GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

THE RILEY GROUP, INC.
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PREPARED FOR:

DV INVESTMENTS LLC
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RGI PROJECT NO. 2022-291-2

POORTINGA PROPERTY
3505 188TH STREET NORTHEAST
ARLINGTON, WASHINGTON

OCTOBER 4, 2022

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RILEYGROUP

October 4, 2022

Spencer Esau
DV Investments LLC
3426 West Lake Sammamish Parkway Northeast
Redmond, Washington 98052

Subject: **Geotechnical Engineering Report**
Poortinga Property
3505 188th Street Northeast
Arlington, Washington
RGI Project No. 2022-291-2

Dear Spencer Esau:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the Poortinga Property located at 3505 188th Street Northeast, Arlington, Washington. Our services were completed in accordance with our proposal dated May 9, 2022 and authorized by Raja Venugopal on July 6, 2022. The information in this GER is based on our understanding of the proposed construction, and the soil and groundwater conditions encountered in the Borings and test pits completed by RGI at the site on July 13, 2022 and August 2, 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 GER 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 GER.

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

Respectfully submitted,

THE RILEY GROUP, INC.

State of Washington 2698 Licensed Geologist
10/4/2022
ERIC L. WOODS

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TABLE OF CONTENTS

LIST OF FIGURES AND APPENDICES

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 GER 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 three borings and ten test pits to approximate depths of 7 to 51.5 feet below existing site grades.

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 include loose to medium dense silty sand with some gravel over medium dense deposits of sand with trace to some silt and gravel, gravelly sand, and sandy gravel. The sand deposits became dense at a depth of 50 feet in Boring B-1.

Groundwater: A groundwater table was encountered at depths of 26 to 35 feet in Borings B-1 and B-2 during our subsurface exploration.

Foundations: Foundations for the proposed building may be supported on conventional spread footings bearing on medium dense native soil or structural fill.

Slab-on-grade: Slab-on-grade floors and slabs for the proposed building can be supported on medium dense native soil or structural fill.

Pavements: The following pavement sections are recommended:

- **For asphalt areas**: 3 inches of Hot Mix Asphalt (HMA) over 6 inches of crushed rock base (CRB) or 3 inches of HMA over 4 inches of ATB
- **For concrete pavement areas**: 6 inches of concrete over 4 inches of CRB

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the Poortinga Property in Arlington, Washington. The purpose of this evaluation is to assess subsurface conditions and provide geotechnical recommendations for the construction of a business park. Our scope of services included field explorations, laboratory testing, engineering analyses, and preparation of this GER.

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, RGI 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 project site is located at 3505 188th Street Northeast in Arlington, Washington. The approximate location of the site is shown on Figure 1.

The site is currently occupied by a single-family residence, a barn, and several outbuildings, all located in the southern portion of the property. The remainder of the property is undeveloped.

RGI understands the southern portion of the property will be developed with a business park. Stormwater is expected to be infiltrated underlying the paved parking and drive aisles.

The existing residence is to remain. The remainder of the site including the slope and buffer and the northern parcel will remain undeveloped.

At the time of preparing this GER, building plans were not available for our review. Based on our experience with similar project, RGI expects the buildings well be dock high warehouse type buildings with a slab-on- grade floor. We expect that the proposed buildings will be supported on perimeter walls with bearing loads of eight to ten kips per linear foot, and a series of columns with a maximum load up to 300 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 July 13, 2022, RGI observed the drilling of three borings and August 2, 2022 excavation ten test pits. The approximate exploration locations are shown on Figure 2.

Field logs of each exploration were prepared by the geotechnical engineer or geologist that continuously observed the excavation ordrilling. These logs included visual classifications of the materials encountered during excavation or drilling as well as our interpretation of the subsurface conditions between samples. The boring and 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 exploration, 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 borings and 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 subject site is comprised of three parcels of land totaling approximately 39.47 acres in size. The site is bound to the west by a residential property and undeveloped forest and pasture, to the north by a residential property, to the east by single-family residences and undeveloped forest and pasture, and to the south by 188th Street Northeast.

A single-family residence, barn, and several outbuildings are located in the southern parcel, with a gravel access road extending north along the western property line from 188th Street Northeast.

Site topography is comprised of an upper and lower bench area separated by a north-facing slope. Total elevation change across the site is approximately 84 feet. The upper southern bench area slopes slightly north with about 7 feet of elevation change over about 800 feet.

The central north-facing slope descends approximately 76 feet in elevation at gradients of 50 to 100 percent in the upper slope, decreasing to about 20 to 30 percent on the lower slope. A groundwater seepage zone is located at the toe of the steeper slope.

The lower northern bench is relatively level with less than 2 feet of elevation change over a horizontal distance of 1500 feet. The site is vegetated with grass and medium- to large-diameter cedar and fir trees, with blackberries, ferns, and mixed brush with small- to large-diameter trees on the slope area.

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 southern portion of the site is mapped as Marysville Sand Member (Map Unit Qvrm), which is stratified to massive outwash sand with some gravel and localized silt and clay, deposited by meltwater streams issuing from the retreating Vashon glacier. These descriptions are generally similar to the findings in our field explorations. The soil in the northern portion of the site is mapped as Younger Alluvium (Qyal), which is stratified sand and gravel with silt and clay flood-plain sediment deposited by local rivers and streams.

4.3 SOILS

The soils encountered during field exploration include loose to medium dense silty sand with some gravel over medium dense deposits of sand with trace to some silt and gravel, gravelly sand, and sandy gravel. The sand deposits became dense at a depth of 50 feet in Boring B-1.

More detailed descriptions of the subsurface conditions encountered are presented in the Boring and test pit logs included in Appendix A. Sieve analysis was performed on six selected soil samples. Grain size distribution curves are included in Appendix A.

4.4 GROUNDWATER

A groundwater table was encountered at depths of 26 to 35 feet in Borings B-1 and B-2 during our subsurface exploration. Groundwater was observed seeping from the slope face at the toe of the steeper areas of slope, with surface water flowing down the lower slope to the level bench area in the northern portion of the site.

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. Groundwater level fluctuations should be considered when developing the design and construction plans for the project.

We expect that winter groundwater monitoring will be necessary at the site for the proposed infiltration facilities.

4.5 SEISMIC CONSIDERATIONS

Based on the International Building Code (IBC), RGI recommends the follow seismic parameters for design.

Table 1 IBC

Parameter	2018 Value
Site Soil Class[1]	D[2]
Site Latitude	48.1699
Site Longitude	-122.1815
Short Period Spectral Response Acceleration, S_S (g)	1.063
1-Second Period Spectral Response Acceleration, S_1 (g)	0.379
Adjusted Short Period Spectral Response Acceleration, S_{MS} (g)	1.142
Adjusted 1-Sec Period Spectral Response Acceleration, S_{M1} (g)	0.729
Numeric seismic design value at 0.2 second; S_{DS}(g)	0.761
Numeric seismic design value at 1.0 second; S_{D1}(g)	0.486

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: ASCE 7-16 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. Borings and test pits extended to a maximum depth of 51.5 feet, and this seismic site class definition considers that very dense 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. Since the southern portion of the site is underlain by generally medium dense sand deposits, RGI considers that the possibility of liquefaction during an earthquake is low. Review of the *Liquefaction Susceptibility Map of Snohomish County, Washington* by Stephan P. Palmer, etc., (2004) indicates the soils in the southern portion of the site are mapped as having a low to moderate liquefaction susceptibility during a seismic event. The soils in the northern portion of the site are mapped as having a high liquefaction susceptibility during a seismic event. No development is planned for the northern portion of the site.

4.6 GEOLOGIC HAZARD AREAS

Regulated geologically hazardous areas include erosion, landslide, earthquake, wetland, or other geological hazards. Based on the Arlington Municipal Code, portions of the site meet the criteria of a Landslide Hazard Area.

4.6.1 LANDSLIDE HAZARD AREAS

The slope in the central portion of the site meets the criteria of a Landslide Hazard Area due to groundwater seepage on the slope face and having a slope of 33 percent or greater.

The steep slope in the central portion of the site is about 76 feet in height and descends at gradients of about 50 to 100 percent in the upper slope, decreasing to about 20 to 30 percent on the lower slope. RGI performed a slope stability analysis by using a computer program, Slide version 6.0, which was developed by Rocscience. The safety factor for the critical surfaces was calculated by the Bishop Method. The analyses were performed for the slopes under current static and seismic conditions. The location of the slope stability profile is shown on Figure 2.

The analysis shows stable conditions of 1.5 for static and 1.1 for seismic for the existing conditions with a 75-foot slope buffer. Based on the slope stability analysis, increasing the minimum 50-foot Landslide Hazard buffer an additional 25 feet is necessary. The 75-foot Landslide Hazard Buffer is shown on Figure 2.

An additional building setback of 15 feet for the construction of the development will be required. The buffer and setback for the proposed structure will adequately protect the hazard and will not adversely affect the stability of the slope both on and offsite.

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. Foundations for the proposed building can be supported on conventional spread footings bearing on medium dense native soil or structural fill. Slab-on-grade floors and pavements can be similarly supported.

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

Earthwork will include stripping, grading the parking and building areas, installing underground utilities, installing infiltration systems, and preparing slab and pavement subgrades.

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 one day during wet weather or one 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 pavements, vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. The test pits encountered 4 to 6 inches of topsoil and rootmass. Deeper areas of stripping may be required in forested or heavily vegetated areas 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. The site soils consist of loose to medium dense silty sand with gravel and medium dense sand with varying silt and gravel and sandy gravel.

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). 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 five 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 or soft soil will 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 moisture conditioned 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.

If fill is placed in areas of the site where existing slopes are steeper than 5:1 (Horizontal:Vertical), the area should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be wide enough to accommodate compaction and earth moving equipment, and to allow placement of horizontal lifts of fill.

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 that which would be expected during the drier summer and fall months.

5.2.5 STRUCTURAL FILL

Once stripping, clearing and other preparing operations are complete, cuts and fills can be made to establish desired building grades. Prior to placing fill, RGI recommends proof-rolling as described above.

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.

The suitability of excavated site soils and import 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 U.S. 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 that results in the greatest compacted dry density with a specified compactive effort.

Non-organic site soils are only considered suitable for structural fill provided that their moisture content is within about two percent of the optimum moisture level as determined by ASTM D1557. Excavated site soils may not be suitable for re-use as structural fill depending on the moisture content and weather conditions at the time of construction. If soils are stockpiled for future reuse and wet weather is anticipated, the stockpile should be protected with plastic sheeting that is securely anchored.

Even during dry weather, moisture conditioning (such as, windrowing and drying) of site soils to be reused as structural fill may be required. Even during the summer, delays in grading can occur due to excessively high moisture conditions of the soils or due to precipitation. If wet weather occurs, the upper wetted portion of the site soils may need to be scarified and allowed to dry prior to further earthwork, or may need to be wasted from the site.

If on-site soils are or become unusable, it may become necessary to import clean, granular soils to complete site work that meet the grading requirements listed in Table 2 to be used as structural fill.

Table 2 Structural Fill Gradation

U.S. Sieve Size	Percent Passing
4 inches	100
No. 4 sieve	22 to 100
No. 200 sieve	0 to 5*

*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 soils 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 building foundation can be supported on conventional spread footings bearing on medium dense native soil or structural fill. Loose, organic, or other unsuitable soils may be encountered in the proposed building footprint. If unsuitable soils are encountered, they should be overexcavated and backfilled with structural fill. If loose soils are encountered, they should be moisture conditioned and compacted to the requirements of structural fill.

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	2,500 psf[1]
Friction Coefficient	0.30
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 in the building area, RGI recommends cast-in-place concrete walls be used. 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 in Figure 3.

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

Table 5 Retaining Wall Design

Design Parameter	Value
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 in psf 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, suitable support for slab-on-grade construction should be provided. RGI recommends that the concrete slab be placed on top of medium dense native soil or structural fill. Immediately below the floor slab, RGI recommends placing a four-inch thick capillary break layer of clean, free-draining sand or gravel that has less than five 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-millimeter thick plastic membrane should be placed on a 4-inch thick layer of clean gravel.

For the anticipated floor slab loading, we estimate post-construction floor settlements of 1/4- to 1/2-inch. For thickness design of the slab subjected to point loading from storage racks and fork lift vehicle traffic, RGI recommends using a subgrade modulus (K_S) 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

Due to the free draining nature of the native soils, foundation drains are optional for foundations on the clean native soils. Where free draining soils are not present at foundation subgrade, foundation drains should be installed. A typical footing drain detail is shown on Figure 4. 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

RGI understands that stormwater infiltration is proposed as part of site development. One small-scale Pilot Infiltration Test (PIT) was conducted at the site. Infiltration testing was completed following the small PIT test method as presented in the 2014 Stormwater Management Manual for Western Washington (SMMWW).

Table 6 Measured Infiltration Rates

Test Location	Test Depth	Measured Rate	Design Rate
TP-2/INF-1	5	120	**54[1]**

Correction factors were applied to the measured rate per the manual:

$Ksat_{design} = Ksat_{initial} = CF_V \times CF_T \times CF_M$

CF_V = Site Variability, CF_T = Test Method and CF_M = Degree of Influent Control

$Ksat_{design} = Ksat_{initial} = 1 \times 0.5 \times 0.9 = 0.45$

INF-1: $Ksat_{design} = Ksat_{initial}$ (120) X 0.45 = 54 inches/hour

NOTE [1] RGI recommends a long-term design rate of 20 inches/hour.

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 City of Arlington specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2.5. 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 the referenced ASTM D1557. Soils excavated on site should be suitable for use as backfill material. If on-site soils are or become unusable, imported structural fill meeting the gradation provided in Table 2 should be used for trench backfill.

5.8 PAVEMENTS

Pavement subgrades should be prepared as described in Section 5.2 and as discussed below. Regardless of the relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proof-rolled with heavy construction equipment to verify this condition.

5.8.1 FLEXIBLE PAVEMENTS

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.

- 3 inches of Hot Mix Asphalt (HMA) over 6 inches of crushed rock base (CRB) or 3 inches of HMA over 4 inches of ATB

5.8.2 CONCRETE PAVEMENTS

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

- 6 inches of concrete over 4 inches of CRB

The paving materials used should conform to the WSDOT specifications for HMA, concrete paving, and CRB surfacing (9-03.9(3) Crushed Surfacing).

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.

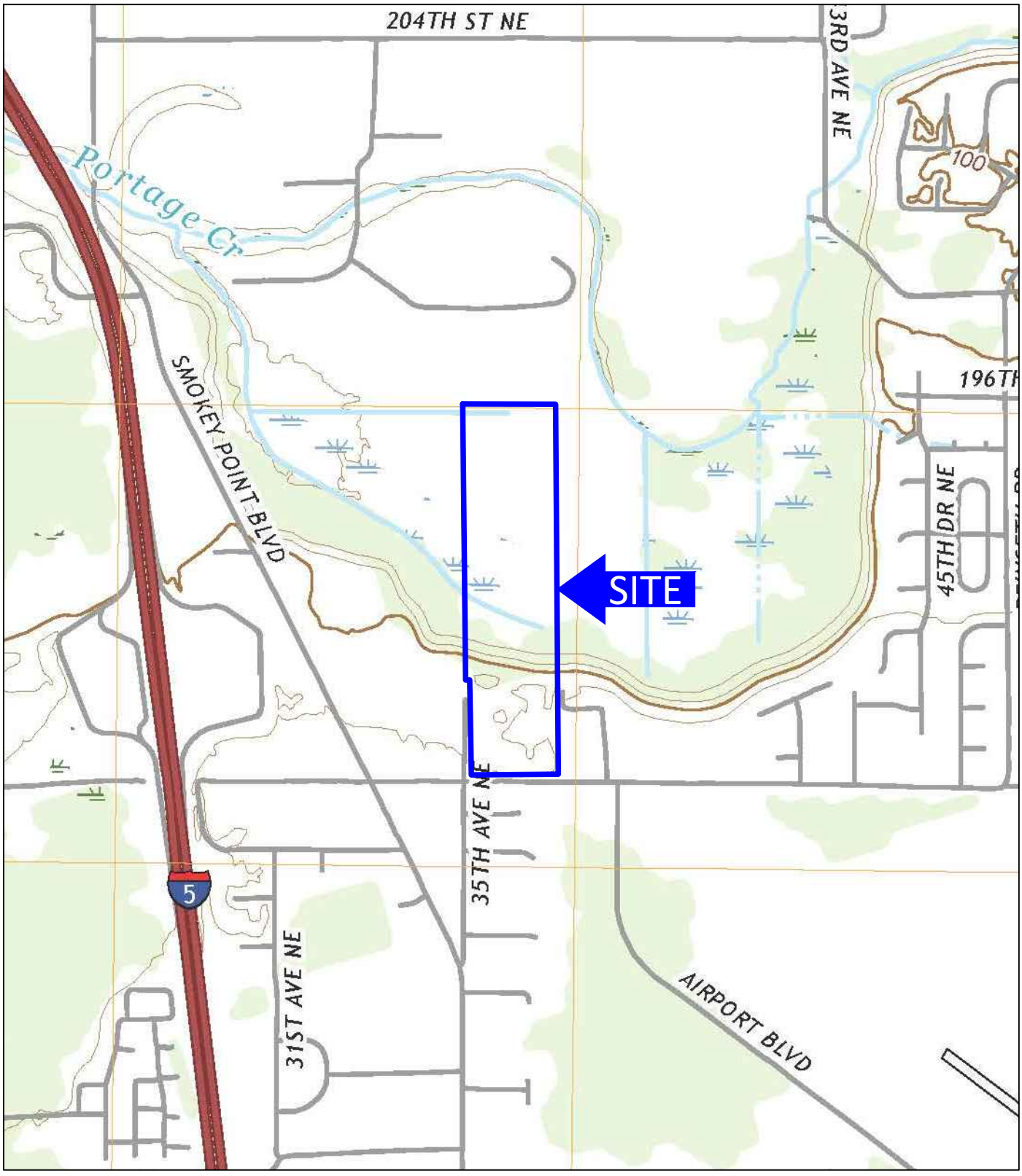
7.0 Limitations

This GER is the property of RGI, DV Investments LLC, and its designated agents. Within the limits of the scope and budget, this GER was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this GER was issued. This GER is intended for specific application to the Poortinga Property project in Arlington, Washington, and for the exclusive use of DV Investments LLC and its 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. If the owner is concerned about the potential for such contamination or pollution, we can provide a proposal for these services.

The analyses and recommendations presented in this GER 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 GER 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 GER in its entirety. The use of information contained in this GER for bidding purposes should be done at the contractor's option and risk.



USGS, 2020, Arlington, Washington
7.5-Minute Quadrangle

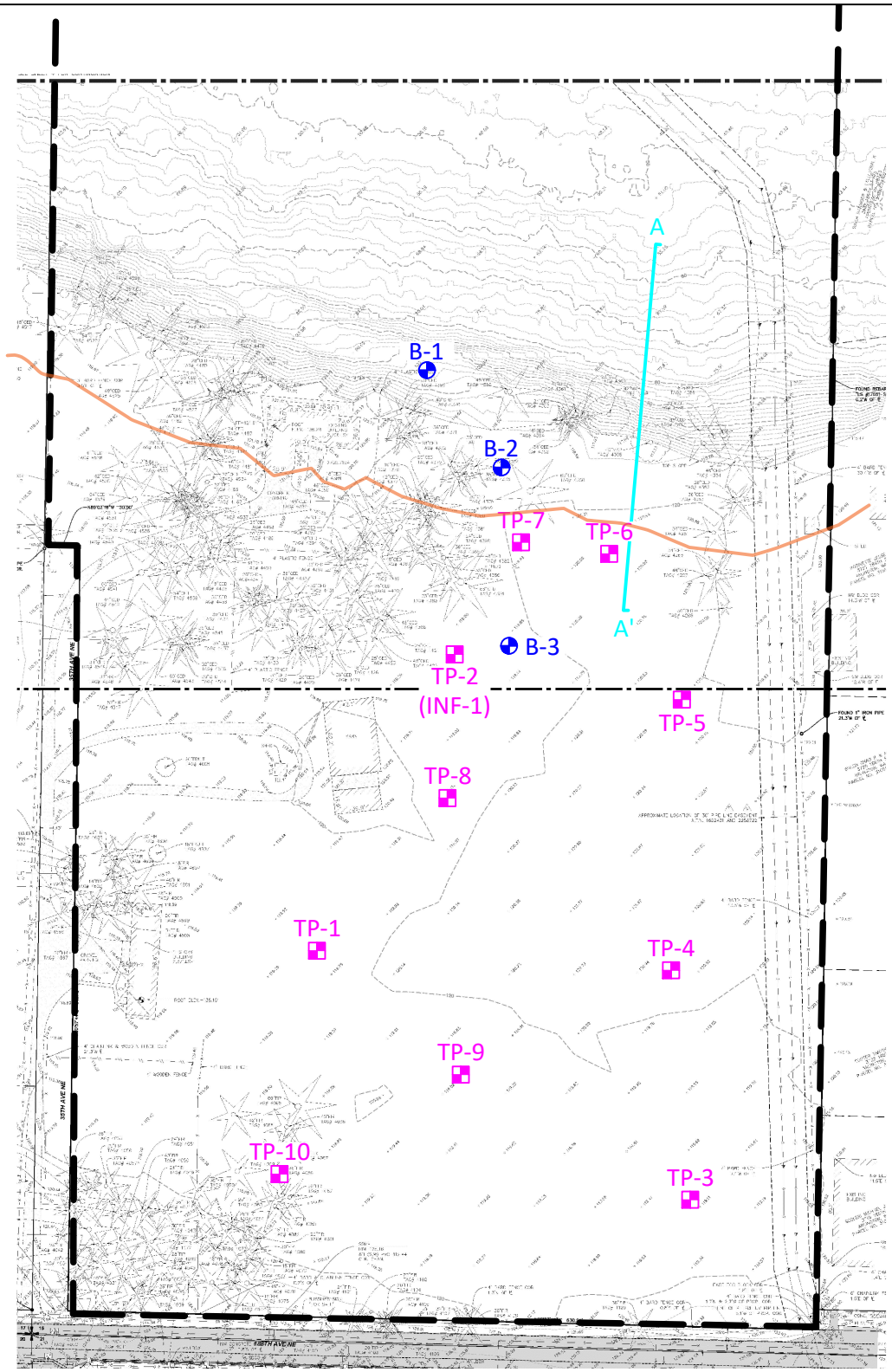
Approximate Scale: 1"=1000'

0 500 1000 2000

N

RILEYGROUP
Corporate Office
17522 Bothell Way Northeast
Bothell, Washington 98011
Phone: 425.415.0551
Fax: 425.415.0311

Poortinga Property		Figure 1
RGI Project Number: 2022-291-2	Site Vicinity Map	Date Drawn: 08/2022
Address: 3505 188th Avenue Northeast, Arlington, Washington 98223		



= Test pit by RGI, 08/02/22
= Boring by RGI, 07/13/22
= 75' Landslide Hazard buffer
= Cross section A
= Property boundary

Approximate Scale: 1"= 140'

0 70 140 280

N

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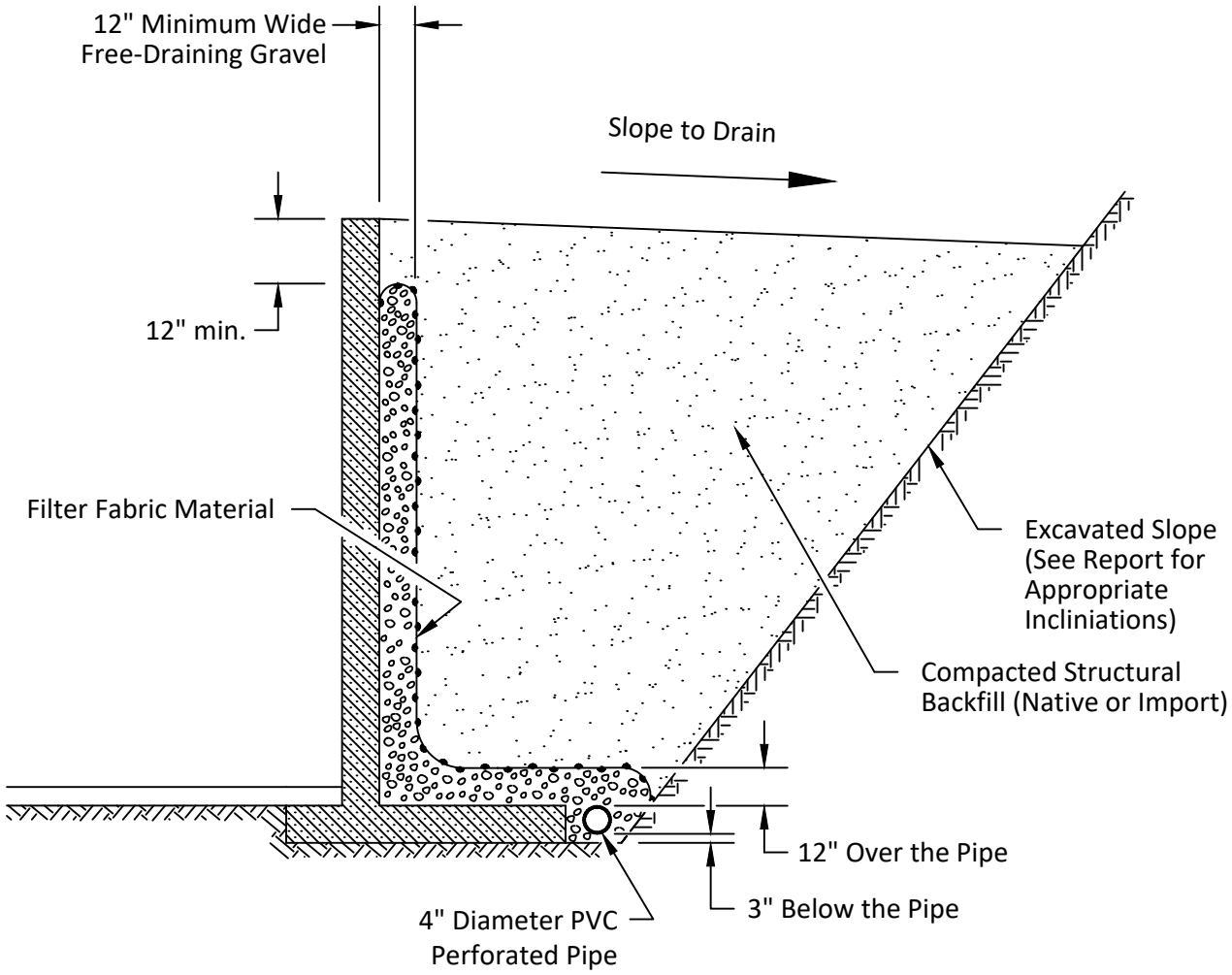
Poortinga Property		Figure 2
RGI Project Number: 2022-291-2	Geotechnical Exploration Plan	Date Drawn: 08/2022
Address: 3505 188th Avenue Northeast, Arlington, Washington 98223		



Not to Scale

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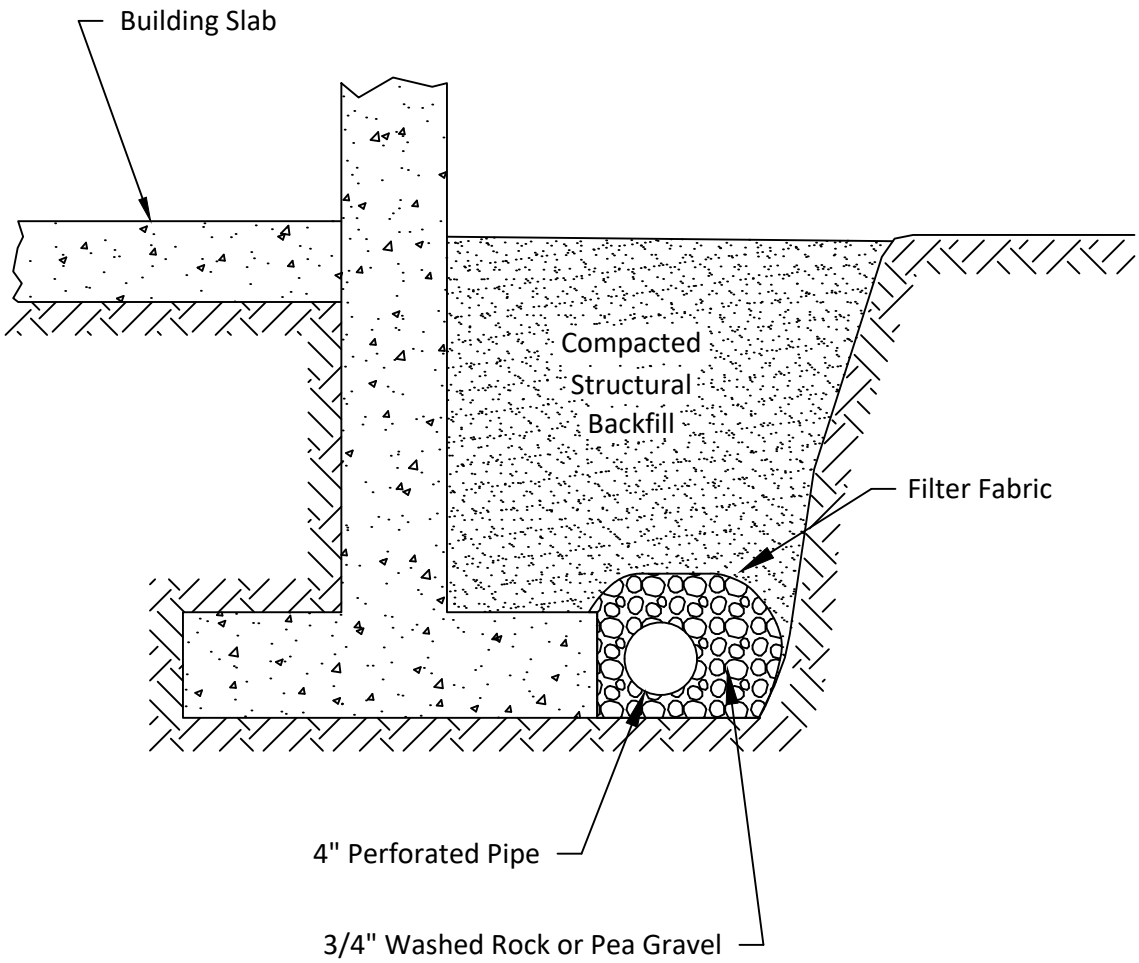
Poortinga Property		Figure 3
RGI Project Number: 2022-291-2	Retaining Wall Drainage Detail	Date Drawn: 08/2022
Address: 3505 188th Avenue Northeast, Arlington, Washington 98223		



Not to Scale

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Fax: 425.415.0311

Poortinga Property		Figure 4
RGI Project Number: 2022-291-2	Typical Footing Drain Detail	Date Drawn: 08/2022
Address: 3505 188th Avenue Northeast, Arlington, Washington 98223		

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

On July 13, 2022 and August 2, 2022, RGI performed field explorations using a tracked drill rig and tracked excavator. We explored subsurface soil conditions at the site by observing the excavation/drilling of three borings and ten test pits to a maximum depth of 51.5 feet below existing grade. The boring and test pit locations are shown on Figure 2. The boring and 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).

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, plasticity, and the limited laboratory testing described below.

Moisture Content Determinations

Moisture content determinations were performed in accordance with ASTM 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 boring and 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 was determined using D6913-04(2009) Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis (ASTM D6913) on six of the samples.

Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

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Boring No.: B-1
Sheet 1 of 2

Date(s) Drilled: **7/13/2022**	Logged By: **ELW**	Surface Conditions: **Blackberries**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **6" auger**	Total Depth of Borehole: **51.5 feet bgs**
Drill Rig Type: **Track Rig**	Drilling Contractor: **Bortec**	Approximate Surface Elevation: **105**
Groundwater Level: **26 feet**	Sampling Method(s): **SPT**	Hammer Data : **140 lb, 30" drop, rope and cathead**
Borehole Backfill: **Bentonite Chips**	Location: **3505 188th Street Northeast, Arlington, Washington**	

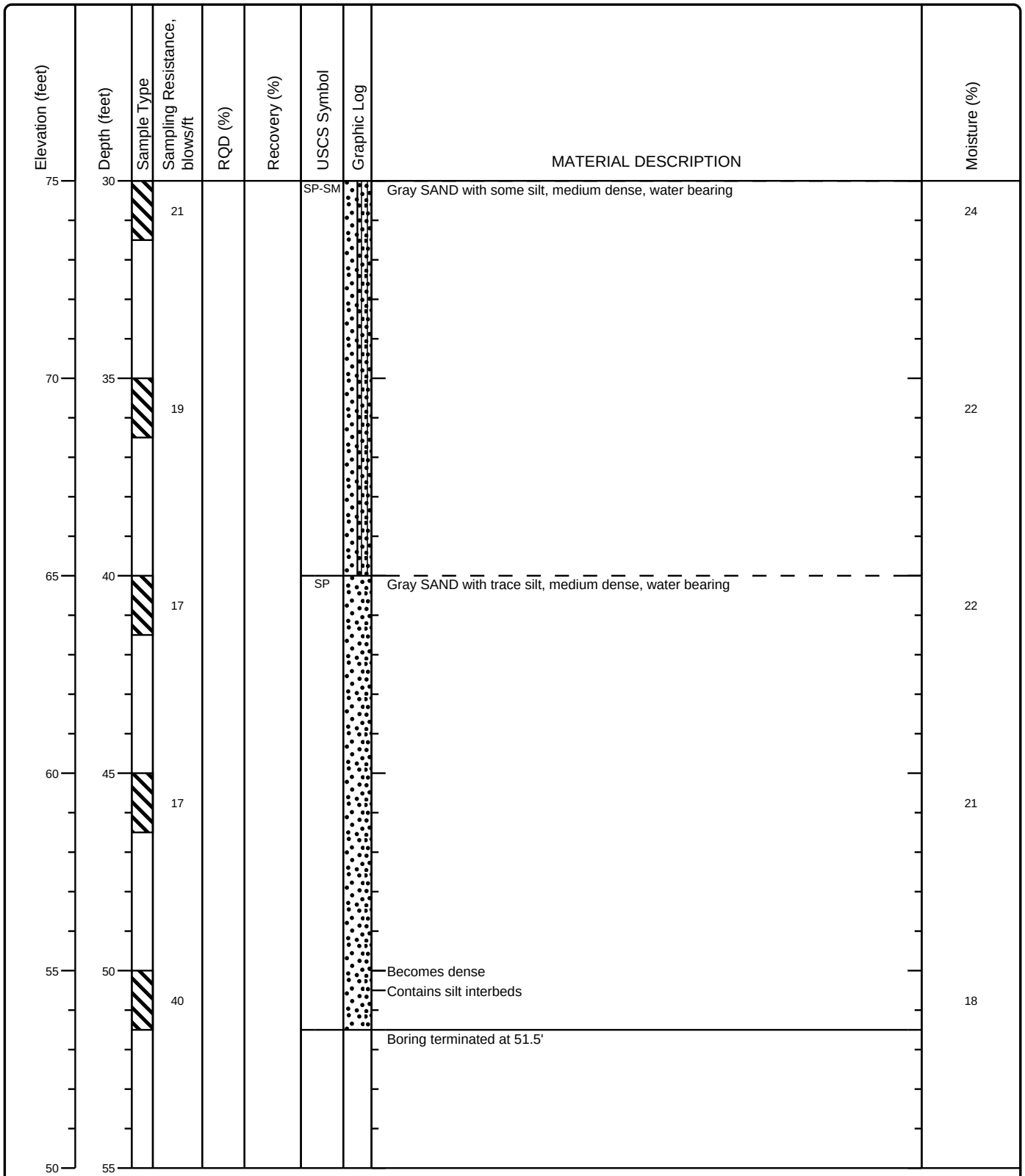
Elevation (feet)	Depth (feet)	Sample Type	Sampling Resistance, blows/ft	RQD (%)	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
105	0					TPSL		Topsoil	
						SP-SM		Gray gravelly SAND with some silt, medium dense, moist	
			19						3
100	5					SP		Gray SAND with some gravel and trace silt, medium dense, moist 4% fines	
			14						6
						SP		Gray SAND with trace silt and gravel, medium dense, moist	
			16						6
95	10					SP-SM		Brown SAND with some silt, medium dense, moist	
			11						7
90	15					SM		Brown silty SAND, medium dense, moist 19% fines	
			12						11
85	20					SP-SM		Gray SAND with some silt, medium dense, moist	
			20						9
80	25					SM		Gray silty SAND, medium dense, moist to wet Contains sand and silt interbeds Becomes water bearing	
			27						25
75	30								

Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

RILEYGROUP

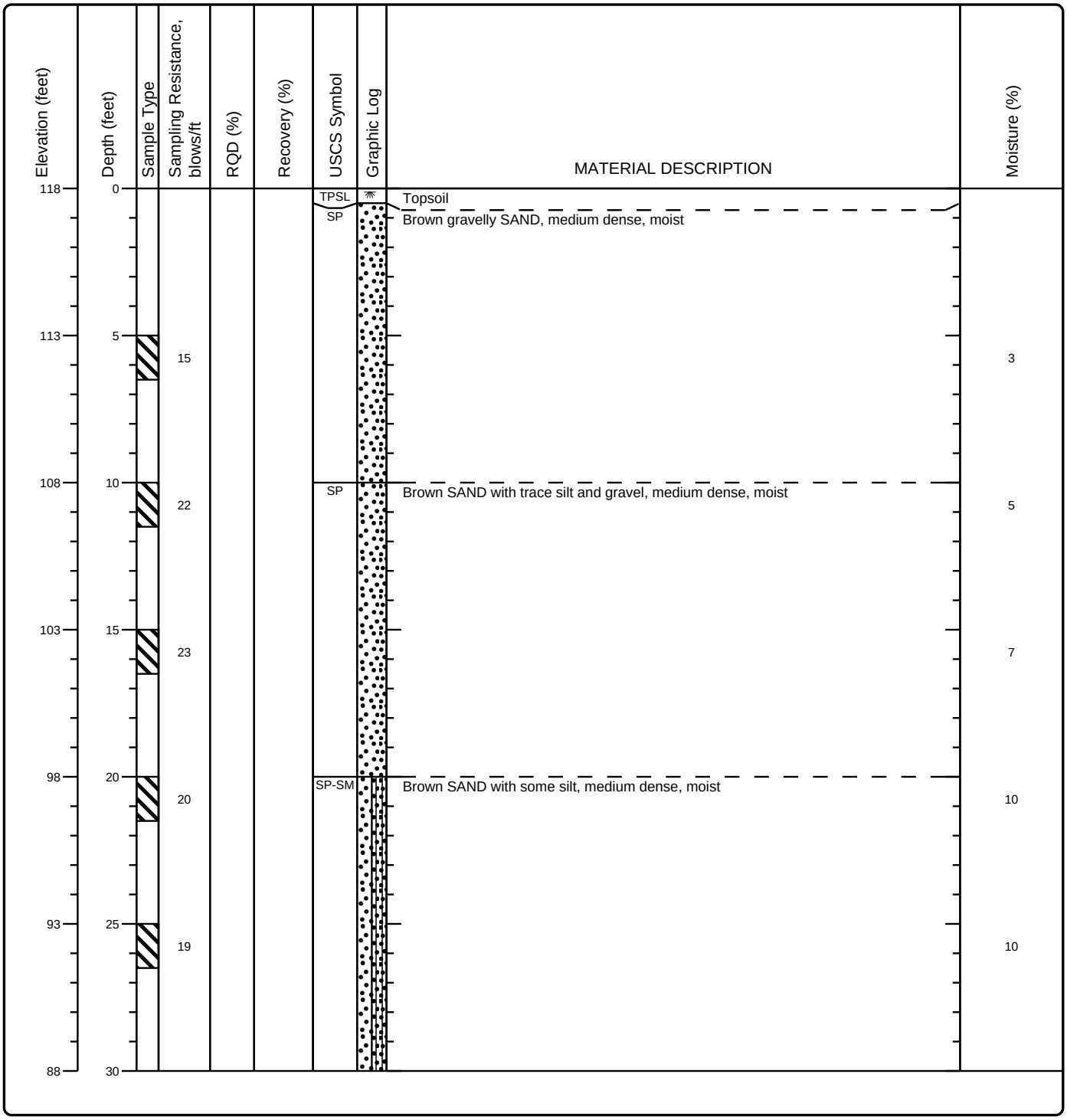
Boring No.: B-1

Sheet 2 of 2



Project Name: **Poortinga Property** Project Number: **2022-291-2** Client: **SMARTCAP, Inc.**	RILEYGROUP Boring No.: B-2 **Sheet 1 of 2**

Date(s) Drilled: **7/13/2022**	Logged By: **ELW**	Surface Conditions: **Grass**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **6" auger**	Total Depth of Borehole: **51.5 feet bgs**
Drill Rig Type: **Track Rig**	Drilling Contractor: **Bortec**	Approximate Surface Elevation: **118**
Groundwater Level: **35 feet**	Sampling Method(s): **SPT**	Hammer Data : **140 lb, 30" drop, rope and cathead**
Borehole Backfill: **Bentonite Chips**	Location: **3505 188th Street Northeast, Arlington, Washington**	



Project Name: **Poortinga Property**

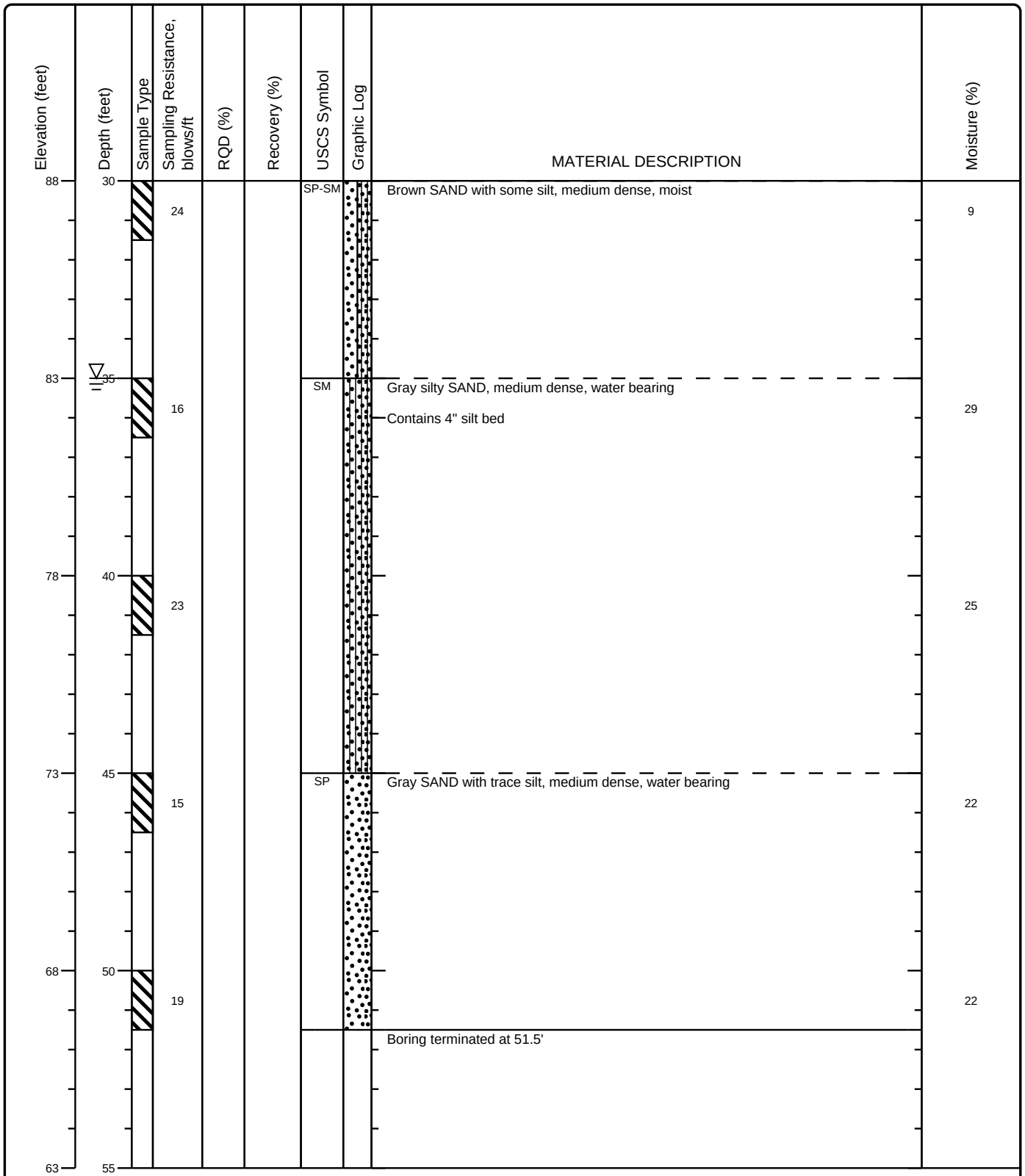
Project Number: **2022-291-2**

Client: **SMARTCAP, Inc.**

RILEYGROUP

Boring No.: B-2

Sheet 2 of 2



Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

RILEYGROUP

Boring No.: B-3
Sheet 1 of 1

Date(s) Drilled: **7/13/2022**	Logged By: **ELW**	Surface Conditions: **Grass**
Drilling Method(s): **Hollow Stem Auger**	Drill Bit Size/Type: **6" auger**	Total Depth of Borehole: **26.5 feet bgs**
Drill Rig Type: **Track Rig**	Drilling Contractor: **Bortec**	Approximate Surface Elevation: **119**
Groundwater Level: **Not Encountered**	Sampling Method(s): **SPT**	Hammer Data : **140 lb, 30" drop, rope and cathead**
Borehole Backfill: **Bentonite Chips**	Location: **3505 188th Street Northeast, Arlington, Washington**	

Elevation (feet)	Depth (feet)	Sample Type	Sampling Resistance, blows/ft	RQD (%)	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
119	0					TPSL		Topsoil	
						SP		Brown gravelly SAND, medium dense, moist	
114	5		20						4
109	10		15			SP		Brown SAND with trace silt and gravel, medium dense, moist	5
104	15		22			SP		Brown SAND with trace silt, medium dense, moist	7
99	20		25			SP-SM		Gray SAND with some silt, medium dense, moist	6
94	25		20					Contains sand and silt interbeds	20
								Boring terminated at 26.5'	
89	30								

Project Name: **Poortinga Property**

Project Number: **2022-291-2**

Client: **SMARTCAP, Inc.**

Key to Log of Boring

Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sampling Resistance, blows/ft	RQD (%)	Recovery (%)	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Moisture (%)
1	2	3	4	5	6	7	8	9	10

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. Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
5. RQD (%): Rock Quality Designation is a relative index of the rock mass quality calculated by comparing the cumulative length of intact pieces of core exceeding 100 mm in length to the cored interval length.
6. Recovery (%): Core Recovery Percentage is determined based on a ratio of the length of core sample recovered compared to the cored interval length.
7. USCS Symbol: USCS symbol of the subsurface material.
8. Graphic Log: Graphic depiction of the subsurface material encountered.
9. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
10. Moisture (%): Moisture, expressed as a water content.

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

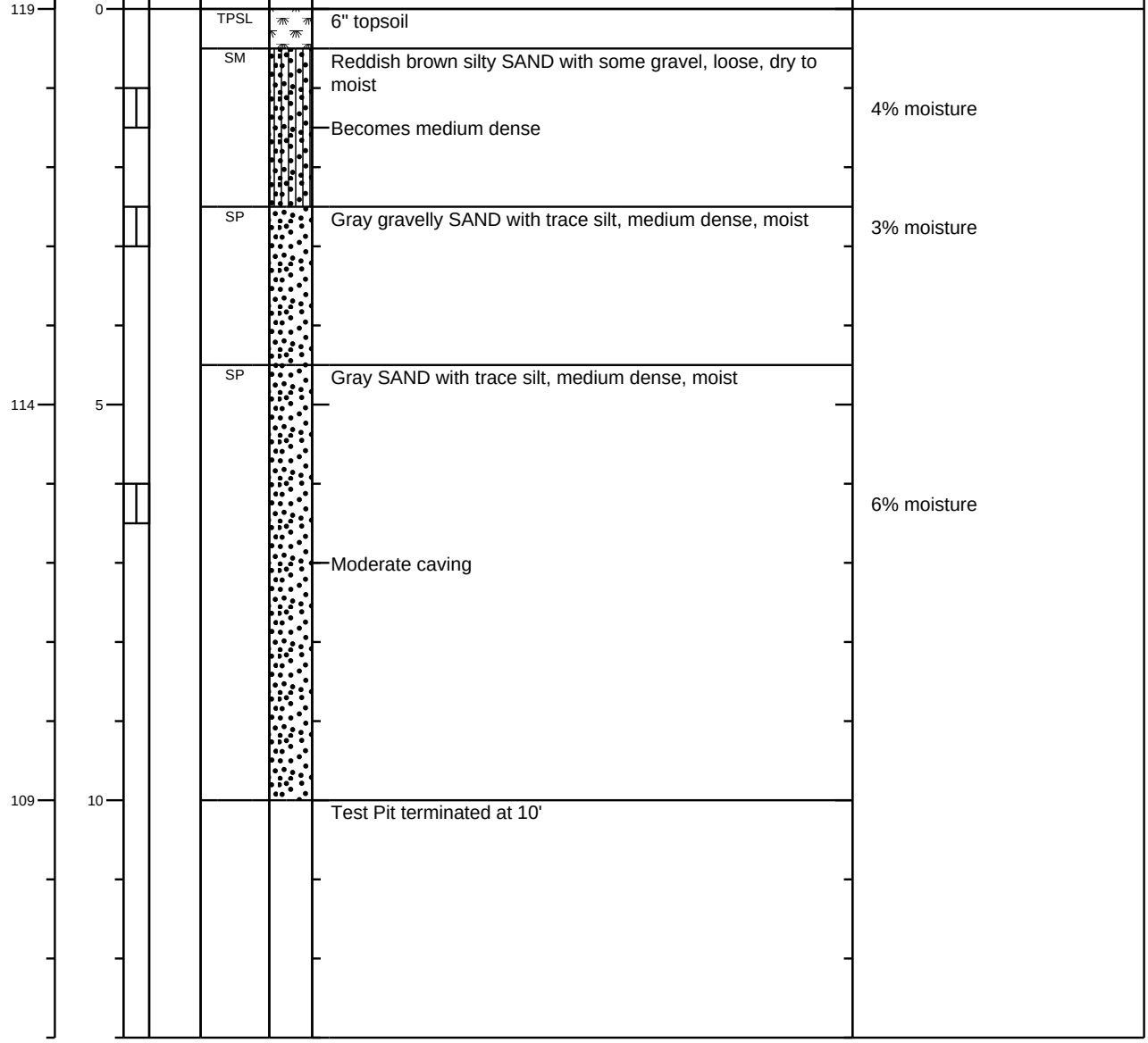
1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific 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.

Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

Test Pit No.: TP-1

Sheet 1 of 1

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **10 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **119**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

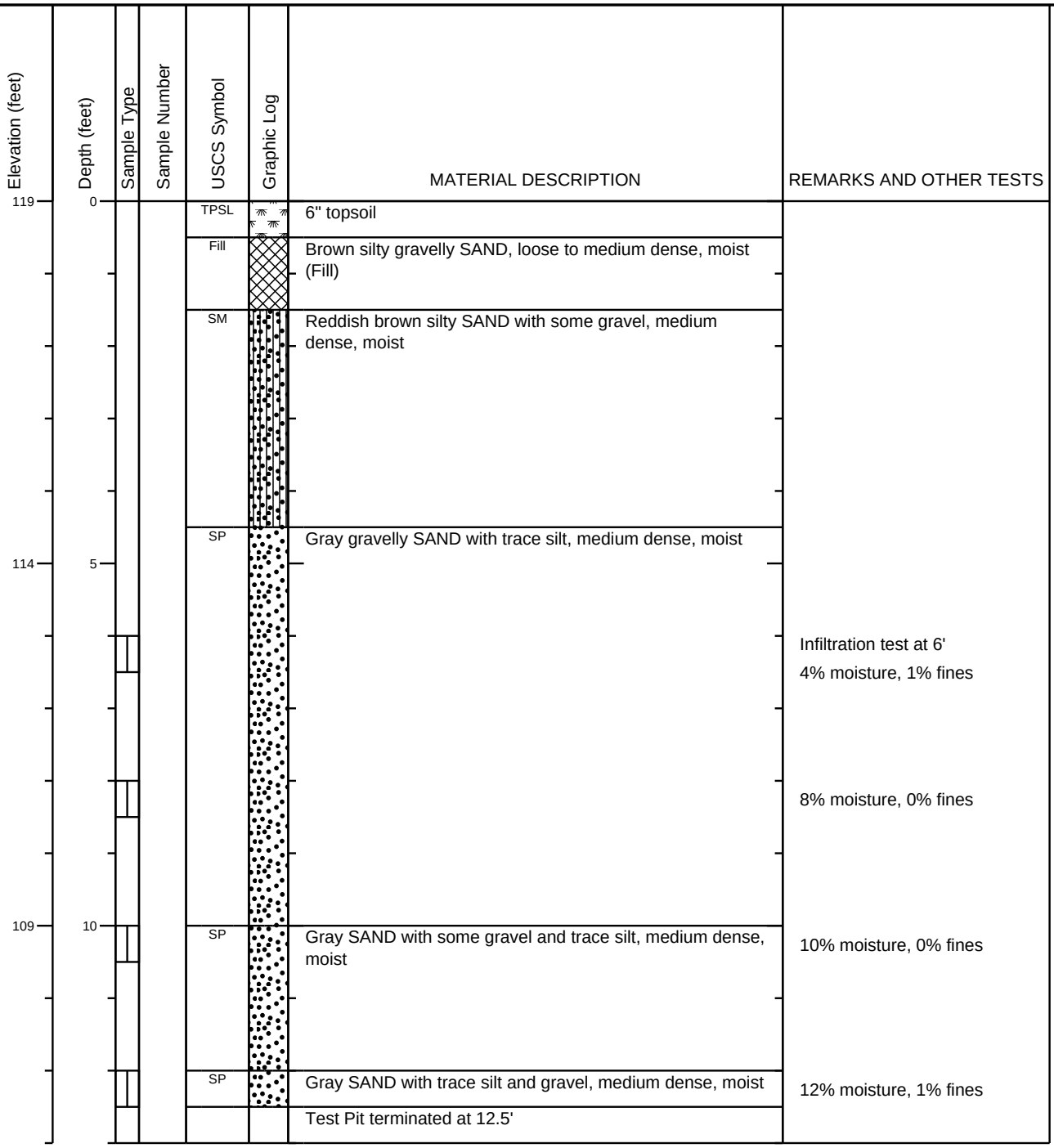
Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

RILEYGROUP

Test Pit No.: TP-2

Sheet 1 of 1

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **12.5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **119**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



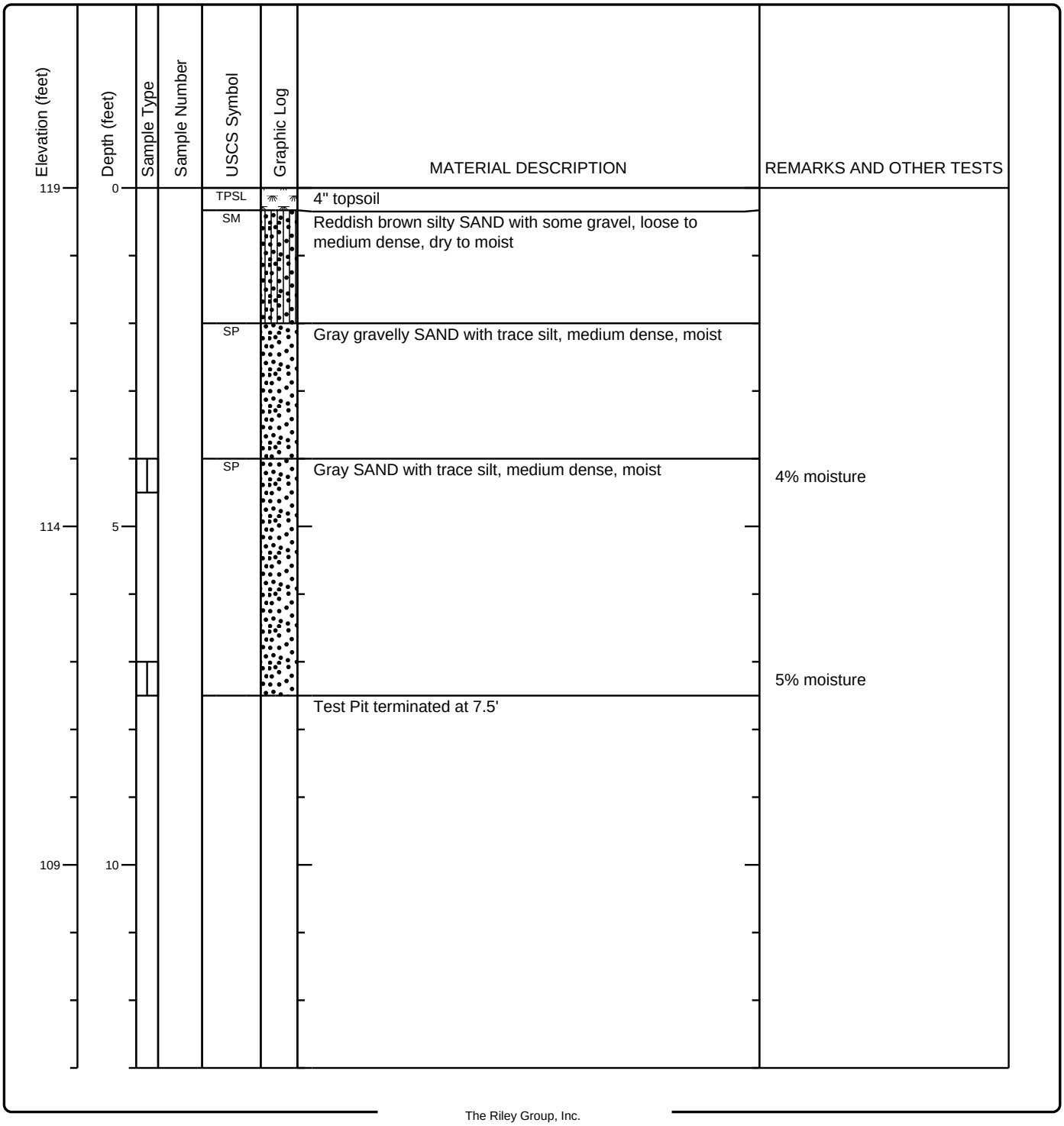
Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

RILEYGROUP

Test Pit No.: TP-3

Sheet 1 of 1

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **7.5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **119**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



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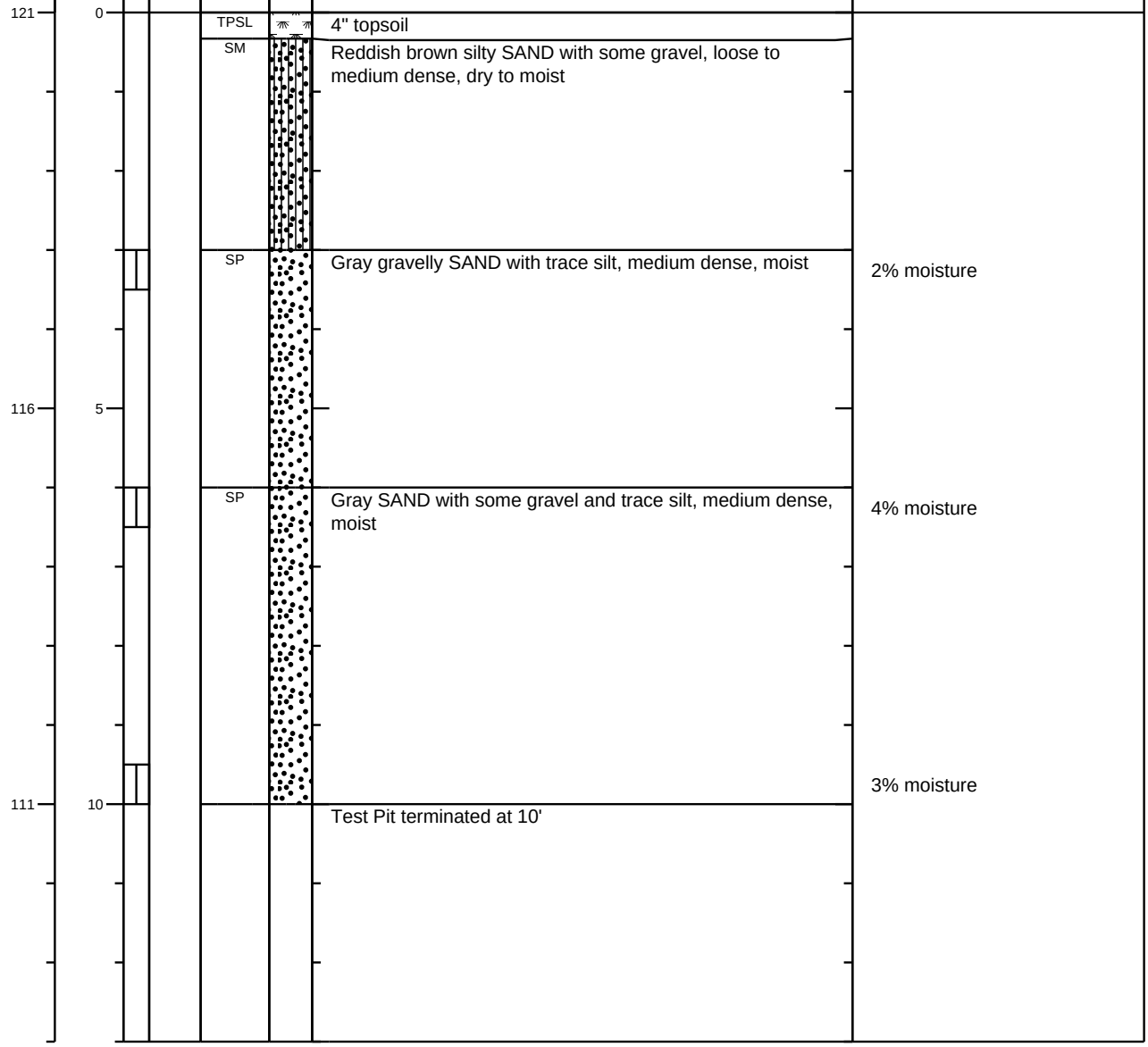
Project Name: **Poortinga Property** Project Number: **2022-291-2** Client: **SMARTCAP, Inc.**	RILEYGROUP Test Pit No.: TP-4 **Sheet 1 of 1**

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **10 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **121**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



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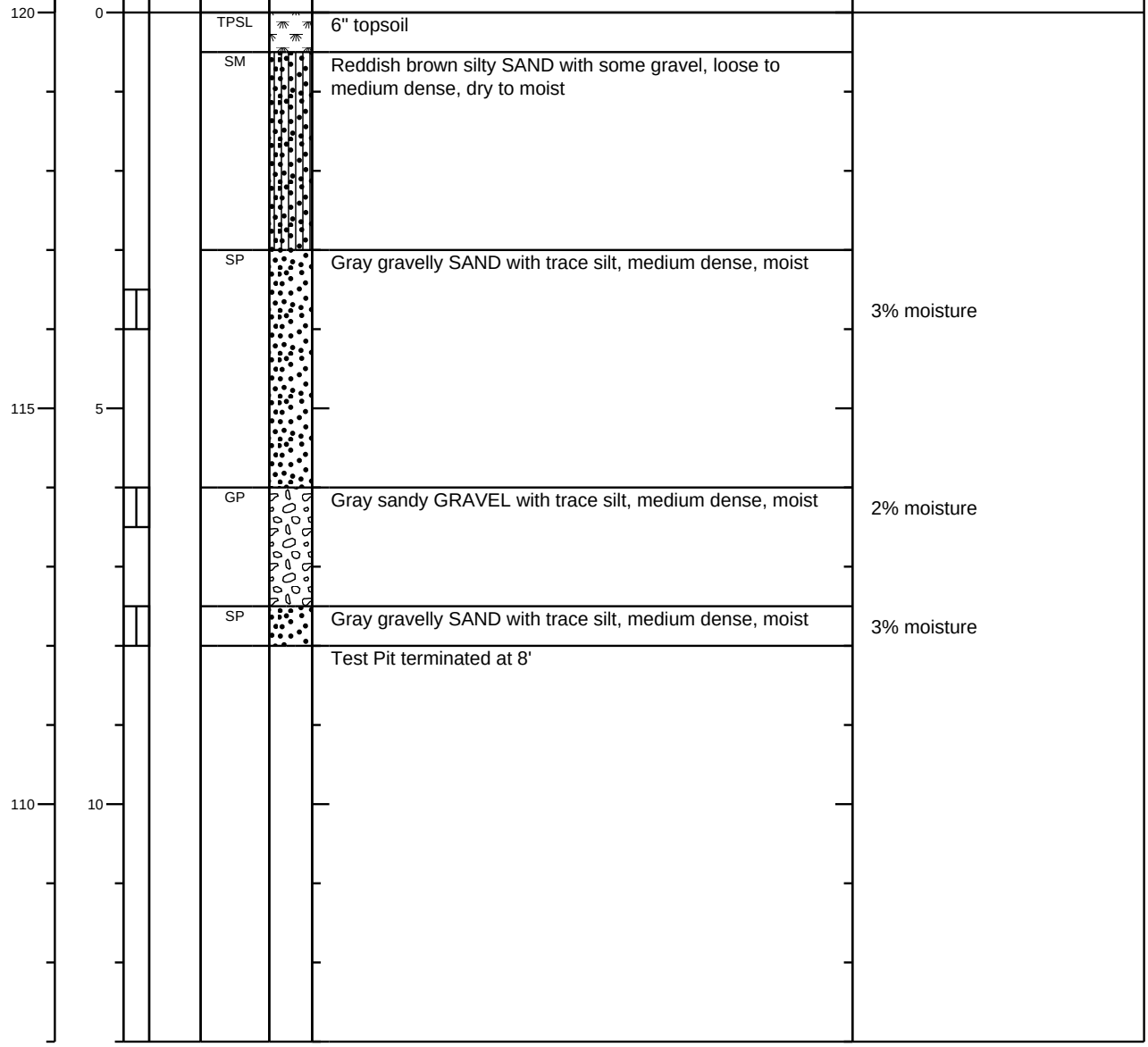
Project Name: **Poortinga Property** Project Number: **2022-291-2** Client: **SMARTCAP, Inc.**	RILEYGROUP Test Pit No.: TP-5 **Sheet 1 of 1**

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **120**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



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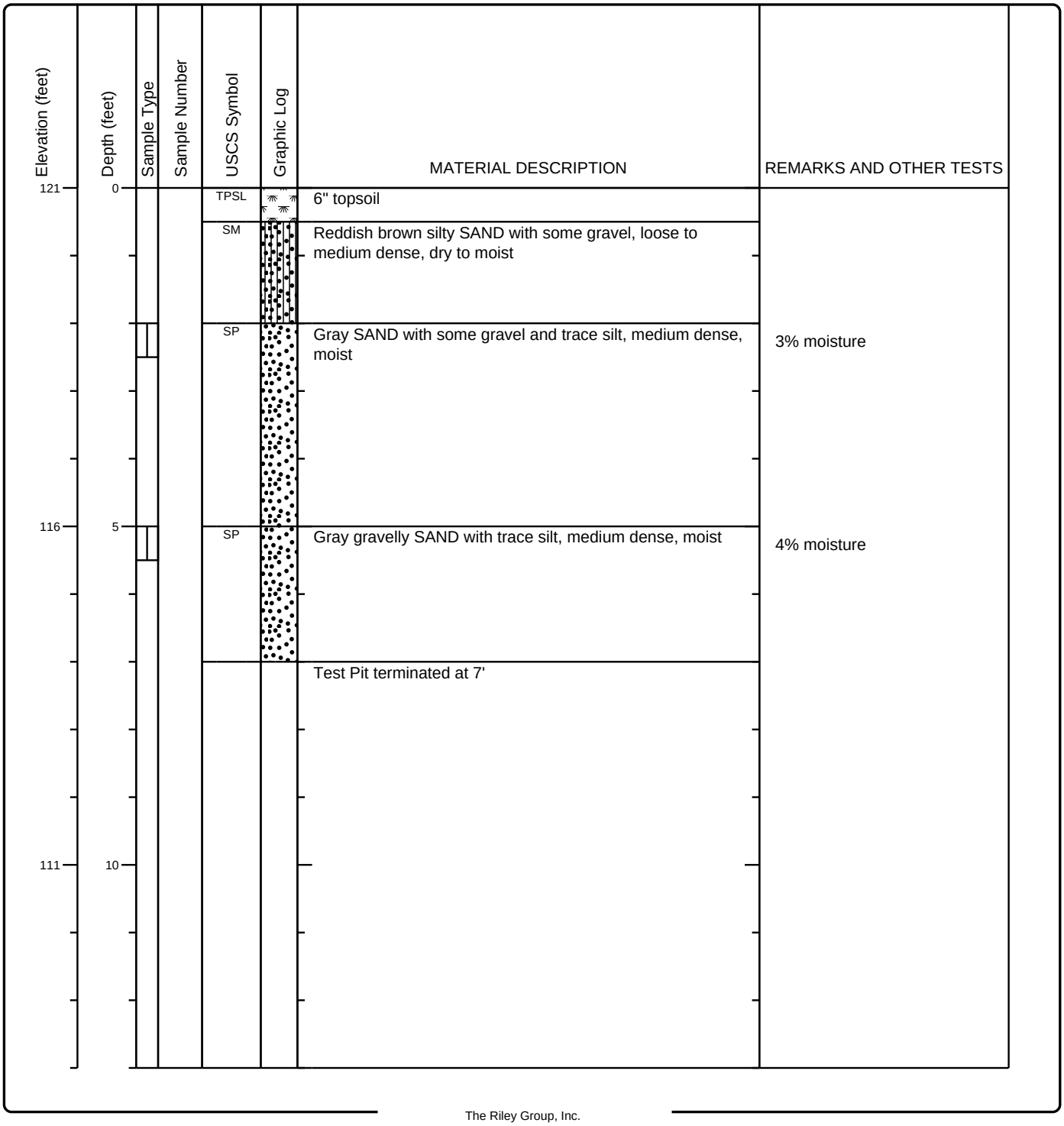
Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

RILEYGROUP

Test Pit No.: TP-6

Sheet 1 of 1

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **7 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **121**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



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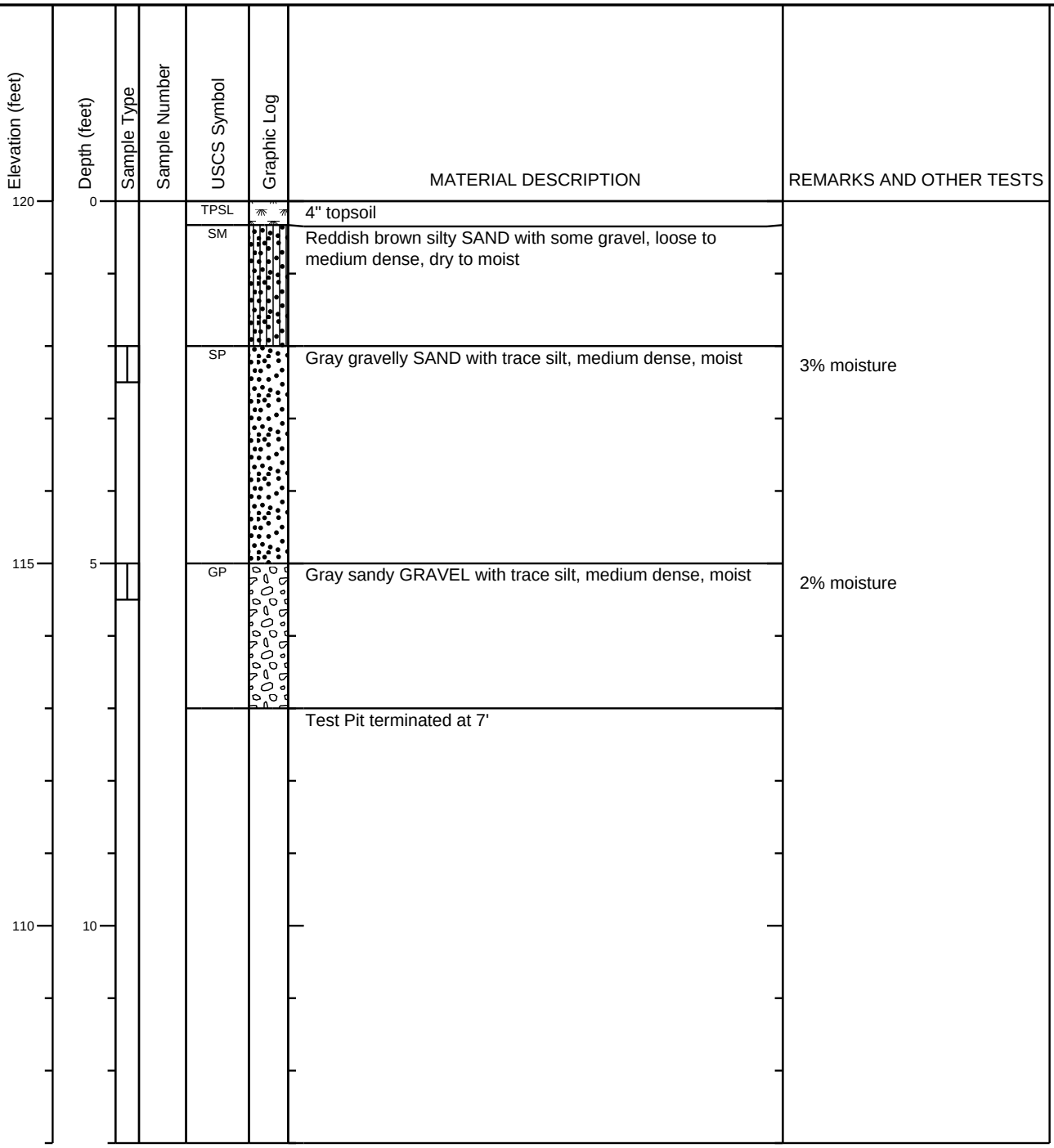
Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

RILEYGROUP

Test Pit No.: TP-7

Sheet 1 of 1

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **7 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **120**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



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17522 Bothell Way NE, Bothell, WA 98011

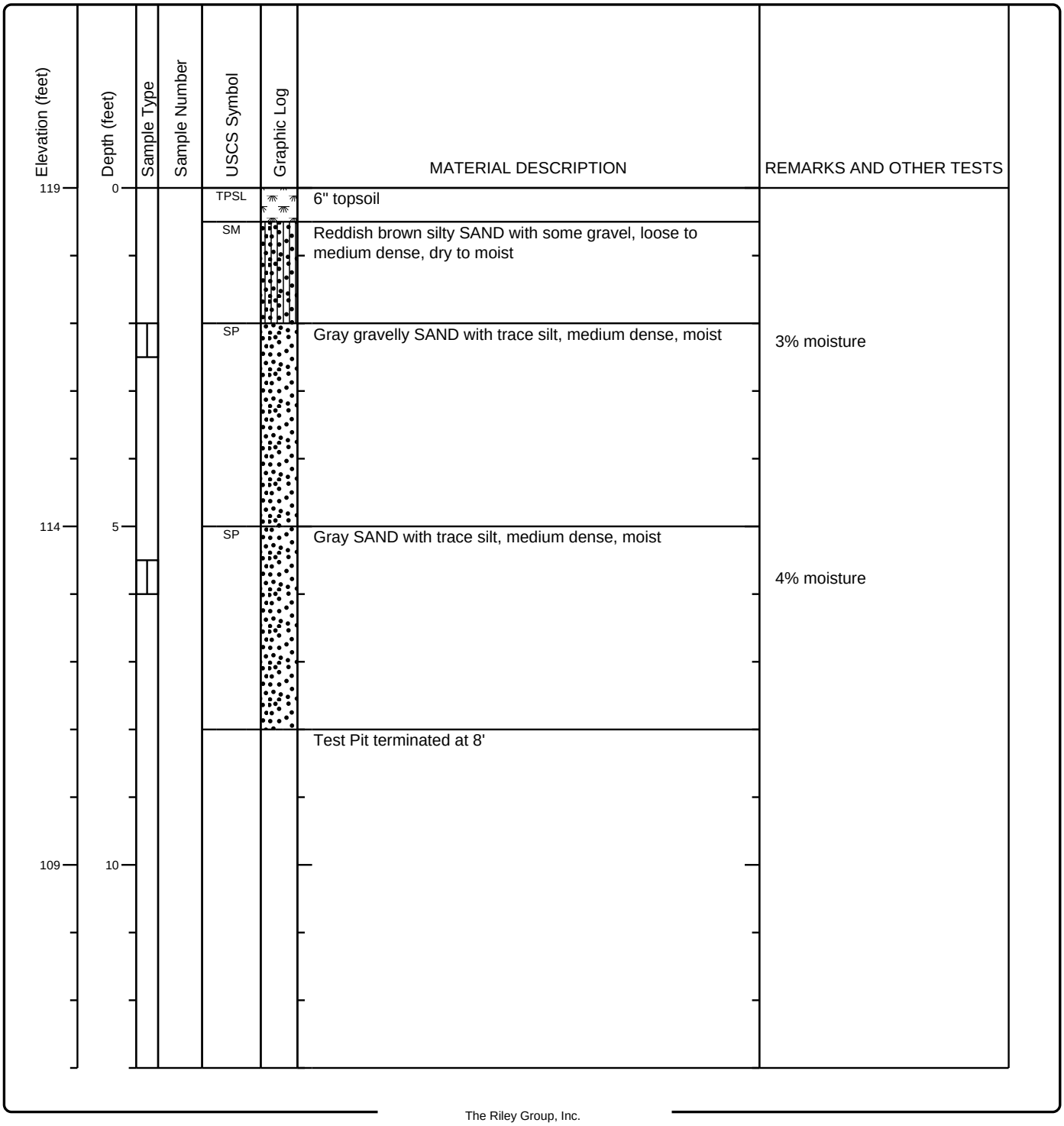
Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

RILEYGROUP

Test Pit No.: TP-8

Sheet 1 of 1

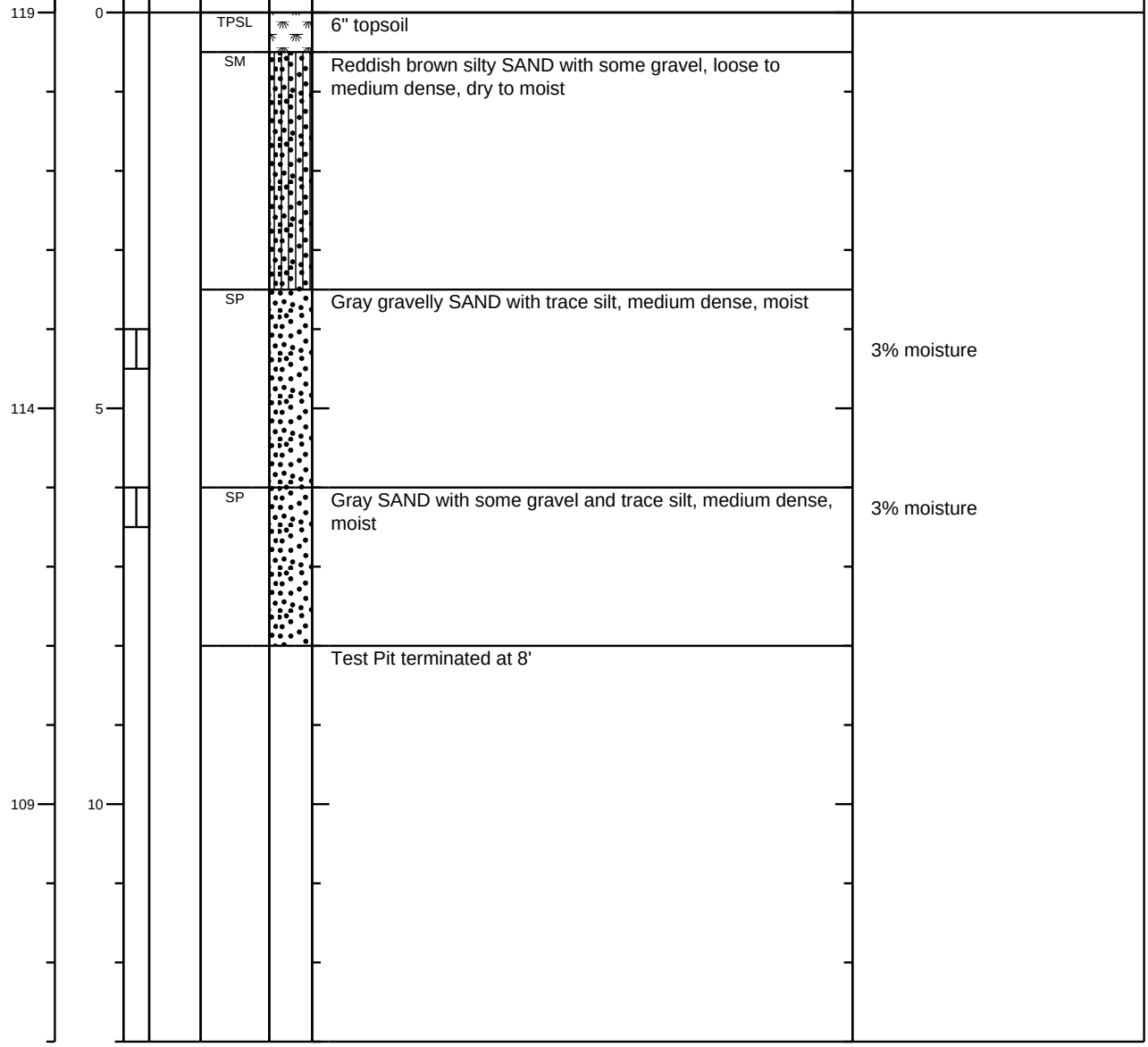
Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **119**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Poortinga Property** Project Number: **2022-291-2** Client: **SMARTCAP, Inc.**	RILEYGROUP Test Pit No.: TP-9 **Sheet 1 of 1**

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **119**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

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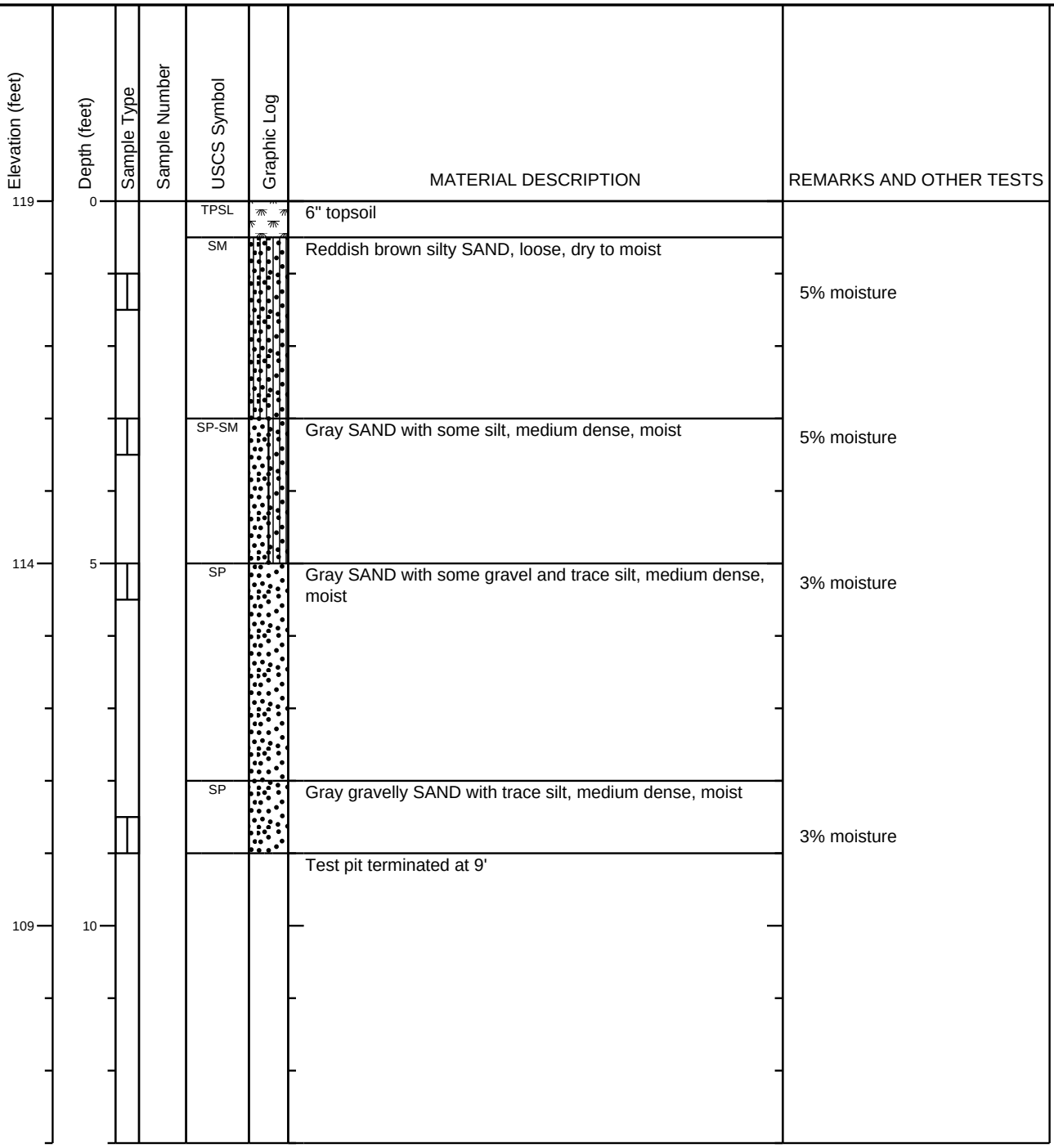
Test Pit No.: TP-10

Sheet 1 of 1

Date(s) Excavated: **8/2/2022**	Logged By **ELW**	Surface Conditions: **Grass**
Excavation Method: **Test Pit**	Bucket Size: **N/A**	Total Depth of Excavation: **9 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **NW Excavating**	Approximate Surface Elevation **119**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket**
Test Pit Backfill: **Cuttings**	Location **3505 188th Street Northeast, Arlington, Washington**	



The Riley Group, Inc.
17522 Bothell Way NE, Bothell, WA 98011

Project Name: **Poortinga Property**
Project Number: **2022-291-2**
Client: **SMARTCAP, Inc.**

RILEYGROUP

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

- AF
- Poorly graded GRAVEL (GP)
- 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.

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

PHONE: (425) 415-0551
FAX: (425) 415-0311

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

PROJECT TITLE	Poortinga Property	**SAMPLE ID/TYPE**	B-1
PROJECT NO.	2022-291-2	**SAMPLE DEPTH**	5'
TECH/TEST DATE	JDH 7/13/2022	**DATE RECEIVED**	7/13/2022

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	472.9
Wt Dry Soil & Tare (gm)	(w2)	446.2
Weight of Tare (gm)	(w3)	15.8
Weight of Water (gm)	(w4=w1-w2)	26.7
Weight of Dry Soil (gm)	(w5=w2-w3)	430.4
Moisture Content (%)	(w4/w5)*100	6

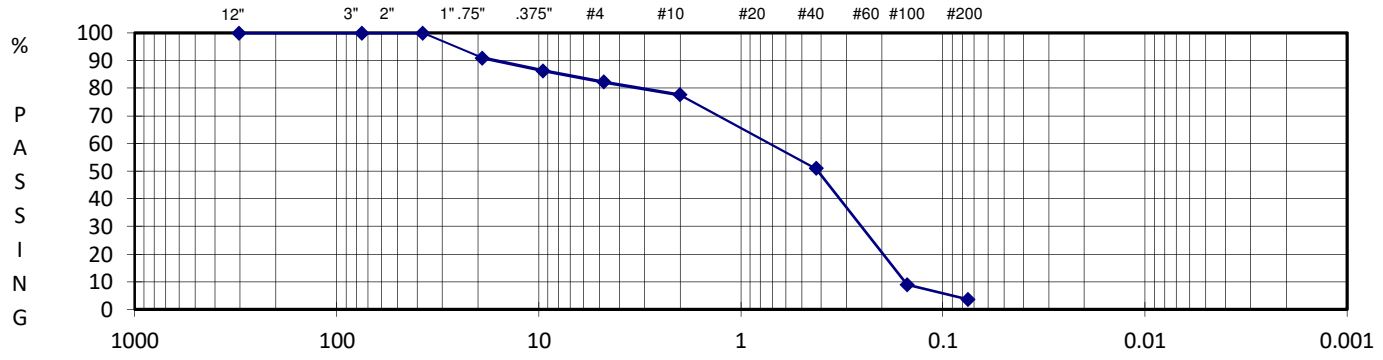
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

Weight Of Sample (gm)		446.2
Tare Weight (gm)		15.8
(W6) Total Dry Weight (gm)		430.4

% COBBLES	**0.0**
% C GRAVEL	**9.1**
% F GRAVEL	**8.6**
% C SAND	**4.7**
% M SAND	**26.6**
% F SAND	**47.3**
% FINES	**3.6**
% TOTAL	**100.0**
D10 (mm)	0.17
D30 (mm)	0.25
D60 (mm)	0.7
Cu	4.1
Cc	0.5

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.8	0.00	0.00	100.00	cobbles
3.0"	15.8	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	15.8	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	55.0	39.20	9.11	90.89	fine gravel
0.50"					fine gravel
0.375"	74.9	59.10	13.73	86.27	fine gravel
#4	92.1	76.30	17.73	82.27	coarse sand
#10	112.2	96.40	22.40	77.60	medium sand
#20					medium sand
#40	226.8	211.00	49.02	50.98	fine sand
#60					fine sand
#100	408.1	392.30	91.15	8.85	fine sand
#200	430.5	414.70	96.35	3.65	fines
PAN	446.2	430.40	100.00	0.00	silt/clay



DESCRIPTION SAND with some gravel and trace silt

USCS SP

Prepared For:
SMARTCAP, Inc.

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	Poortinga Property	**SAMPLE ID/TYPE**	B-1
PROJECT NO.	2022-291-2	**SAMPLE DEPTH**	15'
TECH/TEST DATE	JDH 7/13/2022	**DATE RECEIVED**	7/13/2022

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	477.5
Wt Dry Soil & Tare (gm)	(w2)	431.6
Weight of Tare (gm)	(w3)	15.8
Weight of Water (gm)	(w4=w1-w2)	45.9
Weight of Dry Soil (gm)	(w5=w2-w3)	415.8
Moisture Content (%)	(w4/w5)*100	11

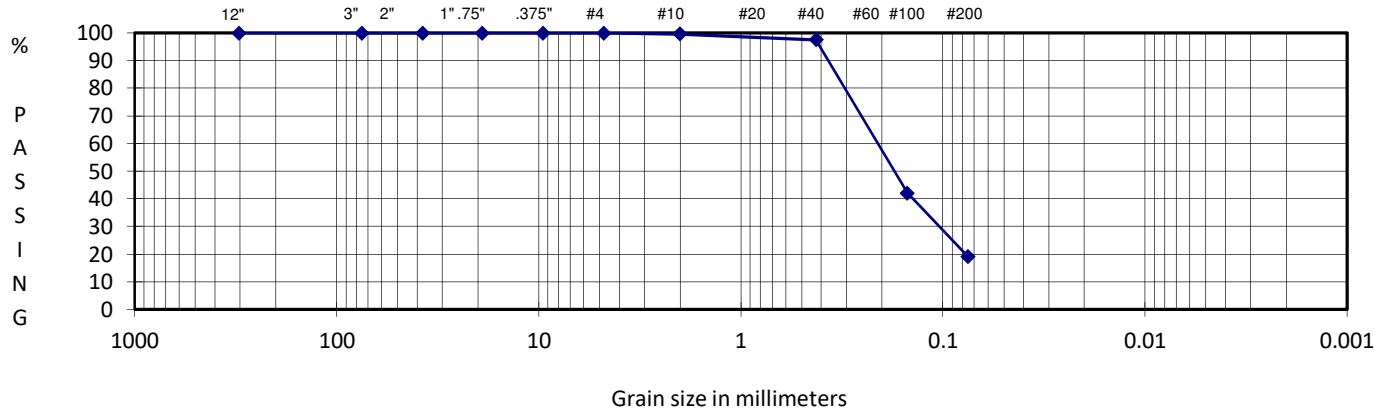
Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

Weight Of Sample (gm)		431.6
Tare Weight (gm)		15.8
(W6) Total Dry Weight (gm)		415.8

% COBBLES	**0.0**
% C GRAVEL	**0.0**
% F GRAVEL	**0.0**
% C SAND	**0.4**
% M SAND	**2.1**
% F SAND	**78.5**
% FINES	**19.1**
% TOTAL	**100.0**
D10 (mm)	
D30 (mm)	
D60 (mm)	
Cu	
Cc	

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.8	0.00	0.00	100.00	cobbles
3.0"	15.8	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	15.8	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	15.8	0.00	0.00	100.00	fine gravel
0.50"					fine gravel
0.375"	15.8	0.00	0.00	100.00	fine gravel
#4	15.8	0.00	0.00	100.00	coarse sand
#10	17.5	1.70	0.41	99.59	medium sand
#20					medium sand
#40	26.1	10.30	2.48	97.52	fine sand
#60					fine sand
#100	256.8	241.00	57.96	42.04	fine sand
#200	352.3	336.50	80.93	19.07	fines
PAN	431.6	415.80	100.00	0.00	silt/clay



DESCRIPTION	Silty SAND
USCS	SM

Prepared For:
SMARTCAP, Inc.

Reviewed By:
ELW

RILEYGROUP

THE RILEY GROUP, INC.
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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Poortinga Property	**SAMPLE ID/TYPE**	TP-2
PROJECT NO.	2022-291-2	**SAMPLE DEPTH**	6'
TECH/TEST DATE	CM 8/2/2022	**DATE RECEIVED**	8/2/2022

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	867.5
Wt Dry Soil & Tare (gm)	(w2)	837.0
Weight of Tare (gm)	(w3)	15.9
Weight of Water (gm)	(w4=w1-w2)	30.5
Weight of Dry Soil (gm)	(w5=w2-w3)	821.1
Moisture Content (%)	(w4/w5)*100	4

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

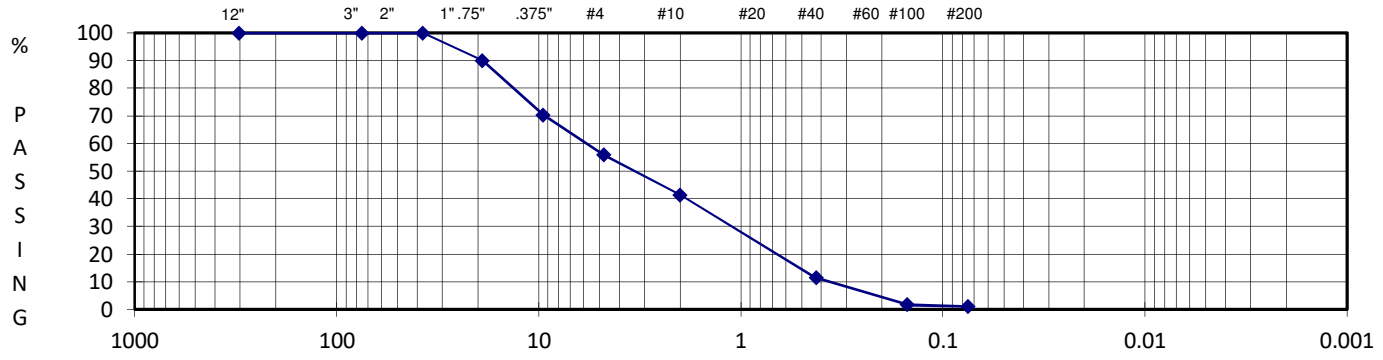
Weight Of Sample (gm)		837.0
Tare Weight (gm)		15.9
(W6) Total Dry Weight (gm)		821.1

% COBBLES	**0.0**
% C GRAVEL	**10.0**
% F GRAVEL	**34.2**
% C SAND	**14.5**
% M SAND	**29.9**
% F SAND	**10.4**
% FINES	**1.0**
% TOTAL	**100.0**

D10 (mm)	0.47
D30 (mm)	1.2
D60 (mm)	5.9
Cu	12.6
Cc	0.5

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.9	0.00	0.00	100.00	cobbles
3.0"	15.9	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	15.9	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	98.0	82.10	10.00	90.00	fine gravel
0.50"					fine gravel
0.375"	259.6	243.70	29.68	70.32	fine gravel
#4	378.9	363.00	44.21	55.79	coarse sand
#10	497.6	481.70	58.67	41.33	medium sand
#20					medium sand
#40	743.1	727.20	88.56	11.44	fine sand
#60					fine sand
#100	823.6	807.70	98.37	1.63	fine sand
#200	828.7	812.80	98.99	1.01	fines
PAN	837.0	821.10	100.00	0.00	silt/clay



DESCRIPTION Gravelly SAND with trace silt

USCS SP

Prepared For:
SMARTCAP, Inc.

Reviewed By:
ELW

RILEYGROUP

THE RILEY GROUP, INC.
17522 Bothell Way NE
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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Poortinga Property	**SAMPLE ID/TYPE**	TP-2
PROJECT NO.	2022-291-2	**SAMPLE DEPTH**	8'
TECH/TEST DATE	CM 8/2/2022	**DATE RECEIVED**	8/2/2022

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	558.3
Wt Dry Soil & Tare (gm)	(w2)	518.7
Weight of Tare (gm)	(w3)	15.9
Weight of Water (gm)	(w4=w1-w2)	39.6
Weight of Dry Soil (gm)	(w5=w2-w3)	502.8
Moisture Content (%)	(w4/w5)*100	8

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

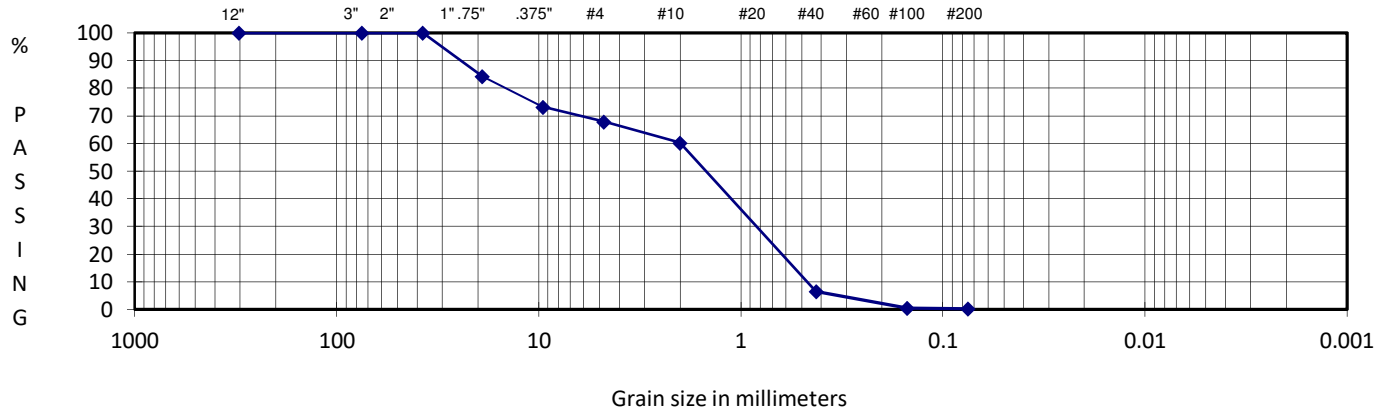
Weight Of Sample (gm)		518.7
Tare Weight (gm)		15.9
(W6) Total Dry Weight (gm)		502.8

% COBBLES	**0.0**
% C GRAVEL	**15.9**
% F GRAVEL	**16.3**
% C SAND	**7.7**
% M SAND	**53.7**
% F SAND	**6.2**
% FINES	**0.2**
% TOTAL	**100.0**

D10 (mm)	0.47
D30 (mm)	0.82
D60 (mm)	2
Cu	4.3
Cc	0.7

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.9	0.00	0.00	100.00	cobbles
3.0"	15.9	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	15.9	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	95.6	79.70	15.85	84.15	fine gravel
0.50"					fine gravel
0.375"	151.3	135.40	26.93	73.07	fine gravel
#4	177.8	161.90	32.20	67.80	coarse sand
#10	216.5	200.60	39.90	60.10	medium sand
#20					medium sand
#40	486.4	470.50	93.58	6.42	fine sand
#60					fine sand
#100	516.4	500.50	99.54	0.46	fine sand
#200	517.6	501.70	99.78	0.22	fines
PAN	518.7	502.80	100.00	0.00	silt/clay



DESCRIPTION Gravelly SAND with trace silt

USCS SP

Prepared For:
SMARTCAP, Inc.

Reviewed By:
ELW

RILEYGROUP

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

PROJECT TITLE	Poortinga Property	**SAMPLE ID/TYPE**	TP-2
PROJECT NO.	2022-291-2	**SAMPLE DEPTH**	10'
TECH/TEST DATE	CM 8/2/2022	**DATE RECEIVED**	8/2/2022

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	608.7
Wt Dry Soil & Tare (gm)	(w2)	552.8
Weight of Tare (gm)	(w3)	15.9
Weight of Water (gm)	(w4=w1-w2)	55.9
Weight of Dry Soil (gm)	(w5=w2-w3)	536.9
Moisture Content (%)	(w4/w5)*100	10

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

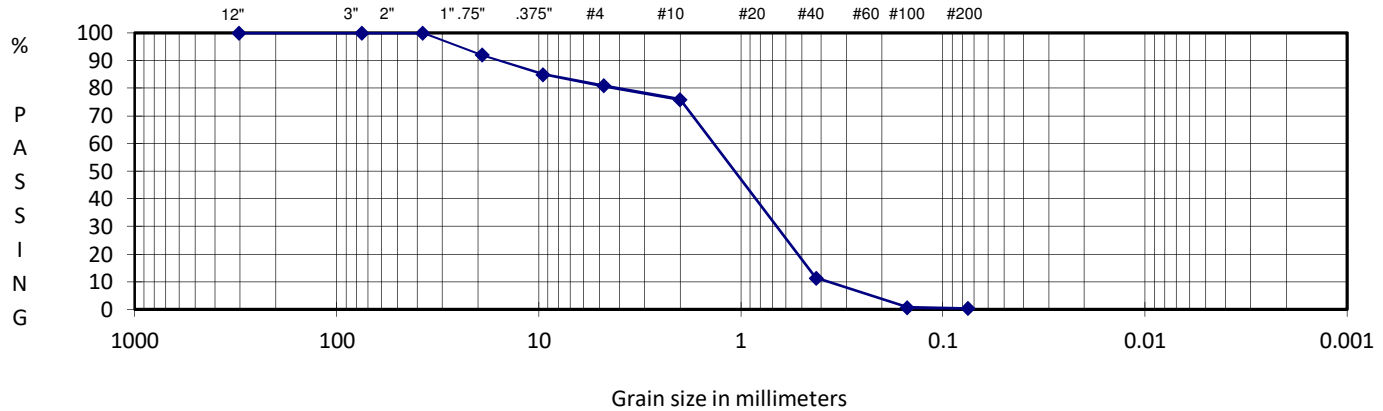
Weight Of Sample (gm)		552.8
Tare Weight (gm)		15.9
(W6) Total Dry Weight (gm)		536.9

% COBBLES	**0.0**
% C GRAVEL	**8.0**
% F GRAVEL	**11.1**
% C SAND	**5.0**
% M SAND	**64.6**
% F SAND	**10.9**
% FINES	**0.3**
% TOTAL	**100.0**

D10 (mm)	0.37
D30 (mm)	0.65
D60 (mm)	1.5
Cu	4.1
Cc	0.8

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.9	0.00	0.00	100.00	cobbles
3.0"	15.9	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	15.9	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	59.1	43.20	8.05	91.95	fine gravel
0.50"					fine gravel
0.375"	97.1	81.20	15.12	84.88	fine gravel
#4	118.9	103.00	19.18	80.82	coarse sand
#10	145.7	129.80	24.18	75.82	medium sand
#20					medium sand
#40	492.4	476.50	88.75	11.25	fine sand
#60					fine sand
#100	549.4	533.50	99.37	0.63	fine sand
#200	551.0	535.10	99.66	0.34	fines
PAN	552.8	536.90	100.00	0.00	silt/clay



DESCRIPTION	SAND with some gravel and trace silt
USCS	SP

Prepared For:
SMARTCAP, Inc.

Reviewed By:
ELW

RILEYGROUP

THE RILEY GROUP, INC.
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Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

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

PROJECT TITLE	Poortinga Property		**SAMPLE ID/TYPE**	TP-2	
PROJECT NO.	2022-291-2		**SAMPLE DEPTH**	12'	
TECH/TEST DATE	CM 8/2/2022		**DATE RECEIVED**	8/2/2022	

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	568.2
Wt Dry Soil & Tare (gm)	(w2)	509.8
Weight of Tare (gm)	(w3)	15.8
Weight of Water (gm)	(w4=w1-w2)	58.4
Weight of Dry Soil (gm)	(w5=w2-w3)	494.0
Moisture Content (%)	(w4/w5)*100	12

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

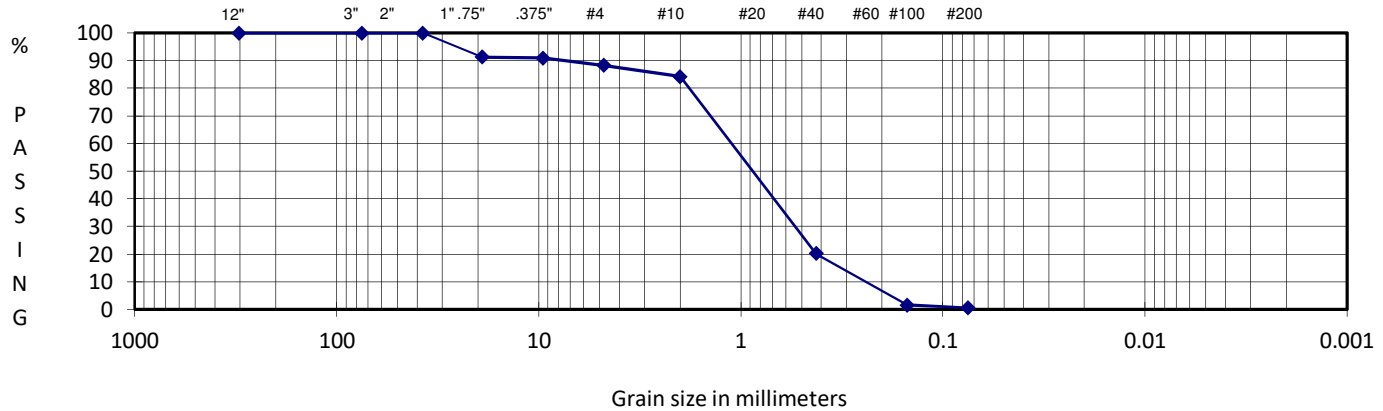
Weight Of Sample (gm)		509.8
Tare Weight (gm)		15.8
(W6) Total Dry Weight (gm)		494.0

% COBBLES	**0.0**
% C GRAVEL	**8.7**
% F GRAVEL	**3.1**
% C SAND	**4.0**
% M SAND	**64.0**
% F SAND	**19.6**
% FINES	**0.6**
% TOTAL	**100.0**

D10 (mm)	0.24
D30 (mm)	0.41
D60 (mm)	1.2
Cu	5.0
Cc	0.6

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	15.8	0.00	0.00	100.00	cobbles
3.0"	15.8	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	15.8	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	58.8	43.00	8.70	91.30	fine gravel
0.50"					fine gravel
0.375"	60.5	44.70	9.05	90.95	fine gravel
#4	74.1	58.30	11.80	88.20	coarse sand
#10	94.0	78.20	15.83	84.17	medium sand
#20					medium sand
#40	410.1	394.30	79.82	20.18	fine sand
#60					fine sand
#100	502.0	486.20	98.42	1.58	fine sand
#200	506.9	491.10	99.41	0.59	fines
PAN	509.8	494.00	100.00	0.00	silt/clay



DESCRIPTION SAND with trace silt and gravel

USCS SP

Prepared For:
SMARTCAP, Inc.

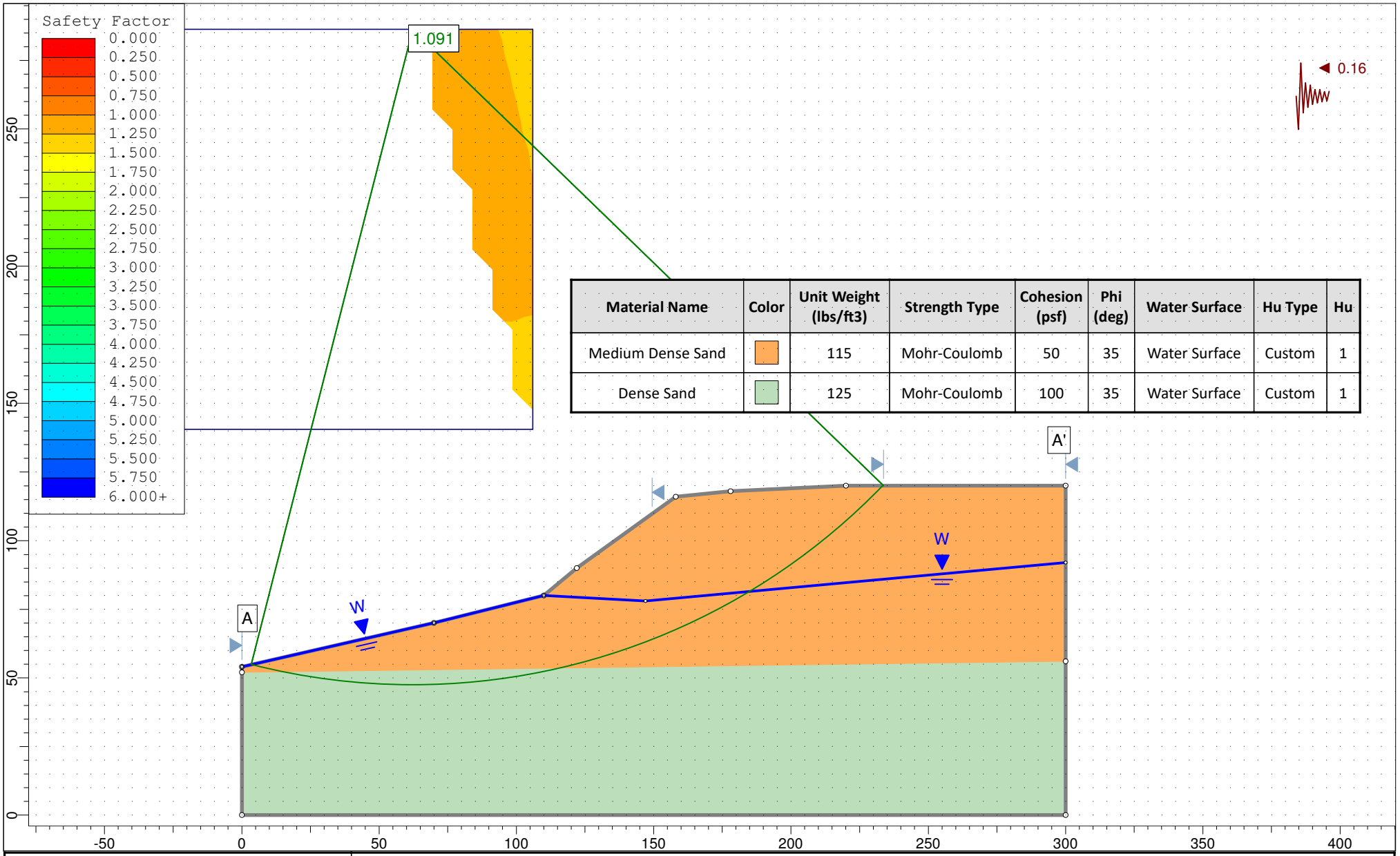
Reviewed By:
ELW

RILEYGROUP

APPENDIX B
SLOPE STABILITY

RGI performed the slope stability analysis by using a computer program, Slide version 6.0, which was developed by Rocscience. The safety factor for the critical surfaces was calculated by the Bishop Method. The analyses were performed for the slopes under existing static and seismic conditions.

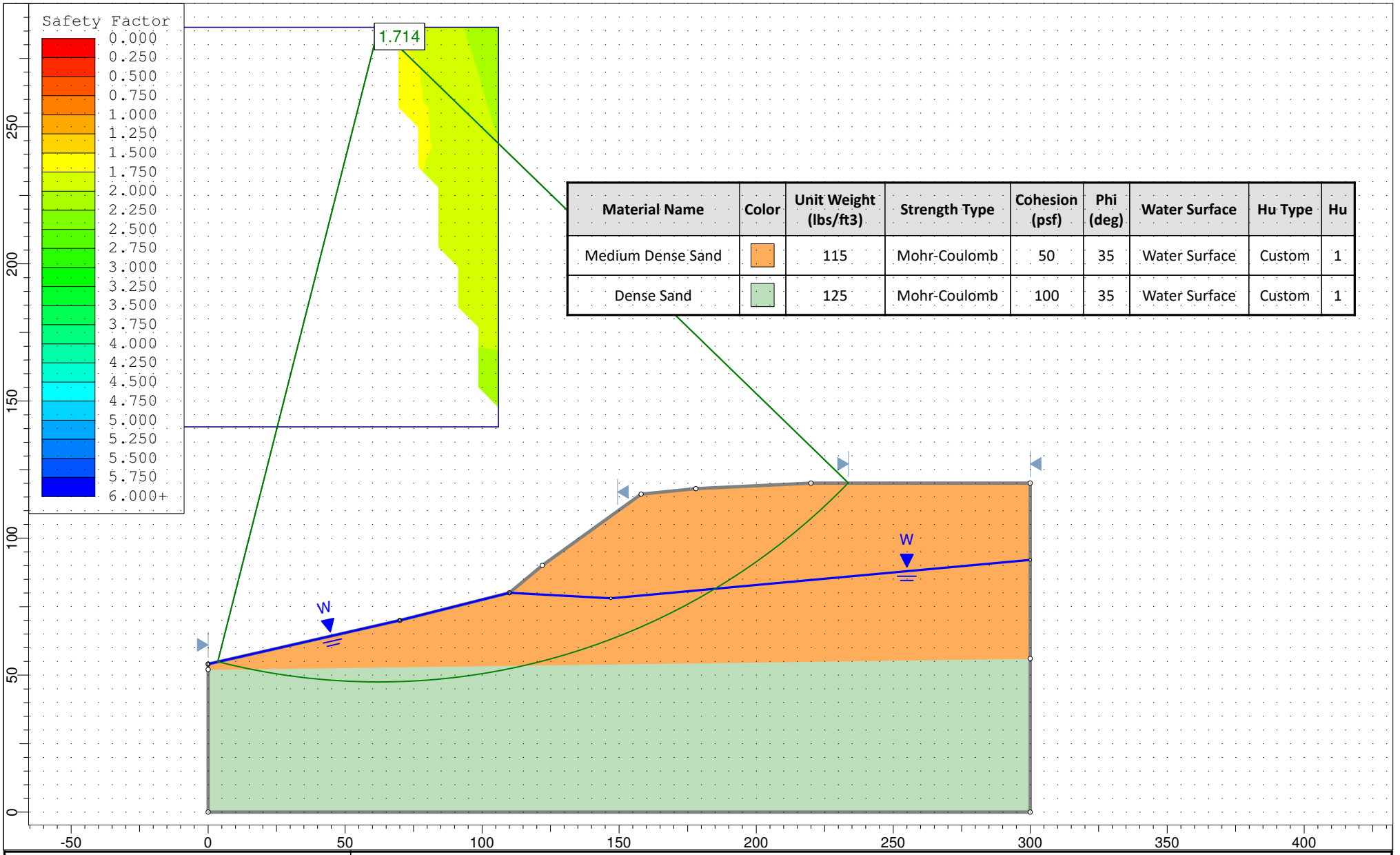
For seismic analysis, peak ground acceleration (PGA) was determined to be 0.450g based on ASCE 7-10 Standard. Following the procedure recommended in NCHRP Seismic Analysis and Design of Retaining Walls, Buried Structures, Slopes, and Embankments (Report 611) and FHWA LRFD Seismic Analysis and Design of Transportation Geotechnical Features and Structural Foundations Manual (2011), a seismic coefficient of 0.16 was determined which is used in the pseudo-static slope stability analysis.



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Medium Dense Sand		115	Mohr-Coulomb	50	35	Water Surface	Custom	1
Dense Sand		125	Mohr-Coulomb	100	35	Water Surface	Custom	1

SLIDEINTERPRET 6.039

Project	Poortinga Property			
Analysis Description	Existing Seismic			
Drawn By	ELW	Scale	1:580	Company: Riley Group, Inc.
Date	8/8/2022, 3:30:03 PM			File Name: Existing Seismic.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Medium Dense Sand		115	Mohr-Coulomb	50	35	Water Surface	Custom	1
Dense Sand		125	Mohr-Coulomb	100	35	Water Surface	Custom	1

SLIDEINTERPRET 6.039

Project	Poortinga Property			
Analysis Description	Existing Static			
Drawn By	ELW	Scale	1:580	Company: Riley Group, Inc.
Date	8/8/2022, 3:30:03 PM			File Name: Existing Static.slim