March 2, 2020

Cardno
6720 SW Macadam Avenue, Suite 200
Portland, OR 97219

Attention: Russel Montgomery

Report of Pavement Engineering Services
Chehalem Elementary School Pavement Improvements
15555 SW Davis Road
Beaverton, Oregon
GeoDesign Project: BeavSchool-61-01

INTRODUCTION

GeoDesign, Inc. is pleased to submit this report of pavement engineering services for the proposed improvements to the east paved lot at Chehalem Elementary School in Beaverton, Oregon. The scope of our services included subsurface explorations, dynamic cone penetrometer (DCP) testing and evaluation, and pavement rehabilitation recommendations. The approximate location of the project is shown on Figure 1.

SCOPE OF SERVICES

The scope of services for this report included pavement investigation, analysis, and design recommendations for the referenced parking lot according to the AASHTO design procedure[1]. Our specific scope of services for this task included the following:

- Identified and marked coring locations and called in utility locates.
- Performed a distress survey of the existing pavement.
- Explored subsurface conditions by drilling four borings through the asphalt concrete (AC), aggregate base, and into the subgrade to depths of up to 5 feet below ground surface (BGS).
- Maintained a detailed log of the explorations. Classified the subgrade soil during the field explorations. Collected samples of the pavement, base, and subgrade materials encountered.

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[1] AASHTO Guide for Design of Pavement Structures, American Association of State Highway and Transportation Officials, 1993.

- Conducted DCP testing in each exploration. Evaluated DCP results and soil classification results to estimate the resilient modulus of the aggregate base and subgrade soil.
- Estimated traffic equivalent single-axle loads (ESALs) based on traffic information provided by the school district and our experience.
- Provided pavement structural designs for full-depth repair.
- Provided recommendations for rehabilitation.
- Provided recommendations for materials and construction.
- Provided this report summarizing our field exploration findings and recommendations.

SITE CONDITIONS

SURFACE CONDITIONS

The project limits are the AC-paved parking area located on the east side of the Chehalem Elementary School north of SW Davis Road. The parking lot includes drive areas for student drop-off and parking areas for passenger vehicles with a landscaped island in the center of the lot.

The pavement is generally in fair condition with isolated areas of moderate raveling and moderate to severe fatigue observed in potential turn and drop-off areas. The largest area of severe fatigue is in the northern-most portion of the parking lot and is approximately 2,400 square feet. In addition, we observed tree root heave in the pavement (up to 2 inches in height) around the center island associated with trees that were recently removed.

SUBSURFACE CONDITIONS

We drilled four borings (C-1 through C-4). The borings were extended through the AC and into the subgrade to depths of up to 5 feet BGS. The approximate exploration locations are shown on Figure 2. We drilled most of the cores on cracks to determine crack depth penetration.

Tables 1 and 2 summarize the findings from these explorations. Detailed boring logs and photographs of the core locations and cores are presented in the Attachment.

Table 1. Pavement Subsurface Summary – Thickness

Core Number	Layer Thickness (inches)	
	AC	Aggregate Base
C-1	6.5	3.5
C-2	6.8	4.2
C-3	5.5	2.5
C-4	4.0	6.0

Table 2. Pavement Subsurface Summary – Distress

Core Number	Cracking Zone (inches)	Stripping Zone (inches)	Other Distress (inches)
C-1	0 to 6.5	None	Moderate fatigue, minor raveling, fabric at 2.0
C-2	0 to 6.8	None	Moderate fatigue, fabric at 2.0
C-3	0 to 5.5	Yes, 1.8 to 2.3	Severe fatigue
C-4	0 to 4.0	None	Moderate to severe fatigue, fabric at 2.0

None: No stripping in core; may still be distress near core location.

Medium stiff to very stiff native and fill silt or clay is beneath the AC and aggregate base. In addition, we observed medium dense, silty gravel fill at C-4. Specific subsurface conditions are presented on the exploration logs in the Attachment. Laboratory tests on samples of the soil collected at depths of approximately 1 foot BGS indicate in situ moisture contents ranging from 13 to 30 percent at the time of our explorations. A summary of the laboratory test results is presented in the Attachment.

DCP TESTING

We conducted DCP testing in general accordance with ASTM D6951 to estimate the resilient modulus of the aggregate base and subgrade materials at each test location. We recorded penetration depth of the cone for each blow of the hammer and terminated testing when at refusal of penetration or end of rod length. We plotted depth of penetration versus blow count and visually assessed where the slope of the data plot was relatively constant and at depths where the slope of the data plot changed significantly. We used the first slope of the data plot to estimate the base layer resilient modulus. We used the slope of the data beyond the first change in slope to estimate the resilient modulus of the subgrade. We used least squares regression to determine the slopes and the equation from the ODOT Pavement Design Guide[2] to estimate the moduli using a correction factor $c_f = 0.62$ for estimating the aggregate base layer moduli and $c_f = 0.35$ for estimating the subgrade resilient moduli. Table 3 lists our estimates of aggregate base and subgrade resilient modulus at each test location.

[2] ODOT Pavement Design Guide, Pavement Services Unit, Oregon Department of Transportation, August 2011.

Table 3. Base Modulus and Subgrade Modulus Estimated from DCP Testing

Core Number	Estimated Resilient Modulus (psi)	
	Aggregate Base	Subgrade
C-1	17,770	5,170
C-2	14,260	5,210
C-3	15,310	7,210
C-4	14,890	7,480

psi: pounds per square inch

PAVEMENT DESIGN

Properties of existing pavement are based on subsurface explorations and DCP testing. Descriptions of our input parameters and the recommended pavement designs are summarized below.

DESIGN STANDARDS

The standards used for pavement design are listed below:

- AASHTO Guide for Design of Pavement Structures
- ODOT Pavement Design Guide

ESAL CALCULATIONS

Based on discussions with the project team, we understand that traffic is limited to passenger cars and one trash and one recycling collection truck every other day. We estimate a total ESAL load of 15,000 for a 20-year design life.

BASE LAYER AND SUBGRADE RESILIENT MODULI

We used the results obtained from DCP testing listed in Table 3 to determine design resilient moduli for the base layer and subgrade. We calculated the average value for each set of results as recommended by the AASHTO design guide. We recommend an aggregate base modulus of 15,560 psi and a subgrade resilient modulus of 6,250 psi.

STRUCTURAL LAYER COEFFICIENTS FOR EXISTING PAVEMENT

We used our observations during the site visits to estimate the layer coefficient for the existing AC in conjunction with Table 5.2 in Part III, Section 5.4.5 in the AASHTO design guide. We used the base layer moduli to estimate the layer coefficients for the base layers using Figure 2.6 in Part II, Section 2.3.5 in the AASHTO design guide. Based on these tables, the structural layer coefficients for the AC and base are 0.25 and 0.08, respectively.

OTHER DESIGN PARAMETERS

Other pavement design parameters used in our analysis are summarized below. These input parameters are recommended in the ODOT design guide.

Reliability
We used a reliability of 80 percent for the parking lot.

Serviceability
We used initial and terminal serviceability values of 4.2 and 2.5, respectively.

Overall Standard Deviation
We used an overall standard deviation value of 0.49.

REHABILITATION RECOMMENDATIONS

Based on the results of our subsurface explorations, DCP testing, and analyses, we recommend rehabilitation with isolated areas of full-depth repair. Our specific recommendations for design and construction of the parking lot are presented in the following sections. These should be incorporated into design and implemented during construction of the proposed improvements. The AC recommended below should conform to the specifications presented in the "Pavement Materials" section.

Our recommendations are based on analyses conducted using the procedures in the AASHTO design guide, the information collected during our field investigations, and traffic information provided by the school district coupled with observations made during site visits. We recommend global rehabilitation through grind and inlay or overlay combined with full-depth repair in areas of moderate to severe fatigue distress.

FULL-DEPTH REPAIR
Full-depth repair should be conducted in areas of moderate to severe fatigue or in areas of root heaving. Based on our observations, we estimate 10 to 20 percent of the pavement area will require full-depth repair prior to rehabilitation. In areas where full-depth repair is conducted, we recommend saw cutting and removing the full depth of AC and extending the excavation a minimum of 12 inches beyond the fatigue extents. Full-depth repair should be completed prior to global rehabilitation.

Full-Depth Repair – Estimate 10 to 20 Percent of Pavement Area
- 4.0-inch-thick ½-inch asphalt concrete pavement (ACP), Level 2, PG 64-22 wearing course
- 8.0-inch-thick aggregate base
- Subgrade geotextile

REHABILITATION
The parking lot is currently slightly below capacity. Rehabilitation can be achieved either by overlaying the existing AC or by grind and inlay methods. For the overlay option, we recommend a 1.5-inch-thick overlay for a 20-year design life. If geometric constraints do not allow for an increase in AC elevation, the parking lot can be rehabilitated through a 2.5-inch grind and inlay for a 15-year design life. Design and implementation of our recommendations should consider the following:

- Recommendations should be evaluated based on existing geometric constraints for drainage, curb reveal, and safety.
- Reflective cracking may occur in some locations as early as five years after construction.
- Rigorous preparation and cleaning of the remaining AC surface followed by a consistent and uniform tack coat coverage of 0.25 gallon per square yard when diluted 1:1 with water.
- Paving fabric was observed in pavement cores C-1, C-2, and C-4 at a depth of 2 inches and stripping was observed in pavement core C-3 at a depth between 1.8 to 2.3. While we expect the stripping and the fabric to primarily be in areas where moderate to severe fatigue was observed and will be repaired, some fabric and stripping should be expected across the remainder of the site. Some construction overage may occur if rehabilitation results in paving fabric or stripping at or near the grind depth.

Rehabilitation – Option 1 – Overlay

- 1.5-inch-thick overlay, 3/8-inch ACP, Level 2, PG 64-22

Rehabilitation – Option 2 – Grind and Inlay

- 2.5-inch-deep cold plane milling
- 2.5-inch-thick inlay, ½-inch ACP, Level 2, PG 64-22

PAVEMENT MATERIALS

A submittal should be made for each pavement material prior to the start of paving operations. Each submittal should include the test information necessary to evaluate the degree to which the properties of the material comply with the properties that were recommended or specified. The geotechnical engineer and other appropriate members of the design team should review each submittal.

AC

The AC should be Level 2, dense ACP according to the Oregon Standard Specifications for Construction – 2018 (OSSC) 00744 (Asphalt Concrete Pavement). If the overlay option is selected for rehabilitation, the ACP should consist of a 3/8-inch mix to allow for proper compaction of the thinner lift (less than 2 inches) and if the grind and inlay option is selected, the ACP should consist of a ½-inch mix. In general, we recommend lift thicknesses between 2.0 and 3.0 inches; the 3/8-inch mix can be placed with a lift thickness of 1.5 inches. If lift thicknesses outside this range are requested, we recommend additional consultation and communication between the school district and the design team.

Aggregate Base

Imported granular material used as aggregate base should be clean, crushed rock or crushed gravel and sand that are well graded. The aggregate base should meet the gradation defined in OSSC 00640 (Aggregate Base and Shoulders), with the exception that the aggregate should have less than 5 percent by dry weight passing the U.S. Standard No. 200 sieve, a maximum particle size of 1½ inches, and at least two mechanically fractured faces. The aggregate base should be compacted to not less than 95 percent of the maximum dry density, as determined by AASHTO T 99.

Stabilization Aggregate
Stabilization material should consist of pit- or quarry-run rock, crushed rock, or crushed gravel and sand and should meet the requirements set forth in OSSC 00330.14 (Selected Granular Backfill) and OSSC 00330.15 (Selected Stone Backfill), with a maximum particle size of 3 inches for selected granular backfill and 6 inches for selected stone backfill, having less than 5 percent by dry weight passing the U.S. Standard No. 4 sieve, and having at least two mechanically fractured faces. The material should be free of organic material and other deleterious material. Stabilization material should be placed over a geotextile fabric in one lift and compacted to a firm condition.

Subgrade Geotextile
The subgrade geotextile should conform to OSSC 00350 (Geosynthetic Installation). A minimum initial aggregate base lift of 6 inches is required over geotextiles.

OBSERVATION OF CONSTRUCTION

Satisfactory earthwork and pavement performance depend to a large degree on the quality of construction. Sufficient observation of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. Recognition of changed conditions often requires experience; therefore, qualified personnel should visit the site with sufficient frequency to determine if subsurface conditions change significantly from those anticipated.

LIMITATIONS

We have prepared this report for use by Cardno, Beaverton School District, and the project design and construction teams for the proposed pavement rehabilitation activities. The data and report can be used for bidding or estimating purposes, but our report, conclusions, and interpretations should not be construed as warranty of the subsurface conditions and are not applicable to other sites.

Exploration observations indicate pavement and soil conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect soil strata or water level variations that may exist between exploration locations. If subsurface conditions differing from those described are noted during the course of excavation and construction, re-evaluation will be necessary.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in this report for consideration in design.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty, express or implied, should be understood.

We appreciate the opportunity to be of continued service to you. Please call if you have questions concerning this report or if we can provide additional services.

Sincerely,

GeoDesign, Inc.

Tyler A. Pierce, P.E.
Project Engineer

Krey D. Younger, P.E., G.E.
Senior Associate Engineer

George Saunders, P.E., G.E.
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
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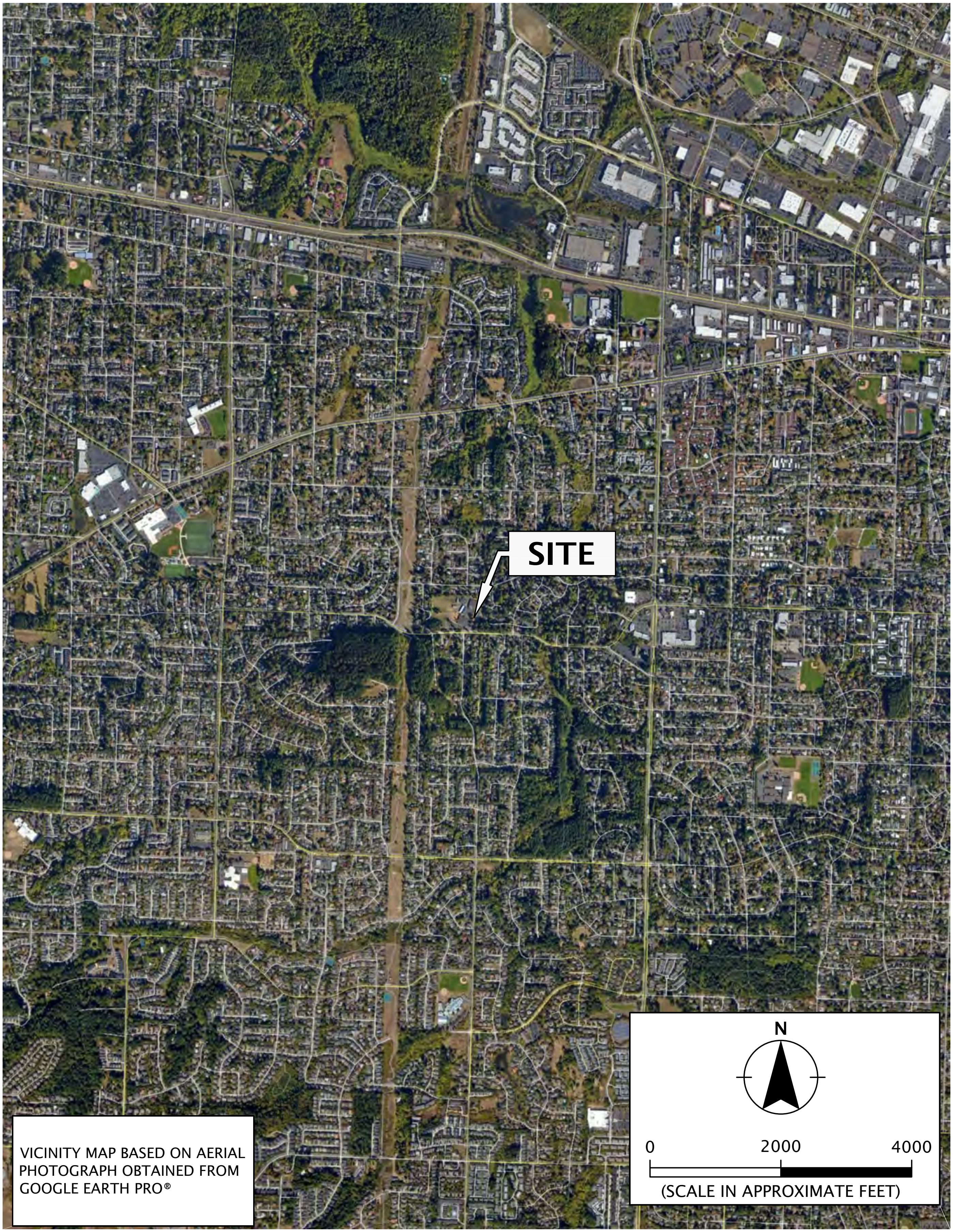
OREGON
JAN. 14 2003
KREY D. YOUNGER
EXPIRES: 6/30/20

cc: Matt Lewis, Cardno (via email only)

TAP:KDY:GPS:kt
Attachments
One copy submitted (via email only)
Document ID: BeavSchool-61-01-030220-geolr.docx

FIGURES



GEODESIGN INC AN NV5 COMPANY	BEAVSCHOOL-61-01	VICINITY MAP	
	MARCH 2020	CHEHALEM ELEMENTARY SCHOOL BEAVERTON, OR	FIGURE 1

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File Name: J:\A-D\BeavSchool\BeavSchool-61\BeavSchool-61-01\Figures\CAD\BeavSchool-61-01-VM01.dwg | Layout: FIGURE 1

LEGEND:

C-1 ⦿ PAVEMENT CORE BORING

N

0 40 80

(SCALE IN FEET)

SITE PLAN BASED ON AERIAL PHOTOGRAPH OBTAINED FROM GOOGLE EARTH PRO®, DECEMBER 31, 2019

GEODESIGN INC
AN NV5 COMPANY

BEAVSCHOOL-61-01

MARCH 2020

SITE PLAN

CHEHALEM ELEMENTARY SCHOOL
BEAVERTON, OR

FIGURE 2

ATTACHMENT

ATTACHMENT

FIELD EXPLORATIONS

GENERAL

We explored subsurface conditions at the site by drilling four borings (C-1 through C-4) to depths of up to 5 feet BGS. The borings were completed by Dan J. Fischer Excavating, Inc. of Forest Grove, Oregon, on December 27, 2019 using a trailer-mounted drill rig. The asphalt cores were recovered using a portable core drill with a 5-inch-diameter, diamond core barrel, and the borings were drilled with a 4-inch-diameter, solid-stem auger. The borings were filled with polymer modified cold-patch asphalt. The exploration logs are presented in this attachment.

The locations of the explorations are shown on Figure 2. The explorations were located in the field relative to existing site features and should be considered approximate.

SOIL SAMPLING

A member of our geology staff observed the explorations. We collected representative samples of the various soils encountered in the borings for geotechnical evaluation. Samples were collected from the borings using 1½-inch-inside diameter, split-spoon sampler (SPT). The split-spoon sampling was conducted in general accordance with ASTM D1586. The split-spoon samplers were driven into the soil with a 140-pound hammer free-falling 30 inches. The samplers were driven a total distance of 18 inches. The number of blows required to drive the sampler the final 12 inches is recorded in the exploration logs, unless otherwise noted. Representative grab samples of the soil were collected from the auger cuttings. Sampling methods and intervals are shown on the exploration logs.

The SPTs completed by Dan J. Fischer Excavating, Inc. were conducted using two wraps around the cathead.

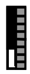
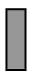
SOIL CLASSIFICATION

The soil samples were classified in accordance with the "Exploration Key" (Table A-1) and "Soil Classification System" (Table A-2), which are presented in this attachment. The exploration logs indicate the depths at which the soil or its characteristics change, although the change could be gradual. Classifications are shown on the exploration logs.

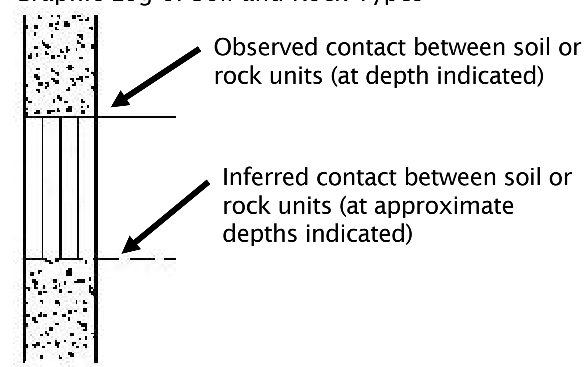
LABORATORY TESTING

MOISTURE CONTENT

We determined the natural moisture content of select soil samples in general accordance with ASTM D2216. The natural moisture content is a ratio of the weight of the water to soil in a test sample and is expressed as a percentage. The test results are presented in this attachment.

SYMBOL	SAMPLING DESCRIPTION
	Location of sample collected in general accordance with ASTM D1586 using Standard Penetration Test with recovery
	Location of sample collected using thin-wall Shelby tube or Geoprobe® sampler in general accordance with ASTM D1587 with recovery
	Location of sample collected using Dames & Moore sampler and 300-pound hammer or pushed with recovery
	Location of sample collected using Dames & Moore sampler and 140-pound hammer or pushed with recovery
	Location of sample collected using 3-inch-O.D. California split-spoon sampler and 140-pound hammer with recovery
	Location of grab sample
	Rock coring interval
	Water level during drilling
	Water level taken on date shown

Graphic Log of Soil and Rock Types



GEOTECHNICAL TESTING EXPLANATIONS

ATT	Atterberg Limits	P	Pushed Sample
CBR	California Bearing Ratio	PP	Pocket Penetrometer
CON	Consolidation	P200	Percent Passing U.S. Standard No. 200 Sieve
DD	Dry Density		
DS	Direct Shear	RES	Resilient Modulus
HYD	Hydrometer Gradation	SIEV	Sieve Gradation
MC	Moisture Content	TOR	Torvane
MD	Moisture-Density Relationship	UC	Unconfined Compressive Strength
NP	Non-Plastic	VS	Vane Shear
OC	Organic Content	kPa	Kilopascal

ENVIRONMENTAL TESTING EXPLANATIONS

CA	Sample Submitted for Chemical Analysis	ND	Not Detected
P	Pushed Sample	NS	No Visible Sheen
PID	Photoionization Detector Headspace Analysis	SS	Slight Sheen
		MS	Moderate Sheen
ppm	Parts per Million	HS	Heavy Sheen

RELATIVE DENSITY - COARSE-GRAINED SOIL

Relative Density	Standard Penetration Resistance	Dames & Moore Sampler (140-pound hammer)	Dames & Moore Sampler (300-pound hammer)
Very Loose	0 – 4	0 – 11	0 – 4
Loose	4 – 10	11 – 26	4 – 10
Medium Dense	10 – 30	26 – 74	10 – 30
Dense	30 – 50	74 – 120	30 – 47
Very Dense	More than 50	More than 120	More than 47

CONSISTENCY - FINE-GRAINED SOIL

Consistency	Standard Penetration Resistance	Dames & Moore Sampler (140-pound hammer)	Dames & Moore Sampler (300-pound hammer)	Unconfined Compressive Strength (tsf)
Very Soft	Less than 2	Less than 3	Less than 2	Less than 0.25
Soft	2 – 4	3 – 6	2 – 5	0.25 – 0.50
Medium Stiff	4 – 8	6 – 12	5 – 9	0.50 – 1.0
Stiff	8 – 15	12 – 25	9 – 19	1.0 – 2.0
Very Stiff	15 – 30	25 – 65	19 – 31	2.0 – 4.0
Hard	More than 30	More than 65	More than 31	More than 4.0

PRIMARY SOIL DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE-GRAINED SOIL (more than 50% retained on No. 200 sieve)	GRAVEL (more than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (< 5% fines)	GW or GP	GRAVEL
		GRAVEL WITH FINES (≥ 5% and ≤ 12% fines)	GW-GM or GP-GM	GRAVEL with silt
			GW-GC or GP-GC	GRAVEL with clay
		GRAVEL WITH FINES (> 12% fines)	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND (50% or more of coarse fraction passing No. 4 sieve)	CLEAN SAND (<5% fines)	SW or SP	SAND
		SAND WITH FINES (≥ 5% and ≤ 12% fines)	SW-SM or SP-SM	SAND with silt
			SW-SC or SP-SC	SAND with clay
		SAND WITH FINES (> 12% fines)	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOIL (50% or more passing No. 200 sieve)	SILT AND CLAY	Liquid limit less than 50	ML	SILT
			CL	CLAY
			CL-ML	silty CLAY
			OL	ORGANIC SILT or ORGANIC CLAY
		Liquid limit 50 or greater	MH	SILT
			CH	CLAY
			OH	ORGANIC SILT or ORGANIC CLAY
HIGHLY ORGANIC SOIL			PT	PEAT

MOISTURE CLASSIFICATION

Term	Field Test
dry	very low moisture, dry to touch
moist	damp, without visible moisture
wet	visible free water, usually saturated

ADDITIONAL CONSTITUENTS

Secondary granular components or other materials such as organics, man-made debris, etc.

Percent	Silt and Clay In: Fine-Grained Soil	Silt and Clay In: Coarse-Grained Soil	Percent	Sand and Gravel In: Fine-Grained Soil	Sand and Gravel In: Coarse-Grained Soil
< 5	trace	trace	< 5	trace	trace
5 – 12	minor	with	5 – 15	minor	minor
> 12	some	silty/clayey	15 – 30	with	with
			> 30	sandy/gravelly	Indicate %

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION / DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT % (0 – 50 – 100)	COMMENTS

C-1

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION / DEPTH	BLOW COUNT	COMMENTS
0.0	ASPHALT CONCRETE (6.5 inches).			Pavement fabric at 2.0 inches.
	AGGREGATE BASE (3.5 inches).	0.5		
	Stiff, gray CLAY (CH), trace organics (wood debris); moist, organics are up to 1/4-inch diameter.	0.8	10	
2.5	Stiff, gray SILT (ML), trace organics (carbonized wood); moist, organics are up to 1/4-inch diameter. light brown-orange, without organics at 3.0 feet	2.0	13	
5.0	Exploration completed at a depth of 4.5 feet. SPT completed using two wraps with a cathead.	4.5		CORE DETAILS: No patch observed. Cored on low to moderate transverse crack.
7.5				

C-2

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION / DEPTH	BLOW COUNT	COMMENTS
0.0	ASPHALT CONCRETE (6.8 inches).			Pavement fabric at 2.0 inches.
	AGGREGATE BASE (4.2 inches).	0.6		
	Medium stiff, gray CLAY (CL), some silt, trace gravel and organics (rootlets); moist - **FILL**.	0.9	7	
2.5	Medium stiff, gray CLAY (CL), some silt, trace organics (carbonized wood); moist, organics are up to 1/4-inch diameter. gray-orange, without organics at 3.5 feet	3.0	6	
5.0	Exploration completed at a depth of 4.5 feet. SPT completed using two wraps with a cathead.	4.5		CORE DETAILS: No patch observed. Cored on low transverse to fatigue crack.
7.5				

DRILLED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: J. Heidgerken COMPLETED: 12/27/19

BORING METHOD: core drill/solid-stem auger (see document text) BORING BIT DIAMETER: 5 inches/4 inches

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION / DEPTH	TESTING	SAMPLE	▲ BLOW COUNT ● MOISTURE CONTENT % (0 – 50 – 100)	COMMENTS

C-3

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION / DEPTH	BLOW COUNT	COMMENTS
0.0	ASPHALT CONCRETE (5.5 inches).			
	AGGREGATE BASE (2.5 inches).	0.5		
	Stiff, brown CLAY (CH); moist.	0.7		
	gray, trace organics (rootlets) at 1.5 feet		10	
2.5				
	brown to light gray, without organics at 3.5 feet		8	
5.0	Exploration completed at a depth of 5.0 feet. SPT completed using two wraps with a cathead.	5.0		CORE DETAILS: No patch observed. Cored on severe fatigue crack.
7.5				

C-4

DEPTH FEET	MATERIAL DESCRIPTION	ELEVATION / DEPTH	BLOW COUNT	COMMENTS
0.0	ASPHALT CONCRETE (4.0 inches).			Pavement fabric at 2.0 inches.
	AGGREGATE BASE (6.0 inches).	0.3		
	Medium stiff, gray CLAY (CH); moist - **FILL**.	0.8		
	Medium dense, brown, silty GRAVEL (GM), trace sand; moist - **FILL**.	1.5	17	
2.5	Very stiff, brown CLAY (CL), some silt; moist.	2.5	18	
5.0	Exploration completed at a depth of 4.5 feet. SPT completed using two wraps with a cathead.	4.5		CORE DETAILS: No patch observed. Cored on moderate to severe fatigue crack.
7.5				

DRILLED BY: Dan J. Fischer Excavating, Inc. LOGGED BY: J. Heidgerken COMPLETED: 12/27/19

BORING METHOD: core drill/solid-stem auger (see document text) BORING BIT DIAMETER: 5 inches/4 inches

CORE LOCATION C-1.

CORE C-1.

GEODESIGN INC AN NV5 COMPANY	BEAVSCHOOL-61-01	**CORE LOCATION AND CORE PHOTOGRAPHS**	
	MARCH 2020	CHEHALEM ELEMENTARY SCHOOL BEAVERTON, OR	**FIGURE A-3**

CORE LOCATION C-2.

CORE C-2.

GEODESIGN INC AN NV5 COMPANY	BEAVSCHOOL-61-01	CORE LOCATION AND CORE PHOTOGRAPHS	
	MARCH 2020	CHEHALEM ELEMENTARY SCHOOL BEAVERTON, OR	FIGURE A-4

CORE LOCATION C-3.

CORE C-3.

CORE LOCATION C-4.

CORE C-4.

BeavSchool-61-01-FA4_A7-CPH.docx Print Date: 2/29/20

GEODESIGN INC AN NV5 COMPANY	BEAVSCHOOL-61-01	CORE LOCATION AND CORE PHOTOGRAPHS	
	MARCH 2020	CHEHALEM ELEMENTARY SCHOOL BEAVERTON, OR	FIGURE A-6

SAMPLE INFORMATION			MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	SIEVE			ATTERBERG LIMITS		
EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	ELEVATION (FEET)			GRAVEL (PERCENT)	SAND (PERCENT)	P200 (PERCENT)	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
C-1	1.0		27							
C-2	1.0		24							
C-3	1.0		30							
C-4	1.0		13							

GEODESIGN INC
AN NV5 COMPANY

BEAVSCHOOL-61-01

MARCH 2020

SUMMARY OF LABORATORY DATA

CHEHALEM ELEMENTARY SCHOOL
BEAVERTON, OR

FIGURE A-7