24-inch bucket.

Where possible, soil in situ strength was estimated using a dynamic, mini-cone penetrometer (DCP) and our observations of the relative excavation difficulty. The mini cone uses a 15-pound slide hammer dropped 20 inches to drive a conical tip into the soil. The number of hammer blows required to drive the cone 1¾-inch increments is roughly equivalent to a SPT blow count. The blows per increment provide an indication of the relative soil density. The blow counts are recorded on the logs. The mini-cone penetrometer test method is described in ASTM STP399.

Blow counts in gravel, cobbles, and boulders are artificially elevated due to the CPT contacting large, oversized gravels. Elevated blow counts can lead to soil misclassification and over-estimating the soil properties. BAER's geologist counted the blows required to drive the rod into the ground for each 1¾-inch increment over a given depth. The recorded blow count data was evaluated using correlation charts to estimate the soil bearing capacity.

The subsurface conditions are known only at the test pit locations on the date explored and should be considered approximate. Actual subsurface conditions may vary between excavation locations. The test pit locations are presented in **Figure 3** and the test pit logs are presented in **Appendix A**. Our geologist classified the in-situ soil in the field and transported the soil samples to the laboratory for further examination and testing.

4.0 LABORATORY TESTING

BAER performed the following laboratory tests on selected soil samples from our explorations.

- Moisture Content (American Society for Testing and Materials (ASTM) Designation: D 2216) for material characterization and soil index properties; and
- Particle Distribution (ASTM Designation: D 422 and ASTM Designation: D 1140) for material characterization and soil index properties.

Northwest Agricultural Consultants performed the following laboratory tests on selected soil samples.

- Organic Matter Content (ASTM Designation: D 2974) for soil index properties; and
- Cation Exchange Capacity (Environmental Protection Agency (EPA) Designation: 9081) for soil properties

Copies of the laboratory test reports are enclosed in **Appendix B**.

5.0 SUBSURFACE CONDITIONS

The following information summarizes the subsurface conditions encountered during the test pit explorations. Please refer to the enclosed logs (**Appendix A**) for more detailed information regarding subsurface conditions.

5.1 Regional Geologic Setting

The *Geologic Map of the Richland 1:100,000 Quadrangle, Washington*; Washington Division of Geology and Earth Resources, Open File Report 94-8 (1994), shows the near-surface geology at the site is primarily mapped as Qfg_3 – Outburst flood deposits and Qfg_3 – Outburst flood deposits, silt and sand (Pleistocene). Qfg_3 includes gravels but ranges from sand to boulders; clasts are chiefly basalt, granite, quartzite, diorite, and volcanic porphyries. Qfs_3 consists of lacustrine silt and fine sand, and fluvial coarse to fine sand. In our opinion, the materials observed in the test pit excavations are consistent with this mapped geology.

5.2 Soils

The native subsurface profile generally consists of a ***Silty Sand (SM)*** or ***Poorly Graded Sand with Silt (SP-SM)***, underlain by a dense ***Poorly Graded Gravel with Silt and Sand (GP-GM)*** and ***Poorly Graded Gravel with Sand (GP)***. Several pits encountered boulders ranging from 1.5 to 2 feet in diameter. Test pits were terminated at practical refusal approximately 8 feet below the existing ground surface (bgs).

5.3 Groundwater

Groundwater was not encountered in the test pits. Based on well logs in the site vicinity, groundwater is approximately 50 feet below the existing surface elevation. A copy of the one referenced well log is enclosed in Appendix C.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General

The existing site is relatively level and is vegetated with weeds. A concrete slab covers a majority of the eastern 50 feet of the site. Several small trees are present on the east half of the site. Depending on the final site grades, we anticipate minimal grading will be required.

6.1.1 Test Pit Backfill

SE used the excavator to backfill each test pit with excavated materials upon completion. The operator compacted the backfill using the excavator bucket. The test pits should be over-excavated and backfilled with compacted structural fill during site grading in accordance with Section "6.2 Earthwork" below.

6.2 Earthwork

Existing vegetation, gravel surfacing, the existing concrete slab, and any deleterious debris should be removed from the site. Stripped organic soil material with debris removed may be stockpiled for use in future landscape areas but may not be used as structural fill. Salvaged gravel surfacing may be reused for general fill in pavement areas.

6.2.1 Moisture Conditioning

The site soil was typically moist to dry at the time of our explorations. Depending on conditions at the time of construction, the soil may require moisture conditioning, either by adding moisture or drying, prior to being compacted. If compaction of fine silty material is attempted without the correct moisture content, the wet or dry compacted material may need to be scarified and additional moisture conditioning effort will be required to reach the optimum moisture and specified compaction.

6.2.2 Subgrade Preparation

The upper 12 inches of exposed subgrade should be moisture conditioned to within 2 percent of optimum and compacted to a minimum 95 percent of the maximum laboratory dry density as determined by the ASTM Designation: D 1557 – *Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.* Where possible, the building and pavement subgrade areas should be proof rolled using a loaded water truck or dump truck to identify loose or unstable areas. The geotechnical engineer should observe the proof rolling activities to determine if the intent of this section is met and to aid in determining areas with soft or unsuitable soils.

6.2.3 Material Reuse

Depending on final grades, on-site material may be available for reuse after processing. The various grades of gravel and sand may be used as general fill and structural fill, if rocks larger than 3-inches diameter are removed. If off-site materials are required, we recommend using materials similar to the on-site soil, or a well-graded, 2-inch minus, pit-run sand and gravel with less than 5 percent fines. All structural fill and backfill should be placed in accordance with Section "6.2.4 Placement and Compaction".

6.2.4 Placement and Compaction

Fill and backfill should be moisture conditioned to within 2 percent of optimum, placed in maximum 8-inch loose lifts, and compacted to a minimum 95 percent of ASTM D 1557. Structural fill under footings, if used, should consist of 5/8-inch minus CSTC. Structural fill should be compacted to 95 percent of ASTM D 1557.

6.2.5 Slopes

Occupational Safety and Health Administration (OSHA) Type C soil best describes the on-site gravelly material. Type C soils may have maximum temporary construction slopes of 1.5 Horizontal to 1 Vertical (1.5H:1V). Permanent cut or fill slopes should be no steeper than 2H:1V and must be protected from both wind and water erosion. Erosion protection may consist of vegetative cover or a minimum 3 inches of coarse concrete aggregate conforming to the requirements of WSDOT Specification 9-03.1(4) c, "Concrete Aggregate AASHTO Grading No. 57."

6.2.6 Utility Trenching

Utility trenching should be accomplished in accordance with American Public Works Association (APWA) Standard Specifications. Based on our explorations, we anticipate excavations may be accomplished using standard excavation equipment although deep trenches penetrating the very dense gravel may require additional effort or larger equipment. Utility piping should be bedded as recommended in the APWA specifications. Utility trenches should be backfilled using structural fill compacted as specified in section "6.2.4 Placement and Compaction". Enough backfill should be placed over the utility before compacting with heavy compactors to prevent damage.

6.2.7 Wet Weather Construction

The site soils are generally fine-grained; the stability of the exposed soils may deteriorate due to changes in moisture content. If construction occurs during wet weather, we recommend:

- Fill materials consist of clean, granular soil with less than 5 percent fines passing the #200 sieve. Fines should be non-plastic.
- The ground surface in the construction area should be sloped to drain and sealed to reduce water infiltration and to prevent water ponding.
- Work areas and stockpiles should be covered with plastic. Geotextile silt fences, straw bales, straw wattles, and/or other measures should be used as needed to control soil erosion.

6.2.8 Infiltration Rate

We performed an infiltration test in TP-3 at approximately 5 feet bgs. The infiltration test was conducted in general accordance with the Small PIT method described in the 2019 Washington Department of Ecology Stormwater Management Manual Table 6.3 and Appendix 6.B.

SE placed approximately 2 feet of water in the test pit. The water was allowed to drain for 2 hours or until completely drained to pre-soak the subsurface soil. After pre-soaking, the pit was again filled with 2 feet of water and the water level measured once filling stopped. The water level was measured at 15-minute intervals. The infiltration rate was determined by the drop in water elevation between the 30-minute and 60-minute readings.

Based on the infiltration test results, we recommend an infiltration rate of **4 inches per hour** in the site gravel. This rate does not include safety factors. Local codes may limit the maximum design infiltration rate. The rate may need to be adjusted if other infiltration methods are used, such as swales. The system designer should verify any other limitations and incorporate an appropriate factor of safety against slowing rates over time due to biological and sediment clogging.

7.0 FOUNDATION DESIGN RECOMMENDATIONS

7.1 Footings

The proposed structures may be supported on conventional spread footings or continuous footings bearing on the native gravel material or structural fill extending to the gravel. Exterior footings should be embedded a minimum 24 inches below adjacent grades for bearing considerations and frost protection.

Excavating the dense gravel may result in an irregular subgrade surface. We recommend placing a 6-inch layer of 5/8-inch CSTC beneath all footing to create a firm working surface and to mitigate the irregular subgrade surface.

Prior to placing any concrete or CSTC, footing subgrade soil should be moisture conditioned and compacted to 95% of ASTM D 1557 or a firm, unyielding condition if the materials are too granular for standard density testing.

We recommend constructing footings a minimum of 2 feet wide for spread footings and minimum 18 inches wide for continuous footing. Footings constructed with these recommendations can be designed with an allowable bearing pressure of 2,500 pounds per square foot (psf). The allowable bearing pressure may be increased by one-third for short-term transient loading conditions (i.e., seismic and/or wind loads).

We anticipate settlement will be the limiting factor for foundation design. Foundation settlement estimates are based on the soil profile and densities encountered at the site. Foundations designed as outlined above should experience less than ½-inch settlement. We anticipate differential settlement will be less than half of total settlements between adjacent footings or across approximately 20 feet of continuous footings. Settlement should occur rapidly as loads are applied.

Lateral forces may be resisted using a combination of friction and passive earth pressure against the buried portions of the structure. For design, a 0.45 coefficient of friction may be assumed along the interface between the footing base and the compacted CSTC. Passive earth pressure from the gravel backfill may be calculated using an equivalent fluid weight of 350 psf per foot of embedment depth. The recommended coefficient of friction and passive earth pressure values do not include a safety factor.

7.2 Concrete Slabs-on-Grade

Exposed subgrade in areas to receive concrete slabs-on-grade should be moisture conditioned and compacted to a minimum of 95 percent of ASTM D 1557.

After compacting the subgrade, we recommend placing a minimum 6-inch layer of 5/8-inch CSTC under the concrete slab. The CSTC should be compacted to a firm, unyielding condition. The geotechnical engineer should observe subgrade preparation prior to gravel placement.

7.3 Pavement Sections

The proposed development includes parking lot upgrades. We anticipate traffic will consist of automobiles and light trucks, with occasional garbage or delivery trucks. Based on the anticipated traffic and the anticipated silty sand subgrade we recommend the following pavement sections.

Table 7.3-1 Recommended Pavement Section

Material Layer	Layer Thickness, inches	Compaction Standard
	Light duty	
Asphaltic Concrete Pavement (HMACP)	3	91 percent of Maximum Theoretical Specific Gravity (Rice's)
Crushed Stone Top Course (CSTC) WSDOT 5/8-inch minus Top Course	6	95 percent of ASTM D 1557
Compacted Subgrade	12	95 percent of ASTM D 1557

The upper 12 inches of the pavement subgrade should be moisture conditioned and compacted to 95 percent of ASTM D 1557. The geotechnical engineer should observe the subgrade prior to base course placement. Soft or unstable areas should be stabilized or over-excavated and replaced with compacted structural fill prior to paving.

7.4 Retaining Walls

Retaining wall foundations should be designed and constructed in accordance with the footing recommendations. All retaining walls should be designed with a minimum 12-inch-wide drainage zone directly behind the wall. The sandy silt may be used as backfill behind the drainage zone. The drainage zone should be separated from the backfill using a separation geotextile. Backfill should be placed in maximum 8-inch loose lifts and compacted to 95 percent of ASTM D 1557.

If retaining walls are constructed as recommended above, the values in the following table may be used for design.

Table 7.4-1 Retaining Wall Design

Design Parameter	Value, pcf/ft. depth
Active Earth Pressure (unrestrained walls)	35
At-rest Earth Pressure (restrained walls)	55

7.5 Seismic Design

Structures should be designed in accordance with the 2018 International Building Code (IBC). The Site Class is based on the average conditions present within 100 feet of the ground surface. The Site Classification is based on shear wave velocity. To establish a higher site class, additional explorations are required, including deep borings and geophysical measurements. Based on the available information, we recommend using the default classification Site Class D (Stiff Soil). Design values determined for the center coordinates of the site using the United States Geological Survey (USGS) *Earthquake Ground Motion Parameters* utility (ATC Hazards by Location Tool – ASCE 7-16) are summarized in Table 7.5-1 below.

Table 7.5-1 Recommended Earthquake Ground Motion Parameters (2018 IBC)

Parameter	Value
Location (Latitude, Longitude), degrees	46.303277, -119.366703
Mapped Spectral Acceleration Values (MCE, Site Class D):	
Short Period, S_s	0.418 g
1.0 Sec. Period, S_1	0.161 g
Soil Factors for Site Class D:	
F_a	1.465 g
F_v	2.278
S_{DS}	0.409 g
S_{D1}	0.244

7.5.1 Liquefaction

Soil liquefaction occurs when saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Liquefaction typically occurs in loose, granular soils located in the upper 50 feet and below the water table. The groundwater depth is approximately 50 feet bgs and the on-site gravel and sand is generally dense. In our opinion, the liquefaction potential at this site is low. Additional exploration and analysis will be required to quantify anticipated settlements due to potential liquefaction.

7.5.2 Fault Rupture Potential

Based on our review of available geologic literature, a hidden, northwest – southeast trending hidden thrust fault generally follows the Yakima River alignment, approximately 0.5 miles northeast of the site. A second hidden thrust fault is located at the base of the hills (Badger Mountain, South Hill, Candy Mountain) approximately 2.2 miles southwest of the site. We are not aware of any major movement along these faults in the last 10,000 years. We did not observe any evidence of surface rupture or recent faulting during our field observation. Therefore, we conclude the fault rupture potential is low at this site.

7.5.3 Slope stability

The site is in a relatively level, developed commercial and residential area in West Richland. In our opinion, the potential for slope failure impacting the proposed project site is low.

8.0 ADDITIONAL SERVICES

BAER is available to provide further geotechnical consultation during the project design phase. We should review the final design and specifications to verify earthwork and foundation recommendations have been properly interpreted and incorporated into the project design and construction specifications. We are also available to provide geotechnical engineering and special inspection services during construction. Observation during construction provides the geotechnical engineer the opportunity to assist in making engineering decisions if variations in subsurface

conditions become apparent. If BAER is not retained to provide construction phase services, we cannot be responsible for soil related construction errors or omissions.

Construction observation and special inspection services are not part of this geotechnical engineering study scope of work. We will be pleased to provide a separate proposal for the construction phase services, if desired.

9.0 UNCERTAINTIES AND LIMITATIONS

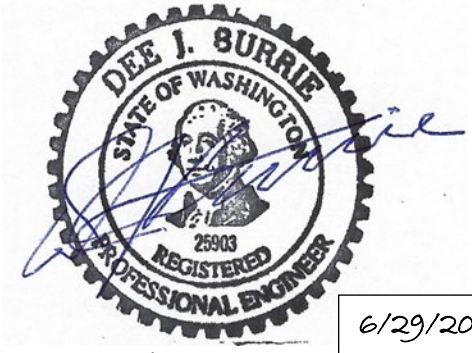
This report was prepared for use the exclusive use of Croskrey Development, LLC and the design team for the proposed commercial development on West Van Giesen Street in West Richland, Washington. This report presents the data from observations and field testing and is based on subsurface conditions at the specific locations and depths indicated. No other representation is made. This report should be made available to potential contractors for information on factual data only. Conclusions and interpretations presented in this report should not be construed as a guarantee or warranty of the subsurface conditions. If changes are made to the project components or layout, additional geotechnical data and analyses may be necessary.

Within the limitations of scope, schedule, and budget, BAER attempted to execute these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our services did not include environmental screening of soil samples retrieved from the explorations completed for this project. Further, we did not complete environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic materials in the soil, rock, surface water, or air in the project area.

We appreciate the opportunity to be of service. If you have questions or comments, please contact our office.

Sincerely,

BAER TESTING & ENGINEERING, INC.



6/29/2023

Dee J. Burrie, P.E.
Chief Engineer

: general@baertesting.com

Notes:
Location Map developed using images provided by Google Earth Pro.

0 1 2
Approximate Scale (Miles)

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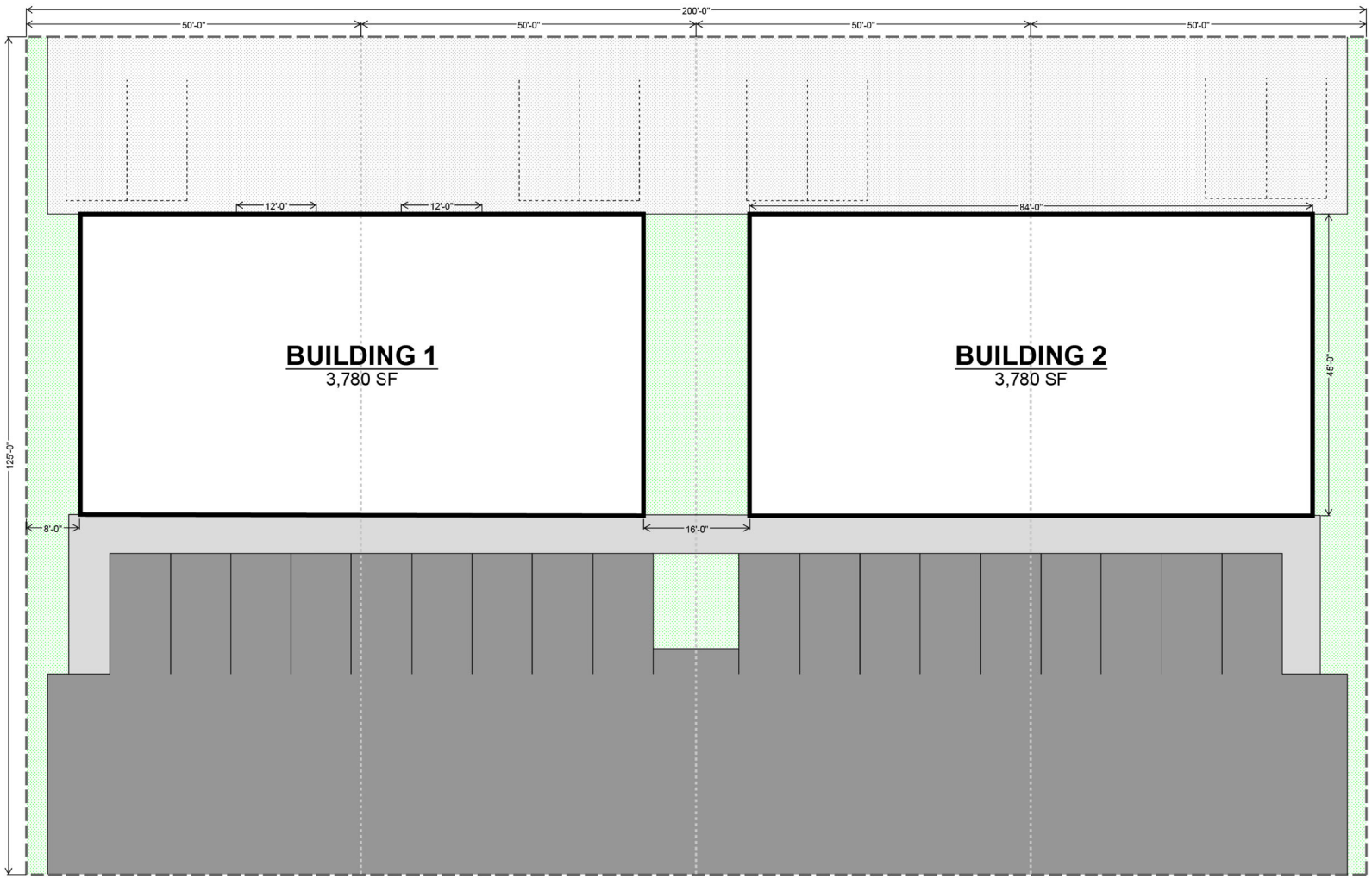
West Van Giesen
Commercial Development
West Richland, Washington

Site Location Map

23-183 | FIG. 1

DESERT VIEW DR.



W VAN GIESEN ST.

Notes:
Preliminary Site Layout Provided by Client.

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West Van Giesen
Commercial Development
West Richland, Washington

Exploration Map

23-183 | FIG. 2

Legend

TP-1 Approximate test pit designation and location

Notes:
Exploration Map developed using images provided by Google Earth Pro.

0 50 100

Approximate Scale (Feet)

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Exploration Map

23-183 | FIG. 3

APPENDIX A
TEST PIT LOGS

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LOG OF TP-1

JOB NO: 23-183 EX. DATE: 6/16/23 LOCATION: Northwest Corner

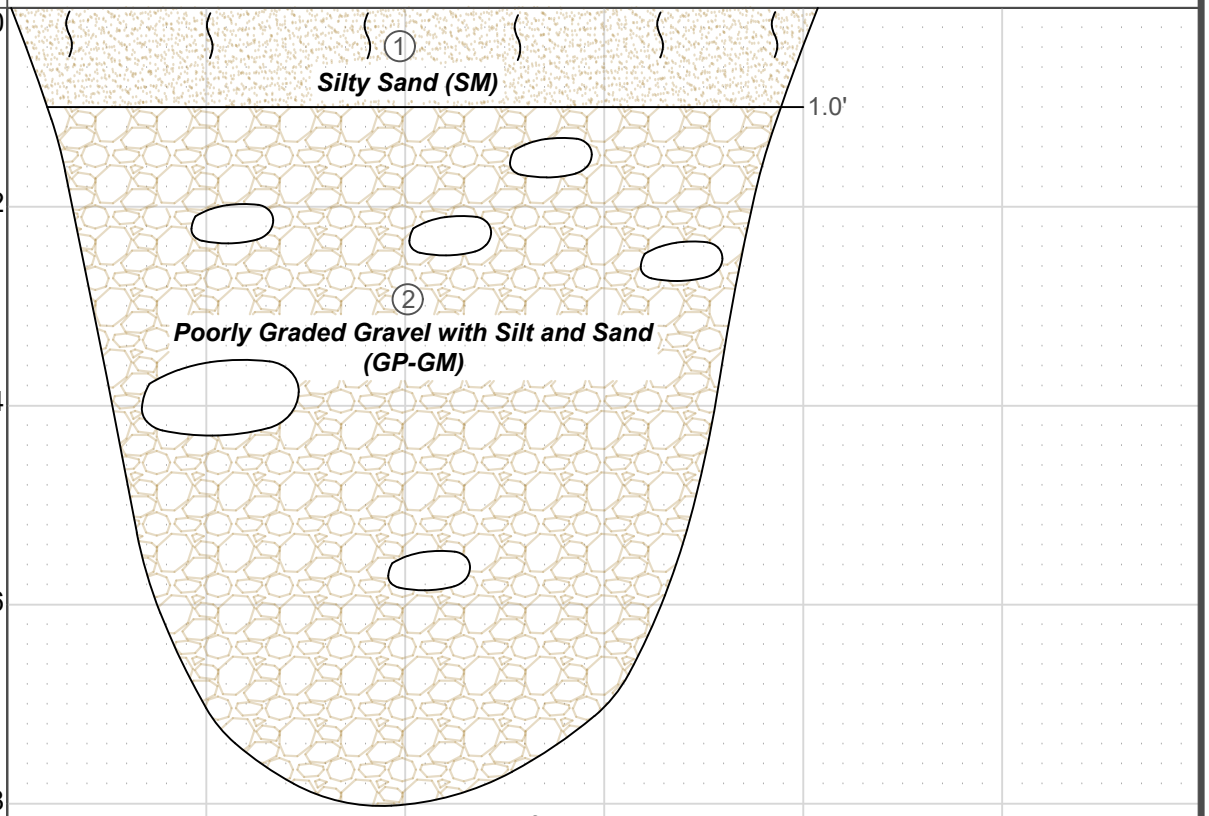
PROJECT: West Van Giesen Commercial Development - West Richland, Washington

Logged By: BH GPS Coordinates: N 46.3033187 E -119.3668846

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Weeds				
① 0 - 1.0' Medium dense, brown, ***Silty Sand (SM)***; Dry; fine to medium sand; nonplastic silt; organics (roots) near the surface (6 inches).	None Observed			0
② 1.0 - 8.0' Dense, brown, ***Poorly Graded Gravel with Silt and Sand (GP-GM)***; Dry; rounded to subangular gravel, little cobbles, trace subangular boulders, maximum diam. 26 inches; fine to coarse sand; nonplastic silt; zone of white precipitation at 1 to 4 feet; clasts horizontally aligned with precipitation on bottoms.		*12-50/0.5"		2
		*8-50/0.25"		4
			S-1 ☒	6
Test Pit Terminated at ±8.0 feet No Groundwater Encountered				8
				10
				12

* Elevated blow counts due to oversize gravel

Sketch of West Pit Side Surface Elevation:



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LOG OF TP-2

JOB NO: 23-183 EX. DATE: 6/16/23 LOCATION: Northeast Corner

PROJECT: West Van Giesen Commercial Development - West Richland, Washington

Logged By: BH GPS Coordinates: N 46.3034069 E -119.3665785

SOIL DESCRIPTION

Surface Description:
Weeds

① 0 - 2.0'
Medium dense, brown, ***Silty Sand (SM)***; Dry; fine to medium sand; nonplastic silt; organics (roots) near the surface (6 inches).

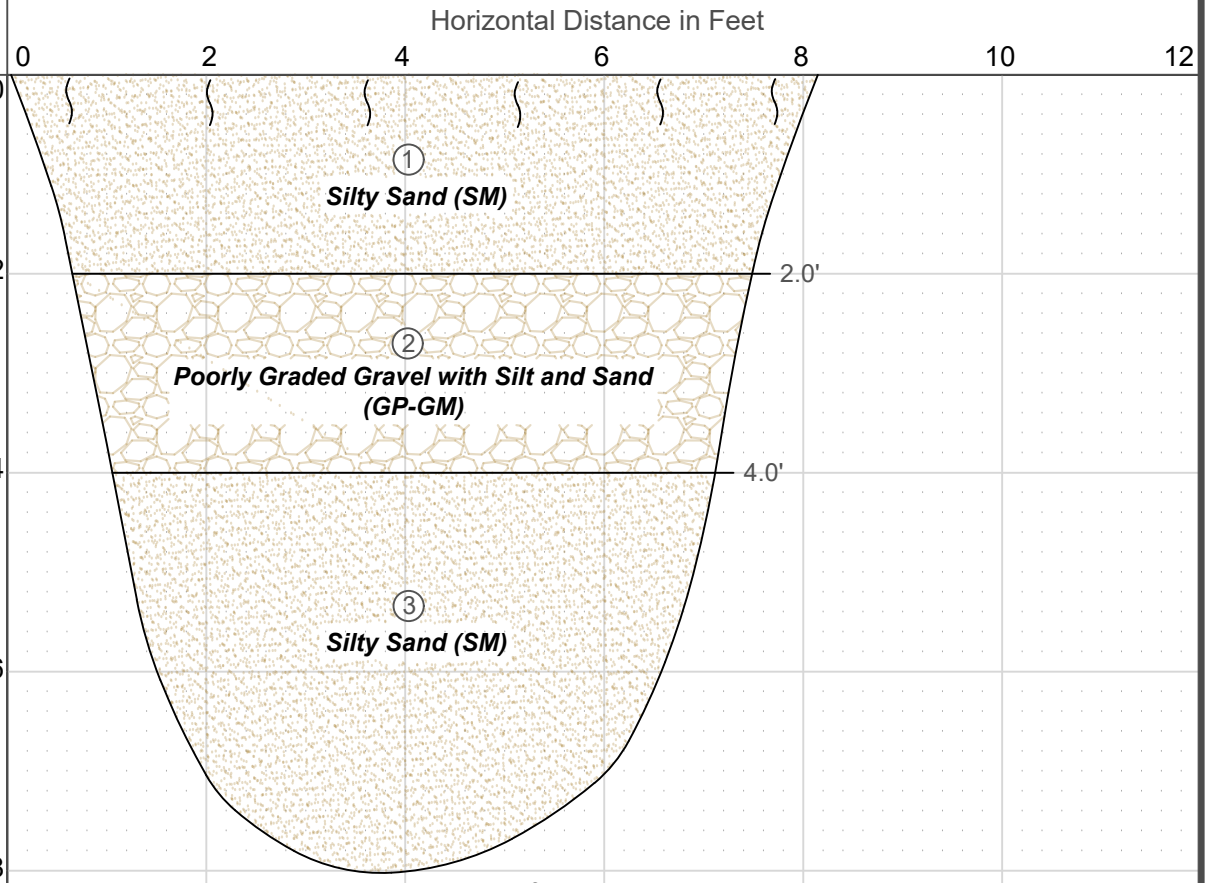
② 2.0 - 4.0'
Dense, brown, ***Poorly Graded Gravel with Silt and Sand (GP-GM)***; Dry; rounded to subrounded gravel, few cobbles, maximum diam. 5 inches; fine to coarse sand; nonplastic silt; clasts horizontally aligned with precipitation on bottoms.

③ 4.0 - 8.0'
Medium dense, brown, ***Silty Sand (SM)***; Dry; fine to medium sand; nonplastic silt.

Test Pit Terminated at ±8.0 feet
No Groundwater Encountered

Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
None Observed			0
	7-12-18		2
			4
	12-16-25	S-1 ☒	6
			8
			10
			12

Sketch of West Pit Side Surface Elevation:



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LOG OF TP-3

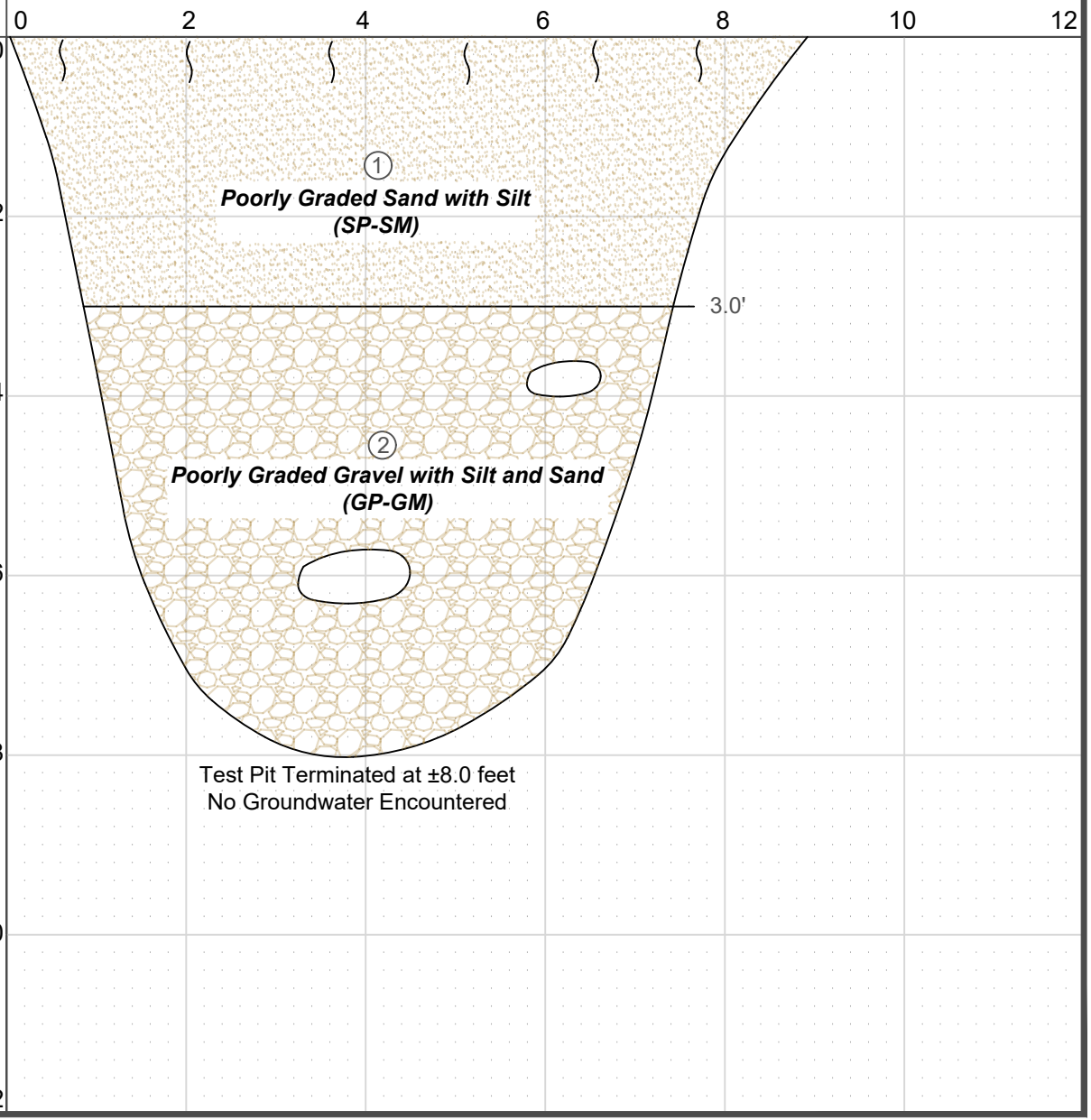
JOB NO: 23-183 EX. DATE: 6/16/23 LOCATION: Southwest Corner

PROJECT: West Van Giesen Commercial Development - West Richland, Washington

Logged By: BH GPS Coordinates: N 46.3031538 E -119.3669060

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Weeds				
① 0 - 3.0' Medium dense, brown, ***Poorly Graded Sand with Silt (SP-SM)***; Dry; fine to medium sand; nonplastic silt; organics (roots) near the surface (6 inches).	None Observed	8-12-16	S-1 ☒	0
② 3.0 - 8.0' Dense, brown, ***Poorly Graded Gravel with Silt and Sand (GP-GM)***; Dry; rounded to subangular gravel, little cobbles, trace subangular boulders, maximum diam. 16 inches; fine to coarse sand; nonplastic silt; clasts horizontally aligned with precipitation on bottoms; strongly cemented from 3 to 5 feet.		*10-15-50/0.25"	S-2 ☒	6
Test Pit Terminated at ±8.0 feet No Groundwater Encountered				8
* Elevated blow counts due to oversize gravel				10
				12

Sketch of West Pit Side Surface Elevation:



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LOG OF TP-4

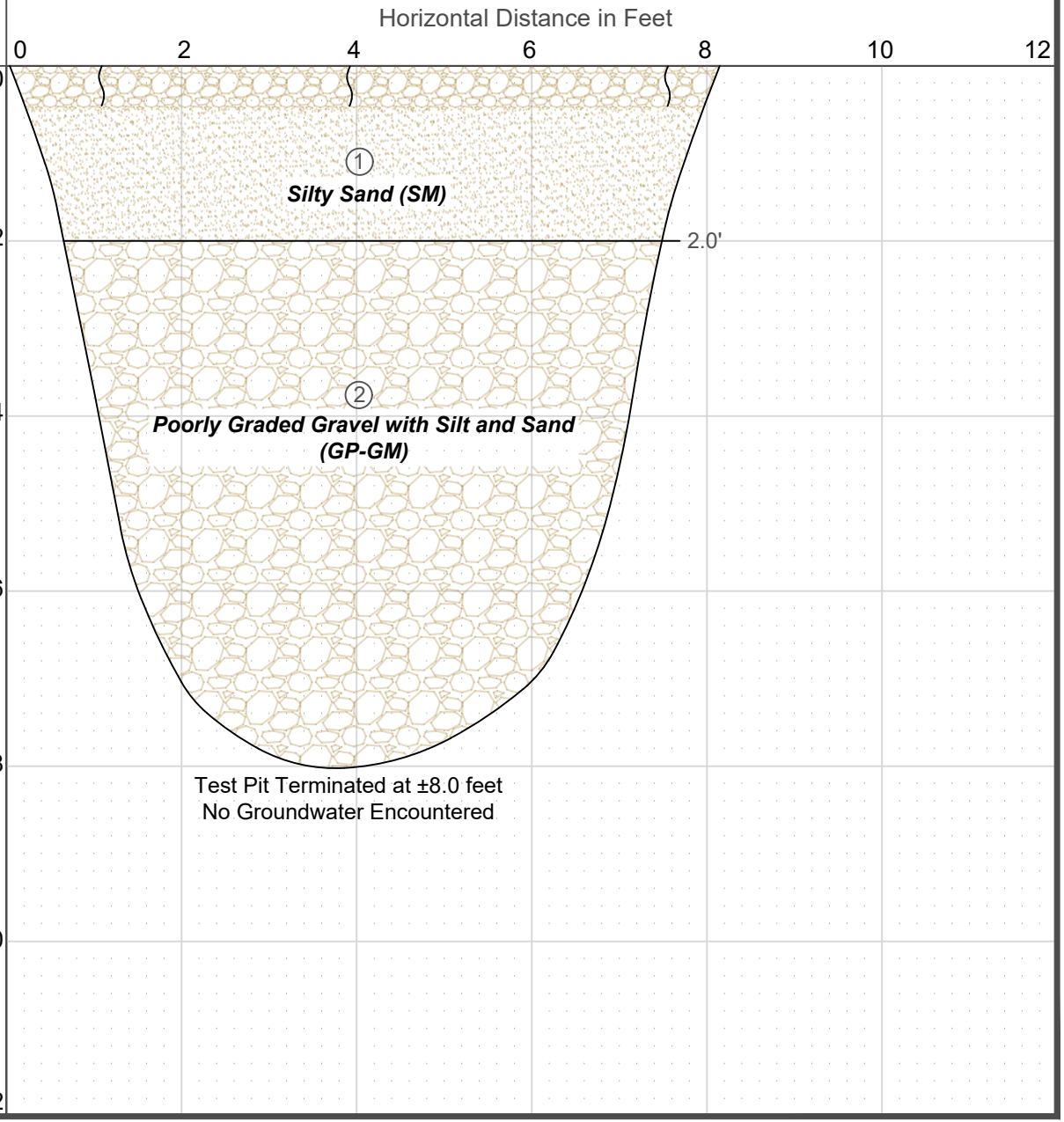
JOB NO: 23-183 EX. DATE: 6/16/23 LOCATION: Southeast Corner

PROJECT: West Van Giesen Commercial Development - West Richland, Washington

Logged By: BH GPS Coordinates: N 46.3032351 E -119.3664286

SOIL DESCRIPTION	Ground Water	Blow Counts ASTM STP399	Samples	Depth, Ft.
Surface Description: Weeds				
① 0 - 2.0' Medium dense, brown, ***Silty Sand (SM)***; Dry; fine to medium sand; nonplastic silt; organics (roots) and gravel near the surface (6 inches).	**None Observed**		S-1	0
② 2.0 - 8.0' Dense, brown, ***Poorly Graded Gravel with Silt and Sand (GP-GM)***; Dry; rounded to subrounded gravel, few cobbles, maximum diam. 8 inches; fine to coarse sand; nonplastic silt; clasts horizontally aligned with precipitation on bottoms.		*8-50/0.5"		2
		*12-50/0.25"		4
				6
			S-2	8
Test Pit Terminated at ±8.0 feet No Groundwater Encountered				10
* Elevated blow counts due to oversize gravel				12

Sketch of East Pit Side Surface Elevation:



APPENDIX B
LABORATORY TEST RESULTS

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CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-183
PROJECT:	West Van Giesen Commercial Development	**WORK ORDER #:**	23-1696
SAMPLE SOURCE:	TP 2 @ 6'	**SAMPLE NUMBER:**	23-1696-1
DATE SAMPLED:	6/16/2023	**DATE TESTED:**	6/21/2023
MATERIAL TYPE:	Silty Sand (SM)	**TESTED BY:**	AH

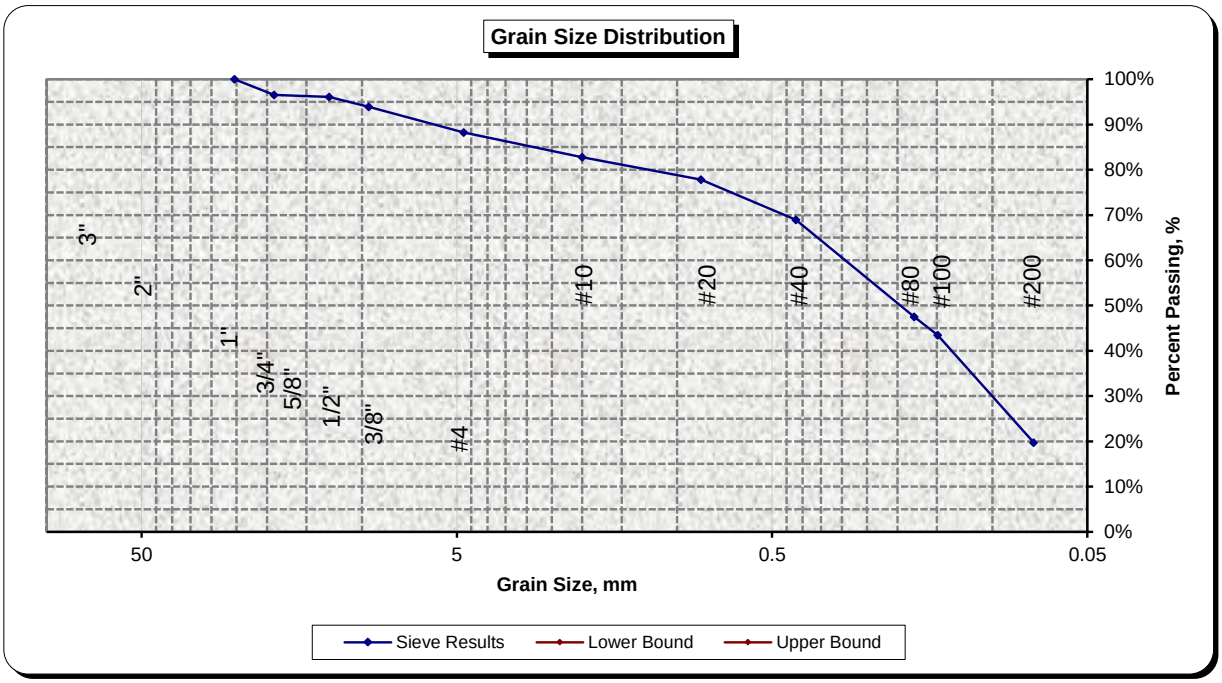
Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS
ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	88%	
3"			#8		
2 1/2"			#10	83%	
2"			#16		
1 1/2"			#20	78%	
1 1/4"			#30		
1"	100%		#40	69%	
3/4"	97%		#50		
5/8"			#60		
1/2"	96%		#80	48%	
3/8"	94%		#100	43%	
1/4"			#200	19.8%	

SOIL MOISTURE DETERMINATION
ASTM D 2216

4.1%



REVIEWED BY:
Dee Burrie, Technical Director

: (509) 469-3068
: (509) 469-3070
: www.baertesting.com

Baer Testing & Engineering, Inc.

1106 Ledwich Ave.
Yakima, WA 98902

CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-183
PROJECT:	West Van Giesen Commercial Development	**WORK ORDER #:**	23-1696
SAMPLE SOURCE:	TP 3 @ 2'	**SAMPLE NUMBER:**	23-1696-2
DATE SAMPLED:	6/16/2023	**DATE TESTED:**	6/21/2023
MATERIAL TYPE:	Poorly Graded Sand with Silt (SP-SM)	**TESTED BY:**	AH

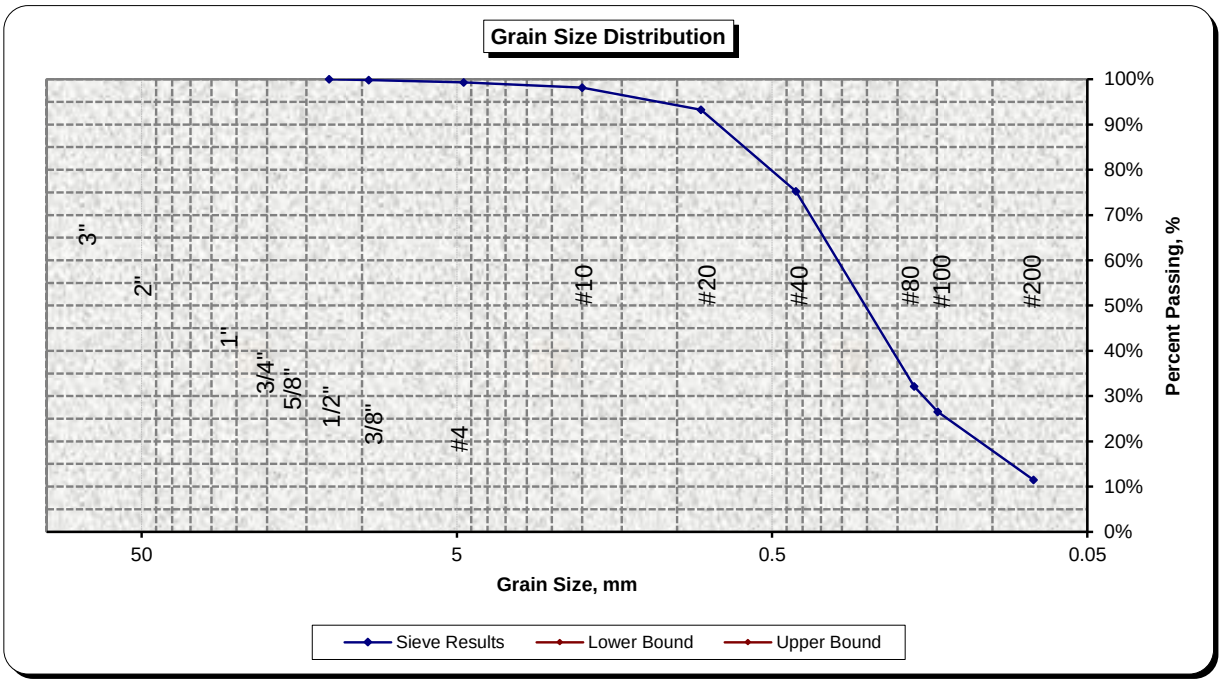
Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS
ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	99%	
3"			#8		
2 1/2"			#10	98%	
2"			#16		
1 1/2"			#20	93%	
1 1/4"			#30		
1"			#40	75%	
3/4"			#50		
5/8"			#60		
1/2"	100%		#80	32%	
3/8"	100%		#100	27%	
1/4"			#200	11.5%	

SOIL MOISTURE DETERMINATION
ASTM D 2216

3.5%



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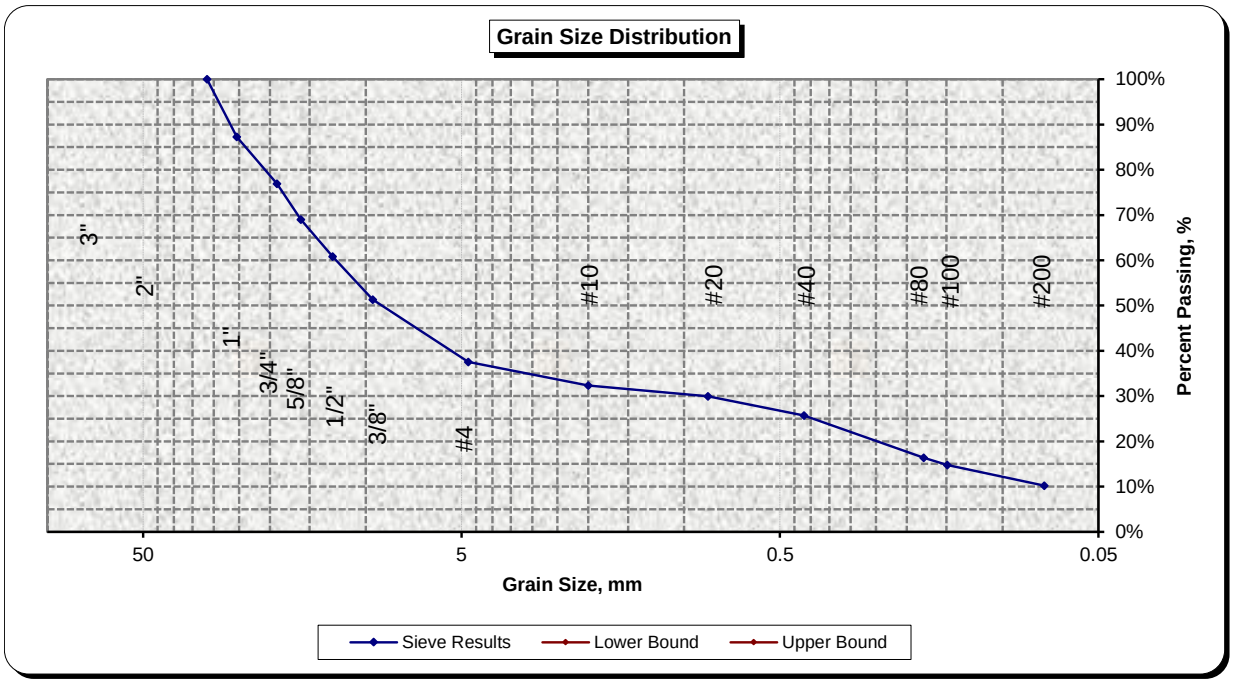
CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-183
PROJECT:	West Van Giesen Commercial Development	**WORK ORDER #:**	23-1696
SAMPLE SOURCE:	TP 3 @ 6'	**SAMPLE NUMBER:**	23-1696-3
DATE SAMPLED:	6/16/2023	**DATE TESTED:**	6/21/2023
MATERIAL TYPE:	Poorly Graded Gravel with Silt and Sand (GP-GM)	**TESTED BY:**	AH

Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS
ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	38%	
3"			#8		
2 1/2"			#10	32%	
2"			#16		
1 1/2"			#20	30%	
1 1/4"	100%		#30		
1"	87%		#40	26%	
3/4"	77%		#50		
5/8"	69%		#60		
1/2"	61%		#80	16%	
3/8"	51%		#100	15%	
1/4"			#200	10.2%	

SOIL MOISTURE DETERMINATION
ASTM D 2216



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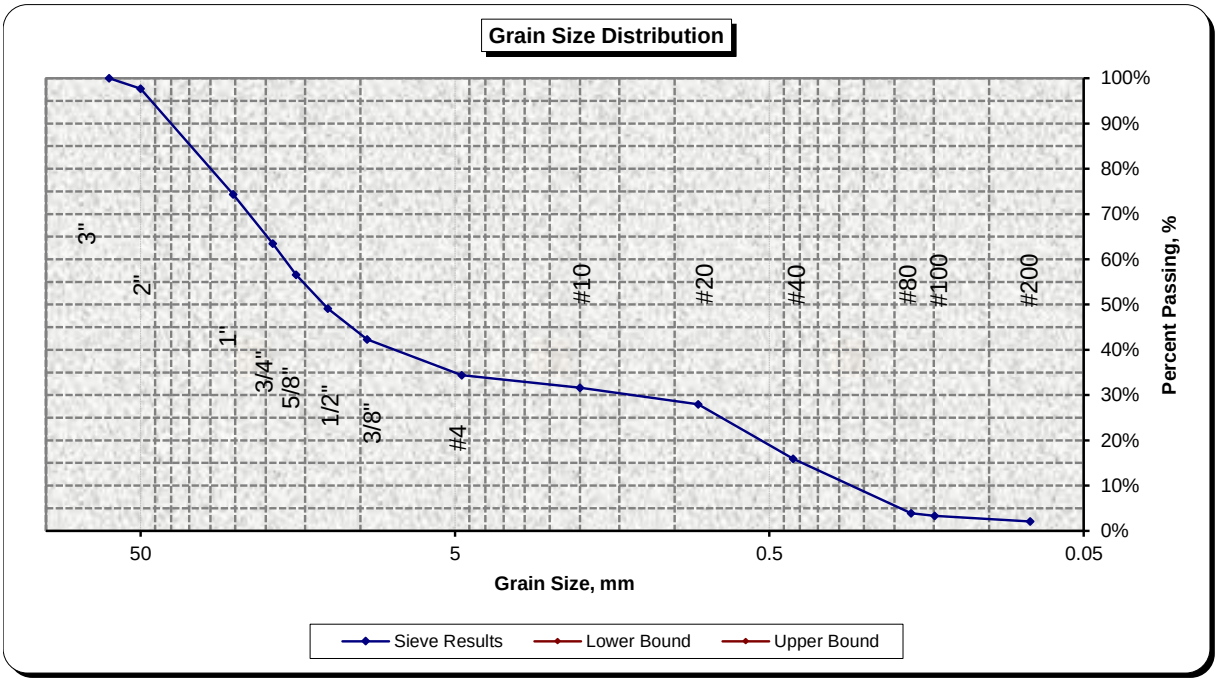
CLIENT:	Croskrey Development, LLC	**PROJECT NUMBER:**	23-183
PROJECT:	West Van Giesen Commercial Development	**WORK ORDER #:**	23-1696
SAMPLE SOURCE:	TP 4 @ 8'	**SAMPLE NUMBER:**	23-1696-4
DATE SAMPLED:	6/16/2023	**DATE TESTED:**	6/21/2023
MATERIAL TYPE:	Poorly Graded Gravel with Sand (GP)	**TESTED BY:**	AH

Sampled in Accordance with ASTM D 75 and reduced in accordance with ASTM C 702 or D 421 unless otherwise noted.

SIEVE ANALYSIS OF SOILS ASTM C 136/D 1140

Sieve Size:	Percent Passing:	Specs:	Sieve Size:	Percent Passing:	Specs:
4"			#4	34%	
3"			#8		
2 1/2"	100%		#10	32%	
2"	98%		#16		
1 1/2"			#20	28%	
1 1/4"			#30		
1"	74%		#40	16%	
3/4"	63%		#50		
5/8"	57%		#60		
1/2"	49%		#80	4%	
3/8"	42%		#100	3%	
1/4"			#200	2.1%	

SOIL MOISTURE DETERMINATION ASTM D 2216



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lab@nwag.com

PAP-Accredited
NAPT

BAER Testing Inc.
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Yakima, WA 98902

Report: 64111-1-1
Date: June 16, 2023
Project No:
Project Name: W Van Giesen Com Dev

Sample ID	Organic Matter	Cation Exchange Capacity
TP-3 @ 8’	1.60%	14.7 meq/100g
	ASTM D2974	**EPA 9081**

Sample ID	Sand	Silt	Clay	Texture Class
TP-3 @ 8’	54.0%	35.0%	11.0%	Sandy Loam

APPENDIX C
WASHINGTON DEPT OF ECOLOGY WELL LOGS

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

37753

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W050076

UNIQUE WELL I.D. # ACL-002

Water Right Permit No. _____

OWNER: Name ED HOFF Address 5725 W. VanGiesen W. Rich WA 99353

(2) LOCATION OF WELL: County Benton SE 1/4 SW 1/4 Sec 31 T. 10 N., R 28E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) _____

(3) PROPOSED USE: ☑ Domestic ☐ Industrial ☐ Municipal ☐ ☐ Irrigation ☐ Test Well ☐ Other ☐ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (If more than one) _____

Abandoned ☐ New well ☑ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☑ Jetted ☐

(5) DIMENSIONS: Diameter of well 6" inches.
Drilled 167 feet. Depth of completed well 167 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from 0 ft. to 20 ft.
Welded ☐ 4½" Diam. from -7 ft. to 167 ft.
Liner installed ☑ _____" Diam. from _____ ft. to _____ ft.
Threaded ☐

Perforations: Yes ☑ No ☐ (Liner)
Type of perforator used ½" Drill Bit
SIZE of perforations ½ in. by _____ in.
160 perforations from 127 ft. to 167 ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☐ No ☑
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☐ No ☑ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☑ No ☐ To what depth? 20 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level 50 ft. below top of well Date 5-23-96
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? _____
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest 100 gal./min. with stem set at 147 ft. for 2 hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Brown Sand	0'	2'
Sand & Broken Basalt	2"	8"
Basalt, Black, Hard	8"	79"
Green Clay	79'	98'
Gray & Green clay sm Basalt	98'	126' 10GPM
Gray Clay & Basalt	126'	146'
Green & Gray clay Porus Basalt (Water Bering 100+ GPM)	146'	167'

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DEPARTMENT OF ECOLOGY
CENTRAL REGION OFFICE

Work Started 5-21-96, 19. Completed 5-23-96, 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Statewide Well Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 2839 W Kenn Ave # 330 Kenn WA 99336

(Signed) _____ (WELL DRILLER) License No. 2343

Contractor's Registration No. STATEWD 027DQ Date 4/97, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (9/93)