GEO Group Northwest, Inc.
Geotechnical Engineers, Geologists
& Environmental Specialists

July 27th, 2021 Project No. G-5422

Cascade Apartments, LLC
c/o Mr. Simon Simon
2812 Architecture
Phone: (425) 252-2153
Email: Simon@2812Architecture.com

Subject: **Soil Grain Size & Cation Exchange Capacity Analysis**
Cascade Mixed-Use Building
Parcel #: 31052100307300
Arlington, Washington

Reference: **"Geotechnical Engineering Investigation, Proposed Four-Story Mixed-Use Building, Parcel #: 31052100307300, Arlington, Washington," GEO Group Northwest, Inc., G-5113, June 17th, 2021**

Dear Cascade Apartments, LLC,

At your request GEO Group Northwest, Inc., had grain size and cation exchange capacity lab tests performed on site soil samples which were collected during the above-referenced engineering investigation. Our review and analysis of the lab results provided are presented in this letter below.

Grain Size Analysis

Laboratory grain size analysis was performed by AAR Testing and Inspection, Inc., of Redmond, Washington to determine a quantitative particle size distribution of the surface site soils at the subject site. Tested samples consisted of boring samples from the previous geotechnical investigation referenced above. Samples from depths of 2.5' and 5' bgs (below the ground surface) in borings B1 and B2 were combined, generating discrete samples representative of each boring location for analysis. Surface soils near B-1 and B-2 both consist of poorly graded sand

with silt (SP-SM), according to USCS designation. USDA designation of the soil sample at B-1 is defined as well-sorted sand with approximately 9 percent fine gravel. USDA designation of the soil sample at B-2 is defined as well-sorted, fine gravelly sand (approximately 15 percent fine gravel). For the complete particle size distribution reports, refer to *Appendix A* of this letter.

Cation Exchange Capacity

Laboratory analysis was performed by Fremont Analytical, Inc., of Seattle, Washington to determine a quantitative cation exchange capacity for the surface site soils at subject site. The soil samples were similar to those described in the *Grain Size Analysis* section of this letter. Surface soils near B-1 were identified to exhibit a cation exchange capacity equal to 11.3 milliequivalents per 100 grams (11.3 meq/100g). Surface soils near B-2 were identified to exhibit a cation exchange capacity equal to 10.8 milliequivalents per 100 grams (10.8 meq/100g). For the complete results of the cation exchange analysis, refer to *Appendix B* of this letter.

Summary

Based on the results of the analysis and our experience with soils of this nature, we anticipate infiltration at the subject site to be feasible, although limited due to the encountered groundwater horizon at approximately 7.5' below the ground surface.

Please contact us if you have any questions.

Sincerely,

GEO Group Northwest, Inc.

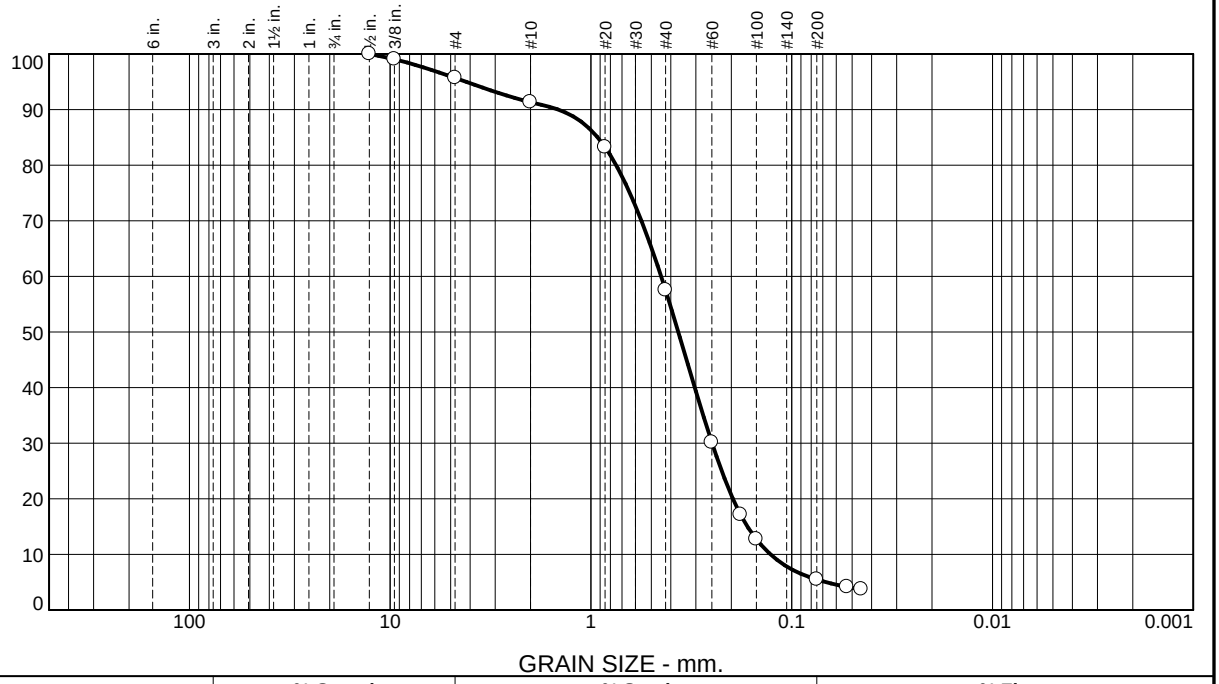
Garrett Dean, G.I.T.
Staff Engineering Geologist

William Chang, P.E.
Principal Engineer

Attachments

Appendix A – Particle Size Distribution Reports
Appendix B – Cation Exchange Capacity Report

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	4	5	33	53	5	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1/2	100		
3/8	99		
#4	96		
#10	91		
#20	83		
#40	58		
#60	30		
#80	17		
#100	13		
#200	5.5		
#270	4.2		
#325	3.7		

* (no specification provided)

Material Description

Poorly graded sand with silt

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=**

Coefficients

D_{90}= 1.4568 D_{85}= 0.9260 D_{60}= 0.4471
D_{50}= 0.3671 D_{30}= 0.2493 D_{15}= 0.1662
D_{10}= 0.1274 C_u= 3.51 C_c= 1.09

Remarks

F.M.=2.00

Date Received: 07/07/2021 **Date Tested:** 07/08/2021

Tested By: Tama Lewis

Checked By: Stu Swenson, CET

Title: Laboratory Manager

Source of Sample: B-1 **Depth:** 5

Sample Number: 21673

Date Sampled: 05/24/2021

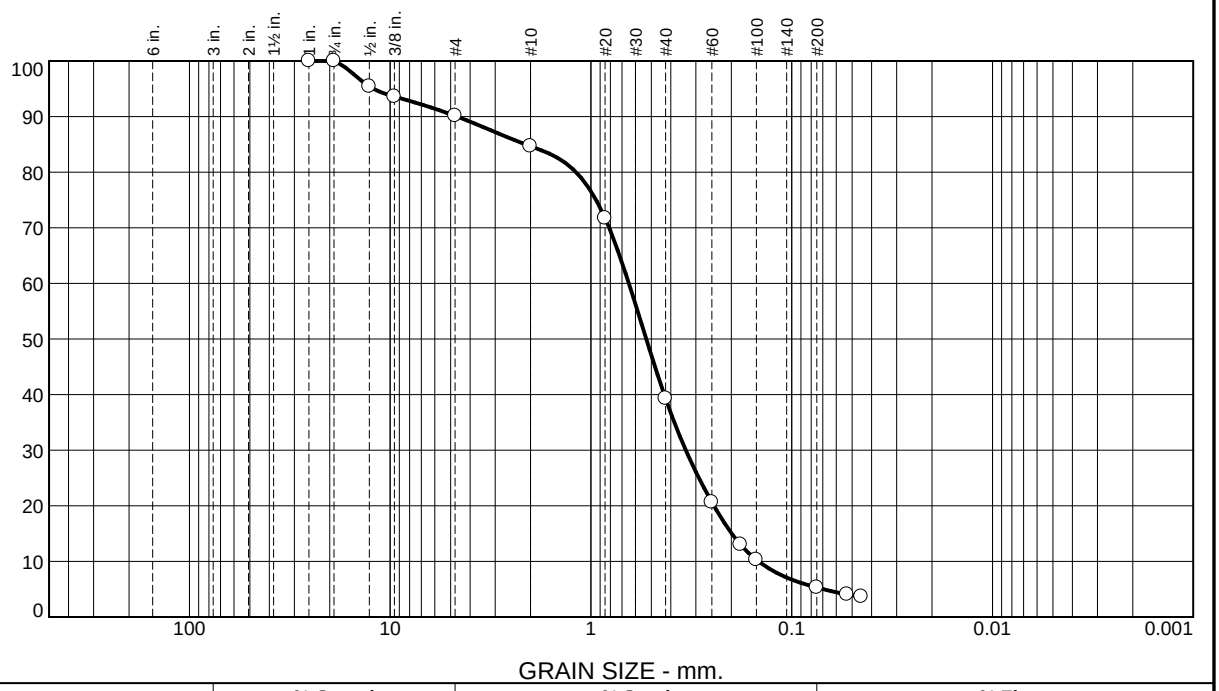
A.A.R. Testing Laboratory, Inc.

Client: GEO Group NW

Project: GEO Group NW

Project No: 21-021

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	0	10	5	46	34	5	

TEST RESULTS (ASTM D6913)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	100		
3/4	100		
1/2	95		
3/8	94		
#4	90		
#10	85		
#20	72		
#40	39		
#60	21		
#80	13		
#100	10		
#200	5.3		
#270	4.1		
#325	3.7		

* (no specification provided)

Material Description

Poorly graded sand with silt

Atterberg Limits (ASTM D 4318)

PL= **LL=** **PI=**

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=**

Coefficients

D_{90}= 4.6439 D_{85}= 2.1200 D_{60}= 0.6471
D_{50}= 0.5301 D_{30}= 0.3368 D_{15}= 0.1991
D_{10}= 0.1462 C_u= 4.43 C_c= 1.20

Remarks

F.M.=2.58

Date Received: 07/07/2021 **Date Tested:** 07/08/2021

Tested By: Tama Lewis

Checked By: Stu Swenson, CET

Title: Laboratory Manager

Source of Sample: B-2 **Depth:** 5

Sample Number: 21674

Date Sampled: 05/24/2021

A.A.R. Testing Laboratory, Inc.

Client: GEO Group NW

Project: GEO Group NW

Project No: 21-021

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

GEO Group Northwest, Inc.
Garrett Dean
13705 Bel-Red Rd
Bellevue, WA 98005

RE: Arlington Mixed Use Building
Work Order Number: 2107101

July 23, 2021

Attention Garrett Dean:

Fremont Analytical, Inc. received 2 sample(s) on 7/7/2021 for the analyses presented in the following report.

Cation Exchange Capacity by EPA 9081

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *07/23/2021*

CLIENT: GEO Group Northwest, Inc.
Project: Arlington Mixed Use Building
Work Order: 2107101

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2107101-001	B-1, G-5422	05/24/2021 12:00 AM	07/07/2021 4:40 PM
2107101-002	B-2, G-5422	05/24/2021 12:00 AM	07/07/2021 4:40 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Original

Case Narrative

WO#: **2107101**
Date: **7/23/2021**

CLIENT: GEO Group Northwest, Inc.
Project: Arlington Mixed Use Building

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2107101**
Date Reported: **7/23/2021**

CLIENT: GEO Group Northwest, Inc.
Project: Arlington Mixed Use Building

Lab ID: 2107101-001 **Collection Date:** 5/24/2021
Client Sample ID: **B-1, G-5422** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Cation Exchange Capacity by EPA 9081				Batch ID: R68762		Analyst: EH
Cation Exchange Capacity	11.3	1.00		meq/100g	1	7/22/2021 5:12:14 PM

Lab ID: 2107101-002 **Collection Date:** 5/24/2021
Client Sample ID: **B-2, G-5422** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Cation Exchange Capacity by EPA 9081				Batch ID: R68762		Analyst: EH
Cation Exchange Capacity	10.8	1.00		meq/100g	1	7/22/2021 5:23:22 PM

Work Order: 2107101
CLIENT: GEO Group Northwest, Inc.
Project: Arlington Mixed Use Building

QC SUMMARY REPORT

Cation Exchange Capacity by EPA 9081

Sample ID: **MB-CEC**	SampType: **MBLK**	Units: **meq/100g**	Prep Date: **7/22/2021**	RunNo: **68762**
Client ID: **MBLKS**	Batch ID: **R68762**		Analysis Date: **7/22/2021**	SeqNo: **1390405**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	ND	1.00									

Sample ID: **LCS-CEC**	SampType: **LCS**	Units: **µg/L**	Prep Date: **7/22/2021**	RunNo: **68762**
Client ID: **LCSS**	Batch ID: **R68762**		Analysis Date: **7/22/2021**	SeqNo: **1390406**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sodium	1,110	230	1,000	0	111	75	125				

Sample ID: **2107101-001ADUP**	SampType: **DUP**	Units: **meq/100g**	Prep Date: **7/22/2021**	RunNo: **68762**
Client ID: **B-1, G-5422**	Batch ID: **R68762**		Analysis Date: **7/22/2021**	SeqNo: **1390408**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Cation Exchange Capacity	7.48	1.00						108.1	174	30	R

NOTES:
R - High RPD observed. The method is in control as indicated by the LCS.

Sample Log-In Check List

Client Name:	**GGN**	Work Order Number:	**2107101**
Logged by:	**Gabrielle Coeuille**	Date Received:	**7/7/2021 4:40:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes	☑	No	☐	Not Present ☐
2.	How was the sample delivered?	Client				

Log In

3.	Coolers are present?	Yes	☐	No	☑	NA ☐
		No cooler present				
4.	Shipping container/cooler in good condition?	Yes	☑	No	☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes	☐	No	☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes	☐	No	☑	NA ☐
		Unknown prior to receipt				
7.	Were all items received at a temperature of >2°C to 6°C *	Yes	☐	No	☐	NA ☑
8.	Sample(s) in proper container(s)?	Yes	☑	No	☐	
9.	Sufficient sample volume for indicated test(s)?	Yes	☑	No	☐	
10.	Are samples properly preserved?	Yes	☑	No	☐	
11.	Was preservative added to bottles?	Yes	☐	No	☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes	☐	No	☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes	☑	No	☐	
14.	Does paperwork match bottle labels?	Yes	☑	No	☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No	☐	
16.	Is it clear what analyses were requested?	Yes	☑	No	☐	
17.	Were all holding times able to be met?	Yes	☑	No	☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes	☑	No	☐	NA ☐

Person Notified:	Garrett Dean	Date:	7/8/2021
By Whom:	Gabrielle Coeuille	Via:	☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:	Ok to proceed out of hold?		
Client Instructions:	Yes.		

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	23.2

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Chain of Custody Record and Laboratory Services Agreement

Fremont Analytical
3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Date: 7/7/2021 Laboratory Project No (internal): 2107101

Page: 1 of: 1

Client: GEO Group Northwest, Inc.
Address: 13705. Bel Red Rd
City, State, Zip: Bellevue, WA, 98005
Telephone: 425-649-8757 Fax: 425 649 8758

Project Name: Arlington Mixed Use Building
Project No: G-5422 Collected by: Garrett Dean
Location: Parcel #: 3105210030 7300
Report To (PM): Garrett Dean
PM Email: gdean@geogroupnw.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T)	Dissolved (D)	Anions (IC)***	EDB (8011)	CEC				Comments
1	B-1, G-5422	5-24-21																X					
2	B-2, G-5422	5-24-21																X					
3																							
4																							
5																							
6																							
7																							
8																							
9																							
10																							

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Turn-around times for samples received after 4:00pm will begin on the following business day.

Special Remarks:

Sample Disposal: ☒ Return to Client ☐ Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x Garrett Dean	7-7-21	x	7/7/21 16.40
x		x	

TAT → SameDay^ NextDay^ 2 Day 3 Day STD

^Please coordinate with the lab in advance