GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

THE RILEY GROUP, INC.
17522 BOTHELL WAY NORTHEAST
BOTHELL, WASHINGTON 98011

PREPARED FOR:

CITY OF SEATTLE, OFFICE OF HOUSING
700 5TH AVENUE SUITE 5700
SEATTLE, WASHINGTON 98108

RGI PROJECT NO. 2021-552-16

FERDINAND STREET VACANT LOT NORTHWEST, SITE 9
4865 MLK JR. WAY SOUTH AND 3112 S FERDINAND STREET
SEATTLE, WASHINGTON

MAY 18, 2022

Corporate Office
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RILEYGROUP

May 18, 2022

Erika Malone
City of Seattle, Office of Housing
700 5th Avenue Suite 5700
Seattle, Washington 98108

Subject: **Geotechnical Engineering Report**
Ferdinand Street Vacant Lot Northwest, Site 9
4865 MLK Jr. Way South and 3112 S Ferdinand Street
Seattle, Washington
RGI Project No. 2021-552-16

Dear Erika Malone:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the Ferdinand Street Vacant Lot Northwest, Site 9 located at 4865 MLK Jr. Way South and 3112 S Ferdinand Street, Seattle, Washington. Our services were completed in accordance with our proposal dated March 1, 2022 and authorized by Laurie Olson with City of Seattle, Office of Housing on March 2, 2022. The information in this GER 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 March 30, 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.

KRISTINA MARIE WELLER
STATE OF WASHINGTON
33182
REGISTERED
PROFESSIONAL ENGINEER

5/18/22

Eric L. Woods, LG
Project Geologist

Kristina M. Weller, PE
Principal Geotechnical Engineer

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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 six test pits to approximate depths of 5 to 15 feet below existing site grades. We previously prepared a Preliminary Phase II Report for the site.

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 fill comprised of silty sand with gravel over native deposits of medium dense silty sand with gravel over very dense sandstone.

Groundwater: No groundwater seepage was encountered at two test pit locations at depths of 7.5 to 8 feet during our subsurface exploration.

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

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the Ferdinand Street Vacant Lot Northwest, Site 9 in Seattle, Washington. The purpose of this evaluation is to assess subsurface conditions and provide geotechnical recommendations for the construction of a housing development. 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 4865 MLK Jr. Way South and 3112 S Ferdinand Street in Seattle, Washington. The approximate location of the site is shown on Figure 1.

The site is currently unoccupied land with some light vegetation. RGI understands that new housing will be constructed on the site.

We expect the structures will be lightly loaded wood frame at grade structures.

3.0 Field Exploration

3.1 Field Exploration

On March 30, 2022, RGI observed the excavation of six test pits. 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.

4.0 Site Conditions

4.1 Surface

The subject site is a triangular-shaped area of land consisting of 2 parcels (1756700120 and 1756700110) totaling approximately 0.17 acres in size. The site is bound to the north by a vacant lot, to the east by Martin Luther King Jr. Way South, to the south by South Ferdinand Street, and to the west by a single-family residence.

The existing site is vacant land covered by trees and other vegetation. The site is relatively flat with an overall elevation difference of approximately 10 feet.

4.2 Geology

Review of the *Geologic Map of Seattle – a Progress Report,* by Kathy G. Troost, etc. (2005) indicates that the soil in the project vicinity is mapped as containing two mapped units. The units include the following: Oligocene aged Blakeley Formation (Tb), which is weakly to moderately lithified, medium- to coarse-grained sandstone, conglomerate and minor siltstone; and Holocene aged lake deposits (Ql), which is predominantly fine grained and horizontally bedded silt and clay with local sand layers, peat and other organic sediments. These descriptions are generally similar to the findings in our field explorations.

4.3 Soils

The soils encountered during field exploration include loose to medium dense fill comprised of silty sand with gravel over native deposits of medium dense silty sand with gravel over very dense sandstone.

More detailed descriptions of the subsurface conditions encountered are presented in the test pit logs included in Appendix A.

4.4 Groundwater

Groundwater seepage was encountered at two test pit locations at depths of 7.5 to 8 feet during our subsurface exploration. The seepage appears to be perched above the underlying sandstone bedrock.

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.

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	47.5580625
Site Longitude	-122.2920193
Short Period Spectral Response Acceleration, S_S (g)	1.487
1-Second Period Spectral Response Acceleration, S_1 (g)	0.516
Adjusted Short Period Spectral Response Acceleration, S_{MS} (g)	1.785
Adjusted 1-Sec Period Spectral Response Acceleration, S_{M1} (g)	0.921[3]
Numeric seismic design value at 0.2 second; S_{DS}(g)	1.19
Numeric seismic design value at 1.0 second; S_{D1}(g)	0.614[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: 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. Test pits extended to a maximum depth of 15 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 assessed the potential for liquefaction of the site's soil during an earthquake. Since the site is underlain by bedrock, RGI considers that the possibility of liquefaction during an earthquake is minimal.

4.6 GEOLOGIC HAZARD AREAS

Regulated geologically hazardous areas include erosion, landslide, earthquake, or other geological hazards. Based on City of Seattle GIS mapping, the site is mapped as containing a 40% or greater steep slope. The slope is located in the southwest corner of the property and is approximately ten feet in height. The slope should be exempt in accordance with 25.09.090.B.2.c.

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 competent native soil or structural fill. Slab-on-grade floors 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

The earthwork is expected to include excavating and backfilling the building foundations and preparing slab 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
- 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 and Subgrade Preparation

Stripping efforts should include removal of pavements, vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. The existing fill will not be suitable for the support of hardscape surfaces or foundations. It may be suitable for use as structural fill provided the debris can be removed and it is free of organics.

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.

5.2.3 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 some 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 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 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 American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (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. Even during dry weather, moisture conditioning (such as, windrowing and drying) of site soils to be reused as structural fill may be required.

The site soils are moisture sensitive and may require moisture conditioning prior to use as structural fill. If on-site soils are or become unusable, it may become necessary to import clean, granular soils to complete site work. 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 to 95 percent of the maximum dry density. The soil's maximum density and optimum moisture should be determined by ASTM D1557. Placement and compaction of structural fill should be observed by RGI.

5.2.5 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 competent 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, the soils should be moisture conditioned and compacted to a firm and unyielding condition.

Table 2 Foundation Design

Design Parameter	Value
Allowable Bearing Capacity	2,000 psf[1]
Friction Coefficient	0.30
Passive pressure (equivalent fluid pressure)	250 pcf[2]

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 5.2.4. The recommended base friction and passive resistance value includes a safety factor of about 1.5.

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.

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 3 Retaining Wall Design

Design Parameter	Value
Allowable Bearing Capacity	2,000 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 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.

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

RGI recommends installing perimeter foundation drains. 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

Infiltration testing was not included in our scope. The site soils are generally not suitable for infiltration of stormwater.

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.

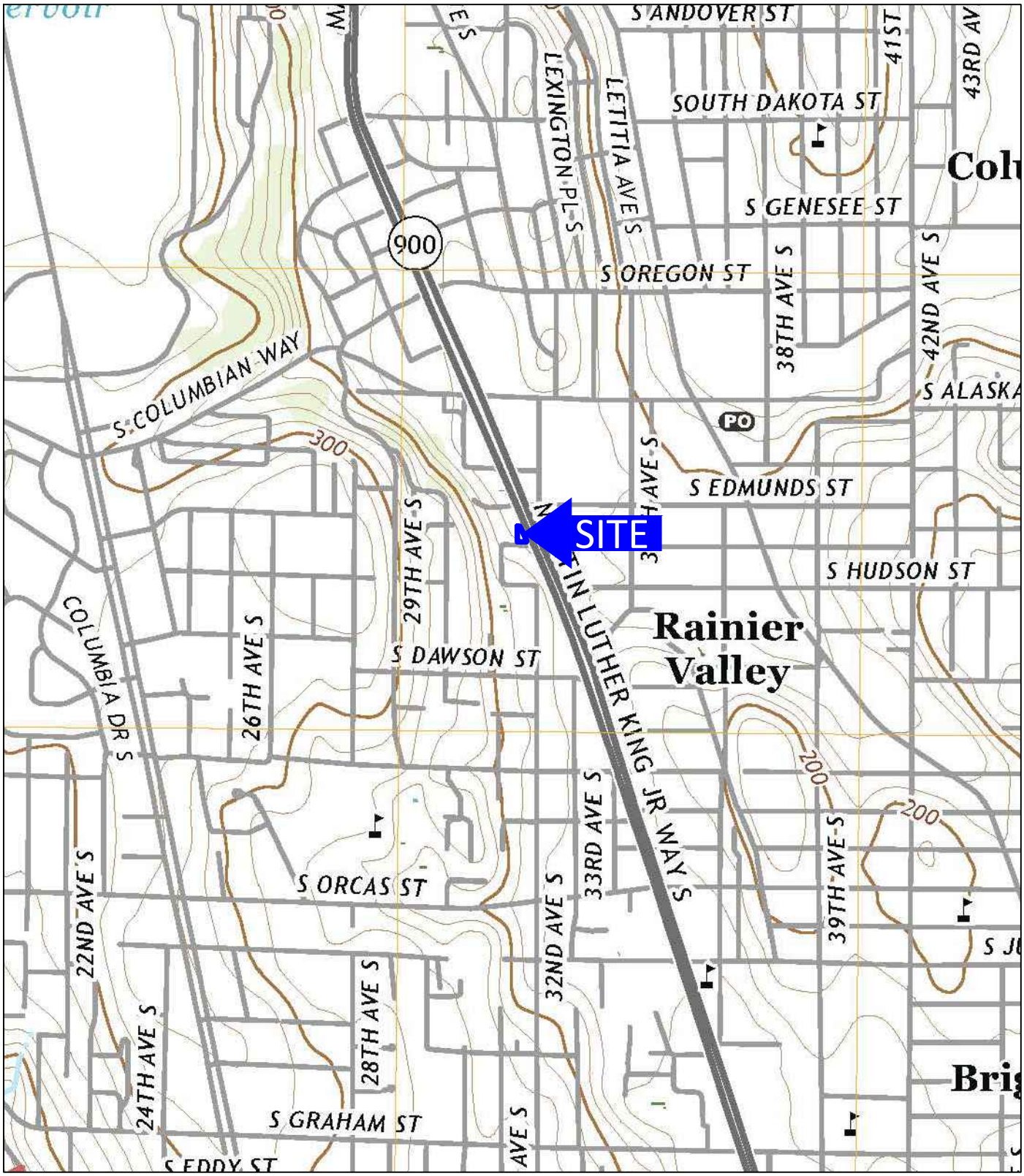
RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations 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, City of Seattle, Office of Housing, 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 Ferdinand Street Vacant Lot Northwest, Site 9 project in Seattle, Washington, and for the exclusive use of City of Seattle, Office of Housing 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 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, Seattle South, Washington
7.5-Minute Quadrangle

Approximate Scale: 1"=1000'

0 500 1000 2000

N

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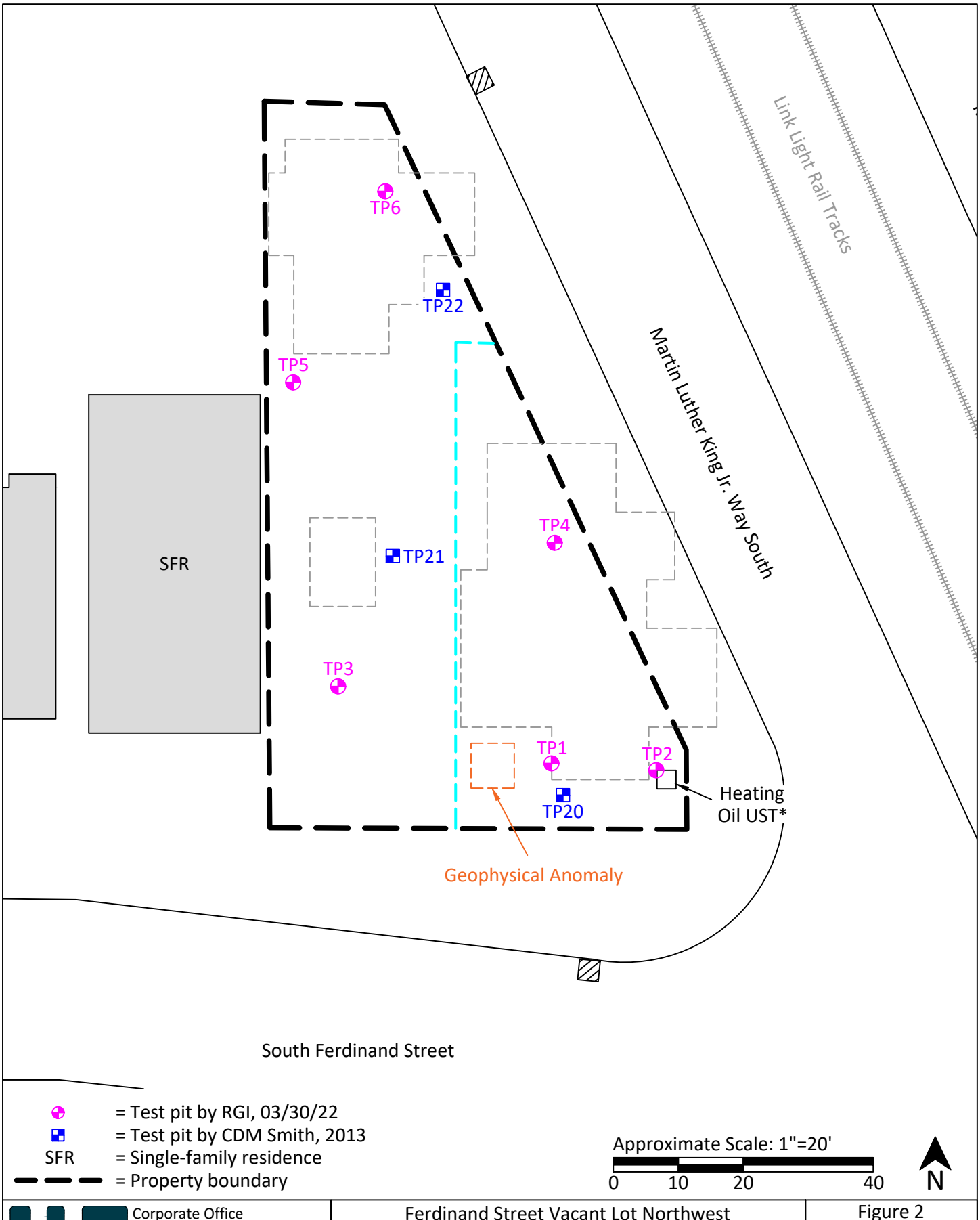
Ferdinand Street Vacant Lot Northwest		Figure 1
RGI Project Number: 2021-552-16	Site Vicinity Map	Date Drawn: 05/2022
Address: 4865 Martin Luther King, Jr. Way S. & 3112 S. Ferdinand St., Seattle, WA 98108		



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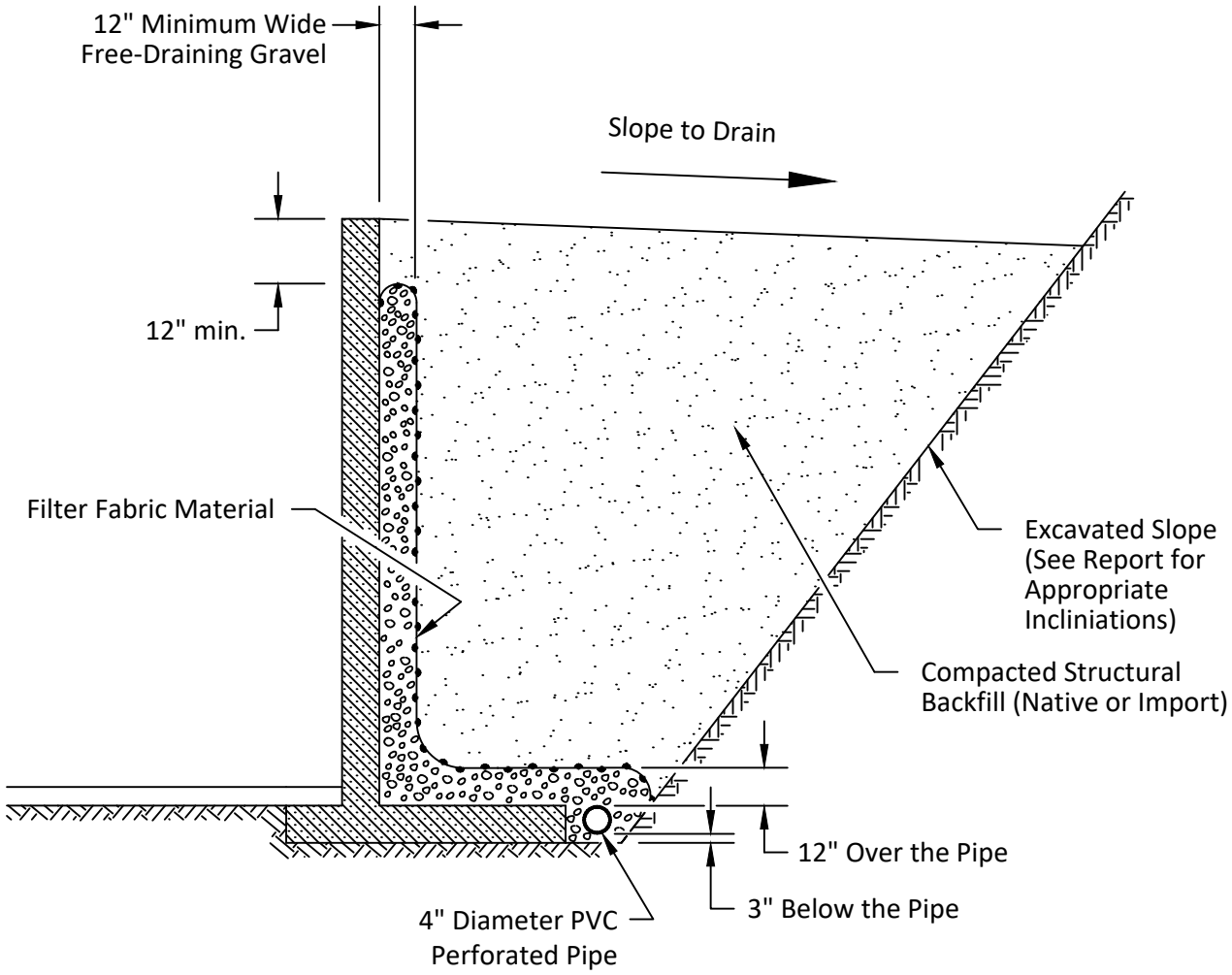
Ferdinand Street Vacant Lot Northwest		Figure 2
RGI Project Number: 2021-552-16	Geotechnical Exploration Plan	Date Drawn: 05/2022
Address: 4865 Martin Luther King, Jr. Way S. & 3112 S. Ferdinand St., Seattle, WA 98108		



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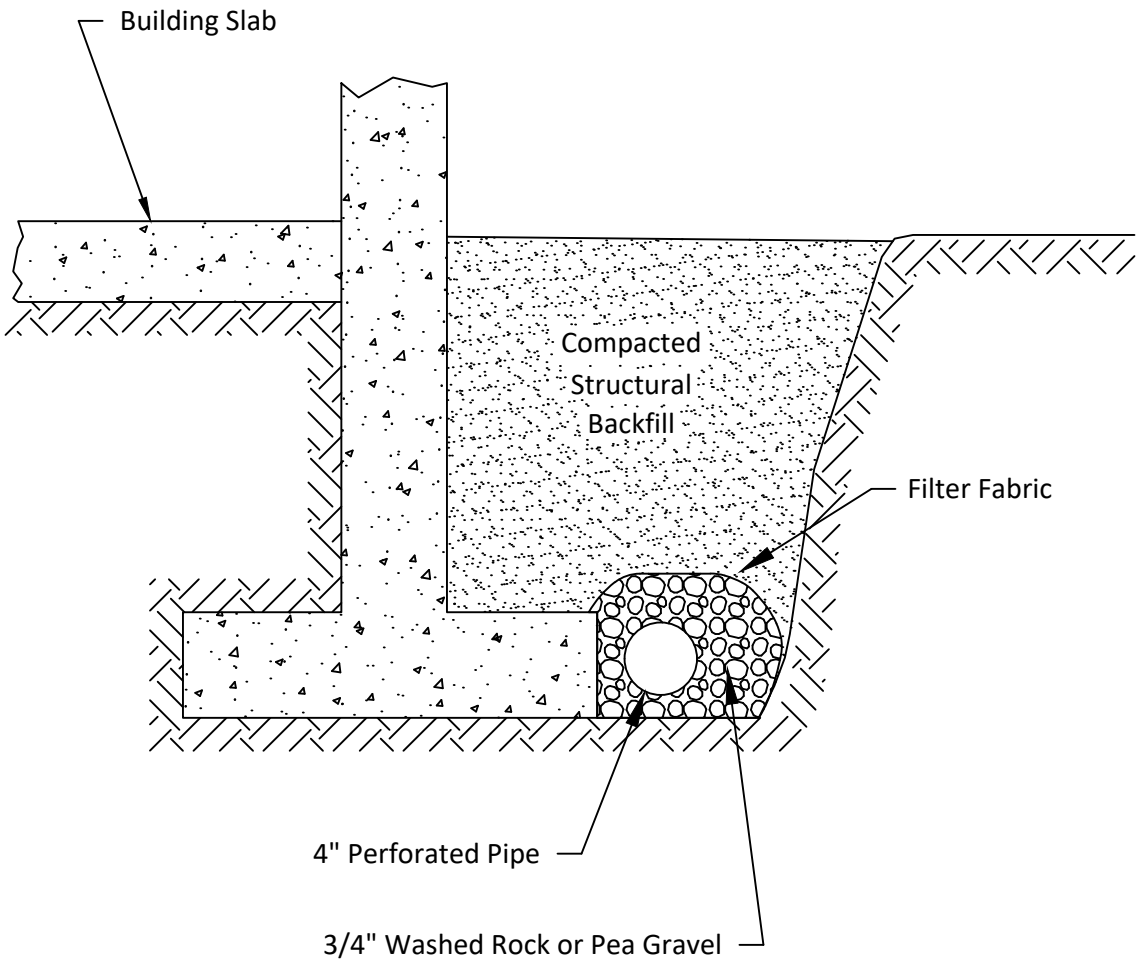
Ferdinand Street Vacant Lot Northwest		Figure 3
RGI Project Number: 2021-552-16	Retaining Wall Drainage Detail	Date Drawn: 05/2022
Address: 4865 Martin Luther King, Jr. Way S. & 3112 S. Ferdinand St., Seattle, WA 98108		



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Ferdinand Street Vacant Lot Northwest		Figure 4
RGI Project Number: 2021-552-16	Typical Footing Drain Detail	Date Drawn: 05/2022
Address: 4865 Martin Luther King, Jr. Way S. & 3112 S. Ferdinand St., Seattle, WA 98108		

APPENDIX A
FIELD EXPLORATION

On March 30, 2022, RGI performed field explorations using a backhoe. We explored subsurface soil conditions at the site by observing the excavation of six test pits to a maximum depth of 15 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).

Project Name: **Ferdinand Street Vacant Lot Northwest - Site 9**
Project Number: **2021-552-16**
Client: **City of Seattle, Office of Housing**

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Test Pit No.: TP1

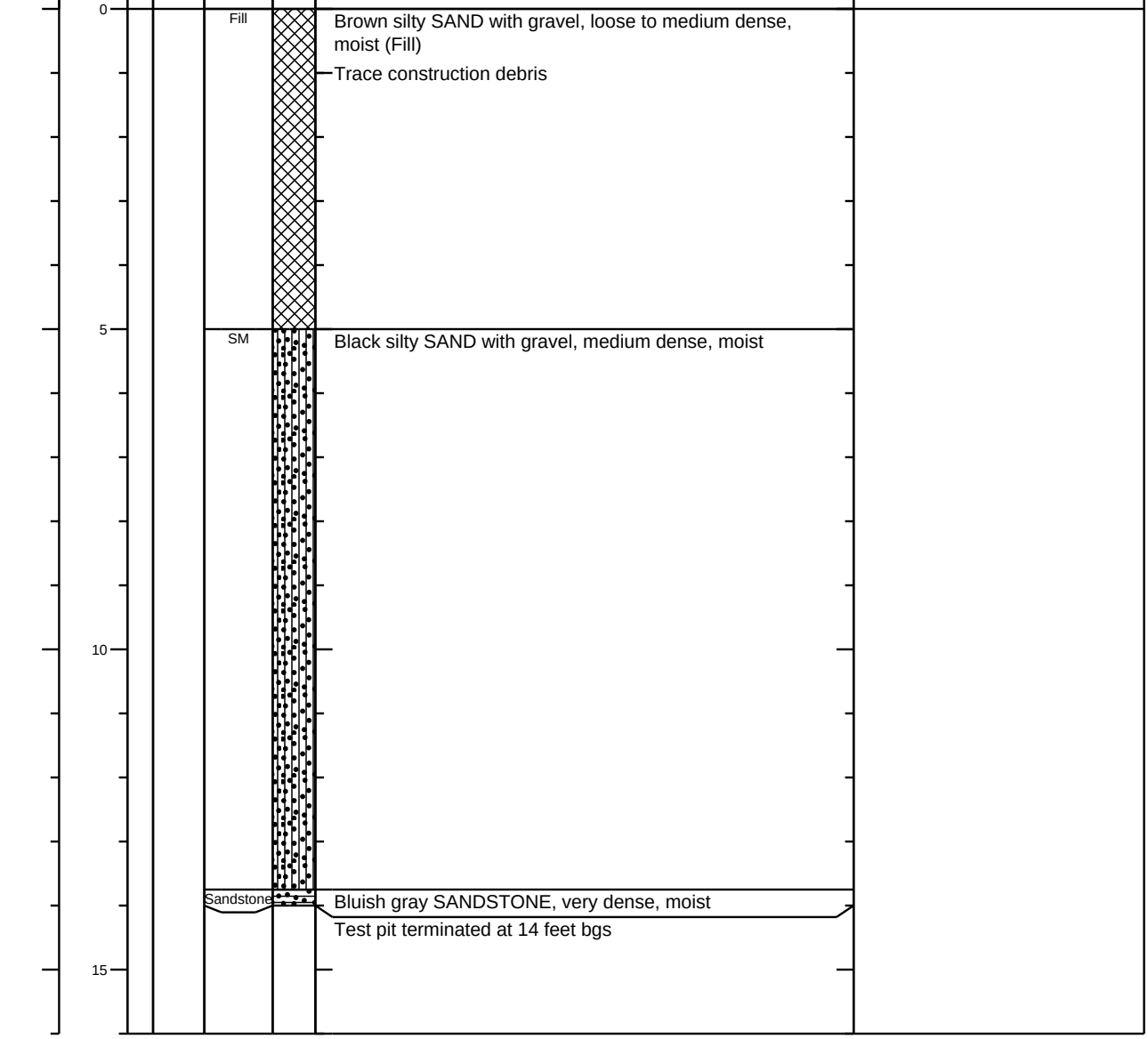
Sheet 1 of 1

Date(s) Excavated: **03/30/22**	Logged By **JD/SK**	Surface Conditions: **Grass**
Excavation Method: **Excavation**	Bucket Size: **N/A**	Total Depth of Excavation: **14 feet bgs**
Excavator Type: **Mini-Excavator**	Excavating Contractor: **Kelly's Excavation**	Approximate Surface Elevation **N/A**
Groundwater Level: **Not Encountered**	Sampling Method(s)	Compaction Method **N/A**
Test Pit Backfill: **Cuttings**	Location **4865 MLK Jr. Way South and 3112 S Ferdinand Street, Seattle, Washington 98108**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			Fill		Brown silty sandy GRAVEL, loose to medium dense, moist (Fill) Contains bricks and construction debris	
				Fill		Brown silty SAND with some gravel, medium dense, moist (Fill) Contains bricks and construction debris	
	5						
				SM		Reddish brown silty SAND with gravel, medium dense, moist	
	10						
						Test pit terminated at 14 feet bgs	
	15						

Project Name: **Ferdinand Street Vacant Lot Northwest - Site 9** Project Number: **2021-552-15** Client: **City of Seattle, Office of Housing**	RILEYGROUP Test Pit No.: TP2 **Sheet 1 of 1**

Date(s) Excavated: **03/30/22**	Logged By **JD/SK**	Surface Conditions: **Grass**
Excavation Method: **Excavation**	Bucket Size: **N/A**	Total Depth of Excavation: **14 feet bgs**
Excavator Type: **Mini-Excavator**	Excavating Contractor: **Kelly's Excavation**	Approximate Surface Elevation **N/A**
Groundwater Level: **Not Encountered**	Sampling Method(s)	Compaction Method **N/A**
Test Pit Backfill: **Cuttings**	Location **4865 MLK Jr. Way South and 3112 S Ferdinand Street, Seattle, Washington 98108**	



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

Project Name: **Ferdinand Street Vacant Lot Northwest - Site 9**
Project Number: **2021-552-15**
Client: **City of Seattle, Office of Housing**

RILEYGROUP

Test Pit No.: TP3

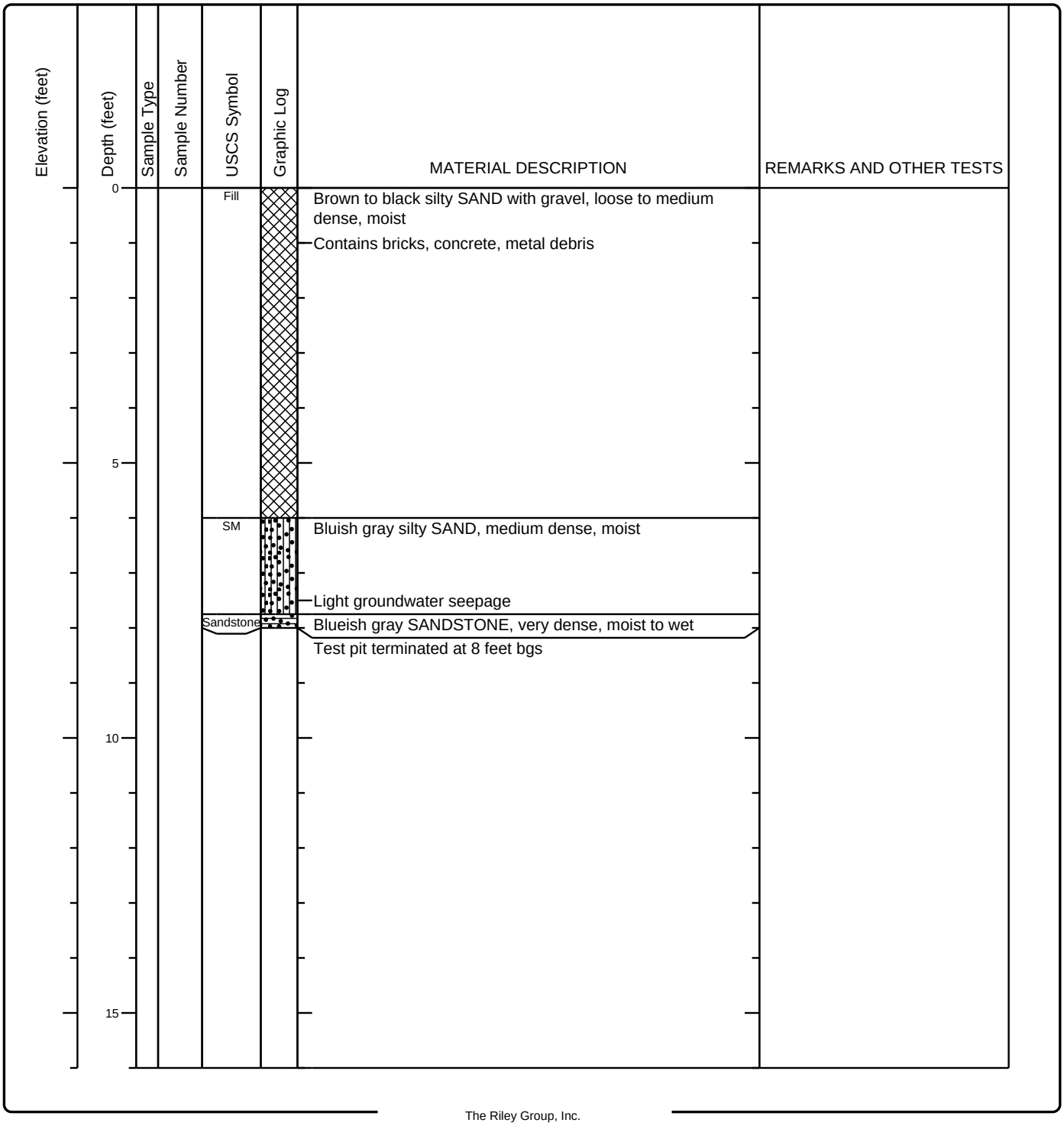
Sheet 1 of 1

Date(s) Excavated: **03/30/22**	Logged By **JD/SK**	Surface Conditions: **Grass**
Excavation Method: **Excavation**	Bucket Size: **N/A**	Total Depth of Excavation: **5 feet bgs**
Excavator Type: **Mini-Excavator**	Excavating Contractor: **Kelly's Excavation**	Approximate Surface Elevation **N/A**
Groundwater Level: **Not Encountered**	Sampling Method(s)	Compaction Method **N/A**
Test Pit Backfill: **Cuttings**	Location **4865 MLK Jr. Way South and 3112 S Ferdinand Street, Seattle, Washington 98108**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			SM		Reddish brown silty SAND with gravel, loose to medium dense, moist	
						Becomes brown, medium dense	
	5					Test pit terminated at 5 feet bgs	
	10						
	15						

Project Name: **Ferdinand Street Vacant Lot Northwest - Site 9**	Test Pit No.: TP4
Project Number: **2021-552-15**	**Sheet 1 of 1**
Client: **City of Seattle, Office of Housing**	

Date(s) Excavated: **03/30/22**	Logged By **JD/SK**	Surface Conditions: **Grass**
Excavation Method: **Excavation**	Bucket Size: **N/A**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Mini-Excavator**	Excavating Contractor: **Kelly's Excavation**	Approximate Surface Elevation **N/A**
Groundwater Level: **Seepage at 7.5'**	Sampling Method(s)	Compaction Method **N/A**
Test Pit Backfill: **Cuttings**	Location **4865 MLK Jr. Way South and 3112 S Ferdinand Street, Seattle, Washington 98108**	



Project Name: **Ferdinand Street Vacant Lot Northwest - Site 9**	Test Pit No.: TP5
Project Number: **2021-552-15**	**Sheet 1 of 1**
Client: **City of Seattle, Office of Housing**	

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Date(s) Excavated: **03/30/22**	Logged By **JD/SK**	Surface Conditions: **Grass**
Excavation Method: **Excavation**	Bucket Size: **N/A**	Total Depth of Excavation: **9 feet bgs**
Excavator Type: **Mini-Excavator**	Excavating Contractor: **Kelly's Excavation**	Approximate Surface Elevation **N/A**
Groundwater Level: **Seepage at 8'**	Sampling Method(s)	Compaction Method **N/A**
Test Pit Backfill: **Cuttings**	Location **4865 MLK Jr. Way South and 3112 S Ferdinand Street, Seattle, Washington 98108**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0			SM		Brown silty SAND with gravel, loose to medium dense, moist	
						Becomes medium dense	
	5			SM		Reddish brown silty SAND with gravel, medium dense, moist	
						Light groundwater seepage	
				Sandstone		Bluish gray SANDSTONE, very dense, moist	
						Test pit terminated at 9 feet bgs	
	10						
	15						

Project Name: **Ferdinand Street Vacant Lot Northwest - Site 9**
Project Number: **2021-552-15**
Client: **City of Seattle, Office of Housing**

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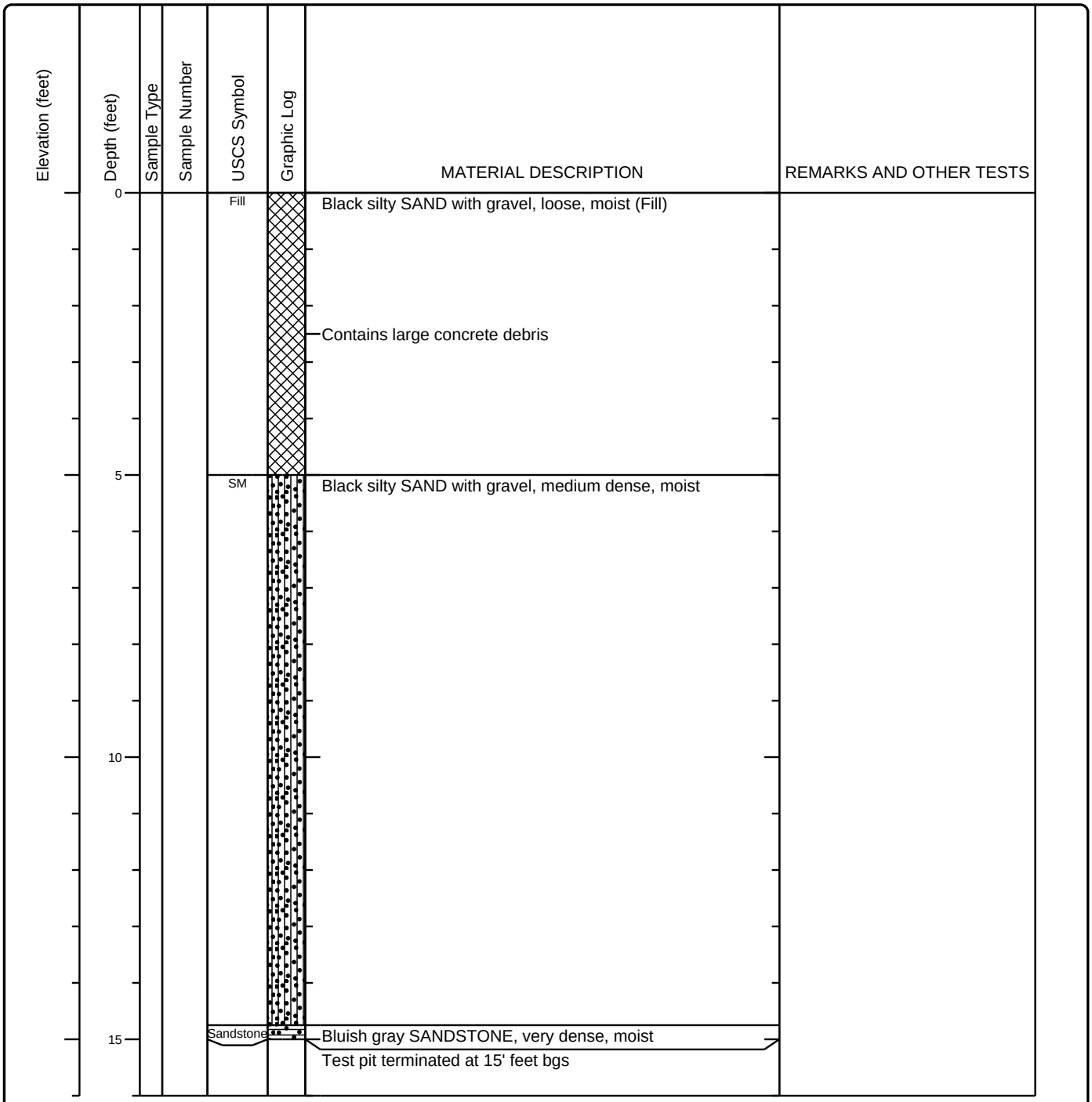
Test Pit No.: TP6

Sheet 1 of 1

Date(s) Excavated: **03/30/22**	Logged By **JD/SK**	Surface Conditions: **Grass**
Excavation Method: **Excavation**	Bucket Size: **N/A**	Total Depth of Excavation: **15 feet bgs**
Excavator Type: **Mini-Excavator**	Excavating Contractor: **Kelly's Excavation**	Approximate Surface Elevation **N/A**
Groundwater Level: **Not Encountered**	Sampling Method(s)	Compaction Method **N/A**
Test Pit Backfill: **Cuttings**	Location **4865 MLK Jr. Way South and 3112 S Ferdinand Street, Seattle, Washington 98108**	



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

Project Name: **Ferdinand Street Vacant Lot Northwest - Site 9**
Project Number: **2021-552-16**
Client: **City of Seattle, Office of Housing**

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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
Sandstone
Silty SAND (SM)

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.