TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

October 14, 2022
Revised June 6, 2024
Project No. T-8565

Mr. Tyler Litzenberger
Vector Development Company
11411 Northeast 124th Street Suite 190
Kirkland, Washington 98034

Subject: Geotechnical Engineering Evaluation
Freeman Logistics
48th Street East and Freeman Road East/North Levee Road East and Freeman Road East
Pierce County, Washington

Reference:
1. Geotechnical Report, Freeman Logistics, Freeman Road East and 19th Avenue Northwest, Pierce County, Washington, Project No. T-8565, prepared by Terra Associates, Inc., dated August 11, 2021, revised July 11, 2022

2. Geotechnical Engineering Evaluation, Freeman Logistics, 48th St East and 78th Avenue East, Pierce County, Washington Project No. T-8565, prepared by Terra Associates, dated September 28, 2023

Dear Mr. Litzenberger:

As requested, we have completed a geotechnical engineering evaluation for the Freeman Logistics project in Pierce County, Washington. The purpose of our evaluation was to determine if the existing pavement along 48th Street East, Freeman Road East, and North Levee Road East could be incorporated into the final pavement section for the subject project and to provide a pavement design for future roadway improvements.

In order to determine the existing pavement structure, we completed eight borings along Freeman Road East, north of the intersection with North Levee Road East, four borings along 48th Road East, west of Freeman Road East and two borings at the intersection of North Levee Road East and Freeman Road East. On September 6, 2023, we supplemented the subsurface information along 48th Street East. The approximate location of the test borings is shown on attached Figure 1.

48th Street East

Surface pavement conditions were observed to be in poor condition. Pavement generally had several areas of old patching, large amounts of alligator cracking and lesser amounts of parallel and perpendicular cracking. Pavement appeared to be in marginally better condition heading west.

Surface conditions along 48th Street East consisted of approximately one to two inches of hot mix asphalt (HMA) overlying approximately four to seven inches of crushed rock base (CRB) on top of subgrade soil. The soil subgrade generally consists of loose to medium dense silty sand to sandy silt with various amounts of gravel overlying medium stiff to stiff sandy silt or loose to medium dense silty sand. Test Borings B-103 exposed medium dense sand with silt underlying the stiff silts at a depth of approximately 5 feet.

Freeman Road East

Surface pavement conditions were observed to be in fair condition. Pavement generally had a larger concentration of parallel cracking closer to the intersection of 48th Road East and Freeman Road East with lesser of alligator and perpendicular cracking. Surface pavement conditions appeared to be in relatively good condition closer towards North Levee Road East with few parallel cracks.

Surface conditions along Freeman Road East consisted of approximately four-and-one-half to six inches of HMA overlying subgrade. No CRB was observed in the borings underlying the paved sections of the roadway along Freeman Road East. The soil subgrade generally consists of loose to medium dense silty sand to silty sand with gravel overlying soft to stiff silts. Test Borings B-1 and B-2 exposed medium dense sands underlying the stiff silts at a depth of approximately 6 feet, and Test Borings B-7 and B-8 exposed medium dense to very dense potential fills consisting of silty sand with gravel in the upper approximately 5 feet. We did not observe any silts in Test Borings B-4 and B-5.

North Levee Road East

Surface pavement conditions were observed to be in relatively fair to good condition. Pavement generally had a larger concentration of parallel cracking in the westbound lane, west of Freeman Road East with lesser of alligator and perpendicular cracking. Surface pavement conditions appeared to be in good condition east of Freeman Road East with only minor parallel cracking, typically in the eastbound lane.

Surface conditions along North Levee Road East consisted of approximately 11 to 12 inches of HMA overlying subgrade. Very minor amounts of CRB were observed in the borings. The soil subgrade generally consists of medium dense fill material consisting of silty sand with gravel overlying possible fill material consisting of very loose to medium dense silty sand with gravel or sand with some to trace silt.

RECOMMENDATIONS

48th Street East

In October 2022 it was believed that truck traffic from the proposed Freeman Logistics project would travel from the site down 48th Street East. In May 2024 review of the traffic impact analysis indicates no truck traffic will travel down 48th Street East. Therefore, the pavement section in this area needs to support light passenger vehicles and occasional heavy traffic in the form of garbage collector rigs or buses.

On September 28, 2023, Terra Associates, Inc. published a geotechnical engineering evaluation that discusses the pavement section along 48th Street East that should be placed following the installation of the utilities. This evaluation used an appropriate 18-kip equivalent single axle load (ESAL) of 50,000 for this roadway. Any section of the roadway that is disturbed following the installation of utilities should be restored following the pavement thickness recommendations in the September 28, 2023, geotechnical engineering evaluation. As there is limited additional traffic from the proposed development that will utilize 48th Street East, the repair work is expected to be limited to the utility installation.

Freeman Road East

The existing pavement section along Freeman Road East has sufficient depth to support a grind and overlay option. The asphalt thickness for the grind and overlay option is included in the pavement sections below.

North Levee Road East

The existing pavement section along North Levee Road East would support a grind and overlay option should it be required. We would note that the existing pavement section along North Levee Road East exceeds the pavement sections outlined below and in our opinion is suitable to support the expected traffic loading from the proposed project.

PAVEMENT SECTIONS

48th Street

For areas of the roadway that are impacted by the utility installation but do not expose the soil subgrade, we have completed the following analysis.

The pavement design section is dependent upon the supporting capability of the subgrade soils and the traffic conditions to which it will be subjected. We expect traffic along the roadway will consist of cars and light trucks, along with occasional heavy traffic in the form of buses and garbage collector rigs. Following the American Association of State Highway and Transportation Officials (AASHTO) procedures, we used a design 18-kip equivalent single axle load (ESAL) of 50,000 based on our experience with similar projects. We have assigned a M_r value of 9,000 psi to the native and existing fill soils supporting the pavement section.

We used the Washington State Department of Transportation (WSDOT) structural coefficients of 0.50 for HMA and 0.13 for crushed rock base (CRB) in determining the design of the pavement section. Additional design parameters required for the AASHTO procedure and selected for our analysis include the following:

- Reliability – 90 percent
- Standard deviation – 0.45
- Present serviceability index – 3.5
- Terminal serviceability index – 2.0

Based upon the above parameters, the structural number required to support the design ESAL is 1.98. This equates to four inches of Hot Mix Asphalt (HMA) over GlasPave GP25 over existing asphalt.

Freeman Road

To evaluate the pavement sections, we used the American Association of State Highway and Transportation Officials (AASHTO) procedures. For this procedure, we calculated the structural number required for the pavement section using a design ESAL of 3,000,000. This value is based on estimated traffic data and the City of Fife's Public Works website. We used the structural coefficients of 0.44 for HMA and 0.14 for CRB in determining the pavement section. Additional design parameters required for the AASHTO procedure and selected for our analysis include the following:

- Reliability – 85 percent
- Standard deviation – 0.45
- Present serviceability index – 4.5
- Terminal serviceability index – 2.0

The supporting capability of the pavement subgrade is represented in the AASHTO procedure by the resilient modulus (M_r). Based on our explorations, the subgrade soils that support the roadway consist predominantly of loose to medium dense silty sand to silty sand with gravel and medium stiff to stiff sandy silt material. Based on correlation with published data and our experience with similar soils, we have assigned the subgrade an M_r value of 7,000 pounds per square inch (psi).

The following pavement sections should be used based on existing subgrade conditions:

- Seven inches of new HMA over GlasPave GP25 over two- and one-half inches of existing HMA.

All subgrades must be in a firm, relatively non-yielding condition prior to paving. Pavement subgrade should be proof rolled with heavy rubber-tired equipment such as a loaded dump truck to verify firm and stable conditions are present, prior to paving.

The strength of a pavement section is determined by the sections' structural number. In accordance with the Washington State Department of Transportation (WSDOT) and American Association of State Highway and Transportation Officials (AASHTO) as noted above, the following structural coefficients are to be used for each individual element to determine a pavement sections structural number:

- HMA – 0.44
- Crushed surfacing top course – 0.14
- Gravel Base Rock – 0.14
- Existing HMA – 0.30

Using these coefficients, the structural number for the proposed pavement section is 3.83 (7*0.44+2.5*0.3). The City of Fife standard details would classify Freeman Road as a Minor Arterial (5,000 to 25,000 daily trips). The standard pavement section for a minor arterial is 3 inches of HMA over 2 inches of CRB over 14 inches of gravel base per the City Standards. Using the above coefficients, the structural number for the City's pavement section is 3.56 (3*0.44+2*0.14+14*0.14). As a result, 3.83 is greater than 3.56, making the proposed pavement section stronger than the city standard pavement section. In addition to having a higher structural number, we are proposing to add a layer of GlasPave which will increase the life of the pavement section and the strength of the pavement section. With the higher structural number and GlasPave layer it is our opinion that the proposed pavement section is the preferred section in terms of strength and long-term life of the pavement.

We trust the information presented in this report is sufficient for your current needs. If you have any questions or require additional information, please call.

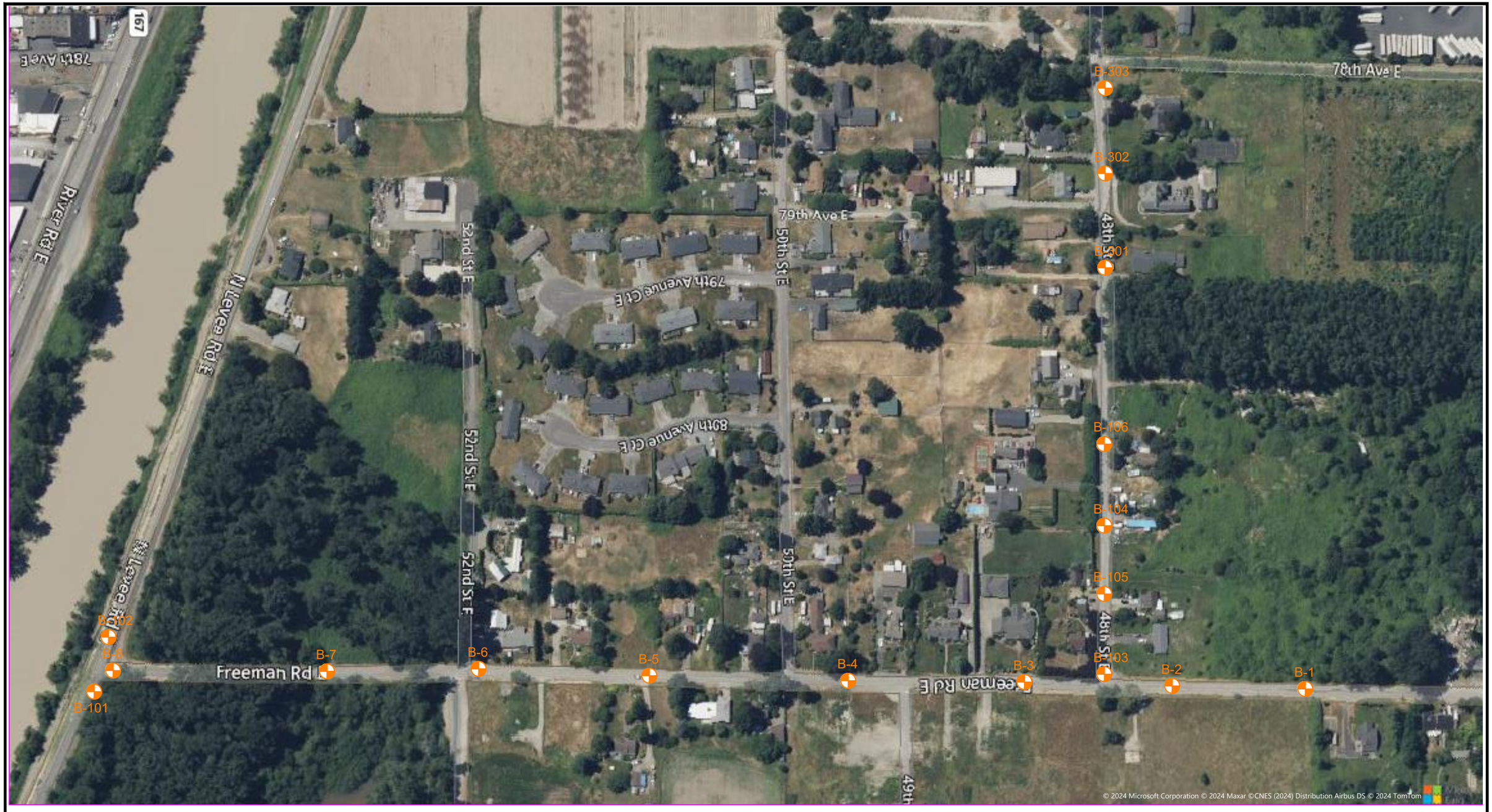
Sincerely yours,
TERRA ASSOCIATES, INC.

CAROLYN S. DECKER
STATE OF WASHINGTON
47016
REGISTERED
PROFESSIONAL ENGINEER

6-6-2024

Carolyn S. Decker, P.E.
President

Enclosures: Figure 1 – Exploration Location Plan
Figures 2 through 18 – Test Boring Logs
Figures 19 through 21 – Grain Size Analyses



NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE: SITE PLAN PROVIDED BY BING MAPS.

LEGEND:

APPROXIMATE BORING LOCATION

0 200 400

APPROXIMATE SCALE IN FEET

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EXPLORATION LOCATION PLAN
FREEMAN LOGISTICS
PUYALLUP, WASHINGTON

Proj.No. T-8565	Date:JUNE 2024	Figure 1

LOG OF BORING NO. B-1

Figure No. 2

Project: Freeman Logistics **Project No:** T-8565 **Date Drilled:** November 3, 2021

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Pierce County, Washington **Depth to Groundwater:** -2.5 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)		Moisture Content (%)
0		(5.5-inches ASPHALT)				
		Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist. (SM)	loose		8	8.0
		Brown to gray SILT, moist to wet, mottled, occasional gravel, occasional organic, occasional sand seam. (ML)	stiff		6	40.6
5					10	34.9
		Blackish-gray SAND, fine to medium sand, moist, interbedded silt seams. (SP)	medium dense			22.7
		Test Boring terminated at approximately 5 feet. Perched groundwater seepage observed at approximately 2.5 feet.				

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-2

Figure No. 3

Project: Freeman Logistics **Project No:** T-8565 **Date Drilled:** November 3, 2021

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Pierce County, Washington **Depth to Groundwater:** 4.5 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)		Moisture Content (%)
0		(4.5-inches ASPHALT) Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist, occasional silt inclusion. (SM)	medium dense		18	8.6
			loose		4	10.2
5		Brown SILT, moist to wet, mottled, occasional sand seam. (ML)	stiff		10	44.3
		Black SAND, fine to medium sand, moist. (SP)	medium dense			14.4
		Test Boring terminated at approximately 5 feet. Perched groundwater seepage observed at approximately 4.5 feet.				

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LOG OF BORING NO. B-3

Figure No. 4

Project: Freeman Logistics **Project No:** T-8565 **Date Drilled:** November 3, 2021

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Pierce County, Washington **Depth to Groundwater:** -2.5 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)		Moisture Content (%)
0		(5-inches ASPHALT) Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist. (SM)	loose		8	7.8
		Brown SILT with sand, fine sand, moist to wet, mottled, occasional gravel. (ML) *No retrievable sample*	medium stiff		4	
5			stiff		9	27.6
		Test Boring terminated at approximately 5 feet. Perched groundwater seepage observed at approximately 2.5 feet.				

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LOG OF BORING NO. B-4

Figure No. 5

Project: Freeman Logistics **Project No:** T-8565 **Date Drilled:** November 3, 2021

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Pierce County, Washington **Depth to Groundwater:** NA **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)		Moisture Content (%)
0		(5-inches ASPHALT)		•	4	6.5
		Brown silty SAND, fine sand, moist, occasional gravel, occasional organic, occasional silt layer. (SM)				24.2
				•	7	10.3
			loose			
5				•	5	11.3
		Test Boring terminated at approximately 5 feet.				
		No groundwater seepage observed.				

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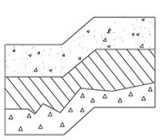

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LOG OF BORING NO. B-5

Figure No. 6

Project: Freeman Logistics **Project No:** T-8565 **Date Drilled:** November 3, 2021

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Pierce County, Washington **Depth to Groundwater:** NA **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)		Moisture Content (%)
0		(5.5-inches ASPHALT)		•	6	5.9
		Brown silty SAND to silty SAND with gravel, fine sand, fine to coarse gravel, moist. (SM)				
				•	4	20.0
			loose			
5				•	6	18.6
		Test Boring terminated at approximately 5 feet.				
		No groundwater seepage observed.				

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LOG OF BORING NO. B-6

Figure No. 7

Project: Freeman Logistics **Project No:** T-8565 **Date Drilled:** November 3, 2021

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Pierce County, Washington **Depth to Groundwater:** NA **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)		Moisture Content (%)
0		(5-inches ASPHALT)				
		Brown silty SAND, fine to coarse sand, moist, mottled, occasional gravel. (SM)	medium dense		18	12.5
			loose		5	12.2
5		Brownish-gray SILT, moist, mottled. (ML)	soft		2	18.5
						50.9
		Test Boring terminated at approximately 5 feet.				
		No groundwater seepage observed.				

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LOG OF BORING NO. B-7

Figure No. 8

Project: Freeman Logistics **Project No:** T-8565 **Date Drilled:** November 3, 2021

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Pierce County, Washington **Depth to Groundwater:** NA **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)		Moisture Content (%)
0		(5-inches ASPHALT)			29	4.1
		FILL?: Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, trace silt inclusions. (SM)	medium dense		11	12.0
5		FILL?: Brown GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, moist. (GP-GM)			7	8.4
		Test Boring terminated at approximately 5 feet. No groundwater seepage observed.				

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LOG OF BORING NO. B-8

Figure No. 9

Project: Freeman Logistics **Project No:** T-8565 **Date Drilled:** November 3, 2021

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Pierce County, Washington **Depth to Groundwater:** NA **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(6-inches ASPHALT)		50/4"	2.4
		FILL?: Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, dry to moist, occasional organic. (SM)	very dense	84	6.0
5		Brown SAND with silt, fine to medium sand, moist, trace gravel. (SP-SM)	medium dense	20	5.5 5.2
		Test Boring terminated at approximately 5 feet. No groundwater seepage observed.			

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LOG OF BORING NO. B-101

Figure No. 10

Project: Freeman Logistics (Offsite Roadway Improvements) **Project No:** T-8565 **Date Drilled:** September 21, 2022

Client: Vector Development Company **Driller:** BoreTec **Logged By:** SLK

Location: Pierce County, Washington **Depth to Groundwater:** N/A **Approx. Elev:** N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(11 inches ASPHALT) (<1-inch BASE COURSE) FILL: Brown grading to brown-orange silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, some crushed rock fragments. (SM)	Medium Dense		5.1
		FILL: Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist. (SM)		15	8.9
					5.4
			Loose	8	
5				5	4.7
		Test Boring terminated at approximately 6.5 feet. No groundwater seepage observed.			

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LOG OF BORING NO. B-102

Figure No. 11

Project: Freeman Logistics (Offsite Roadway Improvements) **Project No:** T-8565 **Date Drilled:** September 21, 2022

Client: Vector Development Company **Driller:** BoreTec **Logged By:** SLK

Location: Pierce County, Washington **Depth to Groundwater:** N/A **Approx. Elev:** N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(12 inches ASPHALT) (<1-inch BASE COURSE) FILL: Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, trace brick debris. (SM)	Medium Dense		8.2
		FILL (?): Dark gray SAND with silt and gravel, moist, fine to coarse sand, fine to coarse gravel. (SP-SM)		20	3.5
		*4-inch layer of intermixed light gray silty sand and crushed rock observed at approximately 3 feet.	Very Loose	3	5.1 4.0
		FILL (?): Dark gray SAND with grading to trace silt, fine to medium sand, moist, scattered gravel. (SP-SM/SP)			
5			Medium Dense	13	5.0
		Test Boring terminated at approximately 6.5 feet. No groundwater seepage observed.			

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LOG OF BORING NO. B-103

Figure No. 12

Project: Freeman Logistics (Offsite Roadway Improvements) **Project No:** T-8565 **Date Drilled:** September 21, 2022

Client: Vector Development Company **Driller:** BoreTec **Logged By:** SLK

Location: Pierce County, Washington **Depth to Groundwater:** N/A **Approx. Elev:** N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(1-inch ASPHALT) (2 inches SILTY SAND) (5 inches BASE COURSE)			
		FILL: Dark brown silty SAND, fine to medium sand, moist, scattered gravel. (SM)			19.0
		Gray and brown sandy SILT, fine to medium sand, moist, mottled. (ML)		7	30.6
			Loose		32.7
				6	
5					26.5
		Brown SAND with silt, fine to medium sand, moist. (SP-SM)	Medium Dense	12	6.8
		Test Boring terminated at approximately 6.5 feet. No groundwater seepage observed.			

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LOG OF BORING NO. B-104

Figure No. 13

Project: Freeman Logistics (Offsite Roadway Improvements) **Project No:** T-8565 **Date Drilled:** September 21, 2022

Client: Vector Development Company **Driller:** BoreTec **Logged By:** SLK

Location: Pierce County, Washington **Depth to Groundwater:** N/A **Approx. Elev:** N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(1-inch ASPHALT) (3 inches GRAVEL BASE COURSE) (4 inches SAND BASE COURSE)			
		FILL: Brown sandy SILT, fine to medium sand, moist. (ML)			20.2
		FILL (?): Brown-gray silty SAND, fine to medium sand, moist. (SM)			
		Brown-gray SILT with sand, fine sand, moist. (ML)		5	17.5
					34.2
		Bedded layers of gray and orange sandy SILT, brown SAND with silt and brown-gray silty SAND, fine to medium sand, moist, heavily mottled. (ML/SP-SM/SM)			30.2
			Loose	6	
5					30.5
				5	
		Test Boring terminated at approximately 6.5 feet. No groundwater seepage observed.			

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LOG OF BORING NO. B-105

Figure No. 14

Project: Freeman Logistics (Offsite Roadway Improvements) **Project No:** T-8565 **Date Drilled:** September 21, 2022

Client: Vector Development Company **Driller:** BoreTec **Logged By:** SLK

Location: Pierce County, Washington **Depth to Groundwater:** N/A **Approx. Elev:** N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(1.5 inches ASPHALT) (4 inches BASE COURSE)			
		FILL: Black silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist. (SM)			17.5
		Intermixed gray-brown grading to dark gray sandy SILT and silty SAND, fine to medium sand, moist, mottled, scattered gravel. (ML/SM)	Loose to Medium Dense	10	23.4
					20.2
		Gray to gray-brown SILT, moist to wet, moderatly to heavily mottled, trace sand. (ML) (97.8% F)		5	41.4
			Medium Stiff		
5					37.8
		*Approximate 1-inch layer of gray silty sand observed at about 5.5 feet.		6	
		Test Boring terminated at approximately 6.5 feet. No groundwater seepage observed. Soils below approximately 3 feet were noted to be slightly wetter.			

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LOG OF BORING NO. B-106

Figure No. 15

Project: Freeman Logistics (Offsite Roadway Improvements) **Project No:** T-8565 **Date Drilled:** September 21, 2022

Client: Vector Development Company **Driller:** BoreTec **Logged By:** SLK

Location: Pierce County, Washington **Depth to Groundwater:** N/A **Approx. Elev:** N/A

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(2 inches ASPHALT) (4 inches BASE COURSE) FILL (?): Dark gray sandy SILT to silty SAND, fine to medium sand, moist, scattered gravel. (ML/SM)			28.1
		Bedded layers of gray-brown sandy SILT and silty SAND, fine to medium sand, moist, trace to some mottling. (ML/SM)	Loose to Medium Dense	10	15.2
					35.3
			Loose	5	
5					23.7
				9	
		Test Boring terminated at approximately 6.5 feet. No groundwater seepage observed. Soils at approximately 3 feet were noted to be slightly wetter.			

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-301

Figure No. 16

Project: Freeman Logistics - 48th St E **Project No:** T-8565 **Date Drilled:** September 6, 2023

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Fife, Washington **Depth to Groundwater:** 9.5 feet **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(1-inch HOT MIX ASPHALT)			
		Brown SAND with silt, fine to medium sand, dry, trace silt seams. (SP-SM)	Medium Dense		13.0
		Brown sandy SILT, fine to medium SAND, dry, occasional silt layer. (ML)	Loose	7	28.6
5		Gray SILT, moist, mottled. (ML)	Medium Stiff	5	34.5
		Gray SAND with silt, moist, interbedded silt seams. (SP-SM)	Medium Dense	14	18.6
		Gray SAND, fine to coarse sand, wet, occasional silt seam. (SP)			
10				13	24.5
		Test Boring terminated at approximately 10 feet. Groundwater seepage observed at approximately 9.5 feet.			

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-302

Figure No. 17

Project: Freeman Logistics - 48th St E **Project No:** T-8565 **Date Drilled:** September 6, 2023

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Fife, Washington **Depth to Groundwater:** 7 feet **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)	Moisture Content (%)
0		(1-inch HOT MIX ASPHALT)	Loose		27.2
		FILL: Gray SAND with silt and gravel, fine to coarse sand, fine to coarse gravel, dry. (SP-SM)			
		Gray SILT, moist, mottled, interbedded sand with silt layers and silty sand seams. (ML)	Medium Stiff	4	37.4
5			Stiff	13	23.5
		Gray silty SAND, fine to medium sand, wet, interbedded silt seams. (SM)	Loose	7	28.1
10				8	30.2
		Test Boring terminated at approximately 10 feet. Groundwater seepage observed at approximately 7 feet.			

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-303

Figure No. 18

Project: Freeman Logistics - 48th St E **Project No:** T-8565 **Date Drilled:** September 6, 2023

Client: Vector Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Fife, Washington **Depth to Groundwater:** 7 feet **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		(2-inches HOT MIX ASPHALT) FILL: Gray silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, dry. (GM)	Very Dense		5.1
		Grayish-brown silty SAND, fine to medium sand, moist, occasional silt layer. (SM)	Loose	6	17.7
5		Gray SILT, moist, slightly mottled, occasional small-sized organic fragment, interbedded silty sand seams. (ML)	Medium Stiff	7	34.7
		Gray SILT with sand, fine to medium sand, moist to wet. (ML)		4	29.5
10		Gray SILT, moist to wet, interbedded silty sand layers. (ML)	Stiff	14	29.0
		Test Boring terminated at approximately 10 feet. Groundwater seepage observed at approximately 7 feet.			

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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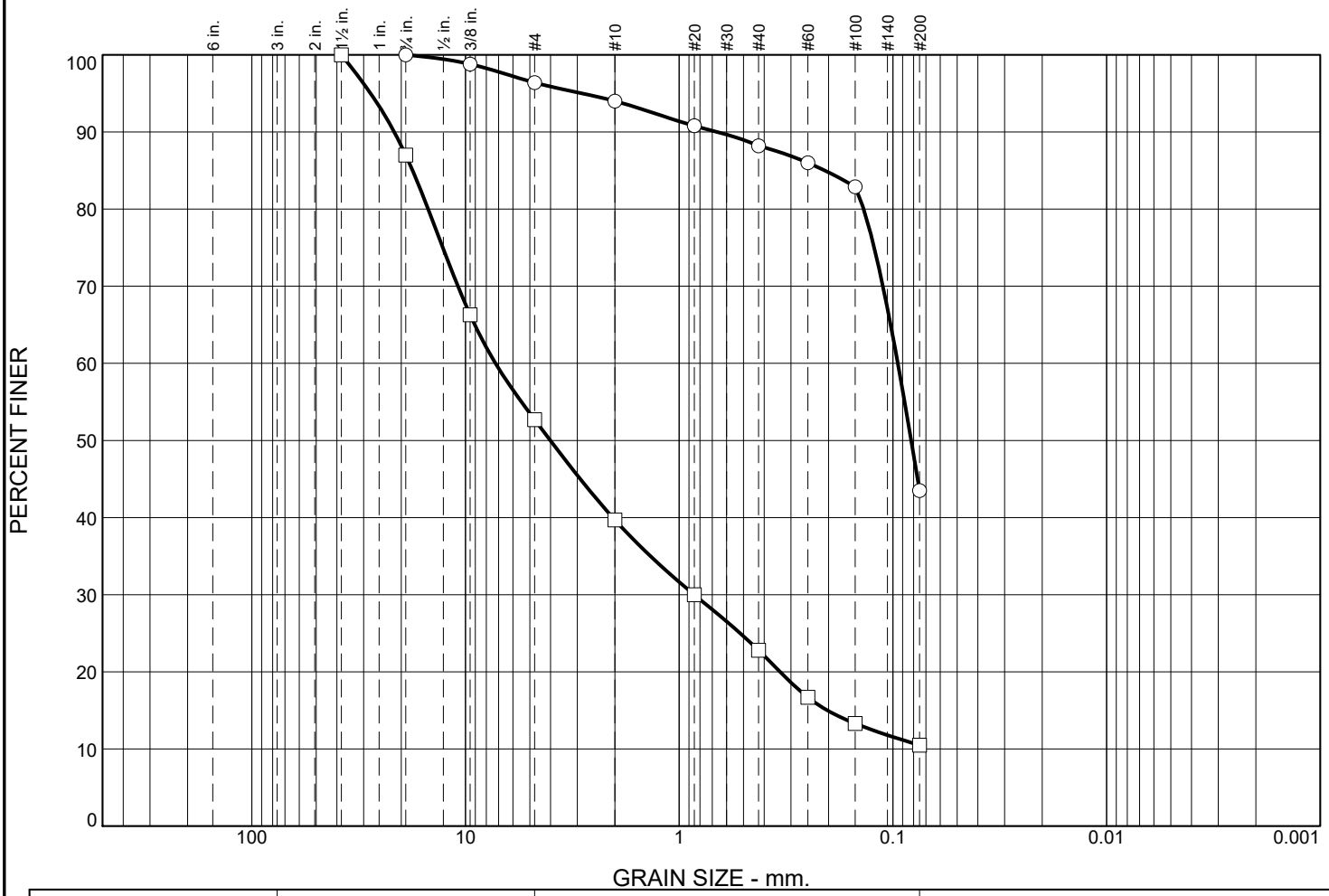
Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	3.6	2.4	5.8	44.7	43.5	
□	0.0	13.0	34.3	13.0	16.9	12.3	10.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2082	0.0948	0.0821					
□			17.6961	7.2404	4.0092	0.8500	0.2025			

Material Description	USCS	AASHTO
○ silty SAND	SM	
□ GRAVEL with silt and sand	GP-GM	

Project No. T-8565 **Client:** Vector Development Company

Project: Freeman Logistics (Offsite Roadway Improvements)

○ **Location:** Test Boring B-6 **Depth:** 2.5 ft **Sample Number:** 2

□ **Location:** Test Boring B-7 **Depth:** 5 ft **Sample Number:** 3

Remarks:

○ Tested on November 23, 2021

□ Tested on November 23, 2021

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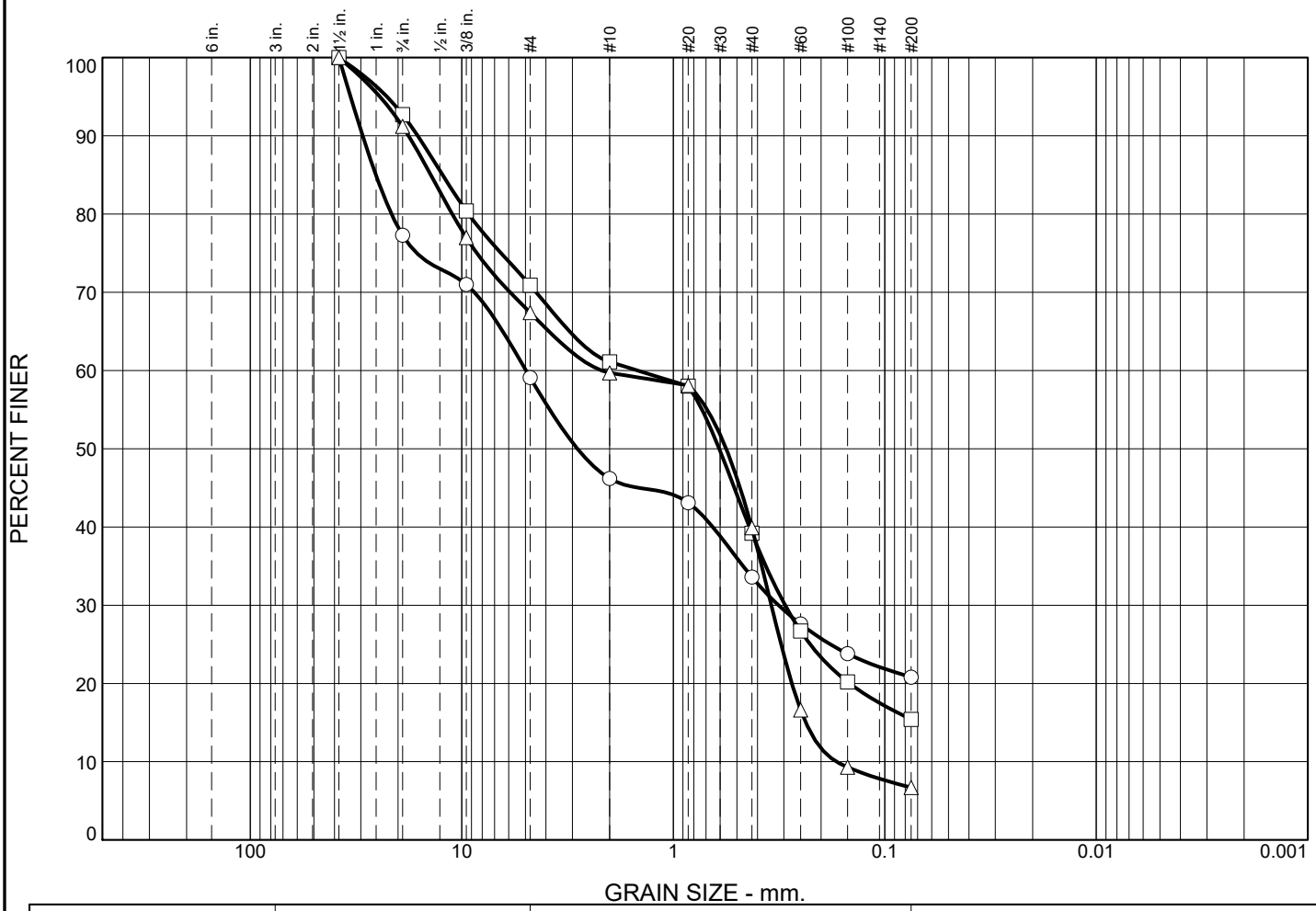
Kirkland, WA

Figure 19

Tested By: FQ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	22.7	18.2	12.9	12.6	12.8	20.8	
□	0.0	7.3	21.8	9.8	21.9	23.8	15.4	
△	0.0	8.8	23.8	7.7	19.8	33.2	6.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			25.4879	4.9685	2.8401	0.3183				
□			12.3245	1.4763	0.6063	0.2960				
△			14.0097	2.1821	0.5623	0.3438	0.2365	0.1692	0.32	12.90

Material Description	USCS	AASHTO
○ silty GRAVEL with sand	GM	
□ silty SAND with gravel	SM	
△ poorly graded SAND with silt and gravel	SP-SM	

Project No. T-8565 **Client:** Vector Development Company

Project: Freeman Logistics (Offsite Roadway Improvements)

○ **Location:** B-101 **Depth:** -1.5 feet

□ **Location:** B-101 **Depth:** -5 feet

△ **Location:** B-102 **Depth:** -1.5 feet

Remarks:

○ Tested on September 27, 2022

□ Tested on September 27, 2022

△ Tested on September 27, 2022

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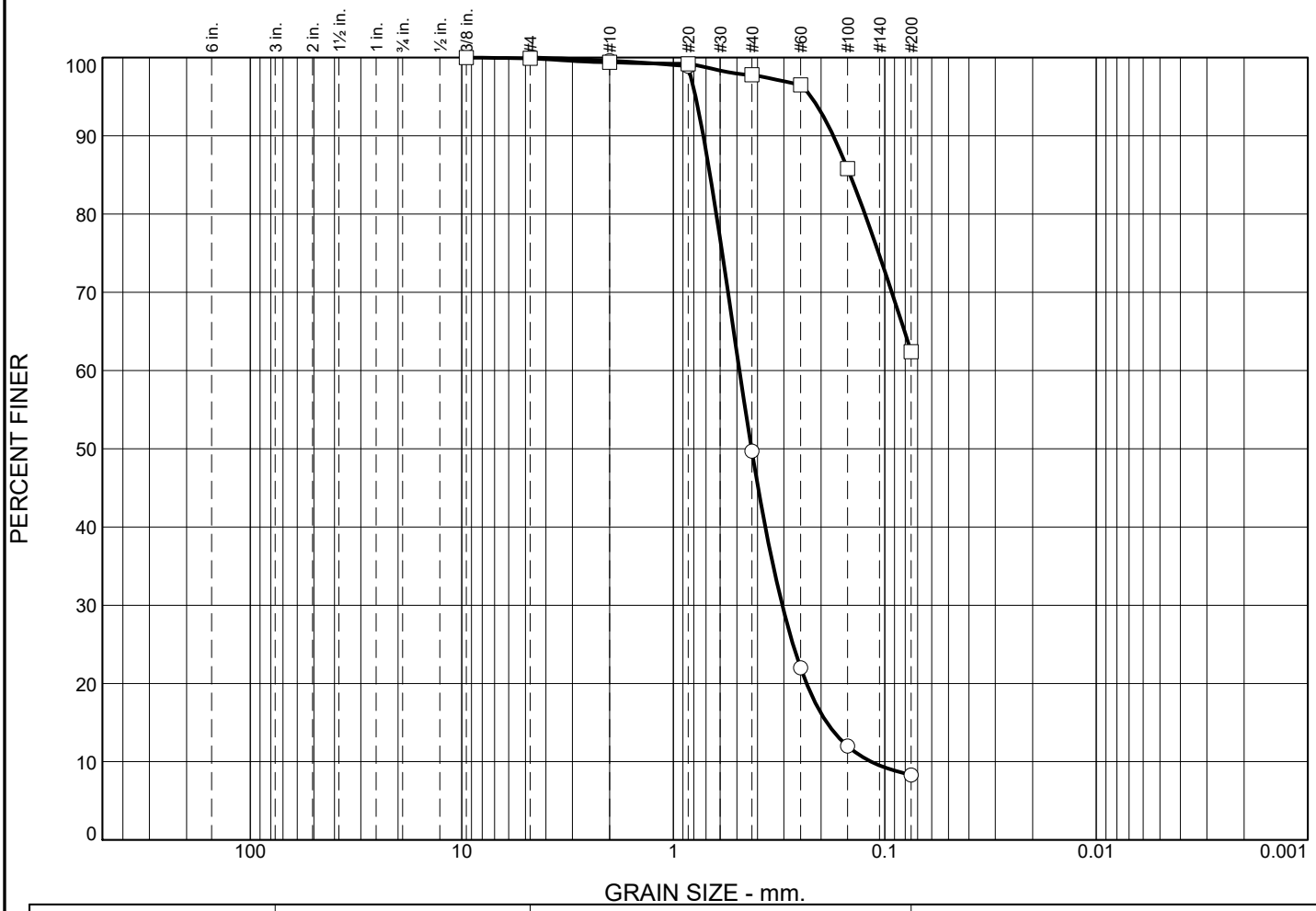
Kirkland, WA

Figure 20

Tested By: KJ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.4	49.9	41.4	8.3	
□	0.0	0.0	0.1	0.5	1.6	35.4	62.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.6696	0.4865	0.4268	0.3052	0.1880	0.1161	1.65	4.19
□			0.1459							

Material Description	USCS	AASHTO
○ poorly graded SAND with silt	SP-SM	
□ sandy SILT	ML	

Project No. T-8565 **Client:** Vector Development Company

Project: Freeman Logistics (Offsite Roadway Improvements)

○ **Location:** B-103 **Depth:** -3 feet

□ **Location:** B-106 **Depth:** -5 feet

Remarks:

○ Tested on September 27, 2022

□ Tested on September 27, 2022

Terra Associates, Inc.

Kirkland, WA

Figure 21

Tested By: KJ