

January 29, 2024

Project No. 11428.048

Santa Monica-Malibu Unified School District
2828 Fourth Street
Santa Monica, California 90405-4308

Attention: Mrs. Barbara Chiavelli

**Subject: Addendum to Geotechnical Exploration Report
Percolation Testing
Proposed New TK-K Classroom and Library Building
Roosevelt Elementary School
801 Montana Avenue
Santa Monica, Los Angeles County, California**

Introduction

Per your request, Leighton Consulting, Inc. (Leighton) has performed supplemental percolation testing for the subject project. Our understanding of the project is based on email correspondence with design team members, and review of an undated, annotated, site plan indicating proposed infiltration system locations prepared by prepared by Kimley-Horn (Project Civil Engineer). This addendum provides the results of percolation testing in support of proposed stormwater infiltration.

Site Description and Proposed Development

Roosevelt Elementary is a kindergarten through 5th grade school located at 801 Montana Avenue in the City of Santa Monica, situated within a residential and commercial neighborhood. The campus is a rectangular parcel of land developed with one- and two-story classroom buildings, tennis/basketball courts, a playfield, an asphalt concrete (AC) blacktop, and an AC parking lot. The campus is bounded on the northwest by Alta Avenue, the northeast by 9th Street, the southeast by Montana Avenue, and the southwest by Lincoln Boulevard. According to the United States Geological Survey (USGS) 7.5-Minute Topanga Quadrangle (USGS, 2018), the site surface is relatively flat at approximately Elevation (El.) +175 to +200 feet mean sea level (msl). The proposed project site is located at the southeastern corner of the property along 9th street and Montana Avenue, and is currently occupied by a classroom building, playground, shade structure, and a lawn area.

We understand the development conceptually consists of seven (7) new 1,350-square-foot single-story classroom buildings with outdoor learning spaces, a new 1,500-square-foot teacher workroom and restroom building, and a new 6,000-square-foot library, as well as a new play area, courtyard, and entrances on 9th Street and Montana Avenue. Ancillary improvements are anticipated to include new pavement, landscaping, and utility infrastructure.

Stormwater infiltration is currently proposed to be achieved utilizing a dry well system with infiltration depths between approximately 20 to 50 feet bgs. Based on the results of our previous investigation (discussed in greater detail below), the approach seems feasible but will likely need to be shallowed to a maximum depth of approximately 40 feet due to existing groundwater conditions and County of Los Angeles requirements.

Previous Site Exploration

Leighton performed a geotechnical exploration at Roosevelt Elementary School in September, 2023 in support of the new proposed TK-K classrooms and Library Building proposed on the eastern side of the campus. Our field exploration consisted of drilling four (4) hollow-stem auger borings to depths ranging from approximately 31 ½ feet to 51 ½ feet below ground surface (bgs). To supplement the hollow-stem borings, we also advanced four (4) hand auger borings to approximate depths of 5 to 10 feet bgs. Our findings, conclusions, and recommendations were presented in our *Geotechnical Exploration Report* dated November 29, 2023.

Our previous geotechnical exploration encountered Pleistocene age alluvial fan deposits consisting of medium to dark brown, medium to very stiff, silty to sandy lean clay with gravel to a depth of approximately 15 to 25 feet bgs. At depth, the alluvial deposits grade coarser to include beds of medium dense to dense silty sand with gravel and sandy gravel. Isolated beds of loose silty sand were identified in borings LB-3 and LB-4 at depths of 30 and 20 feet bgs, respectively. The soils encountered at depths greater than approximately 20 to 25 feet bgs appear to be favorable for infiltration. However, groundwater was encountered at a depth of approximately 47 feet bgs. County of Los Angeles requirements do not allow stormwater infiltration within approximately 10 feet of anticipated groundwater levels.

Purpose and Scope

The purpose of our exploration was to perform field percolation tests at the location and depth of proposed stormwater infiltration devices in order to provide in-situ subsurface

infiltration rates. The test locations and depths were selected based on input from design team members. Our Scope of Work included the following:

- **Pre-Field Exploration Activities** – Site reconnaissance was performed by a Leighton Field Geologist to mark the proposed infiltration test locations. Underground Service Alert (USA) was notified to locate and mark existing underground utilities prior to our subsurface exploration. A subcontracted underground utility locating firm was utilized to clear our exploration locations from potential subsurface conflicts.
- **Supplemental Field Exploration** – Our supplemental subsurface exploration was performed on January 3, 2024 and included drilling, logging, and sampling of three (3) hollow-stem auger borings (designated LP-1 through LP-3) to a depth of approximately 40 feet below the existing ground surface (bgs). The approximate locations of these explorations are shown on Figure 1, *Geotechnical Map*. The corresponding boring logs are presented in Appendix A, *Exploration Logs*.

During drilling of the hollow-stem auger borings both bulk and drive samples were obtained from the borings for geotechnical laboratory testing. Relatively undisturbed samples were collected from the hollow-stem auger borings using a Modified California Ring sampler conducted in accordance with ASTM Test Method D 3550. Standard Penetration Tests (SPTs) were performed within the borings in accordance with ASTM Test Method D 1586. During sampling, the sampler is driven below the bottom of the borehole by a 140-pound weight (hammer) free-falling 30 inches. The drilling rig was equipped with an automatic hammer to provide greater consistency in the drop height and striking frequency. The number of blows to drive the sampler the final 12 inches of the 18-inch drive interval is termed the “blowcount” or SPT N-value. N-values provide a measure of relative density in granular (non-cohesive) soils and comparative consistency in cohesive soils. Number of blows per 6 inches of penetration was recorded on the boring logs included in Appendix A.

The borings were logged in the field by a geologist from our firm. Each soil sample collected was reviewed and described in accordance with the Unified Soil Classification System (USCS). The samples were sealed and packaged for transportation to our laboratory for testing. After completion of drilling, the borings were converted to percolation wells for subsequent testing.

- **Percolation Testing** – Borings LP-1 through LP-3 (Figure 1) were converted to temporary percolation test wells upon completion of drilling and sampling. The test wells consisted of 2-inch slotted (0.020-inch slots) PVC well casings screened between a depth of 2- to 40 feet bgs. The annulus of the screened well zone was then

backfilled with No. 3 Monterey Sand. The full results of the percolation testing are presented in Appendix B, *Percolation Test Data*. Upon completion of the percolation testing, the well casing was removed from each boring and the borings were backfilled with cement-bentonite grout and patched at the surface to match existing site conditions.

- **Laboratory Testing** – Selected relatively undisturbed soil samples obtained from our hollow-stem-auger borings were tested at our in-house Irvine geotechnical laboratory. This laboratory testing program was designed to evaluate the general grain size within the tested zone. Tests performed during this investigation consist of Percent Passing No. 200 Sieve Analysis (ASTM D 1140). Results are presented in Appendix C.
- **Report Preparation** – This report presents our findings, conclusions, and recommendations for the proposed infiltration devices.

Infiltration Testing

Percolation testing was performed within temporary percolation wells LP-1 through LP-3 to evaluate the infiltration characteristics of subsurface soils. The percolation tests were conducted in general accordance with LADPW (2021). The full results of percolation testing are presented in Appendix C. The test locations and zones tested are shown on Figure 1.

A boring percolation test is useful for field measurements of the infiltration rate of soils, and is suited for testing when the design depth of the infiltration device is deeper than current existing grades, especially in areas where it is difficult to dig test pits, or where the depths of these test pits would be considerably deep.

Percolation tests for each well was performed using a constant-head method, which records the approximate volume of water delivered to the test zone while maintaining a relatively constant height of water in the well over the testing period. Since the deeper subsurface materials are favorable for percolation, a water source was used to deliver water to each well at a relatively constant rate while recording the water height in the well. The measured infiltration rate for each percolation test was calculated by dividing the total volume of water infiltrated by the total duration of the test and dividing by the percolation surface area.

Per County of Los Angeles Guidelines (LADPW, 2021), the design infiltration rate incorporates a reduction factor for the test procedure, site variability, number of tests, thoroughness of subsurface investigation and long-term siltation, plugging and

maintenance, with a minimum reduction factor of 3. The high-flow rate aspect of test wells increases the minimum reduction rate to a factor of safety of 5. As such, we have applied a minimum reduction factor to the small-scale infiltration rates measured at the test wells for use in design of the system(s) according to County of Los Angeles Guidelines (LADPW, 2021).

Detailed results of the field testing data and measured infiltration rate for the test wells are presented in Appendix B. The test results are summarized below:

Table 1 – Measured (Unfactored) Infiltration Rate

Test Well Designation	Approximate Depth of Test Zone (feet bgs)	Measured Infiltration Rate (inch per hour)	Design Infiltration Rate (inch per hour)
LP-1	20 to 40	29.2	5.8*
LP-2	20 to 40	145.4	29.1*
LP-3	20 to 40	44.6	8.9*

* Includes Reduction Factor of 5

The results of the high flow percolation tests indicate very favorable infiltration rates at the specific locations and depths tested. Based on the requirements of LADPW (2021), infiltration is **feasible** at the locations and **depths** evaluated.

The results of testing in LP-2 show significantly higher infiltration rates than the other two test locations and represents an outlier that is not indicative of the overall site. It is recommended to utilize the lower infiltration rates as measured in LP-1 and LP-3 for design of proposed stormwater infiltration devices.

Maintenance Considerations

The infiltration facilities should be routinely monitored, especially before and during the rainy season, and corrective measures should be implemented as/when needed. Things to check for include proper upkeep, proper infiltration, absence of accumulated silt, and that de-silting filters/features are clean and functioning. Pre-treatment desilting features should be cleaned and maintained per manufacturers' recommendations. Even with measures to prevent silt from flowing into the infiltration facility, accumulated silt may need to be removed occasionally as part of maintenance.

We appreciate the opportunity to work with you on this project. If you have any questions regarding this report, please call us at your convenience at **866-LEIGHTON**, directly at the phone extension and/or e-mail address listed below.



Respectfully submitted,

LEIGHTON CONSULTING, INC.

Eric M. Holliday, PG, CEG 2774
Associate Engineering Geologist
Ext. 4252, eholliday@leightongroup.com

EMH/lr

Attachments: References
Figure 1 – *Exploration Location Map*
Appendix A – *Exploration Logs*
Appendix B – *Percolation Test Data*
Appendix C – *Geotechnical Laboratory Testing*

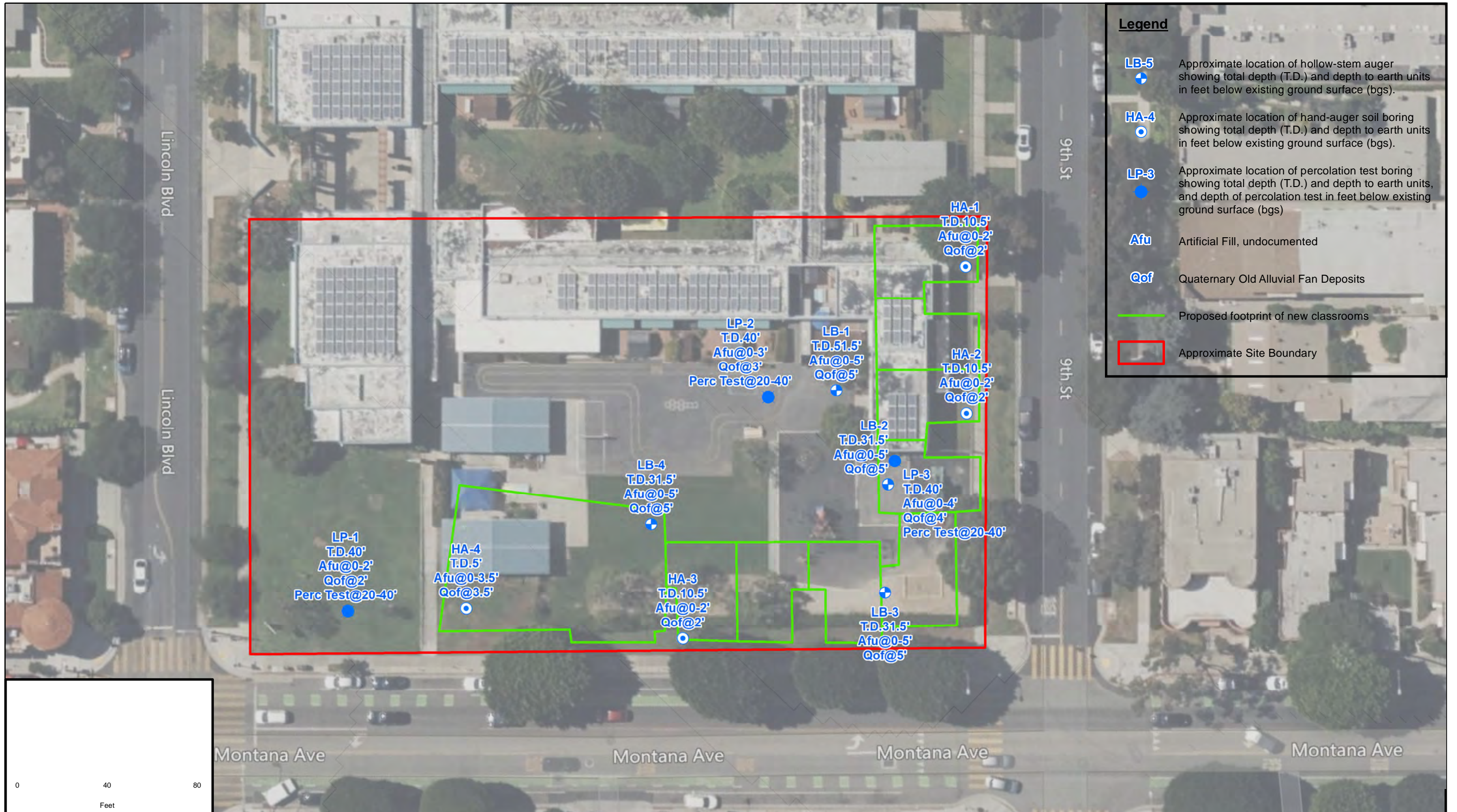
Distribution: (1) Addressee

REFERENCES

County of Los Angeles Department of Public Works (LADPW), 2021, *Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration*, dated June 30, 2021.

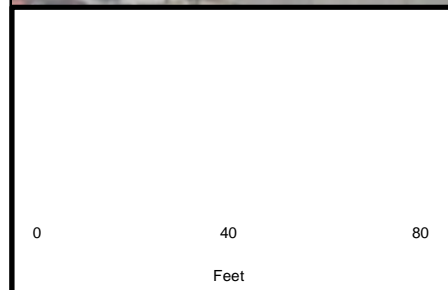
Leighton Consulting, Inc., 2023, *Geotechnical Exploration Report, New TK/K Classroom Building and Library, Roosevelt Elementary School, 801 Montana Avenue, Santa Monica, Los Angeles County, California*, Project No. 11428.048, dated November 29, 2023, revised December 14, 2023.

United States Geological Survey (USGS), 1991, Topographic Map, Topanga 7.5-Minute Quadrangle, dated 1991.



Legend

- + **LB-5** Approximate location of hollow-stem auger showing total depth (T.D.) and depth to earth units in feet below existing ground surface (bgs).
- o **HA-4** Approximate location of hand-auger soil boring showing total depth (T.D.) and depth to earth units in feet below existing ground surface (bgs).
- **LP-3** Approximate location of percolation test boring showing total depth (T.D.) and depth to earth units, and depth of percolation test in feet below existing ground surface (bgs)
- Afu Artificial Fill, undocumented
- Qof Quaternary Old Alluvial Fan Deposits
- Proposed footprint of new classrooms
- Approximate Site Boundary



Project: 11428.048	Eng/Geol: EMH
Scale: 1" = 40'	Date: January 2024
Reference: © 2024 Microsoft Corporation © 2023 Maxar ©CNES (2023) Distribution Airbus DS © 2023 TomTom	

EXPLORATION LOCATION MAP
 Roosevelt ES New TK-K Classroom Buildings and Library
 801 Montana Avenue
 Santa Monica, California

FIGURE 1

APPENDIX A
Exploration Logs

GEOTECHNICAL BORING LOG LP-1

Project No. 11428.048
Project Roosevelt TK-K Classroom
Drilling Co. Choice Drilling
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Figure 1 - Exploration Location Map

Date Drilled 1-3-24
Logged By ECB
Hole Diameter 8"
Ground Elevation 172'
Sampled By ECB

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S			Bulk Driven				This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
170	0			B-1				sCL	@Surface: Grass Lawn Artificial Fill, Undocumented (Afu): Sandy CLAY, dark brown, very moist (recent rain), fine to medium sand, low plasticity, rootlets, some organics, some gravel.	
								CL-ML	Quaternary Old Alluvial Fan Deposits (Qof): @2': Silty CLAY, reddish brown, moist, medium plasticity, subangular slate fragments, subrounded gravels, clay films around gravel grains.	
165	5			R-1	9 15 19			CL	@5': Lean CLAY, reddish brown, moist, very stiff, medium plasticity, oxidized laminae, FeO spotting, trace fine subrounded gravel.	
				R-2	8 15 18				@7.5': very stiff, trace carbonate specs.	
160	10			R-3	12 19 25			CLg	@10': Lean CLAY with Gravel, reddish brown, moist, hard, low to medium plasticity clay, approximately 15-20 % (field estimate) slate fragments and fine subrounded gravel, clay films around granular material.	
								GM	@13': Rig Chatter-abundant gravel-sized slate and siltstone fragments in spoils	
155	15			S-4	10 12 12			SM-SCg	@15': Clayey Silty SAND with Gravel, oxidized reddish brown fine to medium sand, medium dense, approximately 30-40% (field estimate) fractured slate and subangular gravels, some low plasticity clays, interbedded with 1-inch gravel-sized slate and siltstone layers.	
150	20			R-5	33 36 37			SCg	@20': Clayey SAND with Gravel, grayish brown, slightly moist, dense, nonplastic-low plasticity fines, fine subangular slate and siltstone gravels, 15% fines	
145	25			S-6	10 13 15			SMg	@25': Silty SAND with gravel, dark grayish brown, slightly moist, medium dense, approximately 30-40% (field estimate) gravel-sized slate and siltstone fragments, gravels decomposing with clay forming interstitial to fractures.	-200
30										

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- 200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL

- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE

- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH



GEOTECHNICAL BORING LOG LP-1

Project No. 11428.048
Project Roosevelt TK-K Classroom
Drilling Co. Choice Drilling
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Figure 1 - Exploration Location Map

Date Drilled 1-3-24
Logged By ECB
Hole Diameter 8"
Ground Elevation 172'
Sampled By ECB

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests				
This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.														
30				R-7	27 48 36			GP-GC	@30': Poorly-graded GRAVEL with Clay, approximately 80% (field estimate) slate fragments and granitic gravels in a matrix of reddish brown clay, moist, very dense.					
140				S-8	2 3 6			CH	@35': Lean CLAY with Sand, reddish brown, very moist, stiff, medium to high plasticity, trace coarse sand, pinhole pores, 83% fines	-200				
35				R-9	5 9 11				@38': Lean CLAY, reddish brown, very moist to wet, stiff, high absorbcency clay zone, approximately 10% (field estimate) gravel.					
135									@38': Lean CLAY, reddish brown, very moist to wet, stiff, high absorbcency clay zone, approximately 10% (field estimate) gravel.					
40									Total Depth 40 feet bgs. Total Depth 40 feet bgs. No groundwater encountered during drilling. Spoils containerized in drums for offsite disposal. Installed 2-inch diameter PVC percolation well Blank 0-20 feet. Screened pipe (0.020-inch) 20-40 feet. No 3 Monterey SAND in annulus from 19-40 feet (17 bags total). Percolation testing performed on 1-4-2024. Upon completion, casing removed and boring backfilled with cement grout mix to surface on 1-5-2024.					
130														
45														
125														
50														
120														
55														
115														
60														
<table style="width: 100%; font-size: x-small;"> <tr> <td style="width: 33%;"> SAMPLE TYPES: B BULK SAMPLE C CORE SAMPLE G GRAB SAMPLE R RING SAMPLE S SPLIT SPOON SAMPLE T TUBE SAMPLE </td> <td style="width: 33%;"> TYPE OF TESTS: -200 % FINES PASSING AL ATTERBERG LIMITS CN CONSOLIDATION CO COLLAPSE CR CORROSION CU UNDRAINED TRIAXIAL </td> <td style="width: 33%;"> DS DIRECT SHEAR EI EXPANSION INDEX H HYDROMETER MD MAXIMUM DENSITY PP POCKET PENETROMETER RV R VALUE </td> <td style="width: 33%;"> SA SIEVE ANALYSIS SE SAND EQUIVALENT SG SPECIFIC GRAVITY UC UNCONFINED COMPRESSIVE STRENGTH </td> </tr> </table>											SAMPLE TYPES: B BULK SAMPLE C CORE SAMPLE G GRAB SAMPLE R RING SAMPLE S SPLIT SPOON SAMPLE T TUBE SAMPLE	TYPE OF TESTS: -200 % FINES PASSING AL ATTERBERG LIMITS CN CONSOLIDATION CO COLLAPSE CR CORROSION CU UNDRAINED TRIAXIAL	DS DIRECT SHEAR EI EXPANSION INDEX H HYDROMETER MD MAXIMUM DENSITY PP POCKET PENETROMETER RV R VALUE	SA SIEVE ANALYSIS SE SAND EQUIVALENT SG SPECIFIC GRAVITY UC UNCONFINED COMPRESSIVE STRENGTH
SAMPLE TYPES: B BULK SAMPLE C CORE SAMPLE G GRAB SAMPLE R RING SAMPLE S SPLIT SPOON SAMPLE T TUBE SAMPLE	TYPE OF TESTS: -200 % FINES PASSING AL ATTERBERG LIMITS CN CONSOLIDATION CO COLLAPSE CR CORROSION CU UNDRAINED TRIAXIAL	DS DIRECT SHEAR EI EXPANSION INDEX H HYDROMETER MD MAXIMUM DENSITY PP POCKET PENETROMETER RV R VALUE	SA SIEVE ANALYSIS SE SAND EQUIVALENT SG SPECIFIC GRAVITY UC UNCONFINED COMPRESSIVE STRENGTH											



GEOTECHNICAL BORING LOG LP-2

Project No. 11428.048
Project Roosevelt TK-K Classroom
Drilling Co. Choice Drilling
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Figure 1 - Exploration Location Map

Date Drilled 1-3-24
Logged By ECB
Hole Diameter 8"
Ground Elevation 176'
Sampled By ECB

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
175	0	N S						sCL	This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual. @Surface: 4-inch Asphalt over subgrade Artificial Fill, Undocumented (Afu) @0.3': Sandy CLAY, dark brown, moist, siltstone fragments.	
170	5							SMg	Quaternary Old Alluvial Fan Deposits (Qof) @3': Silty SAND with Gravel, reddish brown, moist, fine to medium sand, slate and siltstone gravels, some clay, low plasticity.	
165	10							CLg	@10': CLAY with Gravel, dark brown, moist, low to medium plasticity, some subangular to fractured gravel.	
160	15							SMg	@15': Silty SAND with Gravel, brown, mostly fine to coarse sand, some fines, gravel-sized slate and siltstone siltstone fragments.	
155	20			S-1	13 27 39				@20': Silty SAND with Gravel, grayish brown, slightly moist, very dense, primarily fine to coarse sand, some nonplastic fines, approximately 30-40% (field estimate) gravel-sized slate fragments (1-inch max dimension), 17% fines.	-200
150	25			S-2	23 18 19				@25': Silty SAND with Gravel, grayish brown, slightly moist, dense, fractured slate and siltstone in a matrix of silty sand, fine to coarse sand, fine subangular gravel.	
30	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- 200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL

- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE

- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH



GEOTECHNICAL BORING LOG LP-2

Project No. 11428.048
Project Roosevelt TK-K Classroom
Drilling Co. Choice Drilling
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Figure 1 - Exploration Location Map

Date Drilled 1-3-24
Logged By ECB
Hole Diameter 8"
Ground Elevation 176'
Sampled By ECB

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
145	30			S-3	16 23 24			GM	@30': dense.	
140	35			S-4	8 19 31			SCg	@33': Auger grinding on Silty GRAVEL layer, abundant slate and siltstone gravels in spoils. @35': Decomposing slate fragments and gravel in a matrix of Clayey SAND, dark brown, moist, dense to very dense, primarily fine to medium sand, low plasticity clay, fine subrounded gravel and fractured slate (1-inch max dimension), some oxidation.	
40	40			S-5	13 16 16			SMg	@38': Silty SAND with Gravel, dark brown to gray, slightly moist, dense, fine to coarse sand, fine subangular to fractured gravel, 14% fines	-200
135	45								Total Depth 40 feet bgs. No groundwater encountered during drilling. Spoils containerized in drums for offsite disposal. Installed 2-inch diameter PVC percolation well Blank 0-20 feet. Screened pipe (0.020-inch) 20-40 feet. No 3 Monterey SAND in annulus from 19.5-40 feet (15 bags total). Percolation testing performed on 1-4-2024. Upon completion, casing removed and boring backfilled with cement grout mix to surface on 1-5-2024.	
125	50									
120	55									
60										
SAMPLE TYPES:		TYPE OF TESTS:		DS DIRECT SHEAR		SA SIEVE ANALYSIS				
B BULK SAMPLE	-200 % FINES PASSING	EI EXPANSION INDEX	SE SAND EQUIVALENT							
C CORE SAMPLE	AL ATTERBERG LIMITS	H HYDROMETER	SG SPECIFIC GRAVITY							
G GRAB SAMPLE	CN CONSOLIDATION	MD MAXIMUM DENSITY	UC UNCONFINED COMPRESSIVE STRENGTH							
R RING SAMPLE	CO COLLAPSE	PP POCKET PENETROMETER								
S SPLIT SPOON SAMPLE	CR CORROSION	RV R VALUE								
T TUBE SAMPLE	CU UNDRAINED TRIAXIAL									

GEOTECHNICAL BORING LOG LP-3

Project No.	11428.048	Date Drilled	1-3-24
Project	Roosevelt TK-K Classroom	Logged By	ECB
Drilling Co.	Choice Drilling	Hole Diameter	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	Ground Elevation	176'
Location	See Figure 1 - Exploration Location Map	Sampled By	ECB

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
175	0	[Hatched]						CLs	@Surface: 4-inch Asphalt over subgrade Artificial Fill, Undocumented (Afu)	
		[Hatched]						SCg	@0.3': CLAY with Sand, dark brown, moist, fine to coarse sand, slate fragments. @2': Clayey SAND with Gravel, reddish brown, moist, some gravel and siltstone fragments.	
170	5	[Hatched]						SCg	Quaternary Old Alluvial Fan Deposits (Qof) @4': Clayey SAND with Gravel, moderate brown, moist, fine to medium sand, low plasticity clay, secondary clay forming interstitial to gravel fractures.	
165	10	[Hatched]						sCLg	@10': Sandy CLAY with Gravel, grayish brown, low plasticity clay, some fine to medium sand, slate and siltstone fragments.	
160	15	[Hatched]							@15': decrease gravel percentage	
		[Hatched]						GP	@18': Auger grinding on GRAVEL layer.	
155	20	[Hatched]		S-1	3 3 9			CL-ML	@20': Sandy CLAY, olive brown, very moist, stiff, low plasticity, 55% fines	-200
		[Hatched]						SWg	@21.5': Well-graded SAND with Gravel, brown, approximately 20% (field estimate) gravel-sized slate fragments.	
150	25	[Hatched]						GM	@24': Auger grinding on coarse GRAVEL layer, abundant siltstone fragments and some silt in spoils.	
		[Hatched]						SMg	@27': End of difficult drilling-out of GRAVEL layer.	
30	30	[Hatched]								

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- 200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL

- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE

- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH



GEOTECHNICAL BORING LOG LP-3

Project No. 11428.048
Project Roosevelt TK-K Classroom
Drilling Co. Choice Drilling
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Figure 1 - Exploration Location Map

Date Drilled 1-3-24
Logged By ECB
Hole Diameter 8"
Ground Elevation 176'
Sampled By ECB

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
145	30	N S		S-2	5 7 7			CL SCg	@30': Silty SAND with Gravel, brown, moist, medium dense, primarily fine to coarse sand, some nonplastic fines, some subangular gravel and slate fragments. @31': CLAY, reddish brown, moist, low plasticity, some sand. @32': Clayey SAND with Gravel, grayish brown, slightly moist, fine to coarse gravels - logged from spoils.	
140	35	N S						SPg	@35': Auger grinding on coarse material - spoils contain fine sand with slate fragments.	
40	40	N S		S-3	5 7 11			CLg	@38': CLAY with Gravel, olive brown, moist, very stiff, primarily low plasticity clay, some fragments of slate and decomposing gravel, fractures of gravel contain oxidized clay.	
135									Total Depth 40 feet bgs. No groundwater encountered during drilling. Spoils containerized in drums for offsite disposal. Installed 2-inch diameter PVC percolation well Blank 0-20 feet. Screened pipe (0.020-inch) 20-40 feet. No 3 Monterey SAND in annulus from 19-40 feet (17 bags total). Percolation testing performed on 1-4-2024. Upon completion, casing removed and boring backfilled with cement grout mix to surface on 1-5-2024.	
130	45									
125	50									
120	55									
60	60									
SAMPLE TYPES:		TYPE OF TESTS:								
B	BULK SAMPLE	-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS			
C	CORE SAMPLE	AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT			
G	GRAB SAMPLE	CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY			
R	RING SAMPLE	CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE			
S	SPLIT SPOON SAMPLE	CR	CORROSION	PP	POCKET PENETROMETER		STRENGTH			
T	TUBE SAMPLE	CU	UNDRAINED TRIAXIAL	RV	R VALUE					



APPENDIX B
Percolation Data

Boring Percolation Test Data Sheet

Project Number:	11428.048	Test Hole Number:	LP-1
Project Name:	Roosevelt ES	Date Excavated:	1/3/2023
Earth Description:	Alluvium	Date Tested:	1/4/2023
Liquid Description:	Tap water	Depth of boring (ft):	40
Tested By:	KMD	Radius of boring, r (in):	4
Time Interval Standard		Diameter of casing (in):	2
Start Time for Pre-Soak:	1/4/2023 7AM	Length of slotted of casing (ft):	20
Start Time for Standard:	1/4/2023 820AM	Depth to Initial Water Depth (ft):	26
Standard Time Interval		Porosity of Annulus Material, n :	0.35
Between Readings, mins:	10min	Bentonite Plug at Bottom:	No

Field Percolation Data

Reading	Time	Time Interval, Δt (minutes)	Depth to Water (feet bgs)	Water Height, H (inches)	Cumulative Water Volume Delivered (gallons)
1	8:40	-	30.08	-	0.0
2	8:50	10	30.04	119.5	64.1
3	9:00	10	30.05	119.4	128.2
4	9:10	10	30.05	119.4	192.3
5	9:20	10	30.06	119.3	256.4
6	9:30	10	30.08	119.0	320.5
7	9:40	10	30.08	119.0	384.5
8	9:50	10	30.07	119.2	448.6
9	10:00	10	30.07	119.2	512.7
10	10:10	10	30.07	119.2	576.8
11	10:20	10	30.06	119.3	640.9
12	10:30	10	30.07	119.2	705.0
13	10:40	10	30.07	119.2	769.1
14	10:50	10	30.08	119.0	833.2
15	11:00	10	30.07	119.2	897.3
16	11:10	10	30.06	119.3	961.4
17	11:20	10	30.08	119.0	1025.4
18	11:30	10	30.07	119.2	1089.5
19	11:40	10	30.08	119.0	1153.6

Total Volume of Water Delivered (gallons)	1153.6
Total Volume of Water Delivered (cubic inches)	266486.22
Average Water Height (inches)	119.2
Average Percolation Surface Area (cubic Inches)	3045.9
Duration of Test (minutes)	180
Duration of Test (hours)	3.00

Measured Infiltration Rate = (Total Volume)/(Test Duration)/(Surface Area)

Measured Infiltration Rate (inches per hour) = 29.2

Boring Percolation Test Data Sheet

Project Number:	11428.048	Test Hole Number:	LP-2
Project Name:	Roosevelt ES	Date Excavated:	1/3/2023
Earth Description:	Alluvium	Date Tested:	1/4/2023
Liquid Description:	Tap water	Depth of boring (ft):	40
Tested By:	ECB	Radius of boring, r (in):	4
Time Interval Standard		Diameter of casing (in):	2
Start Time for Pre-Soak:	1/4/2023 7AM	Length of slotted of casing (ft):	20
Start Time for Standard:	1/4/2023 820AM	Depth to Initial Water Depth (ft):	26
Standard Time Interval		Porosity of Annulus Material, n :	0.35
Between Readings, mins:	10min	Bentonite Plug at Bottom:	No

Field Percolation Data

Reading	Time	Time Interval, Δt (minutes)	Depth to Water (feet bgs)	Water Height, H (inches)	Cumulative Water Volume Delivered (gallons)
1	8:20	-	-	-	0.0
2	8:30	10	37.17	34.0	95.7
3	8:40	10	37.24	33.1	191.4
4	8:50	10	37.21	33.5	287.1
5	9:00	10	37.19	33.7	382.8
6	9:10	10	37.16	34.1	478.5
7	9:20	10	37.16	34.1	574.2
8	9:30	10	37.16	34.1	669.9
9	9:40	10	37.17	34.0	765.6
10	9:50	10	37.17	34.0	861.2
11	10:00	10	37.17	34.0	956.9
12	10:10	10	37.17	34.0	1052.6
13	10:20	10	37.17	34.0	1148.3
14	10:30	10	37.14	34.3	1244.0
15	10:40	10	37.14	34.3	1339.7
16	10:50	10	37.14	34.3	1435.4
17	11:00	10	37.14	34.3	1531.0
18	11:10	10	37.00	36.0	1626.7
19	11:20	10	37.00	36.0	1722.4
20	11:30	10	37.00	36.0	1818.1

Total Volume of Water Delivered (gallons) 1818.1
 Total Volume of Water Delivered (cubic inches) 419983.41
 Average Water Height (inches) 34.3
 Average Percolation Surface Area (cubic Inches) 912.2
 Duration of Test (minutes) 190
 Duration of Test (hours) 3.17

Measured Infiltration Rate = (Total Volume)/(Test Duration)/(Surface Area)

Measured Infiltration Rate (inches per hour) = 145.4

Boring Percolation Test Data Sheet

Project Number:	11428.048	Test Hole Number:	LP-3
Project Name:	Roosevelt ES	Date Excavated:	1/3/2023
Earth Description:	Alluvium	Date Tested:	1/4/2023
Liquid Description:	Tap water	Depth of boring (ft):	40
Tested By:	ECB	Radius of boring, r (in):	4
Time Interval Standard		Diameter of casing (in):	2
Start Time for Pre-Soak:	1/4/2023 720AM	Length of slotted of casing (ft):	20
Start Time for Standard:	1/4/2023 825AM	Depth to Initial Water Depth (ft):	26
Standard Time Interval		Porosity of Annulus Material, n :	0.35
Between Readings, mins:	10min	Bentonite Plug at Bottom:	No

Field Percolation Data


Reading	Time	Time Interval, Δt (minutes)	Depth to Water (feet bgs)	Water Height, H (inches)	Cumulative Water Volume Delivered (gallons)
1	8:25	-	-	-	0.0
2	8:35	10	32.62	88.6	80.8
3	8:45	10	32.81	86.3	161.6
4	8:55	10	32.13	94.4	242.4
5	9:05	10	32.07	95.2	323.2
6	9:15	10	31.96	96.5	404.0
7	9:25	10	31.92	97.0	484.8
8	9:35	10	31.90	97.2	565.6
9	9:45	10	31.72	99.4	646.4
10	9:55	10	31.85	97.8	727.2
11	10:05	10	31.59	100.9	808.0
12	10:15	10	31.61	100.7	888.8
13	10:25	10	31.61	100.7	969.6
14	10:35	10	31.61	100.7	1050.4
15	10:45	10	31.61	100.7	1131.2
16	10:55	10	31.62	100.6	1212.0
17	11:05	10	31.62	100.6	1292.8
18	11:15	10	31.60	100.8	1373.6
19	11:25	10	31.60	100.8	1454.4
20	11:35	10	31.60	100.8	1535.2

Total Volume of Water Delivered (gallons)	1535.2
Total Volume of Water Delivered (cubic inches)	354631.2
Average Water Height (inches)	97.9
Average Percolation Surface Area (cubic Inches)	2509.8
Duration of Test (minutes)	190
Duration of Test (hours)	3.17

Measured Infiltration Rate = (Total Volume)/(Test Duration)/(Surface Area)

Measured Infiltration Rate (inches per hour) = 44.6

APPENDIX C
Geotechnical Laboratory Testing

Boring No.	LP-1	LP-1	LP-2	LP-2	LP-3	LP-3		
Sample No.	S-6	S-8	S-1	S-5	S-1	S-2		
Depth (ft.)	25.0	35.0	20.0	38	20	30		
Sample Type	SPT	SPT	SPT	SPT	SPT	SPT		
Soil Identification	Dark brown silty sand with gravel (SM)g	Dark olive brown lean clay with sand (CL)s	Dark brown silty sand with gravel (SM)g	Dark brown silty sand with gravel (SM)g	Dark brown sandy lean clay s(CL)	Dark brown clayey sand (SC)		
Moisture Correction								
Wet Weight of Soil + Container (g)	0.00	0.00	0.00	0.00	0.00	0.00		
Dry Weight of Soil + Container (g)	0.00	0.00	0.00	0.00	0.00	0.00		
Weight of Container (g)	1.00	1.00	1.00	1.00	1.00	1.00		
Moisture Content (%)	0.00	0.00	0.00	0.00	0.00	0.00		
Sample Dry Weight Determination								
Weight of Sample + Container (g)	706.00	626.30	803.00	692.30	527.30	656.00		
Weight of Container (g)	108.40	107.40	110.70	110.40	107.60	111.00		
Weight of Dry Sample (g)	597.60	518.90	692.30	581.90	419.70	545.00		
Container No.:								
After Wash								
Method (A or B)	A	A	A	A	A	A		
Dry Weight of Sample + Cont. (g)	614.10	193.70	684.20	608.80	298.20	383.90		
Weight of Container (g)	108.40	107.40	110.70	110.40	107.60	111.00		
Dry Weight of Sample (g)	505.70	86.30	573.50	498.40	190.60	272.90		
% Passing No. 200 Sieve	15.4	83.4	17.2	14.3	54.6	49.9		
% Retained No. 200 Sieve	84.6	16.6	82.8	85.7	45.4	50.1		
	PERCENT PASSING No. 200 SIEVE ASTM D 1140				Project Name: <u>Roosevelt TK-K Classroom</u>			
					Project No.: <u>11428.048</u>			
					Tested By: <u>K. Jumig</u>		Date: <u>01/18/24</u>	