GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

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PREPARED FOR:

163 BUSINESS PARK LLC
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RGI PROJECT NO. 2022-322-1

SMOKEY POINT #4
163XX SMOKEY POINT BOULEVARD
MARYSVILLE, WASHINGTON

JULY 15, 2022

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RILEYGROUP

July 15, 2022

Mr. Richard Peterson
163 BUSINESS PARK LLC
170 120th Avenue Northeast, Suite 203
Bellevue, Washington 98005

Subject: **Geotechnical Engineering Report**
Smokey Point #4
163XX Smokey Point Boulevard
Marysville, Washington
RGI Project No. 2022-322-1

Dear Mr. Peterson:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the above-referenced subject site. Our services were completed in accordance with our proposal 2022-322-PRP1 forwarded to you June 20, 2022 and authorized by you on the same day. The information in this report is based on our understanding of the proposed construction, and the soil and groundwater conditions encountered in the test pits completed by RGI at the site on June 28, 2022.

RGI recommends that you submit the project plans and specifications to RGI for a general review so that we may confirm that the recommendations in this report are interpreted and implemented properly in the construction documents. RGI also recommends that a representative of our firm be present on site during portions of the project construction to confirm that the soil and groundwater conditions are consistent with those that form the basis for the engineering recommendations in this report.

If you have any questions or require additional information, please contact us.

Sincerely yours,

THE RILEY GROUP, INC.

State of Washington 2698 Licensed Geologist 7/15/2022

ERIC L. WOODS

Eric L. Woods, LG
Project Geologist

RICKY RUNQI WANG STATE OF WASHINGTON 35013 REGISTERED PROFESSIONAL ENGINEER 7/15/2022

Ricky R. Wang, PhD, PE
Principal Engineer

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 PROJECT DESCRIPTION 1
3.0 FIELD EXPLORATION AND LABORATORY TESTING 2
3.1 FIELD EXPLORATION 2
3.2 LABORATORY TESTING 2
4.0 SITE CONDITIONS 2
4.1 SURFACE 2
4.2 GEOLOGY 2
4.3 SOILS 3
4.4 GROUNDWATER 3
4.5 SEISMIC CONSIDERATIONS 3
4.6 GEOLOGIC HAZARD AREAS 4
5.0 DISCUSSION AND RECOMMENDATIONS 4
5.1 GEOTECHNICAL CONSIDERATIONS 4
5.2 EARTHWORK 4
5.2.1 Erosion and Sediment Control 5
5.2.2 Stripping 6
5.2.3 Excavations 6
5.2.4 Site Preparation 6
5.2.5 Structural Fill 7
5.2.6 Wet Weather Construction Considerations 8
5.3 FOUNDATIONS 9
5.4 RETAINING WALLS 10
5.5 SLAB-ON-GRADE CONSTRUCTION 10
5.6 DRAINAGE 11
5.6.1 Surface 11
5.6.2 Subsurface 11
5.6.3 Infiltration 11
5.7 UTILITIES 12
5.8 PAVEMENTS 12
6.0 ADDITIONAL SERVICES 13
7.0 LIMITATIONS 13

LIST OF APPENDICES

Figure 1 ..... Site Vicinity Map
Figure 2 ..... Geotechnical Exploration Plan
Figure 3 ..... Retaining Wall Drainage Detail
Figure 4 ..... Typical Footing Drain Detail
Appendix A ..... Field Exploration and Laboratory Testing

Executive Summary

This Executive Summary should be used in conjunction with the entire Geotechnical Engineering Report (GER) for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. Section 7.0 should be read for an understanding of limitations.

RGI's geotechnical scope of work included the advancement of 10 test pits to a maximum depth of 8.5 feet below ground surface (bgs).

Based on the information obtained from our subsurface exploration, the site is suitable for development of the proposed project. The following geotechnical considerations were identified:

Soil Conditions: The soils encountered during field exploration includes loose to medium dense silty sand, and sand with varying amounts of silt and gravel.

Groundwater: A groundwater table was encountered during our subsurface exploration at depths of 3.5 to 5 feet bgs.

Foundations: Foundations for the proposed building may be supported on conventional spread footings bearing on structural fill.

Slab-on-grade: Slab-on-grade floors and slabs for the proposed building can be supported on structural fill.

Pavements: The following flexible pavement sections are recommended:

- **For heavy truck traffic areas**: 4 inches of asphalt concrete (AC) over 8 inches of crushed rock base (CRB) over structural fill
- **For general parking areas**: 3 inches of AC over 6 inches of CRB over structural fill

If concrete pavement is preferred, the following pavement section can be used.

- **For heavy duty concrete pavement areas**: 6 inches of concrete over 4 inches of CRB over structural fill
- **For standard duty concrete pavement areas**: 5 inches of concrete over 4 inches of CRB over structural fill

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the proposed Smokey Point #4 located at 163XX Smokey Point Boulevard in Marysville, Washington. The approximate location of the site is shown on Figure 1. The site is currently vacant.

RGI understands that the client plans to develop the land and build two warehouse buildings approximately 97,965 and 40,276 square feet. The entire site will be raised with up to 6 feet of structural fill. A geotechnical study will needed to evaluate the soil condition for building support and infiltration system of the entire site. Our understanding of the project is based on a conceptual site plan prepared by Land Technologies and our conversation with the client on May 18, 2022 and Land Technology on June 20, 2022.

The recommendations in the following sections of this GER are based upon our current understanding of the proposed site development as outlined below. If actual features vary or changes are made, we should review them in order to modify our recommendations, as required. In addition, RGI requests to review the site grading plan, final design drawings, and specifications when available to verify that our project understanding is correct and that our recommendations have been properly interpreted and incorporated into the project design and construction.

2.0 Project description

The site consists of two tax parcels (310528-003-016-00 and 310528-003-017-00) of land with a total area of about 10 acres located at 163XX Smokey Point Boulevard in Maryville, Washington. The site is vacant and undeveloped land. The approximate location of the site is shown on Figure 1.

RGI understands that the proposed development will include two warehouse buildings. RGI expects that site grading will require fill up to 6 feet across the entire site.

At the time of preparing this GER, detailed building plans were not available for our review. Based on our experience with similar projects, RGI anticipates that the proposed buildings will be supported on perimeter walls with bearing loads of 4 to 6 kips per linear foot, and a series of columns with a maximum load up to 250 kips. Slab-on-grade floor loading of 250 pounds per square foot (psf) are expected.

3.0 Field Exploration and Laboratory Testing

3.1 Field Exploration

On June 28, 2022, RGI observed the excavation of 10 test pits to depths up to 8.5 feet bgs. The approximate exploration locations are shown on Figure 2.

Field logs of each exploration were prepared by the geologist that continuously observed the excavation. These logs included visual classifications of the materials encountered during excavation as well as our interpretation of the subsurface conditions between samples. The test pit logs included in Appendix A represent an interpretation of the field logs and include modifications based on laboratory observation and analysis of the samples.

3.2 Laboratory Testing

During the field investigation, a representative portion of each recovered sample was sealed in containers and transported to our laboratory for further visual and laboratory examination. Selected samples retrieved from the test pits were tested for moisture content and grain size analysis to aid in soil classification and provide input for the recommendations provided in this GER. The results and descriptions of the laboratory tests are enclosed in Appendix A.

4.0 Site Conditions

4.1 Surface

The site is comprised of two parcels totaling approximately 10 acres in size. The site is bordered to the west and north by commercial developments, and to the east and south by undeveloped, forested properties.

The site is currently undeveloped forest. The site is relatively level with less than 10 feet of elevation change across the property. A wetland is located in the southeast corner of the property.

4.2 Geology

Review of the Geologic Map of the *Arlington West 7.5 Minute Quadrangle, Snohomish County, Washington* by James P. Minard (1985) indicates that the soil in the project vicinity is mapped as Marysville Sand Member (Qvrm), which is stratified to massive outwash sand deposited by meltwater streams issuing from the receding Vashon glacier. These descriptions are generally similar to the native soils encountered during our field explorations.

4.3 SOILS

The soils encountered during field exploration includes loose to medium dense silty sand, and sand with varying amounts of silt and gravel.

More detailed descriptions of the subsurface conditions encountered are included in Appendix A. Sieve analysis was performed on four selected soil samples. Grain size distribution curves are included in Appendix A.

4.4 GROUNDWATER

A groundwater table was encountered during our subsurface exploration at depths of 3.5 to 5 feet bgs.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the explorations were performed. In addition, perched water can develop within seams and layers contained in fill soils or higher permeability soils overlying less permeable soils following periods of heavy or prolonged precipitation. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the logs. Given the time of the field exploration was performed, RGI expects that the groundwater level will be higher in winter season.

4.5 SEISMIC CONSIDERATIONS

Based on the 2018 International Building Code (IBC), RGI recommends the follow seismic parameters in Table 1 be used for design.

Table 1 IBC Seismic Parameters

2018 IBC Parameter	Value
Site Soil Class[1]	D[2]
Site Latitude	48.144234 N
Site Longitude	122.181173 W
Maximum considered earthquake spectral response acceleration parameters (g)	S_s =1.072, S_1 =0.382
Spectral response acceleration parameters adjusted for site class (g)	S_{ms} =1.148, S_{m1} =0.733[3]
Design spectral response acceleration parameters (g)	S_{ds} =0.765, S_{d1} =0.489[3]

1. Note: In general accordance with Chapter 20 of ASCE 7-16. The Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.

2. Note: The 2015 IBC and ASCE 7-10 require a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope of our services does not include the required 100 foot soil profile determination. Test excavations extended to a maximum depth of 8.5 feet, and this seismic site class definition considers that similar soil continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

3. Note: In accordance with ASCE 11.4.8, a ground motion hazard analysis is not required for the following cases:

- Structures on Site Class E sites with S_S greater than or equal to 1.0, provided the site coefficient Fa is taken as equal to that of Site Class C.
- Structures on Site Class D sites with S_1 greater than or equal to 0.2, provided that the value of the seismic response coefficient Cs is determined by Eq. 12.8-2 for values of $T \leq 1.5Ts$ and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for $T_L \geq T > 1.5T_S$ or Eq. 12.8-4 for $T > TL$.
- Structures on Site Class E sites with S_1 greater than or equal to 0.2, provided that T is less than or equal to T_S and the equivalent static force procedure is used for design.

The above exceptions do not apply to seismically isolated structures, structures with damping systems or structures designed using the response history procedures of Chapter 16.

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 from a seismic event. Liquefaction mainly affects geologically recent deposits of fine-grained sands that are below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction, thus reducing or eliminating the soil's strength.

RGI reviewed the results of the field and laboratory testing and assessed the potential for liquefaction of the site's soil during an earthquake. Based on the soil and groundwater condition, RGI considers that the possibility of liquefaction during an earthquake is low.

4.6 Geologic Hazard Areas

Regulated geologically hazardous areas include erosion, landslide, earthquake, or other geological hazards. Review of the *Liquefaction Susceptibility Map of Snohomish County, Washington* by Stephen P. Palmer, etc. (2004) indicates the site is mapped as having a low to moderate liquefaction susceptibility. Based on our evaluation of the soil and groundwater condition, RGI considers that the possibility of liquefaction during an earthquake is low and should have very low impact to the proposed development.

5.0 Discussion and Recommendations

5.1 Geotechnical Considerations

Based on our study, the site is suitable for the proposed construction from a geotechnical standpoint. RGI recommends that the site be raised with at least 2 feet of structural fill. In our opinion, the proposed fill is suitable for supporting the foundations, slab-on-grade and pavements.

Detailed recommendations regarding the above 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.

5.2 Earthwork

Based on the site grades, RGI anticipates the earthwork will include cut and fills to reach subgrade elevations for the building and parking lot grades, installing underground

utilities and excavating and backfilling the building foundations. Given the time of the field exploration was performed, groundwater is unlikely to be encountered during construction if the construction occurs in summer or fall months.

5.2.1 EROSION AND SEDIMENT CONTROL

Potential sources or causes of erosion and sedimentation depend on construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. The impacts on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards.

RGI recommends the following erosion control Best Management Practices (BMPs):

- Scheduling site preparation and grading for the drier summer and early fall months and undertaking activities that expose soil during periods of little or no rainfall
- Retaining existing vegetation whenever feasible
- Establishing a quarry spall construction entrance
- Installing siltation control fencing or anchored straw or coir wattles on the downhill side of work areas
- Covering soil stockpiles with anchored plastic sheeting
- Revegetating or mulching exposed soils with a minimum 3-inch thickness of straw if surfaces will be left undisturbed for more than 1 day during wet weather or 1 week in dry weather
- Directing runoff away from exposed soils and slopes
- Minimizing the length and steepness of slopes with exposed soils and cover excavation surfaces with anchored plastic sheeting (Graded and disturbed slopes should be tracked in place with the equipment running perpendicular to the slope contours so that the track marks provide a texture to help resist erosion and channeling. Some sloughing and raveling of slopes with exposed or disturbed soil should be expected.)
- Decreasing runoff velocities with check dams, straw bales or coir wattles
- Confining sediment to the project site
- Inspecting and maintaining erosion and sediment control measures frequently (The contractor should be aware that inspection and maintenance of erosion control BMPs is critical toward their satisfactory performance. Repair and/or replacement of dysfunctional erosion control elements should be anticipated.)

Permanent erosion protection should be provided by reestablishing vegetation using hydroseeding and/or landscape planting. Until the permanent erosion protection is established, site monitoring should be performed by qualified personnel to evaluate the

effectiveness of the erosion control measures. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

5.2.2 STRIPPING

Stripping efforts should include removal of vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. Based on the site conditions, we anticipate stripping depths of 6 to 8 inches through most of the site.

5.2.3 EXCAVATIONS

All temporary cut slopes associated with the site and utility excavations should be adequately inclined to prevent sloughing and collapse. Based on OSHA regulations, the native soil classifies as a Group C soil.

Accordingly, for excavations more than 4 feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1.5H:1V (horizontal:vertical) in native soil. If there is insufficient room to complete the excavations in this manner, or excavations greater than 20 feet in depth are planned, using temporary shoring to support the excavations should be considered. For open cuts at the site, RGI recommends:

- No traffic, construction equipment, stockpiles or building supplies are allowed at the top of cut slopes within a distance of at least 5 feet from the top of the cut.
- Exposed soil along the slope is protected from surface erosion using waterproof tarps and/or plastic sheeting.
- Construction activities are scheduled so that the length of time the temporary cut is left open is minimized.
- Surface water is diverted away from the excavation.
- The general condition of slopes should be observed periodically by a geotechnical engineer to confirm adequate stability and erosion control measures.

In all cases, however, appropriate inclinations will depend on the actual soil and groundwater conditions encountered during earthwork. Ultimately, the site contractor must be responsible for maintaining safe excavation slopes that comply with applicable OSHA or WISHA guidelines.

5.2.4 SITE PREPARATION

RGI anticipates that some areas of loose soil may be exposed upon completion of stripping and grubbing. Proofrolling and subgrade verification should be considered an essential step in site preparation. After stripping, grubbing, and prior to placement of structural fill, RGI recommends proofrolling building and pavement subgrades and areas

to receive structural fill. These areas should be proofrolled under the observation of RGI and compacted to a firm and unyielding condition in order to achieve a minimum compaction level of 95 percent of the modified proctor maximum dry density as determined by the American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557).

Proofrolling and adequate subgrade compaction can only be achieved when the soils are within approximately ± 2 percent moisture content of the optimum moisture content. Soils which appear firm after stripping and grubbing may be proofrolled with a heavy compactor, loaded double-axle dump truck, or other heavy equipment under the observation of an RGI representative. This observer will assess the subgrade conditions prior to filling. The need for or advisability of proofrolling due to soil moisture conditions should be determined at the time of construction. In wet areas, it may be necessary to hand probe the exposed subgrades in lieu of proofrolling with mechanical equipment.

Subgrade soils that become disturbed due to elevated moisture conditions should be overexcavated to reveal firm, non-yielding, non-organic soils and backfilled with compacted structural fill. In order to maximize utilization of site soils as structural fill, RGI recommends that the earthwork portion of this project be completed during extended periods of warm and dry weather if possible. If earthwork is completed during the wet season (typically November through May) it will be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork will require additional mitigative measures beyond what would be expected during the drier summer and fall months.

5.2.5 STRUCTURAL FILL

RGI recommends fill below the foundation and floor slab, behind retaining walls, and below pavement and hardscape surfaces be placed in accordance with the following recommendations for structural fill. The structural fill should be placed after completion of site preparation procedures as described above.

RGI recommends placing structural fill in lifts not exceeding 12 inches in loose thickness and thoroughly compacted as specified in Table 3. The suitability of soils for compacted structural fill use will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines (that portion passing the US. No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. Soils containing more than about 5 percent fines cannot be consistently compacted to a dense, non-yielding condition when the moisture content is more than 2 percent above or below optimum. Optimum moisture content is that moisture which results in the greatest compacted dry density with a specified compactive effort.

The sandy soil is suitable for re-use as structural fill if the moisture can be property controlled. If the construction occurs in wet weather conditions, import structural fill may be necessary for grading and backfill. The import material must meet the grading requirements listed in Table 2 in order to be used as structural fill in wet weather.

Table 2 Structural Fill Gradation

U.S. Sieve Size	Percent Passing
4 inches	100
No. 4 sieve	75 percent
No. 200 sieve	5 percent *

*Based on minus 3/4 inch fraction.

Prior to use, an RGI representative should observe and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 12 inches and compacted as specified in Table 3. The soil's maximum density and optimum moisture should be determined by ASTM D1557.

Table 3 Structural Fill Compaction ASTM D1557

Location	Material Type	Minimum Compaction Percentage	Moisture Content Range	
Foundations	On-site granular or approved imported fill soils:	95	+2	-2
Retaining Wall Backfill	On-site granular or approved imported fill soils:	92	+2	-2
Slab-on-grade	On-site granular or approved imported fill soils:	95	+2	-2
General Fill (non-structural areas)	On-site granular or approved imported fill soils:	90	+3	-2
Pavement – Subgrade and Base Course	On-site granular or approved imported fill soils:	95	+2	-2

Placement and compaction of structural fill should be observed by RGI. A representative number of in-place density tests should be performed as the fill is being placed to confirm that the recommended level of compaction is achieved.

5.2.6 Wet Weather Construction Considerations

RGI recommends that preparation for site grading and construction include procedures intended to drain ponded water, control surface water runoff, and to collect shallow subsurface seepage zones in excavations, where encountered. It will not be possible to

successfully compact the subgrade or utilize on-site soils as structural fill if accumulated water is not drained prior to grading or if drainage is not controlled during construction. Attempting to grade the site without adequate drainage control measures will reduce the amount of on-site soil effectively available for use, increase the amount of select import fill materials required, and ultimately increase the cost of the earthwork phases of the project. Free water should not be allowed to pond on the subgrade soils. RGI anticipates that the use of berms and shallow drainage ditches, with sumps and pumps in utility trenches, will be required for surface water control during wet weather and/or wet site conditions.

5.3 FOUNDATIONS

Following site preparation and grading, the proposed foundation can be supported on structural fill or medium dense native soil.

Perimeter foundations exposed to weather should be at a minimum depth of 18 inches below final exterior grades. Interior foundations can be constructed at any convenient depth below the floor slab. Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings.

Table 4 Foundation Design

Design Parameter	Value
Allowable Bearing Capacity – Structural fill	2,500 psf[1]
Friction Coefficient	0.25
Passive pressure (equivalent fluid pressure)	250 pcf[2]
Minimum foundation dimensions	Columns: 24 inches Walls: 16 inches

[1]. psf = pounds per square foot

[2]. pcf = pounds per cubic foot

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. For short-term loads, such as wind and seismic, a 1/3 increase in this allowable capacity may be used. At perimeter locations, RGI recommends not including the upper 12 inches of soil in the computation of passive pressures because they can be affected by weather or disturbed by future grading activity. The passive pressure value assumes the foundation will be constructed neat against competent soil or backfilled with structural fill as described in Section 5.2.5. The recommended base friction and passive resistance value includes a safety factor of about 1.5.

With spread footing foundations designed in accordance with the recommendations in this section, maximum total and differential post-construction settlements of 1 inch and 1/2 inch, respectively, should be expected.

5.4 RETAINING WALLS

If retaining walls are needed for grade transitions at the site in building areas, RGI recommends cast-in-place concrete walls be used. The footing should be supported on competent native soil or structural fill. The magnitude of earth pressure development on retaining walls will partly depend on the quality of the wall backfill. RGI recommends placing and compacting wall backfill as structural fill. Wall drainage will be needed behind the wall face. A typical retaining wall drainage detail is shown on Figure 3.

With wall backfill placed and compacted as recommended, and drainage properly installed, RGI recommends using the values in the following table for design.

Table 5 Retaining Wall Design

Design Parameter	Value
Allowable Bearing Capacity – Medium dense native soil or structural fill	2,500 psf
Active Earth Pressure (unrestrained walls)	35 pcf
At-rest Earth Pressure (restrained walls)	50 pcf

For seismic design, an additional uniform load of 7 times the wall height (H) for unrestrained walls and 14H for restrained walls should be applied to the wall surface. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.3.

5.5 SLAB-ON-GRADE CONSTRUCTION

Once site preparation has been completed as described in Section 5.2, slab-on-grade construction can be supported on structural fill. Immediately below the floor slab, RGI recommend placing a 4-inch-thick capillary break layer of clean, free-draining sand or gravel that has less than 5 percent passing the U.S. 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.

Where moisture by vapor transmission is undesirable, an 8- to 10-mil-thick plastic membrane should be placed on a 4-inch-thick layer of clean gravel. For the anticipated floor slab loading, RGI estimates post-construction floor settlements of 1/4- to 1/2-inch. For thickness design of the slab subjected to point loading from storage racks, RGI

recommends using a subgrade modulus (Ks) of 150 pounds per square inch per inch of deflection.

5.6 DRAINAGE

5.6.1 SURFACE

Final exterior grades should promote free and positive drainage away from the building area. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building area. For non-pavement locations, RGI recommends providing a minimum drainage gradient of 3 percent for a minimum distance of 10 feet from the building perimeter. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structure.

5.6.2 SUBSURFACE

Perimeter foundation drains shown on Figure 4 are typically installed around the perimeter of the buildings. The foundation drains and roof downspouts should be tightlined separately to an approved discharge facility. Subsurface drains must be laid with a gradient sufficient to promote positive flow to a controlled point of approved discharge.

5.6.3 INFILTRATION

The native soil was evaluated for infiltration rates based on the soil grain size method. The soil grain size method was selected due to the consistency of the grain size distribution of native soil and the fact the native soil is not glacially consolidated. The grain size method evaluation was completed per the guidelines in the Washington State Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW). Table 6 summarizes our results of analysis:

Table 6 Saturated Design Hydraulic Conductivity

Test Location	Test Depth (feet)	$K_{sat\ design}$ (Inches/hour)
TP-2	3	8.5
TP-5	3.5	4.3

Based on the grain size analysis, RGI recommends that an allowable infiltration rate of 4.3 inches per hour be used for system design. The bottom of the infiltration system should be at least 3 feet over the seasonal high groundwater level and should be in sandy soil. The groundwater level at the time of excavation was 3.5 to 5 feet bgs. Therefore, the site grade should be raised in order to meet the requirement.

The soils exposed in the surface of the infiltration facility area should consist of sandy soils. If an unsuitable layer is encountered, they should be over-excavated and replaced with gravel. A geotechnical engineer or geologist should observe the infiltration facility construction.

5.7 UTILITIES

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) specifications. For site utilities located within the right-of-ways, bedding and backfill should be completed in accordance with Snohomish County and the City of Marysville specifications. At a minimum, trench backfill should be placed as structural fill, as described in Section 5.2.5 and compacted to at least 95 percent of the maximum dry density per ASTM D1557. Where utilities occur below unimproved areas, the degree of compaction can be reduced to a minimum of 90 percent of the soil's maximum density as determined by ASTM D1557. As discussed above, the native soils can reused as structural fill if the construction occurs in summer months.

5.8 PAVEMENTS

Pavement subgrades should be prepared as described in Section 4.2 and as discussed below. Regardless of the 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.

With the pavement subgrade prepared as described above, RGI recommends the following pavement sections for parking and drive areas paved with flexible asphalt concrete surfacing.

- **For general parking**: 3 inches of hot mix asphalt (HMA) over 6 inches of crushed rock base (CRB) over structural fill
- **For driveway and heavy traffic area**: 4 inches of HMA over 8 inches of CRB over structural fill

The asphalt paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for Hot Mix Asphalt Class 1/2 inch and CRB surfacing.

If concrete pavement is preferred, the following pavement section can be used.

- **For heavy duty concrete pavement areas**: 6 inches of concrete over 4 inches of CRB over structural fill
- **For standard duty concrete pavement areas**: 5 inches of concrete over 4 inches of CRB over structural fill

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, surface drainage gradients of no less than 2 percent are recommended. Also, 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.

6.0 Additional Services

RGI is available to provide further geotechnical consultation throughout the design phase of the project. RGI should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design and construction.

RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this scope of work. If these services are desired, please let us know and we will prepare a cost proposal.

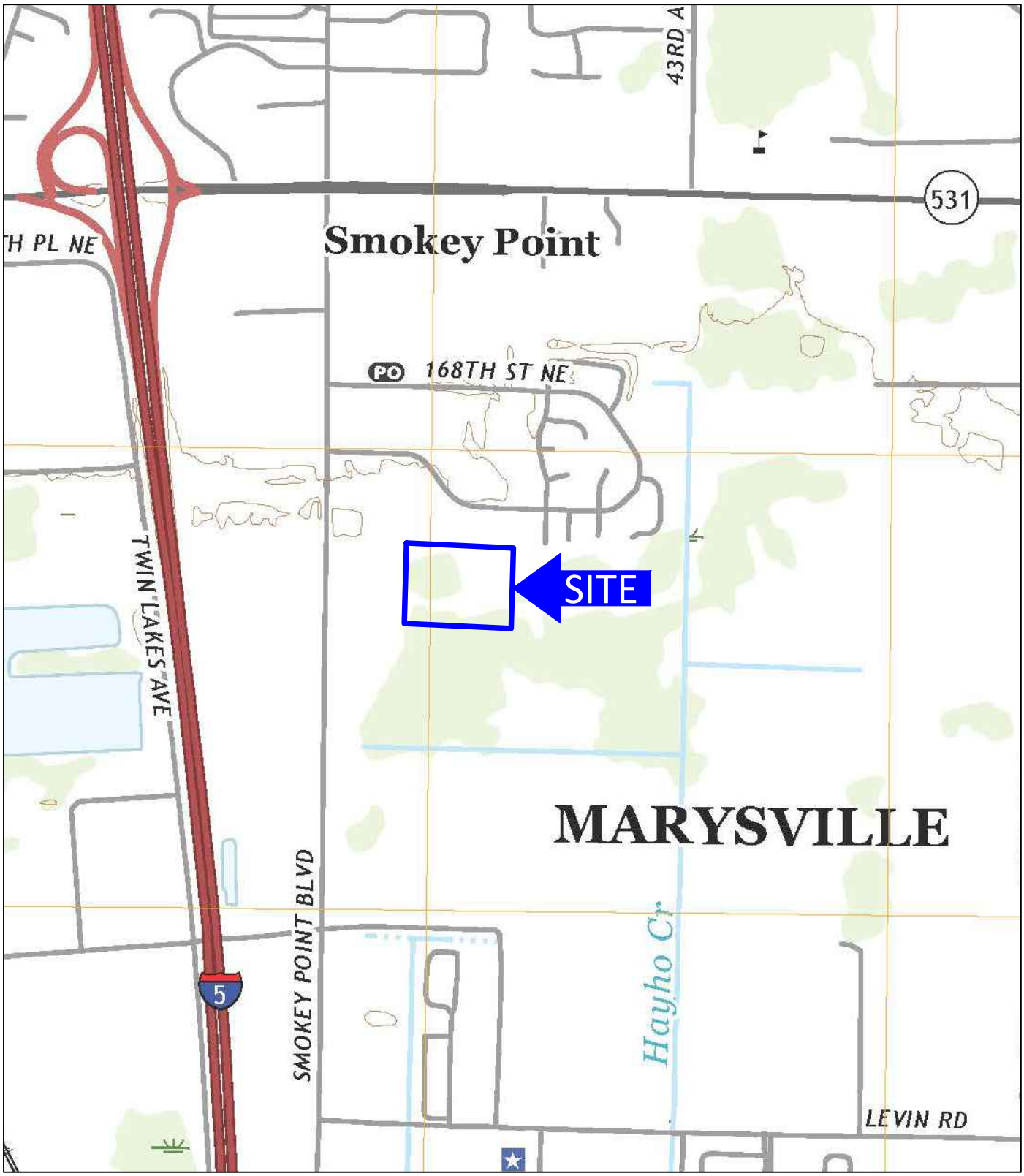
7.0 Limitations

This report is the property of RGI, 163 BUSINESS PARK LLC, Smokey Point #4 and their designated agents. Within the limits of the scope and budget, this report was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this report was issued. This report is intended for specific application to Smokey Point #4 at the southeast corner of 172nd Street Northeast and 43rd Avenue Northeast in Marysville, Washington, and for the exclusive use of 163 BUSINESS PARK LLC, Smokey Point #4 and their authorized representatives. No other warranty, expressed or implied, is made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

The scope of services for this project does not include either specifically or by implication any environmental or biological (for example, mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. We have provided a Phase I Environmental Site Assessment for the site and the results are provided under a separate cover.

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

It is the client's responsibility to see that all parties to the project, including the designers, contractors, subcontractors, are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.



USGS, 2020, Arlington West, Washington
7.5-Minute Quadrangle

Approximate Scale: 1"=1000'

0 500 1000 2000

N

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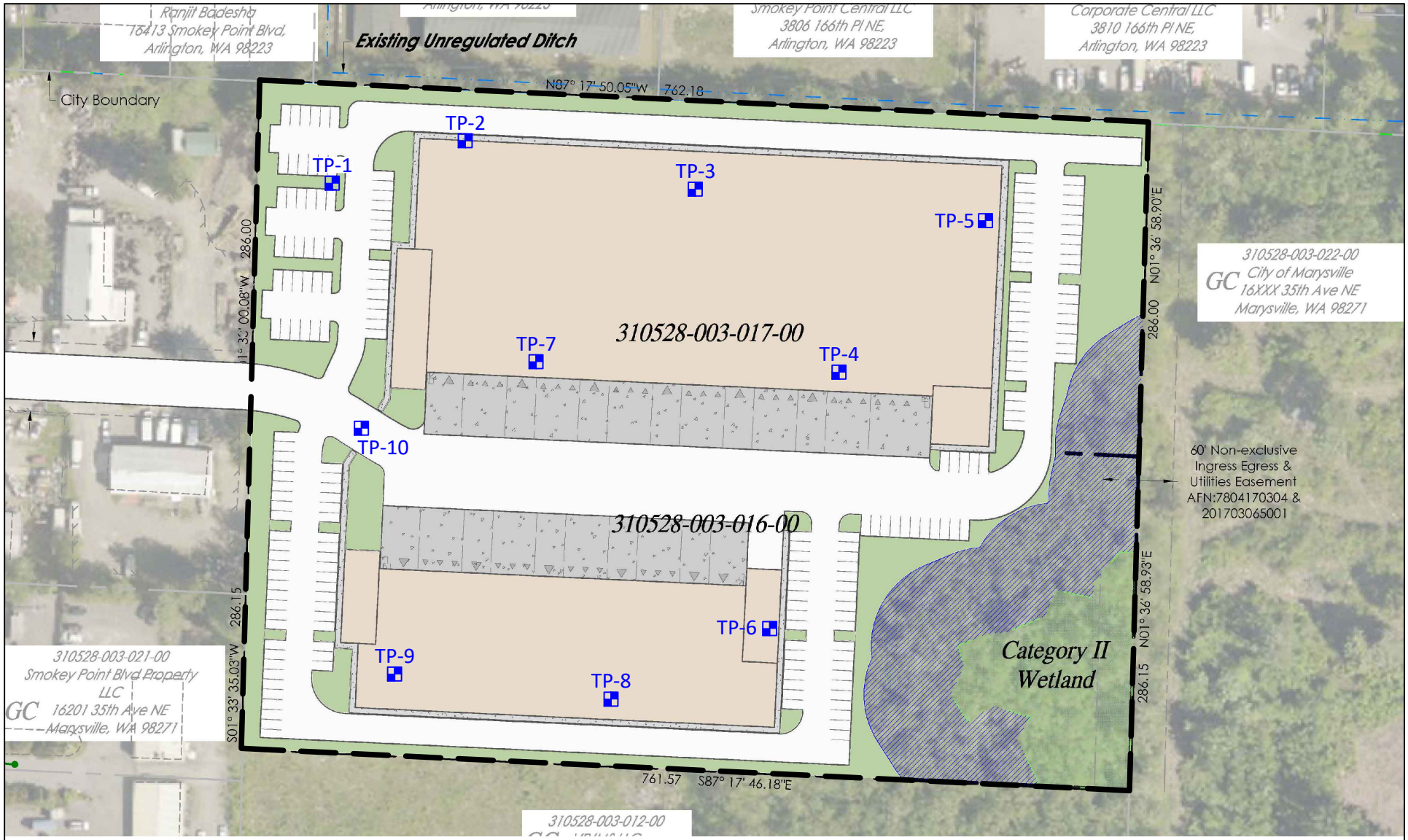
Smokey Point #4		Figure 1
RGI Project Number: 2022-322-1	Site Vicinity Map	Date Drawn: 07/2022
Address: Smokey Point Blvd, Marysville, Washington 98271		



= Test pit by RGI, 06/28/22

= Subject Property boundary

Approximate Scale: 1"= 120'

0 60 120 240

N

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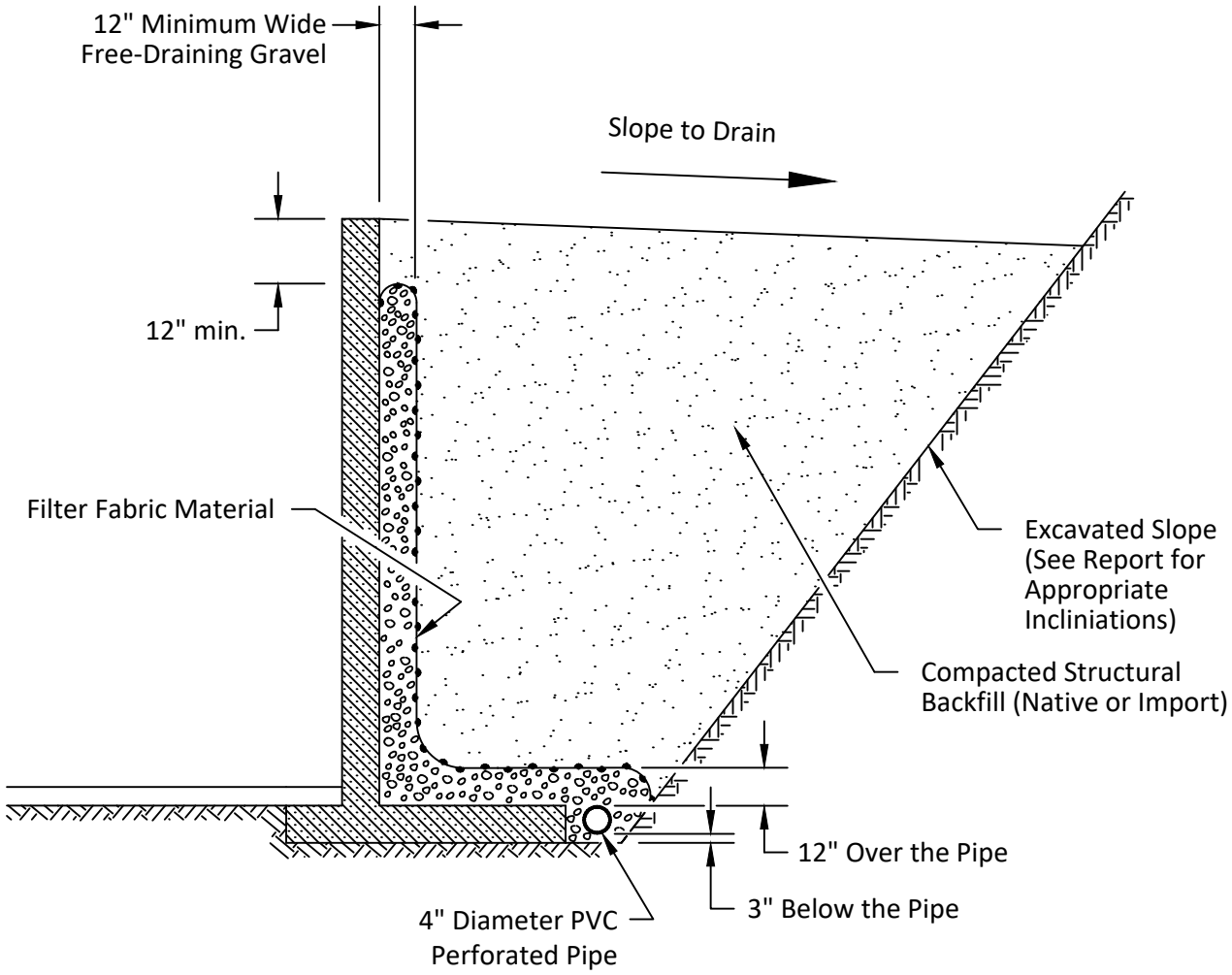
Smokey Point #4		Figure 2
RGI Project Number: 2022-322-1	Geotechnical Exploration Plan	Date Drawn: 07/2022
Address: Smokey Point Blvd, Marysville, Washington 98271		



Not to Scale

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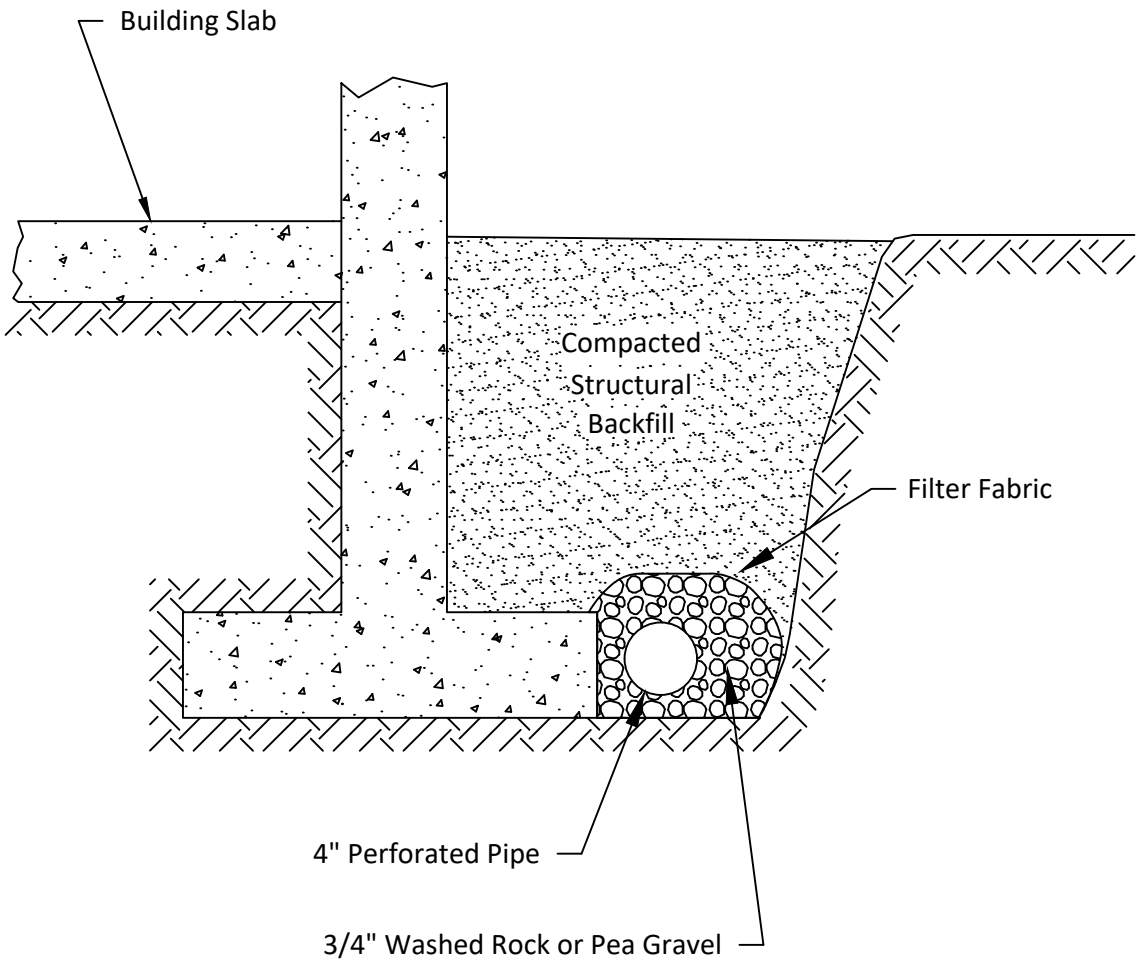
Smokey Point #4		Figure 3
RGI Project Number: 2022-322-1	Retaining Wall Drainage Detail	Date Drawn: 07/2022
Address: Smokey Point Blvd, Marysville, Washington 98271		



Not to Scale

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Smokey Point #4		Figure 4
RGI Project Number: 2022-322-1	Typical Footing Drain Detail	Date Drawn: 07/2022
Address: Smokey Point Blvd, Marysville, Washington 98271		

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

On June 28, 2022, RGI explored the subsurface soil conditions at the site by observing the excavation of 10 test pits to a maximum depth of 8.5 feet below existing grade. The test pit locations are shown on Figure 2. The test pit locations were approximately determined by measurements from existing property lines and paved roads.

A geologist from our office conducted the field exploration and classified the soil conditions encountered, maintained a log of each test exploration, obtained representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described in Appendix A.

Representative soil samples obtained from the explorations were placed in closed containers and taken to our laboratory for further examination and testing. As a part of the laboratory testing program, the soil samples were classified in our in-house laboratory based on visual observation, texture, and the limited laboratory testing described below.

Moisture Content Determinations

Moisture content determinations were performed in accordance with the American Society of Testing and Materials D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216) on representative samples obtained from the exploration in order to aid in identification and correlation of soil types. The moisture content of typical sample was measured and is reported on the test pit logs.

Grain Size Analysis

A grain-size analysis indicates the range in diameter of soil particles included in a particular sample. Grain size analyses for the greater than 75 micrometer portion of the samples were performed in accordance with American Society of Testing and Materials D422 Standard Test Method for Particle-Size Analysis of Soils (ASTM D422) on four of the samples.

Project Name: **Smokey Point #4**
Project Number: **2022-322-1**
Client: **163 Business Park LLC**

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Test Pit No.: TP-1

Sheet 1 of 1

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **7 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **3.5'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TPSL		6" topsoil	
				SM		Reddish brown silty SAND, loose, moist	
						Becomes gray	
				SP-SM		Brown SAND with some silt, medium dense, moist	
						Lightly cemented	20% moisture
				SP		Gray SAND with trace silt, medium dense, moist	
						Becomes water bearing ▽	23% moisture
	5					Moderate caving	
						Occasional gravel	19% moisture, 1% fines
						Test Pit terminated at 7'	
	10						

Project Name: **Smokey Point #4**
Project Number: **2022-322-1**
Client: **163 Business Park LLC**

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Test Pit No.: TP-2

Sheet 1 of 1

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Moss**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **8.5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **5'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TPSL		8" topsoil	
				SM		Reddish brown silty SAND, loose, moist	22% moisture
				SP		Brown SAND with trace silt, medium dense, moist	
						Lightly cemented	15% moisture, 3% fines
						Becomes gray	
						Becomes water bearing ▽	23% moisture
	5					Moderate caving	
							22% moisture
						Test Pit terminated at 8.5'	
	10						

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Project Name: **Smokey Point #4** Project Number: **2022-322-1** Client: **163 Business Park LLC**	RILEYGROUP Test Pit No.: TP-3 **Sheet 1 of 1**

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **5.5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **4.5'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TPSL		8" topsoil	
				SM		Reddish brown silty SAND, loose, moist	
				SP-SM		Tan SAND with some silt, medium dense, moist Lightly cemented	15% moisture
				SP		Gray SAND with trace silt, medium dense, moist Becomes water bearing ▽	
	5						19% moisture
						Test Pit terminated at 5.5'	
	10						

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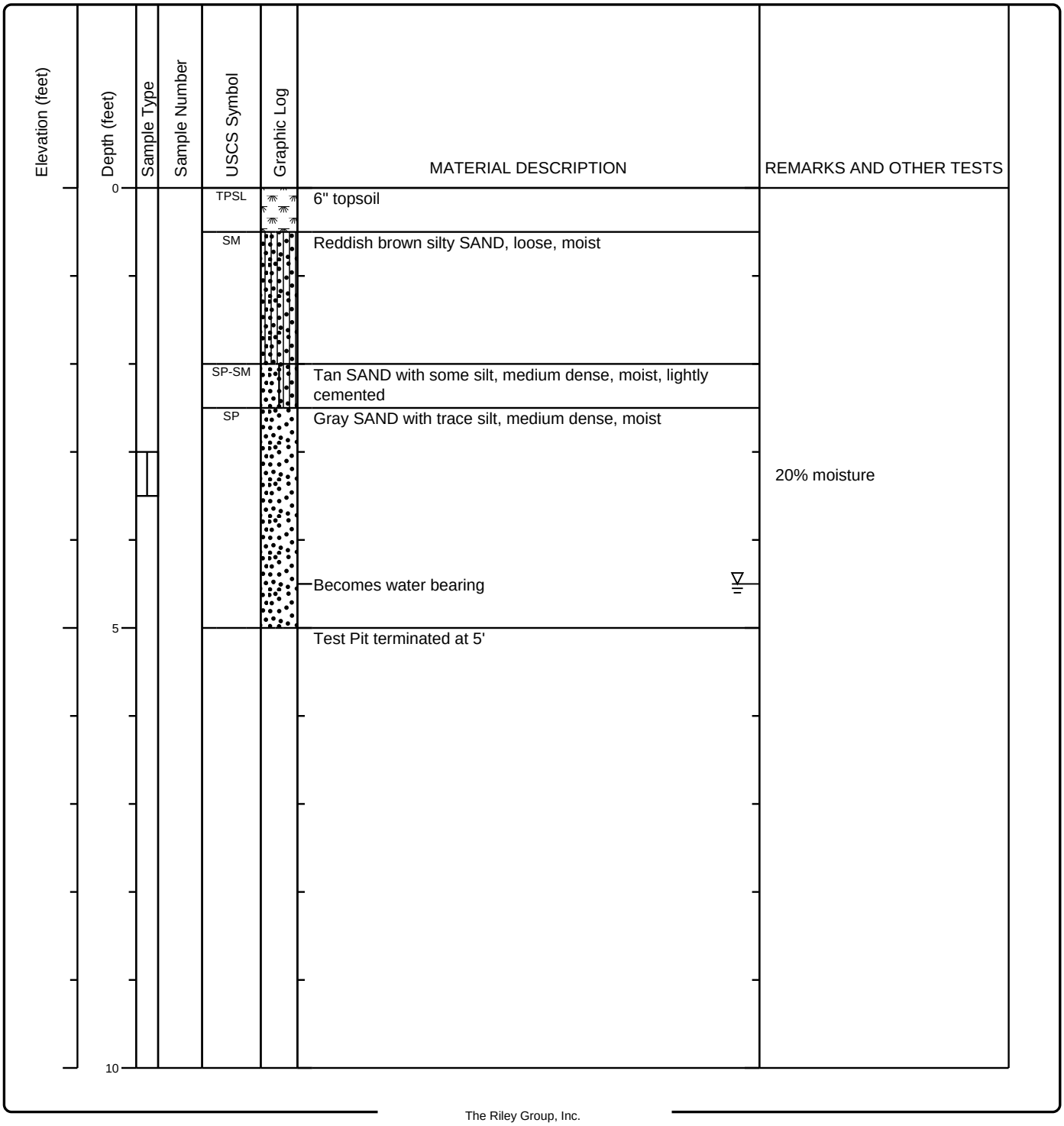
Project Name: **Smokey Point #4** Project Number: **2022-322-1** Client: **163 Business Park LLC**	RILEYGROUP Test Pit No.: TP-4 **Sheet 1 of 1**

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **4.5'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	



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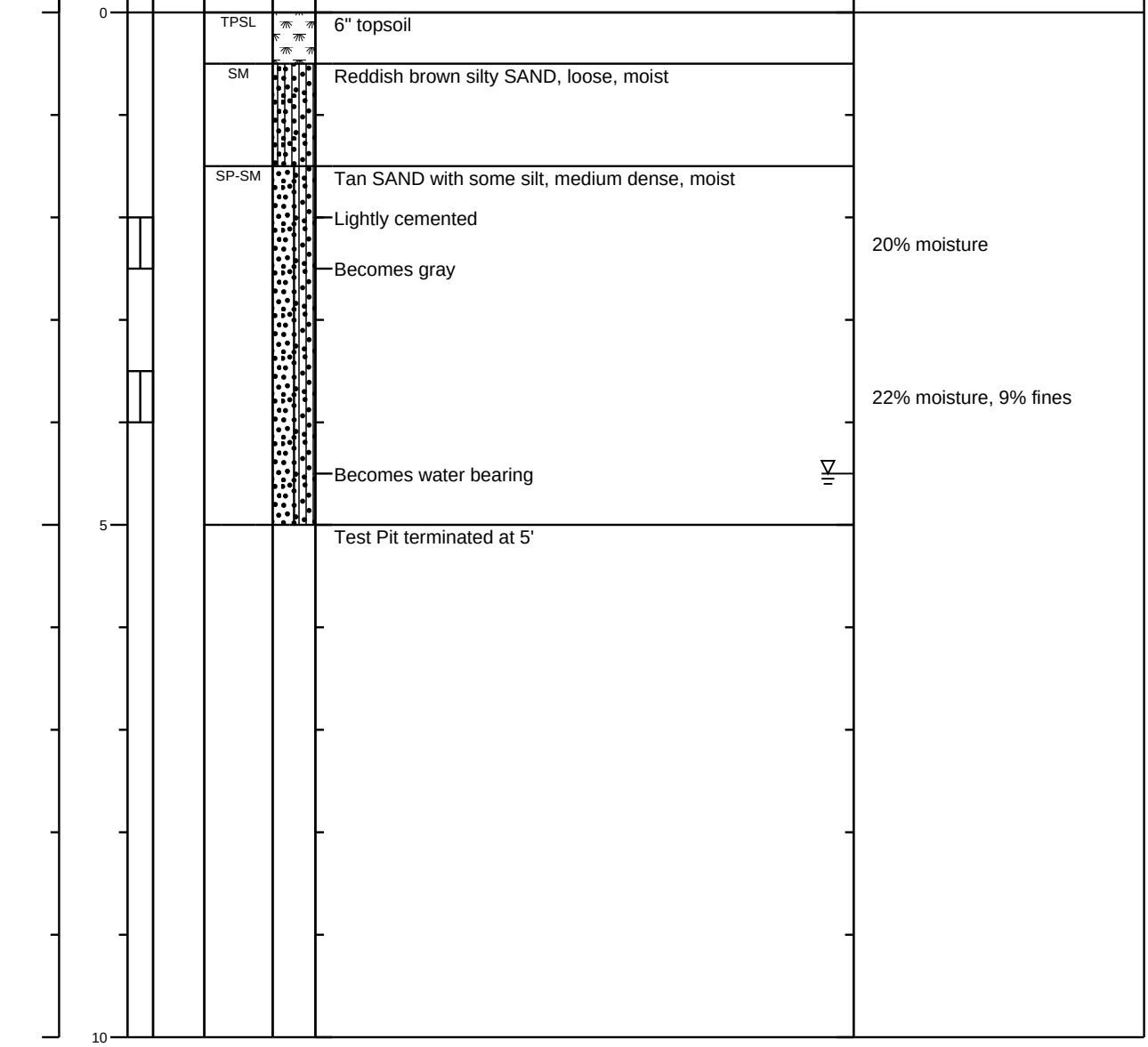
Project Name: **Smokey Point #4** Project Number: **2022-322-1** Client: **163 Business Park LLC**	RILEYGROUP Test Pit No.: TP-5 **Sheet 1 of 1**

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **4.5'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	



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Project Name: **Smokey Point #4**
Project Number: **2022-322-1**
Client: **163 Business Park LLC**

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Test Pit No.: TP-6

Sheet 1 of 1

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **6 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **4'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TPSL		8" topsoil	
				SP-SM		Brown SAND with some silt, loose, moist	
				SP		Gray SAND with trace silt, medium dense, moist	
							19% moisture
						Becomes water bearing ▽	
	5						24% moisture
						Test Pit terminated at 6'	
	10						

Project Name: **Smokey Point #4**
Project Number: **2022-322-1**
Client: **163 Business Park LLC**

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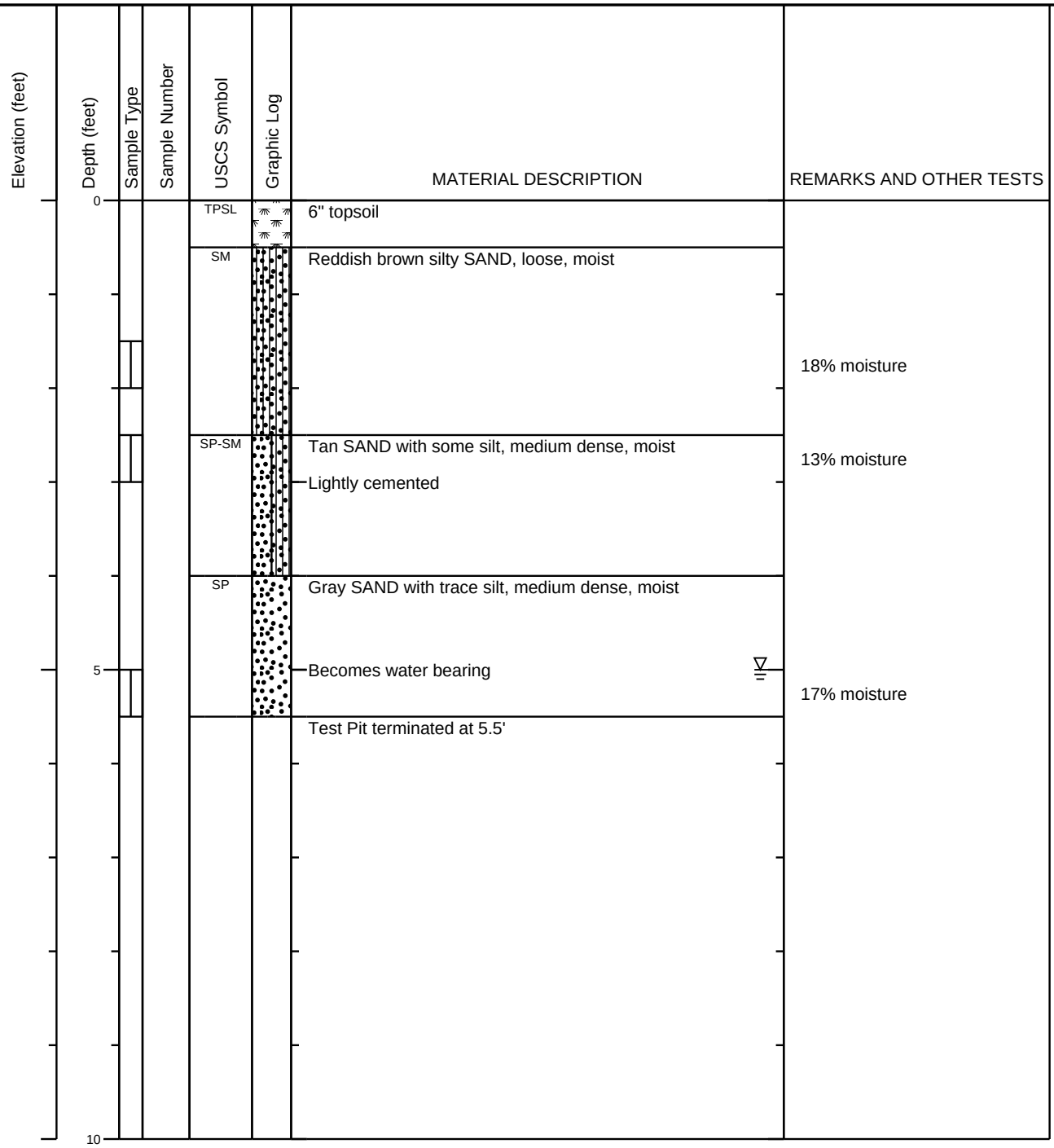
Test Pit No.: TP-7

Sheet 1 of 1

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **5.5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **5'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	



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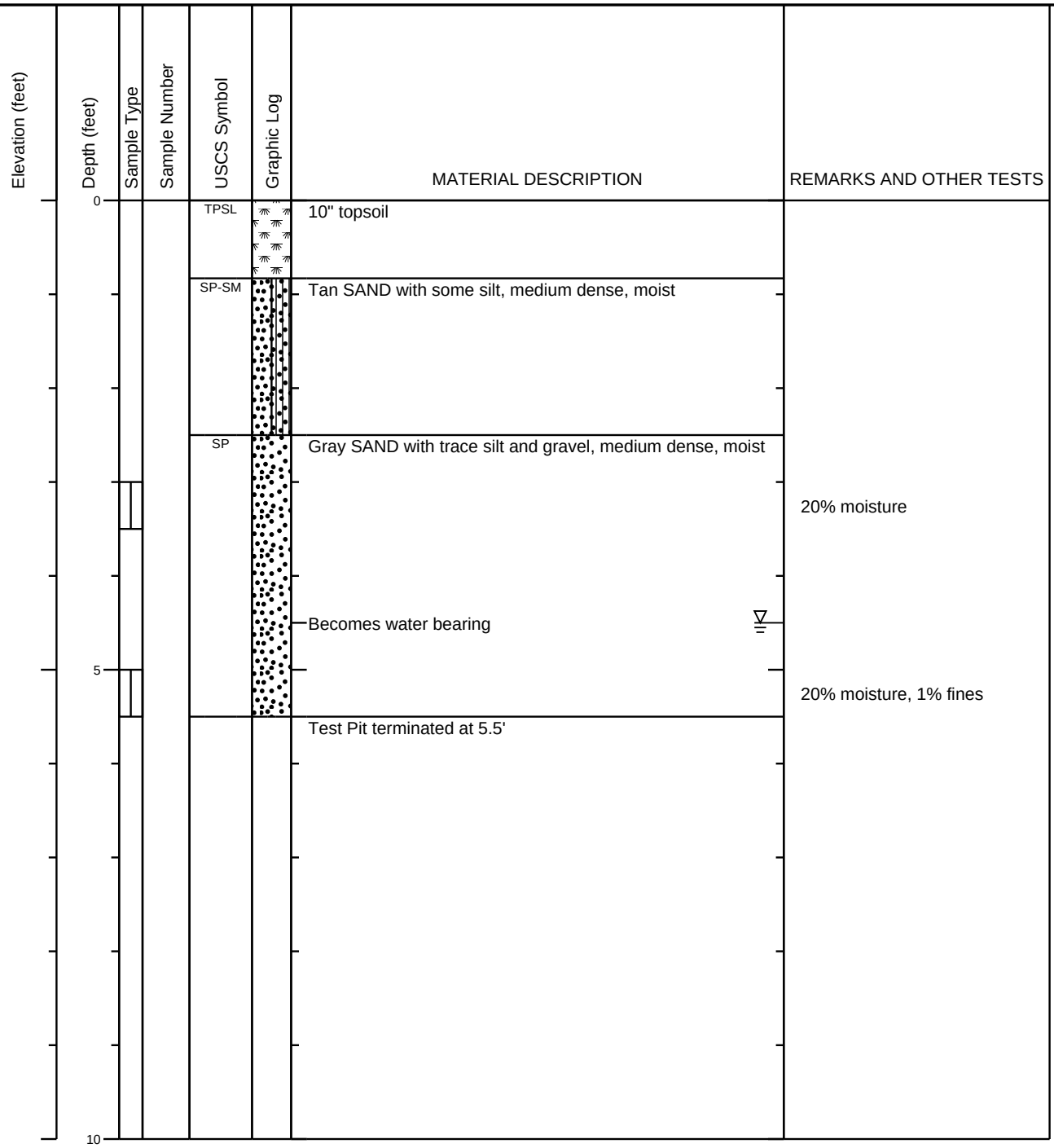
Project Name: **Smokey Point #4** Project Number: **2022-322-1** Client: **163 Business Park LLC**	Test Pit No.: TP-8 **Sheet 1 of 1**

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **5.5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **4.5'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	



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Project Name: **Smokey Point #4**
Project Number: **2022-322-1**
Client: **163 Business Park LLC**

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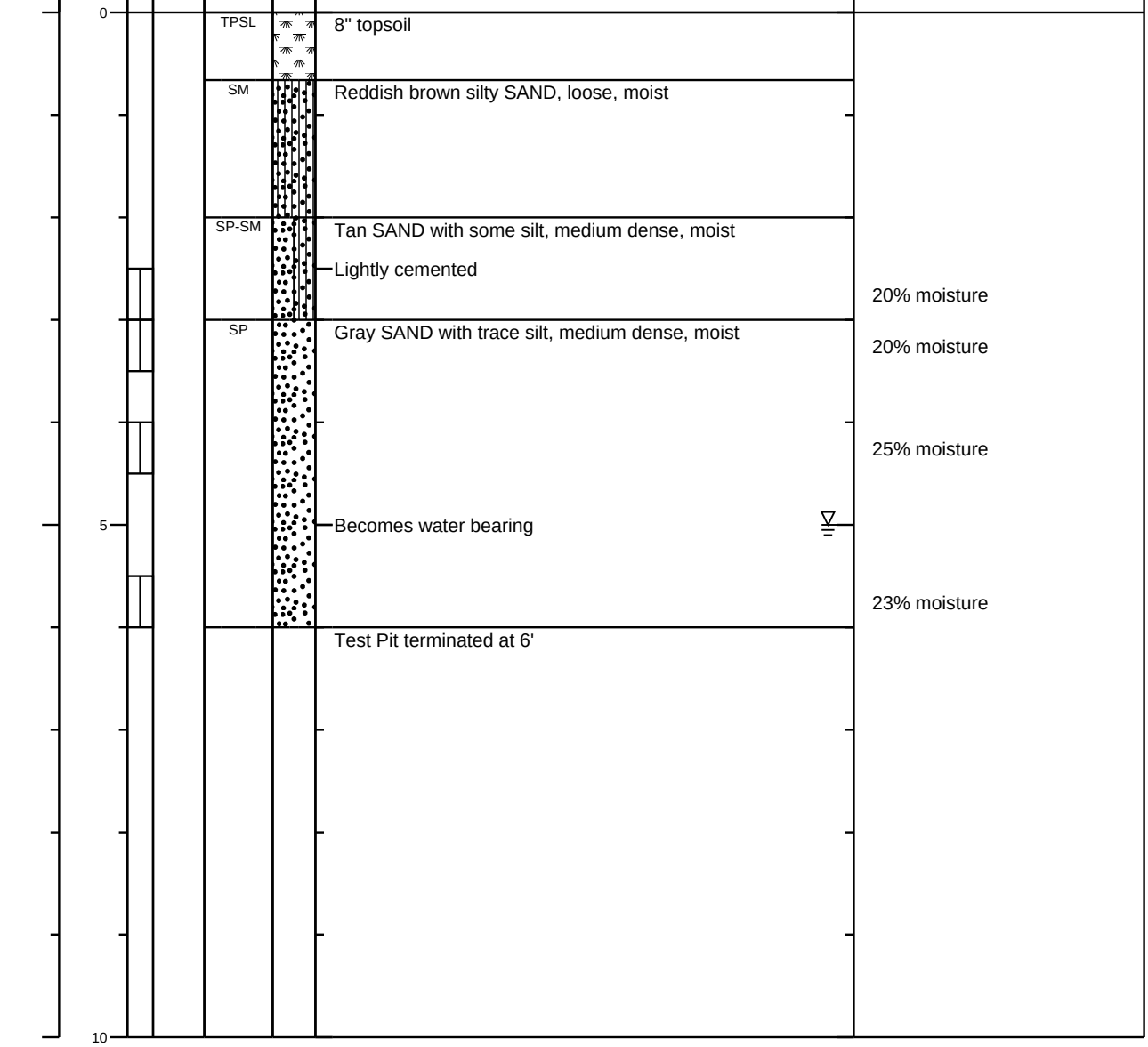
Test Pit No.: TP-9

Sheet 1 of 1

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **6 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **5'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	



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Project Name: **Smokey Point #4** Project Number: **2022-322-1** Client: **163 Business Park LLC**	RILEYGROUP Test Pit No.: TP-10 **Sheet 1 of 1**

Date(s) Excavated: **6/28/2022**	Logged By **ELW**	Surface Conditions: **Mixed Brush**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **5 feet bgs**
Excavator Type: **Mini Excavator**	Excavating Contractor: **Kelly's Excavating**	Approximate Surface Elevation **N/A**
Groundwater Level: **4'**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **163XX Smokey Point Boulevard, Marysville, Washington**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			TPSL		8" topsoil	
				SM		Gray to brown silty SAND, loose, moist	
				SP-SM		Tan SAND with some silt, medium dense, moist	26% moisture
				SP		Gray SAND with trace silt, medium dense, moist Becomes water bearing ▽	23% moisture
	5					Test Pit terminated at 5'	
	10						

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Project Name: **Smokey Point #4**
Project Number: **2022-322-1**
Client: **163 Business Park LLC**

Key to Logs

Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1. Elevation (feet): Elevation (MSL, feet).
2. Depth (feet): Depth in feet below the ground surface.
3. Sample Type: Type of soil sample collected at the depth interval shown.
4. Sample Number: Sample identification number.
5. USCS Symbol: USCS symbol of the subsurface material.
6. Graphic Log: Graphic depiction of the subsurface material encountered.
7. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8. REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Silty SAND (SM)
Poorly graded SAND (SP)
Poorly graded SAND with Silt (SP-SM)
Topsoil

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Smokey Point #4		**SAMPLE ID/TYPE**	TP-1	
PROJECT NO.	2022-322-1		**SAMPLE DEPTH**	5.5 feet	
TECH/TEST DATE	CM	6/29/2022	**DATE RECEIVED**	6/28/2022	

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	821.7
Wt Dry Soil & Tare (gm)	(w2)	709.9
Weight of Tare (gm)	(w3)	133.5
Weight of Water (gm)	(w4=w1-w2)	111.8
Weight of Dry Soil (gm)	(w5=w2-w3)	576.4
Moisture Content (%)	(w4/w5)*100	19

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

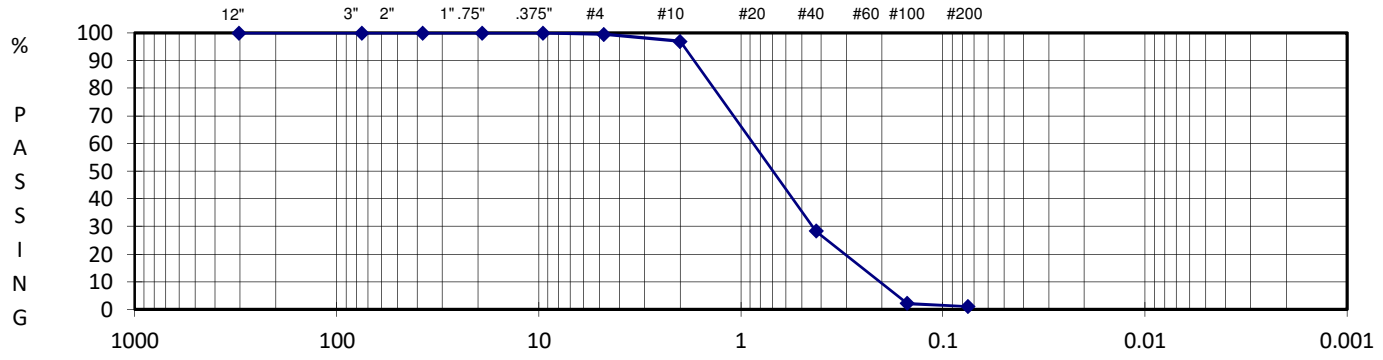
Weight Of Sample (gm)		709.9
Tare Weight (gm)		133.5
(W6) Total Dry Weight (gm)		576.4

% COBBLES	**0.0**
% C GRAVEL	**0.0**
% F GRAVEL	**0.5**
% C SAND	**2.6**
% M SAND	**68.6**
% F SAND	**27.3**
% FINES	**1.1**
% TOTAL	**100.0**

D10 (mm)	0.2
D30 (mm)	0.44
D60 (mm)	0.88
Cu	4.4
Cc	1.1

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	133.5	0.00	0.00	100.00	cobbles
3.0"	133.5	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	133.5	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	133.5	0.00	0.00	100.00	fine gravel
0.50"					fine gravel
0.375"	133.5	0.00	0.00	100.00	fine gravel
#4	136.6	3.10	0.54	99.46	coarse sand
#10	151.3	17.80	3.09	96.91	medium sand
#20					medium sand
#40	546.5	413.00	71.65	28.35	fine sand
#60					fine sand
#100	697.3	563.80	97.81	2.19	fine sand
#200	703.7	570.20	98.92	1.08	fines
PAN	709.9	576.40	100.00	0.00	silt/clay



DESCRIPTION	SAND with trace silt
USCS	SP

Prepared For:
163 Business Park LLC

Reviewed By:
ELW

RILEYGROUP

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Bothell, WA 98011

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FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Smokey Point #4		**SAMPLE ID/TYPE**	TP-2	
PROJECT NO.	2022-322-1		**SAMPLE DEPTH**	3 feet	
TECH/TEST DATE	CM	6/29/2022	**DATE RECEIVED**	6/28/2022	

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	518.8
Wt Dry Soil & Tare (gm)	(w2)	469.7
Weight of Tare (gm)	(w3)	134.0
Weight of Water (gm)	(w4=w1-w2)	49.1
Weight of Dry Soil (gm)	(w5=w2-w3)	335.7
Moisture Content (%)	(w4/w5)*100	15

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

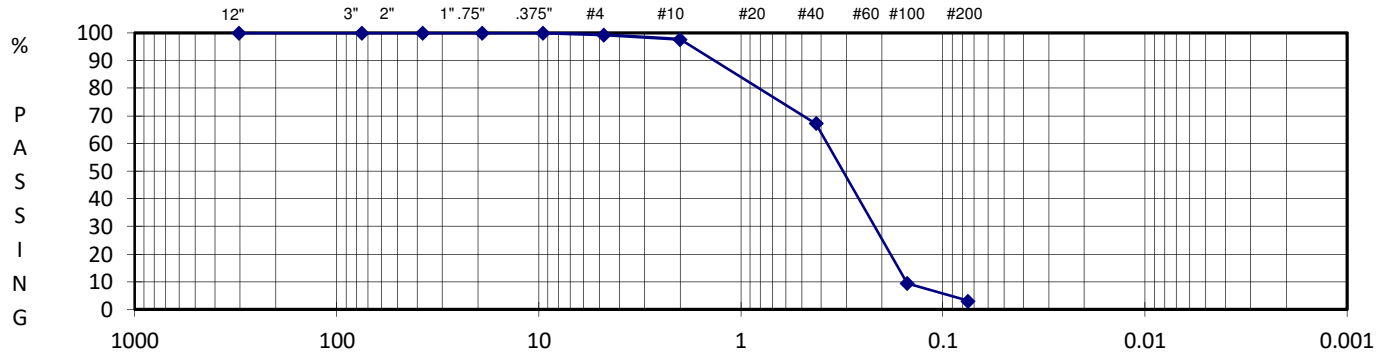
Weight Of Sample (gm)		469.7
Tare Weight (gm)		134.0
(W6) Total Dry Weight (gm)		335.7

% COBBLES	**0.0**
% C GRAVEL	**0.0**
% F GRAVEL	**0.8**
% C SAND	**1.6**
% M SAND	**30.5**
% F SAND	**64.1**
% FINES	**3.0**
% TOTAL	**100.0**

D10 (mm)	0.17
D30 (mm)	0.22
D60 (mm)	0.38
Cu	2.2
Cc	0.7

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	134.0	0.00	0.00	100.00	cobbles
3.0"	134.0	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	134.0	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	134.0	0.00	0.00	100.00	fine gravel
0.50"					fine gravel
0.375"	134.0	0.00	0.00	100.00	fine gravel
#4	136.7	2.70	0.80	99.20	coarse sand
#10	142.0	8.00	2.38	97.62	medium sand
#20					medium sand
#40	244.3	110.30	32.86	67.14	fine sand
#60					fine sand
#100	438.3	304.30	90.65	9.35	fine sand
#200	459.6	325.60	96.99	3.01	fines
PAN	469.7	335.70	100.00	0.00	silt/clay



DESCRIPTION	SAND with trace silt
USCS	SP

Prepared For:
163 Business Park LLC

Reviewed By:
ELW

RILEYGROUP

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Smokey Point #4		**SAMPLE ID/TYPE**	TP-5	
PROJECT NO.	2022-322-1		**SAMPLE DEPTH**	3.5 feet	
TECH/TEST DATE	CM	6/29/2022	**DATE RECEIVED**	6/28/2022	

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	530.7
Wt Dry Soil & Tare (gm)	(w2)	457.9
Weight of Tare (gm)	(w3)	133.5
Weight of Water (gm)	(w4=w1-w2)	72.8
Weight of Dry Soil (gm)	(w5=w2-w3)	324.4
Moisture Content (%)	(w4/w5)*100	22

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

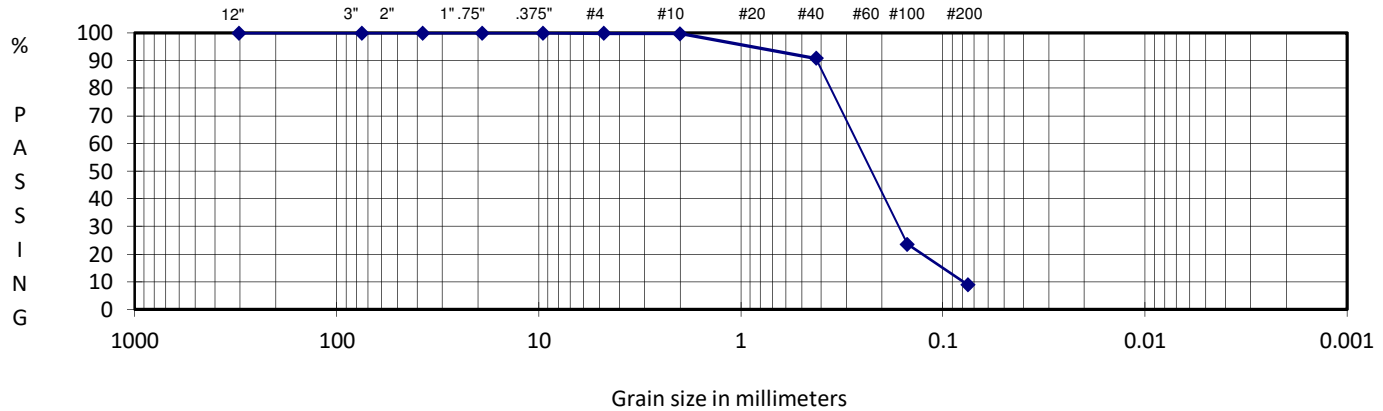
Weight Of Sample (gm)		457.9
Tare Weight (gm)		133.5
(W6) Total Dry Weight (gm)		324.4

% COBBLES	**0.0**
% C GRAVEL	**0.0**
% F GRAVEL	**0.2**
% C SAND	**0.2**
% M SAND	**8.8**
% F SAND	**82.0**
% FINES	**8.8**
% TOTAL	**100.0**

D10 (mm)	0.079
D30 (mm)	0.18
D60 (mm)	0.27
Cu	3.4
Cc	1.5

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	133.5	0.00	0.00	100.00	cobbles
3.0"	133.5	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	133.5	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	133.5	0.00	0.00	100.00	fine gravel
0.50"					fine gravel
0.375"	133.5	0.00	0.00	100.00	fine gravel
#4	134.0	0.50	0.15	99.85	coarse sand
#10	134.6	1.10	0.34	99.66	medium sand
#20					medium sand
#40	163.2	29.70	9.16	90.84	fine sand
#60					fine sand
#100	381.5	248.00	76.45	23.55	fine sand
#200	429.3	295.80	91.18	8.82	fines
PAN	457.9	324.40	100.00	0.00	silt/clay



DESCRIPTION	SAND with some silt
USCS	SP-SM

Prepared For:
163 Business Park LLC

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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Smokey Point #4		**SAMPLE ID/TYPE**	TP-8	
PROJECT NO.	2022-322-1		**SAMPLE DEPTH**	5 feet	
TECH/TEST DATE	CM	6/29/2022	**DATE RECEIVED**	6/28/2022	

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	998.8
Wt Dry Soil & Tare (gm)	(w2)	855.9
Weight of Tare (gm)	(w3)	134.2
Weight of Water (gm)	(w4=w1-w2)	142.9
Weight of Dry Soil (gm)	(w5=w2-w3)	721.7
Moisture Content (%)	(w4/w5)*100	20

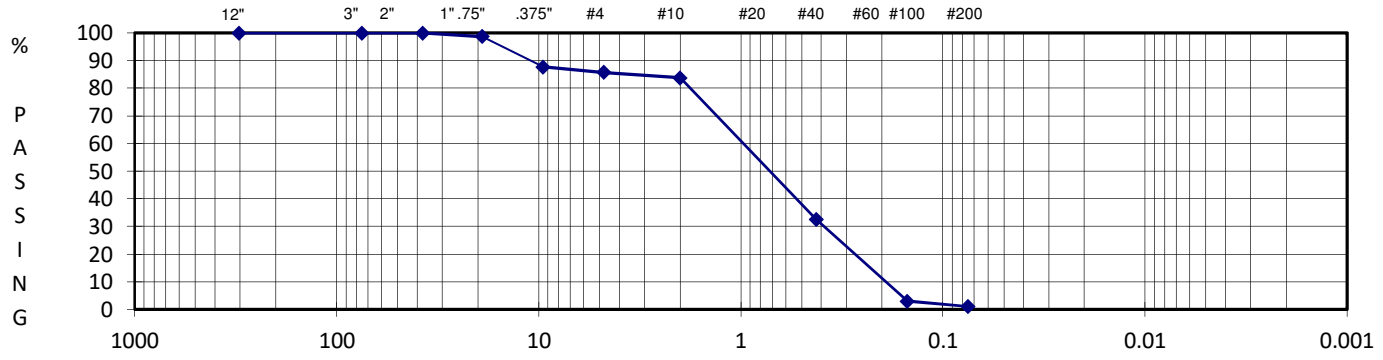
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

Weight Of Sample (gm)		855.9
Tare Weight (gm)		134.2
(W6) Total Dry Weight (gm)		721.7

% COBBLES	**0.0**
% C GRAVEL	**1.3**
% F GRAVEL	**13.0**
% C SAND	**2.0**
% M SAND	**51.2**
% F SAND	**31.5**
% FINES	**1.1**
% TOTAL	**100.0**
D10 (mm)	0.19
D30 (mm)	0.49
D60 (mm)	1
Cu	5.3
Cc	1.3

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	134.2	0.00	0.00	100.00	cobbles
3.0"	134.2	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	134.2	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	143.4	9.20	1.27	98.73	fine gravel
0.50"					fine gravel
0.375"	223.2	89.00	12.33	87.67	fine gravel
#4	237.1	102.90	14.26	85.74	coarse sand
#10	251.6	117.40	16.27	83.73	medium sand
#20					medium sand
#40	620.8	486.60	67.42	32.58	fine sand
#60					fine sand
#100	835.0	700.80	97.10	2.90	fine sand
#200	848.3	714.10	98.95	1.05	fines
PAN	855.9	721.70	100.00	0.00	silt/clay



DESCRIPTION	SAND with trace gravel and silt
USCS	SP

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163 Business Park LLC

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