GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

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

PREPARED FOR:

ILDIKO KOVES
7901 SOUTHEAST 65TH STREET
MERCER ISLAND, WASHINGTON 98040

RGI PROJECT NO. 2024-242-1

KOVES DADU
7901 SOUTHEAST 65TH STREET
MERCER ISLAND, WASHINGTON

AUGUST 26, 2024

Corporate Office: *17522 Bothell Way Northeast, Bothell, WA 98011*
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August 26, 2024

Ildiko Koves
7901 Southeast 65th Street
Mercer Island, Washington 98040

Subject: **Geotechnical Engineering Report**
Koves DADU
7901 Southeast 65th Street
Mercer Island, Washington
RGI Project No. 2024-242-1

Dear Ildiko Koves:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the Koves DADU located at 7901 Southeast 65th Street, Mercer Island, Washington. Our services were completed in accordance with our proposal dated August 6, 2024, and authorized by you on August 13, 2024. 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 August 15, 2024.

RGI recommends that you submit the project plans 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.

08/26/2024

Elizabeth Wratten, LG
Project Geologist

08/26/2024

Kristina M. Weller, PE
Principal Geotechnical Engineer

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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 2 test pits to approximate depths of 2 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 dense to dense silty sand with trace gravel.

Groundwater: No groundwater seepage was encountered during our subsurface exploration.

Infiltration: Infiltration at the site is infeasible due to very dense till within 1 foot of the surface, this impermeable barrier prevents water from infiltrating into the soil.

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

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

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the Koves DADU in Mercer Island, Washington. The purpose of this evaluation is to assess subsurface conditions and provide geotechnical recommendations for the construction of a Detached Auxiliary Dwelling Unit (DADU). 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 final design drawings 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 7901 Southeast 65th Street in Mercer Island, Washington. The approximate location of the site is shown on Figure 1.

The site is currently a single-family residence surrounded by trees and other vegetation. RGI understands that a DADU will be constructed on the site, in the southeast corner.

At the time of preparing this GER, building plans were not available for our review. Based on our experience with similar construction, RGI anticipates that the proposed building will be supported on perimeter walls with bearing loads of two to four kips per linear foot. Slab-on-grade floor loading of 150 pounds per square foot (psf) are expected.

3.0 Field Exploration and Laboratory Testing

3.1 FIELD EXPLORATION

On August 15, 2024, RGI observed the excavation of 2 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 exploration as well as our interpretation of the subsurface conditions between samples. The test pit logs included in Appendix A represent an interpretation of the field logs and include modifications based on laboratory observation and analysis of the samples.

3.2 Laboratory Testing

During the field 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 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 a roughly pentangular-shaped parcel of land approximately 0.32 acres in size. The site is bound to the north by Southeast 65th Street, to the east by 80th Avenue Southeast, to the south by residential property, and to the west by West Mercer Way.

The existing site is a single family residence surrounded by trees and other vegetation. The site is relatively flat with an overall elevation difference less than 10 feet.

4.2 Geology

Review of the *Geologic Map of Surficial Deposits in the Seattle 30' by 60' Quadrangle, Washington,* by James C. Yount, et al. (1993) indicates that the soil in the project vicinity is mapped as Vashon till (Qvt), which is light to dark gray, nonsorted, nonstratified mixture of clay, silt, sand, and gravel. The deposit is generally very dense and impermeable. These descriptions are generally similar to the findings in our field explorations.

4.3 Soils

The soils encountered during field exploration include dense to very dense silty sand with trace gravel. More detailed descriptions of the subsurface conditions encountered are presented in the test pits included in Appendix A. Sieve analysis was performed on selected soil samples. Grain size distribution curves are included in Appendix A.

4.4 Groundwater

No groundwater seepage was encountered during our subsurface exploration. 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.

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	47.5450629
Site Longitude	-122.2327897
Short Period Spectral Response Acceleration, S_S (g)	1.468
1-Second Period Spectral Response Acceleration, S_1 (g)	0.508
Adjusted Short Period Spectral Response Acceleration, S_{MS} (g)	1.468
Adjusted 1-Sec Period Spectral Response Acceleration, S_{M1} (g)	Null[3]
Numeric seismic design value at 0.2 second; S_{DS}(g)	0.978
Numeric seismic design value at 1.0 second; S_{D1}(g)	Null[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 2 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 $T \leq 1.5T_s$ 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 site is underlain by glacial till, 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 the King County iMap GIS mapping, the site does not contain geologically hazardous areas.

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

- Minimizing the length and steepness of slopes with exposed soils and cover excavation surfaces with anchored plastic sheeting
- 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 test pits location encountered 3 inches of topsoil and rootmass. Deeper areas of stripping may be required in heavily vegetated areas of the site, however due to the very dense till most of the tree roots were running through the top 3 inches of soil as they could not penetrate lower.

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 dense to dense silty sand with trace 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 1H: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 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). If soils are stockpiled for future reuse and wet weather is anticipated, the stockpile should be protected with plastic sheeting that is securely anchored.

The site soil is 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 suitable soils for structural fill.

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. 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 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.

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 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.

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

5.4 Retaining Walls

If retaining walls are needed for the buildings, RGI recommends cast-in-place concrete walls be used. Modular block walls may be used for grade changes in other areas.

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
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

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

Very dense lodgment till was encountered at depth of approximately one foot below grade in the site explorations. Lodgment till is considered a “restrictive layer” in stormwater infiltration facility design. The shallow depth to the lodgment till (restrictive layer) would make any conventional infiltration facility (infiltration pond, infiltration trench, or infiltration gallery) infeasible due to lack of the required separation distance between the base of these facilities and a restrictive layer, typically 5 feet.

The shallow depth to the restrictive layer would also make Low Impact Development rain gardens/permeable pavement infeasible due to the absence of sufficient thickness of permeable soils below grade in which to construct the rain garden/permeable pavement, in addition to required separation distances from the base of a rain garden/permeable pavement to the restrictive layer.

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 plans in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design plans.

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.

7.0 Limitations

This GER is the property of RGI, Ildiko Koves, 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 Koves DADU project in Mercer Island, Washington, and for the exclusive use of Ildiko Koves 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, Mercer Island, Washington
7.5-Minute Quadrangle

Approximate Scale: 1"=1000'

0 500 1000 2000

N

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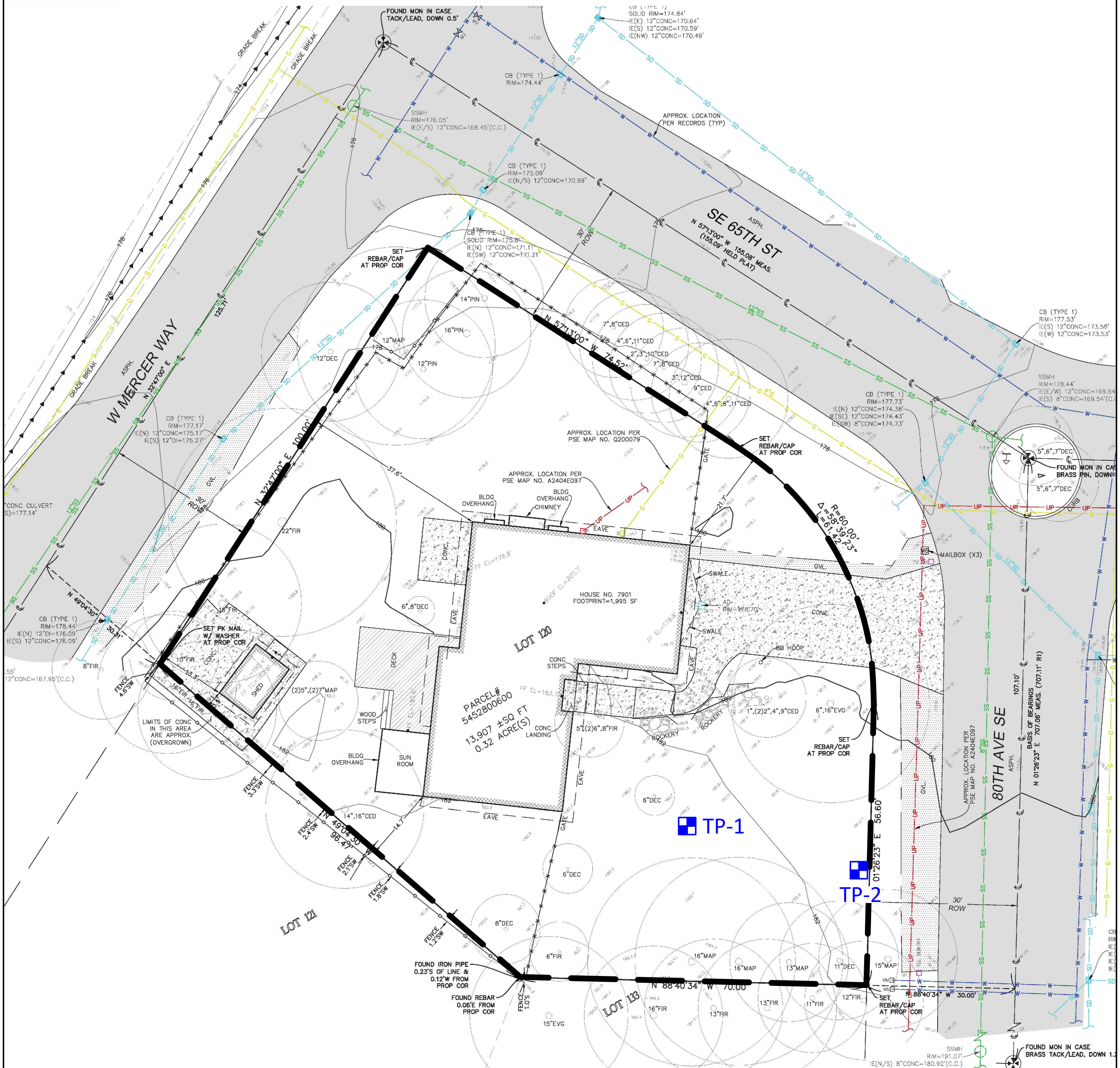
Koves DADU - Cottage		Figure 1
RGI Project Number: 2024-242-1	Site Vicinity Map	Date Drawn: 08/2024
Address: 7901 Southeast 65th Street, Mercer Island, Washington 98040		



= Test pit locations by RGI, 08/15/2024

= Site boundary

Approximate Scale: 1" = 30'

0 15 30 60

N

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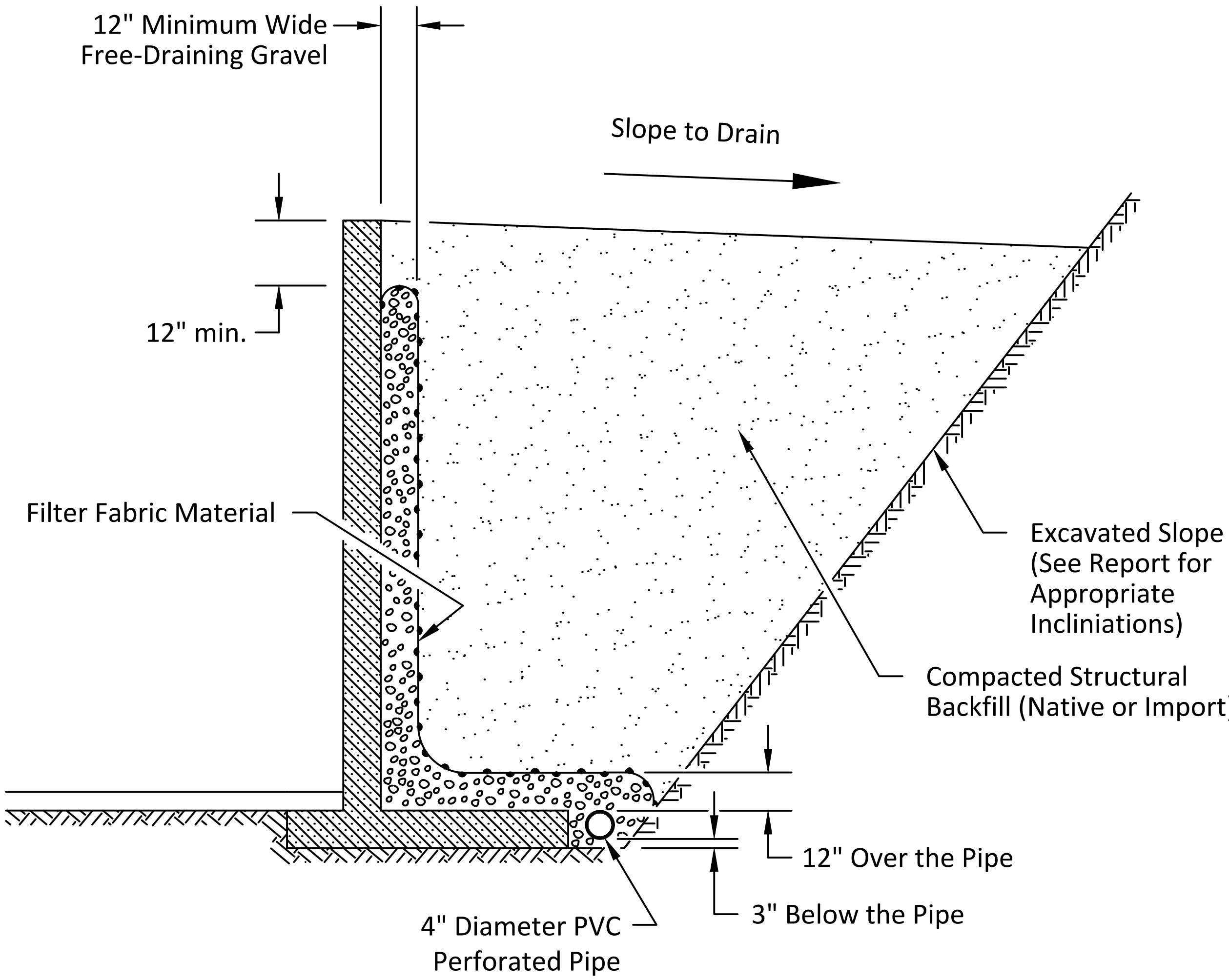
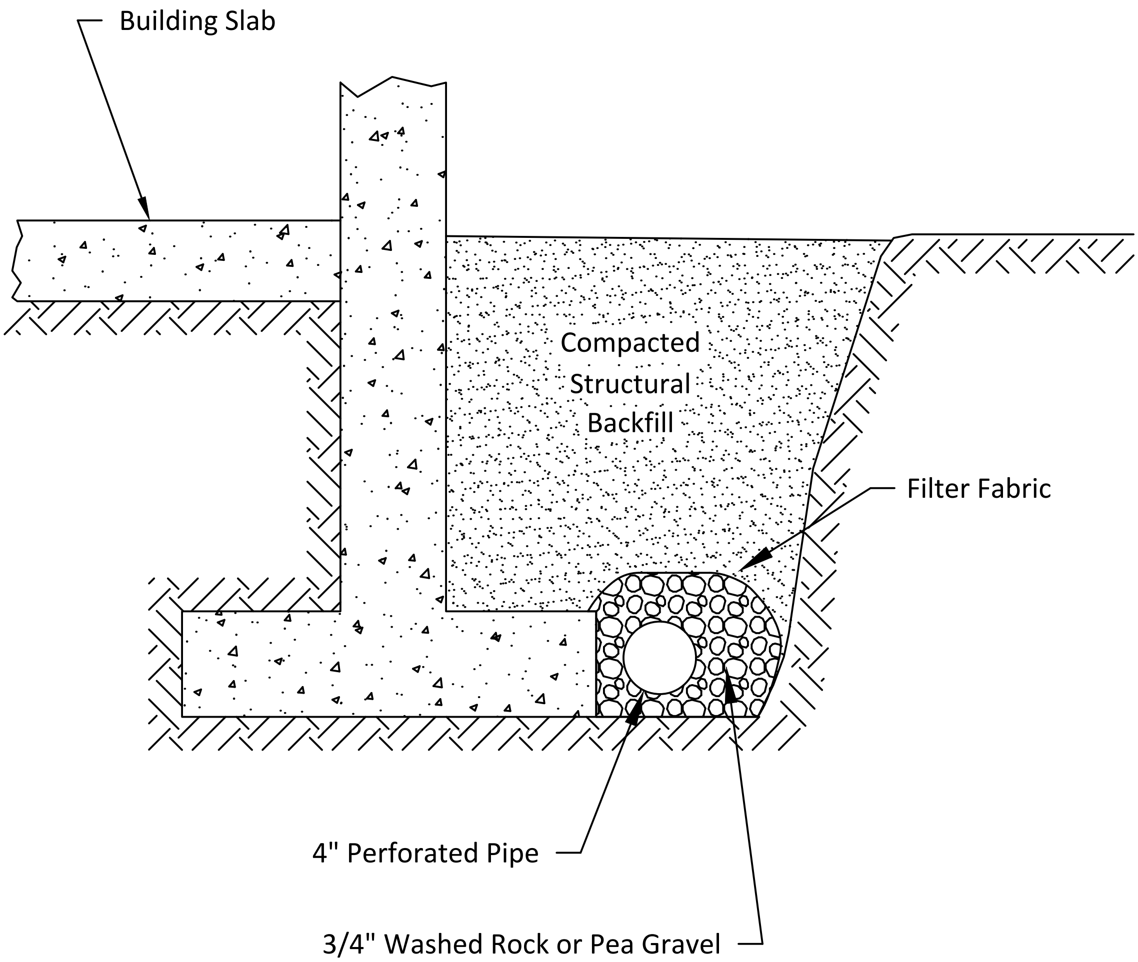
Koves DADU - Cottage		Figure 2
RGI Project Number: 2024-242-1	Geotechnical Exploration Plan	Date Drawn: 08/2024
Address: 7901 Southeast 65th Street, Mercer Island, Washington 98040		



Not to Scale

RILEYGROUP Corporate Office 17522 Bothell Way Northeast Bothell, Washington 98011 Phone: 425.415.0551 Fax: 425.415.0311	Koves DADU - Cottage	Figure 3
RGI Project Number: 2024-242-1	Retaining Wall Drainage Detail	Date Drawn: 08/2024
	Address: 7901 Southeast 65th Street, Mercer Island, Washington 98040	



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Koves DADU - Cottage		Figure 4
RGI Project Number: 2024-242-1	Typical Footing Drain Detail	Date Drawn: 08/2024
Address: 7901 Southeast 65th Street, Mercer Island, Washington 98040		

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

On August 15, 2024, RGI performed field explorations using a rubber tracked mini excavator. We explored subsurface soil conditions at the site by observing the excavation of two test pits to a maximum depth of 2 feet below existing grade. The test pit locations are shown on Figure 2. The exploration 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 test pits 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 one sample.

Project Name: **Koves DADU**	Test Pit No.: TP-1
Project Number: **2024-242-1**	**Sheet 1 of 1**
Client: **Ildiko Koves**	

Date(s) Excavated: **August 15, 2024**	Logged By **LW**	Surface Conditions: **Grass**
Excavation Method: **Excavator**	Bucket Size: **2'**	Total Depth of Excavation: **2 feet bgs**
Excavator Type: **Rubber Tracked**	Excavating Contractor: **Ryatt Construction**	Approximate Surface Elevation **183**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket Tamp**
Test Pit Backfill: **Cuttings**	Location **7901 Southeast 65th Street, Mercer Island, WA**	

Elevation (feet)	Depth (feet)	Sample Type	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines, %
183	0		Tpsl		3 inches of topsoil and rootmass		
			SW-SM		Gray well graded SAND with some silt and trace gravel, moist, dense		
					Becomes very dense		
		Grab				4%	11.9%
					Test pit terminated at 2 feet		
178	5						

Project Name: **Koves DADU** Project Number: **2024-242-1** Client: **Ildiko Koves**	RILEYGROUP # Test Pit No.: TP-2 **Sheet 1 of 1**

Date(s) Excavated: **August 15, 2024**	Logged By **LW**	Surface Conditions: **Grass**
Excavation Method: **Excavator**	Bucket Size: **2'**	Total Depth of Excavation: **1.5 feet bgs**
Excavator Type: **Rubber Tracked**	Excavating Contractor: **Ryatt Construction**	Approximate Surface Elevation **181**
Groundwater Level: **Not Encountered**	Sampling Method(s) **Grab**	Compaction Method **Bucket Tamp**
Test Pit Backfill: **Cuttings**	Location **7901 Southeast 65th Street, Mercer Island, WA**	

Elevation (feet)	Depth (feet)	Sample Type	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines, %
181	0		Tpsl		3 inches of topsoil and rootmass		
			SM		Gray silty SAND with trace gravel, moist, dense		
					Becomes very dense		
		Grab				6%	
					Test pit terminated at 1.5 feet		
176	5						

Project Name: **Koves DADU**	Key to Logs
Project Number: **2024-242-1**	**Sheet 1 of 1**
Client: **Ildiko Koves**	RILEYGROUP

Elevation (feet)	Depth (feet)	Sample Type	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Percent Fines, %
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. USCS Symbol: USCS symbol of the subsurface material.
5. Graphic Log: Graphic depiction of the subsurface material encountered.
6. MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
7. Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
8. Percent Fines, %: The percent fines (soil passing the No. 200 Sieve) in the sample. WA indicates a Wash Sieve, SA indicates a Sieve Analysis.

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)
Well graded SAND with Silt (SW-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, AW)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

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

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

PROJECT TITLE	Koves DADU	**SAMPLE ID/TYPE**	TP-1
PROJECT NO.	2024-242	**SAMPLE DEPTH**	1 feet
TECH/TEST DATE	PL 8/20/2024	**DATE RECEIVED**	8/16/2024

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	1664.8
Wt Dry Soil & Tare (gm)	(w2)	1610.4
Weight of Tare (gm)	(w3)	262.1
Weight of Water (gm)	(w4=w1-w2)	54.4
Weight of Dry Soil (gm)	(w5=w2-w3)	1348.3
Moisture Content (%)	(w4/w5)*100	4

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

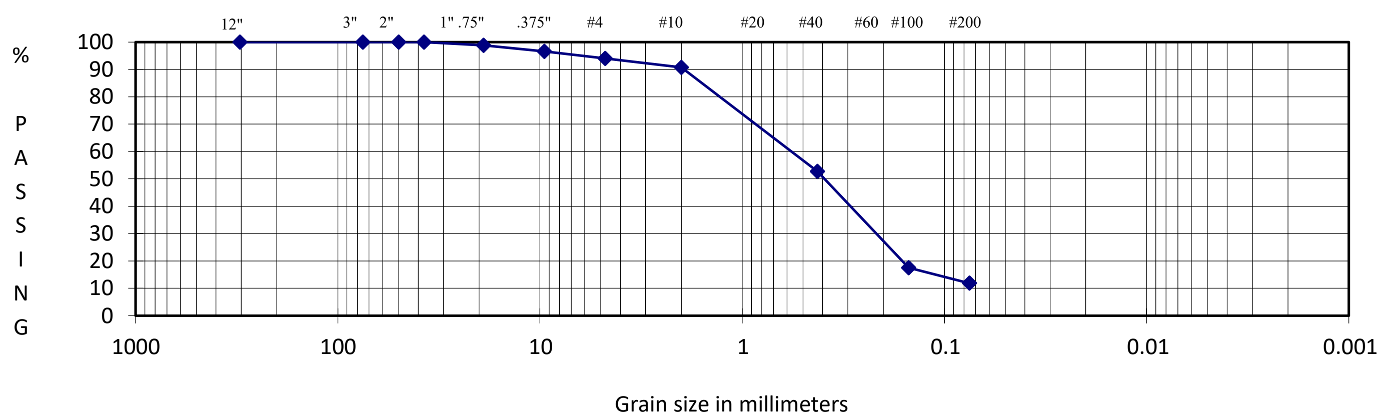
	Weight Of Sample (gm)	1610.4
	Tare Weight (gm)	262.1
(W6)	Total Dry Weight (gm)	1348.3

% COBBLES	0.0
% C GRAVEL	1.1
% F GRAVEL	4.8
% C SAND	3.3
% M SAND	38.0
% F SAND	40.8
% FINES	11.9
% TOTAL	100.0

D10 (mm)	0.06
D30 (mm)	0.21
D60 (mm)	0.56
Cu	9.3
Cc	1.3

SIEVE ANALYSIS

Sieve	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	262.1	0.00	0.00	100.00	cobbles
3.0"	262.1	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"	262.1	0.00	0.00	100.00	coarse gravel
1.5"	262.1	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	277.1	15.00	1.11	98.89	fine gravel
0.50"					fine gravel
0.375"	307.5	45.40	3.37	96.63	fine gravel
#4	342.1	80.00	5.93	94.07	coarse sand
#10	386.9	124.80	9.26	90.74	medium sand
#20					medium sand
#40	899.7	637.60	47.29	52.71	fine sand
#60					fine sand
#100	1373.8	1111.70	82.45	17.55	fine sand
#200	1449.9	1187.80	88.10	11.90	fines
PAN	1610.4	1348.30	100.00	0.00	silt/clay



DESCRIPTION Well graded sand with some silt and trace gravel

USCS SW-SM

Prepared For:
Ildiko Koves

Reviewed By:
KW